11 31 505 Adjusting the timing of the camshaft (s) (for work no. 11 31 005/508)

RISK OF DAMAGE

Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

PRELIMINARY WORK

1 – Checking camshaft timing

- See additional information.

2 – Removing the diesel particulate filter

- See additional information.

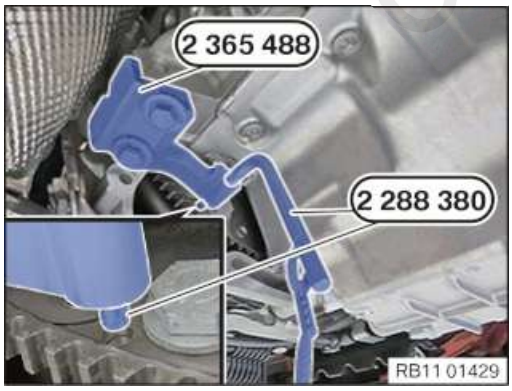
MAIN WORK

3 – Adjusting the timing of the camshafts



- Crank the engine with the special tool 0 493 380 (11 6 480) on the 1st cylinder to the TDC firing position.

  Do **not** crank the engine in reverse.



- Position special tool 2 365 488 and tighten the screws.
- Block the crankshaft with the special tool 2 288 380 on the 1st cylinder in the TDC firing position.

▸ **Remove chain tensioner piston**

carsdiag.com

RISK OF DAMAGE

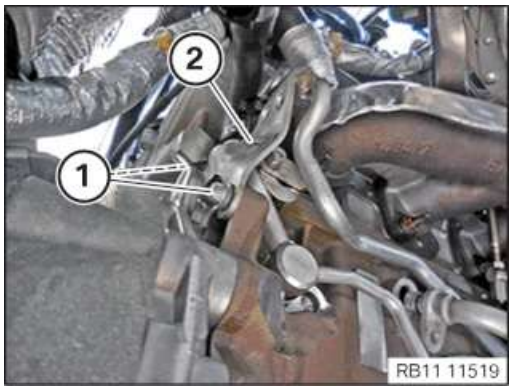
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

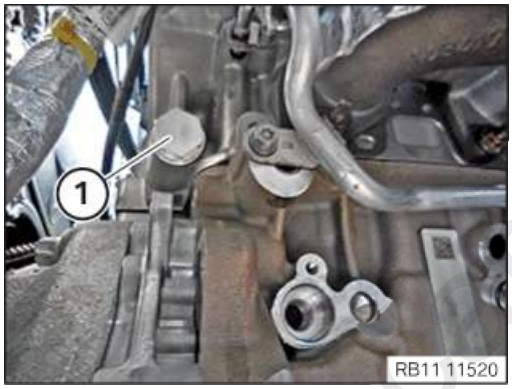
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Loosen screws (1).
- Guide out and remove holder (2).



- Loosen the chain tensioner piston (1).
- Catch and dispose of emerging engine oil.



- Feed out and remove the sealing ring (1).

▸ **Remove exhaust camshaft.**

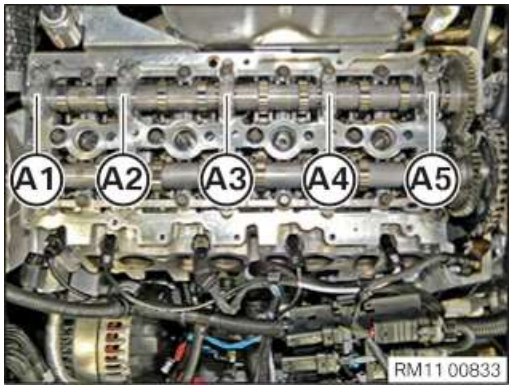
carldiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

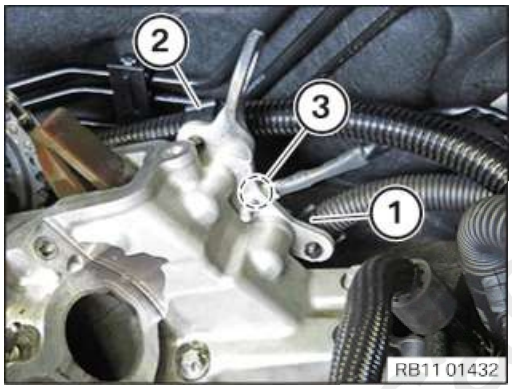


TECHNICAL INFORMATION

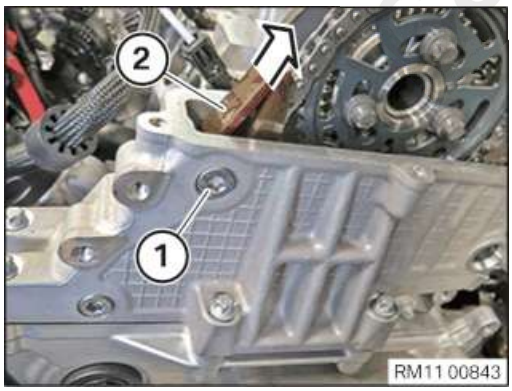
The camshaft is tensioned by the valve springs. Tighten or loosen each screw on the camshaft bearing caps one at a time in the specified sequence and by half a turn only. Repeat procedure.

- Release all the screws of the exhaust camshaft bearing cap (A1) to (A5) from the outside to the inside in half turns.
- Remove exhaust camshaft in upward direction.
- Place all components on special tool 0 495 105 (11 4 480) in a tidy and orderly fashion.

▸ **Remove the timing chain guide rail**



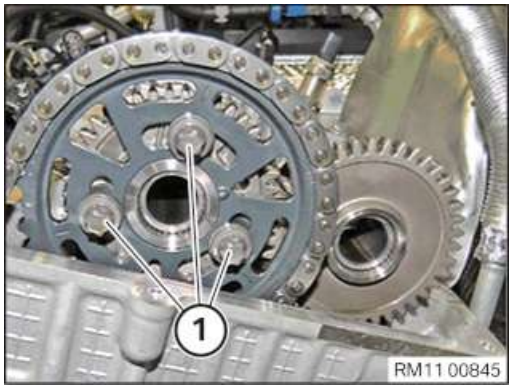
- Loosen the vehicle wiring harness (1) from the bracket.
- Release the positive battery cable (2) from the holder .
- Loosen the screw (3) and remove the grounding cable.



- Remove the bearing journal (1).
- Remove the guide rail (2) in the direction of the arrow.

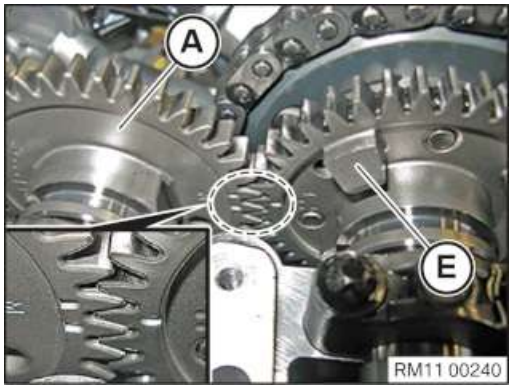
▸ **Removing the camshaft sprocket on the intake camshaft**

cardiagn.com

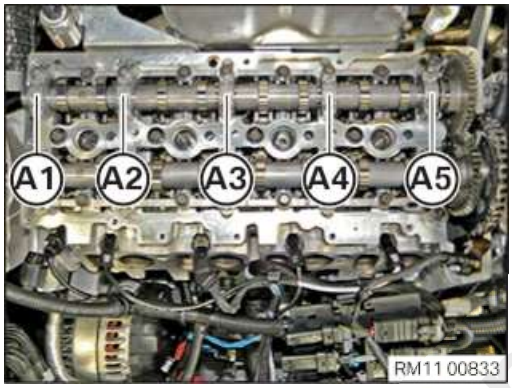


- Loosen screws (1).
- Secure the drive chain against falling.
- Remove the camshaft sprocket on the intake camshaft.

▸ Positioning the camshaft



- Insert the exhaust camshaft (A) such that the marks on the camshafts (A) and (E) correspond in the marked area.
- Position the camshafts (A) and (E) correspondingly.



- Tighten all the exhaust camshaft bearing cap (A1) to (A) from the inside to the outside in half revolutions.

Intake and exhaust camshaft in camshaft support

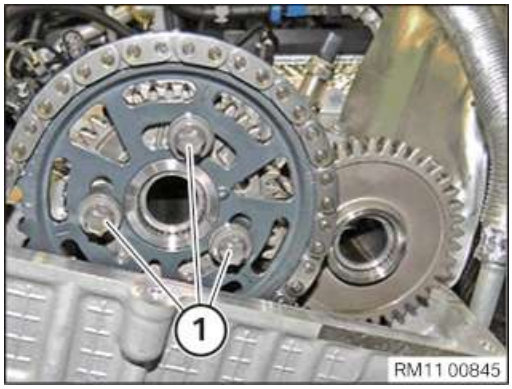
M6x31	Tightening torque	10 Nm



- Place special tool 0 496 112 (11 8 760) on exhaust camshaft.

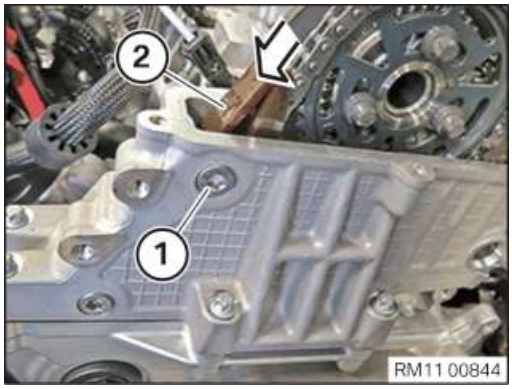
  Special tool 0 496 112 (11 8 760) must lie flush on cylinder head.

▸ Installing the camshaft sprocket on the intake camshaft



- Position the drive chain on the camshaft sprocket so that the thread of the screw connections are located in the centre of the elongated holes.
- Position the camshaft sprocket on the intake camshaft.
- Merely apply the screws (1) hand-tight so that the camshaft sprocket can still be moved in relation to the intake camshaft.

▸ Installing the guide rail of the timing chain

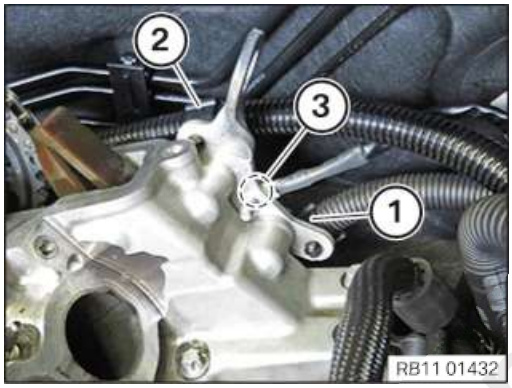


- Position the guide rail (2) in the direction of the arrow.
- Make sure the guide rail (2) is correctly installed at the bottom bearing journal.
- Renew bearing journal (1).

  Parts: Bearing journal
- Tighten the bearing journals (1).

Bearing journal to cylinder head

M16x1.5	Replace bearing journal.	Tightening torque	20 Nm



- Position the grounding cable and tighten the screw (3).

Standard screw connection M8

M8		Tightening torque	19 Nm

- Clip in the positive battery cable (2) into the bracket.
- Clip in the vehicle wiring harness (1) into the bracket.

▸ Installing the chain tensioner piston



TECHNICAL INFORMATION

The oil chamber must be drained for reuse of the chain tensioner.

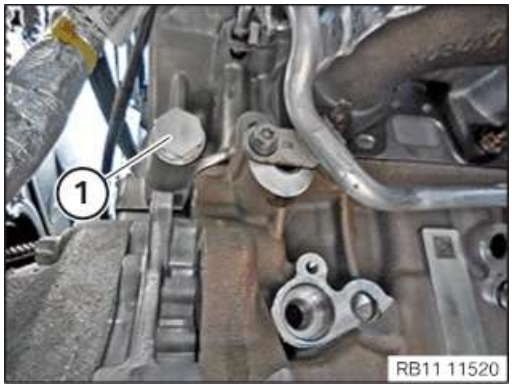
- Place the chain tensioner on a level support pad and slowly compress in the direction of arrow.
- Repeat process twice.

cardiagn.com



- Renew sealing ring (1).

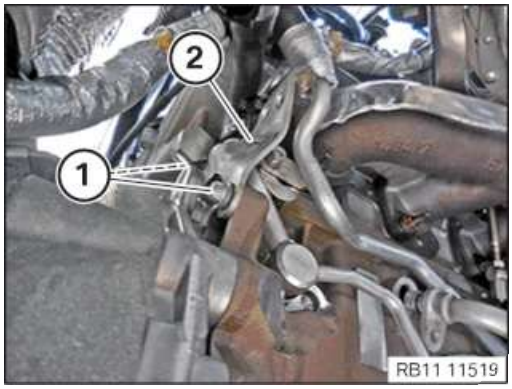
  Parts: Sealing ring
- Insert and install the sealing ring (1).



- Insert and install the chain tensioner piston (1).
- Tighten the chain tensioner piston (1).

Chain tensioner piston to cylinder head

22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

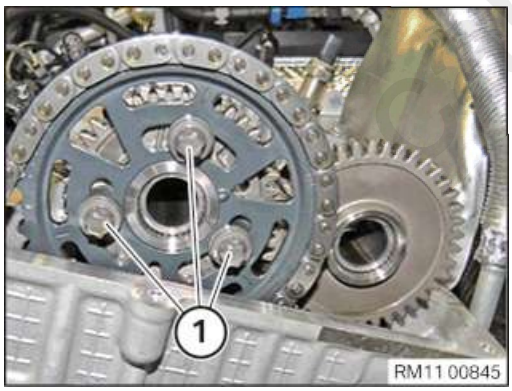


- Insert and install the holder (2).
- Tighten the screws (1).

Holder to crankcase

M8X16		Tightening torque	19 Nm

▸ **Tightening the camshaft sprocket on the intake camshaft**



- Tighten the screws (1).

Camshaft sprocket to camshaft

M7x17.			17 Nm

POSTPROCESSES

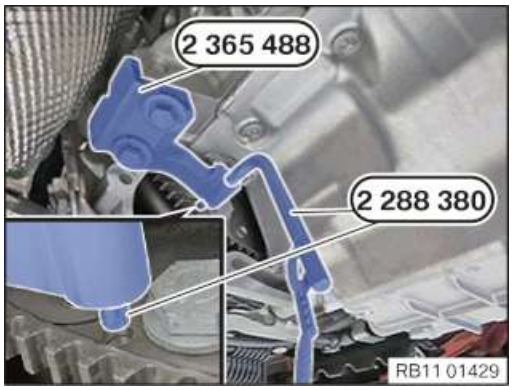
4 – Removing the special tool for fixing the exhaust camshaft

cardiagn.com



- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

5 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

6 – Checking camshaft timing



RISK OF DAMAGE

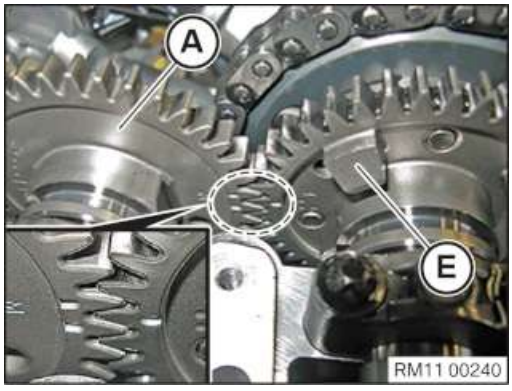
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

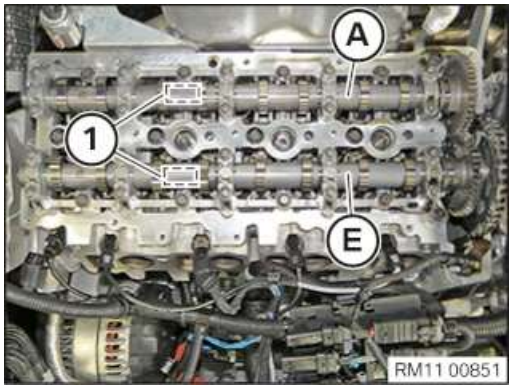
- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

  Do **not** crank the engine in reverse.

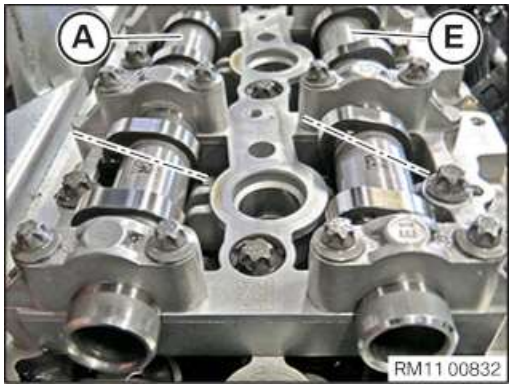


- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.

carlagn.com



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.

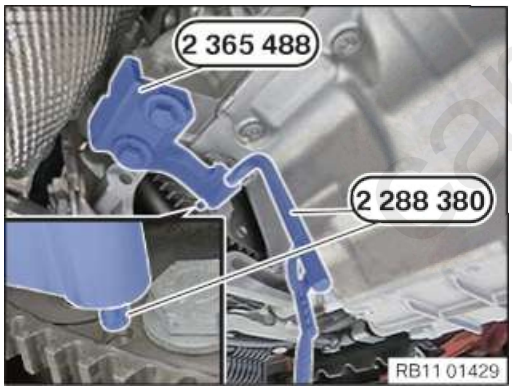


- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.

For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380 .

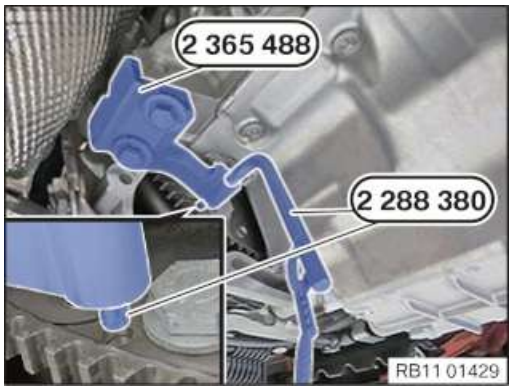
7 – Removing the special tool for fixing the exhaust camshaft

carjiagn.com



- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

8 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

9 – Installing the diesel particulate filter

- See additional information.

Additional Information

Overview of Tightening Torques

Intake and exhaust camshaft in camshaft support			Used in step 3
M6x31		Tightening torque	10 Nm

Bearing journal to cylinder head			Used in step 3
M16x1.5	Replace bearing journal.	Tightening torque	20 Nm

Standard screw connection M8			Used in step 3
M8		Tightening torque	19 Nm

Chain tensioner piston to cylinder head			Used in step 3
22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

Holder to crankcase			Used in step 3
M8X16		Tightening torque	19 Nm

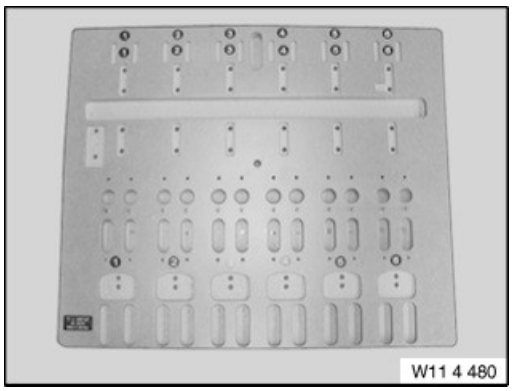
Camshaft sprocket to camshaft			Used in step 3
M7x17.			17 Nm

Special tool 2 365 488 to engine			Used in step 6
M8x60		Tightening torque	19 Nm

Overview of Special Tools

cardiagn.com

0 495 105 (11 4 480) oddments tray



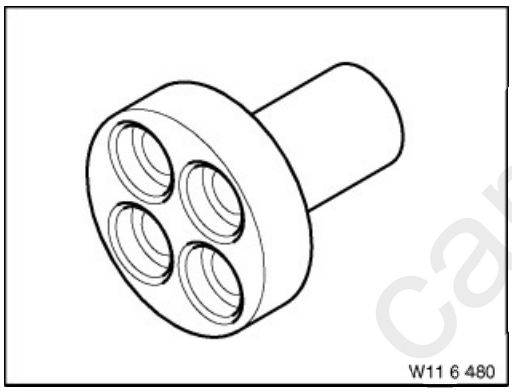
Common Used in step 3

Usage	(Boards (2 pieces)) For setting down the individual components of the cylinder head.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 17 04 (130)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 495 106 (11 4 481)		**oddments tray** (Board, intake side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	
2	0 495 107 (11 4 482)		**oddments tray** (Board, exhaust side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	

0 493 380 (11 6 480) Connector



Common Used in step 36

Usage	For turning over engine at crankshaft hub (vibration absorber).
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	01 11 98 (338)

2 365 488 Adapter



Common Used in step 3568

Usage	For disconnecting the crankshaft at the top dead centre. (longitudinal installation with automatic transmission only).
Included in the tool or work	
Storage location	C56
Replaced by	
In connection with	
SI-Number	01 46 14 (191)

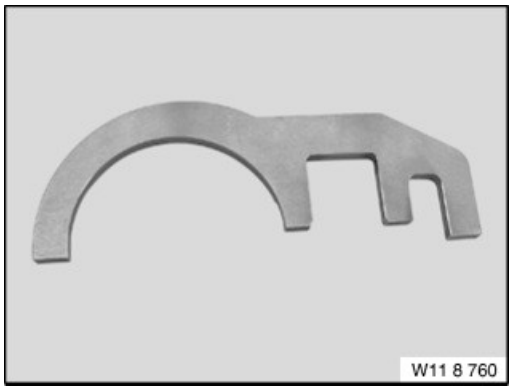
cardiagn.com

2 288 380 Locating stud



Common	Used in step 3568
Usage	For disconnecting the crankshaft at the top dead centre. Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).
Included in the tool or work	
Storage location	A56
Replaced by	
In connection with	
SI-Number	01 04 14 (071)

0 496 112 (11 8 760) Gauge



Common	Used in step 3467
Usage	For securing camshaft at TDC.
Included in the tool or work	
Storage location	B24
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

Links

Repair instructions	Used in step
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1

cardiagn.com

11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Checking camshaft timing	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
11 31 005 Check the timing of the camshaft(s)	1
18 31 080 Removing and installing/replacing diesel particulate filter	29
18 31 080 Removing and installing/replacing diesel particulate filter	29
18 31 080 Removing and installing/replacing diesel particulate filter	29
18 31 080 Removing and installing/replacing diesel particulate filter	29
18 31 080 Removing and installing/replacing diesel particulate filter	29
18 31 080 Removing and installing/replacing diesel particulate filter	29
18 31 080 Removing and installing/replacing diesel particulate filter	29
18 31 080 Removing and installing/replacing diesel particulate filter	29
18 31 080 Removing and installing/replacing diesel particulate filter	29
18 31 080 Removing and installing/replacing diesel particulate filter	29
18 31 080 Removing and installing/replacing diesel particulate filter	29
18 31 080 Removing and installing/replacing diesel particulate filter	29
18 31 080 Removing and installing/replacing diesel particulate filter	29
18 31 080 Removing and installing/replacing diesel particulate filter	29

cardiagn.com

11 31 005 Check the timing of the camshaft (s)

PRELIMINARY WORK

1 – Bring front compartment lid in the service position

Prerequisite

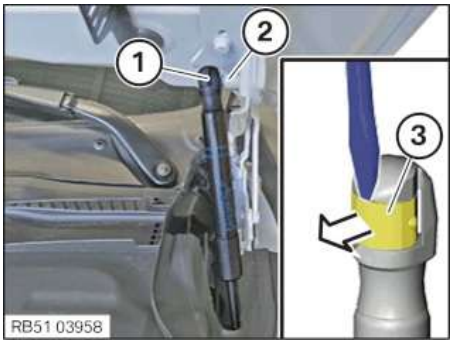
Engine compartment lid is open.

CAUTION

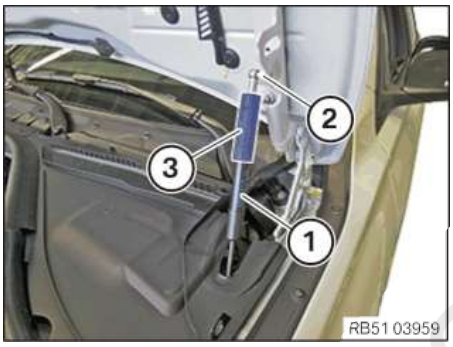
Shutting bonnet or tailgate.

Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.



- Lift clamp (3) slightly using a screwdriver, in the direction of the arrow.
- Lift off ball socket (1) from ball pin (2).
- Repeat the operation on the other side of vehicle.

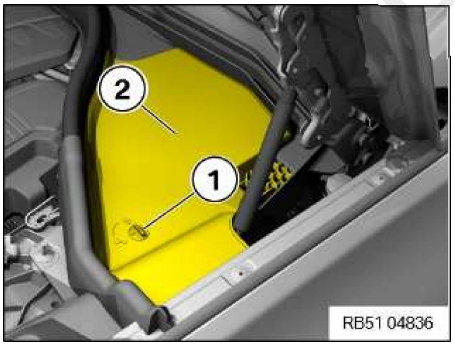


TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

- Remove the bonnet support and open the bonnet further.
- Pull special tool or or (3) over gas pressure spring (1).
- Place special tool on the ball pin (2) and engage using force.
- Repeat the operation on the other side of vehicle.

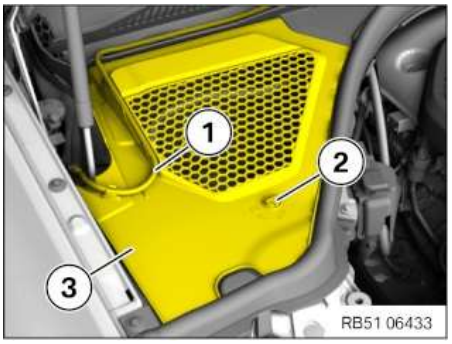
2 – Remove the cover of the engine compartment at the rear left



- Loosen the lock (1).
- Remove the cover (2) of the rear left engine compartment.

3 – Remove the cover of the rear right engine compartment

cardiagn.com



- Release washer fluid hose (1) from the guides.
- Loosen the lock (2).
- Remove the cover (3) of the rear right engine compartment.

4 – Deactivating the 48 V electrical system

Prerequisite

Ignition is switched off.

WARNING

Deactivation of the 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Make sure that **no battery charger** is connected to the jump start terminal point in the engine compartment.
- For vehicles with additional electrical systems (48 V electrical system, high-voltage vehicle electrical system), it is mandatory to deactivate them **before** disconnecting the vehicle battery.

WARNING

Deactivation of the 48 V electrical system.

Risk of short circuits! Risk of fire!

- Make sure that **no charger** is connected to the jump start support point in the engine compartment.

RISK OF DAMAGE

Damage to 48-V battery

If a 48-V battery that is disconnected from the electrical system is activated, the battery electronics will be damaged.

- Only carry out activation of the 48V electrical system with a completely connected 48-V battery.

TECHNICAL INFORMATION

Follow notes for 48-V battery. See further information 6120 ... Notes on 48-V battery.



- Deactivate the 48V electrical system by opening the bonnet.

  The deactivation takes place automatically.

Check

cardiagn.com



TECHNICAL INFORMATION

Zero voltage (48V electrical system is switched off) is displayed only in PAD mode.

- Press the START-STOP button quickly 3 times without stepping on the brake pedal to establish the PAD mode.
- Check isolation from the supply in the instrument cluster in PAD mode.

desired state

- The Check Control message "48V electrical system switched off." (1) is displayed.

Result

» **The absence of voltage** cannot be determined by means of the Check Control message "48V electrical system switched off:" (1). Work is not permitted to be started.

Measure

- Carry out the service function "48 V electrical system deactivation".
  - Vehicle management > Service functions > Voltage supply > Deactivate 48 V electrical system

Only when the Check Control message “48 V electrical system switched off.” (1) is displayed in the instrument cluster is it permitted to disconnect the 12 V battery.

If the absence of voltage is not indicated clearly, contact Technical Support.

Result

» The Check Control message signals that the 48V electrical system has been switched off.

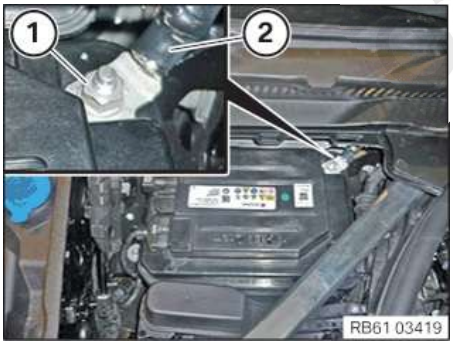
Measure

- Exit PAD mode by pressing the START-STOP button once without depressing the brake pedal.

The work “Disconnecting the negative battery cable of the 48-V battery” can be started.



- Unlock and disconnect plug connection (1) of the CAN bus.
- Release the clip (2).



- Loosen nut (1).
- Pull off negative battery cable (2) of the 48-V battery from the negative battery terminal, set it aside and secure it.



WARNING

Unprotected battery terminals.

Risk of short circuits! Risk of fire!

- Cover the vehicle battery.

- Cover the vehicle battery with the special tool as shown.
- Position the battery earth lead (1) as shown.

5 – Disconnecting all battery earth leads

ardiagn.com



- See additional information.

6 – Removing the wiper arm on the left and right

NOTICE

Description is for left component only. Procedure on the right side is identical.

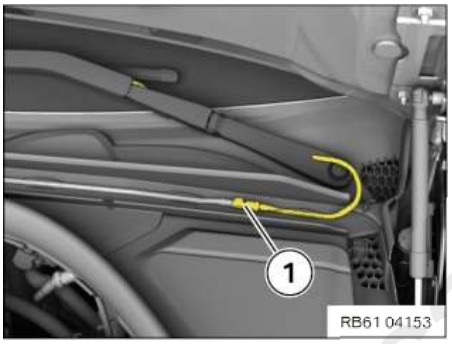
▶ **Remove the wiper arm**

RISK OF DAMAGE

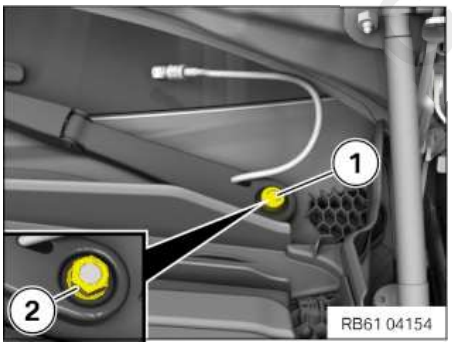
Damage to wiper console.

While removing the wiper arms without using special tool, the wiper console can break.

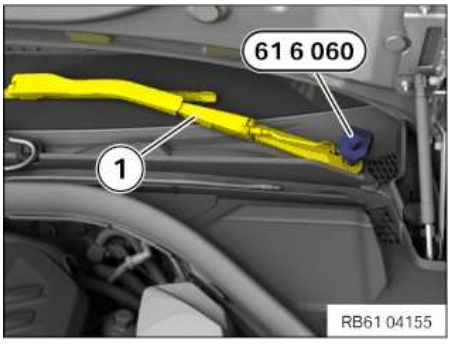
- Removing the wiper arms must be carried out only using the prescribed special tool.
- Do **not** lever off the wiper arm because otherwise the wiper console may break at the predetermined breaking point for active pedestrian protection.



- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.



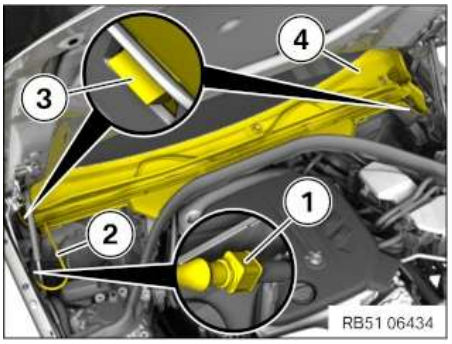
- Remove the protective cap (1).
- Loosen nut (2).



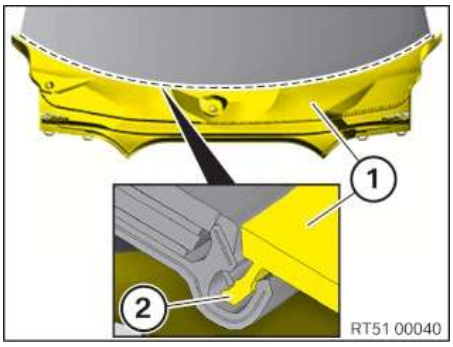
- Pull off the wiper arm (1) using special tool .

7 – Remove cowl panel cover

cardiagn.com



- Release snap fastener (1) of the washer fluid hose (2) and put the washer fluid hose (2) to one side.
- Unclip clips (3) on the cowl panel cover (4).



- Pull the cowl panel cover (1) upward out of the latch mechanism (2) beginning on the side.

8 – Remove the seal for the rear bonnet

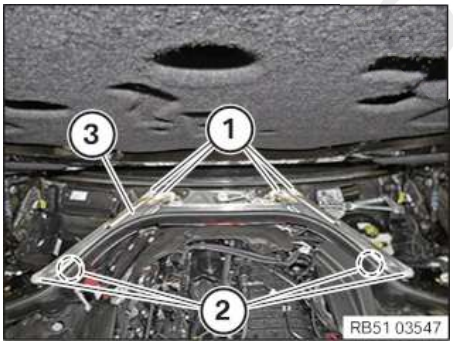


- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

9 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

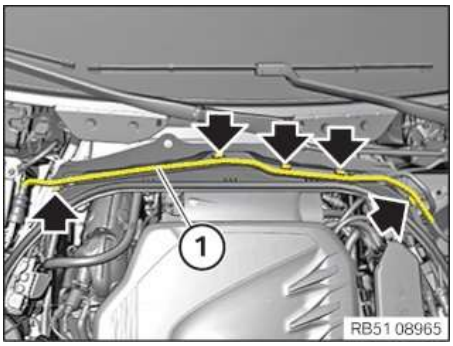
Driving without the strut brace/front-end strut or tension strut is not permitted.



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

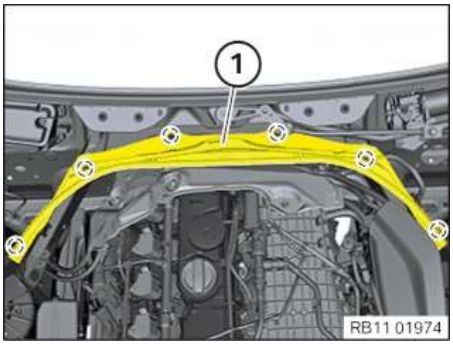
- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.



- **Version with mild hybrid technology:**

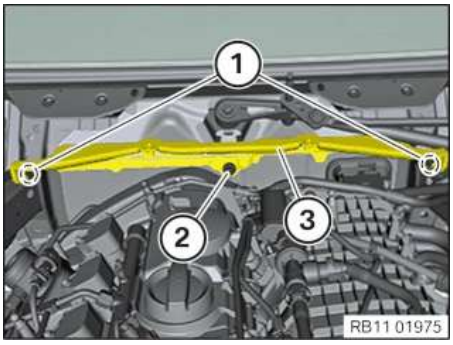
  Unclip the wire (1) at the holders (arrows).

carsdiagn.com



- Unscrew the bolts in the marked areas.
- Remove the centre bulkhead upper part (1).

10 – Removing the centre bulkhead lower section



- Loosen screws (1).
- Loosen nut (2).
- Remove the centre bulkhead lower part (3).

11 – Removing the acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

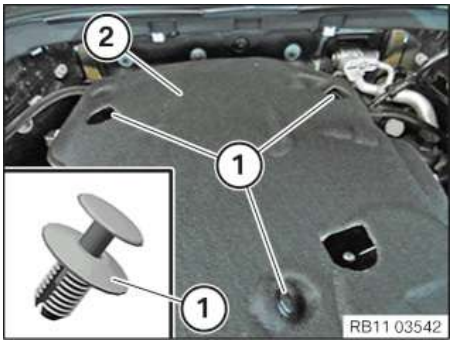
Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



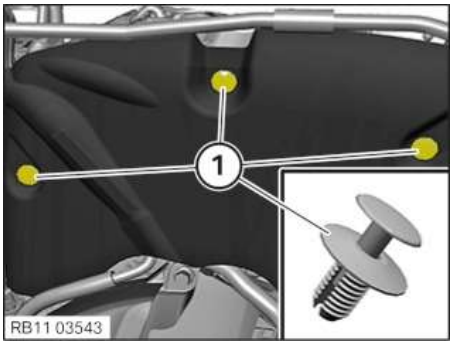
- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

12 – Remove the acoustic cover for the injectors

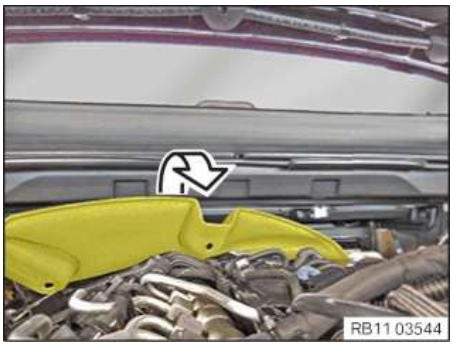


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

13 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).



- Guide out and remove the acoustic cover in the direction of the arrow.

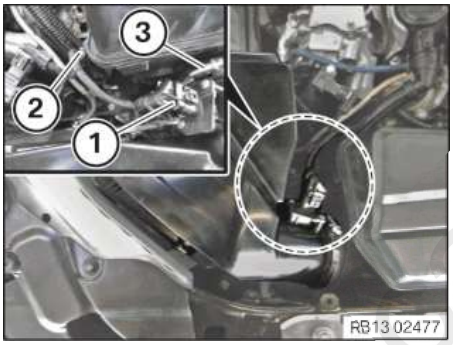
14 – Removing the clean air pipe with the resonator

WARNING

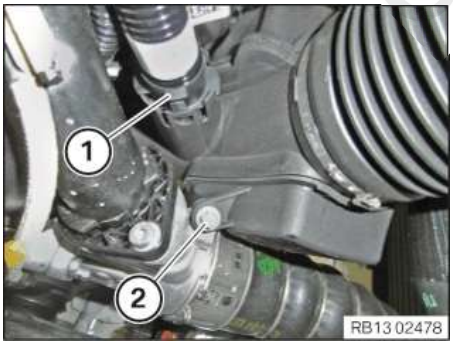
Hot surfaces.

Risk of burning!

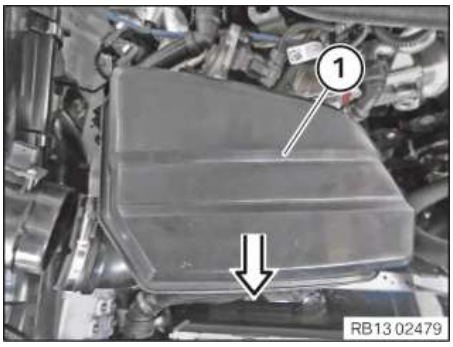
- Perform all work only on components that have cooled down.



- Unlock plug connection (1) and disconnect.
- Loosen clamp (2).
- Unfasten clamp (3).
- Separate the clean air pipe with resonator from the intake filter housing.



- Unlock engine ventilation line (1), disconnect it and place it aside.
- Loosen screw (2).



- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Unlock and loosen clamp (1).



- Feed out and remove clean air pipe with resonator (1) in the direction of the arrow.

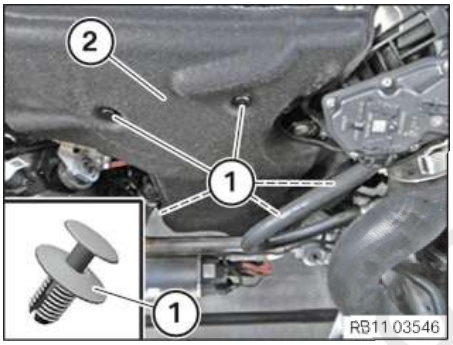
15 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

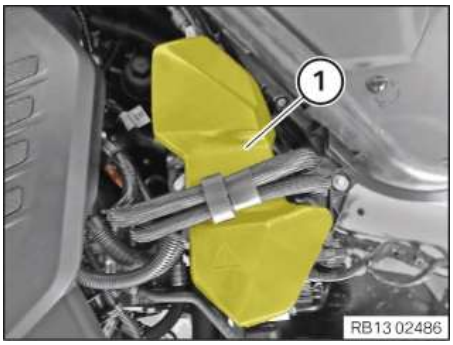
Risk of burning!

- Perform all work only on components that have cooled down.



- Release and remove expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

16 – Remove the cover for the DDE control unit



- Pull off, guide out and remove cover (1) upwards.

17 – Partially releasing the wiring harness section on the intake plenum

cardiagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

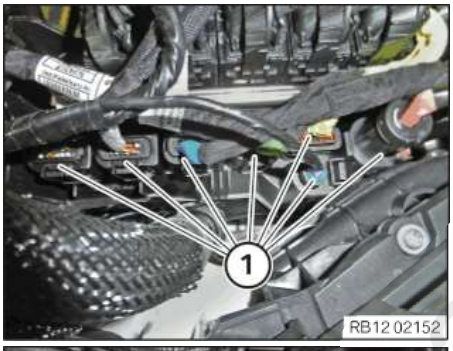
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

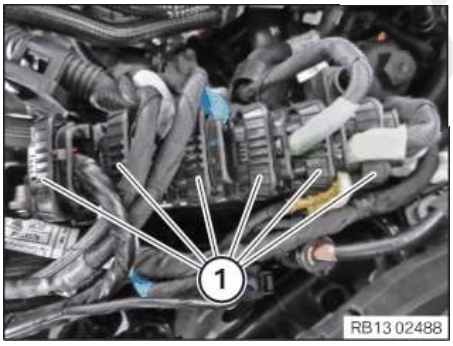
- Do not pull on the wires when disconnecting connectors and plug connections.

TECHNICAL INFORMATION

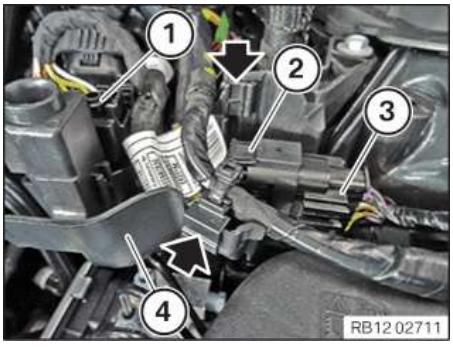
Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.



- Unlock and disconnect plug connections (1).

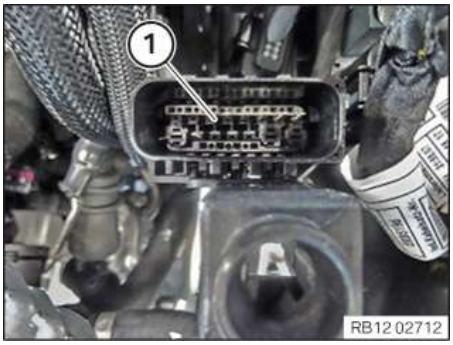


- Unlock and disconnect plug connections (1).

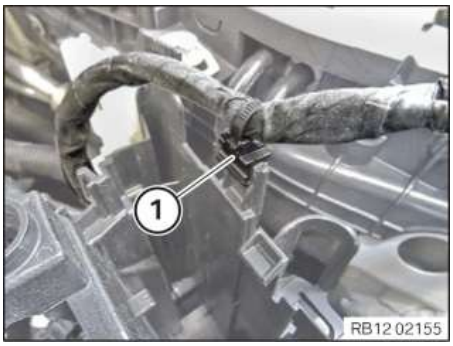


- Unlock plug connection (1) and disconnect.
- Unlock plug connection (2) and disconnect.
- Release the connector (3) and disconnect from the control unit holder (4).
- Release the clamps (arrows).

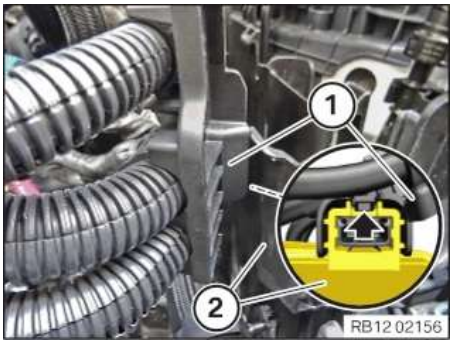
cardiagn.com



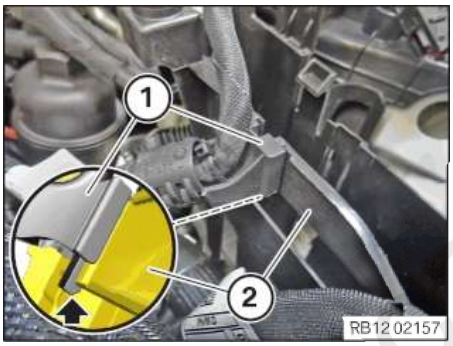
- Unlock plug connection (1) and disconnect.



- Loosen clamp (1).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).

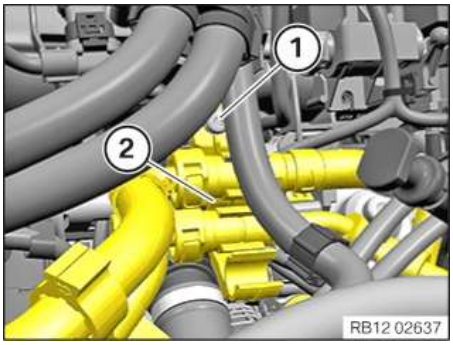


- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.

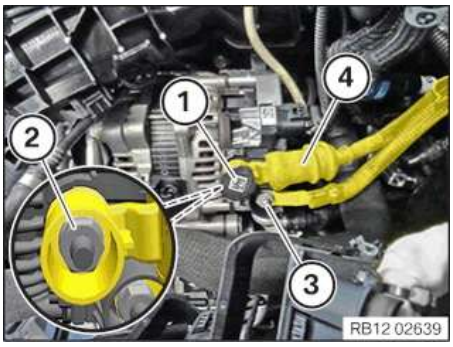


- Unlock holder (1) and feed out coolant line (2) and place it aside.

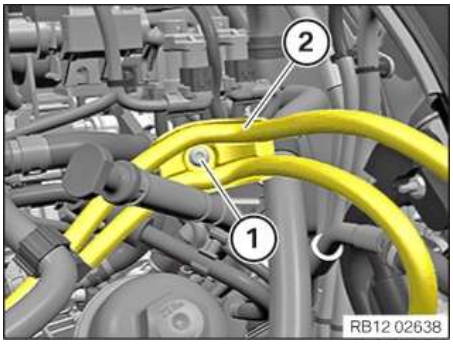
cardiagn.com



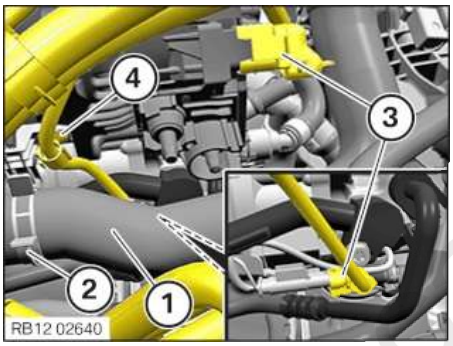
- Release the screw (1).
- Guide out fuel lines (2) and set them aside.



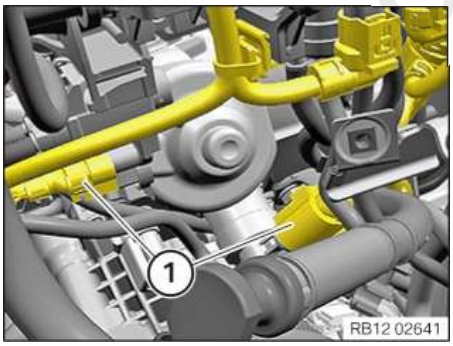
- Guide out and remove the lid (1).
- Release the nuts (2) and (3).
- Feed out positive battery cables (4) and place to one side.



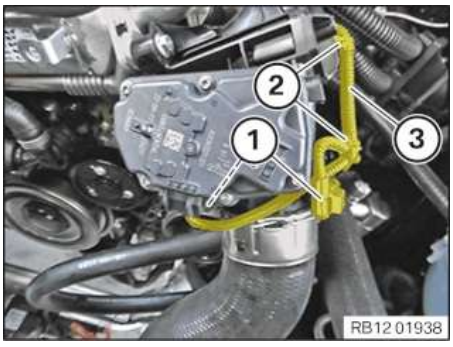
- Release the screw (1).
- Guide out the positive battery cables (2) and set them aside.



- Release the coolant line (1) from the holder (2) .
- Unlock plug connections (3) and disconnect.
- Loosen clamp (4).



- Unlock and disconnect plug connections (1).



- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.

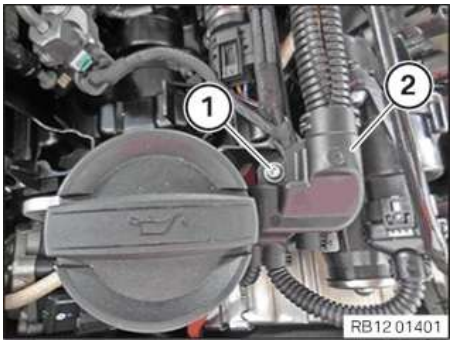
cardiagn.com



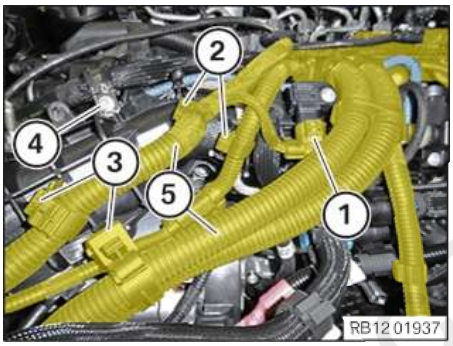
- Unlock and loosen connector (1).



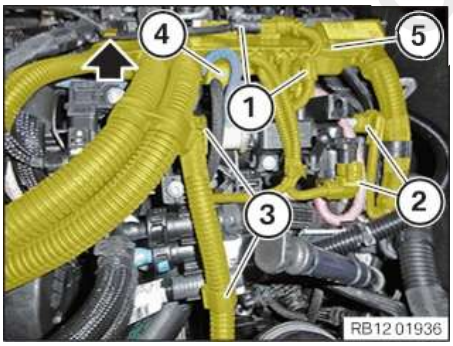
- Unlock plug connection (1) and disconnect.



- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.



- Unlock plug connection (1) and disconnect.
- Loosen clamps (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.



- Unlock and disconnect plug connections (1).
- Release line from clamp (Arrow).
- Unlock and disconnect plug connections (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.

18 – Removing the intake plenum

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

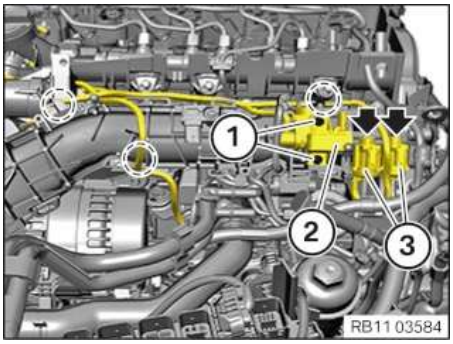
cardiagn.com



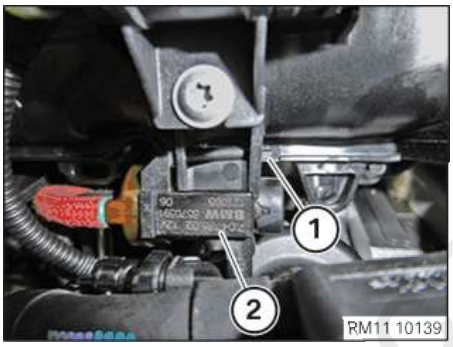
- Unlock clamp (1) and engage in this position.



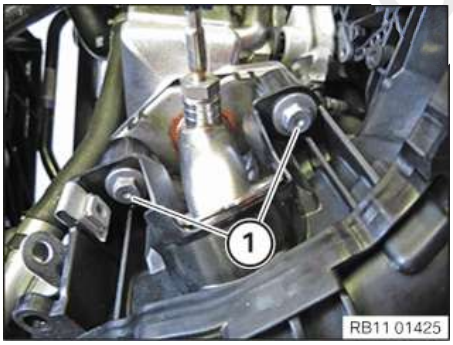
- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.



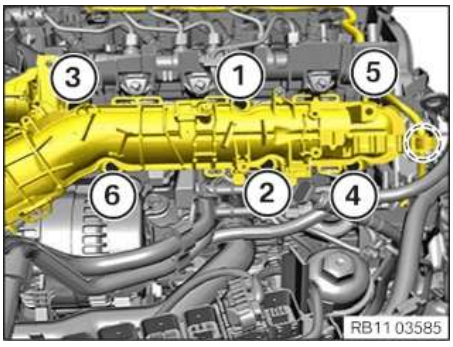
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.

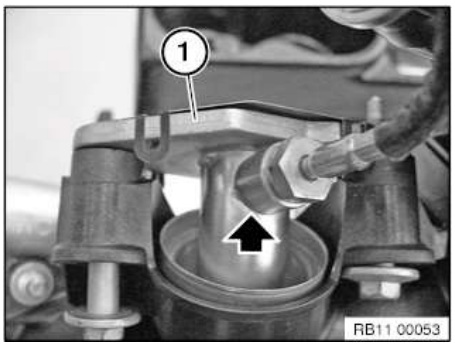


- Loosen screws (1).



- Detach the leakage oil lines in the marked area from the intake plenum.
- Loosen screws in the order (6) to (1).
- Guide the intake plenum out forwards and remove it.

cardiagn.com



- Remove the exhaust-gas recirculation pipe (1) (arrow).

19 – Detaching the leakage oil line from the injectors

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

WARNING

Hot surfaces.

Risk of burning!

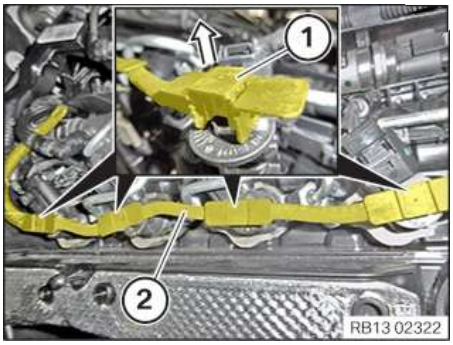
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

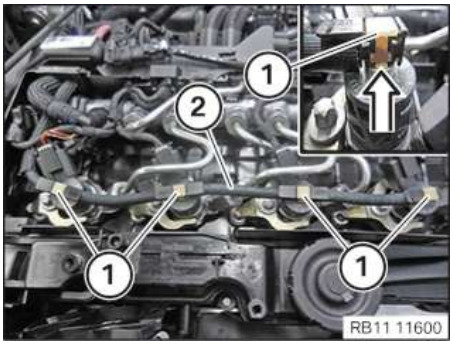


- **Version A:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.



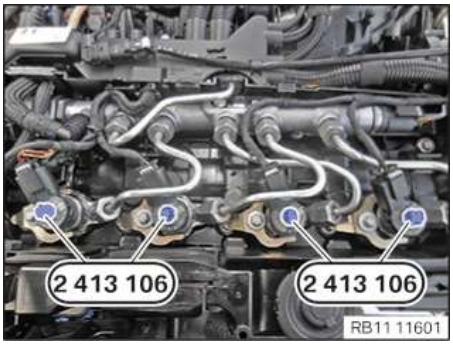
- **Version B:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.

cardiagn.com



- Seal open connections with special tools .

20 – Remove the high pressure lines between the injector and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

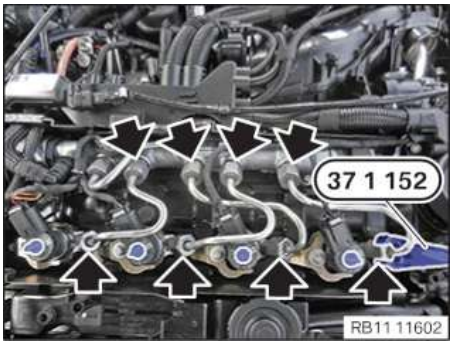
TECHNICAL INFORMATION

If several high pressure lines are removed, ensure that each high pressure line is installed in its original location. Label high pressure lines.

cardiagn.com

TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.



- Release the high pressure lines (arrows) with the special tool .
  Reset the special tool early on to prevent bending of the high pressure line.
- Catch and dispose of escaping fuel.
- Feed out and remove the high pressure lines (arrows).
- Seal off all the open cable connections with the special tool .

21 – Remove the high pressure line between the high pressure pump and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Hot fluids.

Risk of scalding!

- Conduct all work in the vehicle wearing appropriate personal protective equipment only.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

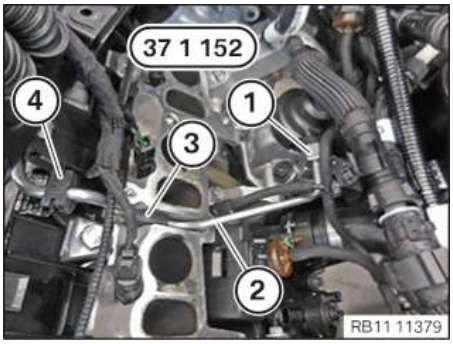
cardiagn.com

TECHNICAL INFORMATION

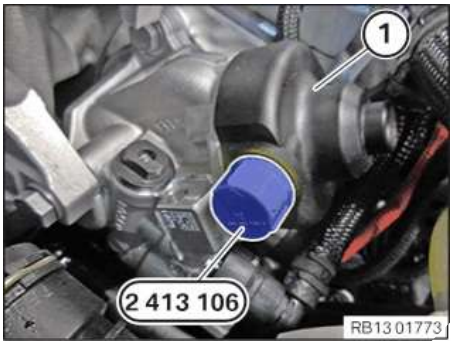
Reset special tool in early to avoid bending pressure lines.



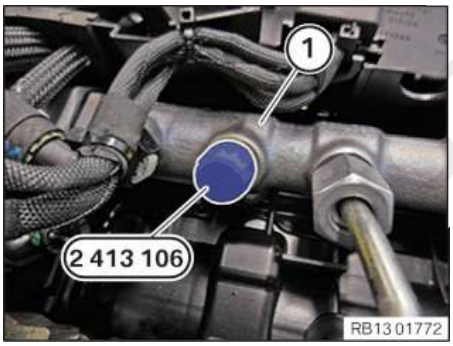
- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.



- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.
- Guide out and remove the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).



- Seal off the opening at the high pressure pump (1) with the special tool .



- Seal off the opening on the rail (1) with the special tool .

22 – Remove high-pressure rail

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

cardiagn.com

RISK OF DAMAGE

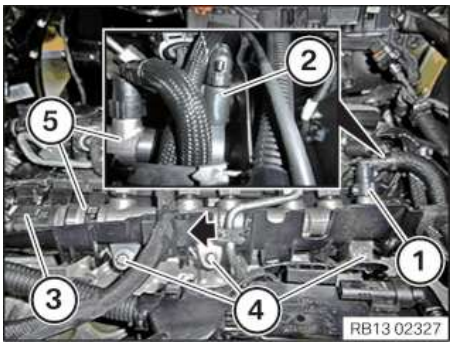
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Unlock and disconnect the fuel return line (1).
- Guide the fuel return line (1) out and set it aside.
- Unlock and disconnect the plug connection (2) on the rail pressure regulating valve.
- Unlock and disconnect the plug connection (3) on the rail pressure sensor.
- Unlock cable clip (Arrow), feed out and place aside.
- Loosen screws (4).
- Thread out and remove the rail (5).

23 – Remove all injection systems

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

cardiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

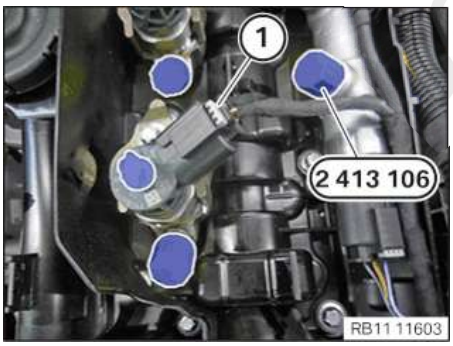
Electrostatic discharge.

Damage to or destruction of electrical components.

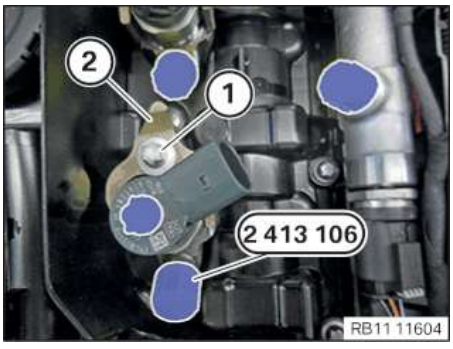
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

TECHNICAL INFORMATION

If several injectors are removed, ensure that each injector is installed at its original location (cylinder). Mark injectors.



- Unlock plug connection (1) and disconnect.



- Loosen screw (1).
- Guide out and remove clamping claw (2).
- Feed out and remove the injector with slight rotational movements.

▸ **Loosen stuck injectors**

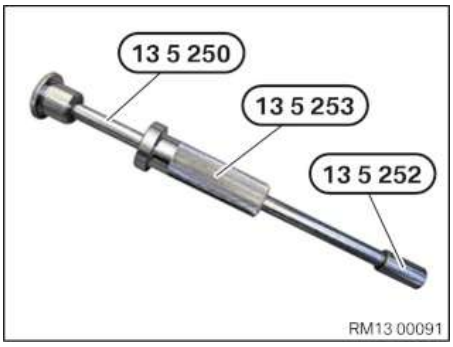
carsdiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

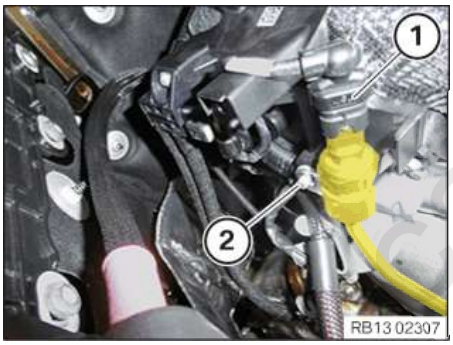


- Unscrew special tool 0 493 339 (13 5 252) from special tool 0 493 321 (13 5 250) and remove special tool 0 493 340 (13 5 253).
- Screw special tool 0 493 339 (13 5 252) back onto special tool 0 493 321 (13 5 250).

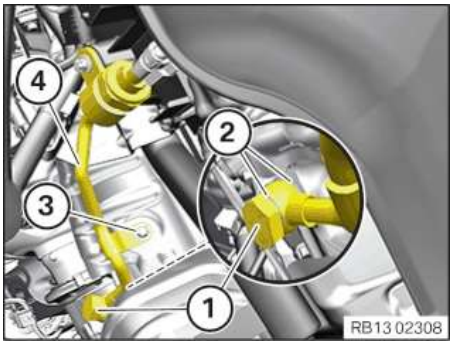


- Screw special tool 0 493 321 (13 5 250) with special tool 0 493 339 (13 5 252) onto pressure line connection (1) of injector.
- Release injector (1) with special tools 0 493 321 (13 5 250) and 0 493 339 (13 5 252) by means of **short** back and forth movements and remove.

24 – Remove the exhaust gas pressure pipe



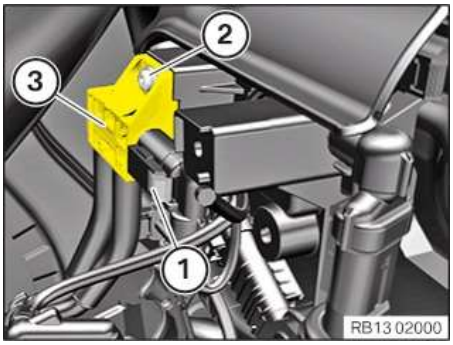
- Unlock plug connection (1) and disconnect.
- Loosen screw (2).



- Unscrew the banjo bolt (1).
- Feed out and remove the sealing rings (2).
- Loosen screw (3).
- Feed out and remove the exhaust gas pressure pipe (4).

25 – Releasing the differential pressure sensor for the diesel particulate filter

cardiagn.com



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).
- Remove the differential pressure sensor (3) and put it to one side.

26 – Removing the sensor bracket on the cylinder head cover

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

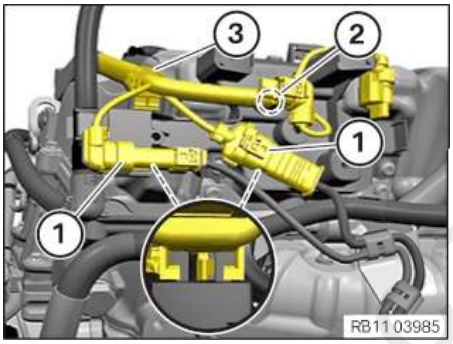
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

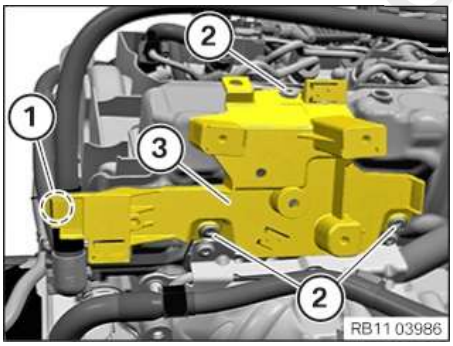
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Unlock plug connection (1) and disconnect.
- Unlock the plug connection (1) and release it from the sensor bracket.
- Release the cable clip in the area (2) from the sensor bracket.
- Release the clamps (3) and set the wiring harness section aside.

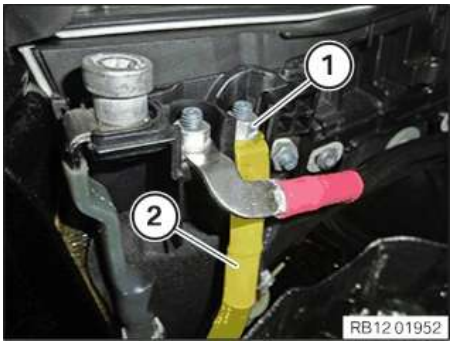


- Release the positive battery cable in the area (1) from the clamp and set it aside.
- Loosen screws (2).
- Feed out holder (3) for the sensor system and remove.

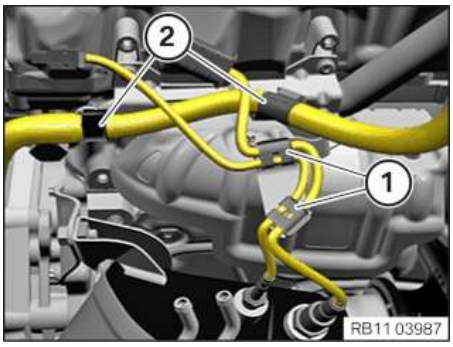


- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.

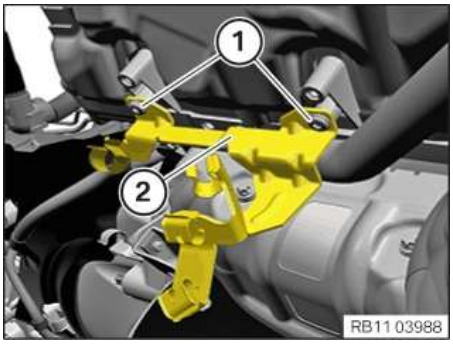
cardiagn.com



- Loosen nut (1).
- Feed out positive battery cable (2) and put to one side.

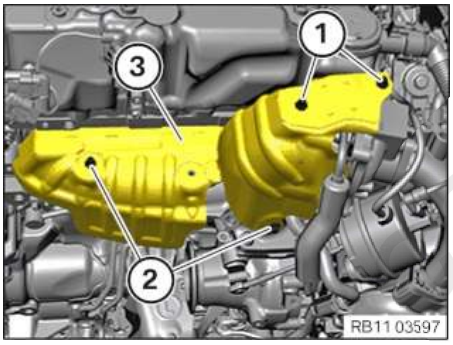


- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



- Loosen screws (1).
- Guide out and remove holder (2).

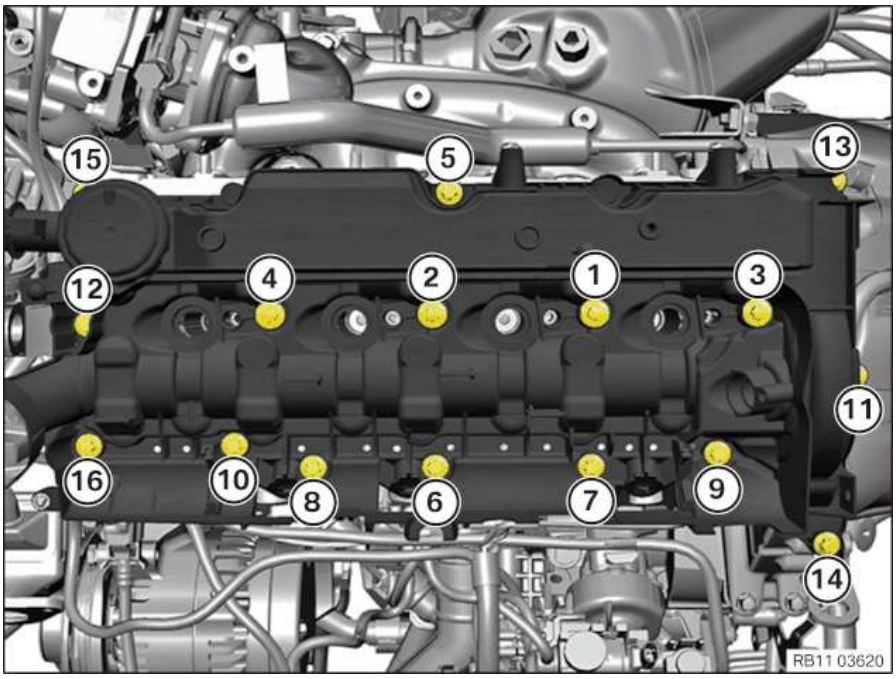
27 – Removing heat shield



- Loosen screws (1).
- Loosen screws (2).
- Feed out and remove the heat shield (3).

28 – Removing the cylinder head cover

Screw connection of the cylinder head cover



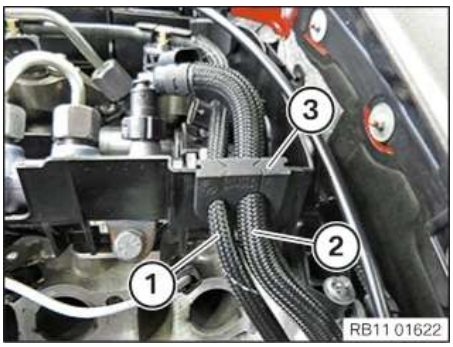
1 - 16 Bolts of the cylinder head cover



- Unlock and detach the locks.
- Feed the engine ventilation line (1) out and set it aside.

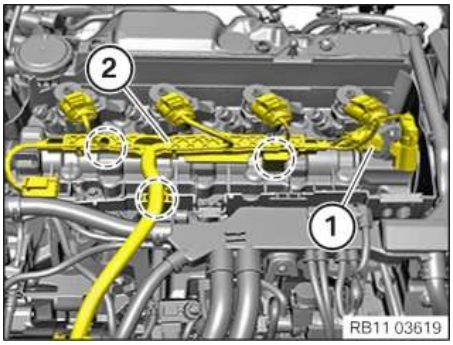


- Feed out and remove the heat shield (1).

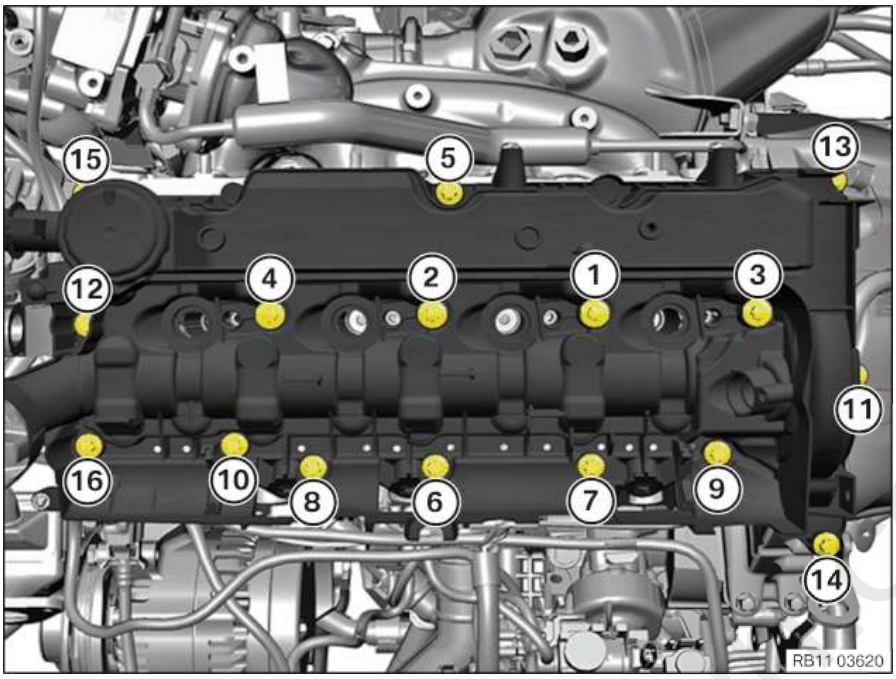


- Remove the leakage oil line (1) including the fuel return line (2) and the grommet (3) and put to one side.

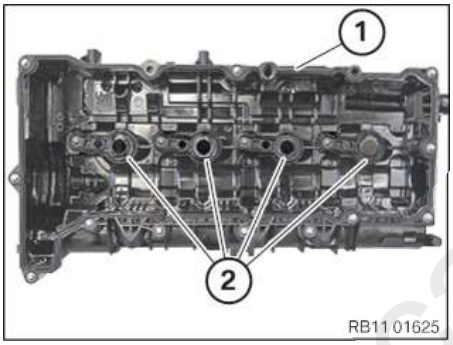
cardiagn.com



- Unlock connector (1) and pull off.
- Disconnect the wiring harness (2) in the marked areas from the cylinder head cover and set aside.

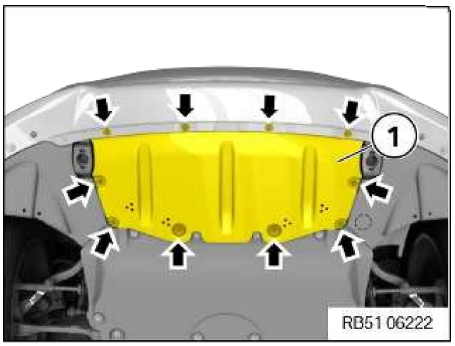


- Evenly loosen the screws in a sequence from (16) to (1).
- Feed out and remove the cylinder head cover.



- Remove the profile seals (1) and (2).

29 – Removing the front underbody protection

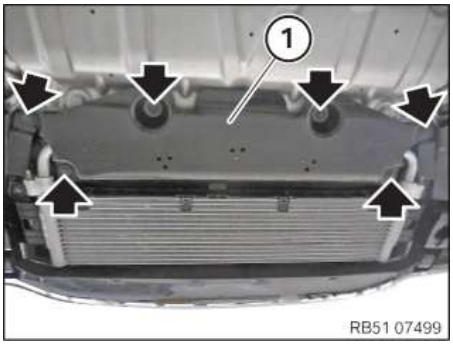


- **Version A:**

  Remove screws (arrows).

  Feed front underbody protection (1) backwards out of the bumper panel.

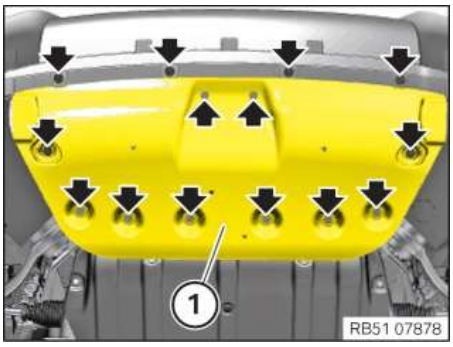
cardiag.com



- **Version B:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

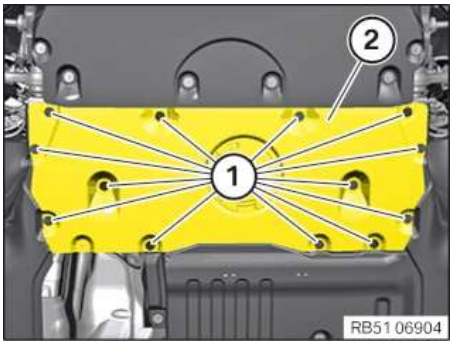


- **Version C:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

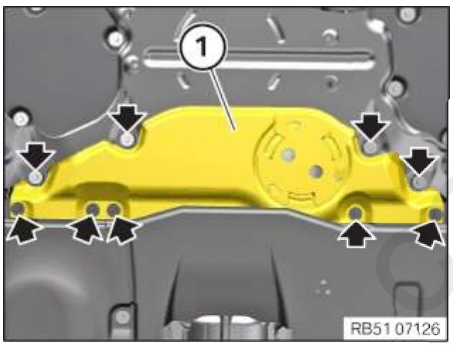
30 – Removing the centre underbody protection



- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .

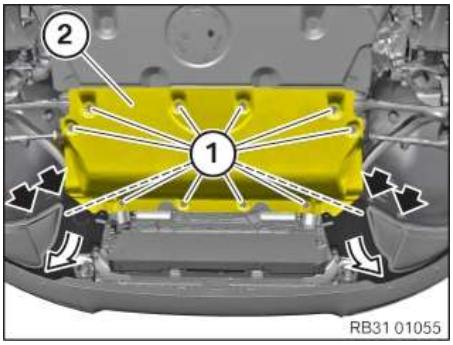


- **Version with all-wheel drive:**

  Remove screws (arrows).

  Feed out and remove the centre underbody protection (1).

31 – Remove the underbody protection of the steering gear



- **Version A:**

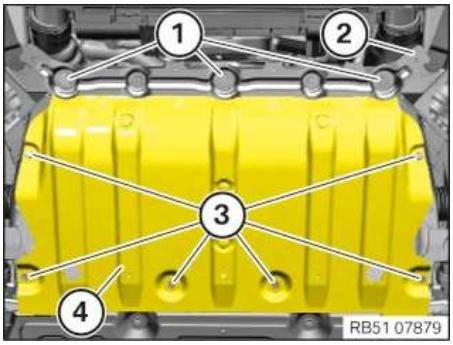
  Unscrew the screws (arrows) of the wheel arch cover on the wheel arch cover.

  Fold the bottom wheel arch cover to the side.

  Loosen screws (1).

  Remove the underbody protection (2) of the steering gear.

carsign.com



- **Version B:**

  Loosen screws (1).

  Remove the holder (2) for the underride protection.

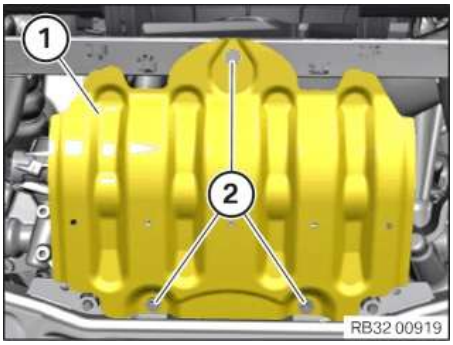
  Loosen screws (3).

  Feed out and remove the underbody protection (4) of the steering gear.

32 – If installed: Removing the steering underbody protection

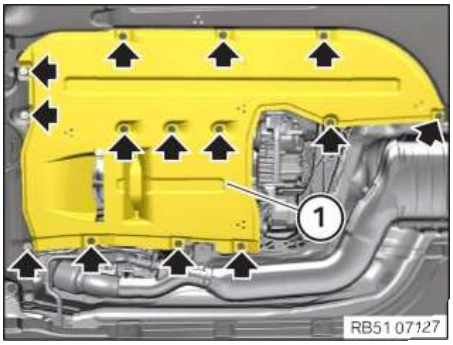
Prerequisite

Front underbody protection has been removed.



- Loosen screws (2).
- Remove underbody protection (1).

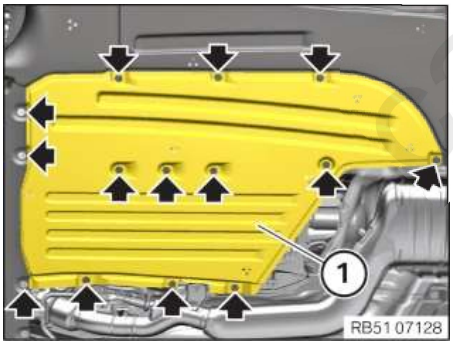
33 – Remove rear underbody protection



- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).



- **Version B:**

  Remove screws (arrows).

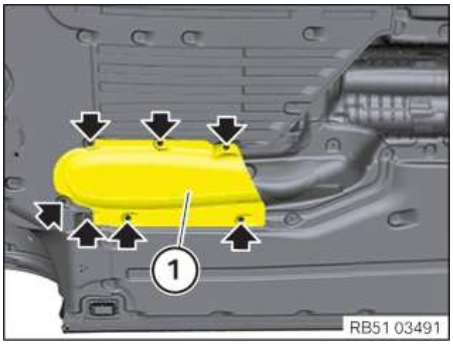
  Guide out rear underbody protection (1) and remove it.

34 – Remove the underbody panelling of the transmission on the side

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

cardiagn.com



- Remove screws (arrows).
- Remove the underbody panelling (1).

35 – Removing starter motor

Prerequisite

Battery earth leads are disconnected.

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

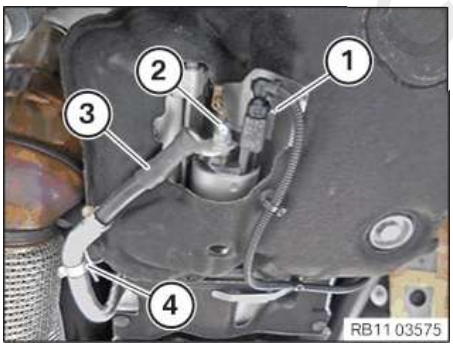
Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

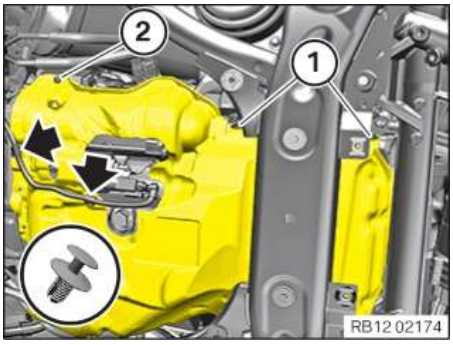
- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

TECHNICAL INFORMATION

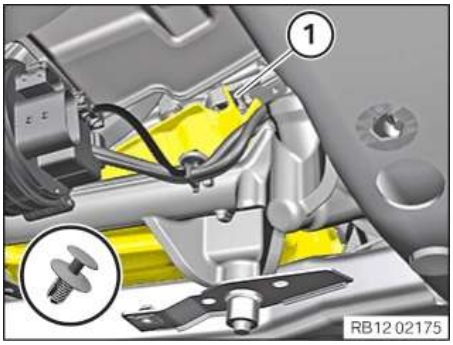
Make sure that the acoustic cover is **not** damaged while removing the starter motor.
A damaged lower acoustic cover can only be renewed when the front axle is lowered.



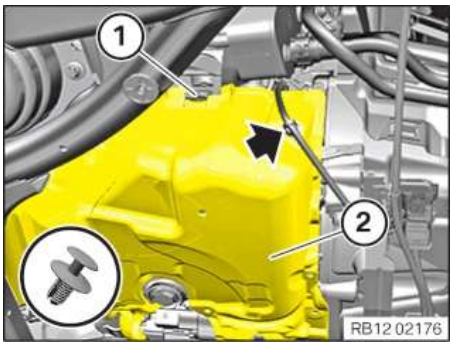
- Unlock plug connection (1) and disconnect.
- Release nut (2).
- Release positive battery cable (3) from holder (4).



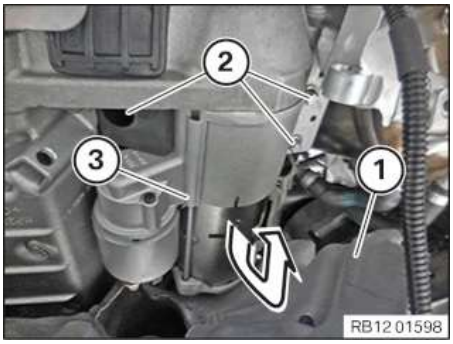
- Loosen the expanding rivet (1).
- Undo fir tree clip (2).
- Release the clamps (arrows).



- Loosen expanding rivet (1).
- Lower the acoustic cover of the oil sump.



- Loosen expanding rivet (1).
- Loosen the clamp (arrow).
- Lower acoustic cover (2).



- Make sure that the acoustic cover (1) is not damaged.
- Carefully press acoustic cover (1) to one side.
- Loosen screws (2).
- Carefully guide out the starter motor (3) in direction of arrow and remove.

MAIN WORK

36 – Checking camshaft timing



RISK OF DAMAGE

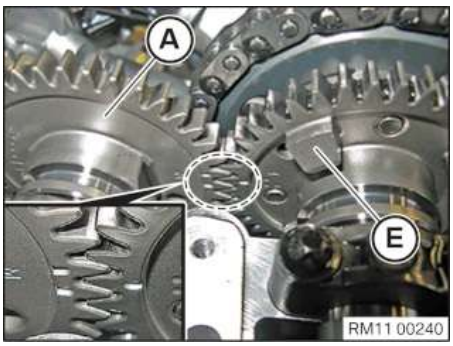
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

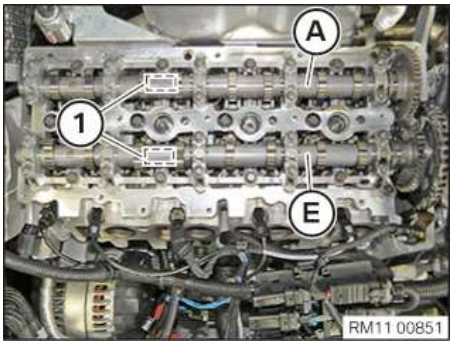
- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

  Do **not** crank the engine in reverse.

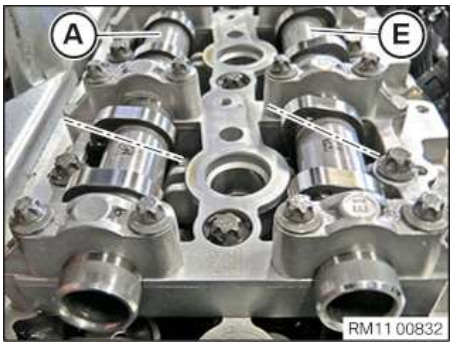


- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.

cardiagn.com



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.

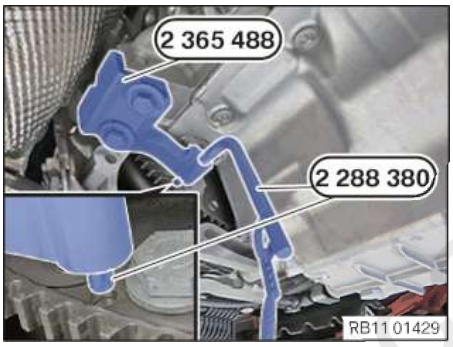


- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

POSTPROCESSES

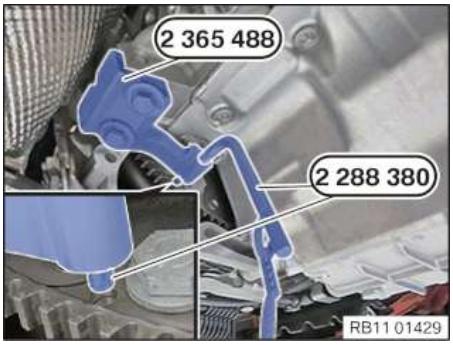
37 – Removing the special tool for fixing the exhaust camshaft



- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

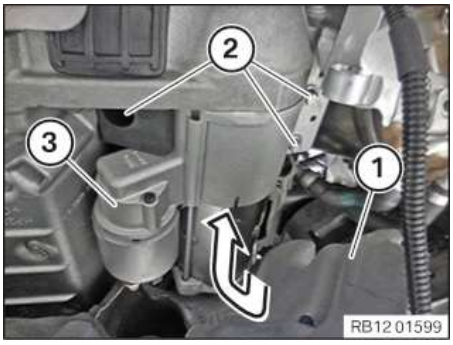
38 – Removing the special tool to disconnect the crankshaft

carlogn.com



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

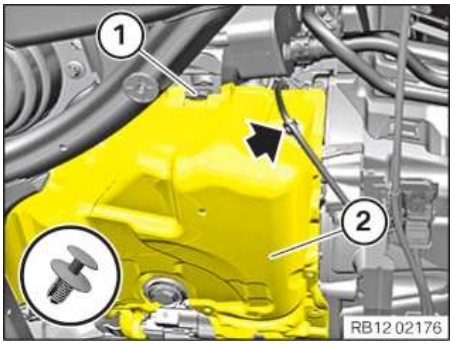
39 – Installing starter motor



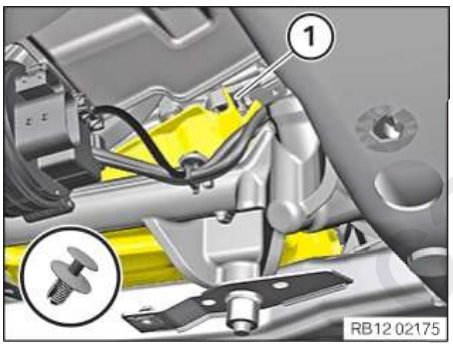
- Make sure that the acoustic cover (1) is not damaged.
- Carefully press the acoustic cover (1) to one side.
- Feed in and install the starter motor (3) in the direction of the arrow.
- Tighten the screws (2).

Starter motor to engine

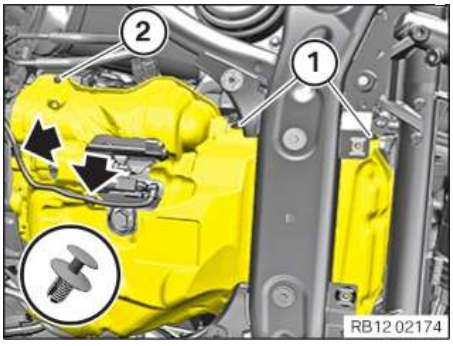
M8X60		Tightening torque	19 Nm



- Position the acoustic cover (2).
- Fasten expanding rivet (1).
- Secure clamp (arrow).

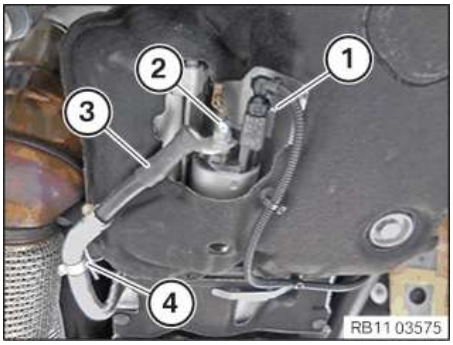


- Fasten expanding rivet (1).

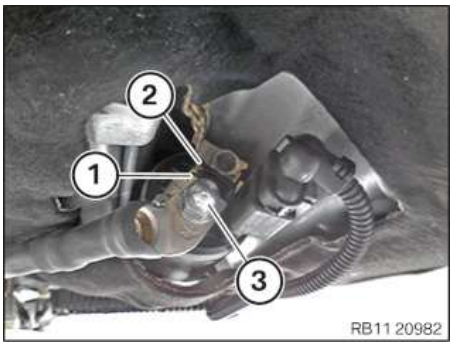


- Secure fir tree clip (2).
- Secure expanding rivet (1).
- Secure the clamps (arrows).

cardiagn.com



- Fasten positive battery cable(3) in holder (4) and position it on the starter motor.
- Tighten the nut (2) hand-tight.
- Connect the connector (1) and audibly lock it.



CAUTION

Improper routing of the positive battery cable.

Risk of short circuits!

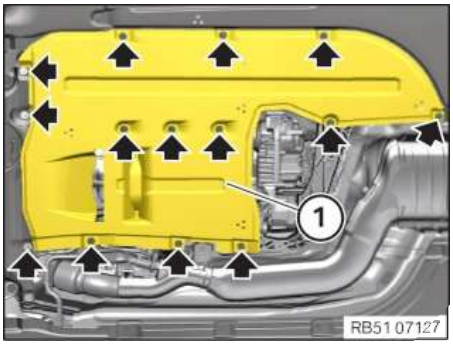
- Route the positive battery cable without abrasions and do not trap.

- Attach the positive battery cable (1) **correctly** to anti-twist lock (2).
- Tighten nut (3).

Battery positive lead to starter

M8		Tightening torque	13,5 Nm

40 – Installing underbody protection at rear



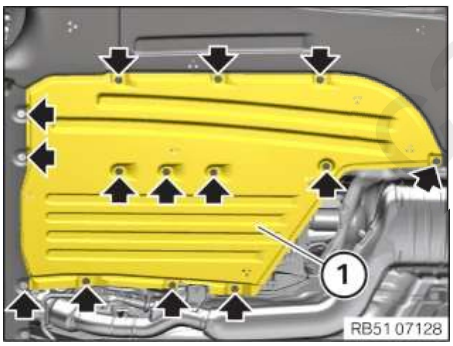
- **Version A:**

  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version B:**

  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

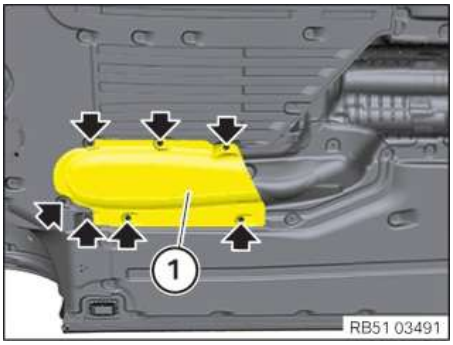
Hexagon screw		Tightening torque	3 Nm

41 – Install the underbody panelling of the transmission on the side

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

cardiagn.com

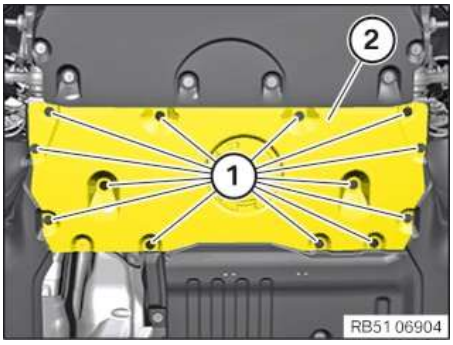


- Insert the underbody panelling (1).
- Tighten screws (arrows).

Underbody panelling

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

42 – Installing the centre underbody protection



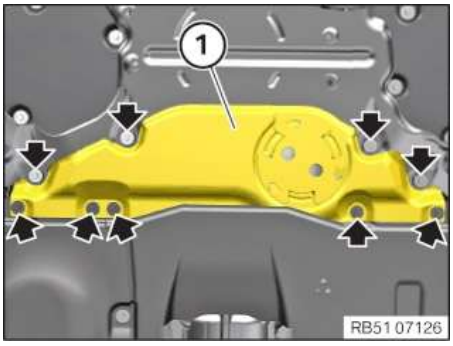
- **Variant with rear wheel drive:**

  Position central underbody protection (2).

  Tighten the screws (1).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version with all-wheel drive:**

  Guide in centre underbody protection (1) and install.

  Tighten screws (arrows).

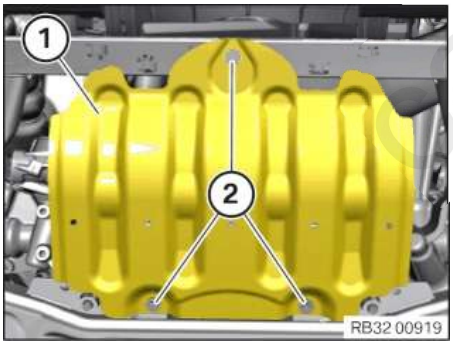
Underbody protection

Hexagon screw		Tightening torque	3 Nm

43 – If installed: Install underbody protection of the steering

Prerequisite

Front underbody protection has been removed.



- Position underbody protection (1).
- Tighten the screws (2).

Underbody protection, steering, to front axle support

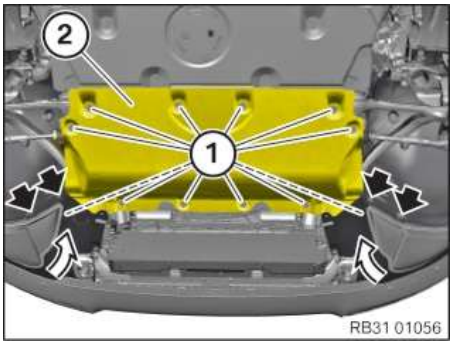
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

44 – Install the underbody protection of the steering gear

carldiagn.com



- **Version A:**

  Position the underbody protection (2) of the steering gear.

  Tighten the screws (1).

Underbody protection of the steering gear

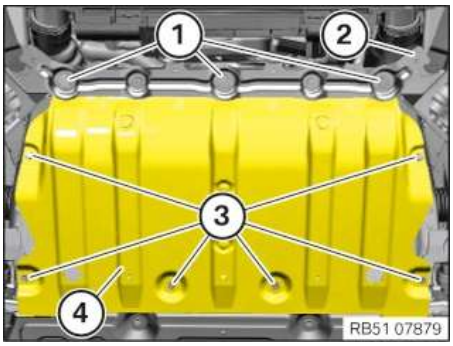
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the bottom wheel arch cover.

  Tighten the screws (arrows) of the lower wheel arch cover on the wheel arch cover.

Wheel arch trim panel, front

Thermoplastic hexagon screw		Tightening torque	2,6 Nm



- **Version B:**

  Feed in the underbody protection (4) of steering gear and install it.

  Tighten the screws (3).

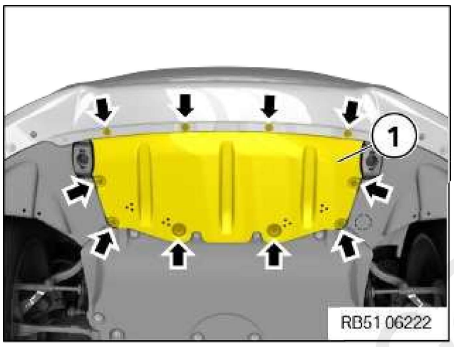
Underbody protection of the steering gear

Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the holder (2) for the underride protection.

  Tighten the screws (1).

45 – Installing the front underbody protection



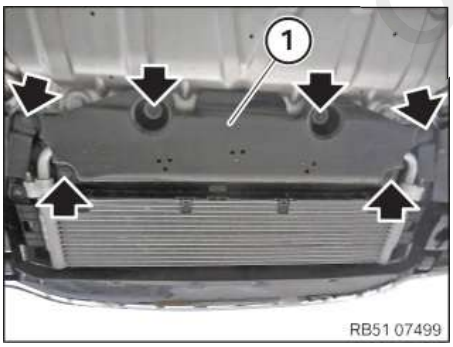
- **Version A:**

  Feed in the front underbody protection (1) towards the front under the bumper panel and position.

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



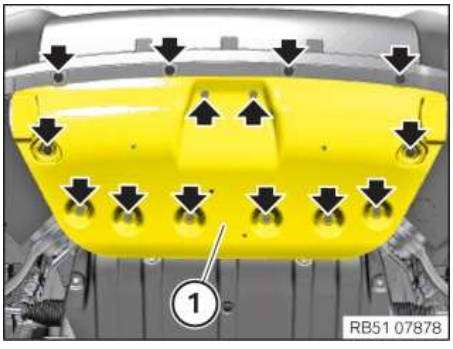
- **Version B:**

  Feed in and position the front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



- **Version C:**

  Feed in and install front underbody protection (1).

  Tighten screws (arrows).

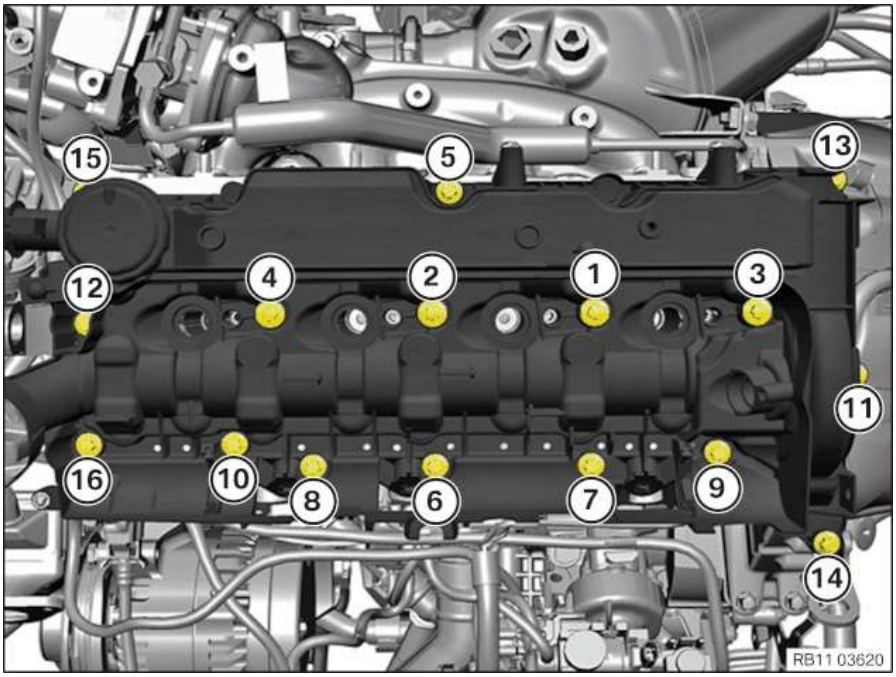
Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

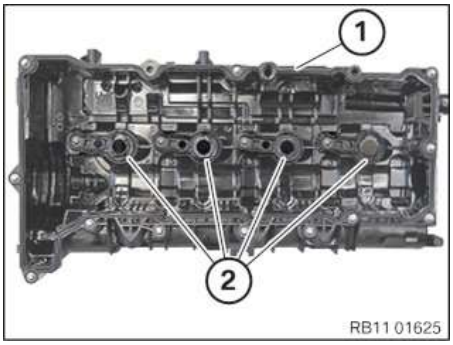
carlagn.com

46 – Installing cylinder head cover

Screw connection of the cylinder head cover

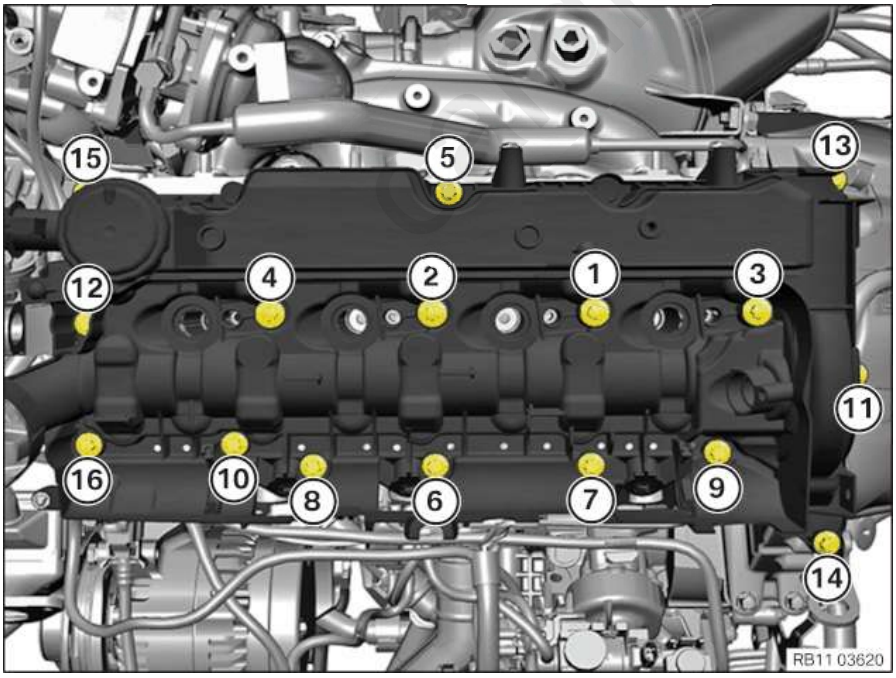


1 - 16 Bolts of the cylinder head cover



- Renew the profile seals (1) and (2) of the cylinder head cover.

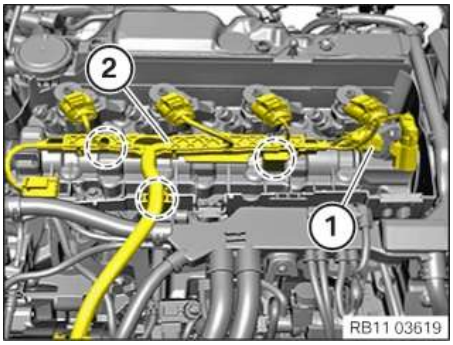
  Parts: Profile seals



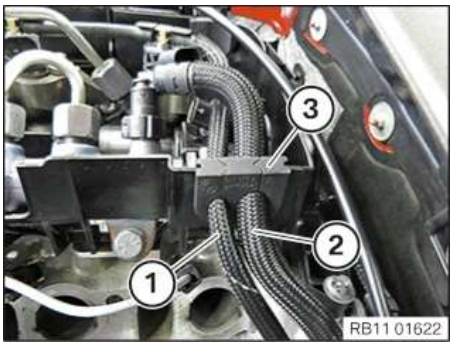
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

Cylinder head cover to cylinder head

M6		Tightening torque.	8,5 Nm



- Position the vehicle wiring harness (2) on the cylinder head cover and fasten in the marked areas.
- Plug in the connector (1) and lock audibly.



- Insert and connect the leakage oil line (1) with the fuel return line (2) and grommet (3).



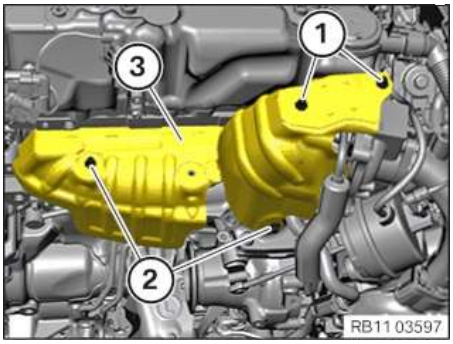
- Feed in and install the heat shield (1).



- Connect engine ventilation line (1) and lock.

  The locks (arrows) must engage audibly.

47 – Installing heat shield



- Feed in and install the heat shield (3).
- Tighten down screws (1) and (2).

Heat shield to exhaust manifold

M6x12			10 Nm

48 – Installing the sensor bracket on the cylinder head cover

cardiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

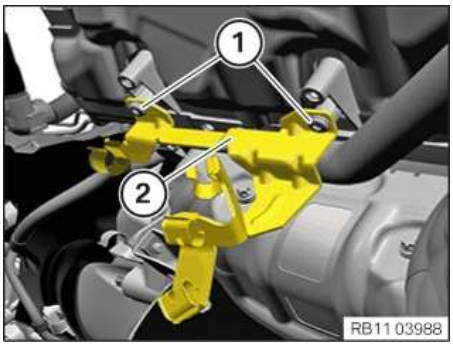
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

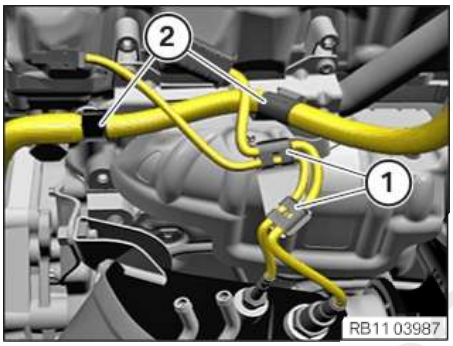
- Route all cables without abrasions, do not trap and crush.



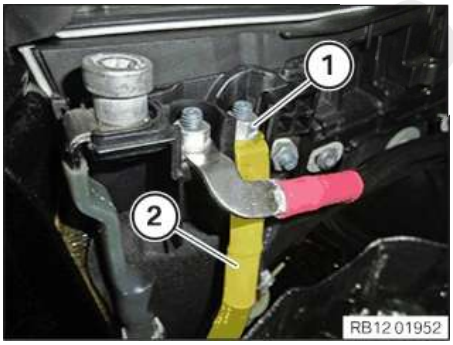
- Insert and install the holder (2).
- Tighten the screws (1).

Bracket on cylinder head cover

	Tightening torque	5 Nm



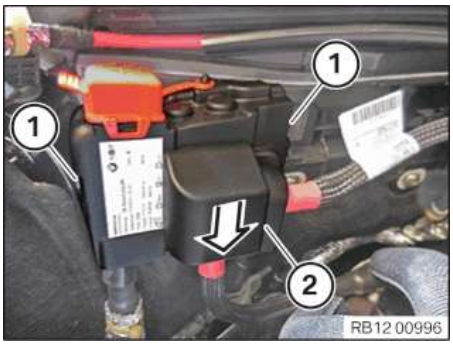
- Secure the positive battery cable in the clamps (2).
- Mount the cable of the exhaust gas sensor system in the clamps (1).



- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

Battery positive lead to battery positive terminal

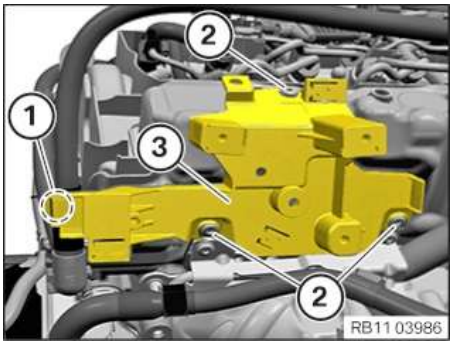
M8		Tightening torque	19 Nm



- Insert and install the cover (2) in the direction of the arrow.

  The locks (1) must engage audibly.

cardiagn.com

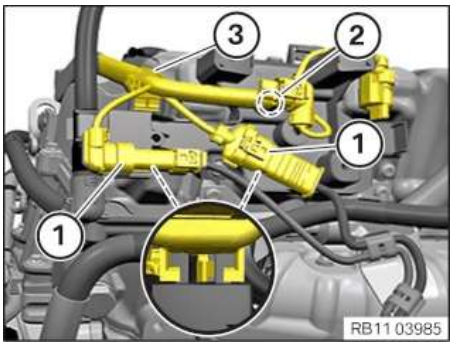


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

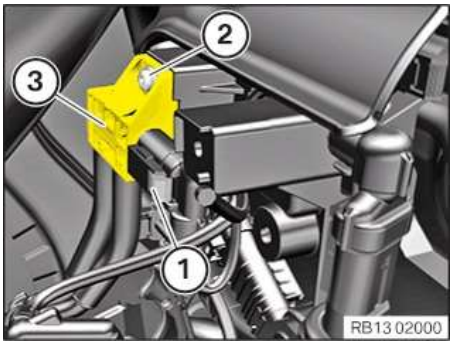
		Tightening torque	5 Nm

- Fasten the positive battery cable in the area (1) in the clamp.



- Feed in the wiring harness section and fasten it with the clamp (3).
- Fasten the cable clip in the area (2) in the sensor bracket.
- Feed in the connector (1) into the sensor bracket and lock it audibly.
- Plug in the connector (1) and lock audibly.

49 – Securing the differential pressure sensor for the diesel particulate filter



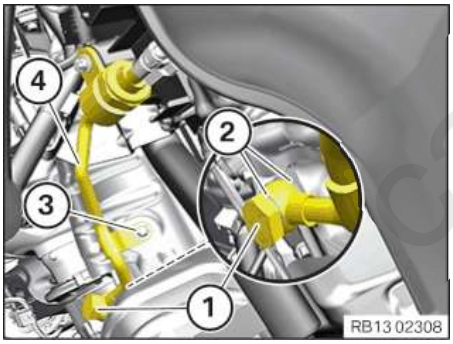
- Feed in and install the differential pressure sensor (3).
- Tighten down screw (2).

Differential pressure sensor of diesel particulate filter on cylinder head cover

TS5x20		Tightening torque	4 Nm

- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

50 – Install the exhaust gas pressure pipe



- Insert and install the exhaust gas pressure pipe (4).
- Replace the sealing rings (2).

  Parts: Sealing ring
- Apply the banjo bolt (1) hand-tight.
- Tighten down screw (3).

Heat shield to exhaust manifold

M6x12		Tightening torque	10 Nm

- Tighten the banjo bolt (1).

Banjo bolt for exhaust pressure pipe to exhaust manifold

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm



- Tighten down screw (2).

Exhaust gas pressure pipe to sensor system holder

TS6x20		Tightening torque	5,7 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

51 – Install all injectors

▸ **Cleaning the injector shafts**

cardiagn.com

CAUTION

Swirling dirt particles caused by compressed air.

Danger of injury!

- Collect dirt particles, e.g. when blowing out, use cloth to do so.

- Wear safety goggles.

RISK OF DAMAGE

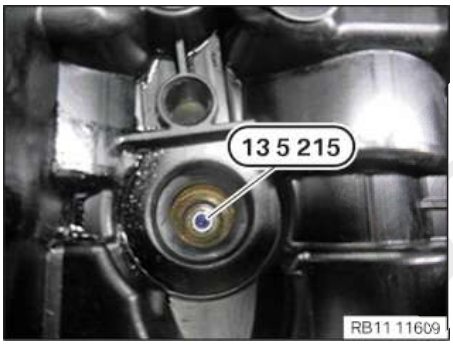
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



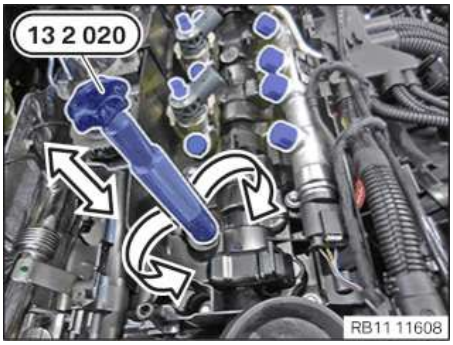
- Check whether the sealing ring remained in the injector shaft and remove the sealing ring as needed.
- Insert the special tool 0 493 763 (13 5 215) with the special tool 0 493 762 (13 5 214) from the set of special tools 0 493 758 (13 5 210) into the injector shaft.
- Remove special tool 0 493 762 (13 5 214).



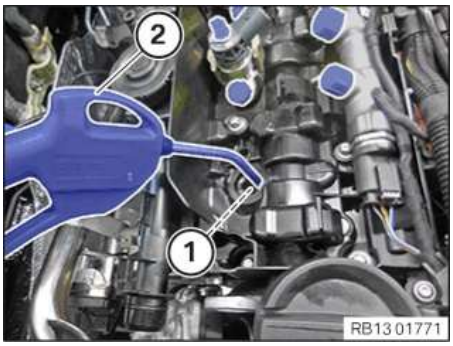
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



- Insert special tool 0 496 150 (13 2 020) into the injector shaft.



- Move special tool 0 496 150 (13 2 020) up and down in the injector shaft with rotational movements in the direction of arrow.
- Feed out special tool 0 496 150 (13 2 020) from the injector shaft and remove.



- Blow out injector shaft (1) with air gun (2).



- Feed the special tool 0 493 762 (13 5 214) into the injector shaft and screw it in with the special tool 0 493 763 (13 5 215).
- Feed out special tool 0 493 762 (13 5 214) with special tool 0 493 763 (13 5 215) from the injector shaft and remove it.

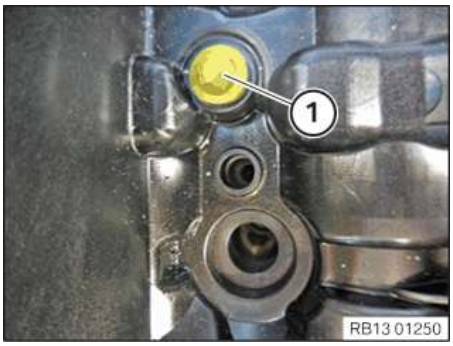
▸ **Check the placement of the clamping claw**

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Tighten down screw (1).

  The clamping claw is positioned on the bolt (1).

Clamping claw facing to cylinder head cover

M6		Tightening torque	10 Nm

▸ **Prepare the injector for installation**

cardiagn.com

RISK OF DAMAGE

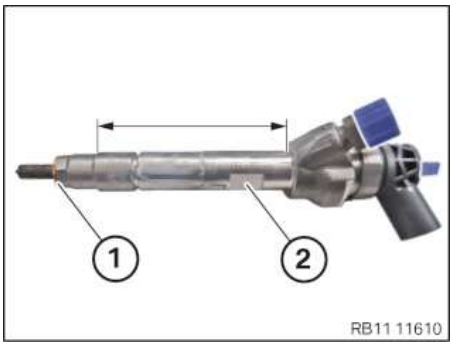
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

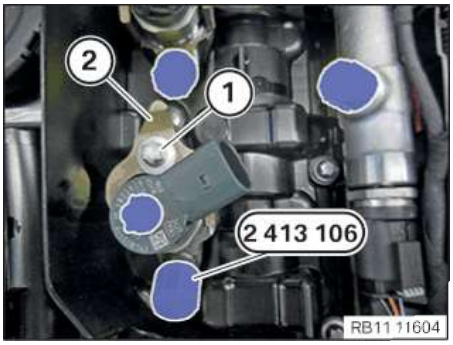
TECHNICAL INFORMATION

Lightly grease the injector shaft with high temperature-resistant grease.
For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



- Renew the copper sealing ring (1) on the injector (2).

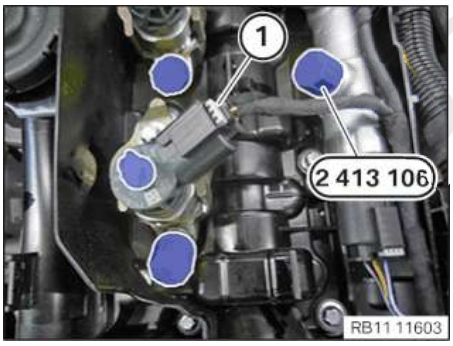
  Parts: Copper sealing ring
- Lightly grease the injector in the marked area with heat-resistant grease before installing the injector (2) in the injector shaft.



- Insert and install the injector .
- Insert and install the clamping claw (2).
- Tighten down screw (1).

Injector to cylinder head cover

M8	Tightening torque	8 Nm
	Angle of rotation	120 °



- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

▸ **Replacement: Perform injection quantity compensation**

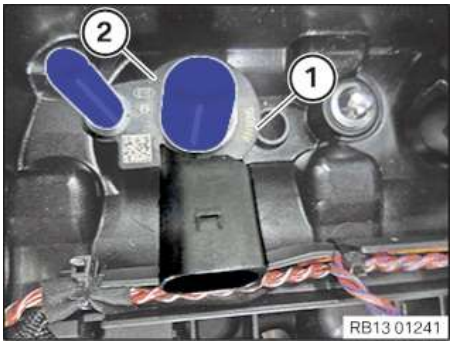
TECHNICAL INFORMATION

If the DDE control unit or an injector has been replaced, it will also be necessary to carry out injection quantity compensation. The adjustment value (7-position letter/number code) is engraved on each injector.

NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

cardiagn.com

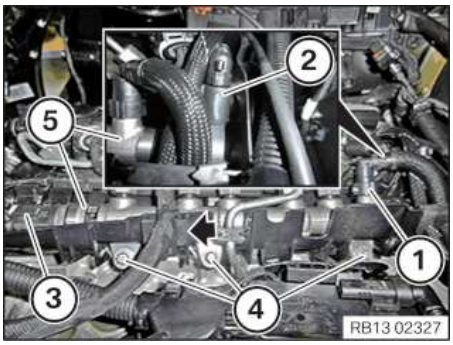


- Read off the adjustment value (1) on the new injector (2).



- Connect diagnosis system:
  - Vehicle identification
  - Function selection
  - Service functions
  - Digital diesel electronics (DDE)
  - Adjustment of injectors
  - Testing schedule
- Start service function with the right arrow button.

52 – Installing the rail



- Insert and install the rail (5).
- Tighten the screws (4).

Rail to cylinder head cover

M8		Tightening torque	19 Nm

- Install and lock cable clip (arrow).

  The cable clip (arrow) must engage audibly.
- Connect and lock the connector (3) at the rail pressure sensor.

  The connector (3) must engage audibly.
- Connect and lock the connector (2) at the rail pressure regulating valve.

  The connector (2) must engage audibly.
- Feed in fuel return line (1) and install.

  The fuel return line (1) must audibly engage.

53 – Installing high pressure line between rail and high pressure pump

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

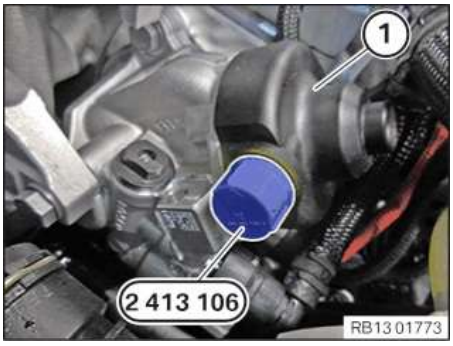
Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

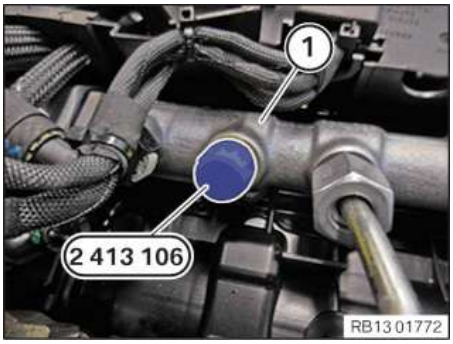
cardiagn.com

TECHNICAL INFORMATION

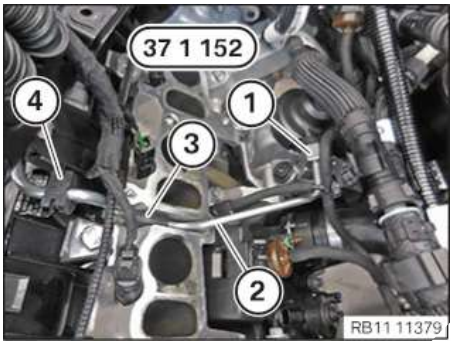
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Feed out and remove special tool on the high pressure pump (1).



- Feed out the special tool on the rail (1) and remove.



- Insert and install the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).
- Hand-tighten the union nut (1) on the high pressure pump.



- Hand-tighten the union nut (1) on the rail.

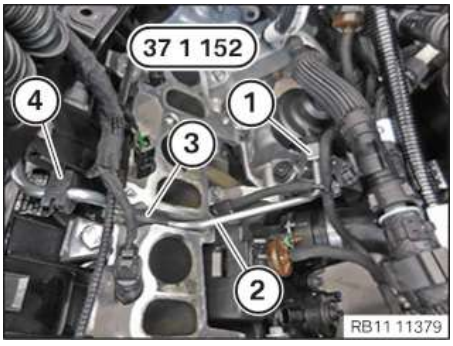
TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten the union nut (1) with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm



- Make sure that the high pressure line (2) is correctly installed with the abrasion protection (3) and the rubber mount (4).

TECHNICAL INFORMATION

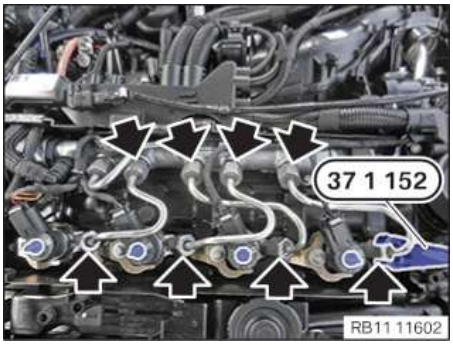
Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten union nut (1) on the high pressure pump with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm

cardiagn.com



- Remove the special tool from all cable connections.
- Feed in and install the high pressure lines (arrows).
- Hand-tighten the high pressure lines (arrows).

TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

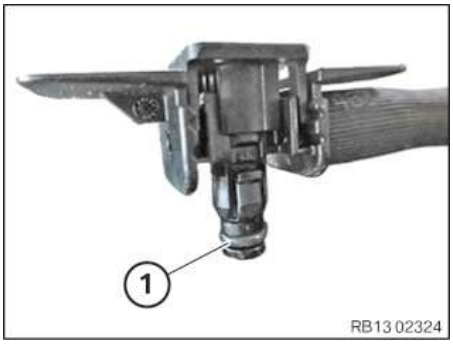
- Tighten the high pressure lines (arrows) with the special tool .

High pressure lines between injector and rail

High-pressure pipe		Tightening torque	24.5 Nm

- Check the high pressure lines (arrows) for tightness (**visual inspection**).

55 – Attach the leakage oil line on the injectors

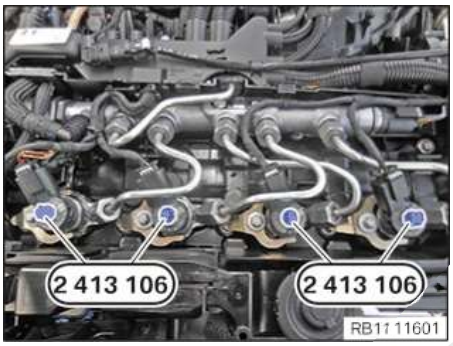


- **Version A:**

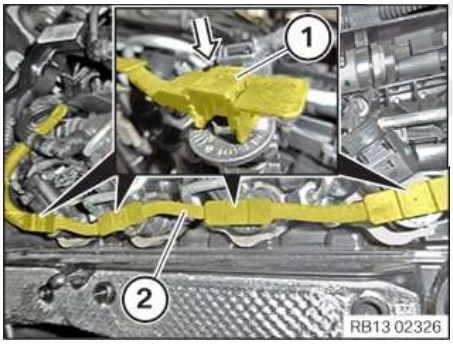
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

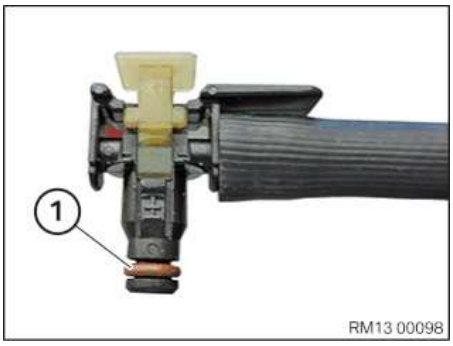
  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.



- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.



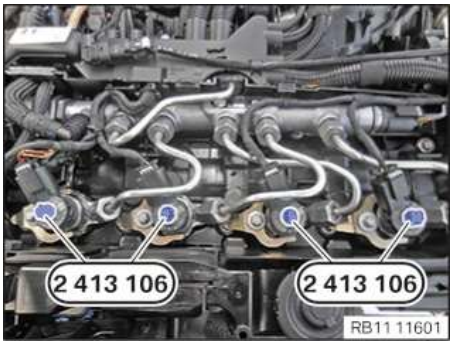
- **Version B**:

  Check sealing ring (1) for damage, renew leakage oil line if necessary.

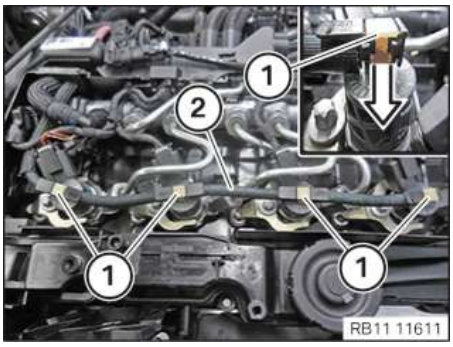
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.

ardiagn.com

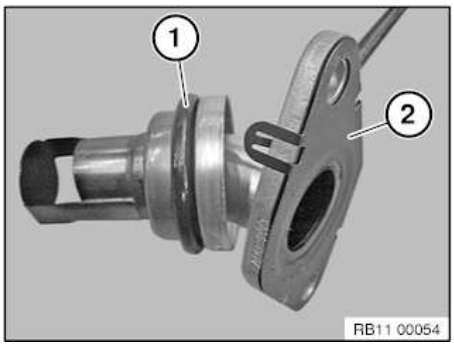


- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.

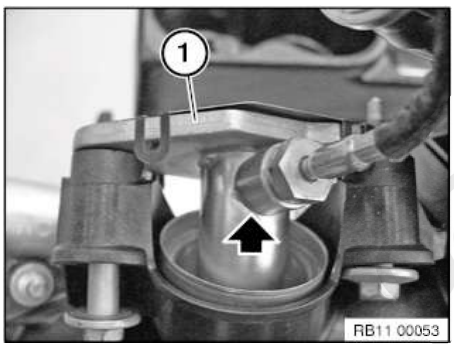
56 – Installing the intake plenum



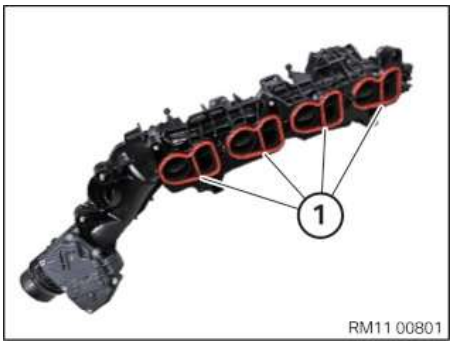
- Renew O-ring (1).

  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

  Parts: Gasket
- Position the seal (2) and clip it in.



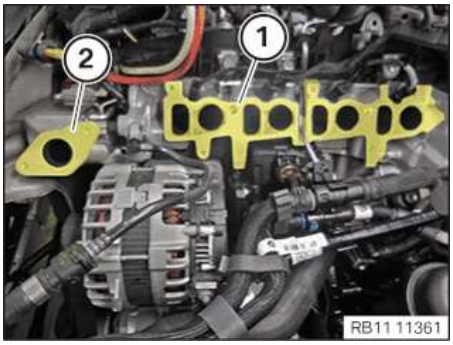
- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).



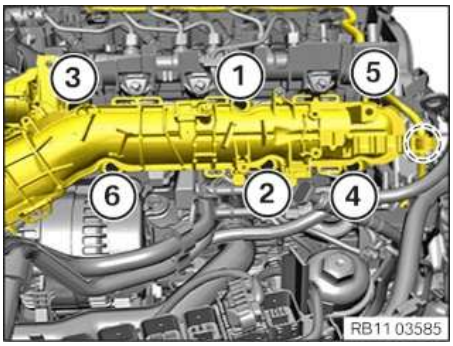
- Renew seals (1).

  Parts: Seals
- Ensure that the seals (1) are firmly mounted on the intake plenum.

cardiagn.com



- Clean connection points (1) at cylinder head.
- Clean the connection point (2) on the exhaust-gas recirculation cooler.

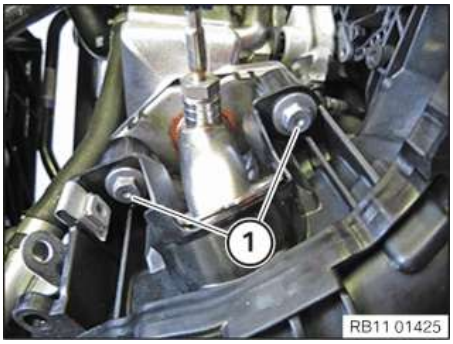


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

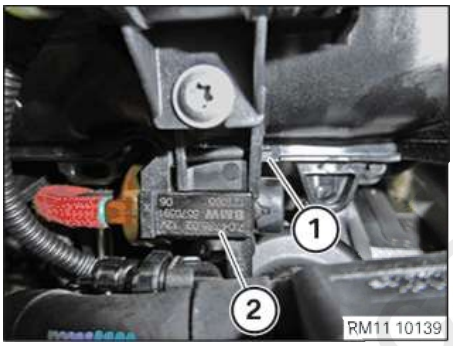
- Attach the wiring harness and fuel lines in the marked area on the intake plenum.



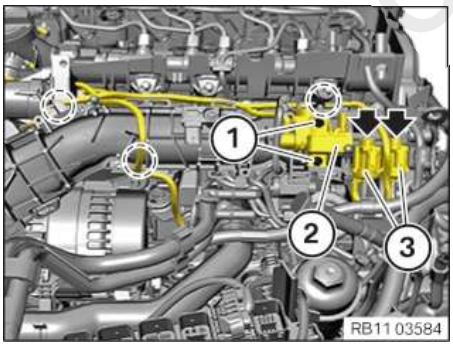
- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm



- Install electric changeover valve (2) from the left to the right in the holder on the intake plenum.
  The lock (1) must audibly engage.



- Install intake plenum electric changeover valve (3) on the intake plenum.
  The locks (arrows) must engage audibly.
- Position the electric changeover valve (2) on the intake plenum.
- Tighten the screws (1).

Electric changeover valve to intake plenum

TS6x20		Tightening torque	5 Nm

- Fasten the vacuum hoses on the intake plenum in the marked areas.



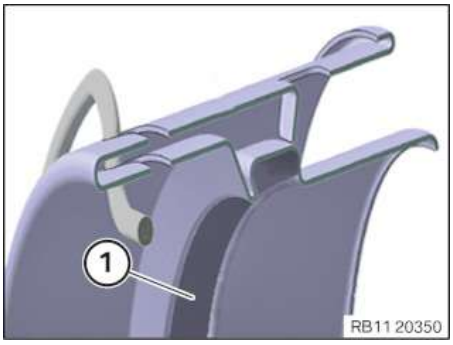
- Check the seal (1) for damage, and renew if necessary.

gardiagn.com

▸ **Replacing damaged seal**

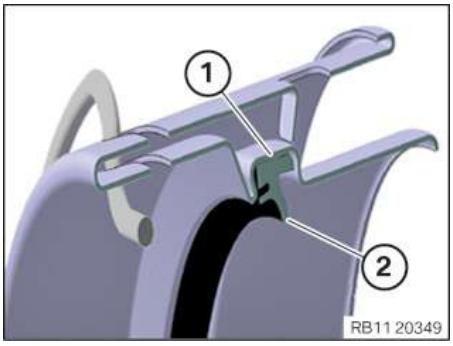
TECHNICAL INFORMATION

Do not use pointed or sharp-edged tools for the installation and/or removal.



- Remove damaged seal.
- Clean gasket groove (1) with a dry towel.

  The gasket groove (1) must be clean.



- Renew gasket.

  Parts: Gasket
- Install seal dry without lubricant or mounting agent.

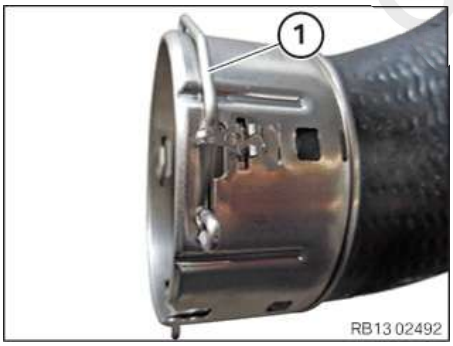
TECHNICAL INFORMATION

Incorrect assembly is possible. Ensure correct installation position.

- Feed in and install the seal.
- Make sure the seal is correctly installed in the gasket groove (1).
- Make sure that the sealing lip (2) is directed inwards as shown.



- Connect the pressure pipe to the throttle body until the locks (1) engage on both sides.



- Check that the locks (1) are correctly seated on the pressure pipe.

57 – Partially securing the wiring harness section on the intake plenum

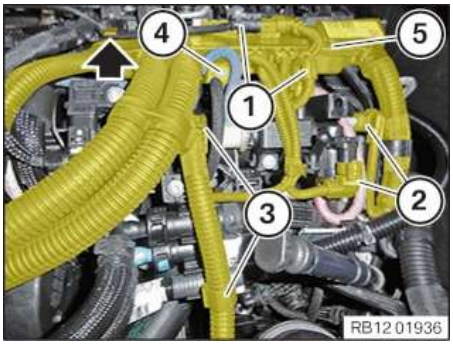
RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

- Route all cables without abrasions, do not trap and crush.

cardiagn.com



- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

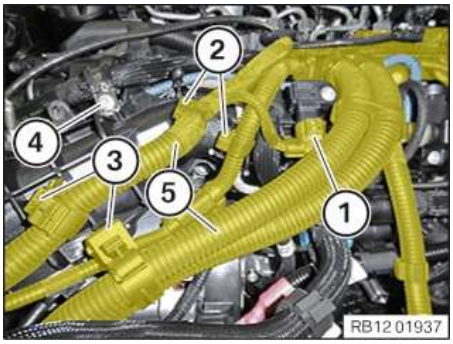
Wiring harness section to manifold

TS5x20		Tightening torque	3,6 Nm

- Secure clamps (3).
- Connect connectors (2) and lock.

  The connectors (2) must engage audibly.
- Secure the line at clamp (Arrow).
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



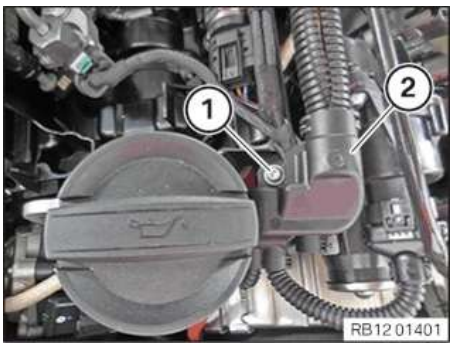
- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

Standard screw connection 4 Nm

Oval-head screw		Tightening torque	4 Nm

- Secure clamps (3).
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



- Guide in the wiring harness section (2) and install.
- Tighten down screw (1).

Wiring harness section to cylinder head cover

TS5x20		Tightening torque	3,6 Nm



- Connect connectors (1) and lock.

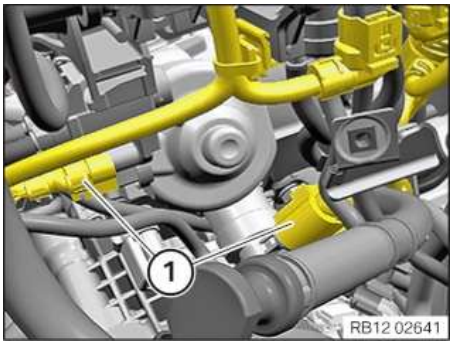
  The connector (1) must engage audibly.



- Connect the connector (1) and lock it.

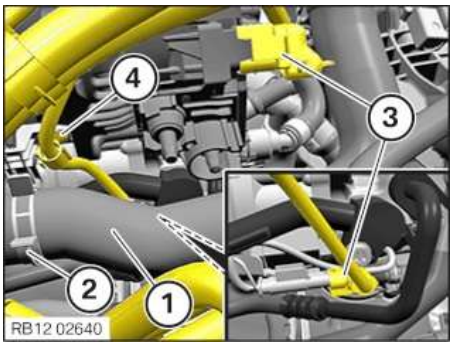
  The connector (1) must engage audibly.

cardiagn.com



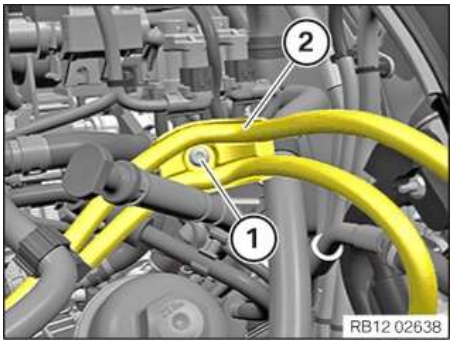
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



- Secure the clamp (4).
- Connect connectors (3) and lock.

  The connectors (3) must engage audibly.
- Feed the coolant line (1) into the holder (2) and install it.



- Feed in and position the positive battery cables (2) .
- Tighten down screw (1).

Standard screw connection M6

M6		Tightening torque	8 Nm



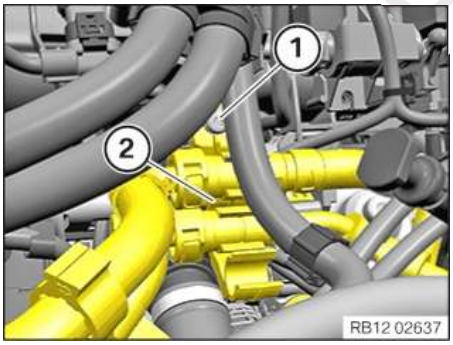
- Feed in and install the positive battery cable (4).
- Feed in and position the positive battery cables (4) .
- Renew the nuts (3) and (2).

  Parts: Nuts
- Tighten nuts (3) and (2).

Battery positive lead on the starter motor generator

M8		Tightening torque	19 Nm

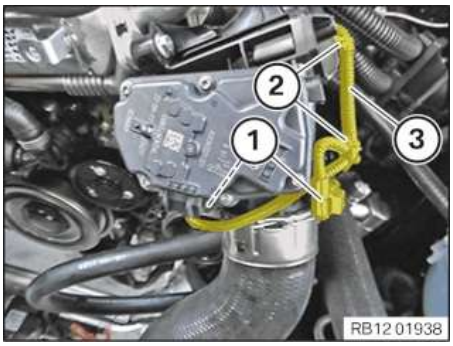
- Guide in and install the lid (1).



- Insert and install the holder (2).
- Tighten down screw (1).

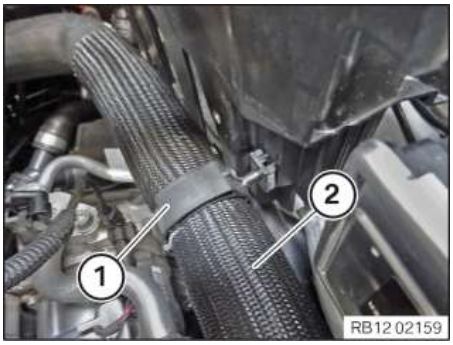
Holder on intake plenum

TS6X20		Tightening torque	5 Nm



- Guide in the wiring harness section (3) and install.
- Secure clamps (2).
- Connect connectors (1) and lock.

cardiagn.com



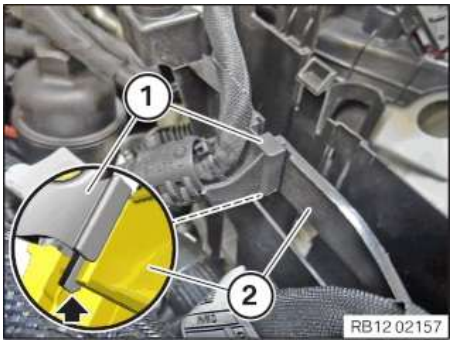
- Feed in and install coolant line (2).
- Lock holder (1).

  The holder (1) must engage audibly.



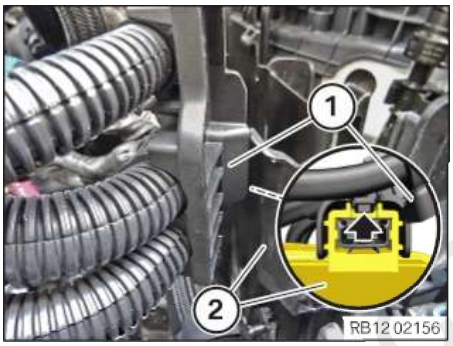
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.



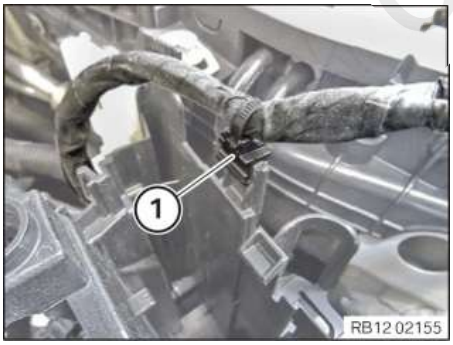
- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.

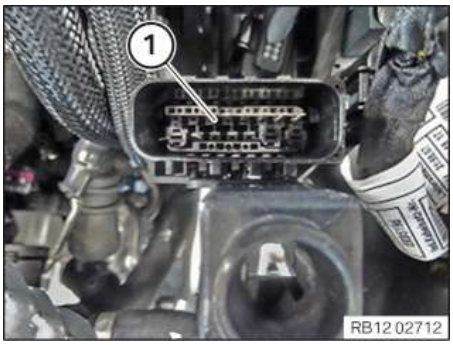


- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.



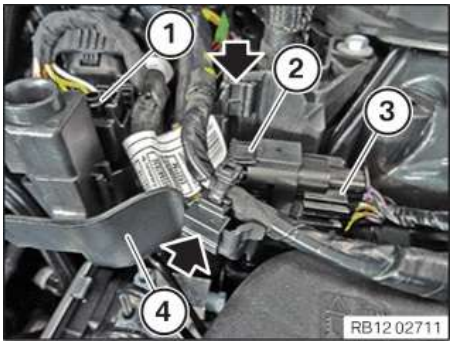
- Secure clamps (1).



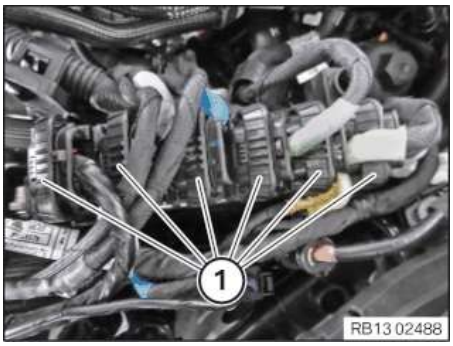
- Feed in and install the connector (1).

  The connector (1) must engage audibly.

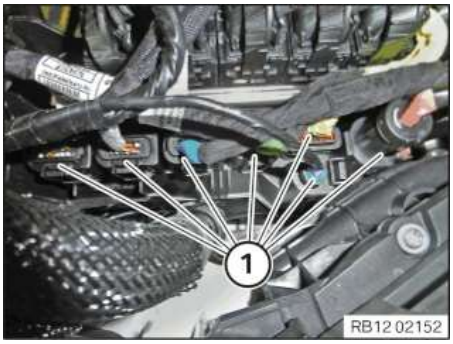
cardiagn.com



- Connect connector (3) to control unit holder (4) and lock it.
  The connector (3) must engage audibly.
- Connect connectors (2) and lock.
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.
  The connector (1) must engage audibly.
- Secure the clamps (arrows).

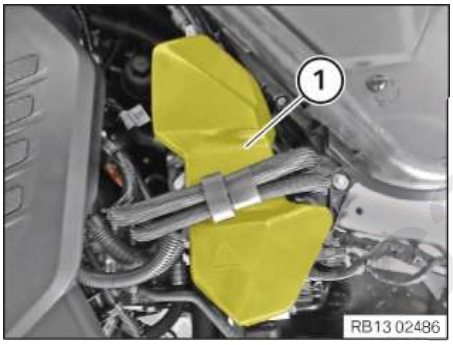


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



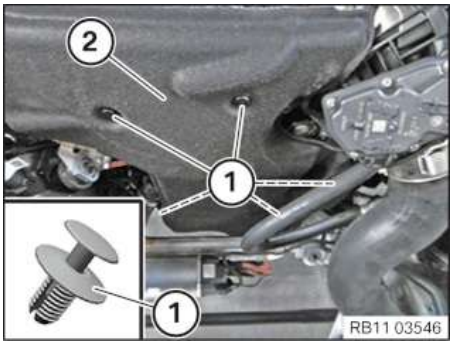
- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.

58 – Install the cover for the DDE control unit



- Insert and install cover (1) into guides.

59 – Install acoustic cover for the engine, front



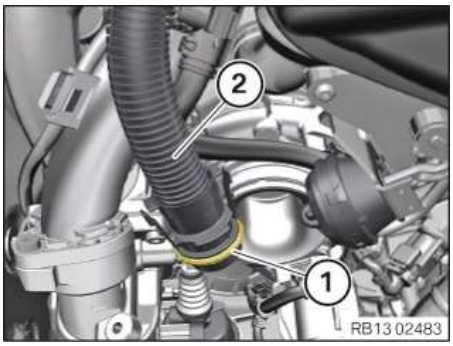
- Feed the acoustic cover (2) in and install.
- Secure the acoustic cover (2) with the expanding rivets (1).

60 – Installing the clean air pipe with resonator

cardiagn.com



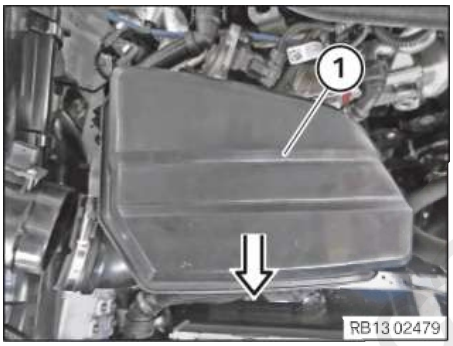
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



- Check the sealing ring (1) for the engine ventilation line (2) for damage and renew where required.



- Feed in and install clean air pipe with resonator (1) in the direction of the arrow.

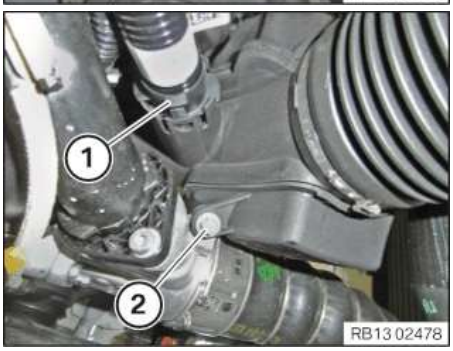


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

  The clamp (1) must engage audibly.

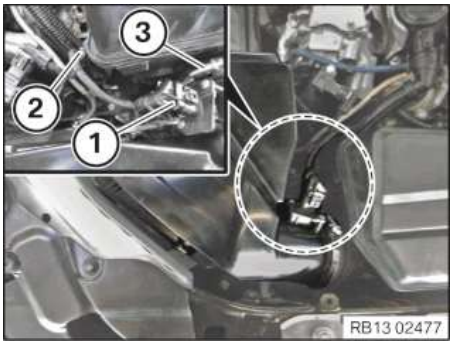


- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm

cardiagn.com



- Connect the clean air pipe with resonator to the intake filter housing.
- Tighten clamp (3).

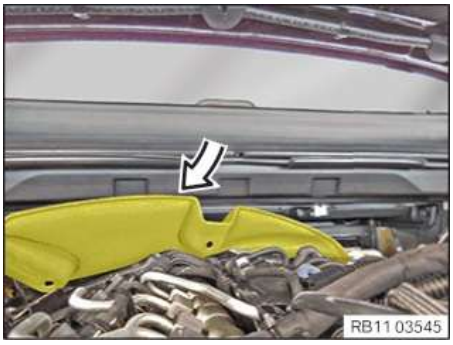
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

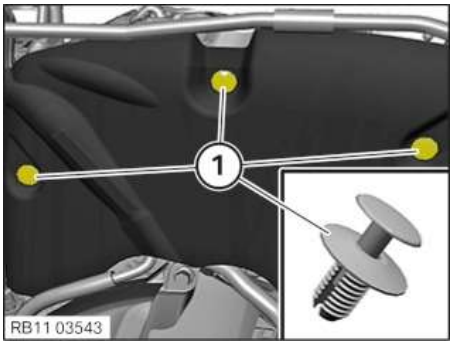
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

61 – Installing acoustic cover at rear

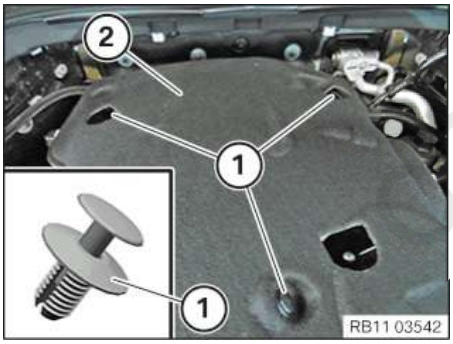


- Guide in the acoustic cover in the direction of the arrow and install it.



- Secure acoustic cover with the expanding rivets (1).

62 – Install the acoustic cover for the injectors



- Feed the acoustic cover (2) in and install.
- **If installed:** Secure the acoustic cover (2) with the expanding rivets (1) .

63 – Install acoustic cover

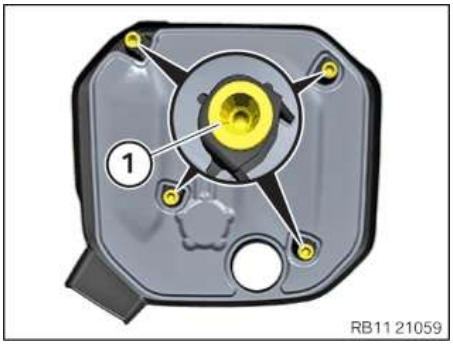
RISK OF DAMAGE

Damage to the acoustic cover/design cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.

cardiagn.com

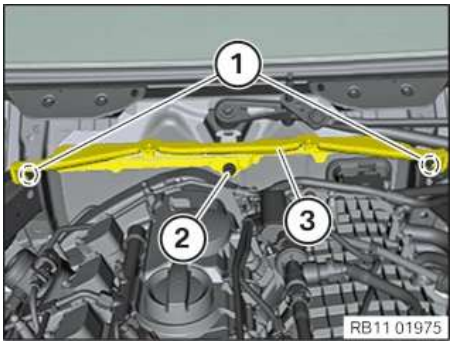


- Check the acoustic cover for correct fit of the rubber mounts (1).



- Clip in the acoustic cover (1) into the holders in the indicated areas.

64 – Installing centre bulkhead lower section

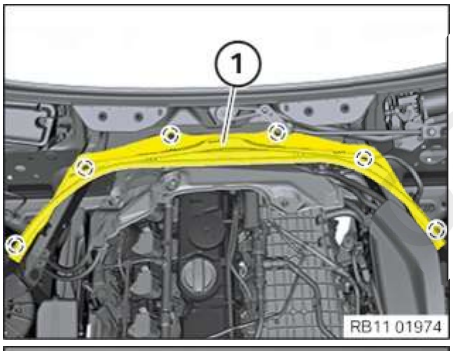


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

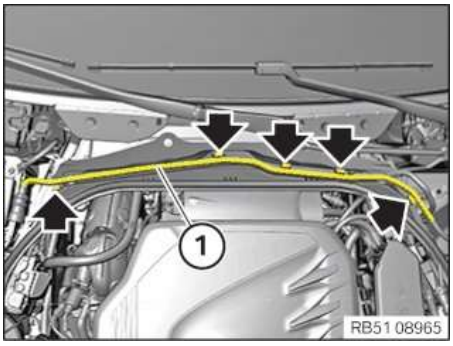
65 – Installing the centre bulkhead upper part



- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

Bulkhead upper part to bottom bulkhead

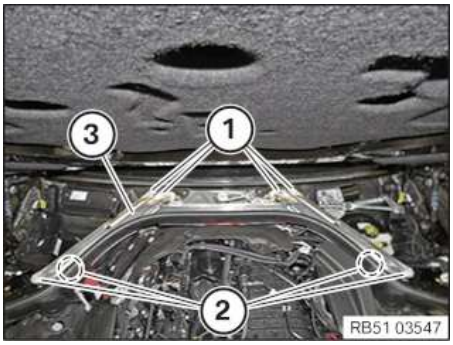
		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

  Clip in the wire (1) into the holders (arrows).

bardiagn.com



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Install the tension strut (3) on the spring strut dome.
- Tighten the screws (1).

Tension strut on bulkhead

M10x25 screw		Tightening torque	56 Nm

- Renew screws (2).

  Parts: Screws
- Tighten the screws (2).

Tension strut to spring strut dome

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

66 – Install the seal for the bonnet



- Press the rear bonnet seal (2) into the guide.
- Feed in cable (1) into the brackets.
- Check that the rear bonnet seal (2) and the cable (1) are seated correctly.

67 – Installing cowl panel cover

RISK OF DAMAGE

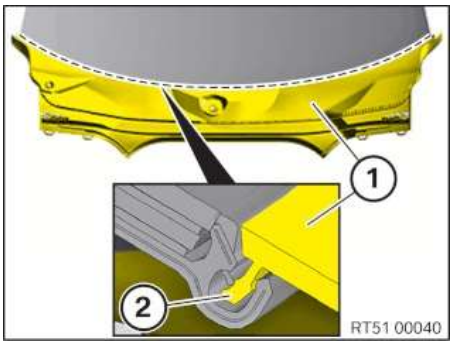
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

- Ensure correct installation of the components.
- Only use undamaged components.

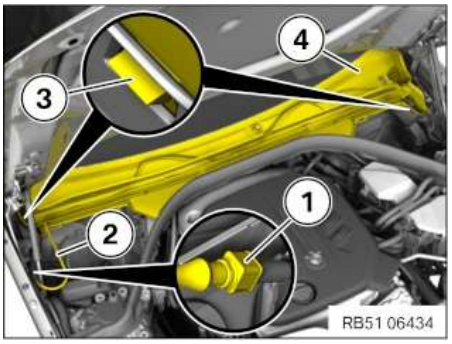
TECHNICAL INFORMATION

Before installing the cowl panel cover it is **mandatory** to check that the 48 V line is routed correctly and fitted tightly.
An incorrectly laid or attached 48 V line can be damaged by the wiper kinematics.



- Push the cowl panel cover (1) into the latch mechanism (2) beginning on the side.

cardiagn.com



- Clip cowl panel cover (4)in by means of the latch mechanisms (3).
- Position windscreen wash hose (2) and connect windscreen wash hose (1)quick lock.

68 – Install left and right wiper arm

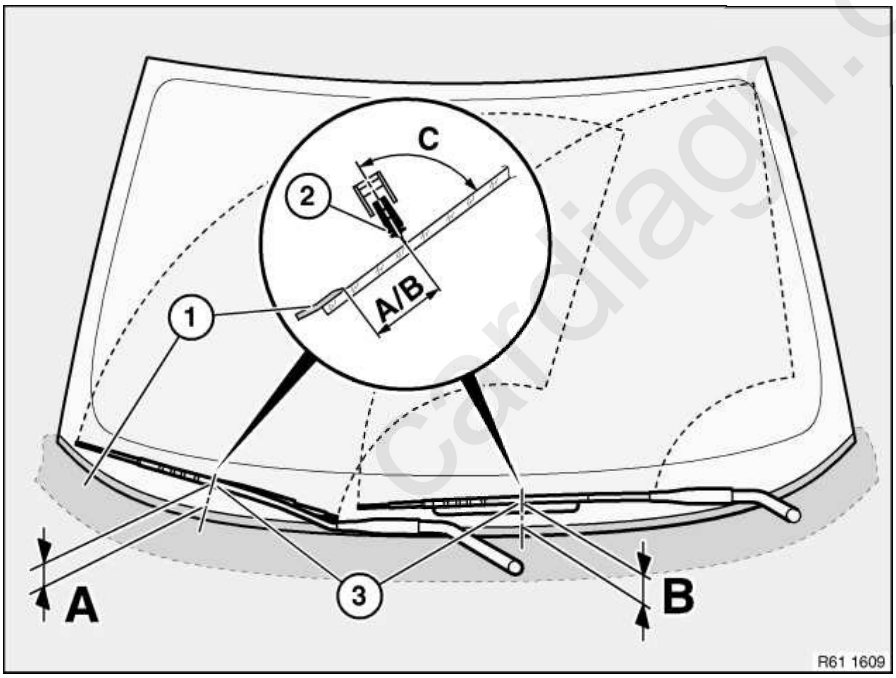
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

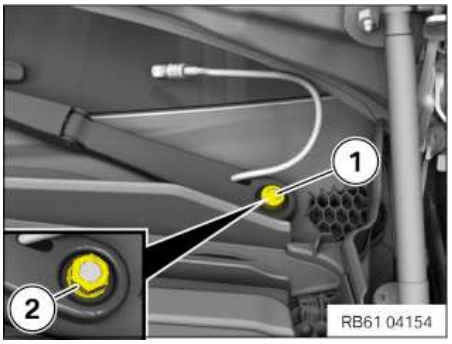
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- Connect the wiper arm (3).
- Correctly position the wiper arm (2) in relation to the window edge (1).

Distance from window pane edge to wiper blade

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm



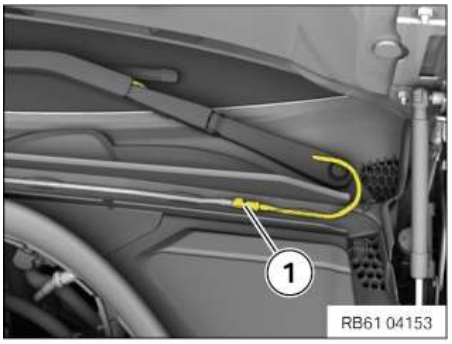
- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

- Connect the protective cap (1).

cardiagn.com



- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

69 – Connecting all battery earth leads



- See additional information.

70 – Activating the 48 V electrical system

Prerequisite

Ignition is switched off.

RISK OF DAMAGE

Damage to 48-V battery

If a 48-V battery that is disconnected from the electrical system is activated, the battery electronics will be damaged.

- Only carry out activation of the 48V electrical system with a completely connected 48-V battery.



- Lift battery earth lead (1).
- Remove special tool .



- Release the negative battery cable (2) of the 48-V battery from the mounting.
- Position the negative battery cable (2) of the 48-V battery on the negative battery terminal.
- Tighten nut (1).

Negative battery cable to 48-V battery

Nut M8		Tightening torque	19 Nm

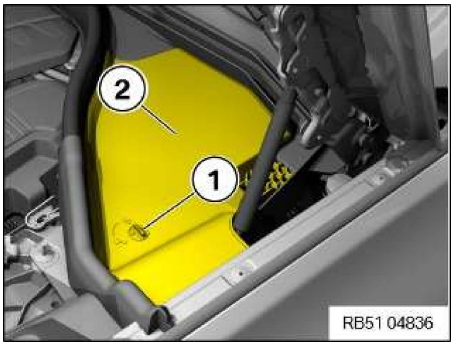


- Connect the connector (1) of the CAN bus and lock it.
- Clip in clip (2).



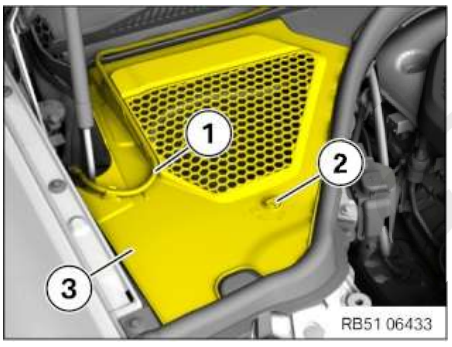
- Activate the 48V electrical system by closing the bonnet.
  The activation takes place automatically.

71 – Install the cover of the engine compartment on the rear left



- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

72 – Install the rear right engine compartment cover



- Position the cover of the engine compartment on the rear right (3).
- Close lock (2).
- Insert washer fluid hose (1) into the guides.

73 – Take bonnet out of the service position

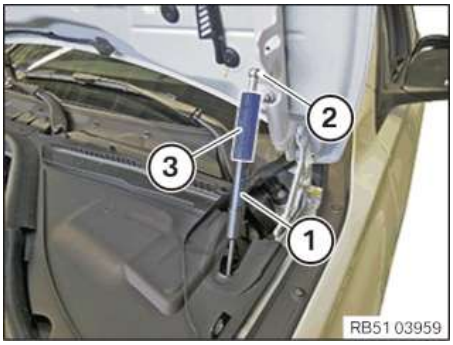
CAUTION

Shutting bonnet or tailgate.

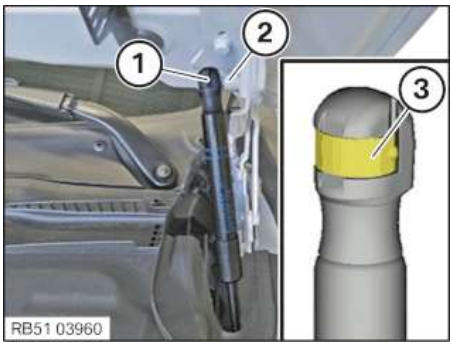
Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.

cardiagn.com



- Support the bonnet by hand.
- Remove the special tool (3) from the ball pin (2).
- Pull off the special tool (3) from the gas pressure spring (1).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.



- Check the clamp (3) is fitted correctly.
- Connect ball socket (1) to ball pin (2).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.

Additional Information

Overview of Tightening Torques

Special tool 2 365 488 to engine			Used in step 36
M8x60		Tightening torque	19 Nm

Starter motor to engine			Used in step 39
M8X60		Tightening torque	19 Nm

Battery positive lead to starter			Used in step 39
M8		Tightening torque	13,5 Nm

Underbody protection			Used in step 4042
Hexagon screw		Tightening torque	3 Nm

Underbody panelling			Used in step 41
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Underbody protection, steering, to front axle support			Used in step 43
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support			Used in step 43
Hexagon bolt M6		Tightening torque	8 Nm

Underbody protection of the steering gear			Used in step 44
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

Wheel arch trim panel, front			Used in step 44
Thermoplastic hexagon screw		Tightening torque	2,6 Nm

cardiagn.com

Underbody protection front — Used in step 45

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Cylinder head cover to cylinder head — Used in step 46

M6		Tightening torque.	8,5 Nm

Heat shield to exhaust manifold — Used in step 47

M6x12			10 Nm

Bracket on cylinder head cover — Used in step 48

		Tightening torque	5 Nm

Battery positive lead to battery positive terminal — Used in step 48

M8		Tightening torque	19 Nm

Differential pressure sensor of diesel particulate filter on cylinder head cover — Used in step 49

TS5x20		Tightening torque	4 Nm

Heat shield to exhaust manifold — Used in step 50

M6x12		Tightening torque	10 Nm

Banjo bolt for exhaust pressure pipe to exhaust manifold — Used in step 50

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm

Exhaust gas pressure pipe to sensor system holder — Used in step 50

TS6x20		Tightening torque	5,7 Nm

Clamping claw facing to cylinder head cover — Used in step 51

M6		Tightening torque	10 Nm

Injector to cylinder head cover — Used in step 51

M8		Tightening torque	8 Nm
		Angle of rotation	120 °

Rail to cylinder head cover — Used in step 52

M8		Tightening torque	19 Nm

High pressure lines between high pressure pump and rail — Used in step 53

High-pressure pipe		Tightening torque	24.5 Nm

High pressure lines between injector and rail — Used in step 54

High-pressure pipe		Tightening torque	24.5 Nm

Intake plenum to cylinder head — Used in step 56

M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum — Used in step 56

		Tightening torque	10 Nm

Electric changeover valve to intake plenum — Used in step 56

TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold — Used in step 57

TS5x20		Tightening torque	3,6 Nm

cardiagn.com

Standard screw connection 4 Nm			Used in step 57
Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover			Used in step 57
TS5x20		Tightening torque	3,6 Nm

Standard screw connection M6			Used in step 57
M6		Tightening torque	8 Nm

Battery positive lead on the starter motor generator			Used in step 57
M8		Tightening torque	19 Nm

Holder on intake plenum			Used in step 57
TS6X20		Tightening torque	5 Nm

Clean air pipe to exhaust turbocharger			Used in step 60
M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing			Used in step 60
Clamp		Tightening torque	3 Nm

Bulkhead lower part to body			Used in step 64
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead			Used in step 65
		Tightening torque	3 Nm

Tension strut on bulkhead			Used in step 65
M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome			Used in step 65
Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm			Used in step 68
Combination hexagon nut		Tightening torque	35 Nm

Negative battery cable to 48-V battery			Used in step 70
Nut M8		Tightening torque	19 Nm

Overview of Special Tools

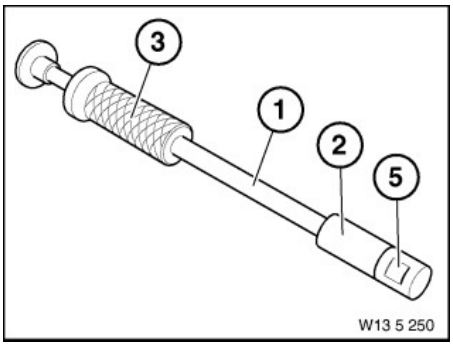
0 493 339 (13 5 252) Bush



Common		Used in step 23
Usage	(Threaded bush)	
Included in the tool or work	0 493 321	
Storage location		
Replaced by		
In connection with		
SI-Number		

cardiagn.com

0 493 321 (13 5 250) Puller



Common Used in step 23

Usage	For removing injector nozzles or injectors from cylinder head
Included in the tool or work	
Storage location	A16
Replaced by	
In connection with	
SI-Number	01 06 98 (306)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 338 (13 5 251)		**Rod** (guide rod)	
2	0 493 339 (13 5 252)		**Bush** (Threaded bush)	
3	0 493 340 (13 5 253)		**Weight** (Weight)	
4	0 493 379 (13 5 254)		**Claw** (Clamping claw) For removal of injector nozzles / engine: M57	
5	0 495 579 (13 5 255)		**Adapter** For removing steering shaft on E85. Refer to SI 01 11 06 (265)	

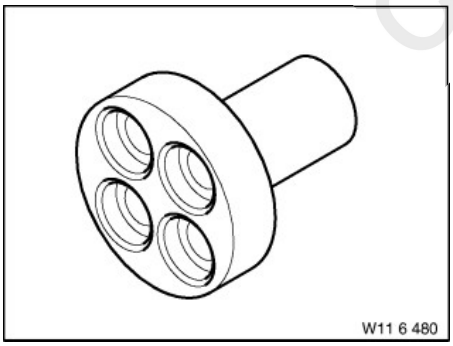
0 493 340 (13 5 253) Weight



Common Used in step 23

Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 380 (11 6 480) Connector

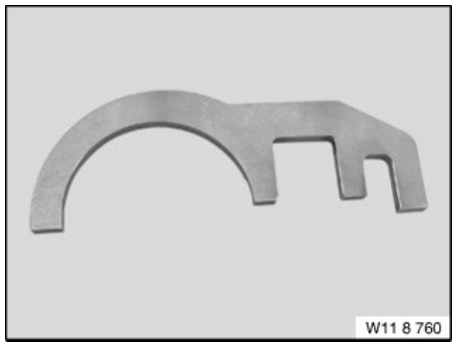


Common Used in step 36

Usage	For turning over engine at crankshaft hub (vibration absorber).
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	01 11 98 (338)

carbiagn.com

0 496 112 (11 8 760) Gauge



Common	Used in step 3637
Usage	For securing camshaft at TDC.
Included in the tool or work	
Storage location	B24
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

2 365 488 Adapter



Common	Used in step 3638
Usage	For disconnecting the crankshaft at the top dead centre. (longitudinal installation with automatic transmission only).
Included in the tool or work	
Storage location	C56
Replaced by	
In connection with	
SI-Number	01 46 14 (191)

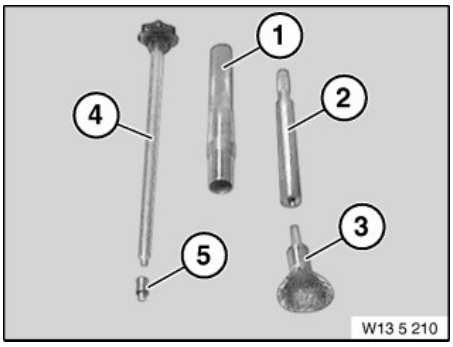
cardiagn.com

2 288 380 Locating stud



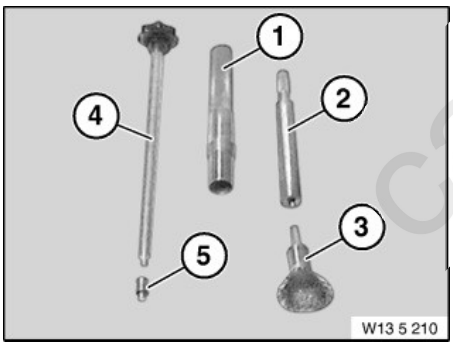
Common	Used in step 3638
Usage	For disconnecting the crankshaft at the top dead centre. Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).
Included in the tool or work	
Storage location	A56
Replaced by	
In connection with	
SI-Number	01 04 14 (071)

0 493 763 (13 5 215) Plug



Common	Used in step 51
Usage	(Seal plug)
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

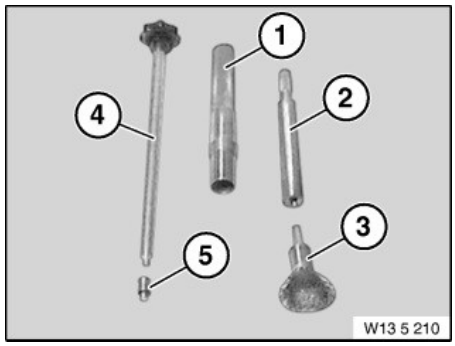
0 493 762 (13 5 214) Rod



Common	Used in step 51
Usage	(Mounting rod) For the seal plug
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

cardiagn.com

0 493 758 (13 5 210) Tool



Common

Used in step 51

Usage	(Cleaning set) For injector channels
Included in the tool or work	
Storage location	B4
Replaced by	
In connection with	
SI-Number	01 05 00 (574)

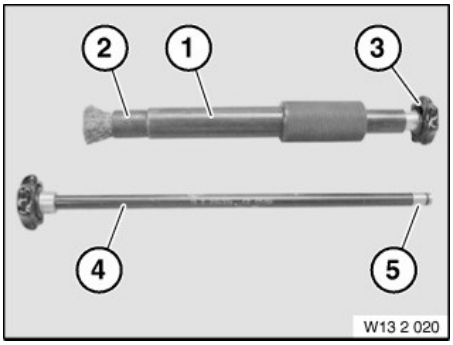
Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 759 (13 5 211)		**Holding sleeve** (Guide sleeve)	
2	0 493 760 (13 5 212)		**Holder** (Brush holder)	
3	0 493 761 (13 5 213)		**Brush head**	
4	0 493 762 (13 5 214)		**Rod** (Mounting rod) For the seal plug	
5	0 493 763 (13 5 215)		**Plug** (Seal plug)	

cardiagn.com

0 496 150 (13 2 020) Tool

Used in step 51



Common

Usage	(Cleaning kit) For cleaning the injector shaft.
Included in the tool or work	
Storage location	A87
Replaced by	
In connection with	
SI-Number	01 07 07 (355)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 496 151 (13 2 021)		**Holding sleeve** (Guide sleeve) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
2	0 496 152 (13 2 022)		**Holder** (Brush holder) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
3	0 496 153 (13 2 023)		**Brush head** Remaining inventories will be sold off, followed by discontinuation and then available as part of complete special tool 13 2 020 = 83 30 0 496 150 only	
4	0 496 154 (13 2 024)		**Rod** (Mounting rod) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
5	0 496 155 (13 2 025)		**Plug** (Seal plug) Available as part of complete special tool 13 2 020 = 83 30 0 496 150 only.	

Overview Technical Data

Distance from window pane edge to wiper blade — Used in step 68

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

Links

Repair instructions (PRE)	Used in step
Notes on 48-V battery	470

General repair instructions	Used in step
11 00 ... Overview of consumables (Electronic Parts Catalogue)	51

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	569
61 20 900 Disconnecting and connecting battery earth lead	569
61 20 900 Disconnecting and connecting battery earth lead	569
61 20 900 Disconnecting and connecting battery earth lead	569

cardiagn.com

61 20 900 Disconnecting and connecting battery earth lead	569
61 20 900 Disconnecting and connecting battery earth lead	569
61 20 900 Disconnecting and connecting battery earth lead	569
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	569
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	569
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	569
61 20 900 Disconnecting and connecting battery earth lead	569
61 20 900 Disconnecting and connecting battery earth lead	569
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	569
61 20 900 Disconnecting and connecting battery earth lead	569
61 20 900 Disconnecting and connecting battery earth lead	569
61 20 900 Disconnecting and connecting battery earth lead	569
61 20 900 Disconnecting and connecting battery earth lead	569
61 20 900 Disconnecting and connecting battery earth lead	569
61 20 900 Disconnecting and connecting battery earth lead	569
61 20 900 Disconnecting and connecting battery earth lead	569
61 20 900 Disconnecting and connecting battery earth lead	569
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	569
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	569
61 20 900 Disconnecting and connecting battery earth lead	569
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	569
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	569
61 20 900 Disconnecting and connecting battery earth lead

11 31 005 Check the timing of the camshaft (s)

PRELIMINARY WORK

1 – Bring front compartment lid in the service position

Prerequisite

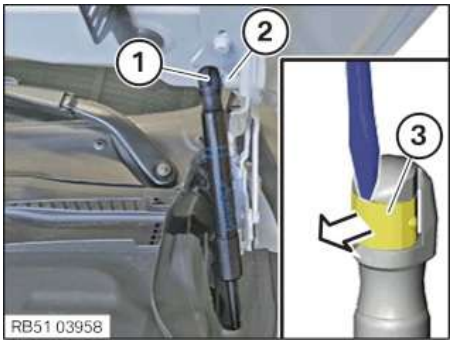
Engine compartment lid is open.

CAUTION

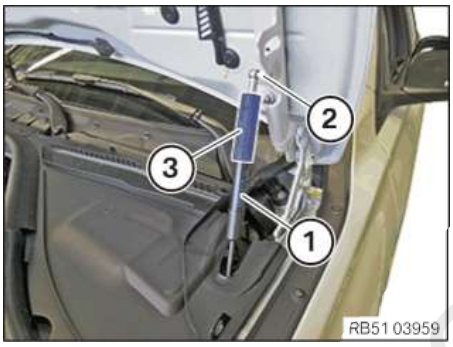
Shutting bonnet or tailgate.

Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.



- Lift clamp (3) slightly using a screwdriver, in the direction of the arrow.
- Lift off ball socket (1) from ball pin (2).
- Repeat the operation on the other side of vehicle.



TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

- Remove the bonnet support and open the bonnet further.
- Pull special tool or or (3) over gas pressure spring (1).
- Place special tool on the ball pin (2) and engage using force.
- Repeat the operation on the other side of vehicle.

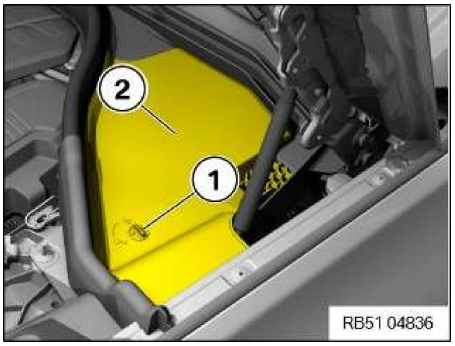
2 – Disconnecting all battery earth leads



- See additional information.

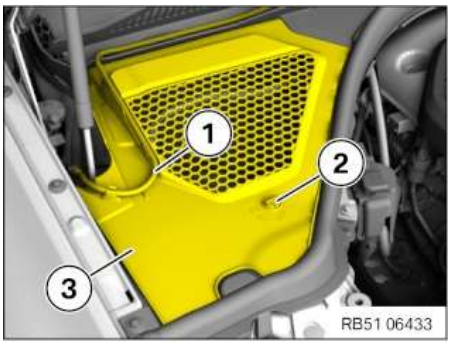
3 – Remove the cover of the engine compartment at the rear left

cardiagn.com



- Loosen the lock (1).
- Remove the cover (2) of the rear left engine compartment.

4 – Remove the cover of the rear right engine compartment



- Release washer fluid hose (1) from the guides.
- Loosen the lock (2).
- Remove the cover (3) of the rear right engine compartment.

5 – Removing the wiper arm on the left and right

NOTICE

Description is for left component only. Procedure on the right side is identical.

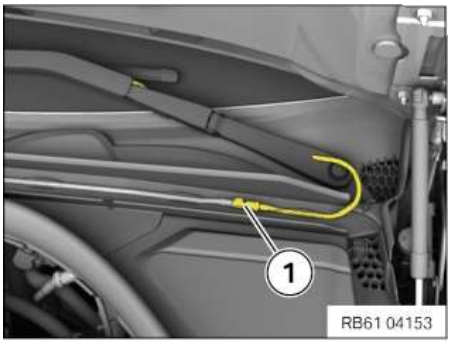
▸ **Remove the wiper arm**

RISK OF DAMAGE

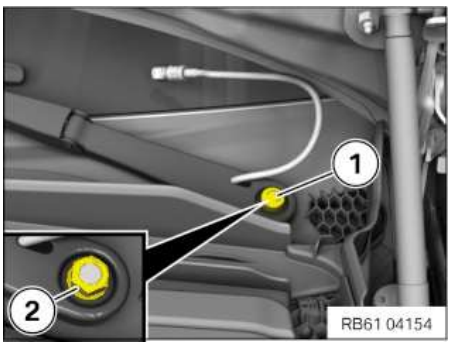
Damage to wiper console.

While removing the wiper arms without using special tool, the wiper console can break.

- Removing the wiper arms must be carried out only using the prescribed special tool.
- Do **not** lever off the wiper arm because otherwise the wiper console may break at the predetermined breaking point for active pedestrian protection.

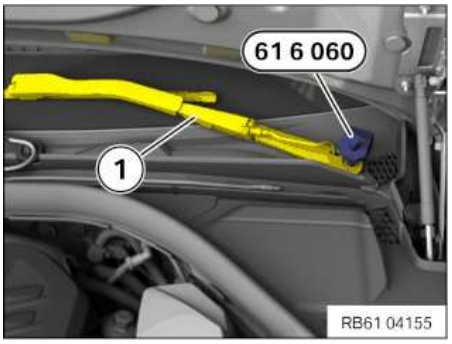


- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.



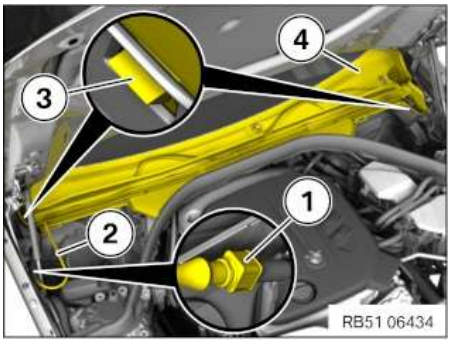
- Remove the protective cap (1).
- Loosen nut (2).

cardiagn.com

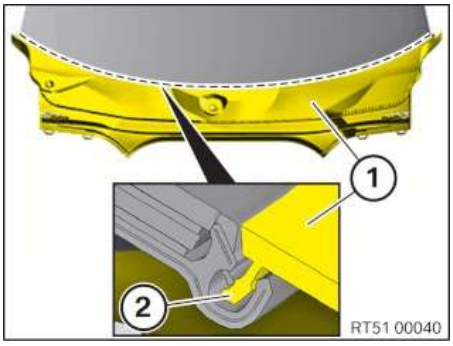


- Pull off the wiper arm (1) using special tool .

6 – Remove cowl panel cover



- Release snap fastener (1) of the washer fluid hose (2) and put the washer fluid hose (2) to one side.
- Unclip clips (3) on the cowl panel cover (4).



- Pull the cowl panel cover (1) upward out of the latch mechanism (2) beginning on the side.

7 – Remove the seal for the rear bonnet

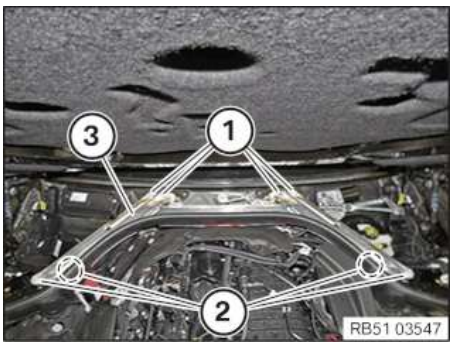


- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

8 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

Driving without the strut brace/front-end strut or tension strut is not permitted.

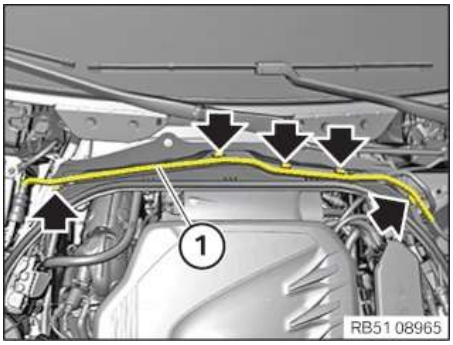


NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

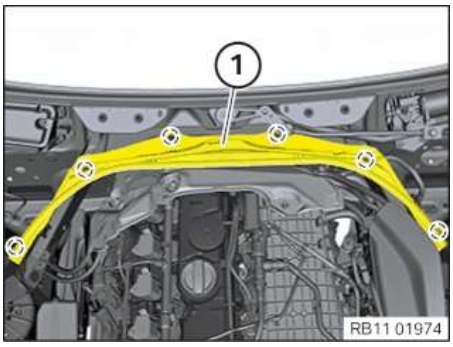
- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.

bardiagn.com



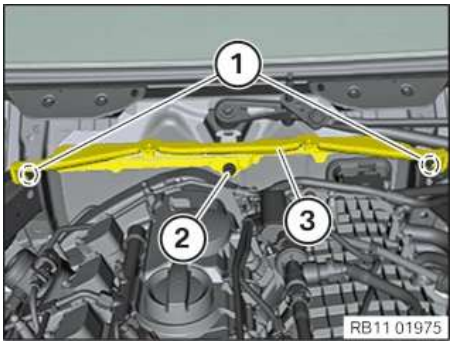
- **Version with mild hybrid technology:**

  Unclip the wire (1) at the holders (arrows).



- Unscrew the bolts in the marked areas.
- Remove the centre bulkhead upper part (1).

9 – Removing the centre bulkhead lower section



- Loosen screws (1).
- Loosen nut (2).
- Remove the centre bulkhead lower part (3).

10 – Removing the acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

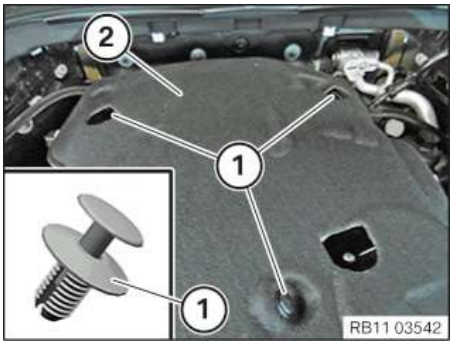
- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

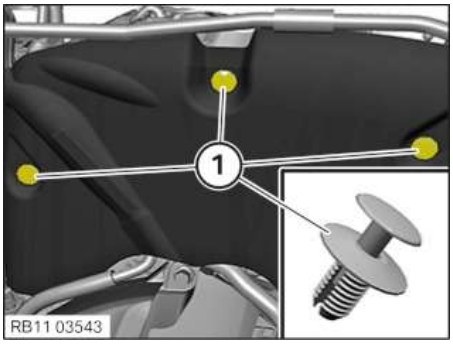
11 – Remove the acoustic cover for the injectors

cardiagn.com

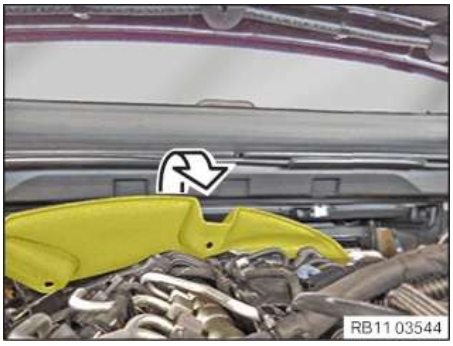


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

12 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).



- Guide out and remove the acoustic cover in the direction of the arrow.

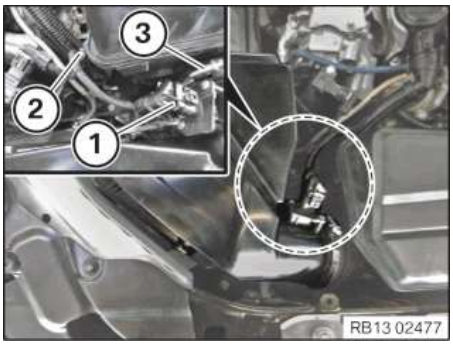
13 – Removing the clean air pipe with the resonator

WARNING

Hot surfaces.

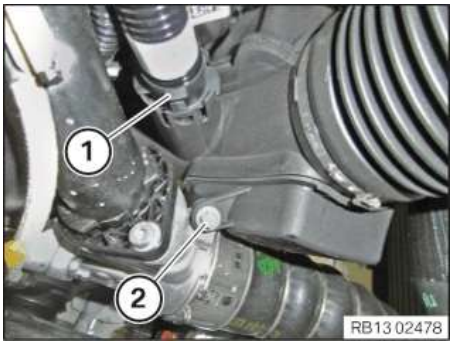
Risk of burning!

- Perform all work only on components that have cooled down.

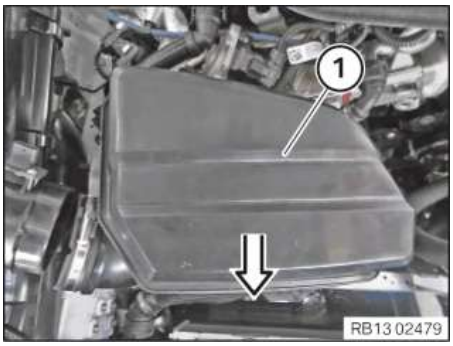


- Unlock plug connection (1) and disconnect.
- Loosen clamp (2).
- Unfasten clamp (3).
- Separate the clean air pipe with resonator from the intake filter housing.

cardiagn.com



- Unlock engine ventilation line (1), disconnect it and place it aside.
- Loosen screw (2).



- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Unlock and loosen clamp (1).



- Feed out and remove clean air pipe with resonator (1) in the direction of the arrow.

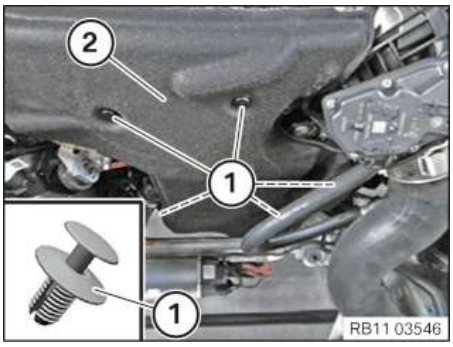
14 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.



- Release and remove expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

cardiagn.com

15 – Partially releasing the wiring harness section on the intake plenum

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

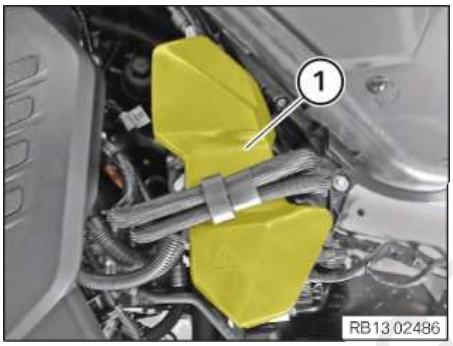
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

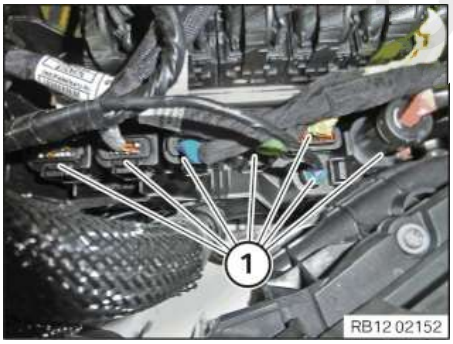
- Do not pull on the wires when disconnecting connectors and plug connections.

TECHNICAL INFORMATION

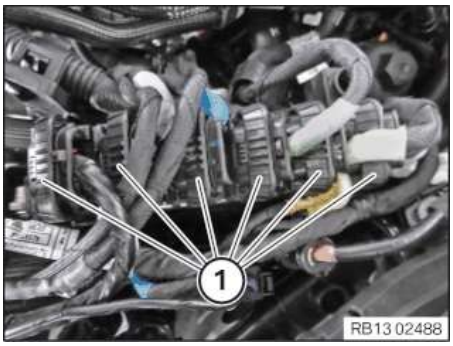
Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.



- Pull off cover (1) upwards, feed out and remove.

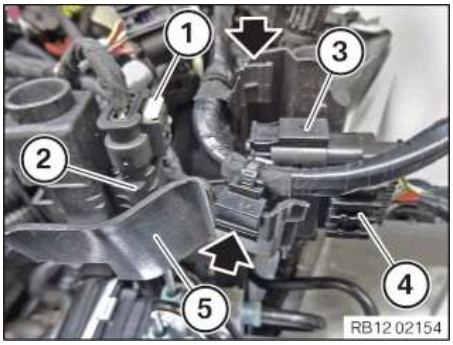


- Unlock and disconnect plug connections (1).

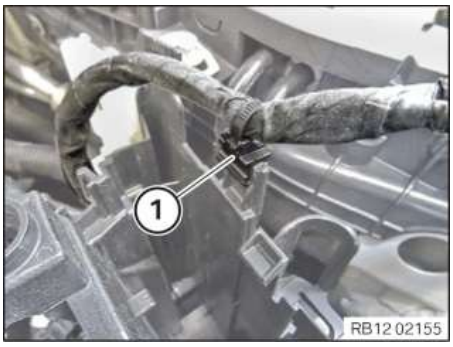


- Unlock and disconnect plug connections (1).

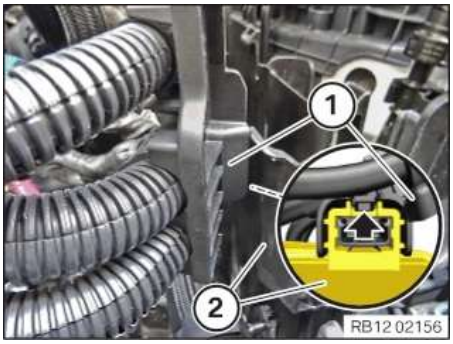
ardiagn.com



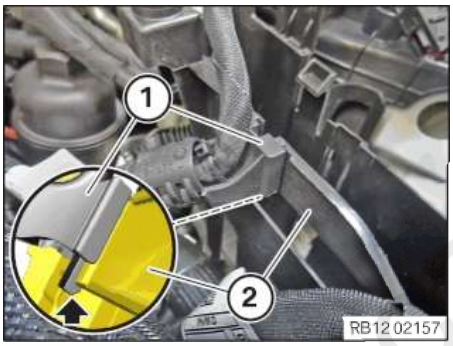
- Unlock plug connection (1) and disconnect.
- Unlock the plug (2) and disconnect from the control unit holder (5).
- Unlock plug connection (3) and disconnect.
- Unlock the plug (4) and disconnect from the control unit holder (5).
- Release the clamps (arrows).



- Loosen clamp (1).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).

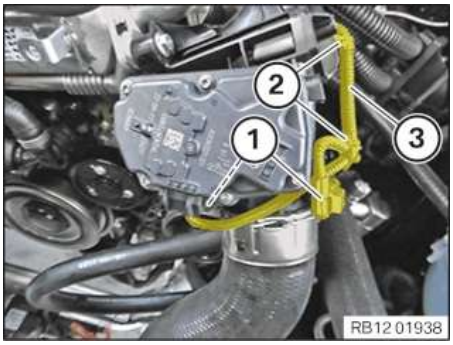


- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.

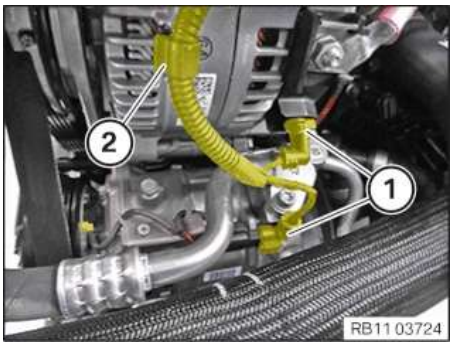


- Unlock holder (1) and feed out coolant line (2) and place it aside.

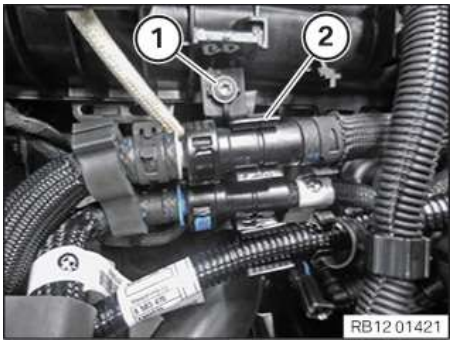
gardiagn.com



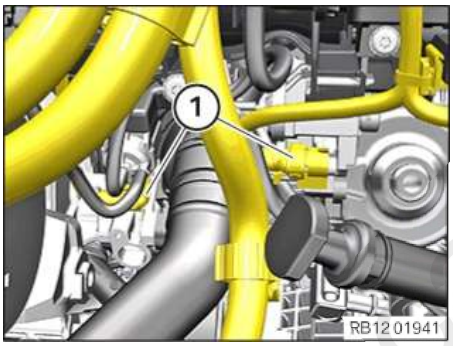
- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.



- Unlock and separate plug connections (1).
- Release the holder (2) from the alternator .



- Loosen screw (1).
- Thread out holder (2) and set aside.



- Unlock and disconnect plug connections (1).

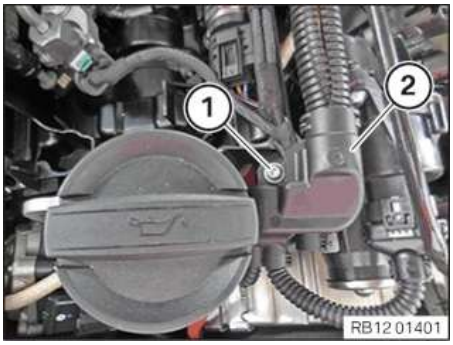


- Unlock and loosen connector (1).

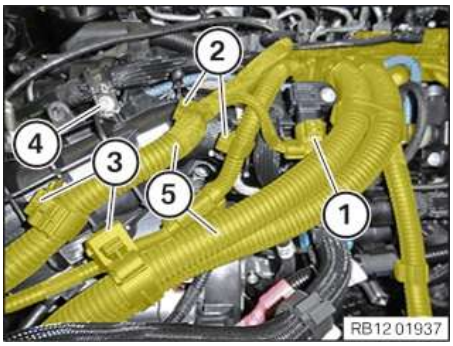


- Unlock plug connection (1) and disconnect.

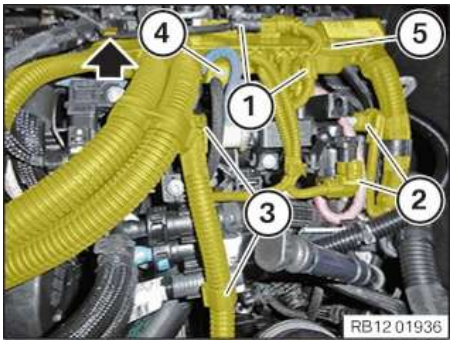
cardiagn.com



- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.



- Unlock plug connection (1) and disconnect.
- Loosen clamps (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.



- Unlock and disconnect plug connections (1).
- Release line from clamp (Arrow).
- Unlock and disconnect plug connections (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.

16 – Removing the intake plenum

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

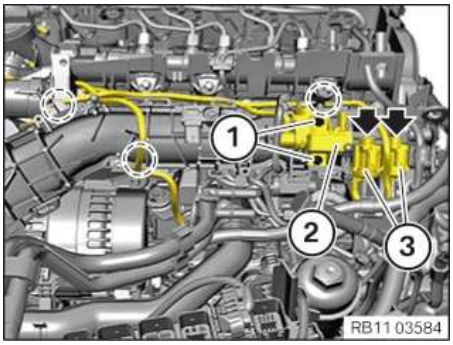


- Unlock clamp (1) and engage in this position.

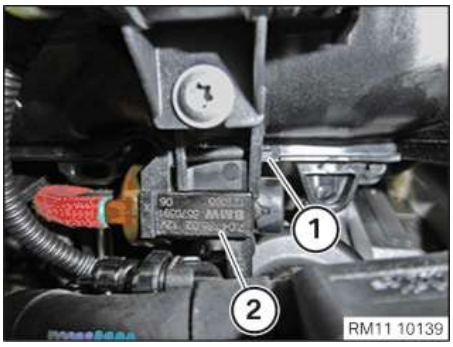


- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.

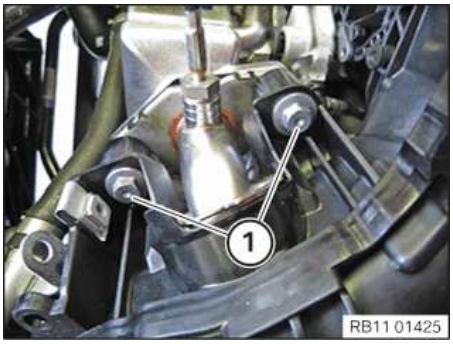
cardiagn.com



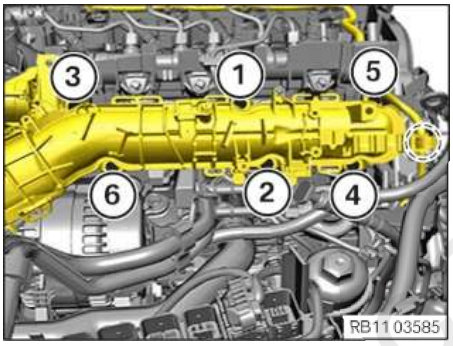
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



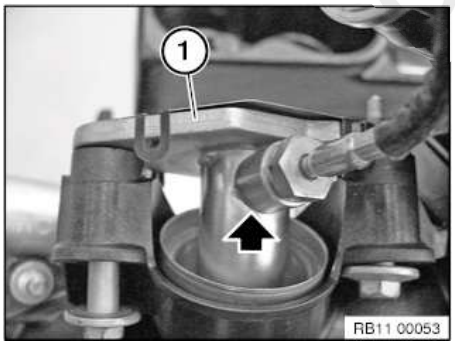
- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.



- Loosen screws (1).



- Detach the leakage oil lines in the marked area from the intake plenum.
- Loosen screws in the order (6) to (1).
- Guide the intake plenum out forwards and remove it.



- Remove the exhaust-gas recirculation pipe (1) (arrow).

17 – Detaching the leakage oil line from the injectors

cardiagn.com

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

WARNING

Hot surfaces.

Risk of burning!

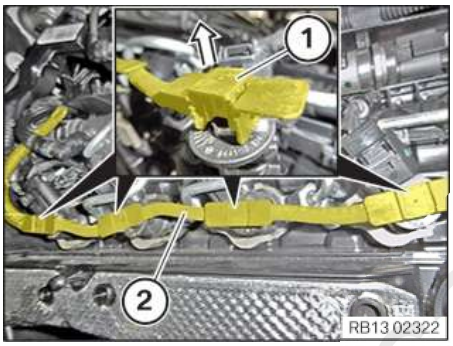
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

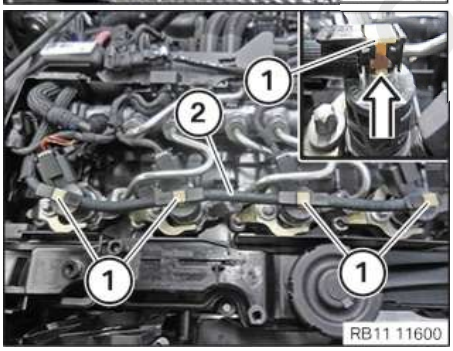


- **Version A:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.

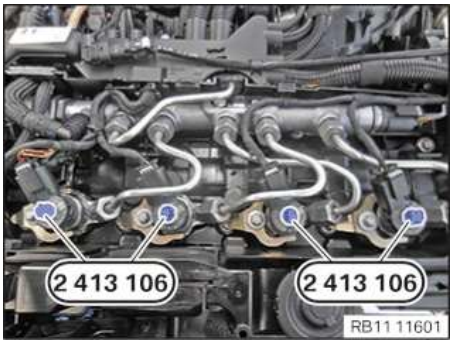


- **Version B:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.



- Seal open connections with special tools .

18 – Remove the high pressure lines between the injector and the rail

cardiagn.com

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

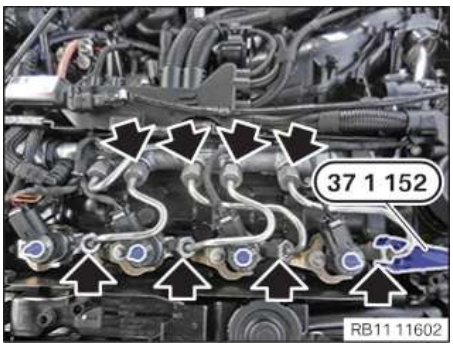
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

If several high pressure lines are removed, ensure that each high pressure line is installed in its original location. Label high pressure lines.

TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.



- Release the high pressure lines (arrows) with the special tool .
  Reset the special tool early on to prevent bending of the high pressure line.
- Catch and dispose of escaping fuel.
- Feed out and remove the high pressure lines (arrows).
- Seal off all the open cable connections with the special tool .

cardiagn.com

19 – Remove the high pressure line between the high pressure pump and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Hot fluids.

Risk of scalding!

- Conduct all work in the vehicle wearing appropriate personal protective equipment only.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

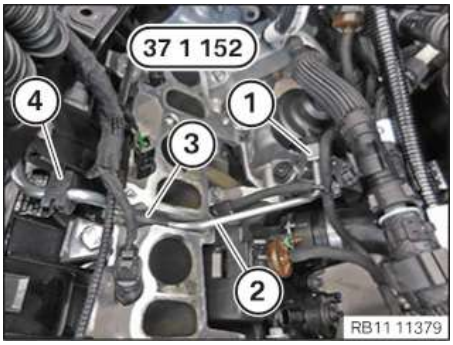
TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.

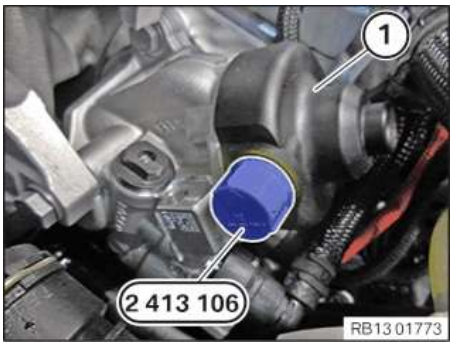


- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.

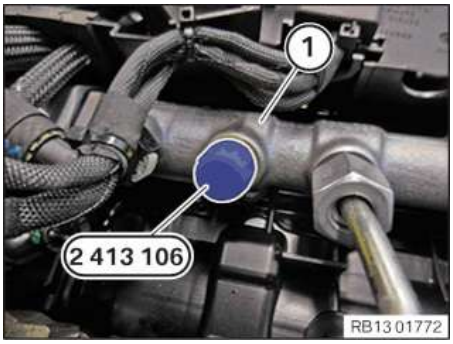
cardiagn.com



- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.
- Guide out and remove the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).



- Seal off the opening at the high pressure pump (1) with the special tool .



- Seal off the opening on the rail (1) with the special tool .

20 – Remove high-pressure rail

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

RISK OF DAMAGE

Contaminant or foreign body.

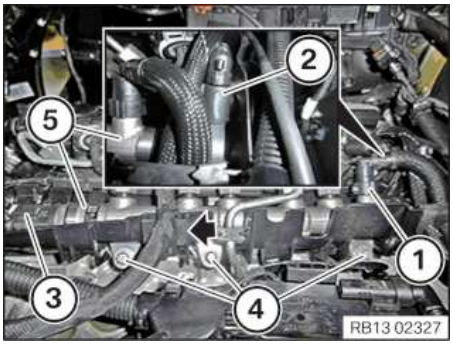
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

cardiagn.com



- Unlock and disconnect the fuel return line (1).
- Guide the fuel return line (1) out and set it aside.
- Unlock and disconnect the plug connection (2) on the rail pressure regulating valve.
- Unlock and disconnect the plug connection (3) on the rail pressure sensor.
- Unlock cable clip (Arrow), feed out and place aside.
- Loosen screws (4).
- Thread out and remove the rail (5).

21 – Remove all injection systems

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

cardiagn.com

RISK OF DAMAGE

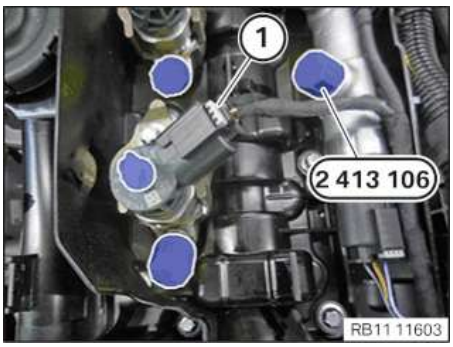
Electrostatic discharge.

Damage to or destruction of electrical components.

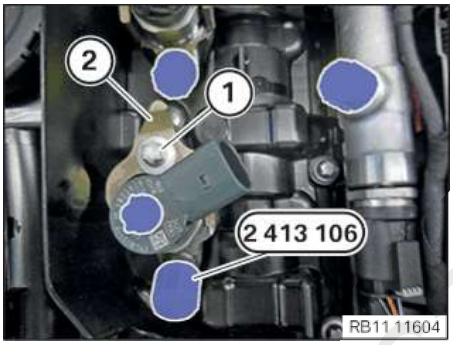
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

TECHNICAL INFORMATION

If several injectors are removed, ensure that each injector is installed at its original location (cylinder). Mark injectors.



- Unlock plug connection (1) and disconnect.



- Loosen screw (1).
- Guide out and remove clamping claw (2).
- Feed out and remove the injector with slight rotational movements.

▸ **Loosen stuck injectors**

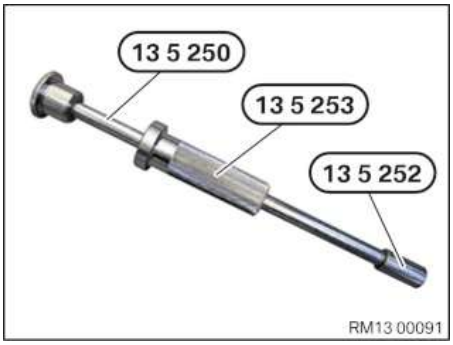
RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

cardiagn.com



- Unscrew special tool 0 493 339 (13 5 252) from special tool 0 493 321 (13 5 250) and remove special tool 0 493 340 (13 5 253).
- Screw special tool 0 493 339 (13 5 252) back onto special tool 0 493 321 (13 5 250).

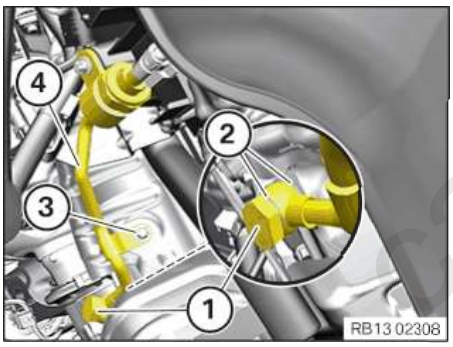


- Screw special tool 0 493 321 (13 5 250) with special tool 0 493 339 (13 5 252) onto pressure line connection (1) of injector.
- Release injector (1) with special tools 0 493 321 (13 5 250) and 0 493 339 (13 5 252) by means of **short** back and forth movements and remove.

22 – Remove the exhaust gas pressure pipe

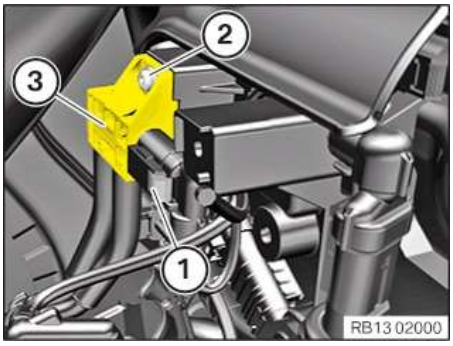


- Unlock plug connection (1) and disconnect.
- Loosen screw (2).



- Unscrew the banjo bolt (1).
- Feed out and remove the sealing rings (2).
- Loosen screw (3).
- Feed out and remove the exhaust gas pressure pipe (4).

23 – Releasing the differential pressure sensor for the diesel particulate filter



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).
- Remove the differential pressure sensor (3) and put it to one side.

24 – Removing the sensor bracket on the cylinder head cover

carbagn.com

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

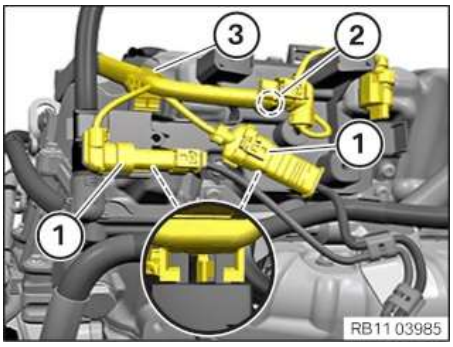
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

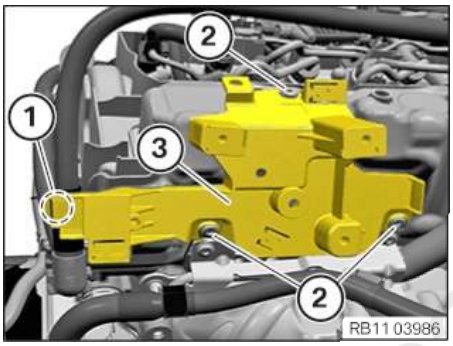
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

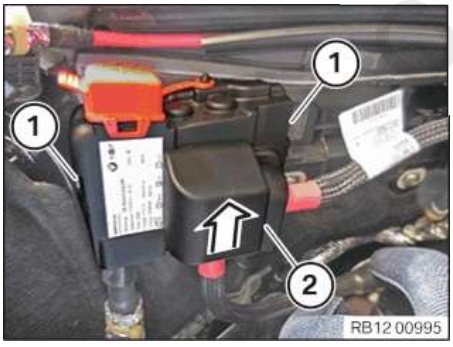
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



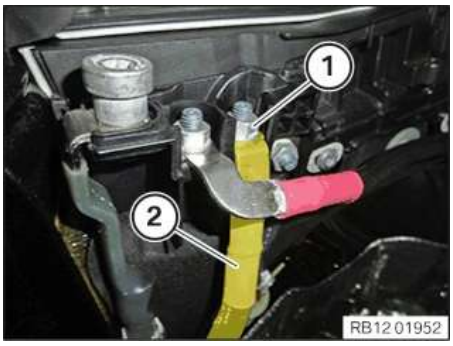
- Unlock plug connection (1) and disconnect.
- Unlock the plug connection (1) and release it from the sensor bracket.
- Release the cable clip in the area (2) from the sensor bracket.
- Release the clamps (3) and set the wiring harness section aside.



- Release the positive battery cable in the area (1) from the clamp and set it aside.
- Loosen screws (2).
- Feed out holder (3) for the sensor system and remove.

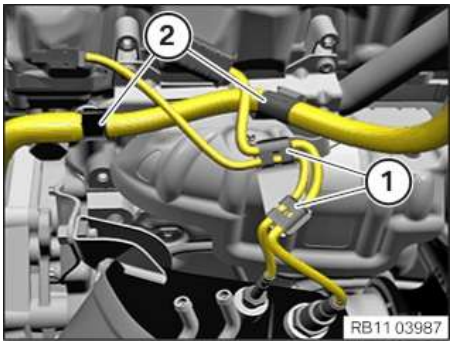


- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.

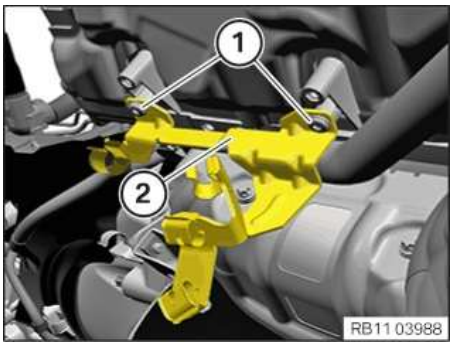


- Loosen nut (1).
- Feed out positive battery cable (2) and put to one side.

cardiagn.com

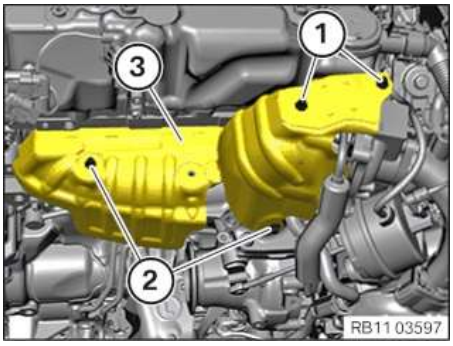


- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



- Loosen screws (1).
- Guide out and remove holder (2).

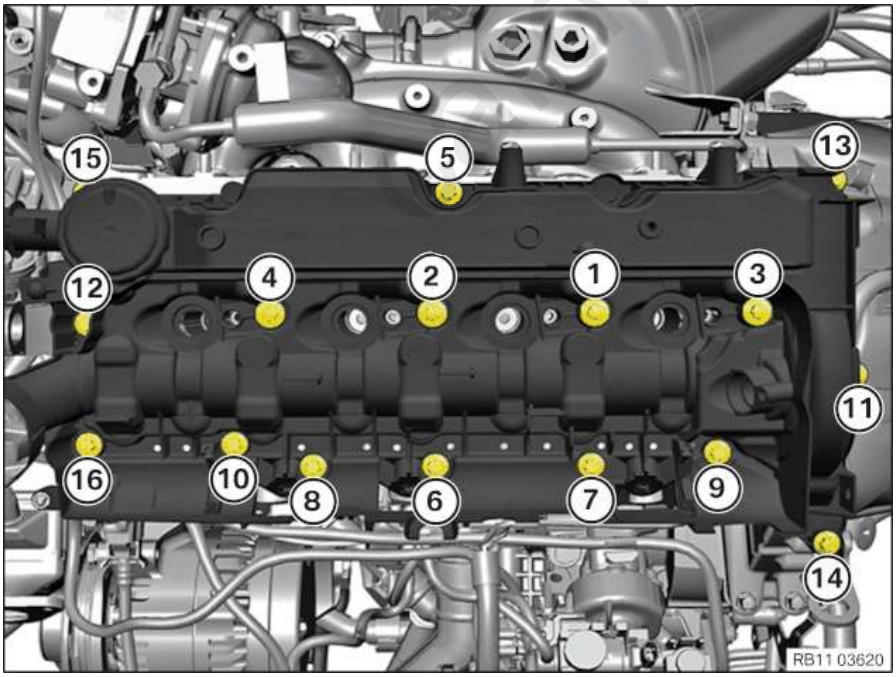
25 – Removing heat shield



- Loosen screws (1).
- Loosen screws (2).
- Feed out and remove the heat shield (3).

26 – Removing the cylinder head cover

Screw connection of the cylinder head cover



1 - 16 Bolts of the cylinder head cover

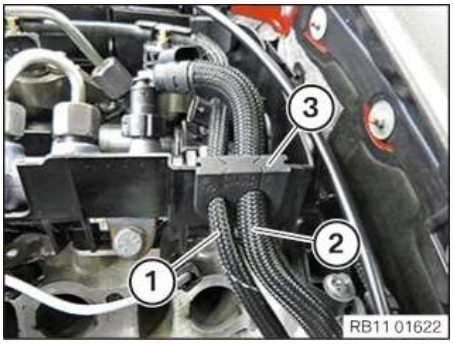
diagn.com



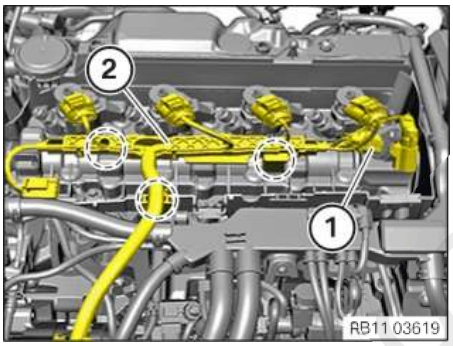
- Unlock and detach the locks.
- Feed the engine ventilation line (1) out and set it aside.



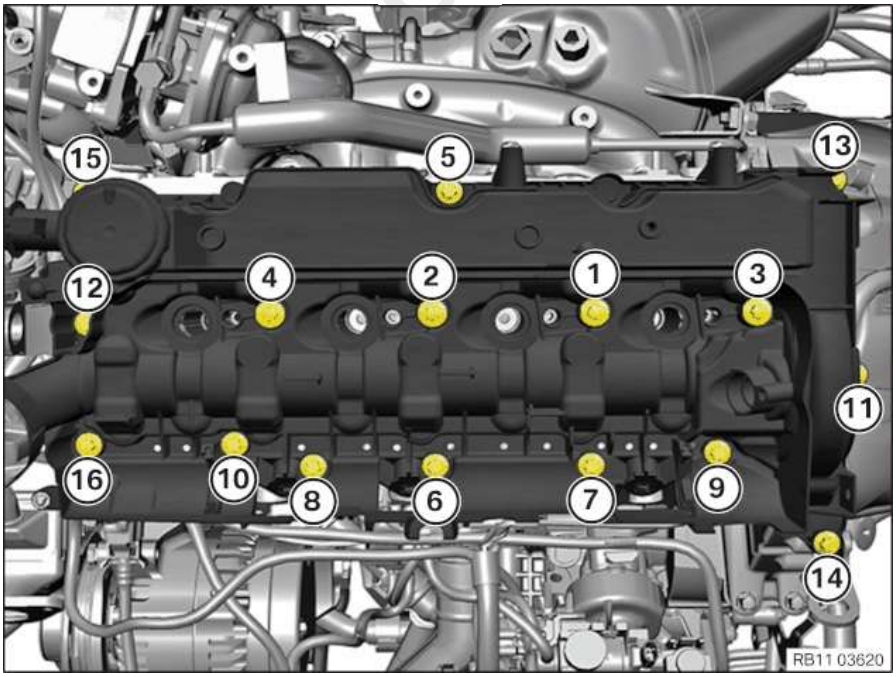
- Feed out and remove the heat shield (1).



- Remove the leakage oil line (1) including the fuel return line (2) and the grommet (3) and put to one side.

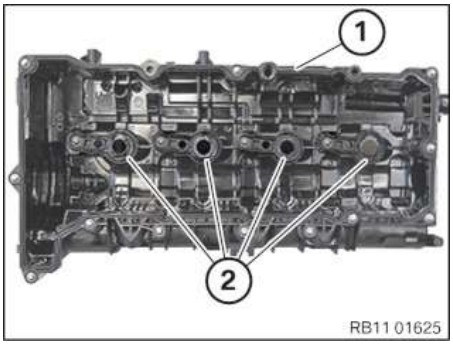


- Unlock connector (1) and pull off.
- Disconnect the wiring harness (2) in the marked areas from the cylinder head cover and set aside.



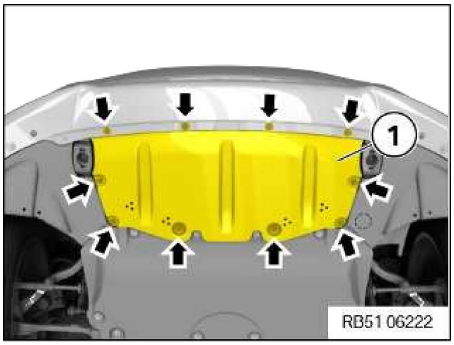
- Evenly loosen the screws in a sequence from (16) to (1).
- Feed out and remove the cylinder head cover.

cardiagn.com



- Remove the profile seals (1) and (2).

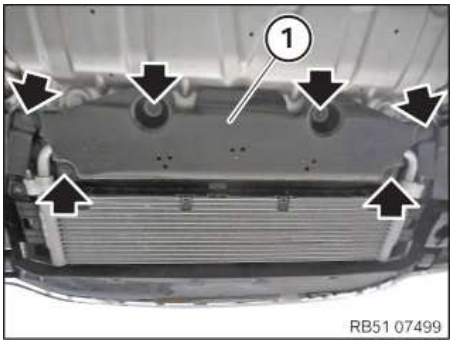
27 – Removing the front underbody protection



- **Version A:**

  Remove screws (arrows).

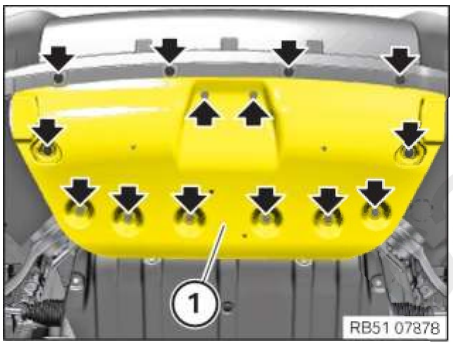
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version B:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

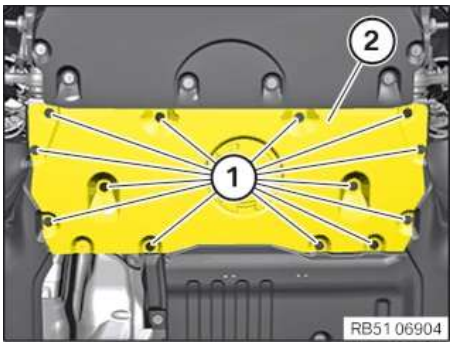


- **Version C:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

28 – Removing the centre underbody protection

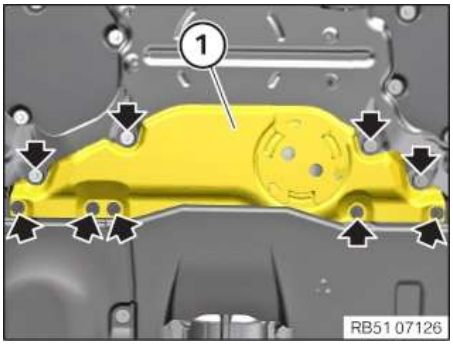


- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .

audiagn.com

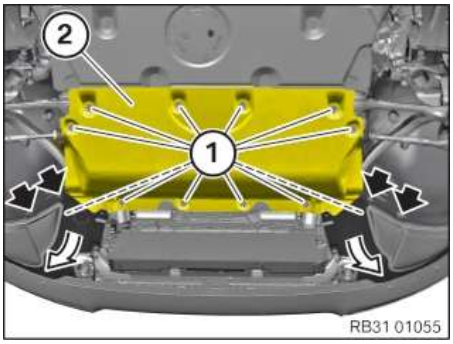


- **Version with all-wheel drive:**

  Remove screws (arrows).

  Feed out and remove the centre underbody protection (1).

29 – Remove the underbody protection of the steering gear



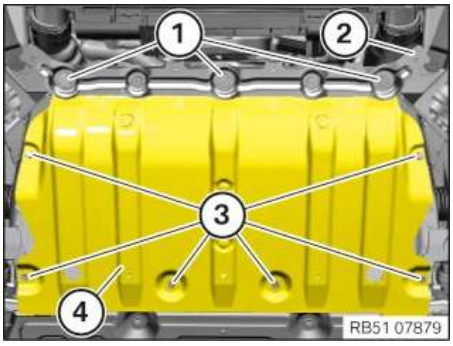
- **Version A:**

  Unscrew the screws (arrows) of the wheel arch cover on the wheel arch cover.

  Fold the bottom wheel arch cover to the side.

  Loosen screws (1).

  Remove the underbody protection (2) of the steering gear.



- **Version B:**

  Loosen screws (1).

  Remove the holder (2) for the underride protection.

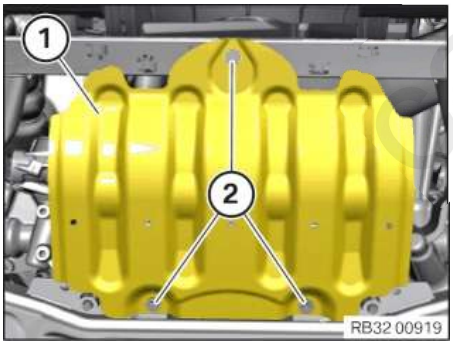
  Loosen screws (3).

  Feed out and remove the underbody protection (4) of the steering gear.

30 – If installed: Removing the steering underbody protection

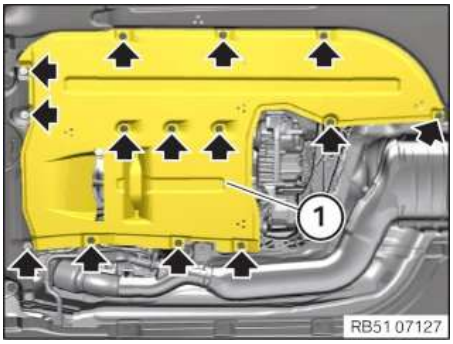
Prerequisite

Front underbody protection has been removed.



- Loosen screws (2).
- Remove underbody protection (1).

31 – Remove rear underbody protection

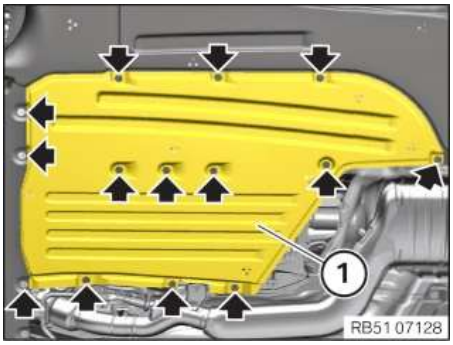


- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).

cardiagn.com



- **Version B:**

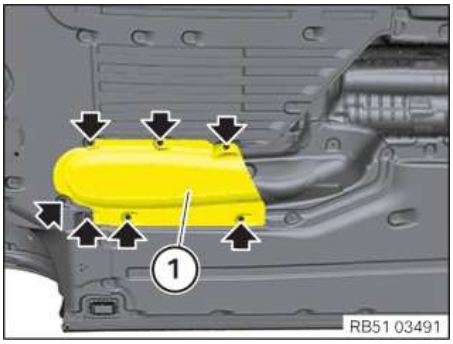
  Remove screws (arrows).

  Guide out rear underbody protection (1) and remove it.

32 – Remove the underbody panelling of the transmission on the side

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.



- Remove screws (arrows).
- Remove the underbody panelling (1).

33 – Removing starter motor

Prerequisite

Battery earth leads are disconnected.

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

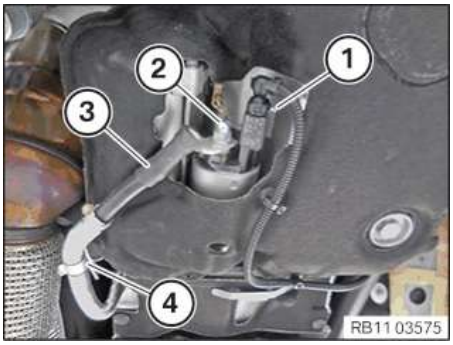
- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

TECHNICAL INFORMATION

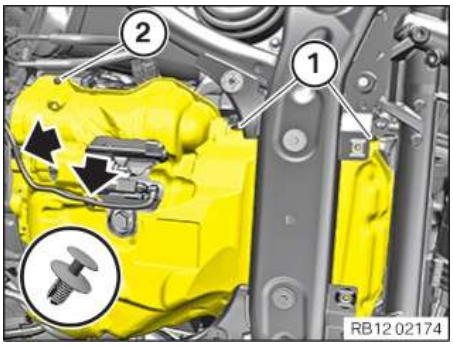
Make sure that the acoustic cover is **not** damaged while removing the starter motor.

A damaged lower acoustic cover can only be renewed when the front axle is lowered.

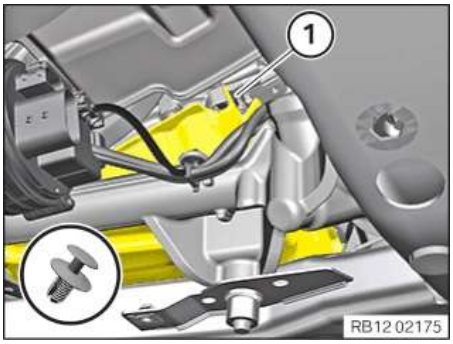
cardiagn.com



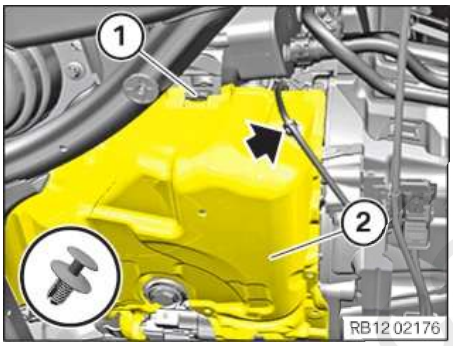
- Unlock plug connection (1) and disconnect.
- Release nut (2).
- Release positive battery cable (3) from holder (4).



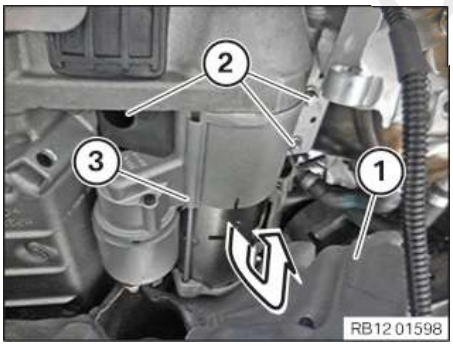
- Loosen the expanding rivet (1).
- Undo fir tree clip (2).
- Release the clamps (arrows).



- Loosen expanding rivet (1).
- Lower the acoustic cover of the oil sump.



- Loosen expanding rivet (1).
- Loosen the clamp (arrow).
- Lower acoustic cover (2).



- Make sure that the acoustic cover (1) is not damaged.
- Carefully press acoustic cover (1) to one side.
- Loosen screws (2).
- Carefully guide out the starter motor (3) in direction of arrow and remove.

MAIN WORK

34 – Checking camshaft timing



RISK OF DAMAGE

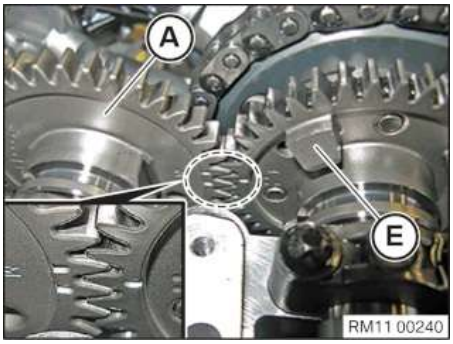
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

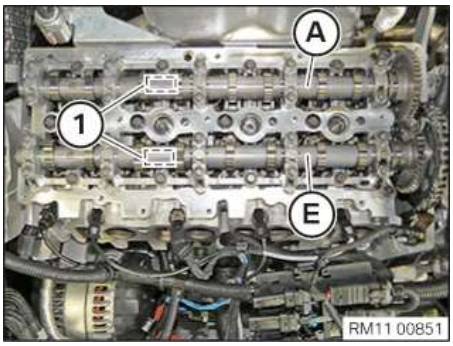
- Turn the combution engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

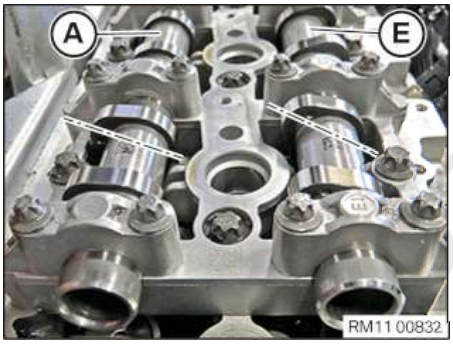
  Do **not** crank the engine in reverse.



- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.



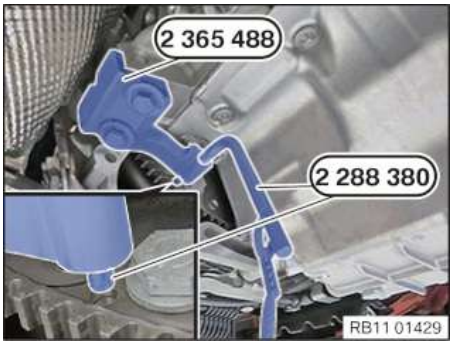
- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.

carmanuals.com



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

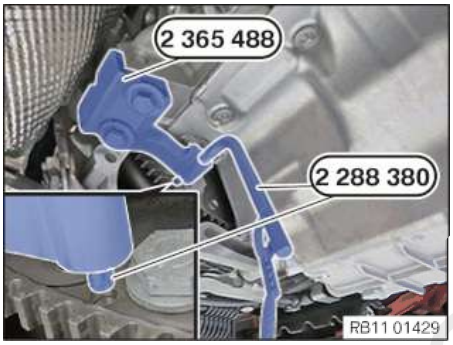
POSTPROCESSES

35 – Removing the special tool for fixing the exhaust camshaft



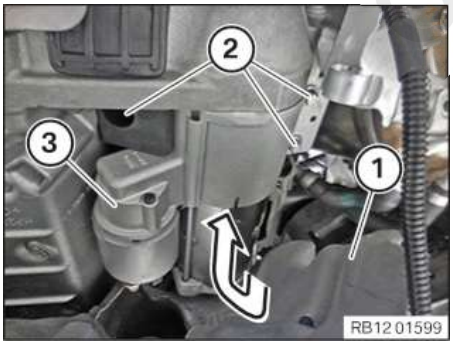
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

36 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

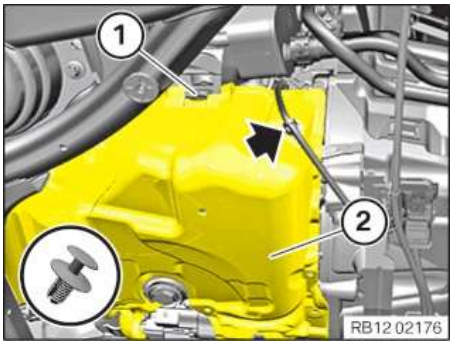
37 – Installing starter motor



- Make sure that the acoustic cover (1) is not damaged.
- Carefully press the acoustic cover (1) to one side.
- Feed in and install the starter motor (3) in the direction of the arrow.
- Tighten the screws (2).

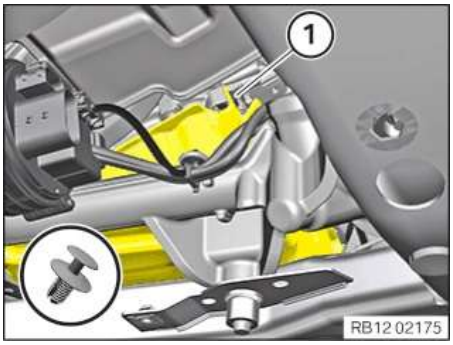
Starter motor to engine

M8X60		Tightening torque	19 Nm

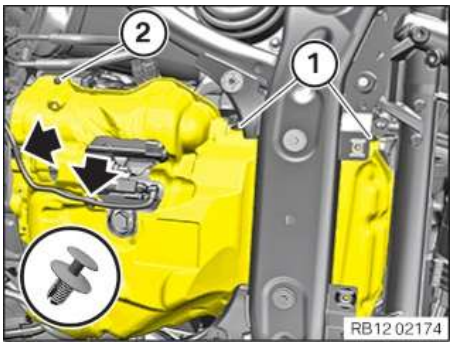


- Position the acoustic cover (2).
- Fasten expanding rivet (1).
- Secure clamp (arrow).

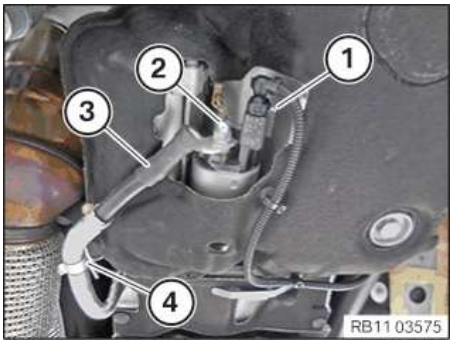
cardiagn.com



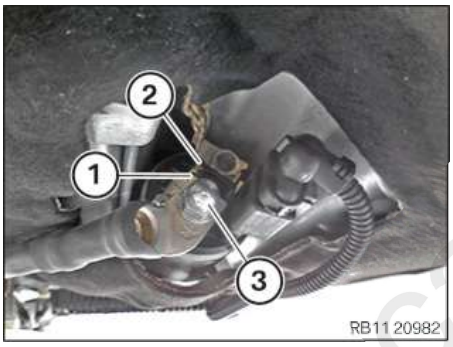
- Fasten expanding rivet (1).



- Secure fir tree clip (2).
- Secure expanding rivet (1).
- Secure the clamps (arrows).



- Fasten positive battery cable(3) in holder (4) and position it on the starter motor.
- Tighten the nut (2) hand-tight.
- Connect the connector (1) and audibly lock it.



CAUTION

Improper routing of the positive battery cable.

Risk of short circuits!

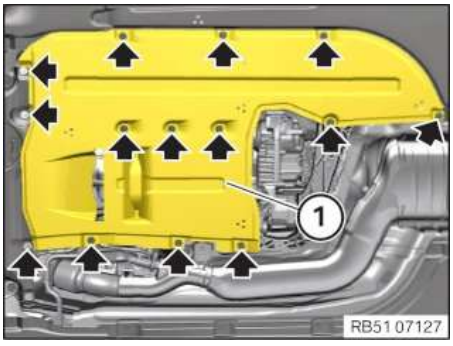
- Route the positive battery cable without abrasions and do not trap.

- Attach the positive battery cable (1) **correctly** to anti-twist lock (2).
- Tighten nut (3).

Battery positive lead to starter

M8		Tightening torque	13,5 Nm

38 – Installing underbody protection at rear



- **Version A:**

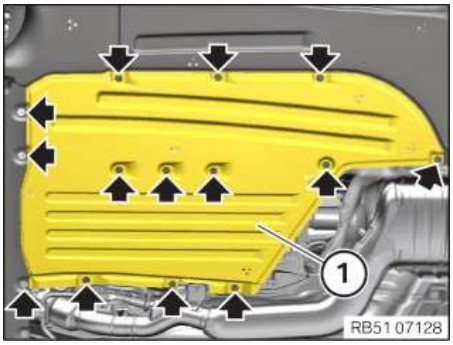
  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm

carlagn.com



- **Version B:**

  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

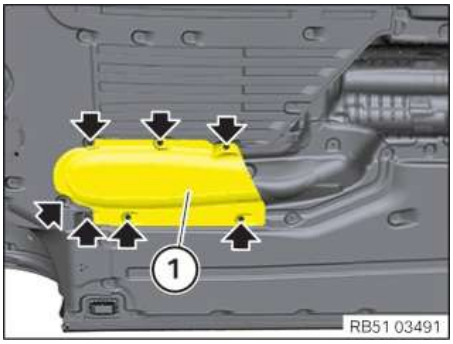
Underbody protection

Hexagon screw		Tightening torque	3 Nm

39 – Install the underbody panelling of the transmission on the side

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

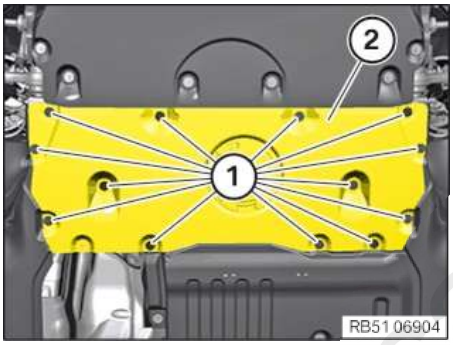


- Insert the underbody panelling (1).
- Tighten screws (arrows).

Underbody panelling

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

40 – Installing the centre underbody protection



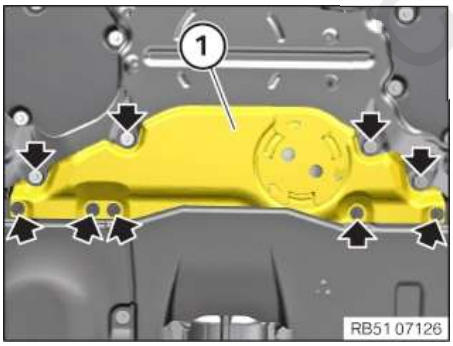
- **Variant with rear wheel drive:**

  Position central underbody protection (2).

  Tighten the screws (1).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version with all-wheel drive:**

  Guide in centre underbody protection (1) and install.

  Tighten screws (arrows).

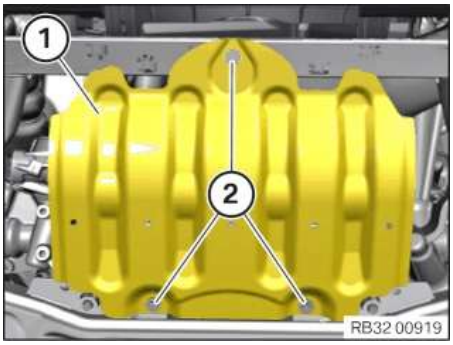
Underbody protection

Hexagon screw		Tightening torque	3 Nm

41 – If installed: Install underbody protection of the steering

Prerequisite

Front underbody protection has been removed.



- Position underbody protection (1).
- Tighten the screws (2).

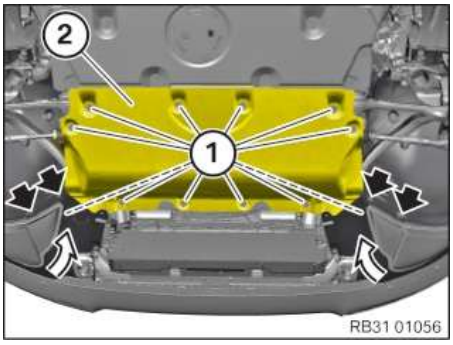
Underbody protection, steering, to front axle support

Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

42 – Install the underbody protection of the steering gear



- **Version A:**

  Position the underbody protection (2) of the steering gear.

  Tighten the screws (1).

Underbody protection of the steering gear

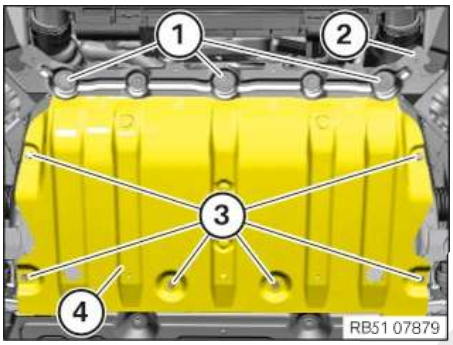
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the bottom wheel arch cover.

  Tighten the screws (arrows) of the lower wheel arch cover on the wheel arch cover.

Wheel arch trim panel, front

Thermoplastic hexagon screw		Tightening torque	2,6 Nm



- **Version B:**

  Feed in the underbody protection (4) of steering gear and install it.

  Tighten the screws (3).

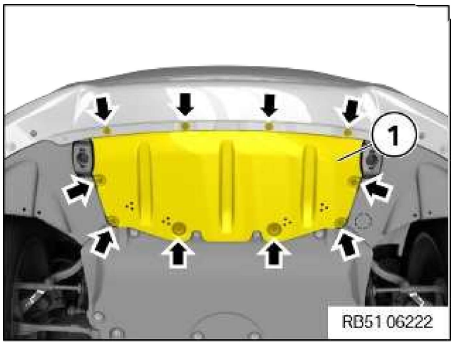
Underbody protection of the steering gear

Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the holder (2) for the underride protection.

  Tighten the screws (1).

43 – Installing the front underbody protection



- **Version A:**

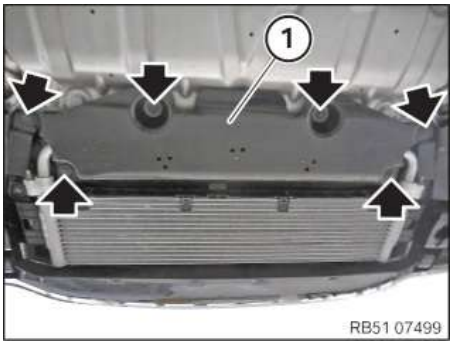
  Feed in the front underbody protection (1) towards the front under the bumper panel and position.

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

cardiagn.com



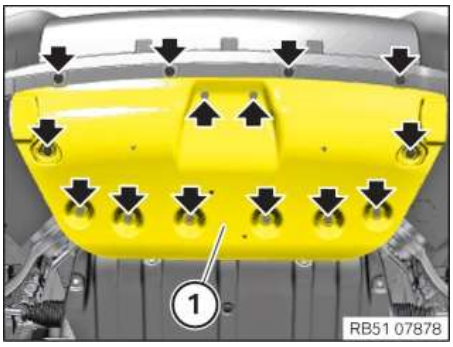
- **Version B:**

  Feed in and position the front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



- **Version C:**

  Feed in and install front underbody protection (1).

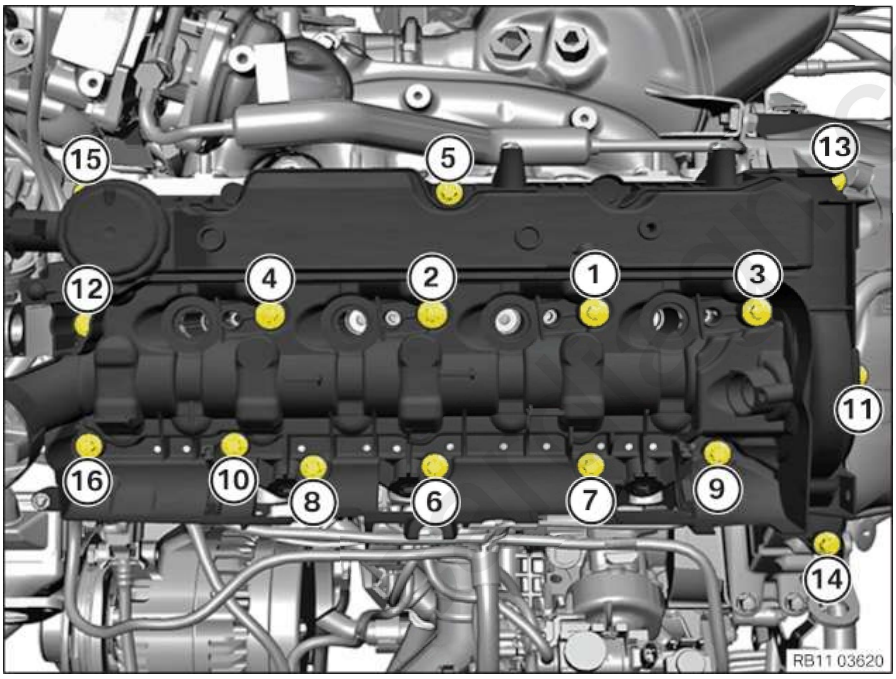
  Tighten screws (arrows).

Underbody protection front

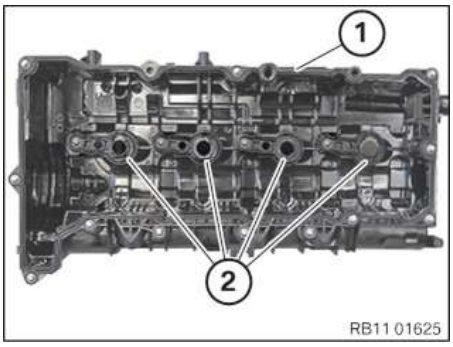
Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

44 – Installing cylinder head cover

Screw connection of the cylinder head cover

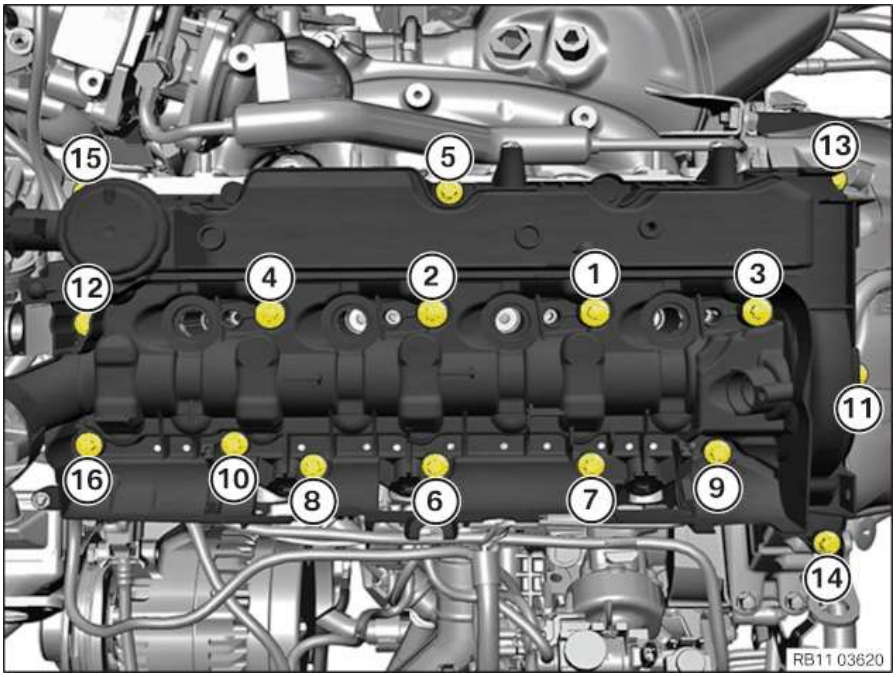


1 - 16 Bolts of the cylinder head cover



- Renew the profile seals (1) and (2) of the cylinder head cover.

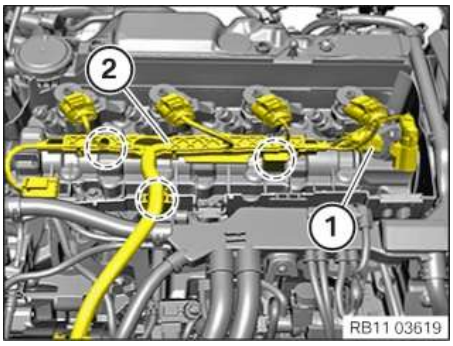
  Parts: Profile seals



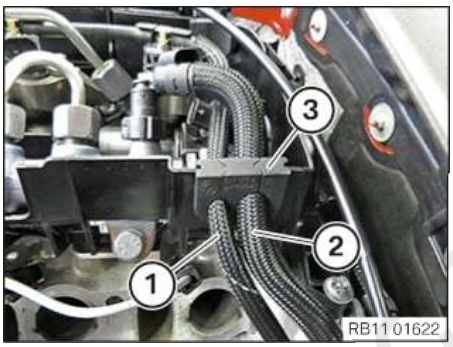
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

Cylinder head cover to cylinder head

M6		Tightening torque.	8,5 Nm



- Position the vehicle wiring harness (2) on the cylinder head cover and fasten in the marked areas.
- Plug in the connector (1) and lock audibly.



- Insert and connect the leakage oil line (1) with the fuel return line (2) and grommet (3).



- Feed in and install the heat shield (1).

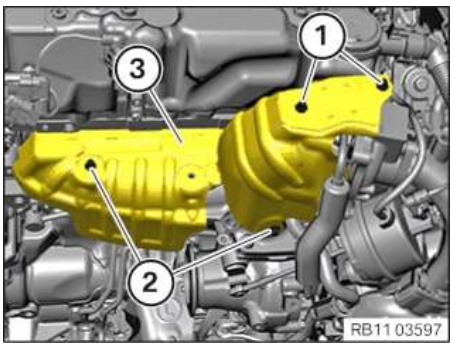


- Connect engine ventilation line (1) and lock.

  The locks (arrows) must engage audibly.

cardiagn.com

45 – Installing heat shield



- Feed in and install the heat shield (3).
- Tighten down screws (1) and (2).

Heat shield to exhaust manifold

M6x12			10 Nm

46 – Installing the sensor bracket on the cylinder head cover

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

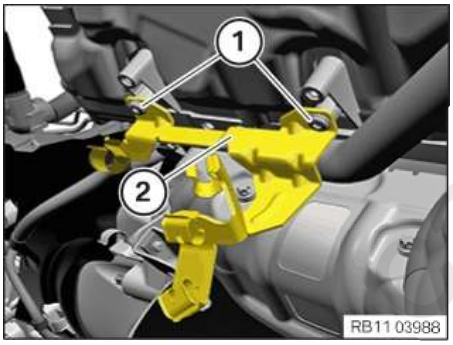
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

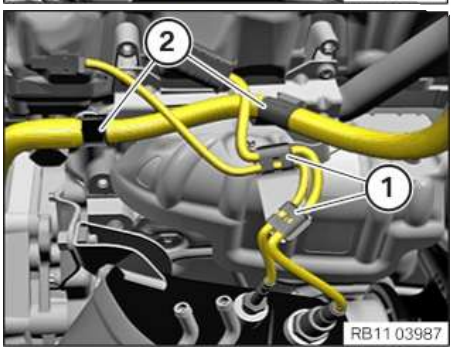
- Route all cables without abrasions, do not trap and crush.



- Insert and install the holder (2).
- Tighten the screws (1).

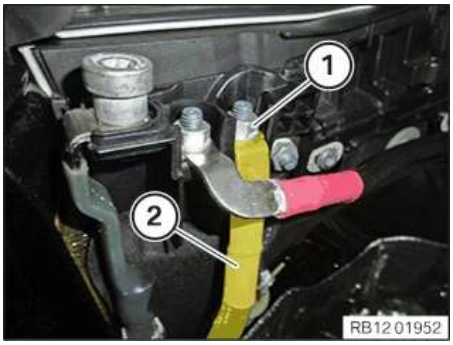
Bracket on cylinder head cover

	Tightening torque	5 Nm



- Secure the positive battery cable in the clamps (2).
- Mount the cable of the exhaust gas sensor system in the clamps (1).

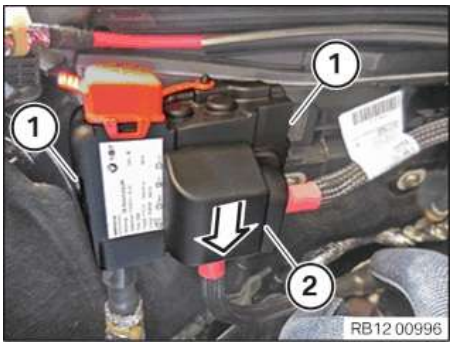
carmanualsdiagn.com



- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

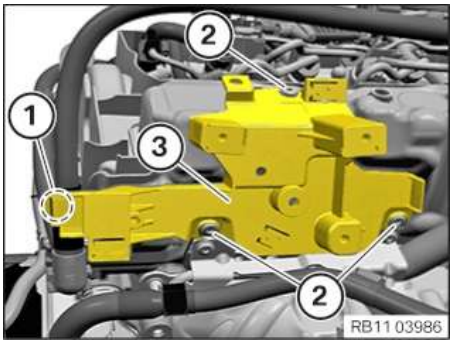
Battery positive lead to battery positive terminal

M8		Tightening torque	19 Nm



- Insert and install the cover (2) in the direction of the arrow.

  The locks (1) must engage audibly.

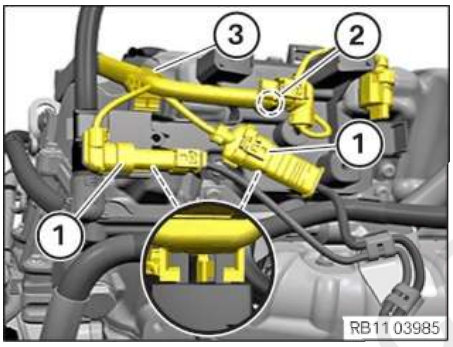


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

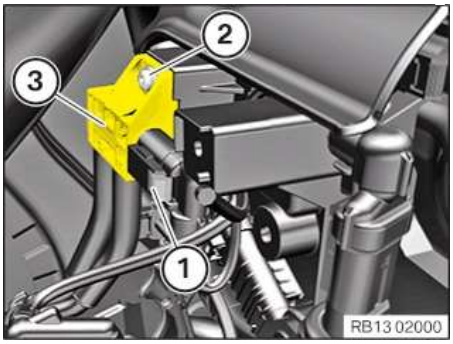
		Tightening torque	5 Nm

- Fasten the positive battery cable in the area (1) in the clamp.



- Feed in the wiring harness section and fasten it with the clamp (3).
- Fasten the cable clip in the area (2) in the sensor bracket.
- Feed in the connector (1) into the sensor bracket and lock it audibly.
- Plug in the connector (1) and lock audibly.

47 – Securing the differential pressure sensor for the diesel particulate filter



- Feed in and install the differential pressure sensor (3).
- Tighten down screw (2).

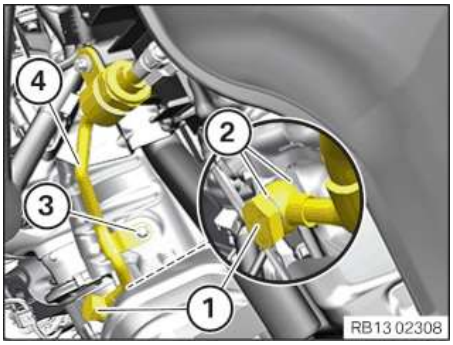
Differential pressure sensor of diesel particulate filter on cylinder head cover

TS5x20		Tightening torque	4 Nm

- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

48 – Install the exhaust gas pressure pipe

cardiagn.com



- Insert and install the exhaust gas pressure pipe (4).
- Replace the sealing rings (2).

  Parts: Sealing ring
- Apply the banjo bolt (1) hand-tight.
- Tighten down screw (3).

Heat shield to exhaust manifold

M6x12		Tightening torque	10 Nm

- Tighten the banjo bolt (1).

Banjo bolt for exhaust pressure pipe to exhaust manifold

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm



- Tighten down screw (2).

Exhaust gas pressure pipe to sensor system holder

TS6x20		Tightening torque	5,7 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

49 – Install all injectors

▸ **Cleaning the injector shafts**

CAUTION

Swirling dirt particles caused by compressed air.

Danger of injury!

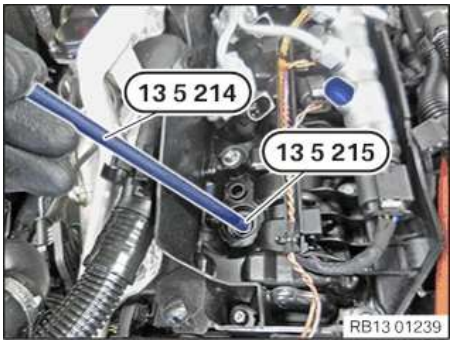
- Collect dirt particles, e.g. when blowing out, use cloth to do so.
- Wear safety goggles.

RISK OF DAMAGE

Contaminant or foreign body.

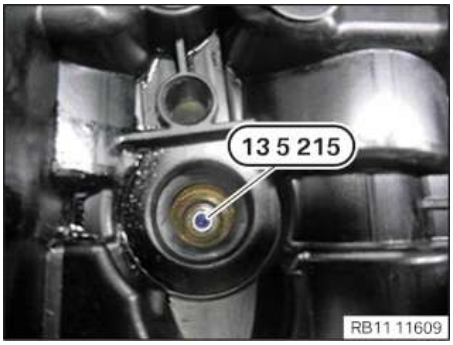
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Check whether the sealing ring remained in the injector shaft and remove the sealing ring as needed.
- Insert the special tool 0 493 763 (13 5 215) with the special tool 0 493 762 (13 5 214) from the set of special tools 0 493 758 (13 5 210) into the injector shaft.
- Remove special tool 0 493 762 (13 5 214).

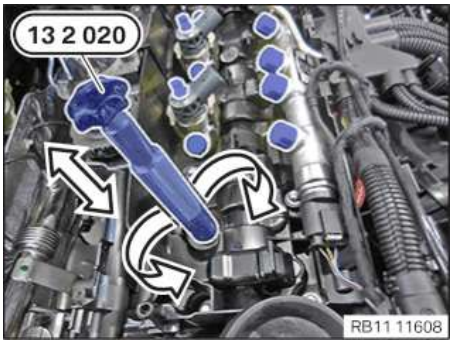
cardiagn.com



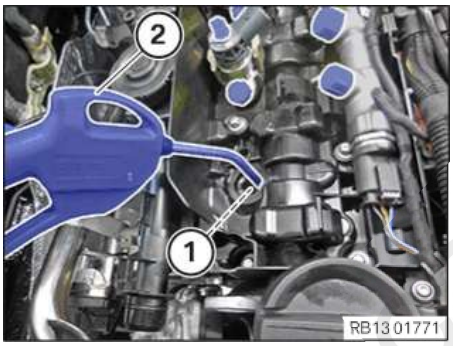
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



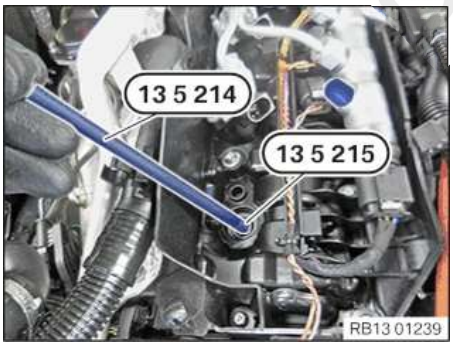
- Insert special tool 0 496 150 (13 2 020) into the injector shaft.



- Move special tool 0 496 150 (13 2 020) up and down in the injector shaft with rotational movements in the direction of arrow.
- Feed out special tool 0 496 150 (13 2 020) from the injector shaft and remove.



- Blow out injector shaft (1) with air gun (2).



- Feed the special tool 0 493 762 (13 5 214) into the injector shaft and screw it in with the special tool 0 493 763 (13 5 215).
- Feed out special tool 0 493 762 (13 5 214) with special tool 0 493 763 (13 5 215) from the injector shaft and remove it.

▸ **Check the placement of the clamping claw**

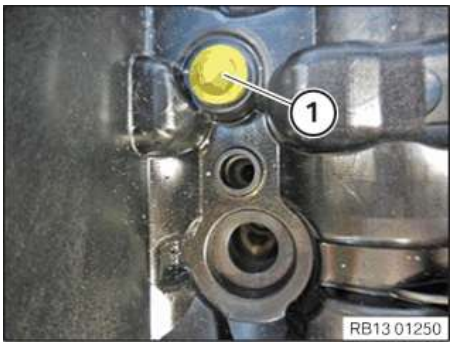
cardiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Tighten down screw (1).

  The clamping claw is positioned on the bolt (1).

Clamping claw facing to cylinder head cover

M6		Tightening torque	10 Nm

▸ **Prepare the injector for installation**

RISK OF DAMAGE

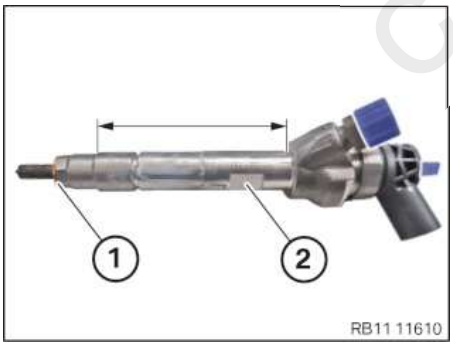
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

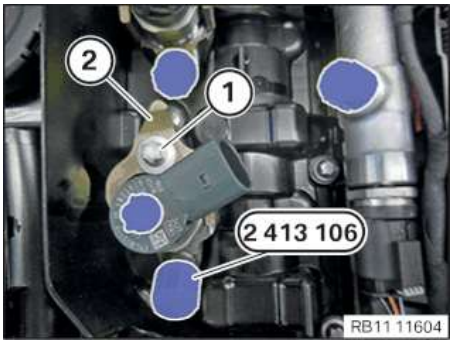
TECHNICAL INFORMATION

Lightly grease the injector shaft with high temperature-resistant grease.
For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



- Renew the copper sealing ring (1) on the injector (2).

  Parts: Copper sealing ring
- Lightly grease the injector in the marked area with heat-resistant grease before installing the injector (2) in the injector shaft.

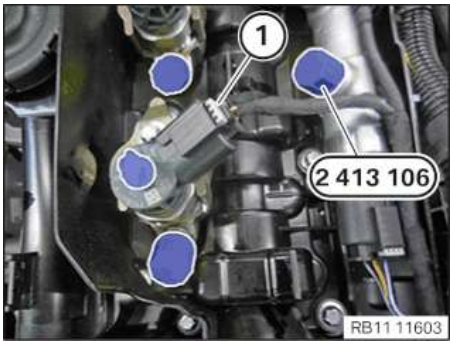


- Insert and install the injector .
- Insert and install the clamping claw (2).
- Tighten down screw (1).

Injector to cylinder head cover

M8		Tightening torque	8 Nm
		Angle of rotation	120 °

cardiagn.com



- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

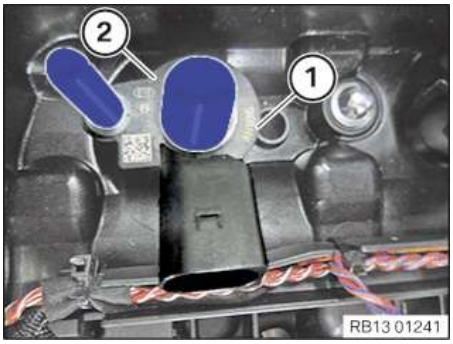
▸ **Replacement: Perform injection quantity compensation**

TECHNICAL INFORMATION

If the DDE control unit or an injector has been replaced, it will also be necessary to carry out injection quantity compensation. The adjustment value (7-position letter/number code) is engraved on each injector.

NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

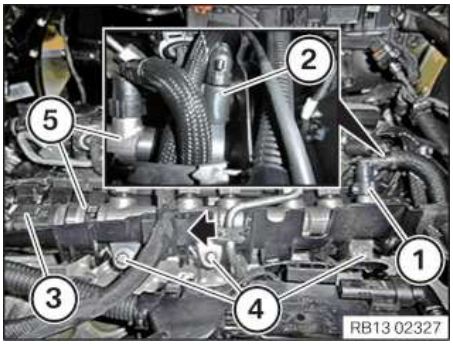


- Read off the adjustment value (1) on the new injector (2).



- Connect diagnosis system:
  - Vehicle identification
  - Function selection
  - Service functions
  - Digital diesel electronics (DDE)
  - Adjustment of injectors
  - Testing schedule
- Start service function with the right arrow button.

50 – Installing the rail



- Insert and install the rail (5).
- Tighten the screws (4).

Rail to cylinder head cover

M8		Tightening torque	19 Nm

- Install and lock cable clip (arrow).

  The cable clip (arrow) must engage audibly.
- Connect and lock the connector (3) at the rail pressure sensor.

  The connector (3) must engage audibly.
- Connect and lock the connector (2) at the rail pressure regulating valve.

  The connector (2) must engage audibly.
- Feed in fuel return line (1) and install.

  The fuel return line (1) must audibly engage.

cardiagn.com

51 – Installing high pressure line between rail and high pressure pump

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

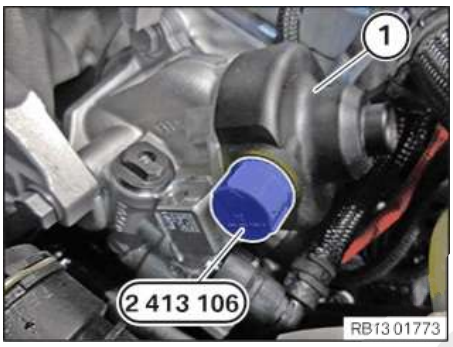
On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

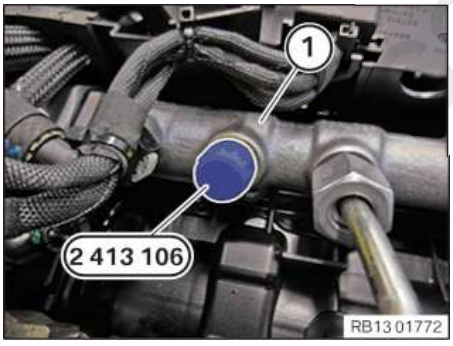
- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

TECHNICAL INFORMATION

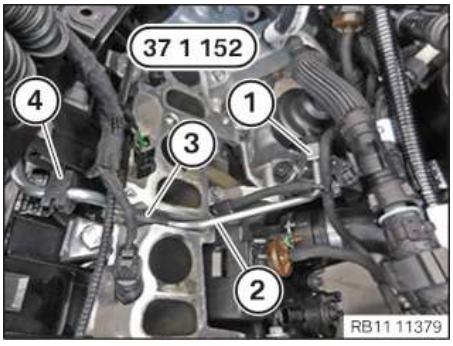
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Feed out and remove special tool on the high pressure pump (1).



- Feed out the special tool on the rail (1) and remove.



- Insert and install the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).
- Hand-tighten the union nut (1) on the high pressure pump.

cardiagn.com



- Hand-tighten the union nut (1) on the rail.

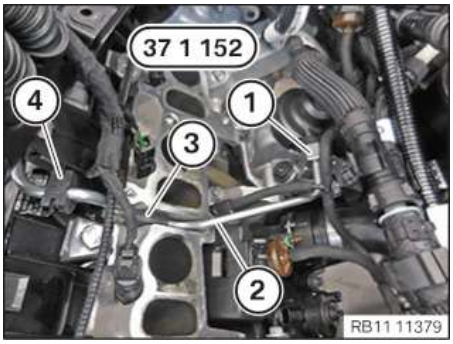
TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten the union nut (1) with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm



- Make sure that the high pressure line (2) is correctly installed with the abrasion protection (3) and the rubber mount (4).

TECHNICAL INFORMATION

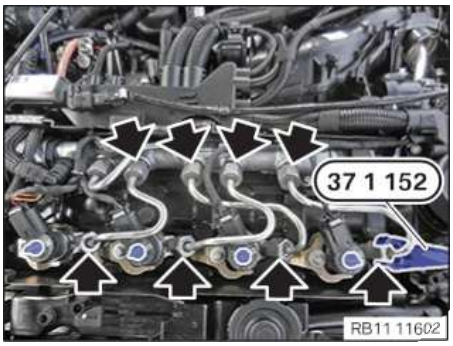
Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten union nut (1) on the high pressure pump with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm

52 – Installing the high pressure lines between the injector and the rail



- Remove the special tool from all cable connections.
- Feed in and install the high pressure lines (arrows).
- Hand-tighten the high pressure lines (arrows).

TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

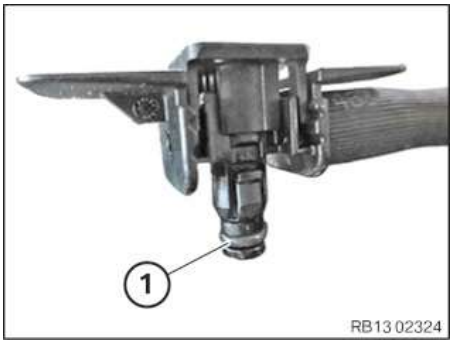
- Tighten the high pressure lines (arrows) with the special tool .

High pressure lines between injector and rail

High-pressure pipe		Tightening torque	24.5 Nm

- Check the high pressure lines (arrows) for tightness (**visual inspection**).

53 – Attach the leakage oil line on the injectors



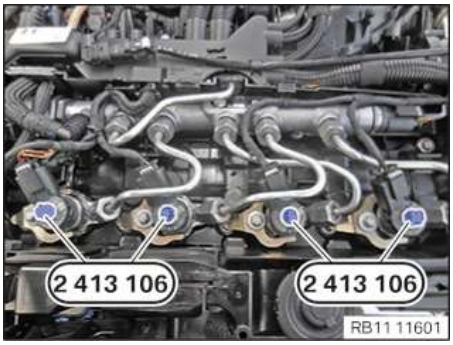
- **Version A:**

  Check sealing ring (1) for damage, renew leakage oil line if necessary.

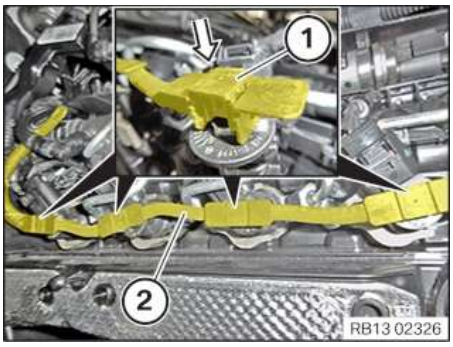
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.

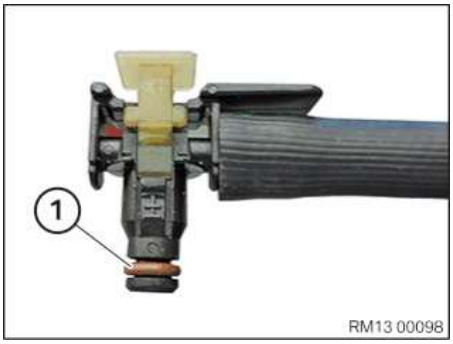
carlagn.com



- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.



- **Version B**:

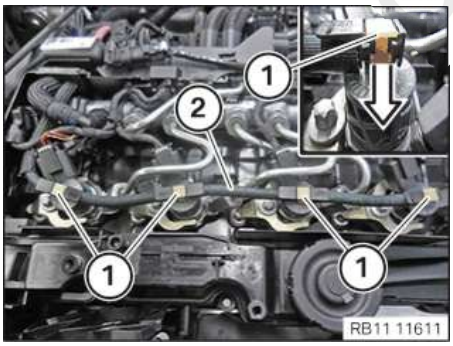
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.



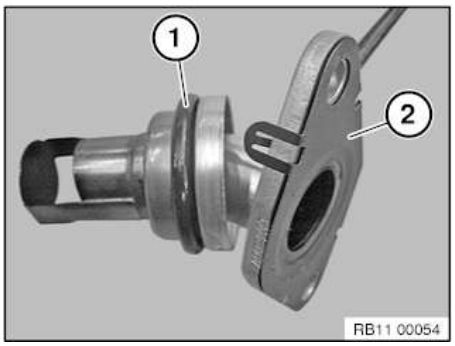
- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.

54 – Installing the intake plenum

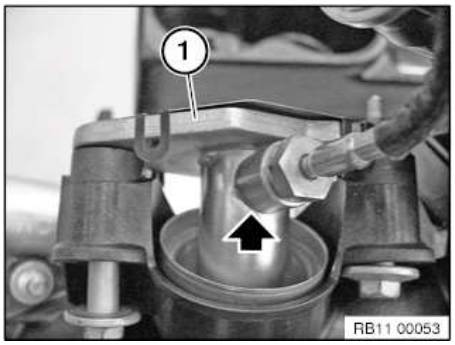
cardiagn.com



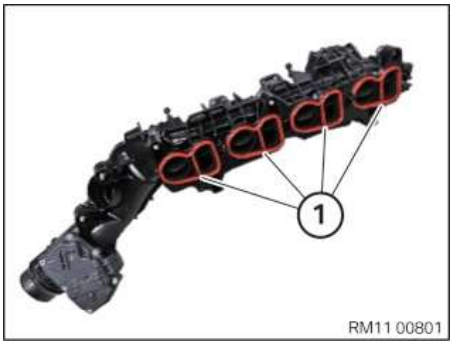
- Renew O-ring (1).

  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

  Parts: Gasket
- Position the seal (2) and clip it in.

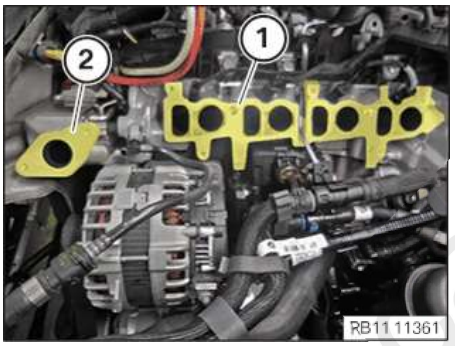


- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).

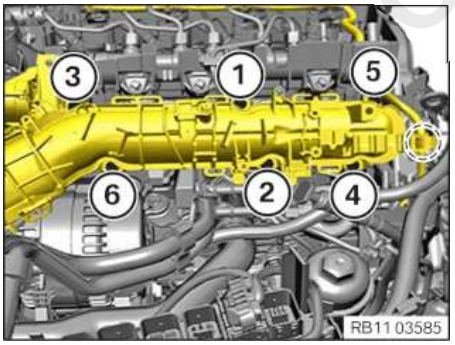


- Renew seals (1).

  Parts: Seals
- Ensure that the seals (1) are firmly mounted on the intake plenum.



- Clean connection points (1) at cylinder head.
- Clean the connection point (2) on the exhaust-gas recirculation cooler.

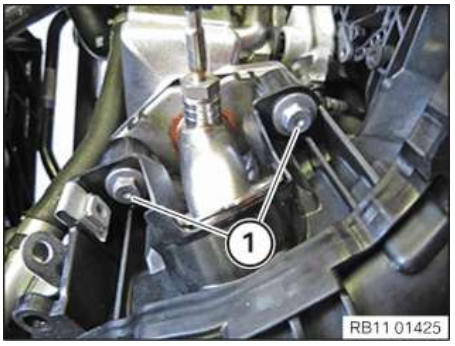


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

- Attach the wiring harness and fuel lines in the marked area on the intake plenum.

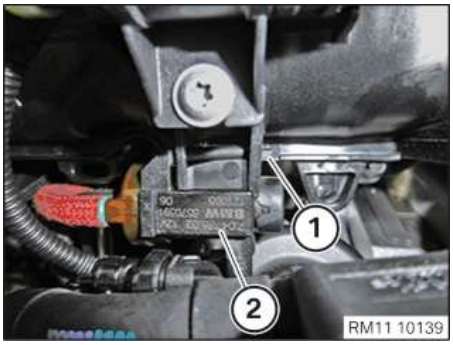


- Tighten the screws (1).

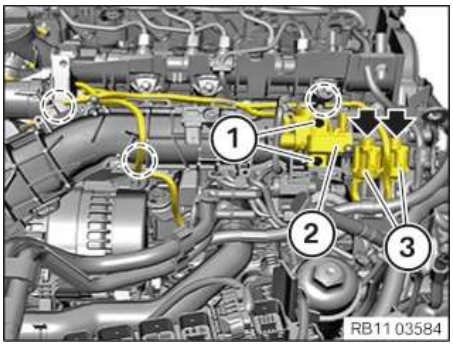
Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm

cardiagn.com



- Install electric changeover valve (2) from the left to the right in the holder on the intake plenum.
  The lock (1) must audibly engage.



- Install intake plenum electric changeover valve (3) on the intake plenum.
  The locks (arrows) must engage audibly.
- Position the electric changeover valve (2) on the intake plenum.
- Tighten the screws (1).

Electric changeover valve to intake plenum

TS6x20		Tightening torque	5 Nm

- Fasten the vacuum hoses on the intake plenum in the marked areas.

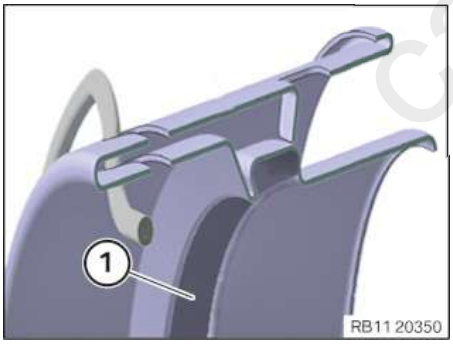


- Check the seal (1) for damage, and renew if necessary.

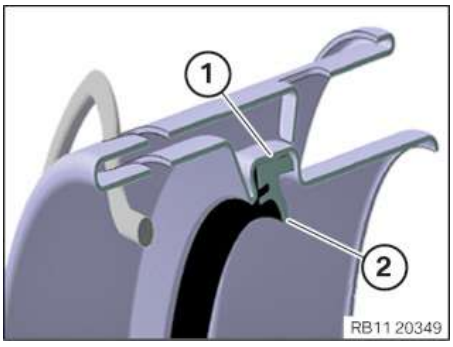
▸ **Replacing damaged seal**

TECHNICAL INFORMATION

Do not use pointed or sharp-edged tools for the installation and/or removal.



- Remove damaged seal.
- Clean gasket groove (1) with a dry towel.
  The gasket groove (1) must be clean.



- Renew gasket.
  Parts: Gasket
- Install seal dry without lubricant or mounting agent.

TECHNICAL INFORMATION

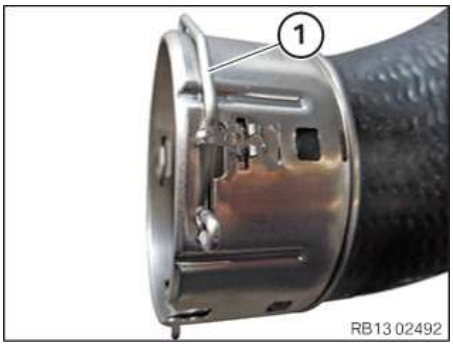
Incorrect assembly is possible. Ensure correct installation position.

- Feed in and install the seal.
- Make sure the seal is correctly installed in the gasket groove (1).
- Make sure that the sealing lip (2) is directed inwards as shown.

cardiagn.com



- Connect the pressure pipe to the throttle body until the locks (1) engage on both sides.



- Check that the locks (1) are correctly seated on the pressure pipe.

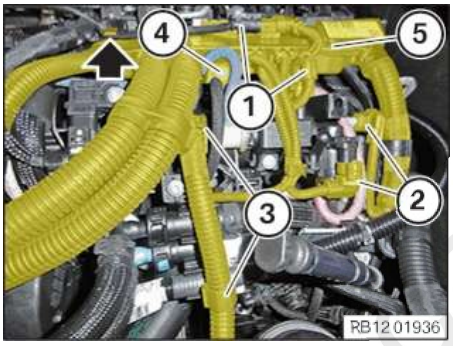
55 – Partially securing the wiring harness section on the intake plenum

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

- Route all cables without abrasions, do not trap and crush.



- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

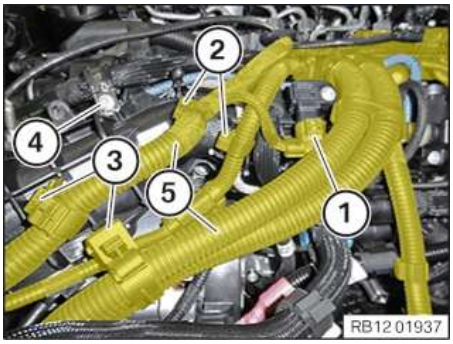
Wiring harness section to manifold

TS5x20		Tightening torque	3,6 Nm

- Secure clamps (3).
- Connect connectors (2) and lock.

  The connectors (2) must engage audibly.
- Secure the line at clamp (Arrow).
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

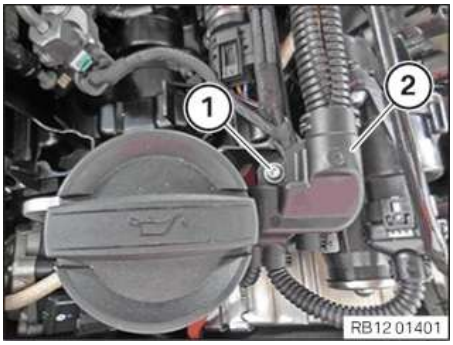
Standard screw connection 4 Nm

Oval-head screw		Tightening torque	4 Nm

- Secure clamps (3).
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

cardiagn.com



- Guide in the wiring harness section (2) and install.
- Tighten down screw (1).

Wiring harness section to cylinder head cover

TS5x20		Tightening torque	3,6 Nm



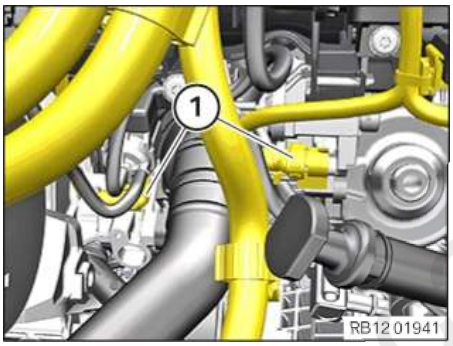
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



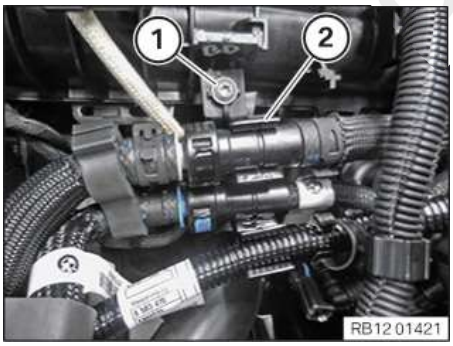
- Connect the connector (1) and lock it.

  The connector (1) must engage audibly.



- Connect connectors (1) and lock.

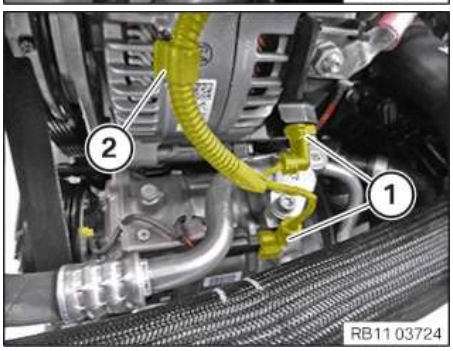
  The connectors (1) must engage audibly.



- Insert and install the holder (2).
- Tighten down screw (1).

Holder on intake plenum

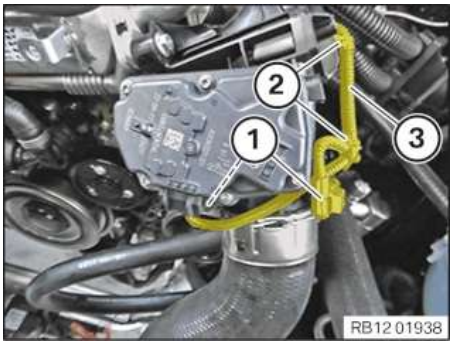
TS6X20		Tightening torque	5 Nm



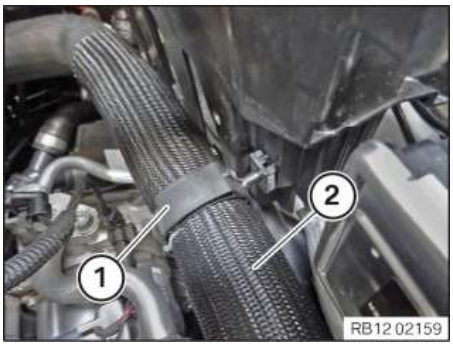
- Connect the connector (1) and lock it.

  The connectors (1) must engage audibly.
- Secure holder (2) to alternator.

cardiagn.com



- Guide in the wiring harness section (3) and install.
- Secure clamps (2).
- Connect connectors (1) and lock.



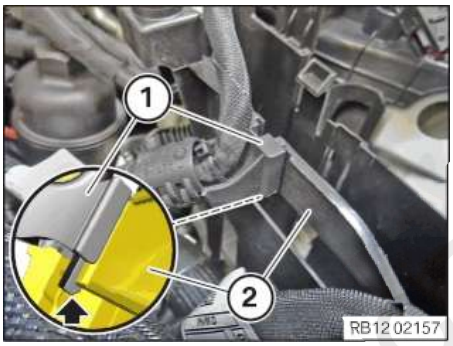
- Feed in and install coolant line (2).
- Lock holder (1).

  The holder (1) must engage audibly.



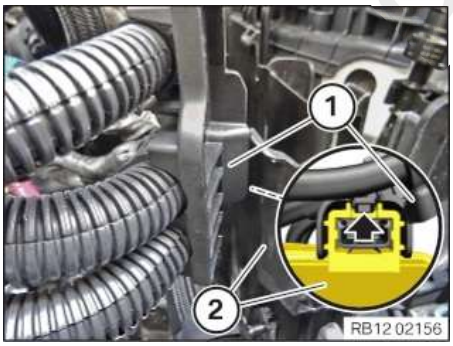
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.



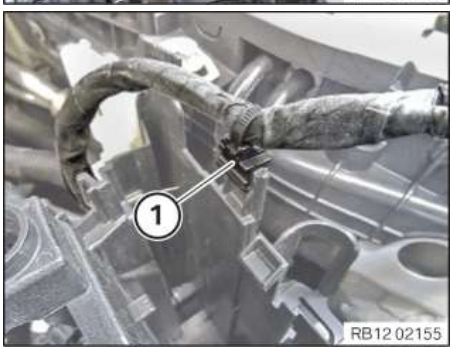
- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.



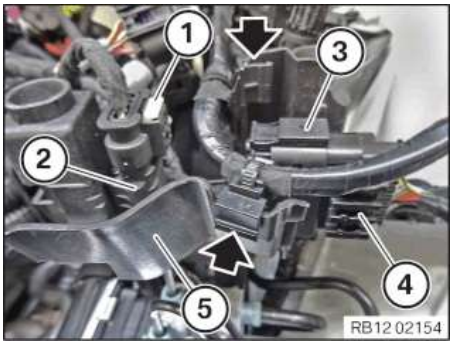
- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.

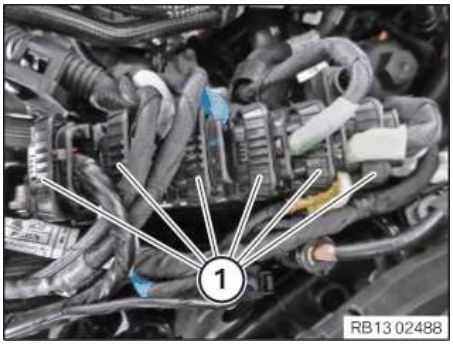


- Secure clamps (1).

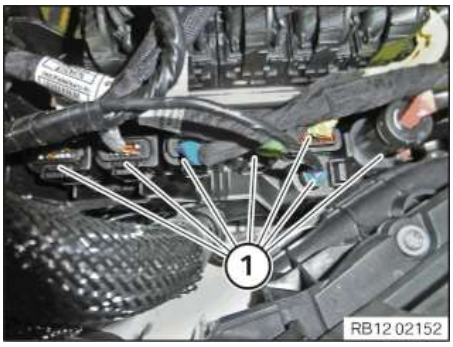
cardiagn.com



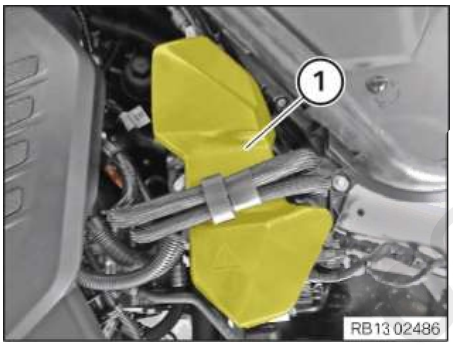
- Connect and lock the connector (4) with the control unit holder (5).
  The connector (4) must engage audibly.
- Connect connectors (3) and lock.
  The connector (3) must engage audibly.
- Connect and lock the connector (2) with the control unit holder (5).
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.
  The connector (1) must engage audibly.
- Secure the clamps (arrows).



- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.

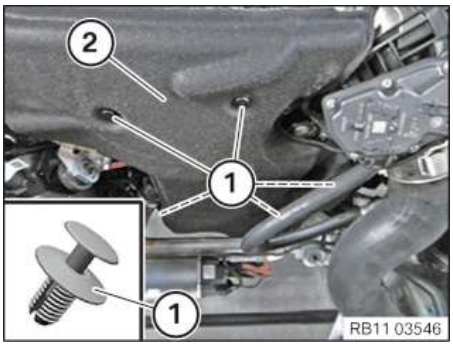


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



- Insert and install cover (1) into guides.

56 – Install acoustic cover for the engine, front



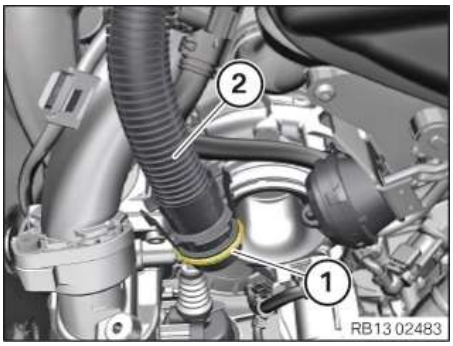
- Feed the acoustic cover (2) in and install.
- Secure the acoustic cover (2) with the expanding rivets (1).

57 – Installing the clean air pipe with resonator

cardiagn.com



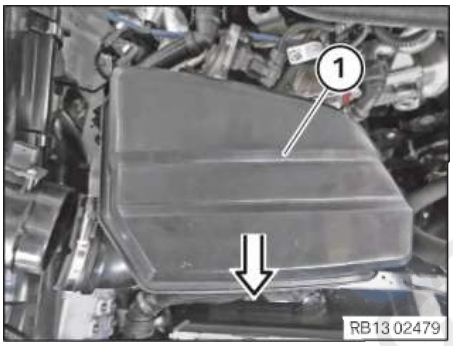
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



- Check the sealing ring (1) for the engine ventilation line (2) for damage and renew where required.



- Feed in and install clean air pipe with resonator (1) in the direction of the arrow.

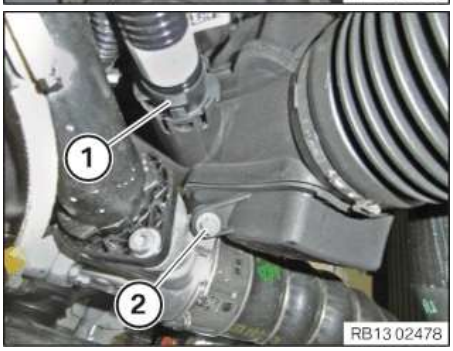


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

  The clamp (1) must engage audibly.

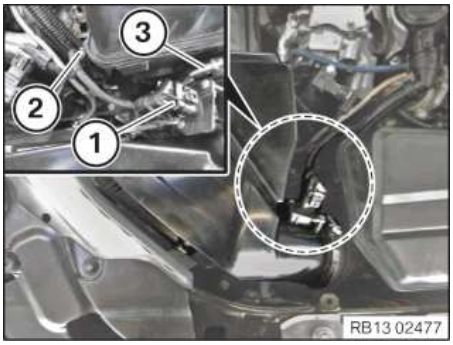


- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm

cardiagn.com



- Connect the clean air pipe with resonator to the intake filter housing.
- Tighten clamp (3).

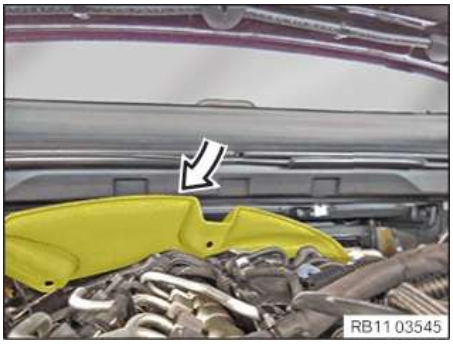
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

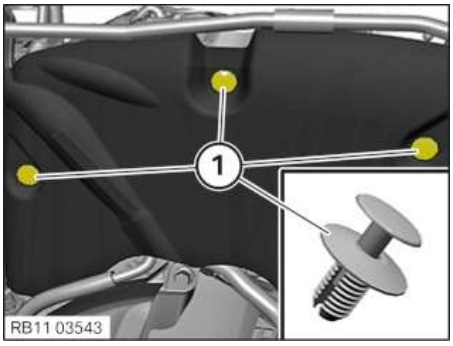
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

58 – Installing acoustic cover at rear

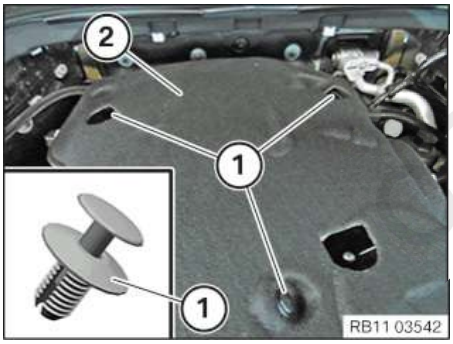


- Guide in the acoustic cover in the direction of the arrow and install it.



- Secure acoustic cover with the expanding rivets (1).

59 – Install the acoustic cover for the injectors



- Feed the acoustic cover (2) in and install.
- **If installed:** Secure the acoustic cover (2) with the expanding rivets (1) .

60 – Install acoustic cover

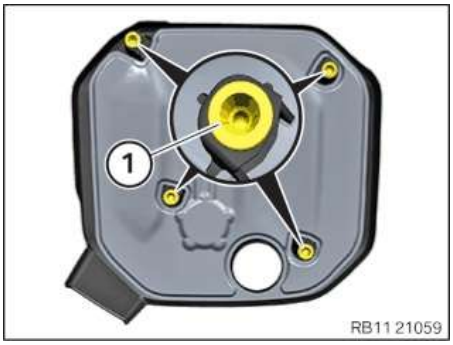
RISK OF DAMAGE

Damage to the acoustic cover/design cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.

cardiagn.com

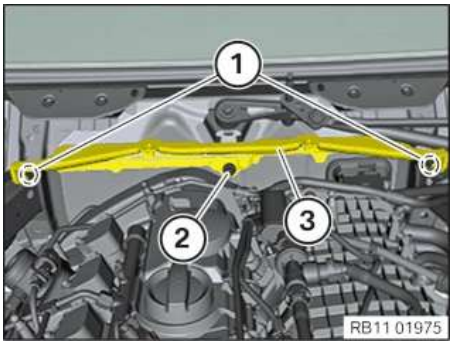


- Check the acoustic cover for correct fit of the rubber mounts (1).



- Clip in the acoustic cover (1) into the holders in the indicated areas.

61 – Installing centre bulkhead lower section

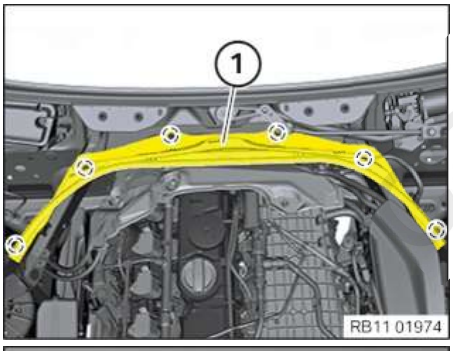


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

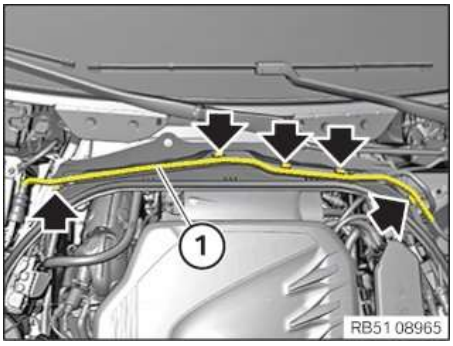
62 – Installing the centre bulkhead upper part



- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

Bulkhead upper part to bottom bulkhead

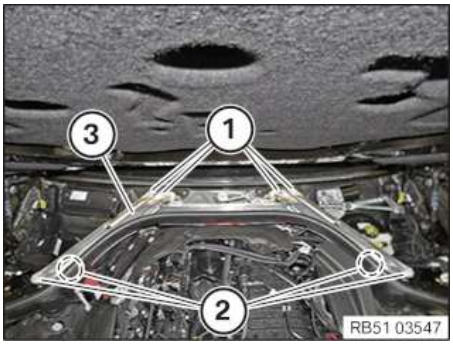
		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

  Clip in the wire (1) into the holders (arrows).

bardiagn.com



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Install the tension strut (3) on the spring strut dome.
- Tighten the screws (1).

Tension strut on bulkhead

M10x25 screw		Tightening torque	56 Nm

- Renew screws (2).

  Parts: Screws
- Tighten the screws (2).

Tension strut to spring strut dome

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

63 – Install the seal for the bonnet



- Press the rear bonnet seal (2) into the guide.
- Feed in cable (1) into the brackets.
- Check that the rear bonnet seal (2) and the cable (1) are seated correctly.

64 – Installing cowl panel cover

RISK OF DAMAGE

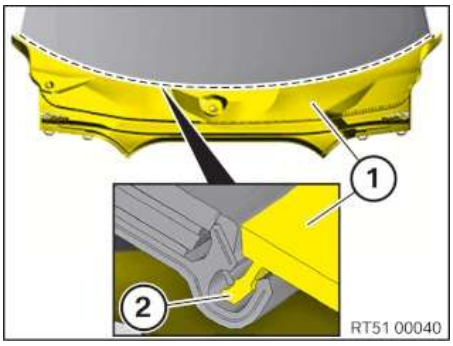
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

- Ensure correct installation of the components.
- Only use undamaged components.

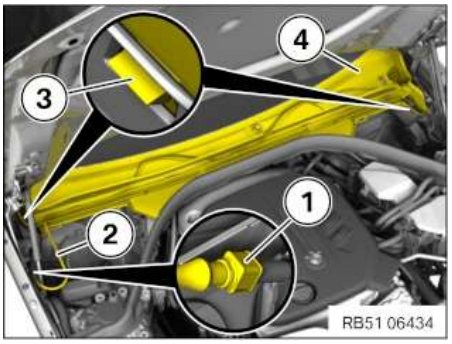
TECHNICAL INFORMATION

Before installing the cowl panel cover it is **mandatory** to check that the 48 V line is routed correctly and fitted tightly.
An incorrectly laid or attached 48 V line can be damaged by the wiper kinematics.



- Push the cowl panel cover (1) into the latch mechanism (2) beginning on the side.

cardiagn.com



- Clip cowl panel cover (4)in by means of the latch mechanisms (3).
- Position windscreen wash hose (2) and connect windscreen wash hose (1)quick lock.

65 – Install left and right wiper arm

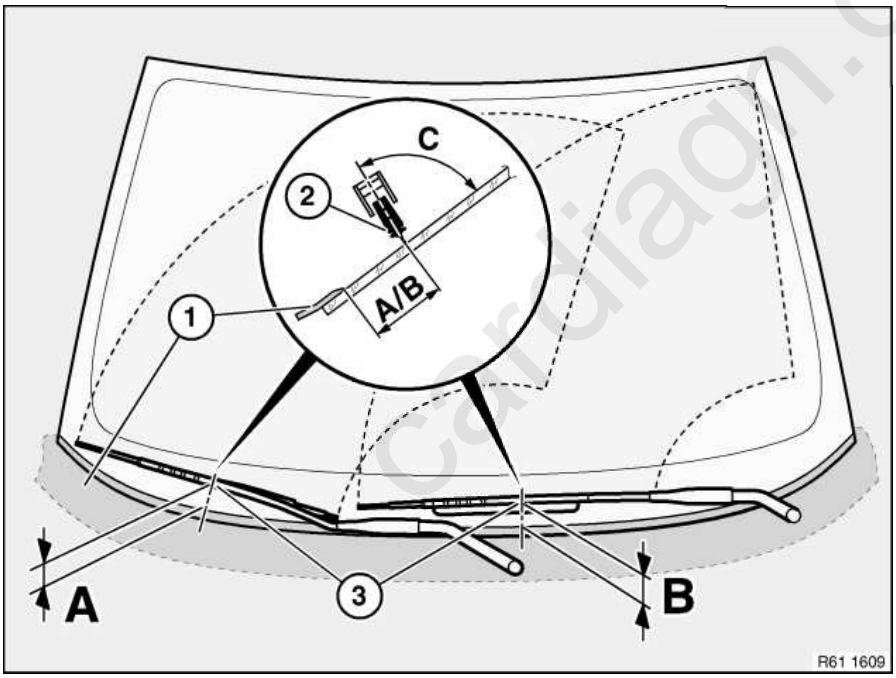
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

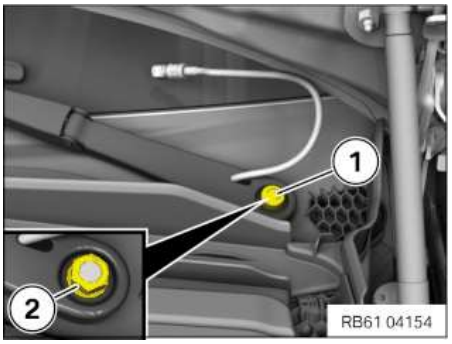
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- Connect the wiper arm (3).
- Correctly position the wiper arm (2) in relation to the window edge (1).

Distance from window pane edge to wiper blade

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm



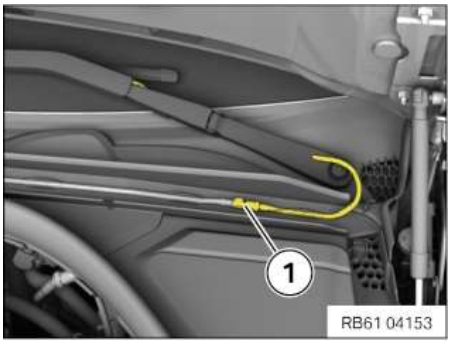
- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

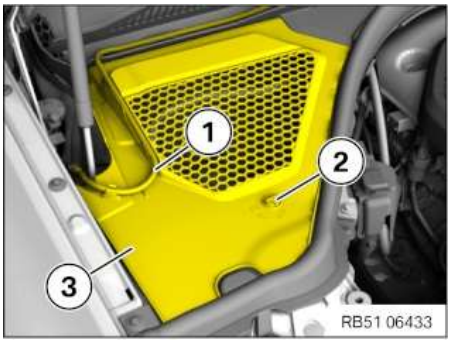
- Connect the protective cap (1).

cardiagn.com



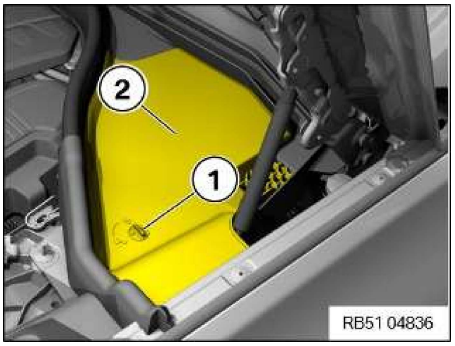
- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

66 – Install the rear right engine compartment cover



- Position the cover of the engine compartment on the rear right (3).
- Close lock (2).
- Insert washer fluid hose (1) into the guides.

67 – Install the cover of the engine compartment on the rear left



- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

68 – Connecting all battery earth leads



- See additional information.

69 – Take bonnet out of the service position

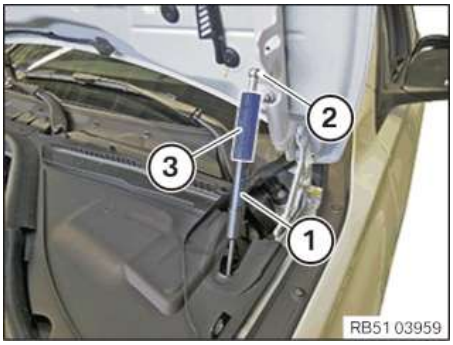
CAUTION

Shutting bonnet or tailgate.

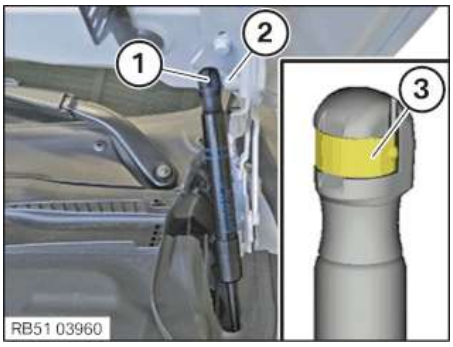
Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.

cardiagn.com



- Support the bonnet by hand.
- Remove the special tool (3) from the ball pin (2).
- Pull off the special tool (3) from the gas pressure spring (1).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.



- Check the clamp (3) is fitted correctly.
- Connect ball socket (1) to ball pin (2).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.

Additional Information

Overview of Tightening Torques

Special tool 2 365 488 to engine			Used in step 34
M8x60		Tightening torque	19 Nm

Starter motor to engine			Used in step 37
M8X60		Tightening torque	19 Nm

Battery positive lead to starter			Used in step 37
M8		Tightening torque	13,5 Nm

Underbody protection			Used in step 3840
Hexagon screw		Tightening torque	3 Nm

Underbody panelling			Used in step 39
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Underbody protection, steering, to front axle support			Used in step 41
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support			Used in step 41
Hexagon bolt M6		Tightening torque	8 Nm

Underbody protection of the steering gear			Used in step 42
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

Wheel arch trim panel, front			Used in step 42
Thermoplastic hexagon screw		Tightening torque	2,6 Nm

cardiagn.com

Underbody protection front			Used in step 43
Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Cylinder head cover to cylinder head			Used in step 44
M6		Tightening torque.	8,5 Nm

Heat shield to exhaust manifold			Used in step 45
M6x12			10 Nm

Bracket on cylinder head cover			Used in step 46
		Tightening torque	5 Nm

Battery positive lead to battery positive terminal			Used in step 46
M8		Tightening torque	19 Nm

Differential pressure sensor of diesel particulate filter on cylinder head cover			Used in step 47
TS5x20		Tightening torque	4 Nm

Heat shield to exhaust manifold			Used in step 48
M6x12		Tightening torque	10 Nm

Banjo bolt for exhaust pressure pipe to exhaust manifold			Used in step 48
Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm

Exhaust gas pressure pipe to sensor system holder			Used in step 48
TS6x20		Tightening torque	5,7 Nm

Clamping claw facing to cylinder head cover			Used in step 49
M6		Tightening torque	10 Nm

Injector to cylinder head cover			Used in step 49
M8		Tightening torque	8 Nm
		Angle of rotation	120 °

Rail to cylinder head cover			Used in step 50
M8		Tightening torque	19 Nm

High pressure lines between high pressure pump and rail			Used in step 51
High-pressure pipe		Tightening torque	24.5 Nm

High pressure lines between injector and rail			Used in step 52
High-pressure pipe		Tightening torque	24.5 Nm

Intake plenum to cylinder head			Used in step 54
M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum			Used in step 54
		Tightening torque	10 Nm

Electric changeover valve to intake plenum			Used in step 54
TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold			Used in step 55
TS5x20		Tightening torque	3,6 Nm

cardiagn.com

Standard screw connection 4 Nm			Used in step 55
Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover			Used in step 55
TS5x20		Tightening torque	3,6 Nm

Holder on intake plenum			Used in step 55
TS6X20		Tightening torque	5 Nm

Clean air pipe to exhaust turbocharger			Used in step 57
M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing			Used in step 57
Clamp		Tightening torque	3 Nm

Bulkhead lower part to body			Used in step 61
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead			Used in step 62
		Tightening torque	3 Nm

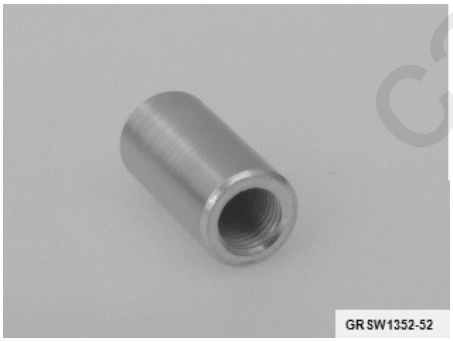
Tension strut on bulkhead			Used in step 62
M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome			Used in step 62
Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm			Used in step 65
Combination hexagon nut		Tightening torque	35 Nm

Overview of Special Tools

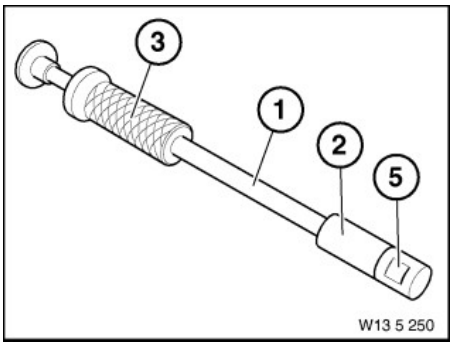
0 493 339 (13 5 252) Bush



Common		Used in step 21
Usage	(Threaded bush)	
Included in the tool or work	0 493 321	
Storage location		
Replaced by		
In connection with		
SI-Number		

cardiagn.com

0 493 321 (13 5 250) Puller



Common Used in step 21

Usage	For removing injector nozzles or injectors from cylinder head
Included in the tool or work	
Storage location	A16
Replaced by	
In connection with	
SI-Number	01 06 98 (306)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 338 (13 5 251)		**Rod** (guide rod)	
2	0 493 339 (13 5 252)		**Bush** (Threaded bush)	
3	0 493 340 (13 5 253)		**Weight** (Weight)	
4	0 493 379 (13 5 254)		**Claw** (Clamping claw) For removal of injector nozzles / engine: M57	
5	0 495 579 (13 5 255)		**Adapter** For removing steering shaft on E85. Refer to SI 01 11 06 (265)	

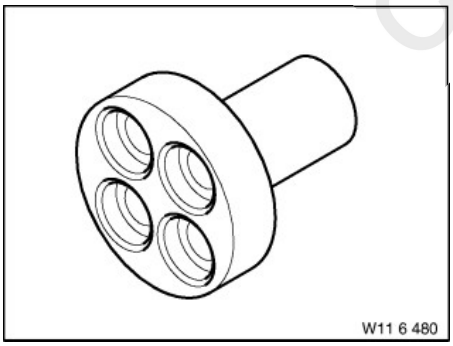
0 493 340 (13 5 253) Weight



Common Used in step 21

Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 380 (11 6 480) Connector

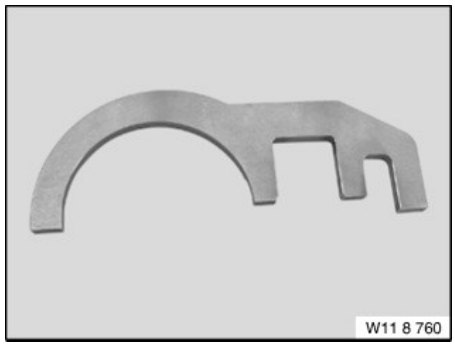


Common Used in step 34

Usage	For turning over engine at crankshaft hub (vibration absorber).
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	01 11 98 (338)

carbiagn.com

0 496 112 (11 8 760) Gauge



Common	Used in step 3435
Usage	For securing camshaft at TDC.
Included in the tool or work	
Storage location	B24
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

2 365 488 Adapter



Common	Used in step 3436
Usage	For disconnecting the crankshaft at the top dead centre. (longitudinal installation with automatic transmission only).
Included in the tool or work	
Storage location	C56
Replaced by	
In connection with	
SI-Number	01 46 14 (191)

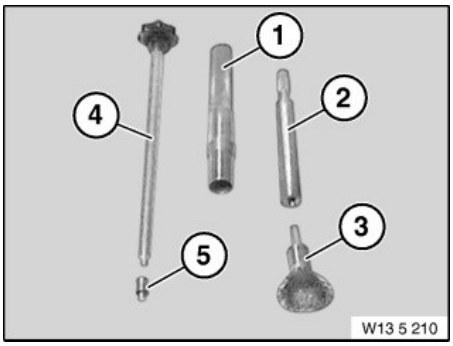
2 288 380 Locating stud



Common	Used in step 3436
Usage	For disconnecting the crankshaft at the top dead centre. Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).
Included in the tool or work	
Storage location	A56
Replaced by	
In connection with	
SI-Number	01 04 14 (071)

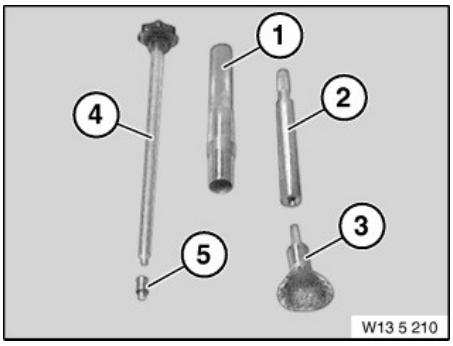
cardiagn.com

0 493 763 (13 5 215) Plug



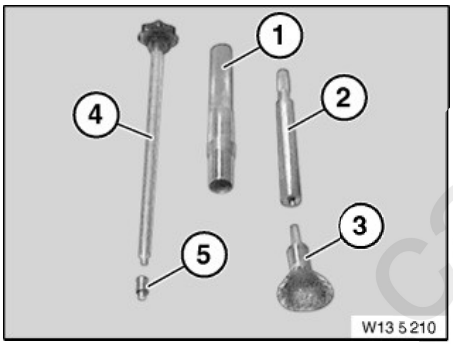
Common	Used in step 49
Usage	(Seal plug)
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 762 (13 5 214) Rod



Common	Used in step 49
Usage	(Mounting rod) For the seal plug
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 758 (13 5 210) Tool



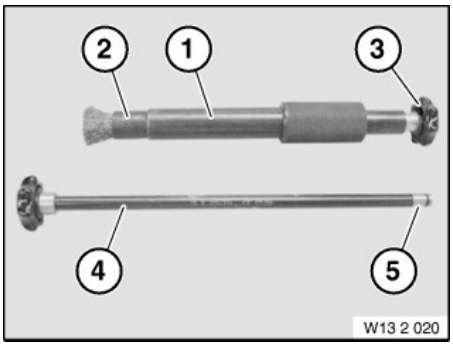
Common	Used in step 49
Usage	(Cleaning set) For injector channels
Included in the tool or work	
Storage location	B4
Replaced by	
In connection with	
SI-Number	01 05 00 (574)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 759 (13 5 211)		**Holding sleeve** (Guide sleeve)	
2	0 493 760 (13 5 212)		**Holder** (Brush holder)	
3	0 493 761 (13 5 213)		**Brush head**	
4	0 493 762 (13 5 214)		**Rod** (Mounting rod) For the seal plug	
5	0 493 763 (13 5 215)		**Plug** (Seal plug)	

cardiagn.com

0 496 150 (13 2 020) Tool



Common Used in step 49

Usage	(Cleaning kit) For cleaning the injector shaft.
Included in the tool or work	
Storage location	A87
Replaced by	
In connection with	
SI-Number	01 07 07 (355)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 496 151 (13 2 021)		**Holding sleeve** (Guide sleeve) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
2	0 496 152 (13 2 022)		**Holder** (Brush holder) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
3	0 496 153 (13 2 023)		**Brush head** Remaining inventories will be sold off, followed by discontinuation and then available as part of complete special tool 13 2 020 = 83 30 0 496 150 only	
4	0 496 154 (13 2 024)		**Rod** (Mounting rod) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
5	0 496 155 (13 2 025)		**Plug** (Seal plug) Available as part of complete special tool 13 2 020 = 83 30 0 496 150 only.	

Overview Technical Data

Distance from window pane edge to wiper blade Used in step 65

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

Links

General repair instructions	Used in step
11 00 ... Overview of consumables (Electronic Parts Catalogue)	49

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	268
61 20 900 Disconnecting and connecting battery earth lead	268
61 20 900 Disconnecting and connecting battery earth lead	268
61 20 900 Disconnecting and connecting battery earth lead	268
61 20 900 Disconnecting and connecting battery earth lead	268
61 20 900 Disconnecting and connecting battery earth lead	268

cardiagn.com

61 20 900 Disconnecting and connecting battery earth lead	268
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	268
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	268
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	268
61 20 900 Disconnecting and connecting battery earth lead	268
61 20 900 Disconnecting and connecting battery earth lead	268
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	268
61 20 900 Disconnecting and connecting battery earth lead	268
61 20 900 Disconnecting and connecting battery earth lead	268
61 20 900 Disconnecting and connecting battery earth lead	268
61 20 900 Disconnecting and connecting battery earth lead	268
61 20 900 Disconnecting and connecting battery earth lead	268
61 20 900 Disconnecting and connecting battery earth lead	268
61 20 900 Disconnecting and connecting battery earth lead	268
61 20 900 Disconnecting and connecting battery earth lead	268
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	268
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	268
61 20 900 Disconnecting and connecting battery earth lead	268
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	268
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	268
61 20 900 Disconnecting and connecting battery earth lead

11 31 ... Notes on checking and adjusting the timing (B36, B37, B38, B46, B47, B48)

Special tools required:

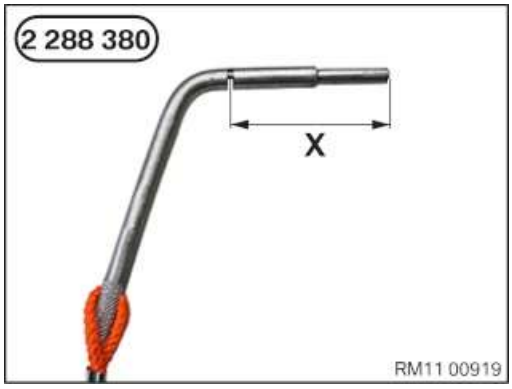
- 2 288 380

Attention!

Risk of damage to engine.

The notes for checking and adjusting the timing must be strictly observed!

If the crankshaft is fixed properly, it is not possible to turn the engine forwards or backwards on the vibration damper.



Vehicles with manual transmission:

Dimension (x) = 56 mm.

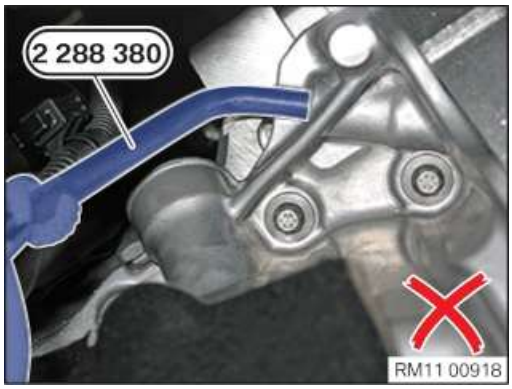
Insert the special tool 2 288 380 up to dimension (X) into the dowel hole.



Vehicles with manual transmission:

Special tool 2 288 380 correctly positioned.

The engine is located at the first cylinder at top dead centre.



Vehicles with manual transmission:

Special tool 2 288 380 incorrectly positioned.

The TDC setting of the first cylinder has not been acheived.



Vehicles with automatic transmission:

Dimension (Y) = 66 mm.

Insert the special tool 2 288 380 up to dimension (Y) into the dowel hole.



Vehicles with automatic transmission:

Special tool 2 288 380 correctly positioned.

The engine is located at the first cylinder at top dead centre.



Vehicles with automatic transmission:

Special tool 2 288 380 incorrectly positioned.

The TDC setting of the first cylinder has not been acheived.

cardiagn.com

11 31 090 Remove and install/replace chain tensioner piston

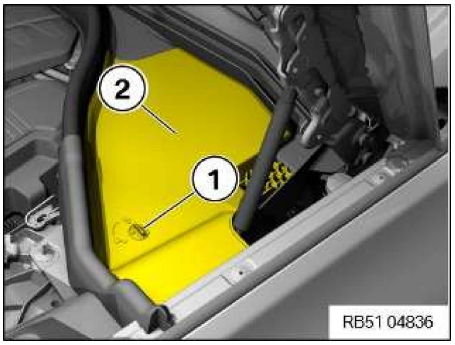
PRELIMINARY WORK

1 – Remove the seal for the rear bonnet



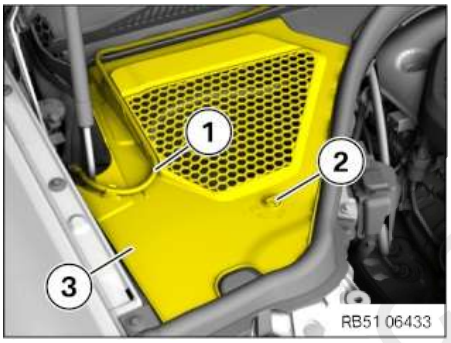
- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

2 – Remove the cover of the engine compartment at the rear left



- Loosen the lock (1).
- Remove the cover (2) of the rear left engine compartment.

3 – Remove the cover of the rear right engine compartment



- Release washer fluid hose (1) from the guides.
- Loosen the lock (2).
- Remove the cover (3) of the rear right engine compartment.

4 – Removing the wiper arm on the left and right

NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Remove the wiper arm**

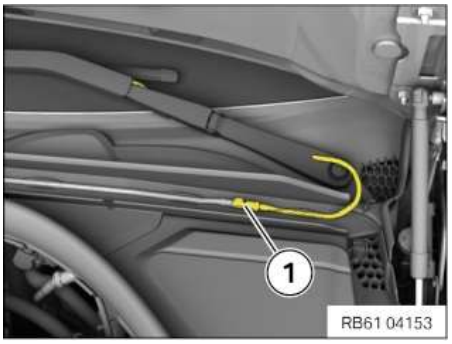
RISK OF DAMAGE

Damage to wiper console.

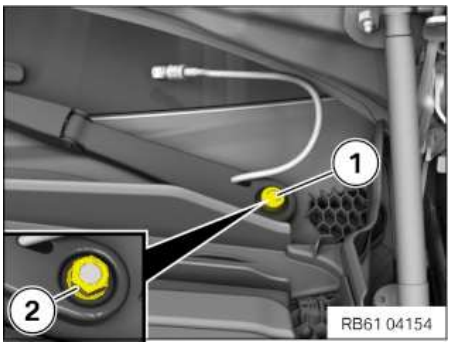
While removing the wiper arms without using special tool, the wiper console can break.

- Removing the wiper arms must be carried out only using the prescribed special tool.
- Do **not** lever off the wiper arm because otherwise the wiper console may break at the predetermined breaking point for active pedestrian protection.

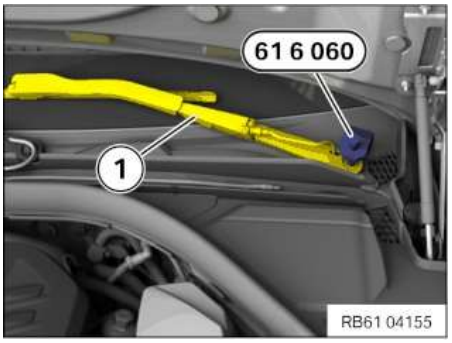
cardiagn.com



- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.

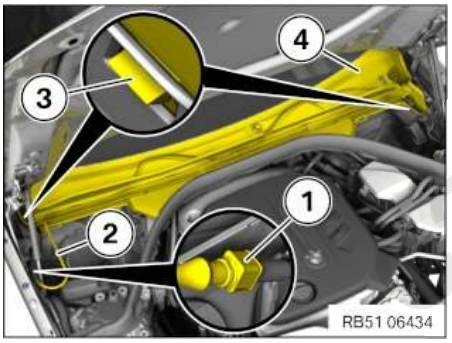


- Remove the protective cap (1).
- Loosen nut (2).

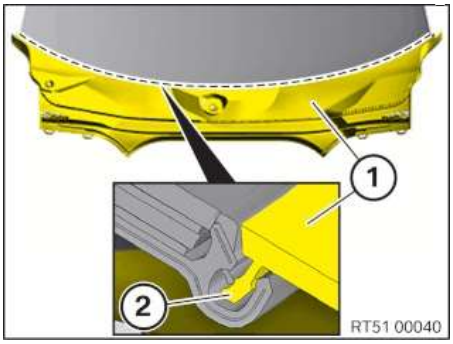


- Pull off the wiper arm (1) using special tool .

5 – Remove cowl panel cover



- Release snap fastener (1) of the washer fluid hose (2) and put the washer fluid hose (2) to one side.
- Unclip clips (3) on the cowl panel cover (4).



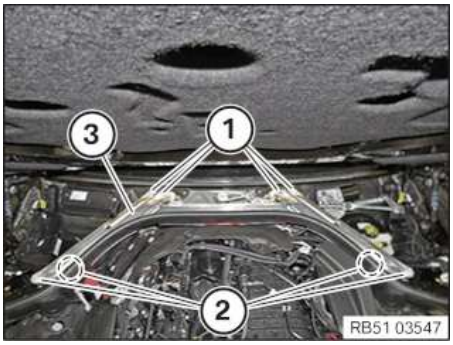
- Pull the cowl panel cover (1) upward out of the latch mechanism (2) beginning on the side.

6 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

Driving without the strut brace/front-end strut or tension strut is not permitted.

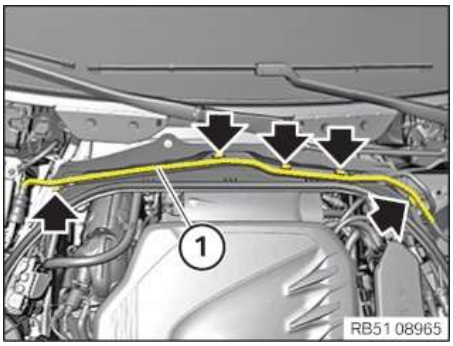
cardiagn.com



NOTICE

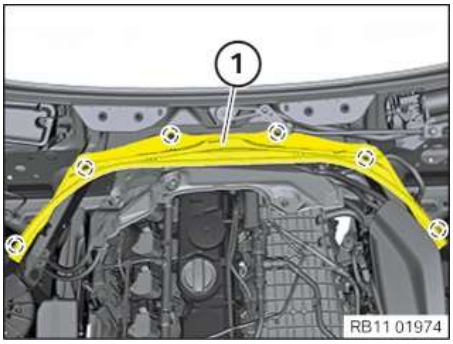
The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.



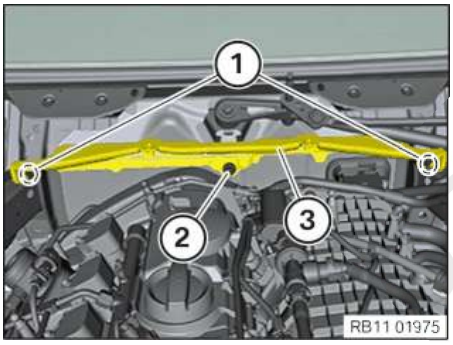
- **Version with mild hybrid technology:**

  Unclip the wire (1) at the holders (arrows).



- Unscrew the bolts in the marked areas.
- Remove the centre bulkhead upper part (1).

7 – Removing the centre bulkhead lower section



- Loosen screws (1).
- Loosen nut (2).
- Remove the centre bulkhead lower part (3).

8 – Remove differential pressure sensor for the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

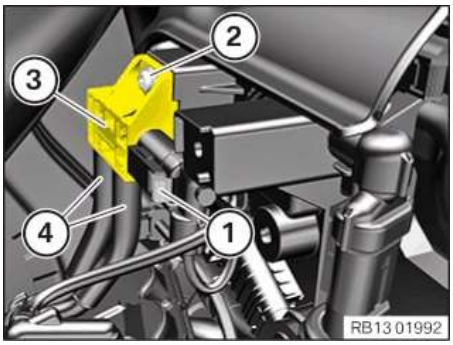
parts4agn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).
- Pull off pressure hose (4).
- Feed out differential pressure sensor (3) and remove.

9 – Remove the exhaust temperature sensor on the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

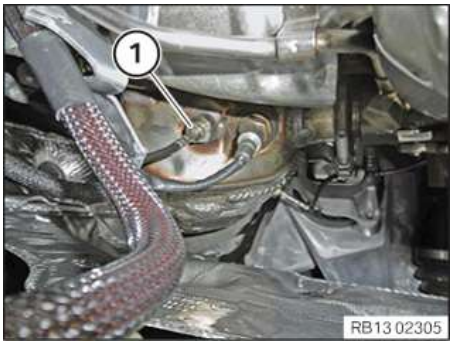
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

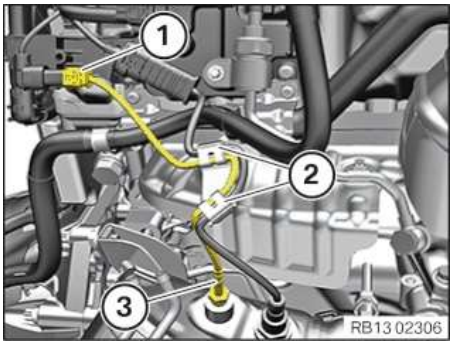
Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)



- Release exhaust temperature sensor (1) using special tool .

cardiagn.com



- Unlock plug connection (1) and disconnect.
- Remove the exhaust temperature sensor (3) from the clamps (2).
- Feed out and remove exhaust temperature sensor (3).

10 – Removing the front oxygen sensor on the diesel particulate filter on top

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

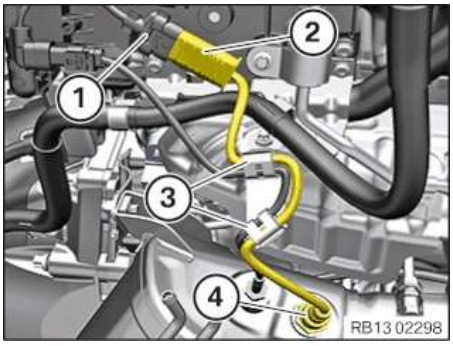
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



- Unlock plug connection (1) and disconnect.
- Unlock and disconnect connector (2).
- Pull the front oxygen sensor (4) out from the clamps (3) and remove it.

cardiag.com



- Release the front oxygen sensor (1) with the standard tools and remove it.

11 – Removing the exhaust temperature sensor for the exhaust system downstream the catalytic converter at the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

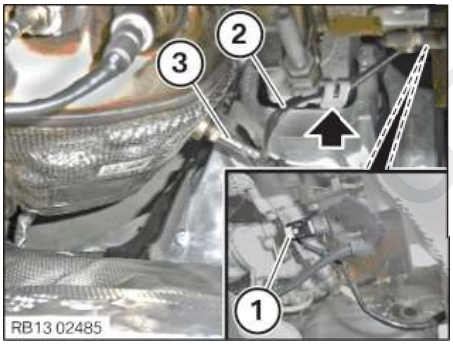
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)



- Unlock plug connection (1) and disconnect.

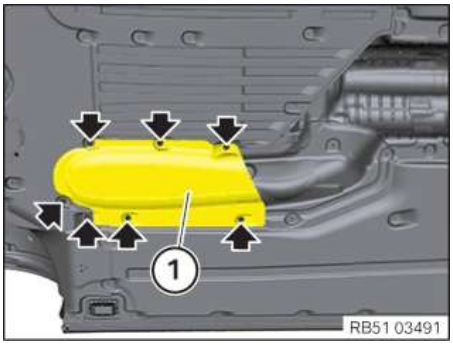
Note: The exhaust temperature sensor is located near the right engine mount.

- Release cable (2) from the clamps (arrow).
- Loosen exhaust temperature sensor (3).
- Feed out and remove exhaust temperature sensor (3).

12 – Remove the underbody panelling of the transmission on the side

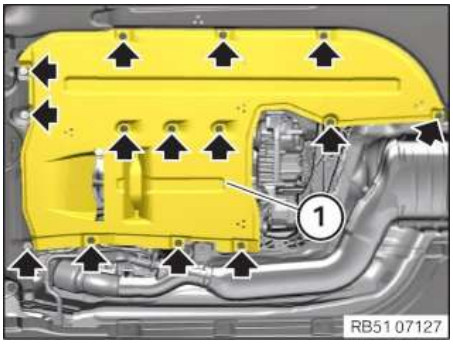
NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.



- Remove screws (arrows).
- Remove the underbody panelling (1).

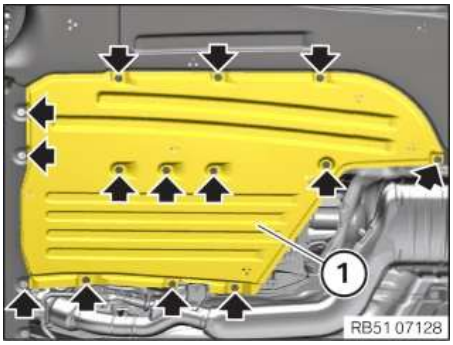
13 – Remove rear underbody protection



- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).

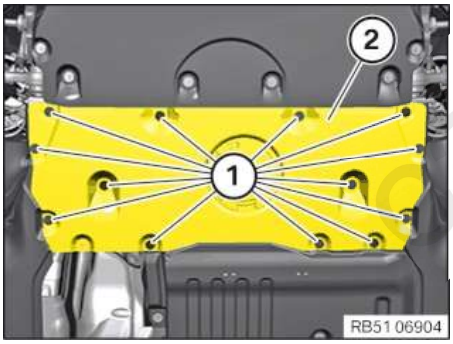


- **Version B:**

  Remove screws (arrows).

  Guide out rear underbody protection (1) and remove it.

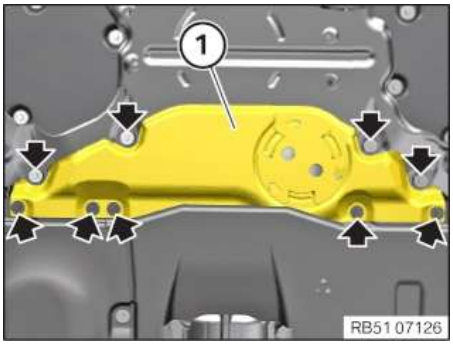
14 – Removing the centre underbody protection



- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .



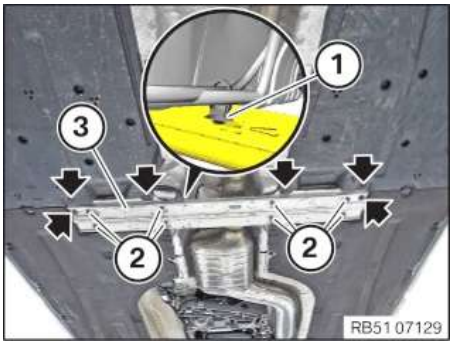
- **Version with all-wheel drive:**

  Remove screws (arrows).

  Feed out and remove the centre underbody protection (1).

15 – Remove the connecting support from the tunnel

cardiagn.com



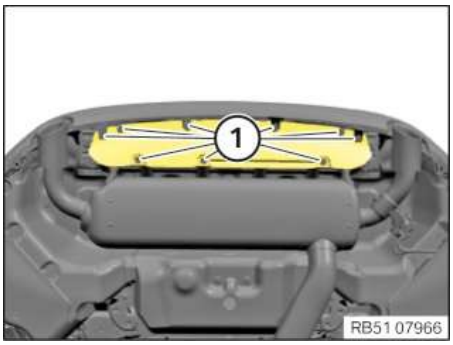
- Remove screws (arrows).

NOTICE

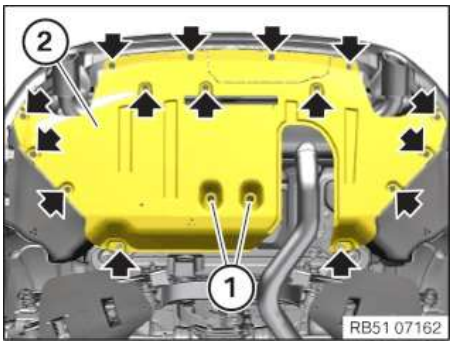
The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Loosen clamp (1).
- Loosen screws (2).
- Guide out and remove connecting support (3) on the tunnel.

16 – Removing the rear diffuser



- **Version 1:**
- Release the screws and nuts (1).
- Remove the diffuser.



- **Version 2:**
- Loosen nuts (1).
- Remove screws (arrows).
- Guide out and remove rear diffuser (2).

17 – Remove exhaust system

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

CAUTION

Component with heavy weight.

Danger of injury!

- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

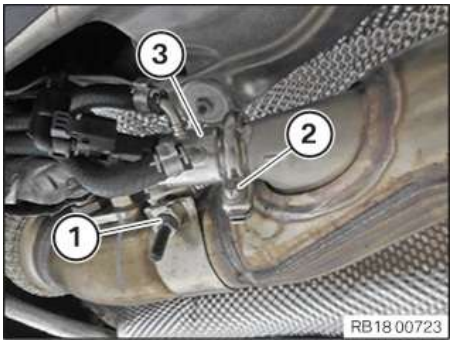
cardiagn.com

CAUTION

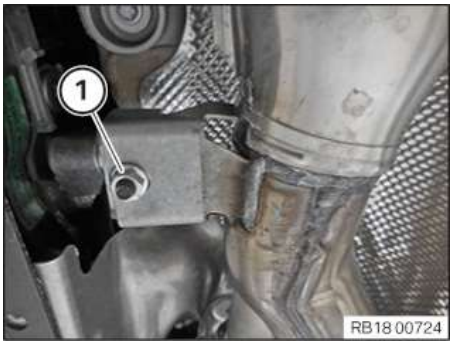
Heavy component.

Heavy components can lead to injury or damage.

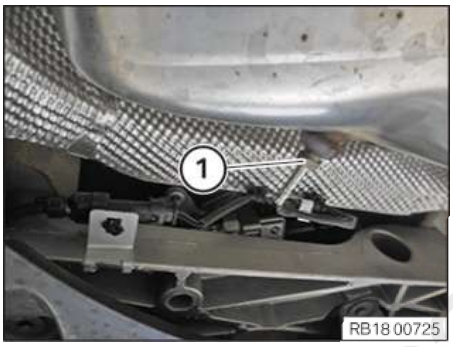
- Remove and install heavy components with the aid of another person/other persons.



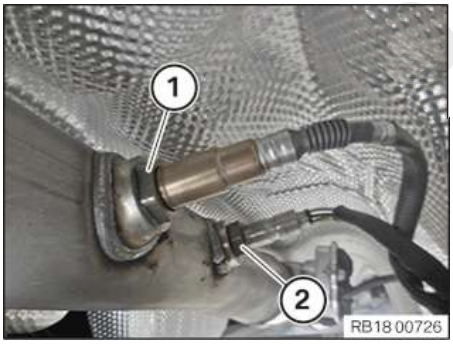
- Unfasten clamp (1).
- Detach the clamp (2) of the SCR metering module (3).
- Detach the SCR metering module (3)from the exhaust system and place to one side.



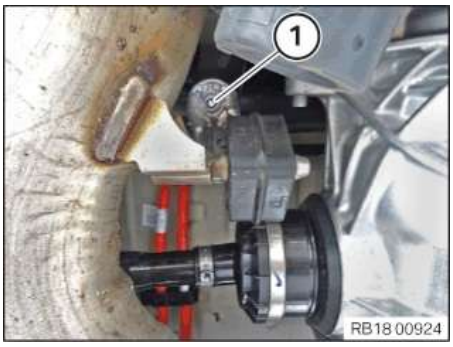
- Loosen nut (1).



- Detach the exhaust temperature sensor (1) from the exhaust system.

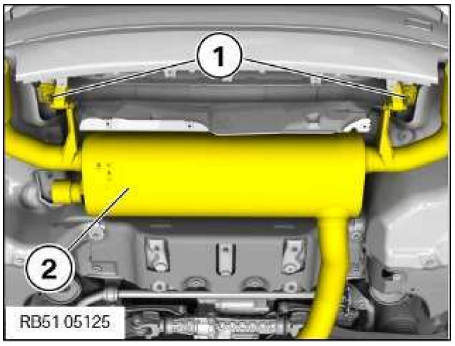


- Release the diesel particulate sensor (1) from the exhaust system and place to one side.
- Release the nitrogen oxide sensor (2) from the exhaust system and place to one side.



- Release the nut (1) on the rear axle support.

cardiagn.com



- Loosen nuts (1).
- Lower and remove the exhaust system (2) with the assistance of a second person.

18 – Removing the monitoring oxygen sensor after the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

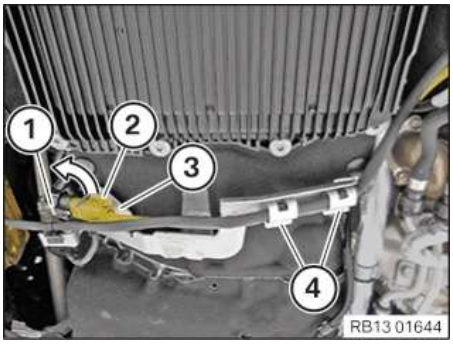
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

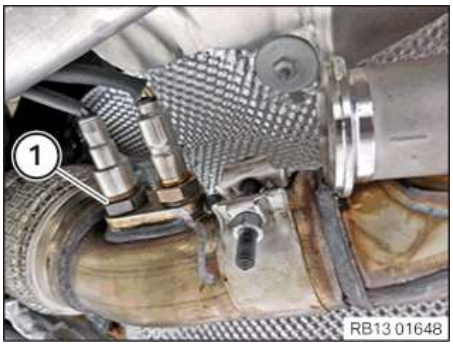


- Unlock and loosen connector (1).
- Loosen connector (2) from the holder (3) in direction of arrow.
- Release the monitoring oxygen sensor from the clamps (4).

cardiagn.com



- Release the monitoring oxygen sensor (1) with the standard tools.



- Thread out the monitoring oxygen sensor (1) and remove it.

19 – Removing the nitrogen oxide sensor before SCR catalytic converter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

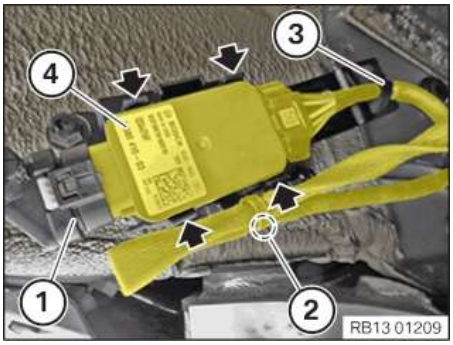
RISK OF DAMAGE

Damage to the nitrogen oxide sensor.

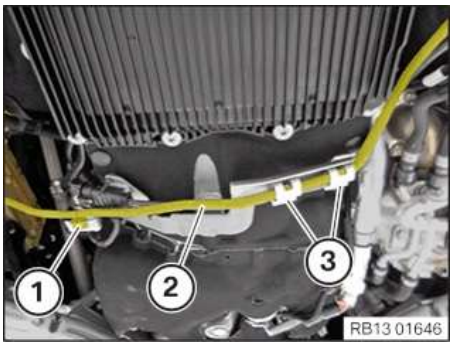
Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

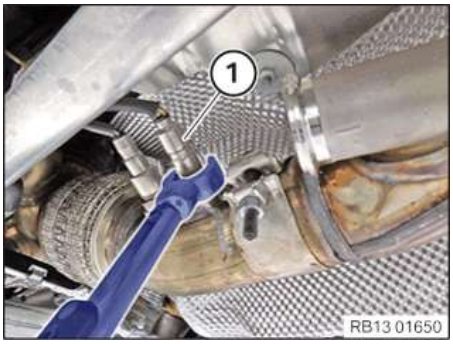
cardiagn.com



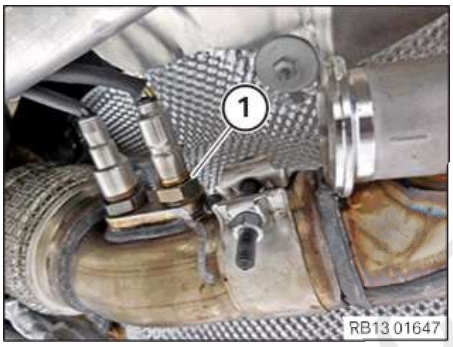
- Unlock plug connection (1) and disconnect.
- Release cable clip in area (2).
- Release line from the holder (3).
- Unclip control unit (4).



- Loosen clamp (1).
- Loosen the cables (2) from the clamps (3).



- Loosen the nitrogen oxide sensor (1) using commercially available tools.



- Feed out and remove the nitrogen oxide sensor (1).

20 – Removing the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

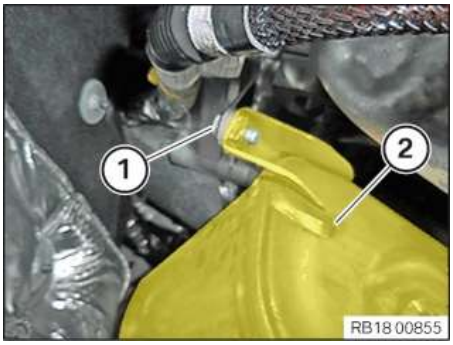
CAUTION

Heavy component.

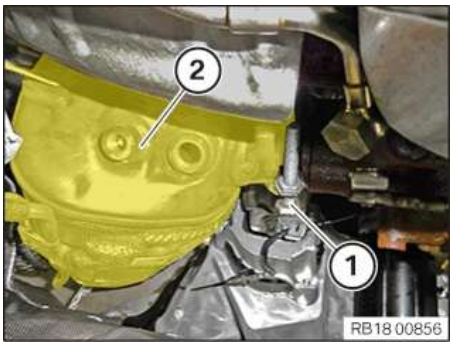
Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

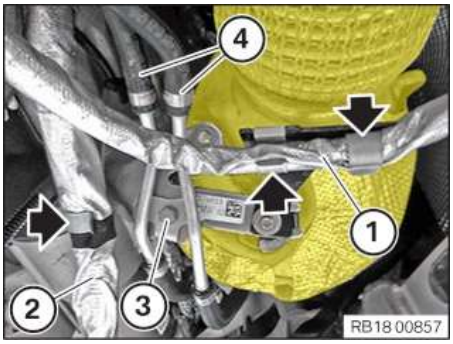
cardiagn.com



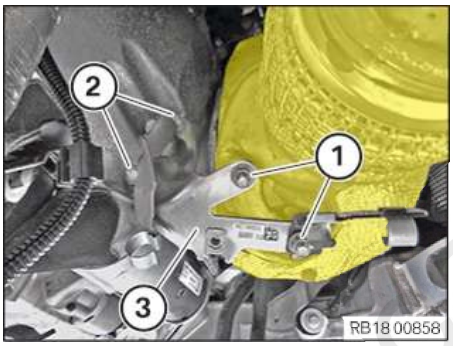
- Release bolt (1) from the holder of diesel particulate filter (2).



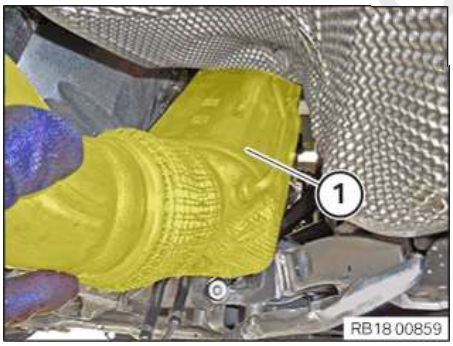
- Loosen V-band clamp (1).
- Feed V-clip (1) out from diesel particulate filter (2) and remove.



- Release the metering line (1) from clamps (Arrows).
- Release positive battery cable (2) from starter motor from clamp (Arrow).
- Loosen screw (3).
- Thread off coolant line (4) and place to the side.



- Loosen nuts (1).
- Loosen screws (2).
- Guide out and remove holder (3).



- Guide out and remove diesel particulate filter (1).

MAIN WORK

21 – Remove chain tensioner piston

cardiagn.com

RISK OF DAMAGE

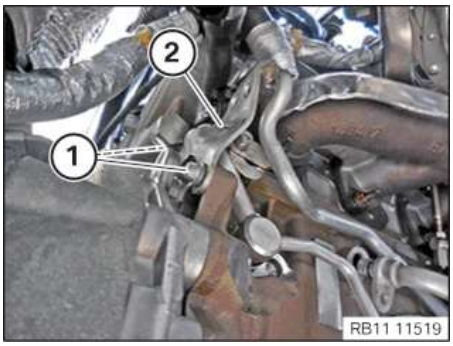
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

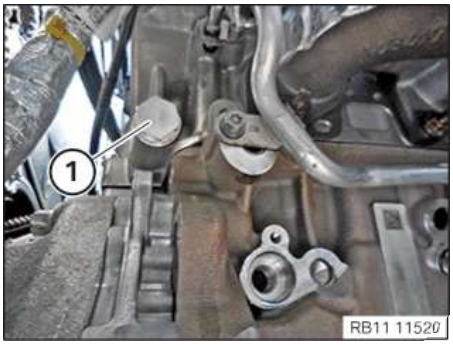
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Loosen screws (1).
- Guide out and remove holder (2).



- Loosen the chain tensioner piston (1).
- Catch and dispose of emerging engine oil.



- Feed out and remove the sealing ring (1).

22 – Installing the chain tensioner piston



TECHNICAL INFORMATION

The oil chamber must be drained for reuse of the chain tensioner.

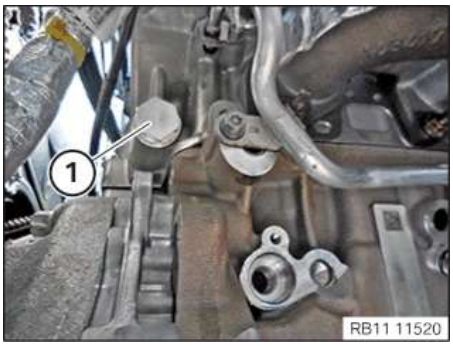
- Place the chain tensioner on a level support pad and slowly compress in the direction of arrow.
- Repeat process twice.

cardiagn.com



- Renew sealing ring (1).

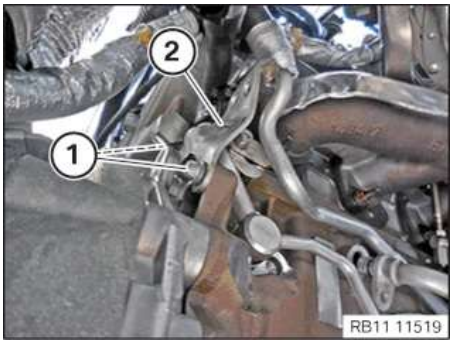
  Parts: Sealing ring
- Insert and install the sealing ring (1).



- Insert and install the chain tensioner piston (1).
- Tighten the chain tensioner piston (1).

Chain tensioner piston to cylinder head

22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm



- Insert and install the holder (2).
- Tighten the screws (1).

Holder to crankcase

M8X16		Tightening torque	19 Nm

POSTPROCESSES

23 – Prepare for the installation of the diesel particulate filter



- Renew the V-clip (1).

  Parts: V-band clamp



- Renew gasket (1).

  Parts: Gasket

24 – Installing the diesel particulate filter

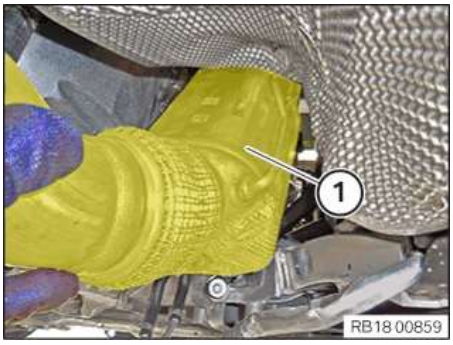
cardiagn.com

CAUTION

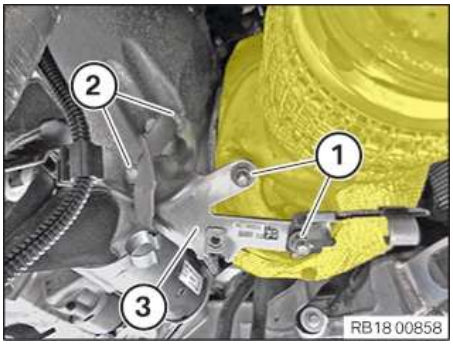
Heavy component.

Heavy components can lead to injury or damage.

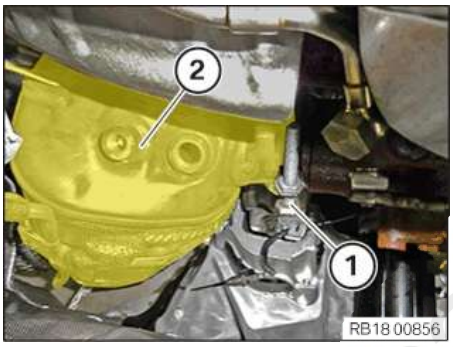
- Remove and install heavy components with the aid of another person/other persons.



- Insert and install the diesel particulate filter (1).



- Insert and install the holder (3).
- **Hand-tighten** the bolts (2).
- Apply the nuts (1) **hand-tight**.

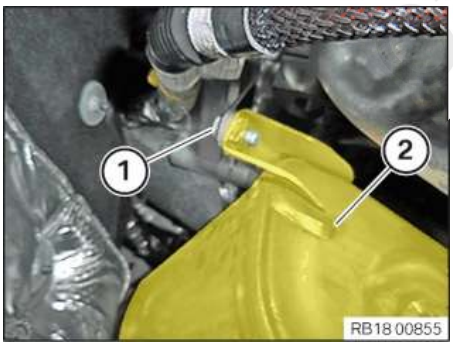


- Renew the V-clip (1).

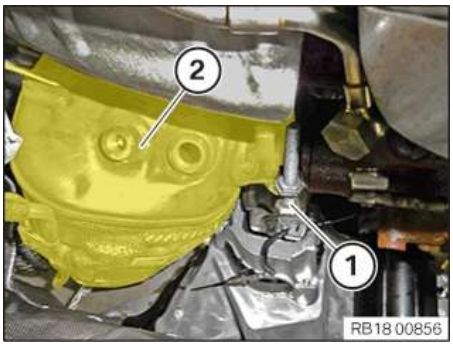
  Parts: V-band clamp
- Feed in and install V-band clamp (1).

Note: Make sure that the seal between the diesel particulate filter and the exhaust turbocharger is installed correctly.

- Position the diesel particulate filter (2) on the exhaust turbocharger .
- Position V-clip (1).
- Apply the V-clip (1) **hand-tight**.



- Feed in screw (1) on the holder of the diesel particulate filter (2) and tighten **hand-tight**.

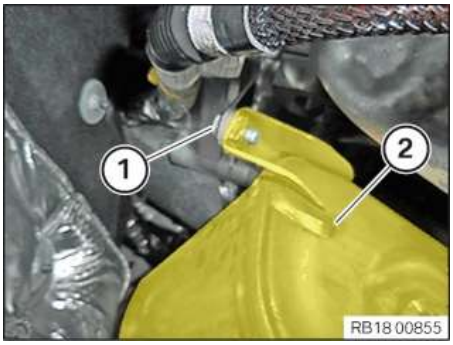


- Tighten the V-clip (1) of the diesel particulate filter (2).

Diesel particulate filter V-clip to exhaust turbocharger

V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

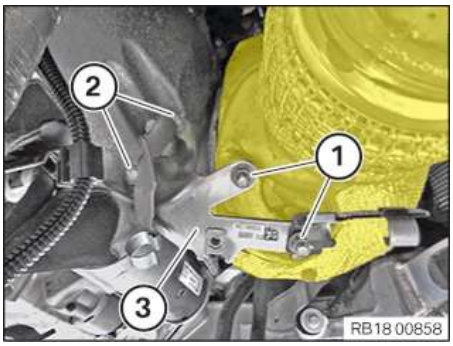
carmanualsonline.com



- Tighten the bolt (1) on the bracket of the diesel particulate filter (2).

Bracket to diesel particulate filter top

M8		Tightening torque	19 Nm



- Tighten the screws (2) on the holder (3).

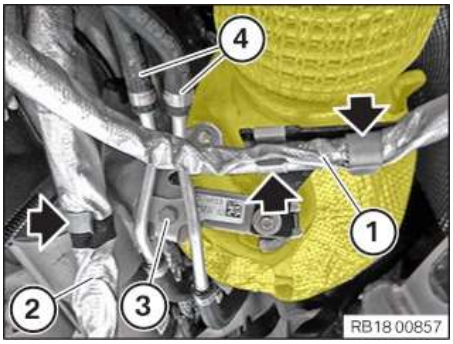
Bracket to transmission for diesel particulate filter holder bottom

M8X20		Tightening torque	19 Nm

- Tighten the nuts (1) on the holder (3).

Lower holder to diesel particulate filter

M8		Tightening torque	19 Nm



- Thread in and install coolant line (4).
- Tighten down screw (3).

Coolant lines for SCR metering module

M6X16		Tightening torque	8 Nm

- Secure the positive battery cable (2) of the starter motor at the clamp (arrow).
- Fasten the metering line (1) on the clamps (arrows).

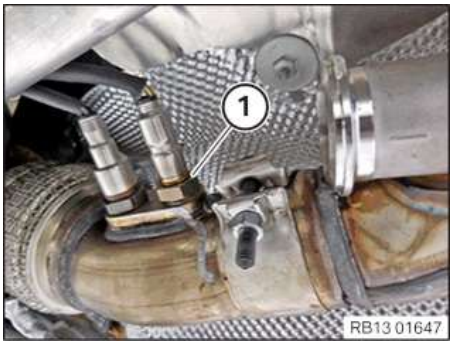
25 – Installing the nitrogen oxide sensor upstream of SCR catalytic converter

RISK OF DAMAGE

Damage to the nitrogen oxide sensor.

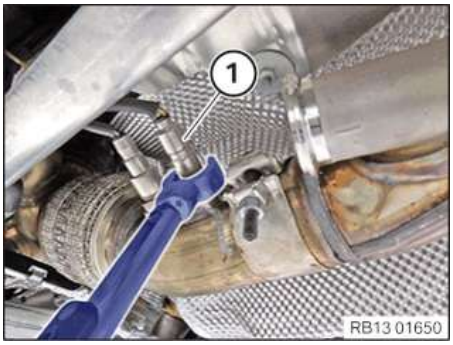
Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



- Feed in and install the nitrogen oxide sensor (1).

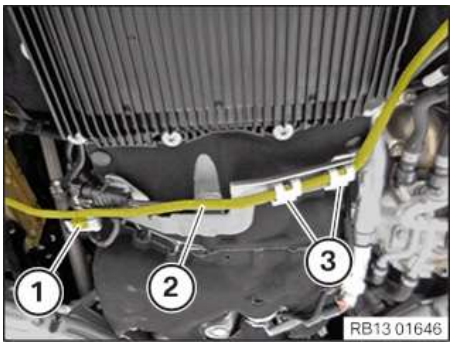
cardiagn.com



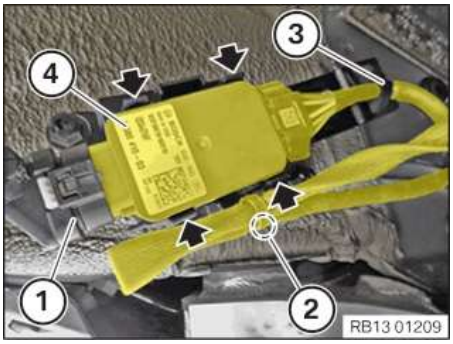
- Tighten the nitrogen oxide sensor (1) using commercially available tools.

Nitrogen oxide sensor before SCR catalytic converter

Sensor		Tightening torque	50 Nm



- Secure the cables (2) to the clamps (3).
- Secure clamps (1).



- Clip in the control unit (4) (arrows).
- Fasten the cable in the holder (3).
- Secure the cable holder (2).
- Plug in the connector (1) and lock audibly.

26 – Installing the monitoring oxygen sensor after the diesel particulate filter

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

TECHNICAL INFORMATION

New oxygen sensors are to be greased lightly and evenly on the thread.

For oxygen sensors that are reused, the following should be observed:

Lightly and evenly grease the oxygen sensor only on the thread. Do not clean and grease that part of the oxygen sensor which protrudes in the exhaust branch (sensor ceramics).

For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue

cardiagn.com



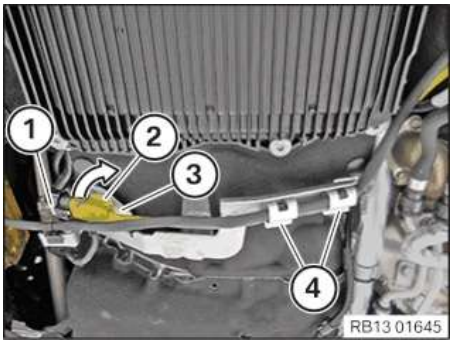
- Insert the monitoring oxygen sensor (1) and install it.



- Tighten the monitoring oxygen sensor (1) with standard tools.

Monitoring oxygen sensor

Sensor		Tightening torque	50 Nm



- Fasten the monitoring oxygen sensor to the clamps (4).
- Secure the connector (2) on the holder (3) in direction of arrow.
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

27 – Installing the exhaust system

CAUTION

Component with heavy weight.

Danger of injury!

- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

Heavy component.

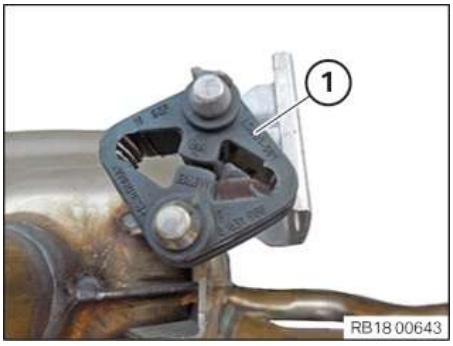
Heavy components can lead to injury or damage.

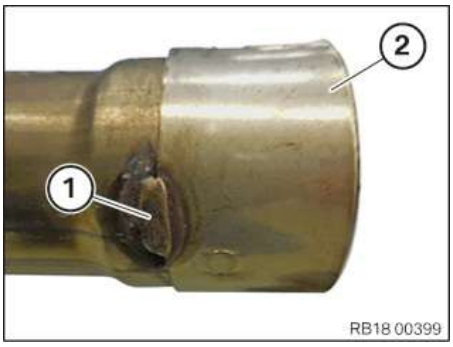
- Remove and install heavy components with the aid of another person/other persons.

TECHNICAL INFORMATION

Mount the exhaust system in voltage-free state, maintaining the tightening sequence from the rear silencer towards the exhaust manifold.

cardiagn.com





NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

- Check all the rubber mounts (1) of the exhaust system for damage.
- Replaced damaged rubber mounts.

  Parts: Rubber mount

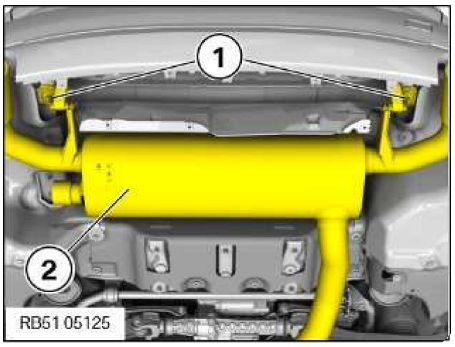
CAUTION

Swarf resulting from sawing or grinding components.

Danger of injury!

- Conduct all work in appropriate personal protective equipment only.
- Wear safety goggles and protective gloves.

- Open the weld seam (1) with a conventional tool.
- Remove the clamp (2).

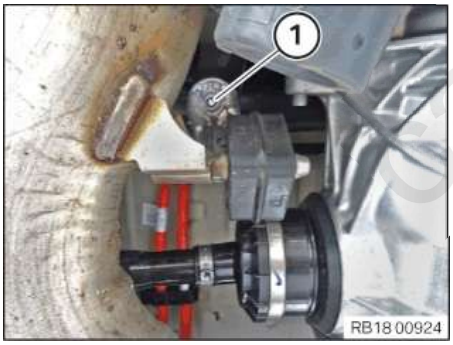


- Insert and install the exhaust system (2).
- Renew nuts (1).

  Parts: Nuts
- Tighten nuts (1).

Rear silencer to body / bumper support

M8	Replace nuts.	Tightening torque	19 Nm

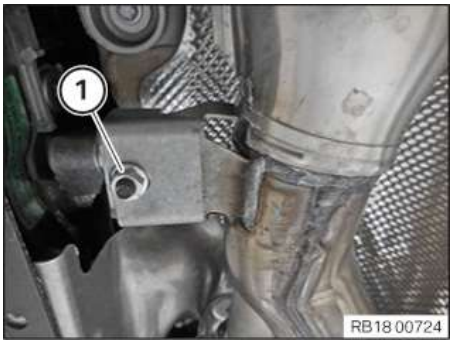


- Renew nut (1) on the rear axle support.

  Parts: Nut
- Tighten nut (1).

Exhaust system to rear axle carrier

M8 nut		Tightening torque	19 Nm

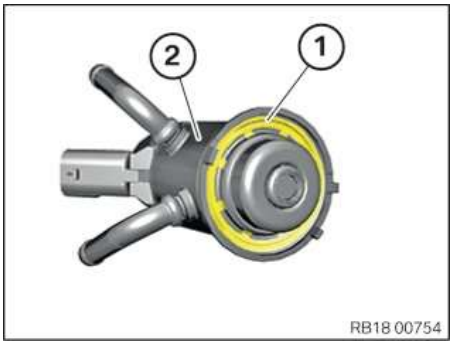


- Tighten nut (1).

Exhaust system to transmission

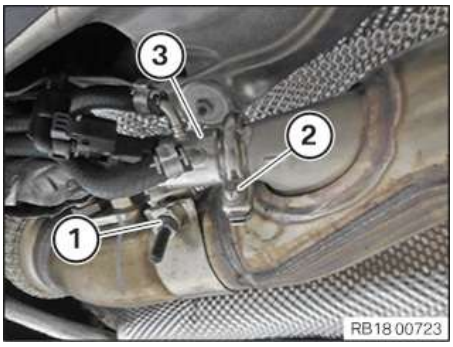
M8		Tightening torque	19 Nm

cardiagn.com



- Renew sealing ring (1) of the SCR metering module (2).

  Parts: Sealing ring



- If necessary, renew clamp (1).

  Parts: Clamp
- Tighten clamp (1).

Exhaust system to diesel particle filter

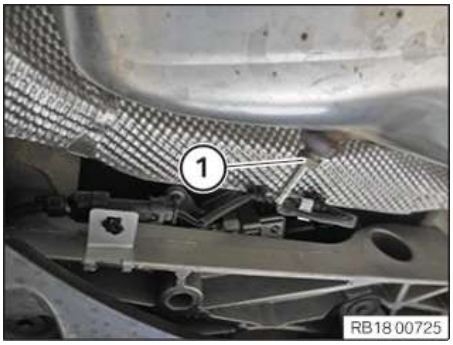
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

- Renew the V-clip (2).

  Parts: V-band clamp
- Install the SCR metering module (3) in the exhaust system.
- Tighten the V-clip (2) of the SCR metering module (3).

SCR metering module V-clip to exhaust system

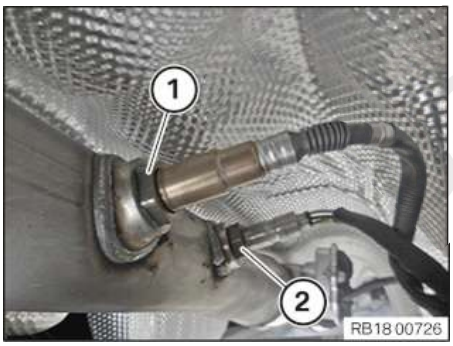
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm



- Install the exhaust temperature sensor (1) in the exhaust system and tighten.

Exhaust-gas temperature sensor upstream of SCR catalytic converter

Sensor		Tightening torque	30 Nm



- Install the diesel particulate sensor (1) in the exhaust system and tighten.

Diesel particulate sensor to exhaust system

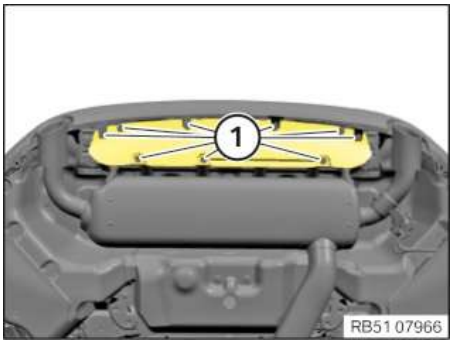
Sensor		Tightening torque	50 Nm

- Install the nitrogen oxide sensor (2) in the exhaust system and tighten.

Nitrogen oxide sensor downstream of SCR catalytic converter

Sensor		Tightening torque	55 Nm

28 – Installing the rear diffuser

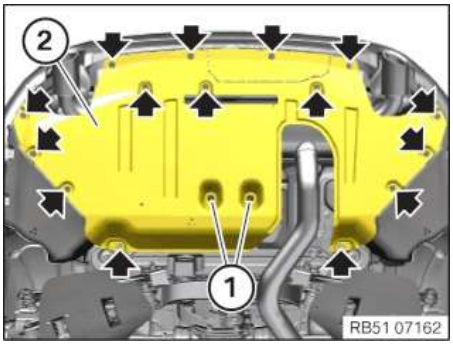


- **Version 1:**
- Install the diffuser and tighten the nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm

cardiagn.com



- **Version 2:**
- Feed in and position the diffuser (2)
- Tighten screws (arrows).

Diffuser / underbody panelling

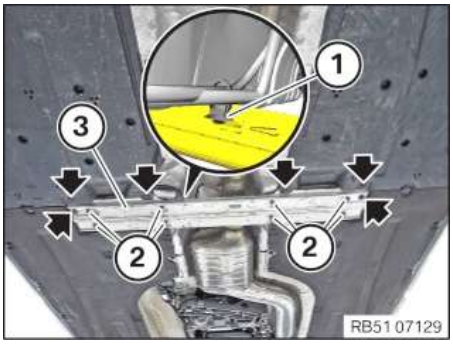
Nuts and screws		Tightening torque	3 Nm

- Tighten nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm

29 – Install the connecting supports on the tunnel



- Guide in and install connecting support (3) on the tunnel.
- Tighten the screws (2).
- Tighten screws (arrows).

Connecting support to tunnel

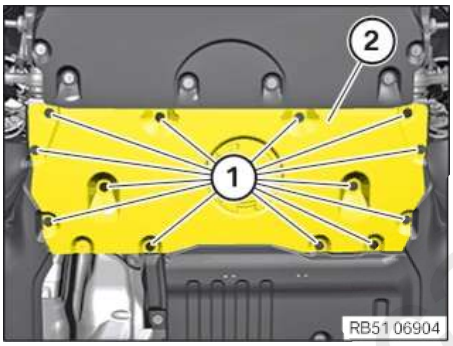
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Secure the clamp (1).

30 – Installing the centre underbody protection



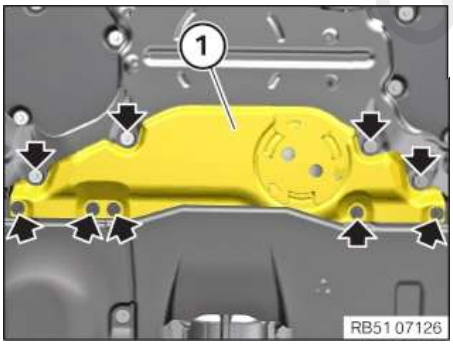
- **Variant with rear wheel drive:**

  Position central underbody protection (2).

  Tighten the screws (1).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version with all-wheel drive:**

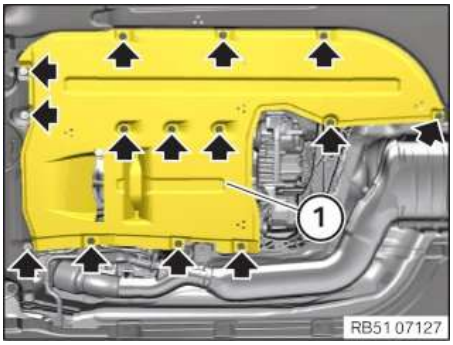
  Guide in centre underbody protection (1) and install.

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm

31 – Installing underbody protection at rear



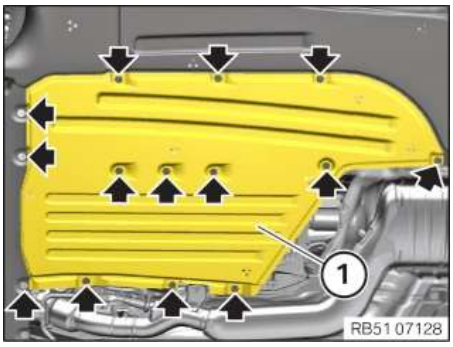
- **Version A:**

  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version B:**

  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

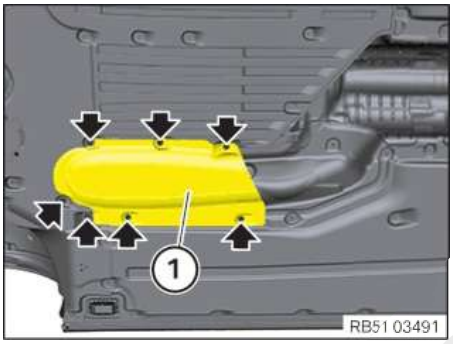
Underbody protection

Hexagon screw		Tightening torque	3 Nm

32 – Install the underbody panelling of the transmission on the side

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

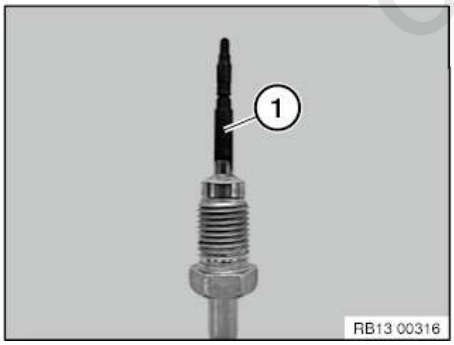


- Insert the underbody panelling (1).
- Tighten screws (arrows).

Underbody panelling

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

33 – Installing the exhaust temperature sensor for the exhaust system downstream the catalytic converter on the diesel particulate filter



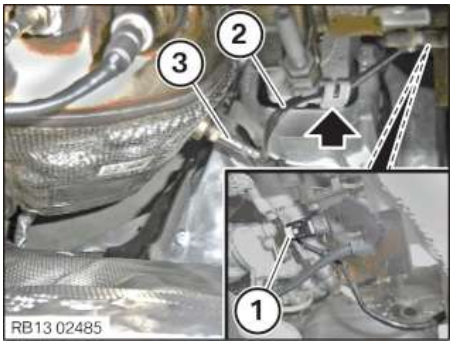
RISK OF DAMAGE

Damage of exhaust temperature sensor.

Damage to exhaust temperature sensors leads to malfunctions.

- Make sure that the gauge tip is not damaged.

- Check the gauge tip (1) for damage.



- Feed in and install the exhaust temperature sensor (3).
- Tighten the exhaust temperature sensor (3).

Exhaust temperature sensor for the exhaust system after catalytic converter before diesel particulate filter

Sensor		Tightening torque	30 Nm

- Secure cable (2) to the clamp (arrow).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

cardiagn.com

34 – Installing the front oxygen sensor on the diesel particulate filter

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

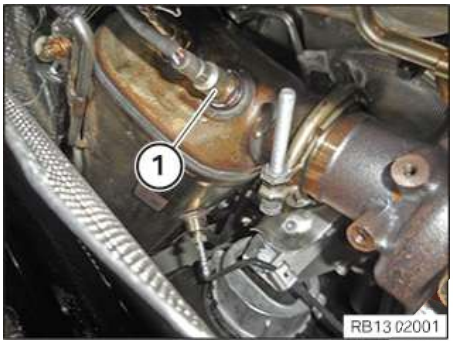
TECHNICAL INFORMATION

New oxygen sensors are to be greased lightly and evenly on the thread.

For oxygen sensors that are reused, the following should be observed:

Lightly and evenly grease the oxygen sensor only on the thread. Do not clean and grease that part of the oxygen sensor which protrudes in the exhaust branch (sensor ceramics).

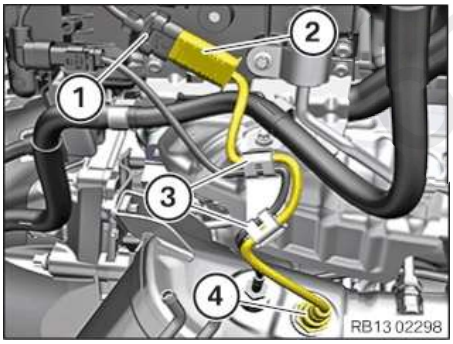
For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



- Insert and install the front oxygen sensor (1).
- Tighten the front oxygen sensor (1) with standard tools.

Front oxygen sensor to top of diesel particulate filter

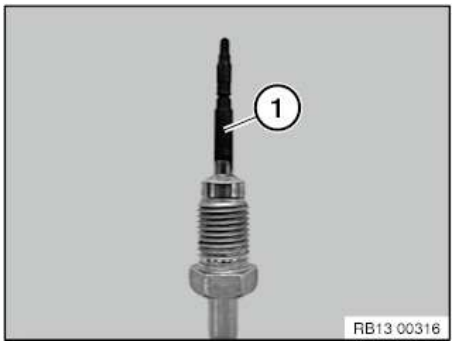
Sensor		Tightening torque	50 Nm



- Fasten the front oxygen sensor (4) to the clamps (3).
- Connect connectors (2) and lock.
- Connect connectors (1) and lock.

  The connectors (1) and (2) must audibly engage.

35 – Install the exhaust-gas temperature sensor on the diesel particulate filter



RISK OF DAMAGE

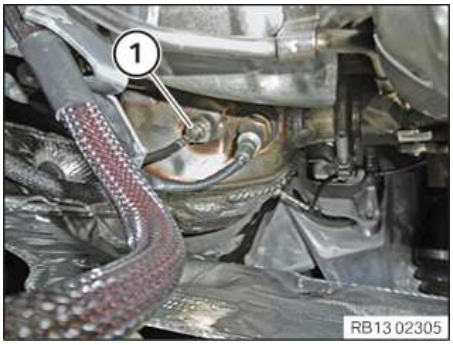
Damage of exhaust temperature sensor.

Damage to exhaust temperature sensors leads to malfunctions.

- Make sure that the gauge tip is not damaged.

- Check gauge tip (1) for damage.

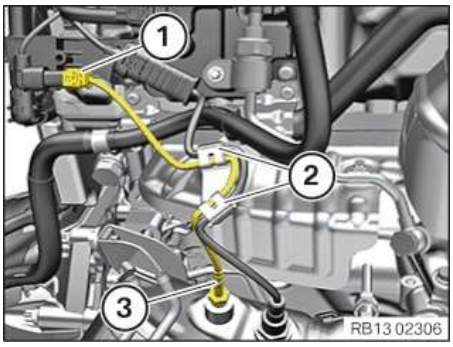
cardiagn.com



- Feed in and install the exhaust temperature sensor (1).
- Tighten the exhaust temperature sensor (1) with the special tool .

Exhaust-gas temperature sensor to diesel particulate filter

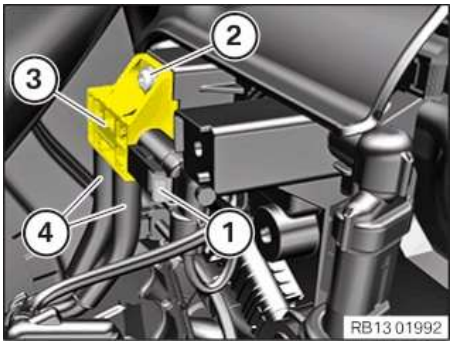
Sensor		Tightening torque	30 Nm



- Secure the exhaust temperature sensor (3) to the clamp (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

36 – Installing the differential pressure sensor for the diesel particulate filter



- Feed in and install the differential pressure sensor (3).
- Tighten down screw (2).

Differential pressure sensor of diesel particulate filter on cylinder head cover

TS5x20		Tightening torque	4 Nm

- Check the pressure hoses (4) for hardening and damage, renew if necessary.
- Connect the pressure hoses (4) and secure them using 15 mm to 19 mm screw clamps.

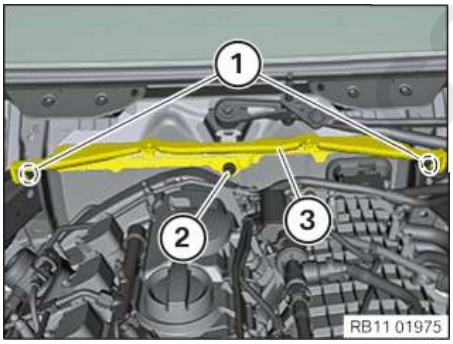
Clamp for the pressure hose on the differential pressure sensor

Clamp 15–19mm		Tightening torque	3 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

37 – Installing centre bulkhead lower section

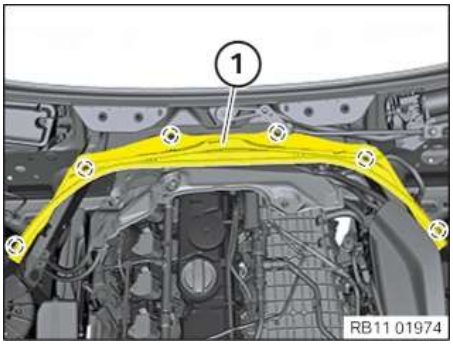


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

38 – Installing the centre bulkhead upper part

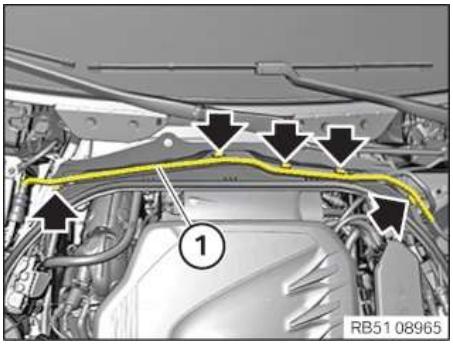


- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

Bulkhead upper part to bottom bulkhead

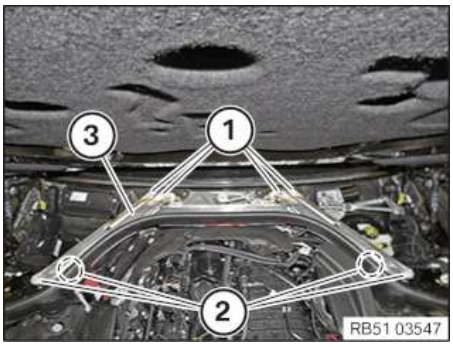
		Tightening torque	3 Nm

cardiagn.com



- **Version with mild hybrid technology:**

  Clip in the wire (1) into the holders (arrows).



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Install the tension strut (3) on the spring strut dome.
- Tighten the screws (1).

Tension strut on bulkhead

M10x25 screw		Tightening torque	56 Nm

- Renew screws (2).

  Parts: Screws
- Tighten the screws (2).

Tension strut to spring strut dome

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

39 – Installing cowl panel cover

RISK OF DAMAGE

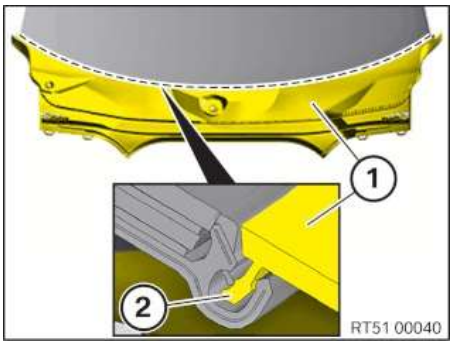
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

- Ensure correct installation of the components.
- Only use undamaged components.

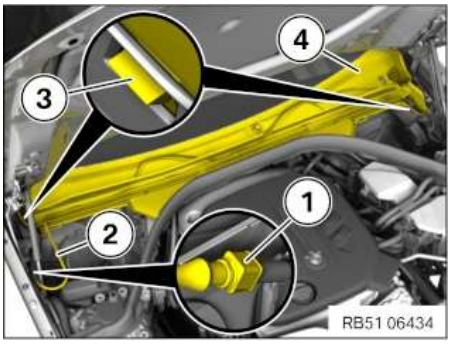
TECHNICAL INFORMATION

Before installing the cowl panel cover it is **mandatory** to check that the 48 V line is routed correctly and fitted tightly.
An incorrectly laid or attached 48 V line can be damaged by the wiper kinematics.



- Push the cowl panel cover (1) into the latch mechanism (2) beginning on the side.

cardiagn.com



- Clip cowl panel cover (4)in by means of the latch mechanisms (3).
- Position windscreen wash hose (2) and connect windscreen wash hose (1)quick lock.

40 – Install left and right wiper arm

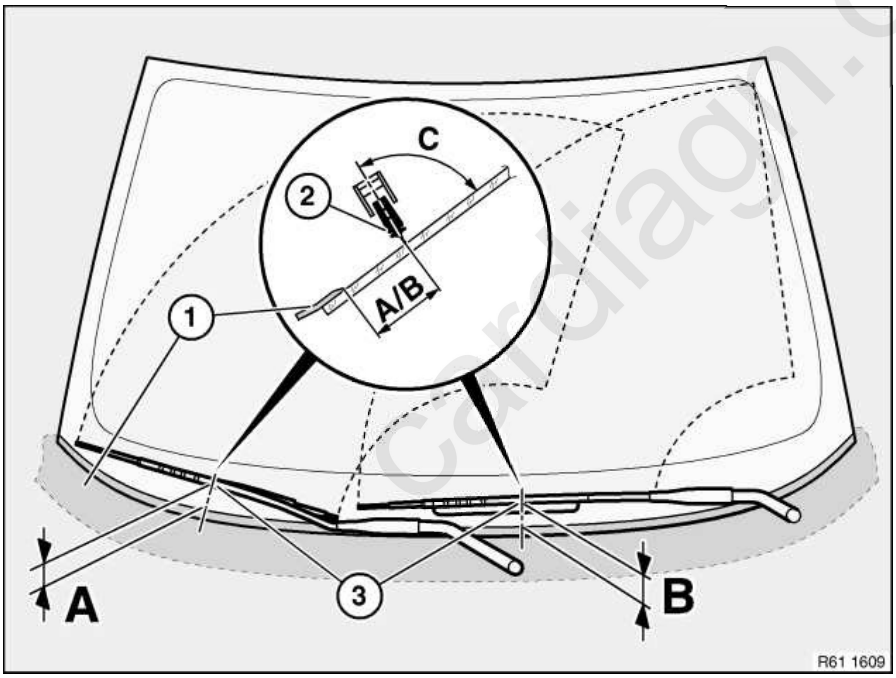
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

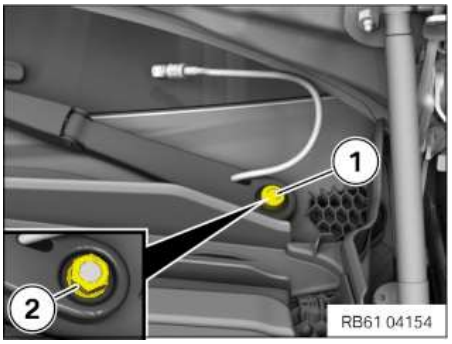
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- Connect the wiper arm (3).
- Correctly position the wiper arm (2) in relation to the window edge (1).

Distance from window pane edge to wiper blade

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm



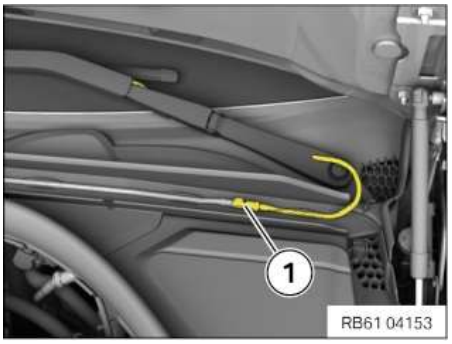
- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

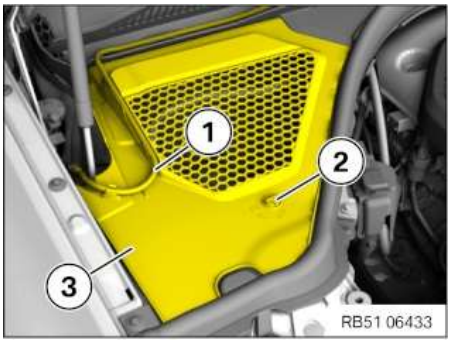
- Connect the protective cap (1).

cardiagn.com



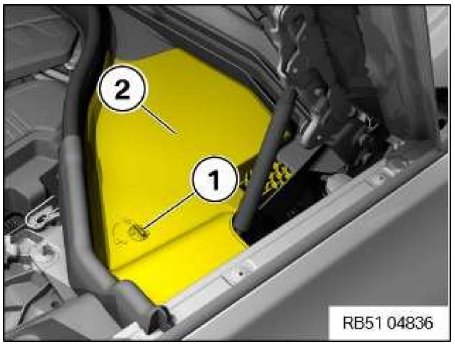
- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

41 – Install the rear right engine compartment cover



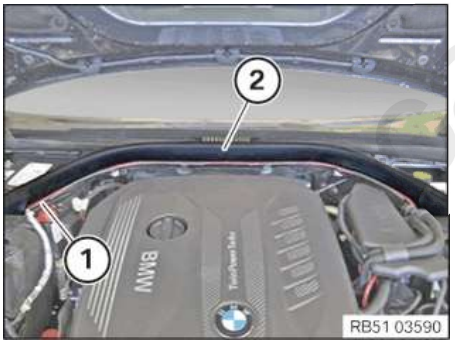
- Position the cover of the engine compartment on the rear right (3).
- Close lock (2).
- Insert washer fluid hose (1) into the guides.

42 – Install the cover of the engine compartment on the rear left



- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

43 – Install the seal for the bonnet



- Press the rear bonnet seal (2) into the guide.
- Feed in cable (1) into the brackets.
- Check that the rear bonnet seal (2) and the cable (1) are seated correctly.

Additional Information

Overview of Tightening Torques

Chain tensioner piston to cylinder head			Used in step 22
22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

Holder to crankcase			Used in step 22
M8X16		Tightening torque	19 Nm

Diesel particulate filter V-clip to exhaust turbocharger			Used in step 24
V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

cardiagn.com

Bracket to diesel particulate filter top			Used in step 24
M8		Tightening torque	19 Nm

Bracket to transmission for diesel particulate filter holder bottom			Used in step 24
M8X20		Tightening torque	19 Nm

Lower holder to diesel particulate filter			Used in step 24
M8		Tightening torque	19 Nm

Coolant lines for SCR metering module			Used in step 24
M6X16		Tightening torque	8 Nm

Nitrogen oxide sensor before SCR catalytic converter			Used in step 25
Sensor		Tightening torque	50 Nm

Monitoring oxygen sensor			Used in step 26
Sensor		Tightening torque	50 Nm

Rear silencer to body / bumper support			Used in step 27
M8	Replace nuts.	Tightening torque	19 Nm

Exhaust system to rear axle carrier			Used in step 27
M8 nut		Tightening torque	19 Nm

Exhaust system to transmission			Used in step 27
M8		Tightening torque	19 Nm

Exhaust system to diesel particle filter			Used in step 27
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

SCR metering module V-clip to exhaust system			Used in step 27
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm

Exhaust-gas temperature sensor upstream of SCR catalytic converter			Used in step 27
Sensor		Tightening torque	30 Nm

Diesel particulate sensor to exhaust system			Used in step 27
Sensor		Tightening torque	50 Nm

Nitrogen oxide sensor downstream of SCR catalytic converter			Used in step 27
Sensor		Tightening torque	55 Nm

Diffuser / underbody panelling			Used in step 28
Nuts and screws		Tightening torque	3 Nm

Connecting support to tunnel			Used in step 29
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

Underbody protection			Used in step 3031
Hexagon screw		Tightening torque	3 Nm

Underbody panelling			Used in step 32
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Exhaust temperature sensor for the exhaust system after catalytic converter before diesel particulate filter			Used in step 33
Sensor		Tightening torque	30 Nm

cardiagn.com

Front oxygen sensor to top of diesel particulate filter			Used in step 34
Sensor		Tightening torque	50 Nm

Exhaust-gas temperature sensor to diesel particulate filter			Used in step 35
Sensor		Tightening torque	30 Nm

Differential pressure sensor of diesel particulate filter on cylinder head cover			Used in step 36
TS5x20		Tightening torque	4 Nm

Clamp for the pressure hose on the differential pressure sensor			Used in step 36
Clamp 15–19mm		Tightening torque	3 Nm

Bulkhead lower part to body			Used in step 37
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead			Used in step 38
		Tightening torque	3 Nm

Tension strut on bulkhead			Used in step 38
M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome			Used in step 38
Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm			Used in step 40
Combination hexagon nut		Tightening torque	35 Nm

Overview of Special Tools

Overview Technical Data

Distance from window pane edge to wiper blade	Used in step 40
Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

Links

Repair instructions	Used in step
61 35 ... Notes on ESD protection (Electro Static Discharge)	8910111819
61 35 ... Notes on ESD protection (Electro Static Discharge)	8910111819

cardiagn.com

11 31 028 Removing and installing / replacing exhaust camshaft

PRELIMINARY WORK

1 – Bring front compartment lid in the service position

Prerequisite

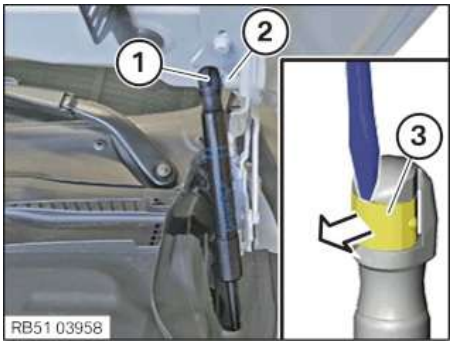
Engine compartment lid is open.

CAUTION

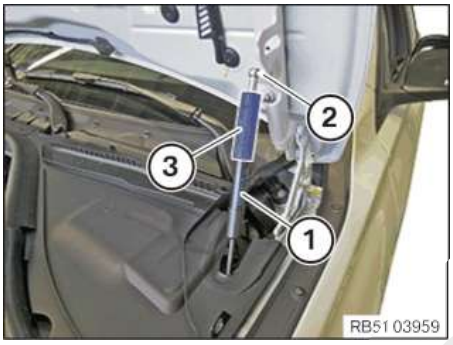
Shutting bonnet or tailgate.

Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.



- Lift clamp (3) slightly using a screwdriver, in the direction of the arrow.
- Lift off ball socket (1) from ball pin (2).
- Repeat the operation on the other side of vehicle.

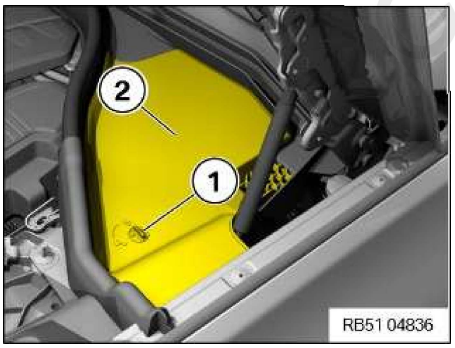


TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

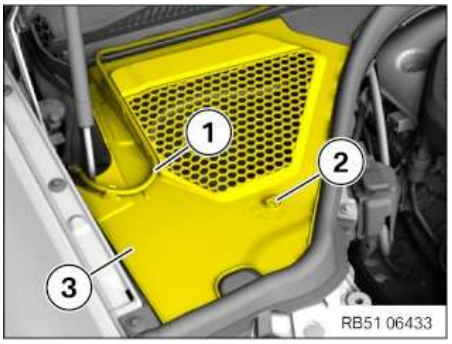
- Remove the bonnet support and open the bonnet further.
- Pull special tool or or (3) over gas pressure spring (1).
- Place special tool on the ball pin (2) and engage using force.
- Repeat the operation on the other side of vehicle.

2 – Remove the cover of the engine compartment at the rear left



- Loosen the lock (1).
- Remove the cover (2) of the rear left engine compartment.

3 – Remove the cover of the rear right engine compartment



- Release washer fluid hose (1) from the guides.
- Loosen the lock (2).
- Remove the cover (3) of the rear right engine compartment.

4 – Deactivating the 48 V electrical system

Prerequisite

Ignition is switched off.

WARNING

Deactivation of the 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Make sure that **no battery charger** is connected to the jump start terminal point in the engine compartment.
- For vehicles with additional electrical systems (48 V electrical system, high-voltage vehicle electrical system), it is mandatory to deactivate them **before** disconnecting the vehicle battery.

WARNING

Deactivation of the 48 V electrical system.

Risk of short circuits! Risk of fire!

- Make sure that **no charger** is connected to the jump start support point in the engine compartment.

RISK OF DAMAGE

Damage to 48-V battery

If a 48-V battery that is disconnected from the electrical system is activated, the battery electronics will be damaged.

- Only carry out activation of the 48V electrical system with a completely connected 48-V battery.

TECHNICAL INFORMATION

Follow notes for 48-V battery. See further information 6120 ... Notes on 48-V battery.



- Deactivate the 48V electrical system by opening the bonnet.

  The deactivation takes place automatically.

Check

cardiagn.com



TECHNICAL INFORMATION

Zero voltage (48V electrical system is switched off) is displayed only in PAD mode.

- Press the START-STOP button quickly 3 times without stepping on the brake pedal to establish the PAD mode.
- Check isolation from the supply in the instrument cluster in PAD mode.

desired state

- The Check Control message "48V electrical system switched off." (1) is displayed.

Result

» **The absence of voltage** cannot be determined by means of the Check Control message "48V electrical system switched off:" (1). Work is not permitted to be started.

Measure

- Carry out the service function "48 V electrical system deactivation".
  - Vehicle management > Service functions > Voltage supply > Deactivate 48 V electrical system

Only when the Check Control message “48 V electrical system switched off.” (1) is displayed in the instrument cluster is it permitted to disconnect the 12 V battery.

If the absence of voltage is not indicated clearly, contact Technical Support.

Result

» The Check Control message signals that the 48V electrical system has been switched off.

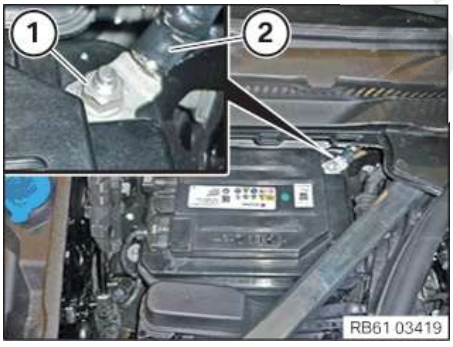
Measure

- Exit PAD mode by pressing the START-STOP button once without depressing the brake pedal.

The work “Disconnecting the negative battery cable of the 48-V battery” can be started.



- Unlock and disconnect plug connection (1) of the CAN bus.
- Release the clip (2).



- Loosen nut (1).
- Pull off negative battery cable (2) of the 48-V battery from the negative battery terminal, set it aside and secure it.



WARNING

Unprotected battery terminals.

Risk of short circuits! Risk of fire!

- Cover the vehicle battery.

- Cover the vehicle battery with the special tool as shown.
- Position the battery earth lead (1) as shown.

5 – Disconnecting all battery earth leads

ardiagn.com



- See additional information.

6 – Removing the wiper arm on the left and right

NOTICE

Description is for left component only. Procedure on the right side is identical.

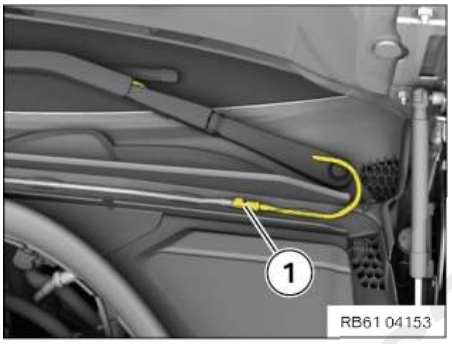
▶ **Remove the wiper arm**

RISK OF DAMAGE

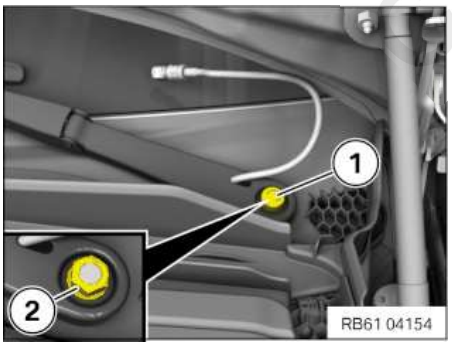
Damage to wiper console.

While removing the wiper arms without using special tool, the wiper console can break.

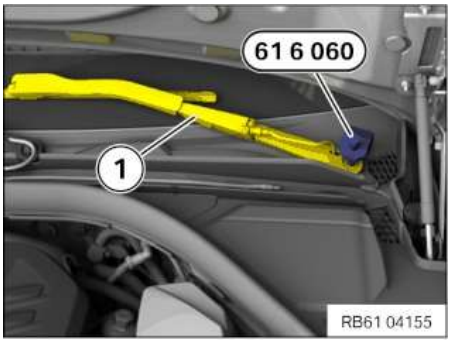
- Removing the wiper arms must be carried out only using the prescribed special tool.
- Do **not** lever off the wiper arm because otherwise the wiper console may break at the predetermined breaking point for active pedestrian protection.



- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.



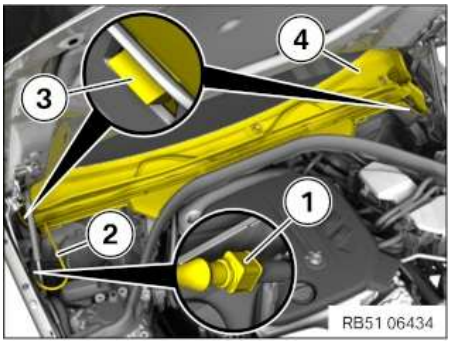
- Remove the protective cap (1).
- Loosen nut (2).



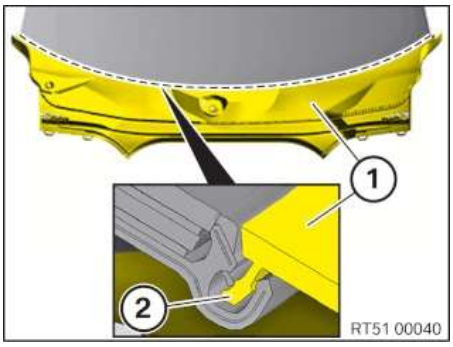
- Pull off the wiper arm (1) using special tool .

7 – Remove cowl panel cover

cardiagn.com



- Release snap fastener (1) of the washer fluid hose (2) and put the washer fluid hose (2) to one side.
- Unclip clips (3) on the cowl panel cover (4).



- Pull the cowl panel cover (1) upward out of the latch mechanism (2) beginning on the side.

8 – Remove the seal for the rear bonnet

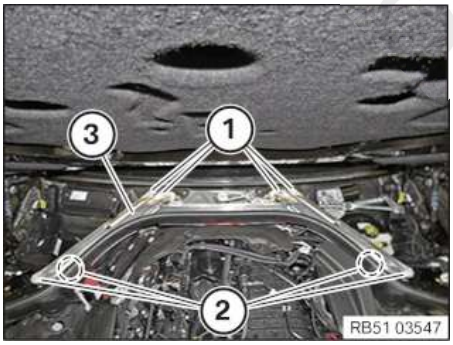


- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

9 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

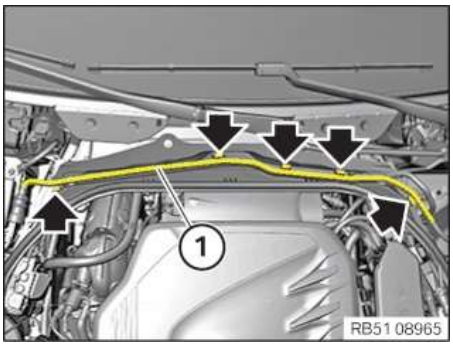
Driving without the strut brace/front-end strut or tension strut is not permitted.



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

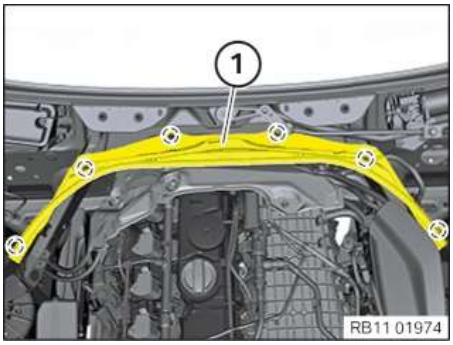
- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.



- **Version with mild hybrid technology:**

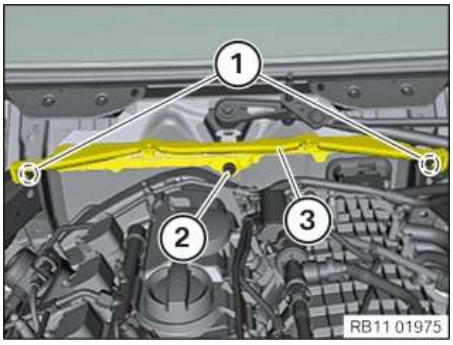
  Unclip the wire (1) at the holders (arrows).

carsdiagn.com



- Unscrew the bolts in the marked areas.
- Remove the centre bulkhead upper part (1).

10 – Removing the centre bulkhead lower section



- Loosen screws (1).
- Loosen nut (2).
- Remove the centre bulkhead lower part (3).

11 – Removing the acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

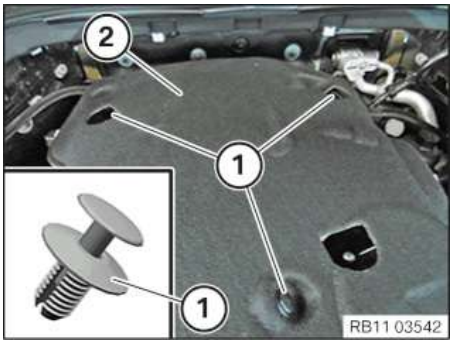
Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



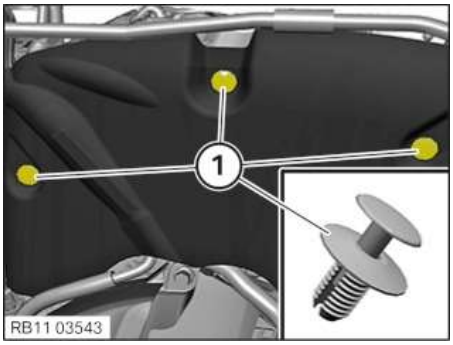
- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

12 – Remove the acoustic cover for the injectors

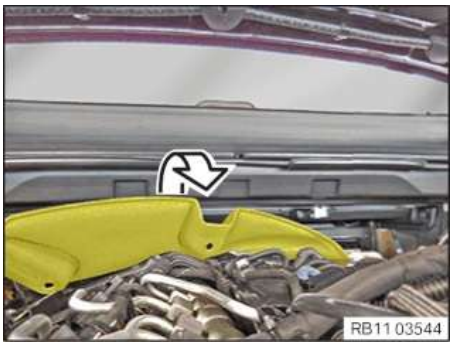


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

13 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).



- Guide out and remove the acoustic cover in the direction of the arrow.

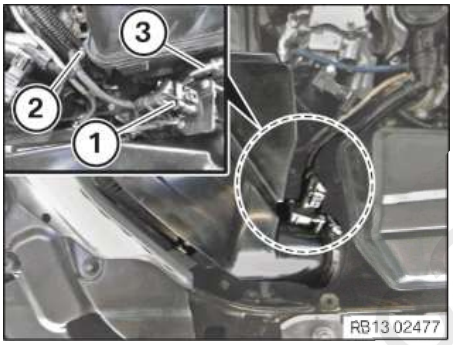
14 – Removing the clean air pipe with the resonator

WARNING

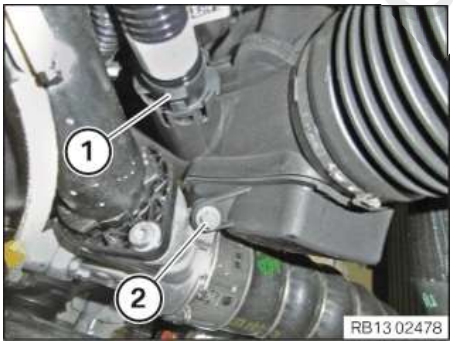
Hot surfaces.

Risk of burning!

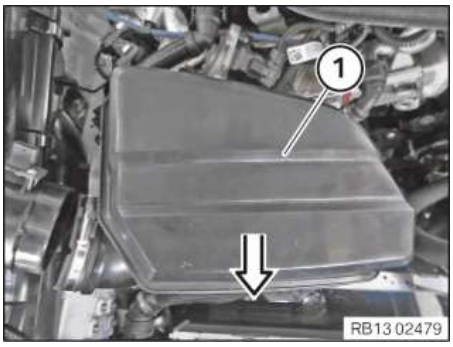
- Perform all work only on components that have cooled down.



- Unlock plug connection (1) and disconnect.
- Loosen clamp (2).
- Unfasten clamp (3).
- Separate the clean air pipe with resonator from the intake filter housing.



- Unlock engine ventilation line (1), disconnect it and place it aside.
- Loosen screw (2).



- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Unlock and loosen clamp (1).



- Feed out and remove clean air pipe with resonator (1) in the direction of the arrow.

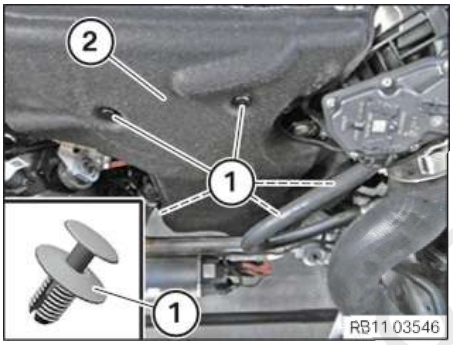
15 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

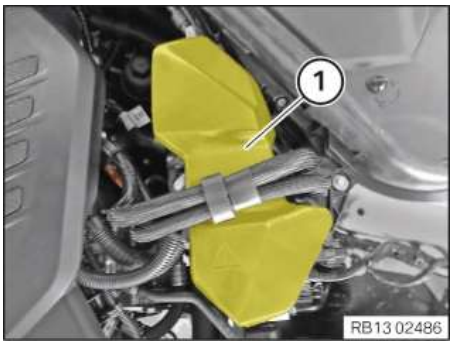
Risk of burning!

- Perform all work only on components that have cooled down.



- Release and remove expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

16 – Remove the cover for the DDE control unit



- Pull off, guide out and remove cover (1) upwards.

17 – Partially releasing the wiring harness section on the intake plenum

cardiagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

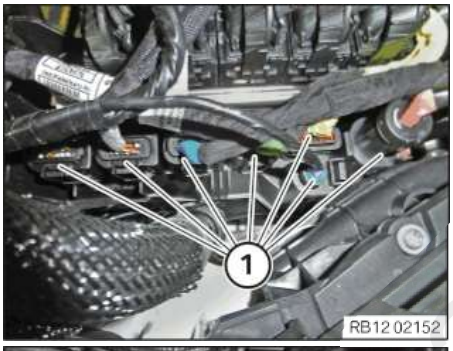
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

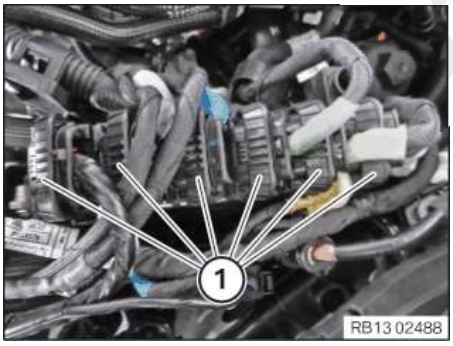
- Do not pull on the wires when disconnecting connectors and plug connections.

TECHNICAL INFORMATION

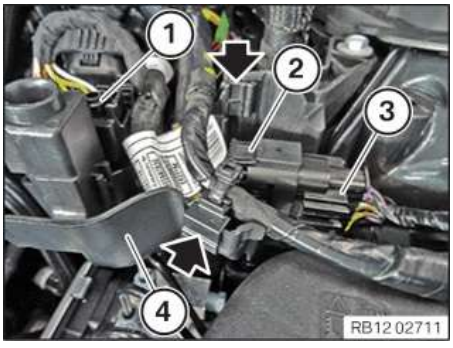
Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.



- Unlock and disconnect plug connections (1).

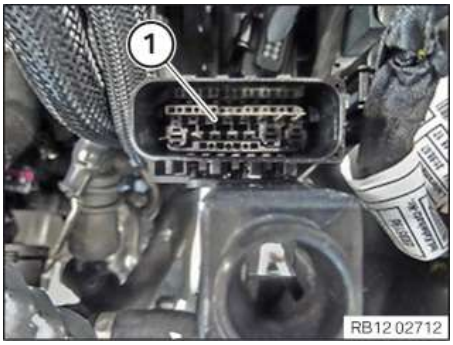


- Unlock and disconnect plug connections (1).

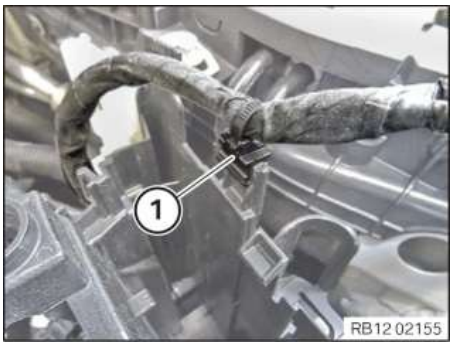


- Unlock plug connection (1) and disconnect.
- Unlock plug connection (2) and disconnect.
- Release the connector (3) and disconnect from the control unit holder (4).
- Release the clamps (arrows).

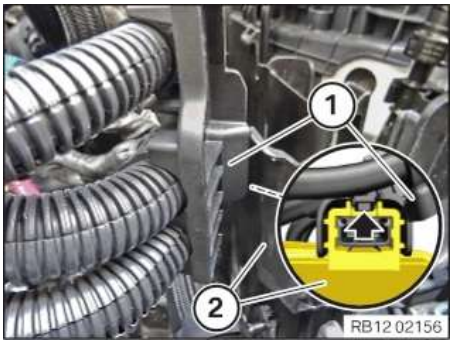
cardiagn.com



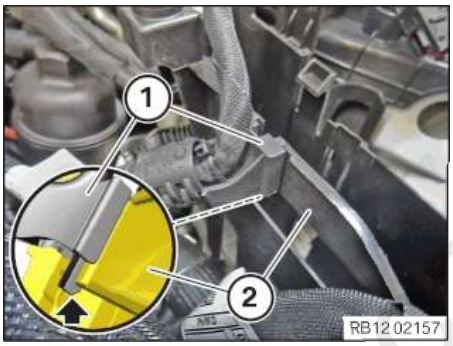
- Unlock plug connection (1) and disconnect.



- Loosen clamp (1).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).

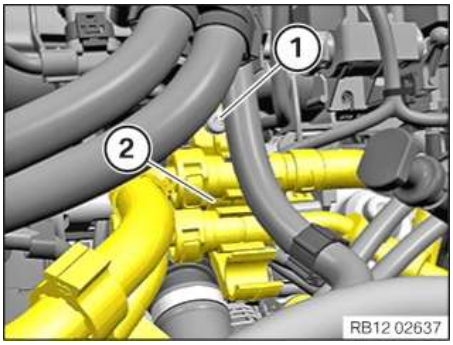


- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.

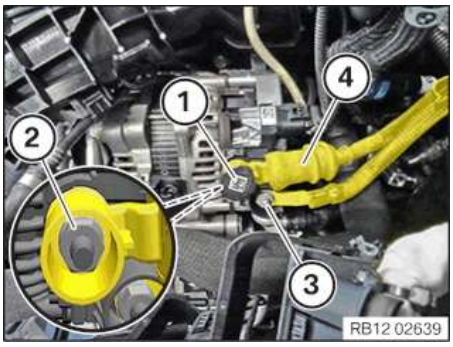


- Unlock holder (1) and feed out coolant line (2) and place it aside.

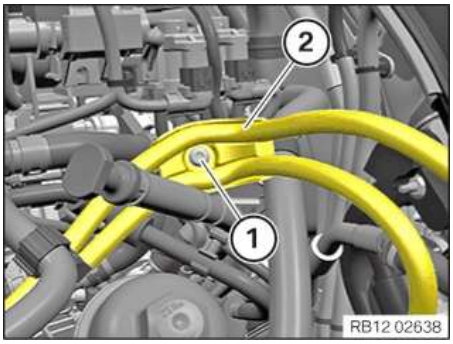
cardiagn.com



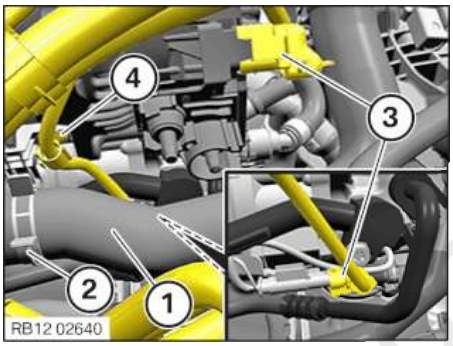
- Release the screw (1).
- Guide out fuel lines (2) and set them aside.



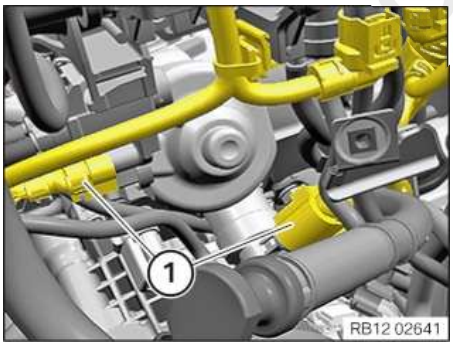
- Guide out and remove the lid (1).
- Release the nuts (2) and (3).
- Feed out positive battery cables (4) and place to one side.



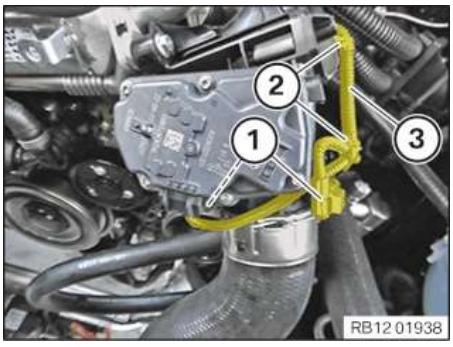
- Release the screw (1).
- Guide out the positive battery cables (2) and set them aside.



- Release the coolant line (1) from the holder (2) .
- Unlock plug connections (3) and disconnect.
- Loosen clamp (4).



- Unlock and disconnect plug connections (1).



- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.

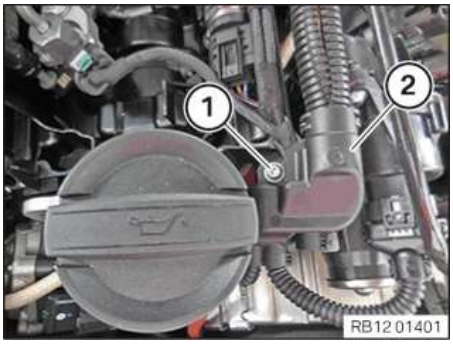
cardiagn.com



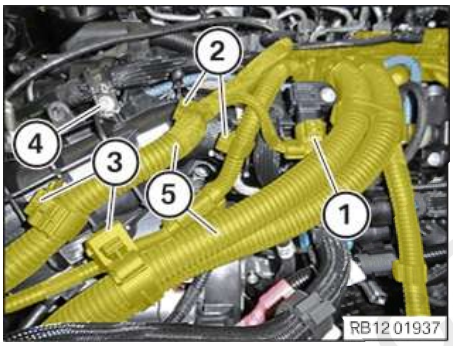
- Unlock and loosen connector (1).



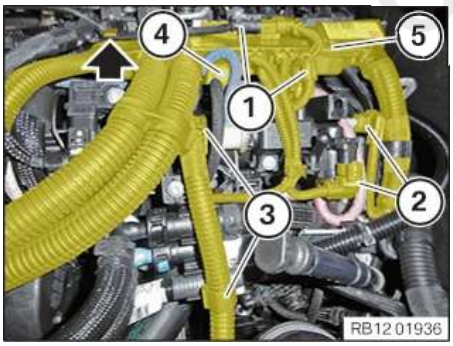
- Unlock plug connection (1) and disconnect.



- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.



- Unlock plug connection (1) and disconnect.
- Loosen clamps (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.



- Unlock and disconnect plug connections (1).
- Release line from clamp (Arrow).
- Unlock and disconnect plug connections (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.

18 – Removing the intake plenum

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

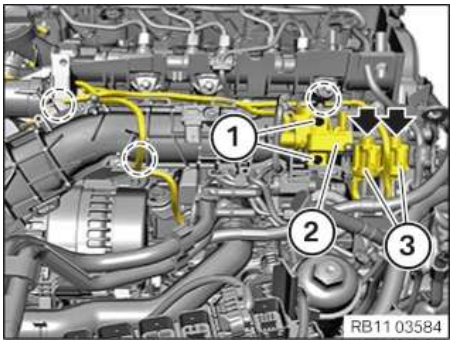
cardiagn.com



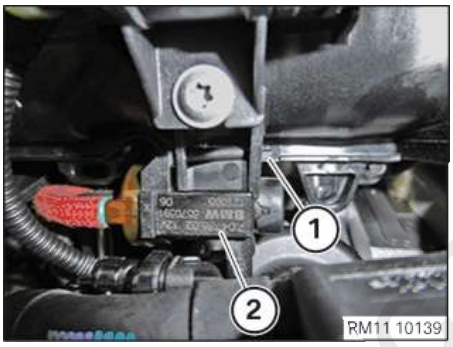
- Unlock clamp (1) and engage in this position.



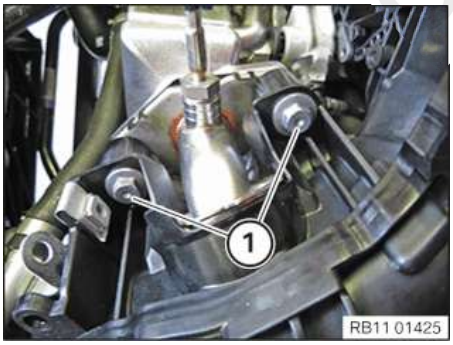
- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.



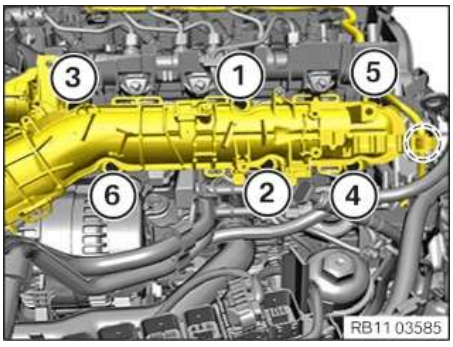
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.

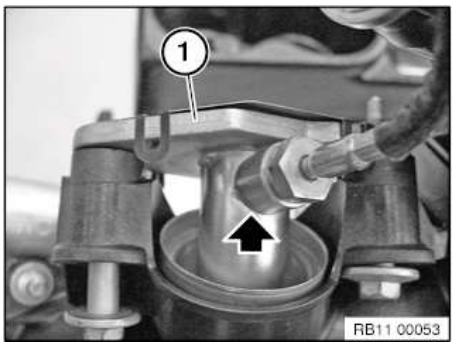


- Loosen screws (1).



- Detach the leakage oil lines in the marked area from the intake plenum.
- Loosen screws in the order (6) to (1).
- Guide the intake plenum out forwards and remove it.

cardiagn.com



- Remove the exhaust-gas recirculation pipe (1) (arrow).

19 – Detaching the leakage oil line from the injectors

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

WARNING

Hot surfaces.

Risk of burning!

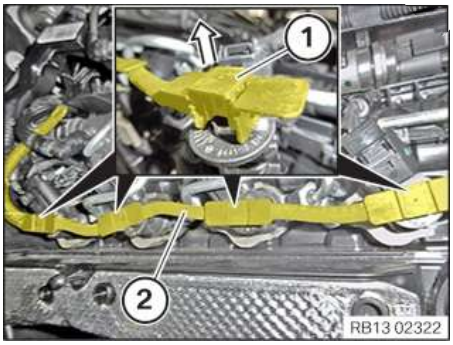
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

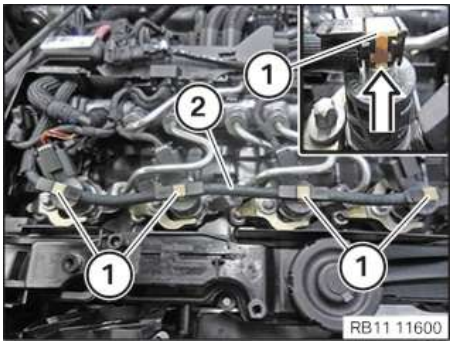


- **Version A:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.



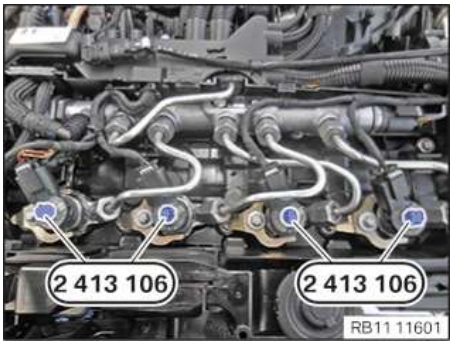
- **Version B:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.

cardiagn.com



- Seal open connections with special tools .

20 – Remove the high pressure lines between the injector and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

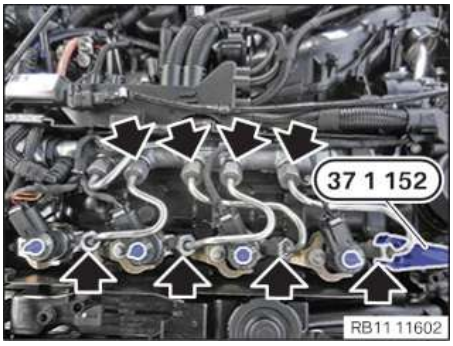
TECHNICAL INFORMATION

If several high pressure lines are removed, ensure that each high pressure line is installed in its original location. Label high pressure lines.

cardiagn.com

TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.



- Release the high pressure lines (arrows) with the special tool .
  Reset the special tool early on to prevent bending of the high pressure line.
- Catch and dispose of escaping fuel.
- Feed out and remove the high pressure lines (arrows).
- Seal off all the open cable connections with the special tool .

21 – Remove the high pressure line between the high pressure pump and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Hot fluids.

Risk of scalding!

- Conduct all work in the vehicle wearing appropriate personal protective equipment only.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

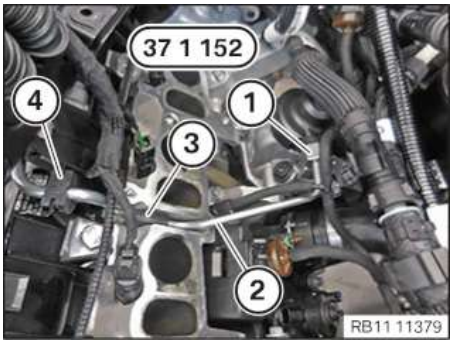
cardiagn.com

TECHNICAL INFORMATION

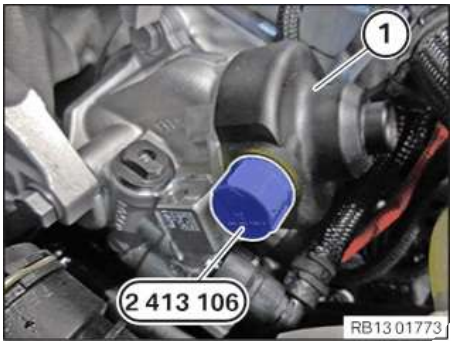
Reset special tool in early to avoid bending pressure lines.



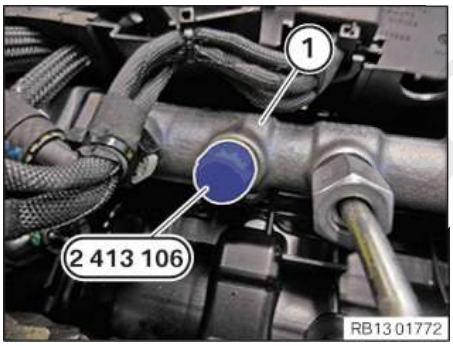
- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.



- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.
- Guide out and remove the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).



- Seal off the opening at the high pressure pump (1) with the special tool .



- Seal off the opening on the rail (1) with the special tool .

22 – Remove high-pressure rail

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

cardiagn.com

RISK OF DAMAGE

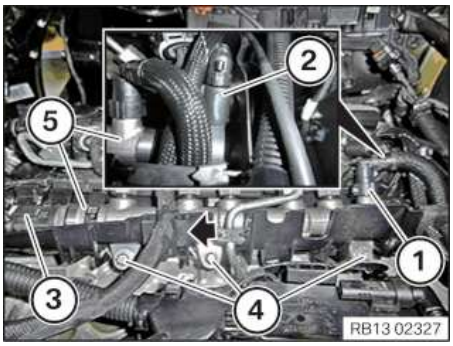
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Unlock and disconnect the fuel return line (1).
- Guide the fuel return line (1) out and set it aside.
- Unlock and disconnect the plug connection (2) on the rail pressure regulating valve.
- Unlock and disconnect the plug connection (3) on the rail pressure sensor.
- Unlock cable clip (Arrow), feed out and place aside.
- Loosen screws (4).
- Thread out and remove the rail (5).

23 – Remove all injection systems

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

cardiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

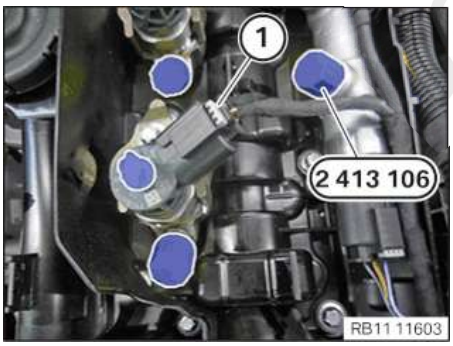
Electrostatic discharge.

Damage to or destruction of electrical components.

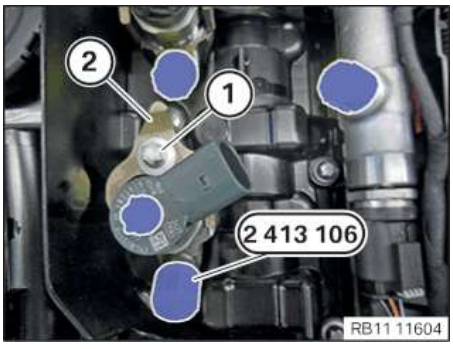
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

TECHNICAL INFORMATION

If several injectors are removed, ensure that each injector is installed at its original location (cylinder). Mark injectors.



- Unlock plug connection (1) and disconnect.



- Loosen screw (1).
- Guide out and remove clamping claw (2).
- Feed out and remove the injector with slight rotational movements.

▸ **Loosen stuck injectors**

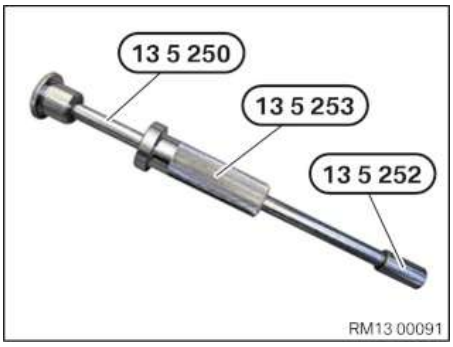
carsdiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

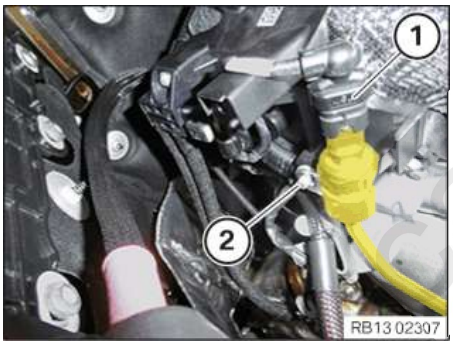


- Unscrew special tool 0 493 339 (13 5 252) from special tool 0 493 321 (13 5 250) and remove special tool 0 493 340 (13 5 253).
- Screw special tool 0 493 339 (13 5 252) back onto special tool 0 493 321 (13 5 250).

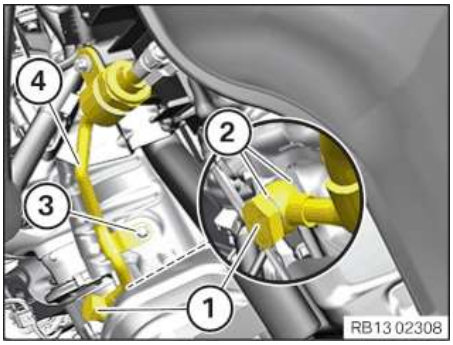


- Screw special tool 0 493 321 (13 5 250) with special tool 0 493 339 (13 5 252) onto pressure line connection (1) of injector.
- Release injector (1) with special tools 0 493 321 (13 5 250) and 0 493 339 (13 5 252) by means of **short** back and forth movements and remove.

24 – Remove the exhaust gas pressure pipe



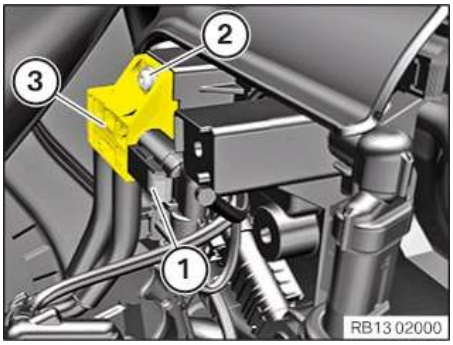
- Unlock plug connection (1) and disconnect.
- Loosen screw (2).



- Unscrew the banjo bolt (1).
- Feed out and remove the sealing rings (2).
- Loosen screw (3).
- Feed out and remove the exhaust gas pressure pipe (4).

25 – Releasing the differential pressure sensor for the diesel particulate filter

cardiagn.com



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).
- Remove the differential pressure sensor (3) and put it to one side.

26 – Removing the sensor bracket on the cylinder head cover

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

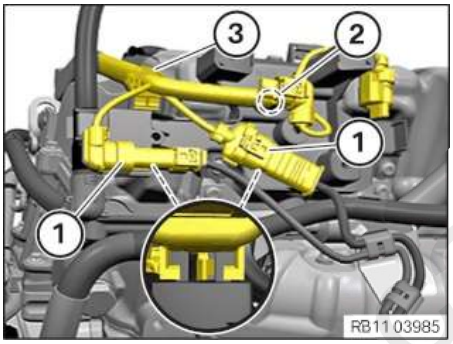
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

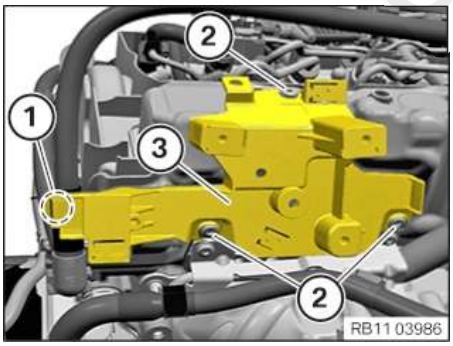
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Unlock plug connection (1) and disconnect.
- Unlock the plug connection (1) and release it from the sensor bracket.
- Release the cable clip in the area (2) from the sensor bracket.
- Release the clamps (3) and set the wiring harness section aside.

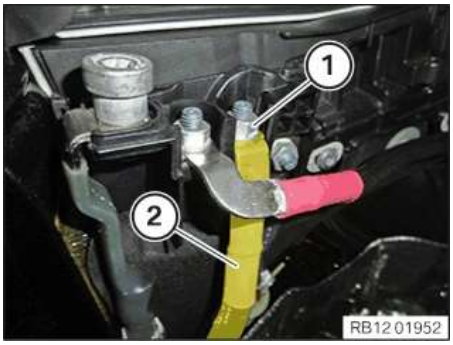


- Release the positive battery cable in the area (1) from the clamp and set it aside.
- Loosen screws (2).
- Feed out holder (3) for the sensor system and remove.

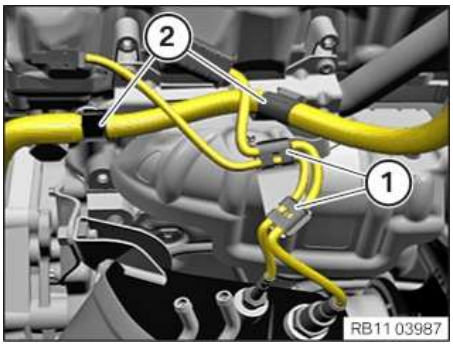


- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.

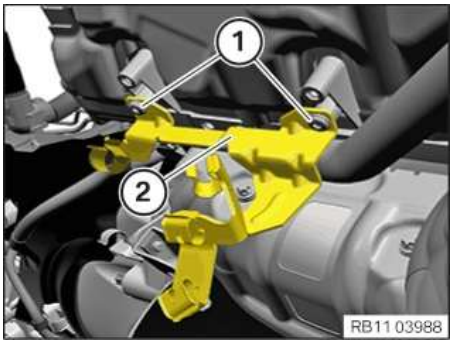
cardiagn.com



- Loosen nut (1).
- Feed out positive battery cable (2) and put to one side.

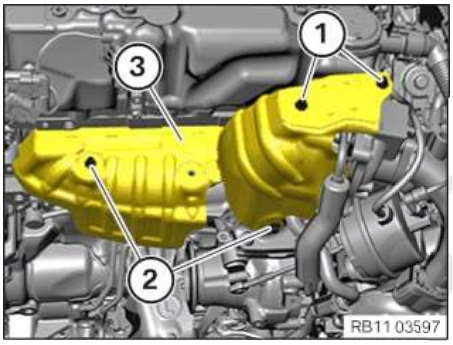


- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



- Loosen screws (1).
- Guide out and remove holder (2).

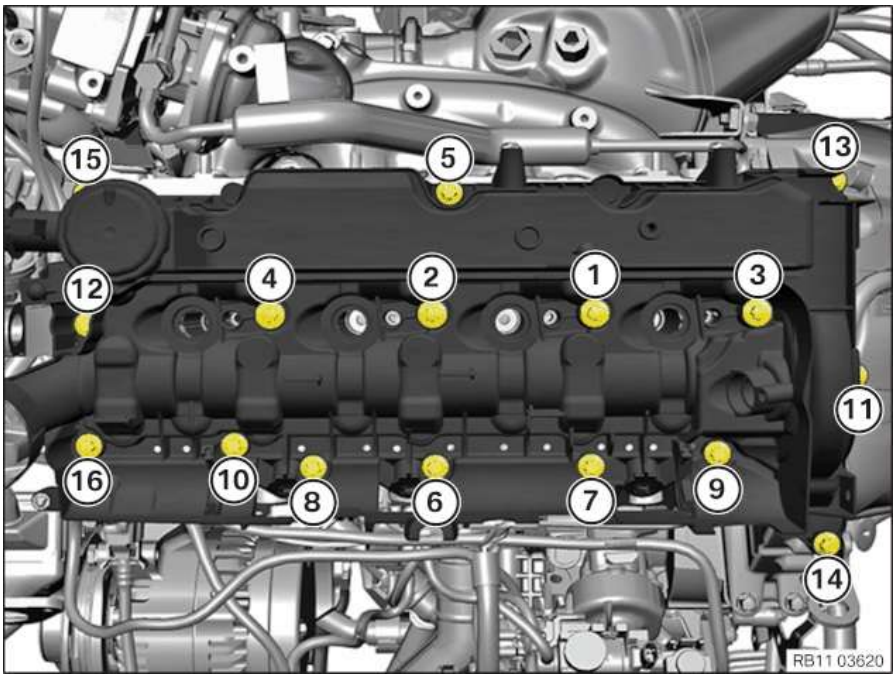
27 – Removing heat shield



- Loosen screws (1).
- Loosen screws (2).
- Feed out and remove the heat shield (3).

28 – Removing the cylinder head cover

Screw connection of the cylinder head cover



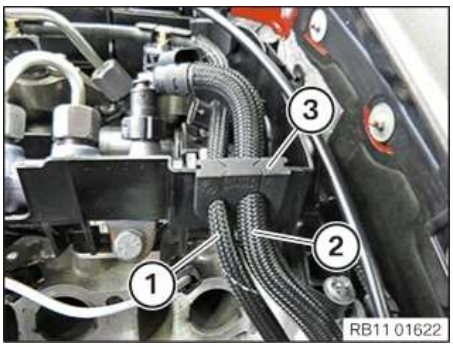
1 - 16 Bolts of the cylinder head cover



- Unlock and detach the locks.
- Feed the engine ventilation line (1) out and set it aside.

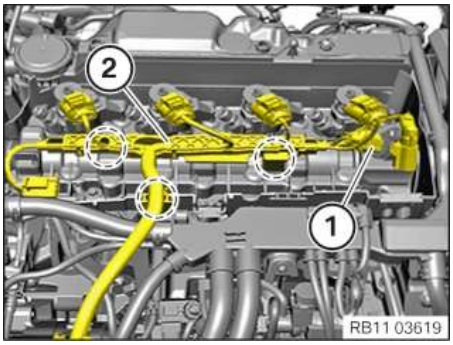


- Feed out and remove the heat shield (1).

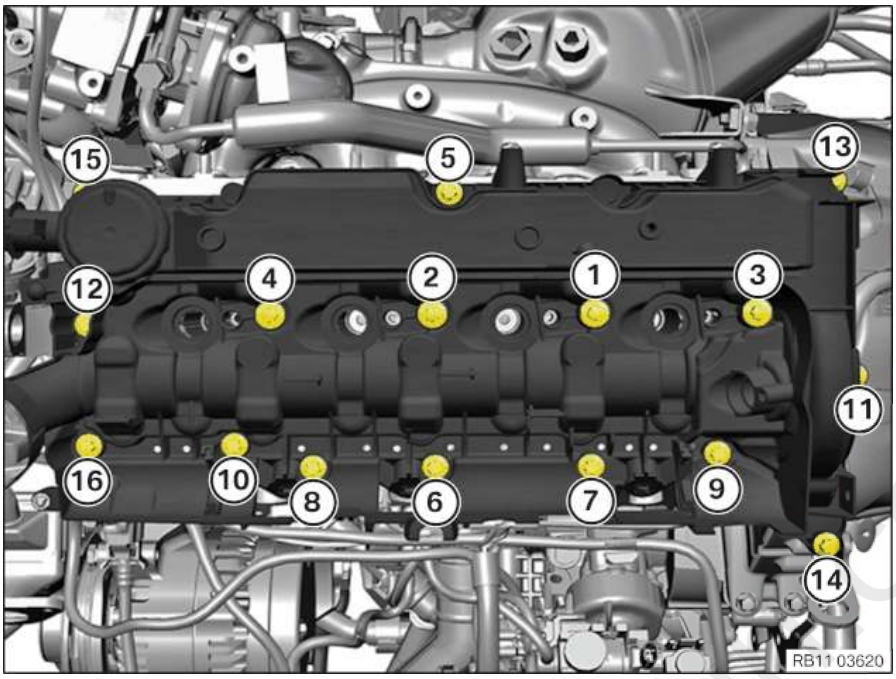


- Remove the leakage oil line (1) including the fuel return line (2) and the grommet (3) and put to one side.

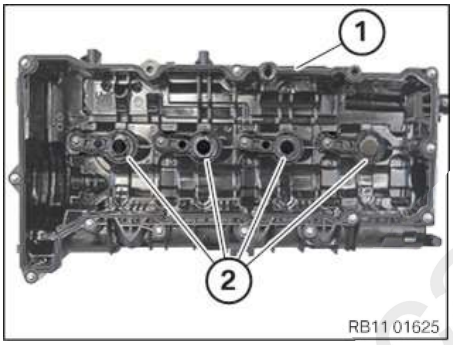
cardiagn.com



- Unlock connector (1) and pull off.
- Disconnect the wiring harness (2) in the marked areas from the cylinder head cover and set aside.

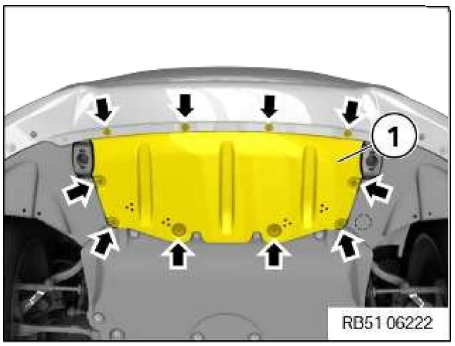


- Evenly loosen the screws in a sequence from (16) to (1).
- Feed out and remove the cylinder head cover.



- Remove the profile seals (1) and (2).

29 – Removing the front underbody protection

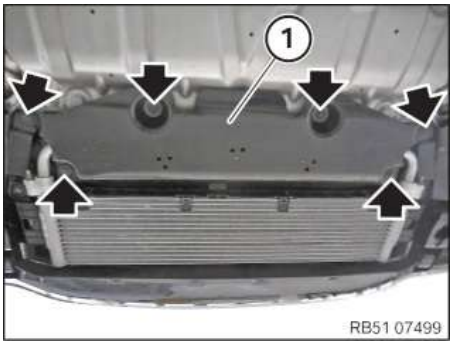


- **Version A:**

  Remove screws (arrows).

  Feed front underbody protection (1) backwards out of the bumper panel.

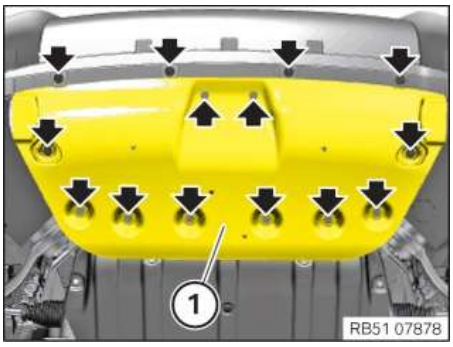
cardiag.com



- **Version B:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

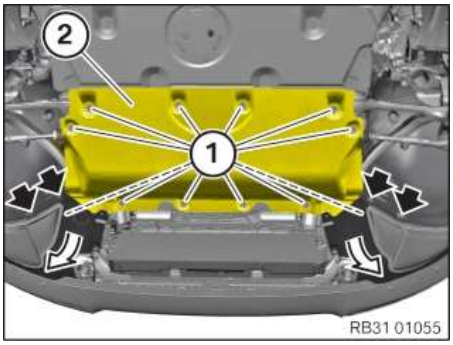


- **Version C:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

30 – Remove the underbody protection of the steering gear



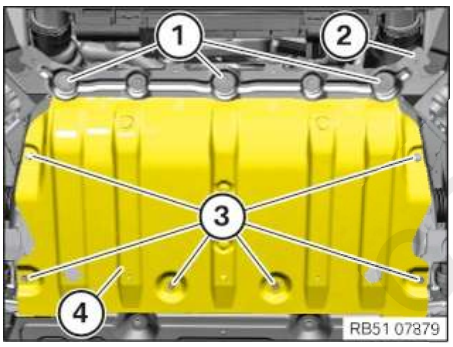
- **Version A:**

  Unscrew the screws (arrows) of the wheel arch cover on the wheel arch cover.

  Fold the bottom wheel arch cover to the side.

  Loosen screws (1).

  Remove the underbody protection (2) of the steering gear.



- **Version B:**

  Loosen screws (1).

  Remove the holder (2) for the underride protection.

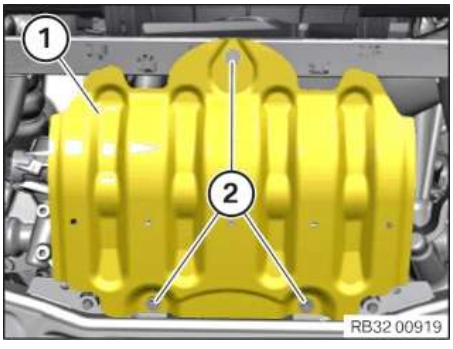
  Loosen screws (3).

  Feed out and remove the underbody protection (4) of the steering gear.

31 – If installed: Removing the steering underbody protection

Prerequisite

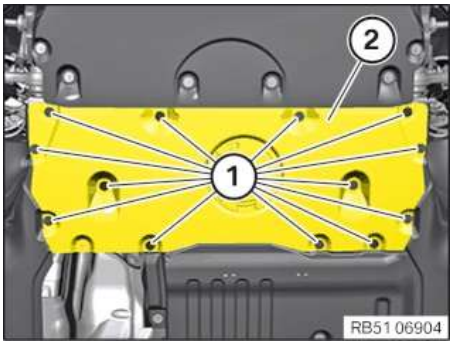
Front underbody protection has been removed.



- Loosen screws (2).
- Remove underbody protection (1).

32 – Removing the centre underbody protection

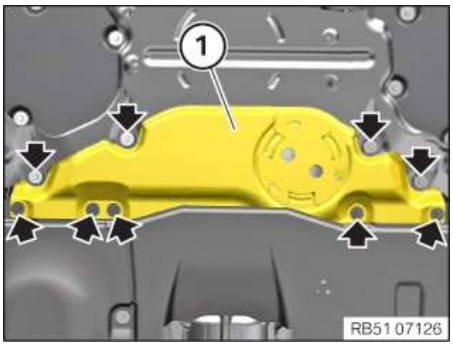
carmagn.com



- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .

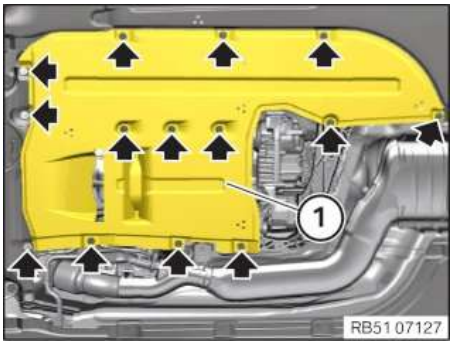


- **Version with all-wheel drive:**

  Remove screws (arrows).

  Feed out and remove the centre underbody protection (1).

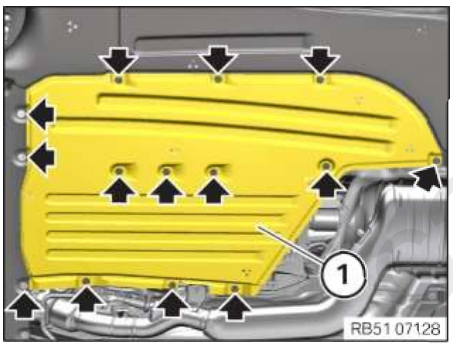
33 – Remove rear underbody protection



- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).



- **Version B:**

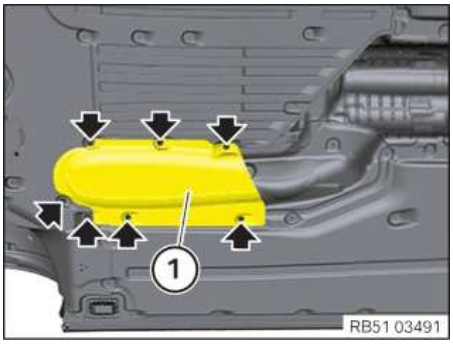
  Remove screws (arrows).

  Guide out rear underbody protection (1) and remove it.

34 – Remove the underbody panelling of the transmission on the side

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.



- Remove screws (arrows).
- Remove the underbody panelling (1).

35 – Removing starter motor

carmanualsdiagn.com

Prerequisite

Battery earth leads are disconnected.

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on 12 V vehicle electrical system.

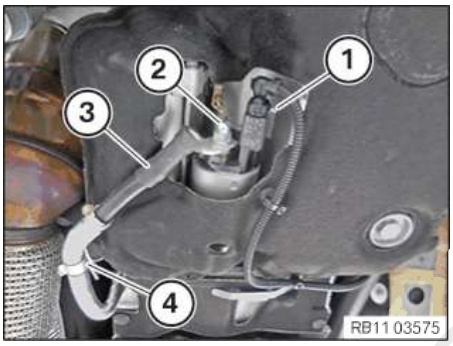
Risk of short circuits! Risk of fire!

- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

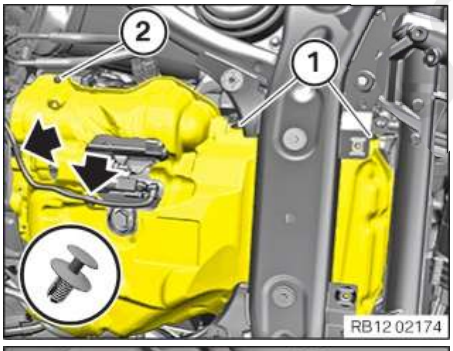
TECHNICAL INFORMATION

Make sure that the acoustic cover is **not** damaged while removing the starter motor.

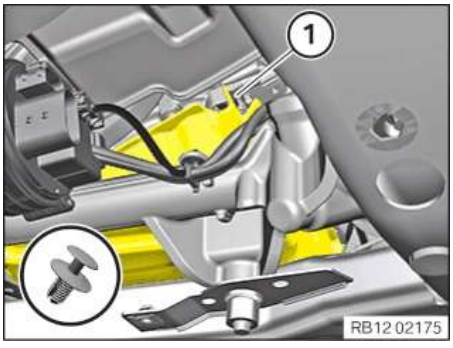
A damaged lower acoustic cover can only be renewed when the front axle is lowered.



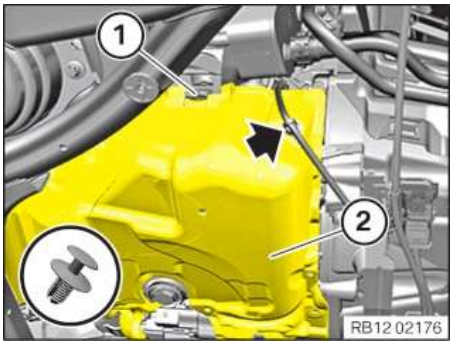
- Unlock plug connection (1) and disconnect.
- Release nut (2).
- Release positive battery cable (3) from holder (4).



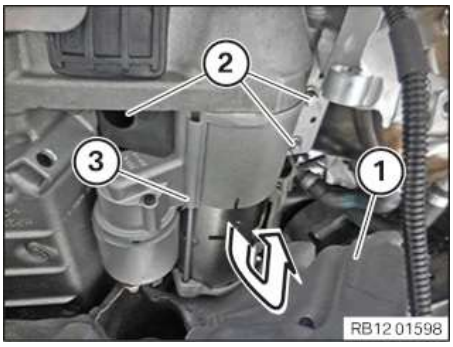
- Loosen the expanding rivet (1).
- Undo fir tree clip (2).
- Release the clamps (arrows).



- Loosen expanding rivet (1).
- Lower the acoustic cover of the oil sump.



- Loosen expanding rivet (1).
- Loosen the clamp (arrow).
- Lower acoustic cover (2).



- Make sure that the acoustic cover (1) is not damaged.
- Carefully press acoustic cover (1) to one side.
- Loosen screws (2).
- Carefully guide out the starter motor (3) in direction of arrow and remove.

36 – Checking camshaft timing



RISK OF DAMAGE

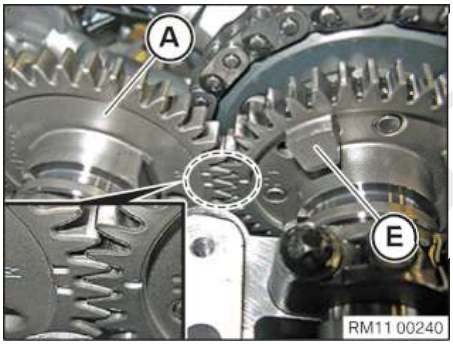
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

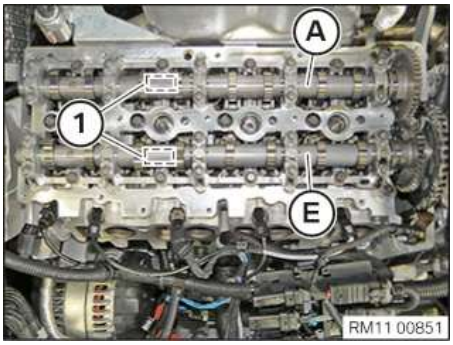
- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

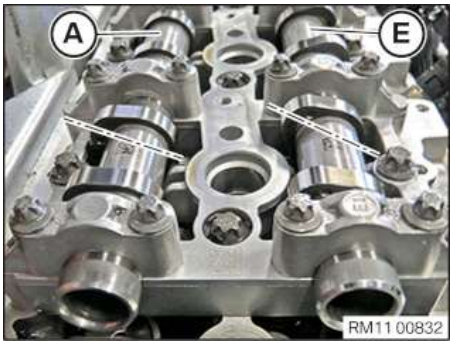
  Do **not** crank the engine in reverse.



- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.

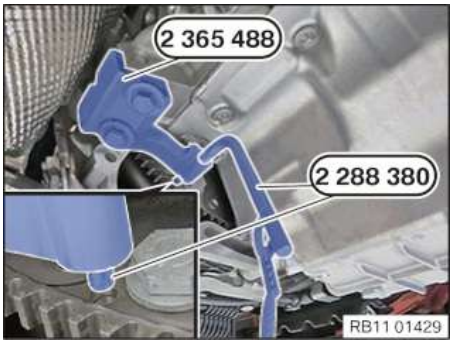


- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

37 – Removing the special tool for fixing the exhaust camshaft



- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

MAIN WORK

38 – Remove exhaust camshaft.

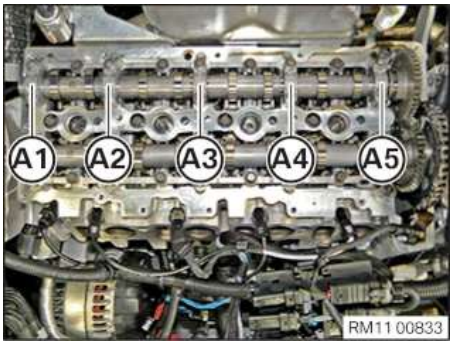
RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

cardiagn.com

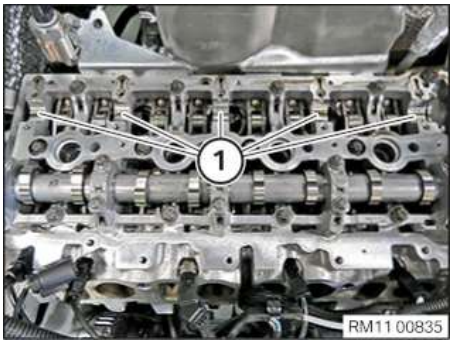


TECHNICAL INFORMATION

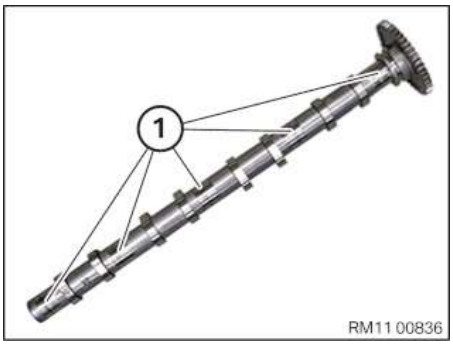
The camshaft is tensioned by the valve springs. Tighten or loosen each screw on the camshaft bearing caps one at a time in the specified sequence and by half a turn only. Repeat procedure.

- Release all the screws of the exhaust camshaft bearing cap (A1) to (A5) from the outside to the inside in half turns.
- Remove exhaust camshaft in upward direction.
- Place all components on special tool 0 495 105 (11 4 480) in a tidy and orderly fashion.

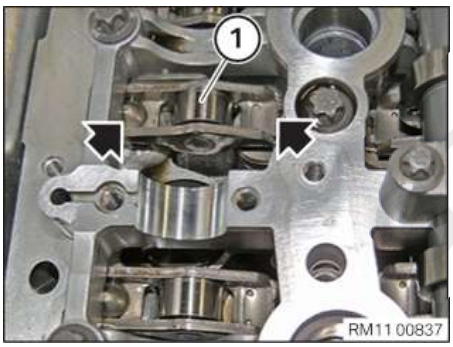
39 – Install exhaust camshaft



- Oil all bearing positions (1).



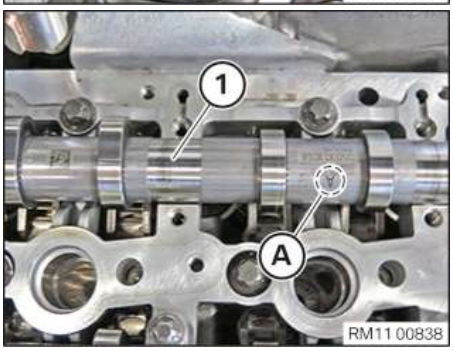
- Oil all bearing positions (1) of the exhaust camshaft.



TECHNICAL INFORMATION

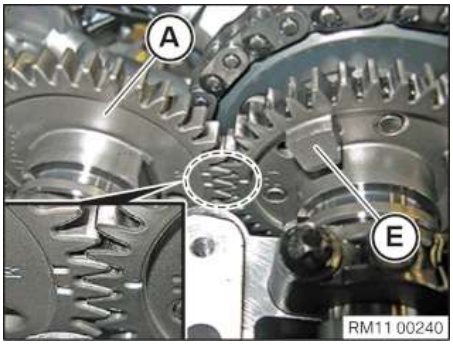
The rocker arms may slip slightly when the camshaft is positioned. Make sure rocker arms are correctly positioned on the hydraulic valve clearance compensating elements and on valves.

- Check the installation position of the roller cam followers (1).

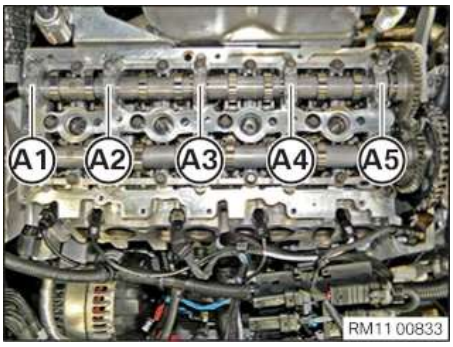


- Make sure that the identification mark (A) of the exhaust camshaft (1) points upwards.
- Insert the exhaust camshaft (1).

cardiagn.com



- Insert the exhaust camshaft (A) such that the marks on the camshafts (A) and (E) correspond in the marked area.
- Position the camshafts (A) and (E) correspondingly.



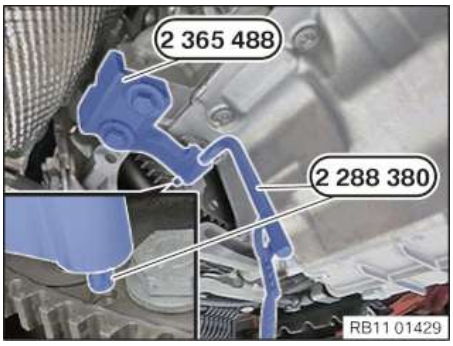
- Tighten all exhaust camshaft bearing caps (A1) to (A5) from the inside to the outside by 1/2 a turn at a time.

Intake and exhaust camshaft in camshaft support

M6x31		Tightening torque	10 Nm

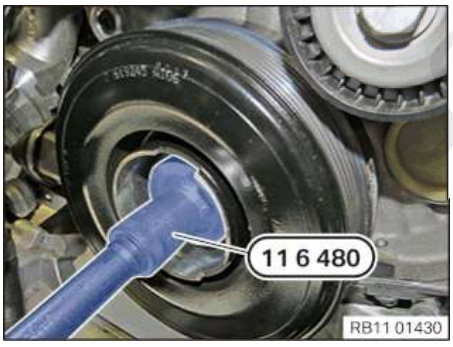
POSTPROCESSES

40 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

41 – Checking camshaft timing



RISK OF DAMAGE

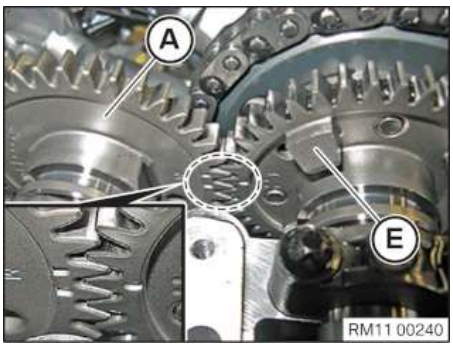
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

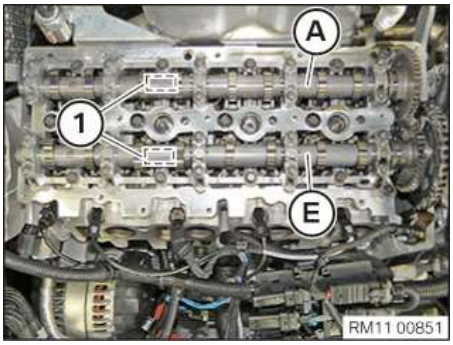
- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

  Do **not** crank the engine in reverse.

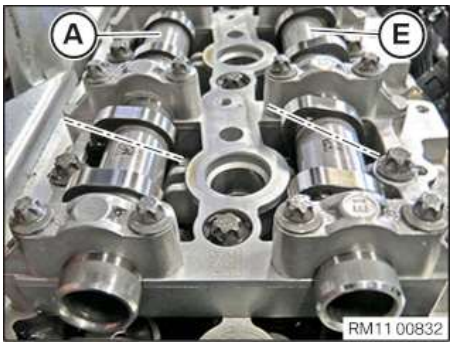


- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.

cardiagn.com



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.

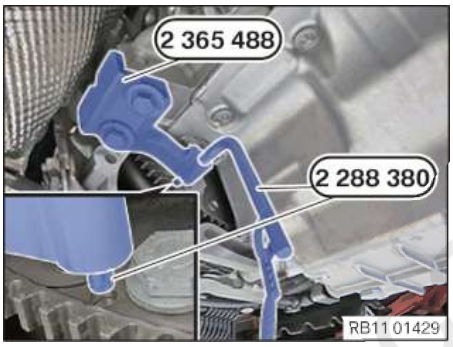


- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

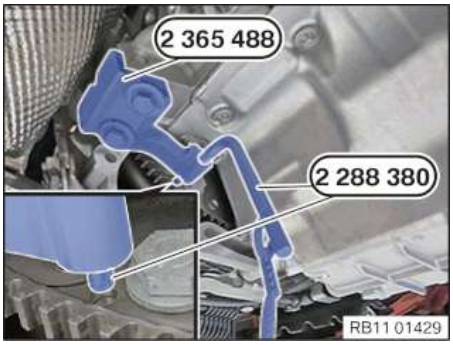
- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

42 – Removing the special tool for fixing the exhaust camshaft



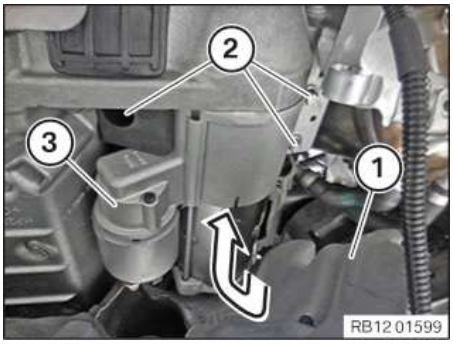
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

43 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

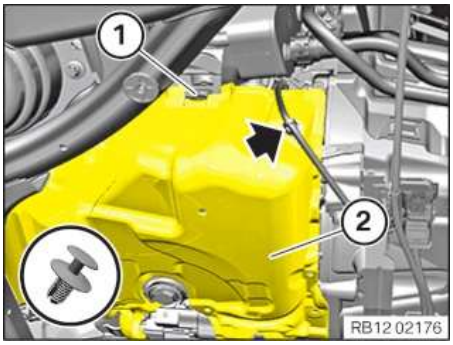
44 – Installing starter motor



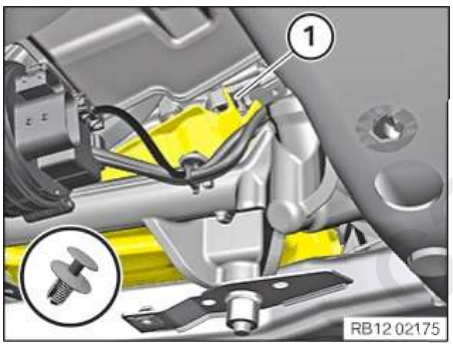
- Make sure that the acoustic cover (1) is not damaged.
- Carefully press the acoustic cover (1) to one side.
- Feed in and install the starter motor (3) in the direction of the arrow.
- Tighten the screws (2).

Starter motor to engine

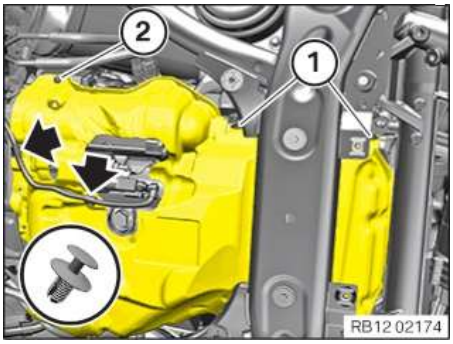
M8X60		Tightening torque	19 Nm



- Position the acoustic cover (2).
- Fasten expanding rivet (1).
- Secure clamp (arrow).

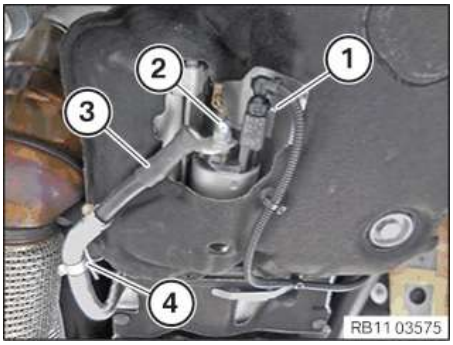


- Fasten expanding rivet (1).

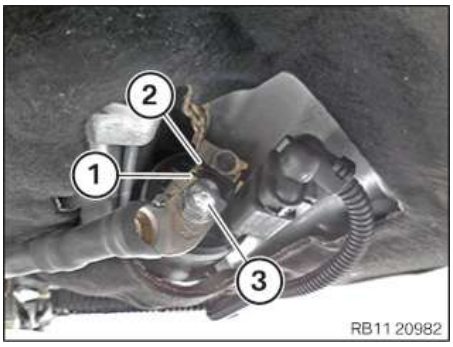


- Secure fir tree clip (2).
- Secure expanding rivet (1).
- Secure the clamps (arrows).

cardiagn.com



- Fasten positive battery cable(3) in holder (4) and position it on the starter motor.
- Tighten the nut (2) hand-tight.
- Connect the connector (1) and audibly lock it.



CAUTION

Improper routing of the positive battery cable.

Risk of short circuits!

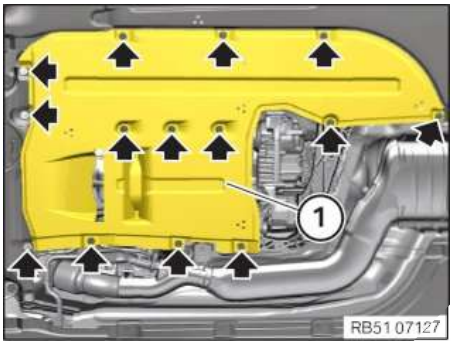
- Route the positive battery cable without abrasions and do not trap.

- Attach the positive battery cable (1) **correctly** to anti-twist lock (2).
- Tighten nut (3).

Battery positive lead to starter

M8		Tightening torque	13,5 Nm

45 – Installing underbody protection at rear



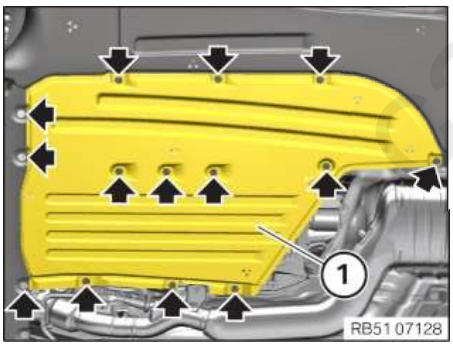
- **Version A:**

  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version B:**

  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

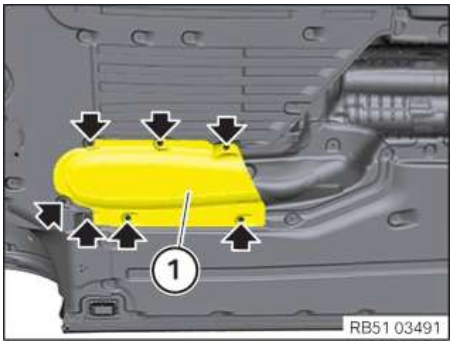
Hexagon screw		Tightening torque	3 Nm

46 – Install the underbody panelling of the transmission on the side

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

cardiagn.com

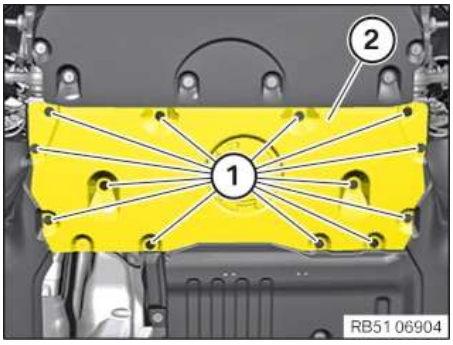


- Insert the underbody panelling (1).
- Tighten screws (arrows).

Underbody panelling

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

47 – Installing the centre underbody protection



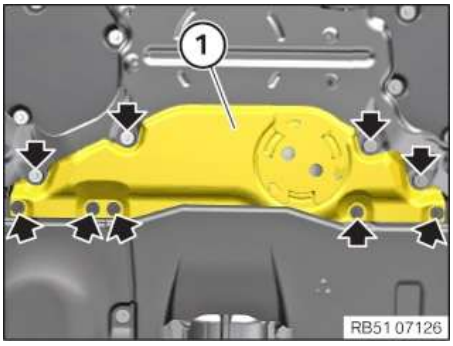
- **Variant with rear wheel drive:**

  Position central underbody protection (2).

  Tighten the screws (1).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version with all-wheel drive:**

  Guide in centre underbody protection (1) and install.

  Tighten screws (arrows).

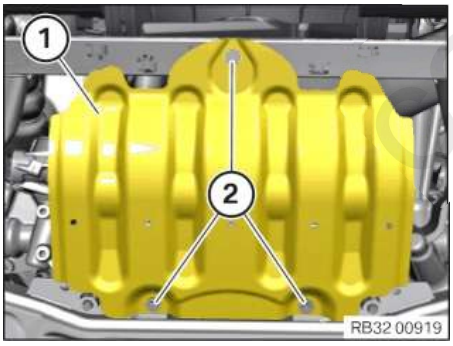
Underbody protection

Hexagon screw		Tightening torque	3 Nm

48 – If installed: Install underbody protection of the steering

Prerequisite

Front underbody protection has been removed.



- Position underbody protection (1).
- Tighten the screws (2).

Underbody protection, steering, to front axle support

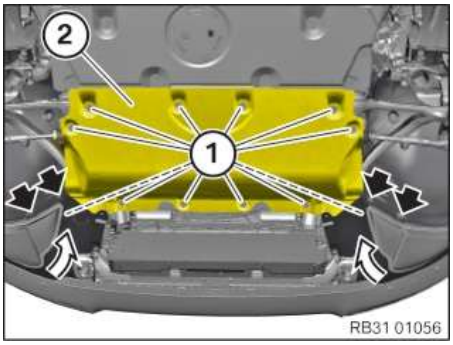
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

49 – Install the underbody protection of the steering gear

carlagn.com



- **Version A:**

  Position the underbody protection (2) of the steering gear.

  Tighten the screws (1).

Underbody protection of the steering gear

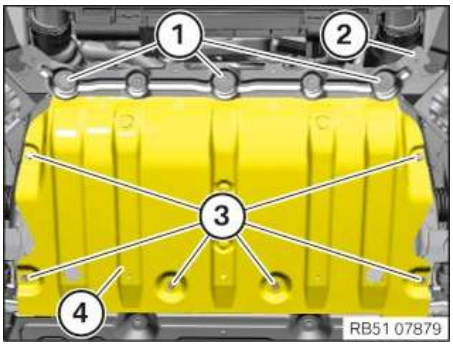
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the bottom wheel arch cover.

  Tighten the screws (arrows) of the lower wheel arch cover on the wheel arch cover.

Wheel arch trim panel, front

Thermoplastic hexagon screw		Tightening torque	2,6 Nm



- **Version B:**

  Feed in the underbody protection (4) of steering gear and install it.

  Tighten the screws (3).

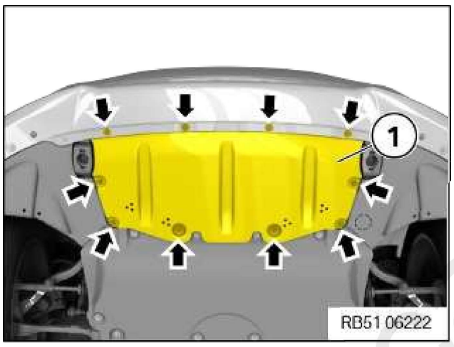
Underbody protection of the steering gear

Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the holder (2) for the underride protection.

  Tighten the screws (1).

50 – Installing the front underbody protection



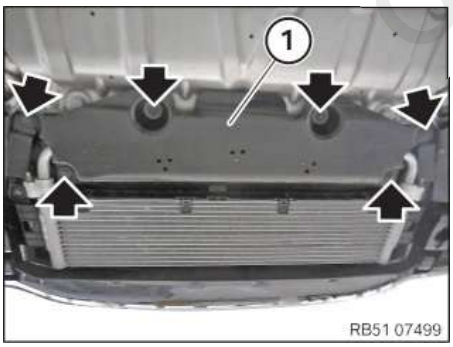
- **Version A:**

  Feed in the front underbody protection (1) towards the front under the bumper panel and position.

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



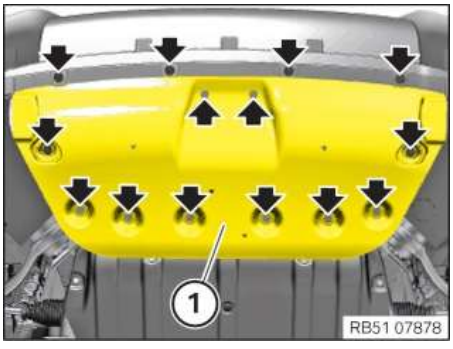
- **Version B:**

  Feed in and position the front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



- **Version C:**

  Feed in and install front underbody protection (1).

  Tighten screws (arrows).

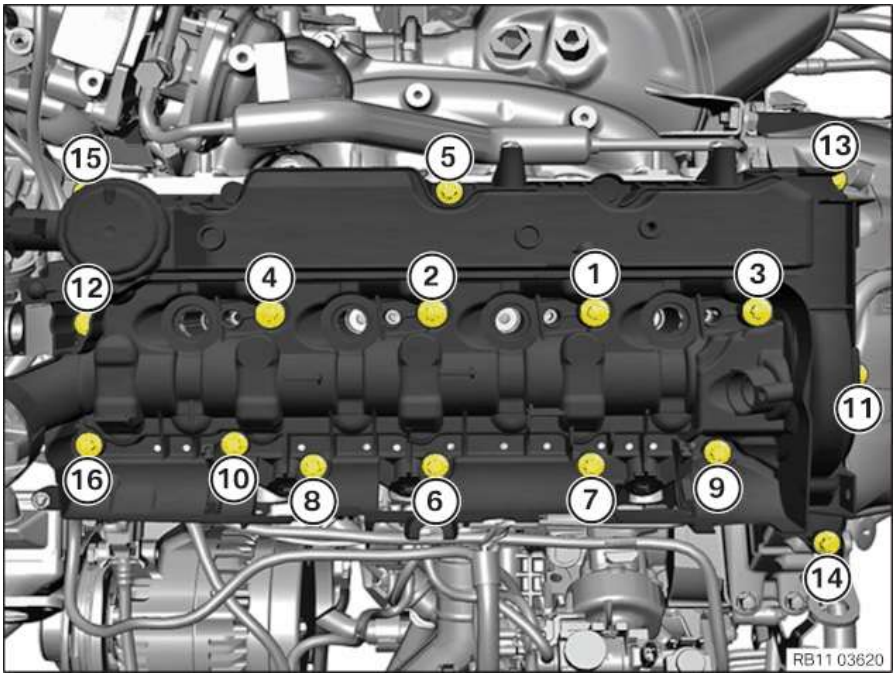
Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

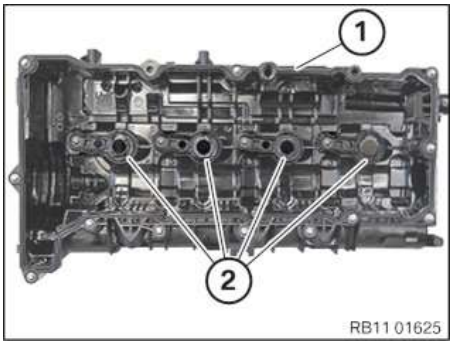
carmagn.com

51 – Installing cylinder head cover

Screw connection of the cylinder head cover

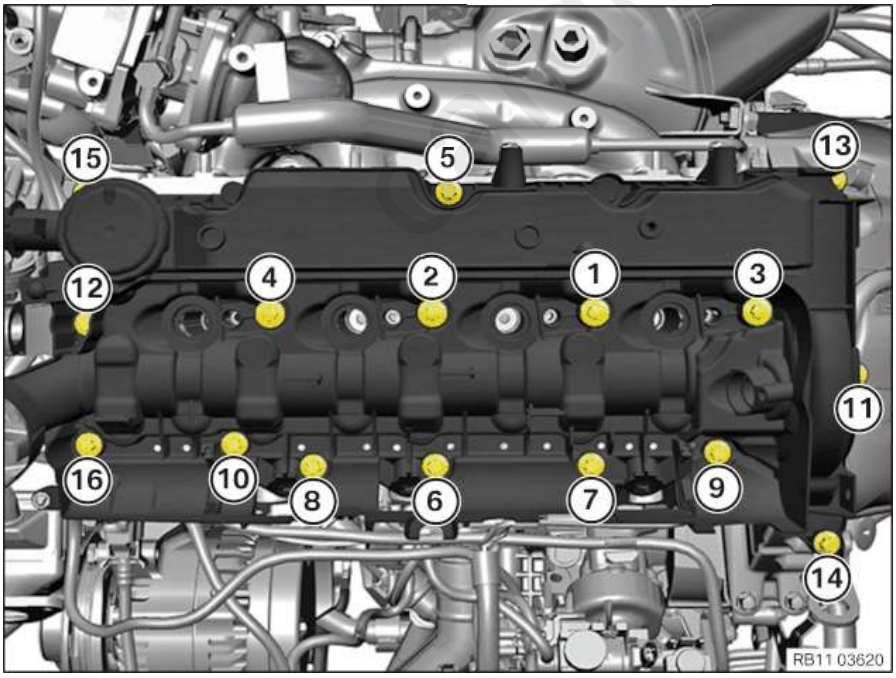


1 - 16 Bolts of the cylinder head cover



- Renew the profile seals (1) and (2) of the cylinder head cover.

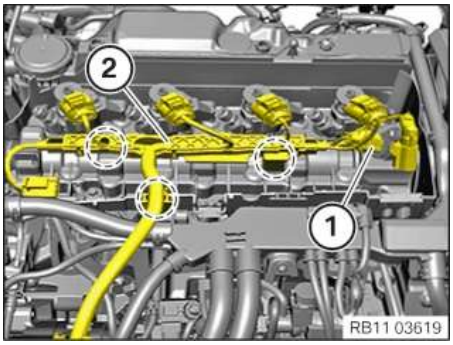
  Parts: Profile seals



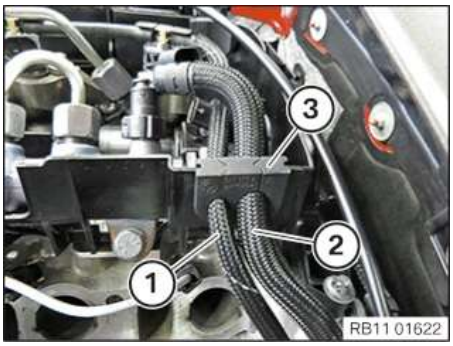
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

Cylinder head cover to cylinder head

M6		Tightening torque.	8,5 Nm



- Position the vehicle wiring harness (2) on the cylinder head cover and fasten in the marked areas.
- Plug in the connector (1) and lock audibly.



- Insert and connect the leakage oil line (1) with the fuel return line (2) and grommet (3).



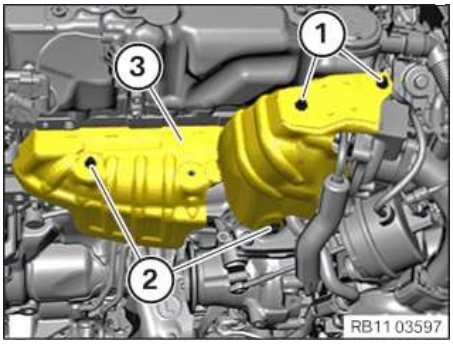
- Feed in and install the heat shield (1).



- Connect engine ventilation line (1) and lock.

  The locks (arrows) must engage audibly.

52 – Installing heat shield



- Feed in and install the heat shield (3).
- Tighten down screws (1) and (2).

Heat shield to exhaust manifold

M6x12			10 Nm

53 – Installing the sensor bracket on the cylinder head cover

cardiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

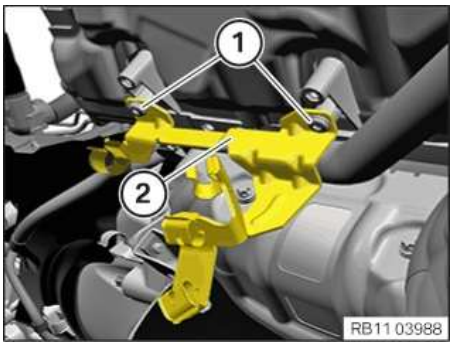
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

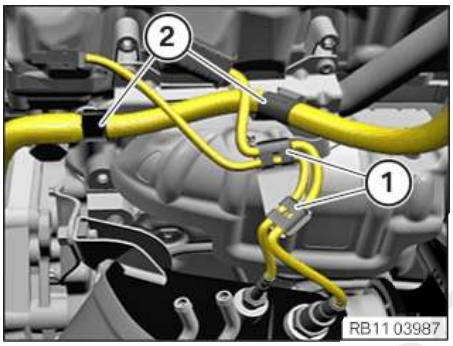
- Route all cables without abrasions, do not trap and crush.



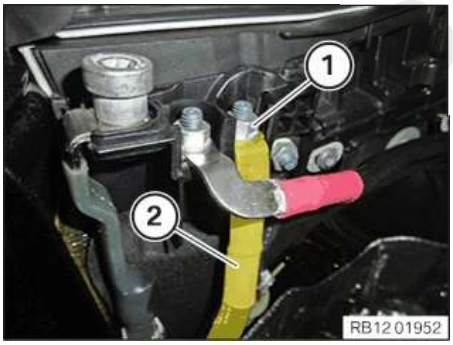
- Insert and install the holder (2).
- Tighten the screws (1).

Bracket on cylinder head cover

	Tightening torque	5 Nm



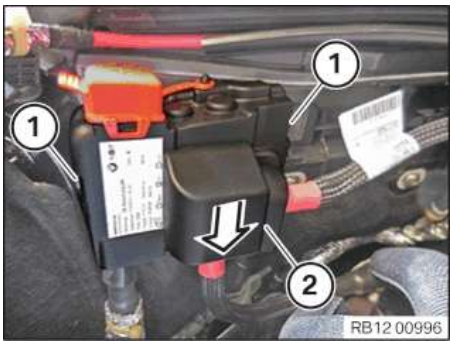
- Secure the positive battery cable in the clamps (2).
- Mount the cable of the exhaust gas sensor system in the clamps (1).



- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

Battery positive lead to battery positive terminal

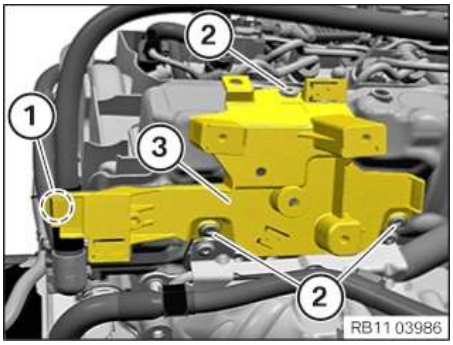
M8		Tightening torque	19 Nm



- Insert and install the cover (2) in the direction of the arrow.

  The locks (1) must engage audibly.

cardiagn.com

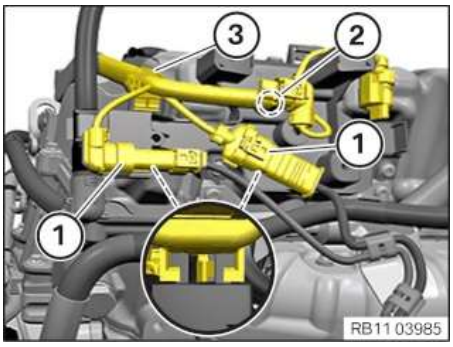


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

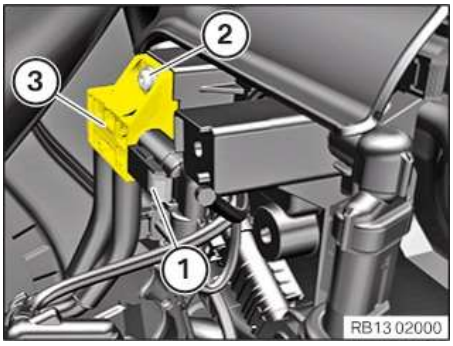
		Tightening torque	5 Nm

- Fasten the positive battery cable in the area (1) in the clamp.



- Feed in the wiring harness section and fasten it with the clamp (3).
- Fasten the cable clip in the area (2) in the sensor bracket.
- Feed in the connector (1) into the sensor bracket and lock it audibly.
- Plug in the connector (1) and lock audibly.

54 – Securing the differential pressure sensor for the diesel particulate filter



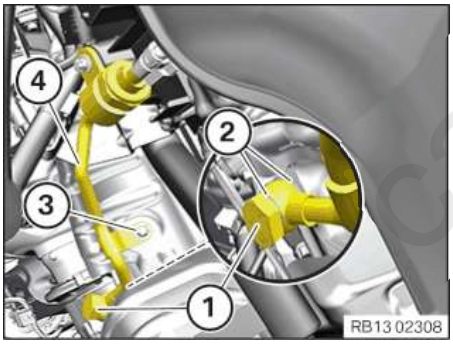
- Feed in and install the differential pressure sensor (3).
- Tighten down screw (2).

Differential pressure sensor of diesel particulate filter on cylinder head cover

TS5x20		Tightening torque	4 Nm

- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

55 – Install the exhaust gas pressure pipe



- Insert and install the exhaust gas pressure pipe (4).
- Replace the sealing rings (2).

  Parts: Sealing ring
- Apply the banjo bolt (1) hand-tight.
- Tighten down screw (3).

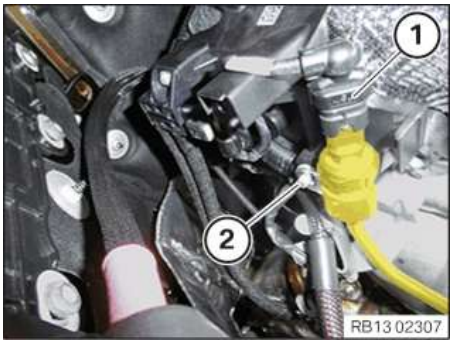
Heat shield to exhaust manifold

M6x12		Tightening torque	10 Nm

- Tighten the banjo bolt (1).

Banjo bolt for exhaust pressure pipe to exhaust manifold

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm



- Tighten down screw (2).

Exhaust gas pressure pipe to sensor system holder

TS6x20		Tightening torque	5,7 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

56 – Install all injectors

▸ **Cleaning the injector shafts**

cardiagn.com

CAUTION

Swirling dirt particles caused by compressed air.

Danger of injury!

- Collect dirt particles, e.g. when blowing out, use cloth to do so.

- Wear safety goggles.

RISK OF DAMAGE

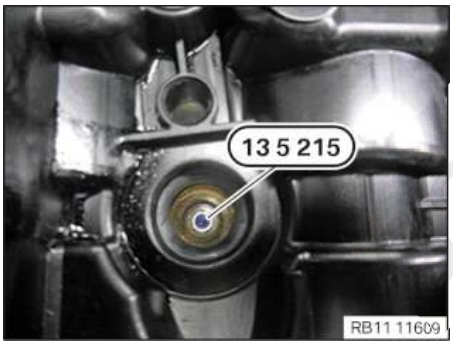
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



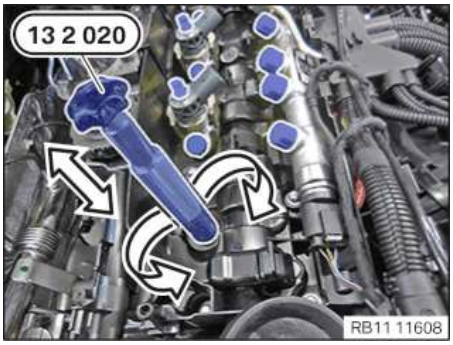
- Check whether the sealing ring remained in the injector shaft and remove the sealing ring as needed.
- Insert the special tool 0 493 763 (13 5 215) with the special tool 0 493 762 (13 5 214) from the set of special tools 0 493 758 (13 5 210) into the injector shaft.
- Remove special tool 0 493 762 (13 5 214).



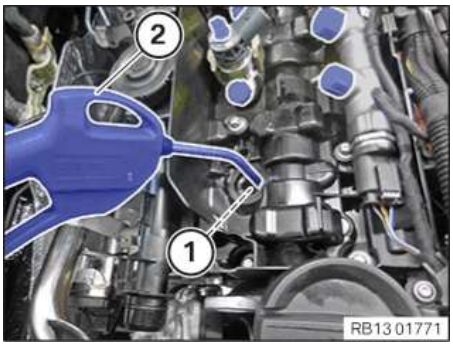
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



- Insert special tool 0 496 150 (13 2 020) into the injector shaft.



- Move special tool 0 496 150 (13 2 020) up and down in the injector shaft with rotational movements in the direction of arrow.
- Feed out special tool 0 496 150 (13 2 020) from the injector shaft and remove.



- Blow out injector shaft (1) with air gun (2).



- Feed the special tool 0 493 762 (13 5 214) into the injector shaft and screw it in with the special tool 0 493 763 (13 5 215).
- Feed out special tool 0 493 762 (13 5 214) with special tool 0 493 763 (13 5 215) from the injector shaft and remove it.

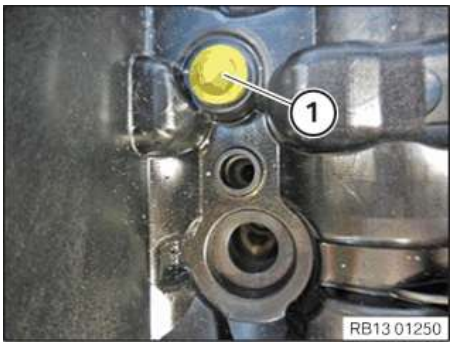
▸ **Check the placement of the clamping claw**

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Tighten down screw (1).

  The clamping claw is positioned on the bolt (1).

Clamping claw facing to cylinder head cover

M6		Tightening torque	10 Nm

▸ **Prepare the injector for installation**

cardiagn.com

RISK OF DAMAGE

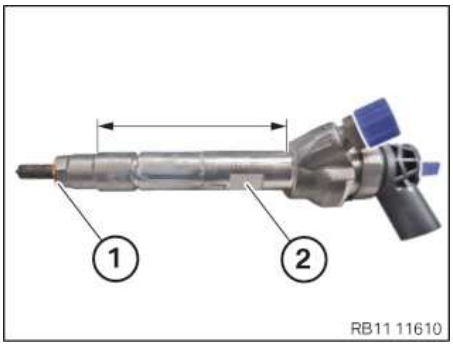
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

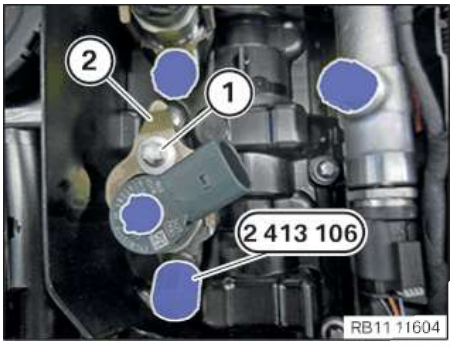
TECHNICAL INFORMATION

Lightly grease the injector shaft with high temperature-resistant grease.
For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



- Renew the copper sealing ring (1) on the injector (2).

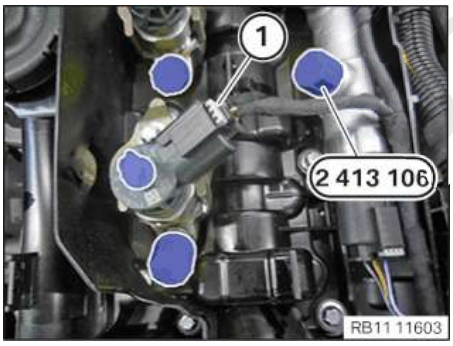
  Parts: Copper sealing ring
- Lightly grease the injector in the marked area with heat-resistant grease before installing the injector (2) in the injector shaft.



- Insert and install the injector .
- Insert and install the clamping claw (2).
- Tighten down screw (1).

Injector to cylinder head cover

M8	Tightening torque	8 Nm
	Angle of rotation	120 °



- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

▸ **Replacement: Perform injection quantity compensation**

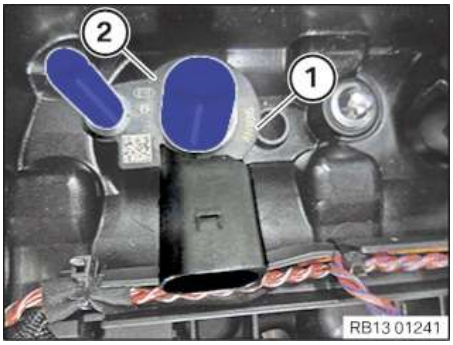
TECHNICAL INFORMATION

If the DDE control unit or an injector has been replaced, it will also be necessary to carry out injection quantity compensation. The adjustment value (7-position letter/number code) is engraved on each injector.

NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

cardiagn.com

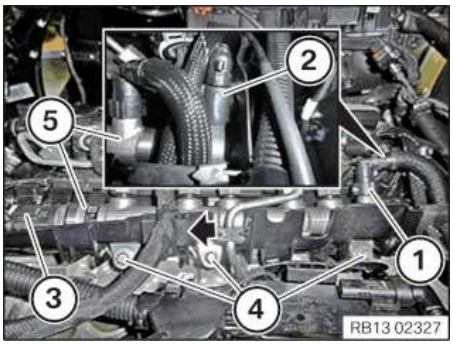


- Read off the adjustment value (1) on the new injector (2).



- Connect diagnosis system:
  - Vehicle identification
  - Function selection
  - Service functions
  - Digital diesel electronics (DDE)
  - Adjustment of injectors
  - Testing schedule
- Start service function with the right arrow button.

57 – Installing the rail



- Insert and install the rail (5).
- Tighten the screws (4).

Rail to cylinder head cover

M8		Tightening torque	19 Nm

- Install and lock cable clip (arrow).

  The cable clip (arrow) must engage audibly.
- Connect and lock the connector (3) at the rail pressure sensor.

  The connector (3) must engage audibly.
- Connect and lock the connector (2) at the rail pressure regulating valve.

  The connector (2) must engage audibly.
- Feed in fuel return line (1) and install.

  The fuel return line (1) must audibly engage.

58 – Installing high pressure line between rail and high pressure pump

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

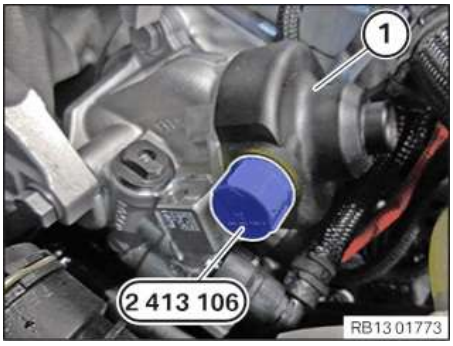
Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

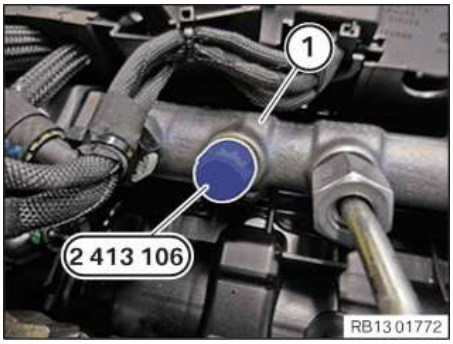
cardiagn.com

TECHNICAL INFORMATION

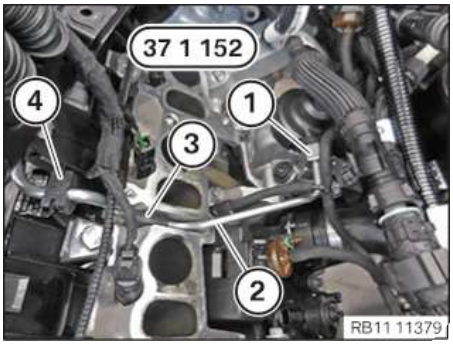
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Feed out and remove special tool on the high pressure pump (1).



- Feed out the special tool on the rail (1) and remove.



- Insert and install the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).
- Hand-tighten the union nut (1) on the high pressure pump.



- Hand-tighten the union nut (1) on the rail.

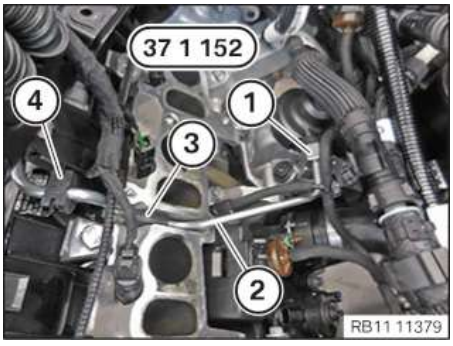
TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten the union nut (1) with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm



- Make sure that the high pressure line (2) is correctly installed with the abrasion protection (3) and the rubber mount (4).

TECHNICAL INFORMATION

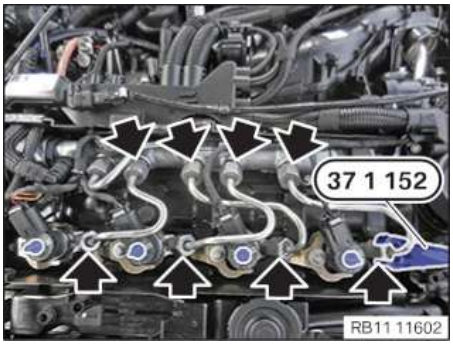
Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten union nut (1) on the high pressure pump with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm

cardiagn.com



- Remove the special tool from all cable connections.
- Feed in and install the high pressure lines (arrows).
- Hand-tighten the high pressure lines (arrows).

TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

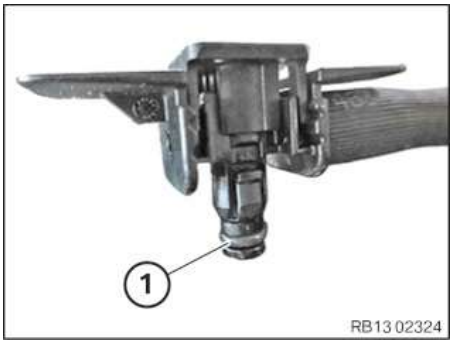
- Tighten the high pressure lines (arrows) with the special tool .

High pressure lines between injector and rail

High-pressure pipe		Tightening torque	24.5 Nm

- Check the high pressure lines (arrows) for tightness (**visual inspection**).

60 – Attach the leakage oil line on the injectors

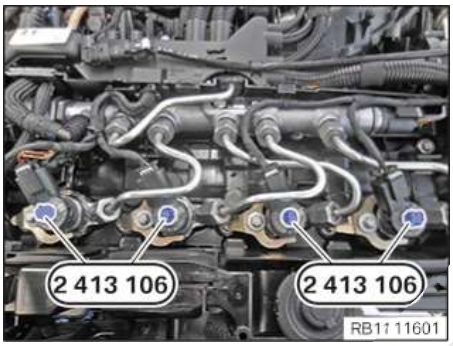


- **Version A:**

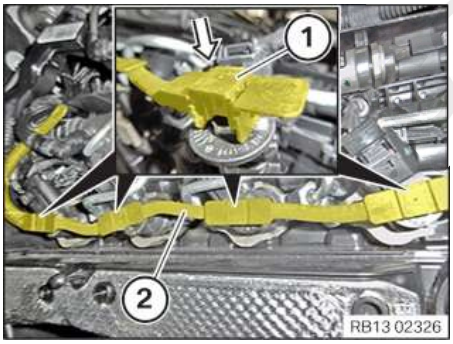
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

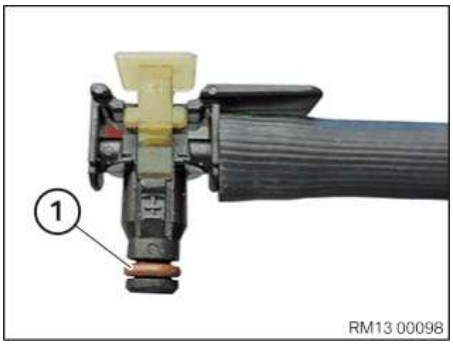
  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.



- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.



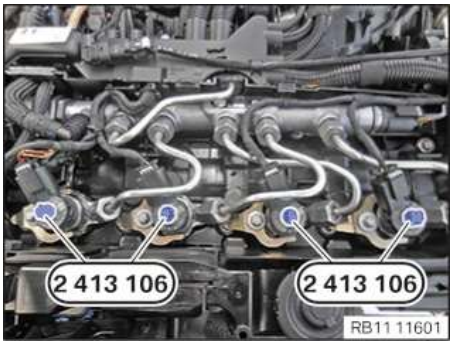
- **Version B**:

  Check sealing ring (1) for damage, renew leakage oil line if necessary.

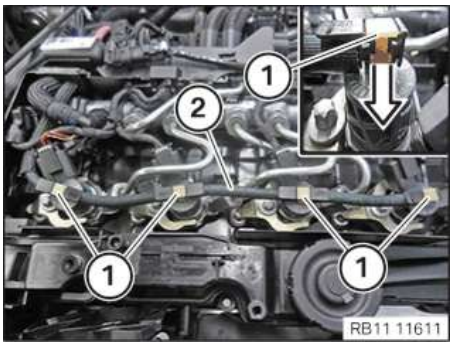
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.

cardiagn.com

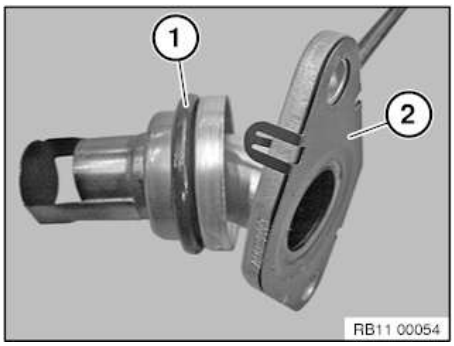


- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.

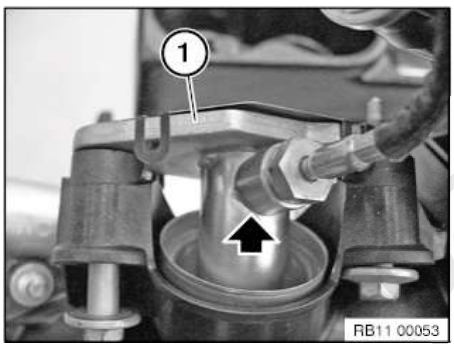
61 – Installing the intake plenum



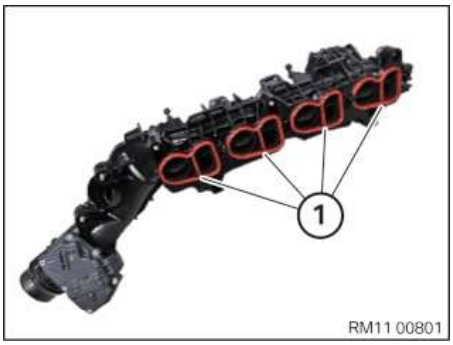
- Renew O-ring (1).

  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

  Parts: Gasket
- Position the seal (2) and clip it in.



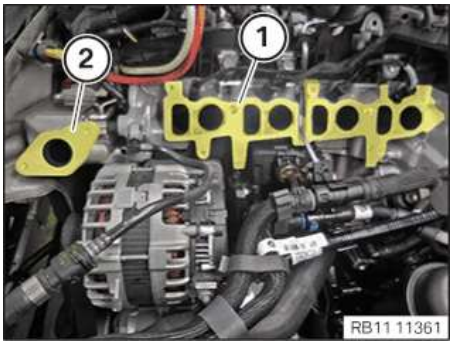
- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).



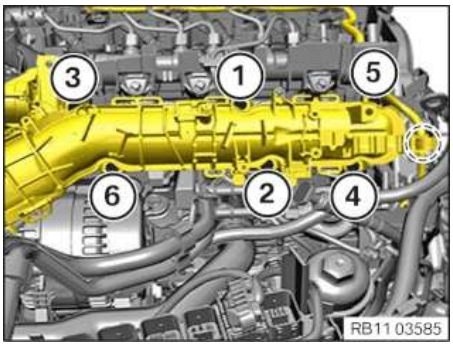
- Renew seals (1).

  Parts: Seals
- Ensure that the seals (1) are firmly mounted on the intake plenum.

cardiagn.com



- Clean connection points (1) at cylinder head.
- Clean the connection point (2) on the exhaust-gas recirculation cooler.

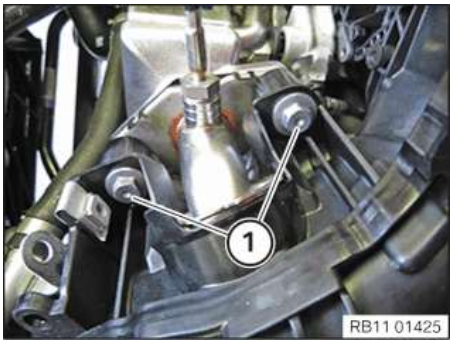


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

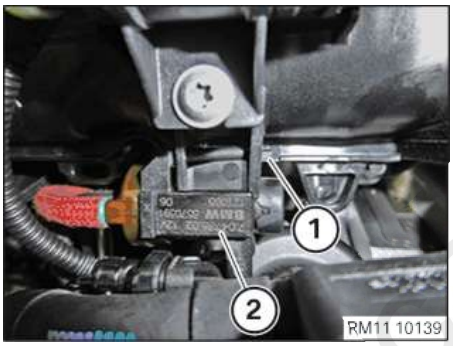
- Attach the wiring harness and fuel lines in the marked area on the intake plenum.



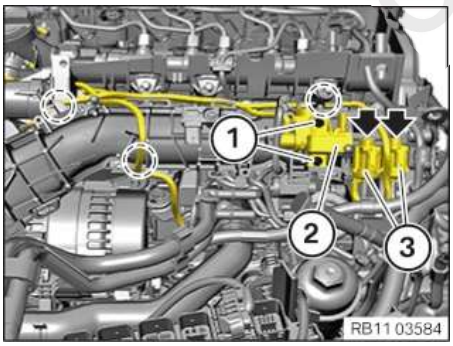
- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm



- Install electric changeover valve (2) from the left to the right in the holder on the intake plenum.
  The lock (1) must audibly engage.



- Install intake plenum electric changeover valve (3) on the intake plenum.
  The locks (arrows) must engage audibly.
- Position the electric changeover valve (2) on the intake plenum.
- Tighten the screws (1).

Electric changeover valve to intake plenum

TS6x20		Tightening torque	5 Nm

- Fasten the vacuum hoses on the intake plenum in the marked areas.



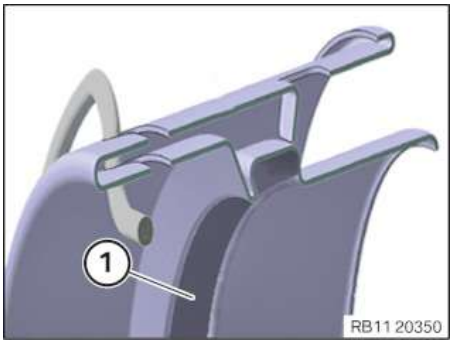
- Check the seal (1) for damage, and renew if necessary.

gardiagn.com

▸ **Replacing damaged seal**

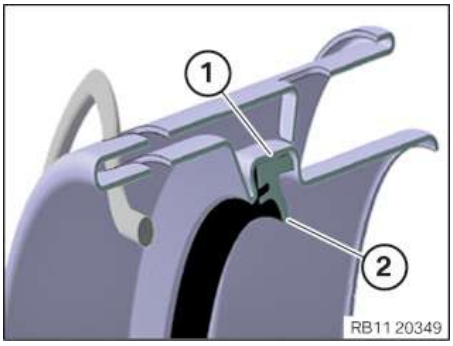
TECHNICAL INFORMATION

Do not use pointed or sharp-edged tools for the installation and/or removal.



- Remove damaged seal.
- Clean gasket groove (1) with a dry towel.

  The gasket groove (1) must be clean.



- Renew gasket.

  Parts: Gasket
- Install seal dry without lubricant or mounting agent.

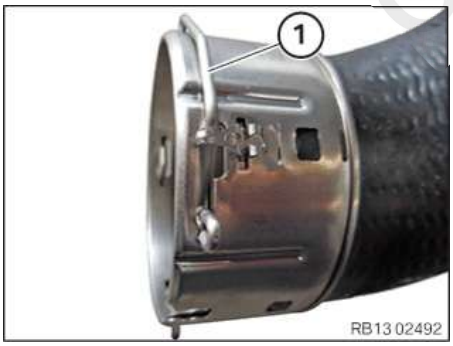
TECHNICAL INFORMATION

Incorrect assembly is possible. Ensure correct installation position.

- Feed in and install the seal.
- Make sure the seal is correctly installed in the gasket groove (1).
- Make sure that the sealing lip (2) is directed inwards as shown.



- Connect the pressure pipe to the throttle body until the locks (1) engage on both sides.



- Check that the locks (1) are correctly seated on the pressure pipe.

62 – Partially securing the wiring harness section on the intake plenum

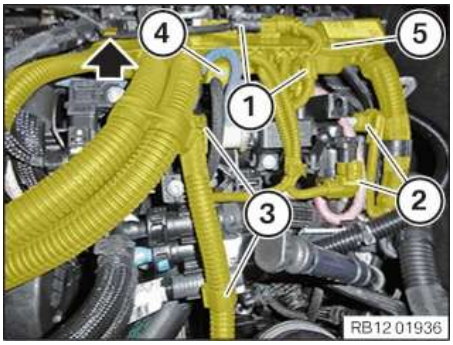
RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

- Route all cables without abrasions, do not trap and crush.

cardiagn.com



- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

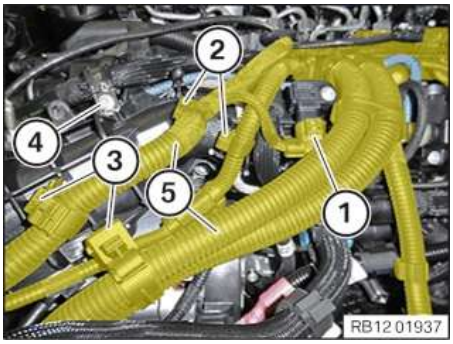
Wiring harness section to manifold

TS5x20		Tightening torque	3,6 Nm

- Secure clamps (3).
- Connect connectors (2) and lock.

  The connectors (2) must engage audibly.
- Secure the line at clamp (Arrow).
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



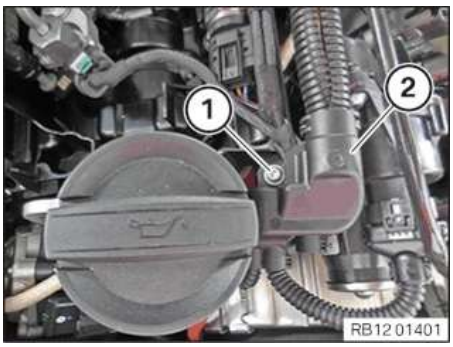
- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

Standard screw connection 4 Nm

Oval-head screw		Tightening torque	4 Nm

- Secure clamps (3).
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



- Guide in the wiring harness section (2) and install.
- Tighten down screw (1).

Wiring harness section to cylinder head cover

TS5x20		Tightening torque	3,6 Nm



- Connect connectors (1) and lock.

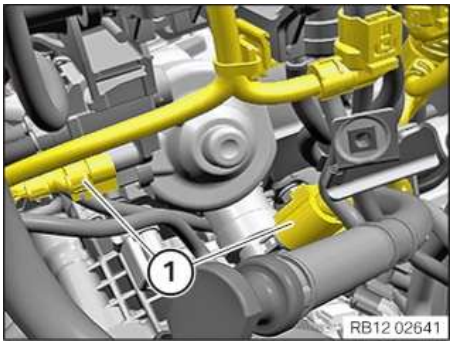
  The connector (1) must engage audibly.



- Connect the connector (1) and lock it.

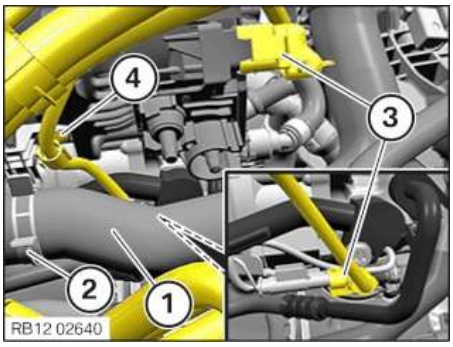
  The connector (1) must engage audibly.

cardiagn.com



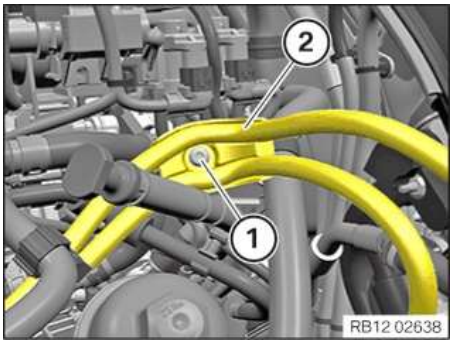
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



- Secure the clamp (4).
- Connect connectors (3) and lock.

  The connectors (3) must engage audibly.
- Feed the coolant line (1) into the holder (2) and install it.



- Feed in and position the positive battery cables (2) .
- Tighten down screw (1).

Standard screw connection M6

M6		Tightening torque	8 Nm



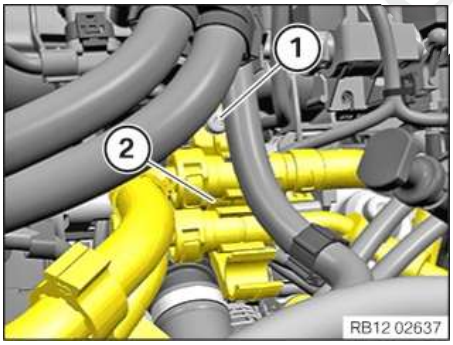
- Feed in and install the positive battery cable (4).
- Feed in and position the positive battery cables (4) .
- Renew the nuts (3) and (2).

  Parts: Nuts
- Tighten nuts (3) and (2).

Battery positive lead on the starter motor generator

M8		Tightening torque	19 Nm

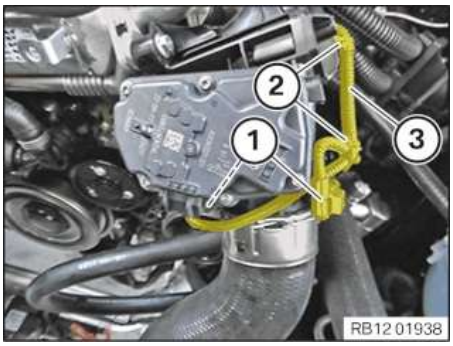
- Guide in and install the lid (1).



- Insert and install the holder (2).
- Tighten down screw (1).

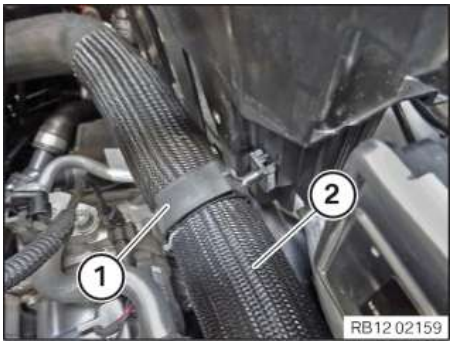
Holder on intake plenum

TS6X20		Tightening torque	5 Nm



- Guide in the wiring harness section (3) and install.
- Secure clamps (2).
- Connect connectors (1) and lock.

cardiagn.com



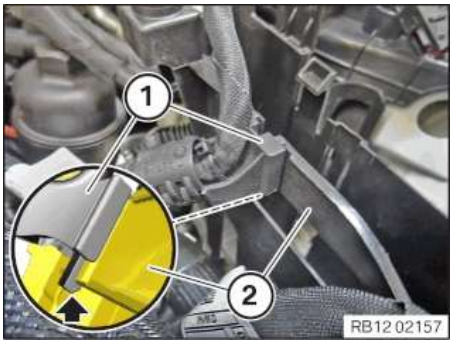
- Feed in and install coolant line (2).
- Lock holder (1).

  The holder (1) must engage audibly.



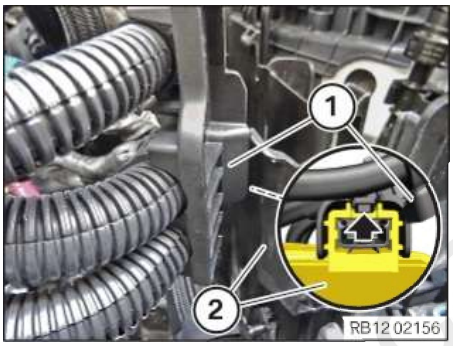
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.



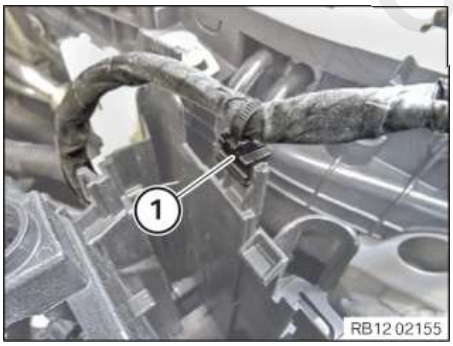
- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.



- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.



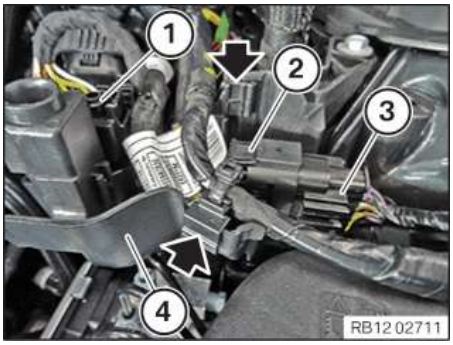
- Secure clamps (1).



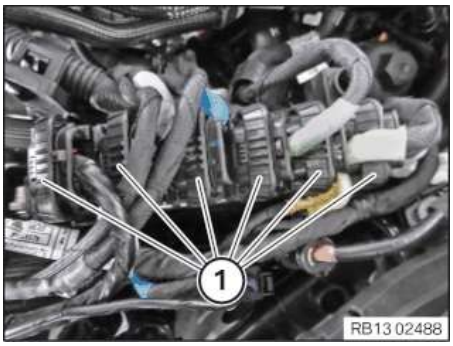
- Feed in and install the connector (1).

  The connector (1) must engage audibly.

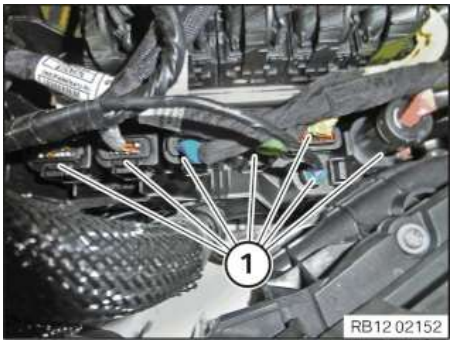
cardiagn.com



- Connect connector (3) to control unit holder (4) and lock it.
  The connector (3) must engage audibly.
- Connect connectors (2) and lock.
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.
  The connector (1) must engage audibly.
- Secure the clamps (arrows).

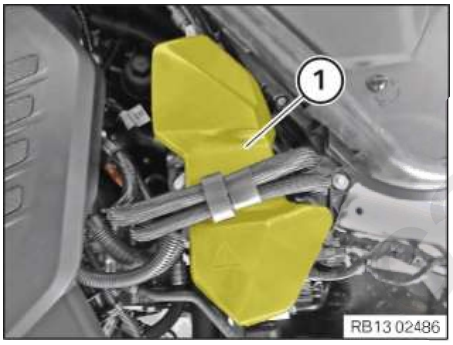


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



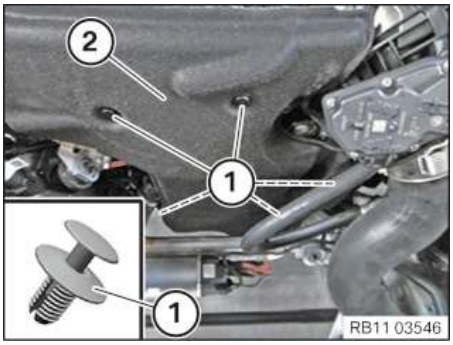
- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.

63 – Install the cover for the DDE control unit



- Insert and install cover (1) into guides.

64 – Install acoustic cover for the engine, front



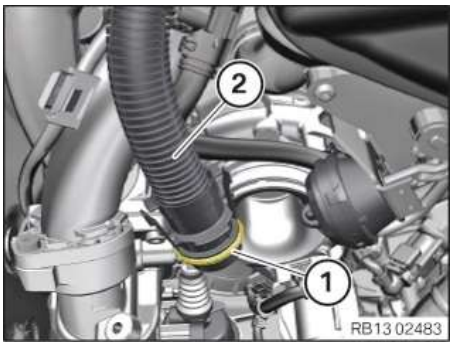
- Feed the acoustic cover (2) in and install.
- Secure the acoustic cover (2) with the expanding rivets (1).

65 – Installing the clean air pipe with resonator

bardiagn.com



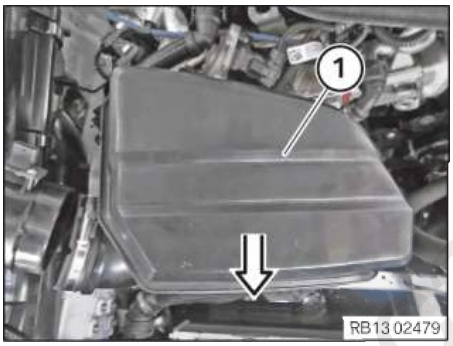
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



- Check the sealing ring (1) for the engine ventilation line (2) for damage and renew where required.



- Feed in and install clean air pipe with resonator (1) in the direction of the arrow.

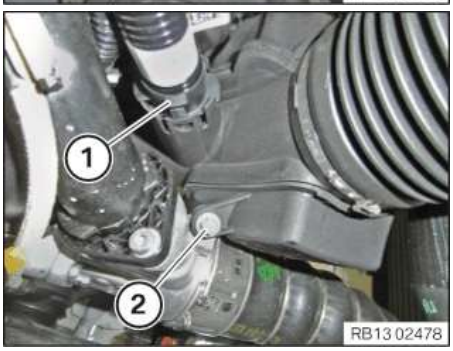


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

  The clamp (1) must engage audibly.

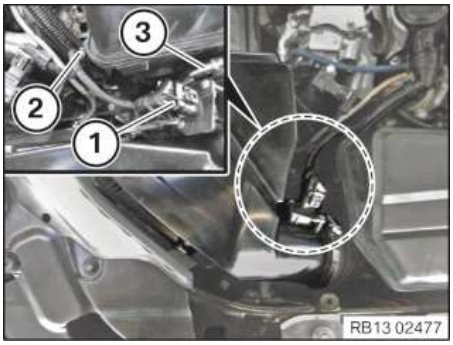


- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm

cardiagn.com



- Connect the clean air pipe with resonator to the intake filter housing.
- Tighten clamp (3).

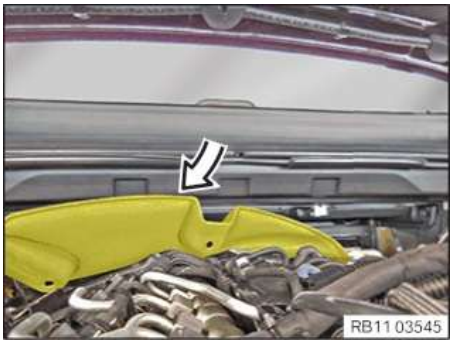
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

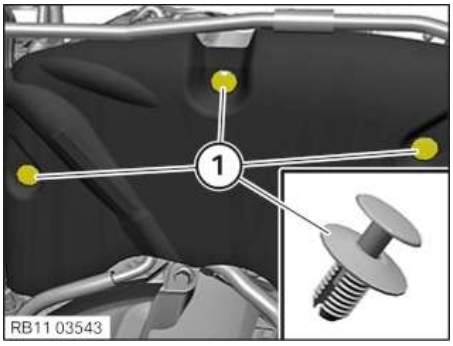
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

66 – Installing acoustic cover at rear

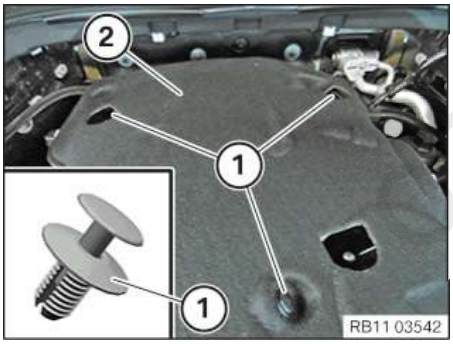


- Guide in the acoustic cover in the direction of the arrow and install it.



- Secure acoustic cover with the expanding rivets (1).

67 – Install the acoustic cover for the injectors



- Feed the acoustic cover (2) in and install.
- **If installed:** Secure the acoustic cover (2) with the expanding rivets (1) .

68 – Install acoustic cover

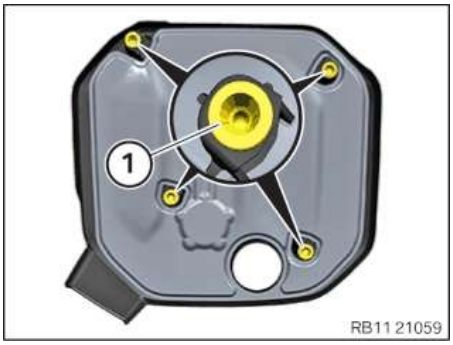
RISK OF DAMAGE

Damage to the acoustic cover/design cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.

cardiagn.com

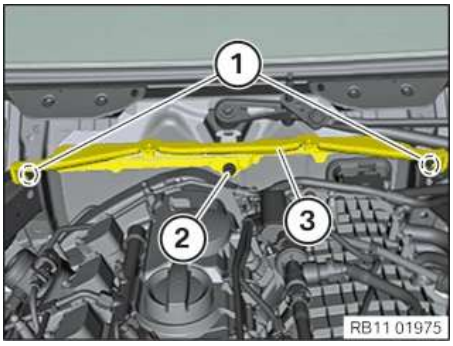


- Check the acoustic cover for correct fit of the rubber mounts (1).



- Clip in the acoustic cover (1) into the holders in the indicated areas.

69 – Installing centre bulkhead lower section

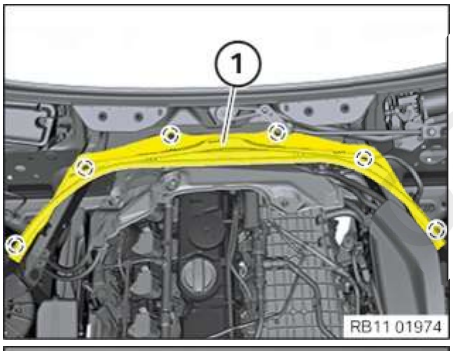


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

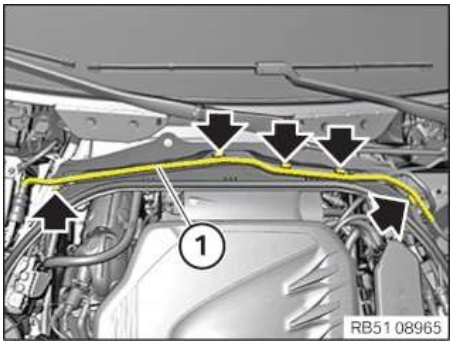
70 – Installing the centre bulkhead upper part



- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

Bulkhead upper part to bottom bulkhead

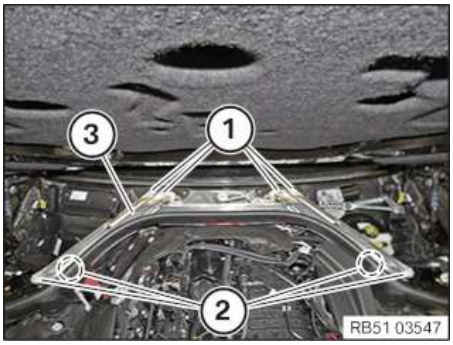
		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

  Clip in the wire (1) into the holders (arrows).

bardiagn.com



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Install the tension strut (3) on the spring strut dome.
- Tighten the screws (1).

Tension strut on bulkhead

M10x25 screw		Tightening torque	56 Nm

- Renew screws (2).

  Parts: Screws
- Tighten the screws (2).

Tension strut to spring strut dome

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

71 – Install the seal for the bonnet



- Press the rear bonnet seal (2) into the guide.
- Feed in cable (1) into the brackets.
- Check that the rear bonnet seal (2) and the cable (1) are seated correctly.

72 – Installing cowl panel cover

RISK OF DAMAGE

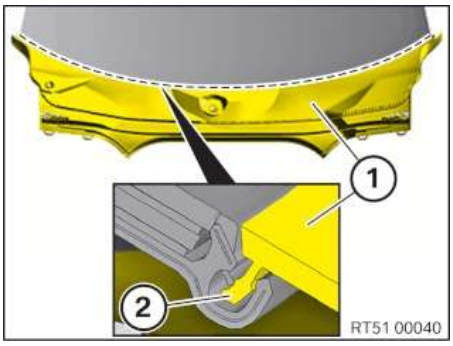
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

- Ensure correct installation of the components.
- Only use undamaged components.

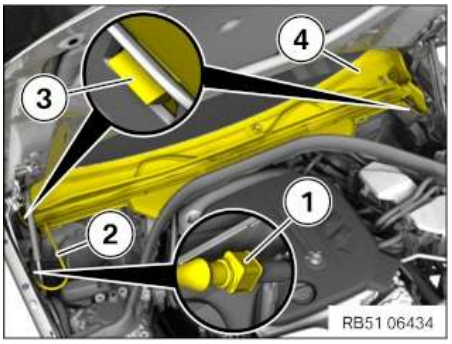
TECHNICAL INFORMATION

Before installing the cowl panel cover it is **mandatory** to check that the 48 V line is routed correctly and fitted tightly.
An incorrectly laid or attached 48 V line can be damaged by the wiper kinematics.



- Push the cowl panel cover (1) into the latch mechanism (2) beginning on the side.

cardiagn.com



- Clip cowl panel cover (4)in by means of the latch mechanisms (3).
- Position windscreen wash hose (2) and connect windscreen wash hose (1)quick lock.

73 – Install left and right wiper arm

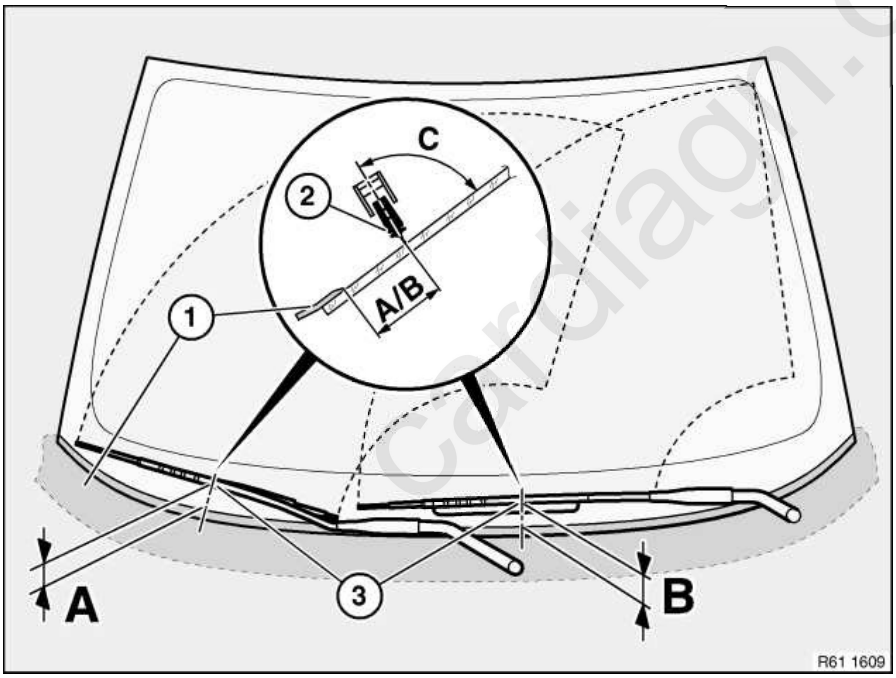
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

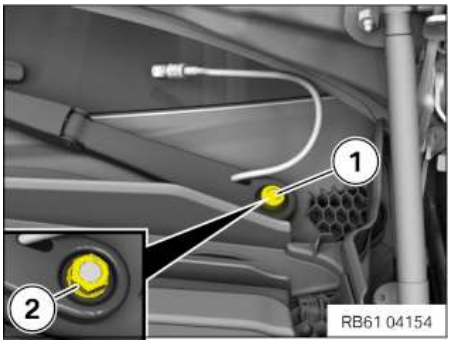
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- Connect the wiper arm (3).
- Correctly position the wiper arm (2) in relation to the window edge (1).

Distance from window pane edge to wiper blade

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm



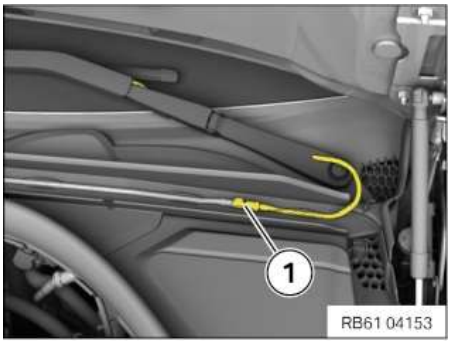
- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

- Connect the protective cap (1).

cardiagn.com



- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

74 – Connecting all battery earth leads



- See additional information.

75 – Activating the 48 V electrical system

Prerequisite

Ignition is switched off.

RISK OF DAMAGE

Damage to 48-V battery

If a 48-V battery that is disconnected from the electrical system is activated, the battery electronics will be damaged.

- Only carry out activation of the 48V electrical system with a completely connected 48-V battery.



- Lift battery earth lead (1).
- Remove special tool .



- Release the negative battery cable (2) of the 48-V battery from the mounting.
- Position the negative battery cable (2) of the 48-V battery on the negative battery terminal.
- Tighten nut (1).

Negative battery cable to 48-V battery

Nut M8		Tightening torque	19 Nm

cardiagn.com

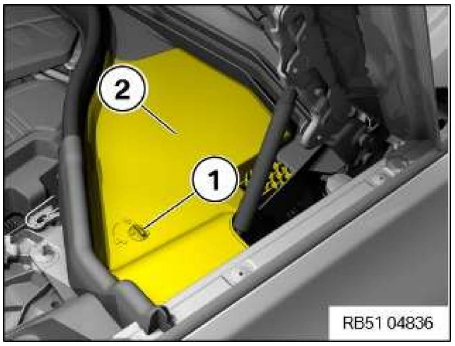


- Connect the connector (1) of the CAN bus and lock it.
- Clip in clip (2).



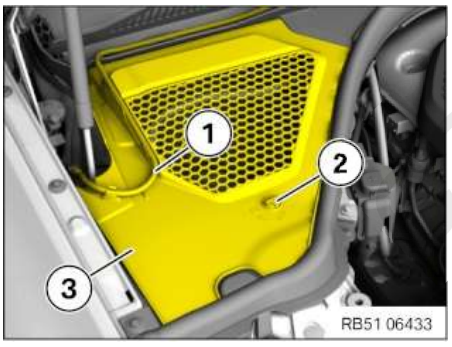
- Activate the 48V electrical system by closing the bonnet.
  The activation takes place automatically.

76 – Install the cover of the engine compartment on the rear left



- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

77 – Install the rear right engine compartment cover



- Position the cover of the engine compartment on the rear right (3).
- Close lock (2).
- Insert washer fluid hose (1) into the guides.

78 – Take bonnet out of the service position

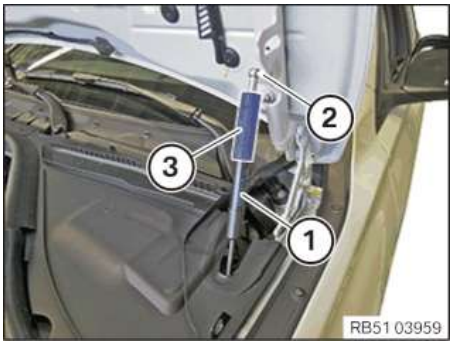
CAUTION

Shutting bonnet or tailgate.

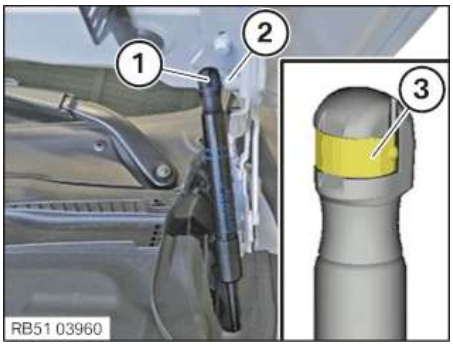
Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.

cardiagn.com



- Support the bonnet by hand.
- Remove the special tool (3) from the ball pin (2).
- Pull off the special tool (3) from the gas pressure spring (1).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.



- Check the clamp (3) is fitted correctly.
- Connect ball socket (1) to ball pin (2).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.

Additional Information

Overview of Tightening Torques

Special tool 2 365 488 to engine			Used in step 3641
M8x60		Tightening torque	19 Nm

Intake and exhaust camshaft in camshaft support			Used in step 39
M6x31		Tightening torque	10 Nm

Starter motor to engine			Used in step 44
M8X60		Tightening torque	19 Nm

Battery positive lead to starter			Used in step 44
M8		Tightening torque	13,5 Nm

Underbody protection			Used in step 4547
Hexagon screw		Tightening torque	3 Nm

Underbody panelling			Used in step 46
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Underbody protection, steering, to front axle support			Used in step 48
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support			Used in step 48
Hexagon bolt M6		Tightening torque	8 Nm

Underbody protection of the steering gear			Used in step 49
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

Wheel arch trim panel, front			Used in step 49
Thermoplastic hexagon screw		Tightening torque	2,6 Nm

cardiagn.com

Underbody protection front			Used in step 50
Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Cylinder head cover to cylinder head			Used in step 51
M6		Tightening torque.	8,5 Nm

Heat shield to exhaust manifold			Used in step 52
M6x12			10 Nm

Bracket on cylinder head cover			Used in step 53
		Tightening torque	5 Nm

Battery positive lead to battery positive terminal			Used in step 53
M8		Tightening torque	19 Nm

Differential pressure sensor of diesel particulate filter on cylinder head cover			Used in step 54
TS5x20		Tightening torque	4 Nm

Heat shield to exhaust manifold			Used in step 55
M6x12		Tightening torque	10 Nm

Banjo bolt for exhaust pressure pipe to exhaust manifold			Used in step 55
Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm

Exhaust gas pressure pipe to sensor system holder			Used in step 55
TS6x20		Tightening torque	5,7 Nm

Clamping claw facing to cylinder head cover			Used in step 56
M6		Tightening torque	10 Nm

Injector to cylinder head cover			Used in step 56
M8		Tightening torque	8 Nm
		Angle of rotation	120 °

Rail to cylinder head cover			Used in step 57
M8		Tightening torque	19 Nm

High pressure lines between high pressure pump and rail			Used in step 58
High-pressure pipe		Tightening torque	24.5 Nm

High pressure lines between injector and rail			Used in step 59
High-pressure pipe		Tightening torque	24.5 Nm

Intake plenum to cylinder head			Used in step 61
M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum			Used in step 61
		Tightening torque	10 Nm

Electric changeover valve to intake plenum			Used in step 61
TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold			Used in step 62
TS5x20		Tightening torque	3,6 Nm

cardiagn.com

Standard screw connection 4 Nm			Used in step 62
Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover			Used in step 62
TS5x20		Tightening torque	3,6 Nm

Standard screw connection M6			Used in step 62
M6		Tightening torque	8 Nm

Battery positive lead on the starter motor generator			Used in step 62
M8		Tightening torque	19 Nm

Holder on intake plenum			Used in step 62
TS6X20		Tightening torque	5 Nm

Clean air pipe to exhaust turbocharger			Used in step 65
M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing			Used in step 65
Clamp		Tightening torque	3 Nm

Bulkhead lower part to body			Used in step 69
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead			Used in step 70
		Tightening torque	3 Nm

Tension strut on bulkhead			Used in step 70
M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome			Used in step 70
Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm			Used in step 73
Combination hexagon nut		Tightening torque	35 Nm

Negative battery cable to 48-V battery			Used in step 75
Nut M8		Tightening torque	19 Nm

Overview of Special Tools

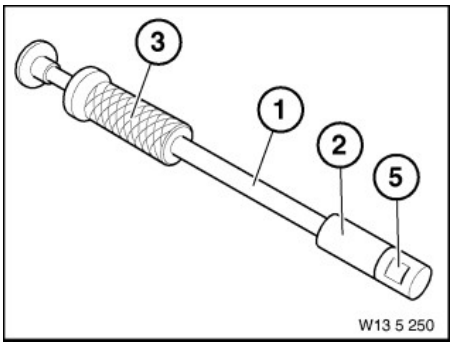
0 493 339 (13 5 252) Bush



Common		Used in step 23
Usage	(Threaded bush)	
Included in the tool or work	0 493 321	
Storage location		
Replaced by		
In connection with		
SI-Number		

cardiagn.com

0 493 321 (13 5 250) Puller



Common Used in step 23

Usage	For removing injector nozzles or injectors from cylinder head
Included in the tool or work	
Storage location	A16
Replaced by	
In connection with	
SI-Number	01 06 98 (306)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 338 (13 5 251)		**Rod** (guide rod)	
2	0 493 339 (13 5 252)		**Bush** (Threaded bush)	
3	0 493 340 (13 5 253)		**Weight** (Weight)	
4	0 493 379 (13 5 254)		**Claw** (Clamping claw) For removal of injector nozzles / engine: M57	
5	0 495 579 (13 5 255)		**Adapter** For removing steering shaft on E85. Refer to SI 01 11 06 (265)	

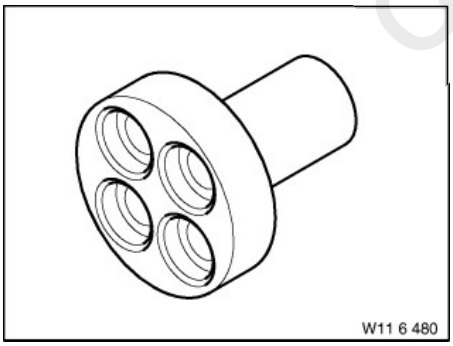
0 493 340 (13 5 253) Weight



Common Used in step 23

Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 380 (11 6 480) Connector

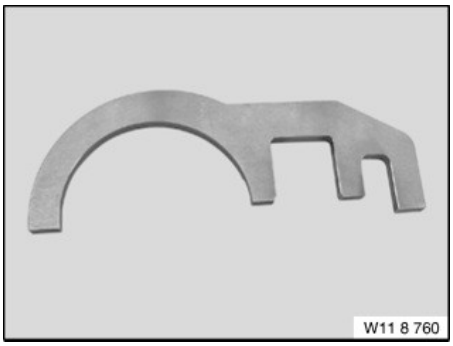


Common Used in step 3641

Usage	For turning over engine at crankshaft hub (vibration absorber).
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	01 11 98 (338)

carblagn.com

0 496 112 (11 8 760) Gauge



Common	Used in step 36374142
Usage	For securing camshaft at TDC.
Included in the tool or work	
Storage location	B24
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

2 365 488 Adapter



Common	Used in step 36404143
Usage	For disconnecting the crankshaft at the top dead centre. (longitudinal installation with automatic transmission only).
Included in the tool or work	
Storage location	C56
Replaced by	
In connection with	
SI-Number	01 46 14 (191)

cardiagn.com

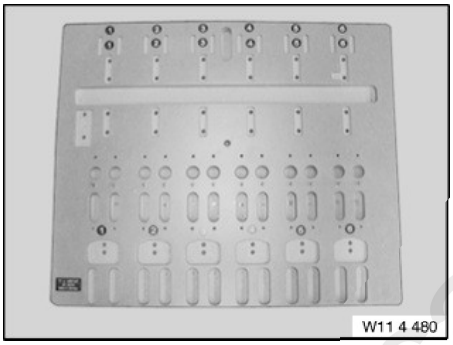
2 288 380 Locating stud



Common Used in step 36404143

Usage	For disconnecting the crankshaft at the top dead centre. Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).
Included in the tool or work	
Storage location	A56
Replaced by	
In connection with	
SI-Number	01 04 14 (071)

0 495 105 (11 4 480) oddments tray



Common Used in step 38

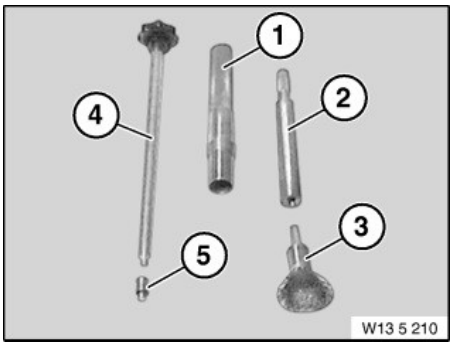
Usage	(Boards (2 pieces)) For setting down the individual components of the cylinder head.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 17 04 (130)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 495 106 (11 4 481)		**oddments tray** (Board, intake side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	
2	0 495 107 (11 4 482)		**oddments tray** (Board, exhaust side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	

cardiagn.com

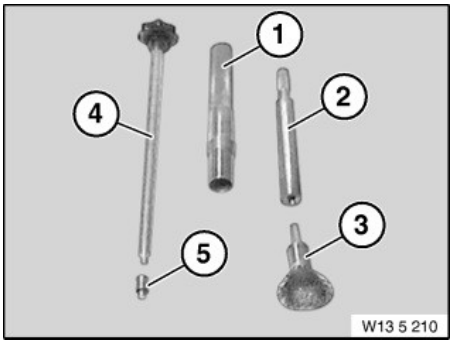
0 493 763 (13 5 215) Plug



Common Used in step 56

Usage	(Seal plug)
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 762 (13 5 214) Rod

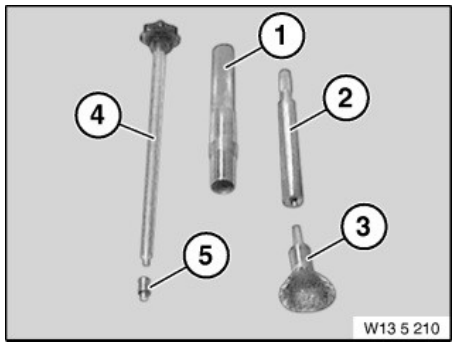


Common Used in step 56

Usage	(Mounting rod) For the seal plug
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

cardiagn.com

0 493 758 (13 5 210) Tool



Common Used in step 56

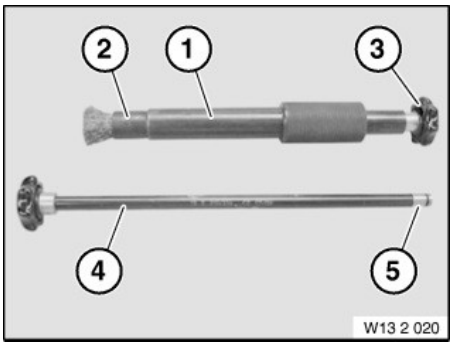
Usage	(Cleaning set) For injector channels
Included in the tool or work	
Storage location	B4
Replaced by	
In connection with	
SI-Number	01 05 00 (574)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 759 (13 5 211)		**Holding sleeve** (Guide sleeve)	
2	0 493 760 (13 5 212)		**Holder** (Brush holder)	
3	0 493 761 (13 5 213)		**Brush head**	
4	0 493 762 (13 5 214)		**Rod** (Mounting rod) For the seal plug	
5	0 493 763 (13 5 215)		**Plug** (Seal plug)	

cardiagn.com

0 496 150 (13 2 020) Tool



Common Used in step 56

Usage	(Cleaning kit) For cleaning the injector shaft.
Included in the tool or work	
Storage location	A87
Replaced by	
In connection with	
SI-Number	01 07 07 (355)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 496 151 (13 2 021)		**Holding sleeve** (Guide sleeve) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
2	0 496 152 (13 2 022)		**Holder** (Brush holder) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
3	0 496 153 (13 2 023)		**Brush head** Remaining inventories will be sold off, followed by discontinuation and then available as part of complete special tool 13 2 020 = 83 30 0 496 150 only	
4	0 496 154 (13 2 024)		**Rod** (Mounting rod) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
5	0 496 155 (13 2 025)		**Plug** (Seal plug) Available as part of complete special tool 13 2 020 = 83 30 0 496 150 only.	

cardiagn.com

Overview Technical Data

Distance from window pane edge to wiper blade Used in step 73

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

Links

Repair instructions (PRE)	Used in step
Notes on 48-V battery	475

General repair instructions	Used in step

11 00 ... Overview of consumables (Electronic Parts Catalogue)	56

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	574
61 20 900 Disconnecting and connecting battery earth lead	574
61 20 900 Disconnecting and connecting battery earth lead	574
61 20 900 Disconnecting and connecting battery earth lead	574
61 20 900 Disconnecting and connecting battery earth lead	574
61 20 900 Disconnecting and connecting battery earth lead	574
61 20 900 Disconnecting and connecting battery earth lead	574
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	574
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	574
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	574
61 20 900 Disconnecting and connecting battery earth lead	574
61 20 900 Disconnecting and connecting battery earth lead	574
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	574
61 20 900 Disconnecting and connecting battery earth lead	574
61 20 900 Disconnecting and connecting battery earth lead	574
61 20 900 Disconnecting and connecting battery earth lead	574
61 20 900 Disconnecting and connecting battery earth lead	574
61 20 900 Disconnecting and connecting battery earth lead	574
61 20 900 Disconnecting and connecting battery earth lead	574
61 20 900 Disconnecting and connecting battery earth lead	574
61 20 900 Disconnecting and connecting battery earth lead	574
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	574
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	574
61 20 900 Disconnecting and connecting battery earth lead	574
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	574
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	574
61 20 900 Disconnecting and connecting battery earth lead

cardiagn.com

11 31 028 Removing and installing / replacing exhaust camshaft

PRELIMINARY WORK

1 – Bring front compartment lid in the service position

Prerequisite

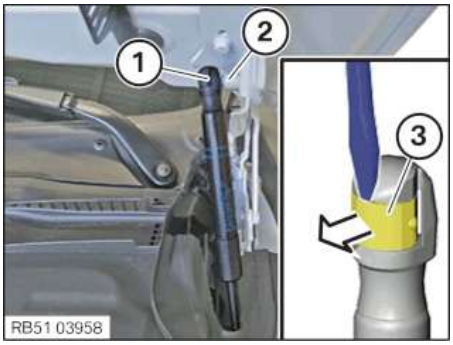
Engine compartment lid is open.

CAUTION

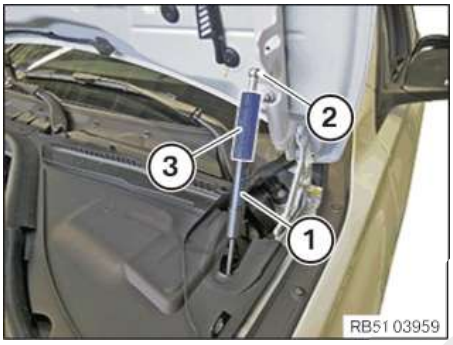
Shutting bonnet or tailgate.

Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.



- Lift clamp (3) slightly using a screwdriver, in the direction of the arrow.
- Lift off ball socket (1) from ball pin (2).
- Repeat the operation on the other side of vehicle.



TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

- Remove the bonnet support and open the bonnet further.
- Pull special tool or or (3) over gas pressure spring (1).
- Place special tool on the ball pin (2) and engage using force.
- Repeat the operation on the other side of vehicle.

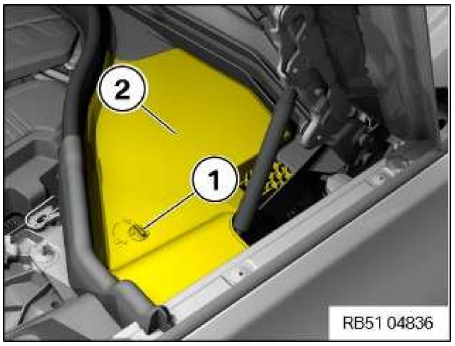
2 – Disconnecting all battery earth leads



- See additional information.

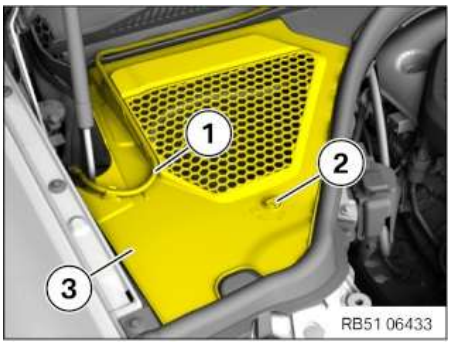
3 – Remove the cover of the engine compartment at the rear left

cardiagn.com



- Loosen the lock (1).
- Remove the cover (2) of the rear left engine compartment.

4 – Remove the cover of the rear right engine compartment



- Release washer fluid hose (1) from the guides.
- Loosen the lock (2).
- Remove the cover (3) of the rear right engine compartment.

5 – Removing the wiper arm on the left and right

NOTICE

Description is for left component only. Procedure on the right side is identical.

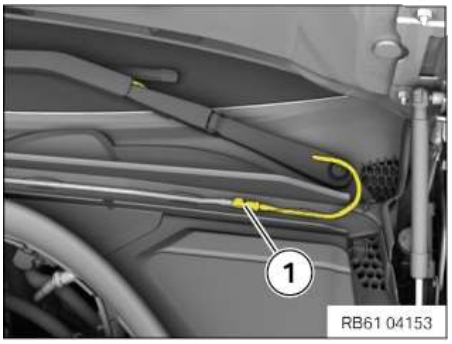
▸ **Remove the wiper arm**

RISK OF DAMAGE

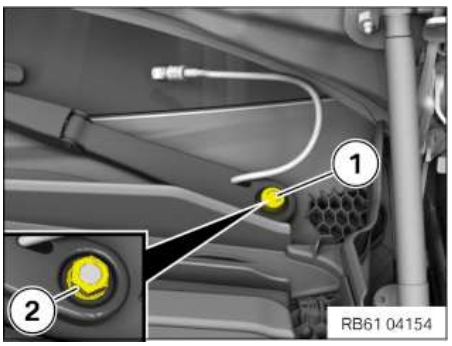
Damage to wiper console.

While removing the wiper arms without using special tool, the wiper console can break.

- Removing the wiper arms must be carried out only using the prescribed special tool.
- Do **not** lever off the wiper arm because otherwise the wiper console may break at the predetermined breaking point for active pedestrian protection.

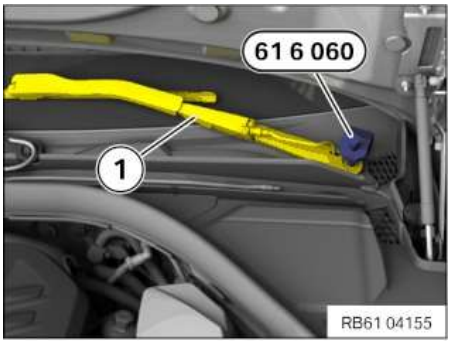


- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.



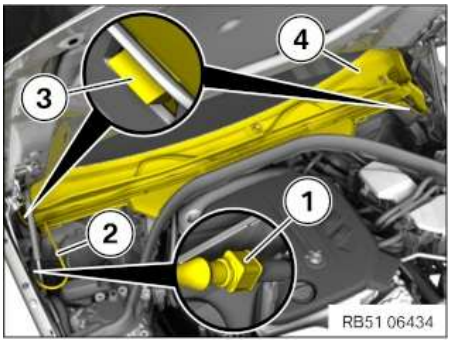
- Remove the protective cap (1).
- Loosen nut (2).

cardiagn.com

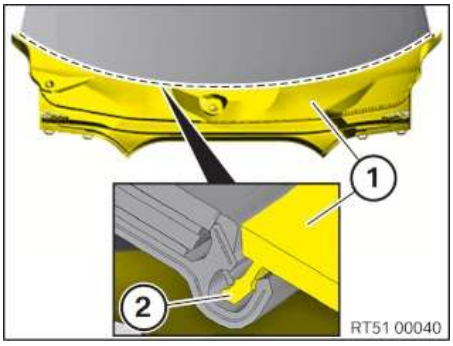


- Pull off the wiper arm (1) using special tool .

6 – Remove cowl panel cover



- Release snap fastener (1) of the washer fluid hose (2) and put the washer fluid hose (2) to one side.
- Unclip clips (3) on the cowl panel cover (4).



- Pull the cowl panel cover (1) upward out of the latch mechanism (2) beginning on the side.

7 – Remove the seal for the rear bonnet

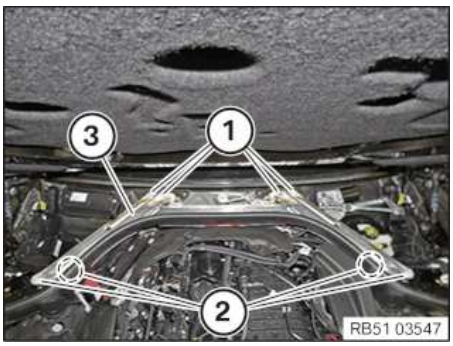


- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

8 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

Driving without the strut brace/front-end strut or tension strut is not permitted.

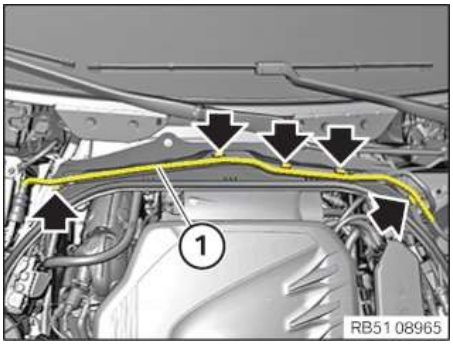


NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

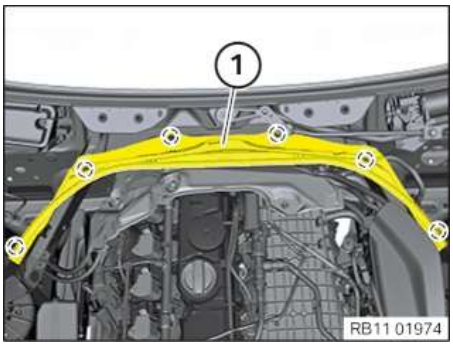
- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.

bardiagn.com



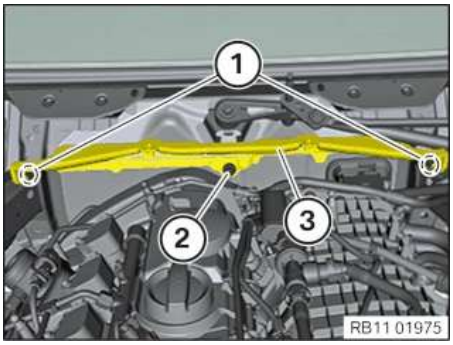
- **Version with mild hybrid technology:**

  Unclip the wire (1) at the holders (arrows).



- Unscrew the bolts in the marked areas.
- Remove the centre bulkhead upper part (1).

9 – Removing the centre bulkhead lower section



- Loosen screws (1).
- Loosen nut (2).
- Remove the centre bulkhead lower part (3).

10 – Removing the acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

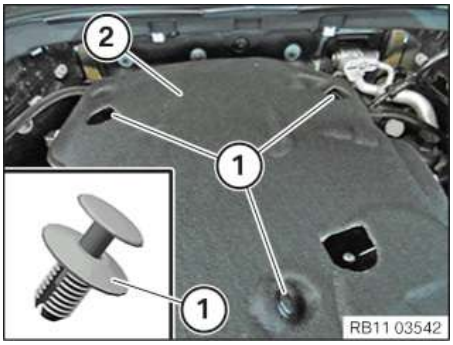
- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

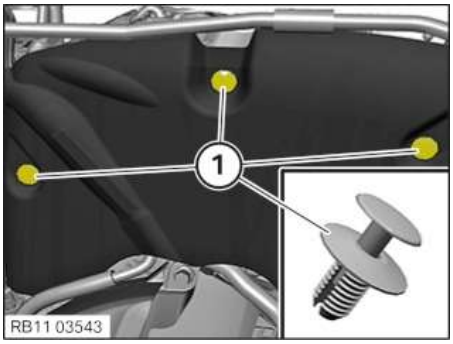
11 – Remove the acoustic cover for the injectors

cardiagn.com

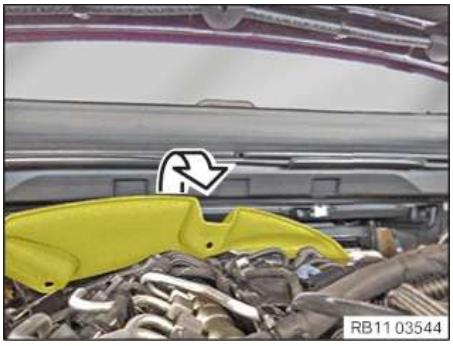


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

12 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).



- Guide out and remove the acoustic cover in the direction of the arrow.

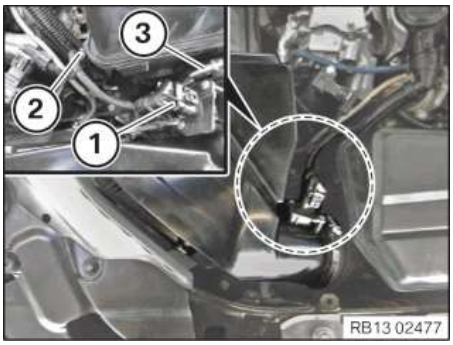
13 – Removing the clean air pipe with the resonator

WARNING

Hot surfaces.

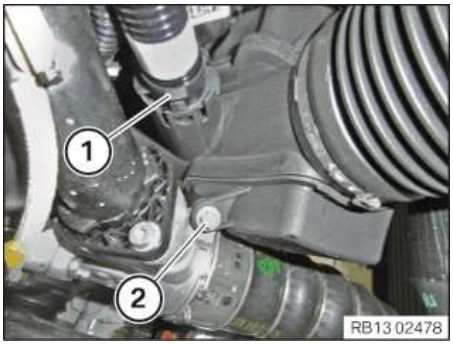
Risk of burning!

- Perform all work only on components that have cooled down.

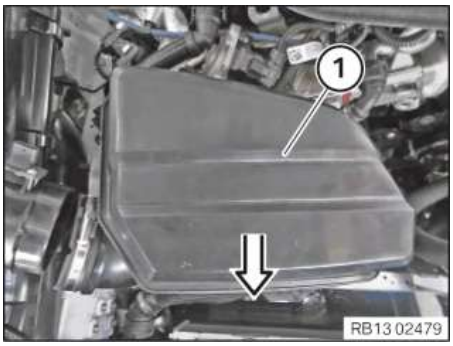


- Unlock plug connection (1) and disconnect.
- Loosen clamp (2).
- Unfasten clamp (3).
- Separate the clean air pipe with resonator from the intake filter housing.

cardiagn.com



- Unlock engine ventilation line (1), disconnect it and place it aside.
- Loosen screw (2).



- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Unlock and loosen clamp (1).



- Feed out and remove clean air pipe with resonator (1) in the direction of the arrow.

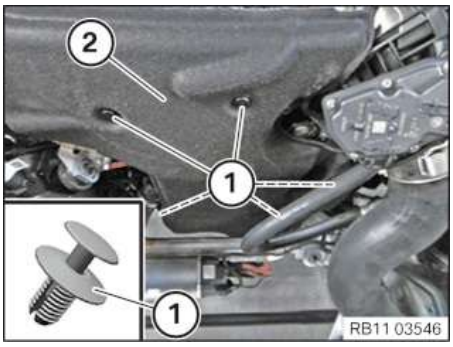
14 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.



- Release and remove expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

cardiagn.com

15 – Partially releasing the wiring harness section on the intake plenum

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

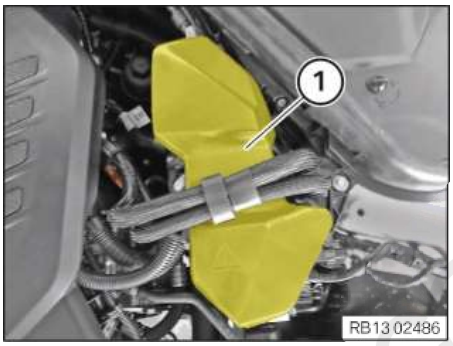
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

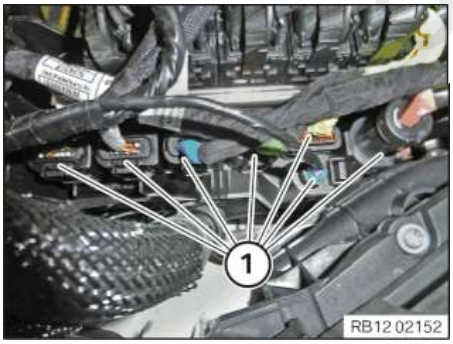
- Do not pull on the wires when disconnecting connectors and plug connections.

TECHNICAL INFORMATION

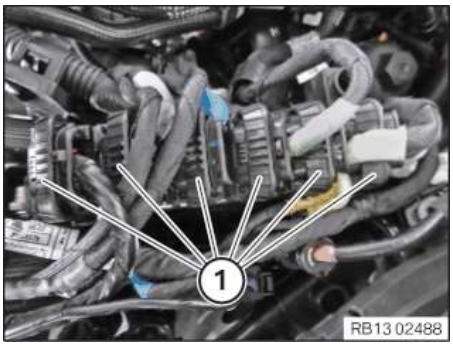
Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.



- Pull off cover (1) upwards, feed out and remove.

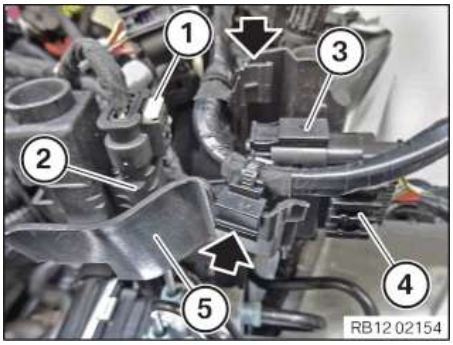


- Unlock and disconnect plug connections (1).

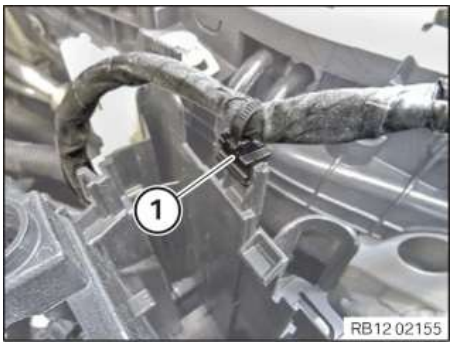


- Unlock and disconnect plug connections (1).

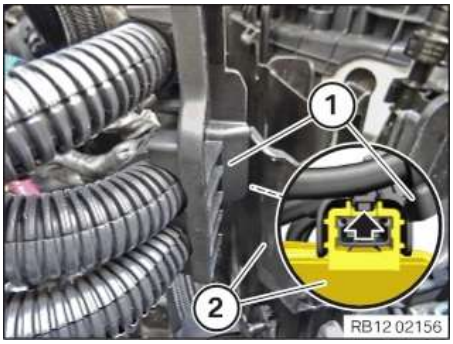
ardiagn.com



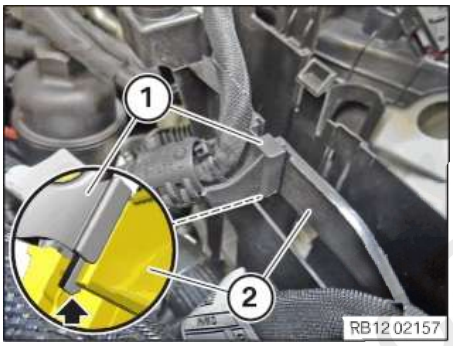
- Unlock plug connection (1) and disconnect.
- Unlock the plug (2) and disconnect from the control unit holder (5).
- Unlock plug connection (3) and disconnect.
- Unlock the plug (4) and disconnect from the control unit holder (5).
- Release the clamps (arrows).



- Loosen clamp (1).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).

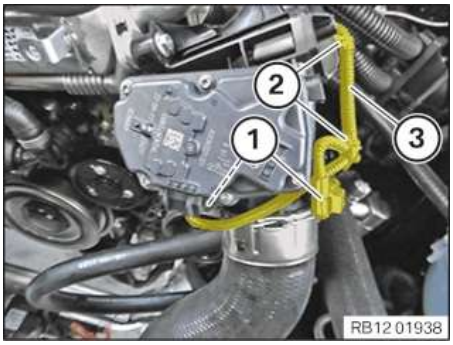


- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.

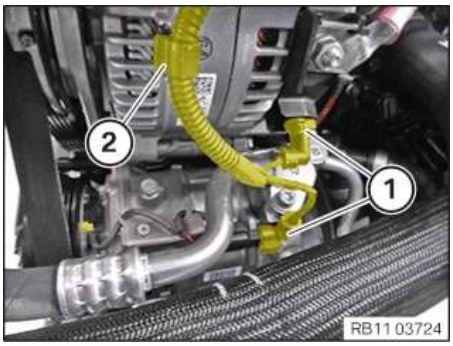


- Unlock holder (1) and feed out coolant line (2) and place it aside.

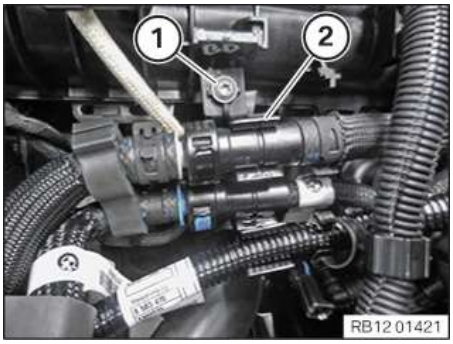
gardiagn.com



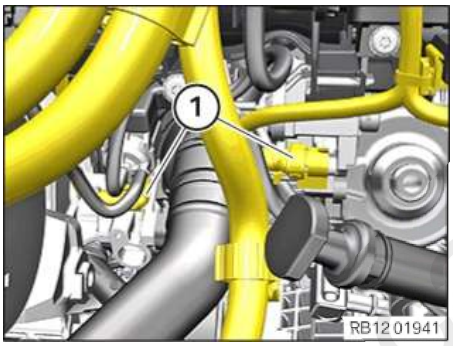
- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.



- Unlock and separate plug connections (1).
- Release the holder (2) from the alternator .



- Loosen screw (1).
- Thread out holder (2) and set aside.



- Unlock and disconnect plug connections (1).

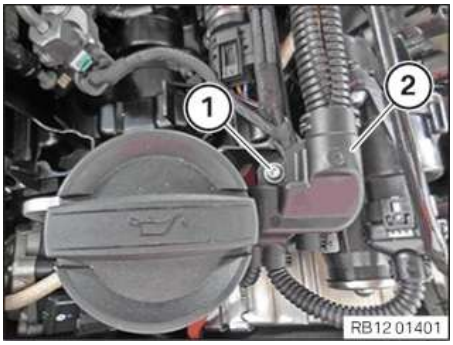


- Unlock and loosen connector (1).

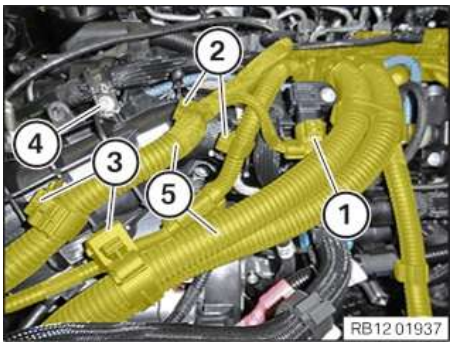


- Unlock plug connection (1) and disconnect.

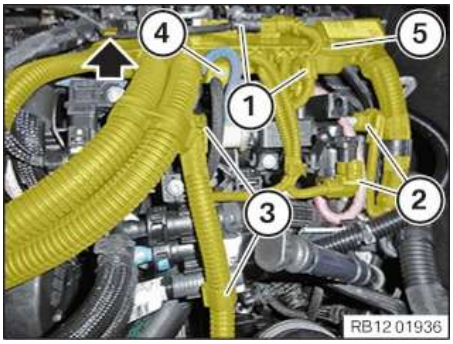
cardiagn.com



- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.



- Unlock plug connection (1) and disconnect.
- Loosen clamps (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.



- Unlock and disconnect plug connections (1).
- Release line from clamp (Arrow).
- Unlock and disconnect plug connections (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.

16 – Removing the intake plenum

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

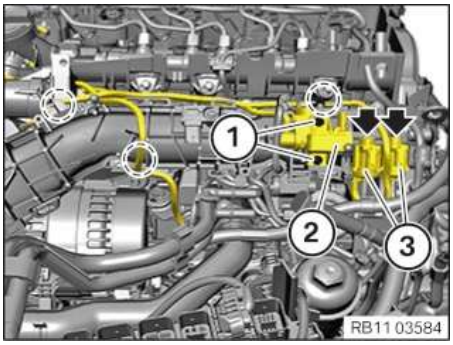


- Unlock clamp (1) and engage in this position.

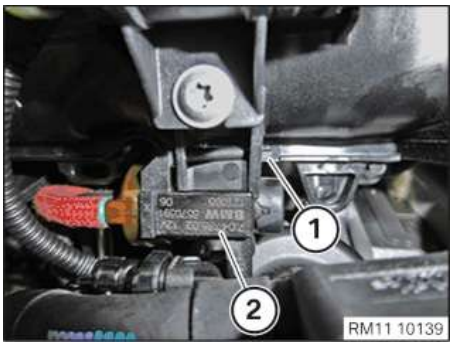


- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.

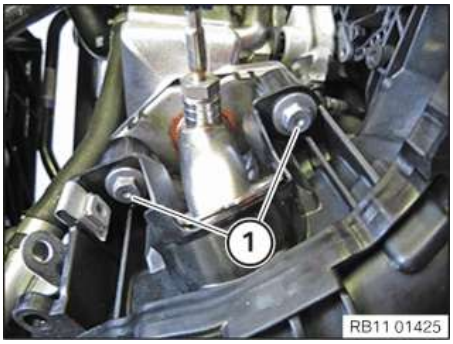
cardiagn.com



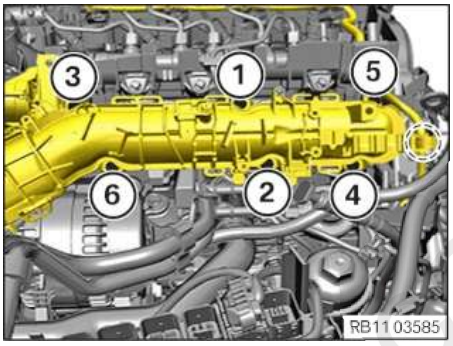
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



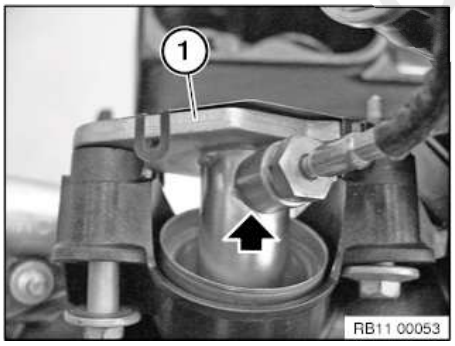
- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.



- Loosen screws (1).



- Detach the leakage oil lines in the marked area from the intake plenum.
- Loosen screws in the order (6) to (1).
- Guide the intake plenum out forwards and remove it.



- Remove the exhaust-gas recirculation pipe (1) (arrow).

17 – Detaching the leakage oil line from the injectors

cardiagn.com

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

WARNING

Hot surfaces.

Risk of burning!

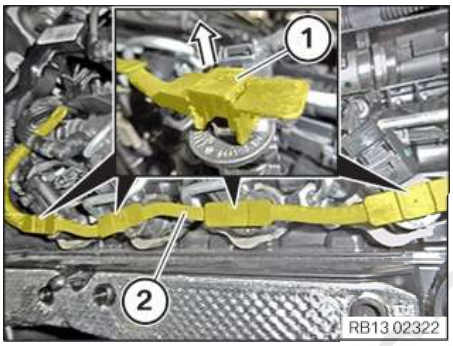
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

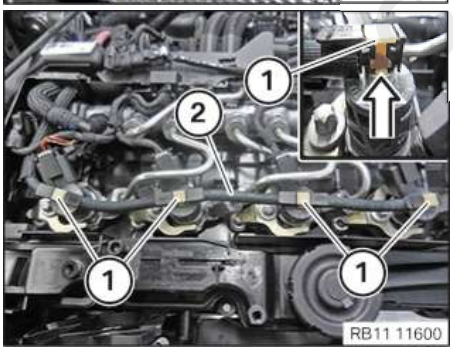


- **Version A:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.

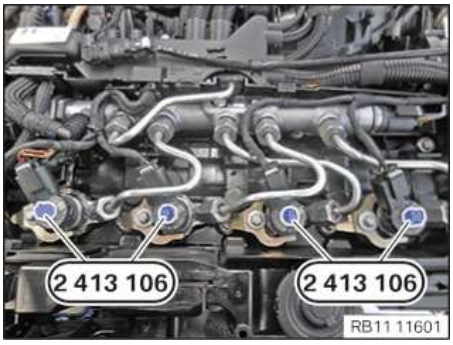


- **Version B:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.



- Seal open connections with special tools .

18 – Remove the high pressure lines between the injector and the rail

cardiagn.com

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

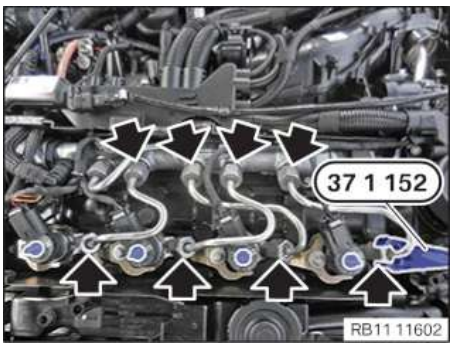
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

If several high pressure lines are removed, ensure that each high pressure line is installed in its original location. Label high pressure lines.

TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.



- Release the high pressure lines (arrows) with the special tool .
  Reset the special tool early on to prevent bending of the high pressure line.
- Catch and dispose of escaping fuel.
- Feed out and remove the high pressure lines (arrows).
- Seal off all the open cable connections with the special tool .

cardiagn.com

19 – Remove the high pressure line between the high pressure pump and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Hot fluids.

Risk of scalding!

- Conduct all work in the vehicle wearing appropriate personal protective equipment only.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

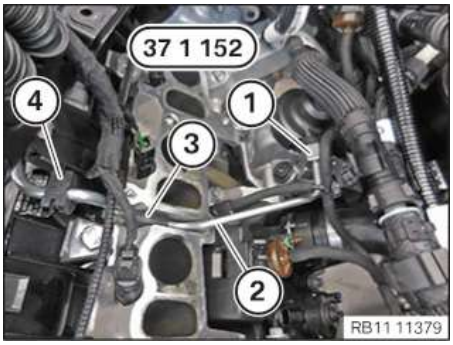
TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.

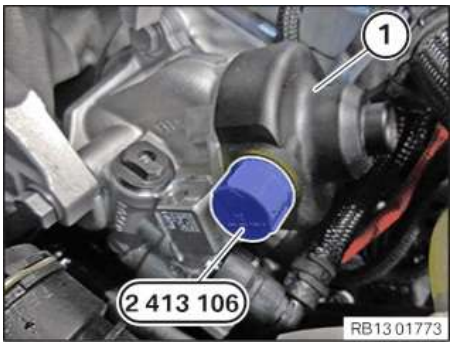


- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.

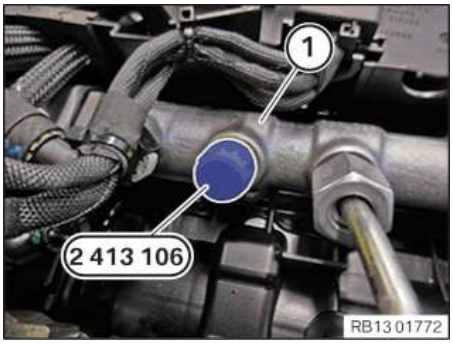
cardiagn.com



- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.
- Guide out and remove the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).



- Seal off the opening at the high pressure pump (1) with the special tool .



- Seal off the opening on the rail (1) with the special tool .

20 – Remove high-pressure rail

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

RISK OF DAMAGE

Contaminant or foreign body.

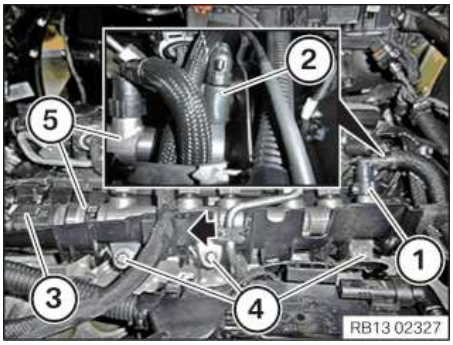
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

cardiagn.com



- Unlock and disconnect the fuel return line (1).
- Guide the fuel return line (1) out and set it aside.
- Unlock and disconnect the plug connection (2) on the rail pressure regulating valve.
- Unlock and disconnect the plug connection (3) on the rail pressure sensor.
- Unlock cable clip (Arrow), feed out and place aside.
- Loosen screws (4).
- Thread out and remove the rail (5).

21 – Remove all injection systems

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

cardiagn.com

RISK OF DAMAGE

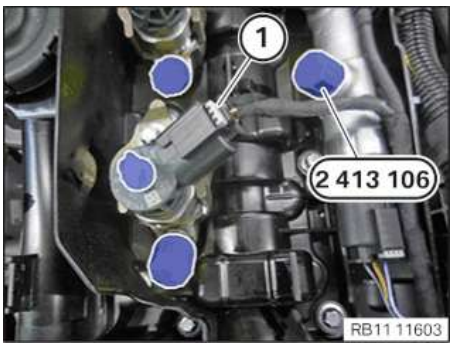
Electrostatic discharge.

Damage to or destruction of electrical components.

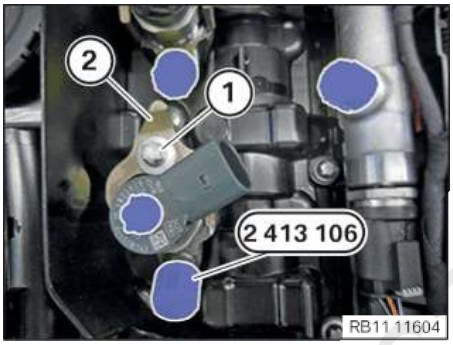
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

TECHNICAL INFORMATION

If several injectors are removed, ensure that each injector is installed at its original location (cylinder). Mark injectors.



- Unlock plug connection (1) and disconnect.



- Loosen screw (1).
- Guide out and remove clamping claw (2).
- Feed out and remove the injector with slight rotational movements.

▸ **Loosen stuck injectors**

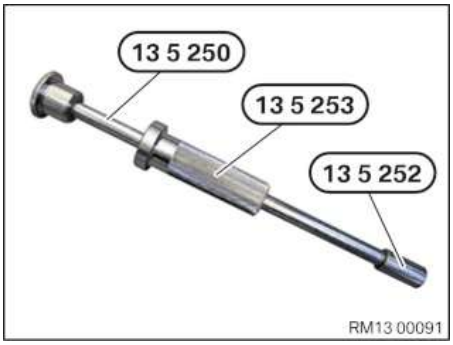
RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

cardiagn.com



- Unscrew special tool 0 493 339 (13 5 252) from special tool 0 493 321 (13 5 250) and remove special tool 0 493 340 (13 5 253).
- Screw special tool 0 493 339 (13 5 252) back onto special tool 0 493 321 (13 5 250).

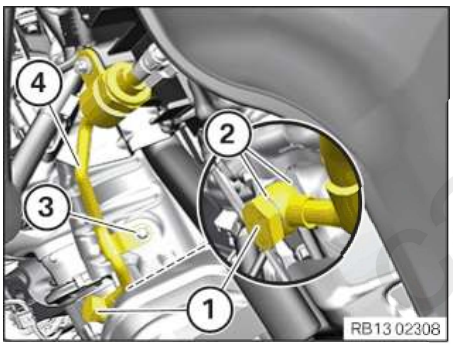


- Screw special tool 0 493 321 (13 5 250) with special tool 0 493 339 (13 5 252) onto pressure line connection (1) of injector.
- Release injector (1) with special tools 0 493 321 (13 5 250) and 0 493 339 (13 5 252) by means of **short** back and forth movements and remove.

22 – Remove the exhaust gas pressure pipe

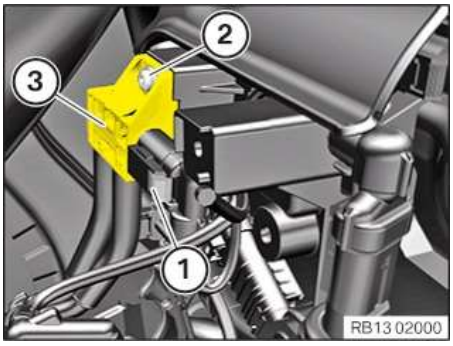


- Unlock plug connection (1) and disconnect.
- Loosen screw (2).



- Unscrew the banjo bolt (1).
- Feed out and remove the sealing rings (2).
- Loosen screw (3).
- Feed out and remove the exhaust gas pressure pipe (4).

23 – Releasing the differential pressure sensor for the diesel particulate filter



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).
- Remove the differential pressure sensor (3) and put it to one side.

24 – Removing the sensor bracket on the cylinder head cover

carbagn.com

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

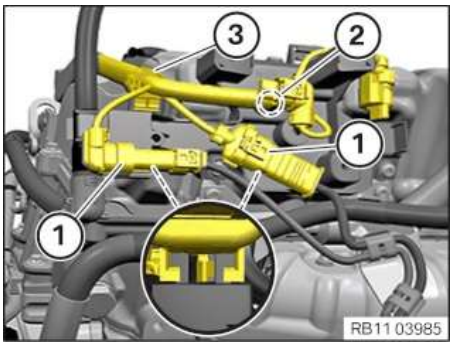
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

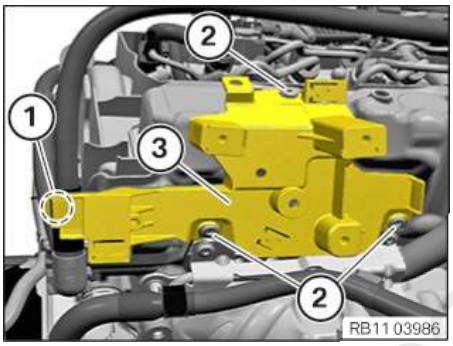
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

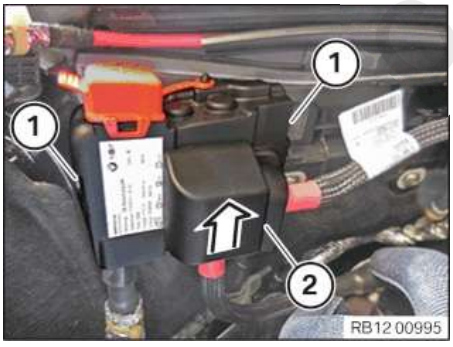
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



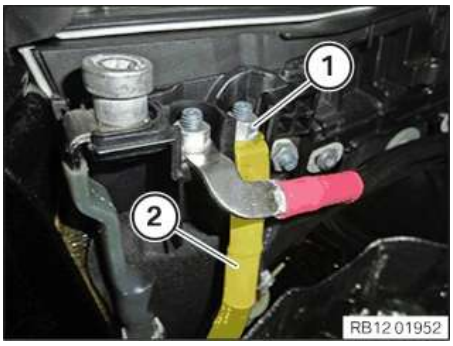
- Unlock plug connection (1) and disconnect.
- Unlock the plug connection (1) and release it from the sensor bracket.
- Release the cable clip in the area (2) from the sensor bracket.
- Release the clamps (3) and set the wiring harness section aside.



- Release the positive battery cable in the area (1) from the clamp and set it aside.
- Loosen screws (2).
- Feed out holder (3) for the sensor system and remove.

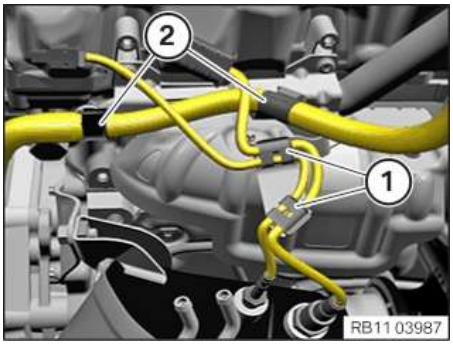


- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.

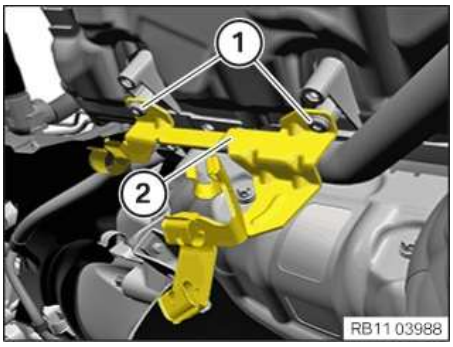


- Loosen nut (1).
- Feed out positive battery cable (2) and put to one side.

cardiagn.com

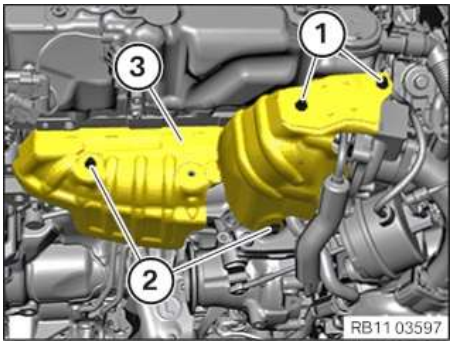


- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



- Loosen screws (1).
- Guide out and remove holder (2).

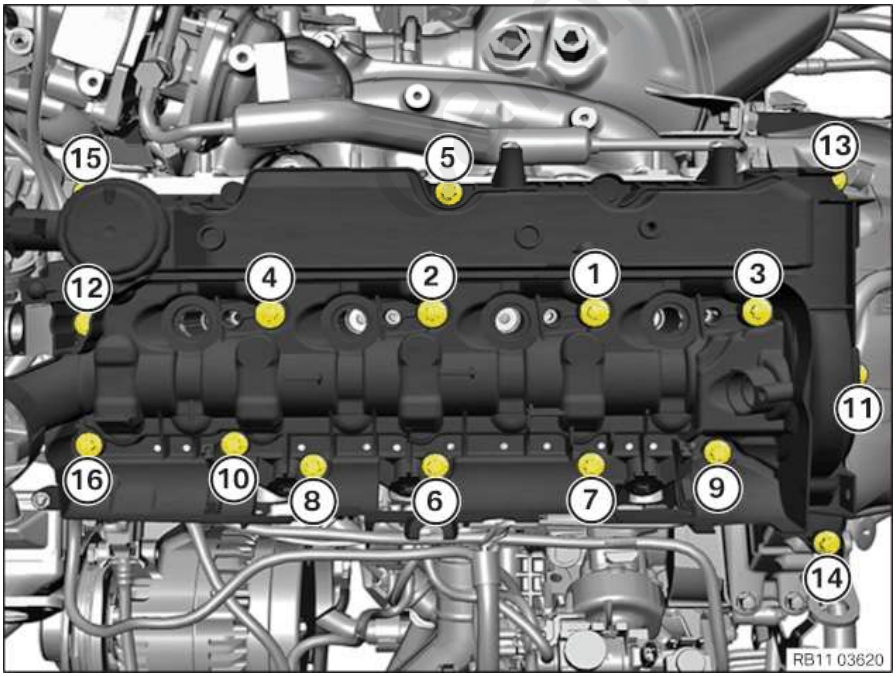
25 – Removing heat shield



- Loosen screws (1).
- Loosen screws (2).
- Feed out and remove the heat shield (3).

26 – Removing the cylinder head cover

Screw connection of the cylinder head cover



1 - 16 Bolts of the cylinder head cover

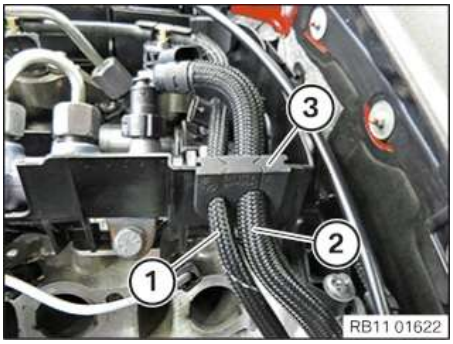
diagn.com



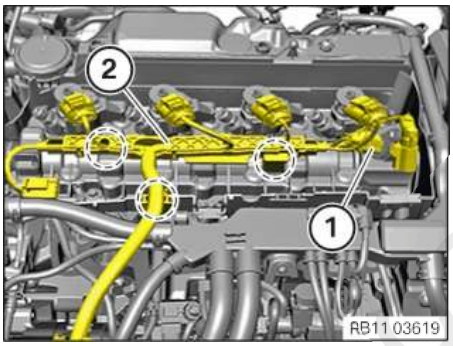
- Unlock and detach the locks.
- Feed the engine ventilation line (1) out and set it aside.



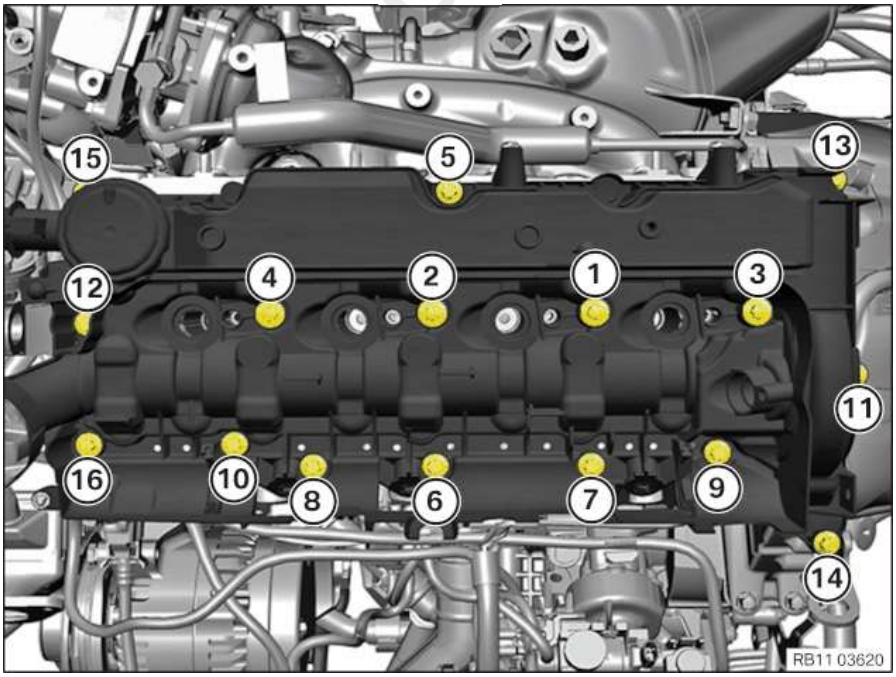
- Feed out and remove the heat shield (1).



- Remove the leakage oil line (1) including the fuel return line (2) and the grommet (3) and put to one side.

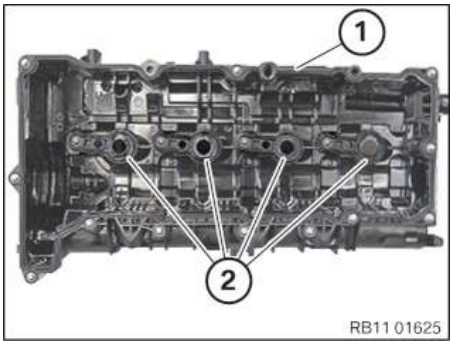


- Unlock connector (1) and pull off.
- Disconnect the wiring harness (2) in the marked areas from the cylinder head cover and set aside.



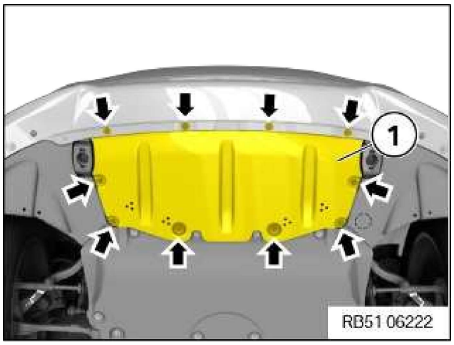
- Evenly loosen the screws in a sequence from (16) to (1).
- Feed out and remove the cylinder head cover.

cardiagn.com



- Remove the profile seals (1) and (2).

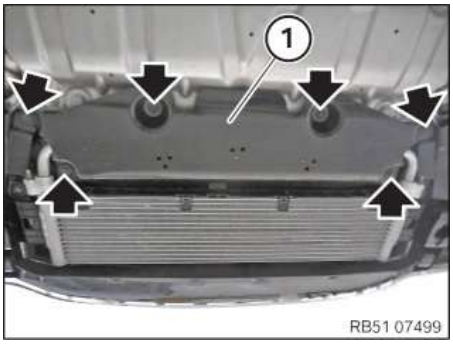
27 – Removing the front underbody protection



- **Version A:**

  Remove screws (arrows).

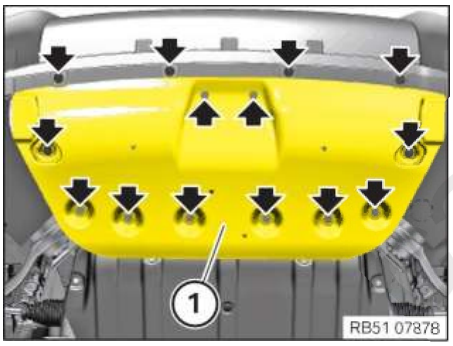
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version B:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

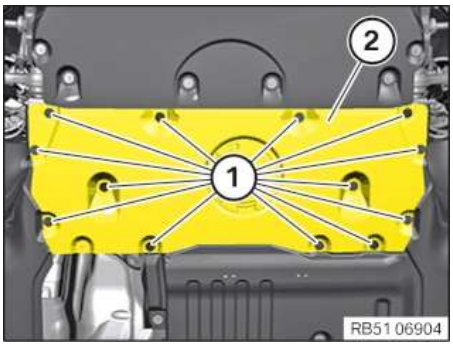


- **Version C:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

28 – Removing the centre underbody protection

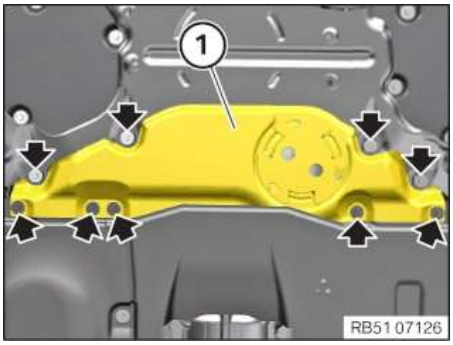


- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .

audiagn.com

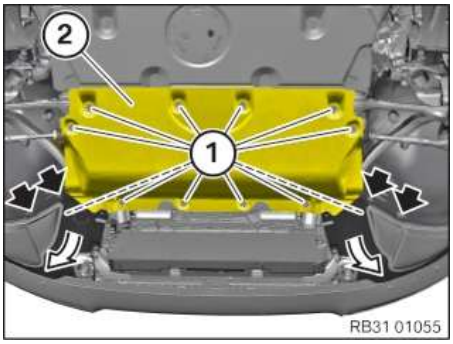


- **Version with all-wheel drive:**

  Remove screws (arrows).

  Feed out and remove the centre underbody protection (1).

29 – Remove the underbody protection of the steering gear



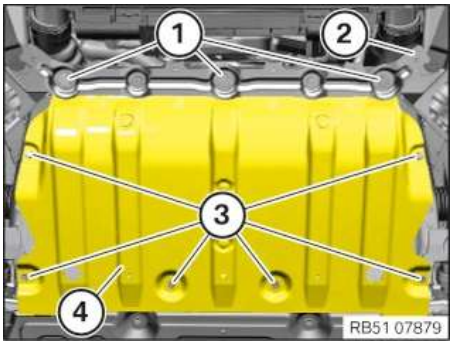
- **Version A:**

  Unscrew the screws (arrows) of the wheel arch cover on the wheel arch cover.

  Fold the bottom wheel arch cover to the side.

  Loosen screws (1).

  Remove the underbody protection (2) of the steering gear.



- **Version B:**

  Loosen screws (1).

  Remove the holder (2) for the underride protection.

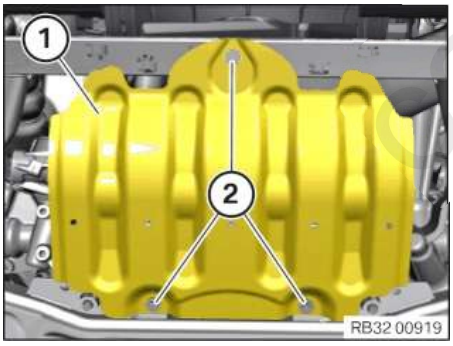
  Loosen screws (3).

  Feed out and remove the underbody protection (4) of the steering gear.

30 – If installed: Removing the steering underbody protection

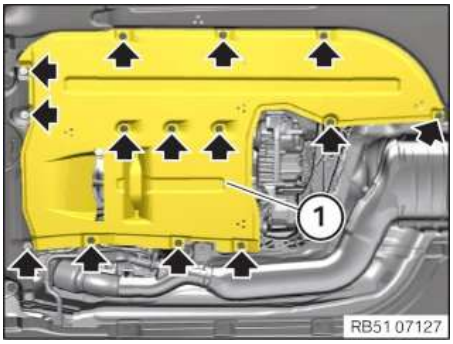
Prerequisite

Front underbody protection has been removed.



- Loosen screws (2).
- Remove underbody protection (1).

31 – Remove rear underbody protection

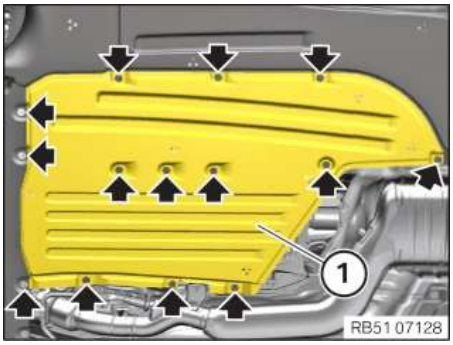


- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).

cardiagn.com



- **Version B:**

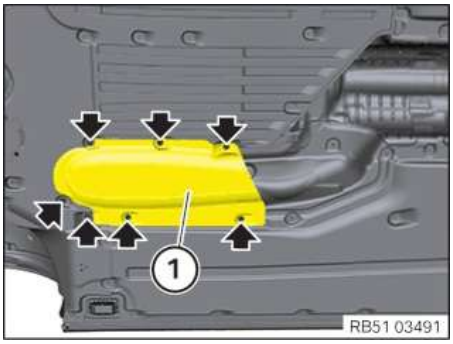
  Remove screws (arrows).

  Guide out rear underbody protection (1) and remove it.

32 – Remove the underbody panelling of the transmission on the side

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.



- Remove screws (arrows).
- Remove the underbody panelling (1).

33 – Removing starter motor

Prerequisite

Battery earth leads are disconnected.

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

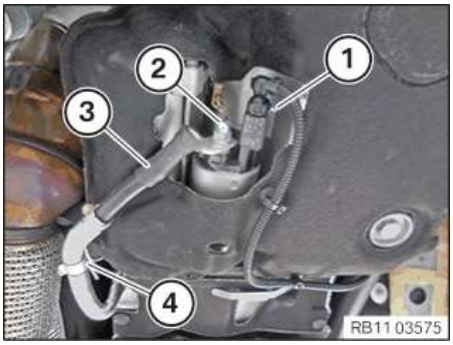
- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

TECHNICAL INFORMATION

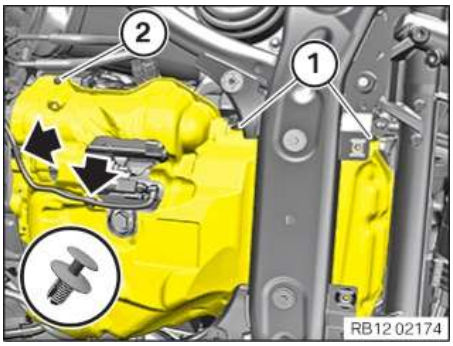
Make sure that the acoustic cover is **not** damaged while removing the starter motor.

A damaged lower acoustic cover can only be renewed when the front axle is lowered.

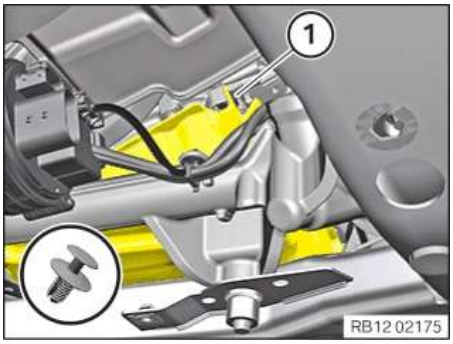
cardiagn.com



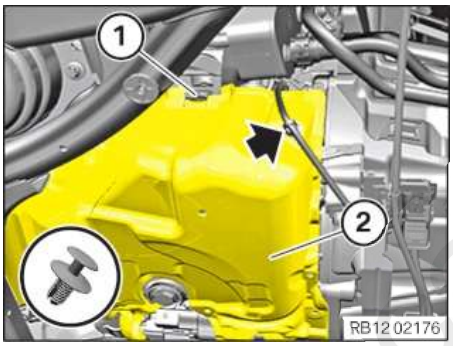
- Unlock plug connection (1) and disconnect.
- Release nut (2).
- Release positive battery cable (3) from holder (4).



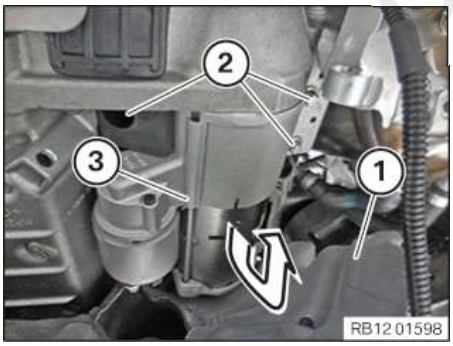
- Loosen the expanding rivet (1).
- Undo fir tree clip (2).
- Release the clamps (arrows).



- Loosen expanding rivet (1).
- Lower the acoustic cover of the oil sump.



- Loosen expanding rivet (1).
- Loosen the clamp (arrow).
- Lower acoustic cover (2).



- Make sure that the acoustic cover (1) is not damaged.
- Carefully press acoustic cover (1) to one side.
- Loosen screws (2).
- Carefully guide out the starter motor (3) in direction of arrow and remove.

34 – Checking camshaft timing

cardiagn.com



RISK OF DAMAGE

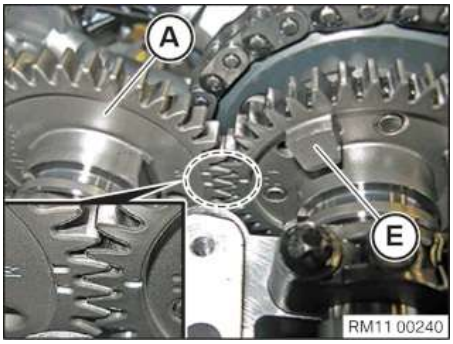
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

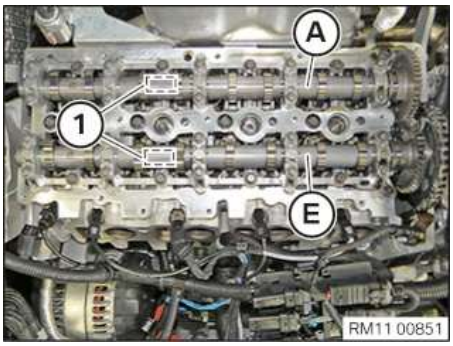
- Turn the combution engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

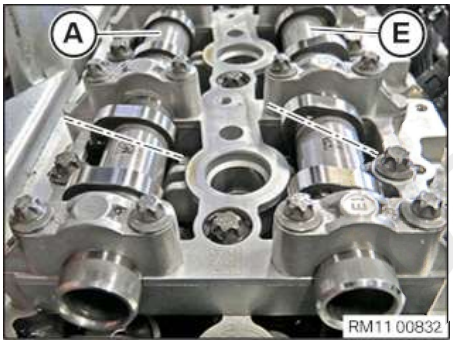
  Do **not** crank the engine in reverse.



- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.



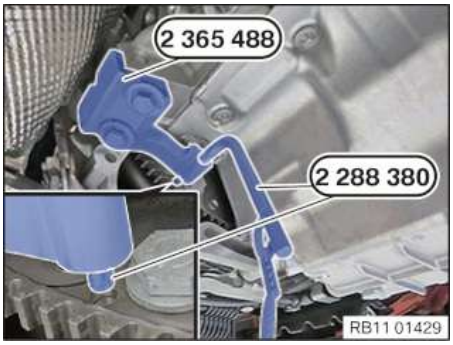
- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.

carmanuals.com



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

35 – Removing the special tool for fixing the exhaust camshaft



- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

MAIN WORK

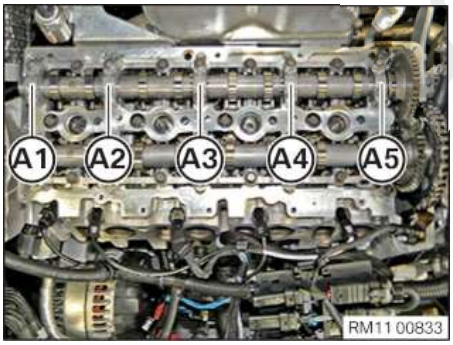
36 – Remove exhaust camshaft.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



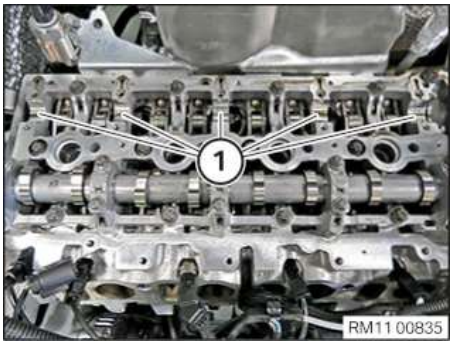
TECHNICAL INFORMATION

The camshaft is tensioned by the valve springs. Tighten or loosen each screw on the camshaft bearing caps one at a time in the specified sequence and by half a turn only. Repeat procedure.

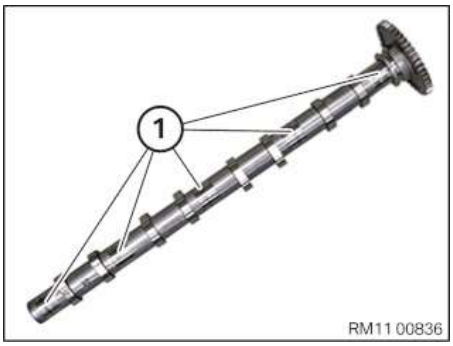
- Release all the screws of the exhaust camshaft bearing cap (A1) to (A5) from the outside to the inside in half turns.
- Remove exhaust camshaft in upward direction.
- Place all components on special tool 0 495 105 (11 4 480) in a tidy and orderly fashion.

37 – Install exhaust camshaft

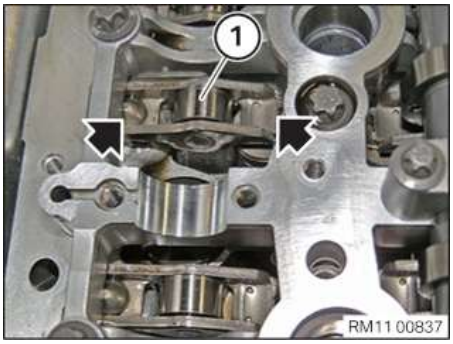
cardiagn.com



- Oil all bearing positions (1).



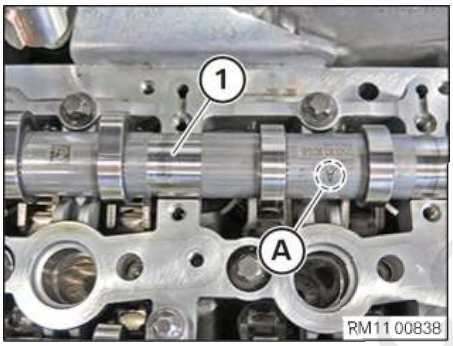
- Oil all bearing positions (1) of the exhaust camshaft.



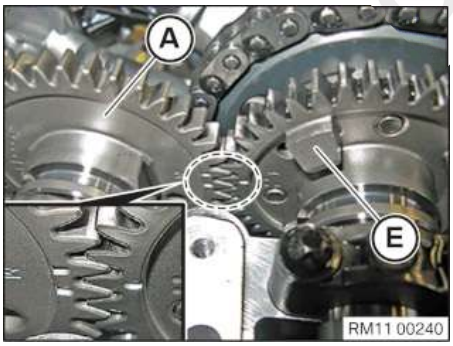
TECHNICAL INFORMATION

The rocker arms may slip slightly when the camshaft is positioned. Make sure rocker arms are correctly positioned on the hydraulic valve clearance compensating elements and on valves.

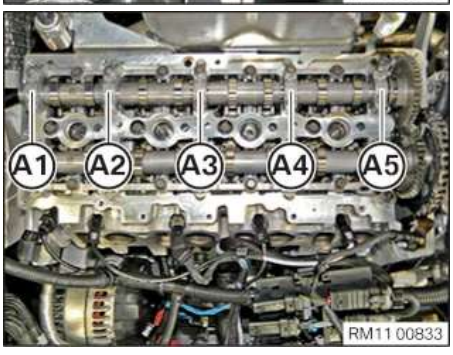
- Check the installation position of the roller cam followers (1).



- Make sure that the identification mark (A) of the exhaust camshaft (1) points upwards.
- Insert the exhaust camshaft (1).



- Insert the exhaust camshaft (A) such that the marks on the camshafts (A) and (E) correspond in the marked area.
- Position the camshafts (A) and (E) correspondingly.



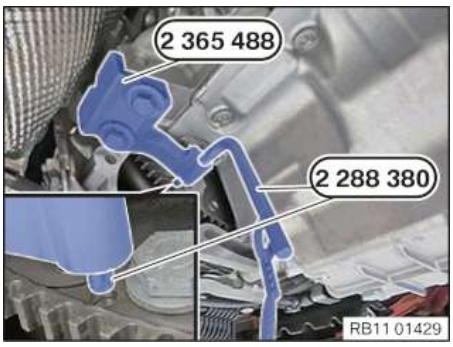
- Tighten all exhaust camshaft bearing caps (A1) to (A5) from the inside to the outside by 1/2 a turn at a time.

Intake and exhaust camshaft in camshaft support

M6x31		Tightening torque	10 Nm

cardiagn.com

38 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

39 – Checking camshaft timing



RISK OF DAMAGE

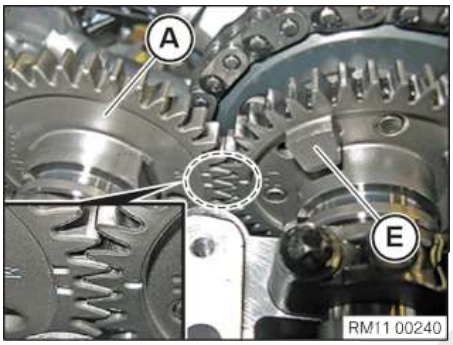
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

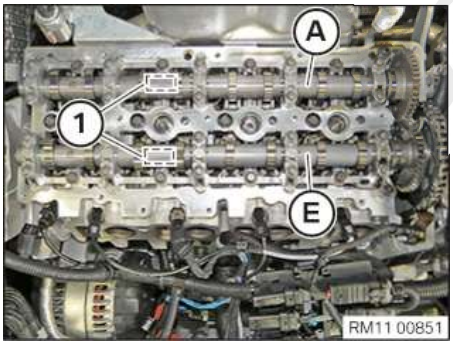
- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

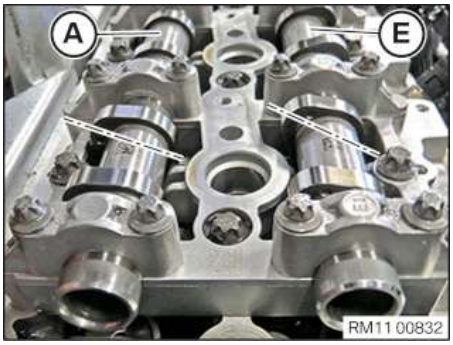
  Do **not** crank the engine in reverse.



- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.



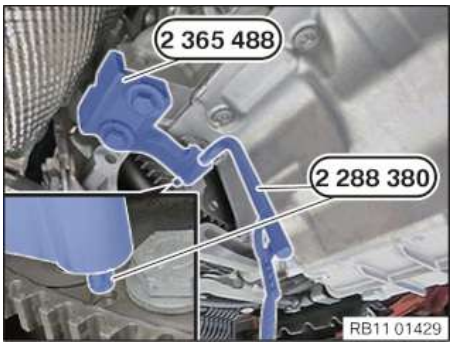
- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.

bardiagn.com



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

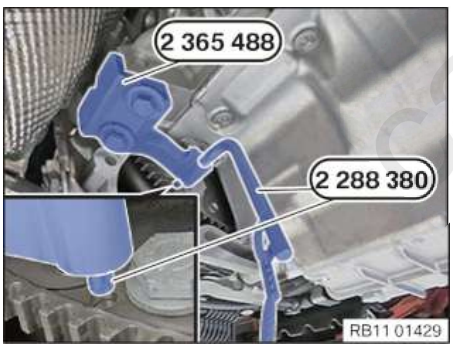
- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

40 – Removing the special tool for fixing the exhaust camshaft



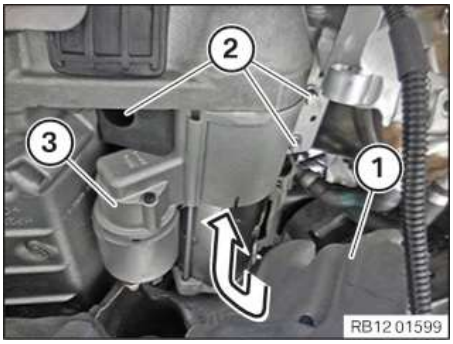
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

41 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

42 – Installing starter motor

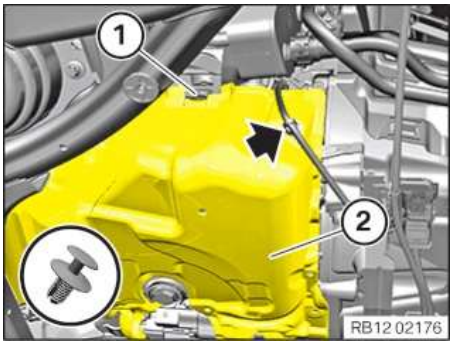


- Make sure that the acoustic cover (1) is not damaged.
- Carefully press the acoustic cover (1) to one side.
- Feed in and install the starter motor (3) in the direction of the arrow.
- Tighten the screws (2).

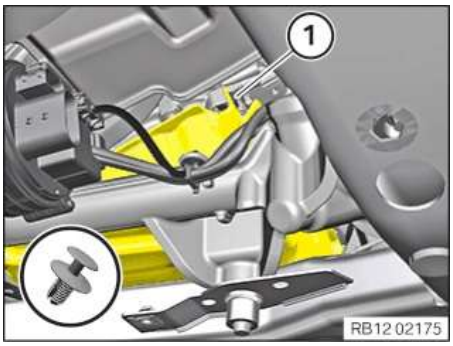
Starter motor to engine

M8X60		Tightening torque	19 Nm

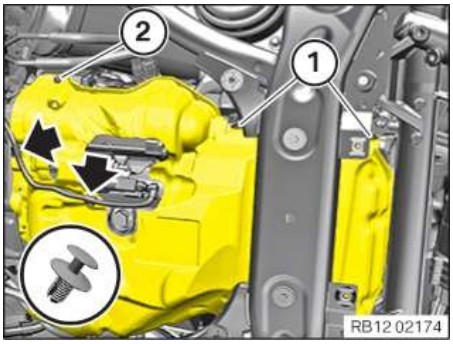
cardiagn.com



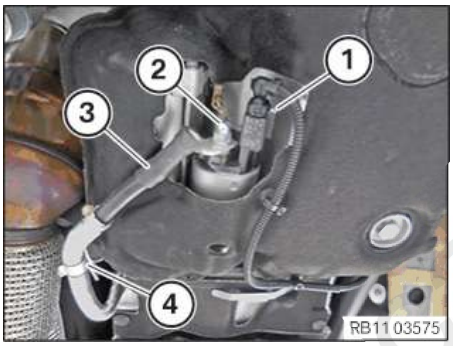
- Position the acoustic cover (2).
- Fasten expanding rivet (1).
- Secure clamp (arrow).



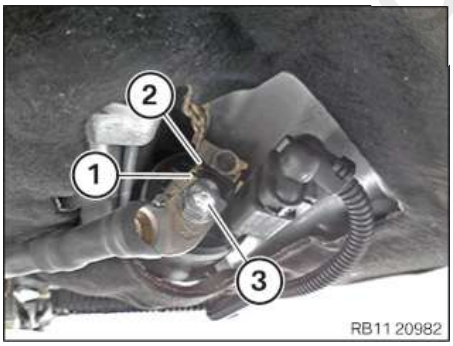
- Fasten expanding rivet (1).



- Secure fir tree clip (2).
- Secure expanding rivet (1).
- Secure the clamps (arrows).



- Fasten positive battery cable(3) in holder (4) and position it on the starter motor.
- Tighten the nut (2) hand-tight.
- Connect the connector (1) and audibly lock it.



CAUTION

Improper routing of the positive battery cable.

Risk of short circuits!

- Route the positive battery cable without abrasions and do not trap.

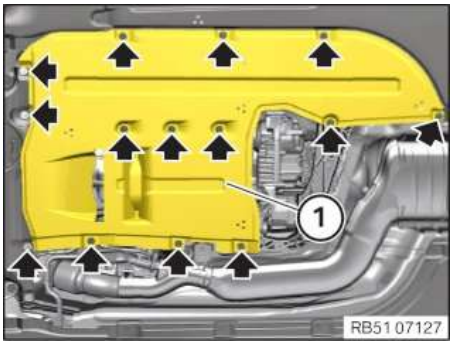
- Attach the positive battery cable (1) **correctly** to anti-twist lock (2).
- Tighten nut (3).

Battery positive lead to starter

M8		Tightening torque	13,5 Nm

43 – Installing underbody protection at rear

cardiagn.com



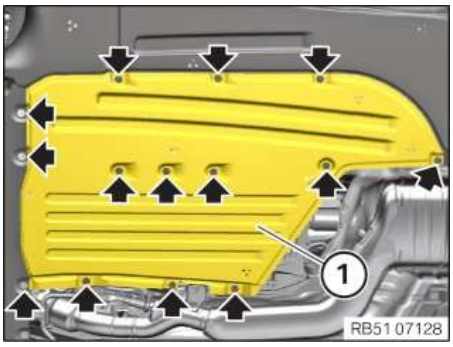
- **Version A:**

  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version B:**

  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

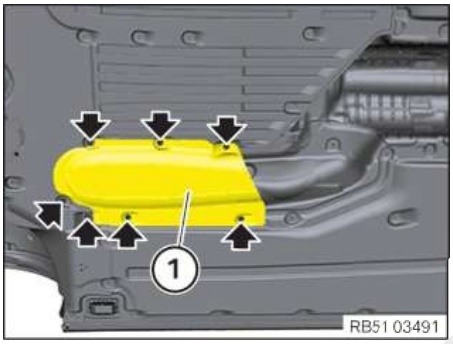
Underbody protection

Hexagon screw		Tightening torque	3 Nm

44 – Install the underbody panelling of the transmission on the side

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

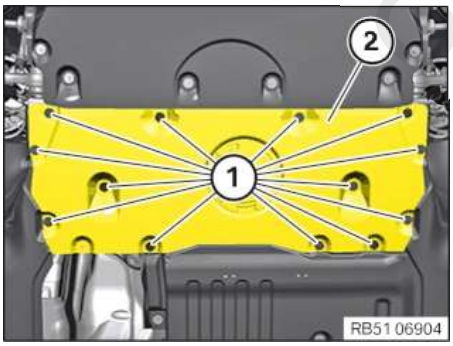


- Insert the underbody panelling (1).
- Tighten screws (arrows).

Underbody panelling

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

45 – Installing the centre underbody protection



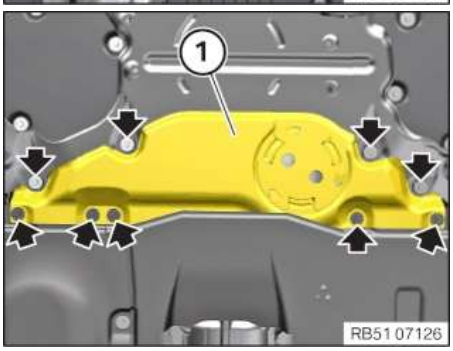
- **Variant with rear wheel drive:**

  Position central underbody protection (2).

  Tighten the screws (1).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version with all-wheel drive:**

  Guide in centre underbody protection (1) and install.

  Tighten screws (arrows).

Underbody protection

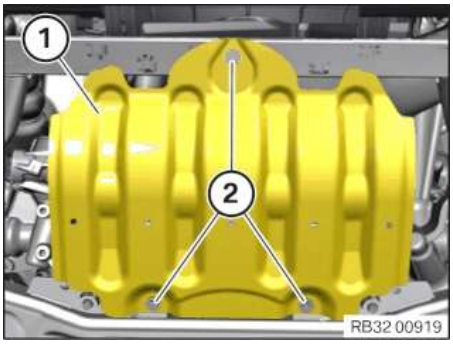
Hexagon screw		Tightening torque	3 Nm

46 – If installed: Install underbody protection of the steering

cardiagn.com

Prerequisite

Front underbody protection has been removed.



- Position underbody protection (1).
- Tighten the screws (2).

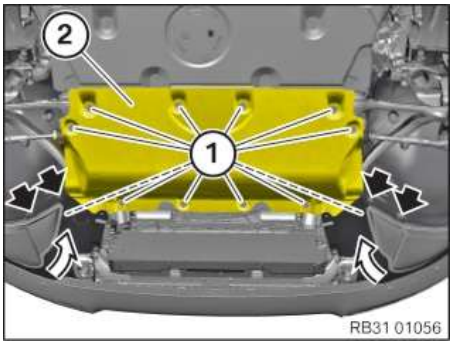
Underbody protection, steering, to front axle support

Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

47 – Install the underbody protection of the steering gear



- **Version A:**

  Position the underbody protection (2) of the steering gear.

  Tighten the screws (1).

Underbody protection of the steering gear

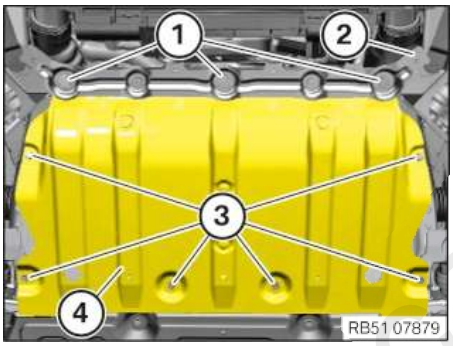
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the bottom wheel arch cover.

  Tighten the screws (arrows) of the lower wheel arch cover on the wheel arch cover.

Wheel arch trim panel, front

Thermoplastic hexagon screw		Tightening torque	2,6 Nm



- **Version B:**

  Feed in the underbody protection (4) of steering gear and install it.

  Tighten the screws (3).

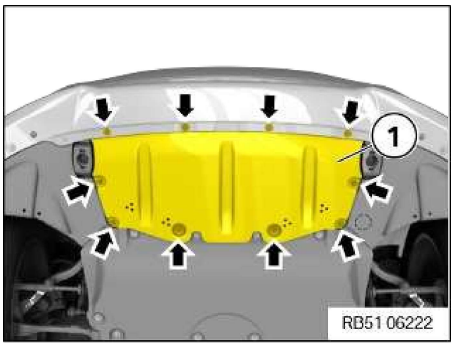
Underbody protection of the steering gear

Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the holder (2) for the underride protection.

  Tighten the screws (1).

48 – Installing the front underbody protection



- **Version A:**

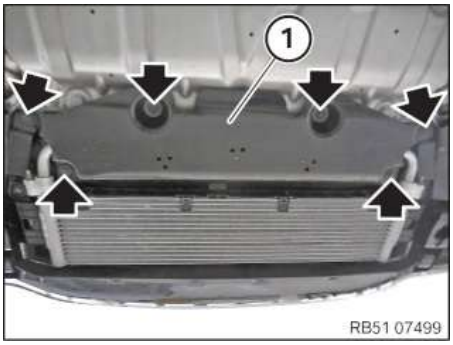
  Feed in the front underbody protection (1) towards the front under the bumper panel and position.

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

carDiagn.com



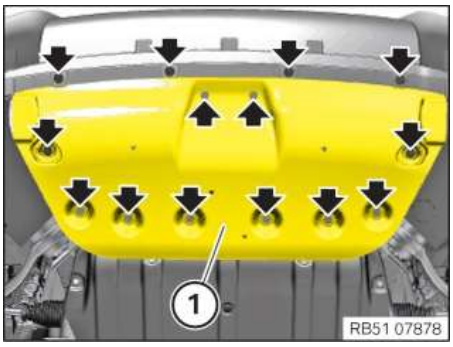
- **Version B:**

  Feed in and position the front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



- **Version C:**

  Feed in and install front underbody protection (1).

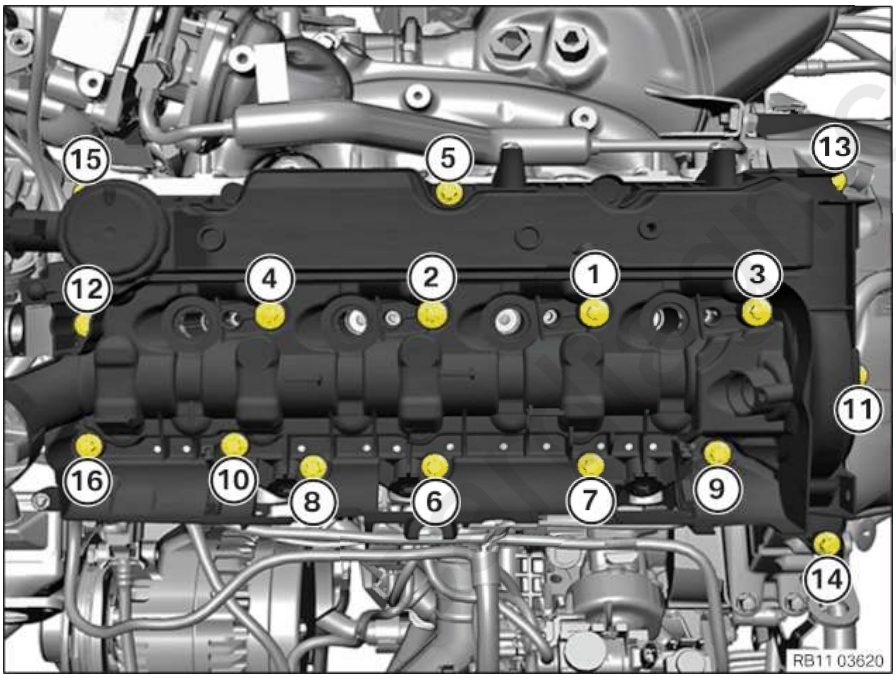
  Tighten screws (arrows).

Underbody protection front

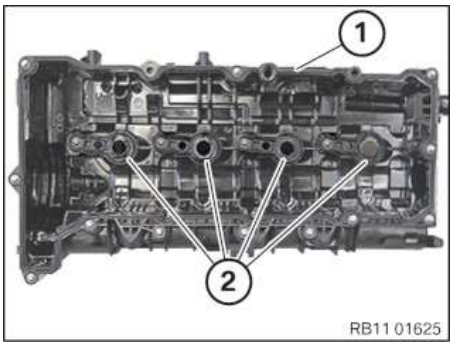
Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

49 – Installing cylinder head cover

Screw connection of the cylinder head cover

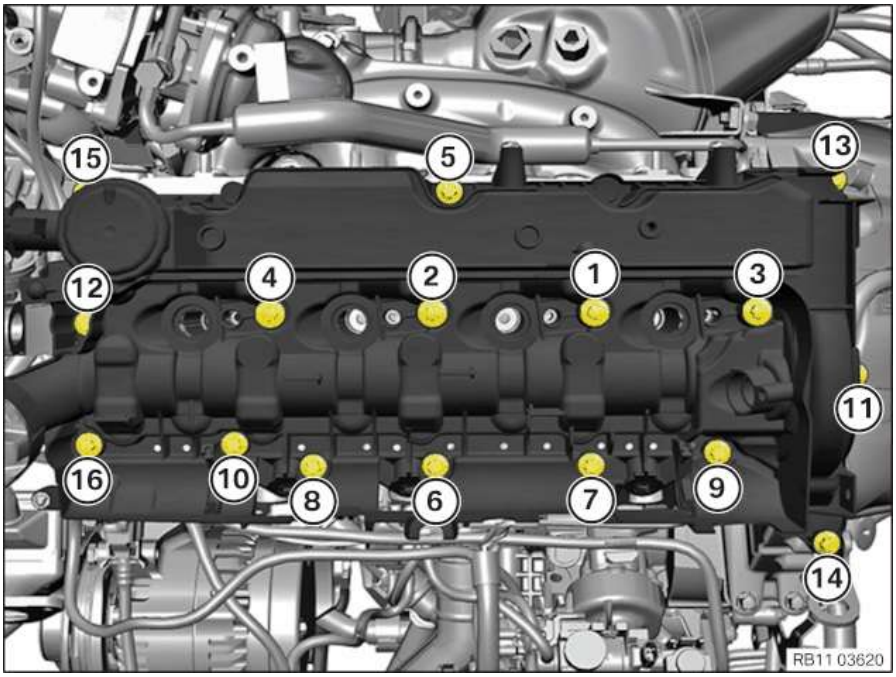


1 - 16 Bolts of the cylinder head cover



- Renew the profile seals (1) and (2) of the cylinder head cover.

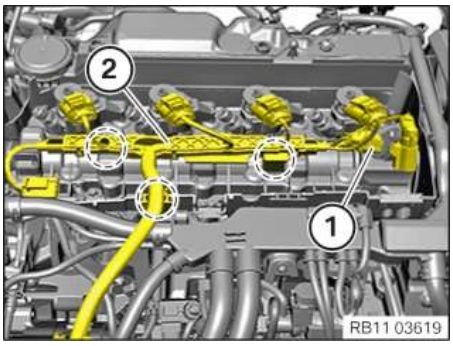
  Parts: Profile seals



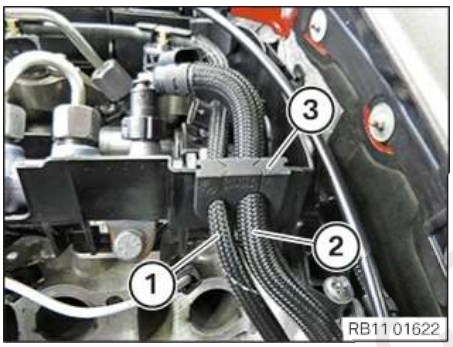
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

Cylinder head cover to cylinder head

M6		Tightening torque.	8,5 Nm



- Position the vehicle wiring harness (2) on the cylinder head cover and fasten in the marked areas.
- Plug in the connector (1) and lock audibly.



- Insert and connect the leakage oil line (1) with the fuel return line (2) and grommet (3).



- Feed in and install the heat shield (1).

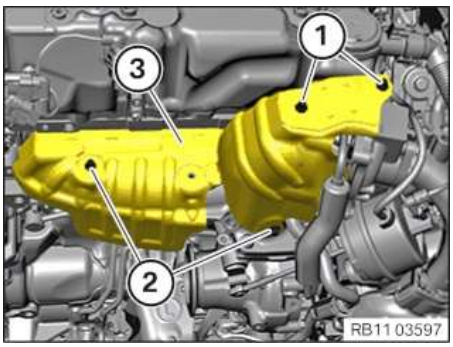


- Connect engine ventilation line (1) and lock.

  The locks (arrows) must engage audibly.

cardiagn.com

50 – Installing heat shield



- Feed in and install the heat shield (3).
- Tighten down screws (1) and (2).

Heat shield to exhaust manifold

M6x12			10 Nm

51 – Installing the sensor bracket on the cylinder head cover

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

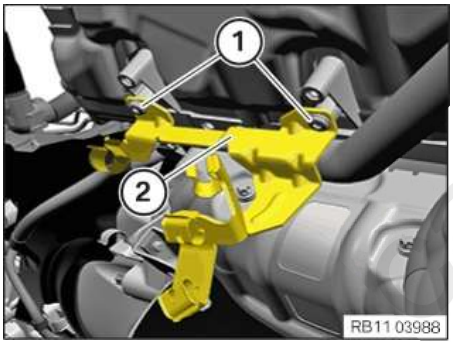
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

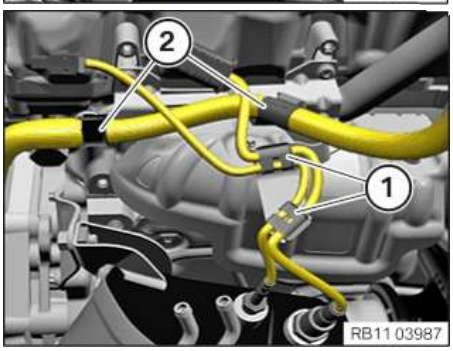
- Route all cables without abrasions, do not trap and crush.



- Insert and install the holder (2).
- Tighten the screws (1).

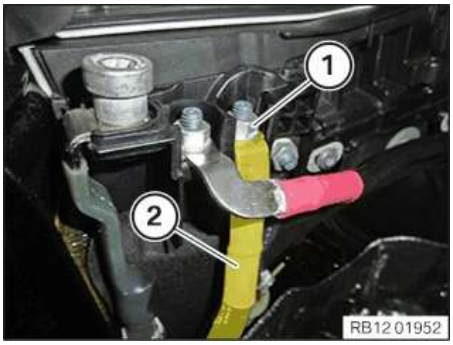
Bracket on cylinder head cover

	Tightening torque	5 Nm



- Secure the positive battery cable in the clamps (2).
- Mount the cable of the exhaust gas sensor system in the clamps (1).

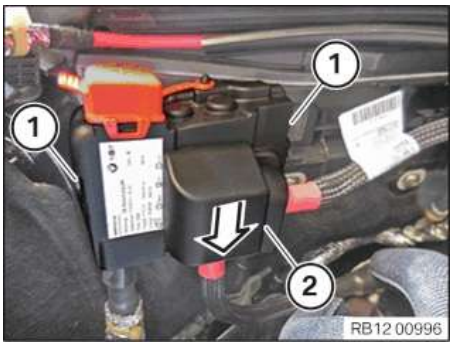
carmanualsdiagn.com



- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

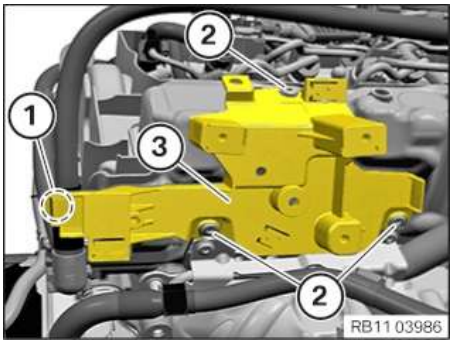
Battery positive lead to battery positive terminal

M8		Tightening torque	19 Nm



- Insert and install the cover (2) in the direction of the arrow.

  The locks (1) must engage audibly.

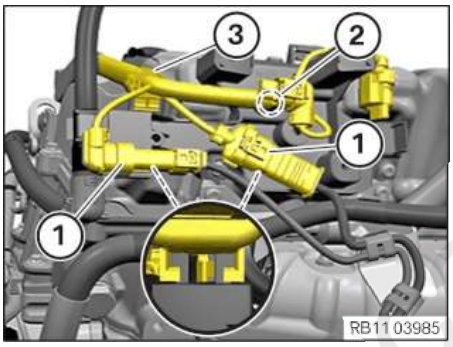


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

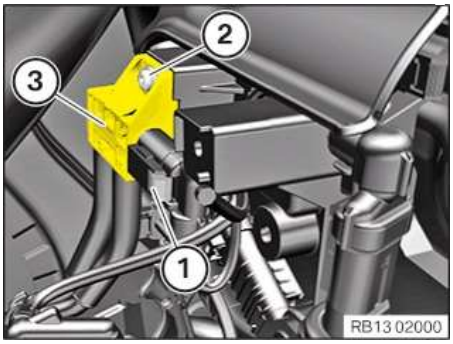
		Tightening torque	5 Nm

- Fasten the positive battery cable in the area (1) in the clamp.



- Feed in the wiring harness section and fasten it with the clamp (3).
- Fasten the cable clip in the area (2) in the sensor bracket.
- Feed in the connector (1) into the sensor bracket and lock it audibly.
- Plug in the connector (1) and lock audibly.

52 – Securing the differential pressure sensor for the diesel particulate filter



- Feed in and install the differential pressure sensor (3).
- Tighten down screw (2).

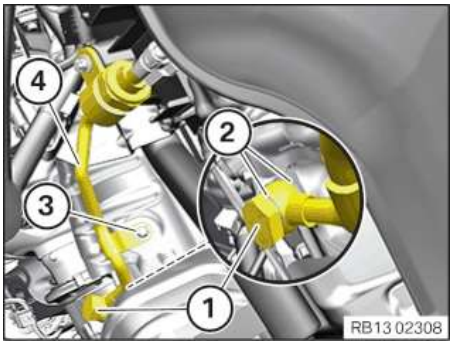
Differential pressure sensor of diesel particulate filter on cylinder head cover

TS5x20		Tightening torque	4 Nm

- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

53 – Install the exhaust gas pressure pipe

cardiagn.com



- Insert and install the exhaust gas pressure pipe (4).
- Replace the sealing rings (2).

  Parts: Sealing ring
- Apply the banjo bolt (1) hand-tight.
- Tighten down screw (3).

Heat shield to exhaust manifold

M6x12		Tightening torque	10 Nm

- Tighten the banjo bolt (1).

Banjo bolt for exhaust pressure pipe to exhaust manifold

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm



- Tighten down screw (2).

Exhaust gas pressure pipe to sensor system holder

TS6x20		Tightening torque	5,7 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

54 – Install all injectors

▸ **Cleaning the injector shafts**

CAUTION

Swirling dirt particles caused by compressed air.

Danger of injury!

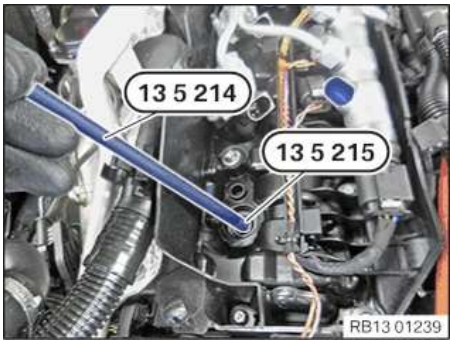
- Collect dirt particles, e.g. when blowing out, use cloth to do so.
- Wear safety goggles.

RISK OF DAMAGE

Contaminant or foreign body.

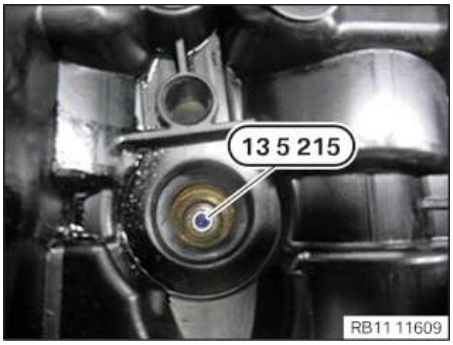
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Check whether the sealing ring remained in the injector shaft and remove the sealing ring as needed.
- Insert the special tool 0 493 763 (13 5 215) with the special tool 0 493 762 (13 5 214) from the set of special tools 0 493 758 (13 5 210) into the injector shaft.
- Remove special tool 0 493 762 (13 5 214).

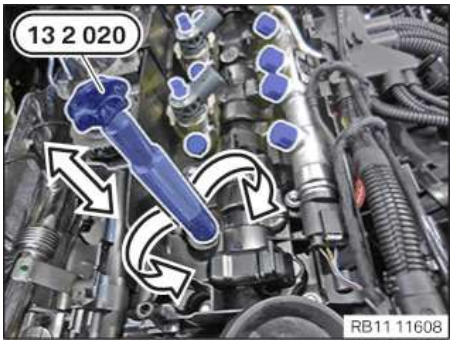
cardiagn.com



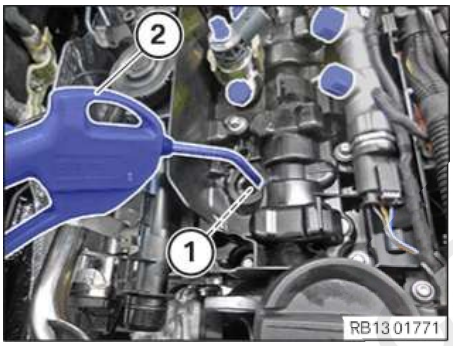
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



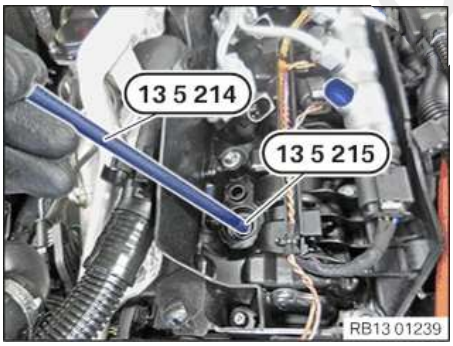
- Insert special tool 0 496 150 (13 2 020) into the injector shaft.



- Move special tool 0 496 150 (13 2 020) up and down in the injector shaft with rotational movements in the direction of arrow.
- Feed out special tool 0 496 150 (13 2 020) from the injector shaft and remove.



- Blow out injector shaft (1) with air gun (2).



- Feed the special tool 0 493 762 (13 5 214) into the injector shaft and screw it in with the special tool 0 493 763 (13 5 215).
- Feed out special tool 0 493 762 (13 5 214) with special tool 0 493 763 (13 5 215) from the injector shaft and remove it.

▸ **Check the placement of the clamping claw**

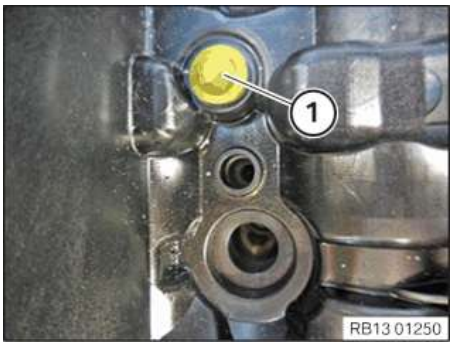
cardiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Tighten down screw (1).

  The clamping claw is positioned on the bolt (1).

Clamping claw facing to cylinder head cover

M6		Tightening torque	10 Nm

▸ **Prepare the injector for installation**

RISK OF DAMAGE

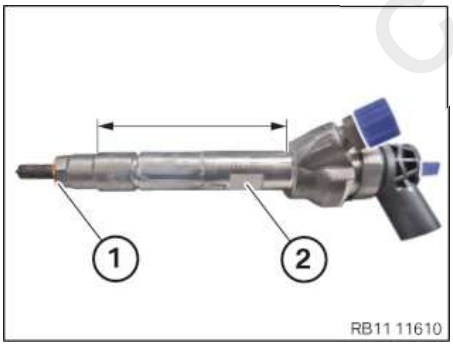
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

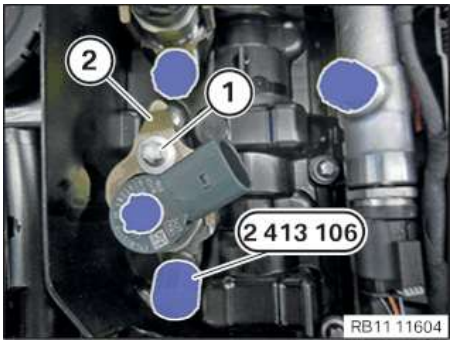
TECHNICAL INFORMATION

Lightly grease the injector shaft with high temperature-resistant grease.
For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



- Renew the copper sealing ring (1) on the injector (2).

  Parts: Copper sealing ring
- Lightly grease the injector in the marked area with heat-resistant grease before installing the injector (2) in the injector shaft.

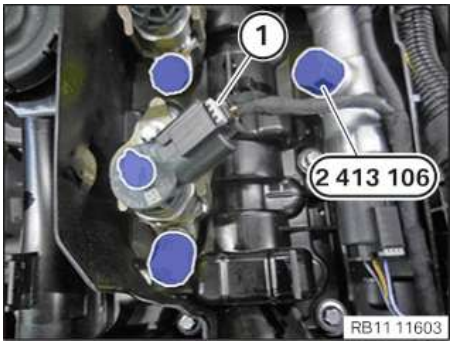


- Insert and install the injector .
- Insert and install the clamping claw (2).
- Tighten down screw (1).

Injector to cylinder head cover

M8		Tightening torque	8 Nm
		Angle of rotation	120 °

cardiagn.com



- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

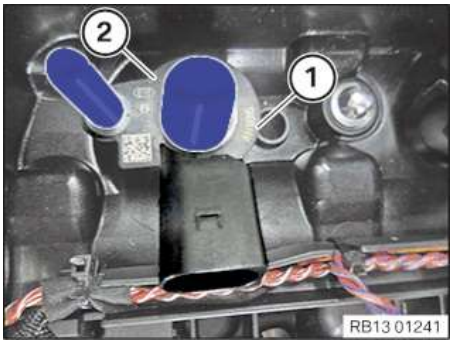
▸ **Replacement: Perform injection quantity compensation**

TECHNICAL INFORMATION

If the DDE control unit or an injector has been replaced, it will also be necessary to carry out injection quantity compensation. The adjustment value (7-position letter/number code) is engraved on each injector.

NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

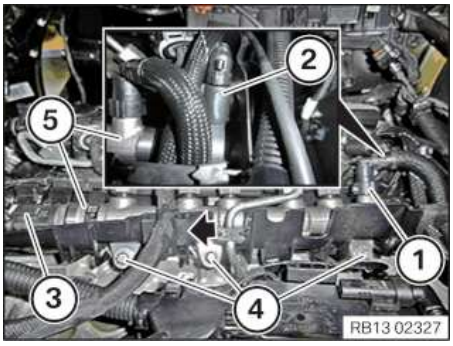


- Read off the adjustment value (1) on the new injector (2).



- Connect diagnosis system:
  - Vehicle identification
  - Function selection
  - Service functions
  - Digital diesel electronics (DDE)
  - Adjustment of injectors
  - Testing schedule
- Start service function with the right arrow button.

55 – Installing the rail



- Insert and install the rail (5).
- Tighten the screws (4).

Rail to cylinder head cover

M8		Tightening torque	19 Nm

- Install and lock cable clip (arrow).

  The cable clip (arrow) must engage audibly.
- Connect and lock the connector (3) at the rail pressure sensor.

  The connector (3) must engage audibly.
- Connect and lock the connector (2) at the rail pressure regulating valve.

  The connector (2) must engage audibly.
- Feed in fuel return line (1) and install.

  The fuel return line (1) must audibly engage.

cardiagn.com

56 – Installing high pressure line between rail and high pressure pump

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

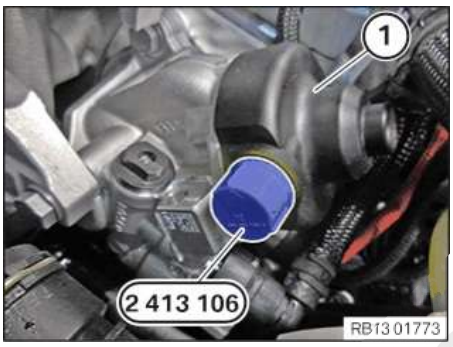
On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

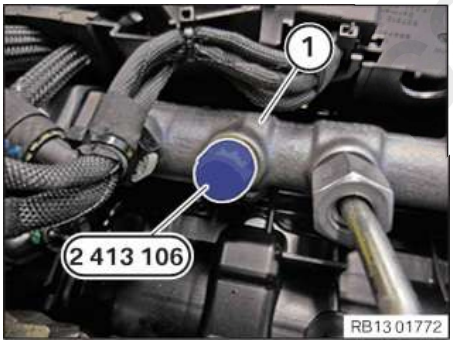
- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

TECHNICAL INFORMATION

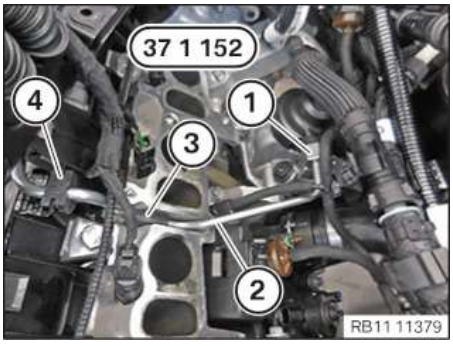
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Feed out and remove special tool on the high pressure pump (1).



- Feed out the special tool on the rail (1) and remove.



- Insert and install the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).
- Hand-tighten the union nut (1) on the high pressure pump.

cardiagn.com



- Hand-tighten the union nut (1) on the rail.

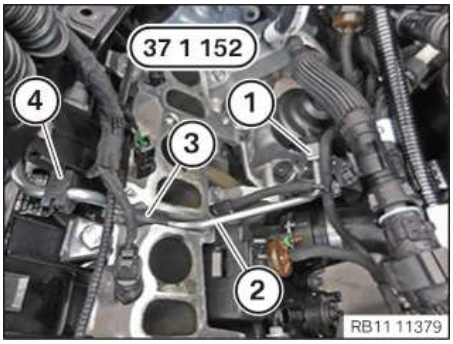
TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten the union nut (1) with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm



- Make sure that the high pressure line (2) is correctly installed with the abrasion protection (3) and the rubber mount (4).

TECHNICAL INFORMATION

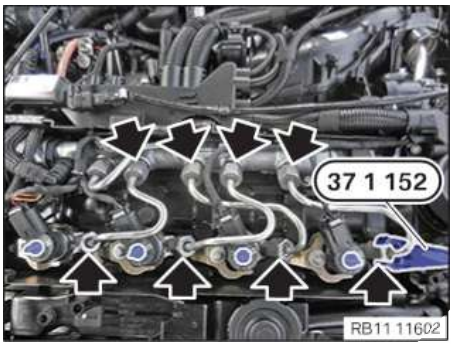
Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten union nut (1) on the high pressure pump with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm

57 – Installing the high pressure lines between the injector and the rail



- Remove the special tool from all cable connections.
- Feed in and install the high pressure lines (arrows).
- Hand-tighten the high pressure lines (arrows).

TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

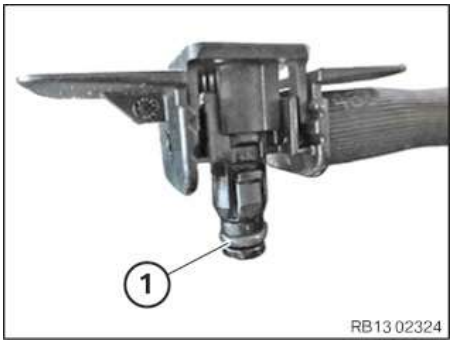
- Tighten the high pressure lines (arrows) with the special tool .

High pressure lines between injector and rail

High-pressure pipe		Tightening torque	24.5 Nm

- Check the high pressure lines (arrows) for tightness (**visual inspection**).

58 – Attach the leakage oil line on the injectors



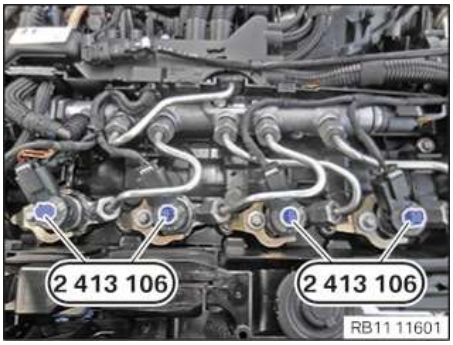
- **Version A:**

  Check sealing ring (1) for damage, renew leakage oil line if necessary.

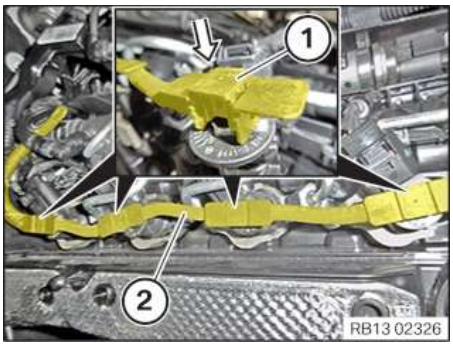
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.

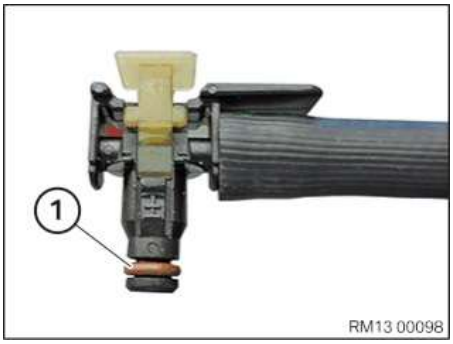
carlagn.com



- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.



- **Version B**:

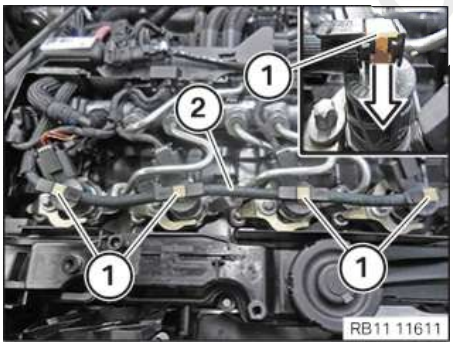
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.



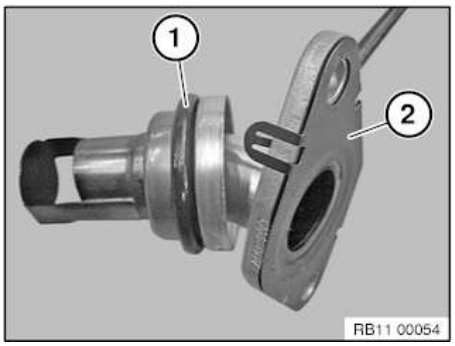
- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.

59 – Installing the intake plenum

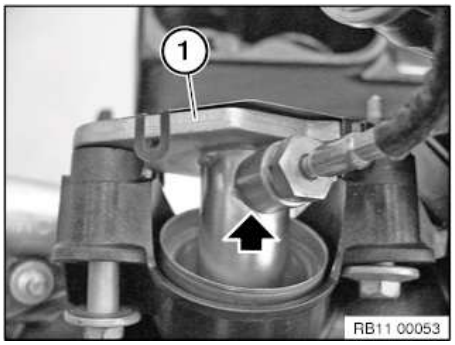
cardiagn.com



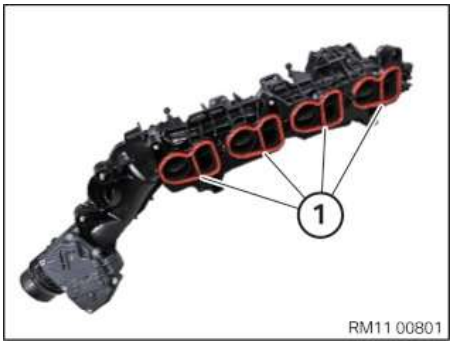
- Renew O-ring (1).

  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

  Parts: Gasket
- Position the seal (2) and clip it in.

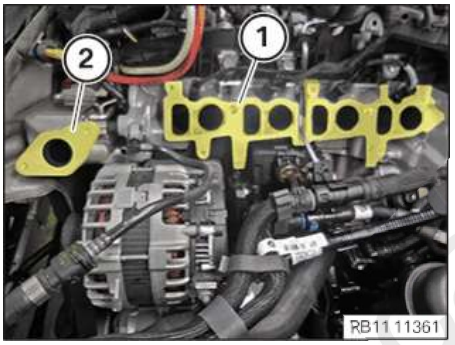


- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).

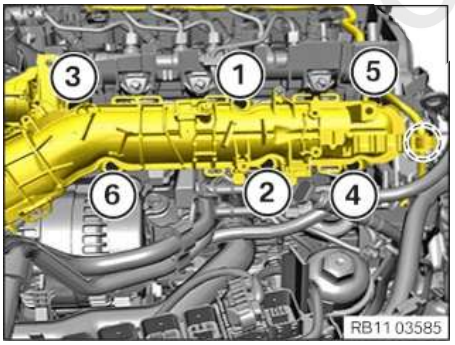


- Renew seals (1).

  Parts: Seals
- Ensure that the seals (1) are firmly mounted on the intake plenum.



- Clean connection points (1) at cylinder head.
- Clean the connection point (2) on the exhaust-gas recirculation cooler.

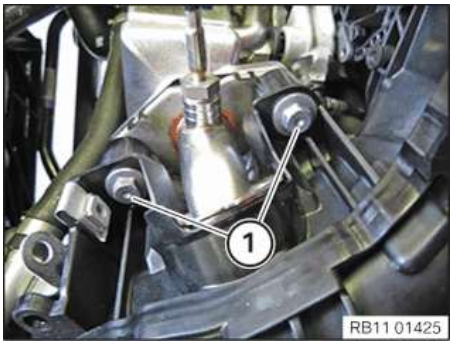


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

- Attach the wiring harness and fuel lines in the marked area on the intake plenum.

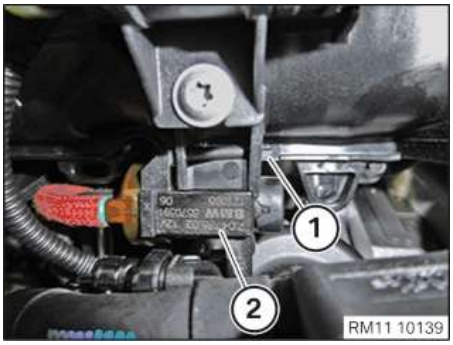


- Tighten the screws (1).

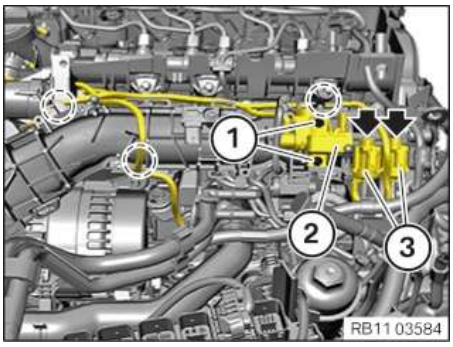
Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm

cardiagn.com



- Install electric changeover valve (2) from the left to the right in the holder on the intake plenum.
  The lock (1) must audibly engage.



- Install intake plenum electric changeover valve (3) on the intake plenum.
  The locks (arrows) must engage audibly.
- Position the electric changeover valve (2) on the intake plenum.
- Tighten the screws (1).

Electric changeover valve to intake plenum

TS6x20		Tightening torque	5 Nm

- Fasten the vacuum hoses on the intake plenum in the marked areas.

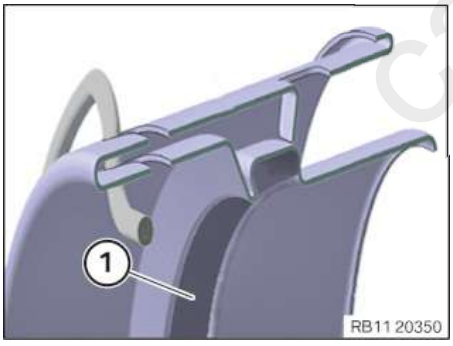


- Check the seal (1) for damage, and renew if necessary.

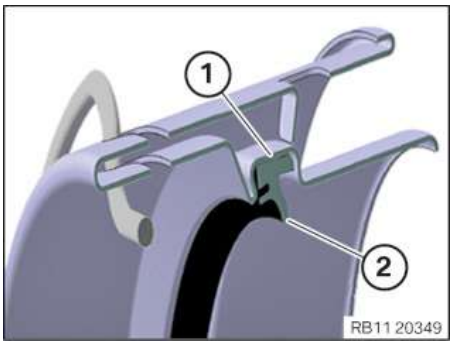
▸ **Replacing damaged seal**

TECHNICAL INFORMATION

Do not use pointed or sharp-edged tools for the installation and/or removal.



- Remove damaged seal.
- Clean gasket groove (1) with a dry towel.
  The gasket groove (1) must be clean.



- Renew gasket.
  Parts: Gasket
- Install seal dry without lubricant or mounting agent.

TECHNICAL INFORMATION

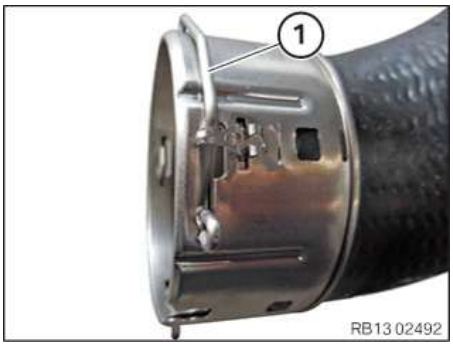
Incorrect assembly is possible. Ensure correct installation position.

- Feed in and install the seal.
- Make sure the seal is correctly installed in the gasket groove (1).
- Make sure that the sealing lip (2) is directed inwards as shown.

cardiagn.com



- Connect the pressure pipe to the throttle body until the locks (1) engage on both sides.



- Check that the locks (1) are correctly seated on the pressure pipe.

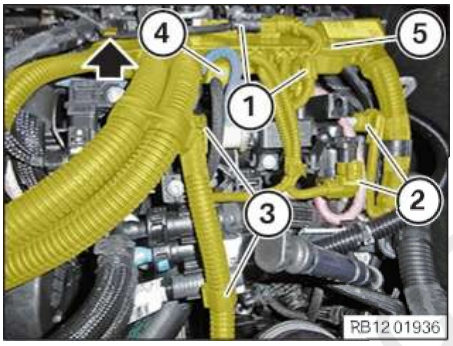
60 – Partially securing the wiring harness section on the intake plenum

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

- Route all cables without abrasions, do not trap and crush.



- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

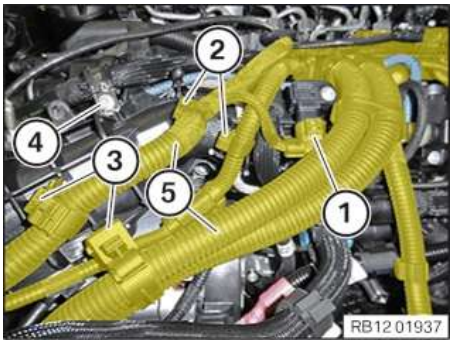
Wiring harness section to manifold

TS5x20		Tightening torque	3,6 Nm

- Secure clamps (3).
- Connect connectors (2) and lock.

  The connectors (2) must engage audibly.
- Secure the line at clamp (Arrow).
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

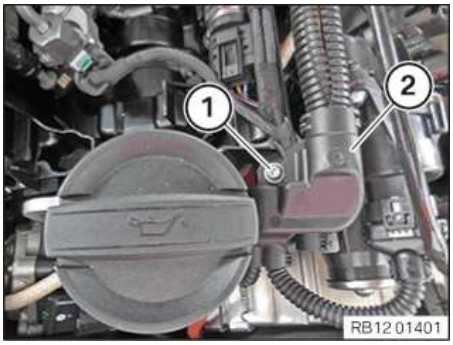
Standard screw connection 4 Nm

Oval-head screw		Tightening torque	4 Nm

- Secure clamps (3).
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

cardiagn.com



- Guide in the wiring harness section (2) and install.
- Tighten down screw (1).

Wiring harness section to cylinder head cover

TS5x20		Tightening torque	3,6 Nm



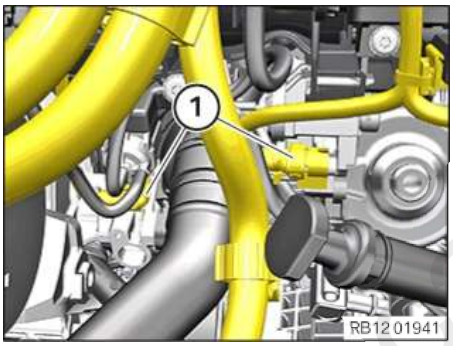
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



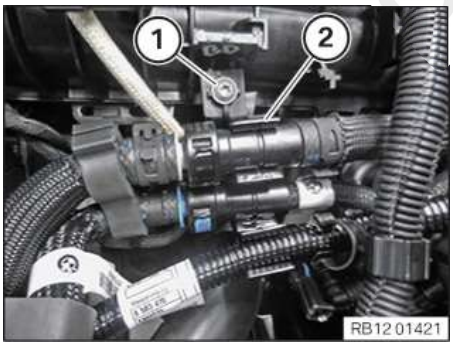
- Connect the connector (1) and lock it.

  The connector (1) must engage audibly.



- Connect connectors (1) and lock.

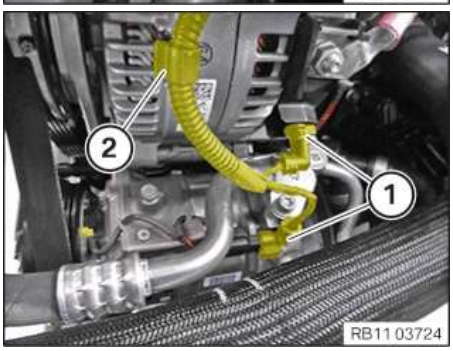
  The connectors (1) must engage audibly.



- Insert and install the holder (2).
- Tighten down screw (1).

Holder on intake plenum

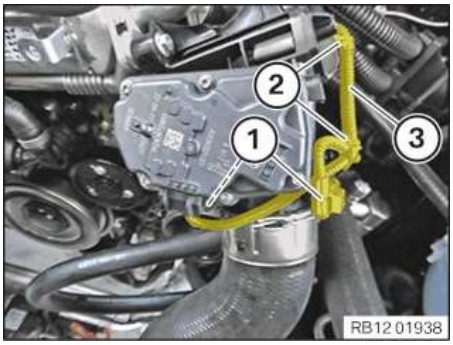
TS6X20		Tightening torque	5 Nm



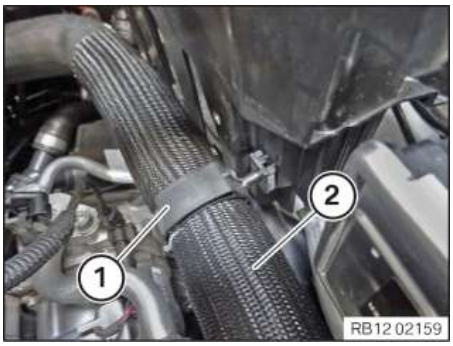
- Connect the connector (1) and lock it.

  The connectors (1) must engage audibly.
- Secure holder (2) to alternator.

cardiagn.com



- Guide in the wiring harness section (3) and install.
- Secure clamps (2).
- Connect connectors (1) and lock.



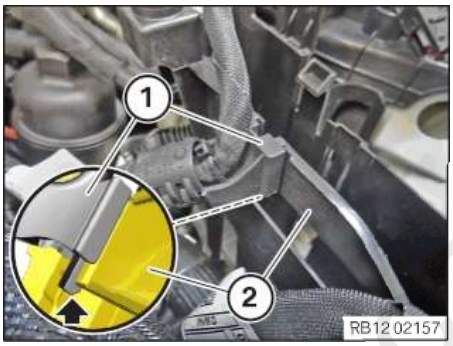
- Feed in and install coolant line (2).
- Lock holder (1).

  The holder (1) must engage audibly.



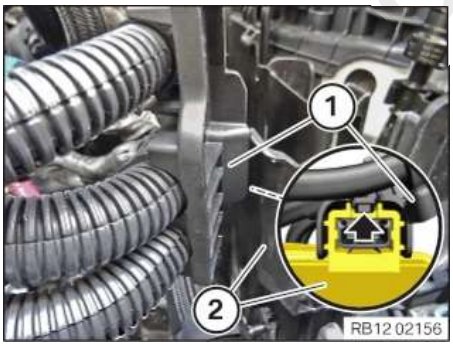
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.



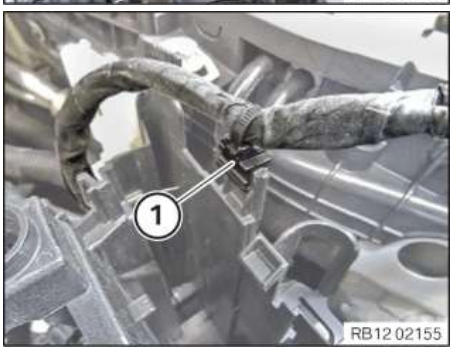
- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.



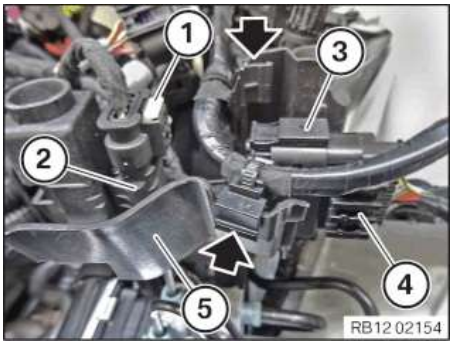
- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.

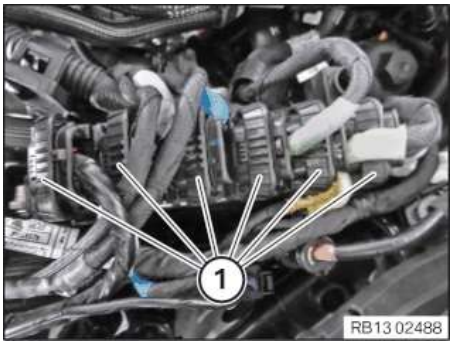


- Secure clamps (1).

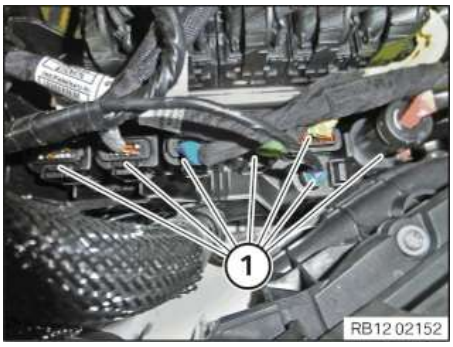
cardiagn.com



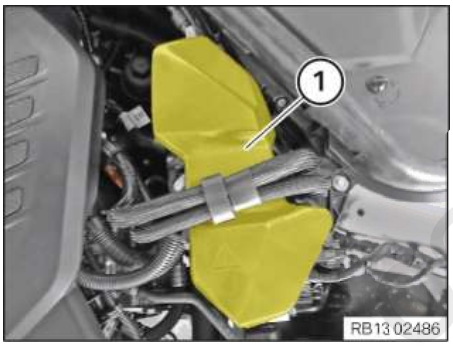
- Connect and lock the connector (4) with the control unit holder (5).
  The connector (4) must engage audibly.
- Connect connectors (3) and lock.
  The connector (3) must engage audibly.
- Connect and lock the connector (2) with the control unit holder (5).
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.
  The connector (1) must engage audibly.
- Secure the clamps (arrows).



- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.

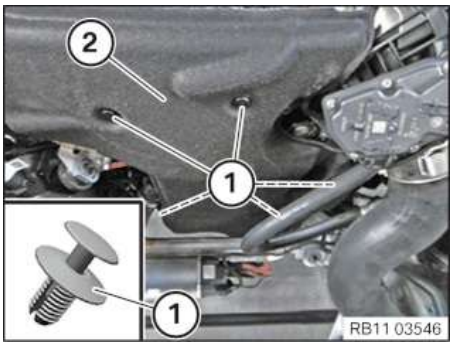


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



- Insert and install cover (1) into guides.

61 – Install acoustic cover for the engine, front



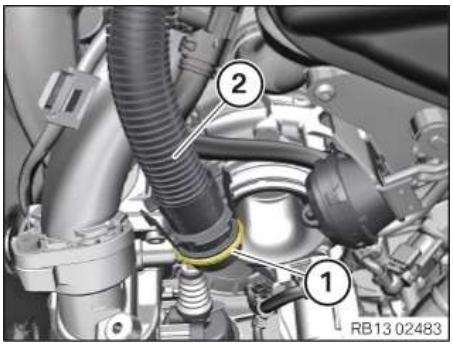
- Feed the acoustic cover (2) in and install.
- Secure the acoustic cover (2) with the expanding rivets (1).

62 – Installing the clean air pipe with resonator

cardiagn.com



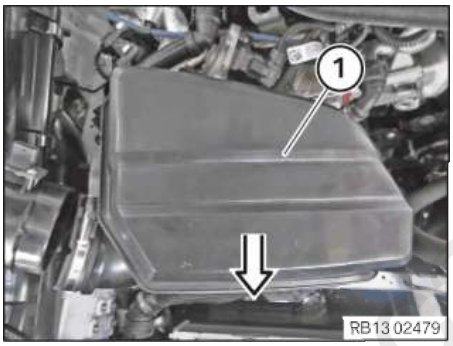
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



- Check the sealing ring (1) for the engine ventilation line (2) for damage and renew where required.



- Feed in and install clean air pipe with resonator (1) in the direction of the arrow.

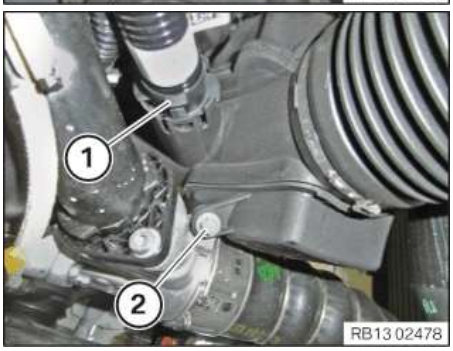


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

  The clamp (1) must engage audibly.

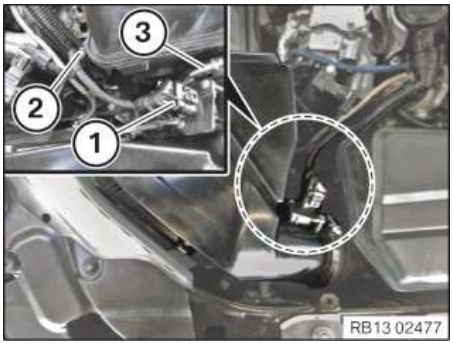


- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm

cardiagn.com



- Connect the clean air pipe with resonator to the intake filter housing.
- Tighten clamp (3).

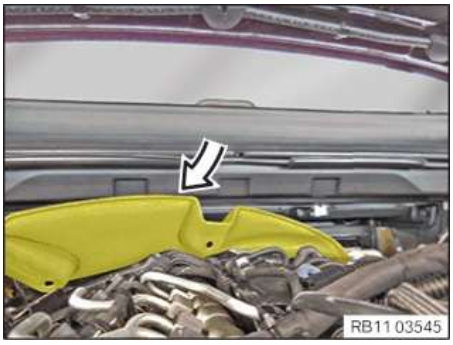
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

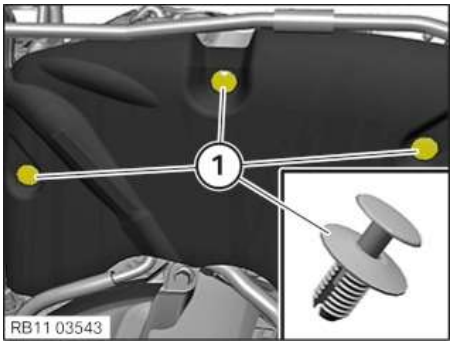
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

63 – Installing acoustic cover at rear

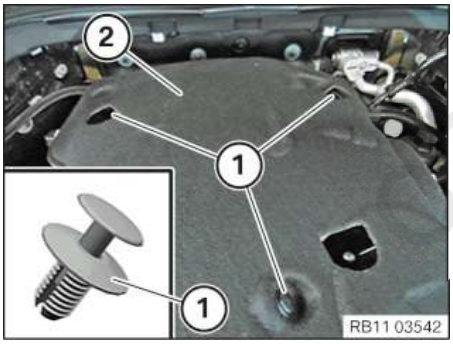


- Guide in the acoustic cover in the direction of the arrow and install it.



- Secure acoustic cover with the expanding rivets (1).

64 – Install the acoustic cover for the injectors



- Feed the acoustic cover (2) in and install.
- **If installed:** Secure the acoustic cover (2) with the expanding rivets (1) .

65 – Install acoustic cover

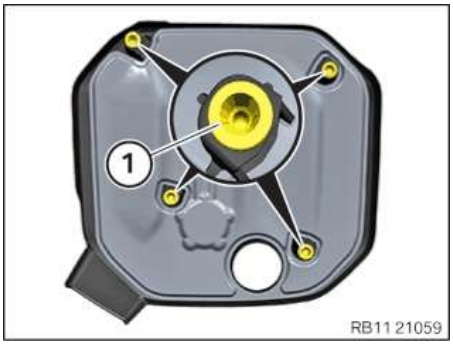
RISK OF DAMAGE

Damage to the acoustic cover/design cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.

cardiagn.com

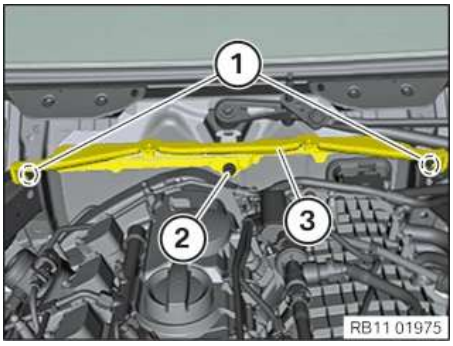


- Check the acoustic cover for correct fit of the rubber mounts (1).



- Clip in the acoustic cover (1) into the holders in the indicated areas.

66 – Installing centre bulkhead lower section

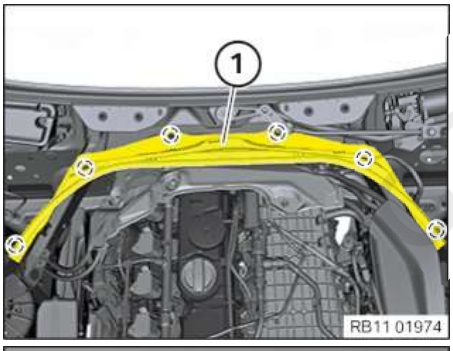


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

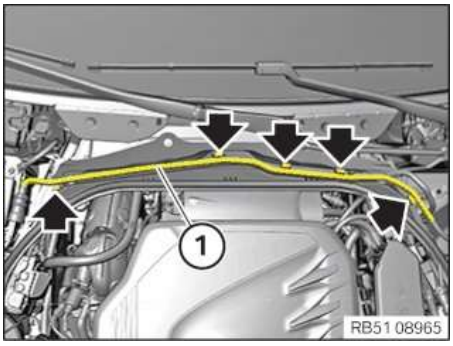
67 – Installing the centre bulkhead upper part



- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

Bulkhead upper part to bottom bulkhead

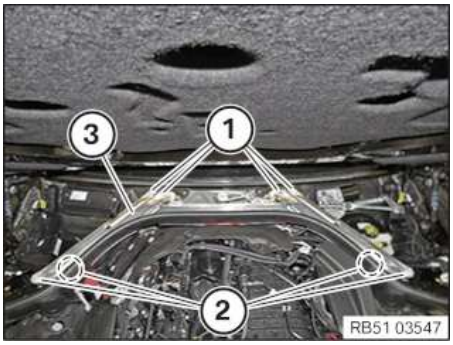
		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

  Clip in the wire (1) into the holders (arrows).

bardiagn.com



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Install the tension strut (3) on the spring strut dome.
- Tighten the screws (1).

Tension strut on bulkhead

M10x25 screw		Tightening torque	56 Nm

- Renew screws (2).

  Parts: Screws
- Tighten the screws (2).

Tension strut to spring strut dome

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

68 – Install the seal for the bonnet



- Press the rear bonnet seal (2) into the guide.
- Feed in cable (1) into the brackets.
- Check that the rear bonnet seal (2) and the cable (1) are seated correctly.

69 – Installing cowl panel cover

RISK OF DAMAGE

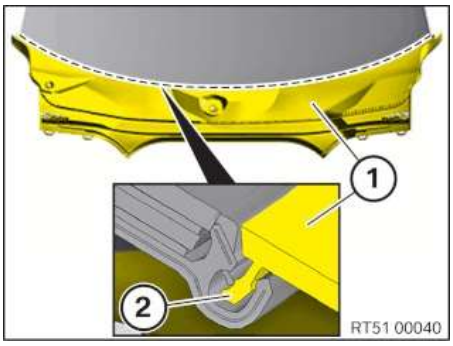
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

- Ensure correct installation of the components.
- Only use undamaged components.

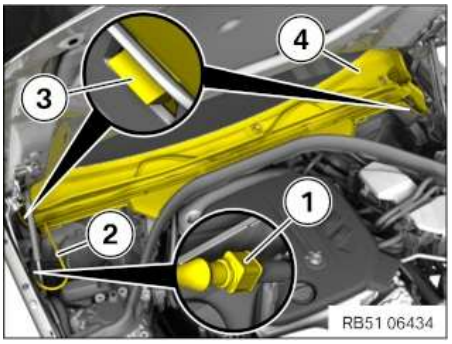
TECHNICAL INFORMATION

Before installing the cowl panel cover it is **mandatory** to check that the 48 V line is routed correctly and fitted tightly.
An incorrectly laid or attached 48 V line can be damaged by the wiper kinematics.



- Push the cowl panel cover (1) into the latch mechanism (2) beginning on the side.

cardiagn.com



- Clip cowl panel cover (4)in by means of the latch mechanisms (3).
- Position windscreen wash hose (2) and connect windscreen wash hose (1)quick lock.

70 – Install left and right wiper arm

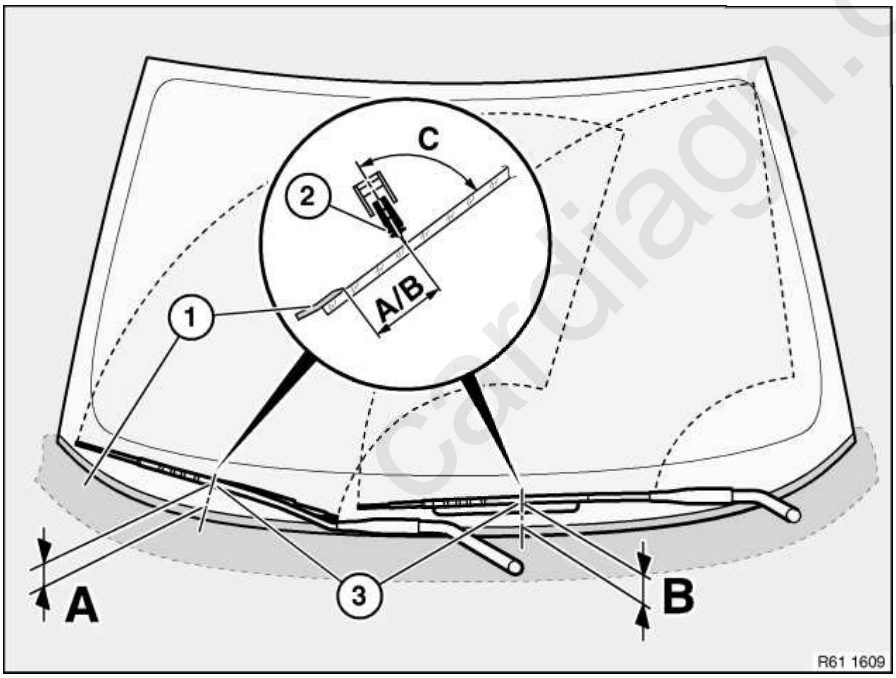
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

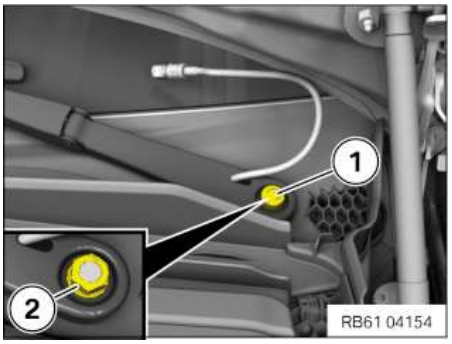
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- Connect the wiper arm (3).
- Correctly position the wiper arm (2) in relation to the window edge (1).

Distance from window pane edge to wiper blade

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm



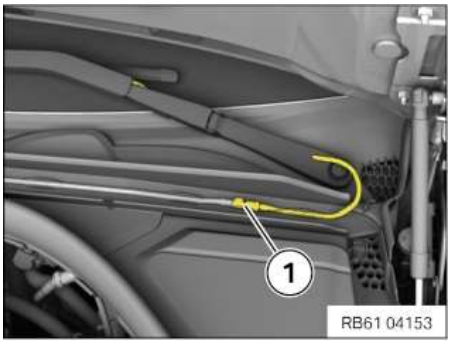
- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

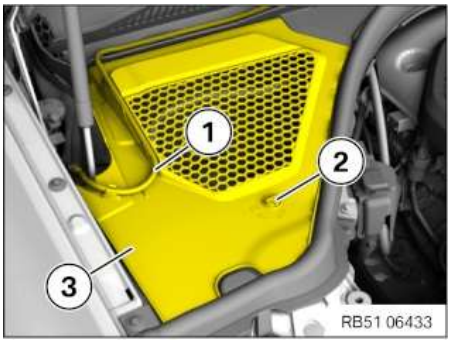
- Connect the protective cap (1).

cardiagn.com



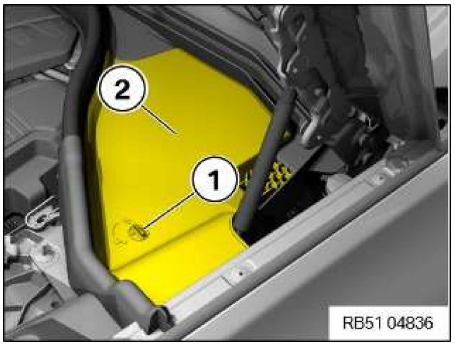
- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

71 – Install the rear right engine compartment cover



- Position the cover of the engine compartment on the rear right (3).
- Close lock (2).
- Insert washer fluid hose (1) into the guides.

72 – Install the cover of the engine compartment on the rear left



- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

73 – Connecting all battery earth leads



- See additional information.

74 – Take bonnet out of the service position

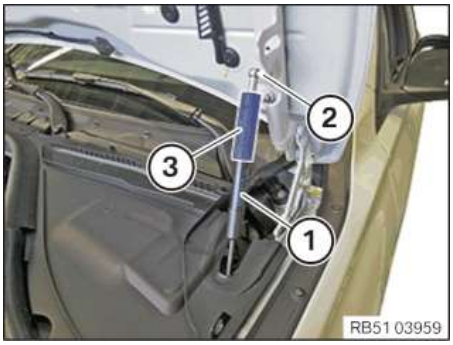
CAUTION

Shutting bonnet or tailgate.

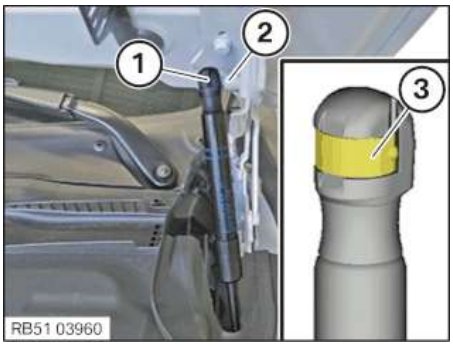
Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.

cardiagn.com



- Support the bonnet by hand.
- Remove the special tool (3) from the ball pin (2).
- Pull off the special tool (3) from the gas pressure spring (1).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.



- Check the clamp (3) is fitted correctly.
- Connect ball socket (1) to ball pin (2).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.

Additional Information

Overview of Tightening Torques

Special tool 2 365 488 to engine			Used in step 3439
M8x60		Tightening torque	19 Nm

Intake and exhaust camshaft in camshaft support			Used in step 37
M6x31		Tightening torque	10 Nm

Starter motor to engine			Used in step 42
M8X60		Tightening torque	19 Nm

Battery positive lead to starter			Used in step 42
M8		Tightening torque	13,5 Nm

Underbody protection			Used in step 4345
Hexagon screw		Tightening torque	3 Nm

Underbody panelling			Used in step 44
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Underbody protection, steering, to front axle support			Used in step 46
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support			Used in step 46
Hexagon bolt M6		Tightening torque	8 Nm

Underbody protection of the steering gear			Used in step 47
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

Wheel arch trim panel, front			Used in step 47
Thermoplastic hexagon screw		Tightening torque	2,6 Nm

cardiagn.com

Underbody protection front			Used in step 48
Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Cylinder head cover to cylinder head			Used in step 49
M6		Tightening torque.	8,5 Nm

Heat shield to exhaust manifold			Used in step 50
M6x12			10 Nm

Bracket on cylinder head cover			Used in step 51
		Tightening torque	5 Nm

Battery positive lead to battery positive terminal			Used in step 51
M8		Tightening torque	19 Nm

Differential pressure sensor of diesel particulate filter on cylinder head cover			Used in step 52
TS5x20		Tightening torque	4 Nm

Heat shield to exhaust manifold			Used in step 53
M6x12		Tightening torque	10 Nm

Banjo bolt for exhaust pressure pipe to exhaust manifold			Used in step 53
Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm

Exhaust gas pressure pipe to sensor system holder			Used in step 53
TS6x20		Tightening torque	5,7 Nm

Clamping claw facing to cylinder head cover			Used in step 54
M6		Tightening torque	10 Nm

Injector to cylinder head cover			Used in step 54
M8		Tightening torque	8 Nm
		Angle of rotation	120 °

Rail to cylinder head cover			Used in step 55
M8		Tightening torque	19 Nm

High pressure lines between high pressure pump and rail			Used in step 56
High-pressure pipe		Tightening torque	24.5 Nm

High pressure lines between injector and rail			Used in step 57
High-pressure pipe		Tightening torque	24.5 Nm

Intake plenum to cylinder head			Used in step 59
M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum			Used in step 59
		Tightening torque	10 Nm

Electric changeover valve to intake plenum			Used in step 59
TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold			Used in step 60
TS5x20		Tightening torque	3,6 Nm

cardiagn.com

Standard screw connection 4 Nm			Used in step 60
Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover			Used in step 60
TS5x20		Tightening torque	3,6 Nm

Holder on intake plenum			Used in step 60
TS6X20		Tightening torque	5 Nm

Clean air pipe to exhaust turbocharger			Used in step 62
M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing			Used in step 62
Clamp		Tightening torque	3 Nm

Bulkhead lower part to body			Used in step 66
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead			Used in step 67
		Tightening torque	3 Nm

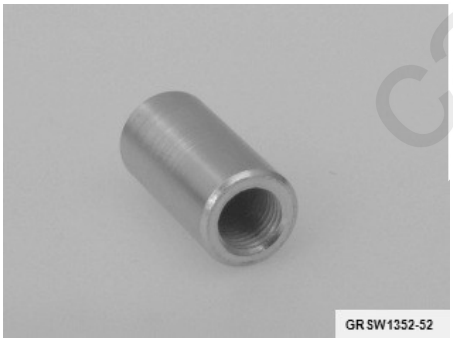
Tension strut on bulkhead			Used in step 67
M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome			Used in step 67
Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm			Used in step 70
Combination hexagon nut		Tightening torque	35 Nm

Overview of Special Tools

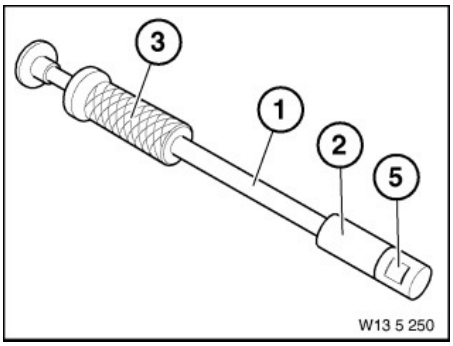
0 493 339 (13 5 252) Bush



Common		Used in step 21
Usage	(Threaded bush)	
Included in the tool or work	0 493 321	
Storage location		
Replaced by		
In connection with		
SI-Number		

cardiagn.com

0 493 321 (13 5 250) Puller



Common Used in step 21

Usage	For removing injector nozzles or injectors from cylinder head
Included in the tool or work	
Storage location	A16
Replaced by	
In connection with	
SI-Number	01 06 98 (306)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 338 (13 5 251)		**Rod** (guide rod)	
2	0 493 339 (13 5 252)		**Bush** (Threaded bush)	
3	0 493 340 (13 5 253)		**Weight** (Weight)	
4	0 493 379 (13 5 254)		**Claw** (Clamping claw) For removal of injector nozzles / engine: M57	
5	0 495 579 (13 5 255)		**Adapter** For removing steering shaft on E85. Refer to SI 01 11 06 (265)	

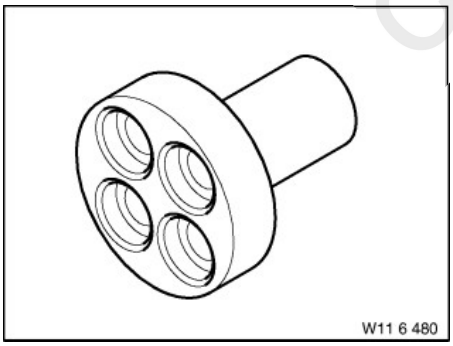
0 493 340 (13 5 253) Weight



Common Used in step 21

Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 380 (11 6 480) Connector

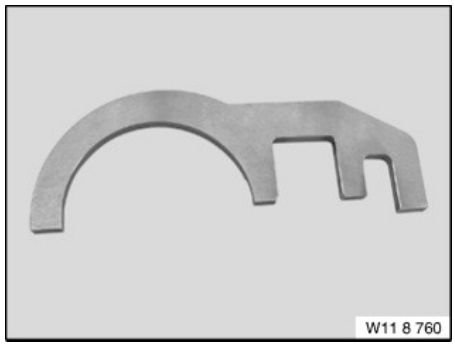


Common Used in step 3439

Usage	For turning over engine at crankshaft hub (vibration absorber).
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	01 11 98 (338)

carbiagn.com

0 496 112 (11 8 760) Gauge



Common	Used in step 34353940
Usage	For securing camshaft at TDC.
Included in the tool or work	
Storage location	B24
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

2 365 488 Adapter



Common	Used in step 34383941
Usage	For disconnecting the crankshaft at the top dead centre. (longitudinal installation with automatic transmission only).
Included in the tool or work	
Storage location	C56
Replaced by	
In connection with	
SI-Number	01 46 14 (191)

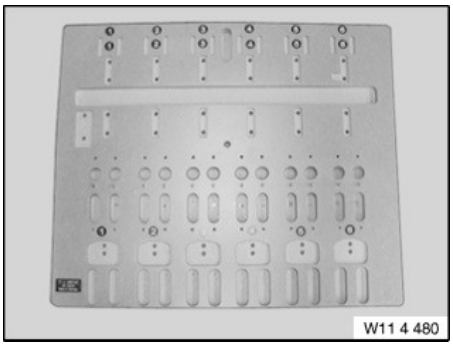
2 288 380 Locating stud



Common	Used in step 34383941
Usage	For disconnecting the crankshaft at the top dead centre. Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).
Included in the tool or work	
Storage location	A56
Replaced by	
In connection with	
SI-Number	01 04 14 (071)

cardiagn.com

0 495 105 (11 4 480) oddments tray

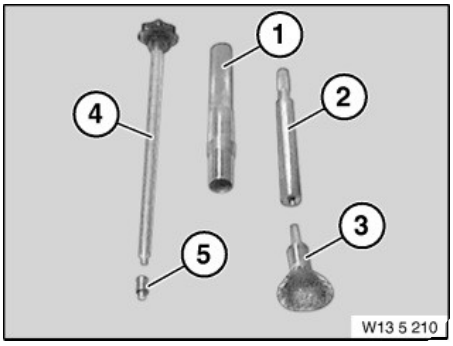


Common	Used in step 36
Usage	(Boards (2 pieces)) For setting down the individual components of the cylinder head.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 17 04 (130)

Consisting of

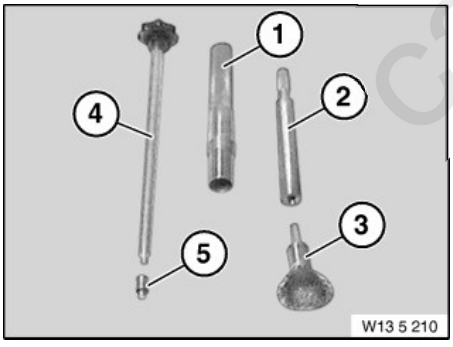
Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 495 106 (11 4 481)		**oddments tray** (Board, intake side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	
2	0 495 107 (11 4 482)		**oddments tray** (Board, exhaust side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	

0 493 763 (13 5 215) Plug



Common	Used in step 54
Usage	(Seal plug)
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

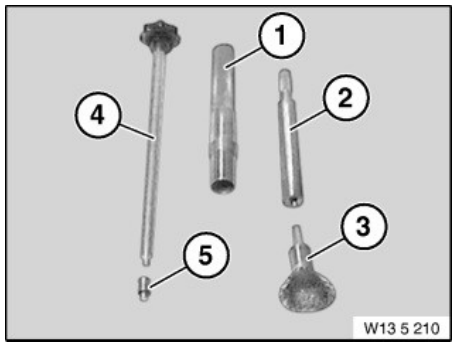
0 493 762 (13 5 214) Rod



Common	Used in step 54
Usage	(Mounting rod) For the seal plug
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

cardiagn.com

0 493 758 (13 5 210) Tool



Common

Used in step 54

Usage	(Cleaning set) For injector channels
Included in the tool or work	
Storage location	B4
Replaced by	
In connection with	
SI-Number	01 05 00 (574)

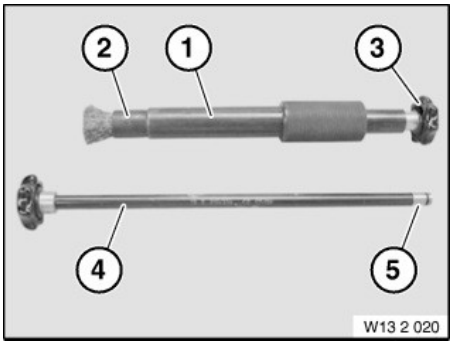
Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 759 (13 5 211)		**Holding sleeve** (Guide sleeve)	
2	0 493 760 (13 5 212)		**Holder** (Brush holder)	
3	0 493 761 (13 5 213)		**Brush head**	
4	0 493 762 (13 5 214)		**Rod** (Mounting rod) For the seal plug	
5	0 493 763 (13 5 215)		**Plug** (Seal plug)	

0 496 150 (13 2 020) Tool

Used in step 54

cardiagn.com



Common

Usage	(Cleaning kit) For cleaning the injector shaft.
Included in the tool or work	
Storage location	A87
Replaced by	
In connection with	
SI-Number	01 07 07 (355)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 496 151 (13 2 021)		**Holding sleeve** (Guide sleeve) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
2	0 496 152 (13 2 022)		**Holder** (Brush holder) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
3	0 496 153 (13 2 023)		**Brush head** Remaining inventories will be sold off, followed by discontinuation and then available as part of complete special tool 13 2 020 = 83 30 0 496 150 only	
4	0 496 154 (13 2 024)		**Rod** (Mounting rod) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
5	0 496 155 (13 2 025)		**Plug** (Seal plug) Available as part of complete special tool 13 2 020 = 83 30 0 496 150 only.	

Overview Technical Data

Distance from window pane edge to wiper blade Used in step 70

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

Links

General repair instructions	Used in step
11 00 ... Overview of consumables (Electronic Parts Catalogue)	54

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	273
61 20 900 Disconnecting and connecting battery earth lead	273
61 20 900 Disconnecting and connecting battery earth lead	273
61 20 900 Disconnecting and connecting battery earth lead	273
61 20 900 Disconnecting and connecting battery earth lead	273
61 20 900 Disconnecting and connecting battery earth lead	273
61 20 900 Disconnecting and connecting battery earth lead	273
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	273

cardiagn.com

61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads) 273
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads) 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads) 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads) 273
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads) 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads) 273
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle) 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads) 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 20 900 Disconnecting and connecting battery earth lead 273
61 35 ... Notes on ESD protection (Electro Static Discharge) 1521
61 35 ... Notes on ESD protection (Electro Static Discharge) 1521

cardiagn.com

11 31 022 Removing and installing/replacing both camshafts

PRELIMINARY WORK

1 – Bring front compartment lid in the service position

Prerequisite

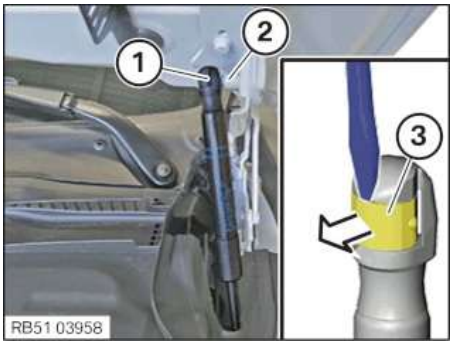
Engine compartment lid is open.

CAUTION

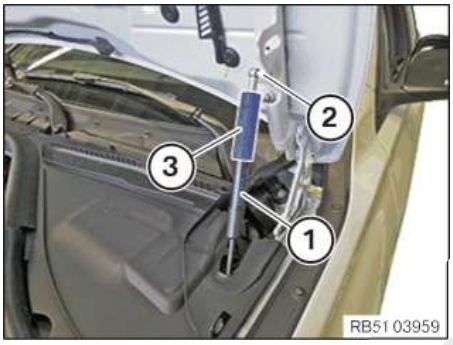
Shutting bonnet or tailgate.

Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.



- Lift clamp (3) slightly using a screwdriver, in the direction of the arrow.
- Lift off ball socket (1) from ball pin (2).
- Repeat the operation on the other side of vehicle.

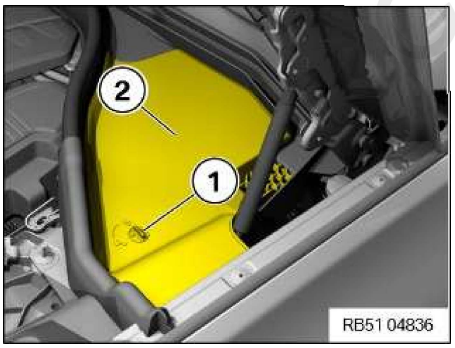


TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

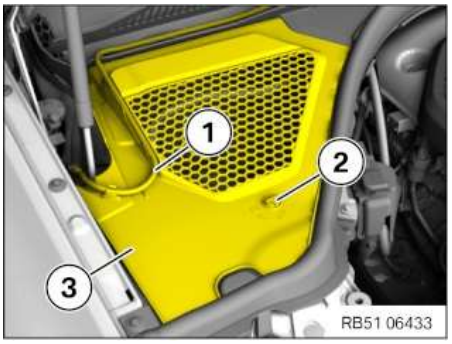
- Remove the bonnet support and open the bonnet further.
- Pull special tool or or (3) over gas pressure spring (1).
- Place special tool on the ball pin (2) and engage using force.
- Repeat the operation on the other side of vehicle.

2 – Remove the cover of the engine compartment at the rear left



- Loosen the lock (1).
- Remove the cover (2) of the rear left engine compartment.

3 – Remove the cover of the rear right engine compartment



- Release washer fluid hose (1) from the guides.
- Loosen the lock (2).
- Remove the cover (3) of the rear right engine compartment.

4 – Deactivating the 48 V electrical system

Prerequisite

Ignition is switched off.

WARNING

Deactivation of the 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Make sure that **no battery charger** is connected to the jump start terminal point in the engine compartment.
- For vehicles with additional electrical systems (48 V electrical system, high-voltage vehicle electrical system), it is mandatory to deactivate them **before** disconnecting the vehicle battery.

WARNING

Deactivation of the 48 V electrical system.

Risk of short circuits! Risk of fire!

- Make sure that **no charger** is connected to the jump start support point in the engine compartment.

RISK OF DAMAGE

Damage to 48-V battery

If a 48-V battery that is disconnected from the electrical system is activated, the battery electronics will be damaged.

- Only carry out activation of the 48V electrical system with a completely connected 48-V battery.

TECHNICAL INFORMATION

Follow notes for 48-V battery. See further information 6120 ... Notes on 48-V battery.



- Deactivate the 48V electrical system by opening the bonnet.

  The deactivation takes place automatically.

Check

cardiagn.com



TECHNICAL INFORMATION

Zero voltage (48V electrical system is switched off) is displayed only in PAD mode.

- Press the START-STOP button quickly 3 times without stepping on the brake pedal to establish the PAD mode.
- Check isolation from the supply in the instrument cluster in PAD mode.

desired state

- The Check Control message "48V electrical system switched off." (1) is displayed.

Result

» **The absence of voltage** cannot be determined by means of the Check Control message "48V electrical system switched off:" (1). Work is not permitted to be started.

Measure

- Carry out the service function "48 V electrical system deactivation".
  - Vehicle management > Service functions > Voltage supply > Deactivate 48 V electrical system

Only when the Check Control message “48 V electrical system switched off.” (1) is displayed in the instrument cluster is it permitted to disconnect the 12 V battery.

If the absence of voltage is not indicated clearly, contact Technical Support.

Result

» The Check Control message signals that the 48V electrical system has been switched off.

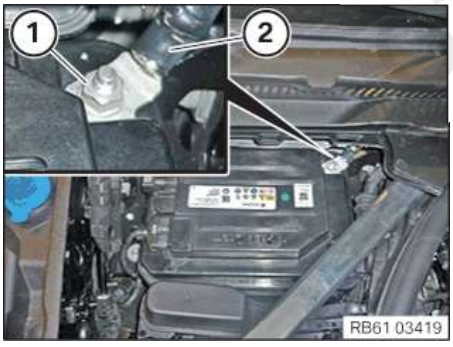
Measure

- Exit PAD mode by pressing the START-STOP button once without depressing the brake pedal.

The work “Disconnecting the negative battery cable of the 48-V battery” can be started.



- Unlock and disconnect plug connection (1) of the CAN bus.
- Release the clip (2).



- Loosen nut (1).
- Pull off negative battery cable (2) of the 48-V battery from the negative battery terminal, set it aside and secure it.



WARNING

Unprotected battery terminals.

Risk of short circuits! Risk of fire!

- Cover the vehicle battery.

- Cover the vehicle battery with the special tool as shown.
- Position the battery earth lead (1) as shown.

5 – Disconnecting all battery earth leads

ardiagn.com



- See additional information.

6 – Removing the wiper arm on the left and right

NOTICE

Description is for left component only. Procedure on the right side is identical.

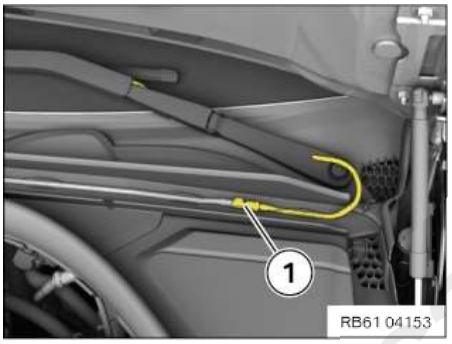
▶ **Remove the wiper arm**

RISK OF DAMAGE

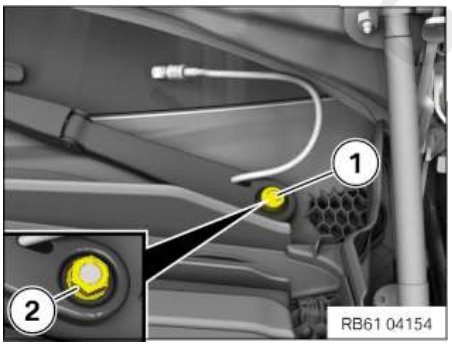
Damage to wiper console.

While removing the wiper arms without using special tool, the wiper console can break.

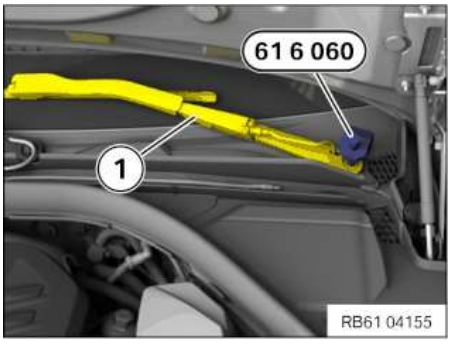
- Removing the wiper arms must be carried out only using the prescribed special tool.
- Do **not** lever off the wiper arm because otherwise the wiper console may break at the predetermined breaking point for active pedestrian protection.



- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.



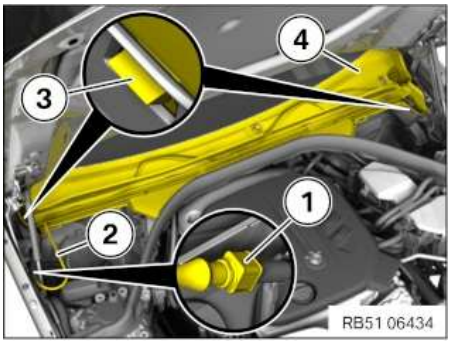
- Remove the protective cap (1).
- Loosen nut (2).



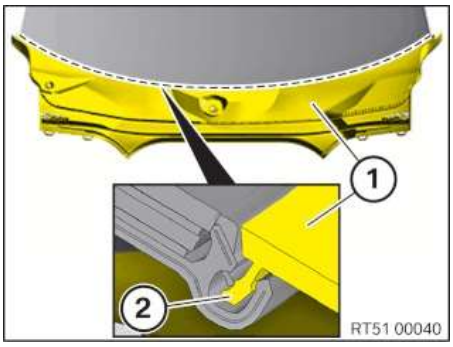
- Pull off the wiper arm (1) using special tool .

7 – Remove cowl panel cover

cardiagn.com



- Release snap fastener (1) of the washer fluid hose (2) and put the washer fluid hose (2) to one side.
- Unclip clips (3) on the cowl panel cover (4).



- Pull the cowl panel cover (1) upward out of the latch mechanism (2) beginning on the side.

8 – Remove the seal for the rear bonnet

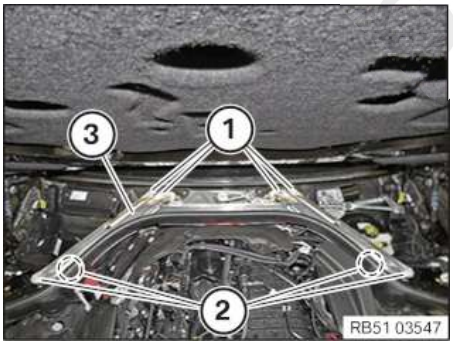


- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

9 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

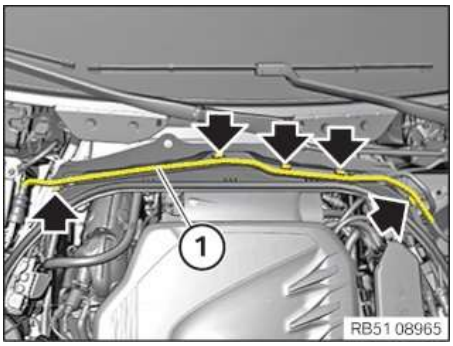
Driving without the strut brace/front-end strut or tension strut is not permitted.



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

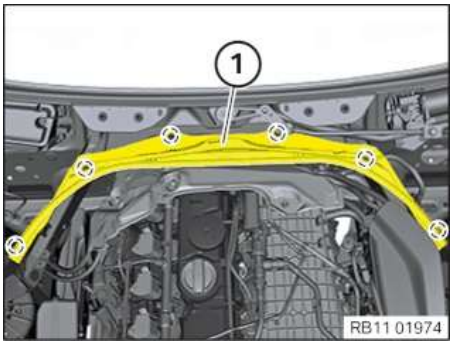
- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.



- **Version with mild hybrid technology:**

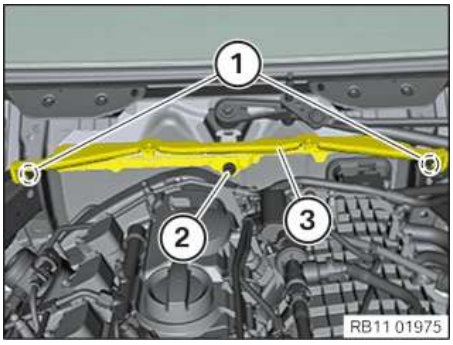
  Unclip the wire (1) at the holders (arrows).

carsdiagn.com



- Unscrew the bolts in the marked areas.
- Remove the centre bulkhead upper part (1).

10 – Removing the centre bulkhead lower section



- Loosen screws (1).
- Loosen nut (2).
- Remove the centre bulkhead lower part (3).

11 – Removing the acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

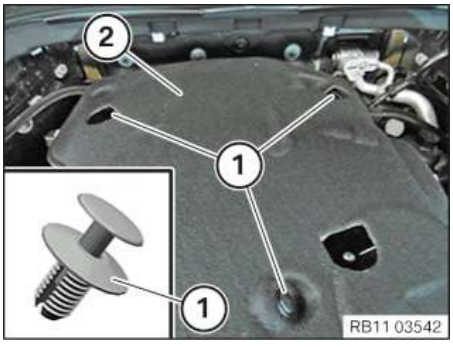
Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



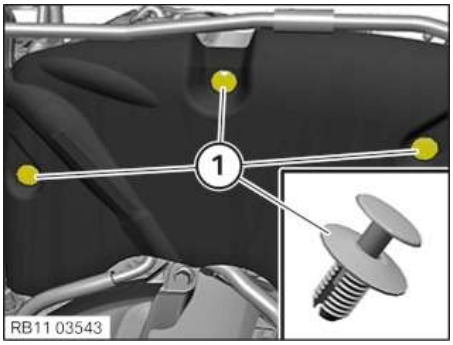
- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

12 – Remove the acoustic cover for the injectors

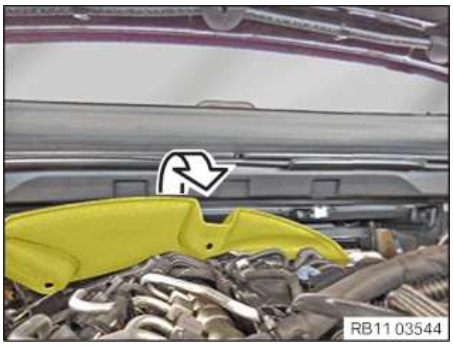


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

13 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).



- Guide out and remove the acoustic cover in the direction of the arrow.

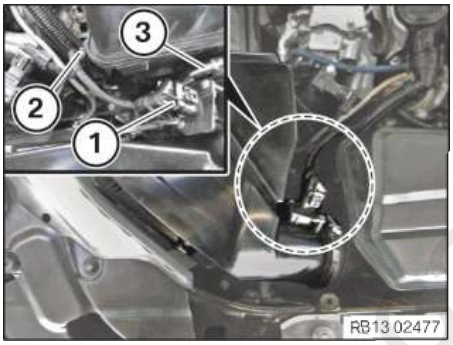
14 – Removing the clean air pipe with the resonator

WARNING

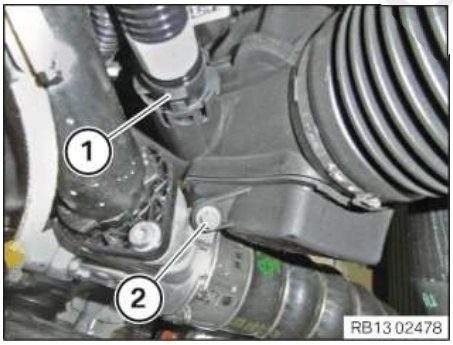
Hot surfaces.

Risk of burning!

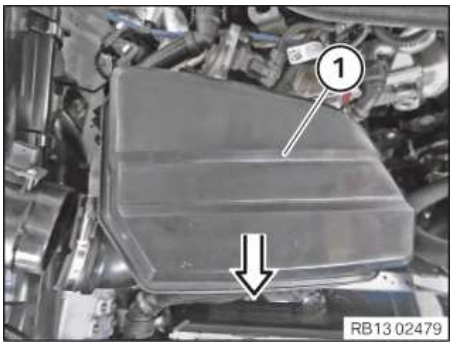
- Perform all work only on components that have cooled down.



- Unlock plug connection (1) and disconnect.
- Loosen clamp (2).
- Unfasten clamp (3).
- Separate the clean air pipe with resonator from the intake filter housing.



- Unlock engine ventilation line (1), disconnect it and place it aside.
- Loosen screw (2).



- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Unlock and loosen clamp (1).



- Feed out and remove clean air pipe with resonator (1) in the direction of the arrow.

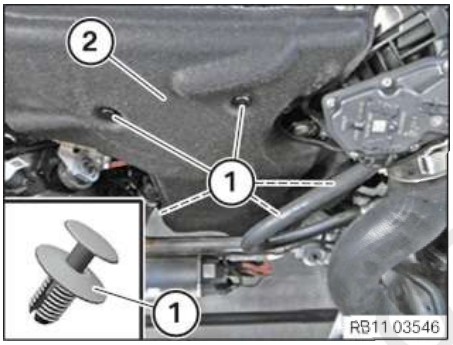
15 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

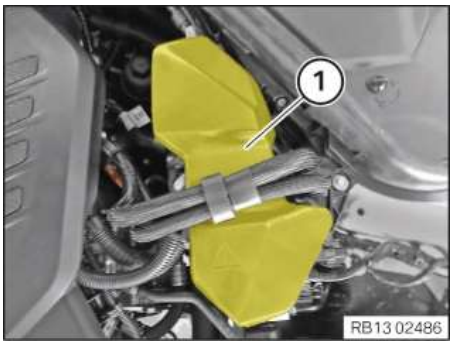
Risk of burning!

- Perform all work only on components that have cooled down.



- Release and remove expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

16 – Remove the cover for the DDE control unit



- Pull off, guide out and remove cover (1) upwards.

17 – Partially releasing the wiring harness section on the intake plenum

cardiagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

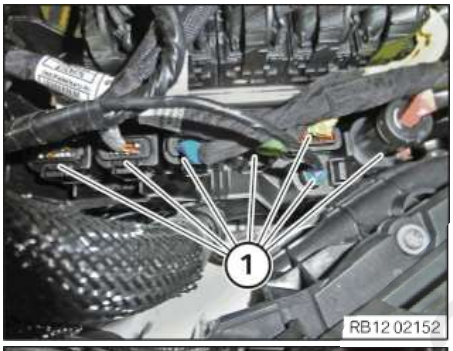
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

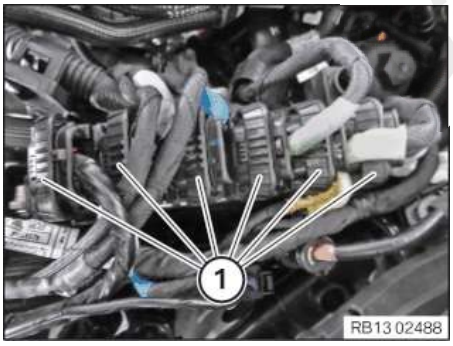
- Do not pull on the wires when disconnecting connectors and plug connections.

TECHNICAL INFORMATION

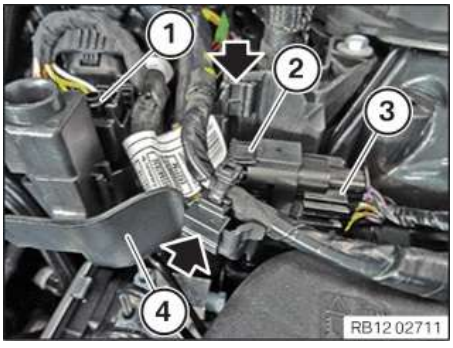
Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.



- Unlock and disconnect plug connections (1).

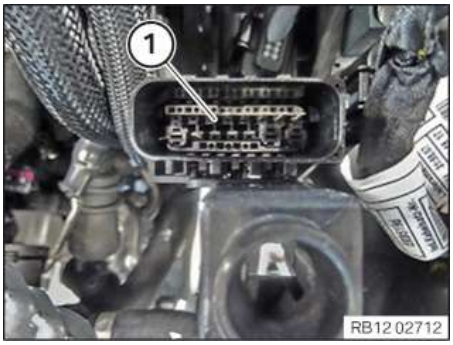


- Unlock and disconnect plug connections (1).

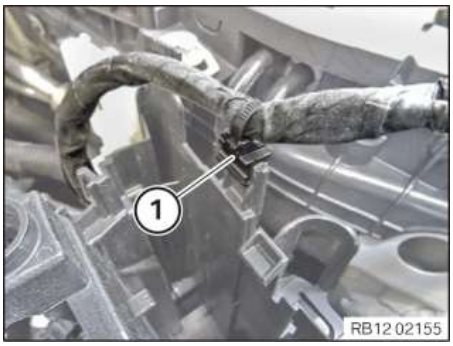


- Unlock plug connection (1) and disconnect.
- Unlock plug connection (2) and disconnect.
- Release the connector (3) and disconnect from the control unit holder (4).
- Release the clamps (arrows).

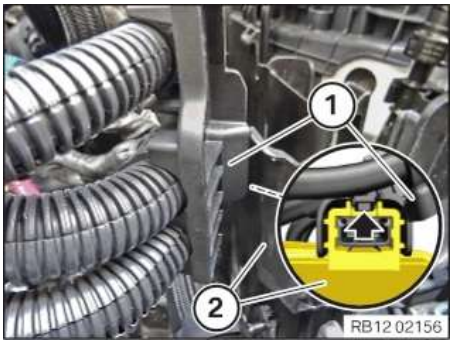
cardiagn.com



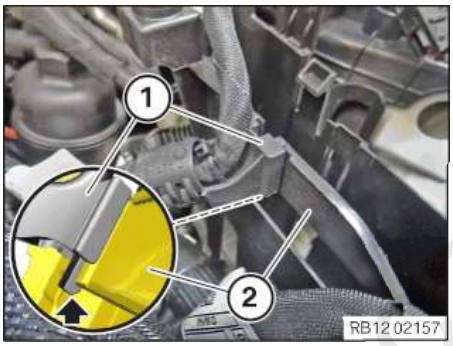
- Unlock plug connection (1) and disconnect.



- Loosen clamp (1).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).

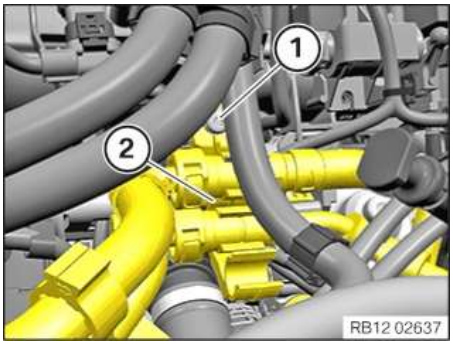


- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.

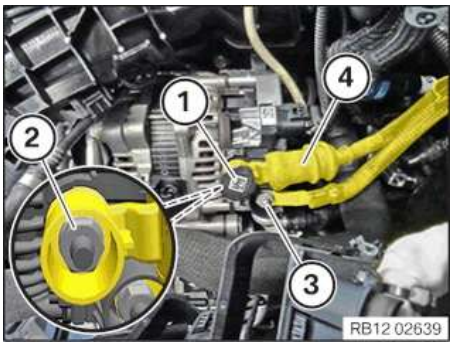


- Unlock holder (1) and feed out coolant line (2) and place it aside.

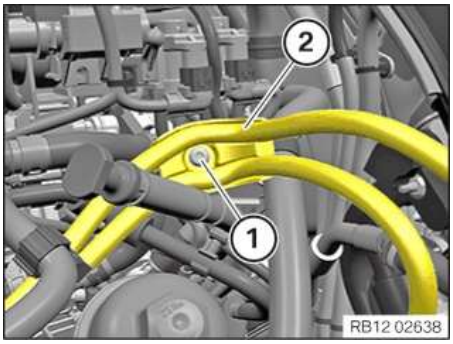
cardiagn.com



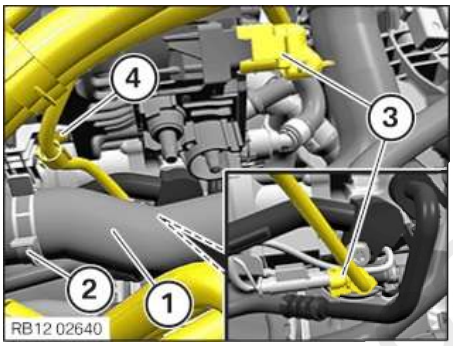
- Release the screw (1).
- Guide out fuel lines (2) and set them aside.



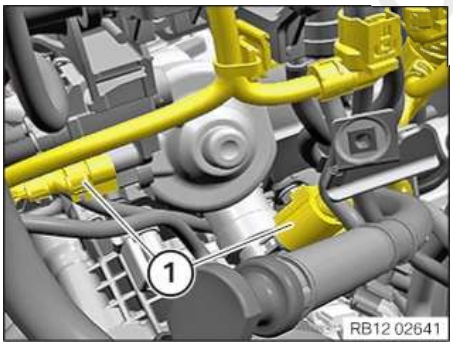
- Guide out and remove the lid (1).
- Release the nuts (2) and (3).
- Feed out positive battery cables (4) and place to one side.



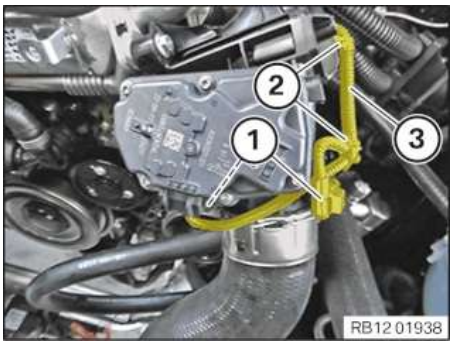
- Release the screw (1).
- Guide out the positive battery cables (2) and set them aside.



- Release the coolant line (1) from the holder (2) .
- Unlock plug connections (3) and disconnect.
- Loosen clamp (4).



- Unlock and disconnect plug connections (1).



- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.

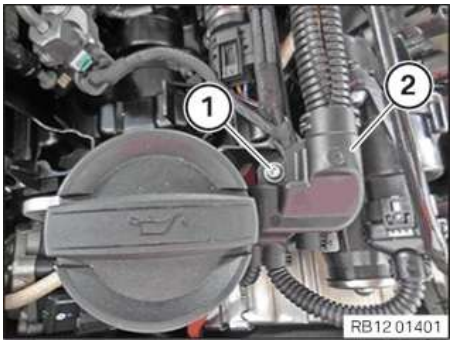
cardiagn.com



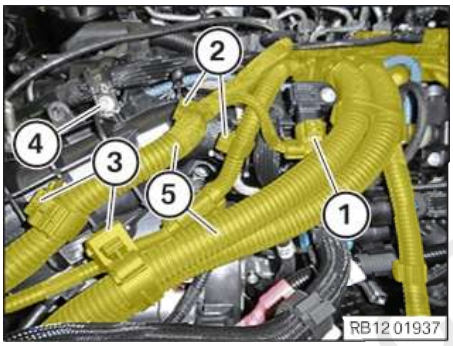
- Unlock and loosen connector (1).



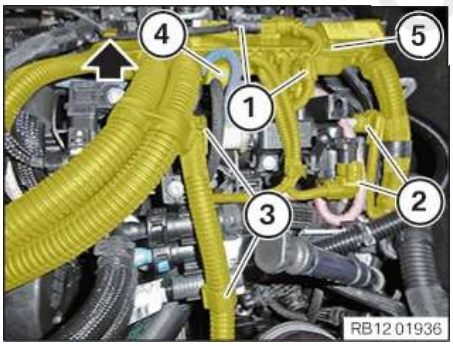
- Unlock plug connection (1) and disconnect.



- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.



- Unlock plug connection (1) and disconnect.
- Loosen clamps (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.



- Unlock and disconnect plug connections (1).
- Release line from clamp (Arrow).
- Unlock and disconnect plug connections (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.

18 – Removing the intake plenum

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

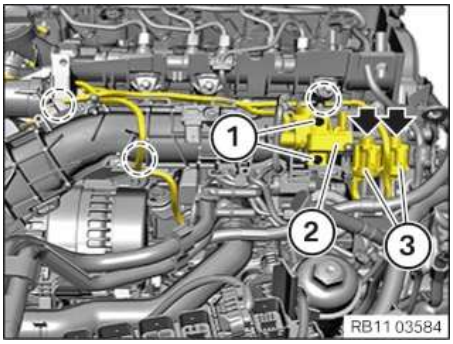
cardiagn.com



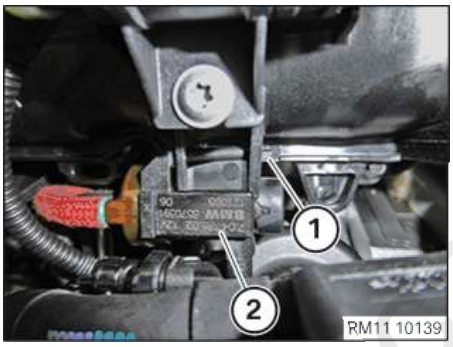
- Unlock clamp (1) and engage in this position.



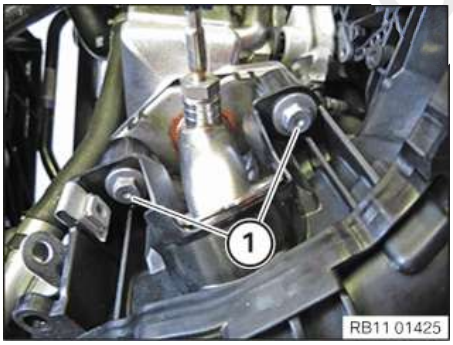
- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.



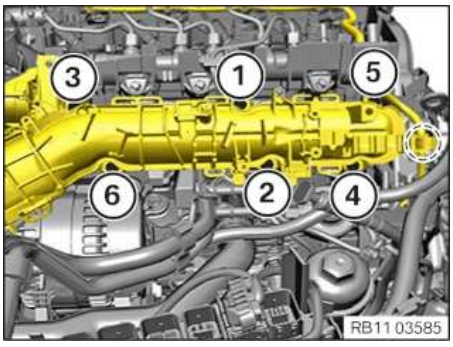
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.

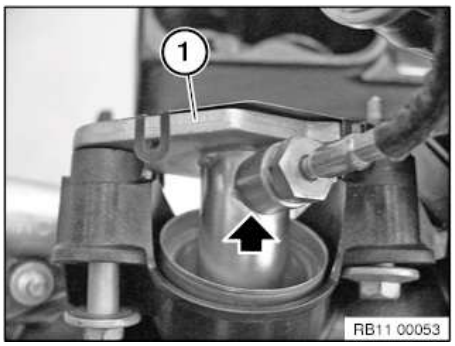


- Loosen screws (1).



- Detach the leakage oil lines in the marked area from the intake plenum.
- Loosen screws in the order (6) to (1).
- Guide the intake plenum out forwards and remove it.

cardiagn.com



- Remove the exhaust-gas recirculation pipe (1) (arrow).

19 – Detaching the leakage oil line from the injectors

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

WARNING

Hot surfaces.

Risk of burning!

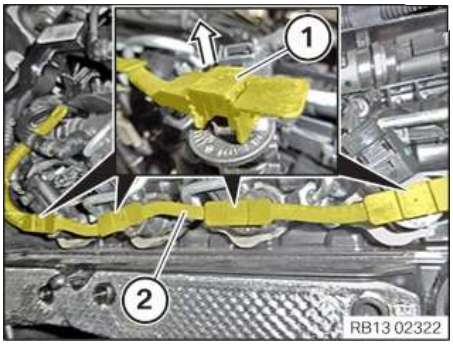
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

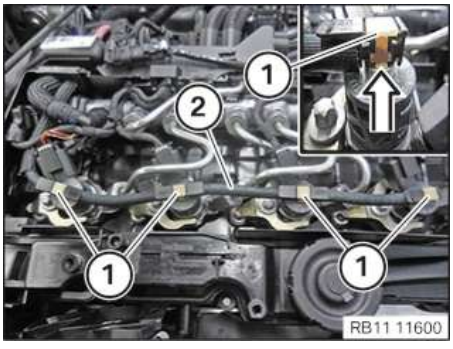


- **Version A:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.



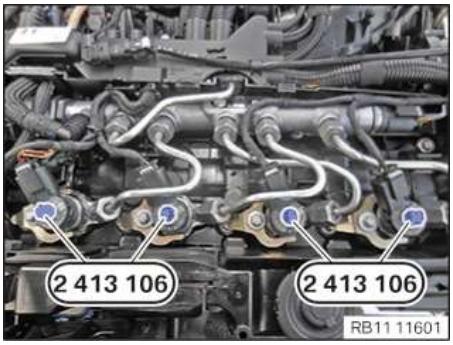
- **Version B:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.

cardiagn.com



- Seal open connections with special tools .

20 – Remove the high pressure lines between the injector and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

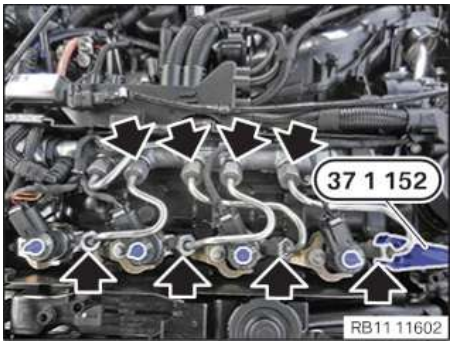
TECHNICAL INFORMATION

If several high pressure lines are removed, ensure that each high pressure line is installed in its original location. Label high pressure lines.

cardiagn.com

TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.



- Release the high pressure lines (arrows) with the special tool .
  Reset the special tool early on to prevent bending of the high pressure line.
- Catch and dispose of escaping fuel.
- Feed out and remove the high pressure lines (arrows).
- Seal off all the open cable connections with the special tool .

21 – Remove the high pressure line between the high pressure pump and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Hot fluids.

Risk of scalding!

- Conduct all work in the vehicle wearing appropriate personal protective equipment only.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

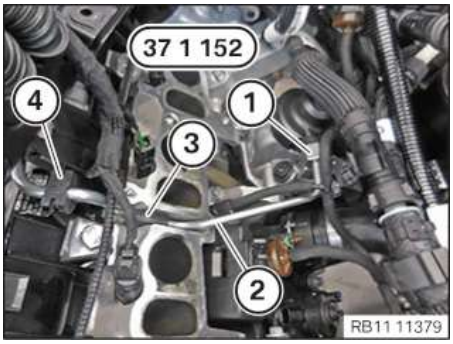
cardiagn.com

TECHNICAL INFORMATION

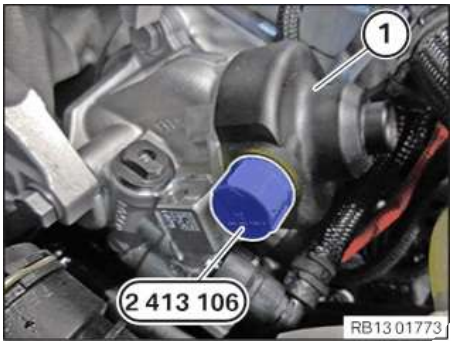
Reset special tool in early to avoid bending pressure lines.



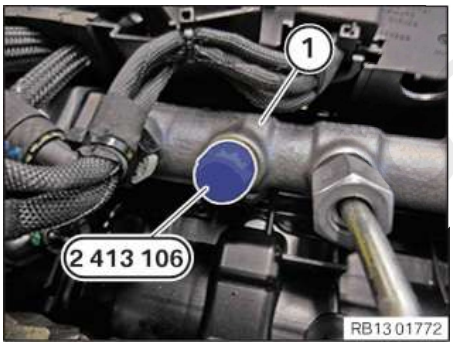
- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.



- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.
- Guide out and remove the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).



- Seal off the opening at the high pressure pump (1) with the special tool .



- Seal off the opening on the rail (1) with the special tool .

22 – Remove high-pressure rail

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

cardiagn.com

RISK OF DAMAGE

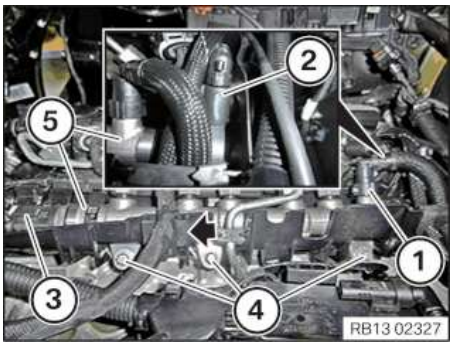
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Unlock and disconnect the fuel return line (1).
- Guide the fuel return line (1) out and set it aside.
- Unlock and disconnect the plug connection (2) on the rail pressure regulating valve.
- Unlock and disconnect the plug connection (3) on the rail pressure sensor.
- Unlock cable clip (Arrow), feed out and place aside.
- Loosen screws (4).
- Thread out and remove the rail (5).

23 – Remove all injection systems

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

cardiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

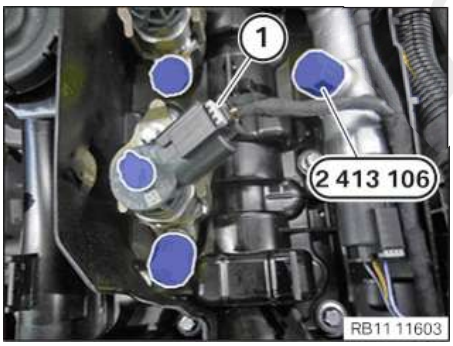
Electrostatic discharge.

Damage to or destruction of electrical components.

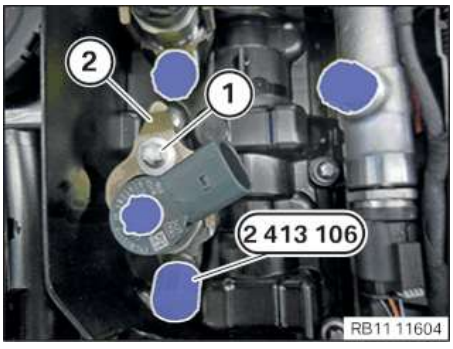
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

TECHNICAL INFORMATION

If several injectors are removed, ensure that each injector is installed at its original location (cylinder). Mark injectors.



- Unlock plug connection (1) and disconnect.



- Loosen screw (1).
- Guide out and remove clamping claw (2).
- Feed out and remove the injector with slight rotational movements.

▸ **Loosen stuck injectors**

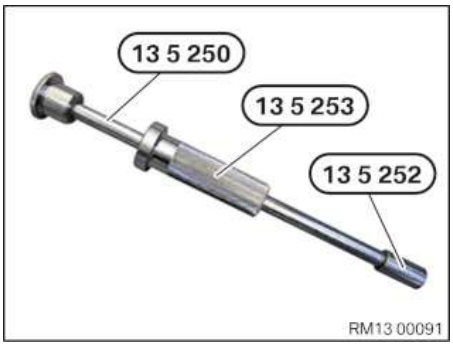
carsdiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

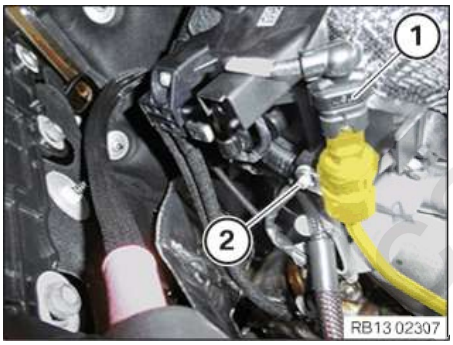


- Unscrew special tool 0 493 339 (13 5 252) from special tool 0 493 321 (13 5 250) and remove special tool 0 493 340 (13 5 253).
- Screw special tool 0 493 339 (13 5 252) back onto special tool 0 493 321 (13 5 250).

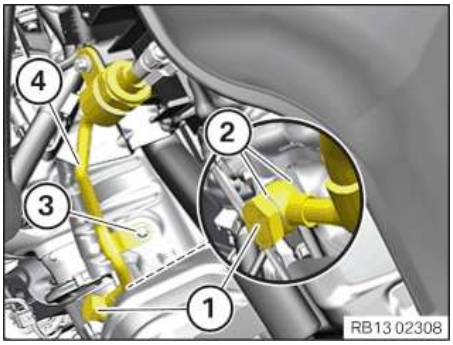


- Screw special tool 0 493 321 (13 5 250) with special tool 0 493 339 (13 5 252) onto pressure line connection (1) of injector.
- Release injector (1) with special tools 0 493 321 (13 5 250) and 0 493 339 (13 5 252) by means of **short** back and forth movements and remove.

24 – Remove the exhaust gas pressure pipe



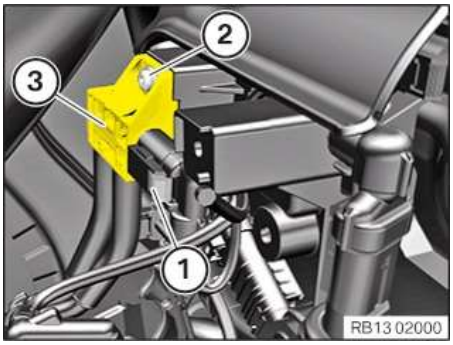
- Unlock plug connection (1) and disconnect.
- Loosen screw (2).



- Unscrew the banjo bolt (1).
- Feed out and remove the sealing rings (2).
- Loosen screw (3).
- Feed out and remove the exhaust gas pressure pipe (4).

25 – Releasing the differential pressure sensor for the diesel particulate filter

cardiagn.com



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).
- Remove the differential pressure sensor (3) and put it to one side.

26 – Removing the sensor bracket on the cylinder head cover

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

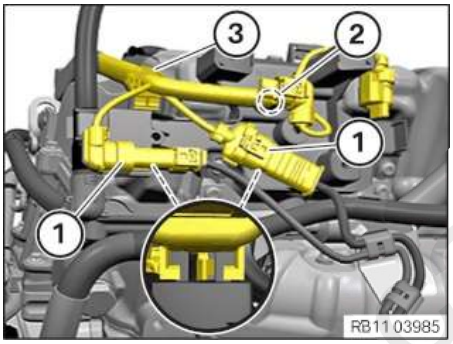
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

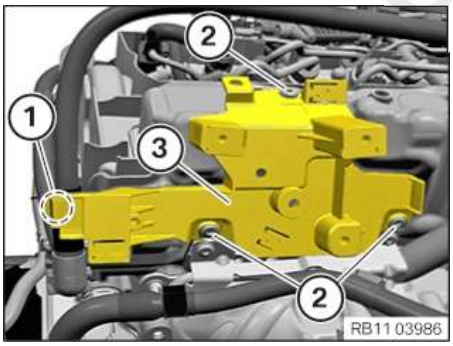
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Unlock plug connection (1) and disconnect.
- Unlock the plug connection (1) and release it from the sensor bracket.
- Release the cable clip in the area (2) from the sensor bracket.
- Release the clamps (3) and set the wiring harness section aside.

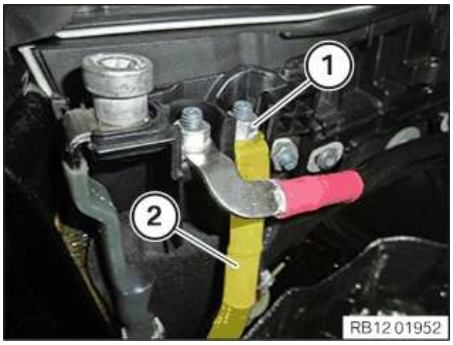


- Release the positive battery cable in the area (1) from the clamp and set it aside.
- Loosen screws (2).
- Feed out holder (3) for the sensor system and remove.

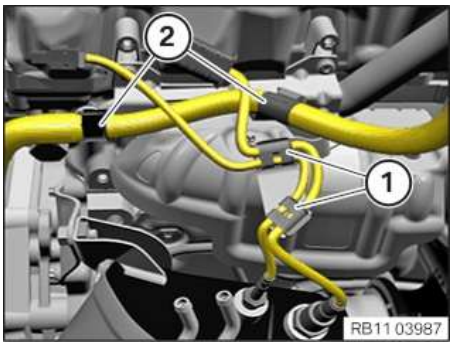


- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.

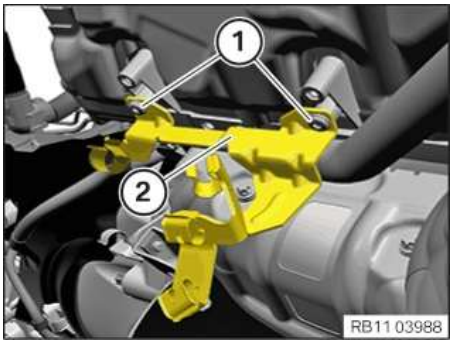
cardiagn.com



- Loosen nut (1).
- Feed out positive battery cable (2) and put to one side.

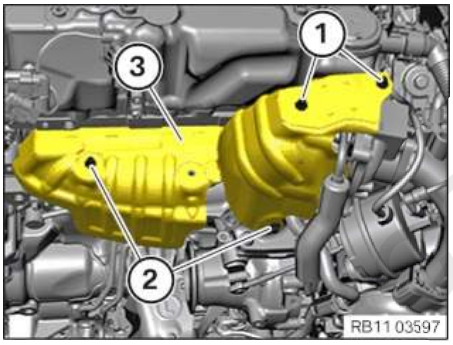


- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



- Loosen screws (1).
- Guide out and remove holder (2).

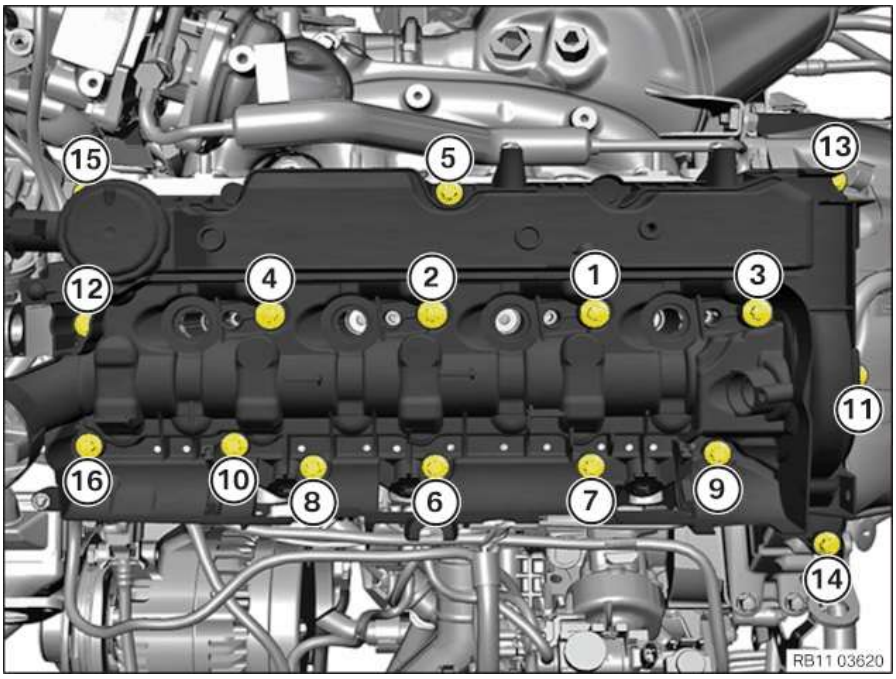
27 – Removing heat shield



- Loosen screws (1).
- Loosen screws (2).
- Feed out and remove the heat shield (3).

28 – Removing the cylinder head cover

Screw connection of the cylinder head cover



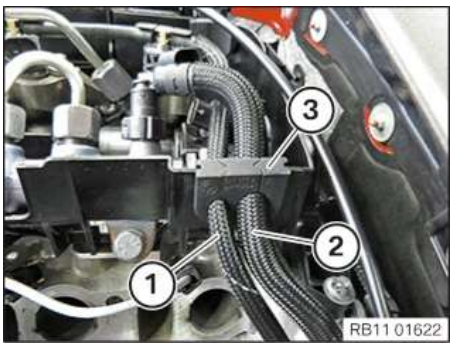
1 - 16 Bolts of the cylinder head cover



- Unlock and detach the locks.
- Feed the engine ventilation line (1) out and set it aside.

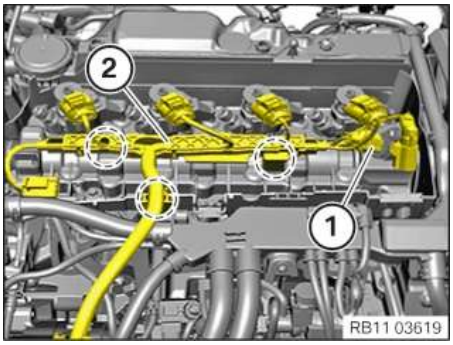


- Feed out and remove the heat shield (1).

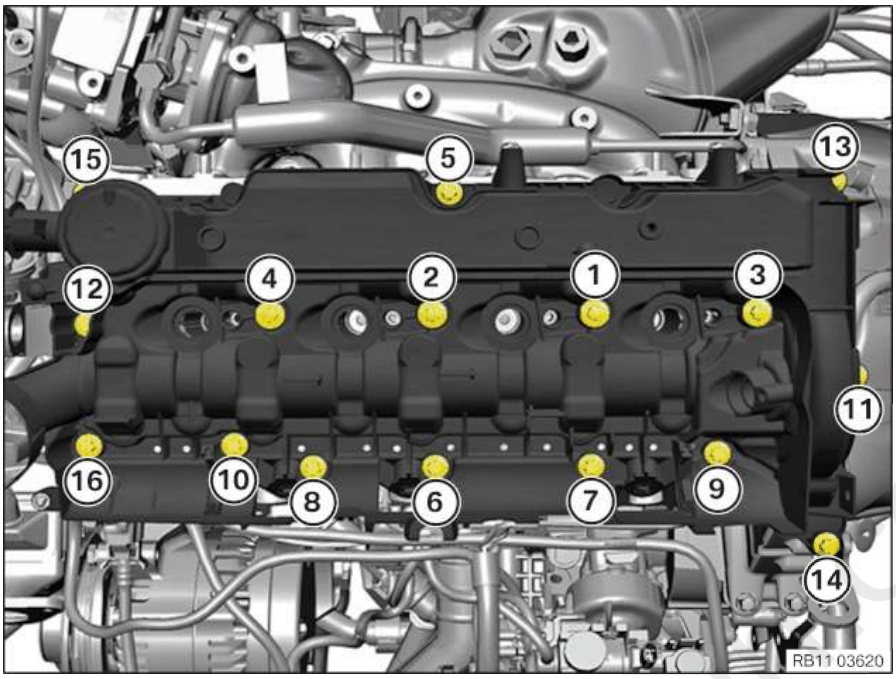


- Remove the leakage oil line (1) including the fuel return line (2) and the grommet (3) and put to one side.

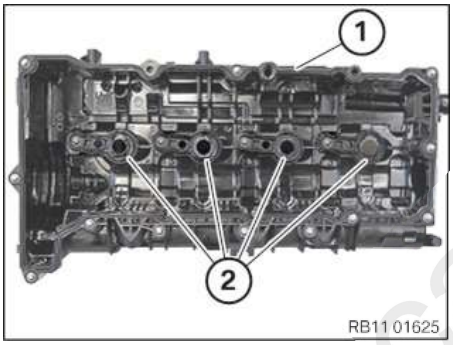
cardiagn.com



- Unlock connector (1) and pull off.
- Disconnect the wiring harness (2) in the marked areas from the cylinder head cover and set aside.

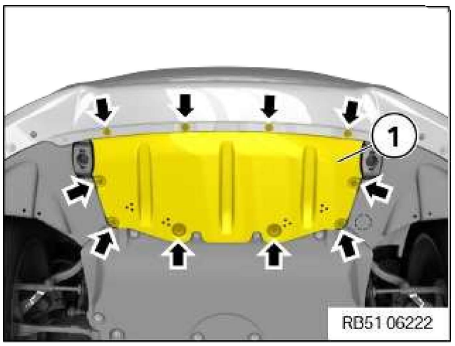


- Evenly loosen the screws in a sequence from (16) to (1).
- Feed out and remove the cylinder head cover.



- Remove the profile seals (1) and (2).

29 – Removing the front underbody protection

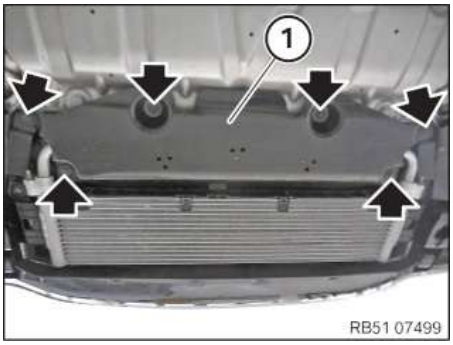


- **Version A:**

  Remove screws (arrows).

  Feed front underbody protection (1) backwards out of the bumper panel.

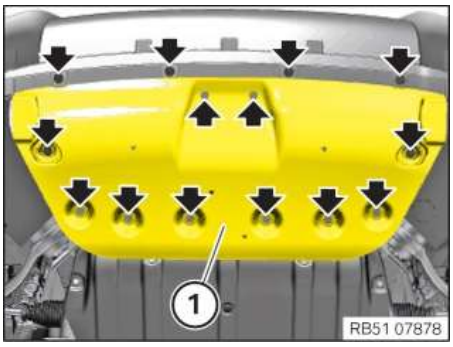
cardiag.com



- **Version B:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

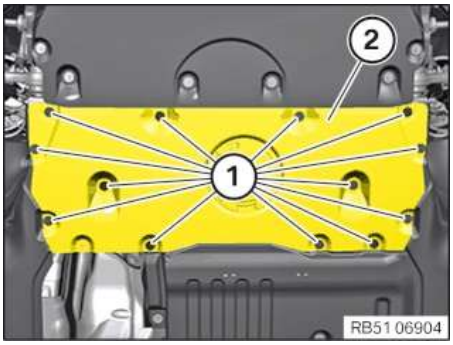


- **Version C:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

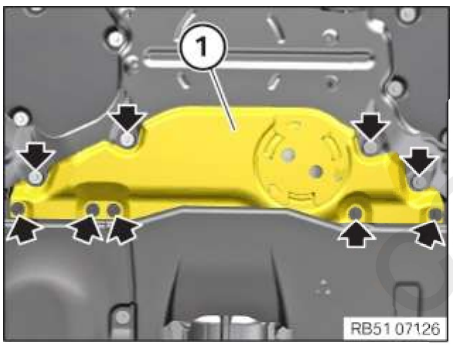
30 – Removing the centre underbody protection



- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .

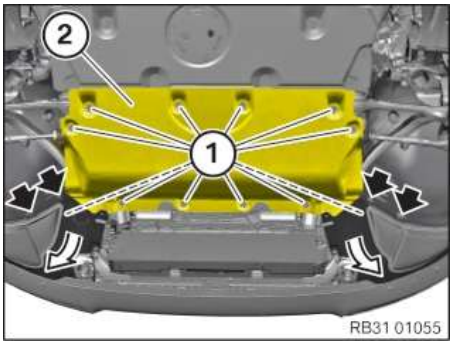


- **Version with all-wheel drive:**

  Remove screws (arrows).

  Feed out and remove the centre underbody protection (1).

31 – Remove the underbody protection of the steering gear



- **Version A:**

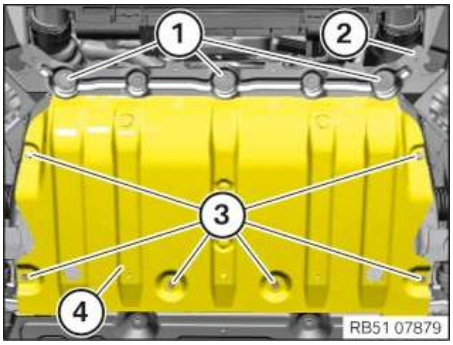
  Unscrew the screws (arrows) of the wheel arch cover on the wheel arch cover.

  Fold the bottom wheel arch cover to the side.

  Loosen screws (1).

  Remove the underbody protection (2) of the steering gear.

carsign.com



- **Version B:**

  Loosen screws (1).

  Remove the holder (2) for the underride protection.

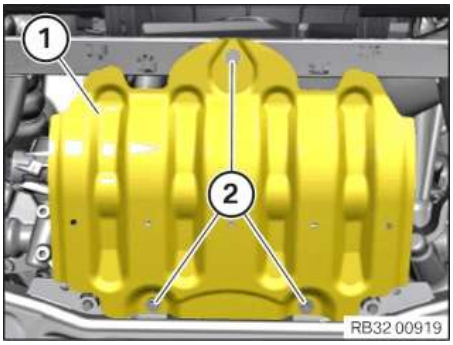
  Loosen screws (3).

  Feed out and remove the underbody protection (4) of the steering gear.

32 – If installed: Removing the steering underbody protection

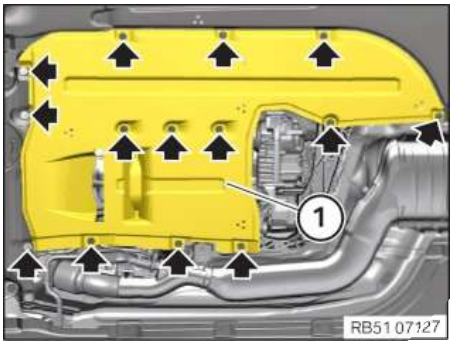
Prerequisite

Front underbody protection has been removed.



- Loosen screws (2).
- Remove underbody protection (1).

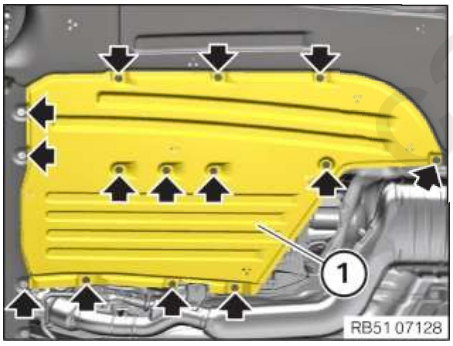
33 – Remove rear underbody protection



- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).



- **Version B:**

  Remove screws (arrows).

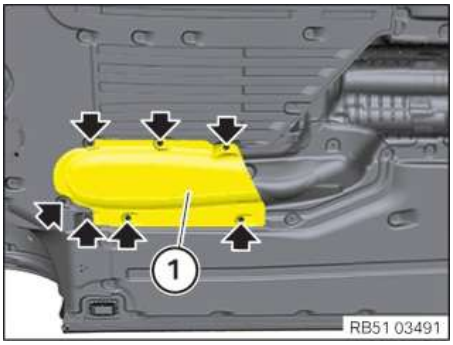
  Guide out rear underbody protection (1) and remove it.

34 – Remove the underbody panelling of the transmission on the side

NOTICE

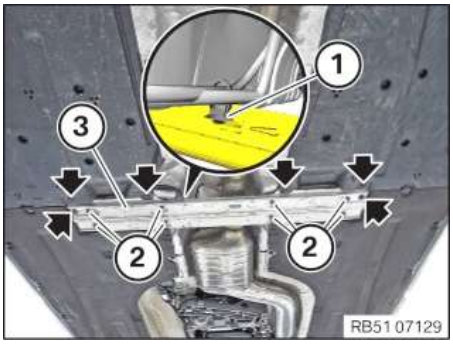
The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

cardiagn.com



- Remove screws (arrows).
- Remove the underbody panelling (1).

35 – Remove the connecting support from the tunnel



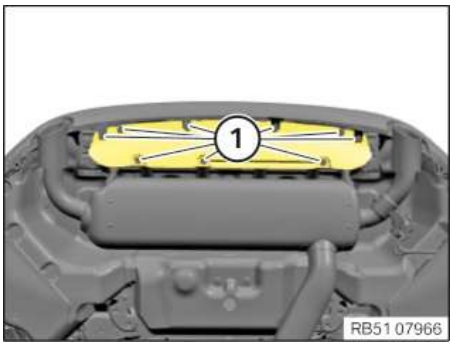
- Remove screws (arrows).

NOTICE

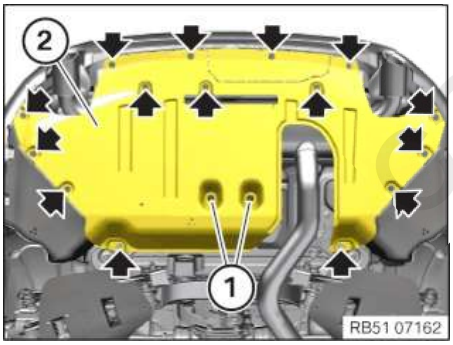
The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Loosen clamp (1).
- Loosen screws (2).
- Guide out and remove connecting support (3) on the tunnel.

36 – Removing the rear diffuser



- **Version 1:**
- Release the screws and nuts (1).
- Remove the diffuser.



- **Version 2:**
- Loosen nuts (1).
- Remove screws (arrows).
- Guide out and remove rear diffuser (2).

37 – Remove exhaust system

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

cardiagn.com

CAUTION

Component with heavy weight.

Danger of injury!

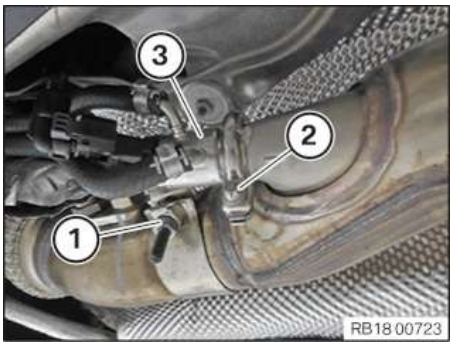
- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

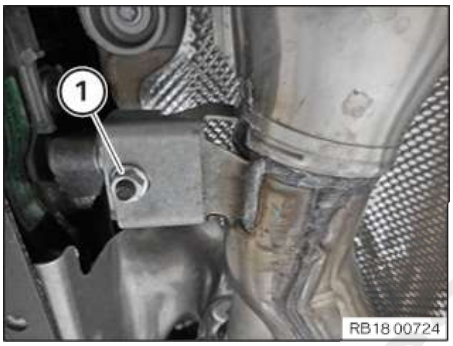
Heavy component.

Heavy components can lead to injury or damage.

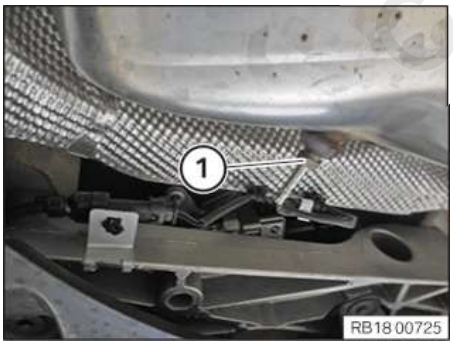
- Remove and install heavy components with the aid of another person/other persons.



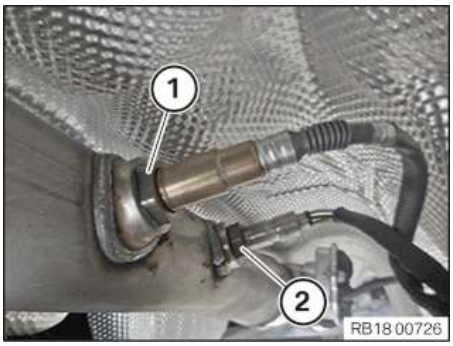
- Unfasten clamp (1).
- Detach the clamp (2) of the SCR metering module (3).
- Detach the SCR metering module (3)from the exhaust system and place to one side.



- Loosen nut (1).

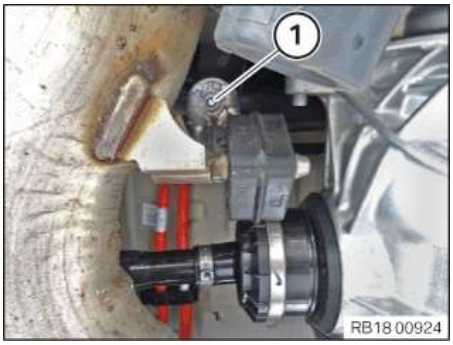


- Detach the exhaust temperature sensor (1) from the exhaust system.

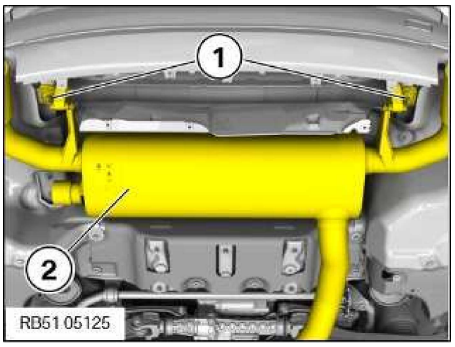


- Release the diesel particulate sensor (1) from the exhaust system and place to one side.
- Release the nitrogen oxide sensor (2) from the exhaust system and place to one side.

cardiagn.com



- Release the nut (1) on the rear axle support.



- Loosen nuts (1).
- Lower and remove the exhaust system (2) with the assistance of a second person.

38 – Removing the monitoring oxygen sensor after the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

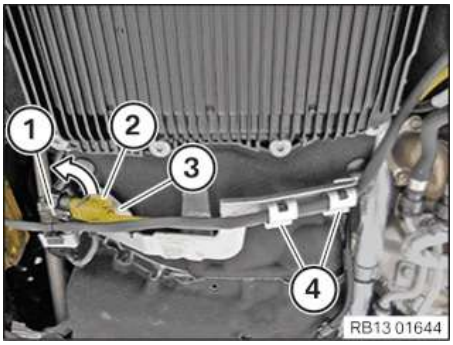
RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
- The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

cardiagn.com



- Unlock and loosen connector (1).
- Loosen connector (2) from the holder (3) in direction of arrow.
- Release the monitoring oxygen sensor from the clamps (4).



- Release the monitoring oxygen sensor (1) with the standard tools.



- Thread out the monitoring oxygen sensor (1) and remove it.

39 – Removing the nitrogen oxide sensor before SCR catalytic converter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

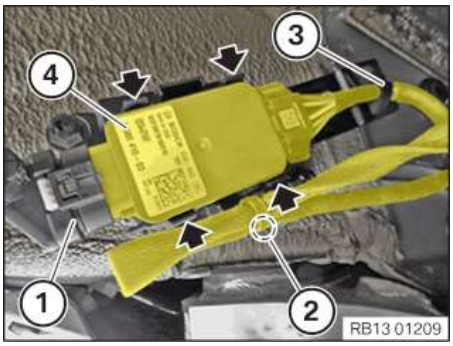
cardiagn.com

RISK OF DAMAGE

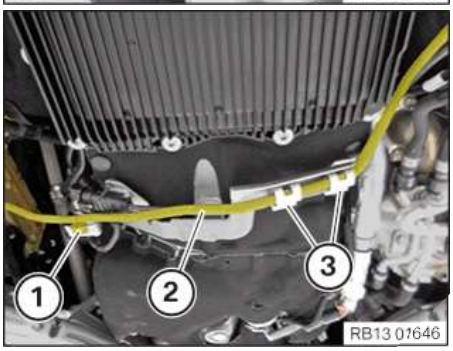
Damage to the nitrogen oxide sensor.

Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

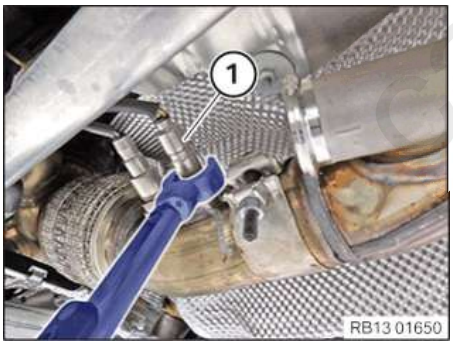
- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



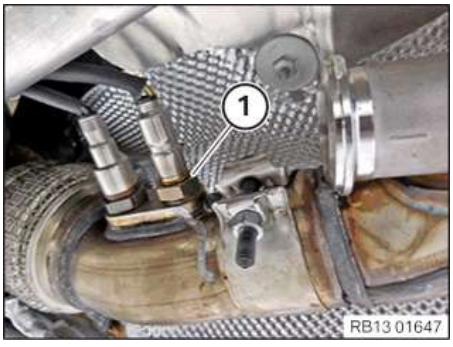
- Unlock plug connection (1) and disconnect.
- Release cable clip in area (2).
- Release line from the holder (3).
- Unclip control unit (4).



- Loosen clamp (1).
- Loosen the cables (2) from the clamps (3).



- Loosen the nitrogen oxide sensor (1) using commercially available tools.



- Feed out and remove the nitrogen oxide sensor (1).

cardiagn.com

WARNING

Hot surfaces.

Risk of burning!

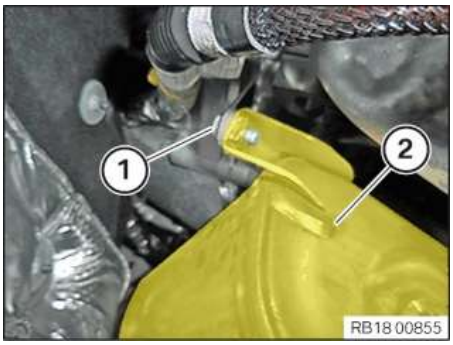
- Perform all work only on components that have cooled down.

CAUTION

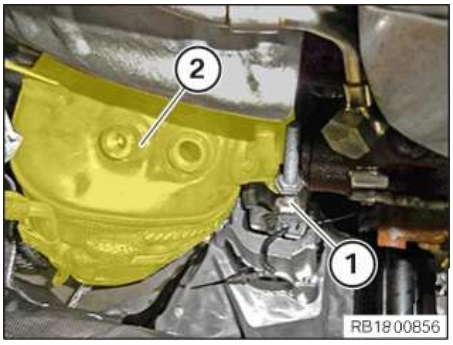
Heavy component.

Heavy components can lead to injury or damage.

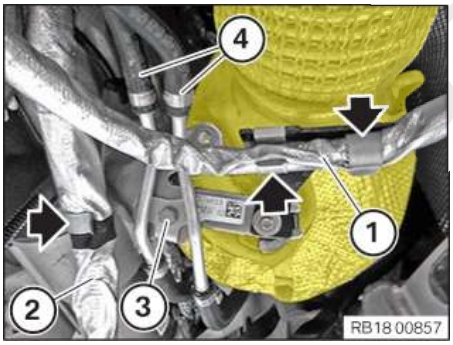
- Remove and install heavy components with the aid of another person/other persons.



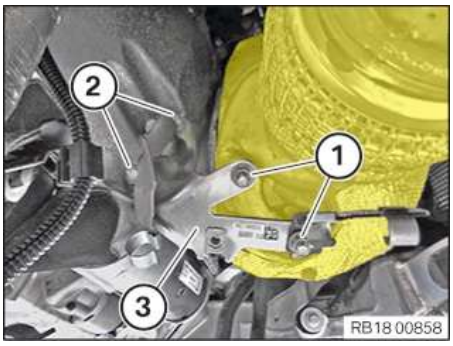
- Release bolt (1) from the holder of diesel particulate filter (2).



- Loosen V-band clamp (1).
- Feed V-clip (1) out from diesel particulate filter (2) and remove.

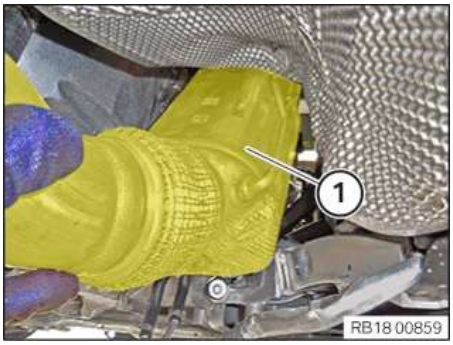


- Release the metering line (1) from clamps (Arrows).
- Release positive battery cable (2) from starter motor from clamp (Arrow).
- Loosen screw (3).
- Thread off coolant line (4) and place to the side.



- Loosen nuts (1).
- Loosen screws (2).
- Guide out and remove holder (3).

cardiagn.com



- Guide out and remove diesel particulate filter (1).

41 – Removing starter motor

Prerequisite

Battery earth leads are disconnected.

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

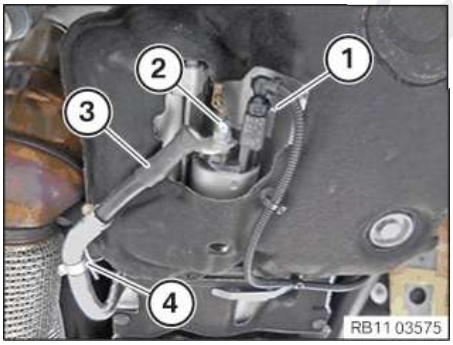
Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

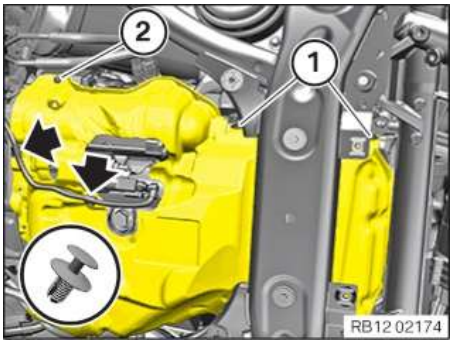
- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

TECHNICAL INFORMATION

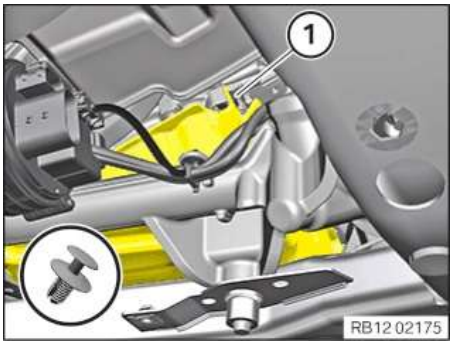
Make sure that the acoustic cover is **not** damaged while removing the starter motor.
A damaged lower acoustic cover can only be renewed when the front axle is lowered.



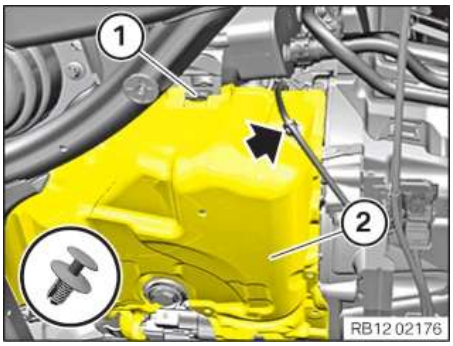
- Unlock plug connection (1) and disconnect.
- Release nut (2).
- Release positive battery cable (3) from holder (4).



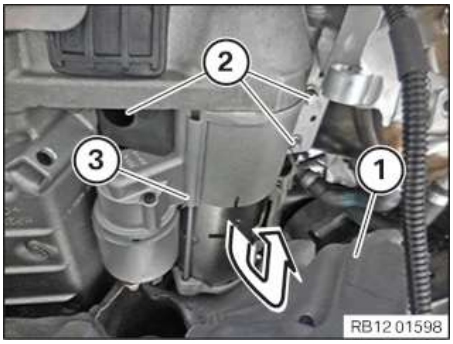
- Loosen the expanding rivet (1).
- Undo fir tree clip (2).
- Release the clamps (arrows).



- Loosen expanding rivet (1).
- Lower the acoustic cover of the oil sump.



- Loosen expanding rivet (1).
- Loosen the clamp (arrow).
- Lower acoustic cover (2).



- Make sure that the acoustic cover (1) is not damaged.
- Carefully press acoustic cover (1) to one side.
- Loosen screws (2).
- Carefully guide out the starter motor (3) in direction of arrow and remove.

42 – Checking camshaft timing



RISK OF DAMAGE

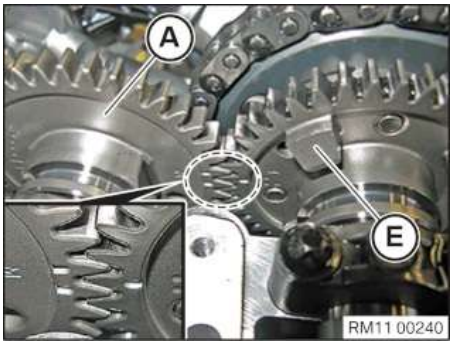
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

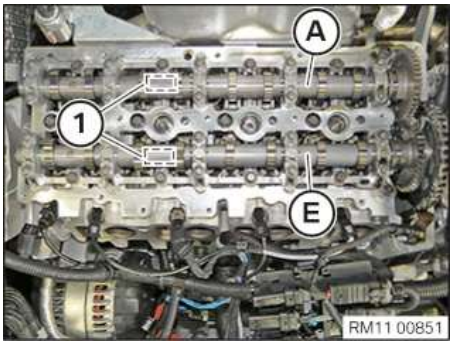
- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

  Do **not** crank the engine in reverse.

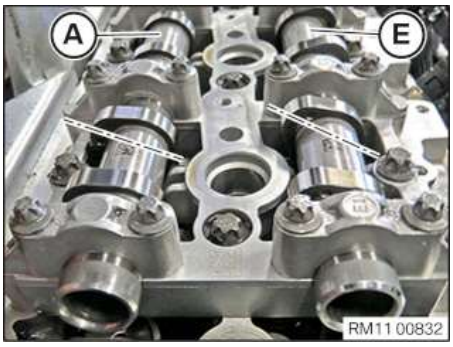


- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.

bardiagn.com



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.

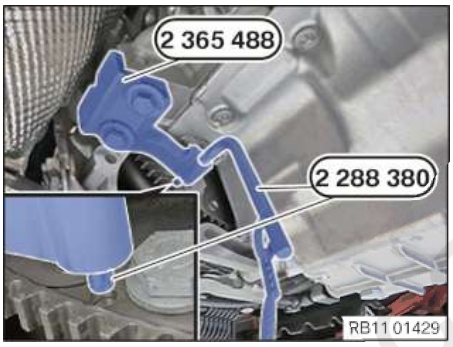


- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

43 – Remove chain tensioner piston

RISK OF DAMAGE

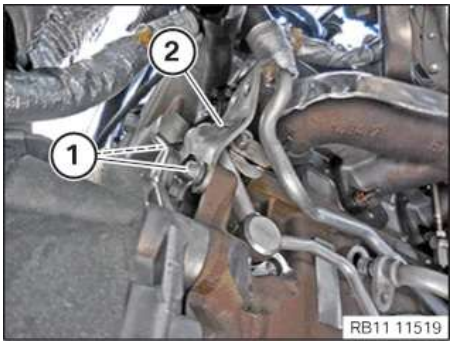
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

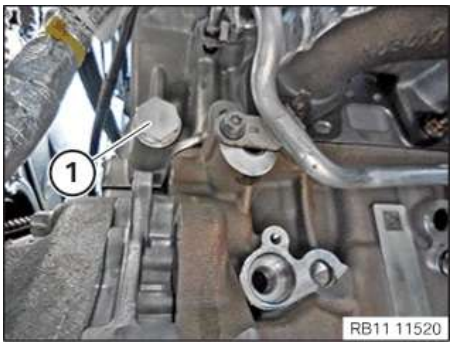
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Loosen screws (1).
- Guide out and remove holder (2).

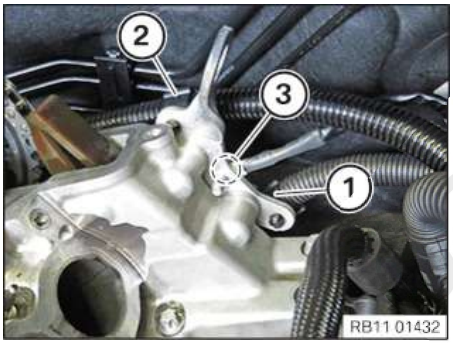


- Loosen the chain tensioner piston (1).
- Catch and dispose of emerging engine oil.

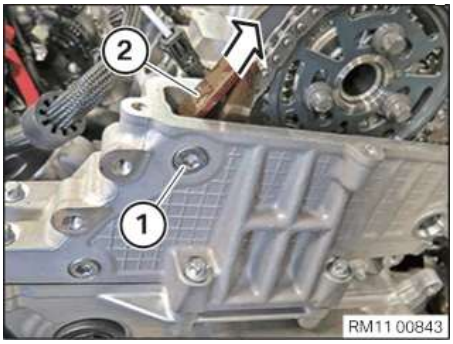


- Feed out and remove the sealing ring (1).

44 – Remove the timing chain guide rail

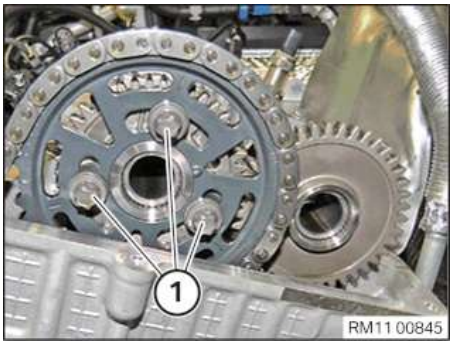


- Loosen the vehicle wiring harness (1) from the bracket.
- Release the positive battery cable (2) from the holder .
- Loosen the screw (3) and remove the grounding cable.



- Remove the bearing journal (1).
- Remove the guide rail (2) in the direction of the arrow.

45 – Removing the camshaft sprocket on the intake camshaft



- Loosen screws (1).
- Secure the drive chain against falling.
- Remove the camshaft sprocket on the intake camshaft.

46 – Removing the special tool for fixing the exhaust camshaft



- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

MAIN WORK

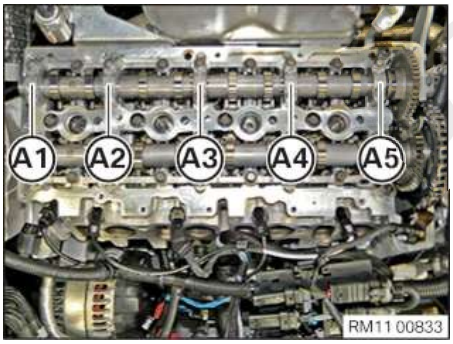
47 – Remove exhaust camshaft.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

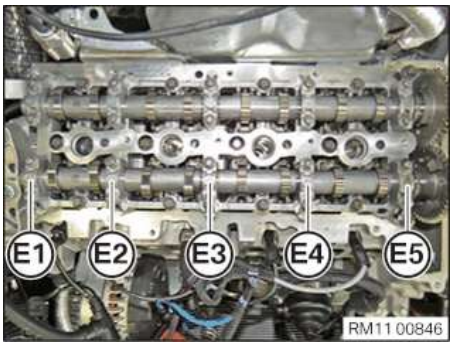


TECHNICAL INFORMATION

The camshaft is tensioned by the valve springs. Tighten or loosen each screw on the camshaft bearing caps one at a time in the specified sequence and by half a turn only. Repeat procedure.

- Release all the screws of the exhaust camshaft bearing cap (A1) to (A5) from the outside to the inside in half turns.
- Remove exhaust camshaft in upward direction.
- Place all components on special tool 0 495 105 (11 4 480) in a tidy and orderly fashion.

48 – Remove intake camshaft

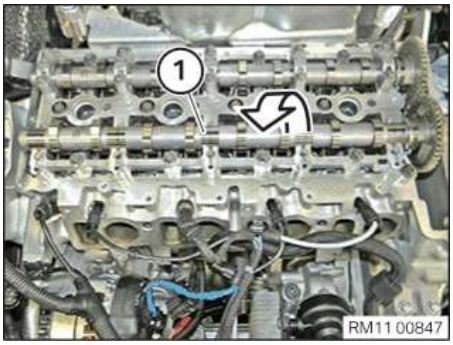


TECHNICAL INFORMATION

The camshaft is tensioned by the valve springs. Tighten or loosen each screw on the camshaft bearing caps one at a time in the specified sequence and by half a turn only. Repeat procedure.

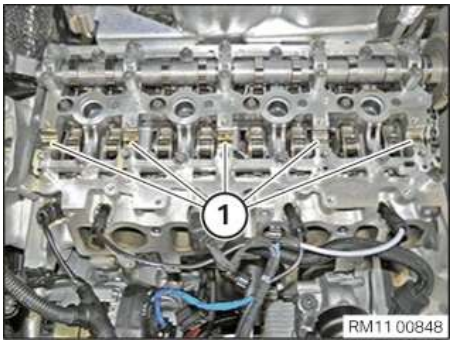
- Loosen all screws of the intake camshaft bearing caps (E1) to (E5) from the outside towards the inside by 1/2 a turn at a time.
- Place all components on special tool 0 495 105 (11 4 480) in a tidy and orderly fashion.

bordiagn.com

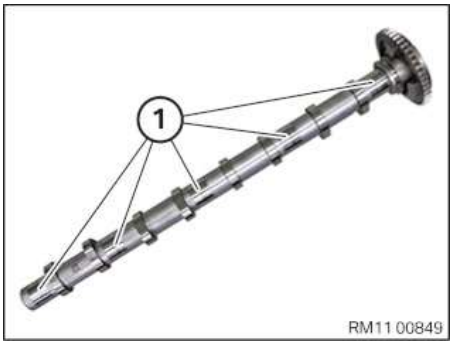


- Remove the intake camshaft (1).

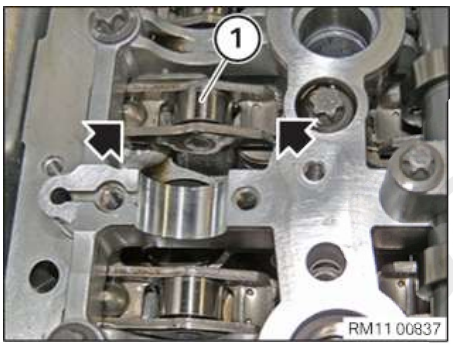
49 – Install intake camshaft



- Oil all bearing positions (1).



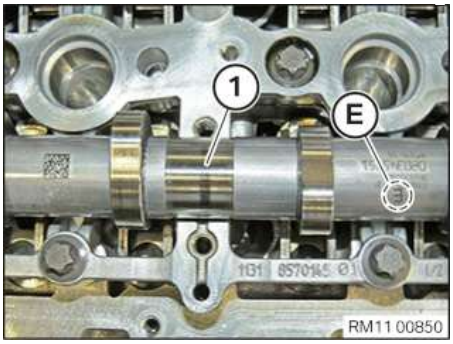
- Oil all the bearing positions (1) of the intake camshaft.



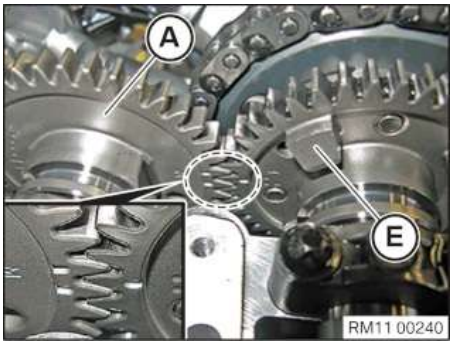
TECHNICAL INFORMATION

The rocker arms may slip slightly when the camshaft is positioned. Make sure rocker arms are correctly positioned on the hydraulic valve clearance compensating elements and on valves.

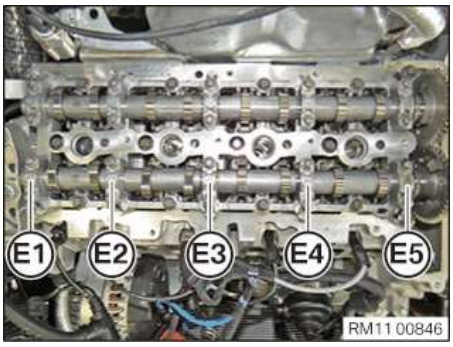
- Check the installation position of the roller cam followers (1).



- Make sure the identification (E) of the intake camshaft points upwards.
- Insert the intake camshaft (1).



- Insert the intake camshaft (A) so that the marks on the camshafts (A) and (E) coincide in the marked area.
- Position the camshafts (A) and (E) correspondingly.

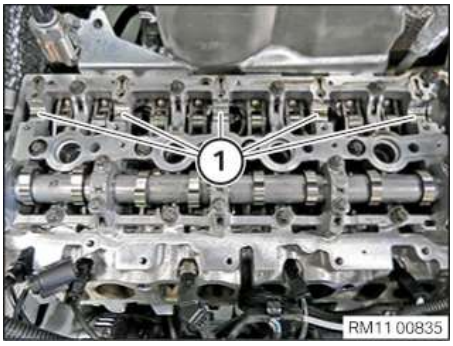


- Tighten all intake camshaft bearing caps (E1) to (E5) from the inside to the outside by 1/2 a turn at a time.

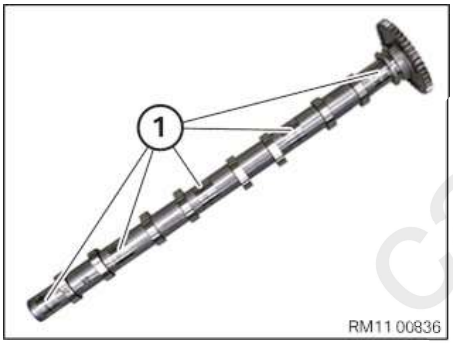
Intake and exhaust camshaft in camshaft support

M6x31		Tightening torque	10 Nm

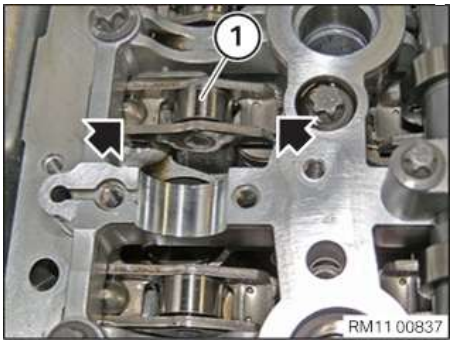
50 – Install exhaust camshaft



- Oil all bearing positions (1).



- Oil all bearing positions (1) of the exhaust camshaft.

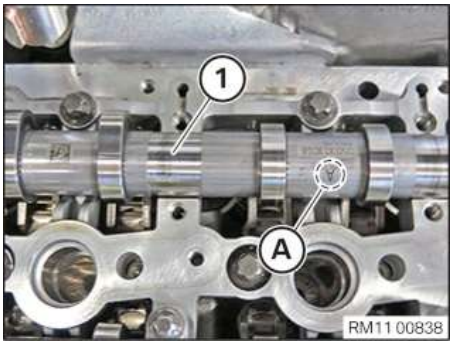


TECHNICAL INFORMATION

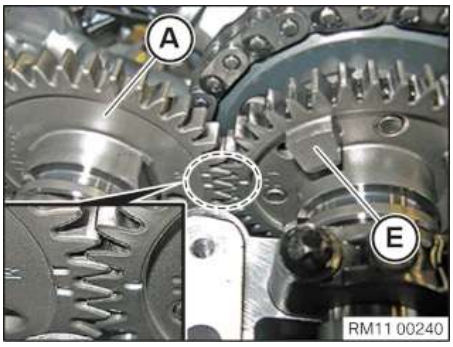
The rocker arms may slip slightly when the camshaft is positioned. Make sure rocker arms are correctly positioned on the hydraulic valve clearance compensating elements and on valves.

- Check the installation position of the roller cam followers (1).

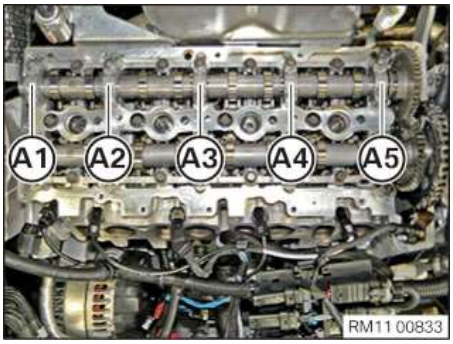
cardiagn.com



- Make sure that the identification mark (A) of the exhaust camshaft (1) points upwards.
- Insert the exhaust camshaft (1).



- Insert the exhaust camshaft (A) such that the marks on the camshafts (A) and (E) correspond in the marked area.
- Position the camshafts (A) and (E) correspondingly.



- Tighten all exhaust camshaft bearing caps (A1) to (A5) from the inside to the outside by 1/2 a turn at a time.

Intake and exhaust camshaft in camshaft support

M6x31		Tightening torque	10 Nm

POSTPROCESSES

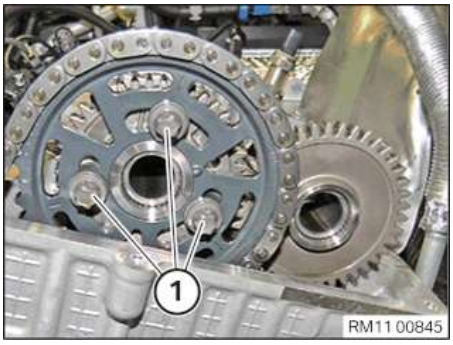
51 – Installing the special tool to secure the exhaust camshaft



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.

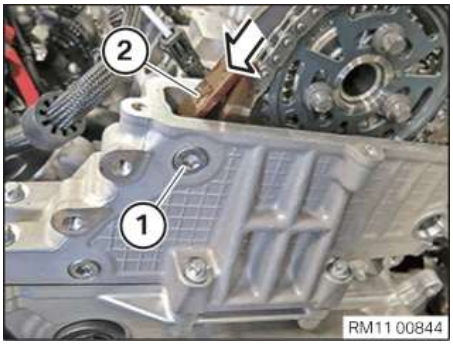
52 – Installing the camshaft sprocket on the intake camshaft



- Position the drive chain on the camshaft sprocket so that the thread of the screw connections are located in the centre of the elongated holes.
- Position the camshaft sprocket on the intake camshaft.
- Merely apply the screws (1) hand-tight so that the camshaft sprocket can still be moved in relation to the intake camshaft.

53 – Installing the guide rail of the timing chain

cardiagn.com

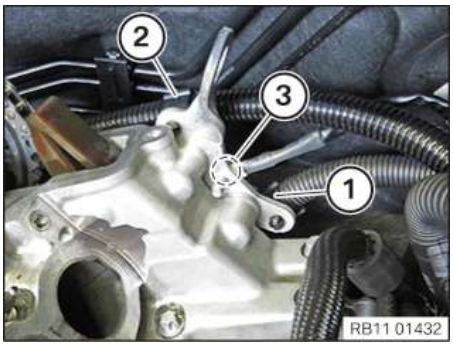


- Position the guide rail (2) in the direction of the arrow.
- Make sure the guide rail (2) is correctly installed at the bottom bearing journal.
- Renew bearing journal (1).

  Parts: Bearing journal
- Tighten the bearing journals (1).

Bearing journal to cylinder head

M16x1.5	Replace bearing journal.	Tightening torque	20 Nm



- Position the grounding cable and tighten the screw (3).

Standard screw connection M8

M8		Tightening torque	19 Nm

- Clip in the positive battery cable (2) into the bracket.
- Clip in the vehicle wiring harness (1) into the bracket.

54 – Installing the chain tensioner piston



TECHNICAL INFORMATION

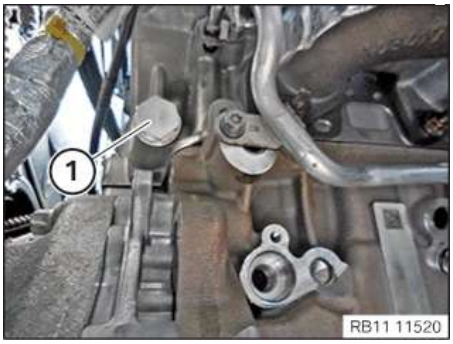
The oil chamber must be drained for reuse of the chain tensioner.

- Place the chain tensioner on a level support pad and slowly compress in the direction of arrow.
- Repeat process twice.



- Renew sealing ring (1).

  Parts: Sealing ring
- Insert and install the sealing ring (1).

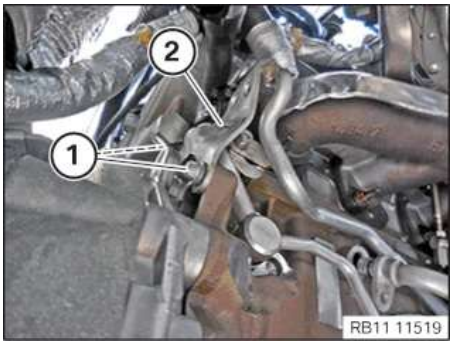


- Insert and install the chain tensioner piston (1).
- Tighten the chain tensioner piston (1).

Chain tensioner piston to cylinder head

22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

carmagn.com

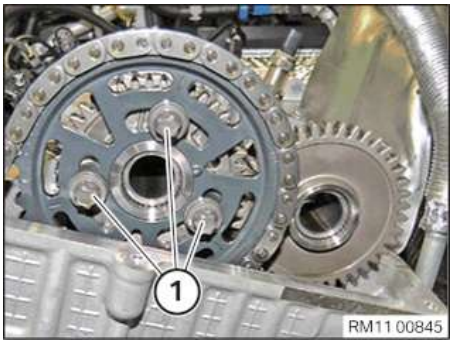


- Insert and install the holder (2).
- Tighten the screws (1).

Holder to crankcase

M8X16		Tightening torque	19 Nm

55 – Tightening the camshaft sprocket on the intake camshaft



- Tighten the screws (1).

Camshaft sprocket to camshaft

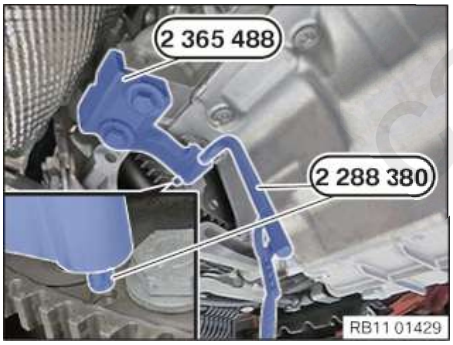
M7x17.			17 Nm

56 – Removing the special tool for fixing the exhaust camshaft



- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

57 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

58 – Checking camshaft timing



RISK OF DAMAGE

Damage to the engine.

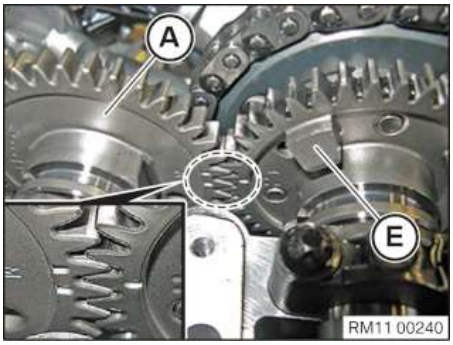
The engine may be damaged if it is manually rotated in the wrong direction.

- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

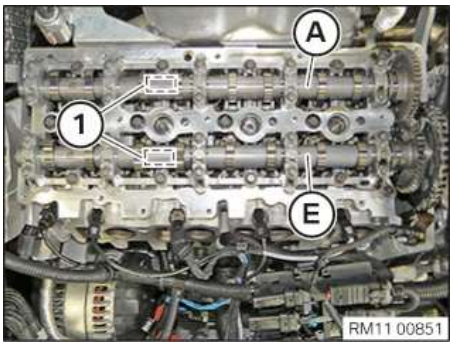
- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

  Do **not** crank the engine in reverse.

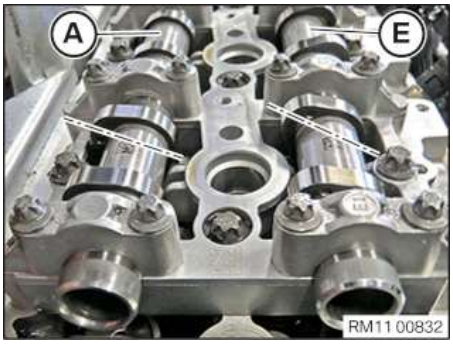
cardiagn.com



- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.

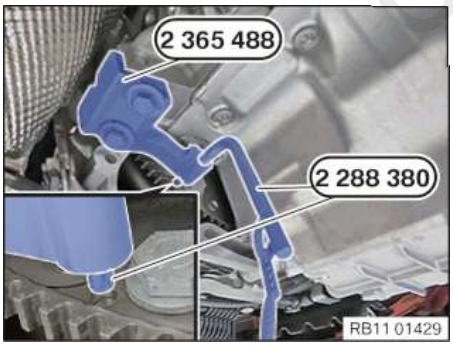


- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

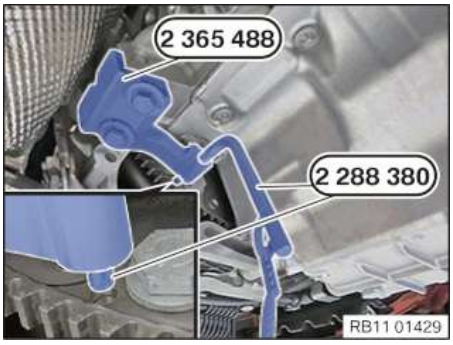
59 – Removing the special tool for fixing the exhaust camshaft

cardiagn.com



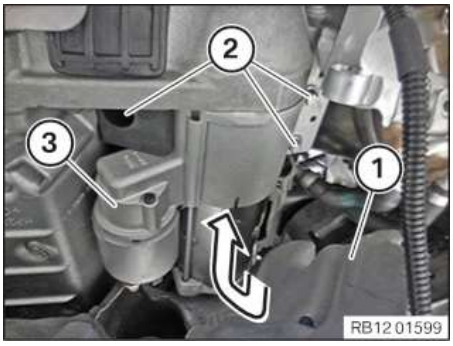
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

60 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

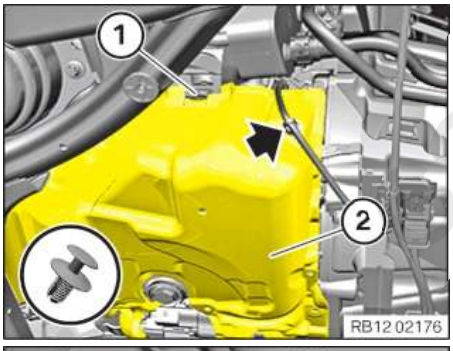
61 – Installing starter motor



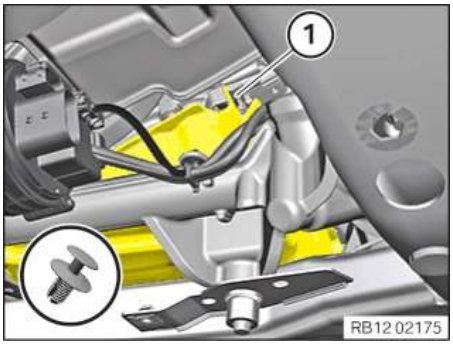
- Make sure that the acoustic cover (1) is not damaged.
- Carefully press the acoustic cover (1) to one side.
- Feed in and install the starter motor (3) in the direction of the arrow.
- Tighten the screws (2).

Starter motor to engine

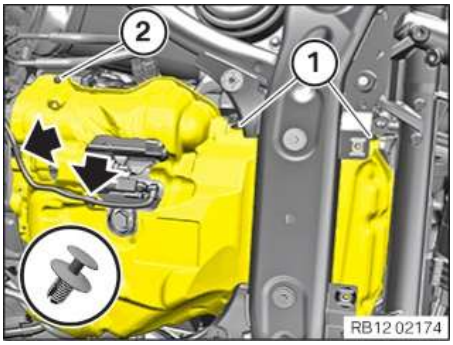
M8X60		Tightening torque	19 Nm



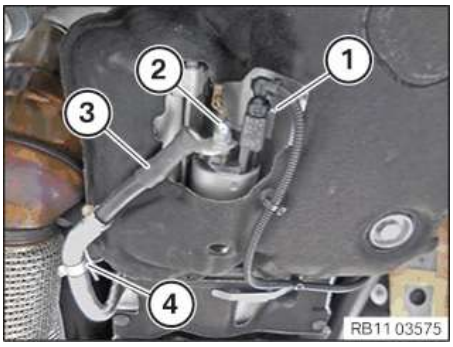
- Position the acoustic cover (2).
- Fasten expanding rivet (1).
- Secure clamp (arrow).



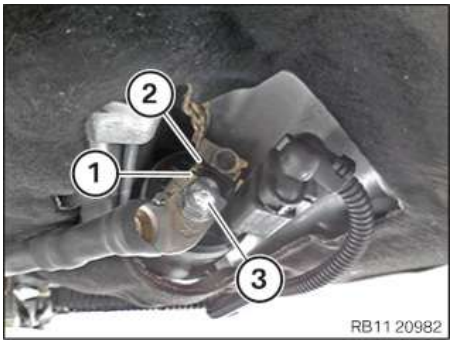
- Fasten expanding rivet (1).



- Secure fir tree clip (2).
- Secure expanding rivet (1).
- Secure the clamps (arrows).



- Fasten positive battery cable(3) in holder (4) and position it on the starter motor.
- Tighten the nut (2) hand-tight.
- Connect the connector (1) and audibly lock it.



CAUTION

Improper routing of the positive battery cable.

Risk of short circuits!

- Route the positive battery cable without abrasions and do not trap.

- Attach the positive battery cable (1) **correctly** to anti-twist lock (2).
- Tighten nut (3).

Battery positive lead to starter

M8	Tightening torque	13,5 Nm

62 – Prepare for the installation of the diesel particulate filter



- Renew the V-clip (1).

  Parts: V-band clamp



- Renew gasket (1).

  Parts: Gasket

63 – Installing the diesel particulate filter

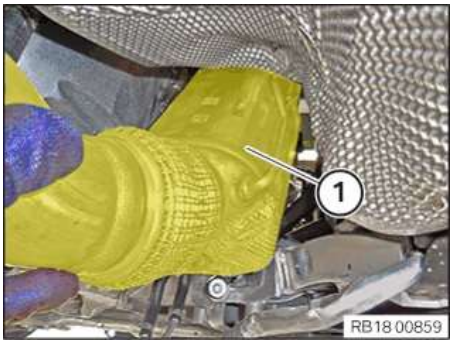
cardiagn.com

CAUTION

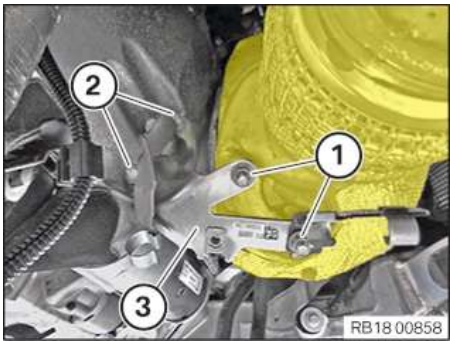
Heavy component.

Heavy components can lead to injury or damage.

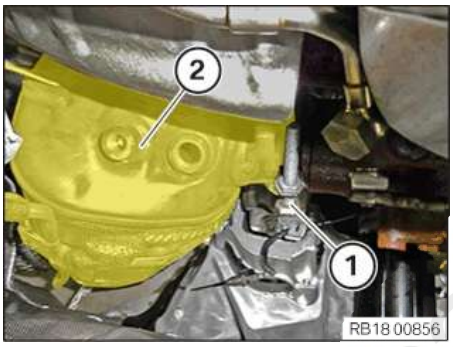
- Remove and install heavy components with the aid of another person/other persons.



- Insert and install the diesel particulate filter (1).



- Insert and install the holder (3).
- **Hand-tighten** the bolts (2).
- Apply the nuts (1) **hand-tight**.

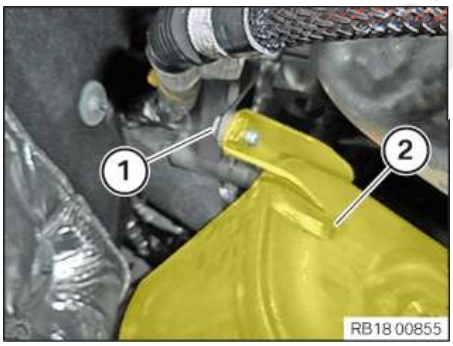


- Renew the V-clip (1).

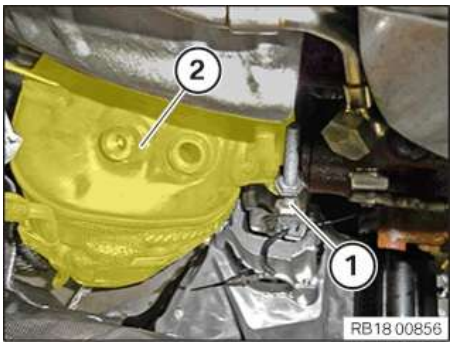
  Parts: V-band clamp
- Feed in and install V-band clamp (1).

Note: Make sure that the seal between the diesel particulate filter and the exhaust turbocharger is installed correctly.

- Position the diesel particulate filter (2) on the exhaust turbocharger .
- Position V-clip (1).
- Apply the V-clip (1) **hand-tight**.



- Feed in screw (1) on the holder of the diesel particulate filter (2) and tighten **hand-tight**.

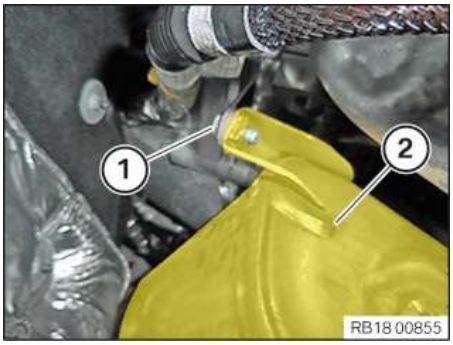


- Tighten the V-clip (1) of the diesel particulate filter (2).

Diesel particulate filter V-clip to exhaust turbocharger

V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

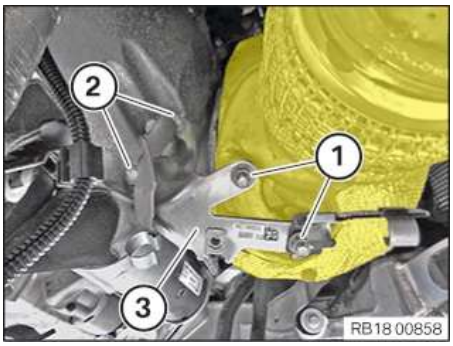
carmanualsonline.com



- Tighten the bolt (1) on the bracket of the diesel particulate filter (2).

Bracket to diesel particulate filter top

M8		Tightening torque	19 Nm



- Tighten the screws (2) on the holder (3).

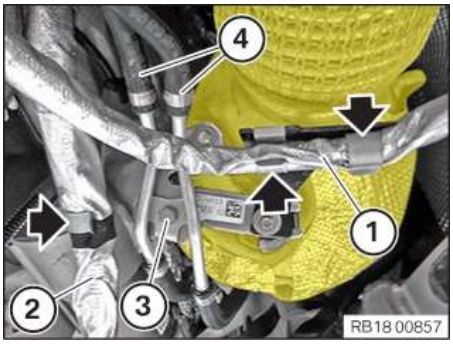
Bracket to transmission for diesel particulate filter holder bottom

M8X20		Tightening torque	19 Nm

- Tighten the nuts (1) on the holder (3).

Lower holder to diesel particulate filter

M8		Tightening torque	19 Nm



- Thread in and install coolant line (4).
- Tighten down screw (3).

Coolant lines for SCR metering module

M6X16		Tightening torque	8 Nm

- Secure the positive battery cable (2) of the starter motor at the clamp (arrow).
- Fasten the metering line (1) on the clamps (arrows).

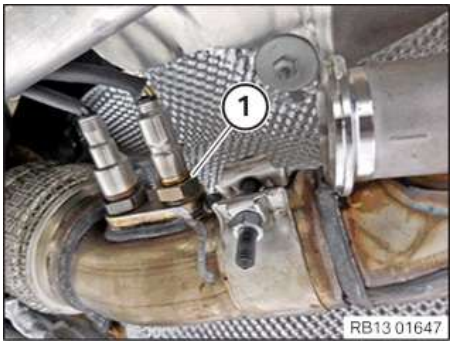
64 – Installing the nitrogen oxide sensor upstream of SCR catalytic converter

RISK OF DAMAGE

Damage to the nitrogen oxide sensor.

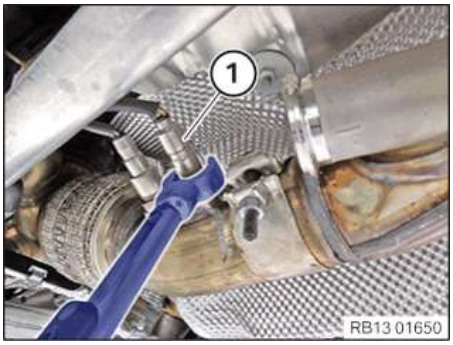
Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



- Feed in and install the nitrogen oxide sensor (1).

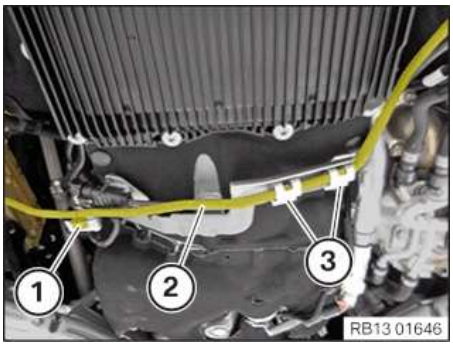
cardiagn.com



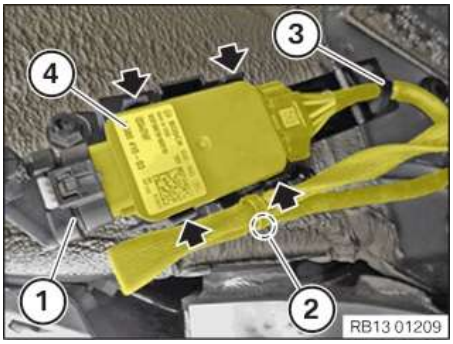
- Tighten the nitrogen oxide sensor (1) using commercially available tools.

Nitrogen oxide sensor before SCR catalytic converter

Sensor		Tightening torque	50 Nm



- Secure the cables (2) to the clamps (3).
- Secure clamps (1).



- Clip in the control unit (4) (arrows).
- Fasten the cable in the holder (3).
- Secure the cable holder (2).
- Plug in the connector (1) and lock audibly.

65 – Installing the monitoring oxygen sensor after the diesel particulate filter

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

TECHNICAL INFORMATION

New oxygen sensors are to be greased lightly and evenly on the thread.

For oxygen sensors that are reused, the following should be observed:

Lightly and evenly grease the oxygen sensor only on the thread. Do not clean and grease that part of the oxygen sensor which protrudes in the exhaust branch (sensor ceramics).

For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue

cardiagn.com



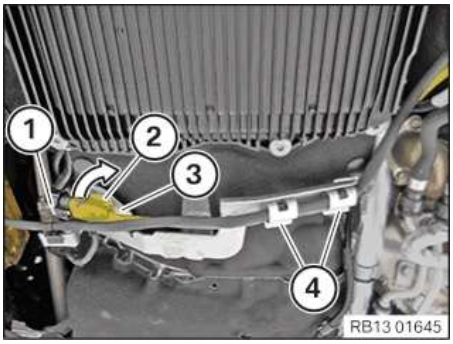
- Insert the monitoring oxygen sensor (1) and install it.



- Tighten the monitoring oxygen sensor (1) with standard tools.

Monitoring oxygen sensor

Sensor		Tightening torque	50 Nm



- Fasten the monitoring oxygen sensor to the clamps (4).
- Secure the connector (2) on the holder (3) in direction of arrow.
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

66 – Installing the exhaust system

CAUTION

Component with heavy weight.

Danger of injury!

- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

Heavy component.

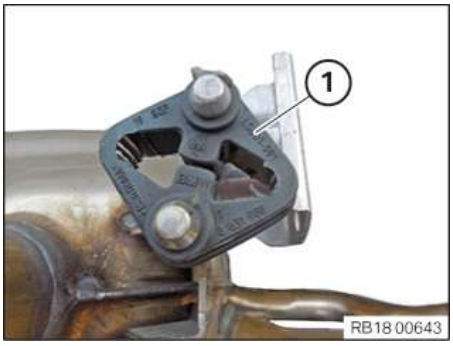
Heavy components can lead to injury or damage.

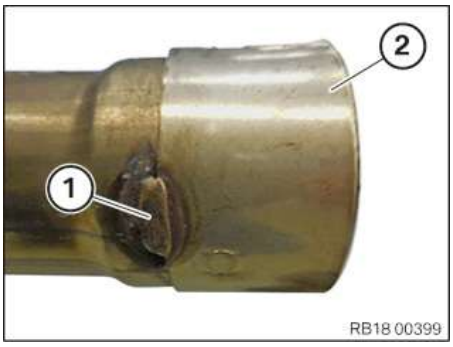
- Remove and install heavy components with the aid of another person/other persons.

TECHNICAL INFORMATION

Mount the exhaust system in voltage-free state, maintaining the tightening sequence from the rear silencer towards the exhaust manifold.

cardiagn.com





NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

- Check all the rubber mounts (1) of the exhaust system for damage.
- Replaced damaged rubber mounts.

  Parts: Rubber mount

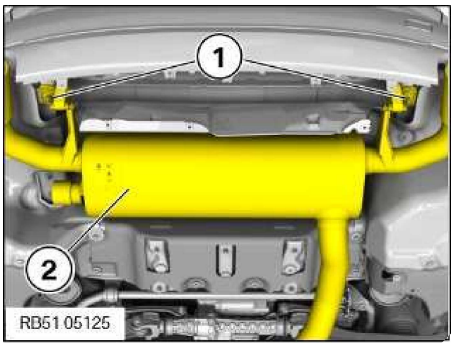
CAUTION

Swarf resulting from sawing or grinding components.

Danger of injury!

- Conduct all work in appropriate personal protective equipment only.
- Wear safety goggles and protective gloves.

- Open the weld seam (1) with a conventional tool.
- Remove the clamp (2).

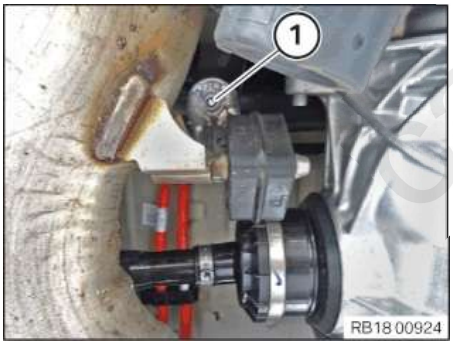


- Insert and install the exhaust system (2).
- Renew nuts (1).

  Parts: Nuts
- Tighten nuts (1).

Rear silencer to body / bumper support

M8	Replace nuts.	Tightening torque	19 Nm

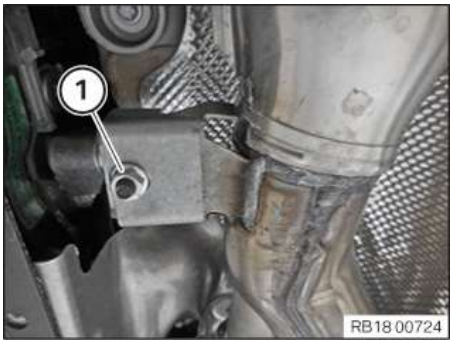


- Renew nut (1) on the rear axle support.

  Parts: Nut
- Tighten nut (1).

Exhaust system to rear axle carrier

M8 nut		Tightening torque	19 Nm

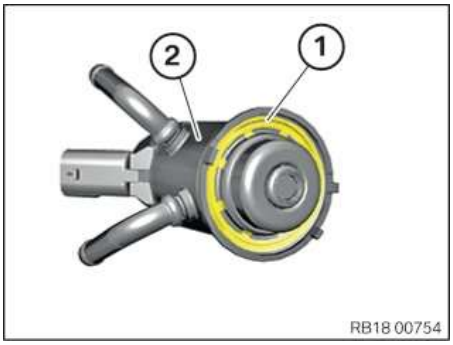


- Tighten nut (1).

Exhaust system to transmission

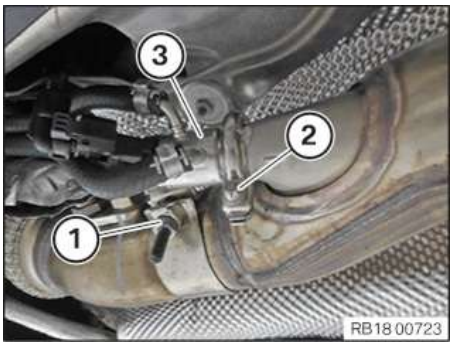
M8		Tightening torque	19 Nm

cardiagn.com



- Renew sealing ring (1) of the SCR metering module (2).

  Parts: Sealing ring



- If necessary, renew clamp (1).

  Parts: Clamp
- Tighten clamp (1).

Exhaust system to diesel particle filter

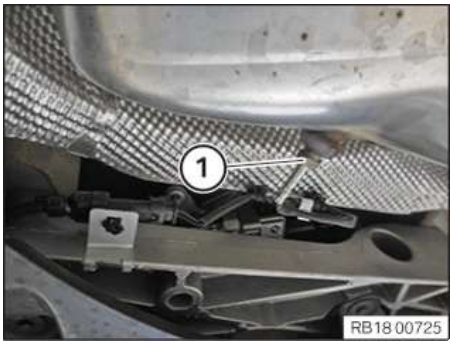
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

- Renew the V-clip (2).

  Parts: V-band clamp
- Install the SCR metering module (3) in the exhaust system.
- Tighten the V-clip (2) of the SCR metering module (3).

SCR metering module V-clip to exhaust system

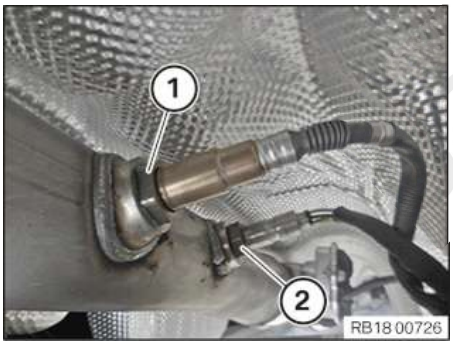
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm



- Install the exhaust temperature sensor (1) in the exhaust system and tighten.

Exhaust-gas temperature sensor upstream of SCR catalytic converter

Sensor		Tightening torque	30 Nm



- Install the diesel particulate sensor (1) in the exhaust system and tighten.

Diesel particulate sensor to exhaust system

Sensor		Tightening torque	50 Nm

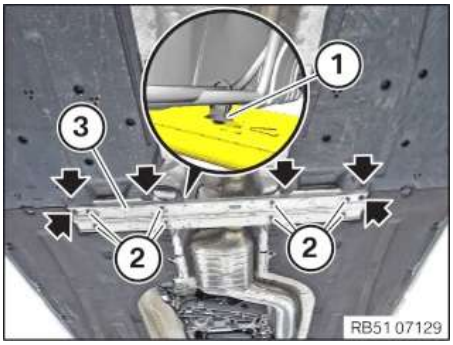
- Install the nitrogen oxide sensor (2) in the exhaust system and tighten.

Nitrogen oxide sensor downstream of SCR catalytic converter

Sensor		Tightening torque	55 Nm

67 – Install the connecting supports on the tunnel

cardiagn.com



- Guide in and install connecting support (3) on the tunnel.
- Tighten the screws (2).
- Tighten screws (arrows).

Connecting support to tunnel

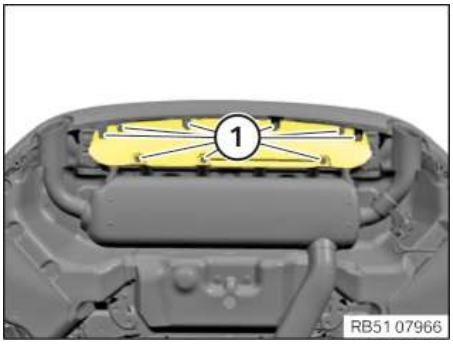
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Secure the clamp (1).

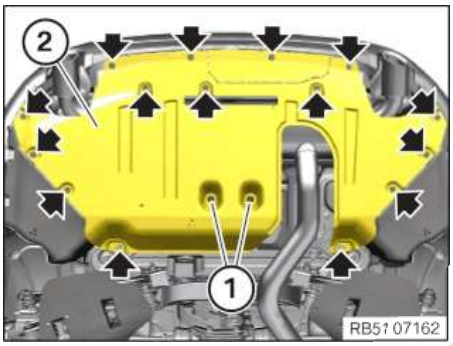
68 – Installing the rear diffuser



- **Version 1:**
- Install the diffuser and tighten the nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm



- **Version 2:**
- Feed in and position the diffuser (2)
- Tighten screws (arrows).

Diffuser / underbody panelling

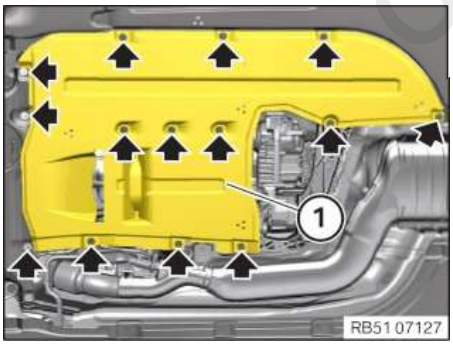
Nuts and screws		Tightening torque	3 Nm

- Tighten nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm

69 – Installing underbody protection at rear



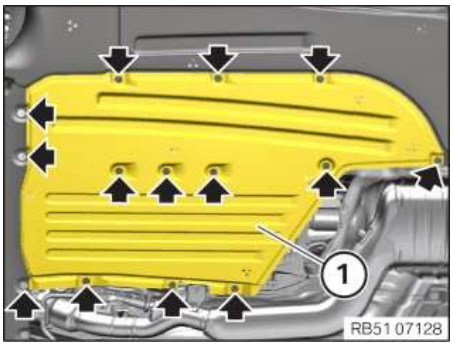
- **Version A:**

Insert and install the rear underbody protection (1).

Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version B:**

Insert and install the rear underbody protection (1).

Tighten screws (arrows).

Underbody protection

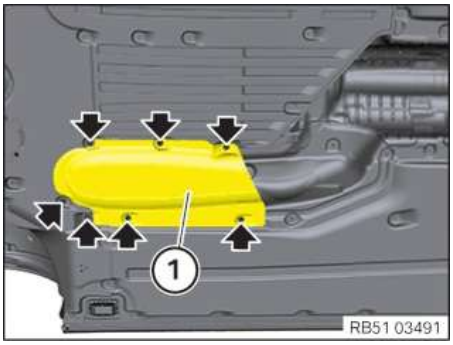
Hexagon screw		Tightening torque	3 Nm

cardiagn.com

70 – Install the underbody panelling of the transmission on the side

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

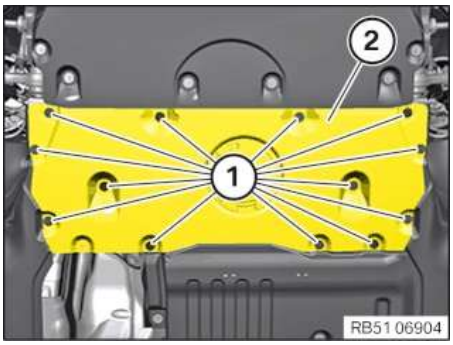


- Insert the underbody panelling (1).
- Tighten screws (arrows).

Underbody panelling

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

71 – Installing the centre underbody protection



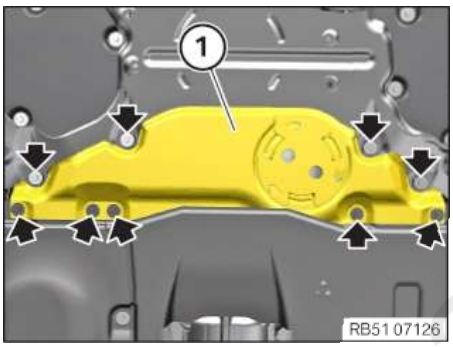
- **Variant with rear wheel drive:**

  Position central underbody protection (2).

  Tighten the screws (1).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version with all-wheel drive:**

  Guide in centre underbody protection (1) and install.

  Tighten screws (arrows).

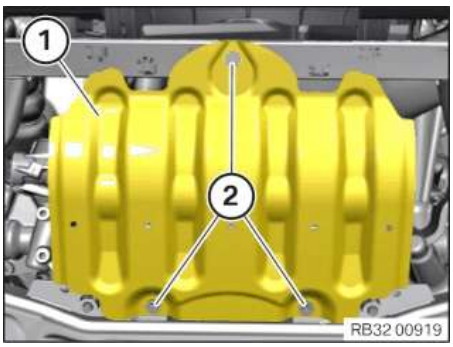
Underbody protection

Hexagon screw		Tightening torque	3 Nm

72 – If installed: Install underbody protection of the steering

Prerequisite

Front underbody protection has been removed.



- Position underbody protection (1).
- Tighten the screws (2).

Underbody protection, steering, to front axle support

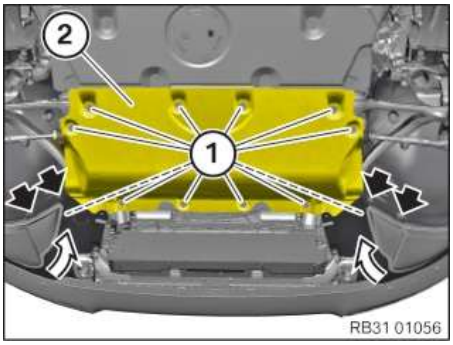
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

73 – Install the underbody protection of the steering gear

cardiagn.com



- **Version A:**

  Position the underbody protection (2) of the steering gear.

  Tighten the screws (1).

Underbody protection of the steering gear

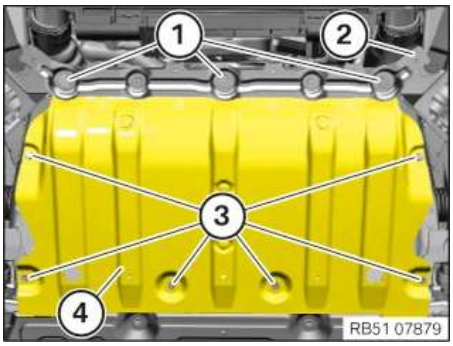
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the bottom wheel arch cover.

  Tighten the screws (arrows) of the lower wheel arch cover on the wheel arch cover.

Wheel arch trim panel, front

Thermoplastic hexagon screw		Tightening torque	2,6 Nm



- **Version B:**

  Feed in the underbody protection (4) of steering gear and install it.

  Tighten the screws (3).

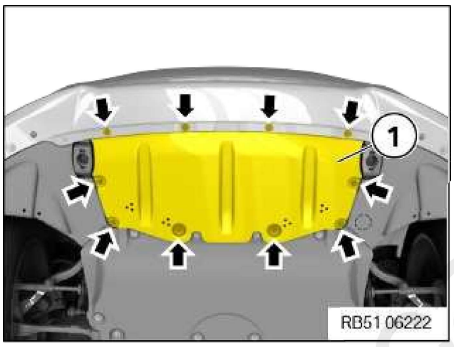
Underbody protection of the steering gear

Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the holder (2) for the underride protection.

  Tighten the screws (1).

74 – Installing the front underbody protection



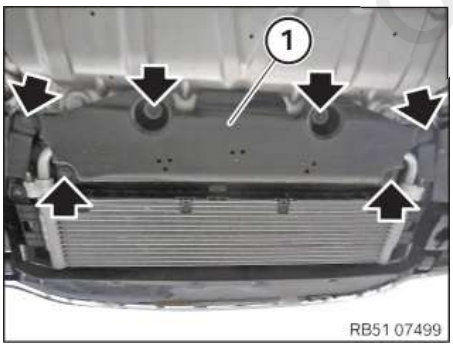
- **Version A:**

  Feed in the front underbody protection (1) towards the front under the bumper panel and position.

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



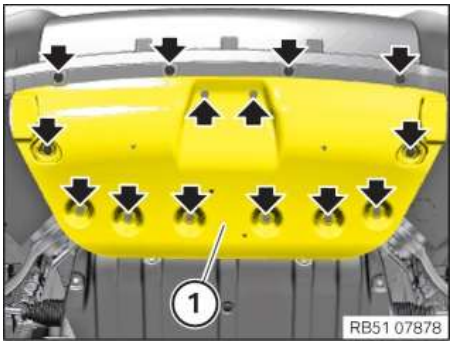
- **Version B:**

  Feed in and position the front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



- **Version C:**

  Feed in and install front underbody protection (1).

  Tighten screws (arrows).

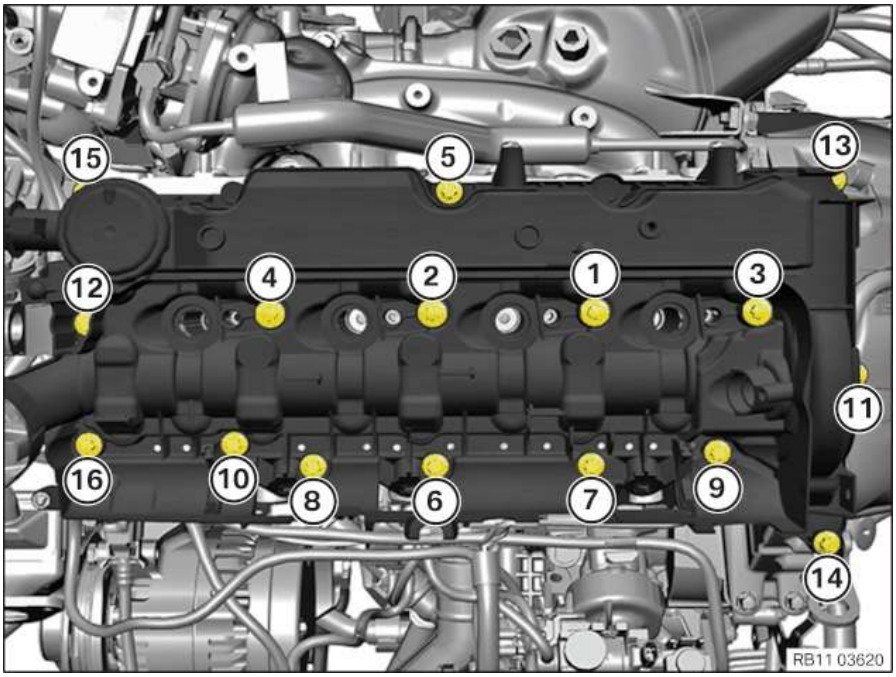
Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

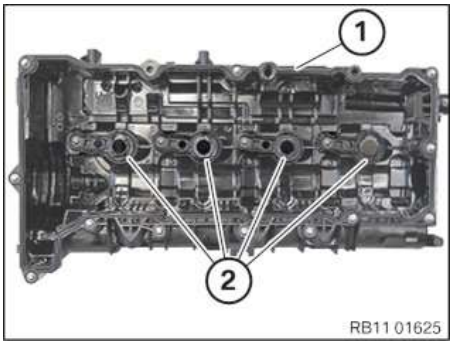
carlagn.com

75 – Installing cylinder head cover

Screw connection of the cylinder head cover

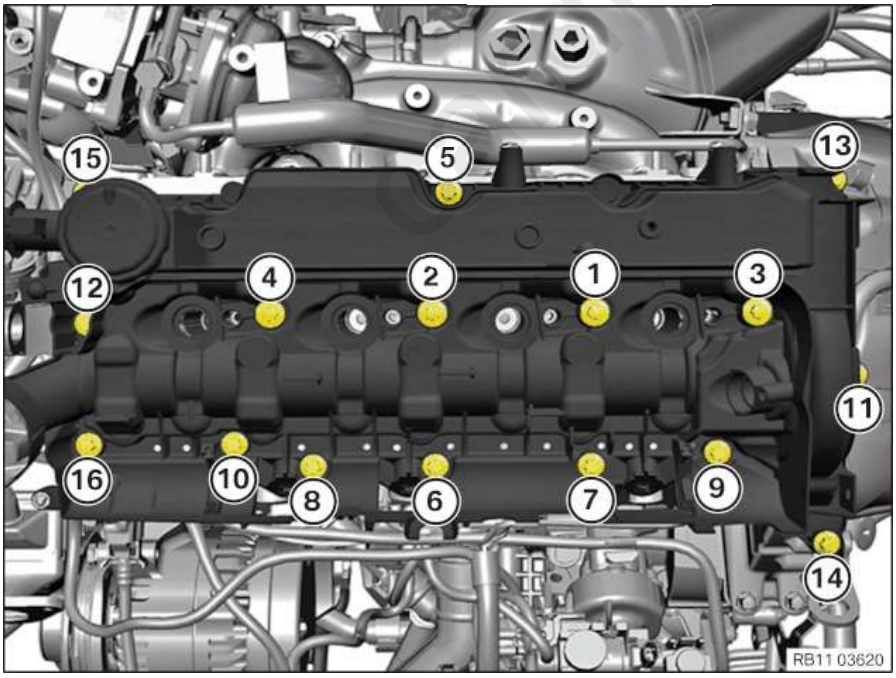


1 - 16 Bolts of the cylinder head cover



- Renew the profile seals (1) and (2) of the cylinder head cover.

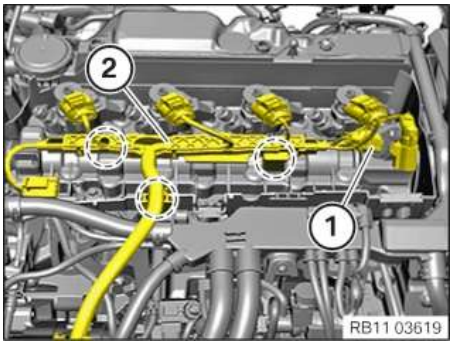
  Parts: Profile seals



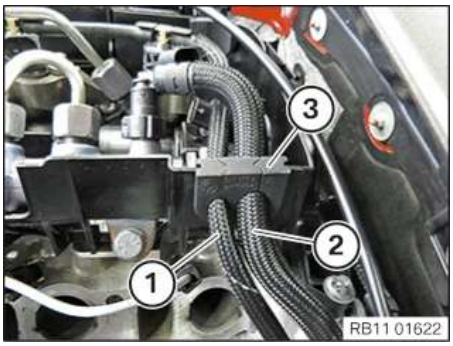
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

Cylinder head cover to cylinder head

M6		Tightening torque.	8,5 Nm



- Position the vehicle wiring harness (2) on the cylinder head cover and fasten in the marked areas.
- Plug in the connector (1) and lock audibly.



- Insert and connect the leakage oil line (1) with the fuel return line (2) and grommet (3).



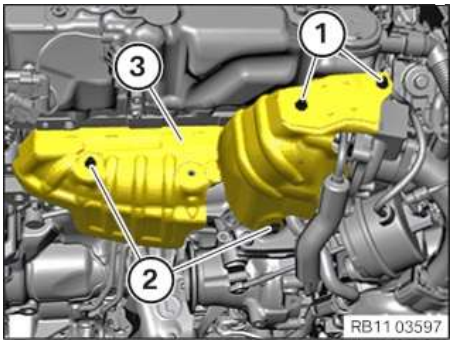
- Feed in and install the heat shield (1).



- Connect engine ventilation line (1) and lock.

  The locks (arrows) must engage audibly.

76 – Installing heat shield



- Feed in and install the heat shield (3).
- Tighten down screws (1) and (2).

Heat shield to exhaust manifold

M6x12			10 Nm

77 – Installing the sensor bracket on the cylinder head cover

cardiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

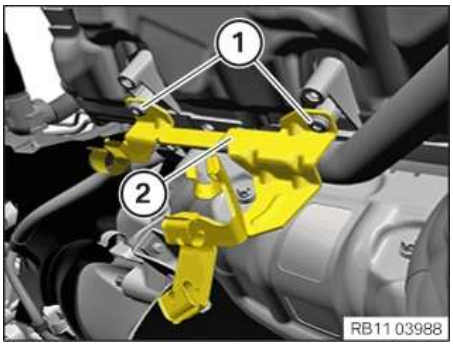
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

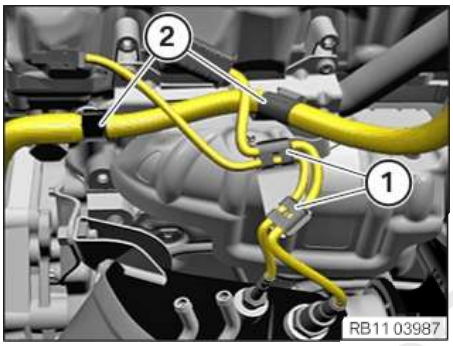
- Route all cables without abrasions, do not trap and crush.



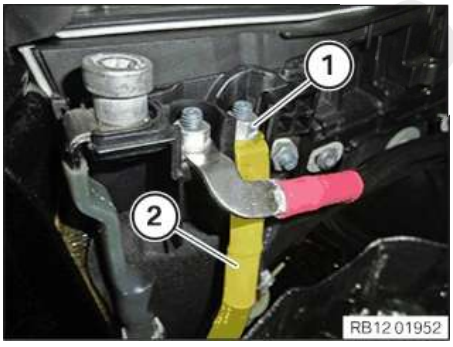
- Insert and install the holder (2).
- Tighten the screws (1).

Bracket on cylinder head cover

	Tightening torque	5 Nm



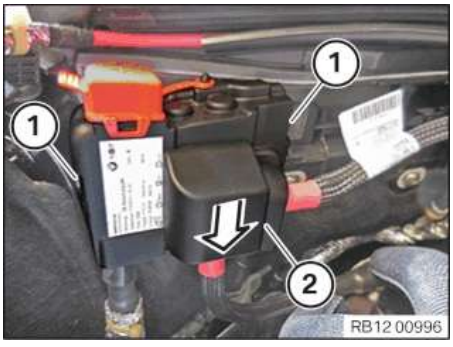
- Secure the positive battery cable in the clamps (2).
- Mount the cable of the exhaust gas sensor system in the clamps (1).



- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

Battery positive lead to battery positive terminal

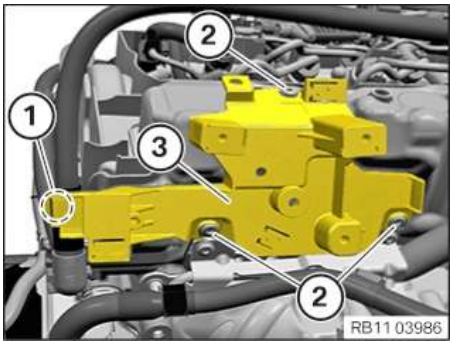
M8		Tightening torque	19 Nm



- Insert and install the cover (2) in the direction of the arrow.

  The locks (1) must engage audibly.

cardiagn.com

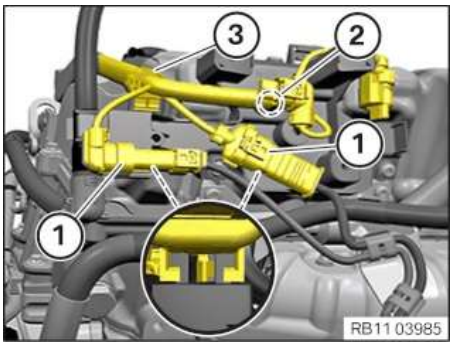


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

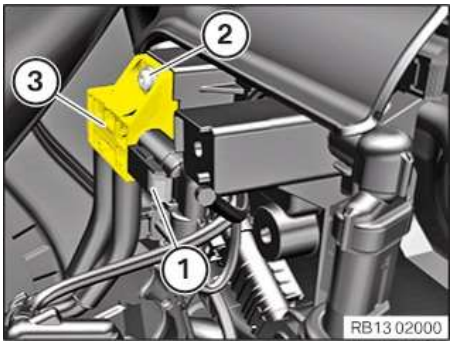
		Tightening torque	5 Nm

- Fasten the positive battery cable in the area (1) in the clamp.



- Feed in the wiring harness section and fasten it with the clamp (3).
- Fasten the cable clip in the area (2) in the sensor bracket.
- Feed in the connector (1) into the sensor bracket and lock it audibly.
- Plug in the connector (1) and lock audibly.

78 – Securing the differential pressure sensor for the diesel particulate filter



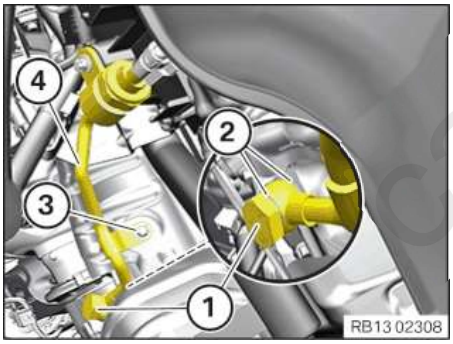
- Feed in and install the differential pressure sensor (3).
- Tighten down screw (2).

Differential pressure sensor of diesel particulate filter on cylinder head cover

TS5x20		Tightening torque	4 Nm

- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

79 – Install the exhaust gas pressure pipe



- Insert and install the exhaust gas pressure pipe (4).
- Replace the sealing rings (2).

  Parts: Sealing ring
- Apply the banjo bolt (1) hand-tight.
- Tighten down screw (3).

Heat shield to exhaust manifold

M6x12		Tightening torque	10 Nm

- Tighten the banjo bolt (1).

Banjo bolt for exhaust pressure pipe to exhaust manifold

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm



- Tighten down screw (2).

Exhaust gas pressure pipe to sensor system holder

TS6x20		Tightening torque	5,7 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

80 – Install all injectors

▸ **Cleaning the injector shafts**

cardiagn.com

CAUTION

Swirling dirt particles caused by compressed air.

Danger of injury!

- Collect dirt particles, e.g. when blowing out, use cloth to do so.

- Wear safety goggles.

RISK OF DAMAGE

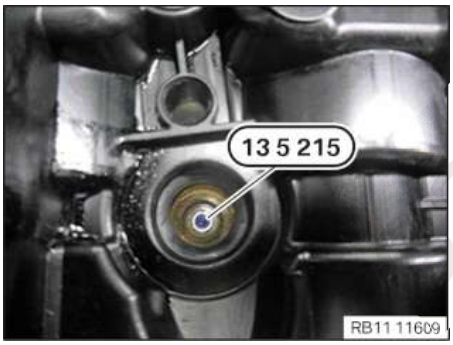
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



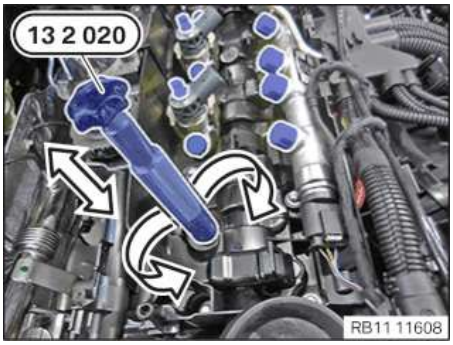
- Check whether the sealing ring remained in the injector shaft and remove the sealing ring as needed.
- Insert the special tool 0 493 763 (13 5 215) with the special tool 0 493 762 (13 5 214) from the set of special tools 0 493 758 (13 5 210) into the injector shaft.
- Remove special tool 0 493 762 (13 5 214).



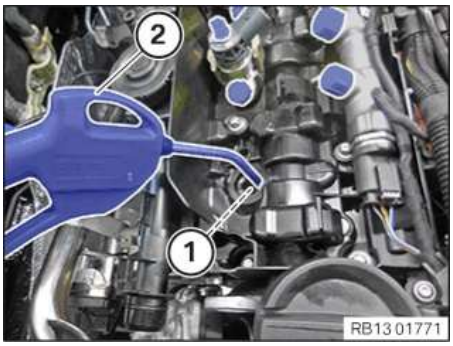
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



- Insert special tool 0 496 150 (13 2 020) into the injector shaft.



- Move special tool 0 496 150 (13 2 020) up and down in the injector shaft with rotational movements in the direction of arrow.
- Feed out special tool 0 496 150 (13 2 020) from the injector shaft and remove.



- Blow out injector shaft (1) with air gun (2).



- Feed the special tool 0 493 762 (13 5 214) into the injector shaft and screw it in with the special tool 0 493 763 (13 5 215).
- Feed out special tool 0 493 762 (13 5 214) with special tool 0 493 763 (13 5 215) from the injector shaft and remove it.

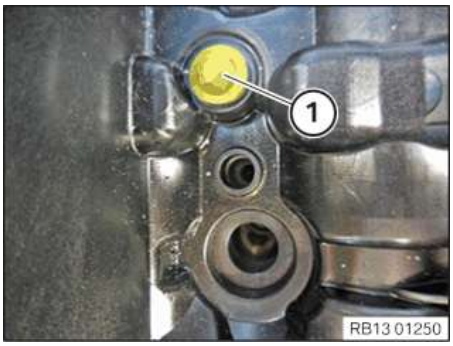
▸ **Check the placement of the clamping claw**

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Tighten down screw (1).

  The clamping claw is positioned on the bolt (1).

Clamping claw facing to cylinder head cover

M6		Tightening torque	10 Nm

▸ **Prepare the injector for installation**

cardiagn.com

RISK OF DAMAGE

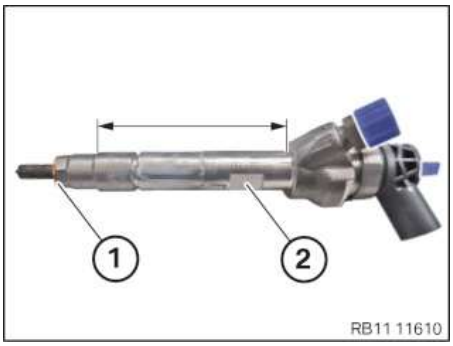
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

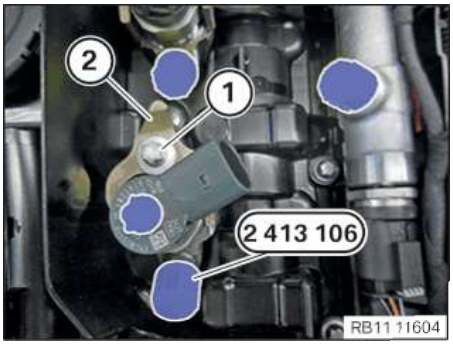
TECHNICAL INFORMATION

Lightly grease the injector shaft with high temperature-resistant grease.
For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



- Renew the copper sealing ring (1) on the injector (2).

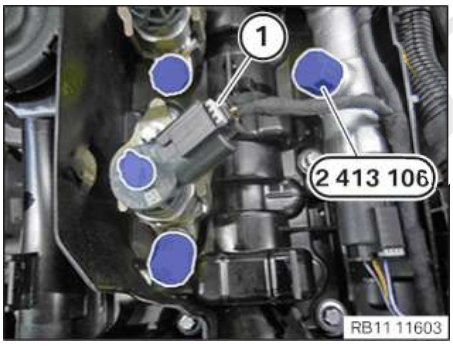
  Parts: Copper sealing ring
- Lightly grease the injector in the marked area with heat-resistant grease before installing the injector (2) in the injector shaft.



- Insert and install the injector .
- Insert and install the clamping claw (2).
- Tighten down screw (1).

Injector to cylinder head cover

M8	Tightening torque	8 Nm
	Angle of rotation	120 °



- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

▸ **Replacement: Perform injection quantity compensation**

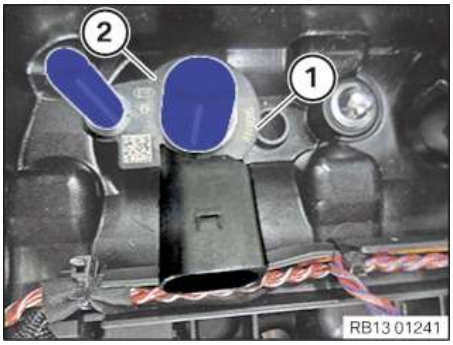
TECHNICAL INFORMATION

If the DDE control unit or an injector has been replaced, it will also be necessary to carry out injection quantity compensation. The adjustment value (7-position letter/number code) is engraved on each injector.

NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

cardiagn.com

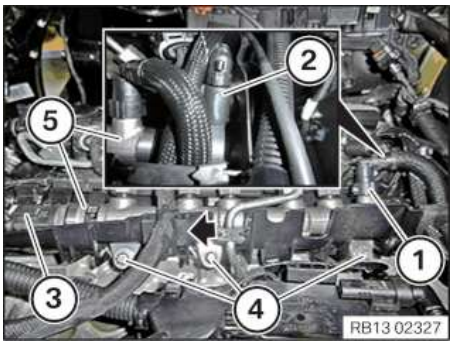


- Read off the adjustment value (1) on the new injector (2).



- Connect diagnosis system:
  - Vehicle identification
  - Function selection
  - Service functions
  - Digital diesel electronics (DDE)
  - Adjustment of injectors
  - Testing schedule
- Start service function with the right arrow button.

81 – Installing the rail



- Insert and install the rail (5).
- Tighten the screws (4).

Rail to cylinder head cover

M8		Tightening torque	19 Nm

- Install and lock cable clip (arrow).

  The cable clip (arrow) must engage audibly.
- Connect and lock the connector (3) at the rail pressure sensor.

  The connector (3) must engage audibly.
- Connect and lock the connector (2) at the rail pressure regulating valve.

  The connector (2) must engage audibly.
- Feed in fuel return line (1) and install.

  The fuel return line (1) must audibly engage.

82 – Installing high pressure line between rail and high pressure pump

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

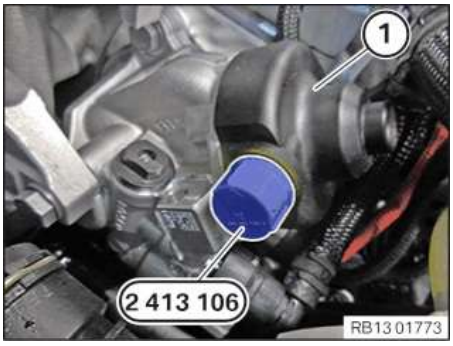
Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

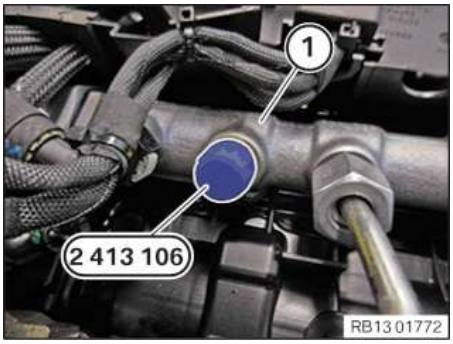
cardiagn.com

TECHNICAL INFORMATION

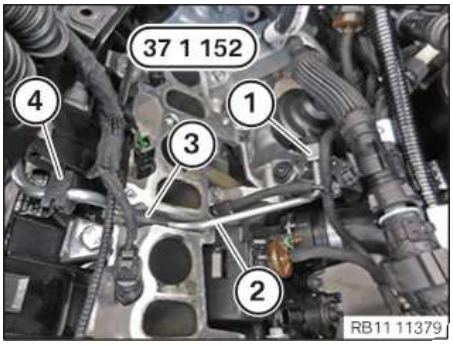
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Feed out and remove special tool on the high pressure pump (1).



- Feed out the special tool on the rail (1) and remove.



- Insert and install the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).
- Hand-tighten the union nut (1) on the high pressure pump.



- Hand-tighten the union nut (1) on the rail.

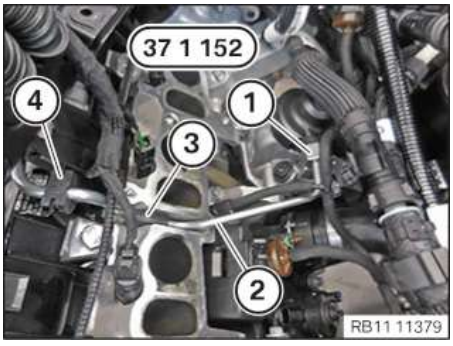
TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten the union nut (1) with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm



- Make sure that the high pressure line (2) is correctly installed with the abrasion protection (3) and the rubber mount (4).

TECHNICAL INFORMATION

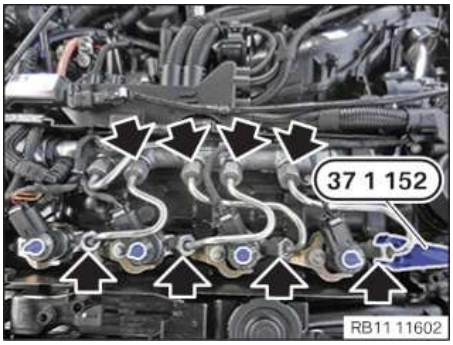
Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten union nut (1) on the high pressure pump with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm

mandiagn.com



- Remove the special tool from all cable connections.
- Feed in and install the high pressure lines (arrows).
- Hand-tighten the high pressure lines (arrows).

TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

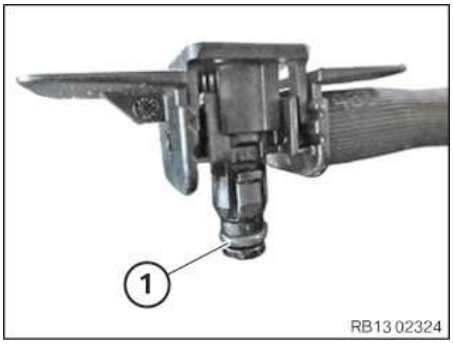
- Tighten the high pressure lines (arrows) with the special tool .

High pressure lines between injector and rail

High-pressure pipe		Tightening torque	24.5 Nm

- Check the high pressure lines (arrows) for tightness (**visual inspection**).

84 – Attach the leakage oil line on the injectors

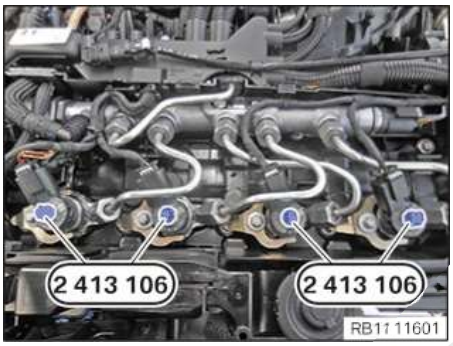


- **Version A:**

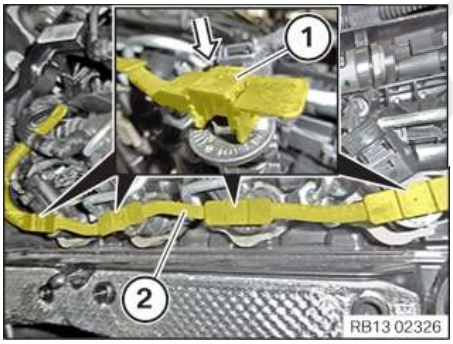
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

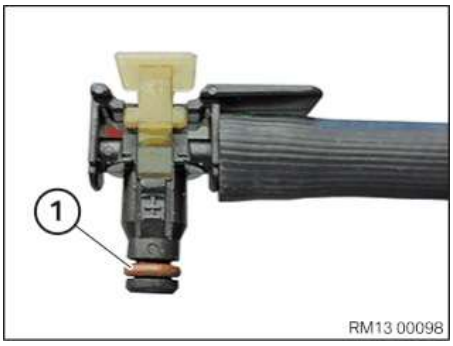
  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.



- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.



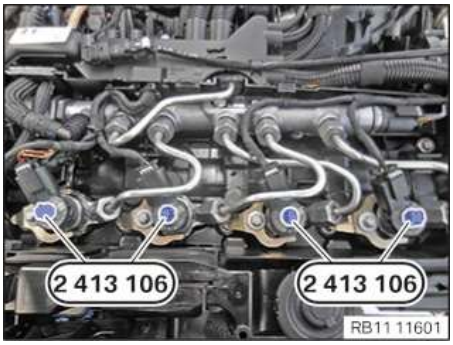
- **Version B**:

  Check sealing ring (1) for damage, renew leakage oil line if necessary.

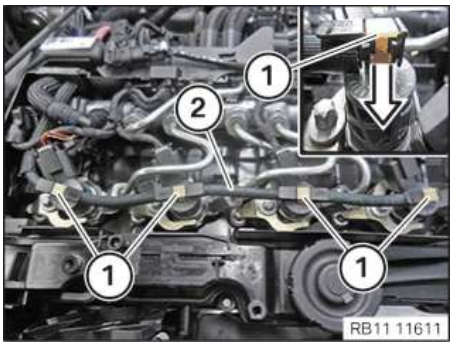
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.

ardiagn.com

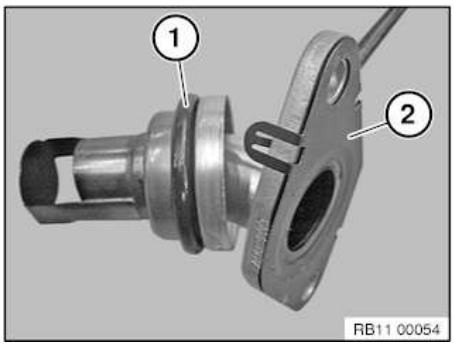


- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.

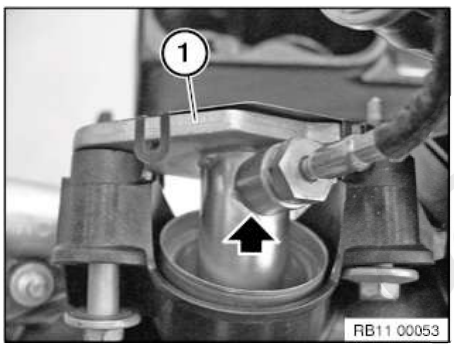
85 – Installing the intake plenum



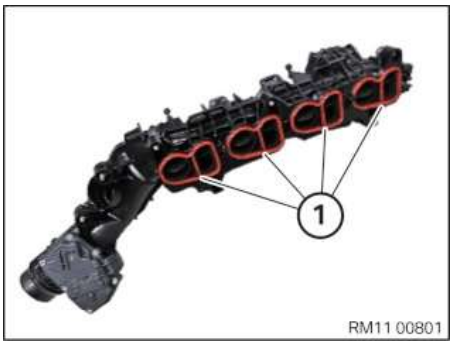
- Renew O-ring (1).

  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

  Parts: Gasket
- Position the seal (2) and clip it in.



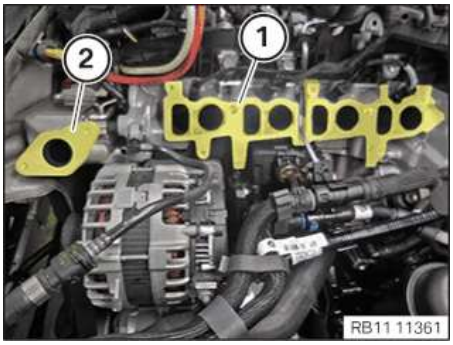
- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).



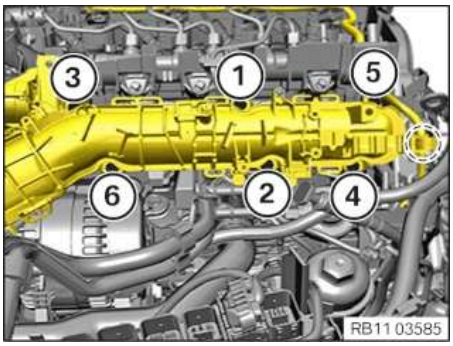
- Renew seals (1).

  Parts: Seals
- Ensure that the seals (1) are firmly mounted on the intake plenum.

cardiagn.com



- Clean connection points (1) at cylinder head.
- Clean the connection point (2) on the exhaust-gas recirculation cooler.

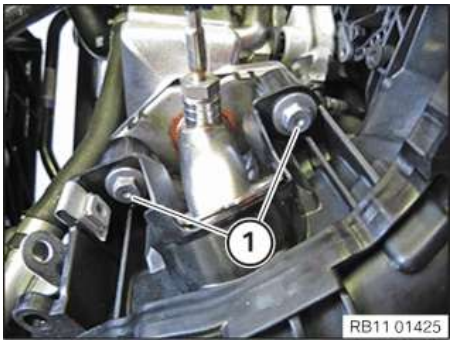


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

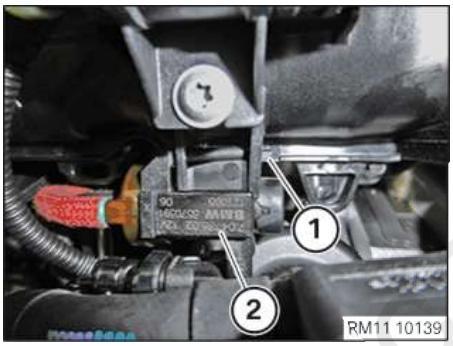
- Attach the wiring harness and fuel lines in the marked area on the intake plenum.



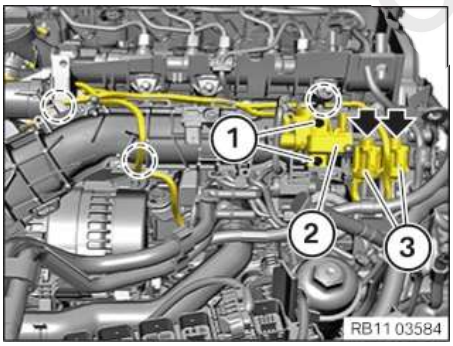
- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm



- Install electric changeover valve (2) from the left to the right in the holder on the intake plenum.
  The lock (1) must audibly engage.



- Install intake plenum electric changeover valve (3) on the intake plenum.
  The locks (arrows) must engage audibly.
- Position the electric changeover valve (2) on the intake plenum.
- Tighten the screws (1).

Electric changeover valve to intake plenum

TS6x20		Tightening torque	5 Nm

- Fasten the vacuum hoses on the intake plenum in the marked areas.



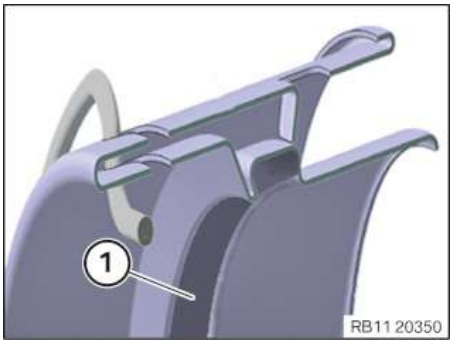
- Check the seal (1) for damage, and renew if necessary.

gardiagn.com

▸ **Replacing damaged seal**

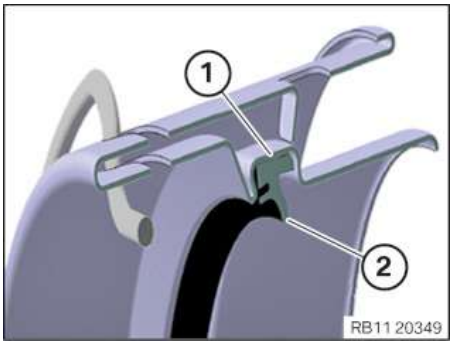
TECHNICAL INFORMATION

Do not use pointed or sharp-edged tools for the installation and/or removal.



- Remove damaged seal.
- Clean gasket groove (1) with a dry towel.

  The gasket groove (1) must be clean.



- Renew gasket.

  Parts: Gasket
- Install seal dry without lubricant or mounting agent.

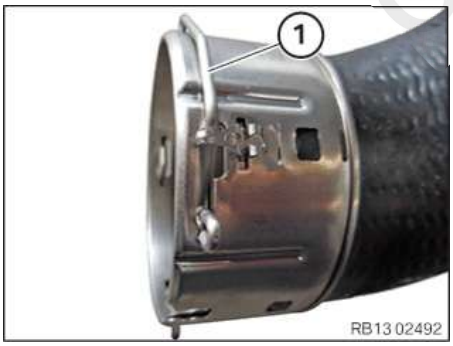
TECHNICAL INFORMATION

Incorrect assembly is possible. Ensure correct installation position.

- Feed in and install the seal.
- Make sure the seal is correctly installed in the gasket groove (1).
- Make sure that the sealing lip (2) is directed inwards as shown.



- Connect the pressure pipe to the throttle body until the locks (1) engage on both sides.



- Check that the locks (1) are correctly seated on the pressure pipe.

86 – Partially securing the wiring harness section on the intake plenum

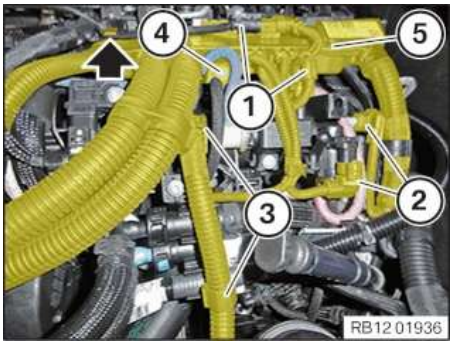
RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

- Route all cables without abrasions, do not trap and crush.

cardiagn.com



- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

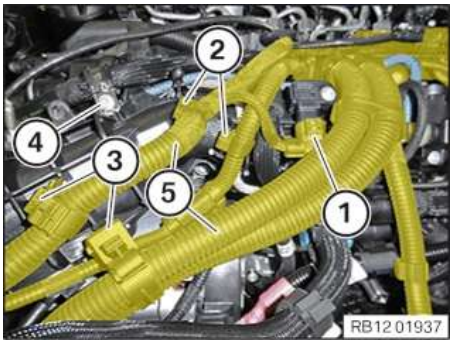
Wiring harness section to manifold

TS5x20		Tightening torque	3,6 Nm

- Secure clamps (3).
- Connect connectors (2) and lock.

  The connectors (2) must engage audibly.
- Secure the line at clamp (Arrow).
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



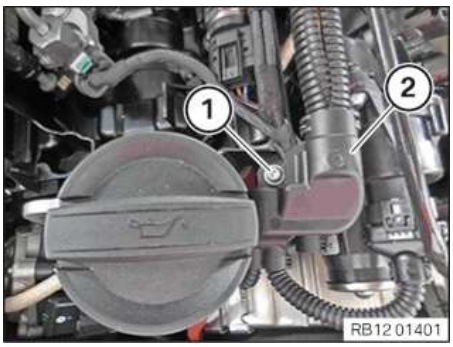
- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

Standard screw connection 4 Nm

Oval-head screw		Tightening torque	4 Nm

- Secure clamps (3).
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



- Guide in the wiring harness section (2) and install.
- Tighten down screw (1).

Wiring harness section to cylinder head cover

TS5x20		Tightening torque	3,6 Nm



- Connect connectors (1) and lock.

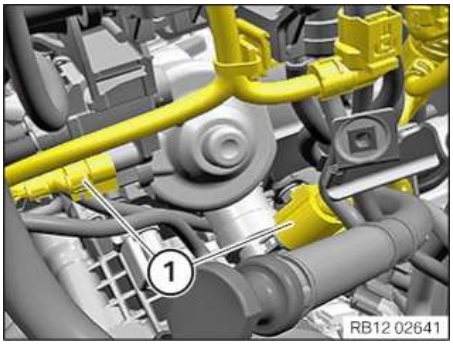
  The connector (1) must engage audibly.



- Connect the connector (1) and lock it.

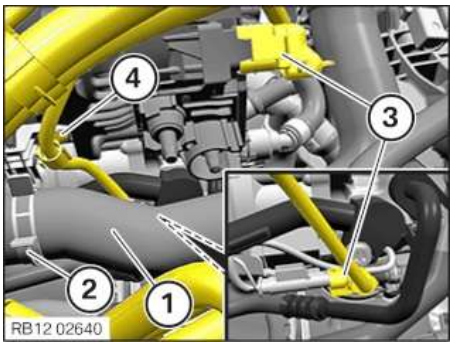
  The connector (1) must engage audibly.

cardiagn.com



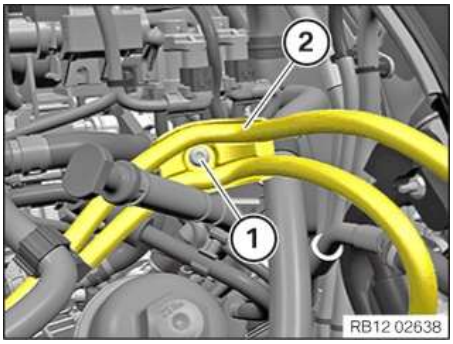
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



- Secure the clamp (4).
- Connect connectors (3) and lock.

  The connectors (3) must engage audibly.
- Feed the coolant line (1) into the holder (2) and install it.



- Feed in and position the positive battery cables (2) .
- Tighten down screw (1).

Standard screw connection M6

M6		Tightening torque	8 Nm



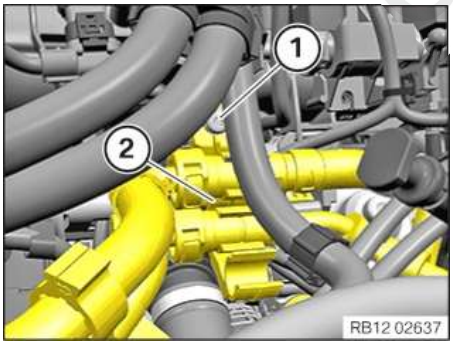
- Feed in and install the positive battery cable (4).
- Feed in and position the positive battery cables (4) .
- Renew the nuts (3) and (2).

  Parts: Nuts
- Tighten nuts (3) and (2).

Battery positive lead on the starter motor generator

M8		Tightening torque	19 Nm

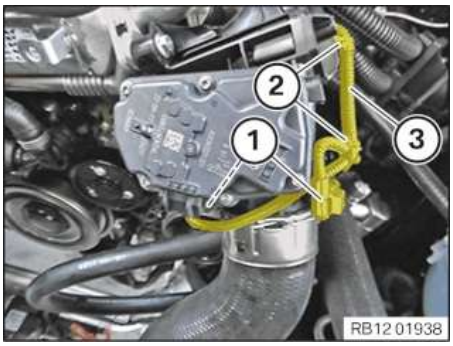
- Guide in and install the lid (1).



- Insert and install the holder (2).
- Tighten down screw (1).

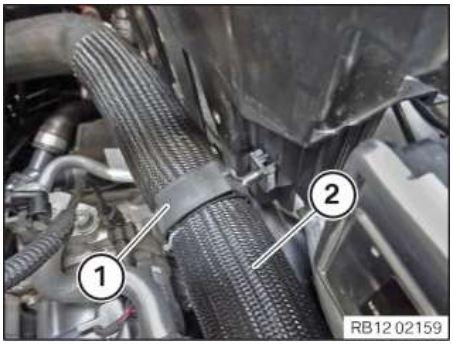
Holder on intake plenum

TS6X20		Tightening torque	5 Nm



- Guide in the wiring harness section (3) and install.
- Secure clamps (2).
- Connect connectors (1) and lock.

cardiagn.com



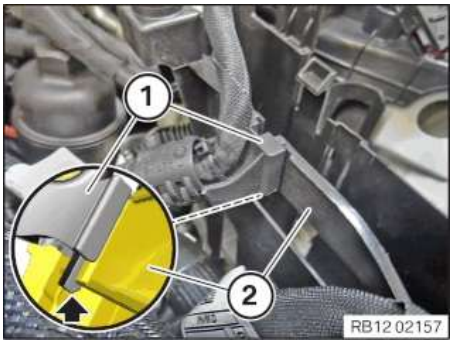
- Feed in and install coolant line (2).
- Lock holder (1).

  The holder (1) must engage audibly.



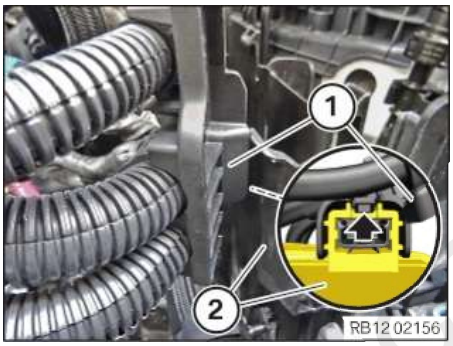
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.



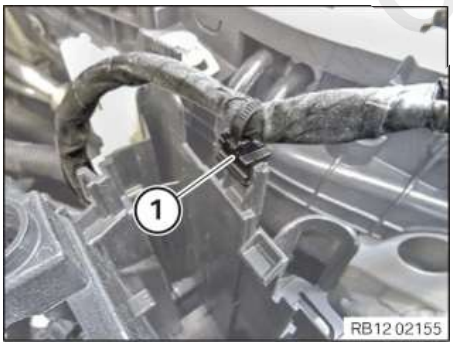
- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.



- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.



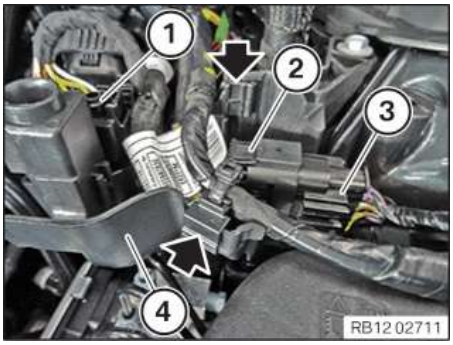
- Secure clamps (1).



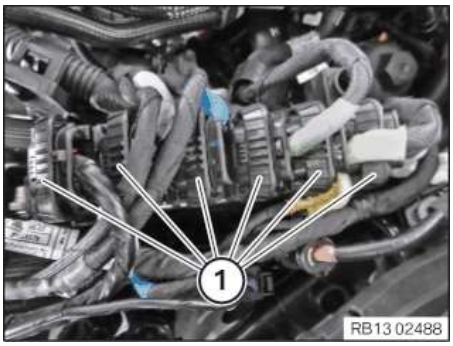
- Feed in and install the connector (1).

  The connector (1) must engage audibly.

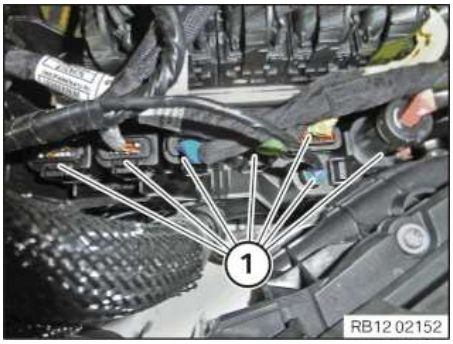
cardiagn.com



- Connect connector (3) to control unit holder (4) and lock it.
  The connector (3) must engage audibly.
- Connect connectors (2) and lock.
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.
  The connector (1) must engage audibly.
- Secure the clamps (arrows).

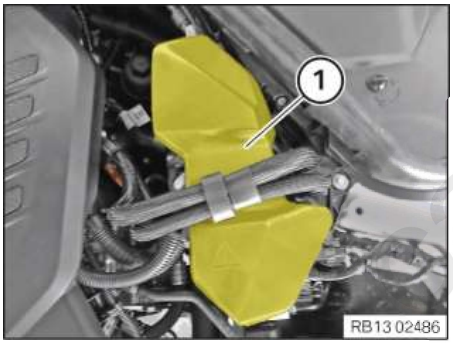


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



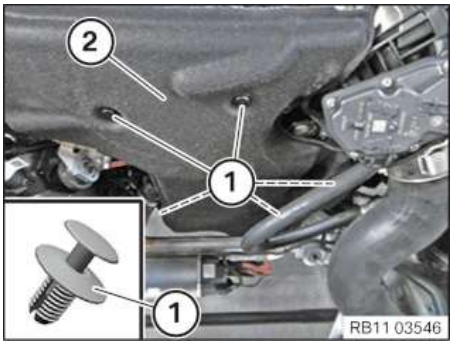
- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.

87 – Install the cover for the DDE control unit



- Insert and install cover (1) into guides.

88 – Install acoustic cover for the engine, front



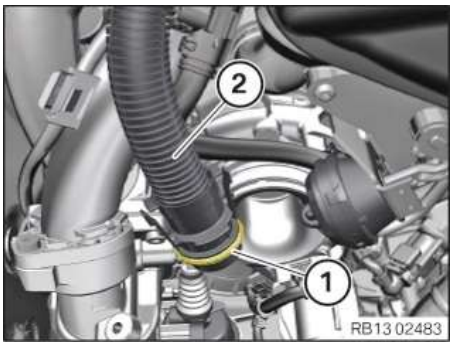
- Feed the acoustic cover (2) in and install.
- Secure the acoustic cover (2) with the expanding rivets (1).

89 – Installing the clean air pipe with resonator

bardiagn.com



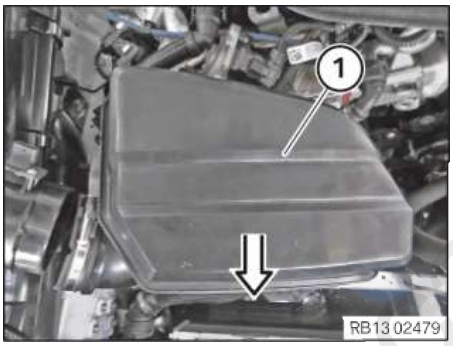
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



- Check the sealing ring (1) for the engine ventilation line (2) for damage and renew where required.



- Feed in and install clean air pipe with resonator (1) in the direction of the arrow.

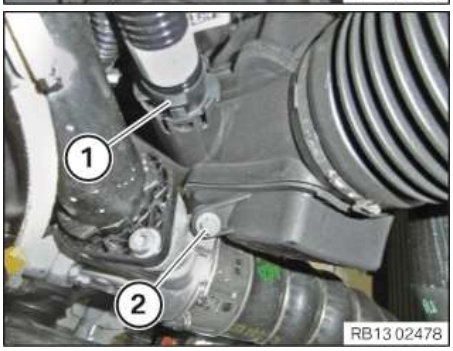


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

  The clamp (1) must engage audibly.

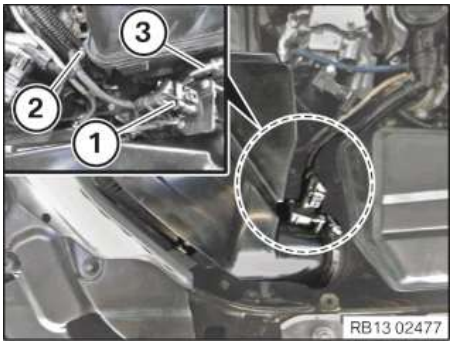


- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm

cardiagn.com



- Connect the clean air pipe with resonator to the intake filter housing.
- Tighten clamp (3).

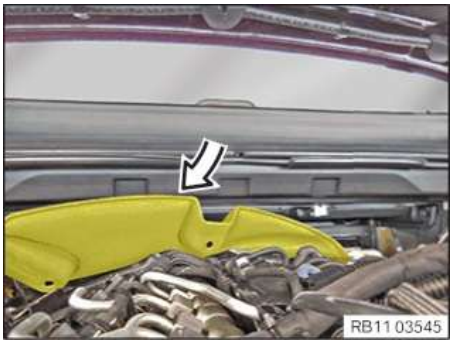
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

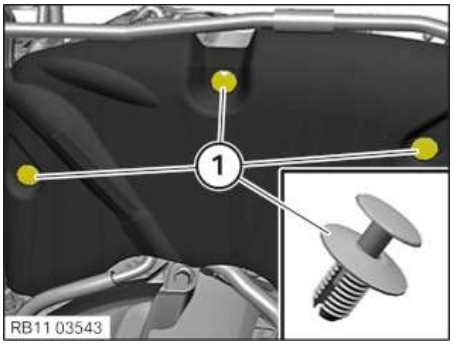
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

90 – Installing acoustic cover at rear

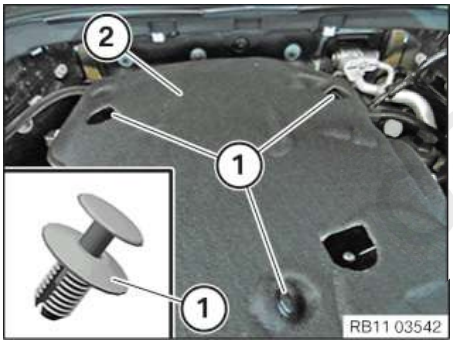


- Guide in the acoustic cover in the direction of the arrow and install it.



- Secure acoustic cover with the expanding rivets (1).

91 – Install the acoustic cover for the injectors



- Feed the acoustic cover (2) in and install.
- **If installed:** Secure the acoustic cover (2) with the expanding rivets (1) .

92 – Install acoustic cover

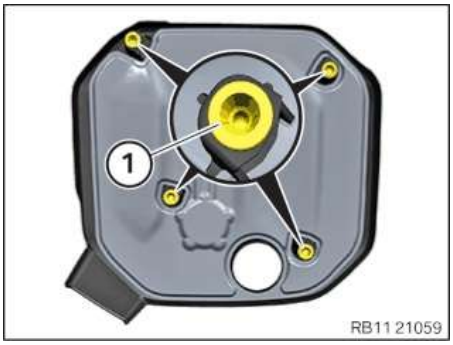
RISK OF DAMAGE

Damage to the acoustic cover/design cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.

cardiagn.com

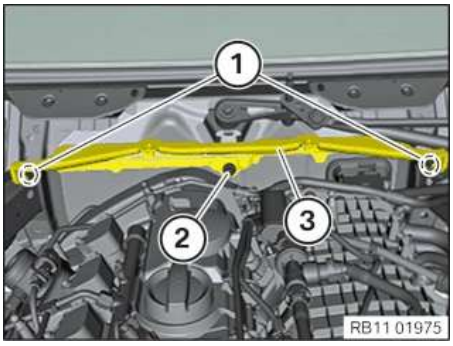


- Check the acoustic cover for correct fit of the rubber mounts (1).



- Clip in the acoustic cover (1) into the holders in the indicated areas.

93 – Installing centre bulkhead lower section

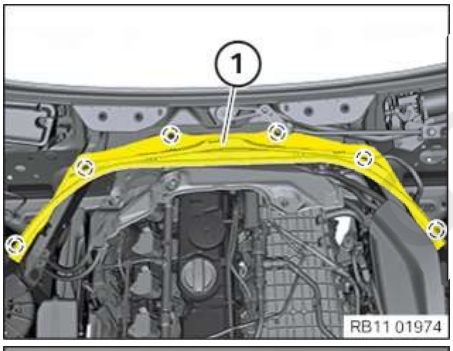


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

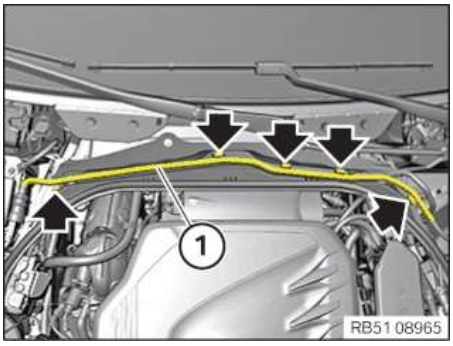
94 – Installing the centre bulkhead upper part



- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

Bulkhead upper part to bottom bulkhead

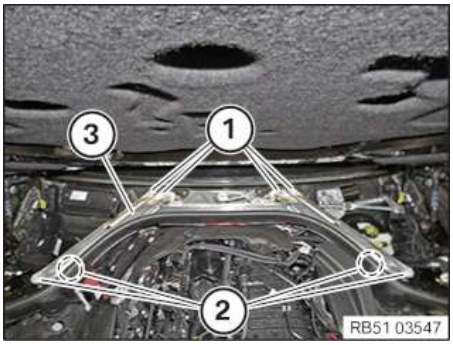
		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

  Clip in the wire (1) into the holders (arrows).

bardiagn.com



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Install the tension strut (3) on the spring strut dome.
- Tighten the screws (1).

Tension strut on bulkhead

M10x25 screw		Tightening torque	56 Nm

- Renew screws (2).

  Parts: Screws
- Tighten the screws (2).

Tension strut to spring strut dome

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

95 – Install the seal for the bonnet



- Press the rear bonnet seal (2) into the guide.
- Feed in cable (1) into the brackets.
- Check that the rear bonnet seal (2) and the cable (1) are seated correctly.

96 – Installing cowl panel cover

RISK OF DAMAGE

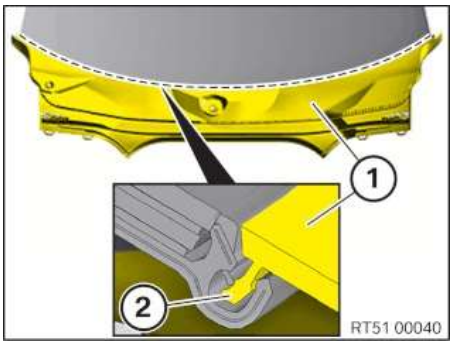
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

- Ensure correct installation of the components.
- Only use undamaged components.

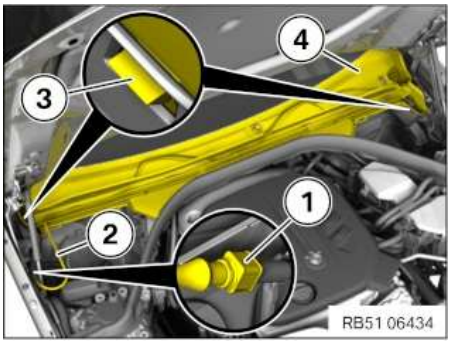
TECHNICAL INFORMATION

Before installing the cowl panel cover it is **mandatory** to check that the 48 V line is routed correctly and fitted tightly.
An incorrectly laid or attached 48 V line can be damaged by the wiper kinematics.



- Push the cowl panel cover (1) into the latch mechanism (2) beginning on the side.

cardiagn.com



- Clip cowl panel cover (4)in by means of the latch mechanisms (3).
- Position windscreen wash hose (2) and connect windscreen wash hose (1)quick lock.

97 – Install left and right wiper arm

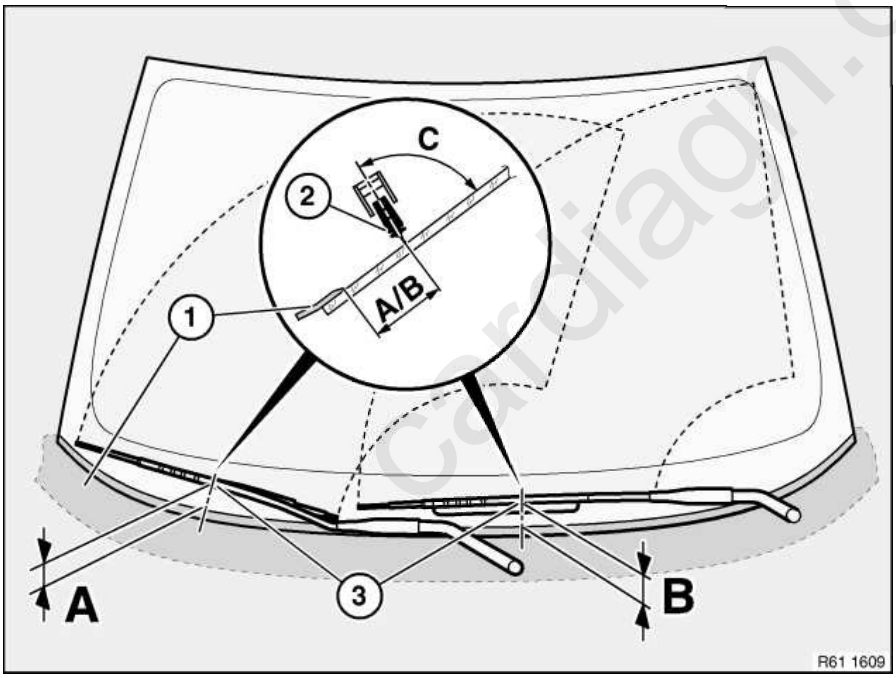
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

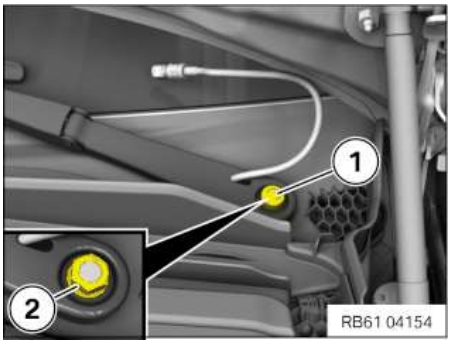
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- Connect the wiper arm (3).
- Correctly position the wiper arm (2) in relation to the window edge (1).

Distance from window pane edge to wiper blade

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm



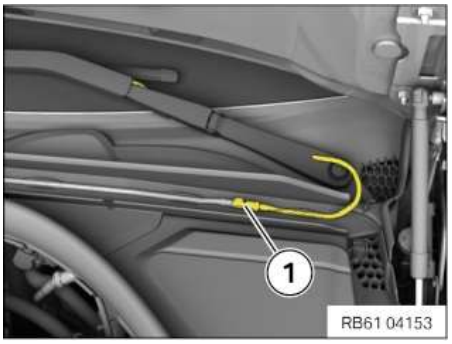
- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

- Connect the protective cap (1).

cardiagn.com



- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

98 – Connecting all battery earth leads



- See additional information.

99 – Activating the 48 V electrical system

Prerequisite

Ignition is switched off.

RISK OF DAMAGE

Damage to 48-V battery

If a 48-V battery that is disconnected from the electrical system is activated, the battery electronics will be damaged.

- Only carry out activation of the 48V electrical system with a completely connected 48-V battery.



- Lift battery earth lead (1).
- Remove special tool .



- Release the negative battery cable (2) of the 48-V battery from the mounting.
- Position the negative battery cable (2) of the 48-V battery on the negative battery terminal.
- Tighten nut (1).

Negative battery cable to 48-V battery

Nut M8		Tightening torque	19 Nm

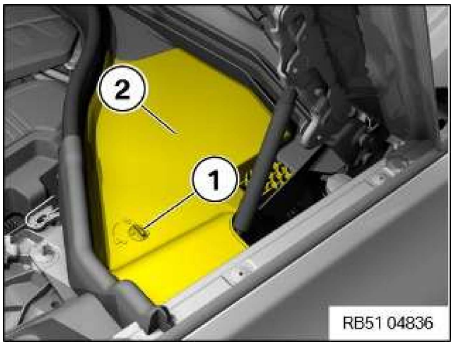


- Connect the connector (1) of the CAN bus and lock it.
- Clip in clip (2).



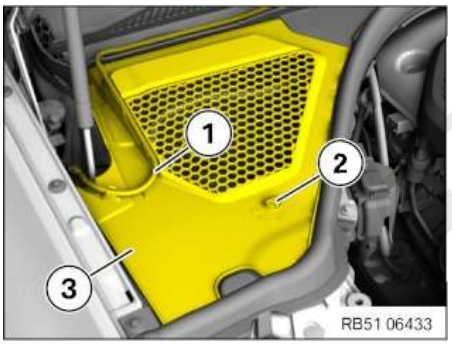
- Activate the 48V electrical system by closing the bonnet.
  The activation takes place automatically.

100 – Install the cover of the engine compartment on the rear left



- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

101 – Install the rear right engine compartment cover



- Position the cover of the engine compartment on the rear right (3).
- Close lock (2).
- Insert washer fluid hose (1) into the guides.

102 – Take bonnet out of the service position

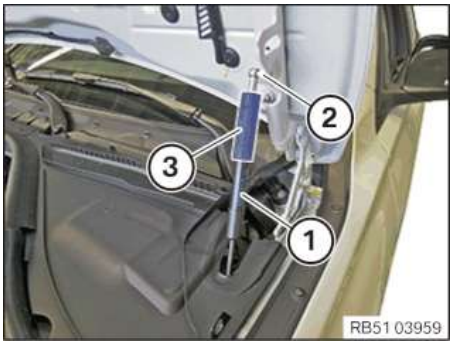
CAUTION

Shutting bonnet or tailgate.

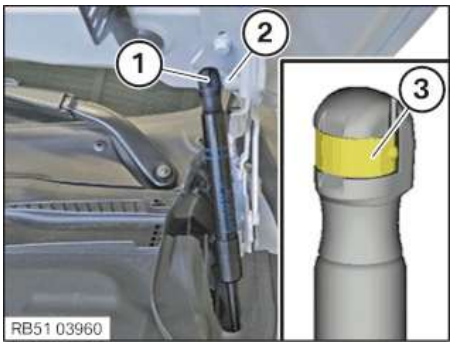
Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.

cardiagn.com



- Support the bonnet by hand.
- Remove the special tool (3) from the ball pin (2).
- Pull off the special tool (3) from the gas pressure spring (1).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.



- Check the clamp (3) is fitted correctly.
- Connect ball socket (1) to ball pin (2).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.

Additional Information

Overview of Tightening Torques

Special tool 2 365 488 to engine			Used in step 4258
M8x60		Tightening torque	19 Nm

Intake and exhaust camshaft in camshaft support			Used in step 4950
M6x31		Tightening torque	10 Nm

Bearing journal to cylinder head			Used in step 53
M16x1.5	Replace bearing journal.	Tightening torque	20 Nm

Standard screw connection M8			Used in step 53
M8		Tightening torque	19 Nm

Chain tensioner piston to cylinder head			Used in step 54
22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

Holder to crankcase			Used in step 54
M8X16		Tightening torque	19 Nm

Camshaft sprocket to camshaft			Used in step 55
M7x17.			17 Nm

Starter motor to engine			Used in step 61
M8X60		Tightening torque	19 Nm

Battery positive lead to starter			Used in step 61
M8		Tightening torque	13,5 Nm

Diesel particulate filter V-clip to exhaust turbocharger			Used in step 63
V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

Bracket to diesel particulate filter top			Used in step 63
M8		Tightening torque	19 Nm

cardiagn.com

Bracket to transmission for diesel particulate filter holder bottom			Used in step 63
M8X20		Tightening torque	19 Nm

Lower holder to diesel particulate filter			Used in step 63
M8		Tightening torque	19 Nm

Coolant lines for SCR metering module			Used in step 63
M6X16		Tightening torque	8 Nm

Nitrogen oxide sensor before SCR catalytic converter			Used in step 64
Sensor		Tightening torque	50 Nm

Monitoring oxygen sensor			Used in step 65
Sensor		Tightening torque	50 Nm

Rear silencer to body / bumper support			Used in step 66
M8	Replace nuts.	Tightening torque	19 Nm

Exhaust system to rear axle carrier			Used in step 66
M8 nut		Tightening torque	19 Nm

Exhaust system to transmission			Used in step 66
M8		Tightening torque	19 Nm

Exhaust system to diesel particle filter			Used in step 66
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

SCR metering module V-clip to exhaust system			Used in step 66
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm

Exhaust-gas temperature sensor upstream of SCR catalytic converter			Used in step 66
Sensor		Tightening torque	30 Nm

Diesel particulate sensor to exhaust system			Used in step 66
Sensor		Tightening torque	50 Nm

Nitrogen oxide sensor downstream of SCR catalytic converter			Used in step 66
Sensor		Tightening torque	55 Nm

Connecting support to tunnel			Used in step 67
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

Diffuser / underbody panelling			Used in step 68
Nuts and screws		Tightening torque	3 Nm

Underbody protection			Used in step 6971
Hexagon screw		Tightening torque	3 Nm

Underbody panelling			Used in step 70
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Underbody protection, steering, to front axle support			Used in step 72
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support			Used in step 72
Hexagon bolt M6		Tightening torque	8 Nm

cardiagn.com

Underbody protection of the steering gear — Used in step 73

Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

Wheel arch trim panel, front — Used in step 73

Thermoplastic hexagon screw		Tightening torque	2,6 Nm

Underbody protection front — Used in step 74

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Cylinder head cover to cylinder head — Used in step 75

M6		Tightening torque.	8,5 Nm

Heat shield to exhaust manifold — Used in step 76

M6x12			10 Nm

Bracket on cylinder head cover — Used in step 77

		Tightening torque	5 Nm

Battery positive lead to battery positive terminal — Used in step 77

M8		Tightening torque	19 Nm

Differential pressure sensor of diesel particulate filter on cylinder head cover — Used in step 78

TS5x20		Tightening torque	4 Nm

Heat shield to exhaust manifold — Used in step 79

M6x12		Tightening torque	10 Nm

Banjo bolt for exhaust pressure pipe to exhaust manifold — Used in step 79

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm

Exhaust gas pressure pipe to sensor system holder — Used in step 79

TS6x20		Tightening torque	5,7 Nm

Clamping claw facing to cylinder head cover — Used in step 80

M6		Tightening torque	10 Nm

Injector to cylinder head cover — Used in step 80

M8		Tightening torque	8 Nm
		Angle of rotation	120 °

Rail to cylinder head cover — Used in step 81

M8		Tightening torque	19 Nm

High pressure lines between high pressure pump and rail — Used in step 82

High-pressure pipe		Tightening torque	24.5 Nm

High pressure lines between injector and rail — Used in step 83

High-pressure pipe		Tightening torque	24.5 Nm

Intake plenum to cylinder head — Used in step 85

M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum — Used in step 85

		Tightening torque	10 Nm

cardiagn.com

Electric changeover valve to intake plenum			Used in step 85
TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold			Used in step 86
TS5x20		Tightening torque	3,6 Nm

Standard screw connection 4 Nm			Used in step 86
Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover			Used in step 86
TS5x20		Tightening torque	3,6 Nm

Standard screw connection M6			Used in step 86
M6		Tightening torque	8 Nm

Battery positive lead on the starter motor generator			Used in step 86
M8		Tightening torque	19 Nm

Holder on intake plenum			Used in step 86
TS6X20		Tightening torque	5 Nm

Clean air pipe to exhaust turbocharger			Used in step 89
M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing			Used in step 89
Clamp		Tightening torque	3 Nm

Bulkhead lower part to body			Used in step 93
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead			Used in step 94
		Tightening torque	3 Nm

Tension strut on bulkhead			Used in step 94
M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome			Used in step 94
Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm			Used in step 97
Combination hexagon nut		Tightening torque	35 Nm

Negative battery cable to 48-V battery			Used in step 99
Nut M8		Tightening torque	19 Nm

Overview of Special Tools

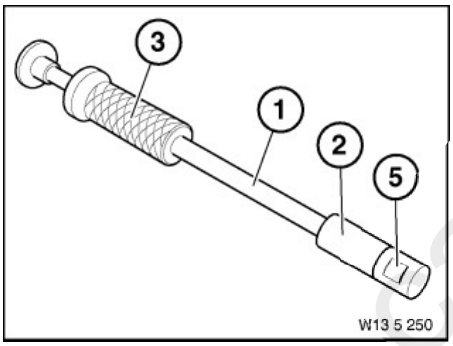
cardiagn.com

0 493 339 (13 5 252) Bush



Common	Used in step 23
Usage	(Threaded bush)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 321 (13 5 250) Puller



Common	Used in step 23
Usage	For removing injector nozzles or injectors from cylinder head
Included in the tool or work	
Storage location	A16
Replaced by	
In connection with	
SI-Number	01 06 98 (306)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 338 (13 5 251)		**Rod** (guide rod)	
2	0 493 339 (13 5 252)		**Bush** (Threaded bush)	
3	0 493 340 (13 5 253)		**Weight** (Weight)	
4	0 493 379 (13 5 254)		**Claw** (Clamping claw) For removal of injector nozzles / engine: M57	
5	0 495 579 (13 5 255)		**Adapter** For removing steering shaft on E85. Refer to SI 01 11 06 (265)	

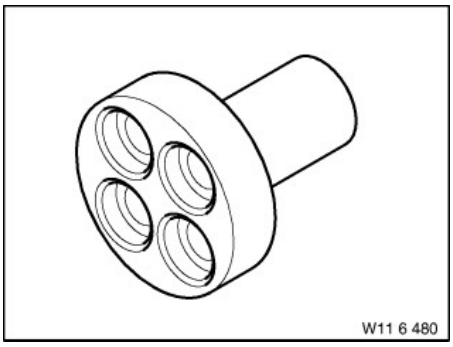
cardiagn.com

0 493 340 (13 5 253) Weight



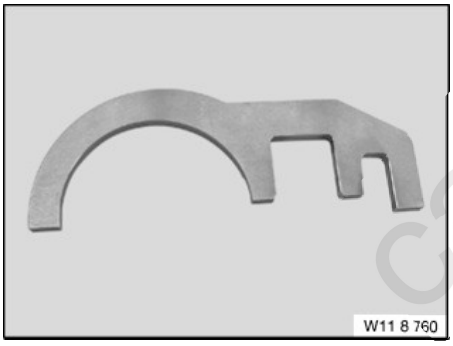
Common	Used in step 23
Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 380 (11 6 480) Connector



Common	Used in step 4258
Usage	For turning over engine at crankshaft hub (vibration absorber).
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	01 11 98 (338)

0 496 112 (11 8 760) Gauge



Common	Used in step 424651565859
Usage	For securing camshaft at TDC.
Included in the tool or work	
Storage location	B24
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

2 365 488 Adapter



Common	Used in step 42575860
Usage	For disconnecting the crankshaft at the top dead centre. (longitudinal installation with automatic transmission only).
Included in the tool or work	
Storage location	C56
Replaced by	
In connection with	
SI-Number	01 46 14 (191)

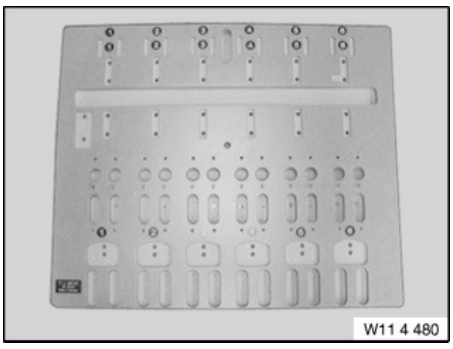
cardiagn.com

2 288 380 Locating stud



Common	Used in step 42575860
Usage	For disconnecting the crankshaft at the top dead centre. Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).
Included in the tool or work	
Storage location	A56
Replaced by	
In connection with	
SI-Number	01 04 14 (071)

0 495 105 (11 4 480) oddments tray

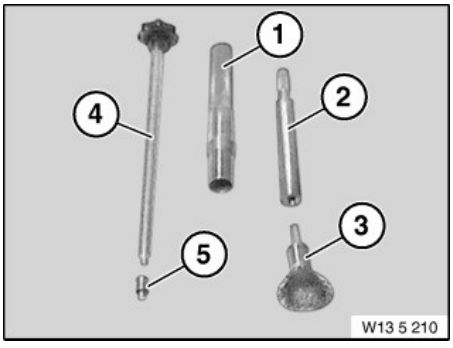


Common	Used in step 4748
Usage	(Boards (2 pieces)) For setting down the individual components of the cylinder head.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 17 04 (130)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 495 106 (11 4 481)		**oddments tray** (Board, intake side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	
2	0 495 107 (11 4 482)		**oddments tray** (Board, exhaust side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	

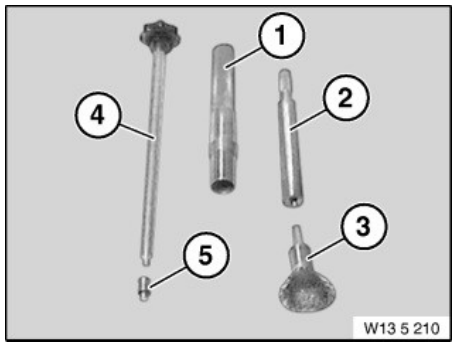
0 493 763 (13 5 215) Plug



Common	Used in step 80
Usage	(Seal plug)
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

cardiagn.com

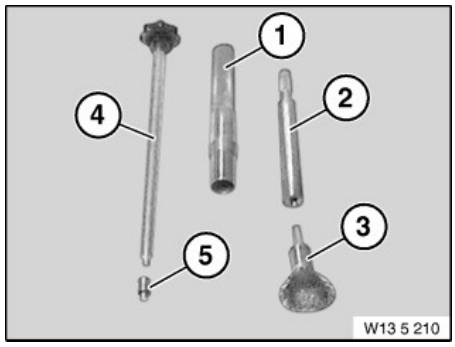
0 493 762 (13 5 214) Rod



Common Used in step 80

Usage	(Mounting rod) For the seal plug
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 758 (13 5 210) Tool



Common Used in step 80

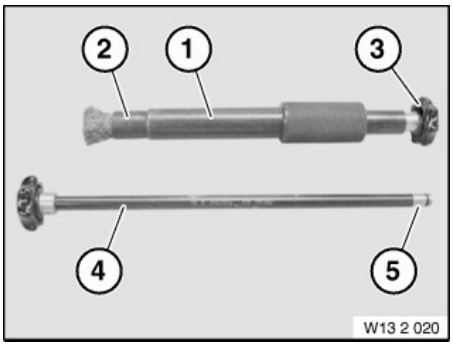
Usage	(Cleaning set) For injector channels
Included in the tool or work	
Storage location	B4
Replaced by	
In connection with	
SI-Number	01 05 00 (574)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 759 (13 5 211)		**Holding sleeve** (Guide sleeve)	
2	0 493 760 (13 5 212)		**Holder** (Brush holder)	
3	0 493 761 (13 5 213)		**Brush head**	
4	0 493 762 (13 5 214)		**Rod** (Mounting rod) For the seal plug	
5	0 493 763 (13 5 215)		**Plug** (Seal plug)	

carmagn.com

0 496 150 (13 2 020) Tool



Common Used in step 80

Usage	(Cleaning kit) For cleaning the injector shaft.
Included in the tool or work	
Storage location	A87
Replaced by	
In connection with	
SI-Number	01 07 07 (355)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 496 151 (13 2 021)		**Holding sleeve** (Guide sleeve) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
2	0 496 152 (13 2 022)		**Holder** (Brush holder) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
3	0 496 153 (13 2 023)		**Brush head** Remaining inventories will be sold off, followed by discontinuation and then available as part of complete special tool 13 2 020 = 83 30 0 496 150 only	
4	0 496 154 (13 2 024)		**Rod** (Mounting rod) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
5	0 496 155 (13 2 025)		**Plug** (Seal plug) Available as part of complete special tool 13 2 020 = 83 30 0 496 150 only.	

cardiagn.com

Distance from window pane edge to wiper blade	Used in step 97
Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

Links

Repair instructions (PRE)	Used in step
Notes on 48-V battery	499

General repair instructions	Used in step
11 00 ... Overview of consumables (Electronic Parts Catalogue)	80

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	598
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	598
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	598
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	598
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598

cardiagn.com

61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 35 ... Notes on ESD protection (Electro Static Discharge)	17233839
61 35 ... Notes on ESD protection (Electro Static Discharge)	17233839

cardiagn.com

11 31 022 Removing and installing/replacing both camshafts

PRELIMINARY WORK

1 – Bring front compartment lid in the service position

Prerequisite

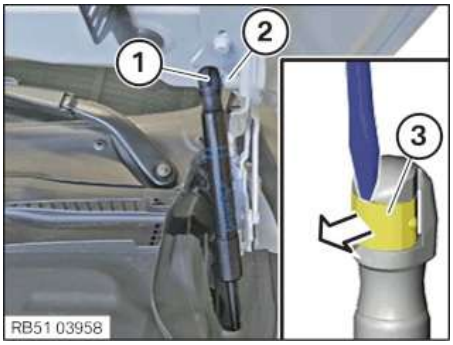
Engine compartment lid is open.

CAUTION

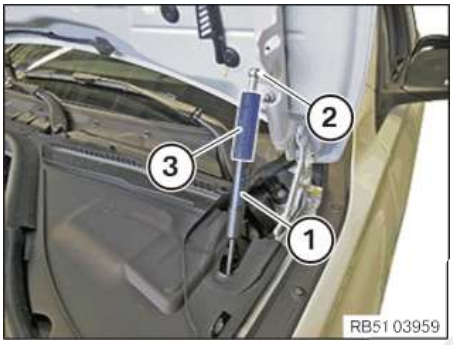
Shutting bonnet or tailgate.

Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.



- Lift clamp (3) slightly using a screwdriver, in the direction of the arrow.
- Lift off ball socket (1) from ball pin (2).
- Repeat the operation on the other side of vehicle.



TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

- Remove the bonnet support and open the bonnet further.
- Pull special tool or or (3) over gas pressure spring (1).
- Place special tool on the ball pin (2) and engage using force.
- Repeat the operation on the other side of vehicle.

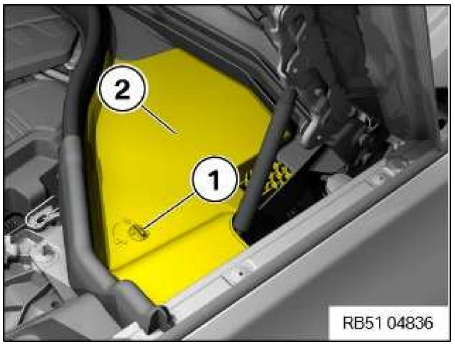
2 – Disconnecting all battery earth leads



- See additional information.

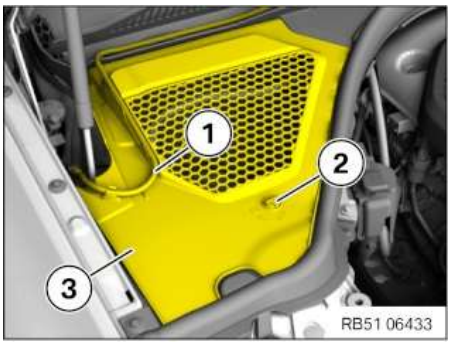
3 – Remove the cover of the engine compartment at the rear left

cardiagn.com



- Loosen the lock (1).
- Remove the cover (2) of the rear left engine compartment.

4 – Remove the cover of the rear right engine compartment



- Release washer fluid hose (1) from the guides.
- Loosen the lock (2).
- Remove the cover (3) of the rear right engine compartment.

5 – Removing the wiper arm on the left and right

NOTICE

Description is for left component only. Procedure on the right side is identical.

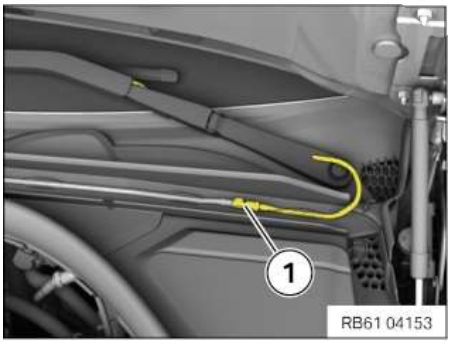
▸ **Remove the wiper arm**

RISK OF DAMAGE

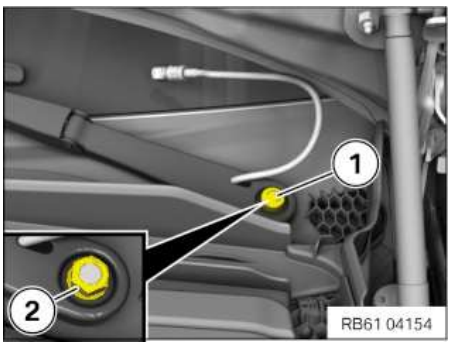
Damage to wiper console.

While removing the wiper arms without using special tool, the wiper console can break.

- Removing the wiper arms must be carried out only using the prescribed special tool.
- Do **not** lever off the wiper arm because otherwise the wiper console may break at the predetermined breaking point for active pedestrian protection.

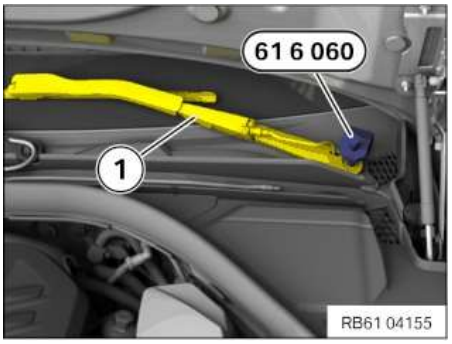


- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.



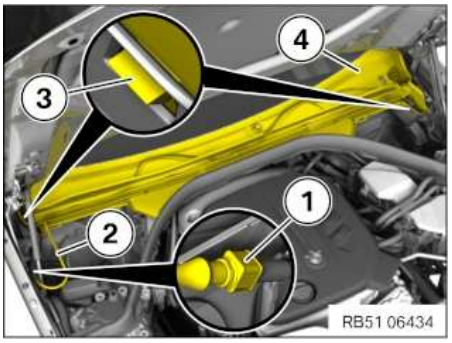
- Remove the protective cap (1).
- Loosen nut (2).

cardiagn.com

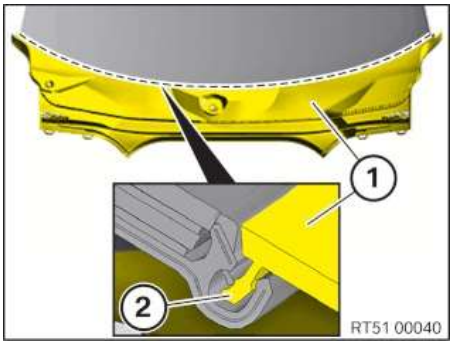


- Pull off the wiper arm (1) using special tool .

6 – Remove cowl panel cover



- Release snap fastener (1) of the washer fluid hose (2) and put the washer fluid hose (2) to one side.
- Unclip clips (3) on the cowl panel cover (4).



- Pull the cowl panel cover (1) upward out of the latch mechanism (2) beginning on the side.

7 – Remove the seal for the rear bonnet

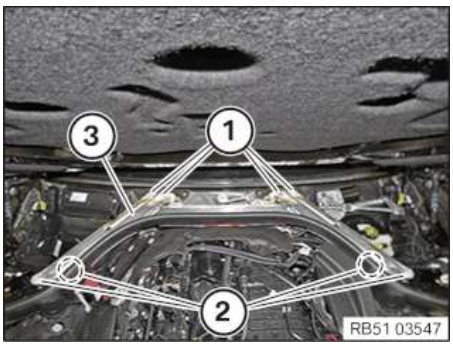


- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

8 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

Driving without the strut brace/front-end strut or tension strut is not permitted.

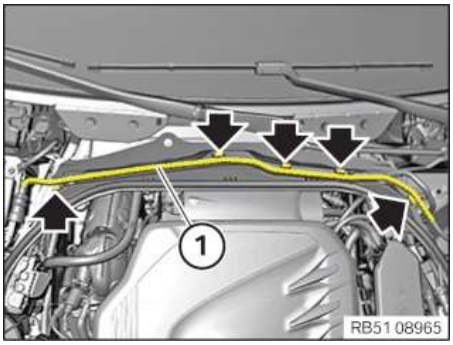


NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

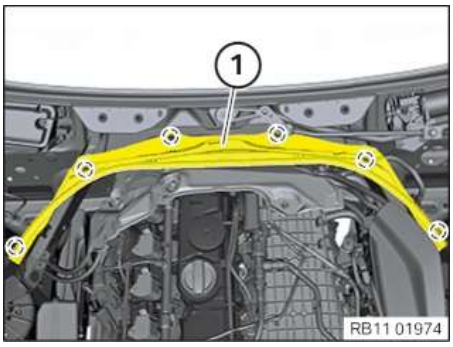
- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.

bardiagn.com



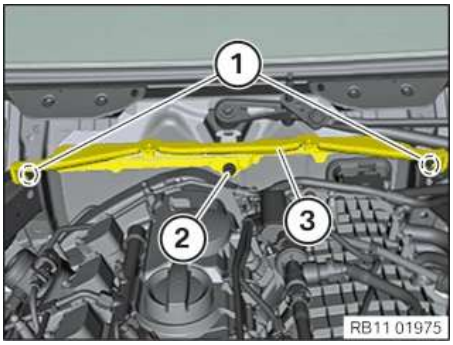
- **Version with mild hybrid technology:**

  Unclip the wire (1) at the holders (arrows).



- Unscrew the bolts in the marked areas.
- Remove the centre bulkhead upper part (1).

9 – Removing the centre bulkhead lower section



- Loosen screws (1).
- Loosen nut (2).
- Remove the centre bulkhead lower part (3).

10 – Removing the acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

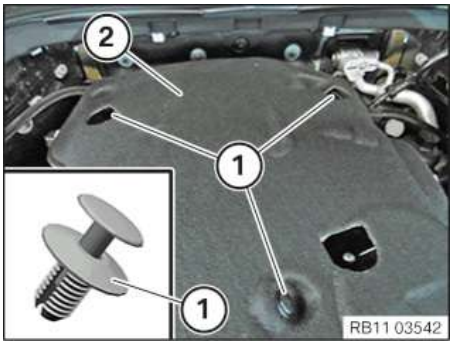
- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

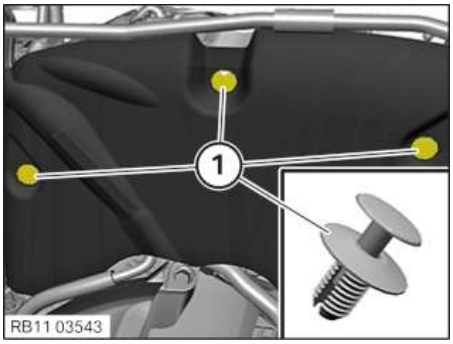
11 – Remove the acoustic cover for the injectors

cardiagn.com

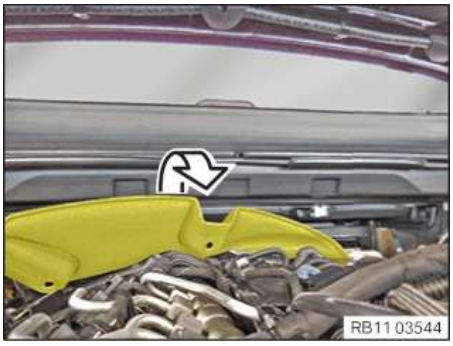


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

12 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).



- Guide out and remove the acoustic cover in the direction of the arrow.

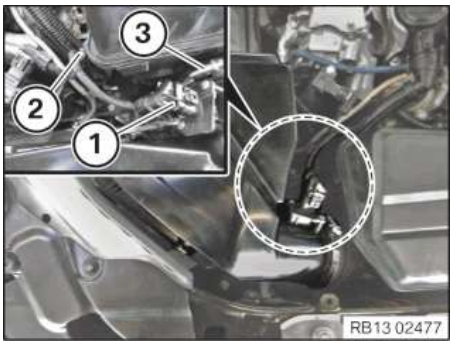
13 – Removing the clean air pipe with the resonator

WARNING

Hot surfaces.

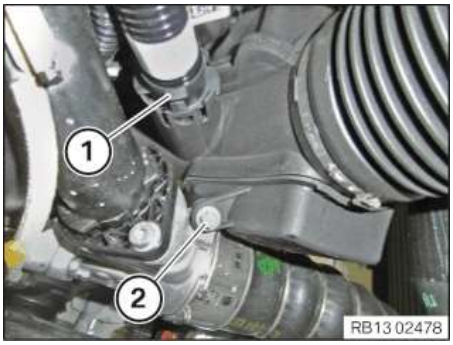
Risk of burning!

- Perform all work only on components that have cooled down.

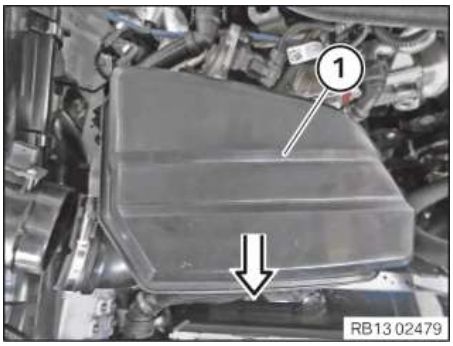


- Unlock plug connection (1) and disconnect.
- Loosen clamp (2).
- Unfasten clamp (3).
- Separate the clean air pipe with resonator from the intake filter housing.

cardiagn.com



- Unlock engine ventilation line (1), disconnect it and place it aside.
- Loosen screw (2).



- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Unlock and loosen clamp (1).



- Feed out and remove clean air pipe with resonator (1) in the direction of the arrow.

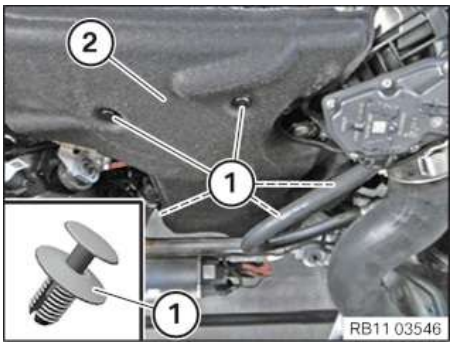
14 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.



- Release and remove expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

cardiagn.com

15 – Partially releasing the wiring harness section on the intake plenum

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

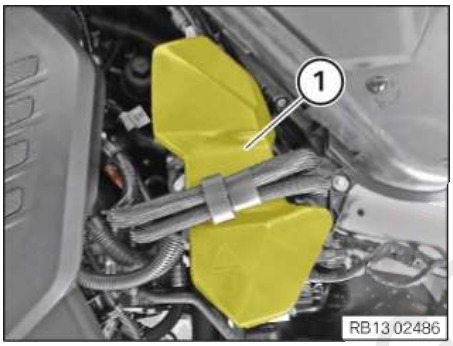
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

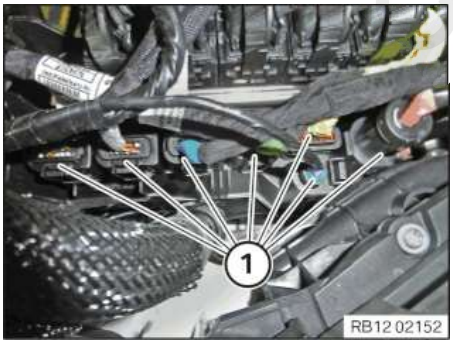
- Do not pull on the wires when disconnecting connectors and plug connections.

TECHNICAL INFORMATION

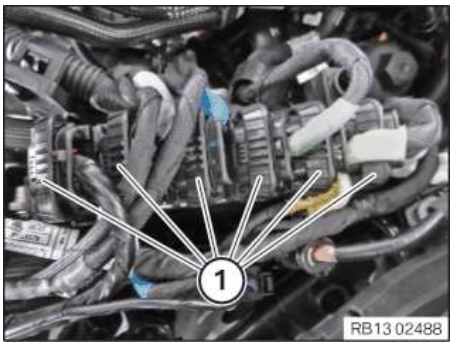
Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.



- Pull off cover (1) upwards, feed out and remove.

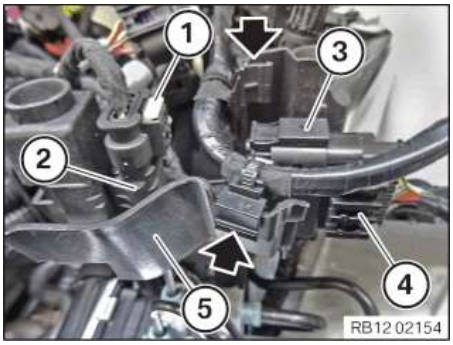


- Unlock and disconnect plug connections (1).

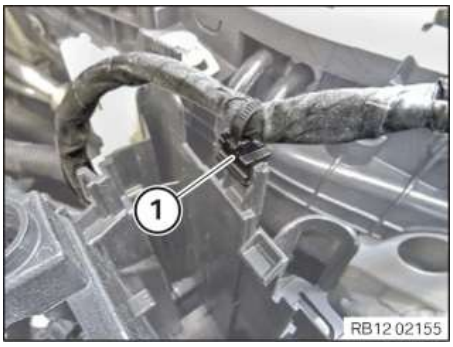


- Unlock and disconnect plug connections (1).

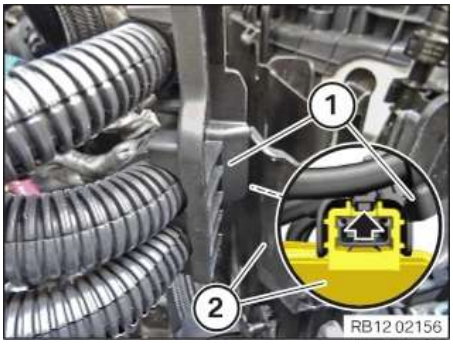
ardiagn.com



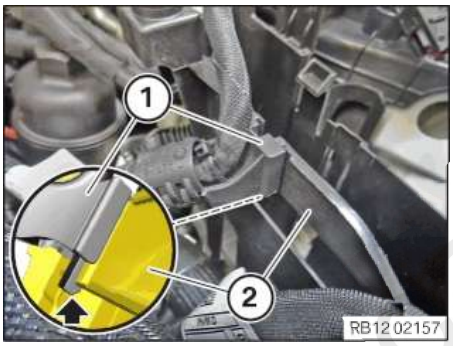
- Unlock plug connection (1) and disconnect.
- Unlock the plug (2) and disconnect from the control unit holder (5).
- Unlock plug connection (3) and disconnect.
- Unlock the plug (4) and disconnect from the control unit holder (5).
- Release the clamps (arrows).



- Loosen clamp (1).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).

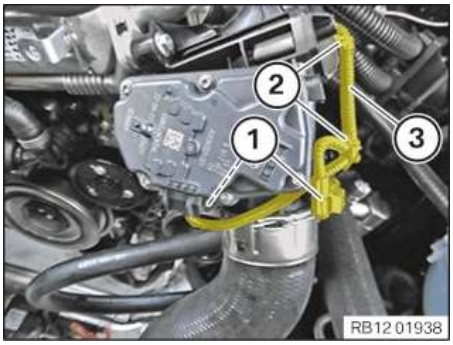


- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.

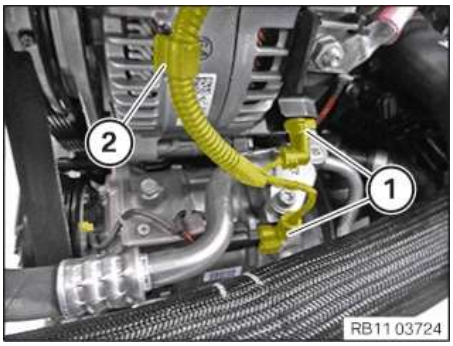


- Unlock holder (1) and feed out coolant line (2) and place it aside.

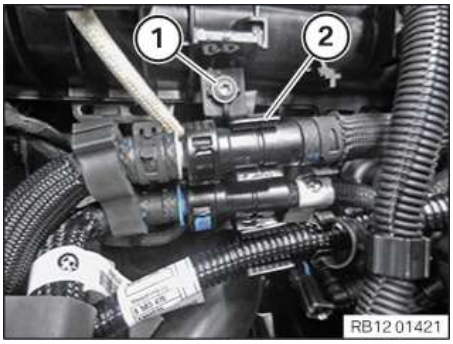
gardiagn.com



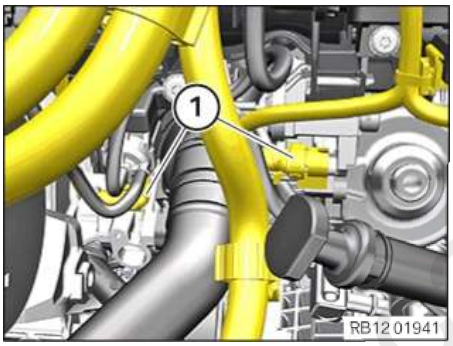
- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.



- Unlock and separate plug connections (1).
- Release the holder (2) from the alternator .



- Loosen screw (1).
- Thread out holder (2) and set aside.



- Unlock and disconnect plug connections (1).

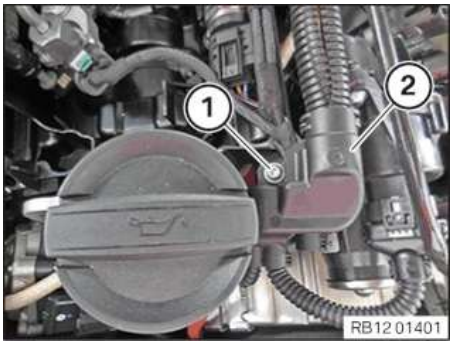


- Unlock and loosen connector (1).

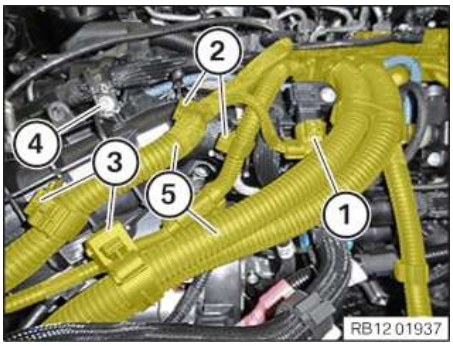


- Unlock plug connection (1) and disconnect.

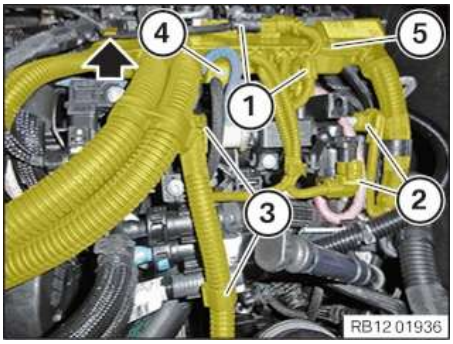
cardiagn.com



- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.



- Unlock plug connection (1) and disconnect.
- Loosen clamps (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.



- Unlock and disconnect plug connections (1).
- Release line from clamp (Arrow).
- Unlock and disconnect plug connections (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.

16 – Removing the intake plenum

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

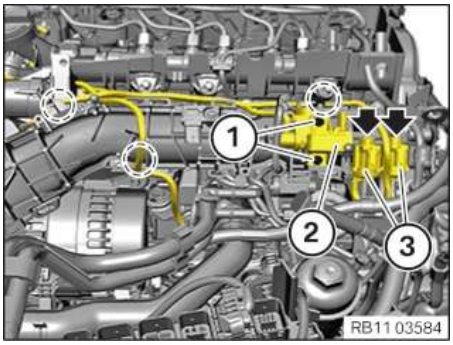


- Unlock clamp (1) and engage in this position.

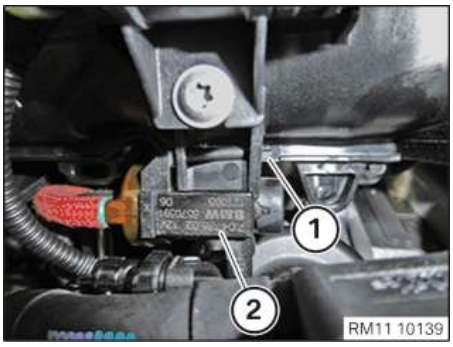


- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.

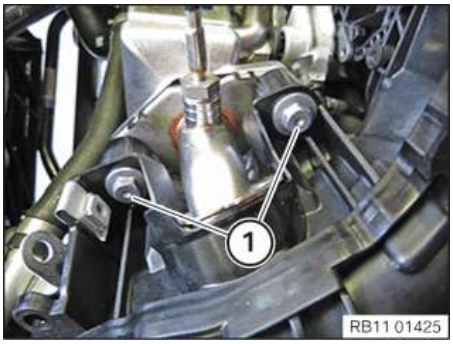
cardiagn.com



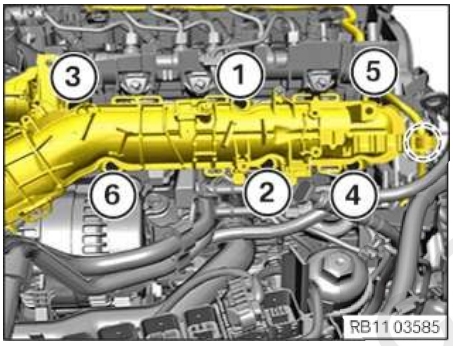
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



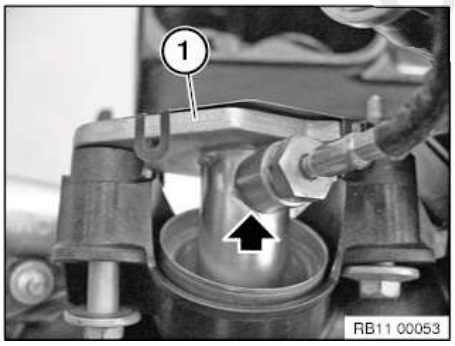
- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.



- Loosen screws (1).



- Detach the leakage oil lines in the marked area from the intake plenum.
- Loosen screws in the order (6) to (1).
- Guide the intake plenum out forwards and remove it.



- Remove the exhaust-gas recirculation pipe (1) (arrow).

17 – Detaching the leakage oil line from the injectors

cardiagn.com

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

WARNING

Hot surfaces.

Risk of burning!

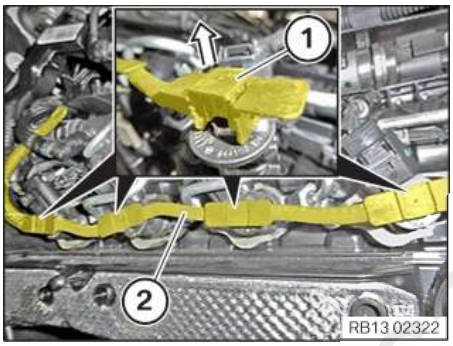
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

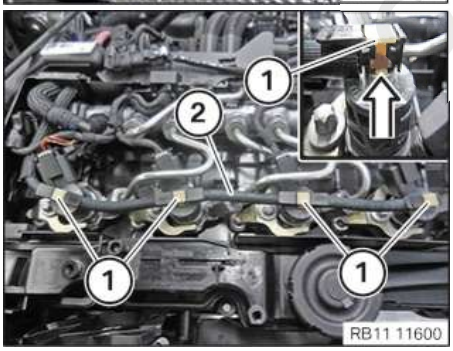


- **Version A:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.

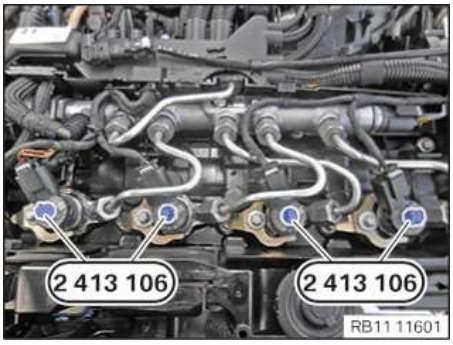


- **Version B:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.



- Seal open connections with special tools .

18 – Remove the high pressure lines between the injector and the rail

cardiagn.com

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

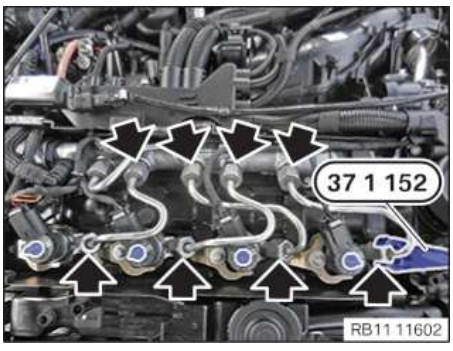
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

If several high pressure lines are removed, ensure that each high pressure line is installed in its original location. Label high pressure lines.

TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.



- Release the high pressure lines (arrows) with the special tool .
  Reset the special tool early on to prevent bending of the high pressure line.
- Catch and dispose of escaping fuel.
- Feed out and remove the high pressure lines (arrows).
- Seal off all the open cable connections with the special tool .

cardiagn.com

19 – Remove the high pressure line between the high pressure pump and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Hot fluids.

Risk of scalding!

- Conduct all work in the vehicle wearing appropriate personal protective equipment only.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

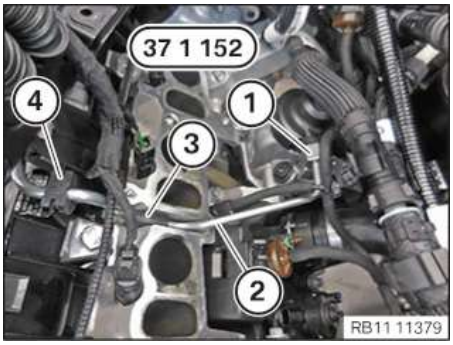
TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.

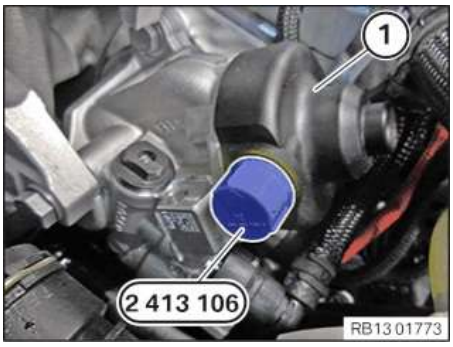


- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.

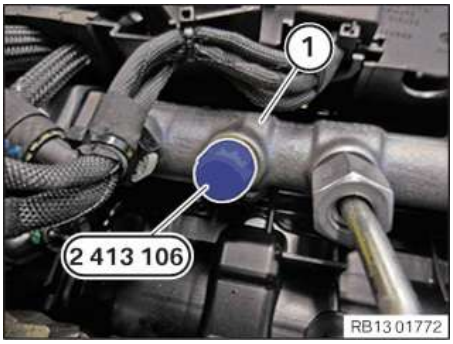
cardiagn.com



- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.
- Guide out and remove the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).



- Seal off the opening at the high pressure pump (1) with the special tool .



- Seal off the opening on the rail (1) with the special tool .

20 – Remove high-pressure rail

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

RISK OF DAMAGE

Contaminant or foreign body.

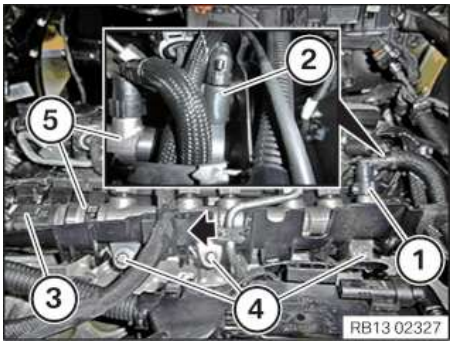
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

cardiagn.com



- Unlock and disconnect the fuel return line (1).
- Guide the fuel return line (1) out and set it aside.
- Unlock and disconnect the plug connection (2) on the rail pressure regulating valve.
- Unlock and disconnect the plug connection (3) on the rail pressure sensor.
- Unlock cable clip (Arrow), feed out and place aside.
- Loosen screws (4).
- Thread out and remove the rail (5).

21 – Remove all injection systems

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

cardiagn.com

RISK OF DAMAGE

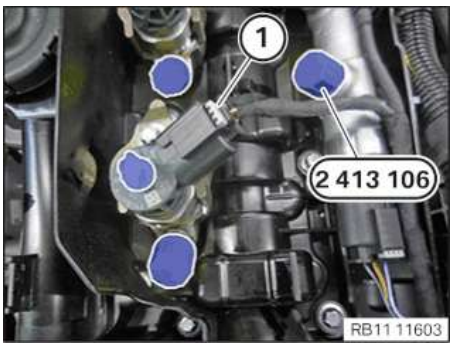
Electrostatic discharge.

Damage to or destruction of electrical components.

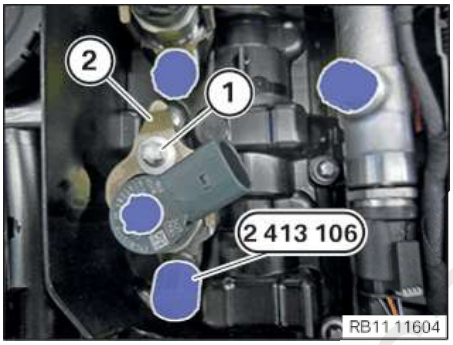
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

TECHNICAL INFORMATION

If several injectors are removed, ensure that each injector is installed at its original location (cylinder). Mark injectors.



- Unlock plug connection (1) and disconnect.



- Loosen screw (1).
- Guide out and remove clamping claw (2).
- Feed out and remove the injector with slight rotational movements.

▸ **Loosen stuck injectors**

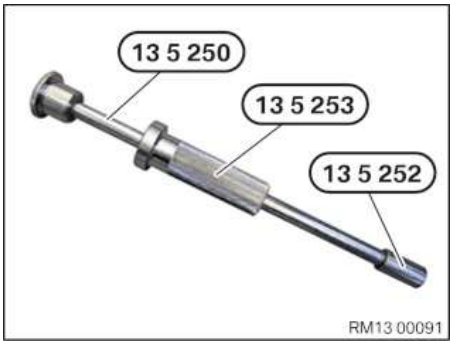
RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

cardiagn.com



- Unscrew special tool 0 493 339 (13 5 252) from special tool 0 493 321 (13 5 250) and remove special tool 0 493 340 (13 5 253).
- Screw special tool 0 493 339 (13 5 252) back onto special tool 0 493 321 (13 5 250).

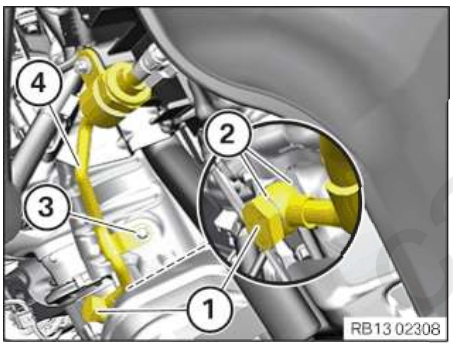


- Screw special tool 0 493 321 (13 5 250) with special tool 0 493 339 (13 5 252) onto pressure line connection (1) of injector.
- Release injector (1) with special tools 0 493 321 (13 5 250) and 0 493 339 (13 5 252) by means of **short** back and forth movements and remove.

22 – Remove the exhaust gas pressure pipe

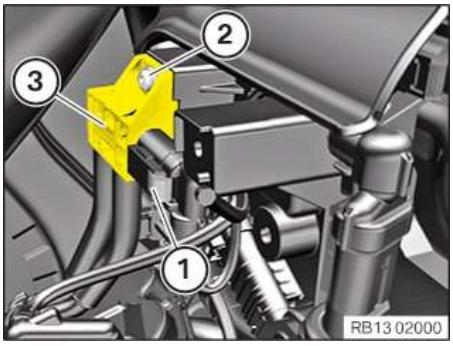


- Unlock plug connection (1) and disconnect.
- Loosen screw (2).



- Unscrew the banjo bolt (1).
- Feed out and remove the sealing rings (2).
- Loosen screw (3).
- Feed out and remove the exhaust gas pressure pipe (4).

23 – Releasing the differential pressure sensor for the diesel particulate filter



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).
- Remove the differential pressure sensor (3) and put it to one side.

24 – Removing the sensor bracket on the cylinder head cover

carbagn.com

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

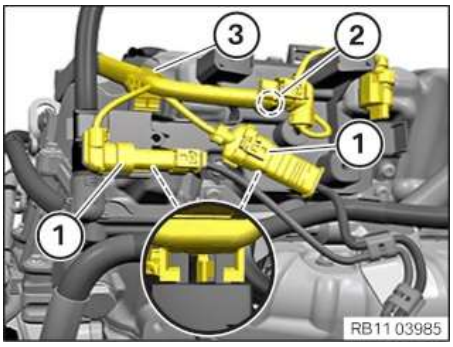
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

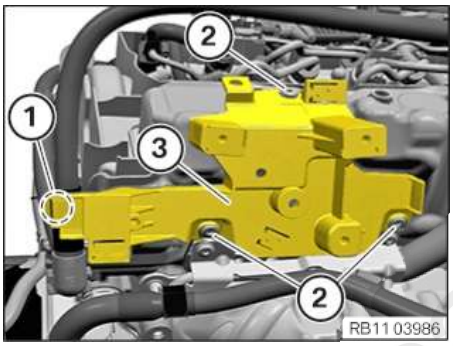
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

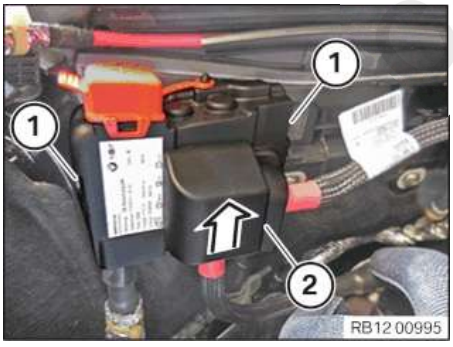
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



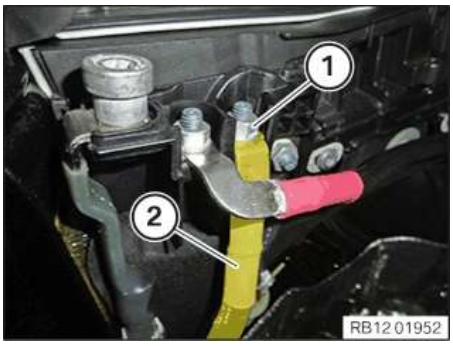
- Unlock plug connection (1) and disconnect.
- Unlock the plug connection (1) and release it from the sensor bracket.
- Release the cable clip in the area (2) from the sensor bracket.
- Release the clamps (3) and set the wiring harness section aside.



- Release the positive battery cable in the area (1) from the clamp and set it aside.
- Loosen screws (2).
- Feed out holder (3) for the sensor system and remove.

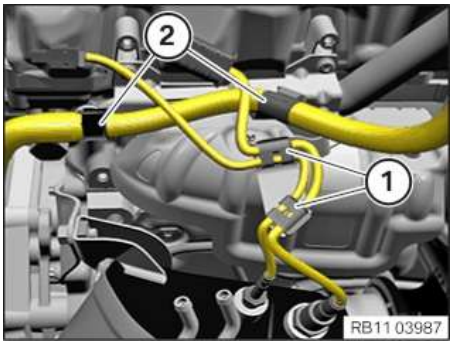


- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.

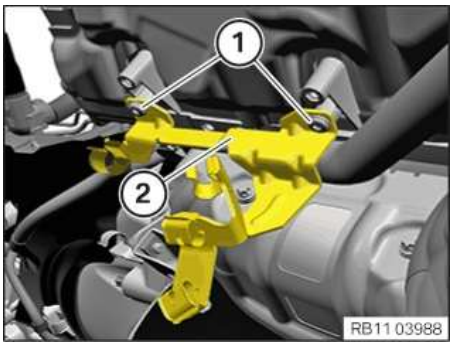


- Loosen nut (1).
- Feed out positive battery cable (2) and put to one side.

cardiagn.com

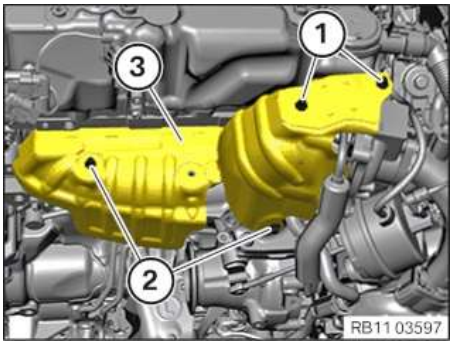


- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



- Loosen screws (1).
- Guide out and remove holder (2).

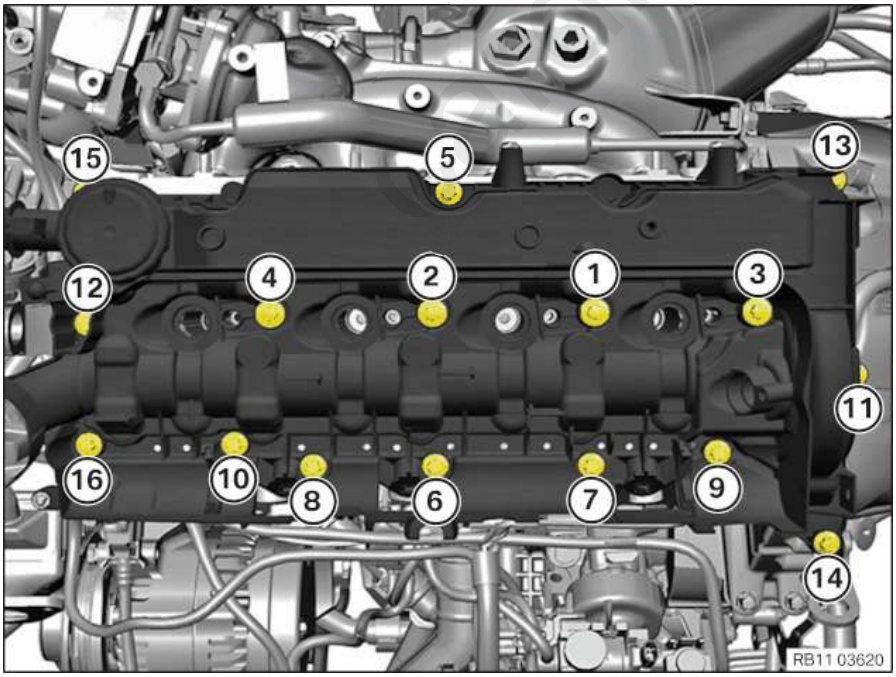
25 – Removing heat shield



- Loosen screws (1).
- Loosen screws (2).
- Feed out and remove the heat shield (3).

26 – Removing the cylinder head cover

Screw connection of the cylinder head cover



1 - 16 Bolts of the cylinder head cover

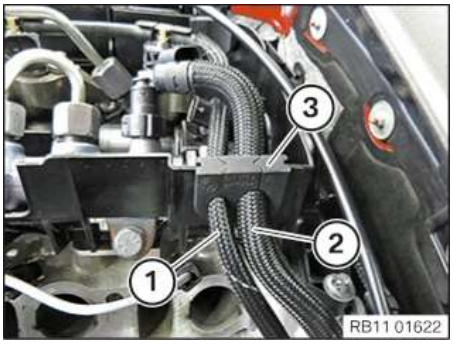
diagn.com



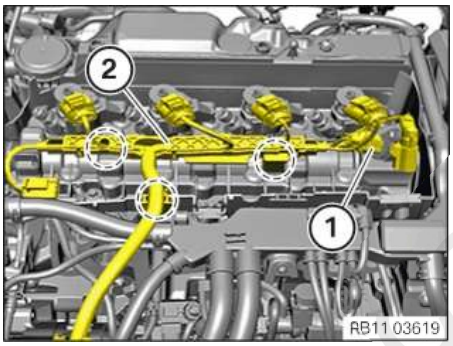
- Unlock and detach the locks.
- Feed the engine ventilation line (1) out and set it aside.



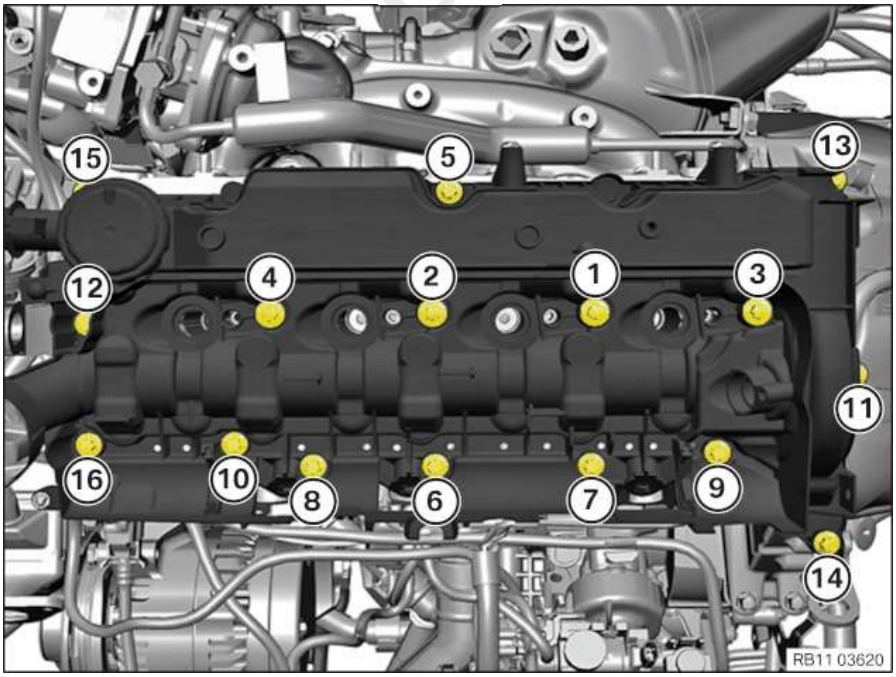
- Feed out and remove the heat shield (1).



- Remove the leakage oil line (1) including the fuel return line (2) and the grommet (3) and put to one side.

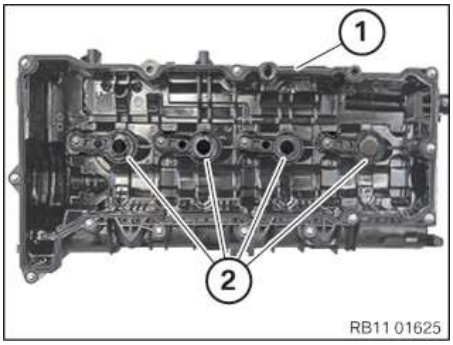


- Unlock connector (1) and pull off.
- Disconnect the wiring harness (2) in the marked areas from the cylinder head cover and set aside.



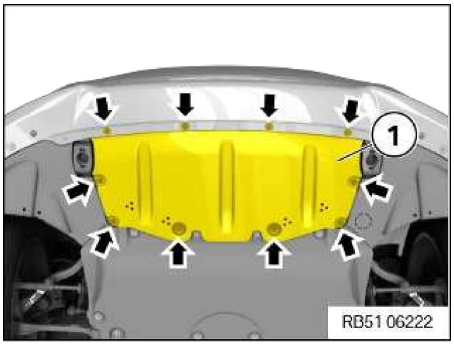
- Evenly loosen the screws in a sequence from (16) to (1).
- Feed out and remove the cylinder head cover.

cardiagn.com



- Remove the profile seals (1) and (2).

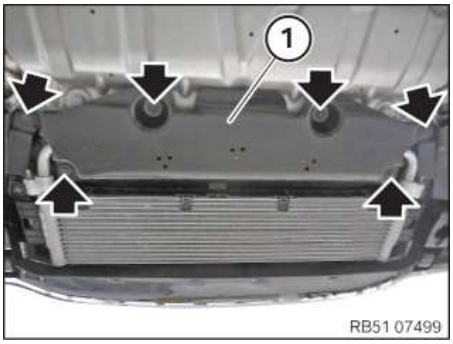
27 – Removing the front underbody protection



- **Version A:**

  Remove screws (arrows).

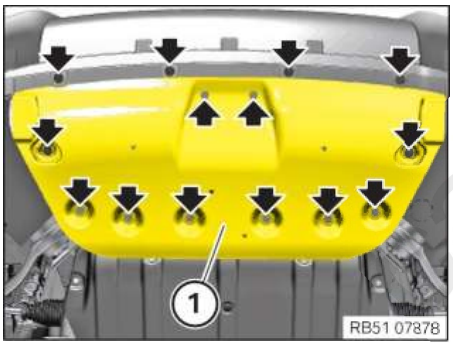
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version B:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

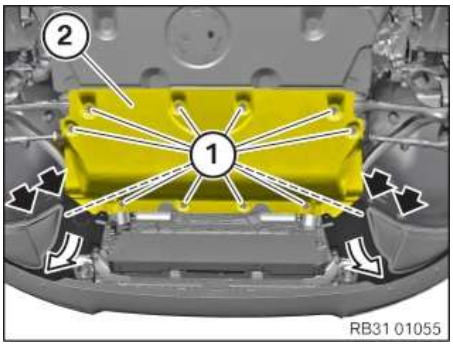


- **Version C:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

28 – Remove the underbody protection of the steering gear



- **Version A:**

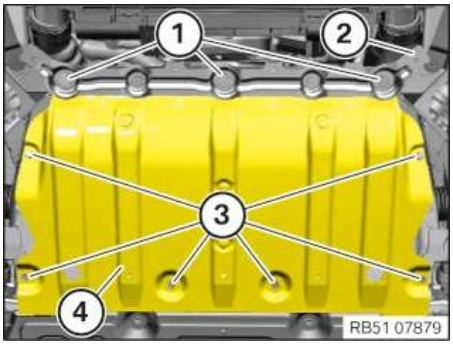
  Unscrew the screws (arrows) of the wheel arch cover on the wheel arch cover.

  Fold the bottom wheel arch cover to the side.

  Loosen screws (1).

  Remove the underbody protection (2) of the steering gear.

ardiagn.com



- **Version B:**

  Loosen screws (1).

  Remove the holder (2) for the underride protection.

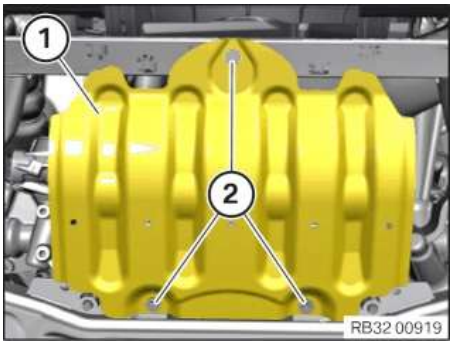
  Loosen screws (3).

  Feed out and remove the underbody protection (4) of the steering gear.

29 – If installed: Removing the steering underbody protection

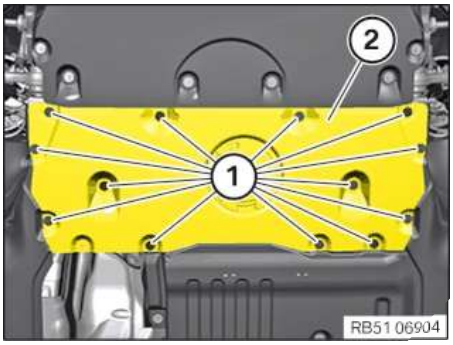
Prerequisite

Front underbody protection has been removed.



- Loosen screws (2).
- Remove underbody protection (1).

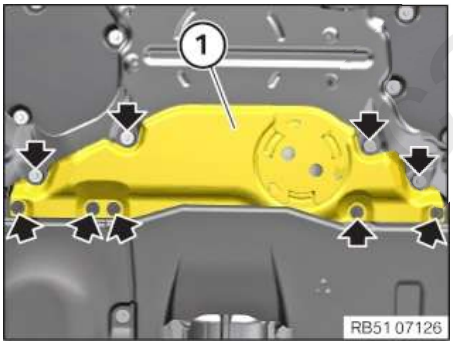
30 – Removing the centre underbody protection



- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .

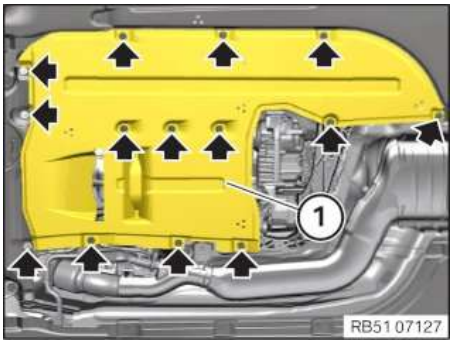


- **Version with all-wheel drive:**

  Remove screws (arrows).

  Feed out and remove the centre underbody protection (1).

31 – Remove rear underbody protection

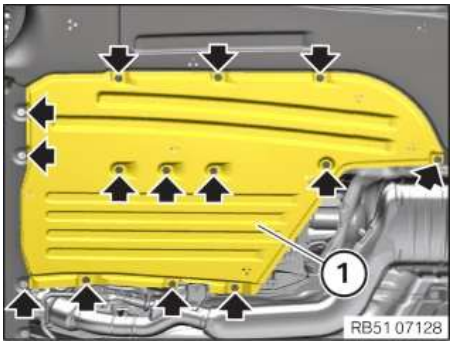


- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).

cardiagn.com



- **Version B:**

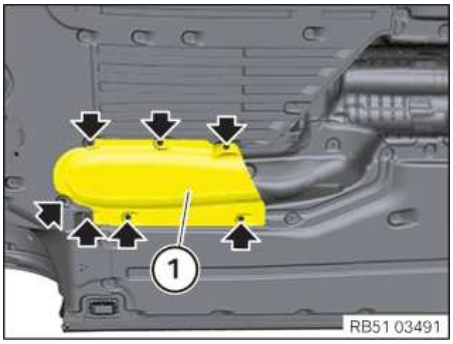
  Remove screws (arrows).

  Guide out rear underbody protection (1) and remove it.

32 – Remove the underbody panelling of the transmission on the side

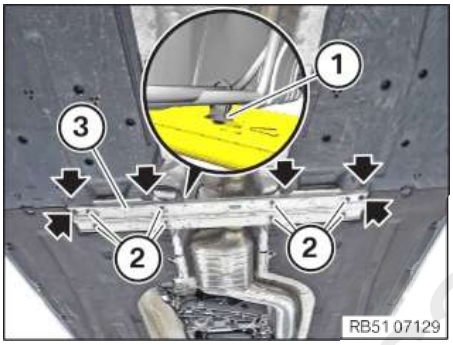
NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.



- Remove screws (arrows).
- Remove the underbody panelling (1).

33 – Remove the connecting support from the tunnel



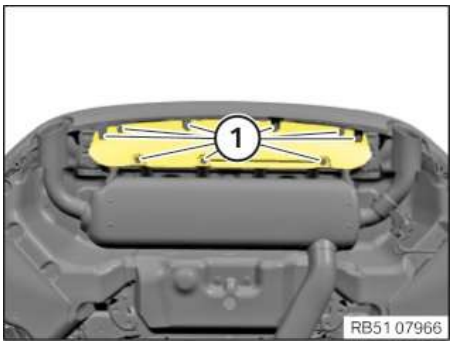
- Remove screws (arrows).

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

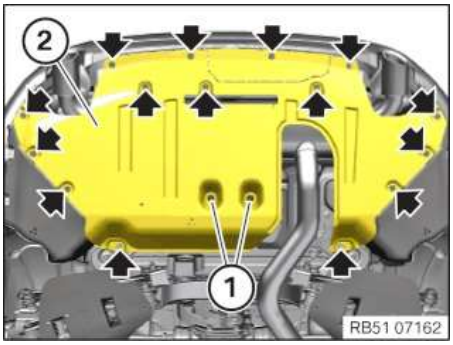
- Loosen clamp (1).
- Loosen screws (2).
- Guide out and remove connecting support (3) on the tunnel.

34 – Removing the rear diffuser



- **Version 1:**
- Release the screws and nuts (1).
- Remove the diffuser.

carolagn.com



- **Version 2:**
- Loosen nuts (1).
- Remove screws (arrows).
- Guide out and remove rear diffuser (2).

35 – Remove exhaust system

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

CAUTION

Component with heavy weight.

Danger of injury!

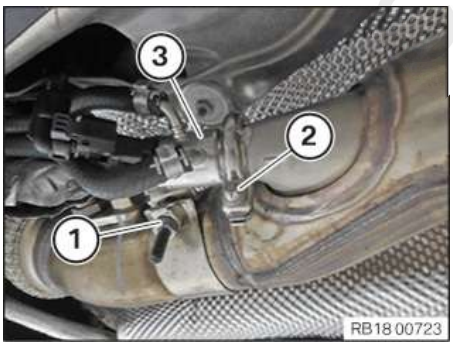
- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

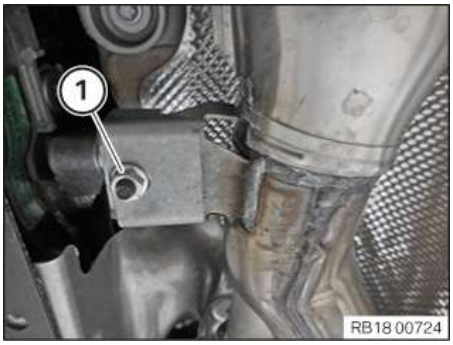
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

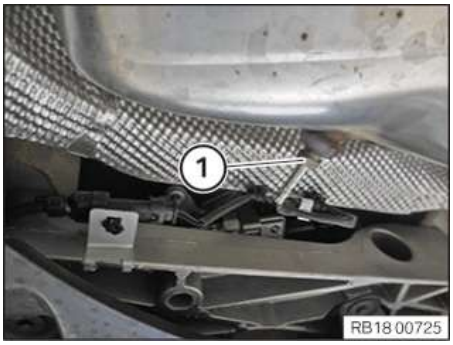


- Unfasten clamp (1).
- Detach the clamp (2) of the SCR metering module (3).
- Detach the SCR metering module (3)from the exhaust system and place to one side.

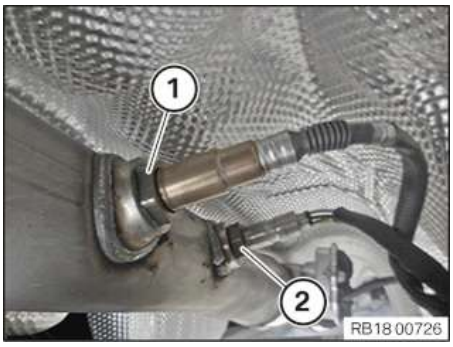


- Loosen nut (1).

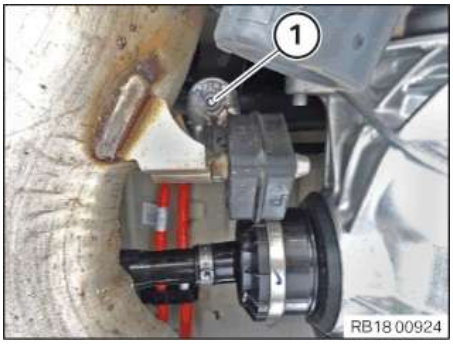
cardiagn.com



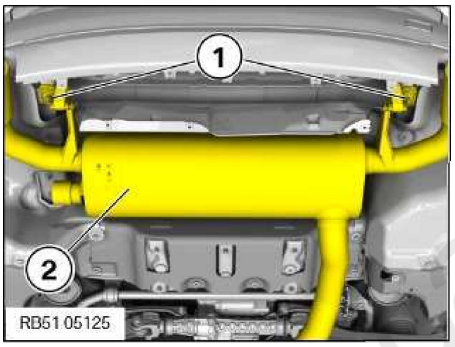
- Detach the exhaust temperature sensor (1) from the exhaust system.



- Release the diesel particulate sensor (1) from the exhaust system and place to one side.
- Release the nitrogen oxide sensor (2) from the exhaust system and place to one side.



- Release the nut (1) on the rear axle support.



- Loosen nuts (1).
- Lower and remove the exhaust system (2) with the assistance of a second person.

36 – Removing the monitoring oxygen sensor after the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

cardiagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

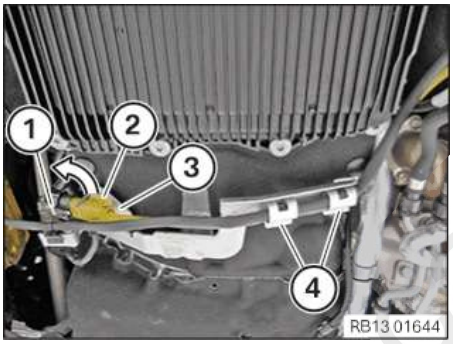
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



- Unlock and loosen connector (1).
- Loosen connector (2) from the holder (3) in direction of arrow.
- Release the monitoring oxygen sensor from the clamps (4).



- Release the monitoring oxygen sensor (1) with the standard tools.



- Thread out the monitoring oxygen sensor (1) and remove it.

carDiagn.com

37 – Removing the nitrogen oxide sensor before SCR catalytic converter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

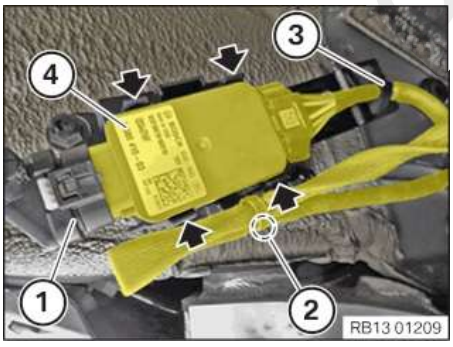
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

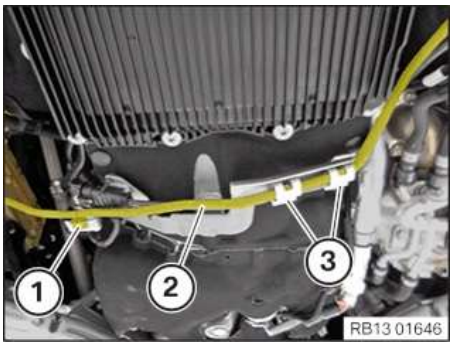
Damage to the nitrogen oxide sensor.

Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

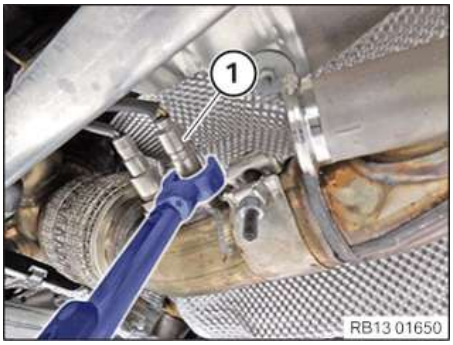
- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
- The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



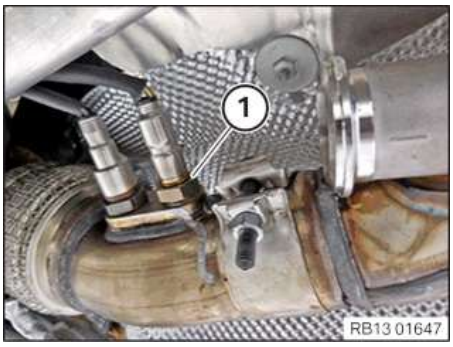
- Unlock plug connection (1) and disconnect.
- Release cable clip in area (2).
- Release line from the holder (3).
- Unclip control unit (4).



- Loosen clamp (1).
- Loosen the cables (2) from the clamps (3).



- Loosen the nitrogen oxide sensor (1) using commercially available tools.



- Feed out and remove the nitrogen oxide sensor (1).

38 – Removing the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

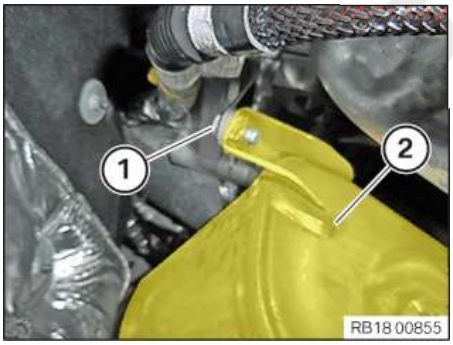
- Perform all work only on components that have cooled down.

CAUTION

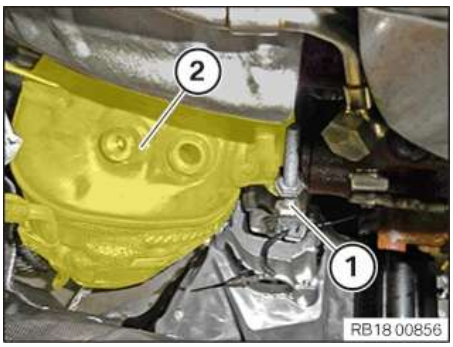
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

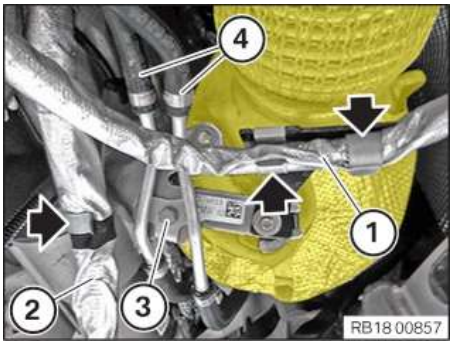


- Release bolt (1) from the holder of diesel particulate filter (2).

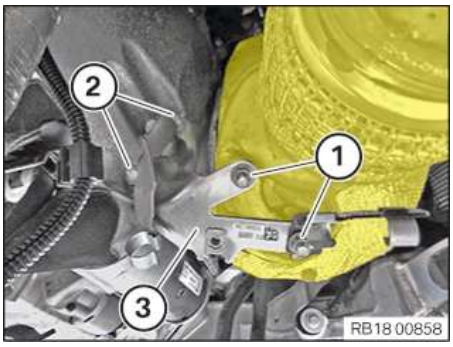


- Loosen V-band clamp (1).
- Feed V-clip (1) out from diesel particulate filter (2) and remove.

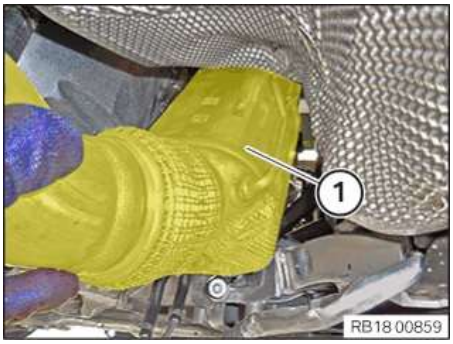
boardiagn.com



- Release the metering line (1) from clamps (Arrows).
- Release positive battery cable (2) from starter motor from clamp (Arrow).
- Loosen screw (3).
- Thread off coolant line (4) and place to the side.



- Loosen nuts (1).
- Loosen screws (2).
- Guide out and remove holder (3).



- Guide out and remove diesel particulate filter (1).

39 – Removing starter motor

Prerequisite

Battery earth leads are disconnected.

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

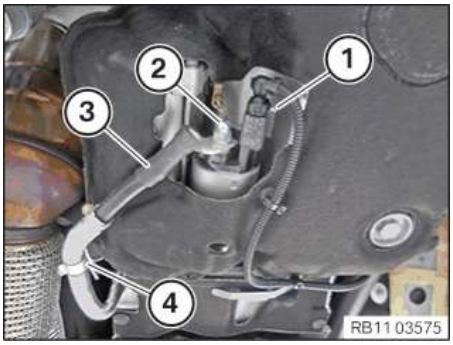
- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

TECHNICAL INFORMATION

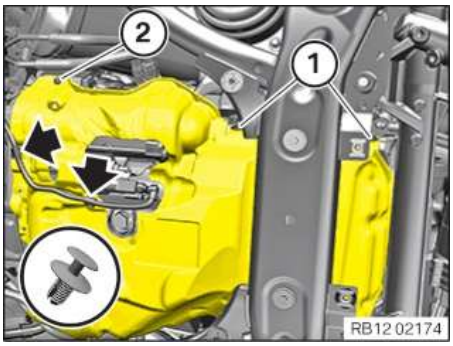
Make sure that the acoustic cover is **not** damaged while removing the starter motor.

A damaged lower acoustic cover can only be renewed when the front axle is lowered.

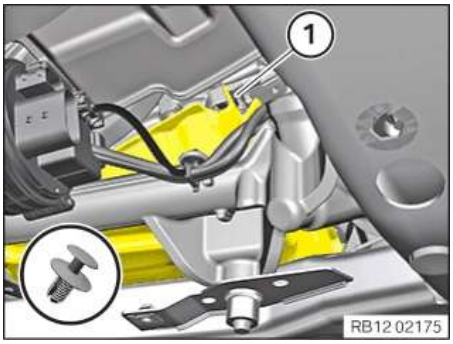
cardiagn.com



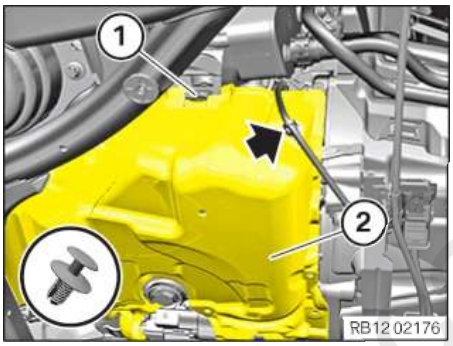
- Unlock plug connection (1) and disconnect.
- Release nut (2).
- Release positive battery cable (3) from holder (4).



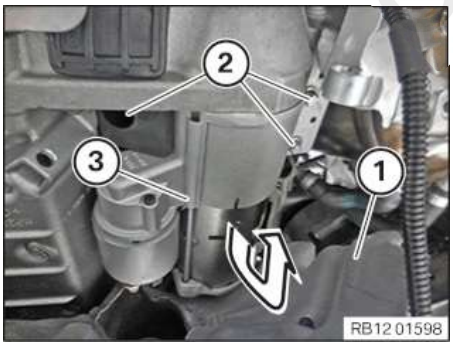
- Loosen the expanding rivet (1).
- Undo fir tree clip (2).
- Release the clamps (arrows).



- Loosen expanding rivet (1).
- Lower the acoustic cover of the oil sump.



- Loosen expanding rivet (1).
- Loosen the clamp (arrow).
- Lower acoustic cover (2).



- Make sure that the acoustic cover (1) is not damaged.
- Carefully press acoustic cover (1) to one side.
- Loosen screws (2).
- Carefully guide out the starter motor (3) in direction of arrow and remove.

40 – Checking camshaft timing



RISK OF DAMAGE

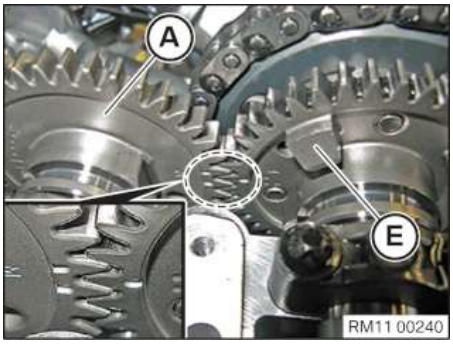
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

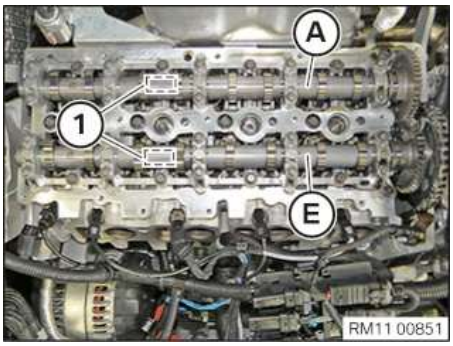
- Turn the combution engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

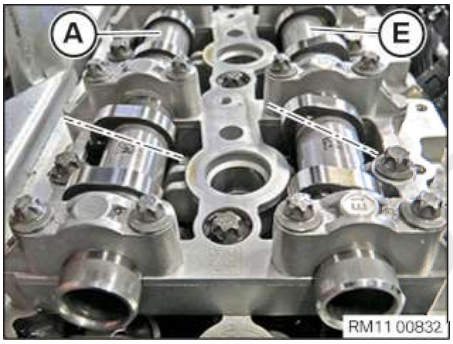
  Do **not** crank the engine in reverse.



- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.



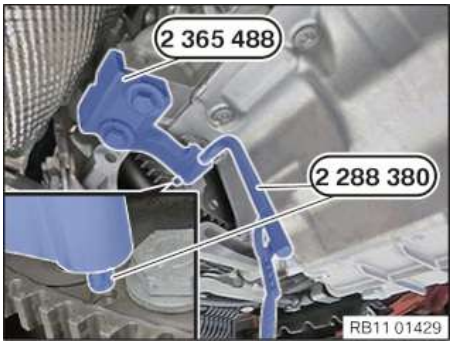
- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.

carmanualsdiagn.com



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

41 – Remove chain tensioner piston

RISK OF DAMAGE

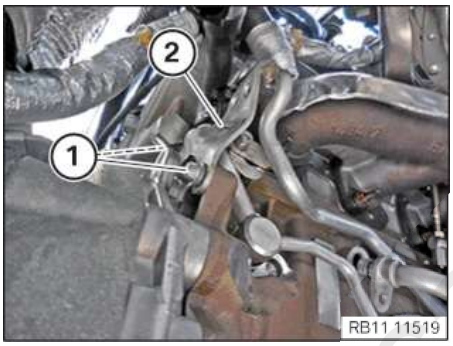
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Loosen screws (1).
- Guide out and remove holder (2).



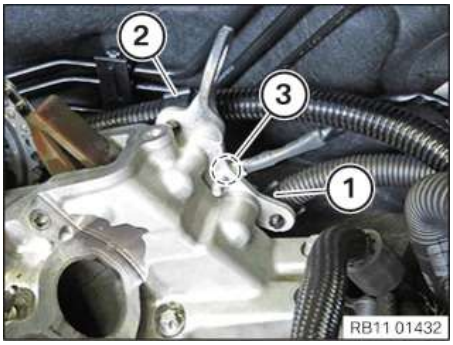
- Loosen the chain tensioner piston (1).
- Catch and dispose of emerging engine oil.



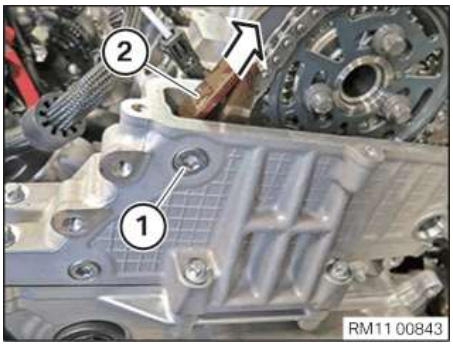
- Feed out and remove the sealing ring (1).

42 – Remove the timing chain guide rail

cardiagn.com

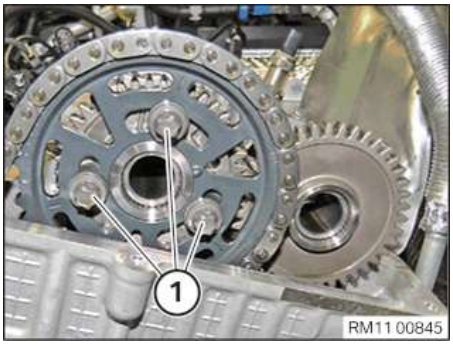


- Loosen the vehicle wiring harness (1) from the bracket.
- Release the positive battery cable (2) from the holder .
- Loosen the screw (3) and remove the grounding cable.



- Remove the bearing journal (1).
- Remove the guide rail (2) in the direction of the arrow.

43 – Removing the camshaft sprocket on the intake camshaft



- Loosen screws (1).
- Secure the drive chain against falling.
- Remove the camshaft sprocket on the intake camshaft.

44 – Removing the special tool for fixing the exhaust camshaft



- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

MAIN WORK

45 – Remove exhaust camshaft.

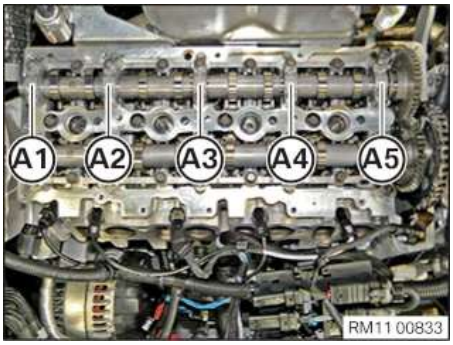
RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

cardiagn.com

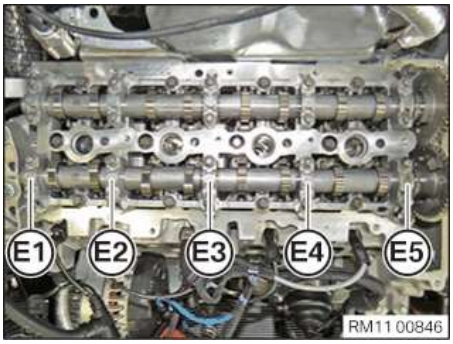


TECHNICAL INFORMATION

The camshaft is tensioned by the valve springs. Tighten or loosen each screw on the camshaft bearing caps one at a time in the specified sequence and by half a turn only. Repeat procedure.

- Release all the screws of the exhaust camshaft bearing cap (A1) to (A5) from the outside to the inside in half turns.
- Remove exhaust camshaft in upward direction.
- Place all components on special tool 0 495 105 (11 4 480) in a tidy and orderly fashion.

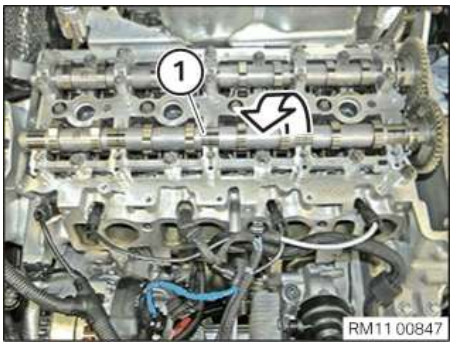
46 – Remove intake camshaft



TECHNICAL INFORMATION

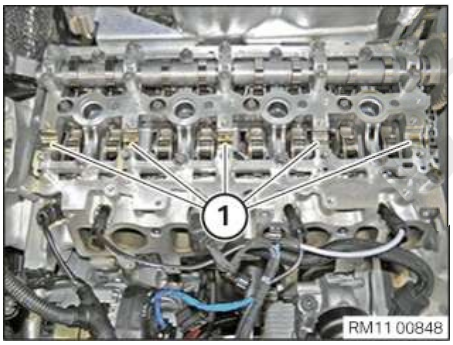
The camshaft is tensioned by the valve springs. Tighten or loosen each screw on the camshaft bearing caps one at a time in the specified sequence and by half a turn only. Repeat procedure.

- Loosen all screws of the intake camshaft bearing caps (E1) to (E5) from the outside towards the inside by 1/2 a turn at a time.
- Place all components on special tool 0 495 105 (11 4 480) in a tidy and orderly fashion.

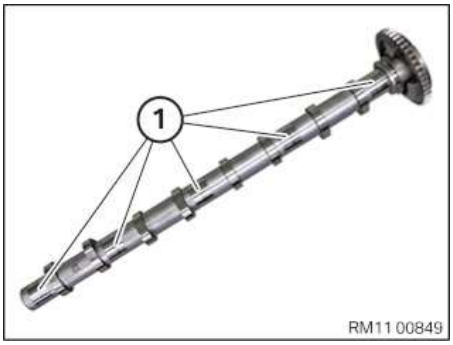


- Remove the intake camshaft (1).

47 – Install intake camshaft

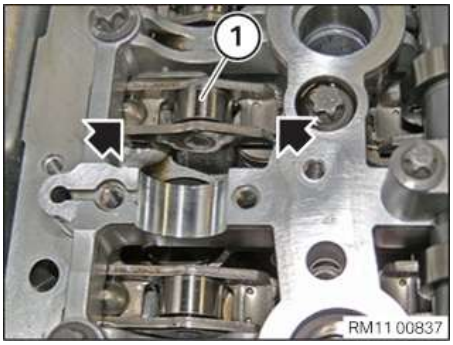


- Oil all bearing positions (1).



- Oil all the bearing positions (1) of the intake camshaft.

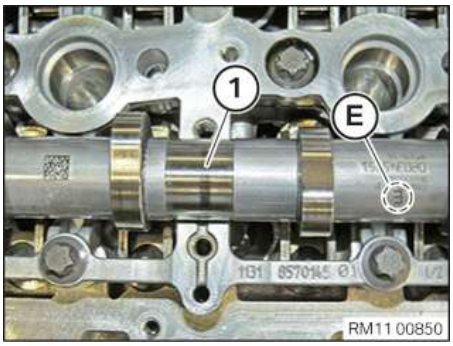
cardiagn.com



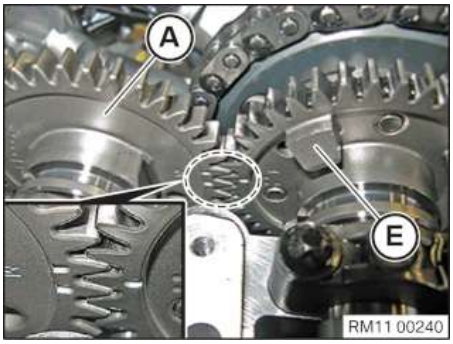
TECHNICAL INFORMATION

The rocker arms may slip slightly when the camshaft is positioned. Make sure rocker arms are correctly positioned on the hydraulic valve clearance compensating elements and on valves.

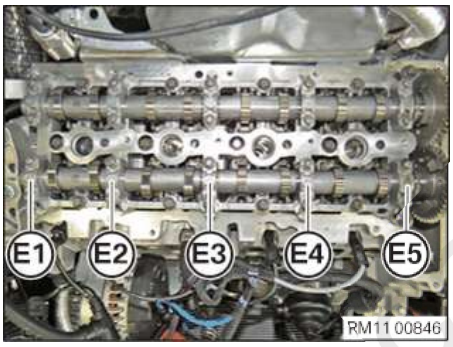
- Check the installation position of the roller cam followers (1).



- Make sure the identification (E) of the intake camshaft points upwards.
- Insert the intake camshaft (1).



- Insert the intake camshaft (A) so that the marks on the camshafts (A) and (E) coincide in the marked area.
- Position the camshafts (A) and (E) correspondingly.

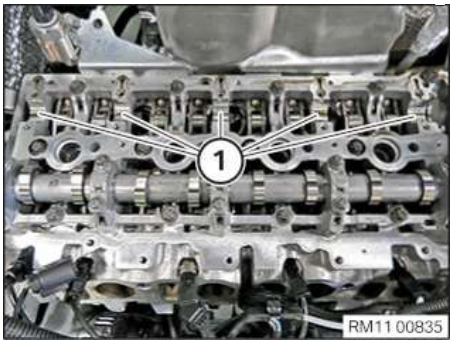


- Tighten all intake camshaft bearing caps (E1) to (E5) from the inside to the outside by 1/2 a turn at a time.

Intake and exhaust camshaft in camshaft support

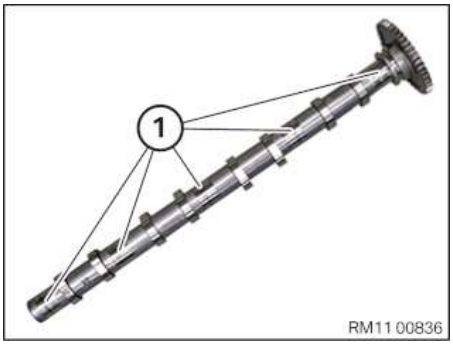
M6x31	Tightening torque	10 Nm

48 – Install exhaust camshaft

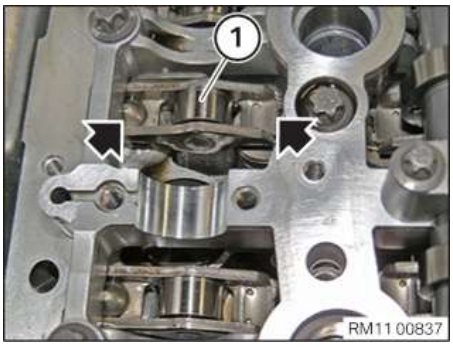


- Oil all bearing positions (1).

cardiagn.com



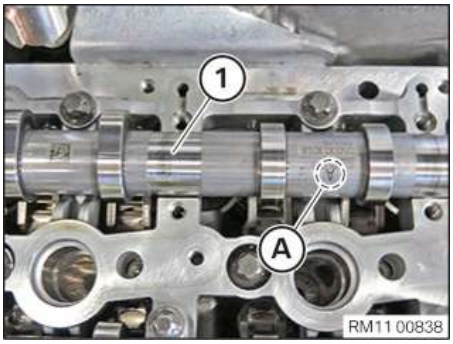
- Oil all bearing positions (1) of the exhaust camshaft.



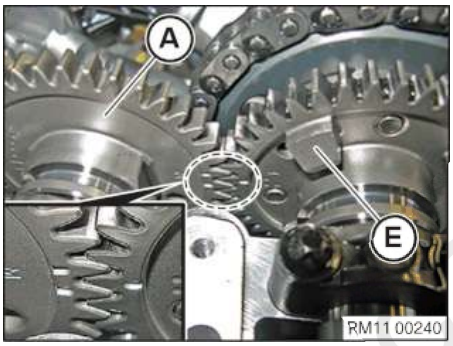
TECHNICAL INFORMATION

The rocker arms may slip slightly when the camshaft is positioned. Make sure rocker arms are correctly positioned on the hydraulic valve clearance compensating elements and on valves.

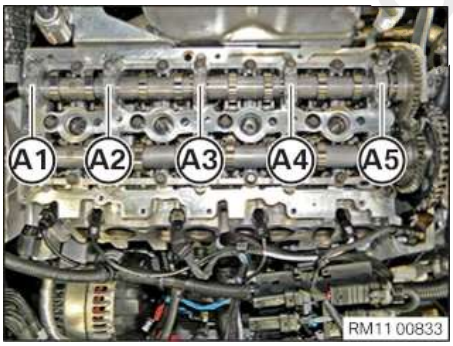
- Check the installation position of the roller cam followers (1).



- Make sure that the identification mark (A) of the exhaust camshaft (1) points upwards.
- Insert the exhaust camshaft (1).



- Insert the exhaust camshaft (A) such that the marks on the camshafts (A) and (E) correspond in the marked area.
- Position the camshafts (A) and (E) correspondingly.



- Tighten all exhaust camshaft bearing caps (A1) to (A5) from the inside to the outside by 1/2 a turn at a time.

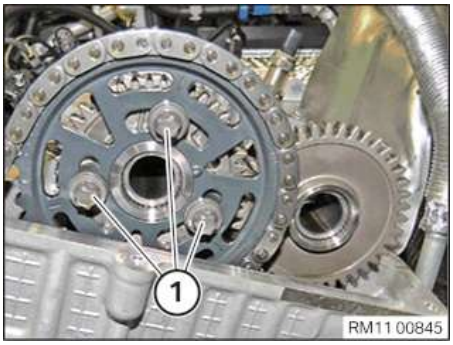
Intake and exhaust camshaft in camshaft support

M6x31		Tightening torque	10 Nm

POSTPROCESSES

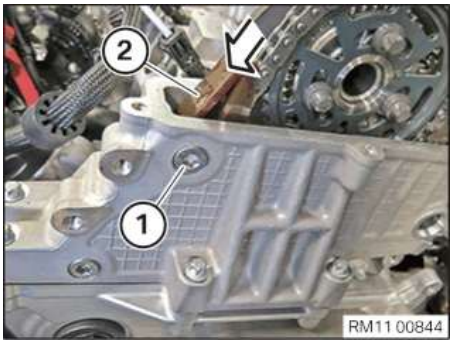
49 – Installing the camshaft sprocket on the intake camshaft

cardiagn.com



- Position the drive chain on the camshaft sprocket so that the thread of the screw connections are located in the centre of the elongated holes.
- Position the camshaft sprocket on the intake camshaft.
- Merely apply the screws (1) hand-tight so that the camshaft sprocket can still be moved in relation to the intake camshaft.

50 – Installing the guide rail of the timing chain

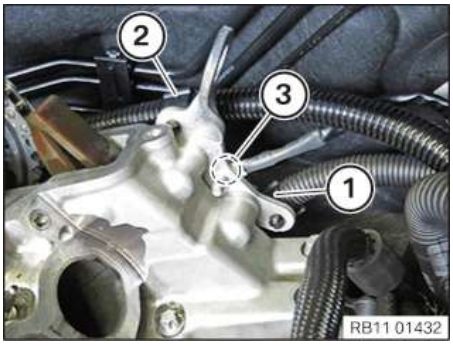


- Position the guide rail (2) in the direction of the arrow.
- Make sure the guide rail (2) is correctly installed at the bottom bearing journal.
- Renew bearing journal (1).

  Parts: Bearing journal
- Tighten the bearing journals (1).

Bearing journal to cylinder head

M16x1.5	Replace bearing journal.	Tightening torque	20 Nm



- Position the grounding cable and tighten the screw (3).

Standard screw connection M8

M8		Tightening torque	19 Nm

- Clip in the positive battery cable (2) into the bracket.
- Clip in the vehicle wiring harness (1) into the bracket.

51 – Installing the chain tensioner piston



TECHNICAL INFORMATION

The oil chamber must be drained for reuse of the chain tensioner.

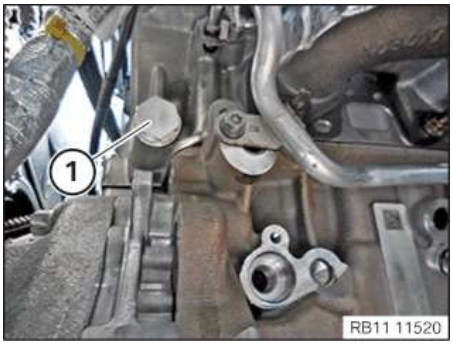
- Place the chain tensioner on a level support pad and slowly compress in the direction of arrow.
- Repeat process twice.



- Renew sealing ring (1).

  Parts: Sealing ring
- Insert and install the sealing ring (1).

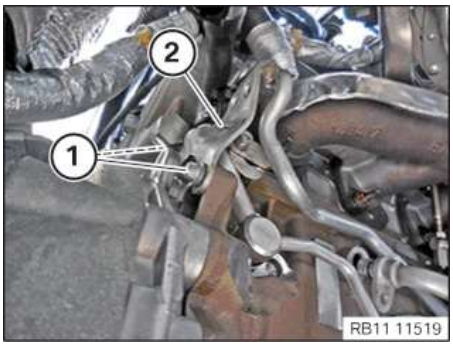
cardiagn.com



- Insert and install the chain tensioner piston (1).
- Tighten the chain tensioner piston (1).

Chain tensioner piston to cylinder head

22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

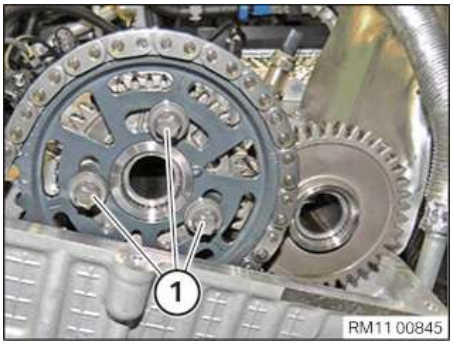


- Insert and install the holder (2).
- Tighten the screws (1).

Holder to crankcase

M8X16		Tightening torque	19 Nm

52 – Tightening the camshaft sprocket on the intake camshaft

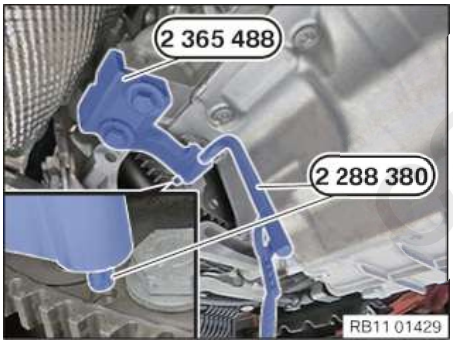


- Tighten the screws (1).

Camshaft sprocket to camshaft

M7x17.			17 Nm

53 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

54 – Checking camshaft timing



RISK OF DAMAGE

Damage to the engine.

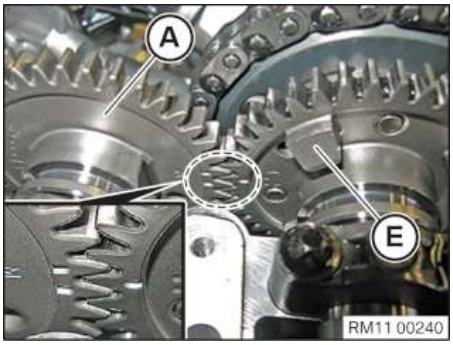
The engine may be damaged if it is manually rotated in the wrong direction.

- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

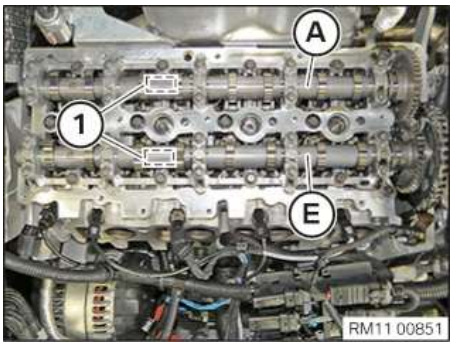
- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

  Do **not** crank the engine in reverse.

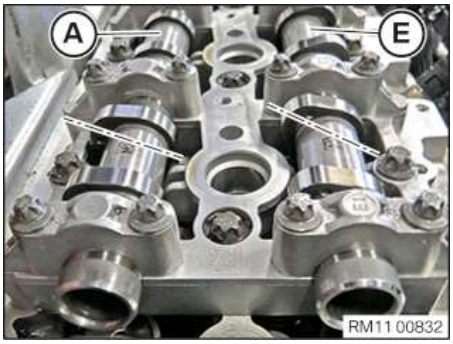
cardiagn.com



- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.

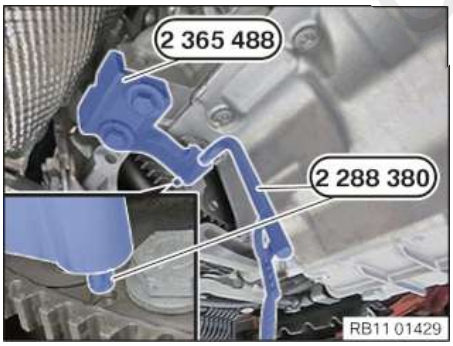


- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

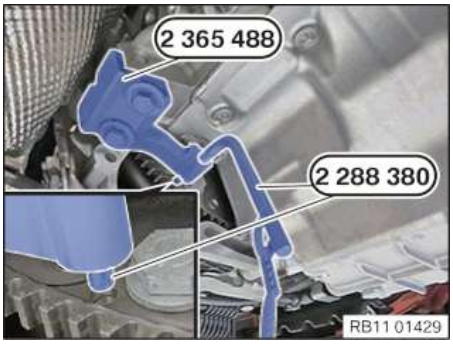
55 – Removing the special tool for fixing the exhaust camshaft

cardiagn.com



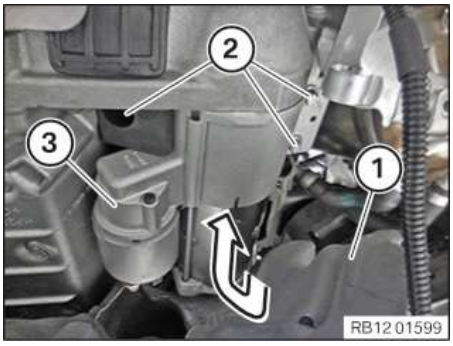
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

56 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

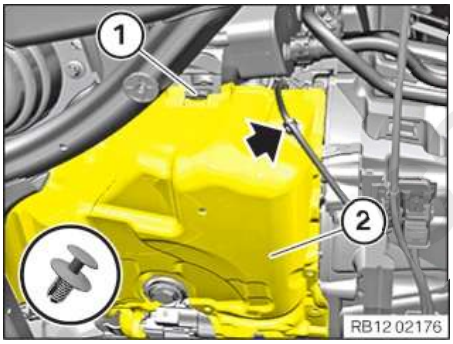
57 – Installing starter motor



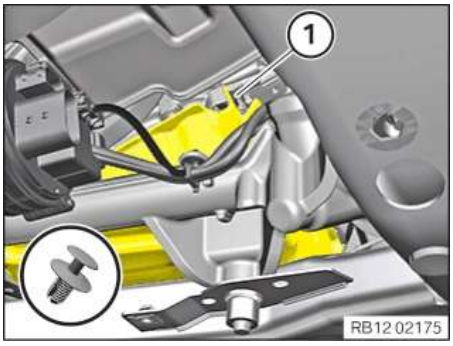
- Make sure that the acoustic cover (1) is not damaged.
- Carefully press the acoustic cover (1) to one side.
- Feed in and install the starter motor (3) in the direction of the arrow.
- Tighten the screws (2).

Starter motor to engine

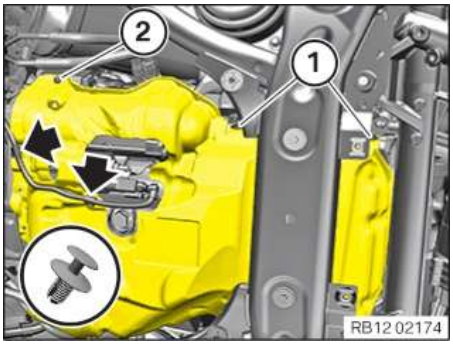
M8X60		Tightening torque	19 Nm



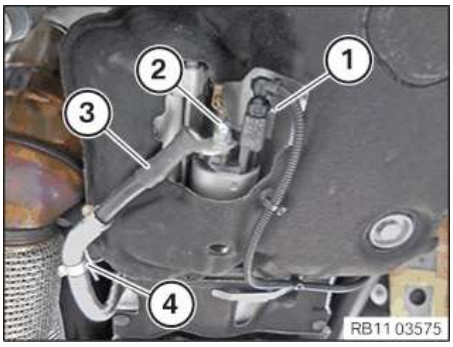
- Position the acoustic cover (2).
- Fasten expanding rivet (1).
- Secure clamp (arrow).



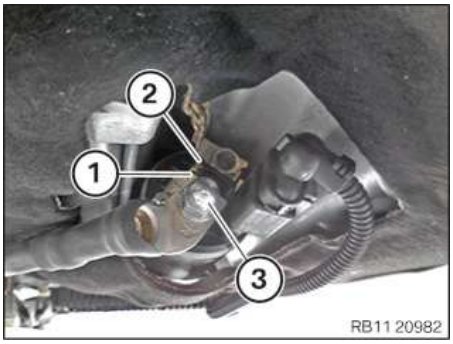
- Fasten expanding rivet (1).



- Secure fir tree clip (2).
- Secure expanding rivet (1).
- Secure the clamps (arrows).



- Fasten positive battery cable(3) in holder (4) and position it on the starter motor.
- Tighten the nut (2) hand-tight.
- Connect the connector (1) and audibly lock it.



CAUTION

Improper routing of the positive battery cable.

Risk of short circuits!

- Route the positive battery cable without abrasions and do not trap.

- Attach the positive battery cable (1) **correctly** to anti-twist lock (2).
- Tighten nut (3).

Battery positive lead to starter

M8	Tightening torque	13,5 Nm

58 – Prepare for the installation of the diesel particulate filter



- Renew the V-clip (1).

  Parts: V-band clamp



- Renew gasket (1).

  Parts: Gasket

59 – Installing the diesel particulate filter

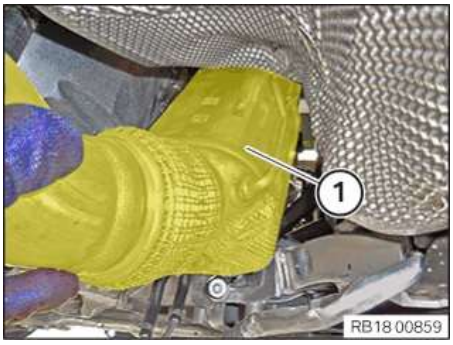
cardiagn.com

CAUTION

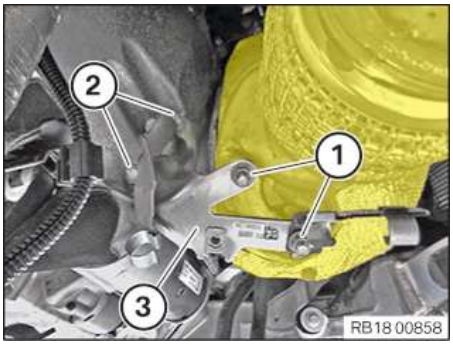
Heavy component.

Heavy components can lead to injury or damage.

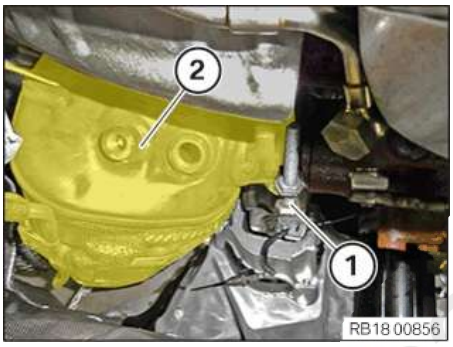
- Remove and install heavy components with the aid of another person/other persons.



- Insert and install the diesel particulate filter (1).



- Insert and install the holder (3).
- **Hand-tighten** the bolts (2).
- Apply the nuts (1) **hand-tight**.

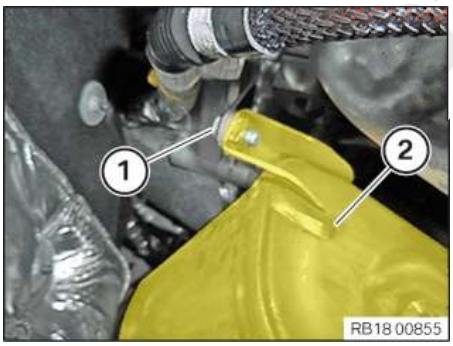


- Renew the V-clip (1).

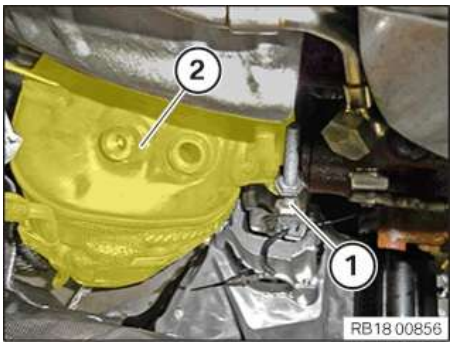
  Parts: V-band clamp
- Feed in and install V-band clamp (1).

Note: Make sure that the seal between the diesel particulate filter and the exhaust turbocharger is installed correctly.

- Position the diesel particulate filter (2) on the exhaust turbocharger .
- Position V-clip (1).
- Apply the V-clip (1) **hand-tight**.



- Feed in screw (1) on the holder of the diesel particulate filter (2) and tighten **hand-tight**.

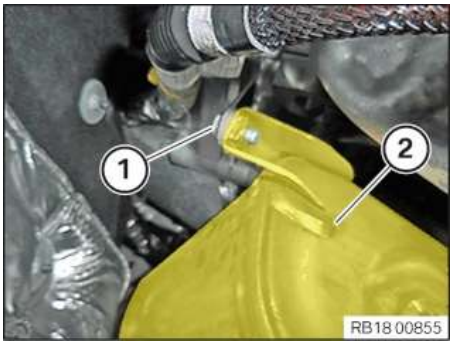


- Tighten the V-clip (1) of the diesel particulate filter (2).

Diesel particulate filter V-clip to exhaust turbocharger

V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

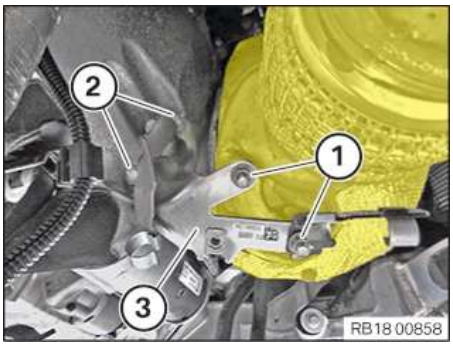
carmanualsonline.com



- Tighten the bolt (1) on the bracket of the diesel particulate filter (2).

Bracket to diesel particulate filter top

M8		Tightening torque	19 Nm



- Tighten the screws (2) on the holder (3).

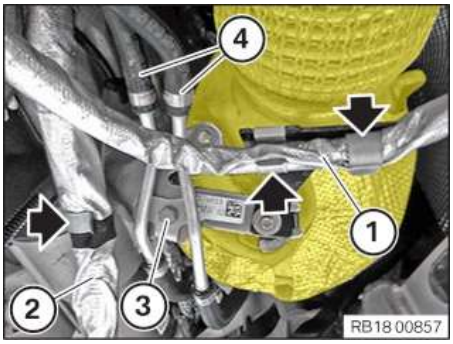
Bracket to transmission for diesel particulate filter holder bottom

M8X20		Tightening torque	19 Nm

- Tighten the nuts (1) on the holder (3).

Lower holder to diesel particulate filter

M8		Tightening torque	19 Nm



- Thread in and install coolant line (4).
- Tighten down screw (3).

Coolant lines for SCR metering module

M6X16		Tightening torque	8 Nm

- Secure the positive battery cable (2) of the starter motor at the clamp (arrow).
- Fasten the metering line (1) on the clamps (arrows).

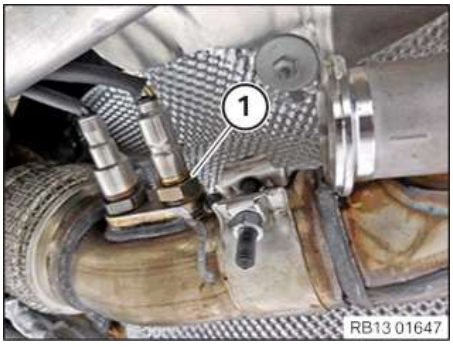
60 – Installing the nitrogen oxide sensor upstream of SCR catalytic converter

RISK OF DAMAGE

Damage to the nitrogen oxide sensor.

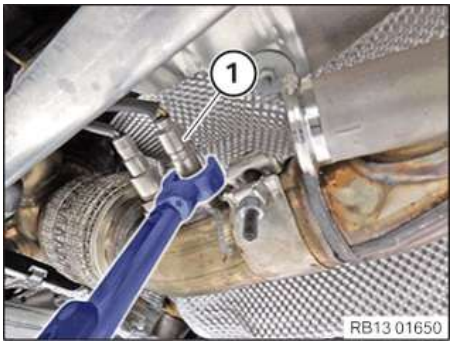
Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



- Feed in and install the nitrogen oxide sensor (1).

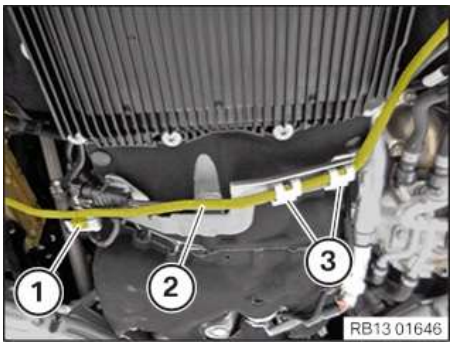
cardiagn.com



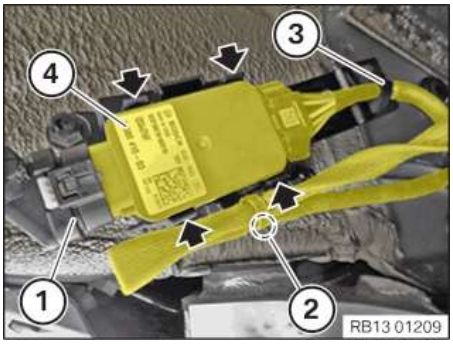
- Tighten the nitrogen oxide sensor (1) using commercially available tools.

Nitrogen oxide sensor before SCR catalytic converter

Sensor		Tightening torque	50 Nm



- Secure the cables (2) to the clamps (3).
- Secure clamps (1).



- Clip in the control unit (4) (arrows).
- Fasten the cable in the holder (3).
- Secure the cable holder (2).
- Plug in the connector (1) and lock audibly.

61 – Installing the monitoring oxygen sensor after the diesel particulate filter

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

TECHNICAL INFORMATION

New oxygen sensors are to be greased lightly and evenly on the thread.

For oxygen sensors that are reused, the following should be observed:

Lightly and evenly grease the oxygen sensor only on the thread. Do not clean and grease that part of the oxygen sensor which protrudes in the exhaust branch (sensor ceramics).

For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue

cardiagn.com



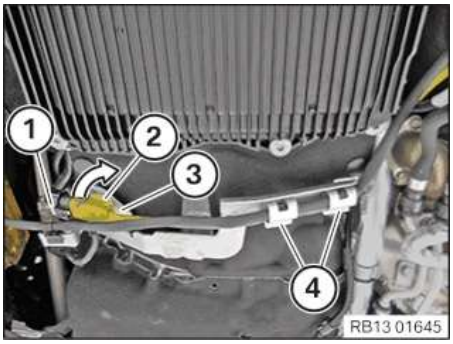
- Insert the monitoring oxygen sensor (1) and install it.



- Tighten the monitoring oxygen sensor (1) with standard tools.

Monitoring oxygen sensor

Sensor		Tightening torque	50 Nm



- Fasten the monitoring oxygen sensor to the clamps (4).
- Secure the connector (2) on the holder (3) in direction of arrow.
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

62 – Installing the exhaust system

CAUTION

Component with heavy weight.

Danger of injury!

- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

Heavy component.

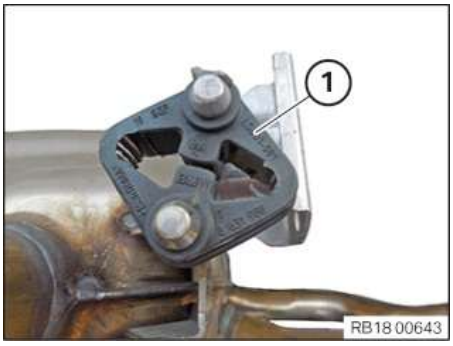
Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

TECHNICAL INFORMATION

Mount the exhaust system in voltage-free state, maintaining the tightening sequence from the rear silencer towards the exhaust manifold.

cardiagn.com

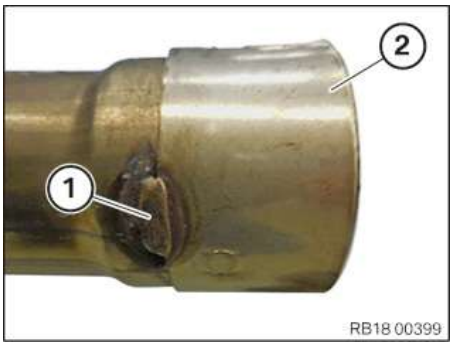


NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

- Check all the rubber mounts (1) of the exhaust system for damage.
- Replaced damaged rubber mounts.

  Parts: Rubber mount



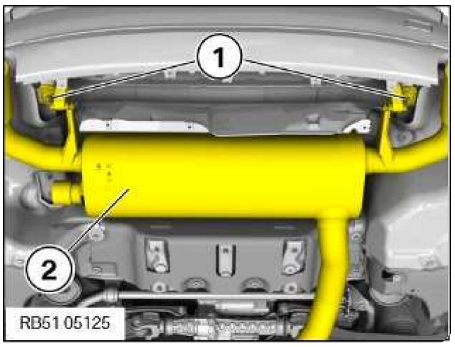
CAUTION

Swarf resulting from sawing or grinding components.

Danger of injury!

- Conduct all work in appropriate personal protective equipment only.
- Wear safety goggles and protective gloves.

- Open the weld seam (1) with a conventional tool.
- Remove the clamp (2).

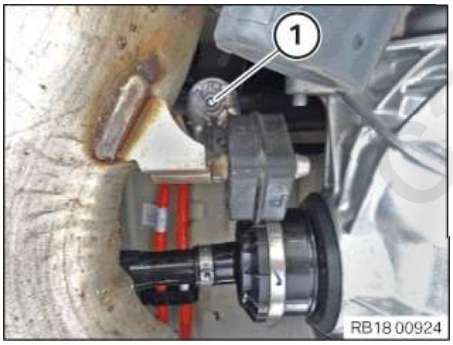


- Insert and install the exhaust system (2).
- Renew nuts (1).

  Parts: Nuts
- Tighten nuts (1).

Rear silencer to body / bumper support

M8	Replace nuts.	Tightening torque	19 Nm

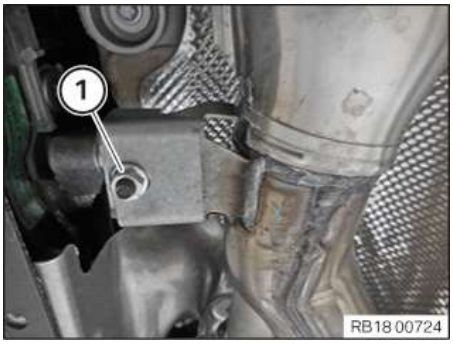


- Renew nut (1) on the rear axle support.

  Parts: Nut
- Tighten nut (1).

Exhaust system to rear axle carrier

M8 nut		Tightening torque	19 Nm

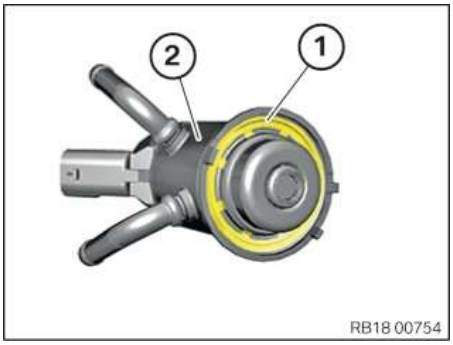


- Tighten nut (1).

Exhaust system to transmission

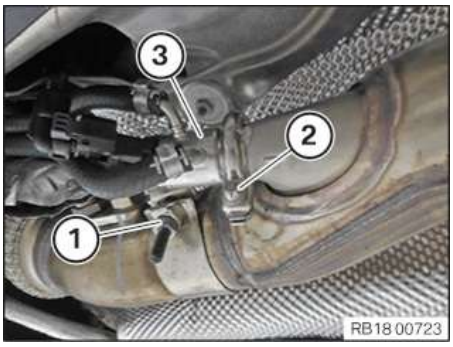
M8		Tightening torque	19 Nm

cardiagn.com



- Renew sealing ring (1) of the SCR metering module (2).

  Parts: Sealing ring



- If necessary, renew clamp (1).

  Parts: Clamp
- Tighten clamp (1).

Exhaust system to diesel particle filter

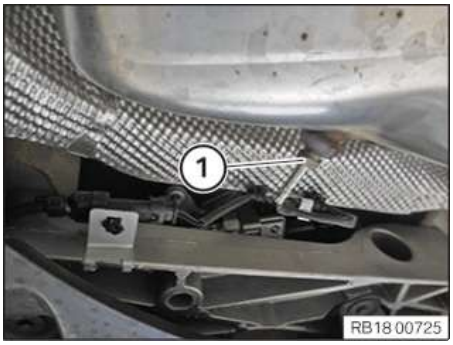
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

- Renew the V-clip (2).

  Parts: V-band clamp
- Install the SCR metering module (3) in the exhaust system.
- Tighten the V-clip (2) of the SCR metering module (3).

SCR metering module V-clip to exhaust system

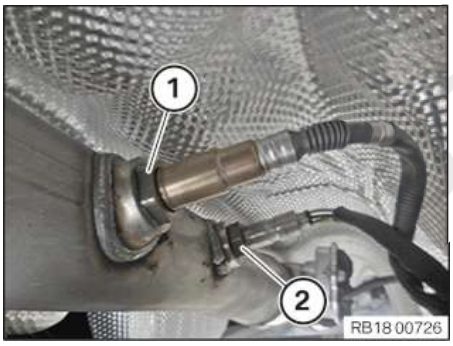
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm



- Install the exhaust temperature sensor (1) in the exhaust system and tighten.

Exhaust-gas temperature sensor upstream of SCR catalytic converter

Sensor		Tightening torque	30 Nm



- Install the diesel particulate sensor (1) in the exhaust system and tighten.

Diesel particulate sensor to exhaust system

Sensor		Tightening torque	50 Nm

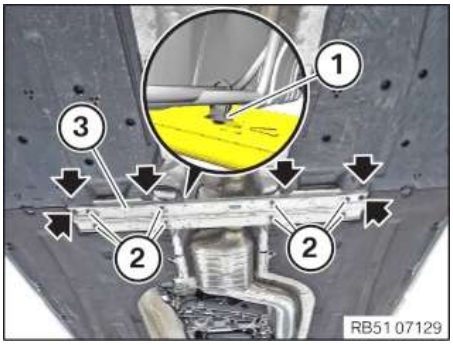
- Install the nitrogen oxide sensor (2) in the exhaust system and tighten.

Nitrogen oxide sensor downstream of SCR catalytic converter

Sensor		Tightening torque	55 Nm

63 – Install the connecting supports on the tunnel

cardiagn.com



- Guide in and install connecting support (3) on the tunnel.
- Tighten the screws (2).
- Tighten screws (arrows).

Connecting support to tunnel

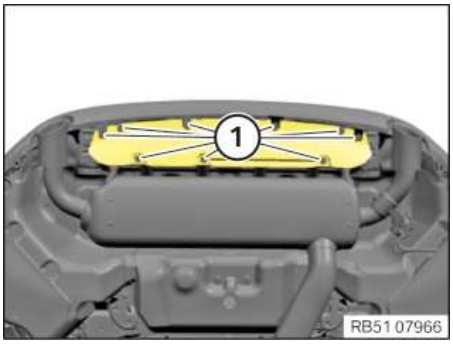
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Secure the clamp (1).

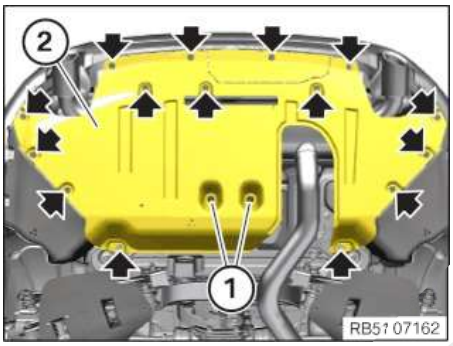
64 – Installing the rear diffuser



- **Version 1:**
- Install the diffuser and tighten the nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm



- **Version 2:**
- Feed in and position the diffuser (2)
- Tighten screws (arrows).

Diffuser / underbody panelling

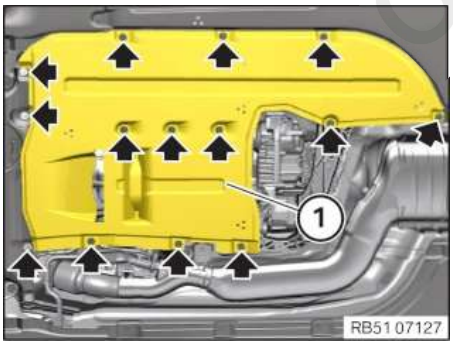
Nuts and screws		Tightening torque	3 Nm

- Tighten nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm

65 – Installing underbody protection at rear



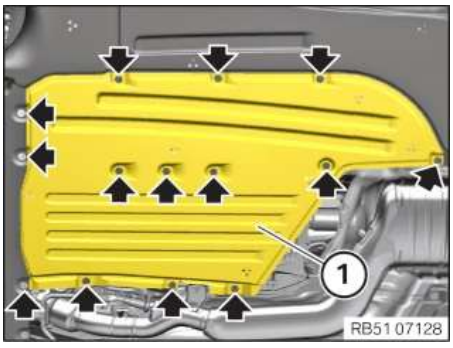
- **Version A:**

Insert and install the rear underbody protection (1).

Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version B:**

Insert and install the rear underbody protection (1).

Tighten screws (arrows).

Underbody protection

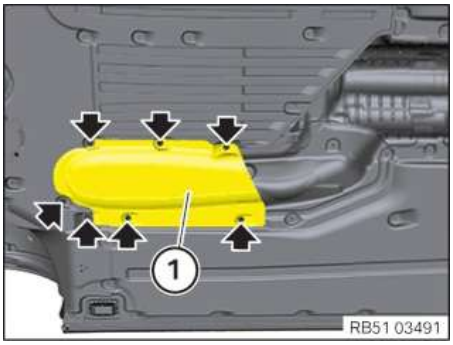
Hexagon screw		Tightening torque	3 Nm

cardiagn.com

66 – Install the underbody panelling of the transmission on the side

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

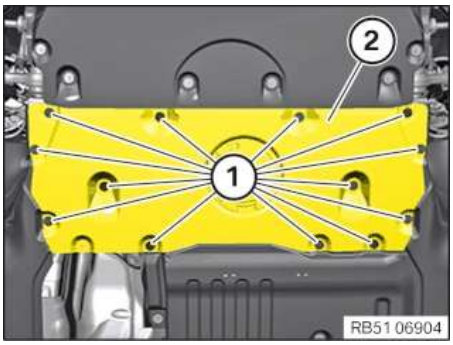


- Insert the underbody panelling (1).
- Tighten screws (arrows).

Underbody panelling

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

67 – Installing the centre underbody protection



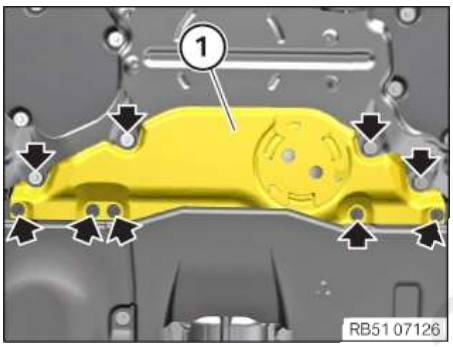
- **Variant with rear wheel drive:**

  Position central underbody protection (2).

  Tighten the screws (1).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version with all-wheel drive:**

  Guide in centre underbody protection (1) and install.

  Tighten screws (arrows).

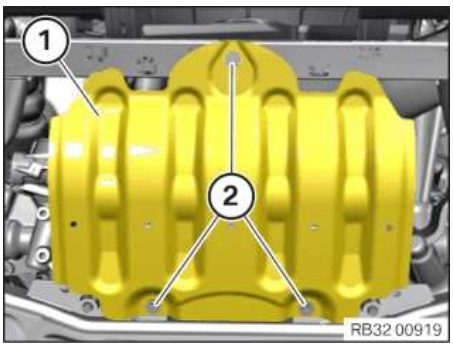
Underbody protection

Hexagon screw		Tightening torque	3 Nm

68 – If installed: Install underbody protection of the steering

Prerequisite

Front underbody protection has been removed.



- Position underbody protection (1).
- Tighten the screws (2).

Underbody protection, steering, to front axle support

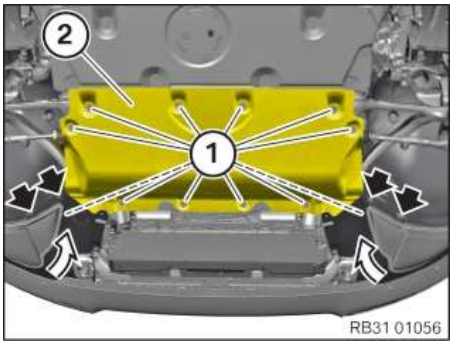
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

69 – Install the underbody protection of the steering gear

cardiagn.com



- **Version A:**

  Position the underbody protection (2) of the steering gear.

  Tighten the screws (1).

Underbody protection of the steering gear

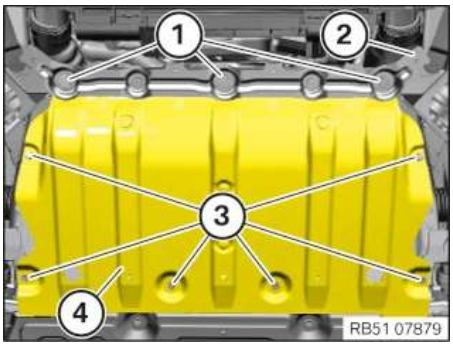
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the bottom wheel arch cover.

  Tighten the screws (arrows) of the lower wheel arch cover on the wheel arch cover.

Wheel arch trim panel, front

Thermoplastic hexagon screw		Tightening torque	2,6 Nm



- **Version B:**

  Feed in the underbody protection (4) of steering gear and install it.

  Tighten the screws (3).

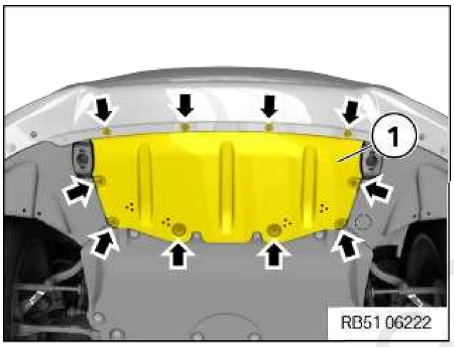
Underbody protection of the steering gear

Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the holder (2) for the underride protection.

  Tighten the screws (1).

70 – Installing the front underbody protection



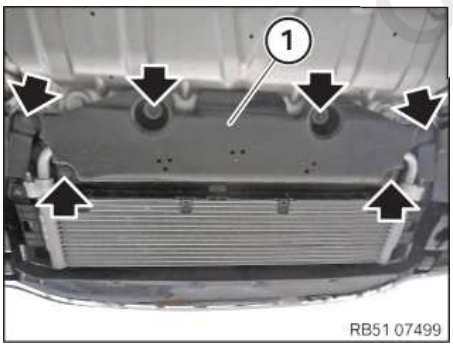
- **Version A:**

  Feed in the front underbody protection (1) towards the front under the bumper panel and position.

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



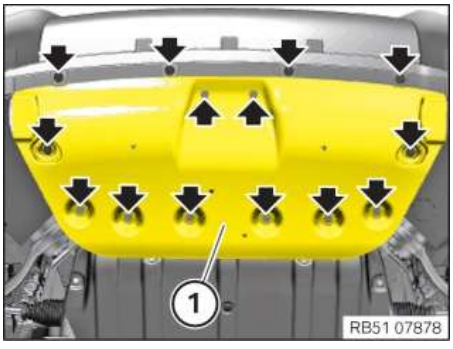
- **Version B:**

  Feed in and position the front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



- **Version C:**

  Feed in and install front underbody protection (1).

  Tighten screws (arrows).

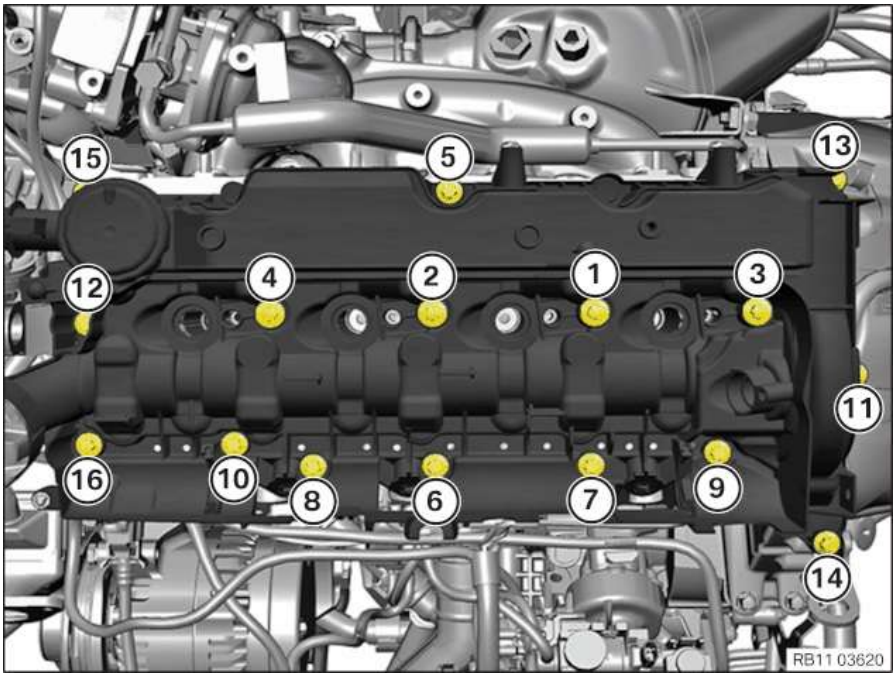
Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

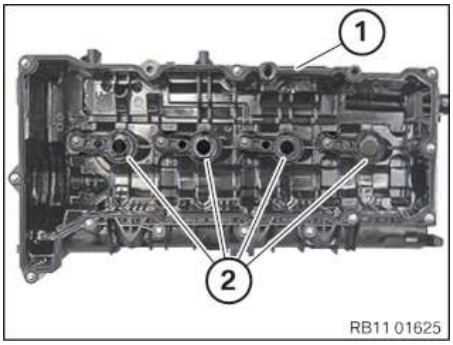
carmagn.com

71 – Installing cylinder head cover

Screw connection of the cylinder head cover

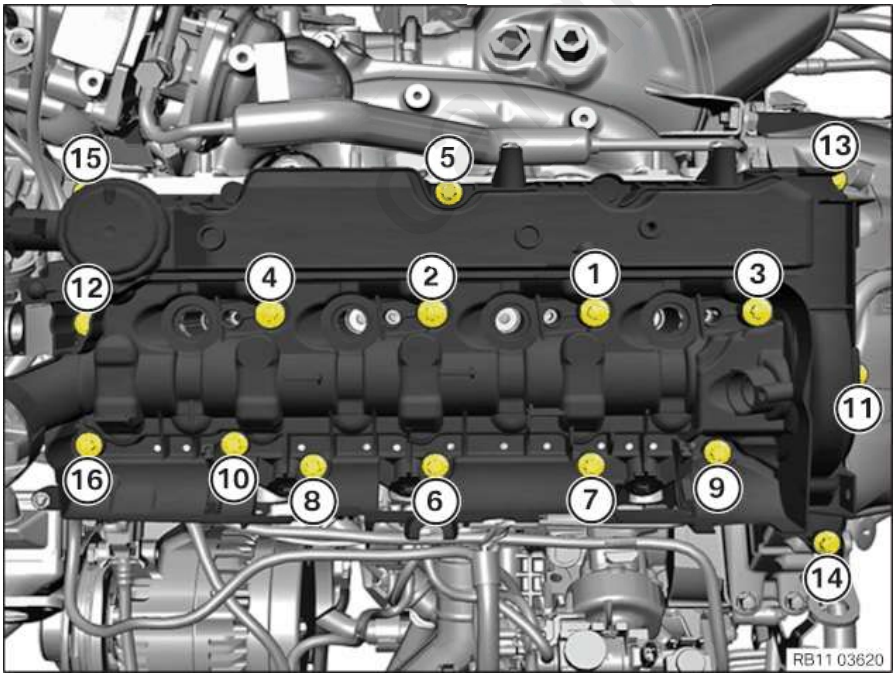


1 - 16 Bolts of the cylinder head cover



- Renew the profile seals (1) and (2) of the cylinder head cover.

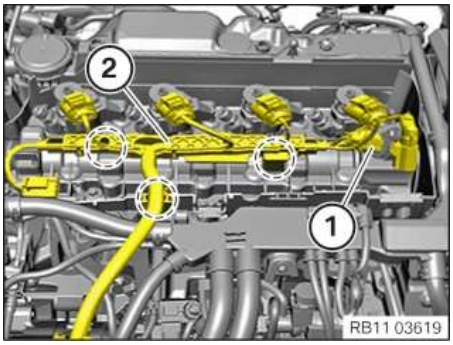
  Parts: Profile seals



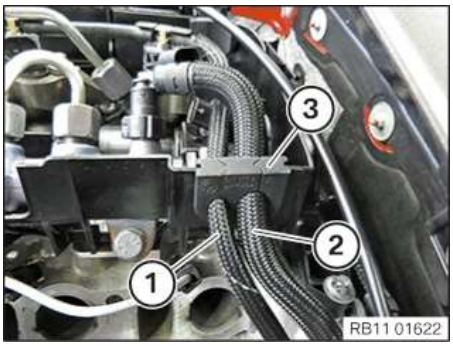
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

Cylinder head cover to cylinder head

M6		Tightening torque.	8,5 Nm



- Position the vehicle wiring harness (2) on the cylinder head cover and fasten in the marked areas.
- Plug in the connector (1) and lock audibly.



- Insert and connect the leakage oil line (1) with the fuel return line (2) and grommet (3).



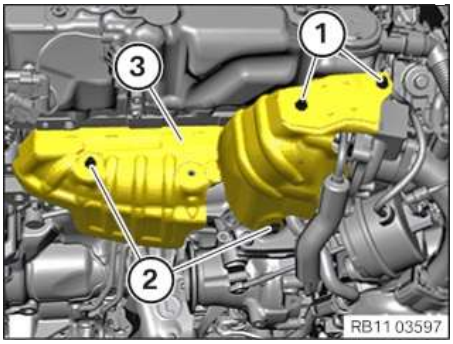
- Feed in and install the heat shield (1).



- Connect engine ventilation line (1) and lock.

  The locks (arrows) must engage audibly.

72 – Installing heat shield



- Feed in and install the heat shield (3).
- Tighten down screws (1) and (2).

Heat shield to exhaust manifold

M6x12			10 Nm

73 – Installing the sensor bracket on the cylinder head cover

cardiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

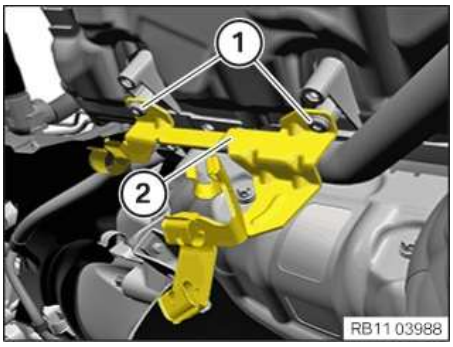
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

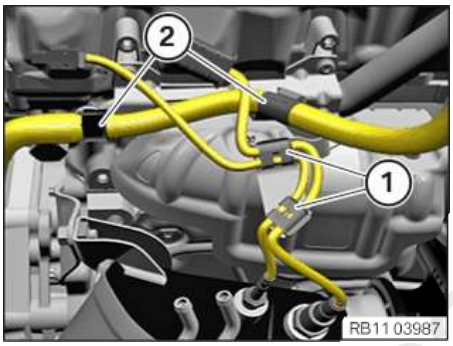
- Route all cables without abrasions, do not trap and crush.



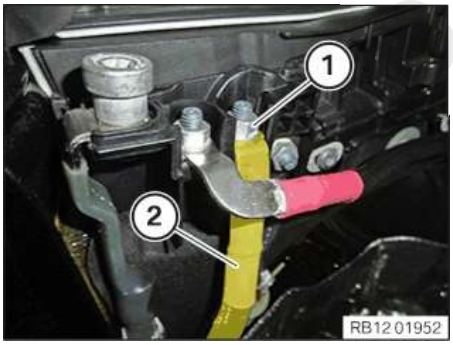
- Insert and install the holder (2).
- Tighten the screws (1).

Bracket on cylinder head cover

	Tightening torque	5 Nm



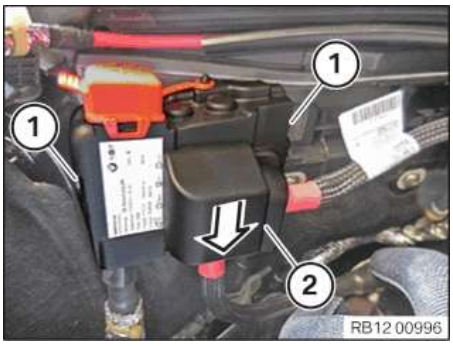
- Secure the positive battery cable in the clamps (2).
- Mount the cable of the exhaust gas sensor system in the clamps (1).



- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

Battery positive lead to battery positive terminal

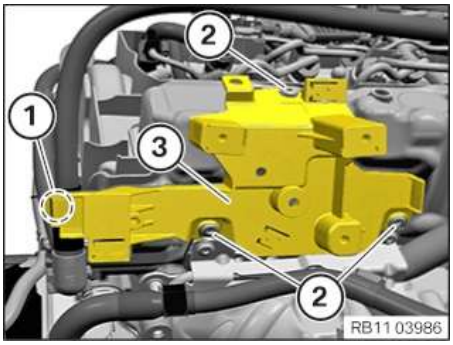
M8		Tightening torque	19 Nm



- Insert and install the cover (2) in the direction of the arrow.

  The locks (1) must engage audibly.

cardiagn.com

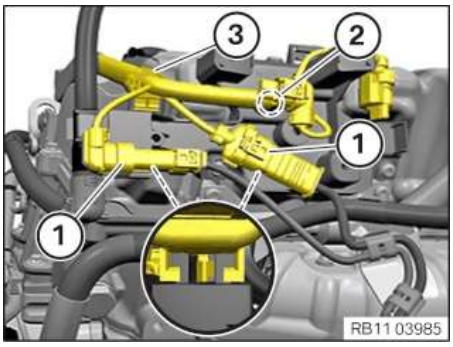


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

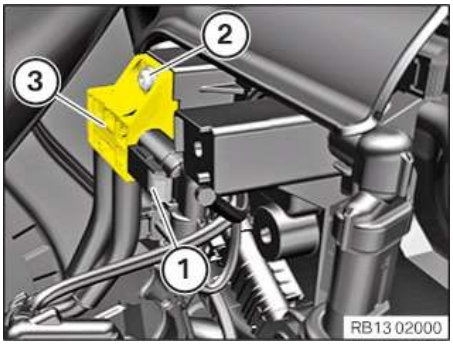
		Tightening torque	5 Nm

- Fasten the positive battery cable in the area (1) in the clamp.



- Feed in the wiring harness section and fasten it with the clamp (3).
- Fasten the cable clip in the area (2) in the sensor bracket.
- Feed in the connector (1) into the sensor bracket and lock it audibly.
- Plug in the connector (1) and lock audibly.

74 – Securing the differential pressure sensor for the diesel particulate filter



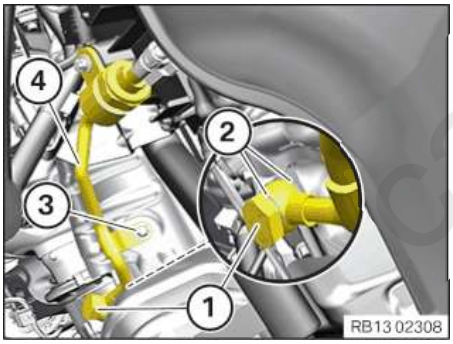
- Feed in and install the differential pressure sensor (3).
- Tighten down screw (2).

Differential pressure sensor of diesel particulate filter on cylinder head cover

TS5x20		Tightening torque	4 Nm

- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

75 – Install the exhaust gas pressure pipe



- Insert and install the exhaust gas pressure pipe (4).
- Replace the sealing rings (2).

  Parts: Sealing ring
- Apply the banjo bolt (1) hand-tight.
- Tighten down screw (3).

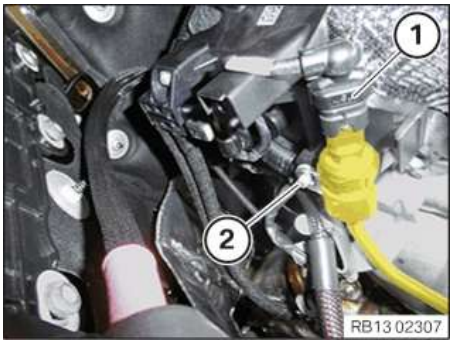
Heat shield to exhaust manifold

M6x12		Tightening torque	10 Nm

- Tighten the banjo bolt (1).

Banjo bolt for exhaust pressure pipe to exhaust manifold

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm



- Tighten down screw (2).

Exhaust gas pressure pipe to sensor system holder

TS6x20		Tightening torque	5,7 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

76 – Install all injectors

▸ **Cleaning the injector shafts**

cardiagn.com

CAUTION

Swirling dirt particles caused by compressed air.

Danger of injury!

- Collect dirt particles, e.g. when blowing out, use cloth to do so.

- Wear safety goggles.

RISK OF DAMAGE

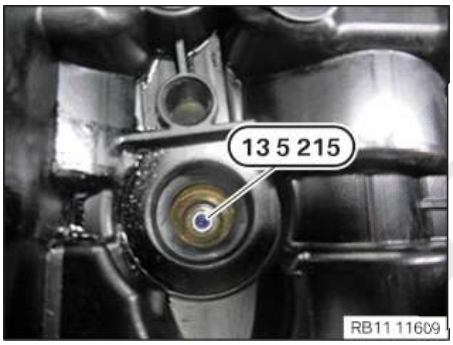
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



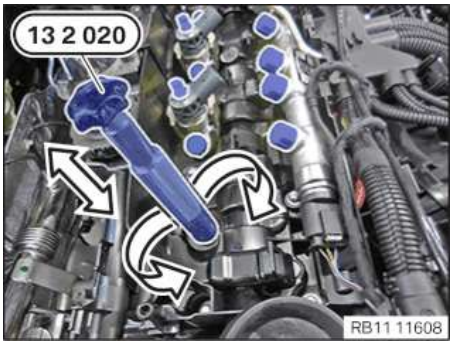
- Check whether the sealing ring remained in the injector shaft and remove the sealing ring as needed.
- Insert the special tool 0 493 763 (13 5 215) with the special tool 0 493 762 (13 5 214) from the set of special tools 0 493 758 (13 5 210) into the injector shaft.
- Remove special tool 0 493 762 (13 5 214).



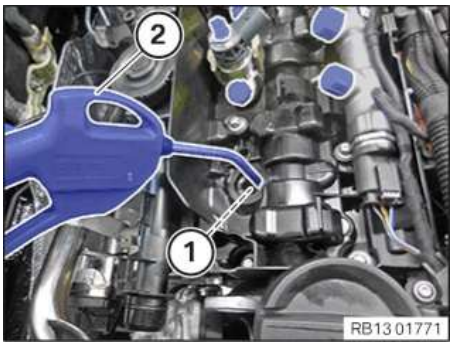
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



- Insert special tool 0 496 150 (13 2 020) into the injector shaft.



- Move special tool 0 496 150 (13 2 020) up and down in the injector shaft with rotational movements in the direction of arrow.
- Feed out special tool 0 496 150 (13 2 020) from the injector shaft and remove.



- Blow out injector shaft (1) with air gun (2).



- Feed the special tool 0 493 762 (13 5 214) into the injector shaft and screw it in with the special tool 0 493 763 (13 5 215).
- Feed out special tool 0 493 762 (13 5 214) with special tool 0 493 763 (13 5 215) from the injector shaft and remove it.

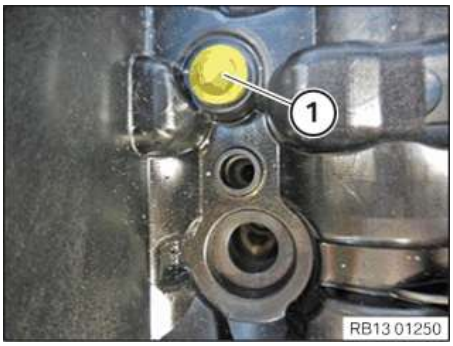
▸ **Check the placement of the clamping claw**

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Tighten down screw (1).

  The clamping claw is positioned on the bolt (1).

Clamping claw facing to cylinder head cover

M6		Tightening torque	10 Nm

▸ **Prepare the injector for installation**

cardiagn.com

RISK OF DAMAGE

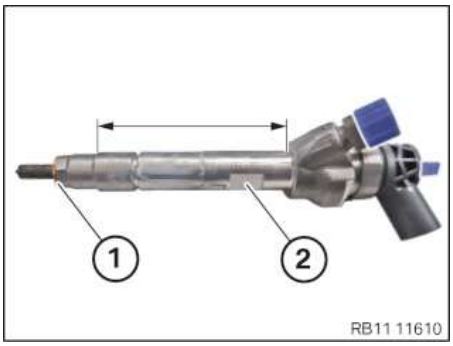
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

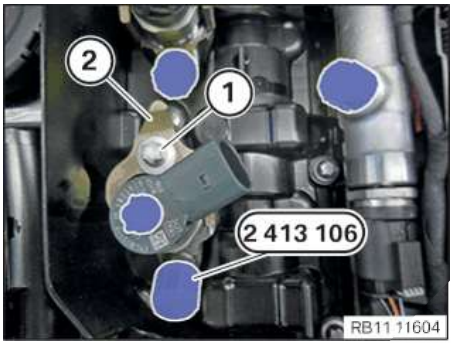
TECHNICAL INFORMATION

Lightly grease the injector shaft with high temperature-resistant grease.
For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



- Renew the copper sealing ring (1) on the injector (2).

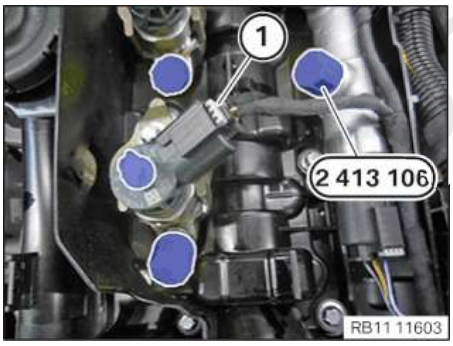
  Parts: Copper sealing ring
- Lightly grease the injector in the marked area with heat-resistant grease before installing the injector (2) in the injector shaft.



- Insert and install the injector .
- Insert and install the clamping claw (2).
- Tighten down screw (1).

Injector to cylinder head cover

M8	Tightening torque	8 Nm
	Angle of rotation	120 °



- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

▸ **Replacement: Perform injection quantity compensation**

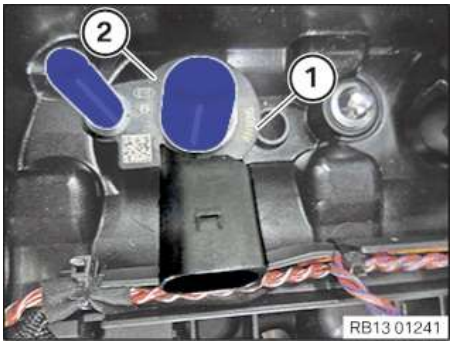
TECHNICAL INFORMATION

If the DDE control unit or an injector has been replaced, it will also be necessary to carry out injection quantity compensation. The adjustment value (7-position letter/number code) is engraved on each injector.

NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

cardiagn.com

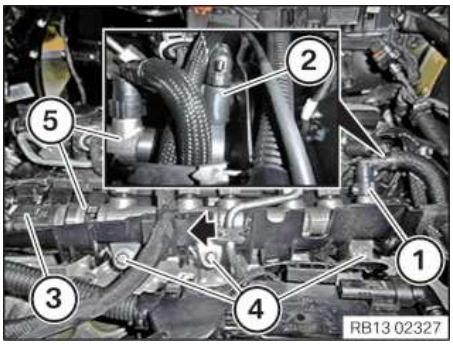


- Read off the adjustment value (1) on the new injector (2).



- Connect diagnosis system:
  - Vehicle identification
  - Function selection
  - Service functions
  - Digital diesel electronics (DDE)
  - Adjustment of injectors
  - Testing schedule
- Start service function with the right arrow button.

77 – Installing the rail



- Insert and install the rail (5).
- Tighten the screws (4).

Rail to cylinder head cover

M8		Tightening torque	19 Nm

- Install and lock cable clip (arrow).

  The cable clip (arrow) must engage audibly.
- Connect and lock the connector (3) at the rail pressure sensor.

  The connector (3) must engage audibly.
- Connect and lock the connector (2) at the rail pressure regulating valve.

  The connector (2) must engage audibly.
- Feed in fuel return line (1) and install.

  The fuel return line (1) must audibly engage.

78 – Installing high pressure line between rail and high pressure pump

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

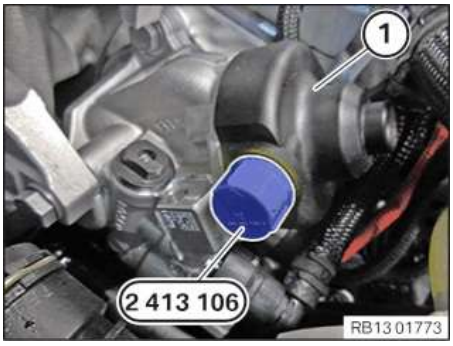
Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

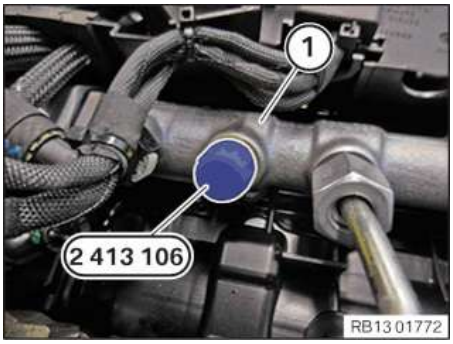
cardiagn.com

TECHNICAL INFORMATION

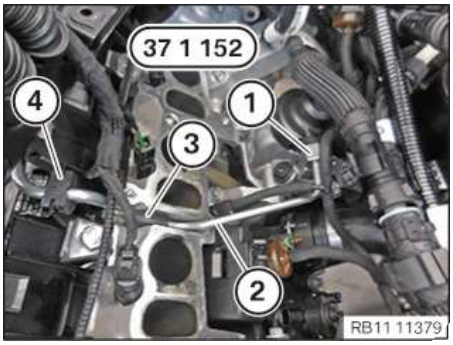
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Feed out and remove special tool on the high pressure pump (1).



- Feed out the special tool on the rail (1) and remove.



- Insert and install the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).
- Hand-tighten the union nut (1) on the high pressure pump.



- Hand-tighten the union nut (1) on the rail.

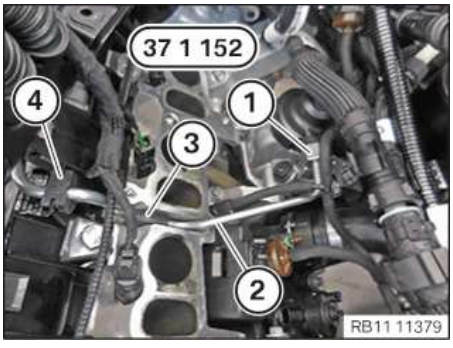
TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten the union nut (1) with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm



- Make sure that the high pressure line (2) is correctly installed with the abrasion protection (3) and the rubber mount (4).

TECHNICAL INFORMATION

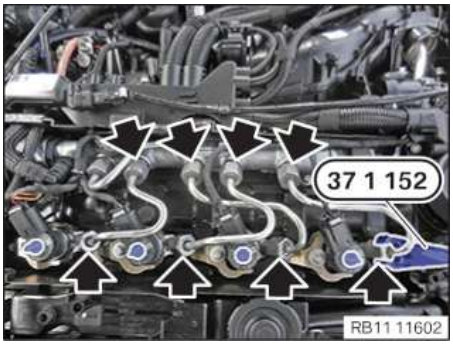
Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten union nut (1) on the high pressure pump with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm

mandiagn.com



- Remove the special tool from all cable connections.
- Feed in and install the high pressure lines (arrows).
- Hand-tighten the high pressure lines (arrows).

TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

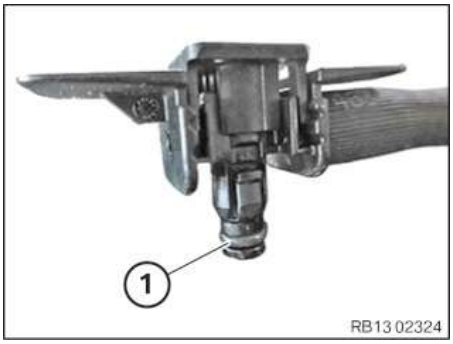
- Tighten the high pressure lines (arrows) with the special tool .

High pressure lines between injector and rail

High-pressure pipe		Tightening torque	24.5 Nm

- Check the high pressure lines (arrows) for tightness (**visual inspection**).

80 – Attach the leakage oil line on the injectors

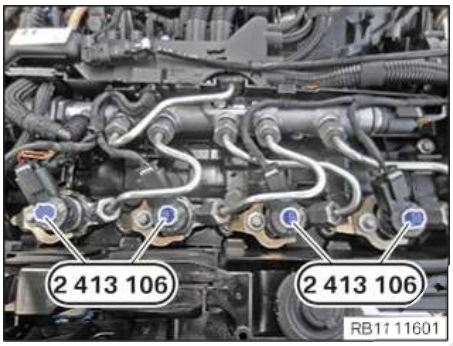


- **Version A:**

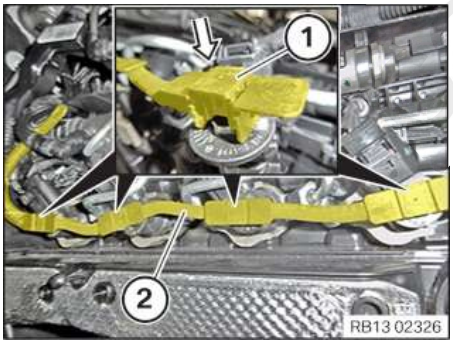
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

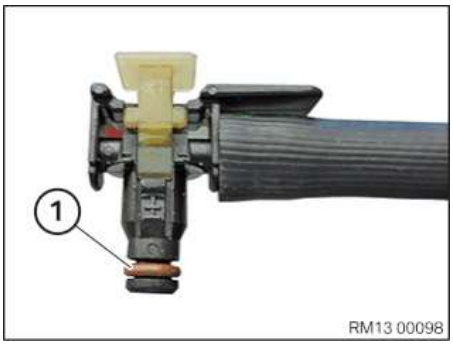
  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.



- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.



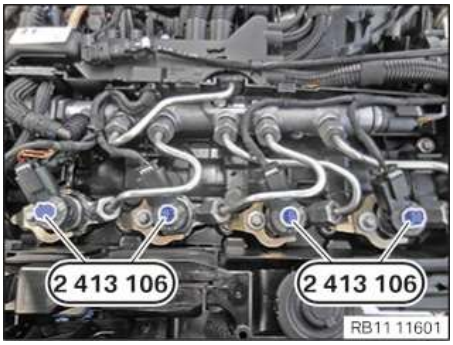
- **Version B**:

  Check sealing ring (1) for damage, renew leakage oil line if necessary.

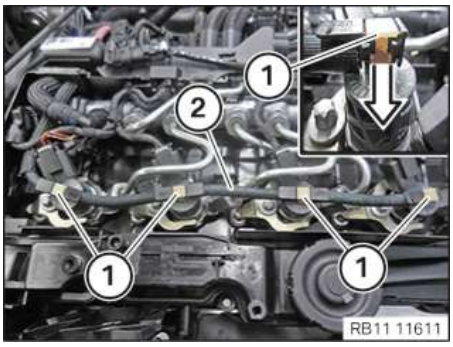
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.

cardiagn.com

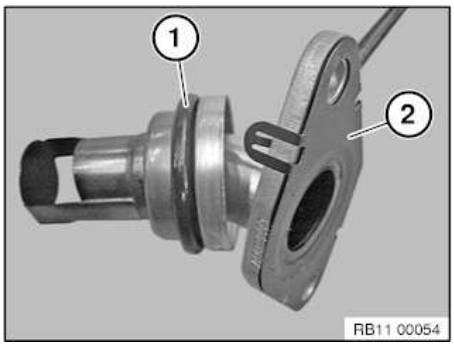


- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.

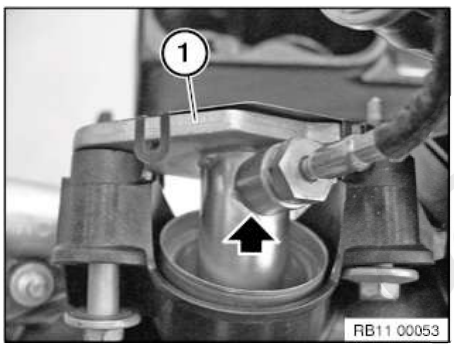
81 – Installing the intake plenum



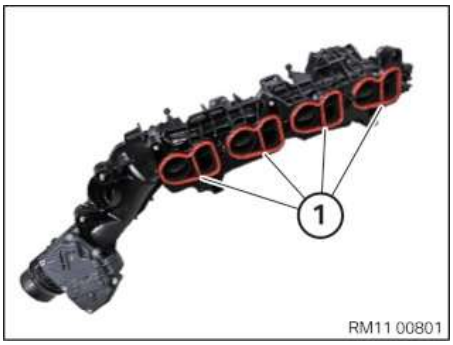
- Renew O-ring (1).

  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

  Parts: Gasket
- Position the seal (2) and clip it in.



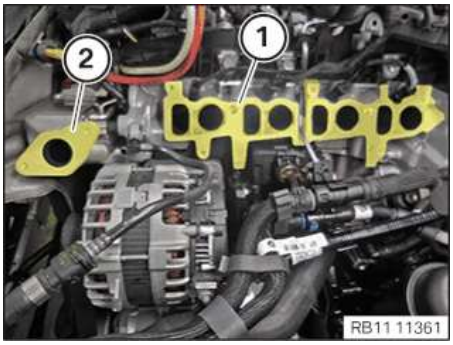
- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).



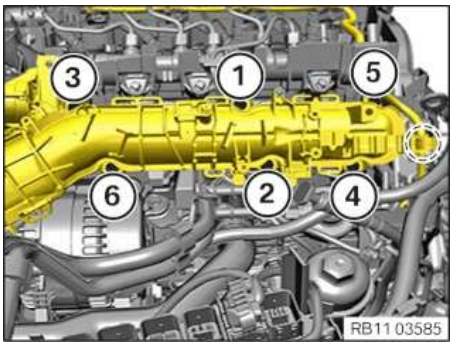
- Renew seals (1).

  Parts: Seals
- Ensure that the seals (1) are firmly mounted on the intake plenum.

cardiagn.com



- Clean connection points (1) at cylinder head.
- Clean the connection point (2) on the exhaust-gas recirculation cooler.

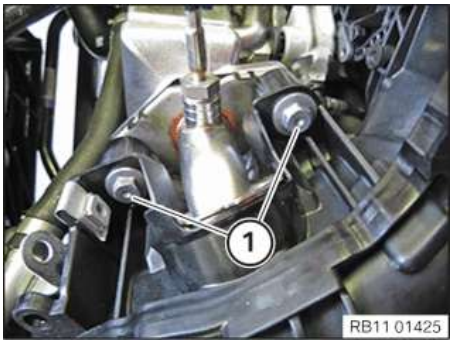


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

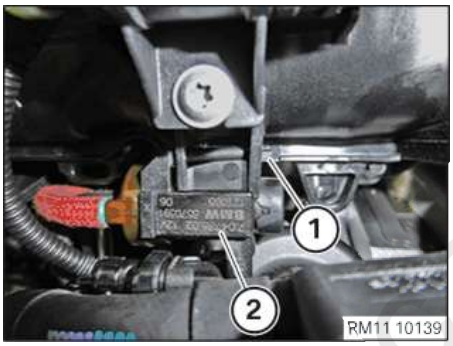
- Attach the wiring harness and fuel lines in the marked area on the intake plenum.



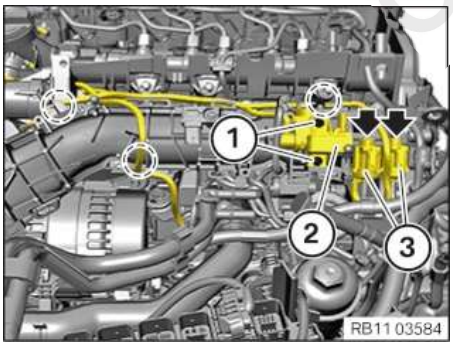
- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm



- Install electric changeover valve (2) from the left to the right in the holder on the intake plenum.
  The lock (1) must audibly engage.



- Install intake plenum electric changeover valve (3) on the intake plenum.
  The locks (arrows) must engage audibly.
- Position the electric changeover valve (2) on the intake plenum.
- Tighten the screws (1).

Electric changeover valve to intake plenum

TS6x20		Tightening torque	5 Nm

- Fasten the vacuum hoses on the intake plenum in the marked areas.



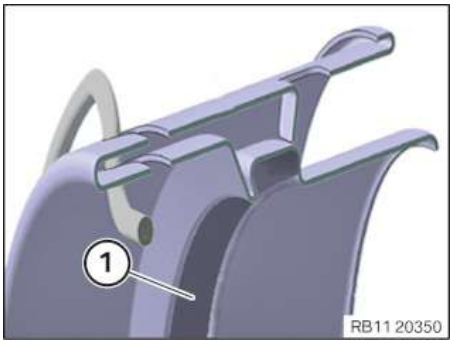
- Check the seal (1) for damage, and renew if necessary.

gardiagn.com

▸ **Replacing damaged seal**

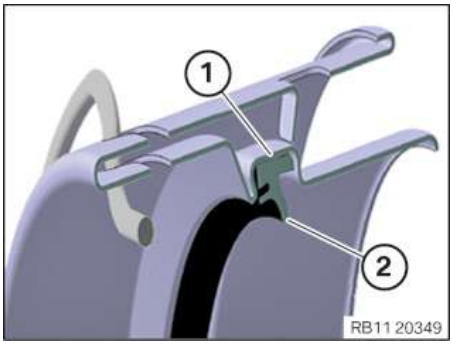
TECHNICAL INFORMATION

Do not use pointed or sharp-edged tools for the installation and/or removal.



- Remove damaged seal.
- Clean gasket groove (1) with a dry towel.

  The gasket groove (1) must be clean.



- Renew gasket.

  Parts: Gasket
- Install seal dry without lubricant or mounting agent.

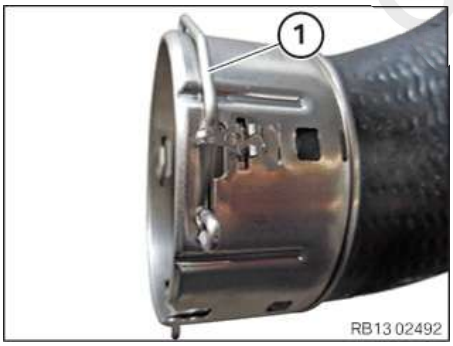
TECHNICAL INFORMATION

Incorrect assembly is possible. Ensure correct installation position.

- Feed in and install the seal.
- Make sure the seal is correctly installed in the gasket groove (1).
- Make sure that the sealing lip (2) is directed inwards as shown.



- Connect the pressure pipe to the throttle body until the locks (1) engage on both sides.



- Check that the locks (1) are correctly seated on the pressure pipe.

82 – Partially securing the wiring harness section on the intake plenum

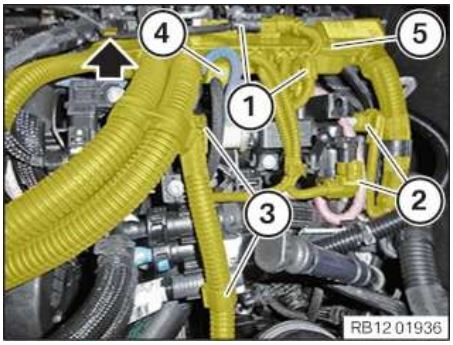
RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

- Route all cables without abrasions, do not trap and crush.

carsdiagn.com



- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

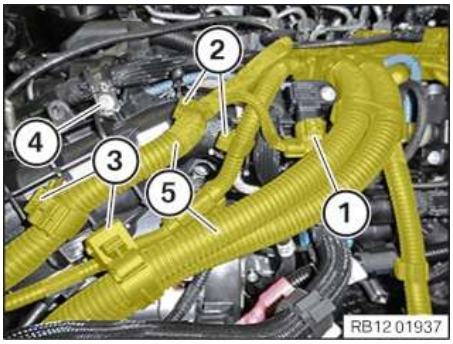
Wiring harness section to manifold

TS5x20		Tightening torque	3,6 Nm

- Secure clamps (3).
- Connect connectors (2) and lock.

  The connectors (2) must engage audibly.
- Secure the line at clamp (Arrow).
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



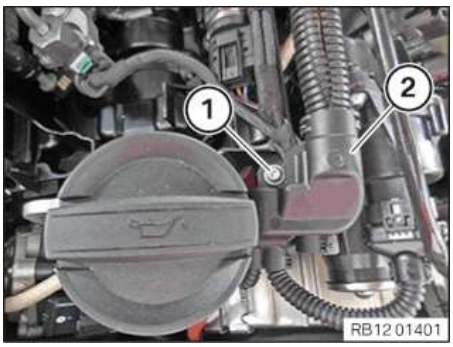
- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

Standard screw connection 4 Nm

Oval-head screw		Tightening torque	4 Nm

- Secure clamps (3).
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



- Guide in the wiring harness section (2) and install.
- Tighten down screw (1).

Wiring harness section to cylinder head cover

TS5x20		Tightening torque	3,6 Nm



- Connect connectors (1) and lock.

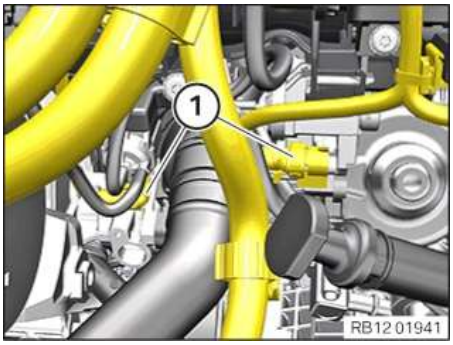
  The connector (1) must engage audibly.



- Connect the connector (1) and lock it.

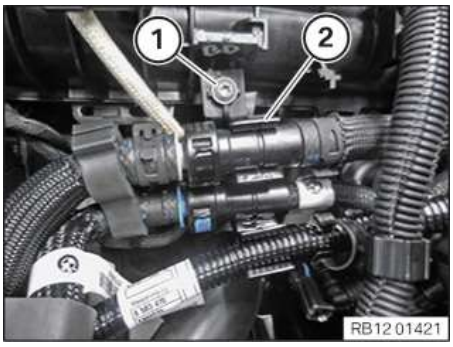
  The connector (1) must engage audibly.

cardiagn.com



- Connect connectors (1) and lock.

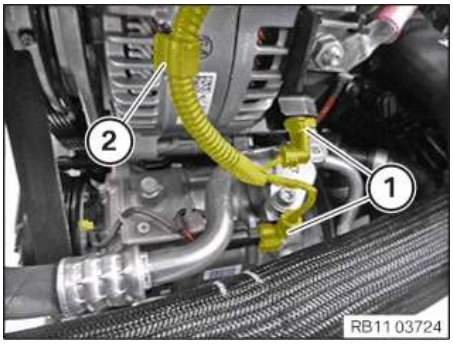
  The connectors (1) must engage audibly.



- Insert and install the holder (2).
- Tighten down screw (1).

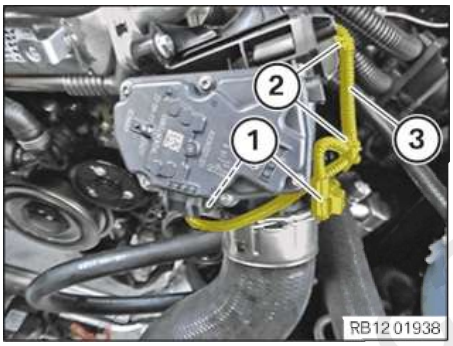
Holder on intake plenum

TS6X20		Tightening torque	5 Nm

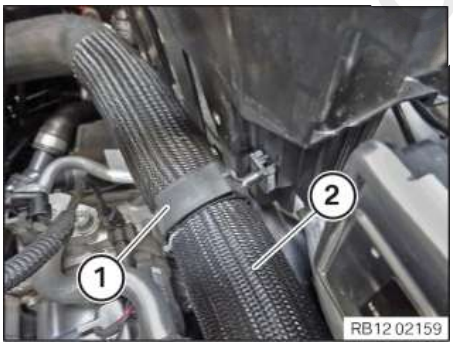


- Connect the connector (1) and lock it.

  The connectors (1) must engage audibly.
- Secure holder (2) to alternator.



- Guide in the wiring harness section (3) and install.
- Secure clamps (2).
- Connect connectors (1) and lock.



- Feed in and install coolant line (2).
- Lock holder (1).

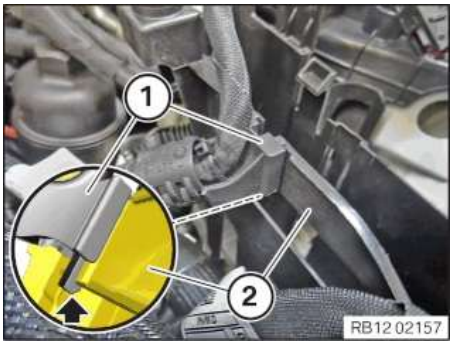
  The holder (1) must engage audibly.



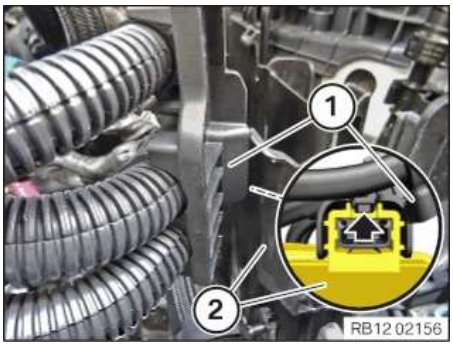
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.

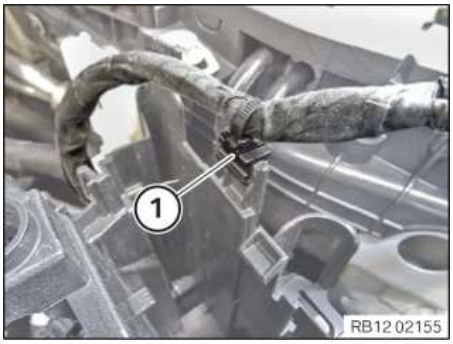
cardiagn.com



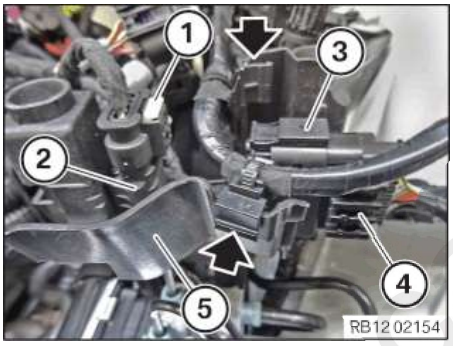
- Connect the cable clip (1) with the control unit holder (2) and lock it.
  Lock (arrow) must audibly engage.



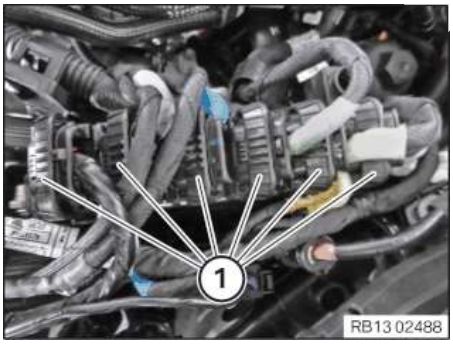
- Connect the cable clip (1) with the control unit holder (2) and lock it.
  Lock (arrow) must audibly engage.



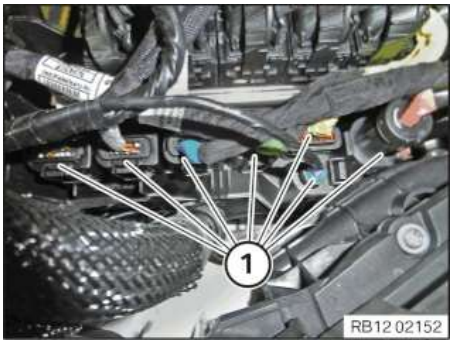
- Secure clamps (1).



- Connect and lock the connector (4) with the control unit holder (5).
  The connector (4) must engage audibly.
- Connect connectors (3) and lock.
  The connector (3) must engage audibly.
- Connect and lock the connector (2) with the control unit holder (5).
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.
  The connector (1) must engage audibly.
- Secure the clamps (arrows).

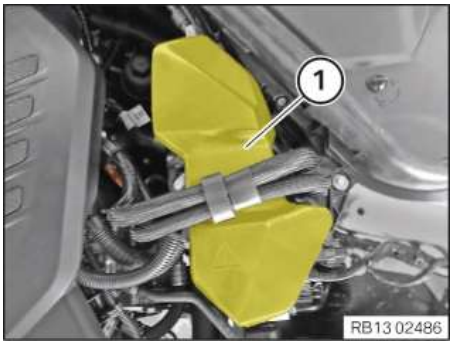


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



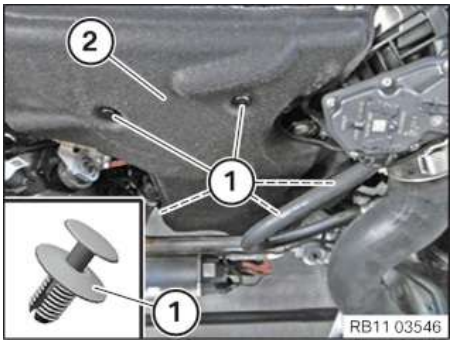
- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.

cardiagn.com



- Insert and install cover (1) into guides.

83 – Install acoustic cover for the engine, front

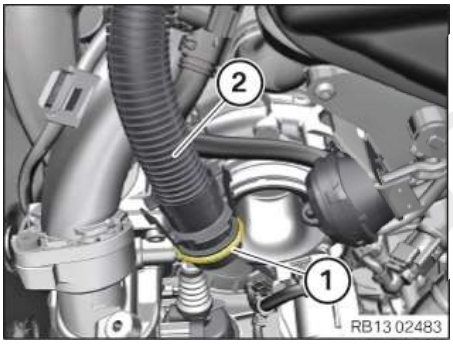


- Feed the acoustic cover (2) in and install.
- Secure the acoustic cover (2) with the expanding rivets (1).

84 – Installing the clean air pipe with resonator



- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.

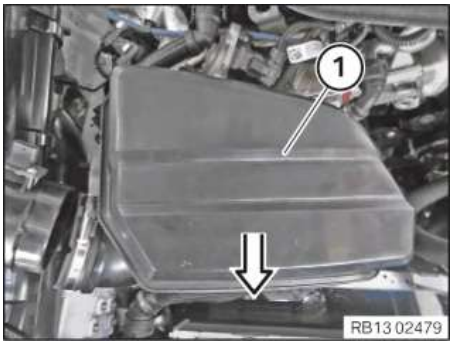


- Check the sealing ring (1) for the engine ventilation line (2) for damage and renew where required.



- Feed in and install clean air pipe with resonator (1) in the direction of the arrow.

cardiagn.com

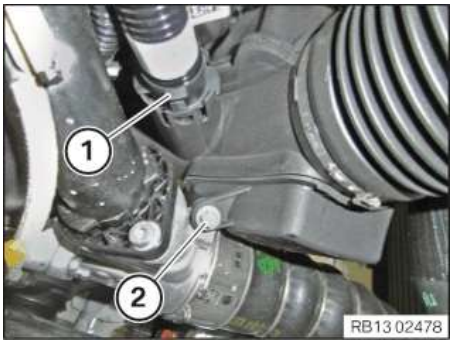


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

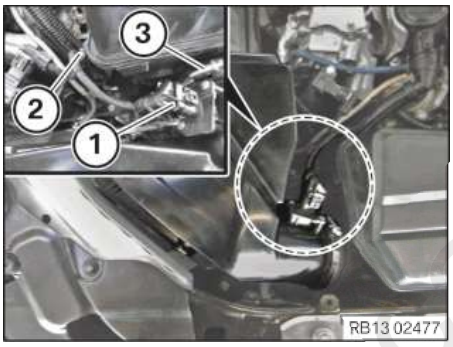
  The clamp (1) must engage audibly.



- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm



- Connect the clean air pipe with resonator to the intake filter housing.
- Tighten clamp (3).

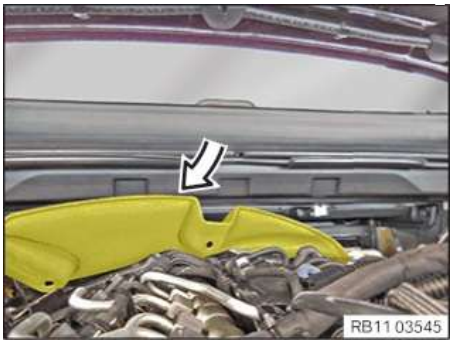
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

- Secure clamps (2).
- Connect connectors (1) and lock.

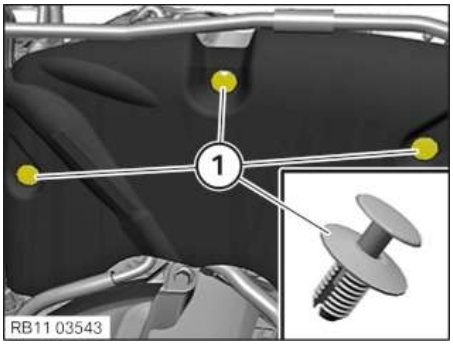
  The connector (1) must engage audibly.

85 – Installing acoustic cover at rear



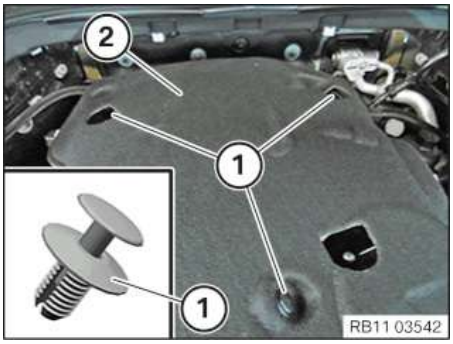
- Guide in the acoustic cover in the direction of the arrow and install it.

cardiagn.com



- Secure acoustic cover with the expanding rivets (1).

86 – Install the acoustic cover for the injectors



- Feed the acoustic cover (2) in and install.
- **If installed:** Secure the acoustic cover (2) with the expanding rivets (1) .

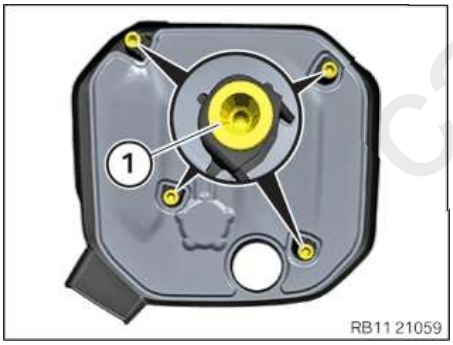
87 – Install acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



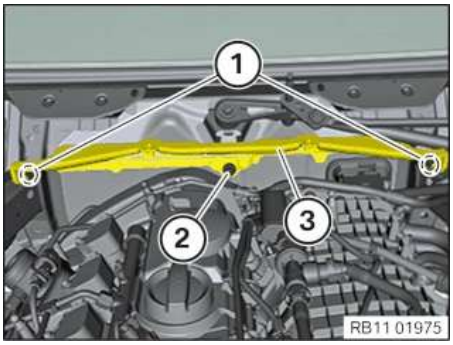
- Check the acoustic cover for correct fit of the rubber mounts (1).



- Clip in the acoustic cover (1) into the holders in the indicated areas.

88 – Installing centre bulkhead lower section

cardiagn.com

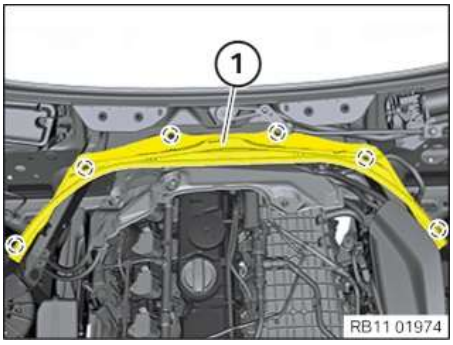


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

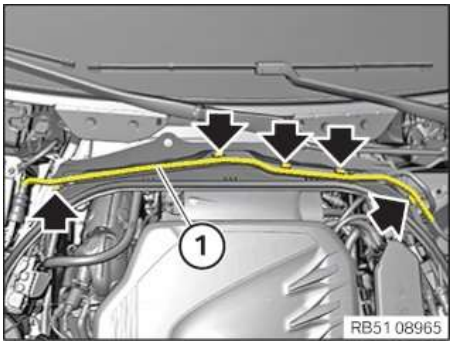
89 – Installing the centre bulkhead upper part



- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

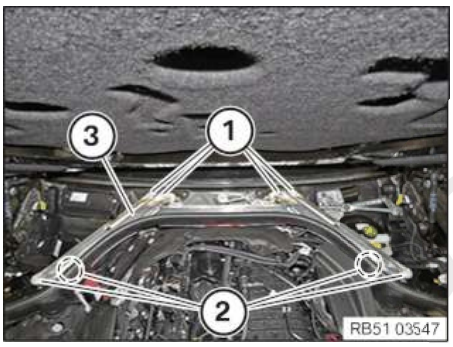
Bulkhead upper part to bottom bulkhead

		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

  Clip in the wire (1) into the holders (arrows).



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Install the tension strut (3) on the spring strut dome.
- Tighten the screws (1).

Tension strut on bulkhead

M10x25 screw		Tightening torque	56 Nm

- Renew screws (2).

  Parts: Screws
- Tighten the screws (2).

Tension strut to spring strut dome

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

90 – Install the seal for the bonnet

carmagn.com



- Press the rear bonnet seal (2) into the guide.
- Feed in cable (1) into the brackets.
- Check that the rear bonnet seal (2) and the cable (1) are seated correctly.

91 – Installing cowl panel cover

RISK OF DAMAGE

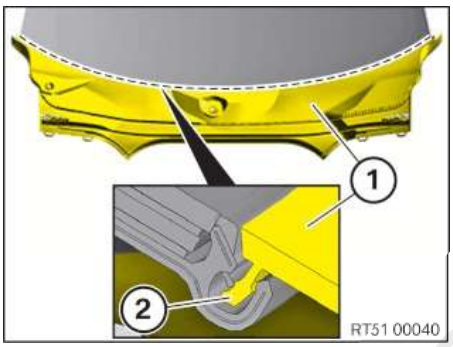
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

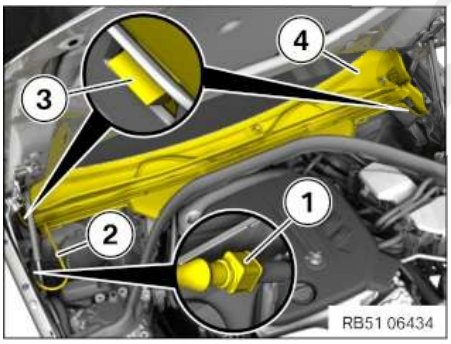
- Ensure correct installation of the components.
- Only use undamaged components.

TECHNICAL INFORMATION

Before installing the cowl panel cover it is **mandatory** to check that the 48 V line is routed correctly and fitted tightly.
An incorrectly laid or attached 48 V line can be damaged by the wiper kinematics.



- Push the cowl panel cover (1) into the latch mechanism (2) beginning on the side.



- Clip cowl panel cover (4)in by means of the latch mechanisms (3).
- Position windscreen wash hose (2) and connect windscreen wash hose (1)quick lock.

92 – Install left and right wiper arm

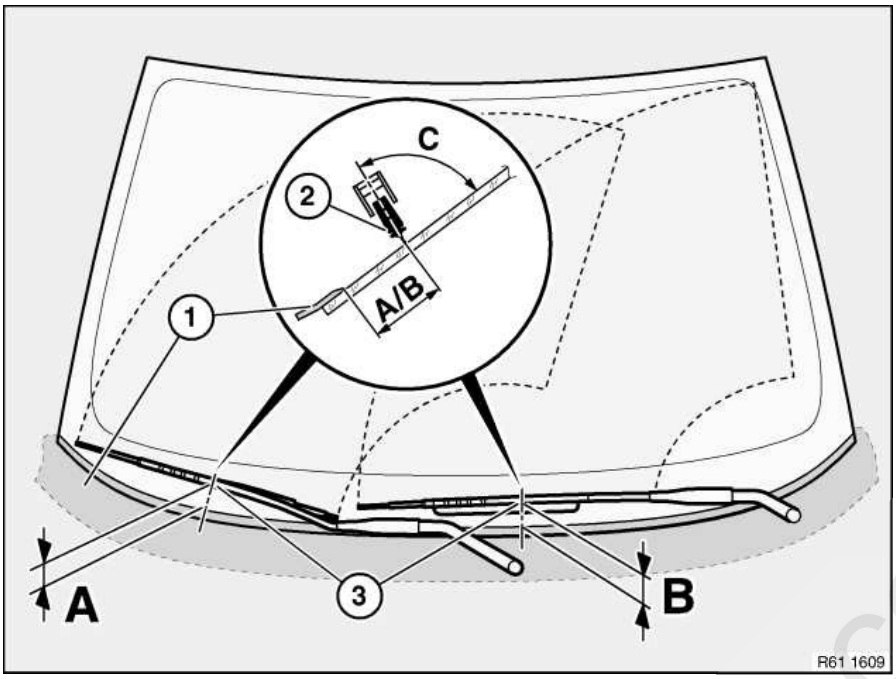
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

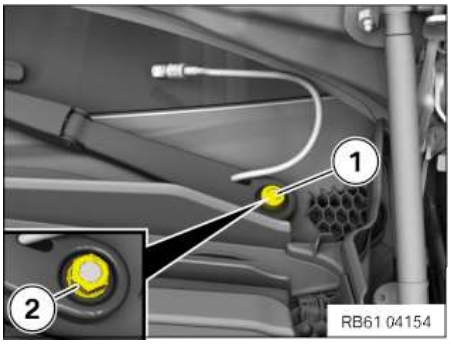
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- Connect the wiper arm (3).
- Correctly position the wiper arm (2) in relation to the window edge (1).

Distance from window pane edge to wiper blade

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

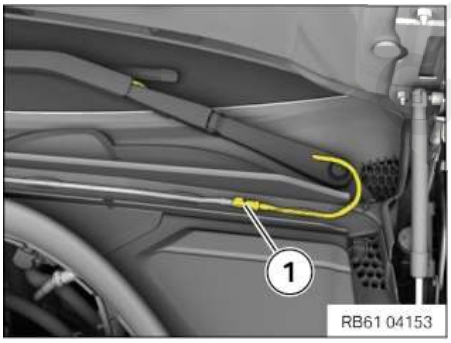


- Tighten nut (2).

Windscreen wiper arm

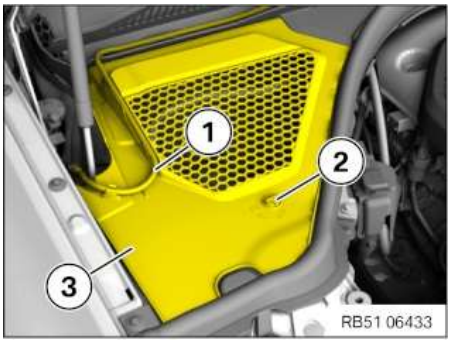
Combination hexagon nut		Tightening torque	35 Nm

- Connect the protective cap (1).



- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

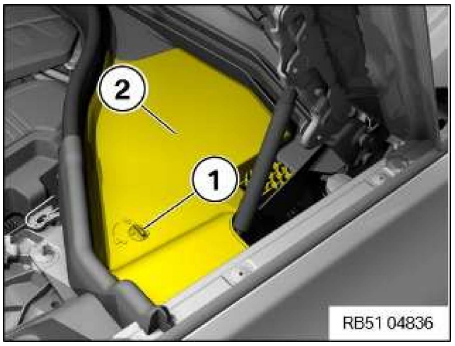
93 – Install the rear right engine compartment cover



- Position the cover of the engine compartment on the rear right (3).
- Close lock (2).
- Insert washer fluid hose (1) into the guides.

94 – Install the cover of the engine compartment on the rear left

cardiagn.com



- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

95 – Connecting all battery earth leads



- See additional information.

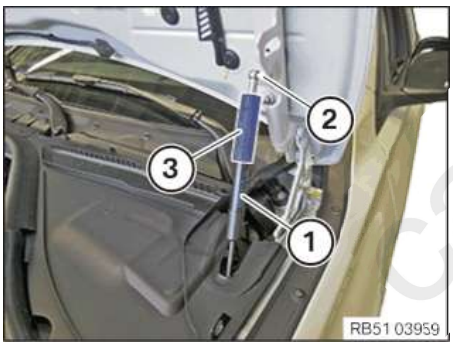
96 – Take bonnet out of the service position

CAUTION

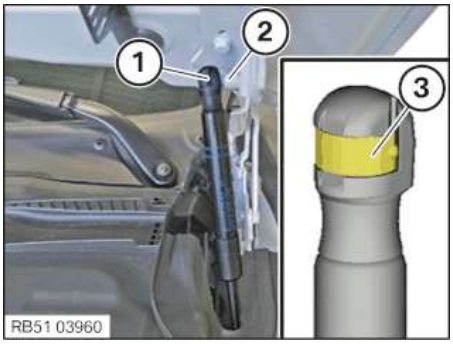
Shutting bonnet or tailgate.

Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.



- Support the bonnet by hand.
- Remove the special tool (3) from the ball pin (2).
- Pull off the special tool (3) from the gas pressure spring (1).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.



- Check the clamp (3) is fitted correctly.
- Connect ball socket (1) to ball pin (2).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.

Additional Information

Overview of Tightening Torques

Special tool 2 365 488 to engine Used in step 4054

M8x60		Tightening torque		19 Nm

cardiagn.com

Intake and exhaust camshaft in camshaft support			Used in step 4748
M6x31		Tightening torque	10 Nm

Bearing journal to cylinder head			Used in step 50
M16x1.5	Replace bearing journal.	Tightening torque	20 Nm

Standard screw connection M8			Used in step 50
M8		Tightening torque	19 Nm

Chain tensioner piston to cylinder head			Used in step 51
22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

Holder to crankcase			Used in step 51
M8X16		Tightening torque	19 Nm

Camshaft sprocket to camshaft			Used in step 52
M7x17.			17 Nm

Starter motor to engine			Used in step 57
M8X60		Tightening torque	19 Nm

Battery positive lead to starter			Used in step 57
M8		Tightening torque	13,5 Nm

Diesel particulate filter V-clip to exhaust turbocharger			Used in step 59
V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

Bracket to diesel particulate filter top			Used in step 59
M8		Tightening torque	19 Nm

Bracket to transmission for diesel particulate filter holder bottom			Used in step 59
M8X20		Tightening torque	19 Nm

Lower holder to diesel particulate filter			Used in step 59
M8		Tightening torque	19 Nm

Coolant lines for SCR metering module			Used in step 59
M6X16		Tightening torque	8 Nm

Nitrogen oxide sensor before SCR catalytic converter			Used in step 60
Sensor		Tightening torque	50 Nm

Monitoring oxygen sensor			Used in step 61
Sensor		Tightening torque	50 Nm

Rear silencer to body / bumper support			Used in step 62
M8	Replace nuts.	Tightening torque	19 Nm

Exhaust system to rear axle carrier			Used in step 62
M8 nut		Tightening torque	19 Nm

Exhaust system to transmission			Used in step 62
M8		Tightening torque	19 Nm

Exhaust system to diesel particle filter			Used in step 62
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

cardiagn.com

SCR metering module V-clip to exhaust system			Used in step 62
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm

Exhaust-gas temperature sensor upstream of SCR catalytic converter			Used in step 62
Sensor		Tightening torque	30 Nm

Diesel particulate sensor to exhaust system			Used in step 62
Sensor		Tightening torque	50 Nm

Nitrogen oxide sensor downstream of SCR catalytic converter			Used in step 62
Sensor		Tightening torque	55 Nm

Connecting support to tunnel			Used in step 63
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

Diffuser / underbody panelling			Used in step 64
Nuts and screws		Tightening torque	3 Nm

Underbody protection			Used in step 6567
Hexagon screw		Tightening torque	3 Nm

Underbody panelling			Used in step 66
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Underbody protection, steering, to front axle support			Used in step 68
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support			Used in step 68
Hexagon bolt M6		Tightening torque	8 Nm

Underbody protection of the steering gear			Used in step 69
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

Wheel arch trim panel, front			Used in step 69
Thermoplastic hexagon screw		Tightening torque	2,6 Nm

Underbody protection front			Used in step 70
Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Cylinder head cover to cylinder head			Used in step 71
M6		Tightening torque.	8,5 Nm

Heat shield to exhaust manifold			Used in step 72
M6x12			10 Nm

Bracket on cylinder head cover			Used in step 73
		Tightening torque	5 Nm

Battery positive lead to battery positive terminal			Used in step 73
M8		Tightening torque	19 Nm

cardiagn.com

Differential pressure sensor of diesel particulate filter on cylinder head cover			Used in step 74
TS5x20		Tightening torque	4 Nm

Heat shield to exhaust manifold			Used in step 75
M6x12		Tightening torque	10 Nm

Banjo bolt for exhaust pressure pipe to exhaust manifold			Used in step 75
Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm

Exhaust gas pressure pipe to sensor system holder			Used in step 75
TS6x20		Tightening torque	5,7 Nm

Clamping claw facing to cylinder head cover			Used in step 76
M6		Tightening torque	10 Nm

Injector to cylinder head cover			Used in step 76
M8		Tightening torque	8 Nm
		Angle of rotation	120 °

Rail to cylinder head cover			Used in step 77
M8		Tightening torque	19 Nm

High pressure lines between high pressure pump and rail			Used in step 78
High-pressure pipe		Tightening torque	24.5 Nm

High pressure lines between injector and rail			Used in step 79
High-pressure pipe		Tightening torque	24.5 Nm

Intake plenum to cylinder head			Used in step 81
M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum			Used in step 81
		Tightening torque	10 Nm

Electric changeover valve to intake plenum			Used in step 81
TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold			Used in step 82
TS5x20		Tightening torque	3,6 Nm

Standard screw connection 4 Nm			Used in step 82
Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover			Used in step 82
TS5x20		Tightening torque	3,6 Nm

Holder on intake plenum			Used in step 82
TS6X20		Tightening torque	5 Nm

Clean air pipe to exhaust turbocharger			Used in step 84
M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing			Used in step 84
Clamp		Tightening torque	3 Nm

Bulkhead lower part to body			Used in step 88
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

cardiagn.com

Bulkhead upper part to bottom bulkhead — Used in step 89

		Tightening torque	3 Nm

Tension strut on bulkhead — Used in step 89

M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome — Used in step 89

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm — Used in step 92

Combination hexagon nut		Tightening torque	35 Nm

Overview of Special Tools

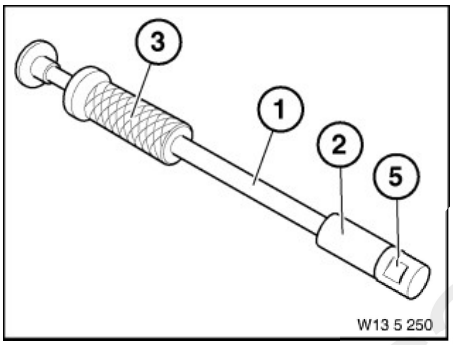
0 493 339 (13 5 252) Bush



Common — Used in step 21

Usage	(Threaded bush)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 321 (13 5 250) Puller



Common — Used in step 21

Usage	For removing injector nozzles or injectors from cylinder head
Included in the tool or work	
Storage location	A16
Replaced by	
In connection with	
SI-Number	01 06 98 (306)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 338 (13 5 251)		**Rod** (guide rod)	
2	0 493 339 (13 5 252)		**Bush** (Threaded bush)	
3	0 493 340 (13 5 253)		**Weight** (Weight)	
4	0 493 379 (13 5 254)		**Claw** (Clamping claw) For removal of injector nozzles / engine: M57	
5	0 495 579 (13 5 255)		**Adapter** For removing steering shaft on E85. Refer to SI 01 11 06 (265)	

cardiagn.com

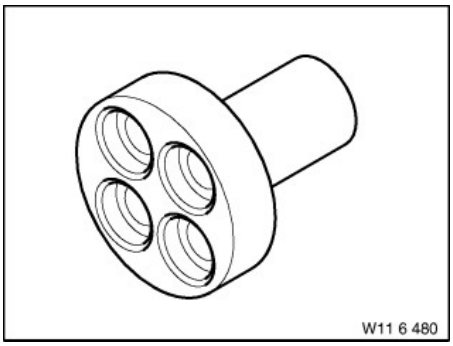
0 493 340 (13 5 253) Weight



Common Used in step 21

Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

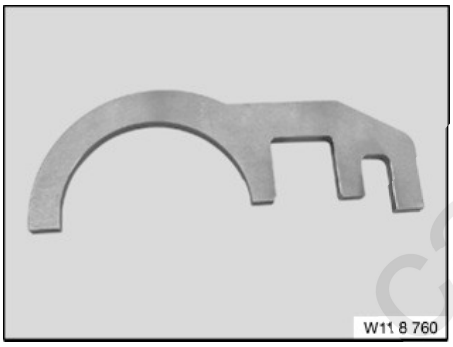
0 493 380 (11 6 480) Connector



Common Used in step 4054

Usage	For turning over engine at crankshaft hub (vibration absorber).
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	01 11 98 (338)

0 496 112 (11 8 760) Gauge



Common Used in step 40445455

Usage	For securing camshaft at TDC.
Included in the tool or work	
Storage location	B24
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

2 365 488 Adapter



Common Used in step 40535456

Usage	For disconnecting the crankshaft at the top dead centre. (longitudinal installation with automatic transmission only).
Included in the tool or work	
Storage location	C56
Replaced by	
In connection with	
SI-Number	01 46 14 (191)

cardiagn.com

2 288 380 Locating stud

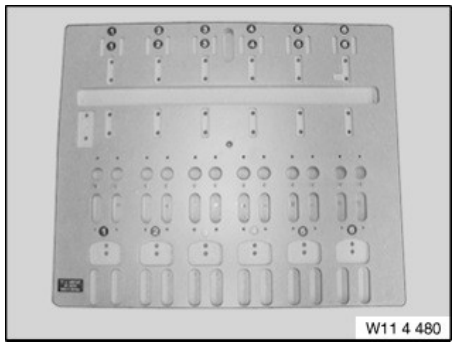


Common Used in step 40535456

Usage	For disconnecting the crankshaft at the top dead centre. Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).
Included in the tool or work	
Storage location	A56
Replaced by	
In connection with	
SI-Number	01 04 14 (071)

cardiagn.com

0 495 105 (11 4 480) oddments tray



Common Used in step 4546

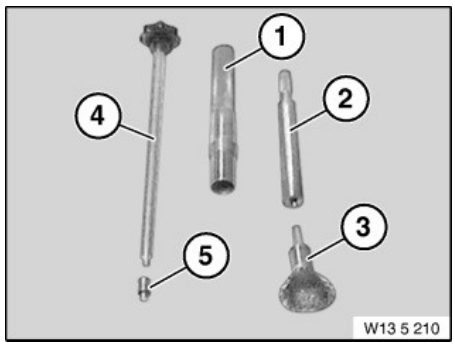
Usage	(Boards (2 pieces)) For setting down the individual components of the cylinder head.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 17 04 (130)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 495 106 (11 4 481)		**oddments tray** (Board, intake side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	
2	0 495 107 (11 4 482)		**oddments tray** (Board, exhaust side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	

cardiagn.com

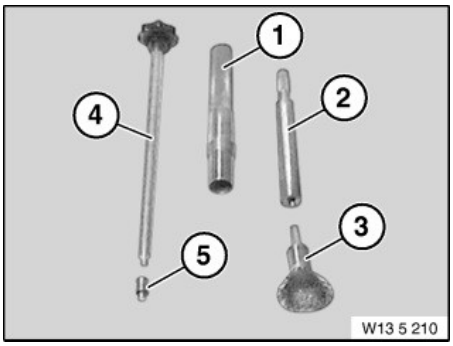
0 493 763 (13 5 215) Plug



Common Used in step 76

Usage	(Seal plug)
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

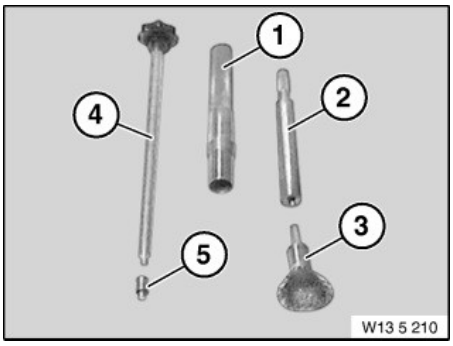
0 493 762 (13 5 214) Rod



Common Used in step 76

Usage	(Mounting rod) For the seal plug
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 758 (13 5 210) Tool



Common Used in step 76

Usage	(Cleaning set) For injector channels
Included in the tool or work	
Storage location	B4
Replaced by	
In connection with	
SI-Number	01 05 00 (574)

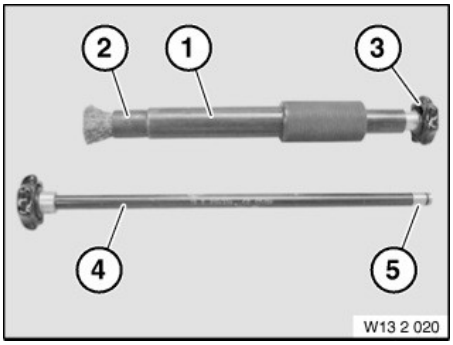
Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 759 (13 5 211)		**Holding sleeve** (Guide sleeve)	
2	0 493 760 (13 5 212)		**Holder** (Brush holder)	
3	0 493 761 (13 5 213)		**Brush head**	
4	0 493 762 (13 5 214)		**Rod** (Mounting rod) For the seal plug	
5	0 493 763 (13 5 215)		**Plug** (Seal plug)	

0 496 150 (13 2 020) Tool

Used in step 76

cardiagn.com



Common

Usage	(Cleaning kit) For cleaning the injector shaft.
Included in the tool or work	
Storage location	A87
Replaced by	
In connection with	
SI-Number	01 07 07 (355)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 496 151 (13 2 021)		**Holding sleeve** (Guide sleeve) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
2	0 496 152 (13 2 022)		**Holder** (Brush holder) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
3	0 496 153 (13 2 023)		**Brush head** Remaining inventories will be sold off, followed by discontinuation and then available as part of complete special tool 13 2 020 = 83 30 0 496 150 only	
4	0 496 154 (13 2 024)		**Rod** (Mounting rod) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
5	0 496 155 (13 2 025)		**Plug** (Seal plug) Available as part of complete special tool 13 2 020 = 83 30 0 496 150 only.	

Overview Technical Data

Distance from window pane edge to wiper blade — Used in step 92

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

Links

General repair instructions	Used in step
11 00 ... Overview of consumables (Electronic Parts Catalogue)	76

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting battery earth lead	295

cardiagn.com

61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	295
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	295
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	295
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	295
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	295
61 20 900 Disconnecting and connecting battery earth lead

11 31 025 Removing and installing/replacing intake camshaft

PRELIMINARY WORK

1 – Bring front compartment lid in the service position

Prerequisite

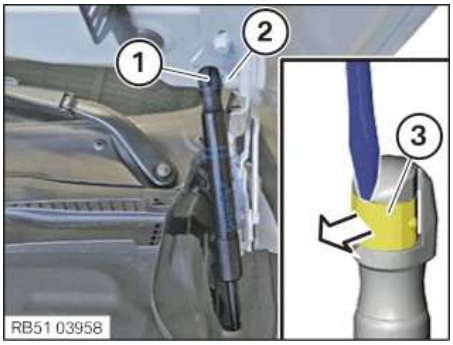
Engine compartment lid is open.

CAUTION

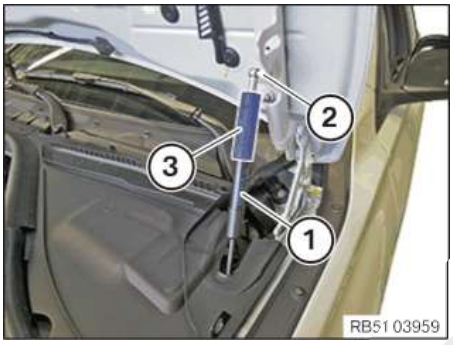
Shutting bonnet or tailgate.

Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.



- Lift clamp (3) slightly using a screwdriver, in the direction of the arrow.
- Lift off ball socket (1) from ball pin (2).
- Repeat the operation on the other side of vehicle.

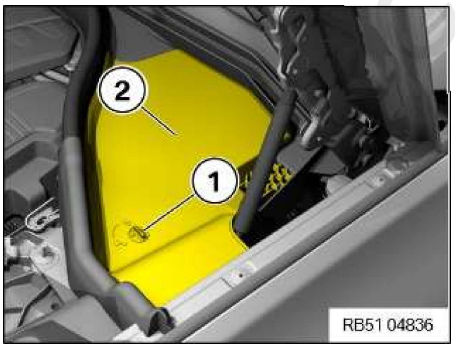


TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

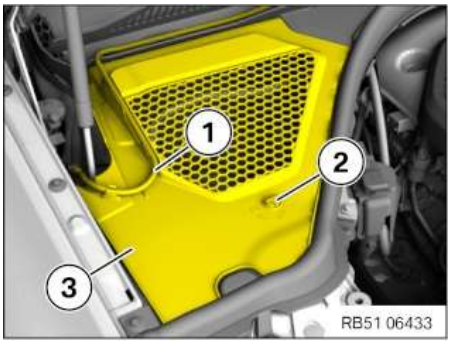
- Remove the bonnet support and open the bonnet further.
- Pull special tool or or (3) over gas pressure spring (1).
- Place special tool on the ball pin (2) and engage using force.
- Repeat the operation on the other side of vehicle.

2 – Remove the cover of the engine compartment at the rear left



- Loosen the lock (1).
- Remove the cover (2) of the rear left engine compartment.

3 – Remove the cover of the rear right engine compartment



- Release washer fluid hose (1) from the guides.
- Loosen the lock (2).
- Remove the cover (3) of the rear right engine compartment.

4 – Deactivating the 48 V electrical system

Prerequisite

Ignition is switched off.

WARNING

Deactivation of the 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Make sure that **no battery charger** is connected to the jump start terminal point in the engine compartment.
- For vehicles with additional electrical systems (48 V electrical system, high-voltage vehicle electrical system), it is mandatory to deactivate them **before** disconnecting the vehicle battery.

WARNING

Deactivation of the 48 V electrical system.

Risk of short circuits! Risk of fire!

- Make sure that **no charger** is connected to the jump start support point in the engine compartment.

RISK OF DAMAGE

Damage to 48-V battery

If a 48-V battery that is disconnected from the electrical system is activated, the battery electronics will be damaged.

- Only carry out activation of the 48V electrical system with a completely connected 48-V battery.

TECHNICAL INFORMATION

Follow notes for 48-V battery. See further information 6120 ... Notes on 48-V battery.



- Deactivate the 48V electrical system by opening the bonnet.

  The deactivation takes place automatically.

Check

cardiagn.com



TECHNICAL INFORMATION

Zero voltage (48V electrical system is switched off) is displayed only in PAD mode.

- Press the START-STOP button quickly 3 times without stepping on the brake pedal to establish the PAD mode.
- Check isolation from the supply in the instrument cluster in PAD mode.

desired state

- The Check Control message "48V electrical system switched off." (1) is displayed.

Result

» **The absence of voltage** cannot be determined by means of the Check Control message "48V electrical system switched off:" (1). Work is not permitted to be started.

Measure

- Carry out the service function "48 V electrical system deactivation".
  - Vehicle management > Service functions > Voltage supply > Deactivate 48 V electrical system

Only when the Check Control message “48 V electrical system switched off.” (1) is displayed in the instrument cluster is it permitted to disconnect the 12 V battery.

If the absence of voltage is not indicated clearly, contact Technical Support.

Result

» The Check Control message signals that the 48V electrical system has been switched off.

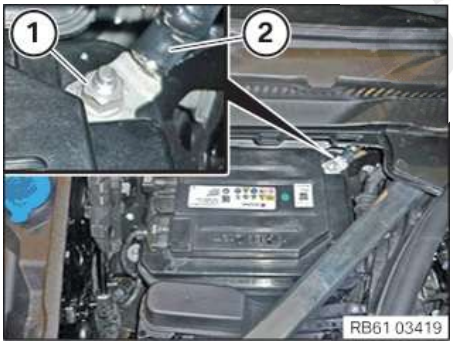
Measure

- Exit PAD mode by pressing the START-STOP button once without depressing the brake pedal.

The work “Disconnecting the negative battery cable of the 48-V battery” can be started.



- Unlock and disconnect plug connection (1) of the CAN bus.
- Release the clip (2).



- Loosen nut (1).
- Pull off negative battery cable (2) of the 48-V battery from the negative battery terminal, set it aside and secure it.



WARNING

Unprotected battery terminals.

Risk of short circuits! Risk of fire!

- Cover the vehicle battery.

- Cover the vehicle battery with the special tool as shown.
- Position the battery earth lead (1) as shown.

5 – Disconnecting all battery earth leads

ardiagn.com



- See additional information.

6 – Removing the wiper arm on the left and right

NOTICE

Description is for left component only. Procedure on the right side is identical.

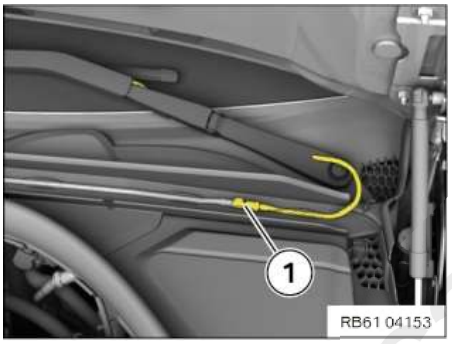
▶ **Remove the wiper arm**

RISK OF DAMAGE

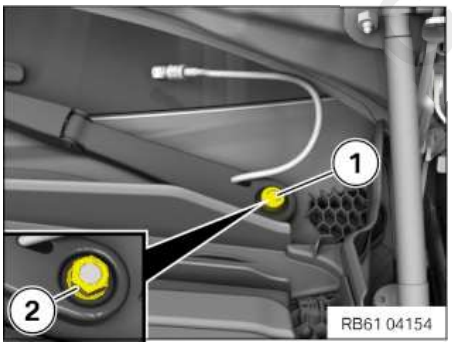
Damage to wiper console.

While removing the wiper arms without using special tool, the wiper console can break.

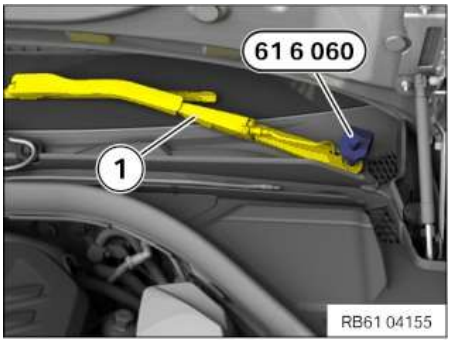
- Removing the wiper arms must be carried out only using the prescribed special tool.
- Do **not** lever off the wiper arm because otherwise the wiper console may break at the predetermined breaking point for active pedestrian protection.



- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.



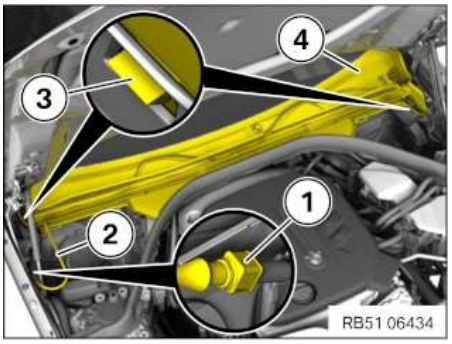
- Remove the protective cap (1).
- Loosen nut (2).



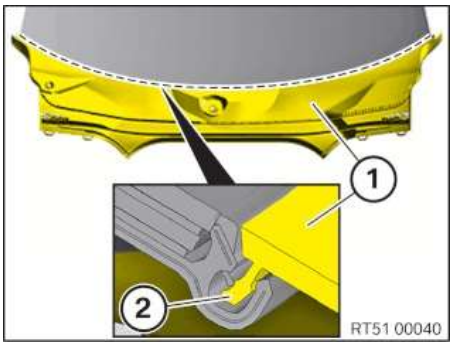
- Pull off the wiper arm (1) using special tool .

7 – Remove cowl panel cover

cardiagn.com



- Release snap fastener (1) of the washer fluid hose (2) and put the washer fluid hose (2) to one side.
- Unclip clips (3) on the cowl panel cover (4).



- Pull the cowl panel cover (1) upward out of the latch mechanism (2) beginning on the side.

8 – Remove the seal for the rear bonnet

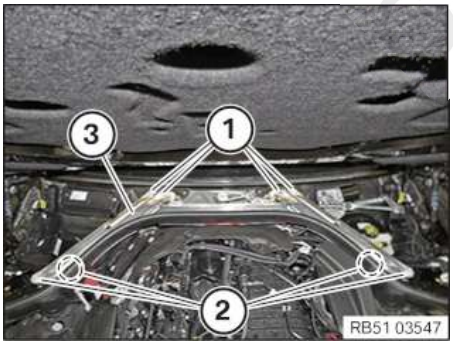


- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

9 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

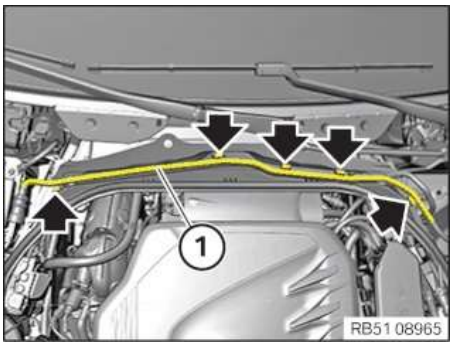
Driving without the strut brace/front-end strut or tension strut is not permitted.



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

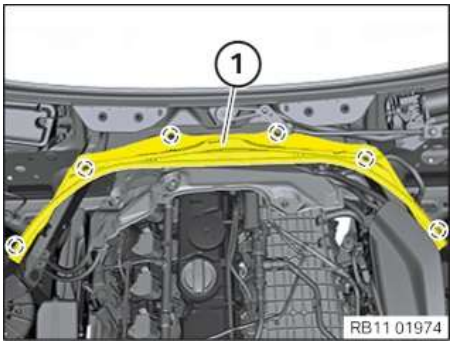
- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.



- **Version with mild hybrid technology:**

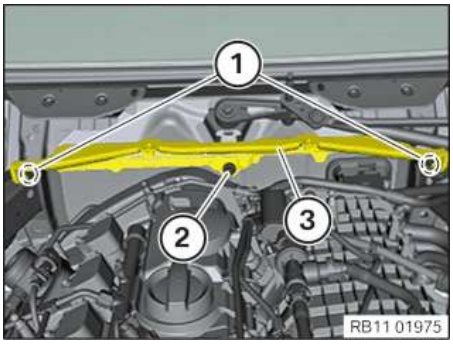
  Unclip the wire (1) at the holders (arrows).

carsdiagn.com



- Unscrew the bolts in the marked areas.
- Remove the centre bulkhead upper part (1).

10 – Removing the centre bulkhead lower section



- Loosen screws (1).
- Loosen nut (2).
- Remove the centre bulkhead lower part (3).

11 – Removing the acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

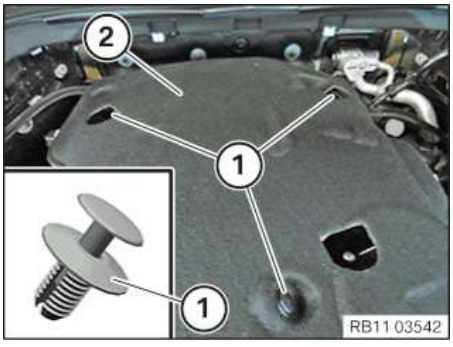
Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



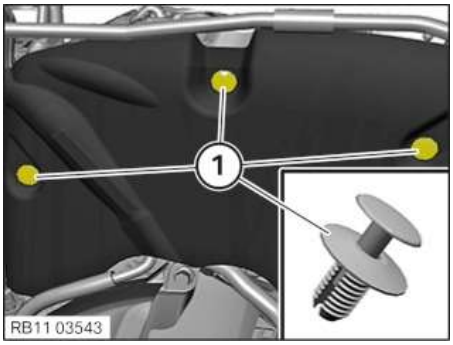
- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

12 – Remove the acoustic cover for the injectors

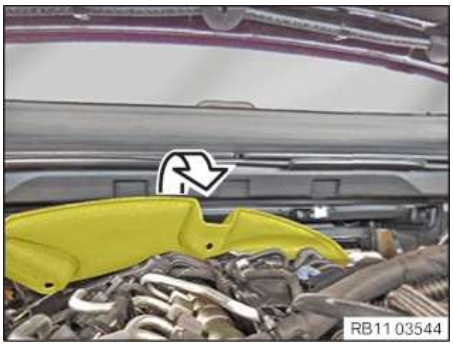


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

13 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).



- Guide out and remove the acoustic cover in the direction of the arrow.

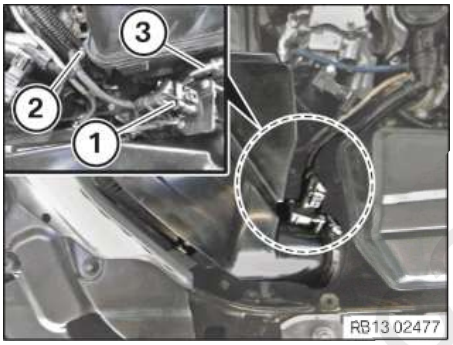
14 – Removing the clean air pipe with the resonator

WARNING

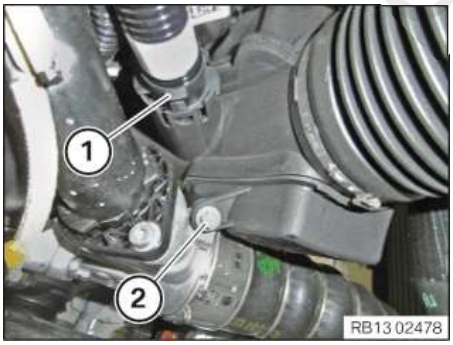
Hot surfaces.

Risk of burning!

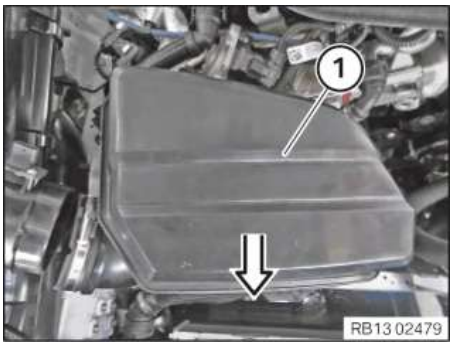
- Perform all work only on components that have cooled down.



- Unlock plug connection (1) and disconnect.
- Loosen clamp (2).
- Unfasten clamp (3).
- Separate the clean air pipe with resonator from the intake filter housing.



- Unlock engine ventilation line (1), disconnect it and place it aside.
- Loosen screw (2).



- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Unlock and loosen clamp (1).



- Feed out and remove clean air pipe with resonator (1) in the direction of the arrow.

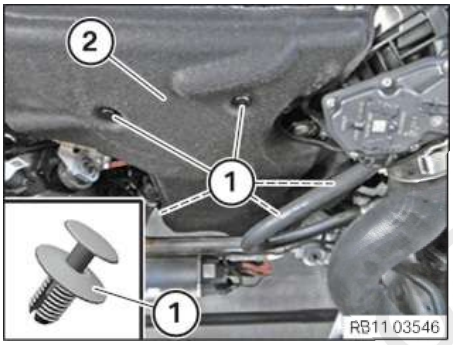
15 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

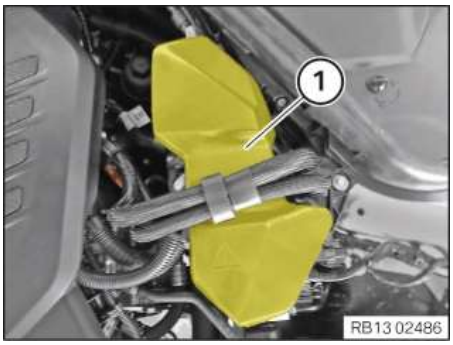
Risk of burning!

- Perform all work only on components that have cooled down.



- Release and remove expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

16 – Remove the cover for the DDE control unit



- Pull off, guide out and remove cover (1) upwards.

17 – Partially releasing the wiring harness section on the intake plenum

cardiagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

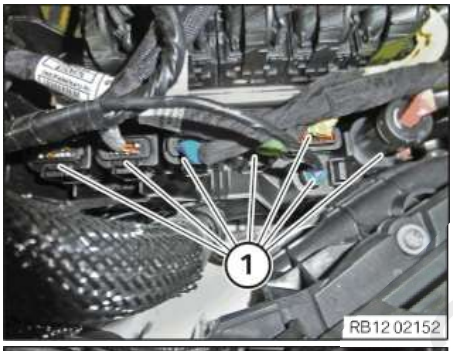
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

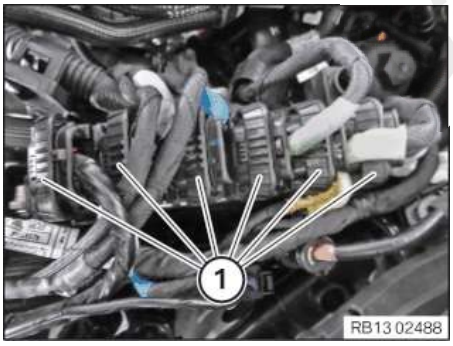
- Do not pull on the wires when disconnecting connectors and plug connections.

TECHNICAL INFORMATION

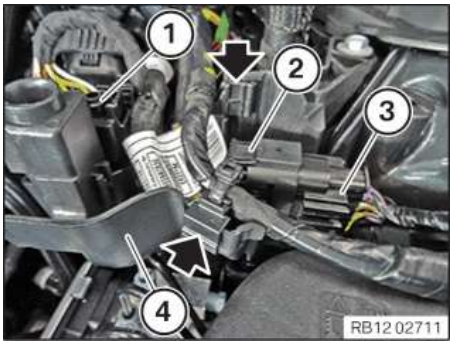
Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.



- Unlock and disconnect plug connections (1).

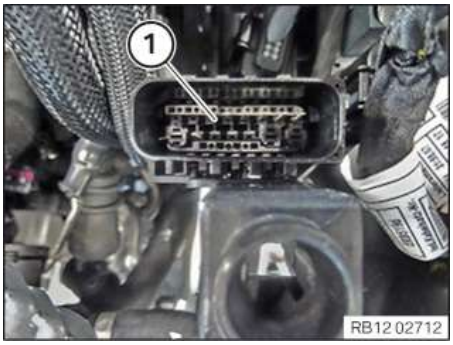


- Unlock and disconnect plug connections (1).

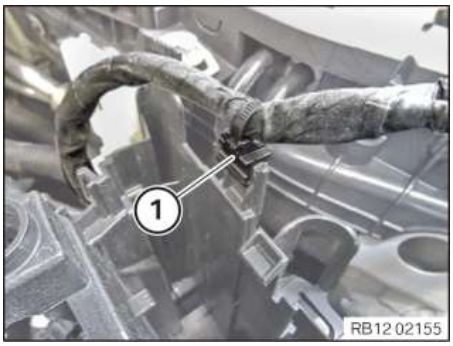


- Unlock plug connection (1) and disconnect.
- Unlock plug connection (2) and disconnect.
- Release the connector (3) and disconnect from the control unit holder (4).
- Release the clamps (arrows).

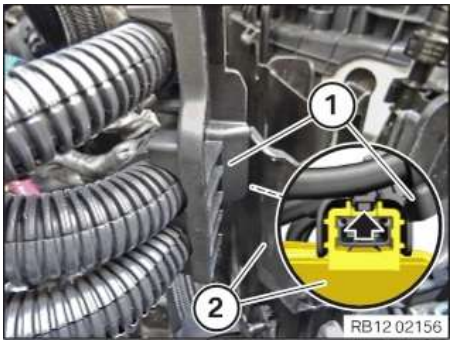
cardiagn.com



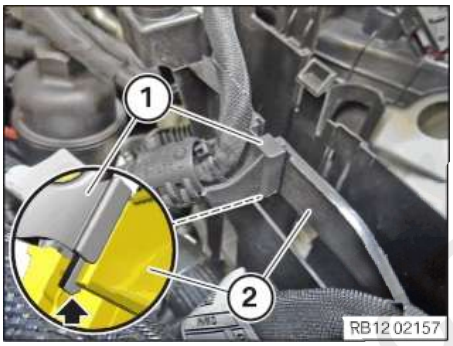
- Unlock plug connection (1) and disconnect.



- Loosen clamp (1).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).

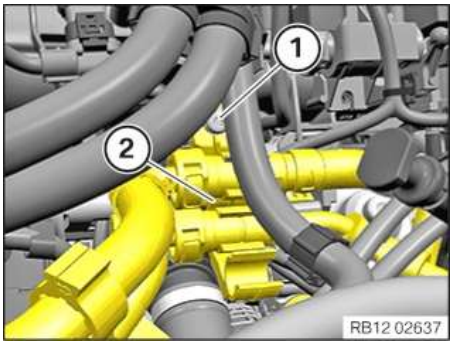


- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.

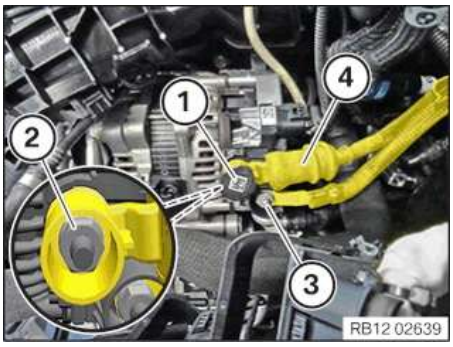


- Unlock holder (1) and feed out coolant line (2) and place it aside.

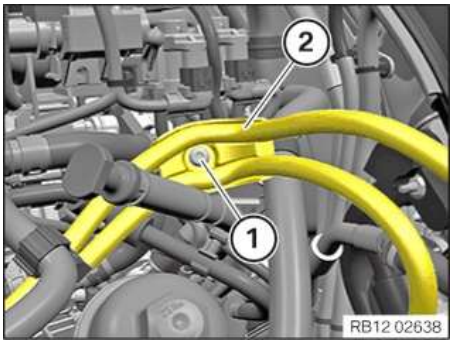
cardiagn.com



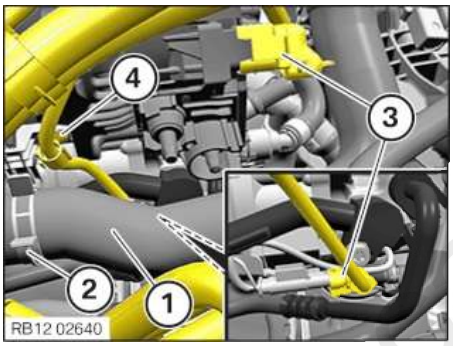
- Release the screw (1).
- Guide out fuel lines (2) and set them aside.



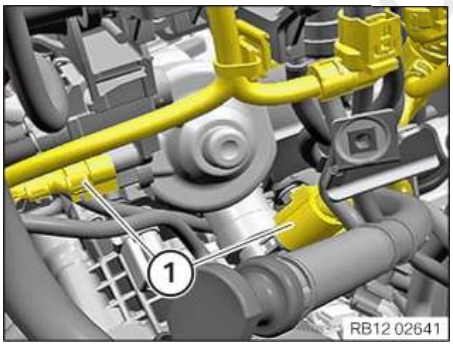
- Guide out and remove the lid (1).
- Release the nuts (2) and (3).
- Feed out positive battery cables (4) and place to one side.



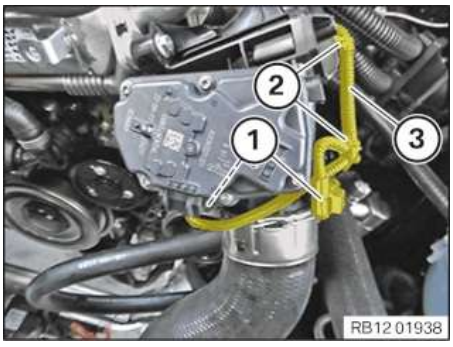
- Release the screw (1).
- Guide out the positive battery cables (2) and set them aside.



- Release the coolant line (1) from the holder (2) .
- Unlock plug connections (3) and disconnect.
- Loosen clamp (4).



- Unlock and disconnect plug connections (1).



- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.

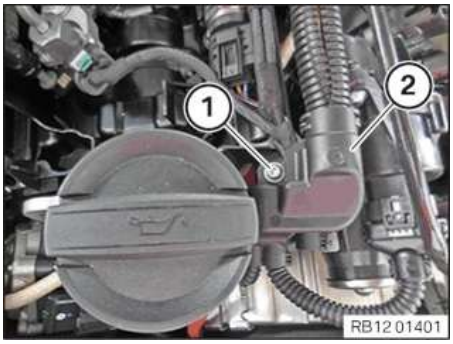
cardiagn.com



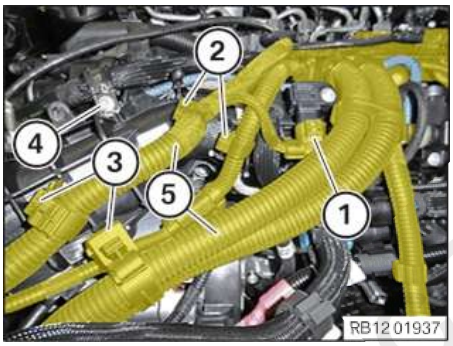
- Unlock and loosen connector (1).



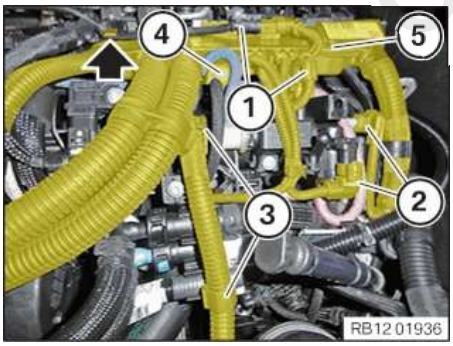
- Unlock plug connection (1) and disconnect.



- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.



- Unlock plug connection (1) and disconnect.
- Loosen clamps (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.



- Unlock and disconnect plug connections (1).
- Release line from clamp (Arrow).
- Unlock and disconnect plug connections (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.

18 – Removing the intake plenum

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

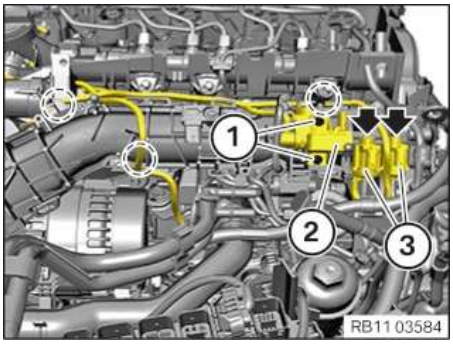
cardiagn.com



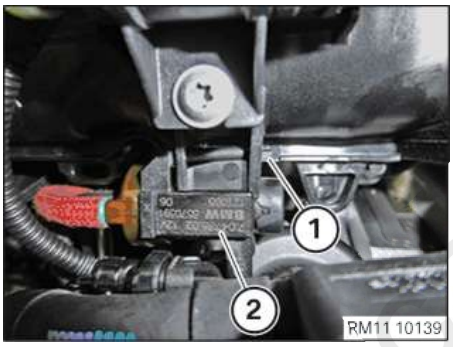
- Unlock clamp (1) and engage in this position.



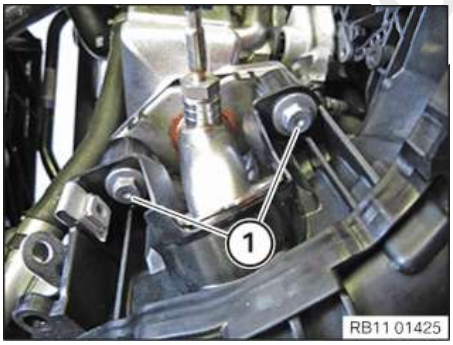
- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.



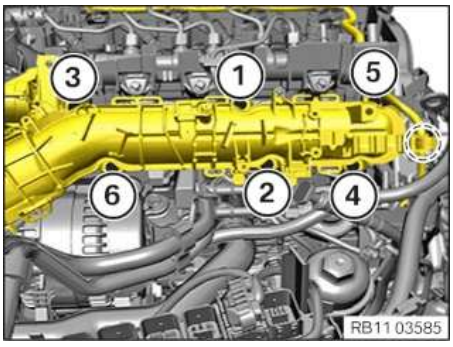
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.

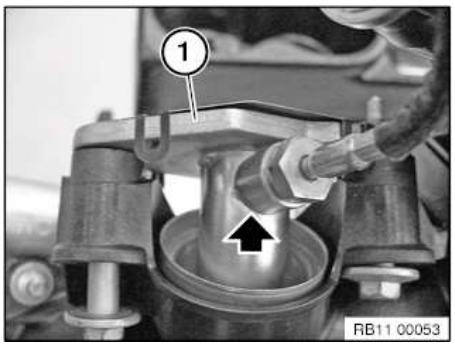


- Loosen screws (1).



- Detach the leakage oil lines in the marked area from the intake plenum.
- Loosen screws in the order (6) to (1).
- Guide the intake plenum out forwards and remove it.

cardiagn.com



- Remove the exhaust-gas recirculation pipe (1) (arrow).

19 – Detaching the leakage oil line from the injectors

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

WARNING

Hot surfaces.

Risk of burning!

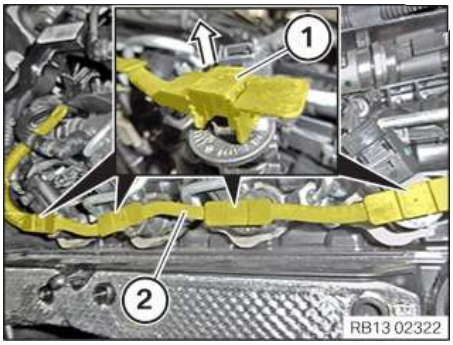
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

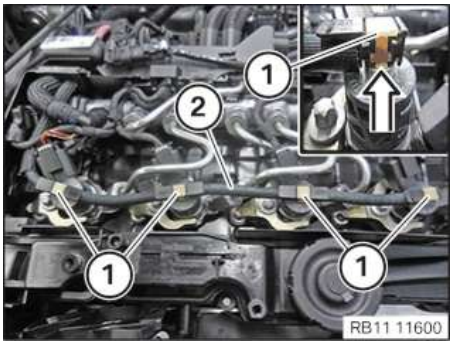


- **Version A:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.



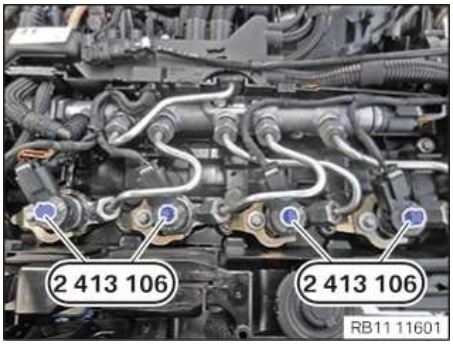
- **Version B:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.

cardiagn.com



- Seal open connections with special tools .

20 – Remove the high pressure lines between the injector and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

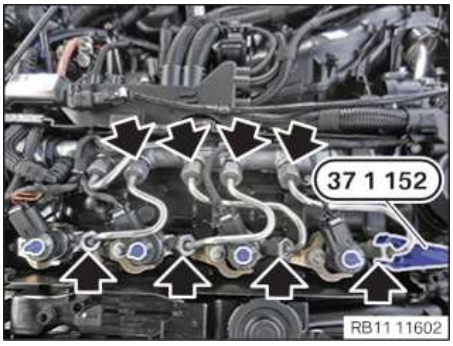
TECHNICAL INFORMATION

If several high pressure lines are removed, ensure that each high pressure line is installed in its original location. Label high pressure lines.

cardiagn.com

TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.



- Release the high pressure lines (arrows) with the special tool .
  Reset the special tool early on to prevent bending of the high pressure line.
- Catch and dispose of escaping fuel.
- Feed out and remove the high pressure lines (arrows).
- Seal off all the open cable connections with the special tool .

21 – Remove the high pressure line between the high pressure pump and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Hot fluids.

Risk of scalding!

- Conduct all work in the vehicle wearing appropriate personal protective equipment only.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

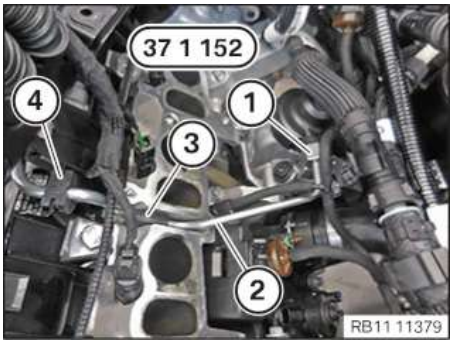
cardiagn.com

TECHNICAL INFORMATION

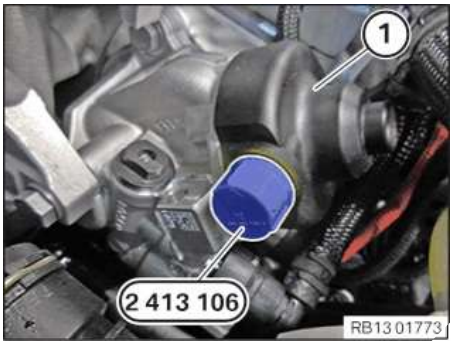
Reset special tool in early to avoid bending pressure lines.



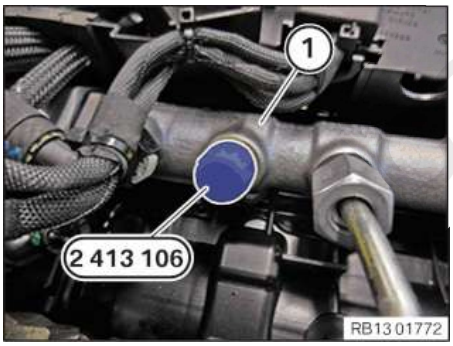
- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.



- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.
- Guide out and remove the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).



- Seal off the opening at the high pressure pump (1) with the special tool .



- Seal off the opening on the rail (1) with the special tool .

22 – Remove high-pressure rail

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

cardiagn.com

RISK OF DAMAGE

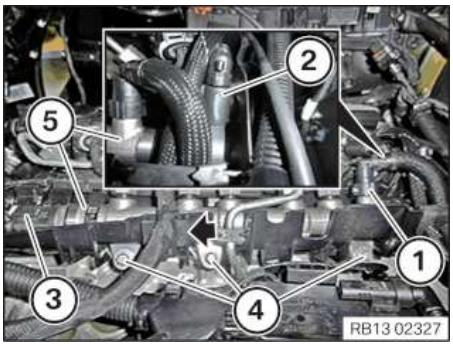
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Unlock and disconnect the fuel return line (1).
- Guide the fuel return line (1) out and set it aside.
- Unlock and disconnect the plug connection (2) on the rail pressure regulating valve.
- Unlock and disconnect the plug connection (3) on the rail pressure sensor.
- Unlock cable clip (Arrow), feed out and place aside.
- Loosen screws (4).
- Thread out and remove the rail (5).

23 – Remove all injection systems

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

cardiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

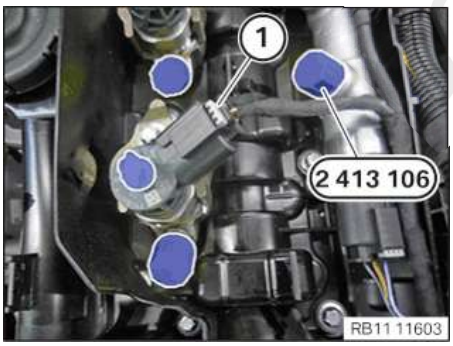
Electrostatic discharge.

Damage to or destruction of electrical components.

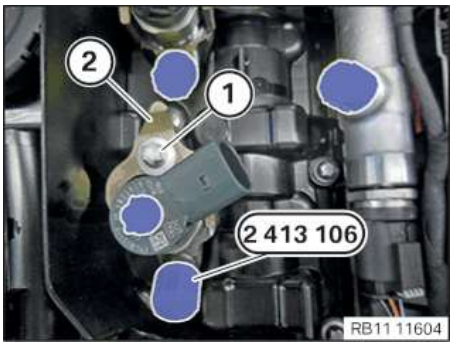
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

TECHNICAL INFORMATION

If several injectors are removed, ensure that each injector is installed at its original location (cylinder). Mark injectors.



- Unlock plug connection (1) and disconnect.



- Loosen screw (1).
- Guide out and remove clamping claw (2).
- Feed out and remove the injector with slight rotational movements.

▸ **Loosen stuck injectors**

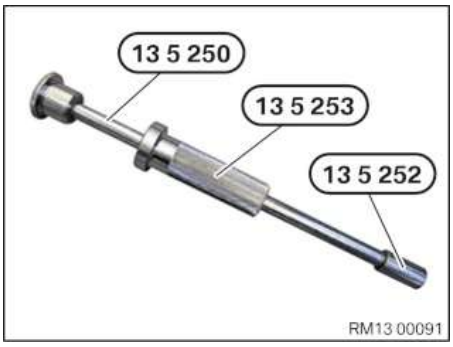
carsdiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

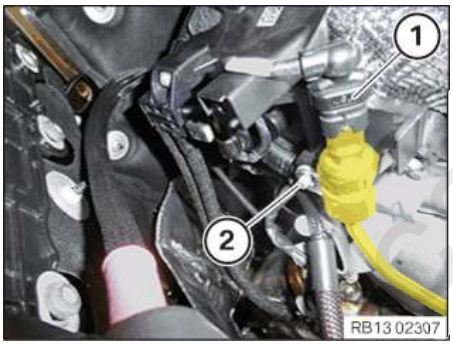


- Unscrew special tool 0 493 339 (13 5 252) from special tool 0 493 321 (13 5 250) and remove special tool 0 493 340 (13 5 253).
- Screw special tool 0 493 339 (13 5 252) back onto special tool 0 493 321 (13 5 250).

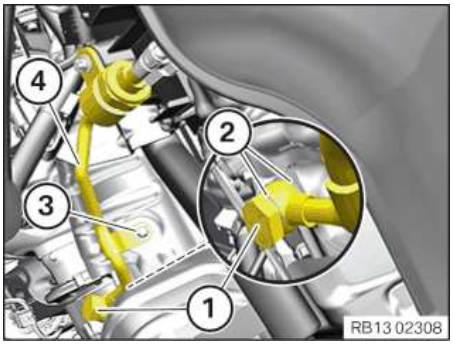


- Screw special tool 0 493 321 (13 5 250) with special tool 0 493 339 (13 5 252) onto pressure line connection (1) of injector.
- Release injector (1) with special tools 0 493 321 (13 5 250) and 0 493 339 (13 5 252) by means of **short** back and forth movements and remove.

24 – Remove the exhaust gas pressure pipe



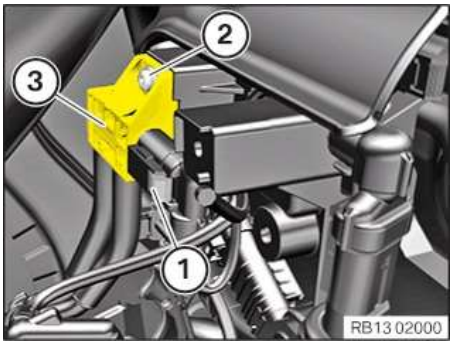
- Unlock plug connection (1) and disconnect.
- Loosen screw (2).



- Unscrew the banjo bolt (1).
- Feed out and remove the sealing rings (2).
- Loosen screw (3).
- Feed out and remove the exhaust gas pressure pipe (4).

25 – Releasing the differential pressure sensor for the diesel particulate filter

cardiagn.com



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).
- Remove the differential pressure sensor (3) and put it to one side.

26 – Removing the sensor bracket on the cylinder head cover

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

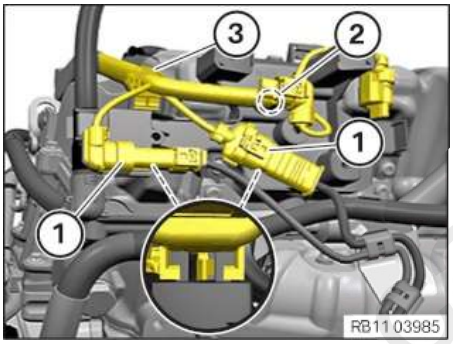
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

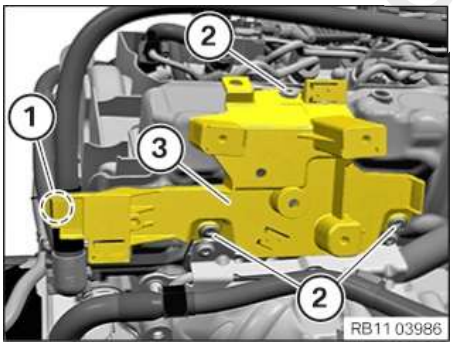
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Unlock plug connection (1) and disconnect.
- Unlock the plug connection (1) and release it from the sensor bracket.
- Release the cable clip in the area (2) from the sensor bracket.
- Release the clamps (3) and set the wiring harness section aside.

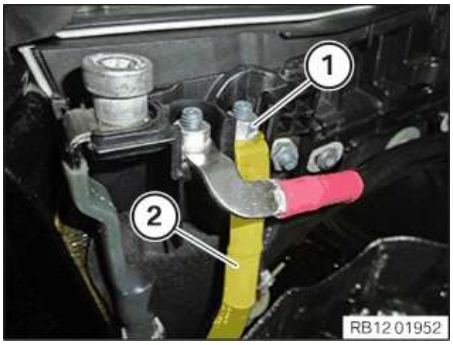


- Release the positive battery cable in the area (1) from the clamp and set it aside.
- Loosen screws (2).
- Feed out holder (3) for the sensor system and remove.

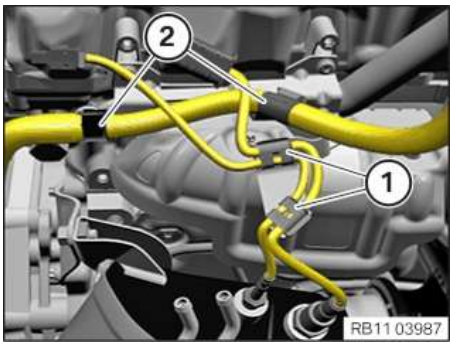


- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.

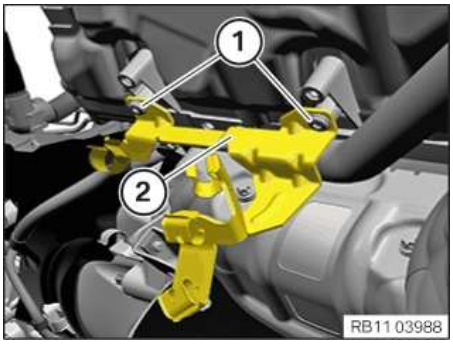
cardiagn.com



- Loosen nut (1).
- Feed out positive battery cable (2) and put to one side.

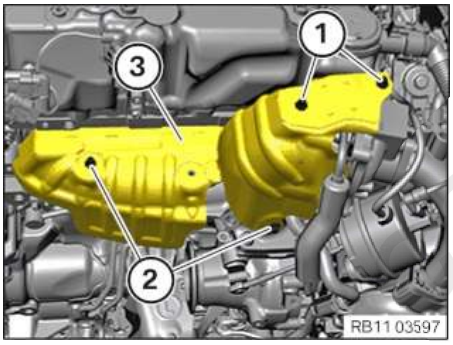


- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



- Loosen screws (1).
- Guide out and remove holder (2).

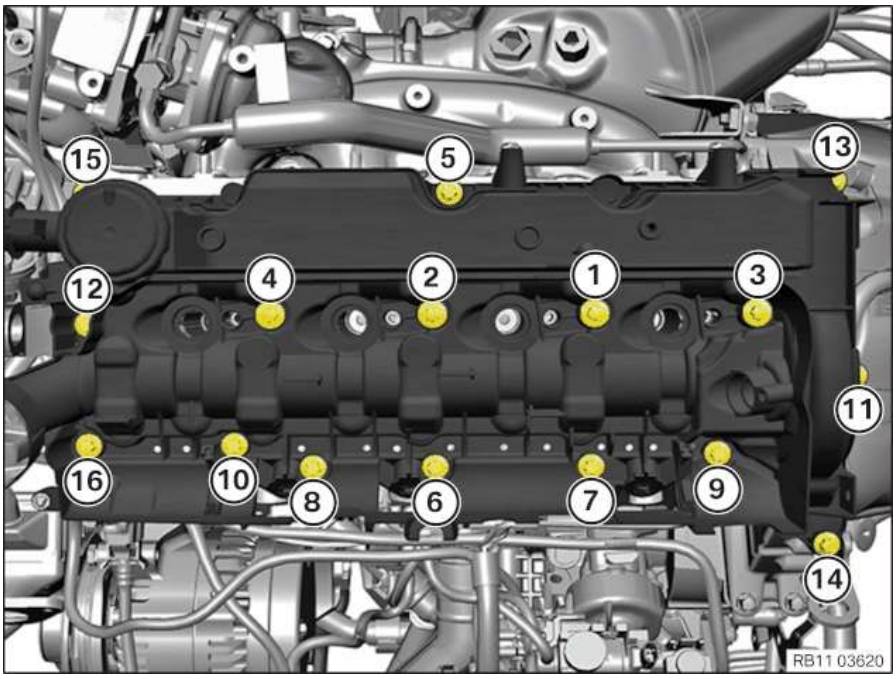
27 – Removing heat shield



- Loosen screws (1).
- Loosen screws (2).
- Feed out and remove the heat shield (3).

28 – Removing the cylinder head cover

Screw connection of the cylinder head cover



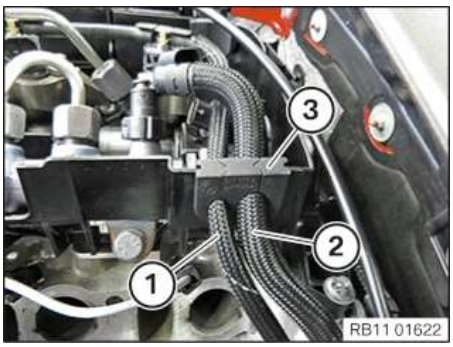
1 - 16 Bolts of the cylinder head cover



- Unlock and detach the locks.
- Feed the engine ventilation line (1) out and set it aside.

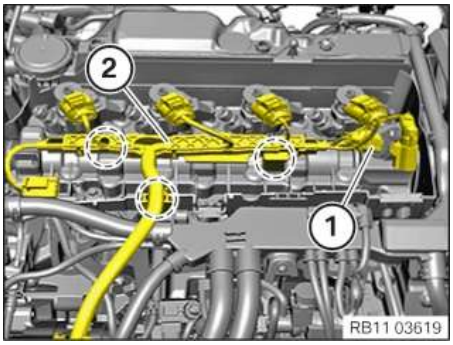


- Feed out and remove the heat shield (1).

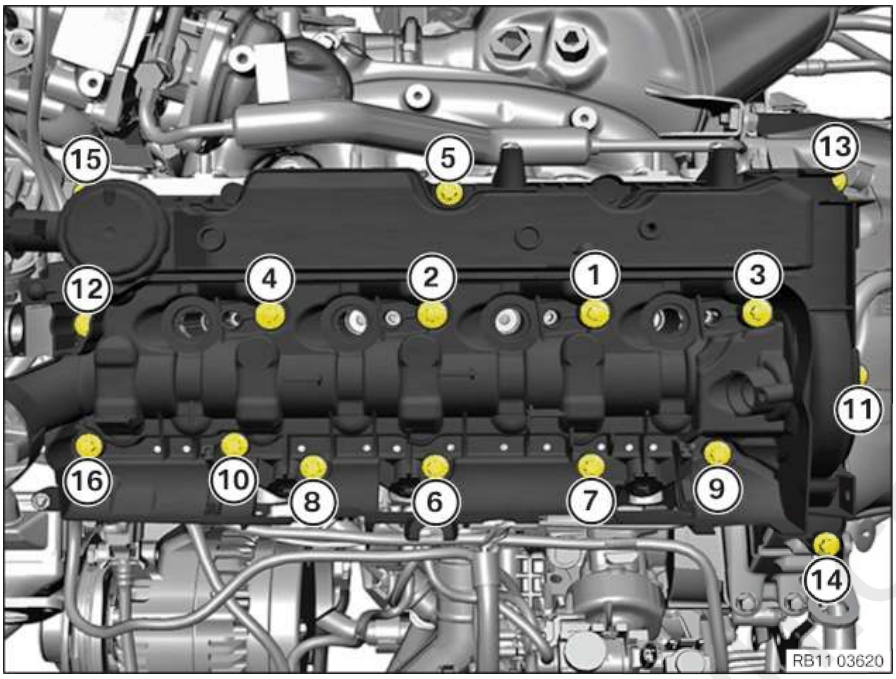


- Remove the leakage oil line (1) including the fuel return line (2) and the grommet (3) and put to one side.

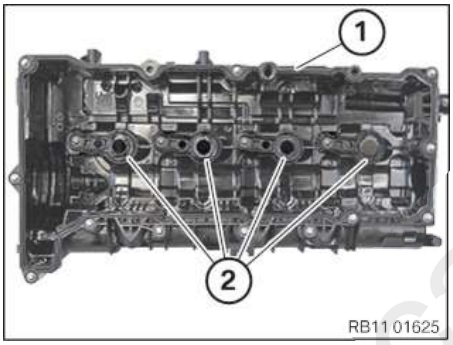
cardiagn.com



- Unlock connector (1) and pull off.
- Disconnect the wiring harness (2) in the marked areas from the cylinder head cover and set aside.

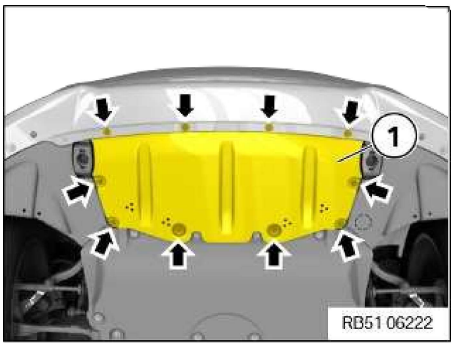


- Evenly loosen the screws in a sequence from (16) to (1).
- Feed out and remove the cylinder head cover.



- Remove the profile seals (1) and (2).

29 – Removing the front underbody protection

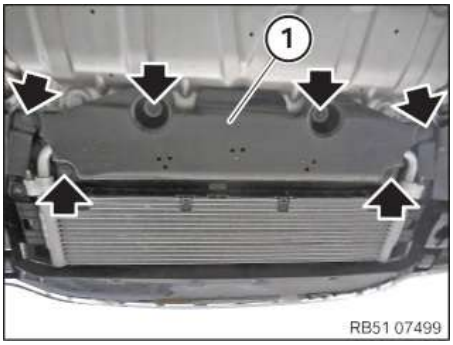


- **Version A:**

  Remove screws (arrows).

  Feed front underbody protection (1) backwards out of the bumper panel.

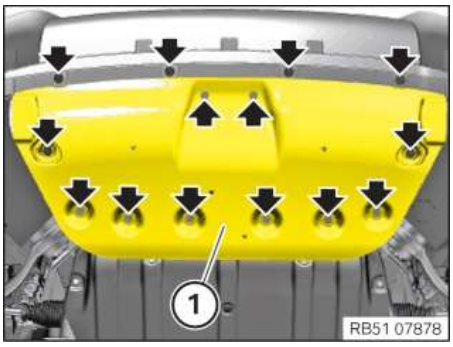
cardiag.com



- **Version B:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

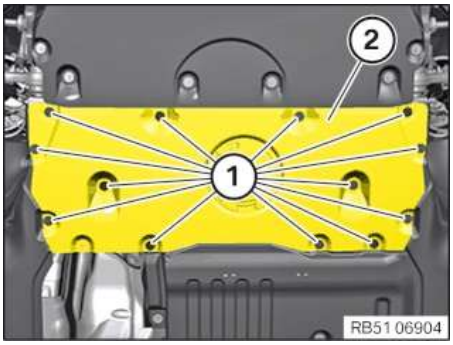


- **Version C:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

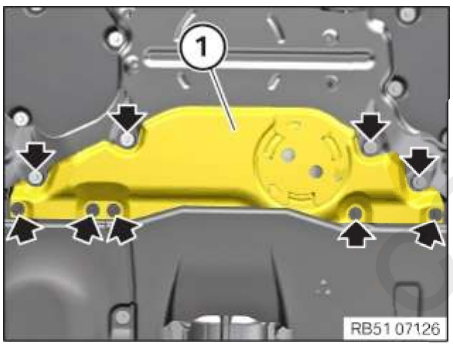
30 – Removing the centre underbody protection



- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .

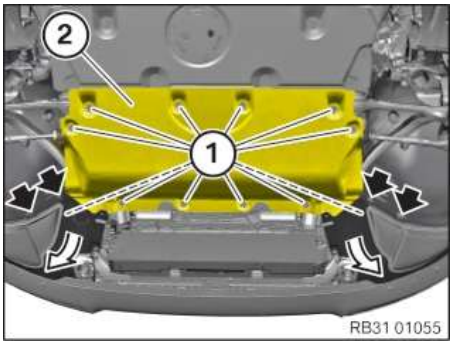


- **Version with all-wheel drive:**

  Remove screws (arrows).

  Feed out and remove the centre underbody protection (1).

31 – Remove the underbody protection of the steering gear



- **Version A:**

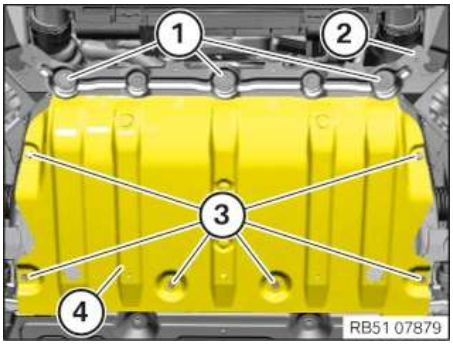
  Unscrew the screws (arrows) of the wheel arch cover on the wheel arch cover.

  Fold the bottom wheel arch cover to the side.

  Loosen screws (1).

  Remove the underbody protection (2) of the steering gear.

carsign.com



- **Version B:**

  Loosen screws (1).

  Remove the holder (2) for the underride protection.

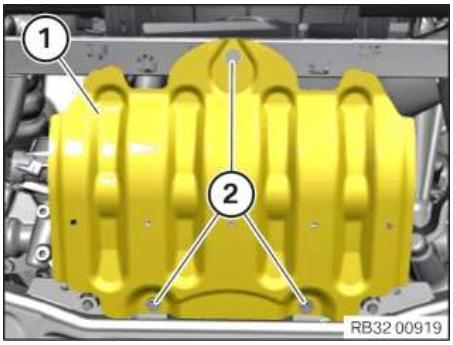
  Loosen screws (3).

  Feed out and remove the underbody protection (4) of the steering gear.

32 – If installed: Removing the steering underbody protection

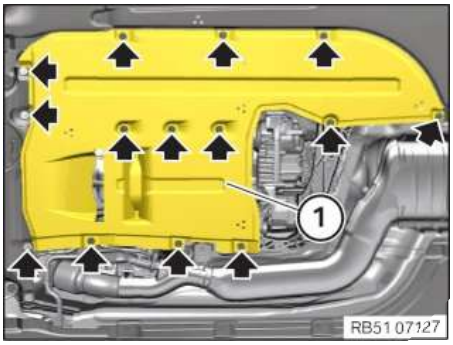
Prerequisite

Front underbody protection has been removed.



- Loosen screws (2).
- Remove underbody protection (1).

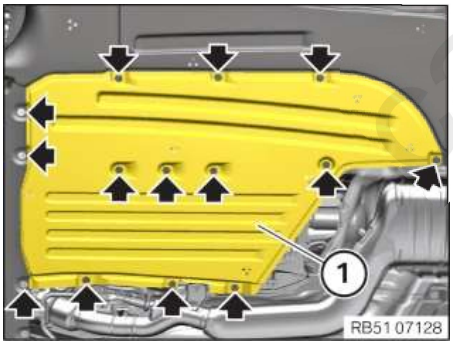
33 – Remove rear underbody protection



- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).



- **Version B:**

  Remove screws (arrows).

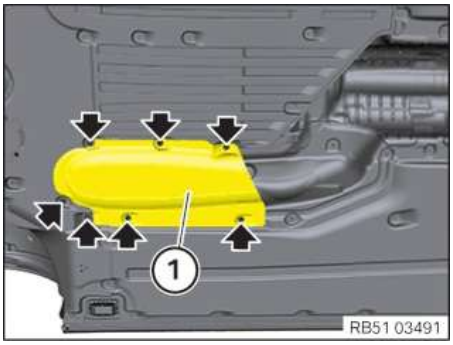
  Guide out rear underbody protection (1) and remove it.

34 – Remove the underbody panelling of the transmission on the side

NOTICE

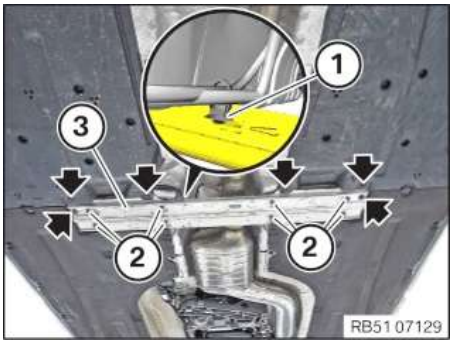
The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

cardiagn.com



- Remove screws (arrows).
- Remove the underbody panelling (1).

35 – Remove the connecting support from the tunnel



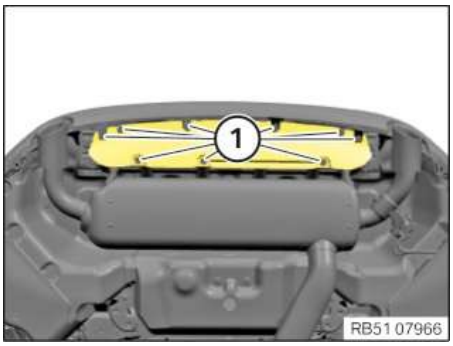
- Remove screws (arrows).

NOTICE

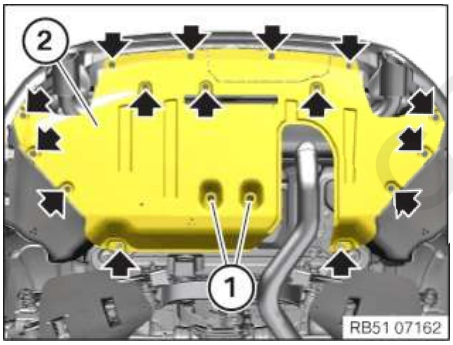
The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Loosen clamp (1).
- Loosen screws (2).
- Guide out and remove connecting support (3) on the tunnel.

36 – Removing the rear diffuser



- **Version 1:**
- Release the screws and nuts (1).
- Remove the diffuser.



- **Version 2:**
- Loosen nuts (1).
- Remove screws (arrows).
- Guide out and remove rear diffuser (2).

37 – Remove exhaust system

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

cardiagn.com

CAUTION

Component with heavy weight.

Danger of injury!

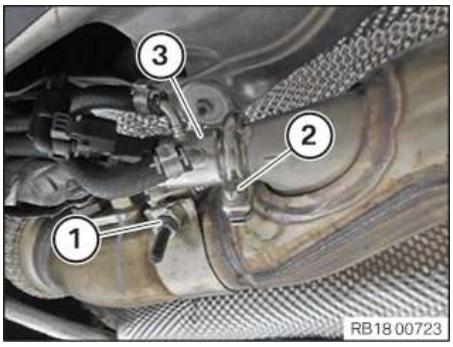
- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

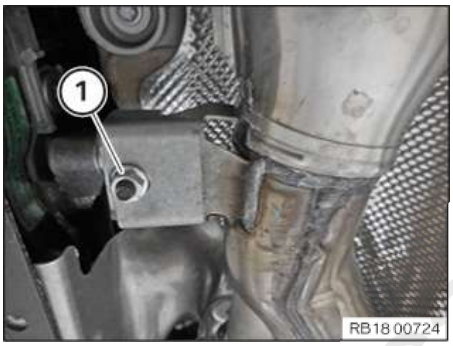
Heavy component.

Heavy components can lead to injury or damage.

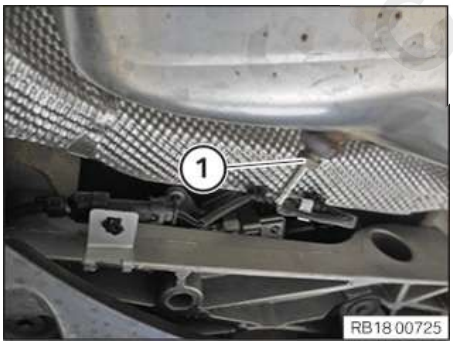
- Remove and install heavy components with the aid of another person/other persons.



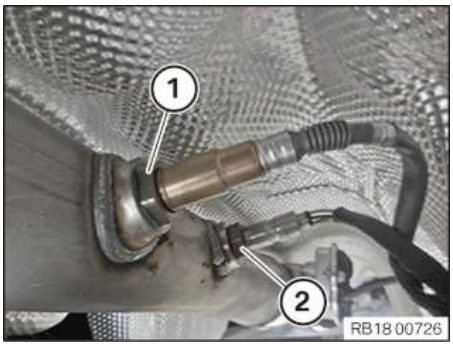
- Unfasten clamp (1).
- Detach the clamp (2) of the SCR metering module (3).
- Detach the SCR metering module (3)from the exhaust system and place to one side.



- Loosen nut (1).

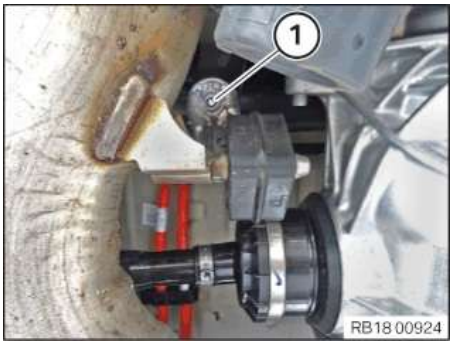


- Detach the exhaust temperature sensor (1) from the exhaust system.

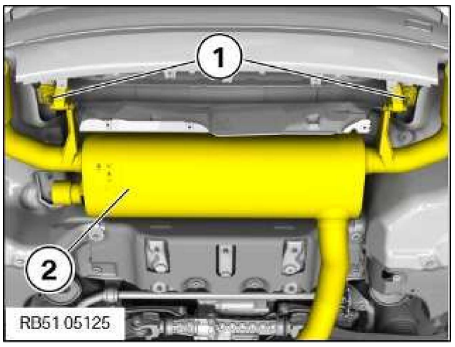


- Release the diesel particulate sensor (1) from the exhaust system and place to one side.
- Release the nitrogen oxide sensor (2) from the exhaust system and place to one side.

cardiagn.com



- Release the nut (1) on the rear axle support.



- Loosen nuts (1).
- Lower and remove the exhaust system (2) with the assistance of a second person.

38 – Removing the monitoring oxygen sensor after the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

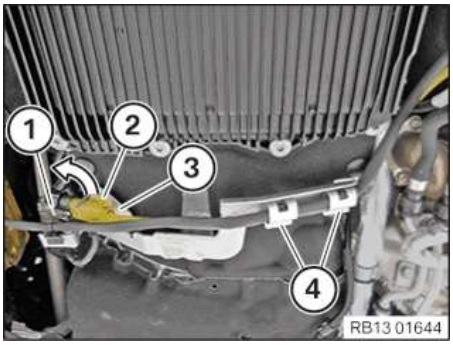
RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
- The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

cardiagn.com



- Unlock and loosen connector (1).
- Loosen connector (2) from the holder (3) in direction of arrow.
- Release the monitoring oxygen sensor from the clamps (4).



- Release the monitoring oxygen sensor (1) with the standard tools.



- Thread out the monitoring oxygen sensor (1) and remove it.

39 – Removing the nitrogen oxide sensor before SCR catalytic converter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

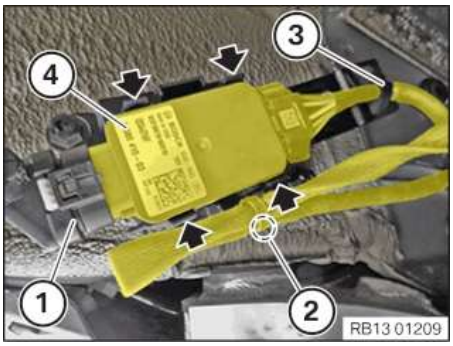
cardiagn.com

RISK OF DAMAGE

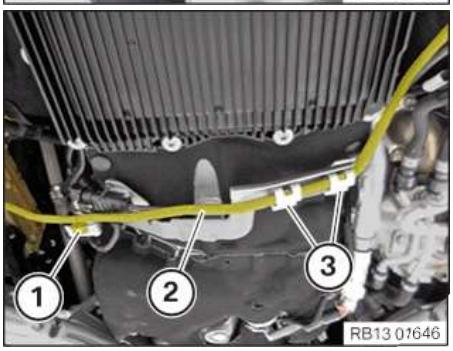
Damage to the nitrogen oxide sensor.

Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

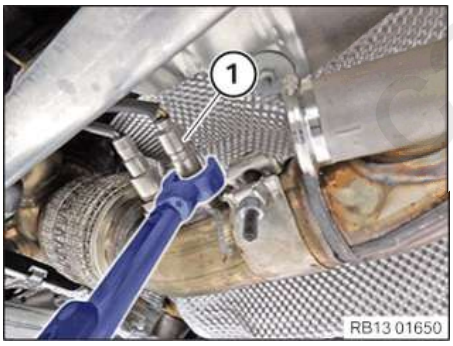
- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



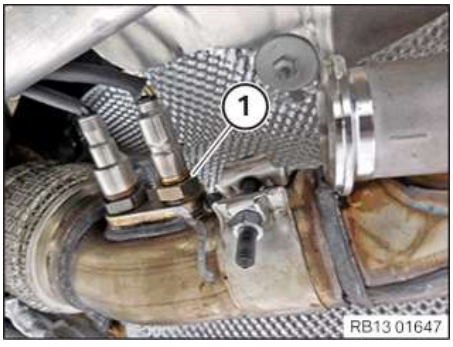
- Unlock plug connection (1) and disconnect.
- Release cable clip in area (2).
- Release line from the holder (3).
- Unclip control unit (4).



- Loosen clamp (1).
- Loosen the cables (2) from the clamps (3).



- Loosen the nitrogen oxide sensor (1) using commercially available tools.



- Feed out and remove the nitrogen oxide sensor (1).

cardiagn.com

WARNING

Hot surfaces.

Risk of burning!

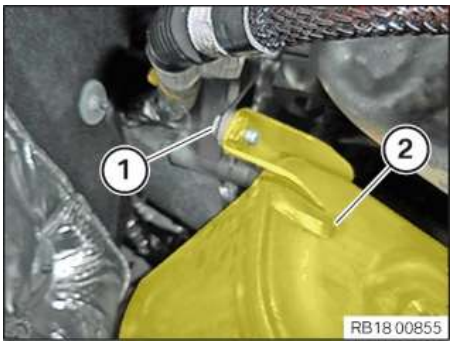
- Perform all work only on components that have cooled down.

CAUTION

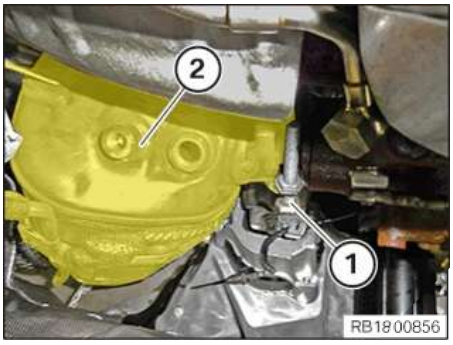
Heavy component.

Heavy components can lead to injury or damage.

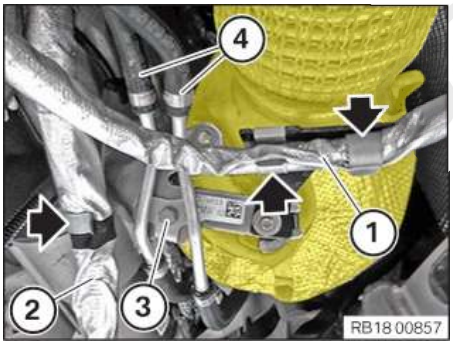
- Remove and install heavy components with the aid of another person/other persons.



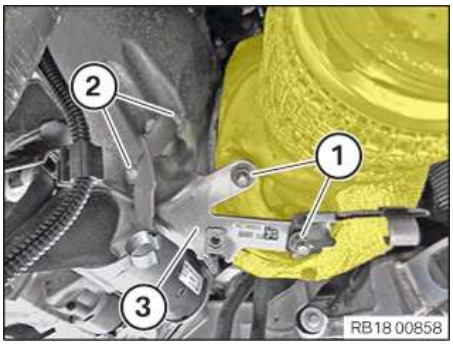
- Release bolt (1) from the holder of diesel particulate filter (2).



- Loosen V-band clamp (1).
- Feed V-clip (1) out from diesel particulate filter (2) and remove.

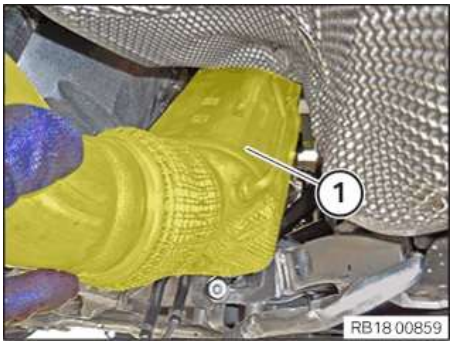


- Release the metering line (1) from clamps (Arrows).
- Release positive battery cable (2) from starter motor from clamp (Arrow).
- Loosen screw (3).
- Thread off coolant line (4) and place to the side.



- Loosen nuts (1).
- Loosen screws (2).
- Guide out and remove holder (3).

cardiagn.com



- Guide out and remove diesel particulate filter (1).

41 – Removing starter motor

Prerequisite

Battery earth leads are disconnected.

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

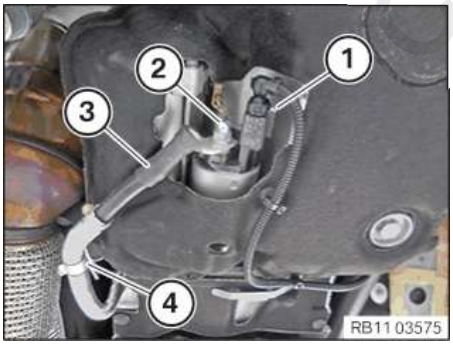
Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

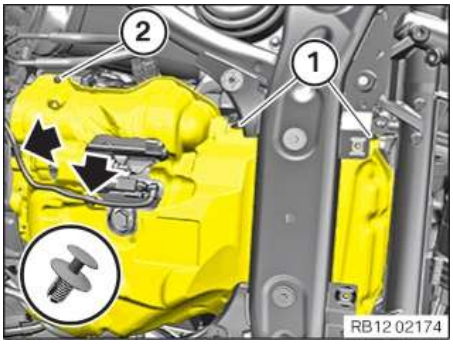
- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

TECHNICAL INFORMATION

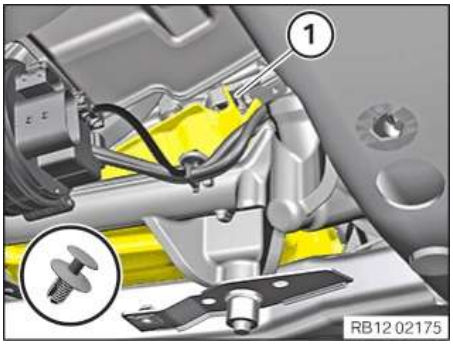
Make sure that the acoustic cover is **not** damaged while removing the starter motor.
A damaged lower acoustic cover can only be renewed when the front axle is lowered.



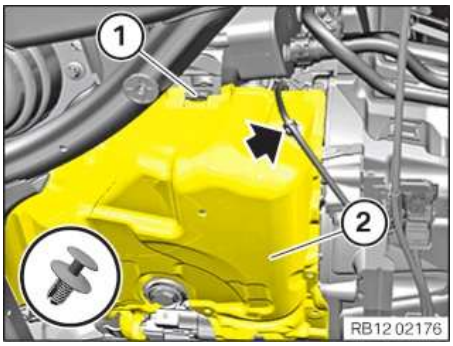
- Unlock plug connection (1) and disconnect.
- Release nut (2).
- Release positive battery cable (3) from holder (4).



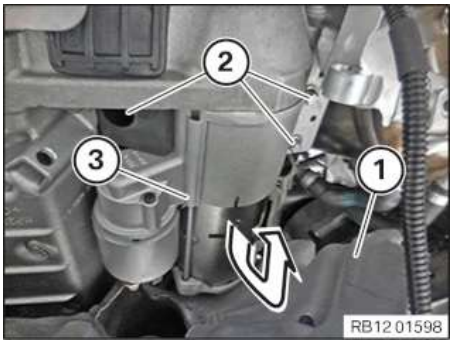
- Loosen the expanding rivet (1).
- Undo fir tree clip (2).
- Release the clamps (arrows).



- Loosen expanding rivet (1).
- Lower the acoustic cover of the oil sump.



- Loosen expanding rivet (1).
- Loosen the clamp (arrow).
- Lower acoustic cover (2).



- Make sure that the acoustic cover (1) is not damaged.
- Carefully press acoustic cover (1) to one side.
- Loosen screws (2).
- Carefully guide out the starter motor (3) in direction of arrow and remove.

42 – Checking camshaft timing



RISK OF DAMAGE

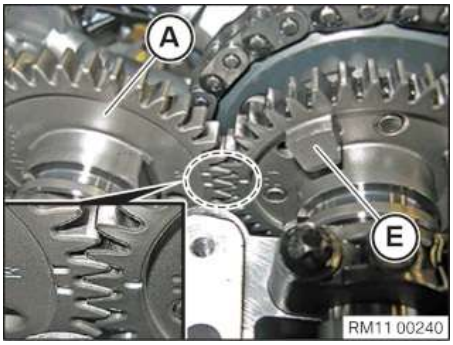
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

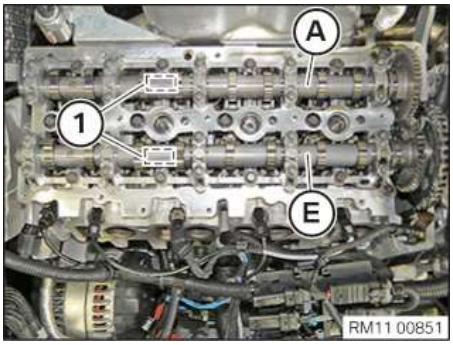
- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

  Do **not** crank the engine in reverse.

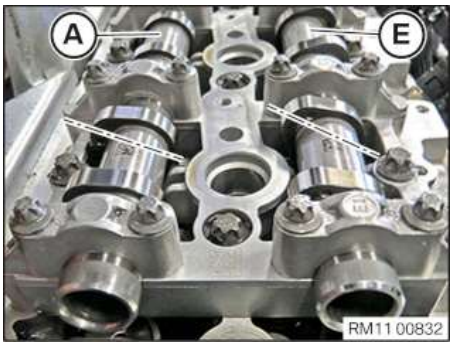


- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.

bardiagn.com



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.

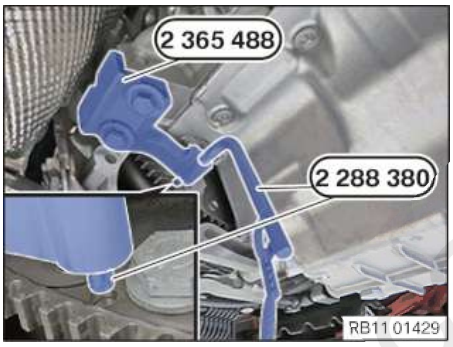


- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

43 – Remove chain tensioner piston

RISK OF DAMAGE

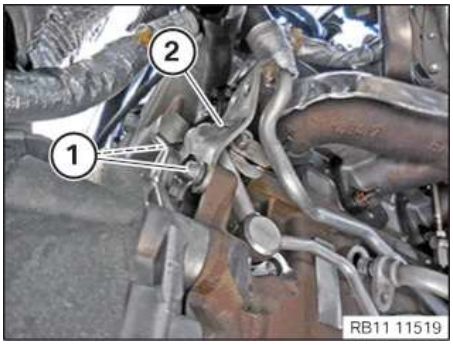
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

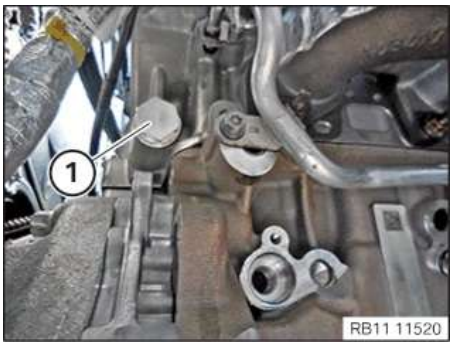
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Loosen screws (1).
- Guide out and remove holder (2).

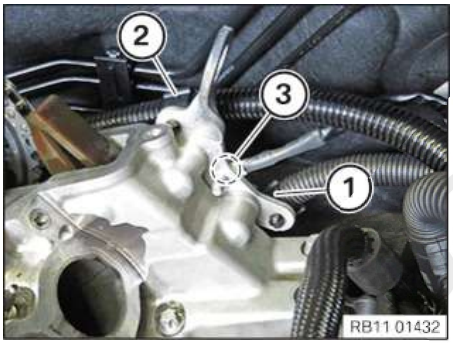


- Loosen the chain tensioner piston (1).
- Catch and dispose of emerging engine oil.

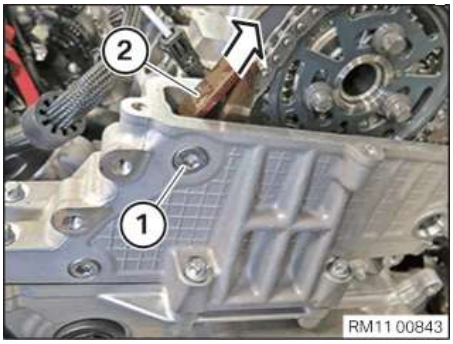


- Feed out and remove the sealing ring (1).

44 – Remove the timing chain guide rail

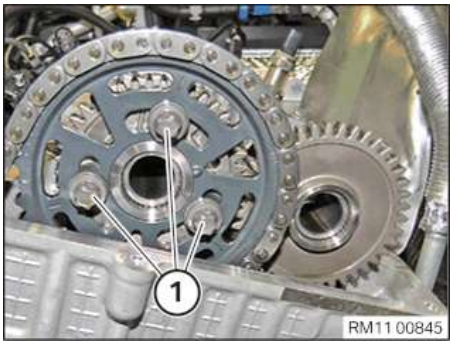


- Loosen the vehicle wiring harness (1) from the bracket.
- Release the positive battery cable (2) from the holder .
- Loosen the screw (3) and remove the grounding cable.



- Remove the bearing journal (1).
- Remove the guide rail (2) in the direction of the arrow.

45 – Removing the camshaft sprocket on the intake camshaft



- Loosen screws (1).
- Secure the drive chain against falling.
- Remove the camshaft sprocket on the intake camshaft.

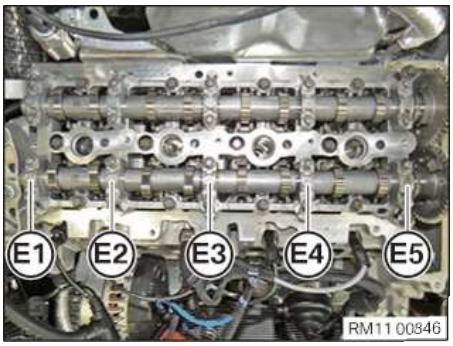
46 – Removing the special tool for fixing the exhaust camshaft



- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

MAIN WORK

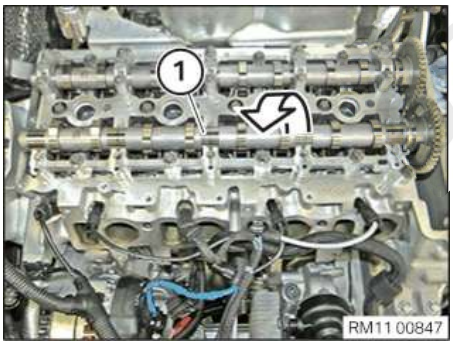
47 – Remove intake camshaft



TECHNICAL INFORMATION

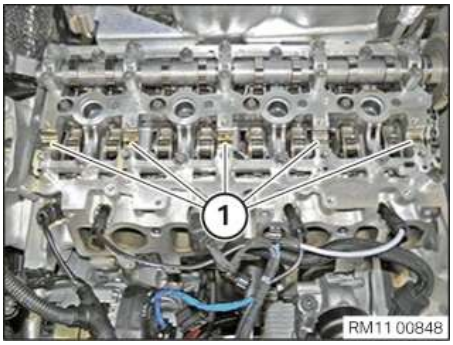
The camshaft is tensioned by the valve springs. Tighten or loosen each screw on the camshaft bearing caps one at a time in the specified sequence and by half a turn only. Repeat procedure.

- Loosen all screws of the intake camshaft bearing caps (E1) to (E5) from the outside towards the inside by 1/2 a turn at a time.
- Place all components on special tool 0 495 105 (11 4 480) in a tidy and orderly fashion.

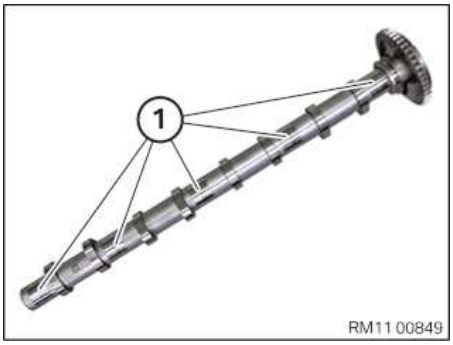


- Remove the intake camshaft (1).

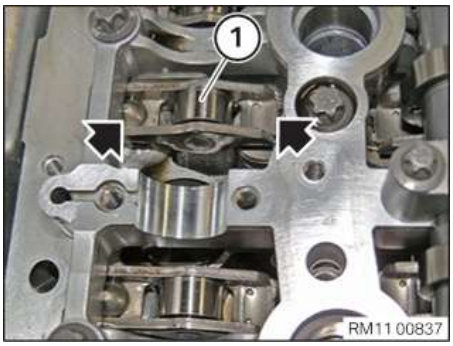
48 – Install intake camshaft



- Oil all bearing positions (1).



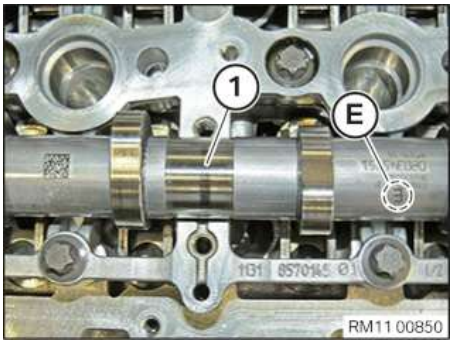
- Oil all the bearing positions (1) of the intake camshaft.



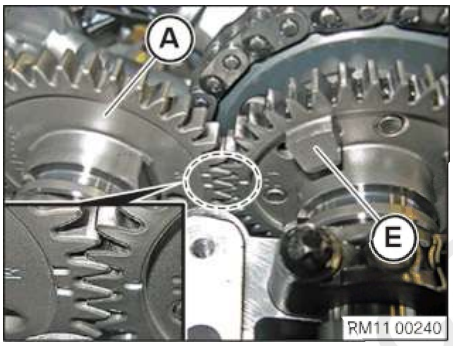
TECHNICAL INFORMATION

The rocker arms may slip slightly when the camshaft is positioned. Make sure rocker arms are correctly positioned on the hydraulic valve clearance compensating elements and on valves.

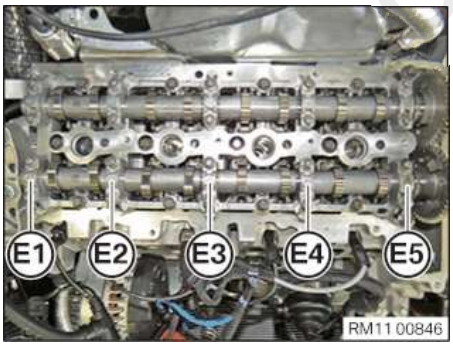
- Check the installation position of the roller cam followers (1).



- Make sure the identification (E) of the intake camshaft points upwards.
- Insert the intake camshaft (1).



- Insert the intake camshaft (A) so that the marks on the camshafts (A) and (E) coincide in the marked area.
- Position the camshafts (A) and (E) correspondingly.



- Tighten all intake camshaft bearing caps (E1) to (E5) from the inside to the outside by 1/2 a turn at a time.

Intake and exhaust camshaft in camshaft support

M6x31		Tightening torque	10 Nm

POSTPROCESSES

49 – Installing the special tool to secure the exhaust camshaft

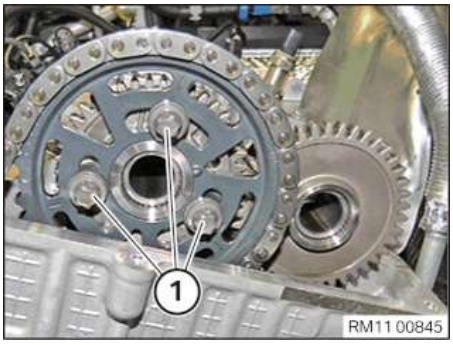
cardiagn.com



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

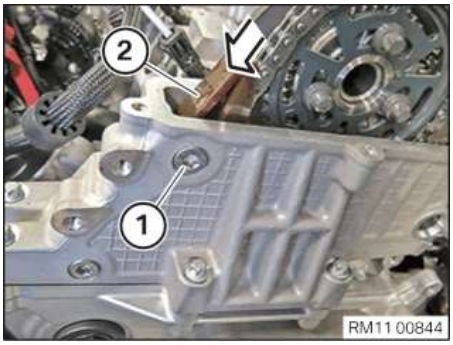
  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.

50 – Installing the camshaft sprocket on the intake camshaft



- Position the drive chain on the camshaft sprocket so that the thread of the screw connections are located in the centre of the elongated holes.
- Position the camshaft sprocket on the intake camshaft.
- Merely apply the screws (1) hand-tight so that the camshaft sprocket can still be moved in relation to the intake camshaft.

51 – Installing the guide rail of the timing chain

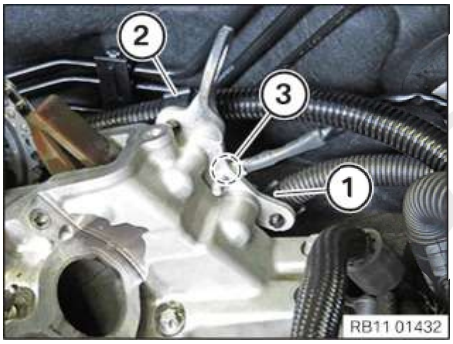


- Position the guide rail (2) in the direction of the arrow.
- Make sure the guide rail (2) is correctly installed at the bottom bearing journal.
- Renew bearing journal (1).

  Parts: Bearing journal
- Tighten the bearing journals (1).

Bearing journal to cylinder head

M16x1.5	Replace bearing journal.	Tightening torque	20 Nm



- Position the grounding cable and tighten the screw (3).

Standard screw connection M8

M8		Tightening torque	19 Nm

- Clip in the positive battery cable (2) into the bracket.
- Clip in the vehicle wiring harness (1) into the bracket.

52 – Installing the chain tensioner piston



TECHNICAL INFORMATION

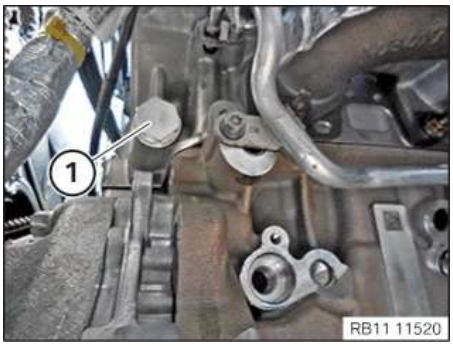
The oil chamber must be drained for reuse of the chain tensioner.

- Place the chain tensioner on a level support pad and slowly compress in the direction of arrow.
- Repeat process twice.



- Renew sealing ring (1).

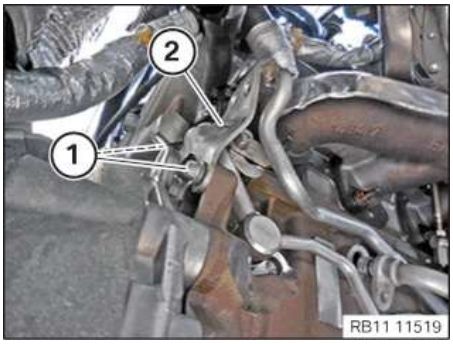
  Parts: Sealing ring
- Insert and install the sealing ring (1).



- Insert and install the chain tensioner piston (1).
- Tighten the chain tensioner piston (1).

Chain tensioner piston to cylinder head

22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

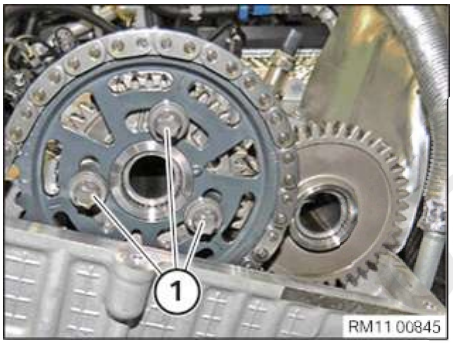


- Insert and install the holder (2).
- Tighten the screws (1).

Holder to crankcase

M8X16		Tightening torque	19 Nm

53 – Tightening the camshaft sprocket on the intake camshaft



- Tighten the screws (1).

Camshaft sprocket to camshaft

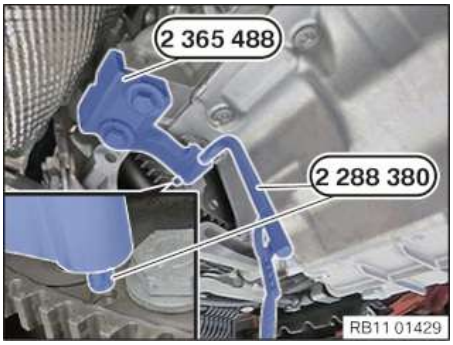
M7x17.			17 Nm

54 – Removing the special tool for fixing the exhaust camshaft



- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

55 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

56 – Checking camshaft timing



RISK OF DAMAGE

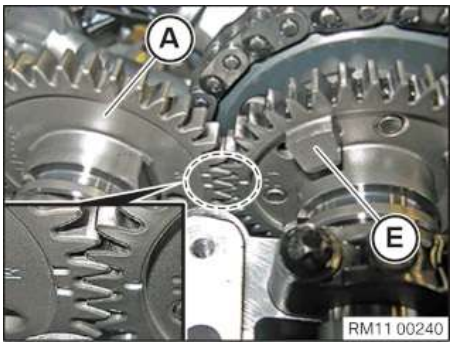
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

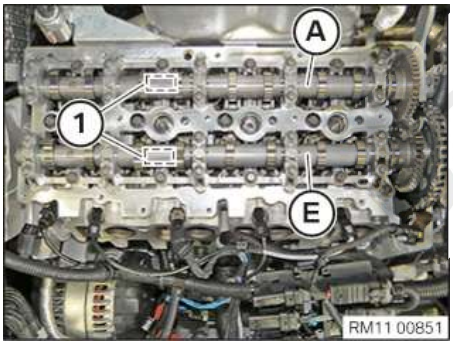
- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

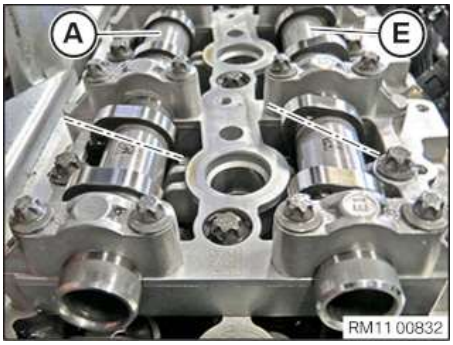
  Do **not** crank the engine in reverse.



- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.



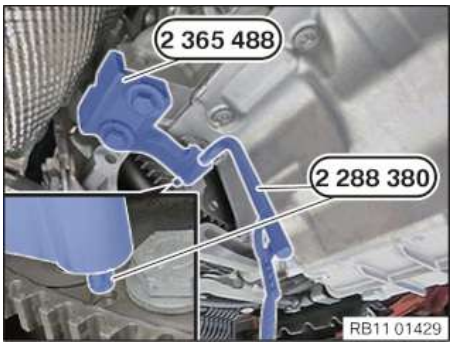
- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.

cardiagn.com



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

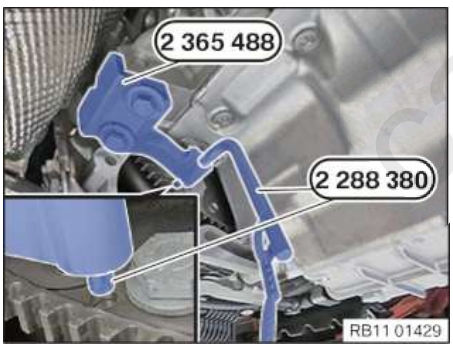
- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

57 – Removing the special tool for fixing the exhaust camshaft



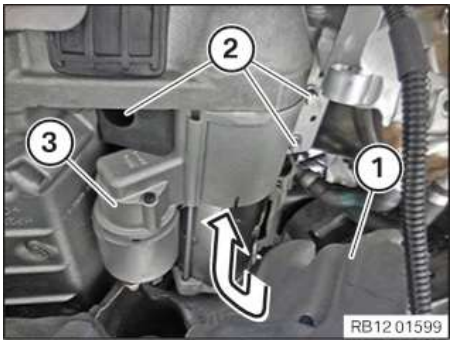
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

58 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

59 – Installing starter motor

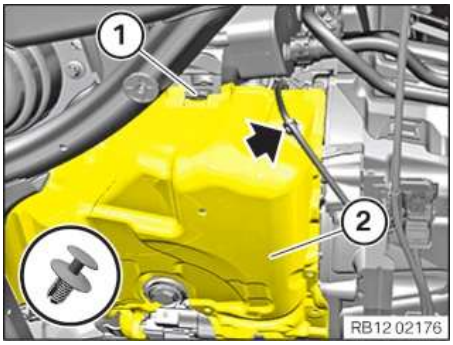


- Make sure that the acoustic cover (1) is not damaged.
- Carefully press the acoustic cover (1) to one side.
- Feed in and install the starter motor (3) in the direction of the arrow.
- Tighten the screws (2).

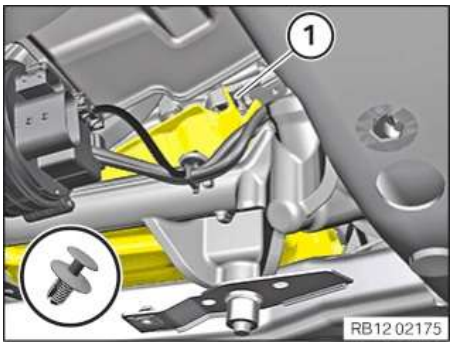
Starter motor to engine

M8X60		Tightening torque	19 Nm

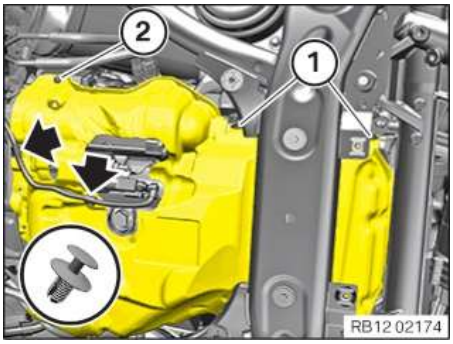
cardiagn.com



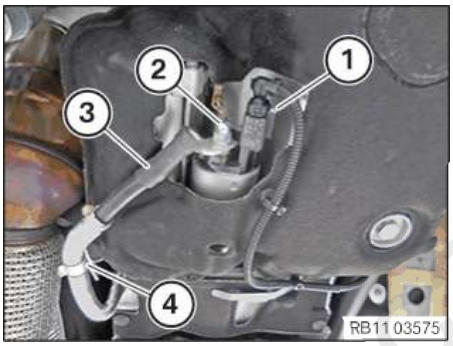
- Position the acoustic cover (2).
- Fasten expanding rivet (1).
- Secure clamp (arrow).



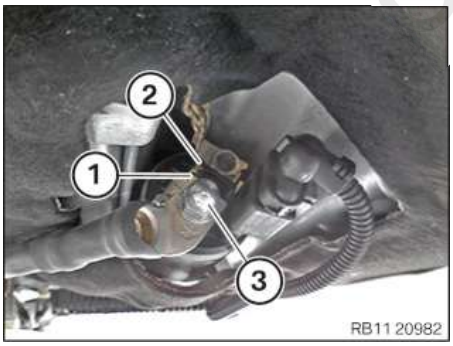
- Fasten expanding rivet (1).



- Secure fir tree clip (2).
- Secure expanding rivet (1).
- Secure the clamps (arrows).



- Fasten positive battery cable(3) in holder (4) and position it on the starter motor.
- Tighten the nut (2) hand-tight.
- Connect the connector (1) and audibly lock it.



CAUTION

Improper routing of the positive battery cable.

Risk of short circuits!

- Route the positive battery cable without abrasions and do not trap.

- Attach the positive battery cable (1) **correctly** to anti-twist lock (2).
- Tighten nut (3).

Battery positive lead to starter

M8		Tightening torque	13,5 Nm

60 – Prepare for the installation of the diesel particulate filter

cardiagn.com



- Renew the V-clip (1).

  Parts: V-band clamp



- Renew gasket (1).

  Parts: Gasket

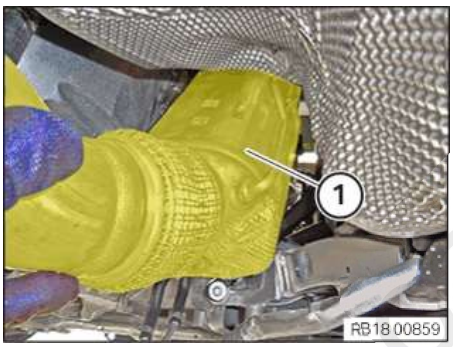
61 – Installing the diesel particulate filter

CAUTION

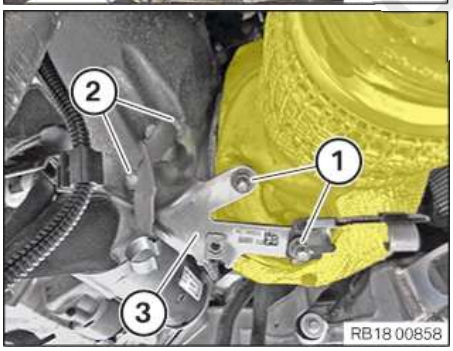
Heavy component.

Heavy components can lead to injury or damage.

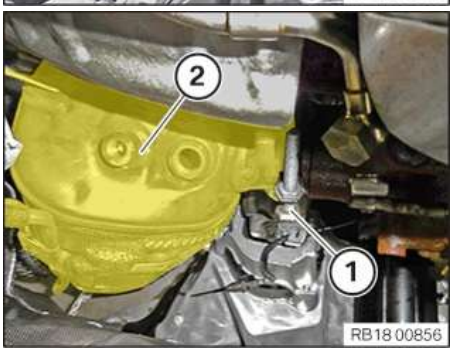
- Remove and install heavy components with the aid of another person/other persons.



- Insert and install the diesel particulate filter (1).



- Insert and install the holder (3).
- **Hand-tighten** the bolts (2).
- Apply the nuts (1) **hand-tight**.



- Renew the V-clip (1).

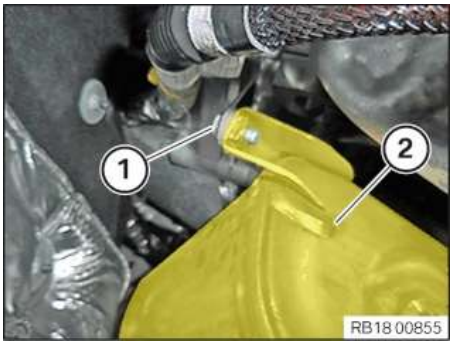
  Parts: V-band clamp

- Feed in and install V-band clamp (1).

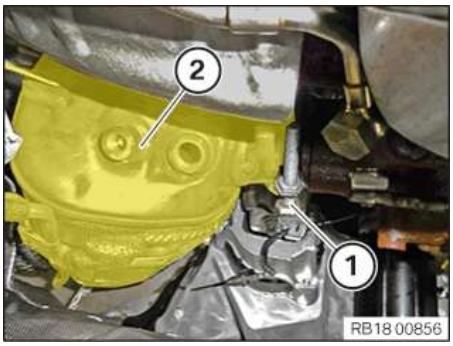
Note: Make sure that the seal between the diesel particulate filter and the exhaust turbocharger is installed correctly.

- Position the diesel particulate filter (2) on the exhaust turbocharger .
- Position V-clip (1).
- Apply the V-clip (1) **hand-tight**.

cardiagn.com



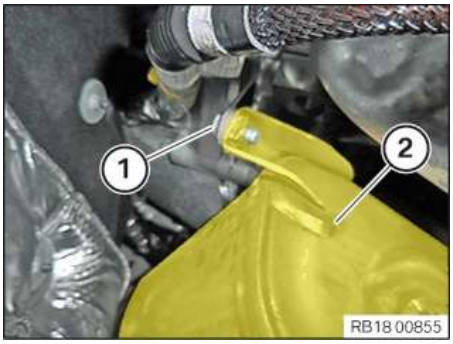
- Feed in screw (1) on the holder of the diesel particulate filter (2) and tighten **hand-tight**.



- Tighten the V-clip (1) of the diesel particulate filter (2).

Diesel particulate filter V-clip to exhaust turbocharger

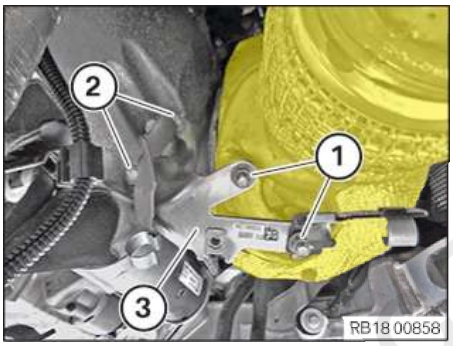
V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm



- Tighten the bolt (1) on the bracket of the diesel particulate filter (2).

Bracket to diesel particulate filter top

M8		Tightening torque	19 Nm



- Tighten the screws (2) on the holder (3).

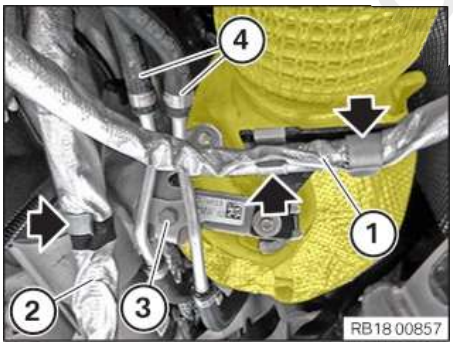
Bracket to transmission for diesel particulate filter holder bottom

M8X20	Tightening torque	19 Nm

- Tighten the nuts (1) on the holder (3).

Lower holder to diesel particulate filter

M8	Tightening torque	19 Nm



- Thread in and install coolant line (4).
- Tighten down screw (3).

Coolant lines for SCR metering module

M6X16	Tightening torque	8 Nm

- Secure the positive battery cable (2) of the starter motor at the clamp (arrow).
- Fasten the metering line (1) on the clamps (arrows).

62 – Installing the nitrogen oxide sensor upstream of SCR catalytic converter

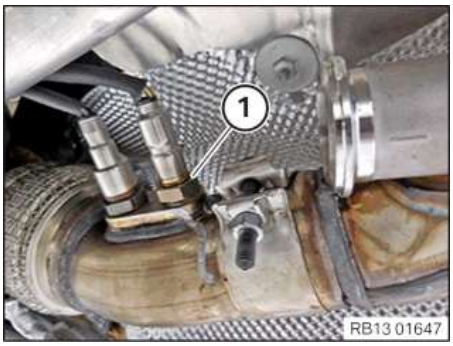
carlign.com

RISK OF DAMAGE

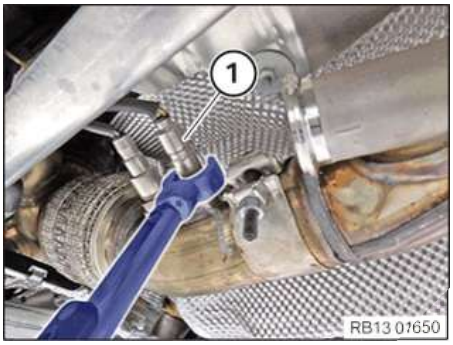
Damage to the nitrogen oxide sensor.

Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
- The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



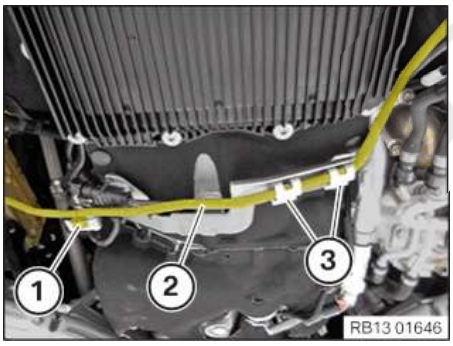
- Feed in and install the nitrogen oxide sensor (1).



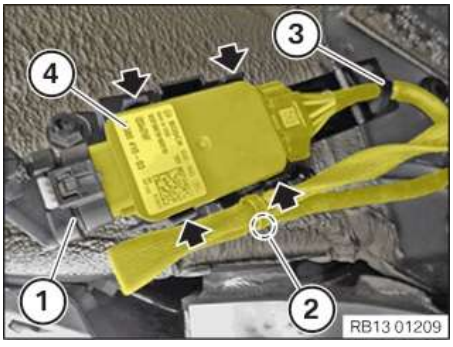
- Tighten the nitrogen oxide sensor (1) using commercially available tools.

Nitrogen oxide sensor before SCR catalytic converter

Sensor		Tightening torque	50 Nm



- Secure the cables (2) to the clamps (3).
- Secure clamps (1).



- Clip in the control unit (4) (arrows).
- Fasten the cable in the holder (3).
- Secure the cable holder (2).
- Plug in the connector (1) and lock audibly.

63 – Installing the monitoring oxygen sensor after the diesel particulate filter

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

TECHNICAL INFORMATION

New oxygen sensors are to be greased lightly and evenly on the thread.

For oxygen sensors that are reused, the following should be observed:

Lightly and evenly grease the oxygen sensor only on the thread. Do not clean and grease that part of the oxygen sensor which protrudes in the exhaust branch (sensor ceramics).

For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



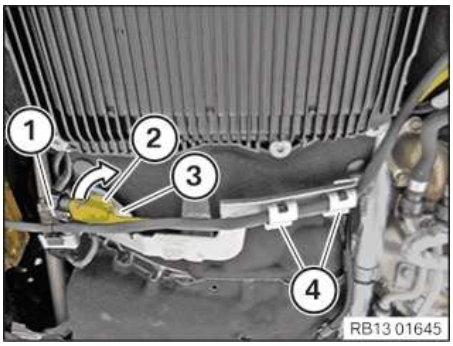
- Insert the monitoring oxygen sensor (1) and install it.



- Tighten the monitoring oxygen sensor (1) with standard tools.

Monitoring oxygen sensor

Sensor		Tightening torque	50 Nm



- Fasten the monitoring oxygen sensor to the clamps (4).
- Secure the connector (2) on the holder (3) in direction of arrow.
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

cardiagn.com

CAUTION

Component with heavy weight.

Danger of injury!

- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

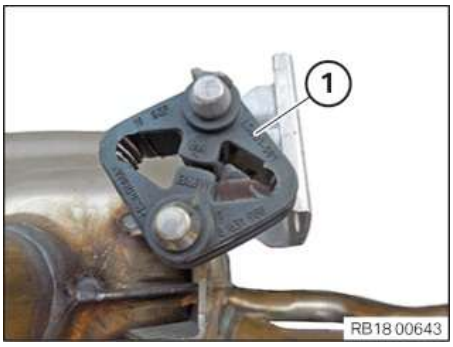
Heavy component.

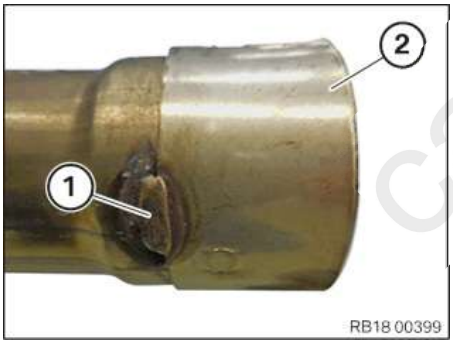
Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

TECHNICAL INFORMATION

Mount the exhaust system in voltage-free state, maintaining the tightening sequence from the rear silencer towards the exhaust manifold.





NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

- Check all the rubber mounts (1) of the exhaust system for damage.
- Replaced damaged rubber mounts.

  Parts: Rubber mount

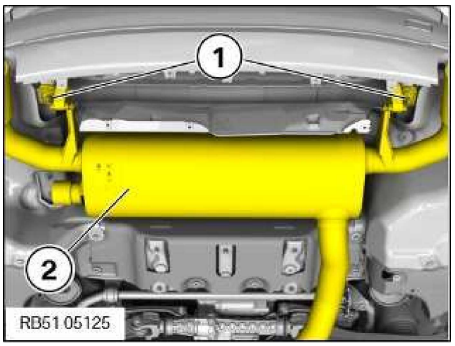
CAUTION

Swarf resulting from sawing or grinding components.

Danger of injury!

- Conduct all work in appropriate personal protective equipment only.
- Wear safety goggles and protective gloves.

- Open the weld seam (1) with a conventional tool.
- Remove the clamp (2).



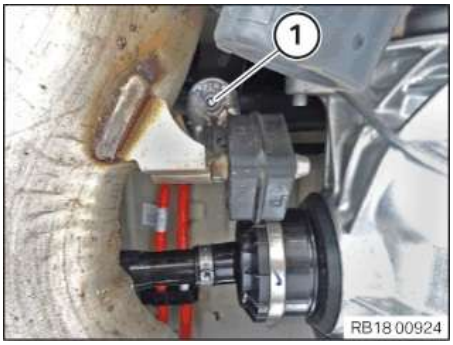
- Insert and install the exhaust system (2).
- Renew nuts (1).

  Parts: Nuts
- Tighten nuts (1).

Rear silencer to body / bumper support

M8	Replace nuts.	Tightening torque	19 Nm

cardiagn.com

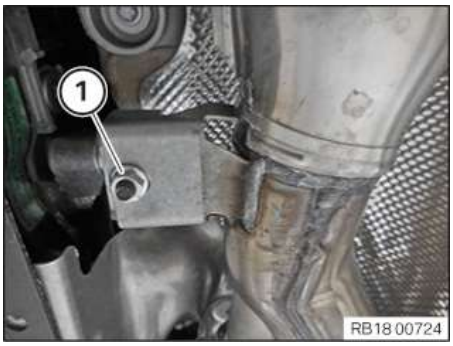


- Renew nut (1) on the rear axle support.

  Parts: Nut
- Tighten nut (1).

Exhaust system to rear axle carrier

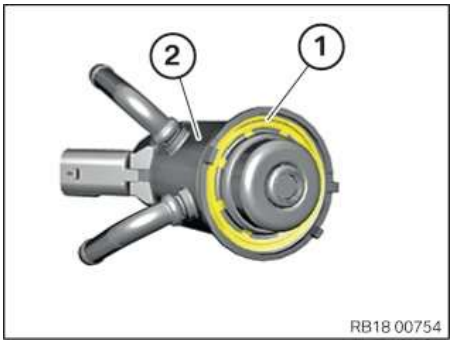
M8 nut		Tightening torque	19 Nm



- Tighten nut (1).

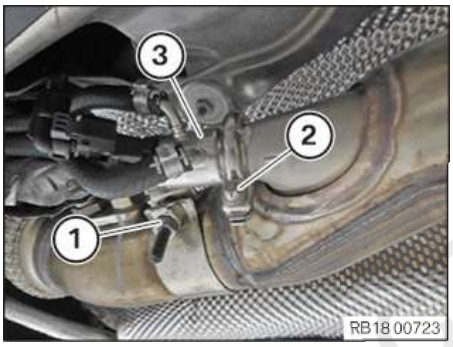
Exhaust system to transmission

M8		Tightening torque	19 Nm



- Renew sealing ring (1) of the SCR metering module (2).

  Parts: Sealing ring



- If necessary, renew clamp (1).

  Parts: Clamp
- Tighten clamp (1).

Exhaust system to diesel particle filter

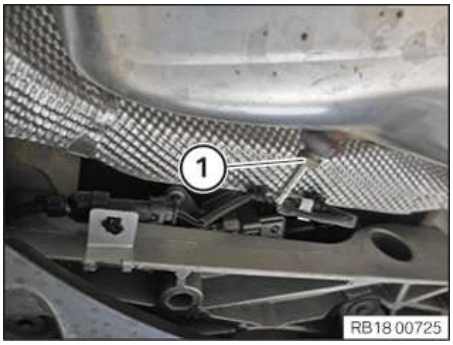
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

- Renew the V-clip (2).

  Parts: V-band clamp
- Install the SCR metering module (3) in the exhaust system.
- Tighten the V-clip (2) of the SCR metering module (3).

SCR metering module V-clip to exhaust system

V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm

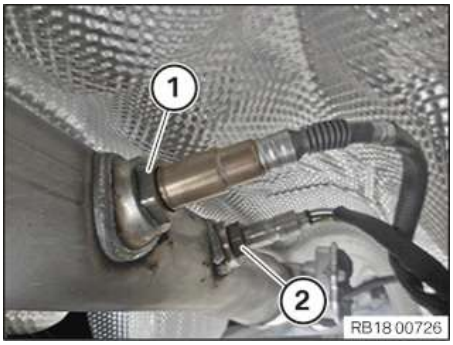


- Install the exhaust temperature sensor (1) in the exhaust system and tighten.

Exhaust-gas temperature sensor upstream of SCR catalytic converter

Sensor		Tightening torque	30 Nm

cardiagn.com



- Install the diesel particulate sensor (1) in the exhaust system and tighten.

Diesel particulate sensor to exhaust system

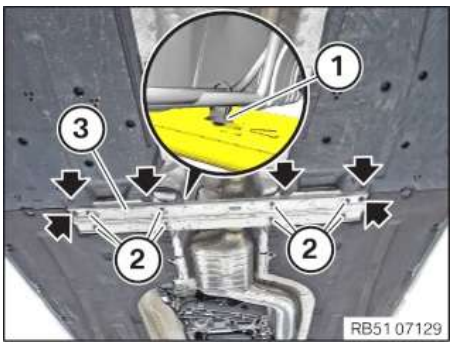
Sensor		Tightening torque	50 Nm

- Install the nitrogen oxide sensor (2) in the exhaust system and tighten.

Nitrogen oxide sensor downstream of SCR catalytic converter

Sensor		Tightening torque	55 Nm

65 – Install the connecting supports on the tunnel



- Guide in and install connecting support (3) on the tunnel.
- Tighten the screws (2).
- Tighten screws (arrows).

Connecting support to tunnel

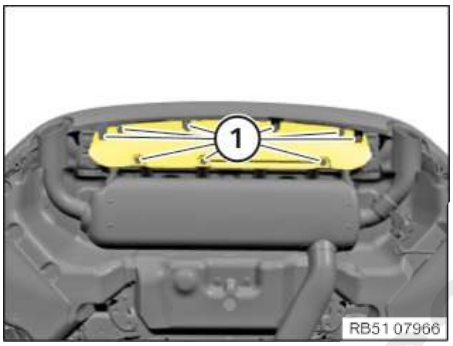
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Secure the clamp (1).

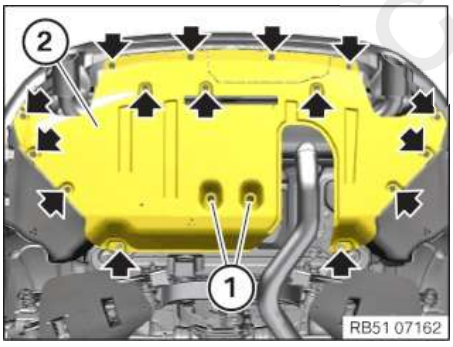
66 – Installing the rear diffuser



- **Version 1:**
- Install the diffuser and tighten the nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm



- **Version 2:**
- Feed in and position the diffuser (2)
- Tighten screws (arrows).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm

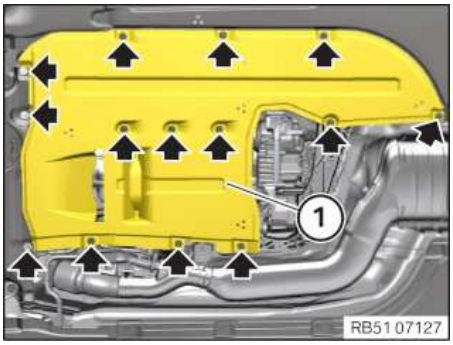
- Tighten nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm

67 – Installing underbody protection at rear

cardiagn.com



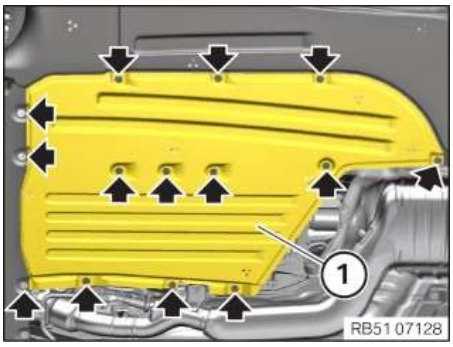
- **Version A:**

  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version B:**

  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

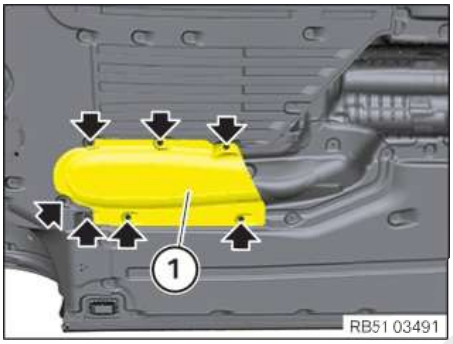
Underbody protection

Hexagon screw		Tightening torque	3 Nm

68 – Install the underbody panelling of the transmission on the side

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

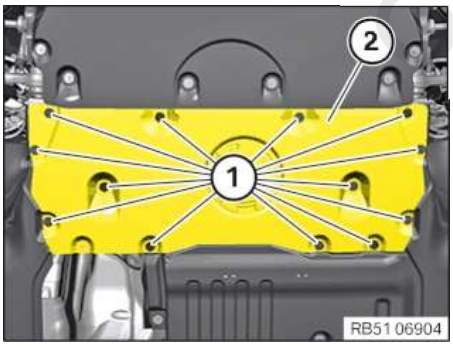


- Insert the underbody panelling (1).
- Tighten screws (arrows).

Underbody panelling

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

69 – Installing the centre underbody protection



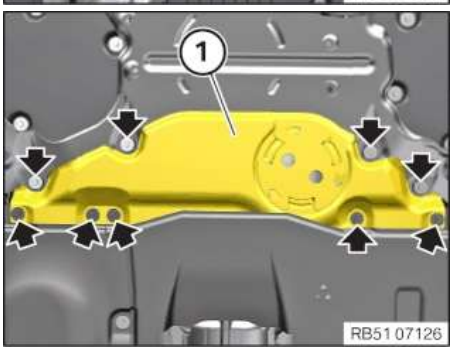
- **Variant with rear wheel drive:**

  Position central underbody protection (2).

  Tighten the screws (1).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version with all-wheel drive:**

  Guide in centre underbody protection (1) and install.

  Tighten screws (arrows).

Underbody protection

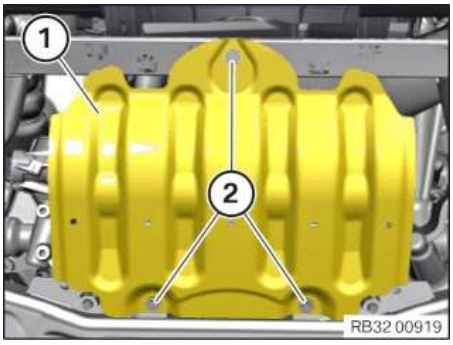
Hexagon screw		Tightening torque	3 Nm

70 – If installed: Install underbody protection of the steering

cardiagn.com

Prerequisite

Front underbody protection has been removed.



- Position underbody protection (1).
- Tighten the screws (2).

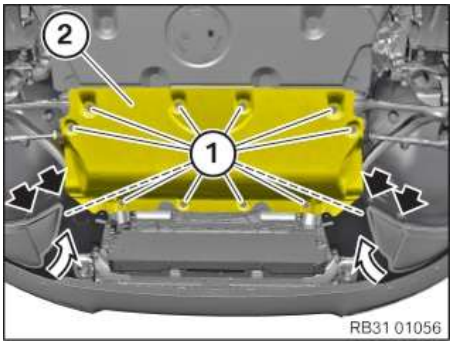
Underbody protection, steering, to front axle support

Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

71 – Install the underbody protection of the steering gear



- **Version A:**

  Position the underbody protection (2) of the steering gear.

  Tighten the screws (1).

Underbody protection of the steering gear

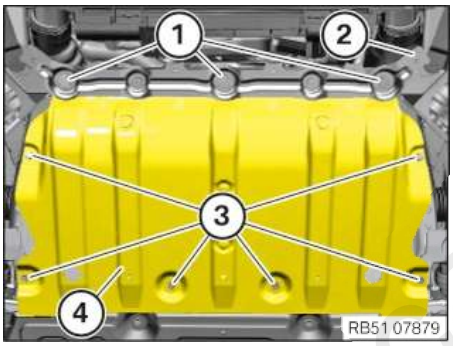
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the bottom wheel arch cover.

  Tighten the screws (arrows) of the lower wheel arch cover on the wheel arch cover.

Wheel arch trim panel, front

Thermoplastic hexagon screw		Tightening torque	2,6 Nm



- **Version B:**

  Feed in the underbody protection (4) of steering gear and install it.

  Tighten the screws (3).

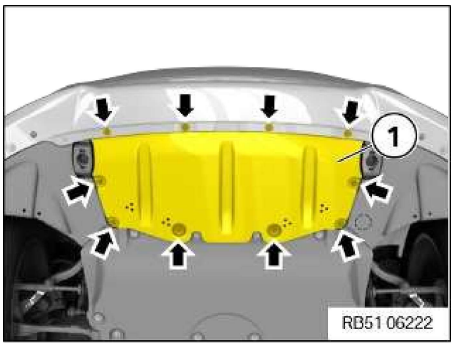
Underbody protection of the steering gear

Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the holder (2) for the underride protection.

  Tighten the screws (1).

72 – Installing the front underbody protection



- **Version A:**

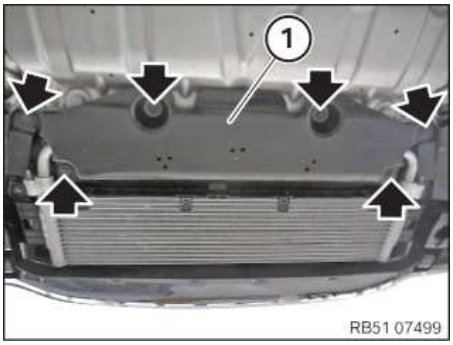
  Feed in the front underbody protection (1) towards the front under the bumper panel and position.

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

carDiagn.com



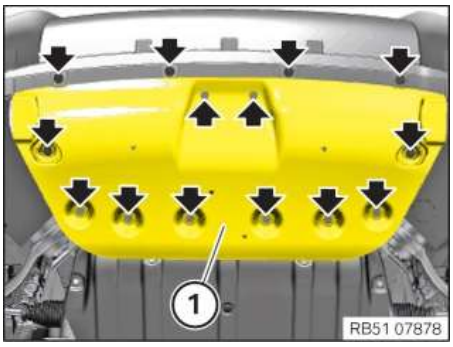
- **Version B:**

  Feed in and position the front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



- **Version C:**

  Feed in and install front underbody protection (1).

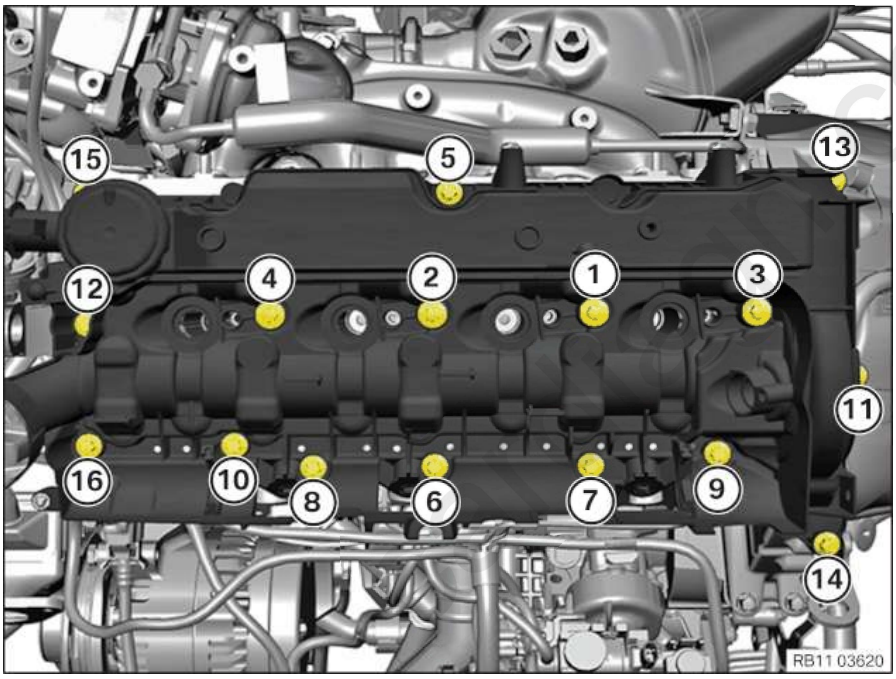
  Tighten screws (arrows).

Underbody protection front

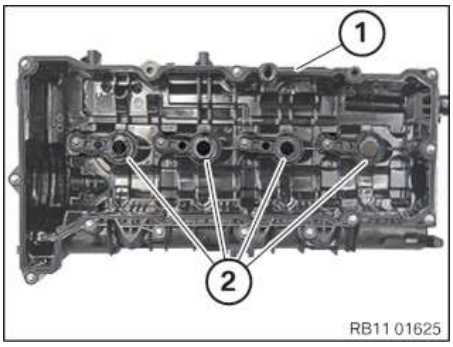
Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

73 – Installing cylinder head cover

Screw connection of the cylinder head cover

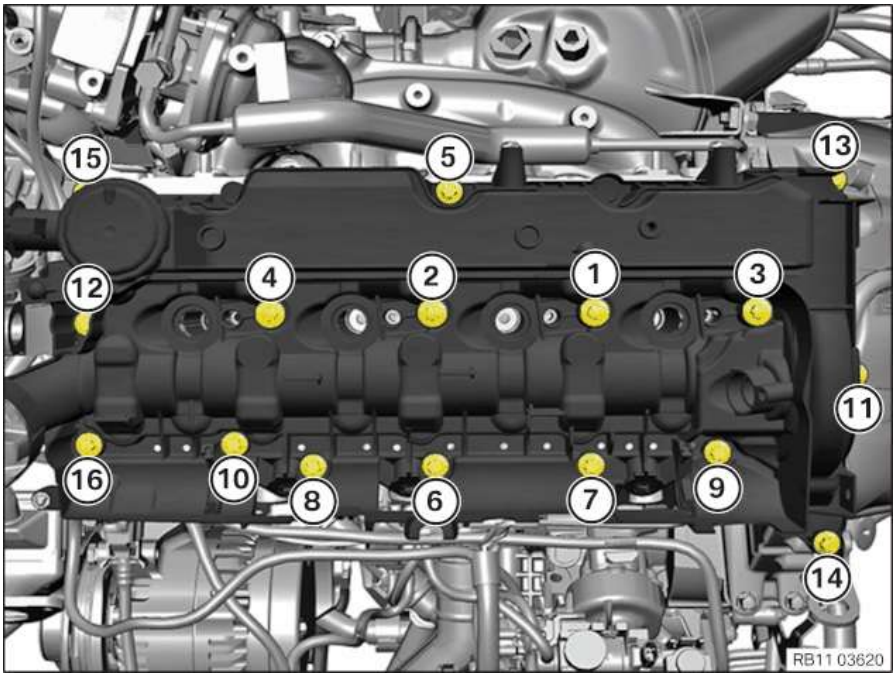


1 - 16 Bolts of the cylinder head cover



- Renew the profile seals (1) and (2) of the cylinder head cover.

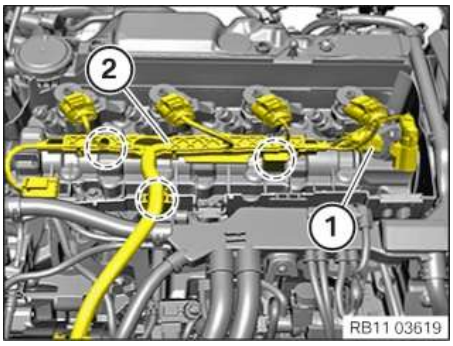
  Parts: Profile seals



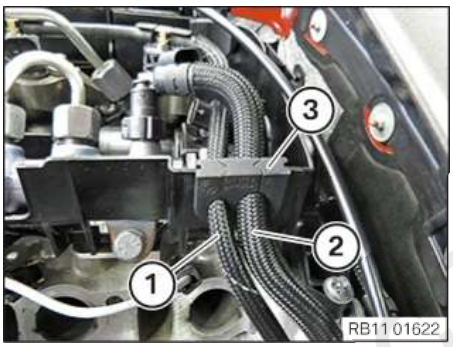
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

Cylinder head cover to cylinder head

M6		Tightening torque.	8,5 Nm



- Position the vehicle wiring harness (2) on the cylinder head cover and fasten in the marked areas.
- Plug in the connector (1) and lock audibly.



- Insert and connect the leakage oil line (1) with the fuel return line (2) and grommet (3).



- Feed in and install the heat shield (1).

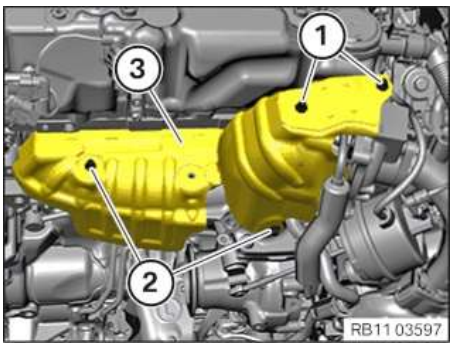


- Connect engine ventilation line (1) and lock.

  The locks (arrows) must engage audibly.

cardiagn.com

74 – Installing heat shield



- Feed in and install the heat shield (3).
- Tighten down screws (1) and (2).

Heat shield to exhaust manifold

M6x12			10 Nm

75 – Installing the sensor bracket on the cylinder head cover

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

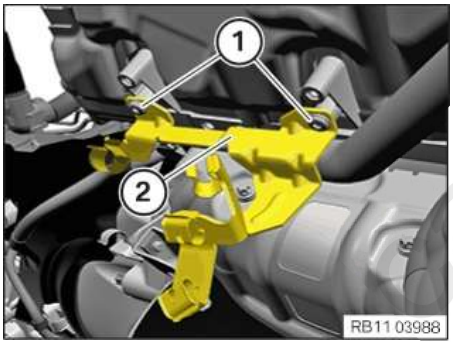
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

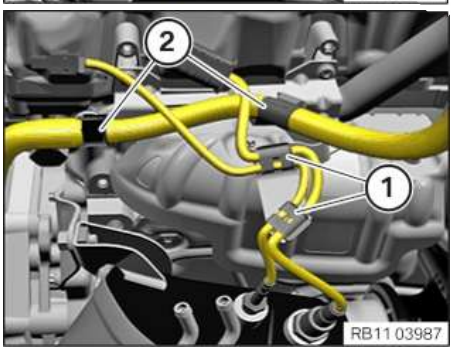
- Route all cables without abrasions, do not trap and crush.



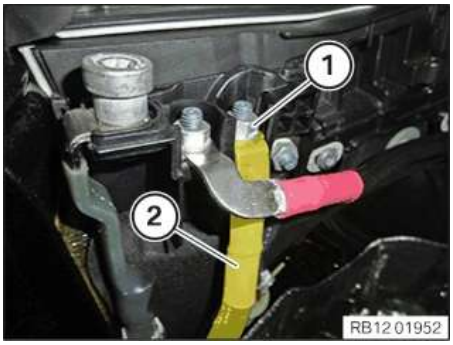
- Insert and install the holder (2).
- Tighten the screws (1).

Bracket on cylinder head cover

	Tightening torque	5 Nm



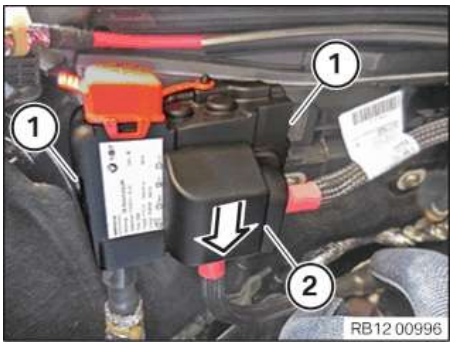
- Secure the positive battery cable in the clamps (2).
- Mount the cable of the exhaust gas sensor system in the clamps (1).



- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

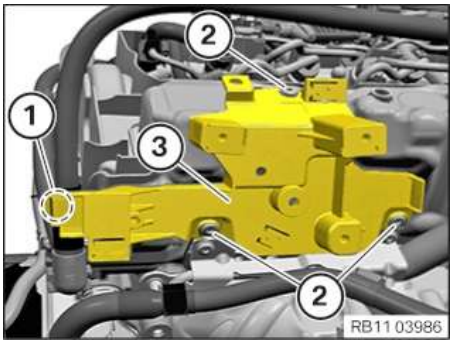
Battery positive lead to battery positive terminal

M8		Tightening torque	19 Nm



- Insert and install the cover (2) in the direction of the arrow.

  The locks (1) must engage audibly.

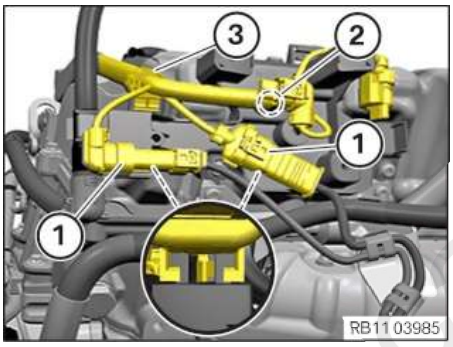


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

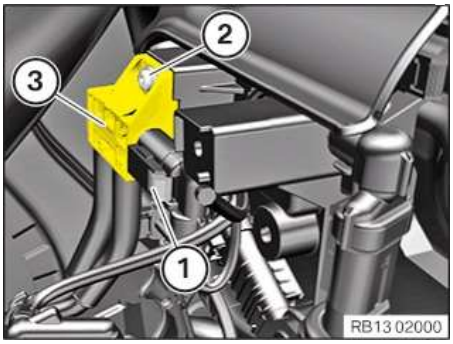
		Tightening torque	5 Nm

- Fasten the positive battery cable in the area (1) in the clamp.



- Feed in the wiring harness section and fasten it with the clamp (3).
- Fasten the cable clip in the area (2) in the sensor bracket.
- Feed in the connector (1) into the sensor bracket and lock it audibly.
- Plug in the connector (1) and lock audibly.

76 – Securing the differential pressure sensor for the diesel particulate filter



- Feed in and install the differential pressure sensor (3).
- Tighten down screw (2).

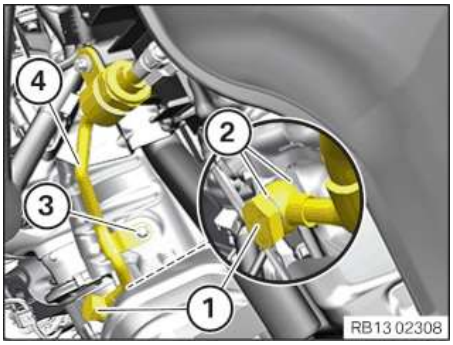
Differential pressure sensor of diesel particulate filter on cylinder head cover

TS5x20		Tightening torque	4 Nm

- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

77 – Install the exhaust gas pressure pipe

cardiagn.com



- Insert and install the exhaust gas pressure pipe (4).
- Replace the sealing rings (2).

  Parts: Sealing ring
- Apply the banjo bolt (1) hand-tight.
- Tighten down screw (3).

Heat shield to exhaust manifold

M6x12		Tightening torque	10 Nm

- Tighten the banjo bolt (1).

Banjo bolt for exhaust pressure pipe to exhaust manifold

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm



- Tighten down screw (2).

Exhaust gas pressure pipe to sensor system holder

TS6x20		Tightening torque	5,7 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

78 – Install all injectors

▸ **Cleaning the injector shafts**

CAUTION

Swirling dirt particles caused by compressed air.

Danger of injury!

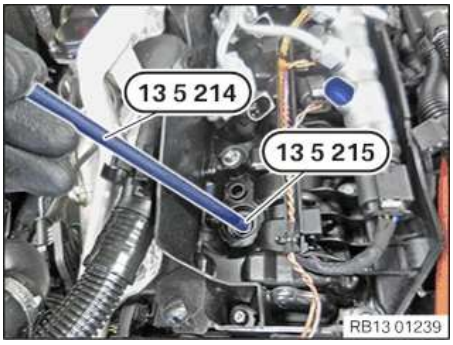
- Collect dirt particles, e.g. when blowing out, use cloth to do so.
- Wear safety goggles.

RISK OF DAMAGE

Contaminant or foreign body.

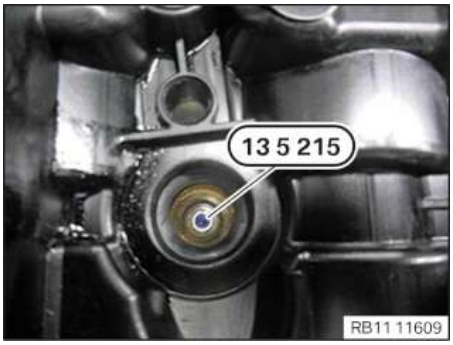
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Check whether the sealing ring remained in the injector shaft and remove the sealing ring as needed.
- Insert the special tool 0 493 763 (13 5 215) with the special tool 0 493 762 (13 5 214) from the set of special tools 0 493 758 (13 5 210) into the injector shaft.
- Remove special tool 0 493 762 (13 5 214).

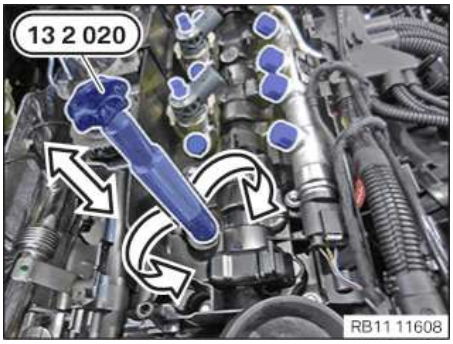
cardiagn.com



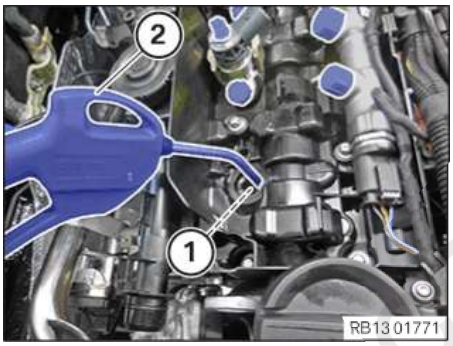
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



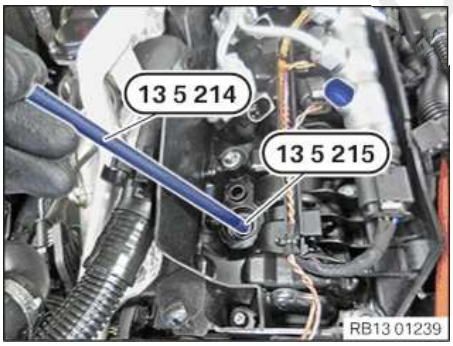
- Insert special tool 0 496 150 (13 2 020) into the injector shaft.



- Move special tool 0 496 150 (13 2 020) up and down in the injector shaft with rotational movements in the direction of arrow.
- Feed out special tool 0 496 150 (13 2 020) from the injector shaft and remove.



- Blow out injector shaft (1) with air gun (2).



- Feed the special tool 0 493 762 (13 5 214) into the injector shaft and screw it in with the special tool 0 493 763 (13 5 215).
- Feed out special tool 0 493 762 (13 5 214) with special tool 0 493 763 (13 5 215) from the injector shaft and remove it.

▸ **Check the placement of the clamping claw**

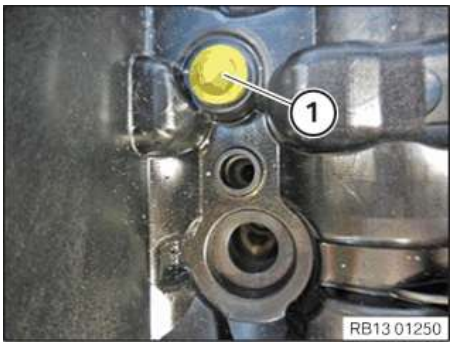
cardiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Tighten down screw (1).

  The clamping claw is positioned on the bolt (1).

Clamping claw facing to cylinder head cover

M6		Tightening torque	10 Nm

▸ **Prepare the injector for installation**

RISK OF DAMAGE

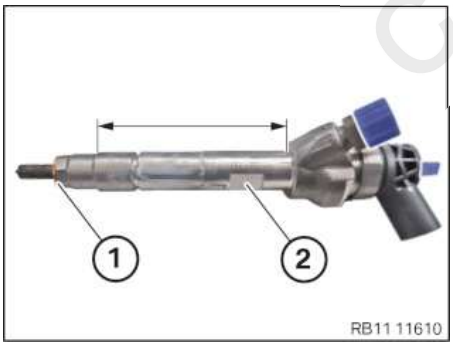
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

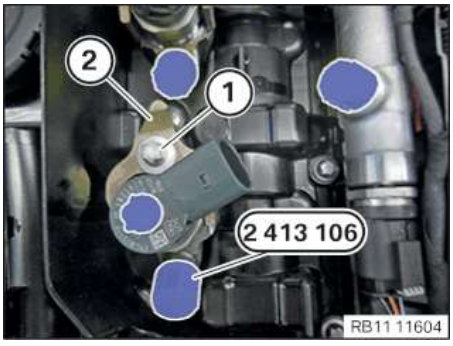
TECHNICAL INFORMATION

Lightly grease the injector shaft with high temperature-resistant grease.
For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



- Renew the copper sealing ring (1) on the injector (2).

  Parts: Copper sealing ring
- Lightly grease the injector in the marked area with heat-resistant grease before installing the injector (2) in the injector shaft.

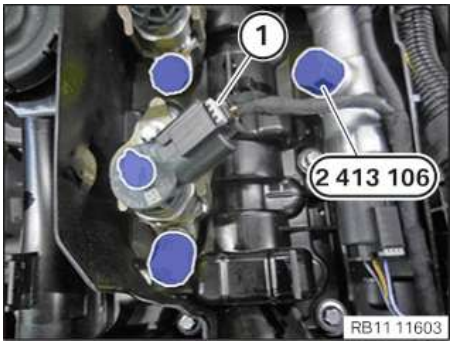


- Insert and install the injector .
- Insert and install the clamping claw (2).
- Tighten down screw (1).

Injector to cylinder head cover

M8		Tightening torque	8 Nm
		Angle of rotation	120 °

cardiagn.com



- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

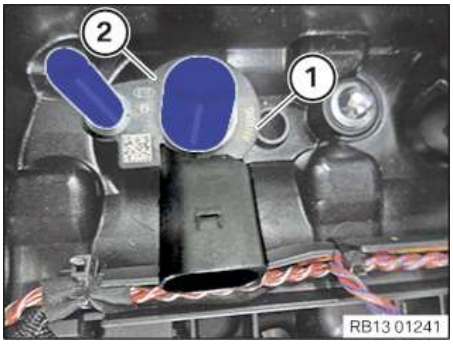
▸ **Replacement: Perform injection quantity compensation**

TECHNICAL INFORMATION

If the DDE control unit or an injector has been replaced, it will also be necessary to carry out injection quantity compensation. The adjustment value (7-position letter/number code) is engraved on each injector.

NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

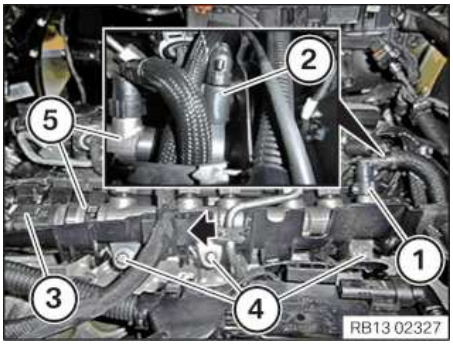


- Read off the adjustment value (1) on the new injector (2).



- Connect diagnosis system:
  - Vehicle identification
  - Function selection
  - Service functions
  - Digital diesel electronics (DDE)
  - Adjustment of injectors
  - Testing schedule
- Start service function with the right arrow button.

79 – Installing the rail



- Insert and install the rail (5).
- Tighten the screws (4).

Rail to cylinder head cover

M8		Tightening torque	19 Nm

- Install and lock cable clip (arrow).

  The cable clip (arrow) must engage audibly.
- Connect and lock the connector (3) at the rail pressure sensor.

  The connector (3) must engage audibly.
- Connect and lock the connector (2) at the rail pressure regulating valve.

  The connector (2) must engage audibly.
- Feed in fuel return line (1) and install.

  The fuel return line (1) must audibly engage.

cardiagn.com

80 – Installing high pressure line between rail and high pressure pump

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

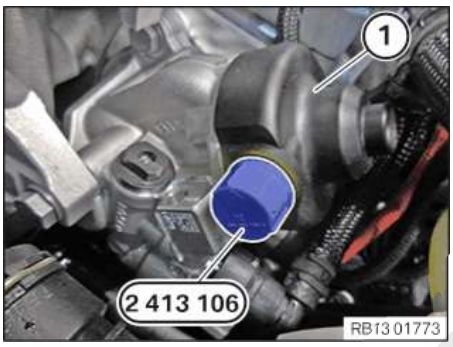
On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

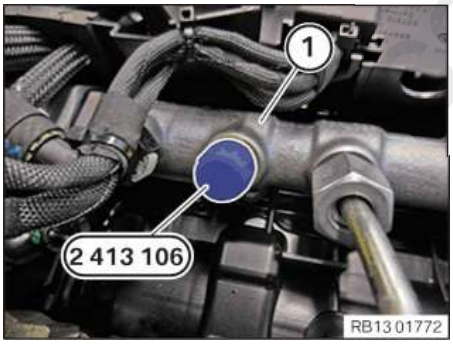
- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

TECHNICAL INFORMATION

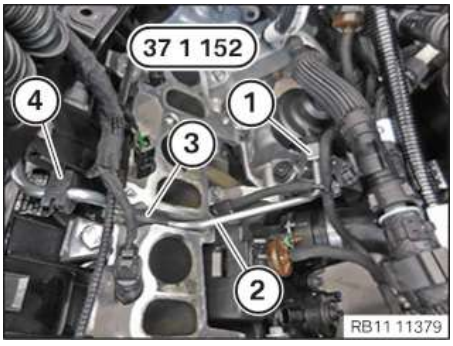
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Feed out and remove special tool on the high pressure pump (1).



- Feed out the special tool on the rail (1) and remove.



- Insert and install the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).
- Hand-tighten the union nut (1) on the high pressure pump.



- Hand-tighten the union nut (1) on the rail.

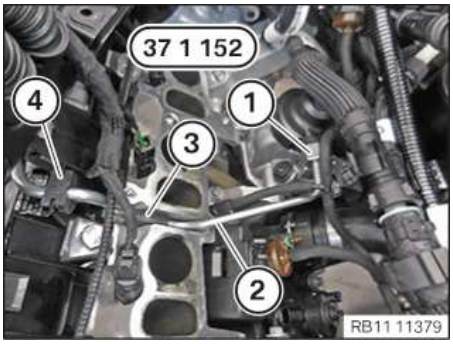
TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten the union nut (1) with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm



- Make sure that the high pressure line (2) is correctly installed with the abrasion protection (3) and the rubber mount (4).

TECHNICAL INFORMATION

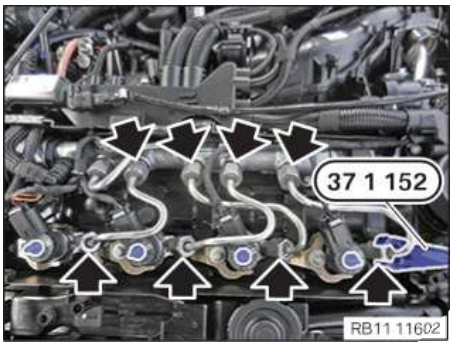
Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten union nut (1) on the high pressure pump with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm

81 – Installing the high pressure lines between the injector and the rail



- Remove the special tool from all cable connections.
- Feed in and install the high pressure lines (arrows).
- Hand-tighten the high pressure lines (arrows).

TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

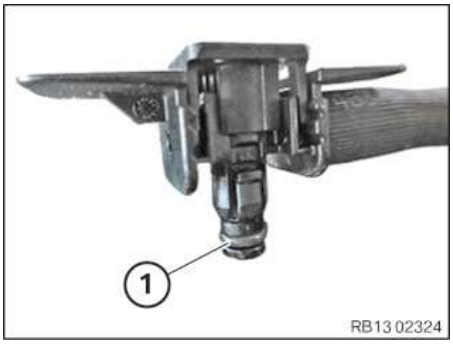
- Tighten the high pressure lines (arrows) with the special tool .

High pressure lines between injector and rail

High-pressure pipe		Tightening torque	24.5 Nm

- Check the high pressure lines (arrows) for tightness (**visual inspection**).

82 – Attach the leakage oil line on the injectors



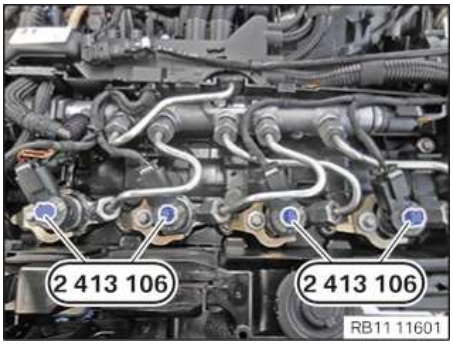
- **Version A:**

  Check sealing ring (1) for damage, renew leakage oil line if necessary.

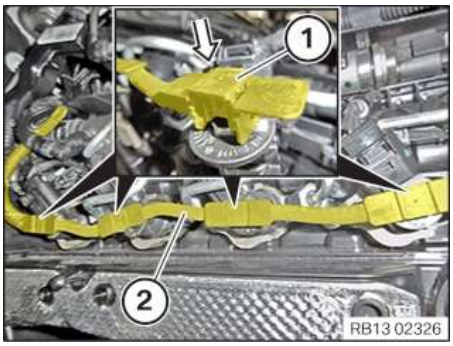
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.

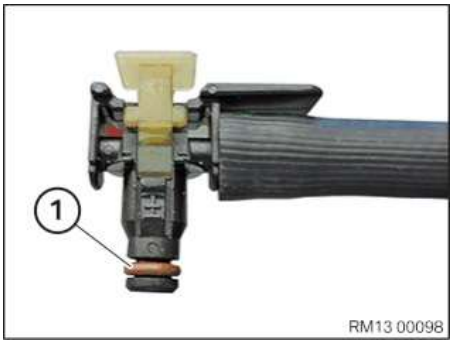
carlagn.com



- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.



- **Version B**:

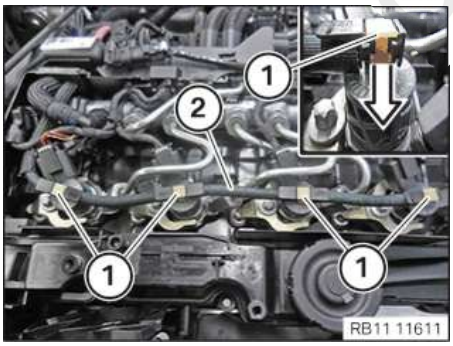
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.



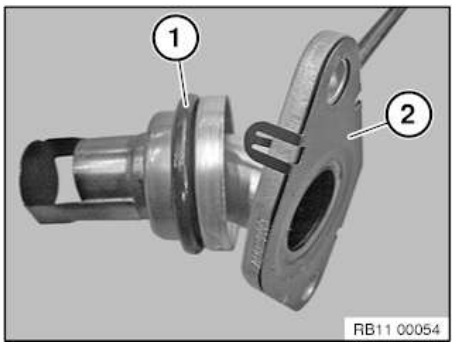
- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.

83 – Installing the intake plenum

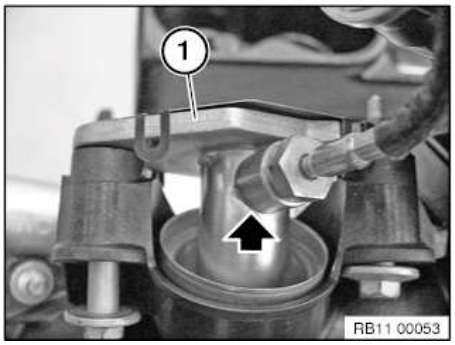
cardiagn.com



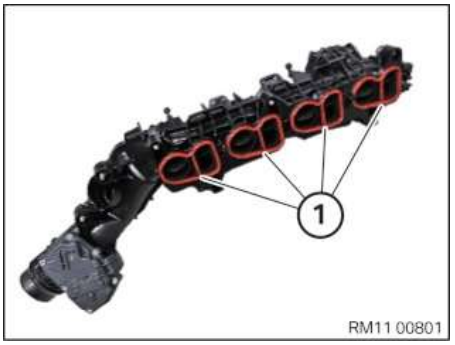
- Renew O-ring (1).

  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

  Parts: Gasket
- Position the seal (2) and clip it in.

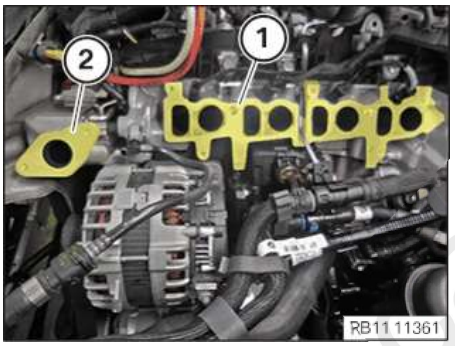


- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).

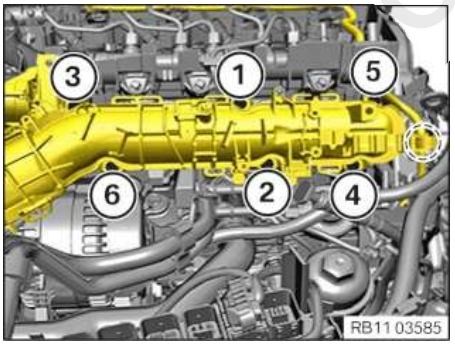


- Renew seals (1).

  Parts: Seals
- Ensure that the seals (1) are firmly mounted on the intake plenum.



- Clean connection points (1) at cylinder head.
- Clean the connection point (2) on the exhaust-gas recirculation cooler.

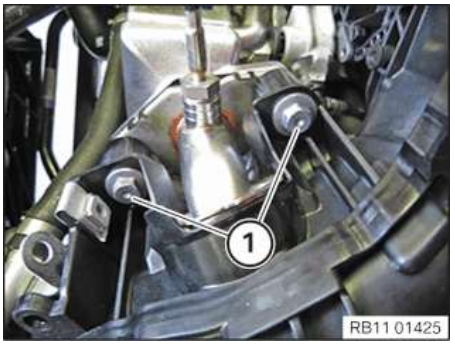


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

- Attach the wiring harness and fuel lines in the marked area on the intake plenum.

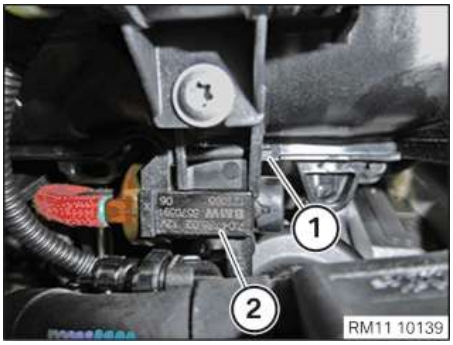


- Tighten the screws (1).

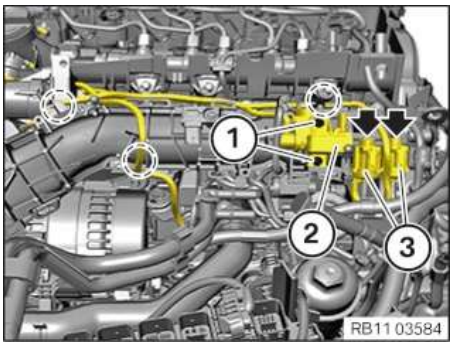
Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm

cardiagn.com



- Install electric changeover valve (2) from the left to the right in the holder on the intake plenum.
  The lock (1) must audibly engage.



- Install intake plenum electric changeover valve (3) on the intake plenum.
  The locks (arrows) must engage audibly.
- Position the electric changeover valve (2) on the intake plenum.
- Tighten the screws (1).

Electric changeover valve to intake plenum

TS6x20		Tightening torque	5 Nm

- Fasten the vacuum hoses on the intake plenum in the marked areas.

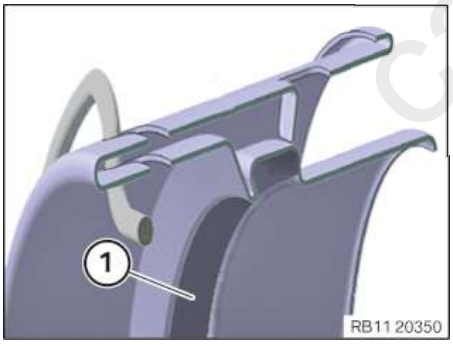


- Check the seal (1) for damage, and renew if necessary.

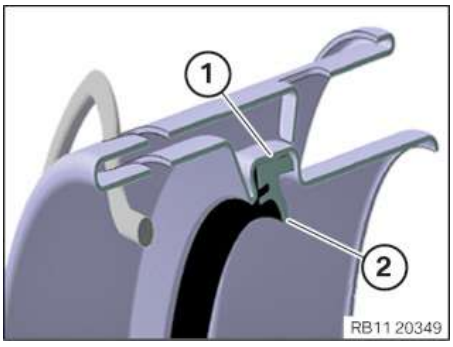
▸ **Replacing damaged seal**

TECHNICAL INFORMATION

Do not use pointed or sharp-edged tools for the installation and/or removal.



- Remove damaged seal.
- Clean gasket groove (1) with a dry towel.
  The gasket groove (1) must be clean.



- Renew gasket.
  Parts: Gasket
- Install seal dry without lubricant or mounting agent.

TECHNICAL INFORMATION

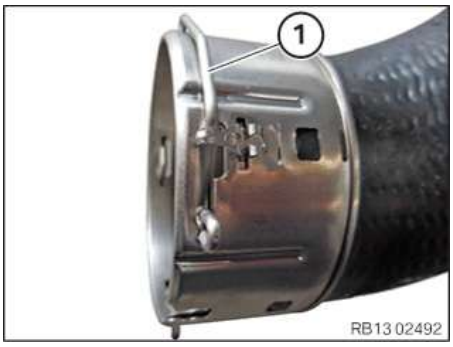
Incorrect assembly is possible. Ensure correct installation position.

- Feed in and install the seal.
- Make sure the seal is correctly installed in the gasket groove (1).
- Make sure that the sealing lip (2) is directed inwards as shown.

cardiagn.com



- Connect the pressure pipe to the throttle body until the locks (1) engage on both sides.



- Check that the locks (1) are correctly seated on the pressure pipe.

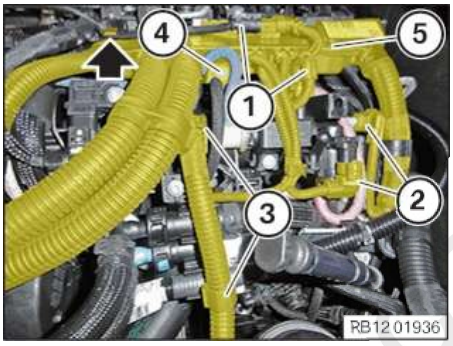
84 – Partially securing the wiring harness section on the intake plenum

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

- Route all cables without abrasions, do not trap and crush.



- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

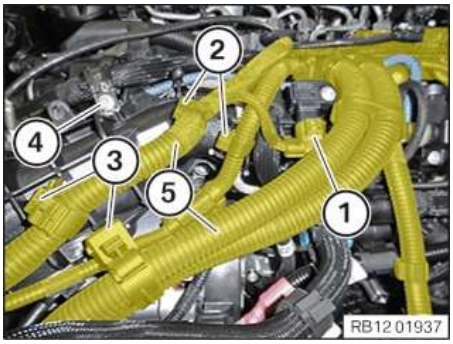
Wiring harness section to manifold

TS5x20		Tightening torque	3,6 Nm

- Secure clamps (3).
- Connect connectors (2) and lock.

  The connectors (2) must engage audibly.
- Secure the line at clamp (Arrow).
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

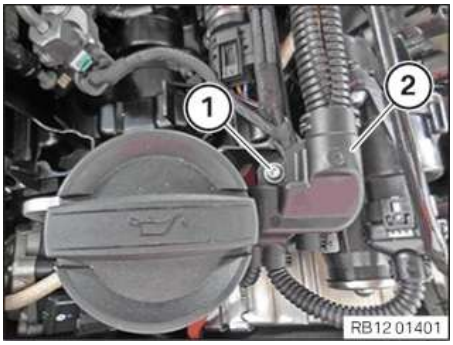
Standard screw connection 4 Nm

Oval-head screw		Tightening torque	4 Nm

- Secure clamps (3).
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

cardiagn.com



- Guide in the wiring harness section (2) and install.
- Tighten down screw (1).

Wiring harness section to cylinder head cover

TS5x20		Tightening torque	3,6 Nm



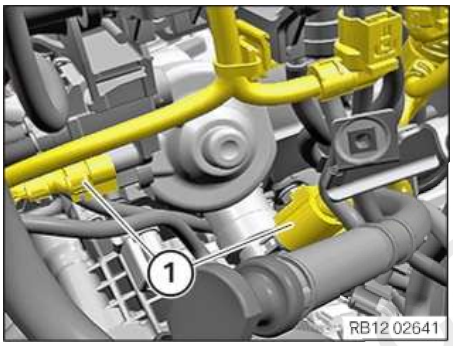
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



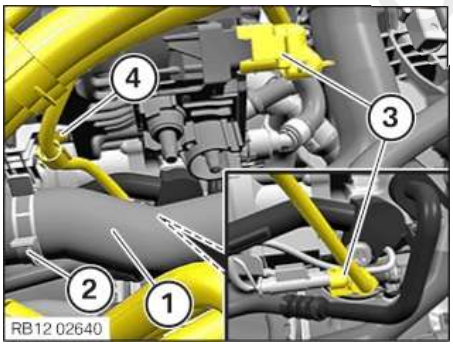
- Connect the connector (1) and lock it.

  The connector (1) must engage audibly.



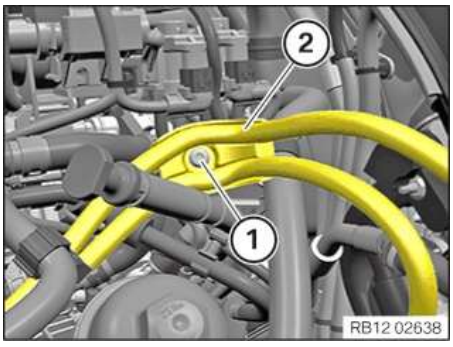
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



- Secure the clamp (4).
- Connect connectors (3) and lock.

  The connectors (3) must engage audibly.
- Feed the coolant line (1) into the holder (2) and install it.



- Feed in and position the positive battery cables (2) .
- Tighten down screw (1).

Standard screw connection M6

M6		Tightening torque	8 Nm

cardiagn.com



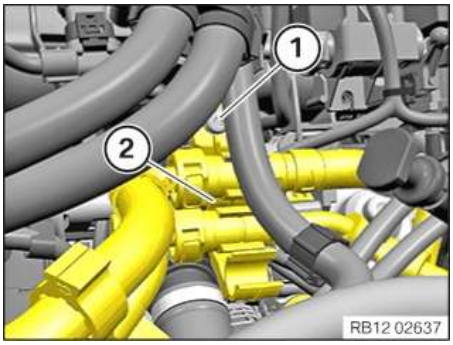
- Feed in and install the positive battery cable (4).
- Feed in and position the positive battery cables (4) .
- Renew the nuts (3) and (2).

  Parts: Nuts
- Tighten nuts (3) and (2).

Battery positive lead on the starter motor generator

M8		Tightening torque	19 Nm

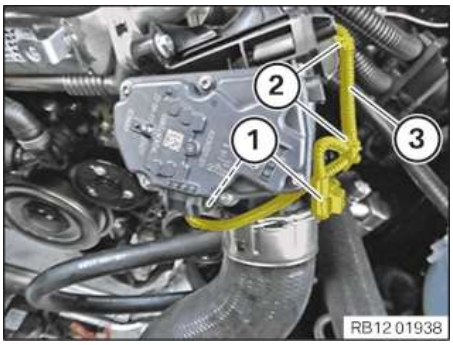
- Guide in and install the lid (1).



- Insert and install the holder (2).
- Tighten down screw (1).

Holder on intake plenum

TS6X20		Tightening torque	5 Nm



- Guide in the wiring harness section (3) and install.
- Secure clamps (2).
- Connect connectors (1) and lock.



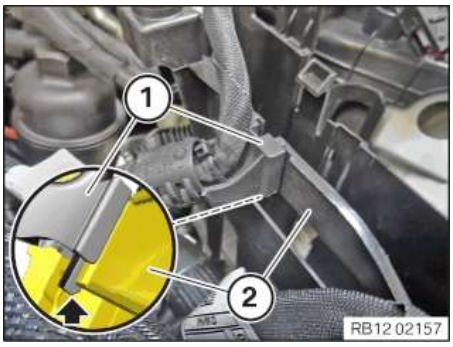
- Feed in and install coolant line (2).
- Lock holder (1).

  The holder (1) must engage audibly.



- Feed in and install the cable clip (1).

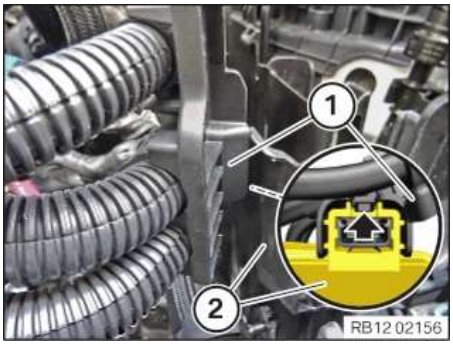
  Lock (arrow) must audibly engage.



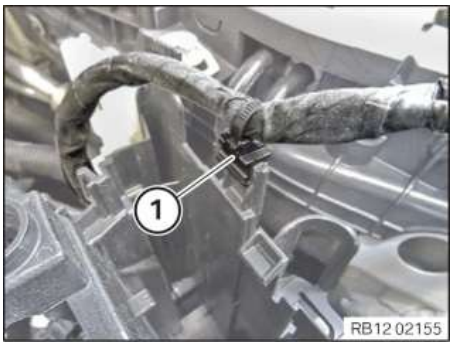
- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.

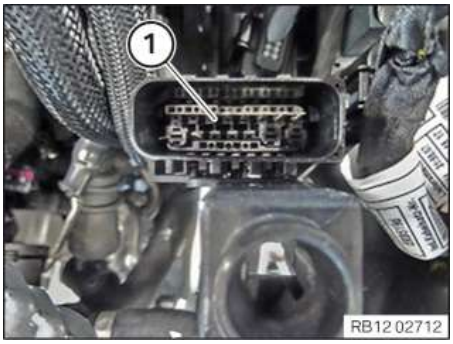
cardiagn.com



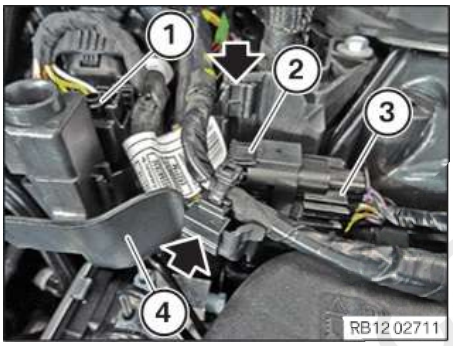
- Connect the cable clip (1) with the control unit holder (2) and lock it.
  Lock (arrow) must audibly engage.



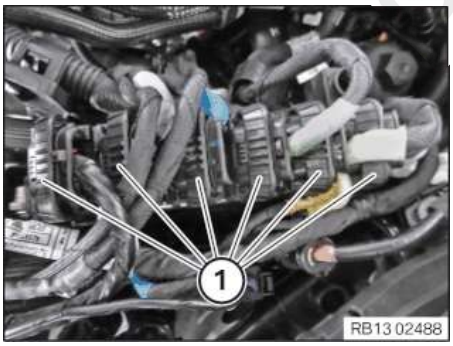
- Secure clamps (1).



- Feed in and install the connector (1).
  The connector (1) must engage audibly.



- Connect connector (3) to control unit holder (4) and lock it.
  The connector (3) must engage audibly.
- Connect connectors (2) and lock.
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.
  The connector (1) must engage audibly.
- Secure the clamps (arrows).



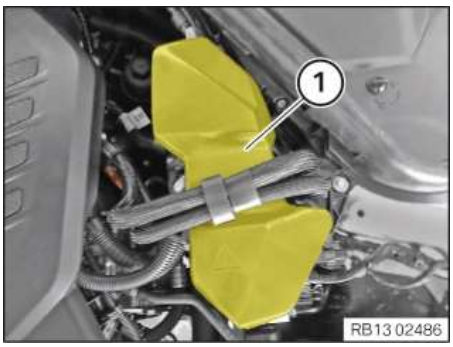
- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.

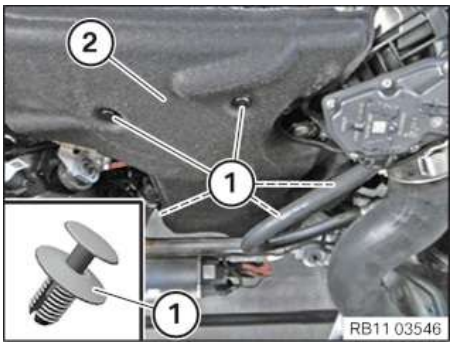
cardiagn.com

85 – Install the cover for the DDE control unit



- Insert and install cover (1) into guides.

86 – Install acoustic cover for the engine, front

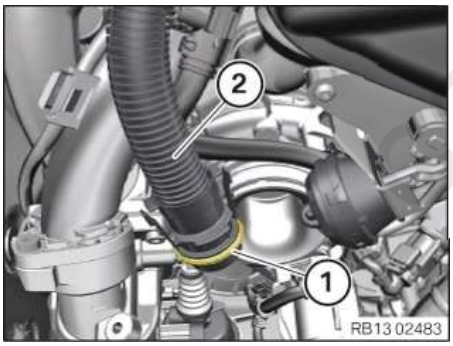


- Feed the acoustic cover (2) in and install.
- Secure the acoustic cover (2) with the expanding rivets (1).

87 – Installing the clean air pipe with resonator



- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.

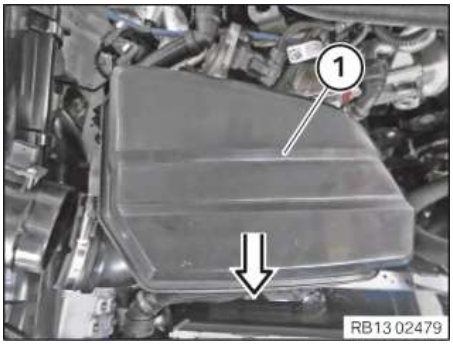


- Check the sealing ring (1) for the engine ventilation line (2) for damage and renew where required.



- Feed in and install clean air pipe with resonator (1) in the direction of the arrow.

cardiagn.com

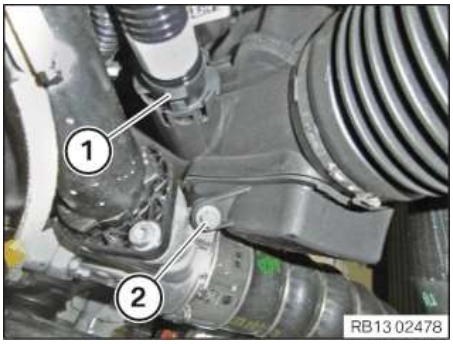


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

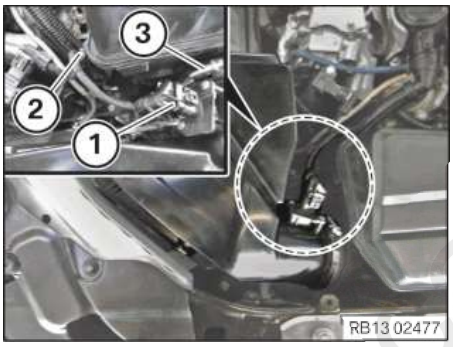
  The clamp (1) must engage audibly.



- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm



- Connect the clean air pipe with resonator to the intake filter housing.
- Tighten clamp (3).

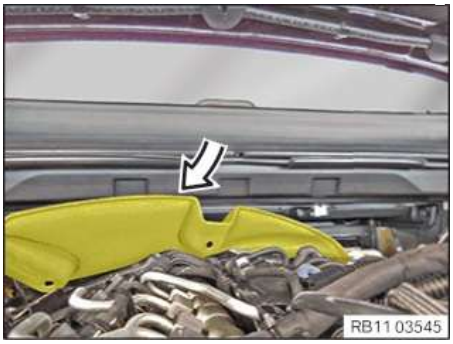
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

- Secure clamps (2).
- Connect connectors (1) and lock.

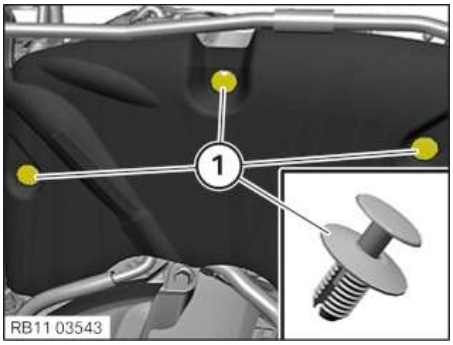
  The connector (1) must engage audibly.

88 – Installing acoustic cover at rear



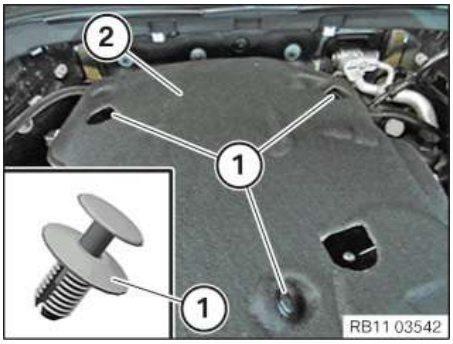
- Guide in the acoustic cover in the direction of the arrow and install it.

cardiagn.com



- Secure acoustic cover with the expanding rivets (1).

89 – Install the acoustic cover for the injectors



- Feed the acoustic cover (2) in and install.
- **If installed:** Secure the acoustic cover (2) with the expanding rivets (1) .

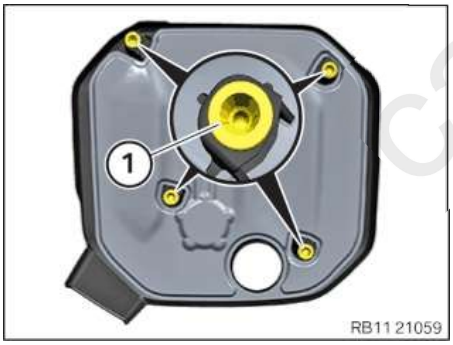
90 – Install acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



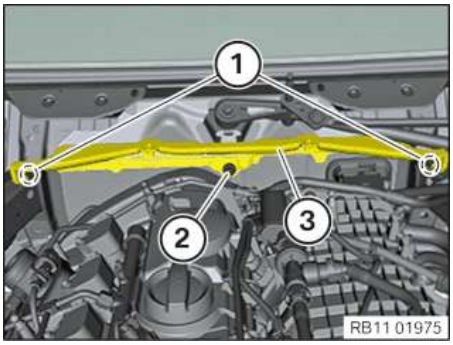
- Check the acoustic cover for correct fit of the rubber mounts (1).



- Clip in the acoustic cover (1) into the holders in the indicated areas.

91 – Installing centre bulkhead lower section

cardiagn.com

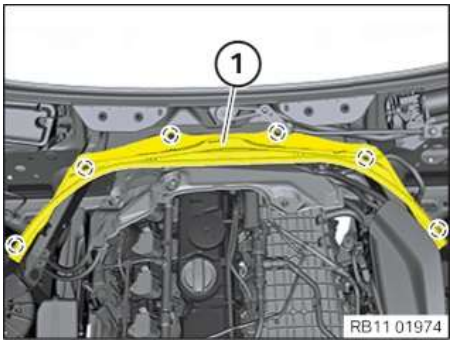


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

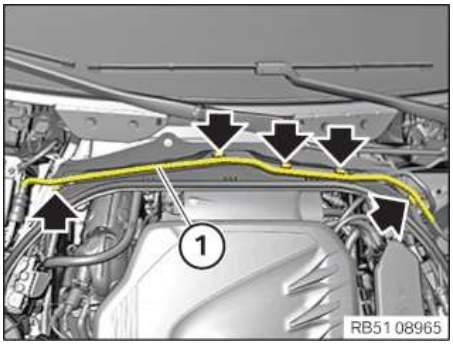
92 – Installing the centre bulkhead upper part



- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

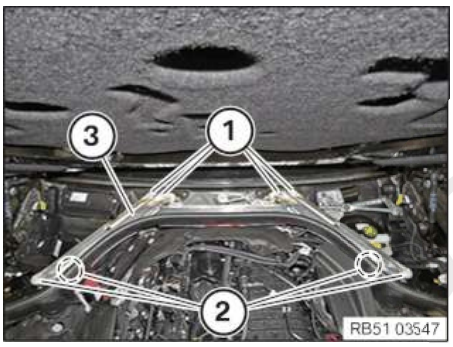
Bulkhead upper part to bottom bulkhead

		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

  Clip in the wire (1) into the holders (arrows).



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Install the tension strut (3) on the spring strut dome.
- Tighten the screws (1).

Tension strut on bulkhead

M10x25 screw		Tightening torque	56 Nm

- Renew screws (2).

  Parts: Screws
- Tighten the screws (2).

Tension strut to spring strut dome

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

93 – Install the seal for the bonnet

carmagn.com



- Press the rear bonnet seal (2) into the guide.
- Feed in cable (1) into the brackets.
- Check that the rear bonnet seal (2) and the cable (1) are seated correctly.

94 – Installing cowl panel cover

RISK OF DAMAGE

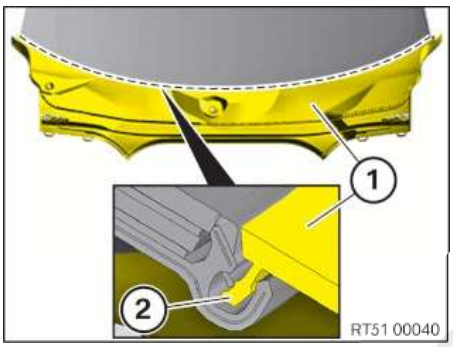
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

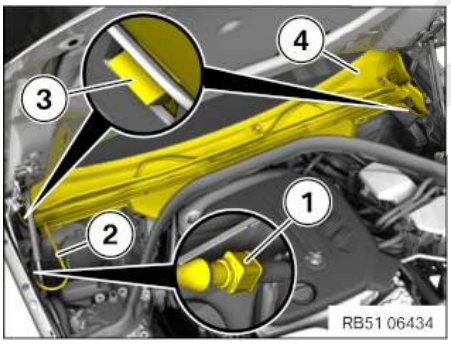
- Ensure correct installation of the components.
- Only use undamaged components.

TECHNICAL INFORMATION

Before installing the cowl panel cover it is **mandatory** to check that the 48 V line is routed correctly and fitted tightly.
An incorrectly laid or attached 48 V line can be damaged by the wiper kinematics.



- Push the cowl panel cover (1) into the latch mechanism (2) beginning on the side.



- Clip cowl panel cover (4)in by means of the latch mechanisms (3).
- Position windscreen wash hose (2) and connect windscreen wash hose (1)quick lock.

95 – Install left and right wiper arm

NOTICE

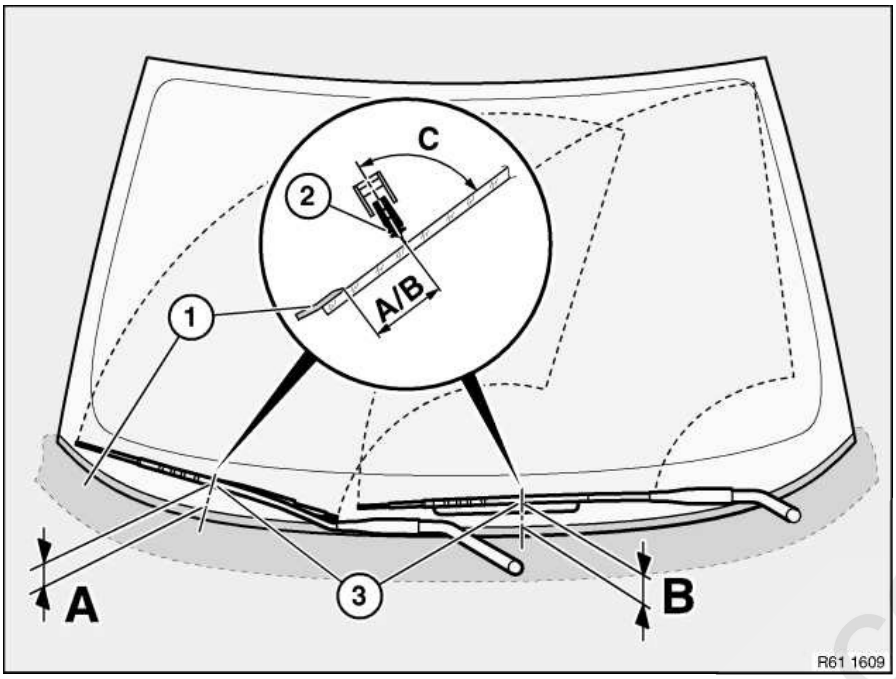
Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

cardiagn.com

TECHNICAL INFORMATION

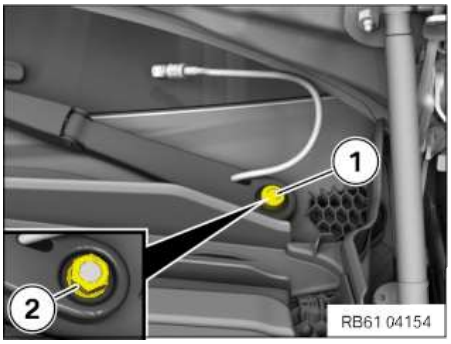
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- Connect the wiper arm (3).
- Correctly position the wiper arm (2) in relation to the window edge (1).

Distance from window pane edge to wiper blade

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

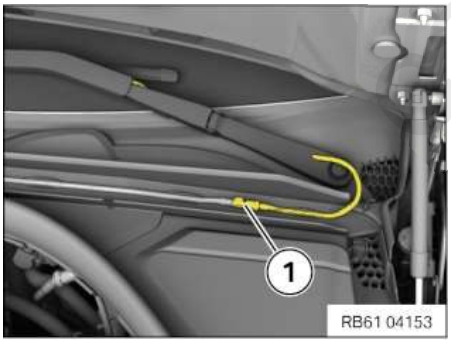


- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

- Connect the protective cap (1).



- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

96 – Connecting all battery earth leads



- See additional information.

97 – Activating the 48 V electrical system

Prerequisite

Ignition is switched off.

RISK OF DAMAGE

Damage to 48-V battery

If a 48-V battery that is disconnected from the electrical system is activated, the battery electronics will be damaged.

- Only carry out activation of the 48V electrical system with a completely connected 48-V battery.



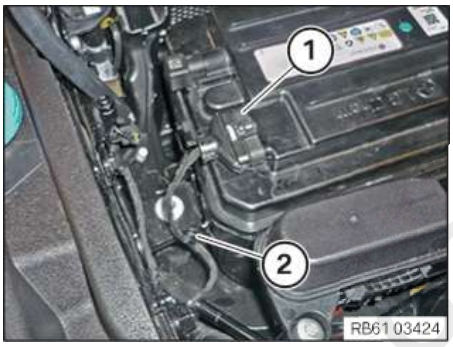
- Lift battery earth lead (1).
- Remove special tool .



- Release the negative battery cable (2) of the 48-V battery from the mounting.
- Position the negative battery cable (2) of the 48-V battery on the negative battery terminal.
- Tighten nut (1).

Negative battery cable to 48-V battery

Nut M8		Tightening torque	19 Nm



- Connect the connector (1) of the CAN bus and lock it.
- Clip in clip (2).

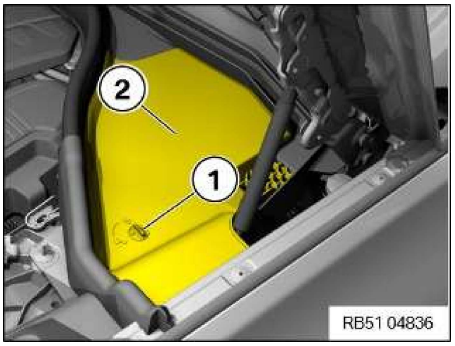


- Activate the 48V electrical system by closing the bonnet.

  The activation takes place automatically.

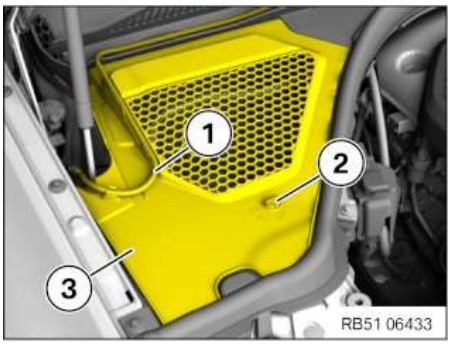
98 – Install the cover of the engine compartment on the rear left

cardiagn.com



- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

99 – Install the rear right engine compartment cover



- Position the cover of the engine compartment on the rear right (3).
- Close lock (2).
- Insert washer fluid hose (1) into the guides.

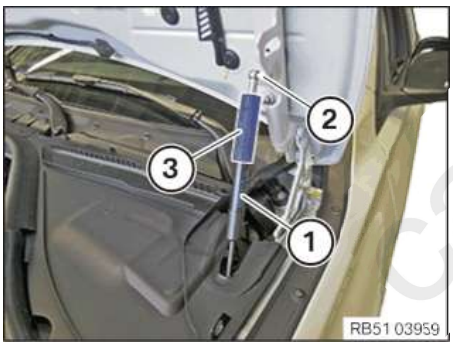
100 – Take bonnet out of the service position

CAUTION

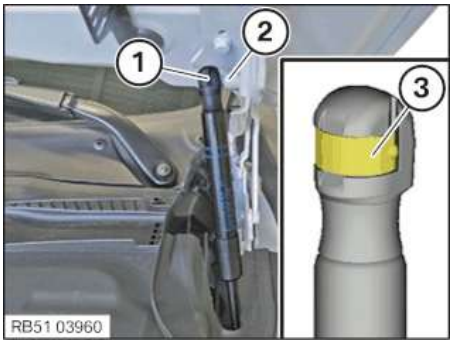
Shutting bonnet or tailgate.

Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.



- Support the bonnet by hand.
- Remove the special tool (3) from the ball pin (2).
- Pull off the special tool (3) from the gas pressure spring (1).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.



- Check the clamp (3) is fitted correctly.
- Connect ball socket (1) to ball pin (2).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.

Additional Information

Overview of Tightening Torques

Special tool 2 365 488 to engine Used in step 4256

M8x60		Tightening torque		19 Nm

Intake and exhaust camshaft in camshaft support			Used in step 48
M6x31		Tightening torque	10 Nm

Bearing journal to cylinder head			Used in step 51
M16x1.5	Replace bearing journal.	Tightening torque	20 Nm

Standard screw connection M8			Used in step 51
M8		Tightening torque	19 Nm

Chain tensioner piston to cylinder head			Used in step 52
22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

Holder to crankcase			Used in step 52
M8X16		Tightening torque	19 Nm

Camshaft sprocket to camshaft			Used in step 53
M7x17.			17 Nm

Starter motor to engine			Used in step 59
M8X60		Tightening torque	19 Nm

Battery positive lead to starter			Used in step 59
M8		Tightening torque	13,5 Nm

Diesel particulate filter V-clip to exhaust turbocharger			Used in step 61
V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

Bracket to diesel particulate filter top			Used in step 61
M8		Tightening torque	19 Nm

Bracket to transmission for diesel particulate filter holder bottom			Used in step 61
M8X20		Tightening torque	19 Nm

Lower holder to diesel particulate filter			Used in step 61
M8		Tightening torque	19 Nm

Coolant lines for SCR metering module			Used in step 61
M6X16		Tightening torque	8 Nm

Nitrogen oxide sensor before SCR catalytic converter			Used in step 62
Sensor		Tightening torque	50 Nm

Monitoring oxygen sensor			Used in step 63
Sensor		Tightening torque	50 Nm

Rear silencer to body / bumper support			Used in step 64
M8	Replace nuts.	Tightening torque	19 Nm

Exhaust system to rear axle carrier			Used in step 64
M8 nut		Tightening torque	19 Nm

Exhaust system to transmission			Used in step 64
M8		Tightening torque	19 Nm

Exhaust system to diesel particle filter			Used in step 64
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

cardiagn.com

SCR metering module V-clip to exhaust system			Used in step 64
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm

Exhaust-gas temperature sensor upstream of SCR catalytic converter			Used in step 64
Sensor		Tightening torque	30 Nm

Diesel particulate sensor to exhaust system			Used in step 64
Sensor		Tightening torque	50 Nm

Nitrogen oxide sensor downstream of SCR catalytic converter			Used in step 64
Sensor		Tightening torque	55 Nm

Connecting support to tunnel			Used in step 65
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

Diffuser / underbody panelling			Used in step 66
Nuts and screws		Tightening torque	3 Nm

Underbody protection			Used in step 6769
Hexagon screw		Tightening torque	3 Nm

Underbody panelling			Used in step 68
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Underbody protection, steering, to front axle support			Used in step 70
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support			Used in step 70
Hexagon bolt M6		Tightening torque	8 Nm

Underbody protection of the steering gear			Used in step 71
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

Wheel arch trim panel, front			Used in step 71
Thermoplastic hexagon screw		Tightening torque	2,6 Nm

Underbody protection front			Used in step 72
Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Cylinder head cover to cylinder head			Used in step 73
M6		Tightening torque.	8,5 Nm

Heat shield to exhaust manifold			Used in step 74
M6x12			10 Nm

Bracket on cylinder head cover			Used in step 75
		Tightening torque	5 Nm

Battery positive lead to battery positive terminal			Used in step 75
M8		Tightening torque	19 Nm

cardiagn.com

Differential pressure sensor of diesel particulate filter on cylinder head cover — Used in step 76

TS5x20		Tightening torque	4 Nm

Heat shield to exhaust manifold — Used in step 77

M6x12		Tightening torque	10 Nm

Banjo bolt for exhaust pressure pipe to exhaust manifold — Used in step 77

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm

Exhaust gas pressure pipe to sensor system holder — Used in step 77

TS6x20		Tightening torque	5,7 Nm

Clamping claw facing to cylinder head cover — Used in step 78

M6		Tightening torque	10 Nm

Injector to cylinder head cover — Used in step 78

M8		Tightening torque	8 Nm
		Angle of rotation	120 °

Rail to cylinder head cover — Used in step 79

M8		Tightening torque	19 Nm

High pressure lines between high pressure pump and rail — Used in step 80

High-pressure pipe		Tightening torque	24.5 Nm

High pressure lines between injector and rail — Used in step 81

High-pressure pipe		Tightening torque	24.5 Nm

Intake plenum to cylinder head — Used in step 83

M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum — Used in step 83

		Tightening torque	10 Nm

Electric changeover valve to intake plenum — Used in step 83

TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold — Used in step 84

TS5x20		Tightening torque	3,6 Nm

Standard screw connection 4 Nm — Used in step 84

Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover — Used in step 84

TS5x20		Tightening torque	3,6 Nm

Standard screw connection M6 — Used in step 84

M6		Tightening torque	8 Nm

Battery positive lead on the starter motor generator — Used in step 84

M8		Tightening torque	19 Nm

Holder on intake plenum — Used in step 84

TS6X20		Tightening torque	5 Nm

Clean air pipe to exhaust turbocharger — Used in step 87

M6X20		Tightening torque	8 Nm

cardiagn.com

Clean air pipe to upper section of intake filter housing — Used in step 87

Clamp		Tightening torque	3 Nm

Bulkhead lower part to body — Used in step 91

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead — Used in step 92

		Tightening torque	3 Nm

Tension strut on bulkhead — Used in step 92

M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome — Used in step 92

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm — Used in step 95

Combination hexagon nut		Tightening torque	35 Nm

Negative battery cable to 48-V battery — Used in step 97

Nut M8		Tightening torque	19 Nm

Overview of Special Tools

0 493 339 (13 5 252) Bush

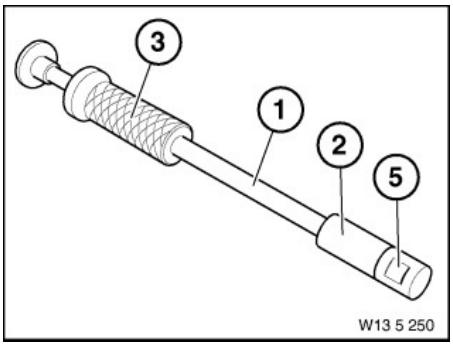


Common — Used in step 23

Usage	(Threaded bush)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

carsiagn.com

0 493 321 (13 5 250) Puller



Common Used in step 23

Usage	For removing injector nozzles or injectors from cylinder head
Included in the tool or work	
Storage location	A16
Replaced by	
In connection with	
SI-Number	01 06 98 (306)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 338 (13 5 251)		**Rod** (guide rod)	
2	0 493 339 (13 5 252)		**Bush** (Threaded bush)	
3	0 493 340 (13 5 253)		**Weight** (Weight)	
4	0 493 379 (13 5 254)		**Claw** (Clamping claw) For removal of injector nozzles / engine: M57	
5	0 495 579 (13 5 255)		**Adapter** For removing steering shaft on E85. Refer to SI 01 11 06 (265)	

cardiagn.com

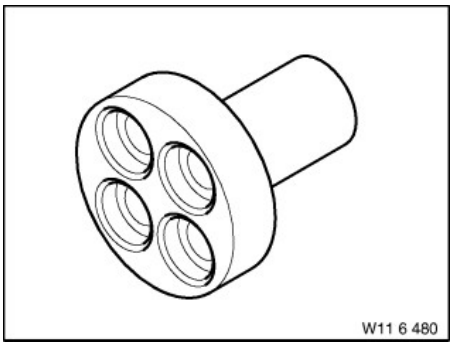
0 493 340 (13 5 253) Weight



Common Used in step 23

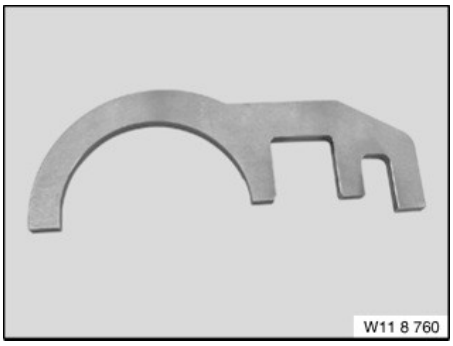
Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 380 (11 6 480) Connector



Common	Used in step 4256
Usage	For turning over engine at crankshaft hub (vibration absorber).
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	01 11 98 (338)

0 496 112 (11 8 760) Gauge



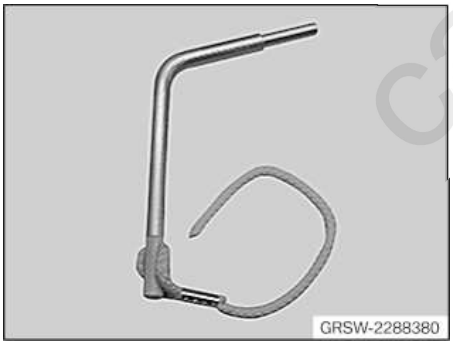
Common	Used in step 424649545657
Usage	For securing camshaft at TDC.
Included in the tool or work	
Storage location	B24
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

2 365 488 Adapter



Common	Used in step 42555658
Usage	For disconnecting the crankshaft at the top dead centre. (longitudinal installation with automatic transmission only).
Included in the tool or work	
Storage location	C56
Replaced by	
In connection with	
SI-Number	01 46 14 (191)

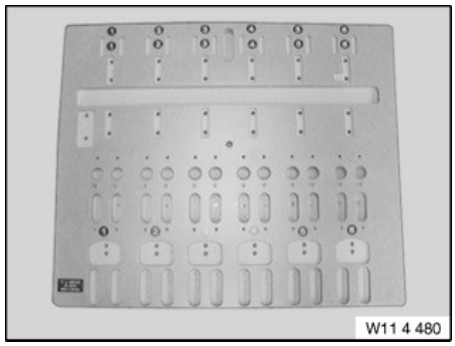
2 288 380 Locating stud



Common	Used in step 42555658
Usage	For disconnecting the crankshaft at the top dead centre. Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).
Included in the tool or work	
Storage location	A56
Replaced by	
In connection with	
SI-Number	01 04 14 (071)

cardiagn.com

0 495 105 (11 4 480) oddments tray



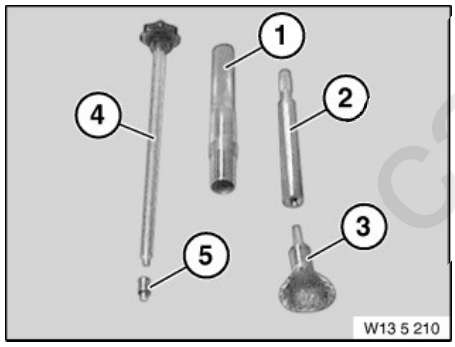
Common Used in step 47

Usage	(Boards (2 pieces)) For setting down the individual components of the cylinder head.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 17 04 (130)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 495 106 (11 4 481)		**oddments tray** (Board, intake side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	
2	0 495 107 (11 4 482)		**oddments tray** (Board, exhaust side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	

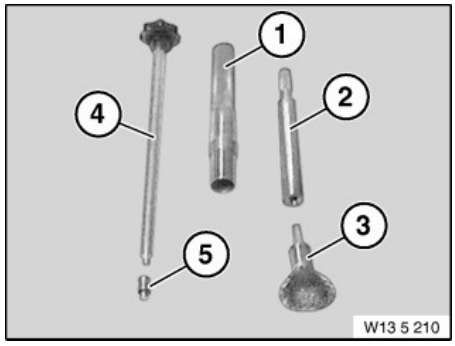
0 493 763 (13 5 215) Plug



Common Used in step 78

Usage	(Seal plug)
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 762 (13 5 214) Rod

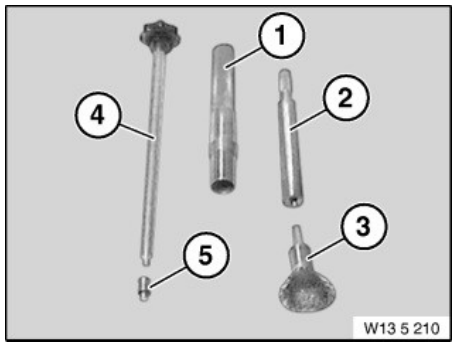


Common Used in step 78

Usage	(Mounting rod) For the seal plug
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

cardiagn.com

0 493 758 (13 5 210) Tool



Common

Used in step 78

Usage	(Cleaning set) For injector channels
Included in the tool or work	
Storage location	B4
Replaced by	
In connection with	
SI-Number	01 05 00 (574)

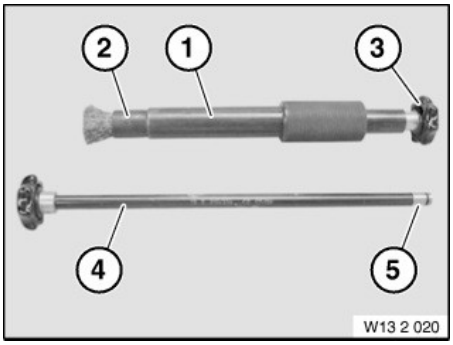
Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 759 (13 5 211)		**Holding sleeve** (Guide sleeve)	
2	0 493 760 (13 5 212)		**Holder** (Brush holder)	
3	0 493 761 (13 5 213)		**Brush head**	
4	0 493 762 (13 5 214)		**Rod** (Mounting rod) For the seal plug	
5	0 493 763 (13 5 215)		**Plug** (Seal plug)	

0 496 150 (13 2 020) Tool

Used in step 78

cardiagn.com



Common

Usage	(Cleaning kit) For cleaning the injector shaft.
Included in the tool or work	
Storage location	A87
Replaced by	
In connection with	
SI-Number	01 07 07 (355)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 496 151 (13 2 021)		**Holding sleeve** (Guide sleeve) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
2	0 496 152 (13 2 022)		**Holder** (Brush holder) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
3	0 496 153 (13 2 023)		**Brush head** Remaining inventories will be sold off, followed by discontinuation and then available as part of complete special tool 13 2 020 = 83 30 0 496 150 only	
4	0 496 154 (13 2 024)		**Rod** (Mounting rod) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
5	0 496 155 (13 2 025)		**Plug** (Seal plug) Available as part of complete special tool 13 2 020 = 83 30 0 496 150 only.	

Overview Technical Data

Distance from window pane edge to wiper blade — Used in step 95

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

Links

Repair instructions (PRE)	Used in step
Notes on 48-V battery	497

General repair instructions	Used in step
11 00 ... Overview of consumables (Electronic Parts Catalogue)	78

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	596
61 20 900 Disconnecting and connecting battery earth lead	596
61 20 900 Disconnecting and connecting battery earth lead	596
61 20 900 Disconnecting and connecting battery earth lead	596

cardiagn.com

61 20 900 Disconnecting and connecting battery earth lead	596
61 20 900 Disconnecting and connecting battery earth lead	596
61 20 900 Disconnecting and connecting battery earth lead	596
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	596
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	596
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	596
61 20 900 Disconnecting and connecting battery earth lead	596
61 20 900 Disconnecting and connecting battery earth lead	596
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	596
61 20 900 Disconnecting and connecting battery earth lead	596
61 20 900 Disconnecting and connecting battery earth lead	596
61 20 900 Disconnecting and connecting battery earth lead	596
61 20 900 Disconnecting and connecting battery earth lead	596
61 20 900 Disconnecting and connecting battery earth lead	596
61 20 900 Disconnecting and connecting battery earth lead	596
61 20 900 Disconnecting and connecting battery earth lead	596
61 20 900 Disconnecting and connecting battery earth lead	596
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	596
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	596
61 20 900 Disconnecting and connecting battery earth lead	596
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	596
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	596
61 20 900 Disconnecting and connecting battery earth lead

11 31 025 Removing and installing/replacing intake camshaft

PRELIMINARY WORK

1 – Bring front compartment lid in the service position

Prerequisite

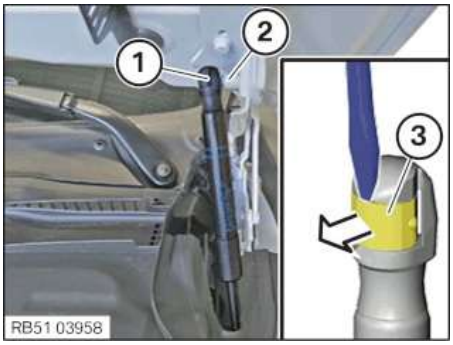
Engine compartment lid is open.

CAUTION

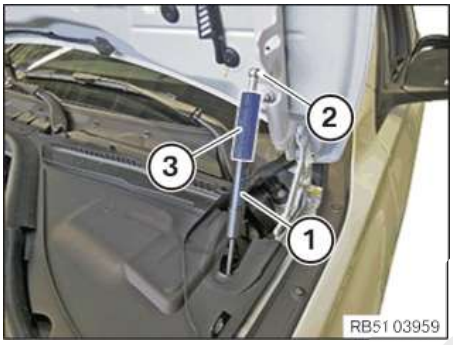
Shutting bonnet or tailgate.

Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.



- Lift clamp (3) slightly using a screwdriver, in the direction of the arrow.
- Lift off ball socket (1) from ball pin (2).
- Repeat the operation on the other side of vehicle.



TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

- Remove the bonnet support and open the bonnet further.
- Pull special tool or or (3) over gas pressure spring (1).
- Place special tool on the ball pin (2) and engage using force.
- Repeat the operation on the other side of vehicle.

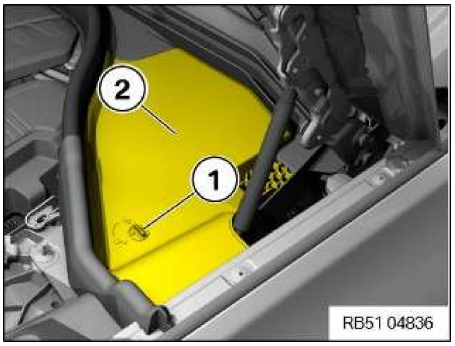
2 – Disconnecting all battery earth leads



- See additional information.

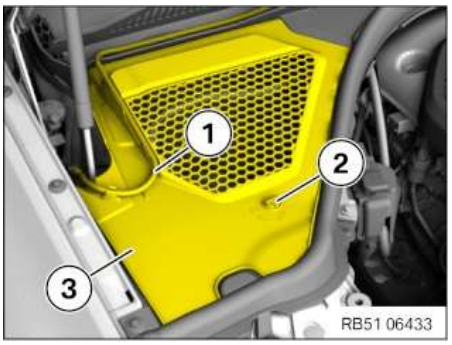
3 – Remove the cover of the engine compartment at the rear left

cardiagn.com



- Loosen the lock (1).
- Remove the cover (2) of the rear left engine compartment.

4 – Remove the cover of the rear right engine compartment



- Release washer fluid hose (1) from the guides.
- Loosen the lock (2).
- Remove the cover (3) of the rear right engine compartment.

5 – Removing the wiper arm on the left and right

NOTICE

Description is for left component only. Procedure on the right side is identical.

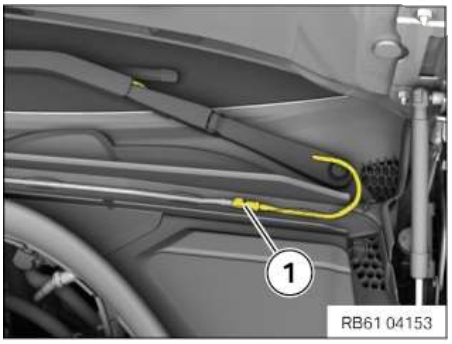
▸ **Remove the wiper arm**

RISK OF DAMAGE

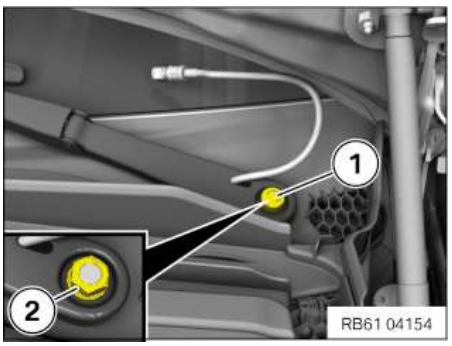
Damage to wiper console.

While removing the wiper arms without using special tool, the wiper console can break.

- Removing the wiper arms must be carried out only using the prescribed special tool.
- Do **not** lever off the wiper arm because otherwise the wiper console may break at the predetermined breaking point for active pedestrian protection.

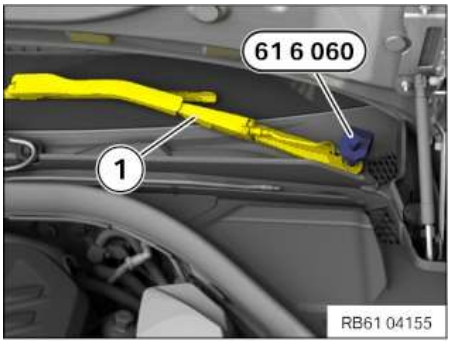


- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.



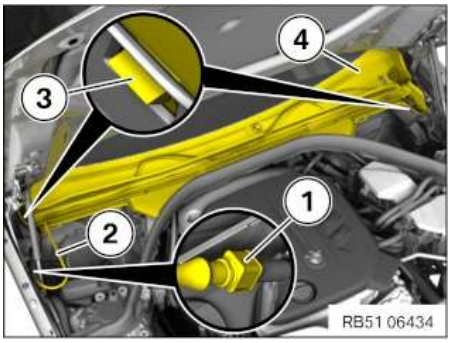
- Remove the protective cap (1).
- Loosen nut (2).

cardiagn.com

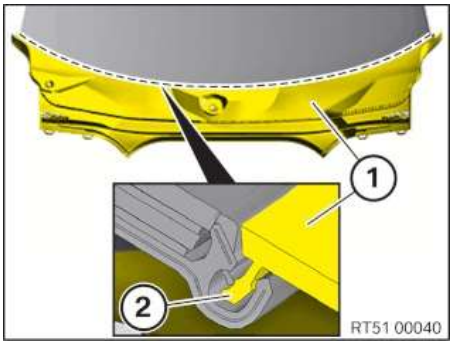


- Pull off the wiper arm (1) using special tool .

6 – Remove cowl panel cover



- Release snap fastener (1) of the washer fluid hose (2) and put the washer fluid hose (2) to one side.
- Unclip clips (3) on the cowl panel cover (4).



- Pull the cowl panel cover (1) upward out of the latch mechanism (2) beginning on the side.

7 – Remove the seal for the rear bonnet

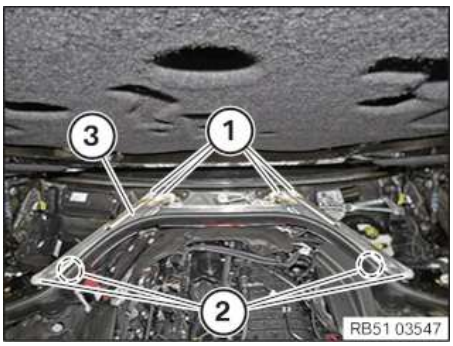


- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

8 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

Driving without the strut brace/front-end strut or tension strut is not permitted.

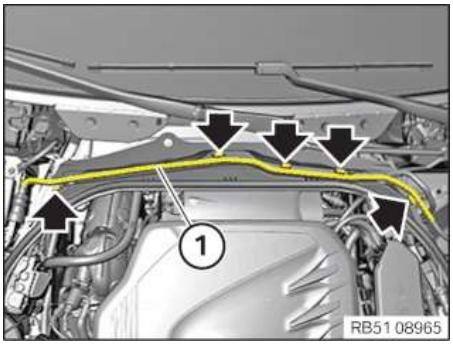


NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

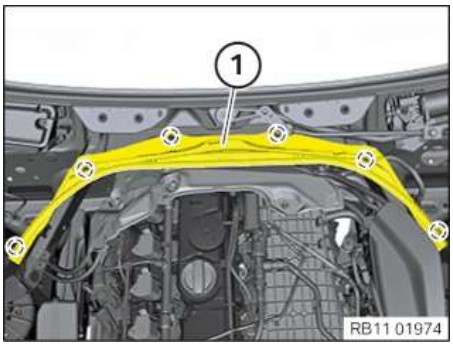
- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.

bardiagn.com



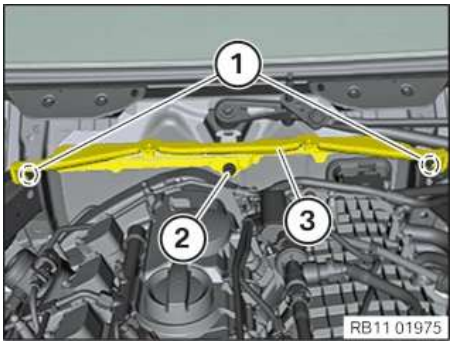
- **Version with mild hybrid technology:**

  Unclip the wire (1) at the holders (arrows).



- Unscrew the bolts in the marked areas.
- Remove the centre bulkhead upper part (1).

9 – Removing the centre bulkhead lower section



- Loosen screws (1).
- Loosen nut (2).
- Remove the centre bulkhead lower part (3).

10 – Removing the acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

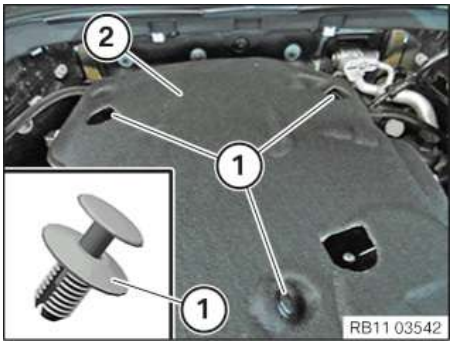
- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

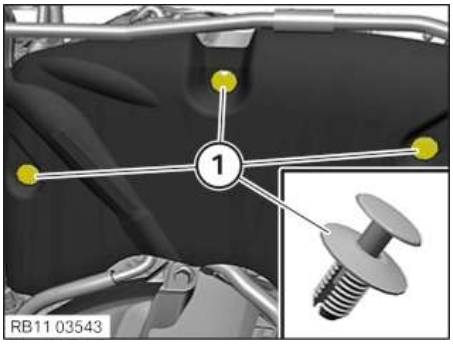
11 – Remove the acoustic cover for the injectors

cardiagn.com

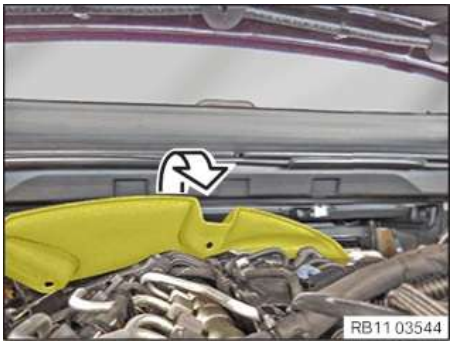


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

12 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).



- Guide out and remove the acoustic cover in the direction of the arrow.

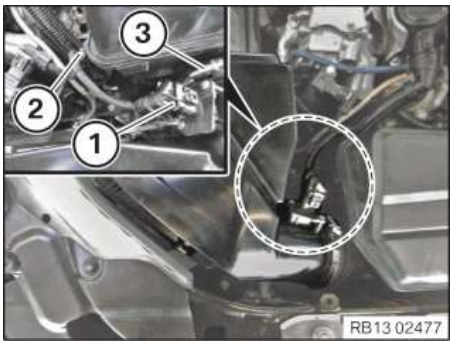
13 – Removing the clean air pipe with the resonator

WARNING

Hot surfaces.

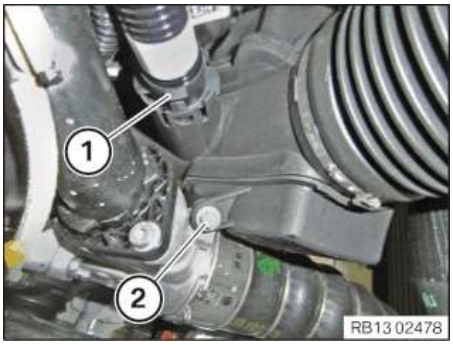
Risk of burning!

- Perform all work only on components that have cooled down.

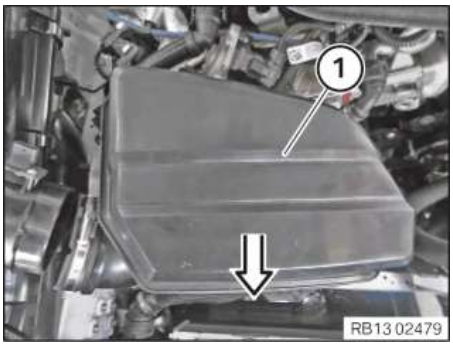


- Unlock plug connection (1) and disconnect.
- Loosen clamp (2).
- Unfasten clamp (3).
- Separate the clean air pipe with resonator from the intake filter housing.

cardiagn.com



- Unlock engine ventilation line (1), disconnect it and place it aside.
- Loosen screw (2).



- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Unlock and loosen clamp (1).



- Feed out and remove clean air pipe with resonator (1) in the direction of the arrow.

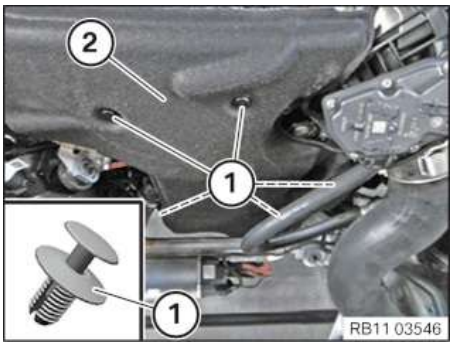
14 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.



- Release and remove expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

cardiagn.com

15 – Partially releasing the wiring harness section on the intake plenum

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

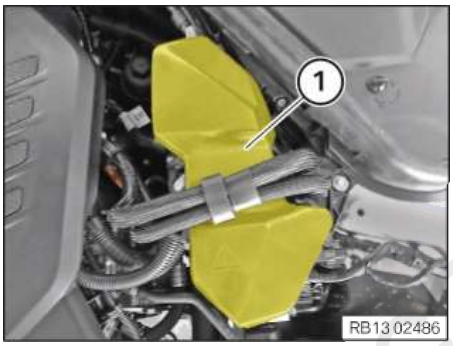
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

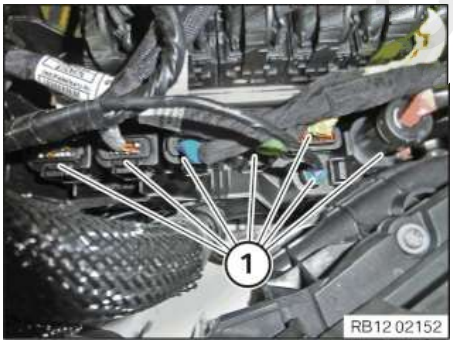
- Do not pull on the wires when disconnecting connectors and plug connections.

TECHNICAL INFORMATION

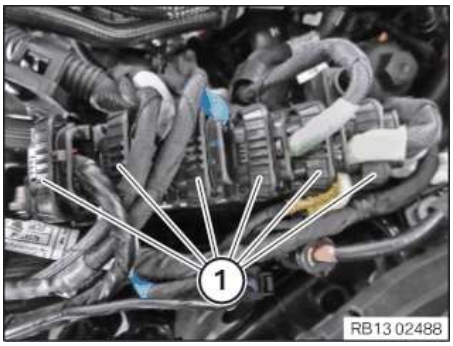
Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.



- Pull off cover (1) upwards, feed out and remove.

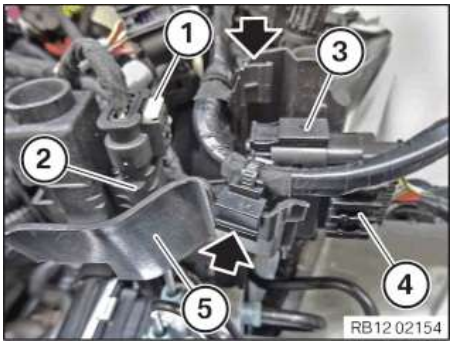


- Unlock and disconnect plug connections (1).

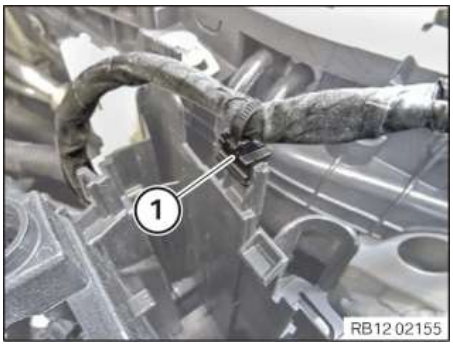


- Unlock and disconnect plug connections (1).

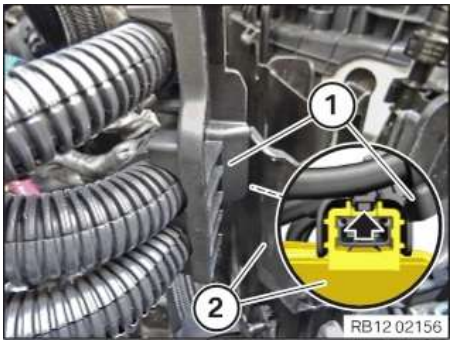
ardiagn.com



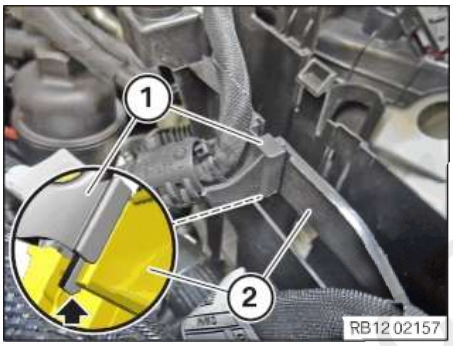
- Unlock plug connection (1) and disconnect.
- Unlock the plug (2) and disconnect from the control unit holder (5).
- Unlock plug connection (3) and disconnect.
- Unlock the plug (4) and disconnect from the control unit holder (5).
- Release the clamps (arrows).



- Loosen clamp (1).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).

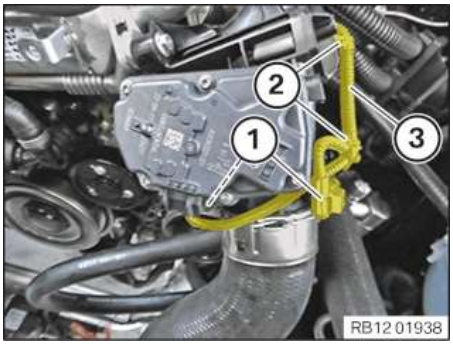


- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.

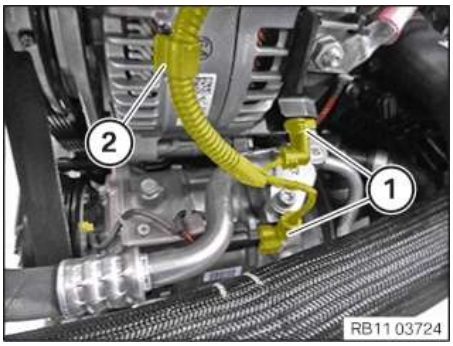


- Unlock holder (1) and feed out coolant line (2) and place it aside.

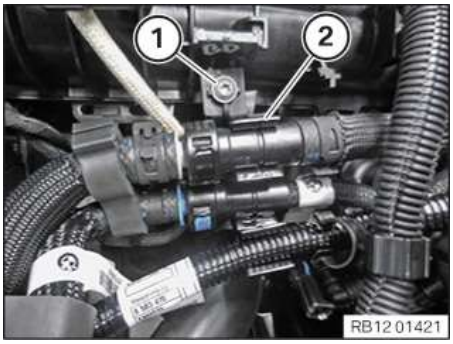
gardiagn.com



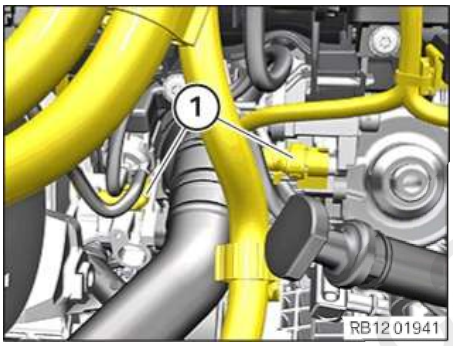
- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.



- Unlock and separate plug connections (1).
- Release the holder (2) from the alternator .



- Loosen screw (1).
- Thread out holder (2) and set aside.



- Unlock and disconnect plug connections (1).

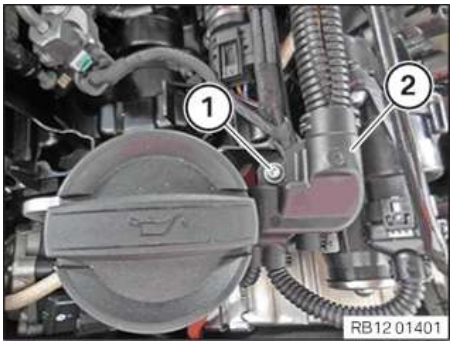


- Unlock and loosen connector (1).

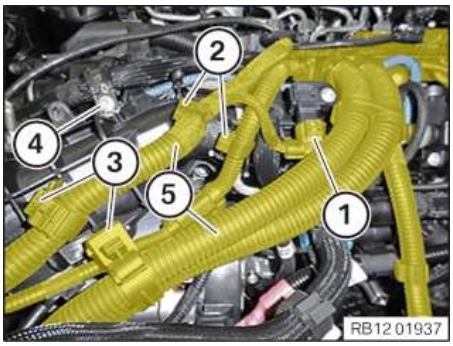


- Unlock plug connection (1) and disconnect.

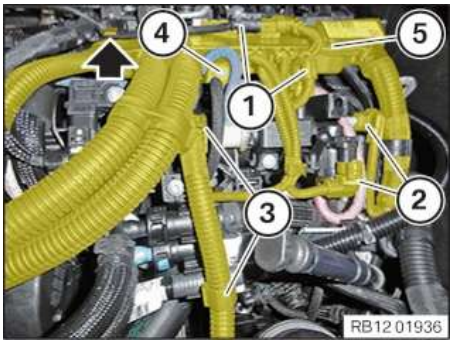
cardiagn.com



- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.



- Unlock plug connection (1) and disconnect.
- Loosen clamps (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.



- Unlock and disconnect plug connections (1).
- Release line from clamp (Arrow).
- Unlock and disconnect plug connections (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.

16 – Removing the intake plenum

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

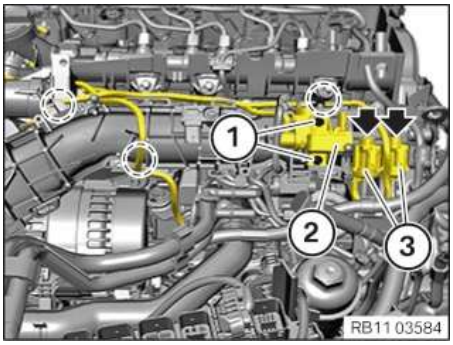


- Unlock clamp (1) and engage in this position.

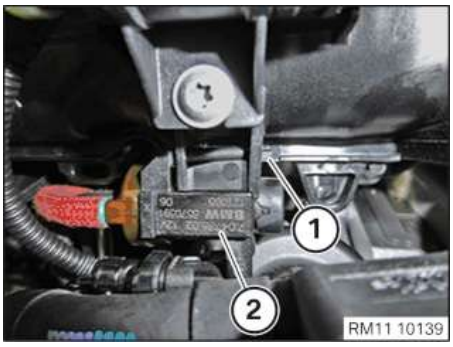


- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.

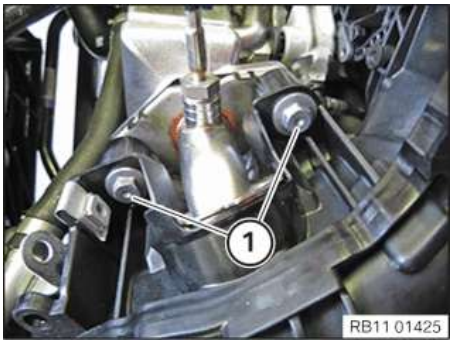
cardiagn.com



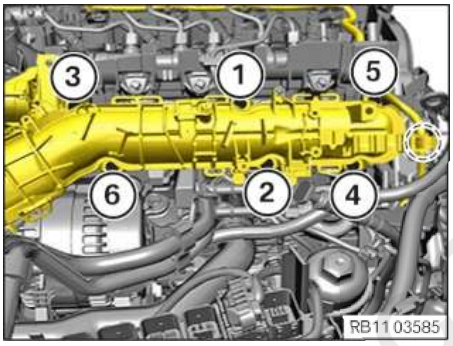
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



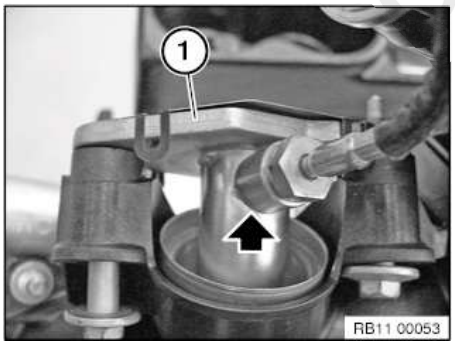
- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.



- Loosen screws (1).



- Detach the leakage oil lines in the marked area from the intake plenum.
- Loosen screws in the order (6) to (1).
- Guide the intake plenum out forwards and remove it.



- Remove the exhaust-gas recirculation pipe (1) (arrow).

17 – Detaching the leakage oil line from the injectors

cardiagn.com

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

WARNING

Hot surfaces.

Risk of burning!

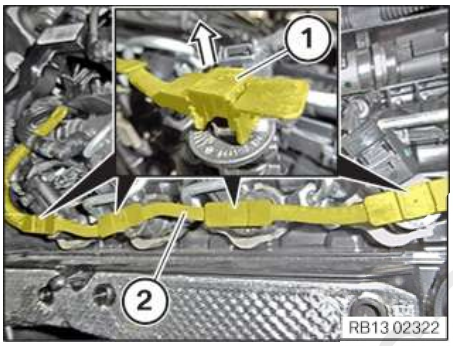
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

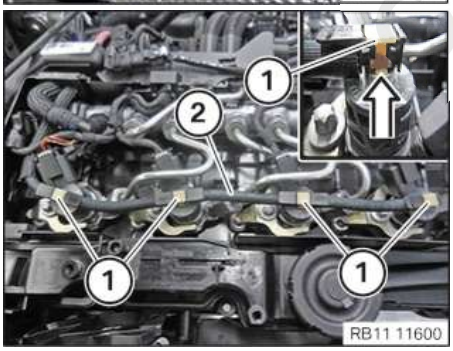


- **Version A:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.

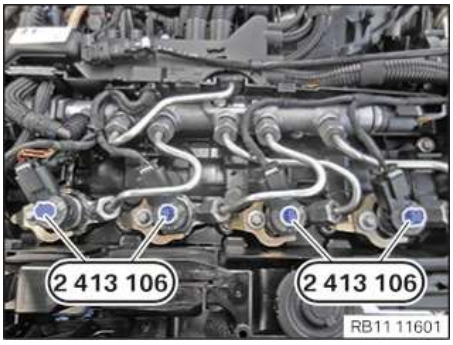


- **Version B:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.



- Seal open connections with special tools .

18 – Remove the high pressure lines between the injector and the rail

cardiagn.com

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

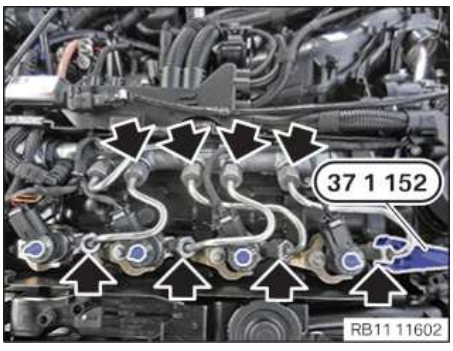
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

If several high pressure lines are removed, ensure that each high pressure line is installed in its original location. Label high pressure lines.

TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.



- Release the high pressure lines (arrows) with the special tool .
  Reset the special tool early on to prevent bending of the high pressure line.
- Catch and dispose of escaping fuel.
- Feed out and remove the high pressure lines (arrows).
- Seal off all the open cable connections with the special tool .

cardiagn.com

19 – Remove the high pressure line between the high pressure pump and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Hot fluids.

Risk of scalding!

- Conduct all work in the vehicle wearing appropriate personal protective equipment only.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

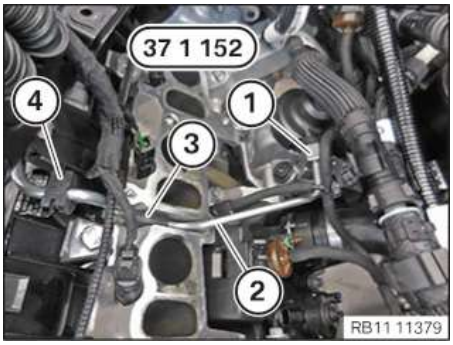
TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.

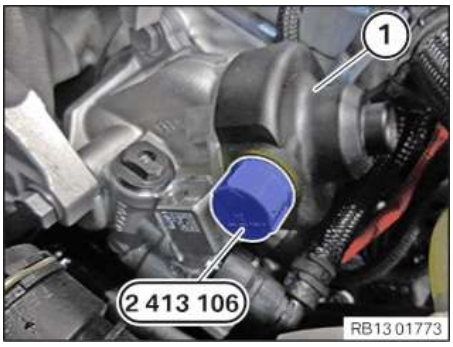


- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.

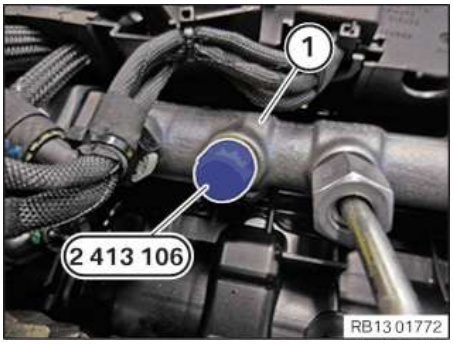
cardiagn.com



- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.
- Guide out and remove the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).



- Seal off the opening at the high pressure pump (1) with the special tool .



- Seal off the opening on the rail (1) with the special tool .

20 – Remove high-pressure rail

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

RISK OF DAMAGE

Contaminant or foreign body.

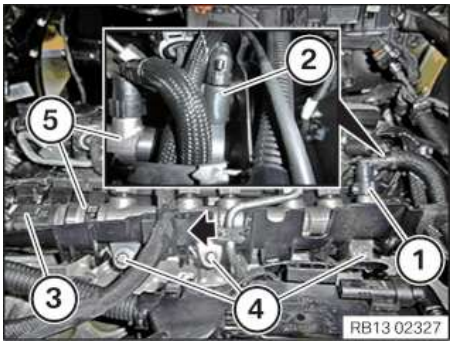
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

cardiagn.com



- Unlock and disconnect the fuel return line (1).
- Guide the fuel return line (1) out and set it aside.
- Unlock and disconnect the plug connection (2) on the rail pressure regulating valve.
- Unlock and disconnect the plug connection (3) on the rail pressure sensor.
- Unlock cable clip (Arrow), feed out and place aside.
- Loosen screws (4).
- Thread out and remove the rail (5).

21 – Remove all injection systems

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

cardiagn.com

RISK OF DAMAGE

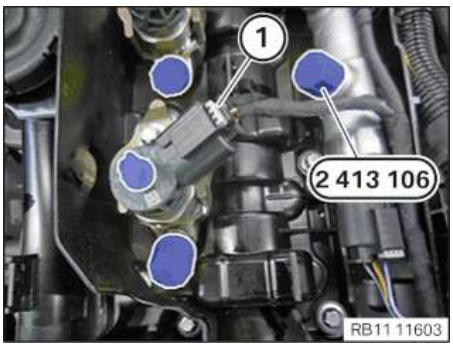
Electrostatic discharge.

Damage to or destruction of electrical components.

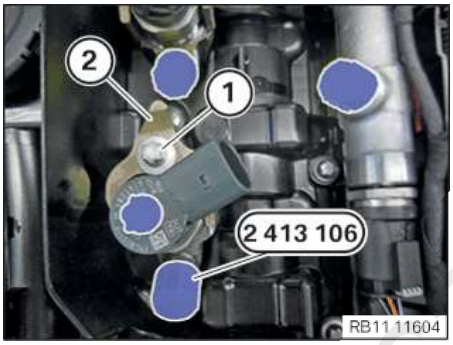
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

TECHNICAL INFORMATION

If several injectors are removed, ensure that each injector is installed at its original location (cylinder). Mark injectors.



- Unlock plug connection (1) and disconnect.



- Loosen screw (1).
- Guide out and remove clamping claw (2).
- Feed out and remove the injector with slight rotational movements.

▸ **Loosen stuck injectors**

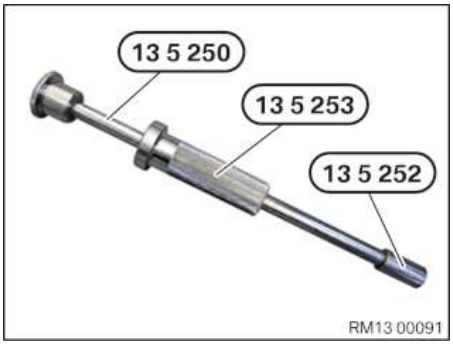
RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

cardiagn.com



- Unscrew special tool 0 493 339 (13 5 252) from special tool 0 493 321 (13 5 250) and remove special tool 0 493 340 (13 5 253).
- Screw special tool 0 493 339 (13 5 252) back onto special tool 0 493 321 (13 5 250).

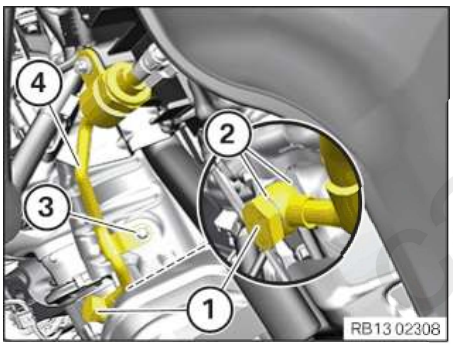


- Screw special tool 0 493 321 (13 5 250) with special tool 0 493 339 (13 5 252) onto pressure line connection (1) of injector.
- Release injector (1) with special tools 0 493 321 (13 5 250) and 0 493 339 (13 5 252) by means of **short** back and forth movements and remove.

22 – Remove the exhaust gas pressure pipe

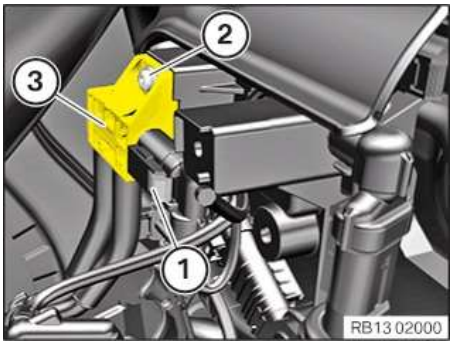


- Unlock plug connection (1) and disconnect.
- Loosen screw (2).



- Unscrew the banjo bolt (1).
- Feed out and remove the sealing rings (2).
- Loosen screw (3).
- Feed out and remove the exhaust gas pressure pipe (4).

23 – Releasing the differential pressure sensor for the diesel particulate filter



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).
- Remove the differential pressure sensor (3) and put it to one side.

24 – Removing the sensor bracket on the cylinder head cover

carbagn.com

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

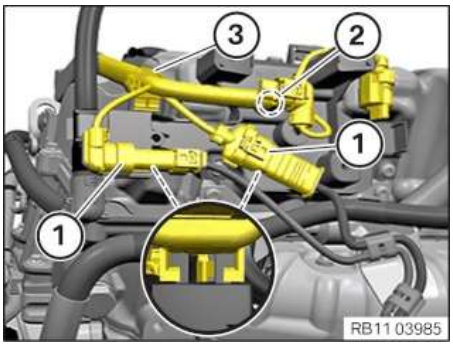
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

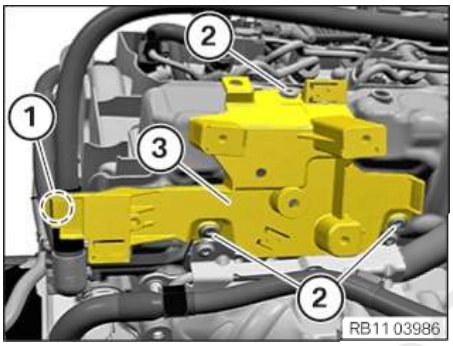
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

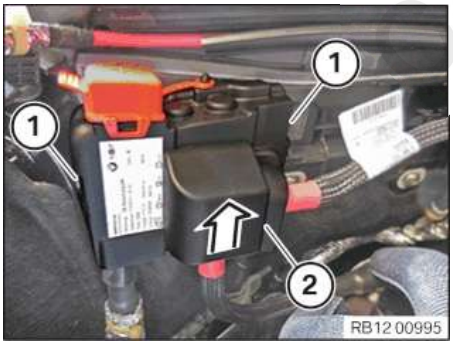
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



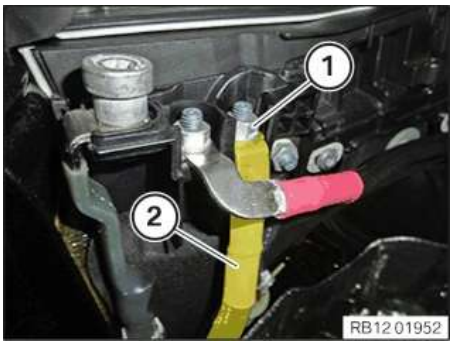
- Unlock plug connection (1) and disconnect.
- Unlock the plug connection (1) and release it from the sensor bracket.
- Release the cable clip in the area (2) from the sensor bracket.
- Release the clamps (3) and set the wiring harness section aside.



- Release the positive battery cable in the area (1) from the clamp and set it aside.
- Loosen screws (2).
- Feed out holder (3) for the sensor system and remove.

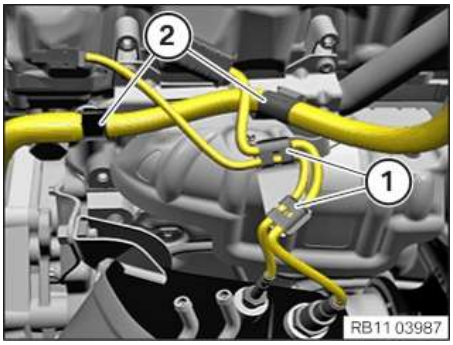


- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.

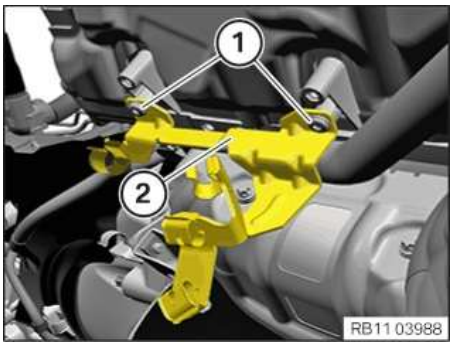


- Loosen nut (1).
- Feed out positive battery cable (2) and put to one side.

cardiagn.com

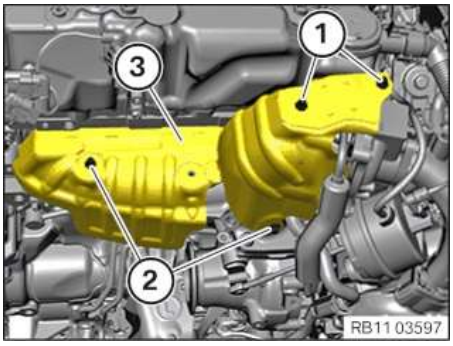


- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



- Loosen screws (1).
- Guide out and remove holder (2).

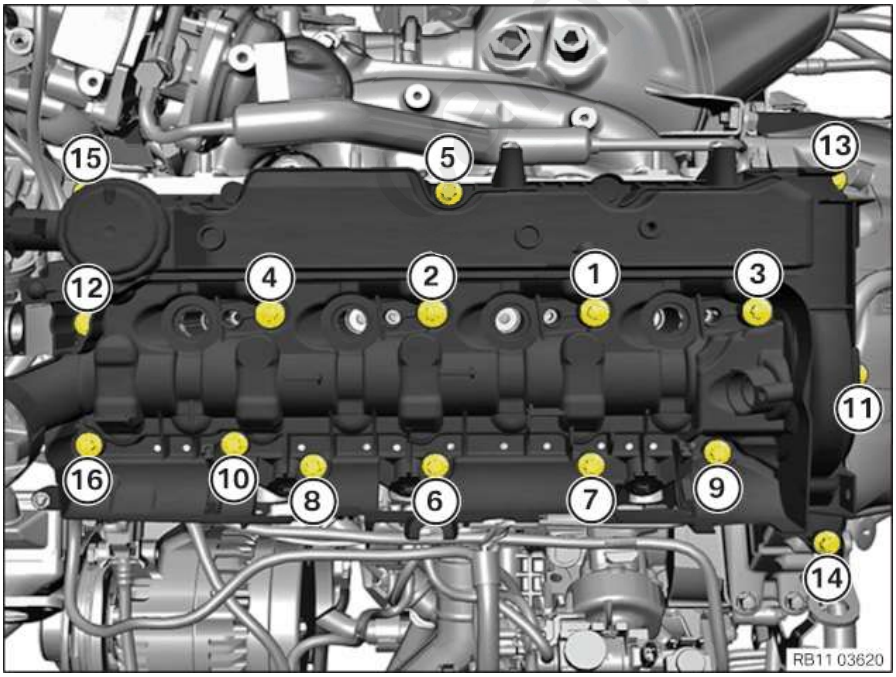
25 – Removing heat shield



- Loosen screws (1).
- Loosen screws (2).
- Feed out and remove the heat shield (3).

26 – Removing the cylinder head cover

Screw connection of the cylinder head cover



1 - 16 Bolts of the cylinder head cover

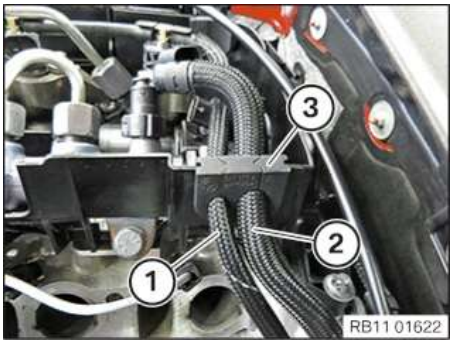
diagn.com



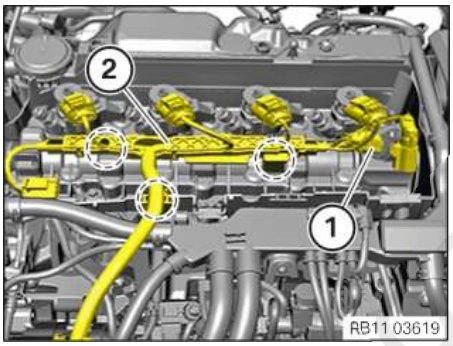
- Unlock and detach the locks.
- Feed the engine ventilation line (1) out and set it aside.



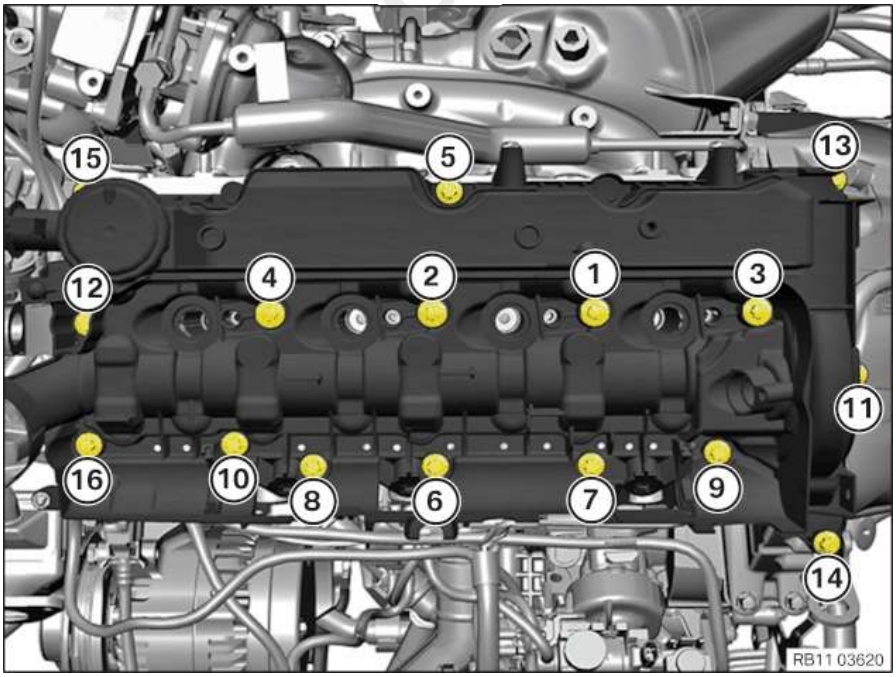
- Feed out and remove the heat shield (1).



- Remove the leakage oil line (1) including the fuel return line (2) and the grommet (3) and put to one side.

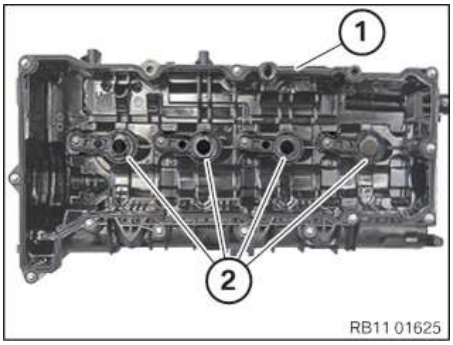


- Unlock connector (1) and pull off.
- Disconnect the wiring harness (2) in the marked areas from the cylinder head cover and set aside.



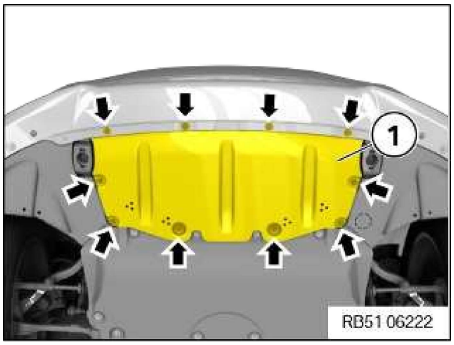
- Evenly loosen the screws in a sequence from (16) to (1).
- Feed out and remove the cylinder head cover.

cardiagn.com



- Remove the profile seals (1) and (2).

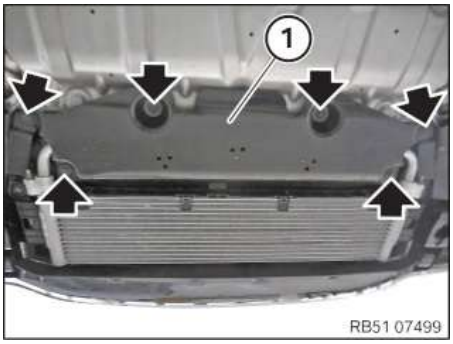
27 – Removing the front underbody protection



- **Version A:**

  Remove screws (arrows).

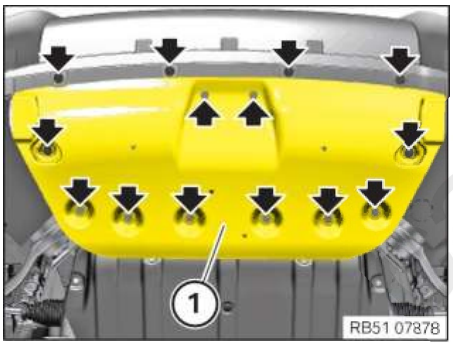
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version B:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

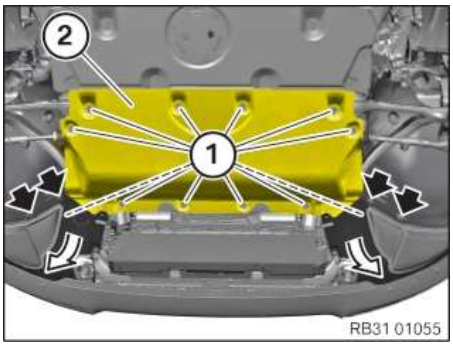


- **Version C:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

28 – Remove the underbody protection of the steering gear



- **Version A:**

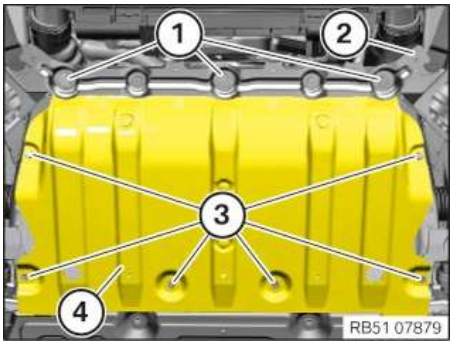
  Unscrew the screws (arrows) of the wheel arch cover on the wheel arch cover.

  Fold the bottom wheel arch cover to the side.

  Loosen screws (1).

  Remove the underbody protection (2) of the steering gear.

ardiagn.com



- **Version B:**

  Loosen screws (1).

  Remove the holder (2) for the underride protection.

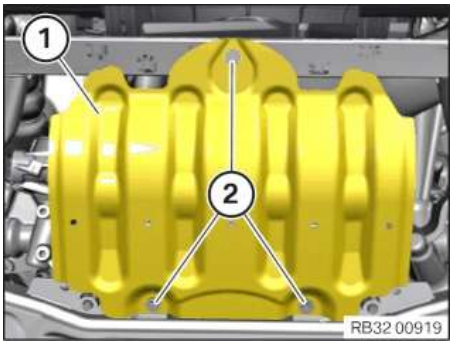
  Loosen screws (3).

  Feed out and remove the underbody protection (4) of the steering gear.

29 – If installed: Removing the steering underbody protection

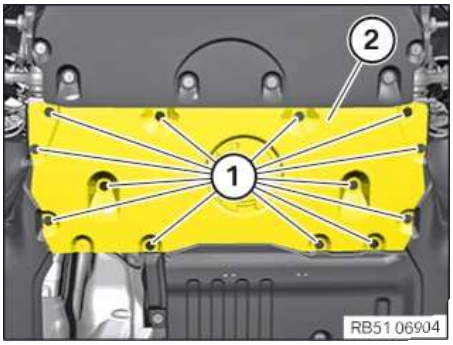
Prerequisite

Front underbody protection has been removed.



- Loosen screws (2).
- Remove underbody protection (1).

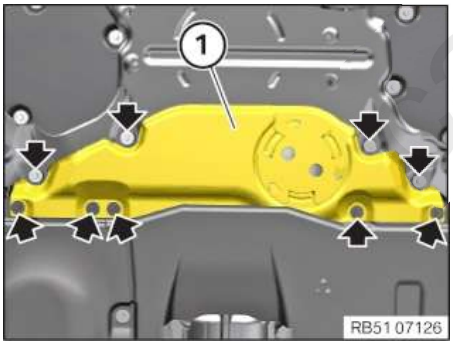
30 – Removing the centre underbody protection



- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .

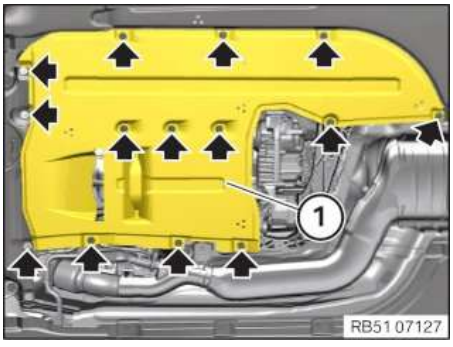


- **Version with all-wheel drive:**

  Remove screws (arrows).

  Feed out and remove the centre underbody protection (1).

31 – Remove rear underbody protection

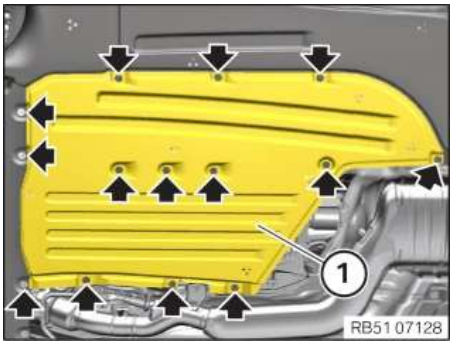


- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).

cardiagn.com



- **Version B:**

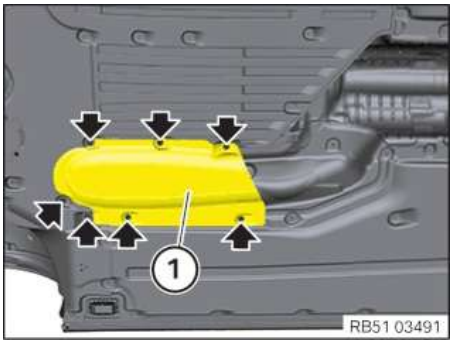
  Remove screws (arrows).

  Guide out rear underbody protection (1) and remove it.

32 – Remove the underbody panelling of the transmission on the side

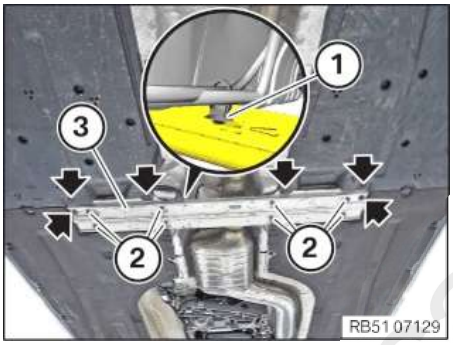
NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.



- Remove screws (arrows).
- Remove the underbody panelling (1).

33 – Remove the connecting support from the tunnel



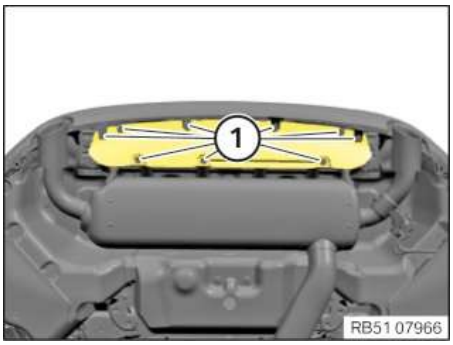
- Remove screws (arrows).

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

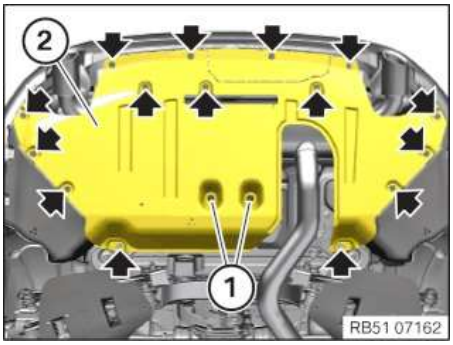
- Loosen clamp (1).
- Loosen screws (2).
- Guide out and remove connecting support (3) on the tunnel.

34 – Removing the rear diffuser



- **Version 1:**
- Release the screws and nuts (1).
- Remove the diffuser.

carolagn.com



- **Version 2:**
- Loosen nuts (1).
- Remove screws (arrows).
- Guide out and remove rear diffuser (2).

35 – Remove exhaust system

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

CAUTION

Component with heavy weight.

Danger of injury!

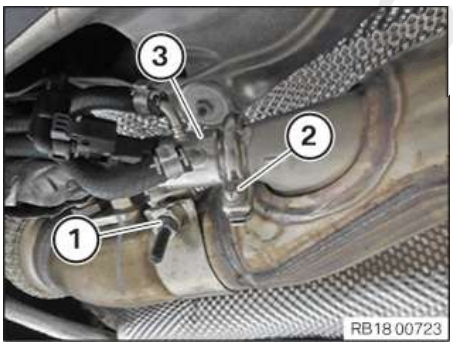
- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

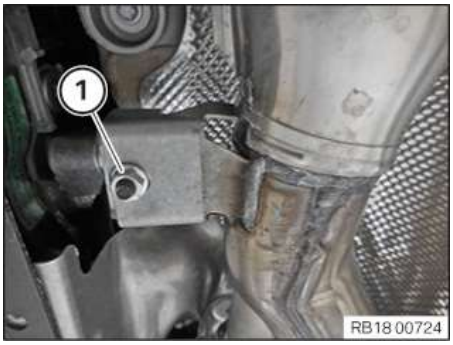
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

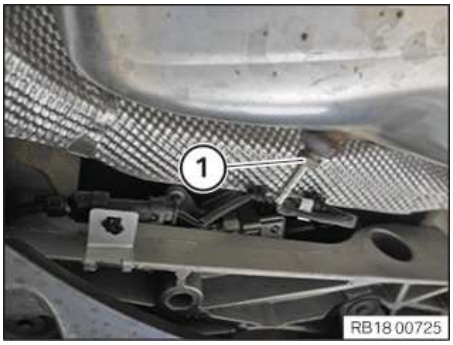


- Unfasten clamp (1).
- Detach the clamp (2) of the SCR metering module (3).
- Detach the SCR metering module (3)from the exhaust system and place to one side.

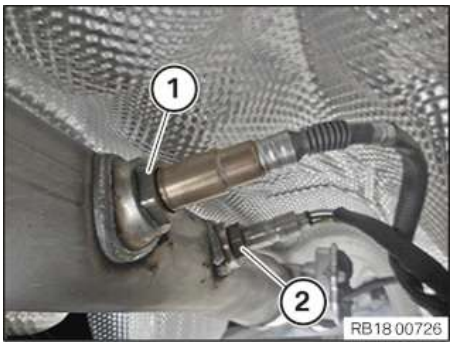


- Loosen nut (1).

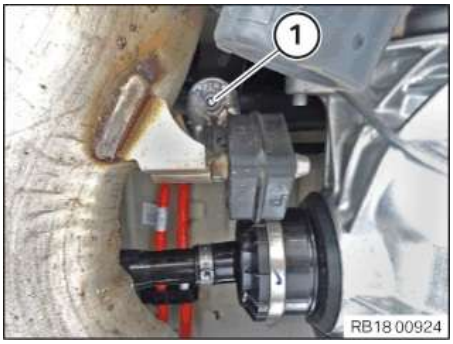
cardiagn.com



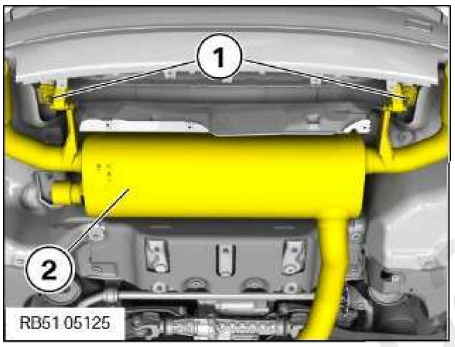
- Detach the exhaust temperature sensor (1) from the exhaust system.



- Release the diesel particulate sensor (1) from the exhaust system and place to one side.
- Release the nitrogen oxide sensor (2) from the exhaust system and place to one side.



- Release the nut (1) on the rear axle support.



- Loosen nuts (1).
- Lower and remove the exhaust system (2) with the assistance of a second person.

36 – Removing the monitoring oxygen sensor after the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

cardiagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

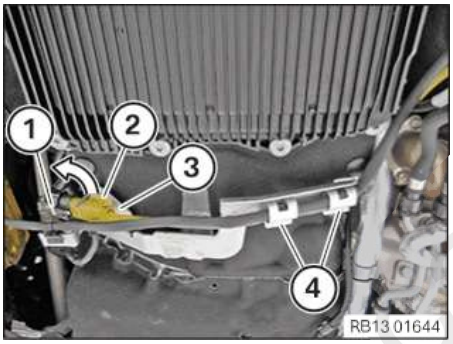
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



- Unlock and loosen connector (1).
- Loosen connector (2) from the holder (3) in direction of arrow.
- Release the monitoring oxygen sensor from the clamps (4).



- Release the monitoring oxygen sensor (1) with the standard tools.



- Thread out the monitoring oxygen sensor (1) and remove it.

carDiagn.com

37 – Removing the nitrogen oxide sensor before SCR catalytic converter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

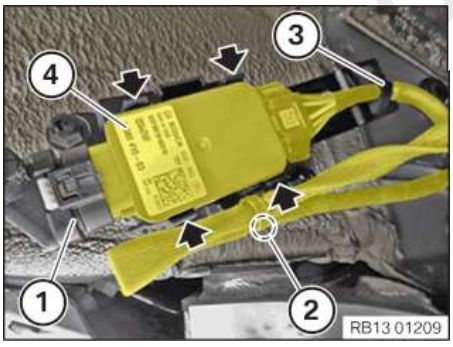
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

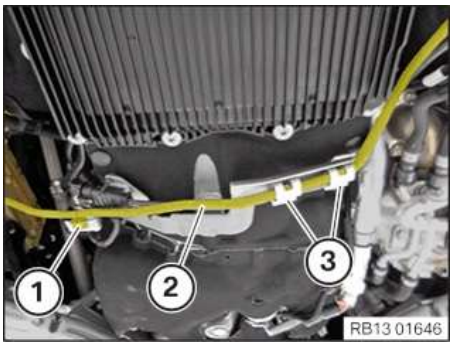
Damage to the nitrogen oxide sensor.

Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

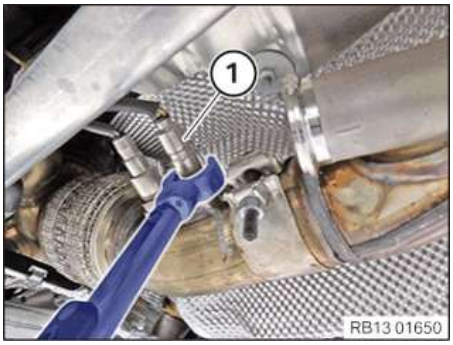
- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
- The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



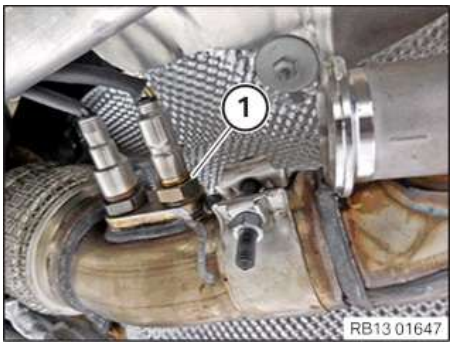
- Unlock plug connection (1) and disconnect.
- Release cable clip in area (2).
- Release line from the holder (3).
- Unclip control unit (4).



- Loosen clamp (1).
- Loosen the cables (2) from the clamps (3).



- Loosen the nitrogen oxide sensor (1) using commercially available tools.



- Feed out and remove the nitrogen oxide sensor (1).

38 – Removing the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

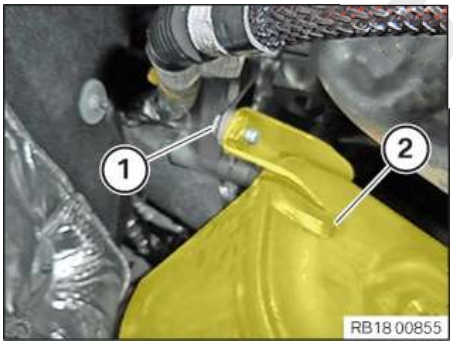
- Perform all work only on components that have cooled down.

CAUTION

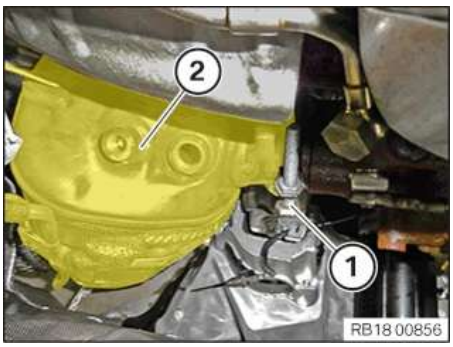
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

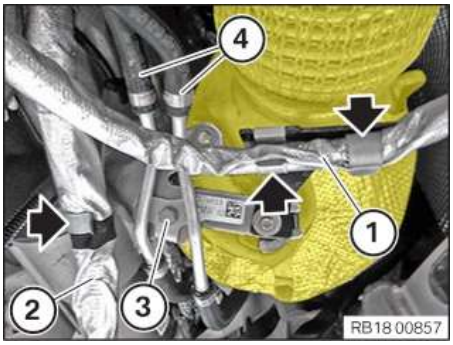


- Release bolt (1) from the holder of diesel particulate filter (2).

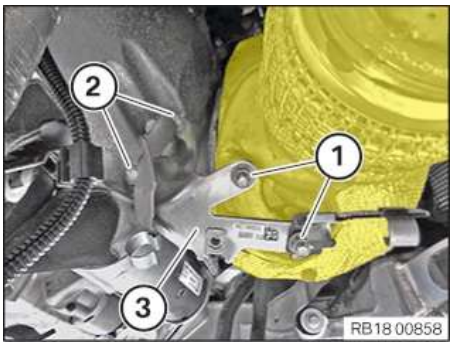


- Loosen V-band clamp (1).
- Feed V-clip (1) out from diesel particulate filter (2) and remove.

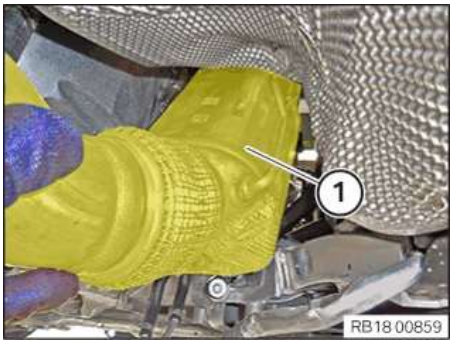
boardiagn.com



- Release the metering line (1) from clamps (Arrows).
- Release positive battery cable (2) from starter motor from clamp (Arrow).
- Loosen screw (3).
- Thread off coolant line (4) and place to the side.



- Loosen nuts (1).
- Loosen screws (2).
- Guide out and remove holder (3).



- Guide out and remove diesel particulate filter (1).

39 – Removing starter motor

Prerequisite

Battery earth leads are disconnected.

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

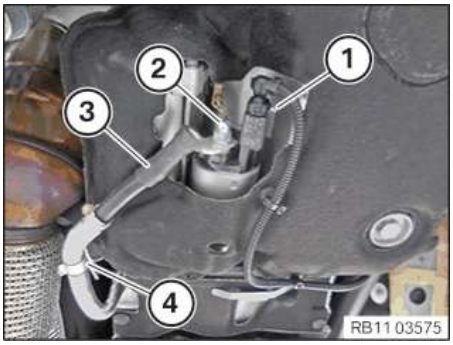
- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

TECHNICAL INFORMATION

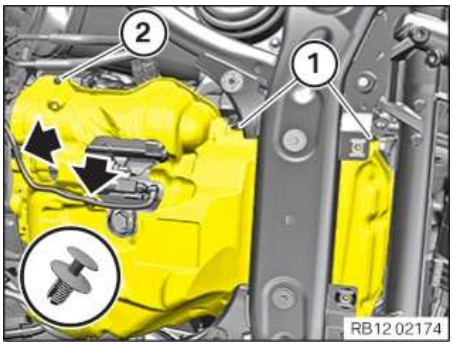
Make sure that the acoustic cover is **not** damaged while removing the starter motor.

A damaged lower acoustic cover can only be renewed when the front axle is lowered.

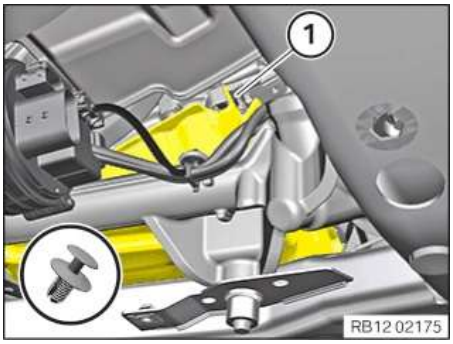
cardiagn.com



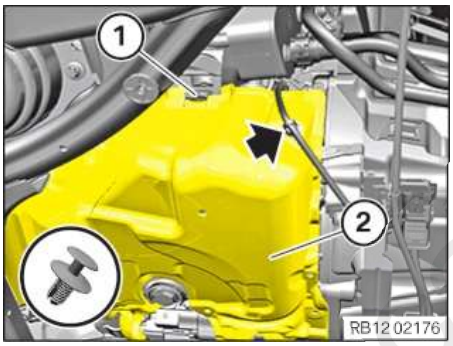
- Unlock plug connection (1) and disconnect.
- Release nut (2).
- Release positive battery cable (3) from holder (4).



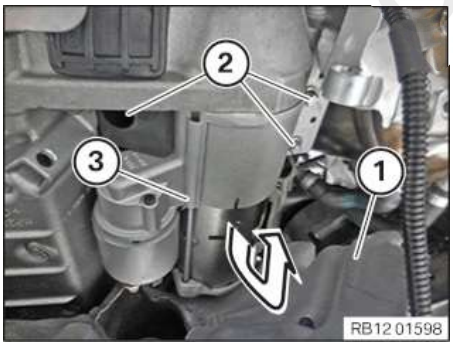
- Loosen the expanding rivet (1).
- Undo fir tree clip (2).
- Release the clamps (arrows).



- Loosen expanding rivet (1).
- Lower the acoustic cover of the oil sump.



- Loosen expanding rivet (1).
- Loosen the clamp (arrow).
- Lower acoustic cover (2).



- Make sure that the acoustic cover (1) is not damaged.
- Carefully press acoustic cover (1) to one side.
- Loosen screws (2).
- Carefully guide out the starter motor (3) in direction of arrow and remove.

40 – Checking camshaft timing



RISK OF DAMAGE

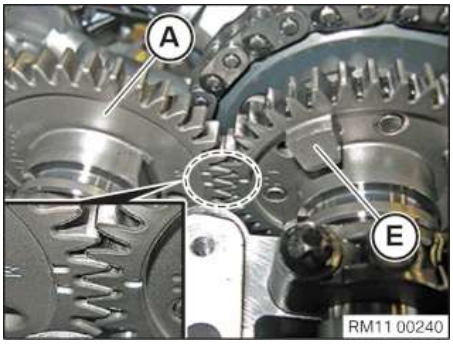
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

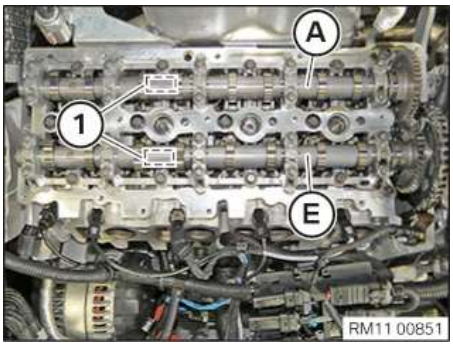
- Turn the combution engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

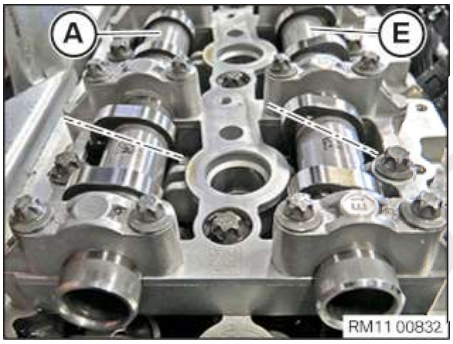
  Do **not** crank the engine in reverse.



- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.



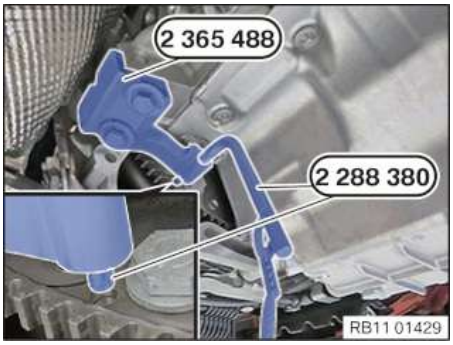
- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.

carmanualsdiagn.com



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

41 – Remove chain tensioner piston

RISK OF DAMAGE

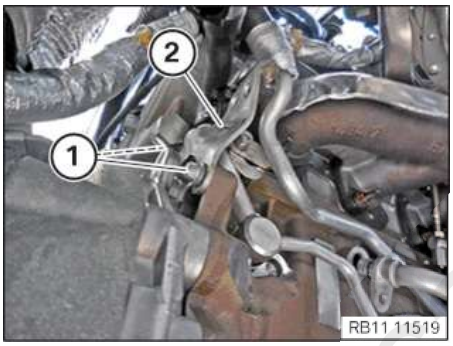
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Loosen screws (1).
- Guide out and remove holder (2).



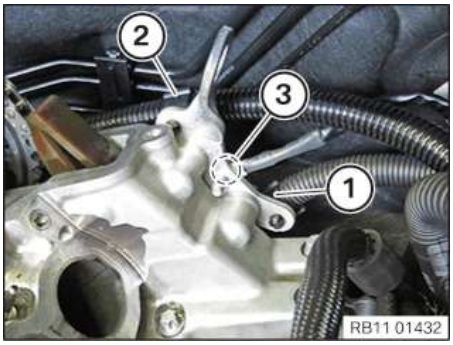
- Loosen the chain tensioner piston (1).
- Catch and dispose of emerging engine oil.



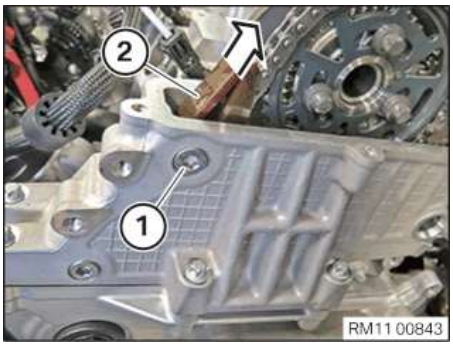
- Feed out and remove the sealing ring (1).

42 – Remove the timing chain guide rail

cardiagn.com

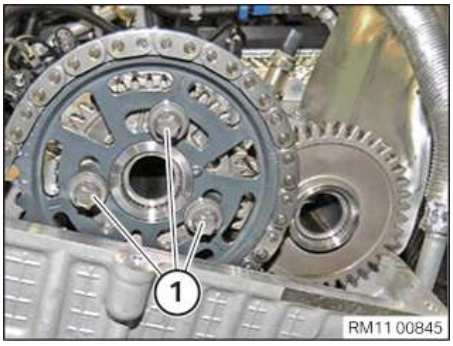


- Loosen the vehicle wiring harness (1) from the bracket.
- Release the positive battery cable (2) from the holder .
- Loosen the screw (3) and remove the grounding cable.



- Remove the bearing journal (1).
- Remove the guide rail (2) in the direction of the arrow.

43 – Removing the camshaft sprocket on the intake camshaft



- Loosen screws (1).
- Secure the drive chain against falling.
- Remove the camshaft sprocket on the intake camshaft.

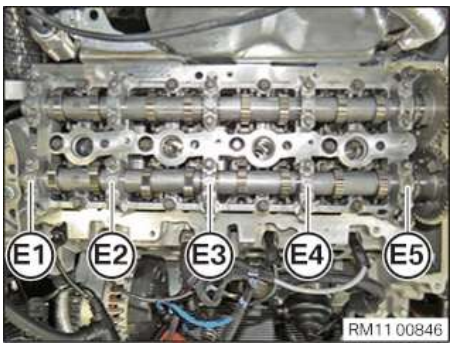
44 – Removing the special tool for fixing the exhaust camshaft



- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

MAIN WORK

45 – Remove intake camshaft

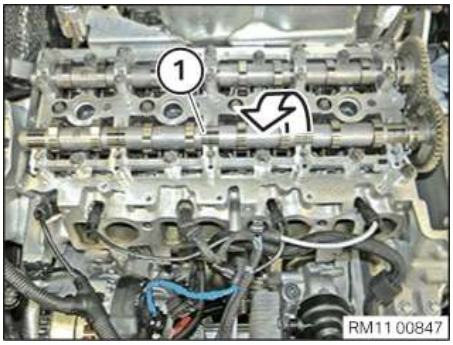


TECHNICAL INFORMATION

The camshaft is tensioned by the valve springs. Tighten or loosen each screw on the camshaft bearing caps one at a time in the specified sequence and by half a turn only. Repeat procedure.

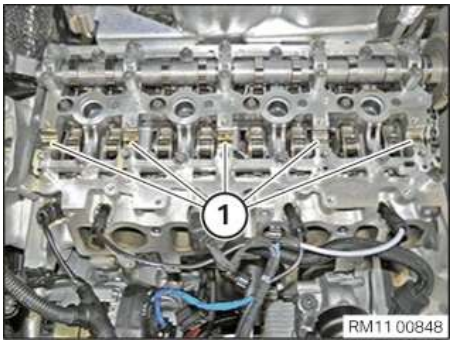
- Loosen all screws of the intake camshaft bearing caps (E1) to (E5) from the outside towards the inside by 1/2 a turn at a time.
- Place all components on special tool 0 495 105 (11 4 480) in a tidy and orderly fashion.

cardiagn.com

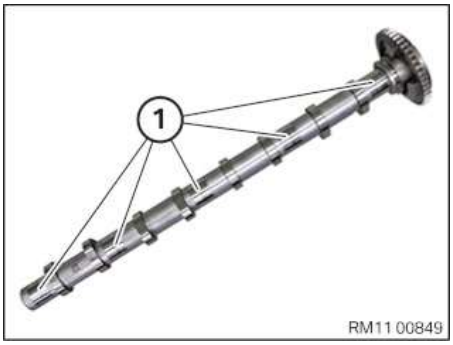


- Remove the intake camshaft (1).

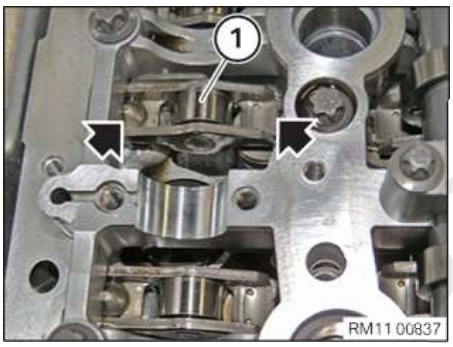
46 – Install intake camshaft



- Oil all bearing positions (1).



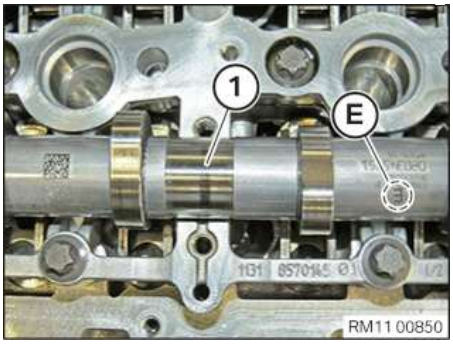
- Oil all the bearing positions (1) of the intake camshaft.



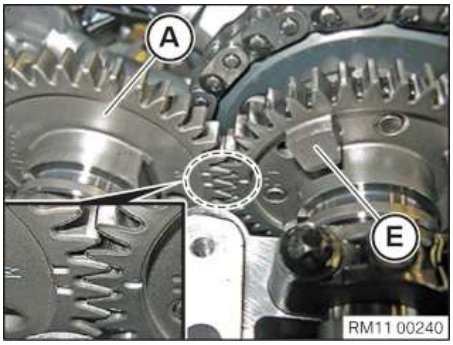
TECHNICAL INFORMATION

The rocker arms may slip slightly when the camshaft is positioned. Make sure rocker arms are correctly positioned on the hydraulic valve clearance compensating elements and on valves.

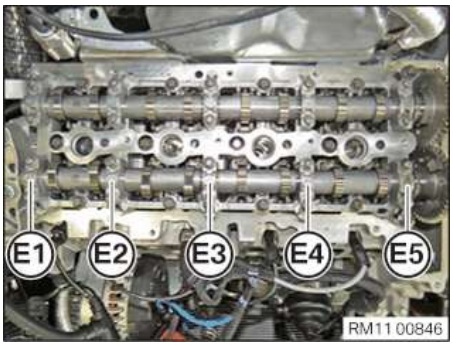
- Check the installation position of the roller cam followers (1).



- Make sure the identification (E) of the intake camshaft points upwards.
- Insert the intake camshaft (1).



- Insert the intake camshaft (A) so that the marks on the camshafts (A) and (E) coincide in the marked area.
- Position the camshafts (A) and (E) correspondingly.



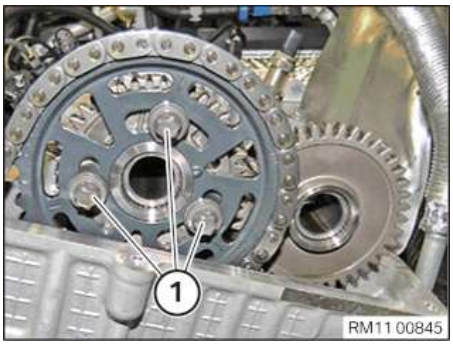
- Tighten all intake camshaft bearing caps (E1) to (E5) from the inside to the outside by 1/2 a turn at a time.

Intake and exhaust camshaft in camshaft support

M6x31		Tightening torque	10 Nm

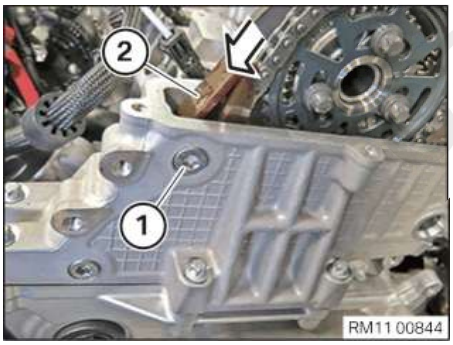
POSTPROCESSES

47 – Installing the camshaft sprocket on the intake camshaft



- Position the drive chain on the camshaft sprocket so that the thread of the screw connections are located in the centre of the elongated holes.
- Position the camshaft sprocket on the intake camshaft.
- Merely apply the screws (1) hand-tight so that the camshaft sprocket can still be moved in relation to the intake camshaft.

48 – Installing the guide rail of the timing chain

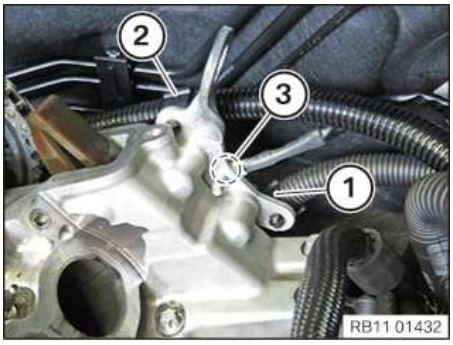


- Position the guide rail (2) in the direction of the arrow.
- Make sure the guide rail (2) is correctly installed at the bottom bearing journal.
- Renew bearing journal (1).

  Parts: Bearing journal
- Tighten the bearing journals (1).

Bearing journal to cylinder head

M16x1.5	Replace bearing journal.	Tightening torque	20 Nm



- Position the grounding cable and tighten the screw (3).

Standard screw connection M8

M8		Tightening torque	19 Nm

- Clip in the positive battery cable (2) into the bracket.
- Clip in the vehicle wiring harness (1) into the bracket.

49 – Installing the chain tensioner piston



TECHNICAL INFORMATION

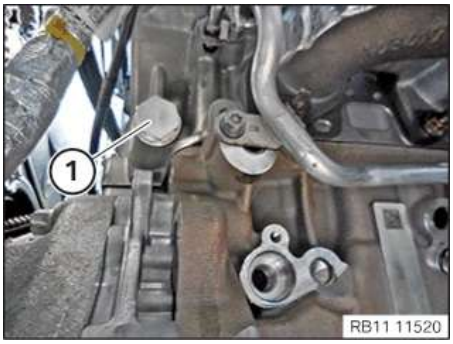
The oil chamber must be drained for reuse of the chain tensioner.

- Place the chain tensioner on a level support pad and slowly compress in the direction of arrow.
- Repeat process twice.



- Renew sealing ring (1).

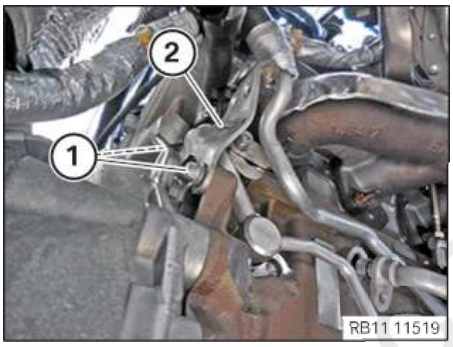
  Parts: Sealing ring
- Insert and install the sealing ring (1).



- Insert and install the chain tensioner piston (1).
- Tighten the chain tensioner piston (1).

Chain tensioner piston to cylinder head

22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

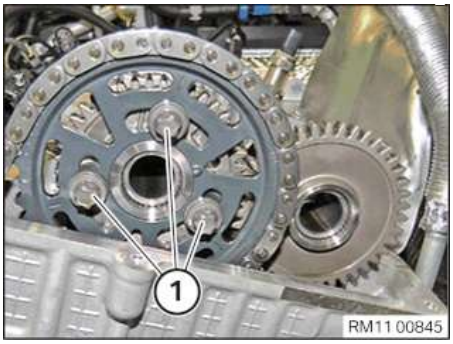


- Insert and install the holder (2).
- Tighten the screws (1).

Holder to crankcase

M8X16		Tightening torque	19 Nm

50 – Tightening the camshaft sprocket on the intake camshaft



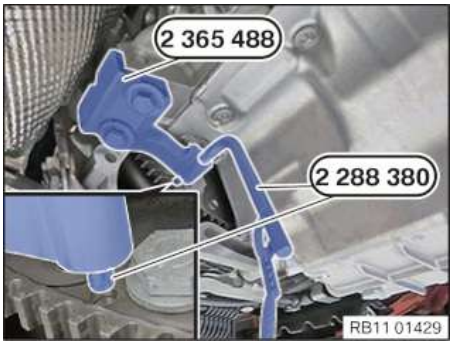
- Tighten the screws (1).

Camshaft sprocket to camshaft

M7x17.			17 Nm

51 – Removing the special tool to disconnect the crankshaft

cardiagn.com



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

52 – Checking camshaft timing



RISK OF DAMAGE

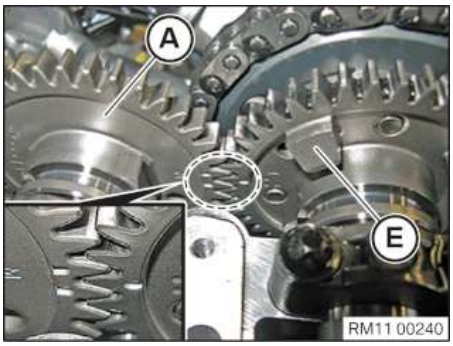
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

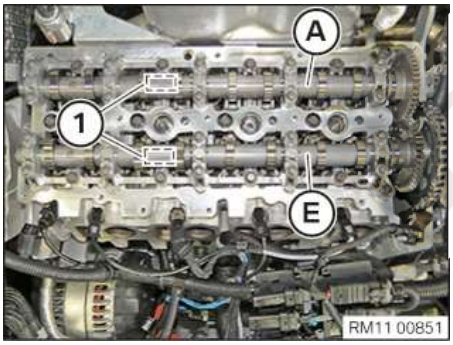
- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

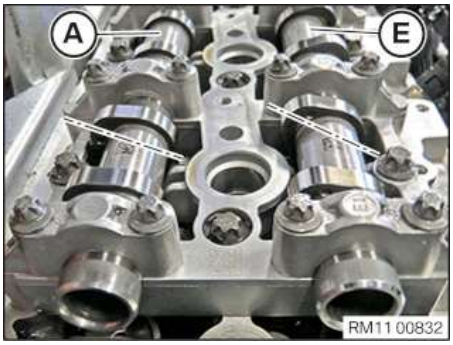
  Do **not** crank the engine in reverse.



- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.



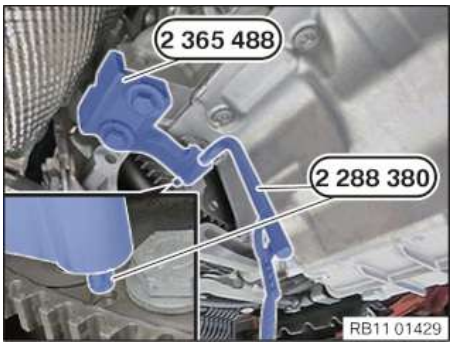
- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.

cardiagn.com



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

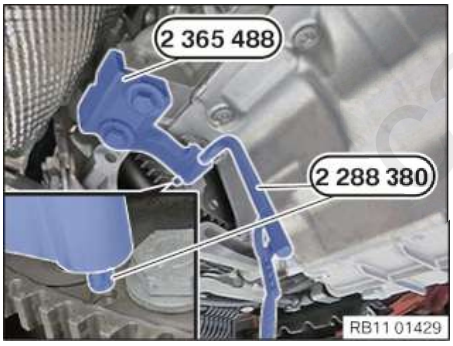
- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

53 – Removing the special tool for fixing the exhaust camshaft



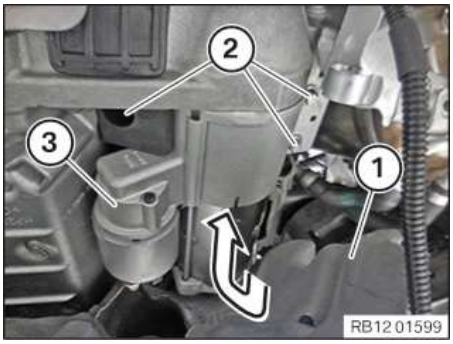
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

54 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

55 – Installing starter motor

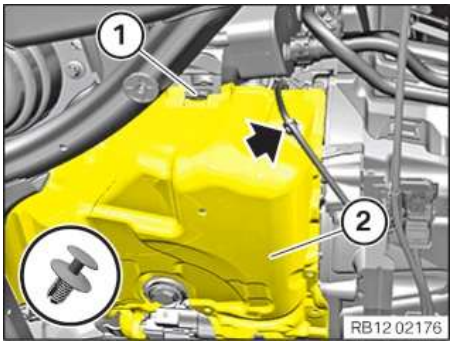


- Make sure that the acoustic cover (1) is not damaged.
- Carefully press the acoustic cover (1) to one side.
- Feed in and install the starter motor (3) in the direction of the arrow.
- Tighten the screws (2).

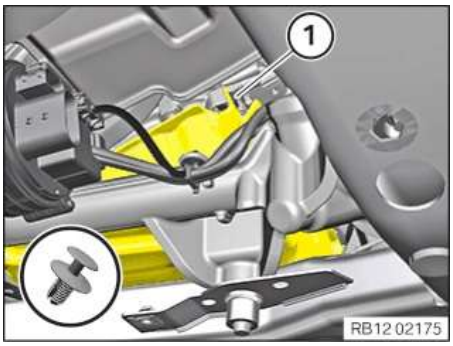
Starter motor to engine

M8X60		Tightening torque	19 Nm

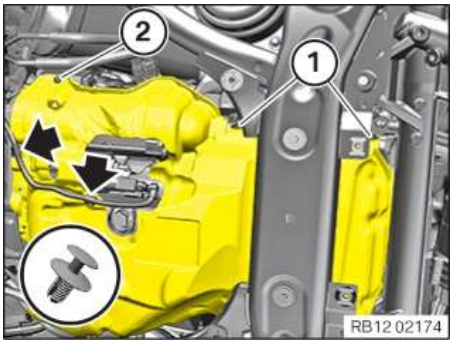
cardiagn.com



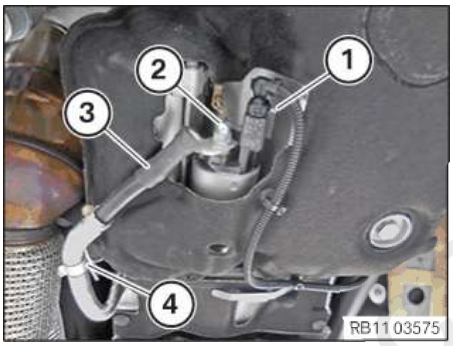
- Position the acoustic cover (2).
- Fasten expanding rivet (1).
- Secure clamp (arrow).



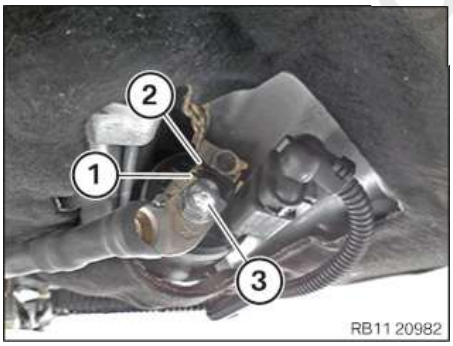
- Fasten expanding rivet (1).



- Secure fir tree clip (2).
- Secure expanding rivet (1).
- Secure the clamps (arrows).



- Fasten positive battery cable(3) in holder (4) and position it on the starter motor.
- Tighten the nut (2) hand-tight.
- Connect the connector (1) and audibly lock it.



CAUTION

Improper routing of the positive battery cable.

Risk of short circuits!

- Route the positive battery cable without abrasions and do not trap.

- Attach the positive battery cable (1) **correctly** to anti-twist lock (2).
- Tighten nut (3).

Battery positive lead to starter

M8		Tightening torque	13,5 Nm

56 – Prepare for the installation of the diesel particulate filter

cardiagn.com



- Renew the V-clip (1).

  Parts: V-band clamp



- Renew gasket (1).

  Parts: Gasket

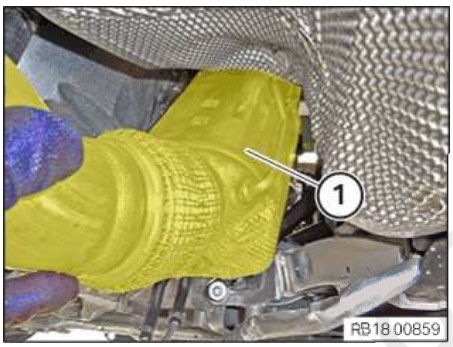
57 – Installing the diesel particulate filter

CAUTION

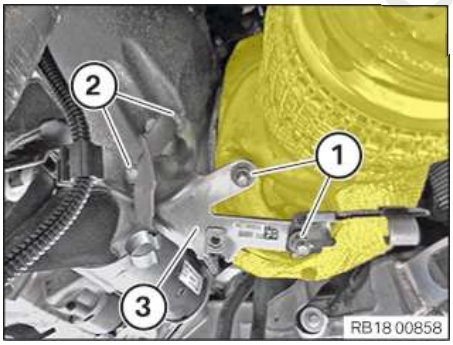
Heavy component.

Heavy components can lead to injury or damage.

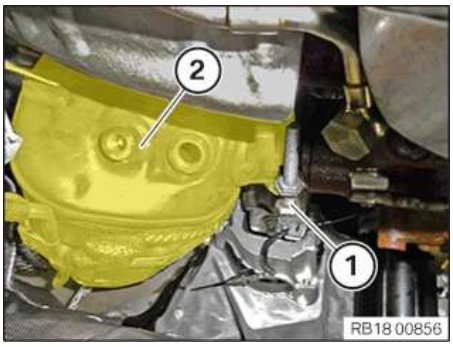
- Remove and install heavy components with the aid of another person/other persons.



- Insert and install the diesel particulate filter (1).



- Insert and install the holder (3).
- **Hand-tighten** the bolts (2).
- Apply the nuts (1) **hand-tight**.



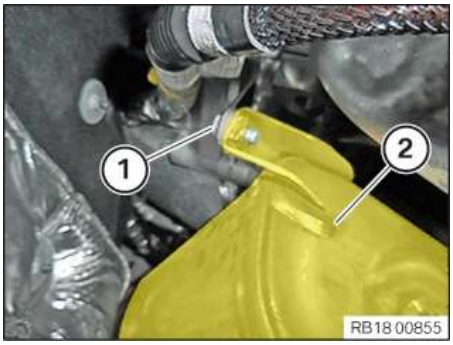
- Renew the V-clip (1).

  Parts: V-band clamp
- Feed in and install V-band clamp (1).

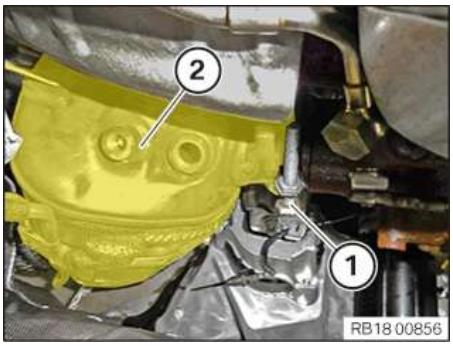
Note: Make sure that the seal between the diesel particulate filter and the exhaust turbocharger is installed correctly.

- Position the diesel particulate filter (2) on the exhaust turbocharger .
- Position V-clip (1).
- Apply the V-clip (1) **hand-tight**.

cardiagn.com



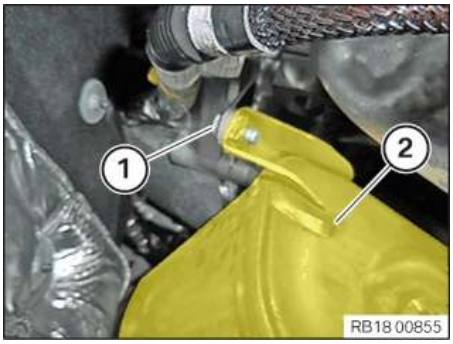
- Feed in screw (1) on the holder of the diesel particulate filter (2) and tighten **hand-tight**.



- Tighten the V-clip (1) of the diesel particulate filter (2).

Diesel particulate filter V-clip to exhaust turbocharger

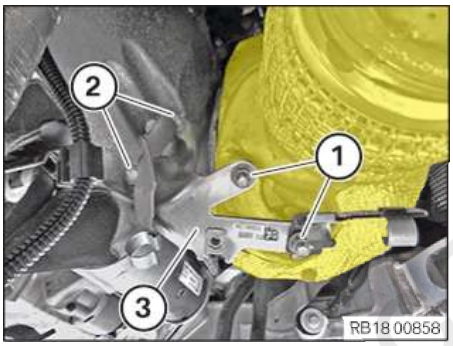
V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm



- Tighten the bolt (1) on the bracket of the diesel particulate filter (2).

Bracket to diesel particulate filter top

M8		Tightening torque	19 Nm



- Tighten the screws (2) on the holder (3).

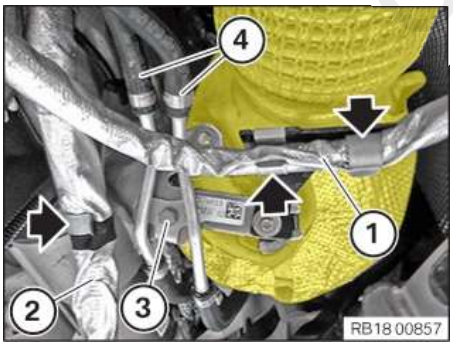
Bracket to transmission for diesel particulate filter holder bottom

M8X20	Tightening torque	19 Nm

- Tighten the nuts (1) on the holder (3).

Lower holder to diesel particulate filter

M8		Tightening torque	19 Nm



- Thread in and install coolant line (4).
- Tighten down screw (3).

Coolant lines for SCR metering module

M6X16		Tightening torque	8 Nm

- Secure the positive battery cable (2) of the starter motor at the clamp (arrow).
- Fasten the metering line (1) on the clamps (arrows).

58 – Installing the nitrogen oxide sensor upstream of SCR catalytic converter

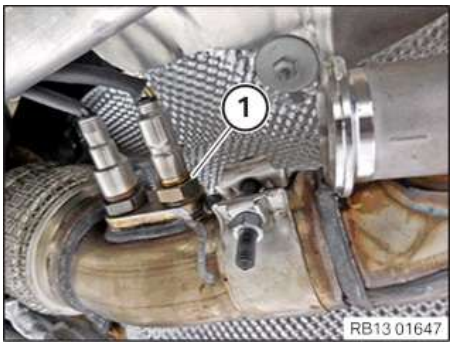
carlign.com

RISK OF DAMAGE

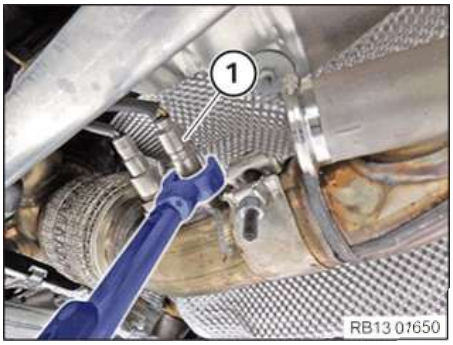
Damage to the nitrogen oxide sensor.

Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



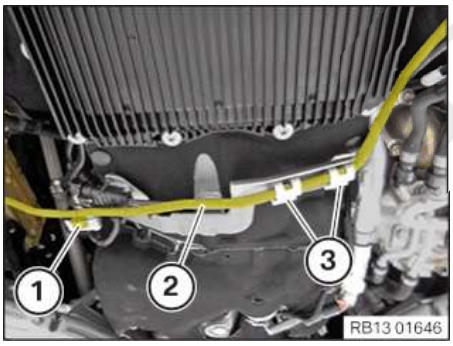
- Feed in and install the nitrogen oxide sensor (1).



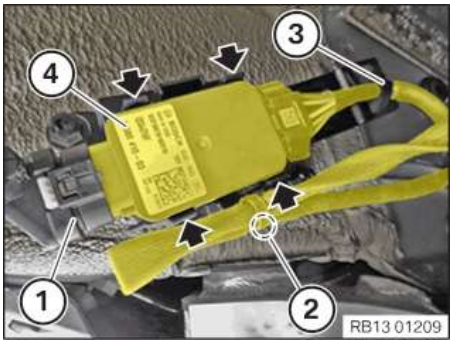
- Tighten the nitrogen oxide sensor (1) using commercially available tools.

Nitrogen oxide sensor before SCR catalytic converter

Sensor		Tightening torque	50 Nm



- Secure the cables (2) to the clamps (3).
- Secure clamps (1).



- Clip in the control unit (4) (arrows).
- Fasten the cable in the holder (3).
- Secure the cable holder (2).
- Plug in the connector (1) and lock audibly.

59 – Installing the monitoring oxygen sensor after the diesel particulate filter

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
- The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

TECHNICAL INFORMATION

New oxygen sensors are to be greased lightly and evenly on the thread.

For oxygen sensors that are reused, the following should be observed:

Lightly and evenly grease the oxygen sensor only on the thread. Do not clean and grease that part of the oxygen sensor which protrudes in the exhaust branch (sensor ceramics).

For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



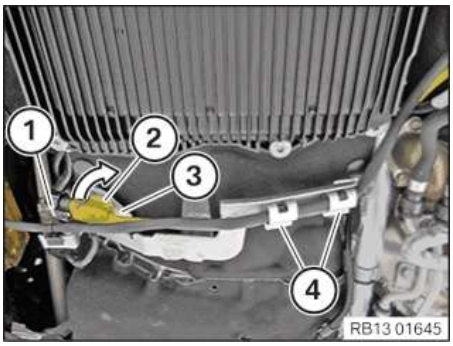
- Insert the monitoring oxygen sensor (1) and install it.



- Tighten the monitoring oxygen sensor (1) with standard tools.

Monitoring oxygen sensor

Sensor		Tightening torque	50 Nm



- Fasten the monitoring oxygen sensor to the clamps (4).
- Secure the connector (2) on the holder (3) in direction of arrow.
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

cardiagn.com

CAUTION

Component with heavy weight.

Danger of injury!

- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

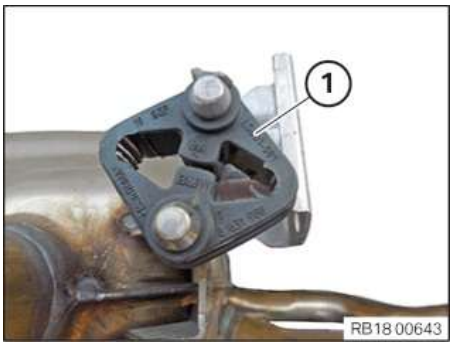
Heavy component.

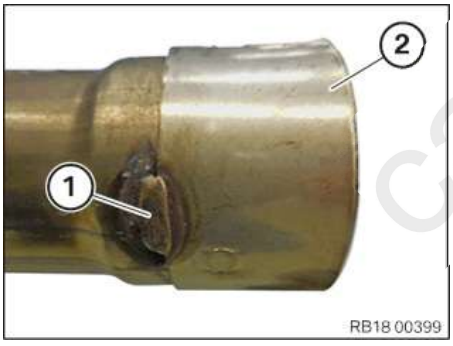
Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

TECHNICAL INFORMATION

Mount the exhaust system in voltage-free state, maintaining the tightening sequence from the rear silencer towards the exhaust manifold.





NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

- Check all the rubber mounts (1) of the exhaust system for damage.
- Replaced damaged rubber mounts.

  Parts: Rubber mount

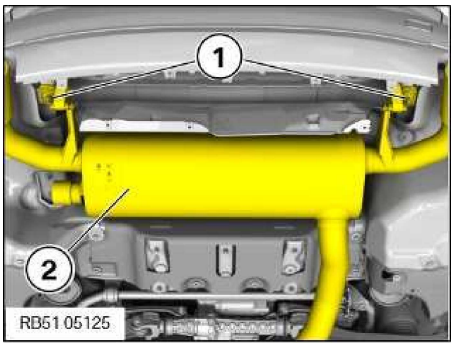
CAUTION

Swarf resulting from sawing or grinding components.

Danger of injury!

- Conduct all work in appropriate personal protective equipment only.
- Wear safety goggles and protective gloves.

- Open the weld seam (1) with a conventional tool.
- Remove the clamp (2).



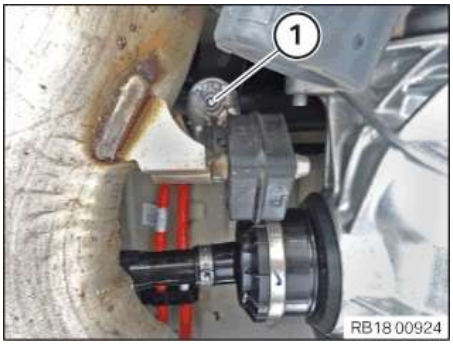
- Insert and install the exhaust system (2).
- Renew nuts (1).

  Parts: Nuts
- Tighten nuts (1).

Rear silencer to body / bumper support

M8	Replace nuts.	Tightening torque	19 Nm

cardiagn.com

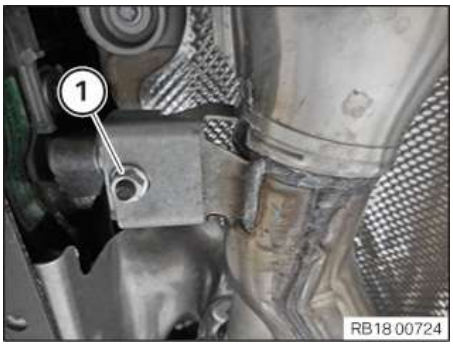


- Renew nut (1) on the rear axle support.

  Parts: Nut
- Tighten nut (1).

Exhaust system to rear axle carrier

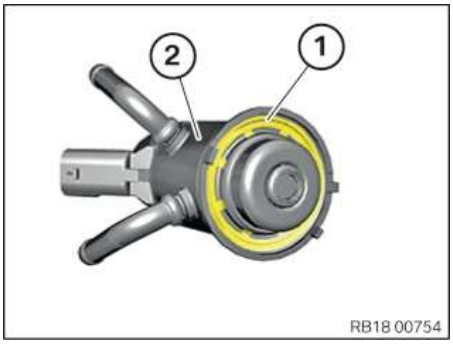
M8 nut		Tightening torque	19 Nm



- Tighten nut (1).

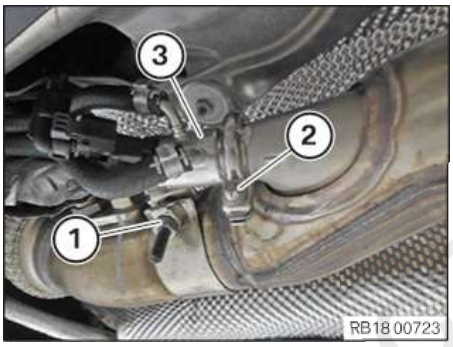
Exhaust system to transmission

M8		Tightening torque	19 Nm



- Renew sealing ring (1) of the SCR metering module (2).

  Parts: Sealing ring



- If necessary, renew clamp (1).

  Parts: Clamp
- Tighten clamp (1).

Exhaust system to diesel particle filter

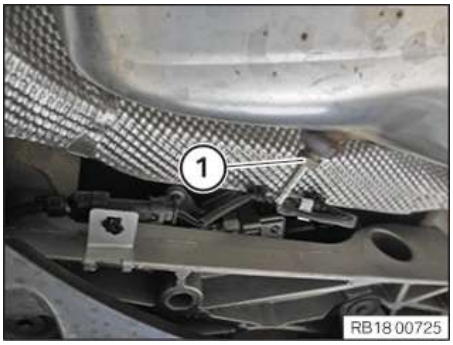
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

- Renew the V-clip (2).

  Parts: V-band clamp
- Install the SCR metering module (3) in the exhaust system.
- Tighten the V-clip (2) of the SCR metering module (3).

SCR metering module V-clip to exhaust system

V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm

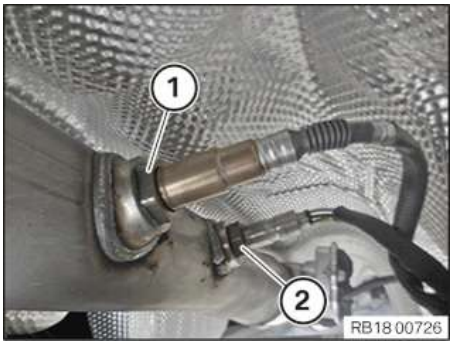


- Install the exhaust temperature sensor (1) in the exhaust system and tighten.

Exhaust-gas temperature sensor upstream of SCR catalytic converter

Sensor		Tightening torque	30 Nm

cardiagn.com



- Install the diesel particulate sensor (1) in the exhaust system and tighten.

Diesel particulate sensor to exhaust system

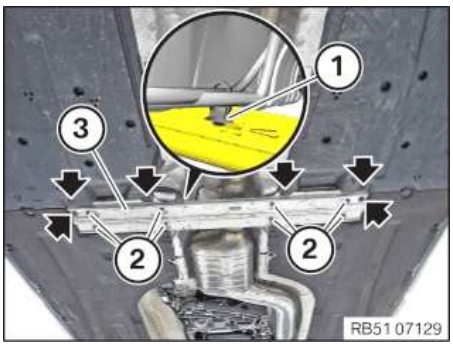
Sensor		Tightening torque	50 Nm

- Install the nitrogen oxide sensor (2) in the exhaust system and tighten.

Nitrogen oxide sensor downstream of SCR catalytic converter

Sensor		Tightening torque	55 Nm

61 – Install the connecting supports on the tunnel



- Guide in and install connecting support (3) on the tunnel.
- Tighten the screws (2).
- Tighten screws (arrows).

Connecting support to tunnel

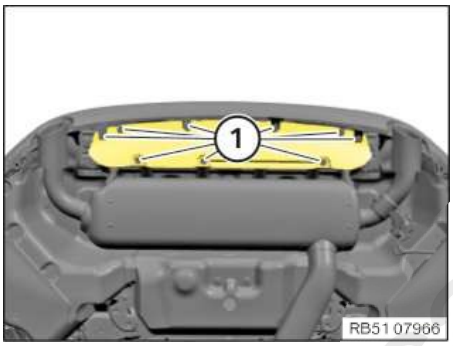
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Secure the clamp (1).

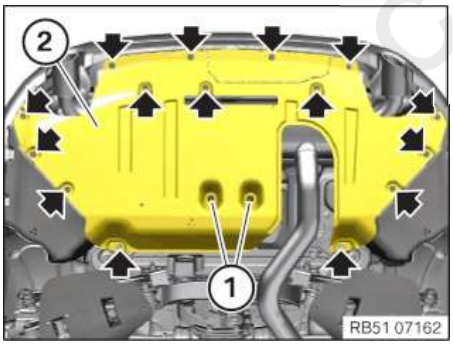
62 – Installing the rear diffuser



- **Version 1:**
- Install the diffuser and tighten the nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm



- **Version 2:**
- Feed in and position the diffuser (2)
- Tighten screws (arrows).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm

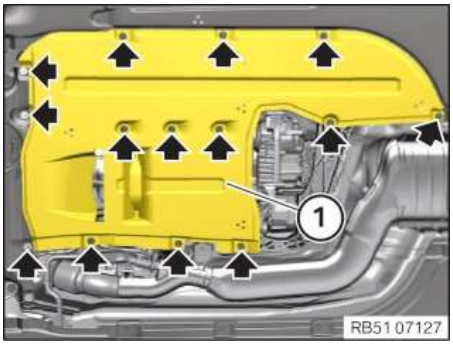
- Tighten nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm

63 – Installing underbody protection at rear

cardiagn.com



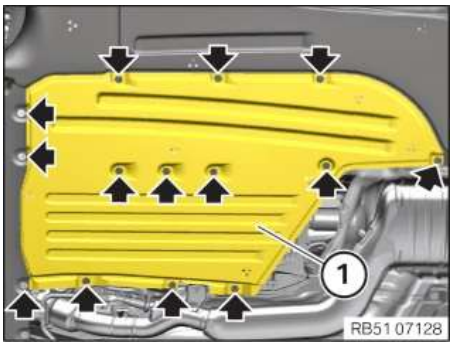
- **Version A:**

  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version B:**

  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

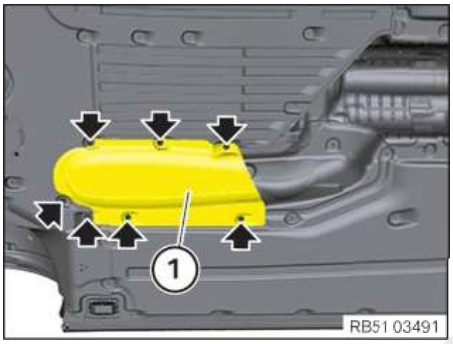
Underbody protection

Hexagon screw		Tightening torque	3 Nm

64 – Install the underbody panelling of the transmission on the side

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

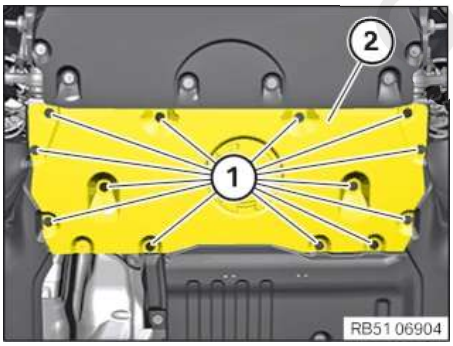


- Insert the underbody panelling (1).
- Tighten screws (arrows).

Underbody panelling

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

65 – Installing the centre underbody protection



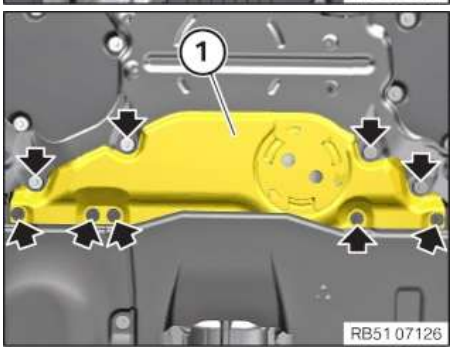
- **Variant with rear wheel drive:**

  Position central underbody protection (2).

  Tighten the screws (1).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version with all-wheel drive:**

  Guide in centre underbody protection (1) and install.

  Tighten screws (arrows).

Underbody protection

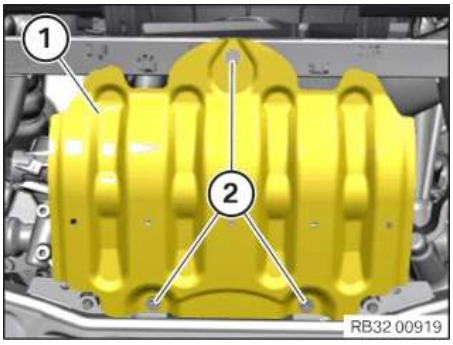
Hexagon screw		Tightening torque	3 Nm

66 – If installed: Install underbody protection of the steering

cardiagn.com

Prerequisite

Front underbody protection has been removed.



- Position underbody protection (1).
- Tighten the screws (2).

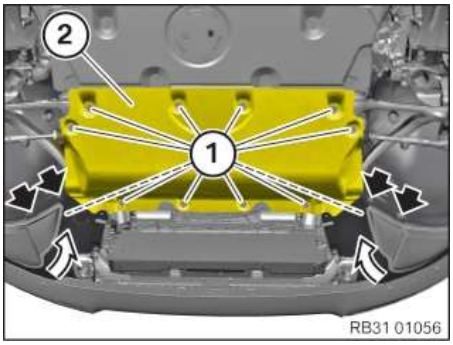
Underbody protection, steering, to front axle support

Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

67 – Install the underbody protection of the steering gear



- **Version A:**

  Position the underbody protection (2) of the steering gear.

  Tighten the screws (1).

Underbody protection of the steering gear

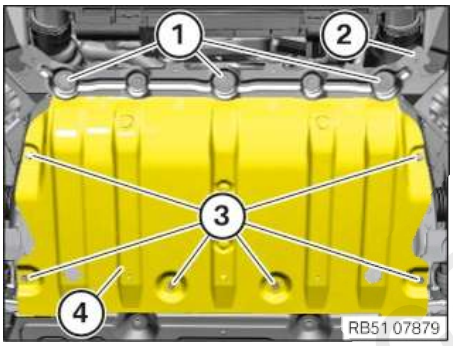
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the bottom wheel arch cover.

  Tighten the screws (arrows) of the lower wheel arch cover on the wheel arch cover.

Wheel arch trim panel, front

Thermoplastic hexagon screw		Tightening torque	2,6 Nm



- **Version B:**

  Feed in the underbody protection (4) of steering gear and install it.

  Tighten the screws (3).

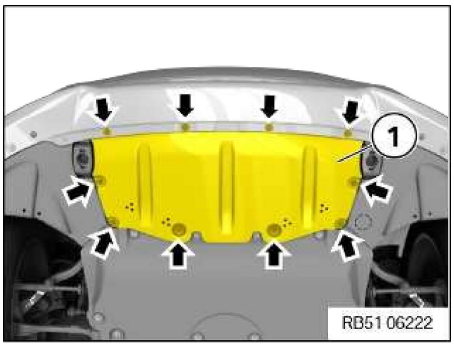
Underbody protection of the steering gear

Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the holder (2) for the underride protection.

  Tighten the screws (1).

68 – Installing the front underbody protection



- **Version A:**

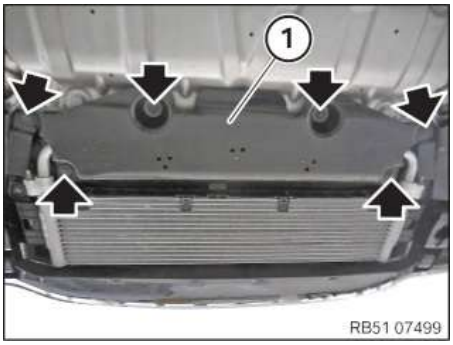
  Feed in the front underbody protection (1) towards the front under the bumper panel and position.

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

carDiagn.com



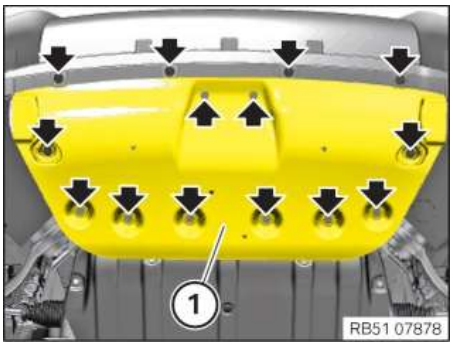
- **Version B:**

  Feed in and position the front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



- **Version C:**

  Feed in and install front underbody protection (1).

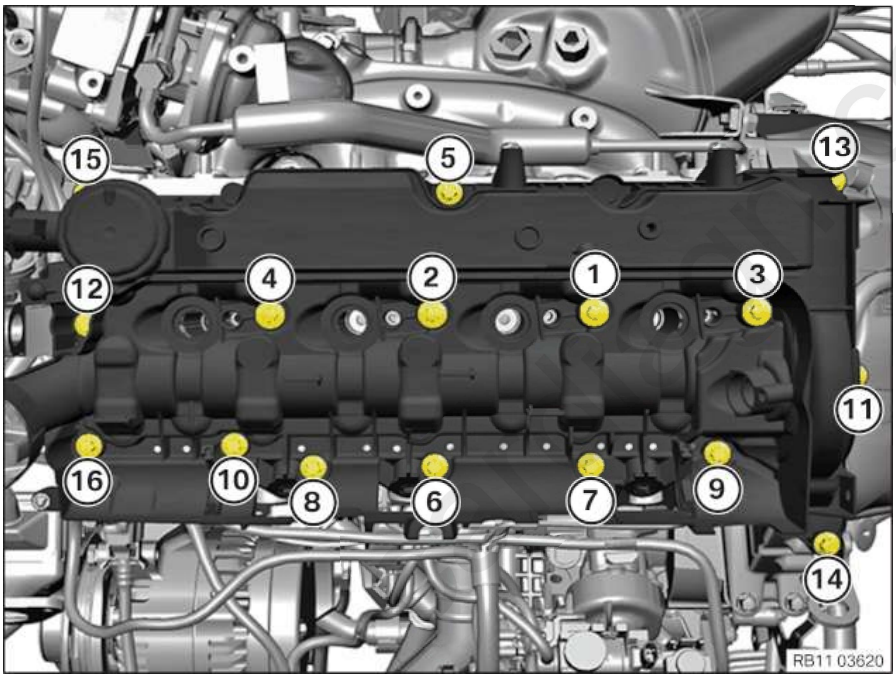
  Tighten screws (arrows).

Underbody protection front

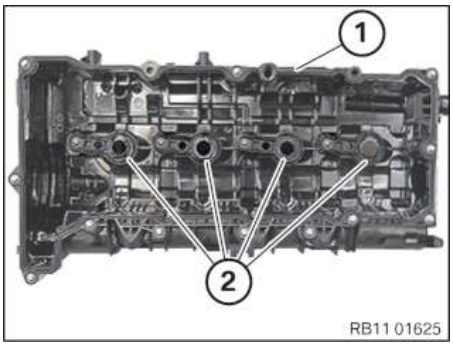
Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

69 – Installing cylinder head cover

Screw connection of the cylinder head cover

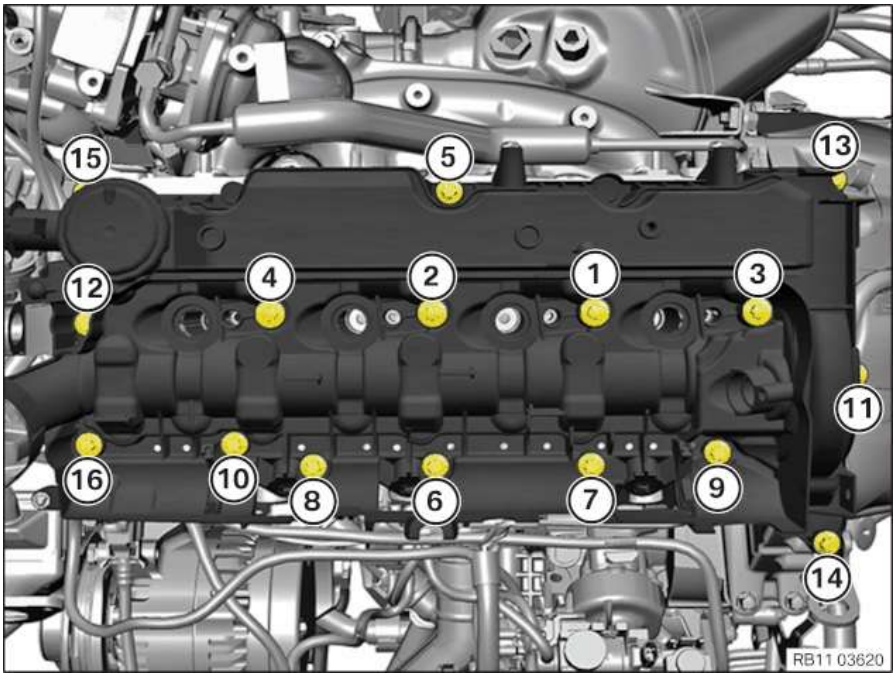


1 - 16 Bolts of the cylinder head cover



- Renew the profile seals (1) and (2) of the cylinder head cover.

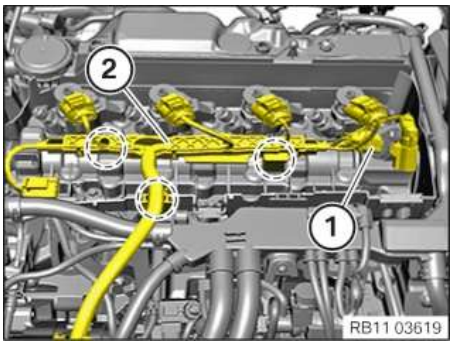
  Parts: Profile seals



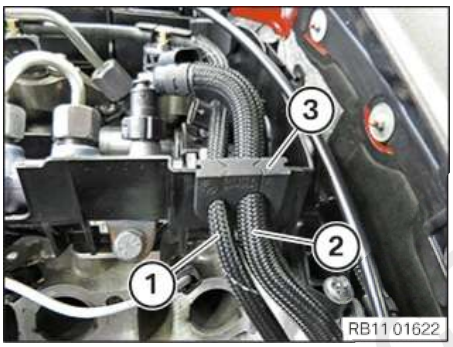
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

Cylinder head cover to cylinder head

M6		Tightening torque.	8,5 Nm



- Position the vehicle wiring harness (2) on the cylinder head cover and fasten in the marked areas.
- Plug in the connector (1) and lock audibly.



- Insert and connect the leakage oil line (1) with the fuel return line (2) and grommet (3).



- Feed in and install the heat shield (1).

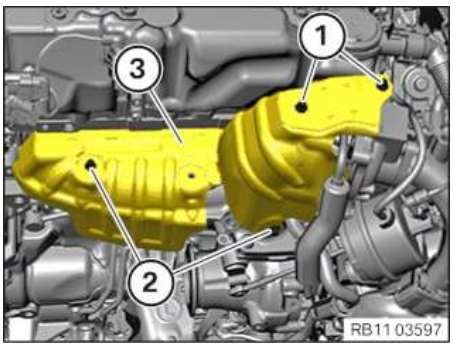


- Connect engine ventilation line (1) and lock.

  The locks (arrows) must engage audibly.

cardiagn.com

70 – Installing heat shield



- Feed in and install the heat shield (3).
- Tighten down screws (1) and (2).

Heat shield to exhaust manifold

M6x12			10 Nm

71 – Installing the sensor bracket on the cylinder head cover

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

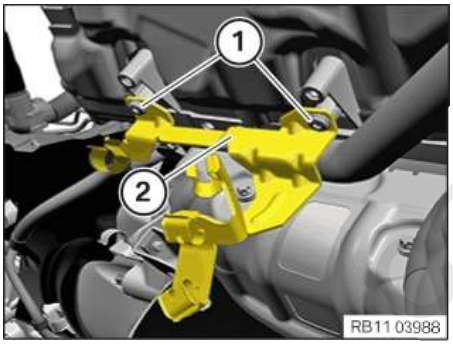
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

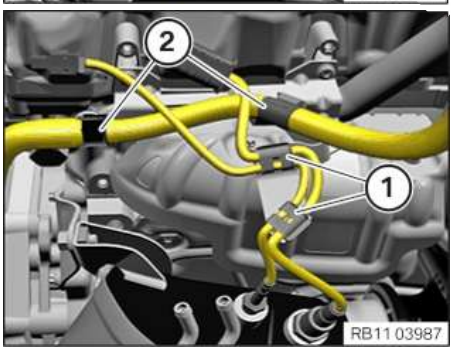
- Route all cables without abrasions, do not trap and crush.



- Insert and install the holder (2).
- Tighten the screws (1).

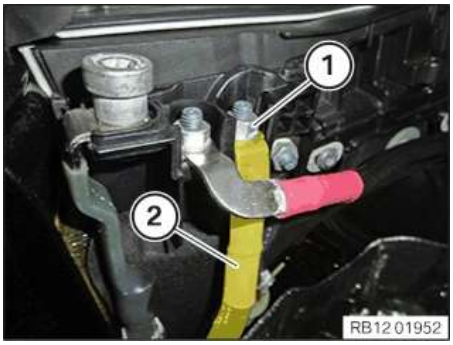
Bracket on cylinder head cover

	Tightening torque	5 Nm



- Secure the positive battery cable in the clamps (2).
- Mount the cable of the exhaust gas sensor system in the clamps (1).

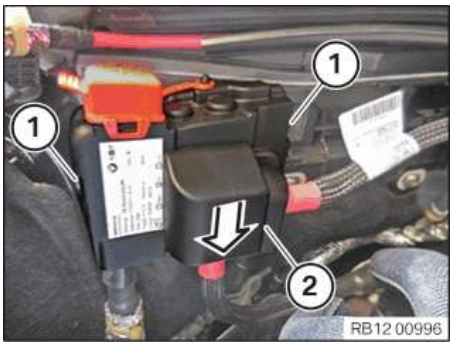
cardiagn.com



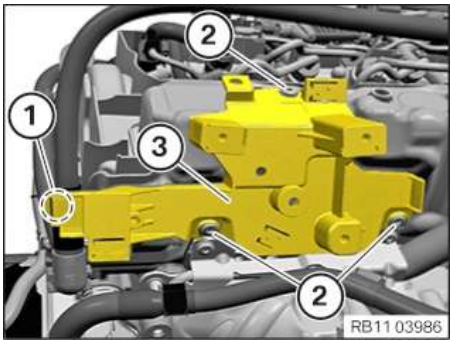
- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

Battery positive lead to battery positive terminal

M8		Tightening torque	19 Nm



- Insert and install the cover (2) in the direction of the arrow.
  The locks (1) must engage audibly.

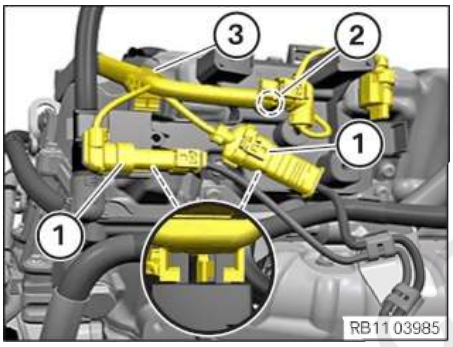


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

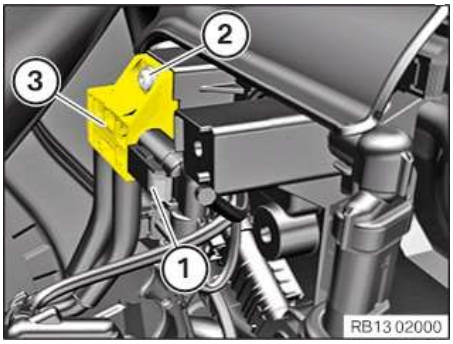
		Tightening torque	5 Nm

- Fasten the positive battery cable in the area (1) in the clamp.



- Feed in the wiring harness section and fasten it with the clamp (3).
- Fasten the cable clip in the area (2) in the sensor bracket.
- Feed in the connector (1) into the sensor bracket and lock it audibly.
- Plug in the connector (1) and lock audibly.

72 – Securing the differential pressure sensor for the diesel particulate filter



- Feed in and install the differential pressure sensor (3).
- Tighten down screw (2).

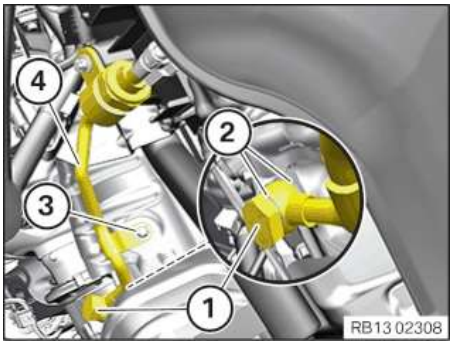
Differential pressure sensor of diesel particulate filter on cylinder head cover

TS5x20		Tightening torque	4 Nm

- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

73 – Install the exhaust gas pressure pipe

cardiagn.com



- Insert and install the exhaust gas pressure pipe (4).
- Replace the sealing rings (2).

  Parts: Sealing ring
- Apply the banjo bolt (1) hand-tight.
- Tighten down screw (3).

Heat shield to exhaust manifold

M6x12		Tightening torque	10 Nm

- Tighten the banjo bolt (1).

Banjo bolt for exhaust pressure pipe to exhaust manifold

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm



- Tighten down screw (2).

Exhaust gas pressure pipe to sensor system holder

TS6x20		Tightening torque	5,7 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

74 – Install all injectors

▸ **Cleaning the injector shafts**

CAUTION

Swirling dirt particles caused by compressed air.

Danger of injury!

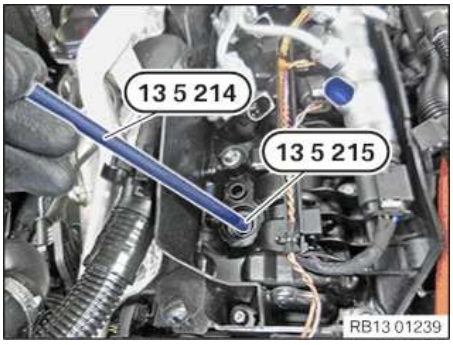
- Collect dirt particles, e.g. when blowing out, use cloth to do so.
- Wear safety goggles.

RISK OF DAMAGE

Contaminant or foreign body.

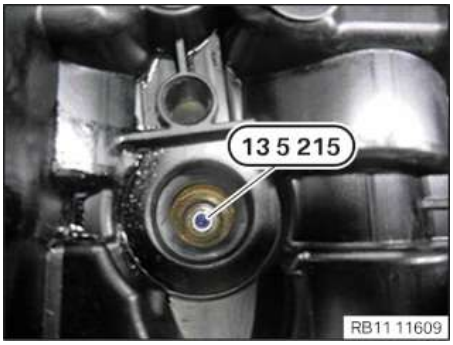
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Check whether the sealing ring remained in the injector shaft and remove the sealing ring as needed.
- Insert the special tool 0 493 763 (13 5 215) with the special tool 0 493 762 (13 5 214) from the set of special tools 0 493 758 (13 5 210) into the injector shaft.
- Remove special tool 0 493 762 (13 5 214).

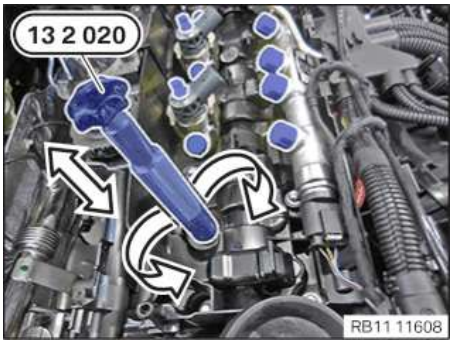
cardiagn.com



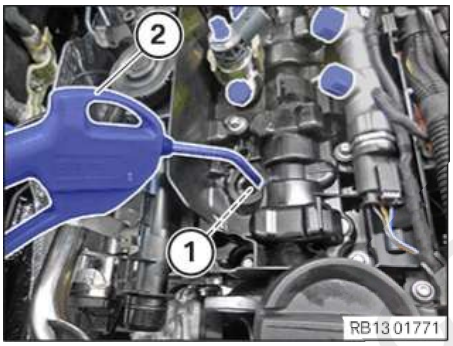
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



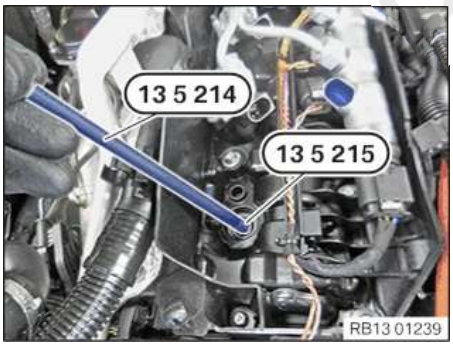
- Insert special tool 0 496 150 (13 2 020) into the injector shaft.



- Move special tool 0 496 150 (13 2 020) up and down in the injector shaft with rotational movements in the direction of arrow.
- Feed out special tool 0 496 150 (13 2 020) from the injector shaft and remove.



- Blow out injector shaft (1) with air gun (2).



- Feed the special tool 0 493 762 (13 5 214) into the injector shaft and screw it in with the special tool 0 493 763 (13 5 215).
- Feed out special tool 0 493 762 (13 5 214) with special tool 0 493 763 (13 5 215) from the injector shaft and remove it.

▸ **Check the placement of the clamping claw**

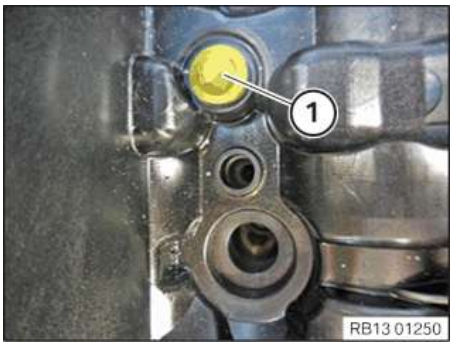
cardiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Tighten down screw (1).

  The clamping claw is positioned on the bolt (1).

Clamping claw facing to cylinder head cover

M6		Tightening torque	10 Nm

▸ **Prepare the injector for installation**

RISK OF DAMAGE

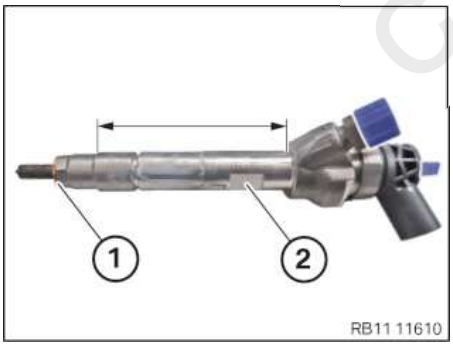
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

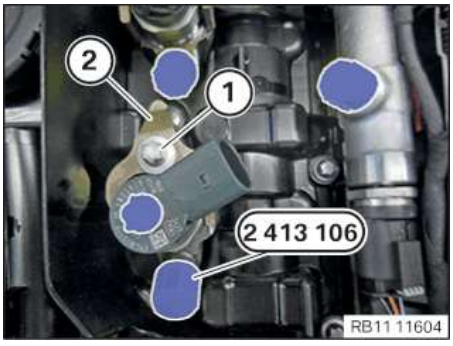
TECHNICAL INFORMATION

Lightly grease the injector shaft with high temperature-resistant grease.
For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



- Renew the copper sealing ring (1) on the injector (2).

  Parts: Copper sealing ring
- Lightly grease the injector in the marked area with heat-resistant grease before installing the injector (2) in the injector shaft.

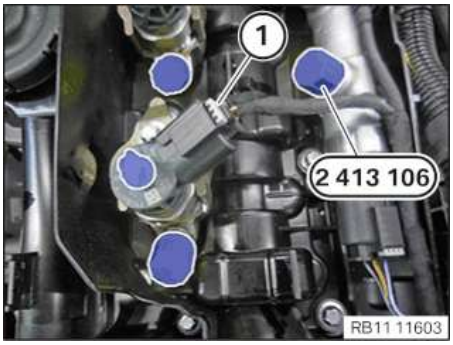


- Insert and install the injector .
- Insert and install the clamping claw (2).
- Tighten down screw (1).

Injector to cylinder head cover

M8		Tightening torque	8 Nm
		Angle of rotation	120 °

cardiagn.com



- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

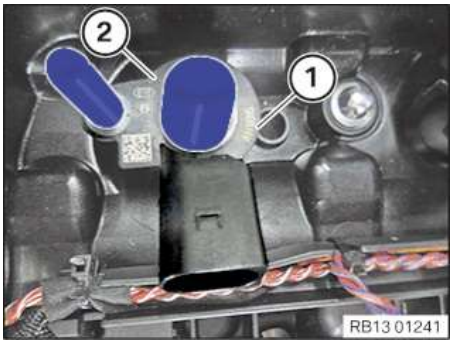
▸ **Replacement: Perform injection quantity compensation**

TECHNICAL INFORMATION

If the DDE control unit or an injector has been replaced, it will also be necessary to carry out injection quantity compensation. The adjustment value (7-position letter/number code) is engraved on each injector.

NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

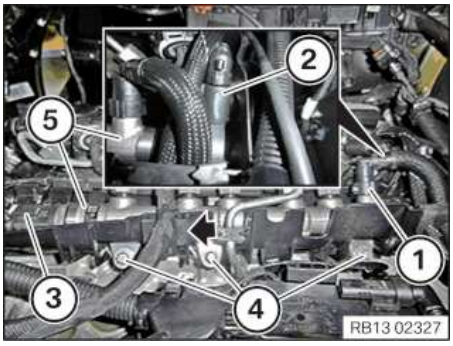


- Read off the adjustment value (1) on the new injector (2).



- Connect diagnosis system:
  - Vehicle identification
  - Function selection
  - Service functions
  - Digital diesel electronics (DDE)
  - Adjustment of injectors
  - Testing schedule
- Start service function with the right arrow button.

75 – Installing the rail



- Insert and install the rail (5).
- Tighten the screws (4).

Rail to cylinder head cover

M8		Tightening torque	19 Nm

- Install and lock cable clip (arrow).

  The cable clip (arrow) must engage audibly.
- Connect and lock the connector (3) at the rail pressure sensor.

  The connector (3) must engage audibly.
- Connect and lock the connector (2) at the rail pressure regulating valve.

  The connector (2) must engage audibly.
- Feed in fuel return line (1) and install.

  The fuel return line (1) must audibly engage.

cardiagn.com

76 – Installing high pressure line between rail and high pressure pump

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

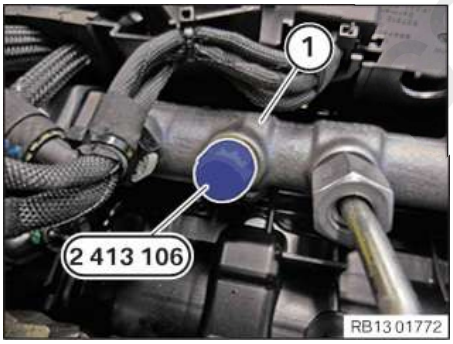
- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

TECHNICAL INFORMATION

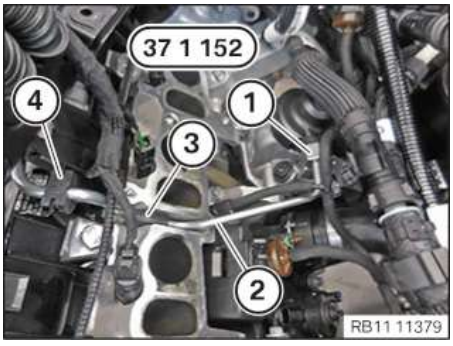
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Feed out and remove special tool on the high pressure pump (1).



- Feed out the special tool on the rail (1) and remove.



- Insert and install the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).
- Hand-tighten the union nut (1) on the high pressure pump.



- Hand-tighten the union nut (1) on the rail.

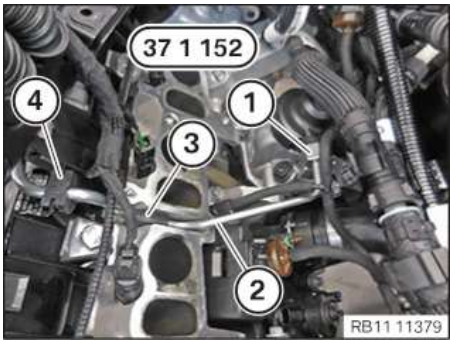
TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten the union nut (1) with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm



- Make sure that the high pressure line (2) is correctly installed with the abrasion protection (3) and the rubber mount (4).

TECHNICAL INFORMATION

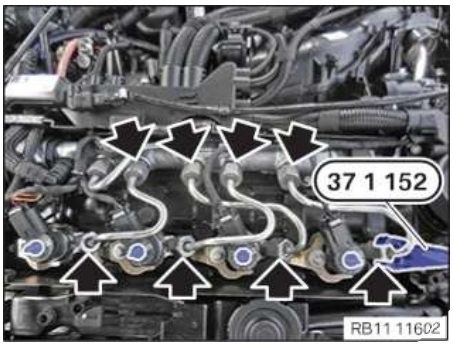
Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten union nut (1) on the high pressure pump with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm

77 – Installing the high pressure lines between the injector and the rail



- Remove the special tool from all cable connections.
- Feed in and install the high pressure lines (arrows).
- Hand-tighten the high pressure lines (arrows).

TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

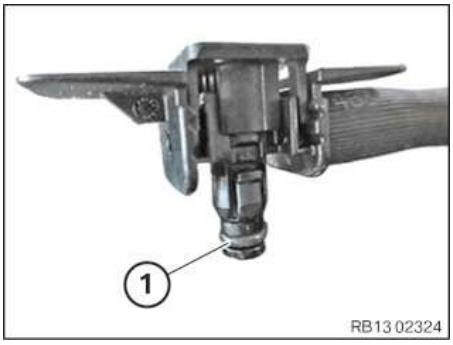
- Tighten the high pressure lines (arrows) with the special tool .

High pressure lines between injector and rail

High-pressure pipe		Tightening torque	24.5 Nm

- Check the high pressure lines (arrows) for tightness (**visual inspection**).

78 – Attach the leakage oil line on the injectors



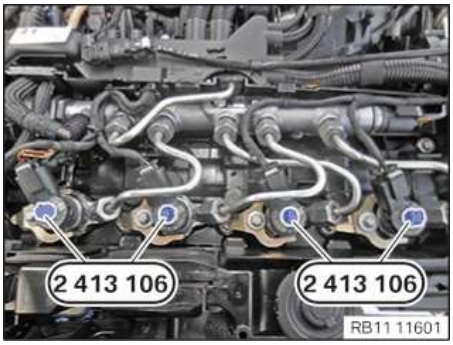
- **Version A:**

  Check sealing ring (1) for damage, renew leakage oil line if necessary.

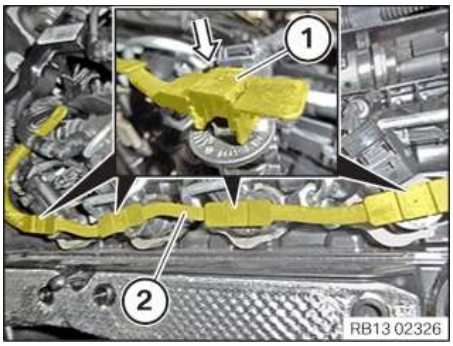
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.

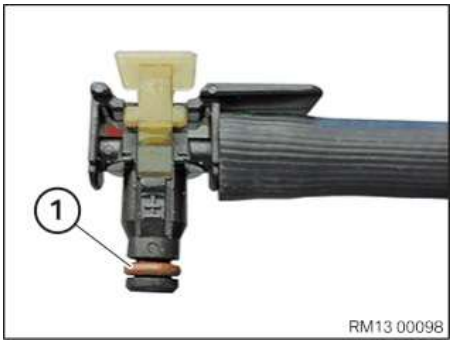
carlagn.com



- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.



- **Version B**:

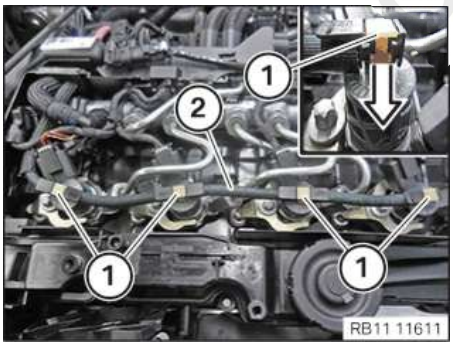
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.



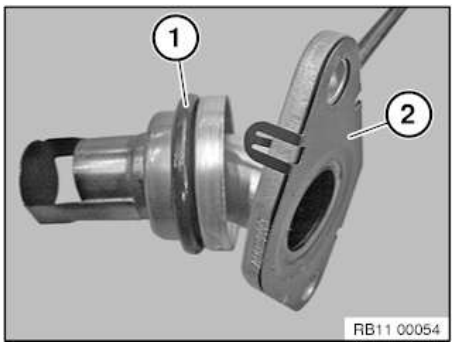
- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.

79 – Installing the intake plenum

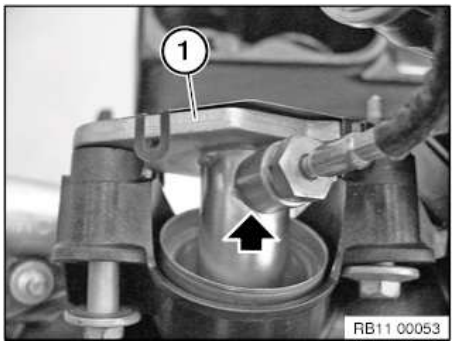
cardiagn.com



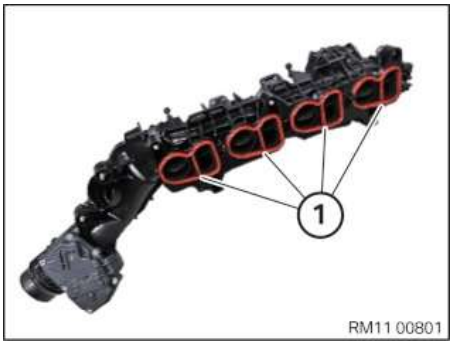
- Renew O-ring (1).

  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

  Parts: Gasket
- Position the seal (2) and clip it in.

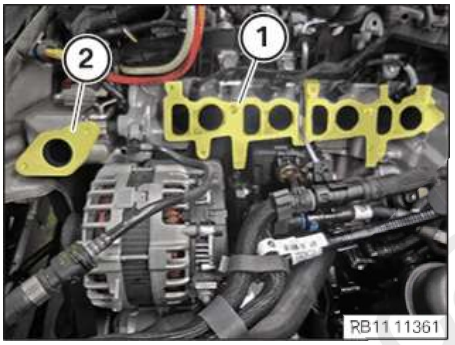


- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).

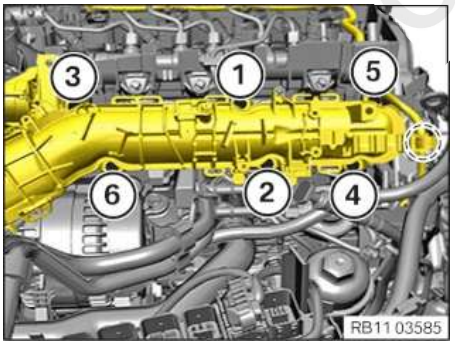


- Renew seals (1).

  Parts: Seals
- Ensure that the seals (1) are firmly mounted on the intake plenum.



- Clean connection points (1) at cylinder head.
- Clean the connection point (2) on the exhaust-gas recirculation cooler.

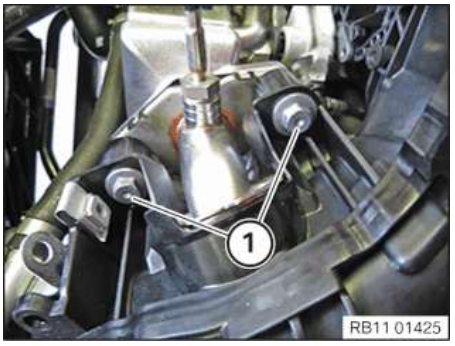


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

- Attach the wiring harness and fuel lines in the marked area on the intake plenum.

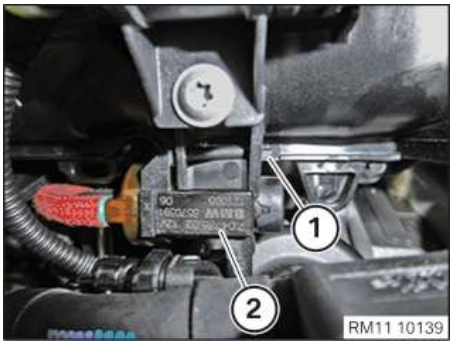


- Tighten the screws (1).

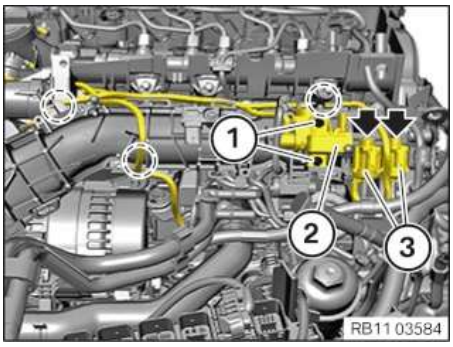
Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm

cardiagn.com



- Install electric changeover valve (2) from the left to the right in the holder on the intake plenum.
  The lock (1) must audibly engage.



- Install intake plenum electric changeover valve (3) on the intake plenum.
  The locks (arrows) must engage audibly.
- Position the electric changeover valve (2) on the intake plenum.
- Tighten the screws (1).

Electric changeover valve to intake plenum

TS6x20		Tightening torque	5 Nm

- Fasten the vacuum hoses on the intake plenum in the marked areas.

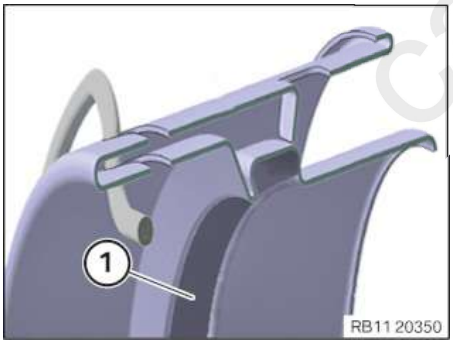


- Check the seal (1) for damage, and renew if necessary.

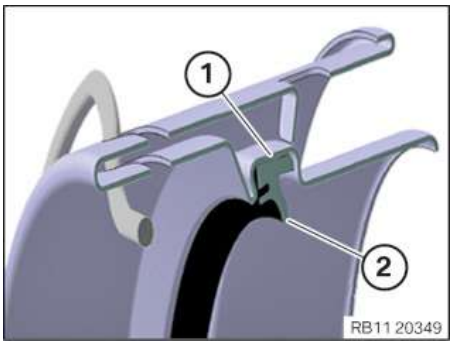
▸ **Replacing damaged seal**

TECHNICAL INFORMATION

Do not use pointed or sharp-edged tools for the installation and/or removal.



- Remove damaged seal.
- Clean gasket groove (1) with a dry towel.
  The gasket groove (1) must be clean.



- Renew gasket.
  Parts: Gasket
- Install seal dry without lubricant or mounting agent.

TECHNICAL INFORMATION

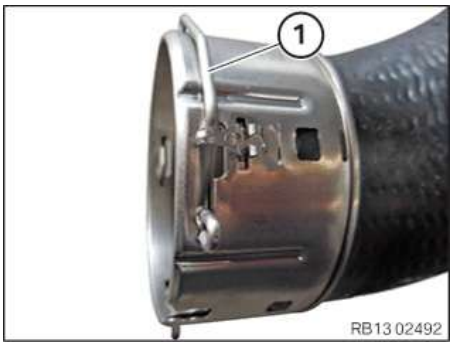
Incorrect assembly is possible. Ensure correct installation position.

- Feed in and install the seal.
- Make sure the seal is correctly installed in the gasket groove (1).
- Make sure that the sealing lip (2) is directed inwards as shown.

cardiagn.com



- Connect the pressure pipe to the throttle body until the locks (1) engage on both sides.



- Check that the locks (1) are correctly seated on the pressure pipe.

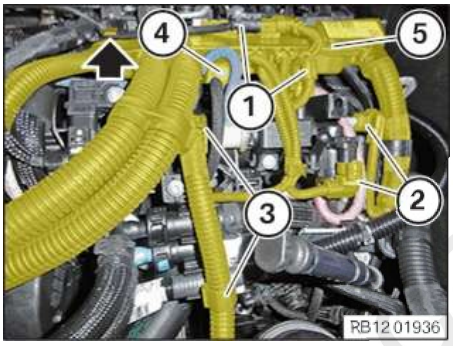
80 – Partially securing the wiring harness section on the intake plenum

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

- Route all cables without abrasions, do not trap and crush.



- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

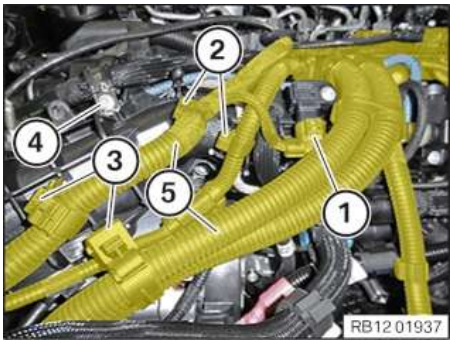
Wiring harness section to manifold

TS5x20		Tightening torque	3,6 Nm

- Secure clamps (3).
- Connect connectors (2) and lock.

  The connectors (2) must engage audibly.
- Secure the line at clamp (Arrow).
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

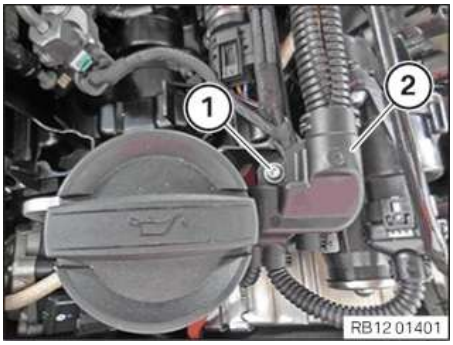
Standard screw connection 4 Nm

Oval-head screw		Tightening torque	4 Nm

- Secure clamps (3).
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

cardiagn.com



- Guide in the wiring harness section (2) and install.
- Tighten down screw (1).

Wiring harness section to cylinder head cover

TS5x20		Tightening torque	3,6 Nm



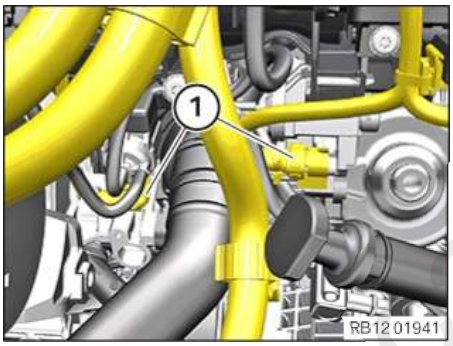
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



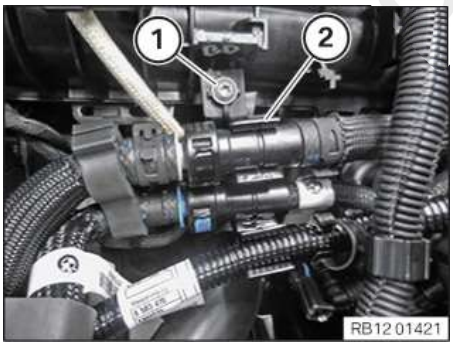
- Connect the connector (1) and lock it.

  The connector (1) must engage audibly.



- Connect connectors (1) and lock.

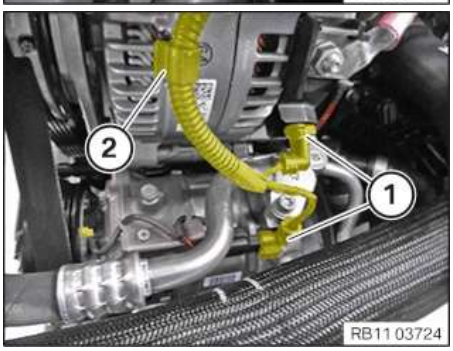
  The connectors (1) must engage audibly.



- Insert and install the holder (2).
- Tighten down screw (1).

Holder on intake plenum

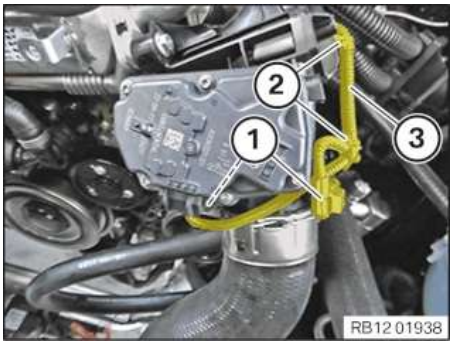
TS6X20		Tightening torque	5 Nm



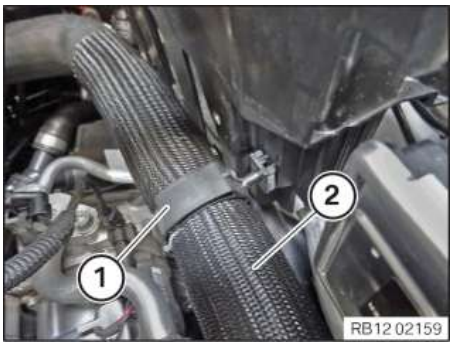
- Connect the connector (1) and lock it.

  The connectors (1) must engage audibly.
- Secure holder (2) to alternator.

cardiagn.com



- Guide in the wiring harness section (3) and install.
- Secure clamps (2).
- Connect connectors (1) and lock.



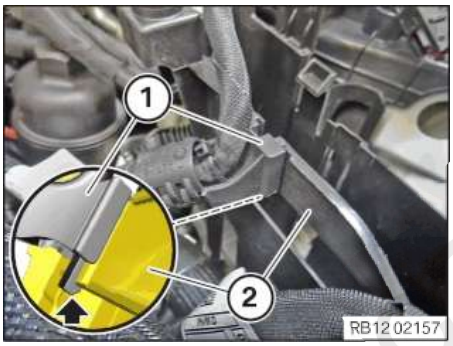
- Feed in and install coolant line (2).
- Lock holder (1).

  The holder (1) must engage audibly.



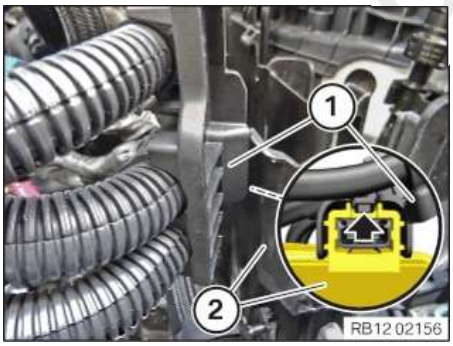
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.



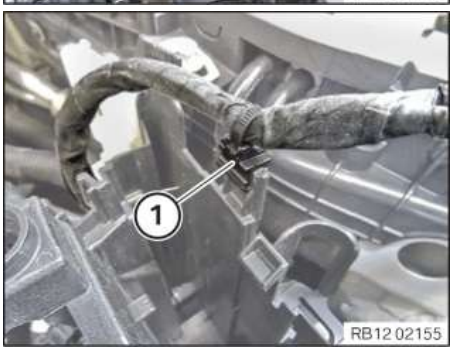
- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.



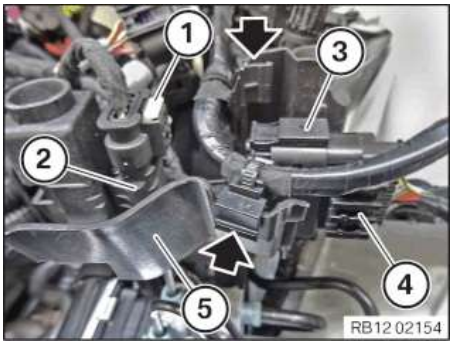
- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.

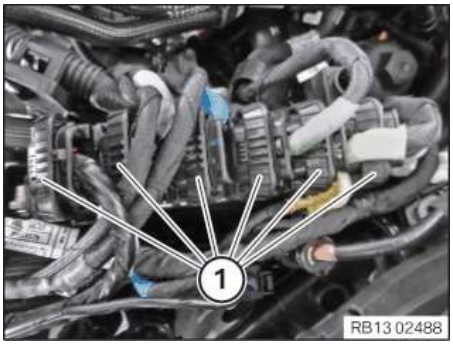


- Secure clamps (1).

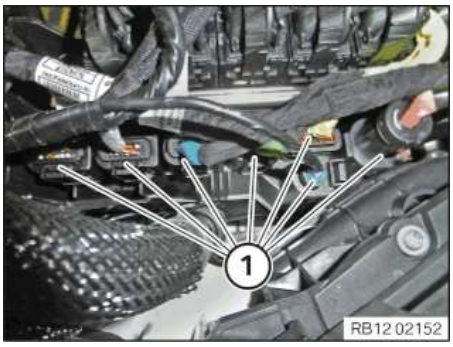
cardiagn.com



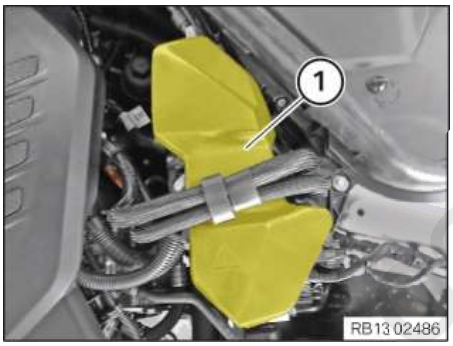
- Connect and lock the connector (4) with the control unit holder (5).
  The connector (4) must engage audibly.
- Connect connectors (3) and lock.
  The connector (3) must engage audibly.
- Connect and lock the connector (2) with the control unit holder (5).
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.
  The connector (1) must engage audibly.
- Secure the clamps (arrows).



- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.

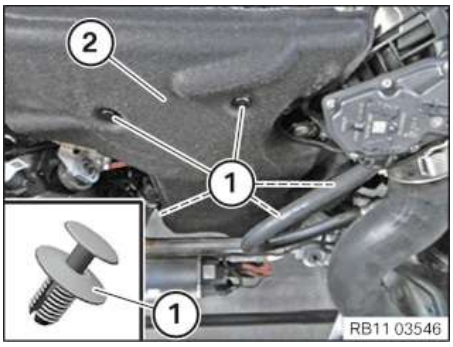


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



- Insert and install cover (1) into guides.

81 – Install acoustic cover for the engine, front



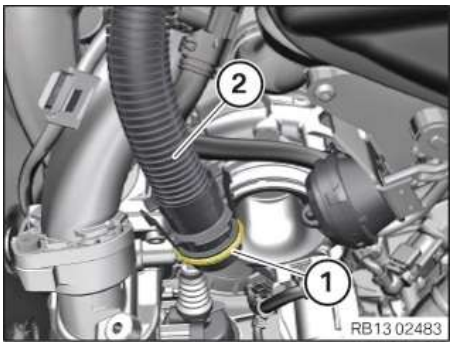
- Feed the acoustic cover (2) in and install.
- Secure the acoustic cover (2) with the expanding rivets (1).

82 – Installing the clean air pipe with resonator

cardiagn.com



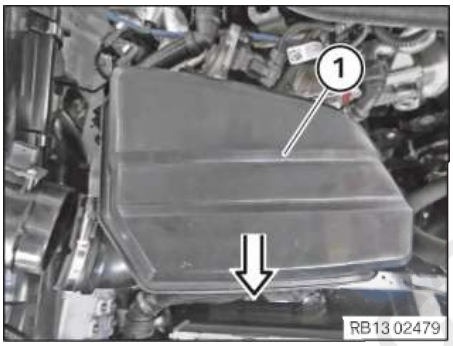
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



- Check the sealing ring (1) for the engine ventilation line (2) for damage and renew where required.



- Feed in and install clean air pipe with resonator (1) in the direction of the arrow.

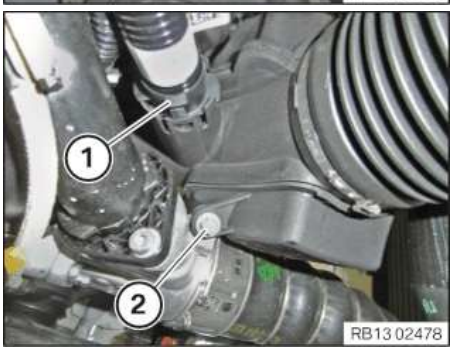


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

  The clamp (1) must engage audibly.

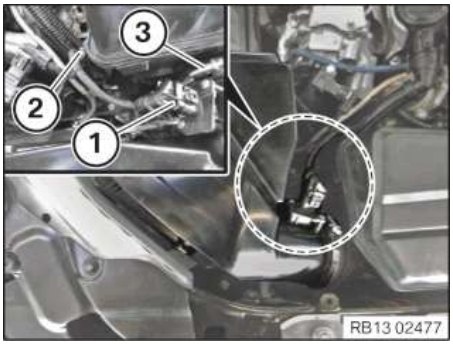


- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm

cardiagn.com



- Connect the clean air pipe with resonator to the intake filter housing.
- Tighten clamp (3).

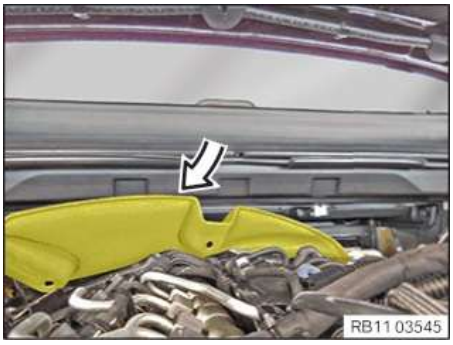
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

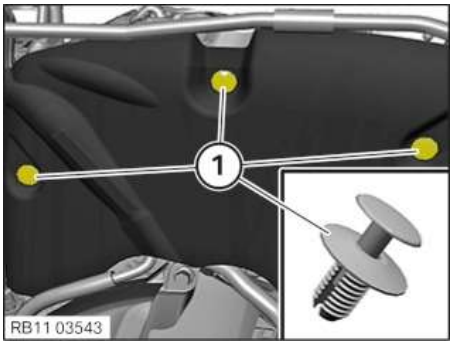
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

83 – Installing acoustic cover at rear

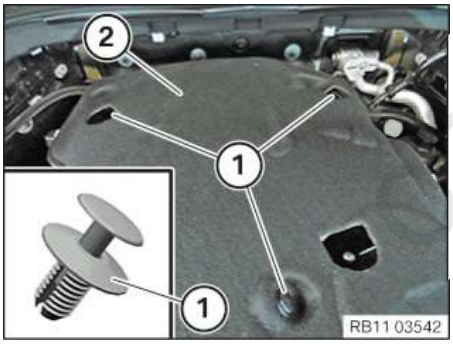


- Guide in the acoustic cover in the direction of the arrow and install it.



- Secure acoustic cover with the expanding rivets (1).

84 – Install the acoustic cover for the injectors



- Feed the acoustic cover (2) in and install.
- **If installed:** Secure the acoustic cover (2) with the expanding rivets (1) .

85 – Install acoustic cover

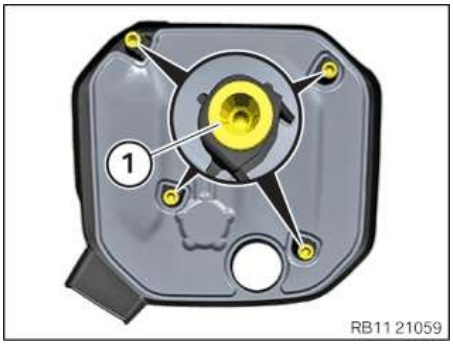
RISK OF DAMAGE

Damage to the acoustic cover/design cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.

cardiagn.com

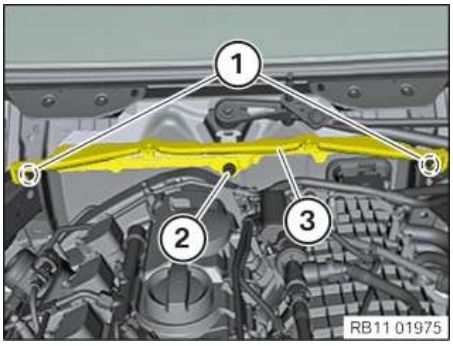


- Check the acoustic cover for correct fit of the rubber mounts (1).



- Clip in the acoustic cover (1) into the holders in the indicated areas.

86 – Installing centre bulkhead lower section

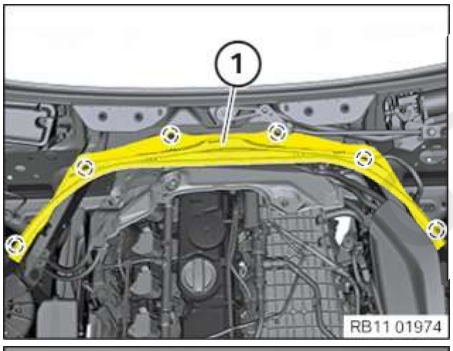


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

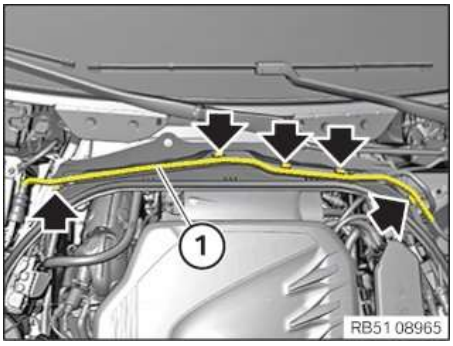
87 – Installing the centre bulkhead upper part



- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

Bulkhead upper part to bottom bulkhead

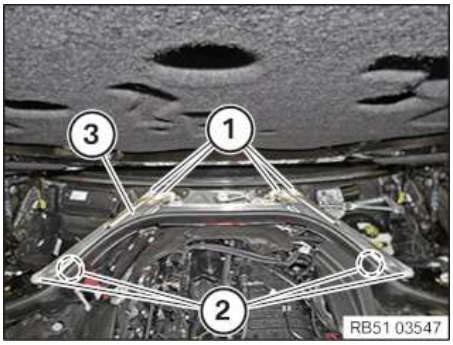
		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

  Clip in the wire (1) into the holders (arrows).

bardiagn.com



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Install the tension strut (3) on the spring strut dome.
- Tighten the screws (1).

Tension strut on bulkhead

M10x25 screw		Tightening torque	56 Nm

- Renew screws (2).

  Parts: Screws
- Tighten the screws (2).

Tension strut to spring strut dome

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

88 – Install the seal for the bonnet



- Press the rear bonnet seal (2) into the guide.
- Feed in cable (1) into the brackets.
- Check that the rear bonnet seal (2) and the cable (1) are seated correctly.

89 – Installing cowl panel cover

RISK OF DAMAGE

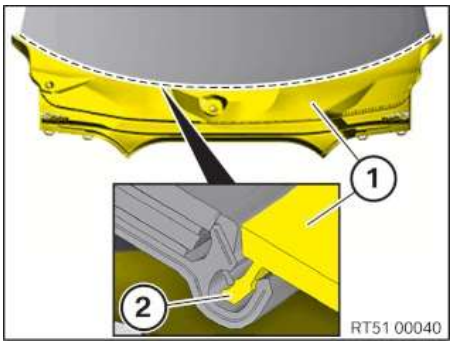
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

- Ensure correct installation of the components.
- Only use undamaged components.

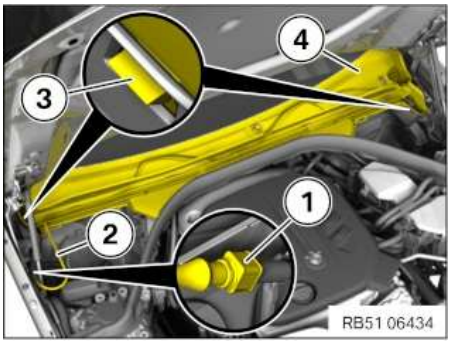
TECHNICAL INFORMATION

Before installing the cowl panel cover it is **mandatory** to check that the 48 V line is routed correctly and fitted tightly.
An incorrectly laid or attached 48 V line can be damaged by the wiper kinematics.



- Push the cowl panel cover (1) into the latch mechanism (2) beginning on the side.

cardiagn.com



- Clip cowl panel cover (4)in by means of the latch mechanisms (3).
- Position windscreen wash hose (2) and connect windscreen wash hose (1)quick lock.

90 – Install left and right wiper arm

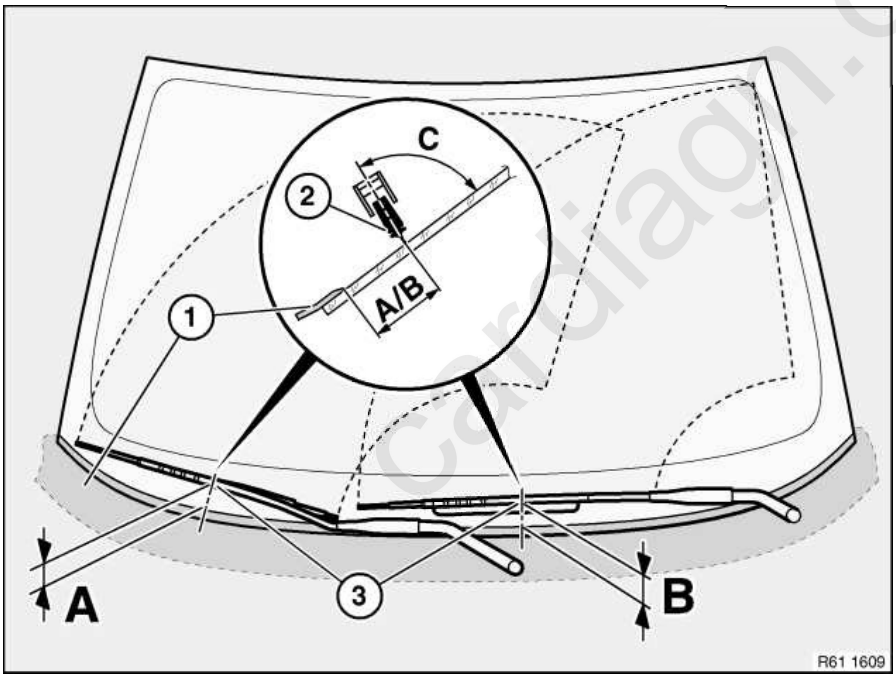
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

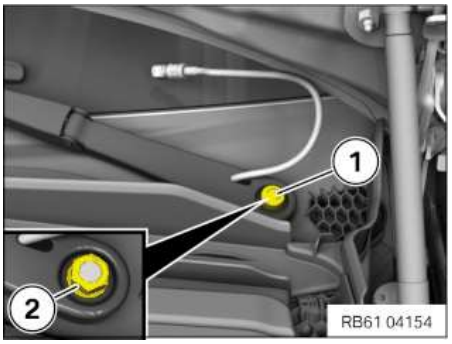
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- Connect the wiper arm (3).
- Correctly position the wiper arm (2) in relation to the window edge (1).

Distance from window pane edge to wiper blade

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm



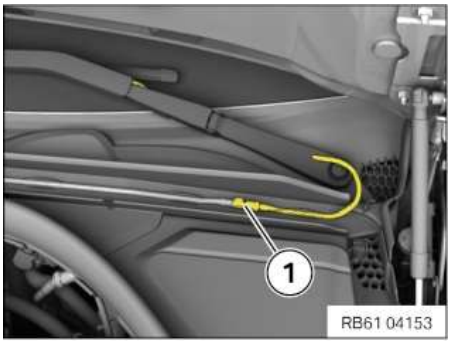
- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

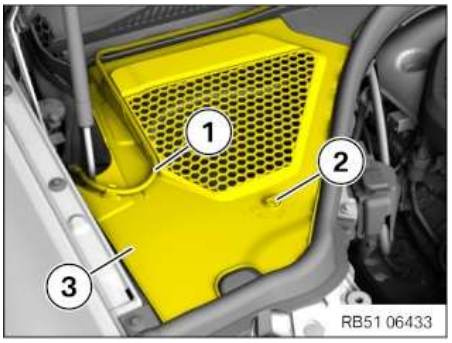
- Connect the protective cap (1).

cardiagn.com



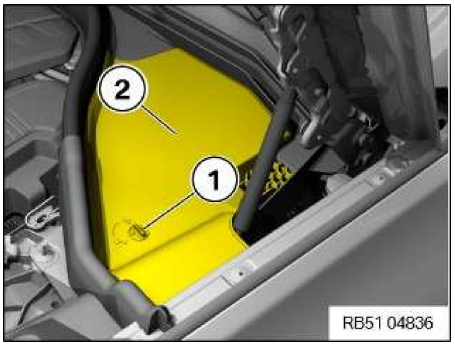
- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

91 – Install the rear right engine compartment cover



- Position the cover of the engine compartment on the rear right (3).
- Close lock (2).
- Insert washer fluid hose (1) into the guides.

92 – Install the cover of the engine compartment on the rear left



- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

93 – Connecting all battery earth leads



- See additional information.

94 – Take bonnet out of the service position

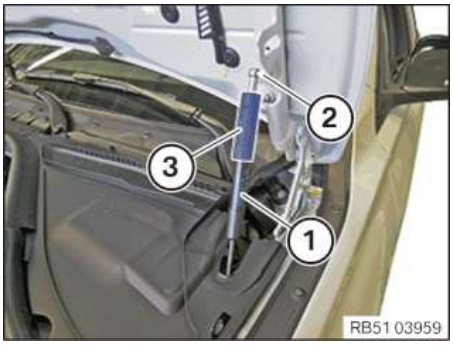
CAUTION

Shutting bonnet or tailgate.

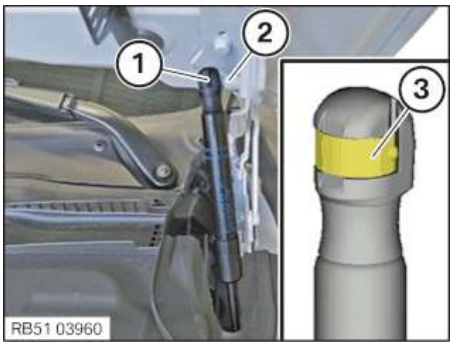
Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.

cardiagn.com



- Support the bonnet by hand.
- Remove the special tool (3) from the ball pin (2).
- Pull off the special tool (3) from the gas pressure spring (1).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.



- Check the clamp (3) is fitted correctly.
- Connect ball socket (1) to ball pin (2).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.

Additional Information

Overview of Tightening Torques

Special tool 2 365 488 to engine			Used in step 4052
M8x60		Tightening torque	19 Nm

Intake and exhaust camshaft in camshaft support			Used in step 46
M6x31		Tightening torque	10 Nm

Bearing journal to cylinder head			Used in step 48
M16x1.5	Replace bearing journal.	Tightening torque	20 Nm

Standard screw connection M8			Used in step 48
M8		Tightening torque	19 Nm

Chain tensioner piston to cylinder head			Used in step 49
22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

Holder to crankcase			Used in step 49
M8X16		Tightening torque	19 Nm

Camshaft sprocket to camshaft			Used in step 50
M7x17.			17 Nm

Starter motor to engine			Used in step 55
M8X60		Tightening torque	19 Nm

Battery positive lead to starter			Used in step 55
M8		Tightening torque	13,5 Nm

Diesel particulate filter V-clip to exhaust turbocharger			Used in step 57
V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

Bracket to diesel particulate filter top			Used in step 57
M8		Tightening torque	19 Nm

cardiagn.com

Bracket to transmission for diesel particulate filter holder bottom			Used in step 57
M8X20		Tightening torque	19 Nm

Lower holder to diesel particulate filter			Used in step 57
M8		Tightening torque	19 Nm

Coolant lines for SCR metering module			Used in step 57
M6X16		Tightening torque	8 Nm

Nitrogen oxide sensor before SCR catalytic converter			Used in step 58
Sensor		Tightening torque	50 Nm

Monitoring oxygen sensor			Used in step 59
Sensor		Tightening torque	50 Nm

Rear silencer to body / bumper support			Used in step 60
M8	Replace nuts.	Tightening torque	19 Nm

Exhaust system to rear axle carrier			Used in step 60
M8 nut		Tightening torque	19 Nm

Exhaust system to transmission			Used in step 60
M8		Tightening torque	19 Nm

Exhaust system to diesel particle filter			Used in step 60
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

SCR metering module V-clip to exhaust system			Used in step 60
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm

Exhaust-gas temperature sensor upstream of SCR catalytic converter			Used in step 60
Sensor		Tightening torque	30 Nm

Diesel particulate sensor to exhaust system			Used in step 60
Sensor		Tightening torque	50 Nm

Nitrogen oxide sensor downstream of SCR catalytic converter			Used in step 60
Sensor		Tightening torque	55 Nm

Connecting support to tunnel			Used in step 61
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

Diffuser / underbody panelling			Used in step 62
Nuts and screws		Tightening torque	3 Nm

Underbody protection			Used in step 6365
Hexagon screw		Tightening torque	3 Nm

Underbody panelling			Used in step 64
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Underbody protection, steering, to front axle support			Used in step 66
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support			Used in step 66
Hexagon bolt M6		Tightening torque	8 Nm

cardiagn.com

Underbody protection of the steering gear — Used in step 67

Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

Wheel arch trim panel, front — Used in step 67

Thermoplastic hexagon screw		Tightening torque	2,6 Nm

Underbody protection front — Used in step 68

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Cylinder head cover to cylinder head — Used in step 69

M6		Tightening torque.	8,5 Nm

Heat shield to exhaust manifold — Used in step 70

M6x12			10 Nm

Bracket on cylinder head cover — Used in step 71

		Tightening torque	5 Nm

Battery positive lead to battery positive terminal — Used in step 71

M8		Tightening torque	19 Nm

Differential pressure sensor of diesel particulate filter on cylinder head cover — Used in step 72

TS5x20		Tightening torque	4 Nm

Heat shield to exhaust manifold — Used in step 73

M6x12		Tightening torque	10 Nm

Banjo bolt for exhaust pressure pipe to exhaust manifold — Used in step 73

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm

Exhaust gas pressure pipe to sensor system holder — Used in step 73

TS6x20		Tightening torque	5,7 Nm

Clamping claw facing to cylinder head cover — Used in step 74

M6		Tightening torque	10 Nm

Injector to cylinder head cover — Used in step 74

M8		Tightening torque	8 Nm
		Angle of rotation	120 °

Rail to cylinder head cover — Used in step 75

M8		Tightening torque	19 Nm

High pressure lines between high pressure pump and rail — Used in step 76

High-pressure pipe		Tightening torque	24.5 Nm

High pressure lines between injector and rail — Used in step 77

High-pressure pipe		Tightening torque	24.5 Nm

Intake plenum to cylinder head — Used in step 79

M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum — Used in step 79

		Tightening torque	10 Nm

cardiagn.com

Electric changeover valve to intake plenum			Used in step 79
TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold			Used in step 80
TS5x20		Tightening torque	3,6 Nm

Standard screw connection 4 Nm			Used in step 80
Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover			Used in step 80
TS5x20		Tightening torque	3,6 Nm

Holder on intake plenum			Used in step 80
TS6X20		Tightening torque	5 Nm

Clean air pipe to exhaust turbocharger			Used in step 82
M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing			Used in step 82
Clamp		Tightening torque	3 Nm

Bulkhead lower part to body			Used in step 86
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead			Used in step 87
		Tightening torque	3 Nm

Tension strut on bulkhead			Used in step 87
M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome			Used in step 87
Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm			Used in step 90
Combination hexagon nut		Tightening torque	35 Nm

Overview of Special Tools

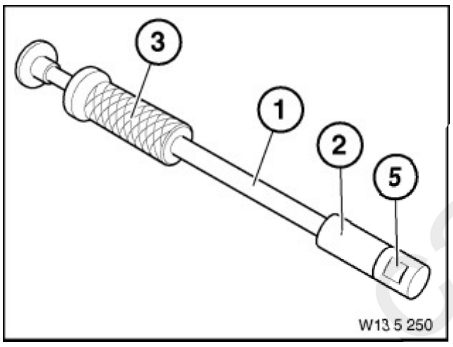
cardiagn.com

0 493 339 (13 5 252) Bush



Common	Used in step 21
Usage	(Threaded bush)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 321 (13 5 250) Puller



Common	Used in step 21
Usage	For removing injector nozzles or injectors from cylinder head
Included in the tool or work	
Storage location	A16
Replaced by	
In connection with	
SI-Number	01 06 98 (306)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 338 (13 5 251)		**Rod** (guide rod)	
2	0 493 339 (13 5 252)		**Bush** (Threaded bush)	
3	0 493 340 (13 5 253)		**Weight** (Weight)	
4	0 493 379 (13 5 254)		**Claw** (Clamping claw) For removal of injector nozzles / engine: M57	
5	0 495 579 (13 5 255)		**Adapter** For removing steering shaft on E85. Refer to SI 01 11 06 (265)	

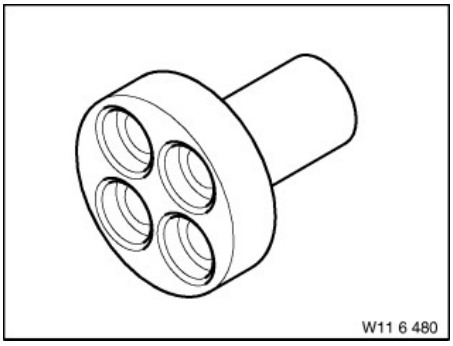
cardiagn.com

0 493 340 (13 5 253) Weight



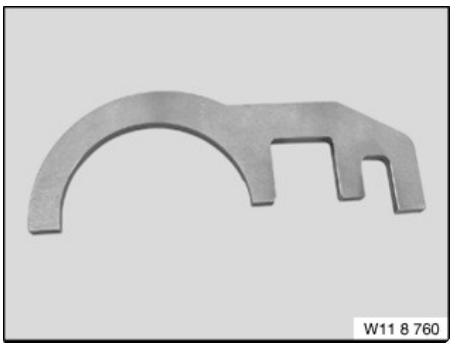
Common	Used in step 21
Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 380 (11 6 480) Connector



Common	Used in step 4052
Usage	For turning over engine at crankshaft hub (vibration absorber).
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	01 11 98 (338)

0 496 112 (11 8 760) Gauge



Common	Used in step 40445253
Usage	For securing camshaft at TDC.
Included in the tool or work	
Storage location	B24
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

2 365 488 Adapter



Common	Used in step 40515254
Usage	For disconnecting the crankshaft at the top dead centre. (longitudinal installation with automatic transmission only).
Included in the tool or work	
Storage location	C56
Replaced by	
In connection with	
SI-Number	01 46 14 (191)

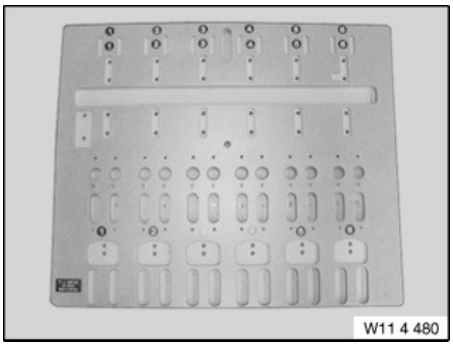
2 288 380 Locating stud



Common	Used in step 40515254
Usage	For disconnecting the crankshaft at the top dead centre. Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).
Included in the tool or work	
Storage location	A56
Replaced by	
In connection with	
SI-Number	01 04 14 (071)

cardiagn.com

0 495 105 (11 4 480) oddments tray

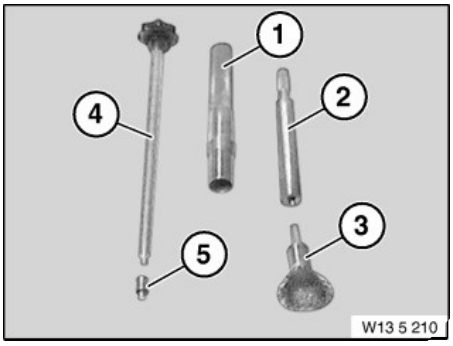


Common	Used in step 45
Usage	(Boards (2 pieces)) For setting down the individual components of the cylinder head.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 17 04 (130)

Consisting of

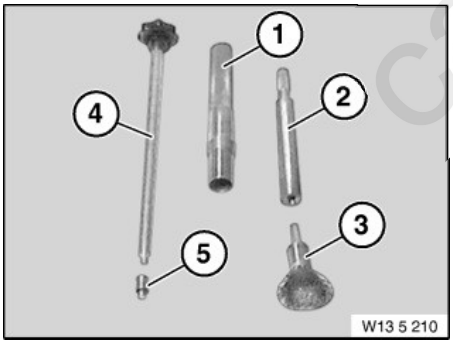
Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 495 106 (11 4 481)		**oddments tray** (Board, intake side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	
2	0 495 107 (11 4 482)		**oddments tray** (Board, exhaust side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	

0 493 763 (13 5 215) Plug



Common	Used in step 74
Usage	(Seal plug)
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

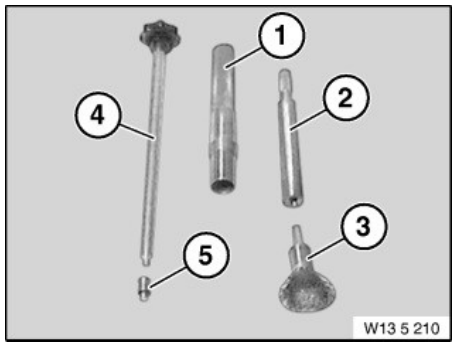
0 493 762 (13 5 214) Rod



Common	Used in step 74
Usage	(Mounting rod) For the seal plug
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

cardiagn.com

0 493 758 (13 5 210) Tool



Common

Used in step 74

Usage	(Cleaning set) For injector channels
Included in the tool or work	
Storage location	B4
Replaced by	
In connection with	
SI-Number	01 05 00 (574)

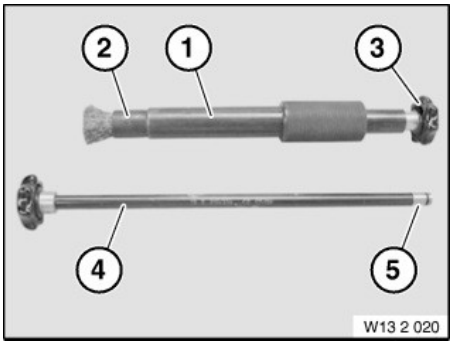
Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 759 (13 5 211)		**Holding sleeve** (Guide sleeve)	
2	0 493 760 (13 5 212)		**Holder** (Brush holder)	
3	0 493 761 (13 5 213)		**Brush head**	
4	0 493 762 (13 5 214)		**Rod** (Mounting rod) For the seal plug	
5	0 493 763 (13 5 215)		**Plug** (Seal plug)	

cardiagn.com

0 496 150 (13 2 020) Tool

Used in step 74



Common

Usage	(Cleaning kit) For cleaning the injector shaft.
Included in the tool or work	
Storage location	A87
Replaced by	
In connection with	
SI-Number	01 07 07 (355)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 496 151 (13 2 021)		**Holding sleeve** (Guide sleeve) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
2	0 496 152 (13 2 022)		**Holder** (Brush holder) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
3	0 496 153 (13 2 023)		**Brush head** Remaining inventories will be sold off, followed by discontinuation and then available as part of complete special tool 13 2 020 = 83 30 0 496 150 only	
4	0 496 154 (13 2 024)		**Rod** (Mounting rod) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
5	0 496 155 (13 2 025)		**Plug** (Seal plug) Available as part of complete special tool 13 2 020 = 83 30 0 496 150 only.	

Overview Technical Data

Distance from window pane edge to wiper blade — Used in step 90

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

Links

General repair instructions	Used in step
11 00 ... Overview of consumables (Electronic Parts Catalogue)	74

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	293
61 20 900 Disconnecting and connecting battery earth lead	293
61 20 900 Disconnecting and connecting battery earth lead	293
61 20 900 Disconnecting and connecting battery earth lead	293
61 20 900 Disconnecting and connecting battery earth lead	293
61 20 900 Disconnecting and connecting battery earth lead	293

cardiagn.com

61 20 900 Disconnecting and connecting battery earth lead	293
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	293
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	293
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	293
61 20 900 Disconnecting and connecting battery earth lead	293
61 20 900 Disconnecting and connecting battery earth lead	293
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	293
61 20 900 Disconnecting and connecting battery earth lead	293
61 20 900 Disconnecting and connecting battery earth lead	293
61 20 900 Disconnecting and connecting battery earth lead	293
61 20 900 Disconnecting and connecting battery earth lead	293
61 20 900 Disconnecting and connecting battery earth lead	293
61 20 900 Disconnecting and connecting battery earth lead	293
61 20 900 Disconnecting and connecting battery earth lead	293
61 20 900 Disconnecting and connecting battery earth lead	293
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	293
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	293
61 20 900 Disconnecting and connecting battery earth lead	293
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	293
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	293
61 20 900 Disconnecting and connecting battery earth lead

11 31 567 Replacing open timing chain, top

PRELIMINARY WORK

1 – If necessary: Checking the timing chain at the top for elongation using the diagnosis system



- Connect the battery charger to the vehicle.
- Connect the diagnostic system to the vehicle.
- **Read fault memory of DDE control unit.**
  - Vehicle handling
  - Troubleshooting
  - Function structure
  - Power train
  - Digital Diesel Electronics

2 – Bring front compartment lid in the service position

Prerequisite

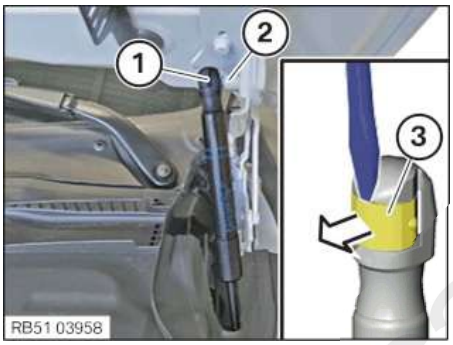
Engine compartment lid is open.

CAUTION

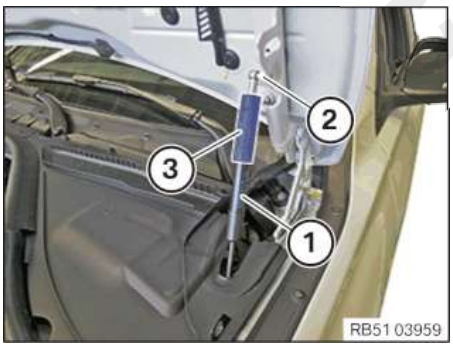
Shutting bonnet or tailgate.

Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.



- Lift clamp (3) slightly using a screwdriver, in the direction of the arrow.
- Lift off ball socket (1) from ball pin (2).
- Repeat the operation on the other side of vehicle.

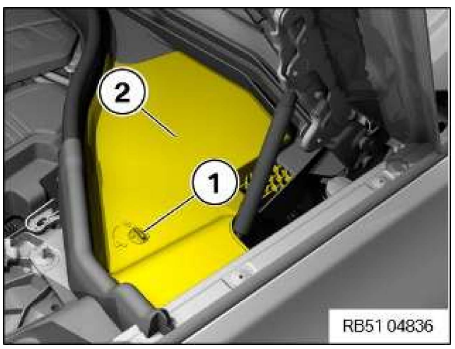


TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

- Remove the bonnet support and open the bonnet further.
- Pull special tool or or (3) over gas pressure spring (1).
- Place special tool on the ball pin (2) and engage using force.
- Repeat the operation on the other side of vehicle.

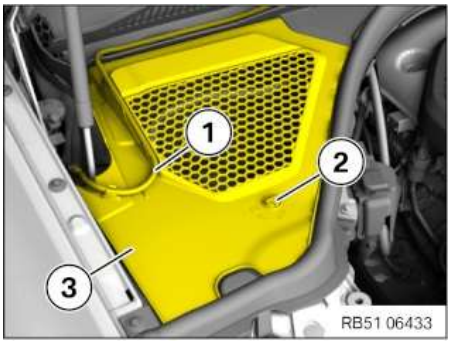
3 – Remove the cover of the engine compartment at the rear left



- Loosen the lock (1).
- Remove the cover (2) of the rear left engine compartment.

cardiag.com

4 – Remove the cover of the rear right engine compartment



- Release washer fluid hose (1) from the guides.
- Loosen the lock (2).
- Remove the cover (3) of the rear right engine compartment.

5 – Deactivating the 48 V electrical system

Prerequisite

Ignition is switched off.

WARNING

Deactivation of the 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Make sure that **no battery charger** is connected to the jump start terminal point in the engine compartment.
- For vehicles with additional electrical systems (48 V electrical system, high-voltage vehicle electrical system), it is mandatory to deactivate them **before** disconnecting the vehicle battery.

WARNING

Deactivation of the 48 V electrical system.

Risk of short circuits! Risk of fire!

- Make sure that **no charger** is connected to the jump start support point in the engine compartment.

RISK OF DAMAGE

Damage to 48-V battery

If a 48-V battery that is disconnected from the electrical system is activated, the battery electronics will be damaged.

- Only carry out activation of the 48V electrical system with a completely connected 48-V battery.

TECHNICAL INFORMATION

Follow notes for 48-V battery. See further information 6120 ... Notes on 48-V battery.



- Deactivate the 48V electrical system by opening the bonnet.

  The deactivation takes place automatically.

Check

cardiagn.com



TECHNICAL INFORMATION

Zero voltage (48V electrical system is switched off) is displayed only in PAD mode.

- Press the START-STOP button quickly 3 times without stepping on the brake pedal to establish the PAD mode.
- Check isolation from the supply in the instrument cluster in PAD mode.

desired state

- The Check Control message "48V electrical system switched off." (1) is displayed.

Result

» **The absence of voltage** cannot be determined by means of the Check Control message "48V electrical system switched off:" (1). Work is not permitted to be started.

Measure

- Carry out the service function "48 V electrical system deactivation".
  - Vehicle management > Service functions > Voltage supply > Deactivate 48 V electrical system

Only when the Check Control message “48 V electrical system switched off.” (1) is displayed in the instrument cluster is it permitted to disconnect the 12 V battery.

If the absence of voltage is not indicated clearly, contact Technical Support.

Result

» The Check Control message signals that the 48V electrical system has been switched off.

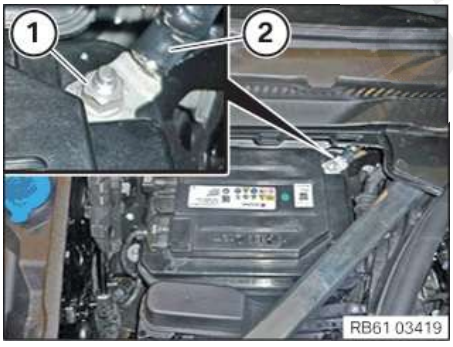
Measure

- Exit PAD mode by pressing the START-STOP button once without depressing the brake pedal.

The work “Disconnecting the negative battery cable of the 48-V battery” can be started.



- Unlock and disconnect plug connection (1) of the CAN bus.
- Release the clip (2).



- Loosen nut (1).
- Pull off negative battery cable (2) of the 48-V battery from the negative battery terminal, set it aside and secure it.



WARNING

Unprotected battery terminals.

Risk of short circuits! Risk of fire!

- Cover the vehicle battery.

- Cover the vehicle battery with the special tool as shown.
- Position the battery earth lead (1) as shown.

ardiagn.com



- See additional information.

7 – Removing the wiper arm on the left and right

NOTICE

Description is for left component only. Procedure on the right side is identical.

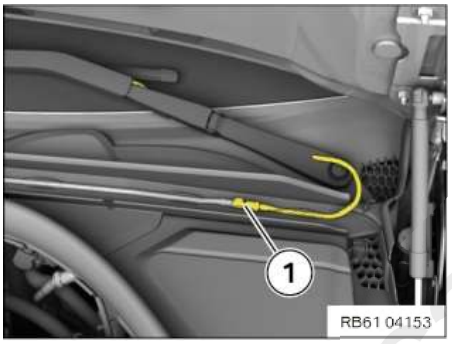
▶ **Remove the wiper arm**

RISK OF DAMAGE

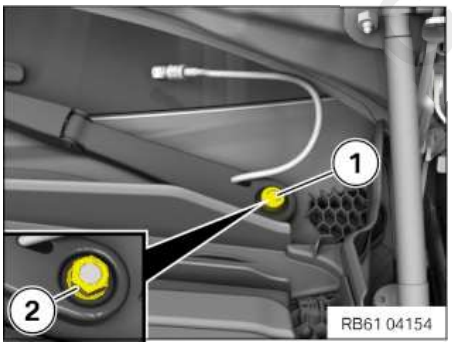
Damage to wiper console.

While removing the wiper arms without using special tool, the wiper console can break.

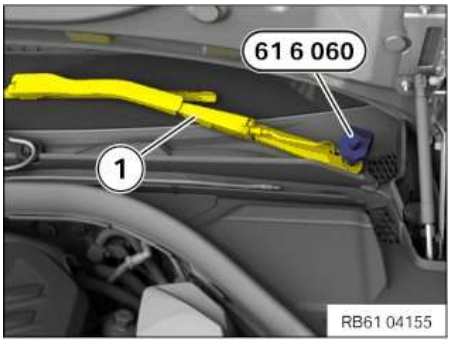
- Removing the wiper arms must be carried out only using the prescribed special tool.
- Do **not** lever off the wiper arm because otherwise the wiper console may break at the predetermined breaking point for active pedestrian protection.



- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.



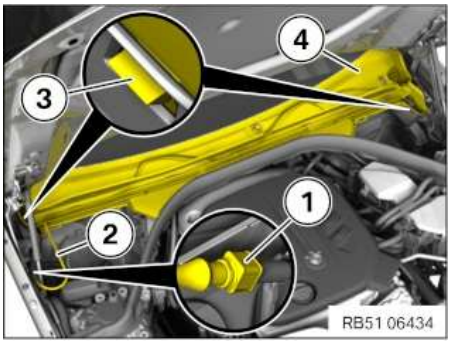
- Remove the protective cap (1).
- Loosen nut (2).



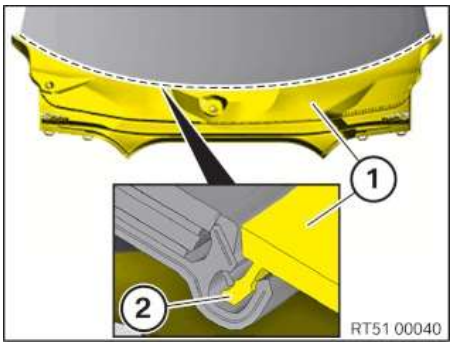
- Pull off the wiper arm (1) using special tool .

8 – Remove cowl panel cover

cardiagn.com



- Release snap fastener (1) of the washer fluid hose (2) and put the washer fluid hose (2) to one side.
- Unclip clips (3) on the cowl panel cover (4).



- Pull the cowl panel cover (1) upward out of the latch mechanism (2) beginning on the side.

9 – Remove the seal for the rear bonnet

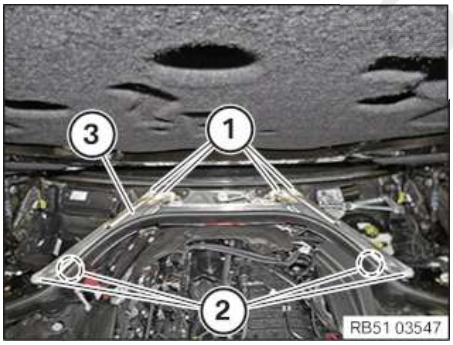


- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

10 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

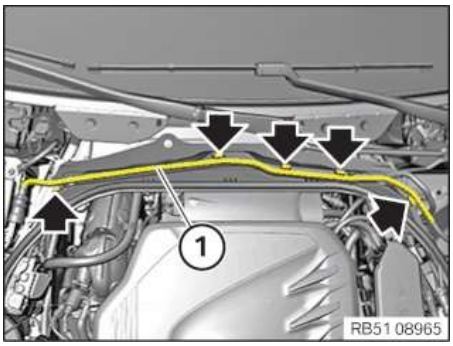
Driving without the strut brace/front-end strut or tension strut is not permitted.



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

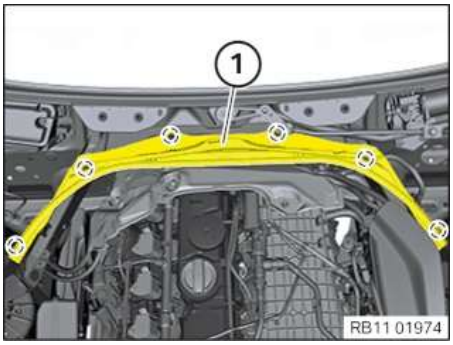
- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.



- **Version with mild hybrid technology:**

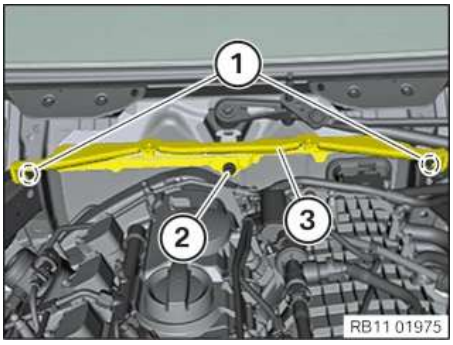
  Unclip the wire (1) at the holders (arrows).

carsdiagn.com



- Unscrew the bolts in the marked areas.
- Remove the centre bulkhead upper part (1).

11 – Removing the centre bulkhead lower section



- Loosen screws (1).
- Loosen nut (2).
- Remove the centre bulkhead lower part (3).

12 – Removing the acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

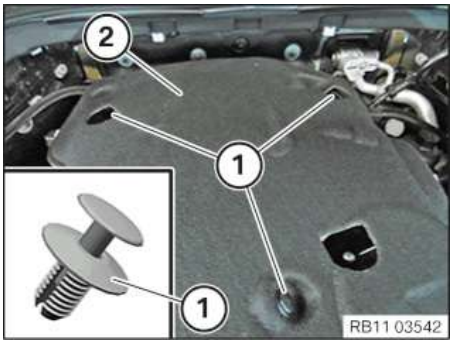
Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



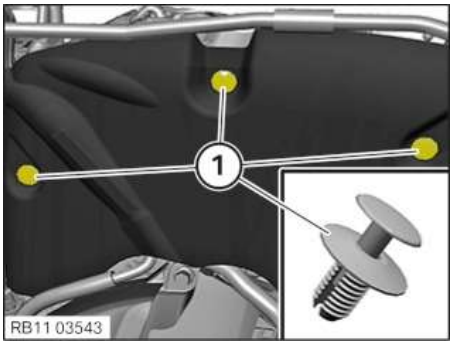
- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

13 – Remove the acoustic cover for the injectors

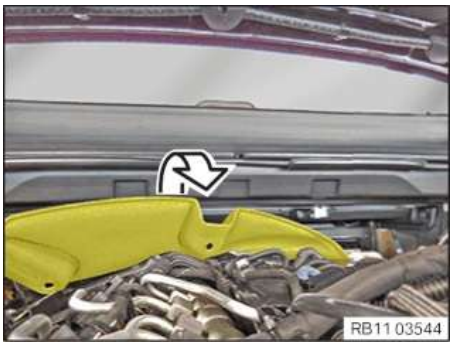


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

14 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).



- Guide out and remove the acoustic cover in the direction of the arrow.

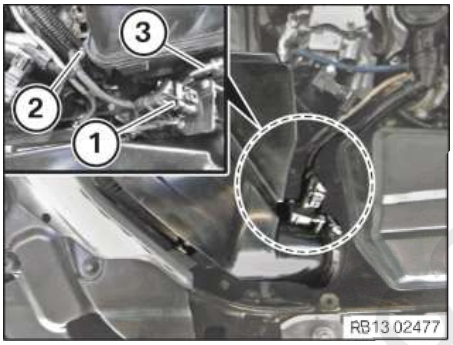
15 – Removing the clean air pipe with the resonator

WARNING

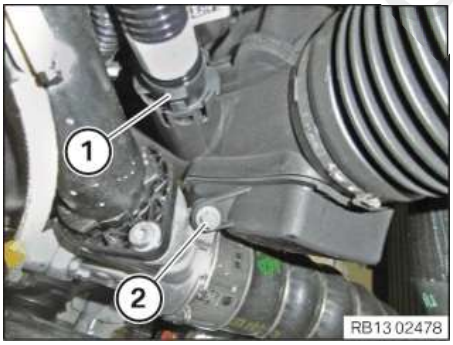
Hot surfaces.

Risk of burning!

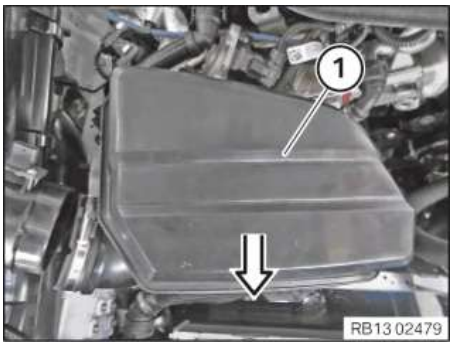
- Perform all work only on components that have cooled down.



- Unlock plug connection (1) and disconnect.
- Loosen clamp (2).
- Unfasten clamp (3).
- Separate the clean air pipe with resonator from the intake filter housing.



- Unlock engine ventilation line (1), disconnect it and place it aside.
- Loosen screw (2).



- Press and hold clean air pipe with resonator (1) in the direction of the arrow.

cardiagn.com



- Unlock and loosen clamp (1).



- Feed out and remove clean air pipe with resonator (1) in the direction of the arrow.

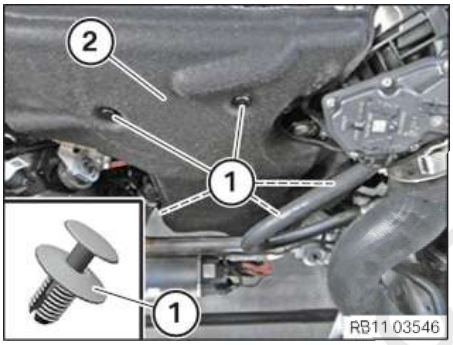
16 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

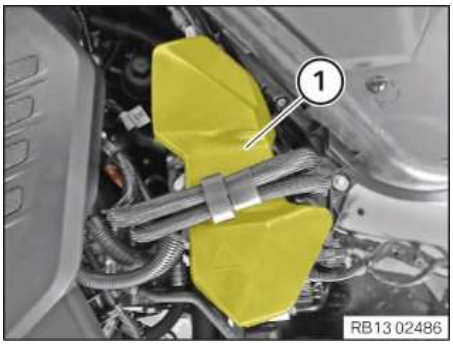
Risk of burning!

- Perform all work only on components that have cooled down.



- Release and remove expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

17 – Remove the cover for the DDE control unit



- Pull off, guide out and remove cover (1) upwards.

18 – Partially releasing the wiring harness section on the intake plenum

cardiagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

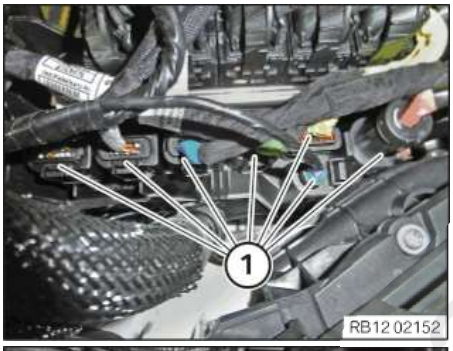
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

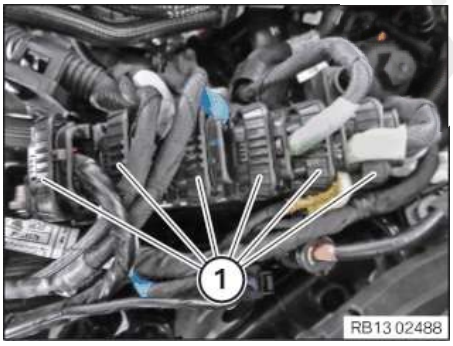
- Do not pull on the wires when disconnecting connectors and plug connections.

TECHNICAL INFORMATION

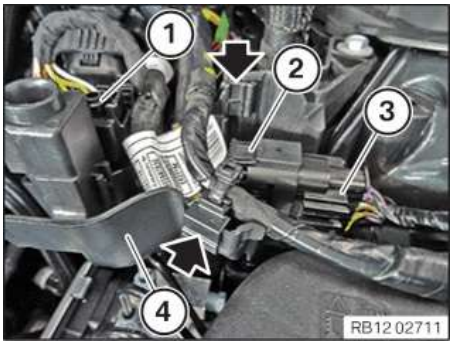
Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.



- Unlock and disconnect plug connections (1).

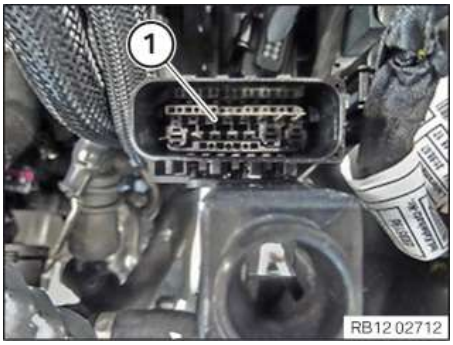


- Unlock and disconnect plug connections (1).

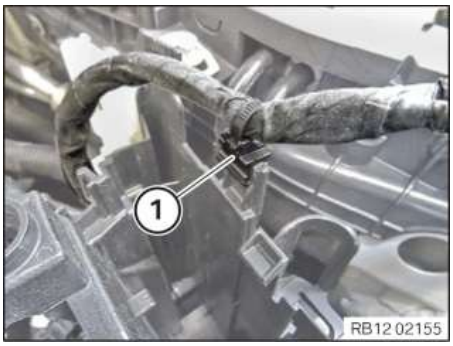


- Unlock plug connection (1) and disconnect.
- Unlock plug connection (2) and disconnect.
- Release the connector (3) and disconnect from the control unit holder (4).
- Release the clamps (arrows).

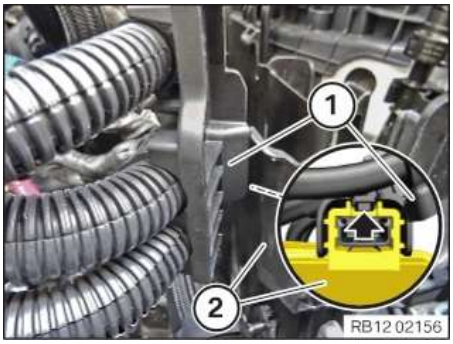
cardiagn.com



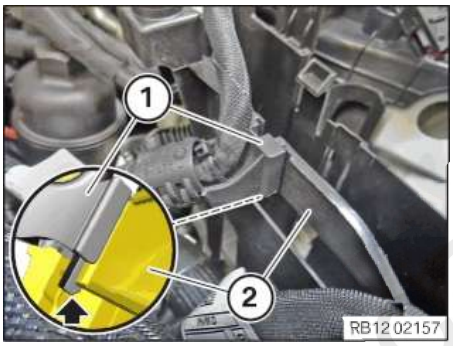
- Unlock plug connection (1) and disconnect.



- Loosen clamp (1).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).

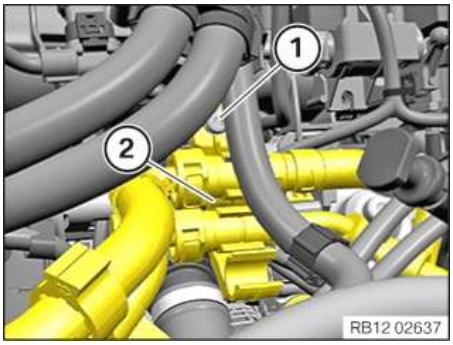


- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.

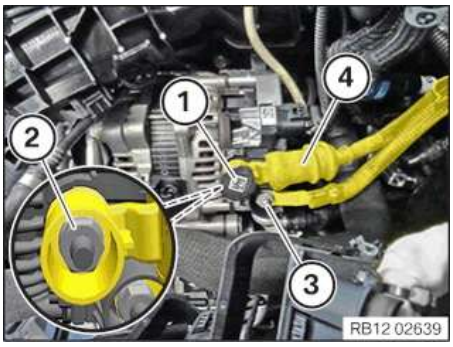


- Unlock holder (1) and feed out coolant line (2) and place it aside.

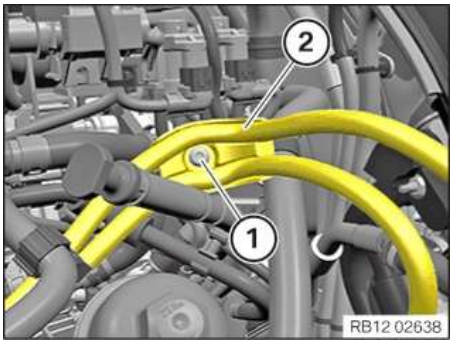
cardiagn.com



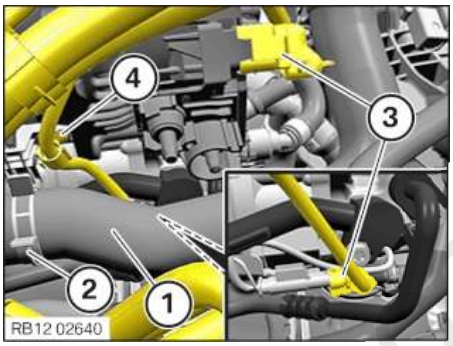
- Release the screw (1).
- Guide out fuel lines (2) and set them aside.



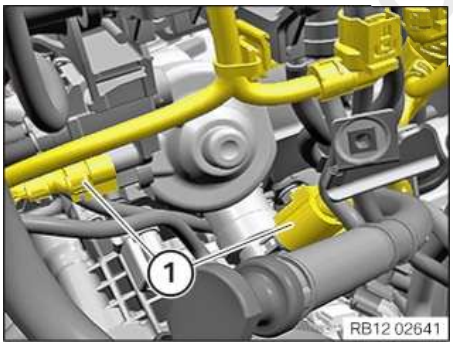
- Guide out and remove the lid (1).
- Release the nuts (2) and (3).
- Feed out positive battery cables (4) and place to one side.



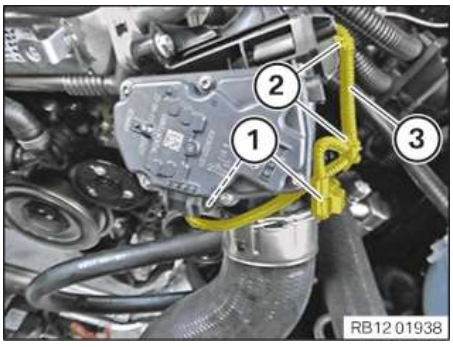
- Release the screw (1).
- Guide out the positive battery cables (2) and set them aside.



- Release the coolant line (1) from the holder (2) .
- Unlock plug connections (3) and disconnect.
- Loosen clamp (4).



- Unlock and disconnect plug connections (1).



- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.

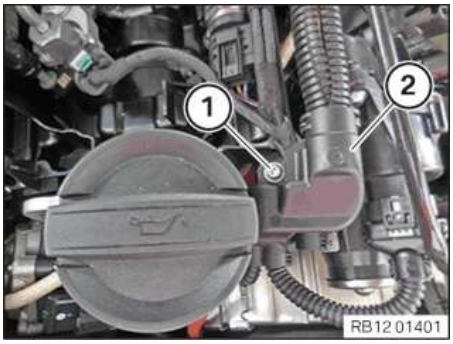
cardiagn.com



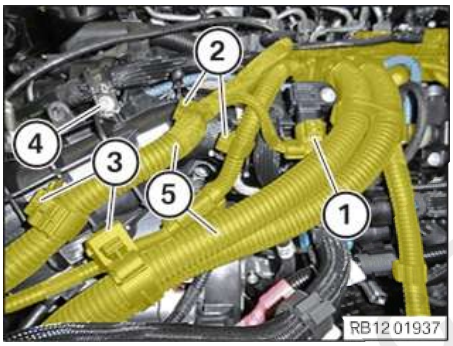
- Unlock and loosen connector (1).



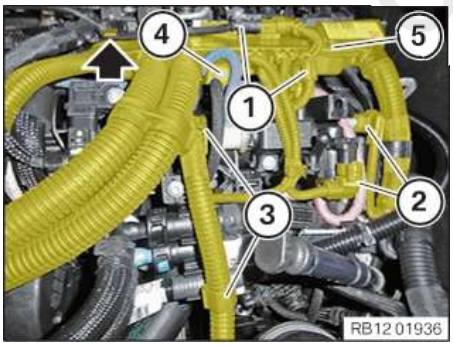
- Unlock plug connection (1) and disconnect.



- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.



- Unlock plug connection (1) and disconnect.
- Loosen clamps (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.



- Unlock and disconnect plug connections (1).
- Release line from clamp (Arrow).
- Unlock and disconnect plug connections (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.

19 – Removing the intake plenum

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

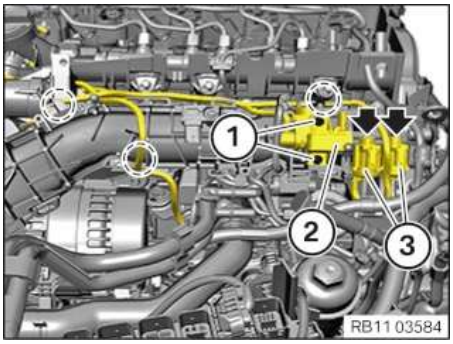
cardiagn.com



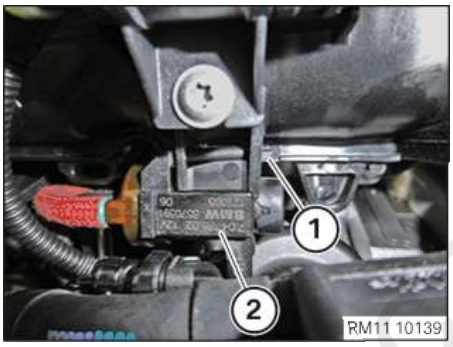
- Unlock clamp (1) and engage in this position.



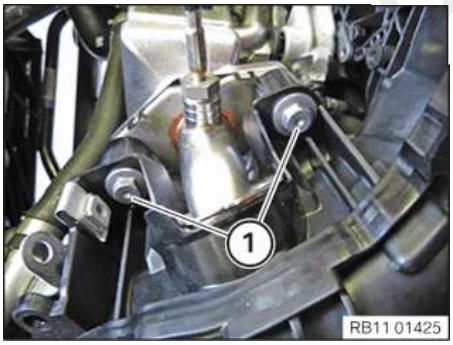
- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.



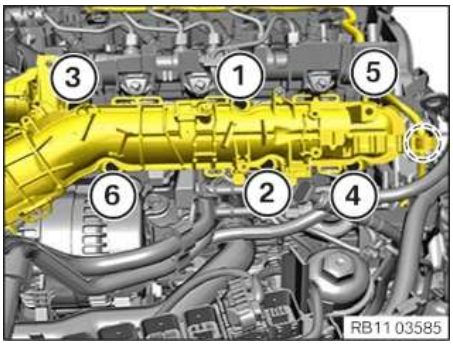
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.

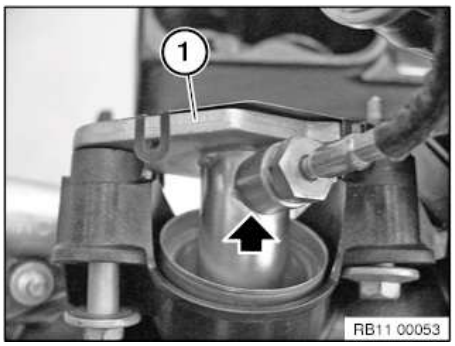


- Loosen screws (1).



- Detach the leakage oil lines in the marked area from the intake plenum.
- Loosen screws in the order (6) to (1).
- Guide the intake plenum out forwards and remove it.

cardiagn.com



- Remove the exhaust-gas recirculation pipe (1) (arrow).

20 – Detaching the leakage oil line from the injectors

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

WARNING

Hot surfaces.

Risk of burning!

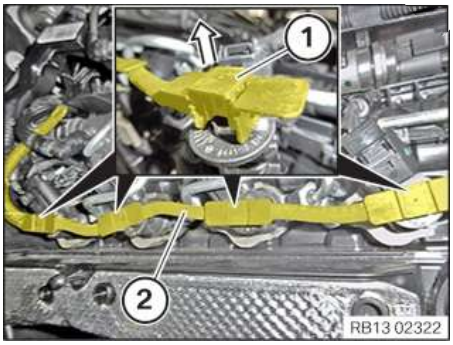
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

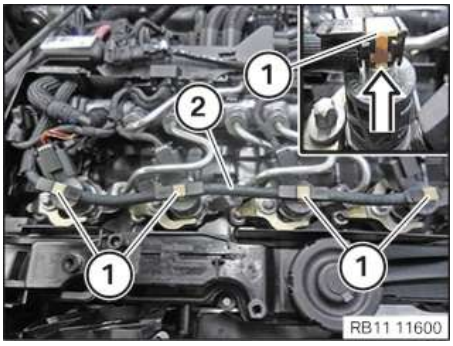


- **Version A:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.



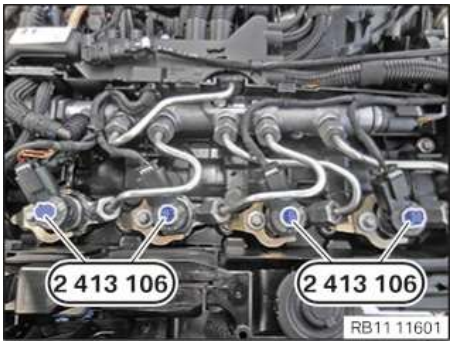
- **Version B:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.

cardiagn.com



- Seal open connections with special tools .

21 – Remove the high pressure lines between the injector and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

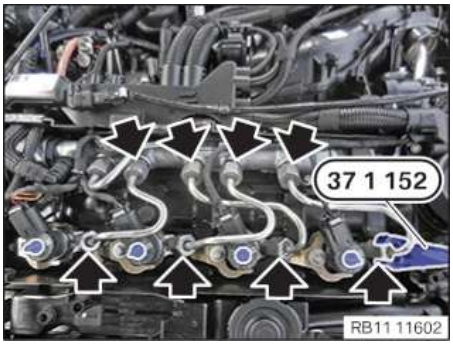
TECHNICAL INFORMATION

If several high pressure lines are removed, ensure that each high pressure line is installed in its original location. Label high pressure lines.

cardiagn.com

TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.



- Release the high pressure lines (arrows) with the special tool .
  Reset the special tool early on to prevent bending of the high pressure line.
- Catch and dispose of escaping fuel.
- Feed out and remove the high pressure lines (arrows).
- Seal off all the open cable connections with the special tool .

22 – Remove the high pressure line between the high pressure pump and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Hot fluids.

Risk of scalding!

- Conduct all work in the vehicle wearing appropriate personal protective equipment only.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

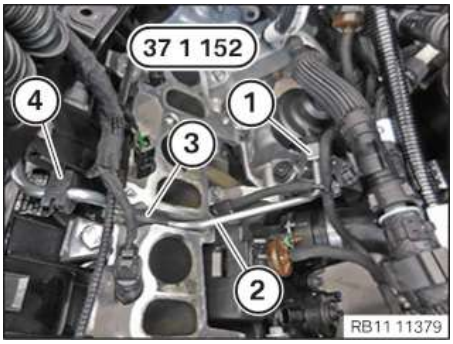
cardiagn.com

TECHNICAL INFORMATION

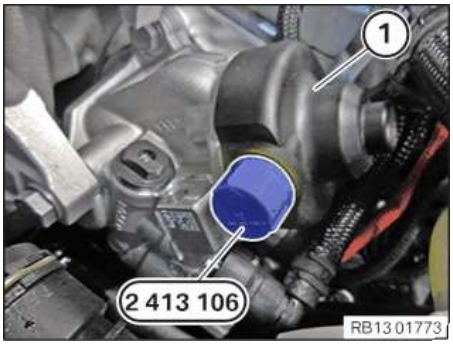
Reset special tool in early to avoid bending pressure lines.



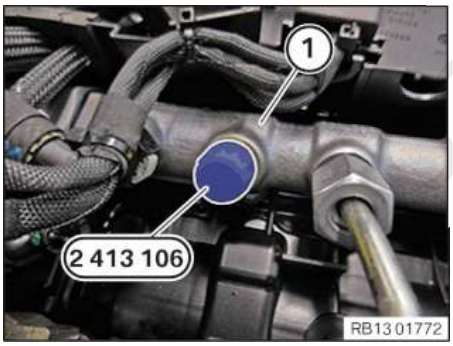
- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.



- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.
- Guide out and remove the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).



- Seal off the opening at the high pressure pump (1) with the special tool .



- Seal off the opening on the rail (1) with the special tool .

23 – Remove high-pressure rail

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

cardiagn.com

RISK OF DAMAGE

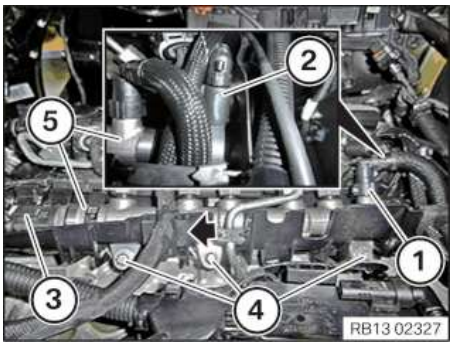
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Unlock and disconnect the fuel return line (1).
- Guide the fuel return line (1) out and set it aside.
- Unlock and disconnect the plug connection (2) on the rail pressure regulating valve.
- Unlock and disconnect the plug connection (3) on the rail pressure sensor.
- Unlock cable clip (Arrow), feed out and place aside.
- Loosen screws (4).
- Thread out and remove the rail (5).

24 – Remove all injection systems

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

cardiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

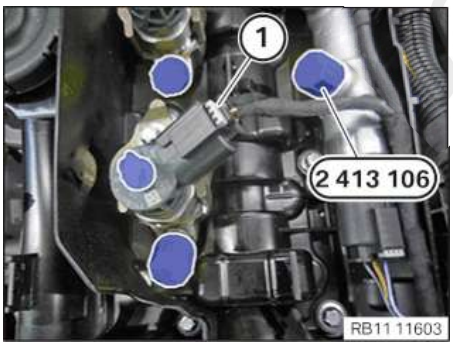
Electrostatic discharge.

Damage to or destruction of electrical components.

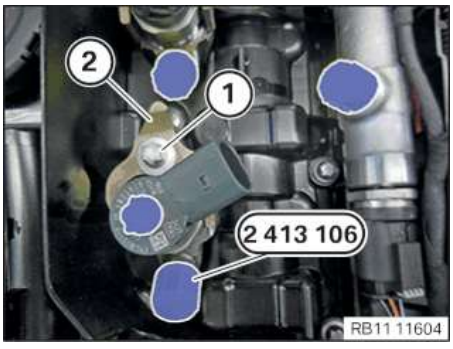
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

TECHNICAL INFORMATION

If several injectors are removed, ensure that each injector is installed at its original location (cylinder). Mark injectors.



- Unlock plug connection (1) and disconnect.



- Loosen screw (1).
- Guide out and remove clamping claw (2).
- Feed out and remove the injector with slight rotational movements.

▸ **Loosen stuck injectors**

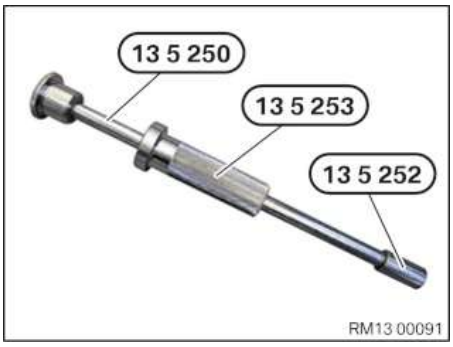
carsdiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

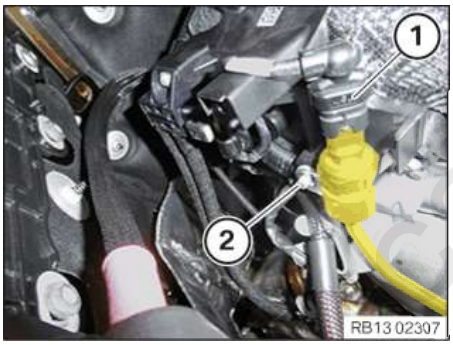


- Unscrew special tool 0 493 339 (13 5 252) from special tool 0 493 321 (13 5 250) and remove special tool 0 493 340 (13 5 253).
- Screw special tool 0 493 339 (13 5 252) back onto special tool 0 493 321 (13 5 250).

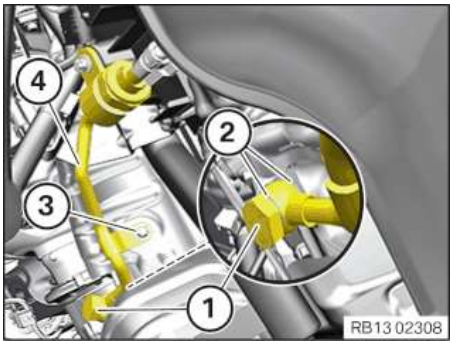


- Screw special tool 0 493 321 (13 5 250) with special tool 0 493 339 (13 5 252) onto pressure line connection (1) of injector.
- Release injector (1) with special tools 0 493 321 (13 5 250) and 0 493 339 (13 5 252) by means of **short** back and forth movements and remove.

25 – Remove the exhaust gas pressure pipe



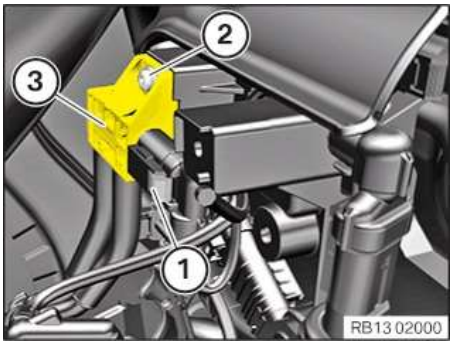
- Unlock plug connection (1) and disconnect.
- Loosen screw (2).



- Unscrew the banjo bolt (1).
- Feed out and remove the sealing rings (2).
- Loosen screw (3).
- Feed out and remove the exhaust gas pressure pipe (4).

26 – Releasing the differential pressure sensor for the diesel particulate filter

cardiagn.com



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).
- Remove the differential pressure sensor (3) and put it to one side.

27 – Removing the sensor bracket on the cylinder head cover

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

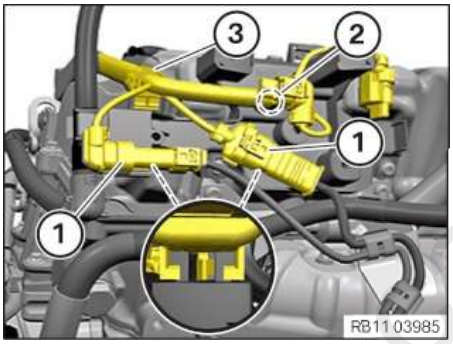
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

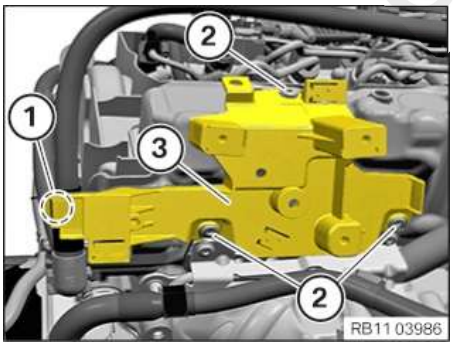
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Unlock plug connection (1) and disconnect.
- Unlock the plug connection (1) and release it from the sensor bracket.
- Release the cable clip in the area (2) from the sensor bracket.
- Release the clamps (3) and set the wiring harness section aside.

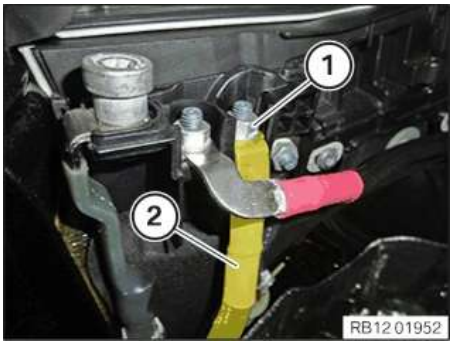


- Release the positive battery cable in the area (1) from the clamp and set it aside.
- Loosen screws (2).
- Feed out holder (3) for the sensor system and remove.

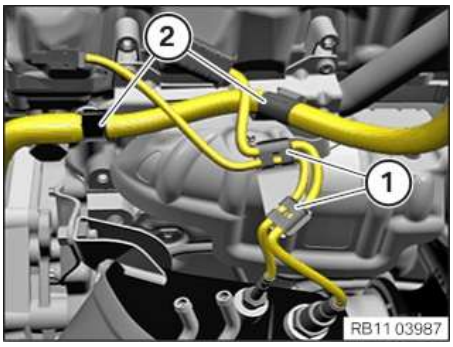


- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.

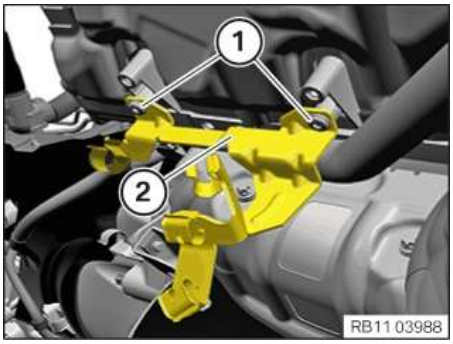
cardiagn.com



- Loosen nut (1).
- Feed out positive battery cable (2) and put to one side.

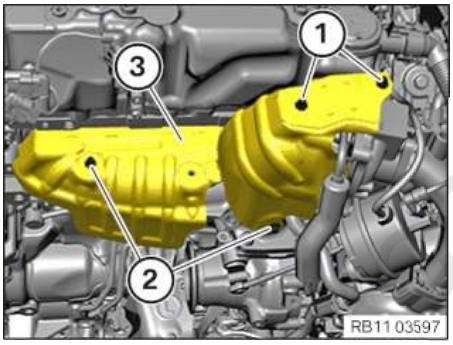


- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



- Loosen screws (1).
- Guide out and remove holder (2).

28 – Removing heat shield

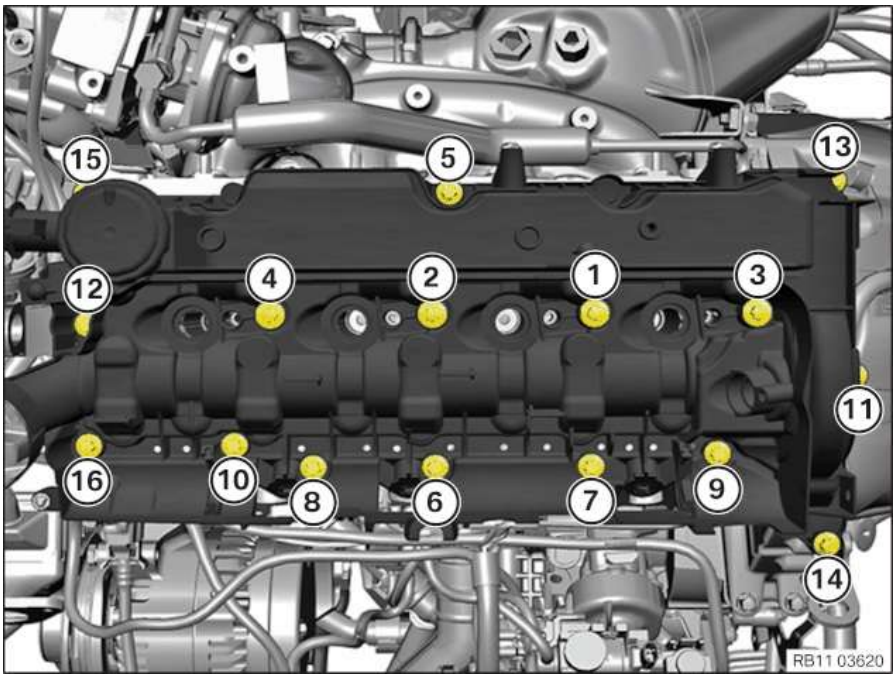


- Loosen screws (1).
- Loosen screws (2).
- Feed out and remove the heat shield (3).

29 – Removing the cylinder head cover

carmanuals.com

Screw connection of the cylinder head cover



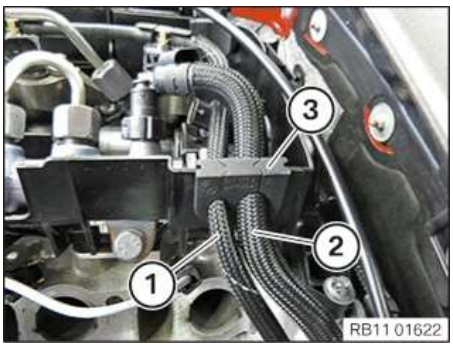
1 - 16 Bolts of the cylinder head cover



- Unlock and detach the locks.
- Feed the engine ventilation line (1) out and set it aside.

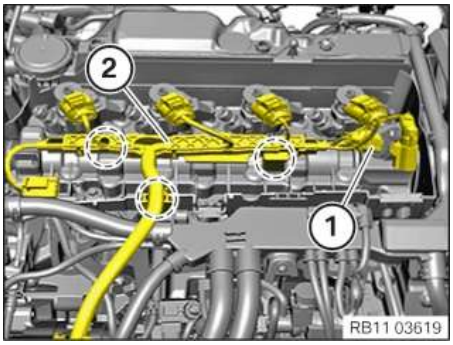


- Feed out and remove the heat shield (1).

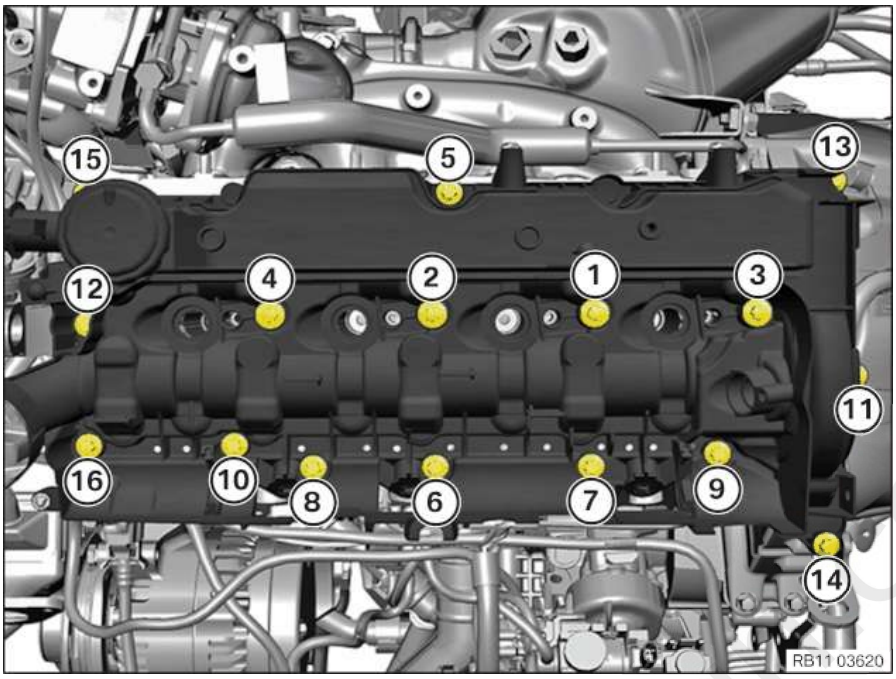


- Remove the leakage oil line (1) including the fuel return line (2) and the grommet (3) and put to one side.

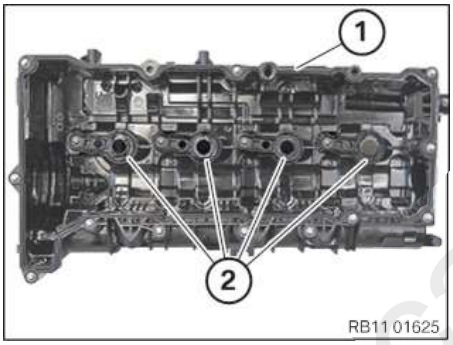
cardiagn.com



- Unlock connector (1) and pull off.
- Disconnect the wiring harness (2) in the marked areas from the cylinder head cover and set aside.

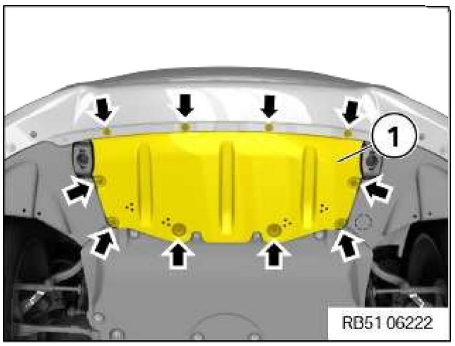


- Evenly loosen the screws in a sequence from (16) to (1).
- Feed out and remove the cylinder head cover.



- Remove the profile seals (1) and (2).

30 – Removing the front underbody protection

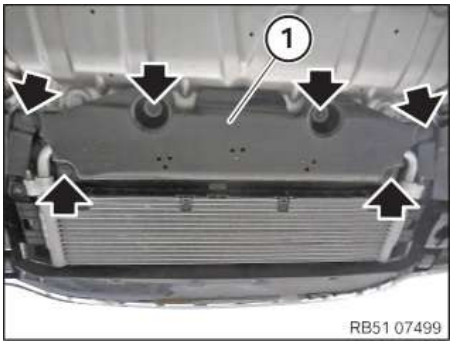


- **Version A:**

  Remove screws (arrows).

  Feed front underbody protection (1) backwards out of the bumper panel.

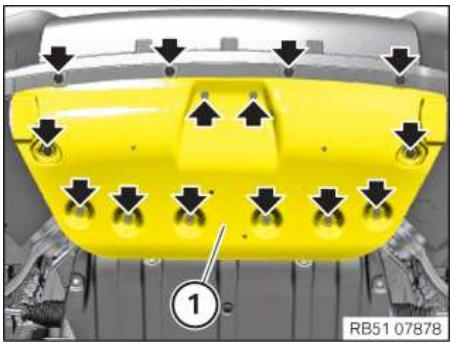
cardiag.com



- **Version B:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

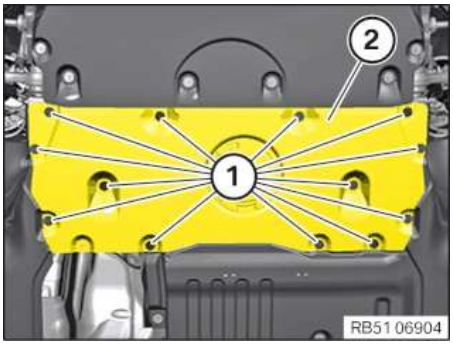


- **Version C:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

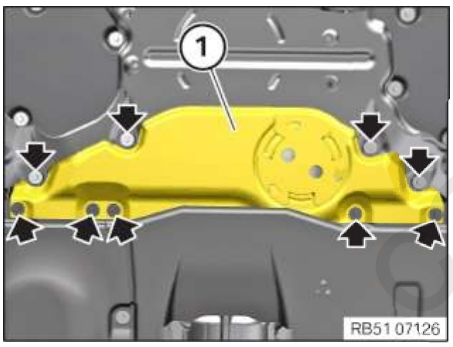
31 – Removing the centre underbody protection



- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .

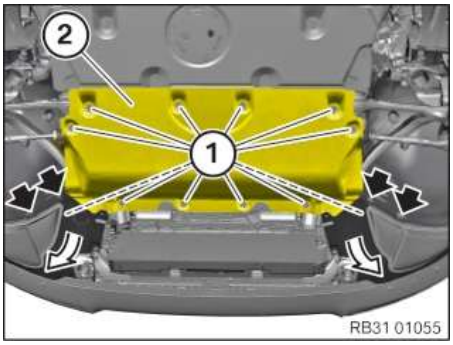


- **Version with all-wheel drive:**

  Remove screws (arrows).

  Feed out and remove the centre underbody protection (1).

32 – Remove the underbody protection of the steering gear



- **Version A:**

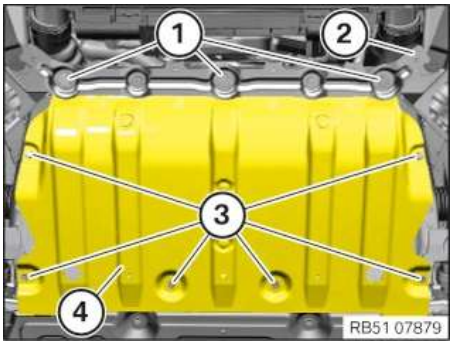
  Unscrew the screws (arrows) of the wheel arch cover on the wheel arch cover.

  Fold the bottom wheel arch cover to the side.

  Loosen screws (1).

  Remove the underbody protection (2) of the steering gear.

carsign.com



- **Version B:**

  Loosen screws (1).

  Remove the holder (2) for the underride protection.

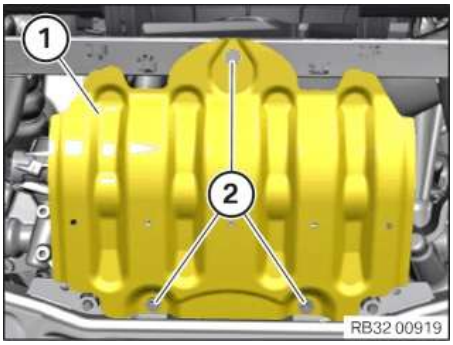
  Loosen screws (3).

  Feed out and remove the underbody protection (4) of the steering gear.

33 – If installed: Removing the steering underbody protection

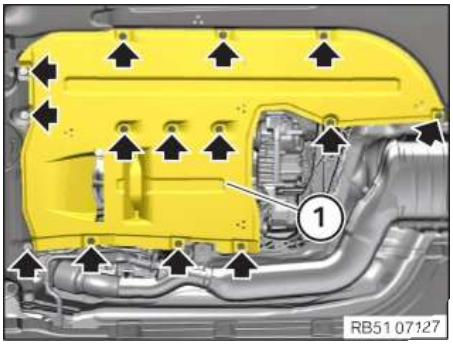
Prerequisite

Front underbody protection has been removed.



- Loosen screws (2).
- Remove underbody protection (1).

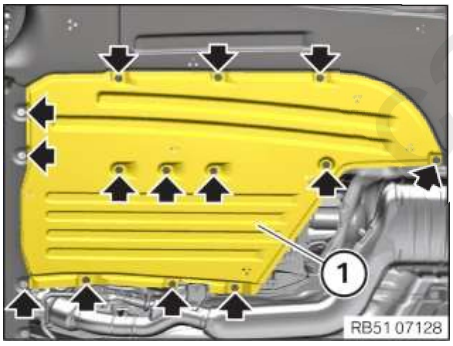
34 – Remove rear underbody protection



- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).



- **Version B:**

  Remove screws (arrows).

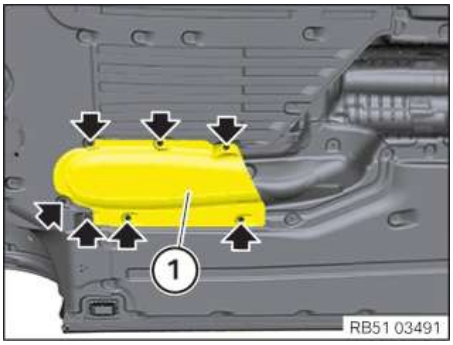
  Guide out rear underbody protection (1) and remove it.

35 – Remove the underbody panelling of the transmission on the side

NOTICE

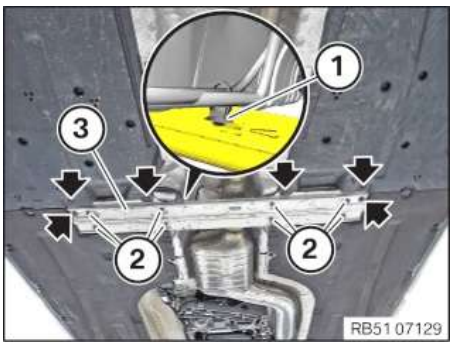
The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

cardiagn.com



- Remove screws (arrows).
- Remove the underbody panelling (1).

36 – Remove the connecting support from the tunnel



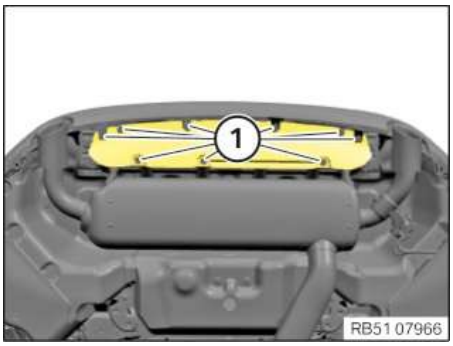
- Remove screws (arrows).

NOTICE

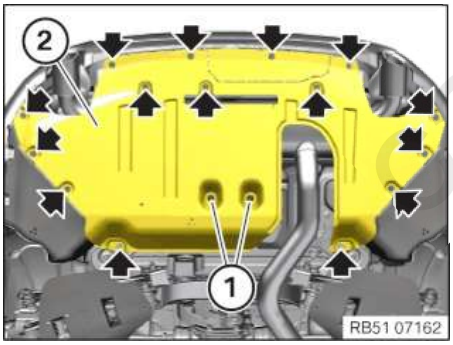
The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Loosen clamp (1).
- Loosen screws (2).
- Guide out and remove connecting support (3) on the tunnel.

37 – Removing the rear diffuser



- **Version 1:**
- Release the screws and nuts (1).
- Remove the diffuser.



- **Version 2:**
- Loosen nuts (1).
- Remove screws (arrows).
- Guide out and remove rear diffuser (2).

38 – Remove exhaust system

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

cardiagn.com

CAUTION

Component with heavy weight.

Danger of injury!

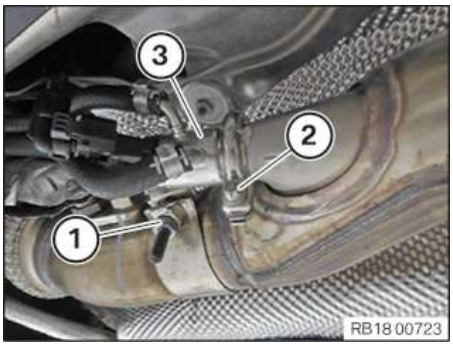
- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

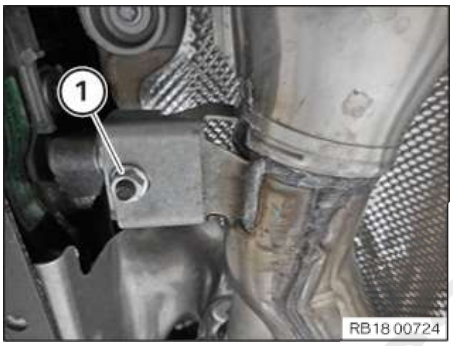
Heavy component.

Heavy components can lead to injury or damage.

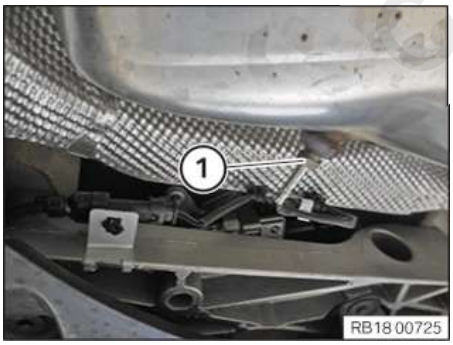
- Remove and install heavy components with the aid of another person/other persons.



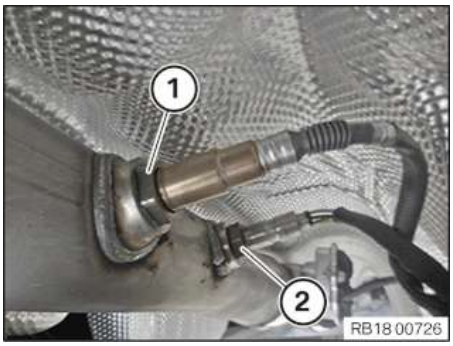
- Unfasten clamp (1).
- Detach the clamp (2) of the SCR metering module (3).
- Detach the SCR metering module (3)from the exhaust system and place to one side.



- Loosen nut (1).

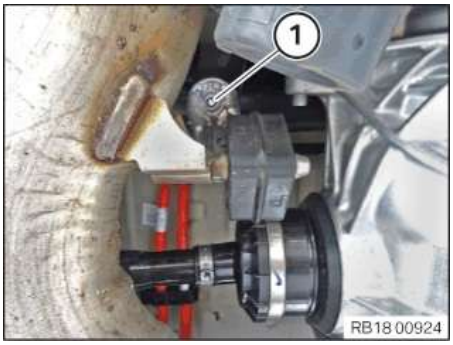


- Detach the exhaust temperature sensor (1) from the exhaust system.

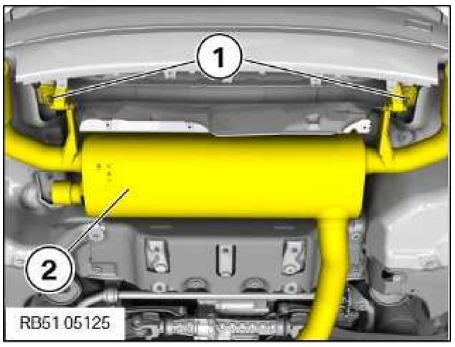


- Release the diesel particulate sensor (1) from the exhaust system and place to one side.
- Release the nitrogen oxide sensor (2) from the exhaust system and place to one side.

cardiagn.com



- Release the nut (1) on the rear axle support.



- Loosen nuts (1).
- Lower and remove the exhaust system (2) with the assistance of a second person.

39 – Removing the monitoring oxygen sensor after the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

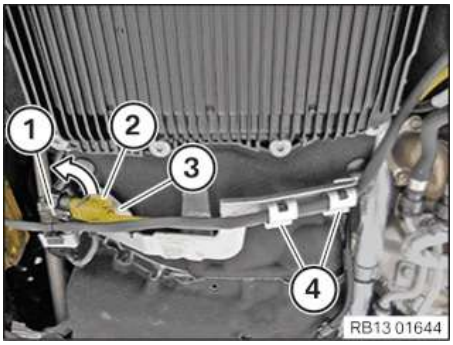
RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
- The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

cardiagn.com



- Unlock and loosen connector (1).
- Loosen connector (2) from the holder (3) in direction of arrow.
- Release the monitoring oxygen sensor from the clamps (4).



- Release the monitoring oxygen sensor (1) with the standard tools.



- Thread out the monitoring oxygen sensor (1) and remove it.

40 – Removing the nitrogen oxide sensor before SCR catalytic converter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

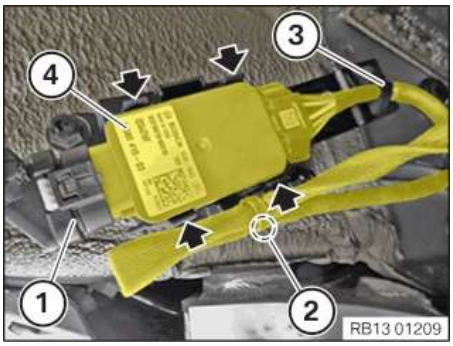
cardiagn.com

RISK OF DAMAGE

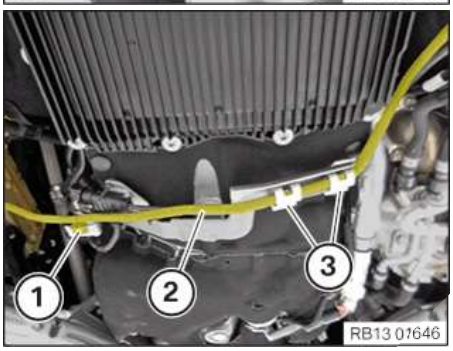
Damage to the nitrogen oxide sensor.

Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

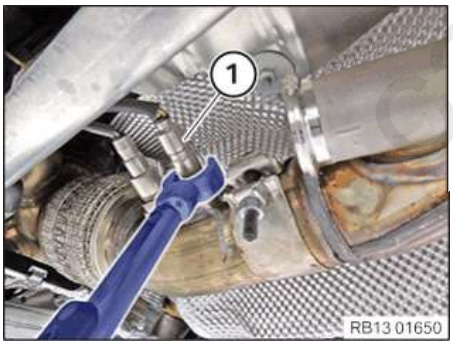
- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



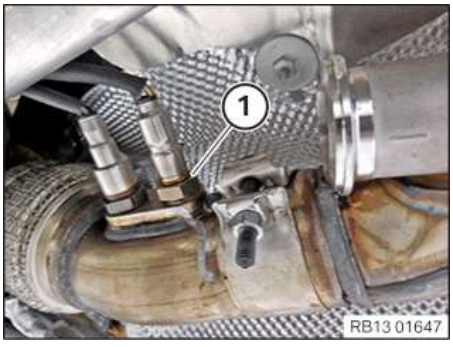
- Unlock plug connection (1) and disconnect.
- Release cable clip in area (2).
- Release line from the holder (3).
- Unclip control unit (4).



- Loosen clamp (1).
- Loosen the cables (2) from the clamps (3).



- Loosen the nitrogen oxide sensor (1) using commercially available tools.



- Feed out and remove the nitrogen oxide sensor (1).

cardiagn.com

WARNING

Hot surfaces.

Risk of burning!

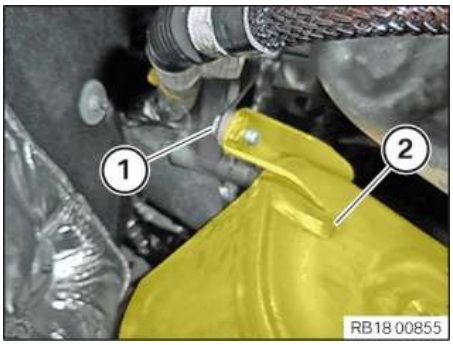
- Perform all work only on components that have cooled down.

CAUTION

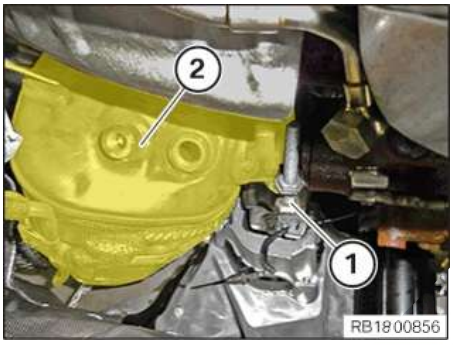
Heavy component.

Heavy components can lead to injury or damage.

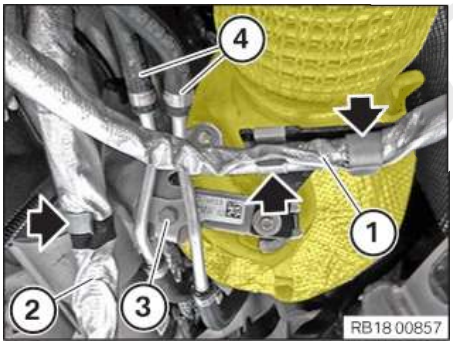
- Remove and install heavy components with the aid of another person/other persons.



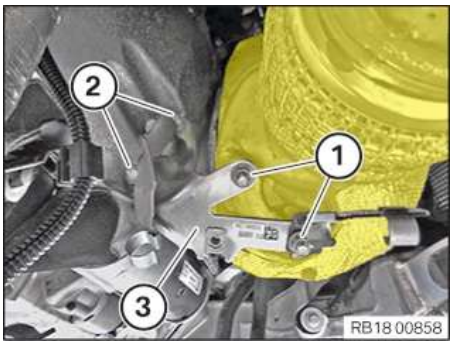
- Release bolt (1) from the holder of diesel particulate filter (2).



- Loosen V-band clamp (1).
- Feed V-clip (1) out from diesel particulate filter (2) and remove.

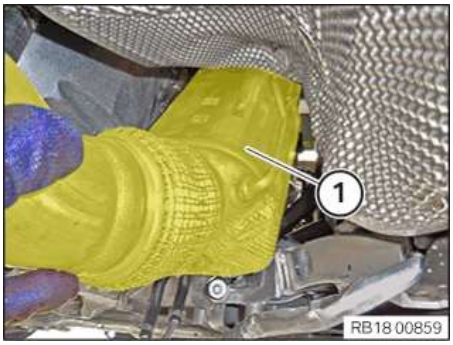


- Release the metering line (1) from clamps (Arrows).
- Release positive battery cable (2) from starter motor from clamp (Arrow).
- Loosen screw (3).
- Thread off coolant line (4) and place to the side.



- Loosen nuts (1).
- Loosen screws (2).
- Guide out and remove holder (3).

cardiagn.com



- Guide out and remove diesel particulate filter (1).

42 – Removing starter motor

Prerequisite

Battery earth leads are disconnected.

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

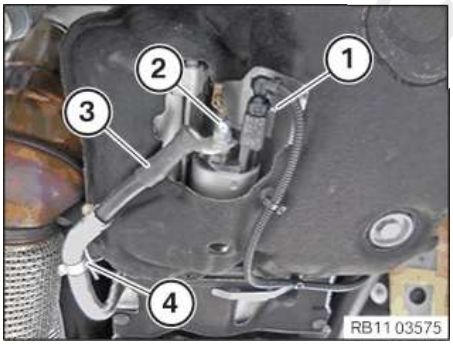
Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

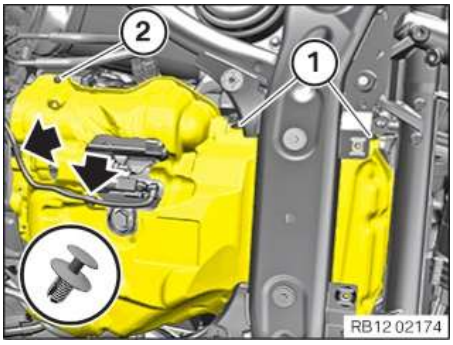
- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

TECHNICAL INFORMATION

Make sure that the acoustic cover is **not** damaged while removing the starter motor.
A damaged lower acoustic cover can only be renewed when the front axle is lowered.

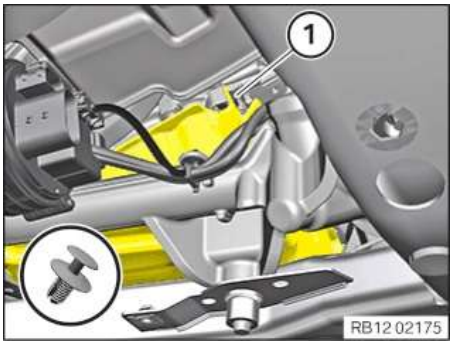


- Unlock plug connection (1) and disconnect.
- Release nut (2).
- Release positive battery cable (3) from holder (4).

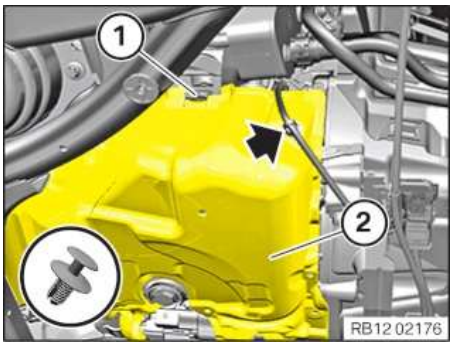


- Loosen the expanding rivet (1).
- Undo fir tree clip (2).
- Release the clamps (arrows).

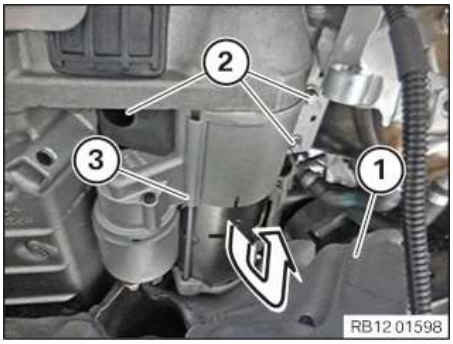
cardiagn.com



- Loosen expanding rivet (1).
- Lower the acoustic cover of the oil sump.



- Loosen expanding rivet (1).
- Loosen the clamp (arrow).
- Lower acoustic cover (2).



- Make sure that the acoustic cover (1) is not damaged.
- Carefully press acoustic cover (1) to one side.
- Loosen screws (2).
- Carefully guide out the starter motor (3) in direction of arrow and remove.

43 – Checking camshaft timing



RISK OF DAMAGE

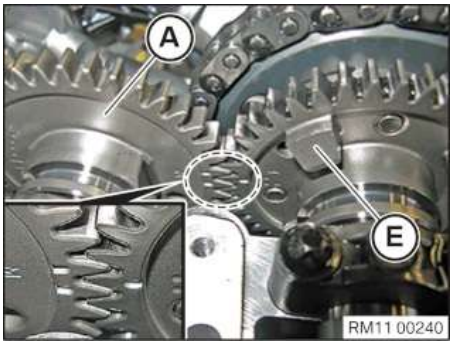
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

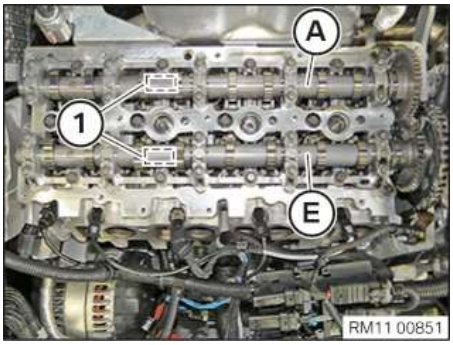
- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

  Do **not** crank the engine in reverse.

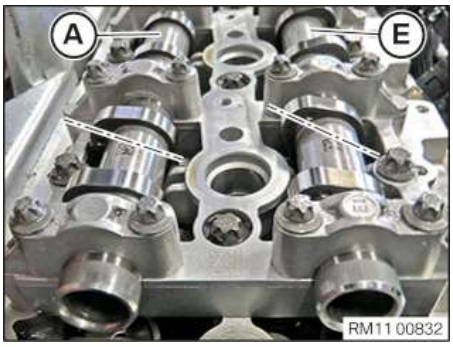


- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.

bardiagn.com



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.

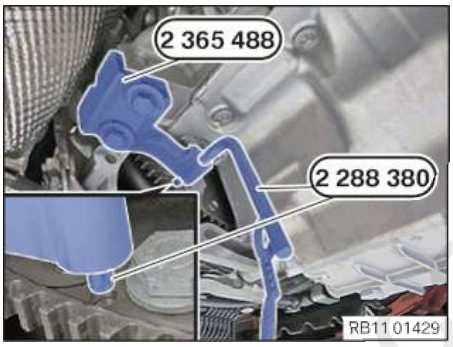


- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

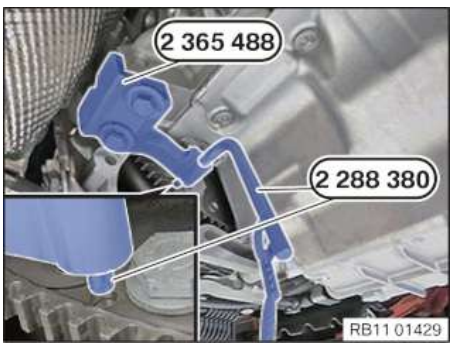
- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

44 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

45 – Installing the special tool to secure the exhaust camshaft



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.

MAIN WORK

46 – Replace top timing chain

Prerequisite

Timing chain guides are not damaged.

RISK OF DAMAGE

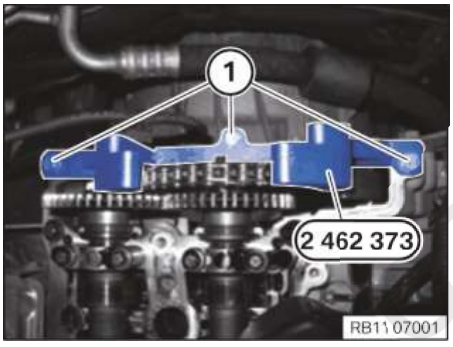
Damage of the engine and mounted parts.

Non-compliance with the instructions for mounting and disassembly may lead to damage to the engine and mounted parts.

- Comply with the regulations for the installation and disassembly.
- Perform work with care.

TECHNICAL INFORMATION

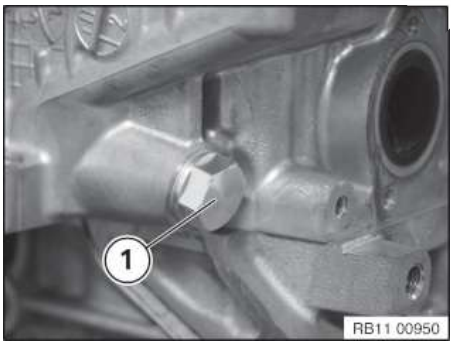
Maintain conditions of absolute cleanliness.



- Fasten the special tool 2 462 373 from the set of special tools 2 462 828 with conventional screws (1).
- Tighten the screws (1).

Standard screw connection M6

M6		Tightening torque	8 Nm

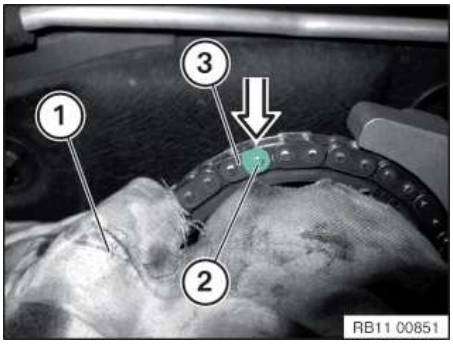


- Release and remove the chain tensioner (1).
- Renew the chain tensioner (1).

  Parts: Chain tensioner
- Feed in and install the chain tensioner (1).
- Tighten the chain tensioner (1).

Chain tensioner piston to cylinder head

22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm



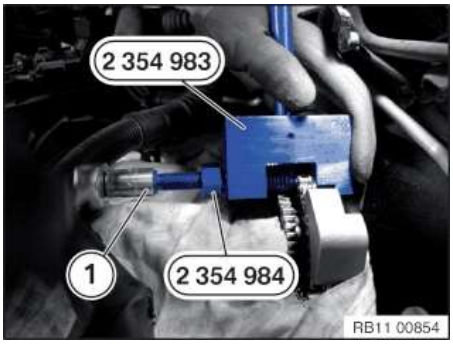
- Cover the cylinder head at the chain drive using appropriate auxiliary materials (1).
- Mark the rivet (2) on the right side of the inner tab (3) (arrow).



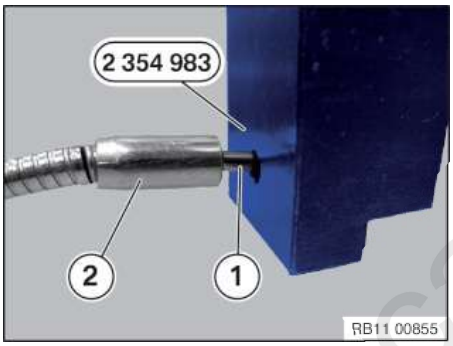
- Prepare the special tool from the set of special tools 2 462 828.
- Check the bolt (1) for damage.



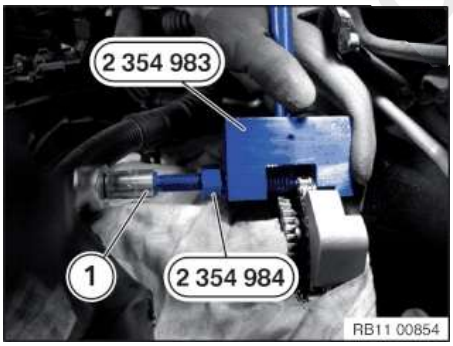
- Turn over the bolt on the special tool until the short length (arrow) is reached.



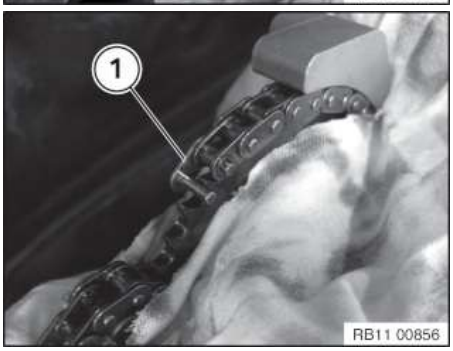
- Feed in and install the special tool on the timing chain around the marked rivet.
- Pre-tension the special tool by hand until the bolt of the special tool lies exactly on the bolt of the timing chain.
- **Secure the rivet of the timing chain against falling down from the rear bore hole of the special tool while pushing it out.**
- Screw in the spindle of the special tool with a conventional tool (1) up to the limit position.



- Feed out the pushed rivet (1) with a magnet (2) from the special tool and remove.



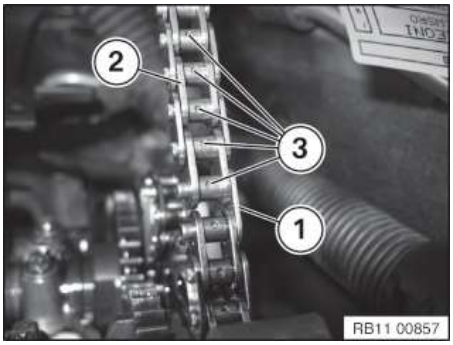
- Turn over the spindle of the special tool with a conventional tool (1).
- Guide the special tool out and remove.



- Replace timing chain.

  Parts: Timing chain (repair kit)
- Feed the chain link (1) into the existing timing chain and install.
- Lightly grease the timing chain.

cardiagn.com



- Feed in the timing chain (2) such that the oil holes (3) are visible from the outside.
- Feed in and install the timing chain (2) on the chain link (1).
- Correctly position the timing chain (2) and the chain link (1).



RISK OF DAMAGE

Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Prepare special tool 0 493 380 (11 6 480).

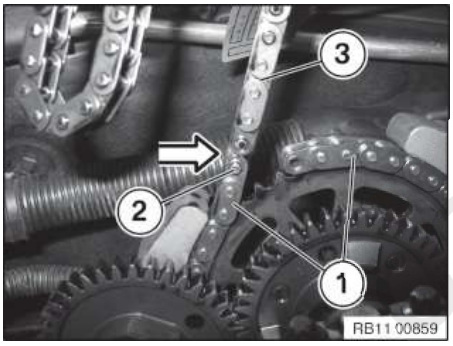


TECHNICAL INFORMATION

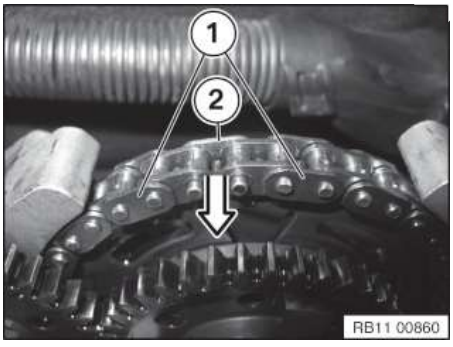
Conduct the following operation with the assistance of a second person.

- Keep the timing chain (1) under tension.
- Slowly turn the engine with the special tool 0 493 380 (11 6 480) in the direction of arrow and feed in the new timing chain.

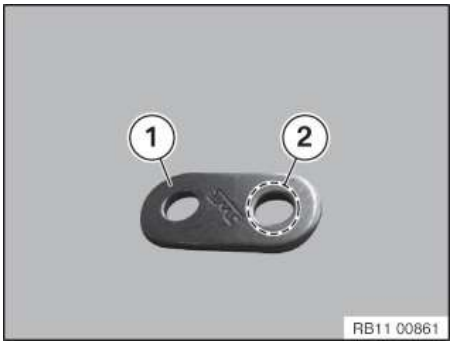
  Do **not** crank the engine in reverse.



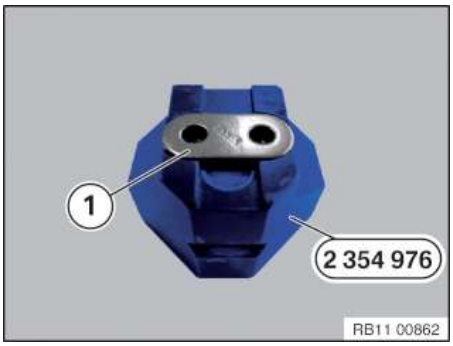
- Slowly turn the engine with the special tool 0 493 380 (11 6 480) in the direction of rotation until the existing timing chain (3) in the area (Pfeil) can be fed out.
- Feed out the existing timing chain (3) with the chain link (2) and remove.
- Position the timing chain (1) on the sprocket.



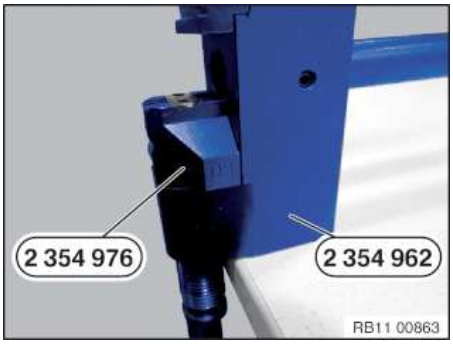
- Feed the chain link (2) into the timing chain (1) from the rear side in the direction of arrow and install.



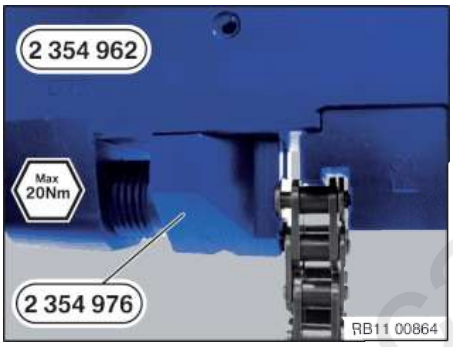
- Ensure that the curved side (2) of the tab (1) faces the timing chain.



- Position the tab (1) on the magnets of the special tool .
- **Ensure correct installation position.**



- Feed in and install the special tool with the tab in the special tool .



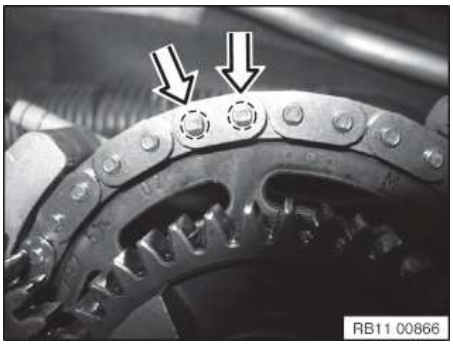
- Feed the special tools and onto the timing chain using the tab and install.
- Hand-tighten the spindle on the special tool .
- **Ensure correct installation position.**
- Turn the spindle on the special tool with a torque wrench.
- Compress the chain link.

Pressing the timing chain with special tool 2 354 962

Spindle	The torque must not be exceeded.		20 Nm



- Release the spindle and feed out the special tool .
- Prepare special tool as pictured.

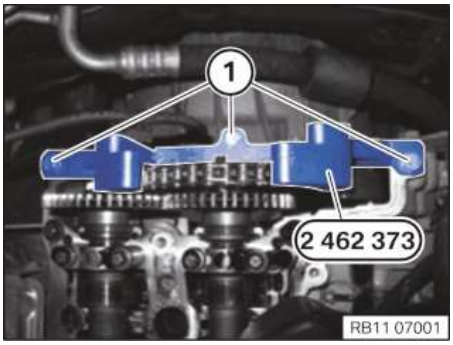


- Press the rivets (arrows) **again, individually** using the special tool .

Pressing the timing chain with special tool 2 354 962

Spindle	The torque must not be exceeded.		20 Nm

carlagn.com



- Loosen screws (1).
- Guide the special tool 2 462 373 out and remove.

POSTPROCESSES

47 – Checking camshaft timing



RISK OF DAMAGE

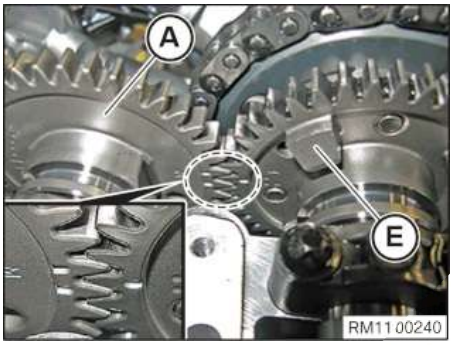
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

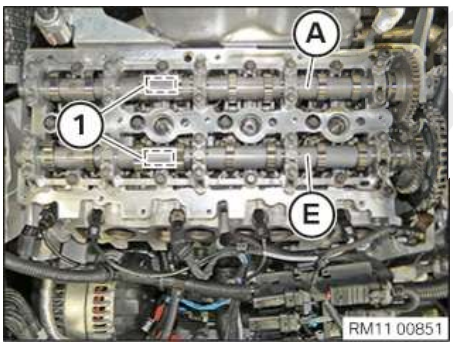
- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

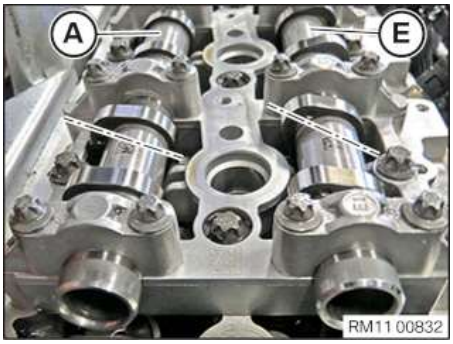
  Do **not** crank the engine in reverse.



- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.



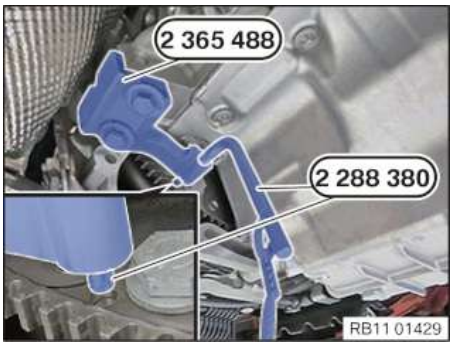
- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.

bardiag.com



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

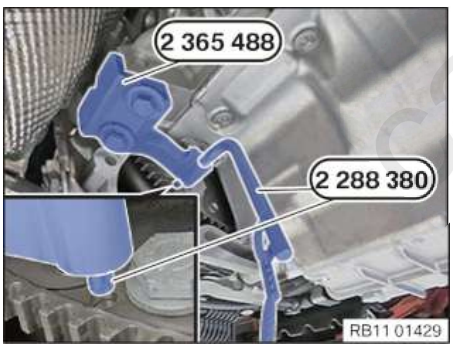
- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

48 – Removing the special tool for fixing the exhaust camshaft



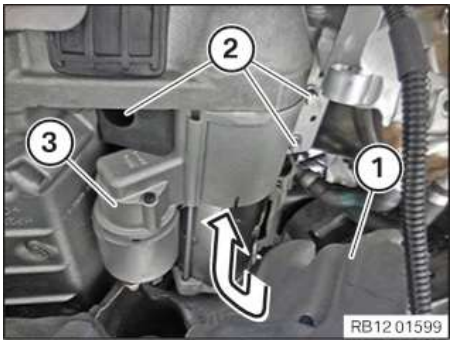
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

49 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

50 – Installing starter motor

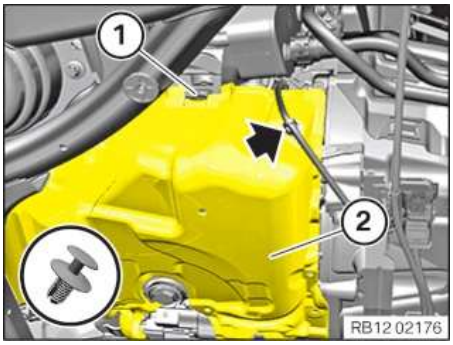


- Make sure that the acoustic cover (1) is not damaged.
- Carefully press the acoustic cover (1) to one side.
- Feed in and install the starter motor (3) in the direction of the arrow.
- Tighten the screws (2).

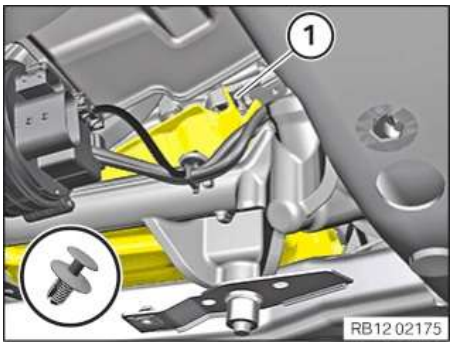
Starter motor to engine

M8X60		Tightening torque	19 Nm

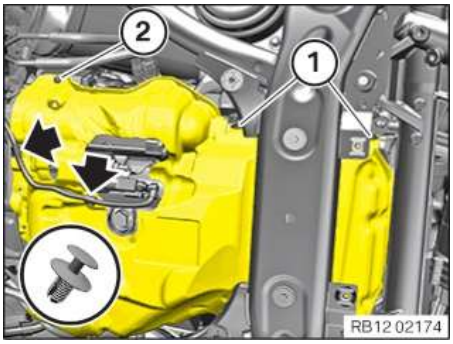
cardiagn.com



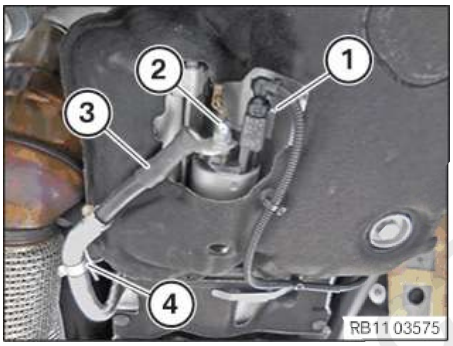
- Position the acoustic cover (2).
- Fasten expanding rivet (1).
- Secure clamp (arrow).



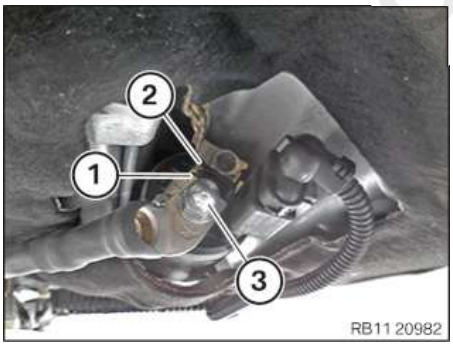
- Fasten expanding rivet (1).



- Secure fir tree clip (2).
- Secure expanding rivet (1).
- Secure the clamps (arrows).



- Fasten positive battery cable(3) in holder (4) and position it on the starter motor.
- Tighten the nut (2) hand-tight.
- Connect the connector (1) and audibly lock it.



CAUTION

Improper routing of the positive battery cable.

Risk of short circuits!

- Route the positive battery cable without abrasions and do not trap.

- Attach the positive battery cable (1) **correctly** to anti-twist lock (2).
- Tighten nut (3).

Battery positive lead to starter

M8		Tightening torque	13,5 Nm

51 – Prepare for the installation of the diesel particulate filter

cardiagn.com



- Renew the V-clip (1).

  Parts: V-band clamp



- Renew gasket (1).

  Parts: Gasket

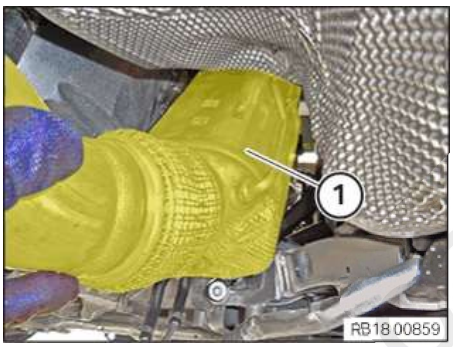
52 – Installing the diesel particulate filter

CAUTION

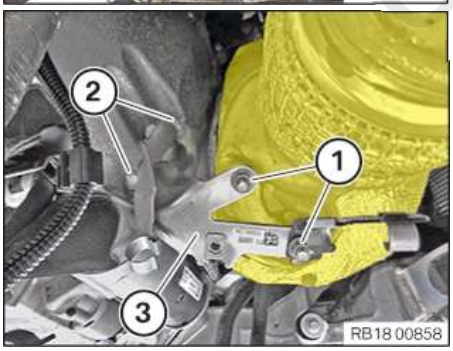
Heavy component.

Heavy components can lead to injury or damage.

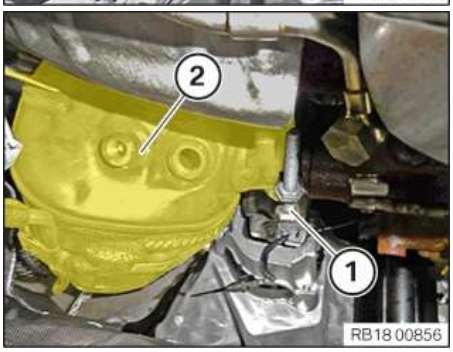
- Remove and install heavy components with the aid of another person/other persons.



- Insert and install the diesel particulate filter (1).



- Insert and install the holder (3).
- **Hand-tighten** the bolts (2).
- Apply the nuts (1) **hand-tight**.



- Renew the V-clip (1).

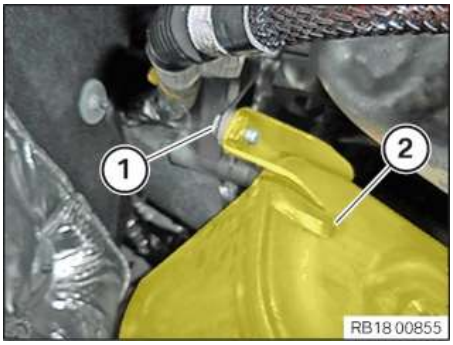
  Parts: V-band clamp

- Feed in and install V-band clamp (1).

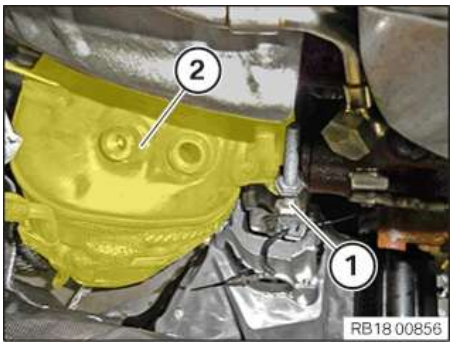
Note: Make sure that the seal between the diesel particulate filter and the exhaust turbocharger is installed correctly.

- Position the diesel particulate filter (2) on the exhaust turbocharger .
- Position V-clip (1).
- Apply the V-clip (1) **hand-tight**.

cardiagn.com



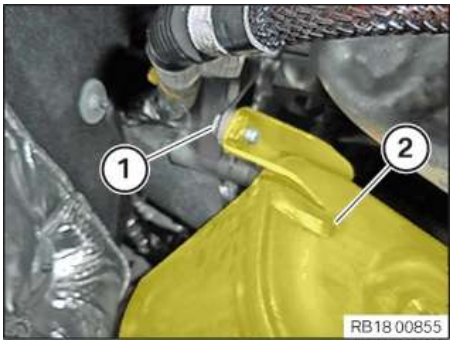
- Feed in screw (1) on the holder of the diesel particulate filter (2) and tighten **hand-tight**.



- Tighten the V-clip (1) of the diesel particulate filter (2).

Diesel particulate filter V-clip to exhaust turbocharger

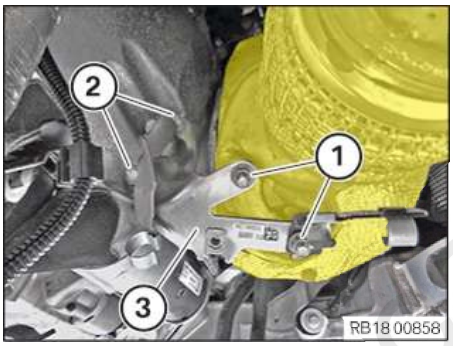
V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm



- Tighten the bolt (1) on the bracket of the diesel particulate filter (2).

Bracket to diesel particulate filter top

M8		Tightening torque	19 Nm



- Tighten the screws (2) on the holder (3).

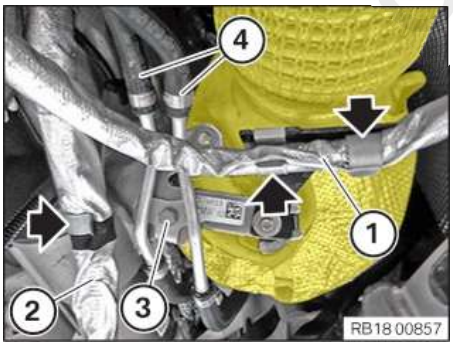
Bracket to transmission for diesel particulate filter holder bottom

M8X20	Tightening torque	19 Nm

- Tighten the nuts (1) on the holder (3).

Lower holder to diesel particulate filter

M8		Tightening torque	19 Nm



- Thread in and install coolant line (4).
- Tighten down screw (3).

Coolant lines for SCR metering module

M6X16		Tightening torque	8 Nm

- Secure the positive battery cable (2) of the starter motor at the clamp (arrow).
- Fasten the metering line (1) on the clamps (arrows).

53 – Installing the nitrogen oxide sensor upstream of SCR catalytic converter

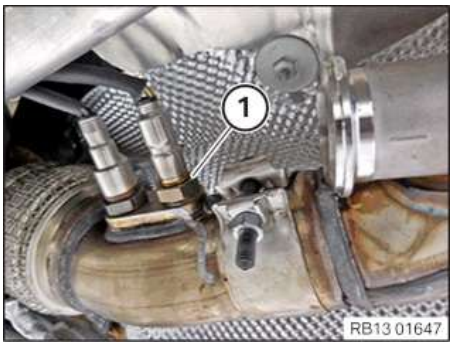
carlagn.com

RISK OF DAMAGE

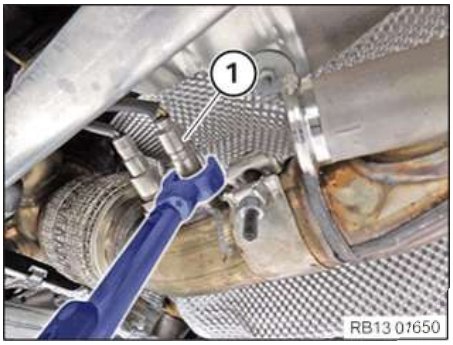
Damage to the nitrogen oxide sensor.

Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



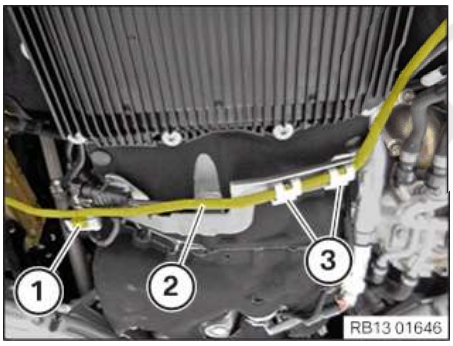
- Feed in and install the nitrogen oxide sensor (1).



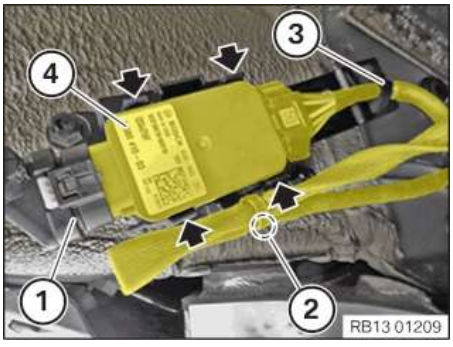
- Tighten the nitrogen oxide sensor (1) using commercially available tools.

Nitrogen oxide sensor before SCR catalytic converter

Sensor		Tightening torque	50 Nm



- Secure the cables (2) to the clamps (3).
- Secure clamps (1).



- Clip in the control unit (4) (arrows).
- Fasten the cable in the holder (3).
- Secure the cable holder (2).
- Plug in the connector (1) and lock audibly.

54 – Installing the monitoring oxygen sensor after the diesel particulate filter

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

TECHNICAL INFORMATION

New oxygen sensors are to be greased lightly and evenly on the thread.

For oxygen sensors that are reused, the following should be observed:

Lightly and evenly grease the oxygen sensor only on the thread. Do not clean and grease that part of the oxygen sensor which protrudes in the exhaust branch (sensor ceramics).

For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



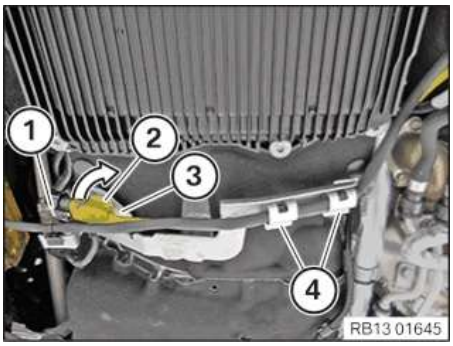
- Insert the monitoring oxygen sensor (1) and install it.



- Tighten the monitoring oxygen sensor (1) with standard tools.

Monitoring oxygen sensor

Sensor		Tightening torque	50 Nm



- Fasten the monitoring oxygen sensor to the clamps (4).
- Secure the connector (2) on the holder (3) in direction of arrow.
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

cardiagn.com

CAUTION

Component with heavy weight.

Danger of injury!

- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

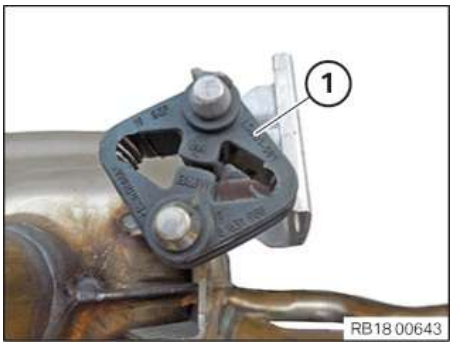
Heavy component.

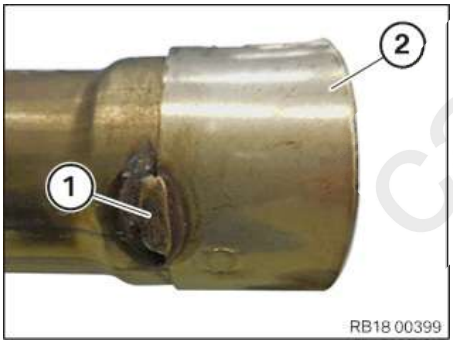
Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

TECHNICAL INFORMATION

Mount the exhaust system in voltage-free state, maintaining the tightening sequence from the rear silencer towards the exhaust manifold.





NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

- Check all the rubber mounts (1) of the exhaust system for damage.
- Replaced damaged rubber mounts.

  Parts: Rubber mount

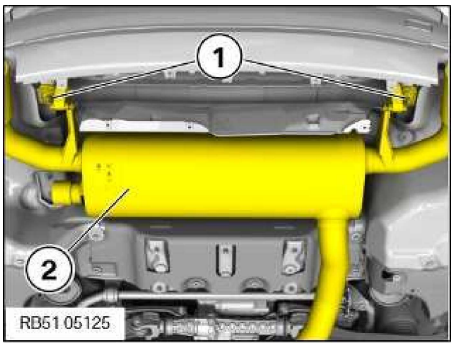
CAUTION

Swarf resulting from sawing or grinding components.

Danger of injury!

- Conduct all work in appropriate personal protective equipment only.
- Wear safety goggles and protective gloves.

- Open the weld seam (1) with a conventional tool.
- Remove the clamp (2).



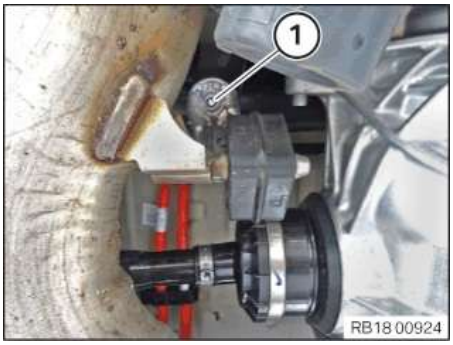
- Insert and install the exhaust system (2).
- Renew nuts (1).

  Parts: Nuts
- Tighten nuts (1).

Rear silencer to body / bumper support

M8	Replace nuts.	Tightening torque	19 Nm

cardiagn.com

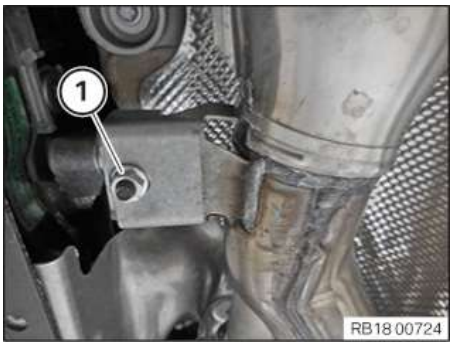


- Renew nut (1) on the rear axle support.

  Parts: Nut
- Tighten nut (1).

Exhaust system to rear axle carrier

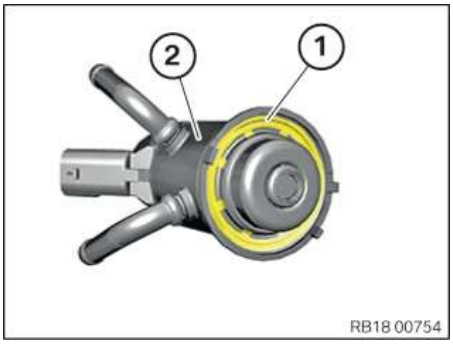
M8 nut		Tightening torque	19 Nm



- Tighten nut (1).

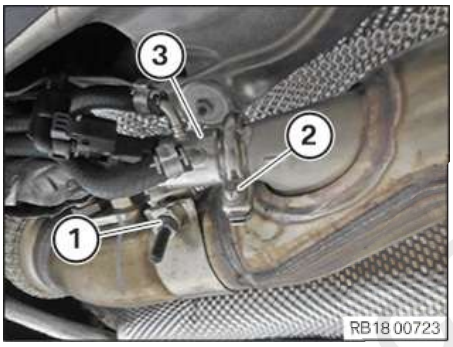
Exhaust system to transmission

M8		Tightening torque	19 Nm



- Renew sealing ring (1) of the SCR metering module (2).

  Parts: Sealing ring



- If necessary, renew clamp (1).

  Parts: Clamp
- Tighten clamp (1).

Exhaust system to diesel particle filter

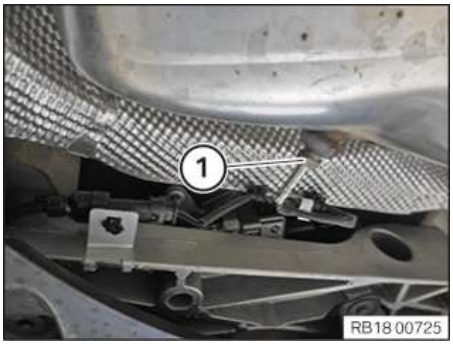
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

- Renew the V-clip (2).

  Parts: V-band clamp
- Install the SCR metering module (3) in the exhaust system.
- Tighten the V-clip (2) of the SCR metering module (3).

SCR metering module V-clip to exhaust system

V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm

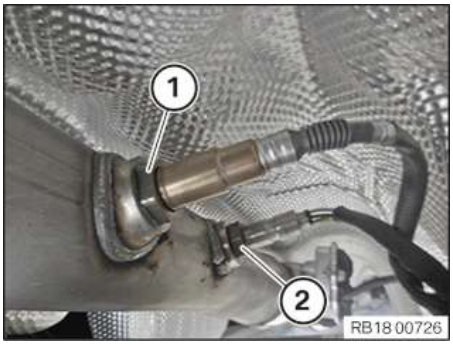


- Install the exhaust temperature sensor (1) in the exhaust system and tighten.

Exhaust-gas temperature sensor upstream of SCR catalytic converter

Sensor		Tightening torque	30 Nm

cardiagn.com



- Install the diesel particulate sensor (1) in the exhaust system and tighten.

Diesel particulate sensor to exhaust system

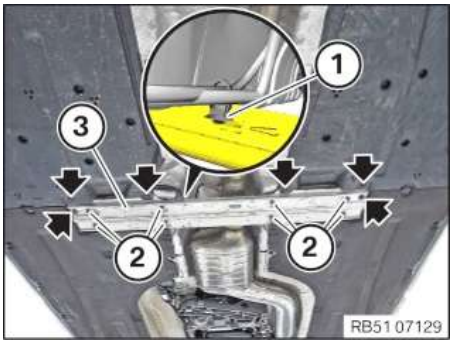
Sensor		Tightening torque	50 Nm

- Install the nitrogen oxide sensor (2) in the exhaust system and tighten.

Nitrogen oxide sensor downstream of SCR catalytic converter

Sensor		Tightening torque	55 Nm

56 – Install the connecting supports on the tunnel



- Guide in and install connecting support (3) on the tunnel.
- Tighten the screws (2).
- Tighten screws (arrows).

Connecting support to tunnel

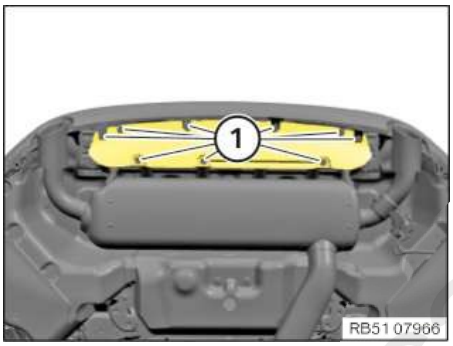
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Secure the clamp (1).

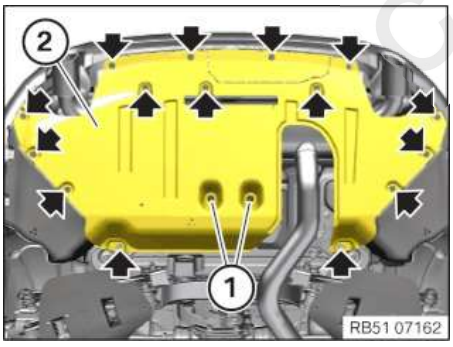
57 – Installing the rear diffuser



- **Version 1:**
- Install the diffuser and tighten the nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm



- **Version 2:**
- Feed in and position the diffuser (2)
- Tighten screws (arrows).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm

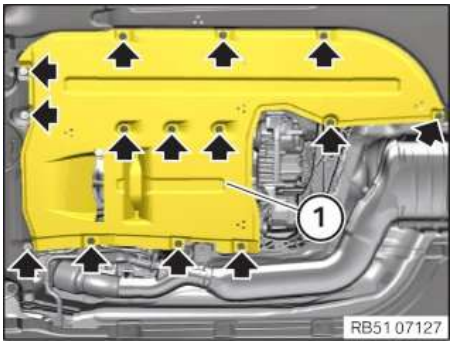
- Tighten nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm

58 – Installing underbody protection at rear

cardiagn.com



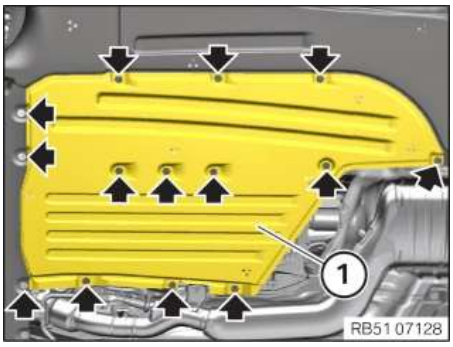
- **Version A:**

  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version B:**

  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

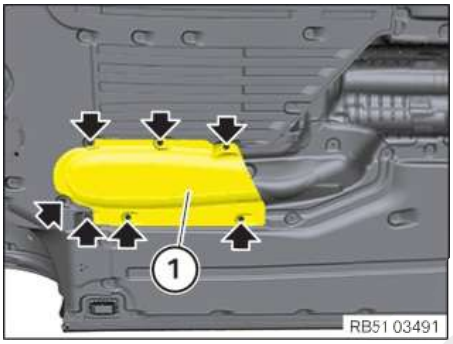
Underbody protection

Hexagon screw		Tightening torque	3 Nm

59 – Install the underbody panelling of the transmission on the side

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

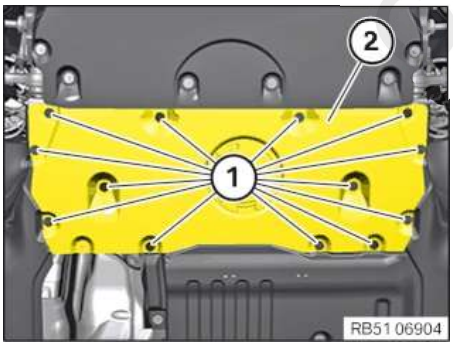


- Insert the underbody panelling (1).
- Tighten screws (arrows).

Underbody panelling

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

60 – Installing the centre underbody protection



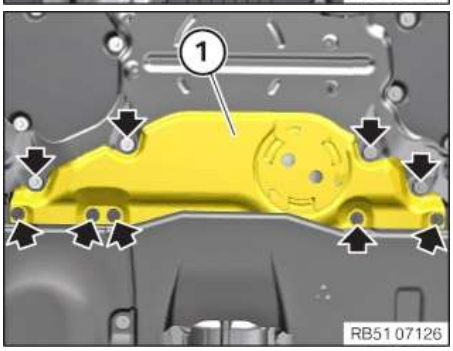
- **Variant with rear wheel drive:**

  Position central underbody protection (2).

  Tighten the screws (1).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version with all-wheel drive:**

  Guide in centre underbody protection (1) and install.

  Tighten screws (arrows).

Underbody protection

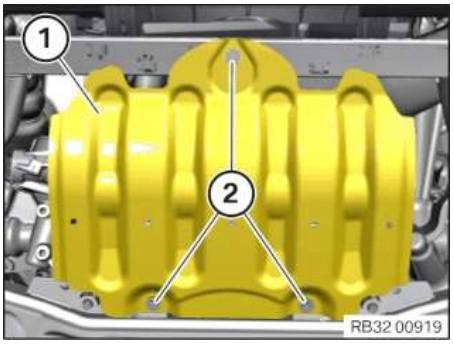
Hexagon screw		Tightening torque	3 Nm

61 – If installed: Install underbody protection of the steering

cardiagn.com

Prerequisite

Front underbody protection has been removed.



- Position underbody protection (1).
- Tighten the screws (2).

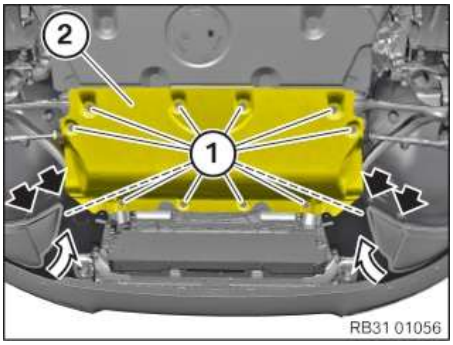
Underbody protection, steering, to front axle support

Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

62 – Install the underbody protection of the steering gear



- **Version A:**

  Position the underbody protection (2) of the steering gear.

  Tighten the screws (1).

Underbody protection of the steering gear

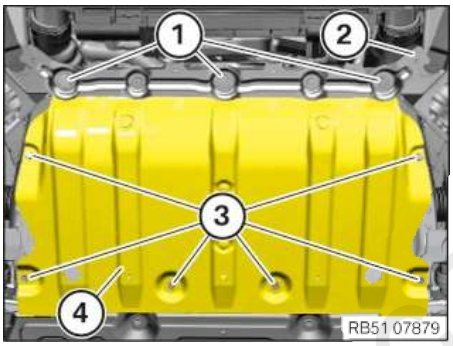
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the bottom wheel arch cover.

  Tighten the screws (arrows) of the lower wheel arch cover on the wheel arch cover.

Wheel arch trim panel, front

Thermoplastic hexagon screw		Tightening torque	2,6 Nm



- **Version B:**

  Feed in the underbody protection (4) of steering gear and install it.

  Tighten the screws (3).

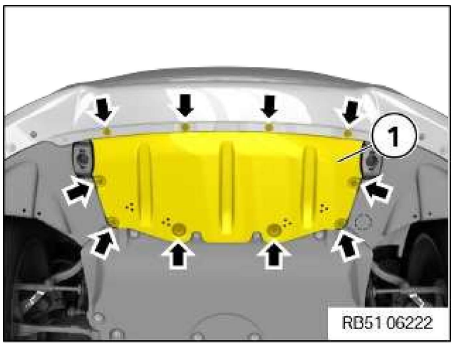
Underbody protection of the steering gear

Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the holder (2) for the underride protection.

  Tighten the screws (1).

63 – Installing the front underbody protection



- **Version A:**

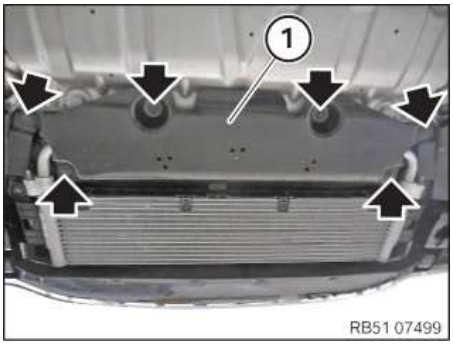
  Feed in the front underbody protection (1) towards the front under the bumper panel and position.

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

carDiagn.com



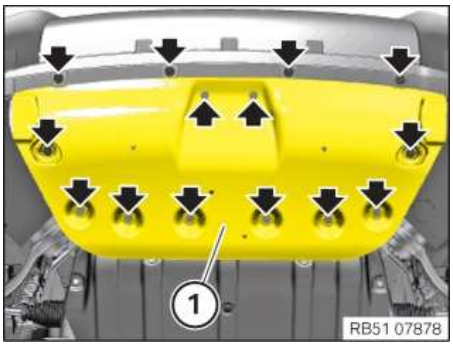
- **Version B:**

  Feed in and position the front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



- **Version C:**

  Feed in and install front underbody protection (1).

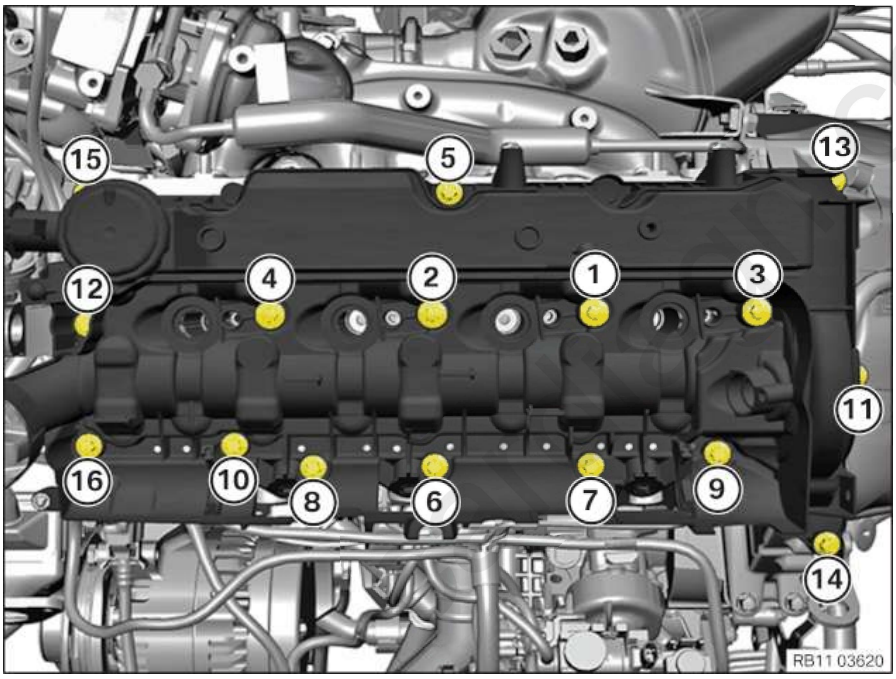
  Tighten screws (arrows).

Underbody protection front

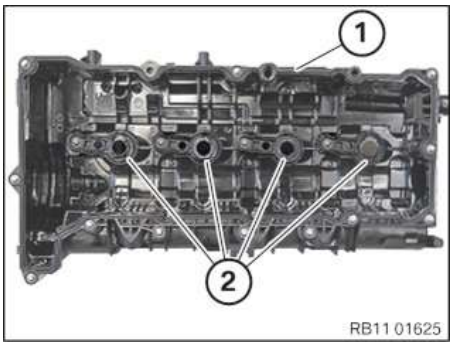
Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

64 – Installing cylinder head cover

Screw connection of the cylinder head cover

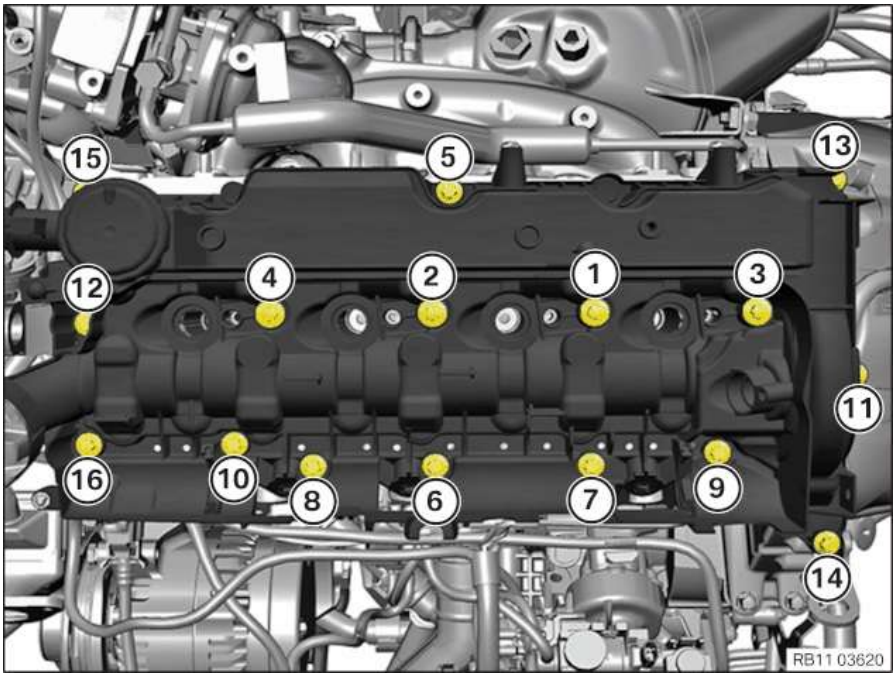


1 - 16 Bolts of the cylinder head cover



- Renew the profile seals (1) and (2) of the cylinder head cover.

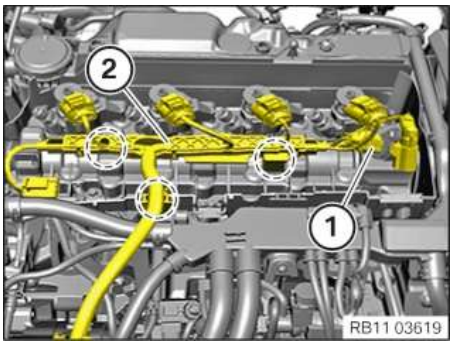
  Parts: Profile seals



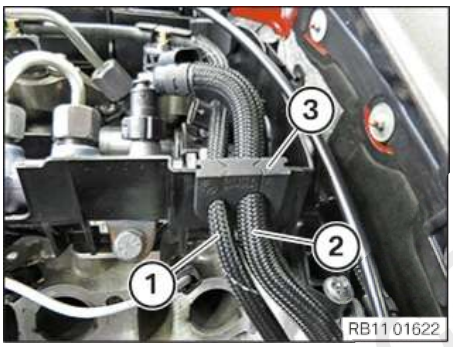
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

Cylinder head cover to cylinder head

M6		Tightening torque.	8,5 Nm



- Position the vehicle wiring harness (2) on the cylinder head cover and fasten in the marked areas.
- Plug in the connector (1) and lock audibly.



- Insert and connect the leakage oil line (1) with the fuel return line (2) and grommet (3).



- Feed in and install the heat shield (1).

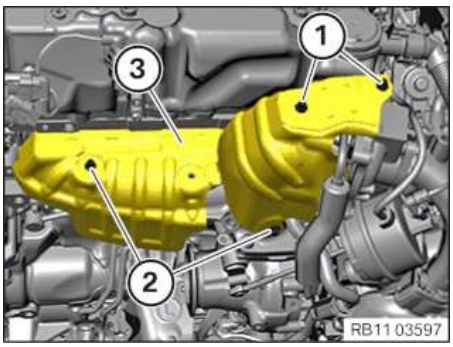


- Connect engine ventilation line (1) and lock.

  The locks (arrows) must engage audibly.

cardiagn.com

65 – Installing heat shield



- Feed in and install the heat shield (3).
- Tighten down screws (1) and (2).

Heat shield to exhaust manifold

M6x12			10 Nm

66 – Installing the sensor bracket on the cylinder head cover

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

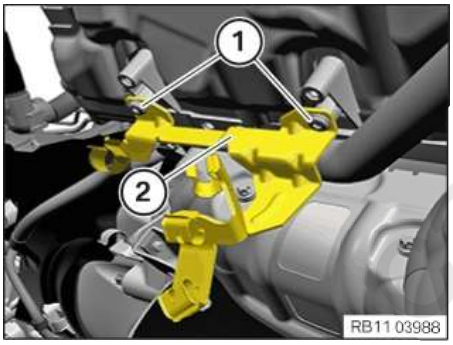
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

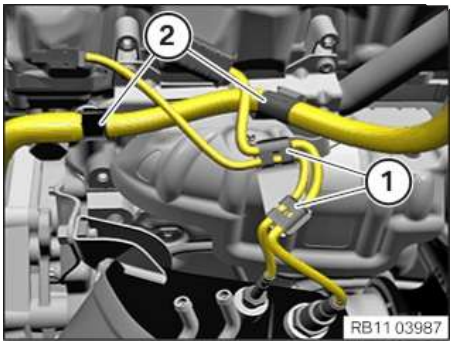
- Route all cables without abrasions, do not trap and crush.



- Insert and install the holder (2).
- Tighten the screws (1).

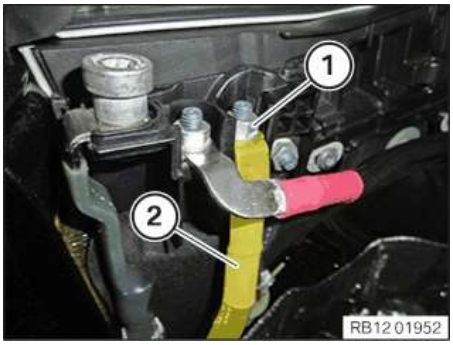
Bracket on cylinder head cover

	Tightening torque	5 Nm



- Secure the positive battery cable in the clamps (2).
- Mount the cable of the exhaust gas sensor system in the clamps (1).

carmanualsdiagn.com



- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

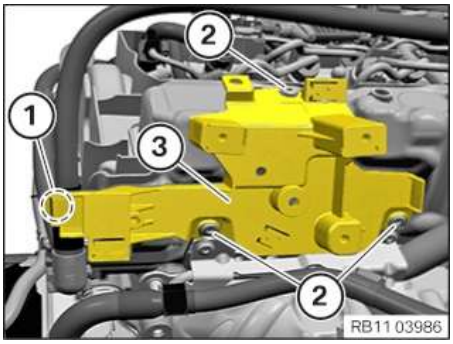
Battery positive lead to battery positive terminal

M8		Tightening torque	19 Nm



- Insert and install the cover (2) in the direction of the arrow.

  The locks (1) must engage audibly.

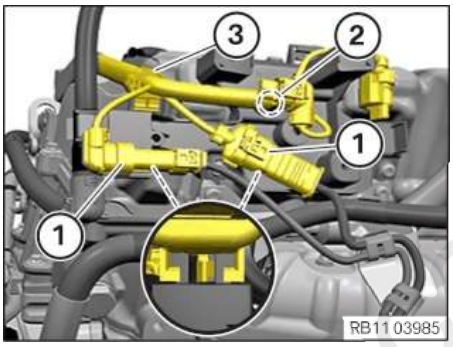


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

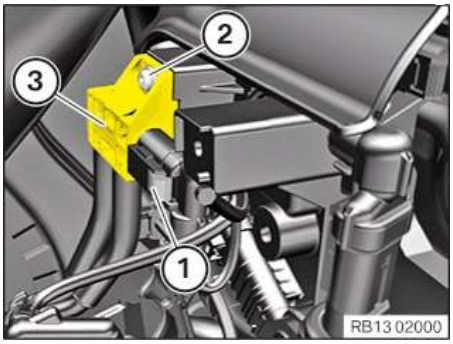
		Tightening torque	5 Nm

- Fasten the positive battery cable in the area (1) in the clamp.



- Feed in the wiring harness section and fasten it with the clamp (3).
- Fasten the cable clip in the area (2) in the sensor bracket.
- Feed in the connector (1) into the sensor bracket and lock it audibly.
- Plug in the connector (1) and lock audibly.

67 – Securing the differential pressure sensor for the diesel particulate filter



- Feed in and install the differential pressure sensor (3).
- Tighten down screw (2).

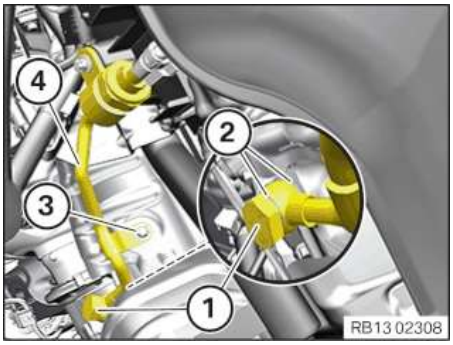
Differential pressure sensor of diesel particulate filter on cylinder head cover

TS5x20		Tightening torque	4 Nm

- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

68 – Install the exhaust gas pressure pipe

cardiagn.com



- Insert and install the exhaust gas pressure pipe (4).
- Replace the sealing rings (2).

  Parts: Sealing ring
- Apply the banjo bolt (1) hand-tight.
- Tighten down screw (3).

Heat shield to exhaust manifold

M6x12		Tightening torque	10 Nm

- Tighten the banjo bolt (1).

Banjo bolt for exhaust pressure pipe to exhaust manifold

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm



- Tighten down screw (2).

Exhaust gas pressure pipe to sensor system holder

TS6x20		Tightening torque	5,7 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

69 – Install all injectors

▸ **Cleaning the injector shafts**

CAUTION

Swirling dirt particles caused by compressed air.

Danger of injury!

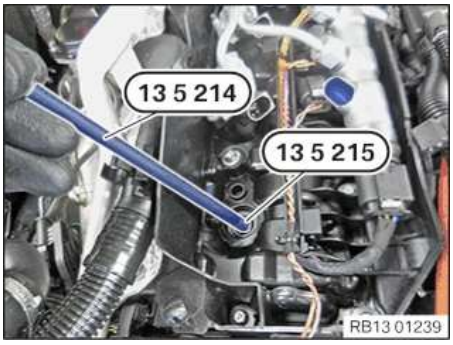
- Collect dirt particles, e.g. when blowing out, use cloth to do so.
- Wear safety goggles.

RISK OF DAMAGE

Contaminant or foreign body.

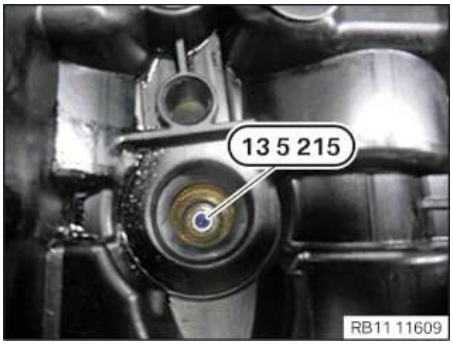
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Check whether the sealing ring remained in the injector shaft and remove the sealing ring as needed.
- Insert the special tool 0 493 763 (13 5 215) with the special tool 0 493 762 (13 5 214) from the set of special tools 0 493 758 (13 5 210) into the injector shaft.
- Remove special tool 0 493 762 (13 5 214).

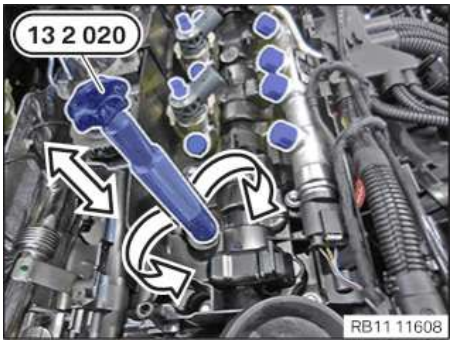
cardiagn.com



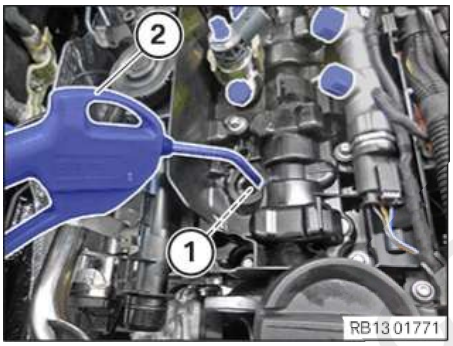
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



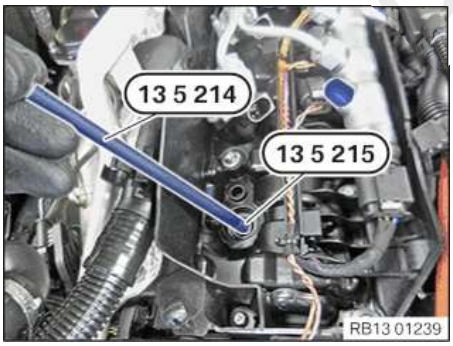
- Insert special tool 0 496 150 (13 2 020) into the injector shaft.



- Move special tool 0 496 150 (13 2 020) up and down in the injector shaft with rotational movements in the direction of arrow.
- Feed out special tool 0 496 150 (13 2 020) from the injector shaft and remove.



- Blow out injector shaft (1) with air gun (2).



- Feed the special tool 0 493 762 (13 5 214) into the injector shaft and screw it in with the special tool 0 493 763 (13 5 215).
- Feed out special tool 0 493 762 (13 5 214) with special tool 0 493 763 (13 5 215) from the injector shaft and remove it.

▸ **Check the placement of the clamping claw**

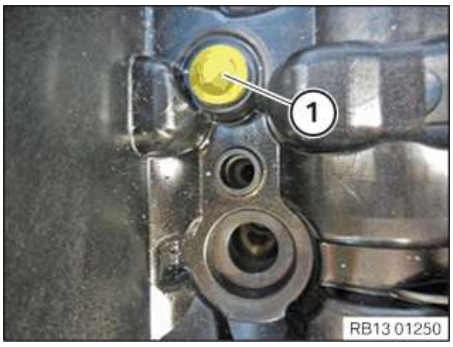
cardiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Tighten down screw (1).

  The clamping claw is positioned on the bolt (1).

Clamping claw facing to cylinder head cover

M6		Tightening torque	10 Nm

▸ **Prepare the injector for installation**

RISK OF DAMAGE

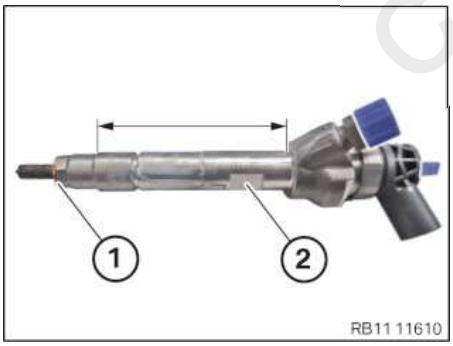
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

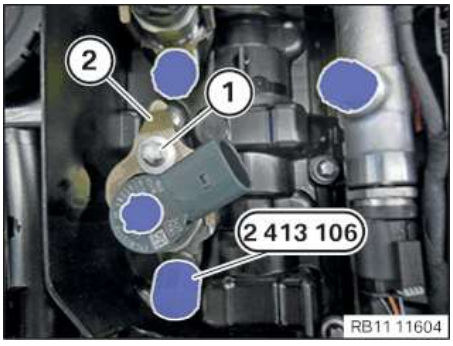
TECHNICAL INFORMATION

Lightly grease the injector shaft with high temperature-resistant grease.
For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



- Renew the copper sealing ring (1) on the injector (2).

  Parts: Copper sealing ring
- Lightly grease the injector in the marked area with heat-resistant grease before installing the injector (2) in the injector shaft.

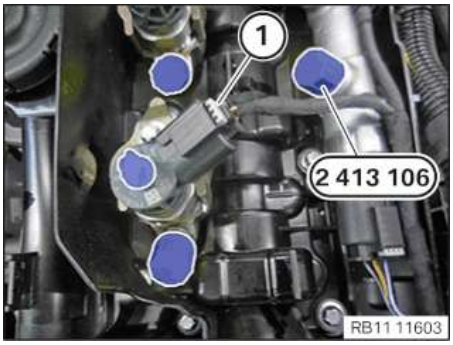


- Insert and install the injector .
- Insert and install the clamping claw (2).
- Tighten down screw (1).

Injector to cylinder head cover

M8		Tightening torque	8 Nm
		Angle of rotation	120 °

cardiagn.com



- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

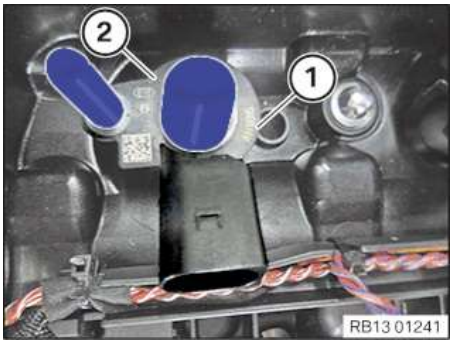
▸ **Replacement: Perform injection quantity compensation**

TECHNICAL INFORMATION

If the DDE control unit or an injector has been replaced, it will also be necessary to carry out injection quantity compensation. The adjustment value (7-position letter/number code) is engraved on each injector.

NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

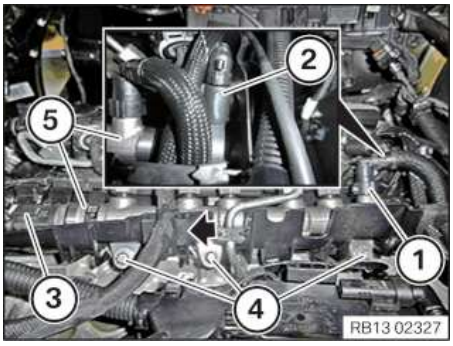


- Read off the adjustment value (1) on the new injector (2).



- Connect diagnosis system:
  - Vehicle identification
  - Function selection
  - Service functions
  - Digital diesel electronics (DDE)
  - Adjustment of injectors
  - Testing schedule
- Start service function with the right arrow button.

70 – Installing the rail



- Insert and install the rail (5).
- Tighten the screws (4).

Rail to cylinder head cover

M8		Tightening torque	19 Nm

- Install and lock cable clip (arrow).

  The cable clip (arrow) must engage audibly.
- Connect and lock the connector (3) at the rail pressure sensor.

  The connector (3) must engage audibly.
- Connect and lock the connector (2) at the rail pressure regulating valve.

  The connector (2) must engage audibly.
- Feed in fuel return line (1) and install.

  The fuel return line (1) must audibly engage.

cardiagn.com

71 – Installing high pressure line between rail and high pressure pump

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

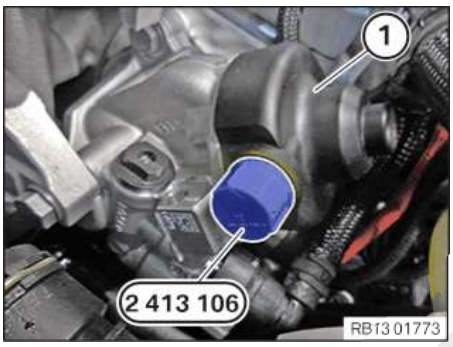
On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

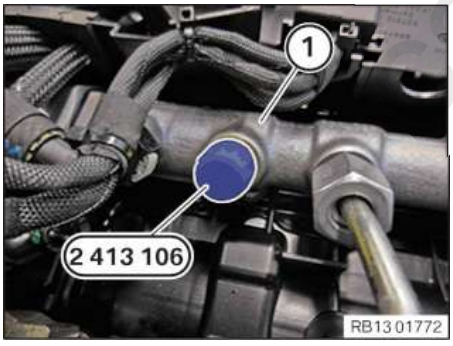
- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

TECHNICAL INFORMATION

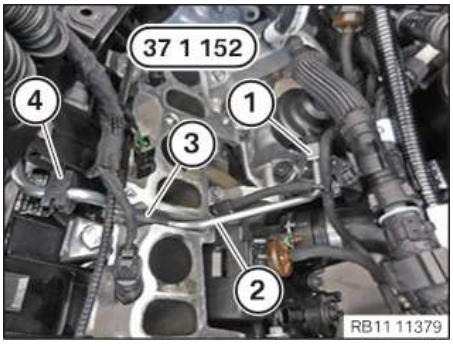
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Feed out and remove special tool on the high pressure pump (1).



- Feed out the special tool on the rail (1) and remove.



- Insert and install the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).
- Hand-tighten the union nut (1) on the high pressure pump.

cardiagn.com



- Hand-tighten the union nut (1) on the rail.

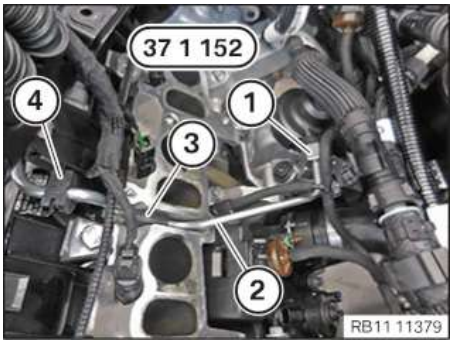
TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten the union nut (1) with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm



- Make sure that the high pressure line (2) is correctly installed with the abrasion protection (3) and the rubber mount (4).

TECHNICAL INFORMATION

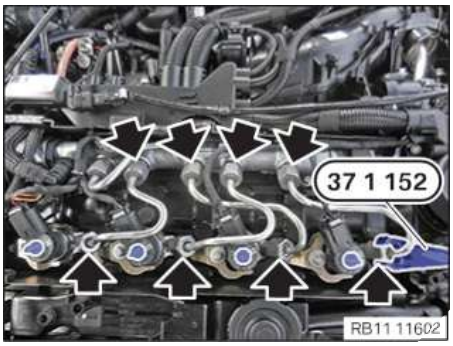
Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten union nut (1) on the high pressure pump with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm

72 – Installing the high pressure lines between the injector and the rail



- Remove the special tool from all cable connections.
- Feed in and install the high pressure lines (arrows).
- Hand-tighten the high pressure lines (arrows).

TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

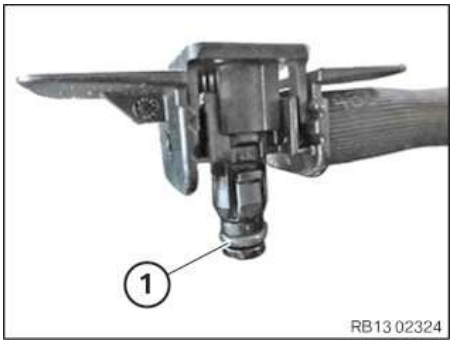
- Tighten the high pressure lines (arrows) with the special tool .

High pressure lines between injector and rail

High-pressure pipe		Tightening torque	24.5 Nm

- Check the high pressure lines (arrows) for tightness (**visual inspection**).

73 – Attach the leakage oil line on the injectors



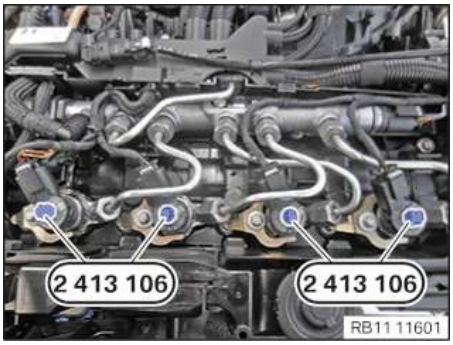
- **Version A:**

  Check sealing ring (1) for damage, renew leakage oil line if necessary.

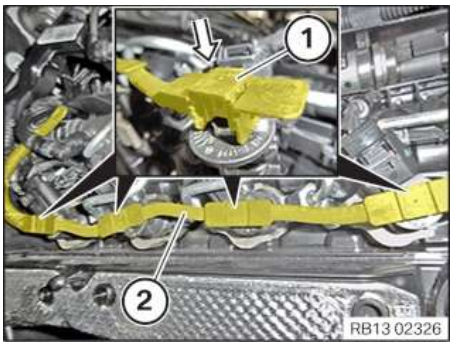
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.

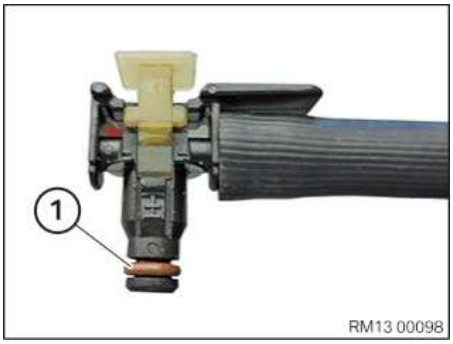
carlagn.com



- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.



- **Version B**:

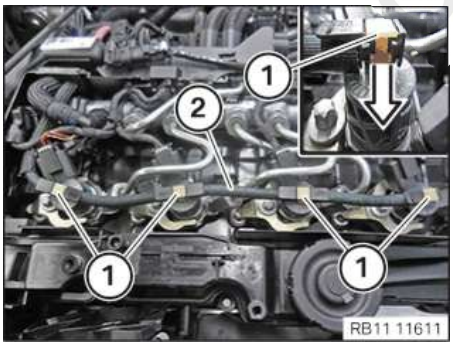
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.



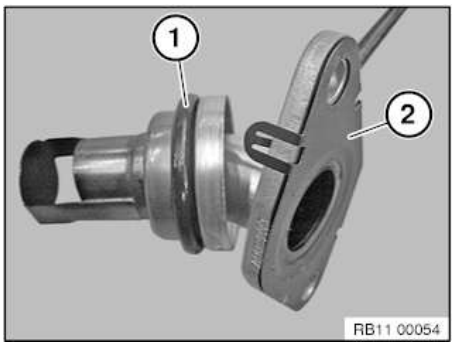
- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.

74 – Installing the intake plenum

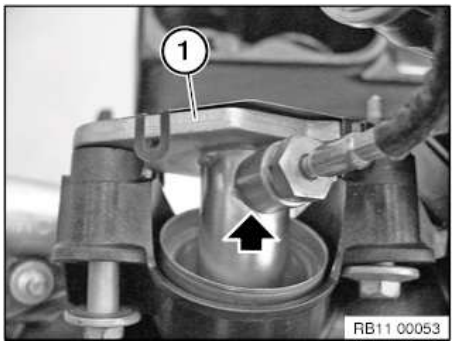
cardiagn.com



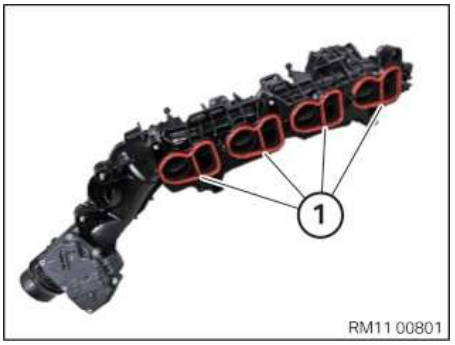
- Renew O-ring (1).

  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

  Parts: Gasket
- Position the seal (2) and clip it in.

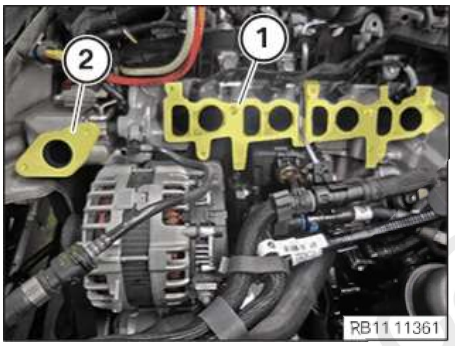


- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).

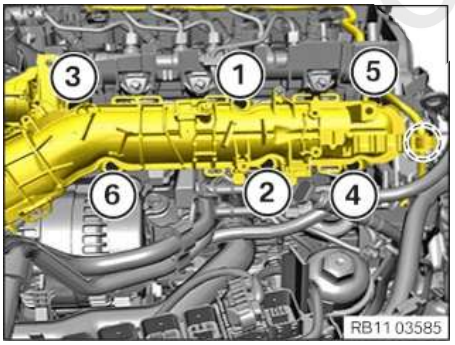


- Renew seals (1).

  Parts: Seals
- Ensure that the seals (1) are firmly mounted on the intake plenum.



- Clean connection points (1) at cylinder head.
- Clean the connection point (2) on the exhaust-gas recirculation cooler.

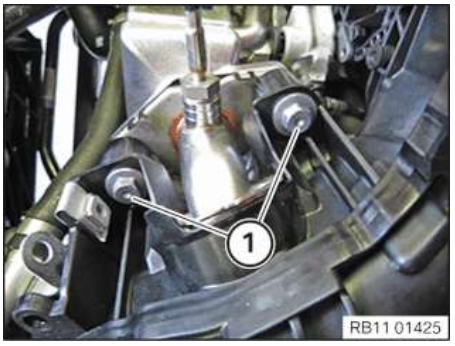


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

- Attach the wiring harness and fuel lines in the marked area on the intake plenum.

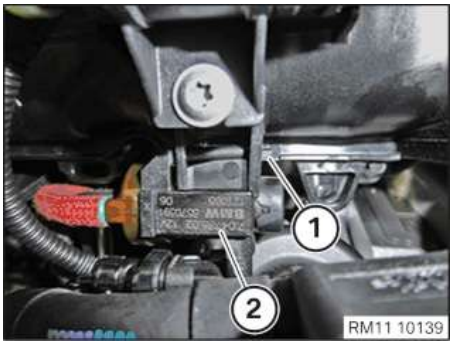


- Tighten the screws (1).

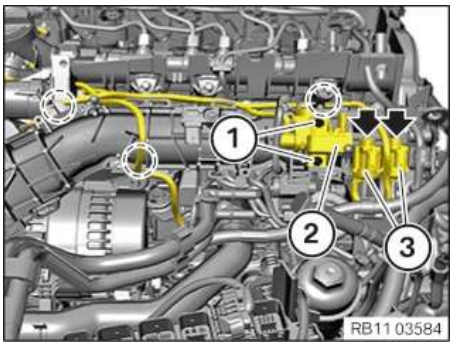
Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm

cardiagn.com



- Install electric changeover valve (2) from the left to the right in the holder on the intake plenum.
  The lock (1) must audibly engage.



- Install intake plenum electric changeover valve (3) on the intake plenum.
  The locks (arrows) must engage audibly.
- Position the electric changeover valve (2) on the intake plenum.
- Tighten the screws (1).

Electric changeover valve to intake plenum

TS6x20		Tightening torque	5 Nm

- Fasten the vacuum hoses on the intake plenum in the marked areas.

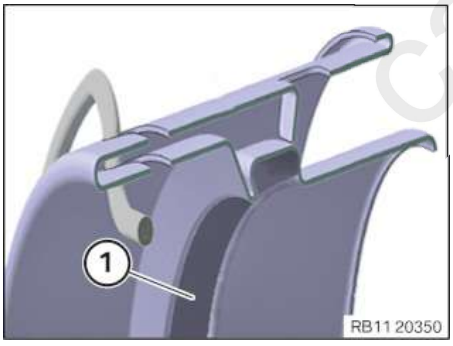


- Check the seal (1) for damage, and renew if necessary.

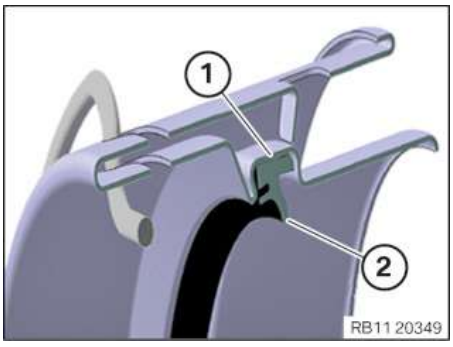
▸ **Replacing damaged seal**

TECHNICAL INFORMATION

Do not use pointed or sharp-edged tools for the installation and/or removal.



- Remove damaged seal.
- Clean gasket groove (1) with a dry towel.
  The gasket groove (1) must be clean.



- Renew gasket.
  Parts: Gasket
- Install seal dry without lubricant or mounting agent.

TECHNICAL INFORMATION

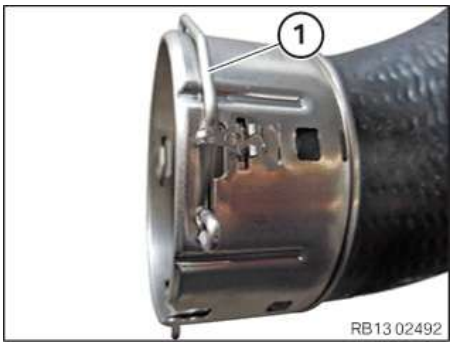
Incorrect assembly is possible. Ensure correct installation position.

- Feed in and install the seal.
- Make sure the seal is correctly installed in the gasket groove (1).
- Make sure that the sealing lip (2) is directed inwards as shown.

cardiagn.com



- Connect the pressure pipe to the throttle body until the locks (1) engage on both sides.



- Check that the locks (1) are correctly seated on the pressure pipe.

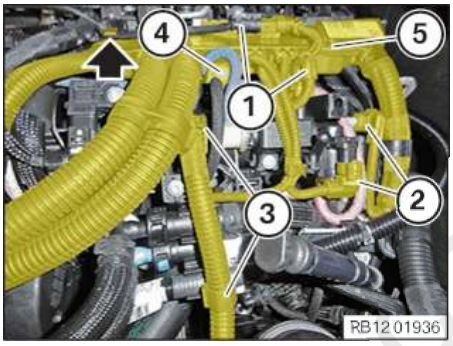
75 – Partially securing the wiring harness section on the intake plenum

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

- Route all cables without abrasions, do not trap and crush.



- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

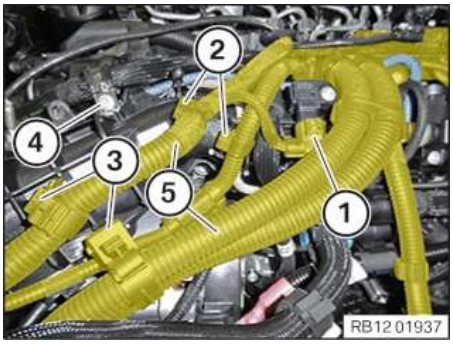
Wiring harness section to manifold

TS5x20		Tightening torque	3,6 Nm

- Secure clamps (3).
- Connect connectors (2) and lock.

  The connectors (2) must engage audibly.
- Secure the line at clamp (Arrow).
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

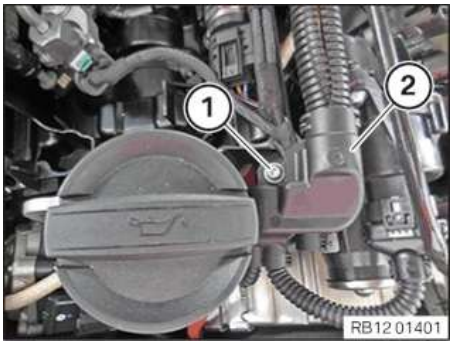
Standard screw connection 4 Nm

Oval-head screw		Tightening torque	4 Nm

- Secure clamps (3).
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

cardiagn.com



- Guide in the wiring harness section (2) and install.
- Tighten down screw (1).

Wiring harness section to cylinder head cover

TS5x20		Tightening torque	3,6 Nm



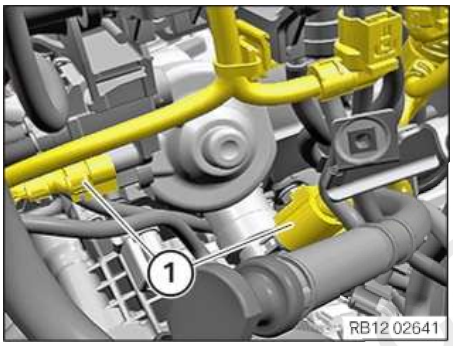
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



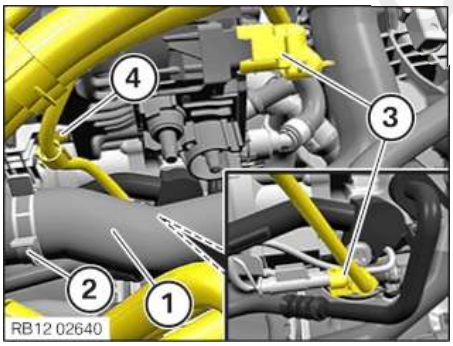
- Connect the connector (1) and lock it.

  The connector (1) must engage audibly.



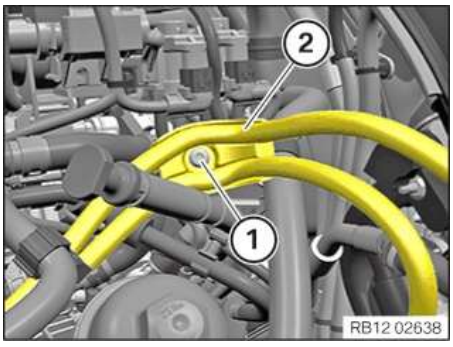
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



- Secure the clamp (4).
- Connect connectors (3) and lock.

  The connectors (3) must engage audibly.
- Feed the coolant line (1) into the holder (2) and install it.



- Feed in and position the positive battery cables (2) .
- Tighten down screw (1).

Standard screw connection M6

M6		Tightening torque	8 Nm

cardiagn.com



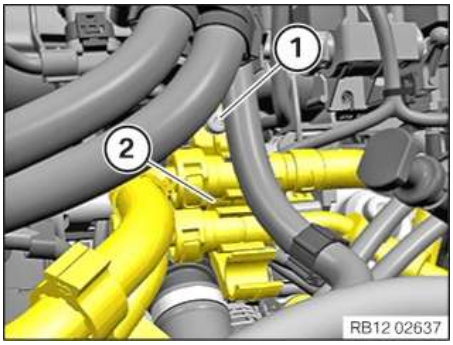
- Feed in and install the positive battery cable (4).
- Feed in and position the positive battery cables (4) .
- Renew the nuts (3) and (2).

  Parts: Nuts
- Tighten nuts (3) and (2).

Battery positive lead on the starter motor generator

M8		Tightening torque	19 Nm

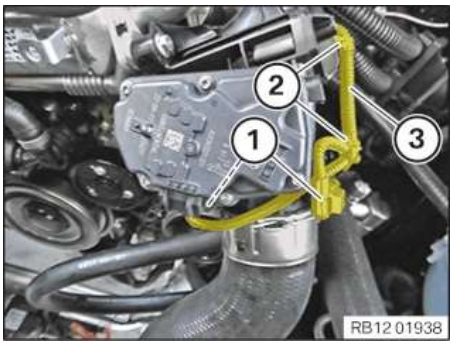
- Guide in and install the lid (1).



- Insert and install the holder (2).
- Tighten down screw (1).

Holder on intake plenum

TS6X20		Tightening torque	5 Nm



- Guide in the wiring harness section (3) and install.
- Secure clamps (2).
- Connect connectors (1) and lock.



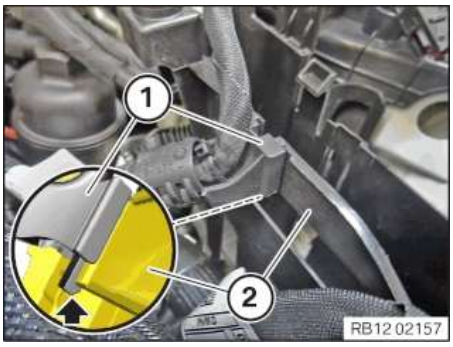
- Feed in and install coolant line (2).
- Lock holder (1).

  The holder (1) must engage audibly.



- Feed in and install the cable clip (1).

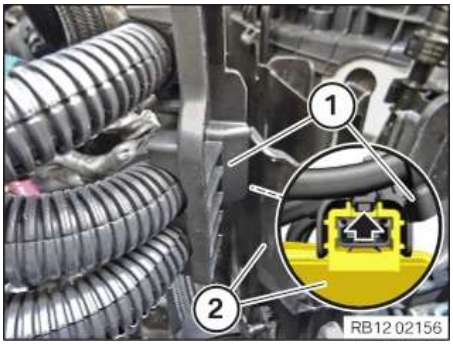
  Lock (arrow) must audibly engage.



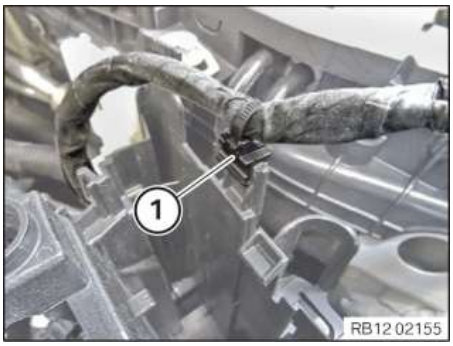
- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.

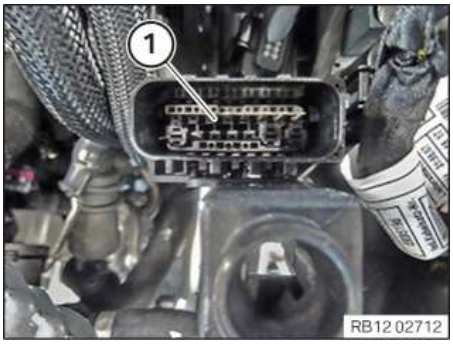
cardiagn.com



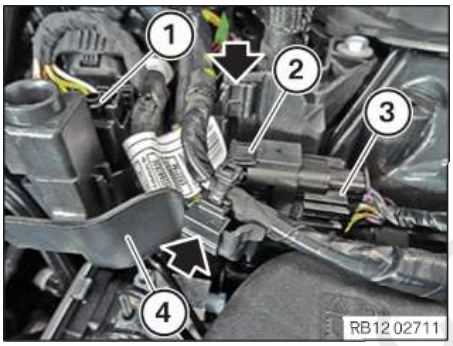
- Connect the cable clip (1) with the control unit holder (2) and lock it.
  Lock (arrow) must audibly engage.



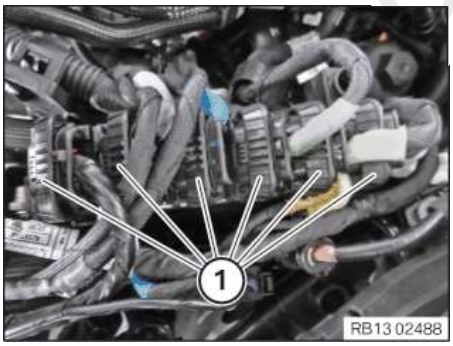
- Secure clamps (1).



- Feed in and install the connector (1).
  The connector (1) must engage audibly.



- Connect connector (3) to control unit holder (4) and lock it.
  The connector (3) must engage audibly.
- Connect connectors (2) and lock.
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.
  The connector (1) must engage audibly.
- Secure the clamps (arrows).



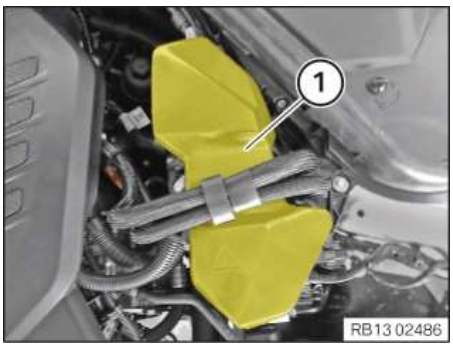
- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.

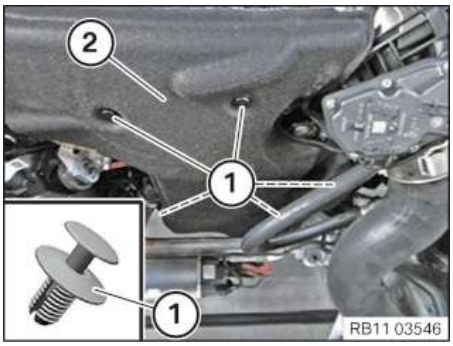
cardiagn.com

76 – Install the cover for the DDE control unit



- Insert and install cover (1) into guides.

77 – Install acoustic cover for the engine, front

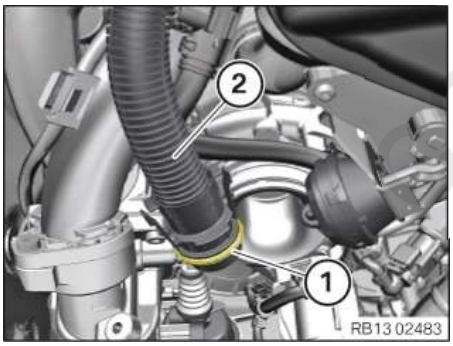


- Feed the acoustic cover (2) in and install.
- Secure the acoustic cover (2) with the expanding rivets (1).

78 – Installing the clean air pipe with resonator



- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.

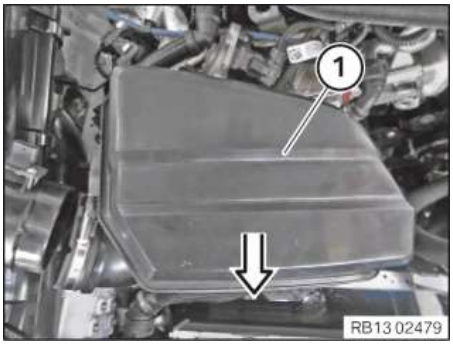


- Check the sealing ring (1) for the engine ventilation line (2) for damage and renew where required.



- Feed in and install clean air pipe with resonator (1) in the direction of the arrow.

cardiagn.com

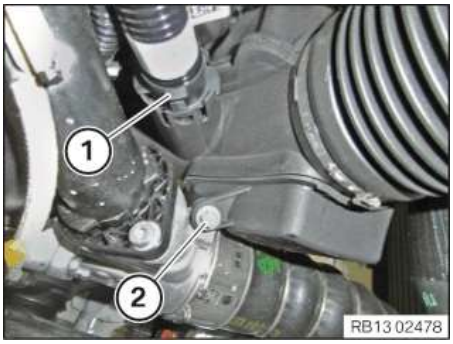


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

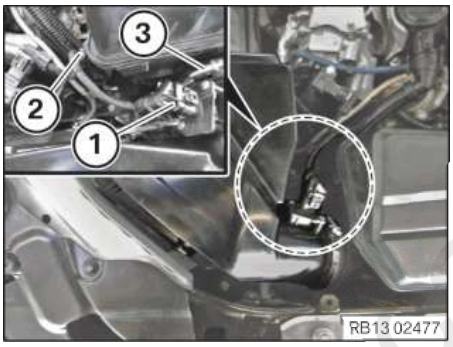
  The clamp (1) must engage audibly.



- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm



- Connect the clean air pipe with resonator to the intake filter housing.
- Tighten clamp (3).

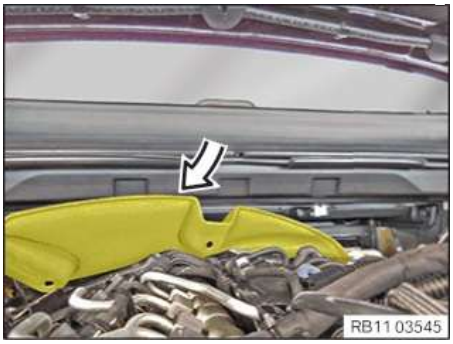
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

- Secure clamps (2).
- Connect connectors (1) and lock.

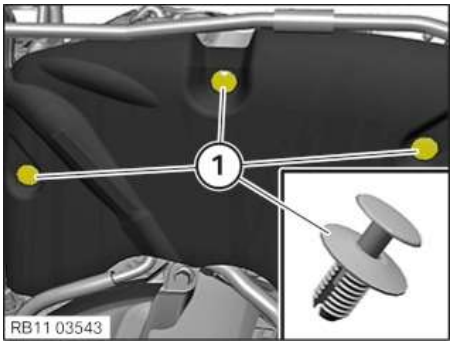
  The connector (1) must engage audibly.

79 – Installing acoustic cover at rear



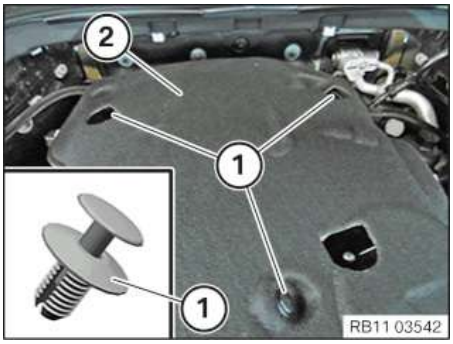
- Guide in the acoustic cover in the direction of the arrow and install it.

cardiagn.com



- Secure acoustic cover with the expanding rivets (1).

80 – Install the acoustic cover for the injectors



- Feed the acoustic cover (2) in and install.
- **If installed:** Secure the acoustic cover (2) with the expanding rivets (1) .

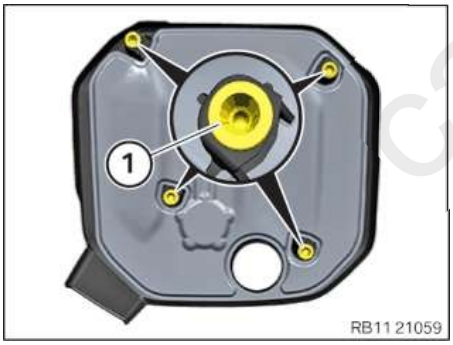
81 – Install acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.

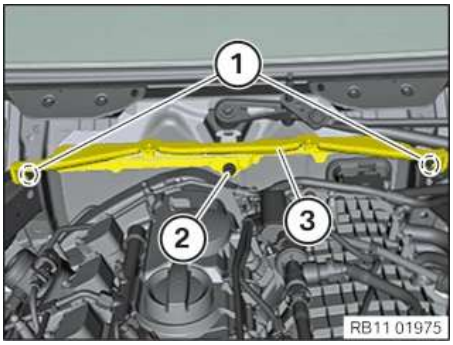


- Check the acoustic cover for correct fit of the rubber mounts (1).



- Clip in the acoustic cover (1) into the holders in the indicated areas.

82 – Installing centre bulkhead lower section

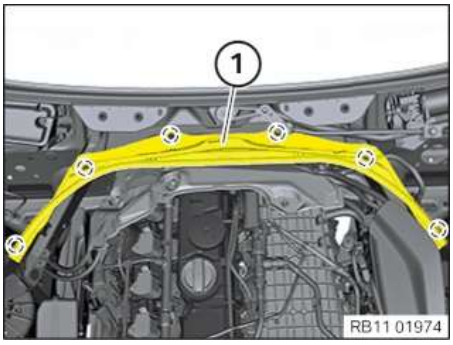


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

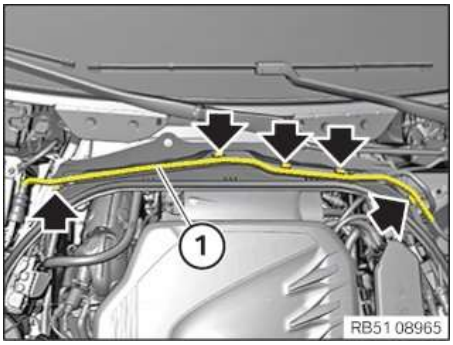
83 – Installing the centre bulkhead upper part



- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

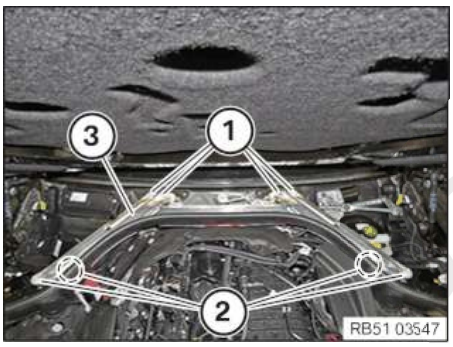
Bulkhead upper part to bottom bulkhead

		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

  Clip in the wire (1) into the holders (arrows).



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Install the tension strut (3) on the spring strut dome.
- Tighten the screws (1).

Tension strut on bulkhead

M10x25 screw		Tightening torque	56 Nm

- Renew screws (2).

  Parts: Screws
- Tighten the screws (2).

Tension strut to spring strut dome

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

84 – Install the seal for the bonnet

carmagn.com



- Press the rear bonnet seal (2) into the guide.
- Feed in cable (1) into the brackets.
- Check that the rear bonnet seal (2) and the cable (1) are seated correctly.

85 – Installing cowl panel cover

RISK OF DAMAGE

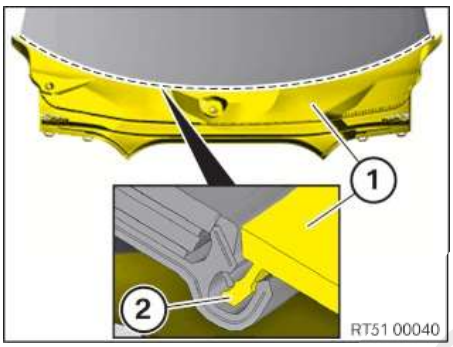
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

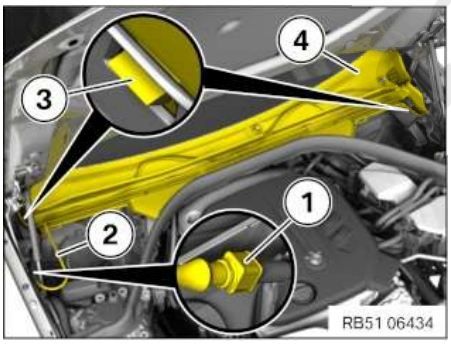
- Ensure correct installation of the components.
- Only use undamaged components.

TECHNICAL INFORMATION

Before installing the cowl panel cover it is **mandatory** to check that the 48 V line is routed correctly and fitted tightly.
An incorrectly laid or attached 48 V line can be damaged by the wiper kinematics.



- Push the cowl panel cover (1) into the latch mechanism (2) beginning on the side.



- Clip cowl panel cover (4)in by means of the latch mechanisms (3).
- Position windscreen wash hose (2) and connect windscreen wash hose (1)quick lock.

86 – Install left and right wiper arm

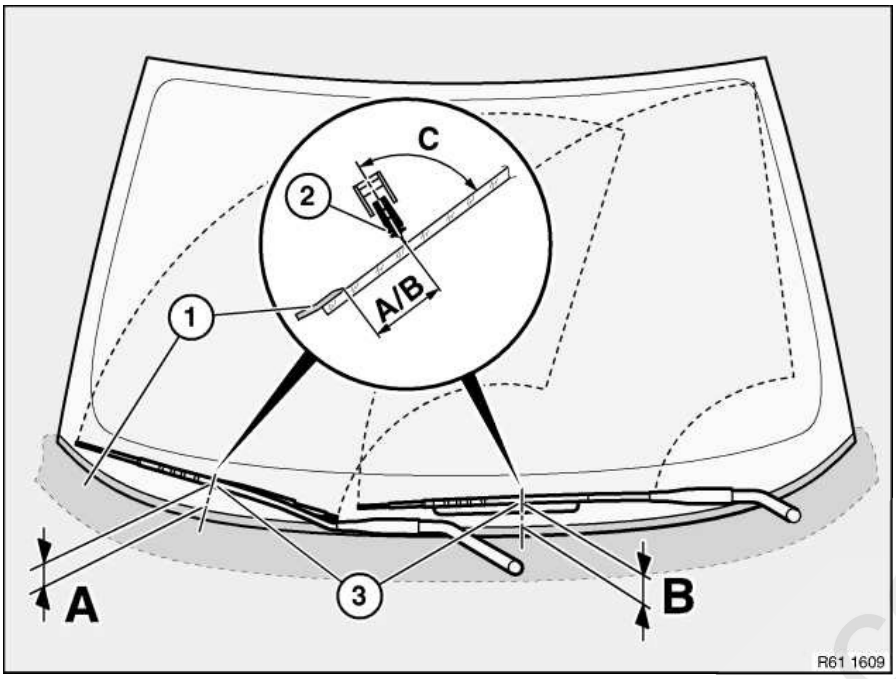
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

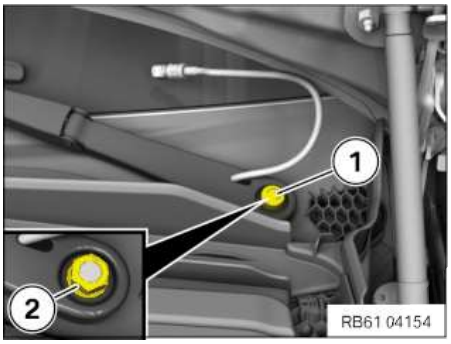
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- Connect the wiper arm (3).
- Correctly position the wiper arm (2) in relation to the window edge (1).

Distance from window pane edge to wiper blade

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

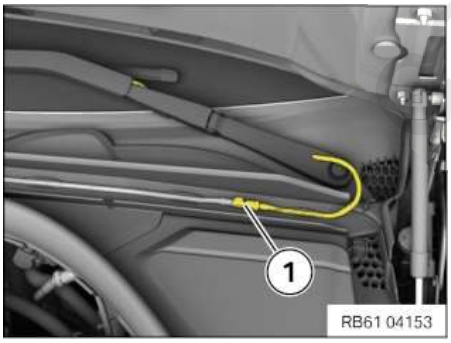


- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

- Connect the protective cap (1).



- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

87 – Connecting all battery earth leads



- See additional information.

88 – Activating the 48 V electrical system

Prerequisite

Ignition is switched off.

RISK OF DAMAGE

Damage to 48-V battery

If a 48-V battery that is disconnected from the electrical system is activated, the battery electronics will be damaged.

- Only carry out activation of the 48V electrical system with a completely connected 48-V battery.



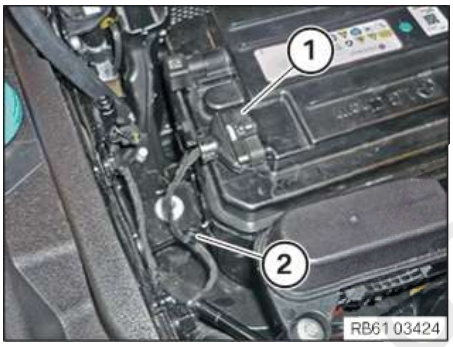
- Lift battery earth lead (1).
- Remove special tool .



- Release the negative battery cable (2) of the 48-V battery from the mounting.
- Position the negative battery cable (2) of the 48-V battery on the negative battery terminal.
- Tighten nut (1).

Negative battery cable to 48-V battery

Nut M8		Tightening torque	19 Nm



- Connect the connector (1) of the CAN bus and lock it.
- Clip in clip (2).

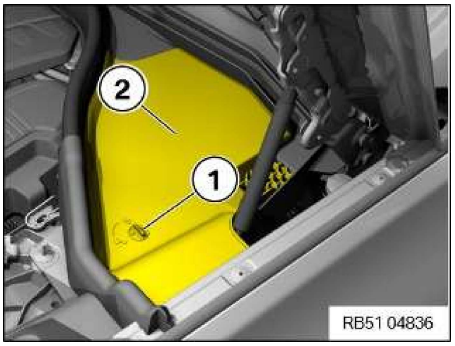


- Activate the 48V electrical system by closing the bonnet.

  The activation takes place automatically.

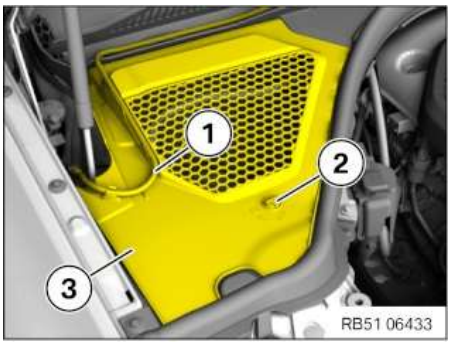
89 – Install the cover of the engine compartment on the rear left

cardiagn.com



- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

90 – Install the rear right engine compartment cover



- Position the cover of the engine compartment on the rear right (3).
- Close lock (2).
- Insert washer fluid hose (1) into the guides.

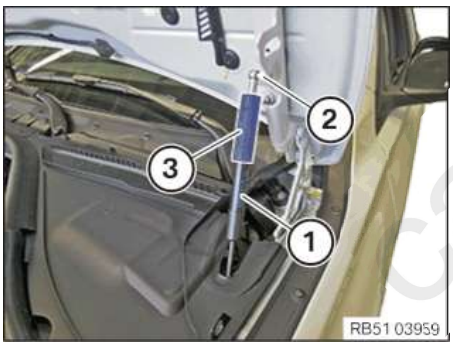
91 – Take bonnet out of the service position

CAUTION

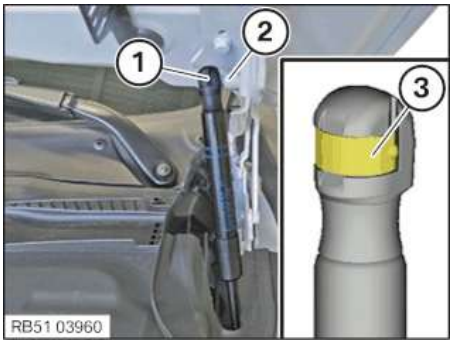
Shutting bonnet or tailgate.

Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.



- Support the bonnet by hand.
- Remove the special tool (3) from the ball pin (2).
- Pull off the special tool (3) from the gas pressure spring (1).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.



- Check the clamp (3) is fitted correctly.
- Connect ball socket (1) to ball pin (2).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.

Additional Information

Overview of Tightening Torques

Special tool 2 365 488 to engine Used in step 4347

M8x60		Tightening torque		19 Nm

Standard screw connection M6			Used in step 4675
M6		Tightening torque	8 Nm

Chain tensioner piston to cylinder head			Used in step 46
22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

Pressing the timing chain with special tool 2 354 962			Used in step 46
Spindle	The torque must not be exceeded.		20 Nm

Starter motor to engine			Used in step 50
M8X60		Tightening torque	19 Nm

Battery positive lead to starter			Used in step 50
M8		Tightening torque	13,5 Nm

Diesel particulate filter V-clip to exhaust turbocharger			Used in step 52
V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

Bracket to diesel particulate filter top			Used in step 52
M8		Tightening torque	19 Nm

Bracket to transmission for diesel particulate filter holder bottom			Used in step 52
M8X20		Tightening torque	19 Nm

Lower holder to diesel particulate filter			Used in step 52
M8		Tightening torque	19 Nm

Coolant lines for SCR metering module			Used in step 52
M6X16		Tightening torque	8 Nm

Nitrogen oxide sensor before SCR catalytic converter			Used in step 53
Sensor		Tightening torque	50 Nm

Monitoring oxygen sensor			Used in step 54
Sensor		Tightening torque	50 Nm

Rear silencer to body / bumper support			Used in step 55
M8	Replace nuts.	Tightening torque	19 Nm

Exhaust system to rear axle carrier			Used in step 55
M8 nut		Tightening torque	19 Nm

Exhaust system to transmission			Used in step 55
M8		Tightening torque	19 Nm

Exhaust system to diesel particle filter			Used in step 55
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

SCR metering module V-clip to exhaust system			Used in step 55
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm

Exhaust-gas temperature sensor upstream of SCR catalytic converter			Used in step 55
Sensor		Tightening torque	30 Nm

Diesel particulate sensor to exhaust system			Used in step 55
Sensor		Tightening torque	50 Nm

cardiagn.com

Nitrogen oxide sensor downstream of SCR catalytic converter			Used in step 55
Sensor		Tightening torque	55 Nm

Connecting support to tunnel			Used in step 56
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

Diffuser / underbody panelling			Used in step 57
Nuts and screws		Tightening torque	3 Nm

Underbody protection			Used in step 5860
Hexagon screw		Tightening torque	3 Nm

Underbody panelling			Used in step 59
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Underbody protection, steering, to front axle support			Used in step 61
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support			Used in step 61
Hexagon bolt M6		Tightening torque	8 Nm

Underbody protection of the steering gear			Used in step 62
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

Wheel arch trim panel, front			Used in step 62
Thermoplastic hexagon screw		Tightening torque	2,6 Nm

Underbody protection front			Used in step 63
Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Cylinder head cover to cylinder head			Used in step 64
M6		Tightening torque.	8,5 Nm

Heat shield to exhaust manifold			Used in step 65
M6x12			10 Nm

Bracket on cylinder head cover			Used in step 66
		Tightening torque	5 Nm

Battery positive lead to battery positive terminal			Used in step 66
M8		Tightening torque	19 Nm

Differential pressure sensor of diesel particulate filter on cylinder head cover			Used in step 67
TS5x20		Tightening torque	4 Nm

Heat shield to exhaust manifold			Used in step 68
M6x12		Tightening torque	10 Nm

Banjo bolt for exhaust pressure pipe to exhaust manifold			Used in step 68
Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm

cardiagn.com

Exhaust gas pressure pipe to sensor system holder			Used in step 68
TS6x20		Tightening torque	5,7 Nm

Clamping claw facing to cylinder head cover			Used in step 69
M6		Tightening torque	10 Nm

Injector to cylinder head cover			Used in step 69
M8		Tightening torque	8 Nm
		Angle of rotation	120 °

Rail to cylinder head cover			Used in step 70
M8		Tightening torque	19 Nm

High pressure lines between high pressure pump and rail			Used in step 71
High-pressure pipe		Tightening torque	24.5 Nm

High pressure lines between injector and rail			Used in step 72
High-pressure pipe		Tightening torque	24.5 Nm

Intake plenum to cylinder head			Used in step 74
M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum			Used in step 74
		Tightening torque	10 Nm

Electric changeover valve to intake plenum			Used in step 74
TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold			Used in step 75
TS5x20		Tightening torque	3,6 Nm

Standard screw connection 4 Nm			Used in step 75
Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover			Used in step 75
TS5x20		Tightening torque	3,6 Nm

Battery positive lead on the starter motor generator			Used in step 75
M8		Tightening torque	19 Nm

Holder on intake plenum			Used in step 75
TS6X20		Tightening torque	5 Nm

Clean air pipe to exhaust turbocharger			Used in step 78
M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing			Used in step 78
Clamp		Tightening torque	3 Nm

Bulkhead lower part to body			Used in step 82
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead			Used in step 83
		Tightening torque	3 Nm

Tension strut on bulkhead			Used in step 83
M10x25 screw		Tightening torque	56 Nm

cardiagn.com

Tension strut to spring strut dome — Used in step 83

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm — Used in step 86

Combination hexagon nut		Tightening torque	35 Nm

Negative battery cable to 48-V battery — Used in step 88

Nut M8		Tightening torque	19 Nm

Overview of Special Tools

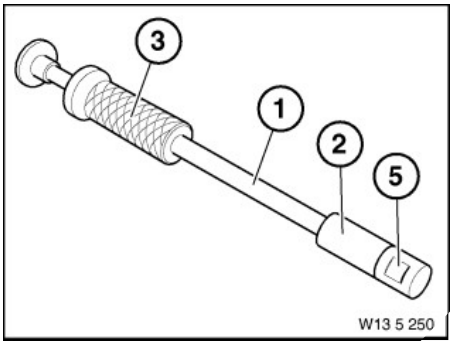
0 493 339 (13 5 252) Bush



Common — Used in step 24

Usage	(Threaded bush)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 321 (13 5 250) Puller



Common — Used in step 24

Usage	For removing injector nozzles or injectors from cylinder head
Included in the tool or work	
Storage location	A16
Replaced by	
In connection with	
SI-Number	01 06 98 (306)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 338 (13 5 251)		**Rod** (guide rod)	
2	0 493 339 (13 5 252)		**Bush** (Threaded bush)	
3	0 493 340 (13 5 253)		**Weight** (Weight)	
4	0 493 379 (13 5 254)		**Claw** (Clamping claw) For removal of injector nozzles / engine: M57	
5	0 495 579 (13 5 255)		**Adapter** For removing steering shaft on E85. Refer to SI 01 11 06 (265)	

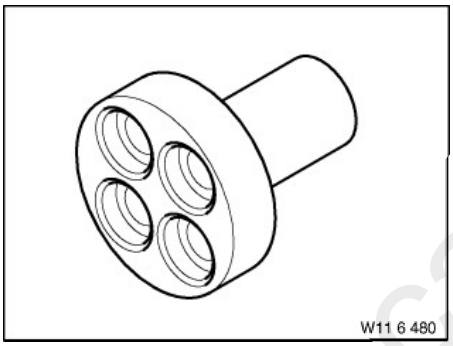
cardiagn.com

0 493 340 (13 5 253) Weight



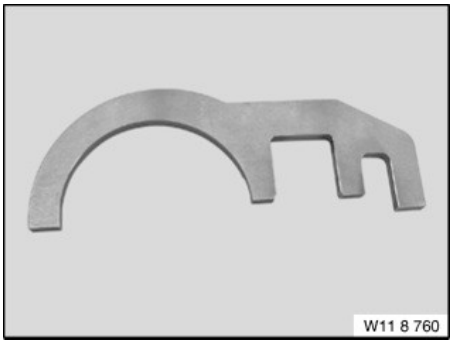
Common	Used in step 24
Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 380 (11 6 480) Connector



Common	Used in step 434647
Usage	For turning over engine at crankshaft hub (vibration absorber).
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	01 11 98 (338)

0 496 112 (11 8 760) Gauge



Common	Used in step 43454748
Usage	For securing camshaft at TDC.
Included in the tool or work	
Storage location	B24
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

cardiagn.com

2 365 488 Adapter



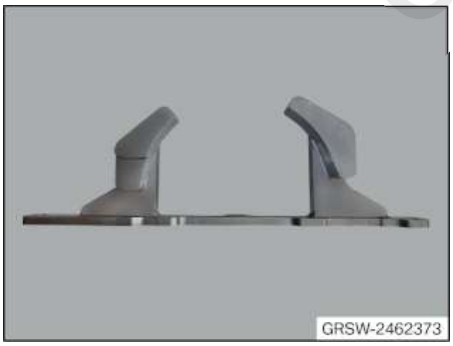
Common	Used in step 43444749
Usage	For disconnecting the crankshaft at the top dead centre. (longitudinal installation with automatic transmission only).
Included in the tool or work	
Storage location	C56
Replaced by	
In connection with	
SI-Number	01 46 14 (191)

2 288 380 Locating stud



Common	Used in step 43444749
Usage	For disconnecting the crankshaft at the top dead centre. Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).
Included in the tool or work	
Storage location	A56
Replaced by	
In connection with	
SI-Number	01 04 14 (071)

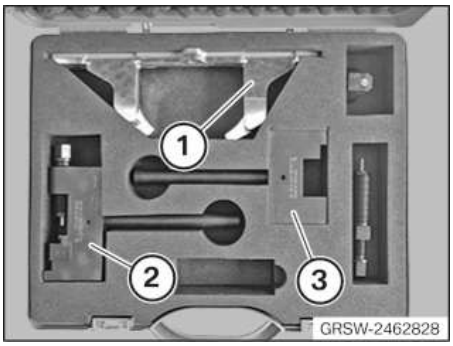
2 462 373 Holder



Common	Used in step 46
Usage	For the exchange of the top timing chain of the engine: B47 (Included in tool set 2462828).
Included in the tool or work	2 462 828
Storage location	Individual
Replaced by	
In connection with	83302462828
SI-Number	01 02 20 (711)

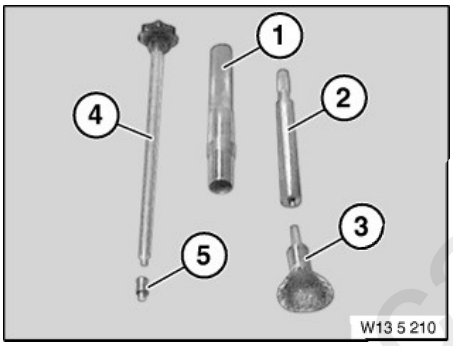
cardiagn.com

2 462 828 Riveting tool



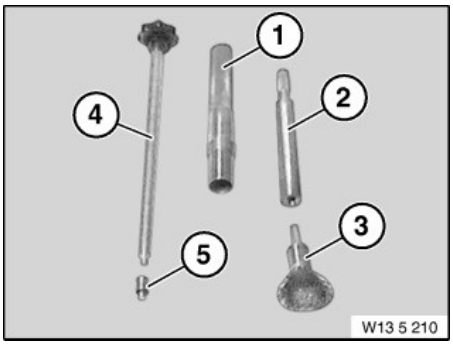
Common	Used in step 46
Usage	For opening and riveting the top timing chain at replacement. Consisting of: 2462373 Holder, 2354981 riveting tool for opening the timing chain 2354959, riveting tool for riveting the timing chain, replaces the riveting tool set 2354985
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 02 20 (711)

0 493 763 (13 5 215) Plug



Common	Used in step 69
Usage	(Seal plug)
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

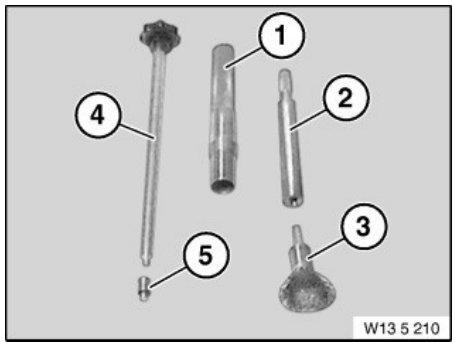
0 493 762 (13 5 214) Rod



Common	Used in step 69
Usage	(Mounting rod) For the seal plug
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

cardiagn.com

0 493 758 (13 5 210) Tool



Common

Used in step 69

Usage	(Cleaning set) For injector channels
Included in the tool or work	
Storage location	B4
Replaced by	
In connection with	
SI-Number	01 05 00 (574)

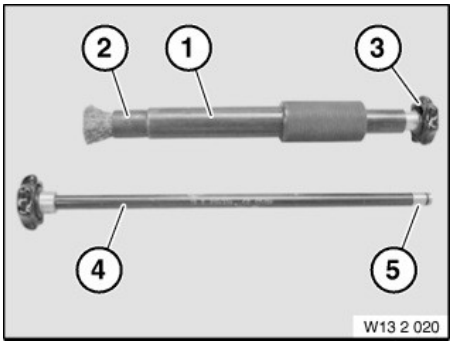
Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 759 (13 5 211)		**Holding sleeve** (Guide sleeve)	
2	0 493 760 (13 5 212)		**Holder** (Brush holder)	
3	0 493 761 (13 5 213)		**Brush head**	
4	0 493 762 (13 5 214)		**Rod** (Mounting rod) For the seal plug	
5	0 493 763 (13 5 215)		**Plug** (Seal plug)	

0 496 150 (13 2 020) Tool

Used in step 69

cardiagn.com



Common

Usage	(Cleaning kit) For cleaning the injector shaft.
Included in the tool or work	
Storage location	A87
Replaced by	
In connection with	
SI-Number	01 07 07 (355)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 496 151 (13 2 021)		**Holding sleeve** (Guide sleeve) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
2	0 496 152 (13 2 022)		**Holder** (Brush holder) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
3	0 496 153 (13 2 023)		**Brush head** Remaining inventories will be sold off, followed by discontinuation and then available as part of complete special tool 13 2 020 = 83 30 0 496 150 only	
4	0 496 154 (13 2 024)		**Rod** (Mounting rod) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
5	0 496 155 (13 2 025)		**Plug** (Seal plug) Available as part of complete special tool 13 2 020 = 83 30 0 496 150 only.	

Overview Technical Data

Distance from window pane edge to wiper blade — Used in step 86

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

Links

Repair instructions (PRE)	Used in step
Notes on 48-V battery	588

General repair instructions	Used in step
11 00 ... Overview of consumables (Electronic Parts Catalogue)	69

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	687
61 20 900 Disconnecting and connecting battery earth lead	687
61 20 900 Disconnecting and connecting battery earth lead	687
61 20 900 Disconnecting and connecting battery earth lead	687

cardiagn.com

61 20 900 Disconnecting and connecting battery earth lead	687
61 20 900 Disconnecting and connecting battery earth lead	687
61 20 900 Disconnecting and connecting battery earth lead	687
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	687
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	687
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	687
61 20 900 Disconnecting and connecting battery earth lead	687
61 20 900 Disconnecting and connecting battery earth lead	687
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	687
61 20 900 Disconnecting and connecting battery earth lead	687
61 20 900 Disconnecting and connecting battery earth lead	687
61 20 900 Disconnecting and connecting battery earth lead	687
61 20 900 Disconnecting and connecting battery earth lead	687
61 20 900 Disconnecting and connecting battery earth lead	687
61 20 900 Disconnecting and connecting battery earth lead	687
61 20 900 Disconnecting and connecting battery earth lead	687
61 20 900 Disconnecting and connecting battery earth lead	687
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	687
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	687
61 20 900 Disconnecting and connecting battery earth lead	687
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	687
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	687
61 20 900 Disconnecting and connecting battery earth lead

11 31 567 Replacing open timing chain, top

PRELIMINARY WORK

1 – If necessary: Checking the timing chain at the top for elongation using the diagnosis system



- Connect the battery charger to the vehicle.
- Connect the diagnostic system to the vehicle.
- **Read fault memory of DDE control unit.**
  - Vehicle handling
  - Troubleshooting
  - Function structure
  - Power train
  - Digital Diesel Electronics

2 – Bring front compartment lid in the service position

Prerequisite

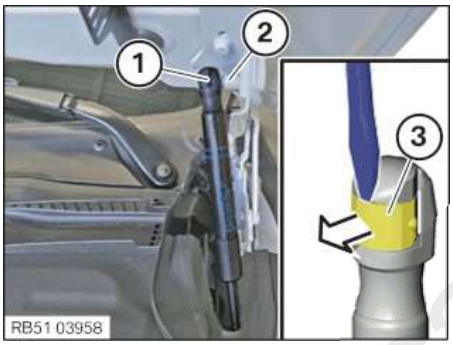
Engine compartment lid is open.

CAUTION

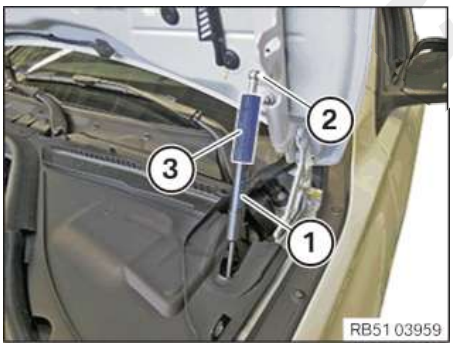
Shutting bonnet or tailgate.

Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.



- Lift clamp (3) slightly using a screwdriver, in the direction of the arrow.
- Lift off ball socket (1) from ball pin (2).
- Repeat the operation on the other side of vehicle.



TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

- Remove the bonnet support and open the bonnet further.
- Pull special tool or or (3) over gas pressure spring (1).
- Place special tool on the ball pin (2) and engage using force.
- Repeat the operation on the other side of vehicle.

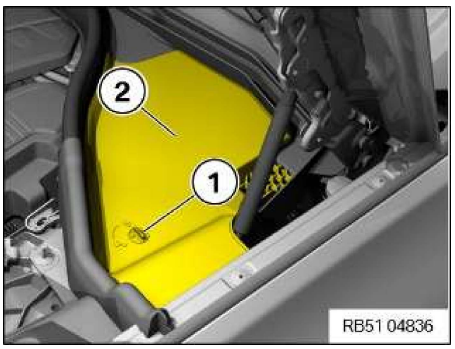
3 – Disconnecting all battery earth leads



- See additional information.

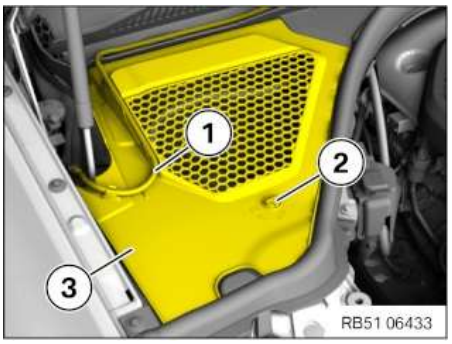
cardiagn.com

4 – Remove the cover of the engine compartment at the rear left



- Loosen the lock (1).
- Remove the cover (2) of the rear left engine compartment.

5 – Remove the cover of the rear right engine compartment



- Release washer fluid hose (1) from the guides.
- Loosen the lock (2).
- Remove the cover (3) of the rear right engine compartment.

6 – Removing the wiper arm on the left and right

NOTICE

Description is for left component only. Procedure on the right side is identical.

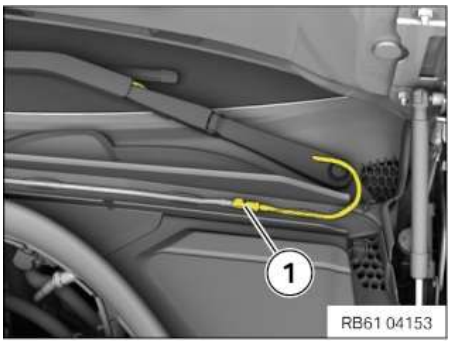
▸ **Remove the wiper arm**

RISK OF DAMAGE

Damage to wiper console.

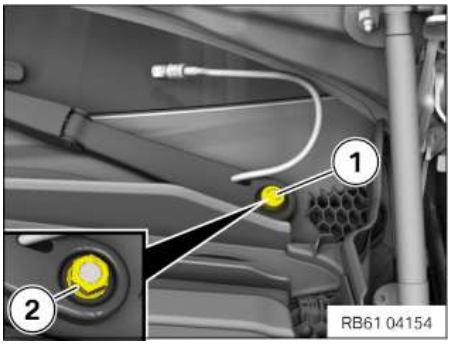
While removing the wiper arms without using special tool, the wiper console can break.

- Removing the wiper arms must be carried out only using the prescribed special tool.
- Do **not** lever off the wiper arm because otherwise the wiper console may break at the predetermined breaking point for active pedestrian protection.

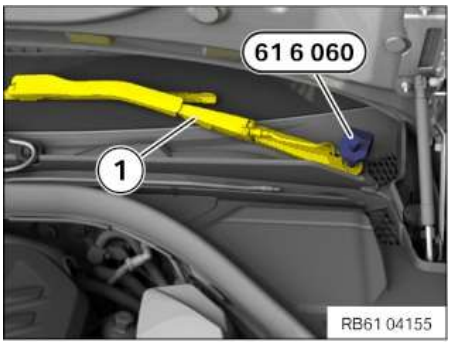


- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.

cardiagn.com

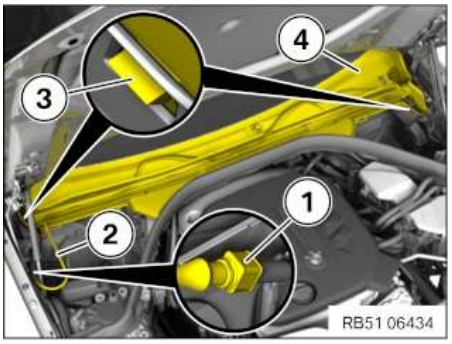


- Remove the protective cap (1).
- Loosen nut (2).

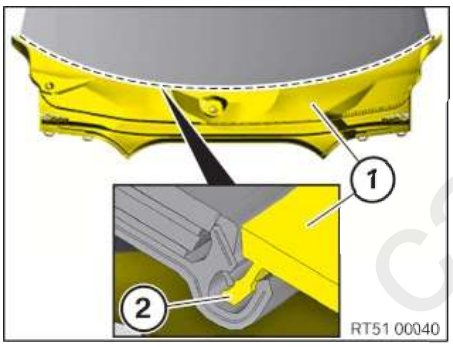


- Pull off the wiper arm (1) using special tool .

7 – Remove cowl panel cover



- Release snap fastener (1) of the washer fluid hose (2) and put the washer fluid hose (2) to one side.
- Unclip clips (3) on the cowl panel cover (4).



- Pull the cowl panel cover (1) upward out of the latch mechanism (2) beginning on the side.

8 – Remove the seal for the rear bonnet



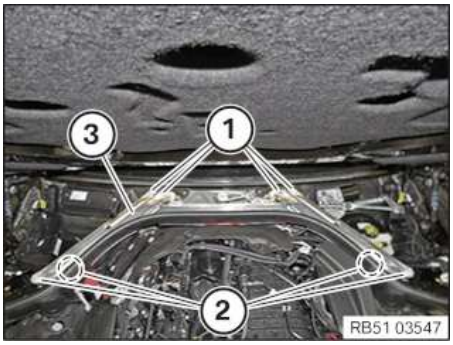
- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

9 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

Driving without the strut brace/front-end strut or tension strut is not permitted.

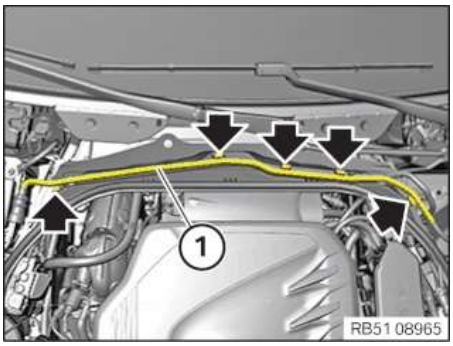
cardiagn.com



NOTICE

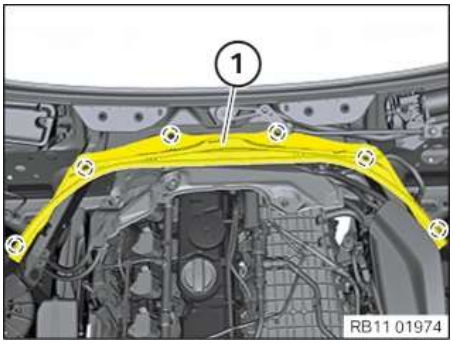
The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.



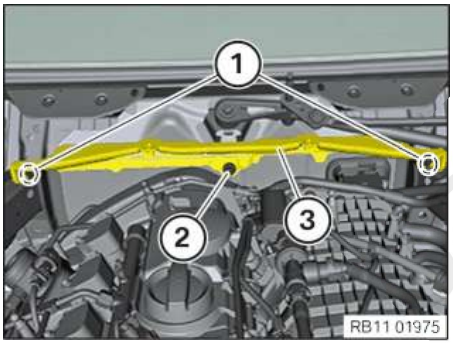
- **Version with mild hybrid technology:**

  Unclip the wire (1) at the holders (arrows).



- Unscrew the bolts in the marked areas.
- Remove the centre bulkhead upper part (1).

10 – Removing the centre bulkhead lower section



- Loosen screws (1).
- Loosen nut (2).
- Remove the centre bulkhead lower part (3).

11 – Removing the acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

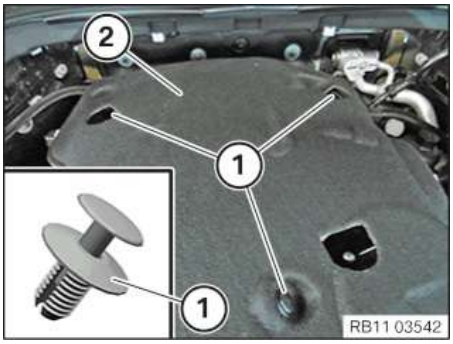
Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



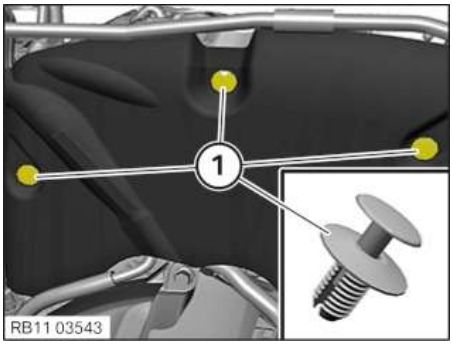
- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

12 – Remove the acoustic cover for the injectors

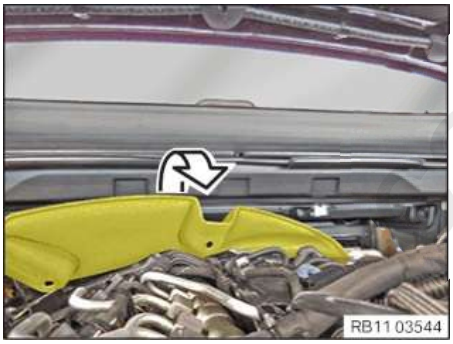


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

13 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).



- Guide out and remove the acoustic cover in the direction of the arrow.

14 – Removing the clean air pipe with the resonator

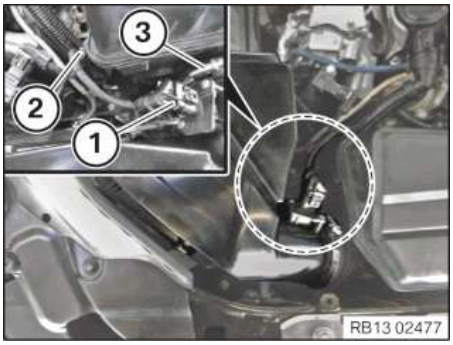
WARNING

Hot surfaces.

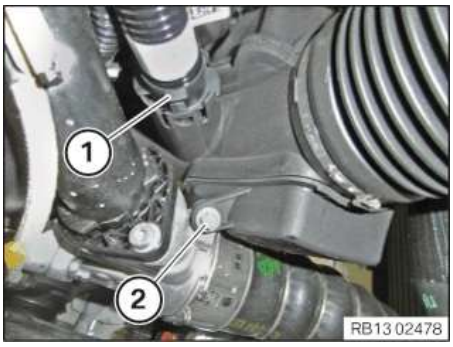
Risk of burning!

- Perform all work only on components that have cooled down.

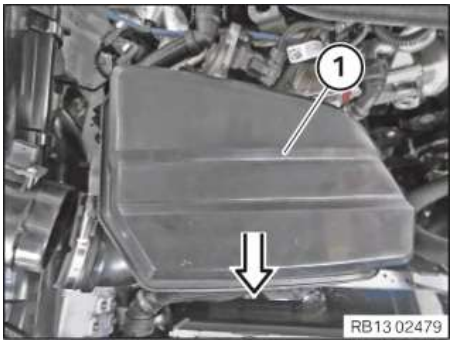
ardiagn.com



- Unlock plug connection (1) and disconnect.
- Loosen clamp (2).
- Unfasten clamp (3).
- Separate the clean air pipe with resonator from the intake filter housing.



- Unlock engine ventilation line (1), disconnect it and place it aside.
- Loosen screw (2).



- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Unlock and loosen clamp (1).



- Feed out and remove clean air pipe with resonator (1) in the direction of the arrow.

15 – Remove acoustic cover of the front engine

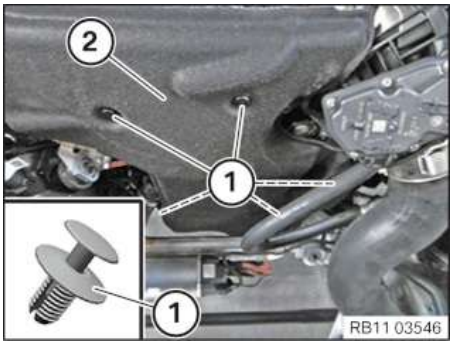
WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

cardiagn.com



- Release and remove expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

16 – Partially releasing the wiring harness section on the intake plenum

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

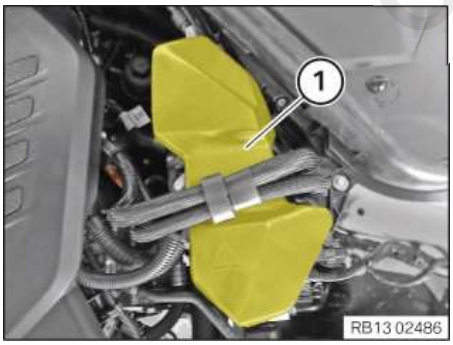
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

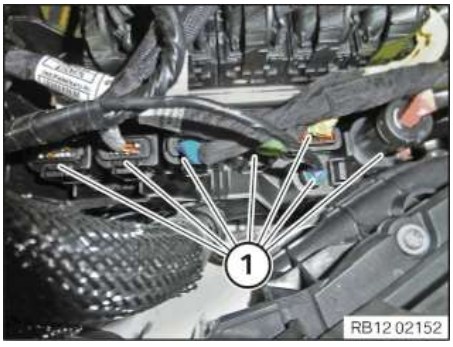
- Do not pull on the wires when disconnecting connectors and plug connections.

TECHNICAL INFORMATION

Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.

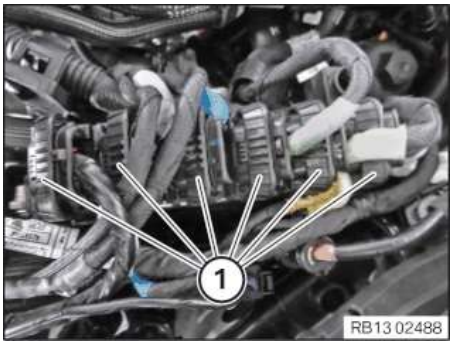


- Pull off cover (1) upwards, feed out and remove.

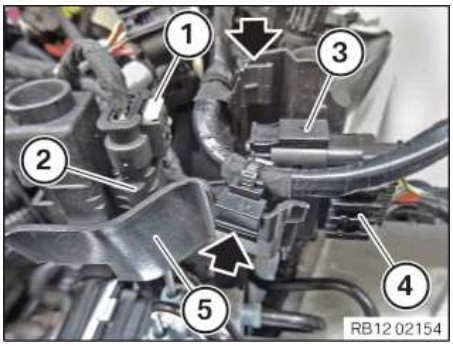


- Unlock and disconnect plug connections (1).

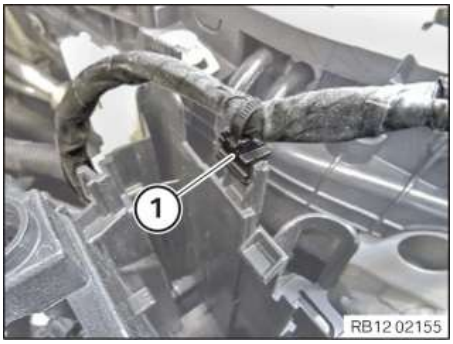
cardiagn.com



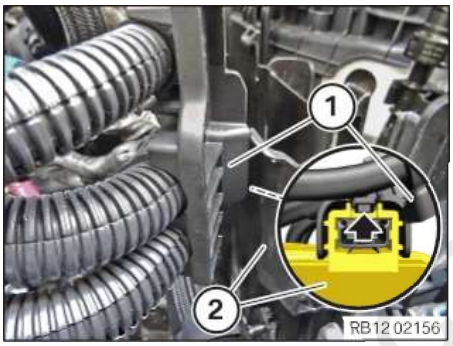
- Unlock and disconnect plug connections (1).



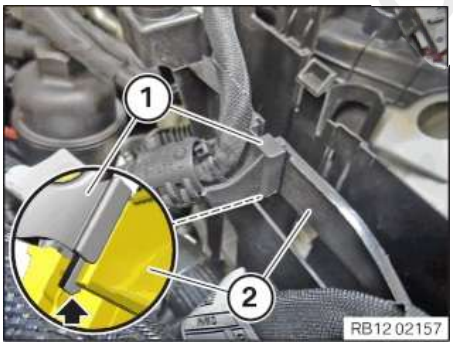
- Unlock plug connection (1) and disconnect.
- Unlock the plug (2) and disconnect from the control unit holder (5).
- Unlock plug connection (3) and disconnect.
- Unlock the plug (4) and disconnect from the control unit holder (5).
- Release the clamps (arrows).



- Loosen clamp (1).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).

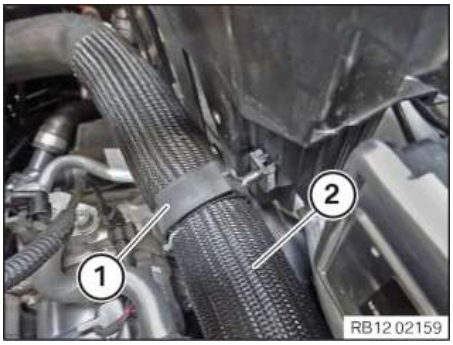


- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).

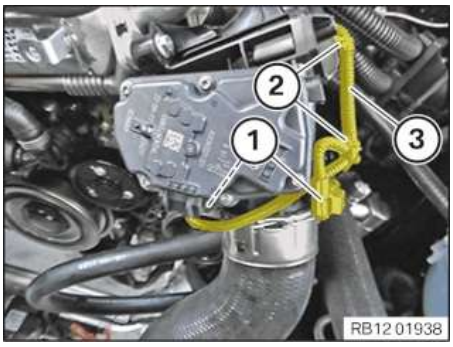


- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.

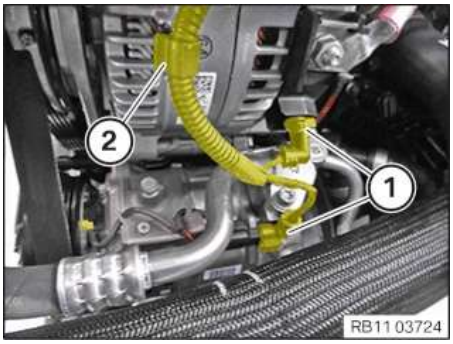
gardiagn.com



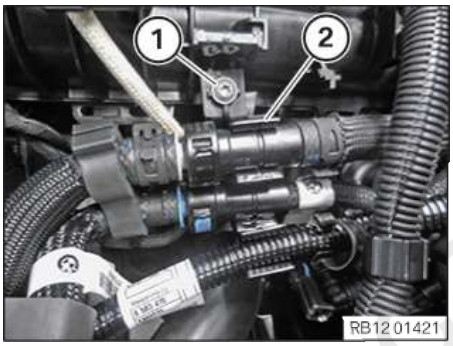
- Unlock holder (1) and feed out coolant line (2) and place it aside.



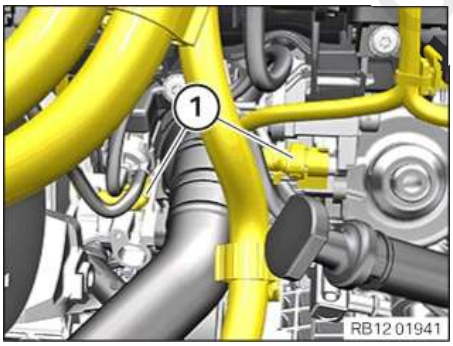
- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.



- Unlock and separate plug connections (1).
- Release the holder (2) from the alternator .



- Loosen screw (1).
- Thread out holder (2) and set aside.



- Unlock and disconnect plug connections (1).

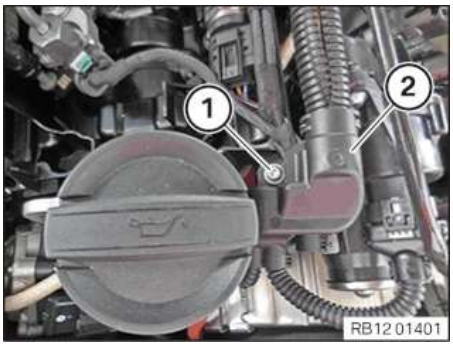


- Unlock and loosen connector (1).

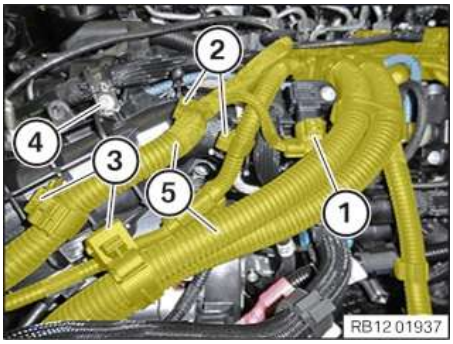
cardiagn.com



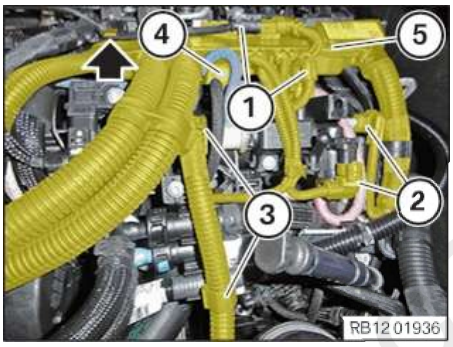
- Unlock plug connection (1) and disconnect.



- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.



- Unlock plug connection (1) and disconnect.
- Loosen clamps (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.



- Unlock and disconnect plug connections (1).
- Release line from clamp (Arrow).
- Unlock and disconnect plug connections (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.

17 – Removing the intake plenum

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

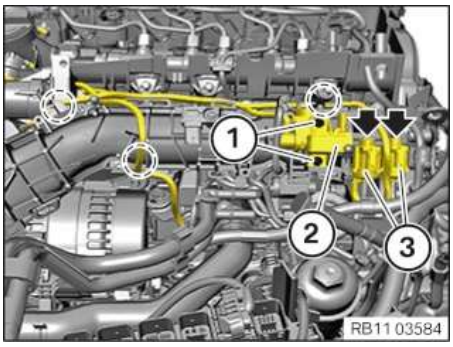


- Unlock clamp (1) and engage in this position.

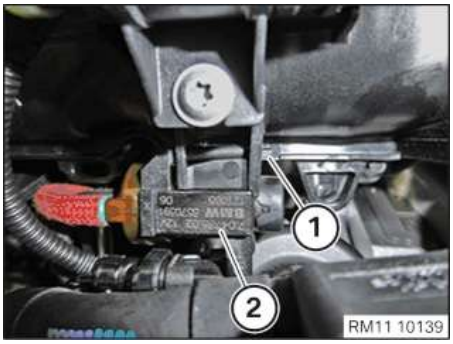
cardiagn.com



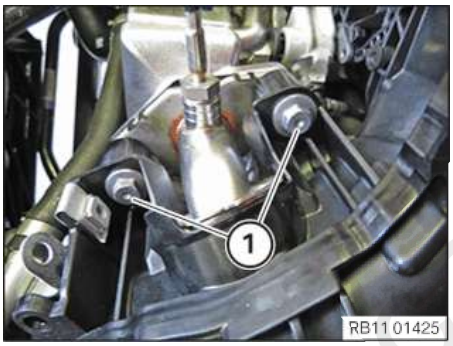
- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.



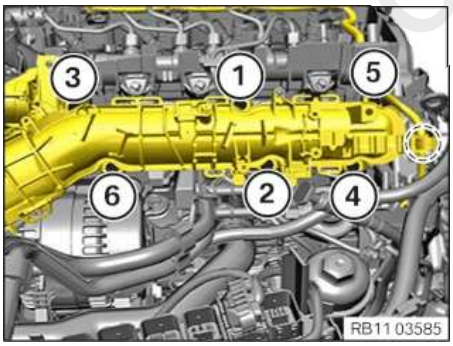
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



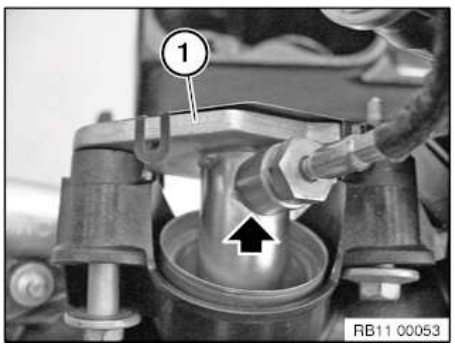
- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.



- Loosen screws (1).



- Detach the leakage oil lines in the marked area from the intake plenum.
- Loosen screws in the order (6) to (1).
- Guide the intake plenum out forwards and remove it.



- Remove the exhaust-gas recirculation pipe (1) (arrow).

gardiagn.com

18 – Detaching the leakage oil line from the injectors

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

WARNING

Hot surfaces.

Risk of burning!

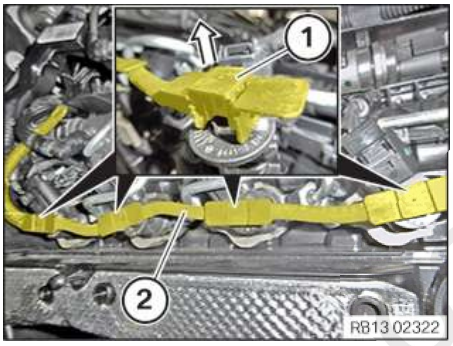
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

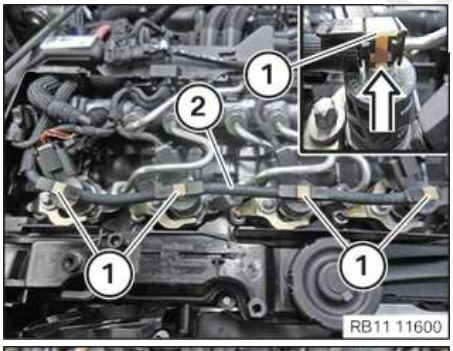


- **Version A:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.

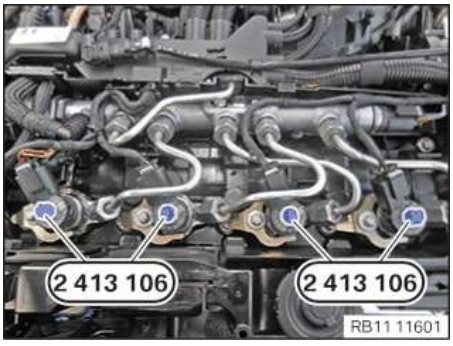


- **Version B:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.



- Seal open connections with special tools .

cardiagn.com

19 – Remove the high pressure lines between the injector and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

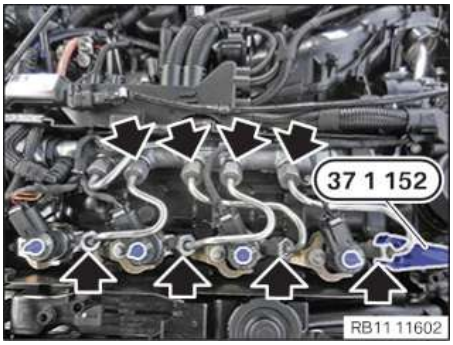
TECHNICAL INFORMATION

If several high pressure lines are removed, ensure that each high pressure line is installed in its original location. Label high pressure lines.

TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.

cardiagn.com



- Release the high pressure lines (arrows) with the special tool .
  Reset the special tool early on to prevent bending of the high pressure line.
- Catch and dispose of escaping fuel.
- Feed out and remove the high pressure lines (arrows).
- Seal off all the open cable connections with the special tool .

20 – Remove the high pressure line between the high pressure pump and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Hot fluids.

Risk of scalding!

- Conduct all work in the vehicle wearing appropriate personal protective equipment only.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

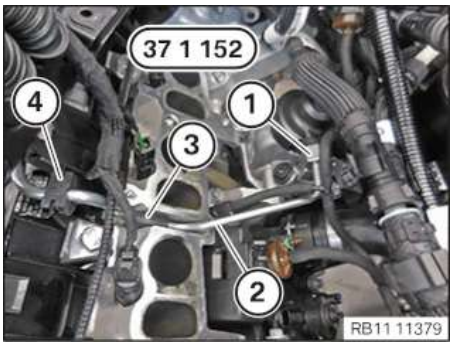
TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.

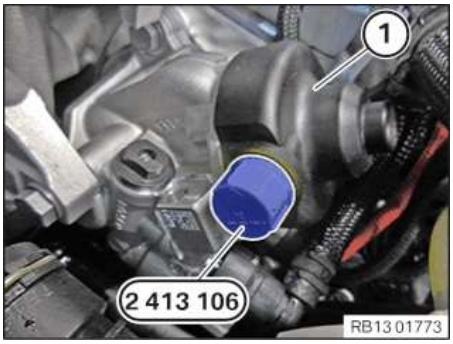
cardiagn.com



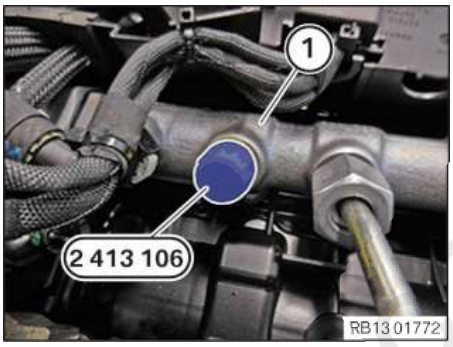
- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.



- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.
- Guide out and remove the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).



- Seal off the opening at the high pressure pump (1) with the special tool .



- Seal off the opening on the rail (1) with the special tool .

21 – Remove high-pressure rail

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

cardiagn.com

RISK OF DAMAGE

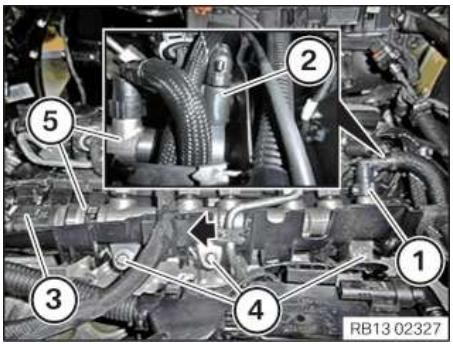
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Unlock and disconnect the fuel return line (1).
- Guide the fuel return line (1) out and set it aside.
- Unlock and disconnect the plug connection (2) on the rail pressure regulating valve.
- Unlock and disconnect the plug connection (3) on the rail pressure sensor.
- Unlock cable clip (Arrow), feed out and place aside.
- Loosen screws (4).
- Thread out and remove the rail (5).

22 – Remove all injection systems

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

cardiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

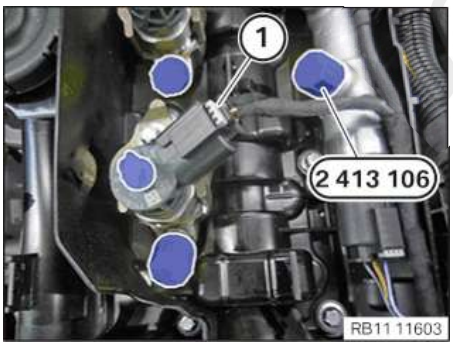
Electrostatic discharge.

Damage to or destruction of electrical components.

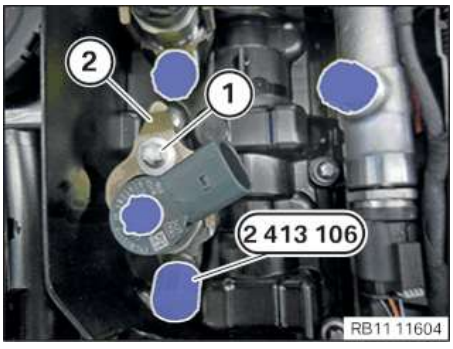
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

TECHNICAL INFORMATION

If several injectors are removed, ensure that each injector is installed at its original location (cylinder). Mark injectors.



- Unlock plug connection (1) and disconnect.



- Loosen screw (1).
- Guide out and remove clamping claw (2).
- Feed out and remove the injector with slight rotational movements.

▸ **Loosen stuck injectors**

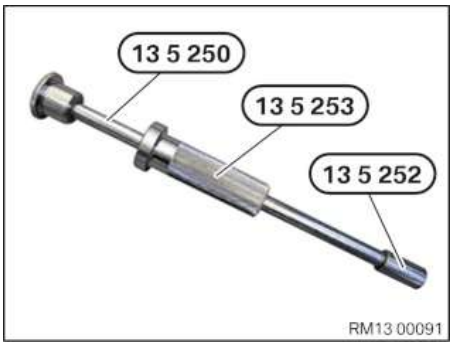
carsdiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

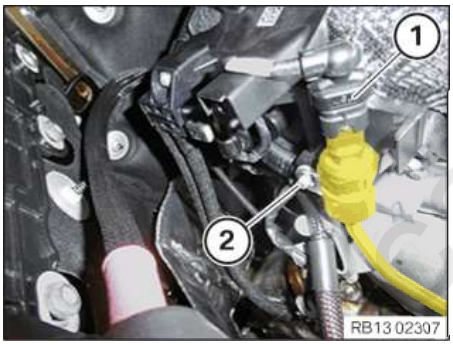


- Unscrew special tool 0 493 339 (13 5 252) from special tool 0 493 321 (13 5 250) and remove special tool 0 493 340 (13 5 253).
- Screw special tool 0 493 339 (13 5 252) back onto special tool 0 493 321 (13 5 250).

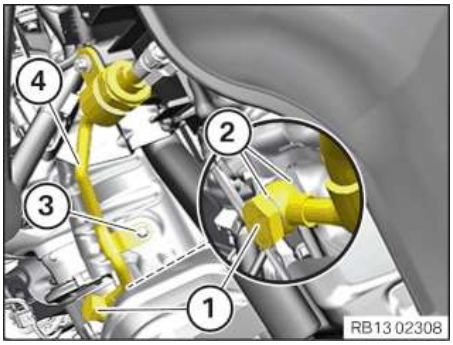


- Screw special tool 0 493 321 (13 5 250) with special tool 0 493 339 (13 5 252) onto pressure line connection (1) of injector.
- Release injector (1) with special tools 0 493 321 (13 5 250) and 0 493 339 (13 5 252) by means of **short** back and forth movements and remove.

23 – Remove the exhaust gas pressure pipe



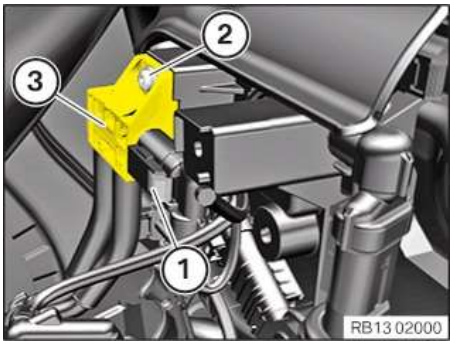
- Unlock plug connection (1) and disconnect.
- Loosen screw (2).



- Unscrew the banjo bolt (1).
- Feed out and remove the sealing rings (2).
- Loosen screw (3).
- Feed out and remove the exhaust gas pressure pipe (4).

24 – Releasing the differential pressure sensor for the diesel particulate filter

cardiagn.com



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).
- Remove the differential pressure sensor (3) and put it to one side.

25 – Removing the sensor bracket on the cylinder head cover

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

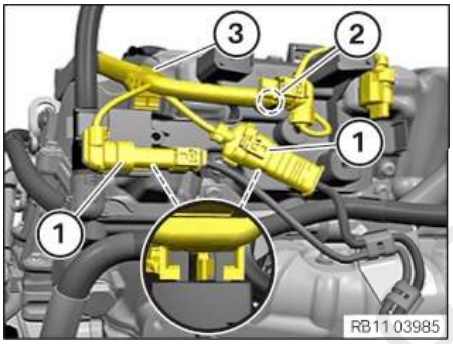
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

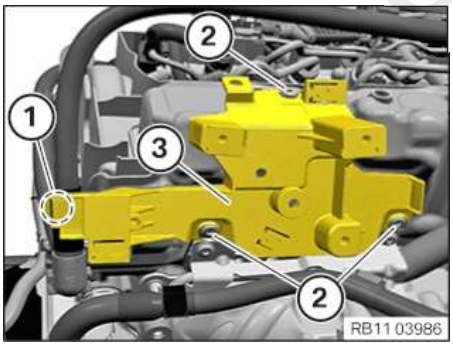
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Unlock plug connection (1) and disconnect.
- Unlock the plug connection (1) and release it from the sensor bracket.
- Release the cable clip in the area (2) from the sensor bracket.
- Release the clamps (3) and set the wiring harness section aside.

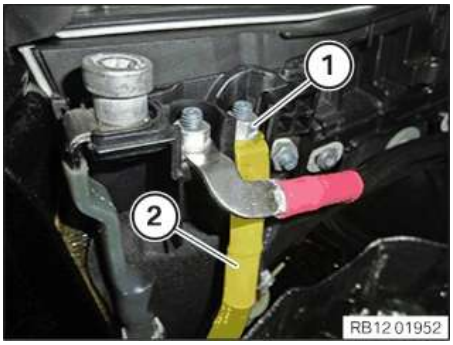


- Release the positive battery cable in the area (1) from the clamp and set it aside.
- Loosen screws (2).
- Feed out holder (3) for the sensor system and remove.

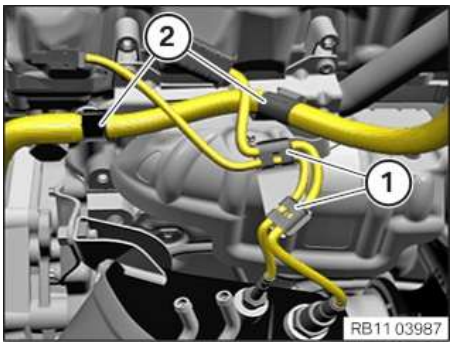


- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.

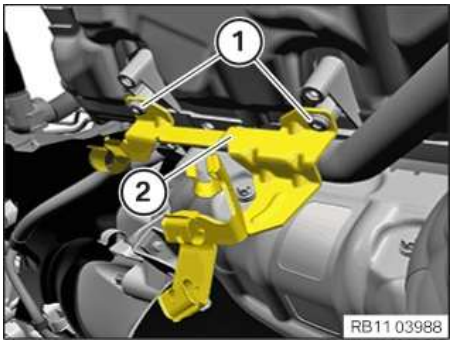
cardiagn.com



- Loosen nut (1).
- Feed out positive battery cable (2) and put to one side.

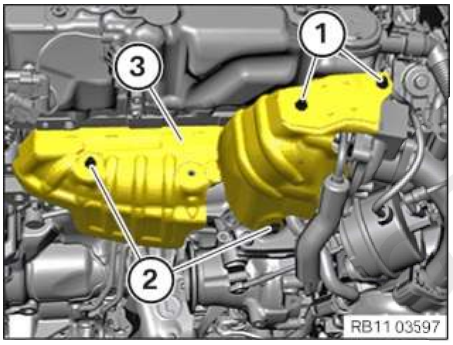


- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



- Loosen screws (1).
- Guide out and remove holder (2).

26 – Removing heat shield

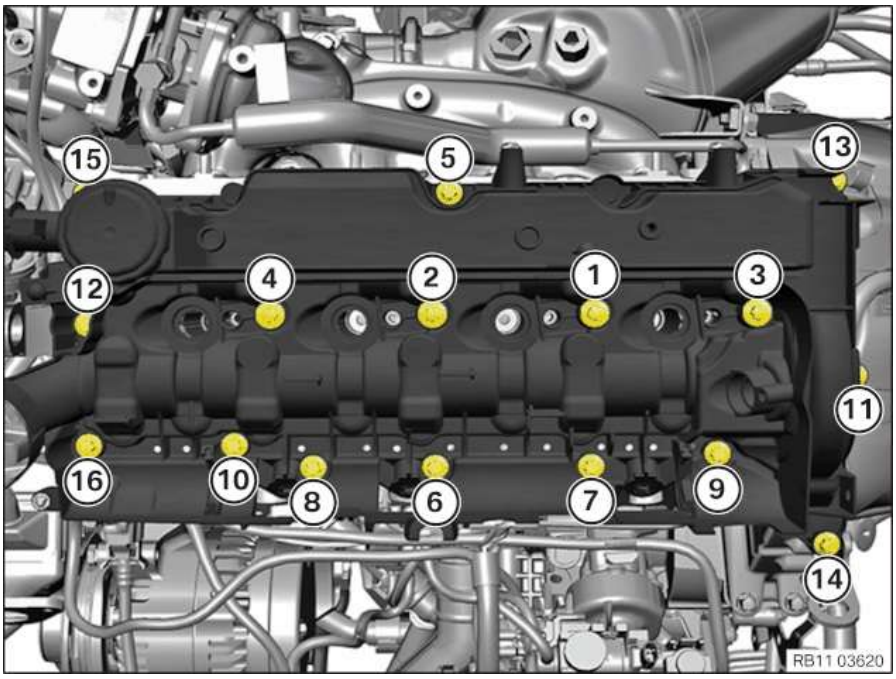


- Loosen screws (1).
- Loosen screws (2).
- Feed out and remove the heat shield (3).

27 – Removing the cylinder head cover

carmanuals.com

Screw connection of the cylinder head cover



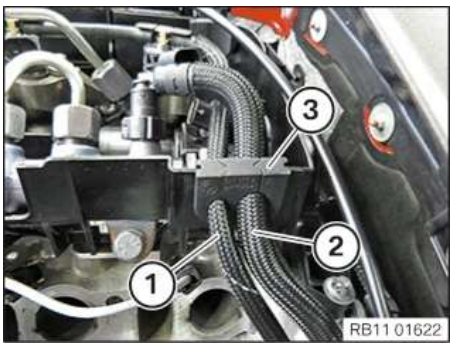
1 - 16 Bolts of the cylinder head cover



- Unlock and detach the locks.
- Feed the engine ventilation line (1) out and set it aside.

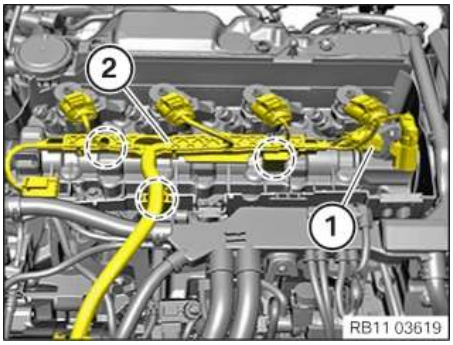


- Feed out and remove the heat shield (1).

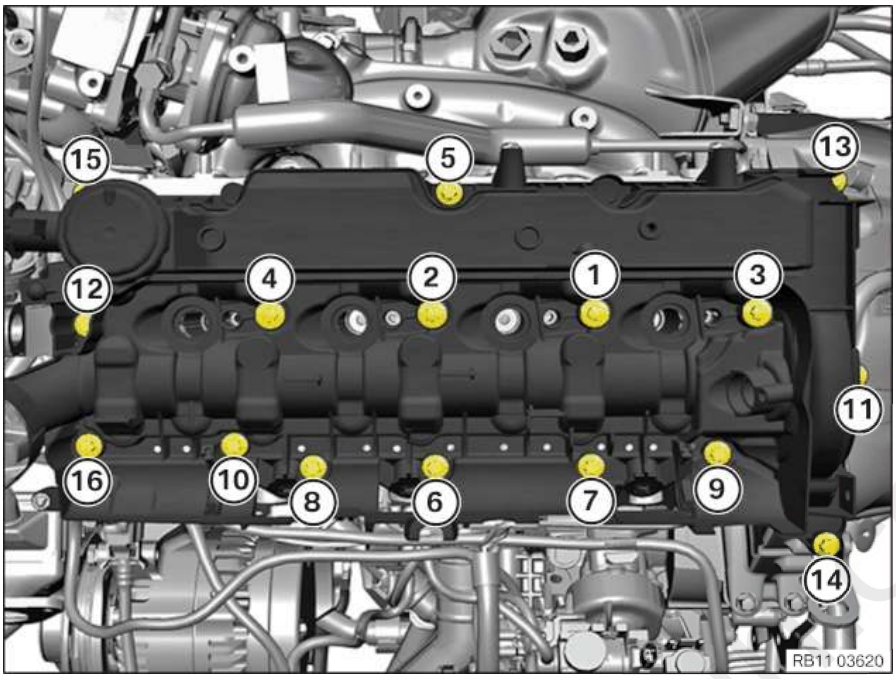


- Remove the leakage oil line (1) including the fuel return line (2) and the grommet (3) and put to one side.

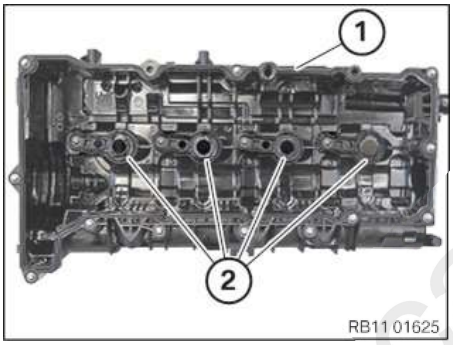
cardiagn.com



- Unlock connector (1) and pull off.
- Disconnect the wiring harness (2) in the marked areas from the cylinder head cover and set aside.

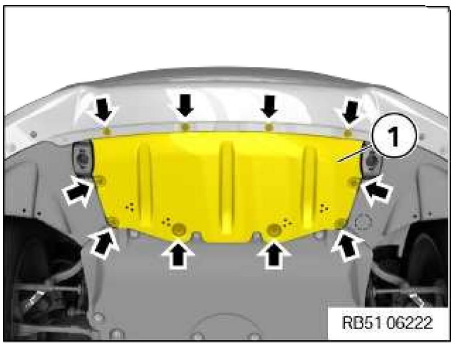


- Evenly loosen the screws in a sequence from (16) to (1).
- Feed out and remove the cylinder head cover.



- Remove the profile seals (1) and (2).

28 – Removing the front underbody protection

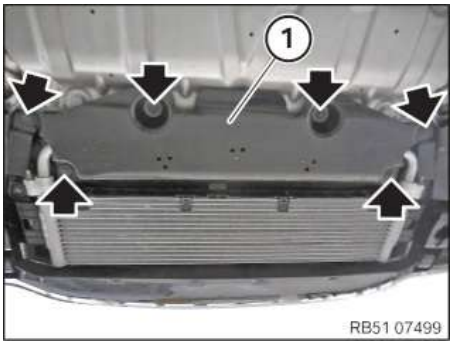


- **Version A:**

  Remove screws (arrows).

  Feed front underbody protection (1) backwards out of the bumper panel.

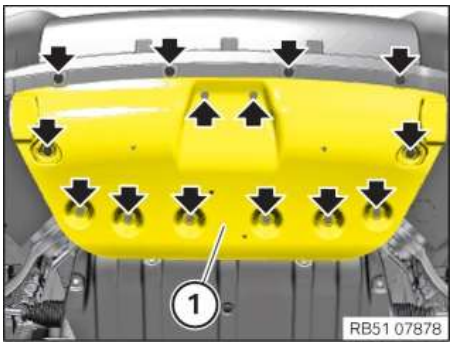
cardiag.com



- **Version B:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

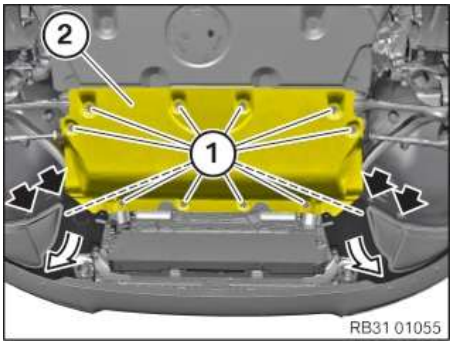


- **Version C:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

29 – Remove the underbody protection of the steering gear



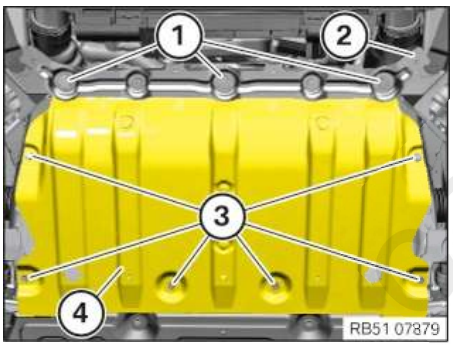
- **Version A:**

  Unscrew the screws (arrows) of the wheel arch cover on the wheel arch cover.

  Fold the bottom wheel arch cover to the side.

  Loosen screws (1).

  Remove the underbody protection (2) of the steering gear.



- **Version B:**

  Loosen screws (1).

  Remove the holder (2) for the underride protection.

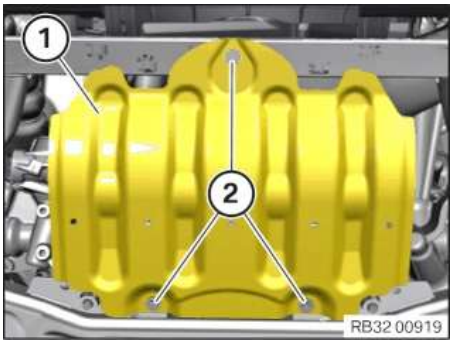
  Loosen screws (3).

  Feed out and remove the underbody protection (4) of the steering gear.

30 – If installed: Removing the steering underbody protection

Prerequisite

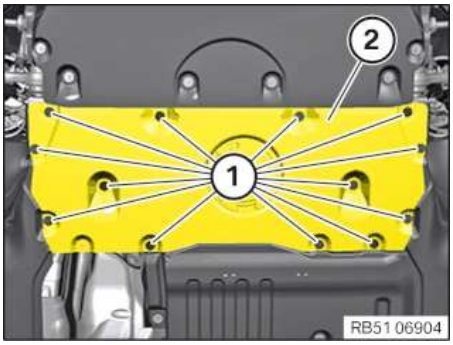
Front underbody protection has been removed.



- Loosen screws (2).
- Remove underbody protection (1).

31 – Removing the centre underbody protection

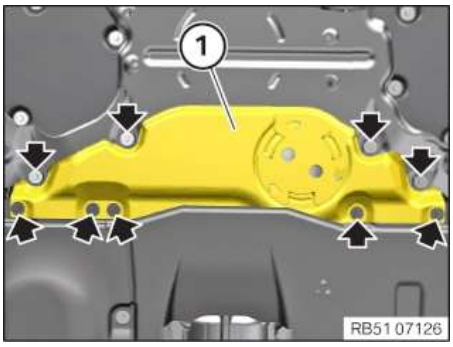
carmagn.com



- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .

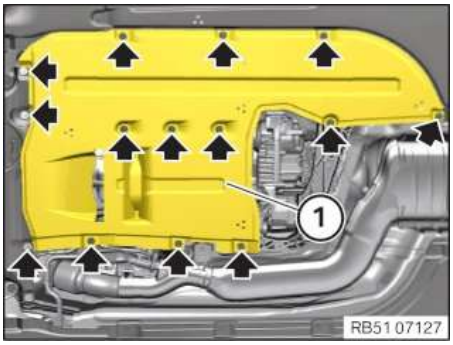


- **Version with all-wheel drive:**

  Remove screws (arrows).

  Feed out and remove the centre underbody protection (1).

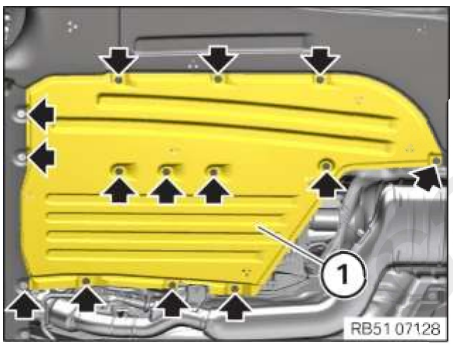
32 – Remove rear underbody protection



- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).



- **Version B:**

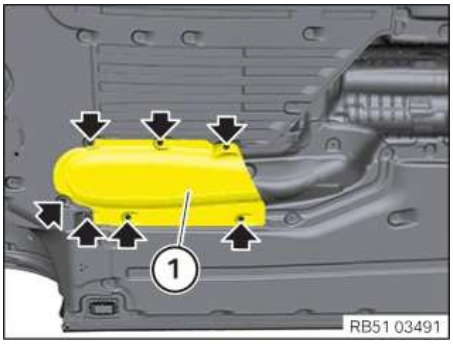
  Remove screws (arrows).

  Guide out rear underbody protection (1) and remove it.

33 – Remove the underbody panelling of the transmission on the side

NOTICE

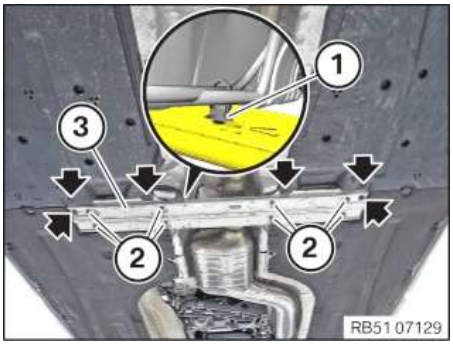
The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.



- Remove screws (arrows).
- Remove the underbody panelling (1).

34 – Remove the connecting support from the tunnel

cardiagn.com



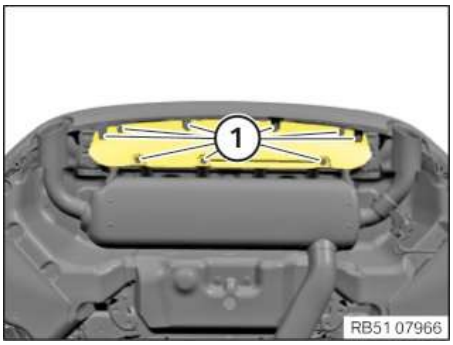
- Remove screws (arrows).

NOTICE

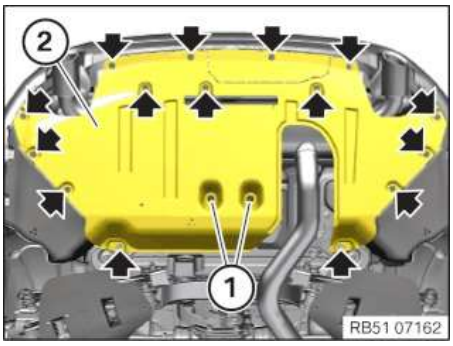
The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Loosen clamp (1).
- Loosen screws (2).
- Guide out and remove connecting support (3) on the tunnel.

35 – Removing the rear diffuser



- **Version 1:**
- Release the screws and nuts (1).
- Remove the diffuser.



- **Version 2:**
- Loosen nuts (1).
- Remove screws (arrows).
- Guide out and remove rear diffuser (2).

36 – Remove exhaust system

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

CAUTION

Component with heavy weight.

Danger of injury!

- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

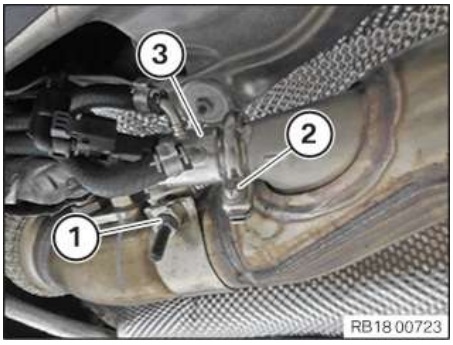
cardiagn.com

CAUTION

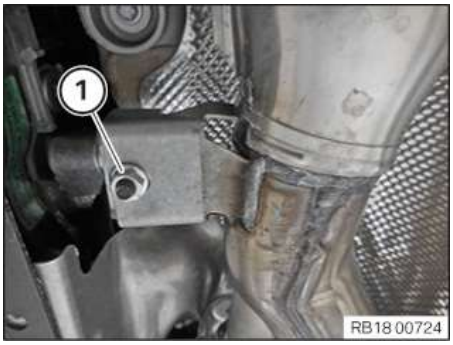
Heavy component.

Heavy components can lead to injury or damage.

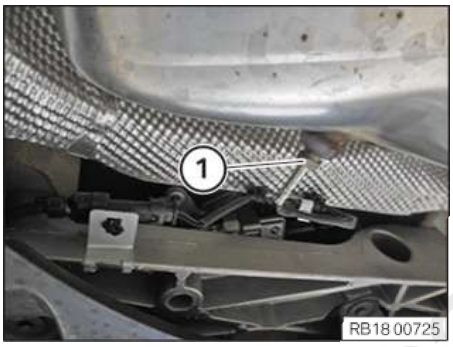
- Remove and install heavy components with the aid of another person/other persons.



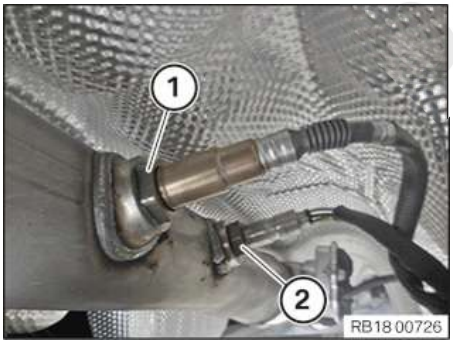
- Unfasten clamp (1).
- Detach the clamp (2) of the SCR metering module (3).
- Detach the SCR metering module (3)from the exhaust system and place to one side.



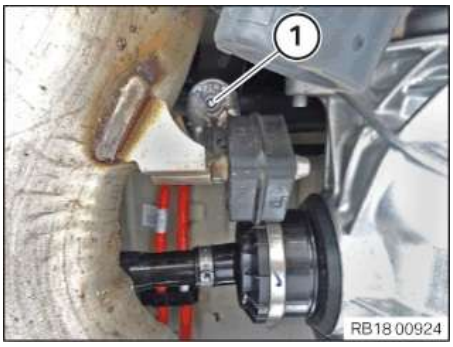
- Loosen nut (1).



- Detach the exhaust temperature sensor (1) from the exhaust system.

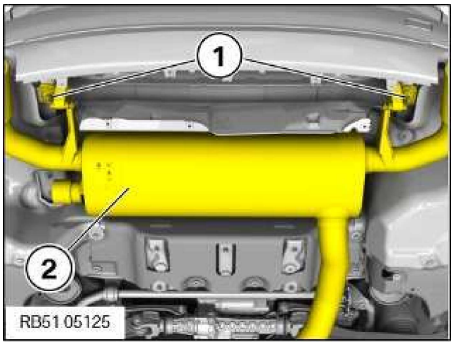


- Release the diesel particulate sensor (1) from the exhaust system and place to one side.
- Release the nitrogen oxide sensor (2) from the exhaust system and place to one side.



- Release the nut (1) on the rear axle support.

ardiagn.com



- Loosen nuts (1).
- Lower and remove the exhaust system (2) with the assistance of a second person.

37 – Removing the monitoring oxygen sensor after the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

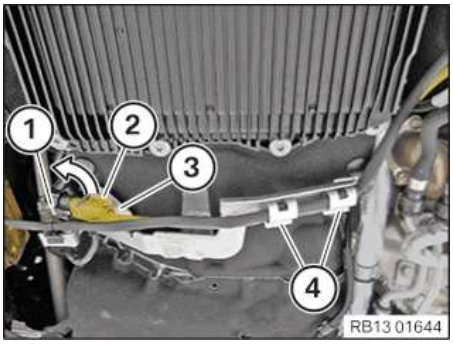
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

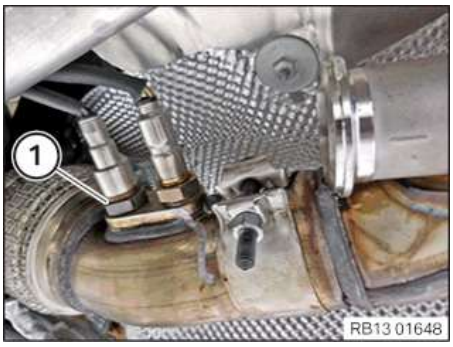


- Unlock and loosen connector (1).
- Loosen connector (2) from the holder (3) in direction of arrow.
- Release the monitoring oxygen sensor from the clamps (4).

cardiagn.com



- Release the monitoring oxygen sensor (1) with the standard tools.



- Thread out the monitoring oxygen sensor (1) and remove it.

38 – Removing the nitrogen oxide sensor before SCR catalytic converter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

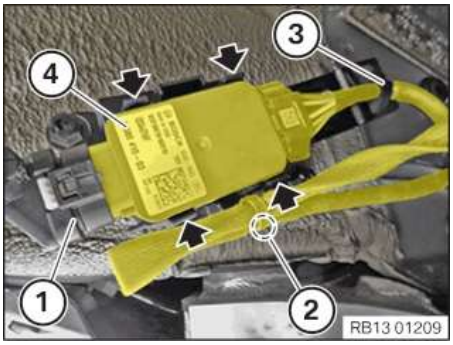
RISK OF DAMAGE

Damage to the nitrogen oxide sensor.

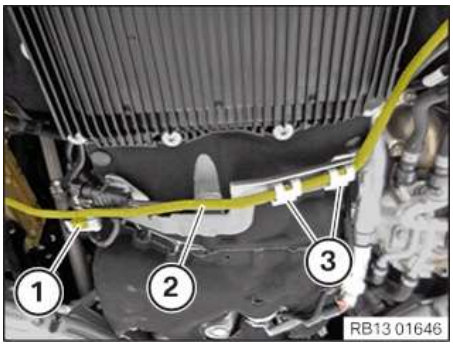
Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

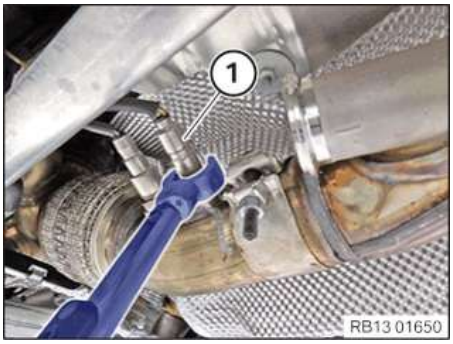
cardiagn.com



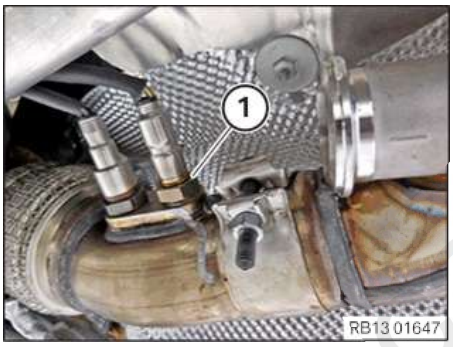
- Unlock plug connection (1) and disconnect.
- Release cable clip in area (2).
- Release line from the holder (3).
- Unclip control unit (4).



- Loosen clamp (1).
- Loosen the cables (2) from the clamps (3).



- Loosen the nitrogen oxide sensor (1) using commercially available tools.



- Feed out and remove the nitrogen oxide sensor (1).

39 – Removing the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

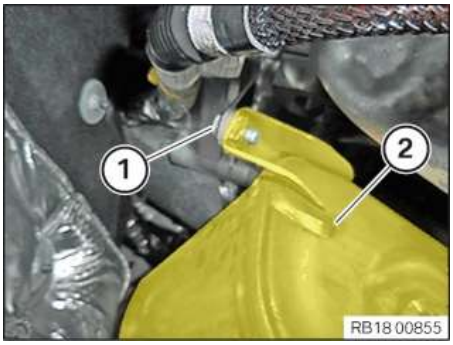
CAUTION

Heavy component.

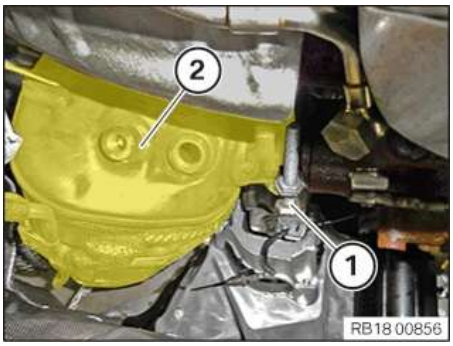
Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

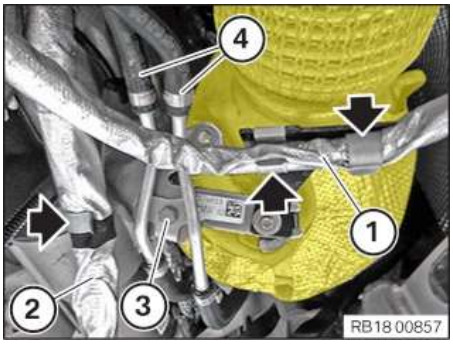
cardiagn.com



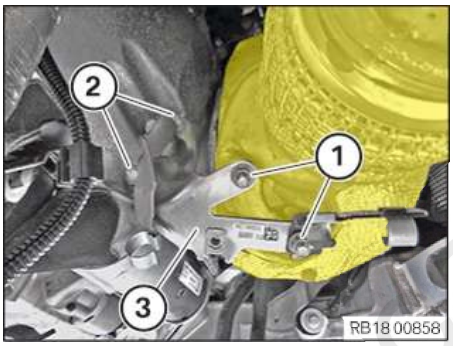
- Release bolt (1) from the holder of diesel particulate filter (2).



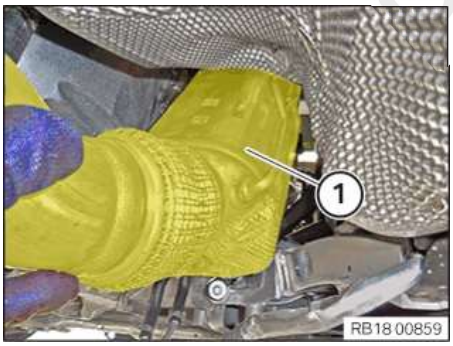
- Loosen V-band clamp (1).
- Feed V-clip (1) out from diesel particulate filter (2) and remove.



- Release the metering line (1) from clamps (Arrows).
- Release positive battery cable (2) from starter motor from clamp (Arrow).
- Loosen screw (3).
- Thread off coolant line (4) and place to the side.



- Loosen nuts (1).
- Loosen screws (2).
- Guide out and remove holder (3).



- Guide out and remove diesel particulate filter (1).

40 – Removing starter motor

Prerequisite

Battery earth leads are disconnected.

cardiagn.com

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

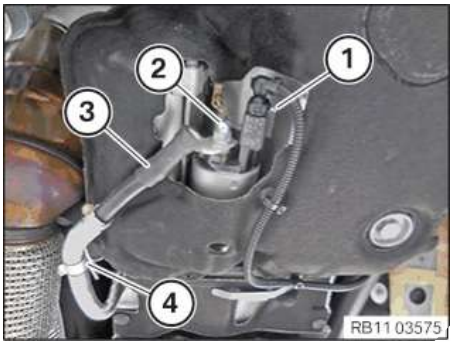
Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

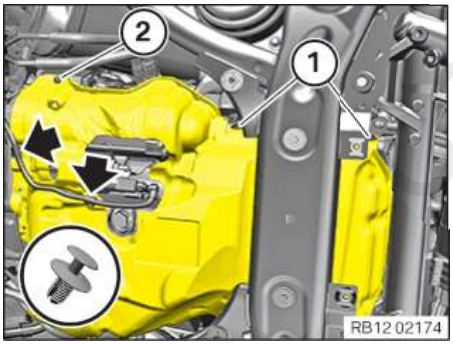
- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

TECHNICAL INFORMATION

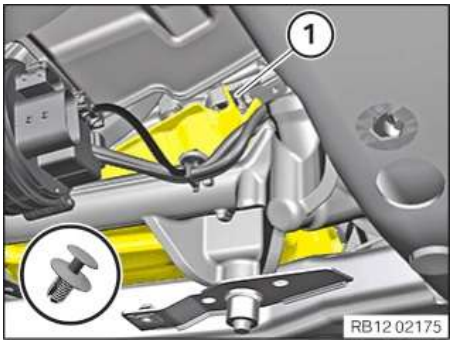
Make sure that the acoustic cover is **not** damaged while removing the starter motor.
A damaged lower acoustic cover can only be renewed when the front axle is lowered.



- Unlock plug connection (1) and disconnect.
- Release nut (2).
- Release positive battery cable (3) from holder (4).

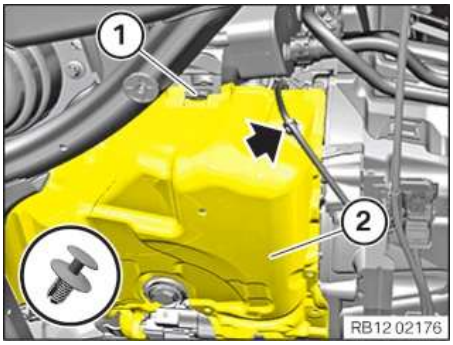


- Loosen the expanding rivet (1).
- Undo fir tree clip (2).
- Release the clamps (arrows).

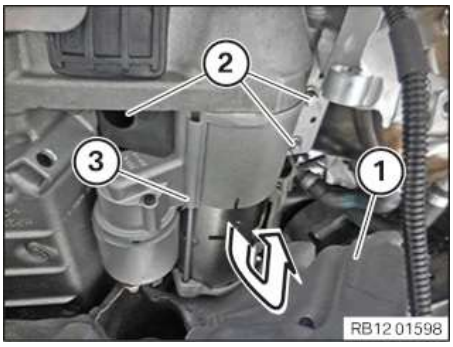


- Loosen expanding rivet (1).
- Lower the acoustic cover of the oil sump.

cardiagn.com



- Loosen expanding rivet (1).
- Loosen the clamp (arrow).
- Lower acoustic cover (2).



- Make sure that the acoustic cover (1) is not damaged.
- Carefully press acoustic cover (1) to one side.
- Loosen screws (2).
- Carefully guide out the starter motor (3) in direction of arrow and remove.

41 – Checking camshaft timing



RISK OF DAMAGE

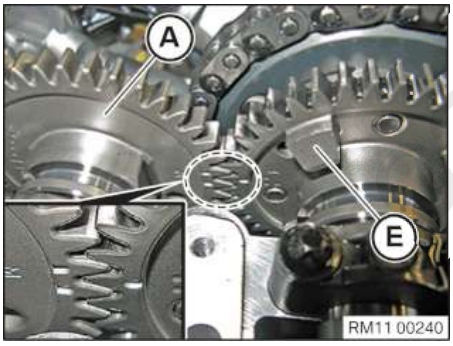
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

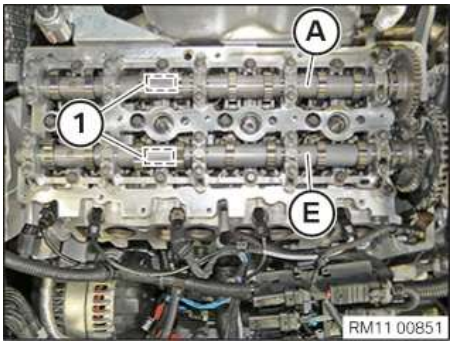
- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

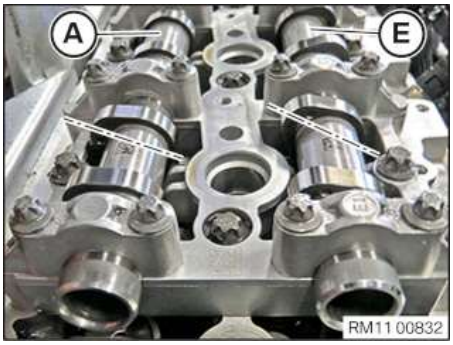
  Do **not** crank the engine in reverse.



- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.

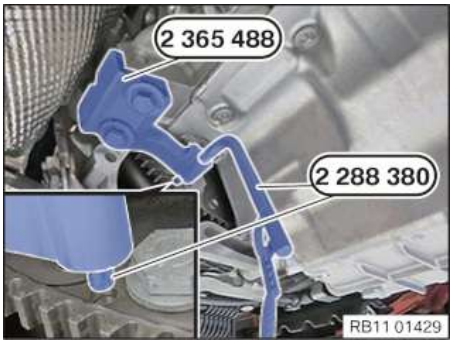


- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

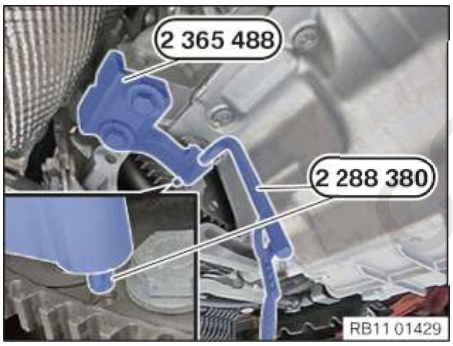
- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

42 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

43 – Removing the special tool for fixing the exhaust camshaft



- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

MAIN WORK

44 – Replace top timing chain

Prerequisite

Timing chain guides are not damaged.

RISK OF DAMAGE

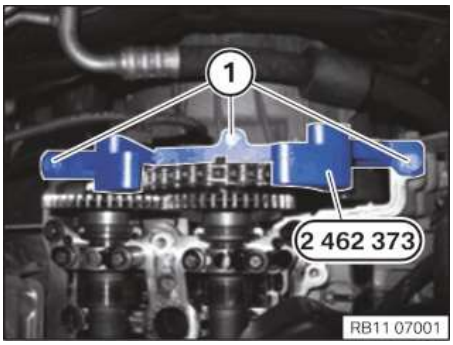
Damage of the engine and mounted parts.

Non-compliance with the instructions for mounting and disassembly may lead to damage to the engine and mounted parts.

- Comply with the regulations for the installation and disassembly.
- Perform work with care.

TECHNICAL INFORMATION

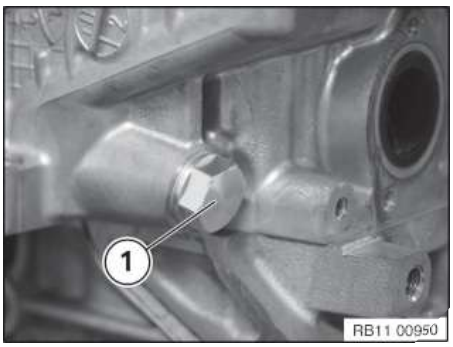
Maintain conditions of absolute cleanliness.



- Fasten the special tool 2 462 373 from the set of special tools 2 462 828 with conventional screws (1).
- Tighten the screws (1).

Standard screw connection M6

M6		Tightening torque	8 Nm

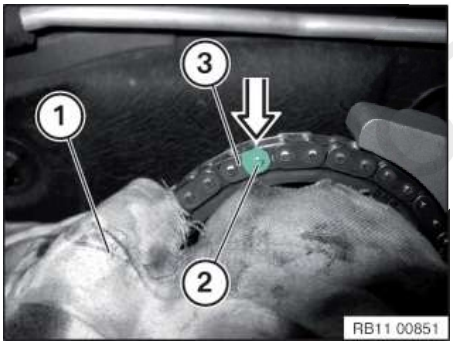


- Release and remove the chain tensioner (1).
- Renew the chain tensioner (1).

  Parts: Chain tensioner
- Feed in and install the chain tensioner (1).
- Tighten the chain tensioner (1).

Chain tensioner piston to cylinder head

22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm



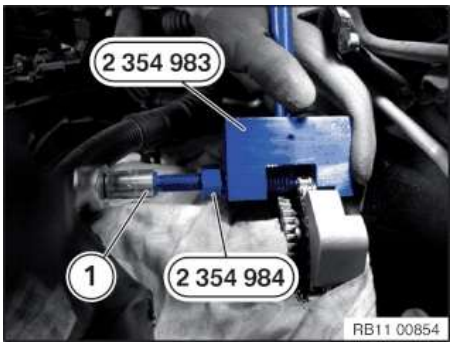
- Cover the cylinder head at the chain drive using appropriate auxiliary materials (1).
- Mark the rivet (2) on the right side of the inner tab (3) (arrow).



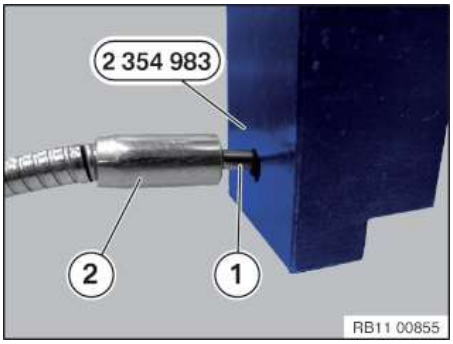
- Prepare the special tool from the set of special tools 2 462 828.
- Check the bolt (1) for damage.



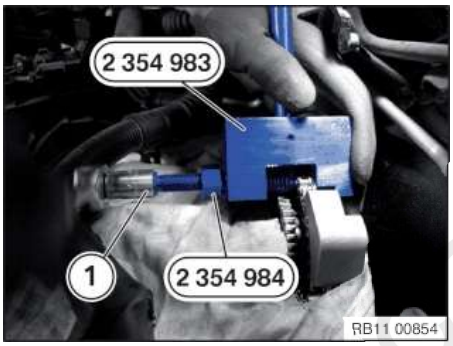
- Turn over the bolt on the special tool until the short length (arrow) is reached.



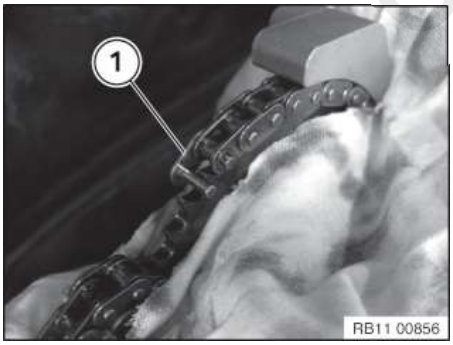
- Feed in and install the special tool on the timing chain around the marked rivet.
- Pre-tension the special tool by hand until the bolt of the special tool lies exactly on the bolt of the timing chain.
- **Secure the rivet of the timing chain against falling down from the rear bore hole of the special tool while pushing it out.**
- Screw in the spindle of the special tool with a conventional tool (1) up to the limit position.



- Feed out the pushed rivet (1) with a magnet (2) from the special tool and remove.

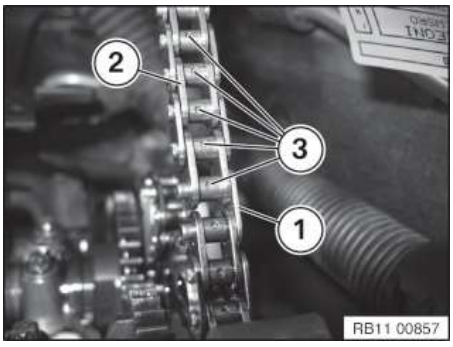


- Turn over the spindle of the special tool with a conventional tool (1).
- Guide the special tool out and remove.



- Replace timing chain.

  Parts: Timing chain (repair kit)
- Feed the chain link (1) into the existing timing chain and install.
- Lightly grease the timing chain.



- Feed in the timing chain (2) such that the oil holes (3) are visible from the outside.
- Feed in and install the timing chain (2) on the chain link (1).
- Correctly position the timing chain (2) and the chain link (1).

cardiagn.com



RISK OF DAMAGE

Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Prepare special tool 0 493 380 (11 6 480).

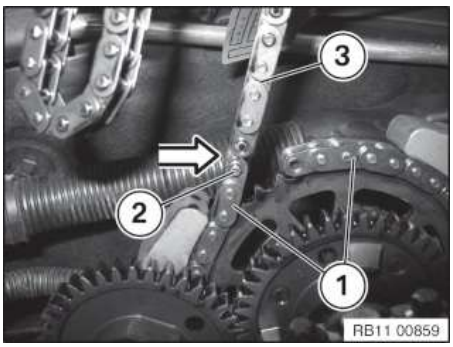


TECHNICAL INFORMATION

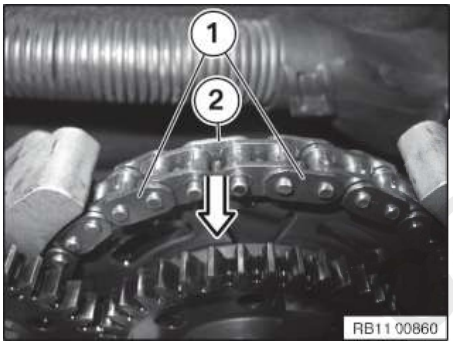
Conduct the following operation with the assistance of a second person.

- Keep the timing chain (1) under tension.
- Slowly turn the engine with the special tool 0 493 380 (11 6 480) in the direction of arrow and feed in the new timing chain.

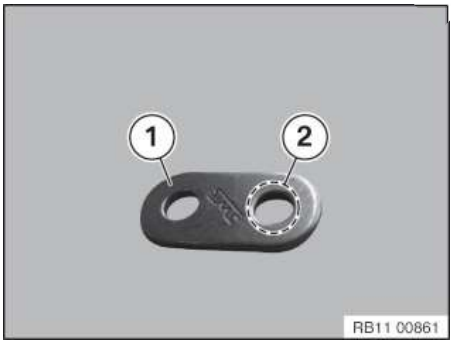
  Do **not** crank the engine in reverse.



- Slowly turn the engine with the special tool 0 493 380 (11 6 480) in the direction of rotation until the existing timing chain (3) in the area (Pfeil) can be fed out.
- Feed out the existing timing chain (3) with the chain link (2) and remove.
- Position the timing chain (1) on the sprocket.

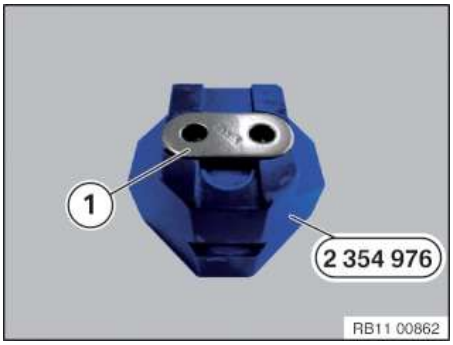


- Feed the chain link (2) into the timing chain (1) from the rear side in the direction of arrow and install.

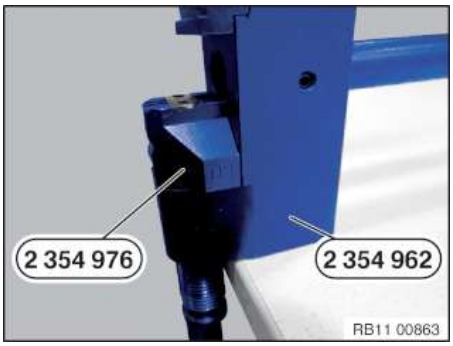


- Ensure that the curved side (2) of the tab (1) faces the timing chain.

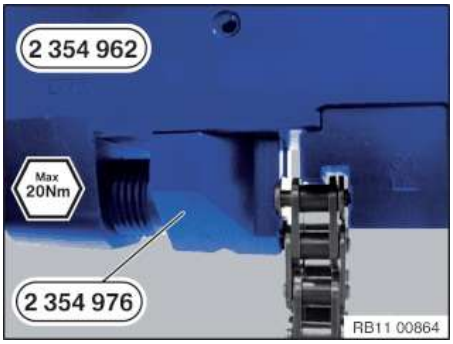
cardiagn.com



- Position the tab (1) on the magnets of the special tool .
- **Ensure correct installation position.**



- Feed in and install the special tool with the tab in the special tool .



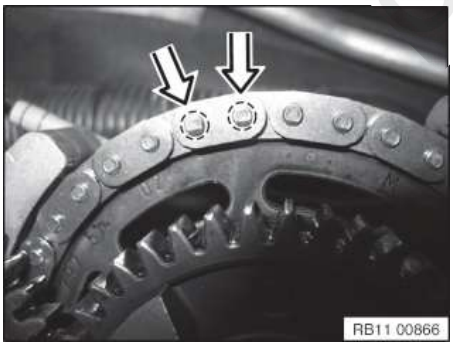
- Feed the special tools and onto the timing chain using the tab and install.
- Hand-tighten the spindle on the special tool .
- **Ensure correct installation position.**
- Turn the spindle on the special tool with a torque wrench.
- Compress the chain link.

Pressing the timing chain with special tool 2 354 962

Spindle	The torque must not be exceeded.		20 Nm



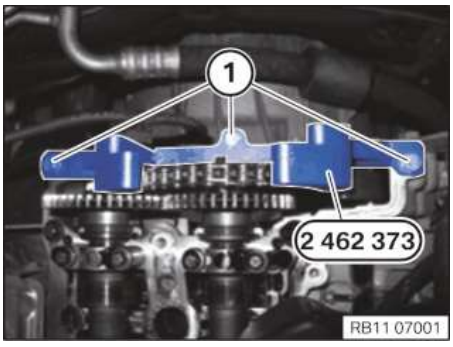
- Release the spindle and feed out the special tool .
- Prepare special tool as pictured.



- Press the rivets (arrows) **again, individually** using the special tool .

Pressing the timing chain with special tool 2 354 962

Spindle	The torque must not be exceeded.		20 Nm



- Loosen screws (1).
- Guide the special tool 2 462 373 out and remove.

cardiagn.com

45 – Checking camshaft timing



RISK OF DAMAGE

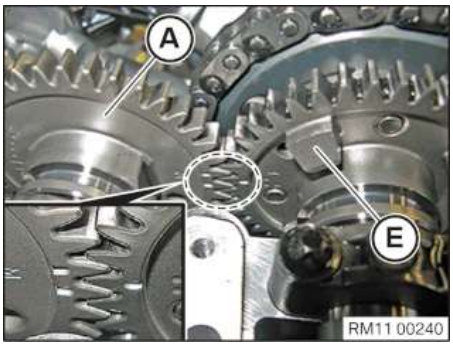
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

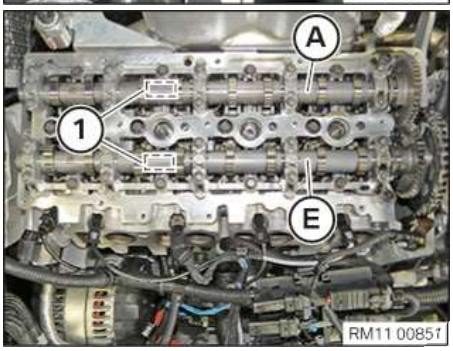
- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

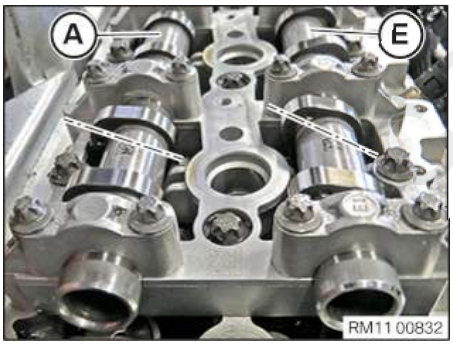
  Do **not** crank the engine in reverse.



- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.



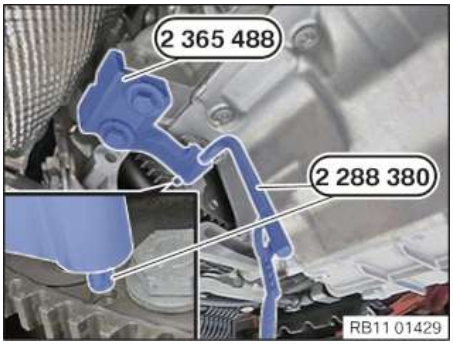
- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760) on exhaust camshaft.

  Special tool 0 496 112 (11 8 760) must lie flush on cylinder head.

cardiagn.com



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

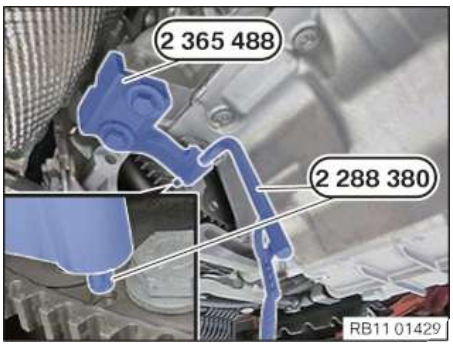
- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

46 – Removing the special tool for fixing the exhaust camshaft



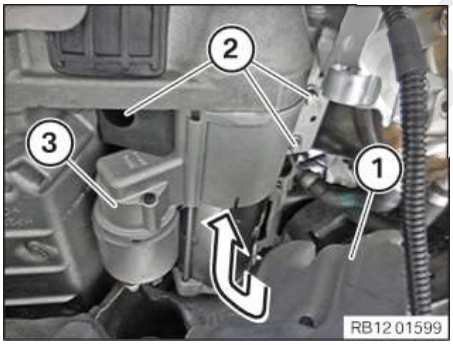
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

47 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

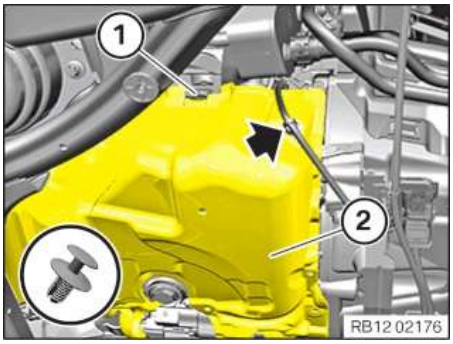
48 – Installing starter motor



- Make sure that the acoustic cover (1) is not damaged.
- Carefully press the acoustic cover (1) to one side.
- Feed in and install the starter motor (3) in the direction of the arrow.
- Tighten the screws (2).

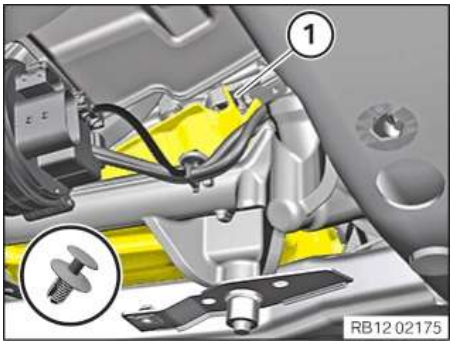
Starter motor to engine

M8X60		Tightening torque	19 Nm

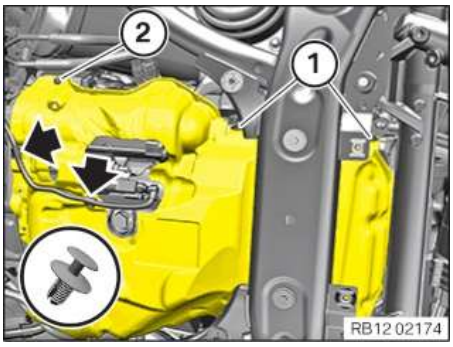


- Position the acoustic cover (2).
- Fasten expanding rivet (1).
- Secure clamp (arrow).

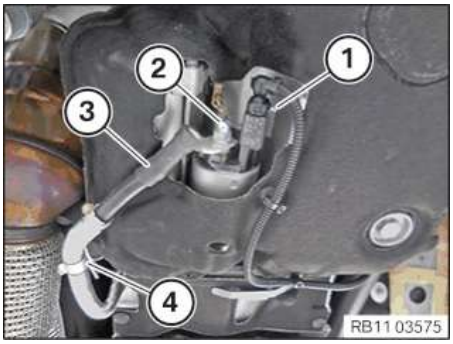
ardiagn.com



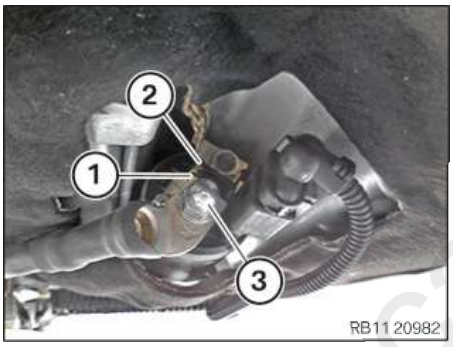
- Fasten expanding rivet (1).



- Secure fir tree clip (2).
- Secure expanding rivet (1).
- Secure the clamps (arrows).



- Fasten positive battery cable(3) in holder (4) and position it on the starter motor.
- Tighten the nut (2) hand-tight.
- Connect the connector (1) and audibly lock it.



CAUTION

Improper routing of the positive battery cable.

Risk of short circuits!

- Route the positive battery cable without abrasions and do not trap.

- Attach the positive battery cable (1) **correctly** to anti-twist lock (2).
- Tighten nut (3).

Battery positive lead to starter

M8		Tightening torque	13,5 Nm

49 – Prepare for the installation of the diesel particulate filter



- Renew the V-clip (1).

  Parts: V-band clamp

carlagn.com



- Renew gasket (1).

  Parts: Gasket

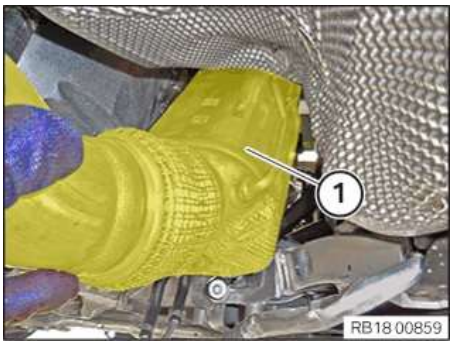
50 – Installing the diesel particulate filter

CAUTION

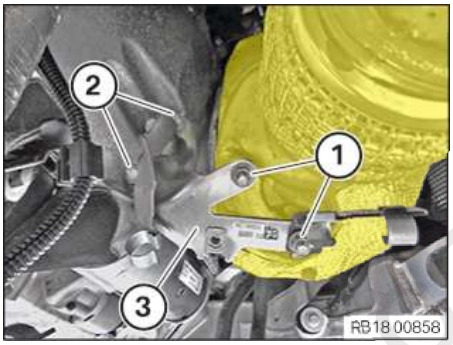
Heavy component.

Heavy components can lead to injury or damage.

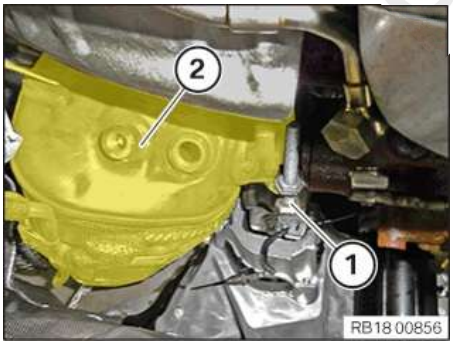
- Remove and install heavy components with the aid of another person/other persons.



- Insert and install the diesel particulate filter (1).



- Insert and install the holder (3).
- **Hand-tighten** the bolts (2).
- Apply the nuts (1) **hand-tight**.

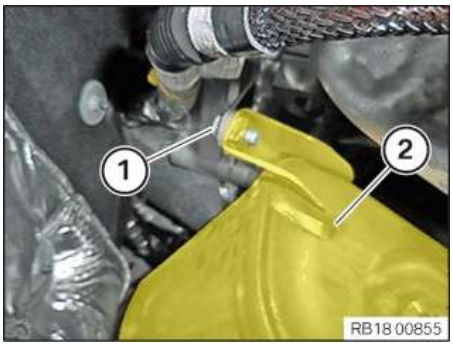


- Renew the V-clip (1).

  Parts: V-band clamp
- Feed in and install V-band clamp (1).

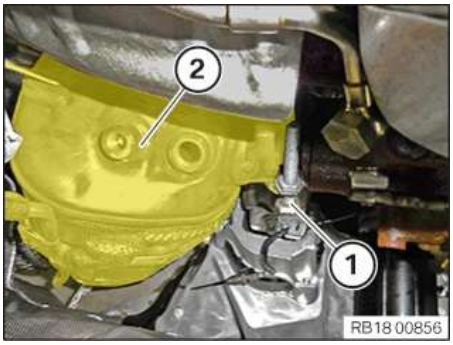
Note: Make sure that the seal between the diesel particulate filter and the exhaust turbocharger is installed correctly.

- Position the diesel particulate filter (2) on the exhaust turbocharger .
- Position V-clip (1).
- Apply the V-clip (1) **hand-tight**.



- Feed in screw (1) on the holder of the diesel particulate filter (2) and tighten **hand-tight**.

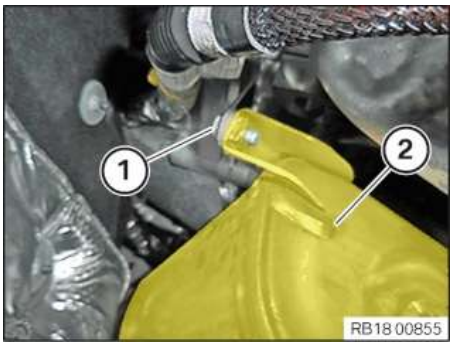
cardiagn.com



- Tighten the V-clip (1) of the diesel particulate filter (2).

Diesel particulate filter V-clip to exhaust turbocharger

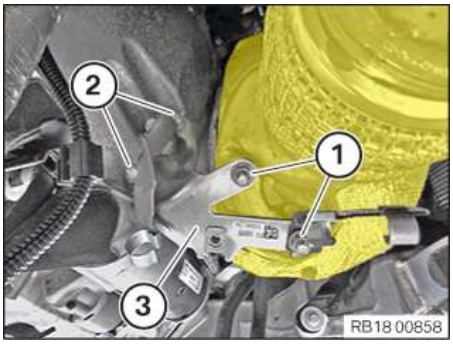
V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm



- Tighten the bolt (1) on the bracket of the diesel particulate filter (2).

Bracket to diesel particulate filter top

M8		Tightening torque	19 Nm



- Tighten the screws (2) on the holder (3).

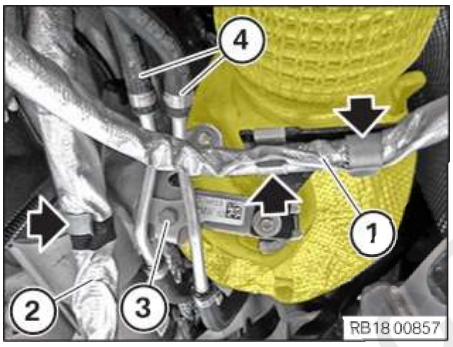
Bracket to transmission for diesel particulate filter holder bottom

M8X20		Tightening torque	19 Nm

- Tighten the nuts (1) on the holder (3).

Lower holder to diesel particulate filter

M8		Tightening torque	19 Nm



- Thread in and install coolant line (4).
- Tighten down screw (3).

Coolant lines for SCR metering module

M6X16		Tightening torque	8 Nm

- Secure the positive battery cable (2) of the starter motor at the clamp (arrow).
- Fasten the metering line (1) on the clamps (arrows).

51 – Installing the nitrogen oxide sensor upstream of SCR catalytic converter

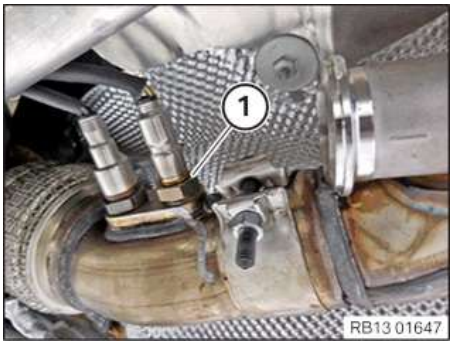
RISK OF DAMAGE

Damage to the nitrogen oxide sensor.

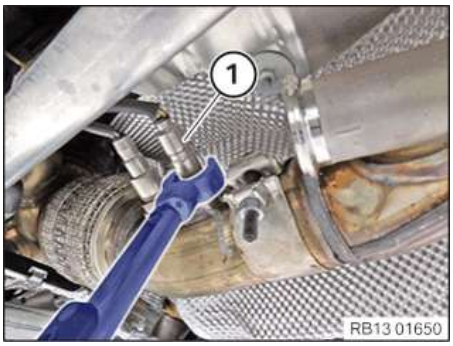
Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
- The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

cardiagn.com



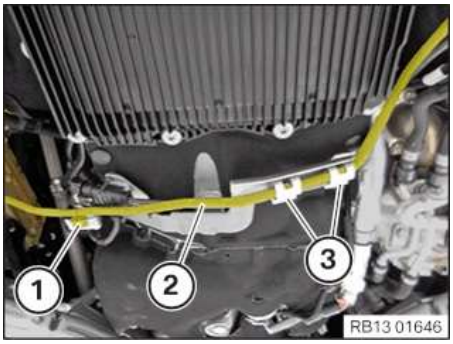
- Feed in and install the nitrogen oxide sensor (1).



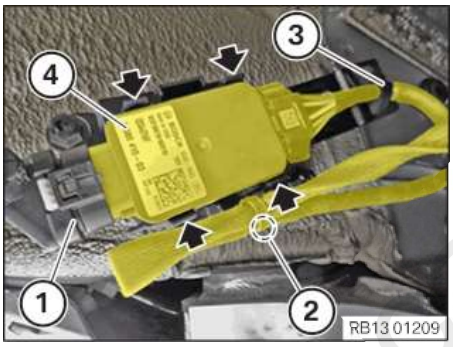
- Tighten the nitrogen oxide sensor (1) using commercially available tools.

Nitrogen oxide sensor before SCR catalytic converter

Sensor		Tightening torque	50 Nm



- Secure the cables (2) to the clamps (3).
- Secure clamps (1).



- Clip in the control unit (4) (arrows).
- Fasten the cable in the holder (3).
- Secure the cable holder (2).
- Plug in the connector (1) and lock audibly.

52 – Installing the monitoring oxygen sensor after the diesel particulate filter

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

cardiagn.com

TECHNICAL INFORMATION

New oxygen sensors are to be greased lightly and evenly on the thread.

For oxygen sensors that are reused, the following should be observed:

Lightly and evenly grease the oxygen sensor only on the thread. Do not clean and grease that part of the oxygen sensor which protrudes in the exhaust branch (sensor ceramics).

For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



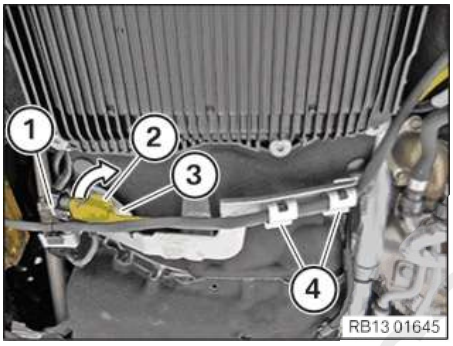
- Insert the monitoring oxygen sensor (1) and install it.



- Tighten the monitoring oxygen sensor (1) with standard tools.

Monitoring oxygen sensor

Sensor		Tightening torque	50 Nm



- Fasten the monitoring oxygen sensor to the clamps (4).
- Secure the connector (2) on the holder (3) in direction of arrow.
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

53 – Installing the exhaust system

CAUTION

Component with heavy weight.

Danger of injury!

- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

Heavy component.

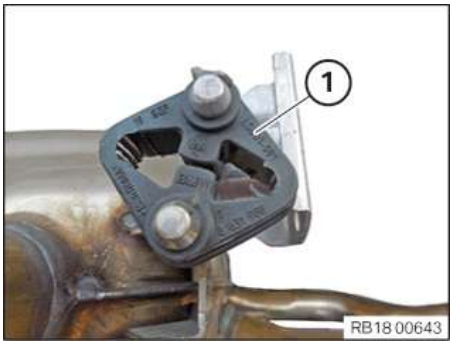
Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

cardiagn.com

TECHNICAL INFORMATION

Mount the exhaust system in voltage-free state, maintaining the tightening sequence from the rear silencer towards the exhaust manifold.

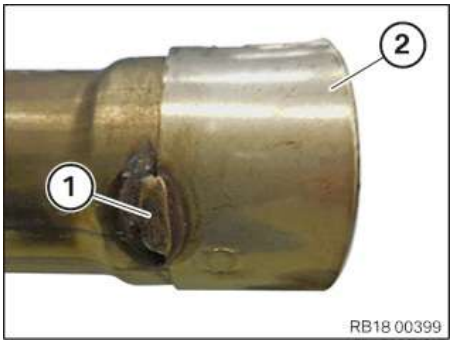


NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

- Check all the rubber mounts (1) of the exhaust system for damage.
- Replaced damaged rubber mounts.

  Parts: Rubber mount



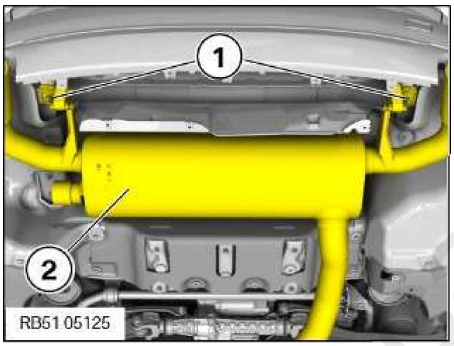
CAUTION

Swarf resulting from sawing or grinding components.

Danger of injury!

- Conduct all work in appropriate personal protective equipment only.
- Wear safety goggles and protective gloves.

- Open the weld seam (1) with a conventional tool.
- Remove the clamp (2).

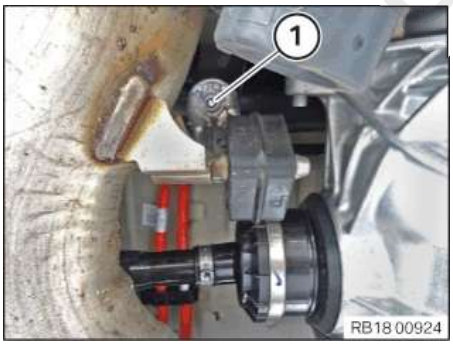


- Insert and install the exhaust system (2).
- Renew nuts (1).

  Parts: Nuts
- Tighten nuts (1).

Rear silencer to body / bumper support

M8	Replace nuts.	Tightening torque	19 Nm

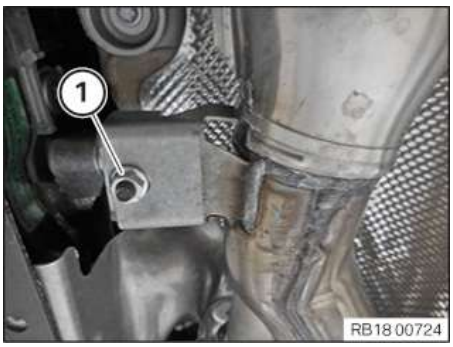


- Renew nut (1) on the rear axle support.

  Parts: Nut
- Tighten nut (1).

Exhaust system to rear axle carrier

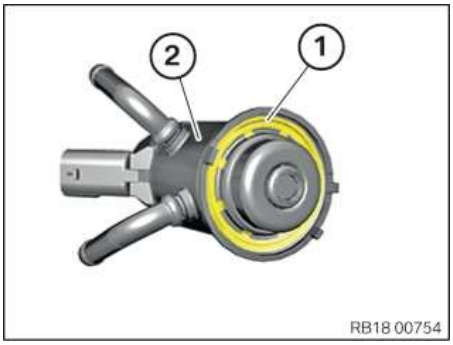
M8 nut		Tightening torque	19 Nm



- Tighten nut (1).

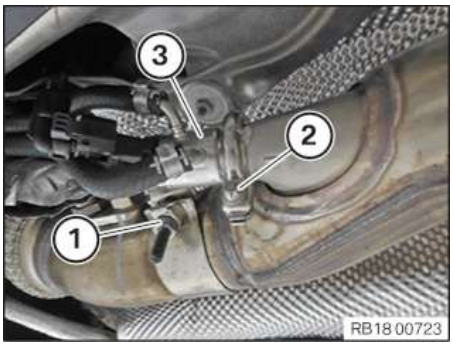
Exhaust system to transmission

M8		Tightening torque	19 Nm



- Renew sealing ring (1) of the SCR metering module (2).

  Parts: Sealing ring



- If necessary, renew clamp (1).

  Parts: Clamp
- Tighten clamp (1).

Exhaust system to diesel particle filter

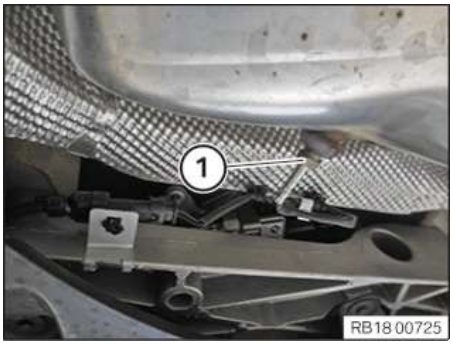
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

- Renew the V-clip (2).

  Parts: V-band clamp
- Install the SCR metering module (3) in the exhaust system.
- Tighten the V-clip (2) of the SCR metering module (3).

SCR metering module V-clip to exhaust system

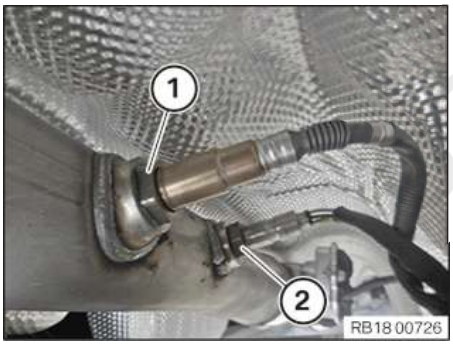
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm



- Install the exhaust temperature sensor (1) in the exhaust system and tighten.

Exhaust-gas temperature sensor upstream of SCR catalytic converter

Sensor		Tightening torque	30 Nm



- Install the diesel particulate sensor (1) in the exhaust system and tighten.

Diesel particulate sensor to exhaust system

Sensor		Tightening torque	50 Nm

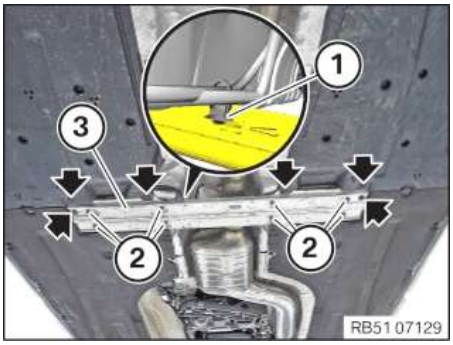
- Install the nitrogen oxide sensor (2) in the exhaust system and tighten.

Nitrogen oxide sensor downstream of SCR catalytic converter

Sensor		Tightening torque	55 Nm

54 – Install the connecting supports on the tunnel

cardiagn.com



- Guide in and install connecting support (3) on the tunnel.
- Tighten the screws (2).
- Tighten screws (arrows).

Connecting support to tunnel

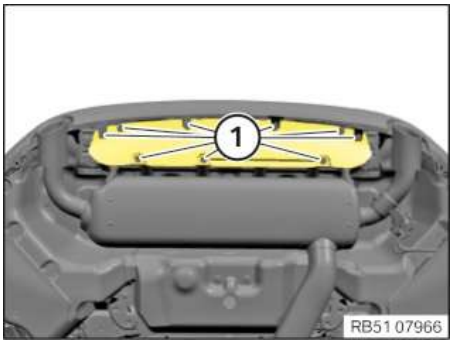
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Secure the clamp (1).

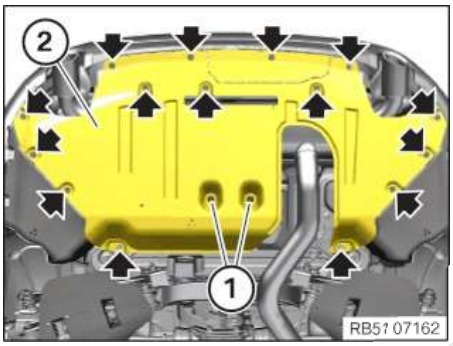
55 – Installing the rear diffuser



- **Version 1:**
- Install the diffuser and tighten the nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm



- **Version 2:**
- Feed in and position the diffuser (2)
- Tighten screws (arrows).

Diffuser / underbody panelling

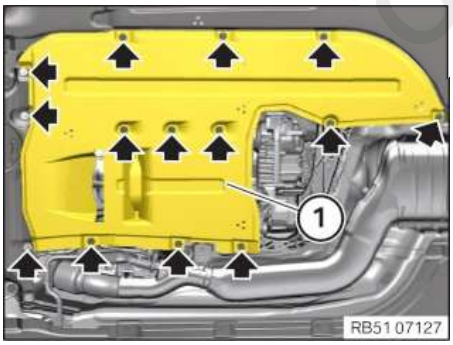
Nuts and screws		Tightening torque	3 Nm

- Tighten nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm

56 – Installing underbody protection at rear



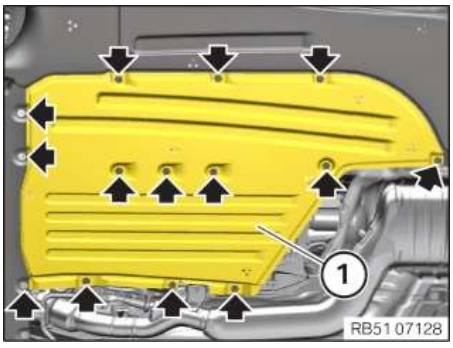
- **Version A:**

Insert and install the rear underbody protection (1).

Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version B:**

Insert and install the rear underbody protection (1).

Tighten screws (arrows).

Underbody protection

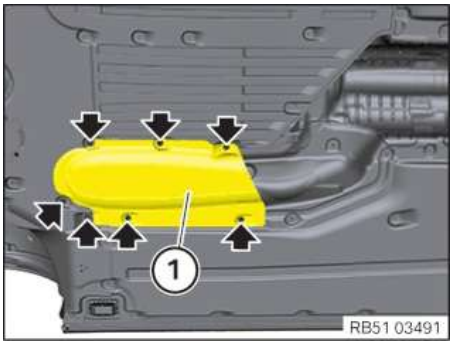
Hexagon screw		Tightening torque	3 Nm

cardiagn.com

57 – Install the underbody panelling of the transmission on the side

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

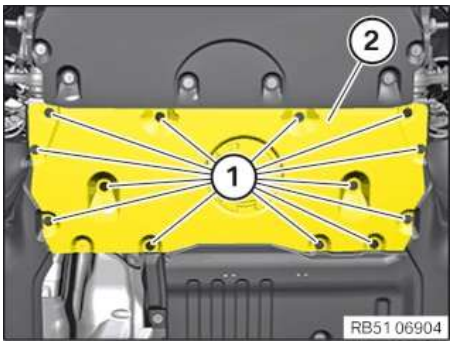


- Insert the underbody panelling (1).
- Tighten screws (arrows).

Underbody panelling

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

58 – Installing the centre underbody protection



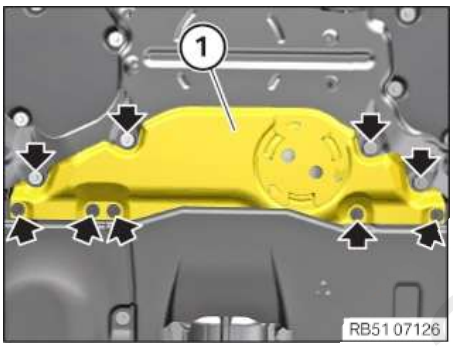
- **Variant with rear wheel drive:**

  Position central underbody protection (2).

  Tighten the screws (1).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version with all-wheel drive:**

  Guide in centre underbody protection (1) and install.

  Tighten screws (arrows).

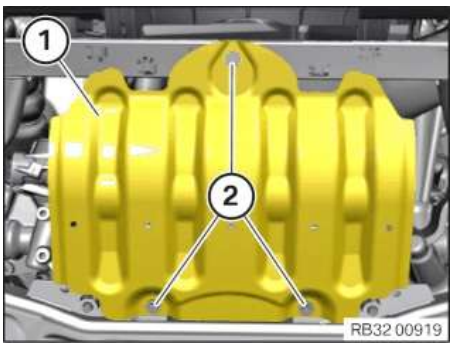
Underbody protection

Hexagon screw		Tightening torque	3 Nm

59 – If installed: Install underbody protection of the steering

Prerequisite

Front underbody protection has been removed.



- Position underbody protection (1).
- Tighten the screws (2).

Underbody protection, steering, to front axle support

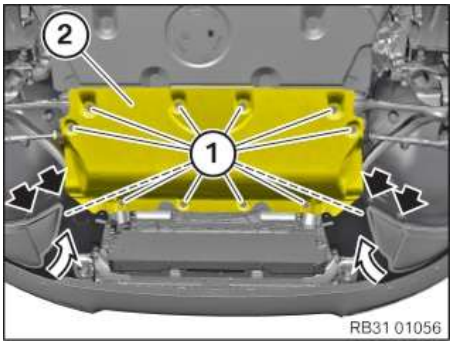
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

60 – Install the underbody protection of the steering gear

cardiagn.com



- **Version A:**

  Position the underbody protection (2) of the steering gear.

  Tighten the screws (1).

Underbody protection of the steering gear

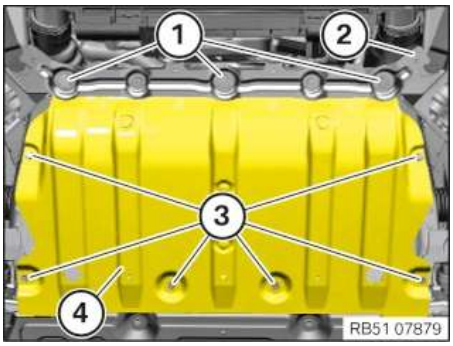
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the bottom wheel arch cover.

  Tighten the screws (arrows) of the lower wheel arch cover on the wheel arch cover.

Wheel arch trim panel, front

Thermoplastic hexagon screw		Tightening torque	2,6 Nm



- **Version B:**

  Feed in the underbody protection (4) of steering gear and install it.

  Tighten the screws (3).

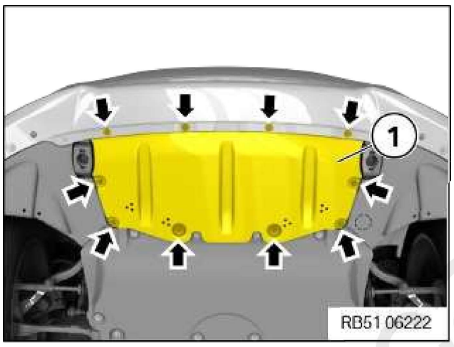
Underbody protection of the steering gear

Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the holder (2) for the underride protection.

  Tighten the screws (1).

61 – Installing the front underbody protection



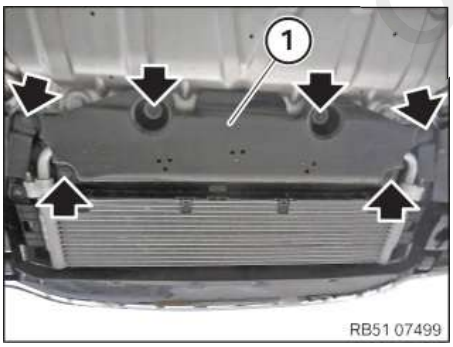
- **Version A:**

  Feed in the front underbody protection (1) towards the front under the bumper panel and position.

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



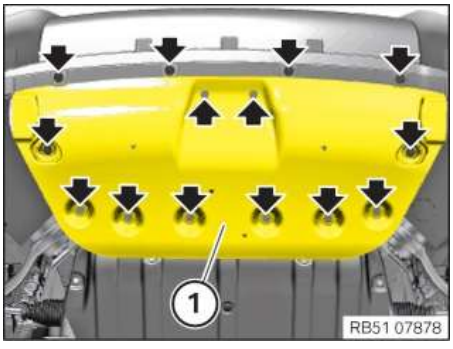
- **Version B:**

  Feed in and position the front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



- **Version C:**

  Feed in and install front underbody protection (1).

  Tighten screws (arrows).

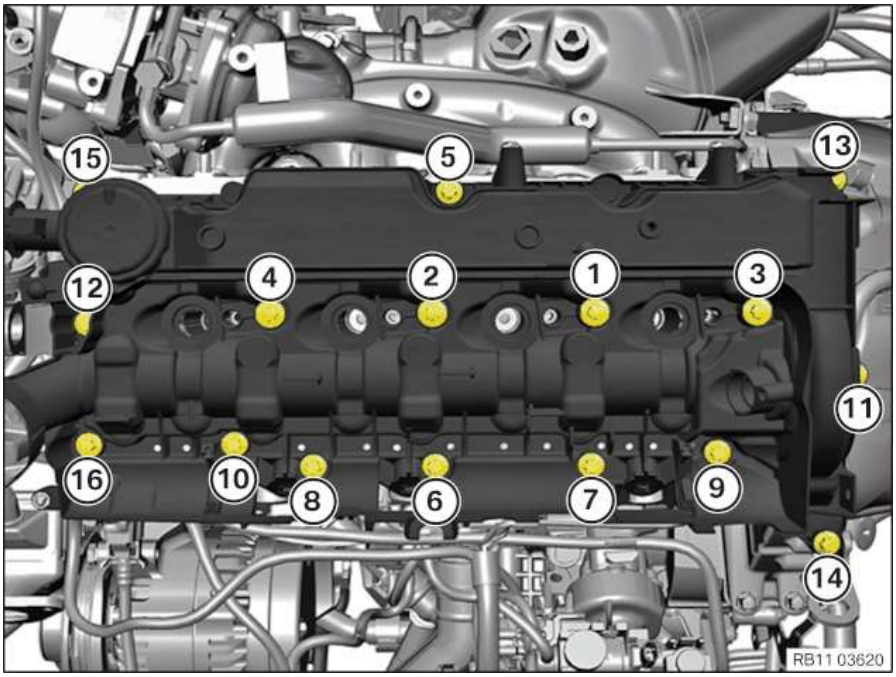
Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

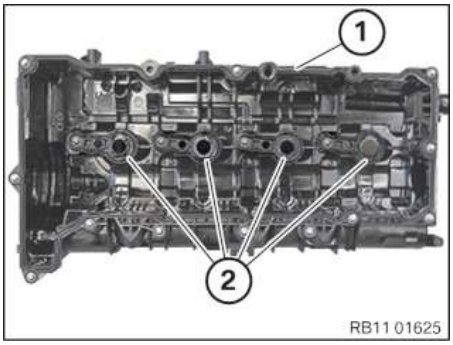
carmagn.com

62 – Installing cylinder head cover

Screw connection of the cylinder head cover

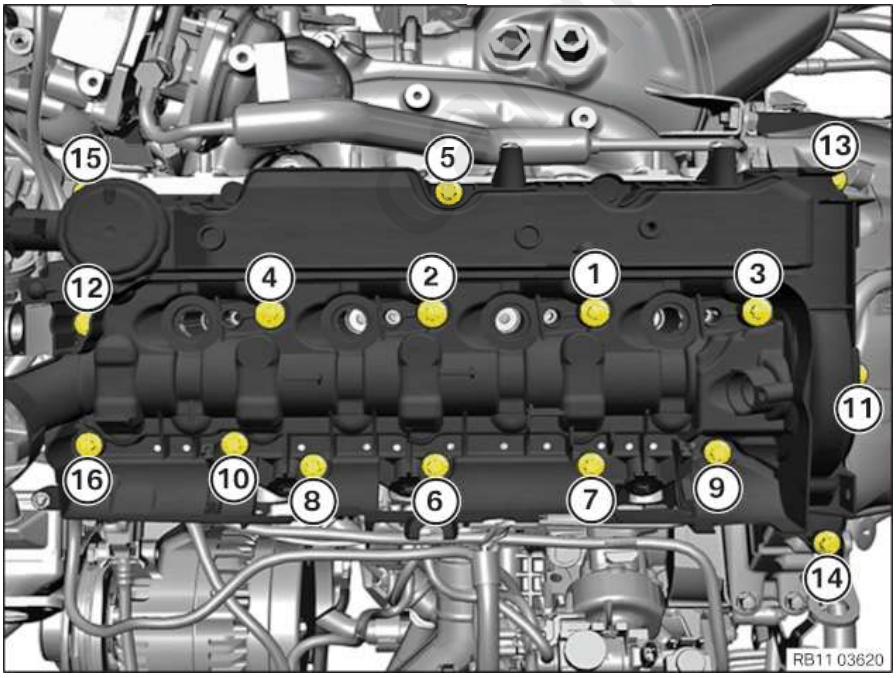


1 - 16 Bolts of the cylinder head cover



- Renew the profile seals (1) and (2) of the cylinder head cover.

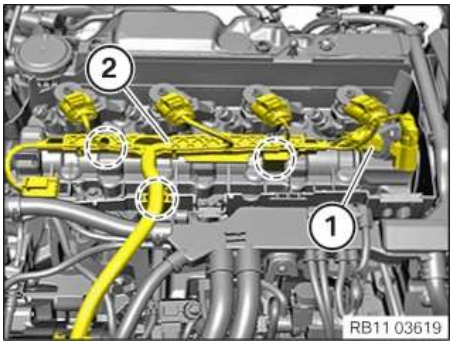
  Parts: Profile seals



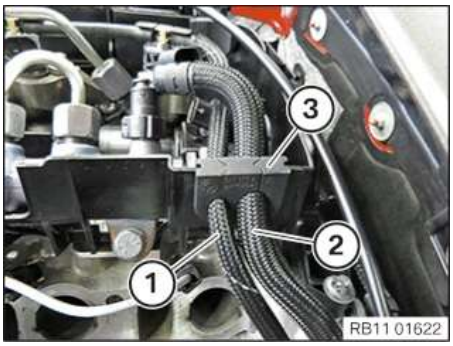
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

Cylinder head cover to cylinder head

M6		Tightening torque.	8,5 Nm



- Position the vehicle wiring harness (2) on the cylinder head cover and fasten in the marked areas.
- Plug in the connector (1) and lock audibly.



- Insert and connect the leakage oil line (1) with the fuel return line (2) and grommet (3).



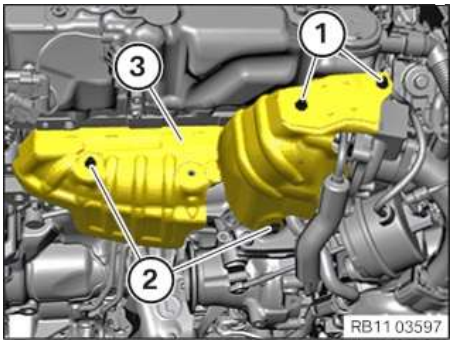
- Feed in and install the heat shield (1).



- Connect engine ventilation line (1) and lock.

  The locks (arrows) must engage audibly.

63 – Installing heat shield



- Feed in and install the heat shield (3).
- Tighten down screws (1) and (2).

Heat shield to exhaust manifold

M6x12			10 Nm

64 – Installing the sensor bracket on the cylinder head cover

cardiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

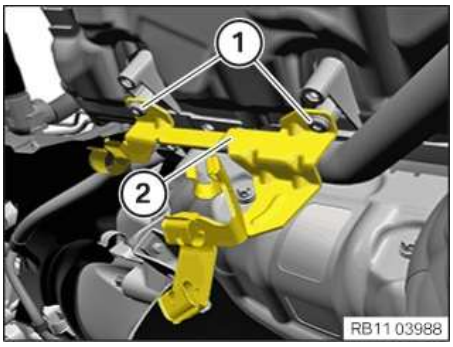
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

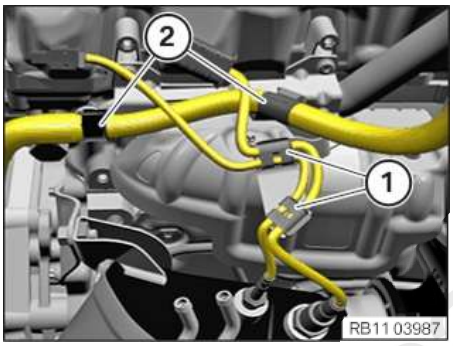
- Route all cables without abrasions, do not trap and crush.



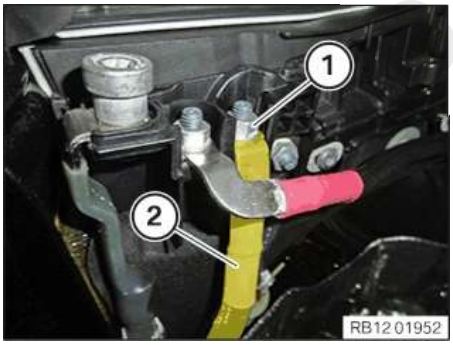
- Insert and install the holder (2).
- Tighten the screws (1).

Bracket on cylinder head cover

	Tightening torque	5 Nm



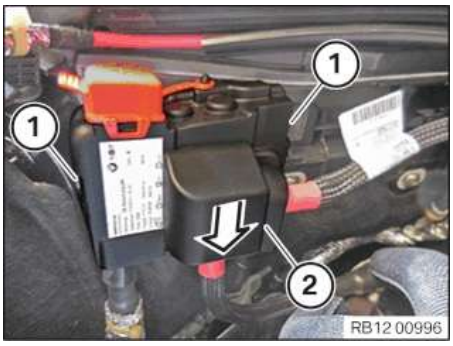
- Secure the positive battery cable in the clamps (2).
- Mount the cable of the exhaust gas sensor system in the clamps (1).



- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

Battery positive lead to battery positive terminal

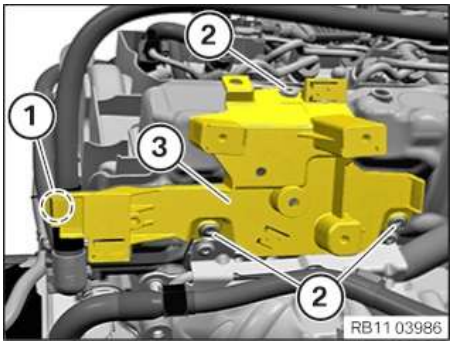
M8		Tightening torque	19 Nm



- Insert and install the cover (2) in the direction of the arrow.

  The locks (1) must engage audibly.

cardiagn.com

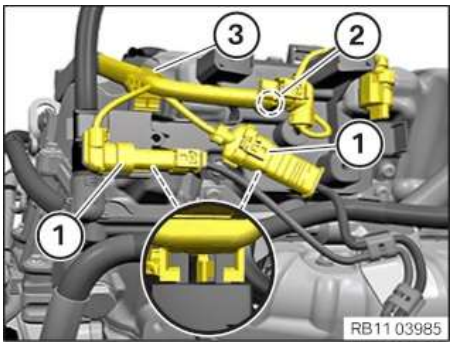


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

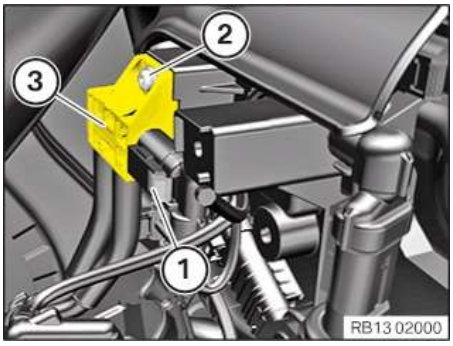
		Tightening torque	5 Nm

- Fasten the positive battery cable in the area (1) in the clamp.



- Feed in the wiring harness section and fasten it with the clamp (3).
- Fasten the cable clip in the area (2) in the sensor bracket.
- Feed in the connector (1) into the sensor bracket and lock it audibly.
- Plug in the connector (1) and lock audibly.

65 – Securing the differential pressure sensor for the diesel particulate filter



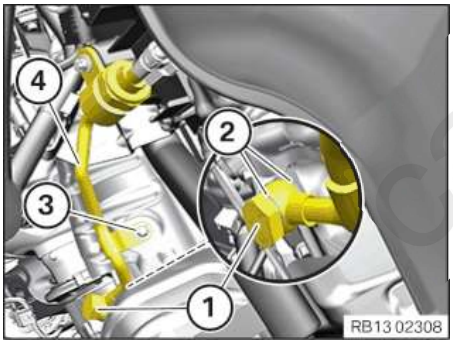
- Feed in and install the differential pressure sensor (3).
- Tighten down screw (2).

Differential pressure sensor of diesel particulate filter on cylinder head cover

TS5x20		Tightening torque	4 Nm

- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

66 – Install the exhaust gas pressure pipe



- Insert and install the exhaust gas pressure pipe (4).
- Replace the sealing rings (2).

  Parts: Sealing ring
- Apply the banjo bolt (1) hand-tight.
- Tighten down screw (3).

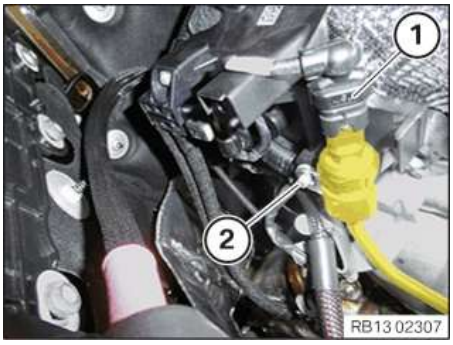
Heat shield to exhaust manifold

M6x12		Tightening torque	10 Nm

- Tighten the banjo bolt (1).

Banjo bolt for exhaust pressure pipe to exhaust manifold

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm



- Tighten down screw (2).

Exhaust gas pressure pipe to sensor system holder

TS6x20		Tightening torque	5,7 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

67 – Install all injectors

▸ **Cleaning the injector shafts**

cardiagn.com

CAUTION

Swirling dirt particles caused by compressed air.

Danger of injury!

- Collect dirt particles, e.g. when blowing out, use cloth to do so.

- Wear safety goggles.

RISK OF DAMAGE

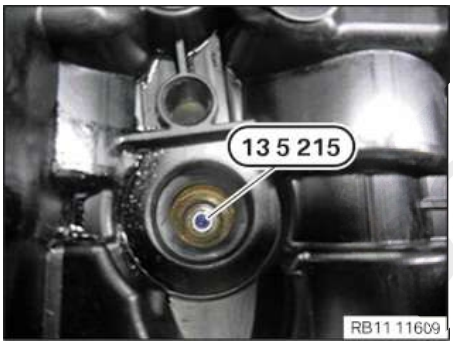
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



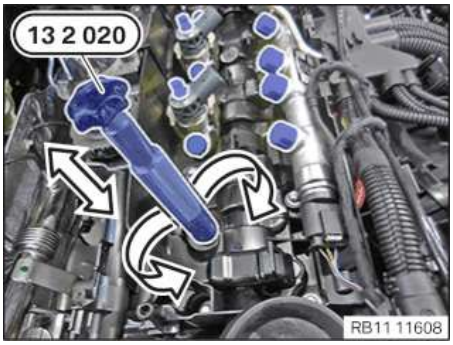
- Check whether the sealing ring remained in the injector shaft and remove the sealing ring as needed.
- Insert the special tool 0 493 763 (13 5 215) with the special tool 0 493 762 (13 5 214) from the set of special tools 0 493 758 (13 5 210) into the injector shaft.
- Remove special tool 0 493 762 (13 5 214).



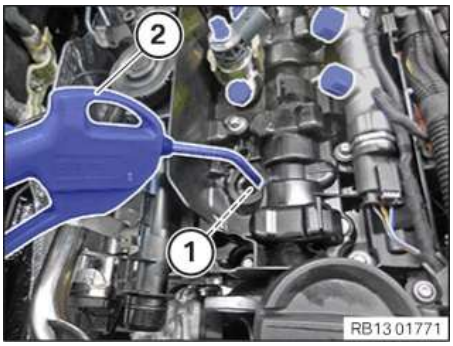
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



- Insert special tool 0 496 150 (13 2 020) into the injector shaft.



- Move special tool 0 496 150 (13 2 020) up and down in the injector shaft with rotational movements in the direction of arrow.
- Feed out special tool 0 496 150 (13 2 020) from the injector shaft and remove.



- Blow out injector shaft (1) with air gun (2).



- Feed the special tool 0 493 762 (13 5 214) into the injector shaft and screw it in with the special tool 0 493 763 (13 5 215).
- Feed out special tool 0 493 762 (13 5 214) with special tool 0 493 763 (13 5 215) from the injector shaft and remove it.

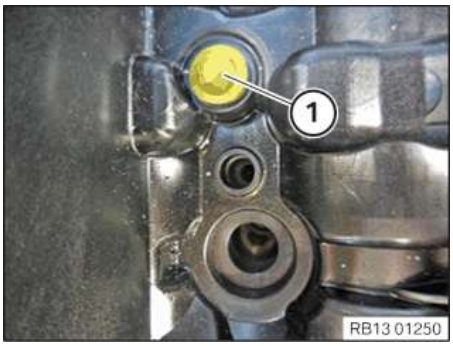
▸ **Check the placement of the clamping claw**

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Tighten down screw (1).

  The clamping claw is positioned on the bolt (1).

Clamping claw facing to cylinder head cover

M6		Tightening torque	10 Nm

▸ **Prepare the injector for installation**

cardiagn.com

RISK OF DAMAGE

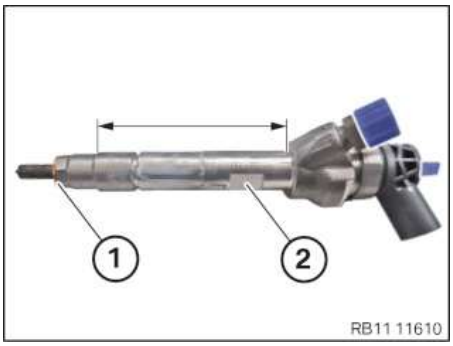
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

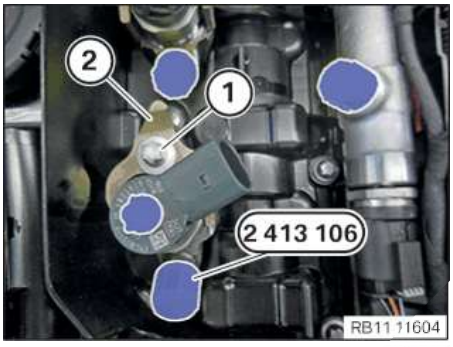
TECHNICAL INFORMATION

Lightly grease the injector shaft with high temperature-resistant grease.
For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



- Renew the copper sealing ring (1) on the injector (2).

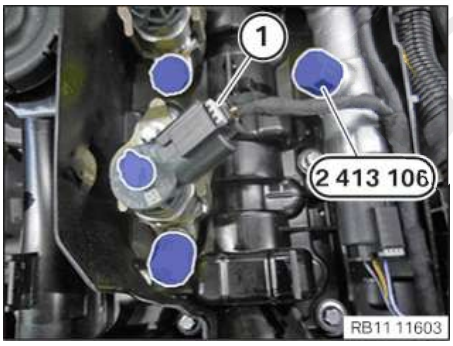
  Parts: Copper sealing ring
- Lightly grease the injector in the marked area with heat-resistant grease before installing the injector (2) in the injector shaft.



- Insert and install the injector .
- Insert and install the clamping claw (2).
- Tighten down screw (1).

Injector to cylinder head cover

M8	Tightening torque	8 Nm
	Angle of rotation	120 °



- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

▸ **Replacement: Perform injection quantity compensation**

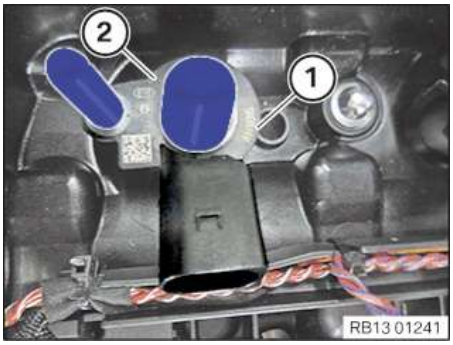
TECHNICAL INFORMATION

If the DDE control unit or an injector has been replaced, it will also be necessary to carry out injection quantity compensation. The adjustment value (7-position letter/number code) is engraved on each injector.

NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

cardiagn.com

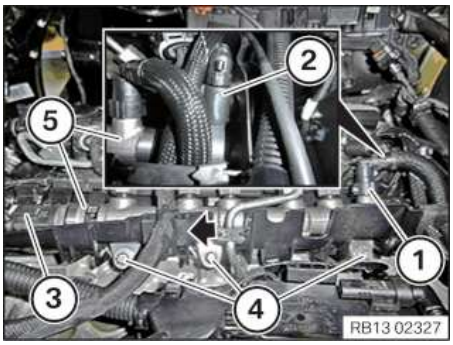


- Read off the adjustment value (1) on the new injector (2).



- Connect diagnosis system:
  - Vehicle identification
  - Function selection
  - Service functions
  - Digital diesel electronics (DDE)
  - Adjustment of injectors
  - Testing schedule
- Start service function with the right arrow button.

68 – Installing the rail



- Insert and install the rail (5).
- Tighten the screws (4).

Rail to cylinder head cover

M8		Tightening torque	19 Nm

- Install and lock cable clip (arrow).

  The cable clip (arrow) must engage audibly.
- Connect and lock the connector (3) at the rail pressure sensor.

  The connector (3) must engage audibly.
- Connect and lock the connector (2) at the rail pressure regulating valve.

  The connector (2) must engage audibly.
- Feed in fuel return line (1) and install.

  The fuel return line (1) must audibly engage.

69 – Installing high pressure line between rail and high pressure pump

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

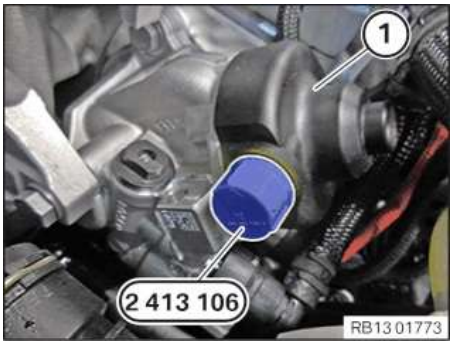
Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

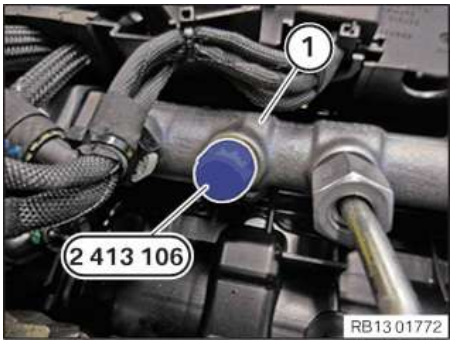
cardiagn.com

TECHNICAL INFORMATION

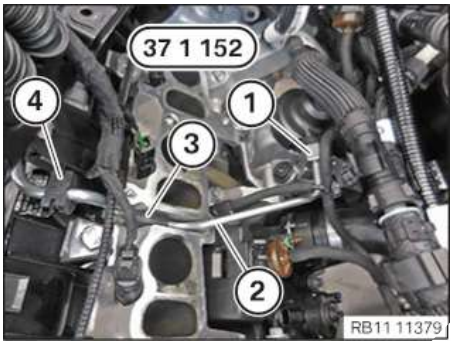
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Feed out and remove special tool on the high pressure pump (1).



- Feed out the special tool on the rail (1) and remove.



- Insert and install the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).
- Hand-tighten the union nut (1) on the high pressure pump.



- Hand-tighten the union nut (1) on the rail.

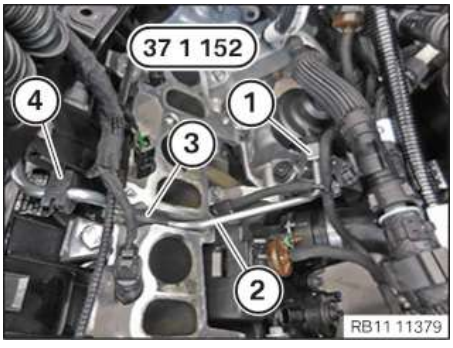
TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten the union nut (1) with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm



- Make sure that the high pressure line (2) is correctly installed with the abrasion protection (3) and the rubber mount (4).

TECHNICAL INFORMATION

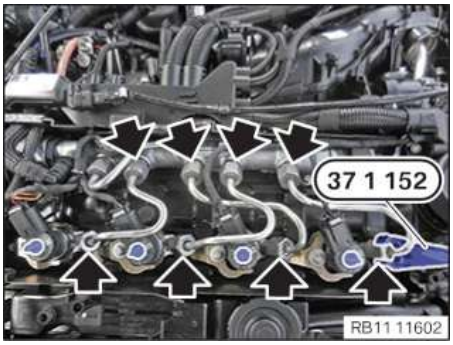
Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten union nut (1) on the high pressure pump with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm

cardiagn.com



- Remove the special tool from all cable connections.
- Feed in and install the high pressure lines (arrows).
- Hand-tighten the high pressure lines (arrows).

TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

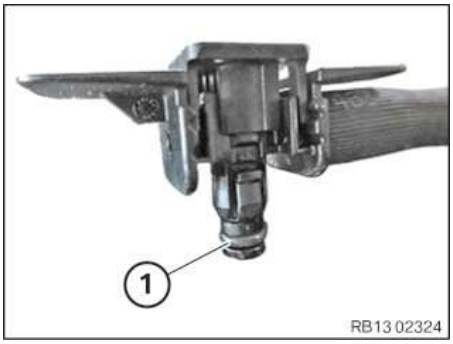
- Tighten the high pressure lines (arrows) with the special tool .

High pressure lines between injector and rail

High-pressure pipe		Tightening torque	24.5 Nm

- Check the high pressure lines (arrows) for tightness (**visual inspection**).

71 – Attach the leakage oil line on the injectors

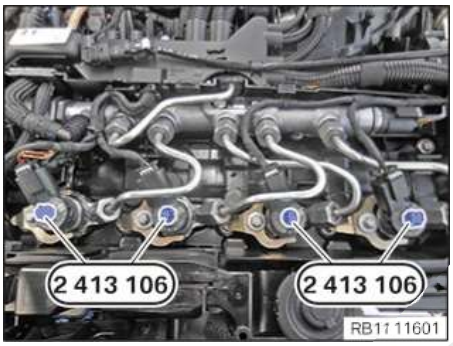


- **Version A:**

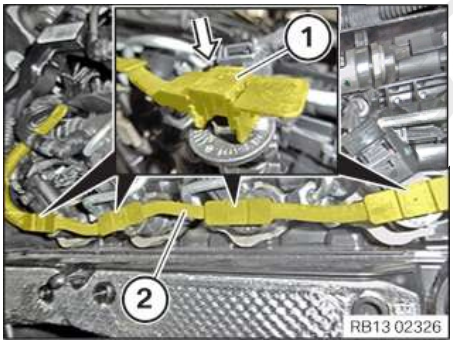
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

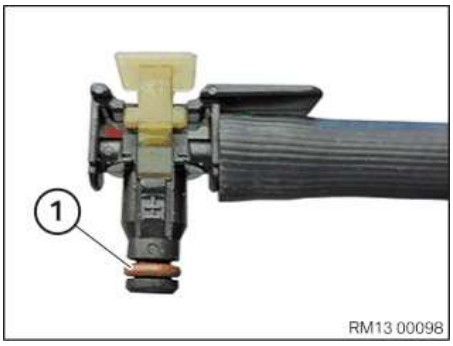
  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.



- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.



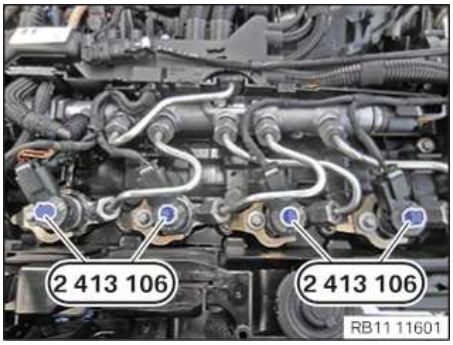
- **Version B**:

  Check sealing ring (1) for damage, renew leakage oil line if necessary.

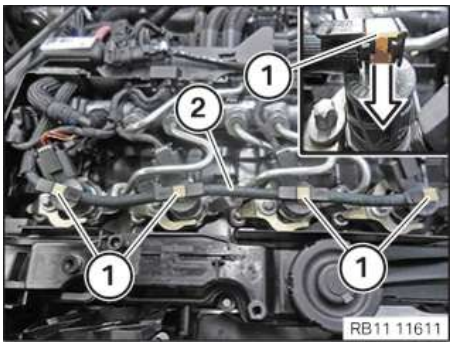
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.

ardiagn.com

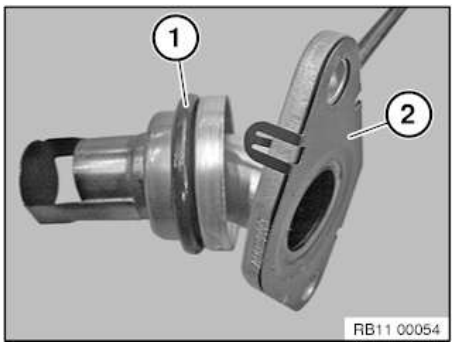


- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.

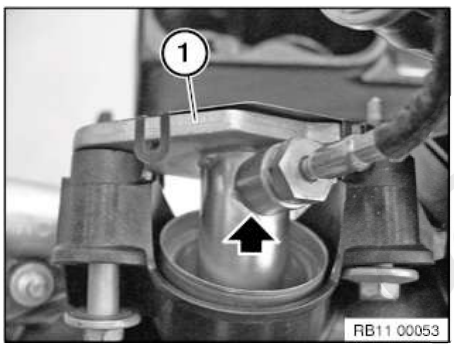
72 – Installing the intake plenum



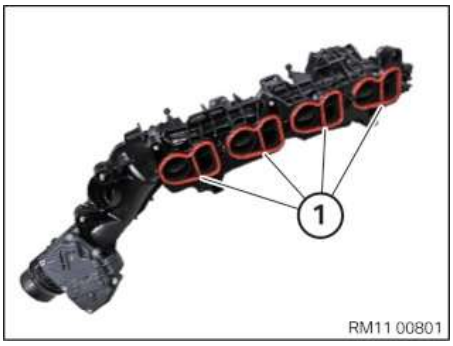
- Renew O-ring (1).

  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

  Parts: Gasket
- Position the seal (2) and clip it in.



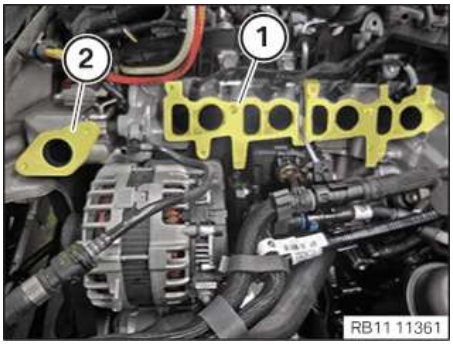
- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).



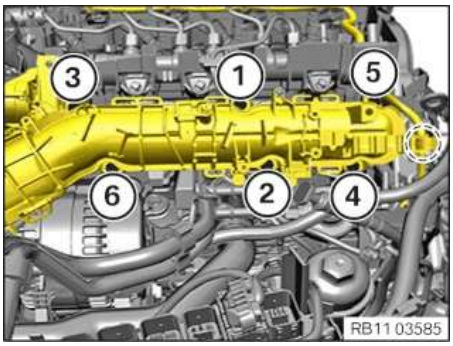
- Renew seals (1).

  Parts: Seals
- Ensure that the seals (1) are firmly mounted on the intake plenum.

cardiagn.com



- Clean connection points (1) at cylinder head.
- Clean the connection point (2) on the exhaust-gas recirculation cooler.

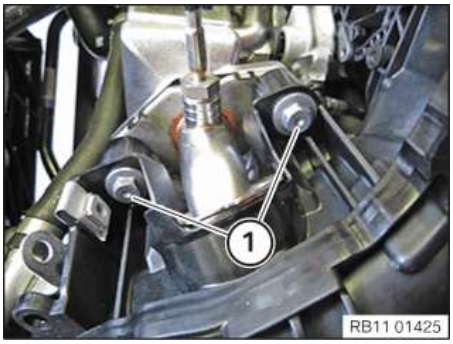


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

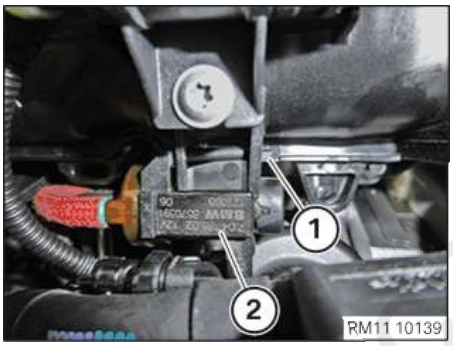
- Attach the wiring harness and fuel lines in the marked area on the intake plenum.



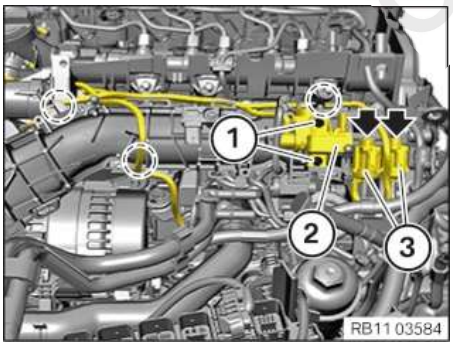
- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm



- Install electric changeover valve (2) from the left to the right in the holder on the intake plenum.
  The lock (1) must audibly engage.



- Install intake plenum electric changeover valve (3) on the intake plenum.
  The locks (arrows) must engage audibly.
- Position the electric changeover valve (2) on the intake plenum.
- Tighten the screws (1).

Electric changeover valve to intake plenum

TS6x20		Tightening torque	5 Nm

- Fasten the vacuum hoses on the intake plenum in the marked areas.



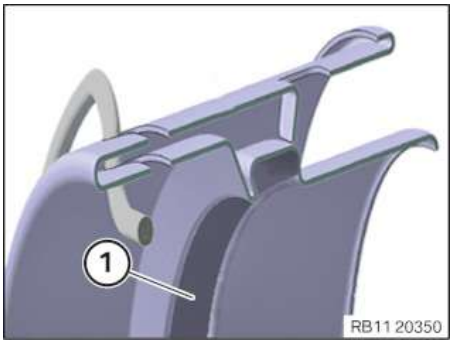
- Check the seal (1) for damage, and renew if necessary.

gardiagn.com

▸ **Replacing damaged seal**

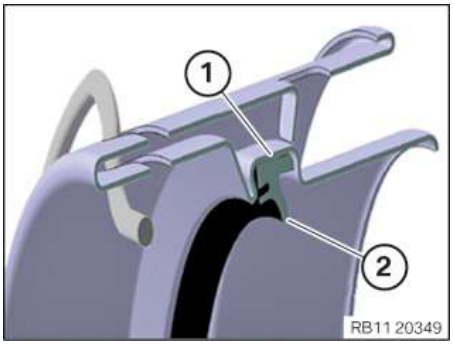
TECHNICAL INFORMATION

Do not use pointed or sharp-edged tools for the installation and/or removal.



- Remove damaged seal.
- Clean gasket groove (1) with a dry towel.

  The gasket groove (1) must be clean.



- Renew gasket.

  Parts: Gasket
- Install seal dry without lubricant or mounting agent.

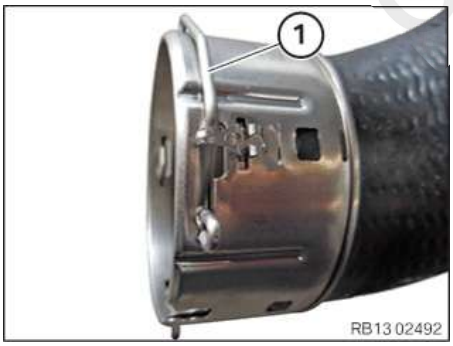
TECHNICAL INFORMATION

Incorrect assembly is possible. Ensure correct installation position.

- Feed in and install the seal.
- Make sure the seal is correctly installed in the gasket groove (1).
- Make sure that the sealing lip (2) is directed inwards as shown.



- Connect the pressure pipe to the throttle body until the locks (1) engage on both sides.



- Check that the locks (1) are correctly seated on the pressure pipe.

73 – Partially securing the wiring harness section on the intake plenum

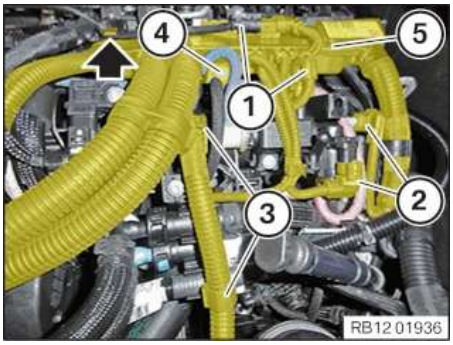
RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

- Route all cables without abrasions, do not trap and crush.

cardiagn.com



- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

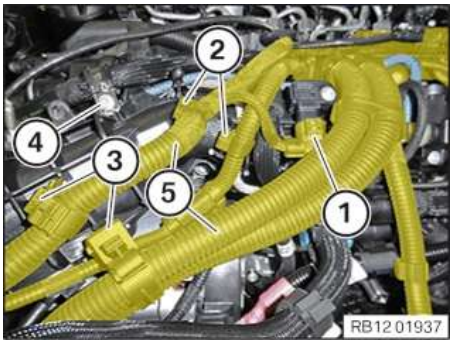
Wiring harness section to manifold

TS5x20		Tightening torque	3,6 Nm

- Secure clamps (3).
- Connect connectors (2) and lock.

  The connectors (2) must engage audibly.
- Secure the line at clamp (Arrow).
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



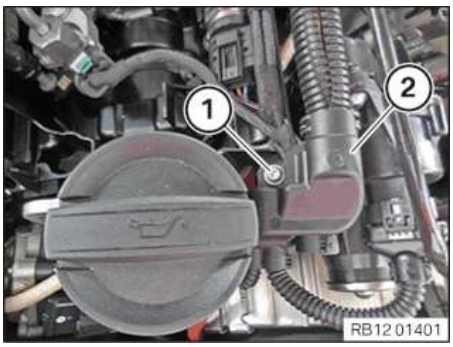
- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

Standard screw connection 4 Nm

Oval-head screw		Tightening torque	4 Nm

- Secure clamps (3).
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



- Guide in the wiring harness section (2) and install.
- Tighten down screw (1).

Wiring harness section to cylinder head cover

TS5x20		Tightening torque	3,6 Nm



- Connect connectors (1) and lock.

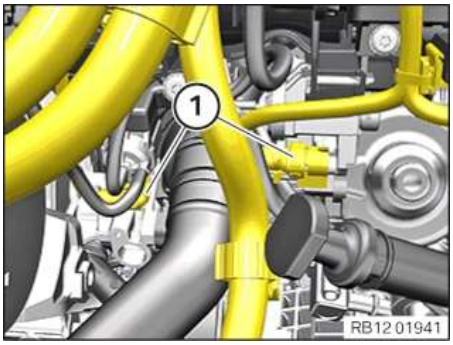
  The connector (1) must engage audibly.



- Connect the connector (1) and lock it.

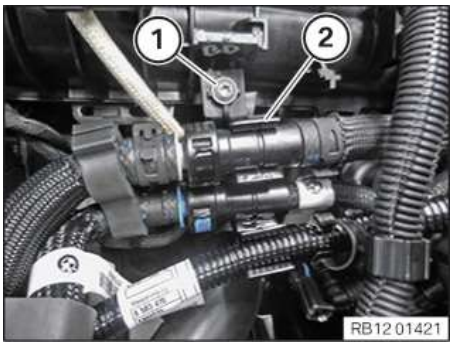
  The connector (1) must engage audibly.

cardiagn.com



- Connect connectors (1) and lock.

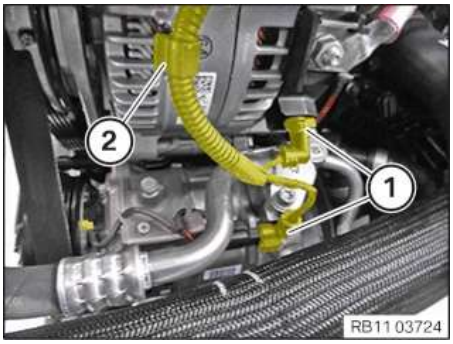
  The connectors (1) must engage audibly.



- Insert and install the holder (2).
- Tighten down screw (1).

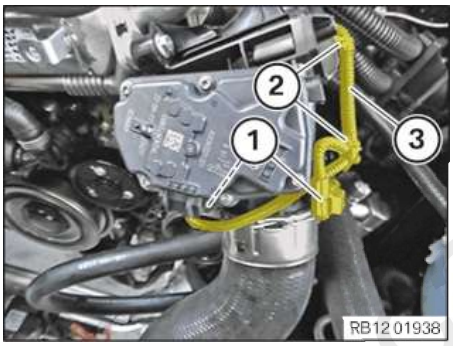
Holder on intake plenum

TS6X20		Tightening torque	5 Nm

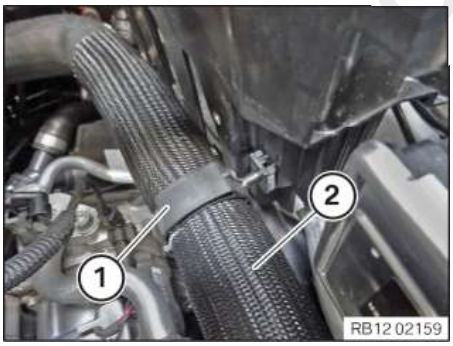


- Connect the connector (1) and lock it.

  The connectors (1) must engage audibly.
- Secure holder (2) to alternator.



- Guide in the wiring harness section (3) and install.
- Secure clamps (2).
- Connect connectors (1) and lock.



- Feed in and install coolant line (2).
- Lock holder (1).

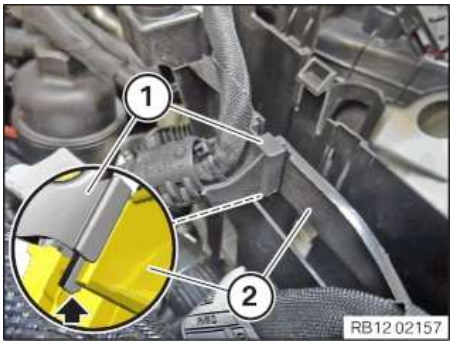
  The holder (1) must engage audibly.



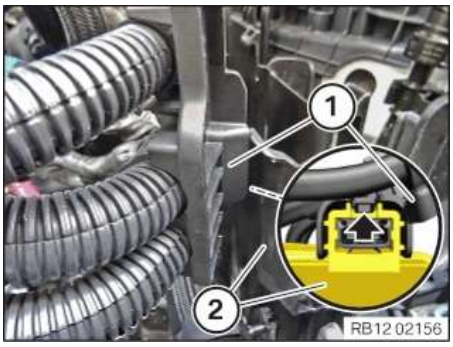
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.

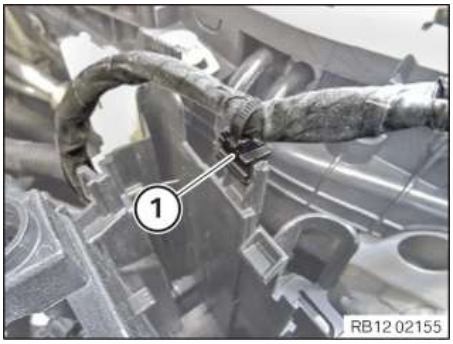
cardiagn.com



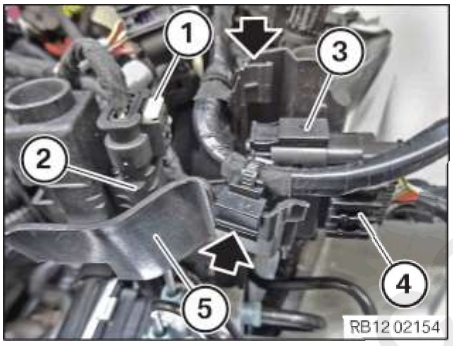
- Connect the cable clip (1) with the control unit holder (2) and lock it.
  Lock (arrow) must audibly engage.



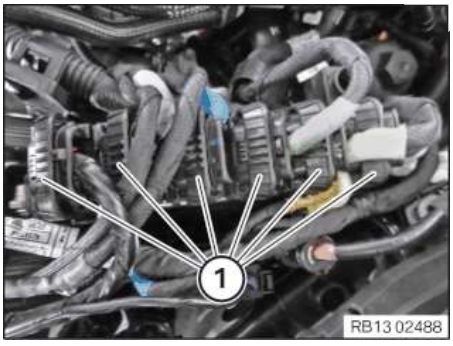
- Connect the cable clip (1) with the control unit holder (2) and lock it.
  Lock (arrow) must audibly engage.



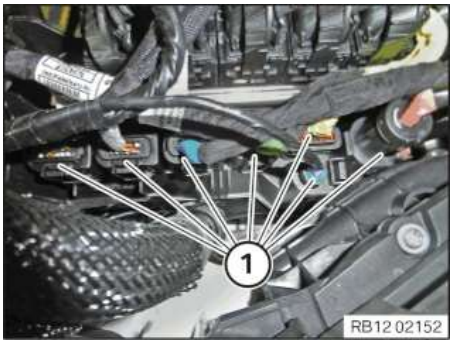
- Secure clamps (1).



- Connect and lock the connector (4) with the control unit holder (5).
  The connector (4) must engage audibly.
- Connect connectors (3) and lock.
  The connector (3) must engage audibly.
- Connect and lock the connector (2) with the control unit holder (5).
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.
  The connector (1) must engage audibly.
- Secure the clamps (arrows).

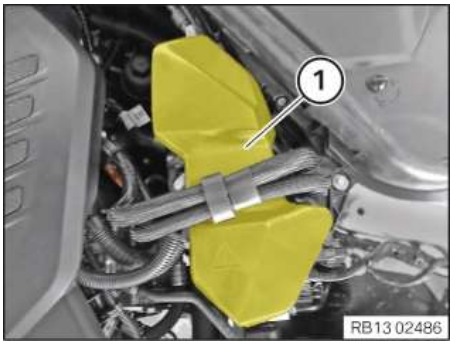


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



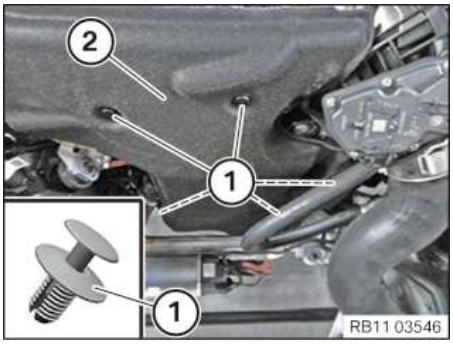
- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.

cardiagn.com



- Insert and install cover (1) into guides.

74 – Install acoustic cover for the engine, front

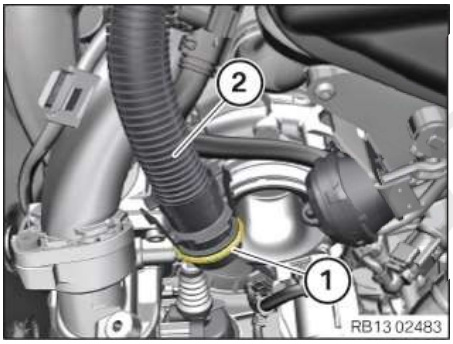


- Feed the acoustic cover (2) in and install.
- Secure the acoustic cover (2) with the expanding rivets (1).

75 – Installing the clean air pipe with resonator



- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.

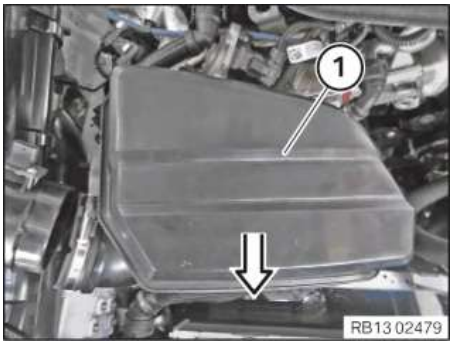


- Check the sealing ring (1) for the engine ventilation line (2) for damage and renew where required.



- Feed in and install clean air pipe with resonator (1) in the direction of the arrow.

cardiagn.com

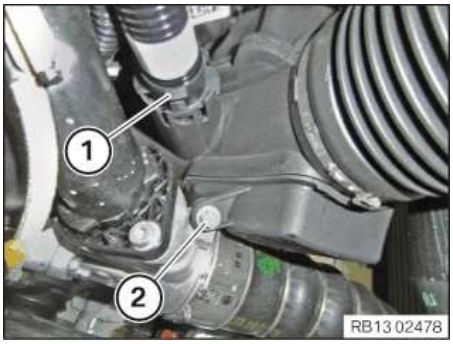


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

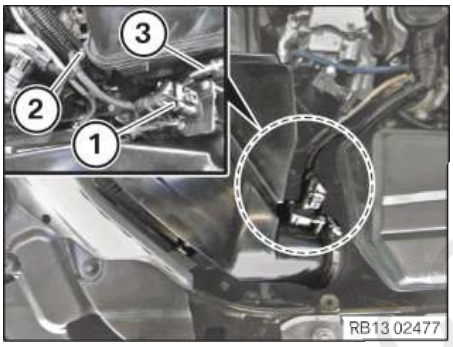
  The clamp (1) must engage audibly.



- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm



- Connect the clean air pipe with resonator to the intake filter housing.
- Tighten clamp (3).

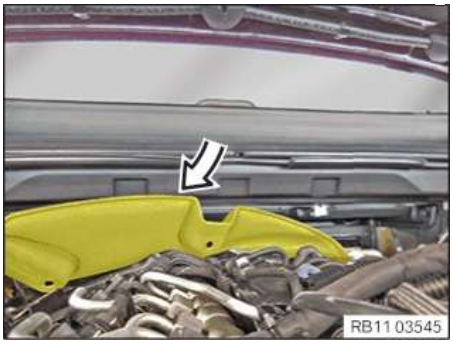
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

- Secure clamps (2).
- Connect connectors (1) and lock.

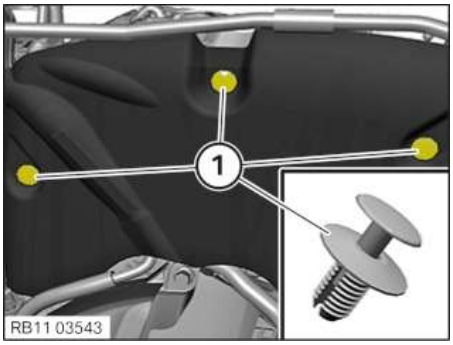
  The connector (1) must engage audibly.

76 – Installing acoustic cover at rear



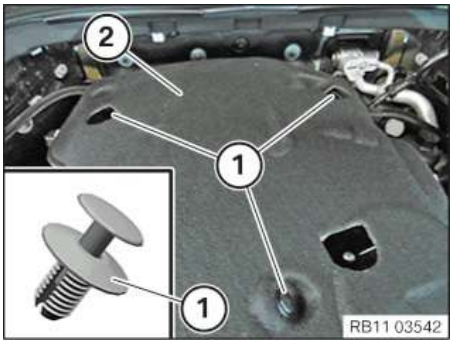
- Guide in the acoustic cover in the direction of the arrow and install it.

cardiagn.com



- Secure acoustic cover with the expanding rivets (1).

77 – Install the acoustic cover for the injectors



- Feed the acoustic cover (2) in and install.
- **If installed:** Secure the acoustic cover (2) with the expanding rivets (1) .

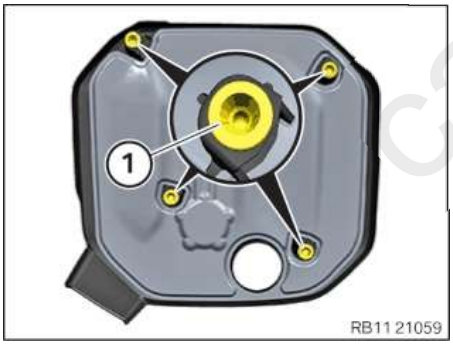
78 – Install acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



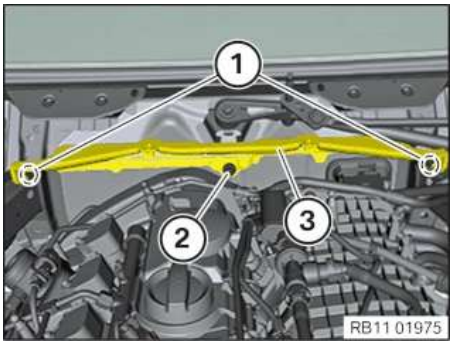
- Check the acoustic cover for correct fit of the rubber mounts (1).



- Clip in the acoustic cover (1) into the holders in the indicated areas.

79 – Installing centre bulkhead lower section

cardiagn.com

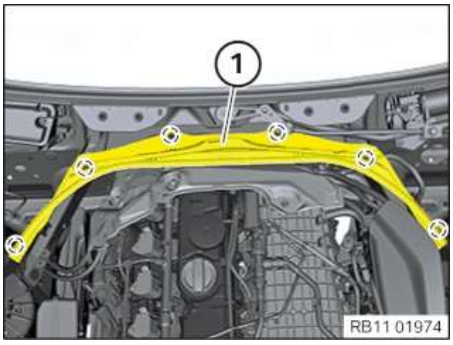


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

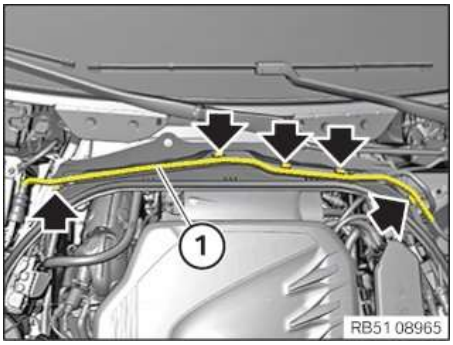
80 – Installing the centre bulkhead upper part



- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

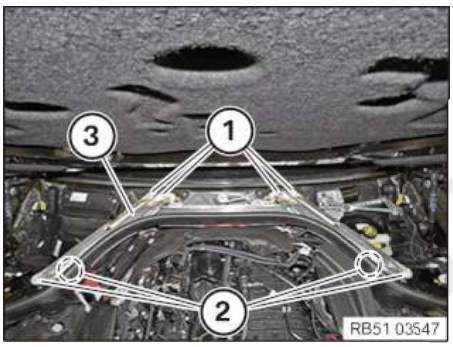
Bulkhead upper part to bottom bulkhead

		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

  Clip in the wire (1) into the holders (arrows).



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Install the tension strut (3) on the spring strut dome.
- Tighten the screws (1).

Tension strut on bulkhead

M10x25 screw		Tightening torque	56 Nm

- Renew screws (2).

  Parts: Screws
- Tighten the screws (2).

Tension strut to spring strut dome

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

81 – Install the seal for the bonnet

carmagn.com



- Press the rear bonnet seal (2) into the guide.
- Feed in cable (1) into the brackets.
- Check that the rear bonnet seal (2) and the cable (1) are seated correctly.

82 – Installing cowl panel cover

RISK OF DAMAGE

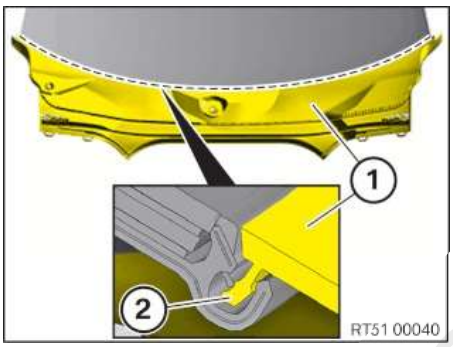
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

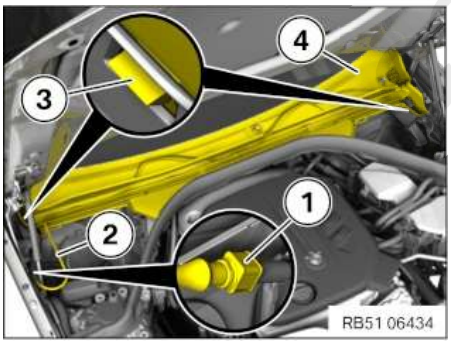
- Ensure correct installation of the components.
- Only use undamaged components.

TECHNICAL INFORMATION

Before installing the cowl panel cover it is **mandatory** to check that the 48 V line is routed correctly and fitted tightly.
An incorrectly laid or attached 48 V line can be damaged by the wiper kinematics.



- Push the cowl panel cover (1) into the latch mechanism (2) beginning on the side.



- Clip cowl panel cover (4)in by means of the latch mechanisms (3).
- Position windscreen wash hose (2) and connect windscreen wash hose (1)quick lock.

83 – Install left and right wiper arm

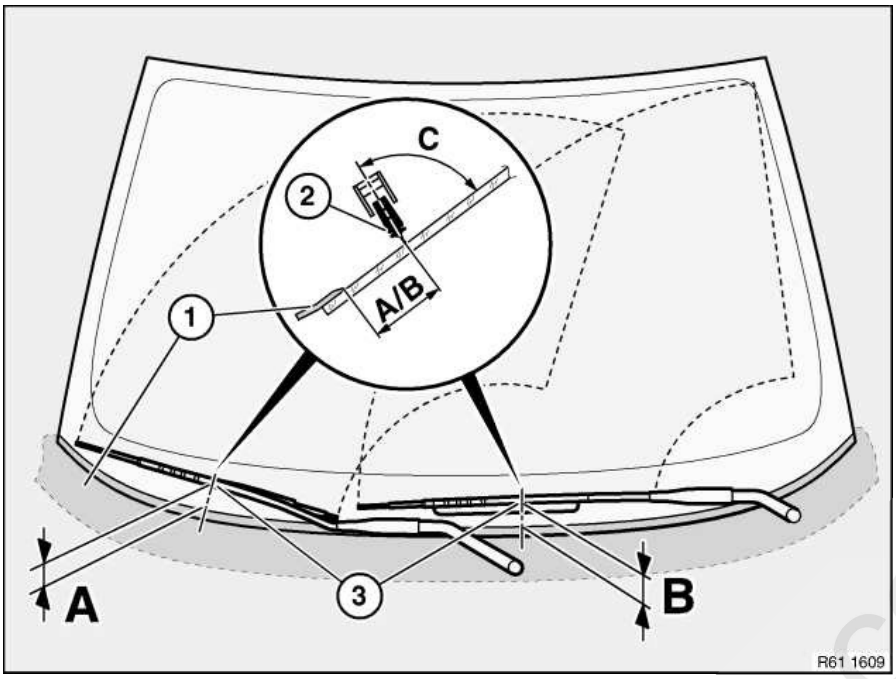
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

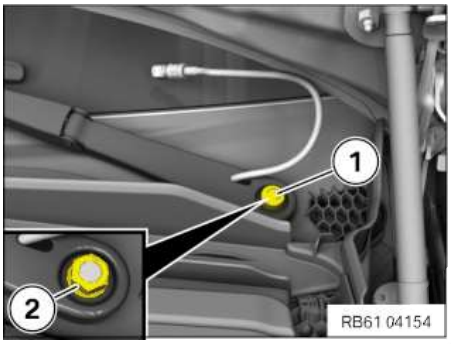
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- Connect the wiper arm (3).
- Correctly position the wiper arm (2) in relation to the window edge (1).

Distance from window pane edge to wiper blade

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

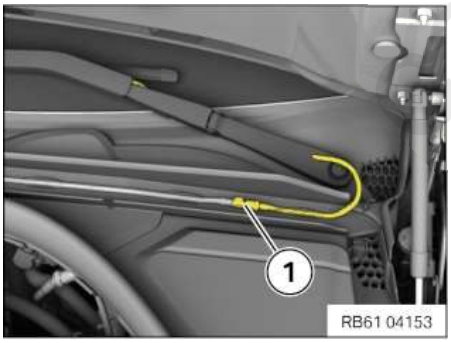


- Tighten nut (2).

Windscreen wiper arm

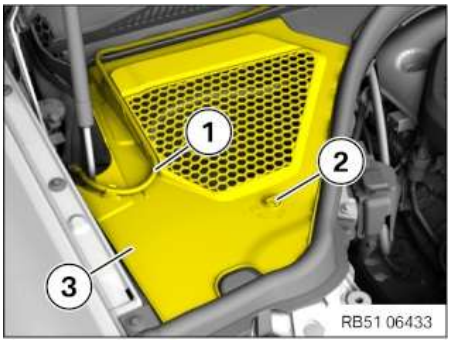
Combination hexagon nut		Tightening torque	35 Nm

- Connect the protective cap (1).



- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

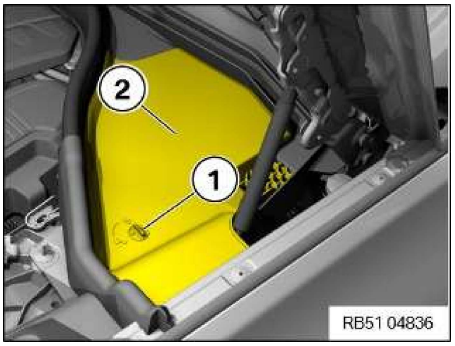
84 – Install the rear right engine compartment cover



- Position the cover of the engine compartment on the rear right (3).
- Close lock (2).
- Insert washer fluid hose (1) into the guides.

85 – Install the cover of the engine compartment on the rear left

cardiagn.com



- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

86 – Connecting all battery earth leads



- See additional information.

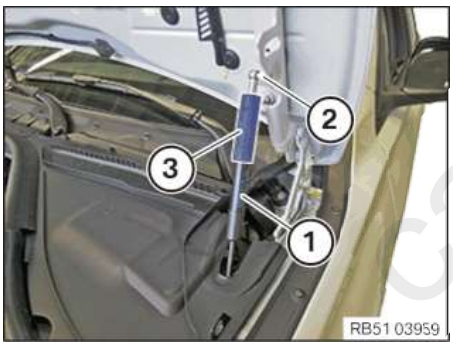
87 – Take bonnet out of the service position

CAUTION

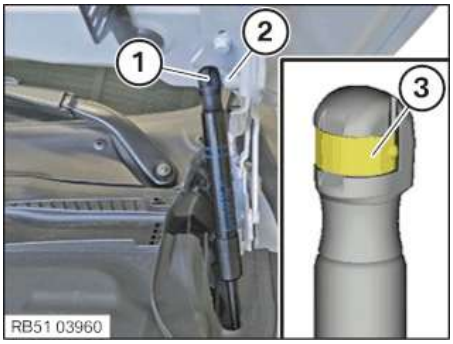
Shutting bonnet or tailgate.

Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.



- Support the bonnet by hand.
- Remove the special tool (3) from the ball pin (2).
- Pull off the special tool (3) from the gas pressure spring (1).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.



- Check the clamp (3) is fitted correctly.
- Connect ball socket (1) to ball pin (2).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.

Additional Information

Overview of Tightening Torques

Special tool 2 365 488 to engine Used in step 4145

M8x60		Tightening torque		19 Nm

Standard screw connection M6			Used in step 44
M6		Tightening torque	8 Nm

Chain tensioner piston to cylinder head			Used in step 44
22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

Pressing the timing chain with special tool 2 354 962			Used in step 44
Spindle	The torque must not be exceeded.		20 Nm

Starter motor to engine			Used in step 48
M8X60		Tightening torque	19 Nm

Battery positive lead to starter			Used in step 48
M8		Tightening torque	13,5 Nm

Diesel particulate filter V-clip to exhaust turbocharger			Used in step 50
V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

Bracket to diesel particulate filter top			Used in step 50
M8		Tightening torque	19 Nm

Bracket to transmission for diesel particulate filter holder bottom			Used in step 50
M8X20		Tightening torque	19 Nm

Lower holder to diesel particulate filter			Used in step 50
M8		Tightening torque	19 Nm

Coolant lines for SCR metering module			Used in step 50
M6X16		Tightening torque	8 Nm

Nitrogen oxide sensor before SCR catalytic converter			Used in step 51
Sensor		Tightening torque	50 Nm

Monitoring oxygen sensor			Used in step 52
Sensor		Tightening torque	50 Nm

Rear silencer to body / bumper support			Used in step 53
M8	Replace nuts.	Tightening torque	19 Nm

Exhaust system to rear axle carrier			Used in step 53
M8 nut		Tightening torque	19 Nm

Exhaust system to transmission			Used in step 53
M8		Tightening torque	19 Nm

Exhaust system to diesel particle filter			Used in step 53
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

SCR metering module V-clip to exhaust system			Used in step 53
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm

Exhaust-gas temperature sensor upstream of SCR catalytic converter			Used in step 53
Sensor		Tightening torque	30 Nm

Diesel particulate sensor to exhaust system			Used in step 53
Sensor		Tightening torque	50 Nm

cardiagn.com

Nitrogen oxide sensor downstream of SCR catalytic converter			Used in step 53
Sensor		Tightening torque	55 Nm

Connecting support to tunnel			Used in step 54
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

Diffuser / underbody panelling			Used in step 55
Nuts and screws		Tightening torque	3 Nm

Underbody protection			Used in step 5658
Hexagon screw		Tightening torque	3 Nm

Underbody panelling			Used in step 57
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Underbody protection, steering, to front axle support			Used in step 59
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support			Used in step 59
Hexagon bolt M6		Tightening torque	8 Nm

Underbody protection of the steering gear			Used in step 60
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

Wheel arch trim panel, front			Used in step 60
Thermoplastic hexagon screw		Tightening torque	2,6 Nm

Underbody protection front			Used in step 61
Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Cylinder head cover to cylinder head			Used in step 62
M6		Tightening torque.	8,5 Nm

Heat shield to exhaust manifold			Used in step 63
M6x12			10 Nm

Bracket on cylinder head cover			Used in step 64
		Tightening torque	5 Nm

Battery positive lead to battery positive terminal			Used in step 64
M8		Tightening torque	19 Nm

Differential pressure sensor of diesel particulate filter on cylinder head cover			Used in step 65
TS5x20		Tightening torque	4 Nm

Heat shield to exhaust manifold			Used in step 66
M6x12		Tightening torque	10 Nm

Banjo bolt for exhaust pressure pipe to exhaust manifold			Used in step 66
Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm

cardiagn.com

Exhaust gas pressure pipe to sensor system holder			Used in step 66
TS6x20		Tightening torque	5,7 Nm

Clamping claw facing to cylinder head cover			Used in step 67
M6		Tightening torque	10 Nm

Injector to cylinder head cover			Used in step 67
M8		Tightening torque	8 Nm
		Angle of rotation	120 °

Rail to cylinder head cover			Used in step 68
M8		Tightening torque	19 Nm

High pressure lines between high pressure pump and rail			Used in step 69
High-pressure pipe		Tightening torque	24.5 Nm

High pressure lines between injector and rail			Used in step 70
High-pressure pipe		Tightening torque	24.5 Nm

Intake plenum to cylinder head			Used in step 72
M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum			Used in step 72
		Tightening torque	10 Nm

Electric changeover valve to intake plenum			Used in step 72
TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold			Used in step 73
TS5x20		Tightening torque	3,6 Nm

Standard screw connection 4 Nm			Used in step 73
Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover			Used in step 73
TS5x20		Tightening torque	3,6 Nm

Holder on intake plenum			Used in step 73
TS6X20		Tightening torque	5 Nm

Clean air pipe to exhaust turbocharger			Used in step 75
M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing			Used in step 75
Clamp		Tightening torque	3 Nm

Bulkhead lower part to body			Used in step 79
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead			Used in step 80
		Tightening torque	3 Nm

Tension strut on bulkhead			Used in step 80
M10x25 screw		Tightening torque	56 Nm

cardiagn.com

Tension strut to spring strut dome — Used in step 80

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm — Used in step 83

Combination hexagon nut		Tightening torque	35 Nm

Overview of Special Tools

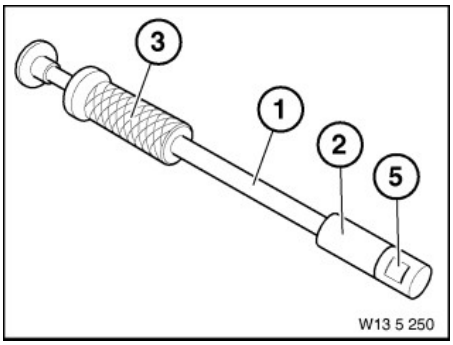
0 493 339 (13 5 252) Bush



Common — Used in step 22

Usage	(Threaded bush)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 321 (13 5 250) Puller



Common — Used in step 22

Usage	For removing injector nozzles or injectors from cylinder head
Included in the tool or work	
Storage location	A16
Replaced by	
In connection with	
SI-Number	01 06 98 (306)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 338 (13 5 251)		**Rod** (guide rod)	
2	0 493 339 (13 5 252)		**Bush** (Threaded bush)	
3	0 493 340 (13 5 253)		**Weight** (Weight)	
4	0 493 379 (13 5 254)		**Claw** (Clamping claw) For removal of injector nozzles / engine: M57	
5	0 495 579 (13 5 255)		**Adapter** For removing steering shaft on E85. Refer to SI 01 11 06 (265)	

0 493 340 (13 5 253) Weight

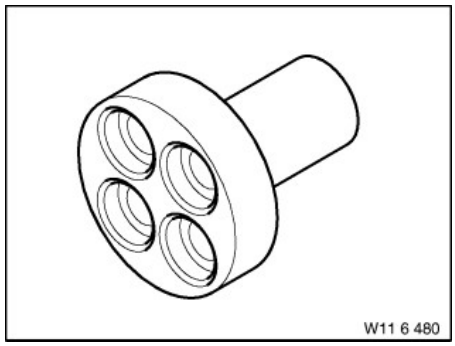


Common — Used in step 22

Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

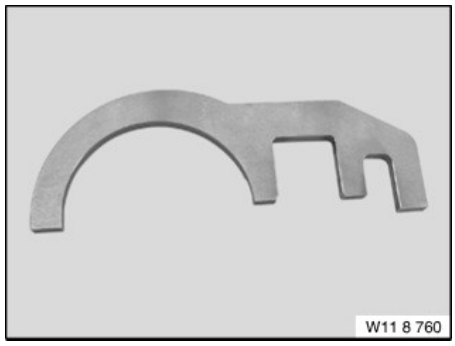
carolagn.com

0 493 380 (11 6 480) Connector



Common	Used in step 414445
Usage	For turning over engine at crankshaft hub (vibration absorber).
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	01 11 98 (338)

0 496 112 (11 8 760) Gauge



Common	Used in step 41434546
Usage	For securing camshaft at TDC.
Included in the tool or work	
Storage location	B24
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

2 365 488 Adapter



Common	Used in step 41424547
Usage	For disconnecting the crankshaft at the top dead centre. (longitudinal installation with automatic transmission only).
Included in the tool or work	
Storage location	C56
Replaced by	
In connection with	
SI-Number	01 46 14 (191)

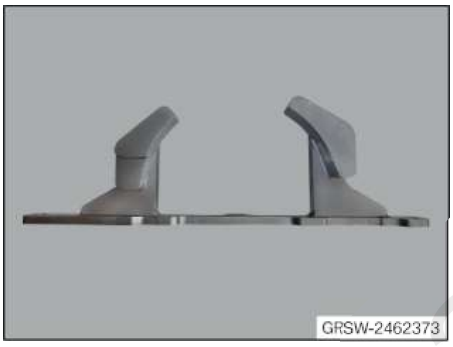
cardiagn.com

2 288 380 Locating stud



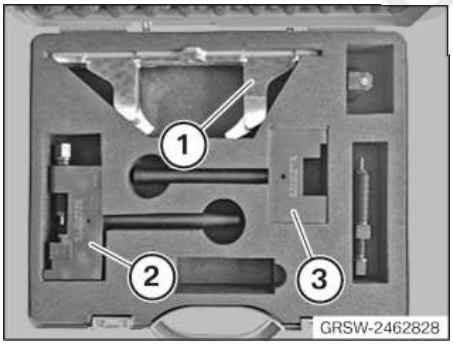
Common	Used in step 41424547
Usage	For disconnecting the crankshaft at the top dead centre. Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).
Included in the tool or work	
Storage location	A56
Replaced by	
In connection with	
SI-Number	01 04 14 (071)

2 462 373 Holder



Common	Used in step 44
Usage	For the exchange of the top timing chain of the engine: B47 (Included in tool set 2462828).
Included in the tool or work	2 462 828
Storage location	Individual
Replaced by	
In connection with	83302462828
SI-Number	01 02 20 (711)

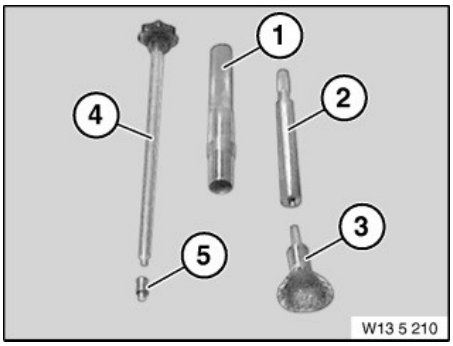
2 462 828 Riveting tool



Common	Used in step 44
Usage	For opening and riveting the top timing chain at replacement. Consisting of: 2462373 Holder, 2354981 riveting tool for opening the timing chain 2354959, riveting tool for riveting the timing chain, replaces the riveting tool set 2354985
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 02 20 (711)

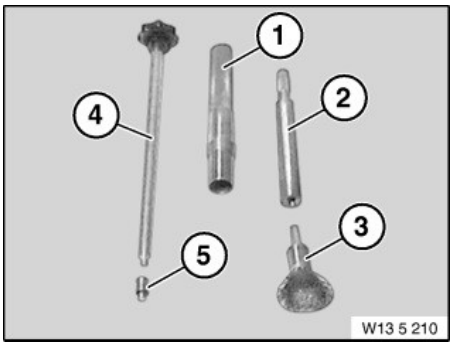
cardiagn.com

0 493 763 (13 5 215) Plug



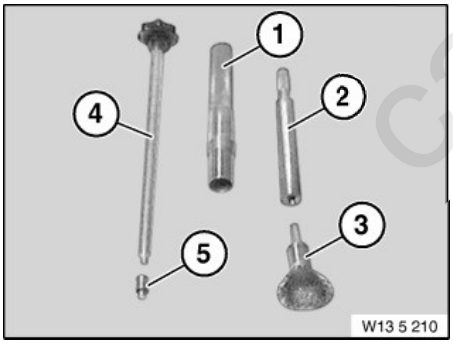
Common	Used in step 67
Usage	(Seal plug)
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 762 (13 5 214) Rod



Common	Used in step 67
Usage	(Mounting rod) For the seal plug
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 758 (13 5 210) Tool



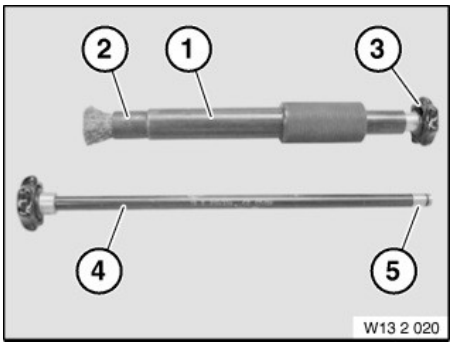
Common	Used in step 67
Usage	(Cleaning set) For injector channels
Included in the tool or work	
Storage location	B4
Replaced by	
In connection with	
SI-Number	01 05 00 (574)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 759 (13 5 211)		**Holding sleeve** (Guide sleeve)	
2	0 493 760 (13 5 212)		**Holder** (Brush holder)	
3	0 493 761 (13 5 213)		**Brush head**	
4	0 493 762 (13 5 214)		**Rod** (Mounting rod) For the seal plug	
5	0 493 763 (13 5 215)		**Plug** (Seal plug)	

cardiagn.com

0 496 150 (13 2 020) Tool



Common Used in step 67

Usage	(Cleaning kit) For cleaning the injector shaft.
Included in the tool or work	
Storage location	A87
Replaced by	
In connection with	
SI-Number	01 07 07 (355)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 496 151 (13 2 021)		**Holding sleeve** (Guide sleeve) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
2	0 496 152 (13 2 022)		**Holder** (Brush holder) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
3	0 496 153 (13 2 023)		**Brush head** Remaining inventories will be sold off, followed by discontinuation and then available as part of complete special tool 13 2 020 = 83 30 0 496 150 only	
4	0 496 154 (13 2 024)		**Rod** (Mounting rod) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
5	0 496 155 (13 2 025)		**Plug** (Seal plug) Available as part of complete special tool 13 2 020 = 83 30 0 496 150 only.	

Overview Technical Data

Distance from window pane edge to wiper blade Used in step 83

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

Links

General repair instructions	Used in step
11 00 ... Overview of consumables (Electronic Parts Catalogue)	67

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	386
61 20 900 Disconnecting and connecting battery earth lead	386
61 20 900 Disconnecting and connecting battery earth lead	386
61 20 900 Disconnecting and connecting battery earth lead	386
61 20 900 Disconnecting and connecting battery earth lead	386
61 20 900 Disconnecting and connecting battery earth lead	386

cardiagn.com

61 20 900 Disconnecting and connecting battery earth lead	386
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	386
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	386
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	386
61 20 900 Disconnecting and connecting battery earth lead	386
61 20 900 Disconnecting and connecting battery earth lead	386
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	386
61 20 900 Disconnecting and connecting battery earth lead	386
61 20 900 Disconnecting and connecting battery earth lead	386
61 20 900 Disconnecting and connecting battery earth lead	386
61 20 900 Disconnecting and connecting battery earth lead	386
61 20 900 Disconnecting and connecting battery earth lead	386
61 20 900 Disconnecting and connecting battery earth lead	386
61 20 900 Disconnecting and connecting battery earth lead	386
61 20 900 Disconnecting and connecting battery earth lead	386
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	386
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	386
61 20 900 Disconnecting and connecting battery earth lead	386
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	386
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	386
61 20 900 Disconnecting and connecting battery earth lead

11 33 050 Removing and installing/replacing all rocker arms

PRELIMINARY WORK

1 – Bring front compartment lid in the service position

Prerequisite

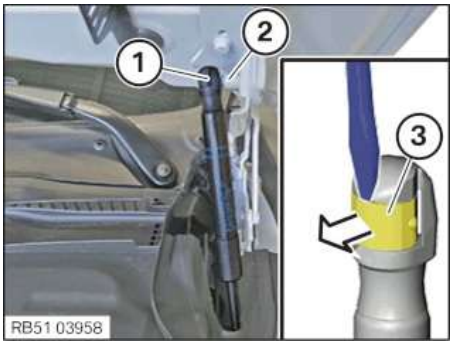
Engine compartment lid is open.

CAUTION

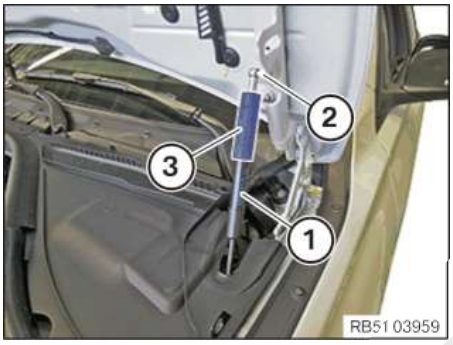
Shutting bonnet or tailgate.

Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.



- Lift clamp (3) slightly using a screwdriver, in the direction of the arrow.
- Lift off ball socket (1) from ball pin (2).
- Repeat the operation on the other side of vehicle.

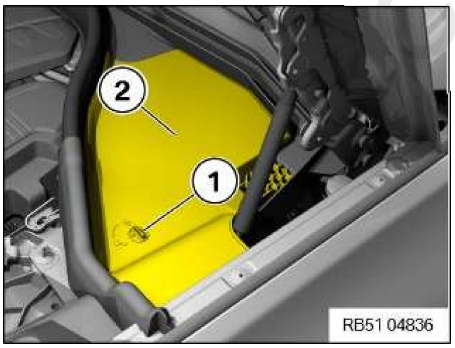


TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

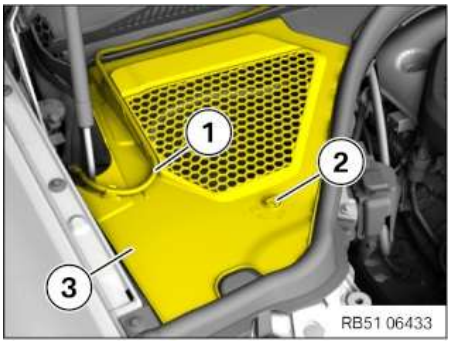
- Remove the bonnet support and open the bonnet further.
- Pull special tool or or (3) over gas pressure spring (1).
- Place special tool on the ball pin (2) and engage using force.
- Repeat the operation on the other side of vehicle.

2 – Remove the cover of the engine compartment at the rear left



- Loosen the lock (1).
- Remove the cover (2) of the rear left engine compartment.

3 – Remove the cover of the rear right engine compartment



- Release washer fluid hose (1) from the guides.
- Loosen the lock (2).
- Remove the cover (3) of the rear right engine compartment.

4 – Deactivating the 48 V electrical system

Prerequisite

Ignition is switched off.

WARNING

Deactivation of the 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Make sure that **no battery charger** is connected to the jump start terminal point in the engine compartment.
- For vehicles with additional electrical systems (48 V electrical system, high-voltage vehicle electrical system), it is mandatory to deactivate them **before** disconnecting the vehicle battery.

WARNING

Deactivation of the 48 V electrical system.

Risk of short circuits! Risk of fire!

- Make sure that **no charger** is connected to the jump start support point in the engine compartment.

RISK OF DAMAGE

Damage to 48-V battery

If a 48-V battery that is disconnected from the electrical system is activated, the battery electronics will be damaged.

- Only carry out activation of the 48V electrical system with a completely connected 48-V battery.

TECHNICAL INFORMATION

Follow notes for 48-V battery. See further information 6120 ... Notes on 48-V battery.



- Deactivate the 48V electrical system by opening the bonnet.

  The deactivation takes place automatically.

Check

cardiagn.com



TECHNICAL INFORMATION

Zero voltage (48V electrical system is switched off) is displayed only in PAD mode.

- Press the START-STOP button quickly 3 times without stepping on the brake pedal to establish the PAD mode.
- Check isolation from the supply in the instrument cluster in PAD mode.

desired state

- The Check Control message "48V electrical system switched off." (1) is displayed.

Result

» **The absence of voltage** cannot be determined by means of the Check Control message "48V electrical system switched off:" (1). Work is not permitted to be started.

Measure

- Carry out the service function "48 V electrical system deactivation".
  - Vehicle management > Service functions > Voltage supply > Deactivate 48 V electrical system

Only when the Check Control message “48 V electrical system switched off.” (1) is displayed in the instrument cluster is it permitted to disconnect the 12 V battery.

If the absence of voltage is not indicated clearly, contact Technical Support.

Result

» The Check Control message signals that the 48V electrical system has been switched off.

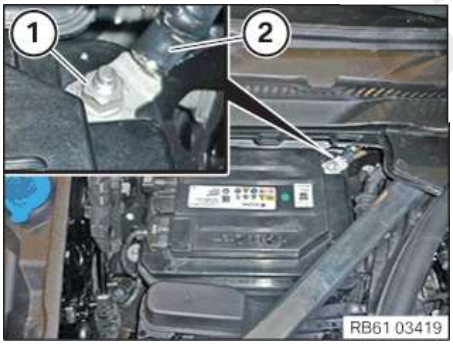
Measure

- Exit PAD mode by pressing the START-STOP button once without depressing the brake pedal.

The work “Disconnecting the negative battery cable of the 48-V battery” can be started.



- Unlock and disconnect plug connection (1) of the CAN bus.
- Release the clip (2).



- Loosen nut (1).
- Pull off negative battery cable (2) of the 48-V battery from the negative battery terminal, set it aside and secure it.



WARNING

Unprotected battery terminals.

Risk of short circuits! Risk of fire!

- Cover the vehicle battery.

- Cover the vehicle battery with the special tool as shown.
- Position the battery earth lead (1) as shown.

5 – Disconnecting all battery earth leads

ardiagn.com



- See additional information.

6 – Removing the wiper arm on the left and right

NOTICE

Description is for left component only. Procedure on the right side is identical.

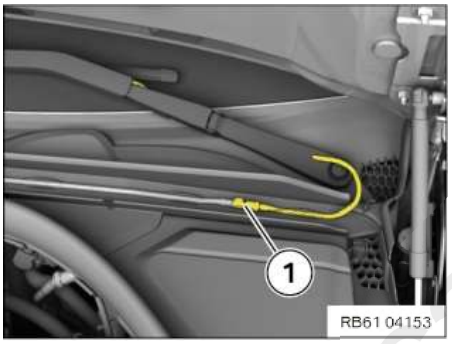
▶ **Remove the wiper arm**

RISK OF DAMAGE

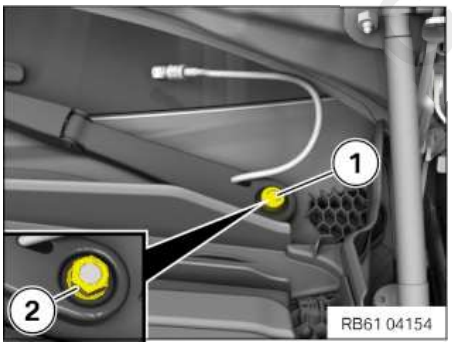
Damage to wiper console.

While removing the wiper arms without using special tool, the wiper console can break.

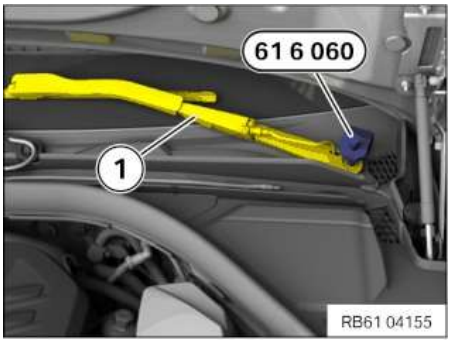
- Removing the wiper arms must be carried out only using the prescribed special tool.
- Do **not** lever off the wiper arm because otherwise the wiper console may break at the predetermined breaking point for active pedestrian protection.



- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.



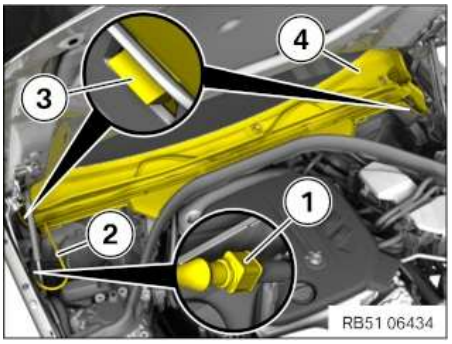
- Remove the protective cap (1).
- Loosen nut (2).



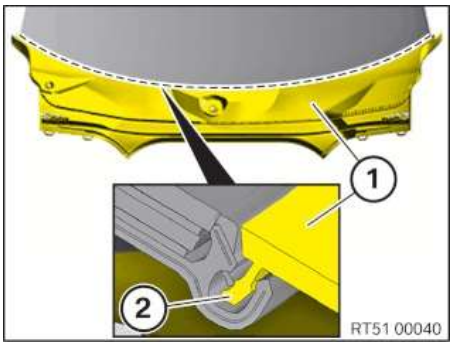
- Pull off the wiper arm (1) using special tool .

7 – Remove cowl panel cover

cardiagn.com



- Release snap fastener (1) of the washer fluid hose (2) and put the washer fluid hose (2) to one side.
- Unclip clips (3) on the cowl panel cover (4).



- Pull the cowl panel cover (1) upward out of the latch mechanism (2) beginning on the side.

8 – Remove the seal for the rear bonnet

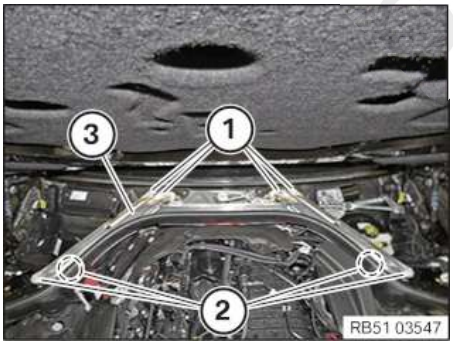


- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

9 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

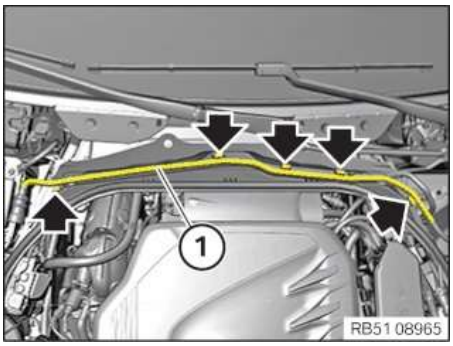
Driving without the strut brace/front-end strut or tension strut is not permitted.



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

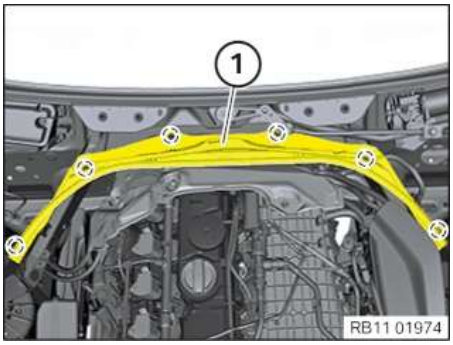
- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.



- **Version with mild hybrid technology:**

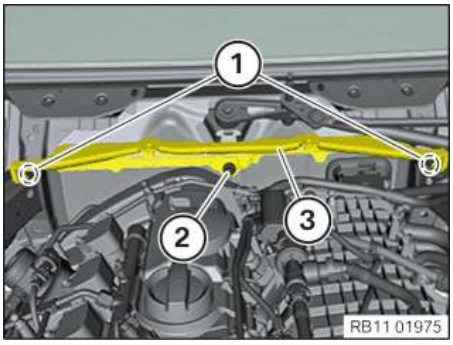
  Unclip the wire (1) at the holders (arrows).

carsdiagn.com



- Unscrew the bolts in the marked areas.
- Remove the centre bulkhead upper part (1).

10 – Removing the centre bulkhead lower section



- Loosen screws (1).
- Loosen nut (2).
- Remove the centre bulkhead lower part (3).

11 – Removing the acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

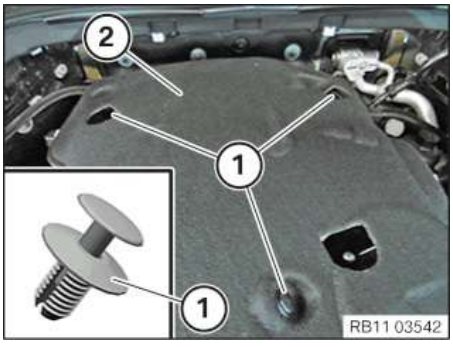
Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



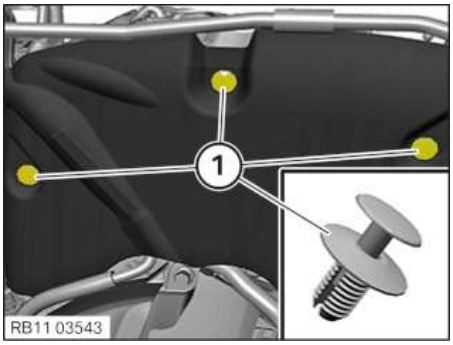
- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

12 – Remove the acoustic cover for the injectors

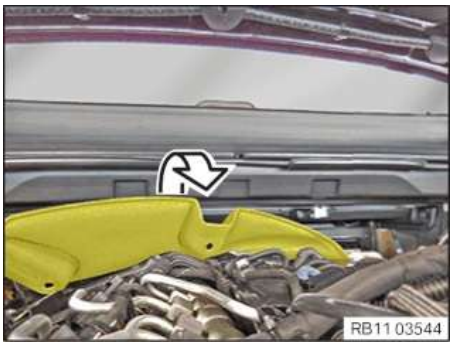


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

13 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).



- Guide out and remove the acoustic cover in the direction of the arrow.

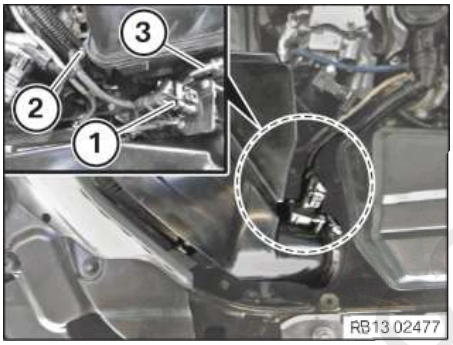
14 – Removing the clean air pipe with the resonator

WARNING

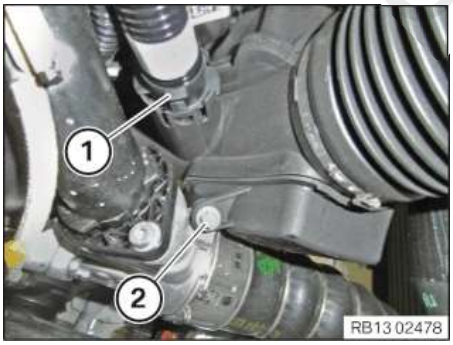
Hot surfaces.

Risk of burning!

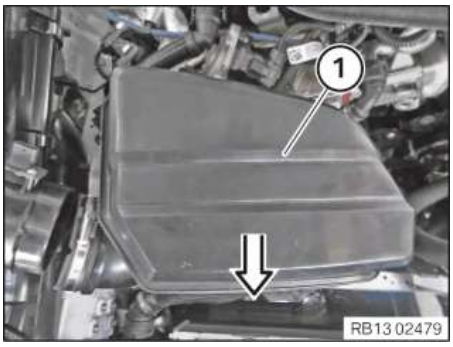
- Perform all work only on components that have cooled down.



- Unlock plug connection (1) and disconnect.
- Loosen clamp (2).
- Unfasten clamp (3).
- Separate the clean air pipe with resonator from the intake filter housing.



- Unlock engine ventilation line (1), disconnect it and place it aside.
- Loosen screw (2).



- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Unlock and loosen clamp (1).



- Feed out and remove clean air pipe with resonator (1) in the direction of the arrow.

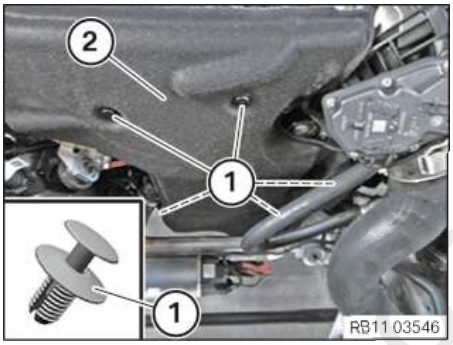
15 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

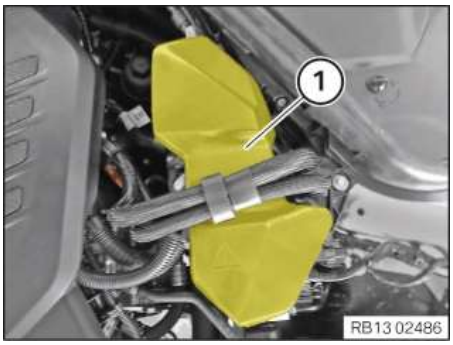
Risk of burning!

- Perform all work only on components that have cooled down.



- Release and remove expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

16 – Remove the cover for the DDE control unit



- Pull off, guide out and remove cover (1) upwards.

17 – Partially releasing the wiring harness section on the intake plenum

cardiagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

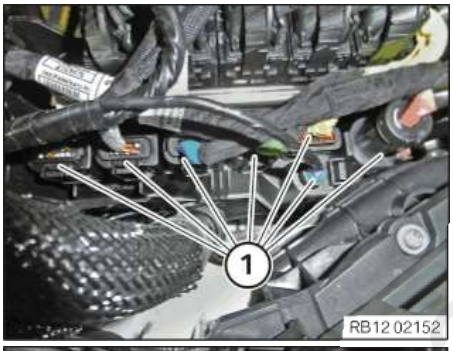
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

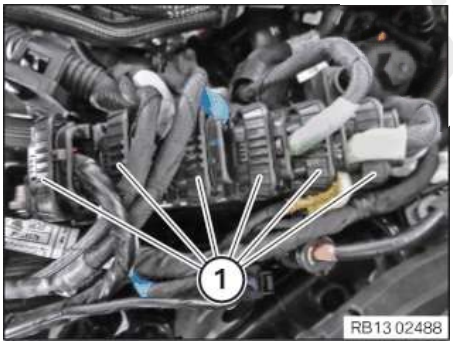
- Do not pull on the wires when disconnecting connectors and plug connections.

TECHNICAL INFORMATION

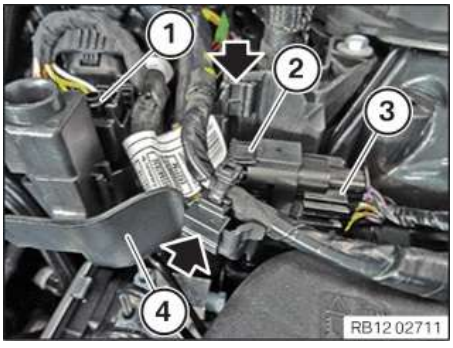
Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.



- Unlock and disconnect plug connections (1).

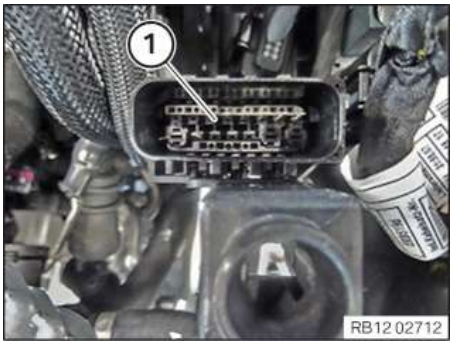


- Unlock and disconnect plug connections (1).

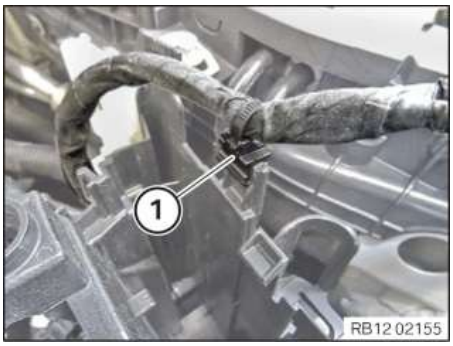


- Unlock plug connection (1) and disconnect.
- Unlock plug connection (2) and disconnect.
- Release the connector (3) and disconnect from the control unit holder (4).
- Release the clamps (arrows).

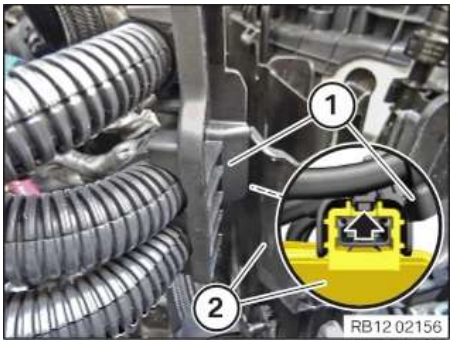
cardiagn.com



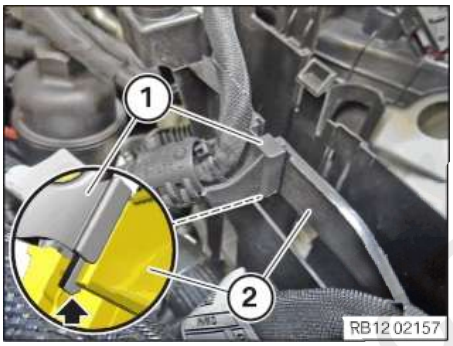
- Unlock plug connection (1) and disconnect.



- Loosen clamp (1).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).

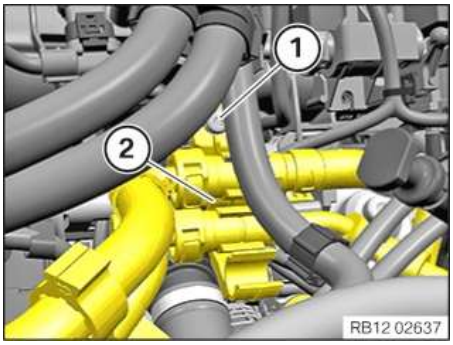


- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.

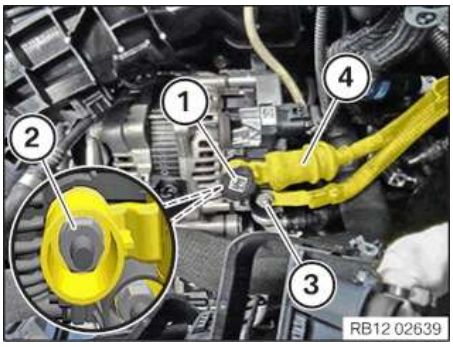


- Unlock holder (1) and feed out coolant line (2) and place it aside.

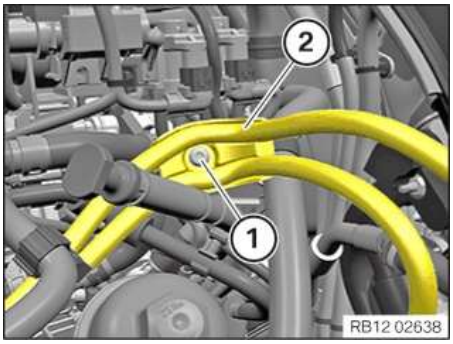
cardiagn.com



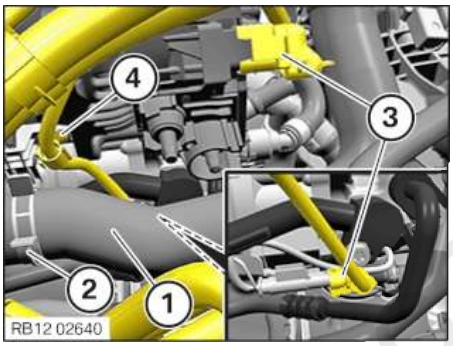
- Release the screw (1).
- Guide out fuel lines (2) and set them aside.



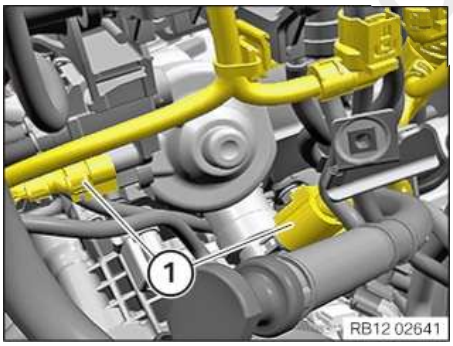
- Guide out and remove the lid (1).
- Release the nuts (2) and (3).
- Feed out positive battery cables (4) and place to one side.



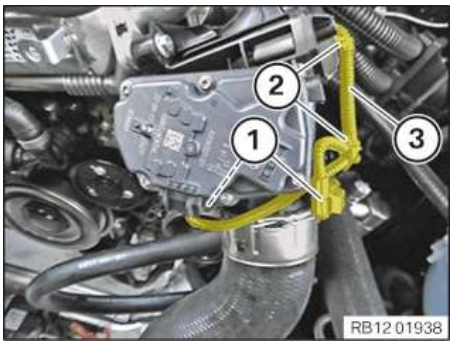
- Release the screw (1).
- Guide out the positive battery cables (2) and set them aside.



- Release the coolant line (1) from the holder (2) .
- Unlock plug connections (3) and disconnect.
- Loosen clamp (4).



- Unlock and disconnect plug connections (1).



- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.

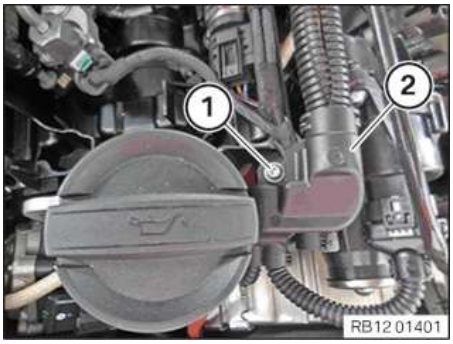
cardiagn.com



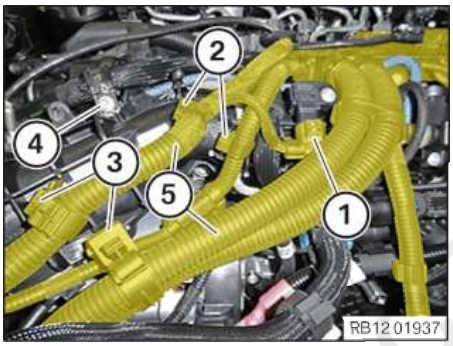
- Unlock and loosen connector (1).



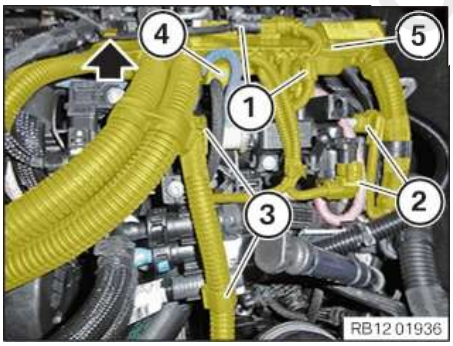
- Unlock plug connection (1) and disconnect.



- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.



- Unlock plug connection (1) and disconnect.
- Loosen clamps (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.



- Unlock and disconnect plug connections (1).
- Release line from clamp (Arrow).
- Unlock and disconnect plug connections (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.

18 – Removing the intake plenum

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

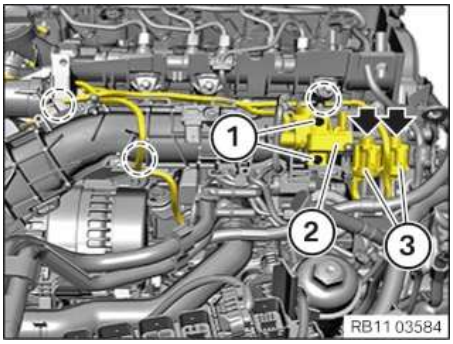
cardiagn.com



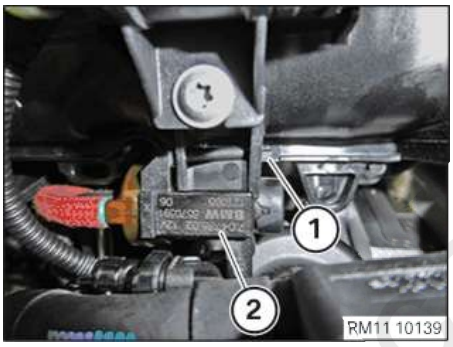
- Unlock clamp (1) and engage in this position.



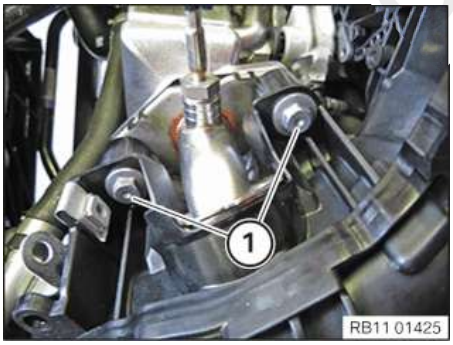
- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.



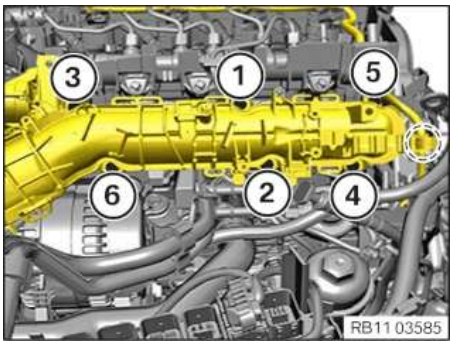
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.

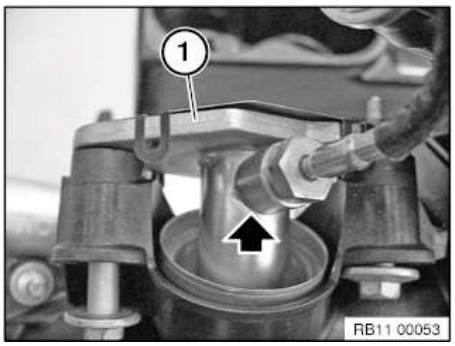


- Loosen screws (1).



- Detach the leakage oil lines in the marked area from the intake plenum.
- Loosen screws in the order (6) to (1).
- Guide the intake plenum out forwards and remove it.

cardiagn.com



- Remove the exhaust-gas recirculation pipe (1) (arrow).

19 – Detaching the leakage oil line from the injectors

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

WARNING

Hot surfaces.

Risk of burning!

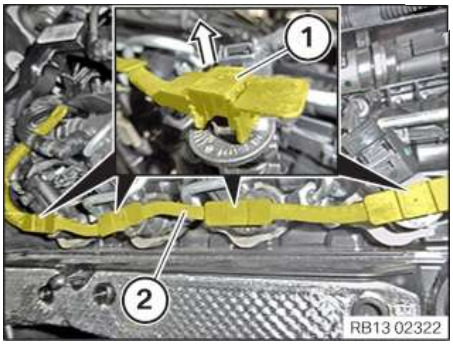
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

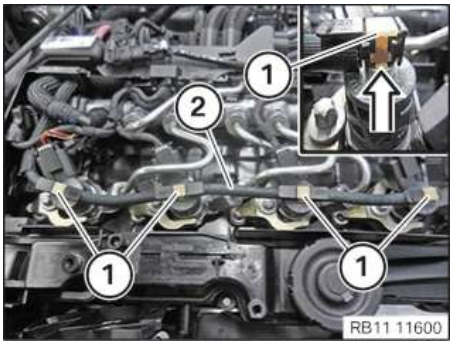


- **Version A:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.



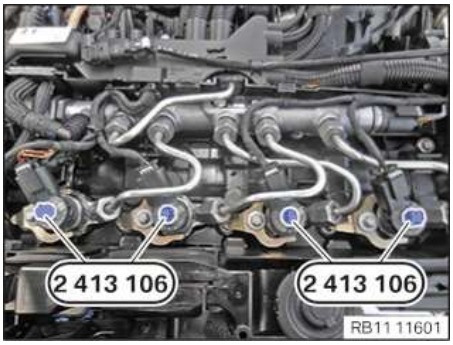
- **Version B:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.

cardiagn.com



- Seal open connections with special tools .

20 – Remove the high pressure lines between the injector and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

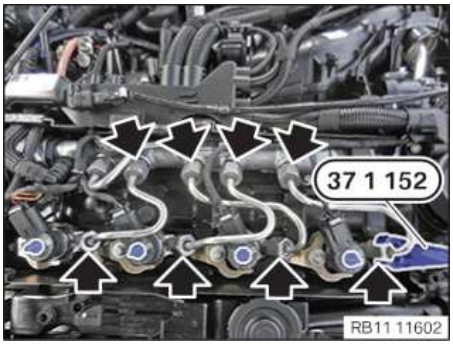
TECHNICAL INFORMATION

If several high pressure lines are removed, ensure that each high pressure line is installed in its original location. Label high pressure lines.

cardiagn.com

TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.



- Release the high pressure lines (arrows) with the special tool .
  Reset the special tool early on to prevent bending of the high pressure line.
- Catch and dispose of escaping fuel.
- Feed out and remove the high pressure lines (arrows).
- Seal off all the open cable connections with the special tool .

21 – Remove the high pressure line between the high pressure pump and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Hot fluids.

Risk of scalding!

- Conduct all work in the vehicle wearing appropriate personal protective equipment only.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

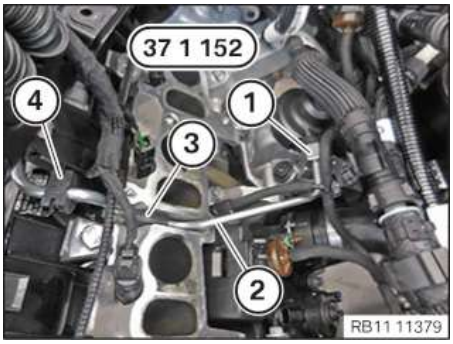
cardiagn.com

TECHNICAL INFORMATION

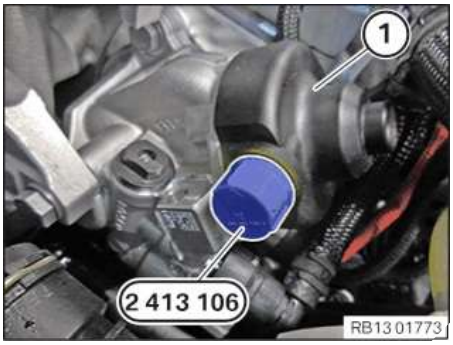
Reset special tool in early to avoid bending pressure lines.



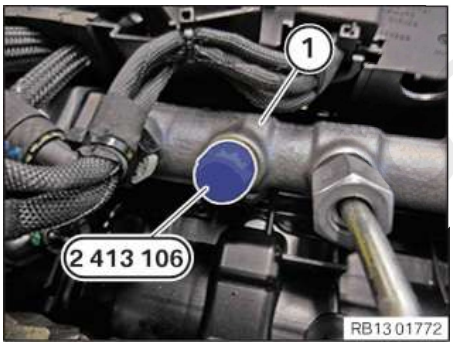
- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.



- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.
- Guide out and remove the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).



- Seal off the opening at the high pressure pump (1) with the special tool .



- Seal off the opening on the rail (1) with the special tool .

22 – Remove high-pressure rail

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

cardiagn.com

RISK OF DAMAGE

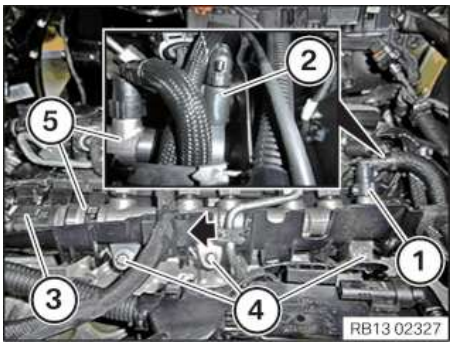
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Unlock and disconnect the fuel return line (1).
- Guide the fuel return line (1) out and set it aside.
- Unlock and disconnect the plug connection (2) on the rail pressure regulating valve.
- Unlock and disconnect the plug connection (3) on the rail pressure sensor.
- Unlock cable clip (Arrow), feed out and place aside.
- Loosen screws (4).
- Thread out and remove the rail (5).

23 – Remove all injection systems

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

cardiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

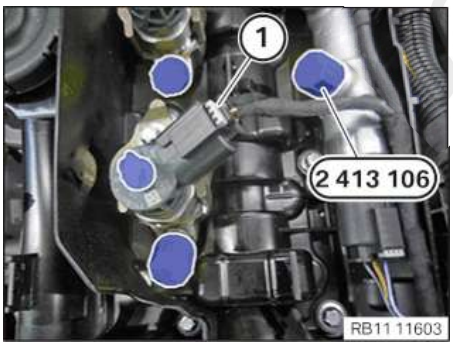
Electrostatic discharge.

Damage to or destruction of electrical components.

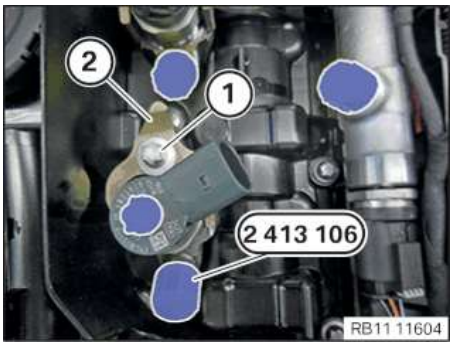
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

TECHNICAL INFORMATION

If several injectors are removed, ensure that each injector is installed at its original location (cylinder). Mark injectors.



- Unlock plug connection (1) and disconnect.



- Loosen screw (1).
- Guide out and remove clamping claw (2).
- Feed out and remove the injector with slight rotational movements.

▸ **Loosen stuck injectors**

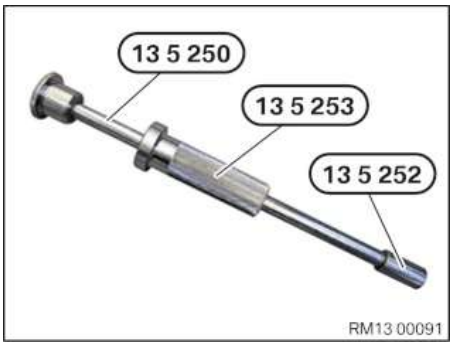
carsdiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

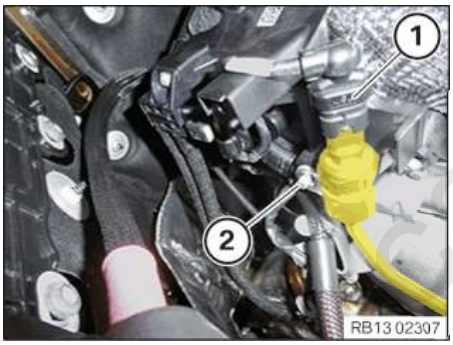


- Unscrew special tool 0 493 339 (13 5 252) from special tool 0 493 321 (13 5 250) and remove special tool 0 493 340 (13 5 253).
- Screw special tool 0 493 339 (13 5 252) back onto special tool 0 493 321 (13 5 250).

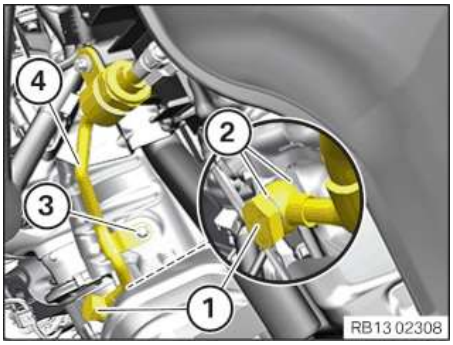


- Screw special tool 0 493 321 (13 5 250) with special tool 0 493 339 (13 5 252) onto pressure line connection (1) of injector.
- Release injector (1) with special tools 0 493 321 (13 5 250) and 0 493 339 (13 5 252) by means of **short** back and forth movements and remove.

24 – Remove the exhaust gas pressure pipe



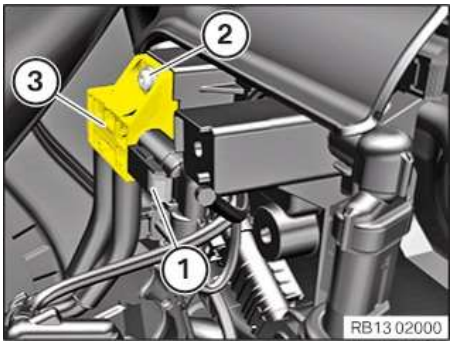
- Unlock plug connection (1) and disconnect.
- Loosen screw (2).



- Unscrew the banjo bolt (1).
- Feed out and remove the sealing rings (2).
- Loosen screw (3).
- Feed out and remove the exhaust gas pressure pipe (4).

25 – Releasing the differential pressure sensor for the diesel particulate filter

cardiagn.com



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).
- Remove the differential pressure sensor (3) and put it to one side.

26 – Removing the sensor bracket on the cylinder head cover

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

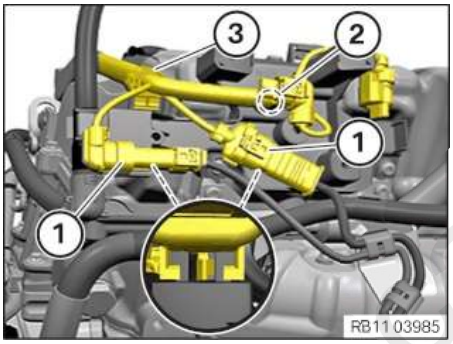
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

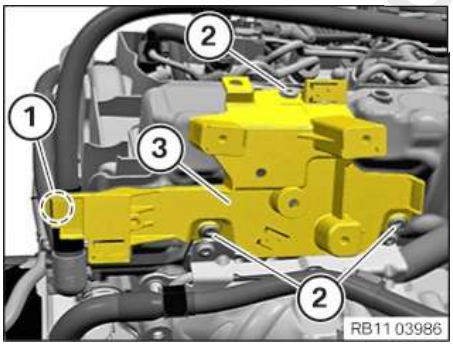
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Unlock plug connection (1) and disconnect.
- Unlock the plug connection (1) and release it from the sensor bracket.
- Release the cable clip in the area (2) from the sensor bracket.
- Release the clamps (3) and set the wiring harness section aside.

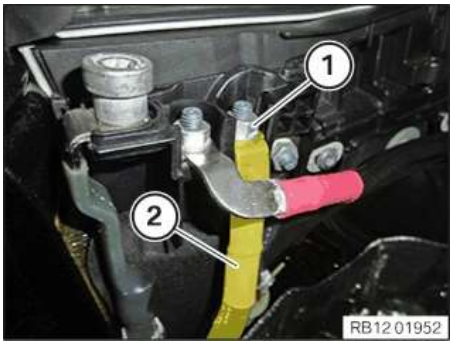


- Release the positive battery cable in the area (1) from the clamp and set it aside.
- Loosen screws (2).
- Feed out holder (3) for the sensor system and remove.

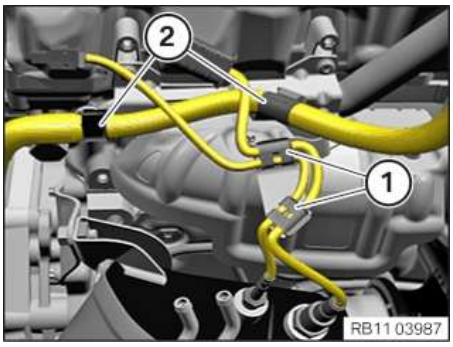


- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.

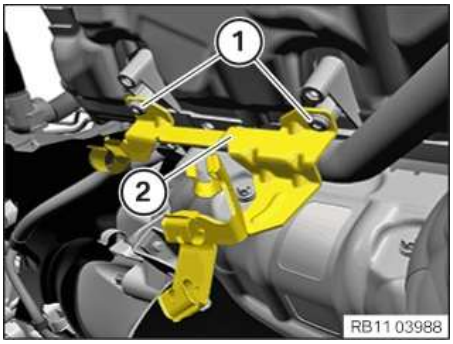
cardiagn.com



- Loosen nut (1).
- Feed out positive battery cable (2) and put to one side.

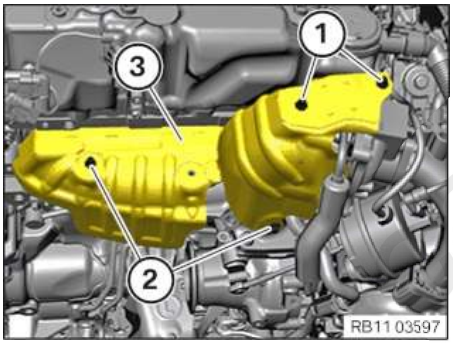


- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



- Loosen screws (1).
- Guide out and remove holder (2).

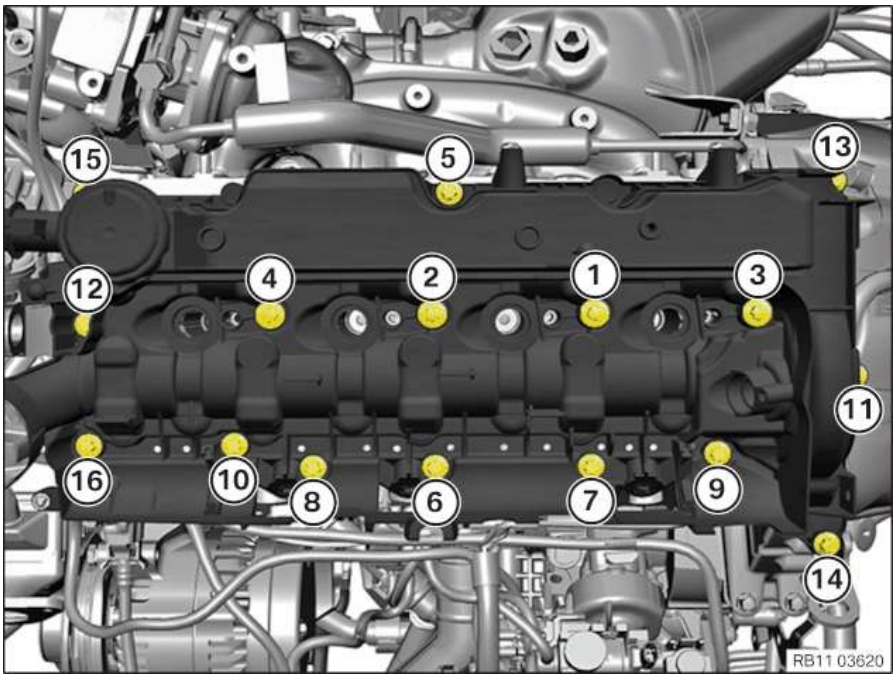
27 – Removing heat shield



- Loosen screws (1).
- Loosen screws (2).
- Feed out and remove the heat shield (3).

28 – Removing the cylinder head cover

Screw connection of the cylinder head cover



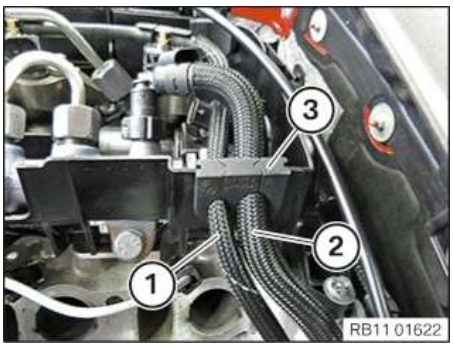
1 - 16 Bolts of the cylinder head cover



- Unlock and detach the locks.
- Feed the engine ventilation line (1) out and set it aside.

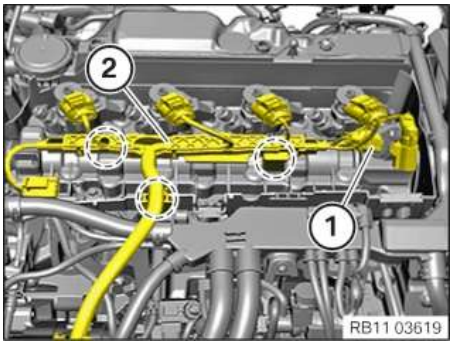


- Feed out and remove the heat shield (1).

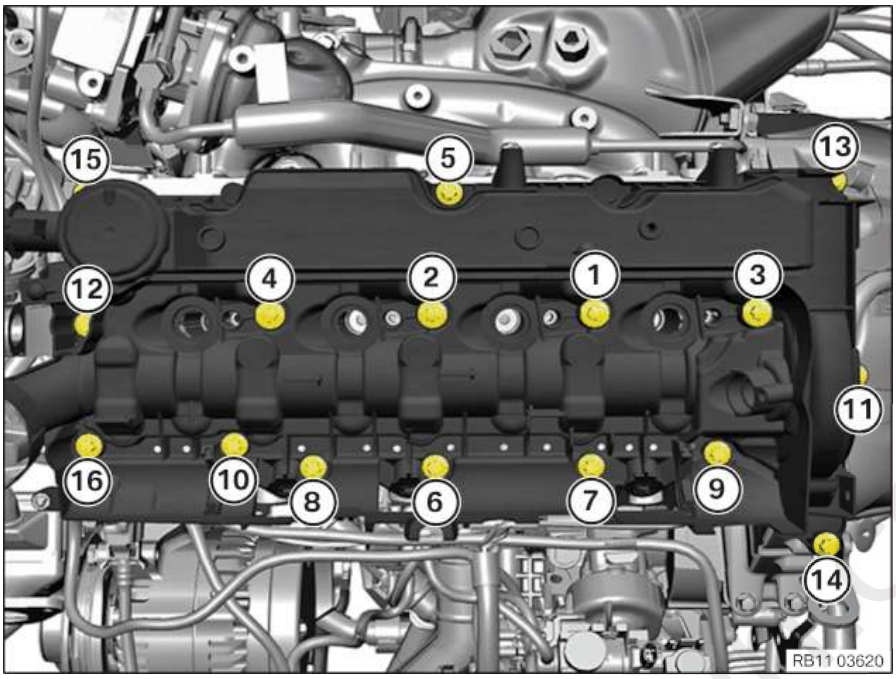


- Remove the leakage oil line (1) including the fuel return line (2) and the grommet (3) and put to one side.

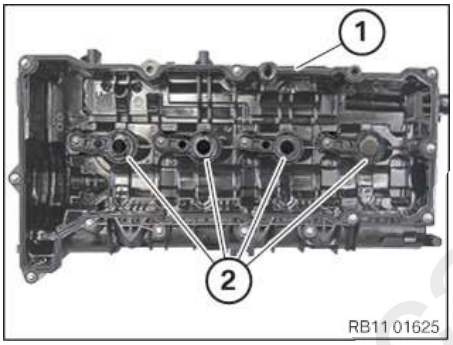
cardiagn.com



- Unlock connector (1) and pull off.
- Disconnect the wiring harness (2) in the marked areas from the cylinder head cover and set aside.

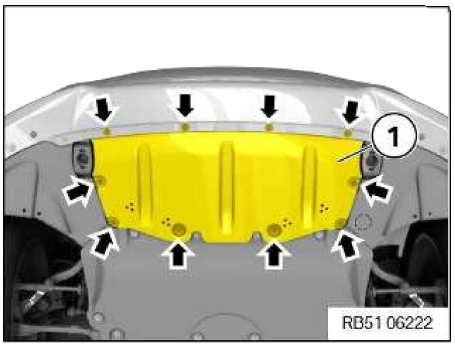


- Evenly loosen the screws in a sequence from (16) to (1).
- Feed out and remove the cylinder head cover.



- Remove the profile seals (1) and (2).

29 – Removing the front underbody protection

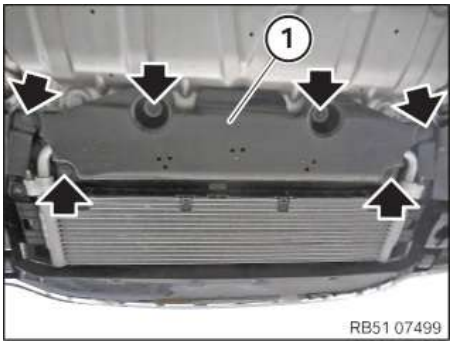


- **Version A:**

  Remove screws (arrows).

  Feed front underbody protection (1) backwards out of the bumper panel.

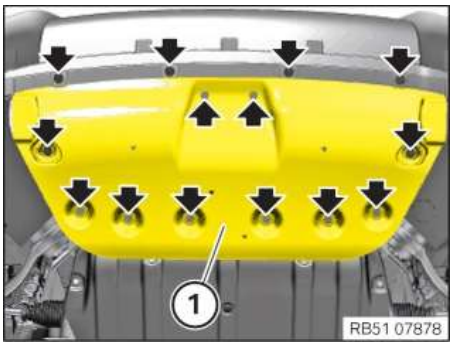
cardiag.com



- **Version B:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

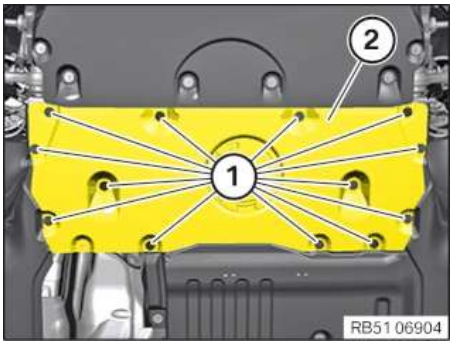


- **Version C:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

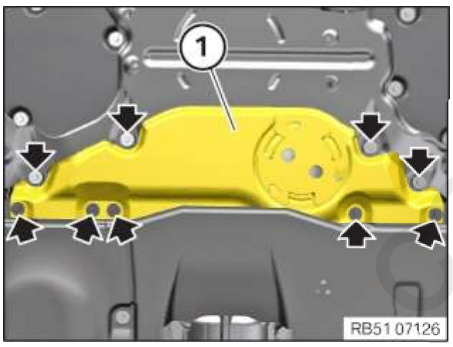
30 – Removing the centre underbody protection



- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .

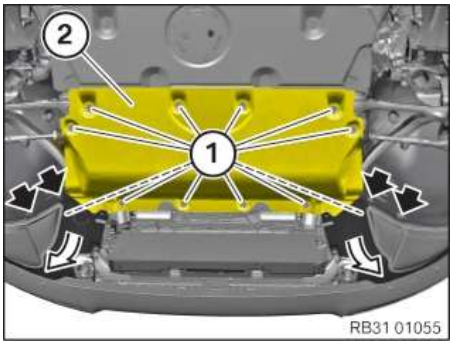


- **Version with all-wheel drive:**

  Remove screws (arrows).

  Feed out and remove the centre underbody protection (1).

31 – Remove the underbody protection of the steering gear



- **Version A:**

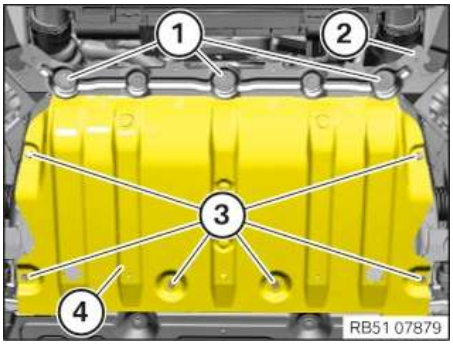
  Unscrew the screws (arrows) of the wheel arch cover on the wheel arch cover.

  Fold the bottom wheel arch cover to the side.

  Loosen screws (1).

  Remove the underbody protection (2) of the steering gear.

carsign.com



- **Version B:**

  Loosen screws (1).

  Remove the holder (2) for the underride protection.

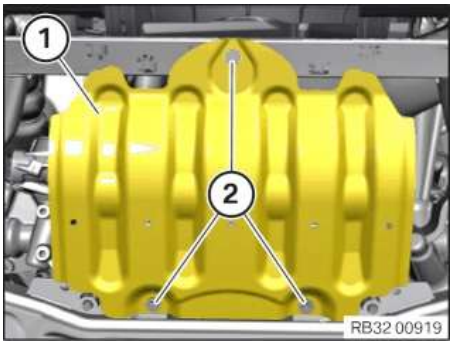
  Loosen screws (3).

  Feed out and remove the underbody protection (4) of the steering gear.

32 – If installed: Removing the steering underbody protection

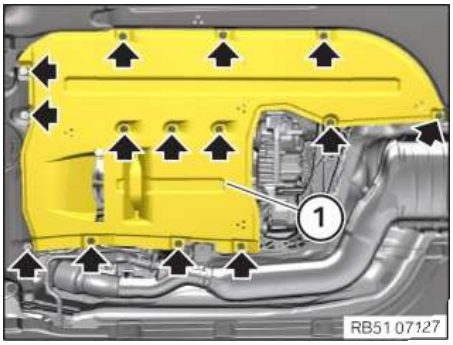
Prerequisite

Front underbody protection has been removed.



- Loosen screws (2).
- Remove underbody protection (1).

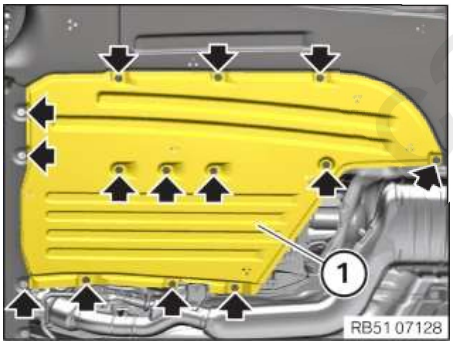
33 – Remove rear underbody protection



- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).



- **Version B:**

  Remove screws (arrows).

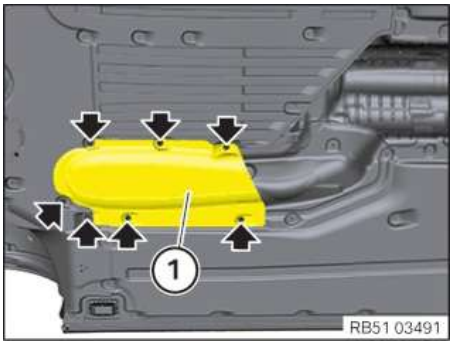
  Guide out rear underbody protection (1) and remove it.

34 – Remove the underbody panelling of the transmission on the side

NOTICE

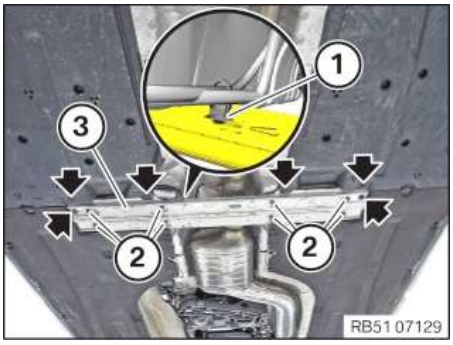
The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

cardiagn.com



- Remove screws (arrows).
- Remove the underbody panelling (1).

35 – Remove the connecting support from the tunnel



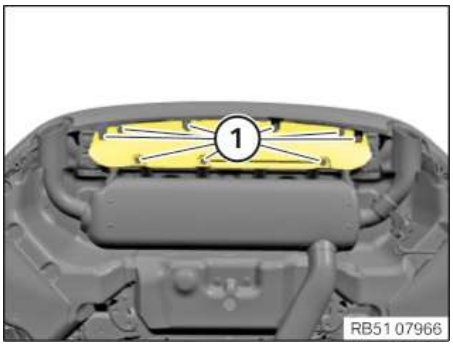
- Remove screws (arrows).

NOTICE

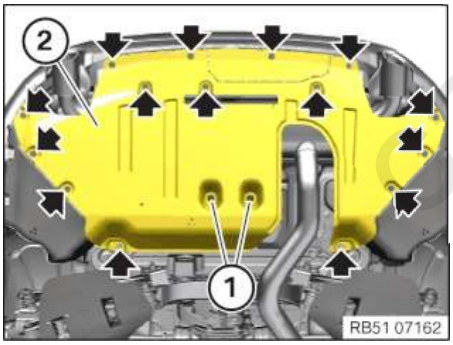
The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Loosen clamp (1).
- Loosen screws (2).
- Guide out and remove connecting support (3) on the tunnel.

36 – Removing the rear diffuser



- **Version 1:**
- Release the screws and nuts (1).
- Remove the diffuser.



- **Version 2:**
- Loosen nuts (1).
- Remove screws (arrows).
- Guide out and remove rear diffuser (2).

37 – Remove exhaust system

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

cardiagn.com

CAUTION

Component with heavy weight.

Danger of injury!

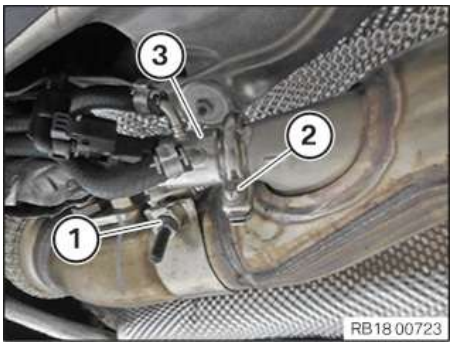
- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

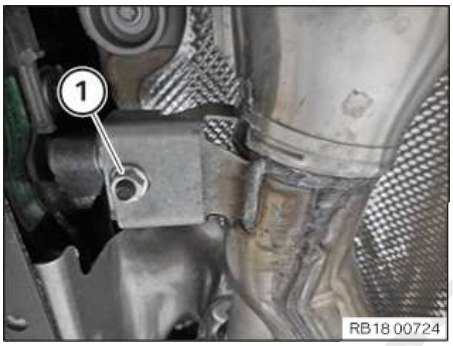
Heavy component.

Heavy components can lead to injury or damage.

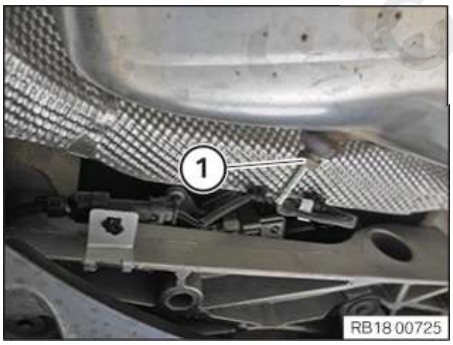
- Remove and install heavy components with the aid of another person/other persons.



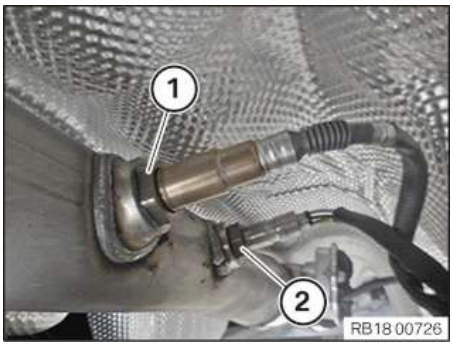
- Unfasten clamp (1).
- Detach the clamp (2) of the SCR metering module (3).
- Detach the SCR metering module (3)from the exhaust system and place to one side.



- Loosen nut (1).

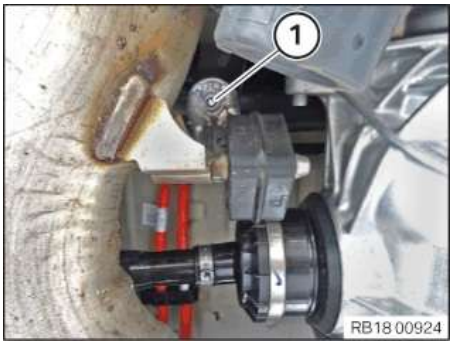


- Detach the exhaust temperature sensor (1) from the exhaust system.

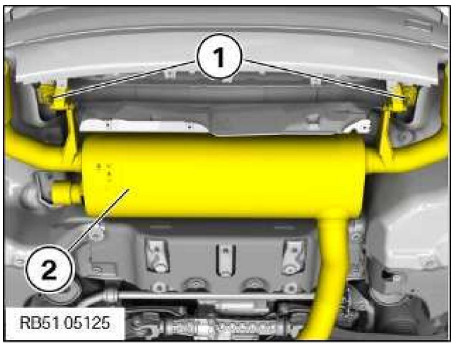


- Release the diesel particulate sensor (1) from the exhaust system and place to one side.
- Release the nitrogen oxide sensor (2) from the exhaust system and place to one side.

cardiagn.com



- Release the nut (1) on the rear axle support.



- Loosen nuts (1).
- Lower and remove the exhaust system (2) with the assistance of a second person.

38 – Removing the monitoring oxygen sensor after the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

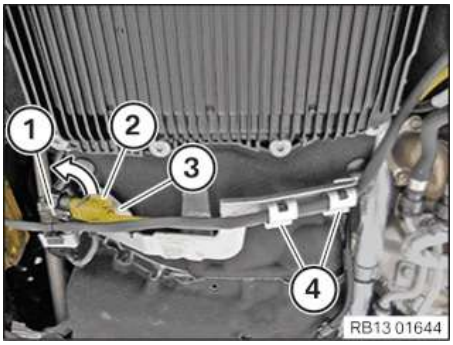
RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
- The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

cardiagn.com



- Unlock and loosen connector (1).
- Loosen connector (2) from the holder (3) in direction of arrow.
- Release the monitoring oxygen sensor from the clamps (4).



- Release the monitoring oxygen sensor (1) with the standard tools.



- Thread out the monitoring oxygen sensor (1) and remove it.

39 – Removing the nitrogen oxide sensor before SCR catalytic converter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

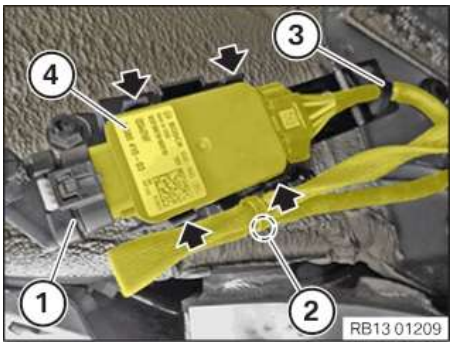
cardiagn.com

RISK OF DAMAGE

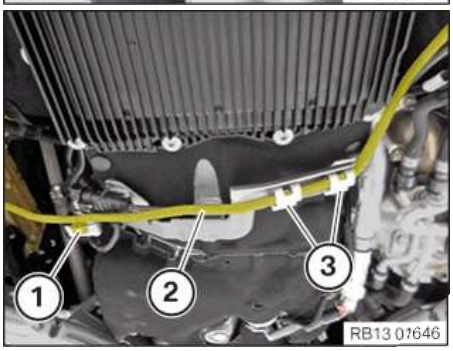
Damage to the nitrogen oxide sensor.

Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

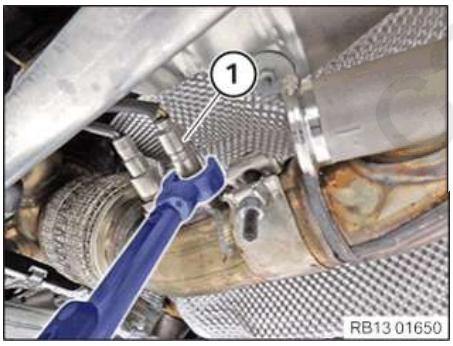
- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



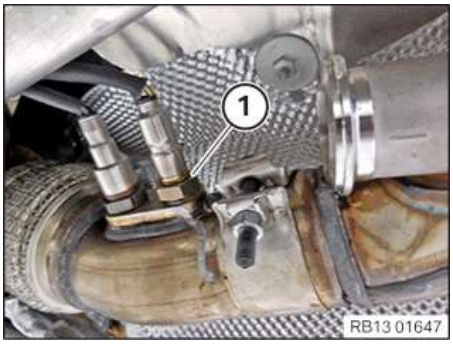
- Unlock plug connection (1) and disconnect.
- Release cable clip in area (2).
- Release line from the holder (3).
- Unclip control unit (4).



- Loosen clamp (1).
- Loosen the cables (2) from the clamps (3).



- Loosen the nitrogen oxide sensor (1) using commercially available tools.



- Feed out and remove the nitrogen oxide sensor (1).

cardiagn.com

WARNING

Hot surfaces.

Risk of burning!

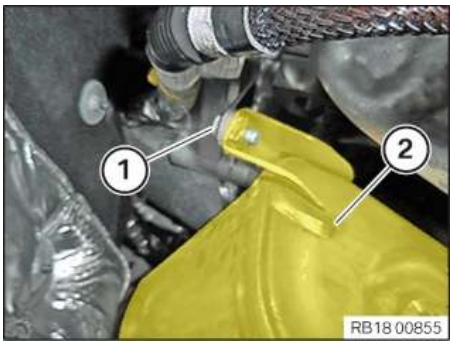
- Perform all work only on components that have cooled down.

CAUTION

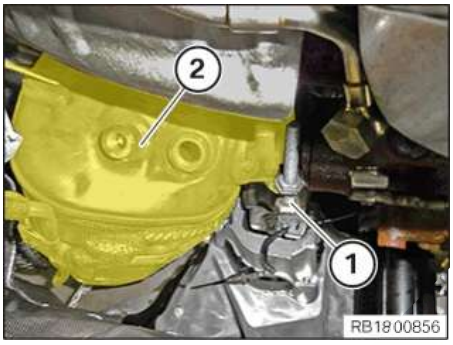
Heavy component.

Heavy components can lead to injury or damage.

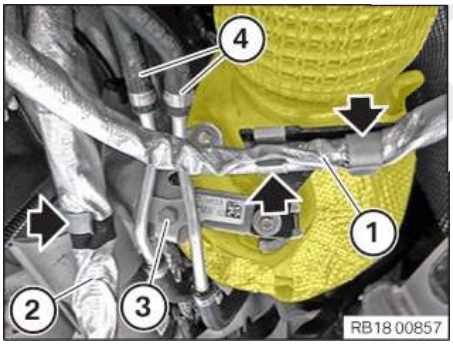
- Remove and install heavy components with the aid of another person/other persons.



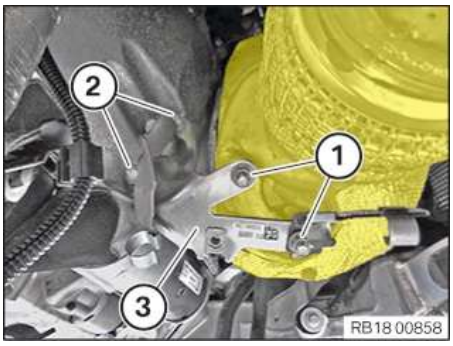
- Release bolt (1) from the holder of diesel particulate filter (2).



- Loosen V-band clamp (1).
- Feed V-clip (1) out from diesel particulate filter (2) and remove.

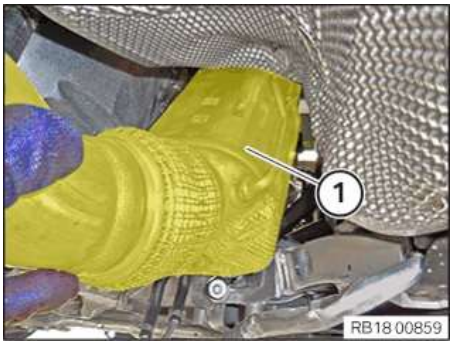


- Release the metering line (1) from clamps (Arrows).
- Release positive battery cable (2) from starter motor from clamp (Arrow).
- Loosen screw (3).
- Thread off coolant line (4) and place to the side.



- Loosen nuts (1).
- Loosen screws (2).
- Guide out and remove holder (3).

cardiagn.com



- Guide out and remove diesel particulate filter (1).

41 – Removing starter motor

Prerequisite

Battery earth leads are disconnected.

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

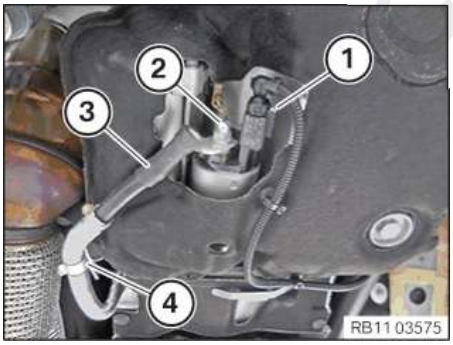
Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

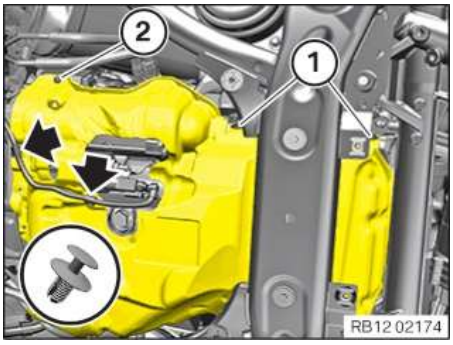
- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

TECHNICAL INFORMATION

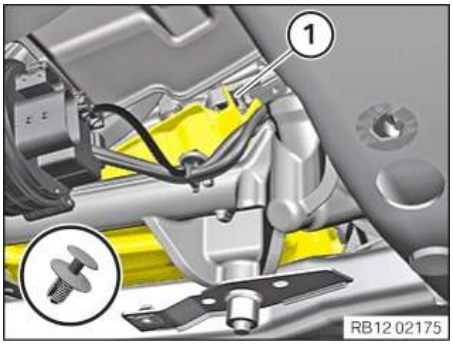
Make sure that the acoustic cover is **not** damaged while removing the starter motor.
A damaged lower acoustic cover can only be renewed when the front axle is lowered.



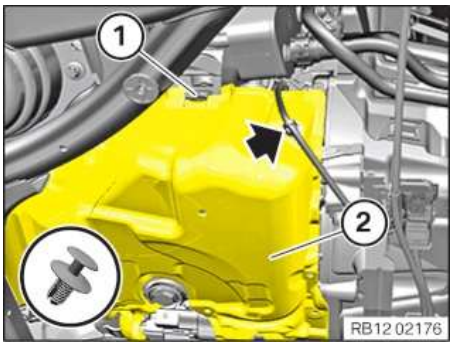
- Unlock plug connection (1) and disconnect.
- Release nut (2).
- Release positive battery cable (3) from holder (4).



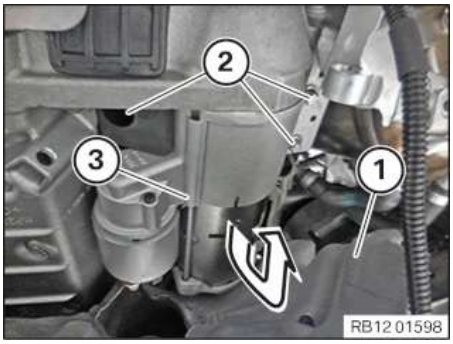
- Loosen the expanding rivet (1).
- Undo fir tree clip (2).
- Release the clamps (arrows).



- Loosen expanding rivet (1).
- Lower the acoustic cover of the oil sump.



- Loosen expanding rivet (1).
- Loosen the clamp (arrow).
- Lower acoustic cover (2).



- Make sure that the acoustic cover (1) is not damaged.
- Carefully press acoustic cover (1) to one side.
- Loosen screws (2).
- Carefully guide out the starter motor (3) in direction of arrow and remove.

42 – Checking camshaft timing



RISK OF DAMAGE

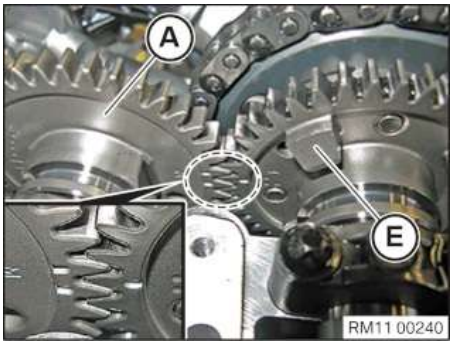
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

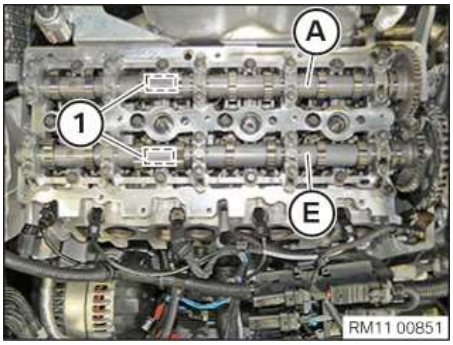
- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

  Do **not** crank the engine in reverse.

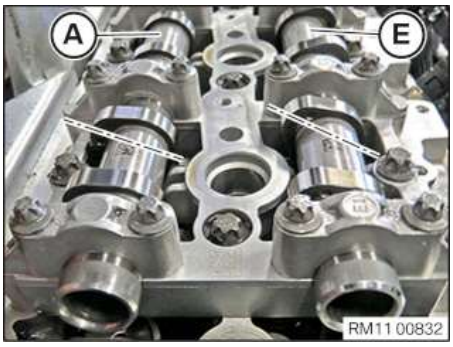


- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.

bardiagn.com



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.

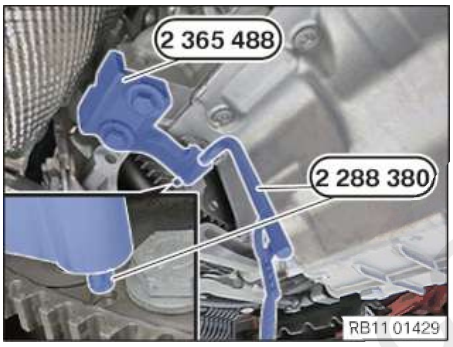


- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

43 – Remove chain tensioner piston

RISK OF DAMAGE

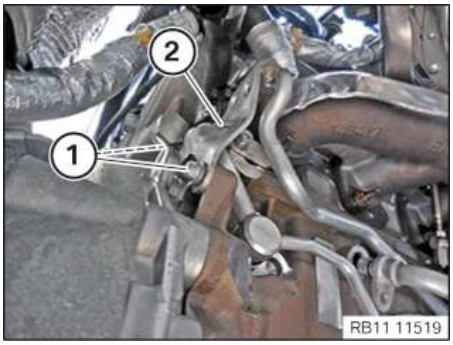
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

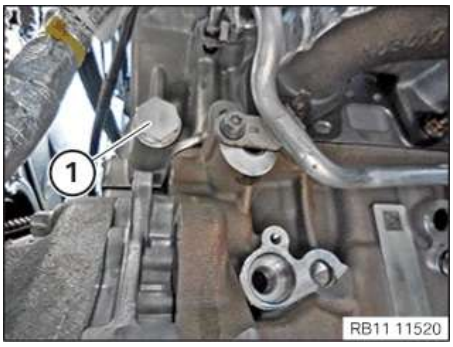
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Loosen screws (1).
- Guide out and remove holder (2).

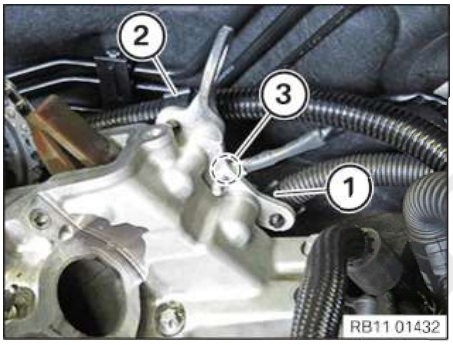


- Loosen the chain tensioner piston (1).
- Catch and dispose of emerging engine oil.

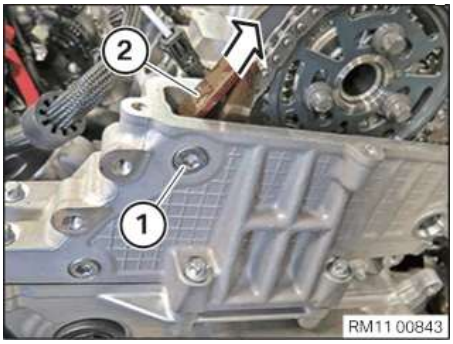


- Feed out and remove the sealing ring (1).

44 – Remove the timing chain guide rail

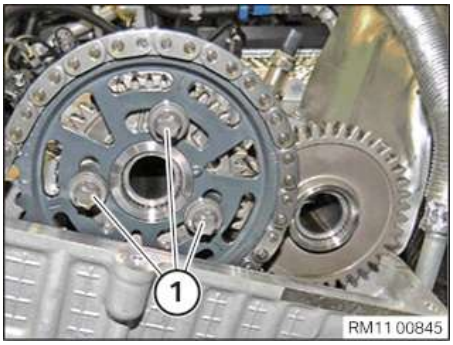


- Loosen the vehicle wiring harness (1) from the bracket.
- Release the positive battery cable (2) from the holder .
- Loosen the screw (3) and remove the grounding cable.



- Remove the bearing journal (1).
- Remove the guide rail (2) in the direction of the arrow.

45 – Removing the camshaft sprocket on the intake camshaft



- Loosen screws (1).
- Secure the drive chain against falling.
- Remove the camshaft sprocket on the intake camshaft.

46 – Removing the special tool for fixing the exhaust camshaft

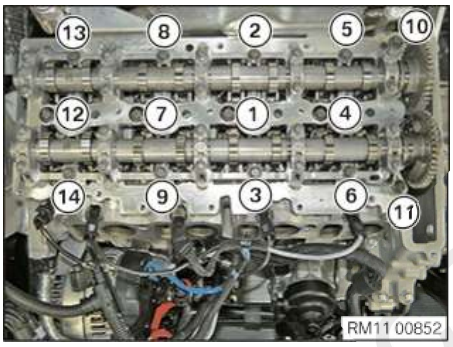


- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

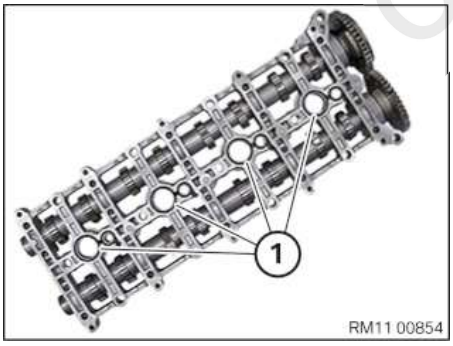
47 – Removing the camshaft support

TECHNICAL INFORMATION

The camshaft is tensioned by the valve springs. Tighten or loosen each screw on the camshaft bearing caps one at a time in the specified sequence and by half a turn only. Repeat procedure.



- Unscrew the screws evenly in order (14) to (1) in multiple increments.
- Feed out and remove the camshaft support with the camshafts towards the top.

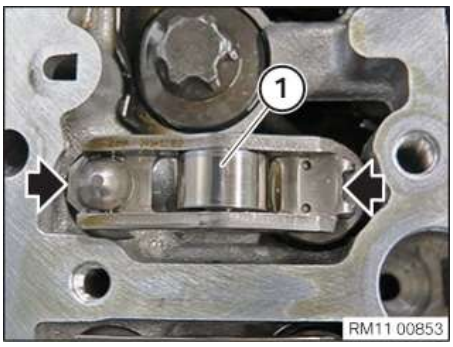


- Guide out and remove gaskets (1).

cardiagn.com

MAIN WORK

48 – Remove roller cam followers



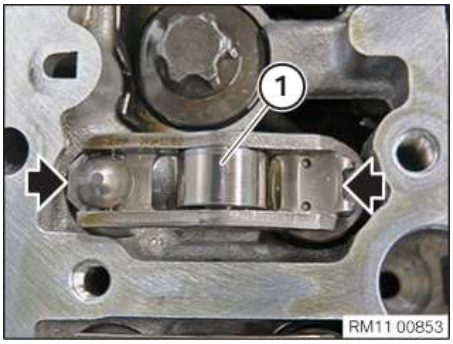
- Guide out and remove all roller cam followers (1) (arrows).
- Place all roller cam followers (1) in order in special tool 0 495 105 (11 4 480).

  Roller cam followers that have already been used must be installed in same position again.

49 – Installing the roller cam followers

TECHNICAL INFORMATION

- Note the installation position of the component. The component may be installed in various installation positions.



- Check all the roller cam followers (1) for damage, and renew if necessary.

  Parts: Roller cam followers
- Insert all roller cam followers (1) and install them (arrows).

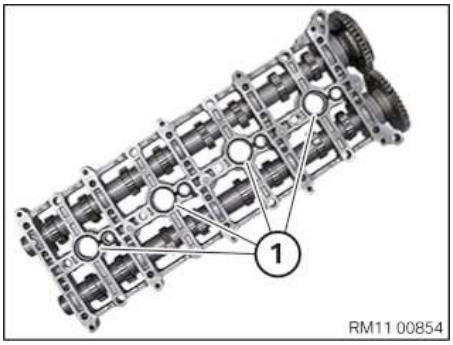
  Roller cam followers (1) that have already been used must be installed in the same place.
- Note the mounting orientation of the roller cam followers (1).
- Oil all roller cam followers (1).

POSTPROCESSES

50 – Installing the camshaft support

TECHNICAL INFORMATION

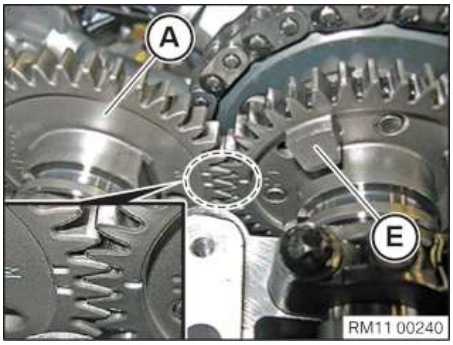
The camshaft is tensioned by the valve springs. Tighten or loosen each screw on the camshaft bearing caps one at a time in the specified sequence and by half a turn only. Repeat procedure.



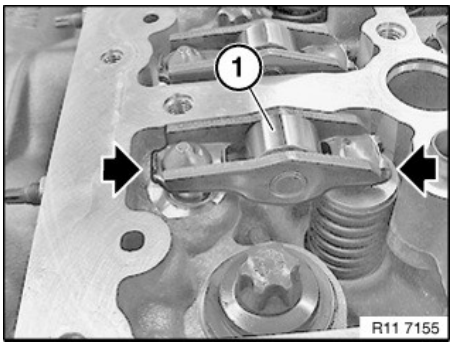
- Renew seals (1).

  Parts: Seals
- Insert and install the gaskets (1).

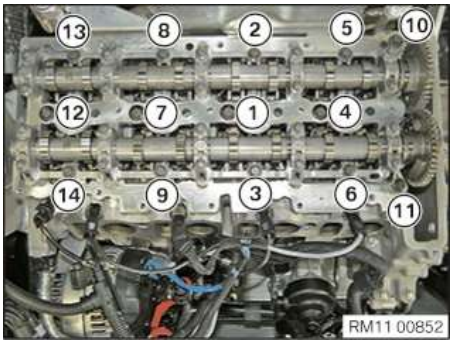
cardiagn.com



- Make sure the marks on both camshafts (A) and (E) correspond in the **highlighted area**.



- Make sure the roller cam followers (1) have the correct mounting orientation.
- Position the camshaft support (arrows).



- Evenly tighten the screws in a sequence from (1) to (14) in several steps.
- Evenly tighten the screws in a sequence from (1) to (14) in several steps.

Camshaft carrier to cylinder head

M7x35		Tightening torque	13 Nm

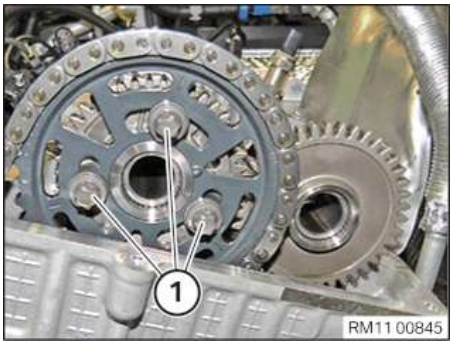
51 – Installing the special tool to secure the exhaust camshaft



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.

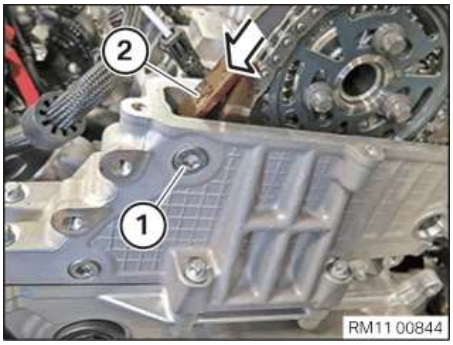
52 – Installing the camshaft sprocket on the intake camshaft



- Position the drive chain on the camshaft sprocket so that the thread of the screw connections are located in the centre of the elongated holes.
- Position the camshaft sprocket on the intake camshaft.
- Merely apply the screws (1) hand-tight so that the camshaft sprocket can still be moved in relation to the intake camshaft.

53 – Installing the guide rail of the timing chain

barringn.com

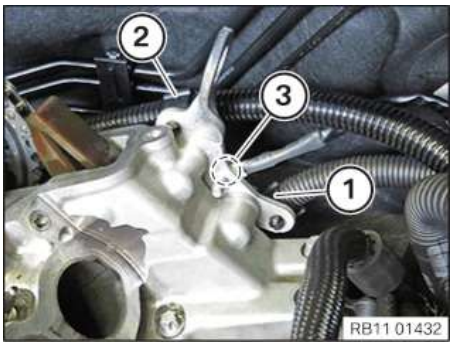


- Position the guide rail (2) in the direction of the arrow.
- Make sure the guide rail (2) is correctly installed at the bottom bearing journal.
- Renew bearing journal (1).

  Parts: Bearing journal
- Tighten the bearing journals (1).

Bearing journal to cylinder head

M16x1.5	Replace bearing journal.	Tightening torque	20 Nm



- Position the grounding cable and tighten the screw (3).

Standard screw connection M8

M8		Tightening torque	19 Nm

- Clip in the positive battery cable (2) into the bracket.
- Clip in the vehicle wiring harness (1) into the bracket.

54 – Installing the chain tensioner piston



TECHNICAL INFORMATION

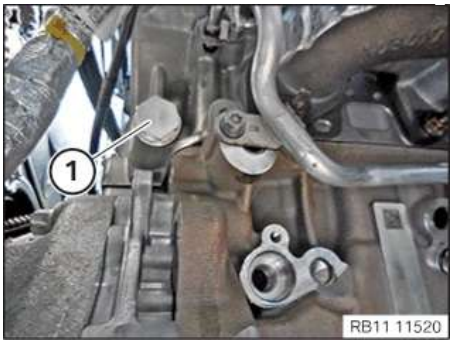
The oil chamber must be drained for reuse of the chain tensioner.

- Place the chain tensioner on a level support pad and slowly compress in the direction of arrow.
- Repeat process twice.



- Renew sealing ring (1).

  Parts: Sealing ring
- Insert and install the sealing ring (1).

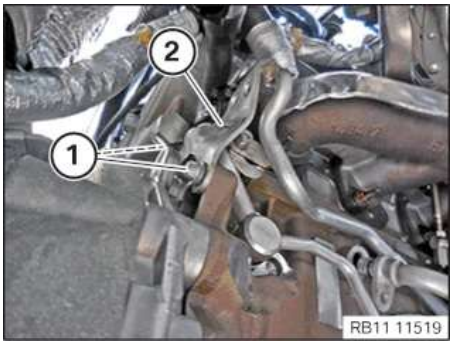


- Insert and install the chain tensioner piston (1).
- Tighten the chain tensioner piston (1).

Chain tensioner piston to cylinder head

22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

carolagn.com

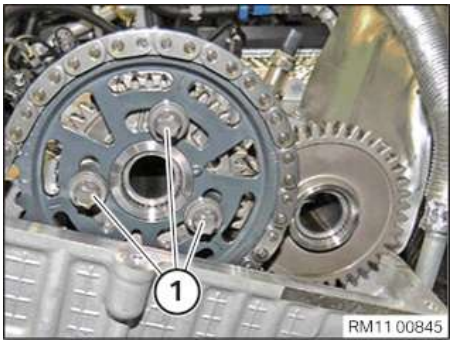


- Insert and install the holder (2).
- Tighten the screws (1).

Holder to crankcase

M8X16		Tightening torque	19 Nm

55 – Tightening the camshaft sprocket on the intake camshaft



- Tighten the screws (1).

Camshaft sprocket to camshaft

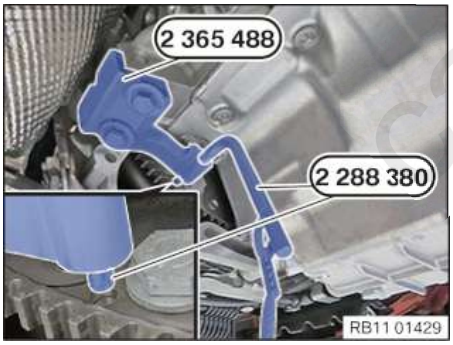
M7x17.			17 Nm

56 – Removing the special tool for fixing the exhaust camshaft



- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

57 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

58 – Checking camshaft timing



RISK OF DAMAGE

Damage to the engine.

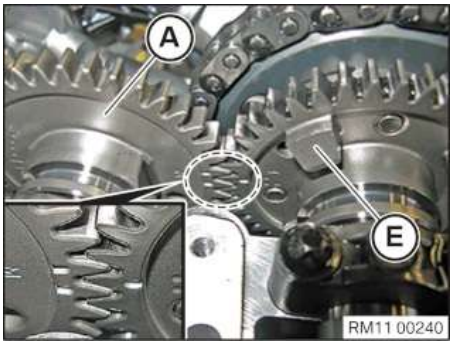
The engine may be damaged if it is manually rotated in the wrong direction.

- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

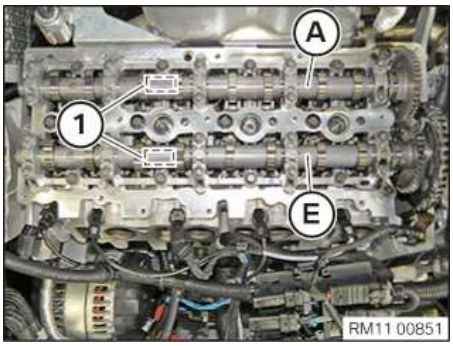
- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

  Do **not** crank the engine in reverse.

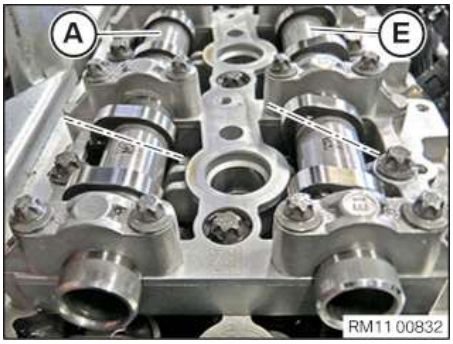
cardiagn.com



- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.

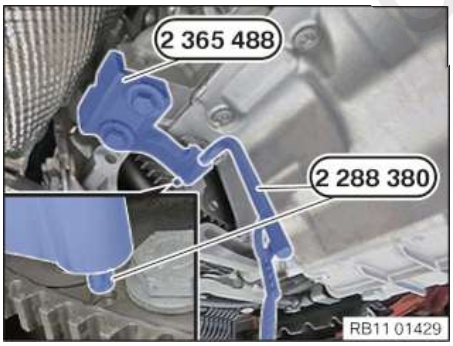


- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

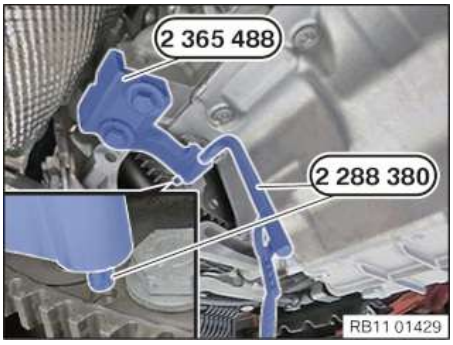
59 – Removing the special tool for fixing the exhaust camshaft

cardiagn.com



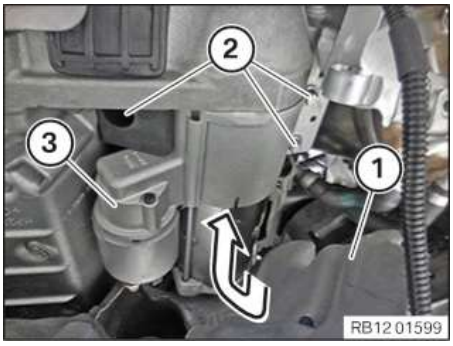
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

60 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

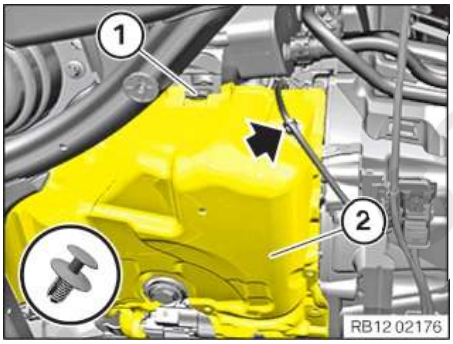
61 – Installing starter motor



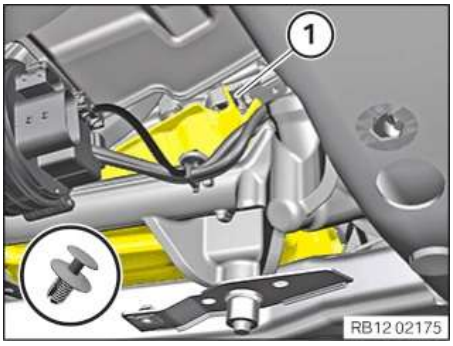
- Make sure that the acoustic cover (1) is not damaged.
- Carefully press the acoustic cover (1) to one side.
- Feed in and install the starter motor (3) in the direction of the arrow.
- Tighten the screws (2).

Starter motor to engine

M8X60		Tightening torque	19 Nm

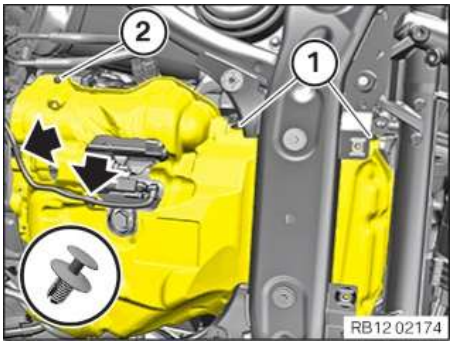


- Position the acoustic cover (2).
- Fasten expanding rivet (1).
- Secure clamp (arrow).

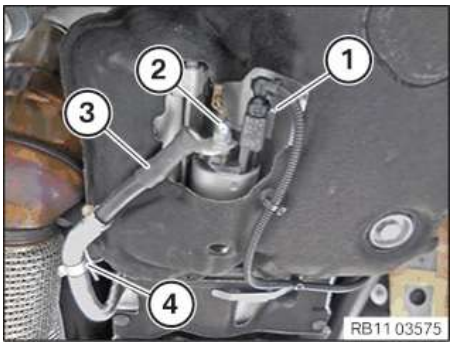


- Fasten expanding rivet (1).

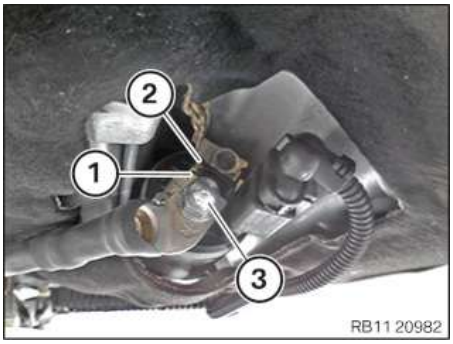
cardiagn.com



- Secure fir tree clip (2).
- Secure expanding rivet (1).
- Secure the clamps (arrows).



- Fasten positive battery cable(3) in holder (4) and position it on the starter motor.
- Tighten the nut (2) hand-tight.
- Connect the connector (1) and audibly lock it.



CAUTION

Improper routing of the positive battery cable.

Risk of short circuits!

- Route the positive battery cable without abrasions and do not trap.

- Attach the positive battery cable (1) **correctly** to anti-twist lock (2).
- Tighten nut (3).

Battery positive lead to starter

M8	Tightening torque	13,5 Nm

62 – Prepare for the installation of the diesel particulate filter



- Renew the V-clip (1).

  Parts: V-band clamp



- Renew gasket (1).

  Parts: Gasket

63 – Installing the diesel particulate filter

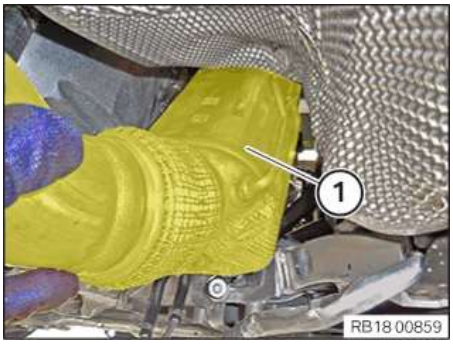
cardiagn.com

CAUTION

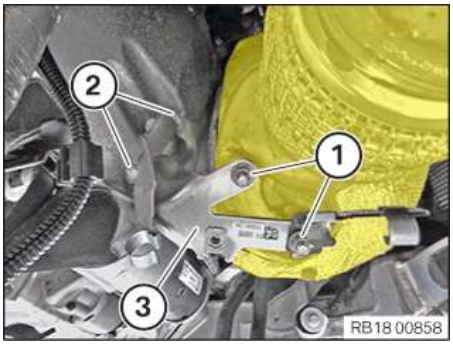
Heavy component.

Heavy components can lead to injury or damage.

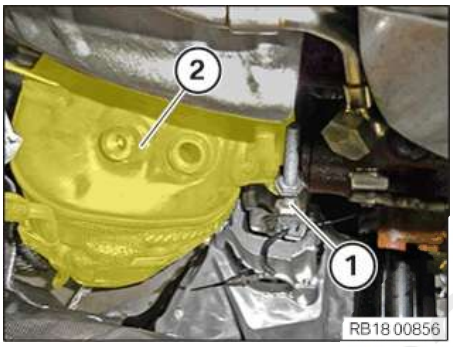
- Remove and install heavy components with the aid of another person/other persons.



- Insert and install the diesel particulate filter (1).



- Insert and install the holder (3).
- **Hand-tighten** the bolts (2).
- Apply the nuts (1) **hand-tight**.

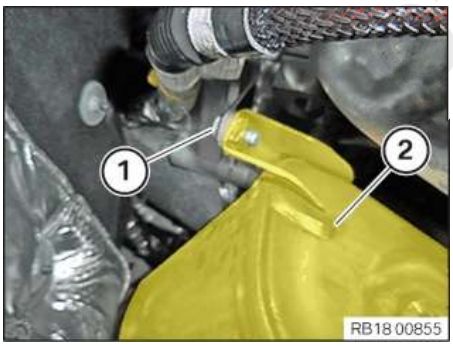


- Renew the V-clip (1).

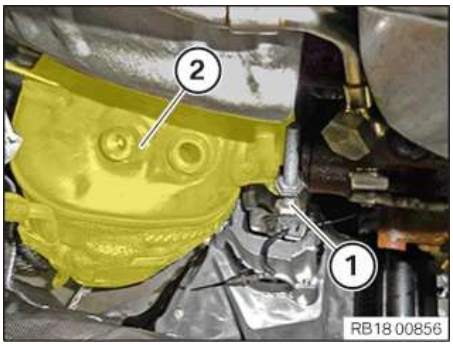
  Parts: V-band clamp
- Feed in and install V-band clamp (1).

Note: Make sure that the seal between the diesel particulate filter and the exhaust turbocharger is installed correctly.

- Position the diesel particulate filter (2) on the exhaust turbocharger .
- Position V-clip (1).
- Apply the V-clip (1) **hand-tight**.



- Feed in screw (1) on the holder of the diesel particulate filter (2) and tighten **hand-tight**.

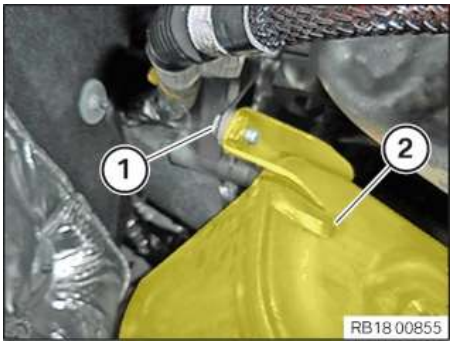


- Tighten the V-clip (1) of the diesel particulate filter (2).

Diesel particulate filter V-clip to exhaust turbocharger

V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

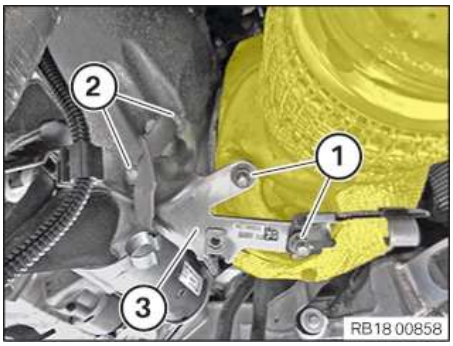
carmanualsonline.com



- Tighten the bolt (1) on the bracket of the diesel particulate filter (2).

Bracket to diesel particulate filter top

M8		Tightening torque	19 Nm



- Tighten the screws (2) on the holder (3).

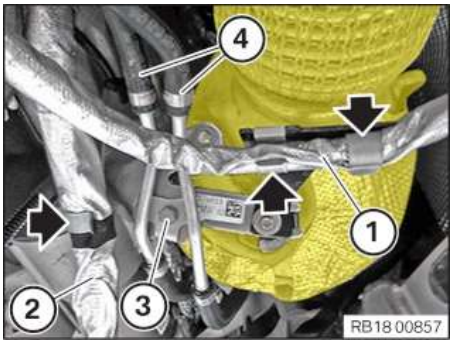
Bracket to transmission for diesel particulate filter holder bottom

M8X20		Tightening torque	19 Nm

- Tighten the nuts (1) on the holder (3).

Lower holder to diesel particulate filter

M8		Tightening torque	19 Nm



- Thread in and install coolant line (4).
- Tighten down screw (3).

Coolant lines for SCR metering module

M6X16		Tightening torque	8 Nm

- Secure the positive battery cable (2) of the starter motor at the clamp (arrow).
- Fasten the metering line (1) on the clamps (arrows).

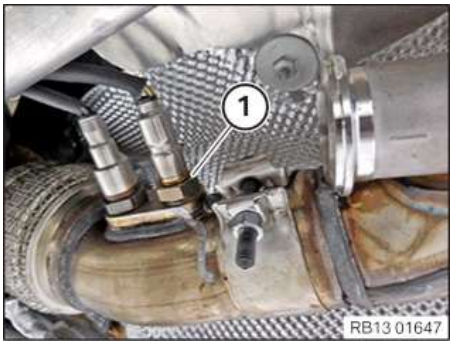
64 – Installing the nitrogen oxide sensor upstream of SCR catalytic converter

RISK OF DAMAGE

Damage to the nitrogen oxide sensor.

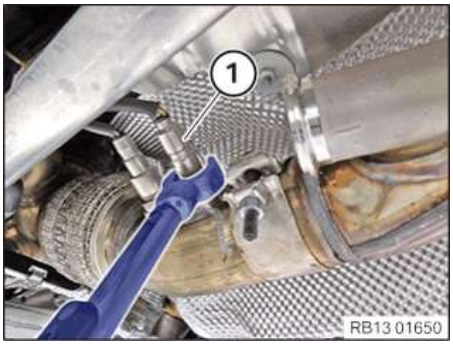
Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



- Feed in and install the nitrogen oxide sensor (1).

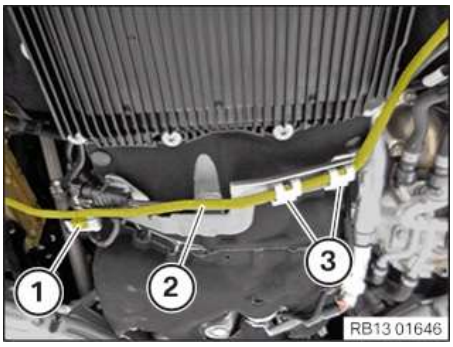
cardiagn.com



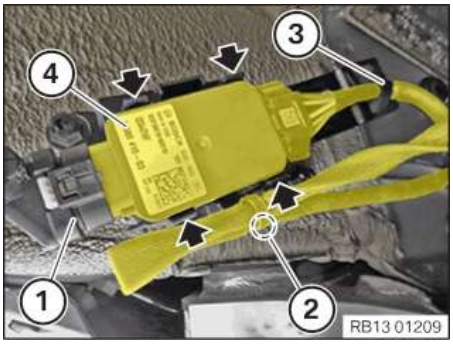
- Tighten the nitrogen oxide sensor (1) using commercially available tools.

Nitrogen oxide sensor before SCR catalytic converter

Sensor		Tightening torque	50 Nm



- Secure the cables (2) to the clamps (3).
- Secure clamps (1).



- Clip in the control unit (4) (arrows).
- Fasten the cable in the holder (3).
- Secure the cable holder (2).
- Plug in the connector (1) and lock audibly.

65 – Installing the monitoring oxygen sensor after the diesel particulate filter

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

TECHNICAL INFORMATION

New oxygen sensors are to be greased lightly and evenly on the thread.

For oxygen sensors that are reused, the following should be observed:

Lightly and evenly grease the oxygen sensor only on the thread. Do not clean and grease that part of the oxygen sensor which protrudes in the exhaust branch (sensor ceramics).

For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue

cardiagn.com



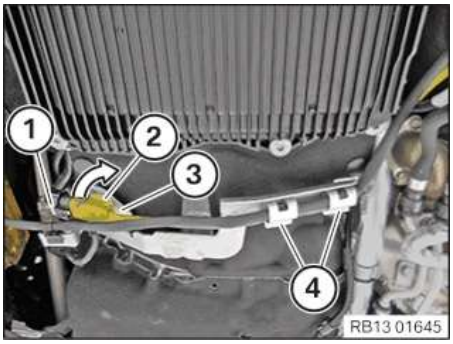
- Insert the monitoring oxygen sensor (1) and install it.



- Tighten the monitoring oxygen sensor (1) with standard tools.

Monitoring oxygen sensor

Sensor		Tightening torque	50 Nm



- Fasten the monitoring oxygen sensor to the clamps (4).
- Secure the connector (2) on the holder (3) in direction of arrow.
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

66 – Installing the exhaust system

CAUTION

Component with heavy weight.

Danger of injury!

- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

Heavy component.

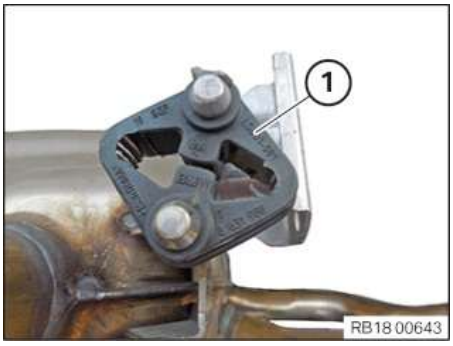
Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

TECHNICAL INFORMATION

Mount the exhaust system in voltage-free state, maintaining the tightening sequence from the rear silencer towards the exhaust manifold.

cardiagn.com

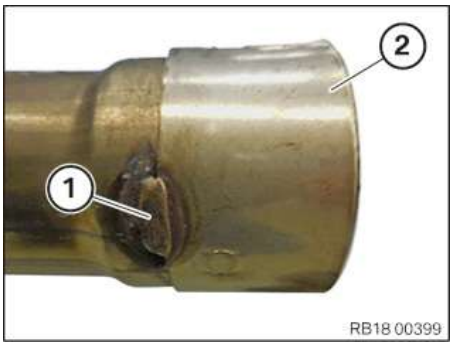


NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

- Check all the rubber mounts (1) of the exhaust system for damage.
- Replaced damaged rubber mounts.

  Parts: Rubber mount



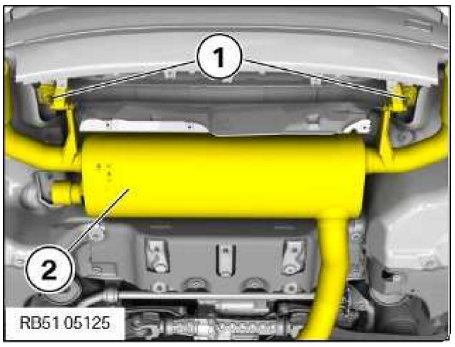
CAUTION

Swarf resulting from sawing or grinding components.

Danger of injury!

- Conduct all work in appropriate personal protective equipment only.
- Wear safety goggles and protective gloves.

- Open the weld seam (1) with a conventional tool.
- Remove the clamp (2).

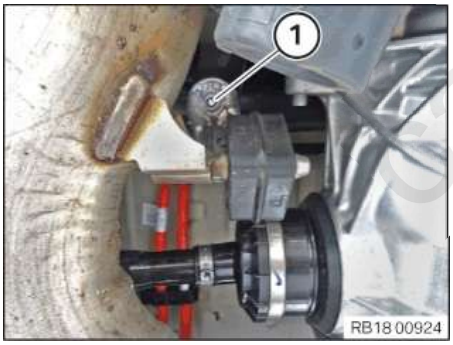


- Insert and install the exhaust system (2).
- Renew nuts (1).

  Parts: Nuts
- Tighten nuts (1).

Rear silencer to body / bumper support

M8	Replace nuts.	Tightening torque	19 Nm

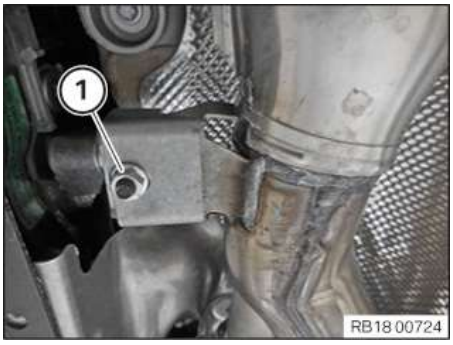


- Renew nut (1) on the rear axle support.

  Parts: Nut
- Tighten nut (1).

Exhaust system to rear axle carrier

M8 nut		Tightening torque	19 Nm

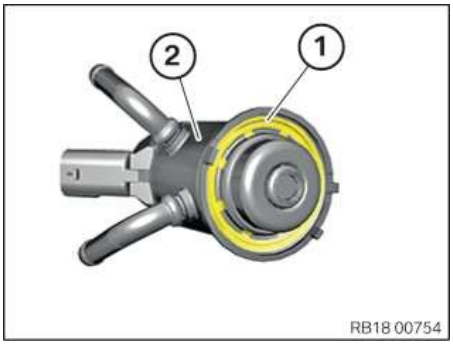


- Tighten nut (1).

Exhaust system to transmission

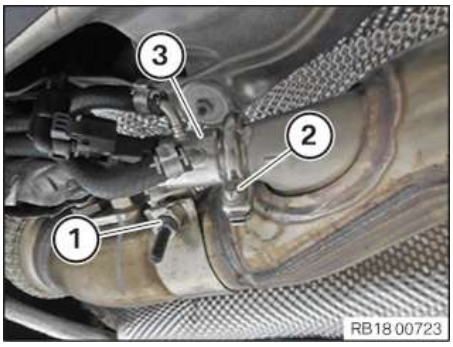
M8		Tightening torque	19 Nm

cardiagn.com



- Renew sealing ring (1) of the SCR metering module (2).

  Parts: Sealing ring



- If necessary, renew clamp (1).

  Parts: Clamp
- Tighten clamp (1).

Exhaust system to diesel particle filter

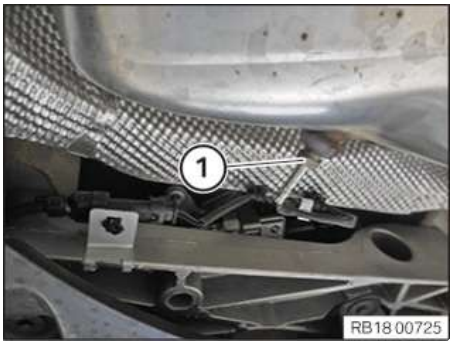
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

- Renew the V-clip (2).

  Parts: V-band clamp
- Install the SCR metering module (3) in the exhaust system.
- Tighten the V-clip (2) of the SCR metering module (3).

SCR metering module V-clip to exhaust system

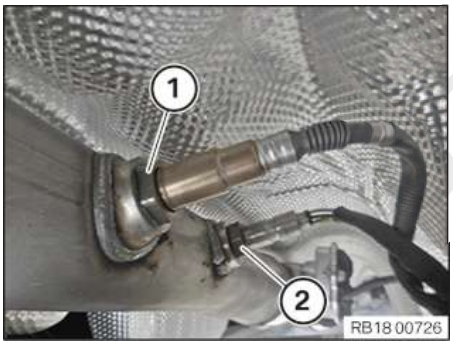
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm



- Install the exhaust temperature sensor (1) in the exhaust system and tighten.

Exhaust-gas temperature sensor upstream of SCR catalytic converter

Sensor		Tightening torque	30 Nm



- Install the diesel particulate sensor (1) in the exhaust system and tighten.

Diesel particulate sensor to exhaust system

Sensor		Tightening torque	50 Nm

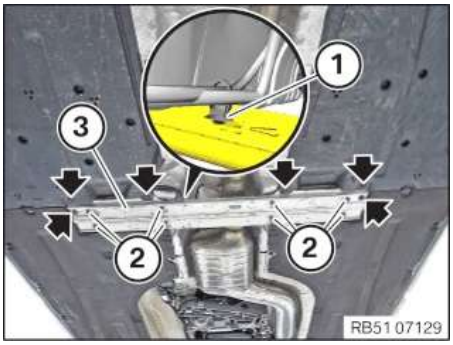
- Install the nitrogen oxide sensor (2) in the exhaust system and tighten.

Nitrogen oxide sensor downstream of SCR catalytic converter

Sensor		Tightening torque	55 Nm

67 – Install the connecting supports on the tunnel

cardiagn.com



- Guide in and install connecting support (3) on the tunnel.
- Tighten the screws (2).
- Tighten screws (arrows).

Connecting support to tunnel

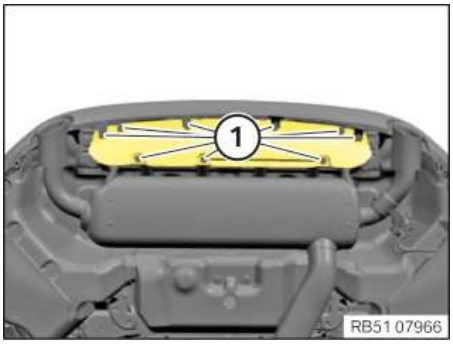
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Secure the clamp (1).

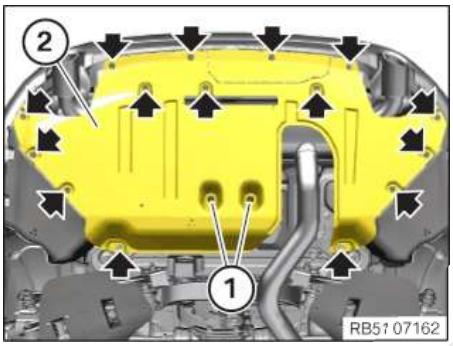
68 – Installing the rear diffuser



- **Version 1:**
- Install the diffuser and tighten the nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm



- **Version 2:**
- Feed in and position the diffuser (2)
- Tighten screws (arrows).

Diffuser / underbody panelling

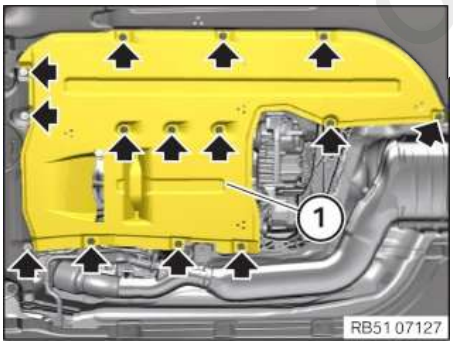
Nuts and screws		Tightening torque	3 Nm

- Tighten nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm

69 – Installing underbody protection at rear



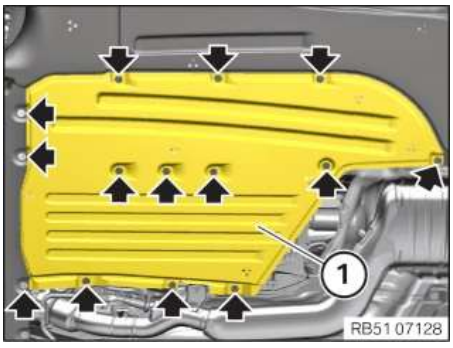
- **Version A:**

Insert and install the rear underbody protection (1).

Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version B:**

Insert and install the rear underbody protection (1).

Tighten screws (arrows).

Underbody protection

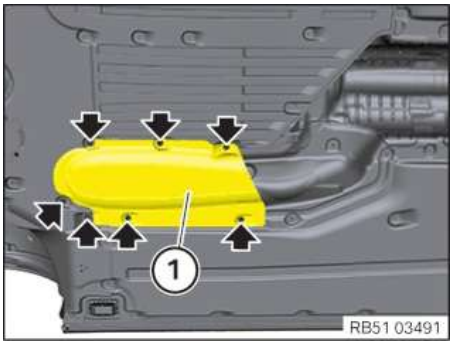
Hexagon screw		Tightening torque	3 Nm

cardiagn.com

70 – Install the underbody panelling of the transmission on the side

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

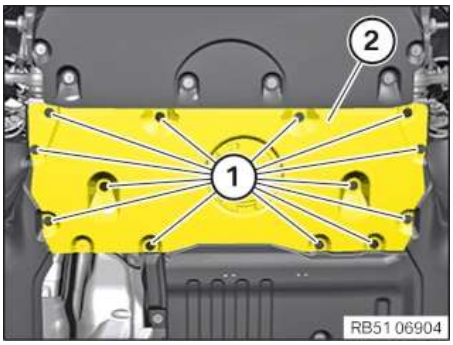


- Insert the underbody panelling (1).
- Tighten screws (arrows).

Underbody panelling

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

71 – Installing the centre underbody protection



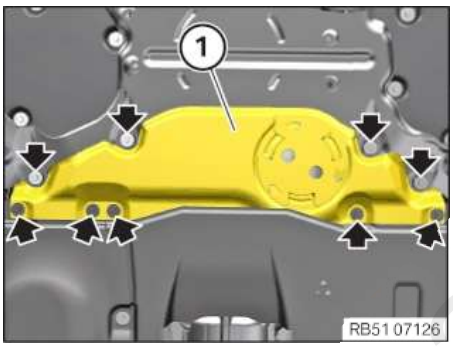
- **Variant with rear wheel drive:**

  Position central underbody protection (2).

  Tighten the screws (1).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version with all-wheel drive:**

  Guide in centre underbody protection (1) and install.

  Tighten screws (arrows).

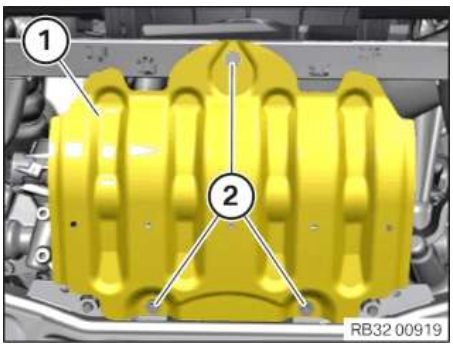
Underbody protection

Hexagon screw		Tightening torque	3 Nm

72 – If installed: Install underbody protection of the steering

Prerequisite

Front underbody protection has been removed.



- Position underbody protection (1).
- Tighten the screws (2).

Underbody protection, steering, to front axle support

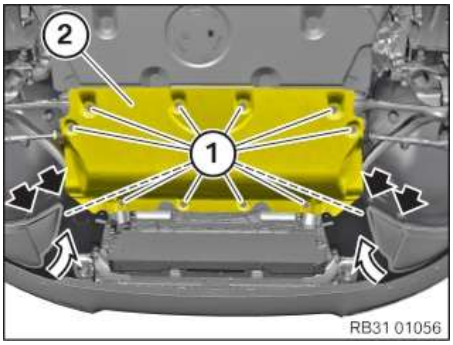
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

73 – Install the underbody protection of the steering gear

cardiagn.com



- **Version A:**

  Position the underbody protection (2) of the steering gear.

  Tighten the screws (1).

Underbody protection of the steering gear

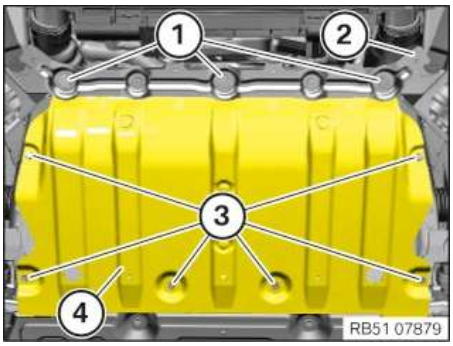
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the bottom wheel arch cover.

  Tighten the screws (arrows) of the lower wheel arch cover on the wheel arch cover.

Wheel arch trim panel, front

Thermoplastic hexagon screw		Tightening torque	2,6 Nm



- **Version B:**

  Feed in the underbody protection (4) of steering gear and install it.

  Tighten the screws (3).

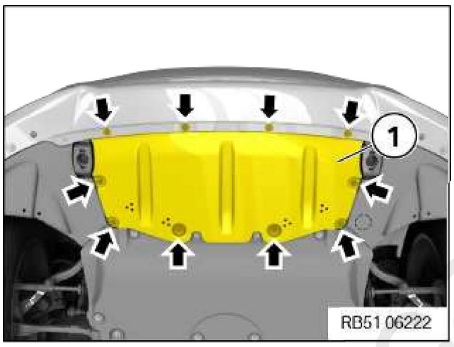
Underbody protection of the steering gear

Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the holder (2) for the underride protection.

  Tighten the screws (1).

74 – Installing the front underbody protection



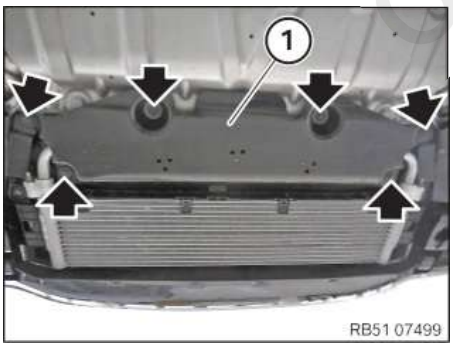
- **Version A:**

  Feed in the front underbody protection (1) towards the front under the bumper panel and position.

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



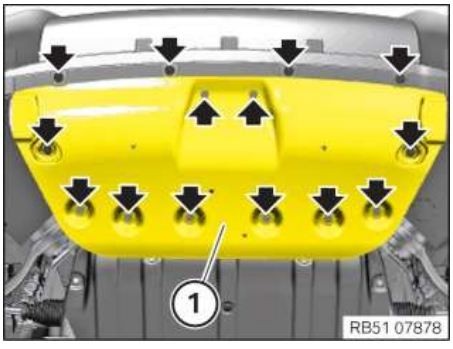
- **Version B:**

  Feed in and position the front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



- **Version C:**

  Feed in and install front underbody protection (1).

  Tighten screws (arrows).

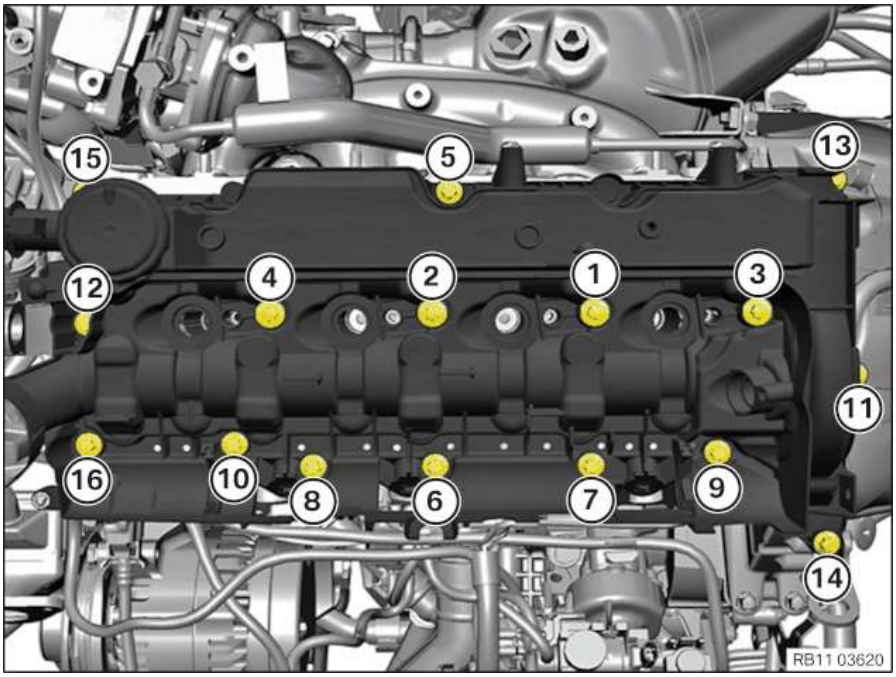
Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

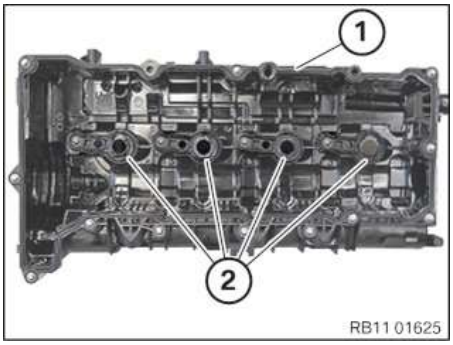
carmagn.com

75 – Installing cylinder head cover

Screw connection of the cylinder head cover

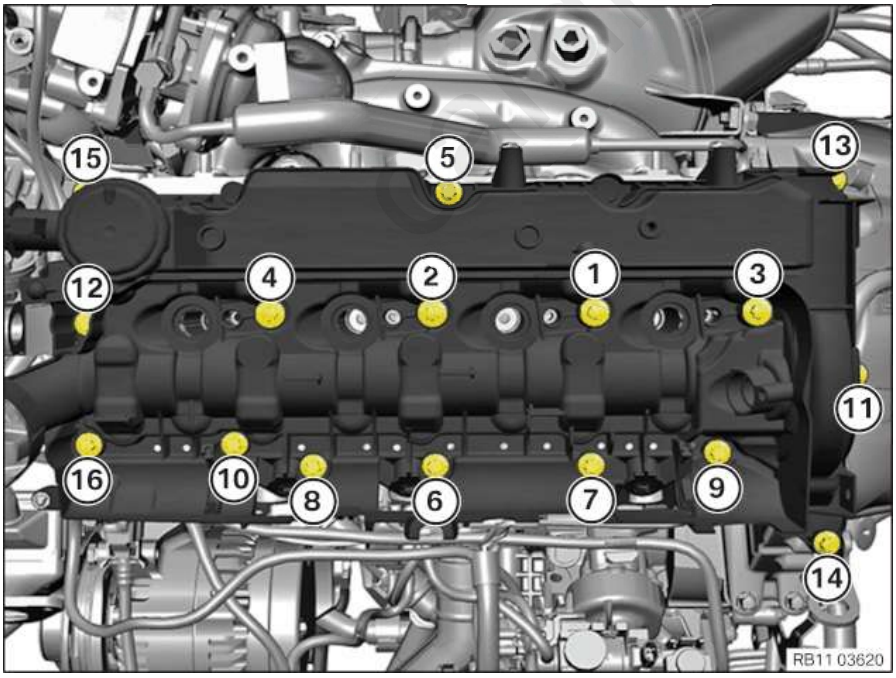


1 - 16 Bolts of the cylinder head cover



- Renew the profile seals (1) and (2) of the cylinder head cover.

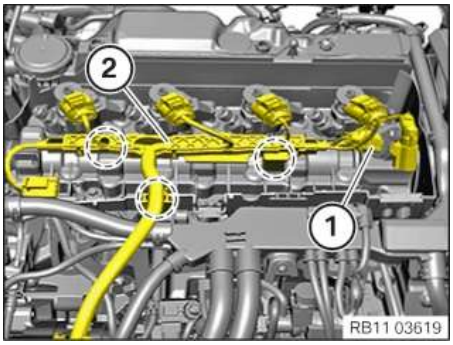
  Parts: Profile seals



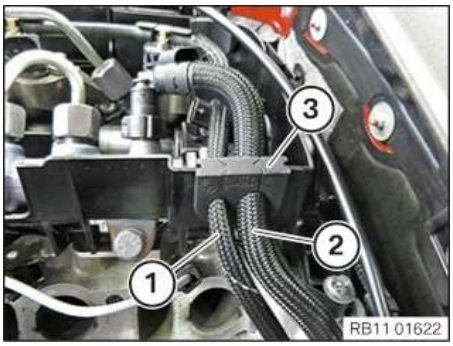
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

Cylinder head cover to cylinder head

M6		Tightening torque.	8,5 Nm



- Position the vehicle wiring harness (2) on the cylinder head cover and fasten in the marked areas.
- Plug in the connector (1) and lock audibly.



- Insert and connect the leakage oil line (1) with the fuel return line (2) and grommet (3).



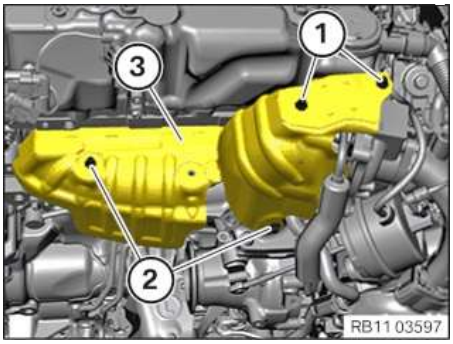
- Feed in and install the heat shield (1).



- Connect engine ventilation line (1) and lock.

  The locks (arrows) must engage audibly.

76 – Installing heat shield



- Feed in and install the heat shield (3).
- Tighten down screws (1) and (2).

Heat shield to exhaust manifold

M6x12			10 Nm

77 – Installing the sensor bracket on the cylinder head cover

cardiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

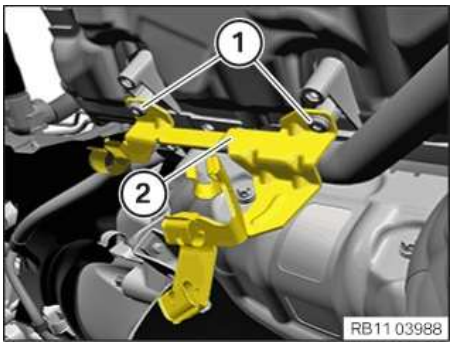
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

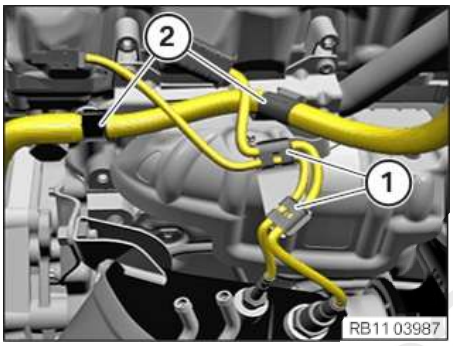
- Route all cables without abrasions, do not trap and crush.



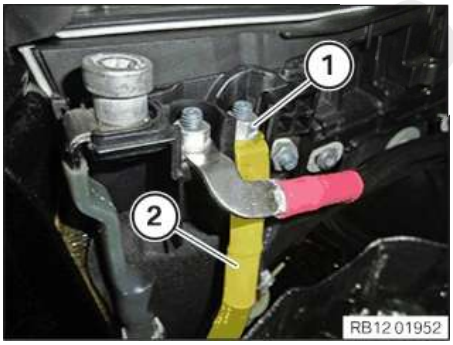
- Insert and install the holder (2).
- Tighten the screws (1).

Bracket on cylinder head cover

	Tightening torque	5 Nm



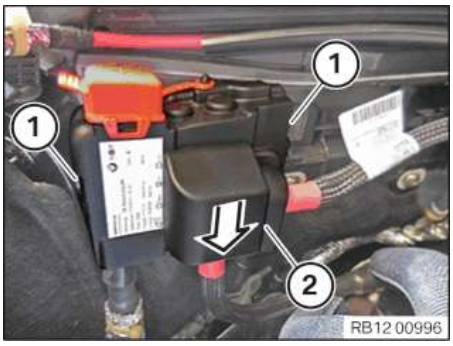
- Secure the positive battery cable in the clamps (2).
- Mount the cable of the exhaust gas sensor system in the clamps (1).



- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

Battery positive lead to battery positive terminal

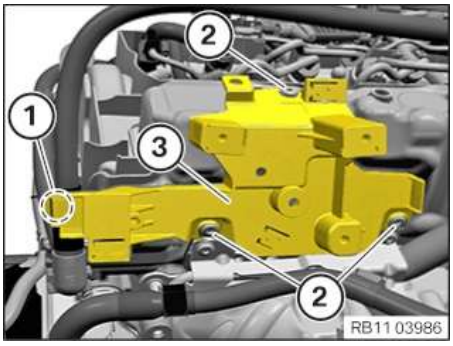
M8		Tightening torque	19 Nm



- Insert and install the cover (2) in the direction of the arrow.

  The locks (1) must engage audibly.

cardiagn.com

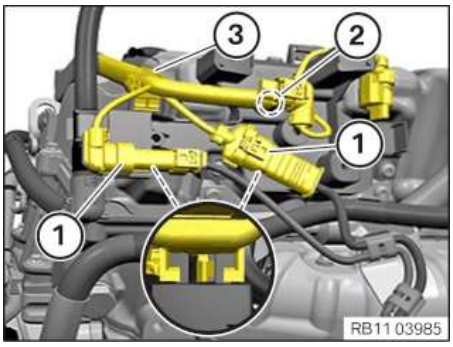


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

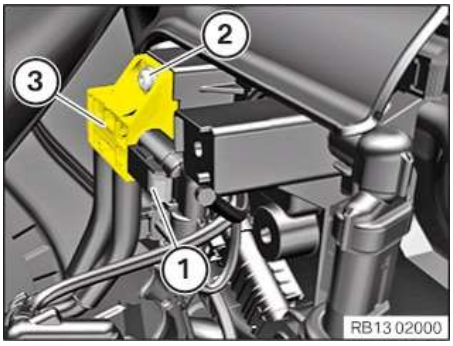
		Tightening torque	5 Nm

- Fasten the positive battery cable in the area (1) in the clamp.



- Feed in the wiring harness section and fasten it with the clamp (3).
- Fasten the cable clip in the area (2) in the sensor bracket.
- Feed in the connector (1) into the sensor bracket and lock it audibly.
- Plug in the connector (1) and lock audibly.

78 – Securing the differential pressure sensor for the diesel particulate filter



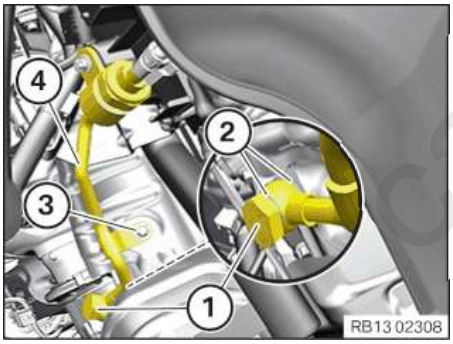
- Feed in and install the differential pressure sensor (3).
- Tighten down screw (2).

Differential pressure sensor of diesel particulate filter on cylinder head cover

TS5x20		Tightening torque	4 Nm

- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

79 – Install the exhaust gas pressure pipe



- Insert and install the exhaust gas pressure pipe (4).
- Replace the sealing rings (2).

  Parts: Sealing ring
- Apply the banjo bolt (1) hand-tight.
- Tighten down screw (3).

Heat shield to exhaust manifold

M6x12		Tightening torque	10 Nm

- Tighten the banjo bolt (1).

Banjo bolt for exhaust pressure pipe to exhaust manifold

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm



- Tighten down screw (2).

Exhaust gas pressure pipe to sensor system holder

TS6x20		Tightening torque	5,7 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

80 – Install all injectors

▸ **Cleaning the injector shafts**

cardiagn.com

CAUTION

Swirling dirt particles caused by compressed air.

Danger of injury!

- Collect dirt particles, e.g. when blowing out, use cloth to do so.

- Wear safety goggles.

RISK OF DAMAGE

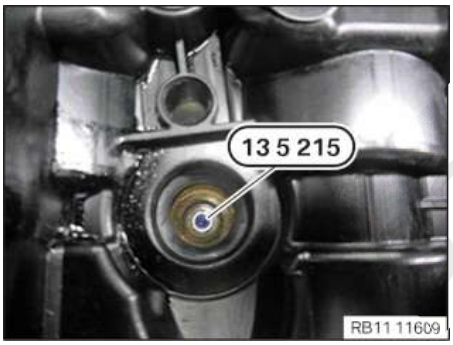
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



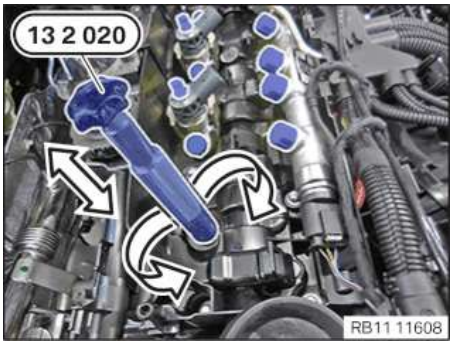
- Check whether the sealing ring remained in the injector shaft and remove the sealing ring as needed.
- Insert the special tool 0 493 763 (13 5 215) with the special tool 0 493 762 (13 5 214) from the set of special tools 0 493 758 (13 5 210) into the injector shaft.
- Remove special tool 0 493 762 (13 5 214).



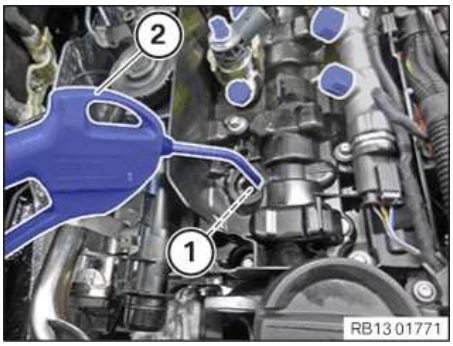
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



- Insert special tool 0 496 150 (13 2 020) into the injector shaft.



- Move special tool 0 496 150 (13 2 020) up and down in the injector shaft with rotational movements in the direction of arrow.
- Feed out special tool 0 496 150 (13 2 020) from the injector shaft and remove.



- Blow out injector shaft (1) with air gun (2).



- Feed the special tool 0 493 762 (13 5 214) into the injector shaft and screw it in with the special tool 0 493 763 (13 5 215).
- Feed out special tool 0 493 762 (13 5 214) with special tool 0 493 763 (13 5 215) from the injector shaft and remove it.

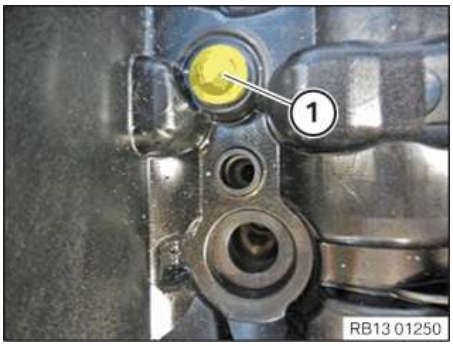
▸ **Check the placement of the clamping claw**

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Tighten down screw (1).

  The clamping claw is positioned on the bolt (1).

Clamping claw facing to cylinder head cover

M6		Tightening torque	10 Nm

▸ **Prepare the injector for installation**

cardiagn.com

RISK OF DAMAGE

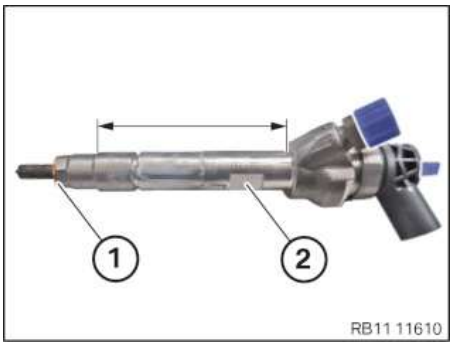
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

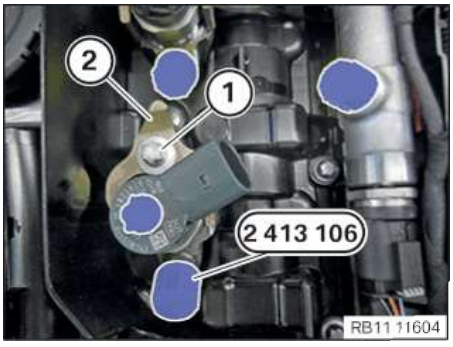
TECHNICAL INFORMATION

Lightly grease the injector shaft with high temperature-resistant grease.
For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



- Renew the copper sealing ring (1) on the injector (2).

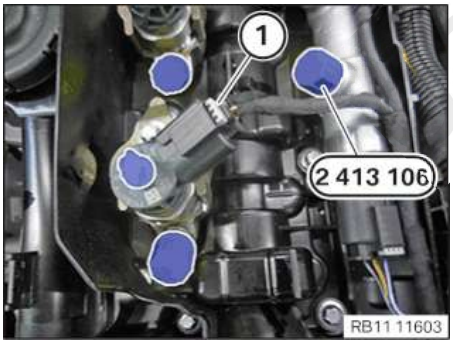
  Parts: Copper sealing ring
- Lightly grease the injector in the marked area with heat-resistant grease before installing the injector (2) in the injector shaft.



- Insert and install the injector .
- Insert and install the clamping claw (2).
- Tighten down screw (1).

Injector to cylinder head cover

M8	Tightening torque	8 Nm
	Angle of rotation	120 °



- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

▸ **Replacement: Perform injection quantity compensation**

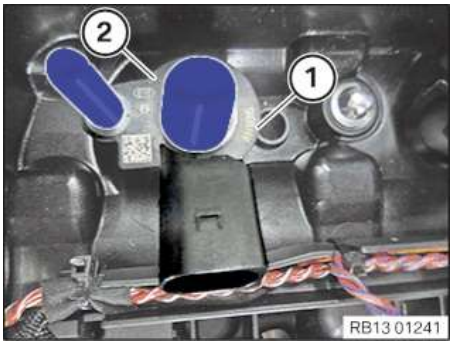
TECHNICAL INFORMATION

If the DDE control unit or an injector has been replaced, it will also be necessary to carry out injection quantity compensation. The adjustment value (7-position letter/number code) is engraved on each injector.

NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

cardiagn.com

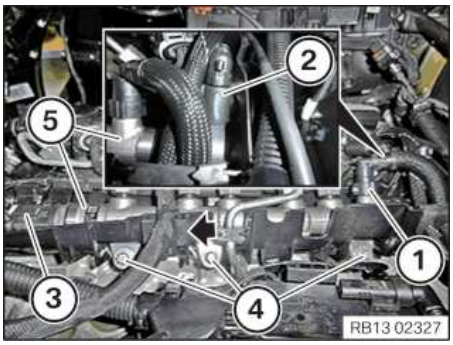


- Read off the adjustment value (1) on the new injector (2).



- Connect diagnosis system:
  - Vehicle identification
  - Function selection
  - Service functions
  - Digital diesel electronics (DDE)
  - Adjustment of injectors
  - Testing schedule
- Start service function with the right arrow button.

81 – Installing the rail



- Insert and install the rail (5).
- Tighten the screws (4).

Rail to cylinder head cover

M8		Tightening torque	19 Nm

- Install and lock cable clip (arrow).

  The cable clip (arrow) must engage audibly.
- Connect and lock the connector (3) at the rail pressure sensor.

  The connector (3) must engage audibly.
- Connect and lock the connector (2) at the rail pressure regulating valve.

  The connector (2) must engage audibly.
- Feed in fuel return line (1) and install.

  The fuel return line (1) must audibly engage.

82 – Installing high pressure line between rail and high pressure pump

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

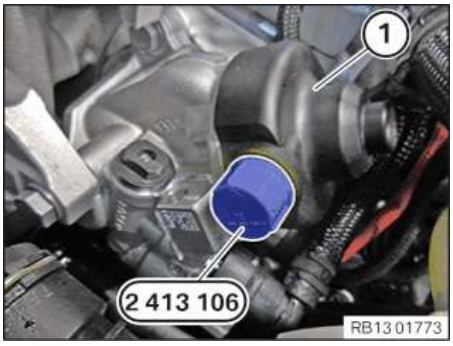
Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

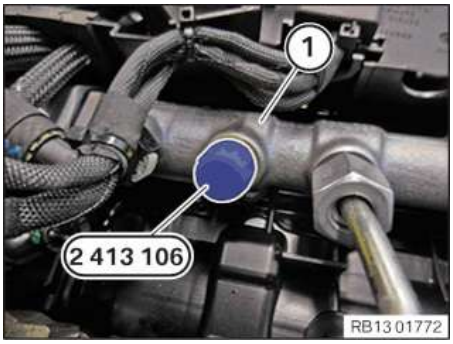
cardiagn.com

TECHNICAL INFORMATION

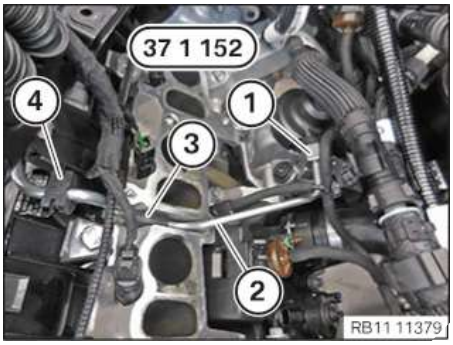
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Feed out and remove special tool on the high pressure pump (1).



- Feed out the special tool on the rail (1) and remove.



- Insert and install the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).
- Hand-tighten the union nut (1) on the high pressure pump.



- Hand-tighten the union nut (1) on the rail.

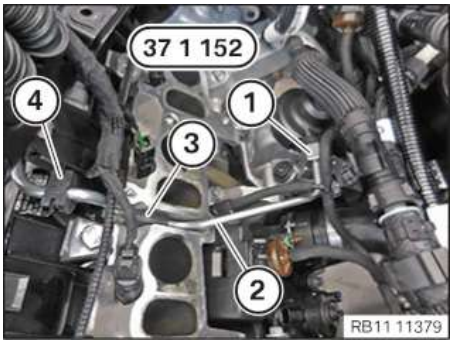
TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten the union nut (1) with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm



- Make sure that the high pressure line (2) is correctly installed with the abrasion protection (3) and the rubber mount (4).

TECHNICAL INFORMATION

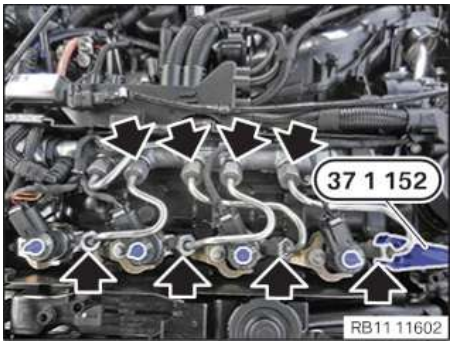
Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten union nut (1) on the high pressure pump with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm

cardiagn.com



- Remove the special tool from all cable connections.
- Feed in and install the high pressure lines (arrows).
- Hand-tighten the high pressure lines (arrows).

TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

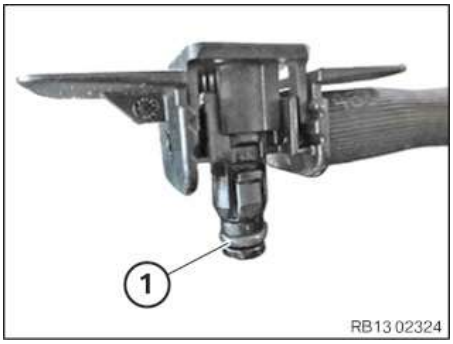
- Tighten the high pressure lines (arrows) with the special tool .

High pressure lines between injector and rail

High-pressure pipe		Tightening torque	24.5 Nm

- Check the high pressure lines (arrows) for tightness (**visual inspection**).

84 – Attach the leakage oil line on the injectors

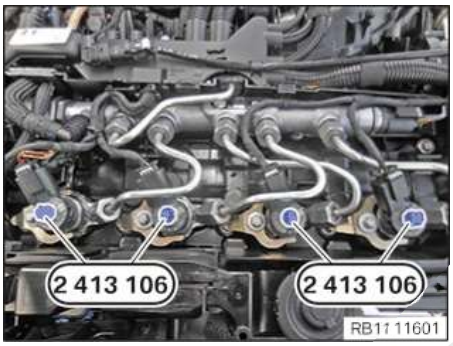


- **Version A:**

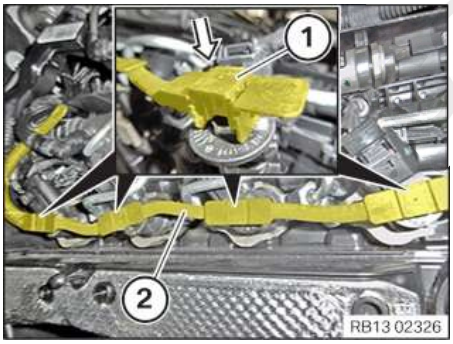
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

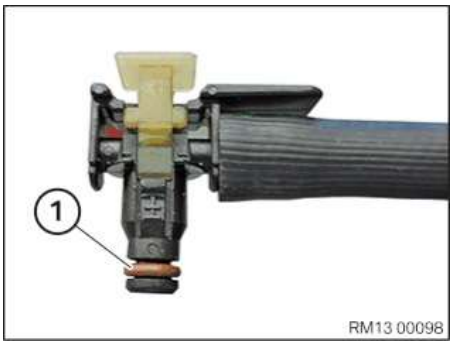
  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.



- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.



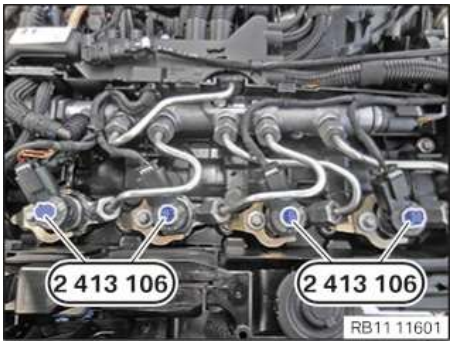
- **Version B**:

  Check sealing ring (1) for damage, renew leakage oil line if necessary.

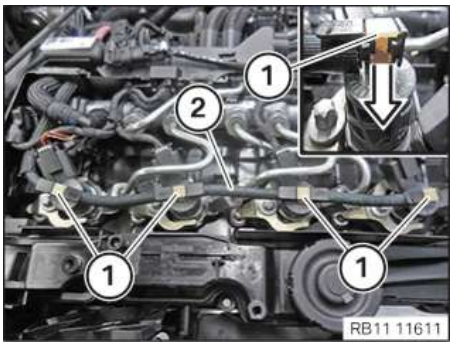
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.

ardiagn.com

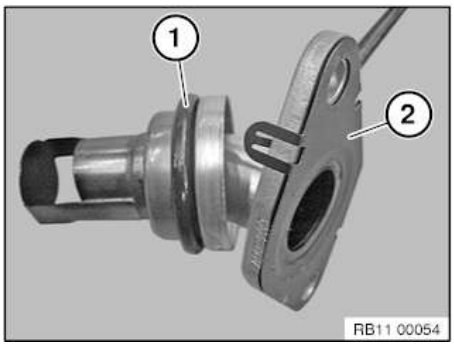


- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.

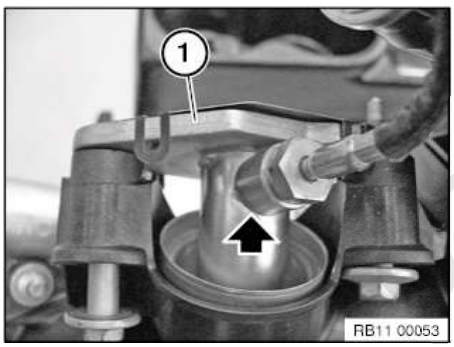
85 – Installing the intake plenum



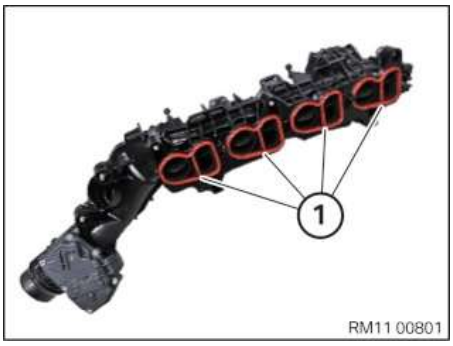
- Renew O-ring (1).

  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

  Parts: Gasket
- Position the seal (2) and clip it in.



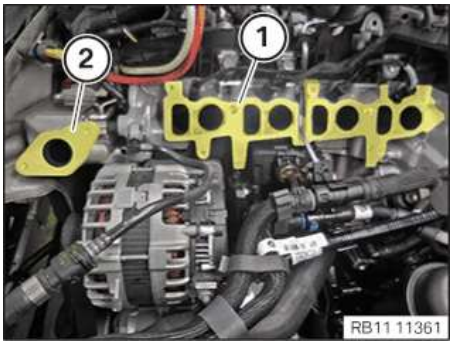
- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).



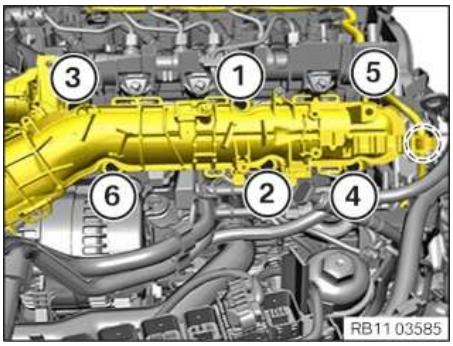
- Renew seals (1).

  Parts: Seals
- Ensure that the seals (1) are firmly mounted on the intake plenum.

cardiagn.com



- Clean connection points (1) at cylinder head.
- Clean the connection point (2) on the exhaust-gas recirculation cooler.

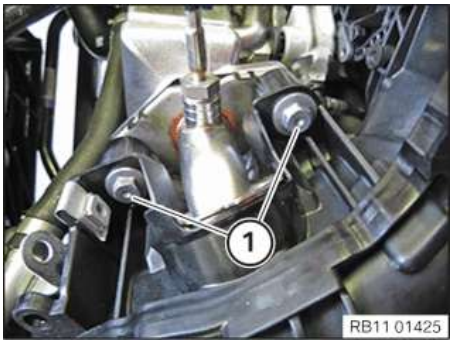


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

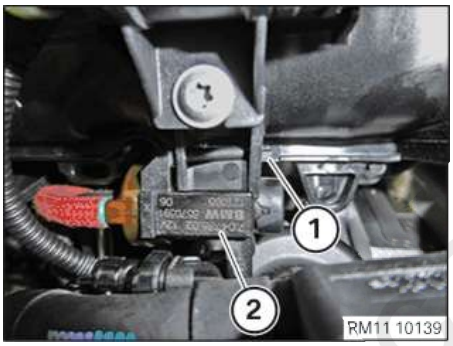
- Attach the wiring harness and fuel lines in the marked area on the intake plenum.



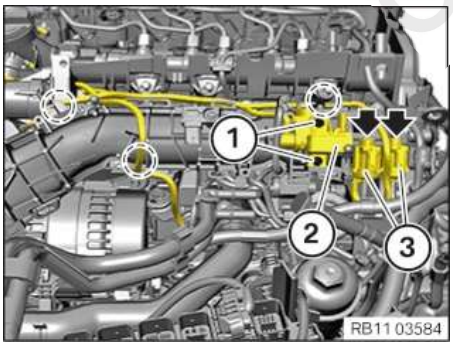
- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm



- Install electric changeover valve (2) from the left to the right in the holder on the intake plenum.
  The lock (1) must audibly engage.



- Install intake plenum electric changeover valve (3) on the intake plenum.
  The locks (arrows) must engage audibly.
- Position the electric changeover valve (2) on the intake plenum.
- Tighten the screws (1).

Electric changeover valve to intake plenum

TS6x20		Tightening torque	5 Nm

- Fasten the vacuum hoses on the intake plenum in the marked areas.



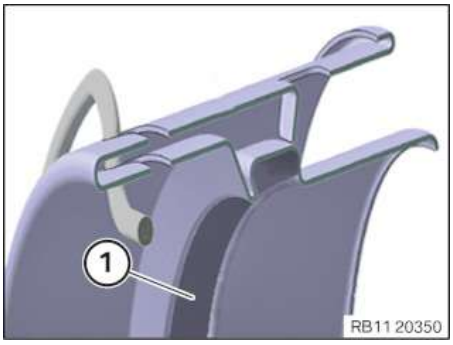
- Check the seal (1) for damage, and renew if necessary.

gardiagn.com

▸ **Replacing damaged seal**

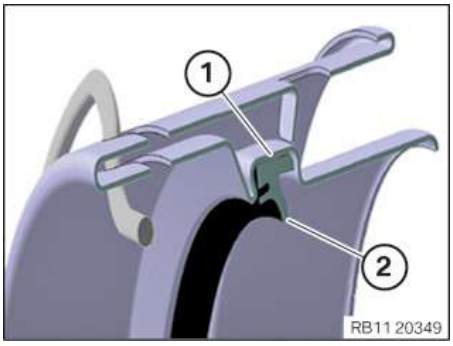
TECHNICAL INFORMATION

Do not use pointed or sharp-edged tools for the installation and/or removal.



- Remove damaged seal.
- Clean gasket groove (1) with a dry towel.

  The gasket groove (1) must be clean.



- Renew gasket.

  Parts: Gasket
- Install seal dry without lubricant or mounting agent.

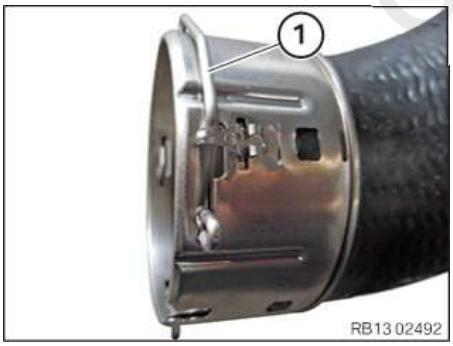
TECHNICAL INFORMATION

Incorrect assembly is possible. Ensure correct installation position.

- Feed in and install the seal.
- Make sure the seal is correctly installed in the gasket groove (1).
- Make sure that the sealing lip (2) is directed inwards as shown.



- Connect the pressure pipe to the throttle body until the locks (1) engage on both sides.



- Check that the locks (1) are correctly seated on the pressure pipe.

86 – Partially securing the wiring harness section on the intake plenum

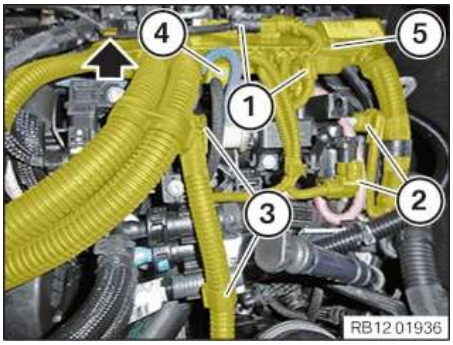
RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

- Route all cables without abrasions, do not trap and crush.

cardiagn.com



- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

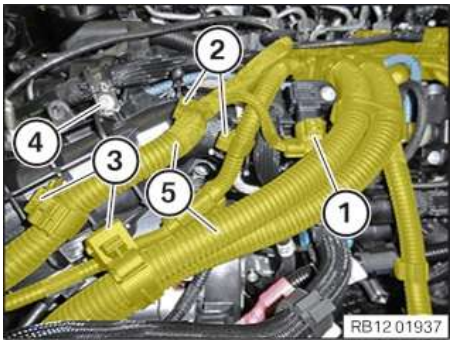
Wiring harness section to manifold

TS5x20		Tightening torque	3,6 Nm

- Secure clamps (3).
- Connect connectors (2) and lock.

  The connectors (2) must engage audibly.
- Secure the line at clamp (Arrow).
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



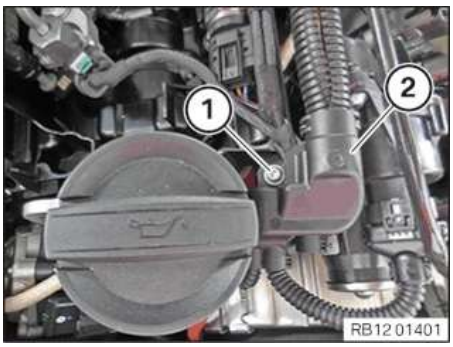
- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

Standard screw connection 4 Nm

Oval-head screw		Tightening torque	4 Nm

- Secure clamps (3).
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



- Guide in the wiring harness section (2) and install.
- Tighten down screw (1).

Wiring harness section to cylinder head cover

TS5x20		Tightening torque	3,6 Nm



- Connect connectors (1) and lock.

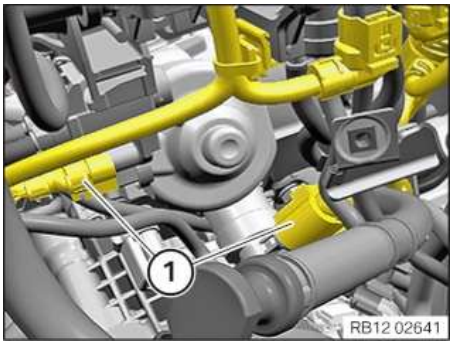
  The connector (1) must engage audibly.



- Connect the connector (1) and lock it.

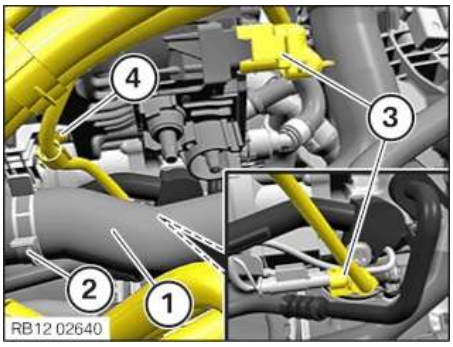
  The connector (1) must engage audibly.

cardiagn.com



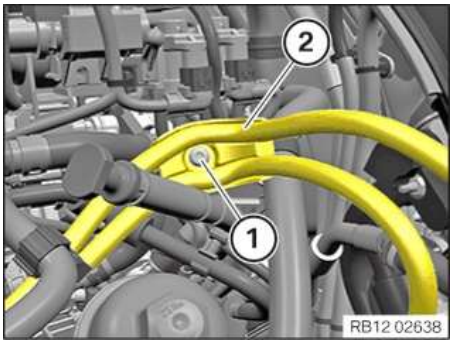
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



- Secure the clamp (4).
- Connect connectors (3) and lock.

  The connectors (3) must engage audibly.
- Feed the coolant line (1) into the holder (2) and install it.



- Feed in and position the positive battery cables (2) .
- Tighten down screw (1).

Standard screw connection M6

M6		Tightening torque	8 Nm



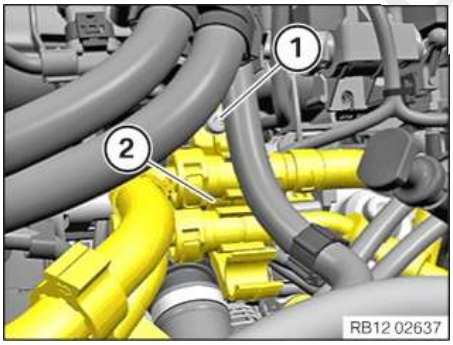
- Feed in and install the positive battery cable (4).
- Feed in and position the positive battery cables (4) .
- Renew the nuts (3) and (2).

  Parts: Nuts
- Tighten nuts (3) and (2).

Battery positive lead on the starter motor generator

M8		Tightening torque	19 Nm

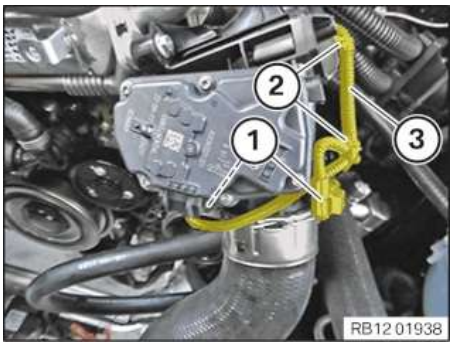
- Guide in and install the lid (1).



- Insert and install the holder (2).
- Tighten down screw (1).

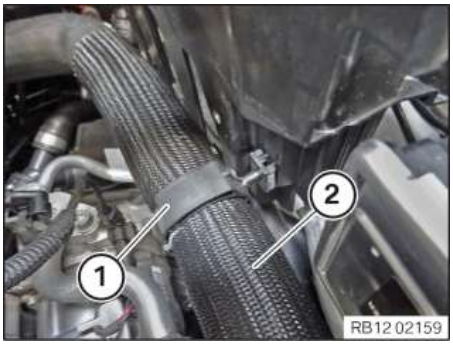
Holder on intake plenum

TS6X20		Tightening torque	5 Nm



- Guide in the wiring harness section (3) and install.
- Secure clamps (2).
- Connect connectors (1) and lock.

cardiagn.com



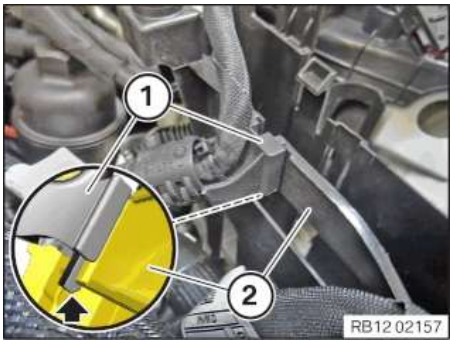
- Feed in and install coolant line (2).
- Lock holder (1).

  The holder (1) must engage audibly.



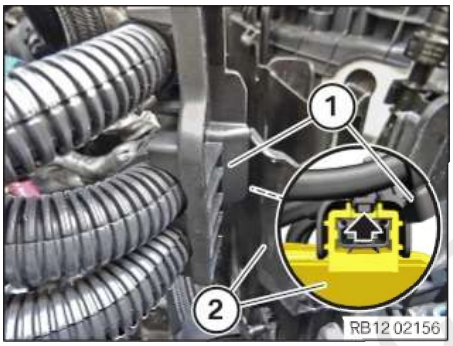
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.



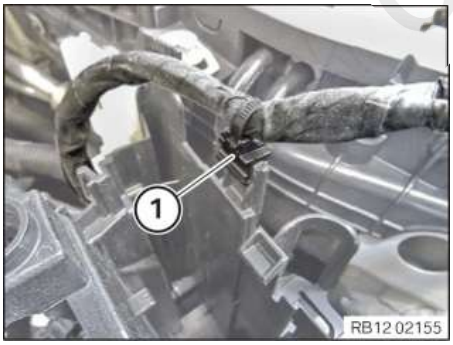
- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.

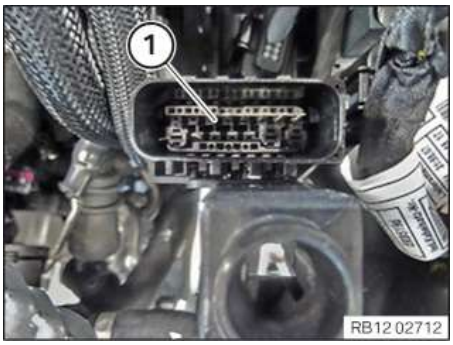


- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.



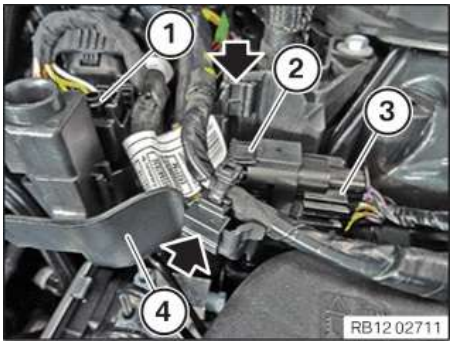
- Secure clamps (1).



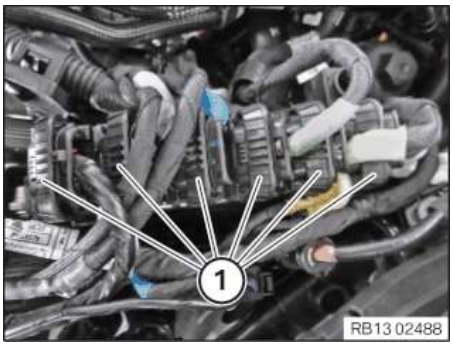
- Feed in and install the connector (1).

  The connector (1) must engage audibly.

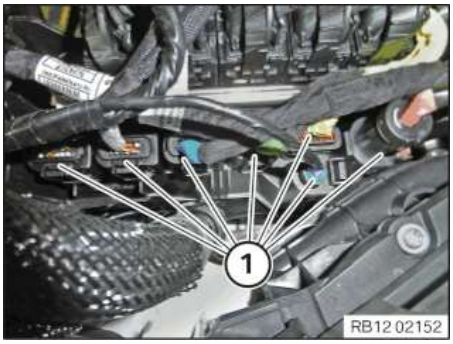
cardiagn.com



- Connect connector (3) to control unit holder (4) and lock it.
  The connector (3) must engage audibly.
- Connect connectors (2) and lock.
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.
  The connector (1) must engage audibly.
- Secure the clamps (arrows).

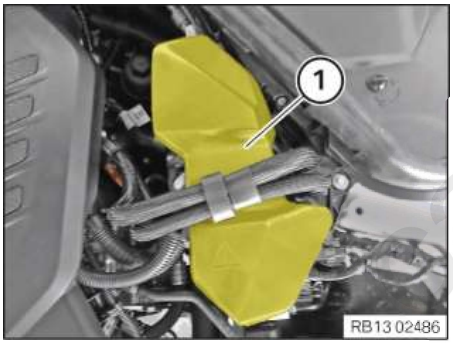


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



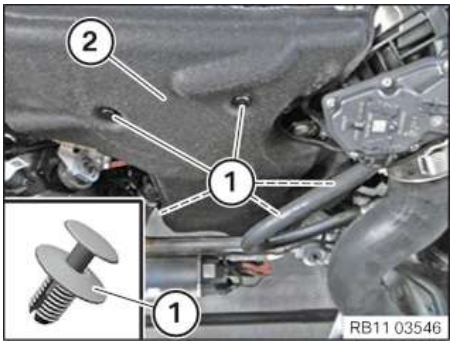
- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.

87 – Install the cover for the DDE control unit



- Insert and install cover (1) into guides.

88 – Install acoustic cover for the engine, front



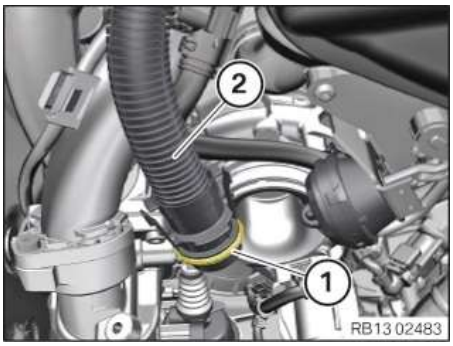
- Feed the acoustic cover (2) in and install.
- Secure the acoustic cover (2) with the expanding rivets (1).

89 – Installing the clean air pipe with resonator

bardiagn.com



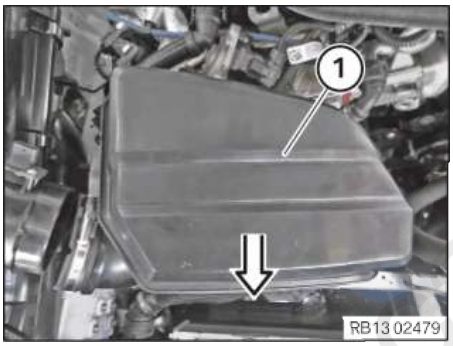
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



- Check the sealing ring (1) for the engine ventilation line (2) for damage and renew where required.



- Feed in and install clean air pipe with resonator (1) in the direction of the arrow.

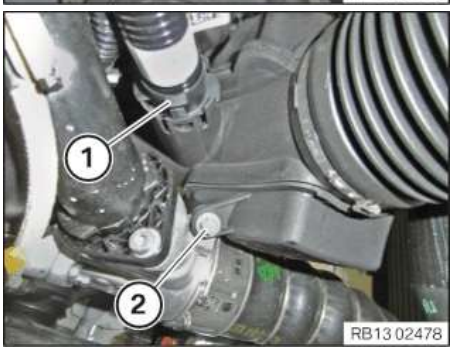


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

  The clamp (1) must engage audibly.

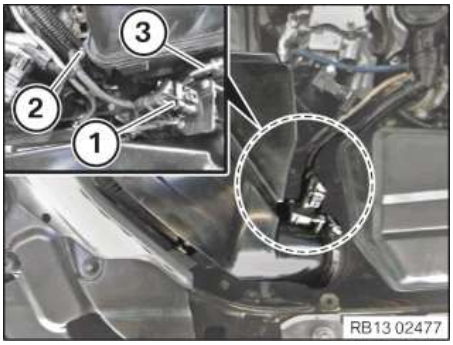


- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm

cardiagn.com



- Connect the clean air pipe with resonator to the intake filter housing.
- Tighten clamp (3).

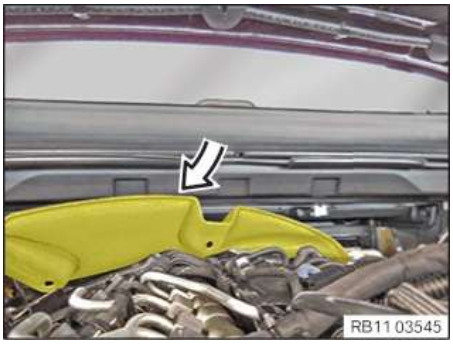
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

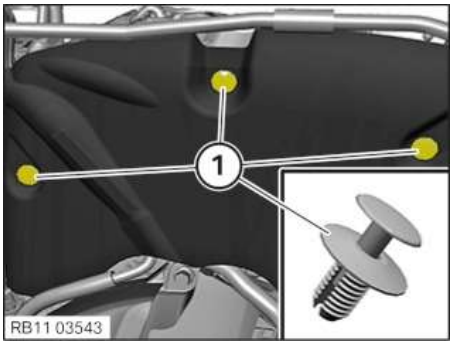
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

90 – Installing acoustic cover at rear

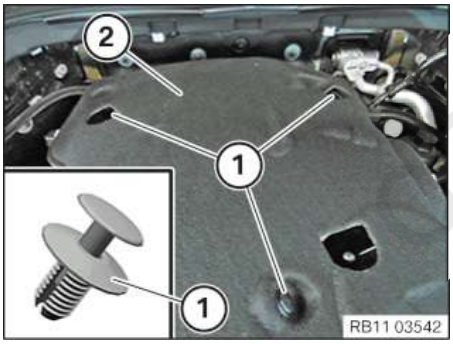


- Guide in the acoustic cover in the direction of the arrow and install it.



- Secure acoustic cover with the expanding rivets (1).

91 – Install the acoustic cover for the injectors



- Feed the acoustic cover (2) in and install.
- **If installed:** Secure the acoustic cover (2) with the expanding rivets (1) .

92 – Install acoustic cover

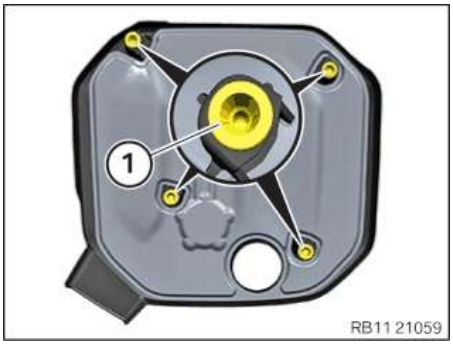
RISK OF DAMAGE

Damage to the acoustic cover/design cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.

cardiagn.com

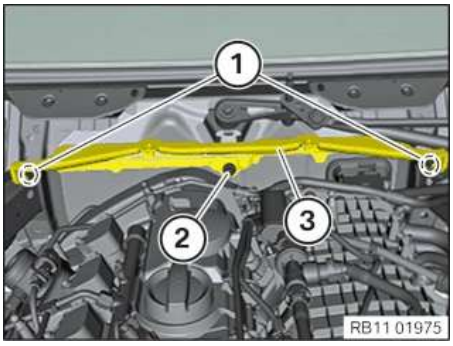


- Check the acoustic cover for correct fit of the rubber mounts (1).



- Clip in the acoustic cover (1) into the holders in the indicated areas.

93 – Installing centre bulkhead lower section

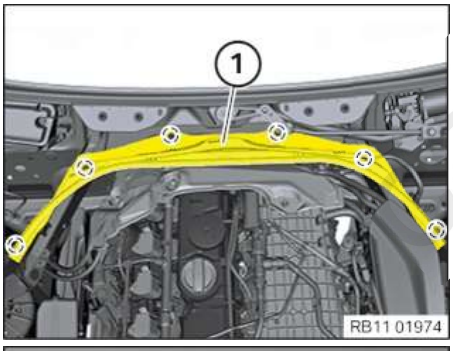


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

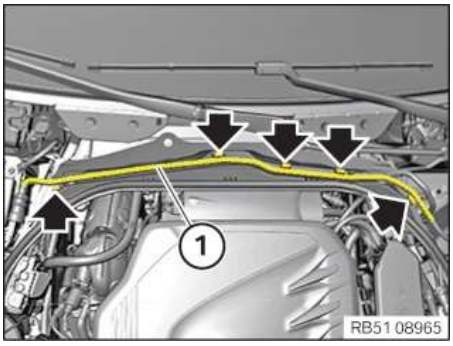
94 – Installing the centre bulkhead upper part



- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

Bulkhead upper part to bottom bulkhead

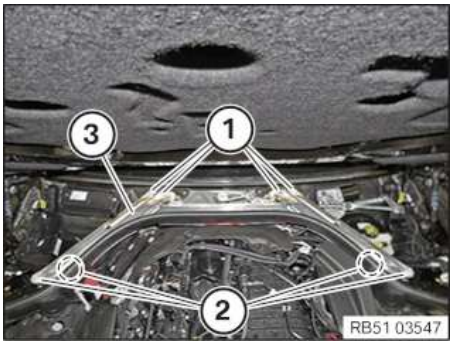
		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

  Clip in the wire (1) into the holders (arrows).

bardiagn.com



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Install the tension strut (3) on the spring strut dome.
- Tighten the screws (1).

Tension strut on bulkhead

M10x25 screw		Tightening torque	56 Nm

- Renew screws (2).

  Parts: Screws
- Tighten the screws (2).

Tension strut to spring strut dome

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

95 – Install the seal for the bonnet



- Press the rear bonnet seal (2) into the guide.
- Feed in cable (1) into the brackets.
- Check that the rear bonnet seal (2) and the cable (1) are seated correctly.

96 – Installing cowl panel cover

RISK OF DAMAGE

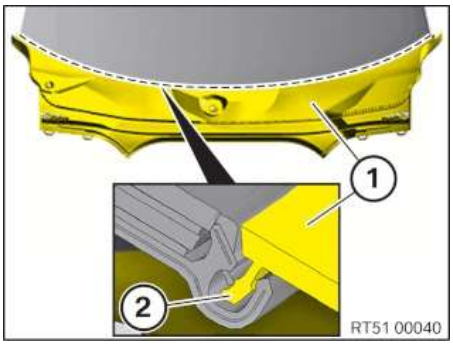
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

- Ensure correct installation of the components.
- Only use undamaged components.

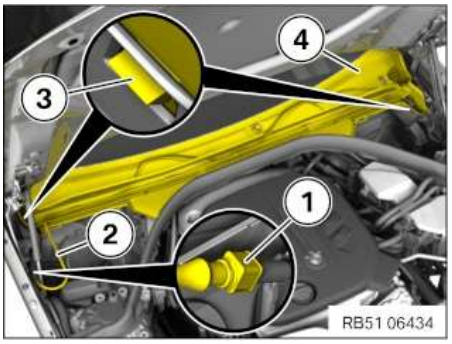
TECHNICAL INFORMATION

Before installing the cowl panel cover it is **mandatory** to check that the 48 V line is routed correctly and fitted tightly.
An incorrectly laid or attached 48 V line can be damaged by the wiper kinematics.



- Push the cowl panel cover (1) into the latch mechanism (2) beginning on the side.

cardiagn.com



- Clip cowl panel cover (4)in by means of the latch mechanisms (3).
- Position windscreen wash hose (2) and connect windscreen wash hose (1)quick lock.

97 – Install left and right wiper arm

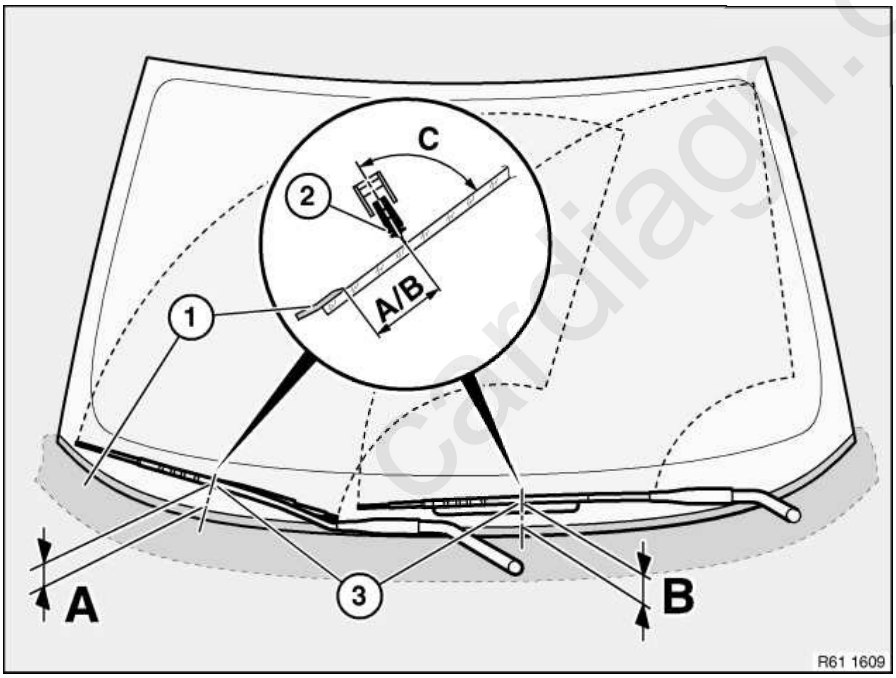
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

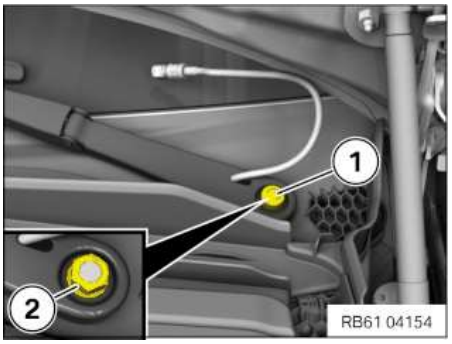
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- Connect the wiper arm (3).
- Correctly position the wiper arm (2) in relation to the window edge (1).

Distance from window pane edge to wiper blade

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm



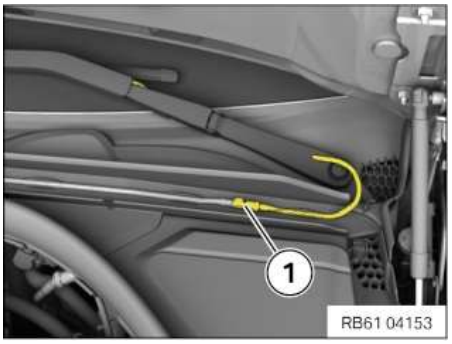
- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

- Connect the protective cap (1).

cardiagn.com



- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

98 – Connecting all battery earth leads



- See additional information.

99 – Activating the 48 V electrical system

Prerequisite

Ignition is switched off.

RISK OF DAMAGE

Damage to 48-V battery

If a 48-V battery that is disconnected from the electrical system is activated, the battery electronics will be damaged.

- Only carry out activation of the 48V electrical system with a completely connected 48-V battery.



- Lift battery earth lead (1).
- Remove special tool .



- Release the negative battery cable (2) of the 48-V battery from the mounting.
- Position the negative battery cable (2) of the 48-V battery on the negative battery terminal.
- Tighten nut (1).

Negative battery cable to 48-V battery

Nut M8		Tightening torque	19 Nm

cardiagn.com

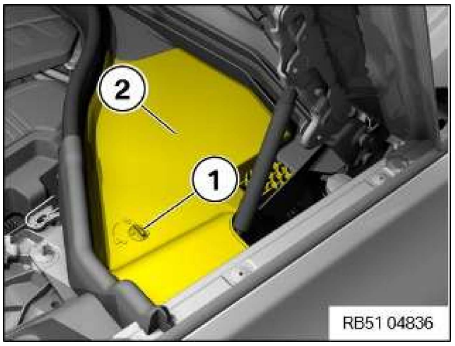


- Connect the connector (1) of the CAN bus and lock it.
- Clip in clip (2).



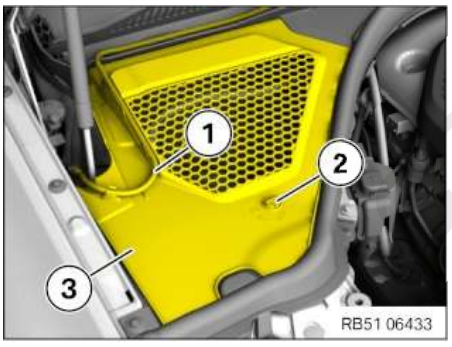
- Activate the 48V electrical system by closing the bonnet.
  The activation takes place automatically.

100 – Install the cover of the engine compartment on the rear left



- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

101 – Install the rear right engine compartment cover



- Position the cover of the engine compartment on the rear right (3).
- Close lock (2).
- Insert washer fluid hose (1) into the guides.

102 – Take bonnet out of the service position

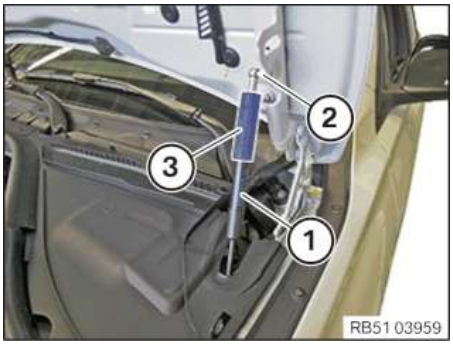
CAUTION

Shutting bonnet or tailgate.

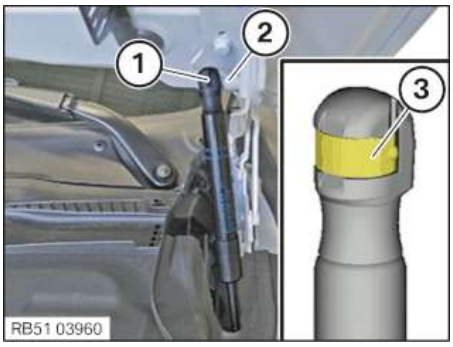
Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.

cardiagn.com



- Support the bonnet by hand.
- Remove the special tool (3) from the ball pin (2).
- Pull off the special tool (3) from the gas pressure spring (1).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.



- Check the clamp (3) is fitted correctly.
- Connect ball socket (1) to ball pin (2).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.

Additional Information

Overview of Tightening Torques

Special tool 2 365 488 to engine			Used in step 4258
M8x60		Tightening torque	19 Nm

Camshaft carrier to cylinder head			Used in step 50
M7x35		Tightening torque	13 Nm

Bearing journal to cylinder head			Used in step 53
M16x1.5	Replace bearing journal.	Tightening torque	20 Nm

Standard screw connection M8			Used in step 53
M8		Tightening torque	19 Nm

Chain tensioner piston to cylinder head			Used in step 54
22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

Holder to crankcase			Used in step 54
M8X16		Tightening torque	19 Nm

Camshaft sprocket to camshaft			Used in step 55
M7x17.			17 Nm

Starter motor to engine			Used in step 61
M8X60		Tightening torque	19 Nm

Battery positive lead to starter			Used in step 61
M8		Tightening torque	13,5 Nm

Diesel particulate filter V-clip to exhaust turbocharger			Used in step 63
V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

Bracket to diesel particulate filter top			Used in step 63
M8		Tightening torque	19 Nm

cardiagn.com

Bracket to transmission for diesel particulate filter holder bottom			Used in step 63
M8X20		Tightening torque	19 Nm

Lower holder to diesel particulate filter			Used in step 63
M8		Tightening torque	19 Nm

Coolant lines for SCR metering module			Used in step 63
M6X16		Tightening torque	8 Nm

Nitrogen oxide sensor before SCR catalytic converter			Used in step 64
Sensor		Tightening torque	50 Nm

Monitoring oxygen sensor			Used in step 65
Sensor		Tightening torque	50 Nm

Rear silencer to body / bumper support			Used in step 66
M8	Replace nuts.	Tightening torque	19 Nm

Exhaust system to rear axle carrier			Used in step 66
M8 nut		Tightening torque	19 Nm

Exhaust system to transmission			Used in step 66
M8		Tightening torque	19 Nm

Exhaust system to diesel particle filter			Used in step 66
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

SCR metering module V-clip to exhaust system			Used in step 66
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm

Exhaust-gas temperature sensor upstream of SCR catalytic converter			Used in step 66
Sensor		Tightening torque	30 Nm

Diesel particulate sensor to exhaust system			Used in step 66
Sensor		Tightening torque	50 Nm

Nitrogen oxide sensor downstream of SCR catalytic converter			Used in step 66
Sensor		Tightening torque	55 Nm

Connecting support to tunnel			Used in step 67
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

Diffuser / underbody panelling			Used in step 68
Nuts and screws		Tightening torque	3 Nm

Underbody protection			Used in step 6971
Hexagon screw		Tightening torque	3 Nm

Underbody panelling			Used in step 70
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Underbody protection, steering, to front axle support			Used in step 72
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support			Used in step 72
Hexagon bolt M6		Tightening torque	8 Nm

cardiagn.com

Underbody protection of the steering gear — Used in step 73

Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

Wheel arch trim panel, front — Used in step 73

Thermoplastic hexagon screw		Tightening torque	2,6 Nm

Underbody protection front — Used in step 74

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Cylinder head cover to cylinder head — Used in step 75

M6		Tightening torque.	8,5 Nm

Heat shield to exhaust manifold — Used in step 76

M6x12			10 Nm

Bracket on cylinder head cover — Used in step 77

		Tightening torque	5 Nm

Battery positive lead to battery positive terminal — Used in step 77

M8		Tightening torque	19 Nm

Differential pressure sensor of diesel particulate filter on cylinder head cover — Used in step 78

TS5x20		Tightening torque	4 Nm

Heat shield to exhaust manifold — Used in step 79

M6x12		Tightening torque	10 Nm

Banjo bolt for exhaust pressure pipe to exhaust manifold — Used in step 79

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm

Exhaust gas pressure pipe to sensor system holder — Used in step 79

TS6x20		Tightening torque	5,7 Nm

Clamping claw facing to cylinder head cover — Used in step 80

M6		Tightening torque	10 Nm

Injector to cylinder head cover — Used in step 80

M8		Tightening torque	8 Nm
		Angle of rotation	120 °

Rail to cylinder head cover — Used in step 81

M8		Tightening torque	19 Nm

High pressure lines between high pressure pump and rail — Used in step 82

High-pressure pipe		Tightening torque	24.5 Nm

High pressure lines between injector and rail — Used in step 83

High-pressure pipe		Tightening torque	24.5 Nm

Intake plenum to cylinder head — Used in step 85

M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum — Used in step 85

		Tightening torque	10 Nm

cardiagn.com

Electric changeover valve to intake plenum			Used in step 85
TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold			Used in step 86
TS5x20		Tightening torque	3,6 Nm

Standard screw connection 4 Nm			Used in step 86
Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover			Used in step 86
TS5x20		Tightening torque	3,6 Nm

Standard screw connection M6			Used in step 86
M6		Tightening torque	8 Nm

Battery positive lead on the starter motor generator			Used in step 86
M8		Tightening torque	19 Nm

Holder on intake plenum			Used in step 86
TS6X20		Tightening torque	5 Nm

Clean air pipe to exhaust turbocharger			Used in step 89
M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing			Used in step 89
Clamp		Tightening torque	3 Nm

Bulkhead lower part to body			Used in step 93
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead			Used in step 94
		Tightening torque	3 Nm

Tension strut on bulkhead			Used in step 94
M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome			Used in step 94
Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm			Used in step 97
Combination hexagon nut		Tightening torque	35 Nm

Negative battery cable to 48-V battery			Used in step 99
Nut M8		Tightening torque	19 Nm

Overview of Special Tools

cardiagn.com

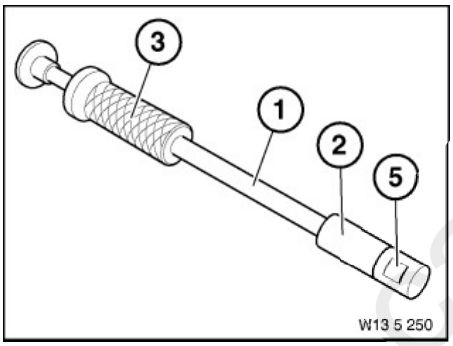
0 493 339 (13 5 252) Bush



Common Used in step 23

Usage	(Threaded bush)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 321 (13 5 250) Puller



Common Used in step 23

Usage	For removing injector nozzles or injectors from cylinder head
Included in the tool or work	
Storage location	A16
Replaced by	
In connection with	
SI-Number	01 06 98 (306)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 338 (13 5 251)		**Rod** (guide rod)	
2	0 493 339 (13 5 252)		**Bush** (Threaded bush)	
3	0 493 340 (13 5 253)		**Weight** (Weight)	
4	0 493 379 (13 5 254)		**Claw** (Clamping claw) For removal of injector nozzles / engine: M57	
5	0 495 579 (13 5 255)		**Adapter** For removing steering shaft on E85. Refer to SI 01 11 06 (265)	

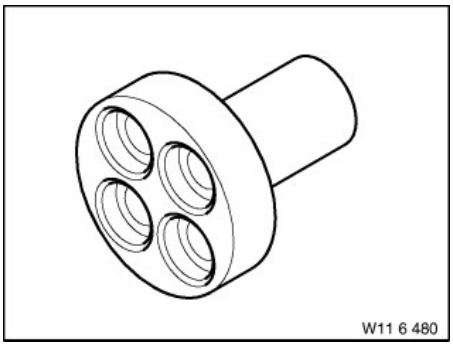
cardiagn.com

0 493 340 (13 5 253) Weight



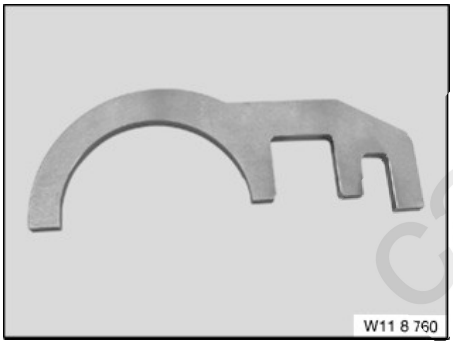
Common	Used in step 23
Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 380 (11 6 480) Connector



Common	Used in step 4258
Usage	For turning over engine at crankshaft hub (vibration absorber).
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	01 11 98 (338)

0 496 112 (11 8 760) Gauge



Common	Used in step 424651565859
Usage	For securing camshaft at TDC.
Included in the tool or work	
Storage location	B24
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

2 365 488 Adapter



Common	Used in step 42575860
Usage	For disconnecting the crankshaft at the top dead centre. (longitudinal installation with automatic transmission only).
Included in the tool or work	
Storage location	C56
Replaced by	
In connection with	
SI-Number	01 46 14 (191)

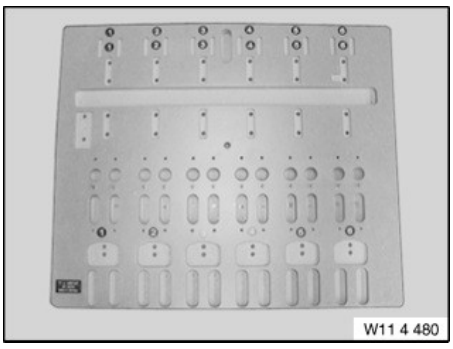
cardiagn.com

2 288 380 Locating stud



Common	Used in step 42575860
Usage	For disconnecting the crankshaft at the top dead centre. Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).
Included in the tool or work	
Storage location	A56
Replaced by	
In connection with	
SI-Number	01 04 14 (071)

0 495 105 (11 4 480) oddments tray

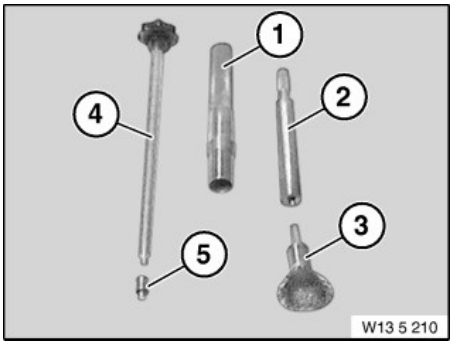


Common	Used in step 48
Usage	(Boards (2 pieces)) For setting down the individual components of the cylinder head.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 17 04 (130)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 495 106 (11 4 481)		**oddments tray** (Board, intake side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	
2	0 495 107 (11 4 482)		**oddments tray** (Board, exhaust side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	

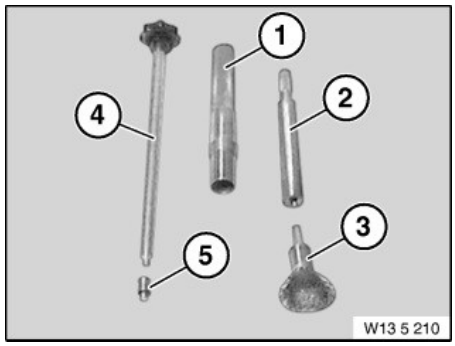
0 493 763 (13 5 215) Plug



Common	Used in step 80
Usage	(Seal plug)
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

cardiagn.com

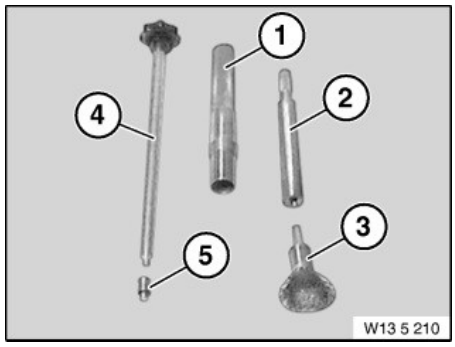
0 493 762 (13 5 214) Rod



Common Used in step 80

Usage	(Mounting rod) For the seal plug
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 758 (13 5 210) Tool



Common Used in step 80

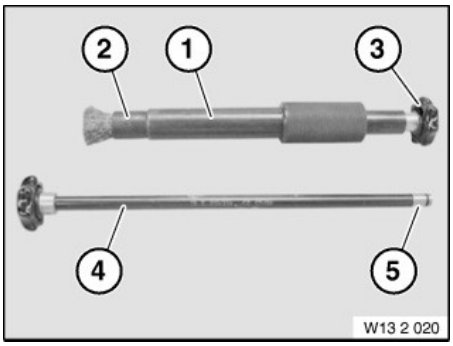
Usage	(Cleaning set) For injector channels
Included in the tool or work	
Storage location	B4
Replaced by	
In connection with	
SI-Number	01 05 00 (574)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 759 (13 5 211)		**Holding sleeve** (Guide sleeve)	
2	0 493 760 (13 5 212)		**Holder** (Brush holder)	
3	0 493 761 (13 5 213)		**Brush head**	
4	0 493 762 (13 5 214)		**Rod** (Mounting rod) For the seal plug	
5	0 493 763 (13 5 215)		**Plug** (Seal plug)	

carmagn.com

0 496 150 (13 2 020) Tool



Common Used in step 80

Usage	(Cleaning kit) For cleaning the injector shaft.
Included in the tool or work	
Storage location	A87
Replaced by	
In connection with	
SI-Number	01 07 07 (355)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 496 151 (13 2 021)		**Holding sleeve** (Guide sleeve) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
2	0 496 152 (13 2 022)		**Holder** (Brush holder) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
3	0 496 153 (13 2 023)		**Brush head** Remaining inventories will be sold off, followed by discontinuation and then available as part of complete special tool 13 2 020 = 83 30 0 496 150 only	
4	0 496 154 (13 2 024)		**Rod** (Mounting rod) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
5	0 496 155 (13 2 025)		**Plug** (Seal plug) Available as part of complete special tool 13 2 020 = 83 30 0 496 150 only.	

cardiagn.com

Distance from window pane edge to wiper blade	Used in step 97
Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

Links

Repair instructions (PRE)	Used in step
Notes on 48-V battery	499

General repair instructions	Used in step
11 00 ... Overview of consumables (Electronic Parts Catalogue)	80

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	598
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	598
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	598
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	598
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598

cardiagn.com

61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 20 900 Disconnecting and connecting battery earth lead	598
61 35 ... Notes on ESD protection (Electro Static Discharge)	17233839
61 35 ... Notes on ESD protection (Electro Static Discharge)	17233839

cardiagn.com

11 33 050 Removing and installing/replacing all rocker arms

PRELIMINARY WORK

1 – Bring front compartment lid in the service position

Prerequisite

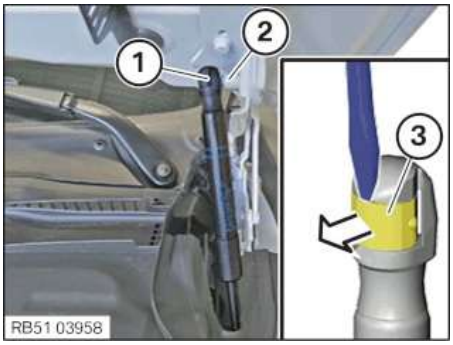
Engine compartment lid is open.

CAUTION

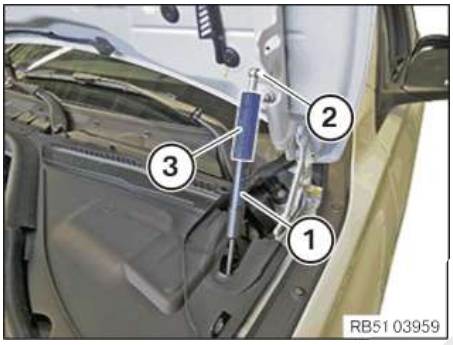
Shutting bonnet or tailgate.

Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.



- Lift clamp (3) slightly using a screwdriver, in the direction of the arrow.
- Lift off ball socket (1) from ball pin (2).
- Repeat the operation on the other side of vehicle.



TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

- Remove the bonnet support and open the bonnet further.
- Pull special tool or or (3) over gas pressure spring (1).
- Place special tool on the ball pin (2) and engage using force.
- Repeat the operation on the other side of vehicle.

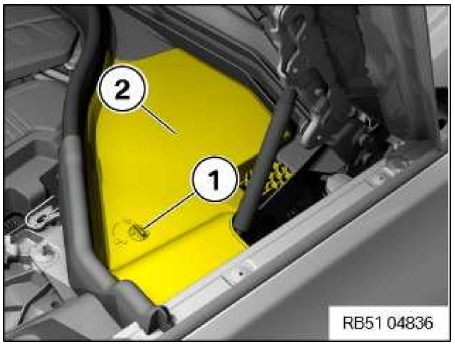
2 – Disconnecting all battery earth leads



- See additional information.

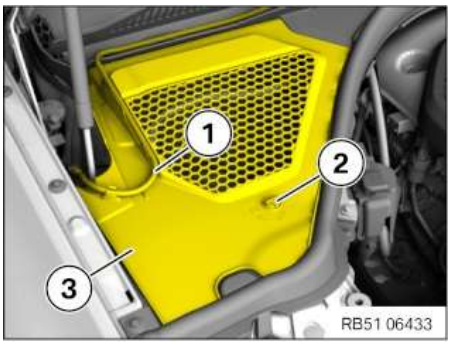
3 – Remove the cover of the engine compartment at the rear left

cardiagn.com



- Loosen the lock (1).
- Remove the cover (2) of the rear left engine compartment.

4 – Remove the cover of the rear right engine compartment



- Release washer fluid hose (1) from the guides.
- Loosen the lock (2).
- Remove the cover (3) of the rear right engine compartment.

5 – Removing the wiper arm on the left and right

NOTICE

Description is for left component only. Procedure on the right side is identical.

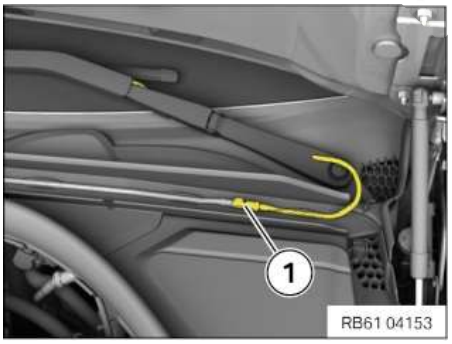
▸ **Remove the wiper arm**

RISK OF DAMAGE

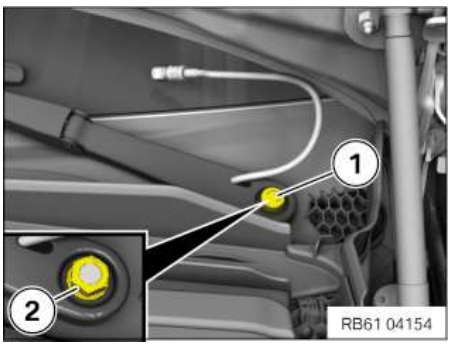
Damage to wiper console.

While removing the wiper arms without using special tool, the wiper console can break.

- Removing the wiper arms must be carried out only using the prescribed special tool.
- Do **not** lever off the wiper arm because otherwise the wiper console may break at the predetermined breaking point for active pedestrian protection.

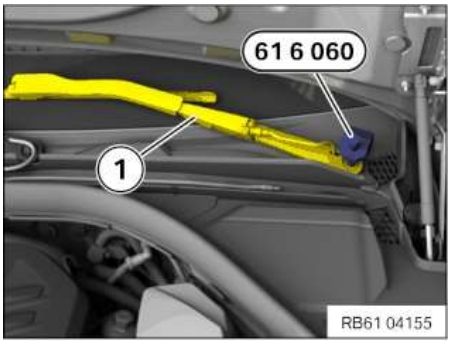


- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.



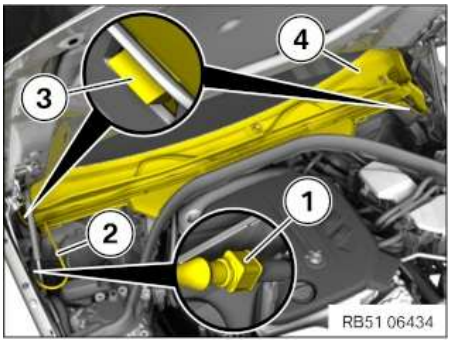
- Remove the protective cap (1).
- Loosen nut (2).

cardiagn.com

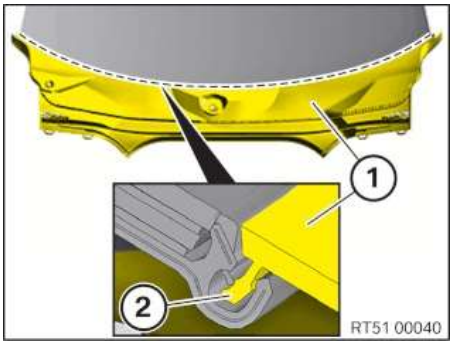


- Pull off the wiper arm (1) using special tool .

6 – Remove cowl panel cover



- Release snap fastener (1) of the washer fluid hose (2) and put the washer fluid hose (2) to one side.
- Unclip clips (3) on the cowl panel cover (4).



- Pull the cowl panel cover (1) upward out of the latch mechanism (2) beginning on the side.

7 – Remove the seal for the rear bonnet

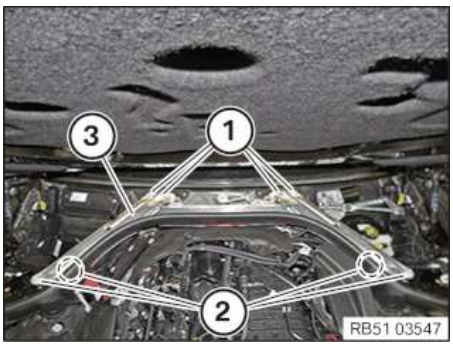


- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

8 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

Driving without the strut brace/front-end strut or tension strut is not permitted.

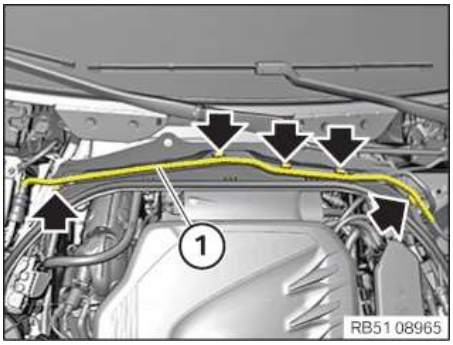


NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

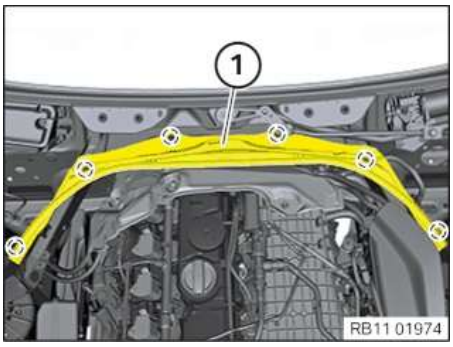
- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.

bardiagn.com



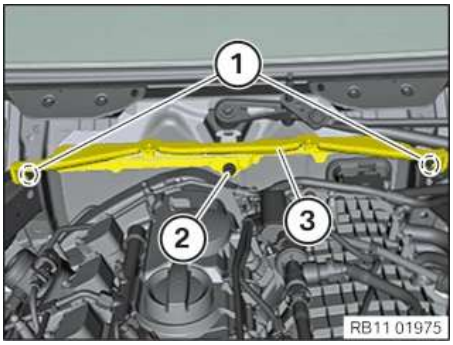
- **Version with mild hybrid technology:**

  Unclip the wire (1) at the holders (arrows).



- Unscrew the bolts in the marked areas.
- Remove the centre bulkhead upper part (1).

9 – Removing the centre bulkhead lower section



- Loosen screws (1).
- Loosen nut (2).
- Remove the centre bulkhead lower part (3).

10 – Removing the acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

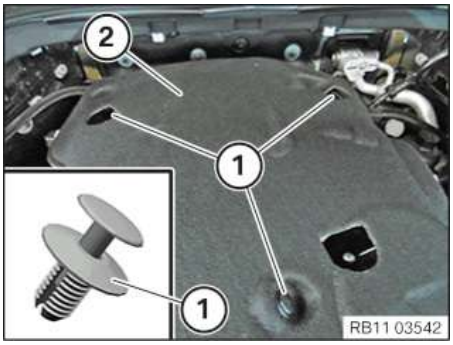
- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

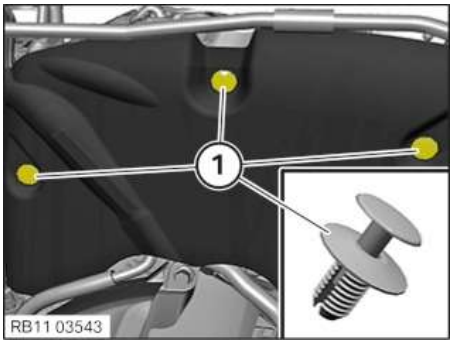
11 – Remove the acoustic cover for the injectors

cardiagn.com

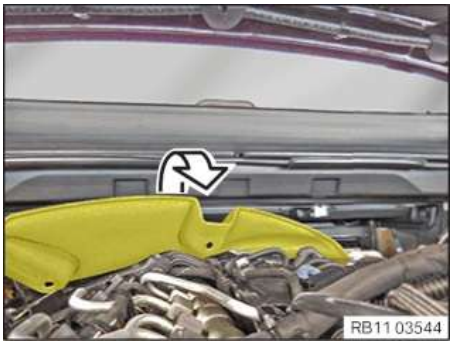


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

12 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).



- Guide out and remove the acoustic cover in the direction of the arrow.

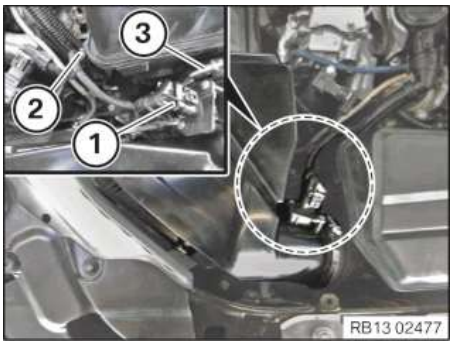
13 – Removing the clean air pipe with the resonator

WARNING

Hot surfaces.

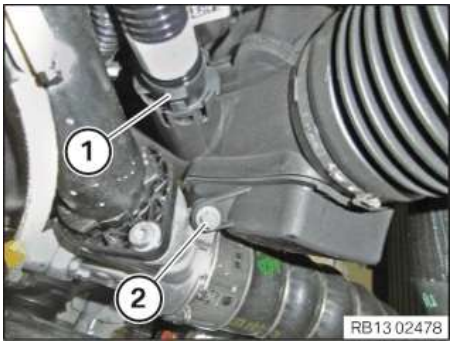
Risk of burning!

- Perform all work only on components that have cooled down.

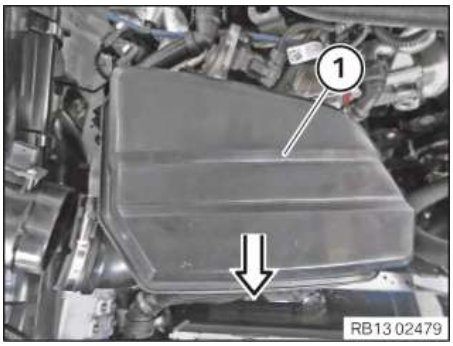


- Unlock plug connection (1) and disconnect.
- Loosen clamp (2).
- Unfasten clamp (3).
- Separate the clean air pipe with resonator from the intake filter housing.

cardiagn.com



- Unlock engine ventilation line (1), disconnect it and place it aside.
- Loosen screw (2).



- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Unlock and loosen clamp (1).



- Feed out and remove clean air pipe with resonator (1) in the direction of the arrow.

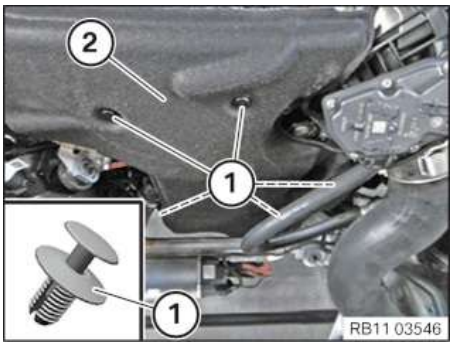
14 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.



- Release and remove expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

cardiagn.com

15 – Partially releasing the wiring harness section on the intake plenum

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

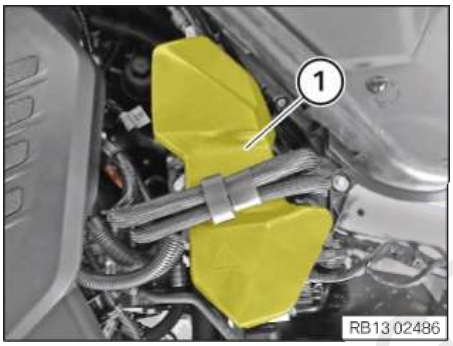
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

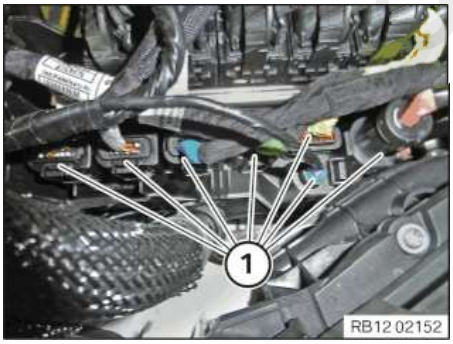
- Do not pull on the wires when disconnecting connectors and plug connections.

TECHNICAL INFORMATION

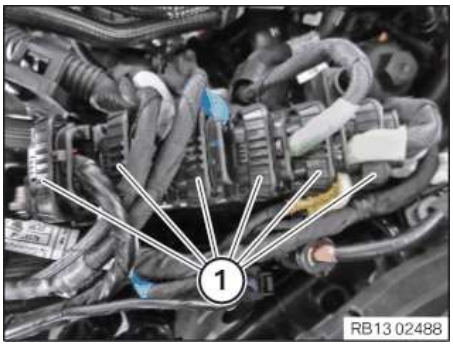
Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.



- Pull off cover (1) upwards, feed out and remove.

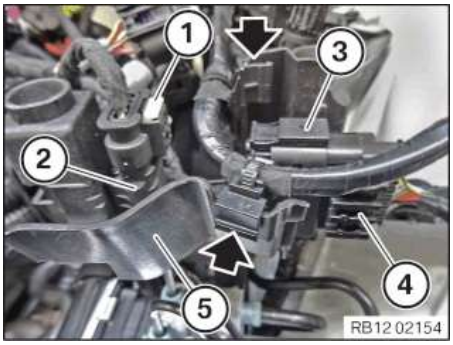


- Unlock and disconnect plug connections (1).

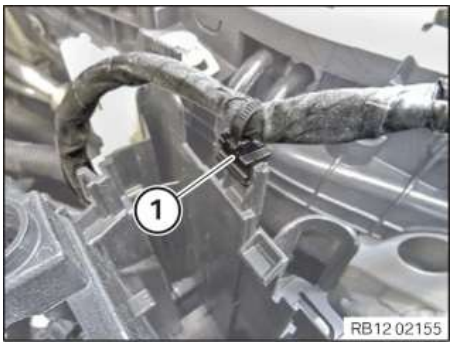


- Unlock and disconnect plug connections (1).

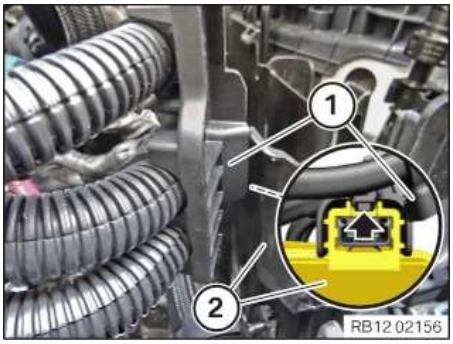
ardiagn.com



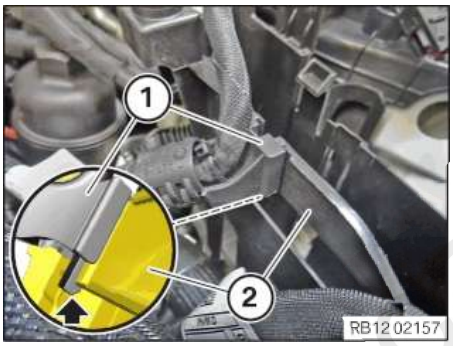
- Unlock plug connection (1) and disconnect.
- Unlock the plug (2) and disconnect from the control unit holder (5).
- Unlock plug connection (3) and disconnect.
- Unlock the plug (4) and disconnect from the control unit holder (5).
- Release the clamps (arrows).



- Loosen clamp (1).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).

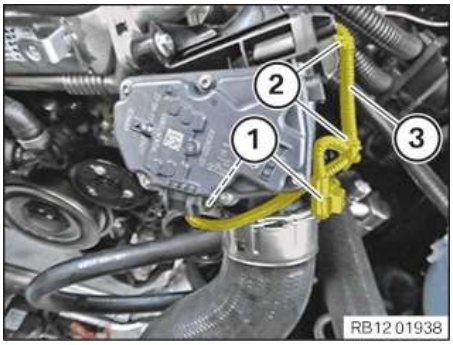


- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.

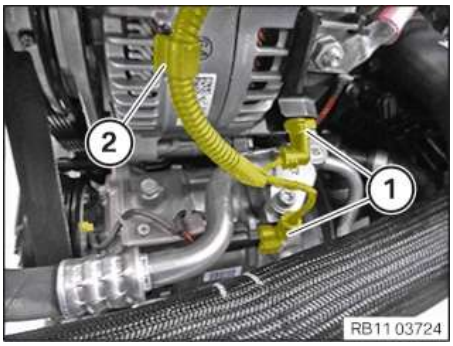


- Unlock holder (1) and feed out coolant line (2) and place it aside.

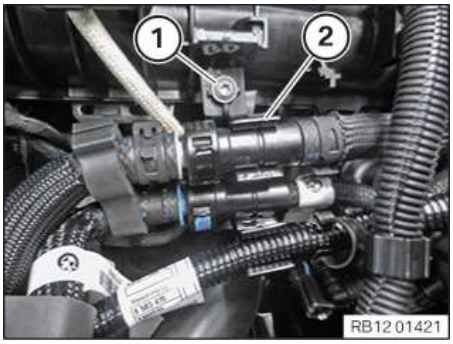
gardiagn.com



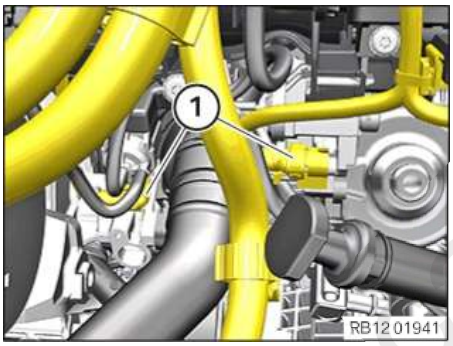
- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.



- Unlock and separate plug connections (1).
- Release the holder (2) from the alternator .



- Loosen screw (1).
- Thread out holder (2) and set aside.



- Unlock and disconnect plug connections (1).

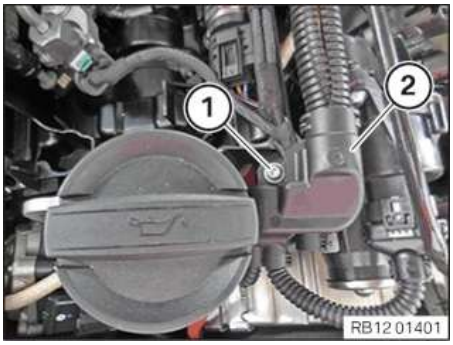


- Unlock and loosen connector (1).

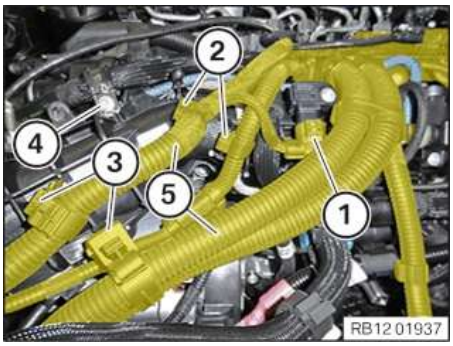


- Unlock plug connection (1) and disconnect.

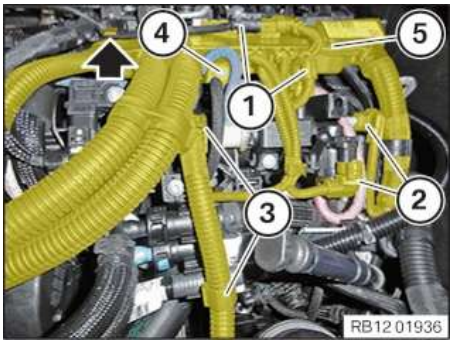
cardiagn.com



- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.



- Unlock plug connection (1) and disconnect.
- Loosen clamps (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.



- Unlock and disconnect plug connections (1).
- Release line from clamp (Arrow).
- Unlock and disconnect plug connections (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.

16 – Removing the intake plenum

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

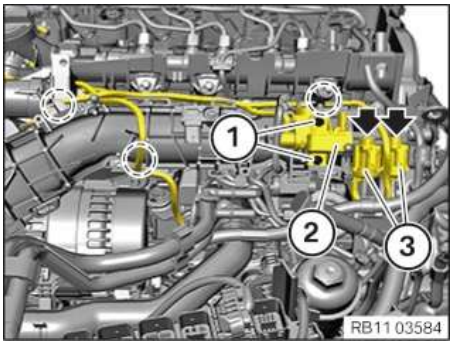


- Unlock clamp (1) and engage in this position.

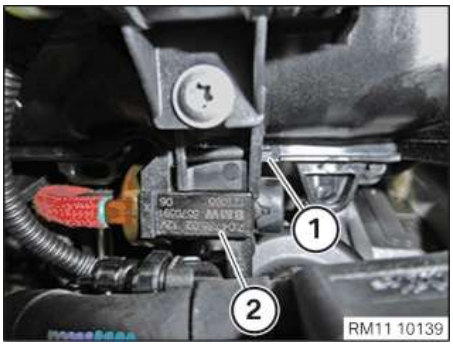


- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.

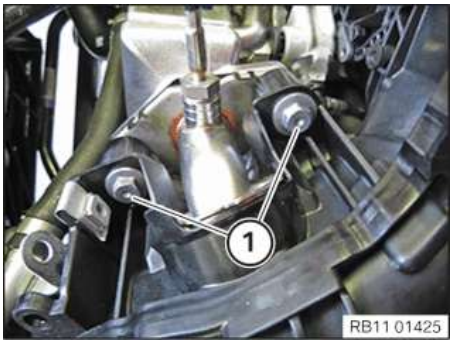
cardiagn.com



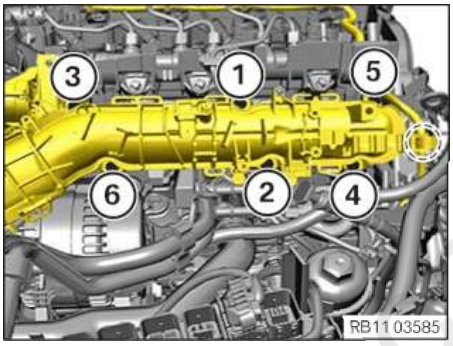
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



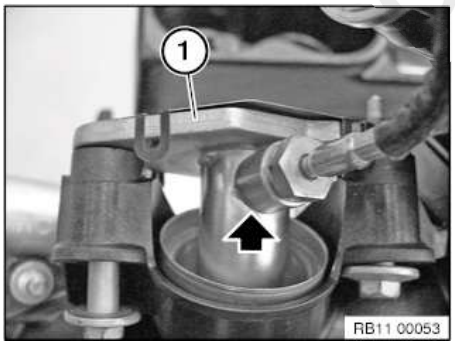
- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.



- Loosen screws (1).



- Detach the leakage oil lines in the marked area from the intake plenum.
- Loosen screws in the order (6) to (1).
- Guide the intake plenum out forwards and remove it.



- Remove the exhaust-gas recirculation pipe (1) (arrow).

17 – Detaching the leakage oil line from the injectors

cardiagn.com

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

WARNING

Hot surfaces.

Risk of burning!

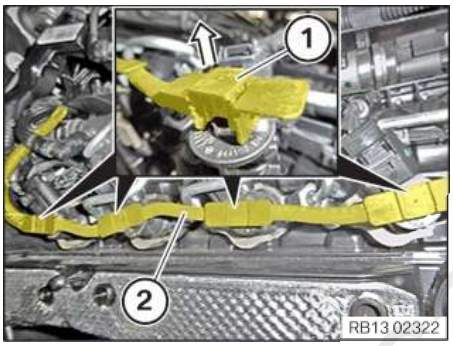
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

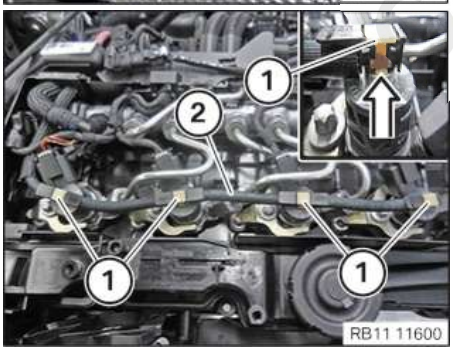


- **Version A:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.

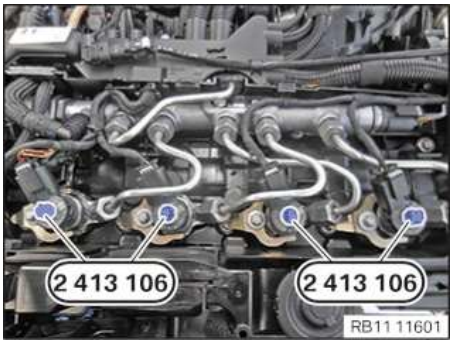


- **Version B:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.



- Seal open connections with special tools .

18 – Remove the high pressure lines between the injector and the rail

cardiagn.com

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

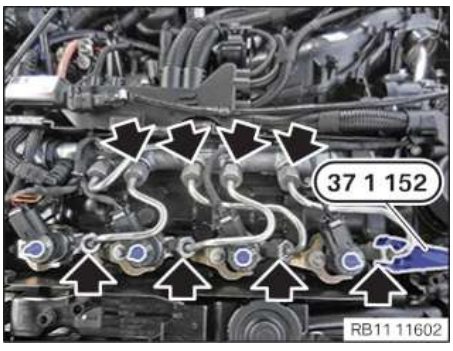
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

If several high pressure lines are removed, ensure that each high pressure line is installed in its original location. Label high pressure lines.

TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.



- Release the high pressure lines (arrows) with the special tool .
  Reset the special tool early on to prevent bending of the high pressure line.
- Catch and dispose of escaping fuel.
- Feed out and remove the high pressure lines (arrows).
- Seal off all the open cable connections with the special tool .

cardiagn.com

19 – Remove the high pressure line between the high pressure pump and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Hot fluids.

Risk of scalding!

- Conduct all work in the vehicle wearing appropriate personal protective equipment only.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

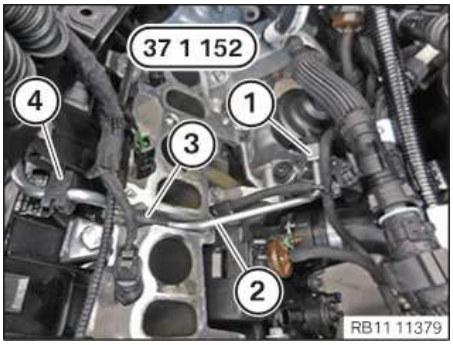
TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.

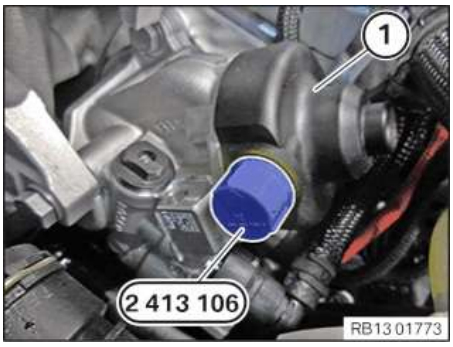


- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.

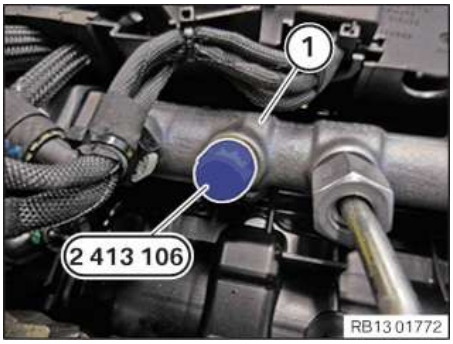
cardiagn.com



- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.
- Guide out and remove the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).



- Seal off the opening at the high pressure pump (1) with the special tool .



- Seal off the opening on the rail (1) with the special tool .

20 – Remove high-pressure rail

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

RISK OF DAMAGE

Contaminant or foreign body.

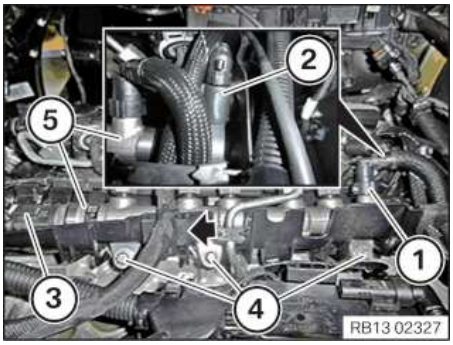
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

cardiagn.com



- Unlock and disconnect the fuel return line (1).
- Guide the fuel return line (1) out and set it aside.
- Unlock and disconnect the plug connection (2) on the rail pressure regulating valve.
- Unlock and disconnect the plug connection (3) on the rail pressure sensor.
- Unlock cable clip (Arrow), feed out and place aside.
- Loosen screws (4).
- Thread out and remove the rail (5).

21 – Remove all injection systems

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

cardiagn.com

RISK OF DAMAGE

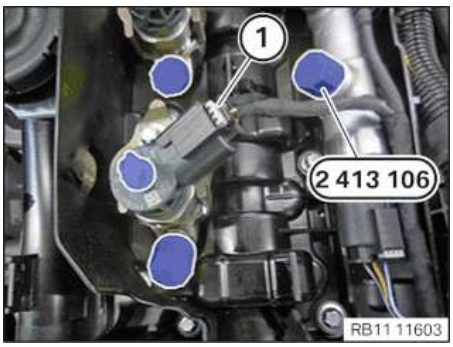
Electrostatic discharge.

Damage to or destruction of electrical components.

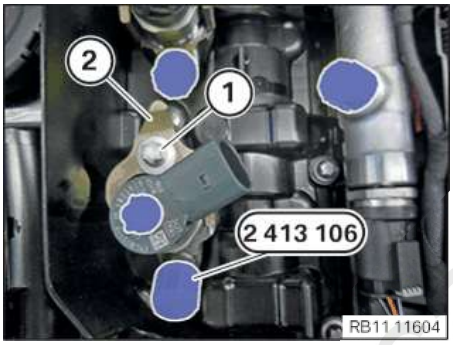
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

TECHNICAL INFORMATION

If several injectors are removed, ensure that each injector is installed at its original location (cylinder). Mark injectors.



- Unlock plug connection (1) and disconnect.



- Loosen screw (1).
- Guide out and remove clamping claw (2).
- Feed out and remove the injector with slight rotational movements.

▸ **Loosen stuck injectors**

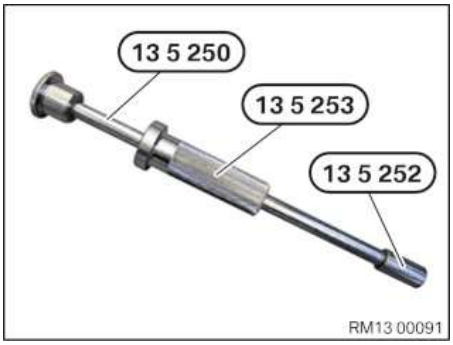
RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

cardiagn.com



- Unscrew special tool 0 493 339 (13 5 252) from special tool 0 493 321 (13 5 250) and remove special tool 0 493 340 (13 5 253).
- Screw special tool 0 493 339 (13 5 252) back onto special tool 0 493 321 (13 5 250).

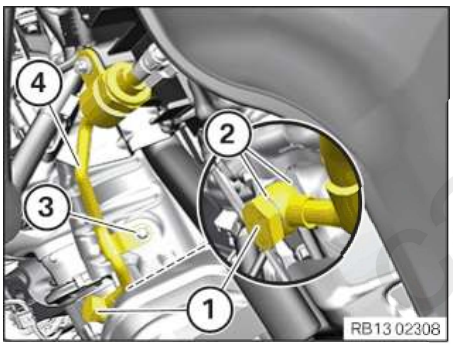


- Screw special tool 0 493 321 (13 5 250) with special tool 0 493 339 (13 5 252) onto pressure line connection (1) of injector.
- Release injector (1) with special tools 0 493 321 (13 5 250) and 0 493 339 (13 5 252) by means of **short** back and forth movements and remove.

22 – Remove the exhaust gas pressure pipe

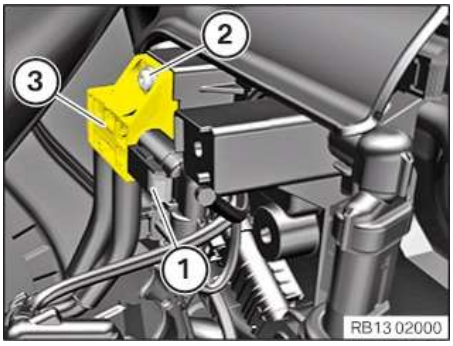


- Unlock plug connection (1) and disconnect.
- Loosen screw (2).



- Unscrew the banjo bolt (1).
- Feed out and remove the sealing rings (2).
- Loosen screw (3).
- Feed out and remove the exhaust gas pressure pipe (4).

23 – Releasing the differential pressure sensor for the diesel particulate filter



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).
- Remove the differential pressure sensor (3) and put it to one side.

24 – Removing the sensor bracket on the cylinder head cover

carbagn.com

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

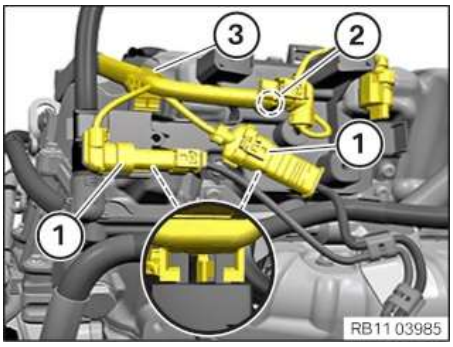
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

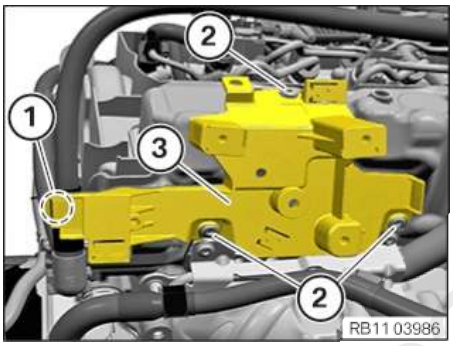
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

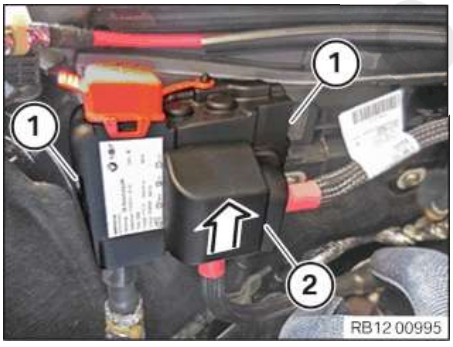
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



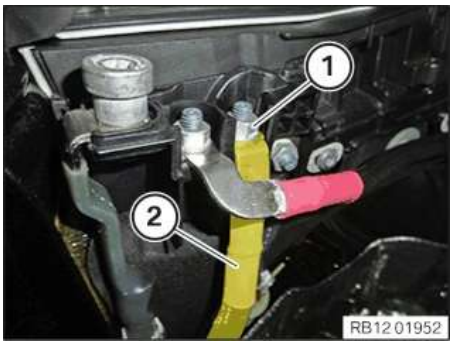
- Unlock plug connection (1) and disconnect.
- Unlock the plug connection (1) and release it from the sensor bracket.
- Release the cable clip in the area (2) from the sensor bracket.
- Release the clamps (3) and set the wiring harness section aside.



- Release the positive battery cable in the area (1) from the clamp and set it aside.
- Loosen screws (2).
- Feed out holder (3) for the sensor system and remove.

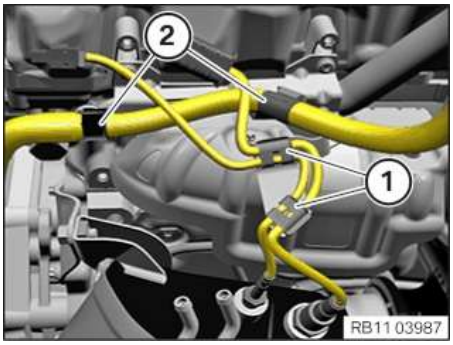


- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.

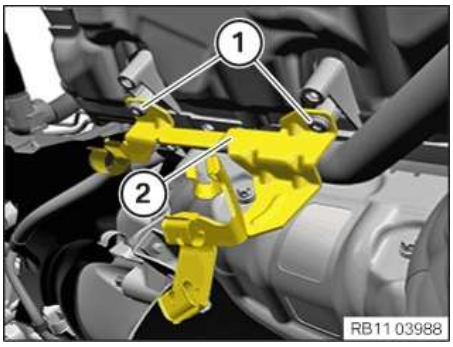


- Loosen nut (1).
- Feed out positive battery cable (2) and put to one side.

cardiagn.com

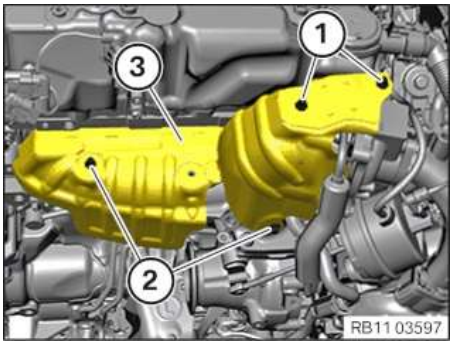


- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



- Loosen screws (1).
- Guide out and remove holder (2).

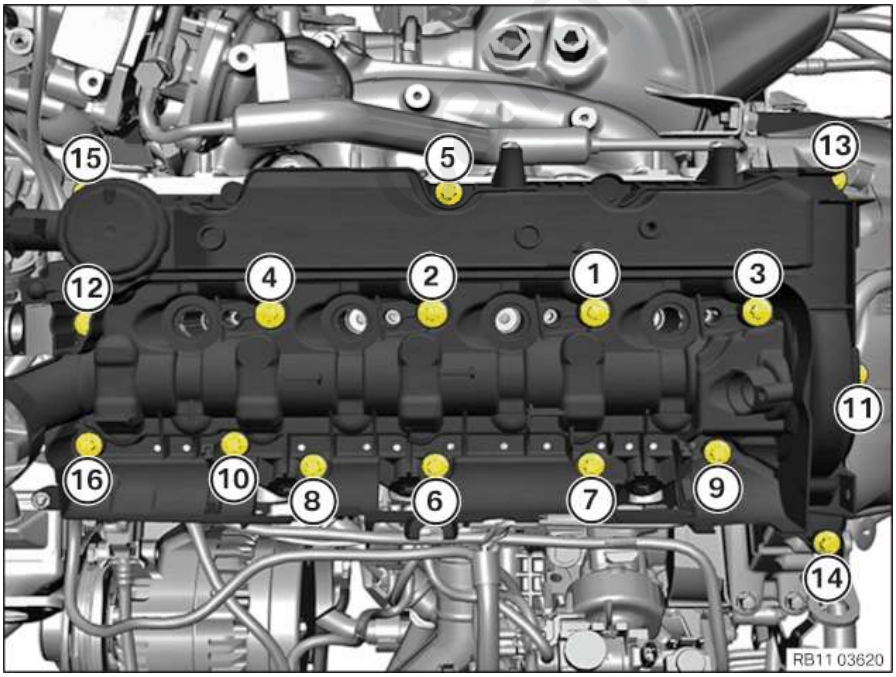
25 – Removing heat shield



- Loosen screws (1).
- Loosen screws (2).
- Feed out and remove the heat shield (3).

26 – Removing the cylinder head cover

Screw connection of the cylinder head cover



1 - 16 Bolts of the cylinder head cover

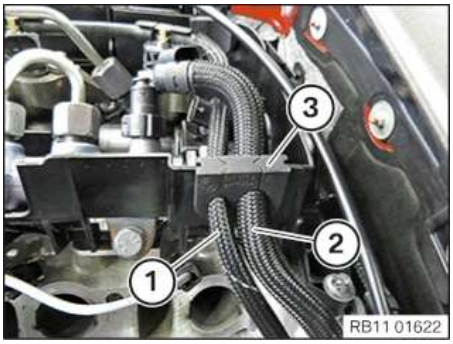
diagn.com



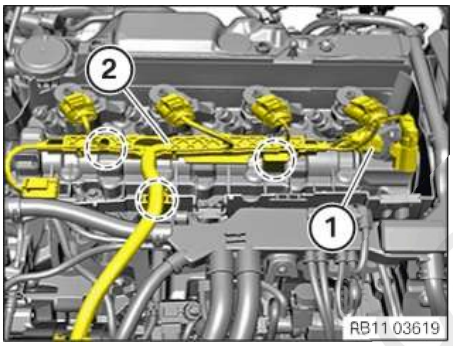
- Unlock and detach the locks.
- Feed the engine ventilation line (1) out and set it aside.



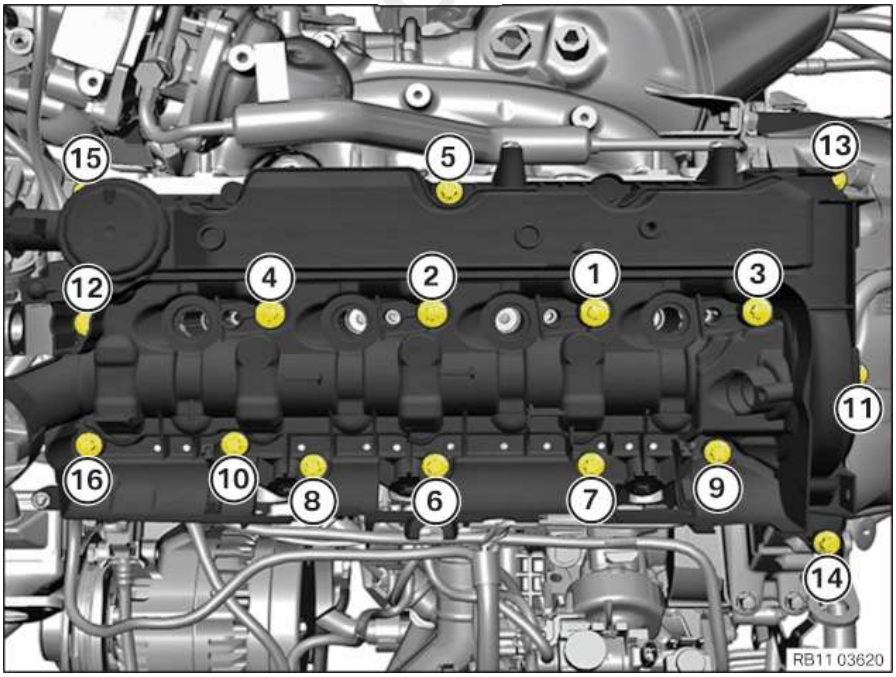
- Feed out and remove the heat shield (1).



- Remove the leakage oil line (1) including the fuel return line (2) and the grommet (3) and put to one side.

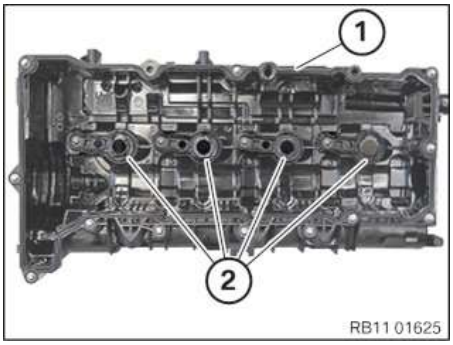


- Unlock connector (1) and pull off.
- Disconnect the wiring harness (2) in the marked areas from the cylinder head cover and set aside.



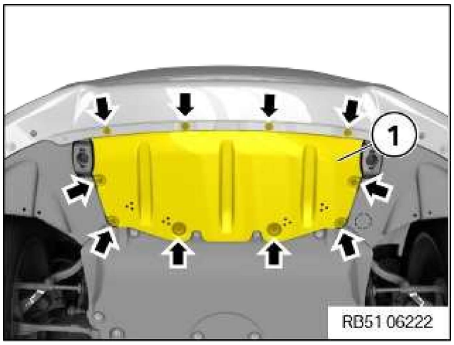
- Evenly loosen the screws in a sequence from (16) to (1).
- Feed out and remove the cylinder head cover.

cardiagn.com



- Remove the profile seals (1) and (2).

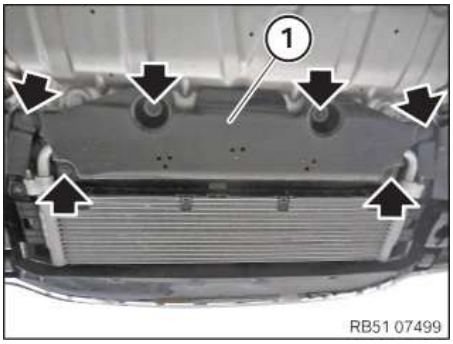
27 – Removing the front underbody protection



- **Version A:**

  Remove screws (arrows).

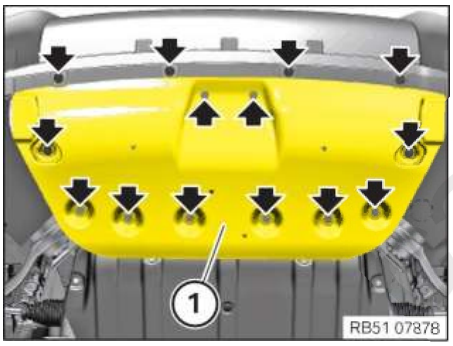
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version B:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

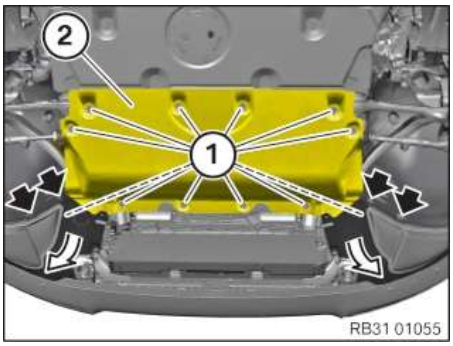


- **Version C:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

28 – Remove the underbody protection of the steering gear



- **Version A:**

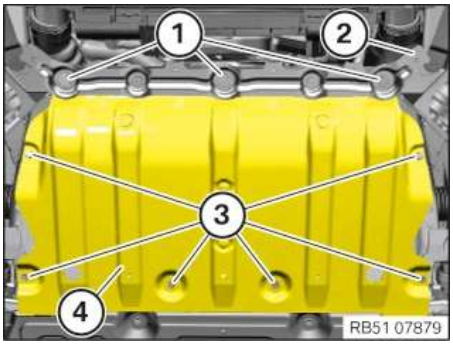
  Unscrew the screws (arrows) of the wheel arch cover on the wheel arch cover.

  Fold the bottom wheel arch cover to the side.

  Loosen screws (1).

  Remove the underbody protection (2) of the steering gear.

ardiagn.com



- **Version B:**

  Loosen screws (1).

  Remove the holder (2) for the underride protection.

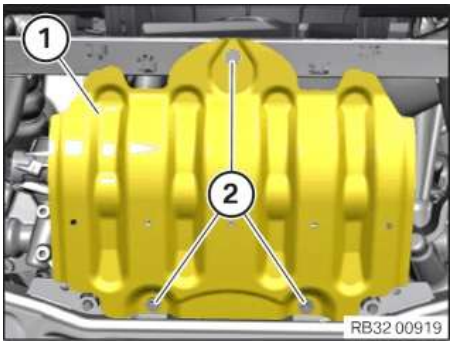
  Loosen screws (3).

  Feed out and remove the underbody protection (4) of the steering gear.

29 – If installed: Removing the steering underbody protection

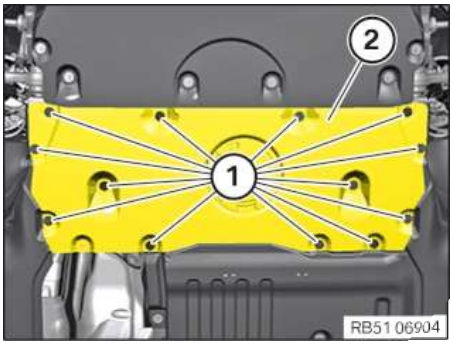
Prerequisite

Front underbody protection has been removed.



- Loosen screws (2).
- Remove underbody protection (1).

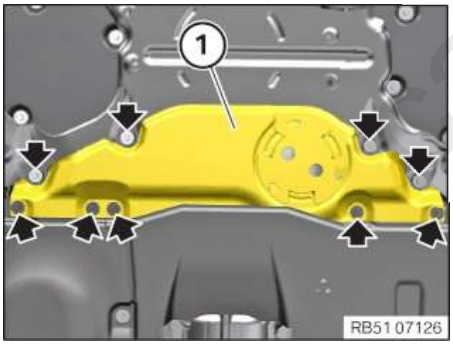
30 – Removing the centre underbody protection



- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .

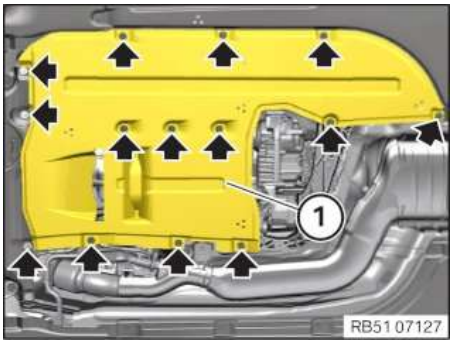


- **Version with all-wheel drive:**

  Remove screws (arrows).

  Feed out and remove the centre underbody protection (1).

31 – Remove rear underbody protection

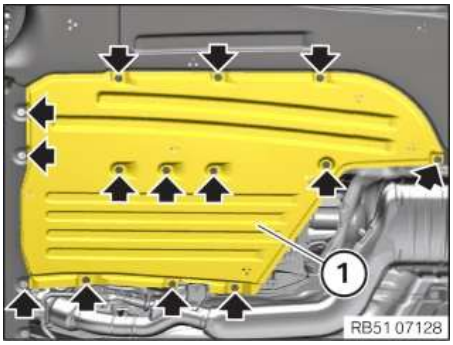


- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).

cardiagn.com



- **Version B:**

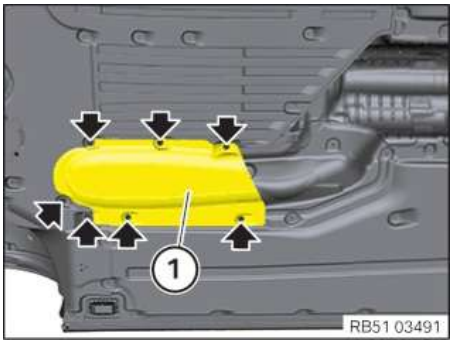
  Remove screws (arrows).

  Guide out rear underbody protection (1) and remove it.

32 – Remove the underbody panelling of the transmission on the side

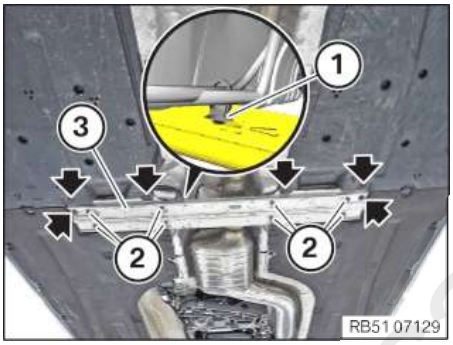
NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.



- Remove screws (arrows).
- Remove the underbody panelling (1).

33 – Remove the connecting support from the tunnel



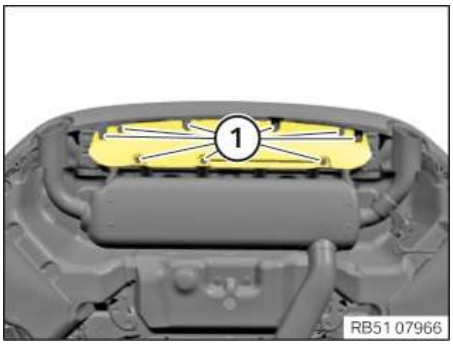
- Remove screws (arrows).

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

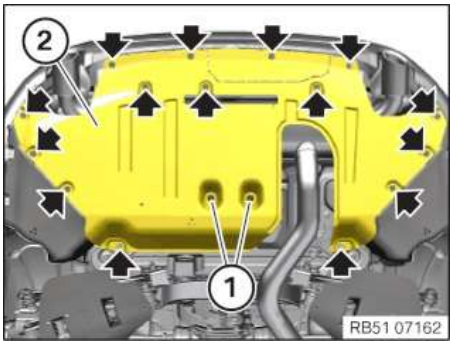
- Loosen clamp (1).
- Loosen screws (2).
- Guide out and remove connecting support (3) on the tunnel.

34 – Removing the rear diffuser



- **Version 1:**
- Release the screws and nuts (1).
- Remove the diffuser.

carolagn.com



- **Version 2:**
- Loosen nuts (1).
- Remove screws (arrows).
- Guide out and remove rear diffuser (2).

35 – Remove exhaust system

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

CAUTION

Component with heavy weight.

Danger of injury!

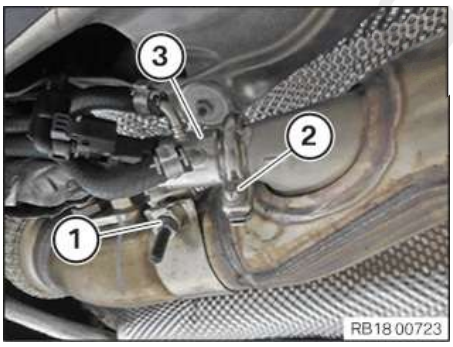
- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

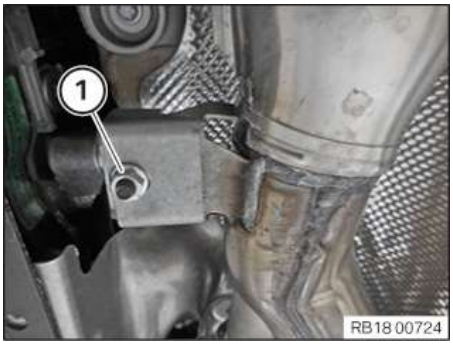
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

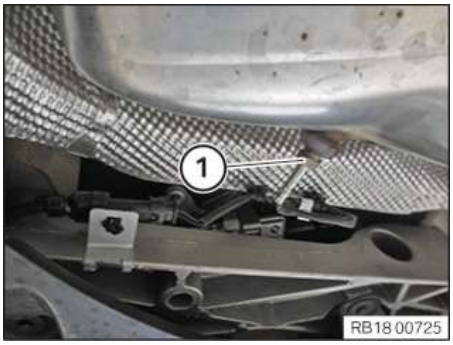


- Unfasten clamp (1).
- Detach the clamp (2) of the SCR metering module (3).
- Detach the SCR metering module (3)from the exhaust system and place to one side.

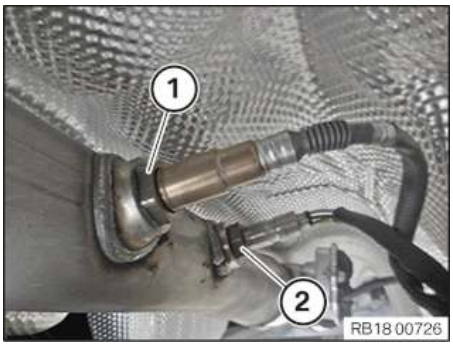


- Loosen nut (1).

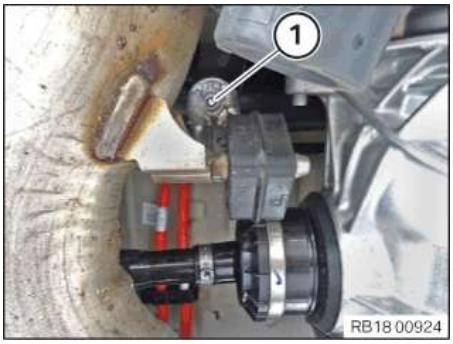
cardiagn.com



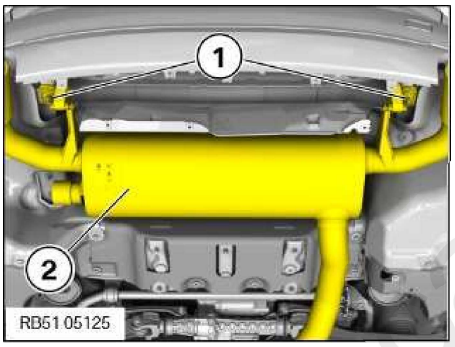
- Detach the exhaust temperature sensor (1) from the exhaust system.



- Release the diesel particulate sensor (1) from the exhaust system and place to one side.
- Release the nitrogen oxide sensor (2) from the exhaust system and place to one side.



- Release the nut (1) on the rear axle support.



- Loosen nuts (1).
- Lower and remove the exhaust system (2) with the assistance of a second person.

36 – Removing the monitoring oxygen sensor after the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

cardiagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

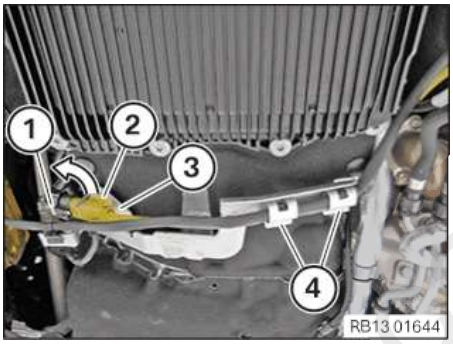
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



- Unlock and loosen connector (1).
- Loosen connector (2) from the holder (3) in direction of arrow.
- Release the monitoring oxygen sensor from the clamps (4).



- Release the monitoring oxygen sensor (1) with the standard tools.



- Thread out the monitoring oxygen sensor (1) and remove it.

carDiagn.com

37 – Removing the nitrogen oxide sensor before SCR catalytic converter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

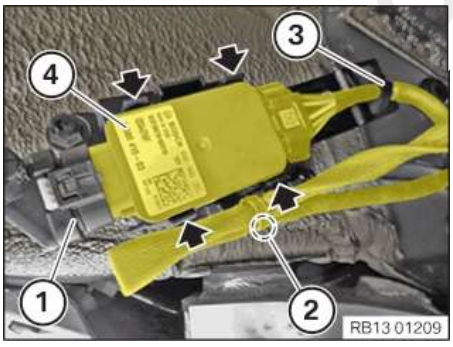
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

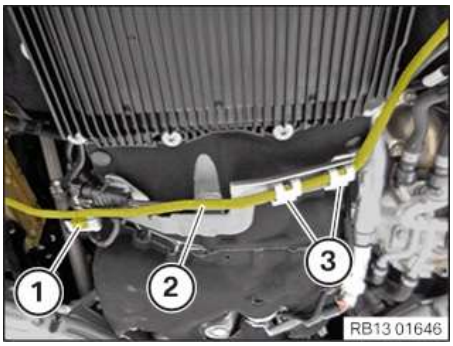
Damage to the nitrogen oxide sensor.

Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

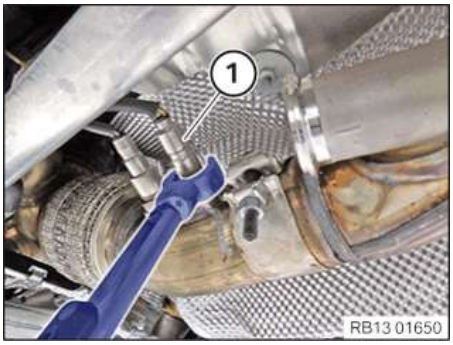
- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
- The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



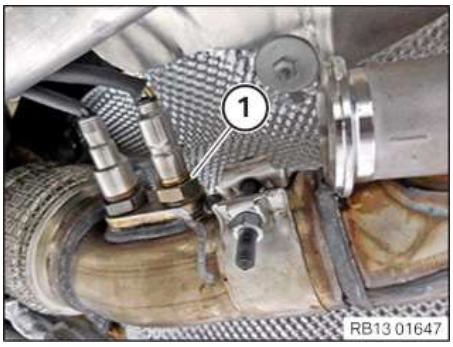
- Unlock plug connection (1) and disconnect.
- Release cable clip in area (2).
- Release line from the holder (3).
- Unclip control unit (4).



- Loosen clamp (1).
- Loosen the cables (2) from the clamps (3).



- Loosen the nitrogen oxide sensor (1) using commercially available tools.



- Feed out and remove the nitrogen oxide sensor (1).

38 – Removing the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

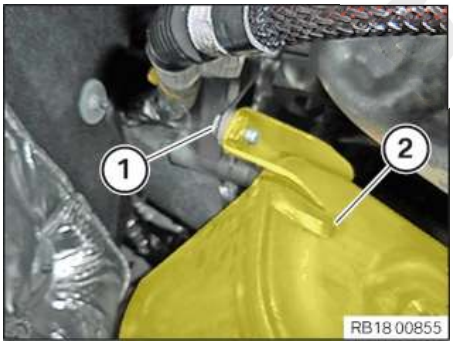
- Perform all work only on components that have cooled down.

CAUTION

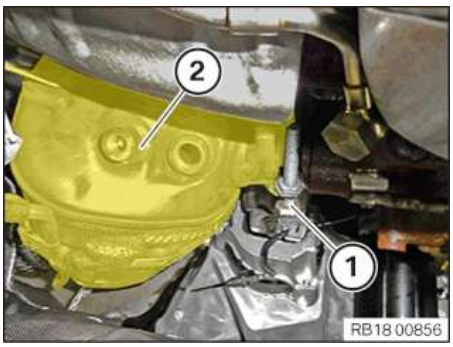
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

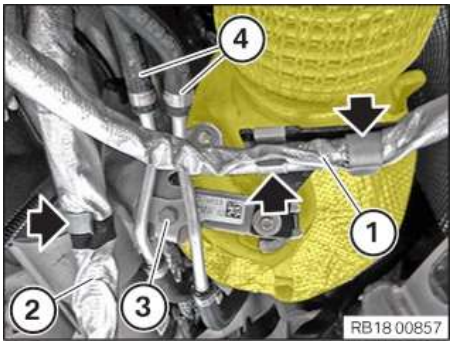


- Release bolt (1) from the holder of diesel particulate filter (2).

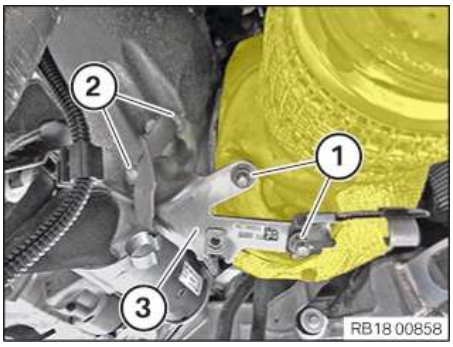


- Loosen V-band clamp (1).
- Feed V-clip (1) out from diesel particulate filter (2) and remove.

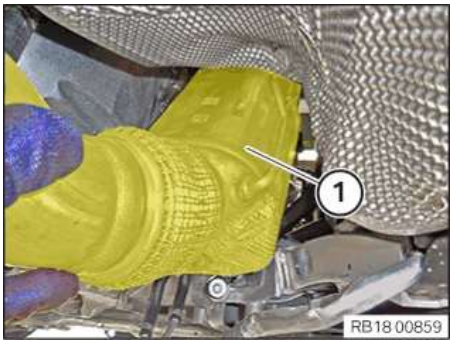
boardiagn.com



- Release the metering line (1) from clamps (Arrows).
- Release positive battery cable (2) from starter motor from clamp (Arrow).
- Loosen screw (3).
- Thread off coolant line (4) and place to the side.



- Loosen nuts (1).
- Loosen screws (2).
- Guide out and remove holder (3).



- Guide out and remove diesel particulate filter (1).

39 – Removing starter motor

Prerequisite

Battery earth leads are disconnected.

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

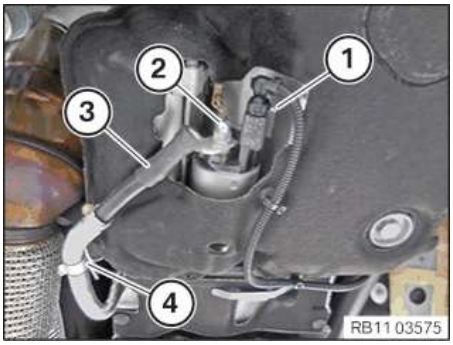
- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

TECHNICAL INFORMATION

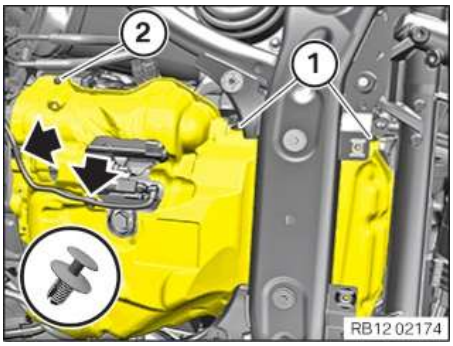
Make sure that the acoustic cover is **not** damaged while removing the starter motor.

A damaged lower acoustic cover can only be renewed when the front axle is lowered.

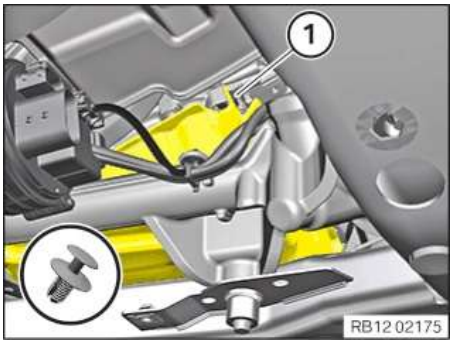
cardiagn.com



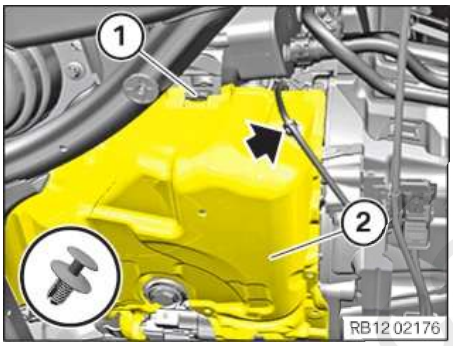
- Unlock plug connection (1) and disconnect.
- Release nut (2).
- Release positive battery cable (3) from holder (4).



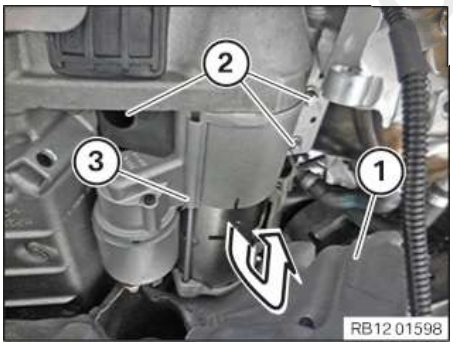
- Loosen the expanding rivet (1).
- Undo fir tree clip (2).
- Release the clamps (arrows).



- Loosen expanding rivet (1).
- Lower the acoustic cover of the oil sump.



- Loosen expanding rivet (1).
- Loosen the clamp (arrow).
- Lower acoustic cover (2).



- Make sure that the acoustic cover (1) is not damaged.
- Carefully press acoustic cover (1) to one side.
- Loosen screws (2).
- Carefully guide out the starter motor (3) in direction of arrow and remove.

40 – Checking camshaft timing



RISK OF DAMAGE

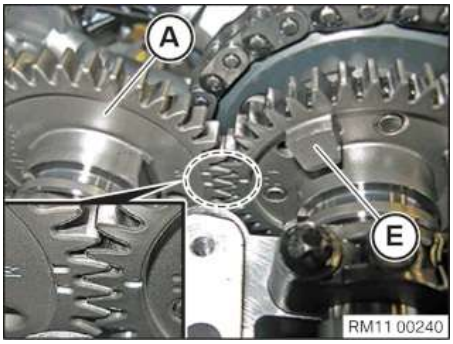
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

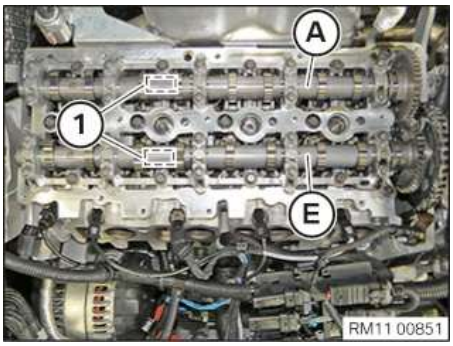
- Turn the combution engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

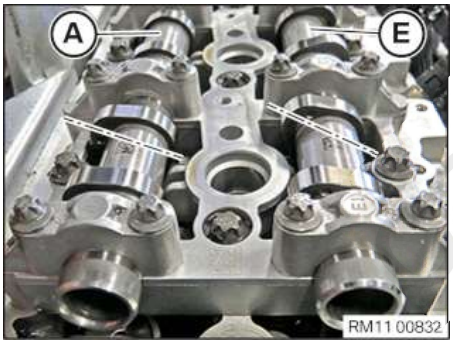
  Do **not** crank the engine in reverse.



- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.



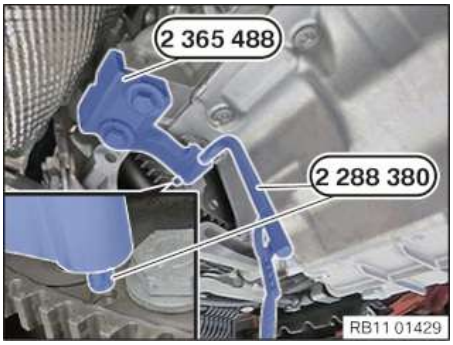
- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.

carmanualsdiagn.com



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

41 – Remove chain tensioner piston

RISK OF DAMAGE

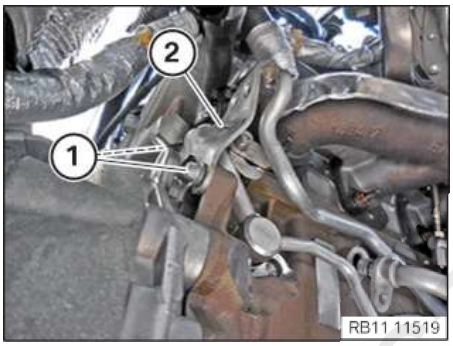
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Loosen screws (1).
- Guide out and remove holder (2).



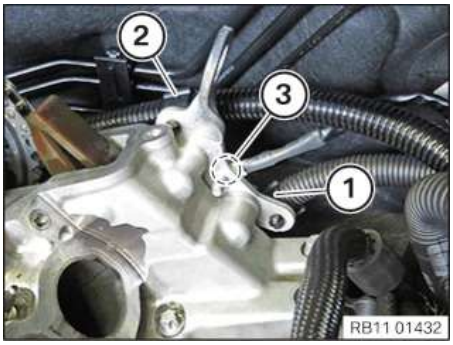
- Loosen the chain tensioner piston (1).
- Catch and dispose of emerging engine oil.



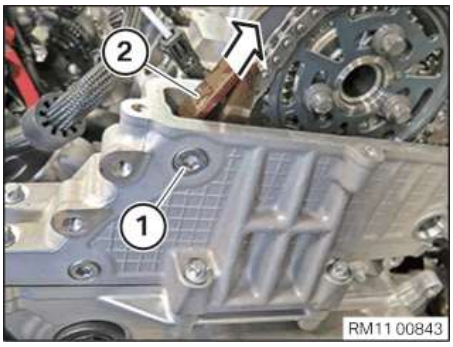
- Feed out and remove the sealing ring (1).

42 – Remove the timing chain guide rail

cardiagn.com

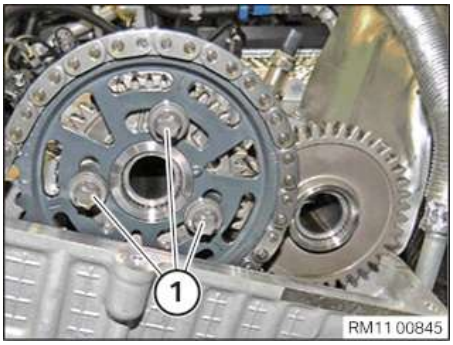


- Loosen the vehicle wiring harness (1) from the bracket.
- Release the positive battery cable (2) from the holder .
- Loosen the screw (3) and remove the grounding cable.



- Remove the bearing journal (1).
- Remove the guide rail (2) in the direction of the arrow.

43 – Removing the camshaft sprocket on the intake camshaft



- Loosen screws (1).
- Secure the drive chain against falling.
- Remove the camshaft sprocket on the intake camshaft.

44 – Removing the special tool for fixing the exhaust camshaft



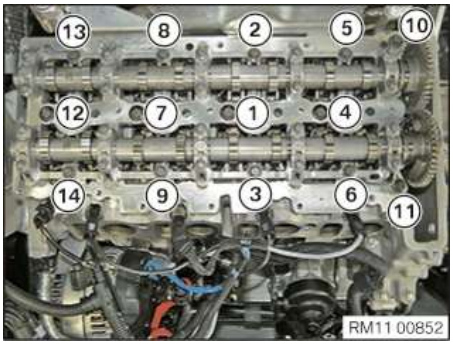
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

45 – Removing the camshaft support

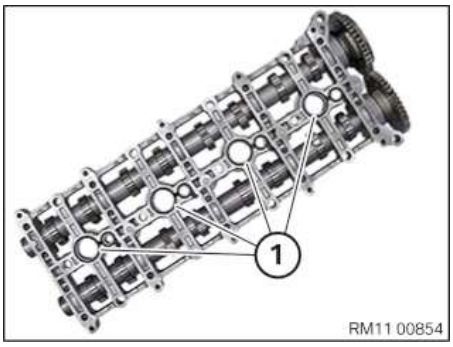
TECHNICAL INFORMATION

The camshaft is tensioned by the valve springs. Tighten or loosen each screw on the camshaft bearing caps one at a time in the specified sequence and by half a turn only. Repeat procedure.

cardiagn.com



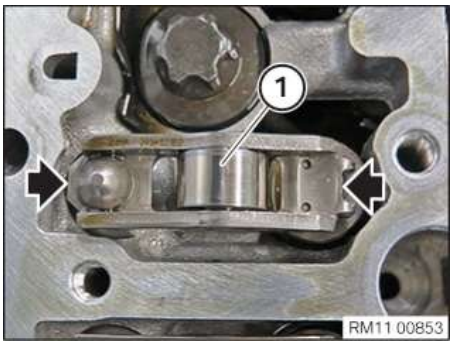
- Unscrew the screws evenly in order (14) to (1) in multiple increments.
- Feed out and remove the camshaft support with the camshafts towards the top.



- Guide out and remove gaskets (1).

MAIN WORK

46 – Remove roller cam followers



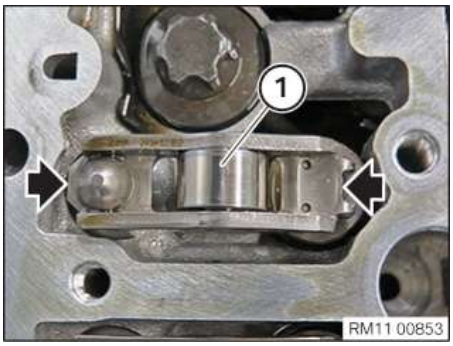
- Guide out and remove all roller cam followers (1) (arrows).
- Place all roller cam followers (1) in order in special tool 0 495 105 (11 4 480).

  Roller cam followers that have already been used must be installed in same position again.

47 – Installing the roller cam followers

TECHNICAL INFORMATION

- Note the installation position of the component. The component may be installed in various installation positions.



- Check all the roller cam followers (1) for damage, and renew if necessary.

  Parts: Roller cam followers
- Insert all roller cam followers (1) and install them (arrows).

  Roller cam followers (1) that have already been used must be installed in the same place.
- Note the mounting orientation of the roller cam followers (1).
- Oil all roller cam followers (1).

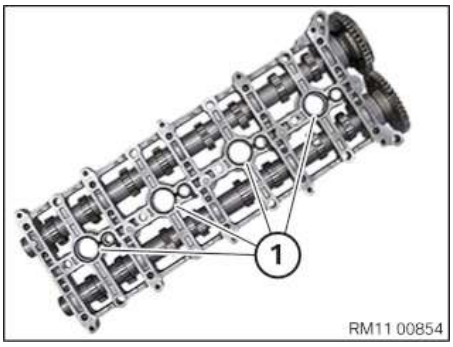
POSTPROCESSES

48 – Installing the camshaft support

cardiagn.com

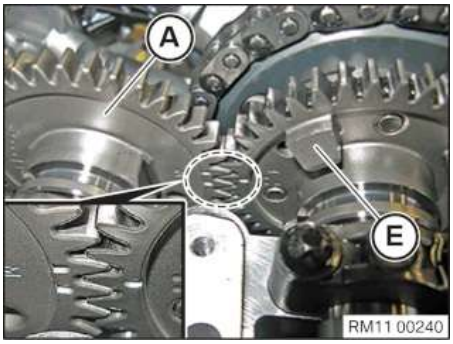
TECHNICAL INFORMATION

The camshaft is tensioned by the valve springs. Tighten or loosen each screw on the camshaft bearing caps one at a time in the specified sequence and by half a turn only. Repeat procedure.

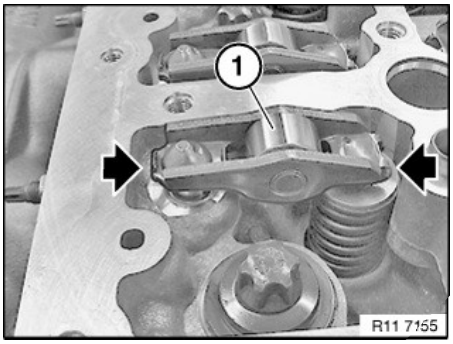


- Renew seals (1).

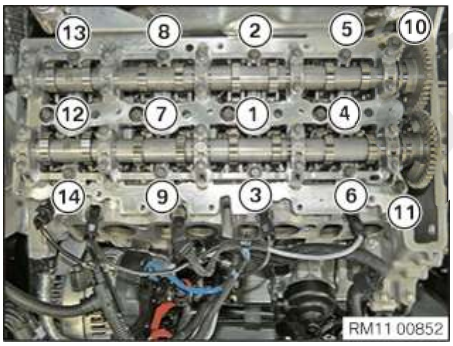
  Parts: Seals
- Insert and install the gaskets (1).



- Make sure the marks on both camshafts (A) and (E) correspond in the **highlighted area**.



- Make sure the roller cam followers (1) have the correct mounting orientation.
- Position the camshaft support (arrows).

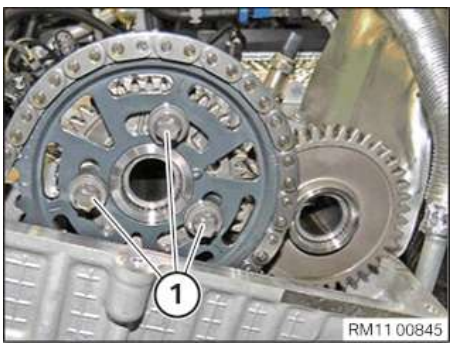


- Evenly tighten the screws in a sequence from (1) to (14) in several steps.
- Evenly tighten the screws in a sequence from (1) to (14) in several steps.

Camshaft carrier to cylinder head

M7x35		Tightening torque	13 Nm

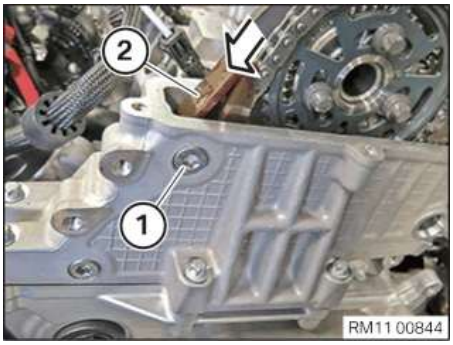
49 – Installing the camshaft sprocket on the intake camshaft



- Position the drive chain on the camshaft sprocket so that the thread of the screw connections are located in the centre of the elongated holes.
- Position the camshaft sprocket on the intake camshaft.
- Merely apply the screws (1) hand-tight so that the camshaft sprocket can still be moved in relation to the intake camshaft.

50 – Installing the guide rail of the timing chain

bordiagn.com

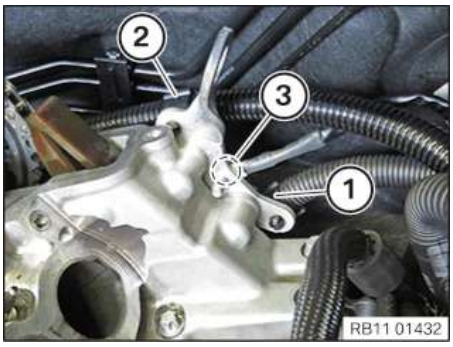


- Position the guide rail (2) in the direction of the arrow.
- Make sure the guide rail (2) is correctly installed at the bottom bearing journal.
- Renew bearing journal (1).

  Parts: Bearing journal
- Tighten the bearing journals (1).

Bearing journal to cylinder head

M16x1.5	Replace bearing journal.	Tightening torque	20 Nm



- Position the grounding cable and tighten the screw (3).

Standard screw connection M8

M8		Tightening torque	19 Nm

- Clip in the positive battery cable (2) into the bracket.
- Clip in the vehicle wiring harness (1) into the bracket.

51 – Installing the chain tensioner piston



TECHNICAL INFORMATION

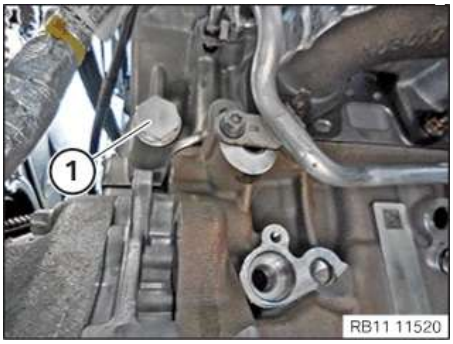
The oil chamber must be drained for reuse of the chain tensioner.

- Place the chain tensioner on a level support pad and slowly compress in the direction of arrow.
- Repeat process twice.



- Renew sealing ring (1).

  Parts: Sealing ring
- Insert and install the sealing ring (1).

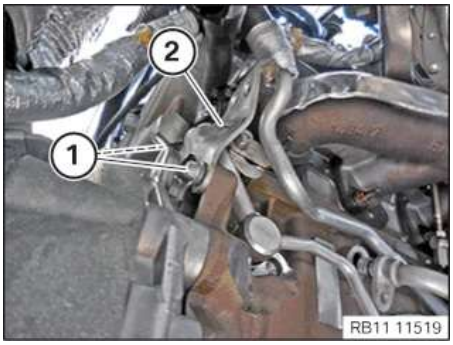


- Insert and install the chain tensioner piston (1).
- Tighten the chain tensioner piston (1).

Chain tensioner piston to cylinder head

22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

carolagn.com

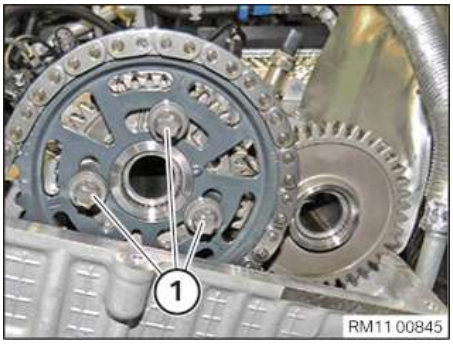


- Insert and install the holder (2).
- Tighten the screws (1).

Holder to crankcase

M8X16		Tightening torque	19 Nm

52 – Tightening the camshaft sprocket on the intake camshaft

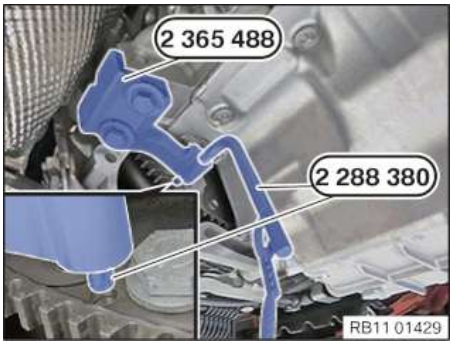


- Tighten the screws (1).

Camshaft sprocket to camshaft

M7x17.			17 Nm

53 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

54 – Checking camshaft timing



RISK OF DAMAGE

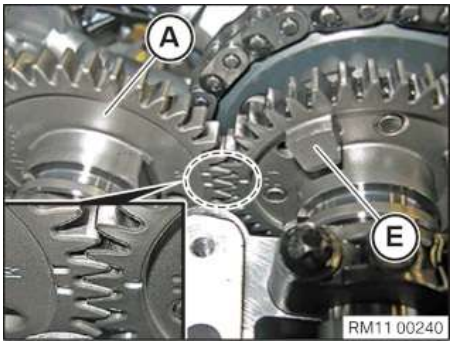
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

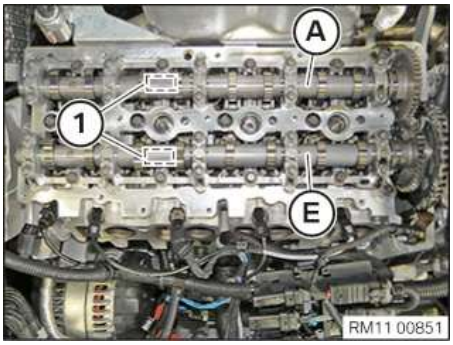
- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

  Do **not** crank the engine in reverse.

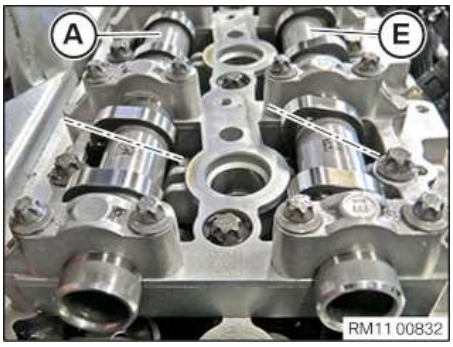


- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.

carsdiagn.com



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.

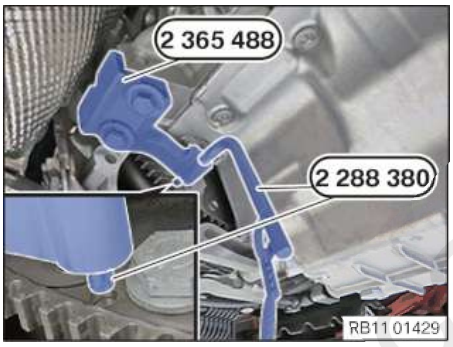


- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

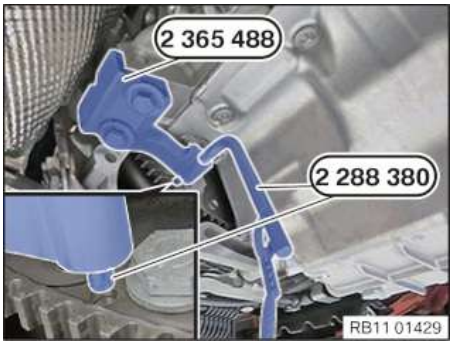
- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

55 – Removing the special tool for fixing the exhaust camshaft



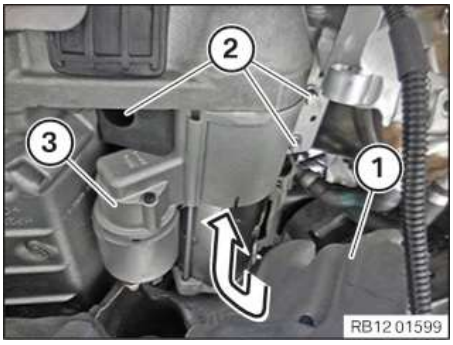
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

56 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

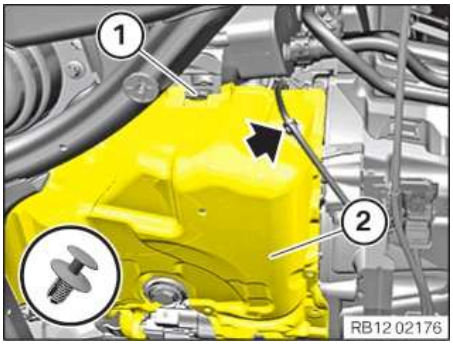
57 – Installing starter motor



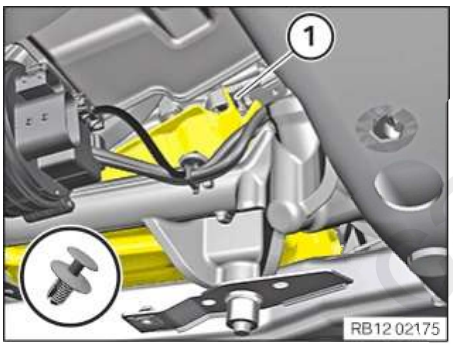
- Make sure that the acoustic cover (1) is not damaged.
- Carefully press the acoustic cover (1) to one side.
- Feed in and install the starter motor (3) in the direction of the arrow.
- Tighten the screws (2).

Starter motor to engine

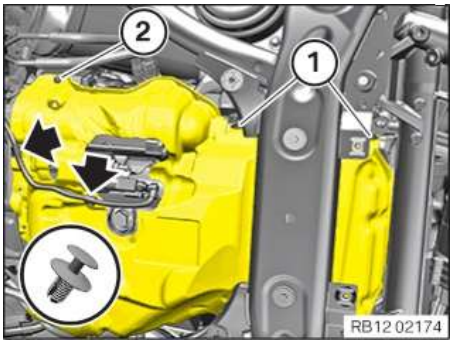
M8X60		Tightening torque	19 Nm



- Position the acoustic cover (2).
- Fasten expanding rivet (1).
- Secure clamp (arrow).

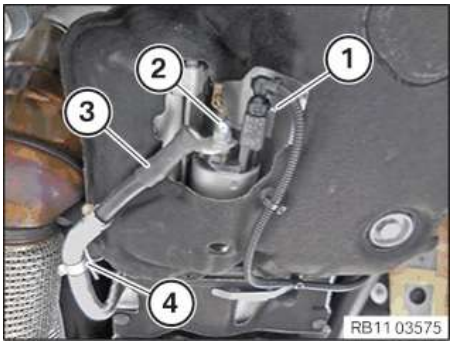


- Fasten expanding rivet (1).

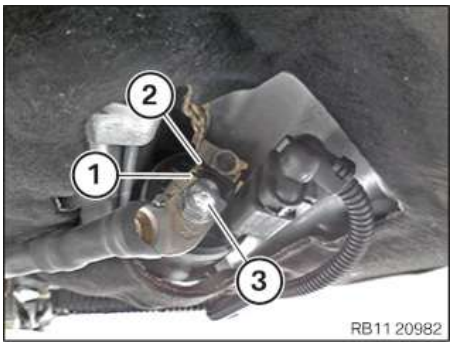


- Secure fir tree clip (2).
- Secure expanding rivet (1).
- Secure the clamps (arrows).

cardiagn.com



- Fasten positive battery cable(3) in holder (4) and position it on the starter motor.
- Tighten the nut (2) hand-tight.
- Connect the connector (1) and audibly lock it.



CAUTION

Improper routing of the positive battery cable.

Risk of short circuits!

- Route the positive battery cable without abrasions and do not trap.

- Attach the positive battery cable (1) **correctly** to anti-twist lock (2).
- Tighten nut (3).

Battery positive lead to starter

M8		Tightening torque	13,5 Nm

58 – Prepare for the installation of the diesel particulate filter



- Renew the V-clip (1).

  Parts: V-band clamp



- Renew gasket (1).

  Parts: Gasket

59 – Installing the diesel particulate filter

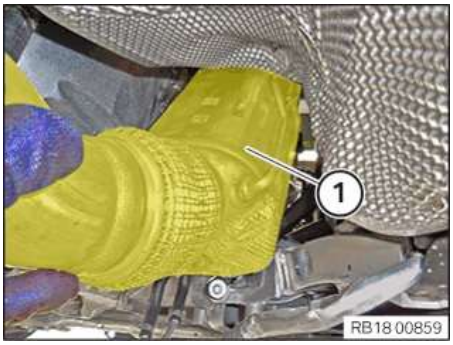
CAUTION

Heavy component.

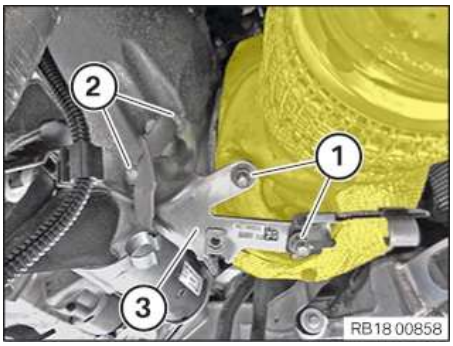
Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

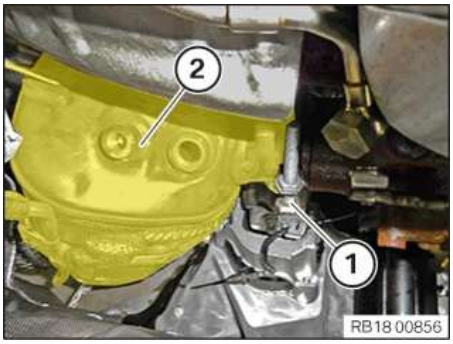
cardiagn.com



- Insert and install the diesel particulate filter (1).



- Insert and install the holder (3).
- **Hand-tighten** the bolts (2).
- Apply the nuts (1) **hand-tight**.

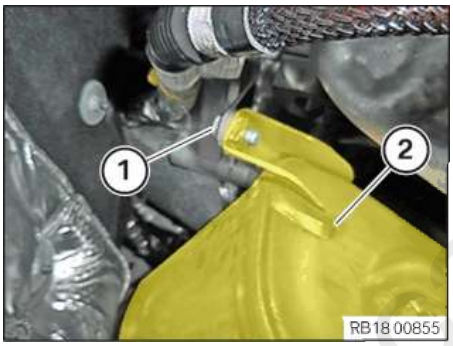


- Renew the V-clip (1).

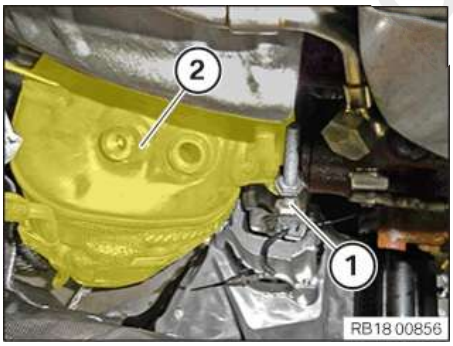
  Parts: V-band clamp
- Feed in and install V-band clamp (1).

Note: Make sure that the seal between the diesel particulate filter and the exhaust turbocharger is installed correctly.

- Position the diesel particulate filter (2) on the exhaust turbocharger .
- Position V-clip (1).
- Apply the V-clip (1) **hand-tight**.



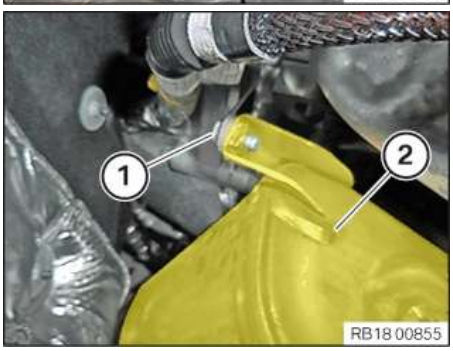
- Feed in screw (1) on the holder of the diesel particulate filter (2) and tighten **hand-tight**.



- Tighten the V-clip (1) of the diesel particulate filter (2).

Diesel particulate filter V-clip to exhaust turbocharger

V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

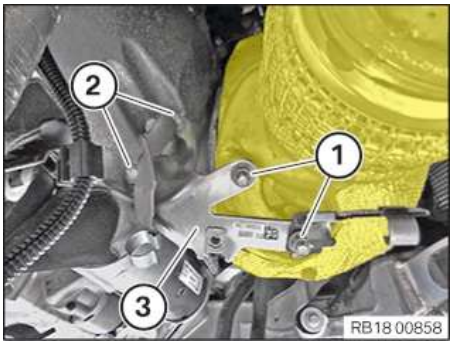


- Tighten the bolt (1) on the bracket of the diesel particulate filter (2).

Bracket to diesel particulate filter top

M8		Tightening torque	19 Nm

cardiagn.com



- Tighten the screws (2) on the holder (3).

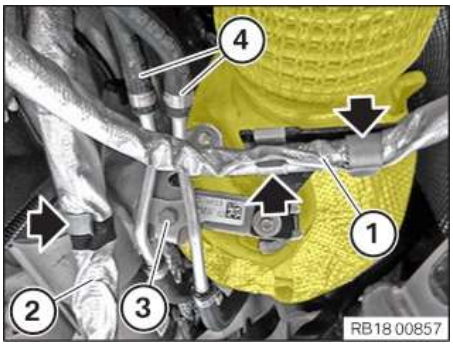
Bracket to transmission for diesel particulate filter holder bottom

M8X20		Tightening torque	19 Nm

- Tighten the nuts (1) on the holder (3).

Lower holder to diesel particulate filter

M8		Tightening torque	19 Nm



- Thread in and install coolant line (4).
- Tighten down screw (3).

Coolant lines for SCR metering module

M6X16		Tightening torque	8 Nm

- Secure the positive battery cable (2) of the starter motor at the clamp (arrow).
- Fasten the metering line (1) on the clamps (arrows).

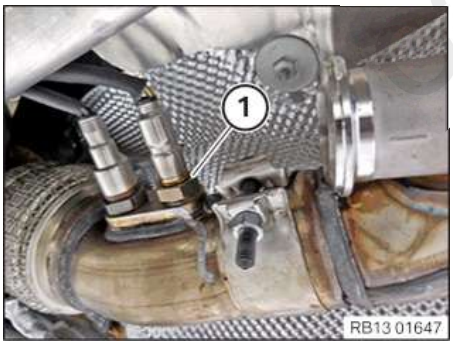
60 – Installing the nitrogen oxide sensor upstream of SCR catalytic converter

RISK OF DAMAGE

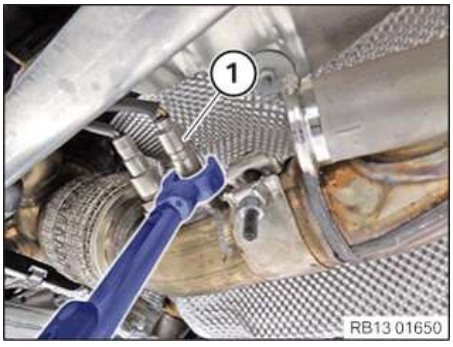
Damage to the nitrogen oxide sensor.

Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
- The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



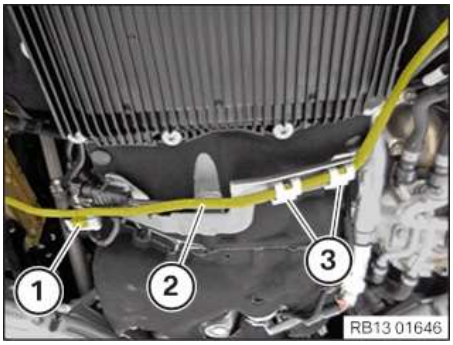
- Feed in and install the nitrogen oxide sensor (1).



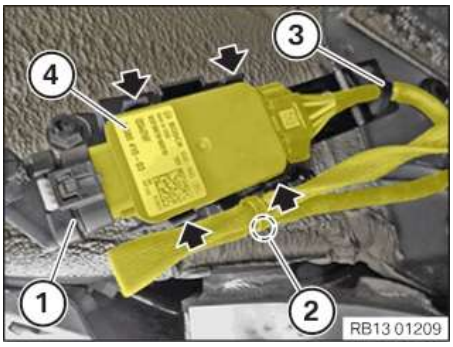
- Tighten the nitrogen oxide sensor (1) using commercially available tools.

Nitrogen oxide sensor before SCR catalytic converter

Sensor		Tightening torque	50 Nm



- Secure the cables (2) to the clamps (3).
- Secure clamps (1).



- Clip in the control unit (4) (arrows).
- Fasten the cable in the holder (3).
- Secure the cable holder (2).
- Plug in the connector (1) and lock audibly.

61 – Installing the monitoring oxygen sensor after the diesel particulate filter

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

TECHNICAL INFORMATION

New oxygen sensors are to be greased lightly and evenly on the thread.

For oxygen sensors that are reused, the following should be observed:

Lightly and evenly grease the oxygen sensor only on the thread. Do not clean and grease that part of the oxygen sensor which protrudes in the exhaust branch (sensor ceramics).

For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



- Insert the monitoring oxygen sensor (1) and install it.

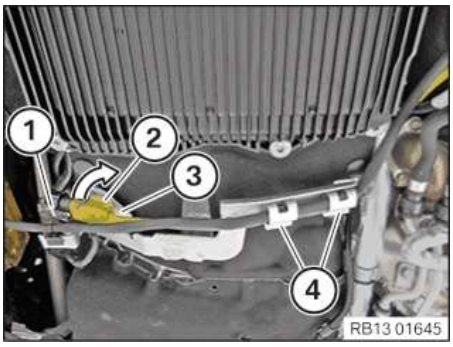
cardiagn.com



- Tighten the monitoring oxygen sensor (1) with standard tools.

Monitoring oxygen sensor

Sensor		Tightening torque	50 Nm



- Fasten the monitoring oxygen sensor to the clamps (4).
- Secure the connector (2) on the holder (3) in direction of arrow.
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

62 – Installing the exhaust system

CAUTION

Component with heavy weight.

Danger of injury!

- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

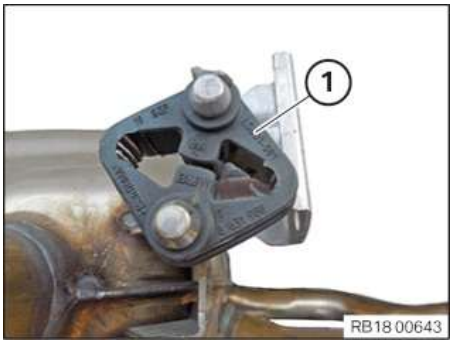
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

TECHNICAL INFORMATION

Mount the exhaust system in voltage-free state, maintaining the tightening sequence from the rear silencer towards the exhaust manifold.



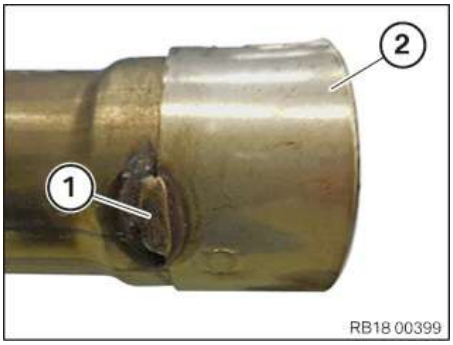
NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

- Check all the rubber mounts (1) of the exhaust system for damage.
- Replaced damaged rubber mounts.

  Parts: Rubber mount

cardiagn.com



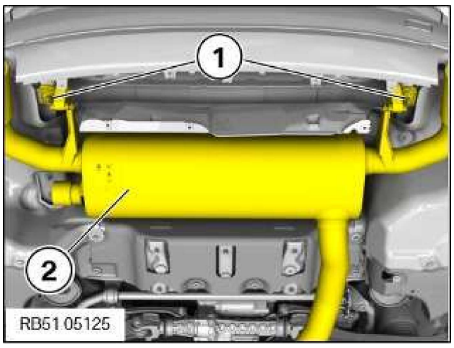
CAUTION

Swarf resulting from sawing or grinding components.

Danger of injury!

- Conduct all work in appropriate personal protective equipment only.
- Wear safety goggles and protective gloves.

- Open the weld seam (1) with a conventional tool.
- Remove the clamp (2).

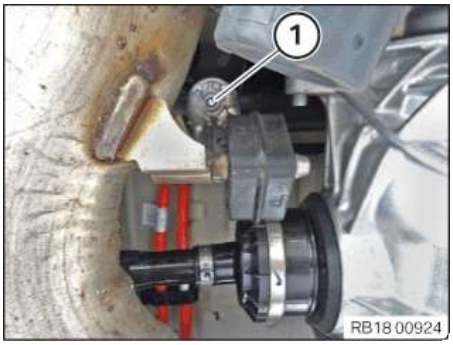


- Insert and install the exhaust system (2).
- Renew nuts (1).

  Parts: Nuts
- Tighten nuts (1).

Rear silencer to body / bumper support

M8	Replace nuts.	Tightening torque	19 Nm

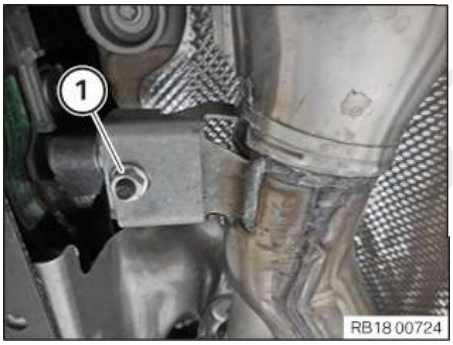


- Renew nut (1) on the rear axle support.

  Parts: Nut
- Tighten nut (1).

Exhaust system to rear axle carrier

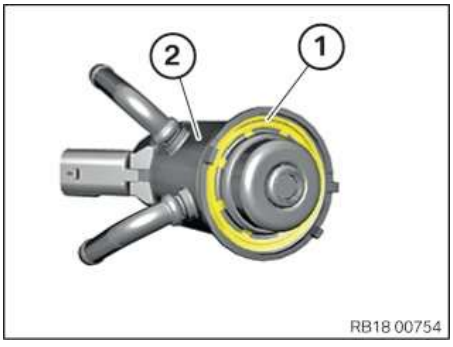
M8 nut		Tightening torque	19 Nm



- Tighten nut (1).

Exhaust system to transmission

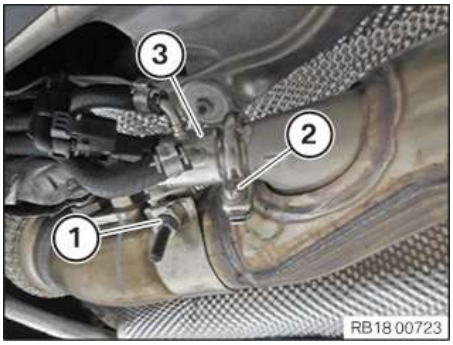
M8		Tightening torque	19 Nm



- Renew sealing ring (1) of the SCR metering module (2).

  Parts: Sealing ring

autodiagn.com



- If necessary, renew clamp (1).

  Parts: Clamp
- Tighten clamp (1).

Exhaust system to diesel particle filter

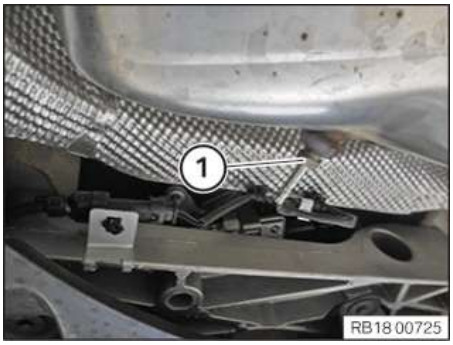
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

- Renew the V-clip (2).

  Parts: V-band clamp
- Install the SCR metering module (3) in the exhaust system.
- Tighten the V-clip (2) of the SCR metering module (3).

SCR metering module V-clip to exhaust system

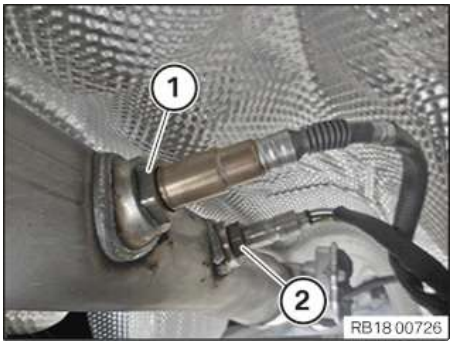
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm



- Install the exhaust temperature sensor (1) in the exhaust system and tighten.

Exhaust-gas temperature sensor upstream of SCR catalytic converter

Sensor		Tightening torque	30 Nm



- Install the diesel particulate sensor (1) in the exhaust system and tighten.

Diesel particulate sensor to exhaust system

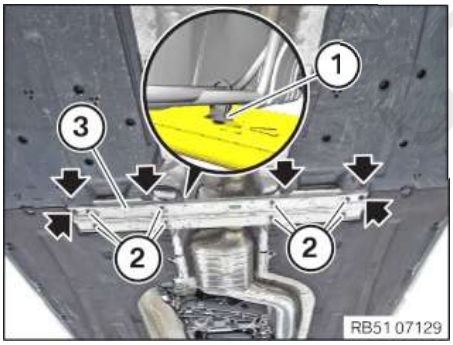
Sensor		Tightening torque	50 Nm

- Install the nitrogen oxide sensor (2) in the exhaust system and tighten.

Nitrogen oxide sensor downstream of SCR catalytic converter

Sensor		Tightening torque	55 Nm

63 – Install the connecting supports on the tunnel



- Guide in and install connecting support (3) on the tunnel.
- Tighten the screws (2).
- Tighten screws (arrows).

Connecting support to tunnel

M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

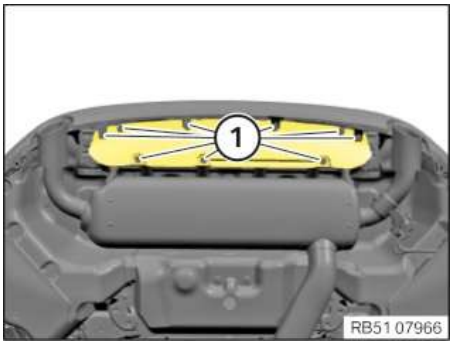
NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Secure the clamp (1).

64 – Installing the rear diffuser

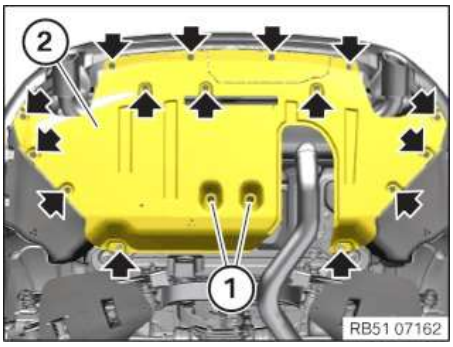
cardiagn.com



- **Version 1:**
- Install the diffuser and tighten the nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm



- **Version 2:**
- Feed in and position the diffuser (2)
- Tighten screws (arrows).

Diffuser / underbody panelling

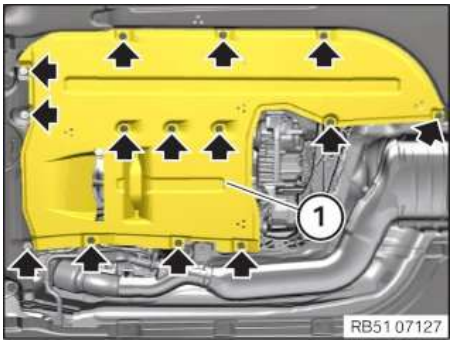
Nuts and screws		Tightening torque	3 Nm

- Tighten nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm

65 – Installing underbody protection at rear



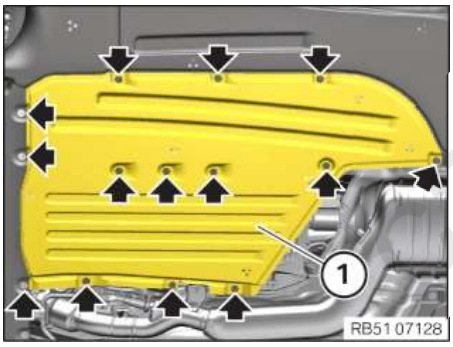
- **Version A:**

  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version B:**

  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

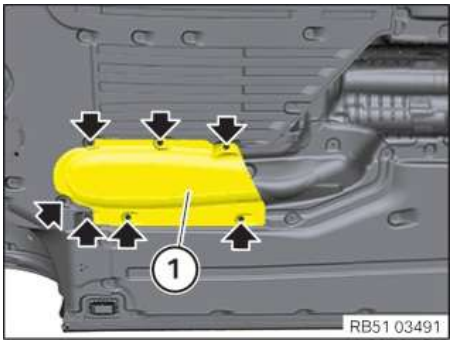
Underbody protection

Hexagon screw		Tightening torque	3 Nm

66 – Install the underbody panelling of the transmission on the side

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

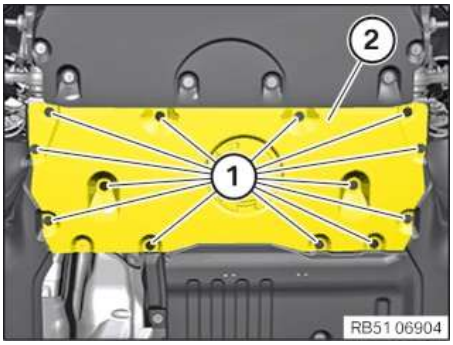


- Insert the underbody panelling (1).
- Tighten screws (arrows).

Underbody panelling

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

67 – Installing the centre underbody protection



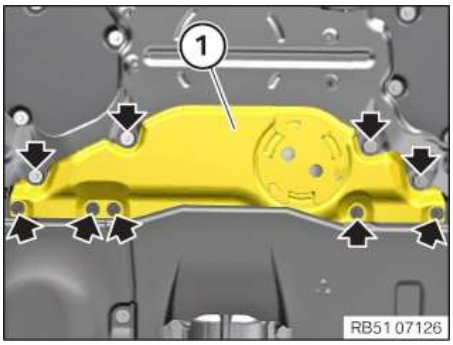
- **Variant with rear wheel drive:**

  Position central underbody protection (2).

  Tighten the screws (1).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version with all-wheel drive:**

  Guide in centre underbody protection (1) and install.

  Tighten screws (arrows).

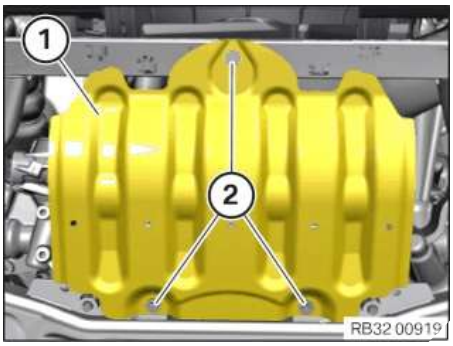
Underbody protection

Hexagon screw		Tightening torque	3 Nm

68 – If installed: Install underbody protection of the steering

Prerequisite

Front underbody protection has been removed.



- Position underbody protection (1).
- Tighten the screws (2).

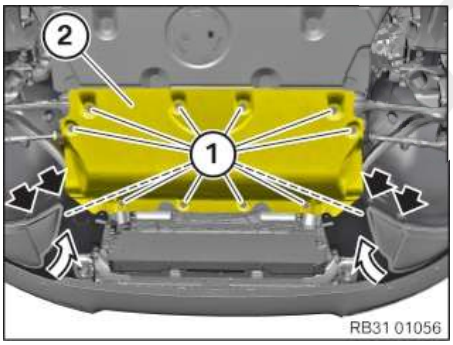
Underbody protection, steering, to front axle support

Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

69 – Install the underbody protection of the steering gear



- **Version A:**

  Position the underbody protection (2) of the steering gear.

  Tighten the screws (1).

Underbody protection of the steering gear

Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

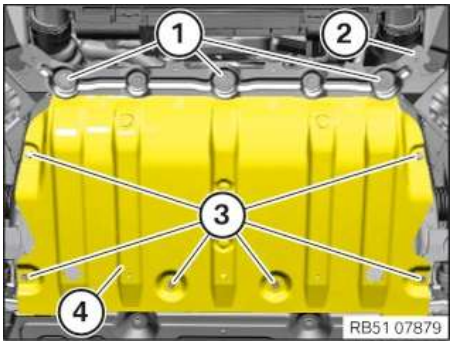
- Position the bottom wheel arch cover.

  Tighten the screws (arrows) of the lower wheel arch cover on the wheel arch cover.

Wheel arch trim panel, front

Thermoplastic hexagon screw		Tightening torque	2,6 Nm

cardiagn.com



- **Version B:**

  Feed in the underbody protection (4) of steering gear and install it.

  Tighten the screws (3).

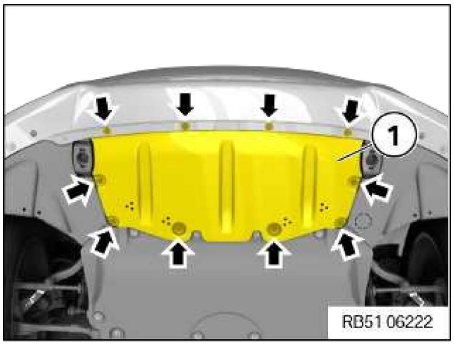
Underbody protection of the steering gear

Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the holder (2) for the underride protection.

  Tighten the screws (1).

70 – Installing the front underbody protection



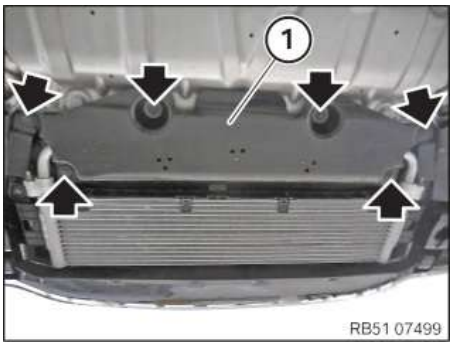
- **Version A:**

  Feed in the front underbody protection (1) towards the front under the bumper panel and position.

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



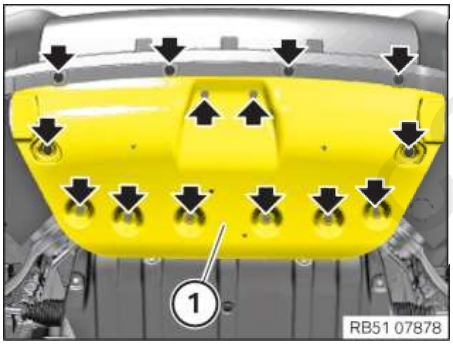
- **Version B:**

  Feed in and position the front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



- **Version C:**

  Feed in and install front underbody protection (1).

  Tighten screws (arrows).

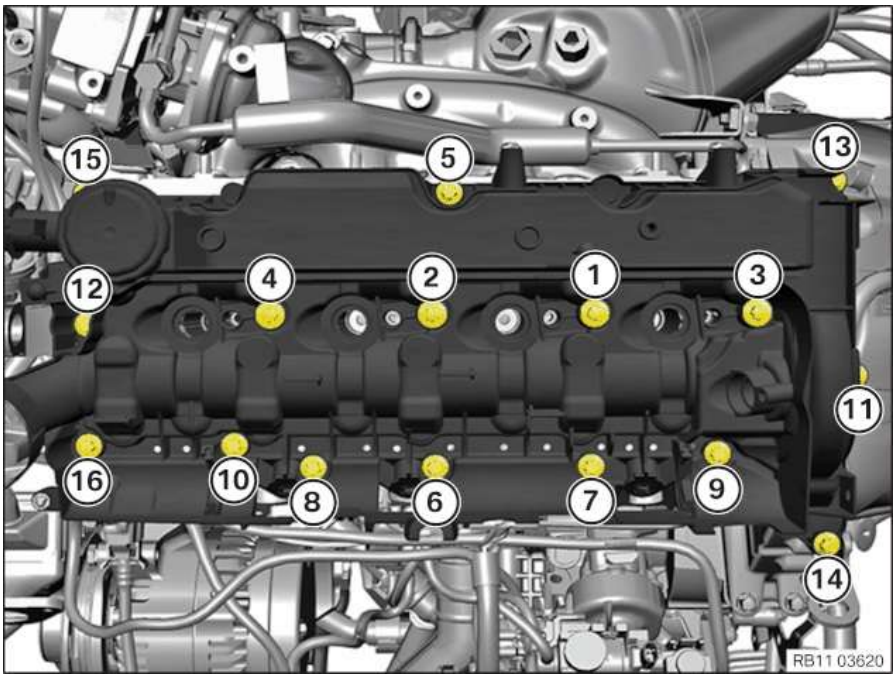
Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

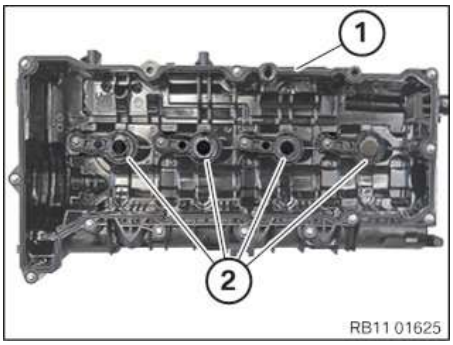
71 – Installing cylinder head cover

cardiagn.com

Screw connection of the cylinder head cover

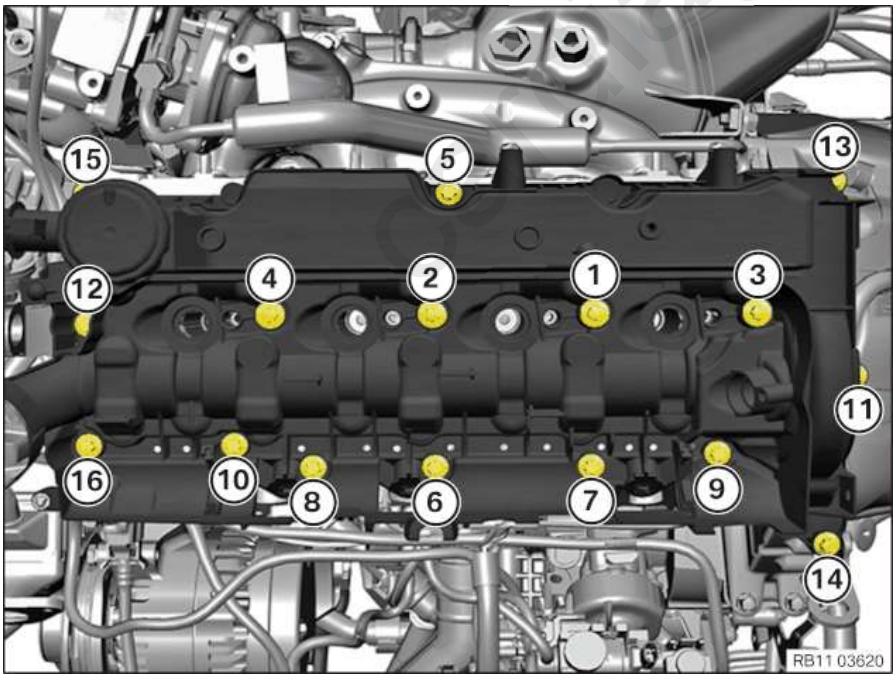


1 - 16 Bolts of the cylinder head cover



- Renew the profile seals (1) and (2) of the cylinder head cover.

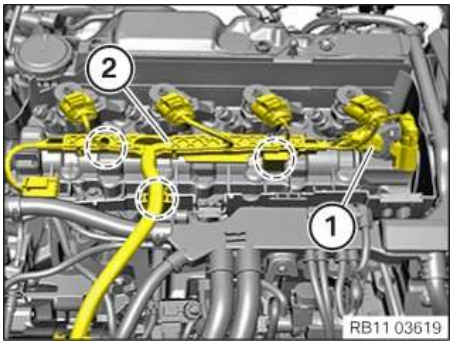
  Parts: Profile seals



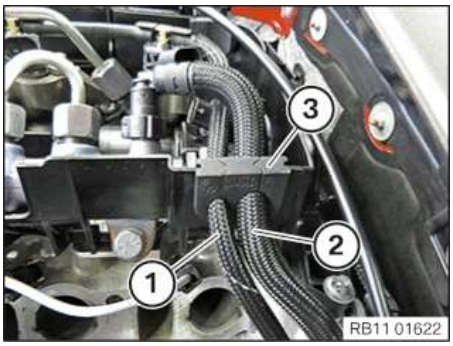
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

Cylinder head cover to cylinder head

M6		Tightening torque.	8,5 Nm



- Position the vehicle wiring harness (2) on the cylinder head cover and fasten in the marked areas.
- Plug in the connector (1) and lock audibly.



- Insert and connect the leakage oil line (1) with the fuel return line (2) and grommet (3).



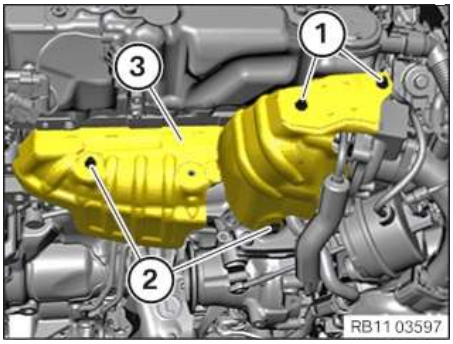
- Feed in and install the heat shield (1).



- Connect engine ventilation line (1) and lock.

  The locks (arrows) must engage audibly.

72 – Installing heat shield



- Feed in and install the heat shield (3).
- Tighten down screws (1) and (2).

Heat shield to exhaust manifold

M6x12			10 Nm

73 – Installing the sensor bracket on the cylinder head cover

cardiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

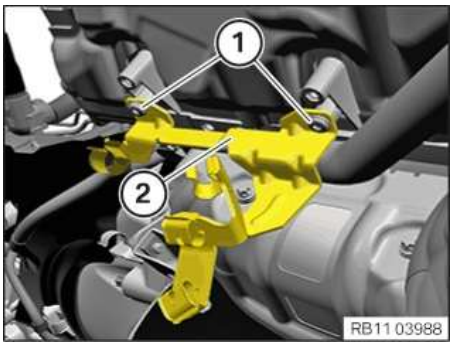
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

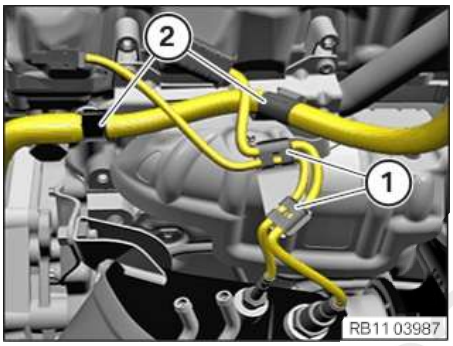
- Route all cables without abrasions, do not trap and crush.



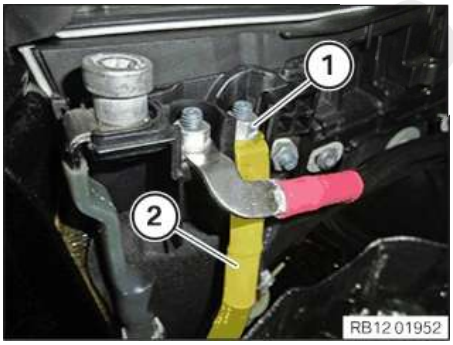
- Insert and install the holder (2).
- Tighten the screws (1).

Bracket on cylinder head cover

	Tightening torque	5 Nm



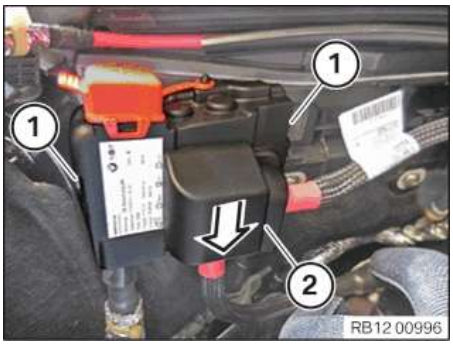
- Secure the positive battery cable in the clamps (2).
- Mount the cable of the exhaust gas sensor system in the clamps (1).



- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

Battery positive lead to battery positive terminal

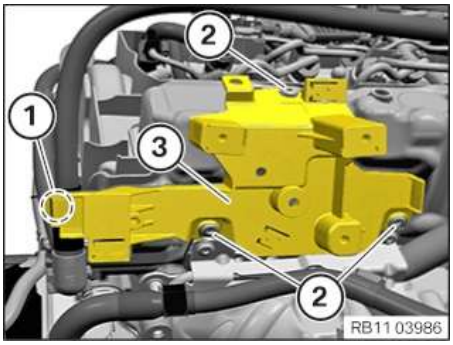
M8		Tightening torque	19 Nm



- Insert and install the cover (2) in the direction of the arrow.

  The locks (1) must engage audibly.

cardiagn.com

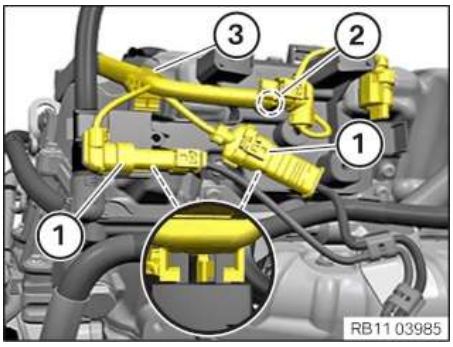


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

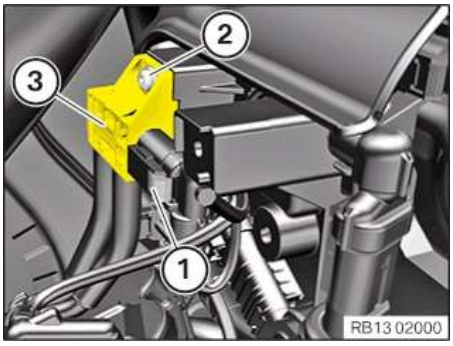
		Tightening torque	5 Nm

- Fasten the positive battery cable in the area (1) in the clamp.



- Feed in the wiring harness section and fasten it with the clamp (3).
- Fasten the cable clip in the area (2) in the sensor bracket.
- Feed in the connector (1) into the sensor bracket and lock it audibly.
- Plug in the connector (1) and lock audibly.

74 – Securing the differential pressure sensor for the diesel particulate filter



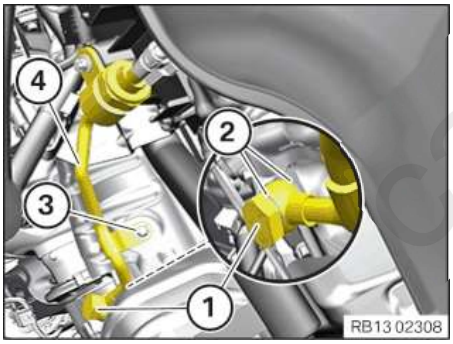
- Feed in and install the differential pressure sensor (3).
- Tighten down screw (2).

Differential pressure sensor of diesel particulate filter on cylinder head cover

TS5x20		Tightening torque	4 Nm

- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

75 – Install the exhaust gas pressure pipe



- Insert and install the exhaust gas pressure pipe (4).
- Replace the sealing rings (2).

  Parts: Sealing ring
- Apply the banjo bolt (1) hand-tight.
- Tighten down screw (3).

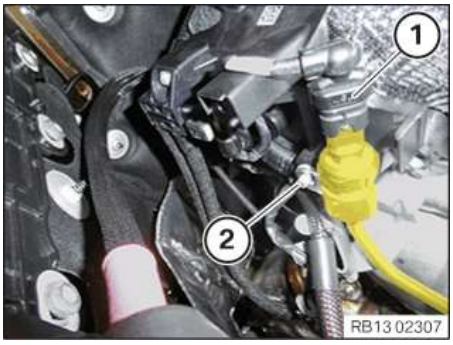
Heat shield to exhaust manifold

M6x12		Tightening torque	10 Nm

- Tighten the banjo bolt (1).

Banjo bolt for exhaust pressure pipe to exhaust manifold

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm



- Tighten down screw (2).

Exhaust gas pressure pipe to sensor system holder

TS6x20		Tightening torque	5,7 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

76 – Install all injectors

▸ **Cleaning the injector shafts**

cardiagn.com

CAUTION

Swirling dirt particles caused by compressed air.

Danger of injury!

- Collect dirt particles, e.g. when blowing out, use cloth to do so.

- Wear safety goggles.

RISK OF DAMAGE

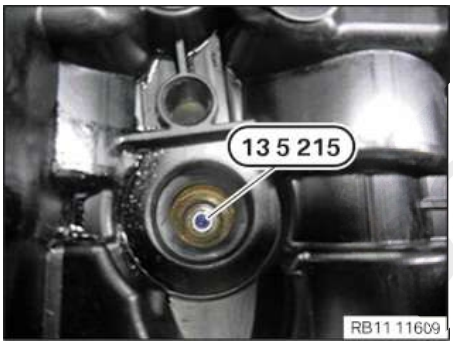
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



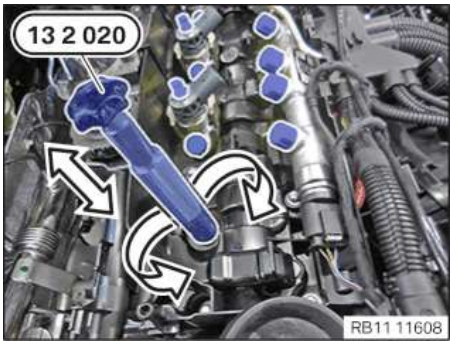
- Check whether the sealing ring remained in the injector shaft and remove the sealing ring as needed.
- Insert the special tool 0 493 763 (13 5 215) with the special tool 0 493 762 (13 5 214) from the set of special tools 0 493 758 (13 5 210) into the injector shaft.
- Remove special tool 0 493 762 (13 5 214).



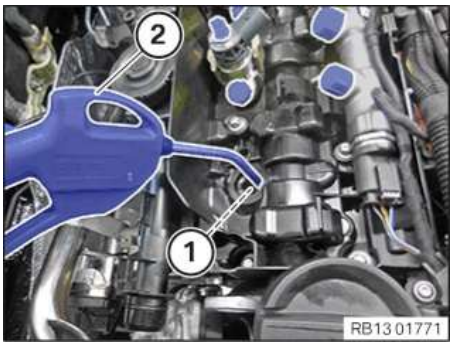
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



- Insert special tool 0 496 150 (13 2 020) into the injector shaft.



- Move special tool 0 496 150 (13 2 020) up and down in the injector shaft with rotational movements in the direction of arrow.
- Feed out special tool 0 496 150 (13 2 020) from the injector shaft and remove.



- Blow out injector shaft (1) with air gun (2).



- Feed the special tool 0 493 762 (13 5 214) into the injector shaft and screw it in with the special tool 0 493 763 (13 5 215).
- Feed out special tool 0 493 762 (13 5 214) with special tool 0 493 763 (13 5 215) from the injector shaft and remove it.

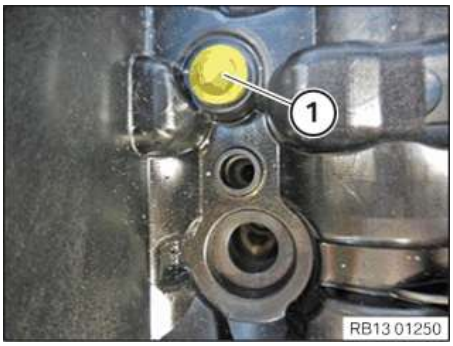
▸ **Check the placement of the clamping claw**

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Tighten down screw (1).

  The clamping claw is positioned on the bolt (1).

Clamping claw facing to cylinder head cover

M6		Tightening torque	10 Nm

▸ **Prepare the injector for installation**

cardiagn.com

RISK OF DAMAGE

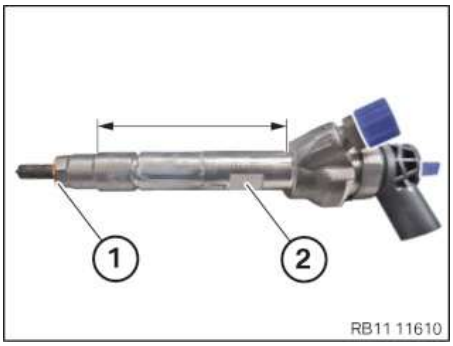
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

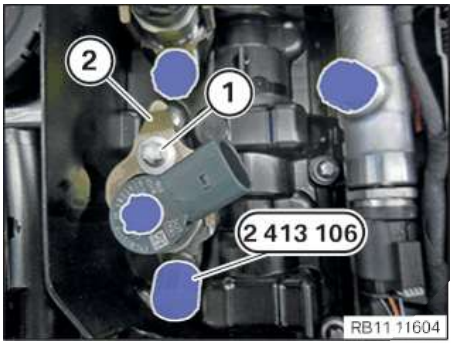
TECHNICAL INFORMATION

Lightly grease the injector shaft with high temperature-resistant grease.
For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



- Renew the copper sealing ring (1) on the injector (2).

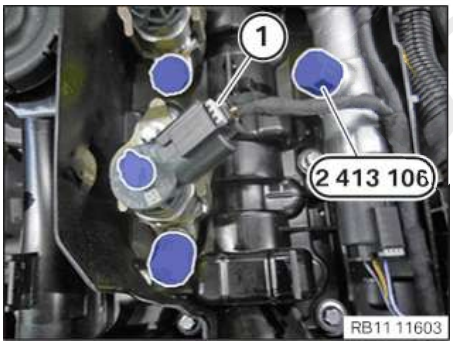
  Parts: Copper sealing ring
- Lightly grease the injector in the marked area with heat-resistant grease before installing the injector (2) in the injector shaft.



- Insert and install the injector .
- Insert and install the clamping claw (2).
- Tighten down screw (1).

Injector to cylinder head cover

M8	Tightening torque	8 Nm
	Angle of rotation	120 °



- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

▸ **Replacement: Perform injection quantity compensation**

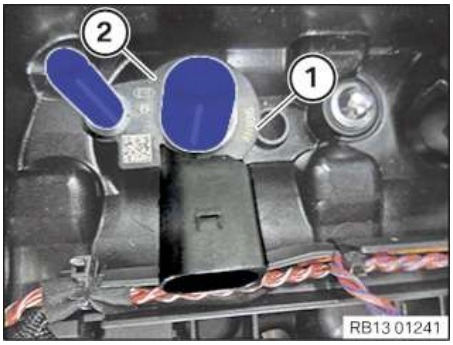
TECHNICAL INFORMATION

If the DDE control unit or an injector has been replaced, it will also be necessary to carry out injection quantity compensation. The adjustment value (7-position letter/number code) is engraved on each injector.

NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

cardiagn.com

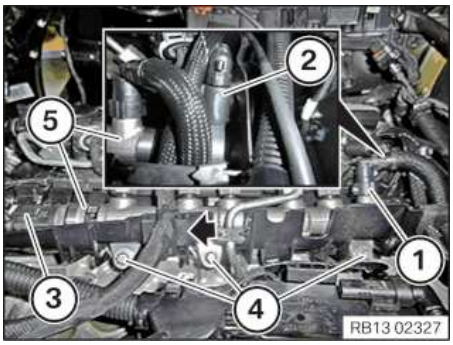


- Read off the adjustment value (1) on the new injector (2).



- Connect diagnosis system:
  - Vehicle identification
  - Function selection
  - Service functions
  - Digital diesel electronics (DDE)
  - Adjustment of injectors
  - Testing schedule
- Start service function with the right arrow button.

77 – Installing the rail



- Insert and install the rail (5).
- Tighten the screws (4).

Rail to cylinder head cover

M8		Tightening torque	19 Nm

- Install and lock cable clip (arrow).

  The cable clip (arrow) must engage audibly.
- Connect and lock the connector (3) at the rail pressure sensor.

  The connector (3) must engage audibly.
- Connect and lock the connector (2) at the rail pressure regulating valve.

  The connector (2) must engage audibly.
- Feed in fuel return line (1) and install.

  The fuel return line (1) must audibly engage.

78 – Installing high pressure line between rail and high pressure pump

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

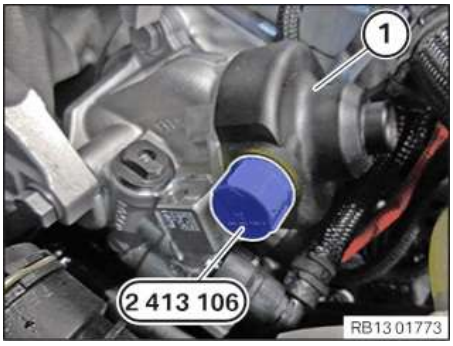
Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

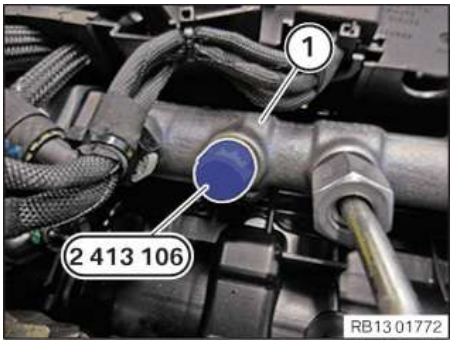
cardiagn.com

TECHNICAL INFORMATION

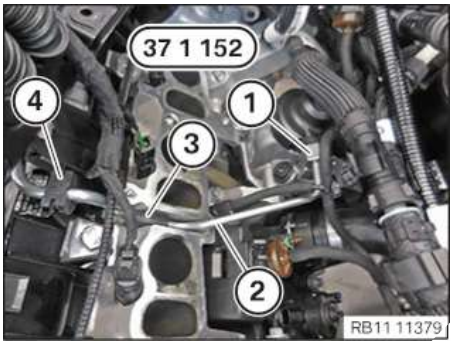
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Feed out and remove special tool on the high pressure pump (1).



- Feed out the special tool on the rail (1) and remove.



- Insert and install the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).
- Hand-tighten the union nut (1) on the high pressure pump.



- Hand-tighten the union nut (1) on the rail.

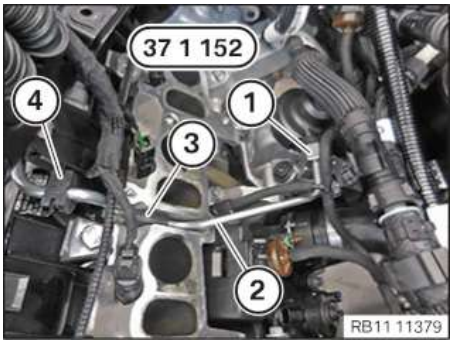
TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten the union nut (1) with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm



- Make sure that the high pressure line (2) is correctly installed with the abrasion protection (3) and the rubber mount (4).

TECHNICAL INFORMATION

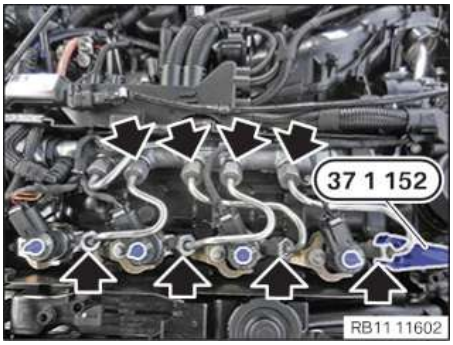
Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten union nut (1) on the high pressure pump with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm

cardiagn.com



- Remove the special tool from all cable connections.
- Feed in and install the high pressure lines (arrows).
- Hand-tighten the high pressure lines (arrows).

TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

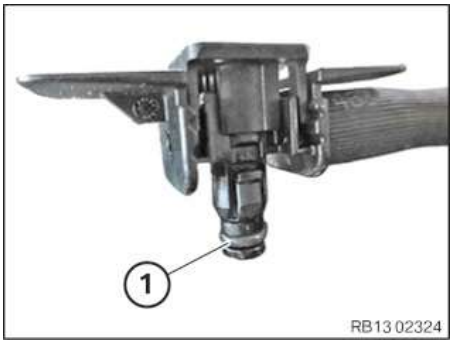
- Tighten the high pressure lines (arrows) with the special tool .

High pressure lines between injector and rail

High-pressure pipe		Tightening torque	24.5 Nm

- Check the high pressure lines (arrows) for tightness (**visual inspection**).

80 – Attach the leakage oil line on the injectors

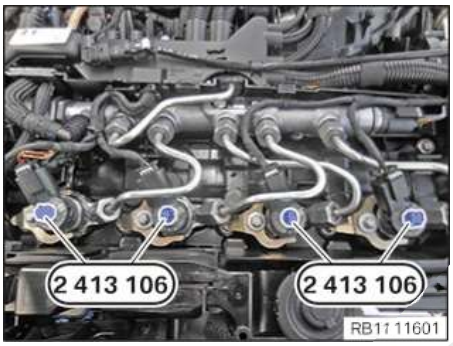


- **Version A:**

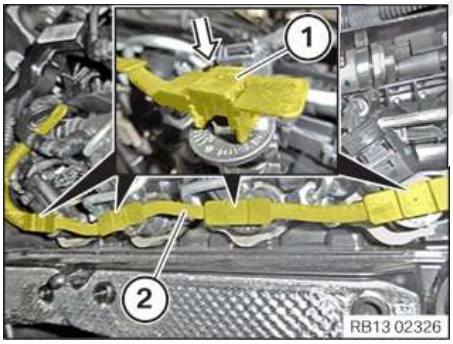
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

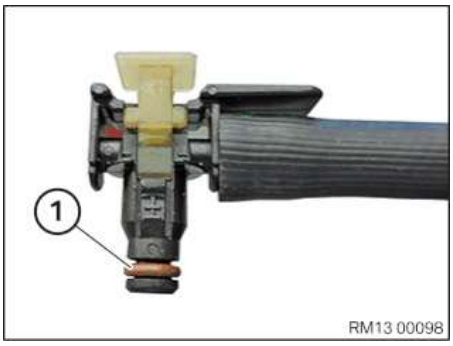
  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.



- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.



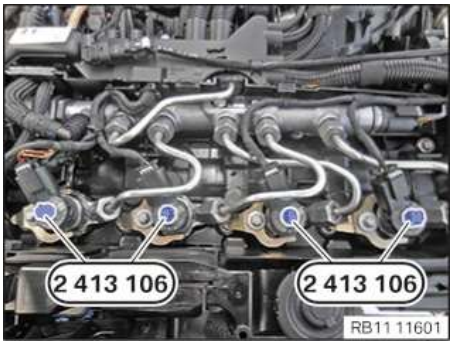
- **Version B**:

  Check sealing ring (1) for damage, renew leakage oil line if necessary.

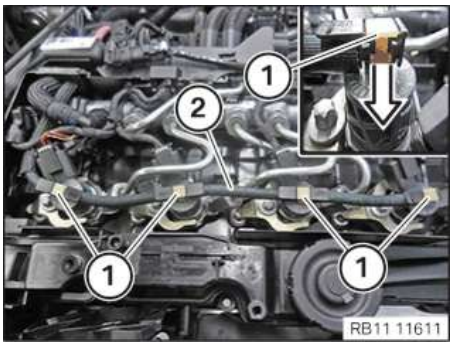
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.

ardiagn.com

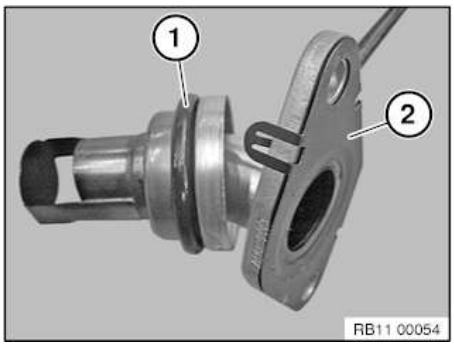


- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.

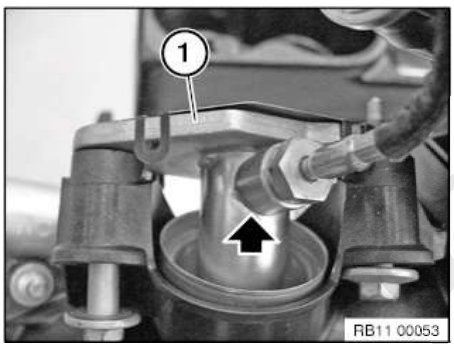
81 – Installing the intake plenum



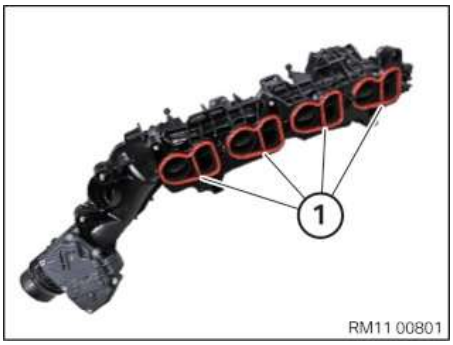
- Renew O-ring (1).

  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

  Parts: Gasket
- Position the seal (2) and clip it in.



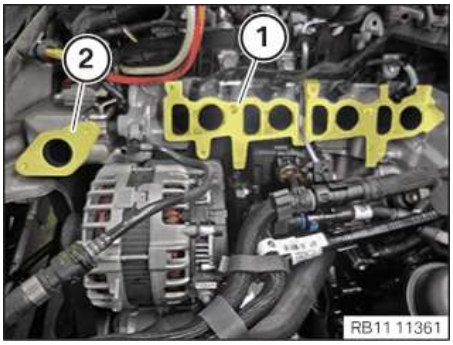
- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).



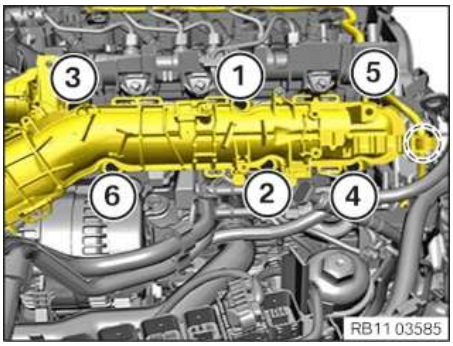
- Renew seals (1).

  Parts: Seals
- Ensure that the seals (1) are firmly mounted on the intake plenum.

cardiagn.com



- Clean connection points (1) at cylinder head.
- Clean the connection point (2) on the exhaust-gas recirculation cooler.

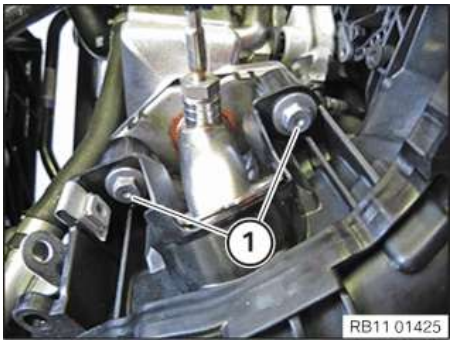


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

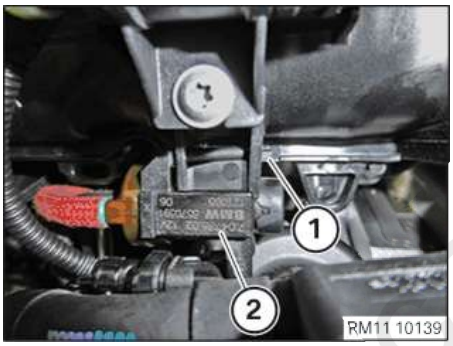
- Attach the wiring harness and fuel lines in the marked area on the intake plenum.



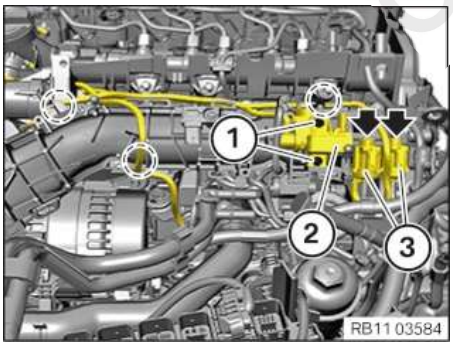
- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm



- Install electric changeover valve (2) from the left to the right in the holder on the intake plenum.
  The lock (1) must audibly engage.



- Install intake plenum electric changeover valve (3) on the intake plenum.
  The locks (arrows) must engage audibly.
- Position the electric changeover valve (2) on the intake plenum.
- Tighten the screws (1).

Electric changeover valve to intake plenum

TS6x20		Tightening torque	5 Nm

- Fasten the vacuum hoses on the intake plenum in the marked areas.



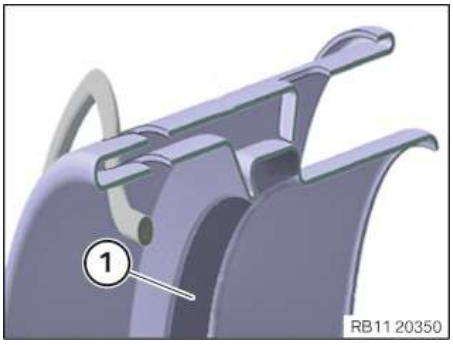
- Check the seal (1) for damage, and renew if necessary.

gardiagn.com

▸ **Replacing damaged seal**

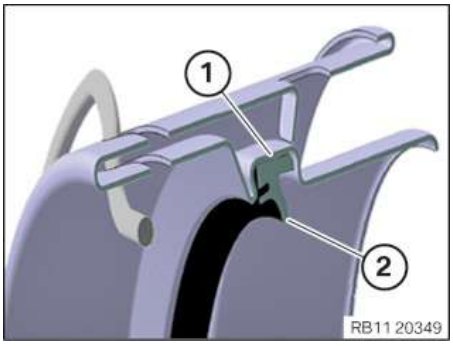
TECHNICAL INFORMATION

Do not use pointed or sharp-edged tools for the installation and/or removal.



- Remove damaged seal.
- Clean gasket groove (1) with a dry towel.

  The gasket groove (1) must be clean.



- Renew gasket.

  Parts: Gasket
- Install seal dry without lubricant or mounting agent.

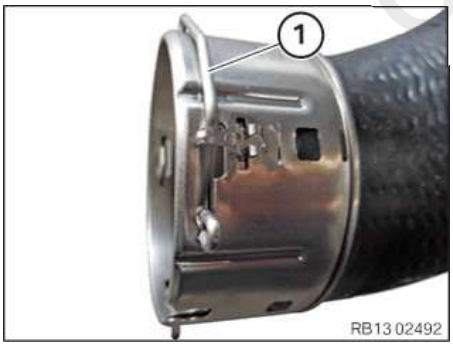
TECHNICAL INFORMATION

Incorrect assembly is possible. Ensure correct installation position.

- Feed in and install the seal.
- Make sure the seal is correctly installed in the gasket groove (1).
- Make sure that the sealing lip (2) is directed inwards as shown.



- Connect the pressure pipe to the throttle body until the locks (1) engage on both sides.



- Check that the locks (1) are correctly seated on the pressure pipe.

82 – Partially securing the wiring harness section on the intake plenum

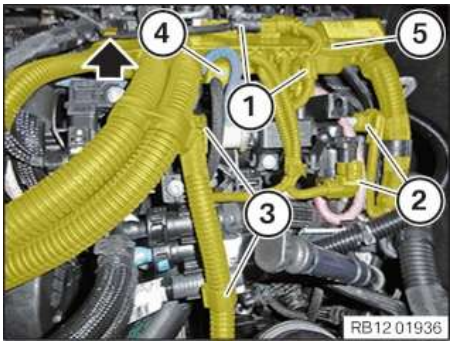
RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

- Route all cables without abrasions, do not trap and crush.

cardiagn.com



- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

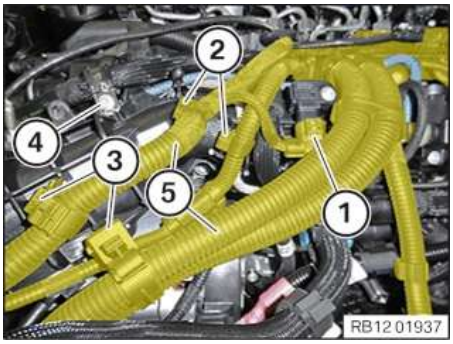
Wiring harness section to manifold

TS5x20		Tightening torque	3,6 Nm

- Secure clamps (3).
- Connect connectors (2) and lock.

  The connectors (2) must engage audibly.
- Secure the line at clamp (Arrow).
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



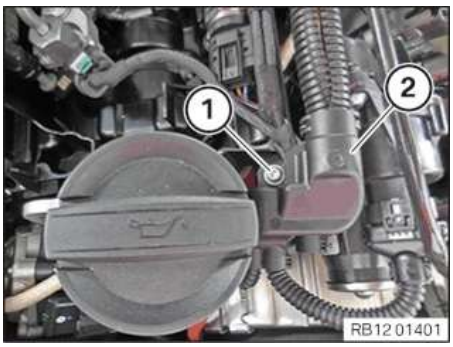
- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

Standard screw connection 4 Nm

Oval-head screw		Tightening torque	4 Nm

- Secure clamps (3).
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



- Guide in the wiring harness section (2) and install.
- Tighten down screw (1).

Wiring harness section to cylinder head cover

TS5x20		Tightening torque	3,6 Nm



- Connect connectors (1) and lock.

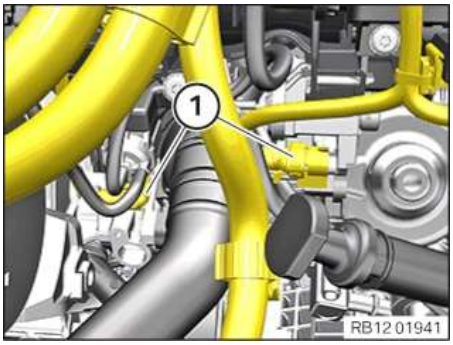
  The connector (1) must engage audibly.



- Connect the connector (1) and lock it.

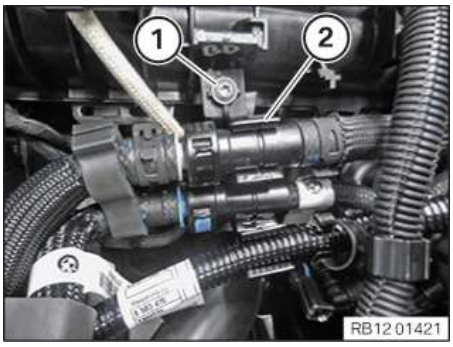
  The connector (1) must engage audibly.

cardiagn.com



- Connect connectors (1) and lock.

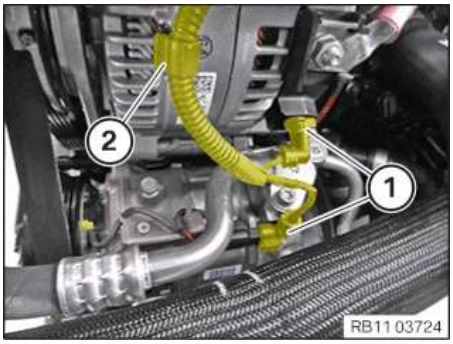
  The connectors (1) must engage audibly.



- Insert and install the holder (2).
- Tighten down screw (1).

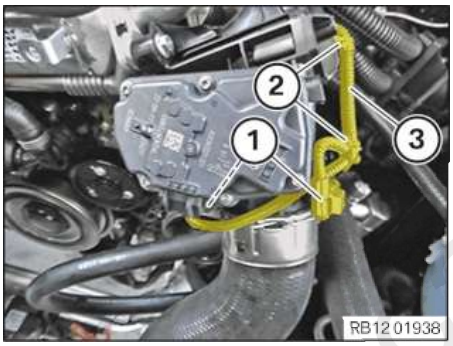
Holder on intake plenum

TS6X20		Tightening torque	5 Nm

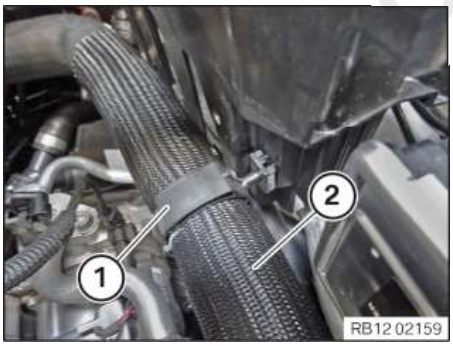


- Connect the connector (1) and lock it.

  The connectors (1) must engage audibly.
- Secure holder (2) to alternator.



- Guide in the wiring harness section (3) and install.
- Secure clamps (2).
- Connect connectors (1) and lock.



- Feed in and install coolant line (2).
- Lock holder (1).

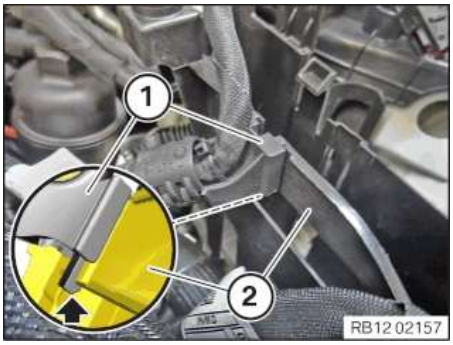
  The holder (1) must engage audibly.



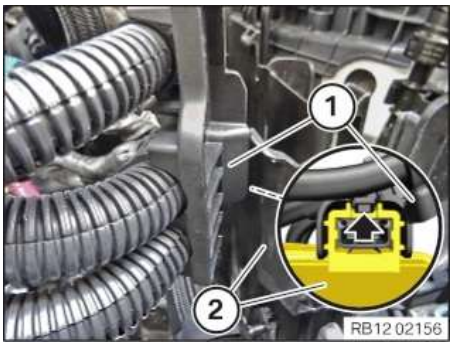
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.

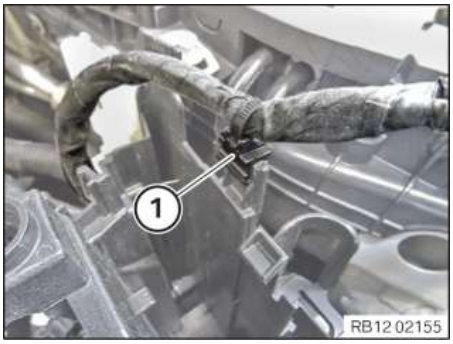
cardiagn.com



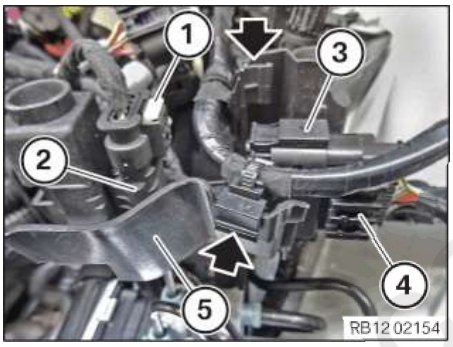
- Connect the cable clip (1) with the control unit holder (2) and lock it.
  Lock (arrow) must audibly engage.



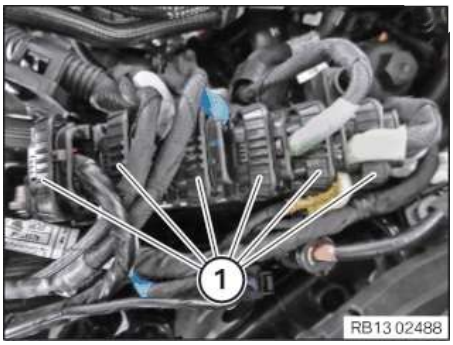
- Connect the cable clip (1) with the control unit holder (2) and lock it.
  Lock (arrow) must audibly engage.



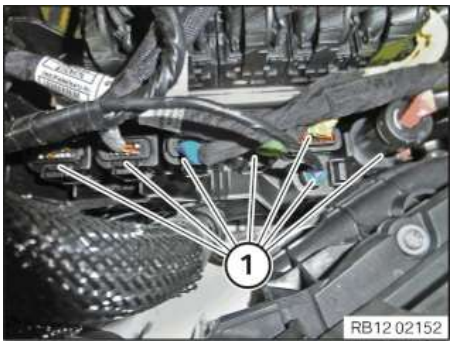
- Secure clamps (1).



- Connect and lock the connector (4) with the control unit holder (5).
  The connector (4) must engage audibly.
- Connect connectors (3) and lock.
  The connector (3) must engage audibly.
- Connect and lock the connector (2) with the control unit holder (5).
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.
  The connector (1) must engage audibly.
- Secure the clamps (arrows).

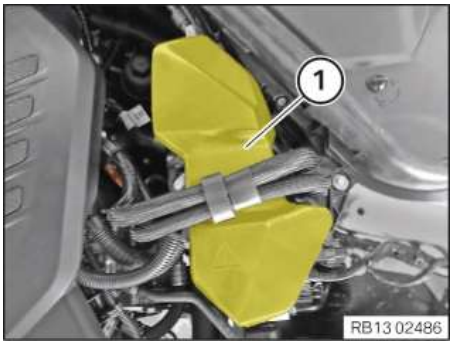


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



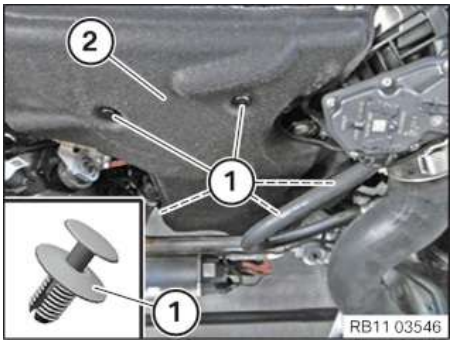
- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.

cardiagn.com



- Insert and install cover (1) into guides.

83 – Install acoustic cover for the engine, front

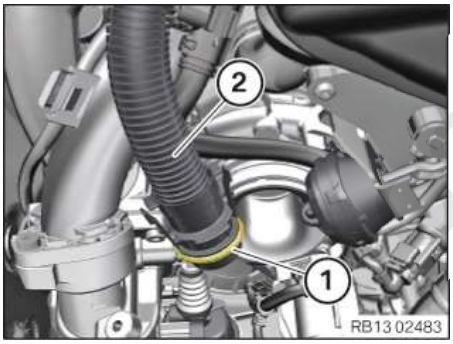


- Feed the acoustic cover (2) in and install.
- Secure the acoustic cover (2) with the expanding rivets (1).

84 – Installing the clean air pipe with resonator



- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.

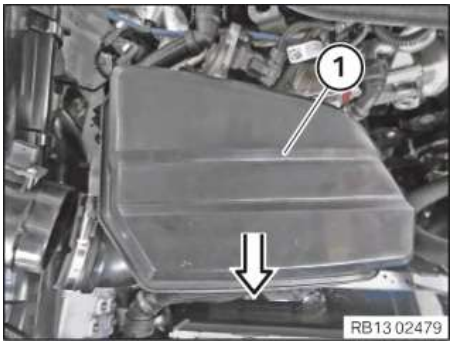


- Check the sealing ring (1) for the engine ventilation line (2) for damage and renew where required.



- Feed in and install clean air pipe with resonator (1) in the direction of the arrow.

cardiagn.com

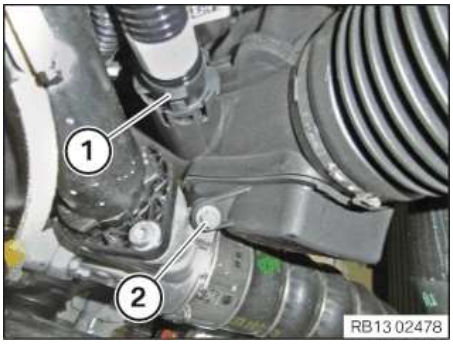


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

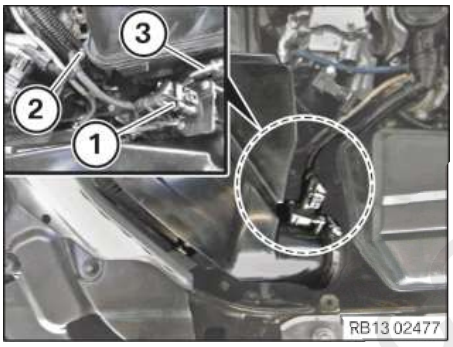
  The clamp (1) must engage audibly.



- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm



- Connect the clean air pipe with resonator to the intake filter housing.
- Tighten clamp (3).

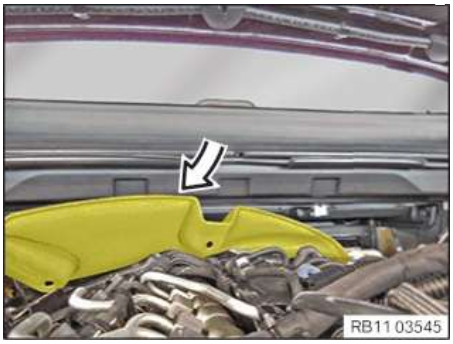
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

- Secure clamps (2).
- Connect connectors (1) and lock.

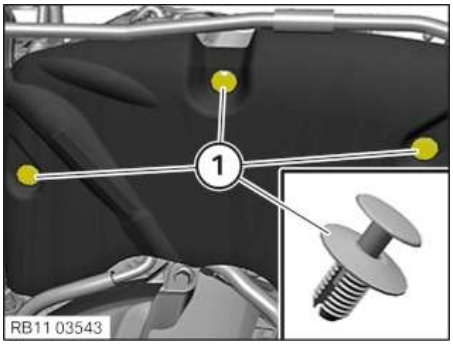
  The connector (1) must engage audibly.

85 – Installing acoustic cover at rear



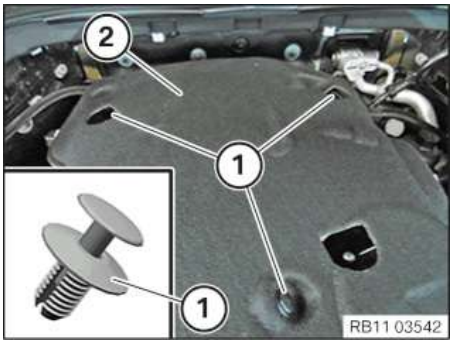
- Guide in the acoustic cover in the direction of the arrow and install it.

cardiagn.com



- Secure acoustic cover with the expanding rivets (1).

86 – Install the acoustic cover for the injectors



- Feed the acoustic cover (2) in and install.
- **If installed:** Secure the acoustic cover (2) with the expanding rivets (1) .

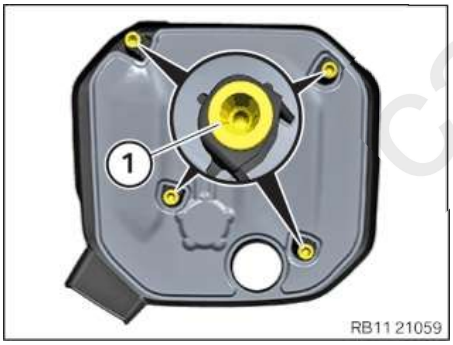
87 – Install acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.

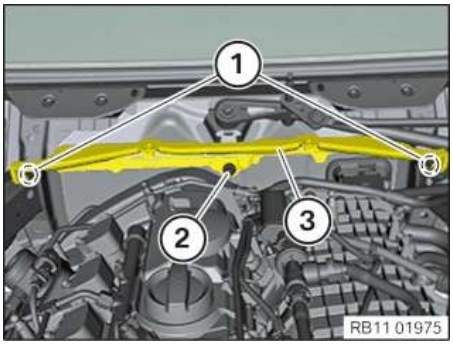


- Check the acoustic cover for correct fit of the rubber mounts (1).



- Clip in the acoustic cover (1) into the holders in the indicated areas.

88 – Installing centre bulkhead lower section

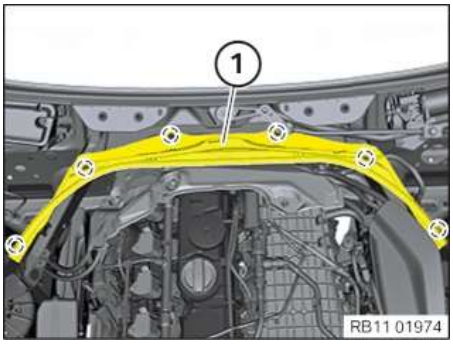


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

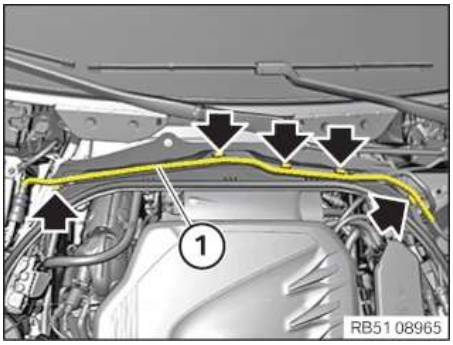
89 – Installing the centre bulkhead upper part



- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

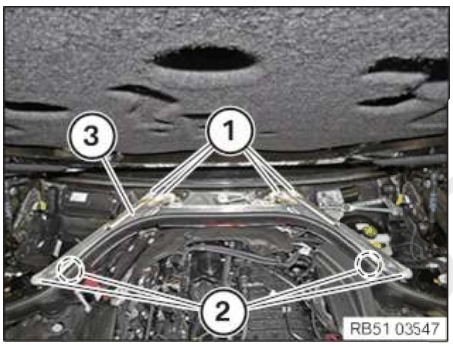
Bulkhead upper part to bottom bulkhead

		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

  Clip in the wire (1) into the holders (arrows).



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Install the tension strut (3) on the spring strut dome.
- Tighten the screws (1).

Tension strut on bulkhead

M10x25 screw		Tightening torque	56 Nm

- Renew screws (2).

  Parts: Screws
- Tighten the screws (2).

Tension strut to spring strut dome

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

90 – Install the seal for the bonnet

carmagn.com



- Press the rear bonnet seal (2) into the guide.
- Feed in cable (1) into the brackets.
- Check that the rear bonnet seal (2) and the cable (1) are seated correctly.

91 – Installing cowl panel cover

RISK OF DAMAGE

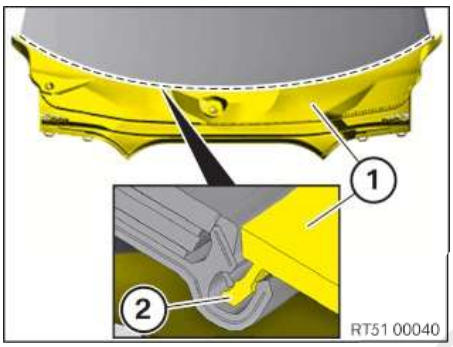
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

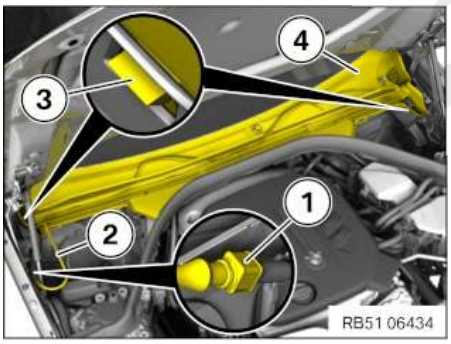
- Ensure correct installation of the components.
- Only use undamaged components.

TECHNICAL INFORMATION

Before installing the cowl panel cover it is **mandatory** to check that the 48 V line is routed correctly and fitted tightly.
An incorrectly laid or attached 48 V line can be damaged by the wiper kinematics.



- Push the cowl panel cover (1) into the latch mechanism (2) beginning on the side.



- Clip cowl panel cover (4)in by means of the latch mechanisms (3).
- Position windscreen wash hose (2) and connect windscreen wash hose (1)quick lock.

92 – Install left and right wiper arm

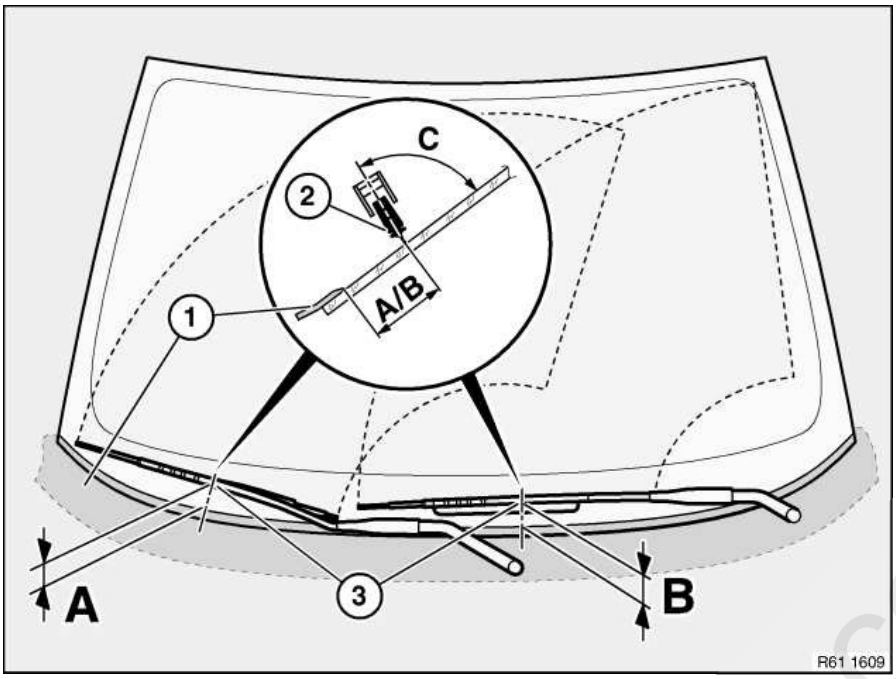
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

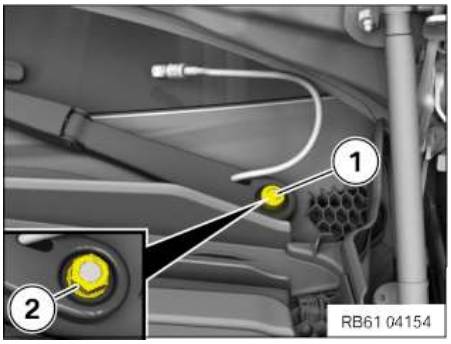
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- Connect the wiper arm (3).
- Correctly position the wiper arm (2) in relation to the window edge (1).

Distance from window pane edge to wiper blade

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

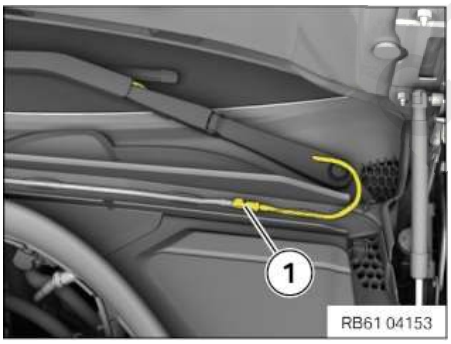


- Tighten nut (2).

Windscreen wiper arm

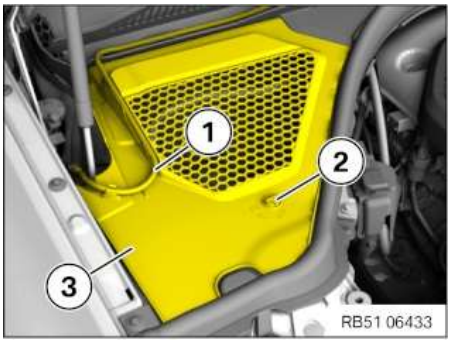
Combination hexagon nut		Tightening torque	35 Nm

- Connect the protective cap (1).



- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

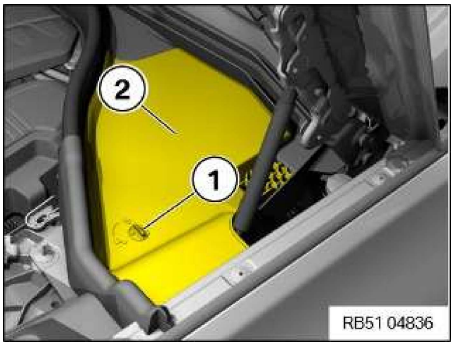
93 – Install the rear right engine compartment cover



- Position the cover of the engine compartment on the rear right (3).
- Close lock (2).
- Insert washer fluid hose (1) into the guides.

94 – Install the cover of the engine compartment on the rear left

cardiagn.com



- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

95 – Connecting all battery earth leads



- See additional information.

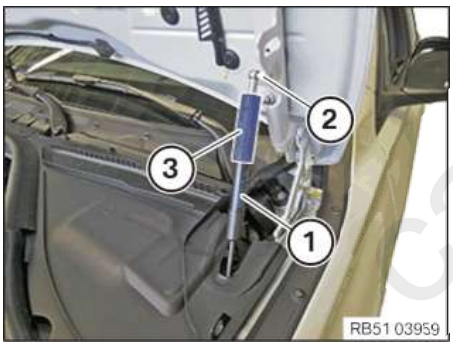
96 – Take bonnet out of the service position

CAUTION

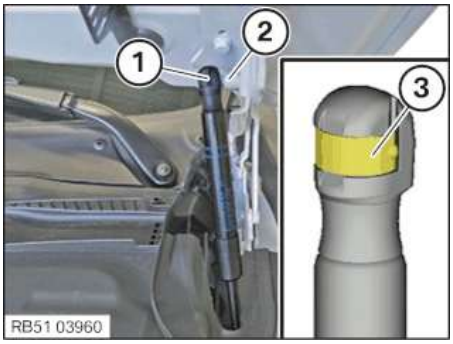
Shutting bonnet or tailgate.

Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.



- Support the bonnet by hand.
- Remove the special tool (3) from the ball pin (2).
- Pull off the special tool (3) from the gas pressure spring (1).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.



- Check the clamp (3) is fitted correctly.
- Connect ball socket (1) to ball pin (2).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.

Additional Information

Overview of Tightening Torques

Special tool 2 365 488 to engine Used in step 4054

M8x60		Tightening torque		19 Nm

cardiagn.com

Camshaft carrier to cylinder head			Used in step 48
M7x35		Tightening torque	13 Nm

Bearing journal to cylinder head			Used in step 50
M16x1.5	Replace bearing journal.	Tightening torque	20 Nm

Standard screw connection M8			Used in step 50
M8		Tightening torque	19 Nm

Chain tensioner piston to cylinder head			Used in step 51
22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

Holder to crankcase			Used in step 51
M8X16		Tightening torque	19 Nm

Camshaft sprocket to camshaft			Used in step 52
M7x17.			17 Nm

Starter motor to engine			Used in step 57
M8X60		Tightening torque	19 Nm

Battery positive lead to starter			Used in step 57
M8		Tightening torque	13,5 Nm

Diesel particulate filter V-clip to exhaust turbocharger			Used in step 59
V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

Bracket to diesel particulate filter top			Used in step 59
M8		Tightening torque	19 Nm

Bracket to transmission for diesel particulate filter holder bottom			Used in step 59
M8X20		Tightening torque	19 Nm

Lower holder to diesel particulate filter			Used in step 59
M8		Tightening torque	19 Nm

Coolant lines for SCR metering module			Used in step 59
M6X16		Tightening torque	8 Nm

Nitrogen oxide sensor before SCR catalytic converter			Used in step 60
Sensor		Tightening torque	50 Nm

Monitoring oxygen sensor			Used in step 61
Sensor		Tightening torque	50 Nm

Rear silencer to body / bumper support			Used in step 62
M8	Replace nuts.	Tightening torque	19 Nm

Exhaust system to rear axle carrier			Used in step 62
M8 nut		Tightening torque	19 Nm

Exhaust system to transmission			Used in step 62
M8		Tightening torque	19 Nm

Exhaust system to diesel particle filter			Used in step 62
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

cardiagn.com

SCR metering module V-clip to exhaust system			Used in step 62
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm

Exhaust-gas temperature sensor upstream of SCR catalytic converter			Used in step 62
Sensor		Tightening torque	30 Nm

Diesel particulate sensor to exhaust system			Used in step 62
Sensor		Tightening torque	50 Nm

Nitrogen oxide sensor downstream of SCR catalytic converter			Used in step 62
Sensor		Tightening torque	55 Nm

Connecting support to tunnel			Used in step 63
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

Diffuser / underbody panelling			Used in step 64
Nuts and screws		Tightening torque	3 Nm

Underbody protection			Used in step 6567
Hexagon screw		Tightening torque	3 Nm

Underbody panelling			Used in step 66
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Underbody protection, steering, to front axle support			Used in step 68
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support			Used in step 68
Hexagon bolt M6		Tightening torque	8 Nm

Underbody protection of the steering gear			Used in step 69
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

Wheel arch trim panel, front			Used in step 69
Thermoplastic hexagon screw		Tightening torque	2,6 Nm

Underbody protection front			Used in step 70
Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Cylinder head cover to cylinder head			Used in step 71
M6		Tightening torque.	8,5 Nm

Heat shield to exhaust manifold			Used in step 72
M6x12			10 Nm

Bracket on cylinder head cover			Used in step 73
		Tightening torque	5 Nm

Battery positive lead to battery positive terminal			Used in step 73
M8		Tightening torque	19 Nm

cardiagn.com

Differential pressure sensor of diesel particulate filter on cylinder head cover			Used in step 74
TS5x20		Tightening torque	4 Nm

Heat shield to exhaust manifold			Used in step 75
M6x12		Tightening torque	10 Nm

Banjo bolt for exhaust pressure pipe to exhaust manifold			Used in step 75
Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm

Exhaust gas pressure pipe to sensor system holder			Used in step 75
TS6x20		Tightening torque	5,7 Nm

Clamping claw facing to cylinder head cover			Used in step 76
M6		Tightening torque	10 Nm

Injector to cylinder head cover			Used in step 76
M8		Tightening torque	8 Nm
		Angle of rotation	120 °

Rail to cylinder head cover			Used in step 77
M8		Tightening torque	19 Nm

High pressure lines between high pressure pump and rail			Used in step 78
High-pressure pipe		Tightening torque	24.5 Nm

High pressure lines between injector and rail			Used in step 79
High-pressure pipe		Tightening torque	24.5 Nm

Intake plenum to cylinder head			Used in step 81
M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum			Used in step 81
		Tightening torque	10 Nm

Electric changeover valve to intake plenum			Used in step 81
TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold			Used in step 82
TS5x20		Tightening torque	3,6 Nm

Standard screw connection 4 Nm			Used in step 82
Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover			Used in step 82
TS5x20		Tightening torque	3,6 Nm

Holder on intake plenum			Used in step 82
TS6X20		Tightening torque	5 Nm

Clean air pipe to exhaust turbocharger			Used in step 84
M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing			Used in step 84
Clamp		Tightening torque	3 Nm

Bulkhead lower part to body			Used in step 88
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

cardiagn.com

Bulkhead upper part to bottom bulkhead			Used in step 89
		Tightening torque	3 Nm

Tension strut on bulkhead			Used in step 89
M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome			Used in step 89
Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm			Used in step 92
Combination hexagon nut		Tightening torque	35 Nm

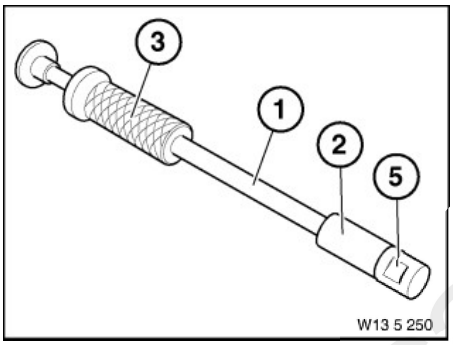
Overview of Special Tools

0 493 339 (13 5 252) Bush



Common	Used in step 21
Usage	(Threaded bush)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 321 (13 5 250) Puller



Common	Used in step 21
Usage	For removing injector nozzles or injectors from cylinder head
Included in the tool or work	
Storage location	A16
Replaced by	
In connection with	
SI-Number	01 06 98 (306)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 338 (13 5 251)		**Rod** (guide rod)	
2	0 493 339 (13 5 252)		**Bush** (Threaded bush)	
3	0 493 340 (13 5 253)		**Weight** (Weight)	
4	0 493 379 (13 5 254)		**Claw** (Clamping claw) For removal of injector nozzles / engine: M57	
5	0 495 579 (13 5 255)		**Adapter** For removing steering shaft on E85. Refer to SI 01 11 06 (265)	

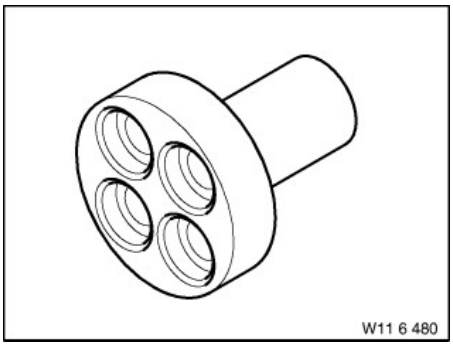
cardiagn.com

0 493 340 (13 5 253) Weight



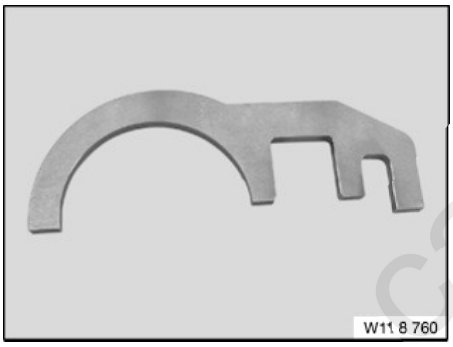
Common	Used in step 21
Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 380 (11 6 480) Connector



Common	Used in step 4054
Usage	For turning over engine at crankshaft hub (vibration absorber).
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	01 11 98 (338)

0 496 112 (11 8 760) Gauge



Common	Used in step 40445455
Usage	For securing camshaft at TDC.
Included in the tool or work	
Storage location	B24
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

2 365 488 Adapter



Common	Used in step 40535456
Usage	For disconnecting the crankshaft at the top dead centre. (longitudinal installation with automatic transmission only).
Included in the tool or work	
Storage location	C56
Replaced by	
In connection with	
SI-Number	01 46 14 (191)

cardiagn.com

2 288 380 Locating stud

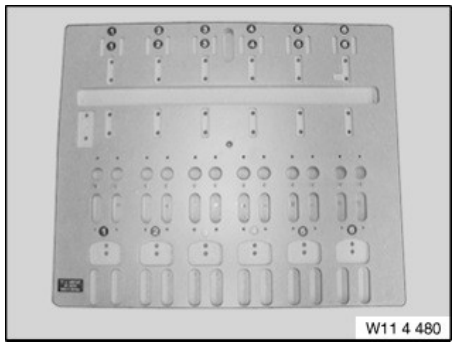


Common Used in step 40535456

Usage	For disconnecting the crankshaft at the top dead centre. Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).
Included in the tool or work	
Storage location	A56
Replaced by	
In connection with	
SI-Number	01 04 14 (071)

cardiagn.com

0 495 105 (11 4 480) oddments tray



Common Used in step 46

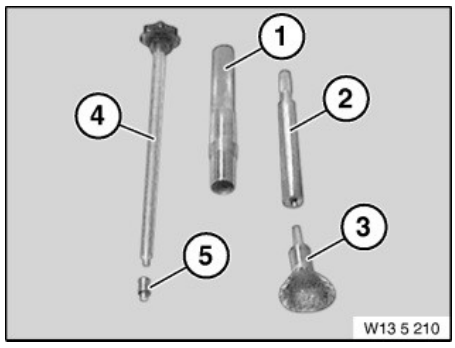
Usage	(Boards (2 pieces)) For setting down the individual components of the cylinder head.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 17 04 (130)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 495 106 (11 4 481)		**oddments tray** (Board, intake side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	
2	0 495 107 (11 4 482)		**oddments tray** (Board, exhaust side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	

cardiagn.com

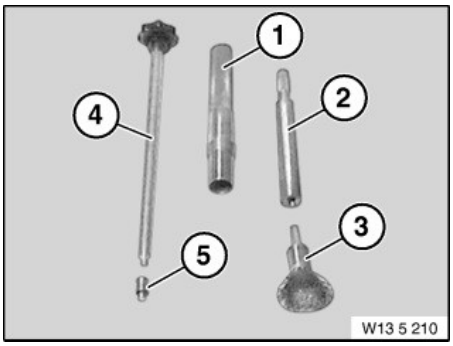
0 493 763 (13 5 215) Plug



Common Used in step 76

Usage	(Seal plug)
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

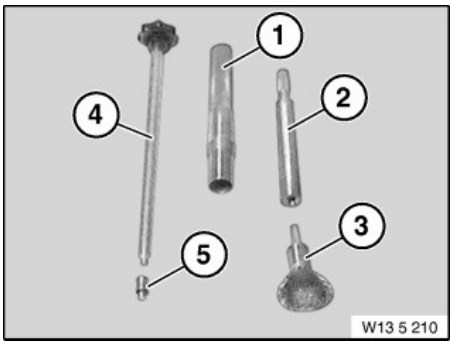
0 493 762 (13 5 214) Rod



Common Used in step 76

Usage	(Mounting rod) For the seal plug
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 758 (13 5 210) Tool



Common Used in step 76

Usage	(Cleaning set) For injector channels
Included in the tool or work	
Storage location	B4
Replaced by	
In connection with	
SI-Number	01 05 00 (574)

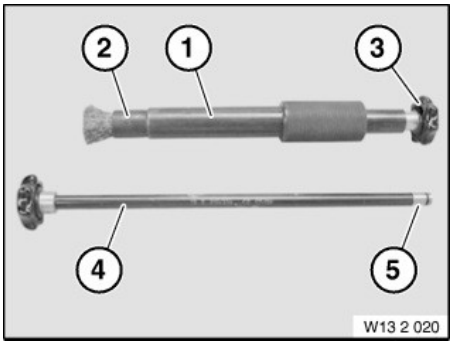
Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 759 (13 5 211)		**Holding sleeve** (Guide sleeve)	
2	0 493 760 (13 5 212)		**Holder** (Brush holder)	
3	0 493 761 (13 5 213)		**Brush head**	
4	0 493 762 (13 5 214)		**Rod** (Mounting rod) For the seal plug	
5	0 493 763 (13 5 215)		**Plug** (Seal plug)	

0 496 150 (13 2 020) Tool

Used in step 76

cardiagn.com



Common

Usage	(Cleaning kit) For cleaning the injector shaft.
Included in the tool or work	
Storage location	A87
Replaced by	
In connection with	
SI-Number	01 07 07 (355)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 496 151 (13 2 021)		**Holding sleeve** (Guide sleeve) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
2	0 496 152 (13 2 022)		**Holder** (Brush holder) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
3	0 496 153 (13 2 023)		**Brush head** Remaining inventories will be sold off, followed by discontinuation and then available as part of complete special tool 13 2 020 = 83 30 0 496 150 only	
4	0 496 154 (13 2 024)		**Rod** (Mounting rod) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
5	0 496 155 (13 2 025)		**Plug** (Seal plug) Available as part of complete special tool 13 2 020 = 83 30 0 496 150 only.	

Overview Technical Data

Distance from window pane edge to wiper blade — Used in step 92

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

Links

General repair instructions	Used in step
11 00 ... Overview of consumables (Electronic Parts Catalogue)	76

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting battery earth lead	295

cardiagn.com

61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	295
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	295
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	295
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	295
61 20 900 Disconnecting and connecting battery earth lead	295
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	295
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	295
61 20 900 Disconnecting and connecting battery earth lead

11 33 062 Replacing all hydraulic valve clearance compensating elements

PRELIMINARY WORK

1 – Bring front compartment lid in the service position

Prerequisite

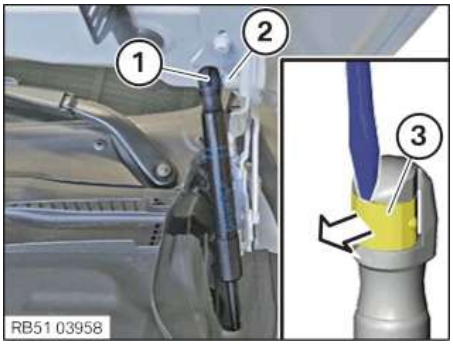
Engine compartment lid is open.

CAUTION

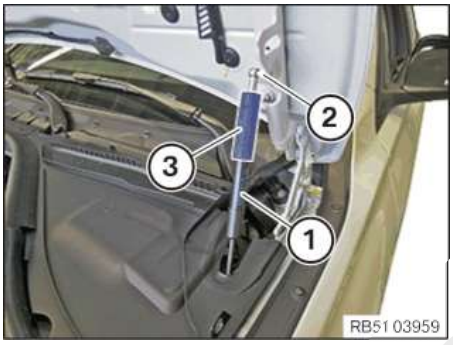
Shutting bonnet or tailgate.

Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.



- Lift clamp (3) slightly using a screwdriver, in the direction of the arrow.
- Lift off ball socket (1) from ball pin (2).
- Repeat the operation on the other side of vehicle.

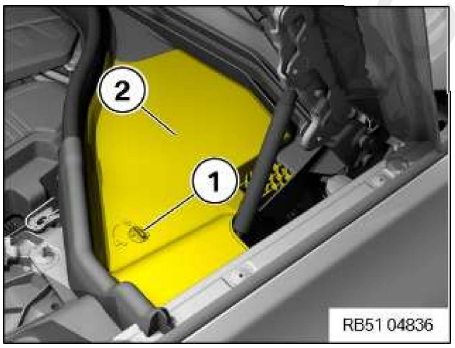


TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

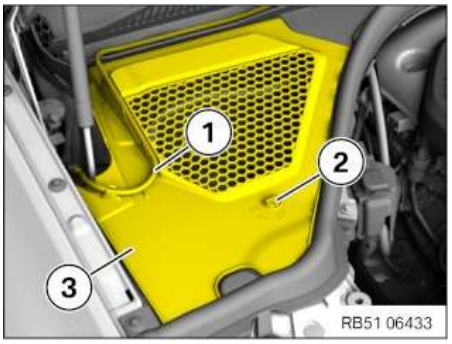
- Remove the bonnet support and open the bonnet further.
- Pull special tool or or (3) over gas pressure spring (1).
- Place special tool on the ball pin (2) and engage using force.
- Repeat the operation on the other side of vehicle.

2 – Remove the cover of the engine compartment at the rear left



- Loosen the lock (1).
- Remove the cover (2) of the rear left engine compartment.

3 – Remove the cover of the rear right engine compartment



- Release washer fluid hose (1) from the guides.
- Loosen the lock (2).
- Remove the cover (3) of the rear right engine compartment.

4 – Deactivating the 48 V electrical system

Prerequisite

Ignition is switched off.

WARNING

Deactivation of the 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Make sure that **no battery charger** is connected to the jump start terminal point in the engine compartment.
- For vehicles with additional electrical systems (48 V electrical system, high-voltage vehicle electrical system), it is mandatory to deactivate them **before** disconnecting the vehicle battery.

WARNING

Deactivation of the 48 V electrical system.

Risk of short circuits! Risk of fire!

- Make sure that **no charger** is connected to the jump start support point in the engine compartment.

RISK OF DAMAGE

Damage to 48-V battery

If a 48-V battery that is disconnected from the electrical system is activated, the battery electronics will be damaged.

- Only carry out activation of the 48V electrical system with a completely connected 48-V battery.

TECHNICAL INFORMATION

Follow notes for 48-V battery. See further information 6120 ... Notes on 48-V battery.



- Deactivate the 48V electrical system by opening the bonnet.

  The deactivation takes place automatically.

Check

cardiagn.com



TECHNICAL INFORMATION

Zero voltage (48V electrical system is switched off) is displayed only in PAD mode.

- Press the START-STOP button quickly 3 times without stepping on the brake pedal to establish the PAD mode.
- Check isolation from the supply in the instrument cluster in PAD mode.

desired state

- The Check Control message "48V electrical system switched off." (1) is displayed.

Result

» **The absence of voltage** cannot be determined by means of the Check Control message "48V electrical system switched off:" (1). Work is not permitted to be started.

Measure

- Carry out the service function "48 V electrical system deactivation".
  - Vehicle management > Service functions > Voltage supply > Deactivate 48 V electrical system

Only when the Check Control message “48 V electrical system switched off.” (1) is displayed in the instrument cluster is it permitted to disconnect the 12 V battery.

If the absence of voltage is not indicated clearly, contact Technical Support.

Result

» The Check Control message signals that the 48V electrical system has been switched off.

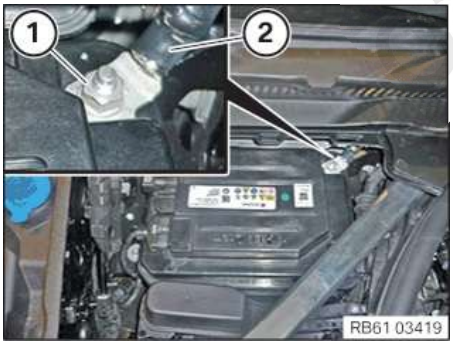
Measure

- Exit PAD mode by pressing the START-STOP button once without depressing the brake pedal.

The work “Disconnecting the negative battery cable of the 48-V battery” can be started.



- Unlock and disconnect plug connection (1) of the CAN bus.
- Release the clip (2).



- Loosen nut (1).
- Pull off negative battery cable (2) of the 48-V battery from the negative battery terminal, set it aside and secure it.



WARNING

Unprotected battery terminals.

Risk of short circuits! Risk of fire!

- Cover the vehicle battery.

- Cover the vehicle battery with the special tool as shown.
- Position the battery earth lead (1) as shown.

5 – Disconnecting all battery earth leads

ardiagn.com



- See additional information.

6 – Removing the wiper arm on the left and right

NOTICE

Description is for left component only. Procedure on the right side is identical.

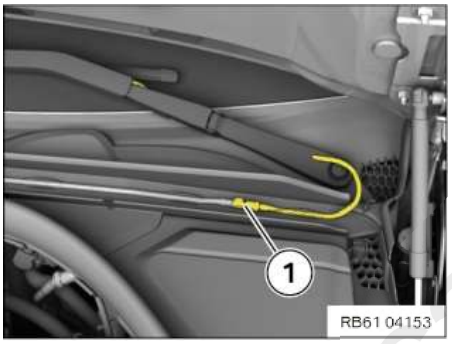
▶ **Remove the wiper arm**

RISK OF DAMAGE

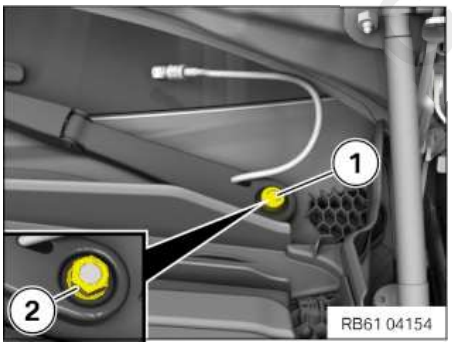
Damage to wiper console.

While removing the wiper arms without using special tool, the wiper console can break.

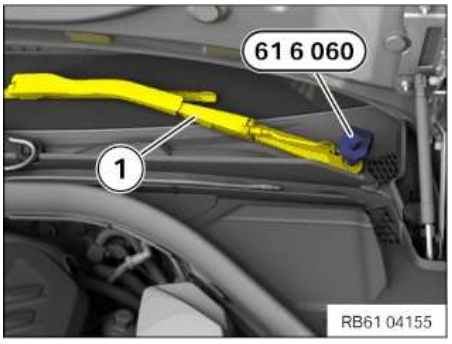
- Removing the wiper arms must be carried out only using the prescribed special tool.
- Do **not** lever off the wiper arm because otherwise the wiper console may break at the predetermined breaking point for active pedestrian protection.



- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.



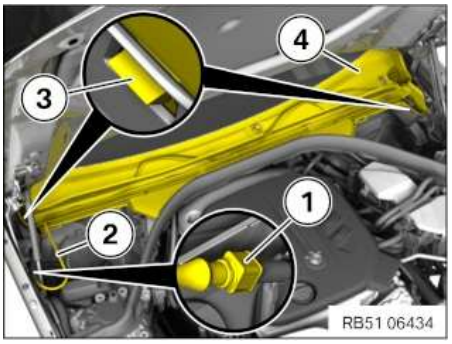
- Remove the protective cap (1).
- Loosen nut (2).



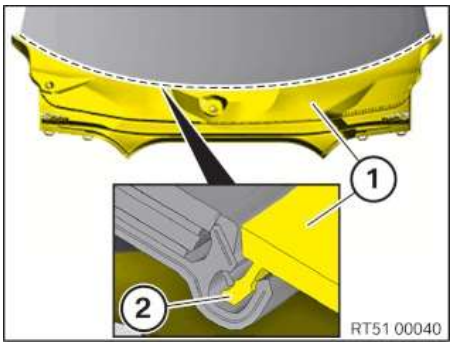
- Pull off the wiper arm (1) using special tool .

7 – Remove cowl panel cover

cardiagn.com



- Release snap fastener (1) of the washer fluid hose (2) and put the washer fluid hose (2) to one side.
- Unclip clips (3) on the cowl panel cover (4).



- Pull the cowl panel cover (1) upward out of the latch mechanism (2) beginning on the side.

8 – Remove the seal for the rear bonnet

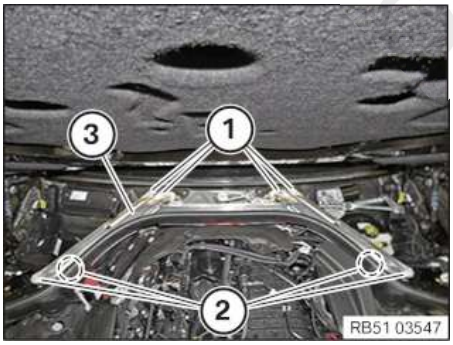


- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

9 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

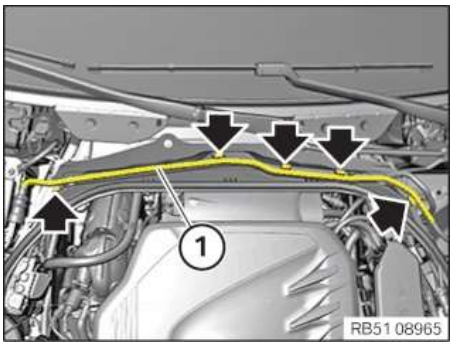
Driving without the strut brace/front-end strut or tension strut is not permitted.



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

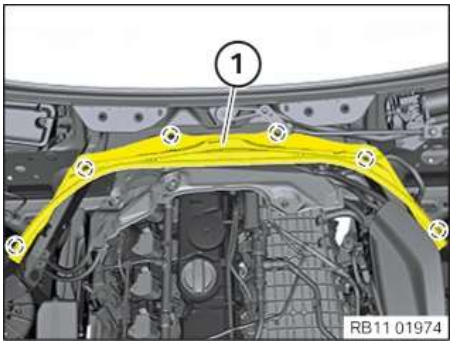
- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.



- **Version with mild hybrid technology:**

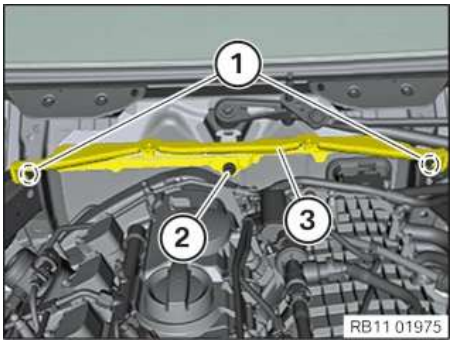
  Unclip the wire (1) at the holders (arrows).

carsdiagn.com



- Unscrew the bolts in the marked areas.
- Remove the centre bulkhead upper part (1).

10 – Removing the centre bulkhead lower section



- Loosen screws (1).
- Loosen nut (2).
- Remove the centre bulkhead lower part (3).

11 – Removing the acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

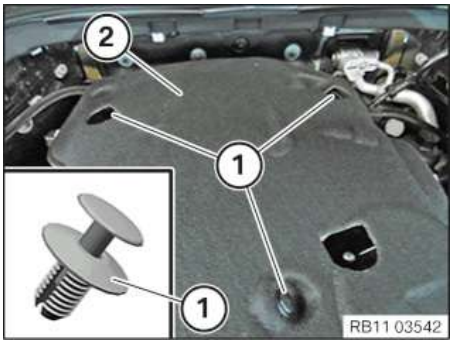
Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



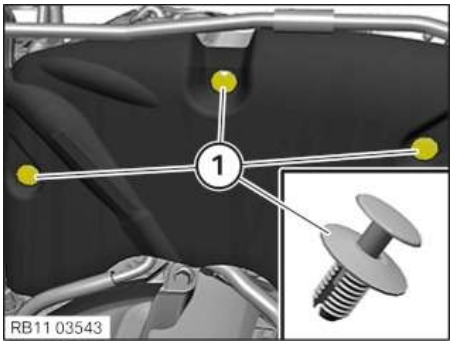
- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

12 – Remove the acoustic cover for the injectors

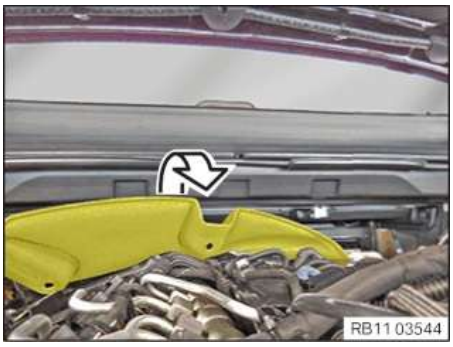


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

13 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).



- Guide out and remove the acoustic cover in the direction of the arrow.

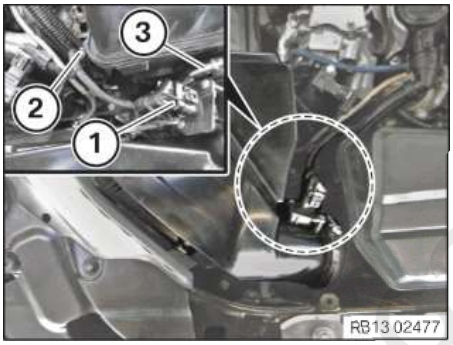
14 – Removing the clean air pipe with the resonator

WARNING

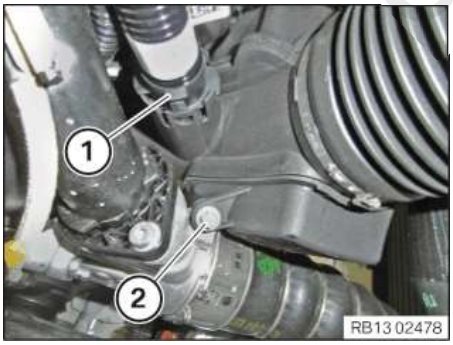
Hot surfaces.

Risk of burning!

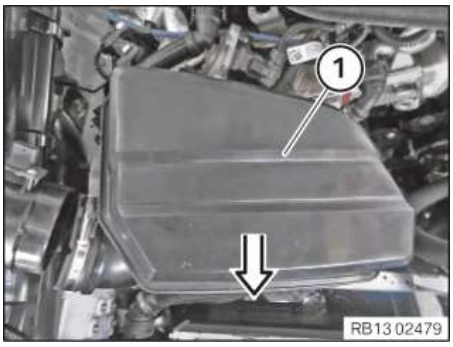
- Perform all work only on components that have cooled down.



- Unlock plug connection (1) and disconnect.
- Loosen clamp (2).
- Unfasten clamp (3).
- Separate the clean air pipe with resonator from the intake filter housing.



- Unlock engine ventilation line (1), disconnect it and place it aside.
- Loosen screw (2).



- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Unlock and loosen clamp (1).



- Feed out and remove clean air pipe with resonator (1) in the direction of the arrow.

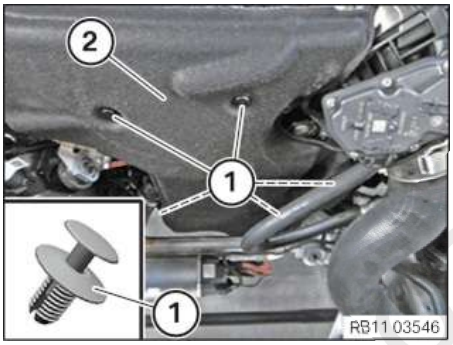
15 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

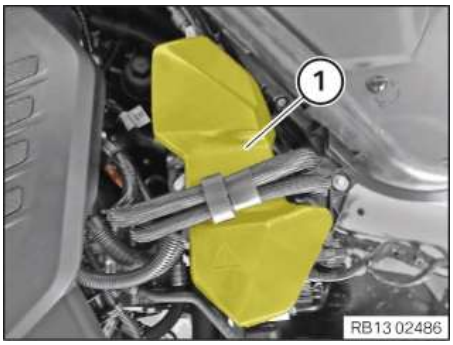
Risk of burning!

- Perform all work only on components that have cooled down.



- Release and remove expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

16 – Remove the cover for the DDE control unit



- Pull off, guide out and remove cover (1) upwards.

17 – Partially releasing the wiring harness section on the intake plenum

cardiagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

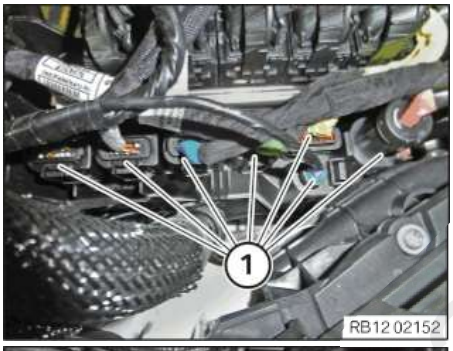
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

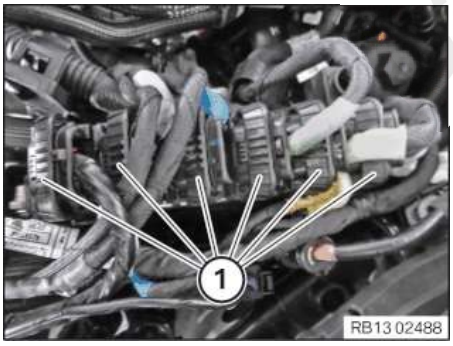
- Do not pull on the wires when disconnecting connectors and plug connections.

TECHNICAL INFORMATION

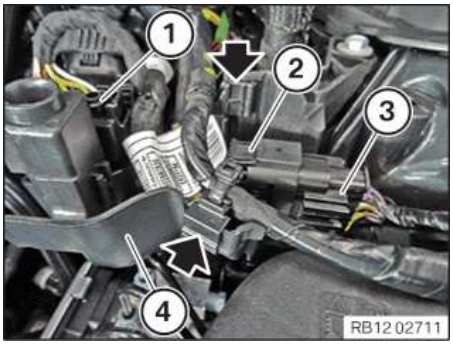
Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.



- Unlock and disconnect plug connections (1).

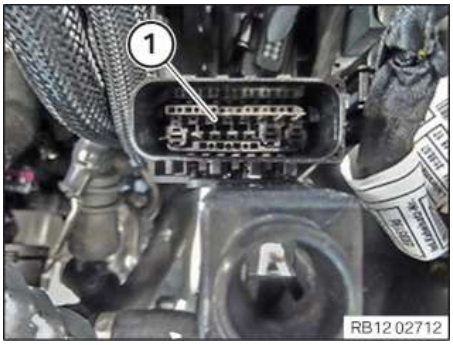


- Unlock and disconnect plug connections (1).

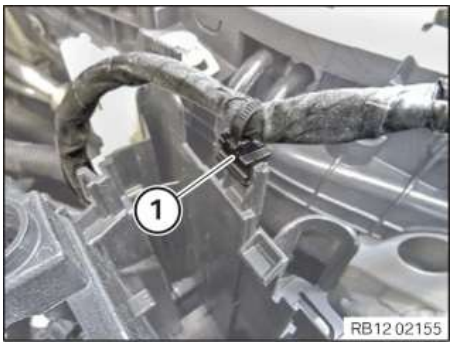


- Unlock plug connection (1) and disconnect.
- Unlock plug connection (2) and disconnect.
- Release the connector (3) and disconnect from the control unit holder (4).
- Release the clamps (arrows).

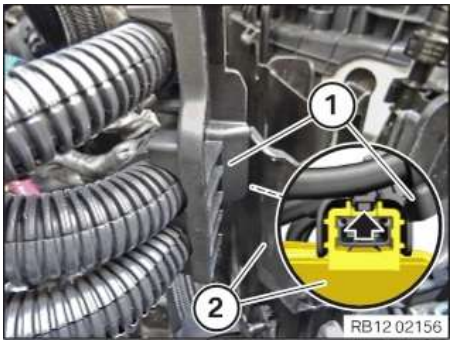
cardiagn.com



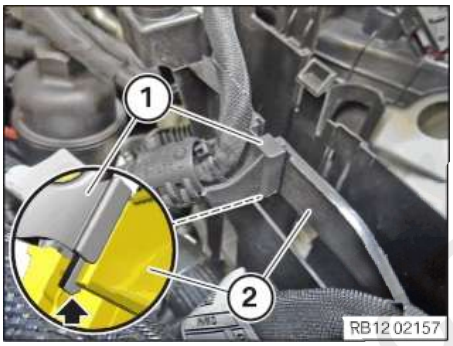
- Unlock plug connection (1) and disconnect.



- Loosen clamp (1).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).

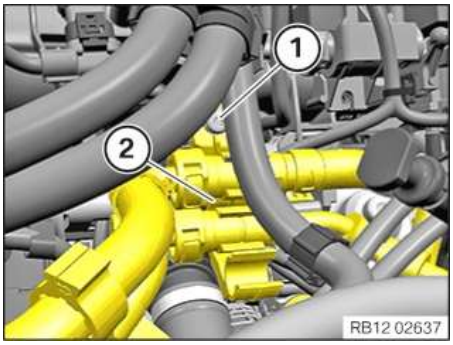


- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.

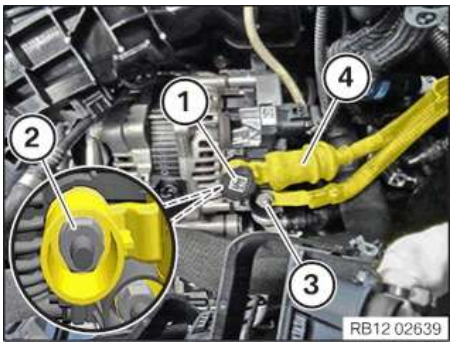


- Unlock holder (1) and feed out coolant line (2) and place it aside.

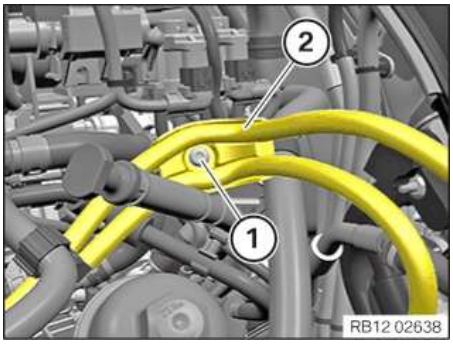
cardiagn.com



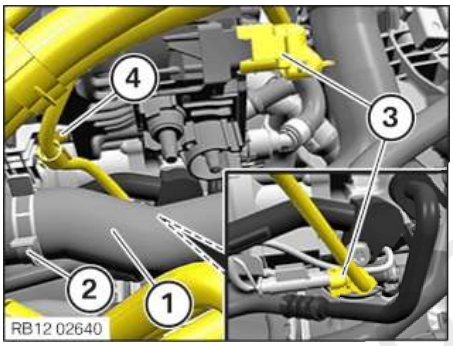
- Release the screw (1).
- Guide out fuel lines (2) and set them aside.



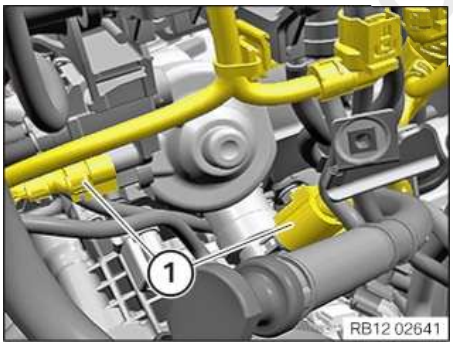
- Guide out and remove the lid (1).
- Release the nuts (2) and (3).
- Feed out positive battery cables (4) and place to one side.



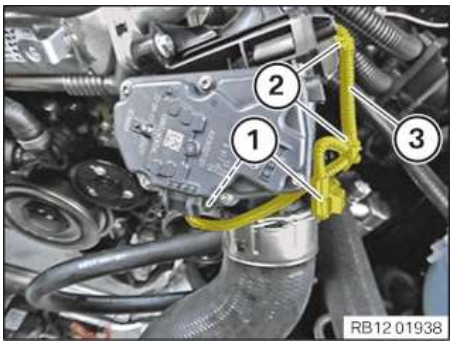
- Release the screw (1).
- Guide out the positive battery cables (2) and set them aside.



- Release the coolant line (1) from the holder (2) .
- Unlock plug connections (3) and disconnect.
- Loosen clamp (4).



- Unlock and disconnect plug connections (1).



- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.

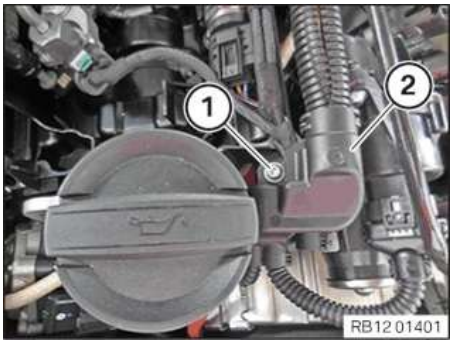
cardiagn.com



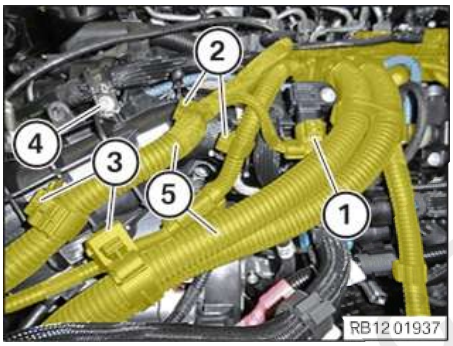
- Unlock and loosen connector (1).



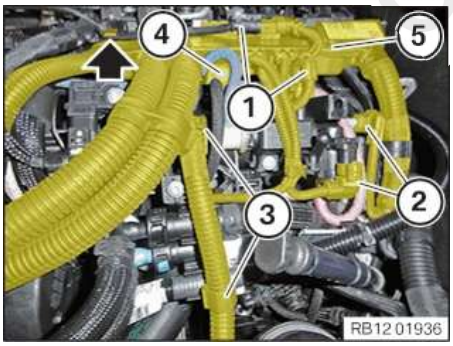
- Unlock plug connection (1) and disconnect.



- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.



- Unlock plug connection (1) and disconnect.
- Loosen clamps (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.



- Unlock and disconnect plug connections (1).
- Release line from clamp (Arrow).
- Unlock and disconnect plug connections (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.

18 – Removing the intake plenum

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

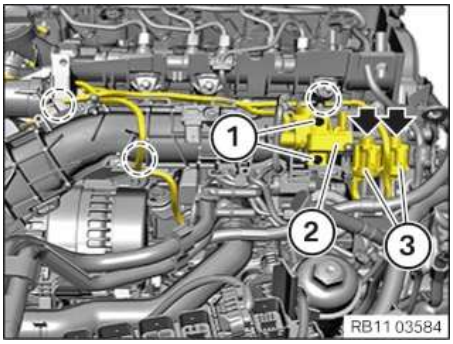
cardiagn.com



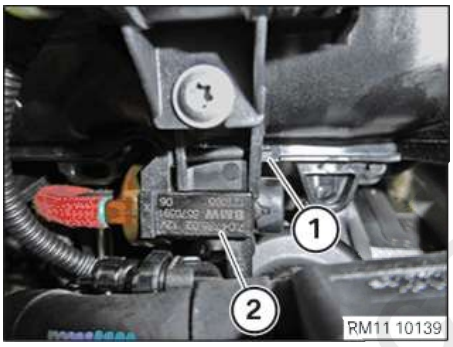
- Unlock clamp (1) and engage in this position.



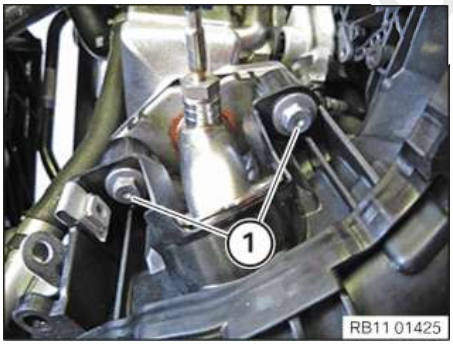
- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.



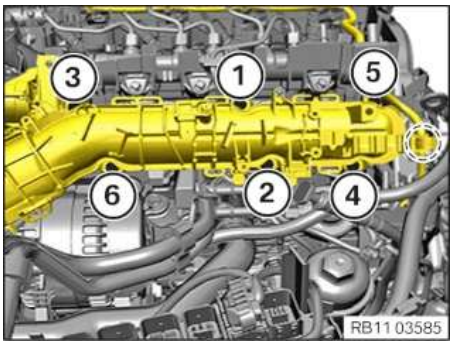
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.

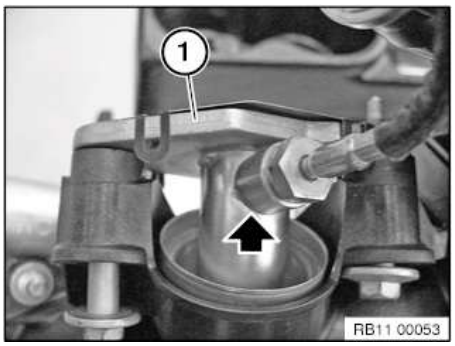


- Loosen screws (1).



- Detach the leakage oil lines in the marked area from the intake plenum.
- Loosen screws in the order (6) to (1).
- Guide the intake plenum out forwards and remove it.

cardiagn.com



- Remove the exhaust-gas recirculation pipe (1) (arrow).

19 – Detaching the leakage oil line from the injectors

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

WARNING

Hot surfaces.

Risk of burning!

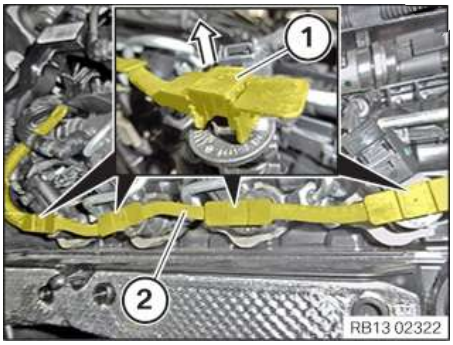
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

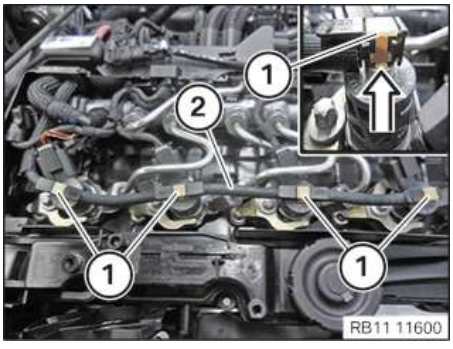


- **Version A:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.



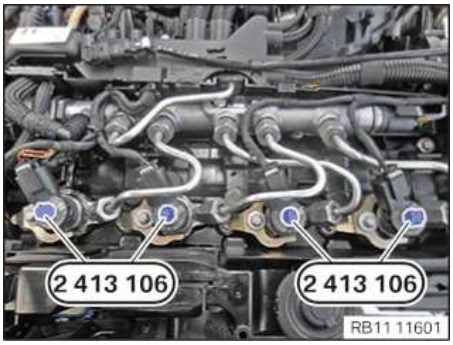
- **Version B:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.

cardiagn.com



- Seal open connections with special tools .

20 – Remove the high pressure lines between the injector and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

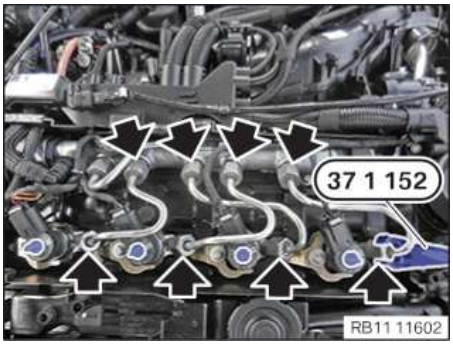
TECHNICAL INFORMATION

If several high pressure lines are removed, ensure that each high pressure line is installed in its original location. Label high pressure lines.

cardiagn.com

TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.



- Release the high pressure lines (arrows) with the special tool .
  Reset the special tool early on to prevent bending of the high pressure line.
- Catch and dispose of escaping fuel.
- Feed out and remove the high pressure lines (arrows).
- Seal off all the open cable connections with the special tool .

21 – Remove the high pressure line between the high pressure pump and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Hot fluids.

Risk of scalding!

- Conduct all work in the vehicle wearing appropriate personal protective equipment only.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

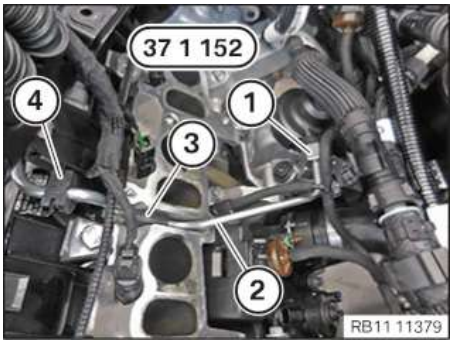
cardiagn.com

TECHNICAL INFORMATION

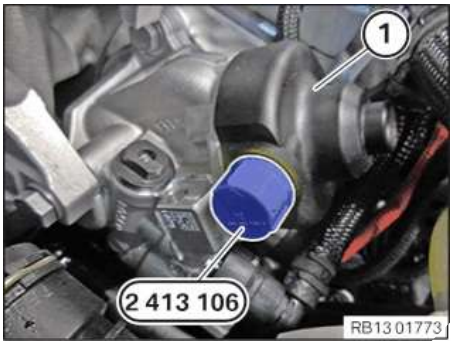
Reset special tool in early to avoid bending pressure lines.



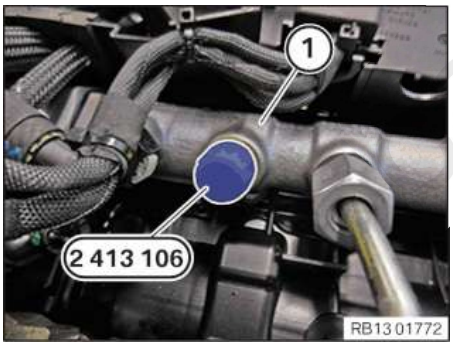
- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.



- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.
- Guide out and remove the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).



- Seal off the opening at the high pressure pump (1) with the special tool .



- Seal off the opening on the rail (1) with the special tool .

22 – Remove high-pressure rail

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

cardiagn.com

RISK OF DAMAGE

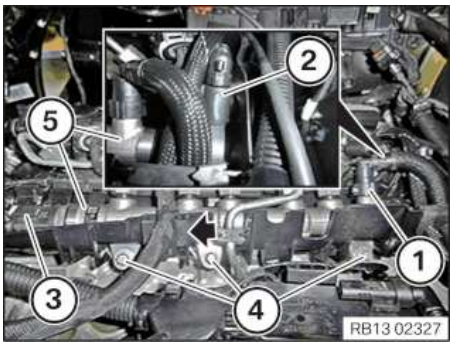
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Unlock and disconnect the fuel return line (1).
- Guide the fuel return line (1) out and set it aside.
- Unlock and disconnect the plug connection (2) on the rail pressure regulating valve.
- Unlock and disconnect the plug connection (3) on the rail pressure sensor.
- Unlock cable clip (Arrow), feed out and place aside.
- Loosen screws (4).
- Thread out and remove the rail (5).

23 – Remove all injection systems

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

cardiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

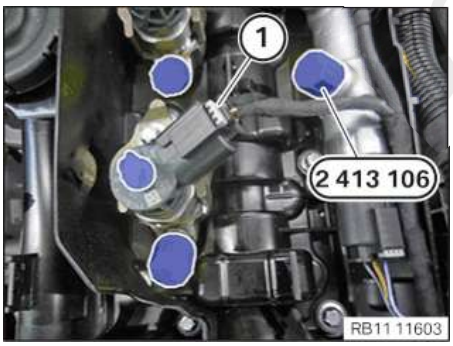
Electrostatic discharge.

Damage to or destruction of electrical components.

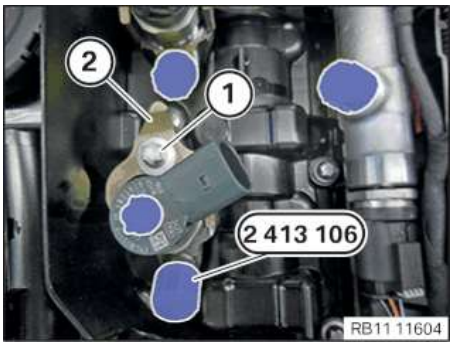
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

TECHNICAL INFORMATION

If several injectors are removed, ensure that each injector is installed at its original location (cylinder). Mark injectors.



- Unlock plug connection (1) and disconnect.



- Loosen screw (1).
- Guide out and remove clamping claw (2).
- Feed out and remove the injector with slight rotational movements.

▸ **Loosen stuck injectors**

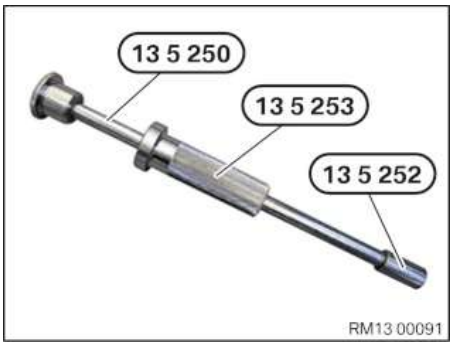
carsdiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

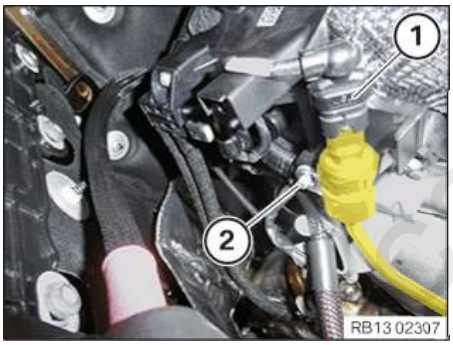


- Unscrew special tool 0 493 339 (13 5 252) from special tool 0 493 321 (13 5 250) and remove special tool 0 493 340 (13 5 253).
- Screw special tool 0 493 339 (13 5 252) back onto special tool 0 493 321 (13 5 250).

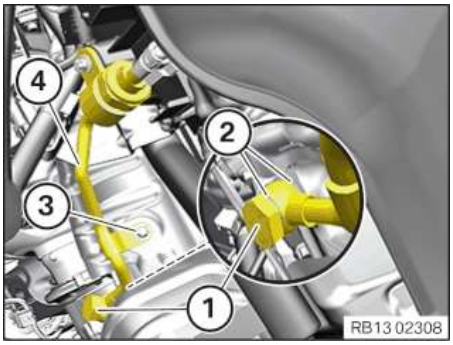


- Screw special tool 0 493 321 (13 5 250) with special tool 0 493 339 (13 5 252) onto pressure line connection (1) of injector.
- Release injector (1) with special tools 0 493 321 (13 5 250) and 0 493 339 (13 5 252) by means of **short** back and forth movements and remove.

24 – Remove the exhaust gas pressure pipe



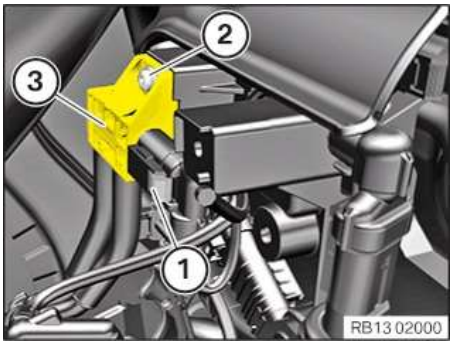
- Unlock plug connection (1) and disconnect.
- Loosen screw (2).



- Unscrew the banjo bolt (1).
- Feed out and remove the sealing rings (2).
- Loosen screw (3).
- Feed out and remove the exhaust gas pressure pipe (4).

25 – Releasing the differential pressure sensor for the diesel particulate filter

cardiagn.com



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).
- Remove the differential pressure sensor (3) and put it to one side.

26 – Removing the sensor bracket on the cylinder head cover

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

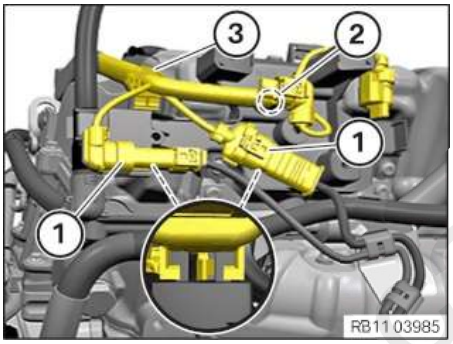
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

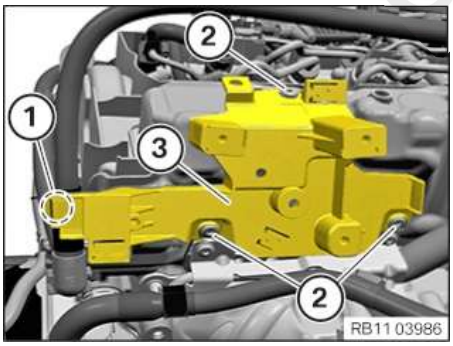
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Unlock plug connection (1) and disconnect.
- Unlock the plug connection (1) and release it from the sensor bracket.
- Release the cable clip in the area (2) from the sensor bracket.
- Release the clamps (3) and set the wiring harness section aside.

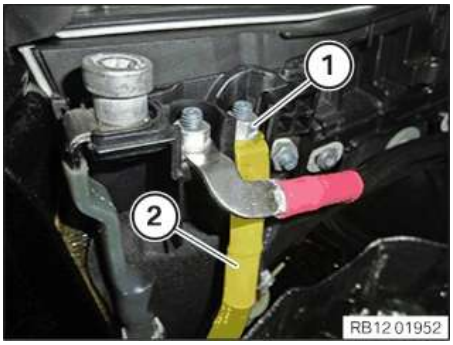


- Release the positive battery cable in the area (1) from the clamp and set it aside.
- Loosen screws (2).
- Feed out holder (3) for the sensor system and remove.

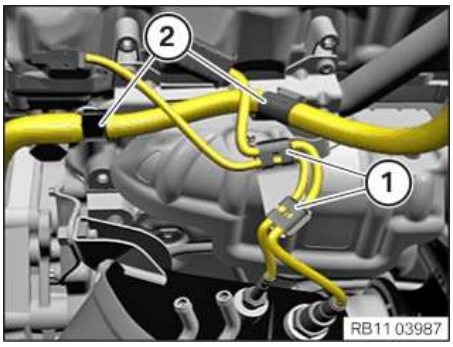


- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.

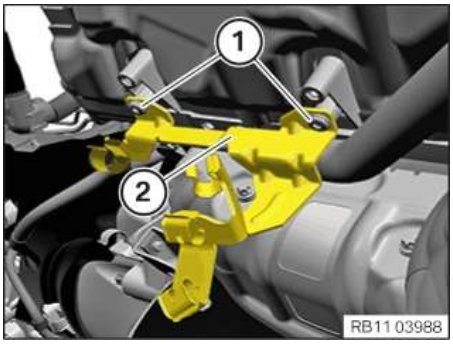
cardiagn.com



- Loosen nut (1).
- Feed out positive battery cable (2) and put to one side.

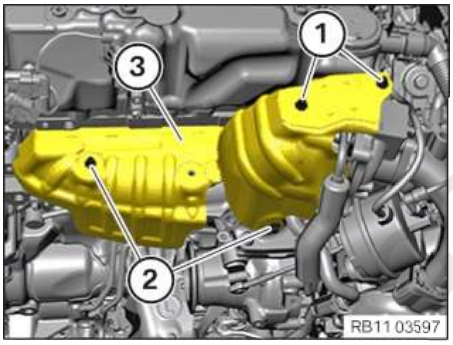


- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



- Loosen screws (1).
- Guide out and remove holder (2).

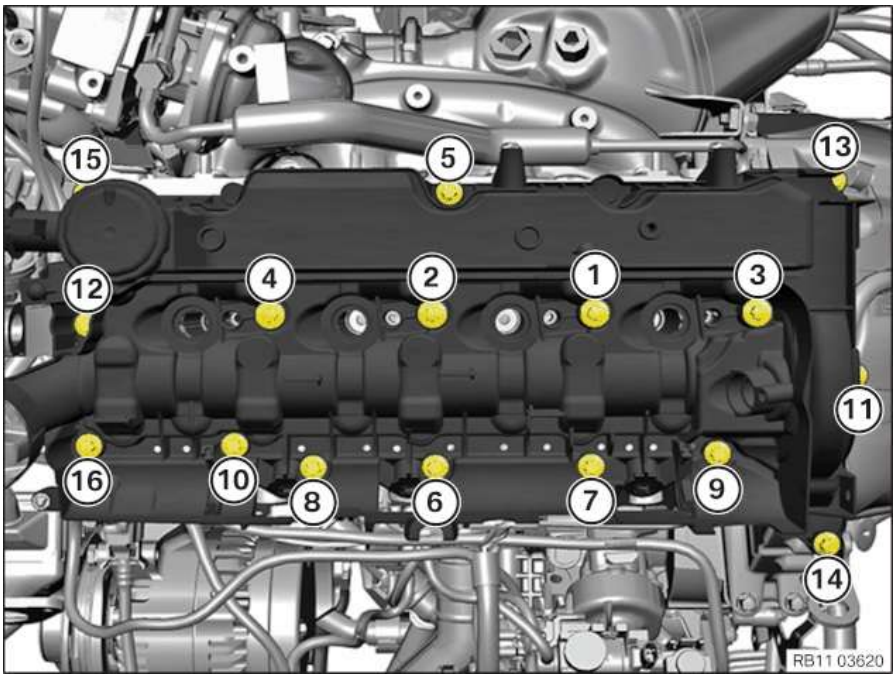
27 – Removing heat shield



- Loosen screws (1).
- Loosen screws (2).
- Feed out and remove the heat shield (3).

28 – Removing the cylinder head cover

Screw connection of the cylinder head cover



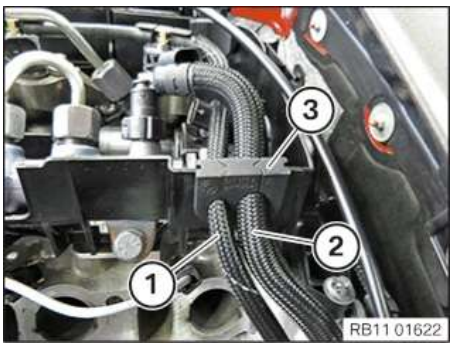
1 - 16 Bolts of the cylinder head cover



- Unlock and detach the locks.
- Feed the engine ventilation line (1) out and set it aside.

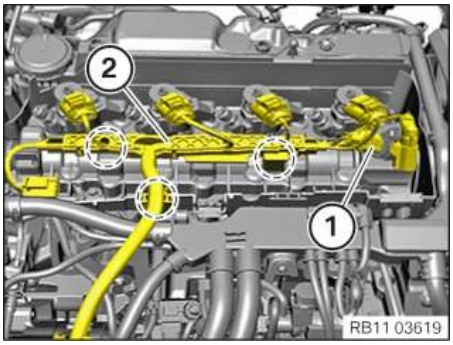


- Feed out and remove the heat shield (1).

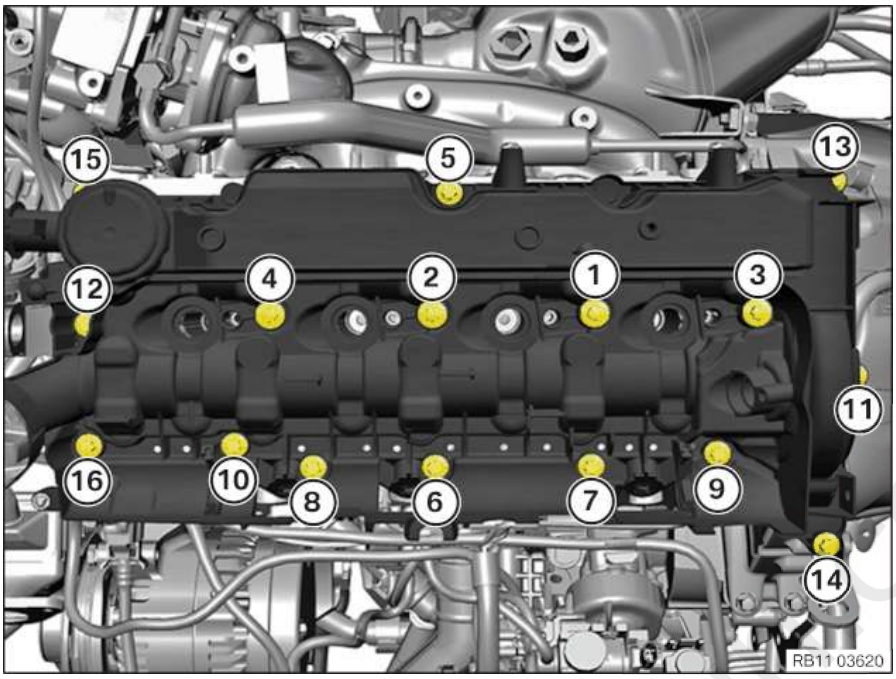


- Remove the leakage oil line (1) including the fuel return line (2) and the grommet (3) and put to one side.

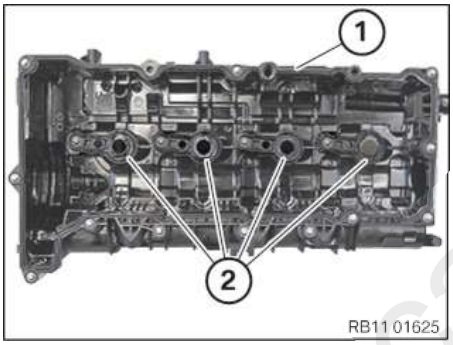
cardiagn.com



- Unlock connector (1) and pull off.
- Disconnect the wiring harness (2) in the marked areas from the cylinder head cover and set aside.

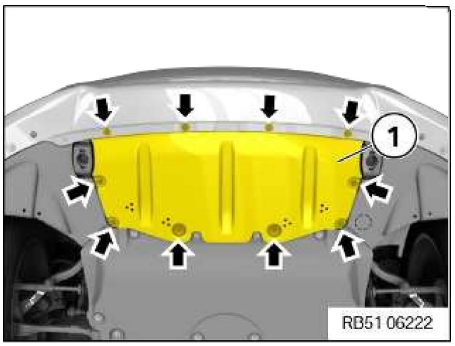


- Evenly loosen the screws in a sequence from (16) to (1).
- Feed out and remove the cylinder head cover.



- Remove the profile seals (1) and (2).

29 – Removing the front underbody protection

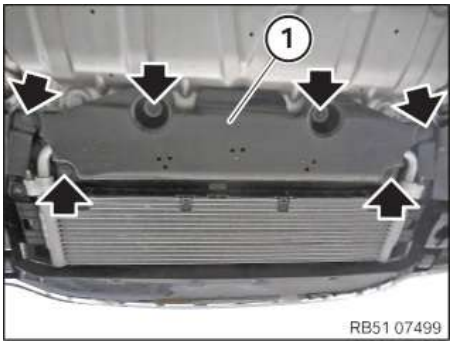


- **Version A:**

  Remove screws (arrows).

  Feed front underbody protection (1) backwards out of the bumper panel.

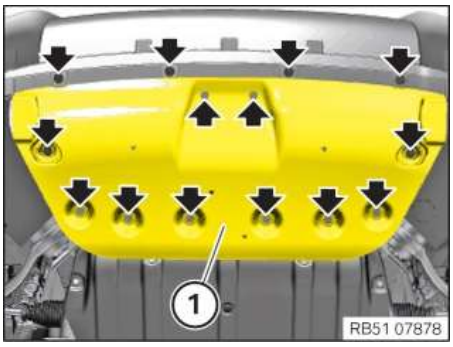
cardiag.com



- **Version B:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

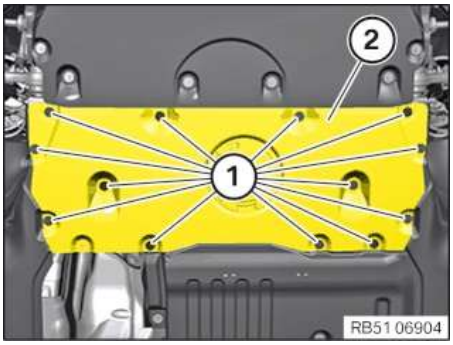


- **Version C:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

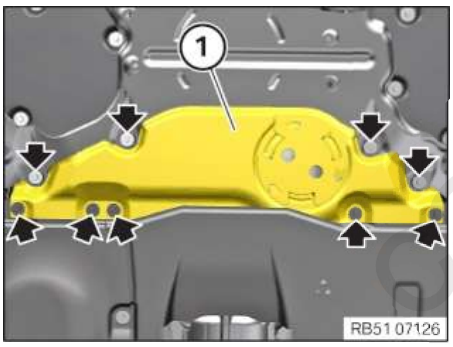
30 – Removing the centre underbody protection



- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .

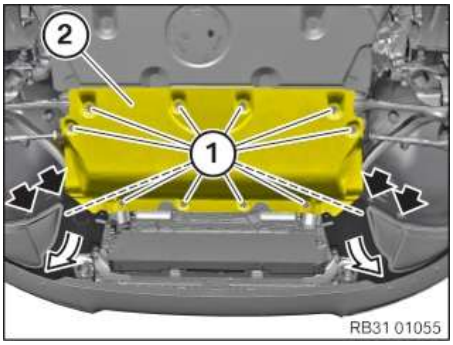


- **Version with all-wheel drive:**

  Remove screws (arrows).

  Feed out and remove the centre underbody protection (1).

31 – Remove the underbody protection of the steering gear



- **Version A:**

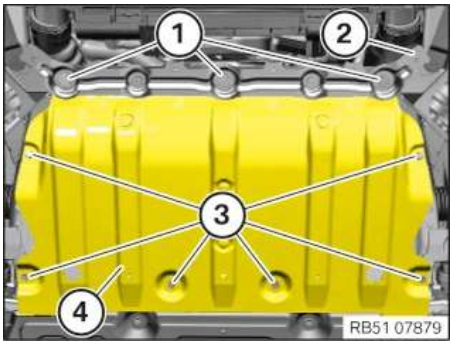
  Unscrew the screws (arrows) of the wheel arch cover on the wheel arch cover.

  Fold the bottom wheel arch cover to the side.

  Loosen screws (1).

  Remove the underbody protection (2) of the steering gear.

carsign.com



- **Version B:**

  Loosen screws (1).

  Remove the holder (2) for the underride protection.

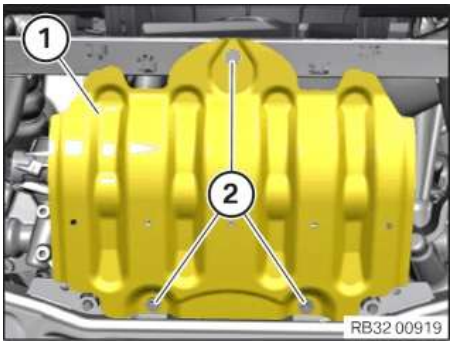
  Loosen screws (3).

  Feed out and remove the underbody protection (4) of the steering gear.

32 – If installed: Removing the steering underbody protection

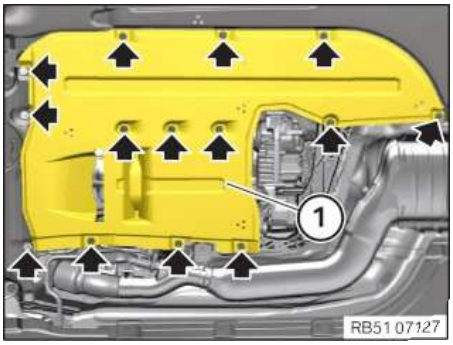
Prerequisite

Front underbody protection has been removed.



- Loosen screws (2).
- Remove underbody protection (1).

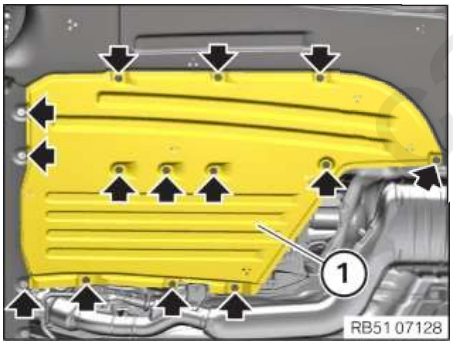
33 – Remove rear underbody protection



- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).



- **Version B:**

  Remove screws (arrows).

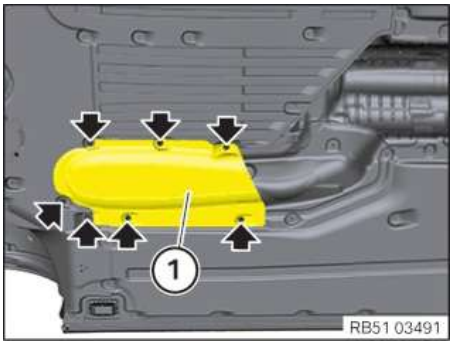
  Guide out rear underbody protection (1) and remove it.

34 – Remove the underbody panelling of the transmission on the side

NOTICE

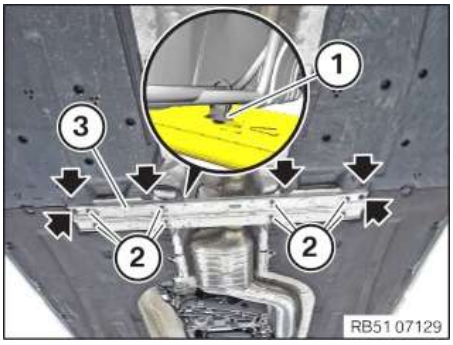
The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

cardiagn.com



- Remove screws (arrows).
- Remove the underbody panelling (1).

35 – Remove the connecting support from the tunnel



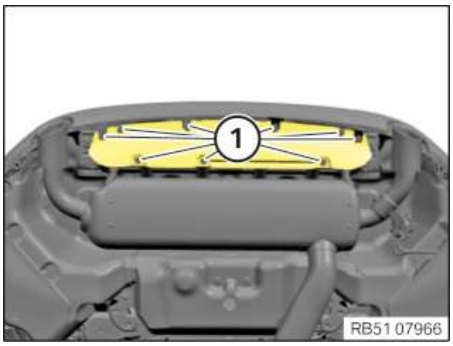
- Remove screws (arrows).

NOTICE

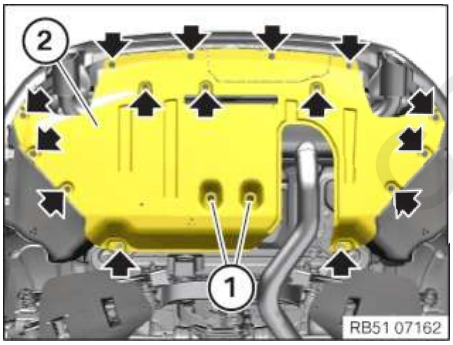
The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Loosen clamp (1).
- Loosen screws (2).
- Guide out and remove connecting support (3) on the tunnel.

36 – Removing the rear diffuser



- **Version 1:**
- Release the screws and nuts (1).
- Remove the diffuser.



- **Version 2:**
- Loosen nuts (1).
- Remove screws (arrows).
- Guide out and remove rear diffuser (2).

37 – Remove exhaust system

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

cardiagn.com

CAUTION

Component with heavy weight.

Danger of injury!

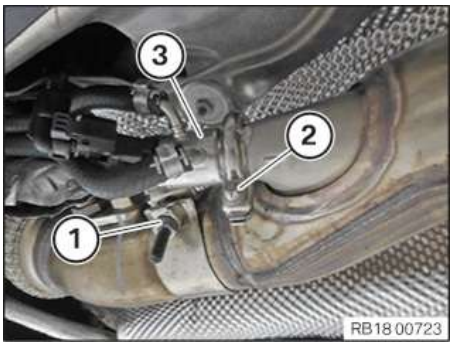
- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

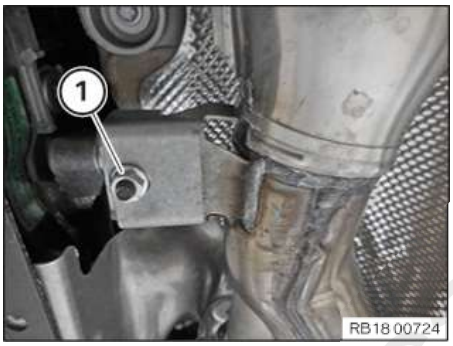
Heavy component.

Heavy components can lead to injury or damage.

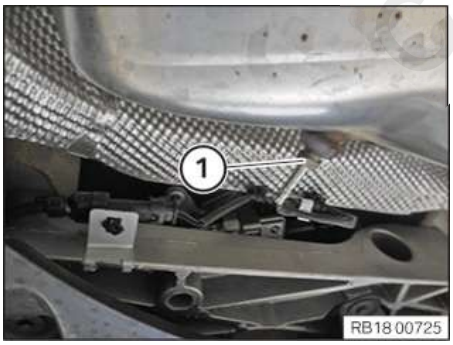
- Remove and install heavy components with the aid of another person/other persons.



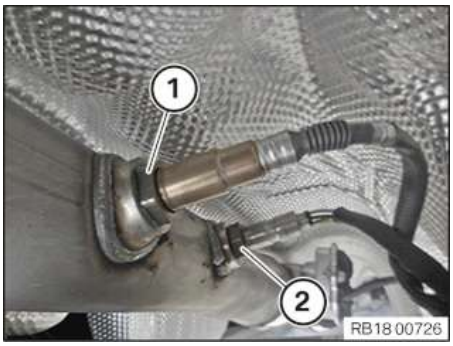
- Unfasten clamp (1).
- Detach the clamp (2) of the SCR metering module (3).
- Detach the SCR metering module (3)from the exhaust system and place to one side.



- Loosen nut (1).

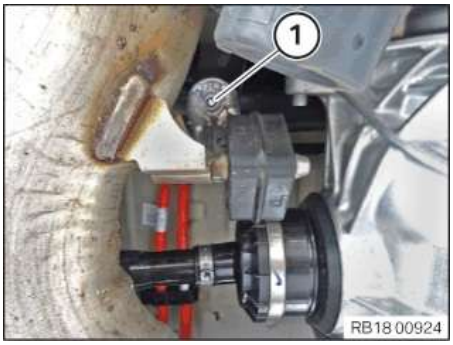


- Detach the exhaust temperature sensor (1) from the exhaust system.

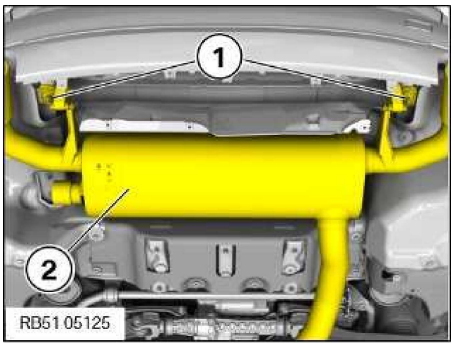


- Release the diesel particulate sensor (1) from the exhaust system and place to one side.
- Release the nitrogen oxide sensor (2) from the exhaust system and place to one side.

cardiagn.com



- Release the nut (1) on the rear axle support.



- Loosen nuts (1).
- Lower and remove the exhaust system (2) with the assistance of a second person.

38 – Removing the monitoring oxygen sensor after the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

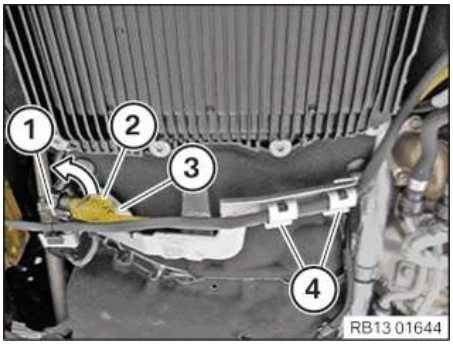
RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
- The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

cardiagn.com



- Unlock and loosen connector (1).
- Loosen connector (2) from the holder (3) in direction of arrow.
- Release the monitoring oxygen sensor from the clamps (4).



- Release the monitoring oxygen sensor (1) with the standard tools.



- Thread out the monitoring oxygen sensor (1) and remove it.

39 – Removing the nitrogen oxide sensor before SCR catalytic converter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

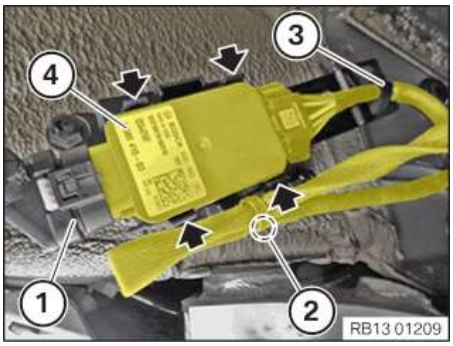
cardiagn.com

RISK OF DAMAGE

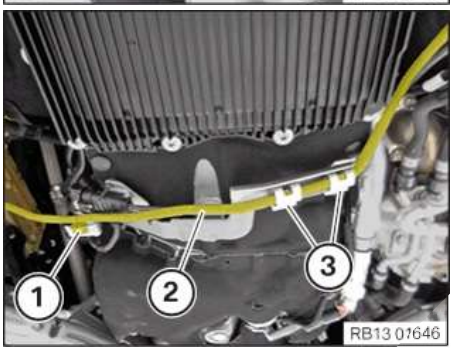
Damage to the nitrogen oxide sensor.

Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

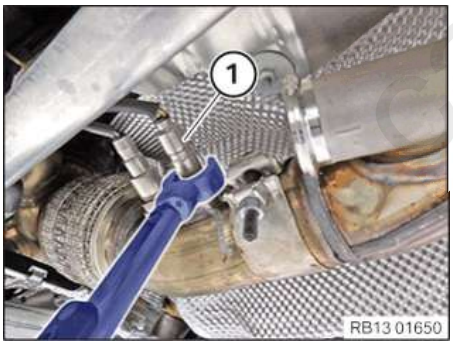
- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



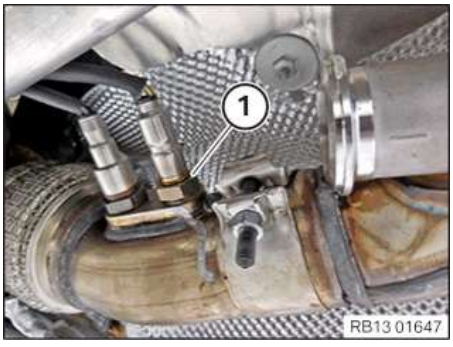
- Unlock plug connection (1) and disconnect.
- Release cable clip in area (2).
- Release line from the holder (3).
- Unclip control unit (4).



- Loosen clamp (1).
- Loosen the cables (2) from the clamps (3).



- Loosen the nitrogen oxide sensor (1) using commercially available tools.



- Feed out and remove the nitrogen oxide sensor (1).

cardiagn.com

WARNING

Hot surfaces.

Risk of burning!

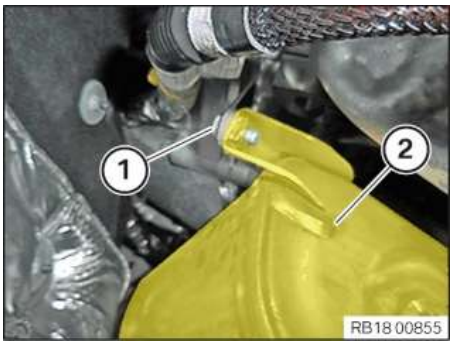
- Perform all work only on components that have cooled down.

CAUTION

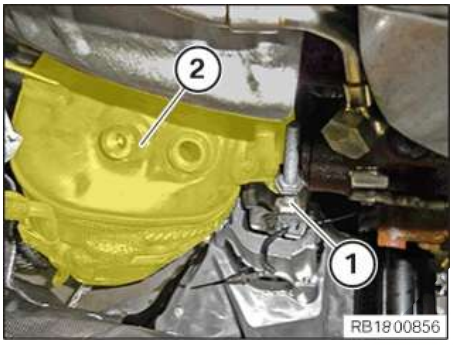
Heavy component.

Heavy components can lead to injury or damage.

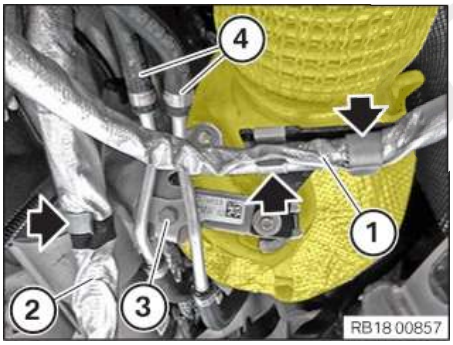
- Remove and install heavy components with the aid of another person/other persons.



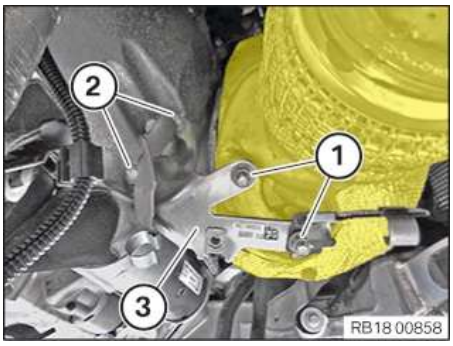
- Release bolt (1) from the holder of diesel particulate filter (2).



- Loosen V-band clamp (1).
- Feed V-clip (1) out from diesel particulate filter (2) and remove.

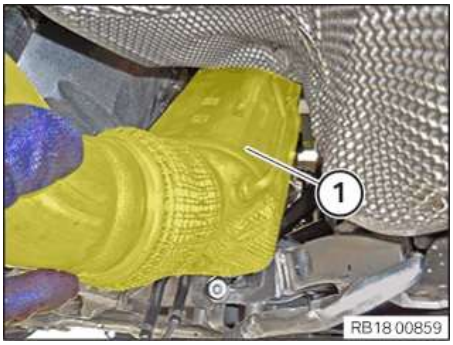


- Release the metering line (1) from clamps (Arrows).
- Release positive battery cable (2) from starter motor from clamp (Arrow).
- Loosen screw (3).
- Thread off coolant line (4) and place to the side.



- Loosen nuts (1).
- Loosen screws (2).
- Guide out and remove holder (3).

cardiagn.com



- Guide out and remove diesel particulate filter (1).

41 – Removing starter motor

Prerequisite

Battery earth leads are disconnected.

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

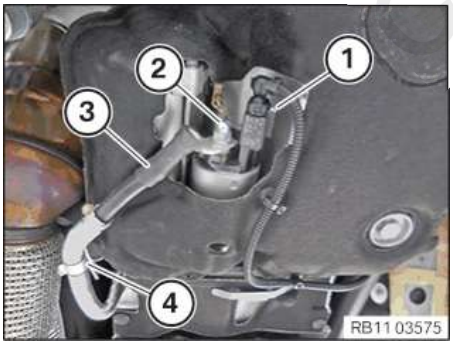
Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

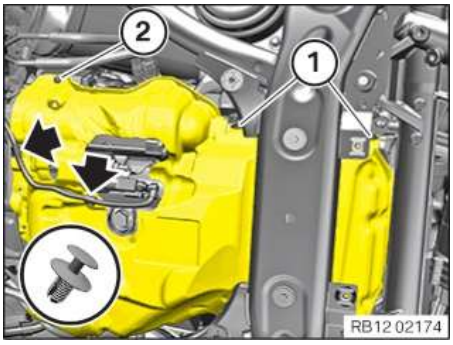
- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

TECHNICAL INFORMATION

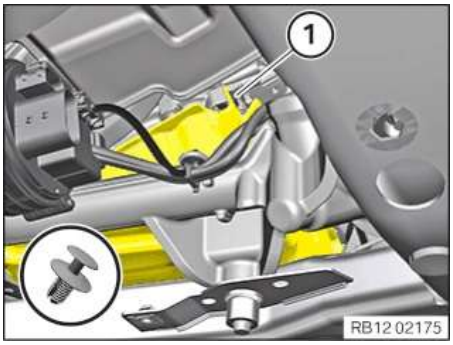
Make sure that the acoustic cover is **not** damaged while removing the starter motor.
A damaged lower acoustic cover can only be renewed when the front axle is lowered.



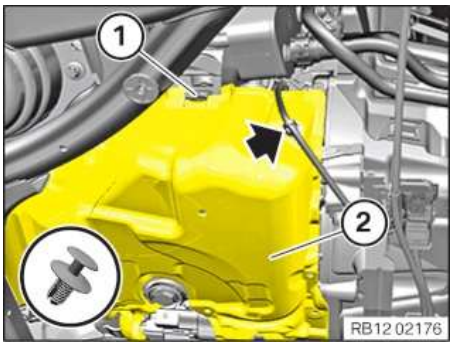
- Unlock plug connection (1) and disconnect.
- Release nut (2).
- Release positive battery cable (3) from holder (4).



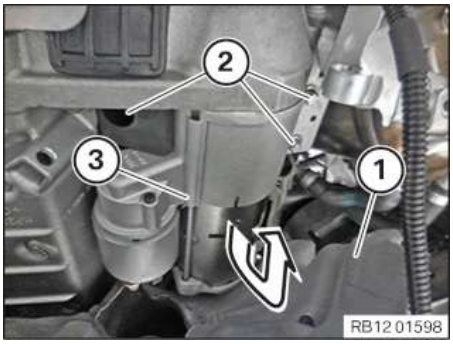
- Loosen the expanding rivet (1).
- Undo fir tree clip (2).
- Release the clamps (arrows).



- Loosen expanding rivet (1).
- Lower the acoustic cover of the oil sump.



- Loosen expanding rivet (1).
- Loosen the clamp (arrow).
- Lower acoustic cover (2).



- Make sure that the acoustic cover (1) is not damaged.
- Carefully press acoustic cover (1) to one side.
- Loosen screws (2).
- Carefully guide out the starter motor (3) in direction of arrow and remove.

42 – Checking camshaft timing



RISK OF DAMAGE

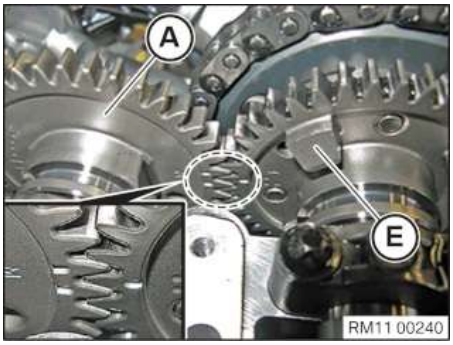
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

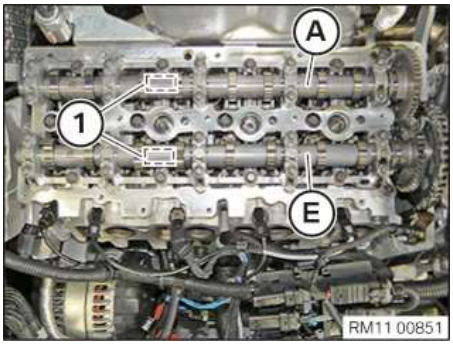
- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

  Do **not** crank the engine in reverse.

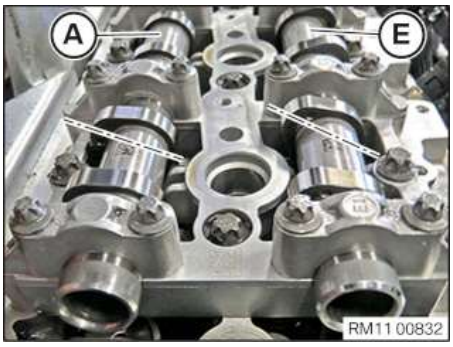


- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.

bardiagn.com



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.

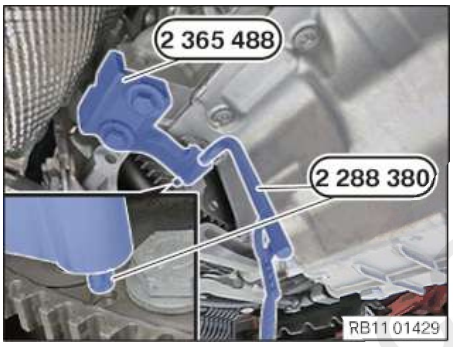


- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

43 – Remove chain tensioner piston

RISK OF DAMAGE

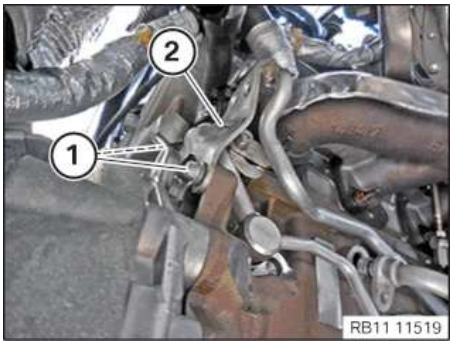
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

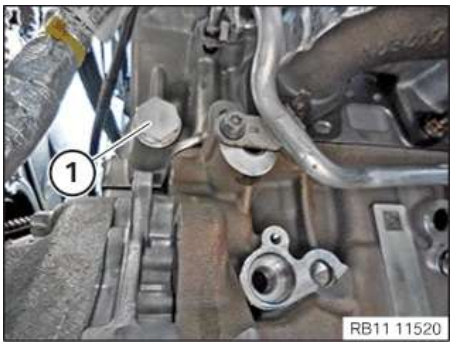
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Loosen screws (1).
- Guide out and remove holder (2).

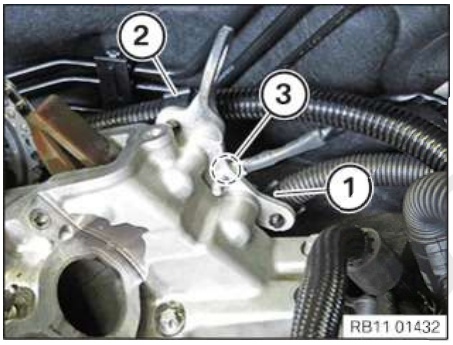


- Loosen the chain tensioner piston (1).
- Catch and dispose of emerging engine oil.

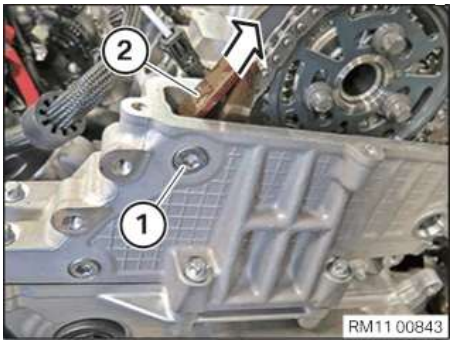


- Feed out and remove the sealing ring (1).

44 – Remove the timing chain guide rail

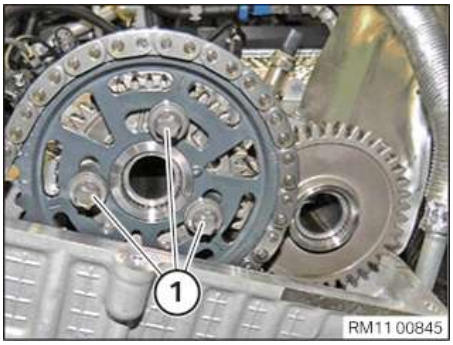


- Loosen the vehicle wiring harness (1) from the bracket.
- Release the positive battery cable (2) from the holder .
- Loosen the screw (3) and remove the grounding cable.



- Remove the bearing journal (1).
- Remove the guide rail (2) in the direction of the arrow.

45 – Removing the camshaft sprocket on the intake camshaft



- Loosen screws (1).
- Secure the drive chain against falling.
- Remove the camshaft sprocket on the intake camshaft.

46 – Removing the special tool for fixing the exhaust camshaft

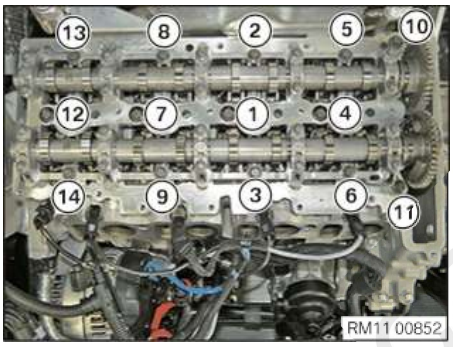


- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

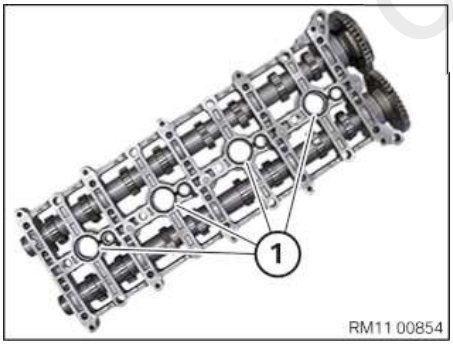
47 – Removing the camshaft support

TECHNICAL INFORMATION

The camshaft is tensioned by the valve springs. Tighten or loosen each screw on the camshaft bearing caps one at a time in the specified sequence and by half a turn only. Repeat procedure.



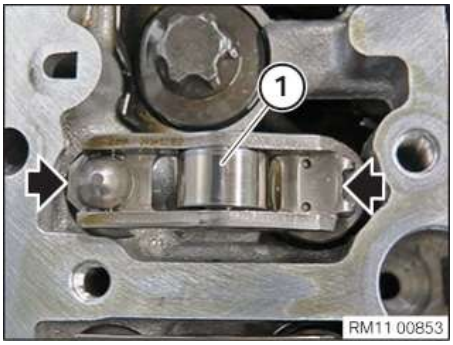
- Unscrew the screws evenly in order (14) to (1) in multiple increments.
- Feed out and remove the camshaft support with the camshafts towards the top.



- Guide out and remove gaskets (1).

48 – Remove roller cam followers

cardiagn.com

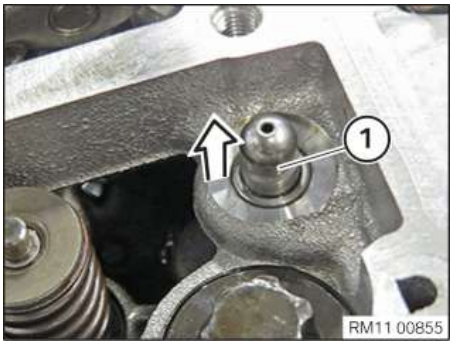


- Guide out and remove all roller cam followers (1) (arrows).
- Place all roller cam followers (1) in order in special tool 0 495 105 (11 4 480).

  Roller cam followers that have already been used must be installed in same position again.

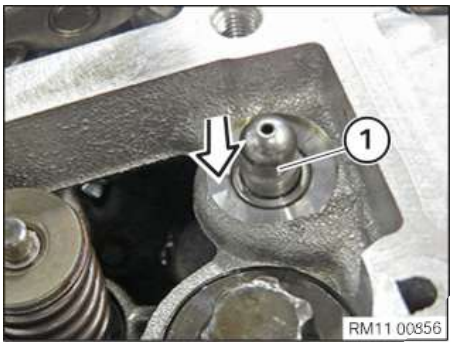
MAIN WORK

49 – Removing all hydraulic valve clearance compensating elements



- Remove all hydraulic valve clearance compensating elements (1) in the direction of the arrow.
- Catch and dispose of emerging engine oil.
- Store all hydraulic valve clearance compensating elements properly arranged on the special tool 0 495 105 (11 4 480).
- Make sure to observe the assignment of the roller cam followers to the hydraulic valve clearance compensating elements when reusing the hydraulic valve clearance compensating elements (1).

50 – Installing all hydraulic valve clearance compensating elements



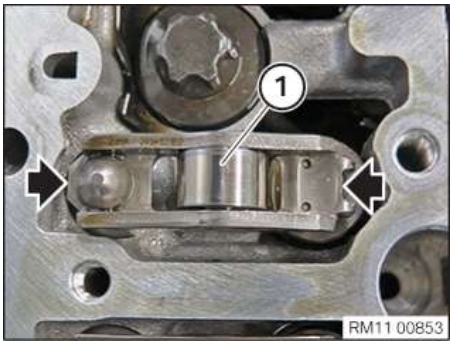
- Make sure to observe the assignment of the roller cam followers to the hydraulic valve clearance compensating elements when reusing the hydraulic valve clearance compensating elements (1).
- Insert and install all hydraulic valve clearance compensating elements (1) in the direction of the arrow.

POSTPROCESSES

51 – Installing the roller cam followers

TECHNICAL INFORMATION

- Note the installation position of the component. The component may be installed in various installation positions.



- Check all the roller cam followers (1) for damage, and renew if necessary.

  Parts: Roller cam followers
- Insert all roller cam followers (1) and install them (arrows).

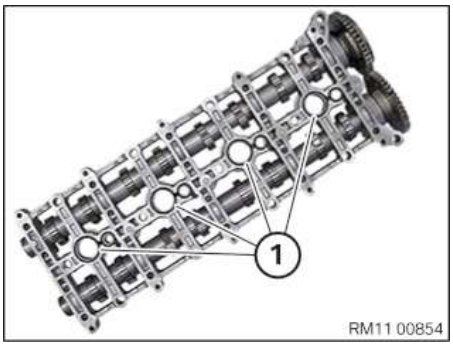
  Roller cam followers (1) that have already been used must be installed in the same place.
- Note the mounting orientation of the roller cam followers (1).
- Oil all roller cam followers (1).

52 – Installing the camshaft support

cardiagn.com

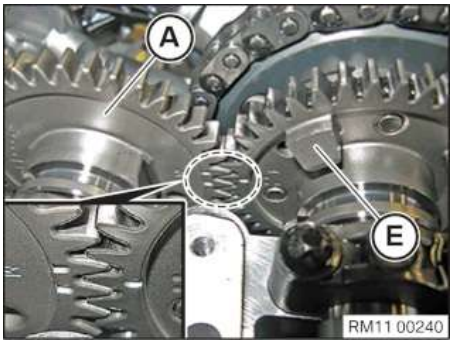
TECHNICAL INFORMATION

The camshaft is tensioned by the valve springs. Tighten or loosen each screw on the camshaft bearing caps one at a time in the specified sequence and by half a turn only. Repeat procedure.

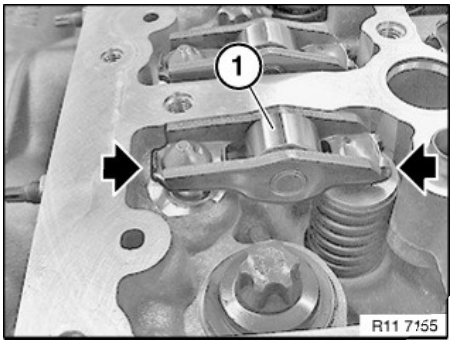


- Renew seals (1).

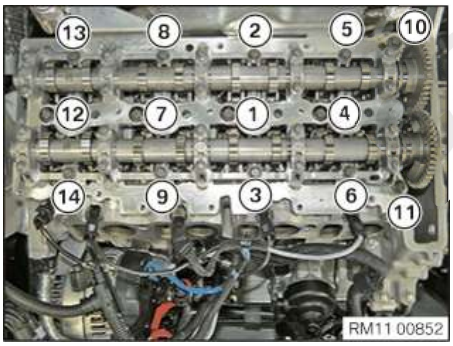
  Parts: Seals
- Insert and install the gaskets (1).



- Make sure the marks on both camshafts (A) and (E) correspond in the **highlighted area**.



- Make sure the roller cam followers (1) have the correct mounting orientation.
- Position the camshaft support (arrows).



- Evenly tighten the screws in a sequence from (1) to (14) in several steps.
- Evenly tighten the screws in a sequence from (1) to (14) in several steps.

Camshaft carrier to cylinder head

M7x35		Tightening torque	13 Nm

53 – Installing the special tool to secure the exhaust camshaft

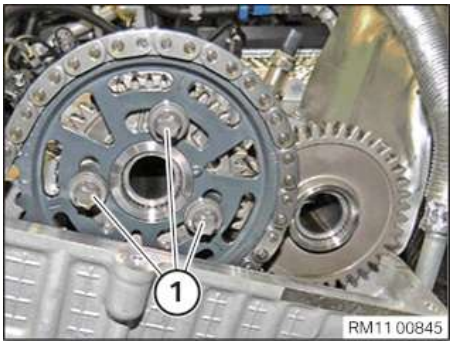


- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.

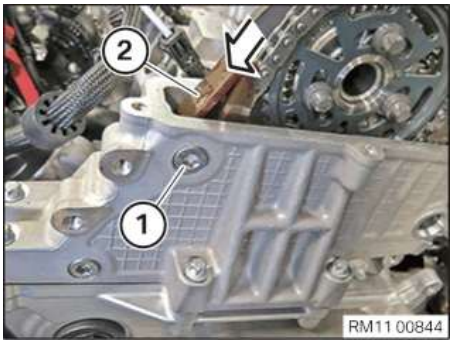
54 – Installing the camshaft sprocket on the intake camshaft

ardiagn.com



- Position the drive chain on the camshaft sprocket so that the thread of the screw connections are located in the centre of the elongated holes.
- Position the camshaft sprocket on the intake camshaft.
- Merely apply the screws (1) hand-tight so that the camshaft sprocket can still be moved in relation to the intake camshaft.

55 – Installing the guide rail of the timing chain

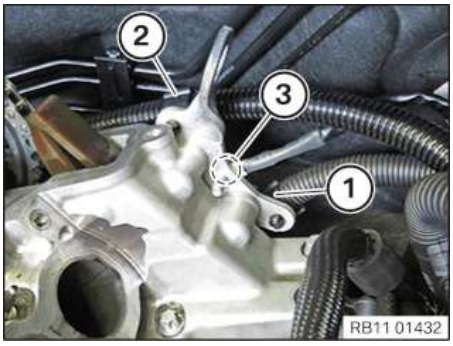


- Position the guide rail (2) in the direction of the arrow.
- Make sure the guide rail (2) is correctly installed at the bottom bearing journal.
- Renew bearing journal (1).

  Parts: Bearing journal
- Tighten the bearing journals (1).

Bearing journal to cylinder head

M16x1.5	Replace bearing journal.	Tightening torque	20 Nm



- Position the grounding cable and tighten the screw (3).

Standard screw connection M8

M8		Tightening torque	19 Nm

- Clip in the positive battery cable (2) into the bracket.
- Clip in the vehicle wiring harness (1) into the bracket.

56 – Installing the chain tensioner piston



TECHNICAL INFORMATION

The oil chamber must be drained for reuse of the chain tensioner.

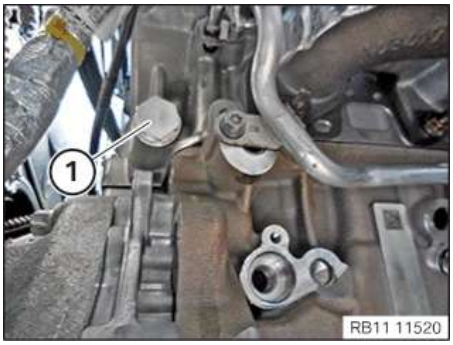
- Place the chain tensioner on a level support pad and slowly compress in the direction of arrow.
- Repeat process twice.



- Renew sealing ring (1).

  Parts: Sealing ring
- Insert and install the sealing ring (1).

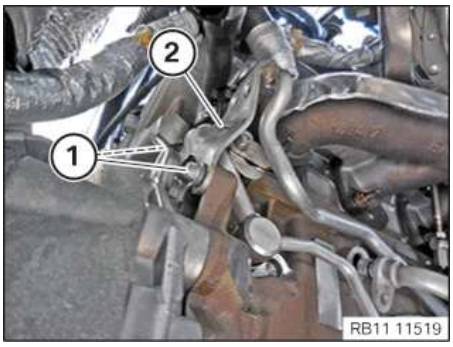
cardiagn.com



- Insert and install the chain tensioner piston (1).
- Tighten the chain tensioner piston (1).

Chain tensioner piston to cylinder head

22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

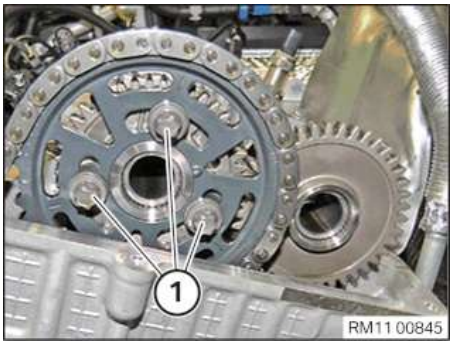


- Insert and install the holder (2).
- Tighten the screws (1).

Holder to crankcase

M8X16		Tightening torque	19 Nm

57 – Tightening the camshaft sprocket on the intake camshaft



- Tighten the screws (1).

Camshaft sprocket to camshaft

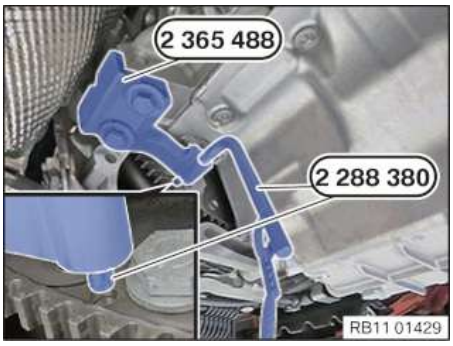
M7x17.			17 Nm

58 – Removing the special tool for fixing the exhaust camshaft



- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

59 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

60 – Checking camshaft timing

cardiagn.com



RISK OF DAMAGE

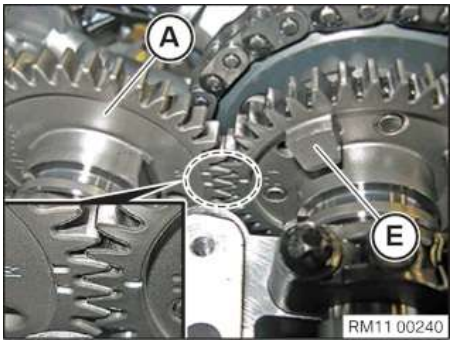
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

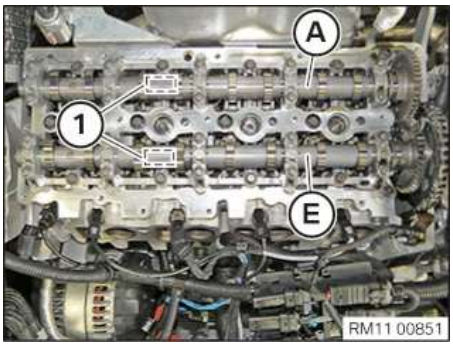
- Turn the combution engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

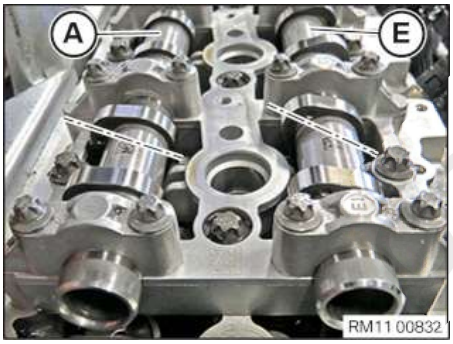
  Do **not** crank the engine in reverse.



- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.



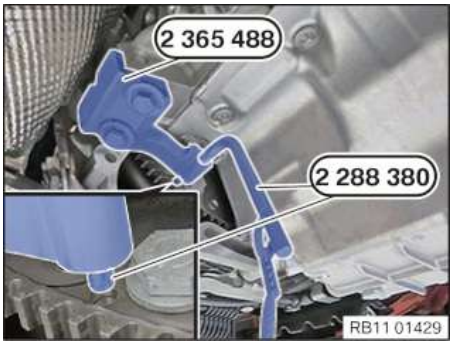
- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.

carlagn.com



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

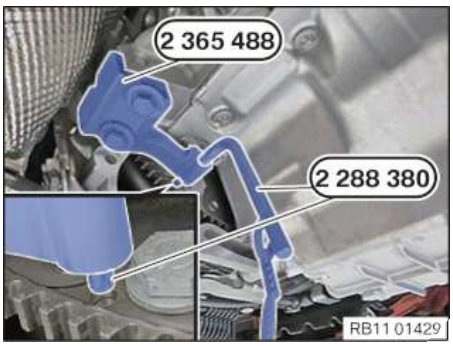
- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

61 – Removing the special tool for fixing the exhaust camshaft



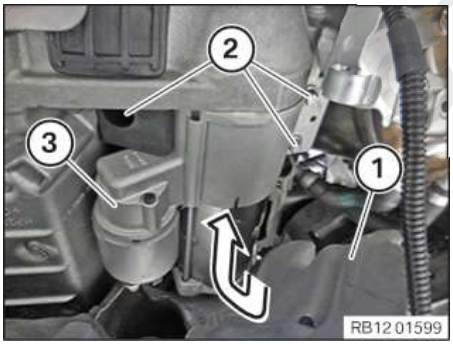
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

62 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

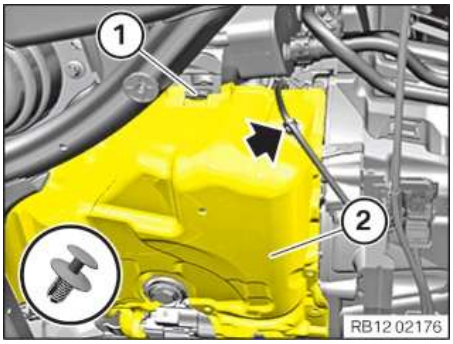
63 – Installing starter motor



- Make sure that the acoustic cover (1) is not damaged.
- Carefully press the acoustic cover (1) to one side.
- Feed in and install the starter motor (3) in the direction of the arrow.
- Tighten the screws (2).

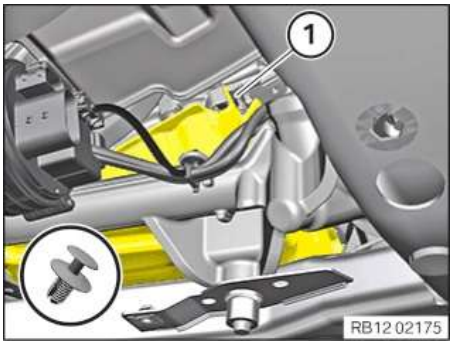
Starter motor to engine

M8X60		Tightening torque	19 Nm

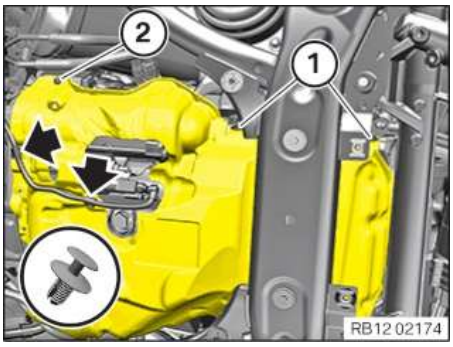


- Position the acoustic cover (2).
- Fasten expanding rivet (1).
- Secure clamp (arrow).

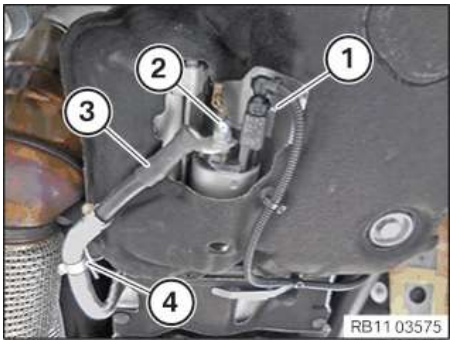
ardiagn.com



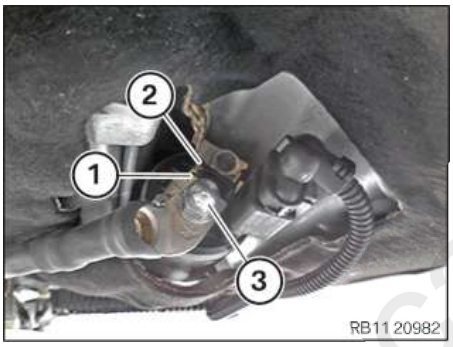
- Fasten expanding rivet (1).



- Secure fir tree clip (2).
- Secure expanding rivet (1).
- Secure the clamps (arrows).



- Fasten positive battery cable(3) in holder (4) and position it on the starter motor.
- Tighten the nut (2) hand-tight.
- Connect the connector (1) and audibly lock it.



CAUTION

Improper routing of the positive battery cable.

Risk of short circuits!

- Route the positive battery cable without abrasions and do not trap.

- Attach the positive battery cable (1) **correctly** to anti-twist lock (2).
- Tighten nut (3).

Battery positive lead to starter

M8		Tightening torque	13,5 Nm

64 – Prepare for the installation of the diesel particulate filter



- Renew the V-clip (1).

  Parts: V-band clamp

carlagn.com



- Renew gasket (1).

  Parts: Gasket

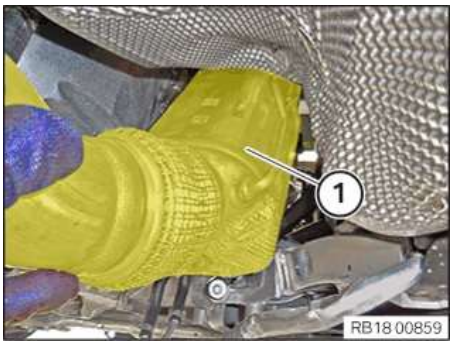
65 – Installing the diesel particulate filter

CAUTION

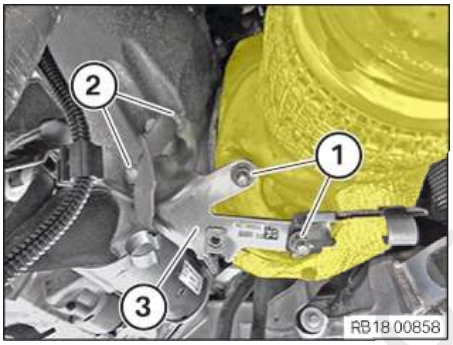
Heavy component.

Heavy components can lead to injury or damage.

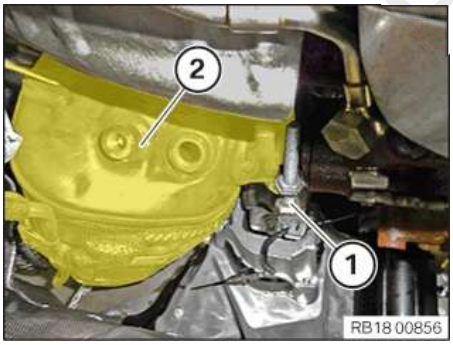
- Remove and install heavy components with the aid of another person/other persons.



- Insert and install the diesel particulate filter (1).



- Insert and install the holder (3).
- **Hand-tighten** the bolts (2).
- Apply the nuts (1) **hand-tight**.

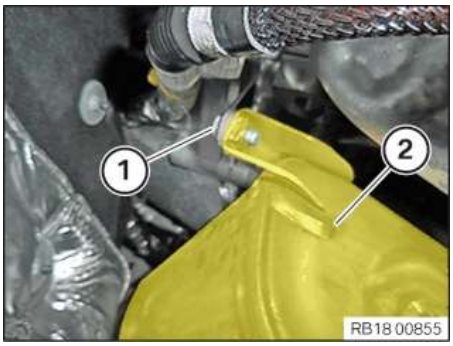


- Renew the V-clip (1).

  Parts: V-band clamp
- Feed in and install V-band clamp (1).

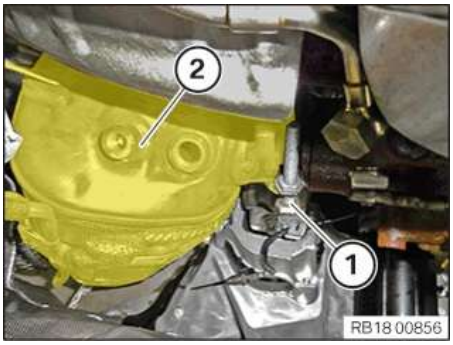
Note: Make sure that the seal between the diesel particulate filter and the exhaust turbocharger is installed correctly.

- Position the diesel particulate filter (2) on the exhaust turbocharger .
- Position V-clip (1).
- Apply the V-clip (1) **hand-tight**.



- Feed in screw (1) on the holder of the diesel particulate filter (2) and tighten **hand-tight**.

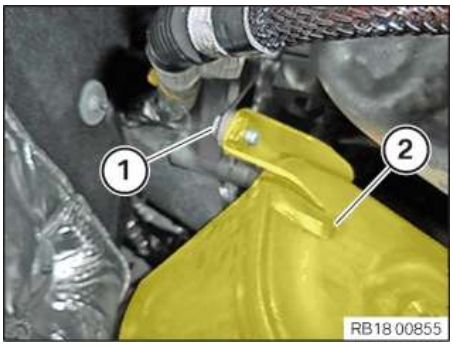
cardiagn.com



- Tighten the V-clip (1) of the diesel particulate filter (2).

Diesel particulate filter V-clip to exhaust turbocharger

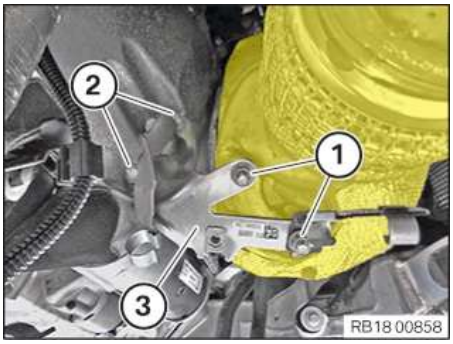
V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm



- Tighten the bolt (1) on the bracket of the diesel particulate filter (2).

Bracket to diesel particulate filter top

M8		Tightening torque	19 Nm



- Tighten the screws (2) on the holder (3).

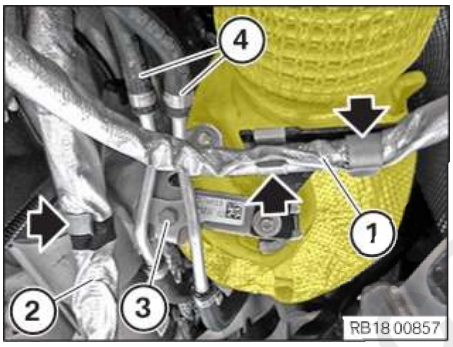
Bracket to transmission for diesel particulate filter holder bottom

M8X20		Tightening torque	19 Nm

- Tighten the nuts (1) on the holder (3).

Lower holder to diesel particulate filter

M8		Tightening torque	19 Nm



- Thread in and install coolant line (4).
- Tighten down screw (3).

Coolant lines for SCR metering module

M6X16		Tightening torque	8 Nm

- Secure the positive battery cable (2) of the starter motor at the clamp (arrow).
- Fasten the metering line (1) on the clamps (arrows).

66 – Installing the nitrogen oxide sensor upstream of SCR catalytic converter

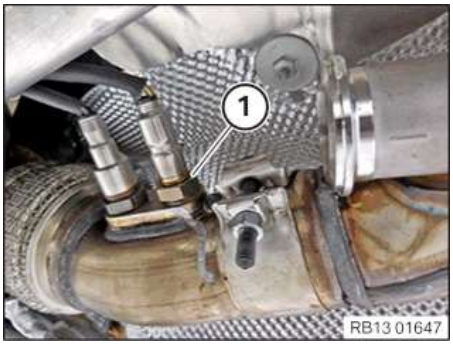
RISK OF DAMAGE

Damage to the nitrogen oxide sensor.

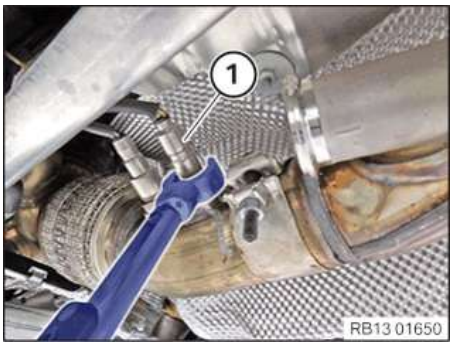
Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
- The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

cardiagn.com



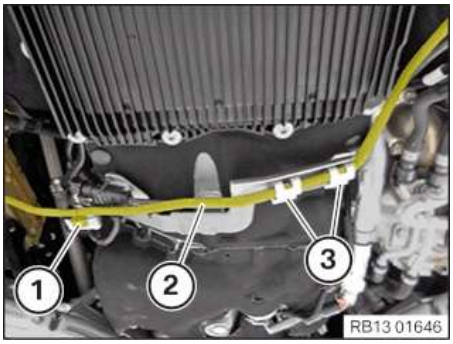
- Feed in and install the nitrogen oxide sensor (1).



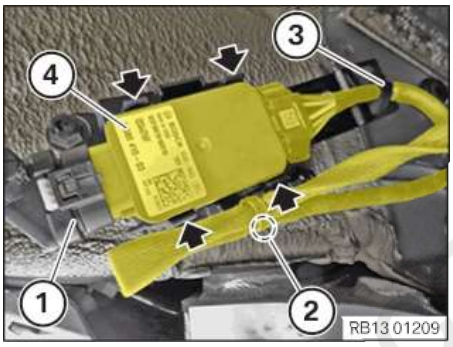
- Tighten the nitrogen oxide sensor (1) using commercially available tools.

Nitrogen oxide sensor before SCR catalytic converter

Sensor		Tightening torque	50 Nm



- Secure the cables (2) to the clamps (3).
- Secure clamps (1).



- Clip in the control unit (4) (arrows).
- Fasten the cable in the holder (3).
- Secure the cable holder (2).
- Plug in the connector (1) and lock audibly.

67 – Installing the monitoring oxygen sensor after the diesel particulate filter

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

cardiagn.com

TECHNICAL INFORMATION

New oxygen sensors are to be greased lightly and evenly on the thread.

For oxygen sensors that are reused, the following should be observed:

Lightly and evenly grease the oxygen sensor only on the thread. Do not clean and grease that part of the oxygen sensor which protrudes in the exhaust branch (sensor ceramics).

For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



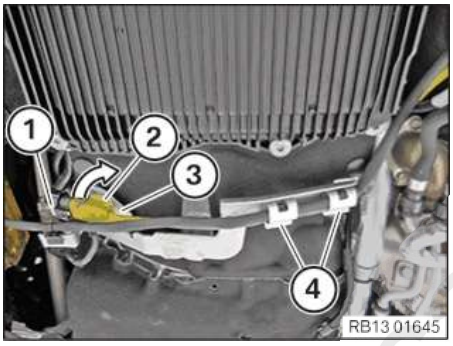
- Insert the monitoring oxygen sensor (1) and install it.



- Tighten the monitoring oxygen sensor (1) with standard tools.

Monitoring oxygen sensor

Sensor		Tightening torque	50 Nm



- Fasten the monitoring oxygen sensor to the clamps (4).
- Secure the connector (2) on the holder (3) in direction of arrow.
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

68 – Installing the exhaust system

CAUTION

Component with heavy weight.

Danger of injury!

- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

Heavy component.

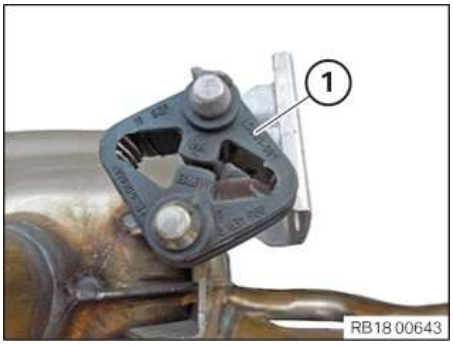
Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

cardiagn.com

TECHNICAL INFORMATION

Mount the exhaust system in voltage-free state, maintaining the tightening sequence from the rear silencer towards the exhaust manifold.

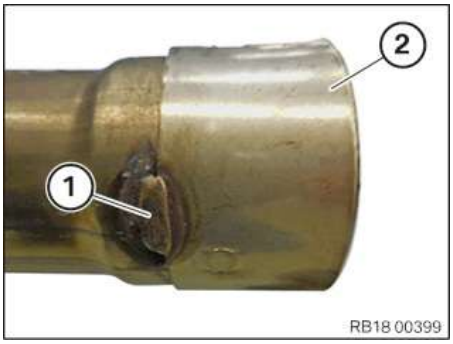


NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

- Check all the rubber mounts (1) of the exhaust system for damage.
- Replaced damaged rubber mounts.

  Parts: Rubber mount



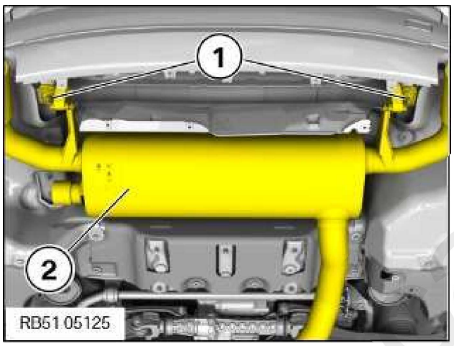
CAUTION

Swarf resulting from sawing or grinding components.

Danger of injury!

- Conduct all work in appropriate personal protective equipment only.
- Wear safety goggles and protective gloves.

- Open the weld seam (1) with a conventional tool.
- Remove the clamp (2).

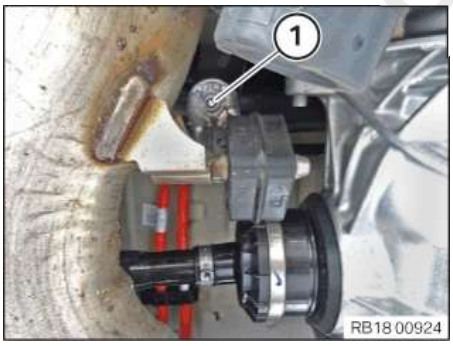


- Insert and install the exhaust system (2).
- Renew nuts (1).

  Parts: Nuts
- Tighten nuts (1).

Rear silencer to body / bumper support

M8	Replace nuts.	Tightening torque	19 Nm

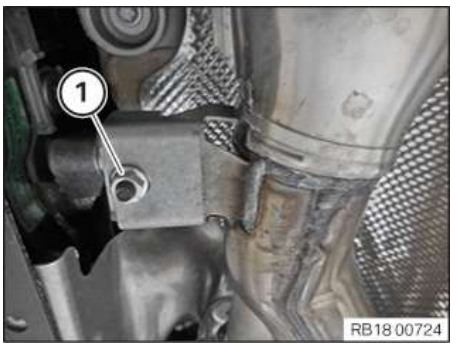


- Renew nut (1) on the rear axle support.

  Parts: Nut
- Tighten nut (1).

Exhaust system to rear axle carrier

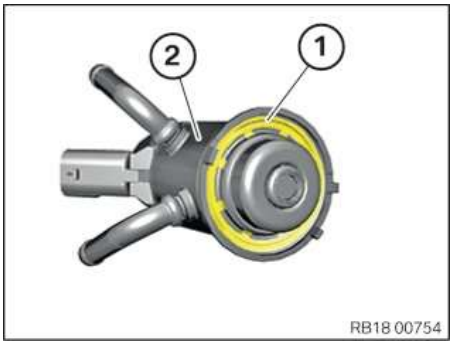
M8 nut		Tightening torque	19 Nm



- Tighten nut (1).

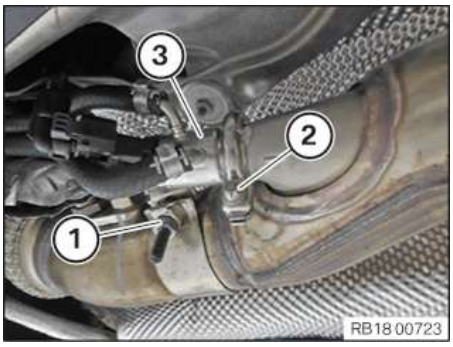
Exhaust system to transmission

M8		Tightening torque	19 Nm



- Renew sealing ring (1) of the SCR metering module (2).

  Parts: Sealing ring



- If necessary, renew clamp (1).

  Parts: Clamp
- Tighten clamp (1).

Exhaust system to diesel particle filter

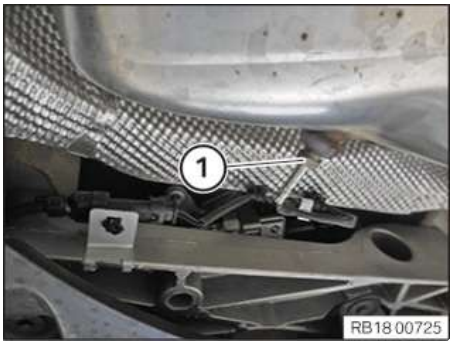
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

- Renew the V-clip (2).

  Parts: V-band clamp
- Install the SCR metering module (3) in the exhaust system.
- Tighten the V-clip (2) of the SCR metering module (3).

SCR metering module V-clip to exhaust system

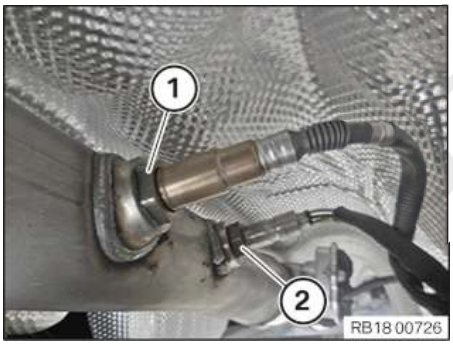
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm



- Install the exhaust temperature sensor (1) in the exhaust system and tighten.

Exhaust-gas temperature sensor upstream of SCR catalytic converter

Sensor		Tightening torque	30 Nm



- Install the diesel particulate sensor (1) in the exhaust system and tighten.

Diesel particulate sensor to exhaust system

Sensor		Tightening torque	50 Nm

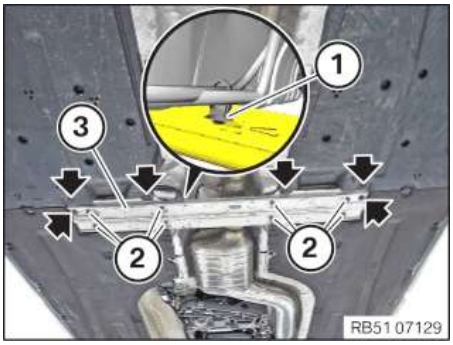
- Install the nitrogen oxide sensor (2) in the exhaust system and tighten.

Nitrogen oxide sensor downstream of SCR catalytic converter

Sensor		Tightening torque	55 Nm

69 – Install the connecting supports on the tunnel

cardiagn.com



- Guide in and install connecting support (3) on the tunnel.
- Tighten the screws (2).
- Tighten screws (arrows).

Connecting support to tunnel

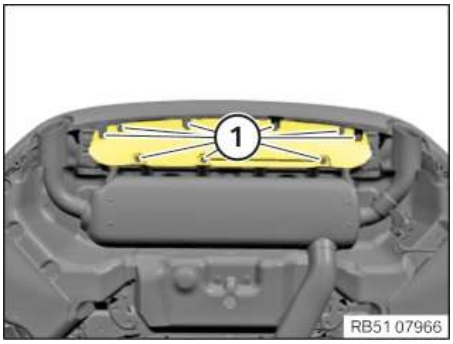
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Secure the clamp (1).

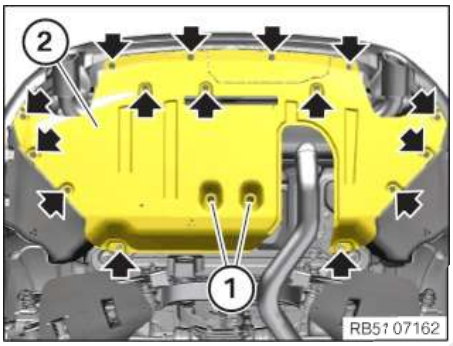
70 – Installing the rear diffuser



- **Version 1:**
- Install the diffuser and tighten the nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm



- **Version 2:**
- Feed in and position the diffuser (2)
- Tighten screws (arrows).

Diffuser / underbody panelling

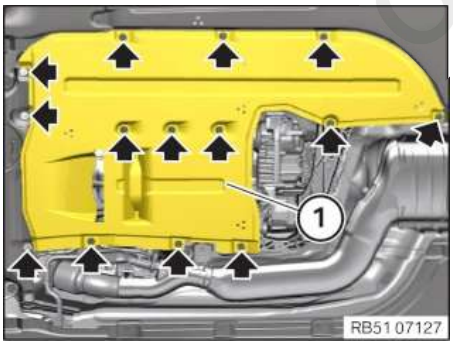
Nuts and screws		Tightening torque	3 Nm

- Tighten nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm

71 – Installing underbody protection at rear



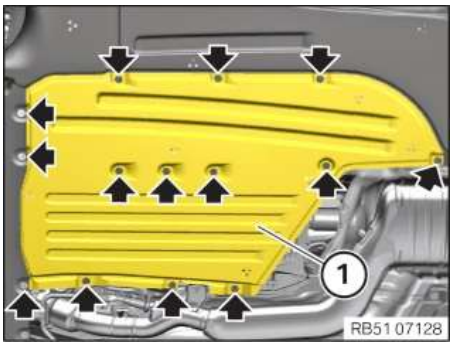
- **Version A:**

Insert and install the rear underbody protection (1).

Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version B:**

Insert and install the rear underbody protection (1).

Tighten screws (arrows).

Underbody protection

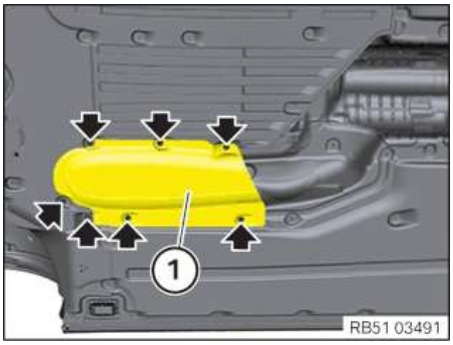
Hexagon screw		Tightening torque	3 Nm

cardiagn.com

72 – Install the underbody panelling of the transmission on the side

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

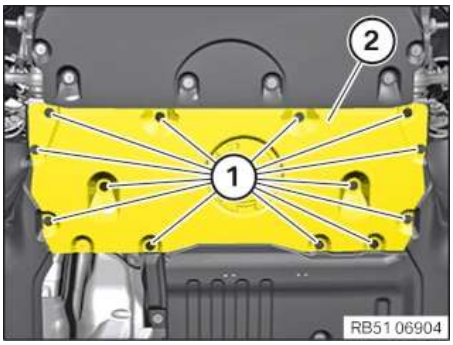


- Insert the underbody panelling (1).
- Tighten screws (arrows).

Underbody panelling

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

73 – Installing the centre underbody protection



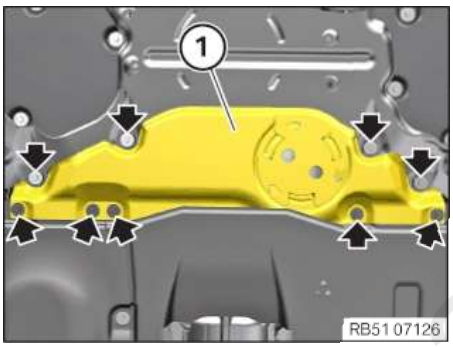
- **Variant with rear wheel drive:**

  Position central underbody protection (2).

  Tighten the screws (1).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version with all-wheel drive:**

  Guide in centre underbody protection (1) and install.

  Tighten screws (arrows).

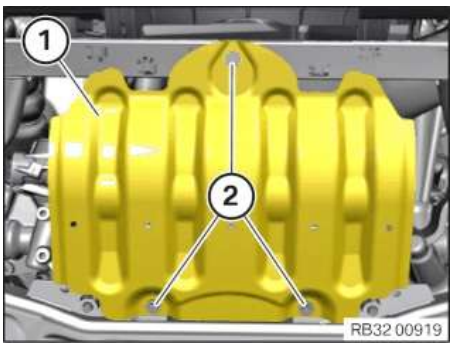
Underbody protection

Hexagon screw		Tightening torque	3 Nm

74 – If installed: Install underbody protection of the steering

Prerequisite

Front underbody protection has been removed.



- Position underbody protection (1).
- Tighten the screws (2).

Underbody protection, steering, to front axle support

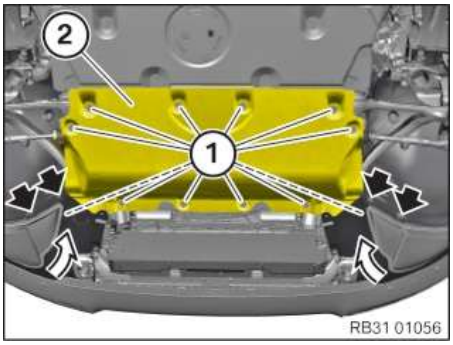
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

75 – Install the underbody protection of the steering gear

cardiagn.com



- **Version A:**

  Position the underbody protection (2) of the steering gear.

  Tighten the screws (1).

Underbody protection of the steering gear

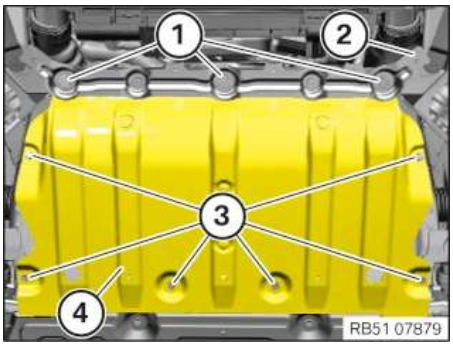
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the bottom wheel arch cover.

  Tighten the screws (arrows) of the lower wheel arch cover on the wheel arch cover.

Wheel arch trim panel, front

Thermoplastic hexagon screw		Tightening torque	2,6 Nm



- **Version B:**

  Feed in the underbody protection (4) of steering gear and install it.

  Tighten the screws (3).

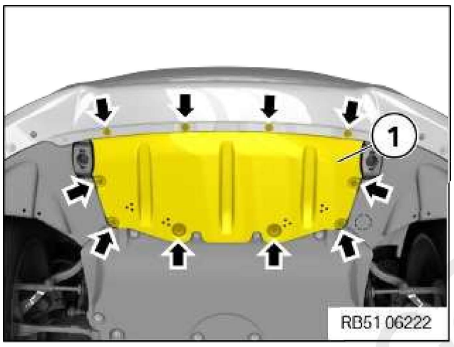
Underbody protection of the steering gear

Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the holder (2) for the underride protection.

  Tighten the screws (1).

76 – Installing the front underbody protection



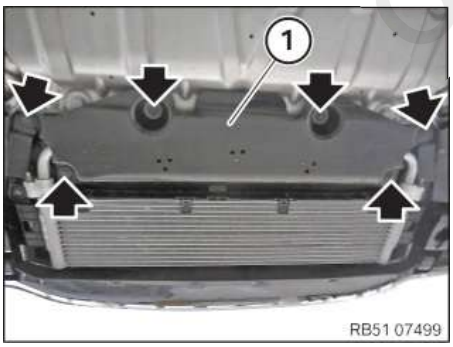
- **Version A:**

  Feed in the front underbody protection (1) towards the front under the bumper panel and position.

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



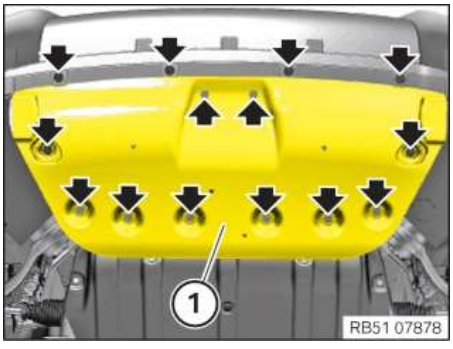
- **Version B:**

  Feed in and position the front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



- **Version C:**

  Feed in and install front underbody protection (1).

  Tighten screws (arrows).

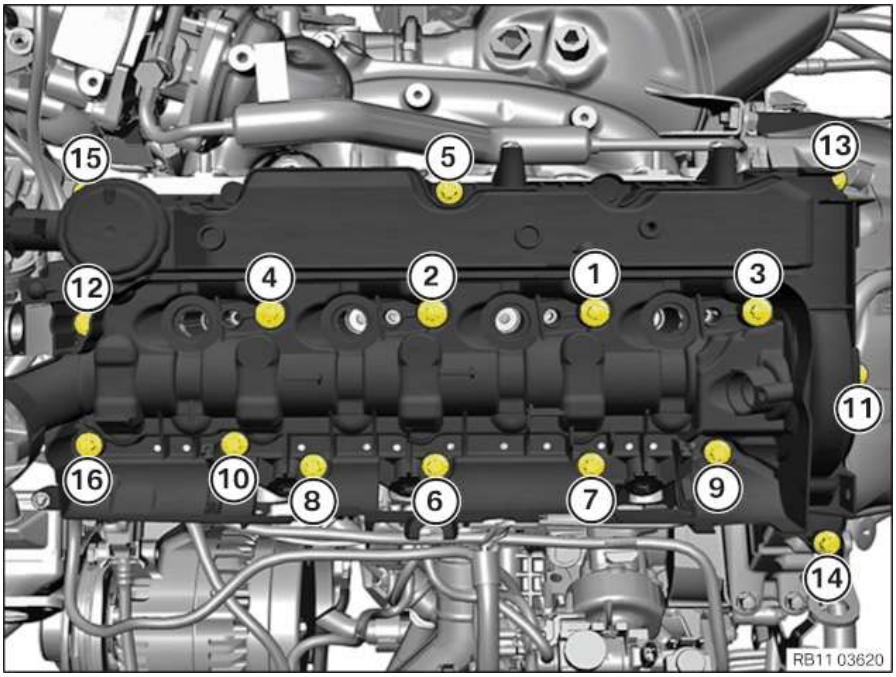
Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

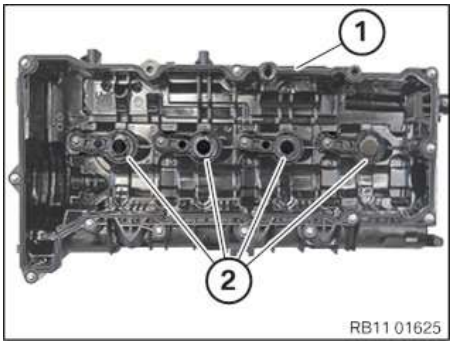
carlagn.com

77 – Installing cylinder head cover

Screw connection of the cylinder head cover

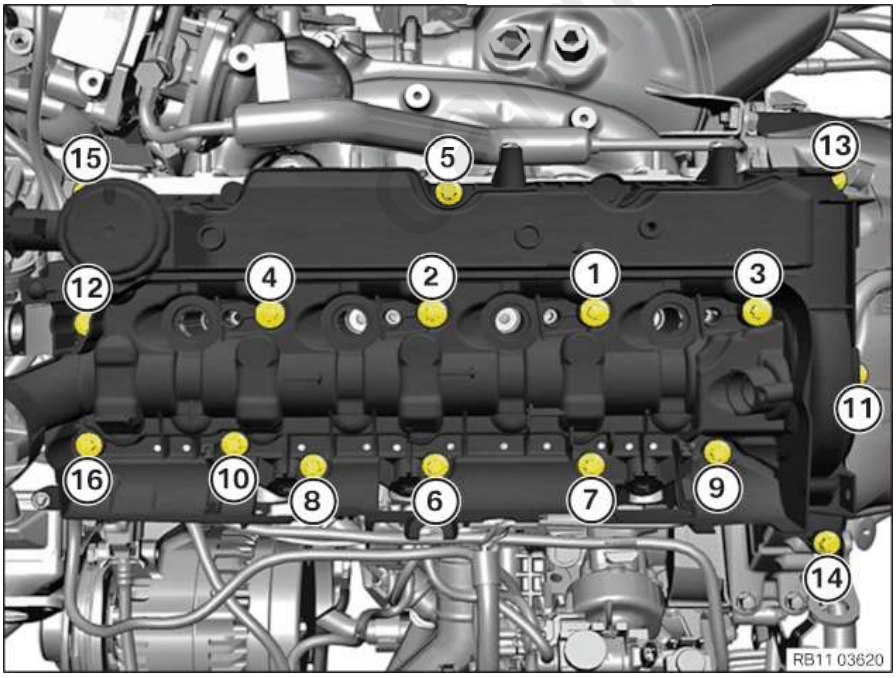


1 - 16 Bolts of the cylinder head cover



- Renew the profile seals (1) and (2) of the cylinder head cover.

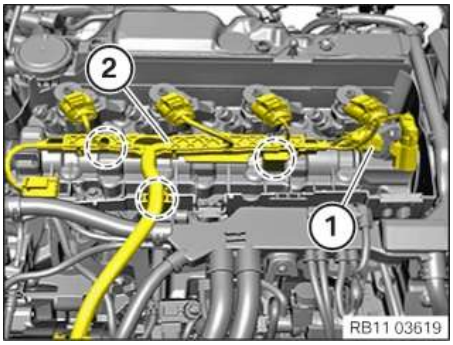
  Parts: Profile seals



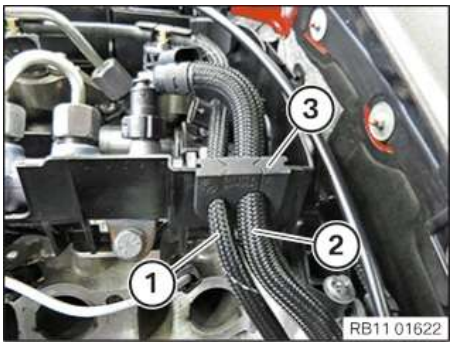
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

Cylinder head cover to cylinder head

M6		Tightening torque.	8,5 Nm



- Position the vehicle wiring harness (2) on the cylinder head cover and fasten in the marked areas.
- Plug in the connector (1) and lock audibly.



- Insert and connect the leakage oil line (1) with the fuel return line (2) and grommet (3).



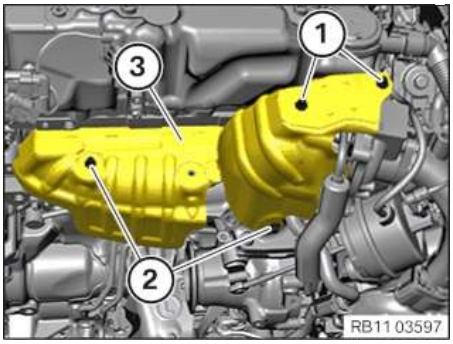
- Feed in and install the heat shield (1).



- Connect engine ventilation line (1) and lock.

  The locks (arrows) must engage audibly.

78 – Installing heat shield



- Feed in and install the heat shield (3).
- Tighten down screws (1) and (2).

Heat shield to exhaust manifold

M6x12			10 Nm

79 – Installing the sensor bracket on the cylinder head cover

cardiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

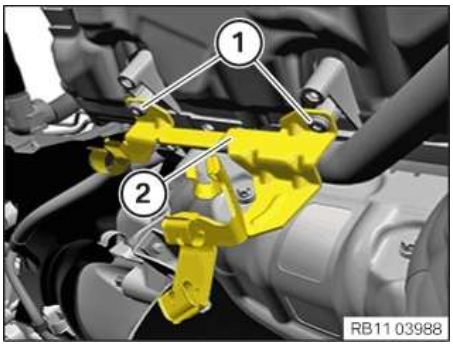
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

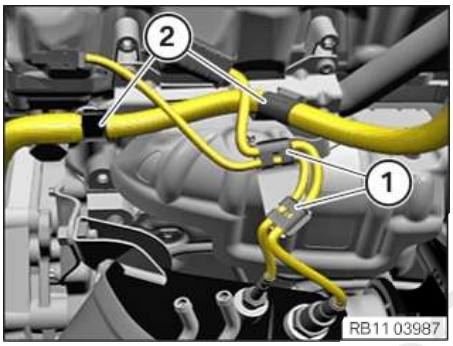
- Route all cables without abrasions, do not trap and crush.



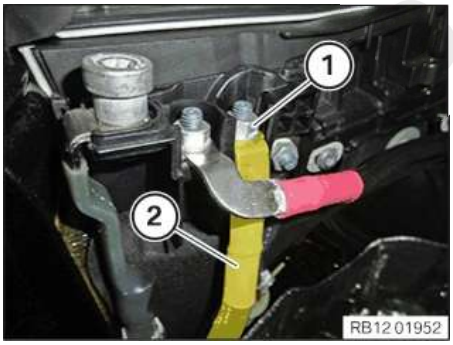
- Insert and install the holder (2).
- Tighten the screws (1).

Bracket on cylinder head cover

	Tightening torque	5 Nm



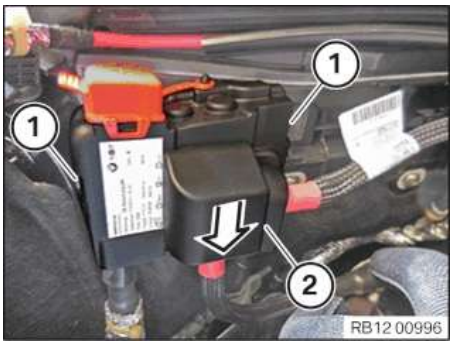
- Secure the positive battery cable in the clamps (2).
- Mount the cable of the exhaust gas sensor system in the clamps (1).



- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

Battery positive lead to battery positive terminal

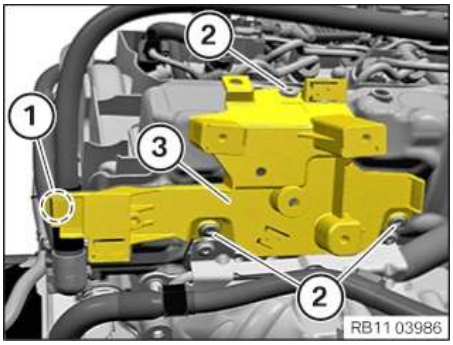
M8		Tightening torque	19 Nm



- Insert and install the cover (2) in the direction of the arrow.

  The locks (1) must engage audibly.

cardiagn.com

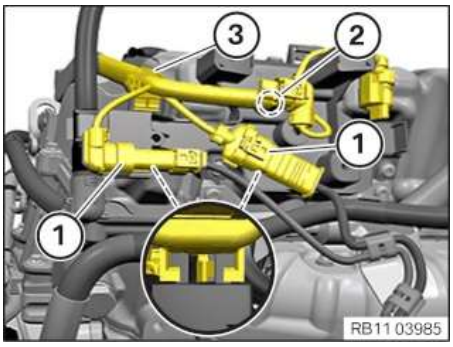


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

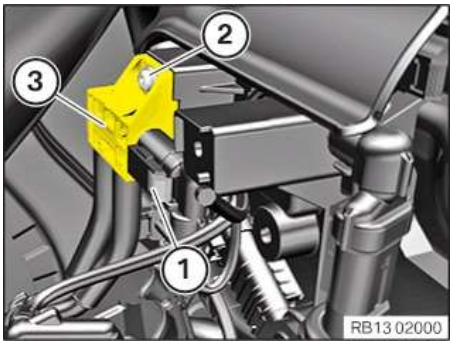
		Tightening torque	5 Nm

- Fasten the positive battery cable in the area (1) in the clamp.



- Feed in the wiring harness section and fasten it with the clamp (3).
- Fasten the cable clip in the area (2) in the sensor bracket.
- Feed in the connector (1) into the sensor bracket and lock it audibly.
- Plug in the connector (1) and lock audibly.

80 – Securing the differential pressure sensor for the diesel particulate filter



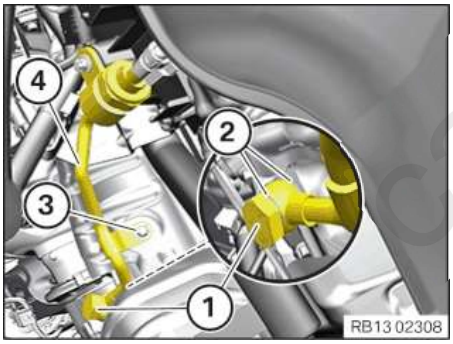
- Feed in and install the differential pressure sensor (3).
- Tighten down screw (2).

Differential pressure sensor of diesel particulate filter on cylinder head cover

TS5x20		Tightening torque	4 Nm

- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

81 – Install the exhaust gas pressure pipe



- Insert and install the exhaust gas pressure pipe (4).
- Replace the sealing rings (2).

  Parts: Sealing ring
- Apply the banjo bolt (1) hand-tight.
- Tighten down screw (3).

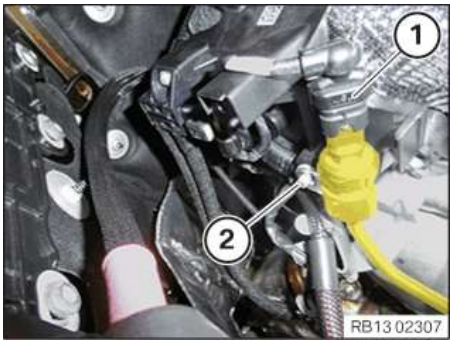
Heat shield to exhaust manifold

M6x12		Tightening torque	10 Nm

- Tighten the banjo bolt (1).

Banjo bolt for exhaust pressure pipe to exhaust manifold

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm



- Tighten down screw (2).

Exhaust gas pressure pipe to sensor system holder

TS6x20		Tightening torque	5,7 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

82 – Install all injectors

▸ **Cleaning the injector shafts**

cardiagn.com

CAUTION

Swirling dirt particles caused by compressed air.

Danger of injury!

- Collect dirt particles, e.g. when blowing out, use cloth to do so.

- Wear safety goggles.

RISK OF DAMAGE

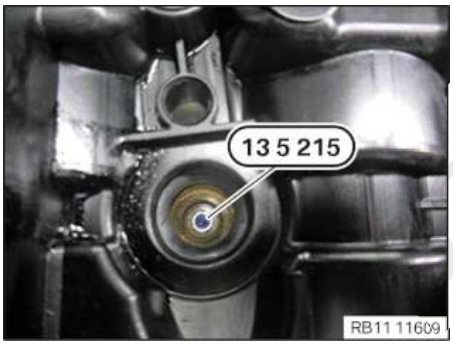
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



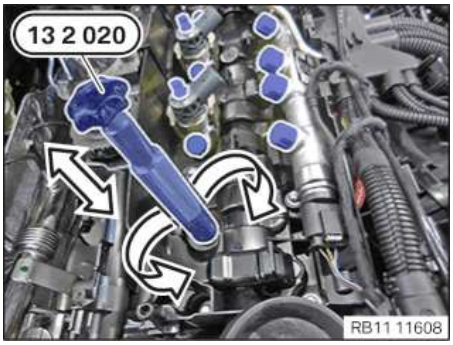
- Check whether the sealing ring remained in the injector shaft and remove the sealing ring as needed.
- Insert the special tool 0 493 763 (13 5 215) with the special tool 0 493 762 (13 5 214) from the set of special tools 0 493 758 (13 5 210) into the injector shaft.
- Remove special tool 0 493 762 (13 5 214).



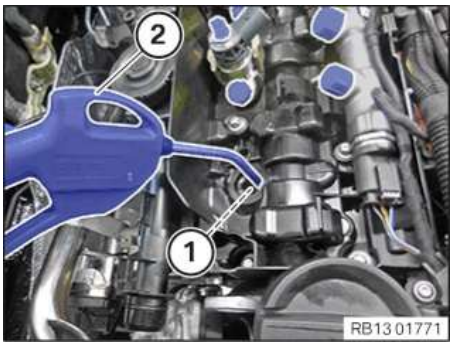
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



- Insert special tool 0 496 150 (13 2 020) into the injector shaft.



- Move special tool 0 496 150 (13 2 020) up and down in the injector shaft with rotational movements in the direction of arrow.
- Feed out special tool 0 496 150 (13 2 020) from the injector shaft and remove.



- Blow out injector shaft (1) with air gun (2).



- Feed the special tool 0 493 762 (13 5 214) into the injector shaft and screw it in with the special tool 0 493 763 (13 5 215).
- Feed out special tool 0 493 762 (13 5 214) with special tool 0 493 763 (13 5 215) from the injector shaft and remove it.

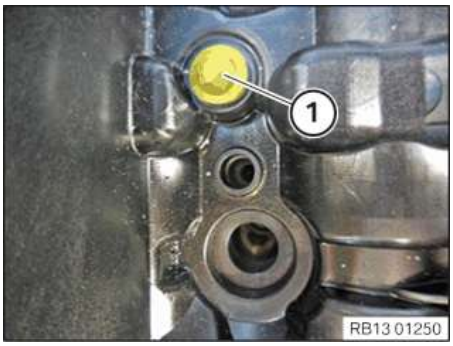
▸ **Check the placement of the clamping claw**

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Tighten down screw (1).

  The clamping claw is positioned on the bolt (1).

Clamping claw facing to cylinder head cover

M6		Tightening torque	10 Nm

▸ **Prepare the injector for installation**

cardiagn.com

RISK OF DAMAGE

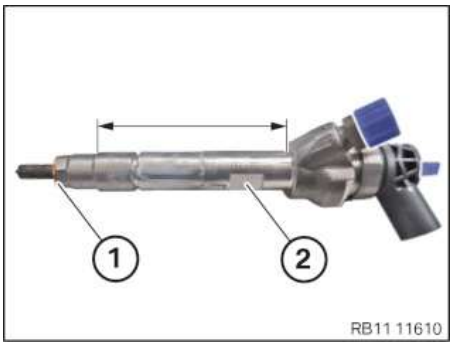
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

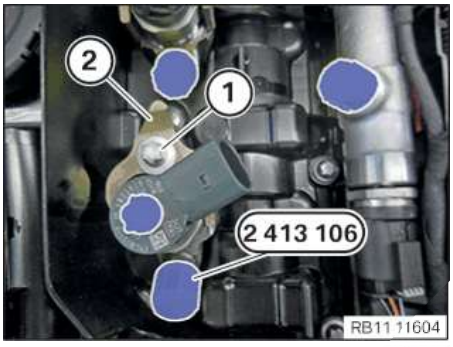
TECHNICAL INFORMATION

Lightly grease the injector shaft with high temperature-resistant grease.
For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



- Renew the copper sealing ring (1) on the injector (2).

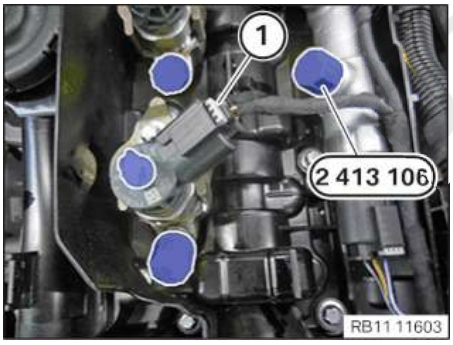
  Parts: Copper sealing ring
- Lightly grease the injector in the marked area with heat-resistant grease before installing the injector (2) in the injector shaft.



- Insert and install the injector .
- Insert and install the clamping claw (2).
- Tighten down screw (1).

Injector to cylinder head cover

M8	Tightening torque	8 Nm
	Angle of rotation	120 °



- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

▸ **Replacement: Perform injection quantity compensation**

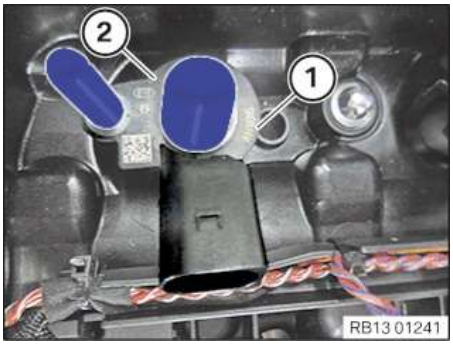
TECHNICAL INFORMATION

If the DDE control unit or an injector has been replaced, it will also be necessary to carry out injection quantity compensation. The adjustment value (7-position letter/number code) is engraved on each injector.

NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

cardiagn.com

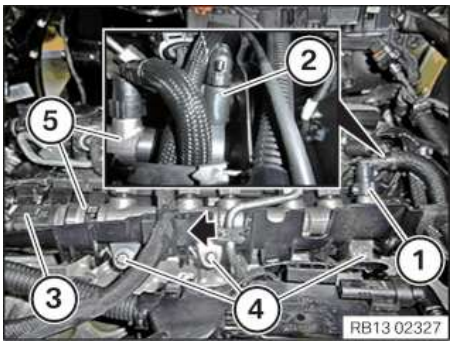


- Read off the adjustment value (1) on the new injector (2).



- Connect diagnosis system:
  - Vehicle identification
  - Function selection
  - Service functions
  - Digital diesel electronics (DDE)
  - Adjustment of injectors
  - Testing schedule
- Start service function with the right arrow button.

83 – Installing the rail



- Insert and install the rail (5).
- Tighten the screws (4).

Rail to cylinder head cover

M8		Tightening torque	19 Nm

- Install and lock cable clip (arrow).

  The cable clip (arrow) must engage audibly.
- Connect and lock the connector (3) at the rail pressure sensor.

  The connector (3) must engage audibly.
- Connect and lock the connector (2) at the rail pressure regulating valve.

  The connector (2) must engage audibly.
- Feed in fuel return line (1) and install.

  The fuel return line (1) must audibly engage.

84 – Installing high pressure line between rail and high pressure pump

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

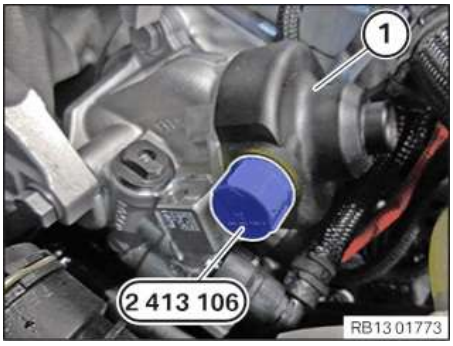
Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

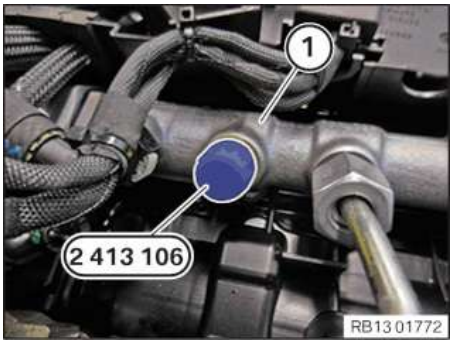
cardiagn.com

TECHNICAL INFORMATION

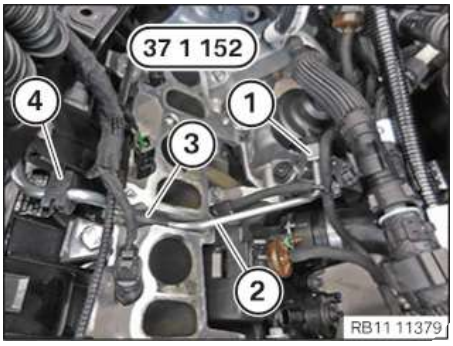
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Feed out and remove special tool on the high pressure pump (1).



- Feed out the special tool on the rail (1) and remove.



- Insert and install the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).
- Hand-tighten the union nut (1) on the high pressure pump.



- Hand-tighten the union nut (1) on the rail.

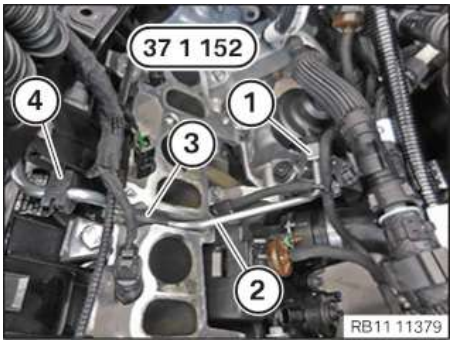
TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten the union nut (1) with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm



- Make sure that the high pressure line (2) is correctly installed with the abrasion protection (3) and the rubber mount (4).

TECHNICAL INFORMATION

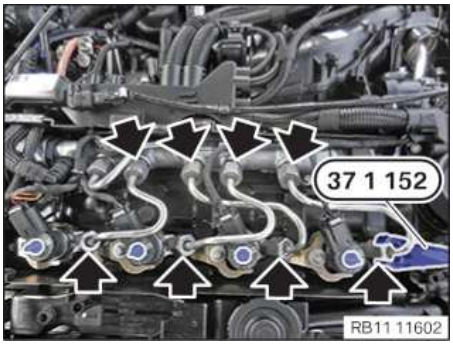
Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten union nut (1) on the high pressure pump with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm

cardiagn.com



- Remove the special tool from all cable connections.
- Feed in and install the high pressure lines (arrows).
- Hand-tighten the high pressure lines (arrows).

TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

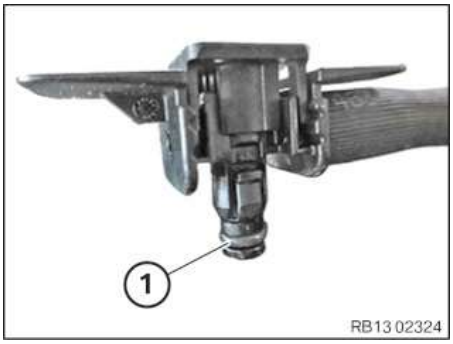
- Tighten the high pressure lines (arrows) with the special tool .

High pressure lines between injector and rail

High-pressure pipe		Tightening torque	24.5 Nm

- Check the high pressure lines (arrows) for tightness (**visual inspection**).

86 – Attach the leakage oil line on the injectors

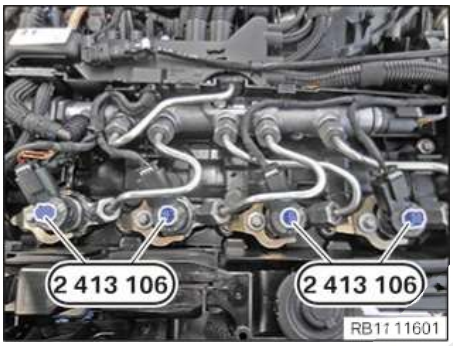


- **Version A:**

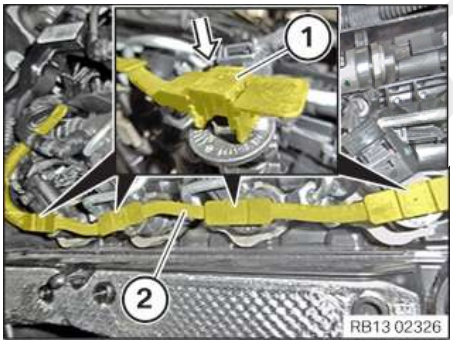
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

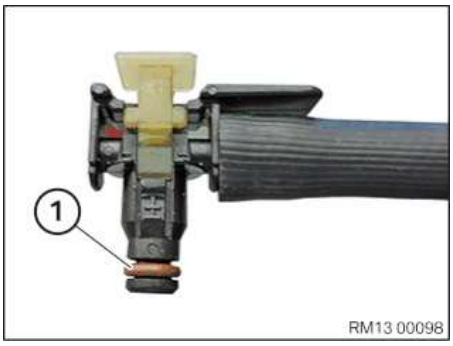
  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.



- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.



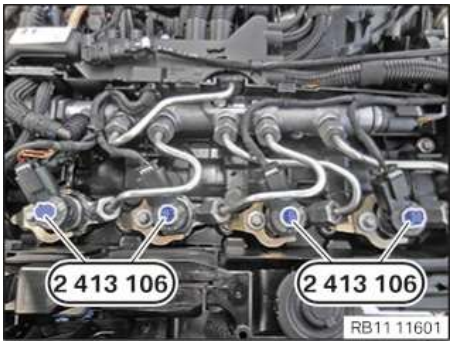
- **Version B**:

  Check sealing ring (1) for damage, renew leakage oil line if necessary.

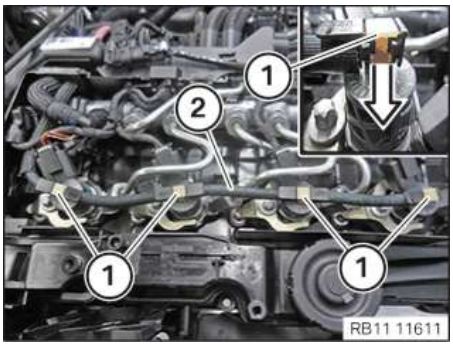
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.

ardiagn.com

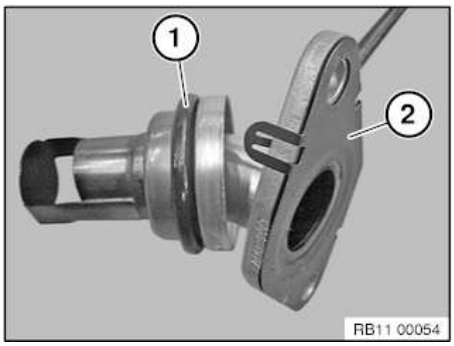


- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.

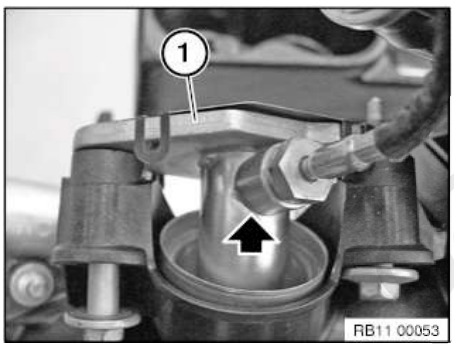
87 – Installing the intake plenum



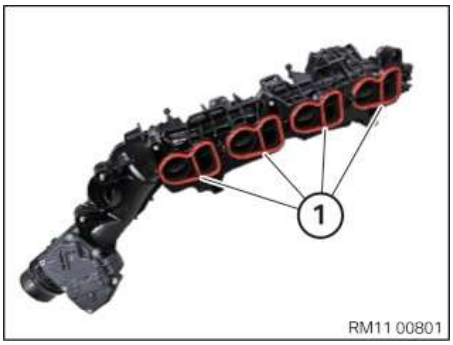
- Renew O-ring (1).

  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

  Parts: Gasket
- Position the seal (2) and clip it in.



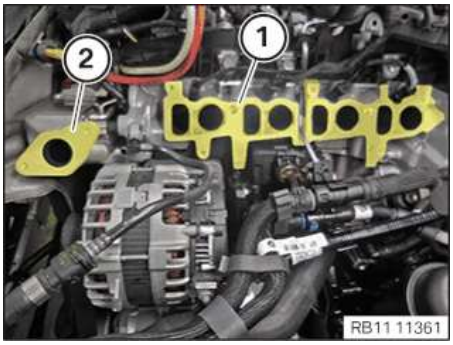
- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).



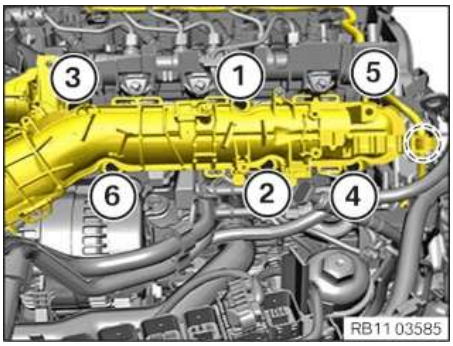
- Renew seals (1).

  Parts: Seals
- Ensure that the seals (1) are firmly mounted on the intake plenum.

cardiagn.com



- Clean connection points (1) at cylinder head.
- Clean the connection point (2) on the exhaust-gas recirculation cooler.

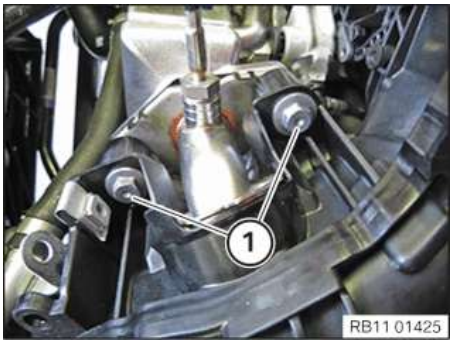


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

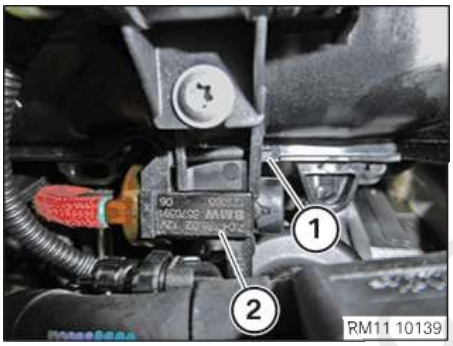
- Attach the wiring harness and fuel lines in the marked area on the intake plenum.



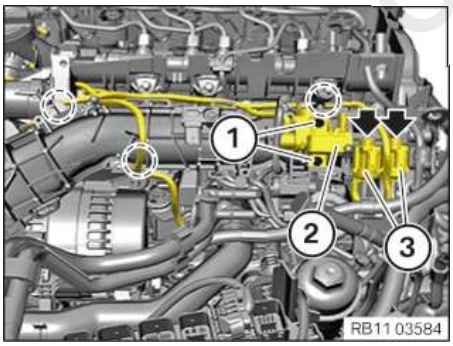
- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm



- Install electric changeover valve (2) from the left to the right in the holder on the intake plenum.
  The lock (1) must audibly engage.



- Install intake plenum electric changeover valve (3) on the intake plenum.
  The locks (arrows) must engage audibly.
- Position the electric changeover valve (2) on the intake plenum.
- Tighten the screws (1).

Electric changeover valve to intake plenum

TS6x20		Tightening torque	5 Nm

- Fasten the vacuum hoses on the intake plenum in the marked areas.



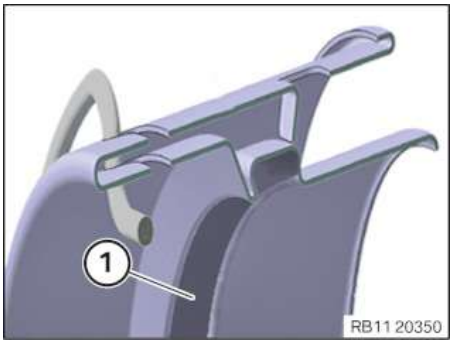
- Check the seal (1) for damage, and renew if necessary.

gardiagn.com

▸ **Replacing damaged seal**

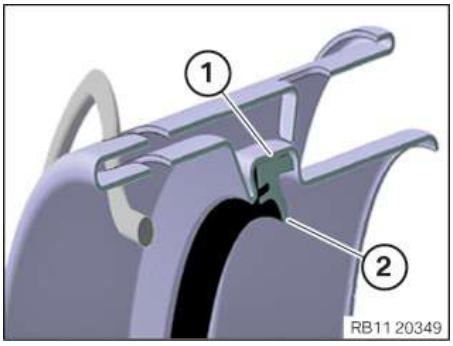
TECHNICAL INFORMATION

Do not use pointed or sharp-edged tools for the installation and/or removal.



- Remove damaged seal.
- Clean gasket groove (1) with a dry towel.

  The gasket groove (1) must be clean.



- Renew gasket.

  Parts: Gasket
- Install seal dry without lubricant or mounting agent.

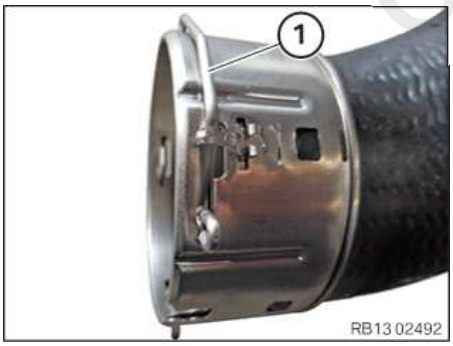
TECHNICAL INFORMATION

Incorrect assembly is possible. Ensure correct installation position.

- Feed in and install the seal.
- Make sure the seal is correctly installed in the gasket groove (1).
- Make sure that the sealing lip (2) is directed inwards as shown.



- Connect the pressure pipe to the throttle body until the locks (1) engage on both sides.



- Check that the locks (1) are correctly seated on the pressure pipe.

88 – Partially securing the wiring harness section on the intake plenum

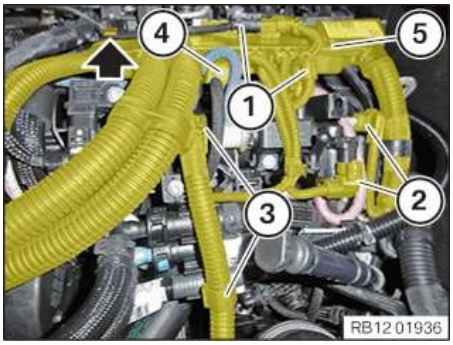
RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

- Route all cables without abrasions, do not trap and crush.

carsdiagn.com



- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

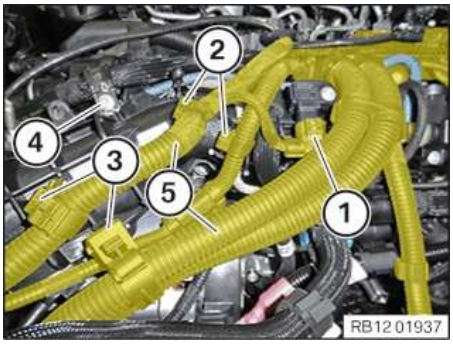
Wiring harness section to manifold

TS5x20		Tightening torque	3,6 Nm

- Secure clamps (3).
- Connect connectors (2) and lock.

  The connectors (2) must engage audibly.
- Secure the line at clamp (Arrow).
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



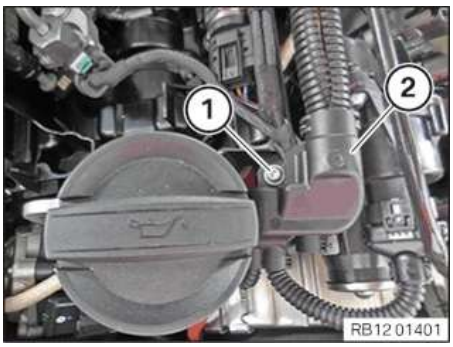
- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

Standard screw connection 4 Nm

Oval-head screw		Tightening torque	4 Nm

- Secure clamps (3).
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



- Guide in the wiring harness section (2) and install.
- Tighten down screw (1).

Wiring harness section to cylinder head cover

TS5x20		Tightening torque	3,6 Nm



- Connect connectors (1) and lock.

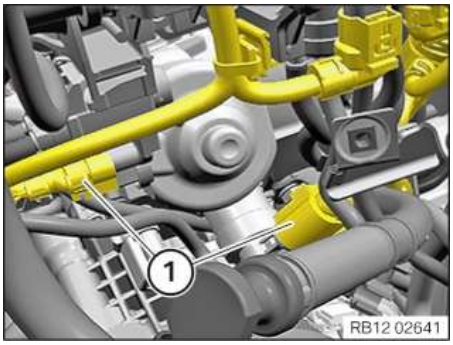
  The connector (1) must engage audibly.



- Connect the connector (1) and lock it.

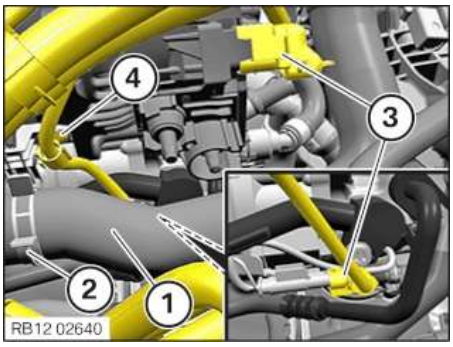
  The connector (1) must engage audibly.

cardiagn.com



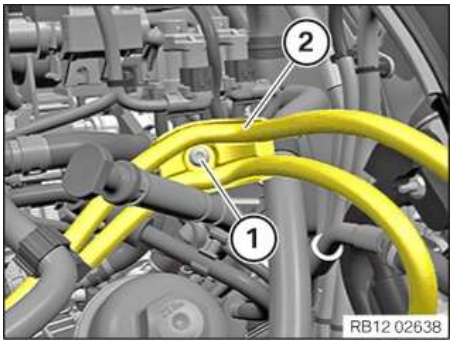
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



- Secure the clamp (4).
- Connect connectors (3) and lock.

  The connectors (3) must engage audibly.
- Feed the coolant line (1) into the holder (2) and install it.



- Feed in and position the positive battery cables (2) .
- Tighten down screw (1).

Standard screw connection M6

M6		Tightening torque	8 Nm



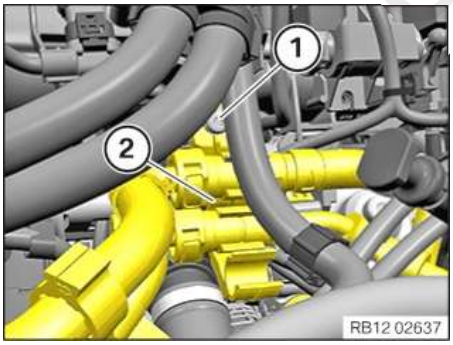
- Feed in and install the positive battery cable (4).
- Feed in and position the positive battery cables (4) .
- Renew the nuts (3) and (2).

  Parts: Nuts
- Tighten nuts (3) and (2).

Battery positive lead on the starter motor generator

M8		Tightening torque	19 Nm

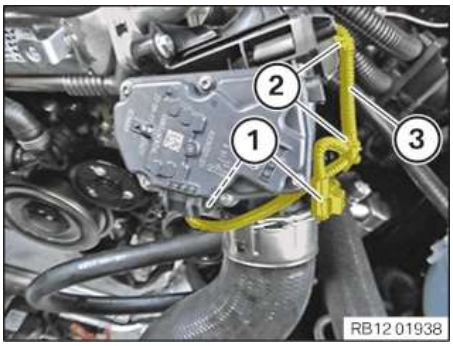
- Guide in and install the lid (1).



- Insert and install the holder (2).
- Tighten down screw (1).

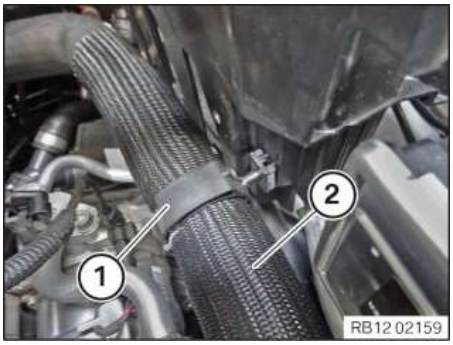
Holder on intake plenum

TS6X20		Tightening torque	5 Nm



- Guide in the wiring harness section (3) and install.
- Secure clamps (2).
- Connect connectors (1) and lock.

cardiagn.com



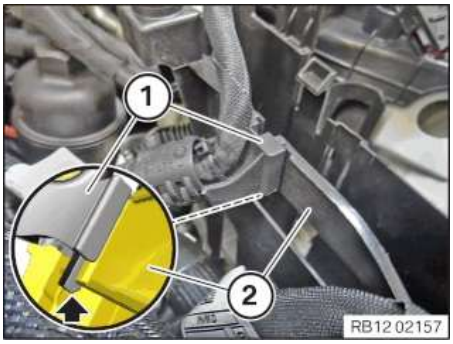
- Feed in and install coolant line (2).
- Lock holder (1).

  The holder (1) must engage audibly.



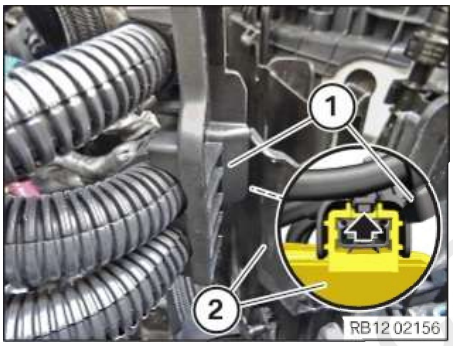
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.



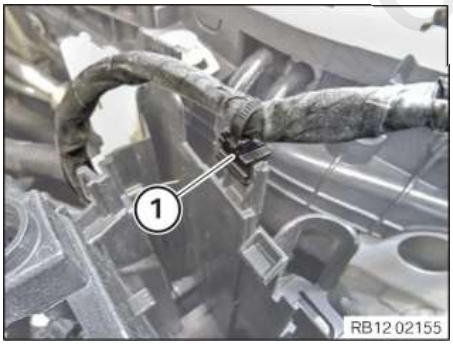
- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.

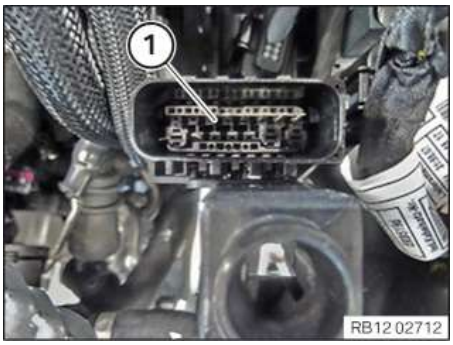


- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.



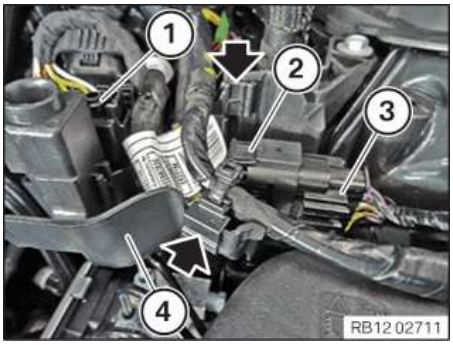
- Secure clamps (1).



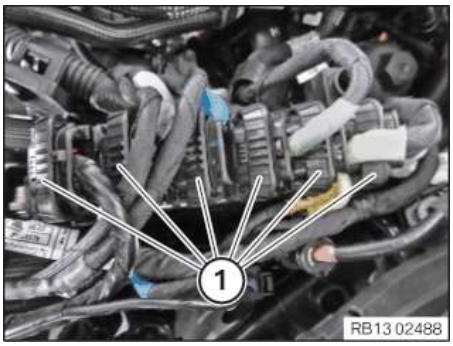
- Feed in and install the connector (1).

  The connector (1) must engage audibly.

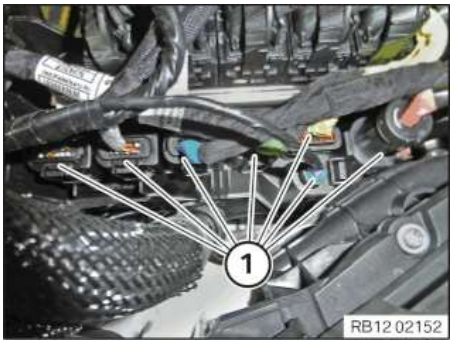
cardiagn.com



- Connect connector (3) to control unit holder (4) and lock it.
  The connector (3) must engage audibly.
- Connect connectors (2) and lock.
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.
  The connector (1) must engage audibly.
- Secure the clamps (arrows).

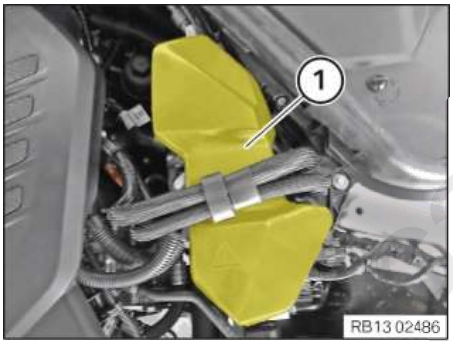


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



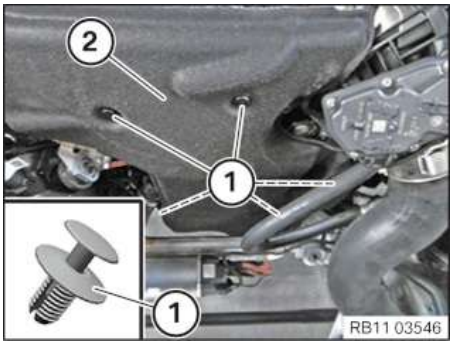
- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.

89 – Install the cover for the DDE control unit



- Insert and install cover (1) into guides.

90 – Install acoustic cover for the engine, front



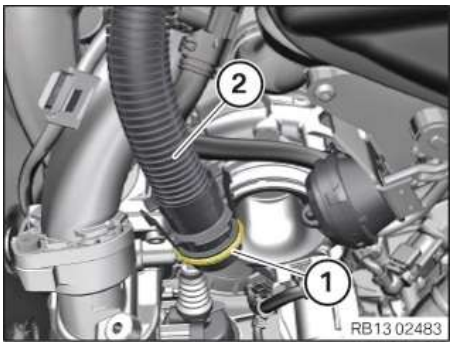
- Feed the acoustic cover (2) in and install.
- Secure the acoustic cover (2) with the expanding rivets (1).

91 – Installing the clean air pipe with resonator

bardiagn.com



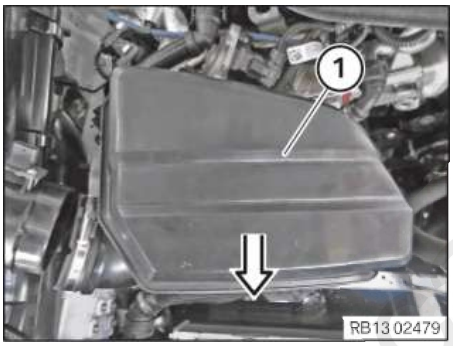
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



- Check the sealing ring (1) for the engine ventilation line (2) for damage and renew where required.



- Feed in and install clean air pipe with resonator (1) in the direction of the arrow.

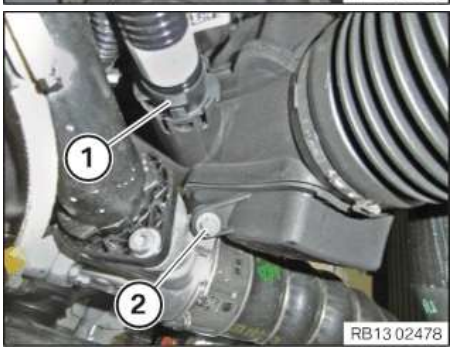


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

  The clamp (1) must engage audibly.

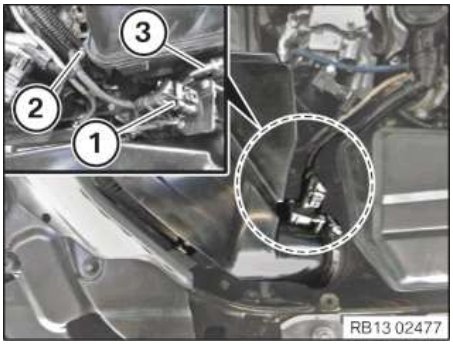


- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm

cardiagn.com



- Connect the clean air pipe with resonator to the intake filter housing.
- Tighten clamp (3).

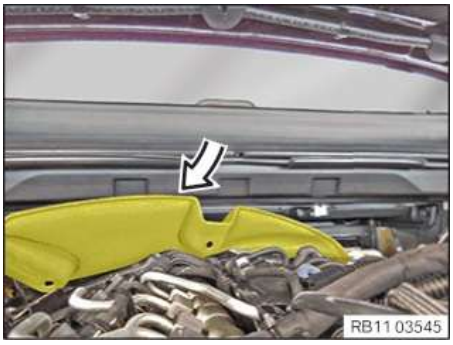
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

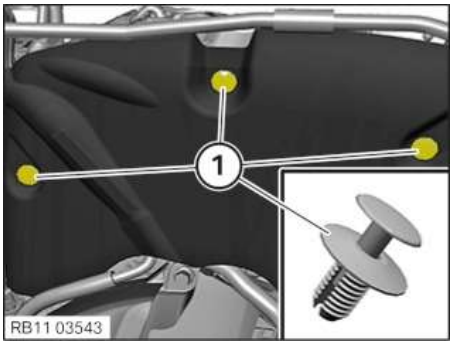
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

92 – Installing acoustic cover at rear

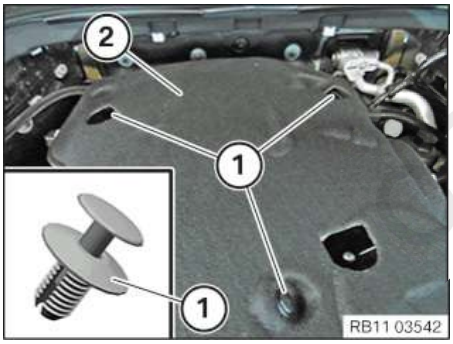


- Guide in the acoustic cover in the direction of the arrow and install it.



- Secure acoustic cover with the expanding rivets (1).

93 – Install the acoustic cover for the injectors



- Feed the acoustic cover (2) in and install.
- **If installed:** Secure the acoustic cover (2) with the expanding rivets (1) .

94 – Install acoustic cover

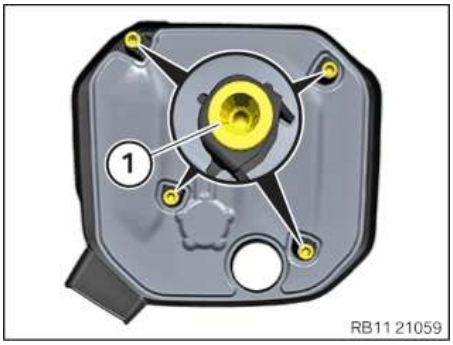
RISK OF DAMAGE

Damage to the acoustic cover/design cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.

cardiagn.com

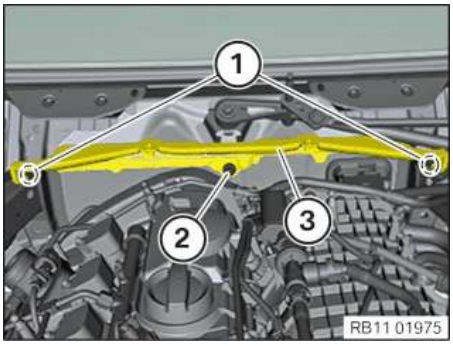


- Check the acoustic cover for correct fit of the rubber mounts (1).



- Clip in the acoustic cover (1) into the holders in the indicated areas.

95 – Installing centre bulkhead lower section

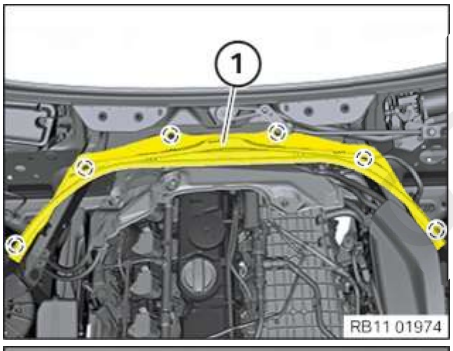


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

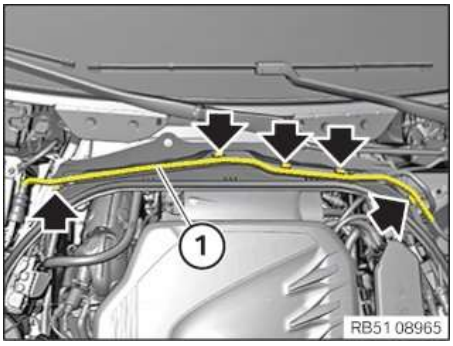
96 – Installing the centre bulkhead upper part



- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

Bulkhead upper part to bottom bulkhead

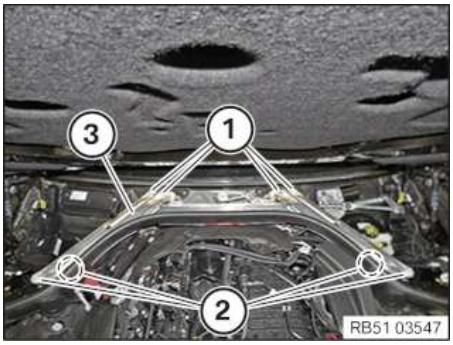
		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

  Clip in the wire (1) into the holders (arrows).

bardiagn.com



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Install the tension strut (3) on the spring strut dome.
- Tighten the screws (1).

Tension strut on bulkhead

M10x25 screw		Tightening torque	56 Nm

- Renew screws (2).

  Parts: Screws
- Tighten the screws (2).

Tension strut to spring strut dome

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

97 – Install the seal for the bonnet



- Press the rear bonnet seal (2) into the guide.
- Feed in cable (1) into the brackets.
- Check that the rear bonnet seal (2) and the cable (1) are seated correctly.

98 – Installing cowl panel cover

RISK OF DAMAGE

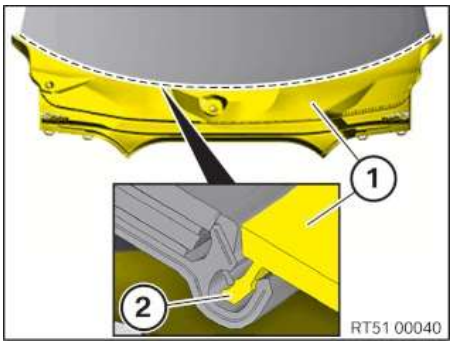
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

- Ensure correct installation of the components.
- Only use undamaged components.

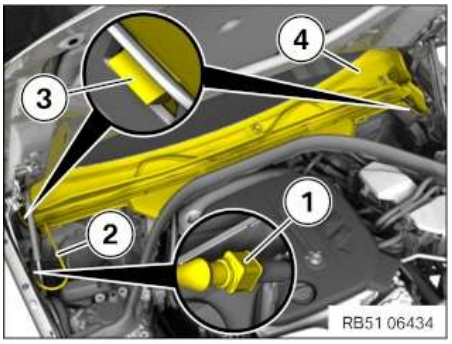
TECHNICAL INFORMATION

Before installing the cowl panel cover it is **mandatory** to check that the 48 V line is routed correctly and fitted tightly.
An incorrectly laid or attached 48 V line can be damaged by the wiper kinematics.



- Push the cowl panel cover (1) into the latch mechanism (2) beginning on the side.

cardiagn.com



- Clip cowl panel cover (4)in by means of the latch mechanisms (3).
- Position windscreen wash hose (2) and connect windscreen wash hose (1)quick lock.

99 – Install left and right wiper arm

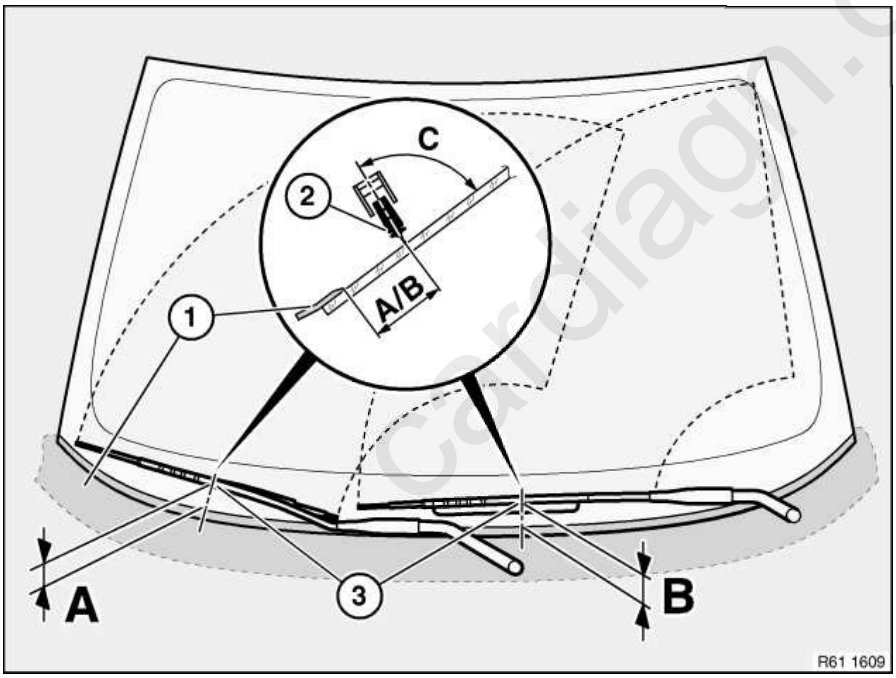
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

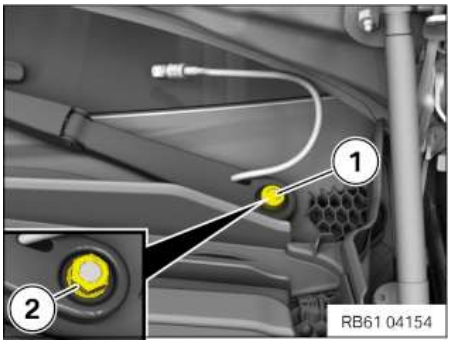
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- Connect the wiper arm (3).
- Correctly position the wiper arm (2) in relation to the window edge (1).

Distance from window pane edge to wiper blade

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm



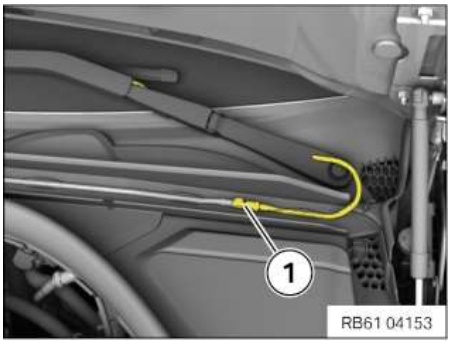
- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

- Connect the protective cap (1).

cardiagn.com



- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

100 – Connecting all battery earth leads



- See additional information.

101 – Activating the 48 V electrical system

Prerequisite

Ignition is switched off.

RISK OF DAMAGE

Damage to 48-V battery

If a 48-V battery that is disconnected from the electrical system is activated, the battery electronics will be damaged.

- Only carry out activation of the 48V electrical system with a completely connected 48-V battery.



- Lift battery earth lead (1).
- Remove special tool .



- Release the negative battery cable (2) of the 48-V battery from the mounting.
- Position the negative battery cable (2) of the 48-V battery on the negative battery terminal.
- Tighten nut (1).

Negative battery cable to 48-V battery

Nut M8		Tightening torque	19 Nm

cardiagn.com

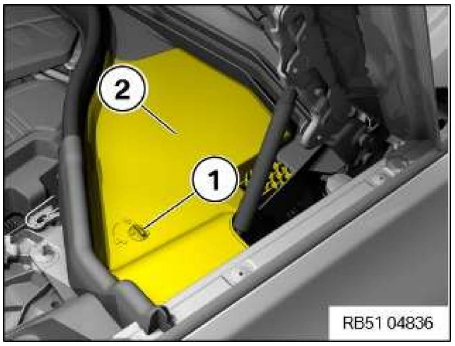


- Connect the connector (1) of the CAN bus and lock it.
- Clip in clip (2).



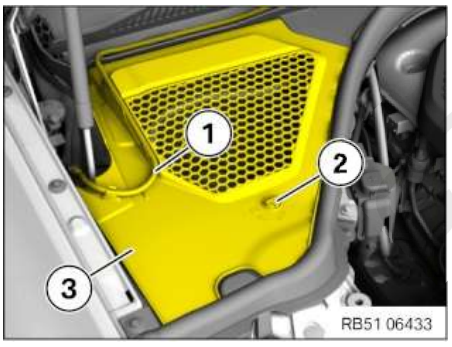
- Activate the 48V electrical system by closing the bonnet.
  The activation takes place automatically.

102 – Install the cover of the engine compartment on the rear left



- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

103 – Install the rear right engine compartment cover



- Position the cover of the engine compartment on the rear right (3).
- Close lock (2).
- Insert washer fluid hose (1) into the guides.

104 – Take bonnet out of the service position

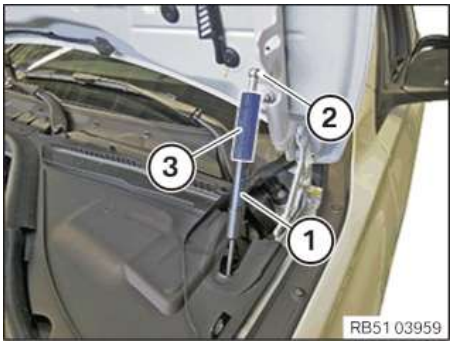
CAUTION

Shutting bonnet or tailgate.

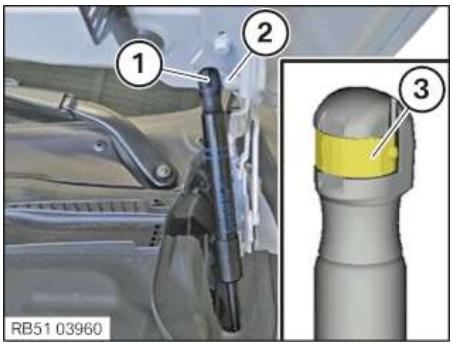
Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.

cardiagn.com



- Support the bonnet by hand.
- Remove the special tool (3) from the ball pin (2).
- Pull off the special tool (3) from the gas pressure spring (1).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.



- Check the clamp (3) is fitted correctly.
- Connect ball socket (1) to ball pin (2).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.

Additional Information

Overview of Tightening Torques

Special tool 2 365 488 to engine			Used in step 4260
M8x60		Tightening torque	19 Nm

Camshaft carrier to cylinder head			Used in step 52
M7x35		Tightening torque	13 Nm

Bearing journal to cylinder head			Used in step 55
M16x1.5	Replace bearing journal.	Tightening torque	20 Nm

Standard screw connection M8			Used in step 55
M8		Tightening torque	19 Nm

Chain tensioner piston to cylinder head			Used in step 56
22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

Holder to crankcase			Used in step 56
M8X16		Tightening torque	19 Nm

Camshaft sprocket to camshaft			Used in step 57
M7x17.			17 Nm

Starter motor to engine			Used in step 63
M8X60		Tightening torque	19 Nm

Battery positive lead to starter			Used in step 63
M8		Tightening torque	13,5 Nm

Diesel particulate filter V-clip to exhaust turbocharger			Used in step 65
V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

Bracket to diesel particulate filter top			Used in step 65
M8		Tightening torque	19 Nm

cardiagn.com

Bracket to transmission for diesel particulate filter holder bottom			Used in step 65
M8X20		Tightening torque	19 Nm

Lower holder to diesel particulate filter			Used in step 65
M8		Tightening torque	19 Nm

Coolant lines for SCR metering module			Used in step 65
M6X16		Tightening torque	8 Nm

Nitrogen oxide sensor before SCR catalytic converter			Used in step 66
Sensor		Tightening torque	50 Nm

Monitoring oxygen sensor			Used in step 67
Sensor		Tightening torque	50 Nm

Rear silencer to body / bumper support			Used in step 68
M8	Replace nuts.	Tightening torque	19 Nm

Exhaust system to rear axle carrier			Used in step 68
M8 nut		Tightening torque	19 Nm

Exhaust system to transmission			Used in step 68
M8		Tightening torque	19 Nm

Exhaust system to diesel particle filter			Used in step 68
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

SCR metering module V-clip to exhaust system			Used in step 68
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm

Exhaust-gas temperature sensor upstream of SCR catalytic converter			Used in step 68
Sensor		Tightening torque	30 Nm

Diesel particulate sensor to exhaust system			Used in step 68
Sensor		Tightening torque	50 Nm

Nitrogen oxide sensor downstream of SCR catalytic converter			Used in step 68
Sensor		Tightening torque	55 Nm

Connecting support to tunnel			Used in step 69
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

Diffuser / underbody panelling			Used in step 70
Nuts and screws		Tightening torque	3 Nm

Underbody protection			Used in step 7173
Hexagon screw		Tightening torque	3 Nm

Underbody panelling			Used in step 72
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Underbody protection, steering, to front axle support			Used in step 74
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support			Used in step 74
Hexagon bolt M6		Tightening torque	8 Nm

cardiagn.com

Underbody protection of the steering gear — Used in step 75

Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

Wheel arch trim panel, front — Used in step 75

Thermoplastic hexagon screw		Tightening torque	2,6 Nm

Underbody protection front — Used in step 76

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Cylinder head cover to cylinder head — Used in step 77

M6		Tightening torque.	8,5 Nm

Heat shield to exhaust manifold — Used in step 78

M6x12			10 Nm

Bracket on cylinder head cover — Used in step 79

		Tightening torque	5 Nm

Battery positive lead to battery positive terminal — Used in step 79

M8		Tightening torque	19 Nm

Differential pressure sensor of diesel particulate filter on cylinder head cover — Used in step 80

TS5x20		Tightening torque	4 Nm

Heat shield to exhaust manifold — Used in step 81

M6x12		Tightening torque	10 Nm

Banjo bolt for exhaust pressure pipe to exhaust manifold — Used in step 81

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm

Exhaust gas pressure pipe to sensor system holder — Used in step 81

TS6x20		Tightening torque	5,7 Nm

Clamping claw facing to cylinder head cover — Used in step 82

M6		Tightening torque	10 Nm

Injector to cylinder head cover — Used in step 82

M8		Tightening torque	8 Nm
		Angle of rotation	120 °

Rail to cylinder head cover — Used in step 83

M8		Tightening torque	19 Nm

High pressure lines between high pressure pump and rail — Used in step 84

High-pressure pipe		Tightening torque	24.5 Nm

High pressure lines between injector and rail — Used in step 85

High-pressure pipe		Tightening torque	24.5 Nm

Intake plenum to cylinder head — Used in step 87

M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum — Used in step 87

		Tightening torque	10 Nm

cardiagn.com

Electric changeover valve to intake plenum			Used in step 87
TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold			Used in step 88
TS5x20		Tightening torque	3,6 Nm

Standard screw connection 4 Nm			Used in step 88
Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover			Used in step 88
TS5x20		Tightening torque	3,6 Nm

Standard screw connection M6			Used in step 88
M6		Tightening torque	8 Nm

Battery positive lead on the starter motor generator			Used in step 88
M8		Tightening torque	19 Nm

Holder on intake plenum			Used in step 88
TS6X20		Tightening torque	5 Nm

Clean air pipe to exhaust turbocharger			Used in step 91
M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing			Used in step 91
Clamp		Tightening torque	3 Nm

Bulkhead lower part to body			Used in step 95
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead			Used in step 96
		Tightening torque	3 Nm

Tension strut on bulkhead			Used in step 96
M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome			Used in step 96
Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm			Used in step 99
Combination hexagon nut		Tightening torque	35 Nm

Negative battery cable to 48-V battery			Used in step 101
Nut M8		Tightening torque	19 Nm

Overview of Special Tools

cardiagn.com

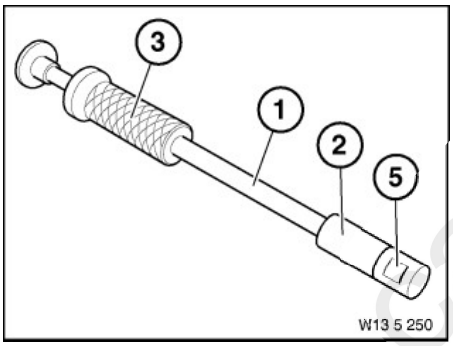
0 493 339 (13 5 252) Bush



Common Used in step 23

Usage	(Threaded bush)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 321 (13 5 250) Puller



Common Used in step 23

Usage	For removing injector nozzles or injectors from cylinder head
Included in the tool or work	
Storage location	A16
Replaced by	
In connection with	
SI-Number	01 06 98 (306)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 338 (13 5 251)		**Rod** (guide rod)	
2	0 493 339 (13 5 252)		**Bush** (Threaded bush)	
3	0 493 340 (13 5 253)		**Weight** (Weight)	
4	0 493 379 (13 5 254)		**Claw** (Clamping claw) For removal of injector nozzles / engine: M57	
5	0 495 579 (13 5 255)		**Adapter** For removing steering shaft on E85. Refer to SI 01 11 06 (265)	

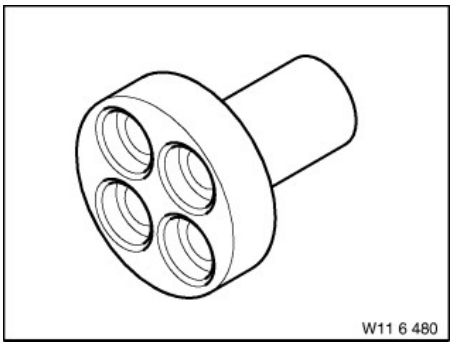
cardiagn.com

0 493 340 (13 5 253) Weight



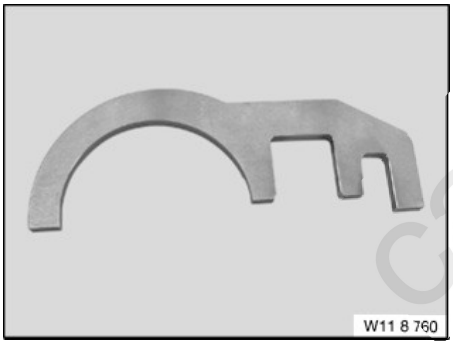
Common	Used in step 23
Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 380 (11 6 480) Connector



Common	Used in step 4260
Usage	For turning over engine at crankshaft hub (vibration absorber).
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	01 11 98 (338)

0 496 112 (11 8 760) Gauge



Common	Used in step 424653586061
Usage	For securing camshaft at TDC.
Included in the tool or work	
Storage location	B24
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

2 365 488 Adapter



Common	Used in step 42596062
Usage	For disconnecting the crankshaft at the top dead centre. (longitudinal installation with automatic transmission only).
Included in the tool or work	
Storage location	C56
Replaced by	
In connection with	
SI-Number	01 46 14 (191)

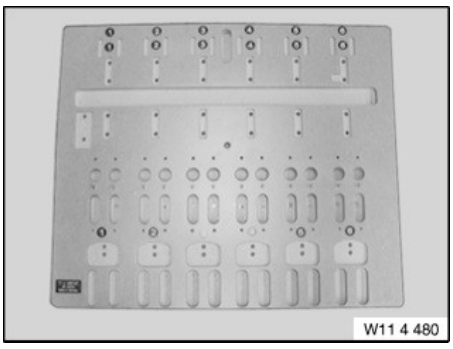
cardiagn.com

2 288 380 Locating stud



Common	Used in step 42596062
Usage	For disconnecting the crankshaft at the top dead centre. Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).
Included in the tool or work	
Storage location	A56
Replaced by	
In connection with	
SI-Number	01 04 14 (071)

0 495 105 (11 4 480) oddments tray

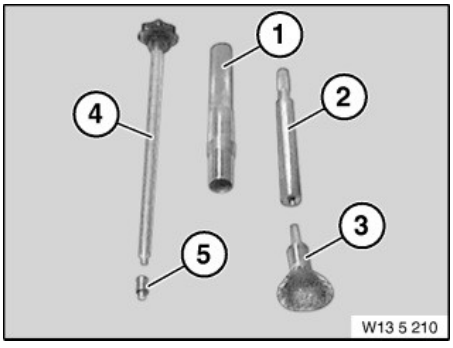


Common	Used in step 4849
Usage	(Boards (2 pieces)) For setting down the individual components of the cylinder head.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 17 04 (130)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 495 106 (11 4 481)		**oddments tray** (Board, intake side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	
2	0 495 107 (11 4 482)		**oddments tray** (Board, exhaust side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	

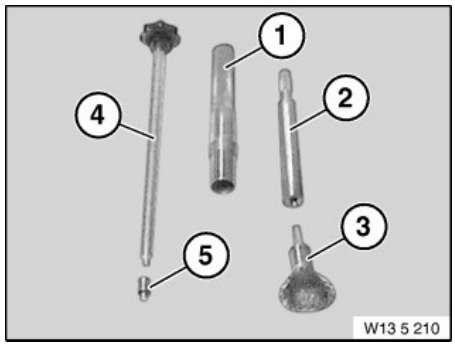
0 493 763 (13 5 215) Plug



Common	Used in step 82
Usage	(Seal plug)
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

cardiagn.com

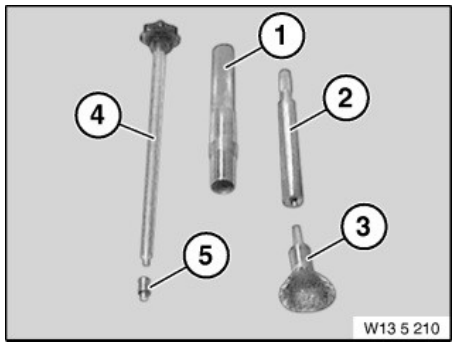
0 493 762 (13 5 214) Rod



Common Used in step 82

Usage	(Mounting rod) For the seal plug
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 758 (13 5 210) Tool



Common Used in step 82

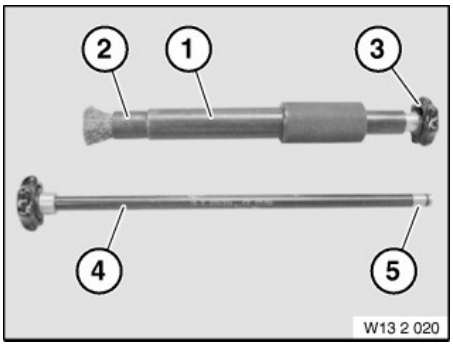
Usage	(Cleaning set) For injector channels
Included in the tool or work	
Storage location	B4
Replaced by	
In connection with	
SI-Number	01 05 00 (574)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 759 (13 5 211)		**Holding sleeve** (Guide sleeve)	
2	0 493 760 (13 5 212)		**Holder** (Brush holder)	
3	0 493 761 (13 5 213)		**Brush head**	
4	0 493 762 (13 5 214)		**Rod** (Mounting rod) For the seal plug	
5	0 493 763 (13 5 215)		**Plug** (Seal plug)	

carmagn.com

0 496 150 (13 2 020) Tool



Common Used in step 82

Usage	(Cleaning kit) For cleaning the injector shaft.
Included in the tool or work	
Storage location	A87
Replaced by	
In connection with	
SI-Number	01 07 07 (355)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 496 151 (13 2 021)		**Holding sleeve** (Guide sleeve) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
2	0 496 152 (13 2 022)		**Holder** (Brush holder) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
3	0 496 153 (13 2 023)		**Brush head** Remaining inventories will be sold off, followed by discontinuation and then available as part of complete special tool 13 2 020 = 83 30 0 496 150 only	
4	0 496 154 (13 2 024)		**Rod** (Mounting rod) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
5	0 496 155 (13 2 025)		**Plug** (Seal plug) Available as part of complete special tool 13 2 020 = 83 30 0 496 150 only.	

cardiagn.com

Distance from window pane edge to wiper blade	Used in step 99
Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

Links

Repair instructions (PRE)	Used in step
Notes on 48-V battery	4101

General repair instructions	Used in step
11 00 ... Overview of consumables (Electronic Parts Catalogue)	82

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5100
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5100
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5100
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5100
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100

cardiagn.com

61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 20 900 Disconnecting and connecting battery earth lead	5100
61 35 ... Notes on ESD protection (Electro Static Discharge)	17233839
61 35 ... Notes on ESD protection (Electro Static Discharge)	17233839

cardiagn.com

11 33 062 Replacing all hydraulic valve clearance compensating elements

PRELIMINARY WORK

1 – Bring front compartment lid in the service position

Prerequisite

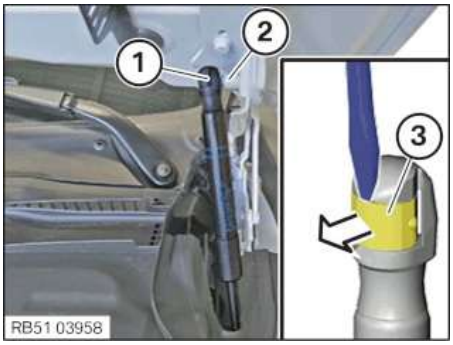
Engine compartment lid is open.

CAUTION

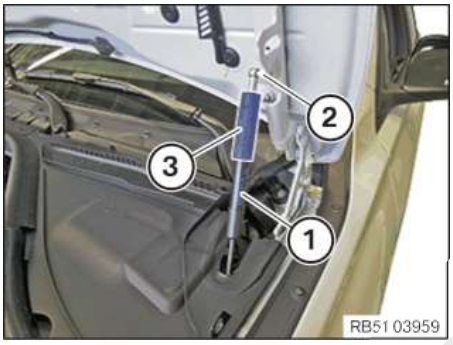
Shutting bonnet or tailgate.

Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.



- Lift clamp (3) slightly using a screwdriver, in the direction of the arrow.
- Lift off ball socket (1) from ball pin (2).
- Repeat the operation on the other side of vehicle.



TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

- Remove the bonnet support and open the bonnet further.
- Pull special tool or or (3) over gas pressure spring (1).
- Place special tool on the ball pin (2) and engage using force.
- Repeat the operation on the other side of vehicle.

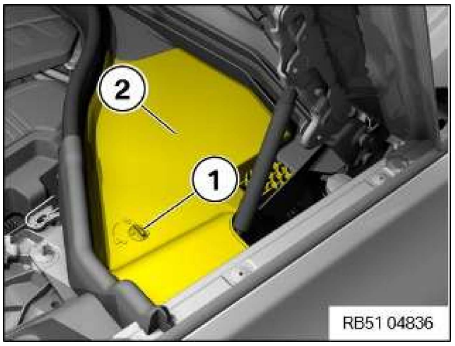
2 – Disconnecting all battery earth leads



- See additional information.

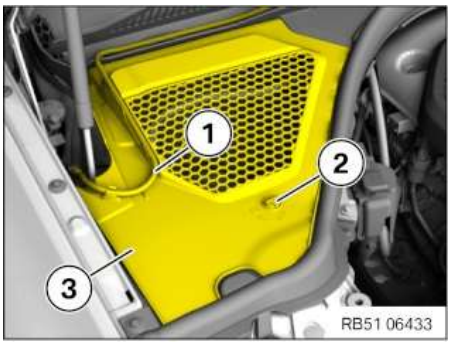
3 – Remove the cover of the engine compartment at the rear left

cardiagn.com



- Loosen the lock (1).
- Remove the cover (2) of the rear left engine compartment.

4 – Remove the cover of the rear right engine compartment



- Release washer fluid hose (1) from the guides.
- Loosen the lock (2).
- Remove the cover (3) of the rear right engine compartment.

5 – Removing the wiper arm on the left and right

NOTICE

Description is for left component only. Procedure on the right side is identical.

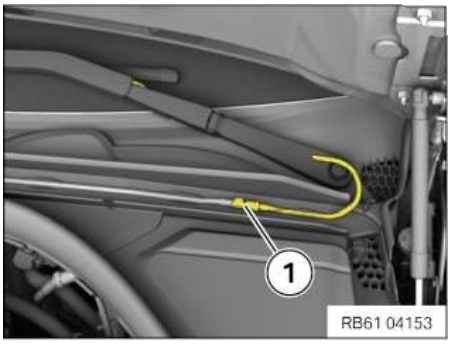
▸ **Remove the wiper arm**

RISK OF DAMAGE

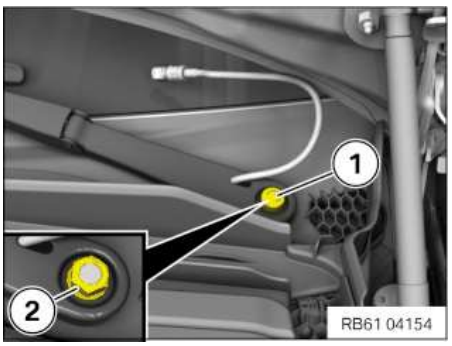
Damage to wiper console.

While removing the wiper arms without using special tool, the wiper console can break.

- Removing the wiper arms must be carried out only using the prescribed special tool.
- Do **not** lever off the wiper arm because otherwise the wiper console may break at the predetermined breaking point for active pedestrian protection.

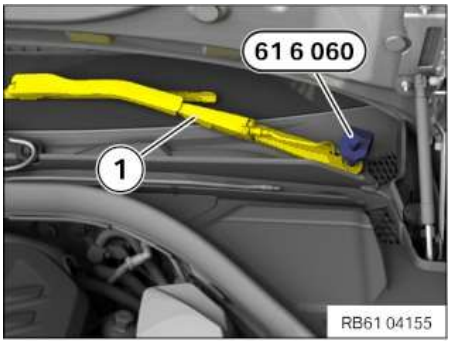


- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.



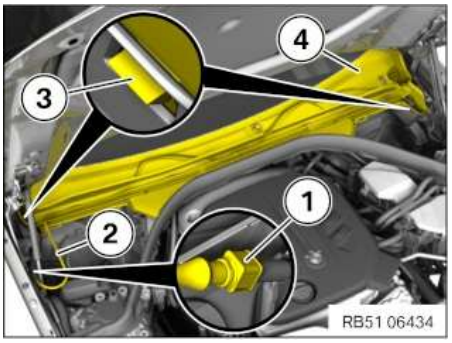
- Remove the protective cap (1).
- Loosen nut (2).

cardiagn.com

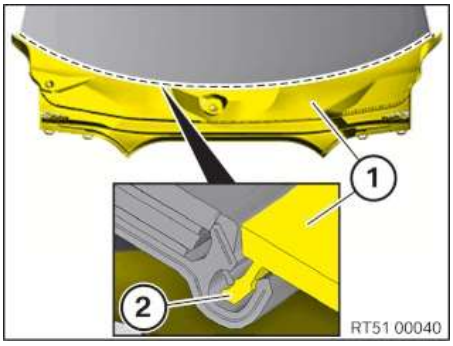


- Pull off the wiper arm (1) using special tool .

6 – Remove cowl panel cover



- Release snap fastener (1) of the washer fluid hose (2) and put the washer fluid hose (2) to one side.
- Unclip clips (3) on the cowl panel cover (4).



- Pull the cowl panel cover (1) upward out of the latch mechanism (2) beginning on the side.

7 – Remove the seal for the rear bonnet

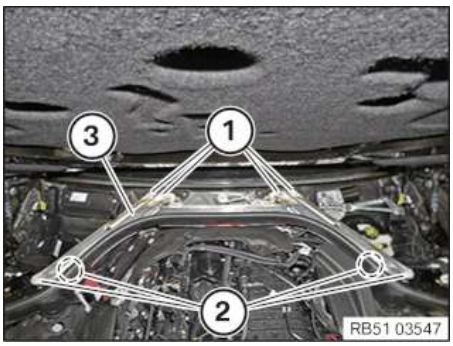


- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

8 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

Driving without the strut brace/front-end strut or tension strut is not permitted.

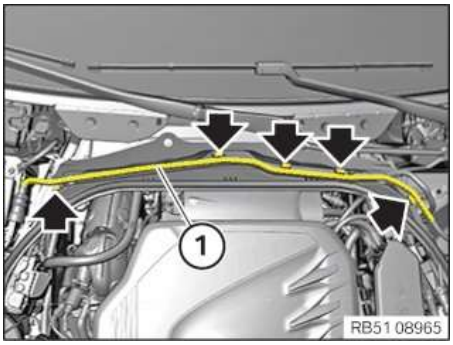


NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

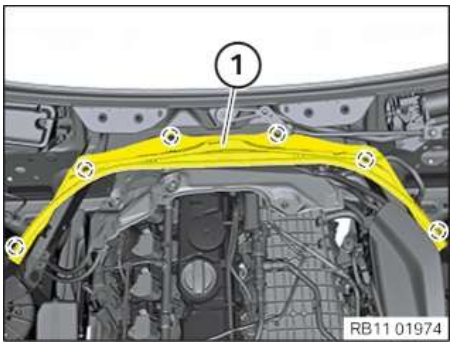
- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.

bardiagn.com



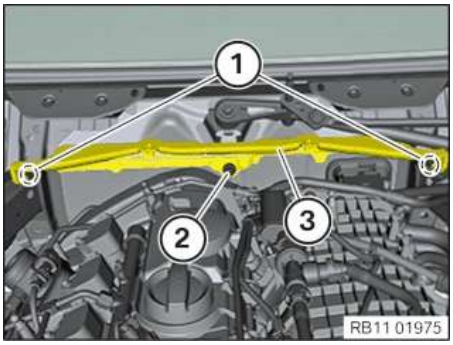
- **Version with mild hybrid technology:**

  Unclip the wire (1) at the holders (arrows).



- Unscrew the bolts in the marked areas.
- Remove the centre bulkhead upper part (1).

9 – Removing the centre bulkhead lower section



- Loosen screws (1).
- Loosen nut (2).
- Remove the centre bulkhead lower part (3).

10 – Removing the acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

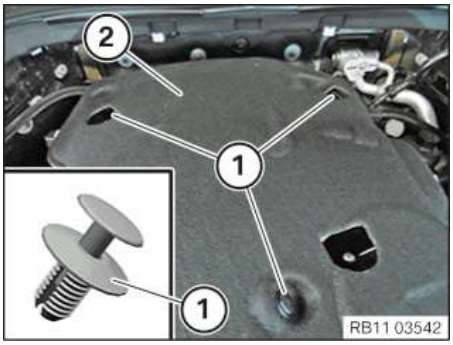
- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

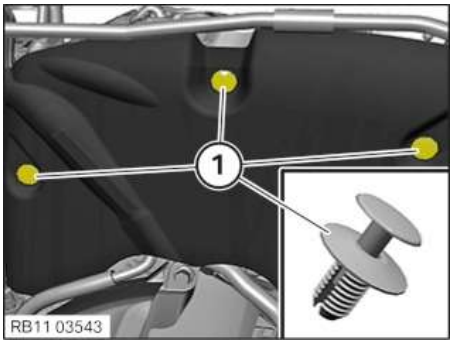
11 – Remove the acoustic cover for the injectors

cardiagn.com

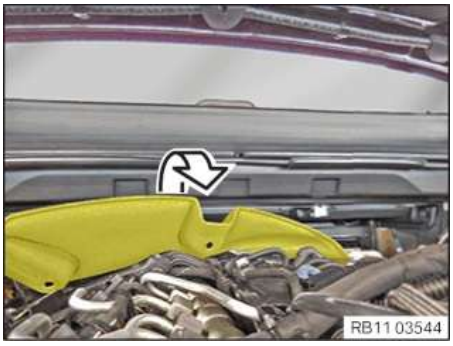


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

12 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).



- Guide out and remove the acoustic cover in the direction of the arrow.

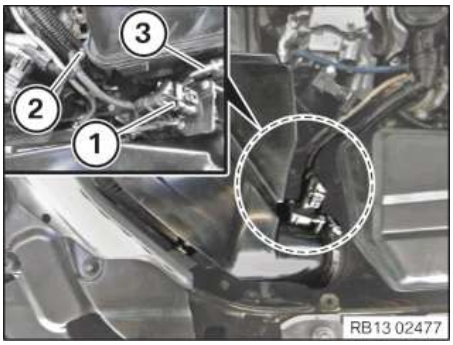
13 – Removing the clean air pipe with the resonator

WARNING

Hot surfaces.

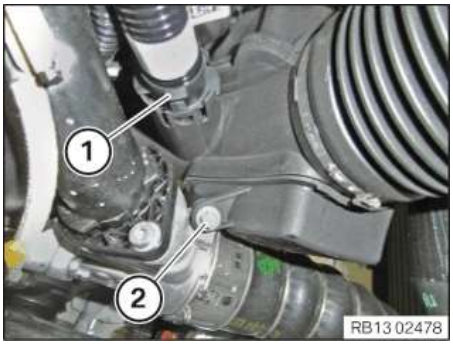
Risk of burning!

- Perform all work only on components that have cooled down.

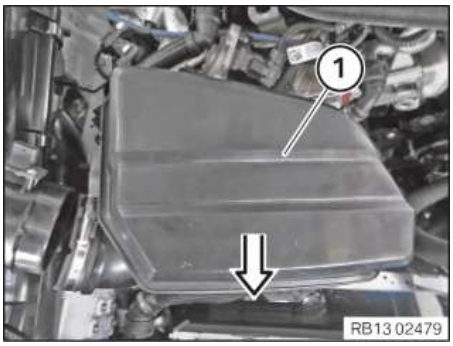


- Unlock plug connection (1) and disconnect.
- Loosen clamp (2).
- Unfasten clamp (3).
- Separate the clean air pipe with resonator from the intake filter housing.

cardiagn.com



- Unlock engine ventilation line (1), disconnect it and place it aside.
- Loosen screw (2).



- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Unlock and loosen clamp (1).



- Feed out and remove clean air pipe with resonator (1) in the direction of the arrow.

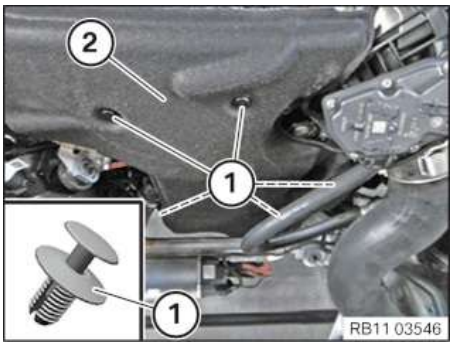
14 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.



- Release and remove expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

cardiagn.com

15 – Partially releasing the wiring harness section on the intake plenum

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

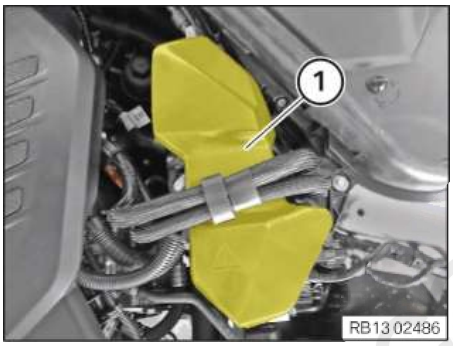
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

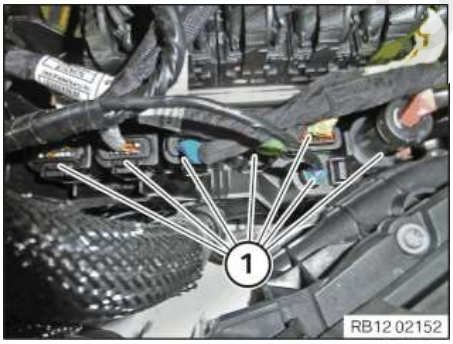
- Do not pull on the wires when disconnecting connectors and plug connections.

TECHNICAL INFORMATION

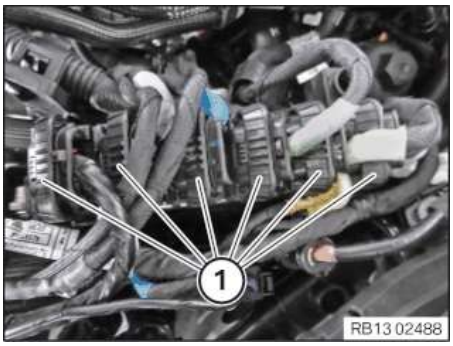
Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.



- Pull off cover (1) upwards, feed out and remove.

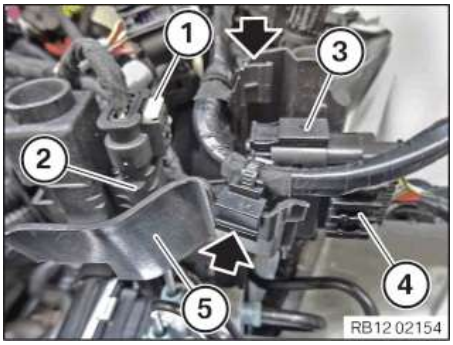


- Unlock and disconnect plug connections (1).

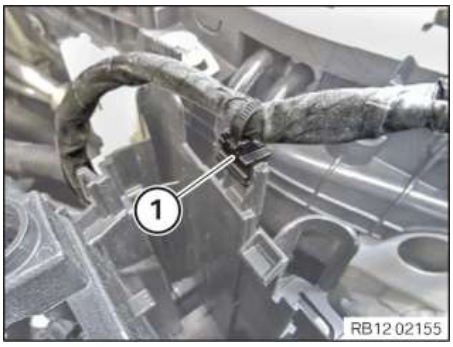


- Unlock and disconnect plug connections (1).

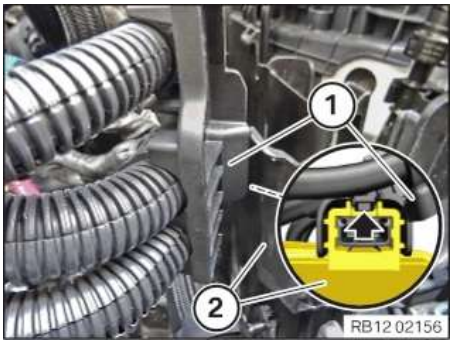
ardiagn.com



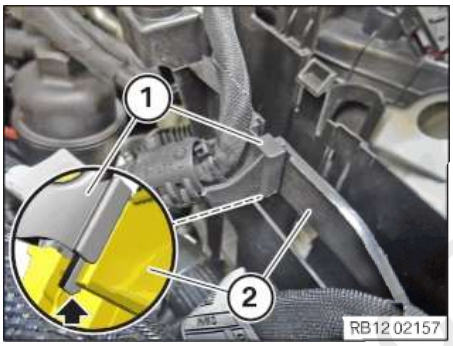
- Unlock plug connection (1) and disconnect.
- Unlock the plug (2) and disconnect from the control unit holder (5).
- Unlock plug connection (3) and disconnect.
- Unlock the plug (4) and disconnect from the control unit holder (5).
- Release the clamps (arrows).



- Loosen clamp (1).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).

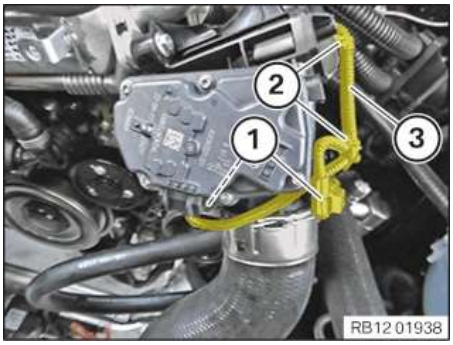


- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.

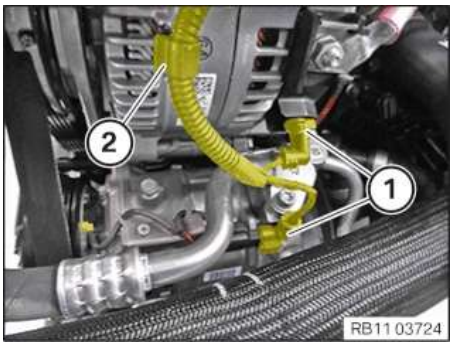


- Unlock holder (1) and feed out coolant line (2) and place it aside.

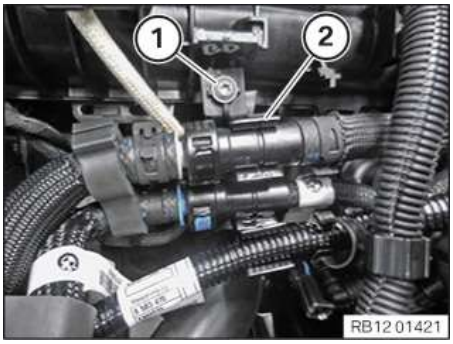
gardiagn.com



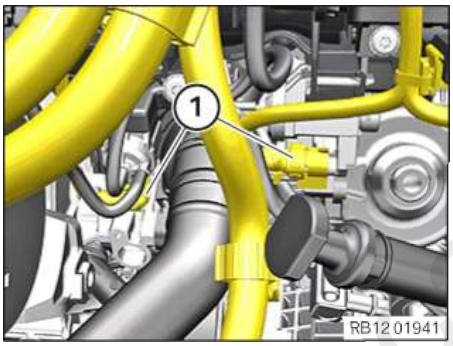
- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.



- Unlock and separate plug connections (1).
- Release the holder (2) from the alternator .



- Loosen screw (1).
- Thread out holder (2) and set aside.



- Unlock and disconnect plug connections (1).

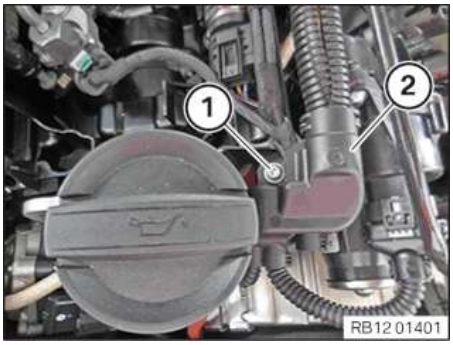


- Unlock and loosen connector (1).

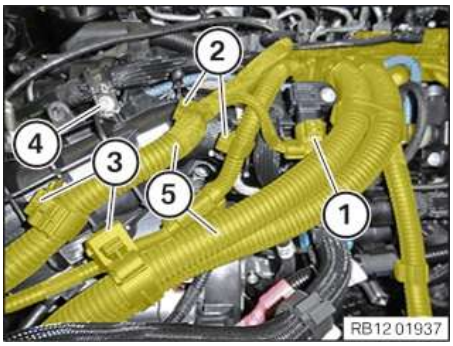


- Unlock plug connection (1) and disconnect.

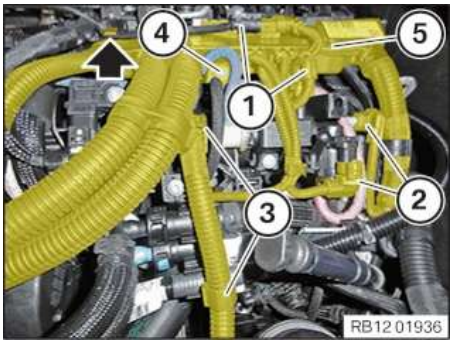
cardiagn.com



- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.



- Unlock plug connection (1) and disconnect.
- Loosen clamps (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.



- Unlock and disconnect plug connections (1).
- Release line from clamp (Arrow).
- Unlock and disconnect plug connections (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.

16 – Removing the intake plenum

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

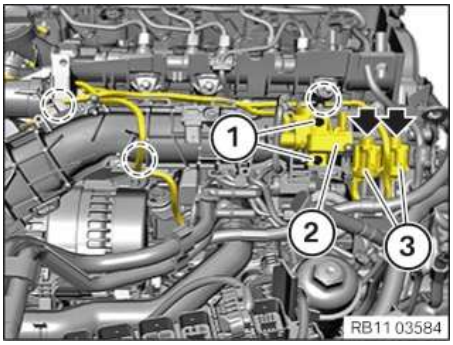


- Unlock clamp (1) and engage in this position.

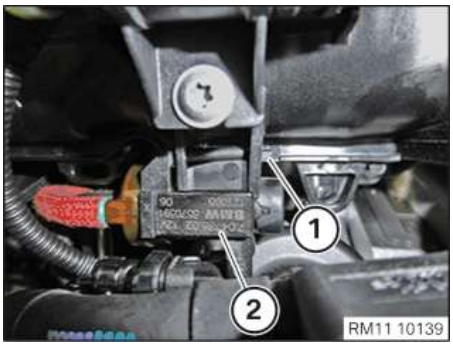


- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.

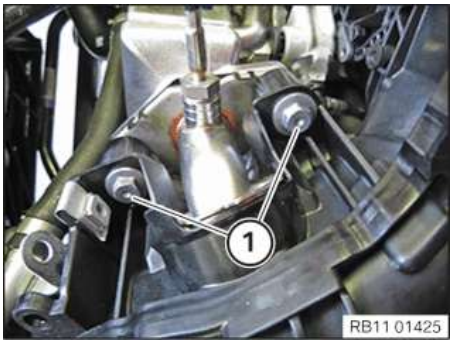
cardiagn.com



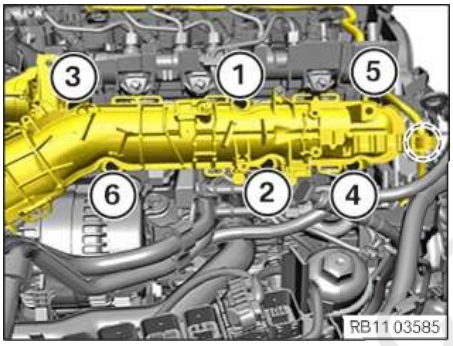
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



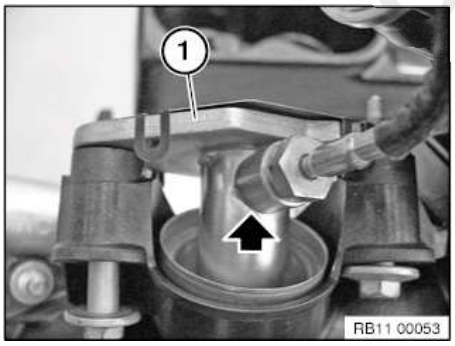
- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.



- Loosen screws (1).



- Detach the leakage oil lines in the marked area from the intake plenum.
- Loosen screws in the order (6) to (1).
- Guide the intake plenum out forwards and remove it.



- Remove the exhaust-gas recirculation pipe (1) (arrow).

17 – Detaching the leakage oil line from the injectors

cardiagn.com

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

WARNING

Hot surfaces.

Risk of burning!

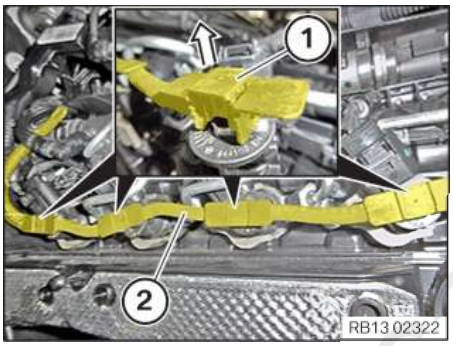
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

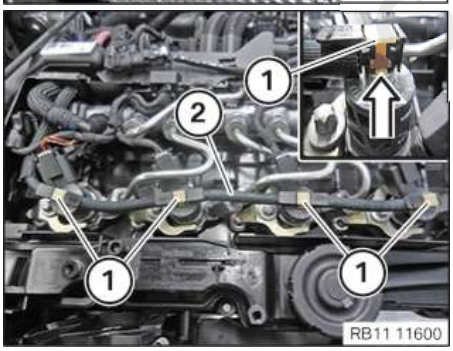


- **Version A:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.

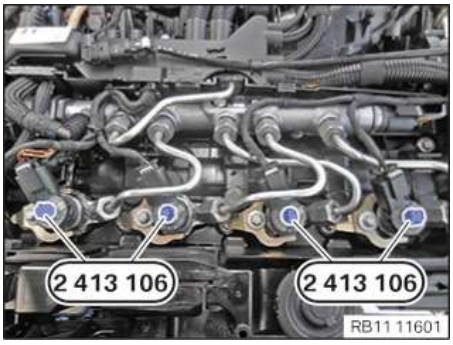


- **Version B:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.



- Seal open connections with special tools .

18 – Remove the high pressure lines between the injector and the rail

cardiagn.com

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

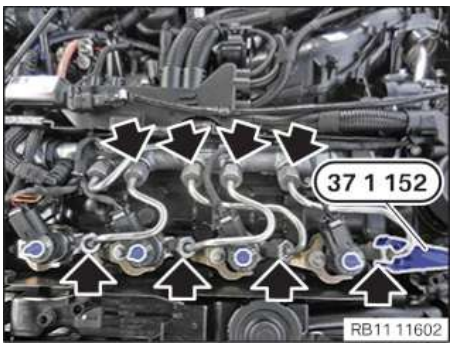
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

If several high pressure lines are removed, ensure that each high pressure line is installed in its original location. Label high pressure lines.

TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.



- Release the high pressure lines (arrows) with the special tool .
  Reset the special tool early on to prevent bending of the high pressure line.
- Catch and dispose of escaping fuel.
- Feed out and remove the high pressure lines (arrows).
- Seal off all the open cable connections with the special tool .

cardiagn.com

19 – Remove the high pressure line between the high pressure pump and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Hot fluids.

Risk of scalding!

- Conduct all work in the vehicle wearing appropriate personal protective equipment only.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

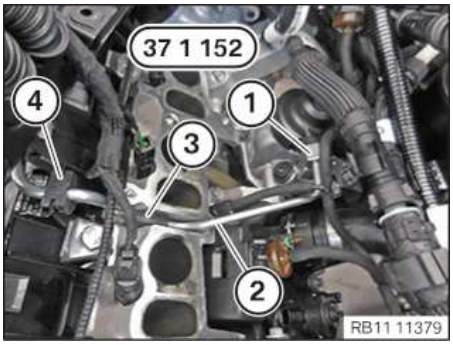
TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.

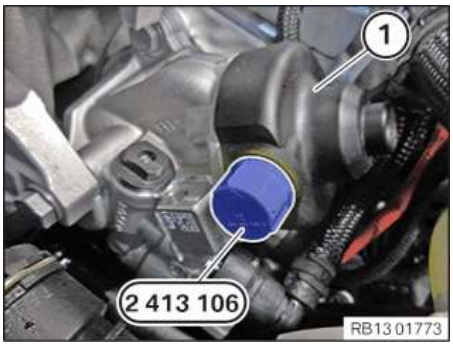


- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.

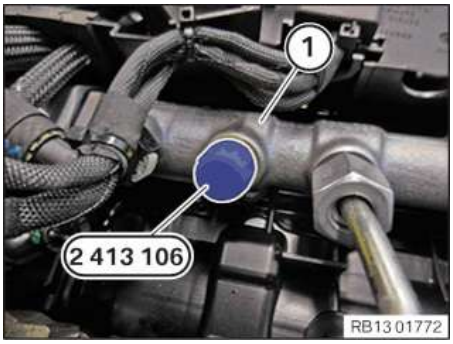
cardiagn.com



- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.
- Guide out and remove the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).



- Seal off the opening at the high pressure pump (1) with the special tool .



- Seal off the opening on the rail (1) with the special tool .

20 – Remove high-pressure rail

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

RISK OF DAMAGE

Contaminant or foreign body.

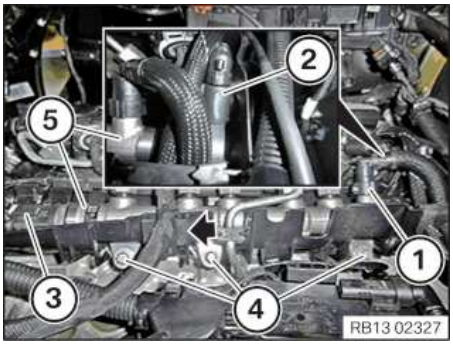
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

cardiagn.com



- Unlock and disconnect the fuel return line (1).
- Guide the fuel return line (1) out and set it aside.
- Unlock and disconnect the plug connection (2) on the rail pressure regulating valve.
- Unlock and disconnect the plug connection (3) on the rail pressure sensor.
- Unlock cable clip (Arrow), feed out and place aside.
- Loosen screws (4).
- Thread out and remove the rail (5).

21 – Remove all injection systems

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

cardiagn.com

RISK OF DAMAGE

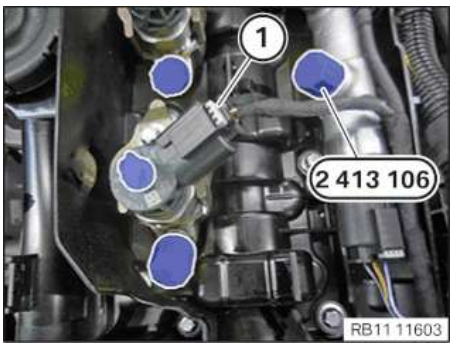
Electrostatic discharge.

Damage to or destruction of electrical components.

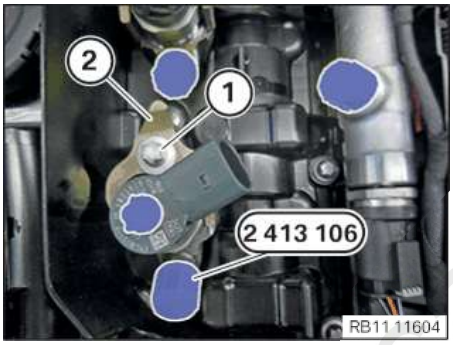
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

TECHNICAL INFORMATION

If several injectors are removed, ensure that each injector is installed at its original location (cylinder). Mark injectors.



- Unlock plug connection (1) and disconnect.



- Loosen screw (1).
- Guide out and remove clamping claw (2).
- Feed out and remove the injector with slight rotational movements.

▸ **Loosen stuck injectors**

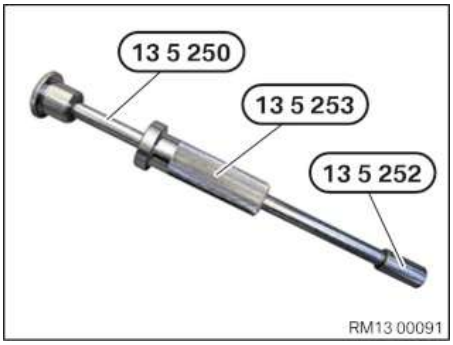
RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

cardiagn.com



- Unscrew special tool 0 493 339 (13 5 252) from special tool 0 493 321 (13 5 250) and remove special tool 0 493 340 (13 5 253).
- Screw special tool 0 493 339 (13 5 252) back onto special tool 0 493 321 (13 5 250).

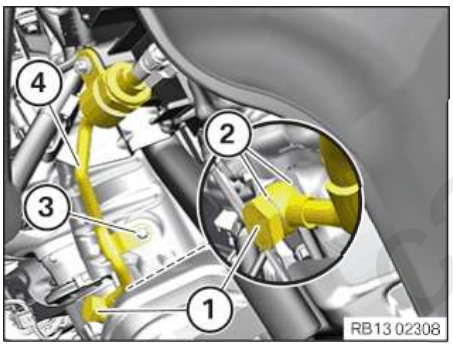


- Screw special tool 0 493 321 (13 5 250) with special tool 0 493 339 (13 5 252) onto pressure line connection (1) of injector.
- Release injector (1) with special tools 0 493 321 (13 5 250) and 0 493 339 (13 5 252) by means of **short** back and forth movements and remove.

22 – Remove the exhaust gas pressure pipe

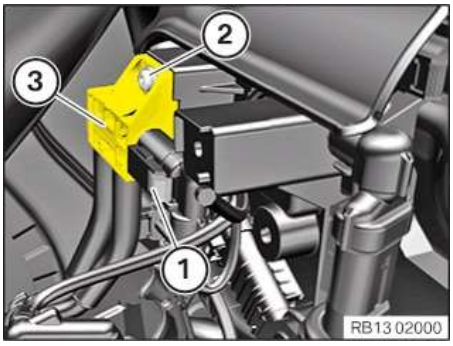


- Unlock plug connection (1) and disconnect.
- Loosen screw (2).



- Unscrew the banjo bolt (1).
- Feed out and remove the sealing rings (2).
- Loosen screw (3).
- Feed out and remove the exhaust gas pressure pipe (4).

23 – Releasing the differential pressure sensor for the diesel particulate filter



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).
- Remove the differential pressure sensor (3) and put it to one side.

24 – Removing the sensor bracket on the cylinder head cover

carbagn.com

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

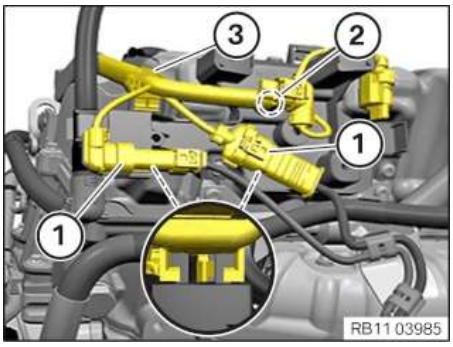
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

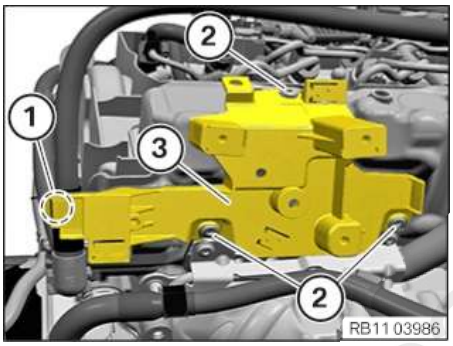
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

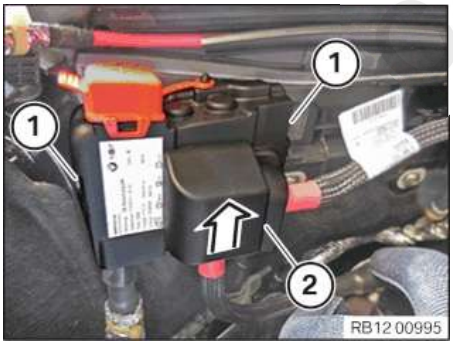
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



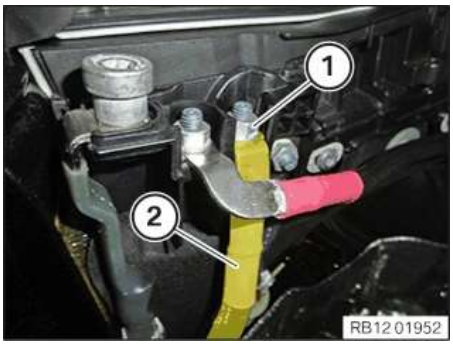
- Unlock plug connection (1) and disconnect.
- Unlock the plug connection (1) and release it from the sensor bracket.
- Release the cable clip in the area (2) from the sensor bracket.
- Release the clamps (3) and set the wiring harness section aside.



- Release the positive battery cable in the area (1) from the clamp and set it aside.
- Loosen screws (2).
- Feed out holder (3) for the sensor system and remove.

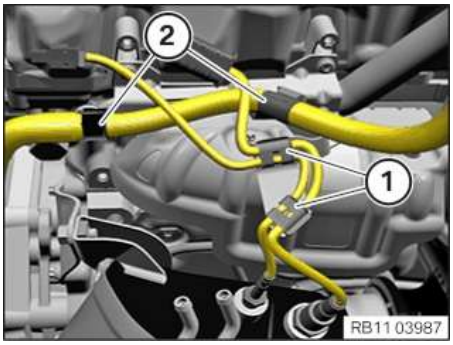


- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.

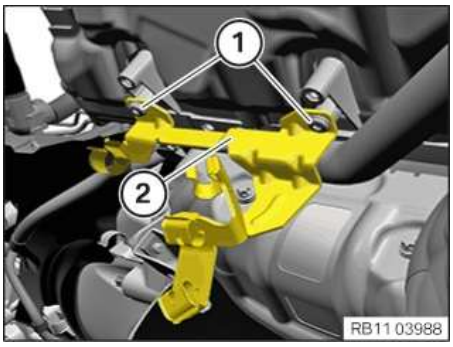


- Loosen nut (1).
- Feed out positive battery cable (2) and put to one side.

cardiagn.com

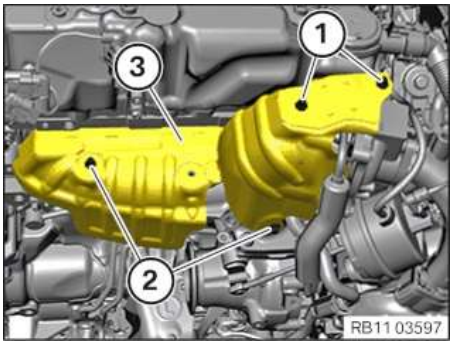


- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



- Loosen screws (1).
- Guide out and remove holder (2).

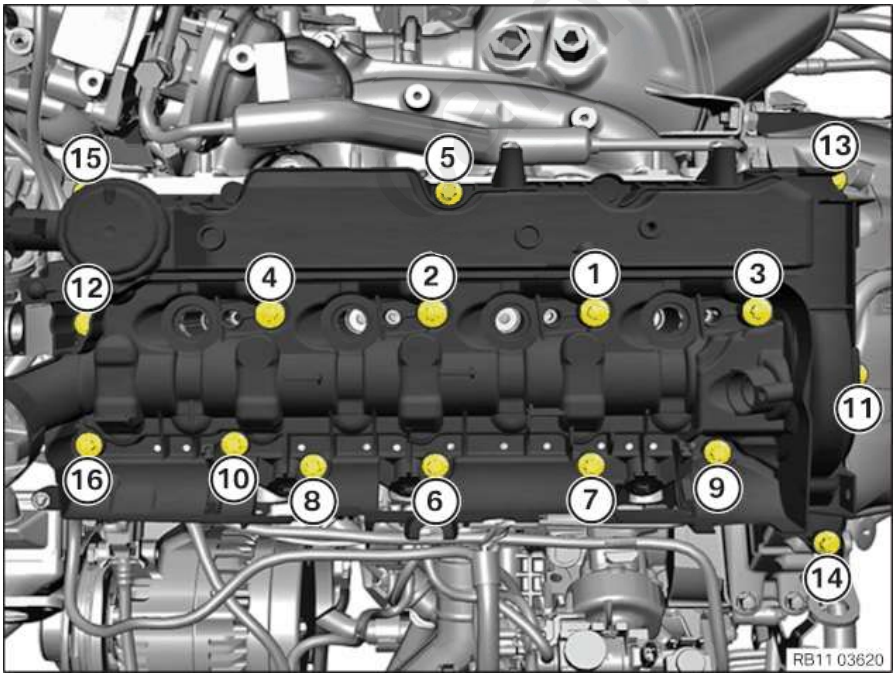
25 – Removing heat shield



- Loosen screws (1).
- Loosen screws (2).
- Feed out and remove the heat shield (3).

26 – Removing the cylinder head cover

Screw connection of the cylinder head cover



1 - 16 Bolts of the cylinder head cover

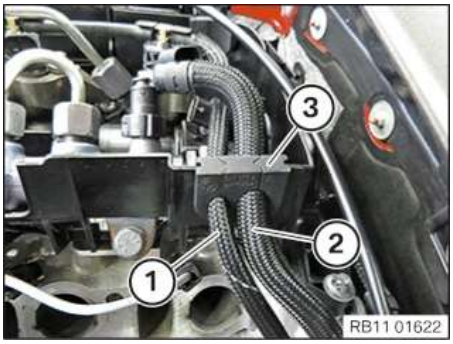
diagn.com



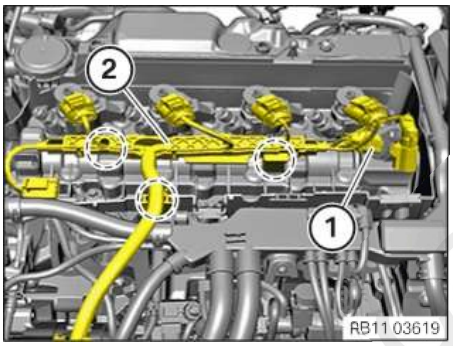
- Unlock and detach the locks.
- Feed the engine ventilation line (1) out and set it aside.



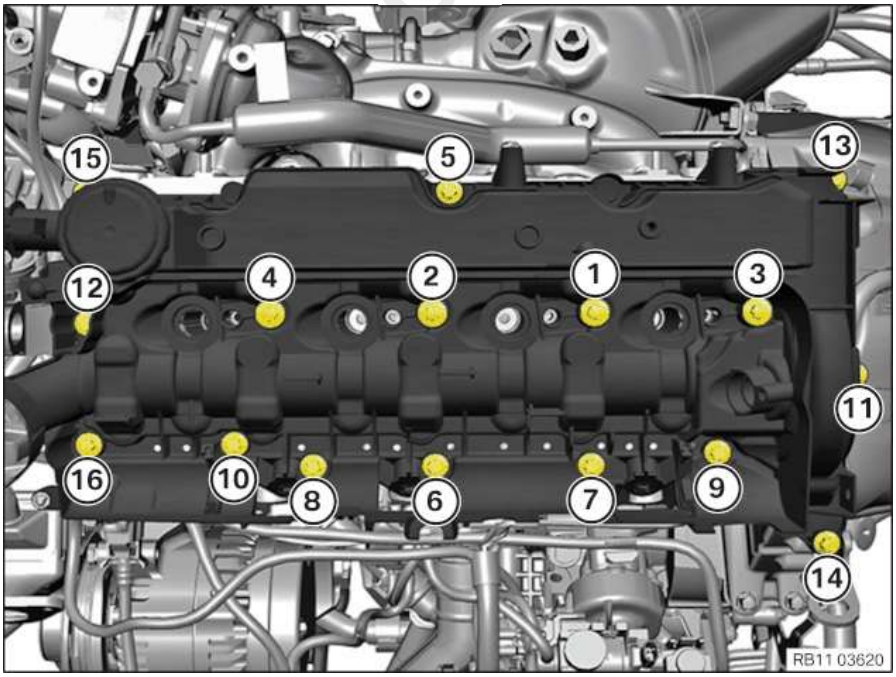
- Feed out and remove the heat shield (1).



- Remove the leakage oil line (1) including the fuel return line (2) and the grommet (3) and put to one side.

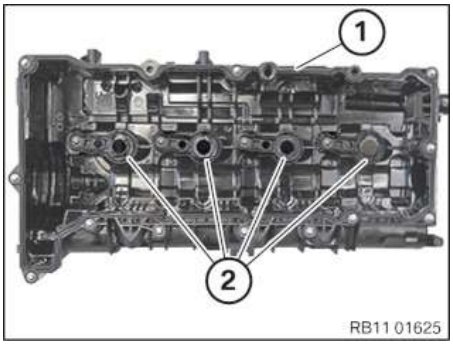


- Unlock connector (1) and pull off.
- Disconnect the wiring harness (2) in the marked areas from the cylinder head cover and set aside.



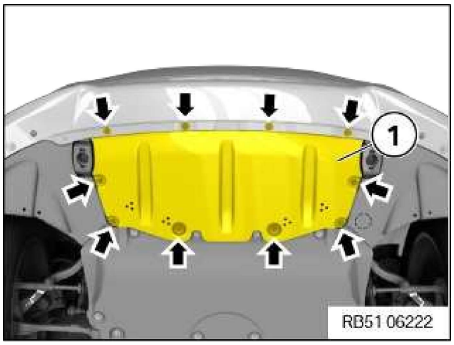
- Evenly loosen the screws in a sequence from (16) to (1).
- Feed out and remove the cylinder head cover.

cardiagn.com



- Remove the profile seals (1) and (2).

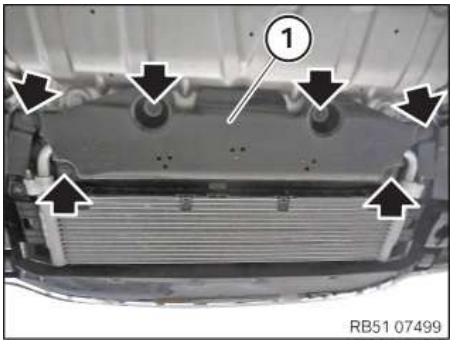
27 – Removing the front underbody protection



- **Version A:**

  Remove screws (arrows).

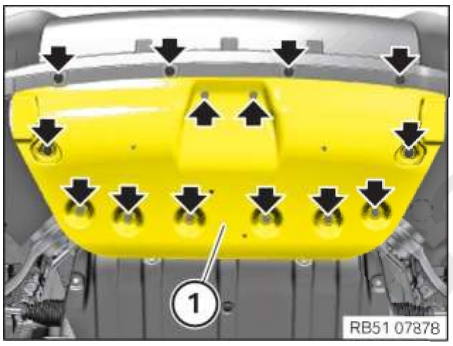
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version B:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

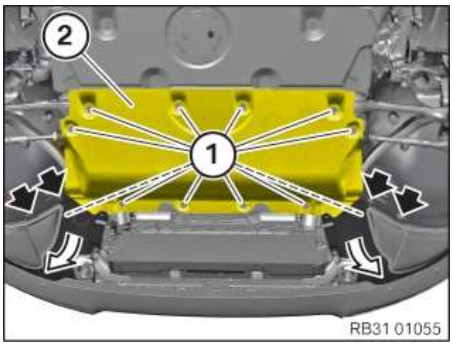


- **Version C:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

28 – Remove the underbody protection of the steering gear



- **Version A:**

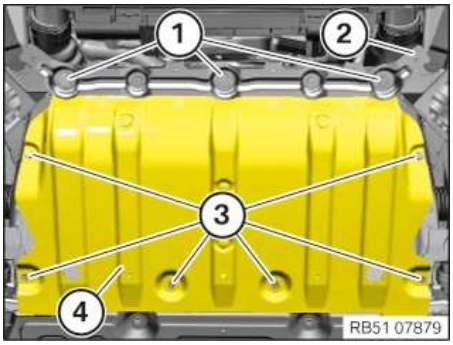
  Unscrew the screws (arrows) of the wheel arch cover on the wheel arch cover.

  Fold the bottom wheel arch cover to the side.

  Loosen screws (1).

  Remove the underbody protection (2) of the steering gear.

ardiagn.com



- **Version B:**

  Loosen screws (1).

  Remove the holder (2) for the underride protection.

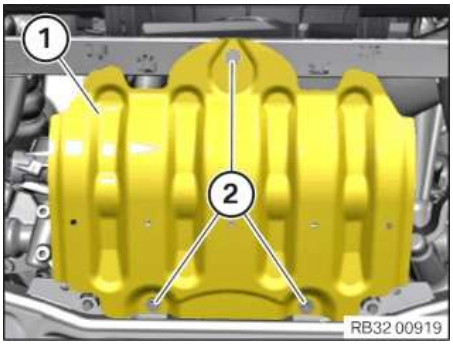
  Loosen screws (3).

  Feed out and remove the underbody protection (4) of the steering gear.

29 – If installed: Removing the steering underbody protection

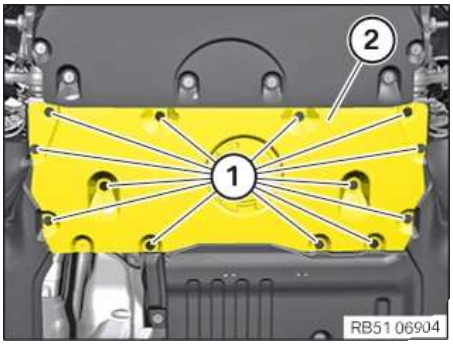
Prerequisite

Front underbody protection has been removed.



- Loosen screws (2).
- Remove underbody protection (1).

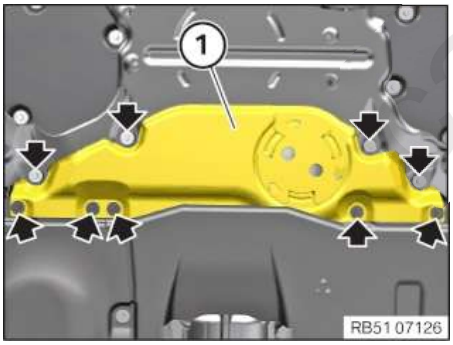
30 – Removing the centre underbody protection



- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .

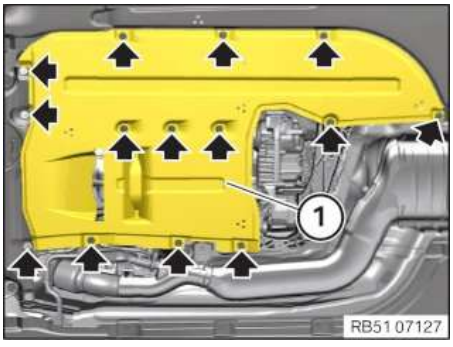


- **Version with all-wheel drive:**

  Remove screws (arrows).

  Feed out and remove the centre underbody protection (1).

31 – Remove rear underbody protection

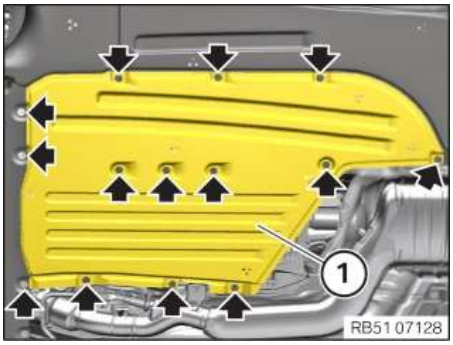


- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).

cardiagn.com



- **Version B:**

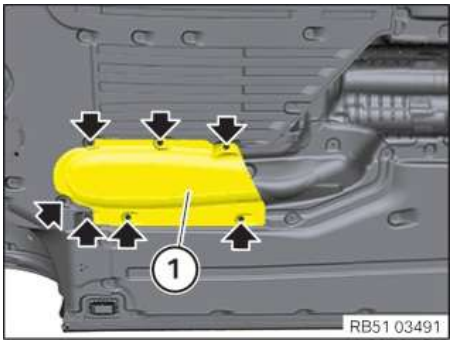
  Remove screws (arrows).

  Guide out rear underbody protection (1) and remove it.

32 – Remove the underbody panelling of the transmission on the side

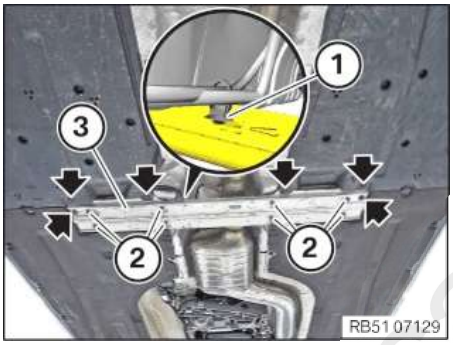
NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.



- Remove screws (arrows).
- Remove the underbody panelling (1).

33 – Remove the connecting support from the tunnel



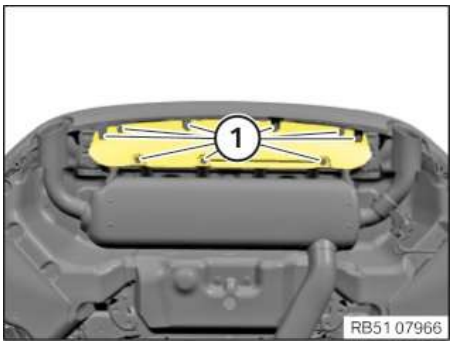
- Remove screws (arrows).

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

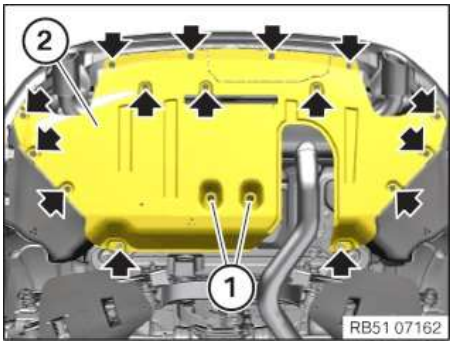
- Loosen clamp (1).
- Loosen screws (2).
- Guide out and remove connecting support (3) on the tunnel.

34 – Removing the rear diffuser



- **Version 1:**
- Release the screws and nuts (1).
- Remove the diffuser.

carolagn.com



- **Version 2:**
- Loosen nuts (1).
- Remove screws (arrows).
- Guide out and remove rear diffuser (2).

35 – Remove exhaust system

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

CAUTION

Component with heavy weight.

Danger of injury!

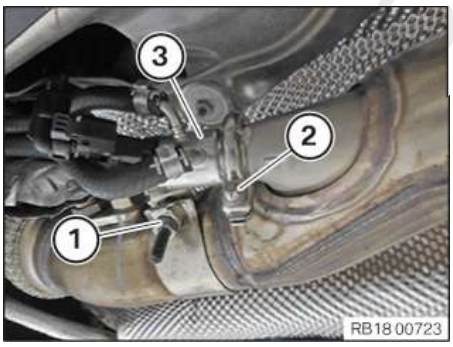
- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

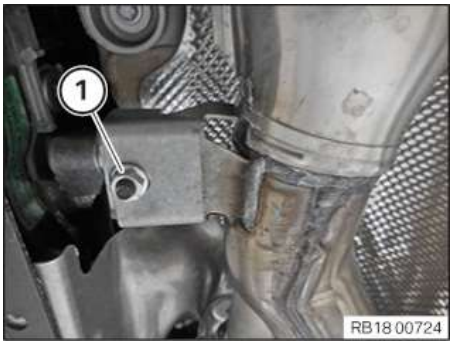
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

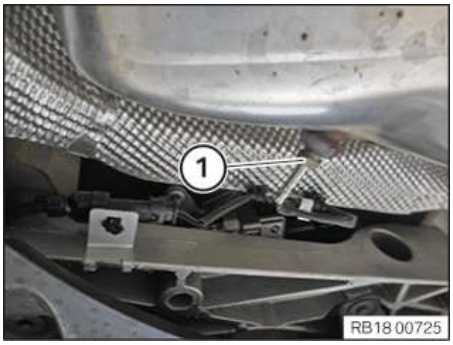


- Unfasten clamp (1).
- Detach the clamp (2) of the SCR metering module (3).
- Detach the SCR metering module (3)from the exhaust system and place to one side.

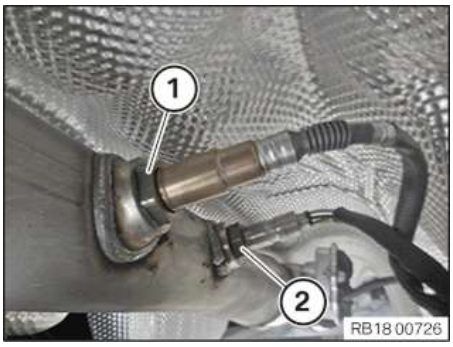


- Loosen nut (1).

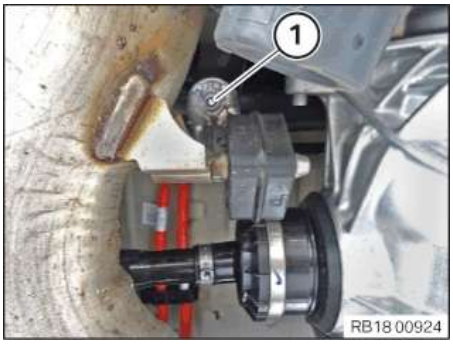
cardiagn.com



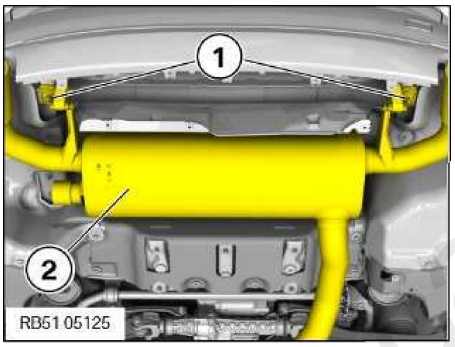
- Detach the exhaust temperature sensor (1) from the exhaust system.



- Release the diesel particulate sensor (1) from the exhaust system and place to one side.
- Release the nitrogen oxide sensor (2) from the exhaust system and place to one side.



- Release the nut (1) on the rear axle support.



- Loosen nuts (1).
- Lower and remove the exhaust system (2) with the assistance of a second person.

36 – Removing the monitoring oxygen sensor after the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

cardiagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

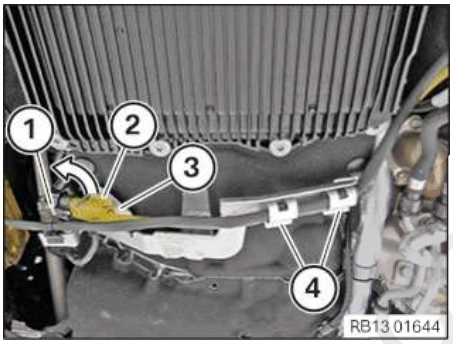
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



- Unlock and loosen connector (1).
- Loosen connector (2) from the holder (3) in direction of arrow.
- Release the monitoring oxygen sensor from the clamps (4).



- Release the monitoring oxygen sensor (1) with the standard tools.



- Thread out the monitoring oxygen sensor (1) and remove it.

carDiagn.com

37 – Removing the nitrogen oxide sensor before SCR catalytic converter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

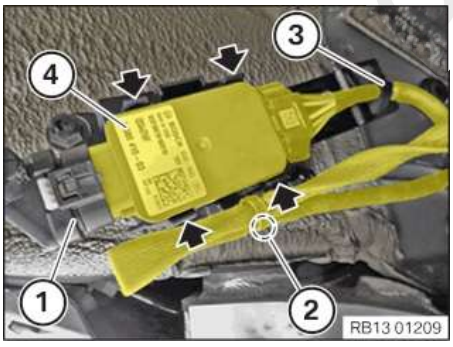
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

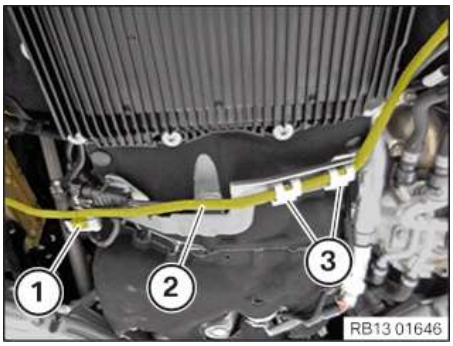
Damage to the nitrogen oxide sensor.

Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

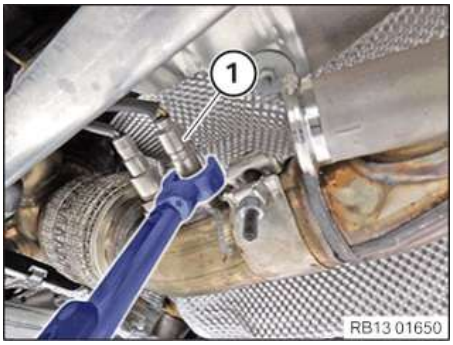
- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
- The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



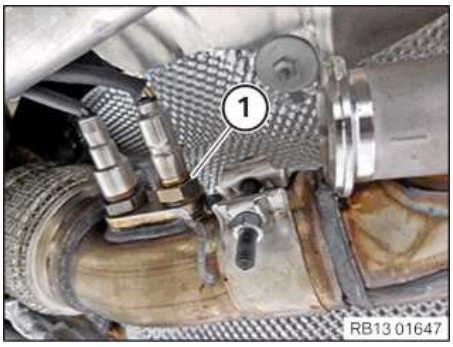
- Unlock plug connection (1) and disconnect.
- Release cable clip in area (2).
- Release line from the holder (3).
- Unclip control unit (4).



- Loosen clamp (1).
- Loosen the cables (2) from the clamps (3).



- Loosen the nitrogen oxide sensor (1) using commercially available tools.



- Feed out and remove the nitrogen oxide sensor (1).

38 – Removing the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

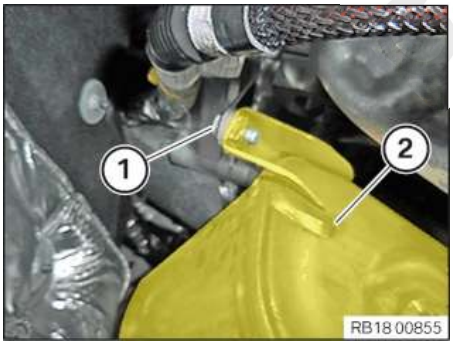
- Perform all work only on components that have cooled down.

CAUTION

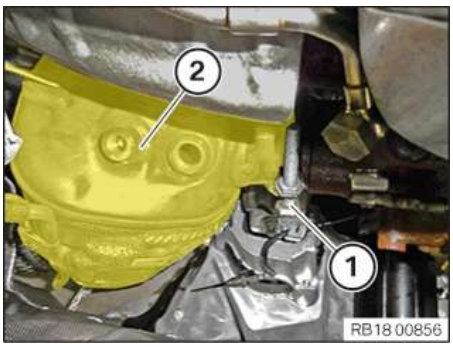
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

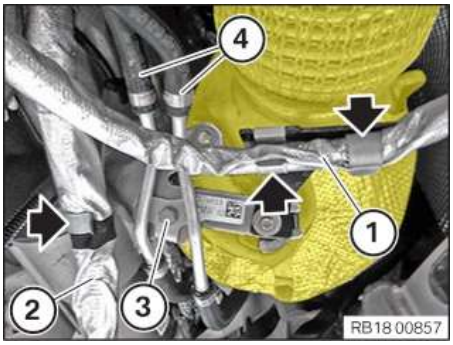


- Release bolt (1) from the holder of diesel particulate filter (2).

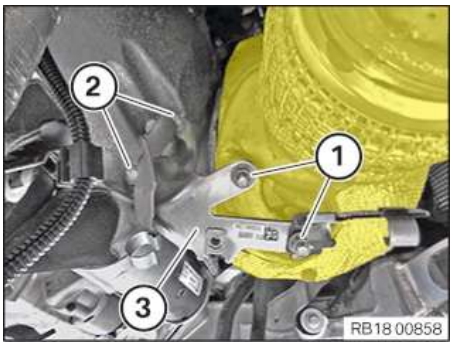


- Loosen V-band clamp (1).
- Feed V-clip (1) out from diesel particulate filter (2) and remove.

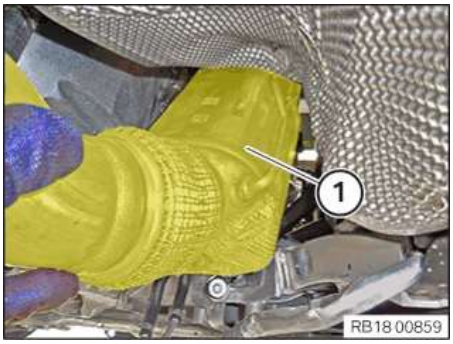
boardiagn.com



- Release the metering line (1) from clamps (Arrows).
- Release positive battery cable (2) from starter motor from clamp (Arrow).
- Loosen screw (3).
- Thread off coolant line (4) and place to the side.



- Loosen nuts (1).
- Loosen screws (2).
- Guide out and remove holder (3).



- Guide out and remove diesel particulate filter (1).

39 – Removing starter motor

Prerequisite

Battery earth leads are disconnected.

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

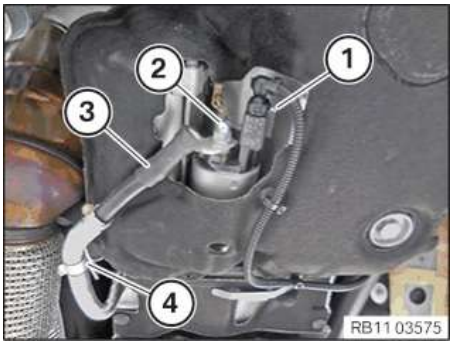
- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

TECHNICAL INFORMATION

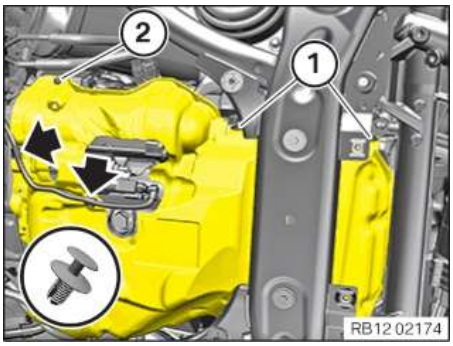
Make sure that the acoustic cover is **not** damaged while removing the starter motor.

A damaged lower acoustic cover can only be renewed when the front axle is lowered.

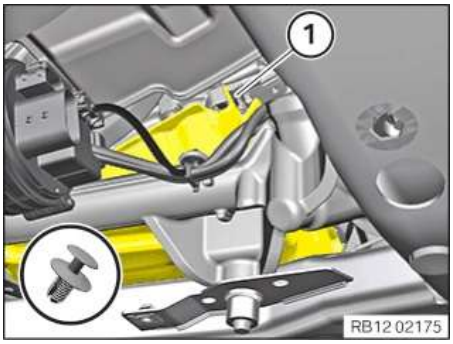
cardiagn.com



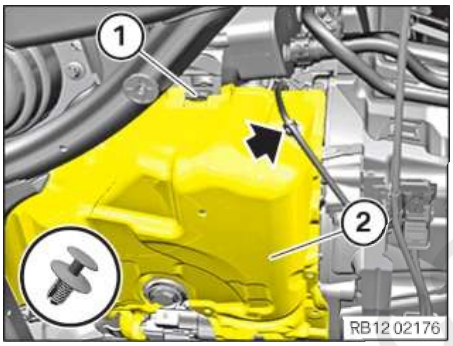
- Unlock plug connection (1) and disconnect.
- Release nut (2).
- Release positive battery cable (3) from holder (4).



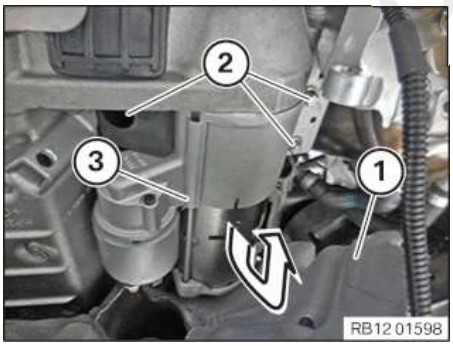
- Loosen the expanding rivet (1).
- Undo fir tree clip (2).
- Release the clamps (arrows).



- Loosen expanding rivet (1).
- Lower the acoustic cover of the oil sump.



- Loosen expanding rivet (1).
- Loosen the clamp (arrow).
- Lower acoustic cover (2).



- Make sure that the acoustic cover (1) is not damaged.
- Carefully press acoustic cover (1) to one side.
- Loosen screws (2).
- Carefully guide out the starter motor (3) in direction of arrow and remove.

40 – Checking camshaft timing



RISK OF DAMAGE

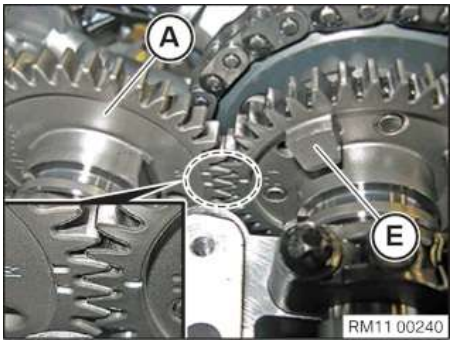
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

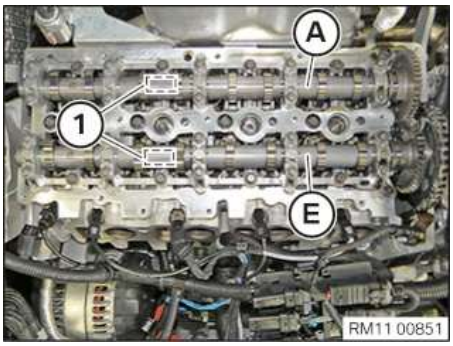
- Turn the combution engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

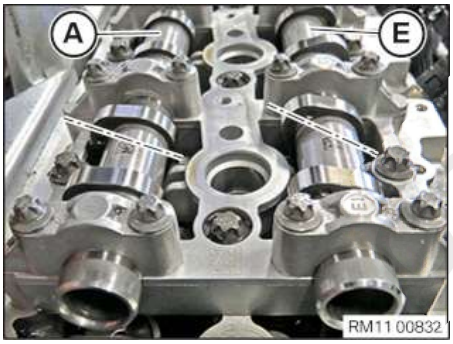
  Do **not** crank the engine in reverse.



- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.



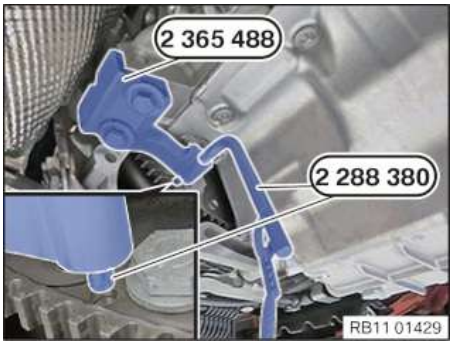
- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.

carmanualsdiagn.com



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

41 – Remove chain tensioner piston

RISK OF DAMAGE

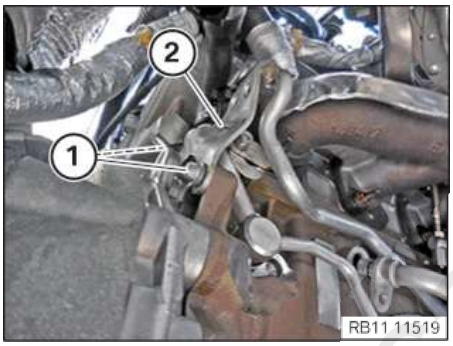
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Loosen screws (1).
- Guide out and remove holder (2).



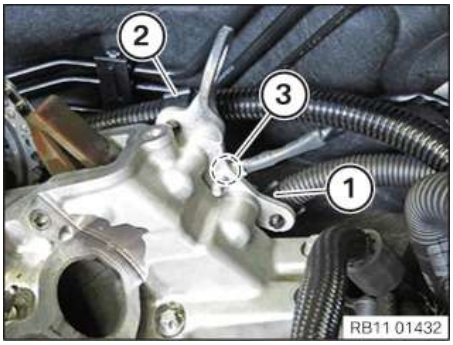
- Loosen the chain tensioner piston (1).
- Catch and dispose of emerging engine oil.



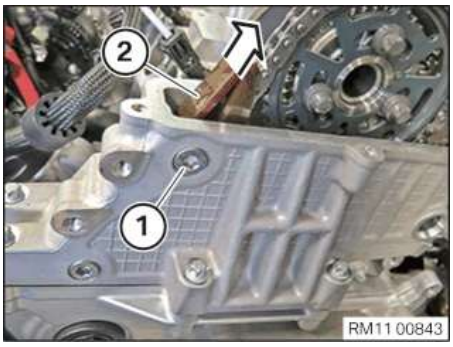
- Feed out and remove the sealing ring (1).

42 – Remove the timing chain guide rail

cardiagn.com

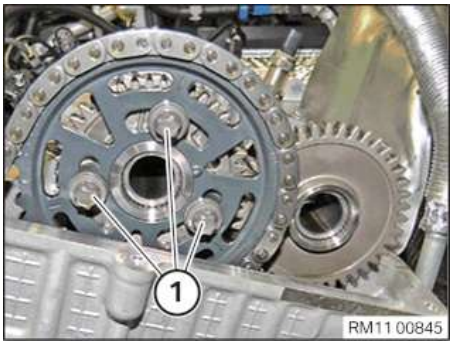


- Loosen the vehicle wiring harness (1) from the bracket.
- Release the positive battery cable (2) from the holder .
- Loosen the screw (3) and remove the grounding cable.



- Remove the bearing journal (1).
- Remove the guide rail (2) in the direction of the arrow.

43 – Removing the camshaft sprocket on the intake camshaft



- Loosen screws (1).
- Secure the drive chain against falling.
- Remove the camshaft sprocket on the intake camshaft.

44 – Removing the special tool for fixing the exhaust camshaft



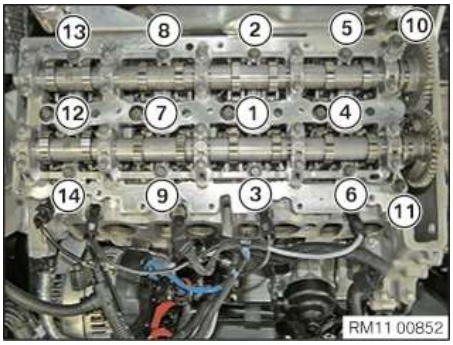
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

45 – Removing the camshaft support

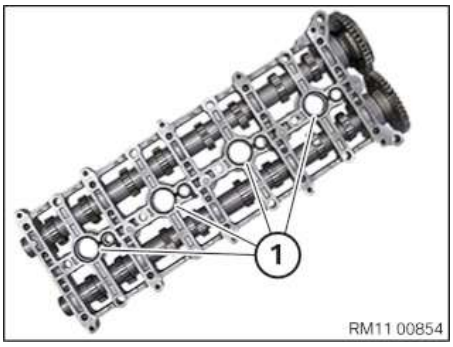
TECHNICAL INFORMATION

The camshaft is tensioned by the valve springs. Tighten or loosen each screw on the camshaft bearing caps one at a time in the specified sequence and by half a turn only. Repeat procedure.

cardiagn.com

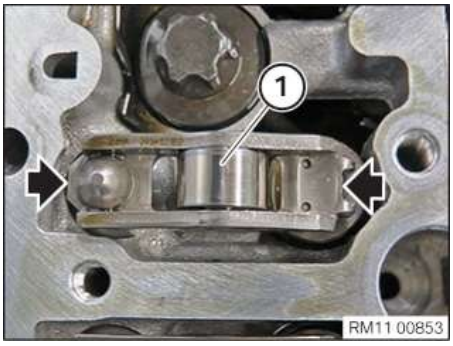


- Unscrew the screws evenly in order (14) to (1) in multiple increments.
- Feed out and remove the camshaft support with the camshafts towards the top.



- Guide out and remove gaskets (1).

46 – Remove roller cam followers

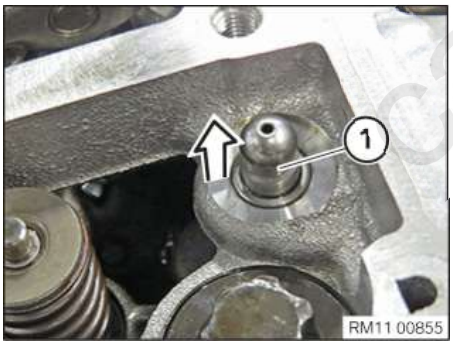


- Guide out and remove all roller cam followers (1) (arrows).
- Place all roller cam followers (1) in order in special tool 0 495 105 (11 4 480).

  Roller cam followers that have already been used must be installed in same position again.

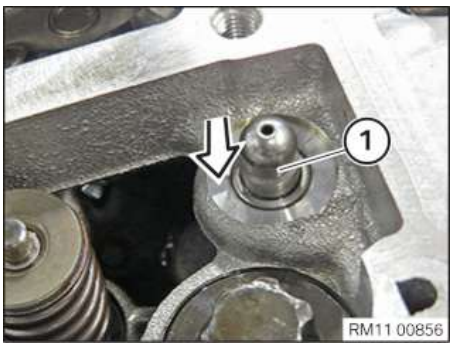
MAIN WORK

47 – Removing all hydraulic valve clearance compensating elements



- Remove all hydraulic valve clearance compensating elements (1) in the direction of the arrow.
- Catch and dispose of emerging engine oil.
- Store all hydraulic valve clearance compensating elements properly arranged on the special tool 0 495 105 (11 4 480).
- Make sure to observe the assignment of the roller cam followers to the hydraulic valve clearance compensating elements when reusing the hydraulic valve clearance compensating elements (1).

48 – Installing all hydraulic valve clearance compensating elements



- Make sure to observe the assignment of the roller cam followers to the hydraulic valve clearance compensating elements when reusing the hydraulic valve clearance compensating elements (1).
- Insert and install all hydraulic valve clearance compensating elements (1) in the direction of the arrow.

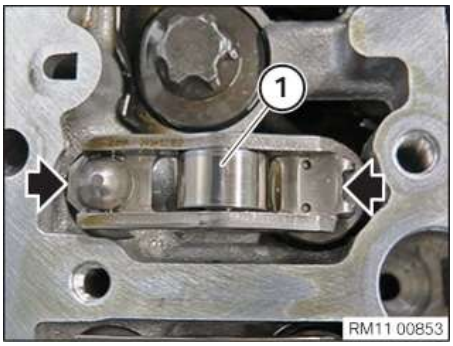
POSTPROCESSES

cardiagn.com

49 – Installing the roller cam followers

TECHNICAL INFORMATION

- Note the installation position of the component. The component may be installed in various installation positions.



- Check all the roller cam followers (1) for damage, and renew if necessary.

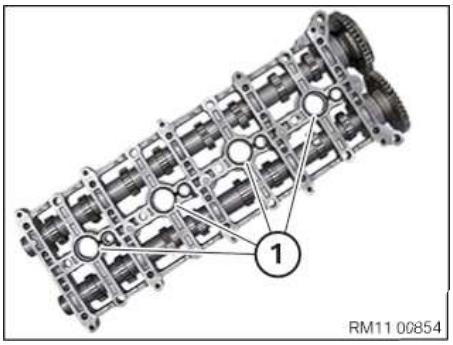
  Parts: Roller cam followers
- Insert all roller cam followers (1) and install them (arrows).

  Roller cam followers (1) that have already been used must be installed in the same place.
- Note the mounting orientation of the roller cam followers (1).
- Oil all roller cam followers (1).

50 – Installing the camshaft support

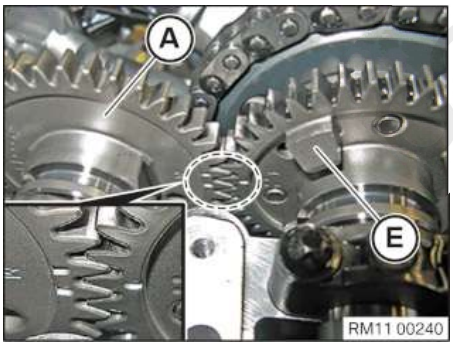
TECHNICAL INFORMATION

The camshaft is tensioned by the valve springs. Tighten or loosen each screw on the camshaft bearing caps one at a time in the specified sequence and by half a turn only. Repeat procedure.

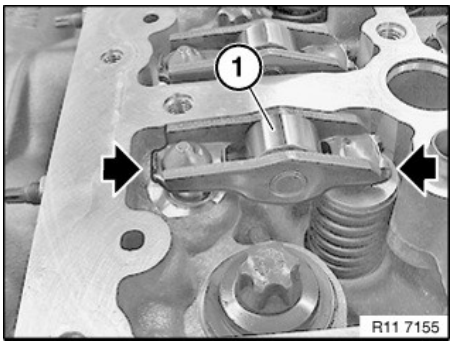


- Renew seals (1).

  Parts: Seals
- Insert and install the gaskets (1).

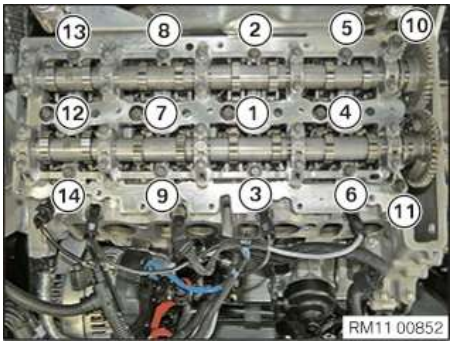


- Make sure the marks on both camshafts (A) and (E) correspond in the **highlighted area**.



- Make sure the roller cam followers (1) have the correct mounting orientation.
- Position the camshaft support (arrows).

bardiagn.com

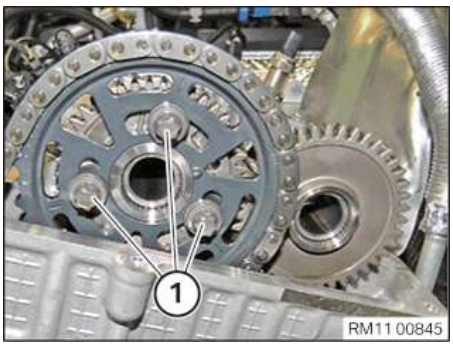


- Evenly tighten the screws in a sequence from (1) to (14) in several steps.
- Evenly tighten the screws in a sequence from (1) to (14) in several steps.

Camshaft carrier to cylinder head

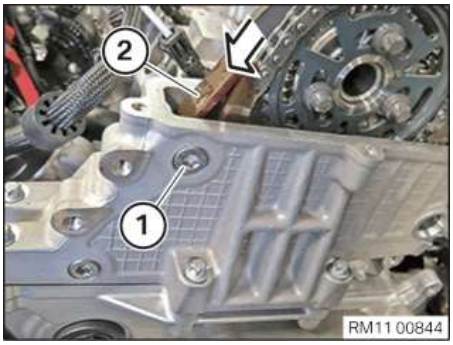
M7x35		Tightening torque	13 Nm

51 – Installing the camshaft sprocket on the intake camshaft



- Position the drive chain on the camshaft sprocket so that the thread of the screw connections are located in the centre of the elongated holes.
- Position the camshaft sprocket on the intake camshaft.
- Merely apply the screws (1) hand-tight so that the camshaft sprocket can still be moved in relation to the intake camshaft.

52 – Installing the guide rail of the timing chain

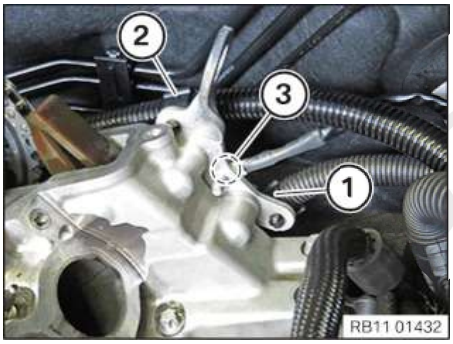


- Position the guide rail (2) in the direction of the arrow.
- Make sure the guide rail (2) is correctly installed at the bottom bearing journal.
- Renew bearing journal (1).

  Parts: Bearing journal
- Tighten the bearing journals (1).

Bearing journal to cylinder head

M16x1.5	Replace bearing journal.	Tightening torque	20 Nm



- Position the grounding cable and tighten the screw (3).

Standard screw connection M8

M8		Tightening torque	19 Nm

- Clip in the positive battery cable (2) into the bracket.
- Clip in the vehicle wiring harness (1) into the bracket.

53 – Installing the chain tensioner piston



TECHNICAL INFORMATION

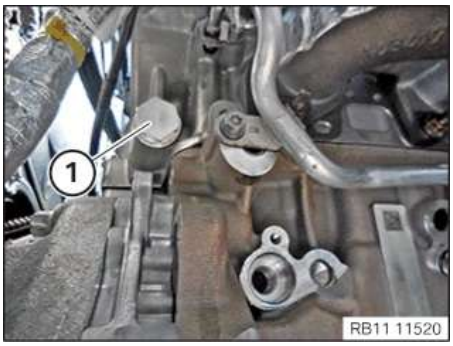
The oil chamber must be drained for reuse of the chain tensioner.

- Place the chain tensioner on a level support pad and slowly compress in the direction of arrow.
- Repeat process twice.



- Renew sealing ring (1).

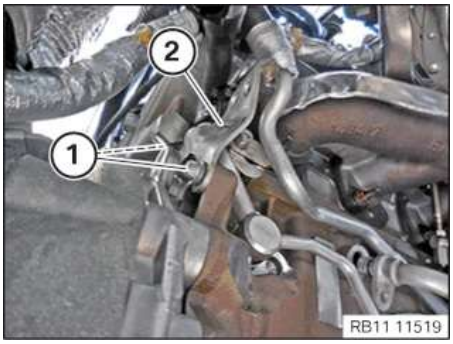
  Parts: Sealing ring
- Insert and install the sealing ring (1).



- Insert and install the chain tensioner piston (1).
- Tighten the chain tensioner piston (1).

Chain tensioner piston to cylinder head

22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

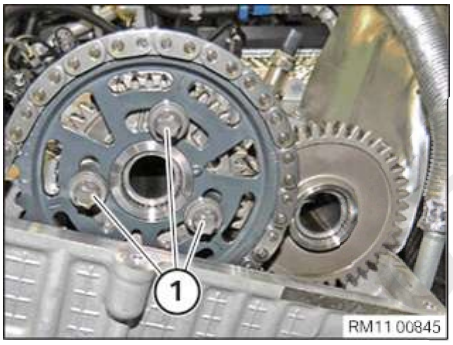


- Insert and install the holder (2).
- Tighten the screws (1).

Holder to crankcase

M8X16		Tightening torque	19 Nm

54 – Tightening the camshaft sprocket on the intake camshaft

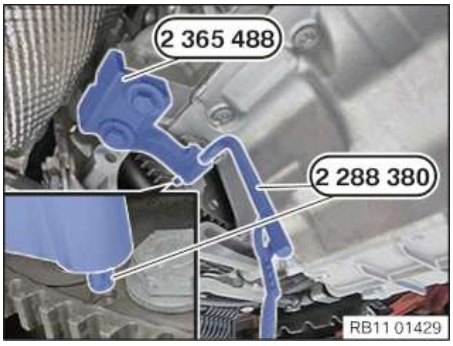


- Tighten the screws (1).

Camshaft sprocket to camshaft

M7x17.			17 Nm

55 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

56 – Checking camshaft timing

carmanualsdesign.com



RISK OF DAMAGE

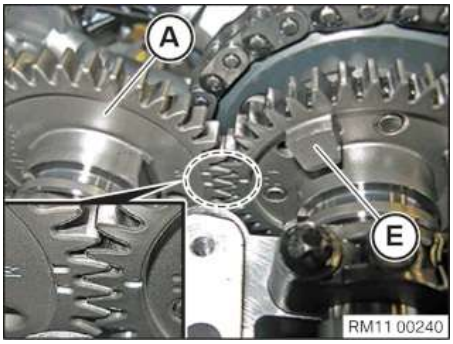
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

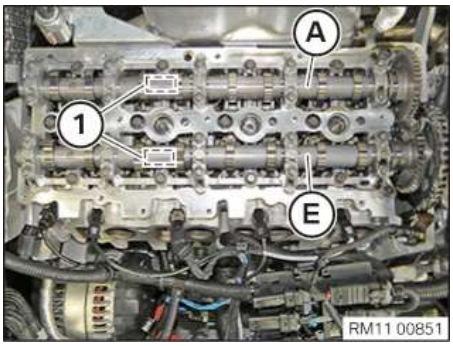
- Turn the combution engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

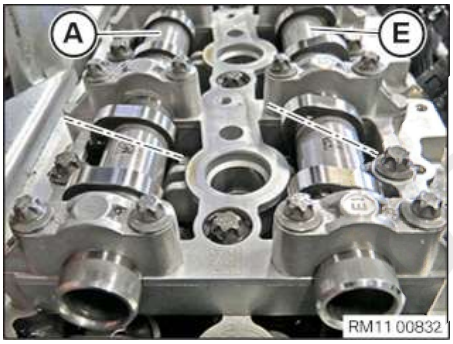
  Do **not** crank the engine in reverse.



- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.



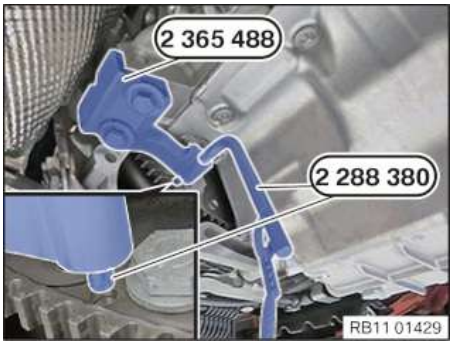
- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.

carDiagn.com



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

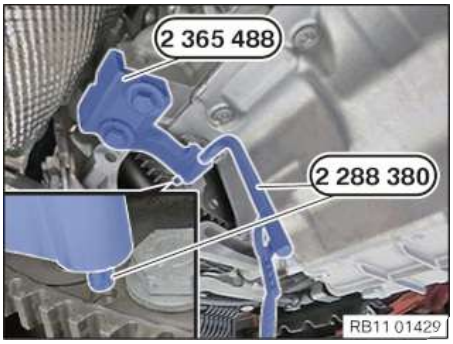
- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

57 – Removing the special tool for fixing the exhaust camshaft



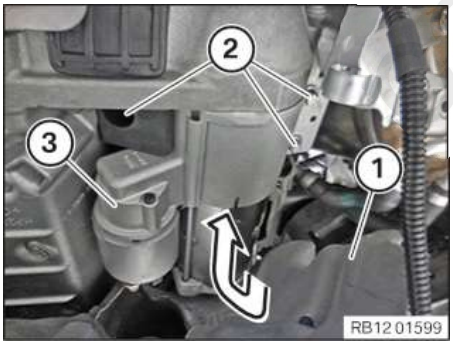
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

58 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

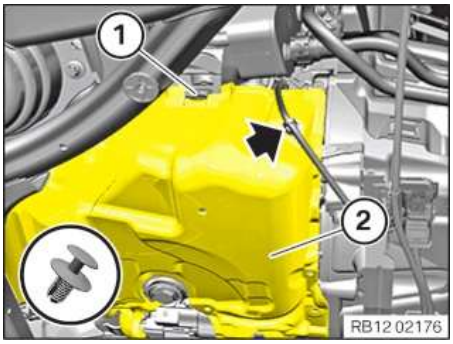
59 – Installing starter motor



- Make sure that the acoustic cover (1) is not damaged.
- Carefully press the acoustic cover (1) to one side.
- Feed in and install the starter motor (3) in the direction of the arrow.
- Tighten the screws (2).

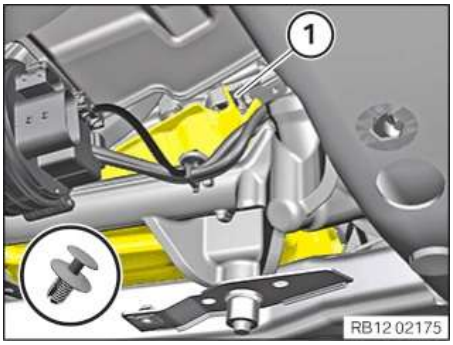
Starter motor to engine

M8X60		Tightening torque	19 Nm

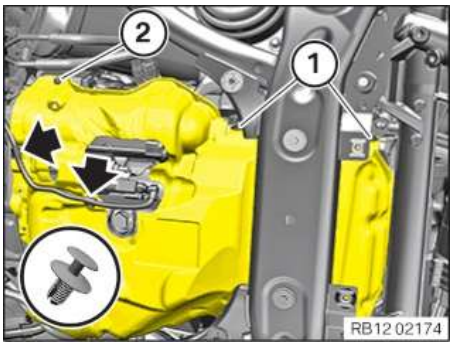


- Position the acoustic cover (2).
- Fasten expanding rivet (1).
- Secure clamp (arrow).

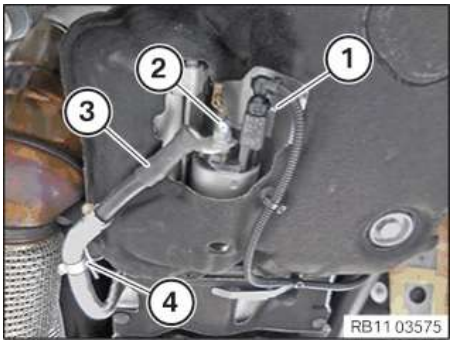
cardiagn.com



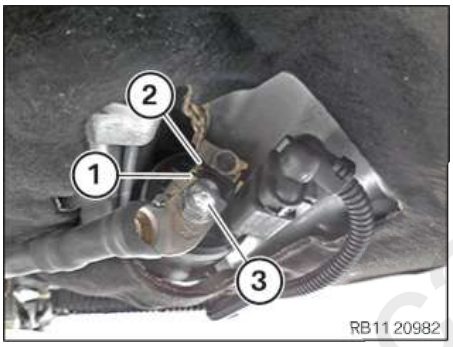
- Fasten expanding rivet (1).



- Secure fir tree clip (2).
- Secure expanding rivet (1).
- Secure the clamps (arrows).



- Fasten positive battery cable(3) in holder (4) and position it on the starter motor.
- Tighten the nut (2) hand-tight.
- Connect the connector (1) and audibly lock it.



CAUTION

Improper routing of the positive battery cable.

Risk of short circuits!

- Route the positive battery cable without abrasions and do not trap.

- Attach the positive battery cable (1) **correctly** to anti-twist lock (2).
- Tighten nut (3).

Battery positive lead to starter

M8		Tightening torque	13,5 Nm

60 – Prepare for the installation of the diesel particulate filter



- Renew the V-clip (1).

  Parts: V-band clamp

carlagn.com



- Renew gasket (1).

  Parts: Gasket

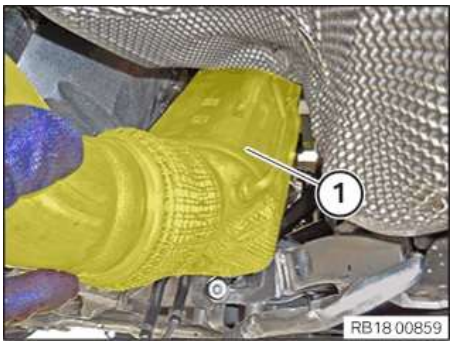
61 – Installing the diesel particulate filter

CAUTION

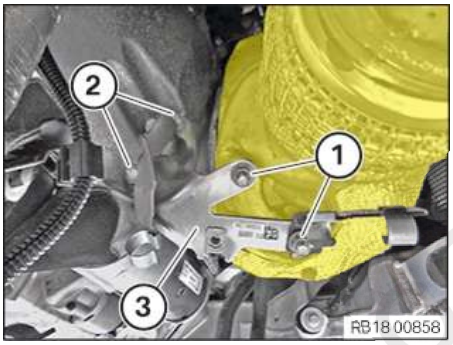
Heavy component.

Heavy components can lead to injury or damage.

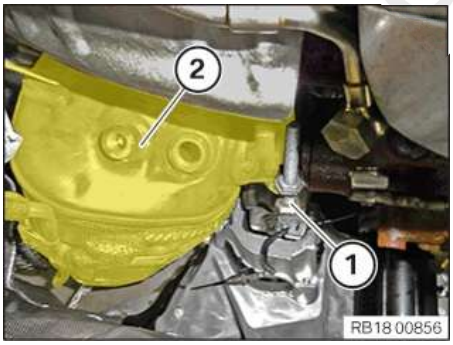
- Remove and install heavy components with the aid of another person/other persons.



- Insert and install the diesel particulate filter (1).



- Insert and install the holder (3).
- **Hand-tighten** the bolts (2).
- Apply the nuts (1) **hand-tight**.

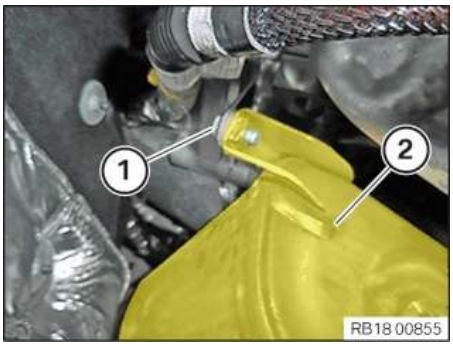


- Renew the V-clip (1).

  Parts: V-band clamp
- Feed in and install V-band clamp (1).

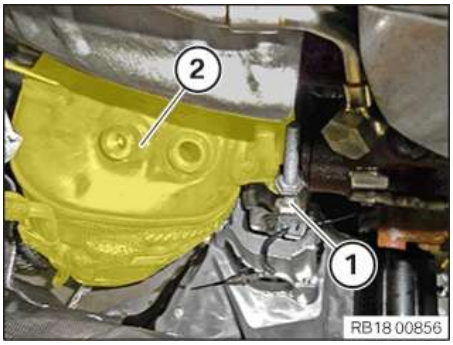
Note: Make sure that the seal between the diesel particulate filter and the exhaust turbocharger is installed correctly.

- Position the diesel particulate filter (2) on the exhaust turbocharger .
- Position V-clip (1).
- Apply the V-clip (1) **hand-tight**.



- Feed in screw (1) on the holder of the diesel particulate filter (2) and tighten **hand-tight**.

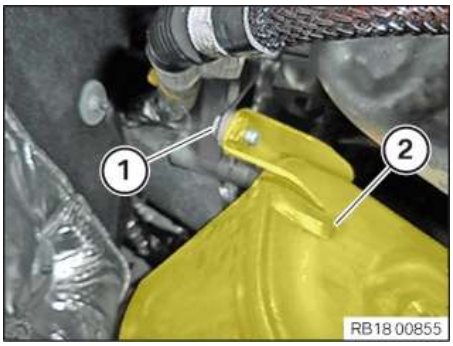
cardiagn.com



- Tighten the V-clip (1) of the diesel particulate filter (2).

Diesel particulate filter V-clip to exhaust turbocharger

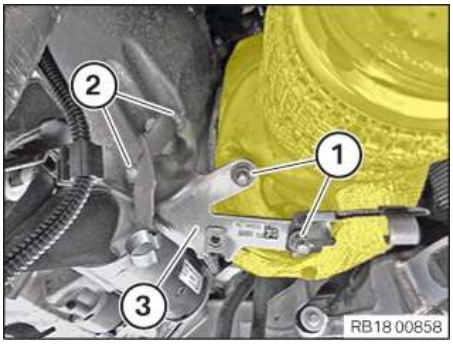
V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm



- Tighten the bolt (1) on the bracket of the diesel particulate filter (2).

Bracket to diesel particulate filter top

M8		Tightening torque	19 Nm



- Tighten the screws (2) on the holder (3).

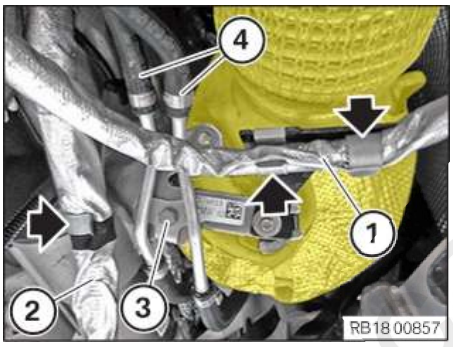
Bracket to transmission for diesel particulate filter holder bottom

M8X20		Tightening torque	19 Nm

- Tighten the nuts (1) on the holder (3).

Lower holder to diesel particulate filter

M8		Tightening torque	19 Nm



- Thread in and install coolant line (4).
- Tighten down screw (3).

Coolant lines for SCR metering module

M6X16		Tightening torque	8 Nm

- Secure the positive battery cable (2) of the starter motor at the clamp (arrow).
- Fasten the metering line (1) on the clamps (arrows).

62 – Installing the nitrogen oxide sensor upstream of SCR catalytic converter

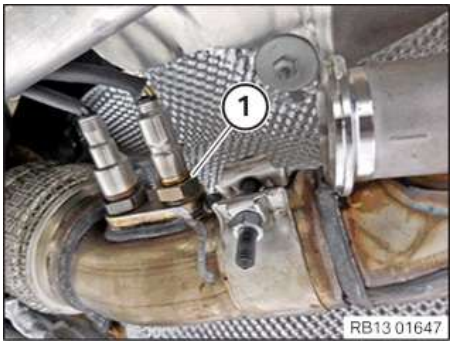
RISK OF DAMAGE

Damage to the nitrogen oxide sensor.

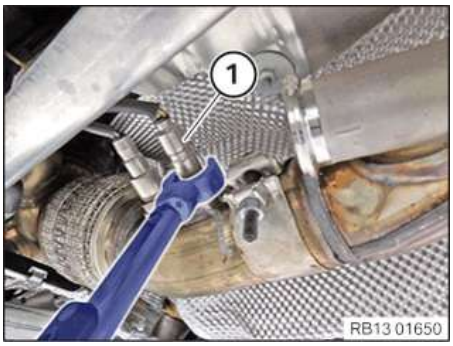
Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
- The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

cardiagn.com



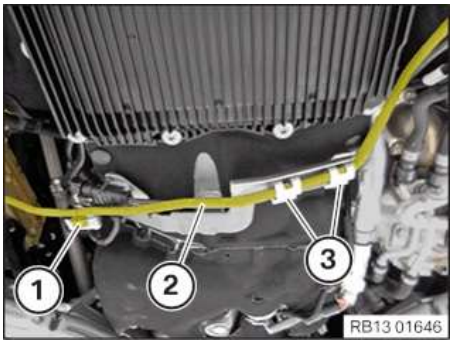
- Feed in and install the nitrogen oxide sensor (1).



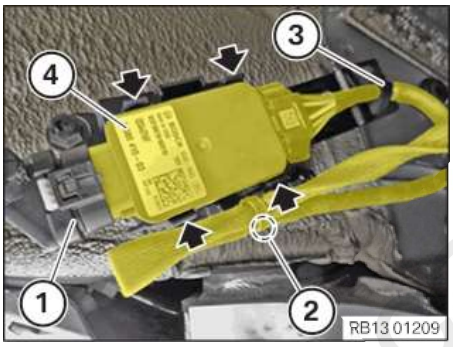
- Tighten the nitrogen oxide sensor (1) using commercially available tools.

Nitrogen oxide sensor before SCR catalytic converter

Sensor		Tightening torque	50 Nm



- Secure the cables (2) to the clamps (3).
- Secure clamps (1).



- Clip in the control unit (4) (arrows).
- Fasten the cable in the holder (3).
- Secure the cable holder (2).
- Plug in the connector (1) and lock audibly.

cardiagn.com

63 – Installing the monitoring oxygen sensor after the diesel particulate filter

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
- The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

TECHNICAL INFORMATION

New oxygen sensors are to be greased lightly and evenly on the thread.

For oxygen sensors that are reused, the following should be observed:

Lightly and evenly grease the oxygen sensor only on the thread. Do not clean and grease that part of the oxygen sensor which protrudes in the exhaust branch (sensor ceramics).

For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



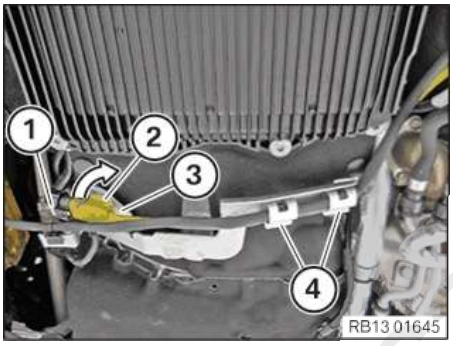
- Insert the monitoring oxygen sensor (1) and install it.



- Tighten the monitoring oxygen sensor (1) with standard tools.

Monitoring oxygen sensor

Sensor		Tightening torque	50 Nm



- Fasten the monitoring oxygen sensor to the clamps (4).
- Secure the connector (2) on the holder (3) in direction of arrow.
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

64 – Installing the exhaust system

CAUTION

Component with heavy weight.

Danger of injury!

- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

Heavy component.

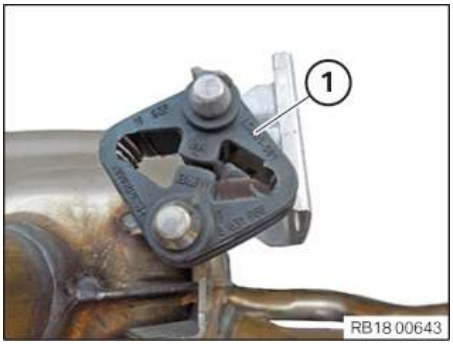
Heavy components can lead to injury or damage.

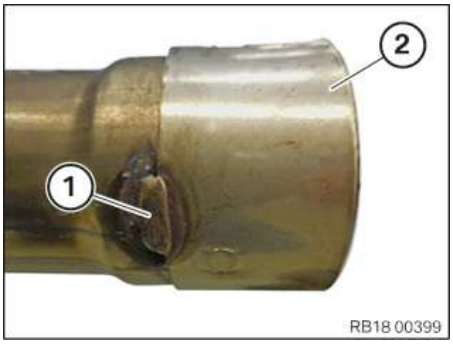
- Remove and install heavy components with the aid of another person/other persons.

cardiagn.com

TECHNICAL INFORMATION

Mount the exhaust system in voltage-free state, maintaining the tightening sequence from the rear silencer towards the exhaust manifold.





NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

- Check all the rubber mounts (1) of the exhaust system for damage.
- Replaced damaged rubber mounts.

  Parts: Rubber mount

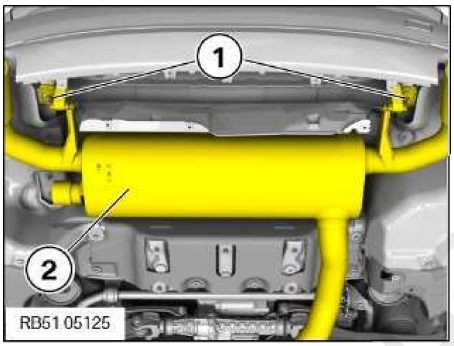
CAUTION

Swarf resulting from sawing or grinding components.

Danger of injury!

- Conduct all work in appropriate personal protective equipment only.
- Wear safety goggles and protective gloves.

- Open the weld seam (1) with a conventional tool.
- Remove the clamp (2).

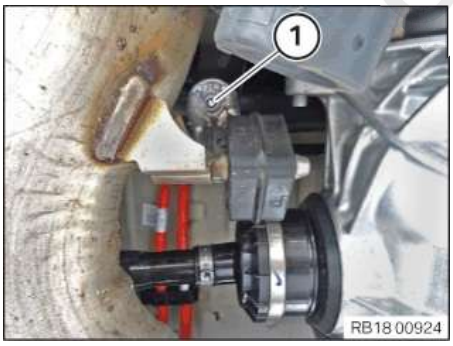


- Insert and install the exhaust system (2).
- Renew nuts (1).

  Parts: Nuts
- Tighten nuts (1).

Rear silencer to body / bumper support

M8	Replace nuts.	Tightening torque	19 Nm

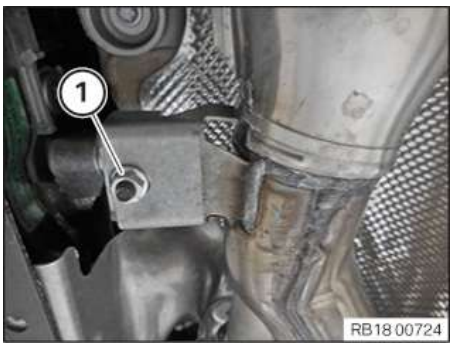


- Renew nut (1) on the rear axle support.

  Parts: Nut
- Tighten nut (1).

Exhaust system to rear axle carrier

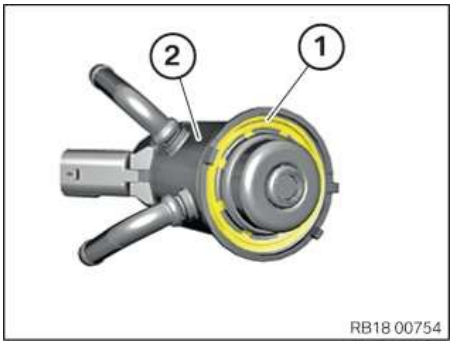
M8 nut		Tightening torque	19 Nm



- Tighten nut (1).

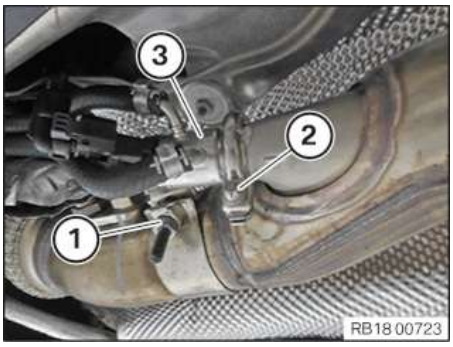
Exhaust system to transmission

M8		Tightening torque	19 Nm



- Renew sealing ring (1) of the SCR metering module (2).

  Parts: Sealing ring



- If necessary, renew clamp (1).

  Parts: Clamp
- Tighten clamp (1).

Exhaust system to diesel particle filter

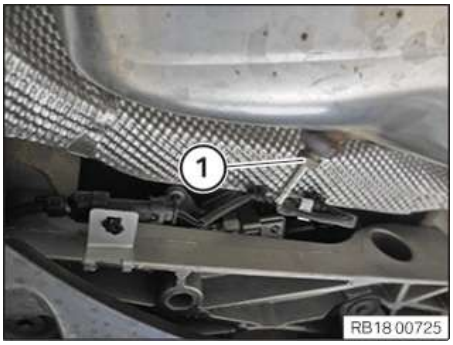
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

- Renew the V-clip (2).

  Parts: V-band clamp
- Install the SCR metering module (3) in the exhaust system.
- Tighten the V-clip (2) of the SCR metering module (3).

SCR metering module V-clip to exhaust system

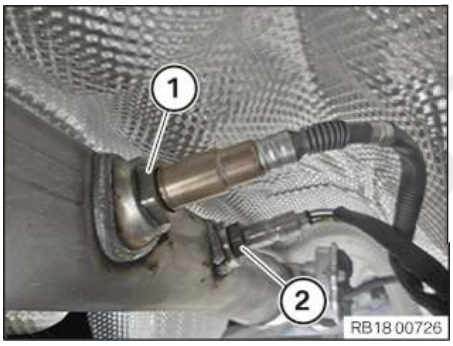
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm



- Install the exhaust temperature sensor (1) in the exhaust system and tighten.

Exhaust-gas temperature sensor upstream of SCR catalytic converter

Sensor		Tightening torque	30 Nm



- Install the diesel particulate sensor (1) in the exhaust system and tighten.

Diesel particulate sensor to exhaust system

Sensor		Tightening torque	50 Nm

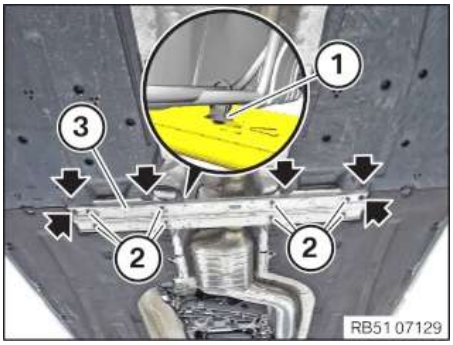
- Install the nitrogen oxide sensor (2) in the exhaust system and tighten.

Nitrogen oxide sensor downstream of SCR catalytic converter

Sensor		Tightening torque	55 Nm

65 – Install the connecting supports on the tunnel

cardiagn.com



- Guide in and install connecting support (3) on the tunnel.
- Tighten the screws (2).
- Tighten screws (arrows).

Connecting support to tunnel

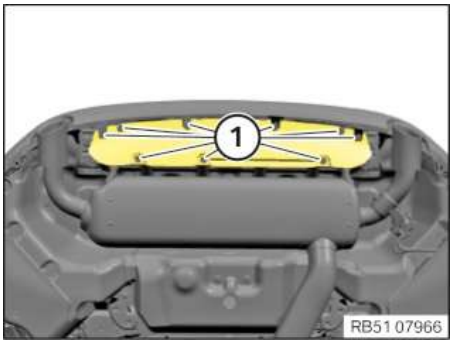
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Secure the clamp (1).

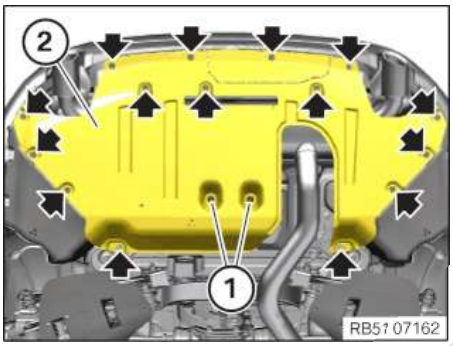
66 – Installing the rear diffuser



- **Version 1:**
- Install the diffuser and tighten the nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm



- **Version 2:**
- Feed in and position the diffuser (2)
- Tighten screws (arrows).

Diffuser / underbody panelling

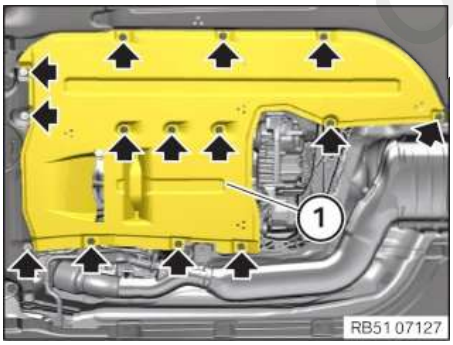
Nuts and screws		Tightening torque	3 Nm

- Tighten nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm

67 – Installing underbody protection at rear



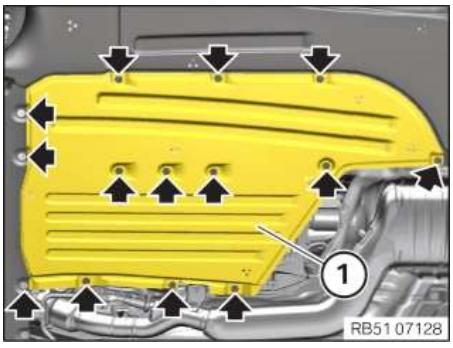
- **Version A:**

Insert and install the rear underbody protection (1).

Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version B:**

Insert and install the rear underbody protection (1).

Tighten screws (arrows).

Underbody protection

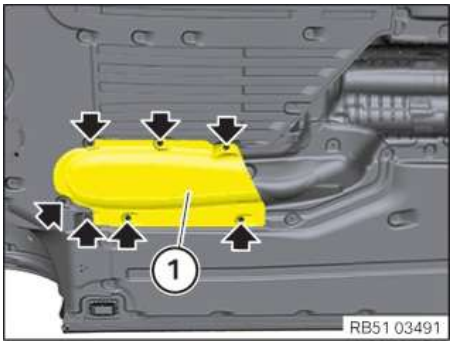
Hexagon screw		Tightening torque	3 Nm

cardiagn.com

68 – Install the underbody panelling of the transmission on the side

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

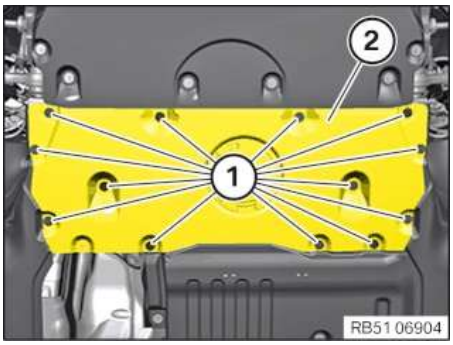


- Insert the underbody panelling (1).
- Tighten screws (arrows).

Underbody panelling

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

69 – Installing the centre underbody protection



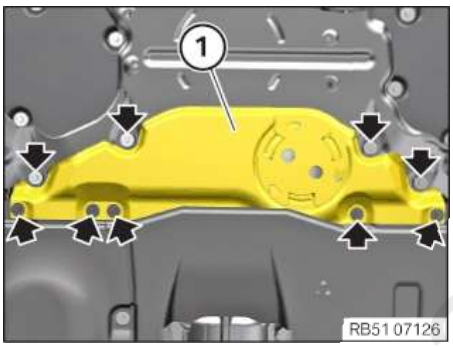
- **Variant with rear wheel drive:**

  Position central underbody protection (2).

  Tighten the screws (1).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version with all-wheel drive:**

  Guide in centre underbody protection (1) and install.

  Tighten screws (arrows).

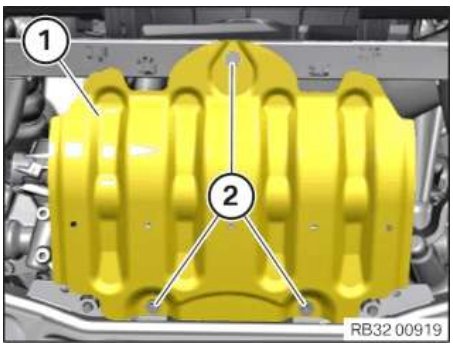
Underbody protection

Hexagon screw		Tightening torque	3 Nm

70 – If installed: Install underbody protection of the steering

Prerequisite

Front underbody protection has been removed.



- Position underbody protection (1).
- Tighten the screws (2).

Underbody protection, steering, to front axle support

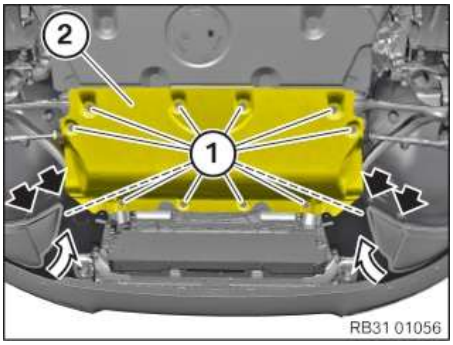
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

71 – Install the underbody protection of the steering gear

cardiagn.com



- **Version A:**

  Position the underbody protection (2) of the steering gear.

  Tighten the screws (1).

Underbody protection of the steering gear

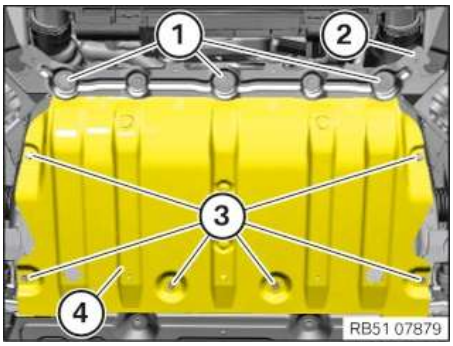
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the bottom wheel arch cover.

  Tighten the screws (arrows) of the lower wheel arch cover on the wheel arch cover.

Wheel arch trim panel, front

Thermoplastic hexagon screw		Tightening torque	2,6 Nm



- **Version B:**

  Feed in the underbody protection (4) of steering gear and install it.

  Tighten the screws (3).

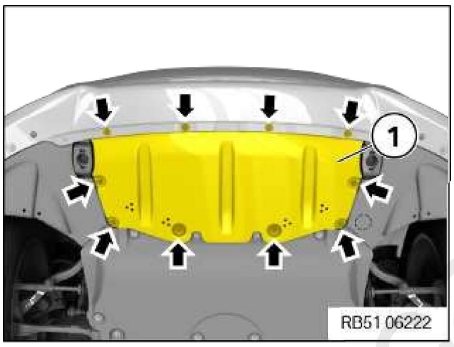
Underbody protection of the steering gear

Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the holder (2) for the underride protection.

  Tighten the screws (1).

72 – Installing the front underbody protection



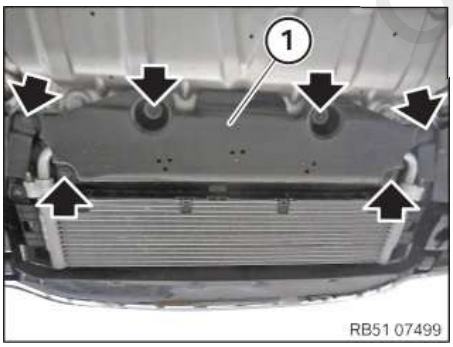
- **Version A:**

  Feed in the front underbody protection (1) towards the front under the bumper panel and position.

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



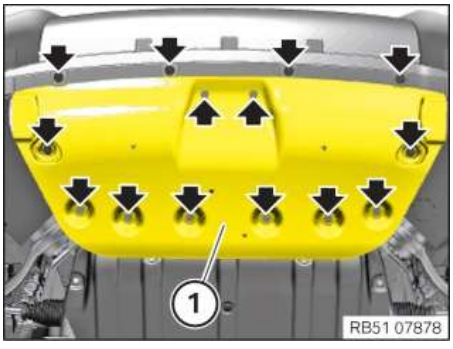
- **Version B:**

  Feed in and position the front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



- **Version C:**

  Feed in and install front underbody protection (1).

  Tighten screws (arrows).

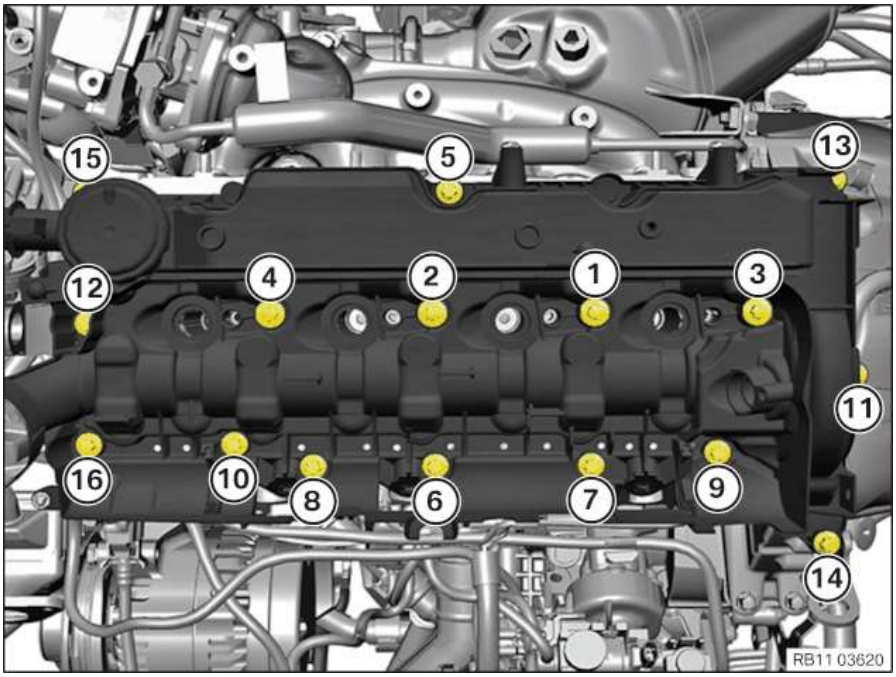
Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

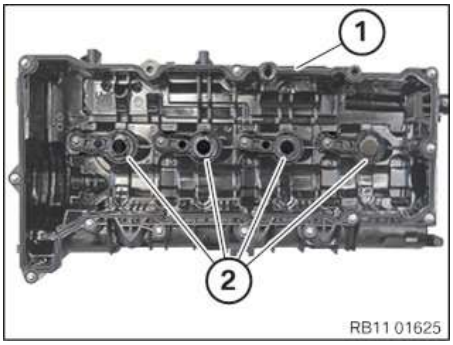
carlagn.com

73 – Installing cylinder head cover

Screw connection of the cylinder head cover

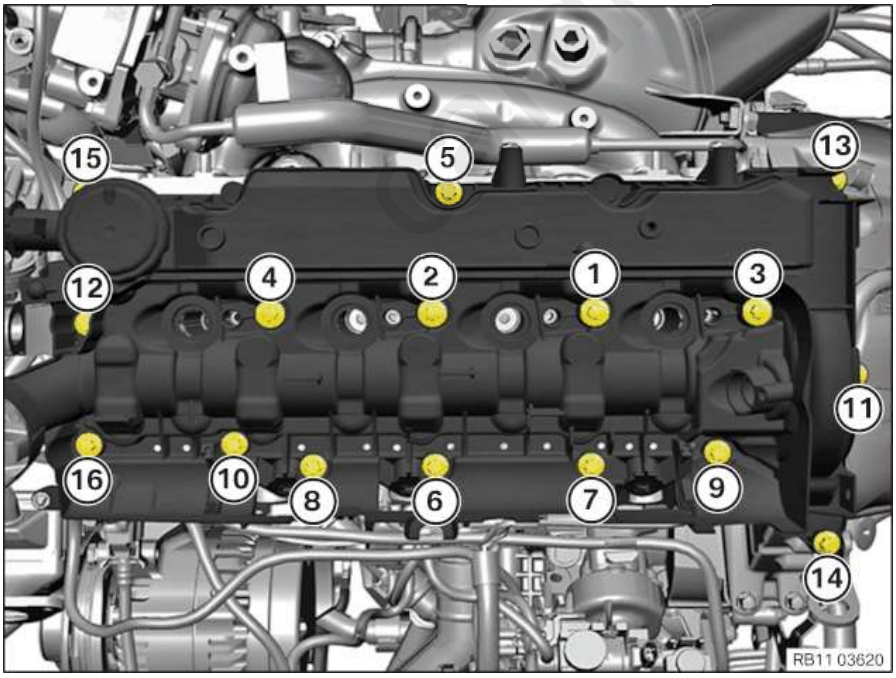


1 - 16 Bolts of the cylinder head cover



- Renew the profile seals (1) and (2) of the cylinder head cover.

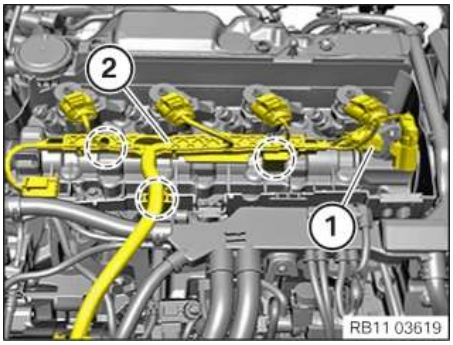
  Parts: Profile seals



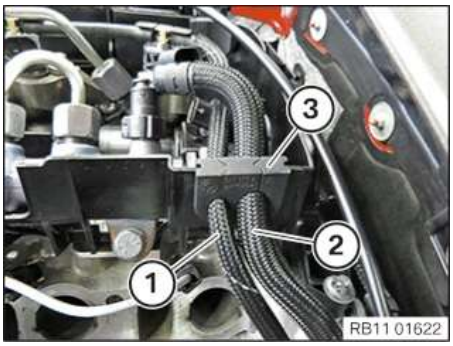
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

Cylinder head cover to cylinder head

M6		Tightening torque.	8,5 Nm



- Position the vehicle wiring harness (2) on the cylinder head cover and fasten in the marked areas.
- Plug in the connector (1) and lock audibly.



- Insert and connect the leakage oil line (1) with the fuel return line (2) and grommet (3).



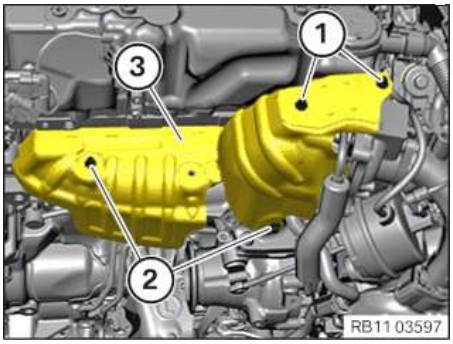
- Feed in and install the heat shield (1).



- Connect engine ventilation line (1) and lock.

  The locks (arrows) must engage audibly.

74 – Installing heat shield



- Feed in and install the heat shield (3).
- Tighten down screws (1) and (2).

Heat shield to exhaust manifold

M6x12			10 Nm

75 – Installing the sensor bracket on the cylinder head cover

cardiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

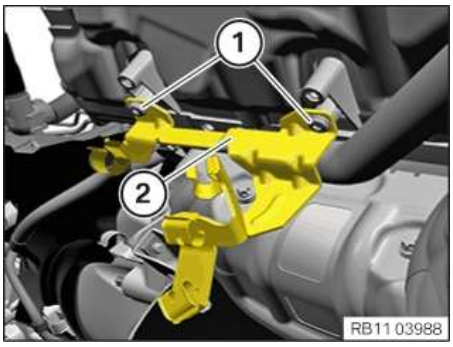
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

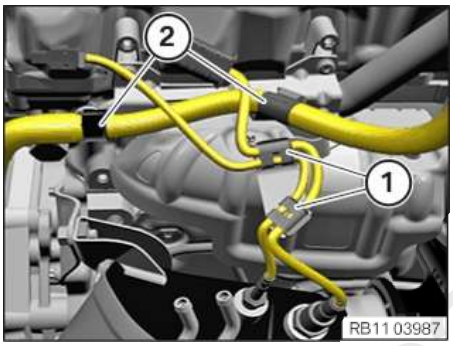
- Route all cables without abrasions, do not trap and crush.



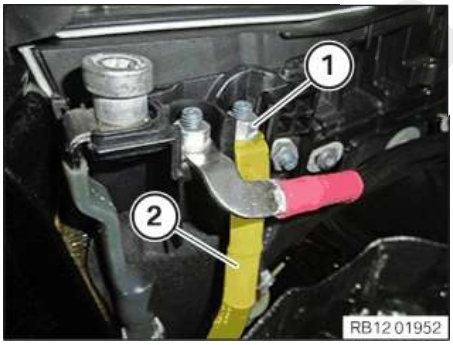
- Insert and install the holder (2).
- Tighten the screws (1).

Bracket on cylinder head cover

	Tightening torque	5 Nm



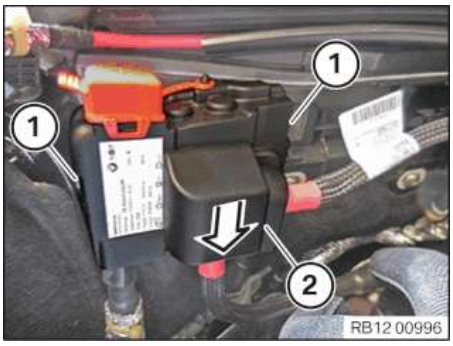
- Secure the positive battery cable in the clamps (2).
- Mount the cable of the exhaust gas sensor system in the clamps (1).



- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

Battery positive lead to battery positive terminal

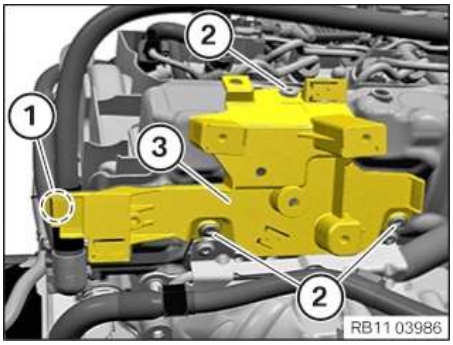
M8		Tightening torque	19 Nm



- Insert and install the cover (2) in the direction of the arrow.

  The locks (1) must engage audibly.

cardiagn.com

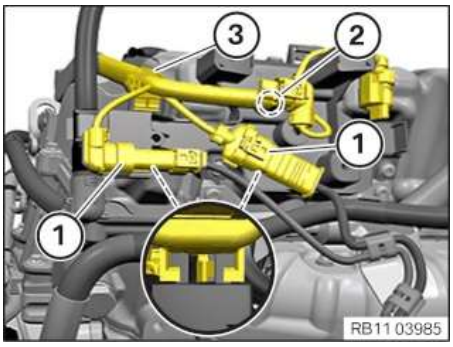


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

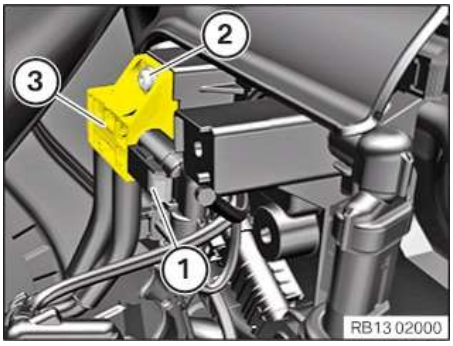
		Tightening torque	5 Nm

- Fasten the positive battery cable in the area (1) in the clamp.



- Feed in the wiring harness section and fasten it with the clamp (3).
- Fasten the cable clip in the area (2) in the sensor bracket.
- Feed in the connector (1) into the sensor bracket and lock it audibly.
- Plug in the connector (1) and lock audibly.

76 – Securing the differential pressure sensor for the diesel particulate filter



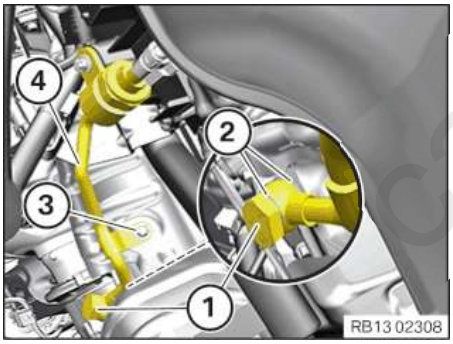
- Feed in and install the differential pressure sensor (3).
- Tighten down screw (2).

Differential pressure sensor of diesel particulate filter on cylinder head cover

TS5x20		Tightening torque	4 Nm

- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

77 – Install the exhaust gas pressure pipe



- Insert and install the exhaust gas pressure pipe (4).
- Replace the sealing rings (2).

  Parts: Sealing ring
- Apply the banjo bolt (1) hand-tight.
- Tighten down screw (3).

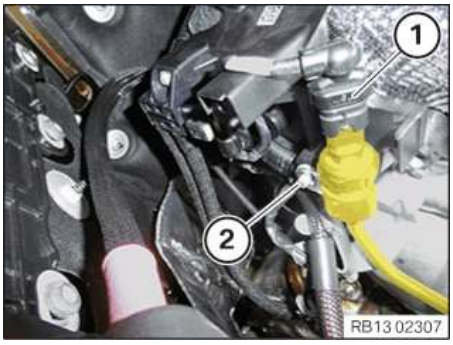
Heat shield to exhaust manifold

M6x12		Tightening torque	10 Nm

- Tighten the banjo bolt (1).

Banjo bolt for exhaust pressure pipe to exhaust manifold

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm



- Tighten down screw (2).

Exhaust gas pressure pipe to sensor system holder

TS6x20		Tightening torque	5,7 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

78 – Install all injectors

▸ **Cleaning the injector shafts**

cardiagn.com

CAUTION

Swirling dirt particles caused by compressed air.

Danger of injury!

- Collect dirt particles, e.g. when blowing out, use cloth to do so.

- Wear safety goggles.

RISK OF DAMAGE

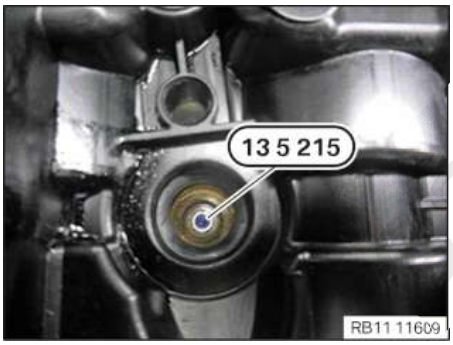
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



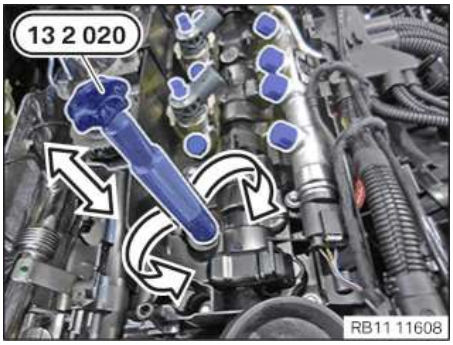
- Check whether the sealing ring remained in the injector shaft and remove the sealing ring as needed.
- Insert the special tool 0 493 763 (13 5 215) with the special tool 0 493 762 (13 5 214) from the set of special tools 0 493 758 (13 5 210) into the injector shaft.
- Remove special tool 0 493 762 (13 5 214).



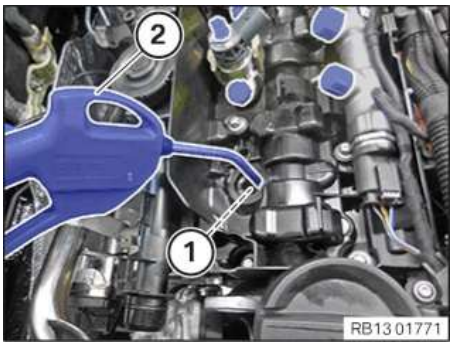
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



- Insert special tool 0 496 150 (13 2 020) into the injector shaft.



- Move special tool 0 496 150 (13 2 020) up and down in the injector shaft with rotational movements in the direction of arrow.
- Feed out special tool 0 496 150 (13 2 020) from the injector shaft and remove.



- Blow out injector shaft (1) with air gun (2).



- Feed the special tool 0 493 762 (13 5 214) into the injector shaft and screw it in with the special tool 0 493 763 (13 5 215).
- Feed out special tool 0 493 762 (13 5 214) with special tool 0 493 763 (13 5 215) from the injector shaft and remove it.

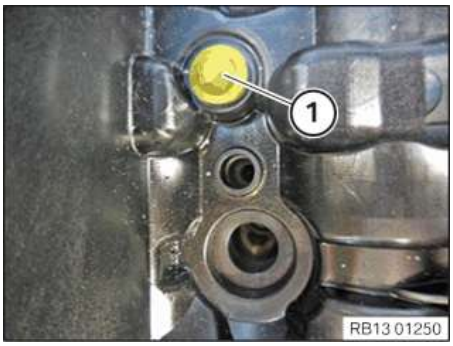
▸ **Check the placement of the clamping claw**

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Tighten down screw (1).

  The clamping claw is positioned on the bolt (1).

Clamping claw facing to cylinder head cover

M6		Tightening torque	10 Nm

▸ **Prepare the injector for installation**

cardiagn.com

RISK OF DAMAGE

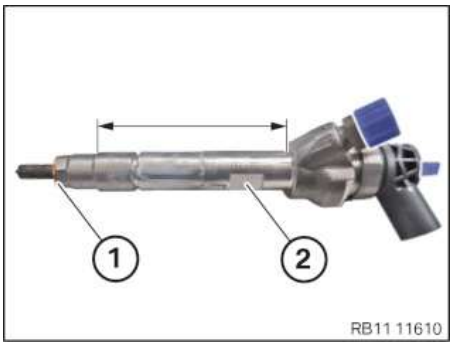
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

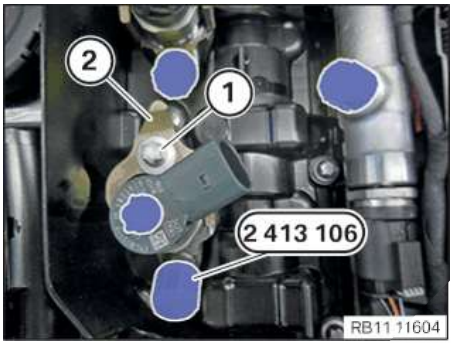
TECHNICAL INFORMATION

Lightly grease the injector shaft with high temperature-resistant grease.
For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



- Renew the copper sealing ring (1) on the injector (2).

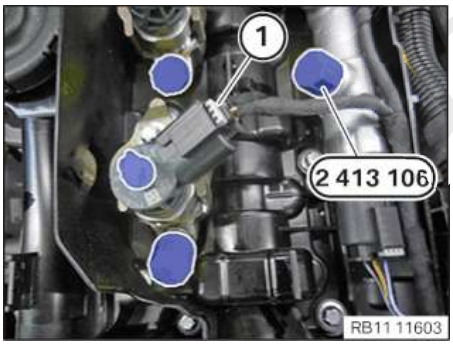
  Parts: Copper sealing ring
- Lightly grease the injector in the marked area with heat-resistant grease before installing the injector (2) in the injector shaft.



- Insert and install the injector .
- Insert and install the clamping claw (2).
- Tighten down screw (1).

Injector to cylinder head cover

M8	Tightening torque	8 Nm
	Angle of rotation	120 °



- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

▸ **Replacement: Perform injection quantity compensation**

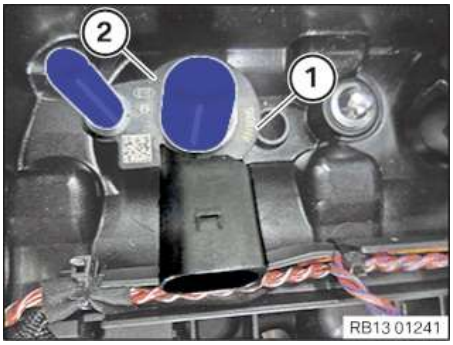
TECHNICAL INFORMATION

If the DDE control unit or an injector has been replaced, it will also be necessary to carry out injection quantity compensation. The adjustment value (7-position letter/number code) is engraved on each injector.

NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

cardiagn.com

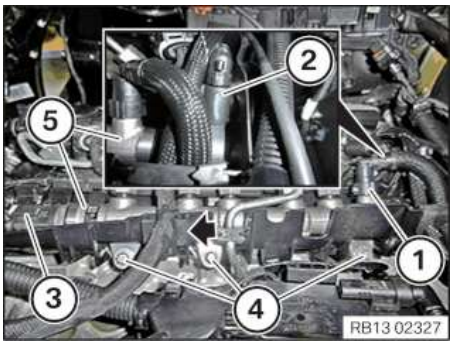


- Read off the adjustment value (1) on the new injector (2).



- Connect diagnosis system:
  - Vehicle identification
  - Function selection
  - Service functions
  - Digital diesel electronics (DDE)
  - Adjustment of injectors
  - Testing schedule
- Start service function with the right arrow button.

79 – Installing the rail



- Insert and install the rail (5).
- Tighten the screws (4).

Rail to cylinder head cover

M8		Tightening torque	19 Nm

- Install and lock cable clip (arrow).

  The cable clip (arrow) must engage audibly.
- Connect and lock the connector (3) at the rail pressure sensor.

  The connector (3) must engage audibly.
- Connect and lock the connector (2) at the rail pressure regulating valve.

  The connector (2) must engage audibly.
- Feed in fuel return line (1) and install.

  The fuel return line (1) must audibly engage.

80 – Installing high pressure line between rail and high pressure pump

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

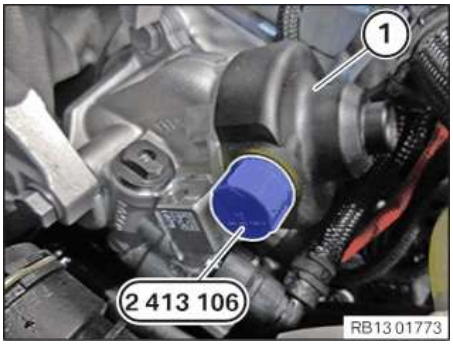
Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

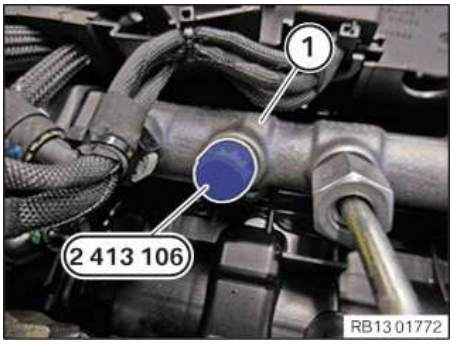
cardiagn.com

TECHNICAL INFORMATION

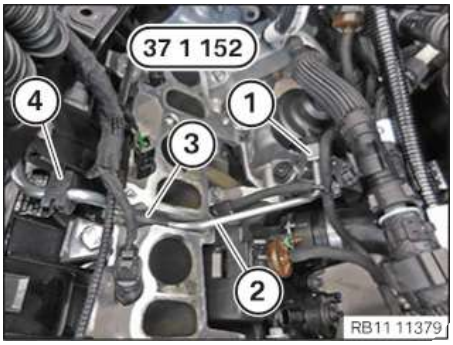
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Feed out and remove special tool on the high pressure pump (1).



- Feed out the special tool on the rail (1) and remove.



- Insert and install the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).
- Hand-tighten the union nut (1) on the high pressure pump.



- Hand-tighten the union nut (1) on the rail.

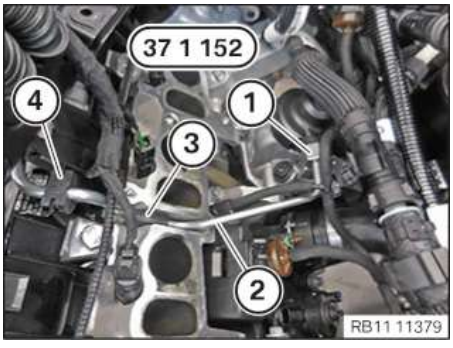
TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten the union nut (1) with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm



- Make sure that the high pressure line (2) is correctly installed with the abrasion protection (3) and the rubber mount (4).

TECHNICAL INFORMATION

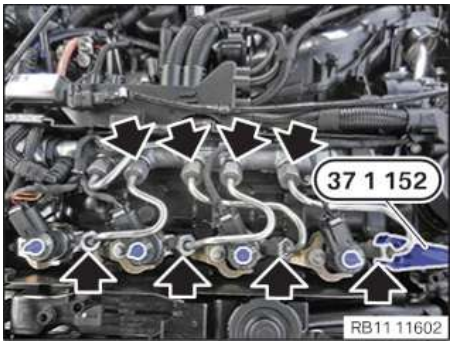
Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten union nut (1) on the high pressure pump with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm

mandiagn.com



- Remove the special tool from all cable connections.
- Feed in and install the high pressure lines (arrows).
- Hand-tighten the high pressure lines (arrows).

TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

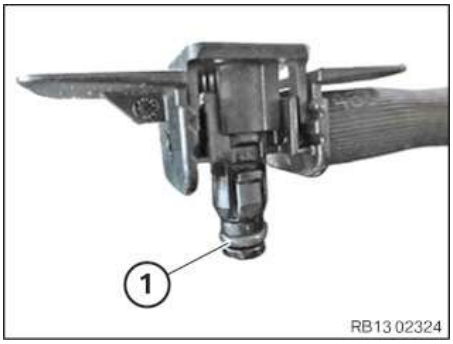
- Tighten the high pressure lines (arrows) with the special tool .

High pressure lines between injector and rail

High-pressure pipe		Tightening torque	24.5 Nm

- Check the high pressure lines (arrows) for tightness (**visual inspection**).

82 – Attach the leakage oil line on the injectors

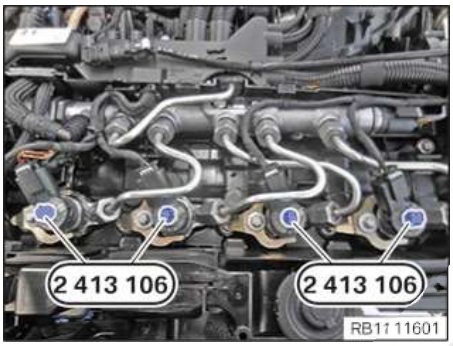


- **Version A:**

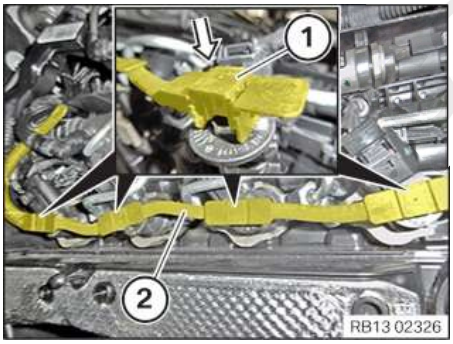
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

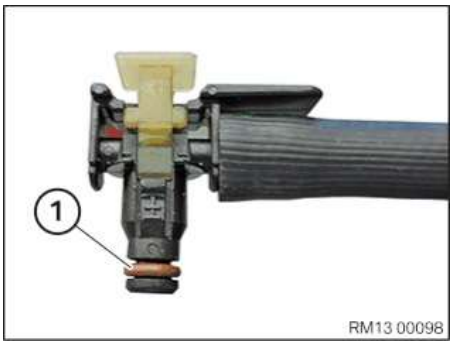
  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.



- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.



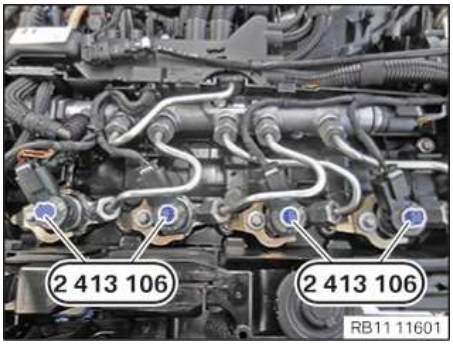
- **Version B**:

  Check sealing ring (1) for damage, renew leakage oil line if necessary.

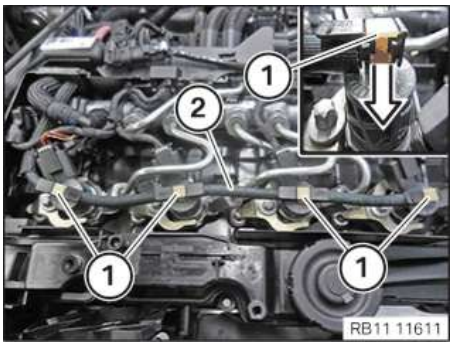
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.

ardiagn.com

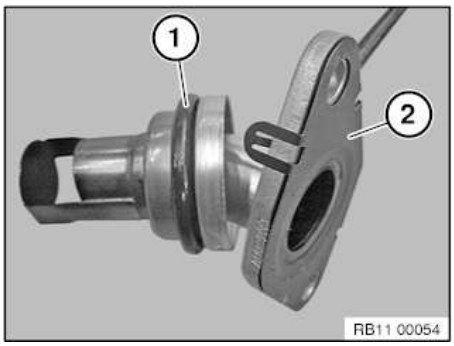


- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.

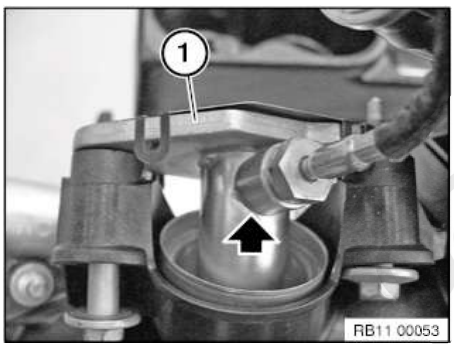
83 – Installing the intake plenum



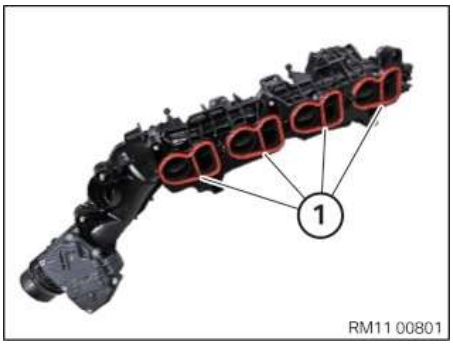
- Renew O-ring (1).

  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

  Parts: Gasket
- Position the seal (2) and clip it in.



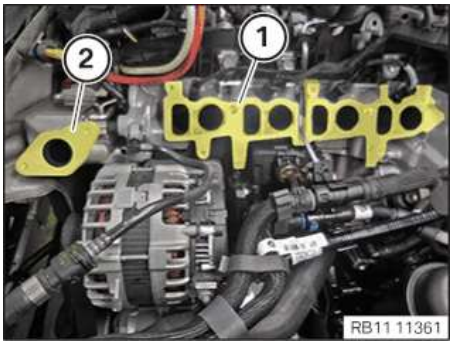
- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).



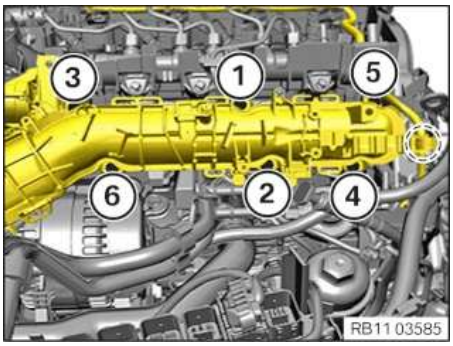
- Renew seals (1).

  Parts: Seals
- Ensure that the seals (1) are firmly mounted on the intake plenum.

cardiagn.com



- Clean connection points (1) at cylinder head.
- Clean the connection point (2) on the exhaust-gas recirculation cooler.

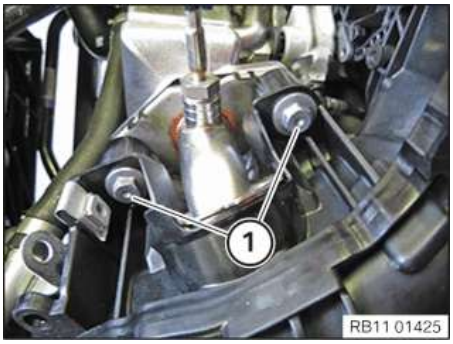


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

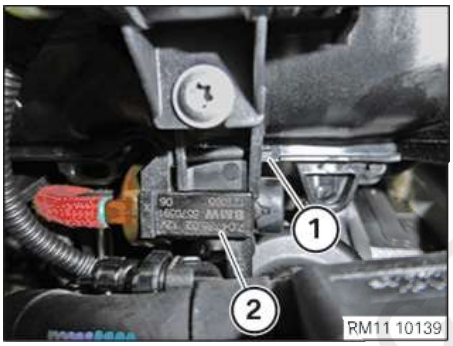
- Attach the wiring harness and fuel lines in the marked area on the intake plenum.



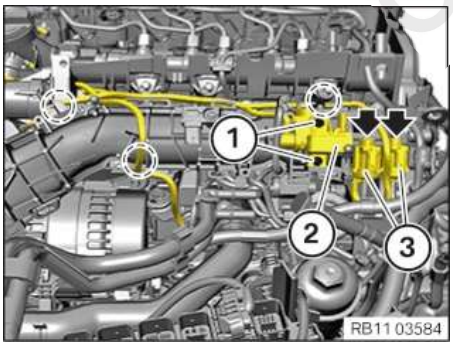
- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm



- Install electric changeover valve (2) from the left to the right in the holder on the intake plenum.
  The lock (1) must audibly engage.



- Install intake plenum electric changeover valve (3) on the intake plenum.
  The locks (arrows) must engage audibly.
- Position the electric changeover valve (2) on the intake plenum.
- Tighten the screws (1).

Electric changeover valve to intake plenum

TS6x20		Tightening torque	5 Nm

- Fasten the vacuum hoses on the intake plenum in the marked areas.



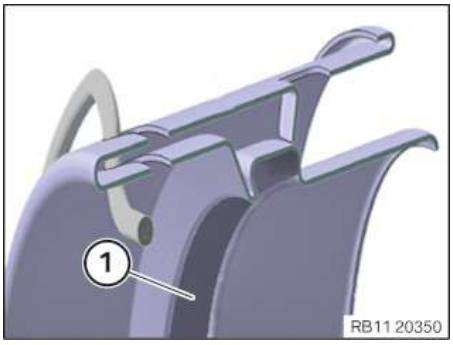
- Check the seal (1) for damage, and renew if necessary.

gardiagn.com

▸ **Replacing damaged seal**

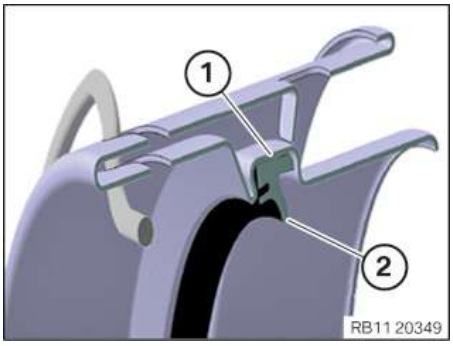
TECHNICAL INFORMATION

Do not use pointed or sharp-edged tools for the installation and/or removal.



- Remove damaged seal.
- Clean gasket groove (1) with a dry towel.

  The gasket groove (1) must be clean.



- Renew gasket.

  Parts: Gasket
- Install seal dry without lubricant or mounting agent.

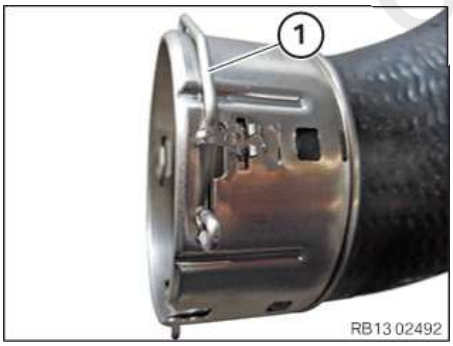
TECHNICAL INFORMATION

Incorrect assembly is possible. Ensure correct installation position.

- Feed in and install the seal.
- Make sure the seal is correctly installed in the gasket groove (1).
- Make sure that the sealing lip (2) is directed inwards as shown.



- Connect the pressure pipe to the throttle body until the locks (1) engage on both sides.



- Check that the locks (1) are correctly seated on the pressure pipe.

84 – Partially securing the wiring harness section on the intake plenum

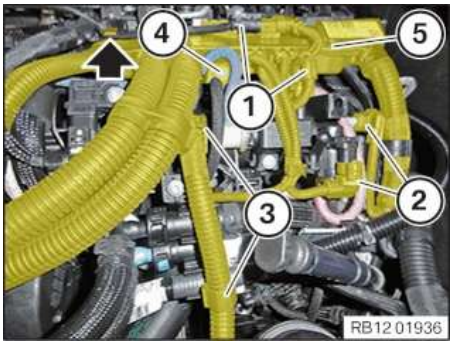
RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

- Route all cables without abrasions, do not trap and crush.

carsdiagn.com



- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

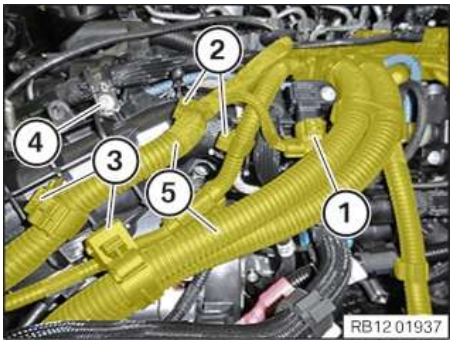
Wiring harness section to manifold

TS5x20		Tightening torque	3,6 Nm

- Secure clamps (3).
- Connect connectors (2) and lock.

  The connectors (2) must engage audibly.
- Secure the line at clamp (Arrow).
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



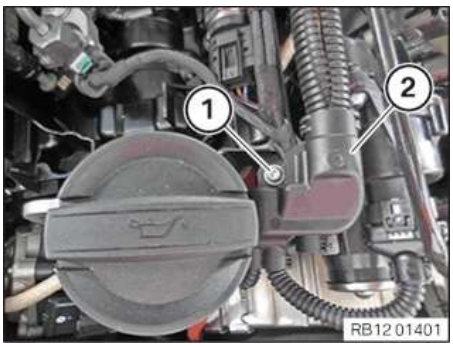
- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

Standard screw connection 4 Nm

Oval-head screw		Tightening torque	4 Nm

- Secure clamps (3).
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



- Guide in the wiring harness section (2) and install.
- Tighten down screw (1).

Wiring harness section to cylinder head cover

TS5x20		Tightening torque	3,6 Nm



- Connect connectors (1) and lock.

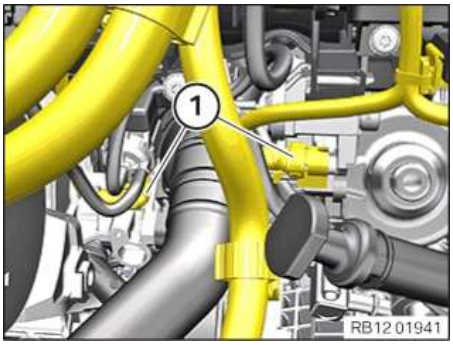
  The connector (1) must engage audibly.



- Connect the connector (1) and lock it.

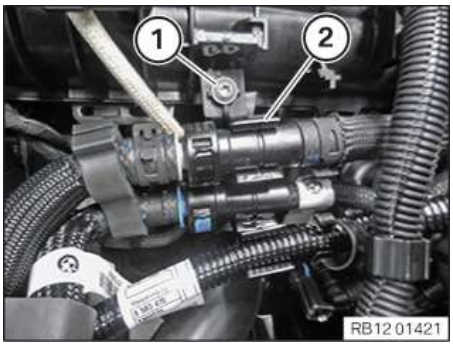
  The connector (1) must engage audibly.

cardiagn.com



- Connect connectors (1) and lock.

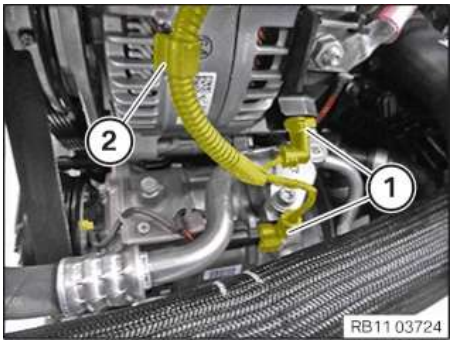
  The connectors (1) must engage audibly.



- Insert and install the holder (2).
- Tighten down screw (1).

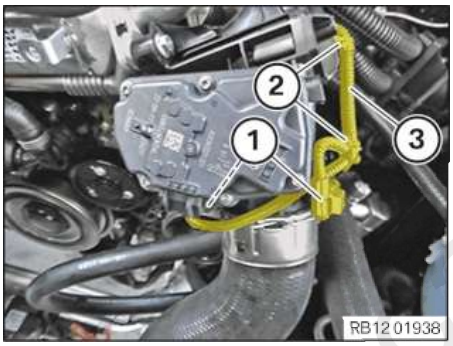
Holder on intake plenum

TS6X20		Tightening torque	5 Nm

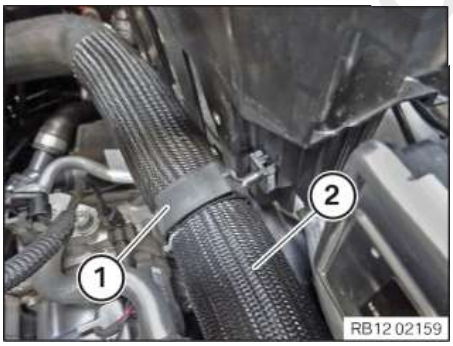


- Connect the connector (1) and lock it.

  The connectors (1) must engage audibly.
- Secure holder (2) to alternator.



- Guide in the wiring harness section (3) and install.
- Secure clamps (2).
- Connect connectors (1) and lock.



- Feed in and install coolant line (2).
- Lock holder (1).

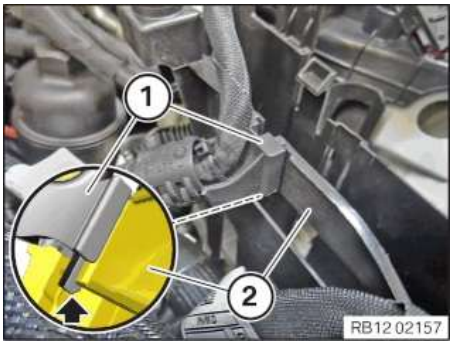
  The holder (1) must engage audibly.



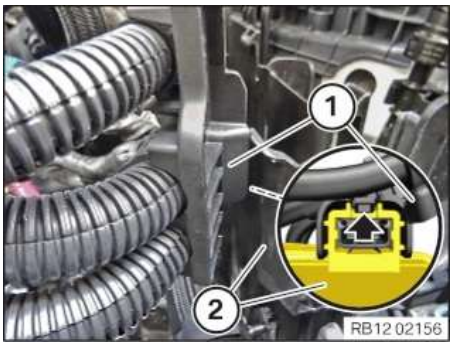
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.

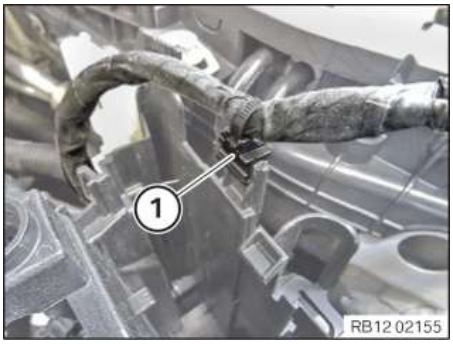
cardiagn.com



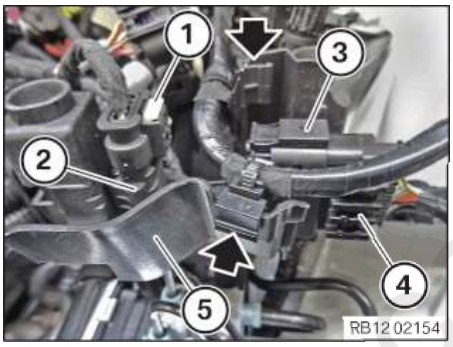
- Connect the cable clip (1) with the control unit holder (2) and lock it.
  Lock (arrow) must audibly engage.



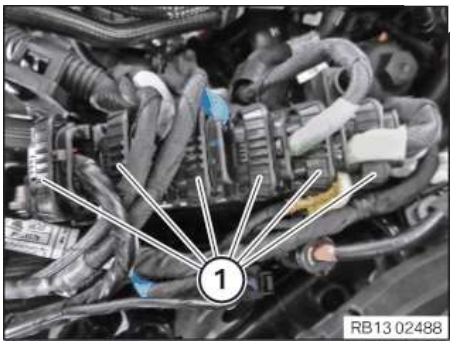
- Connect the cable clip (1) with the control unit holder (2) and lock it.
  Lock (arrow) must audibly engage.



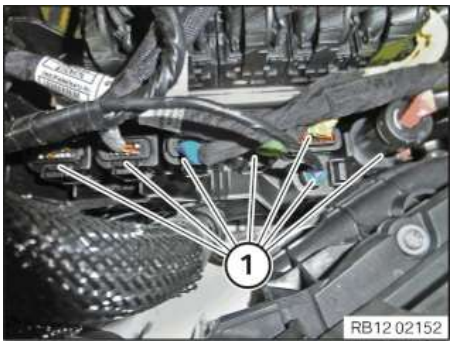
- Secure clamps (1).



- Connect and lock the connector (4) with the control unit holder (5).
  The connector (4) must engage audibly.
- Connect connectors (3) and lock.
  The connector (3) must engage audibly.
- Connect and lock the connector (2) with the control unit holder (5).
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.
  The connector (1) must engage audibly.
- Secure the clamps (arrows).

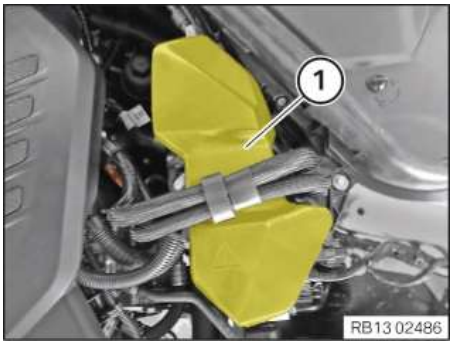


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



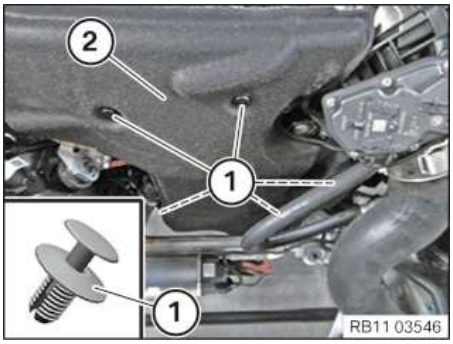
- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.

cardiagn.com



- Insert and install cover (1) into guides.

85 – Install acoustic cover for the engine, front

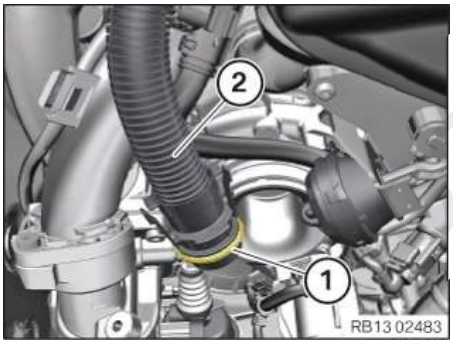


- Feed the acoustic cover (2) in and install.
- Secure the acoustic cover (2) with the expanding rivets (1).

86 – Installing the clean air pipe with resonator



- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.

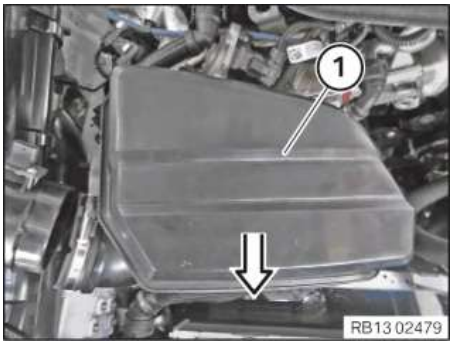


- Check the sealing ring (1) for the engine ventilation line (2) for damage and renew where required.



- Feed in and install clean air pipe with resonator (1) in the direction of the arrow.

cardiagn.com

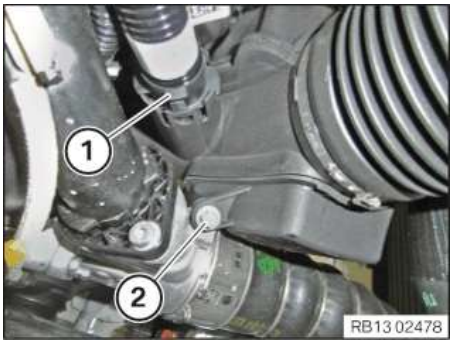


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

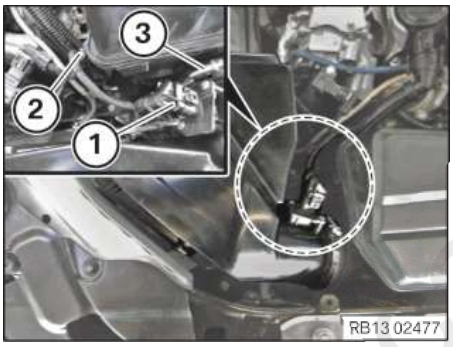
  The clamp (1) must engage audibly.



- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm



- Connect the clean air pipe with resonator to the intake filter housing.
- Tighten clamp (3).

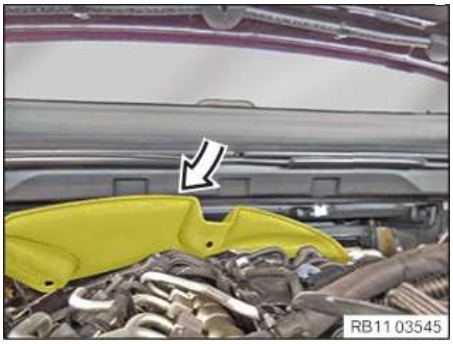
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

- Secure clamps (2).
- Connect connectors (1) and lock.

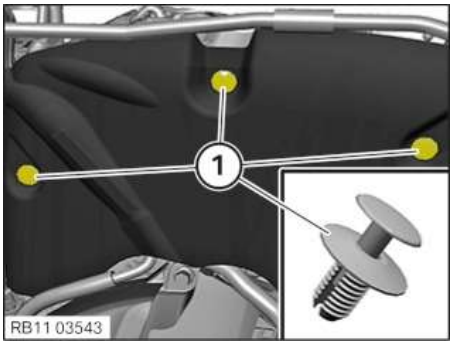
  The connector (1) must engage audibly.

87 – Installing acoustic cover at rear



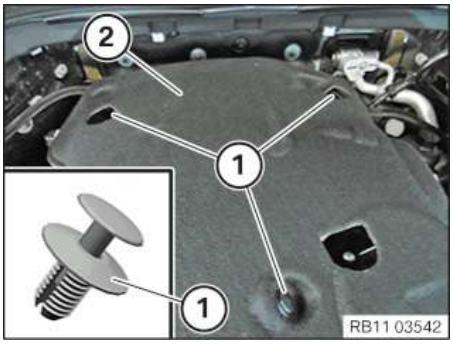
- Guide in the acoustic cover in the direction of the arrow and install it.

cardiagn.com



- Secure acoustic cover with the expanding rivets (1).

88 – Install the acoustic cover for the injectors



- Feed the acoustic cover (2) in and install.
- **If installed:** Secure the acoustic cover (2) with the expanding rivets (1) .

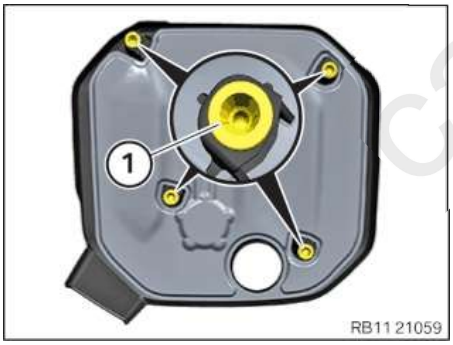
89 – Install acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



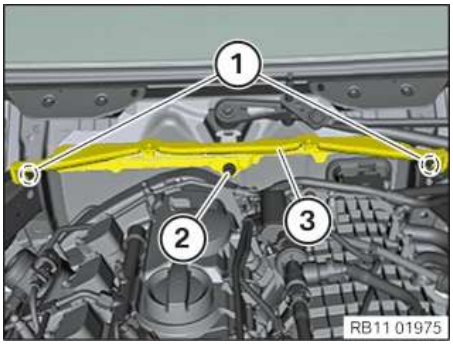
- Check the acoustic cover for correct fit of the rubber mounts (1).



- Clip in the acoustic cover (1) into the holders in the indicated areas.

90 – Installing centre bulkhead lower section

cardiagn.com

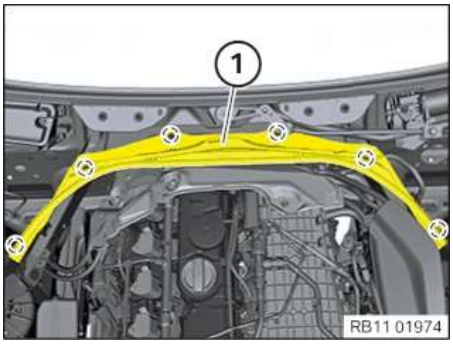


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

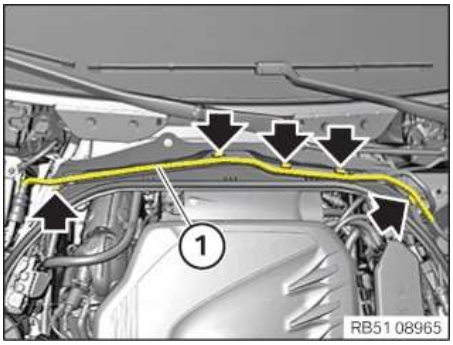
91 – Installing the centre bulkhead upper part



- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

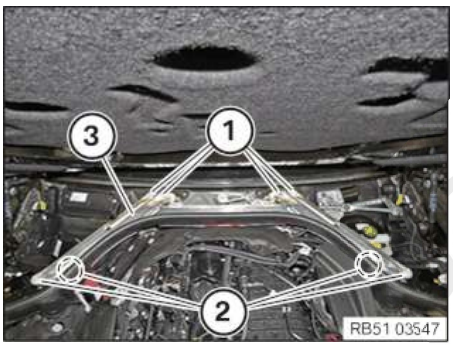
Bulkhead upper part to bottom bulkhead

		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

  Clip in the wire (1) into the holders (arrows).



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Install the tension strut (3) on the spring strut dome.
- Tighten the screws (1).

Tension strut on bulkhead

M10x25 screw		Tightening torque	56 Nm

- Renew screws (2).

  Parts: Screws
- Tighten the screws (2).

Tension strut to spring strut dome

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

92 – Install the seal for the bonnet

carmagn.com



- Press the rear bonnet seal (2) into the guide.
- Feed in cable (1) into the brackets.
- Check that the rear bonnet seal (2) and the cable (1) are seated correctly.

93 – Installing cowl panel cover

RISK OF DAMAGE

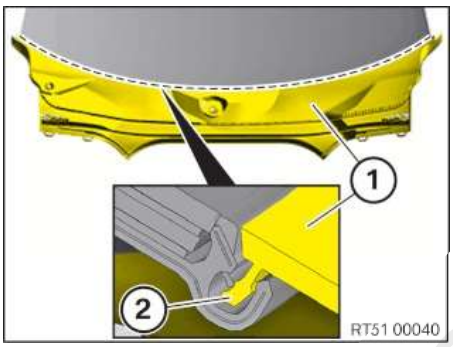
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

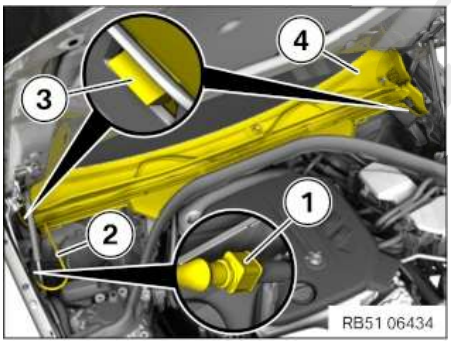
- Ensure correct installation of the components.
- Only use undamaged components.

TECHNICAL INFORMATION

Before installing the cowl panel cover it is **mandatory** to check that the 48 V line is routed correctly and fitted tightly.
An incorrectly laid or attached 48 V line can be damaged by the wiper kinematics.



- Push the cowl panel cover (1) into the latch mechanism (2) beginning on the side.



- Clip cowl panel cover (4)in by means of the latch mechanisms (3).
- Position windscreen wash hose (2) and connect windscreen wash hose (1)quick lock.

94 – Install left and right wiper arm

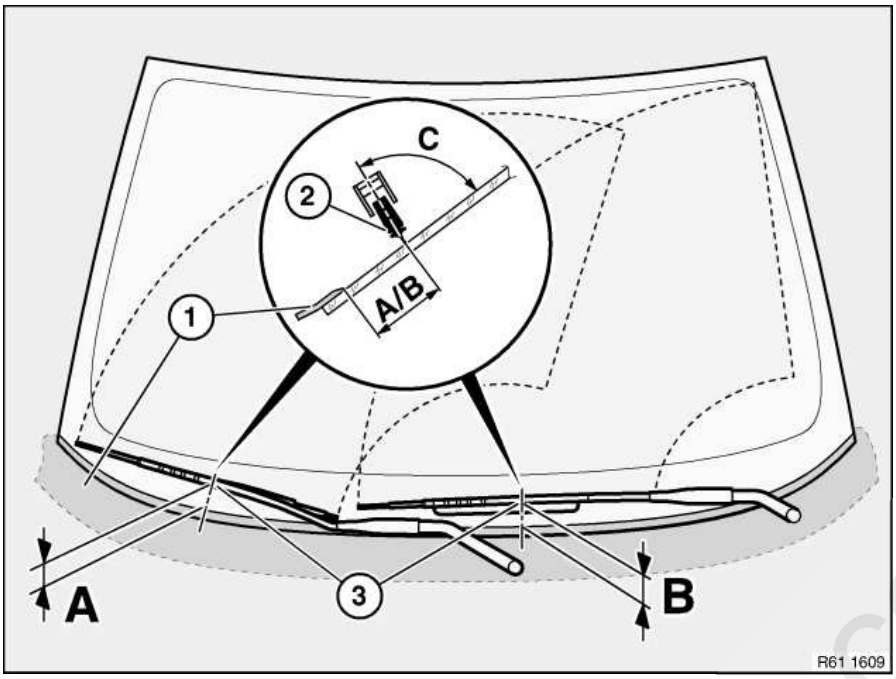
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

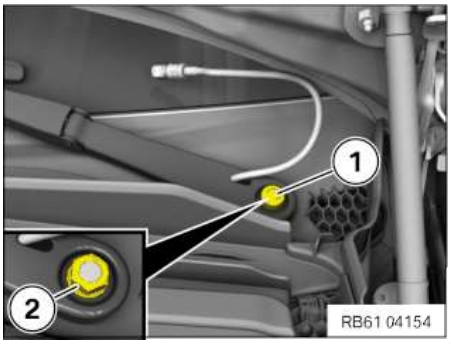
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- Connect the wiper arm (3).
- Correctly position the wiper arm (2) in relation to the window edge (1).

Distance from window pane edge to wiper blade

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

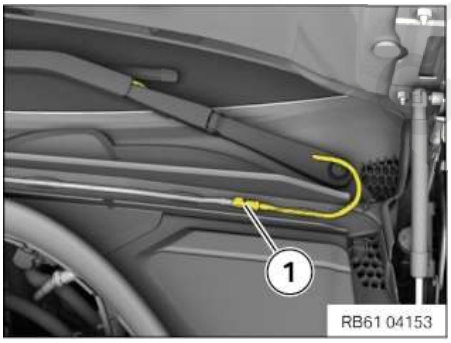


- Tighten nut (2).

Windscreen wiper arm

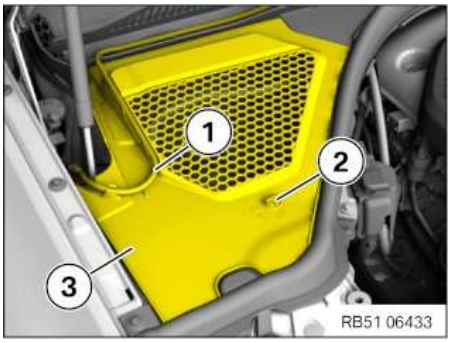
Combination hexagon nut		Tightening torque	35 Nm

- Connect the protective cap (1).



- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

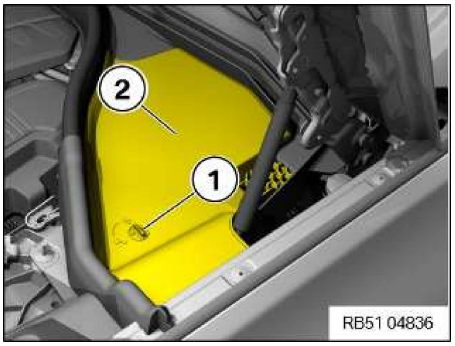
95 – Install the rear right engine compartment cover



- Position the cover of the engine compartment on the rear right (3).
- Close lock (2).
- Insert washer fluid hose (1) into the guides.

96 – Install the cover of the engine compartment on the rear left

cardiagn.com



- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

97 – Connecting all battery earth leads



- See additional information.

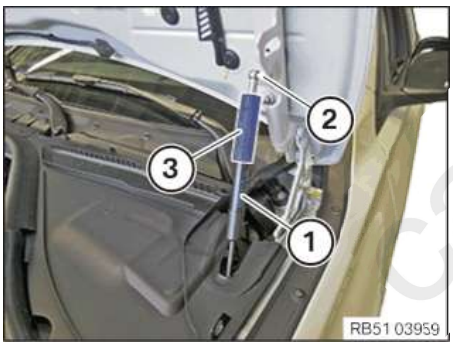
98 – Take bonnet out of the service position

CAUTION

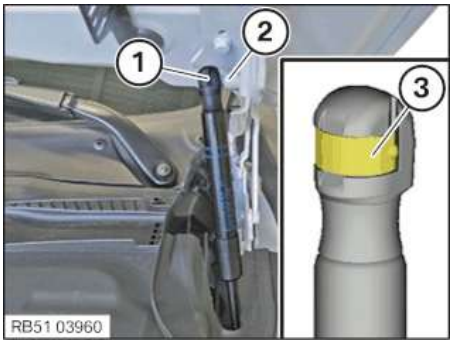
Shutting bonnet or tailgate.

Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.



- Support the bonnet by hand.
- Remove the special tool (3) from the ball pin (2).
- Pull off the special tool (3) from the gas pressure spring (1).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.



- Check the clamp (3) is fitted correctly.
- Connect ball socket (1) to ball pin (2).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.

Additional Information

Overview of Tightening Torques

Special tool 2 365 488 to engine Used in step 4056

M8x60		Tightening torque		19 Nm

carmagn.com

Camshaft carrier to cylinder head			Used in step 50
M7x35		Tightening torque	13 Nm

Bearing journal to cylinder head			Used in step 52
M16x1.5	Replace bearing journal.	Tightening torque	20 Nm

Standard screw connection M8			Used in step 52
M8		Tightening torque	19 Nm

Chain tensioner piston to cylinder head			Used in step 53
22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

Holder to crankcase			Used in step 53
M8X16		Tightening torque	19 Nm

Camshaft sprocket to camshaft			Used in step 54
M7x17.			17 Nm

Starter motor to engine			Used in step 59
M8X60		Tightening torque	19 Nm

Battery positive lead to starter			Used in step 59
M8		Tightening torque	13,5 Nm

Diesel particulate filter V-clip to exhaust turbocharger			Used in step 61
V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

Bracket to diesel particulate filter top			Used in step 61
M8		Tightening torque	19 Nm

Bracket to transmission for diesel particulate filter holder bottom			Used in step 61
M8X20		Tightening torque	19 Nm

Lower holder to diesel particulate filter			Used in step 61
M8		Tightening torque	19 Nm

Coolant lines for SCR metering module			Used in step 61
M6X16		Tightening torque	8 Nm

Nitrogen oxide sensor before SCR catalytic converter			Used in step 62
Sensor		Tightening torque	50 Nm

Monitoring oxygen sensor			Used in step 63
Sensor		Tightening torque	50 Nm

Rear silencer to body / bumper support			Used in step 64
M8	Replace nuts.	Tightening torque	19 Nm

Exhaust system to rear axle carrier			Used in step 64
M8 nut		Tightening torque	19 Nm

Exhaust system to transmission			Used in step 64
M8		Tightening torque	19 Nm

Exhaust system to diesel particle filter			Used in step 64
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

cardiagn.com

SCR metering module V-clip to exhaust system			Used in step 64
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm

Exhaust-gas temperature sensor upstream of SCR catalytic converter			Used in step 64
Sensor		Tightening torque	30 Nm

Diesel particulate sensor to exhaust system			Used in step 64
Sensor		Tightening torque	50 Nm

Nitrogen oxide sensor downstream of SCR catalytic converter			Used in step 64
Sensor		Tightening torque	55 Nm

Connecting support to tunnel			Used in step 65
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

Diffuser / underbody panelling			Used in step 66
Nuts and screws		Tightening torque	3 Nm

Underbody protection			Used in step 6769
Hexagon screw		Tightening torque	3 Nm

Underbody panelling			Used in step 68
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Underbody protection, steering, to front axle support			Used in step 70
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support			Used in step 70
Hexagon bolt M6		Tightening torque	8 Nm

Underbody protection of the steering gear			Used in step 71
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

Wheel arch trim panel, front			Used in step 71
Thermoplastic hexagon screw		Tightening torque	2,6 Nm

Underbody protection front			Used in step 72
Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Cylinder head cover to cylinder head			Used in step 73
M6		Tightening torque.	8,5 Nm

Heat shield to exhaust manifold			Used in step 74
M6x12			10 Nm

Bracket on cylinder head cover			Used in step 75
		Tightening torque	5 Nm

Battery positive lead to battery positive terminal			Used in step 75
M8		Tightening torque	19 Nm

cardiagn.com

Differential pressure sensor of diesel particulate filter on cylinder head cover			Used in step 76
TS5x20		Tightening torque	4 Nm

Heat shield to exhaust manifold			Used in step 77
M6x12		Tightening torque	10 Nm

Banjo bolt for exhaust pressure pipe to exhaust manifold			Used in step 77
Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm

Exhaust gas pressure pipe to sensor system holder			Used in step 77
TS6x20		Tightening torque	5,7 Nm

Clamping claw facing to cylinder head cover			Used in step 78
M6		Tightening torque	10 Nm

Injector to cylinder head cover			Used in step 78
M8		Tightening torque	8 Nm
		Angle of rotation	120 °

Rail to cylinder head cover			Used in step 79
M8		Tightening torque	19 Nm

High pressure lines between high pressure pump and rail			Used in step 80
High-pressure pipe		Tightening torque	24.5 Nm

High pressure lines between injector and rail			Used in step 81
High-pressure pipe		Tightening torque	24.5 Nm

Intake plenum to cylinder head			Used in step 83
M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum			Used in step 83
		Tightening torque	10 Nm

Electric changeover valve to intake plenum			Used in step 83
TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold			Used in step 84
TS5x20		Tightening torque	3,6 Nm

Standard screw connection 4 Nm			Used in step 84
Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover			Used in step 84
TS5x20		Tightening torque	3,6 Nm

Holder on intake plenum			Used in step 84
TS6X20		Tightening torque	5 Nm

Clean air pipe to exhaust turbocharger			Used in step 86
M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing			Used in step 86
Clamp		Tightening torque	3 Nm

Bulkhead lower part to body			Used in step 90
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

cardiagn.com

Bulkhead upper part to bottom bulkhead — Used in step 91

		Tightening torque	3 Nm

Tension strut on bulkhead — Used in step 91

M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome — Used in step 91

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm — Used in step 94

Combination hexagon nut		Tightening torque	35 Nm

Overview of Special Tools

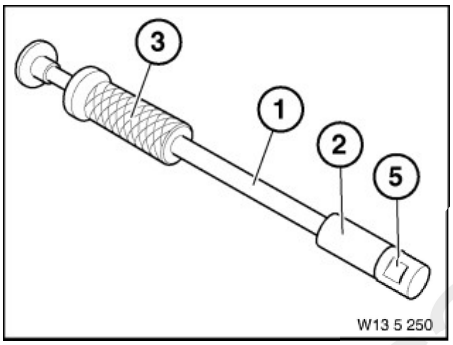
0 493 339 (13 5 252) Bush



Common — Used in step 21

Usage	(Threaded bush)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 321 (13 5 250) Puller



Common — Used in step 21

Usage	For removing injector nozzles or injectors from cylinder head
Included in the tool or work	
Storage location	A16
Replaced by	
In connection with	
SI-Number	01 06 98 (306)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 338 (13 5 251)		**Rod** (guide rod)	
2	0 493 339 (13 5 252)		**Bush** (Threaded bush)	
3	0 493 340 (13 5 253)		**Weight** (Weight)	
4	0 493 379 (13 5 254)		**Claw** (Clamping claw) For removal of injector nozzles / engine: M57	
5	0 495 579 (13 5 255)		**Adapter** For removing steering shaft on E85. Refer to SI 01 11 06 (265)	

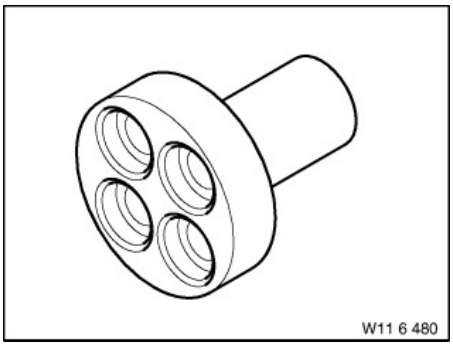
cardiagn.com

0 493 340 (13 5 253) Weight



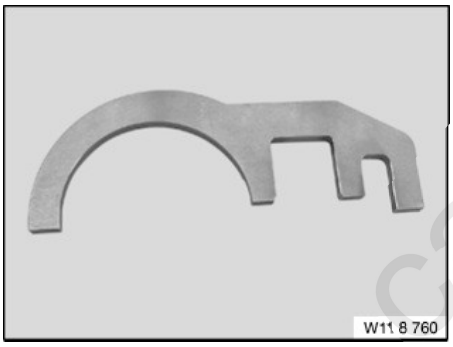
Common	Used in step 21
Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 380 (11 6 480) Connector



Common	Used in step 4056
Usage	For turning over engine at crankshaft hub (vibration absorber).
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	01 11 98 (338)

0 496 112 (11 8 760) Gauge



Common	Used in step 40445657
Usage	For securing camshaft at TDC.
Included in the tool or work	
Storage location	B24
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

2 365 488 Adapter



Common	Used in step 40555658
Usage	For disconnecting the crankshaft at the top dead centre. (longitudinal installation with automatic transmission only).
Included in the tool or work	
Storage location	C56
Replaced by	
In connection with	
SI-Number	01 46 14 (191)

cardiagn.com

2 288 380 Locating stud

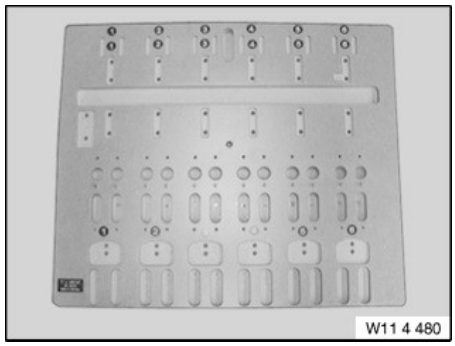


Common Used in step 40555658

Usage	For disconnecting the crankshaft at the top dead centre. Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).
Included in the tool or work	
Storage location	A56
Replaced by	
In connection with	
SI-Number	01 04 14 (071)

cardiagn.com

0 495 105 (11 4 480) oddments tray



Common Used in step 4647

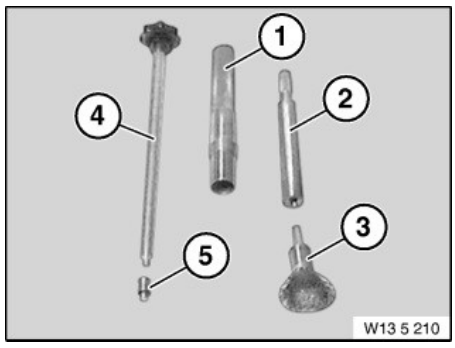
Usage	(Boards (2 pieces)) For setting down the individual components of the cylinder head.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 17 04 (130)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 495 106 (11 4 481)		**oddments tray** (Board, intake side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	
2	0 495 107 (11 4 482)		**oddments tray** (Board, exhaust side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	

cardiagn.com

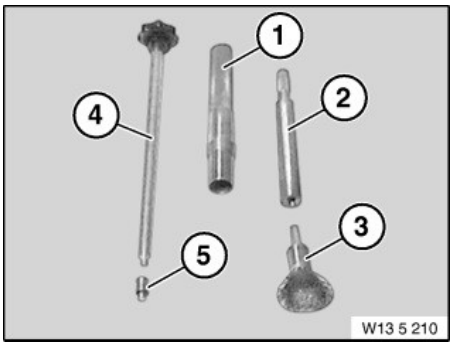
0 493 763 (13 5 215) Plug



Common Used in step 78

Usage	(Seal plug)
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

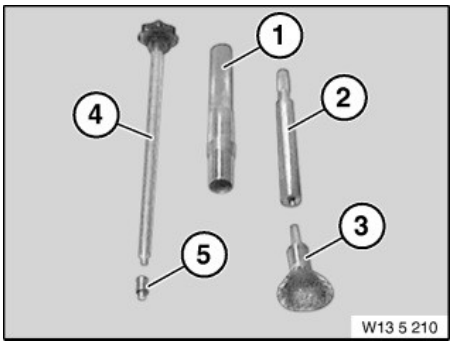
0 493 762 (13 5 214) Rod



Common Used in step 78

Usage	(Mounting rod) For the seal plug
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 758 (13 5 210) Tool



Common Used in step 78

Usage	(Cleaning set) For injector channels
Included in the tool or work	
Storage location	B4
Replaced by	
In connection with	
SI-Number	01 05 00 (574)

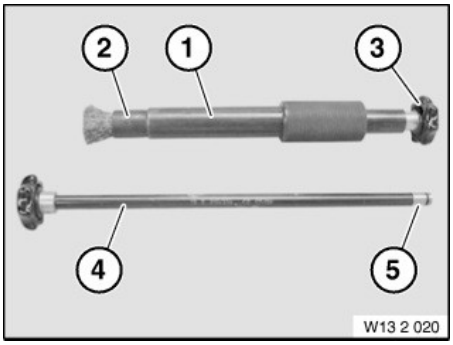
Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 759 (13 5 211)		**Holding sleeve** (Guide sleeve)	
2	0 493 760 (13 5 212)		**Holder** (Brush holder)	
3	0 493 761 (13 5 213)		**Brush head**	
4	0 493 762 (13 5 214)		**Rod** (Mounting rod) For the seal plug	
5	0 493 763 (13 5 215)		**Plug** (Seal plug)	

0 496 150 (13 2 020) Tool

Used in step 78

cardiagn.com



Common

Usage	(Cleaning kit) For cleaning the injector shaft.
Included in the tool or work	
Storage location	A87
Replaced by	
In connection with	
SI-Number	01 07 07 (355)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 496 151 (13 2 021)		**Holding sleeve** (Guide sleeve) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
2	0 496 152 (13 2 022)		**Holder** (Brush holder) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
3	0 496 153 (13 2 023)		**Brush head** Remaining inventories will be sold off, followed by discontinuation and then available as part of complete special tool 13 2 020 = 83 30 0 496 150 only	
4	0 496 154 (13 2 024)		**Rod** (Mounting rod) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
5	0 496 155 (13 2 025)		**Plug** (Seal plug) Available as part of complete special tool 13 2 020 = 83 30 0 496 150 only.	

cardiagn.com

Overview Technical Data

Distance from window pane edge to wiper blade — Used in step 94

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

Links

General repair instructions	Used in step
11 00 ... Overview of consumables (Electronic Parts Catalogue)	78

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	297
61 20 900 Disconnecting and connecting battery earth lead	297
61 20 900 Disconnecting and connecting battery earth lead	297
61 20 900 Disconnecting and connecting battery earth lead	297
61 20 900 Disconnecting and connecting battery earth lead	297
61 20 900 Disconnecting and connecting battery earth lead	297

61 20 900 Disconnecting and connecting battery earth lead	297
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	297
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	297
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	297
61 20 900 Disconnecting and connecting battery earth lead	297
61 20 900 Disconnecting and connecting battery earth lead	297
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	297
61 20 900 Disconnecting and connecting battery earth lead	297
61 20 900 Disconnecting and connecting battery earth lead	297
61 20 900 Disconnecting and connecting battery earth lead	297
61 20 900 Disconnecting and connecting battery earth lead	297
61 20 900 Disconnecting and connecting battery earth lead	297
61 20 900 Disconnecting and connecting battery earth lead	297
61 20 900 Disconnecting and connecting battery earth lead	297
61 20 900 Disconnecting and connecting battery earth lead	297
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	297
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	297
61 20 900 Disconnecting and connecting battery earth lead	297
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	297
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	297
61 20 900 Disconnecting and connecting battery earth lead

11 34 055 Replace all valve springs

WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

RISK OF DAMAGE

Damage to battery terminal, the safety battery terminal or the intelligent battery sensor (IBS).

Damaged battery terminals can lead to malfunctions or vehicle electrical system faults.

- Pull off battery terminal from battery pole by carefully moving to and fro. Do not pry off using a tool.

PRELIMINARY WORK

1 – Bring front compartment lid in the service position

Prerequisite

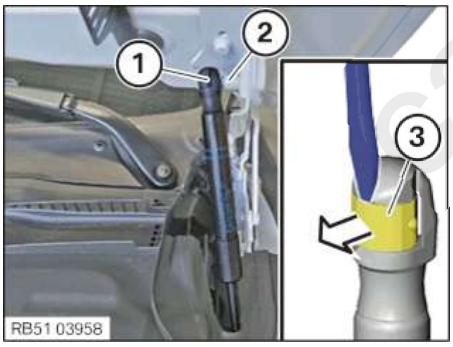
Engine compartment lid is open.

CAUTION

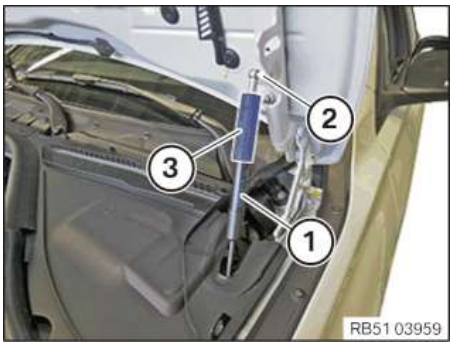
Shutting bonnet or tailgate.

Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.



- Lift clamp (3) slightly using a screwdriver, in the direction of the arrow.
- Lift off ball socket (1) from ball pin (2).
- Repeat the operation on the other side of vehicle.



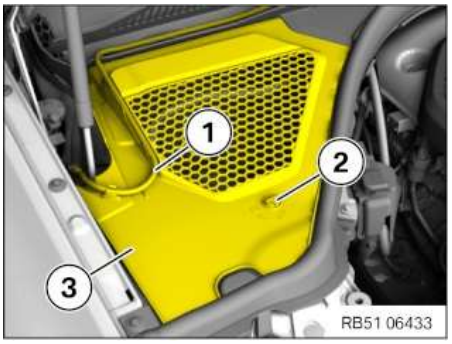
TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

- Remove the bonnet support and open the bonnet further.
- Pull special tool or or (3) over gas pressure spring (1).
- Place special tool on the ball pin (2) and engage using force.
- Repeat the operation on the other side of vehicle.

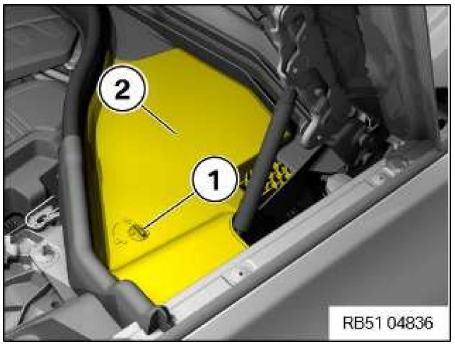
2 – Remove the cover of the rear right engine compartment

cardiagn.com



- Release washer fluid hose (1) from the guides.
- Loosen the lock (2).
- Remove the cover (3) of the rear right engine compartment.

3 – Remove the cover of the engine compartment at the rear left



- Loosen the lock (1).
- Remove the cover (2) of the rear left engine compartment.

4 – Deactivating the 48 V electrical system

Prerequisite

Ignition is switched off.

WARNING

Deactivation of the 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Make sure that **no battery charger** is connected to the jump start terminal point in the engine compartment.
- For vehicles with additional electrical systems (48 V electrical system, high-voltage vehicle electrical system), it is mandatory to deactivate them **before** disconnecting the vehicle battery.

WARNING

Deactivation of the 48 V electrical system.

Risk of short circuits! Risk of fire!

- Make sure that **no charger** is connected to the jump start support point in the engine compartment.

RISK OF DAMAGE

Damage to 48-V battery

If a 48-V battery that is disconnected from the electrical system is activated, the battery electronics will be damaged.

- Only carry out activation of the 48V electrical system with a completely connected 48-V battery.

TECHNICAL INFORMATION

Follow notes for 48-V battery. See further information 6120 ... Notes on 48-V battery.

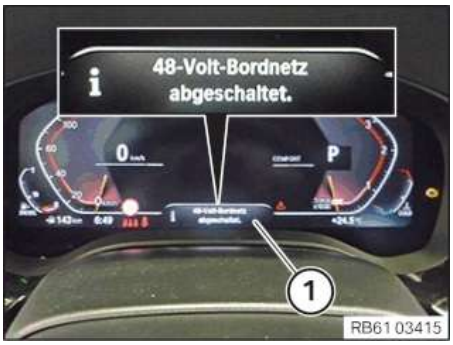
cardiagn.com



- Deactivate the 48V electrical system by opening the bonnet.

  The deactivation takes place automatically.

Check



TECHNICAL INFORMATION

Zero voltage (48V electrical system is switched off) is displayed only in PAD mode.

- Press the START-STOP button quickly 3 times without stepping on the brake pedal to establish the PAD mode.
- Check isolation from the supply in the instrument cluster in PAD mode.

desired state

- The Check Control message "48V electrical system switched off." (1) is displayed.

Result

» **The absence of voltage** cannot be determined by means of the Check Control message "48V electrical system switched off:" (1). Work is not permitted to be started.

Measure

- Carry out the service function "48 V electrical system deactivation".
  - Vehicle management > Service functions > Voltage supply > Deactivate 48 V electrical system

  Only when the Check Control message “48 V electrical system switched off.” (1) is displayed in the instrument cluster is it permitted to disconnect the 12 V battery.

  If the absence of voltage is not indicated clearly, contact Technical Support.

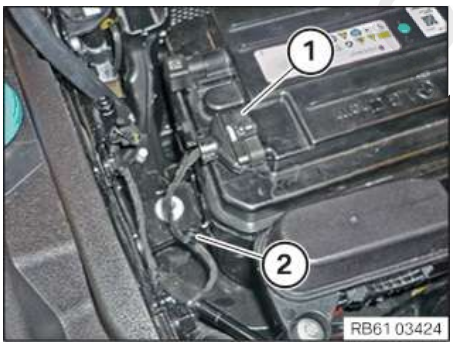
Result

» The Check Control message signals that the 48V electrical system has been switched off.

Measure

- Exit PAD mode by pressing the START-STOP button once without depressing the brake pedal.

  The work “Disconnecting the negative battery cable of the 48-V battery” can be started.



- Unlock and disconnect plug connection (1) of the CAN bus.
- Release the clip (2).



- Loosen nut (1).
- Pull off negative battery cable (2) of the 48-V battery from the negative battery terminal, set it aside and secure it.



WARNING

Unprotected battery terminals.

Risk of short circuits! Risk of fire!

- Cover the vehicle battery.

- Cover the vehicle battery with the special tool as shown.
- Position the battery earth lead (1) as shown.

5 – Disconnecting all battery earth leads



- See additional information.

6 – Removing the wiper arm on the left and right

NOTICE

Description is for left component only. Procedure on the right side is identical.

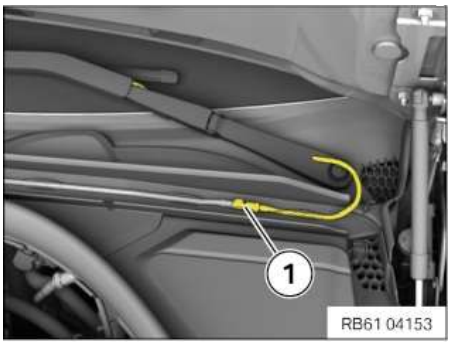
▸ **Remove the wiper arm**

RISK OF DAMAGE

Damage to wiper console.

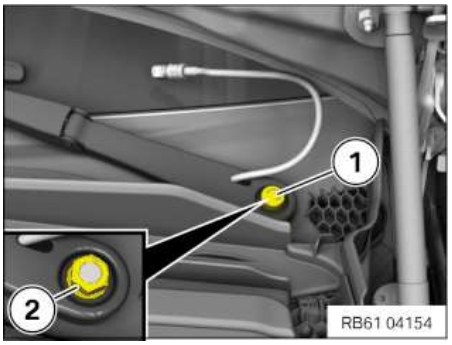
While removing the wiper arms without using special tool, the wiper console can break.

- Removing the wiper arms must be carried out only using the prescribed special tool.
- Do **not** lever off the wiper arm because otherwise the wiper console may break at the predetermined breaking point for active pedestrian protection.

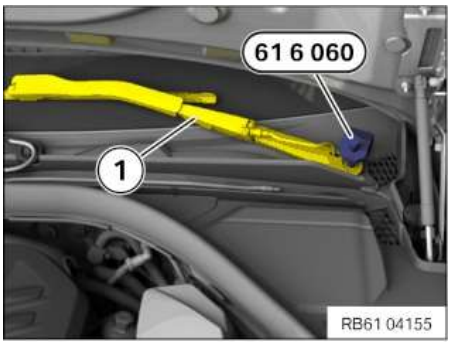


- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.

cardiagn.com

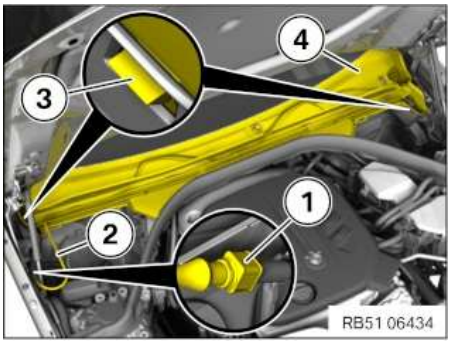


- Remove the protective cap (1).
- Loosen nut (2).

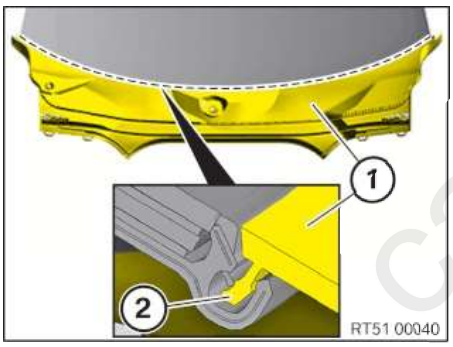


- Pull off the wiper arm (1) using special tool .

7 – Remove cowl panel cover



- Release snap fastener (1) of the washer fluid hose (2) and put the washer fluid hose (2) to one side.
- Unclip clips (3) on the cowl panel cover (4).



- Pull the cowl panel cover (1) upward out of the latch mechanism (2) beginning on the side.

8 – Remove the seal for the rear bonnet



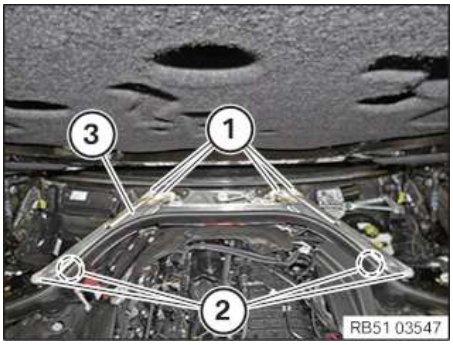
- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

9 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

Driving without the strut brace/front-end strut or tension strut is not permitted.

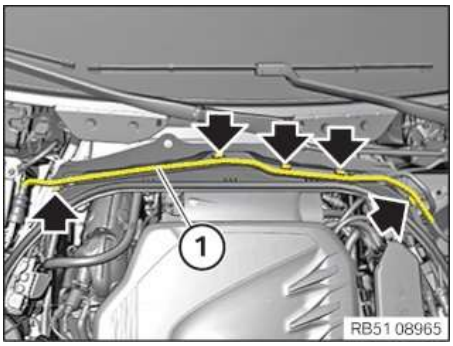
cardiagn.com



NOTICE

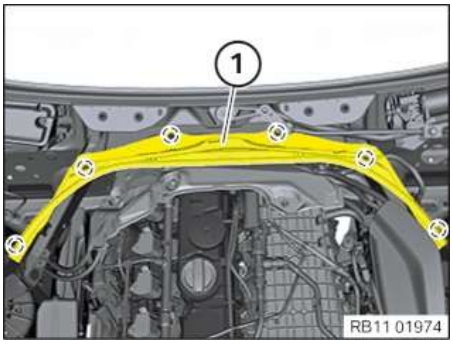
The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.



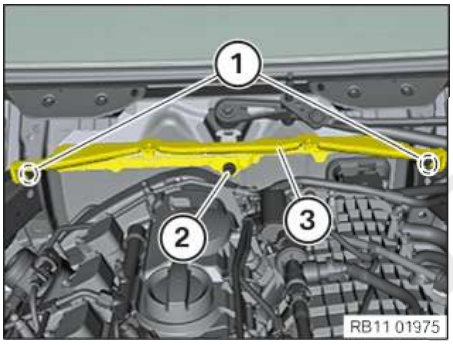
- **Version with mild hybrid technology:**

  Unclip the wire (1) at the holders (arrows).



- Unscrew the bolts in the marked areas.
- Remove the centre bulkhead upper part (1).

10 – Removing the centre bulkhead lower section



- Loosen screws (1).
- Loosen nut (2).
- Remove the centre bulkhead lower part (3).

11 – Removing the acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

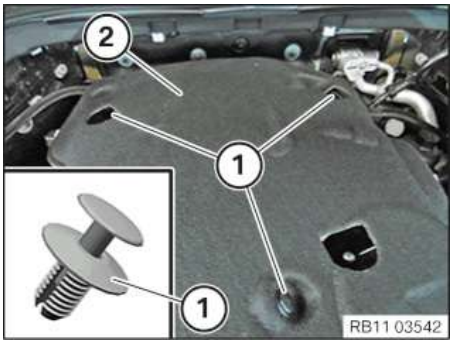
Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



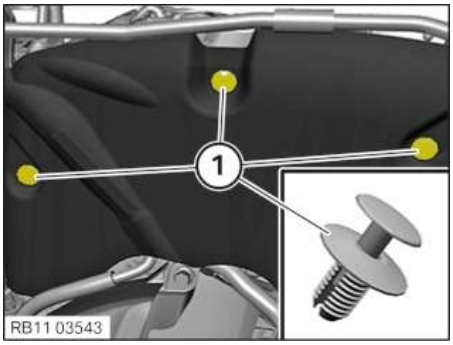
- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

12 – Remove the acoustic cover for the injectors

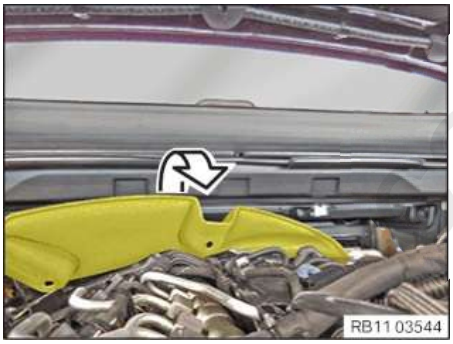


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

13 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).

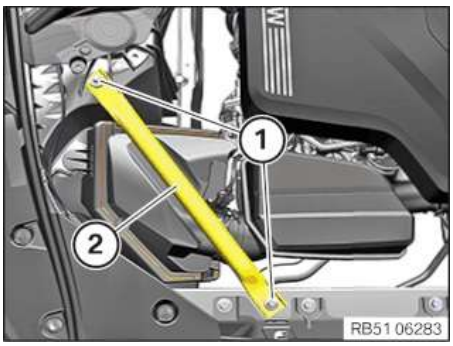


- Guide out and remove the acoustic cover in the direction of the arrow.

14 – Remove right front-end strut

TECHNICAL INFORMATION

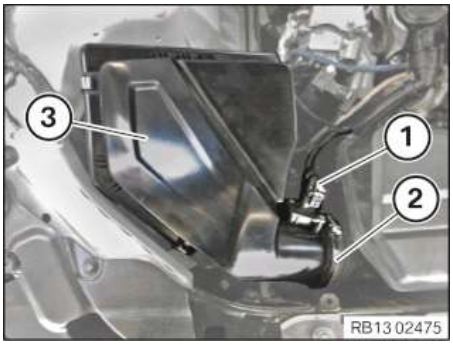
Driving without the strut brace/front-end strut or tension strut is not permitted.



- Loosen screws (1).
- Remove the front-end strut (2).

cardiagn.com

15 – Removing intake silencer housing



- Unlock plug connection (1) and disconnect.
- Unfasten clamp (2).
- Pull out and remove the intake silencer housing (3) from the rubber mounts towards the top.

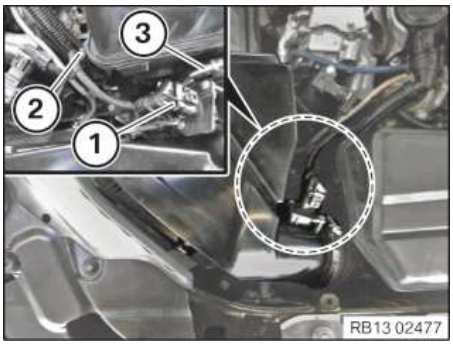
16 – Removing the clean air pipe with the resonator

WARNING

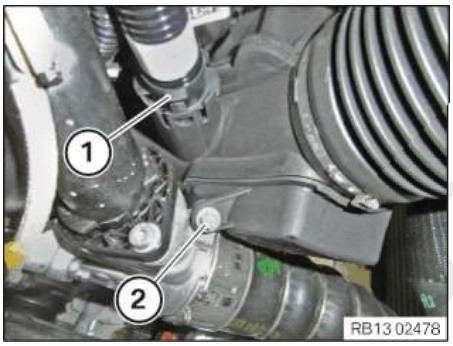
Hot surfaces.

Risk of burning!

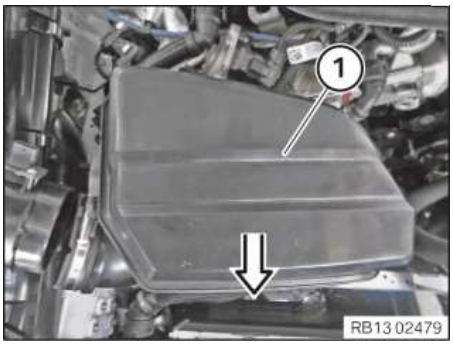
- Perform all work only on components that have cooled down.



- Unlock plug connection (1) and disconnect.
- Loosen clamp (2).
- Unfasten clamp (3).
- Separate the clean air pipe with resonator from the intake filter housing.



- Unlock engine ventilation line (1), disconnect it and place it aside.
- Loosen screw (2).



- Press and hold clean air pipe with resonator (1) in the direction of the arrow.

boardiagn.com



- Unlock and loosen clamp (1).



- Feed out and remove clean air pipe with resonator (1) in the direction of the arrow.

17 – Remove differential pressure sensor for the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

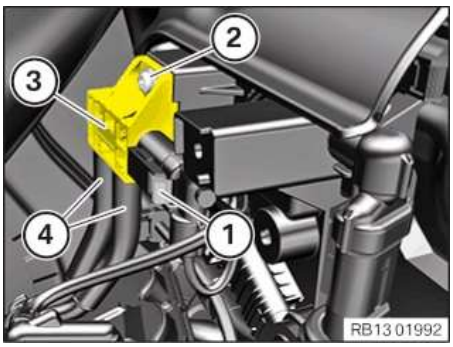
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).
- Pull off pressure hose (4).
- Feed out differential pressure sensor (3) and remove.

18 – Remove the exhaust temperature sensor on the diesel particulate filter

cardiagn.com

WARNING

Hot surfaces.

Risk of burning!

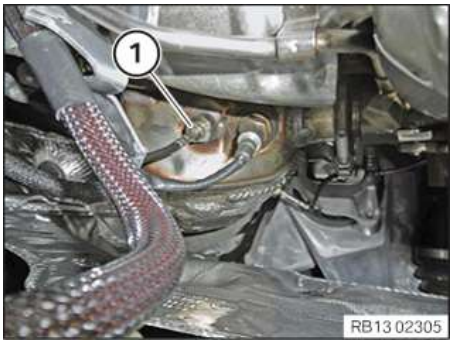
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

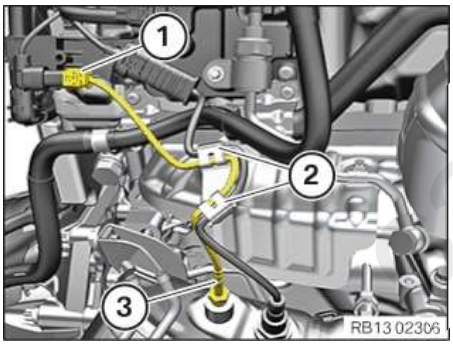
Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)



- Release exhaust temperature sensor (1) using special tool .



- Unlock plug connection (1) and disconnect.
- Remove the exhaust temperature sensor (3) from the clamps (2).
- Feed out and remove exhaust temperature sensor (3).

19 – Removing the front oxygen sensor on the diesel particulate filter on top

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

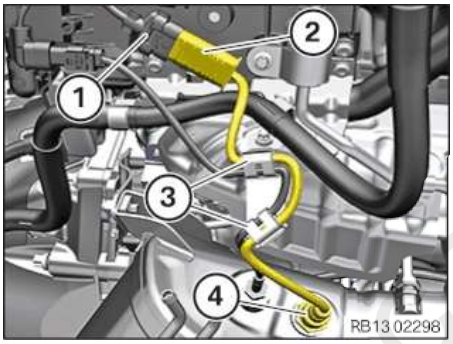
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



- Unlock plug connection (1) and disconnect.
- Unlock and disconnect connector (2).
- Pull the front oxygen sensor (4) out from the clamps (3) and remove it.



- Release the front oxygen sensor (1) with the standard tools and remove it.

20 – Removing the exhaust temperature sensor for the exhaust system downstream the catalytic converter at the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

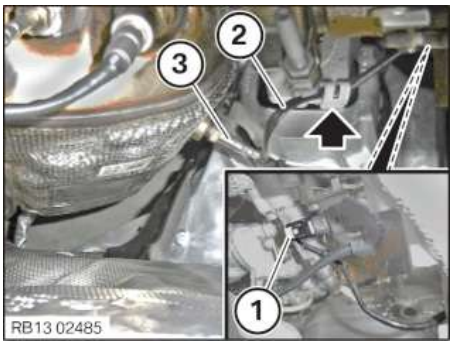
cardiagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

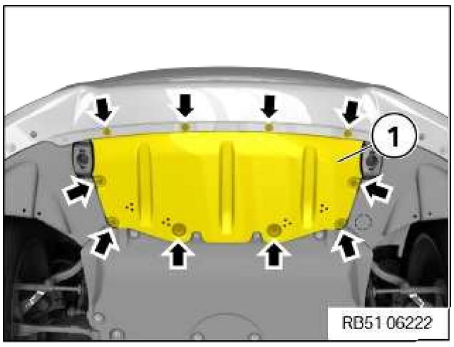


- Unlock plug connection (1) and disconnect.

Note: The exhaust temperature sensor is located near the right engine mount.

- Release cable (2) from the clamps (arrow).
- Loosen exhaust temperature sensor (3).
- Feed out and remove exhaust temperature sensor (3).

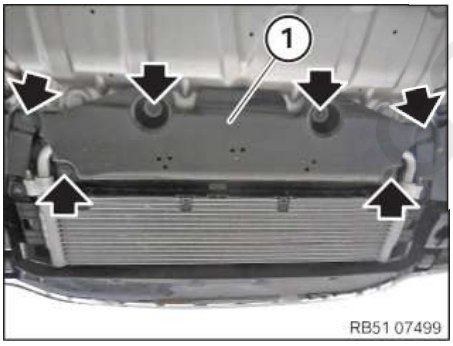
21 – Removing the front underbody protection



- **Version A:**

  Remove screws (arrows).

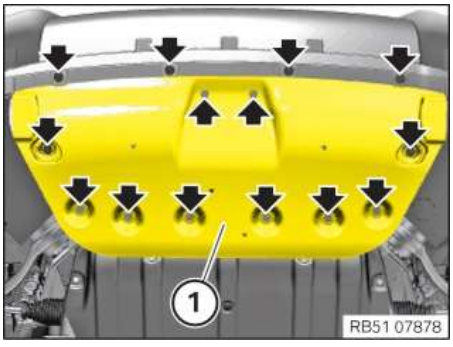
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version B:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

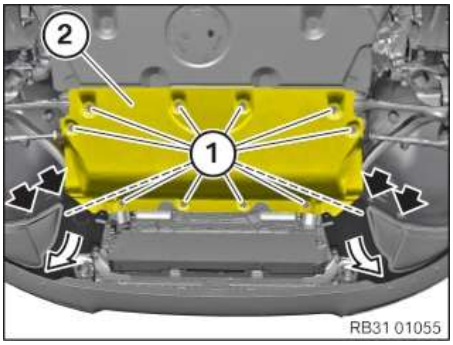


- **Version C:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

22 – Remove the underbody protection of the steering gear



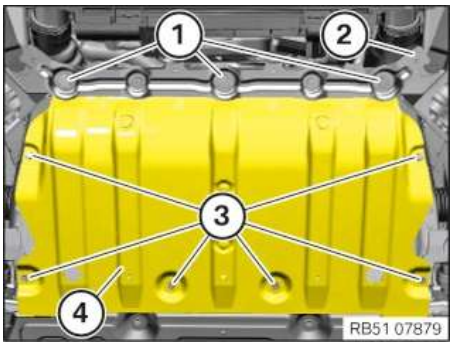
- **Version A:**

  Unscrew the screws (arrows) of the wheel arch cover on the wheel arch cover.

  Fold the bottom wheel arch cover to the side.

  Loosen screws (1).

  Remove the underbody protection (2) of the steering gear.



- **Version B:**

  Loosen screws (1).

  Remove the holder (2) for the underride protection.

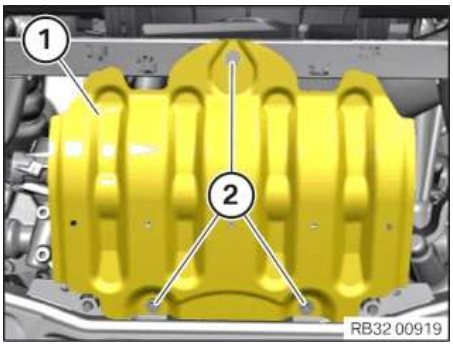
  Loosen screws (3).

  Feed out and remove the underbody protection (4) of the steering gear.

23 – If installed: Removing the steering underbody protection

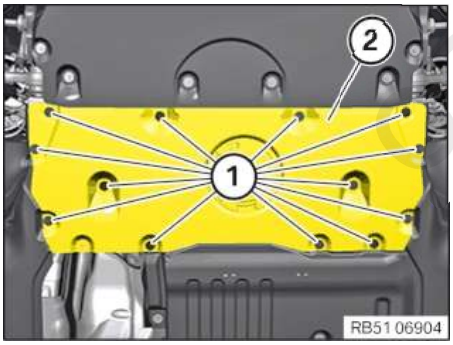
Prerequisite

Front underbody protection has been removed.



- Loosen screws (2).
- Remove underbody protection (1).

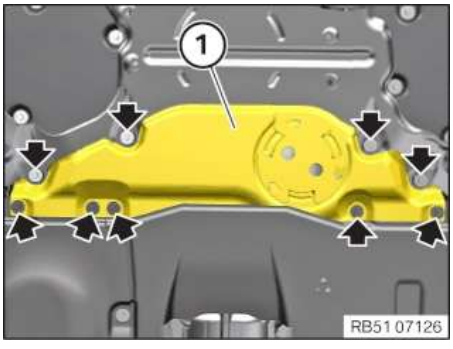
24 – Removing the centre underbody protection



- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .



- **Version with all-wheel drive:**

  Remove screws (arrows).

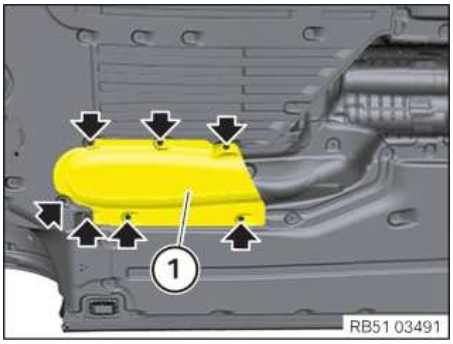
  Feed out and remove the centre underbody protection (1).

25 – Remove the underbody panelling of the transmission on the side

cardiagn.com

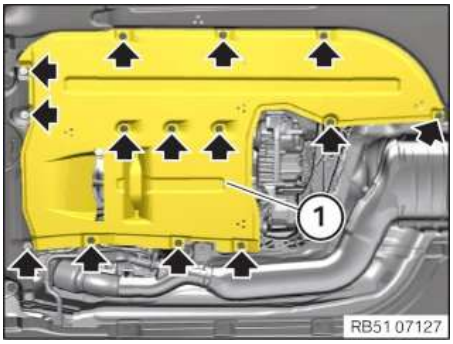
NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.



- Remove screws (arrows).
- Remove the underbody panelling (1).

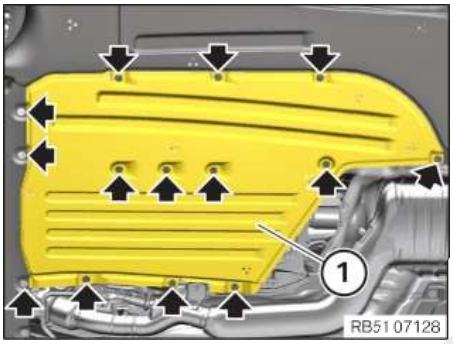
26 – Remove rear underbody protection



- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).

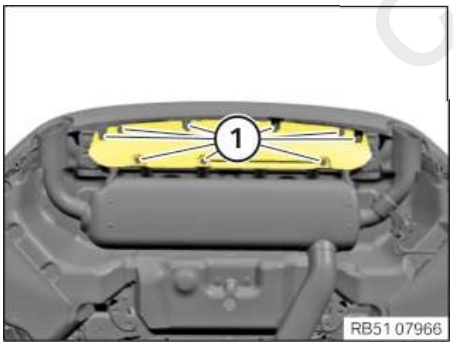


- **Version B:**

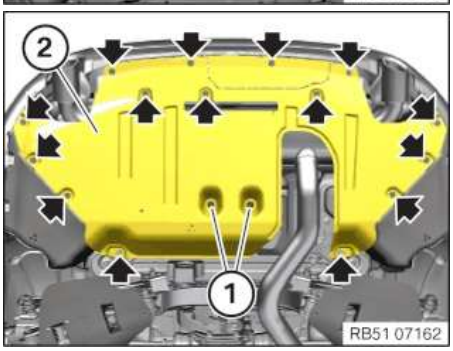
  Remove screws (arrows).

  Guide out rear underbody protection (1) and remove it.

27 – Removing the rear diffuser



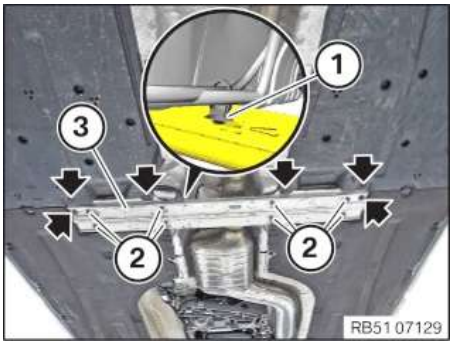
- **Version 1:**
- Release the screws and nuts (1).
- Remove the diffuser.



- **Version 2:**
- Loosen nuts (1).
- Remove screws (arrows).
- Guide out and remove rear diffuser (2).

28 – Remove the connecting support from the tunnel

cardiagn.com



- Remove screws (arrows).

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Loosen clamp (1).
- Loosen screws (2).
- Guide out and remove connecting support (3) on the tunnel.

29 – Remove exhaust system

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

CAUTION

Component with heavy weight.

Danger of injury!

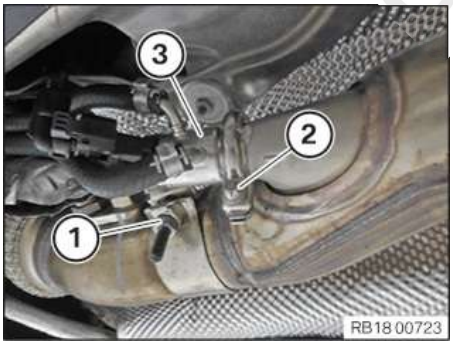
- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

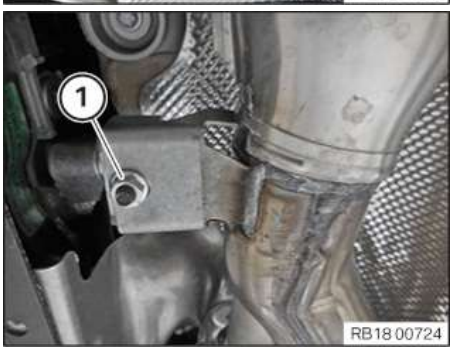
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

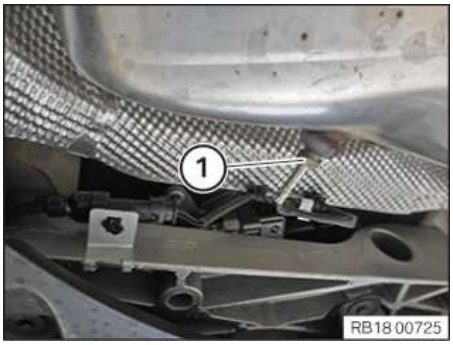


- Unfasten clamp (1).
- Detach the clamp (2) of the SCR metering module (3).
- Detach the SCR metering module (3)from the exhaust system and place to one side.

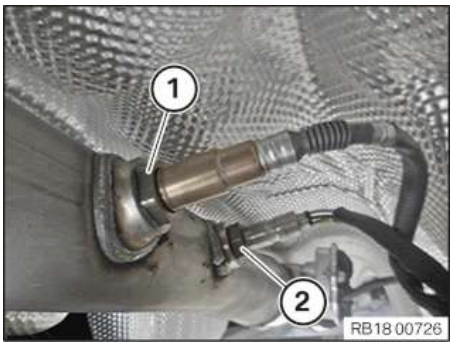


- Loosen nut (1).

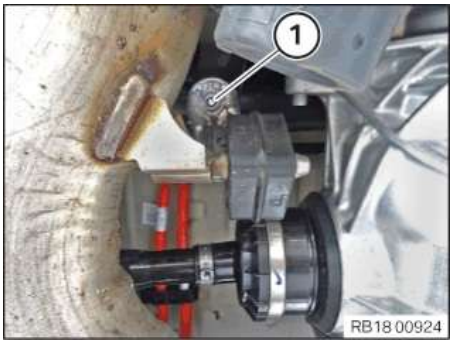
cardiagn.com



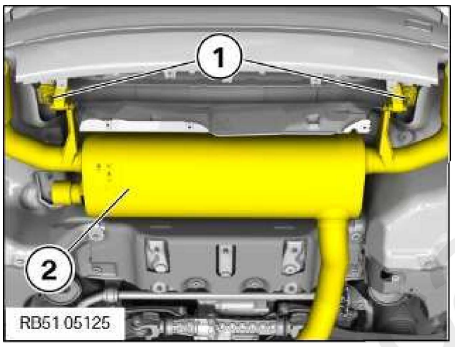
- Detach the exhaust temperature sensor (1) from the exhaust system.



- Release the diesel particulate sensor (1) from the exhaust system and place to one side.
- Release the nitrogen oxide sensor (2) from the exhaust system and place to one side.



- Release the nut (1) on the rear axle support.



- Loosen nuts (1).
- Lower and remove the exhaust system (2) with the assistance of a second person.

30 – Removing the monitoring oxygen sensor after the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

cardiagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

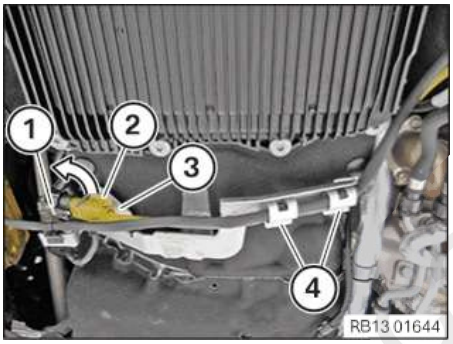
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



- Unlock and loosen connector (1).
- Loosen connector (2) from the holder (3) in direction of arrow.
- Release the monitoring oxygen sensor from the clamps (4).



- Release the monitoring oxygen sensor (1) with the standard tools.



- Thread out the monitoring oxygen sensor (1) and remove it.

carldiag.com

31 – Removing the nitrogen oxide sensor before SCR catalytic converter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

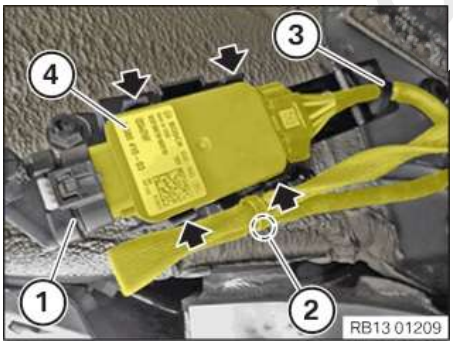
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

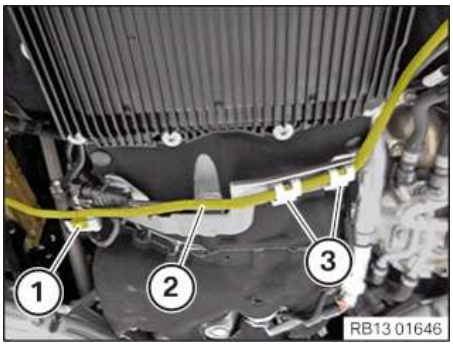
Damage to the nitrogen oxide sensor.

Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

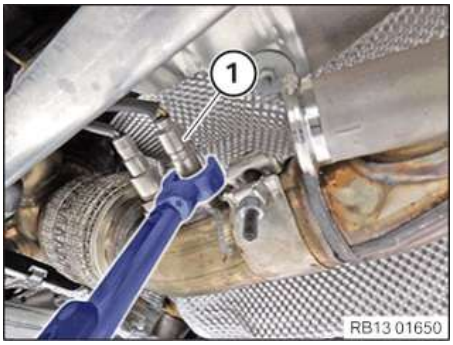
- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
- The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



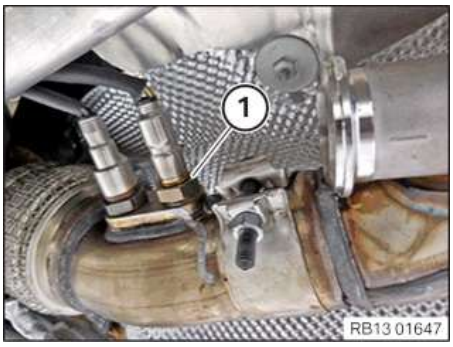
- Unlock plug connection (1) and disconnect.
- Release cable clip in area (2).
- Release line from the holder (3).
- Unclip control unit (4).



- Loosen clamp (1).
- Loosen the cables (2) from the clamps (3).



- Loosen the nitrogen oxide sensor (1) using commercially available tools.



- Feed out and remove the nitrogen oxide sensor (1).

32 – Removing the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

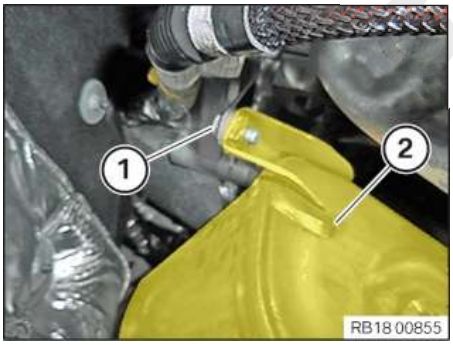
- Perform all work only on components that have cooled down.

CAUTION

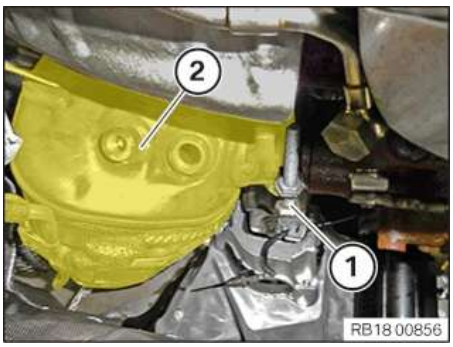
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

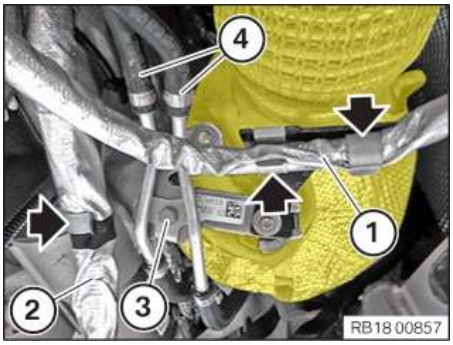


- Release bolt (1) from the holder of diesel particulate filter (2).

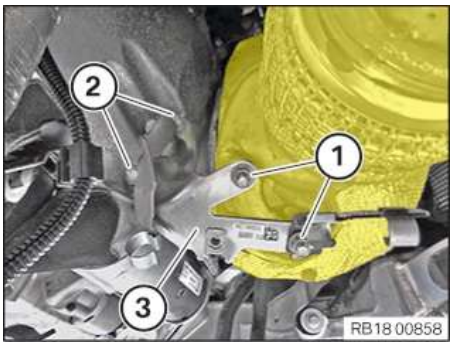


- Loosen V-band clamp (1).
- Feed V-clip (1) out from diesel particulate filter (2) and remove.

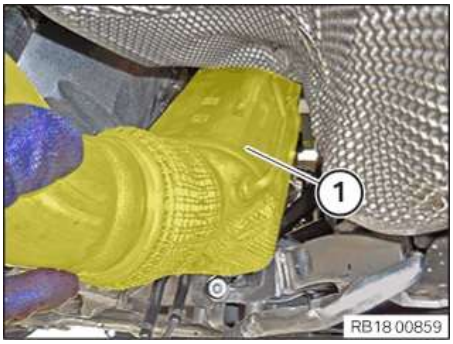
boardiagn.com



- Release the metering line (1) from clamps (Arrows).
- Release positive battery cable (2) from starter motor from clamp (Arrow).
- Loosen screw (3).
- Thread off coolant line (4) and place to the side.



- Loosen nuts (1).
- Loosen screws (2).
- Guide out and remove holder (3).



- Guide out and remove diesel particulate filter (1).

33 – Remove front right wheel

▸ **Removing the wheel**



TECHNICAL INFORMATION

A wheel lift is recommended for easier wheel removal and installation without exertion (see Retailer Equipment Catalogue).

- **In vehicles with M Carbon ceramic brake: The wheel lift must be used to remove the wheel.**

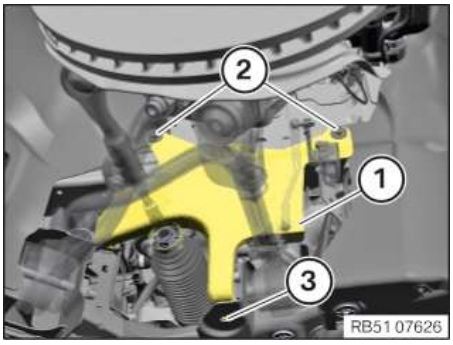
  This process is intended to prevent damage to the brake disc.

carmanuals.com



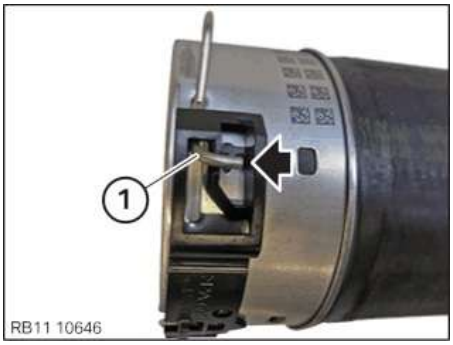
- If several wheels are removed at the same time: Use a piece of chalk to mark on each tyre the axle and side on which the corresponding wheel is fitted.
- Release the wheel bolts (arrows) crosswise and remove the wheel.
- To release and tighten wheel bolts with a security code: Use the correct adapter from the set of special tools .

34 – Remove the cover of the steering assembly



- Loosen screws (2) and (3).
- Remove the cover (1).

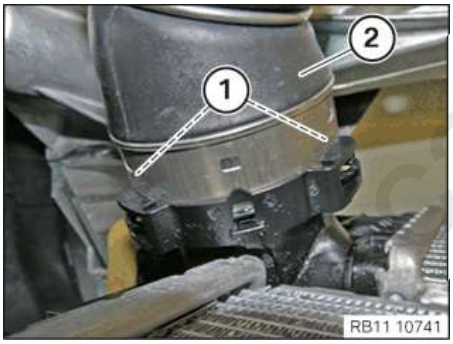
35 – Remove pressure pipe between exhaust turbocharger and charge air cooler



- **Version A:**

  Unlock lock (1).

  The lock (1) must snap audibly into place when unlocked (see arrow).



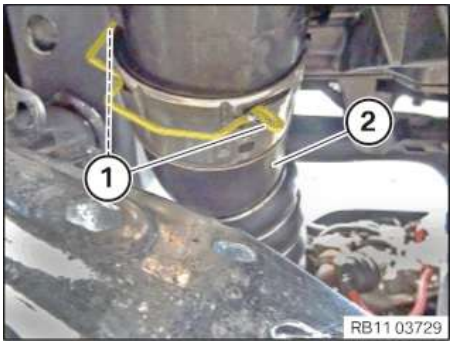
- Unlock the locks (1) on both sides and snap into place.
- Pull off pressure pipe (2) from charge air cooler.



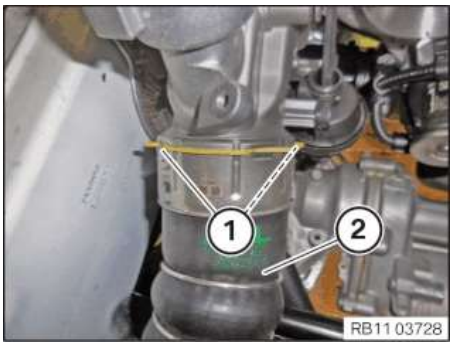
- **Version B:**

  Unlock clamp (1) and engage in this position.

cardiagn.com



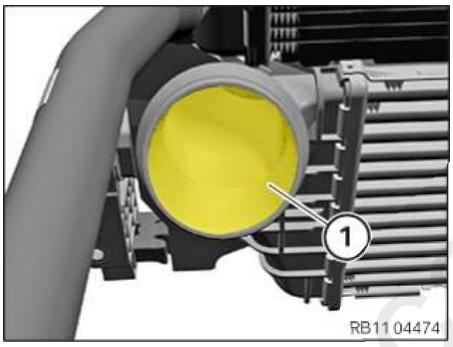
- Unlock the locks (1) and snap into place.
- Pull off pressure pipe (2) from charge air cooler.



- Unlock the lock (1) and engage.
- Pull off pressure pipe (2) from the compressor bypass.



- Remove pressure pipe (1) in upward direction.



NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

- Lock the opening (1) of the charge air cooler with a suitable auxiliary material.

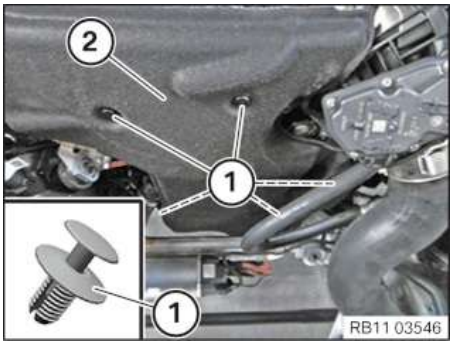
36 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.



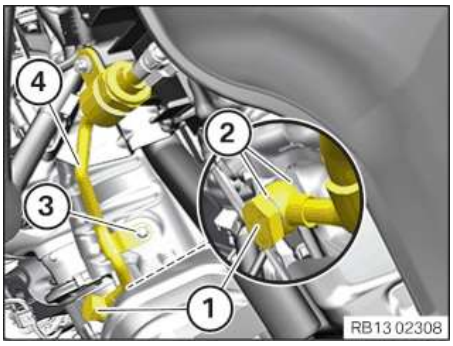
- Release and remove expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

cardiagn.com

37 – Remove the exhaust gas pressure pipe



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).



- Unscrew the banjo bolt (1).
- Feed out and remove the sealing rings (2).
- Loosen screw (3).
- Feed out and remove the exhaust gas pressure pipe (4).

38 – Removing the sensor bracket on the cylinder head cover

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

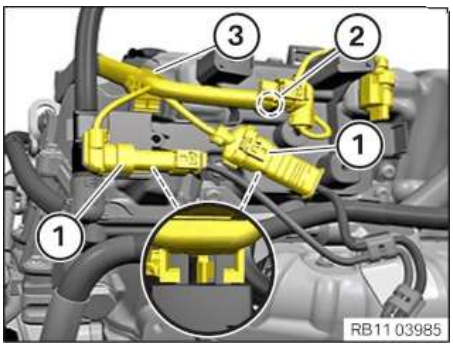
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

Contaminant or foreign body.

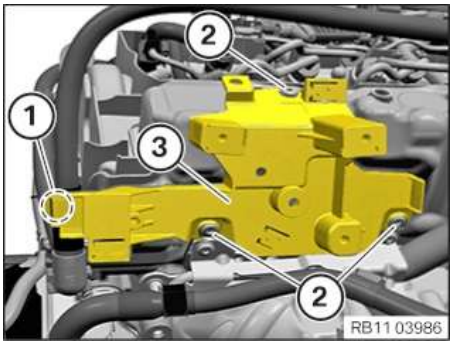
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Unlock plug connection (1) and disconnect.
- Unlock the plug connection (1) and release it from the sensor bracket.
- Release the cable clip in the area (2) from the sensor bracket.
- Release the clamps (3) and set the wiring harness section aside.

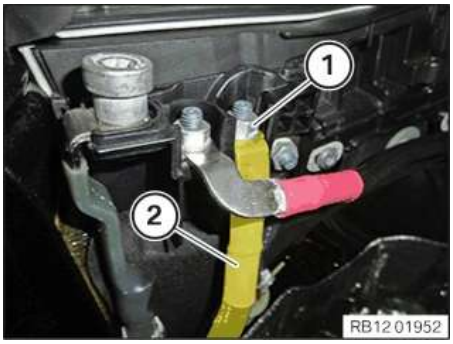
cardiagn.com



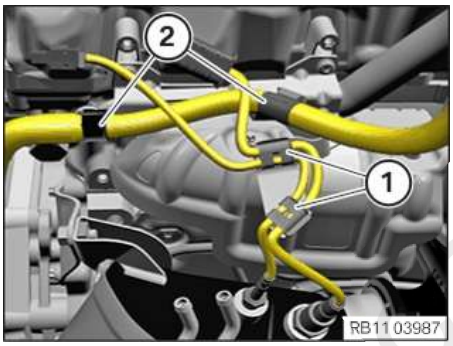
- Release the positive battery cable in the area (1) from the clamp and set it aside.
- Loosen screws (2).
- Feed out holder (3) for the sensor system and remove.



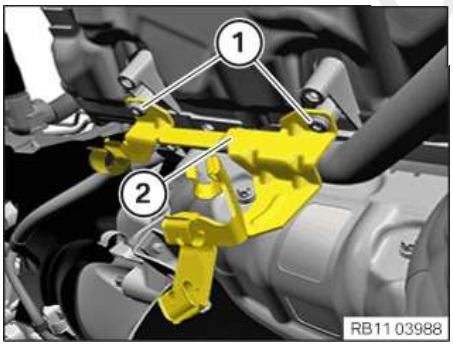
- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.



- Loosen nut (1).
- Feed out positive battery cable (2) and put to one side.



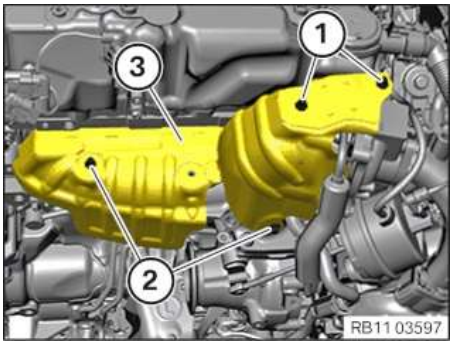
- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



- Loosen screws (1).
- Guide out and remove holder (2).

39 – Removing heat shield

cardiagn.com



- Loosen screws (1).
- Loosen screws (2).
- Feed out and remove the heat shield (3).

40 – Removing the high-pressure stage exhaust turbocharger and low-pressure stage turbocharger

CAUTION

Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

TECHNICAL INFORMATION

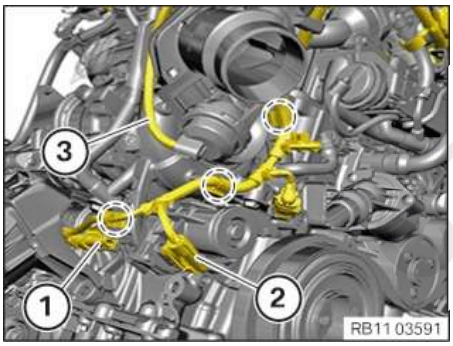
Prior to replacing the exhaust turbocharger: Observe the notes on troubleshooting on the exhaust turbocharger.

For additional information see: FUB-FUB-FB-130003-A10 Troubleshooting on the exhaust turbocharger

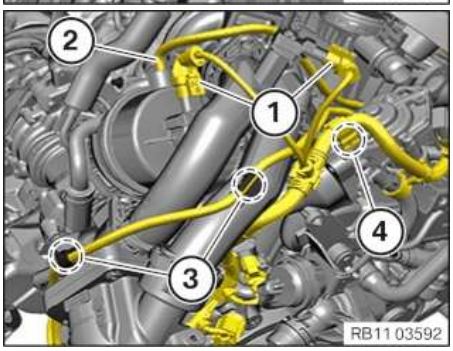
TECHNICAL INFORMATION

With exhaust turbocharger damage, it is imperative to observe the additional information.

For additional information see: 11 65 020 Exhaust turbocharger damage due to plugged oil supply lines



- Release plug connection in area (1) from holder.
- Unlock plug connection (2) and disconnect.
- Release the wiring harness in the marked areas from the exhaust turbochargers.
- Pull off the vacuum hose (3).



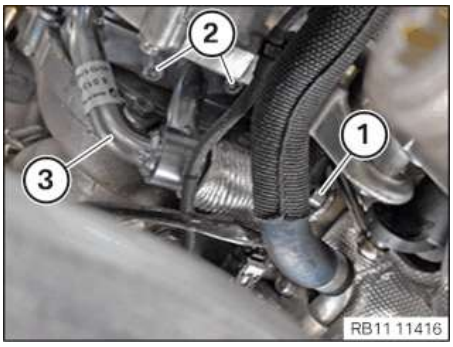
- Unlock plug connections (1) and disconnect.
- Pull off the vacuum hose (2).
- Release the vacuum hose in marked areas (3) from the exhaust turbochargers.
- Release the wiring harness in area (4) from the exhaust-gas recirculation cooler and set it aside.



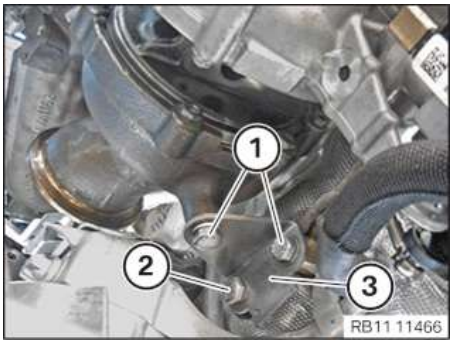
TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

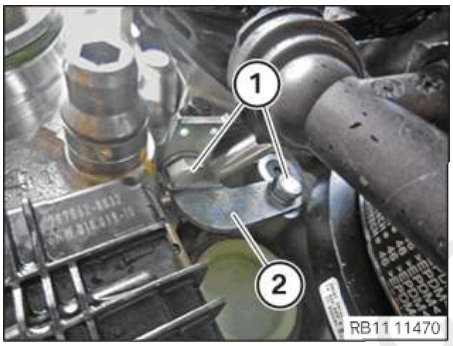
- Release the screws of the oil return line on the crankcase from the right wheel arch.



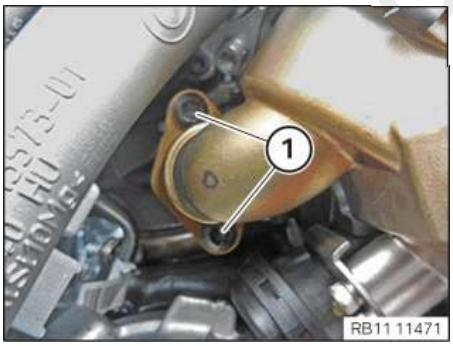
- Release the screw (1).
- Loosen screws (2).
- Remove oil return line (3) from the crankcase.
- Catch and dispose of emerging engine oil.



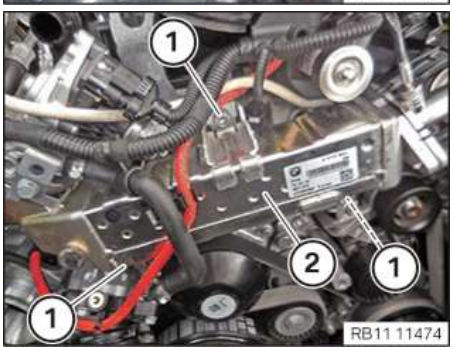
- Unscrew and remove the bolts (1) on the holder (3).
- Slacken screw (2) on holder (3), but do **not** remove.



- Loosen screws (1).
- Guide out and remove holder (2).

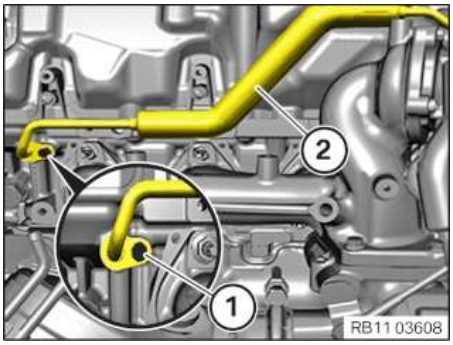


- Loosen screws (1).

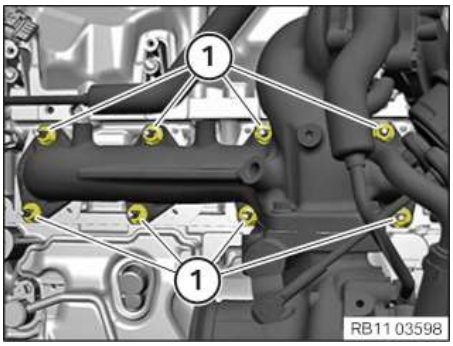


- Slacken screws (1), but do **not** remove.
- Release exhaust-gas recirculation cooler (2) slightly.

cardiagn.com



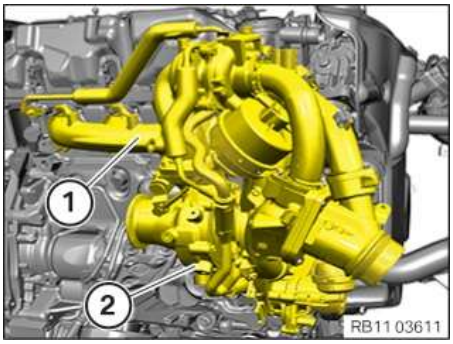
- Loosen screw (1).
- Remove oil feed line (2) for the high-pressure stage exhaust turbocharger from the cylinder head and set it aside.
- Catch and dispose of emerging engine oil.



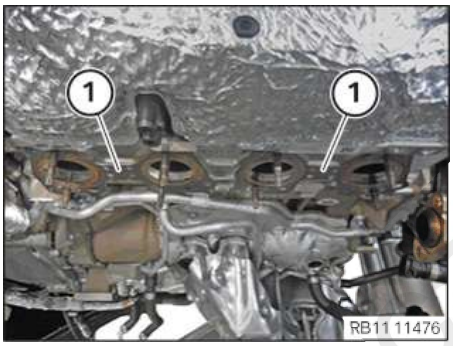
TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

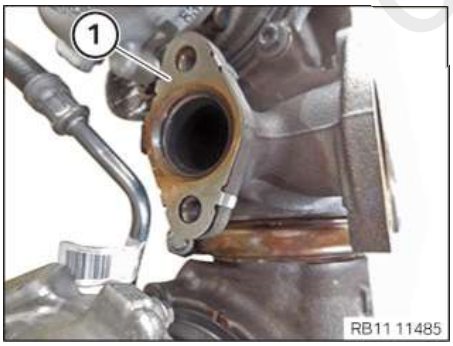
- Loosen nuts (1).



- Guide out exhaust manifold (1) with the high-pressure stage exhaust turbocharger and the low-pressure stage exhaust turbocharger (2) forward towards the top and remove.



- Guide out and remove gaskets (1).



- Guide out and remove gasket (1).

41 – Draining the coolant from the high-temperature cooling system

WARNING

Hot fluids.

Risk of scalding!

- Conduct all work in the vehicle wearing appropriate personal protective equipment only.

cardiagn.com

CAUTION

Materials harmful to health.

Contact with fluids harmful to health!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.

TECHNICAL INFORMATION

Life-long fill of coolant!

Do not reuse used coolant.

When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be emptied and refilled.

In the case of other removal work involving the draining of part quantities of coolant, the coolant level must be topped up with new coolant.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Loosen sealing cap (1).

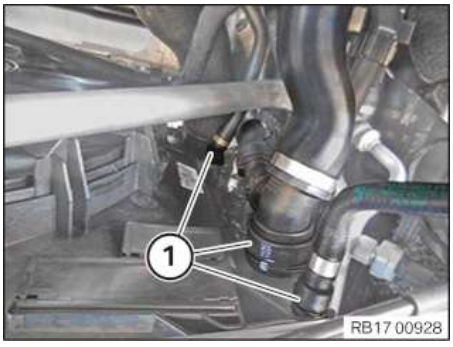
▸ **Avoiding damage to the starter generator due to escaping coolant**

RISK OF DAMAGE

Escaping coolant on the starter generator.

Damage and operating failure of the starter generator.

- Cover the starter generator with suitable, watertight auxiliary materials.
- Close off line connections with seal plugs.
- If necessary: Flush the leaked coolant from the starter generator with at least 1 l water.

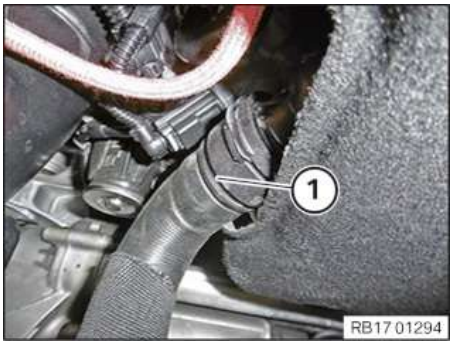


NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

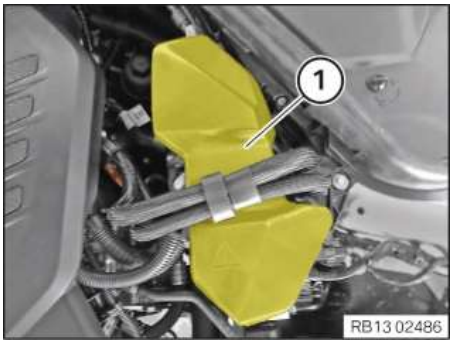
- Unlock all coolant lines (1) and detach.
- Catch and dispose of escaping coolant.

cardiagn.com



- Unlock and loosen coolant line (1).
- Catch and dispose of escaping coolant.

42 – Remove the cover for the DDE control unit



- Pull off, guide out and remove cover (1) upwards.

43 – Partially releasing the wiring harness section on the intake plenum

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

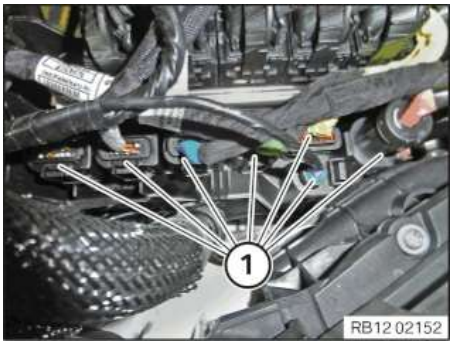
Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

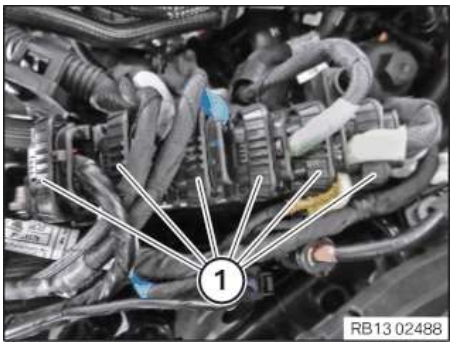
TECHNICAL INFORMATION

Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.

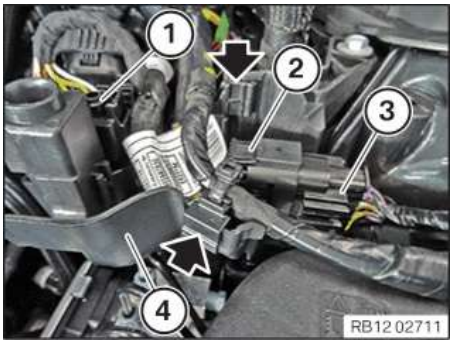
carsign.com



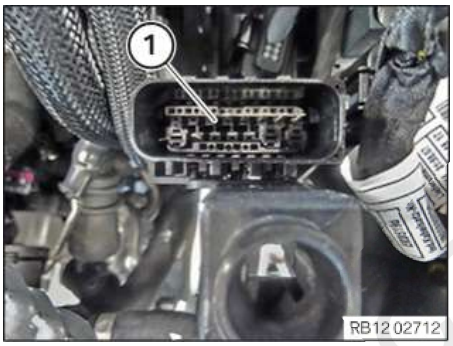
- Unlock and disconnect plug connections (1).



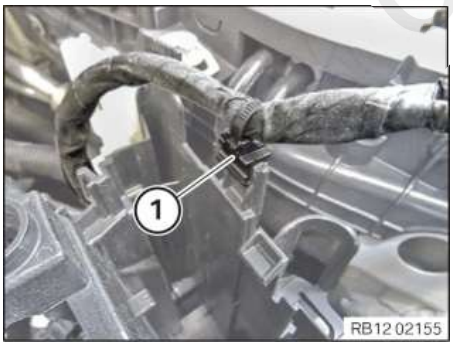
- Unlock and disconnect plug connections (1).



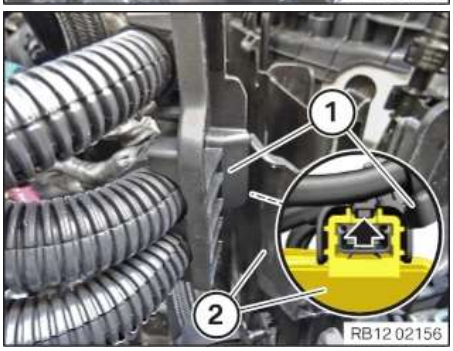
- Unlock plug connection (1) and disconnect.
- Unlock plug connection (2) and disconnect.
- Release the connector (3) and disconnect from the control unit holder (4).
- Release the clamps (arrows).



- Unlock plug connection (1) and disconnect.

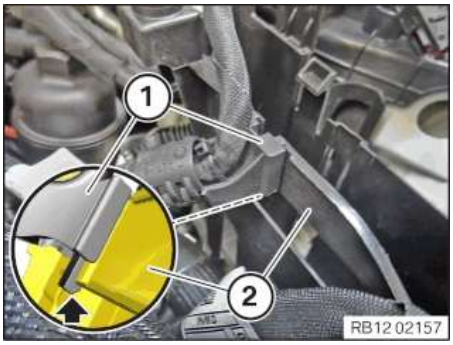


- Loosen clamp (1).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).

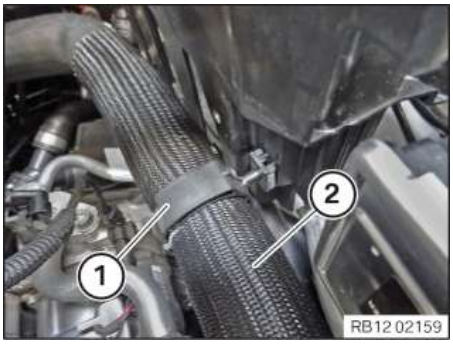
cardiagn.com



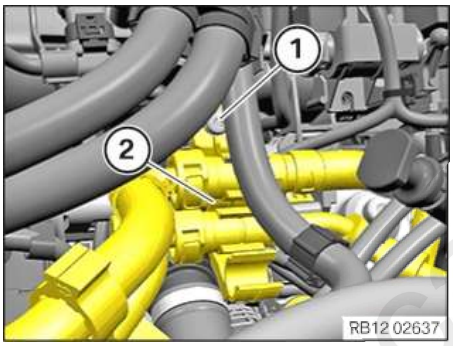
- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).



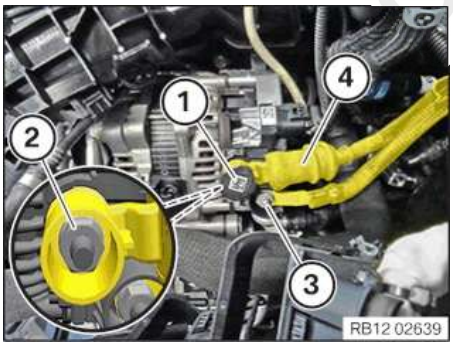
- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.



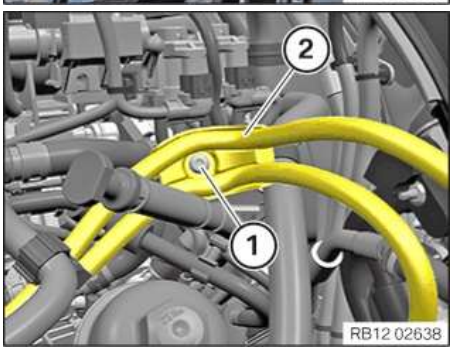
- Unlock holder (1) and feed out coolant line (2) and place it aside.



- Release the screw (1).
- Guide out fuel lines (2) and set them aside.

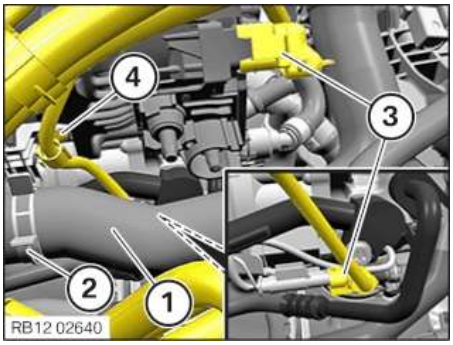


- Guide out and remove the lid (1).
- Release the nuts (2) and (3).
- Feed out positive battery cables (4) and place to one side.

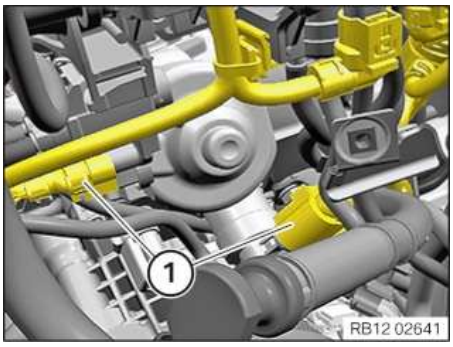


- Release the screw (1).
- Guide out the positive battery cables (2) and set them aside.

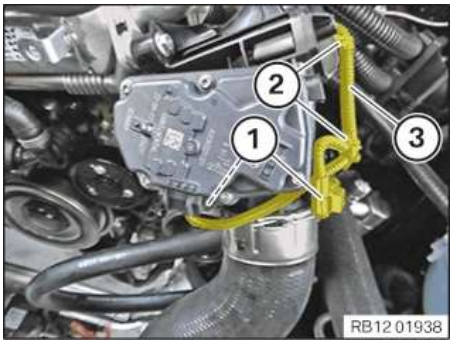
sardiagn.com



- Release the coolant line (1) from the holder (2) .
- Unlock plug connections (3) and disconnect.
- Loosen clamp (4).



- Unlock and disconnect plug connections (1).



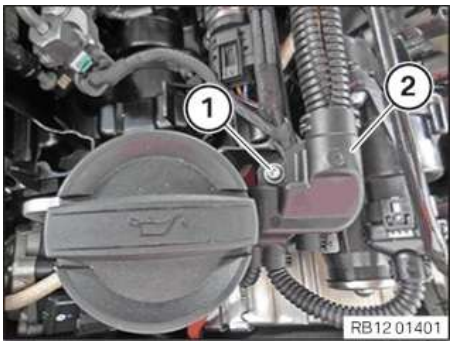
- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.



- Unlock and loosen connector (1).

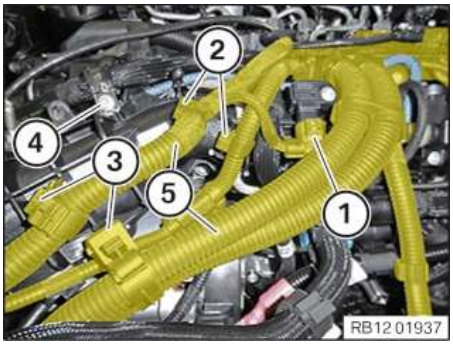


- Unlock plug connection (1) and disconnect.

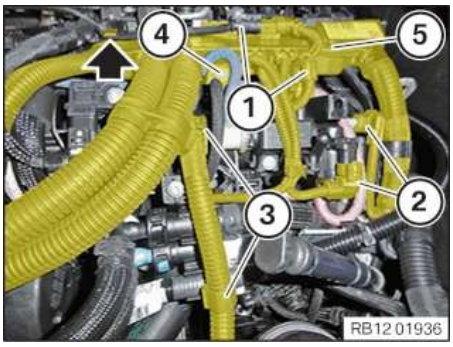


- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.

cardiagn.com



- Unlock plug connection (1) and disconnect.
- Loosen clamps (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.



- Unlock and disconnect plug connections (1).
- Release line from clamp (Arrow).
- Unlock and disconnect plug connections (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.

44 – Removing the intake plenum

TECHNICAL INFORMATION

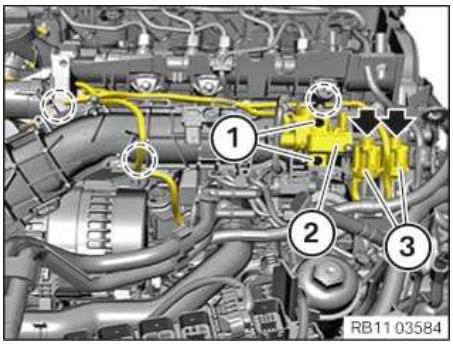
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



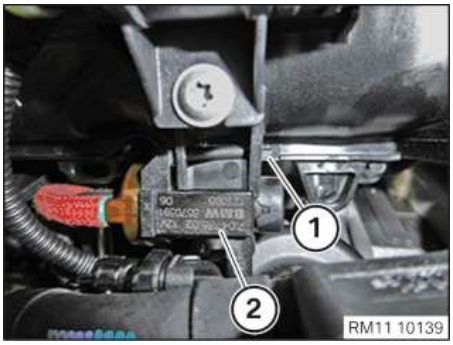
- Unlock clamp (1) and engage in this position.



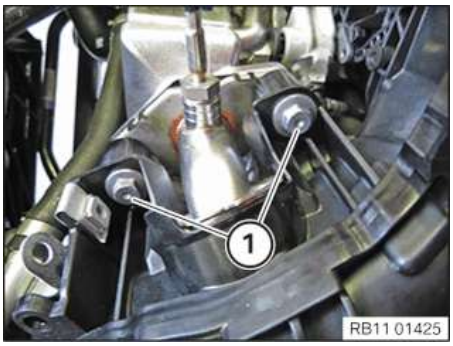
- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.



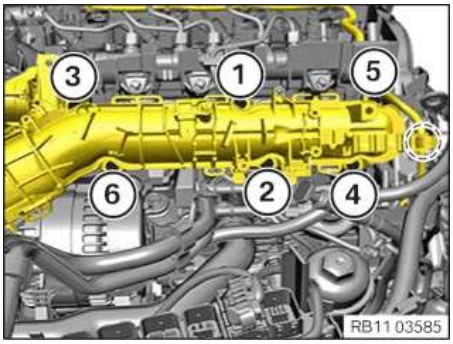
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



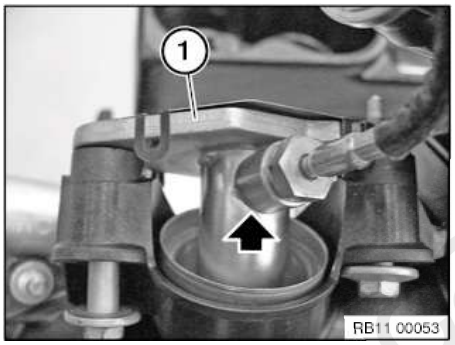
- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.



- Loosen screws (1).



- Detach the leakage oil lines in the marked area from the intake plenum.
- Loosen screws in the order (6) to (1).
- Guide the intake plenum out forwards and remove it.



- Remove the exhaust-gas recirculation pipe (1) (arrow).

45 – Removing the exhaust-gas recirculation cooler

▸ Avoiding damage to the starter generator due to escaping coolant

RISK OF DAMAGE

Escaping coolant on the starter generator.

Damage and operating failure of the starter generator.

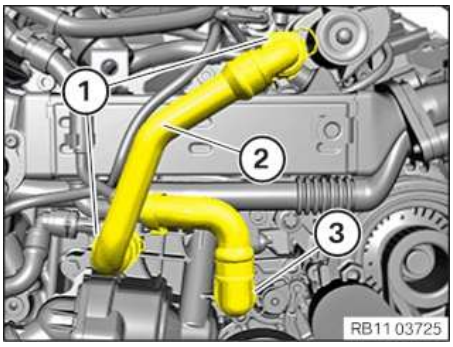
- Cover the starter generator with suitable, watertight auxiliary materials.
- Close off line connections with seal plugs.
- If necessary: Flush the leaked coolant from the starter generator with at least 1 l water.

cardiagn.com



- **Version A:**

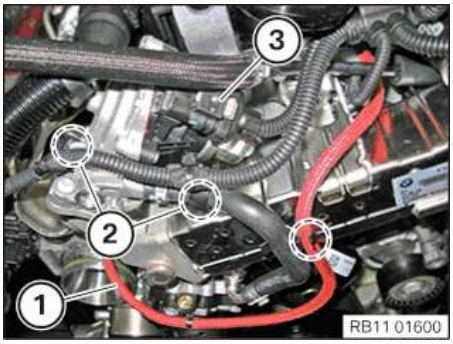
  Unlock and pull off coolant lines (1).



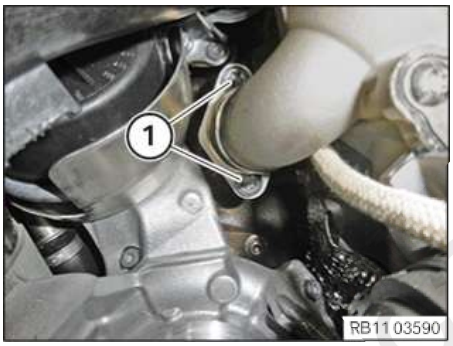
- **Version B:**

  Unlock locks (1) and remove thee coolant line (2).

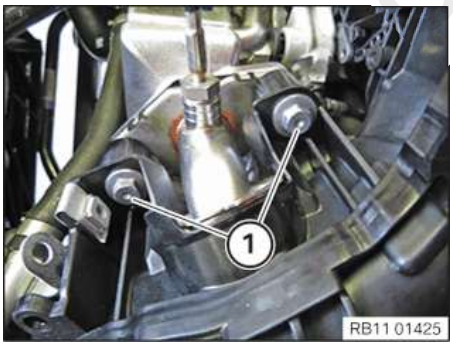
  Unlock coolant line (3) and pull it off the thermostat.



- Loosen the vacuum line (1) from the exhaust-gas recirculation cooler and detach in the highlighted area.
- Loosen the vehicle wiring harness from the exhaust-gas recirculation valve and the coolant line at the clips (2).
- Unlock and disconnect the connector (3) at the exhaust-gas recirculation valve.



- Release the bolts (1) from the exhaust-gas recirculation cooler.

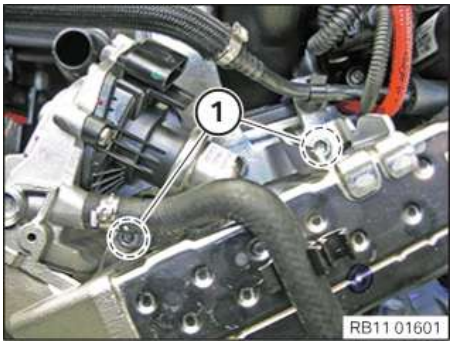


- Loosen the screws (1) on the intake system.



- Loosen the screw (1) below the exhaust-gas recirculation cooler.

cardiagn.com



- Loosen screws (1).
- Remove exhaust-gas recirculation cooler.

46 – Detaching the leakage oil line from the injectors

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

WARNING

Hot surfaces.

Risk of burning!

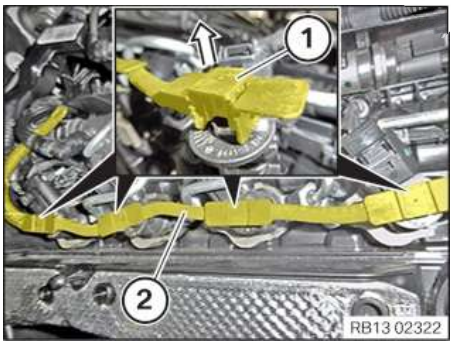
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

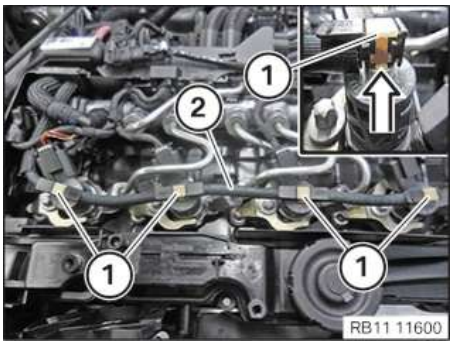


- **Version A:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.



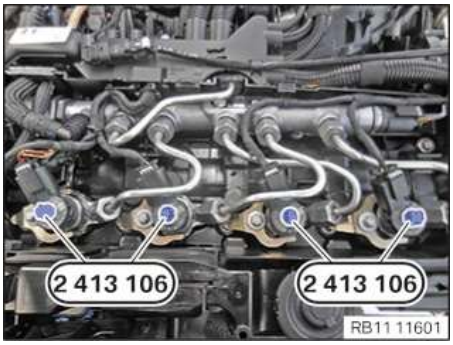
- **Version B:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.

cardiagn.com



- Seal open connections with special tools .

47 – Remove the high pressure lines between the injector and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

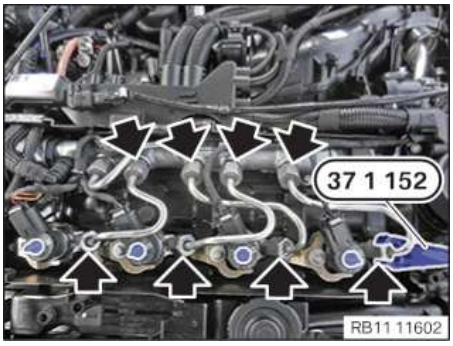
TECHNICAL INFORMATION

If several high pressure lines are removed, ensure that each high pressure line is installed in its original location. Label high pressure lines.

cardiagn.com

TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.



- Release the high pressure lines (arrows) with the special tool .
  Reset the special tool early on to prevent bending of the high pressure line.
- Catch and dispose of escaping fuel.
- Feed out and remove the high pressure lines (arrows).
- Seal off all the open cable connections with the special tool .

48 – Remove the high pressure line between the high pressure pump and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Hot fluids.

Risk of scalding!

- Conduct all work in the vehicle wearing appropriate personal protective equipment only.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

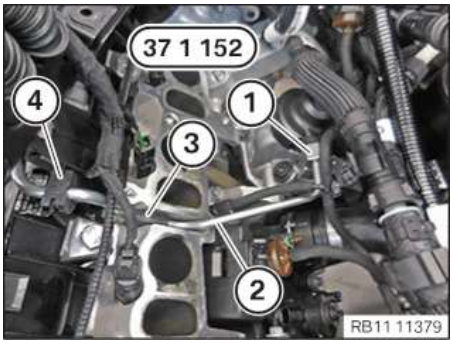
cardiagn.com

TECHNICAL INFORMATION

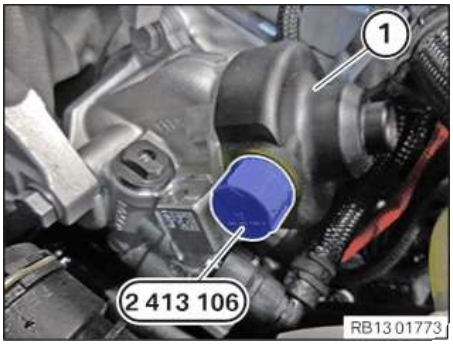
Reset special tool in early to avoid bending pressure lines.



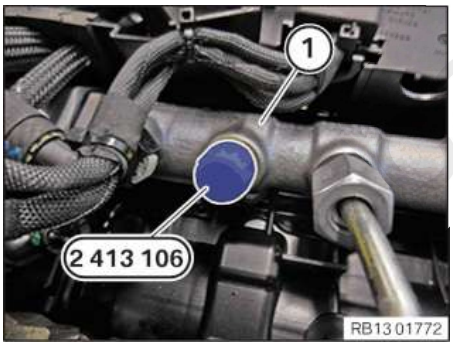
- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.



- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.
- Guide out and remove the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).



- Seal off the opening at the high pressure pump (1) with the special tool .



- Seal off the opening on the rail (1) with the special tool .

49 – Remove high-pressure rail

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

cardiagn.com

RISK OF DAMAGE

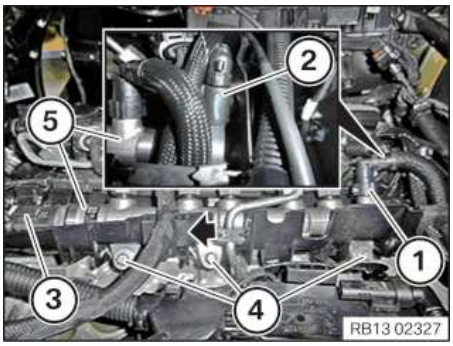
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Unlock and disconnect the fuel return line (1).
- Guide the fuel return line (1) out and set it aside.
- Unlock and disconnect the plug connection (2) on the rail pressure regulating valve.
- Unlock and disconnect the plug connection (3) on the rail pressure sensor.
- Unlock cable clip (Arrow), feed out and place aside.
- Loosen screws (4).
- Thread out and remove the rail (5).

50 – Remove all injection systems

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

cardiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

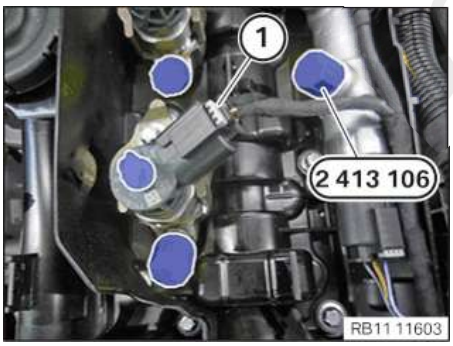
Electrostatic discharge.

Damage to or destruction of electrical components.

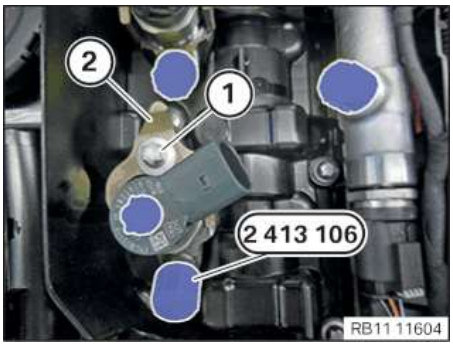
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

TECHNICAL INFORMATION

If several injectors are removed, ensure that each injector is installed at its original location (cylinder). Mark injectors.



- Unlock plug connection (1) and disconnect.



- Loosen screw (1).
- Guide out and remove clamping claw (2).
- Feed out and remove the injector with slight rotational movements.

▸ **Loosen stuck injectors**

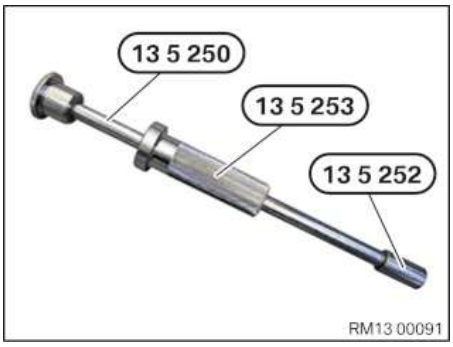
carsdiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



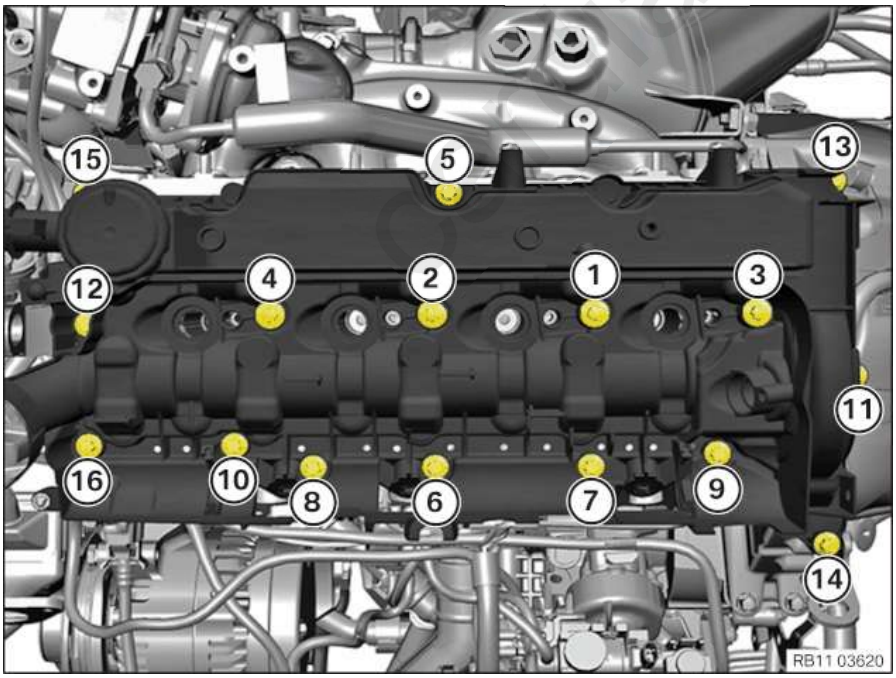
- Unscrew special tool 0 493 339 (13 5 252) from special tool 0 493 321 (13 5 250) and remove special tool 0 493 340 (13 5 253).
- Screw special tool 0 493 339 (13 5 252) back onto special tool 0 493 321 (13 5 250).



- Screw special tool 0 493 321 (13 5 250) with special tool 0 493 339 (13 5 252) onto pressure line connection (1) of injector.
- Release injector (1) with special tools 0 493 321 (13 5 250) and 0 493 339 (13 5 252) by means of **short** back and forth movements and remove.

51 – Removing the cylinder head cover

Screw connection of the cylinder head cover



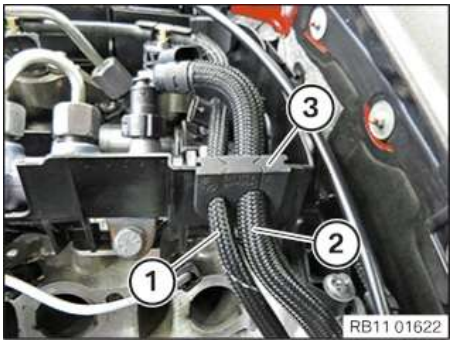
1 - 16 Bolts of the cylinder head cover



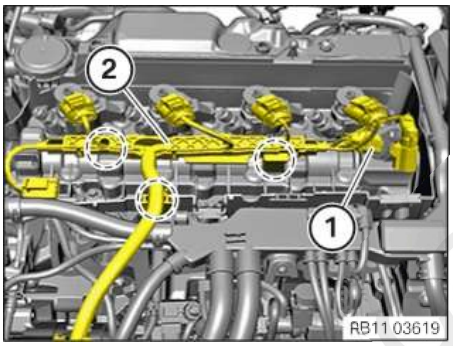
- Unlock and detach the locks.
- Feed the engine ventilation line (1) out and set it aside.



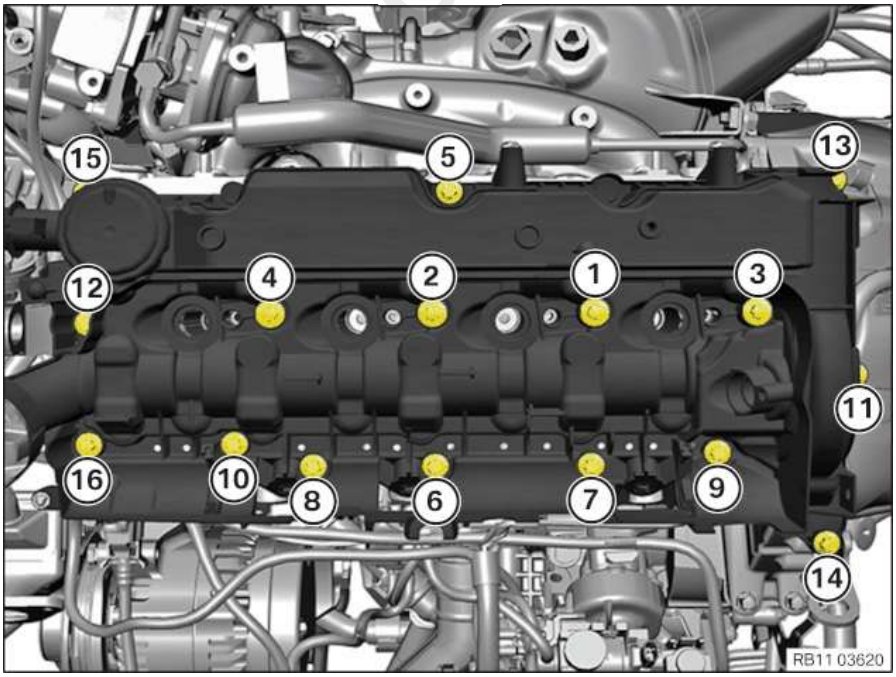
- Feed out and remove the heat shield (1).



- Remove the leakage oil line (1) including the fuel return line (2) and the grommet (3) and put to one side.

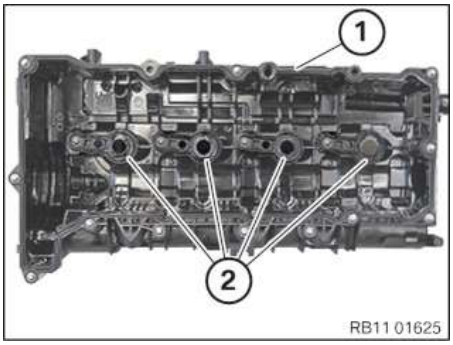


- Unlock connector (1) and pull off.
- Disconnect the wiring harness (2) in the marked areas from the cylinder head cover and set aside.



- Evenly loosen the screws in a sequence from (16) to (1).
- Feed out and remove the cylinder head cover.

cardiagn.com



- Remove the profile seals (1) and (2).

52 – Removing starter motor

Prerequisite

Battery earth leads are disconnected.

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

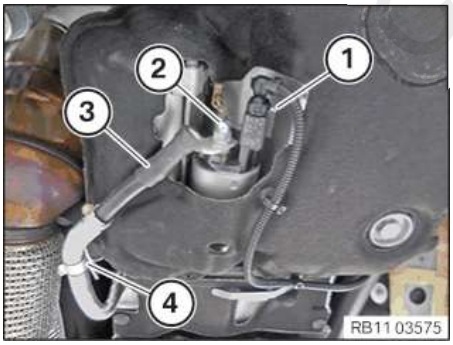
Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

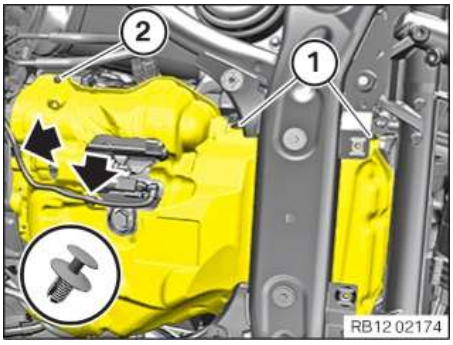
- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

TECHNICAL INFORMATION

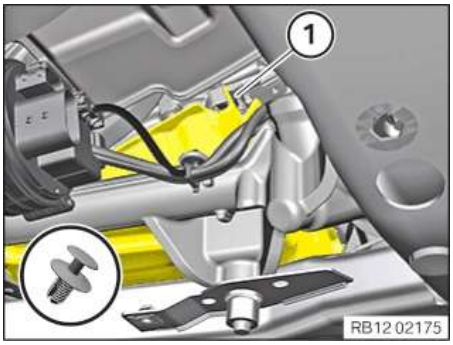
Make sure that the acoustic cover is **not** damaged while removing the starter motor.
A damaged lower acoustic cover can only be renewed when the front axle is lowered.



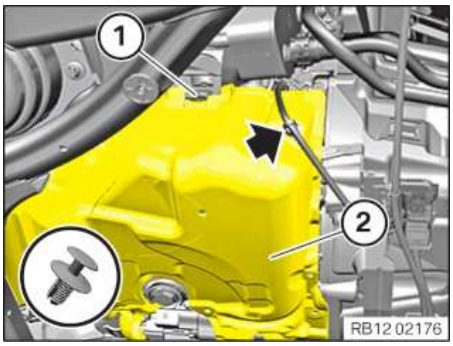
- Unlock plug connection (1) and disconnect.
- Release nut (2).
- Release positive battery cable (3) from holder (4).



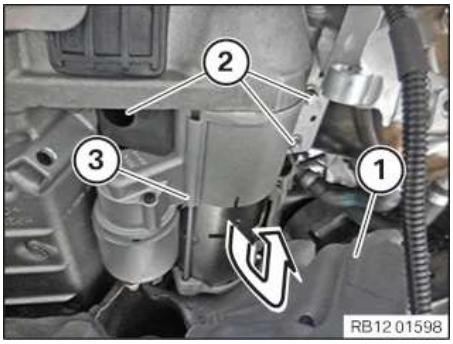
- Loosen the expanding rivet (1).
- Undo fir tree clip (2).
- Release the clamps (arrows).



- Loosen expanding rivet (1).
- Lower the acoustic cover of the oil sump.



- Loosen expanding rivet (1).
- Loosen the clamp (arrow).
- Lower acoustic cover (2).



- Make sure that the acoustic cover (1) is not damaged.
- Carefully press acoustic cover (1) to one side.
- Loosen screws (2).
- Carefully guide out the starter motor (3) in direction of arrow and remove.

53 – Checking camshaft timing



RISK OF DAMAGE

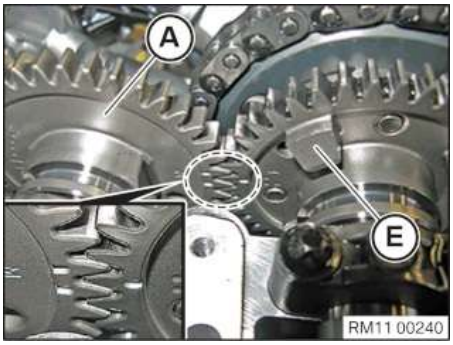
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

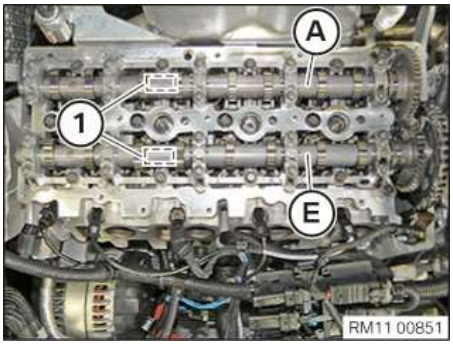
- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

  Do **not** crank the engine in reverse.

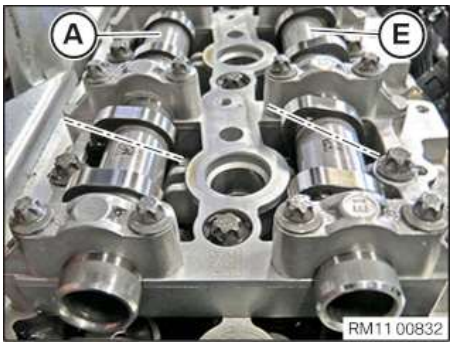


- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.

bordiagn.com



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.

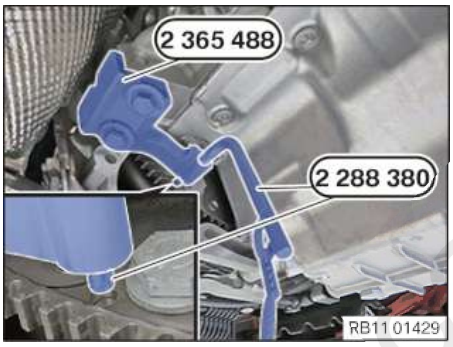


- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

54 – Remove chain tensioner piston

RISK OF DAMAGE

Contaminant or foreign body.

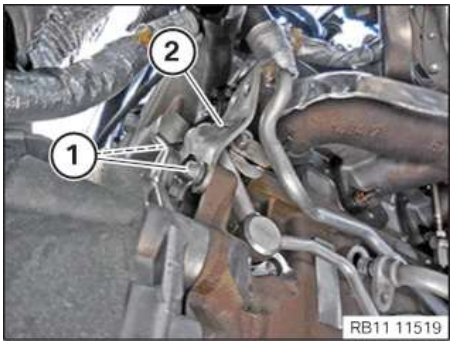
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

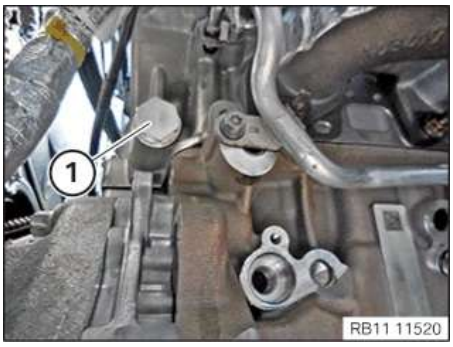
TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

carlogn.com



- Loosen screws (1).
- Guide out and remove holder (2).

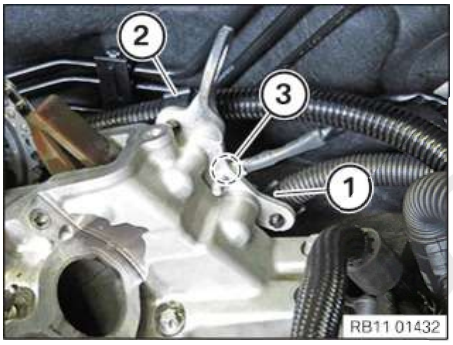


- Loosen the chain tensioner piston (1).
- Catch and dispose of emerging engine oil.

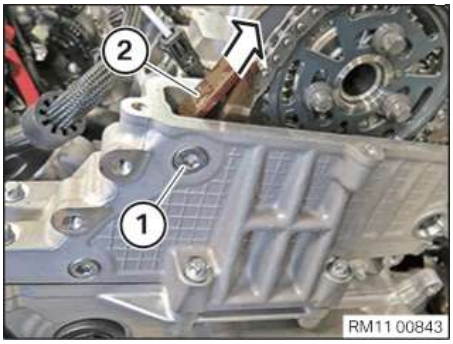


- Feed out and remove the sealing ring (1).

55 – Remove the timing chain guide rail

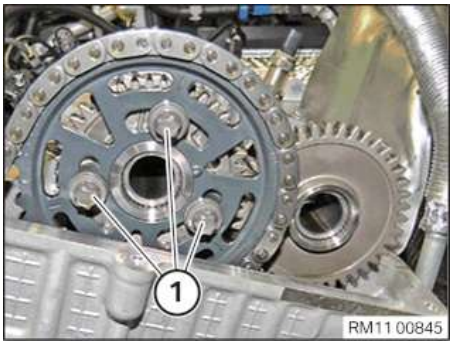


- Loosen the vehicle wiring harness (1) from the bracket.
- Release the positive battery cable (2) from the holder .
- Loosen the screw (3) and remove the grounding cable.



- Remove the bearing journal (1).
- Remove the guide rail (2) in the direction of the arrow.

56 – Removing the camshaft sprocket on the intake camshaft



- Loosen screws (1).
- Secure the drive chain against falling.
- Remove the camshaft sprocket on the intake camshaft.

57 – Removing the special tool for fixing the exhaust camshaft

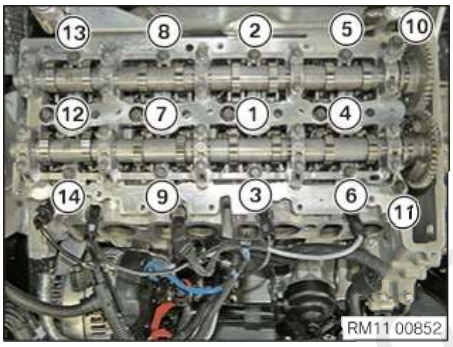


- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

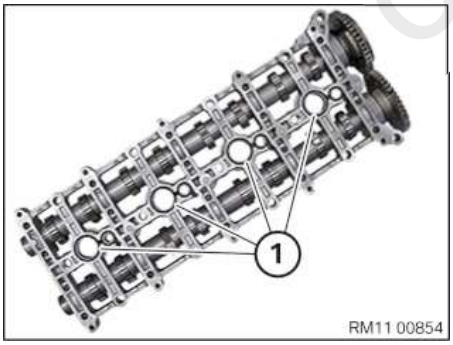
58 – Removing the camshaft support

TECHNICAL INFORMATION

The camshaft is tensioned by the valve springs. Tighten or loosen each screw on the camshaft bearing caps one at a time in the specified sequence and by half a turn only. Repeat procedure.



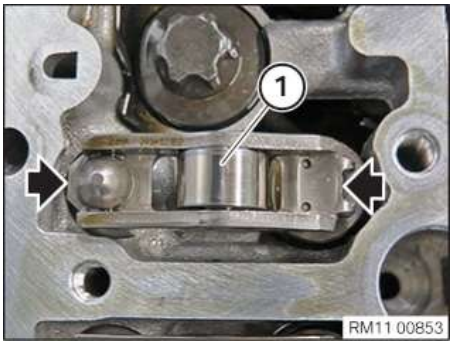
- Unscrew the screws evenly in order (14) to (1) in multiple increments.
- Feed out and remove the camshaft support with the camshafts towards the top.



- Guide out and remove gaskets (1).

59 – Remove roller cam followers

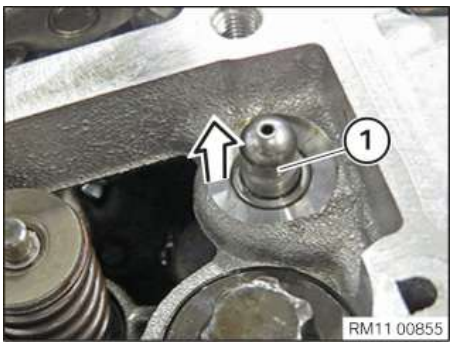
cardiagn.com



- Guide out and remove all roller cam followers (1) (arrows).
- Place all roller cam followers (1) in order in special tool 0 495 105 (11 4 480).

  Roller cam followers that have already been used must be installed in same position again.

60 – Removing all hydraulic valve clearance compensating elements



- Remove all hydraulic valve clearance compensating elements (1) in the direction of the arrow.
- Catch and dispose of emerging engine oil.
- Store all hydraulic valve clearance compensating elements properly arranged on the special tool 0 495 105 (11 4 480).
- Make sure to observe the assignment of the roller cam followers to the hydraulic valve clearance compensating elements when reusing the hydraulic valve clearance compensating elements (1).

61 – Remove all glow elements

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Damage to the glow elements.

Excessive force may damage the glow elements and they may then have to be renewed.

- Handle glow elements with care and do not drop.
- Do not rest the cylinder head on glow elements. Glow elements protrude from the sealing surface of the cylinder head.

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

cardiagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

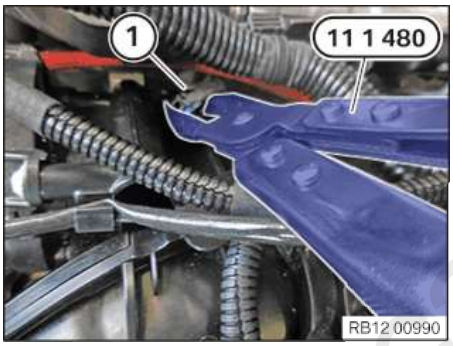
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

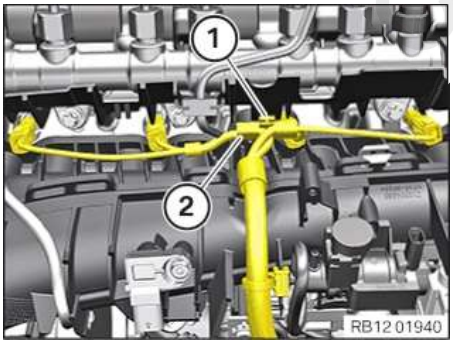
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

NOTICE

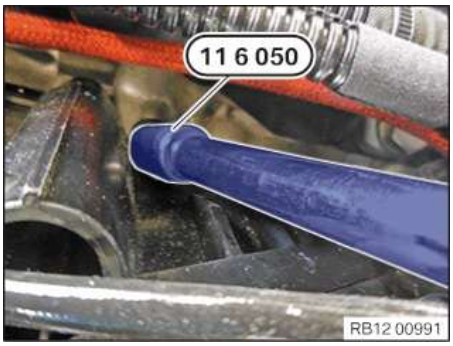
The description is for one component only. The procedure is identical for all further components.



- Unlock and release the connector (1) using special tool 0 490 796 (11 1 480).



- Loosen clamp (1).
- Remove the wiring harness section (2) and put to one side.



- Unscrew the glow elements with the special tool or conventional tools.

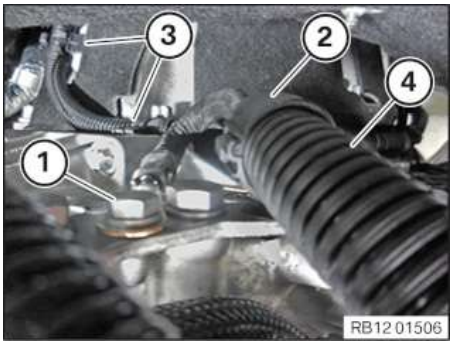
cardiagn.com

RISK OF DAMAGE

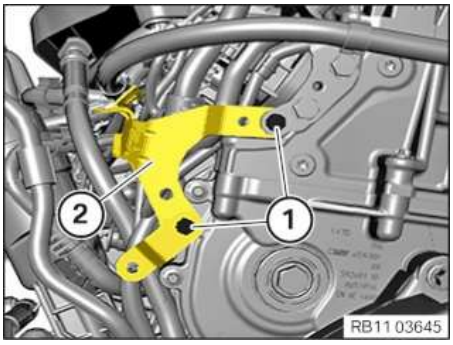
Heavy component.

Heavy components can lead to injury or damage.

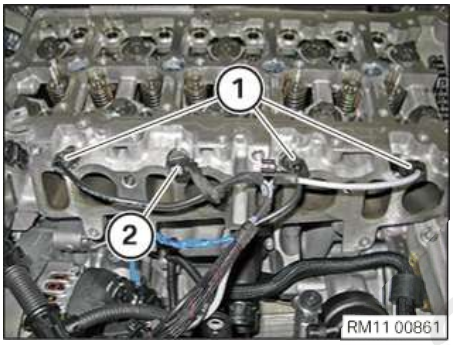
- Remove and install heavy components with the aid of another person/other persons.



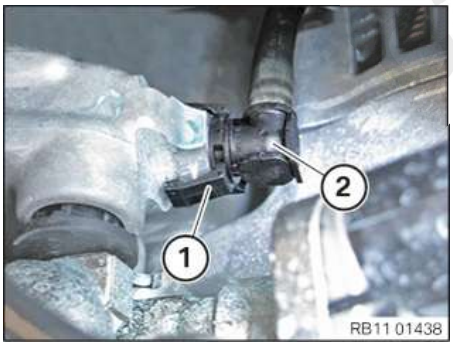
- Loosen screw (1).
- Unlock and loosen holder (2).
- Unlock and loosen the clamps (3).
- Feed out the wiring harness section (4) of the automatic transmission and place to one side.



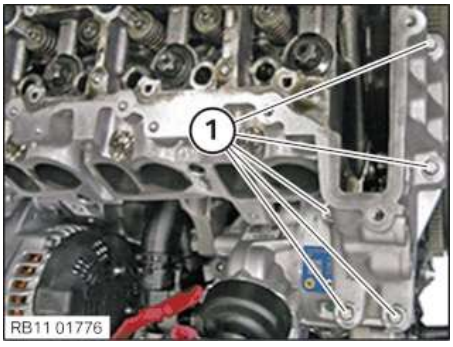
- Loosen screws (1).
- Guide out and remove holder (2).



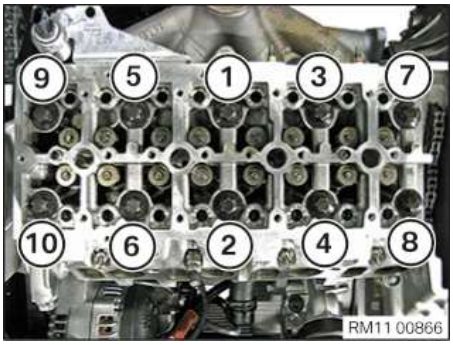
- Release plug connections (1) with special tool 0 495 140 (12 2 300).
- Unlock and disconnect the plug connections (1) and (2).
- Place wiring harness to one side.



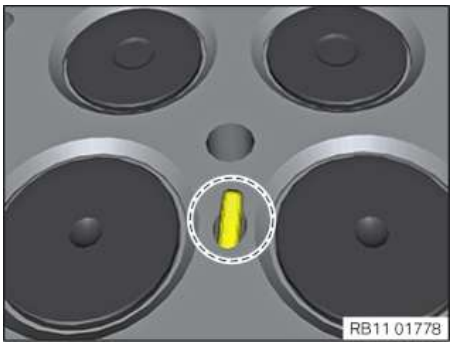
- Release lock (1) of coolant line.
- Remove the coolant line (2) and set it aside.



- Unscrew and remove the bolts (1).



- Release cylinder head bolts from **outside** to **inside** in the order (10) to (1).



RISK OF DAMAGE

Damage to the glow elements.

Excessive force may damage the glow elements and they may then have to be renewed.

- Handle glow elements with care and do not drop.
- Do not rest the cylinder head on glow elements. Glow elements protrude from the sealing surface of the cylinder head.

- Remove the cylinder head with an auxiliary person.



- Check the cylinder head and crankcase for damage.
- Check the fitting sleeves (1) for damage and replace if necessary.

RISK OF DAMAGE

Damage to the surface.

The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.

- Clean the sealing surfaces on the cylinder head and the crankcase using special tool 0 495 102 (11 4 470).

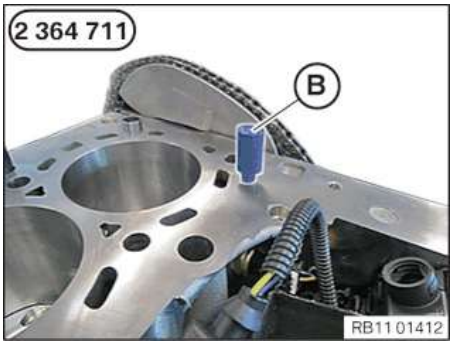
63 – Cleaning the sealing surface

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Lock the front oil duct using special tool (B) from special tool 2 364 711.

cardiagn.com



RISK OF DAMAGE

Damage to the surface.

The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.

- Clean the sealing surface using special tool 0 495 103 (11 4 471).



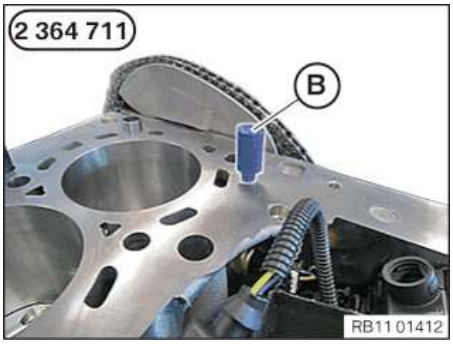
RISK OF DAMAGE

Damage to the surface.

The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

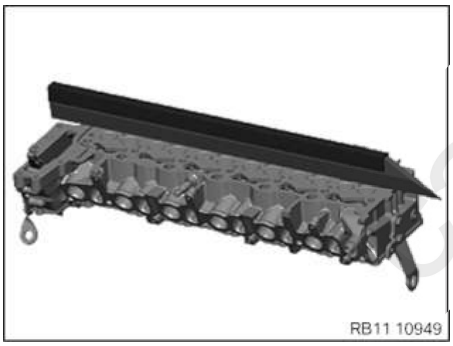
- Do not use any metal-cutting tools.

- Clean the sealing surface using special tool 0 495 104 (11 4 472).



- Remove special tool (B).

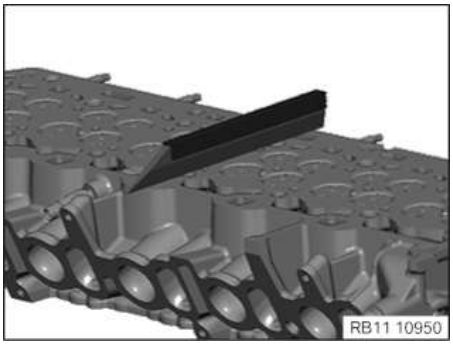
64 – Check the flatness of the cylinder head



- Check the flatness of the cylinder head lengthwise using a straightedge.

Cylinder head flatness

Maximum lengthwise deviation from flatness	0.10 mm
Maximum transverse deviation from flatness	0.05 mm



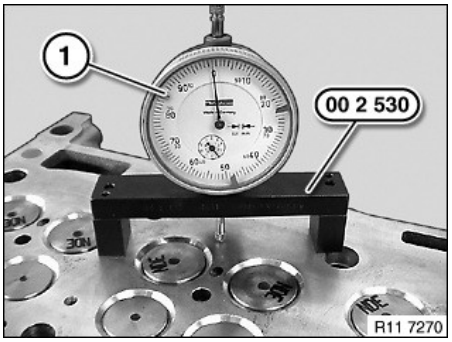
- Check the flatness of the cylinder head crosswise using a straightedge.

Cylinder head flatness

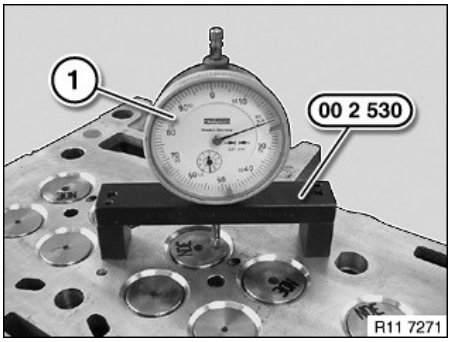
Maximum lengthwise deviation from flatness	0.10 mm
Maximum transverse deviation from flatness	0.05 mm

65 – Checking the valve underprotrusion

cardiagn.com



- Set the dial gauge (1) onto the cleaned cylinder sealing surface with slight preload in special tool 0 490 185 (00 2 530).
- Set dial gauge in mildly preloaded state to "zero".



Check

- Position the dial gauge (1) on the valve with special tool 0 490 185 (00 2 530).
- Measure valve underprotrusion and compare with the setpoint value.

Valve underprotrusion

	0,8 (0.7 - 0,9) mm

Result

» Valve underprotrusion is outside tolerance.

Measure

- Renew cylinder head.

  Parts: Cylinder head

MAIN WORK

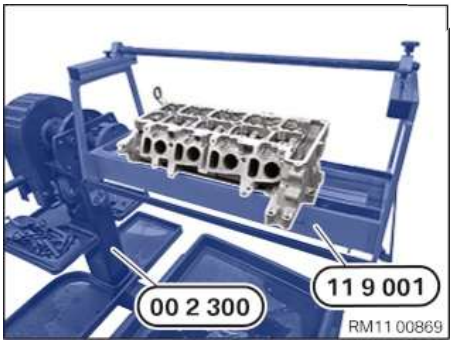
66 – Remove all valve springs

RISK OF DAMAGE

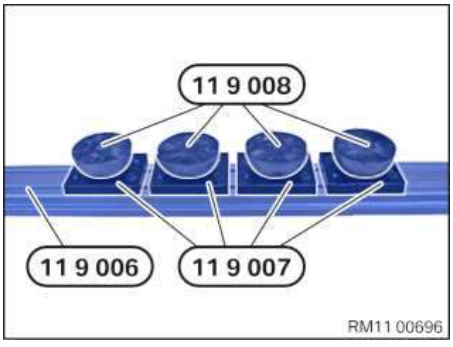
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Mount and screw the cylinder head onto the special tools 0 494 366 (11 9 001) and 0 495 187 (00 2 300).

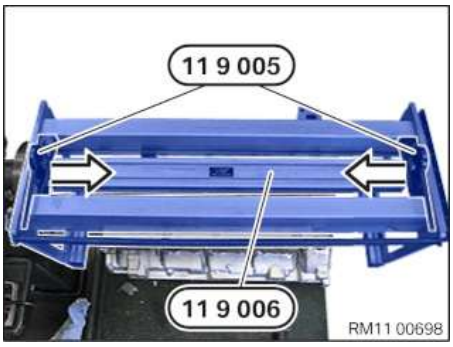


- Prepare the special tools 0 494 371 (11 9 006), 0 494 372 (11 9 007) and 0 494 373 (11 9 008) as shown.

cardiagn.com



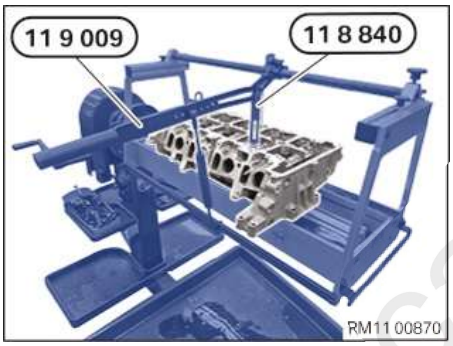
- Position special tools 0 494 373 (11 9 008) as pictured.



- Turn round special tool 0 494 371 (11 9 006) and insert as shown.
- Lock special tool 0 494 370 (11 9 005)in direction of arrow.

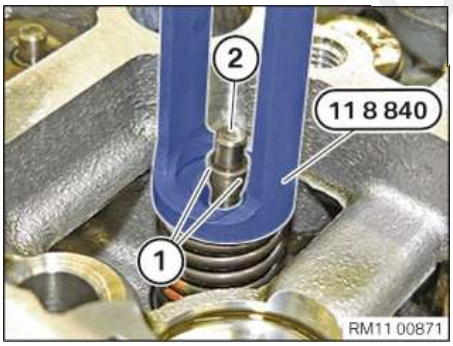


- Lock special tool 0 494 370 (11 9 005)in direction of arrow.
- Move cylinder head with special tool 0 494 362 (11 9 000) through 180° into the installation position.



- Align special tool 0 494 374 (11 9 009) in direction of valve axis.
- Position the special tool 0 496 143 (11 8 840) according to the nut.
- Press down the valve spring on the upper spring cup with the special tools 0 494 374 (11 9 009) and 0 496 143 (11 8 840).

  The **hooks** from the set of special tools 0 494 362 (11 9 000) can be used to **hold** the valve spring in pressed position.



- Keep the valve spring pressed down with the special tool 0 496 143 (11 8 840).
- Remove valve shims (1) of valve (2) with a magnet.
- Feed out valve spring and spring cup and remove.
- Place valve spring, spring cup and valve shims (2) in special tool 0 495 105 (11 4 480) in an orderly manner.

67 – Remove valve stem seals

carsrgn.com

RISK OF DAMAGE

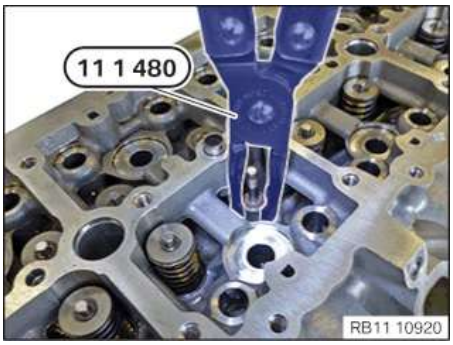
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

NOTICE

The description is for one component only. The procedure is identical for all further components.



- Remove the valve stem seal (1) with the special tool 0 490 796 (11 1 480).

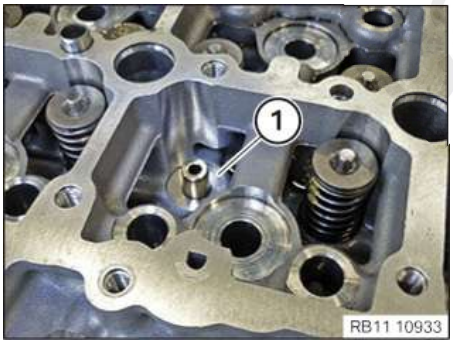
68 – Installing valve stem seals

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



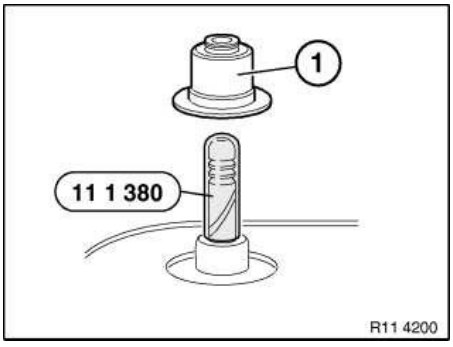
RISK OF DAMAGE

Damage to the surface.

The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.

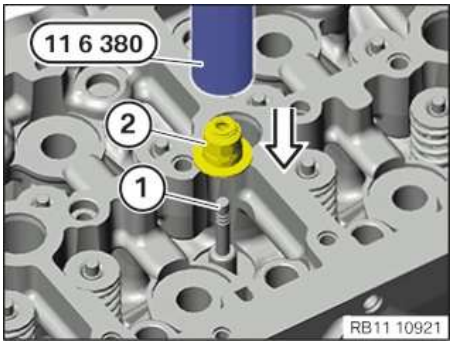
- Clean the contact surfaces (1).



- Fit special tool 0 490 746 (11 1 380).
- Renew the valve stem seal (1).

  Parts: Valve stem seal
- Lubricate and set the valve stem seal (1).

cardiagn.com



- Position the valve stem seals (2) on the valve (1).
- Press down valve stem seal (2) up to the contact surface on the cylinder head using special tool 0 493 249 (11 6 380).

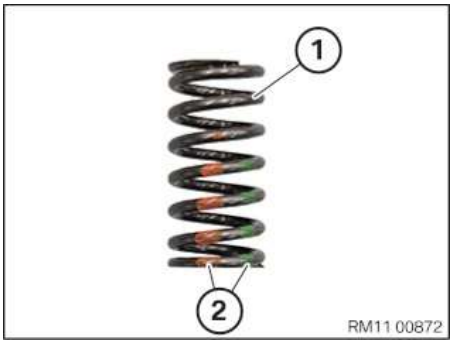
69 – Install all valve springs

RISK OF DAMAGE

Contaminant or foreign body.

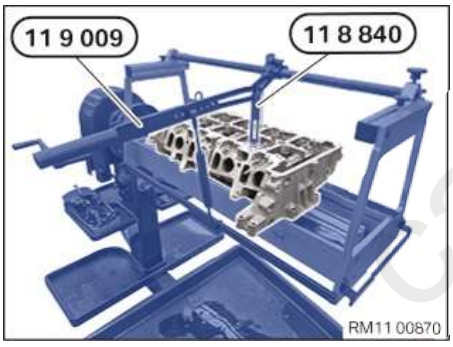
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



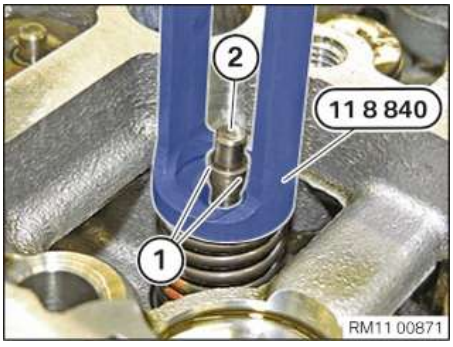
- Ensure that the valve spring (1) is marked using a colour code (2).

  The mounting orientation of the valve spring (1) can be freely chosen.



- Align special tool 0 494 374 (11 9 009) in direction of valve axis.
- Position the special tool 0 496 143 (11 8 840) according to the nut.
- Press down the valve spring on the upper spring cup with the special tools 0 494 374 (11 9 009) and 0 496 143 (11 8 840).

  The **hooks** from the set of special tools 0 494 362 (11 9 000) can be used to **hold** the valve spring in pressed position.

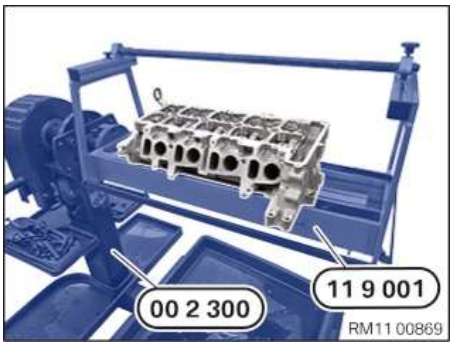


- Keep the valve spring pressed down with the special tool 0 496 143 (11 8 840).
- Insert the valve shims (1) at the valve (2) with the magnet and install.
- Relieve load on valve spring.
- Make sure that the valve shims (1) are installed correctly.

carlagn.com



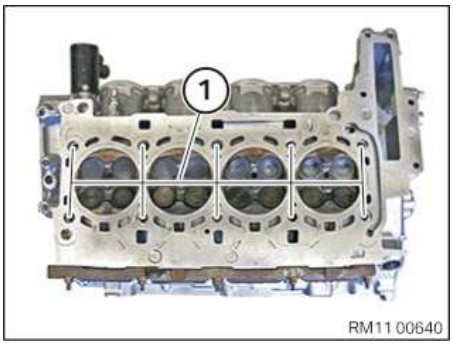
- Unlock the special tool 0 494 370 (11 9 005) in the direction of the arrow.
- Guide the special tool 0 494 371 (11 9 006) out and remove.



- Unscrew and remove the cylinder head from the special tools 0 494 366 (11 9 001) and 0 495 187 (00 2 300).

POSTPROCESSES

70 – Replace cylinder head gasket

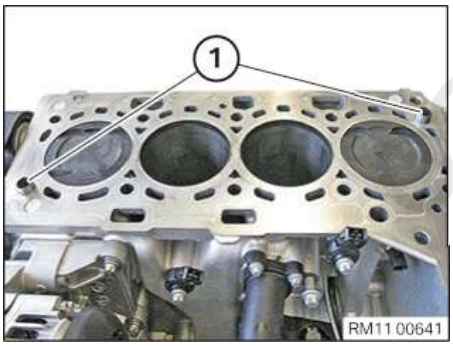


RISK OF DAMAGE

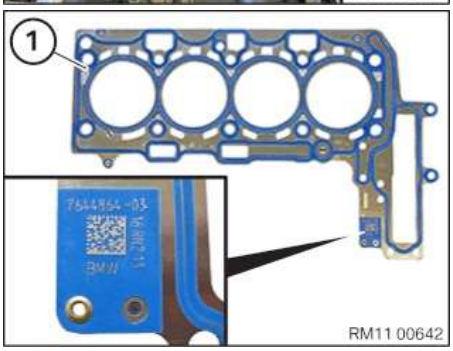
Damage to the surface.

The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.
- Remove oil and dirt residue from the blind holes (1).

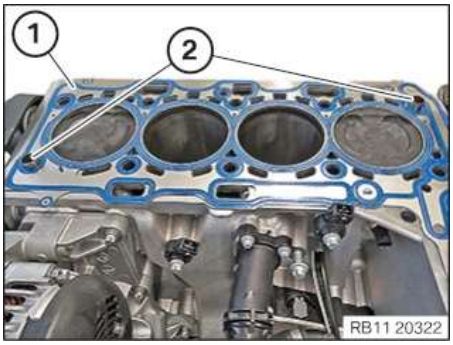


- Check if fitting sleeves (1) fit correctly and check for any damage.



- Identify the cylinder head gasket (1) using the part number.

Note: If the cylinder head is reworked, an additional seal that is 0.3 mm thicker is available for the service.



- Guide in the cylinder head gasket (1) and install.
- Ensure that the cylinder head gasket (1) is installed correctly in the fitting sleeves (2).

71 – Installing the cylinder head

RISK OF DAMAGE

Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

RISK OF DAMAGE

Damage to threads.

Fluid in the threaded hole may damage the thread when screws are tightened in the threads.

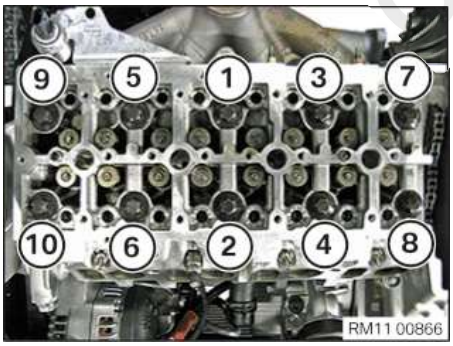
- Dry threaded holes (e.g. using compressed air).

TECHNICAL INFORMATION

Do not remove bolt coating.

TECHNICAL INFORMATION

When assembling, it is essential to observe screwing sequences and tightening torques.
Non-observance of these requirements may result in leaks and damage.



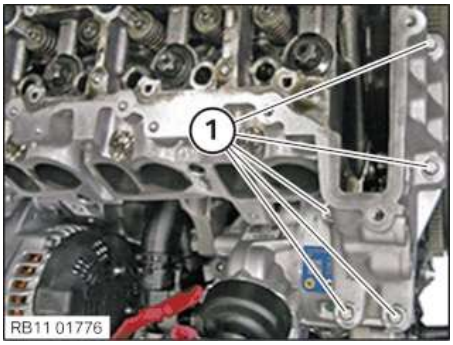
- Position the cylinder head gasket with the previously determined gasket thickness (number of holes).
- Fit new cylinder head screws.

  Parts: Cylinder head bolts
- Position the cylinder head and tighten it with the new cylinder head bolts in the order from (1) to (10).

Cylinder head to crankcase

M12x1.5	Renew screws.	1. Tightening torque	50 Nm
		2. Angle of rotation	120 °
		3. Angle of rotation	120 °

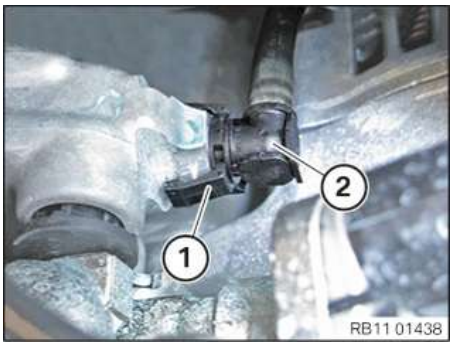
cardiagn.com



- Insert screws (1) and tighten.

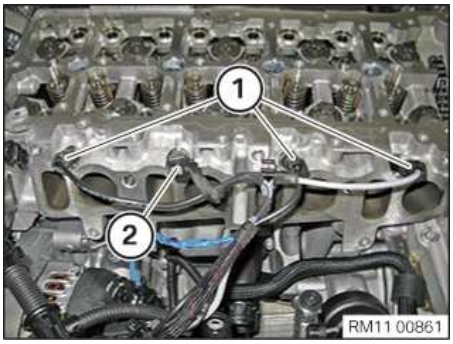
Cylinder head bolt to timing case cover

M8x40		Tightening torque	19 Nm



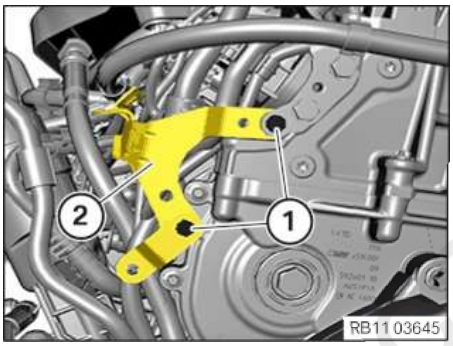
- Fit and lock coolant line (2).

  The lock (1) must engage audibly.



- Connect connectors (1) and (2), then lock.

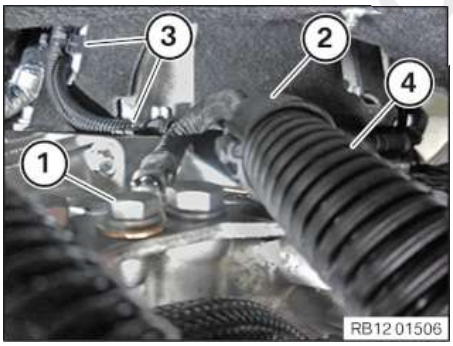
  The connectors (1) and (2) must audibly engage.



- Insert and install the holder (2).
- Tighten the screws (2).

Standard screw connection M6

M6		Tightening torque	8 Nm



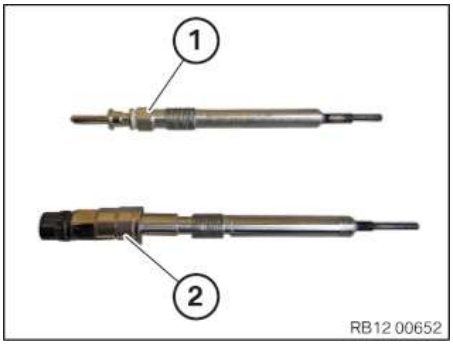
- Guide in the wiring harness section (4) of the automatic transmission and install.
- Lock holder (2).
- Make sure the bracket (2) engages audibly.
- Secure clamps (3).
- Tighten down screw (1).

Ground to cylinder head

M6		Tightening torque	8 Nm

72 – Install all glow elements

cardiagn.com



TECHNICAL INFORMATION

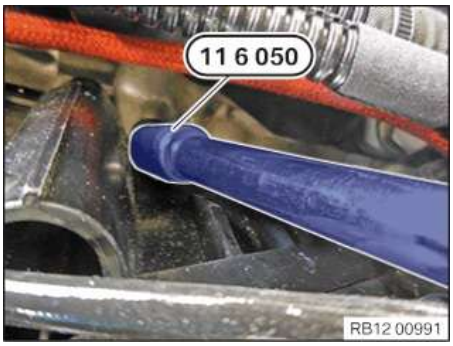
The combustion chamber pressure sensor can and is omitted from a technical point of view.

As an alternative to the combustion chamber pressure sensor, a normal glow element can be installed.

If a glow element is installed as an alternative, the appropriate wiring harness for the glow elements must also be installed.

For more information, see the Electronic Parts Catalogue and other information

- If installed: Install the glow element with **combustion chamber pressure sensor** (2), in the cylinder **2**.
- Install the glow elements (1) in the cylinders **1**, if necessary, **2**, **3** and **4**.



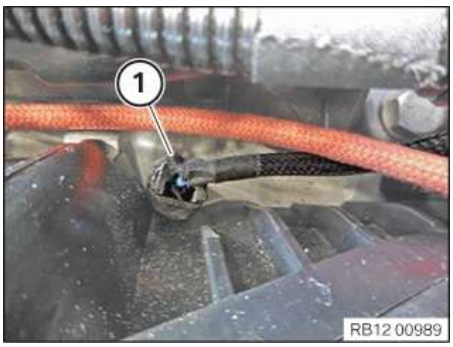
NOTICE

The description is for one component only. The procedure is identical for all further components.

- Screw in and tighten the glow elements with the special tool or conventional tools.

Glow elements to cylinder head

Glow element		Tightening torque	13 Nm

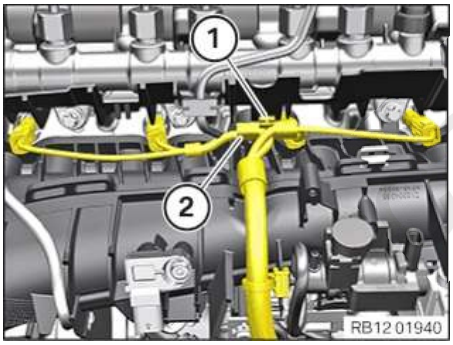


NOTICE

The description is for one component only. The procedure is identical for all further components.

- Connect and lock the connector (1).

  The connector (1) must engage audibly.



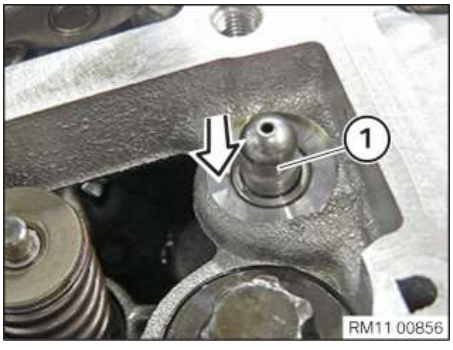
- Guide in the wiring harness section (2) and install.
- Secure clamps (1).

▸ **When replacing the glow element: Teach in glow elements if necessary**



- Teach in glow elements with the diagnosis system.

73 – Installing all hydraulic valve clearance compensating elements



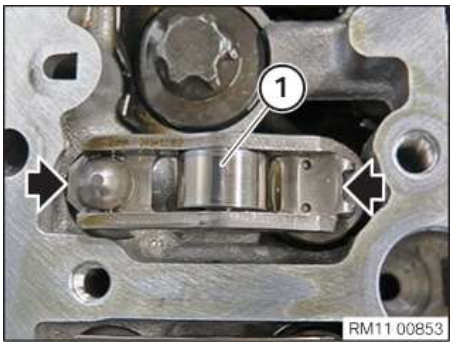
- Make sure to observe the assignment of the roller cam followers to the hydraulic valve clearance compensating elements when reusing the hydraulic valve clearance compensating elements (1).
- Insert and install all hydraulic valve clearance compensating elements (1) in the direction of the arrow.

cardiagn.com

74 – Installing the roller cam followers

TECHNICAL INFORMATION

- Note the installation position of the component. The component may be installed in various installation positions.



- Check all the roller cam followers (1) for damage, and renew if necessary.

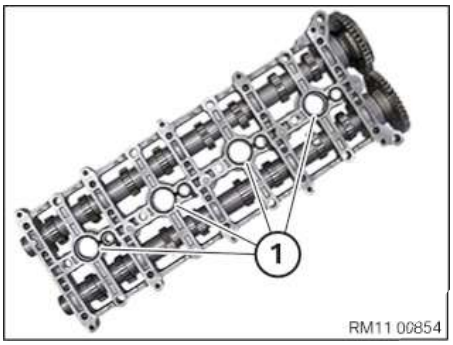
  Parts: Roller cam followers
- Insert all roller cam followers (1) and install them (arrows).

  Roller cam followers (1) that have already been used must be installed in the same place.
- Note the mounting orientation of the roller cam followers (1).
- Oil all roller cam followers (1).

75 – Installing the camshaft support

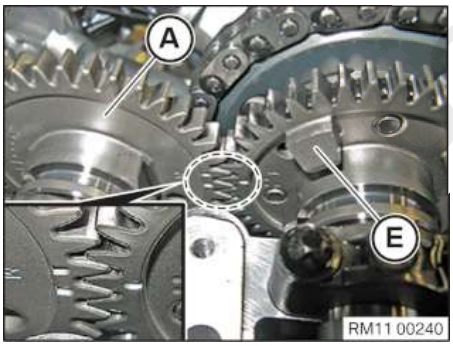
TECHNICAL INFORMATION

The camshaft is tensioned by the valve springs. Tighten or loosen each screw on the camshaft bearing caps one at a time in the specified sequence and by half a turn only. Repeat procedure.

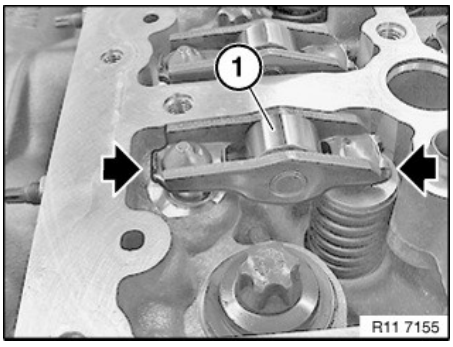


- Renew seals (1).

  Parts: Seals
- Insert and install the gaskets (1).

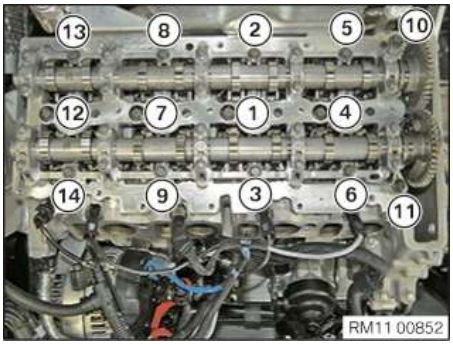


- Make sure the marks on both camshafts (A) and (E) correspond in the **highlighted area**.



- Make sure the roller cam followers (1) have the correct mounting orientation.
- Position the camshaft support (arrows).

bardiagn.com



- Evenly tighten the screws in a sequence from (1) to (14) in several steps.
- Evenly tighten the screws in a sequence from (1) to (14) in several steps.

Camshaft carrier to cylinder head

M7x35		Tightening torque	13 Nm

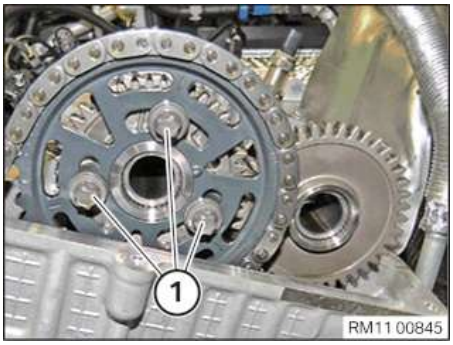
76 – Installing the special tool to secure the exhaust camshaft



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

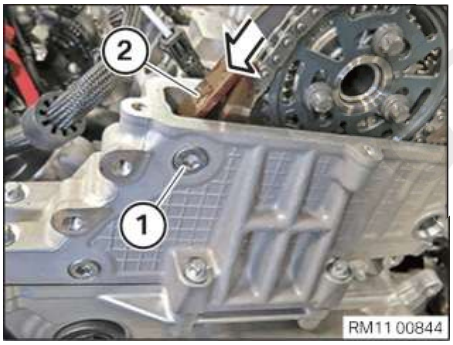
  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.

77 – Installing the camshaft sprocket on the intake camshaft



- Position the drive chain on the camshaft sprocket so that the thread of the screw connections are located in the centre of the elongated holes.
- Position the camshaft sprocket on the intake camshaft.
- Merely apply the screws (1) hand-tight so that the camshaft sprocket can still be moved in relation to the intake camshaft.

78 – Installing the guide rail of the timing chain

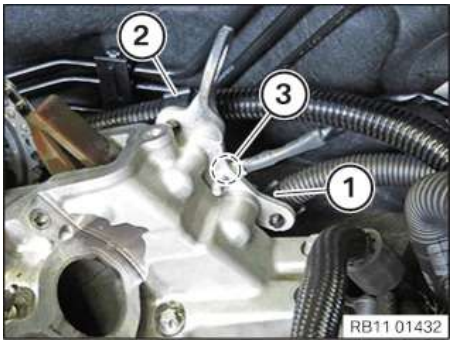


- Position the guide rail (2) in the direction of the arrow.
- Make sure the guide rail (2) is correctly installed at the bottom bearing journal.
- Renew bearing journal (1).

  Parts: Bearing journal
- Tighten the bearing journals (1).

Bearing journal to cylinder head

M16x1.5	Replace bearing journal.	Tightening torque	20 Nm



- Position the grounding cable and tighten the screw (3).

Standard screw connection M8

M8		Tightening torque	19 Nm

- Clip in the positive battery cable (2) into the bracket.
- Clip in the vehicle wiring harness (1) into the bracket.

79 – Installing the chain tensioner piston

cardiagn.com



TECHNICAL INFORMATION

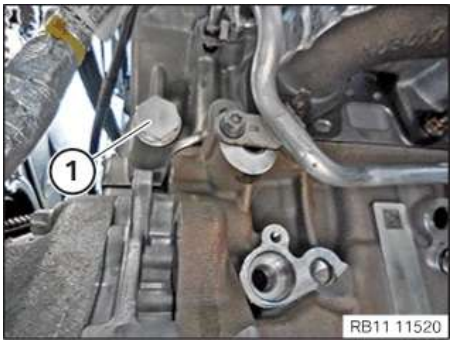
The oil chamber must be drained for reuse of the chain tensioner.

- Place the chain tensioner on a level support pad and slowly compress in the direction of arrow.
- Repeat process twice.



- Renew sealing ring (1).

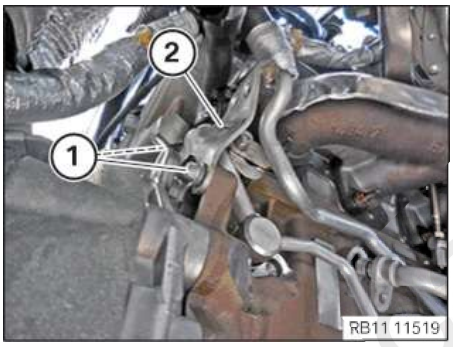
  Parts: Sealing ring
- Insert and install the sealing ring (1).



- Insert and install the chain tensioner piston (1).
- Tighten the chain tensioner piston (1).

Chain tensioner piston to cylinder head

22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

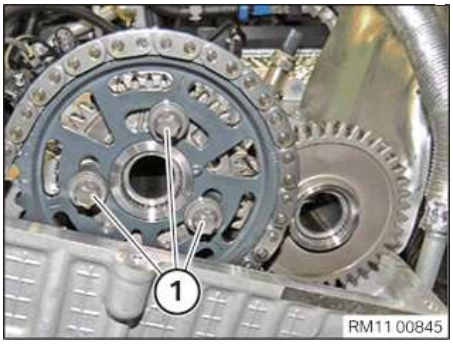


- Insert and install the holder (2).
- Tighten the screws (1).

Holder to crankcase

M8X16		Tightening torque	19 Nm

80 – Tightening the camshaft sprocket on the intake camshaft



- Tighten the screws (1).

Camshaft sprocket to camshaft

M7x17.			17 Nm

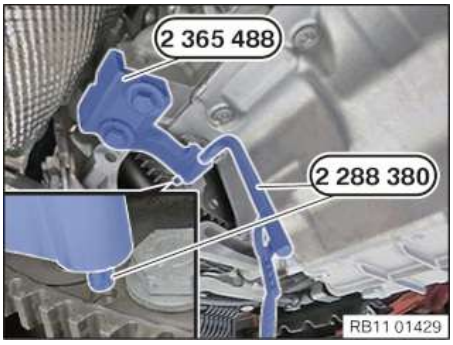
81 – Removing the special tool for fixing the exhaust camshaft

cardiagn.com



- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

82 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

83 – Checking camshaft timing



RISK OF DAMAGE

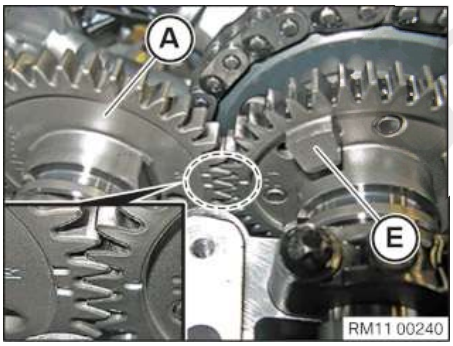
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

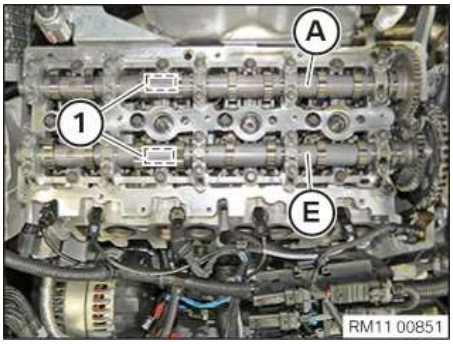
- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

  Do **not** crank the engine in reverse.

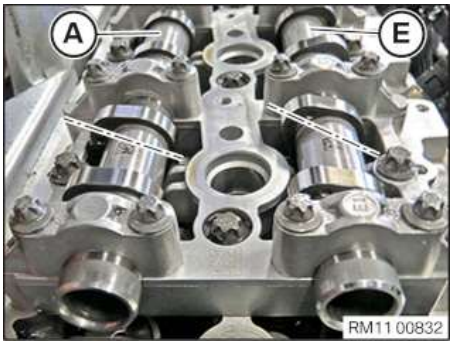


- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.

cardiagn.com

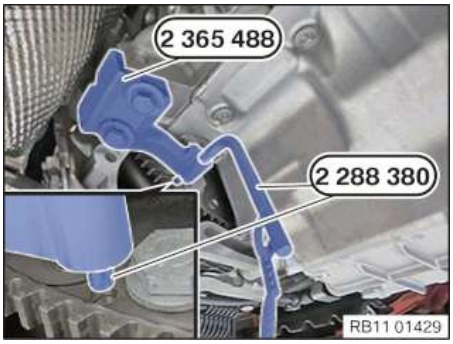


- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

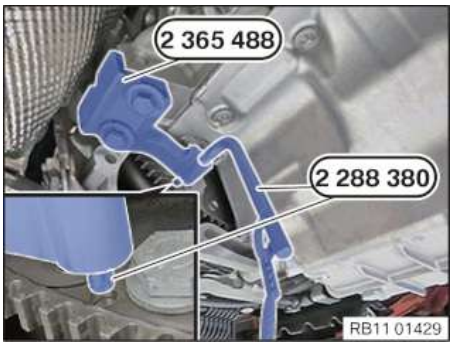
- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

84 – Removing the special tool for fixing the exhaust camshaft



- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

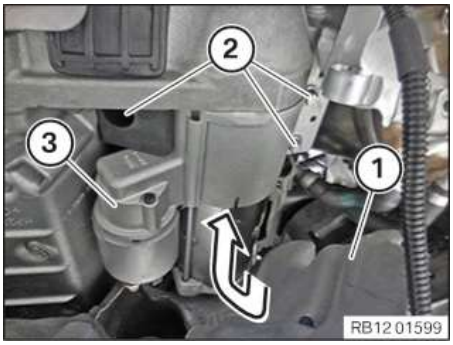
85 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

86 – Installing starter motor

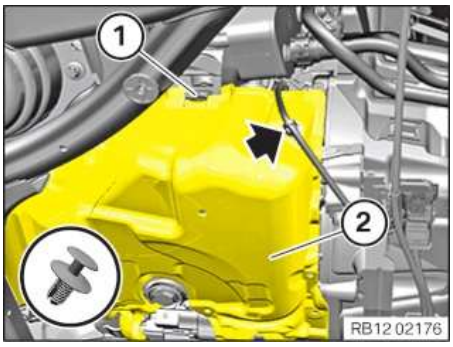
cardiagn.com



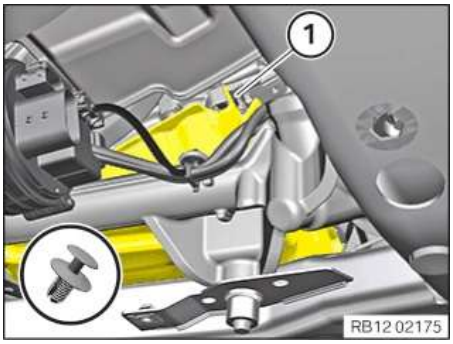
- Make sure that the acoustic cover (1) is not damaged.
- Carefully press the acoustic cover (1) to one side.
- Feed in and install the starter motor (3) in the direction of the arrow.
- Tighten the screws (2).

Starter motor to engine

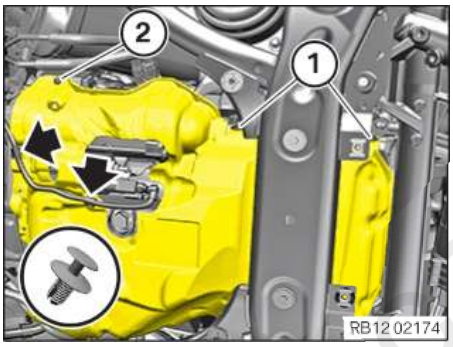
M8X60		Tightening torque	19 Nm



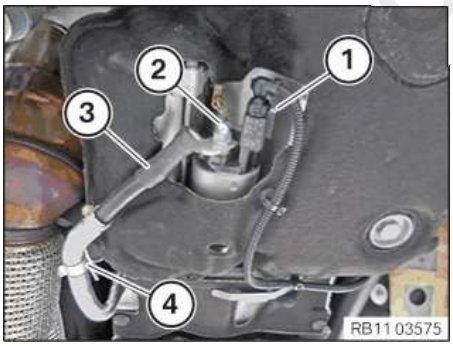
- Position the acoustic cover (2).
- Fasten expanding rivet (1).
- Secure clamp (arrow).



- Fasten expanding rivet (1).

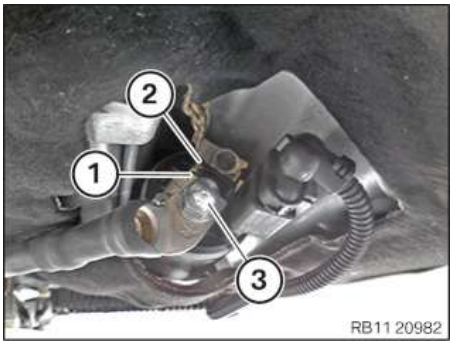


- Secure fir tree clip (2).
- Secure expanding rivet (1).
- Secure the clamps (arrows).



- Fasten positive battery cable(3) in holder (4) and position it on the starter motor.
- Tighten the nut (2) hand-tight.
- Connect the connector (1) and audibly lock it.

cardiagn.com



CAUTION

Improper routing of the positive battery cable.

Risk of short circuits!

- Route the positive battery cable without abrasions and do not trap.

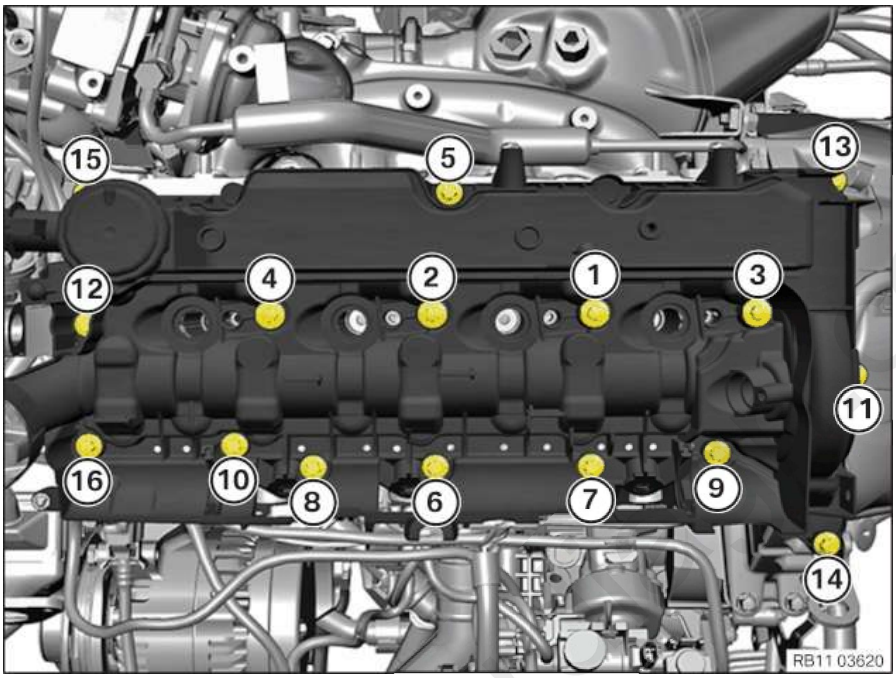
- Attach the positive battery cable (1) **correctly** to anti-twist lock (2).
- Tighten nut (3).

Battery positive lead to starter

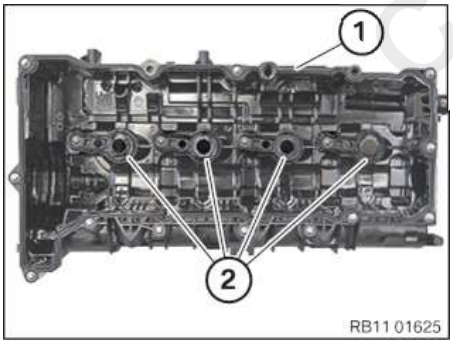
M8		Tightening torque	13,5 Nm

87 – Installing cylinder head cover

Screw connection of the cylinder head cover

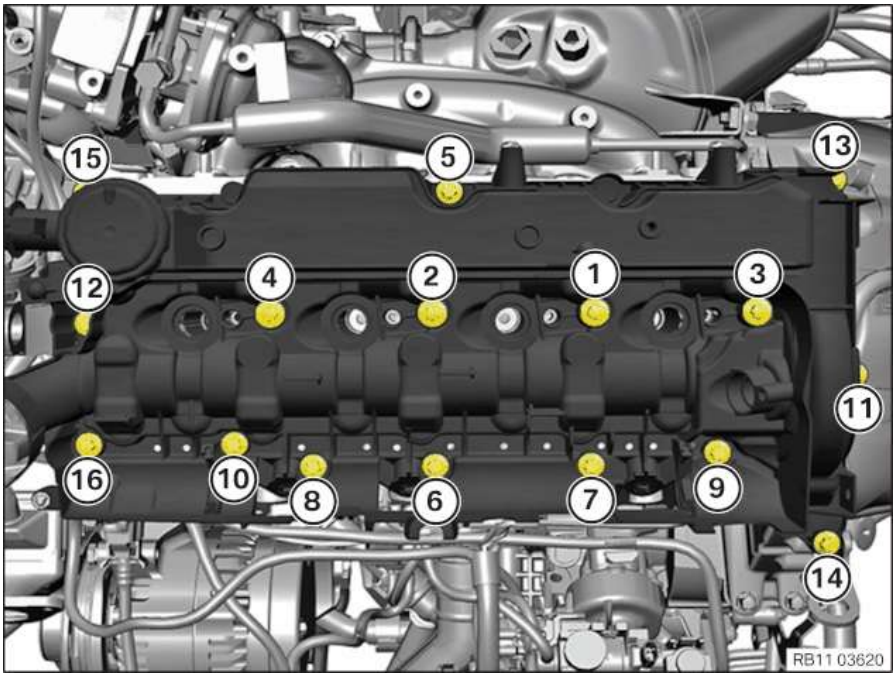


1 - 16 Bolts of the cylinder head cover



- Renew the profile seals (1) and (2) of the cylinder head cover.

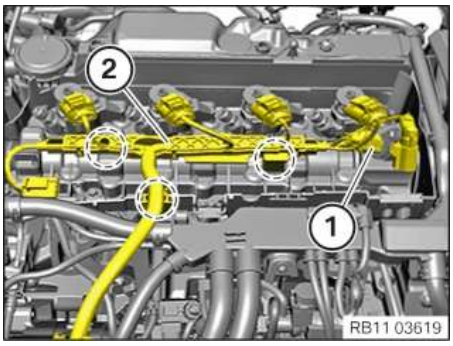
  Parts: Profile seals



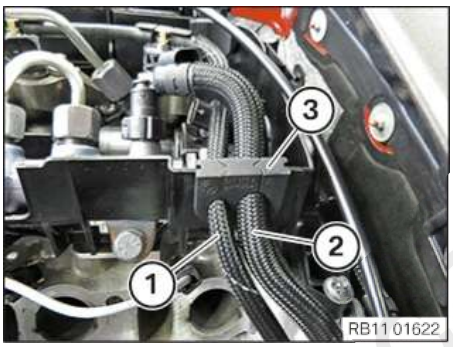
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

Cylinder head cover to cylinder head

M6		Tightening torque.	8,5 Nm



- Position the vehicle wiring harness (2) on the cylinder head cover and fasten in the marked areas.
- Plug in the connector (1) and lock audibly.



- Insert and connect the leakage oil line (1) with the fuel return line (2) and grommet (3).



- Feed in and install the heat shield (1).



- Connect engine ventilation line (1) and lock.

  The locks (arrows) must engage audibly.

cardiagn.com

▸ **Cleaning the injector shafts**

CAUTION

Swirling dirt particles caused by compressed air.

Danger of injury!

- Collect dirt particles, e.g. when blowing out, use cloth to do so.

- Wear safety goggles.

RISK OF DAMAGE

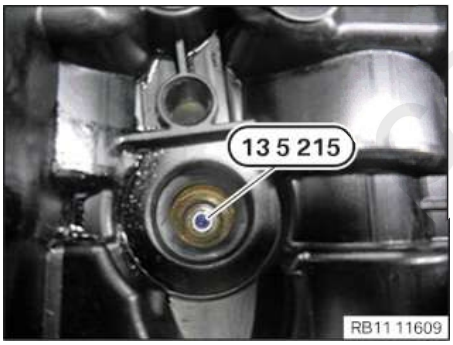
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



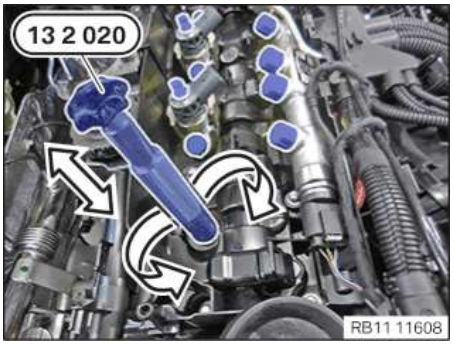
- Check whether the sealing ring remained in the injector shaft and remove the sealing ring as needed.
- Insert the special tool 0 493 763 (13 5 215) with the special tool 0 493 762 (13 5 214) from the set of special tools 0 493 758 (13 5 210) into the injector shaft.
- Remove special tool 0 493 762 (13 5 214).



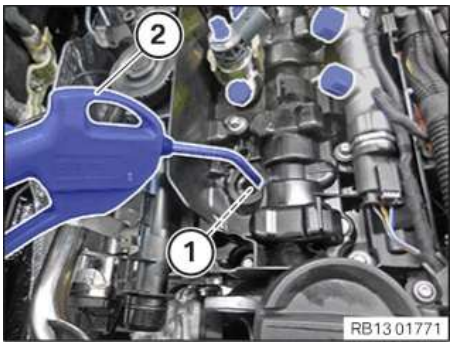
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



- Insert special tool 0 496 150 (13 2 020) into the injector shaft.



- Move special tool 0 496 150 (13 2 020) up and down in the injector shaft with rotational movements in the direction of arrow.
- Feed out special tool 0 496 150 (13 2 020) from the injector shaft and remove.



- Blow out injector shaft (1) with air gun (2).



- Feed the special tool 0 493 762 (13 5 214) into the injector shaft and screw it in with the special tool 0 493 763 (13 5 215).
- Feed out special tool 0 493 762 (13 5 214) with special tool 0 493 763 (13 5 215) from the injector shaft and remove it.

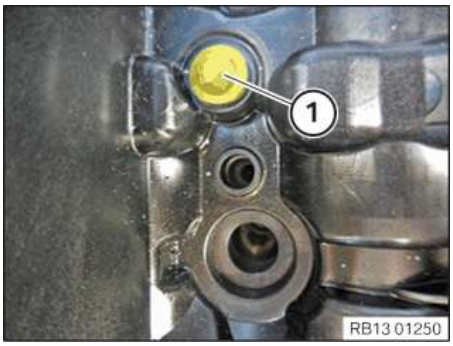
▸ **Check the placement of the clamping claw**

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Tighten down screw (1).

  The clamping claw is positioned on the bolt (1).

Clamping claw facing to cylinder head cover

M6		Tightening torque	10 Nm

▸ **Prepare the injector for installation**

cardiagn.com

RISK OF DAMAGE

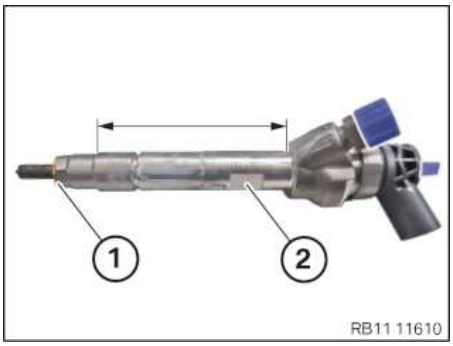
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

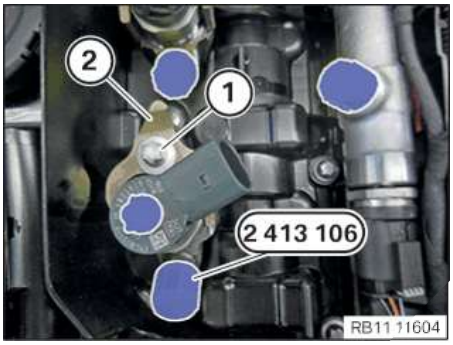
TECHNICAL INFORMATION

Lightly grease the injector shaft with high temperature-resistant grease.
For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



- Renew the copper sealing ring (1) on the injector (2).

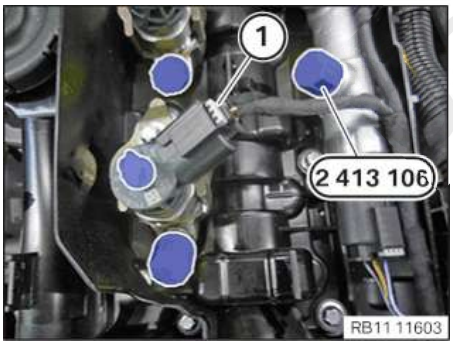
  Parts: Copper sealing ring
- Lightly grease the injector in the marked area with heat-resistant grease before installing the injector (2) in the injector shaft.



- Insert and install the injector .
- Insert and install the clamping claw (2).
- Tighten down screw (1).

Injector to cylinder head cover

M8	Tightening torque	8 Nm
	Angle of rotation	120 °



- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

▸ **Replacement: Perform injection quantity compensation**

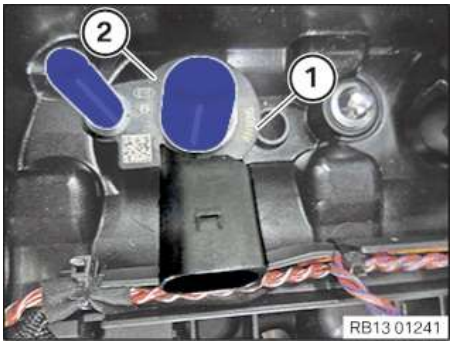
TECHNICAL INFORMATION

If the DDE control unit or an injector has been replaced, it will also be necessary to carry out injection quantity compensation. The adjustment value (7-position letter/number code) is engraved on each injector.

NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

cardiagn.com

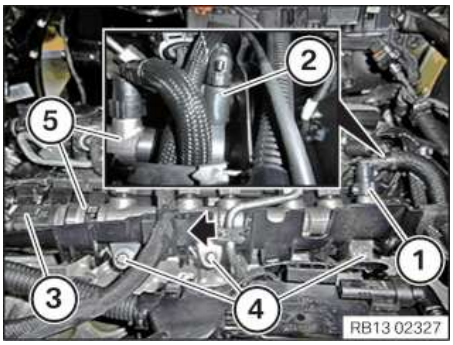


- Read off the adjustment value (1) on the new injector (2).



- Connect diagnosis system:
  - Vehicle identification
  - Function selection
  - Service functions
  - Digital diesel electronics (DDE)
  - Adjustment of injectors
  - Testing schedule
- Start service function with the right arrow button.

89 – Installing the rail



- Insert and install the rail (5).
- Tighten the screws (4).

Rail to cylinder head cover

M8		Tightening torque	19 Nm

- Install and lock cable clip (arrow).

  The cable clip (arrow) must engage audibly.
- Connect and lock the connector (3) at the rail pressure sensor.

  The connector (3) must engage audibly.
- Connect and lock the connector (2) at the rail pressure regulating valve.

  The connector (2) must engage audibly.
- Feed in fuel return line (1) and install.

  The fuel return line (1) must audibly engage.

90 – Installing high pressure line between rail and high pressure pump

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

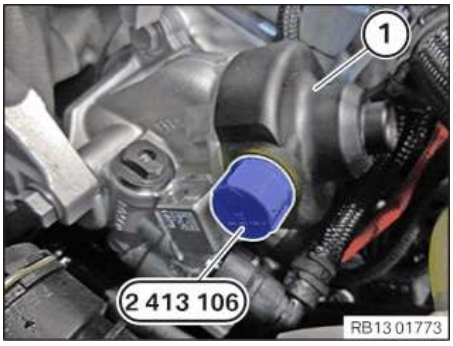
Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

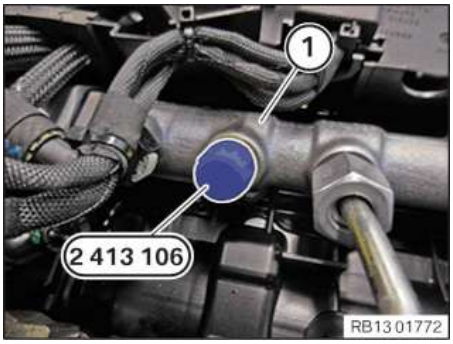
cardiagn.com

TECHNICAL INFORMATION

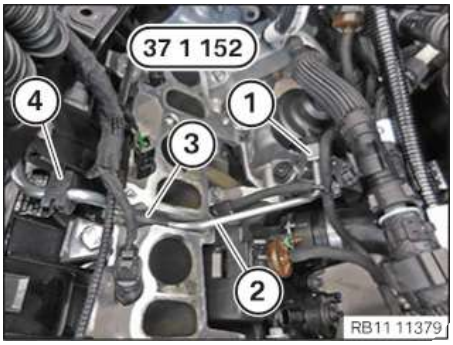
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Feed out and remove special tool on the high pressure pump (1).



- Feed out the special tool on the rail (1) and remove.



- Insert and install the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).
- Hand-tighten the union nut (1) on the high pressure pump.



- Hand-tighten the union nut (1) on the rail.

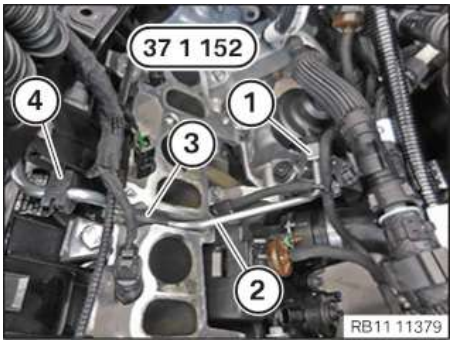
TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten the union nut (1) with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm



- Make sure that the high pressure line (2) is correctly installed with the abrasion protection (3) and the rubber mount (4).

TECHNICAL INFORMATION

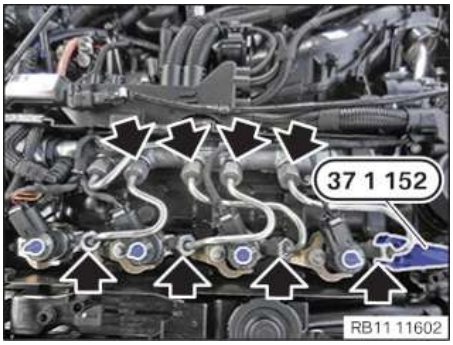
Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten union nut (1) on the high pressure pump with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm

cardiagn.com



- Remove the special tool from all cable connections.
- Feed in and install the high pressure lines (arrows).
- Hand-tighten the high pressure lines (arrows).

TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

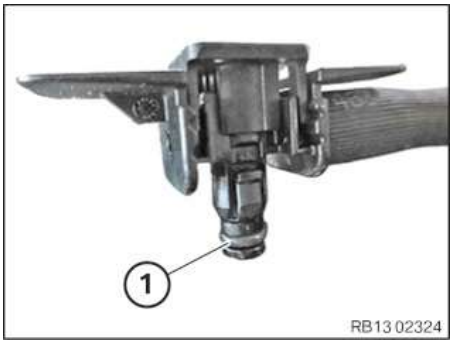
- Tighten the high pressure lines (arrows) with the special tool .

High pressure lines between injector and rail

High-pressure pipe		Tightening torque	24.5 Nm

- Check the high pressure lines (arrows) for tightness (**visual inspection**).

92 – Attach the leakage oil line on the injectors

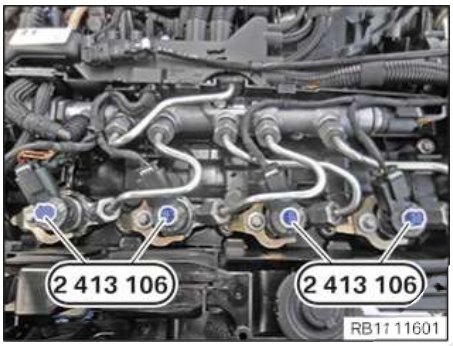


- **Version A:**

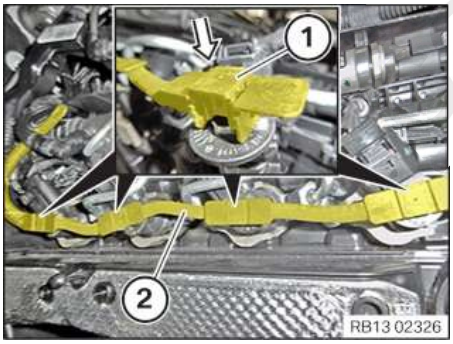
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

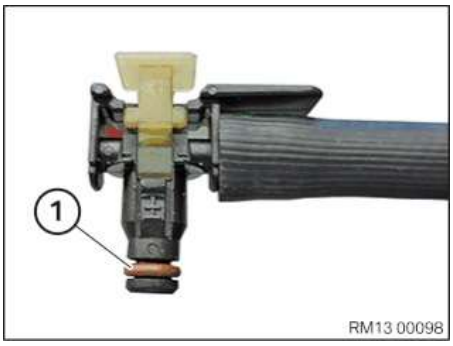
  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.



- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.



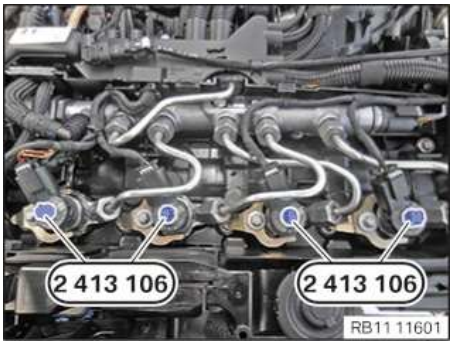
- **Version B**:

  Check sealing ring (1) for damage, renew leakage oil line if necessary.

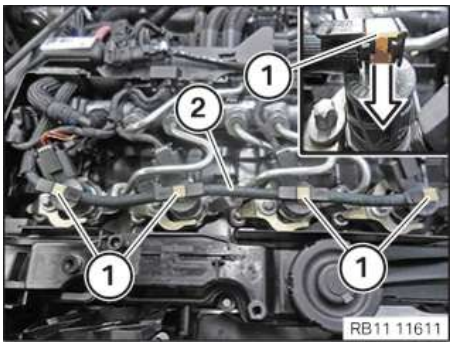
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.

cardiagn.com

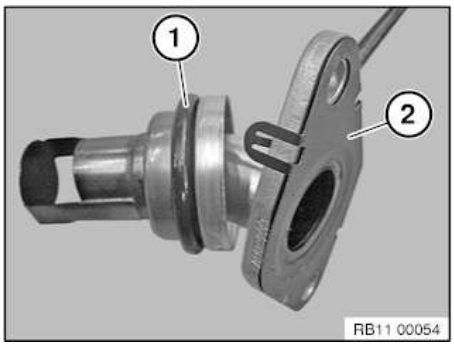


- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.

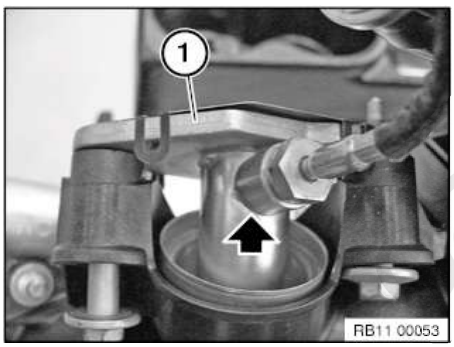
93 – Installing the intake plenum



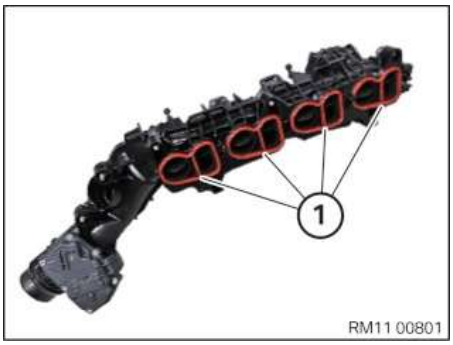
- Renew O-ring (1).

  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

  Parts: Gasket
- Position the seal (2) and clip it in.



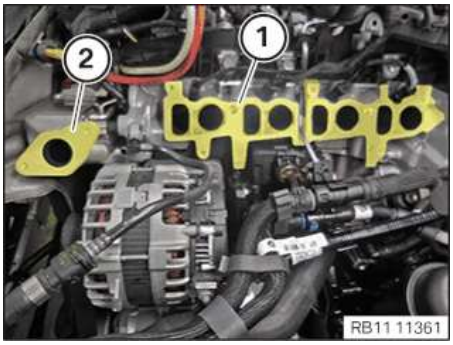
- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).



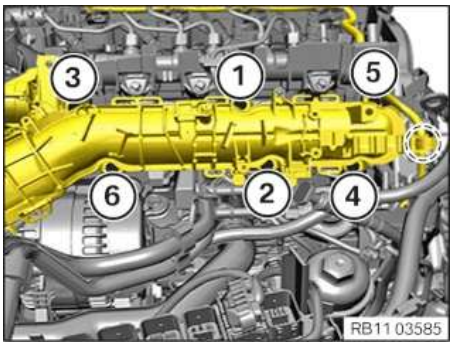
- Renew seals (1).

  Parts: Seals
- Ensure that the seals (1) are firmly mounted on the intake plenum.

cardiagn.com



- Clean connection points (1) at cylinder head.
- Clean the connection point (2) on the exhaust-gas recirculation cooler.

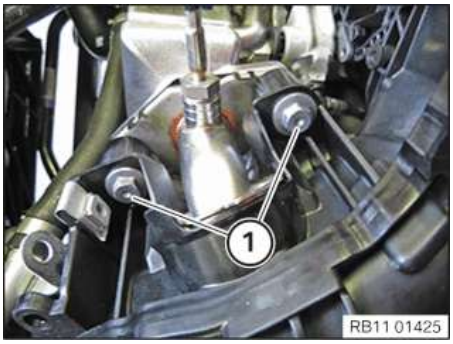


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

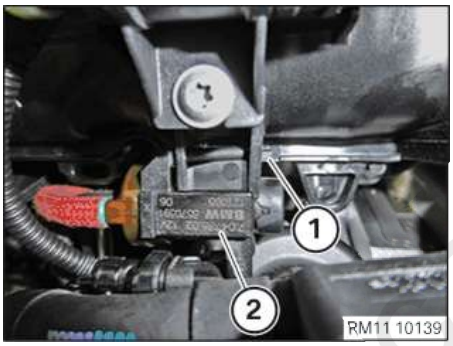
- Attach the wiring harness and fuel lines in the marked area on the intake plenum.



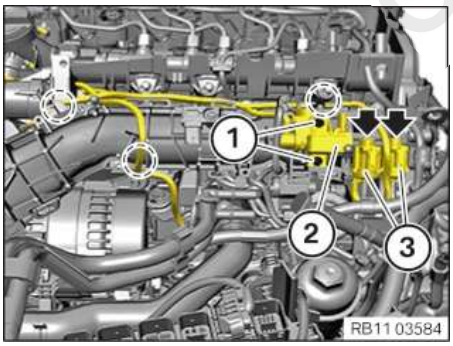
- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm



- Install electric changeover valve (2) from the left to the right in the holder on the intake plenum.
  The lock (1) must audibly engage.



- Install intake plenum electric changeover valve (3) on the intake plenum.
  The locks (arrows) must engage audibly.
- Position the electric changeover valve (2) on the intake plenum.
- Tighten the screws (1).

Electric changeover valve to intake plenum

TS6x20		Tightening torque	5 Nm

- Fasten the vacuum hoses on the intake plenum in the marked areas.



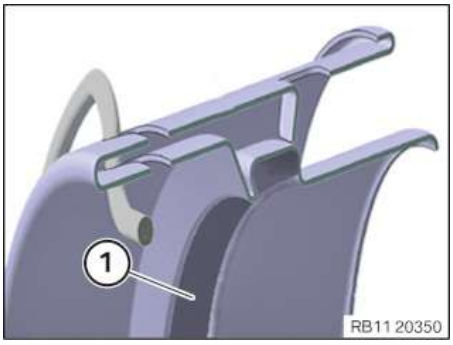
- Check the seal (1) for damage, and renew if necessary.

gardiagn.com

▸ **Replacing damaged seal**

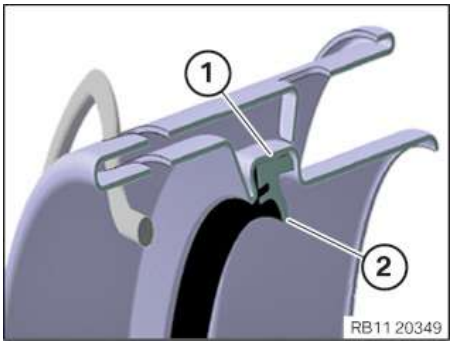
TECHNICAL INFORMATION

Do not use pointed or sharp-edged tools for the installation and/or removal.



- Remove damaged seal.
- Clean gasket groove (1) with a dry towel.

  The gasket groove (1) must be clean.



- Renew gasket.

  Parts: Gasket
- Install seal dry without lubricant or mounting agent.

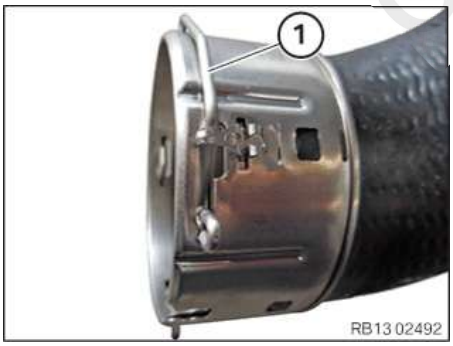
TECHNICAL INFORMATION

Incorrect assembly is possible. Ensure correct installation position.

- Feed in and install the seal.
- Make sure the seal is correctly installed in the gasket groove (1).
- Make sure that the sealing lip (2) is directed inwards as shown.



- Connect the pressure pipe to the throttle body until the locks (1) engage on both sides.



- Check that the locks (1) are correctly seated on the pressure pipe.

94 – Partially securing the wiring harness section on the intake plenum

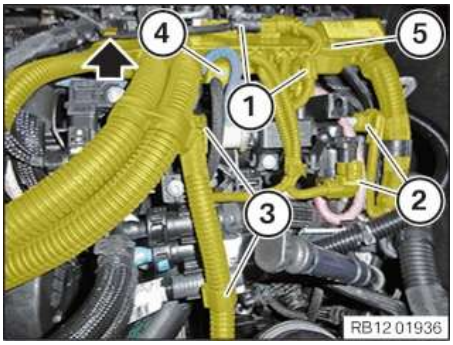
RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

- Route all cables without abrasions, do not trap and crush.

cardiagn.com



- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

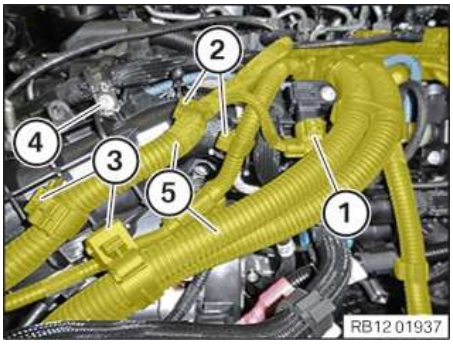
Wiring harness section to manifold

TS5x20		Tightening torque	3,6 Nm

- Secure clamps (3).
- Connect connectors (2) and lock.

  The connectors (2) must engage audibly.
- Secure the line at clamp (Arrow).
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



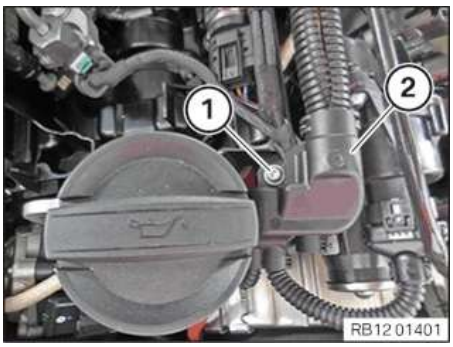
- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

Standard screw connection 4 Nm

Oval-head screw		Tightening torque	4 Nm

- Secure clamps (3).
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



- Guide in the wiring harness section (2) and install.
- Tighten down screw (1).

Wiring harness section to cylinder head cover

TS5x20		Tightening torque	3,6 Nm



- Connect connectors (1) and lock.

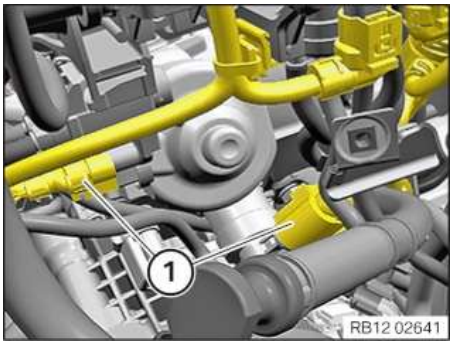
  The connector (1) must engage audibly.



- Connect the connector (1) and lock it.

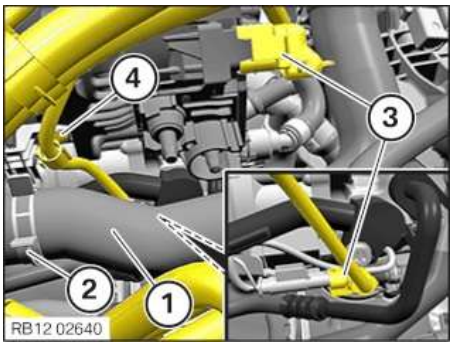
  The connector (1) must engage audibly.

cardiagn.com



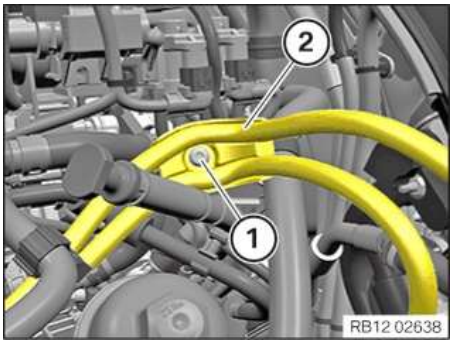
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



- Secure the clamp (4).
- Connect connectors (3) and lock.

  The connectors (3) must engage audibly.
- Feed the coolant line (1) into the holder (2) and install it.



- Feed in and position the positive battery cables (2) .
- Tighten down screw (1).

Standard screw connection M6

M6		Tightening torque	8 Nm



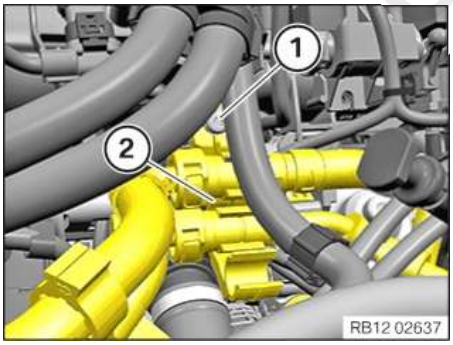
- Feed in and install the positive battery cable (4).
- Feed in and position the positive battery cables (4) .
- Renew the nuts (3) and (2).

  Parts: Nuts
- Tighten nuts (3) and (2).

Battery positive lead on the starter motor generator

M8		Tightening torque	19 Nm

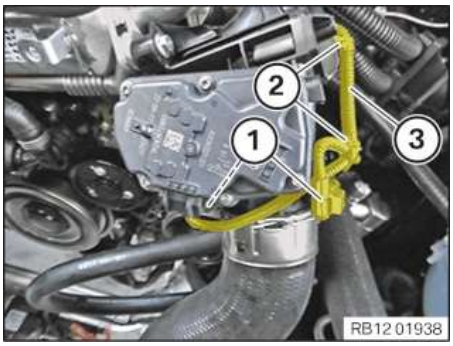
- Guide in and install the lid (1).



- Insert and install the holder (2).
- Tighten down screw (1).

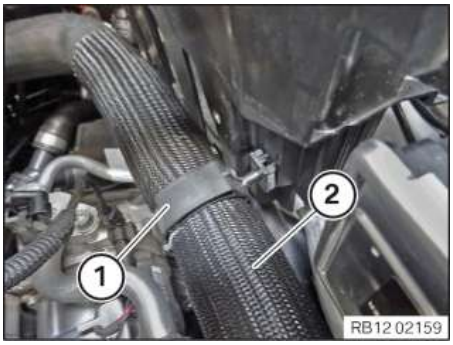
Holder on intake plenum

TS6X20		Tightening torque	5 Nm



- Guide in the wiring harness section (3) and install.
- Secure clamps (2).
- Connect connectors (1) and lock.

cardiagn.com



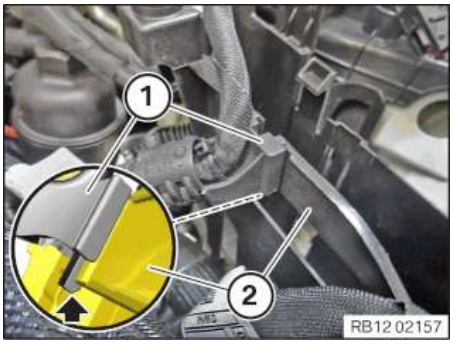
- Feed in and install coolant line (2).
- Lock holder (1).

  The holder (1) must engage audibly.



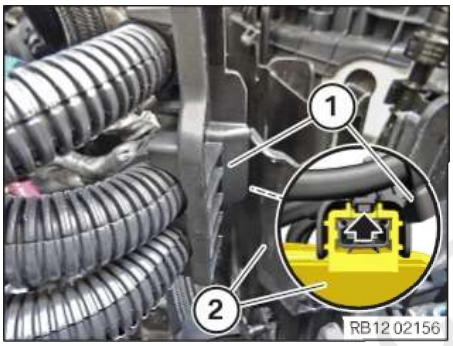
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.



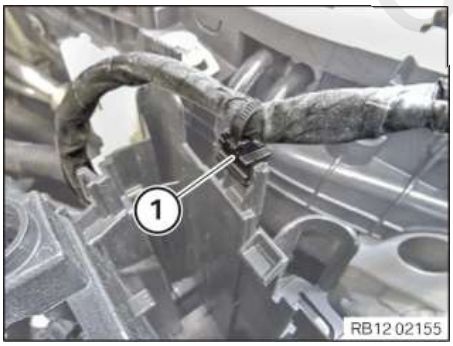
- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.



- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.



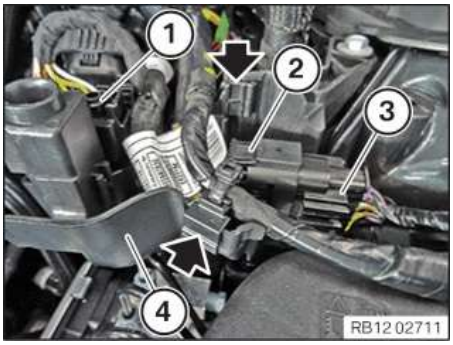
- Secure clamps (1).



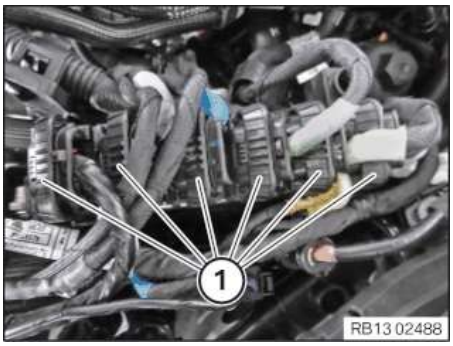
- Feed in and install the connector (1).

  The connector (1) must engage audibly.

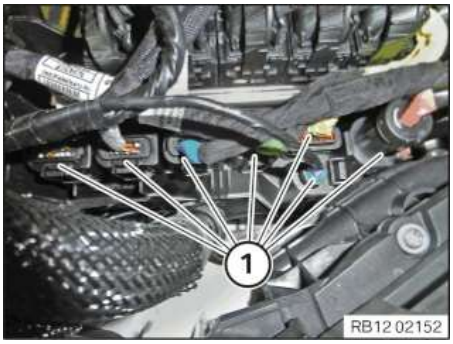
cardiagn.com



- Connect connector (3) to control unit holder (4) and lock it.
  The connector (3) must engage audibly.
- Connect connectors (2) and lock.
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.
  The connector (1) must engage audibly.
- Secure the clamps (arrows).

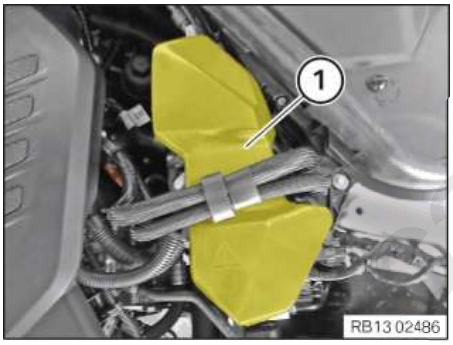


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.

95 – Install the cover for the DDE control unit

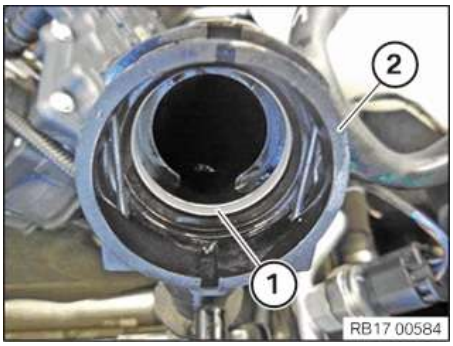


- Insert and install cover (1) into guides.

96 – Connecting the coolant lines

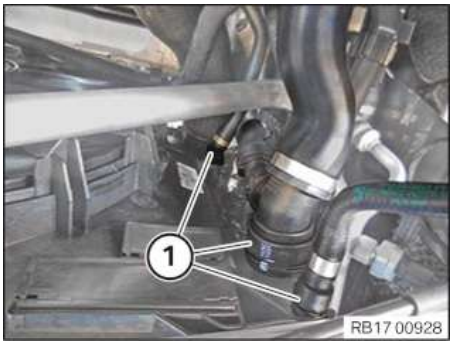
TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.



- Check the sealing ring (1) of the coolant line (2) for damage and renew where required.

cardiagn.com

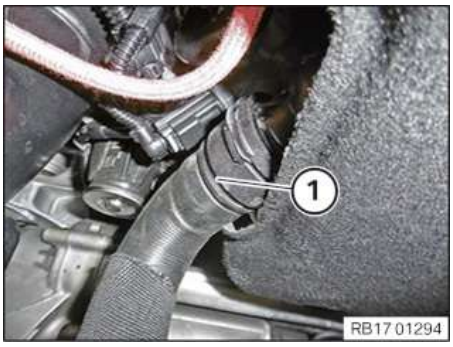


NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

- Connect and lock the coolant lines (1).

  The coolant lines (1) must engage audibly.



- Connect and lock coolant line (1).

  The coolant line (1) must audibly engage.

97 – Installing the high-pressure stage exhaust turbocharger and the low-pressure stage turbocharger

CAUTION

Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

RISK OF DAMAGE

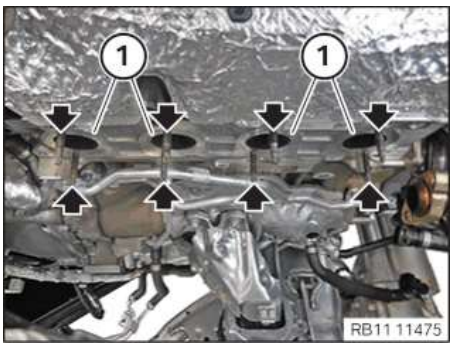
Damage to the surface.

The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.

TECHNICAL INFORMATION

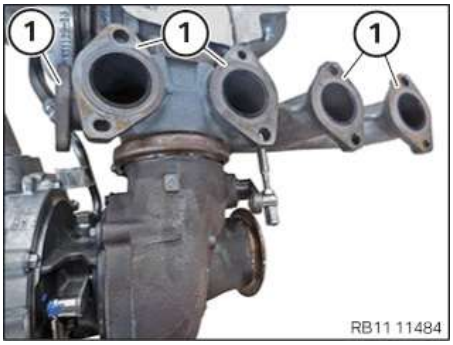
The sealing surfaces must be free from oils, grease and cleaning agents.



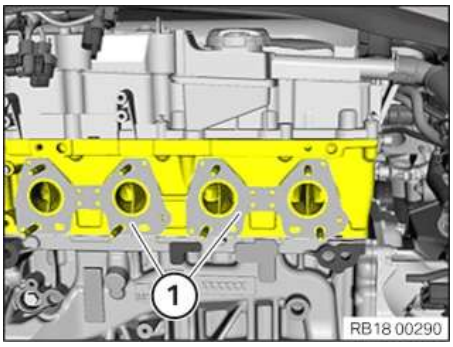
- Check the stud bolts (arrows) on the cylinder head for **correct** fit.
- Clean the connection points (1) with the special tool 0 495 102 (11 4 470).
- Renew gaskets.

  Parts: Seals

cardiagn.com



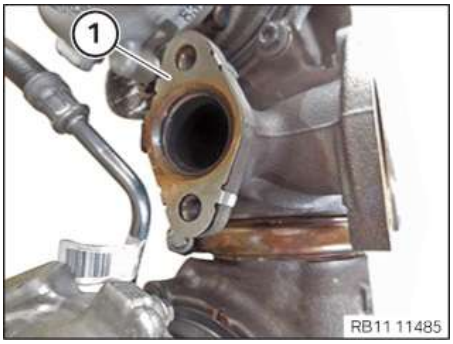
- Clean the connection points (1) on the exhaust manifold with the special tool 0 495 102 (11 4 470).



TECHNICAL INFORMATION

The **coated side** of the seal must be on the side of the exhaust manifold.

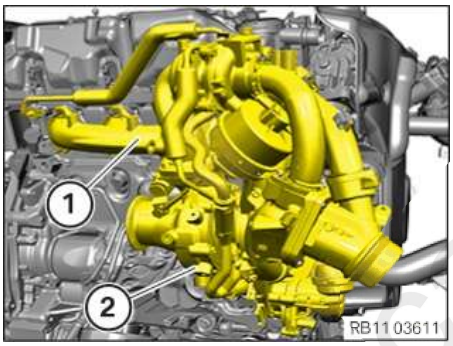
- Insert and install the gaskets (1).



- Renew the seal (1).

  Parts: Gasket

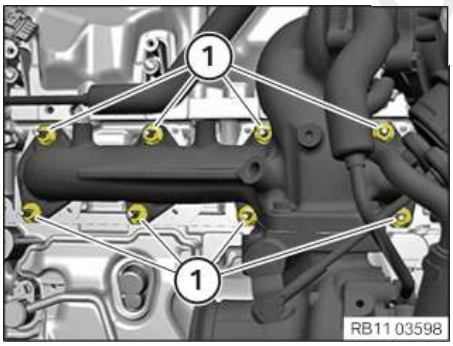
- Insert and install the seal (1).



TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

- Feed in the exhaust manifold (1) with the high-pressure stage exhaust turbocharger and the low-pressure stage turbocharger (2) from the top front and install.



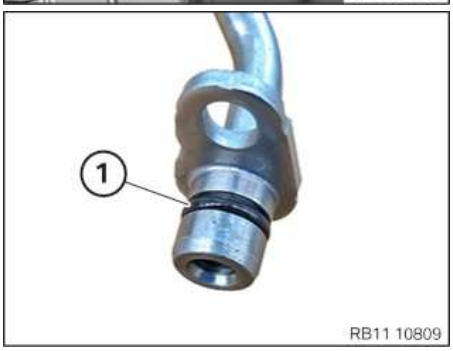
- Renew nuts (1).

  Parts: Nuts

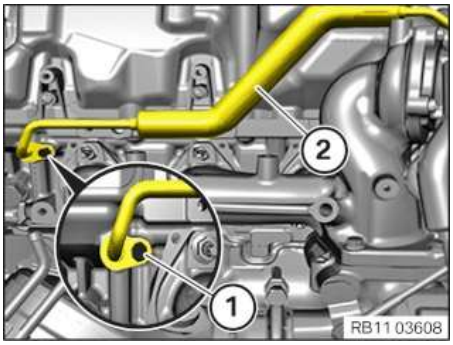
- Tighten the nuts (1) evenly from the inside out.

Exhaust manifold to cylinder head

M7	**If necessary, renew loose stud bolts.**	Tightening torque	11 Nm
	Renew nuts.	Tightening torque	13 Nm



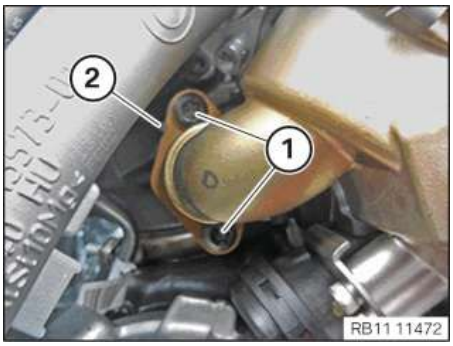
- Check the seal (1) for damage, if necessary, renew the oil feed line.



- Feed in and install the oil feed line (2) for the high-pressure stage exhaust turbocharger.
- Tighten down screw (1).

Oil feed line on cylinder head

M6x12		Tightening torque	8 Nm

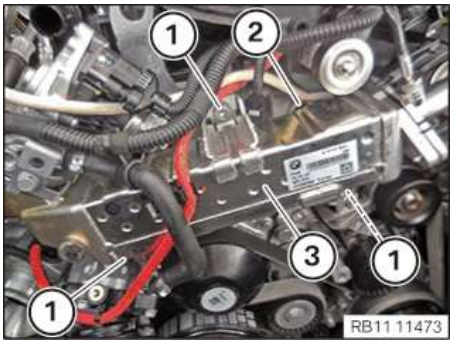


- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

M8x28	Replace screws	Tightening torque	32 Nm

- Ensure that seal (2) is installed.



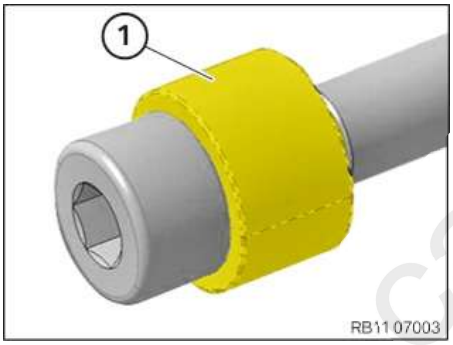
- Position the exhaust-gas recirculation cooler (3).
- Make sure the pipe neck (2) is fitted correctly.
- Tighten the screws (1).

Exhaust-gas recirculation cooler to cylinder head

M8x20 / M8x28		Tightening torque	19 Nm

Check

- Check whether the screws **with the** sleeves (1) (10 mm) are available.



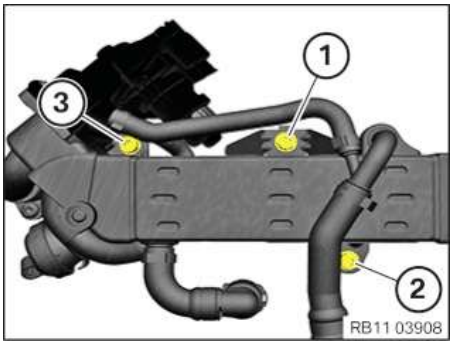
Result

» Screws **without** sleeves (1) are available.

Measure

- Renew screws.

  Parts: Screws (part number 9 886 429)

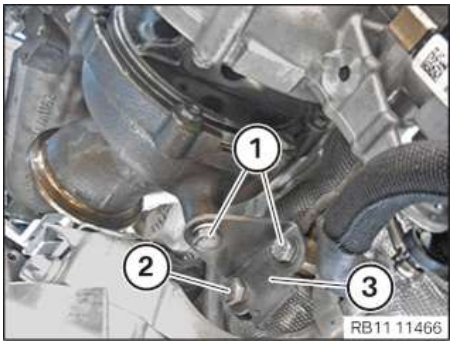


- Tighten the screws (1) to (3).

Exhaust-gas recirculation cooler to cylinder head

M8x20 / M8x28		Tightening torque	19 Nm

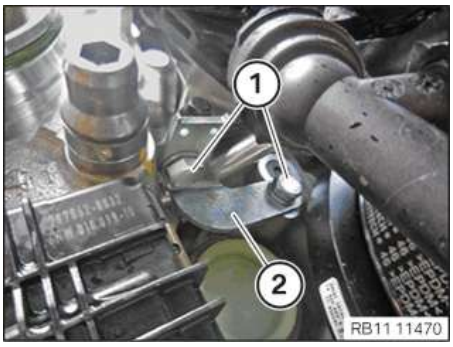
cardiagn.com



- Tighten the bolts (1) and (2) on the bracket (3).

Exhaust turbocharger low-pressure stage to crankcase

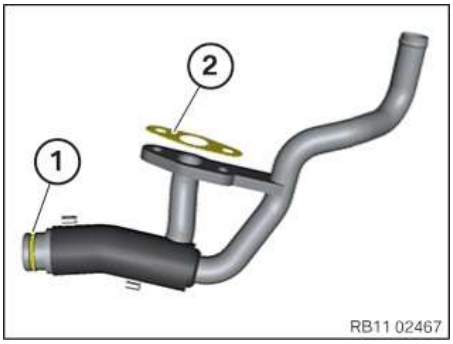
M8X16		Tightening torque	22 Nm



- Insert and install the holder (2).
- Tighten the screws (1).

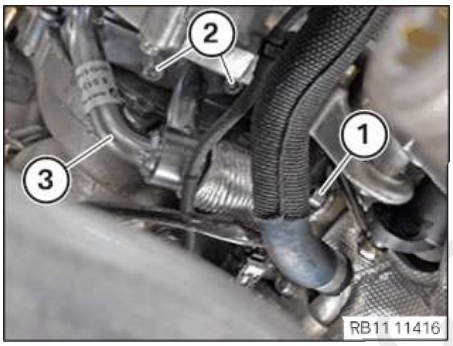
Exhaust turbocharger low-pressure stage to crankcase

M8X16		Tightening torque	22 Nm



- Renew the gasket (2).

  Parts: Gasket
- Check the O-ring (1) for damage and renew the oil return line as needed.



- Install oil return line (3) into crankcase.
- Position oil return line (3) with the seal on the low-pressure stage exhaust turbocharger.
- Tighten the screws (2).

Oil return line to turbocharger

M6x12	Renew gasket.	Tightening torque	8 Nm

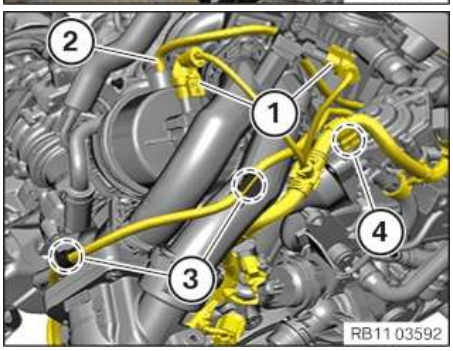
- Install the bolt (1).



- Tighten the screws of the oil return line on the crankcase from the right wheel arch.

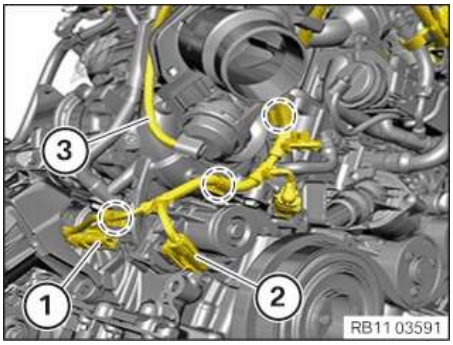
Oil return line to crankcase

M6x12	Check gasket. Renew the seal or line if necessary.	Tightening torque	8 Nm



- Secure the vehicle wiring harness in area (4) to the exhaust-gas recirculation cooler.
- Secure the vacuum hose in the marked areas (3) to the exhaust turbochargers.
- Connect vacuum hose (2).
- Connect all connectors (1) and lock audibly.

carmanualsgn.com



- Connect vacuum hose (3).
- Secure the wiring harness in the marked areas to the exhaust turbochargers.
- Plug in the connector (2) and lock audibly.
- Secure the connector in area (1) to the holder.

98 – Installing the exhaust-gas recirculation cooler

▸ **Avoiding damage to the starter generator due to escaping coolant**

RISK OF DAMAGE

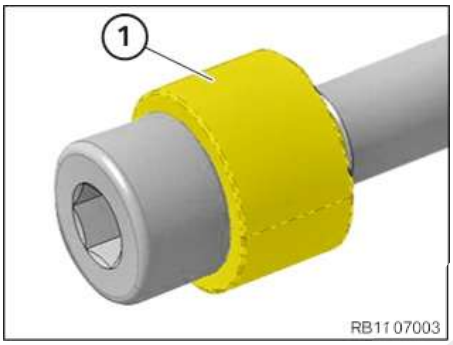
Escaping coolant on the starter generator.

Damage and operating failure of the starter generator.

- Cover the starter generator with suitable, watertight auxiliary materials.
- Close off line connections with seal plugs.
- If necessary: Flush the leaked coolant from the starter generator with at least 1 l water.

▸ **Installing the exhaust-gas recirculation cooler**

Check



- Check whether the screws **with 10mm** sleeves (1) are available.

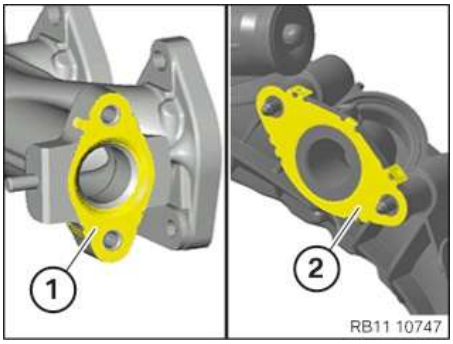
Result

» Screws **without** sleeves (1) are available.

Measure

- Renew screws.

  Parts: Screws (part number 9 886 429)

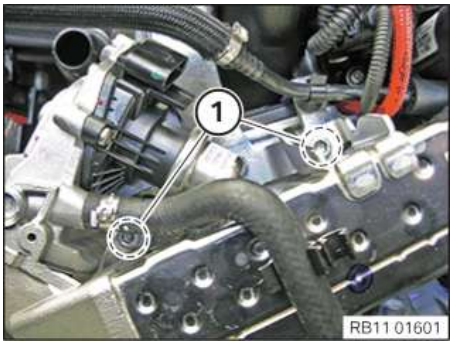


- Renew the seal (1) between the exhaust manifold and the exhaust-gas recirculation cooler.

  Parts: Gasket
- Renew the seal (2) between exhaust-gas recirculation cooler and intake air plenum.

  Parts: Gasket

cardiagn.com



TECHNICAL INFORMATION

When assembling, it is essential to observe screwing sequences and tightening torques. Non-observance of these requirements may result in leaks and damage.

- Tighten the screws (1) and subsequently release them again.

Exhaust-gas recirculation cooler to cylinder head

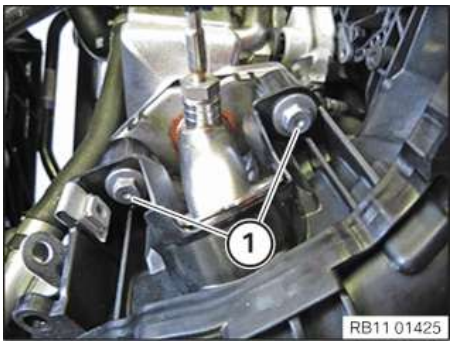
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screw (1) under the exhaust-gas recirculation cooler and then release again.

Exhaust-gas recirculation cooler to cylinder head

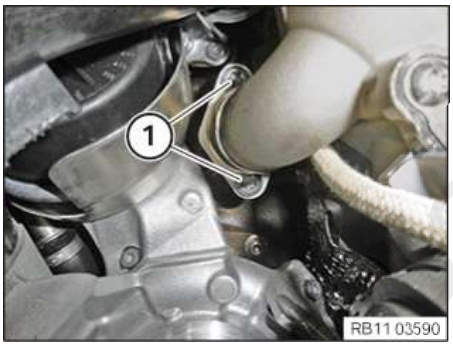
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

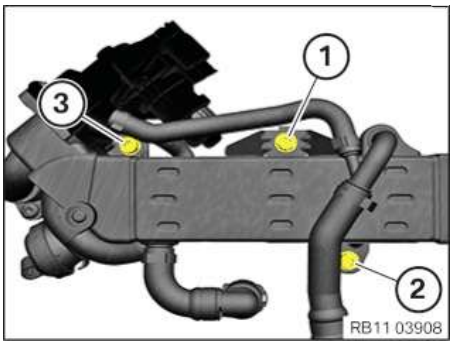
		Tightening torque	10 Nm



- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

M8x28	Replace screws	Tightening torque	32 Nm

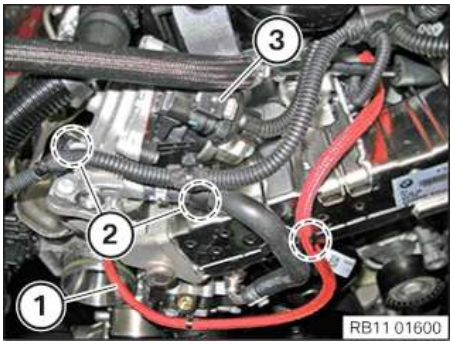


- Tighten screws in the order (1) to (3).

Exhaust-gas recirculation cooler to cylinder head

M8x20 / M8x28		Tightening torque	19 Nm

carofign.com



- Connect the connector (3) to the exhaust-gas recirculation valve.
- Attach the vehicle wiring harness to the clips (2) at the exhaust-gas recirculation valve and at the coolant line.
- Connect the vacuum line (1) to the exhaust-gas recirculation cooler and attach in the highlighted area.

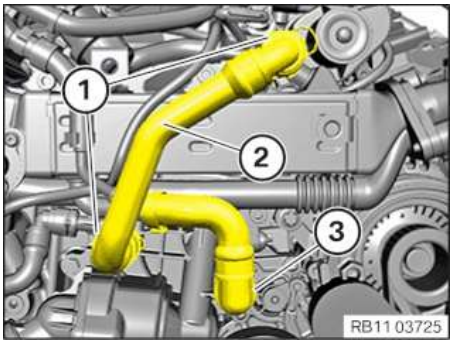


TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.

- **Version A:**

  Connect and audibly lock coolant lines (1).



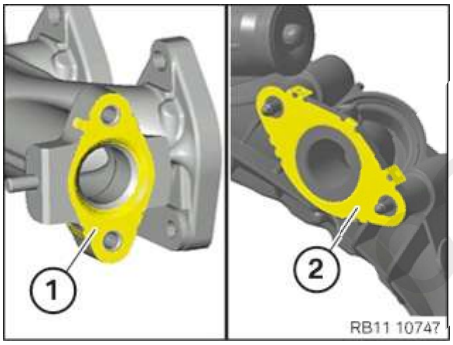
TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.

- **Version B:**

  Connect and audibly lock coolant lines (3).
- Install the coolant line (2).
- Audibly lock the locks (1).

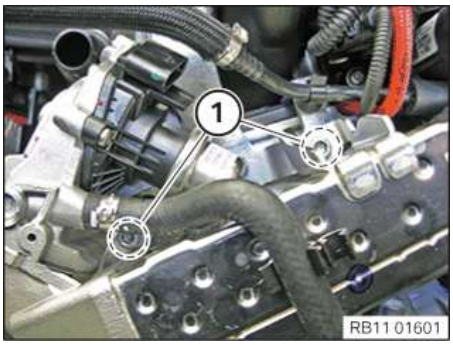
▸ **Installing the exhaust-gas recirculation cooler**



- Renew the seal (1) between the exhaust manifold and the exhaust-gas recirculation cooler.

  Parts: Gasket
- Renew the seal (2) between exhaust-gas recirculation cooler and intake air plenum.

  Parts: Gasket



TECHNICAL INFORMATION

When assembling, it is essential to observe screwing sequences and tightening torques. Non-observance of these requirements may result in leaks and damage.

- Install the exhaust-gas recirculation cooler and fasten with screws (1).
- Tighten the screws (1) and subsequently release them again.

Exhaust-gas recirculation cooler to cylinder head

M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °

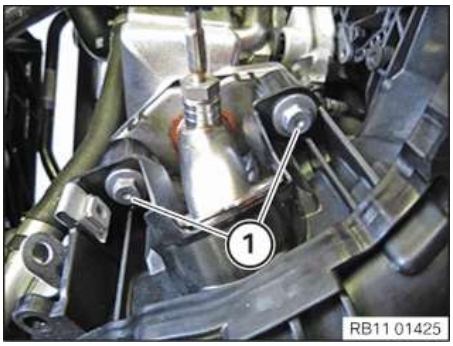
cardiagn.com



- Tighten the screw (1) under the exhaust-gas recirculation cooler and then release again.

Exhaust-gas recirculation cooler to cylinder head

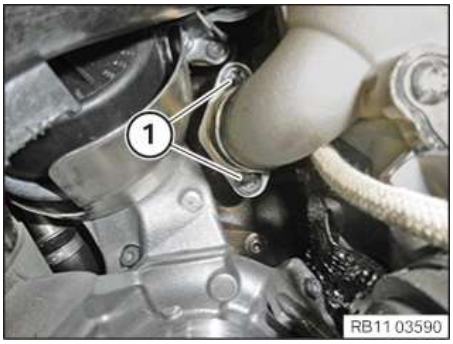
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

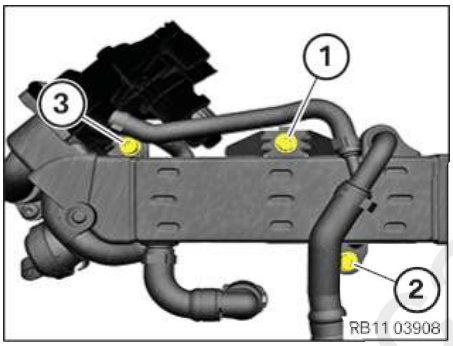
		Tightening torque	10 Nm



- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

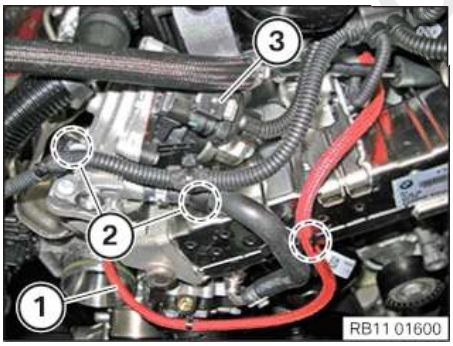
M8x28	Replace screws	Tightening torque	32 Nm



- Tighten screws in the order (1) to (3).

Exhaust-gas recirculation cooler to cylinder head

M8x20 / M8x28	Tightening torque	19 Nm



- Connect the connector (3) to the exhaust-gas recirculation valve.
- Attach the vehicle wiring harness to the clips (2) at the exhaust-gas recirculation valve and at the coolant line.
- Connect the vacuum line (1) to the exhaust-gas recirculation cooler and attach in the highlighted area.



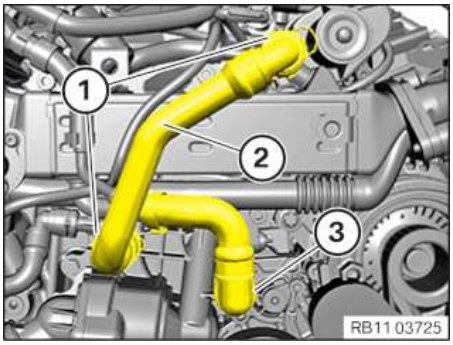
TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.

- **Version A:**

  Connect and audibly lock coolant lines (1).

cardiagn.com



TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.

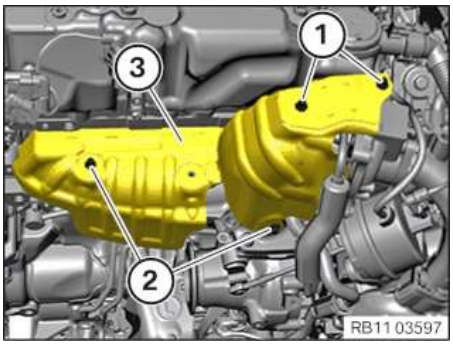
- **Version B:**

  Connect and audibly lock coolant lines (3).

  Install the coolant line (2).

  Audibly lock the locks (1).

99 – Installing heat shield



- Feed in and install the heat shield (3).
- Tighten down screws (1) and (2).

Heat shield to exhaust manifold

M6x12			10 Nm

100 – Installing the sensor bracket on the cylinder head cover

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

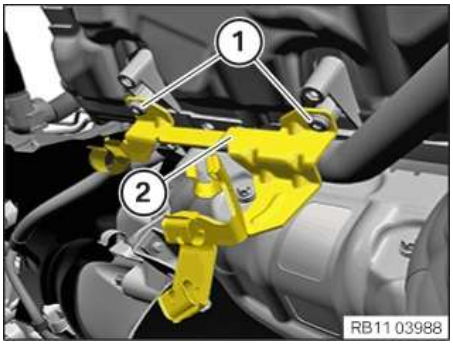
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

- Route all cables without abrasions, do not trap and crush.

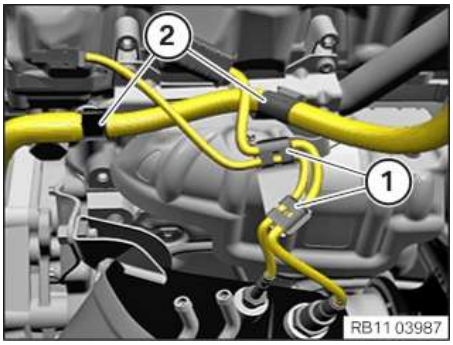


- Insert and install the holder (2).
- Tighten the screws (1).

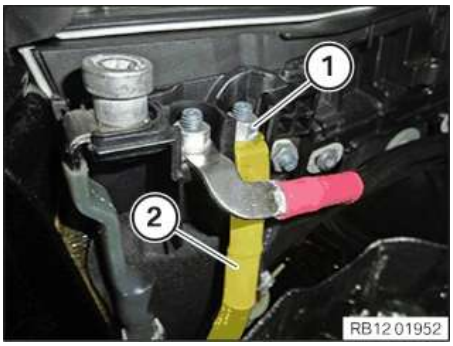
Bracket on cylinder head cover

	Tightening torque	5 Nm

cardiagn.com



- Secure the positive battery cable in the clamps (2).
- Mount the cable of the exhaust gas sensor system in the clamps (1).



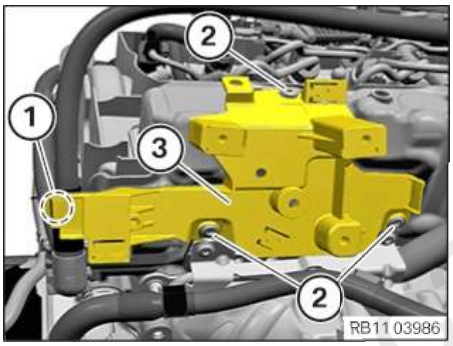
- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

Battery positive lead to battery positive terminal

M8		Tightening torque	19 Nm



- Insert and install the cover (2) in the direction of the arrow.
  The locks (1) must engage audibly.

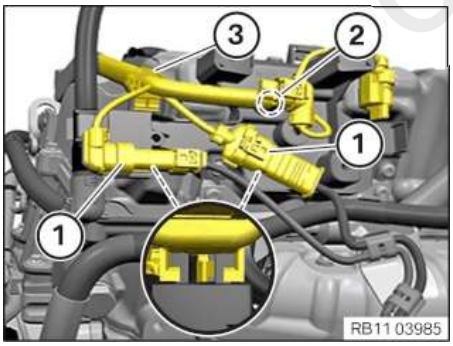


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

		Tightening torque	5 Nm

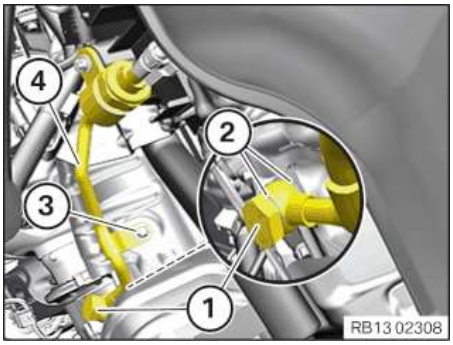
- Fasten the positive battery cable in the area (1) in the clamp.



- Feed in the wiring harness section and fasten it with the clamp (3).
- Fasten the cable clip in the area (2) in the sensor bracket.
- Feed in the connector (1) into the sensor bracket and lock it audibly.
- Plug in the connector (1) and lock audibly.

101 – Install the exhaust gas pressure pipe

cardiagn.com



- Insert and install the exhaust gas pressure pipe (4).
- Replace the sealing rings (2).

  Parts: Sealing ring
- Apply the banjo bolt (1) hand-tight.
- Tighten down screw (3).

Heat shield to exhaust manifold

M6x12		Tightening torque	10 Nm

- Tighten the banjo bolt (1).

Banjo bolt for exhaust pressure pipe to exhaust manifold

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm



- Tighten down screw (2).

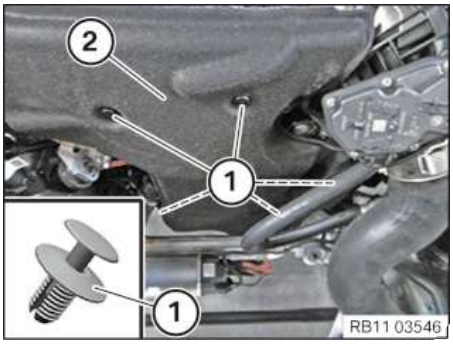
Exhaust gas pressure pipe to sensor system holder

TS6x20		Tightening torque	5,7 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

102 – Install acoustic cover for the engine, front



- Feed the acoustic cover (2) in and install.
- Secure the acoustic cover (2) with the expanding rivets (1).

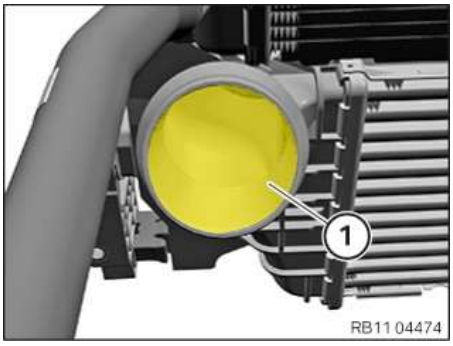
103 – Install pressure pipe between exhaust turbocharger and charge air cooler

RISK OF DAMAGE

Damage to the exhaust turbocharger.

A leak at the pressure pipe can damage the exhaust turbocharger.

- Replace the gaskets and pressure pipe if necessary.



RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

- Remove the auxiliary materials for sealing the opening (1) of the charge air cooler.

cardiagn.com



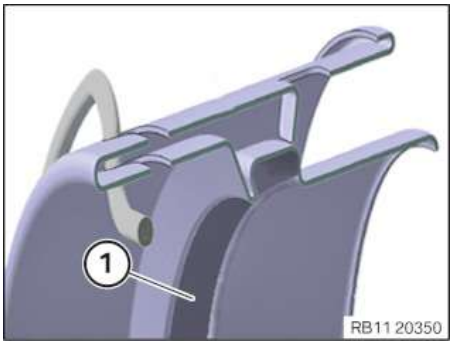
- Check the seal (1) for damage and renew if necessary.

  Parts: Gasket

▸ **Replacing damaged seal**

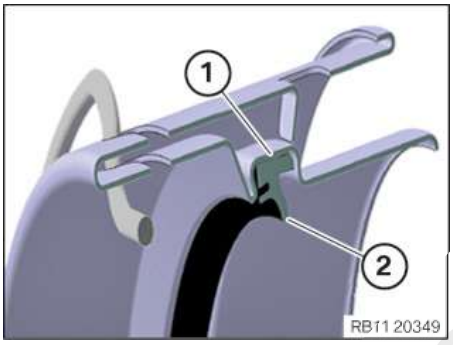
TECHNICAL INFORMATION

Do not use pointed or sharp-edged tools for the installation and/or removal.



- Remove damaged seal.
- Clean gasket groove (1) with a dry towel.

  The gasket groove (1) must be clean.



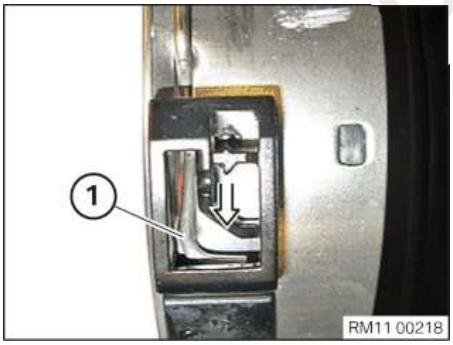
- Renew gasket.

  Parts: Gasket
- Install seal dry without lubricant or mounting agent.

TECHNICAL INFORMATION

Incorrect assembly is possible. Ensure correct installation position.

- Feed in and install the seal.
- Make sure the seal is correctly installed in the gasket groove (1).
- Make sure that the sealing lip (2) is directed inwards as shown.



- **Version A:**

  Lock the lock (1).

  The lock (1) on the pressure pipe must engage audibly.



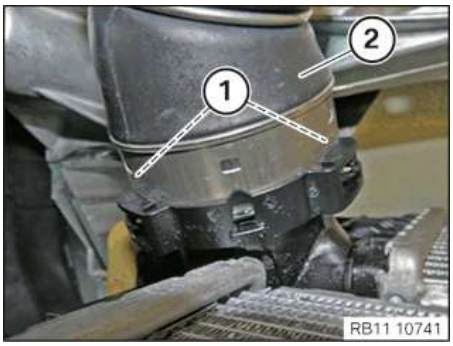
- Pay attention to the installation position:

  The pressure pipe fits on charge air cooler in one installation position only.

carmagn.com



- Install the pressure pipe (1) from the top.



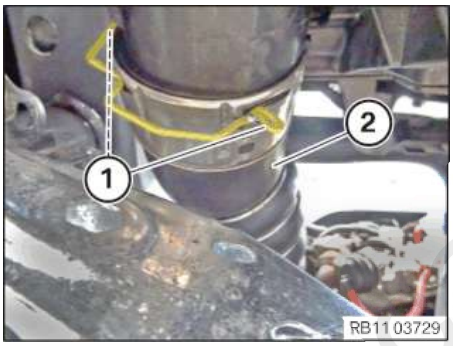
- Connect pressure pipe (2) to charge air cooler.
- Lock the lock (1) on both sides.



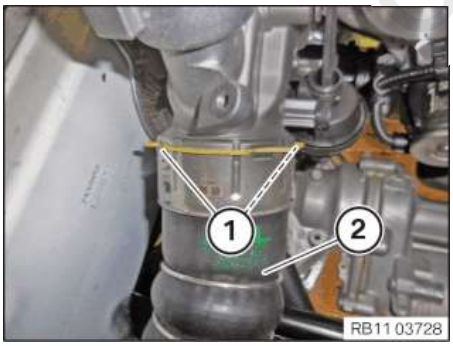
- **Version B:**

  Lock the lock (1).

  The lock (1) on the pressure pipe must engage audibly.



- Attach the pressure pipe (2) to the charge air cooler until the lock (1) engages on both sides.



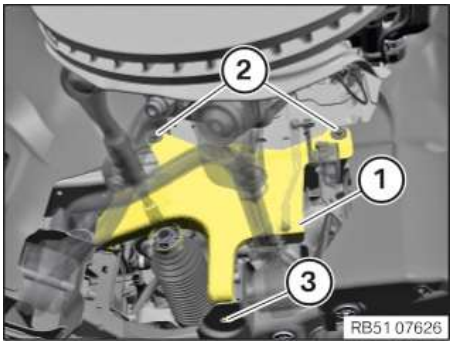
- Place the pressure pipe (2) onto the compressor bypass and ensure that the lock (1) engages audibly.

104 – Install the cover of the steering assembly

TECHNICAL INFORMATION

When tightening the screws, the cover can twist and cause chafe marks on the anti-roll bar (risk of corrosion).
Hold the cover while tightening the screws. Then check the position of the cover.

cardiagn.com



- Position the cover (1).
- Tighten down screws (2) and (3).

Cover, steering unit

Screw		Tightening torque	3 Nm

105 – Installing the front right wheel

▸ **Mounting the wheel**



TECHNICAL INFORMATION

The contact surface between the brake disc and the wheel rim must be clean and free from oil and grease. There is otherwise a risk of the wheel becoming loose at a later time.

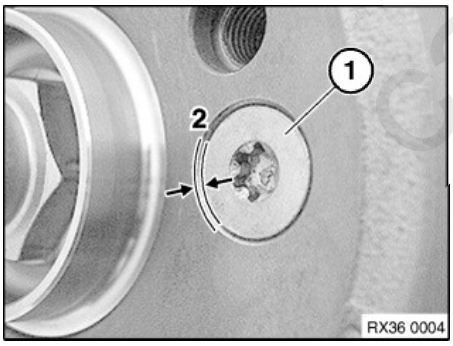
- Remove dirt, grease residues and corrosion from the contact surface with a drill and the special tool 2 344 011.

  Do not operate special tool 2 344 011 with an impact screwdriver.
- Degrease the contact surfaces with the universal cleaner (see BMW Group Parts).
- In the event of grease residue in the area of the wheel bolt holes, remove and clean the brake disc.



- Remove dirt, grease residues and corrosion from the contact surface with a drill and the special tool 2 344 011.

  Do not operate special tool 2 344 011 with an impact screwdriver.
- Degrease the contact surfaces with the universal cleaner (see BMW Group Parts).



- Check that the mounting bolt (1) for the brake disc is securely seated.

  The mounting bolt (1) for the brake disc **may not** protrude on the contact surface (2) between the brake disc and the wheel rim.

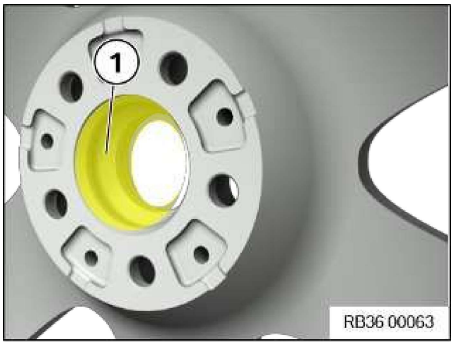
Brake disc to front wheel hub

M8	Renew screw.	Tightening torque	16 Nm

Brake disc to rear wheel hub

M8	Renew screw.	Tightening torque	16 Nm

cardiagn.com



TECHNICAL INFORMATION

Wheel hubs and wheel centering on the models G80, G82 and G83 **must not** be greased.

- Thinly grease the wheel centring (1) in the wheel rim.

Expendable materials

Brake block paste * TU = Trade Unit. TU numbers cannot be ordered! For invoicing purposes only.	3 g, Bag	83192158851
	100 g, Tube	83192158852
	5 g, TU*	83230140233



TECHNICAL INFORMATION

Wheel hubs and wheel centering on the models G80, G82 and G83 **must not** be greased.

- Apply a thin layer of grease to the front and rear wheel hubs (1) to protect against corrosion.

Expendable materials

Brake block paste * TU = Trade Unit. TU numbers cannot be ordered! For invoicing purposes only.	3 g, Bag	83192158851
	100 g, Tube	83192158852
	5 g, TU*	83230140233



TECHNICAL INFORMATION

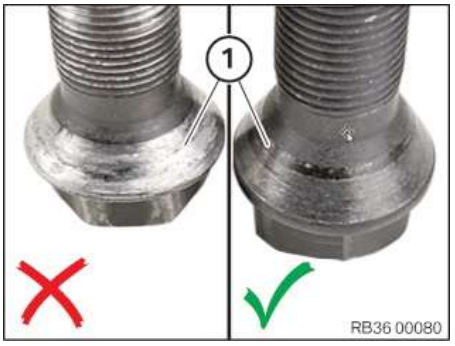
A wheel lift is recommended for easier wheel removal and installation without exertion (see Retailer Equipment Catalogue).

- **In vehicles with M Carbon ceramic brake: The wheel lift must be used to install the wheel.**

  This process is intended to prevent damage to the brake disc.

Check

- **Check wheel bolts for wear.**



cardiagn.com

Result

» Places (> 30%) of the bearing surfaces (1) of the taper on the screw head show a silver wear.

Measure

- Replace wheel bolts.

  Parts: Wheel bolts



TECHNICAL INFORMATION

Never use impact screwdrivers or electric screwdrivers to screw in and tighten the wheel bolts.

The wheel rim must rest uniformly against the brake disc.

In the case of non-original BMW wheel bolts/wheel rims, it may be necessary to retighten the wheel bolts on account of setting properties (refer to the documentation from the manufacturer).

Do not apply oil to new wheel bolts.

- Renew the corroded wheel bolts (arrows).

  Parts: Wheel bolts
- Clean the wheel bolts (arrows).
- Check the wheel bolts (arrows) and threads for damage, renew the wheel bolts (arrows) if necessary.
- Join and tighten the wheel bolts (arrows).

Wheel bolts

M14 / SW17	Screw in wheel bolts and evenly tighten crosswise by hand in order to centre the wheel rim.	Tightening torque	140 Nm
	Tighten wheel bolts to the prescribed tightening torque with a calibrated torque wrench in a crosswise sequence.	Check	140 Nm
	Check all the wheel bolts in the same order or retighten to the prescribed tightening torque again.		

106 – Prepare for the installation of the diesel particulate filter



- Renew the V-clip (1).

  Parts: V-band clamp



- Renew gasket (1).

  Parts: Gasket

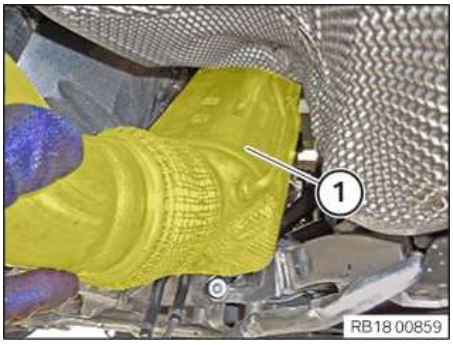
107 – Installing the diesel particulate filter

CAUTION

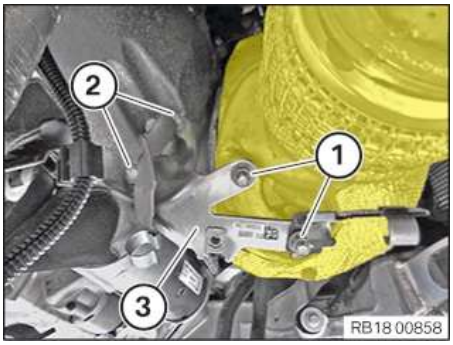
Heavy component.

Heavy components can lead to injury or damage.

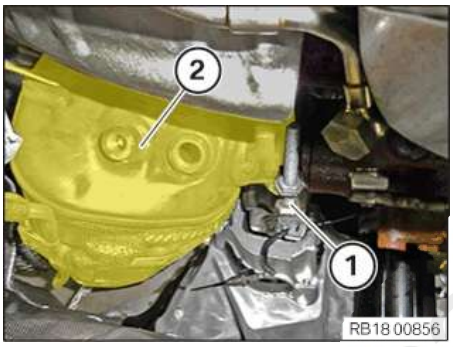
- Remove and install heavy components with the aid of another person/other persons.



- Insert and install the diesel particulate filter (1).



- Insert and install the holder (3).
- **Hand-tighten** the bolts (2).
- Apply the nuts (1) **hand-tight**.

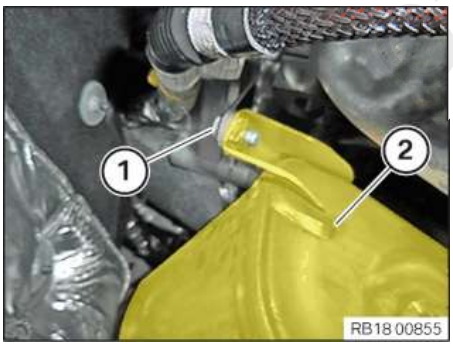


- Renew the V-clip (1).

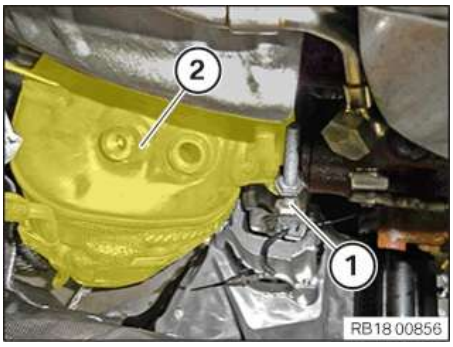
  Parts: V-band clamp
- Feed in and install V-band clamp (1).

Note: Make sure that the seal between the diesel particulate filter and the exhaust turbocharger is installed correctly.

- Position the diesel particulate filter (2) on the exhaust turbocharger .
- Position V-clip (1).
- Apply the V-clip (1) **hand-tight**.



- Feed in screw (1) on the holder of the diesel particulate filter (2) and tighten **hand-tight**.

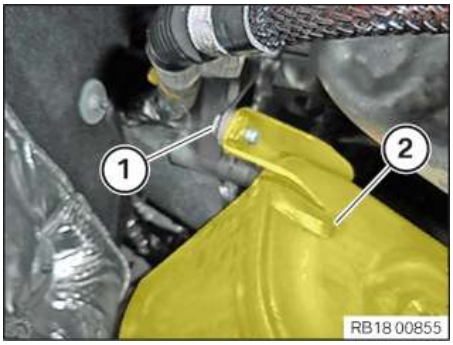


- Tighten the V-clip (1) of the diesel particulate filter (2).

Diesel particulate filter V-clip to exhaust turbocharger

V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

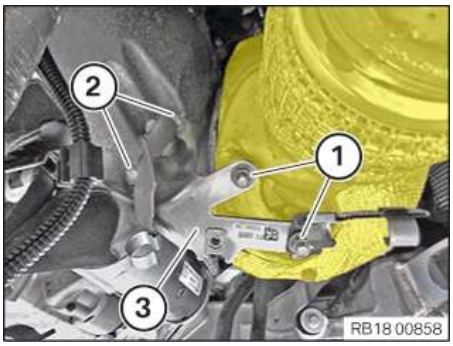
carmanualsonline.com



- Tighten the bolt (1) on the bracket of the diesel particulate filter (2).

Bracket to diesel particulate filter top

M8		Tightening torque	19 Nm



- Tighten the screws (2) on the holder (3).

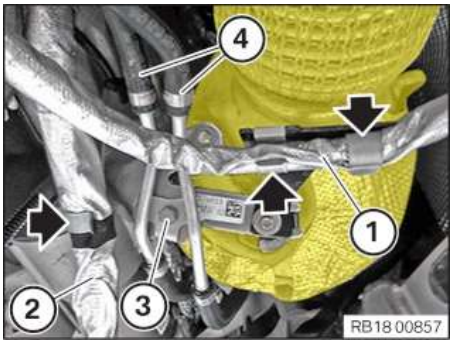
Bracket to transmission for diesel particulate filter holder bottom

M8X20		Tightening torque	19 Nm

- Tighten the nuts (1) on the holder (3).

Lower holder to diesel particulate filter

M8		Tightening torque	19 Nm



- Thread in and install coolant line (4).
- Tighten down screw (3).

Coolant lines for SCR metering module

M6X16		Tightening torque	8 Nm

- Secure the positive battery cable (2) of the starter motor at the clamp (arrow).
- Fasten the metering line (1) on the clamps (arrows).

108 – Installing the nitrogen oxide sensor upstream of SCR catalytic converter

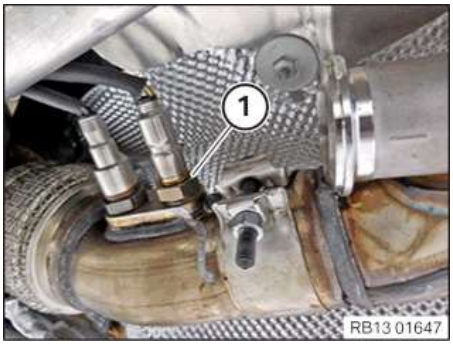
RISK OF DAMAGE



Damage to the nitrogen oxide sensor.

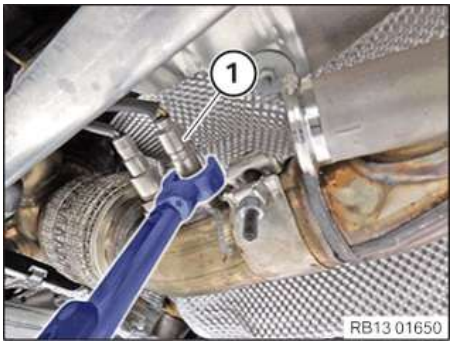
Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



- Feed in and install the nitrogen oxide sensor (1).

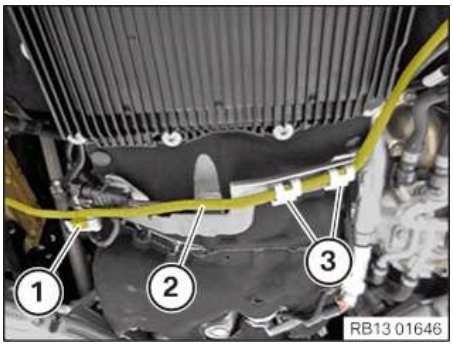
cardiagn.com



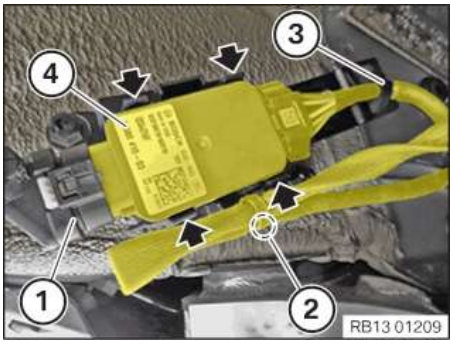
- Tighten the nitrogen oxide sensor (1) using commercially available tools.

Nitrogen oxide sensor before SCR catalytic converter

Sensor		Tightening torque	50 Nm



- Secure the cables (2) to the clamps (3).
- Secure clamps (1).



- Clip in the control unit (4) (arrows).
- Fasten the cable in the holder (3).
- Secure the cable holder (2).
- Plug in the connector (1) and lock audibly.

109 – Installing the monitoring oxygen sensor after the diesel particulate filter

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

TECHNICAL INFORMATION

New oxygen sensors are to be greased lightly and evenly on the thread.

For oxygen sensors that are reused, the following should be observed:

Lightly and evenly grease the oxygen sensor only on the thread. Do not clean and grease that part of the oxygen sensor which protrudes in the exhaust branch (sensor ceramics).

For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue

cardiagn.com



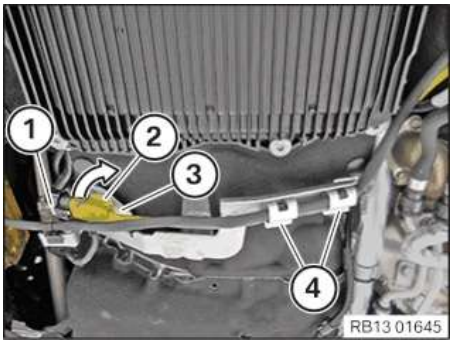
- Insert the monitoring oxygen sensor (1) and install it.



- Tighten the monitoring oxygen sensor (1) with standard tools.

Monitoring oxygen sensor

Sensor		Tightening torque	50 Nm



- Fasten the monitoring oxygen sensor to the clamps (4).
- Secure the connector (2) on the holder (3) in direction of arrow.
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

110 – Installing the exhaust system

CAUTION

Component with heavy weight.

Danger of injury!

- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

Heavy component.

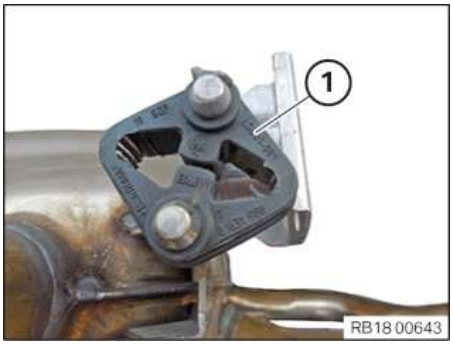
Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

TECHNICAL INFORMATION

Mount the exhaust system in voltage-free state, maintaining the tightening sequence from the rear silencer towards the exhaust manifold.

cardiagn.com

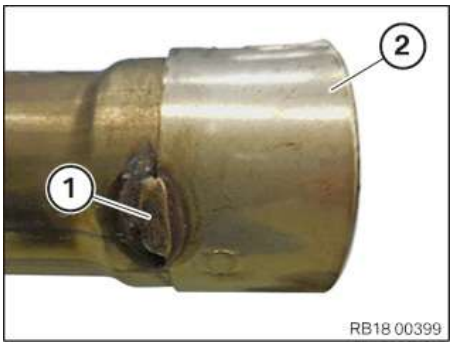


NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

- Check all the rubber mounts (1) of the exhaust system for damage.
- Replaced damaged rubber mounts.

  Parts: Rubber mount



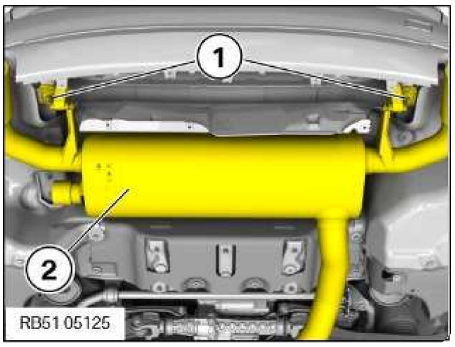
CAUTION

Swarf resulting from sawing or grinding components.

Danger of injury!

- Conduct all work in appropriate personal protective equipment only.
- Wear safety goggles and protective gloves.

- Open the weld seam (1) with a conventional tool.
- Remove the clamp (2).

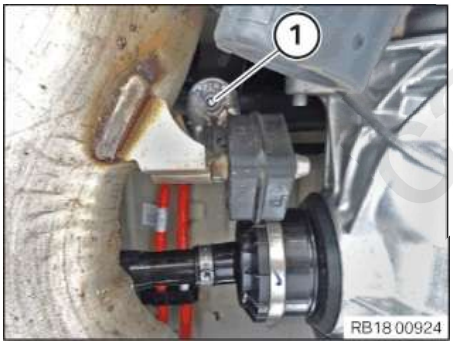


- Insert and install the exhaust system (2).
- Renew nuts (1).

  Parts: Nuts
- Tighten nuts (1).

Rear silencer to body / bumper support

M8	Replace nuts.	Tightening torque	19 Nm

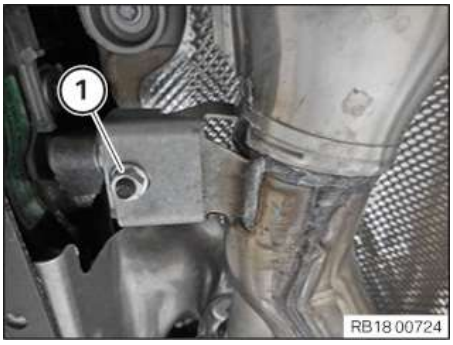


- Renew nut (1) on the rear axle support.

  Parts: Nut
- Tighten nut (1).

Exhaust system to rear axle carrier

M8 nut		Tightening torque	19 Nm

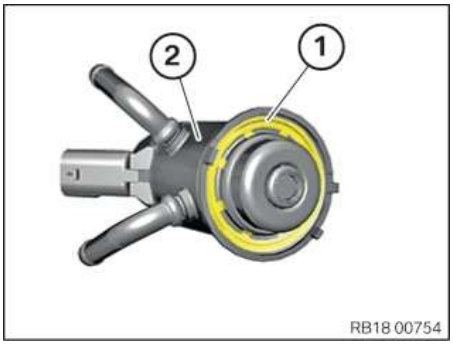


- Tighten nut (1).

Exhaust system to transmission

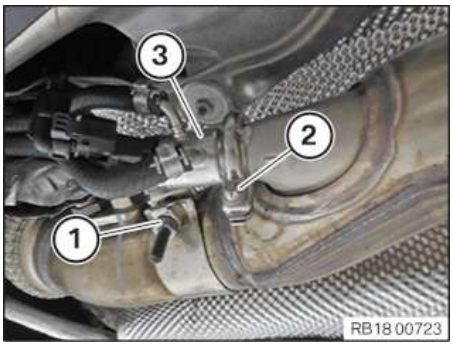
M8		Tightening torque	19 Nm

cardiagn.com



- Renew sealing ring (1) of the SCR metering module (2).

  Parts: Sealing ring



- If necessary, renew clamp (1).

  Parts: Clamp
- Tighten clamp (1).

Exhaust system to diesel particle filter

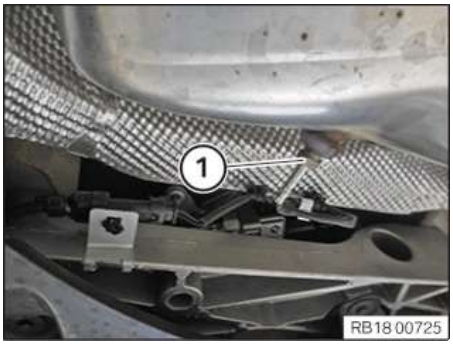
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

- Renew the V-clip (2).

  Parts: V-band clamp
- Install the SCR metering module (3) in the exhaust system.
- Tighten the V-clip (2) of the SCR metering module (3).

SCR metering module V-clip to exhaust system

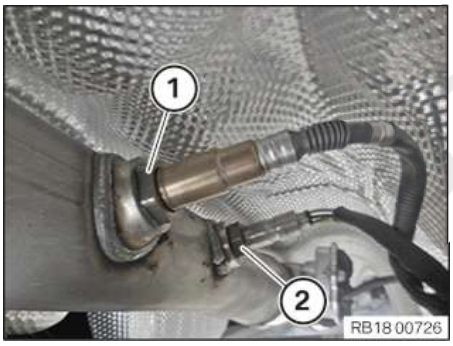
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm



- Install the exhaust temperature sensor (1) in the exhaust system and tighten.

Exhaust-gas temperature sensor upstream of SCR catalytic converter

Sensor		Tightening torque	30 Nm



- Install the diesel particulate sensor (1) in the exhaust system and tighten.

Diesel particulate sensor to exhaust system

Sensor		Tightening torque	50 Nm

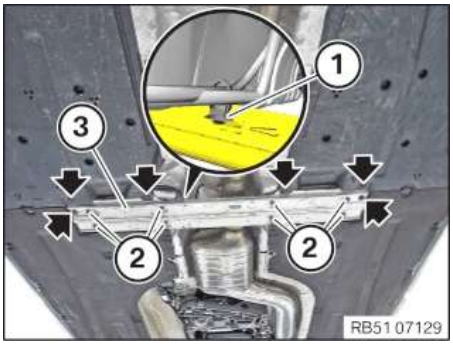
- Install the nitrogen oxide sensor (2) in the exhaust system and tighten.

Nitrogen oxide sensor downstream of SCR catalytic converter

Sensor		Tightening torque	55 Nm

111 – Install the connecting supports on the tunnel

cardiagn.com



- Guide in and install connecting support (3) on the tunnel.
- Tighten the screws (2).
- Tighten screws (arrows).

Connecting support to tunnel

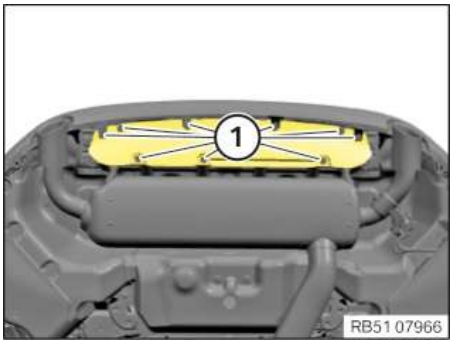
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Secure the clamp (1).

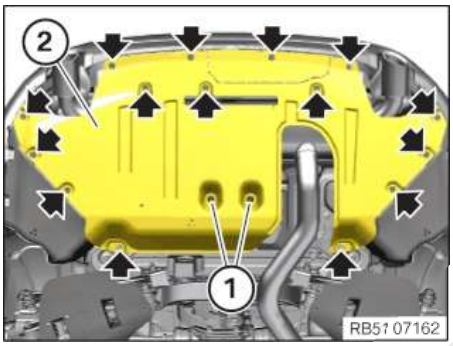
112 – Installing the rear diffuser



- **Version 1:**
- Install the diffuser and tighten the nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm



- **Version 2:**
- Feed in and position the diffuser (2)
- Tighten screws (arrows).

Diffuser / underbody panelling

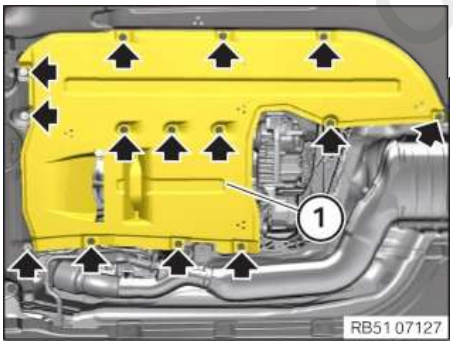
Nuts and screws		Tightening torque	3 Nm

- Tighten nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm

113 – Installing underbody protection at rear



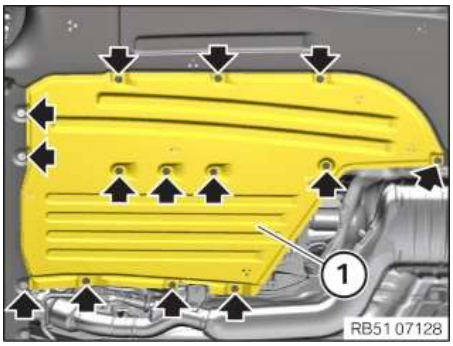
- **Version A:**

Insert and install the rear underbody protection (1).

Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version B:**

Insert and install the rear underbody protection (1).

Tighten screws (arrows).

Underbody protection

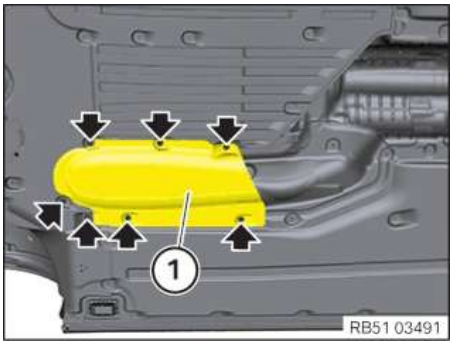
Hexagon screw		Tightening torque	3 Nm

cardiagn.com

114 – Install the underbody panelling of the transmission on the side

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

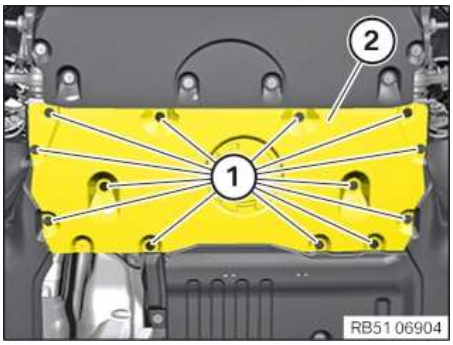


- Insert the underbody panelling (1).
- Tighten screws (arrows).

Underbody panelling

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

115 – Installing the centre underbody protection



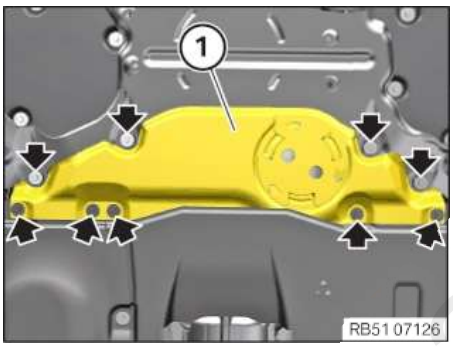
- **Variant with rear wheel drive:**

  Position central underbody protection (2).

  Tighten the screws (1).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version with all-wheel drive:**

  Guide in centre underbody protection (1) and install.

  Tighten screws (arrows).

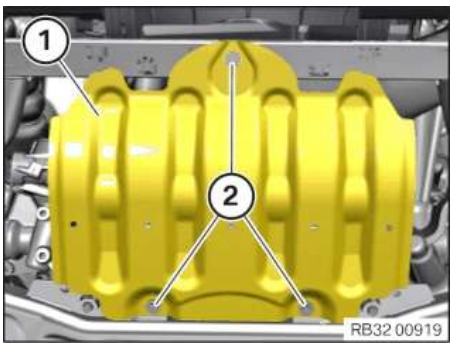
Underbody protection

Hexagon screw		Tightening torque	3 Nm

116 – If installed: Install underbody protection of the steering

Prerequisite

Front underbody protection has been removed.



- Position underbody protection (1).
- Tighten the screws (2).

Underbody protection, steering, to front axle support

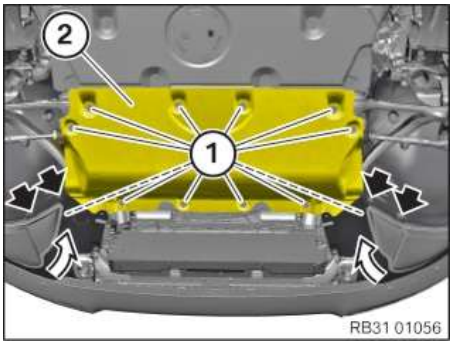
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

117 – Install the underbody protection of the steering gear

cardiagn.com



- **Version A:**

  Position the underbody protection (2) of the steering gear.

  Tighten the screws (1).

Underbody protection of the steering gear

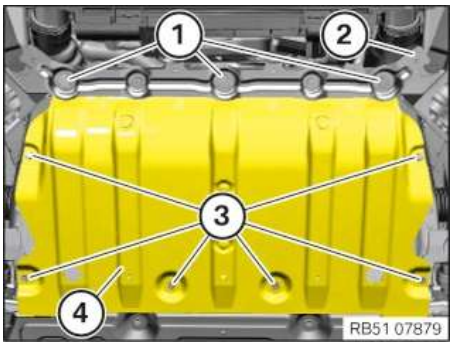
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the bottom wheel arch cover.

  Tighten the screws (arrows) of the lower wheel arch cover on the wheel arch cover.

Wheel arch trim panel, front

Thermoplastic hexagon screw		Tightening torque	2,6 Nm



- **Version B:**

  Feed in the underbody protection (4) of steering gear and install it.

  Tighten the screws (3).

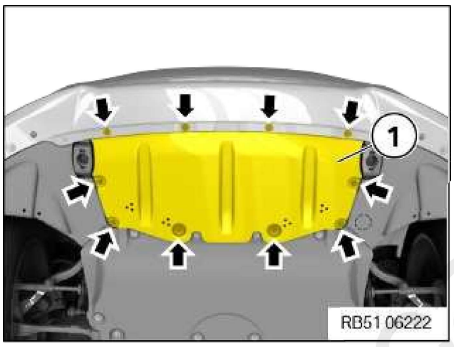
Underbody protection of the steering gear

Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the holder (2) for the underride protection.

  Tighten the screws (1).

118 – Installing the front underbody protection



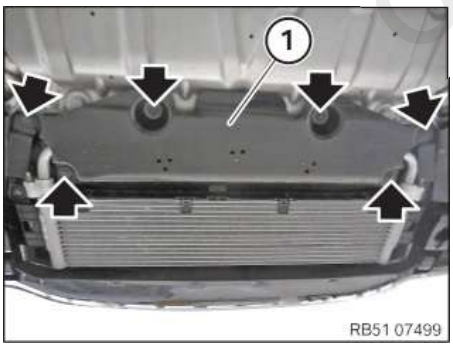
- **Version A:**

  Feed in the front underbody protection (1) towards the front under the bumper panel and position.

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



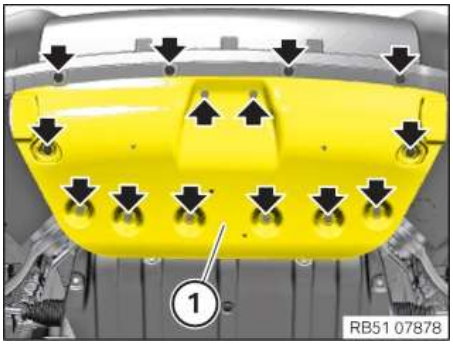
- **Version B:**

  Feed in and position the front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



- **Version C:**

  Feed in and install front underbody protection (1).

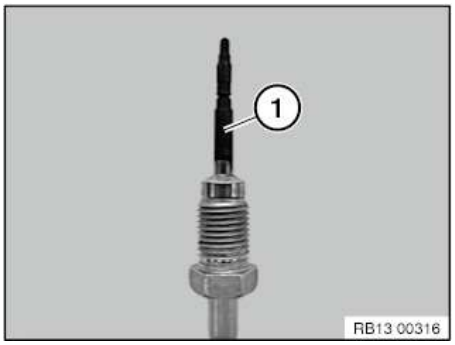
  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

carriagn.com

119 – Installing the exhaust temperature sensor for the exhaust system downstream the catalytic converter on the diesel particulate filter



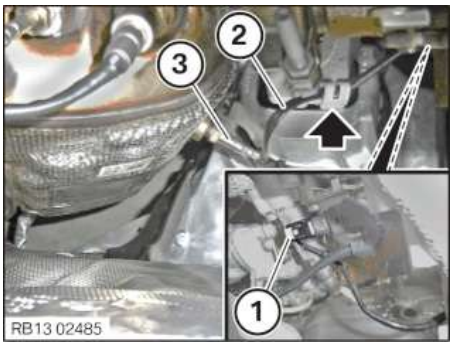
RISK OF DAMAGE

Damage of exhaust temperature sensor.

Damage to exhaust temperature sensors leads to malfunctions.

- Make sure that the gauge tip is not damaged.

- Check the gauge tip (1) for damage.



- Feed in and install the exhaust temperature sensor (3).
- Tighten the exhaust temperature sensor (3).

Exhaust temperature sensor for the exhaust system after catalytic converter before diesel particulate filter

Sensor		Tightening torque	30 Nm

- Secure cable (2) to the clamp (arrow).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

120 – Installing the front oxygen sensor on the diesel particulate filter

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
- The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

TECHNICAL INFORMATION

New oxygen sensors are to be greased lightly and evenly on the thread.

For oxygen sensors that are reused, the following should be observed:

Lightly and evenly grease the oxygen sensor only on the thread. Do not clean and grease that part of the oxygen sensor which protrudes in the exhaust branch (sensor ceramics).

For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue

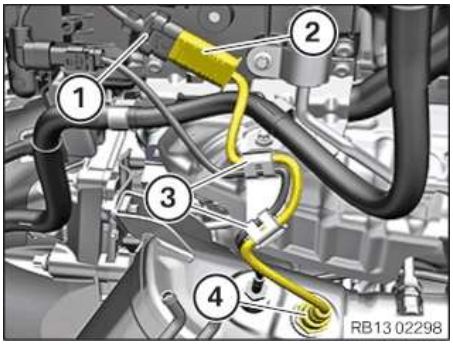


- Insert and install the front oxygen sensor (1).
- Tighten the front oxygen sensor (1) with standard tools.

Front oxygen sensor to top of diesel particulate filter

Sensor		Tightening torque	50 Nm

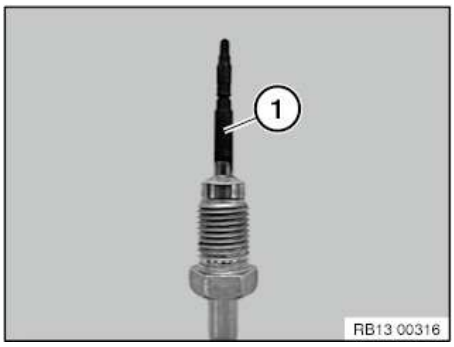
carDiagn.com



- Fasten the front oxygen sensor (4) to the clamps (3).
- Connect connectors (2) and lock.
- Connect connectors (1) and lock.

  The connectors (1) and (2) must audibly engage.

121 – Install the exhaust-gas temperature sensor on the diesel particulate filter



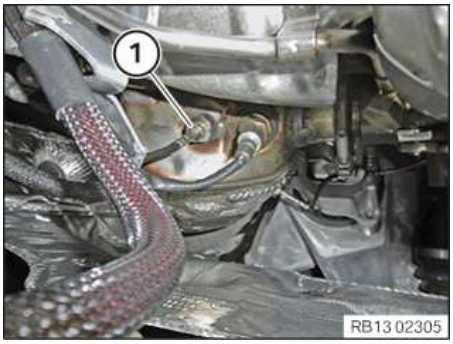
RISK OF DAMAGE

Damage of exhaust temperature sensor.

Damage to exhaust temperature sensors leads to malfunctions.

- Make sure that the gauge tip is not damaged.

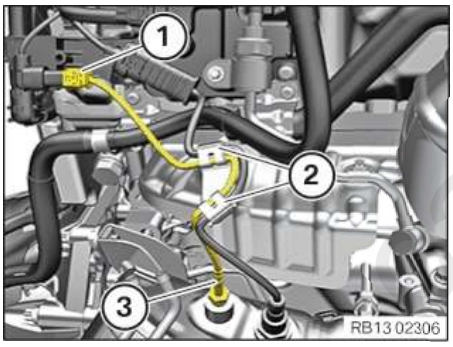
- Check gauge tip (1) for damage.



- Feed in and install the exhaust temperature sensor (1).
- Tighten the exhaust temperature sensor (1) with the special tool .

Exhaust-gas temperature sensor to diesel particulate filter

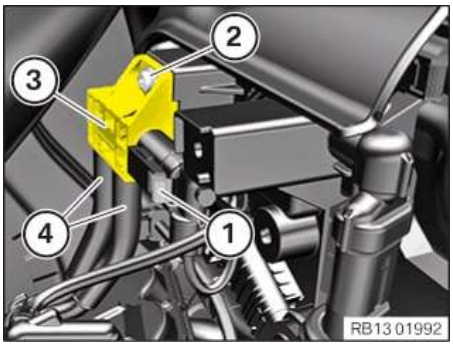
Sensor		Tightening torque	30 Nm



- Secure the exhaust temperature sensor (3) to the clamp (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

122 – Installing the differential pressure sensor for the diesel particulate filter



- Feed in and install the differential pressure sensor (3).
- Tighten down screw (2).

Differential pressure sensor of diesel particulate filter on cylinder head cover

TS5x20		Tightening torque	4 Nm

- Check the pressure hoses (4) for hardening and damage, renew if necessary.
- Connect the pressure hoses (4) and secure them using 15 mm to 19 mm screw clamps.

Clamp for the pressure hose on the differential pressure sensor

Clamp 15–19mm		Tightening torque	3 Nm

- Connect connectors (1) and lock.

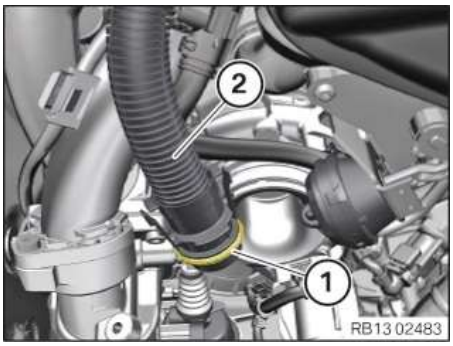
  The connector (1) must engage audibly.

123 – Installing the clean air pipe with resonator

carsign.com



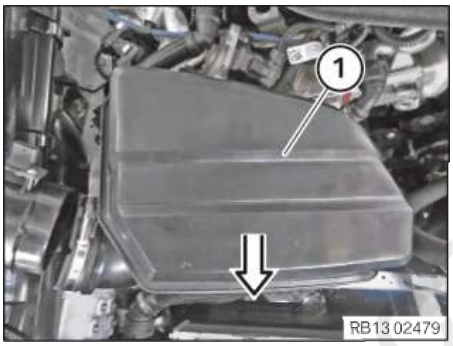
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



- Check the sealing ring (1) for the engine ventilation line (2) for damage and renew where required.



- Feed in and install clean air pipe with resonator (1) in the direction of the arrow.

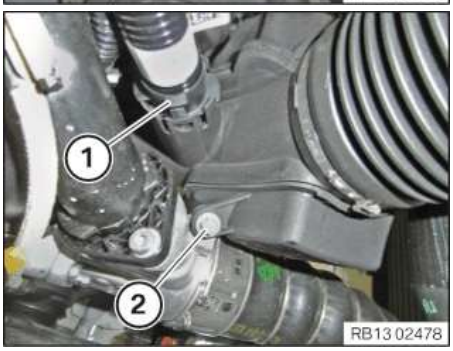


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

  The clamp (1) must engage audibly.

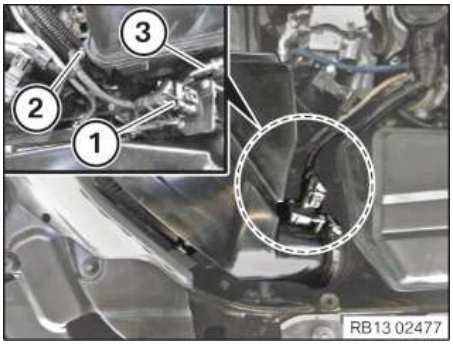


- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm

cardiagn.com



- Connect the clean air pipe with resonator to the intake filter housing.
- Tighten clamp (3).

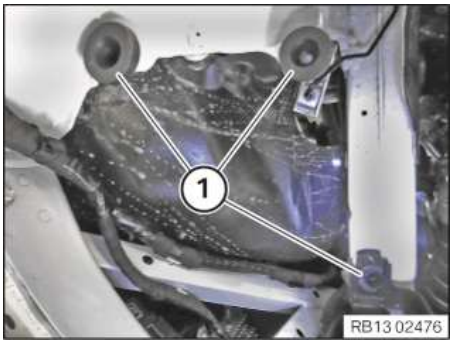
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

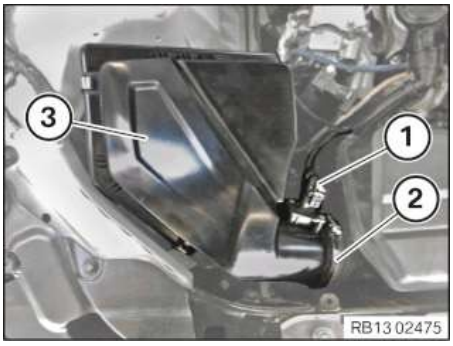
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

124 – Installing intake silencer housing



- Check the rubber mount (1) for correct fit.



- Feed the intake filter housing (3) in and engage it in the rubber mounts.
- Tighten clamp (2).

Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

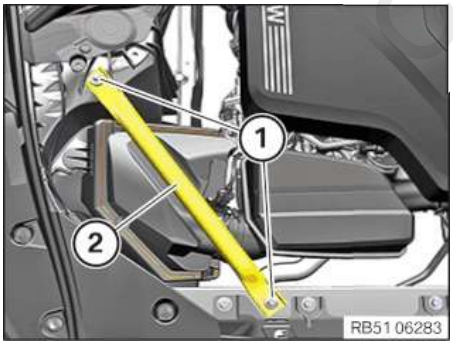
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

125 – Install the right front-end strut

TECHNICAL INFORMATION

Driving without the strut brace/front-end strut or tension strut is not permitted.



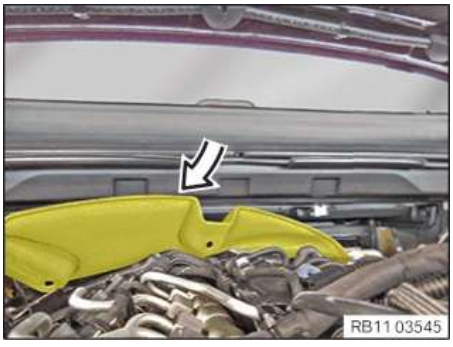
- Install the front-end strut (2).
- Renew screws (1).

  Parts: Screws
- Tighten the screws (1).

Front end strut

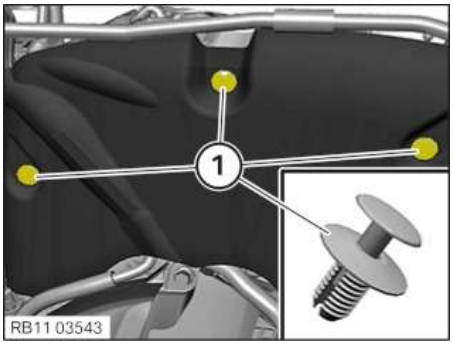
Screw		Tightening torque	56 Nm

126 – Installing acoustic cover at rear



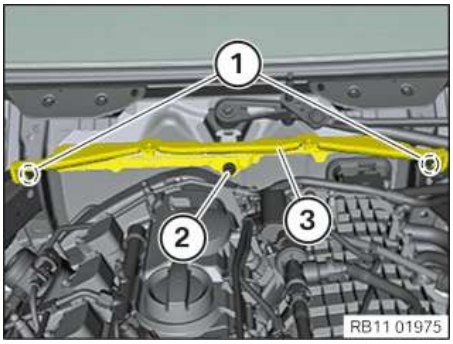
- Guide in the acoustic cover in the direction of the arrow and install it.

cardiagn.com



- Secure acoustic cover with the expanding rivets (1).

127 – Installing centre bulkhead lower section

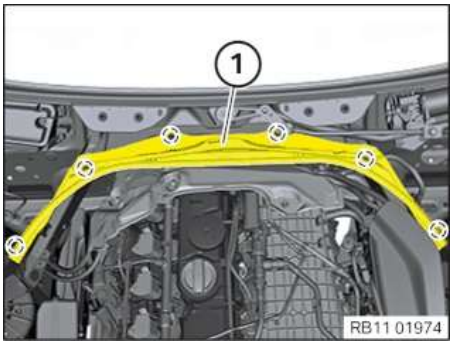


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

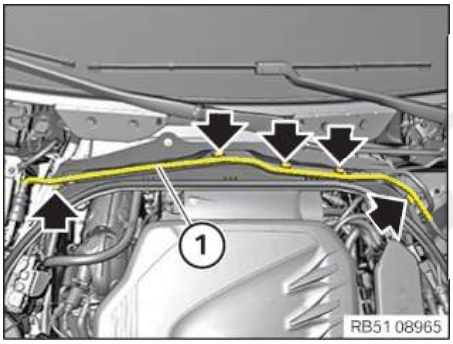
128 – Installing the centre bulkhead upper part



- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

Bulkhead upper part to bottom bulkhead

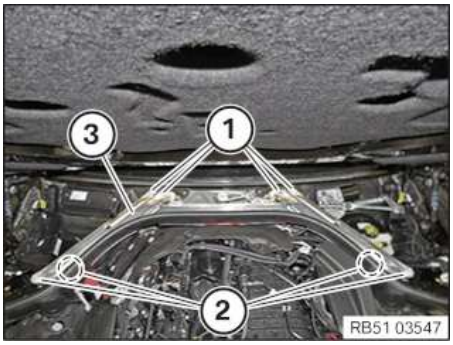
		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

  Clip in the wire (1) into the holders (arrows).

cardiagn.com



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Install the tension strut (3) on the spring strut dome.
- Tighten the screws (1).

Tension strut on bulkhead

M10x25 screw		Tightening torque	56 Nm

- Renew screws (2).

  Parts: Screws
- Tighten the screws (2).

Tension strut to spring strut dome

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

129 – Install the seal for the bonnet



- Press the rear bonnet seal (2) into the guide.
- Feed in cable (1) into the brackets.
- Check that the rear bonnet seal (2) and the cable (1) are seated correctly.

130 – Installing cowl panel cover

RISK OF DAMAGE

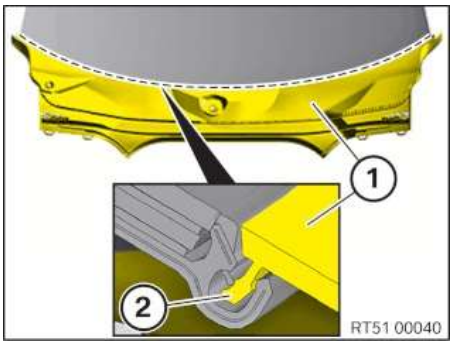
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

- Ensure correct installation of the components.
- Only use undamaged components.

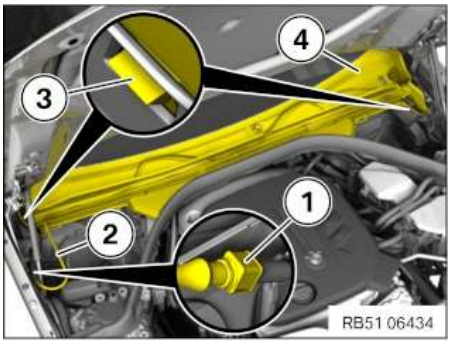
TECHNICAL INFORMATION

Before installing the cowl panel cover it is **mandatory** to check that the 48 V line is routed correctly and fitted tightly.
An incorrectly laid or attached 48 V line can be damaged by the wiper kinematics.



- Push the cowl panel cover (1) into the latch mechanism (2) beginning on the side.

cardiagn.com



- Clip cowl panel cover (4)in by means of the latch mechanisms (3).
- Position windscreen wash hose (2) and connect windscreen wash hose (1)quick lock.

131 – Install left and right wiper arm

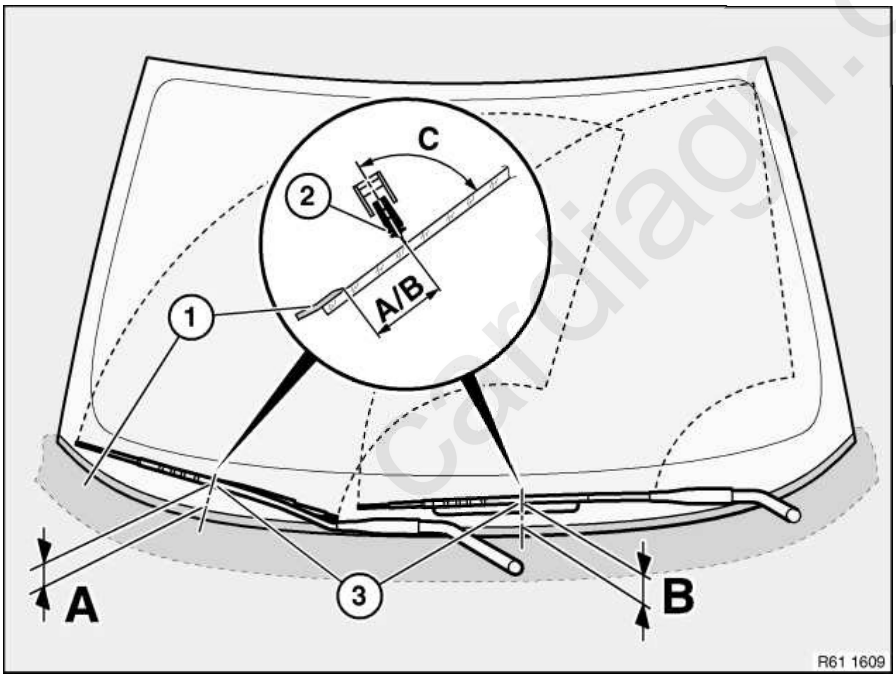
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

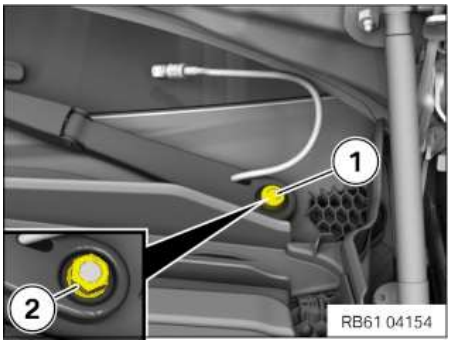
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- Connect the wiper arm (3).
- Correctly position the wiper arm (2) in relation to the window edge (1).

Distance from window pane edge to wiper blade

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm



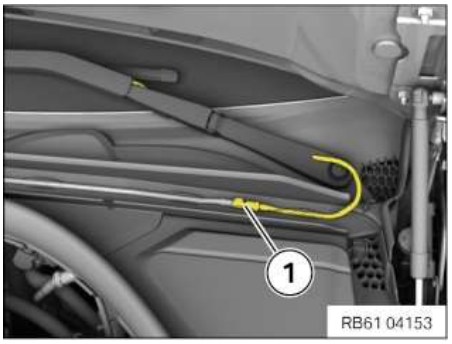
- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

- Connect the protective cap (1).

cardiagn.com



- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

132 – Connecting all battery earth leads



- See additional information.

133 – Activating the 48 V electrical system

Prerequisite

Ignition is switched off.

RISK OF DAMAGE

Damage to 48-V battery

If a 48-V battery that is disconnected from the electrical system is activated, the battery electronics will be damaged.

- Only carry out activation of the 48V electrical system with a completely connected 48-V battery.



- Lift battery earth lead (1).
- Remove special tool .



- Release the negative battery cable (2) of the 48-V battery from the mounting.
- Position the negative battery cable (2) of the 48-V battery on the negative battery terminal.
- Tighten nut (1).

Negative battery cable to 48-V battery

Nut M8		Tightening torque	19 Nm

cardiagn.com

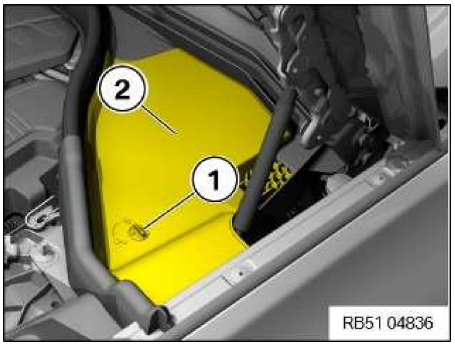


- Connect the connector (1) of the CAN bus and lock it.
- Clip in clip (2).



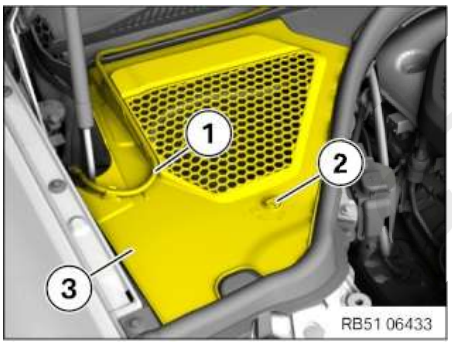
- Activate the 48V electrical system by closing the bonnet.
  The activation takes place automatically.

134 – Install the cover of the engine compartment on the rear left



- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

135 – Install the rear right engine compartment cover



- Position the cover of the engine compartment on the rear right (3).
- Close lock (2).
- Insert washer fluid hose (1) into the guides.

136 – Take bonnet out of the service position

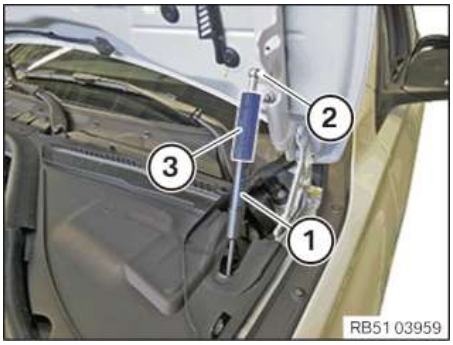
CAUTION

Shutting bonnet or tailgate.

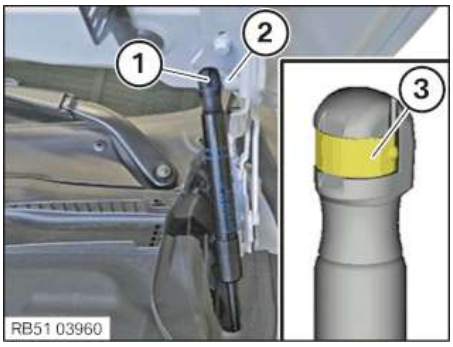
Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.

cardiagn.com



- Support the bonnet by hand.
- Remove the special tool (3) from the ball pin (2).
- Pull off the special tool (3) from the gas pressure spring (1).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.



- Check the clamp (3) is fitted correctly.
- Connect ball socket (1) to ball pin (2).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.

137 – Filling and bleed the high-temperature coolant circuit



TECHNICAL INFORMATION

It is **mandatory** to fill the cooling system before bleeding.
Fill **both** the circuits for high and low-temperature coolant circuits.

- See additional information.

138 – Check engine oil level

Prerequisite
Vehicle is in a horizontal position.

TECHNICAL INFORMATION

Please comply with instructions in Owner's Handbook.

- Carry out an electronic oil measurement.
- Top up engine oil if necessary.

▸ **Check engine oil level**

TECHNICAL INFORMATION

Always check the engine oil level when the engine is at operating temperature (engine oil temperature > 70°C).

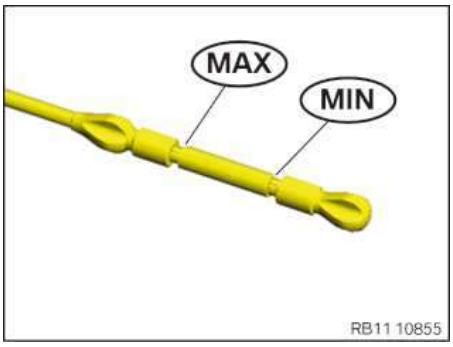
cardiagn.com

- Park vehicle on a horizontal surface.
- Stop the engine and wait for 5 minutes.
- Pull out the oil dipstick and wipe off using a lint-free cloth.

TECHNICAL INFORMATION

Do not pull out or insert the oil dipstick into the guide tube too quickly or slowly.

- Push the oil dipstick into the guide tube up to the limit position and pull it out again.



TECHNICAL INFORMATION

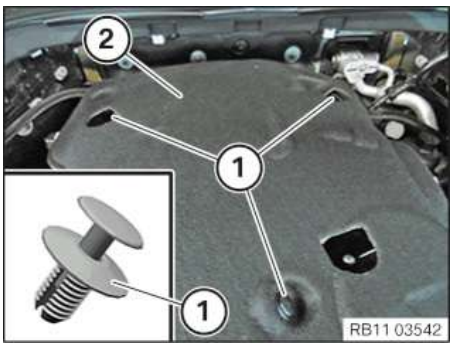
The engine oil level must be between the minimum mark and the maximum mark of the oil dipstick.

- Read the engine oil level on the oil dipstick.
- Top up engine oil if necessary.

Oil quantity between the two markings MIN and MAX of the oil dipstick

1.0 l

139 – Install the acoustic cover for the injectors



- Feed the acoustic cover (2) in and install.
- **If installed:** Secure the acoustic cover (2) with the expanding rivets (1) .

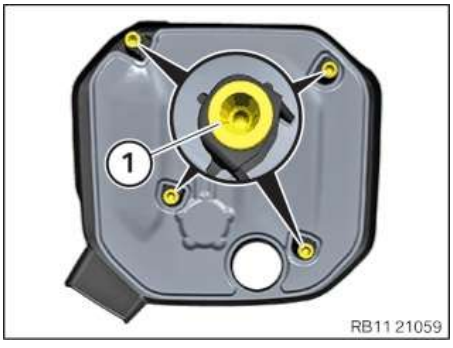
140 – Install acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



- Check the acoustic cover for correct fit of the rubber mounts (1).

cardiagn.com



- Clip in the acoustic cover (1) into the holders in the indicated areas.

Additional Information

Overview of Tightening Torques

Special tool 2 365 488 to engine			Used in step 5383
M8x60		Tightening torque	19 Nm

Cylinder head to crankcase			Used in step 71
M12x1.5	Renew screws.	1. Tightening torque	50 Nm
		2. Angle of rotation	120 °
		3. Angle of rotation	120 °

Cylinder head bolt to timing case cover			Used in step 71
M8x40		Tightening torque	19 Nm

Standard screw connection M6			Used in step 7194
M6		Tightening torque	8 Nm

Ground to cylinder head			Used in step 71
M6		Tightening torque	8 Nm

Glow elements to cylinder head			Used in step 72
Glow element		Tightening torque	13 Nm

Camshaft carrier to cylinder head			Used in step 75
M7x35		Tightening torque	13 Nm

Bearing journal to cylinder head			Used in step 78
M16x1.5	Replace bearing journal.	Tightening torque	20 Nm

Standard screw connection M8			Used in step 78
M8		Tightening torque	19 Nm

Chain tensioner piston to cylinder head			Used in step 79
22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

Holder to crankcase			Used in step 79
M8X16		Tightening torque	19 Nm

Camshaft sprocket to camshaft			Used in step 80
M7x17.			17 Nm

Starter motor to engine			Used in step 86
M8X60		Tightening torque	19 Nm

Battery positive lead to starter			Used in step 86
M8		Tightening torque	13,5 Nm

cardiagn.com

Cylinder head cover to cylinder head			Used in step 87
M6		Tightening torque.	8,5 Nm

Clamping claw facing to cylinder head cover			Used in step 88
M6		Tightening torque	10 Nm

Injector to cylinder head cover			Used in step 88
M8		Tightening torque	8 Nm
		Angle of rotation	120 °

Rail to cylinder head cover			Used in step 89
M8		Tightening torque	19 Nm

High pressure lines between high pressure pump and rail			Used in step 90
High-pressure pipe		Tightening torque	24.5 Nm

High pressure lines between injector and rail			Used in step 91
High-pressure pipe		Tightening torque	24.5 Nm

Intake plenum to cylinder head			Used in step 93
M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum			Used in step 9398
		Tightening torque	10 Nm

Electric changeover valve to intake plenum			Used in step 93
TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold			Used in step 94
TS5x20		Tightening torque	3,6 Nm

Standard screw connection 4 Nm			Used in step 94
Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover			Used in step 94
TS5x20		Tightening torque	3,6 Nm

Battery positive lead on the starter motor generator			Used in step 94
M8		Tightening torque	19 Nm

Holder on intake plenum			Used in step 94
TS6X20		Tightening torque	5 Nm

Exhaust manifold to cylinder head			Used in step 97
M7	**If necessary, renew loose stud bolts.**	Tightening torque	11 Nm
	Renew nuts.	Tightening torque	13 Nm

Oil feed line on cylinder head			Used in step 97
M6x12		Tightening torque	8 Nm

Exhaust-gas recirculation cooler to exhaust manifold			Used in step 9798
M8x28	Replace screws	Tightening torque	32 Nm

Exhaust-gas recirculation cooler to cylinder head			Used in step 9798
M8x20 / M8x28		Tightening torque	19 Nm

Exhaust turbocharger low-pressure stage to crankcase			Used in step 97
M8X16		Tightening torque	22 Nm

cardiagn.com

Oil return line to turbocharger — Used in step 97

M6x12	Renew gasket.	Tightening torque	8 Nm

Oil return line to crankcase — Used in step 97

M6x12	Check gasket. Renew the seal or line if necessary.	Tightening torque	8 Nm

Exhaust-gas recirculation cooler to cylinder head — Used in step 98

M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °

Heat shield to exhaust manifold — Used in step 99

M6x12			10 Nm

Bracket on cylinder head cover — Used in step 100

		Tightening torque	5 Nm

Battery positive lead to battery positive terminal — Used in step 100

M8		Tightening torque	19 Nm

Heat shield to exhaust manifold — Used in step 101

M6x12		Tightening torque	10 Nm

Banjo bolt for exhaust pressure pipe to exhaust manifold — Used in step 101

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm

Exhaust gas pressure pipe to sensor system holder — Used in step 101

TS6x20		Tightening torque	5,7 Nm

Cover, steering unit — Used in step 104

Screw		Tightening torque	3 Nm

Brake disc to front wheel hub — Used in step 105

M8	Renew screw.	Tightening torque	16 Nm

Brake disc to rear wheel hub — Used in step 105

M8	Renew screw.	Tightening torque	16 Nm

Wheel bolts — Used in step 105

M14 / SW17	Screw in wheel bolts and evenly tighten crosswise by hand in order to centre the wheel rim. Tighten wheel bolts to the prescribed tightening torque with a calibrated torque wrench in a crosswise sequence. Check all the wheel bolts in the same order or retighten to the prescribed tightening torque again.	Tightening torque Check	140 Nm 140 Nm

Diesel particulate filter V-clip to exhaust turbocharger — Used in step 107

V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

Bracket to diesel particulate filter top — Used in step 107

M8		Tightening torque	19 Nm

Bracket to transmission for diesel particulate filter holder bottom — Used in step 107

M8X20		Tightening torque	19 Nm

Lower holder to diesel particulate filter — Used in step 107

M8		Tightening torque	19 Nm

cardiagn.com

Coolant lines for SCR metering module			Used in step 107
M6X16		Tightening torque	8 Nm

Nitrogen oxide sensor before SCR catalytic converter			Used in step 108
Sensor		Tightening torque	50 Nm

Monitoring oxygen sensor			Used in step 109
Sensor		Tightening torque	50 Nm

Rear silencer to body / bumper support			Used in step 110
M8	Replace nuts.	Tightening torque	19 Nm

Exhaust system to rear axle carrier			Used in step 110
M8 nut		Tightening torque	19 Nm

Exhaust system to transmission			Used in step 110
M8		Tightening torque	19 Nm

Exhaust system to diesel particle filter			Used in step 110
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

SCR metering module V-clip to exhaust system			Used in step 110
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm

Exhaust-gas temperature sensor upstream of SCR catalytic converter			Used in step 110
Sensor		Tightening torque	30 Nm

Diesel particulate sensor to exhaust system			Used in step 110
Sensor		Tightening torque	50 Nm

Nitrogen oxide sensor downstream of SCR catalytic converter			Used in step 110
Sensor		Tightening torque	55 Nm

Connecting support to tunnel			Used in step 111
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

Diffuser / underbody panelling			Used in step 112
Nuts and screws		Tightening torque	3 Nm

Underbody protection			Used in step 113115
Hexagon screw		Tightening torque	3 Nm

Underbody panelling			Used in step 114
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Underbody protection, steering, to front axle support			Used in step 116
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support			Used in step 116
Hexagon bolt M6		Tightening torque	8 Nm

Underbody protection of the steering gear			Used in step 117
Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

cardiagn.com

Wheel arch trim panel, front			Used in step 117
Thermoplastic hexagon screw		Tightening torque	2,6 Nm

Underbody protection front			Used in step 118
Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Exhaust temperature sensor for the exhaust system after catalytic converter before diesel particulate filter			Used in step 119
Sensor		Tightening torque	30 Nm

Front oxygen sensor to top of diesel particulate filter			Used in step 120
Sensor		Tightening torque	50 Nm

Exhaust-gas temperature sensor to diesel particulate filter			Used in step 121
Sensor		Tightening torque	30 Nm

Differential pressure sensor of diesel particulate filter on cylinder head cover			Used in step 122
TS5x20		Tightening torque	4 Nm

Clamp for the pressure hose on the differential pressure sensor			Used in step 122
Clamp 15–19mm		Tightening torque	3 Nm

Clean air pipe to exhaust turbocharger			Used in step 123
M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing			Used in step 123124
Clamp		Tightening torque	3 Nm

Front end strut			Used in step 125
Screw		Tightening torque	56 Nm

Bulkhead lower part to body			Used in step 127
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead			Used in step 128
		Tightening torque	3 Nm

Tension strut on bulkhead			Used in step 128
M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome			Used in step 128
Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm			Used in step 131
Combination hexagon nut		Tightening torque	35 Nm

Negative battery cable to 48-V battery			Used in step 133
Nut M8		Tightening torque	19 Nm

Overview of Special Tools

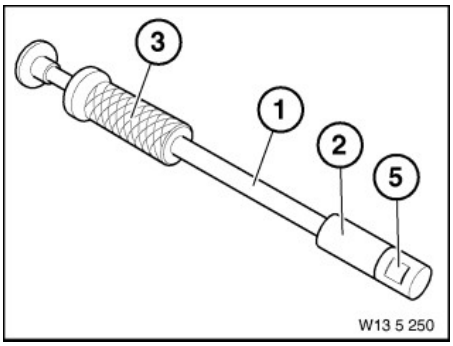
cardiagn.com

0 493 339 (13 5 252) Bush



Common	Used in step 50
Usage	(Threaded bush)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 321 (13 5 250) Puller



Common	Used in step 50
Usage	For removing injector nozzles or injectors from cylinder head
Included in the tool or work	
Storage location	A16
Replaced by	
In connection with	
SI-Number	01 06 98 (306)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 338 (13 5 251)		**Rod** (guide rod)	
2	0 493 339 (13 5 252)		**Bush** (Threaded bush)	
3	0 493 340 (13 5 253)		**Weight** (Weight)	
4	0 493 379 (13 5 254)		**Claw** (Clamping claw) For removal of injector nozzles / engine: M57	
5	0 495 579 (13 5 255)		**Adapter** For removing steering shaft on E85. Refer to SI 01 11 06 (265)	

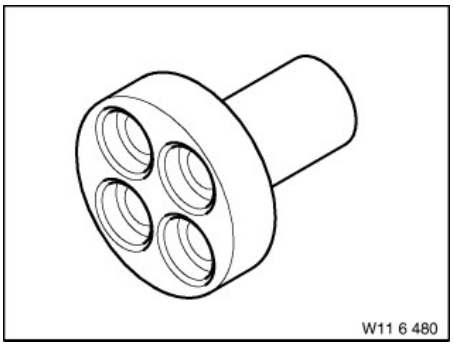
0 493 340 (13 5 253) Weight



Common	Used in step 50
Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

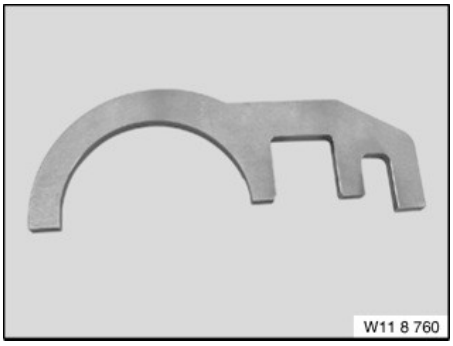
carmagn.com

0 493 380 (11 6 480) Connector



Common	Used in step 5383
Usage	For turning over engine at crankshaft hub (vibration absorber).
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	01 11 98 (338)

0 496 112 (11 8 760) Gauge



Common	Used in step 535776818384
Usage	For securing camshaft at TDC.
Included in the tool or work	
Storage location	B24
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

2 365 488 Adapter



Common	Used in step 53828385
Usage	For disconnecting the crankshaft at the top dead centre. (longitudinal installation with automatic transmission only).
Included in the tool or work	
Storage location	C56
Replaced by	
In connection with	
SI-Number	01 46 14 (191)

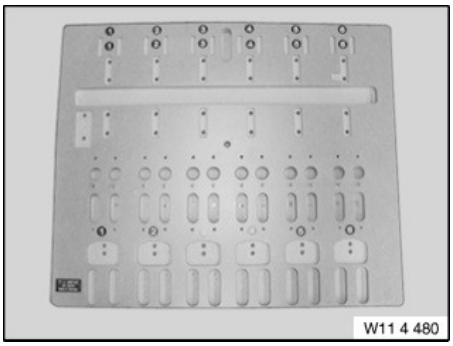
2 288 380 Locating stud



Common	Used in step 53828385
Usage	For disconnecting the crankshaft at the top dead centre. Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).
Included in the tool or work	
Storage location	A56
Replaced by	
In connection with	
SI-Number	01 04 14 (071)

cardiagn.com

0 495 105 (11 4 480) oddments tray



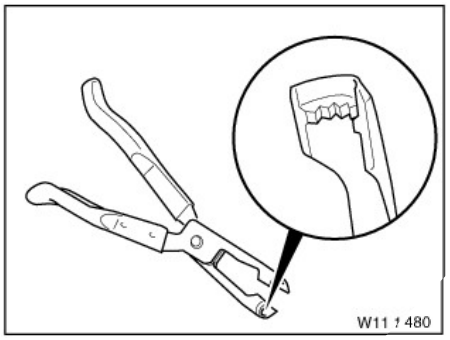
Common Used in step 596066

Usage	(Boards (2 pieces)) For setting down the individual components of the cylinder head.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 17 04 (130)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 495 106 (11 4 481)		**oddments tray** (Board, intake side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	
2	0 495 107 (11 4 482)		**oddments tray** (Board, exhaust side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	

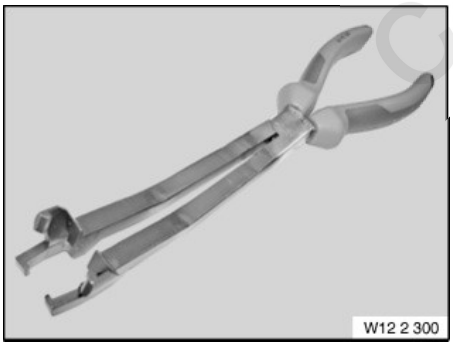
0 490 796 (11 1 480) Pliers



Common Used in step 6167

Usage	For removing valve stem seal
Included in the tool or work	
Storage location	A10
Replaced by	
In connection with	
SI-Number	01 01 93 (621)

0 495 140 (12 2 300) Pliers

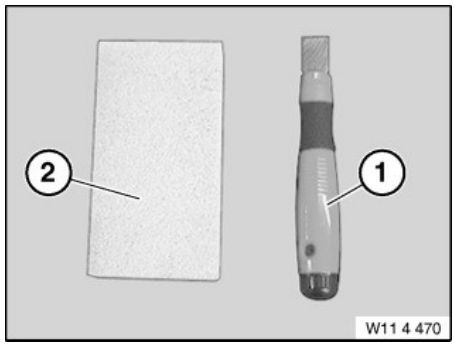


Common Used in step 62

Usage	(Special pliers for glow plug connectors) For unlocking, detaching and attaching glow plug connectors.
Included in the tool or work	
Storage location	A51
Replaced by	
In connection with	
SI-Number	01 19 05 (215)

cardiagn.com

0 495 102 (11 4 470) Tool



Common Used in step 6297

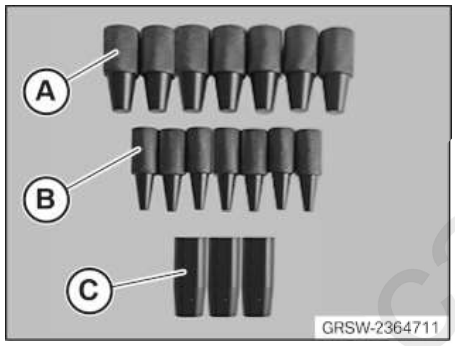
Usage	(cleaning kit) For cleaning sealing surfaces on magnesium crankcase/cylinder head.
Included in the tool or work	
Storage location	C52
Replaced by	
In connection with	
SI-Number	01 17 04 (130)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 495 103 (11 4 471)		**Scraper**	
2	0 495 104 (11 4 472)		**Extractor** (grindstone)	

cardiagn.com

2 364 711 Plug



Common Used in step 63

Usage	For closing the pressure oil holes for cleaning the cylinder head sealing surfaces.
Included in the tool or work	
Storage location	C20
Replaced by	
In connection with	
SI-Number	

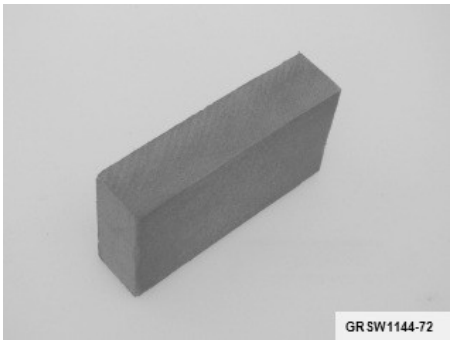
0 495 103 (11 4 471) Scraper



Common Used in step 63

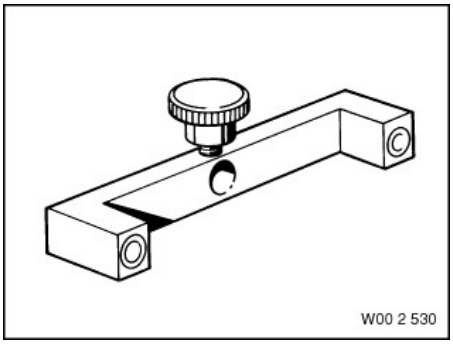
Usage	
Included in the tool or work	0 495 102
Storage location	C52
Replaced by	
In connection with	
SI-Number	

0 495 104 (11 4 472) Extractor



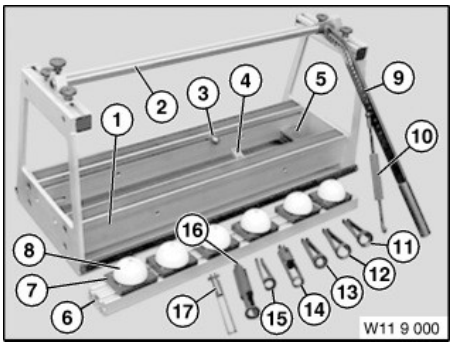
Common	Used in step 63
Usage	(grindstone)
Included in the tool or work	0 495 102
Storage location	C52
Replaced by	
In connection with	
SI-Number	

0 490 185 (00 2 530) Bridge



Common	Used in step 65
Usage	(Measuring bridge) For determining the piston projection (Diesel)
Included in the tool or work	
Storage location	A3
Replaced by	
In connection with	
SI-Number	

0 494 366 (11 9 001) Device

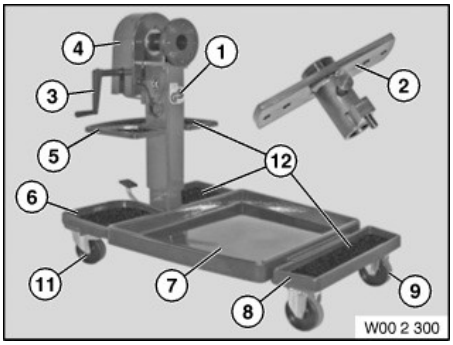


Common	Used in step 6669
Usage	
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 187 (00 2 300) Assembly stand

Used in step 6669

cardiagn.com



Common

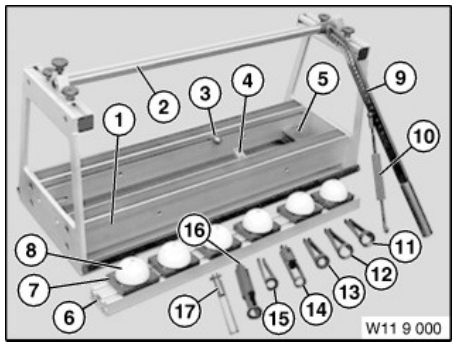
Usage	Assembly stand with universal flange for mounting engines from S85
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 25 04 (155)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 495 188 (00 2 301)		**Assembly stand** available only as complete assembly stand 83 30 0 495 187.	
2	0 495 189 (00 2 302)	2 299 563	**Tool** (Universal flange). Do not use any more!!! Technically locked. Is replaced by a new flange with part number 83 30 2 299 563. All flanges delivered by the end of 2011 will be replaced free of charge. From 2012, only the new flange will be supplied. Also applies to the complete engine mounting stand 00 2 300.	
3	0 495 200 (00 2 303)		**Crank**	
4	0 495 201 (00 2 304)		**Cover** (Protective hood)	
5	0 495 202 (00 2 305)		**oddments tray** (Oddments tray for small parts)	
6	0 495 203 (00 2 306)		**Shaped element** (Rear shaped pan)	
7	0 495 204 (00 2 307)		**Collection pan** (Oil collection pan)	
8	0 495 205 (00 2 308)		**Shaped element** (Front shaped pan)	
9	0 495 206 (00 2 309)		**Wheel** (Front wheel (without stop))	
10	0 495 207 (00 2 311)		**Wheel** (Rear wheel (with stop))	
11	0 495 208 (00 2 312)		**Mat** (Checker mat set)	
2	2 299 563		**Adapter** New adapter for the engine assembly stand. Replacement for 83 30 0 495 189 - 00 2 302.	

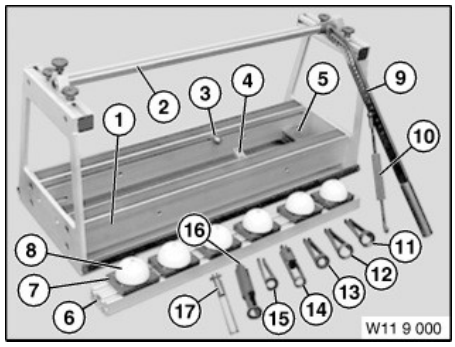
carmagn.com

0 494 371 (11 9 006) Insert



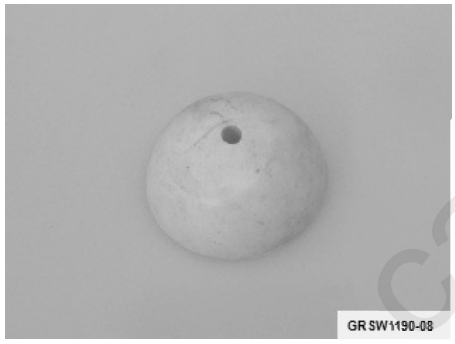
Common	Used in step 6669
Usage	(Aluminium strip)
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 494 372 (11 9 007) Shaped part



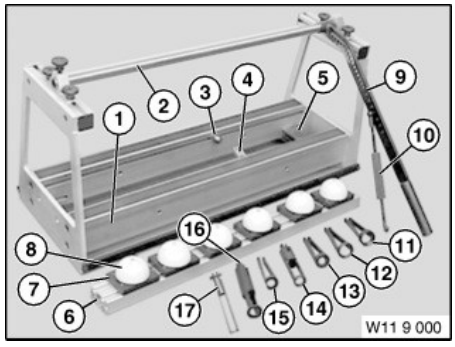
Common	Used in step 66
Usage	(Shaped part)
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 494 373 (11 9 008) Shaped part



Common	Used in step 66
Usage	(Shaped part) Shaped part made of plastic
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

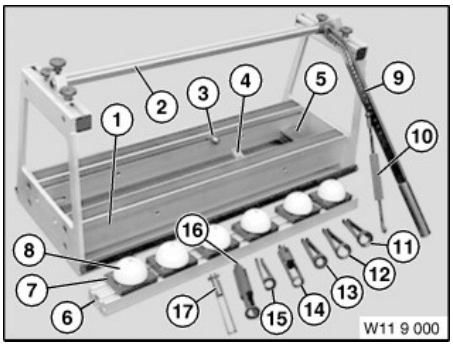
0 494 370 (11 9 005) Quick fastener



Common	Used in step 6669
Usage	
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

cardiagn.com

0 494 362 (11 9 000) Device



Common Used in step 6669

Usage	(Cylinder head expander tool)
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	002300 = 0495187
SI-Number	01 03 02 (833)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 494 366 (11 9 001)		**Device**	
6	0 494 371 (11 9 006)		**Insert** (Aluminium strip)	
11	0 494 376 (11 9 012)		**Basket** (Valve spring cage) Engine M41, M51, S50	
17	0 495 028 (11 9 017)		**Basket** (Valve spring cage) Engine N52	
2	0 494 367 (11 9 002)		**Rod**	
3	0 494 368 (11 9 003)		**Adapter** (Sliding block)	
4	0 494 369 (11 9 004)		**Tab**	
5	0 494 370 (11 9 005)		**Quick fastener**	
7	0 494 372 (11 9 007)		**Shaped part** (shaped part)	
8	0 494 373 (11 9 008)		**Shaped part** (Shaped part) Shaped part made of plastic	
9	0 494 374 (11 9 009)		**Lever**	
10	0 494 375 (11 9 011)		**Hook**	
12	0 494 377 (11 9 013)		**Basket** (Valve spring cage) Engine M43, M73	
13	0 494 378 (11 9 014)		**Basket** (Valve spring cage) Engine M44, M52, M54, M56, M62, S52, S54, S62	
14	0 494 379 (11 9 015)		**Basket** (Valve spring cage) Engine M47, M47TU, M57, M57TU, N40, N42, N62, N73	
15	0 494 380 (11 9 016)		**Basket** (Valve spring cage) Engine M21, M40	

cardiagn.com

0 494 374 (11 9 009) Lever



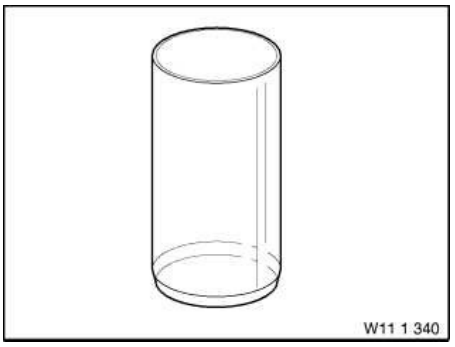
Common	Used in step 6669
Usage	
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 496 143 (11 8 840) Basket



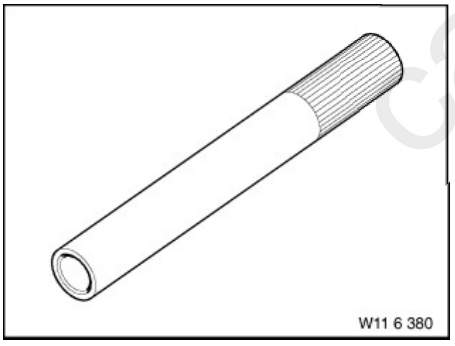
Common	Used in step 6669
Usage	(Valve spring cage) For removing and fitting the valves.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

0 490 746 (11 1 380) Holding sleeve



Common	Used in step 68
Usage	(Assembly sleeve) For fitting the valve stem seal, diameter 7 mm
Included in the tool or work	
Storage location	individual
Replaced by	
In connection with	
SI-Number	

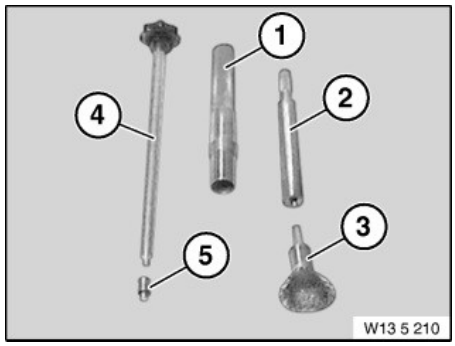
0 493 249 (11 6 380) Bush



Common	Used in step 68
Usage	For fitting valve stem seal
Included in the tool or work	
Storage location	A9
Replaced by	
In connection with	
SI-Number	01 06 98 (306)

cardiagn.com

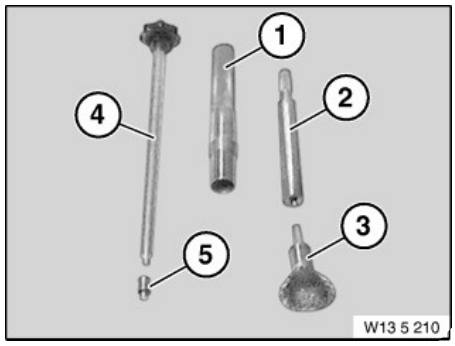
0 493 763 (13 5 215) Plug



Common Used in step 88

Usage	(Seal plug)
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 762 (13 5 214) Rod

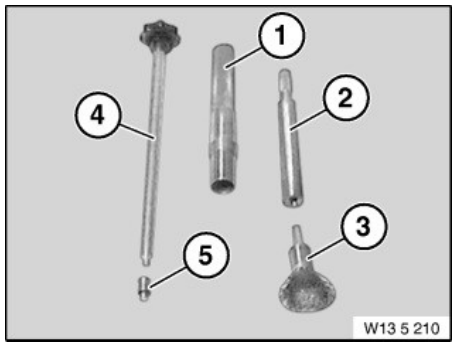


Common Used in step 88

Usage	(Mounting rod) For the seal plug
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

cardiagn.com

0 493 758 (13 5 210) Tool



Common

Used in step 88

Usage	(Cleaning set) For injector channels
Included in the tool or work	
Storage location	B4
Replaced by	
In connection with	
SI-Number	01 05 00 (574)

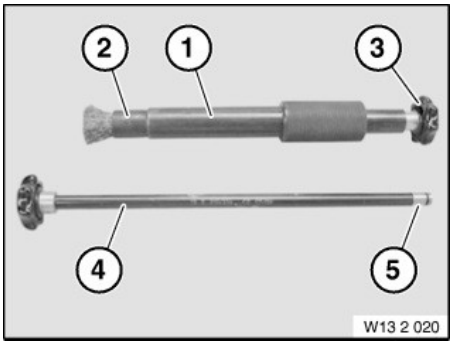
Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 759 (13 5 211)		**Holding sleeve** (Guide sleeve)	
2	0 493 760 (13 5 212)		**Holder** (Brush holder)	
3	0 493 761 (13 5 213)		**Brush head**	
4	0 493 762 (13 5 214)		**Rod** (Mounting rod) For the seal plug	
5	0 493 763 (13 5 215)		**Plug** (Seal plug)	

0 496 150 (13 2 020) Tool

Used in step 88

cardiagn.com



Common

Usage	(Cleaning kit) For cleaning the injector shaft.
Included in the tool or work	
Storage location	A87
Replaced by	
In connection with	
SI-Number	01 07 07 (355)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 496 151 (13 2 021)		**Holding sleeve** (Guide sleeve) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
2	0 496 152 (13 2 022)		**Holder** (Brush holder) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
3	0 496 153 (13 2 023)		**Brush head** Remaining inventories will be sold off, followed by discontinuation and then available as part of complete special tool 13 2 020 = 83 30 0 496 150 only	
4	0 496 154 (13 2 024)		**Rod** (Mounting rod) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
5	0 496 155 (13 2 025)		**Plug** (Seal plug) Available as part of complete special tool 13 2 020 = 83 30 0 496 150 only	Used in step 105

2 344 011 Tool



Common

Usage	Tool (wheel hub grinder) for cleaning the connection of the wheel rim (wheel contact face) to the wheel hub.
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	08 08 12 (872)

Replacement tools:

0 495 221 (36 1 323) Wheel stud



Common Used in step 33

Usage	(Code 30) Code 39 available separately, (see EPC) under 36 13 1 181 259
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

cardiagn.com

0 495 224 (36 1 326) Wheel stud



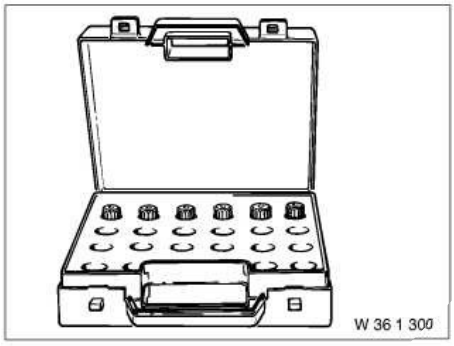
Common	Used in step 33
Usage	(Code 33) With centring bore available separately, (see EPC) under 36 13 6 765 546
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 225 (36 1 327) Wheel stud



Common	Used in step 33
Usage	(Code 34) With centring bore available separately (see EPC) under 36 13 6 765 547
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 226 (36 1 328) Wheel stud



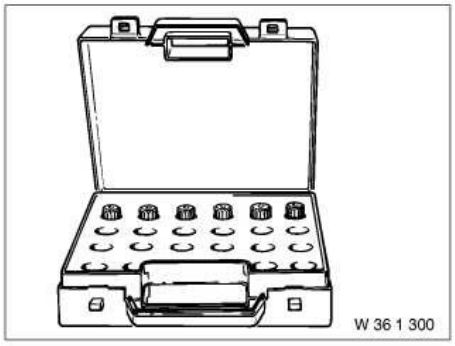
Common	Used in step 33
Usage	(Code 35) With centring bore available separately, (see EPC) under 36 13 6 762 340
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 227 (36 1 329) Wheel stud



Common	Used in step 33
Usage	(Code 36) With centring bore available separately (see EPC) under 36 13 6 762 341
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 228 (36 1 331) Wheel stud



Common	Used in step 33
Usage	(Code 37) With centring bore available separately (see EPC) under 36 13 6 762 342
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

cardiagn.com

0 495 229 (36 1 332) Wheel stud



Common	Used in step 33
Usage	(Code 38) With centring bore available separately (see EPC) under 36 13 6 762 343
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 230 (36 1 333) Wheel stud



Common	Used in step 33
Usage	(Code 40) With centring bore available separately (see EPC) under 36 13 6 762 344
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

2 299 563 Adapter



Common	Used in step 6669
Usage	New adapter for the engine assembly stand. Replacement for 83 30 0 495 189 - 00 2 302.
Included in the tool or work	0 495 187
Storage location	
Replaced by	
In connection with	
SI-Number	

Overview Technical Data

Cylinder head flatness	Used in step 64
Maximum lengthwise deviation from flatness	0.10 mm
Maximum transverse deviation from flatness	0.05 mm

Valve underprotrusion	Used in step 65
	0,8 (0.7 - 0,9) mm

Distance from window pane edge to wiper blade	Used in step 131
Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

Oil quantity between the two markings MIN and MAX of the oil dipstick	Used in step 138
	1.0 l

Links

Repair instructions (PRE)	Used in step
Notes on 48-V battery	4133

General repair instructions	Used in step

cardiagn.com

11 00 ... Overview of consumables (Electronic Parts Catalogue)	88

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5132
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5132
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5132
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5132
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132

61 35 ... Notes on ESD protection (Electro Static Discharge)	17181920303143506 1

carsign.com

61 35 ... Notes on ESD protection (Electro Static Discharge)	171819203031435061
00 02 001 Raising the vehicle using a vehicle lift	33105
12 51 010 Replacing wiring harness section for preheating system	72
12 51 010 Replacing wiring harness section for preheating system	72
12 51 010 Replacing wiring harness section for preheating system	72
12 51 010 Replacing wiring harness section for preheating system	72
17 00 008 Draining and topping up coolant for high-temperature circuit	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 008 Draining and topping up coolant for high-temperature circuit	137
17 00 008 Draining and topping up coolant for high-temperature circuit	137
17 00 008 Draining and topping up coolant for high-temperature circuit	137
17 00 008 Draining and topping up coolant for high-temperature circuit	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool

17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	137
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	137
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 009 Check the cooling system for watertightness with a special tool (with a tester)	137
17 00 009 Check the cooling system for watertightness with a special tool (with a tester)	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 008 Draining and topping up coolant for high-temperature circuit	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 008 Draining and topping up coolant for high-temperature circuit	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137

cardiagn.com

11 34 055 Replace all valve springs

WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

RISK OF DAMAGE

Damage to battery terminal, the safety battery terminal or the intelligent battery sensor (IBS).

Damaged battery terminals can lead to malfunctions or vehicle electrical system faults.

- Pull off battery terminal from battery pole by carefully moving to and fro. Do not pry off using a tool.

PRELIMINARY WORK

1 – Bring front compartment lid in the service position

Prerequisite

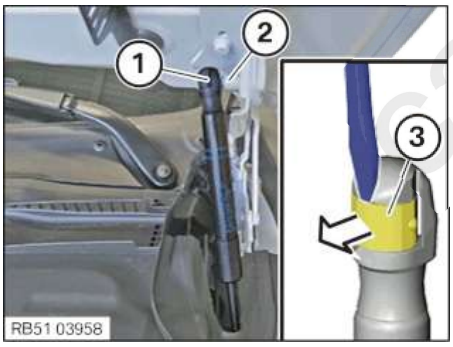
Engine compartment lid is open.

CAUTION

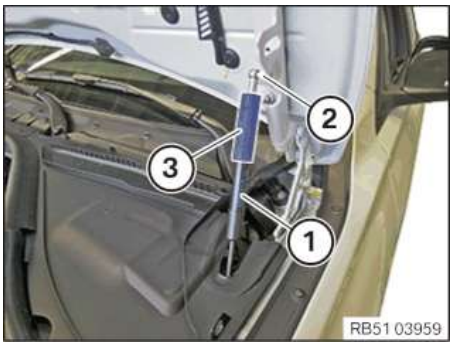
Shutting bonnet or tailgate.

Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.



- Lift clamp (3) slightly using a screwdriver, in the direction of the arrow.
- Lift off ball socket (1) from ball pin (2).
- Repeat the operation on the other side of vehicle.



TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

- Remove the bonnet support and open the bonnet further.
- Pull special tool or or (3) over gas pressure spring (1).
- Place special tool on the ball pin (2) and engage using force.
- Repeat the operation on the other side of vehicle.

2 – Disconnecting all battery earth leads

cardiagn.com



- See additional information.

3 – Removing the acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

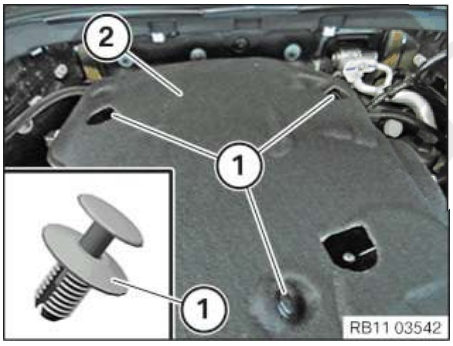
Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



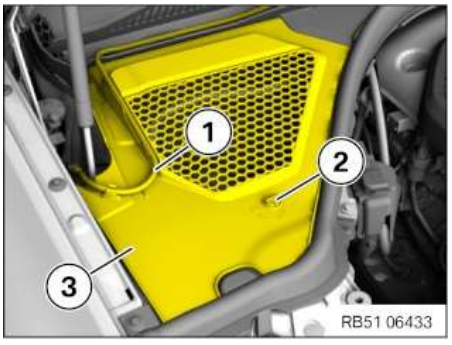
- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

4 – Remove the acoustic cover for the injectors



- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

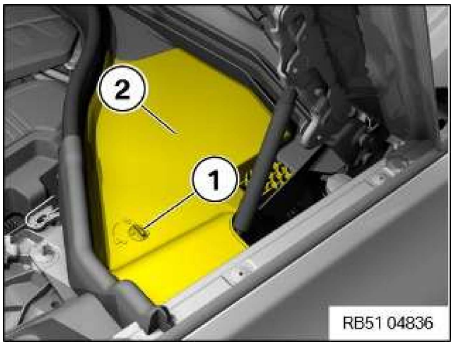
5 – Remove the cover of the rear right engine compartment



- Release washer fluid hose (1) from the guides.
- Loosen the lock (2).
- Remove the cover (3) of the rear right engine compartment.

6 – Remove the cover of the engine compartment at the rear left

cardiagn.com



- Loosen the lock (1).
- Remove the cover (2) of the rear left engine compartment.

7 – Removing the wiper arm on the left and right

NOTICE

Description is for left component only. Procedure on the right side is identical.

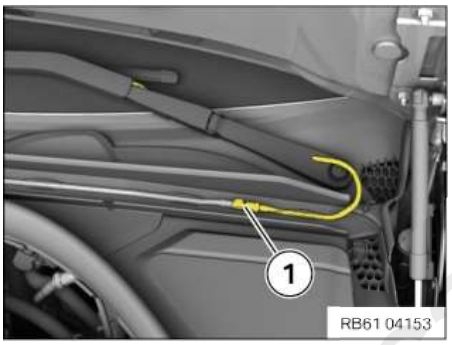
▸ **Remove the wiper arm**

RISK OF DAMAGE

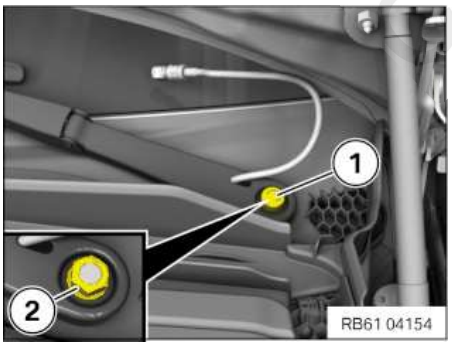
Damage to wiper console.

While removing the wiper arms without using special tool, the wiper console can break.

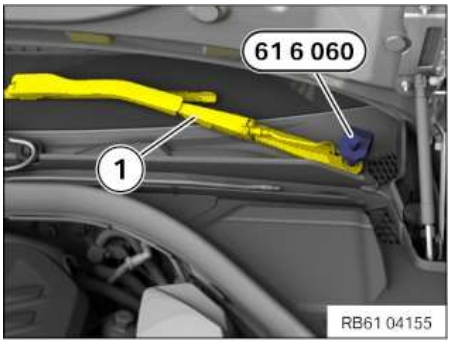
- Removing the wiper arms must be carried out only using the prescribed special tool.
- Do **not** lever off the wiper arm because otherwise the wiper console may break at the predetermined breaking point for active pedestrian protection.



- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.



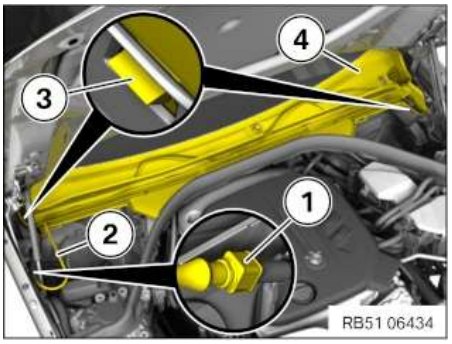
- Remove the protective cap (1).
- Loosen nut (2).



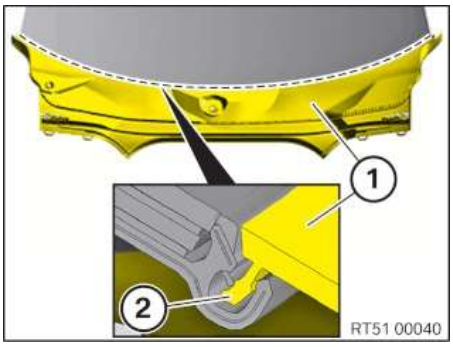
- Pull off the wiper arm (1) using special tool .

8 – Remove cowl panel cover

cardiagn.com



- Release snap fastener (1) of the washer fluid hose (2) and put the washer fluid hose (2) to one side.
- Unclip clips (3) on the cowl panel cover (4).



- Pull the cowl panel cover (1) upward out of the latch mechanism (2) beginning on the side.

9 – Remove the seal for the rear bonnet

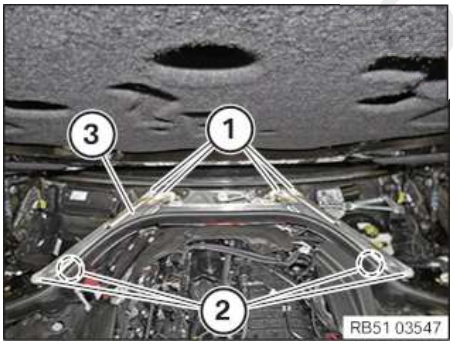


- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

10 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

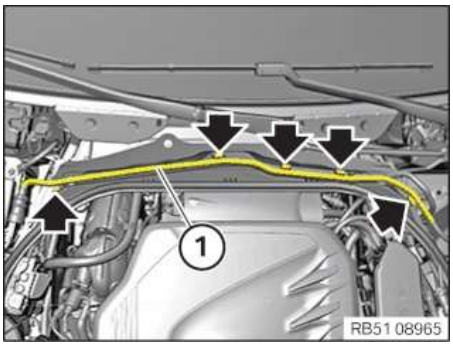
Driving without the strut brace/front-end strut or tension strut is not permitted.



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

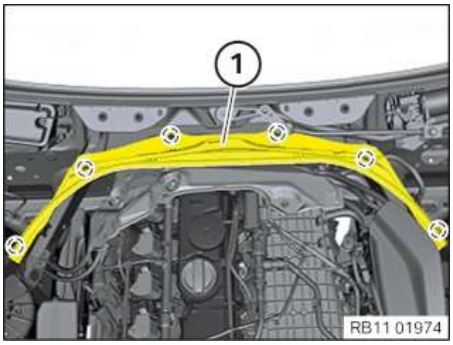
- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.



- **Version with mild hybrid technology:**

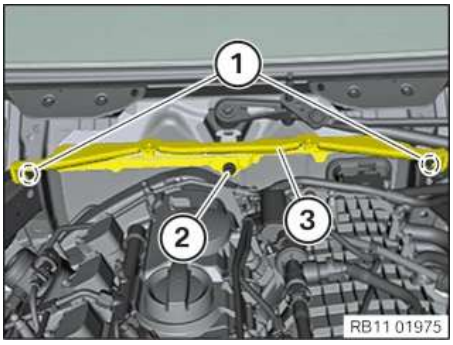
  Unclip the wire (1) at the holders (arrows).

carsdiagn.com



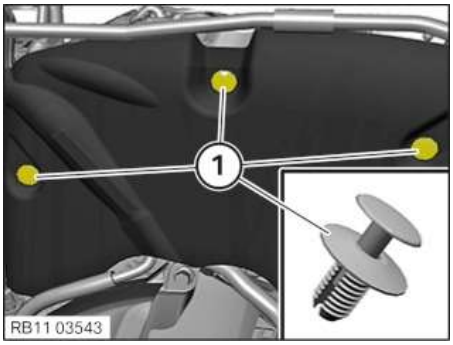
- Unscrew the bolts in the marked areas.
- Remove the centre bulkhead upper part (1).

11 – Removing the centre bulkhead lower section

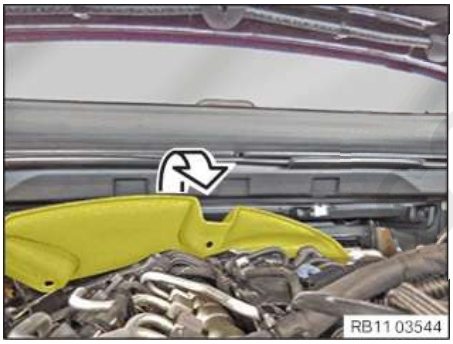


- Loosen screws (1).
- Loosen nut (2).
- Remove the centre bulkhead lower part (3).

12 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).

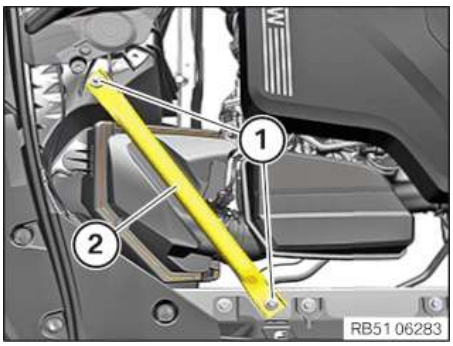


- Guide out and remove the acoustic cover in the direction of the arrow.

13 – Remove right front-end strut

TECHNICAL INFORMATION

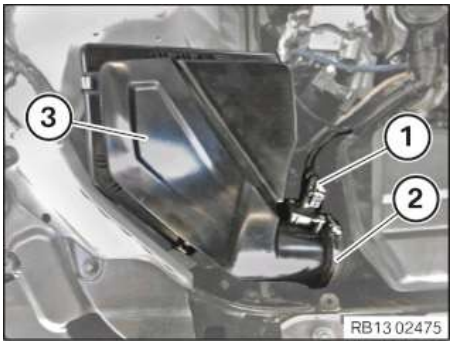
Driving without the strut brace/front-end strut or tension strut is not permitted.



- Loosen screws (1).
- Remove the front-end strut (2).

cardiagn.com

14 – Removing intake silencer housing



- Unlock plug connection (1) and disconnect.
- Unfasten clamp (2).
- Pull out and remove the intake silencer housing (3) from the rubber mounts towards the top.

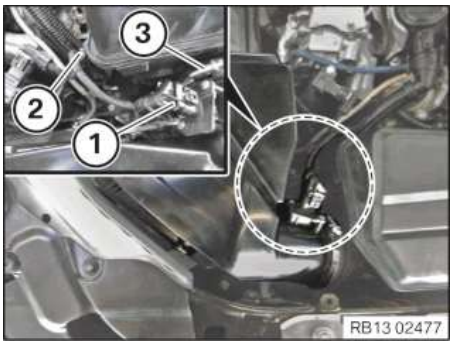
15 – Removing the clean air pipe with the resonator

WARNING

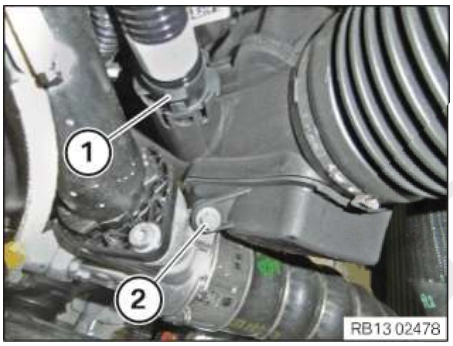
Hot surfaces.

Risk of burning!

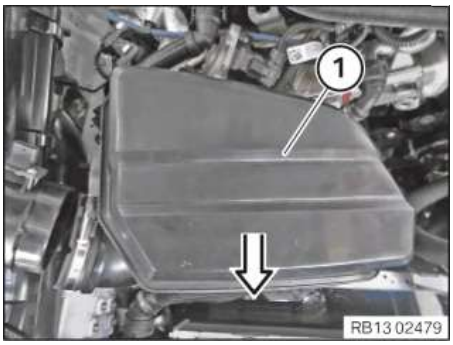
- Perform all work only on components that have cooled down.



- Unlock plug connection (1) and disconnect.
- Loosen clamp (2).
- Unfasten clamp (3).
- Separate the clean air pipe with resonator from the intake filter housing.



- Unlock engine ventilation line (1), disconnect it and place it aside.
- Loosen screw (2).



- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Unlock and loosen clamp (1).



- Feed out and remove clean air pipe with resonator (1) in the direction of the arrow.

16 – Remove differential pressure sensor for the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

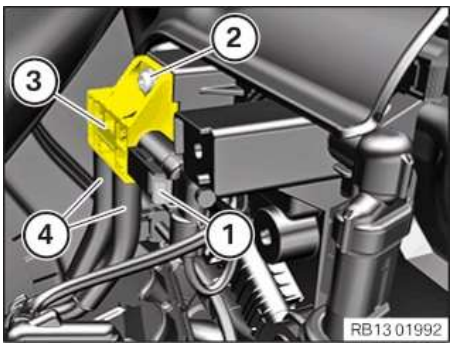
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).
- Pull off pressure hose (4).
- Feed out differential pressure sensor (3) and remove.

17 – Remove the exhaust temperature sensor on the diesel particulate filter

cardiagn.com

WARNING

Hot surfaces.

Risk of burning!

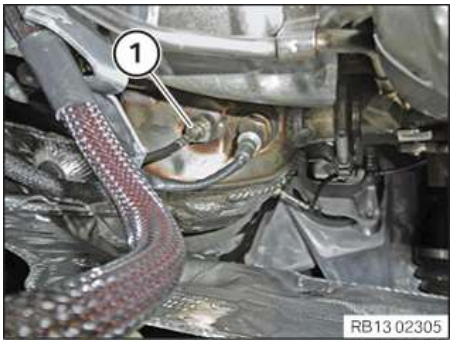
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

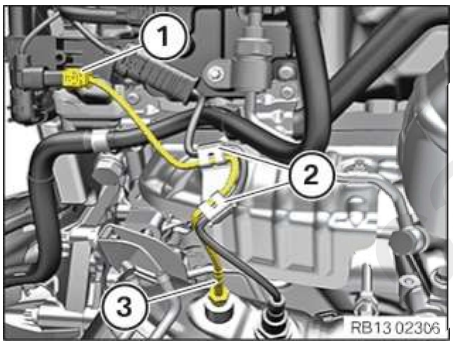
Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)



- Release exhaust temperature sensor (1) using special tool .



- Unlock plug connection (1) and disconnect.
- Remove the exhaust temperature sensor (3) from the clamps (2).
- Feed out and remove exhaust temperature sensor (3).

18 – Removing the front oxygen sensor on the diesel particulate filter on top

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

carlagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

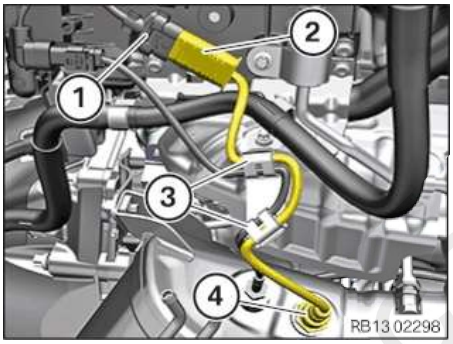
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



- Unlock plug connection (1) and disconnect.
- Unlock and disconnect connector (2).
- Pull the front oxygen sensor (4) out from the clamps (3) and remove it.



- Release the front oxygen sensor (1) with the standard tools and remove it.

19 – Removing the exhaust temperature sensor for the exhaust system downstream the catalytic converter at the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

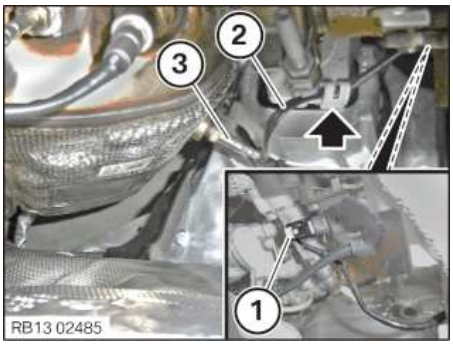
cardiagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

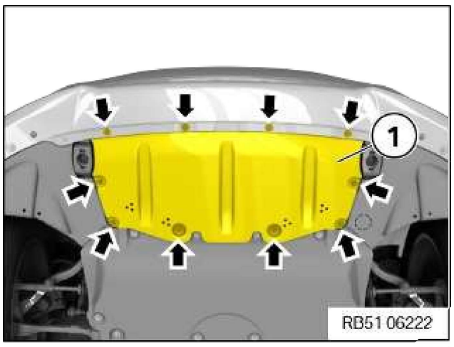


- Unlock plug connection (1) and disconnect.

Note: The exhaust temperature sensor is located near the right engine mount.

- Release cable (2) from the clamps (arrow).
- Loosen exhaust temperature sensor (3).
- Feed out and remove exhaust temperature sensor (3).

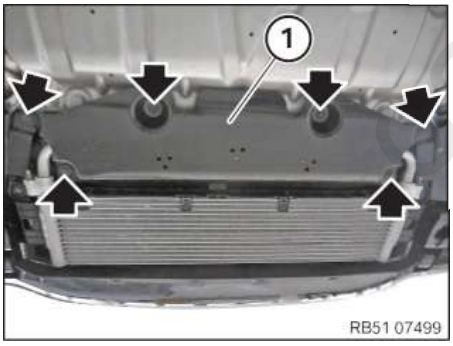
20 – Removing the front underbody protection



- **Version A:**

  Remove screws (arrows).

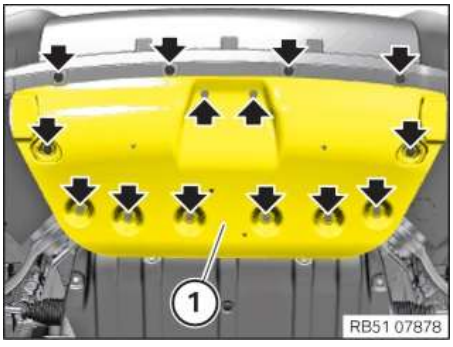
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version B:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

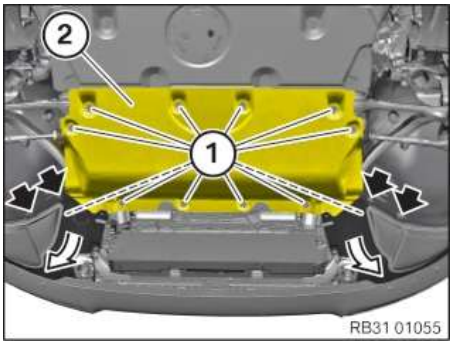


- **Version C:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

21 – Remove the underbody protection of the steering gear



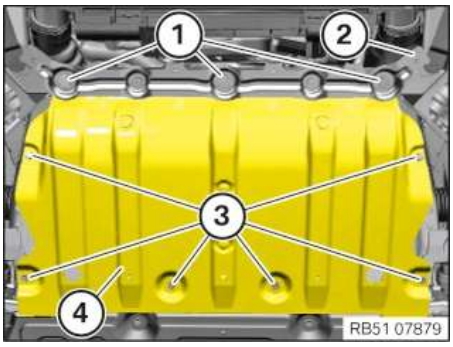
- **Version A:**

  Unscrew the screws (arrows) of the wheel arch cover on the wheel arch cover.

  Fold the bottom wheel arch cover to the side.

  Loosen screws (1).

  Remove the underbody protection (2) of the steering gear.



- **Version B:**

  Loosen screws (1).

  Remove the holder (2) for the underride protection.

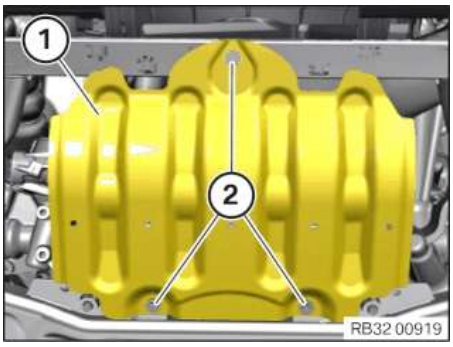
  Loosen screws (3).

  Feed out and remove the underbody protection (4) of the steering gear.

22 – If installed: Removing the steering underbody protection

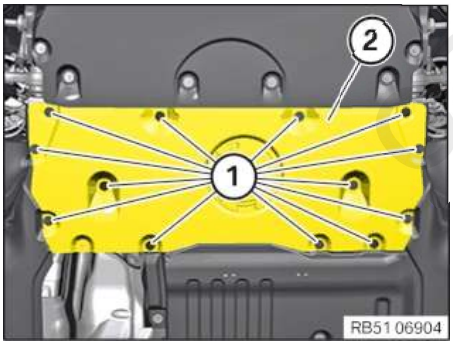
Prerequisite

Front underbody protection has been removed.



- Loosen screws (2).
- Remove underbody protection (1).

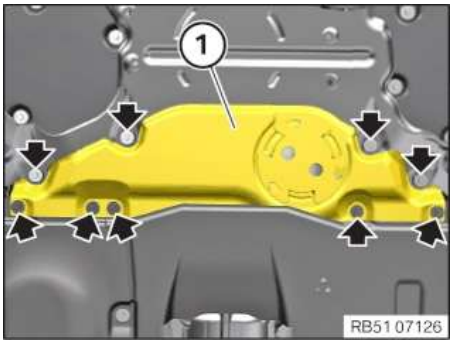
23 – Removing the centre underbody protection



- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .



- **Version with all-wheel drive:**

  Remove screws (arrows).

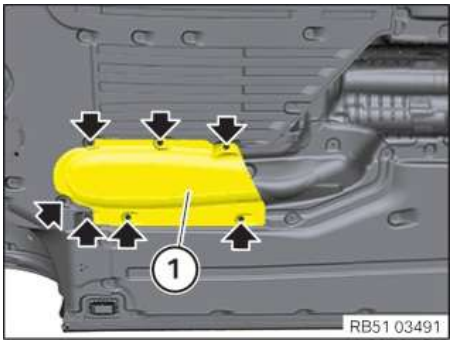
  Feed out and remove the centre underbody protection (1).

24 – Remove the underbody panelling of the transmission on the side

cardiagn.com

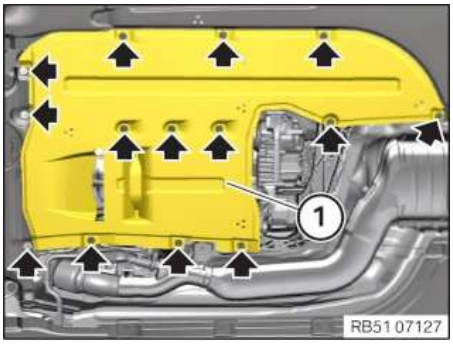
NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.



- Remove screws (arrows).
- Remove the underbody panelling (1).

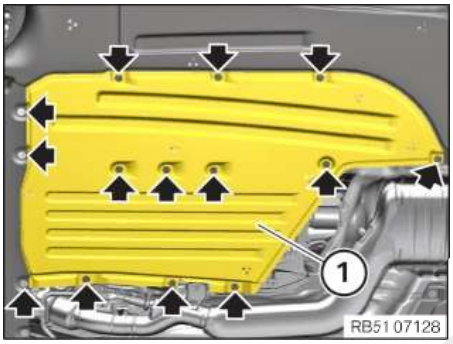
25 – Remove rear underbody protection



- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).

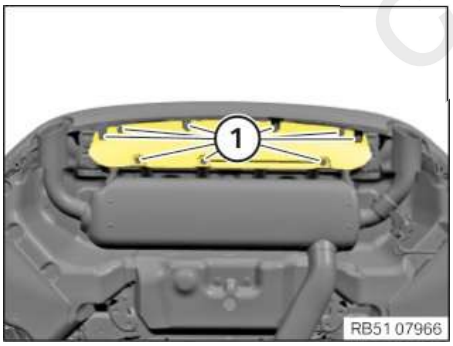


- **Version B:**

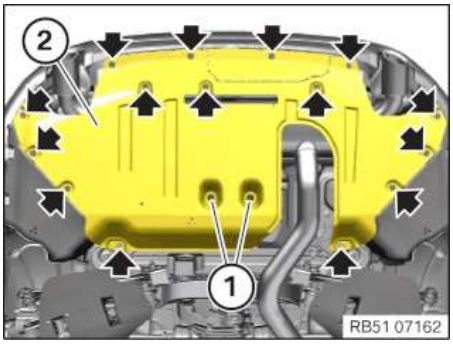
  Remove screws (arrows).

  Guide out rear underbody protection (1) and remove it.

26 – Removing the rear diffuser



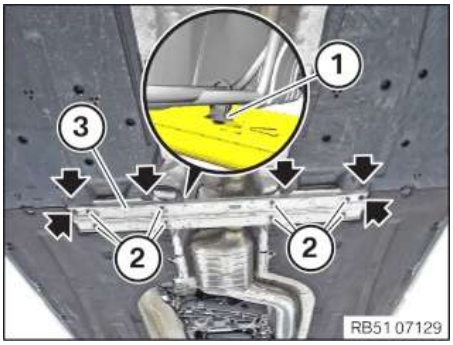
- **Version 1:**
- Release the screws and nuts (1).
- Remove the diffuser.



- **Version 2:**
- Loosen nuts (1).
- Remove screws (arrows).
- Guide out and remove rear diffuser (2).

27 – Remove the connecting support from the tunnel

cardiagn.com



- Remove screws (arrows).

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Loosen clamp (1).
- Loosen screws (2).
- Guide out and remove connecting support (3) on the tunnel.

28 – Remove exhaust system

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

CAUTION

Component with heavy weight.

Danger of injury!

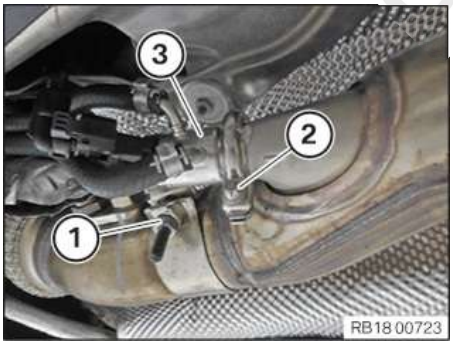
- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

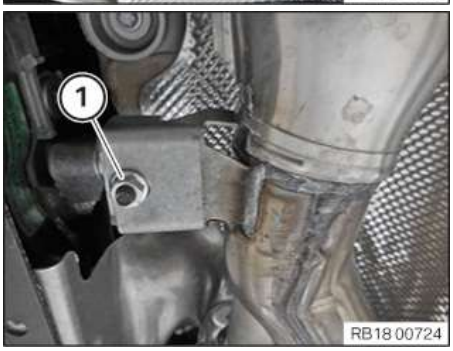
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

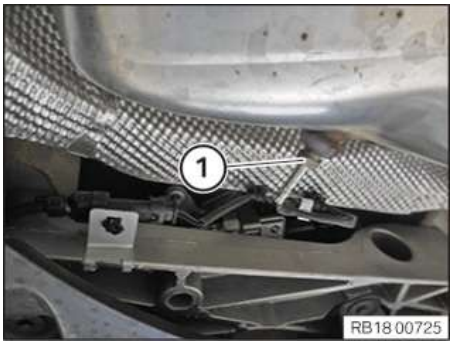


- Unfasten clamp (1).
- Detach the clamp (2) of the SCR metering module (3).
- Detach the SCR metering module (3)from the exhaust system and place to one side.

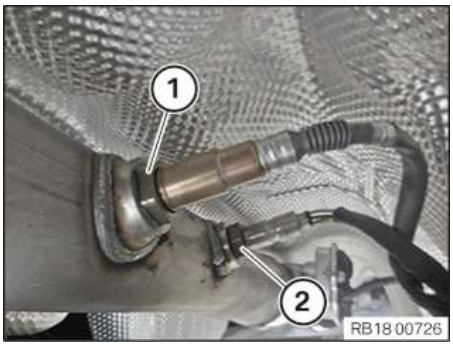


- Loosen nut (1).

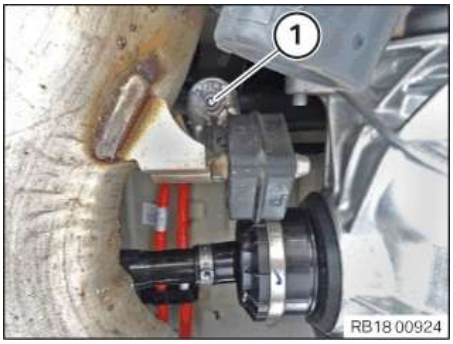
cardiagn.com



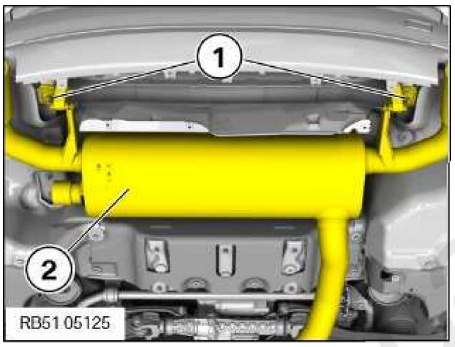
- Detach the exhaust temperature sensor (1) from the exhaust system.



- Release the diesel particulate sensor (1) from the exhaust system and place to one side.
- Release the nitrogen oxide sensor (2) from the exhaust system and place to one side.



- Release the nut (1) on the rear axle support.



- Loosen nuts (1).
- Lower and remove the exhaust system (2) with the assistance of a second person.

29 – Removing the monitoring oxygen sensor after the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

cardiagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

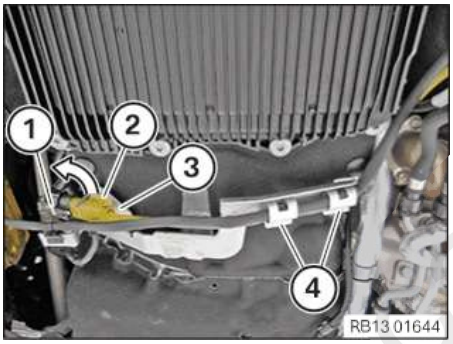
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



- Unlock and loosen connector (1).
- Loosen connector (2) from the holder (3) in direction of arrow.
- Release the monitoring oxygen sensor from the clamps (4).



- Release the monitoring oxygen sensor (1) with the standard tools.



- Thread out the monitoring oxygen sensor (1) and remove it.

carsdiagn.com

30 – Removing the nitrogen oxide sensor before SCR catalytic converter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

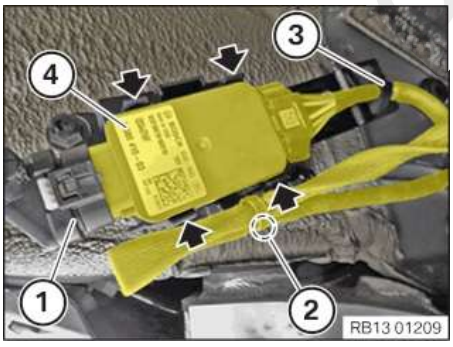
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

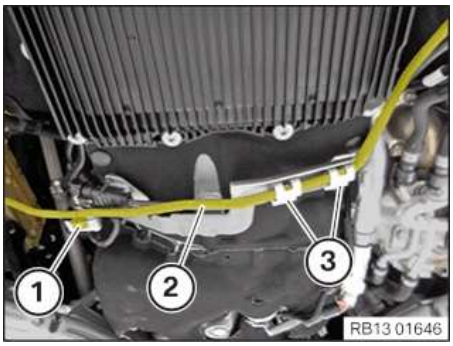
Damage to the nitrogen oxide sensor.

Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

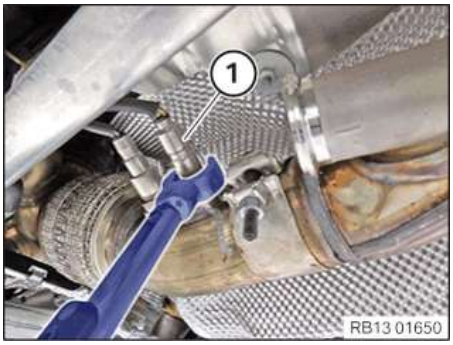
- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
- The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



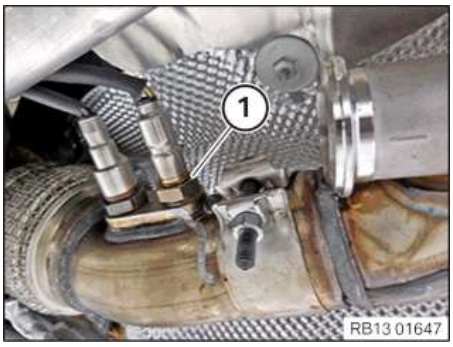
- Unlock plug connection (1) and disconnect.
- Release cable clip in area (2).
- Release line from the holder (3).
- Unclip control unit (4).



- Loosen clamp (1).
- Loosen the cables (2) from the clamps (3).



- Loosen the nitrogen oxide sensor (1) using commercially available tools.



- Feed out and remove the nitrogen oxide sensor (1).

31 – Removing the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

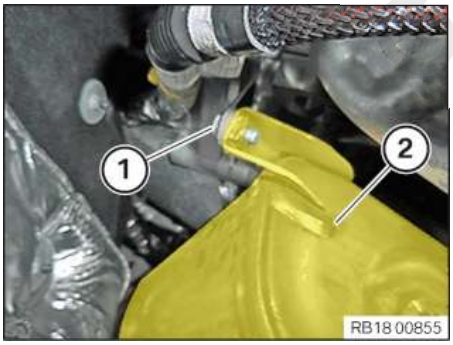
- Perform all work only on components that have cooled down.

CAUTION

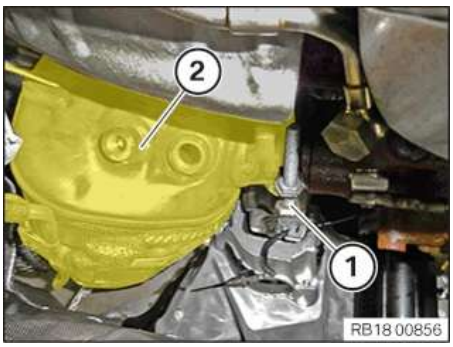
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

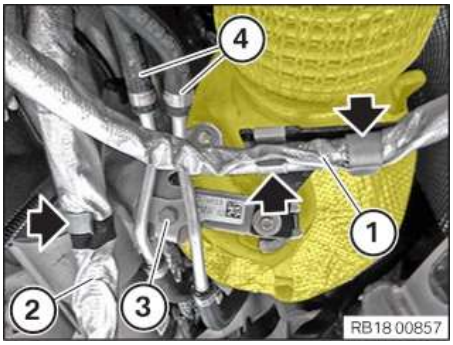


- Release bolt (1) from the holder of diesel particulate filter (2).

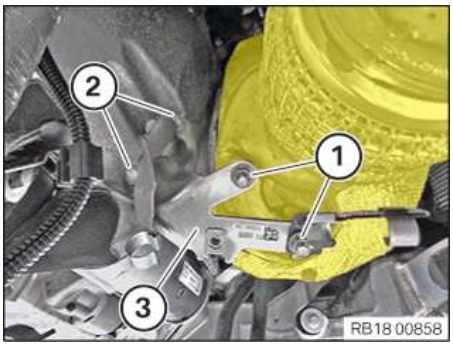


- Loosen V-band clamp (1).
- Feed V-clip (1) out from diesel particulate filter (2) and remove.

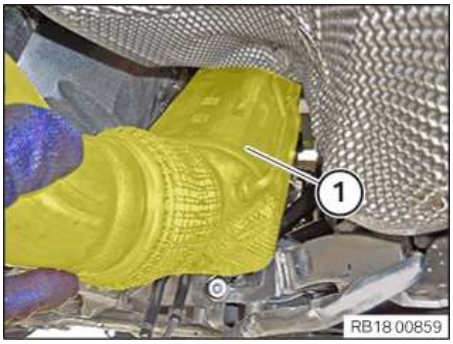
boardiagn.com



- Release the metering line (1) from clamps (Arrows).
- Release positive battery cable (2) from starter motor from clamp (Arrow).
- Loosen screw (3).
- Thread off coolant line (4) and place to the side.



- Loosen nuts (1).
- Loosen screws (2).
- Guide out and remove holder (3).



- Guide out and remove diesel particulate filter (1).

32 – Remove front right wheel

▸ **Removing the wheel**



TECHNICAL INFORMATION

A wheel lift is recommended for easier wheel removal and installation without exertion (see Retailer Equipment Catalogue).

- **In vehicles with M Carbon ceramic brake: The wheel lift must be used to remove the wheel.**

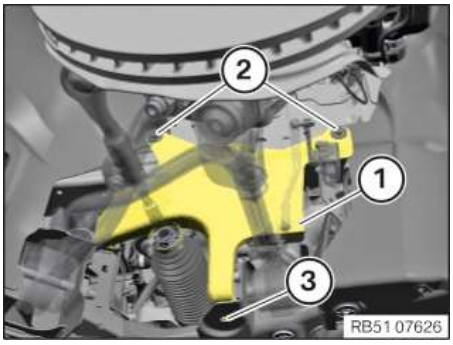
  This process is intended to prevent damage to the brake disc.

carsdiagn.com



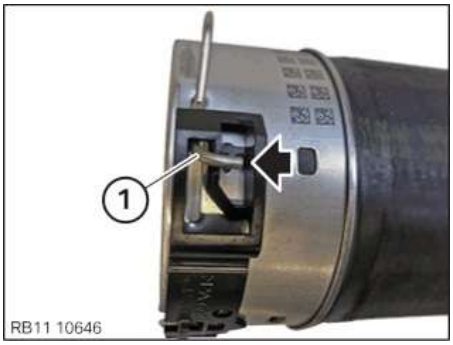
- If several wheels are removed at the same time: Use a piece of chalk to mark on each tyre the axle and side on which the corresponding wheel is fitted.
- Release the wheel bolts (arrows) crosswise and remove the wheel.
- To release and tighten wheel bolts with a security code: Use the correct adapter from the set of special tools .

33 – Remove the cover of the steering assembly



- Loosen screws (2) and (3).
- Remove the cover (1).

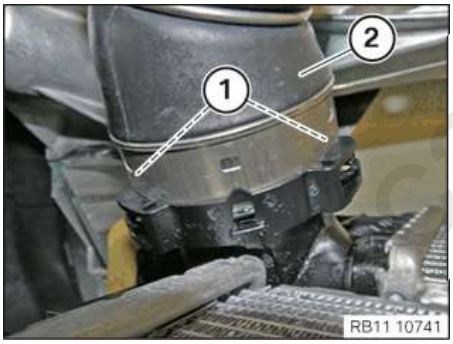
34 – Remove pressure pipe between exhaust turbocharger and charge air cooler



- **Version A:**

  Unlock lock (1).

  The lock (1) must snap audibly into place when unlocked (see arrow).



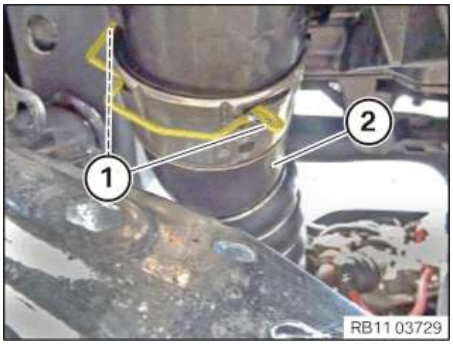
- Unlock the locks (1) on both sides and snap into place.
- Pull off pressure pipe (2) from charge air cooler.



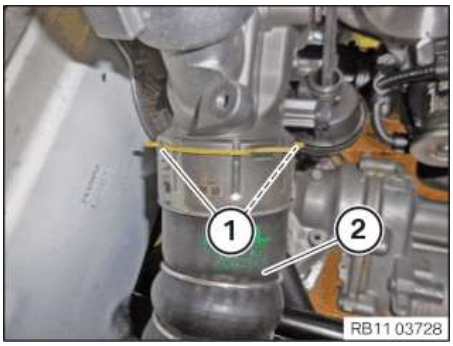
- **Version B:**

  Unlock clamp (1) and engage in this position.

cardiagn.com



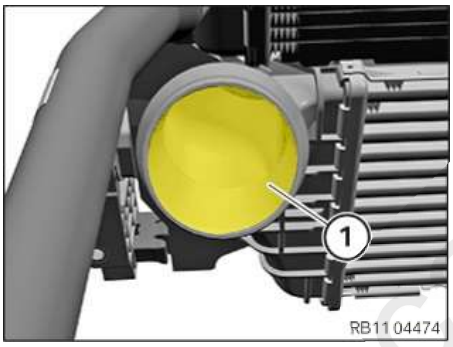
- Unlock the locks (1) and snap into place.
- Pull off pressure pipe (2) from charge air cooler.



- Unlock the lock (1) and engage.
- Pull off pressure pipe (2) from the compressor bypass.



- Remove pressure pipe (1) in upward direction.



NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

- Lock the opening (1) of the charge air cooler with a suitable auxiliary material.

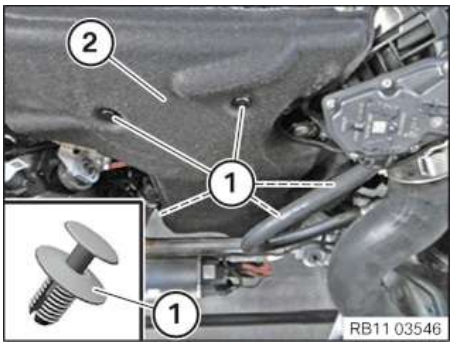
35 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.



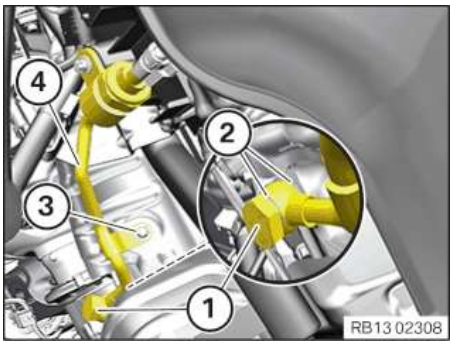
- Release and remove expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

carolagn.com

36 – Remove the exhaust gas pressure pipe



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).



- Unscrew the banjo bolt (1).
- Feed out and remove the sealing rings (2).
- Loosen screw (3).
- Feed out and remove the exhaust gas pressure pipe (4).

37 – Removing the sensor bracket on the cylinder head cover

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

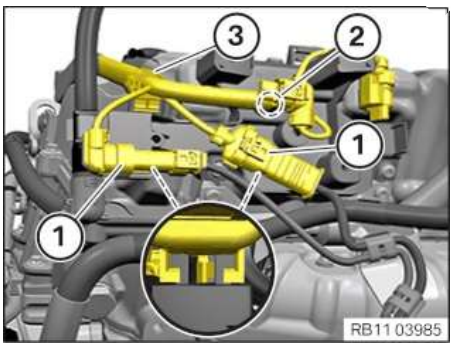
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

Contaminant or foreign body.

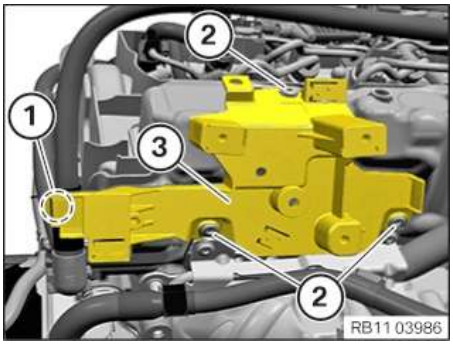
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Unlock plug connection (1) and disconnect.
- Unlock the plug connection (1) and release it from the sensor bracket.
- Release the cable clip in the area (2) from the sensor bracket.
- Release the clamps (3) and set the wiring harness section aside.

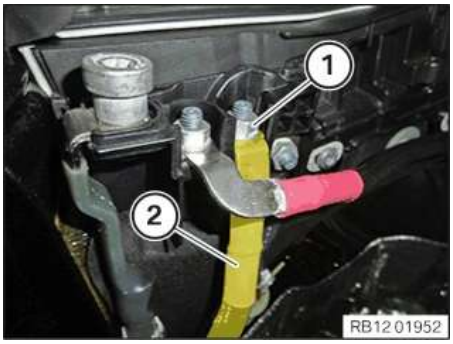
cardiagn.com



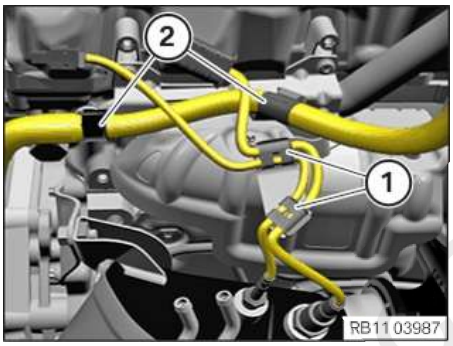
- Release the positive battery cable in the area (1) from the clamp and set it aside.
- Loosen screws (2).
- Feed out holder (3) for the sensor system and remove.



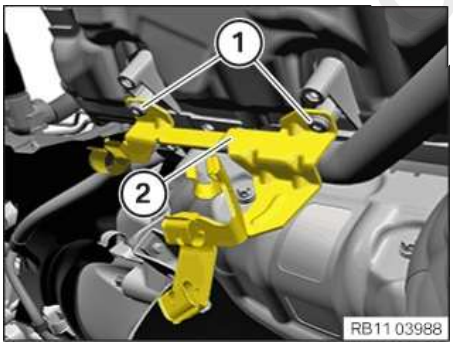
- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.



- Loosen nut (1).
- Feed out positive battery cable (2) and put to one side.



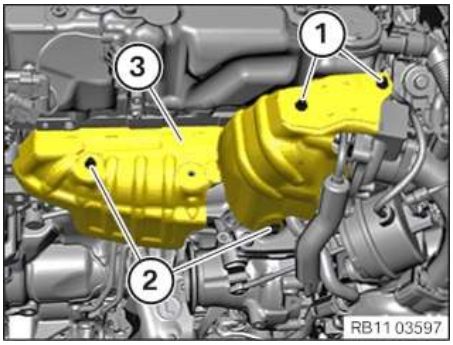
- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



- Loosen screws (1).
- Guide out and remove holder (2).

38 – Removing heat shield

cardiagn.com



- Loosen screws (1).
- Loosen screws (2).
- Feed out and remove the heat shield (3).

39 – Removing the high-pressure stage exhaust turbocharger and low-pressure stage turbocharger

CAUTION

Heavy component.

Heavy components can lead to injury or damage.

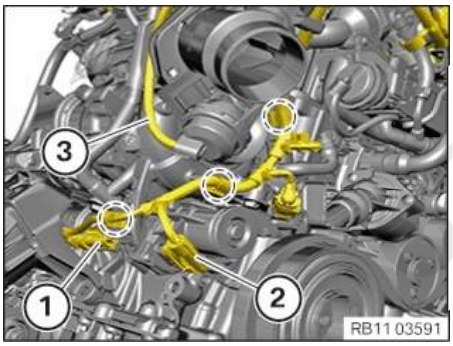
- Remove and install heavy components with the aid of another person/other persons.

TECHNICAL INFORMATION

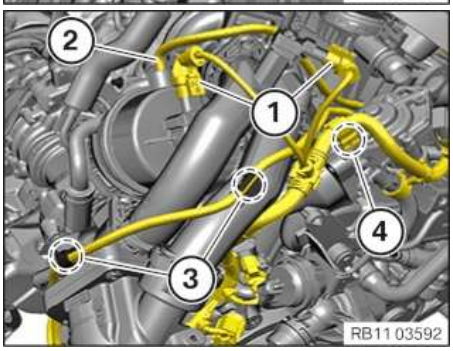
Prior to replacing the exhaust turbocharger: Observe the notes on troubleshooting on the exhaust turbocharger.
For additional information see: FUB-FUB-FB-130003-A10 Troubleshooting on the exhaust turbocharger

TECHNICAL INFORMATION

With exhaust turbocharger damage, it is imperative to observe the additional information.
For additional information see: 11 65 020 Exhaust turbocharger damage due to plugged oil supply lines



- Release plug connection in area (1) from holder.
- Unlock plug connection (2) and disconnect.
- Release the wiring harness in the marked areas from the exhaust turbochargers.
- Pull off the vacuum hose (3).



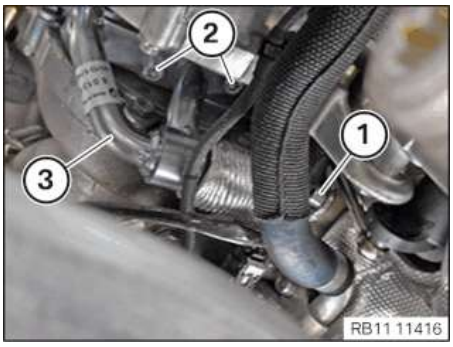
- Unlock plug connections (1) and disconnect.
- Pull off the vacuum hose (2).
- Release the vacuum hose in marked areas (3) from the exhaust turbochargers.
- Release the wiring harness in area (4) from the exhaust-gas recirculation cooler and set it aside.



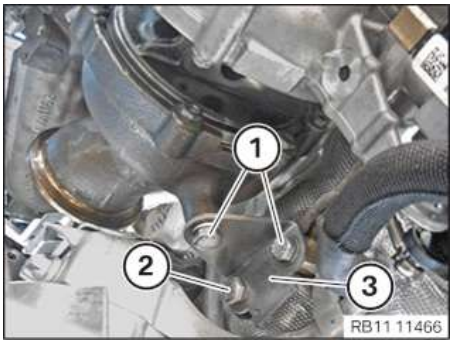
TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

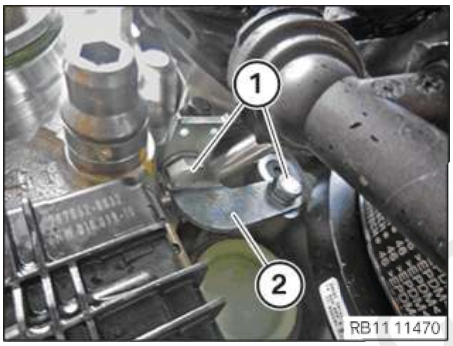
- Release the screws of the oil return line on the crankcase from the right wheel arch.



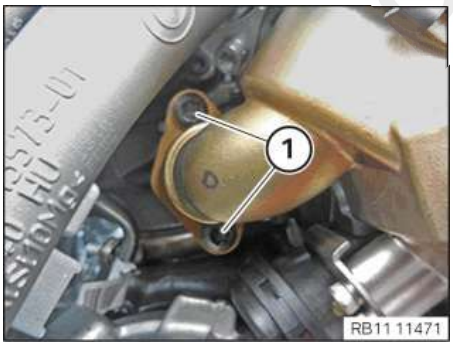
- Release the screw (1).
- Loosen screws (2).
- Remove oil return line (3) from the crankcase.
- Catch and dispose of emerging engine oil.



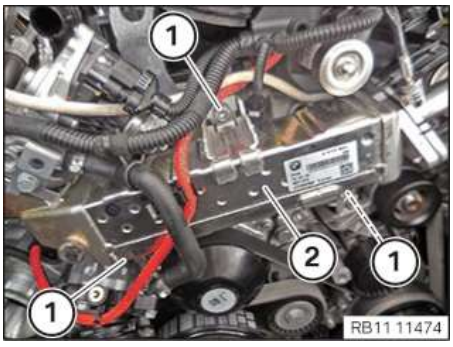
- Unscrew and remove the bolts (1) on the holder (3).
- Slacken screw (2) on holder (3), but do **not** remove.



- Loosen screws (1).
- Guide out and remove holder (2).

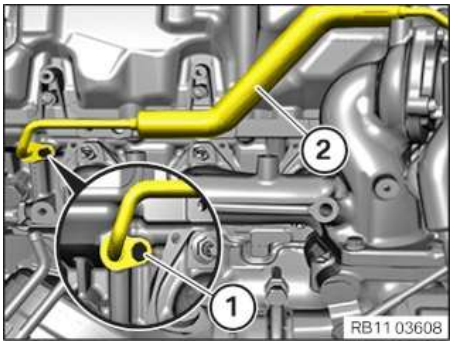


- Loosen screws (1).

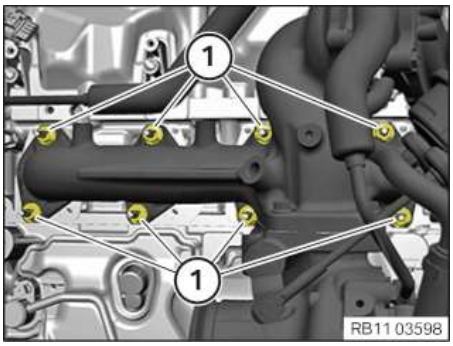


- Slacken screws (1), but do **not** remove.
- Release exhaust-gas recirculation cooler (2) slightly.

cardiagn.com



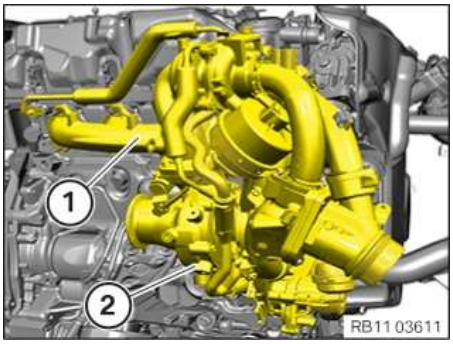
- Loosen screw (1).
- Remove oil feed line (2) for the high-pressure stage exhaust turbocharger from the cylinder head and set it aside.
- Catch and dispose of emerging engine oil.



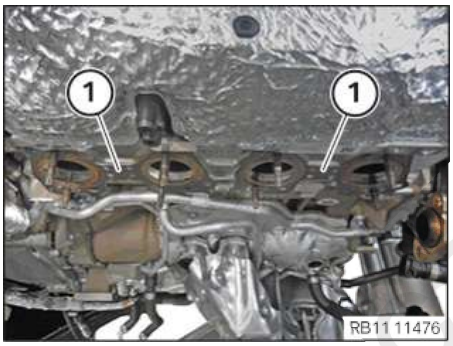
TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

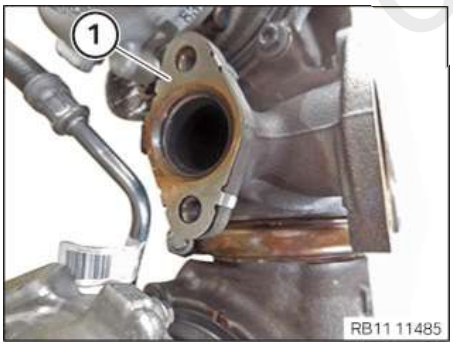
- Loosen nuts (1).



- Guide out exhaust manifold (1) with the high-pressure stage exhaust turbocharger and the low-pressure stage exhaust turbocharger (2) forward towards the top and remove.



- Guide out and remove gaskets (1).



- Guide out and remove gasket (1).

40 – Draining coolant

WARNING

Hot fluids.

Risk of scalding!

- Conduct all work in the vehicle wearing appropriate personal protective equipment only.

cardiagn.com

CAUTION

Materials harmful to health.

Contact with fluids harmful to health!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.

TECHNICAL INFORMATION

Life-long fill of coolant!

Do not reuse used coolant.

When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be emptied and refilled.

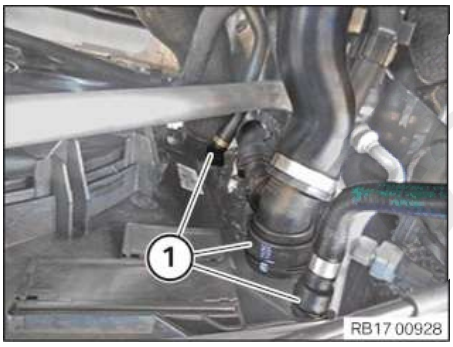
In the case of other removal work involving the draining of part quantities of coolant, the coolant level must be topped up with new coolant.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Loosen sealing cap (1) from the coolant expansion tank.



NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

- Unlock all coolant lines (1) and detach.
- Catch and dispose of escaping coolant.



- Unlock and loosen coolant line (1).
- Catch and dispose of escaping coolant.

41 – Partially releasing the wiring harness section on the intake plenum

cardiagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

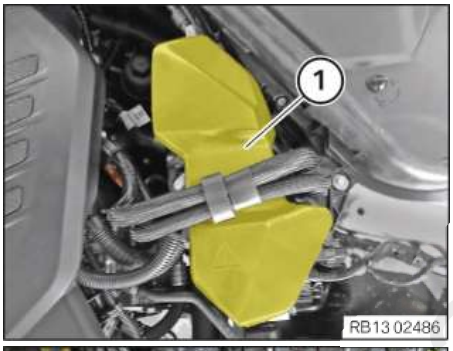
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

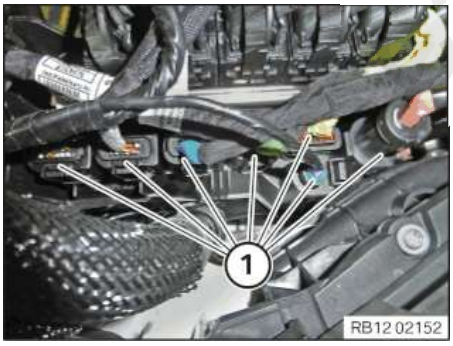
- Do not pull on the wires when disconnecting connectors and plug connections.

TECHNICAL INFORMATION

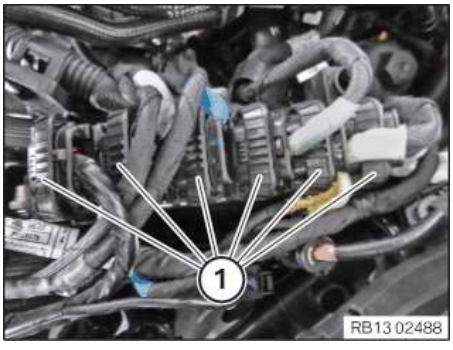
Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.



- Pull off cover (1) upwards, feed out and remove.

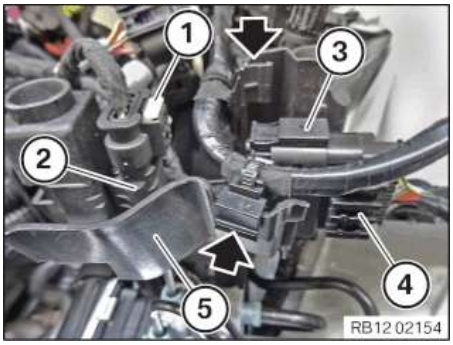


- Unlock and disconnect plug connections (1).

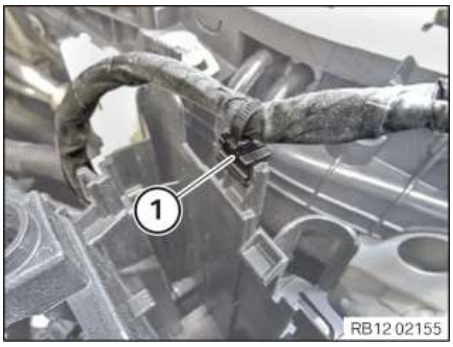


- Unlock and disconnect plug connections (1).

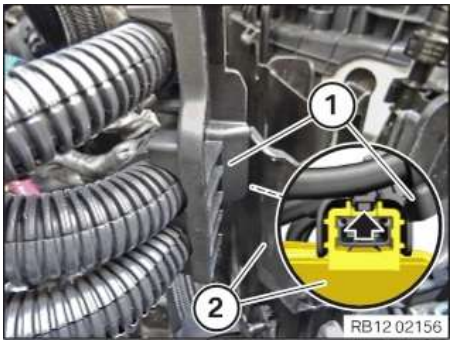
cardiagn.com



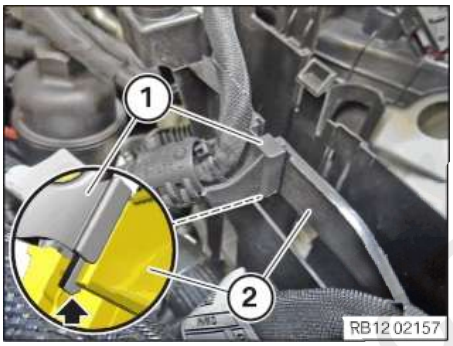
- Unlock plug connection (1) and disconnect.
- Unlock the plug (2) and disconnect from the control unit holder (5).
- Unlock plug connection (3) and disconnect.
- Unlock the plug (4) and disconnect from the control unit holder (5).
- Release the clamps (arrows).



- Loosen clamp (1).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).

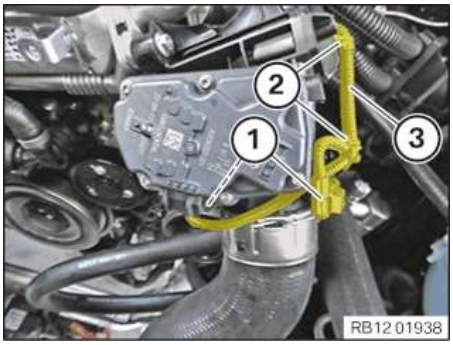


- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.

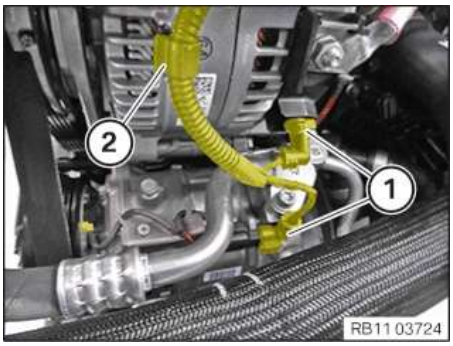


- Unlock holder (1) and feed out coolant line (2) and place it aside.

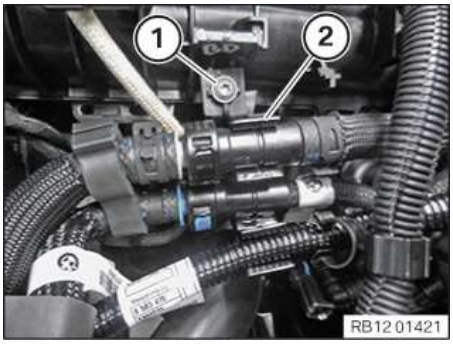
gardiagn.com



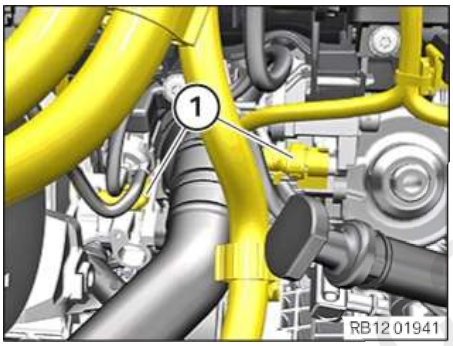
- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.



- Unlock and separate plug connections (1).
- Release the holder (2) from the alternator .



- Loosen screw (1).
- Thread out holder (2) and set aside.



- Unlock and disconnect plug connections (1).

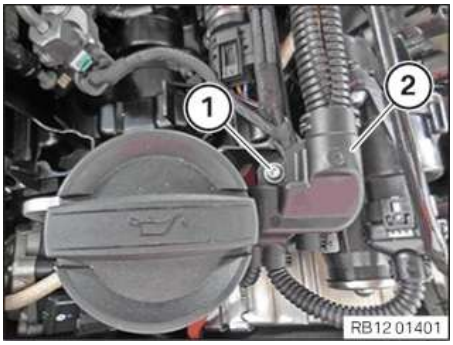


- Unlock and loosen connector (1).

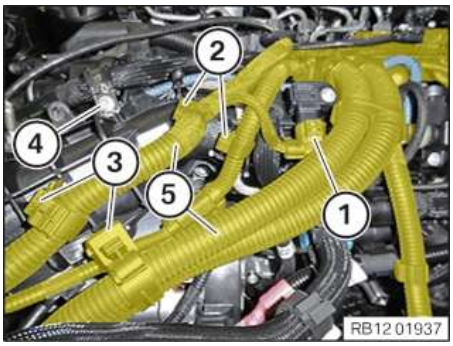


- Unlock plug connection (1) and disconnect.

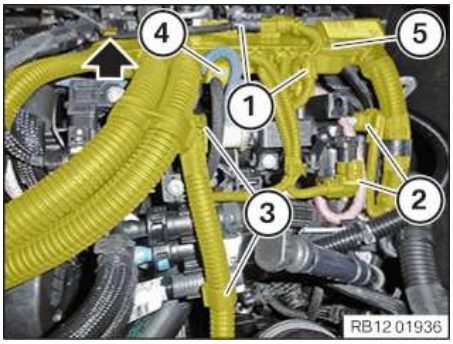
cardiagn.com



- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.



- Unlock plug connection (1) and disconnect.
- Loosen clamps (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.



- Unlock and disconnect plug connections (1).
- Release line from clamp (Arrow).
- Unlock and disconnect plug connections (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.

42 – Removing the intake plenum

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

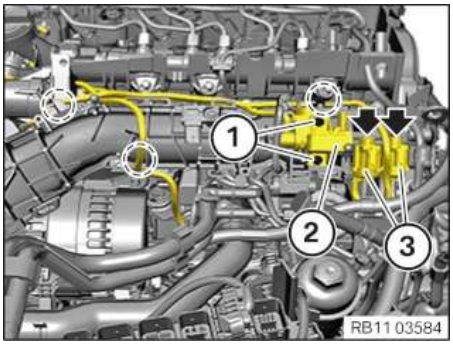


- Unlock clamp (1) and engage in this position.

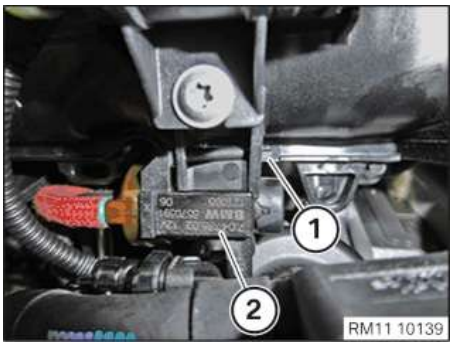


- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.

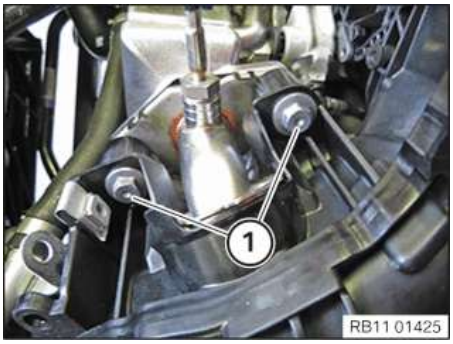
cardiagn.com



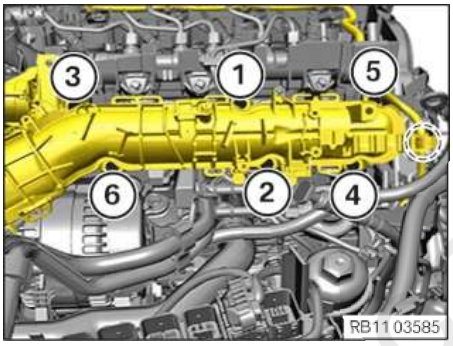
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



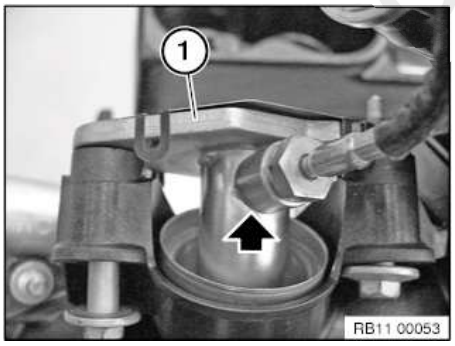
- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.



- Loosen screws (1).



- Detach the leakage oil lines in the marked area from the intake plenum.
- Loosen screws in the order (6) to (1).
- Guide the intake plenum out forwards and remove it.



- Remove the exhaust-gas recirculation pipe (1) (arrow).

43 – Removing the exhaust-gas recirculation cooler

▸ **Avoiding damage to the starter generator due to escaping coolant**

cardiagn.com

RISK OF DAMAGE

Escaping coolant on the starter generator.

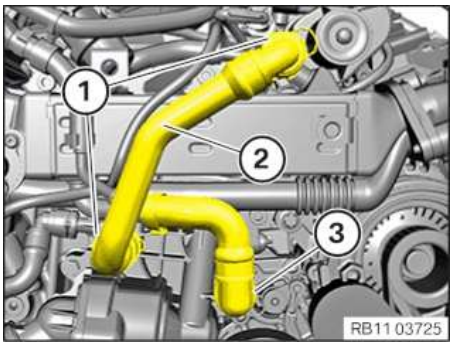
Damage and operating failure of the starter generator.

- Cover the starter generator with suitable, watertight auxiliary materials.
- Close off line connections with seal plugs.
- If necessary: Flush the leaked coolant from the starter generator with at least 1 l water.



- **Version A:**

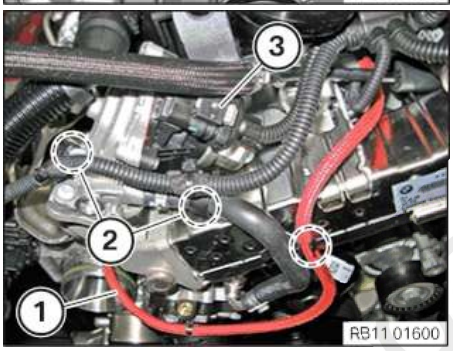
  Unlock and pull off coolant lines (1).



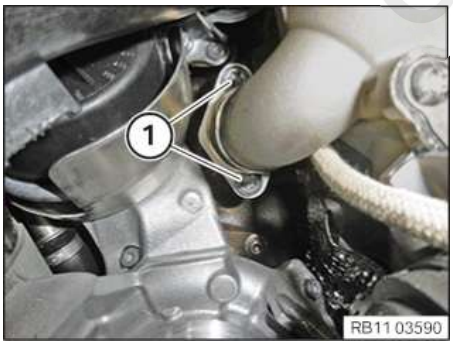
- **Version B:**

  Unlock locks (1) and remove thee coolant line (2).

  Unlock coolant line (3) and pull it off the thermostat.



- Loosen the vacuum line (1) from the exhaust-gas recirculation cooler and detach in the highlighted area.
- Loosen the vehicle wiring harness from the exhaust-gas recirculation valve and the coolant line at the clips (2).
- Unlock and disconnect the connector (3) at the exhaust-gas recirculation valve.



- Release the bolts (1) from the exhaust-gas recirculation cooler.

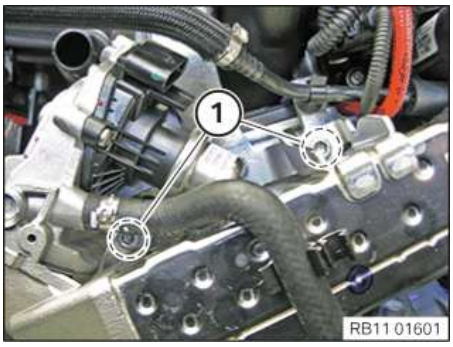


- Loosen the screws (1) on the intake system.

carmagn.com



- Loosen the screw (1) below the exhaust-gas recirculation cooler.



- Loosen screws (1).
- Remove exhaust-gas recirculation cooler.

44 – Detaching the leakage oil line from the injectors

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

WARNING

Hot surfaces.

Risk of burning!

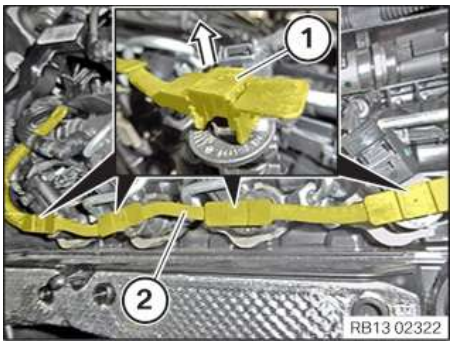
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



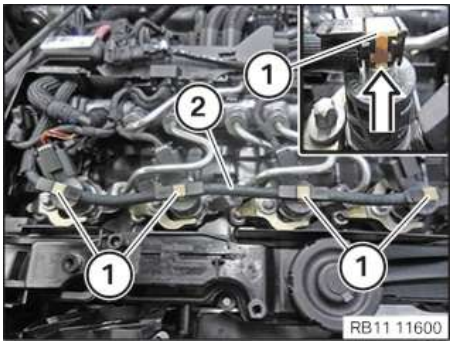
- **Version A:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.

cardiagn.com

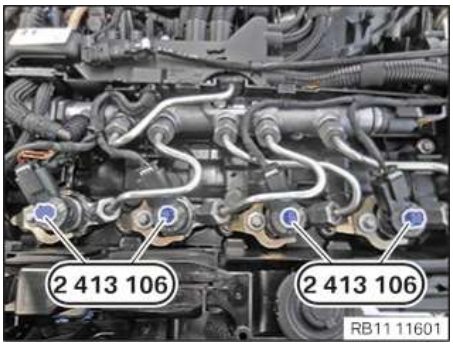


- **Version B:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.



- Seal open connections with special tools .

45 – Remove the high pressure lines between the injector and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

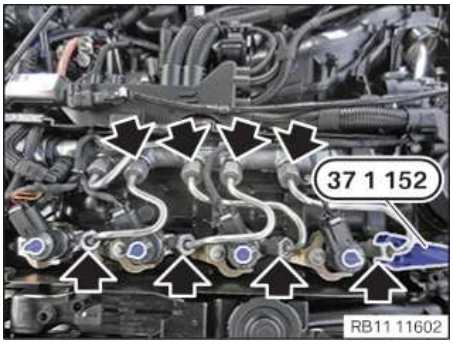
cardiagn.com

TECHNICAL INFORMATION

If several high pressure lines are removed, ensure that each high pressure line is installed in its original location. Label high pressure lines.

TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.



- Release the high pressure lines (arrows) with the special tool .
  Reset the special tool early on to prevent bending of the high pressure line.
- Catch and dispose of escaping fuel.
- Feed out and remove the high pressure lines (arrows).
- Seal off all the open cable connections with the special tool .

46 – Remove the high pressure line between the high pressure pump and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Hot fluids.

Risk of scalding!

- Conduct all work in the vehicle wearing appropriate personal protective equipment only.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

cardiagn.com

TECHNICAL INFORMATION

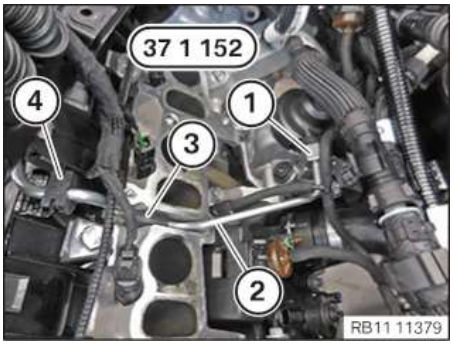
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

TECHNICAL INFORMATION

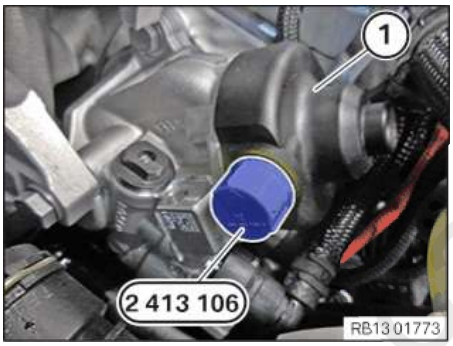
Reset special tool in early to avoid bending pressure lines.



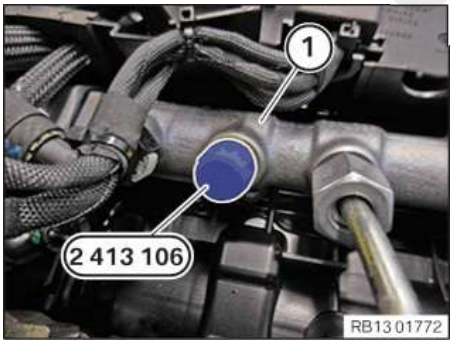
- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.



- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.
- Guide out and remove the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).



- Seal off the opening at the high pressure pump (1) with the special tool .



- Seal off the opening on the rail (1) with the special tool .

47 – Remove high-pressure rail

cardiagn.com

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

RISK OF DAMAGE

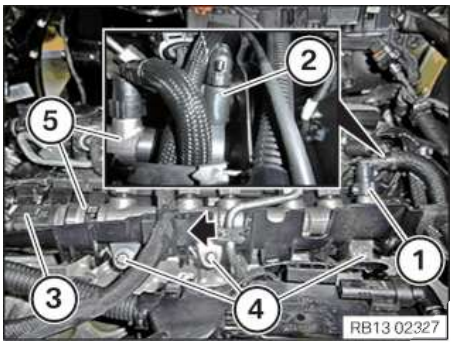
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Unlock and disconnect the fuel return line (1).
- Guide the fuel return line (1) out and set it aside.
- Unlock and disconnect the plug connection (2) on the rail pressure regulating valve.
- Unlock and disconnect the plug connection (3) on the rail pressure sensor.
- Unlock cable clip (Arrow), feed out and place aside.
- Loosen screws (4).
- Thread out and remove the rail (5).

48 – Remove all injection systems

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

cardiagn.com

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

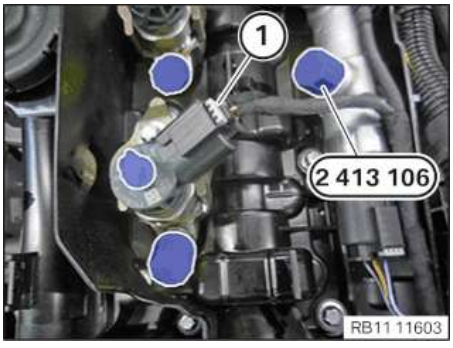
Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

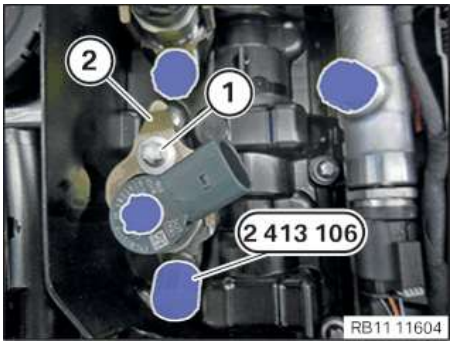
TECHNICAL INFORMATION

If several injectors are removed, ensure that each injector is installed at its original location (cylinder). Mark injectors.



- Unlock plug connection (1) and disconnect.

cardiagn.com



- Loosen screw (1).
- Guide out and remove clamping claw (2).
- Feed out and remove the injector with slight rotational movements.

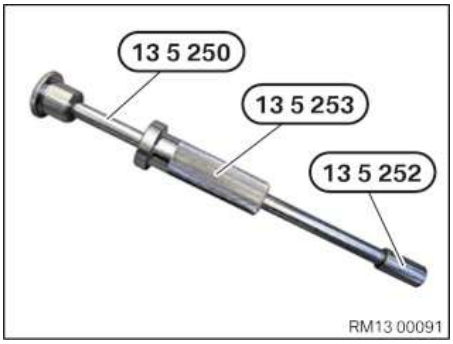
▸ **Loosen stuck injectors**

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Unscrew special tool 0 493 339 (13 5 252) from special tool 0 493 321 (13 5 250) and remove special tool 0 493 340 (13 5 253).
- Screw special tool 0 493 339 (13 5 252) back onto special tool 0 493 321 (13 5 250).

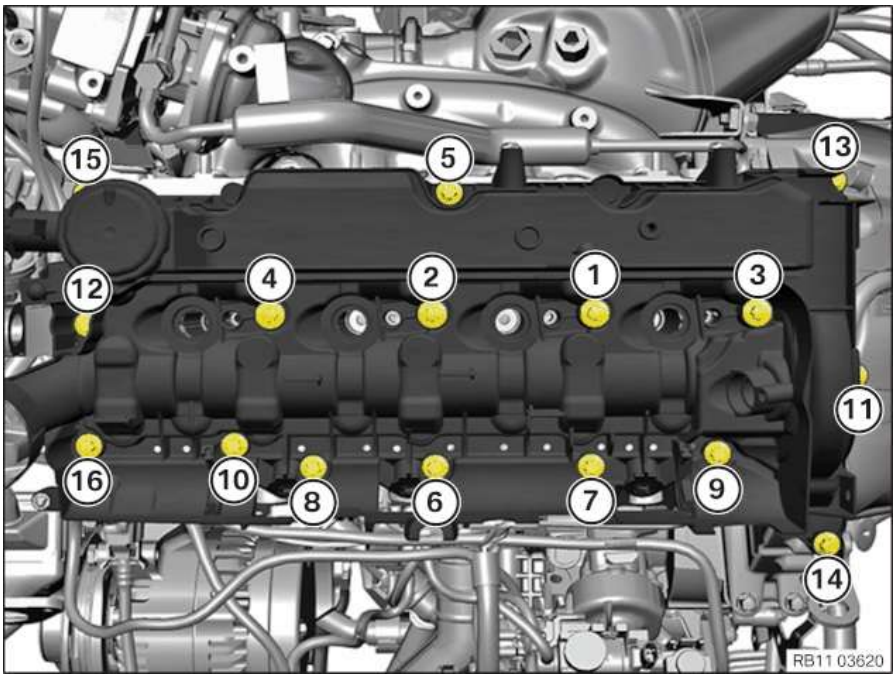


- Screw special tool 0 493 321 (13 5 250) with special tool 0 493 339 (13 5 252) onto pressure line connection (1) of injector.
- Release injector (1) with special tools 0 493 321 (13 5 250) and 0 493 339 (13 5 252) by means of **short** back and forth movements and remove.

49 – Removing the cylinder head cover

carsdiagn.com

Screw connection of the cylinder head cover



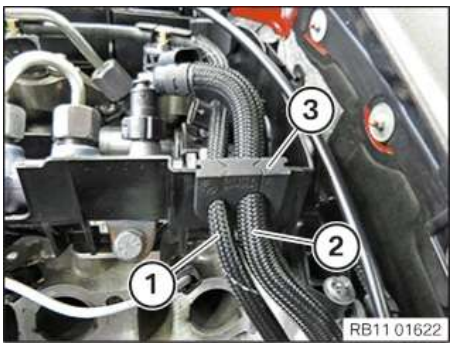
1 - 16 Bolts of the cylinder head cover



- Unlock and detach the locks.
- Feed the engine ventilation line (1) out and set it aside.

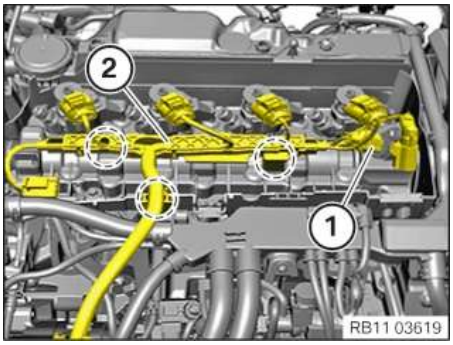


- Feed out and remove the heat shield (1).

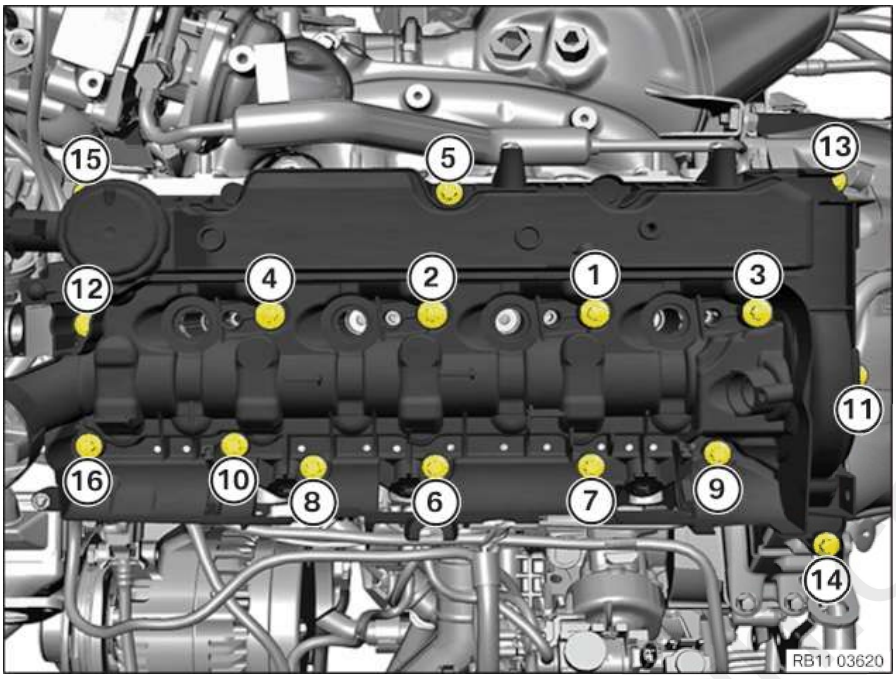


- Remove the leakage oil line (1) including the fuel return line (2) and the grommet (3) and put to one side.

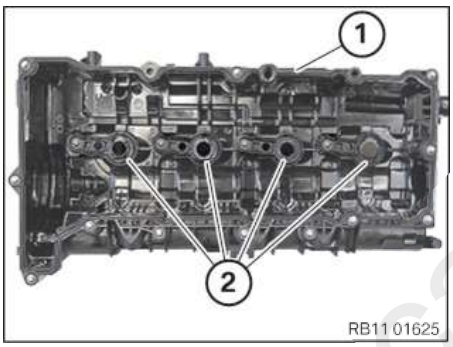
cardiagn.com



- Unlock connector (1) and pull off.
- Disconnect the wiring harness (2) in the marked areas from the cylinder head cover and set aside.



- Evenly loosen the screws in a sequence from (16) to (1).
- Feed out and remove the cylinder head cover.



- Remove the profile seals (1) and (2).

50 – Removing starter motor

Prerequisite

Battery earth leads are disconnected.

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

cardiag.com

WARNING

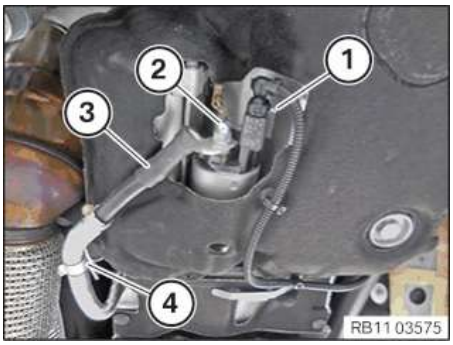
Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

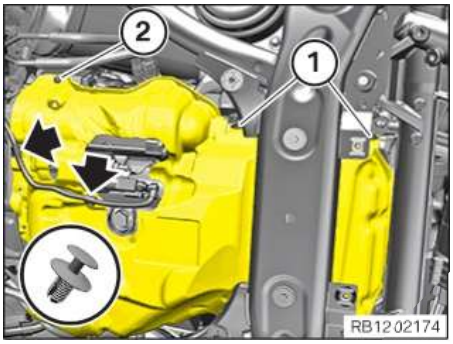
- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

TECHNICAL INFORMATION

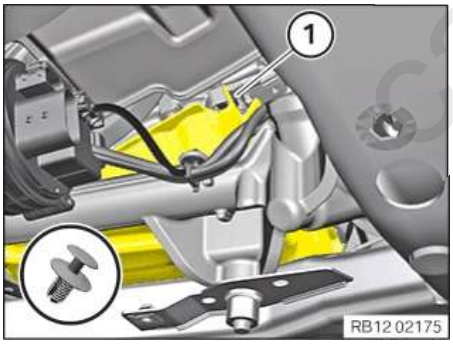
Make sure that the acoustic cover is **not** damaged while removing the starter motor.
A damaged lower acoustic cover can only be renewed when the front axle is lowered.



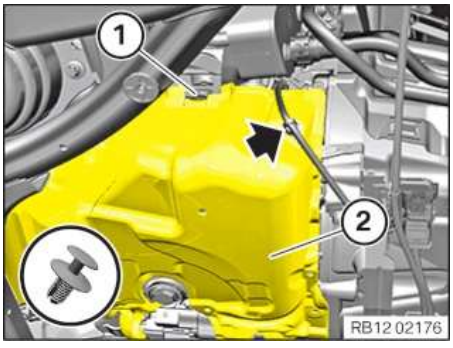
- Unlock plug connection (1) and disconnect.
- Release nut (2).
- Release positive battery cable (3) from holder (4).



- Loosen the expanding rivet (1).
- Undo fir tree clip (2).
- Release the clamps (arrows).

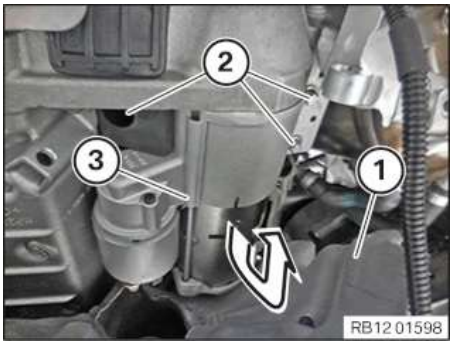


- Loosen expanding rivet (1).
- Lower the acoustic cover of the oil sump.



- Loosen expanding rivet (1).
- Loosen the clamp (arrow).
- Lower acoustic cover (2).

carsdiagn.com



- Make sure that the acoustic cover (1) is not damaged.
- Carefully press acoustic cover (1) to one side.
- Loosen screws (2).
- Carefully guide out the starter motor (3) in direction of arrow and remove.

51 – Checking camshaft timing



RISK OF DAMAGE

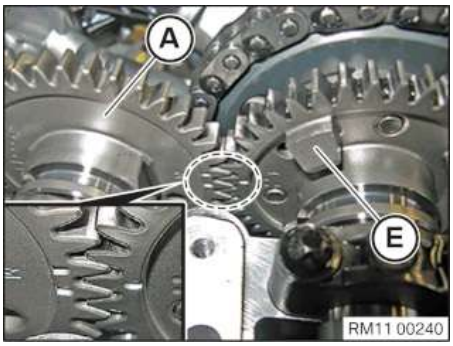
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

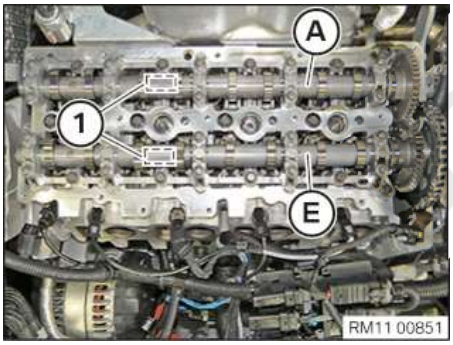
- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

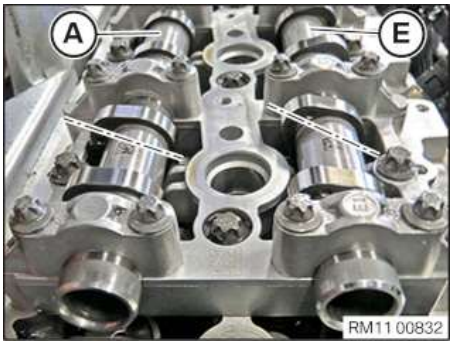
  Do **not** crank the engine in reverse.



- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.



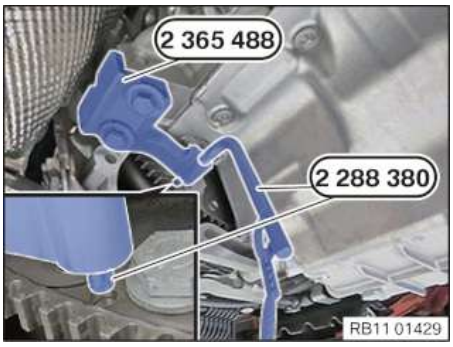
- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.

cardiagn.com



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

52 – Remove chain tensioner piston

RISK OF DAMAGE

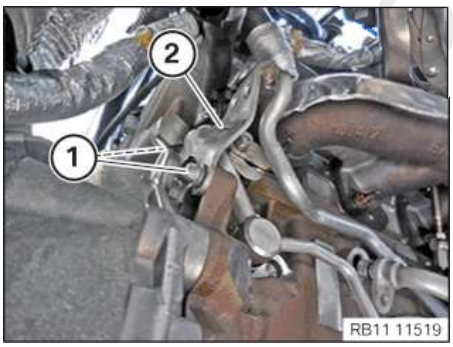
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

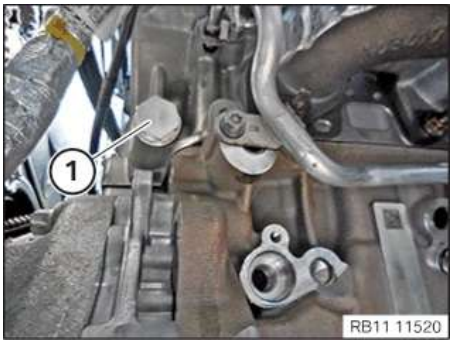
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Loosen screws (1).
- Guide out and remove holder (2).



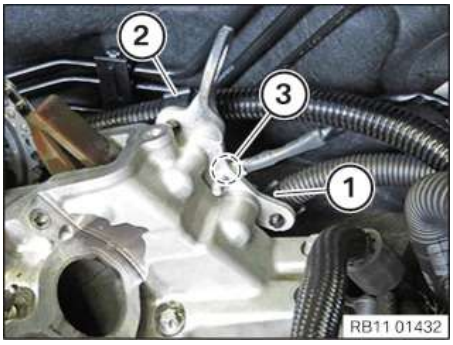
- Loosen the chain tensioner piston (1).
- Catch and dispose of emerging engine oil.

cardiagn.com

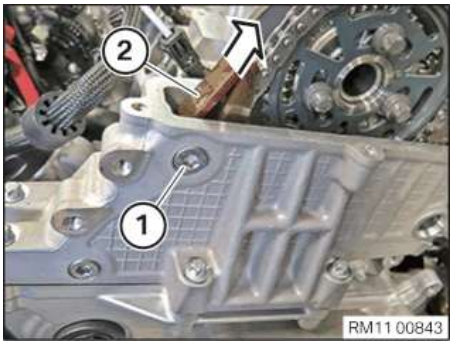


- Feed out and remove the sealing ring (1).

53 – Remove the timing chain guide rail

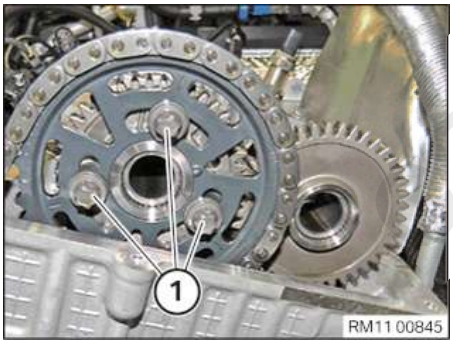


- Loosen the vehicle wiring harness (1) from the bracket.
- Release the positive battery cable (2) from the holder .
- Loosen the screw (3) and remove the grounding cable.



- Remove the bearing journal (1).
- Remove the guide rail (2) in the direction of the arrow.

54 – Removing the camshaft sprocket on the intake camshaft



- Loosen screws (1).
- Secure the drive chain against falling.
- Remove the camshaft sprocket on the intake camshaft.

55 – Removing the special tool for fixing the exhaust camshaft



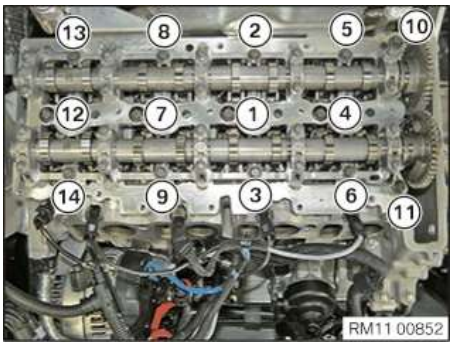
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

56 – Removing the camshaft support

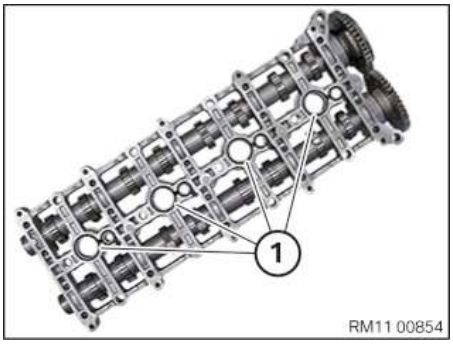
cardiagn.com

TECHNICAL INFORMATION

The camshaft is tensioned by the valve springs. Tighten or loosen each screw on the camshaft bearing caps one at a time in the specified sequence and by half a turn only. Repeat procedure.

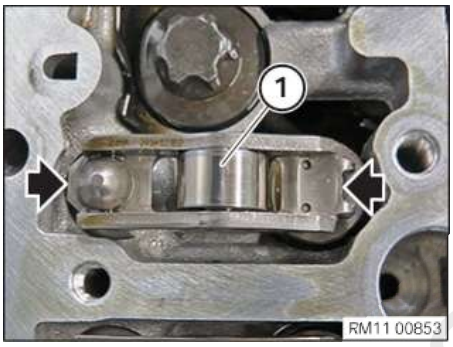


- Unscrew the screws evenly in order (14) to (1) in multiple increments.
- Feed out and remove the camshaft support with the camshafts towards the top.



- Guide out and remove gaskets (1).

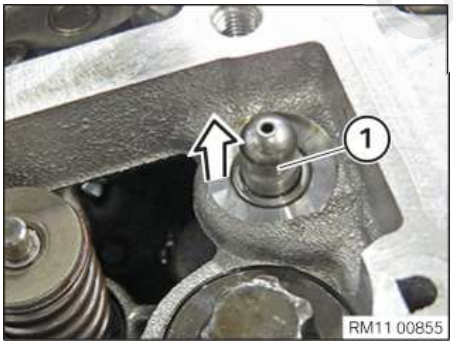
57 – Remove roller cam followers



- Guide out and remove all roller cam followers (1) (arrows).
- Place all roller cam followers (1) in order in special tool 0 495 105 (11 4 480).

  Roller cam followers that have already been used must be installed in same position again.

58 – Removing all hydraulic valve clearance compensating elements



- Remove all hydraulic valve clearance compensating elements (1) in the direction of the arrow.
- Catch and dispose of emerging engine oil.
- Store all hydraulic valve clearance compensating elements properly arranged on the special tool 0 495 105 (11 4 480).
- Make sure to observe the assignment of the roller cam followers to the hydraulic valve clearance compensating elements when reusing the hydraulic valve clearance compensating elements (1).

59 – Remove all glow elements

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

cardiagn.com

RISK OF DAMAGE

Damage to the glow elements.

Excessive force may damage the glow elements and they may then have to be renewed.

- Handle glow elements with care and do not drop.
- Do not rest the cylinder head on glow elements. Glow elements protrude from the sealing surface of the cylinder head.

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

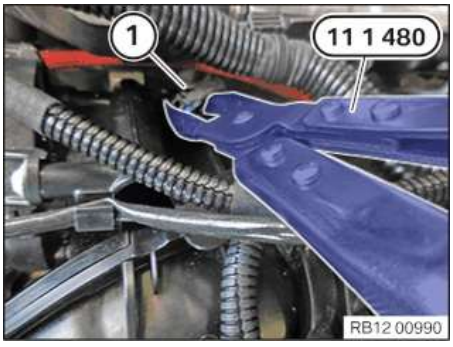
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

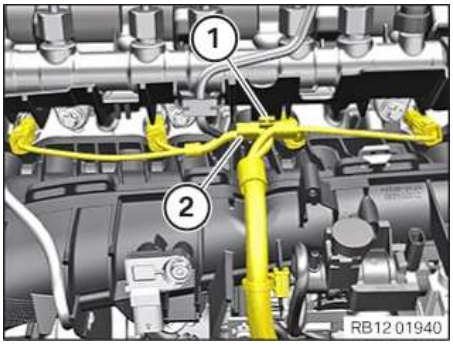
NOTICE

The description is for one component only. The procedure is identical for all further components.

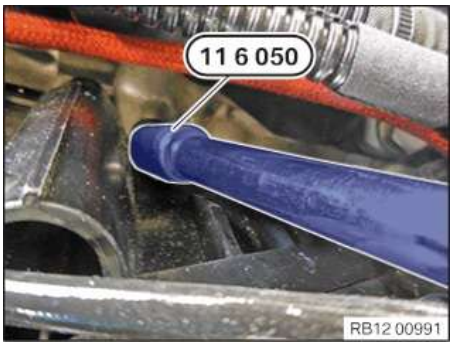


- Unlock and release the connector (1) using special tool 0 490 796 (11 1 480).

cardiagn.com



- Loosen clamp (1).
- Remove the wiring harness section (2) and put to one side.



- Unscrew the glow elements with the special tool or conventional tools.

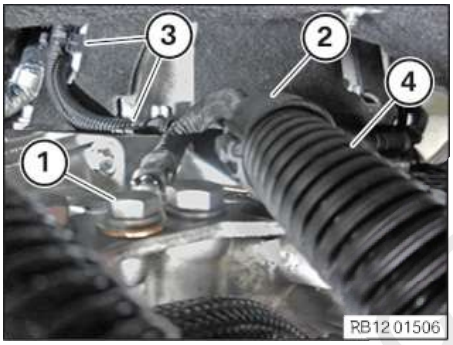
60 – Removing cylinder head

RISK OF DAMAGE

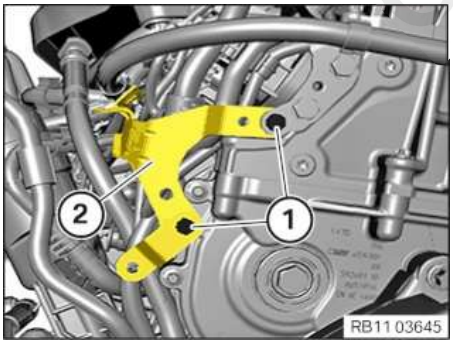
Heavy component.

Heavy components can lead to injury or damage.

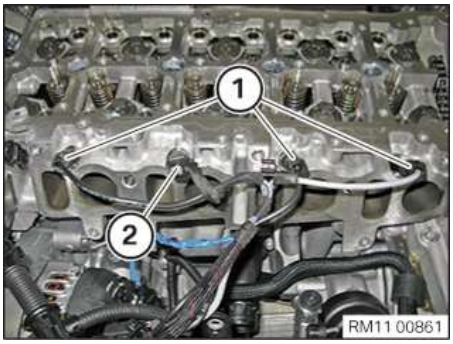
- Remove and install heavy components with the aid of another person/other persons.



- Loosen screw (1).
- Unlock and loosen holder (2).
- Unlock and loosen the clamps (3).
- Feed out the wiring harness section (4) of the automatic transmission and place to one side.

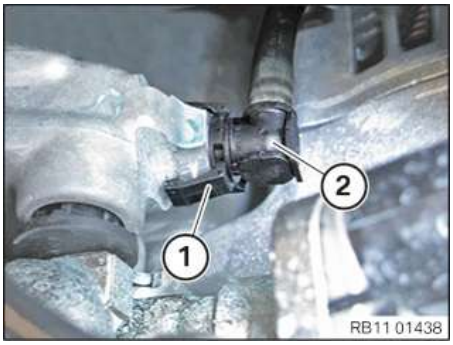


- Loosen screws (1).
- Guide out and remove holder (2).

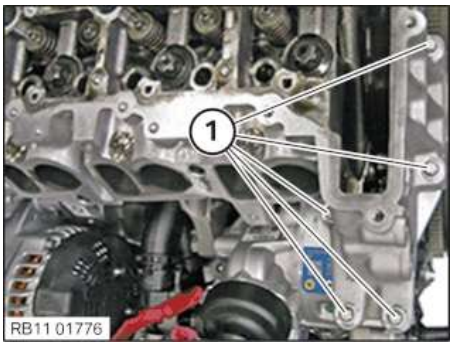


- Release plug connections (1) with special tool 0 495 140 (12 2 300).
- Unlock and disconnect the plug connections (1) and (2).
- Place wiring harness to one side.

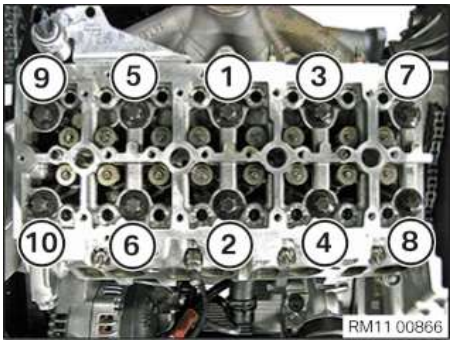
cardiagn.com



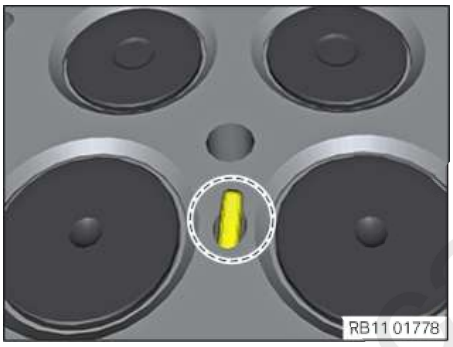
- Release lock (1) of coolant line.
- Remove the coolant line (2) and set it aside.



- Unscrew and remove the bolts (1).



- Release cylinder head bolts from **outside** to **inside** in the order (10) to (1).



RISK OF DAMAGE

Damage to the glow elements.

Excessive force may damage the glow elements and they may then have to be renewed.

- Handle glow elements with care and do not drop.
- Do not rest the cylinder head on glow elements. Glow elements protrude from the sealing surface of the cylinder head.

- Remove the cylinder head with an auxiliary person.



- Check the cylinder head and crankcase for damage.
- Check the fitting sleeves (1) for damage and replace if necessary.

RISK OF DAMAGE

Damage to the surface.

The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.

- Clean the sealing surfaces on the cylinder head and the crankcase using special tool 0 495 102 (11 4 470).

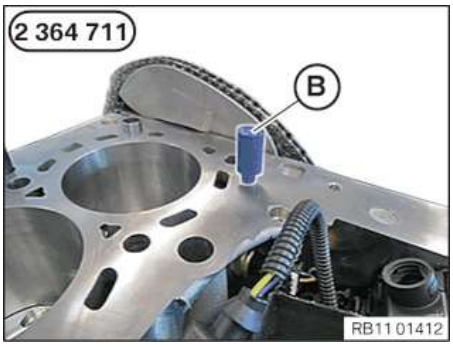
61 – Cleaning the sealing surface

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Lock the front oil duct using special tool (B) from special tool 2 364 711.



RISK OF DAMAGE

Damage to the surface.

The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.

- Clean the sealing surface using special tool 0 495 103 (11 4 471).



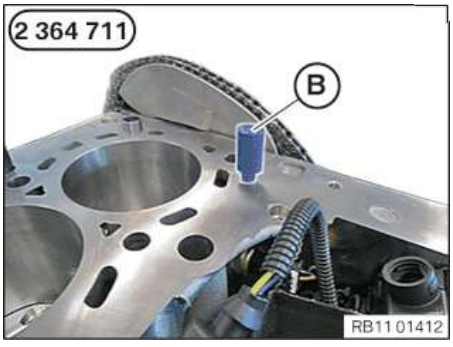
RISK OF DAMAGE

Damage to the surface.

The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.

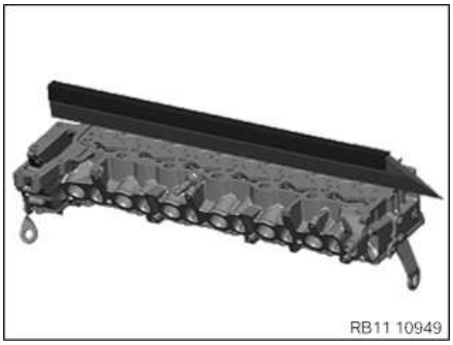
- Clean the sealing surface using special tool 0 495 104 (11 4 472).



- Remove special tool (B).

62 – Check the flatness of the cylinder head

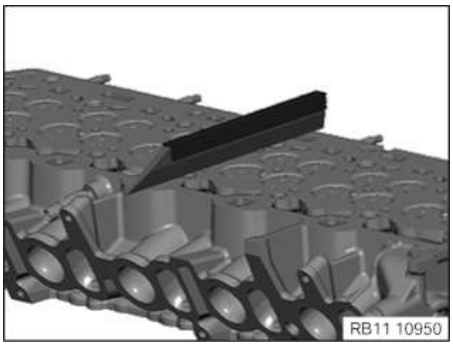
carsdiagn.com



- Check the flatness of the cylinder head lengthwise using a straightedge.

Cylinder head flatness

Maximum lengthwise deviation from flatness	0.10 mm
Maximum transverse deviation from flatness	0.05 mm

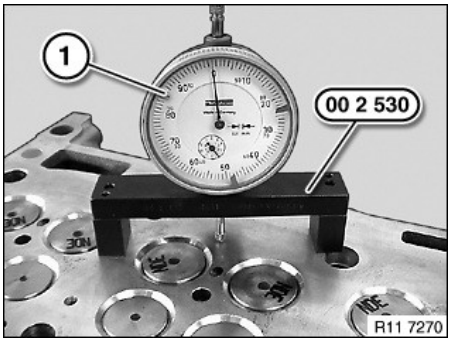


- Check the flatness of the cylinder head crosswise using a straightedge.

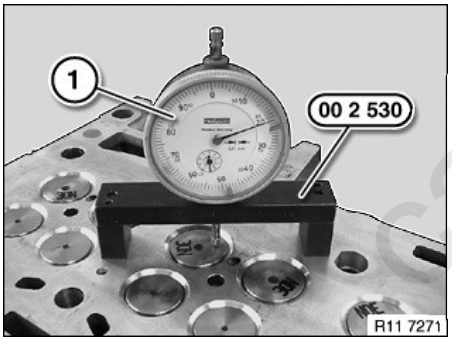
Cylinder head flatness

Maximum lengthwise deviation from flatness	0.10 mm
Maximum transverse deviation from flatness	0.05 mm

63 – Checking the valve underprotrusion



- Set the dial gauge (1) onto the cleaned cylinder sealing surface with slight preload in special tool 0 490 185 (00 2 530).
- Set dial gauge in mildly preloaded state to "zero".



Check

- Position the dial gauge (1) on the valve with special tool 0 490 185 (00 2 530).
- Measure valve underprotrusion and compare with the setpoint value.

Valve underprotrusion

	0,8 (0.7 - 0,9) mm

Result

» Valve underprotrusion is outside tolerance.

Measure

- Renew cylinder head.

  Parts: Cylinder head

MAIN WORK

64 – Remove all valve springs

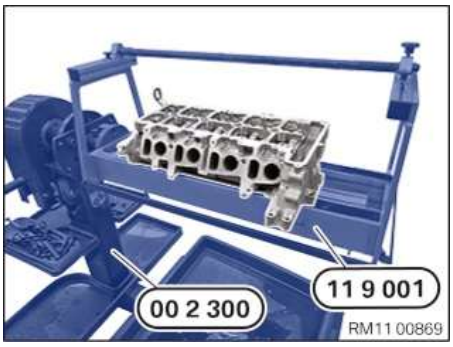
cardiagn.com

RISK OF DAMAGE

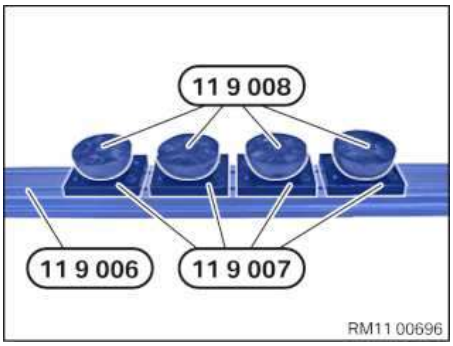
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



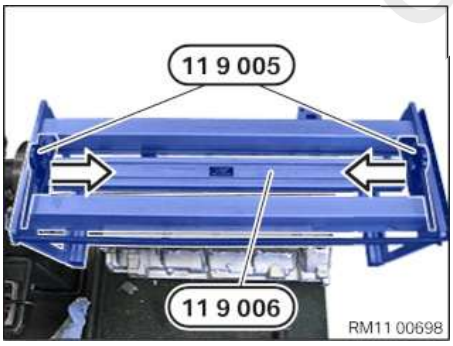
- Mount and screw the cylinder head onto the special tools 0 494 366 (11 9 001) and 0 495 187 (00 2 300).



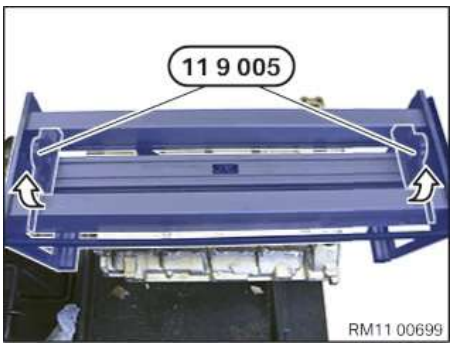
- Prepare the special tools 0 494 371 (11 9 006), 0 494 372 (11 9 007) and 0 494 373 (11 9 008) as shown.



- Position special tools 0 494 373 (11 9 008) as pictured.

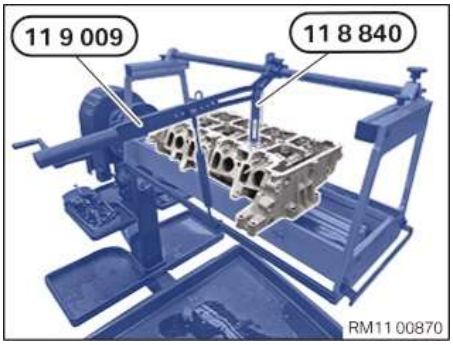


- Turn round special tool 0 494 371 (11 9 006) and insert as shown.
- Lock special tool 0 494 370 (11 9 005)in direction of arrow.



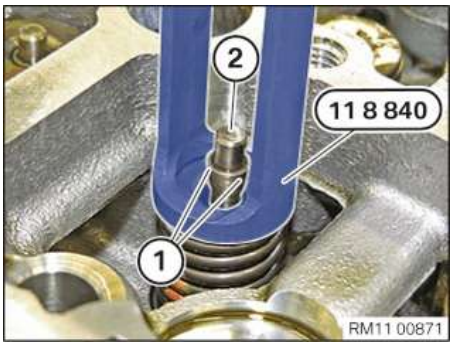
- Lock special tool 0 494 370 (11 9 005)in direction of arrow.
- Move cylinder head with special tool 0 494 362 (11 9 000) through 180° into the installation position.

cardiagn.com



- Align special tool 0 494 374 (11 9 009) in direction of valve axis.
- Position the special tool 0 496 143 (11 8 840) according to the nut.
- Press down the valve spring on the upper spring cup with the special tools 0 494 374 (11 9 009) and 0 496 143 (11 8 840).

  The **hooks** from the set of special tools 0 494 362 (11 9 000) can be used to **hold** the valve spring in pressed position.



- Keep the valve spring pressed down with the special tool 0 496 143 (11 8 840).
- Remove valve shims (1) of valve (2) with a magnet.
- Feed out valve spring and spring cup and remove.
- Place valve spring, spring cup and valve shims (2) in special tool 0 495 105 (11 4 480) in an orderly manner.

65 – Remove valve stem seals

RISK OF DAMAGE

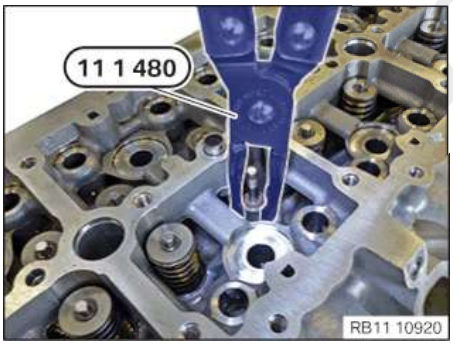
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

NOTICE

The description is for one component only. The procedure is identical for all further components.



- Remove the valve stem seal (1) with the special tool 0 490 796 (11 1 480).

66 – Installing valve stem seals

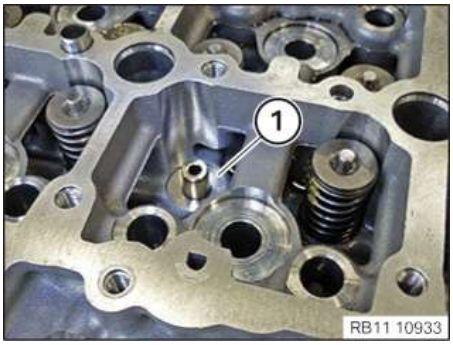
RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

cardiagn.com



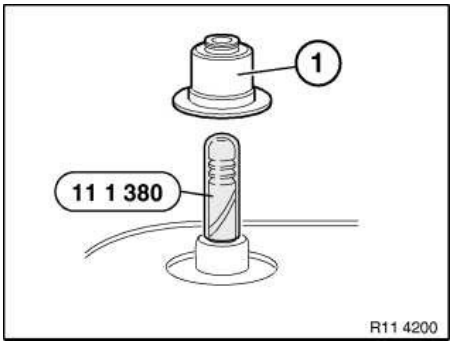
RISK OF DAMAGE

Damage to the surface.

The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

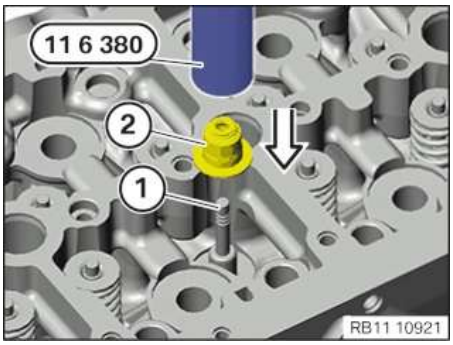
- Do not use any metal-cutting tools.

- Clean the contact surfaces (1).



- Fit special tool 0 490 746 (11 1 380).
- Renew the valve stem seal (1).

  Parts: Valve stem seal
- Lubricate and set the valve stem seal (1).



- Position the valve stem seals (2) on the valve (1).
- Press down valve stem seal (2) up to the contact surface on the cylinder head using special tool 0 493 249 (11 6 380).

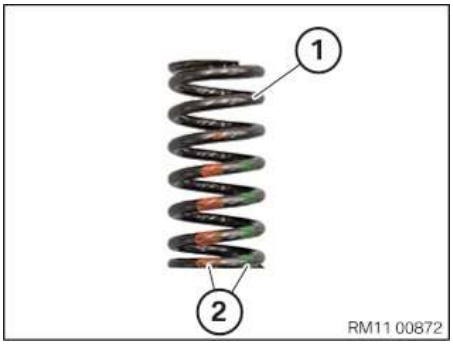
67 – Install all valve springs

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

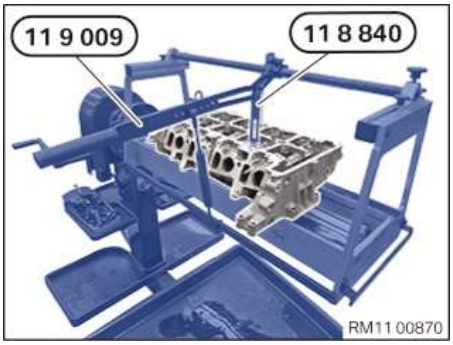
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Ensure that the valve spring (1) is marked using a colour code (2).

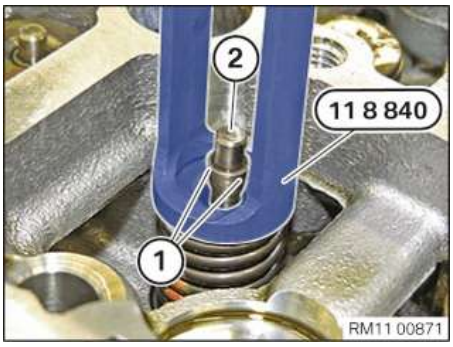
  The mounting orientation of the valve spring (1) can be freely chosen.

cardiagn.com



- Align special tool 0 494 374 (11 9 009) in direction of valve axis.
- Position the special tool 0 496 143 (11 8 840) according to the nut.
- Press down the valve spring on the upper spring cup with the special tools 0 494 374 (11 9 009) and 0 496 143 (11 8 840).

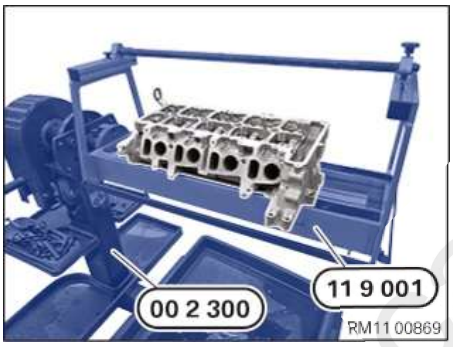
  The **hooks** from the set of special tools 0 494 362 (11 9 000) can be used to **hold** the valve spring in pressed position.



- Keep the valve spring pressed down with the special tool 0 496 143 (11 8 840).
- Insert the valve shims (1) at the valve (2) with the magnet and install.
- Relieve load on valve spring.
- Make sure that the valve shims (1) are installed correctly.



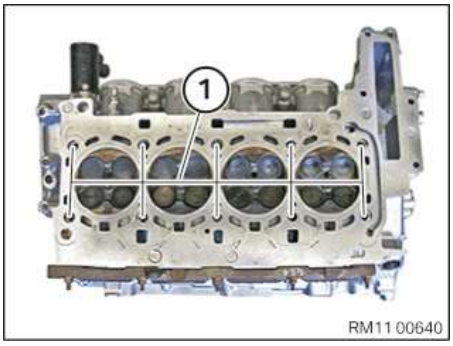
- Unlock the special tool 0 494 370 (11 9 005) in the direction of the arrow.
- Guide the special tool 0 494 371 (11 9 006) out and remove.



- Unscrew and remove the cylinder head from the special tools 0 494 366 (11 9 001) and 0 495 187 (00 2 300).

POSTPROCESSES

68 – Replace cylinder head gasket



RISK OF DAMAGE

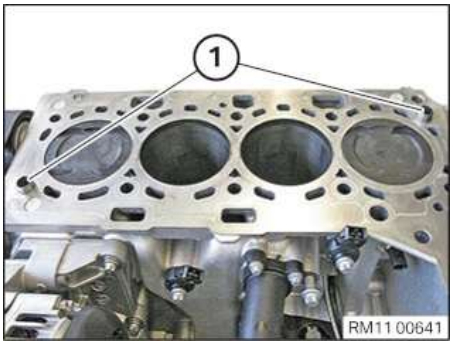
Damage to the surface.

The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

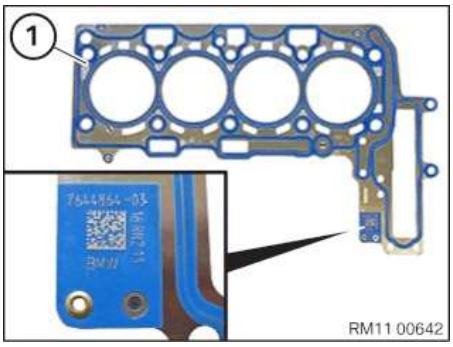
- Do not use any metal-cutting tools.

- Remove oil and dirt residue from the blind holes (1).

cardiagn.com

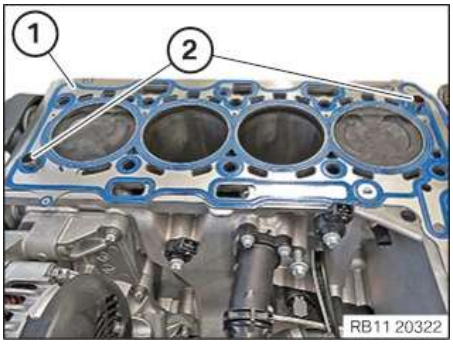


- Check if fitting sleeves (1) fit correctly and check for any damage.



- Identify the cylinder head gasket (1) using the part number.

Note: If the cylinder head is reworked, an additional seal that is 0.3 mm thicker is available for the service.



- Guide in the cylinder head gasket (1) and install.
- Ensure that the cylinder head gasket (1) is installed correctly in the fitting sleeves (2).

69 – Installing the cylinder head

RISK OF DAMAGE

Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

RISK OF DAMAGE

Damage to threads.

Fluid in the threaded hole may damage the thread when screws are tightened in the threads.

- Dry threaded holes (e.g. using compressed air).

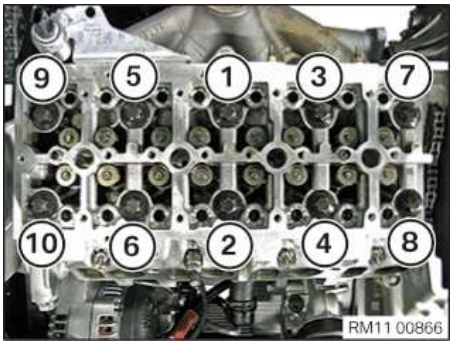
TECHNICAL INFORMATION

Do not remove bolt coating.

TECHNICAL INFORMATION

When assembling, it is essential to observe screwing sequences and tightening torques.
Non-observance of these requirements may result in leaks and damage.

cardiagn.com

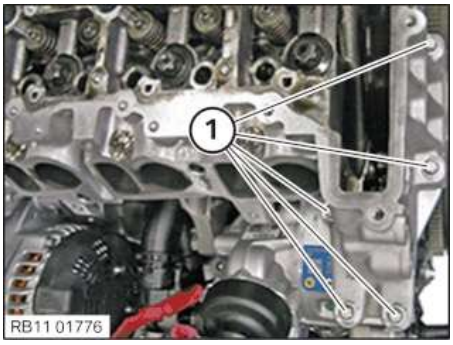


- Position the cylinder head gasket with the previously determined gasket thickness (number of holes).
- Fit new cylinder head screws.

  Parts: Cylinder head bolts
- Position the cylinder head and tighten it with the new cylinder head bolts in the order from (1) to (10).

Cylinder head to crankcase

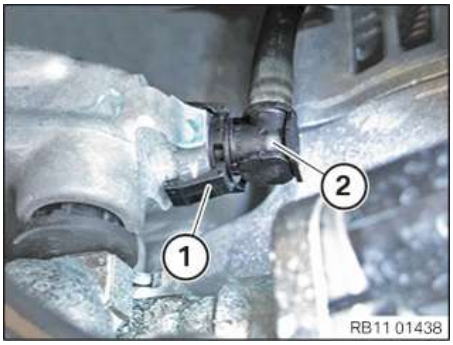
M12x1.5	Renew screws.	1. Tightening torque	50 Nm
		2. Angle of rotation	120 °
		3. Angle of rotation	120 °



- Insert screws (1) and tighten.

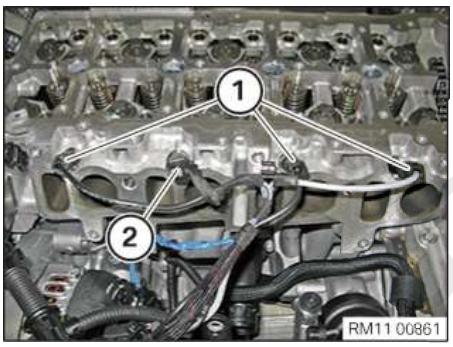
Cylinder head bolt to timing case cover

M8x40		Tightening torque	19 Nm



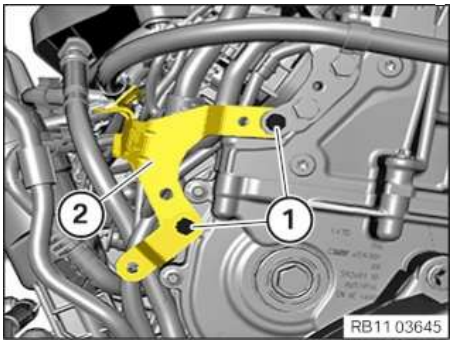
- Fit and lock coolant line (2).

  The lock (1) must engage audibly.



- Connect connectors (1) and (2), then lock.

  The connectors (1) and (2) must audibly engage.

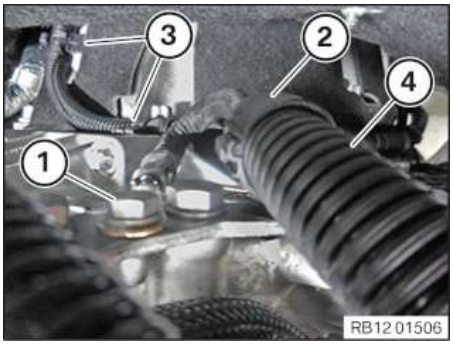


- Insert and install the holder (2).
- Tighten the screws (2).

Standard screw connection M6

M6		Tightening torque	8 Nm

cardiagn.com

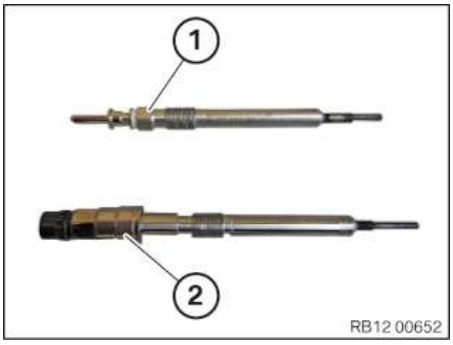


- Guide in the wiring harness section (4) of the automatic transmission and install.
- Lock holder (2).
- Make sure the bracket (2) engages audibly.
- Secure clamps (3).
- Tighten down screw (1).

Ground to cylinder head

M6		Tightening torque	8 Nm

70 – Install all glow elements



TECHNICAL INFORMATION

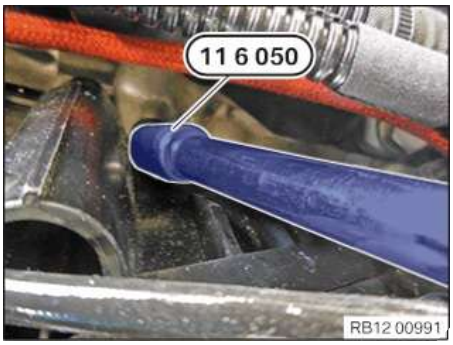
The combustion chamber pressure sensor can and is omitted from a technical point of view.

As an alternative to the combustion chamber pressure sensor, a normal glow element can be installed.

If a glow element is installed as an alternative, the appropriate wiring harness for the glow elements must also be installed.

For more information, see the Electronic Parts Catalogue and other information

- If installed: Install the glow element with **combustion chamber pressure sensor** (2), in the cylinder **2**.
- Install the glow elements (1) in the cylinders **1**, if necessary, **2**, **3** and **4**.



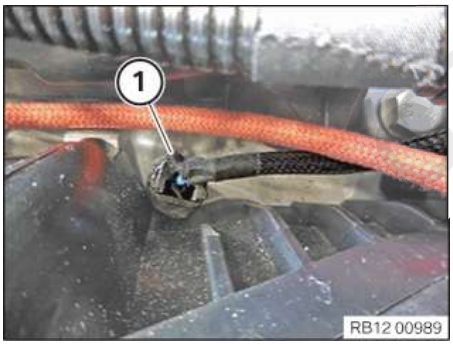
NOTICE

The description is for one component only. The procedure is identical for all further components.

- Screw in and tighten the glow elements with the special tool or conventional tools.

Glow elements to cylinder head

Glow element		Tightening torque	13 Nm

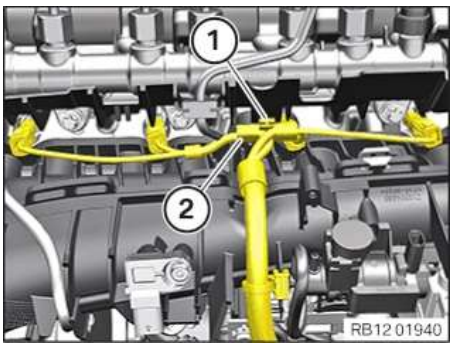


NOTICE

The description is for one component only. The procedure is identical for all further components.

- Connect and lock the connector (1).

  The connector (1) must engage audibly.

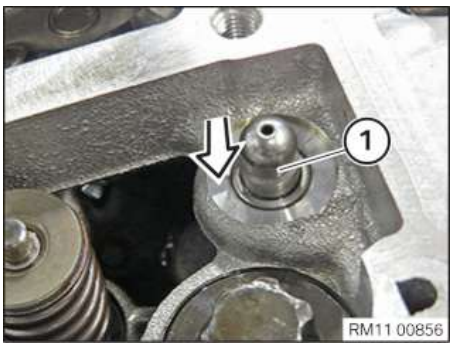


- Guide in the wiring harness section (2) and install.
- Secure clamps (1).

▸ **When replacing the glow element: Teach in glow elements if necessary**

- Teach in glow elements with the diagnosis system.

71 – Installing all hydraulic valve clearance compensating elements

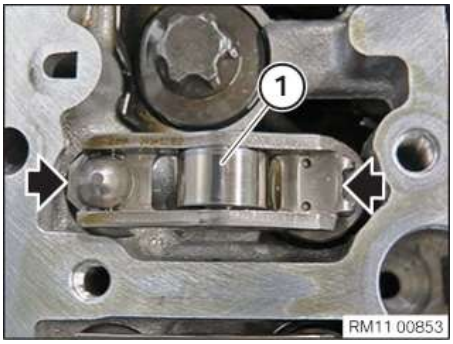


- Make sure to observe the assignment of the roller cam followers to the hydraulic valve clearance compensating elements when reusing the hydraulic valve clearance compensating elements (1).
- Insert and install all hydraulic valve clearance compensating elements (1) in the direction of the arrow.

72 – Installing the roller cam followers

TECHNICAL INFORMATION

- Note the installation position of the component. The component may be installed in various installation positions.



- Check all the roller cam followers (1) for damage, and renew if necessary.

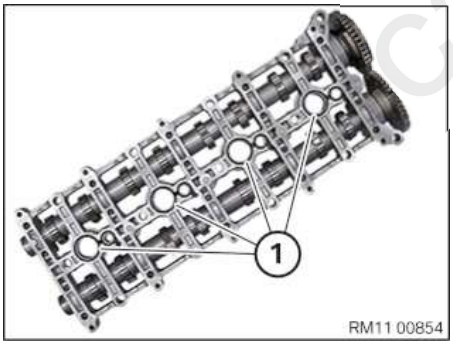
  Parts: Roller cam followers
- Insert all roller cam followers (1) and install them (arrows).

  Roller cam followers (1) that have already been used must be installed in the same place.
- Note the mounting orientation of the roller cam followers (1).
- Oil all roller cam followers (1).

73 – Installing the camshaft support

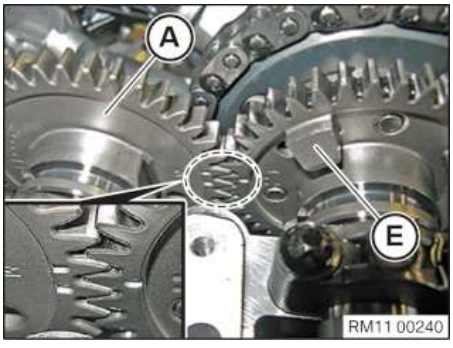
TECHNICAL INFORMATION

The camshaft is tensioned by the valve springs. Tighten or loosen each screw on the camshaft bearing caps one at a time in the specified sequence and by half a turn only. Repeat procedure.



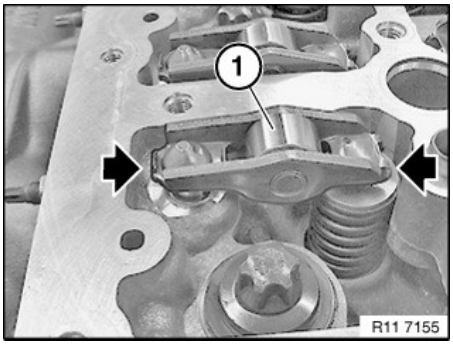
- Renew seals (1).

  Parts: Seals
- Insert and install the gaskets (1).

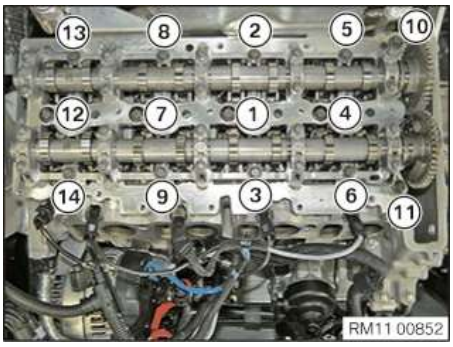


- Make sure the marks on both camshafts (A) and (E) correspond in the **highlighted area**.

cardiagn.com



- Make sure the roller cam followers (1) have the correct mounting orientation.
- Position the camshaft support (arrows).



- Evenly tighten the screws in a sequence from (1) to (14) in several steps.
- Evenly tighten the screws in a sequence from (1) to (14) in several steps.

Camshaft carrier to cylinder head

M7x35		Tightening torque	13 Nm

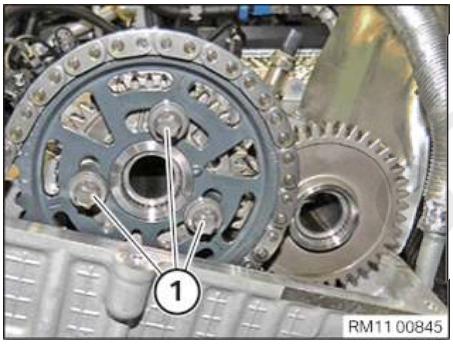
74 – Installing the special tool to secure the exhaust camshaft



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

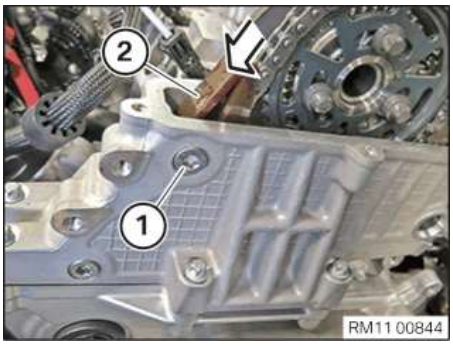
  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.

75 – Installing the camshaft sprocket on the intake camshaft



- Position the drive chain on the camshaft sprocket so that the thread of the screw connections are located in the centre of the elongated holes.
- Position the camshaft sprocket on the intake camshaft.
- Merely apply the screws (1) hand-tight so that the camshaft sprocket can still be moved in relation to the intake camshaft.

76 – Installing the guide rail of the timing chain



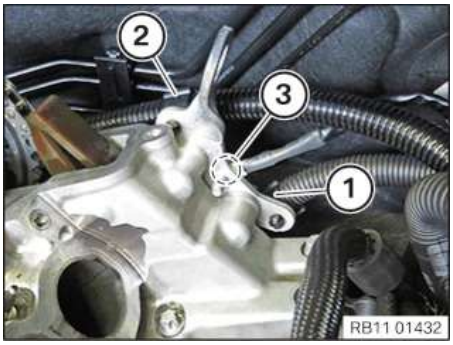
- Position the guide rail (2) in the direction of the arrow.
- Make sure the guide rail (2) is correctly installed at the bottom bearing journal.
- Renew bearing journal (1).

  Parts: Bearing journal
- Tighten the bearing journals (1).

Bearing journal to cylinder head

M16x1.5	Replace bearing journal.	Tightening torque	20 Nm

carlagn.com



- Position the grounding cable and tighten the screw (3).

Standard screw connection M8

M8		Tightening torque	19 Nm

- Clip in the positive battery cable (2) into the bracket.
- Clip in the vehicle wiring harness (1) into the bracket.

77 – Installing the chain tensioner piston



TECHNICAL INFORMATION

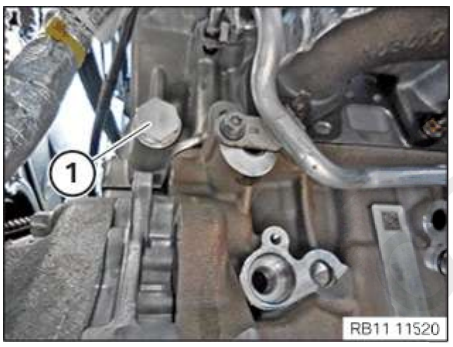
The oil chamber must be drained for reuse of the chain tensioner.

- Place the chain tensioner on a level support pad and slowly compress in the direction of arrow.
- Repeat process twice.



- Renew sealing ring (1).

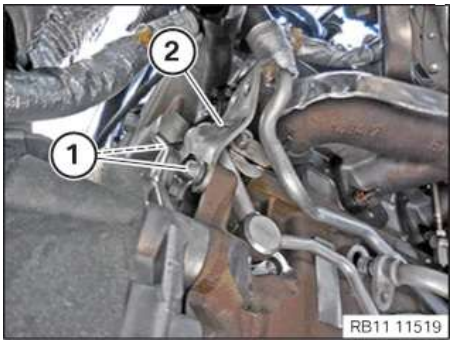
  Parts: Sealing ring
- Insert and install the sealing ring (1).



- Insert and install the chain tensioner piston (1).
- Tighten the chain tensioner piston (1).

Chain tensioner piston to cylinder head

22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm



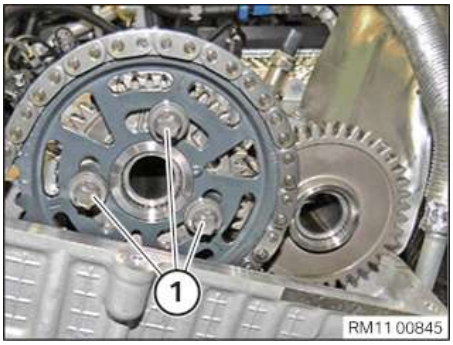
- Insert and install the holder (2).
- Tighten the screws (1).

Holder to crankcase

M8X16		Tightening torque	19 Nm

78 – Tightening the camshaft sprocket on the intake camshaft

carsbgn.com



- Tighten the screws (1).

Camshaft sprocket to camshaft

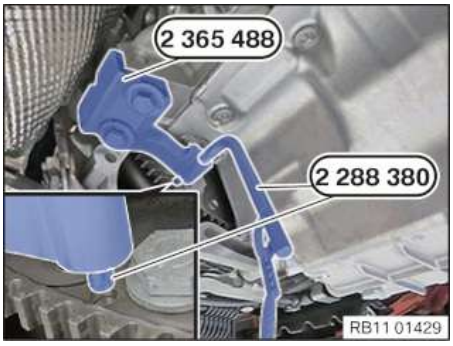
M7x17.			17 Nm

79 – Removing the special tool for fixing the exhaust camshaft



- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

80 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

81 – Checking camshaft timing



RISK OF DAMAGE

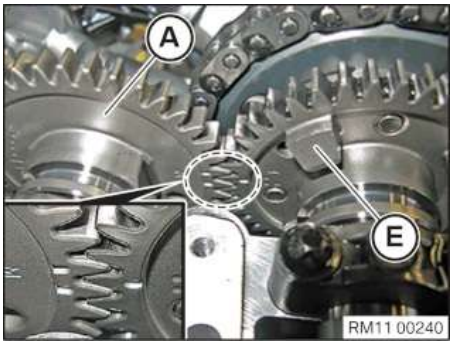
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

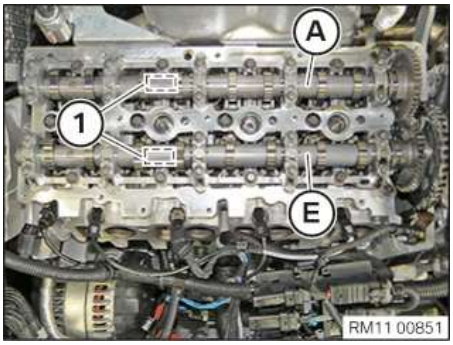
- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

  Do **not** crank the engine in reverse.

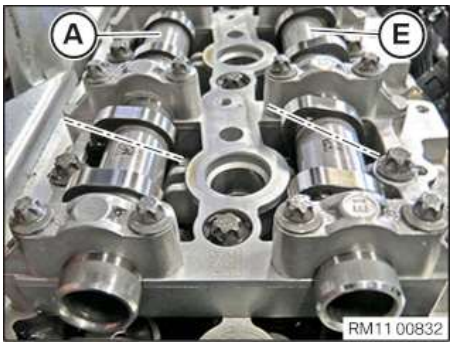


- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.

carsdiagn.com



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.

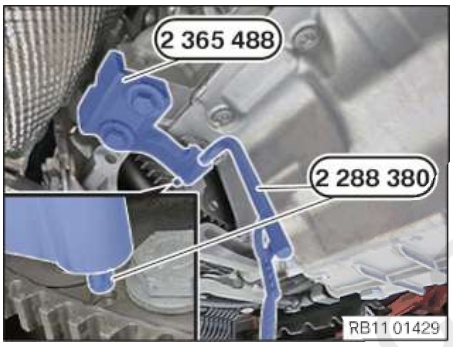


- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

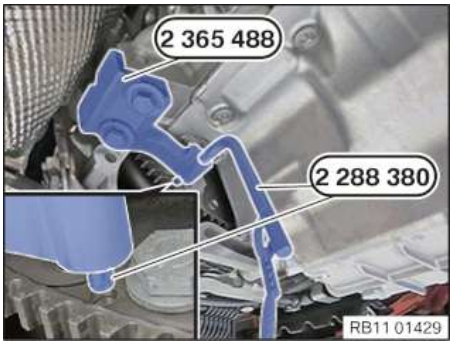
- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

82 – Removing the special tool for fixing the exhaust camshaft



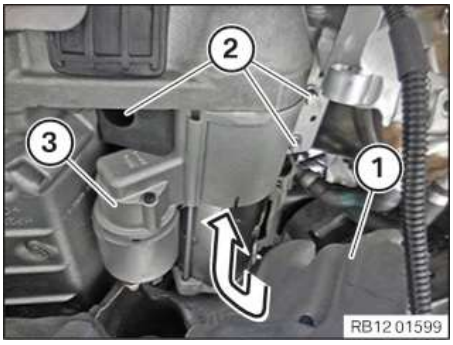
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

83 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

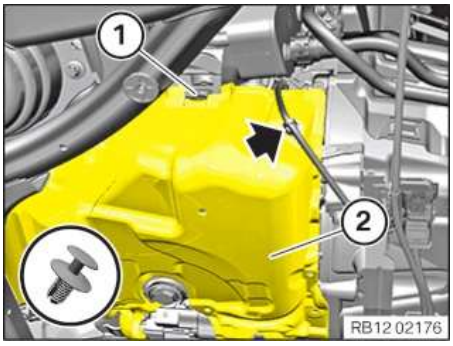
84 – Installing starter motor



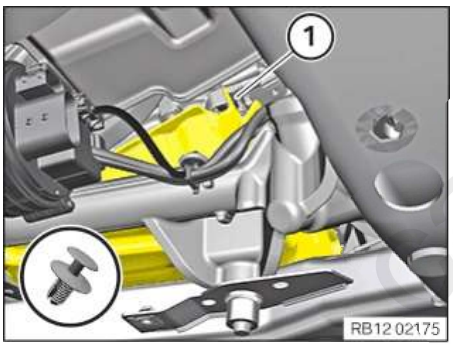
- Make sure that the acoustic cover (1) is not damaged.
- Carefully press the acoustic cover (1) to one side.
- Feed in and install the starter motor (3) in the direction of the arrow.
- Tighten the screws (2).

Starter motor to engine

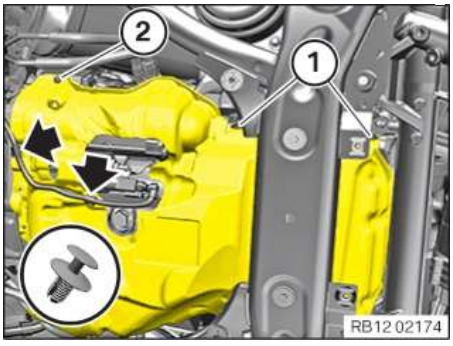
M8X60		Tightening torque	19 Nm



- Position the acoustic cover (2).
- Fasten expanding rivet (1).
- Secure clamp (arrow).

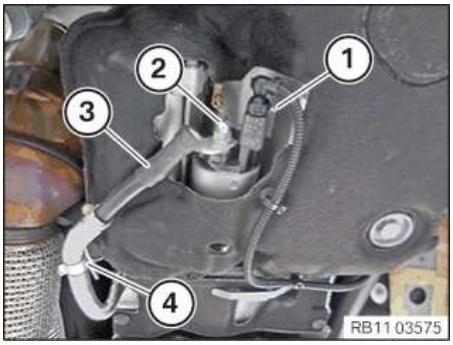


- Fasten expanding rivet (1).

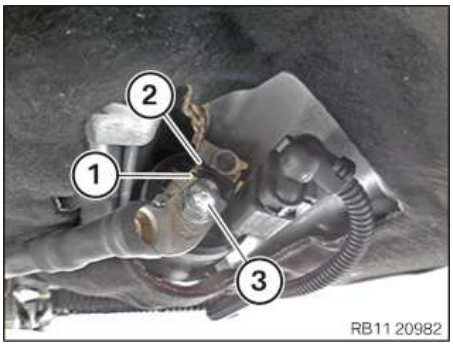


- Secure fir tree clip (2).
- Secure expanding rivet (1).
- Secure the clamps (arrows).

cardiagn.com



- Fasten positive battery cable(3) in holder (4) and position it on the starter motor.
- Tighten the nut (2) hand-tight.
- Connect the connector (1) and audibly lock it.



CAUTION

Improper routing of the positive battery cable.

Risk of short circuits!

- Route the positive battery cable without abrasions and do not trap.

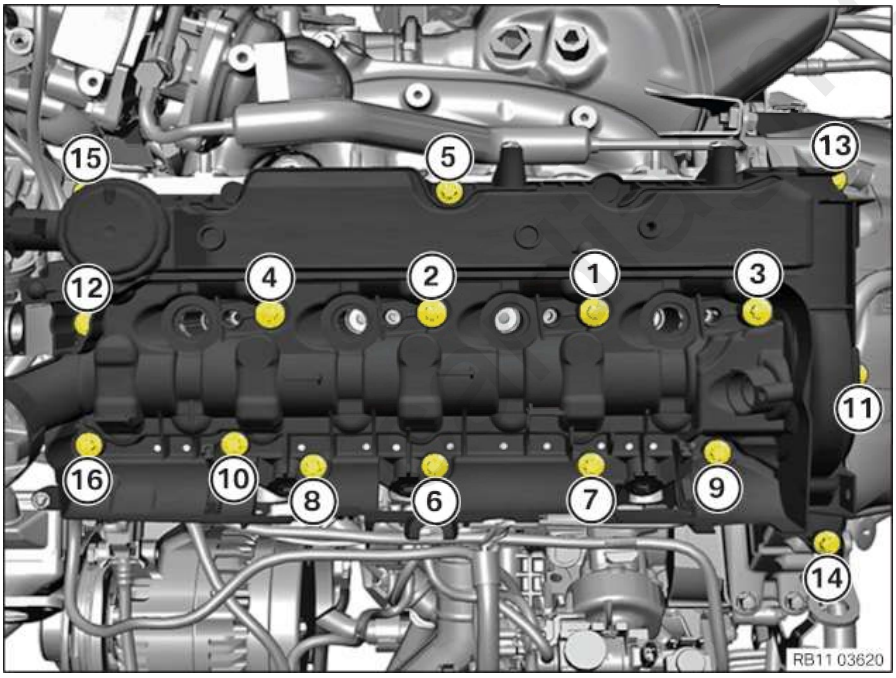
- Attach the positive battery cable (1) **correctly** to anti-twist lock (2).
- Tighten nut (3).

Battery positive lead to starter

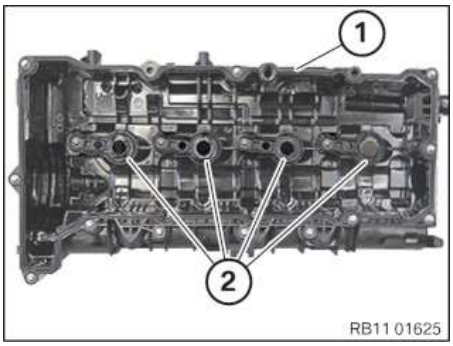
M8		Tightening torque	13,5 Nm

85 – Installing cylinder head cover

Screw connection of the cylinder head cover

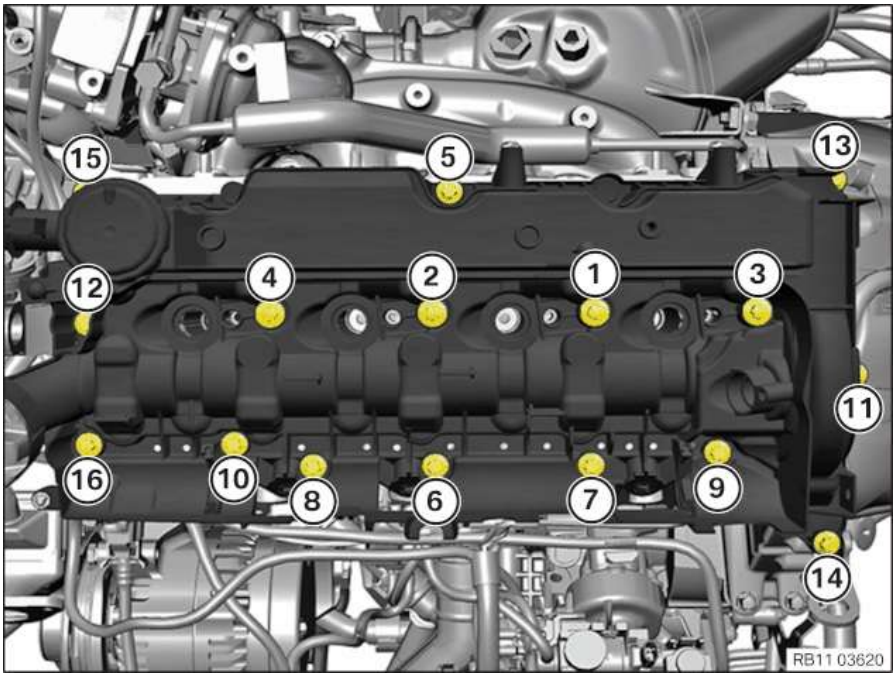


1 - 16 Bolts of the cylinder head cover



- Renew the profile seals (1) and (2) of the cylinder head cover.

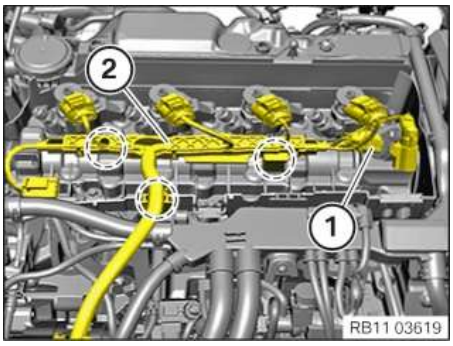
  Parts: Profile seals



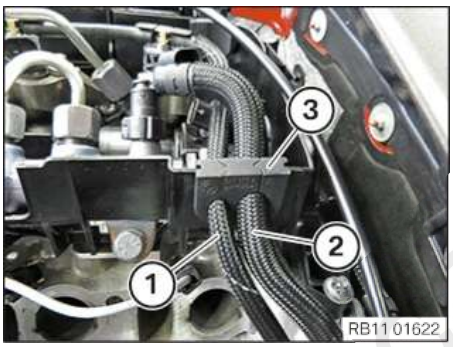
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

Cylinder head cover to cylinder head

M6		Tightening torque.	8,5 Nm



- Position the vehicle wiring harness (2) on the cylinder head cover and fasten in the marked areas.
- Plug in the connector (1) and lock audibly.



- Insert and connect the leakage oil line (1) with the fuel return line (2) and grommet (3).



- Feed in and install the heat shield (1).



- Connect engine ventilation line (1) and lock.

  The locks (arrows) must engage audibly.

cardiagn.com

86 – Install all injectors

▸ **Cleaning the injector shafts**

CAUTION

Swirling dirt particles caused by compressed air.

Danger of injury!

- Collect dirt particles, e.g. when blowing out, use cloth to do so.

- Wear safety goggles.

RISK OF DAMAGE

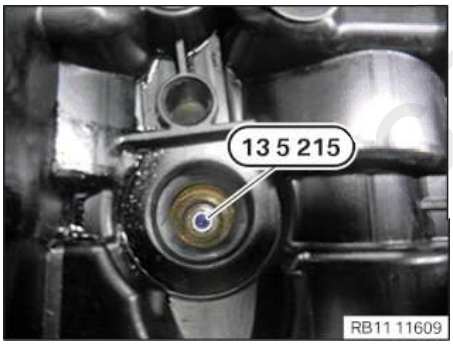
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



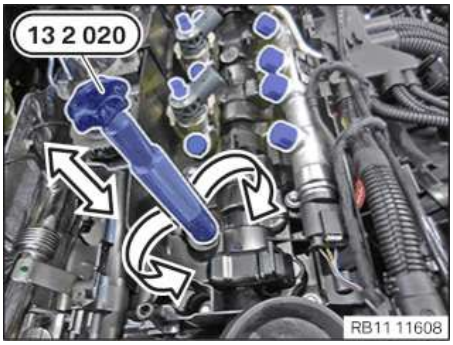
- Check whether the sealing ring remained in the injector shaft and remove the sealing ring as needed.
- Insert the special tool 0 493 763 (13 5 215) with the special tool 0 493 762 (13 5 214) from the set of special tools 0 493 758 (13 5 210) into the injector shaft.
- Remove special tool 0 493 762 (13 5 214).



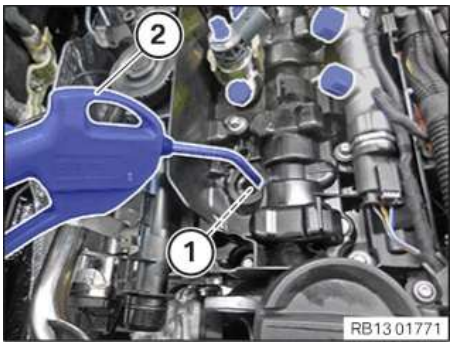
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



- Insert special tool 0 496 150 (13 2 020) into the injector shaft.



- Move special tool 0 496 150 (13 2 020) up and down in the injector shaft with rotational movements in the direction of arrow.
- Feed out special tool 0 496 150 (13 2 020) from the injector shaft and remove.



- Blow out injector shaft (1) with air gun (2).



- Feed the special tool 0 493 762 (13 5 214) into the injector shaft and screw it in with the special tool 0 493 763 (13 5 215).
- Feed out special tool 0 493 762 (13 5 214) with special tool 0 493 763 (13 5 215) from the injector shaft and remove it.

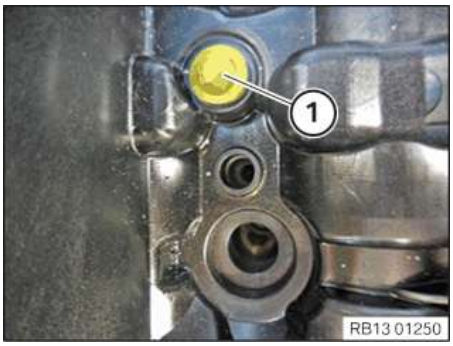
▸ **Check the placement of the clamping claw**

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Tighten down screw (1).

  The clamping claw is positioned on the bolt (1).

Clamping claw facing to cylinder head cover

M6		Tightening torque	10 Nm

▸ **Prepare the injector for installation**

cardiagn.com

RISK OF DAMAGE

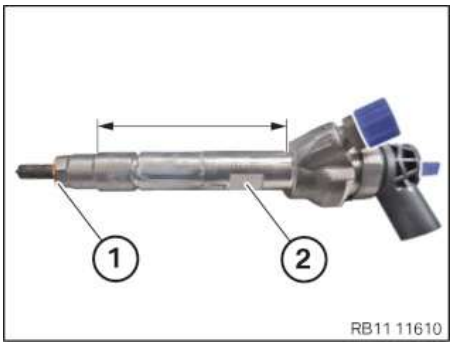
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

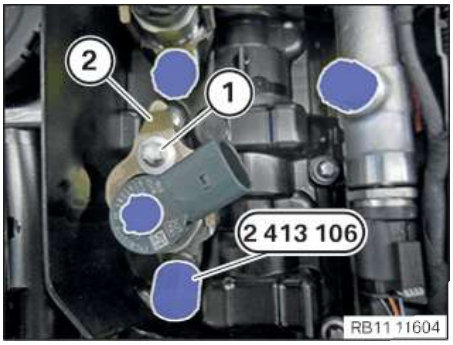
TECHNICAL INFORMATION

Lightly grease the injector shaft with high temperature-resistant grease.
For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



- Renew the copper sealing ring (1) on the injector (2).

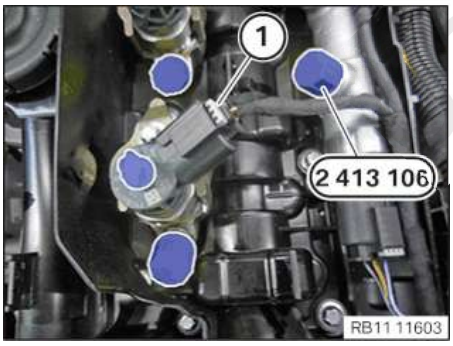
  Parts: Copper sealing ring
- Lightly grease the injector in the marked area with heat-resistant grease before installing the injector (2) in the injector shaft.



- Insert and install the injector .
- Insert and install the clamping claw (2).
- Tighten down screw (1).

Injector to cylinder head cover

M8	Tightening torque	8 Nm
	Angle of rotation	120 °



- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

▸ **Replacement: Perform injection quantity compensation**

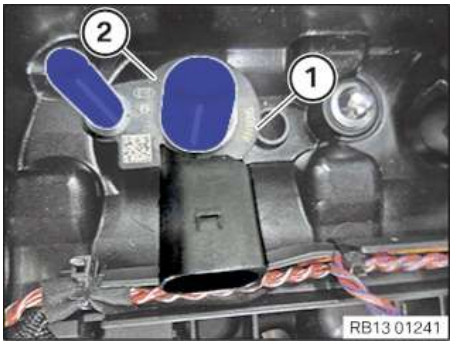
TECHNICAL INFORMATION

If the DDE control unit or an injector has been replaced, it will also be necessary to carry out injection quantity compensation. The adjustment value (7-position letter/number code) is engraved on each injector.

NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

cardiagn.com

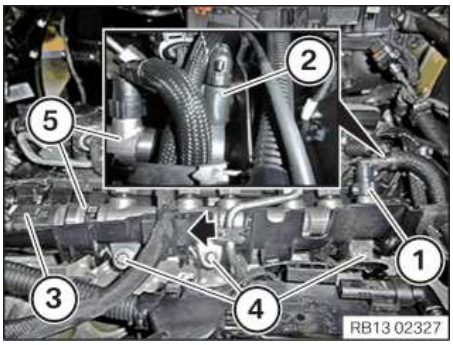


- Read off the adjustment value (1) on the new injector (2).



- Connect diagnosis system:
  - Vehicle identification
  - Function selection
  - Service functions
  - Digital diesel electronics (DDE)
  - Adjustment of injectors
  - Testing schedule
- Start service function with the right arrow button.

87 – Installing the rail



- Insert and install the rail (5).
- Tighten the screws (4).

Rail to cylinder head cover

M8		Tightening torque	19 Nm

- Install and lock cable clip (arrow).

  The cable clip (arrow) must engage audibly.
- Connect and lock the connector (3) at the rail pressure sensor.

  The connector (3) must engage audibly.
- Connect and lock the connector (2) at the rail pressure regulating valve.

  The connector (2) must engage audibly.
- Feed in fuel return line (1) and install.

  The fuel return line (1) must audibly engage.

88 – Installing high pressure line between rail and high pressure pump

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

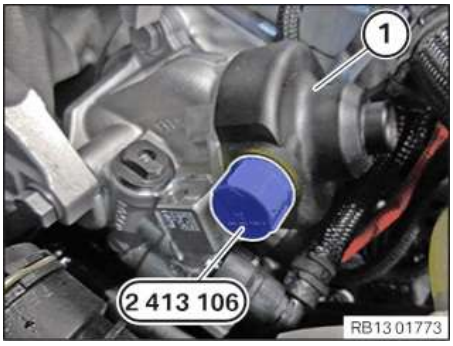
Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

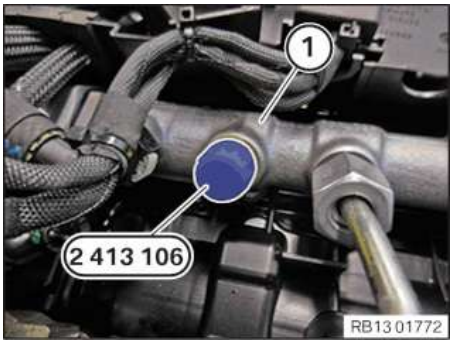
cardiagn.com

TECHNICAL INFORMATION

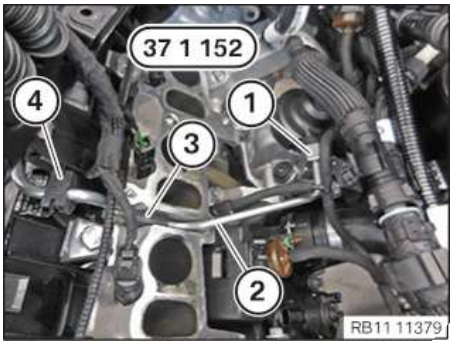
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Feed out and remove special tool on the high pressure pump (1).



- Feed out the special tool on the rail (1) and remove.



- Insert and install the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).
- Hand-tighten the union nut (1) on the high pressure pump.



- Hand-tighten the union nut (1) on the rail.

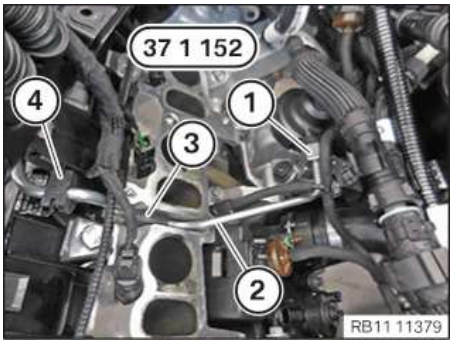
TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten the union nut (1) with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm



- Make sure that the high pressure line (2) is correctly installed with the abrasion protection (3) and the rubber mount (4).

TECHNICAL INFORMATION

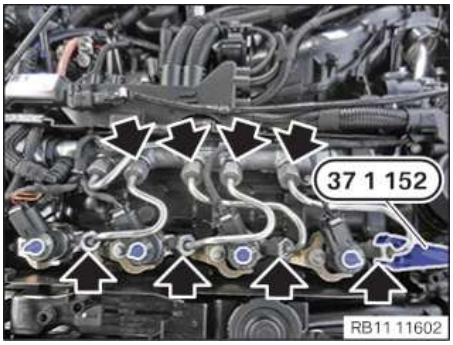
Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten union nut (1) on the high pressure pump with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm

cardiagn.com



- Remove the special tool from all cable connections.
- Feed in and install the high pressure lines (arrows).
- Hand-tighten the high pressure lines (arrows).

TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

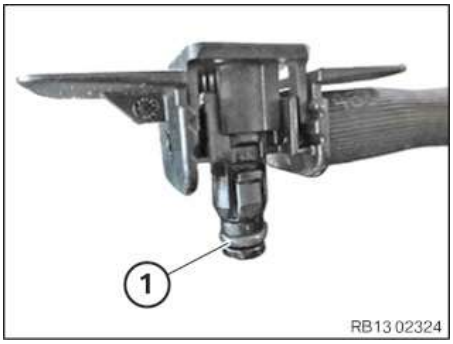
- Tighten the high pressure lines (arrows) with the special tool .

High pressure lines between injector and rail

High-pressure pipe		Tightening torque	24.5 Nm

- Check the high pressure lines (arrows) for tightness (**visual inspection**).

90 – Attach the leakage oil line on the injectors

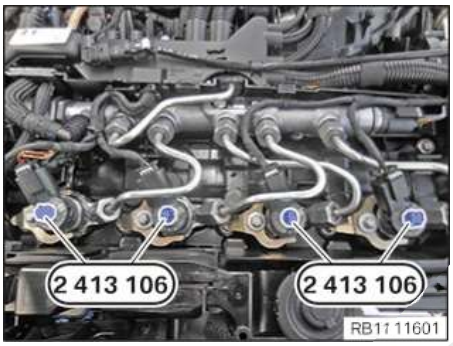


- **Version A:**

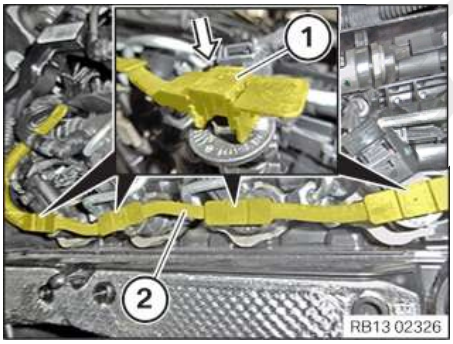
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

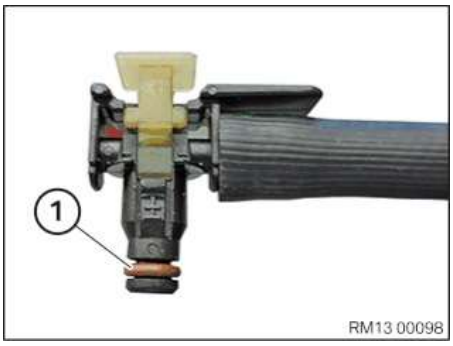
  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.



- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.



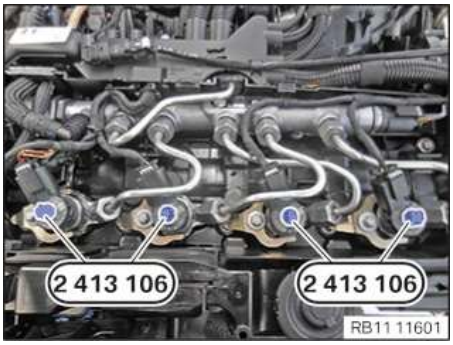
- **Version B**:

  Check sealing ring (1) for damage, renew leakage oil line if necessary.

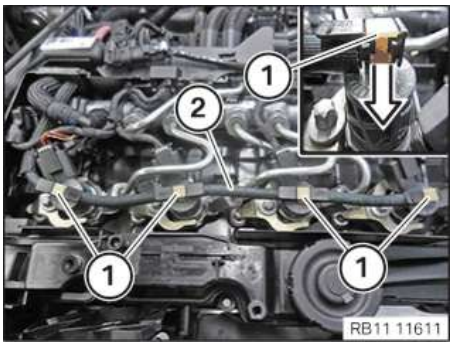
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.

ardiagn.com

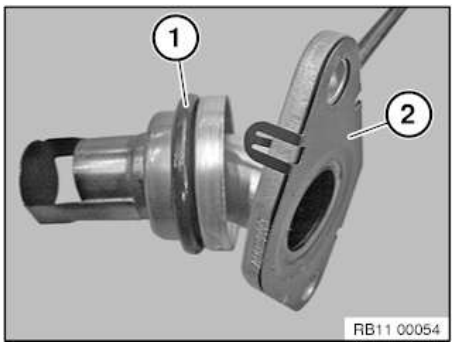


- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.

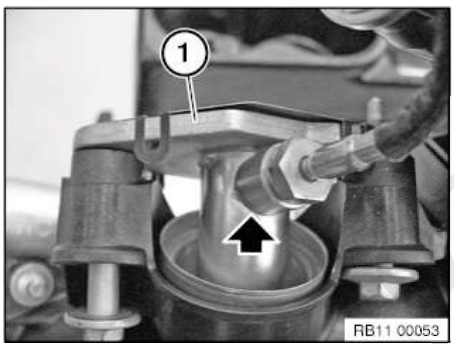
91 – Installing the intake plenum



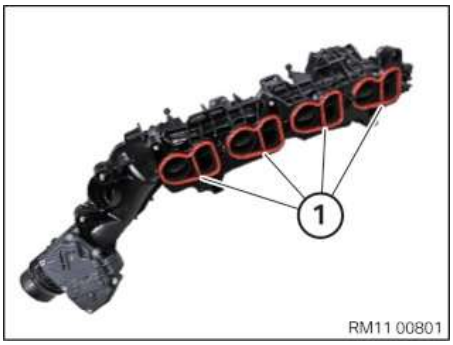
- Renew O-ring (1).

  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

  Parts: Gasket
- Position the seal (2) and clip it in.



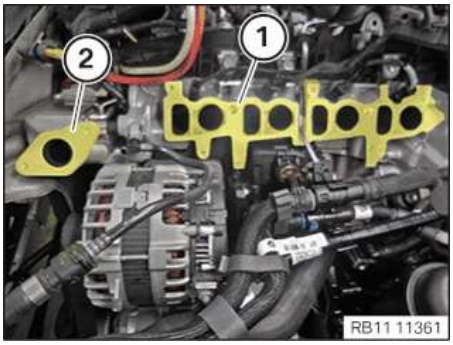
- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).



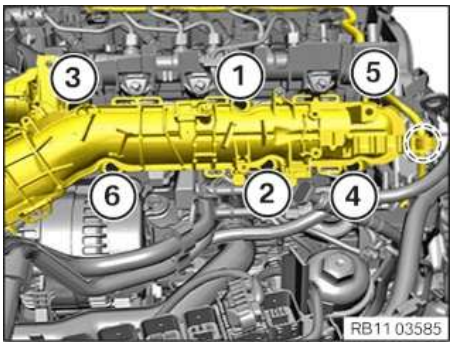
- Renew seals (1).

  Parts: Seals
- Ensure that the seals (1) are firmly mounted on the intake plenum.

cardiagn.com



- Clean connection points (1) at cylinder head.
- Clean the connection point (2) on the exhaust-gas recirculation cooler.

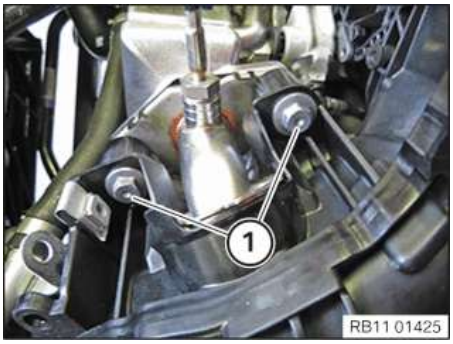


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

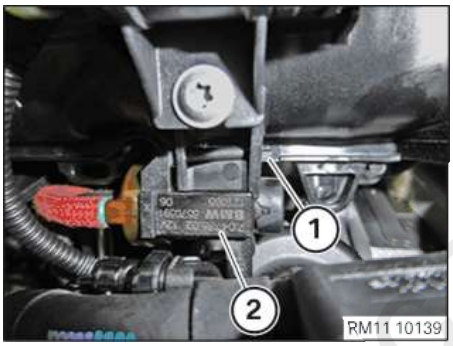
- Attach the wiring harness and fuel lines in the marked area on the intake plenum.



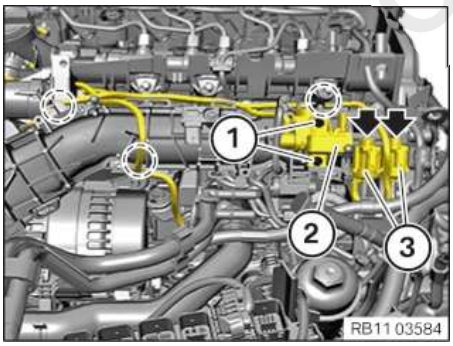
- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm



- Install electric changeover valve (2) from the left to the right in the holder on the intake plenum.
  The lock (1) must audibly engage.



- Install intake plenum electric changeover valve (3) on the intake plenum.
  The locks (arrows) must engage audibly.
- Position the electric changeover valve (2) on the intake plenum.
- Tighten the screws (1).

Electric changeover valve to intake plenum

TS6x20		Tightening torque	5 Nm

- Fasten the vacuum hoses on the intake plenum in the marked areas.



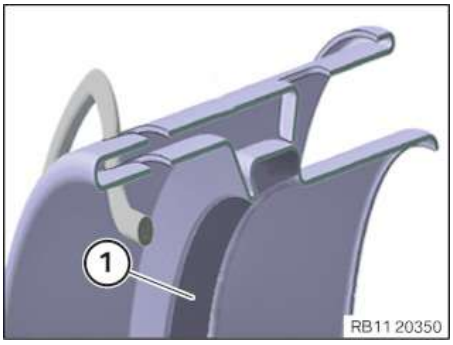
- Check the seal (1) for damage, and renew if necessary.

gardiagn.com

▸ **Replacing damaged seal**

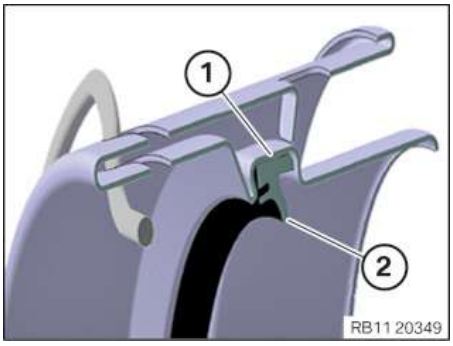
TECHNICAL INFORMATION

Do not use pointed or sharp-edged tools for the installation and/or removal.



- Remove damaged seal.
- Clean gasket groove (1) with a dry towel.

  The gasket groove (1) must be clean.



- Renew gasket.

  Parts: Gasket
- Install seal dry without lubricant or mounting agent.

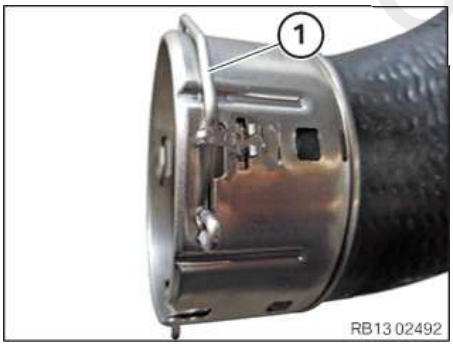
TECHNICAL INFORMATION

Incorrect assembly is possible. Ensure correct installation position.

- Feed in and install the seal.
- Make sure the seal is correctly installed in the gasket groove (1).
- Make sure that the sealing lip (2) is directed inwards as shown.



- Connect the pressure pipe to the throttle body until the locks (1) engage on both sides.



- Check that the locks (1) are correctly seated on the pressure pipe.

92 – Partially securing the wiring harness section on the intake plenum

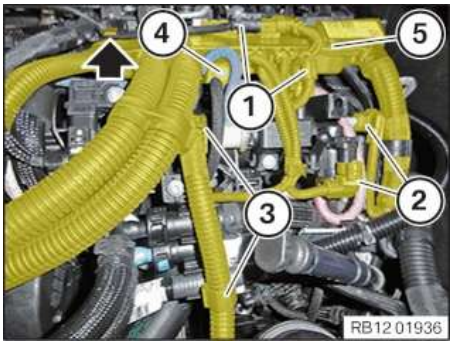
RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

- Route all cables without abrasions, do not trap and crush.

carsdiagn.com



- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

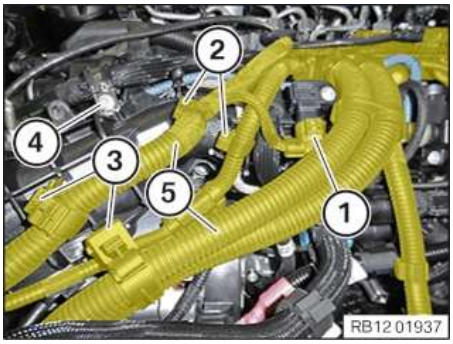
Wiring harness section to manifold

TS5x20		Tightening torque	3,6 Nm

- Secure clamps (3).
- Connect connectors (2) and lock.

  The connectors (2) must engage audibly.
- Secure the line at clamp (Arrow).
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



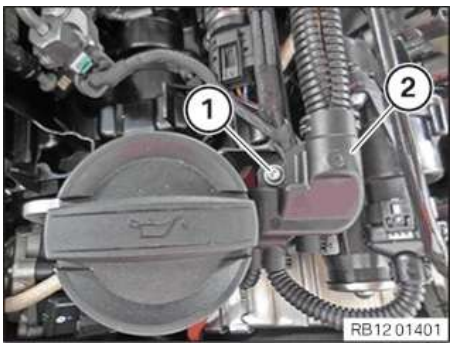
- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

Standard screw connection 4 Nm

Oval-head screw		Tightening torque	4 Nm

- Secure clamps (3).
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



- Guide in the wiring harness section (2) and install.
- Tighten down screw (1).

Wiring harness section to cylinder head cover

TS5x20		Tightening torque	3,6 Nm



- Connect connectors (1) and lock.

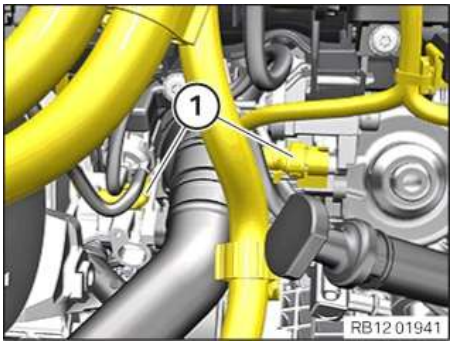
  The connector (1) must engage audibly.



- Connect the connector (1) and lock it.

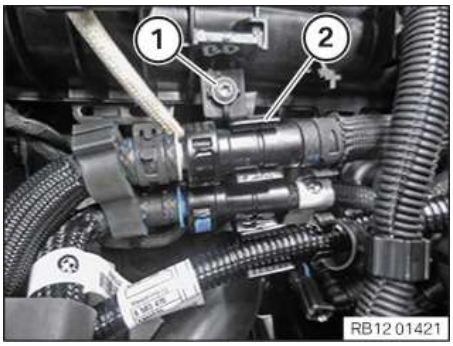
  The connector (1) must engage audibly.

cardiagn.com



- Connect connectors (1) and lock.

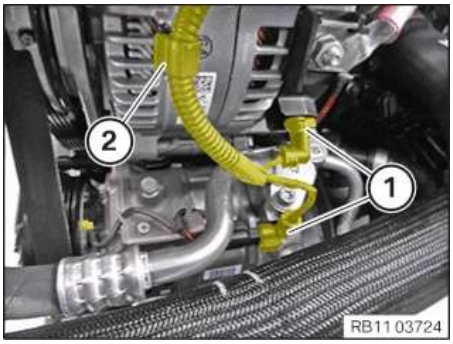
  The connectors (1) must engage audibly.



- Insert and install the holder (2).
- Tighten down screw (1).

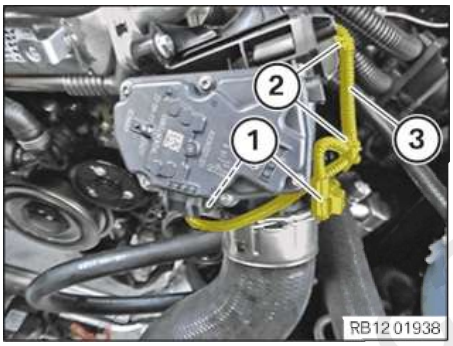
Holder on intake plenum

TS6X20		Tightening torque	5 Nm

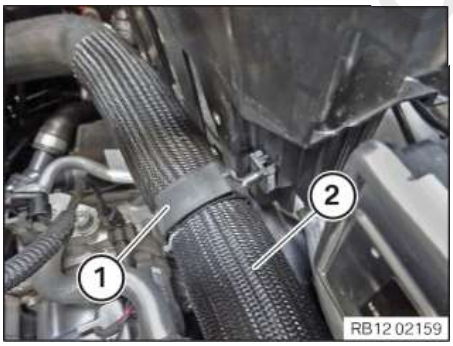


- Connect the connector (1) and lock it.

  The connectors (1) must engage audibly.
- Secure holder (2) to alternator.



- Guide in the wiring harness section (3) and install.
- Secure clamps (2).
- Connect connectors (1) and lock.



- Feed in and install coolant line (2).
- Lock holder (1).

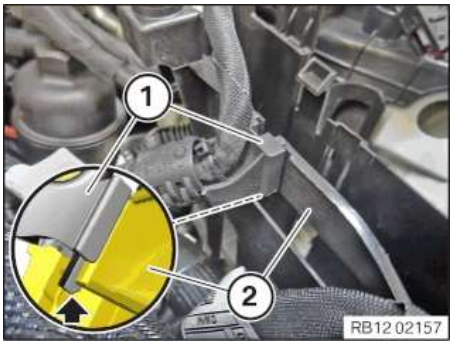
  The holder (1) must engage audibly.



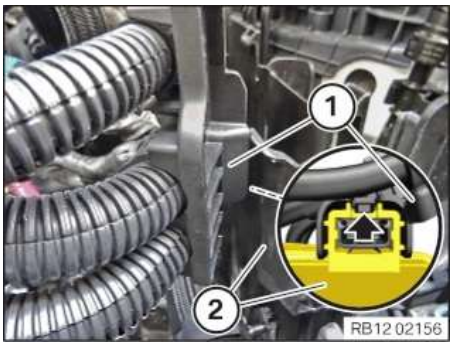
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.

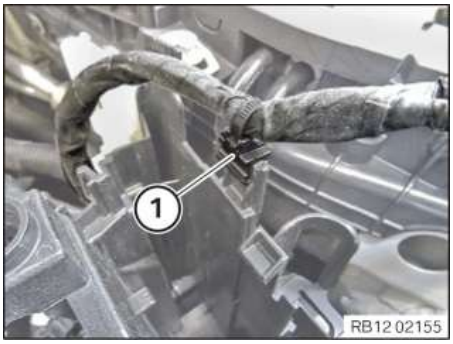
cardiagn.com



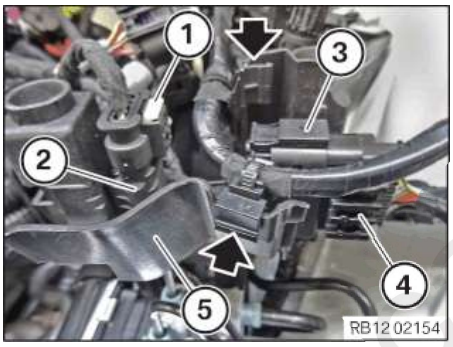
- Connect the cable clip (1) with the control unit holder (2) and lock it.
  Lock (arrow) must audibly engage.



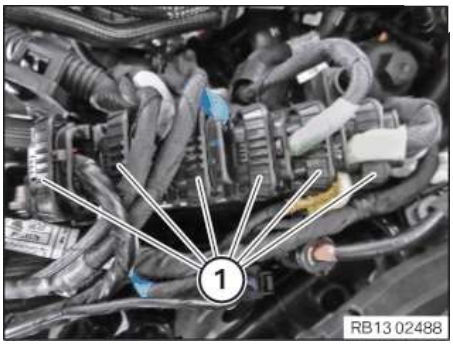
- Connect the cable clip (1) with the control unit holder (2) and lock it.
  Lock (arrow) must audibly engage.



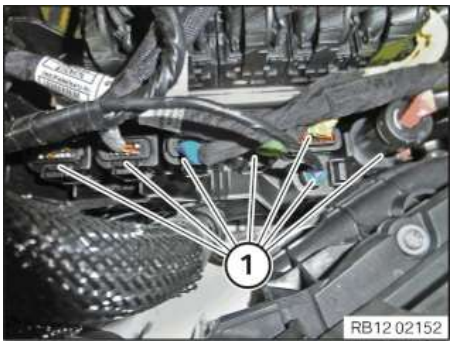
- Secure clamps (1).



- Connect and lock the connector (4) with the control unit holder (5).
  The connector (4) must engage audibly.
- Connect connectors (3) and lock.
  The connector (3) must engage audibly.
- Connect and lock the connector (2) with the control unit holder (5).
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.
  The connector (1) must engage audibly.
- Secure the clamps (arrows).

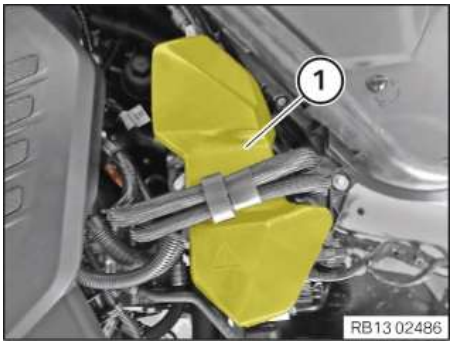


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.

cardiagn.com

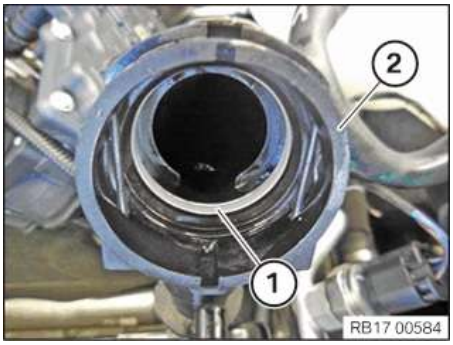


- Insert and install cover (1) into guides.

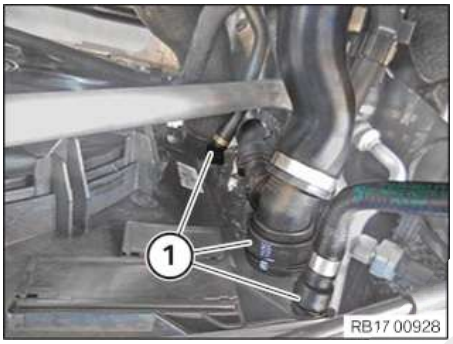
93 – Connecting the coolant lines

TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.



- Check the sealing ring (1) of the coolant line (2) for damage and renew where required.

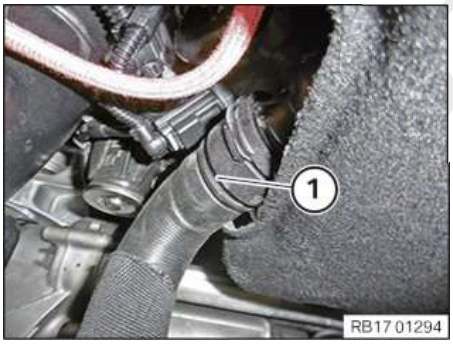


NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

- Connect and lock the coolant lines (1).

  The coolant lines (1) must engage audibly.



- Connect and lock coolant line (1).

  The coolant line (1) must audibly engage.

94 – Installing the high-pressure stage exhaust turbocharger and the low-pressure stage turbocharger

CAUTION

Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

cardiagn.com

RISK OF DAMAGE

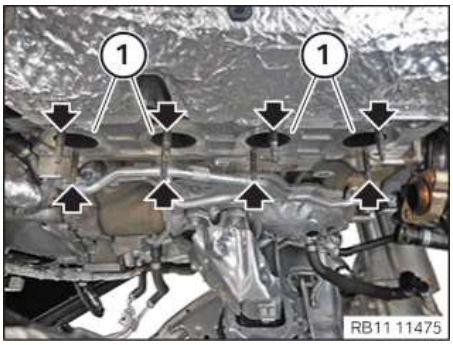
Damage to the surface.

The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.

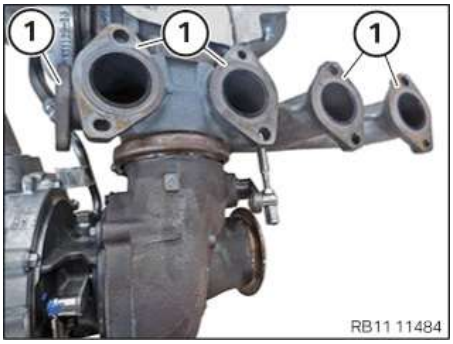
TECHNICAL INFORMATION

The sealing surfaces must be free from oils, grease and cleaning agents.

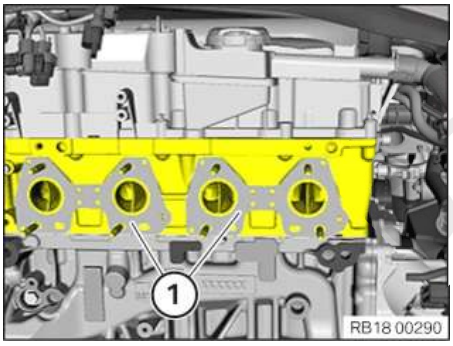


- Check the stud bolts (arrows) on the cylinder head for **correct** fit.
- Clean the connection points (1) with the special tool 0 495 102 (11 4 470).
- Renew gaskets.

  Parts: Seals



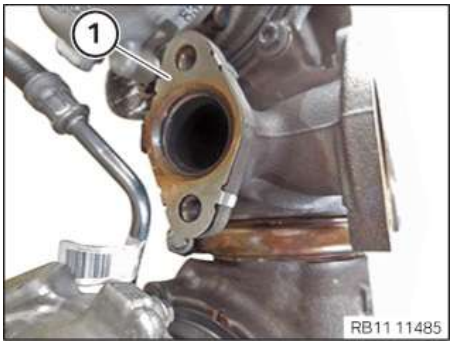
- Clean the connection points (1) on the exhaust manifold with the special tool 0 495 102 (11 4 470).



TECHNICAL INFORMATION

The **coated side** of the seal must be on the side of the exhaust manifold.

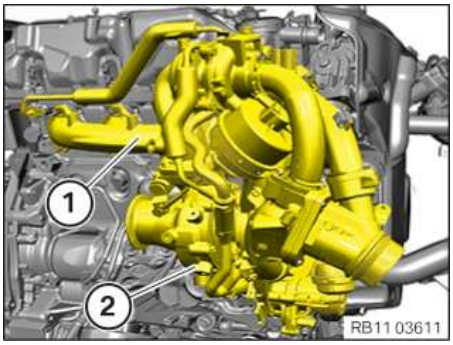
- Insert and install the gaskets (1).



- Renew the seal (1).

  Parts: Gasket
- Insert and install the seal (1).

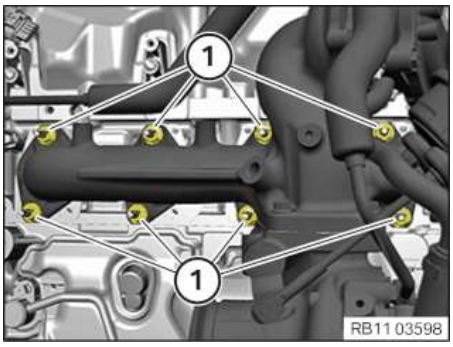
.com



TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

- Feed in the exhaust manifold (1) with the high-pressure stage exhaust turbocharger and the low-pressure stage turbocharger (2) from the top front and install.



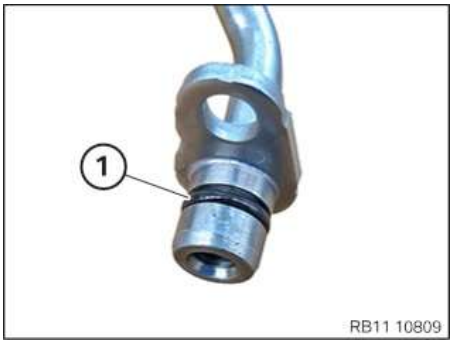
- Renew nuts (1).

  Parts: Nuts

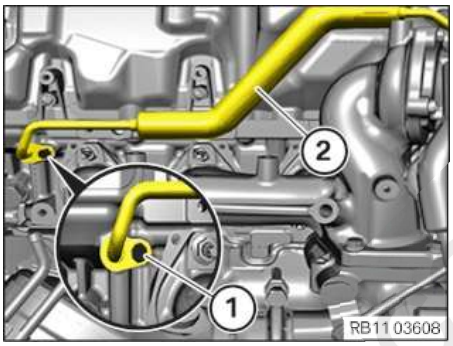
- Tighten the nuts (1) evenly from the inside out.

Exhaust manifold to cylinder head

M7	**If necessary, renew loose stud bolts.**	Tightening torque	11 Nm
	Renew nuts.	Tightening torque	13 Nm



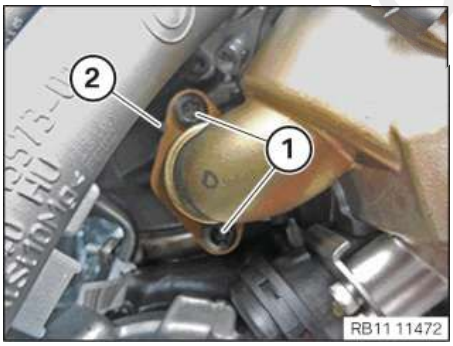
- Check the seal (1) for damage, if necessary, renew the oil feed line.



- Feed in and install the oil feed line (2) for the high-pressure stage exhaust turbocharger.
- Tighten down screw (1).

Oil feed line on cylinder head

M6x12		Tightening torque	8 Nm

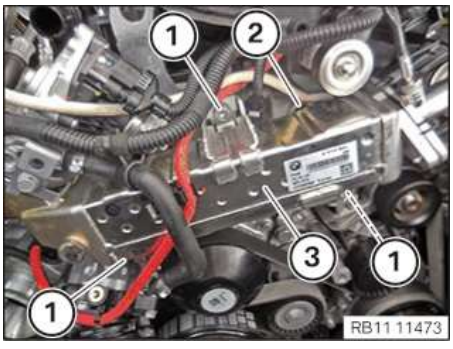


- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

M8x28	Replace screws	Tightening torque	32 Nm

- Ensure that seal (2) is installed.

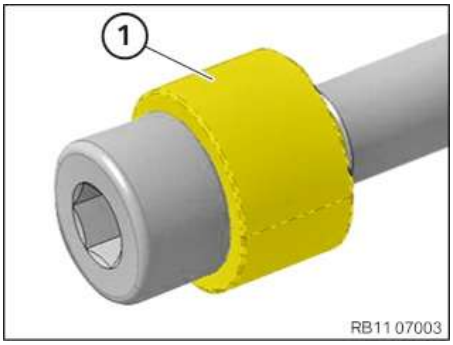


- Position the exhaust-gas recirculation cooler (3).
- Make sure the pipe neck (2) is fitted correctly.
- Tighten the screws (1).

Exhaust-gas recirculation cooler to cylinder head

M8x20 / M8x28		Tightening torque	19 Nm

Check



- Check whether the screws **with the** sleeves (1) (10 mm) are available.

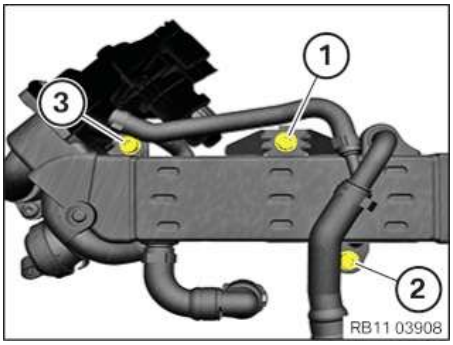
Result

» Screws **without** sleeves (1) are available.

Measure

- Renew screws.

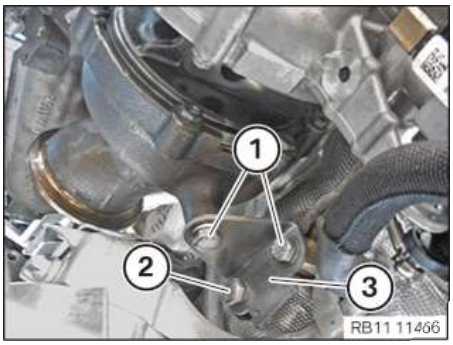
  Parts: Screws (part number 9 886 429)



- Tighten the screws (1) to (3).

Exhaust-gas recirculation cooler to cylinder head

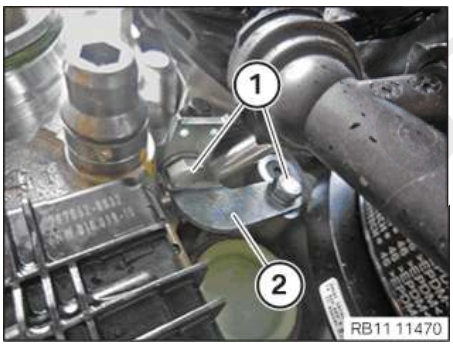
M8x20 / M8x28		Tightening torque	19 Nm



- Tighten the bolts (1) and (2) on the bracket (3).

Exhaust turbocharger low-pressure stage to crankcase

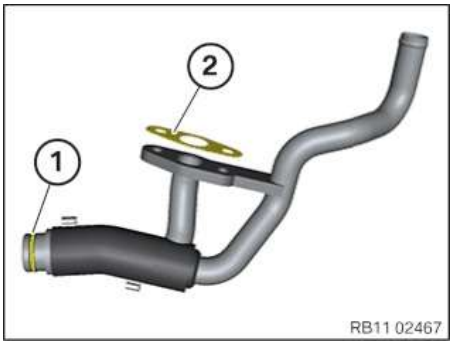
M8X16		Tightening torque	22 Nm



- Insert and install the holder (2).
- Tighten the screws (1).

Exhaust turbocharger low-pressure stage to crankcase

M8X16		Tightening torque	22 Nm

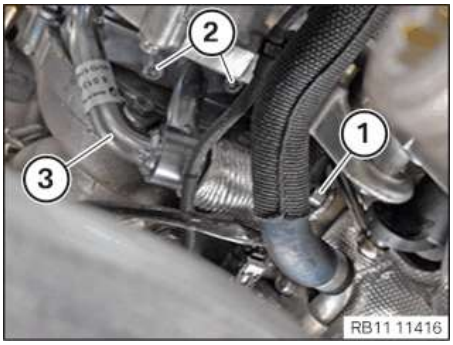


- Renew the gasket (2).

  Parts: Gasket

- Check the O-ring (1) for damage and renew the oil return line as needed.

bordiagn.com



- Install oil return line (3) into crankcase.
- Position oil return line (3) with the seal on the low-pressure stage exhaust turbocharger.
- Tighten the screws (2).

Oil return line to turbocharger

M6x12	Renew gasket.	Tightening torque	8 Nm

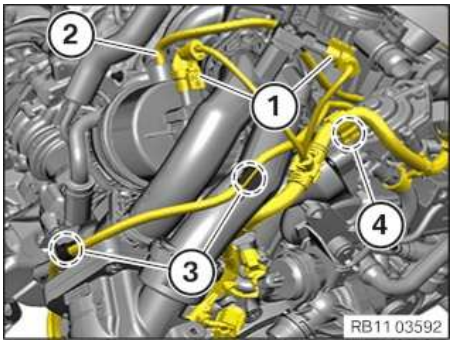
- Install the bolt (1).



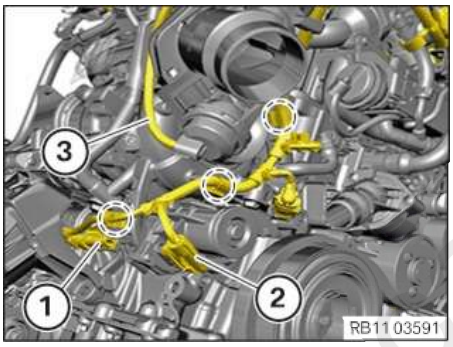
- Tighten the screws of the oil return line on the crankcase from the right wheel arch.

Oil return line to crankcase

M6x12	Check gasket. Renew the seal or line if necessary.	Tightening torque	8 Nm



- Secure the vehicle wiring harness in area (4) to the exhaust-gas recirculation cooler.
- Secure the vacuum hose in the marked areas (3) to the exhaust turbochargers.
- Connect vacuum hose (2).
- Connect all connectors (1) and lock audibly.



- Connect vacuum hose (3).
- Secure the wiring harness in the marked areas to the exhaust turbochargers.
- Plug in the connector (2) and lock audibly.
- Secure the connector in area (1) to the holder.

95 – Installing the exhaust-gas recirculation cooler

▸ **Avoiding damage to the starter generator due to escaping coolant**

RISK OF DAMAGE

Escaping coolant on the starter generator.

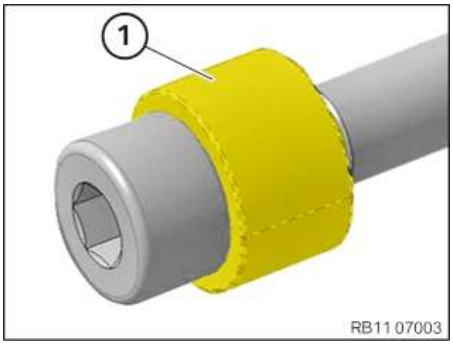
Damage and operating failure of the starter generator.

- Cover the starter generator with suitable, watertight auxiliary materials.
- Close off line connections with seal plugs.
- If necessary: Flush the leaked coolant from the starter generator with at least 1 l water.

▸ **Installing the exhaust-gas recirculation cooler**

Check

cardiagn.com



- Check whether the screws **with 10mm** sleeves (1) are available.

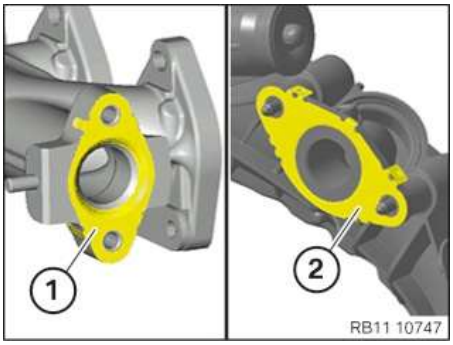
Result

» Screws **without** sleeves (1) are available.

Measure

- Renew screws.

  Parts: Screws (part number 9 886 429)

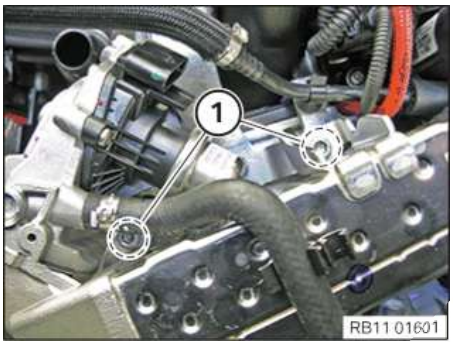


- Renew the seal (1) between the exhaust manifold and the exhaust-gas recirculation cooler.

  Parts: Gasket

- Renew the seal (2) between exhaust-gas recirculation cooler and intake air plenum.

  Parts: Gasket



TECHNICAL INFORMATION

When assembling, it is essential to observe screwing sequences and tightening torques. Non-observance of these requirements may result in leaks and damage.

- Tighten the screws (1) and subsequently release them again.

Exhaust-gas recirculation cooler to cylinder head

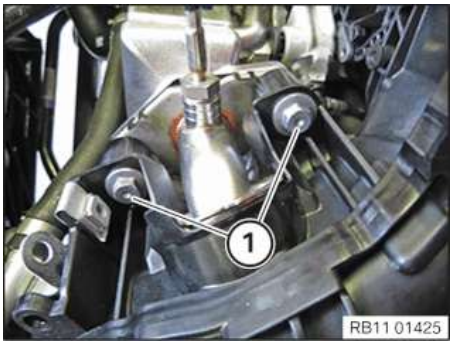
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screw (1) under the exhaust-gas recirculation cooler and then release again.

Exhaust-gas recirculation cooler to cylinder head

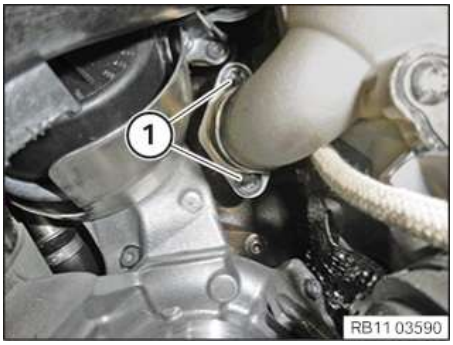
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

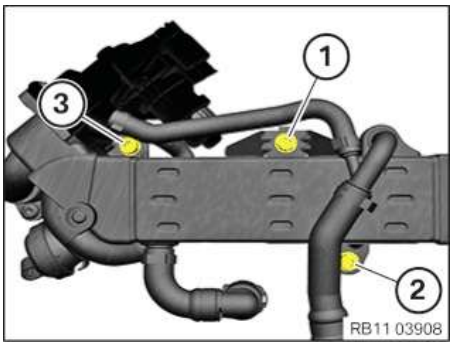
		Tightening torque	10 Nm



- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

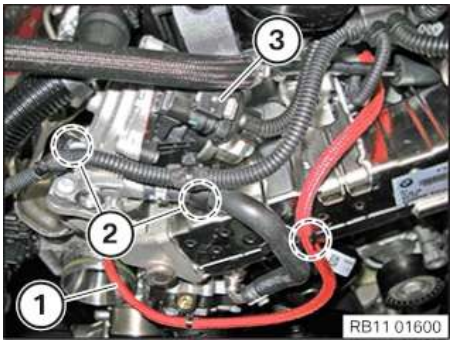
M8x28	Replace screws	Tightening torque	32 Nm



- Tighten screws in the order (1) to (3).

Exhaust-gas recirculation cooler to cylinder head

M8x20 / M8x28		Tightening torque	19 Nm



- Connect the connector (3) to the exhaust-gas recirculation valve.
- Attach the vehicle wiring harness to the clips (2) at the exhaust-gas recirculation valve and at the coolant line.
- Connect the vacuum line (1) to the exhaust-gas recirculation cooler and attach in the highlighted area.

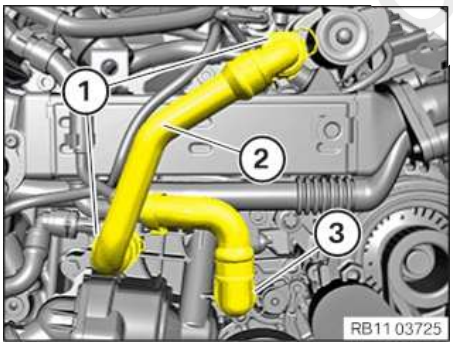


TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.

- **Version A:**

  Connect and audibly lock coolant lines (1).



TECHNICAL INFORMATION

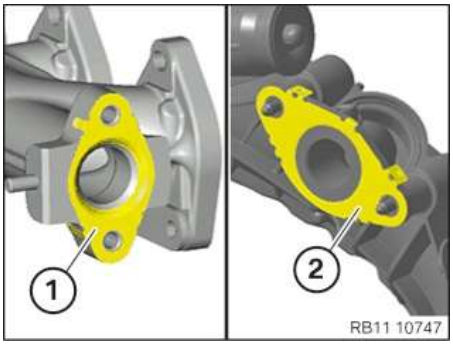
Make sure that the connections are locked correctly. The locks must engage audibly.

- **Version B:**

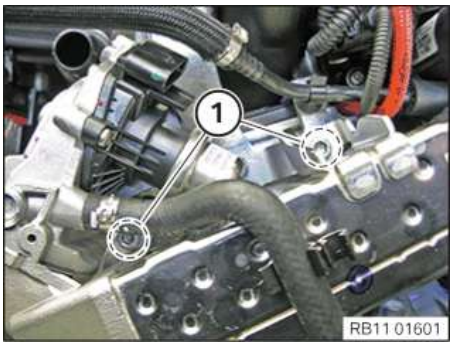
  Connect and audibly lock coolant lines (3).
- Install the coolant line (2).
- Audibly lock the locks (1).

▸ **Installing the exhaust-gas recirculation cooler**

galaagn.com



- Renew the seal (1) between the exhaust manifold and the exhaust-gas recirculation cooler.
  Parts: Gasket
- Renew the seal (2) between exhaust-gas recirculation cooler and intake air plenum.
  Parts: Gasket



TECHNICAL INFORMATION

When assembling, it is essential to observe screwing sequences and tightening torques. Non-observance of these requirements may result in leaks and damage.

- Install the exhaust-gas recirculation cooler and fasten with screws (1).
- Tighten the screws (1) and subsequently release them again.

Exhaust-gas recirculation cooler to cylinder head

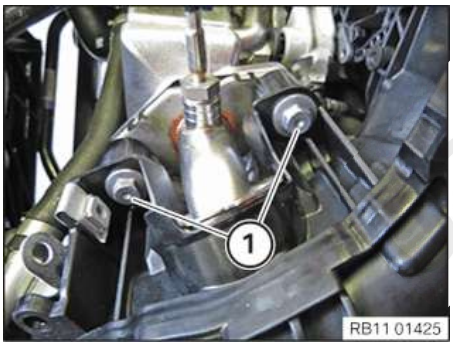
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screw (1) under the exhaust-gas recirculation cooler and then release again.

Exhaust-gas recirculation cooler to cylinder head

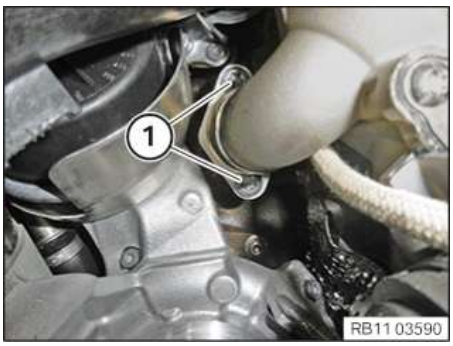
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm

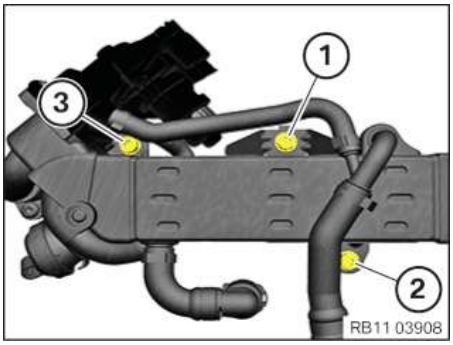


- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

M8x28	Replace screws	Tightening torque	32 Nm

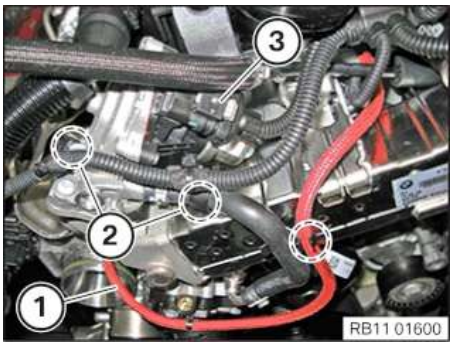
cardiagn.com



- Tighten screws in the order (1) to (3).

Exhaust-gas recirculation cooler to cylinder head

M8x20 / M8x28		Tightening torque	19 Nm



- Connect the connector (3) to the exhaust-gas recirculation valve.
- Attach the vehicle wiring harness to the clips (2) at the exhaust-gas recirculation valve and at the coolant line.
- Connect the vacuum line (1) to the exhaust-gas recirculation cooler and attach in the highlighted area.

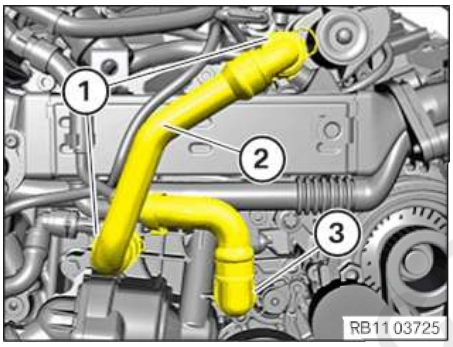


TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.

- **Version A:**

  Connect and audibly lock coolant lines (1).



TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.

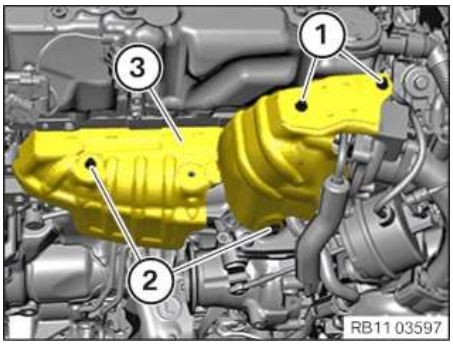
- **Version B:**

  Connect and audibly lock coolant lines (3).

  Install the coolant line (2).

  Audibly lock the locks (1).

96 – Installing heat shield



- Feed in and install the heat shield (3).
- Tighten down screws (1) and (2).

Heat shield to exhaust manifold

M6x12			10 Nm

97 – Installing the sensor bracket on the cylinder head cover

carlogn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

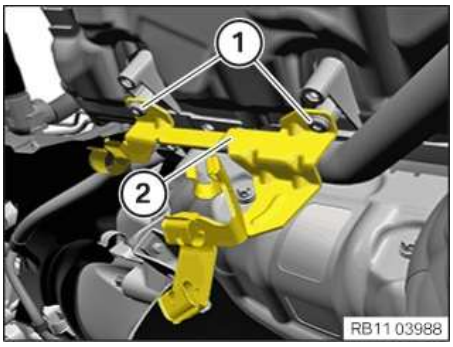
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

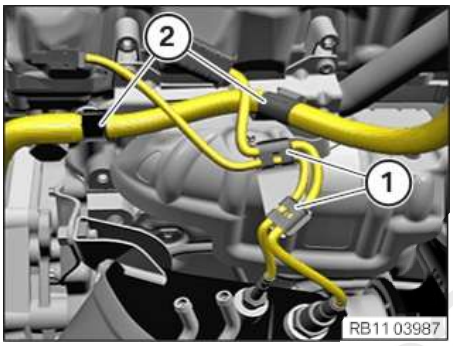
- Route all cables without abrasions, do not trap and crush.



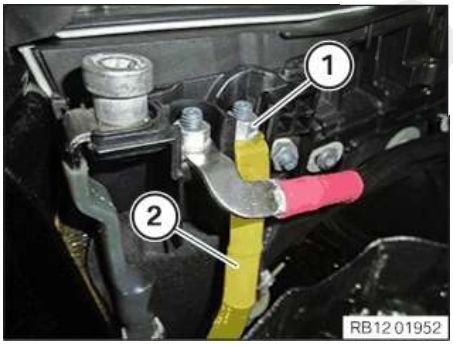
- Insert and install the holder (2).
- Tighten the screws (1).

Bracket on cylinder head cover

	Tightening torque	5 Nm



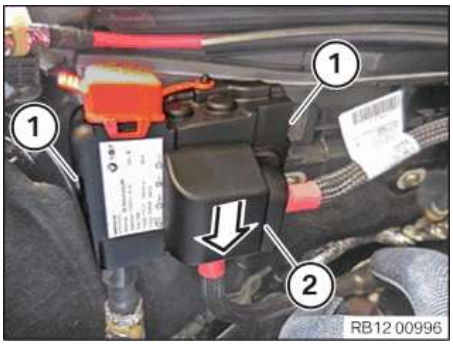
- Secure the positive battery cable in the clamps (2).
- Mount the cable of the exhaust gas sensor system in the clamps (1).



- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

Battery positive lead to battery positive terminal

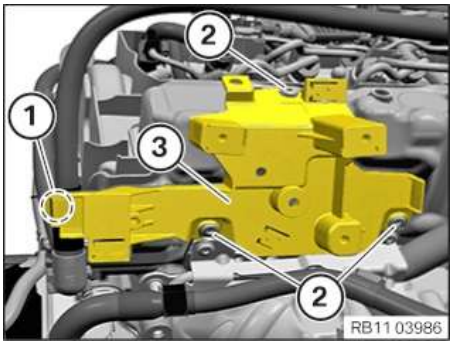
M8		Tightening torque	19 Nm



- Insert and install the cover (2) in the direction of the arrow.

  The locks (1) must engage audibly.

cardiagn.com

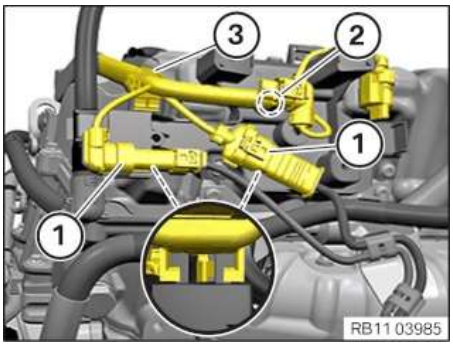


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

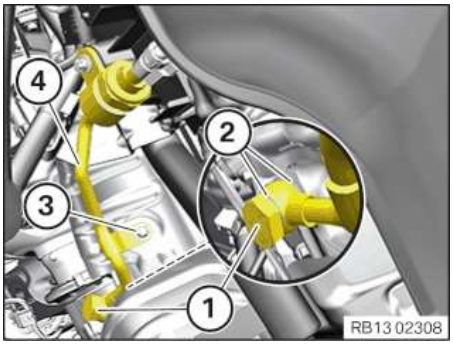
		Tightening torque	5 Nm

- Fasten the positive battery cable in the area (1) in the clamp.



- Feed in the wiring harness section and fasten it with the clamp (3).
- Fasten the cable clip in the area (2) in the sensor bracket.
- Feed in the connector (1) into the sensor bracket and lock it audibly.
- Plug in the connector (1) and lock audibly.

98 – Install the exhaust gas pressure pipe



- Insert and install the exhaust gas pressure pipe (4).
- Replace the sealing rings (2).

  Parts: Sealing ring
- Apply the banjo bolt (1) hand-tight.
- Tighten down screw (3).

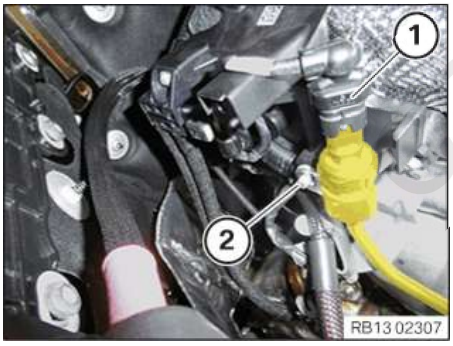
Heat shield to exhaust manifold

M6x12		Tightening torque	10 Nm

- Tighten the banjo bolt (1).

Banjo bolt for exhaust pressure pipe to exhaust manifold

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm



- Tighten down screw (2).

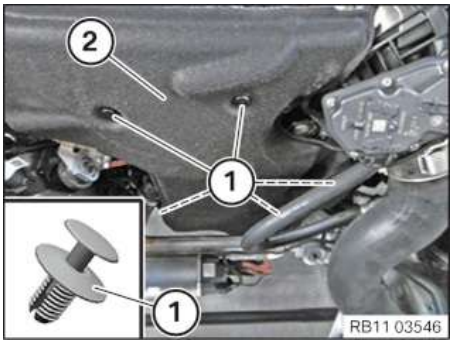
Exhaust gas pressure pipe to sensor system holder

TS6x20		Tightening torque	5,7 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

99 – Install acoustic cover for the engine, front



- Feed the acoustic cover (2) in and install.
- Secure the acoustic cover (2) with the expanding rivets (1).

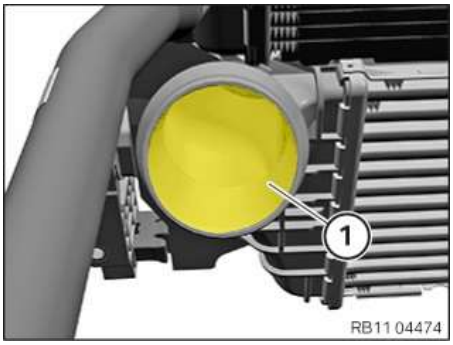
100 – Install pressure pipe between exhaust turbocharger and charge air cooler

RISK OF DAMAGE

Damage to the exhaust turbocharger.

A leak at the pressure pipe can damage the exhaust turbocharger.

- Replace the gaskets and pressure pipe if necessary.



RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

- Remove the auxiliary materials for sealing the opening (1) of the charge air cooler.



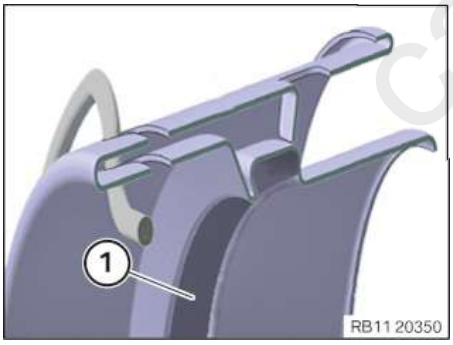
- Check the seal (1) for damage and renew if necessary.

  Parts: Gasket

▸ **Replacing damaged seal**

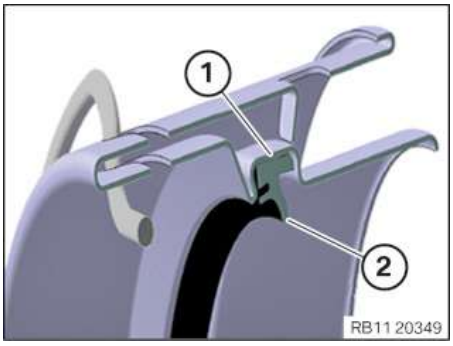
TECHNICAL INFORMATION

Do not use pointed or sharp-edged tools for the installation and/or removal.



- Remove damaged seal.
- Clean gasket groove (1) with a dry towel.

  The gasket groove (1) must be clean.



- Renew gasket.

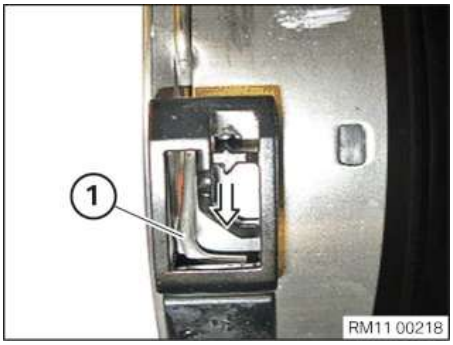
  Parts: Gasket
- Install seal dry without lubricant or mounting agent.

TECHNICAL INFORMATION

Incorrect assembly is possible. Ensure correct installation position.

- Feed in and install the seal.
- Make sure the seal is correctly installed in the gasket groove (1).
- Make sure that the sealing lip (2) is directed inwards as shown.

cardiagn.com



- **Version A:**

  Lock the lock (1).

  The lock (1) on the pressure pipe must engage audibly.

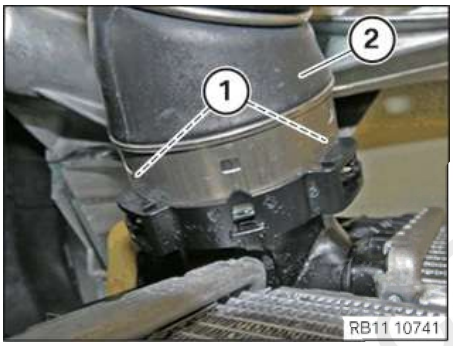


- Pay attention to the installation position:

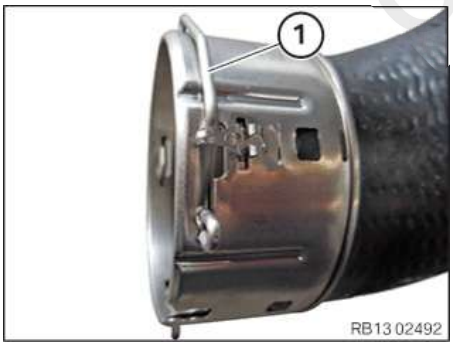
  The pressure pipe fits on charge air cooler in one installation position only.



- Install the pressure pipe (1) from the top.



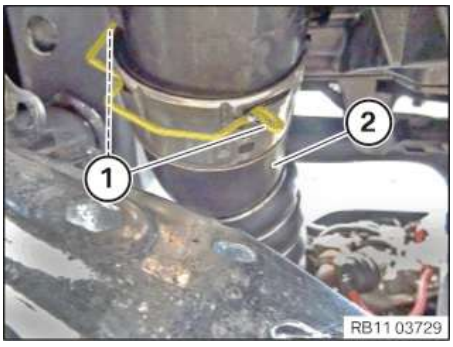
- Connect pressure pipe (2) to charge air cooler.
- Lock the lock (1) on both sides.



- **Version B:**

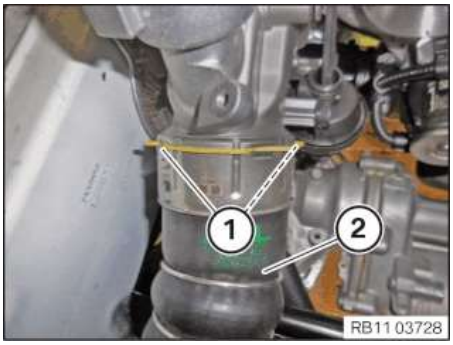
  Lock the lock (1).

  The lock (1) on the pressure pipe must engage audibly.



- Attach the pressure pipe (2) to the charge air cooler until the lock (1) engages on both sides.

cardiagn.com

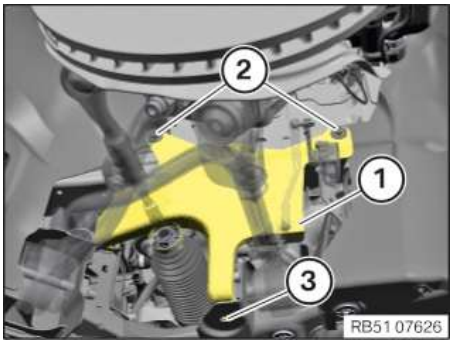


- Place the pressure pipe (2) onto the compressor bypass and ensure that the lock (1) engages audibly.

101 – Install the cover of the steering assembly

TECHNICAL INFORMATION

When tightening the screws, the cover can twist and cause chafe marks on the anti-roll bar (risk of corrosion).
Hold the cover while tightening the screws. Then check the position of the cover.



- Position the cover (1).
- Tighten down screws (2) and (3).

Cover, steering unit

Screw		Tightening torque	3 Nm

102 – Installing the front right wheel

▸ **Mounting the wheel**



TECHNICAL INFORMATION

The contact surface between the brake disc and the wheel rim must be clean and free from oil and grease. There is otherwise a risk of the wheel becoming loose at a later time.

- Remove dirt, grease residues and corrosion from the contact surface with a drill and the special tool 2 344 011.

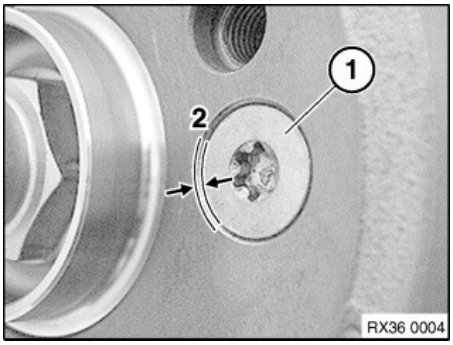
  Do not operate special tool 2 344 011 with an impact screwdriver.
- Degrease the contact surfaces with the universal cleaner (see BMW Group Parts).
- In the event of grease residue in the area of the wheel bolt holes, remove and clean the brake disc.



- Remove dirt, grease residues and corrosion from the contact surface with a drill and the special tool 2 344 011.

  Do not operate special tool 2 344 011 with an impact screwdriver.
- Degrease the contact surfaces with the universal cleaner (see BMW Group Parts).

carDiagn.com



- Check that the mounting bolt (1) for the brake disc is securely seated.

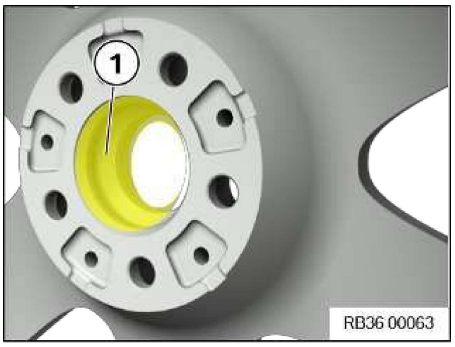
  The mounting bolt (1) for the brake disc **may not** protrude on the contact surface (2) between the brake disc and the wheel rim.

Brake disc to front wheel hub

M8	Renew screw.	Tightening torque	16 Nm

Brake disc to rear wheel hub

M8	Renew screw.	Tightening torque	16 Nm



TECHNICAL INFORMATION

Wheel hubs and wheel centering on the models G80, G82 and G83 **must not** be greased.

- Thinly grease the wheel centring (1) in the wheel rim.

Expendable materials

Brake block paste * TU = Trade Unit. TU numbers cannot be ordered! For invoicing purposes only.	3 g, Bag	83192158851
	100 g, Tube	83192158852
	5 g, TU*	83230140233



TECHNICAL INFORMATION

Wheel hubs and wheel centering on the models G80, G82 and G83 **must not** be greased.

- Apply a thin layer of grease to the front and rear wheel hubs (1) to protect against corrosion.

Expendable materials

Brake block paste * TU = Trade Unit. TU numbers cannot be ordered! For invoicing purposes only.	3 g, Bag	83192158851
	100 g, Tube	83192158852
	5 g, TU*	83230140233



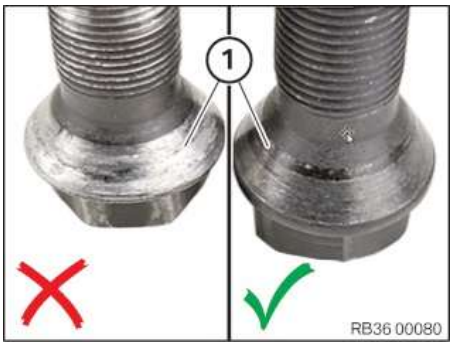
TECHNICAL INFORMATION

A wheel lift is recommended for easier wheel removal and installation without exertion (see Retailer Equipment Catalogue).

- **In vehicles with M Carbon ceramic brake: The wheel lift must be used to install the wheel.**

  This process is intended to prevent damage to the brake disc.

carmagn.com



Check

- **Check wheel bolts for wear.**

Result

» Places (> 30%) of the bearing surfaces (1) of the taper on the screw head show a silver wear.

Measure

- Replace wheel bolts.

  Parts: Wheel bolts



TECHNICAL INFORMATION

Never use impact screwdrivers or electric screwdrivers to screw in and tighten the wheel bolts.

The wheel rim must rest uniformly against the brake disc.

In the case of non-original BMW wheel bolts/wheel rims, it may be necessary to retighten the wheel bolts on account of setting properties (refer to the documentation from the manufacturer).

Do not apply oil to new wheel bolts.

- Renew the corroded wheel bolts (arrows).

  Parts: Wheel bolts
- Clean the wheel bolts (arrows).
- Check the wheel bolts (arrows) and threads for damage, renew the wheel bolts (arrows) if necessary.
- Join and tighten the wheel bolts (arrows).

Wheel bolts

M14 / SW17	Screw in wheel bolts and evenly tighten crosswise by hand in order to centre the wheel rim.	Tightening torque	140 Nm
	Tighten wheel bolts to the prescribed tightening torque with a calibrated torque wrench in a crosswise sequence.	Check	140 Nm
	Check all the wheel bolts in the same order or retighten to the prescribed tightening torque again.		

103 – Prepare for the installation of the diesel particulate filter



- Renew the V-clip (1).

  Parts: V-band clamp

cardiagn.com



- Renew gasket (1).

  Parts: Gasket

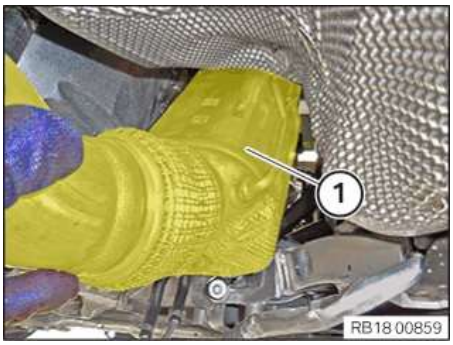
104 – Installing the diesel particulate filter

CAUTION

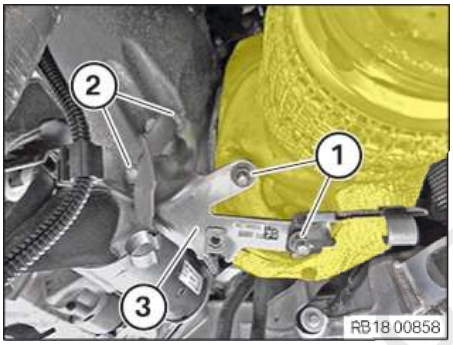
Heavy component.

Heavy components can lead to injury or damage.

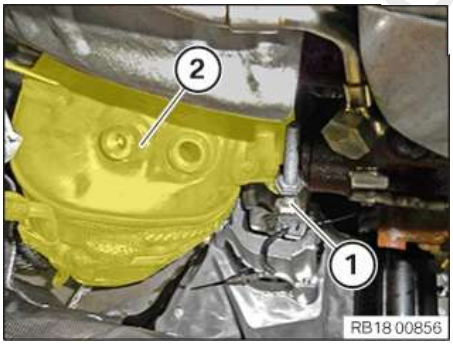
- Remove and install heavy components with the aid of another person/other persons.



- Insert and install the diesel particulate filter (1).



- Insert and install the holder (3).
- **Hand-tighten** the bolts (2).
- Apply the nuts (1) **hand-tight**.

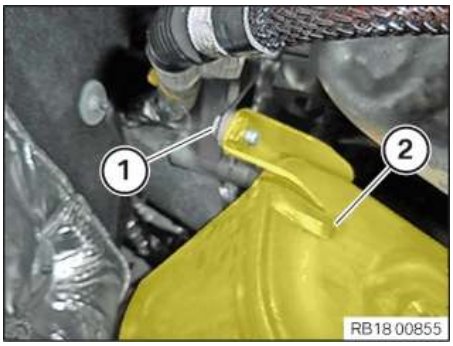


- Renew the V-clip (1).

  Parts: V-band clamp
- Feed in and install V-band clamp (1).

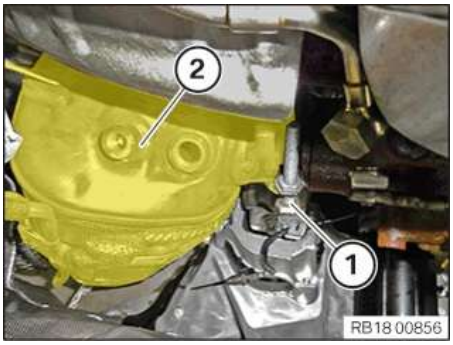
Note: Make sure that the seal between the diesel particulate filter and the exhaust turbocharger is installed correctly.

- Position the diesel particulate filter (2) on the exhaust turbocharger .
- Position V-clip (1).
- Apply the V-clip (1) **hand-tight**.



- Feed in screw (1) on the holder of the diesel particulate filter (2) and tighten **hand-tight**.

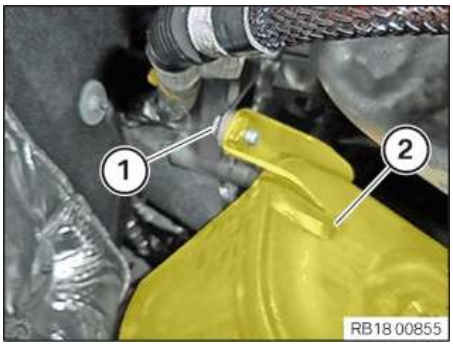
cardiagn.com



- Tighten the V-clip (1) of the diesel particulate filter (2).

Diesel particulate filter V-clip to exhaust turbocharger

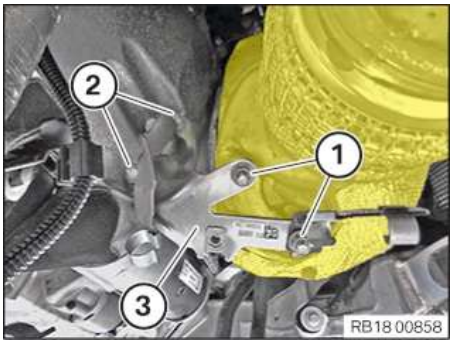
V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm



- Tighten the bolt (1) on the bracket of the diesel particulate filter (2).

Bracket to diesel particulate filter top

M8		Tightening torque	19 Nm



- Tighten the screws (2) on the holder (3).

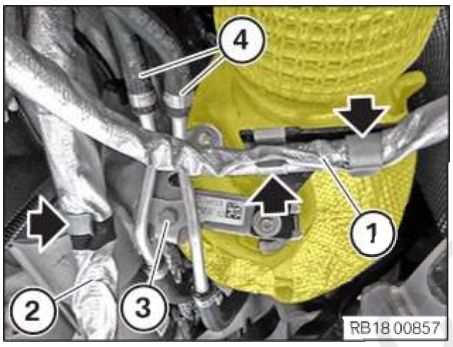
Bracket to transmission for diesel particulate filter holder bottom

M8X20		Tightening torque	19 Nm

- Tighten the nuts (1) on the holder (3).

Lower holder to diesel particulate filter

M8		Tightening torque	19 Nm



- Thread in and install coolant line (4).
- Tighten down screw (3).

Coolant lines for SCR metering module

M6X16		Tightening torque	8 Nm

- Secure the positive battery cable (2) of the starter motor at the clamp (arrow).
- Fasten the metering line (1) on the clamps (arrows).

105 – Installing the nitrogen oxide sensor upstream of SCR catalytic converter

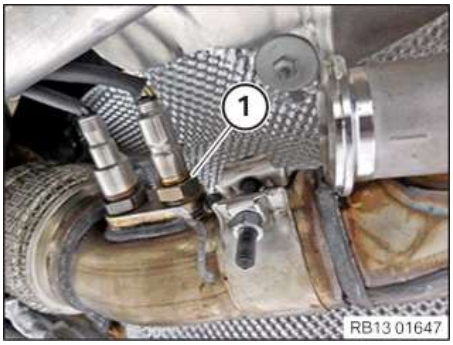
RISK OF DAMAGE

Damage to the nitrogen oxide sensor.

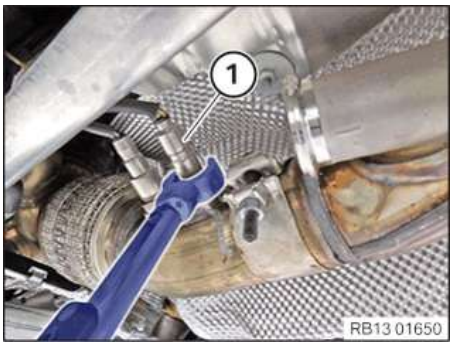
Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
- The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

cardiagn.com



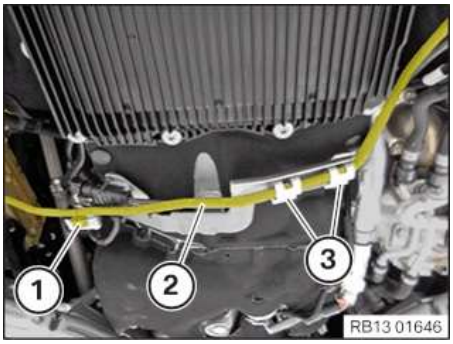
- Feed in and install the nitrogen oxide sensor (1).



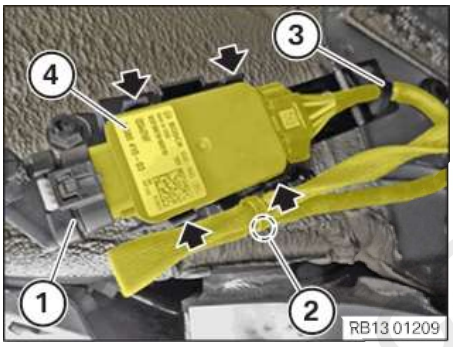
- Tighten the nitrogen oxide sensor (1) using commercially available tools.

Nitrogen oxide sensor before SCR catalytic converter

Sensor		Tightening torque	50 Nm



- Secure the cables (2) to the clamps (3).
- Secure clamps (1).



- Clip in the control unit (4) (arrows).
- Fasten the cable in the holder (3).
- Secure the cable holder (2).
- Plug in the connector (1) and lock audibly.

106 – Installing the monitoring oxygen sensor after the diesel particulate filter

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

cardiagn.com

TECHNICAL INFORMATION

New oxygen sensors are to be greased lightly and evenly on the thread.

For oxygen sensors that are reused, the following should be observed:

Lightly and evenly grease the oxygen sensor only on the thread. Do not clean and grease that part of the oxygen sensor which protrudes in the exhaust branch (sensor ceramics).

For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



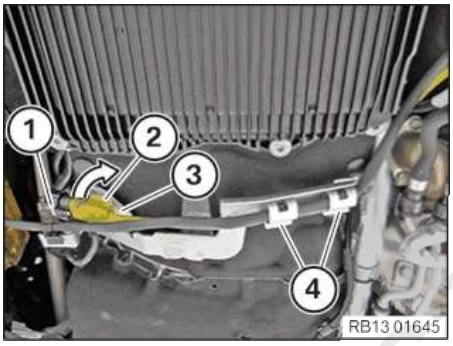
- Insert the monitoring oxygen sensor (1) and install it.



- Tighten the monitoring oxygen sensor (1) with standard tools.

Monitoring oxygen sensor

Sensor		Tightening torque	50 Nm



- Fasten the monitoring oxygen sensor to the clamps (4).
- Secure the connector (2) on the holder (3) in direction of arrow.
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

107 – Installing the exhaust system

CAUTION

Component with heavy weight.

Danger of injury!

- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

Heavy component.

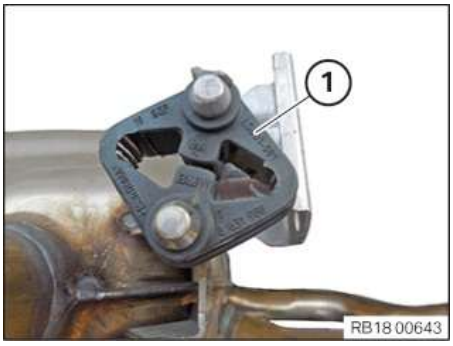
Heavy components can lead to injury or damage.

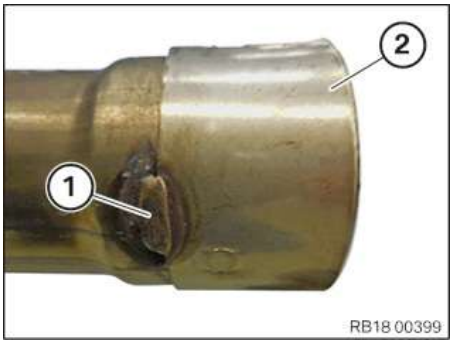
- Remove and install heavy components with the aid of another person/other persons.

cardiagn.com

TECHNICAL INFORMATION

Mount the exhaust system in voltage-free state, maintaining the tightening sequence from the rear silencer towards the exhaust manifold.





NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

- Check all the rubber mounts (1) of the exhaust system for damage.
- Replaced damaged rubber mounts.

  Parts: Rubber mount

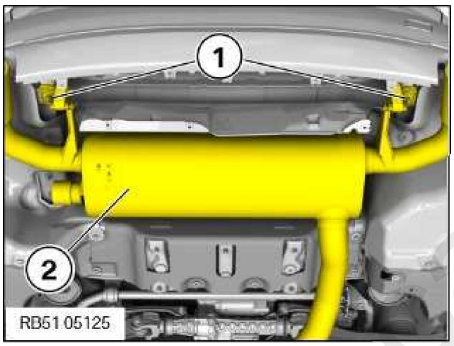
CAUTION

Swarf resulting from sawing or grinding components.

Danger of injury!

- Conduct all work in appropriate personal protective equipment only.
- Wear safety goggles and protective gloves.

- Open the weld seam (1) with a conventional tool.
- Remove the clamp (2).

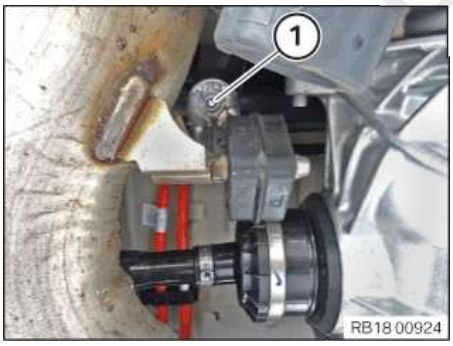


- Insert and install the exhaust system (2).
- Renew nuts (1).

  Parts: Nuts
- Tighten nuts (1).

Rear silencer to body / bumper support

M8	Replace nuts.	Tightening torque	19 Nm

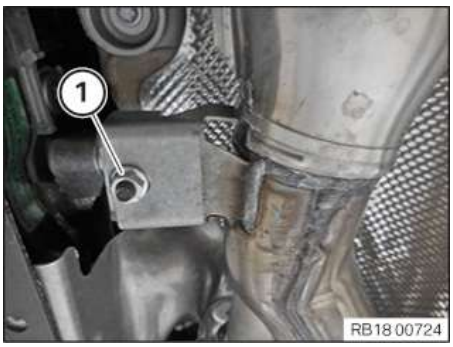


- Renew nut (1) on the rear axle support.

  Parts: Nut
- Tighten nut (1).

Exhaust system to rear axle carrier

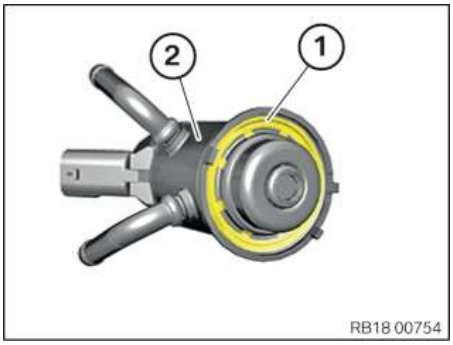
M8 nut		Tightening torque	19 Nm



- Tighten nut (1).

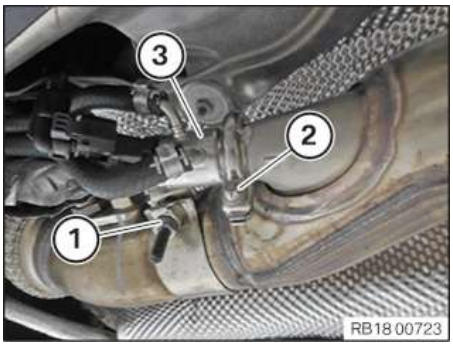
Exhaust system to transmission

M8		Tightening torque	19 Nm



- Renew sealing ring (1) of the SCR metering module (2).

  Parts: Sealing ring



- If necessary, renew clamp (1).

  Parts: Clamp
- Tighten clamp (1).

Exhaust system to diesel particle filter

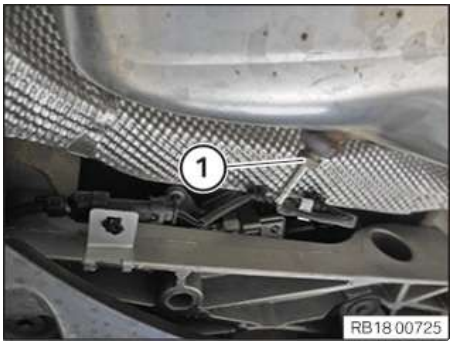
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

- Renew the V-clip (2).

  Parts: V-band clamp
- Install the SCR metering module (3) in the exhaust system.
- Tighten the V-clip (2) of the SCR metering module (3).

SCR metering module V-clip to exhaust system

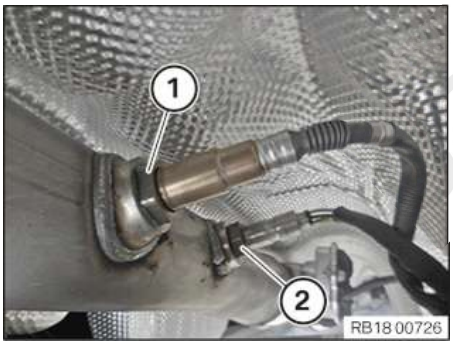
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm



- Install the exhaust temperature sensor (1) in the exhaust system and tighten.

Exhaust-gas temperature sensor upstream of SCR catalytic converter

Sensor		Tightening torque	30 Nm



- Install the diesel particulate sensor (1) in the exhaust system and tighten.

Diesel particulate sensor to exhaust system

Sensor		Tightening torque	50 Nm

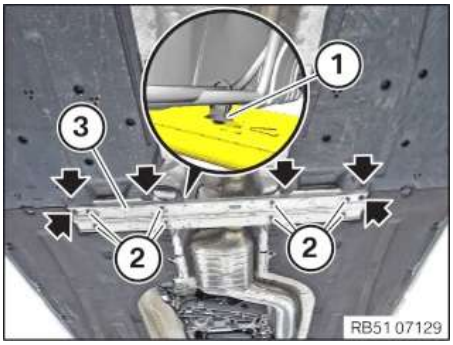
- Install the nitrogen oxide sensor (2) in the exhaust system and tighten.

Nitrogen oxide sensor downstream of SCR catalytic converter

Sensor		Tightening torque	55 Nm

108 – Install the connecting supports on the tunnel

cardiagn.com



- Guide in and install connecting support (3) on the tunnel.
- Tighten the screws (2).
- Tighten screws (arrows).

Connecting support to tunnel

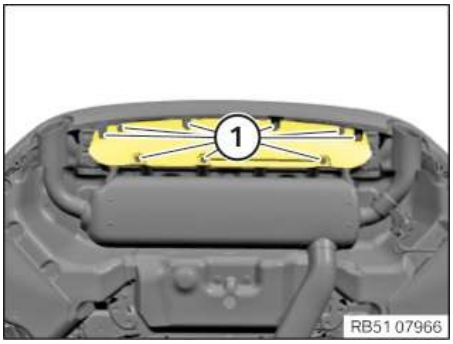
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Secure the clamp (1).

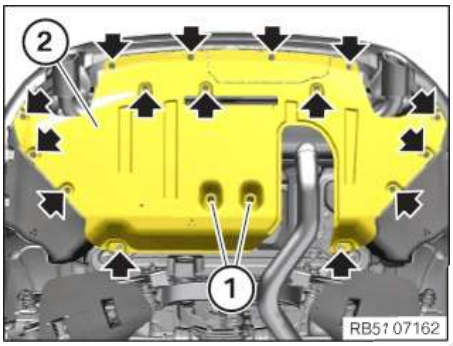
109 – Installing the rear diffuser



- **Version 1:**
- Install the diffuser and tighten the nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm



- **Version 2:**
- Feed in and position the diffuser (2)
- Tighten screws (arrows).

Diffuser / underbody panelling

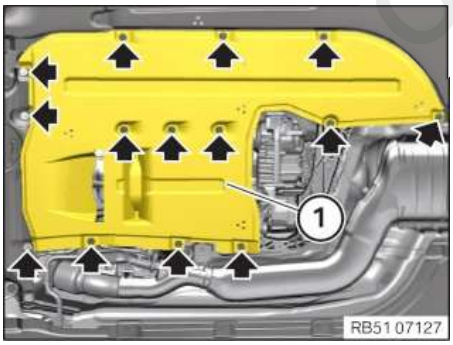
Nuts and screws		Tightening torque	3 Nm

- Tighten nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm

110 – Installing underbody protection at rear



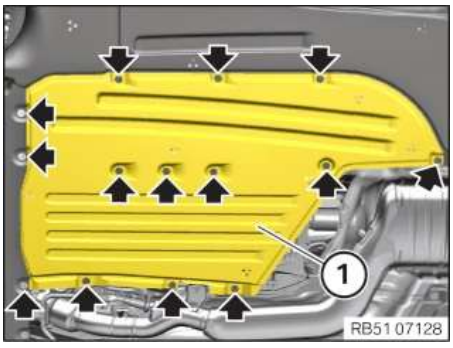
- **Version A:**

Insert and install the rear underbody protection (1).

Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version B:**

Insert and install the rear underbody protection (1).

Tighten screws (arrows).

Underbody protection

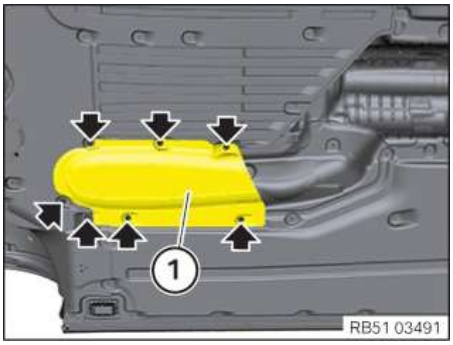
Hexagon screw		Tightening torque	3 Nm

cardiagn.com

111 – Install the underbody panelling of the transmission on the side

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

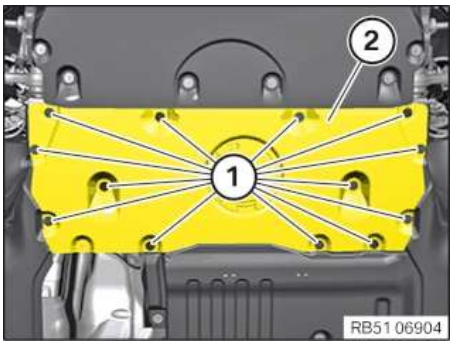


- Insert the underbody panelling (1).
- Tighten screws (arrows).

Underbody panelling

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

112 – Installing the centre underbody protection



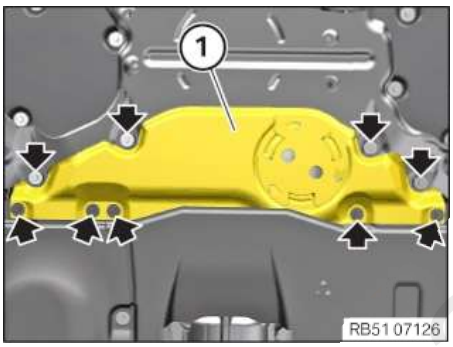
- **Variant with rear wheel drive:**

  Position central underbody protection (2).

  Tighten the screws (1).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version with all-wheel drive:**

  Guide in centre underbody protection (1) and install.

  Tighten screws (arrows).

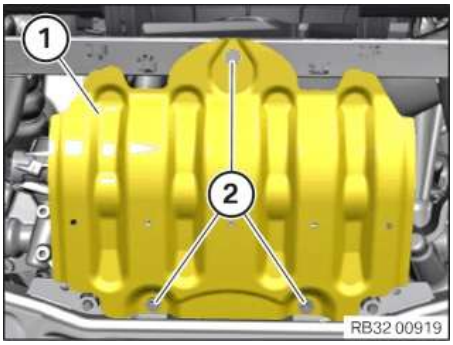
Underbody protection

Hexagon screw		Tightening torque	3 Nm

113 – If installed: Install underbody protection of the steering

Prerequisite

Front underbody protection has been removed.



- Position underbody protection (1).
- Tighten the screws (2).

Underbody protection, steering, to front axle support

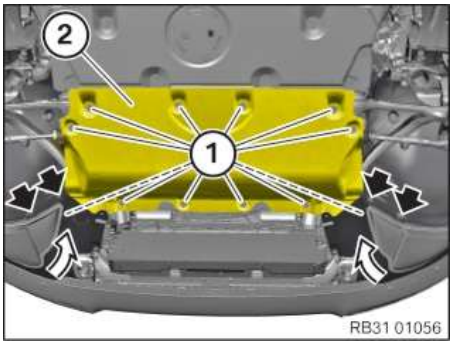
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

114 – Install the underbody protection of the steering gear

cardiagn.com



- **Version A:**

  Position the underbody protection (2) of the steering gear.

  Tighten the screws (1).

Underbody protection of the steering gear

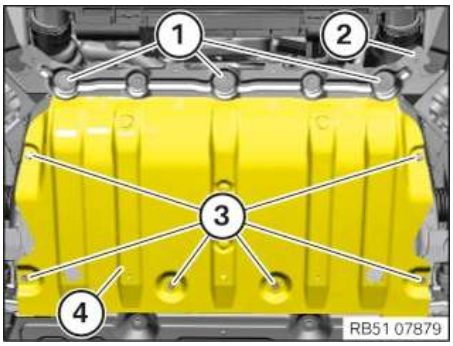
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the bottom wheel arch cover.

  Tighten the screws (arrows) of the lower wheel arch cover on the wheel arch cover.

Wheel arch trim panel, front

Thermoplastic hexagon screw		Tightening torque	2,6 Nm



- **Version B:**

  Feed in the underbody protection (4) of steering gear and install it.

  Tighten the screws (3).

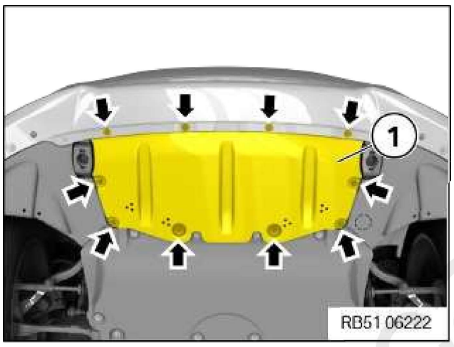
Underbody protection of the steering gear

Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the holder (2) for the underride protection.

  Tighten the screws (1).

115 – Installing the front underbody protection



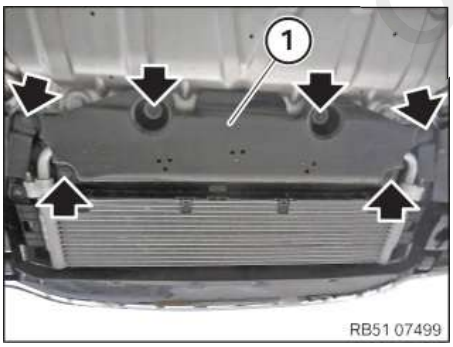
- **Version A:**

  Feed in the front underbody protection (1) towards the front under the bumper panel and position.

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



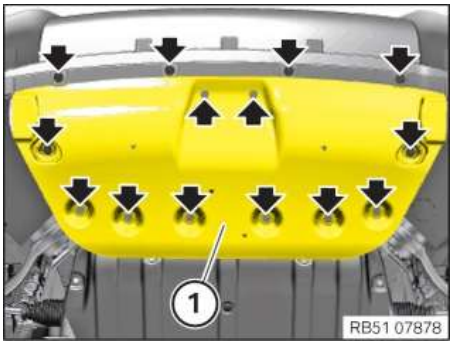
- **Version B:**

  Feed in and position the front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



- **Version C:**

  Feed in and install front underbody protection (1).

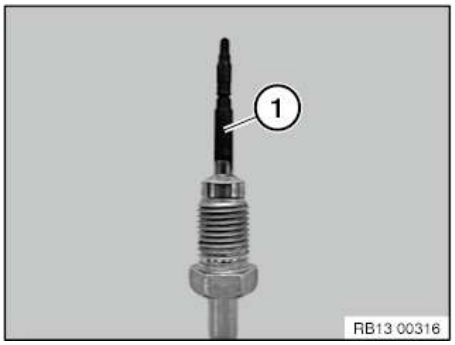
  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

carlagn.com

116 – Installing the exhaust temperature sensor for the exhaust system downstream the catalytic converter on the diesel particulate filter



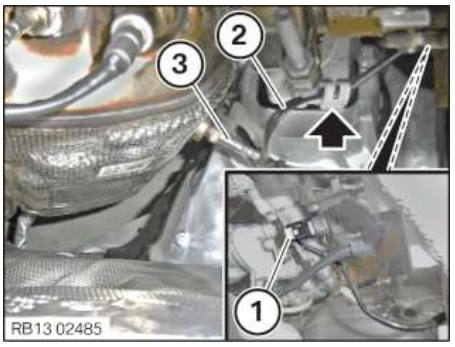
RISK OF DAMAGE

Damage of exhaust temperature sensor.

Damage to exhaust temperature sensors leads to malfunctions.

- Make sure that the gauge tip is not damaged.

- Check the gauge tip (1) for damage.



- Feed in and install the exhaust temperature sensor (3).
- Tighten the exhaust temperature sensor (3).

Exhaust temperature sensor for the exhaust system after catalytic converter before diesel particulate filter

Sensor		Tightening torque	30 Nm

- Secure cable (2) to the clamp (arrow).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

117 – Installing the front oxygen sensor on the diesel particulate filter

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
- The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

TECHNICAL INFORMATION

New oxygen sensors are to be greased lightly and evenly on the thread.

For oxygen sensors that are reused, the following should be observed:

Lightly and evenly grease the oxygen sensor only on the thread. Do not clean and grease that part of the oxygen sensor which protrudes in the exhaust branch (sensor ceramics).

For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue

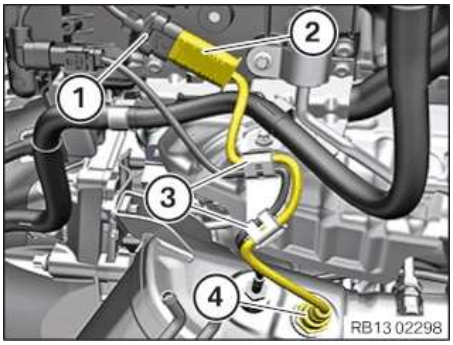


- Insert and install the front oxygen sensor (1).
- Tighten the front oxygen sensor (1) with standard tools.

Front oxygen sensor to top of diesel particulate filter

Sensor		Tightening torque	50 Nm

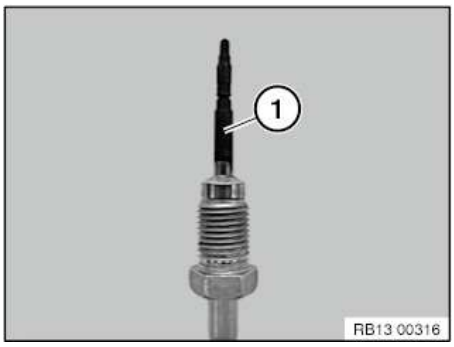
carDiagn.com



- Fasten the front oxygen sensor (4) to the clamps (3).
- Connect connectors (2) and lock.
- Connect connectors (1) and lock.

  The connectors (1) and (2) must audibly engage.

118 – Install the exhaust-gas temperature sensor on the diesel particulate filter



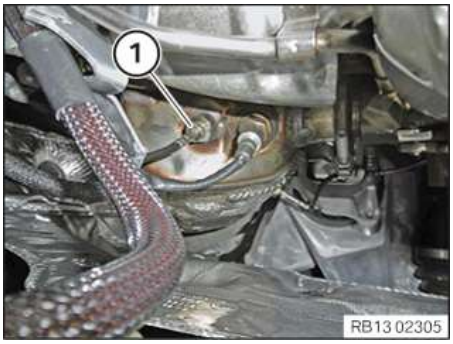
RISK OF DAMAGE

Damage of exhaust temperature sensor.

Damage to exhaust temperature sensors leads to malfunctions.

- Make sure that the gauge tip is not damaged.

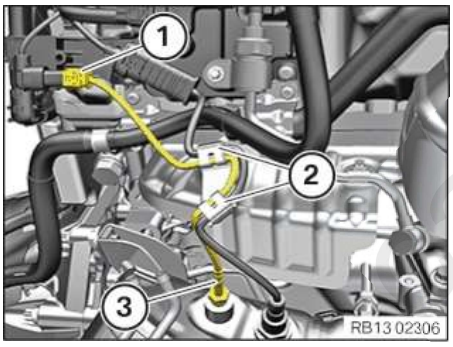
- Check gauge tip (1) for damage.



- Feed in and install the exhaust temperature sensor (1).
- Tighten the exhaust temperature sensor (1) with the special tool .

Exhaust-gas temperature sensor to diesel particulate filter

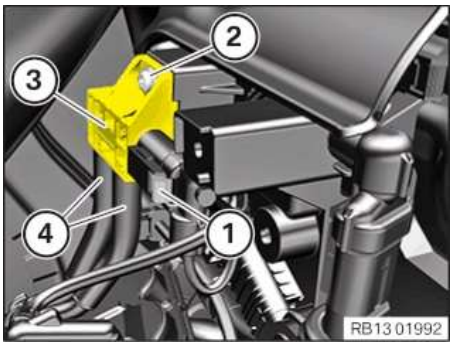
Sensor		Tightening torque	30 Nm



- Secure the exhaust temperature sensor (3) to the clamp (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

119 – Installing the differential pressure sensor for the diesel particulate filter



- Feed in and install the differential pressure sensor (3).
- Tighten down screw (2).

Differential pressure sensor of diesel particulate filter on cylinder head cover

TS5x20		Tightening torque	4 Nm

- Check the pressure hoses (4) for hardening and damage, renew if necessary.
- Connect the pressure hoses (4) and secure them using 15 mm to 19 mm screw clamps.

Clamp for the pressure hose on the differential pressure sensor

Clamp 15–19mm		Tightening torque	3 Nm

- Connect connectors (1) and lock.

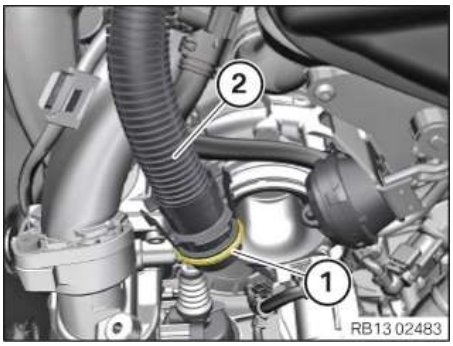
  The connector (1) must engage audibly.

120 – Installing the clean air pipe with resonator

carsign.com



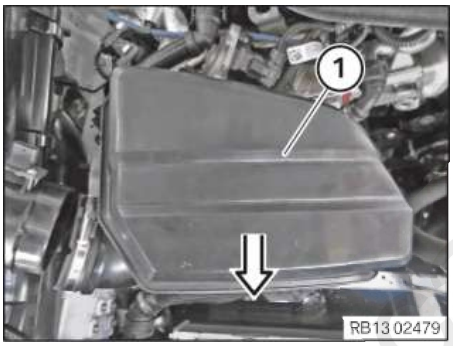
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



- Check the sealing ring (1) for the engine ventilation line (2) for damage and renew where required.



- Feed in and install clean air pipe with resonator (1) in the direction of the arrow.

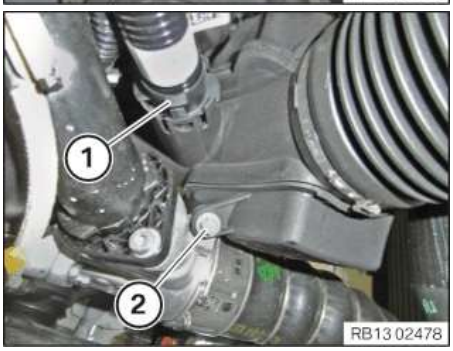


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

  The clamp (1) must engage audibly.

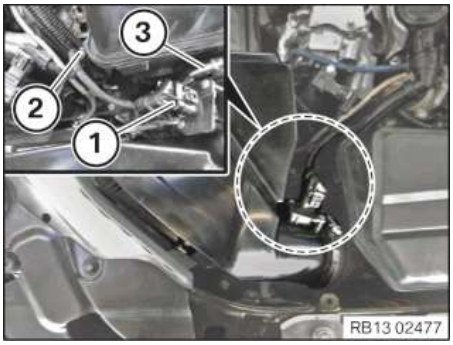


- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm

cardiagn.com



- Connect the clean air pipe with resonator to the intake filter housing.
- Tighten clamp (3).

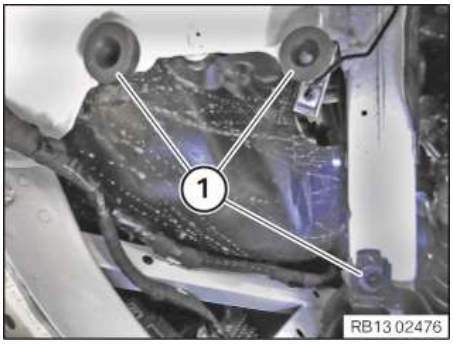
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

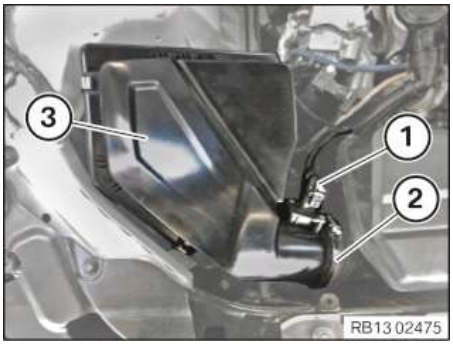
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

121 – Installing intake silencer housing



- Check the rubber mount (1) for correct fit.



- Feed the intake filter housing (3) in and engage it in the rubber mounts.
- Tighten clamp (2).

Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

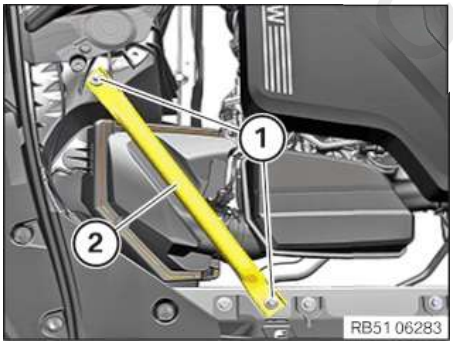
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

122 – Install the right front-end strut

TECHNICAL INFORMATION

Driving without the strut brace/front-end strut or tension strut is not permitted.



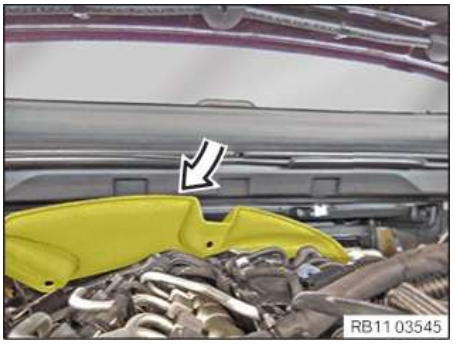
- Install the front-end strut (2).
- Renew screws (1).

  Parts: Screws
- Tighten the screws (1).

Front end strut

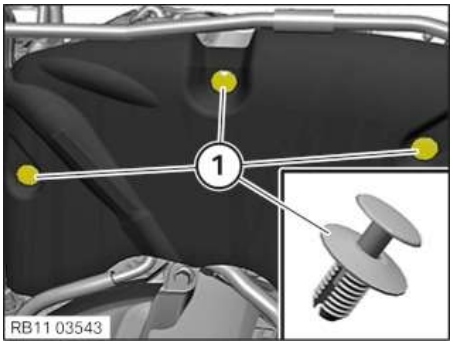
Screw		Tightening torque	56 Nm

123 – Installing acoustic cover at rear



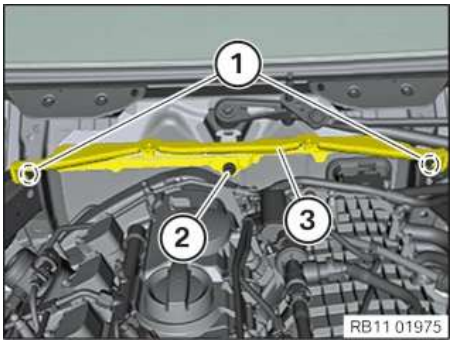
- Guide in the acoustic cover in the direction of the arrow and install it.

cardiagn.com



- Secure acoustic cover with the expanding rivets (1).

124 – Installing centre bulkhead lower section

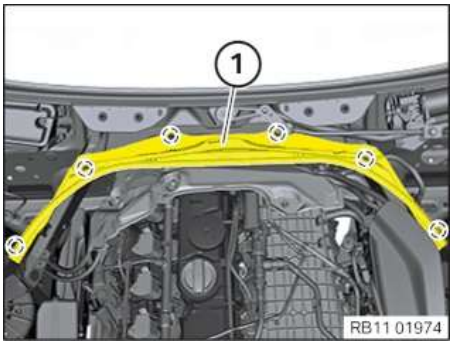


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

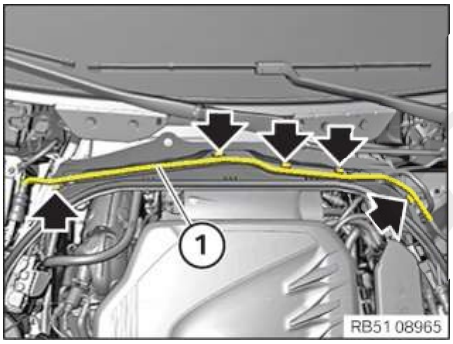
125 – Installing the centre bulkhead upper part



- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

Bulkhead upper part to bottom bulkhead

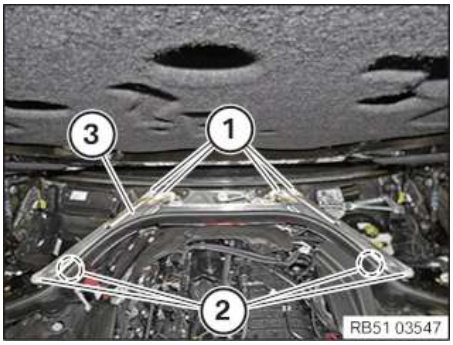
		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

  Clip in the wire (1) into the holders (arrows).

cardiagn.com



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Install the tension strut (3) on the spring strut dome.
- Tighten the screws (1).

Tension strut on bulkhead

M10x25 screw		Tightening torque	56 Nm

- Renew screws (2).

  Parts: Screws
- Tighten the screws (2).

Tension strut to spring strut dome

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

126 – Install the seal for the bonnet



- Press the rear bonnet seal (2) into the guide.
- Feed in cable (1) into the brackets.
- Check that the rear bonnet seal (2) and the cable (1) are seated correctly.

127 – Installing cowl panel cover

RISK OF DAMAGE

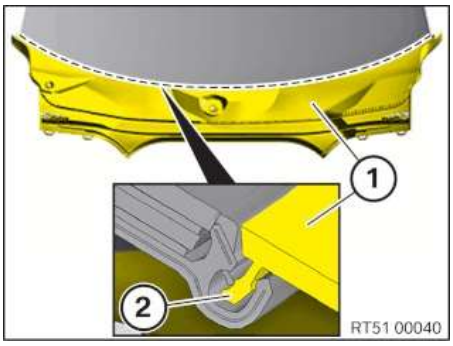
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

- Ensure correct installation of the components.
- Only use undamaged components.

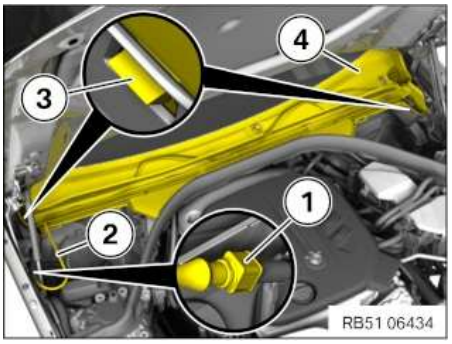
TECHNICAL INFORMATION

Before installing the cowl panel cover it is **mandatory** to check that the 48 V line is routed correctly and fitted tightly.
An incorrectly laid or attached 48 V line can be damaged by the wiper kinematics.



- Push the cowl panel cover (1) into the latch mechanism (2) beginning on the side.

cardiagn.com



- Clip cowl panel cover (4)in by means of the latch mechanisms (3).
- Position windscreen wash hose (2) and connect windscreen wash hose (1)quick lock.

128 – Install left and right wiper arm

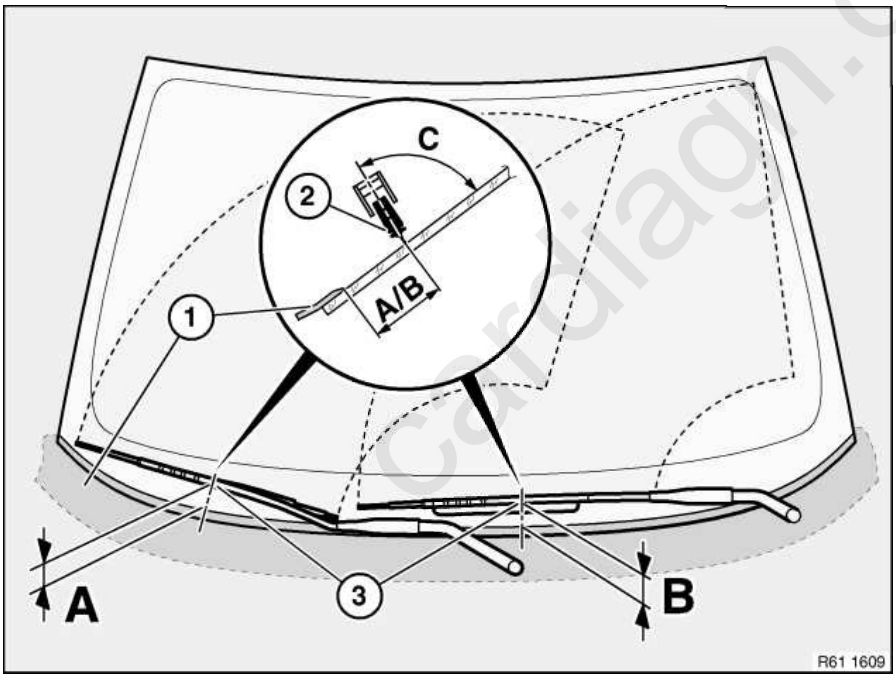
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

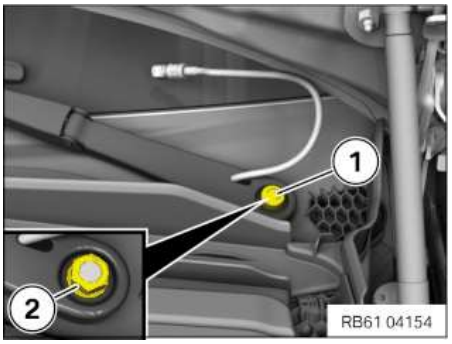
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- Connect the wiper arm (3).
- Correctly position the wiper arm (2) in relation to the window edge (1).

Distance from window pane edge to wiper blade

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm



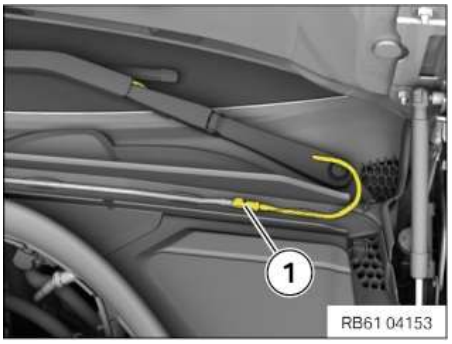
- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

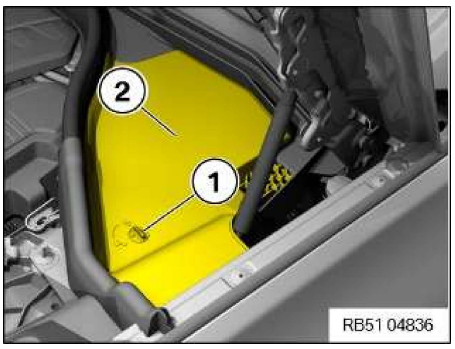
- Connect the protective cap (1).

cardiagn.com



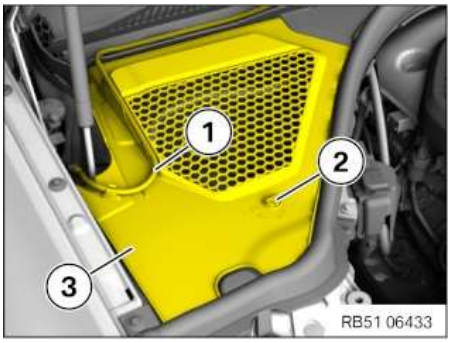
- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

129 – Install the cover of the engine compartment on the rear left



- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

130 – Install the rear right engine compartment cover



- Position the cover of the engine compartment on the rear right (3).
- Close lock (2).
- Insert washer fluid hose (1) into the guides.

131 – Connecting all battery earth leads



- See additional information.

132 – Take bonnet out of the service position

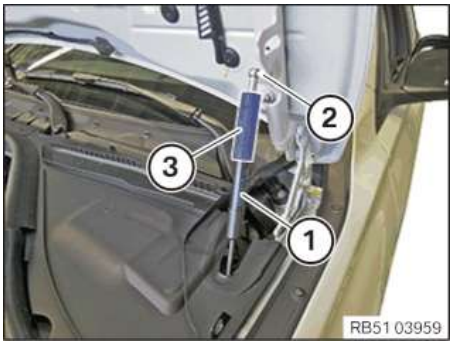
CAUTION

Shutting bonnet or tailgate.

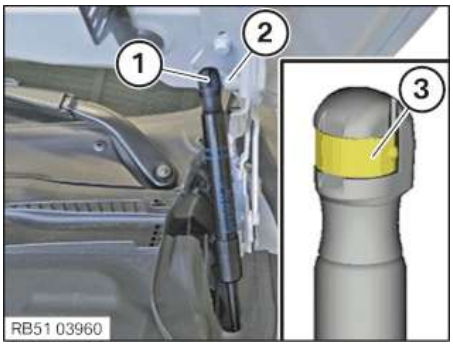
Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.

cardiagn.com



- Support the bonnet by hand.
- Remove the special tool (3) from the ball pin (2).
- Pull off the special tool (3) from the gas pressure spring (1).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.



- Check the clamp (3) is fitted correctly.
- Connect ball socket (1) to ball pin (2).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.

133 – Filling and bleed the high-temperature coolant circuit



TECHNICAL INFORMATION

It is **mandatory** to fill the cooling system before bleeding.
Fill **both** the circuits for high and low-temperature coolant circuits.

- See additional information.

134 – Check engine oil level

Prerequisite
Vehicle is in a horizontal position.

TECHNICAL INFORMATION

Please comply with instructions in Owner's Handbook.

- Carry out an electronic oil measurement.
- Top up engine oil if necessary.

▸ **Check engine oil level**

TECHNICAL INFORMATION

Always check the engine oil level when the engine is at operating temperature (engine oil temperature > 70°C).

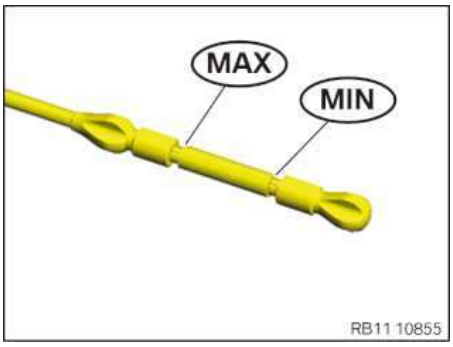
cardiagn.com

- Park vehicle on a horizontal surface.
- Stop the engine and wait for 5 minutes.
- Pull out the oil dipstick and wipe off using a lint-free cloth.

TECHNICAL INFORMATION

Do not pull out or insert the oil dipstick into the guide tube too quickly or slowly.

- Push the oil dipstick into the guide tube up to the limit position and pull it out again.



TECHNICAL INFORMATION

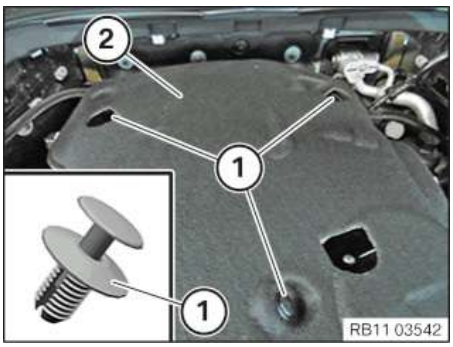
The engine oil level must be between the minimum mark and the maximum mark of the oil dipstick.

- Read the engine oil level on the oil dipstick.
- Top up engine oil if necessary.

Oil quantity between the two markings MIN and MAX of the oil dipstick

1.0 l

135 – Install the acoustic cover for the injectors



- Feed the acoustic cover (2) in and install.
- **If installed:** Secure the acoustic cover (2) with the expanding rivets (1) .

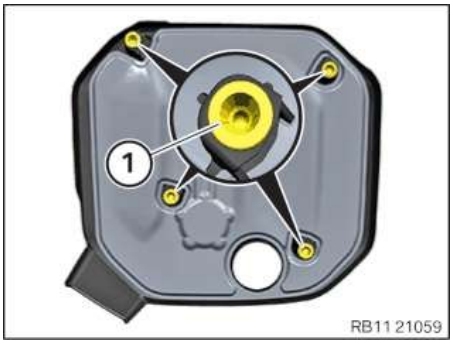
136 – Install acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



- Check the acoustic cover for correct fit of the rubber mounts (1).

cardiagn.com



- Clip in the acoustic cover (1) into the holders in the indicated areas.

Additional Information

Overview of Tightening Torques

Special tool 2 365 488 to engine			Used in step 5181
M8x60		Tightening torque	19 Nm

Cylinder head to crankcase			Used in step 69
M12x1.5	Renew screws.	1. Tightening torque	50 Nm
		2. Angle of rotation	120 °
		3. Angle of rotation	120 °

Cylinder head bolt to timing case cover			Used in step 69
M8x40		Tightening torque	19 Nm

Standard screw connection M6			Used in step 69
M6		Tightening torque	8 Nm

Ground to cylinder head			Used in step 69
M6		Tightening torque	8 Nm

Glow elements to cylinder head			Used in step 70
Glow element		Tightening torque	13 Nm

Camshaft carrier to cylinder head			Used in step 73
M7x35		Tightening torque	13 Nm

Bearing journal to cylinder head			Used in step 76
M16x1.5	Replace bearing journal.	Tightening torque	20 Nm

Standard screw connection M8			Used in step 76
M8		Tightening torque	19 Nm

Chain tensioner piston to cylinder head			Used in step 77
22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

Holder to crankcase			Used in step 77
M8X16		Tightening torque	19 Nm

Camshaft sprocket to camshaft			Used in step 78
M7x17.			17 Nm

Starter motor to engine			Used in step 84
M8X60		Tightening torque	19 Nm

Battery positive lead to starter			Used in step 84
M8		Tightening torque	13,5 Nm

cardiagn.com

Cylinder head cover to cylinder head			Used in step 85
M6		Tightening torque.	8,5 Nm

Clamping claw facing to cylinder head cover			Used in step 86
M6		Tightening torque	10 Nm

Injector to cylinder head cover			Used in step 86
M8		Tightening torque	8 Nm
		Angle of rotation	120 °

Rail to cylinder head cover			Used in step 87
M8		Tightening torque	19 Nm

High pressure lines between high pressure pump and rail			Used in step 88
High-pressure pipe		Tightening torque	24.5 Nm

High pressure lines between injector and rail			Used in step 89
High-pressure pipe		Tightening torque	24.5 Nm

Intake plenum to cylinder head			Used in step 91
M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum			Used in step 9195
		Tightening torque	10 Nm

Electric changeover valve to intake plenum			Used in step 91
TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold			Used in step 92
TS5x20		Tightening torque	3,6 Nm

Standard screw connection 4 Nm			Used in step 92
Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover			Used in step 92
TS5x20		Tightening torque	3,6 Nm

Holder on intake plenum			Used in step 92
TS6X20		Tightening torque	5 Nm

Exhaust manifold to cylinder head			Used in step 94
M7	**If necessary, renew loose stud bolts.**	Tightening torque	11 Nm
	Renew nuts.	Tightening torque	13 Nm

Oil feed line on cylinder head			Used in step 94
M6x12		Tightening torque	8 Nm

Exhaust-gas recirculation cooler to exhaust manifold			Used in step 9495
M8x28	Replace screws	Tightening torque	32 Nm

Exhaust-gas recirculation cooler to cylinder head			Used in step 9495
M8x20 / M8x28		Tightening torque	19 Nm

Exhaust turbocharger low-pressure stage to crankcase			Used in step 94
M8X16		Tightening torque	22 Nm

Oil return line to turbocharger			Used in step 94
M6x12	Renew gasket.	Tightening torque	8 Nm

cardiagn.com

Oil return line to crankcase — Used in step 94

M6x12	Check gasket. Renew the seal or line if necessary.	Tightening torque	8 Nm

Exhaust-gas recirculation cooler to cylinder head — Used in step 95

M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °

Heat shield to exhaust manifold — Used in step 96

M6x12			10 Nm

Bracket on cylinder head cover — Used in step 97

		Tightening torque	5 Nm

Battery positive lead to battery positive terminal — Used in step 97

M8		Tightening torque	19 Nm

Heat shield to exhaust manifold — Used in step 98

M6x12		Tightening torque	10 Nm

Banjo bolt for exhaust pressure pipe to exhaust manifold — Used in step 98

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm

Exhaust gas pressure pipe to sensor system holder — Used in step 98

TS6x20		Tightening torque	5,7 Nm

Cover, steering unit — Used in step 101

Screw		Tightening torque	3 Nm

Brake disc to front wheel hub — Used in step 102

M8	Renew screw.	Tightening torque	16 Nm

Brake disc to rear wheel hub — Used in step 102

M8	Renew screw.	Tightening torque	16 Nm

Wheel bolts — Used in step 102

M14 / SW17	Screw in wheel bolts and evenly tighten crosswise by hand in order to centre the wheel rim. Tighten wheel bolts to the prescribed tightening torque with a calibrated torque wrench in a crosswise sequence. Check all the wheel bolts in the same order or retighten to the prescribed tightening torque again.	Tightening torque Check	140 Nm 140 Nm

Diesel particulate filter V-clip to exhaust turbocharger — Used in step 104

V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

Bracket to diesel particulate filter top — Used in step 104

M8		Tightening torque	19 Nm

Bracket to transmission for diesel particulate filter holder bottom — Used in step 104

M8X20		Tightening torque	19 Nm

Lower holder to diesel particulate filter — Used in step 104

M8		Tightening torque	19 Nm

Coolant lines for SCR metering module — Used in step 104

M6X16		Tightening torque	8 Nm

cardiagn.com

Nitrogen oxide sensor before SCR catalytic converter			Used in step 105
Sensor		Tightening torque	50 Nm

Monitoring oxygen sensor			Used in step 106
Sensor		Tightening torque	50 Nm

Rear silencer to body / bumper support			Used in step 107
M8	Replace nuts.	Tightening torque	19 Nm

Exhaust system to rear axle carrier			Used in step 107
M8 nut		Tightening torque	19 Nm

Exhaust system to transmission			Used in step 107
M8		Tightening torque	19 Nm

Exhaust system to diesel particle filter			Used in step 107
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

SCR metering module V-clip to exhaust system			Used in step 107
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm

Exhaust-gas temperature sensor upstream of SCR catalytic converter			Used in step 107
Sensor		Tightening torque	30 Nm

Diesel particulate sensor to exhaust system			Used in step 107
Sensor		Tightening torque	50 Nm

Nitrogen oxide sensor downstream of SCR catalytic converter			Used in step 107
Sensor		Tightening torque	55 Nm

Connecting support to tunnel			Used in step 108
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

Diffuser / underbody panelling			Used in step 109
Nuts and screws		Tightening torque	3 Nm

Underbody protection			Used in step 110112
Hexagon screw		Tightening torque	3 Nm

Underbody panelling			Used in step 111
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Underbody protection, steering, to front axle support			Used in step 113
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support			Used in step 113
Hexagon bolt M6		Tightening torque	8 Nm

Underbody protection of the steering gear			Used in step 114
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

Wheel arch trim panel, front			Used in step 114
Thermoplastic hexagon screw		Tightening torque	2,6 Nm

cardiagn.com

Underbody protection front — Used in step 115

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Exhaust temperature sensor for the exhaust system after catalytic converter before diesel particulate filter — Used in step 116

Sensor		Tightening torque	30 Nm

Front oxygen sensor to top of diesel particulate filter — Used in step 117

Sensor		Tightening torque	50 Nm

Exhaust-gas temperature sensor to diesel particulate filter — Used in step 118

Sensor		Tightening torque	30 Nm

Differential pressure sensor of diesel particulate filter on cylinder head cover — Used in step 119

TS5x20		Tightening torque	4 Nm

Clamp for the pressure hose on the differential pressure sensor — Used in step 119

Clamp 15–19mm		Tightening torque	3 Nm

Clean air pipe to exhaust turbocharger — Used in step 120

M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing — Used in step 120121

Clamp		Tightening torque	3 Nm

Front end strut — Used in step 122

Screw		Tightening torque	56 Nm

Bulkhead lower part to body — Used in step 124

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead — Used in step 125

		Tightening torque	3 Nm

Tension strut on bulkhead — Used in step 125

M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome — Used in step 125

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm — Used in step 128

Combination hexagon nut		Tightening torque	35 Nm

Overview of Special Tools

0 493 339 (13 5 252) Bush

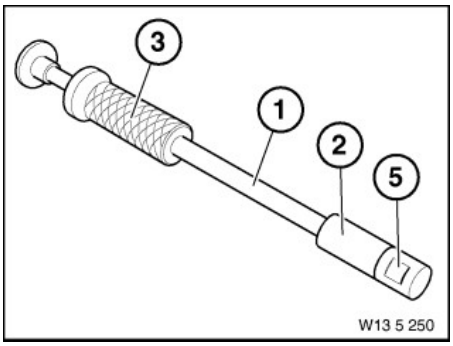


Common — Used in step 48

Usage	(Threaded bush)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

cardiagn.com

0 493 321 (13 5 250) Puller



Common Used in step 48

Usage	For removing injector nozzles or injectors from cylinder head
Included in the tool or work	
Storage location	A16
Replaced by	
In connection with	
SI-Number	01 06 98 (306)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 338 (13 5 251)		**Rod** (guide rod)	
2	0 493 339 (13 5 252)		**Bush** (Threaded bush)	
3	0 493 340 (13 5 253)		**Weight** (Weight)	
4	0 493 379 (13 5 254)		**Claw** (Clamping claw) For removal of injector nozzles / engine: M57	
5	0 495 579 (13 5 255)		**Adapter** For removing steering shaft on E85. Refer to SI 01 11 06 (265)	

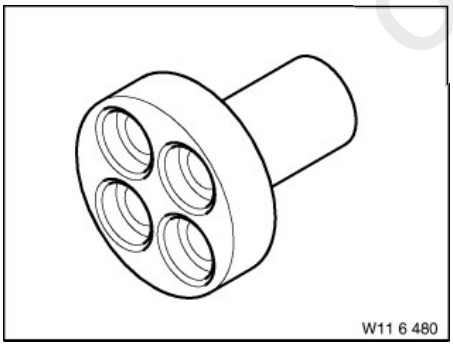
0 493 340 (13 5 253) Weight



Common Used in step 48

Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 380 (11 6 480) Connector

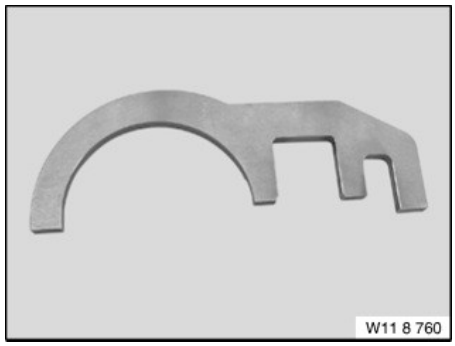


Common Used in step 5181

Usage	For turning over engine at crankshaft hub (vibration absorber).
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	01 11 98 (338)

carbiagn.com

0 496 112 (11 8 760) Gauge



Common	Used in step 515574798182
Usage	For securing camshaft at TDC.
Included in the tool or work	
Storage location	B24
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

2 365 488 Adapter



Common	Used in step 51808183
Usage	For disconnecting the crankshaft at the top dead centre. (longitudinal installation with automatic transmission only).
Included in the tool or work	
Storage location	C56
Replaced by	
In connection with	
SI-Number	01 46 14 (191)

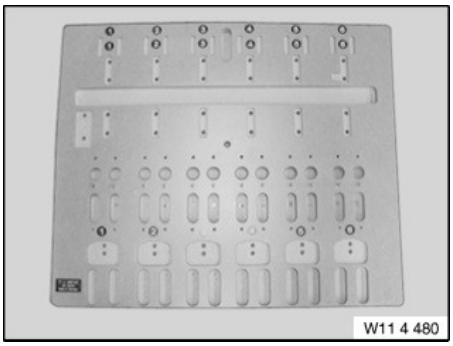
2 288 380 Locating stud



Common	Used in step 51808183
Usage	For disconnecting the crankshaft at the top dead centre. Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).
Included in the tool or work	
Storage location	A56
Replaced by	
In connection with	
SI-Number	01 04 14 (071)

cardiagn.com

0 495 105 (11 4 480) oddments tray



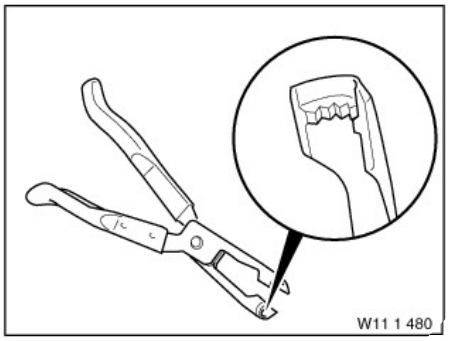
Common Used in step 575864

Usage	(Boards (2 pieces)) For setting down the individual components of the cylinder head.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 17 04 (130)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 495 106 (11 4 481)		**oddments tray** (Board, intake side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	
2	0 495 107 (11 4 482)		**oddments tray** (Board, exhaust side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	

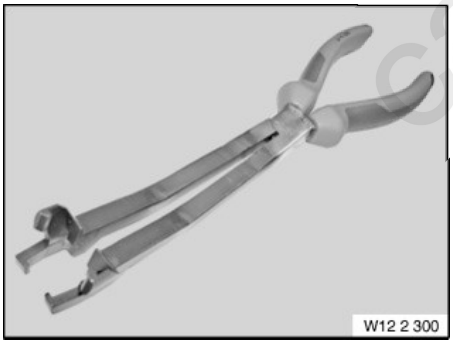
0 490 796 (11 1 480) Pliers



Common Used in step 5965

Usage	For removing valve stem seal
Included in the tool or work	
Storage location	A10
Replaced by	
In connection with	
SI-Number	01 01 93 (621)

0 495 140 (12 2 300) Pliers

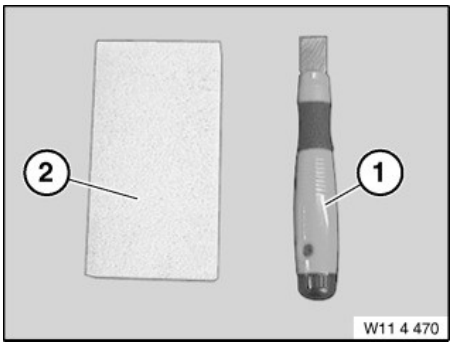


Common Used in step 60

Usage	(Special pliers for glow plug connectors) For unlocking, detaching and attaching glow plug connectors.
Included in the tool or work	
Storage location	A51
Replaced by	
In connection with	
SI-Number	01 19 05 (215)

sardiagn.com

0 495 102 (11 4 470) Tool



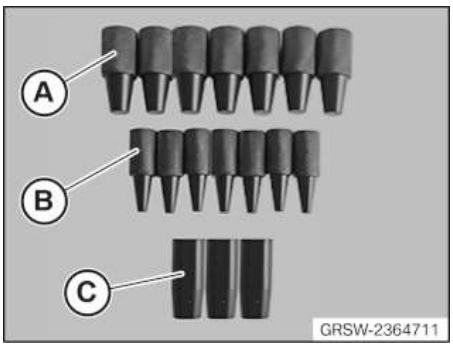
Common Used in step 6094

Usage	(cleaning kit) For cleaning sealing surfaces on magnesium crankcase/cylinder head.
Included in the tool or work	
Storage location	C52
Replaced by	
In connection with	
SI-Number	01 17 04 (130)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 495 103 (11 4 471)		**Scraper**	
2	0 495 104 (11 4 472)		**Extractor** (grindstone)	

2 364 711 Plug



Common Used in step 61

Usage	For closing the pressure oil holes for cleaning the cylinder head sealing surfaces.
Included in the tool or work	
Storage location	C20
Replaced by	
In connection with	
SI-Number	

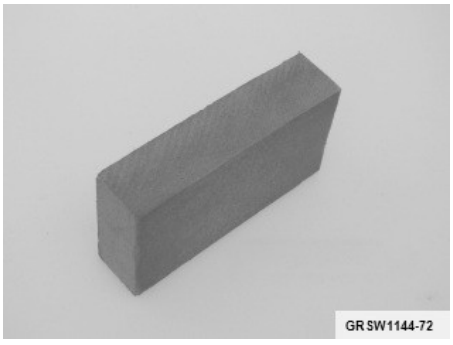
0 495 103 (11 4 471) Scraper



Common Used in step 61

Usage	
Included in the tool or work	0 495 102
Storage location	C52
Replaced by	
In connection with	
SI-Number	

0 495 104 (11 4 472) Extractor

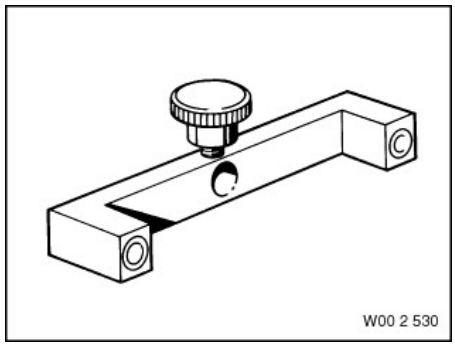


Common Used in step 61

Usage	(grindstone)
Included in the tool or work	0 495 102
Storage location	C52
Replaced by	
In connection with	
SI-Number	

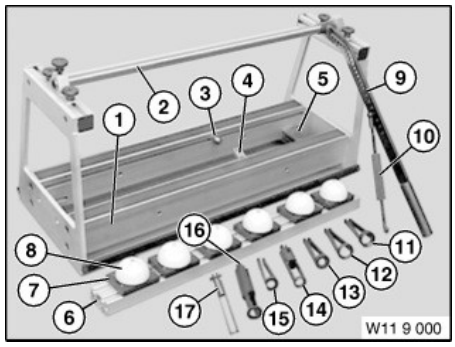
cardiagn.com

0 490 185 (00 2 530) Bridge



Common	Used in step 63
Usage	(Measuring bridge) For determining the piston projection (Diesel)
Included in the tool or work	
Storage location	A3
Replaced by	
In connection with	
SI-Number	

0 494 366 (11 9 001) Device

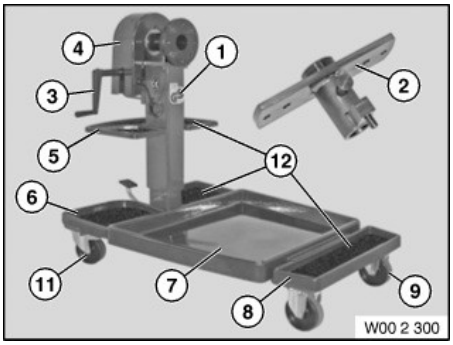


Common	Used in step 6467
Usage	
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 187 (00 2 300) Assembly stand

Used in step 6467

cardiagn.com



Common

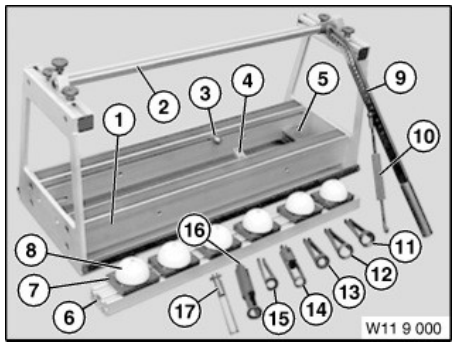
Usage	Assembly stand with universal flange for mounting engines from S85
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 25 04 (155)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 495 188 (00 2 301)		**Assembly stand** available only as complete assembly stand 83 30 0 495 187.	
2	0 495 189 (00 2 302)	2 299 563	**Tool** (Universal flange). Do not use any more!!! Technically locked. Is replaced by a new flange with part number 83 30 2 299 563. All flanges delivered by the end of 2011 will be replaced free of charge. From 2012, only the new flange will be supplied. Also applies to the complete engine mounting stand 00 2 300.	
3	0 495 200 (00 2 303)		**Crank**	
4	0 495 201 (00 2 304)		**Cover** (Protective hood)	
5	0 495 202 (00 2 305)		**oddments tray** (Oddments tray for small parts)	
6	0 495 203 (00 2 306)		**Shaped element** (Rear shaped pan)	
7	0 495 204 (00 2 307)		**Collection pan** (Oil collection pan)	
8	0 495 205 (00 2 308)		**Shaped element** (Front shaped pan)	
9	0 495 206 (00 2 309)		**Wheel** (Front wheel (without stop))	
10	0 495 207 (00 2 311)		**Wheel** (Rear wheel (with stop))	
11	0 495 208 (00 2 312)		**Mat** (Checker mat set)	
2	2 299 563		**Adapter** New adapter for the engine assembly stand. Replacement for 83 30 0 495 189 - 00 2 302.	

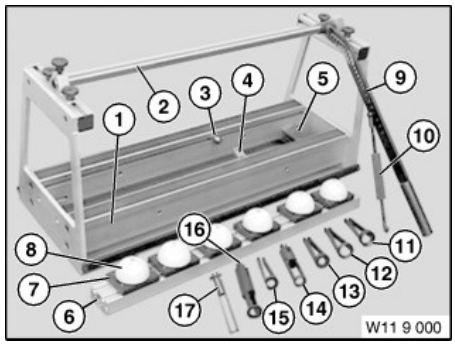
cardiagn.com

0 494 371 (11 9 006) Insert



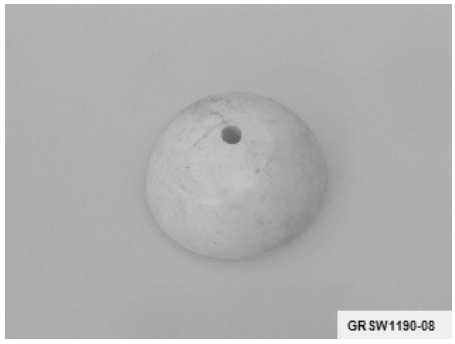
Common	Used in step 6467
Usage	(Aluminium strip)
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 494 372 (11 9 007) Shaped part



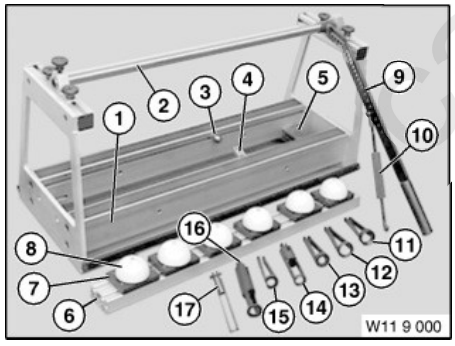
Common	Used in step 64
Usage	(Shaped part)
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 494 373 (11 9 008) Shaped part



Common	Used in step 64
Usage	(Shaped part) Shaped part made of plastic
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 494 370 (11 9 005) Quick fastener

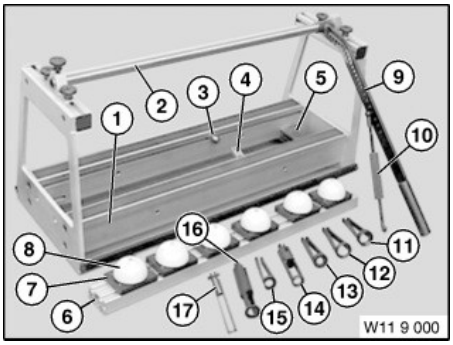


Common	Used in step 6467
Usage	
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 494 362 (11 9 000) Device

Used in step 6467

cardiagn.com



Common

Usage	(Cylinder head expander tool)
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	002300 = 0495187
SI-Number	01 03 02 (833)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 494 366 (11 9 001)		**Device**	
6	0 494 371 (11 9 006)		**Insert** (Aluminium strip)	
11	0 494 376 (11 9 012)		**Basket** (Valve spring cage) Engine M41, M51, S50	
17	0 495 028 (11 9 017)		**Basket** (Valve spring cage) Engine N52	
2	0 494 367 (11 9 002)		**Rod**	
3	0 494 368 (11 9 003)		**Adapter** (Sliding block)	
4	0 494 369 (11 9 004)		**Tab**	
5	0 494 370 (11 9 005)		**Quick fastener**	
7	0 494 372 (11 9 007)		**Shaped part** (shaped part)	
8	0 494 373 (11 9 008)		**Shaped part** (Shaped part) Shaped part made of plastic	
9	0 494 374 (11 9 009)		**Lever**	
10	0 494 375 (11 9 011)		**Hook**	
12	0 494 377 (11 9 013)		**Basket** (Valve spring cage) Engine M43, M73	
13	0 494 378 (11 9 014)		**Basket** (Valve spring cage) Engine M44, M52, M54, M56, M62, S52, S54, S62	
14	0 494 379 (11 9 015)		**Basket** (Valve spring cage) Engine M47, M47TU, M57, M57TU, N40, N42, N62, N73	
15	0 494 380 (11 9 016)		**Basket** (Valve spring cage) Engine M21, M40	

cardiagn.com

0 494 374 (11 9 009) Lever



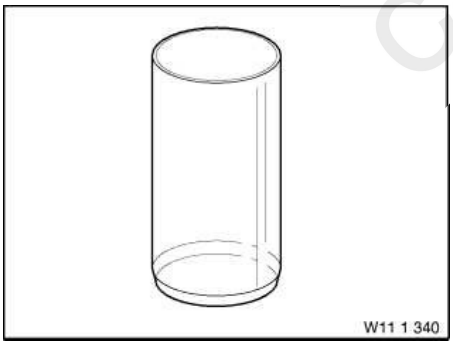
Common	Used in step 6467
Usage	
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 496 143 (11 8 840) Basket



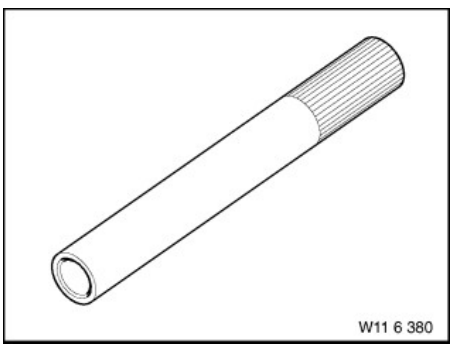
Common	Used in step 6467
Usage	(Valve spring cage) For removing and fitting the valves.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

0 490 746 (11 1 380) Holding sleeve



Common	Used in step 66
Usage	(Assembly sleeve) For fitting the valve stem seal, diameter 7 mm
Included in the tool or work	
Storage location	individual
Replaced by	
In connection with	
SI-Number	

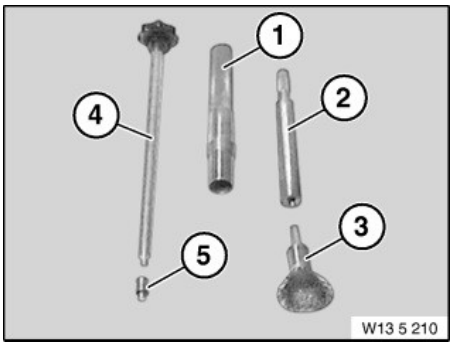
0 493 249 (11 6 380) Bush



Common	Used in step 66
Usage	For fitting valve stem seal
Included in the tool or work	
Storage location	A9
Replaced by	
In connection with	
SI-Number	01 06 98 (306)

cardiagn.com

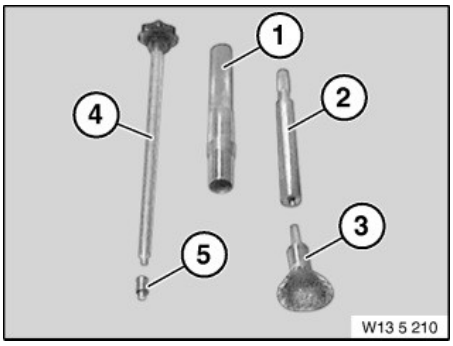
0 493 763 (13 5 215) Plug



Common Used in step 86

Usage	(Seal plug)
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 762 (13 5 214) Rod

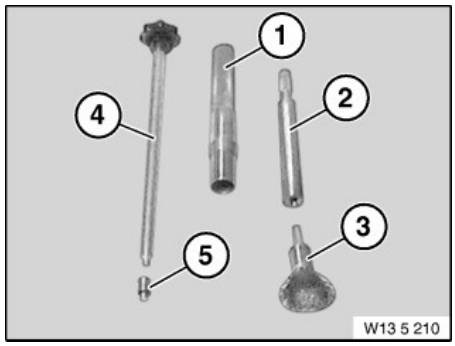


Common Used in step 86

Usage	(Mounting rod) For the seal plug
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

cardiagn.com

0 493 758 (13 5 210) Tool



Common Used in step 86

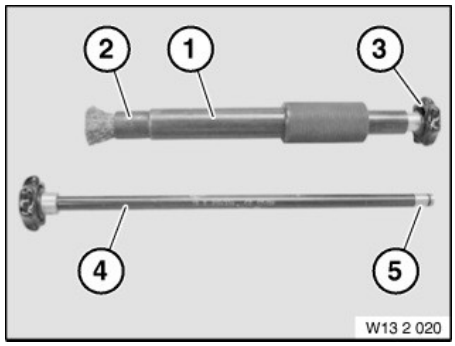
Usage	(Cleaning set) For injector channels
Included in the tool or work	
Storage location	B4
Replaced by	
In connection with	
SI-Number	01 05 00 (574)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 759 (13 5 211)		**Holding sleeve** (Guide sleeve)	
2	0 493 760 (13 5 212)		**Holder** (Brush holder)	
3	0 493 761 (13 5 213)		**Brush head**	
4	0 493 762 (13 5 214)		**Rod** (Mounting rod) For the seal plug	
5	0 493 763 (13 5 215)		**Plug** (Seal plug)	

cardiagn.com

0 496 150 (13 2 020) Tool



Common Used in step 86

Usage	(Cleaning kit) For cleaning the injector shaft.
Included in the tool or work	
Storage location	A87
Replaced by	
In connection with	
SI-Number	01 07 07 (355)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 496 151 (13 2 021)		**Holding sleeve** (Guide sleeve) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
2	0 496 152 (13 2 022)		**Holder** (Brush holder) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
3	0 496 153 (13 2 023)		**Brush head** Remaining inventories will be sold off, followed by discontinuation and then available as part of complete special tool 13 2 020 = 83 30 0 496 150 only	
4	0 496 154 (13 2 024)		**Rod** (Mounting rod) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
5	0 496 155 (13 2 025)		**Plug** (Seal plug) Available as part of complete special tool 13 2 020 = 83 30 0 496 150 only.	

cardiagn.com

2 344 011 Tool



Common	Used in step 102
Usage	Tool (wheel hub grinder) for cleaning the connection of the wheel rim (wheel contact face) to the wheel hub.
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	08 08 12 (872)

Replacement tools:

0 495 221 (36 1 323) Wheel stud



Common	Used in step 32
Usage	(Code 30) Code 39 available separately, (see EPC) under 36 13 1 181 259
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 224 (36 1 326) Wheel stud



Common	Used in step 32
Usage	(Code 33) With centring bore available separately, (see EPC) under 36 13 6 765 546
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

cardiagn.com

0 495 225 (36 1 327) Wheel stud



Common	Used in step 32
Usage	(Code 34) With centring bore available separately (see EPC) under 36 13 6 765 547
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 226 (36 1 328) Wheel stud



Common	Used in step 32
Usage	(Code 35) With centring bore available separately, (see EPC) under 36 13 6 762 340
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 227 (36 1 329) Wheel stud



Common	Used in step 32
Usage	(Code 36) With centring bore available separately (see EPC) under 36 13 6 762 341
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 228 (36 1 331) Wheel stud



Common	Used in step 32
Usage	(Code 37) With centring bore available separately (see EPC) under 36 13 6 762 342
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 229 (36 1 332) Wheel stud



Common	Used in step 32
Usage	(Code 38) With centring bore available separately (see EPC) under 36 13 6 762 343
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

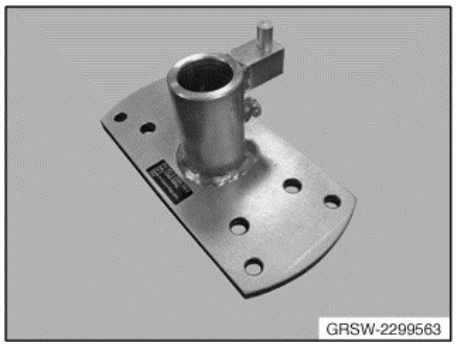
cardiagn.com

0 495 230 (36 1 333) Wheel stud



Common	Used in step 32
Usage	(Code 40) With centring bore available separately (see EPC) under 36 13 6 762 344
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

2 299 563 Adapter



Common	Used in step 6467
Usage	New adapter for the engine assembly stand. Replacement for 83 30 0 495 189 - 00 2 302.
Included in the tool or work	0 495 187
Storage location	
Replaced by	
In connection with	
SI-Number	

Overview Technical Data

Cylinder head flatness	Used in step 62
Maximum lengthwise deviation from flatness	0.10 mm
Maximum transverse deviation from flatness	0.05 mm

Valve underprotrusion	Used in step 63
	0,8 (0.7 - 0,9) mm

Distance from window pane edge to wiper blade	Used in step 128
Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

Oil quantity between the two markings MIN and MAX of the oil dipstick	Used in step 134
	1.0 l

Links

General repair instructions	Used in step
11 00 ... Overview of consumables (Electronic Parts Catalogue)	86

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2131
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2131
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2131

cardiagn.com

61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2131
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2131
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 35 ... Notes on ESD protection (Electro Static Discharge)	161718192930414859
61 35 ... Notes on ESD protection (Electro Static Discharge)	161718192930414859
00 02 001 Raising the vehicle using a vehicle lift	32102
12 51 010 Replacing wiring harness section for preheating system	70
12 51 010 Replacing wiring harness section for preheating system	70
12 51 010 Replacing wiring harness section for preheating system	70
12 51 010 Replacing wiring harness section for preheating system	70
17 00 008 Draining and topping up coolant for high-temperature circuit	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 008 Draining and topping up coolant for high-temperature circuit	133
17 00 008 Draining and topping up coolant for high-temperature circuit	133

carlagn.com

17 00 008 Draining and topping up coolant for high-temperature circuit	133
17 00 008 Draining and topping up coolant for high-temperature circuit	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleeding the cooling system (B36, B38, B46, B48)	133
17 00 039 Bleeding cooling system (B37, B47)	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Filling and bleeding the high-temperature cooling system vacuum filler device (B48)	133
17 00 008 Draining and topping up the high-temperature coolant circuit	133
17 00 008 Draining and topping up the high-temperature coolant circuit	133
17 00 016 Draining and topping up coolant circuit for Range Extender \PREMIUM	133
17 00 008 Draining and topping up the high-temperature coolant circuit	133
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	133
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	133
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133

carmagn.com

17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 009 Check the cooling system for watertightness with a special tool (with a tester)	133
17 00 009 Check the cooling system for watertightness with a special tool (with a tester)	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 008 Draining and topping up coolant for high-temperature circuit	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 008 Draining and topping up coolant for high-temperature circuit	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133

cardiagn.com

11 34 190 Replacing all valve stem seals

WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

RISK OF DAMAGE

Damage to battery terminal, the safety battery terminal or the intelligent battery sensor (IBS).

Damaged battery terminals can lead to malfunctions or vehicle electrical system faults.

- Pull off battery terminal from battery pole by carefully moving to and fro. Do not pry off using a tool.

PRELIMINARY WORK

1 – Bring front compartment lid in the service position

Prerequisite

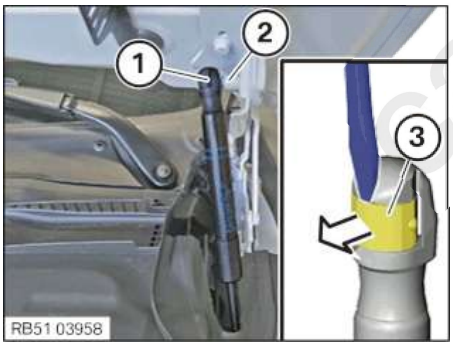
Engine compartment lid is open.

CAUTION

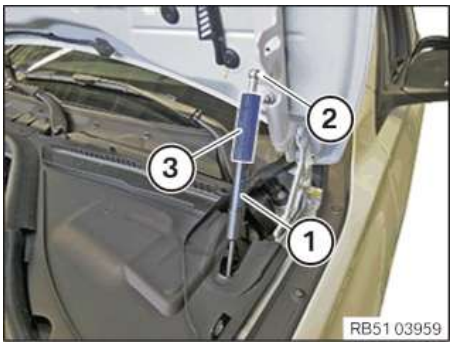
Shutting bonnet or tailgate.

Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.



- Lift clamp (3) slightly using a screwdriver, in the direction of the arrow.
- Lift off ball socket (1) from ball pin (2).
- Repeat the operation on the other side of vehicle.



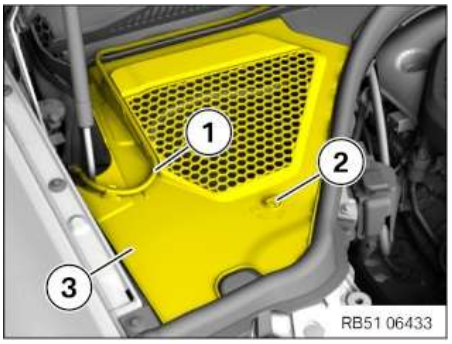
TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

- Remove the bonnet support and open the bonnet further.
- Pull special tool or or (3) over gas pressure spring (1).
- Place special tool on the ball pin (2) and engage using force.
- Repeat the operation on the other side of vehicle.

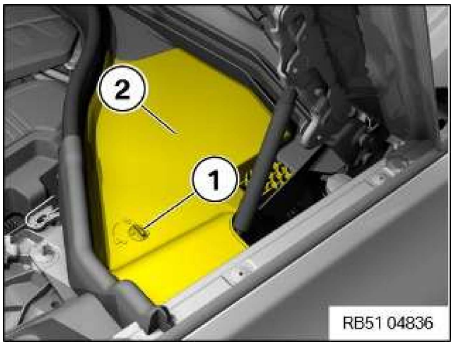
2 – Remove the cover of the rear right engine compartment

cardiagn.com



- Release washer fluid hose (1) from the guides.
- Loosen the lock (2).
- Remove the cover (3) of the rear right engine compartment.

3 – Remove the cover of the engine compartment at the rear left



- Loosen the lock (1).
- Remove the cover (2) of the rear left engine compartment.

4 – Deactivating the 48 V electrical system

Prerequisite

Ignition is switched off.

WARNING

Deactivation of the 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Make sure that **no battery charger** is connected to the jump start terminal point in the engine compartment.
- For vehicles with additional electrical systems (48 V electrical system, high-voltage vehicle electrical system), it is mandatory to deactivate them **before** disconnecting the vehicle battery.

WARNING

Deactivation of the 48 V electrical system.

Risk of short circuits! Risk of fire!

- Make sure that **no charger** is connected to the jump start support point in the engine compartment.

RISK OF DAMAGE

Damage to 48-V battery

If a 48-V battery that is disconnected from the electrical system is activated, the battery electronics will be damaged.

- Only carry out activation of the 48V electrical system with a completely connected 48-V battery.

TECHNICAL INFORMATION

Follow notes for 48-V battery. See further information 6120 ... Notes on 48-V battery.

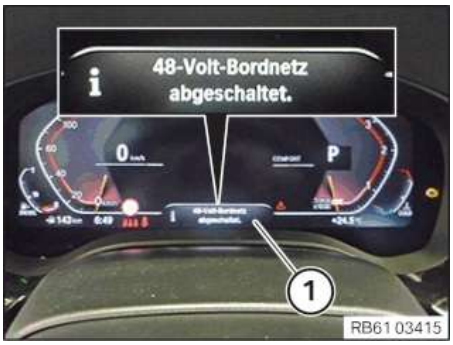
cardiagn.com



- Deactivate the 48V electrical system by opening the bonnet.

  The deactivation takes place automatically.

Check



TECHNICAL INFORMATION

Zero voltage (48V electrical system is switched off) is displayed only in PAD mode.

- Press the START-STOP button quickly 3 times without stepping on the brake pedal to establish the PAD mode.
- Check isolation from the supply in the instrument cluster in PAD mode.

desired state

- The Check Control message "48V electrical system switched off." (1) is displayed.

Result

» **The absence of voltage** cannot be determined by means of the Check Control message "48V electrical system switched off:" (1). Work is not permitted to be started.

Measure

- Carry out the service function "48 V electrical system deactivation".
  - Vehicle management > Service functions > Voltage supply > Deactivate 48 V electrical system

  Only when the Check Control message “48 V electrical system switched off.” (1) is displayed in the instrument cluster is it permitted to disconnect the 12 V battery.

  If the absence of voltage is not indicated clearly, contact Technical Support.

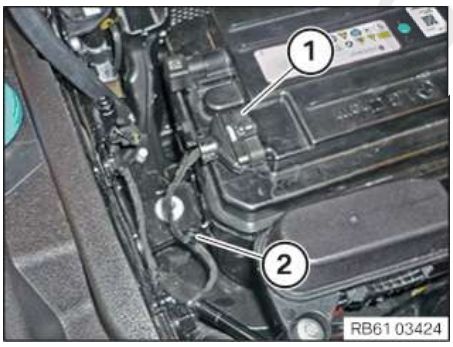
Result

» The Check Control message signals that the 48V electrical system has been switched off.

Measure

- Exit PAD mode by pressing the START-STOP button once without depressing the brake pedal.

  The work “Disconnecting the negative battery cable of the 48-V battery” can be started.



- Unlock and disconnect plug connection (1) of the CAN bus.
- Release the clip (2).



- Loosen nut (1).
- Pull off negative battery cable (2) of the 48-V battery from the negative battery terminal, set it aside and secure it.



WARNING

Unprotected battery terminals.

Risk of short circuits! Risk of fire!

- Cover the vehicle battery.

- Cover the vehicle battery with the special tool as shown.
- Position the battery earth lead (1) as shown.

5 – Disconnecting all battery earth leads



- See additional information.

6 – Removing the wiper arm on the left and right

NOTICE

Description is for left component only. Procedure on the right side is identical.

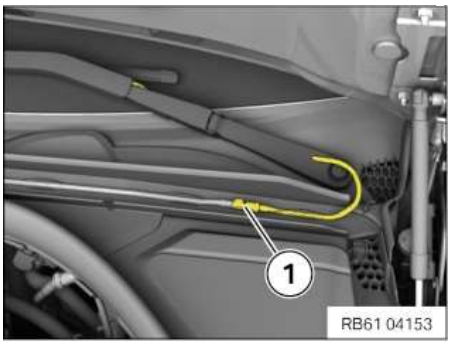
▸ **Remove the wiper arm**

RISK OF DAMAGE

Damage to wiper console.

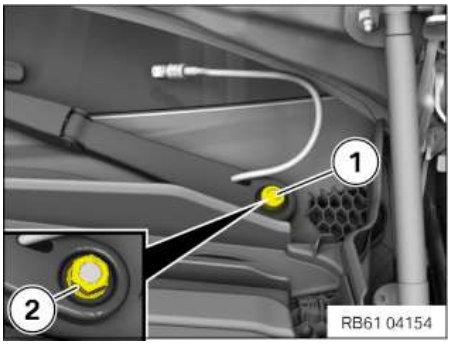
While removing the wiper arms without using special tool, the wiper console can break.

- Removing the wiper arms must be carried out only using the prescribed special tool.
- Do **not** lever off the wiper arm because otherwise the wiper console may break at the predetermined breaking point for active pedestrian protection.

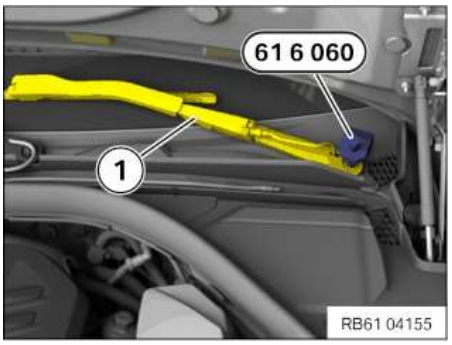


- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.

cardiagn.com

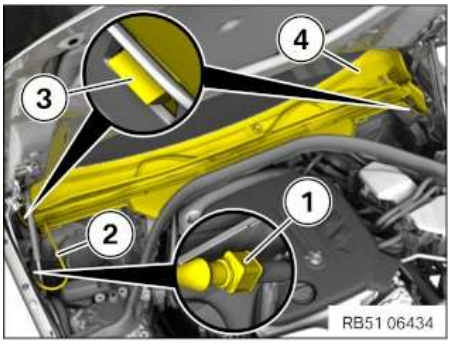


- Remove the protective cap (1).
- Loosen nut (2).

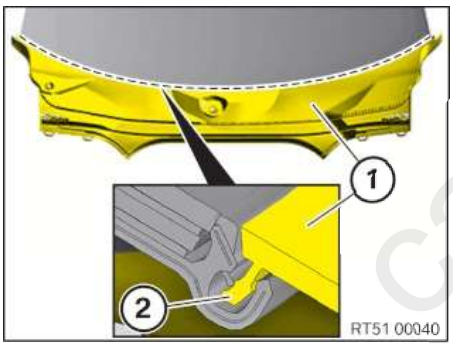


- Pull off the wiper arm (1) using special tool .

7 – Remove cowl panel cover



- Release snap fastener (1) of the washer fluid hose (2) and put the washer fluid hose (2) to one side.
- Unclip clips (3) on the cowl panel cover (4).



- Pull the cowl panel cover (1) upward out of the latch mechanism (2) beginning on the side.

8 – Remove the seal for the rear bonnet



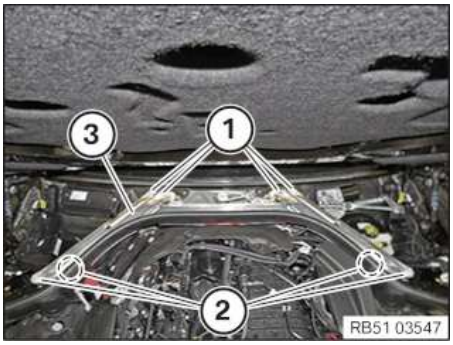
- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

9 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

Driving without the strut brace/front-end strut or tension strut is not permitted.

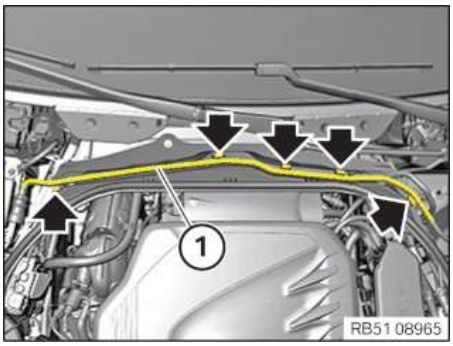
cardiagn.com



NOTICE

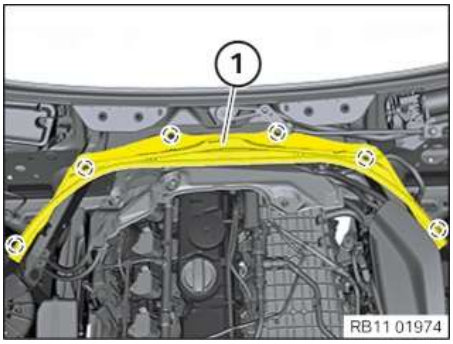
The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.



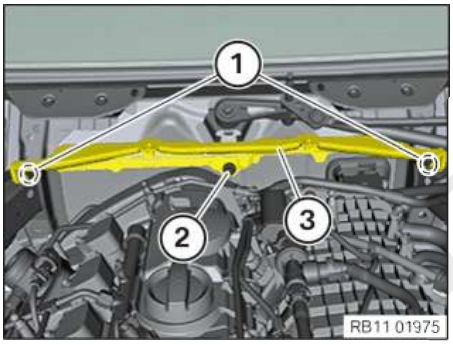
- **Version with mild hybrid technology:**

  Unclip the wire (1) at the holders (arrows).



- Unscrew the bolts in the marked areas.
- Remove the centre bulkhead upper part (1).

10 – Removing the centre bulkhead lower section



- Loosen screws (1).
- Loosen nut (2).
- Remove the centre bulkhead lower part (3).

11 – Removing the acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

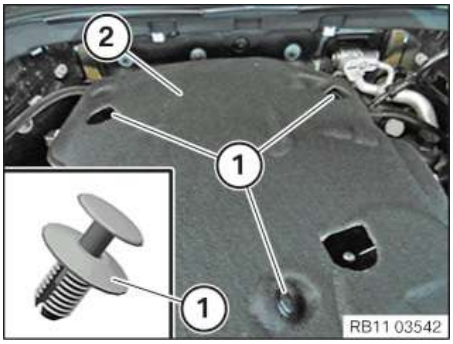
Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



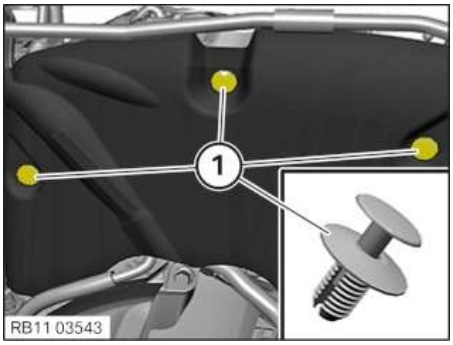
- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

12 – Remove the acoustic cover for the injectors

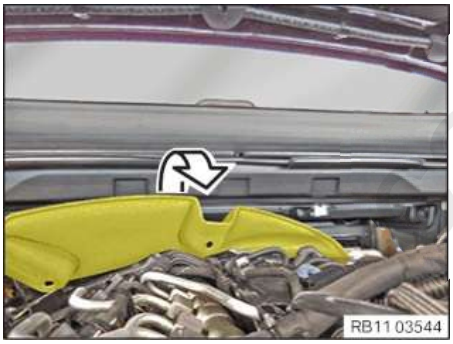


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

13 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).

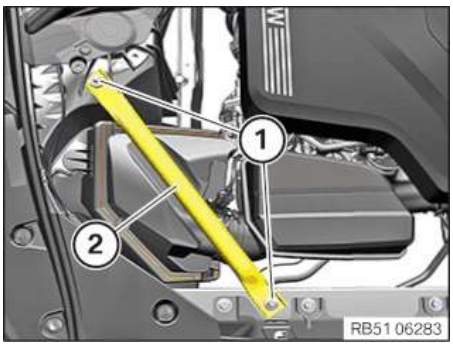


- Guide out and remove the acoustic cover in the direction of the arrow.

14 – Remove right front-end strut

TECHNICAL INFORMATION

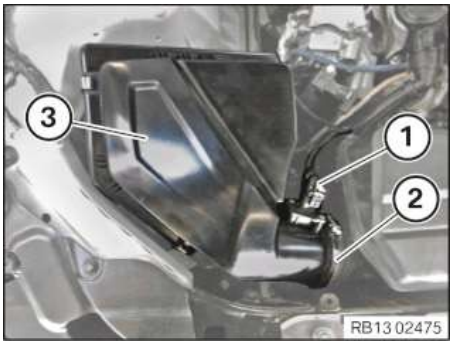
Driving without the strut brace/front-end strut or tension strut is not permitted.



- Loosen screws (1).
- Remove the front-end strut (2).

cardiagn.com

15 – Removing intake silencer housing



- Unlock plug connection (1) and disconnect.
- Unfasten clamp (2).
- Pull out and remove the intake silencer housing (3) from the rubber mounts towards the top.

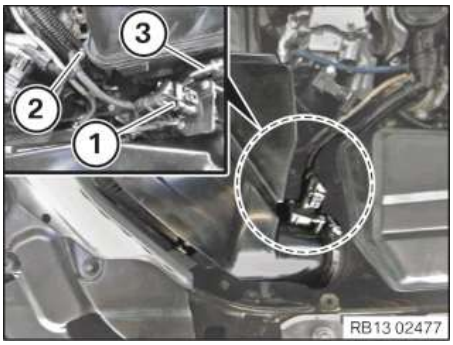
16 – Removing the clean air pipe with the resonator

WARNING

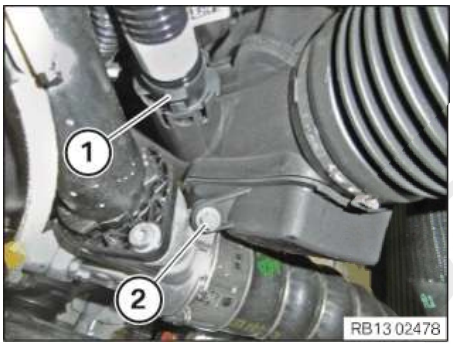
Hot surfaces.

Risk of burning!

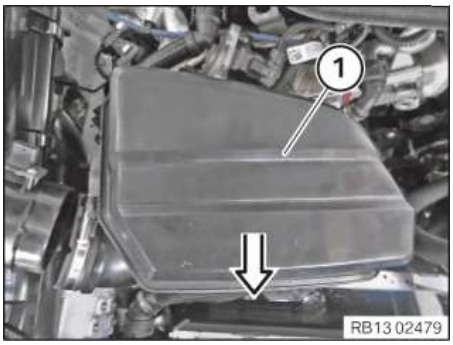
- Perform all work only on components that have cooled down.



- Unlock plug connection (1) and disconnect.
- Loosen clamp (2).
- Unfasten clamp (3).
- Separate the clean air pipe with resonator from the intake filter housing.



- Unlock engine ventilation line (1), disconnect it and place it aside.
- Loosen screw (2).



- Press and hold clean air pipe with resonator (1) in the direction of the arrow.

boardiagn.com



- Unlock and loosen clamp (1).



- Feed out and remove clean air pipe with resonator (1) in the direction of the arrow.

17 – Remove differential pressure sensor for the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

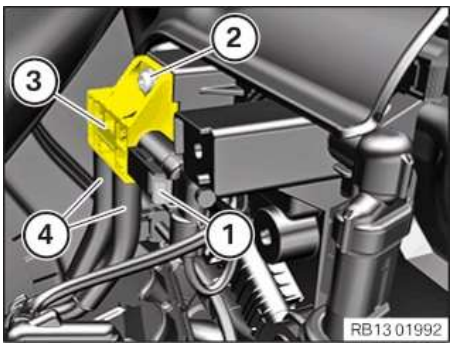
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).
- Pull off pressure hose (4).
- Feed out differential pressure sensor (3) and remove.

18 – Remove the exhaust temperature sensor on the diesel particulate filter

cardiagn.com

WARNING

Hot surfaces.

Risk of burning!

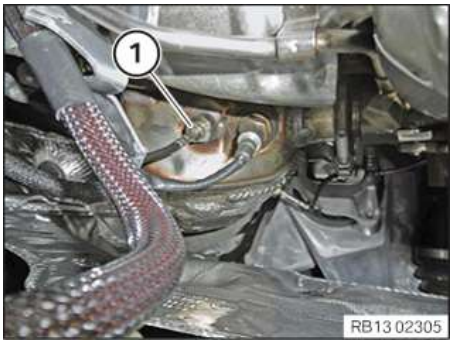
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

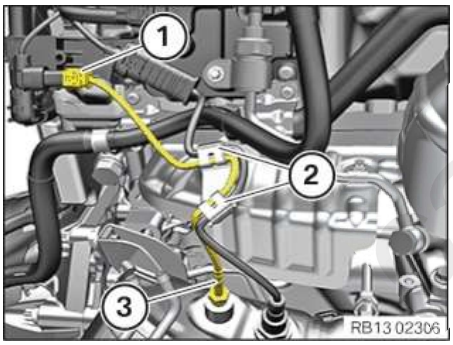
Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)



- Release exhaust temperature sensor (1) using special tool .



- Unlock plug connection (1) and disconnect.
- Remove the exhaust temperature sensor (3) from the clamps (2).
- Feed out and remove exhaust temperature sensor (3).

19 – Removing the front oxygen sensor on the diesel particulate filter on top

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

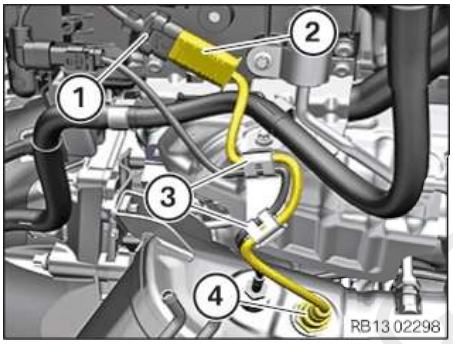
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



- Unlock plug connection (1) and disconnect.
- Unlock and disconnect connector (2).
- Pull the front oxygen sensor (4) out from the clamps (3) and remove it.



- Release the front oxygen sensor (1) with the standard tools and remove it.

20 – Removing the exhaust temperature sensor for the exhaust system downstream the catalytic converter at the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

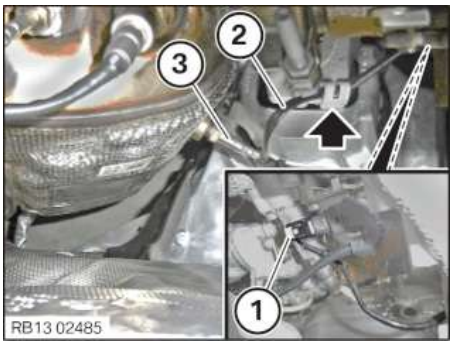
cardiagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

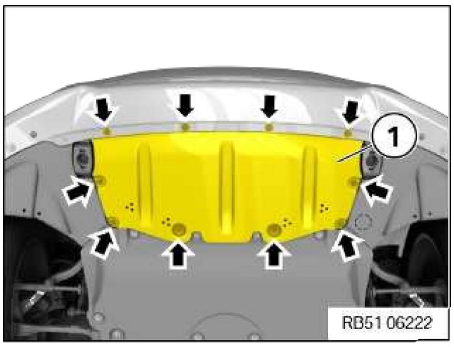


- Unlock plug connection (1) and disconnect.

Note: The exhaust temperature sensor is located near the right engine mount.

- Release cable (2) from the clamps (arrow).
- Loosen exhaust temperature sensor (3).
- Feed out and remove exhaust temperature sensor (3).

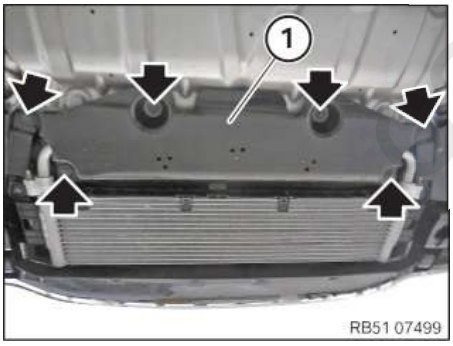
21 – Removing the front underbody protection



- **Version A:**

  Remove screws (arrows).

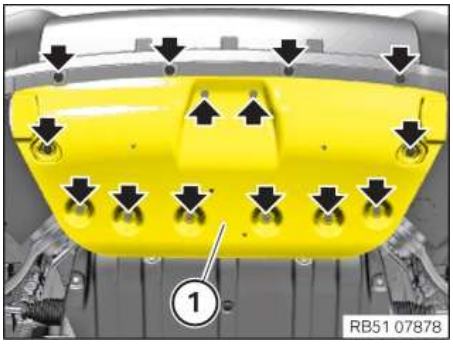
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version B:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

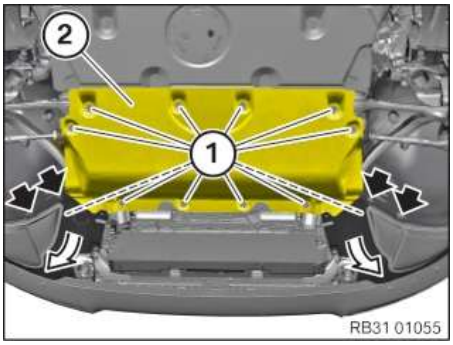


- **Version C:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

22 – Remove the underbody protection of the steering gear



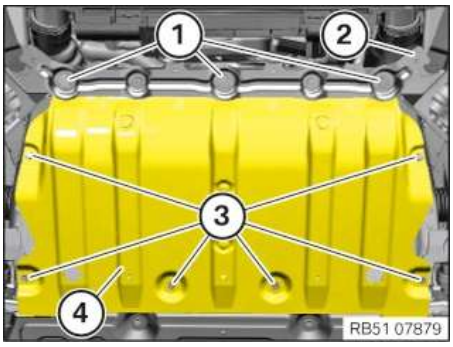
- **Version A:**

  Unscrew the screws (arrows) of the wheel arch cover on the wheel arch cover.

  Fold the bottom wheel arch cover to the side.

  Loosen screws (1).

  Remove the underbody protection (2) of the steering gear.



- **Version B:**

  Loosen screws (1).

  Remove the holder (2) for the underride protection.

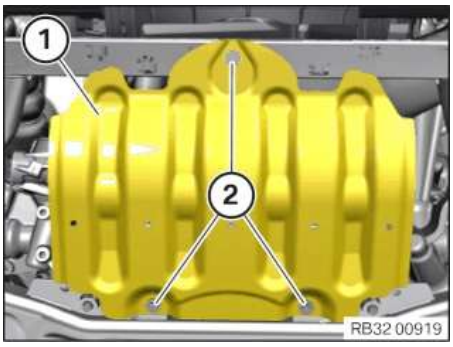
  Loosen screws (3).

  Feed out and remove the underbody protection (4) of the steering gear.

23 – If installed: Removing the steering underbody protection

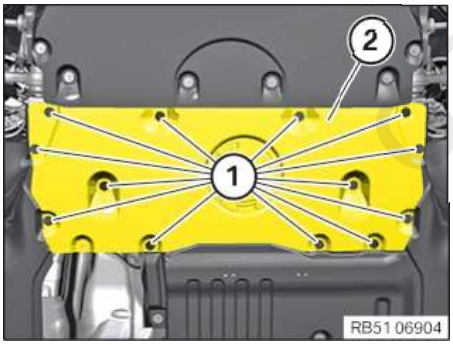
Prerequisite

Front underbody protection has been removed.



- Loosen screws (2).
- Remove underbody protection (1).

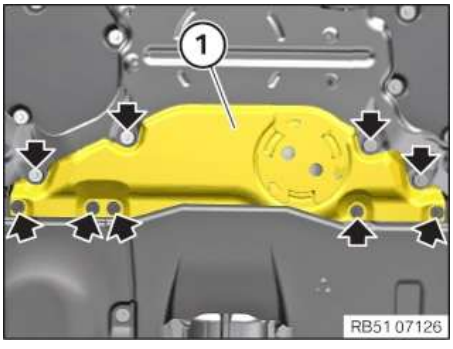
24 – Removing the centre underbody protection



- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .



- **Version with all-wheel drive:**

  Remove screws (arrows).

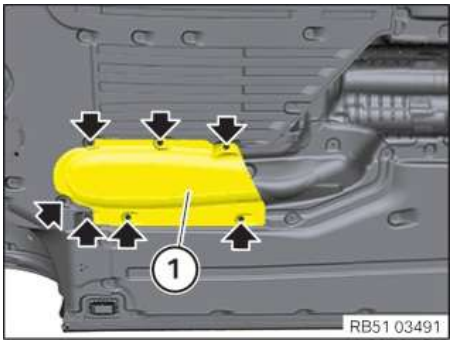
  Feed out and remove the centre underbody protection (1).

25 – Remove the underbody panelling of the transmission on the side

cardiagn.com

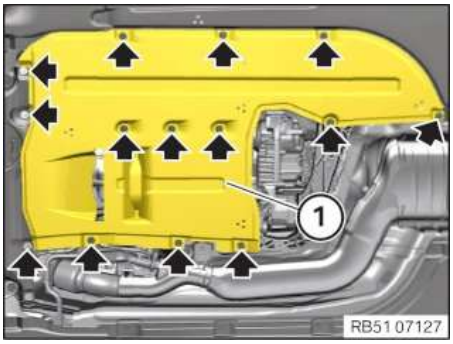
NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.



- Remove screws (arrows).
- Remove the underbody panelling (1).

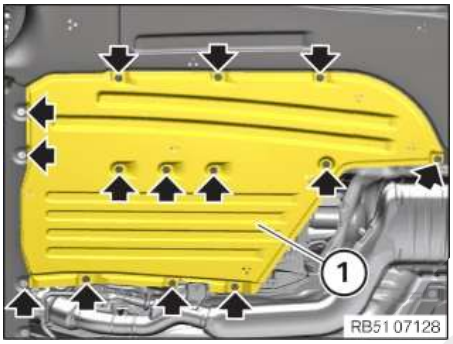
26 – Remove rear underbody protection



- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).

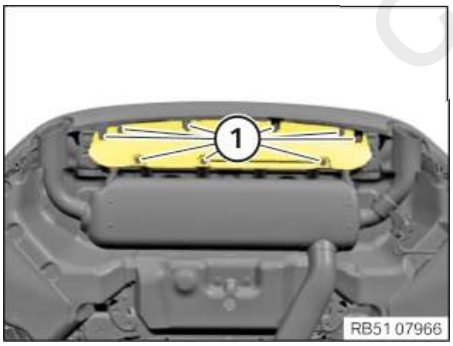


- **Version B:**

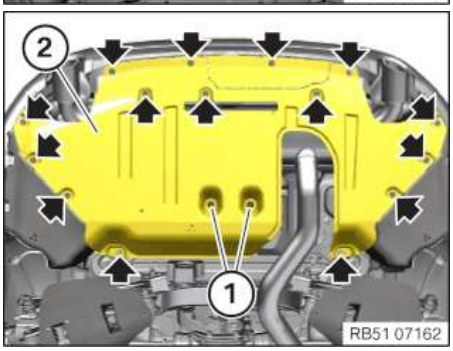
  Remove screws (arrows).

  Guide out rear underbody protection (1) and remove it.

27 – Removing the rear diffuser



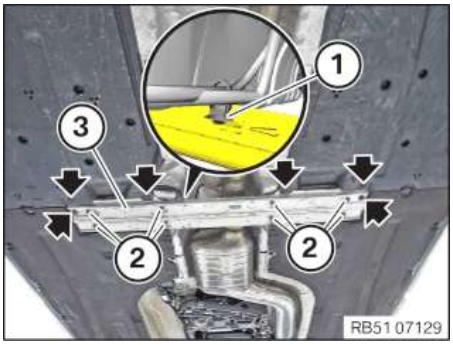
- **Version 1:**
- Release the screws and nuts (1).
- Remove the diffuser.



- **Version 2:**
- Loosen nuts (1).
- Remove screws (arrows).
- Guide out and remove rear diffuser (2).

28 – Remove the connecting support from the tunnel

cardiagn.com



- Remove screws (arrows).

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Loosen clamp (1).
- Loosen screws (2).
- Guide out and remove connecting support (3) on the tunnel.

29 – Remove exhaust system

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

CAUTION

Component with heavy weight.

Danger of injury!

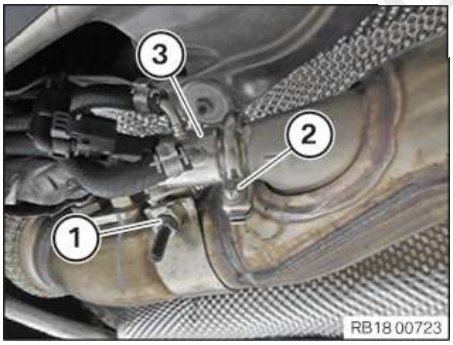
- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

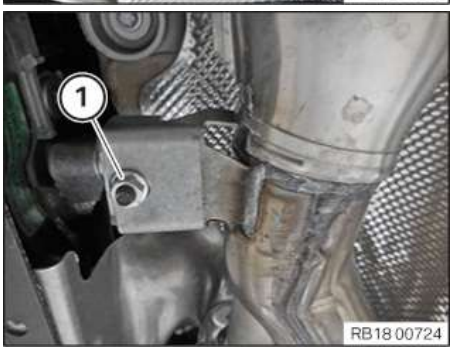
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

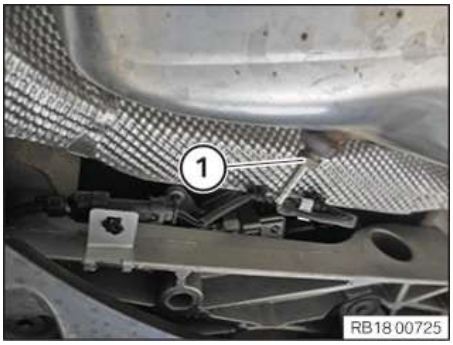


- Unfasten clamp (1).
- Detach the clamp (2) of the SCR metering module (3).
- Detach the SCR metering module (3)from the exhaust system and place to one side.

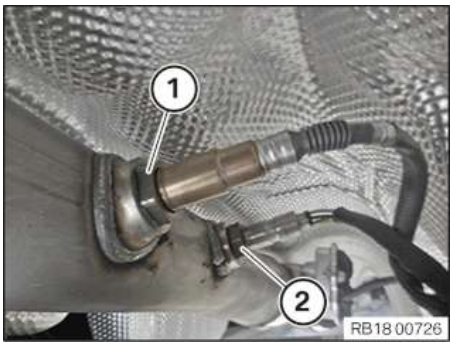


- Loosen nut (1).

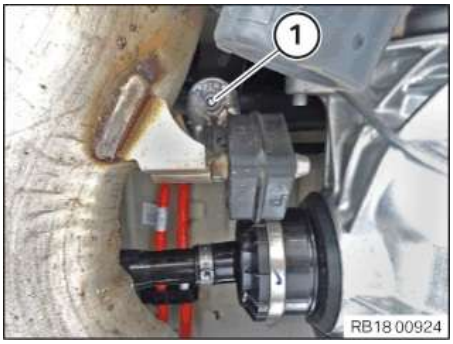
cardiagn.com



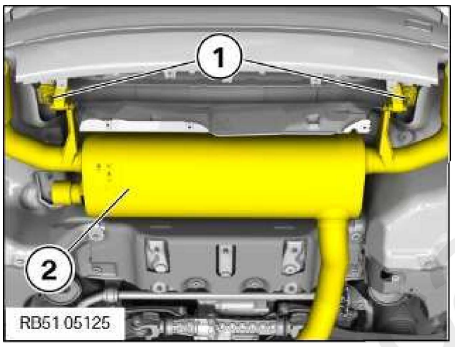
- Detach the exhaust temperature sensor (1) from the exhaust system.



- Release the diesel particulate sensor (1) from the exhaust system and place to one side.
- Release the nitrogen oxide sensor (2) from the exhaust system and place to one side.



- Release the nut (1) on the rear axle support.



- Loosen nuts (1).
- Lower and remove the exhaust system (2) with the assistance of a second person.

30 – Removing the monitoring oxygen sensor after the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

cardiagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

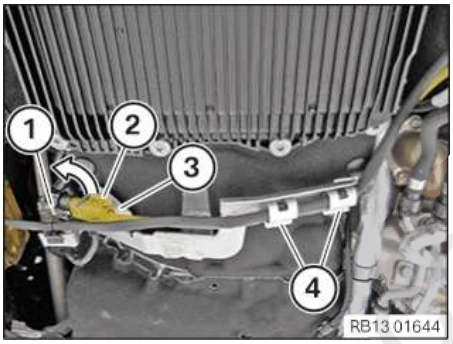
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



- Unlock and loosen connector (1).
- Loosen connector (2) from the holder (3) in direction of arrow.
- Release the monitoring oxygen sensor from the clamps (4).



- Release the monitoring oxygen sensor (1) with the standard tools.



- Thread out the monitoring oxygen sensor (1) and remove it.

carldiag.com

31 – Removing the nitrogen oxide sensor before SCR catalytic converter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

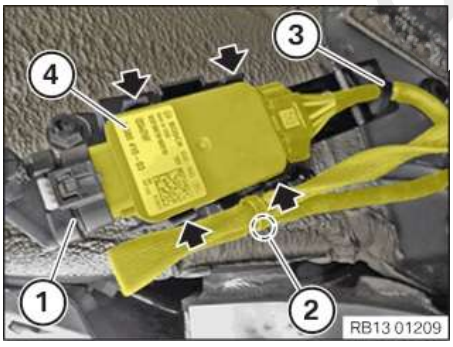
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

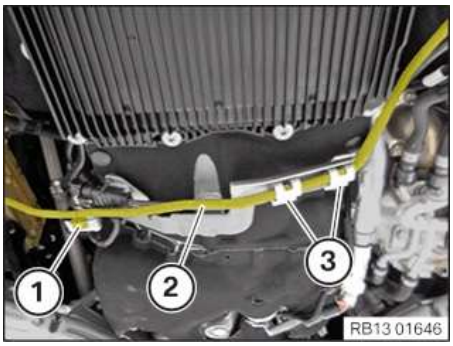
Damage to the nitrogen oxide sensor.

Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

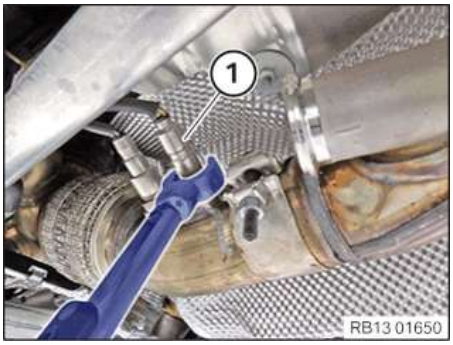
- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
- The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



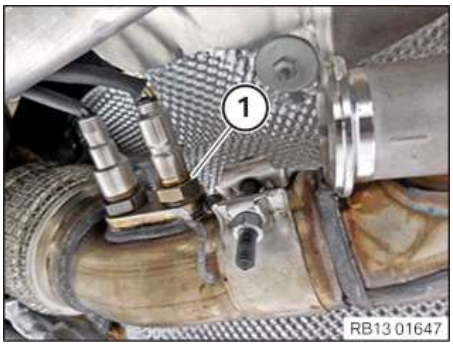
- Unlock plug connection (1) and disconnect.
- Release cable clip in area (2).
- Release line from the holder (3).
- Unclip control unit (4).



- Loosen clamp (1).
- Loosen the cables (2) from the clamps (3).



- Loosen the nitrogen oxide sensor (1) using commercially available tools.



- Feed out and remove the nitrogen oxide sensor (1).

32 – Removing the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

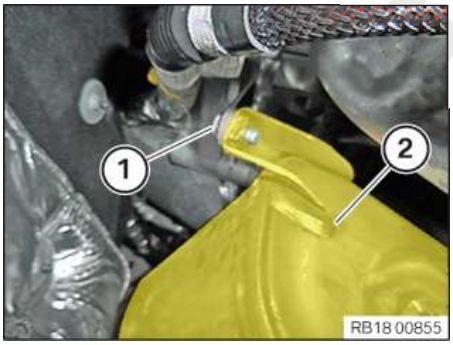
- Perform all work only on components that have cooled down.

CAUTION

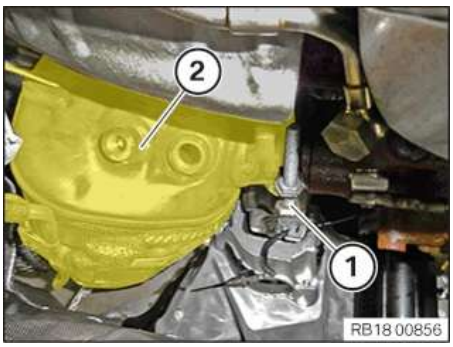
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

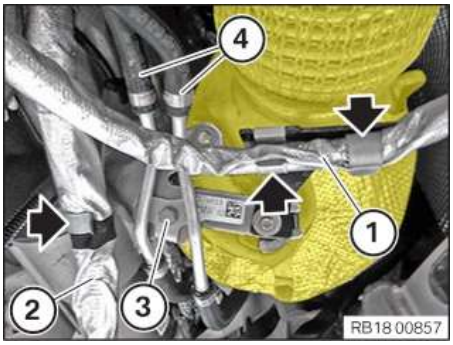


- Release bolt (1) from the holder of diesel particulate filter (2).

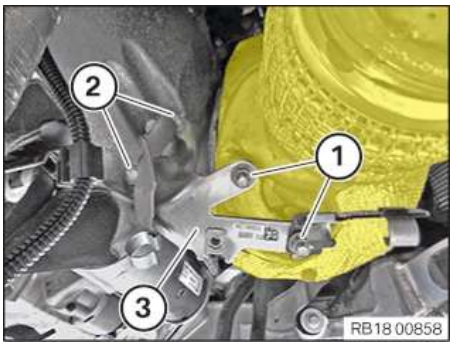


- Loosen V-band clamp (1).
- Feed V-clip (1) out from diesel particulate filter (2) and remove.

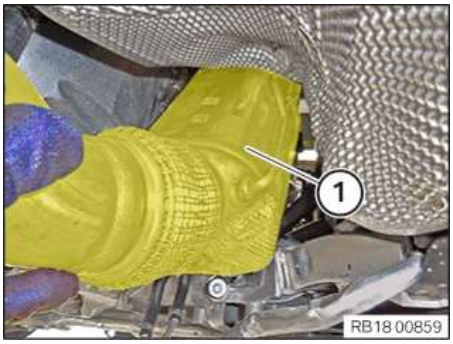
boardiagn.com



- Release the metering line (1) from clamps (Arrows).
- Release positive battery cable (2) from starter motor from clamp (Arrow).
- Loosen screw (3).
- Thread off coolant line (4) and place to the side.



- Loosen nuts (1).
- Loosen screws (2).
- Guide out and remove holder (3).



- Guide out and remove diesel particulate filter (1).

33 – Remove front right wheel

▸ **Removing the wheel**



TECHNICAL INFORMATION

A wheel lift is recommended for easier wheel removal and installation without exertion (see Retailer Equipment Catalogue).

- **In vehicles with M Carbon ceramic brake: The wheel lift must be used to remove the wheel.**

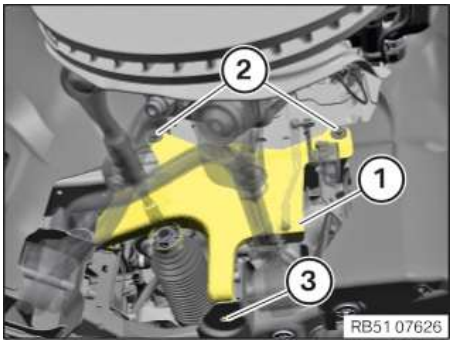
  This process is intended to prevent damage to the brake disc.

carmanuals.com



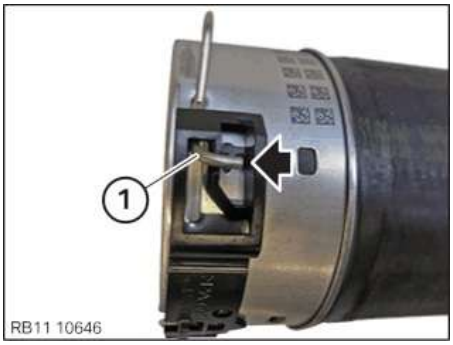
- If several wheels are removed at the same time: Use a piece of chalk to mark on each tyre the axle and side on which the corresponding wheel is fitted.
- Release the wheel bolts (arrows) crosswise and remove the wheel.
- To release and tighten wheel bolts with a security code: Use the correct adapter from the set of special tools .

34 – Remove the cover of the steering assembly



- Loosen screws (2) and (3).
- Remove the cover (1).

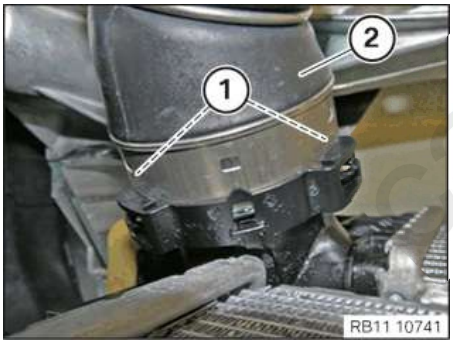
35 – Remove pressure pipe between exhaust turbocharger and charge air cooler



- **Version A:**

  Unlock lock (1).

  The lock (1) must snap audibly into place when unlocked (see arrow).



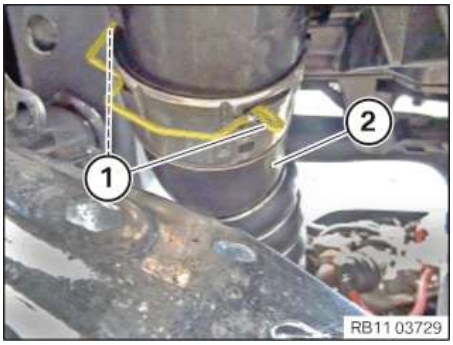
- Unlock the locks (1) on both sides and snap into place.
- Pull off pressure pipe (2) from charge air cooler.



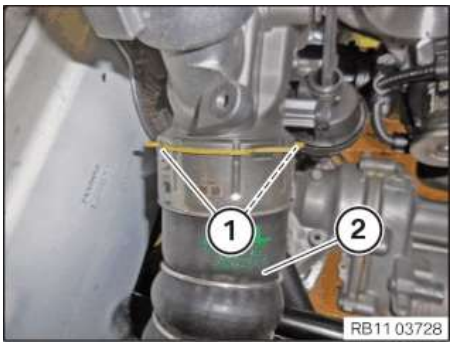
- **Version B:**

  Unlock clamp (1) and engage in this position.

cardiagn.com



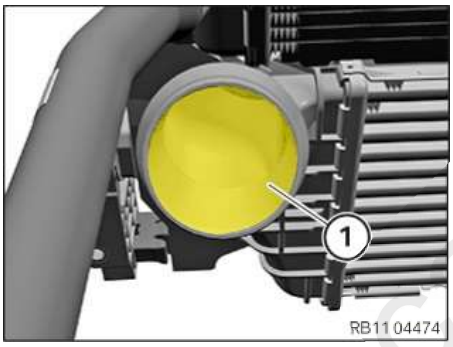
- Unlock the locks (1) and snap into place.
- Pull off pressure pipe (2) from charge air cooler.



- Unlock the lock (1) and engage.
- Pull off pressure pipe (2) from the compressor bypass.



- Remove pressure pipe (1) in upward direction.



NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

- Lock the opening (1) of the charge air cooler with a suitable auxiliary material.

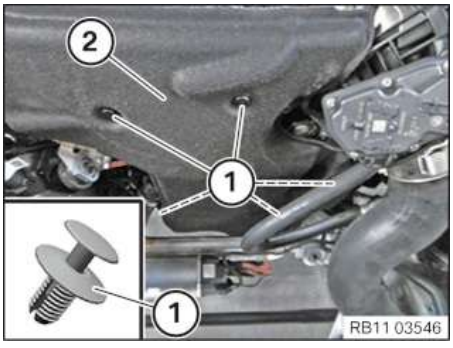
36 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.



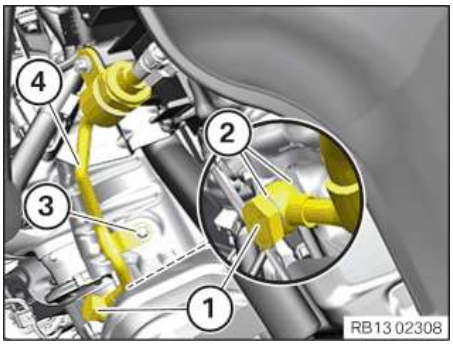
- Release and remove expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

cardiagn.com

37 – Remove the exhaust gas pressure pipe



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).



- Unscrew the banjo bolt (1).
- Feed out and remove the sealing rings (2).
- Loosen screw (3).
- Feed out and remove the exhaust gas pressure pipe (4).

38 – Removing the sensor bracket on the cylinder head cover

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

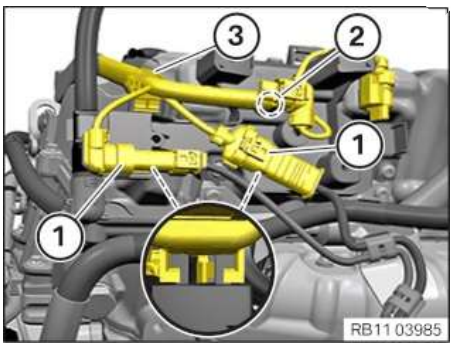
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

Contaminant or foreign body.

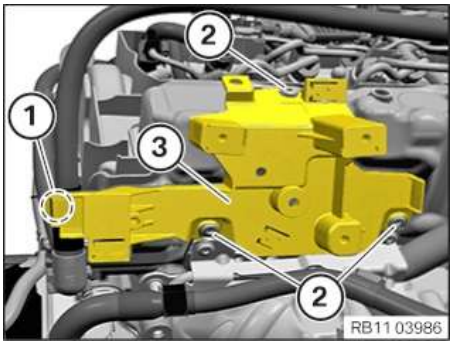
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Unlock plug connection (1) and disconnect.
- Unlock the plug connection (1) and release it from the sensor bracket.
- Release the cable clip in the area (2) from the sensor bracket.
- Release the clamps (3) and set the wiring harness section aside.

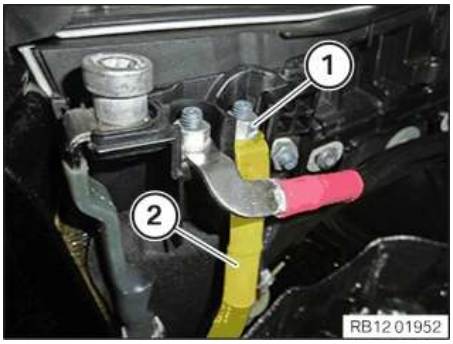
cardiagn.com



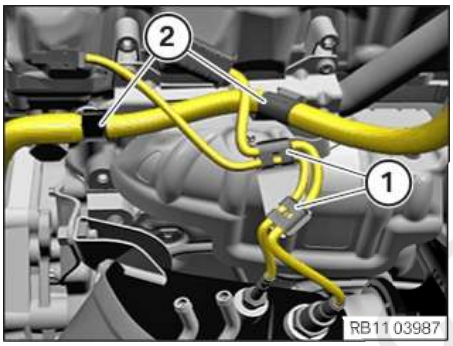
- Release the positive battery cable in the area (1) from the clamp and set it aside.
- Loosen screws (2).
- Feed out holder (3) for the sensor system and remove.



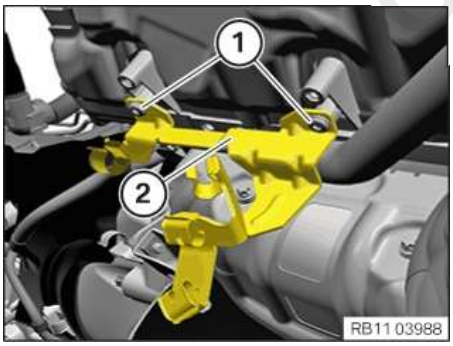
- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.



- Loosen nut (1).
- Feed out positive battery cable (2) and put to one side.



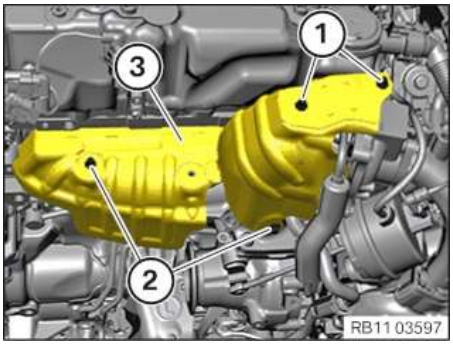
- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



- Loosen screws (1).
- Guide out and remove holder (2).

39 – Removing heat shield

cardiagn.com



- Loosen screws (1).
- Loosen screws (2).
- Feed out and remove the heat shield (3).

40 – Removing the high-pressure stage exhaust turbocharger and low-pressure stage turbocharger

CAUTION

Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

TECHNICAL INFORMATION

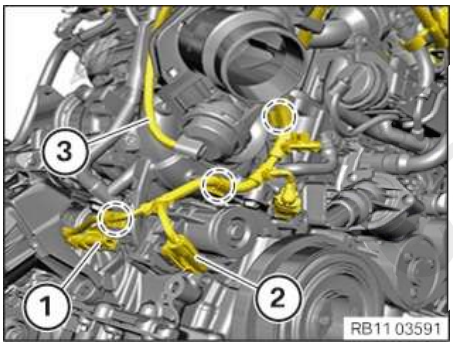
Prior to replacing the exhaust turbocharger: Observe the notes on troubleshooting on the exhaust turbocharger.

For additional information see: FUB-FUB-FB-130003-A10 Troubleshooting on the exhaust turbocharger

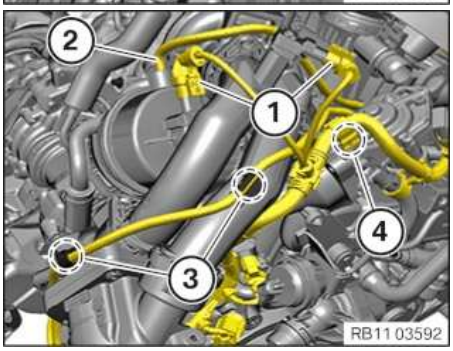
TECHNICAL INFORMATION

With exhaust turbocharger damage, it is imperative to observe the additional information.

For additional information see: 11 65 020 Exhaust turbocharger damage due to plugged oil supply lines



- Release plug connection in area (1) from holder.
- Unlock plug connection (2) and disconnect.
- Release the wiring harness in the marked areas from the exhaust turbochargers.
- Pull off the vacuum hose (3).



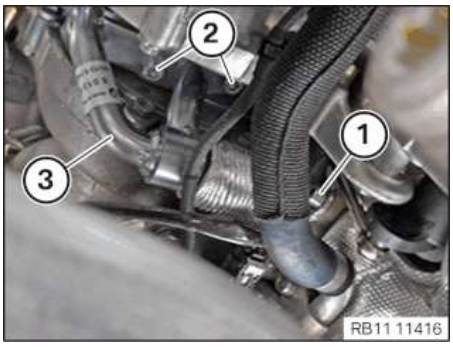
- Unlock plug connections (1) and disconnect.
- Pull off the vacuum hose (2).
- Release the vacuum hose in marked areas (3) from the exhaust turbochargers.
- Release the wiring harness in area (4) from the exhaust-gas recirculation cooler and set it aside.



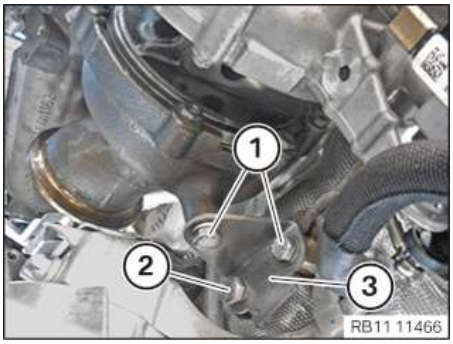
TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

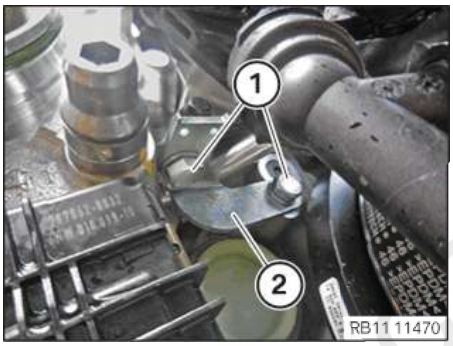
- Release the screws of the oil return line on the crankcase from the right wheel arch.



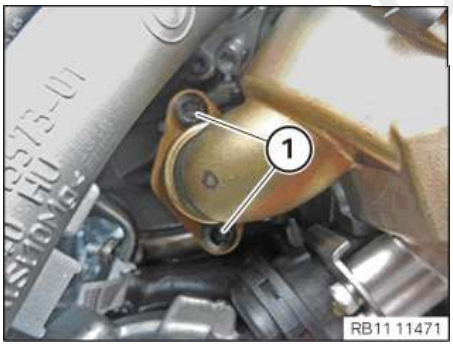
- Release the screw (1).
- Loosen screws (2).
- Remove oil return line (3) from the crankcase.
- Catch and dispose of emerging engine oil.



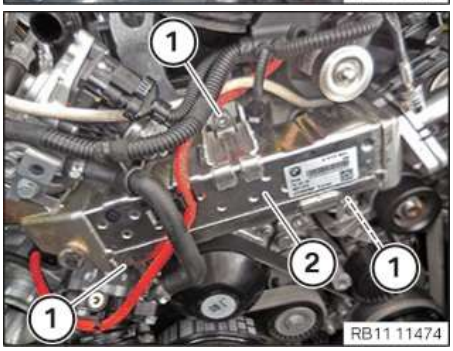
- Unscrew and remove the bolts (1) on the holder (3).
- Slacken screw (2) on holder (3), but do **not** remove.



- Loosen screws (1).
- Guide out and remove holder (2).

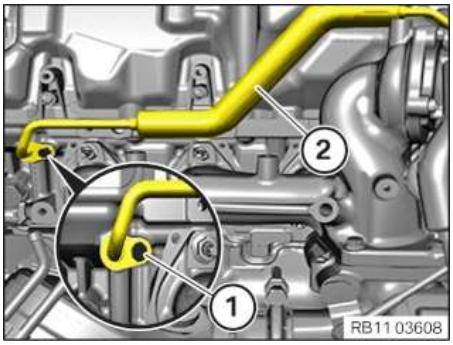


- Loosen screws (1).

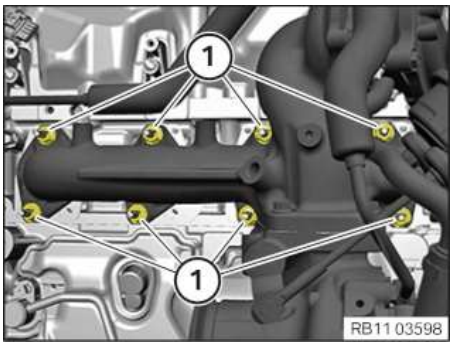


- Slacken screws (1), but do **not** remove.
- Release exhaust-gas recirculation cooler (2) slightly.

cardiagn.com



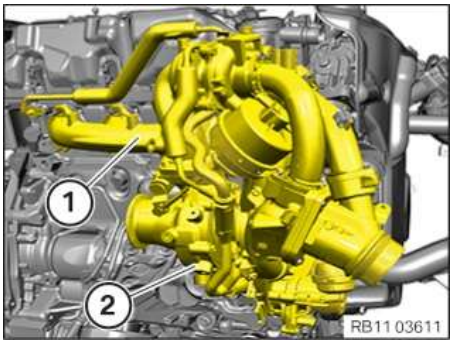
- Loosen screw (1).
- Remove oil feed line (2) for the high-pressure stage exhaust turbocharger from the cylinder head and set it aside.
- Catch and dispose of emerging engine oil.



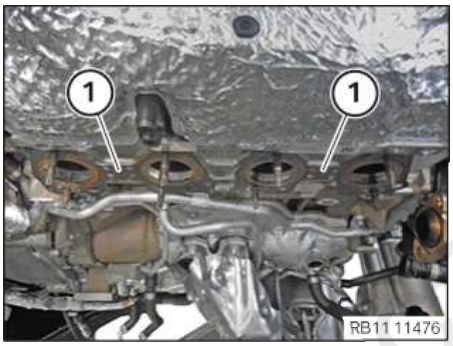
TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

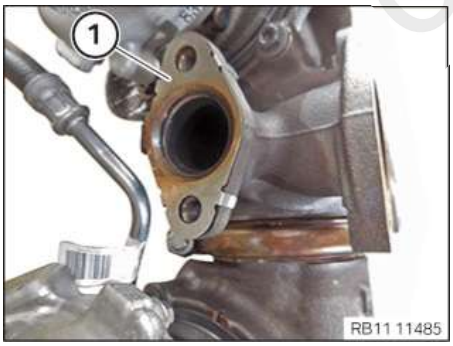
- Loosen nuts (1).



- Guide out exhaust manifold (1) with the high-pressure stage exhaust turbocharger and the low-pressure stage exhaust turbocharger (2) forward towards the top and remove.



- Guide out and remove gaskets (1).



- Guide out and remove gasket (1).

41 – Draining the coolant from the high-temperature cooling system

WARNING

Hot fluids.

Risk of scalding!

- Conduct all work in the vehicle wearing appropriate personal protective equipment only.

cardiagn.com

CAUTION

Materials harmful to health.

Contact with fluids harmful to health!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.

TECHNICAL INFORMATION

Life-long fill of coolant!

Do not reuse used coolant.

When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be emptied and refilled.

In the case of other removal work involving the draining of part quantities of coolant, the coolant level must be topped up with new coolant.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Loosen sealing cap (1).

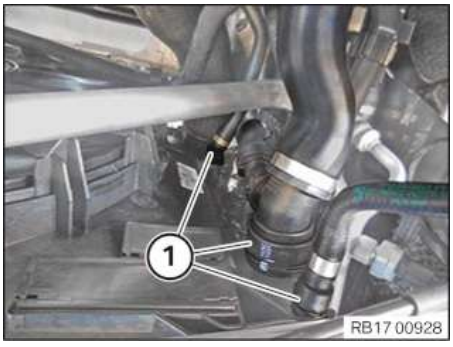
▸ **Avoiding damage to the starter generator due to escaping coolant**

RISK OF DAMAGE

Escaping coolant on the starter generator.

Damage and operating failure of the starter generator.

- Cover the starter generator with suitable, watertight auxiliary materials.
- Close off line connections with seal plugs.
- If necessary: Flush the leaked coolant from the starter generator with at least 1 l water.

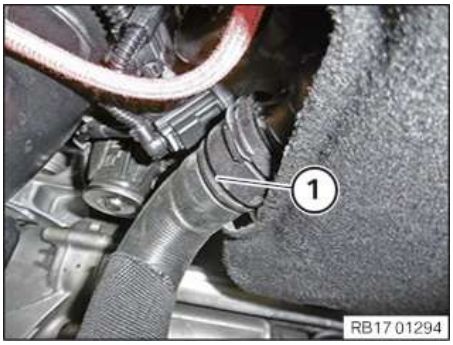


NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

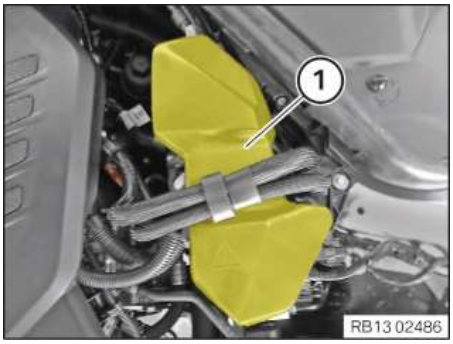
- Unlock all coolant lines (1) and detach.
- Catch and dispose of escaping coolant.

cardiagn.com



- Unlock and loosen coolant line (1).
- Catch and dispose of escaping coolant.

42 – Remove the cover for the DDE control unit



- Pull off, guide out and remove cover (1) upwards.

43 – Partially releasing the wiring harness section on the intake plenum

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

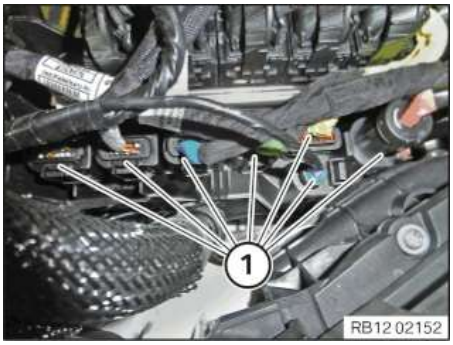
Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

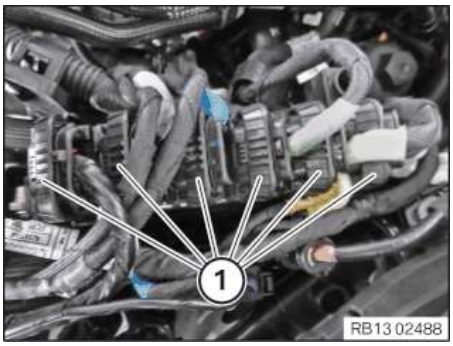
TECHNICAL INFORMATION

Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.

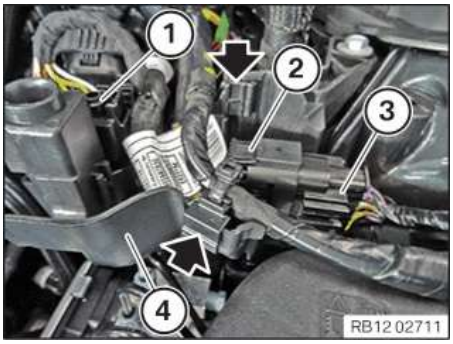
carsign.com



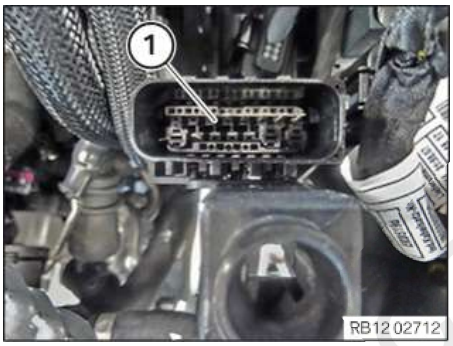
- Unlock and disconnect plug connections (1).



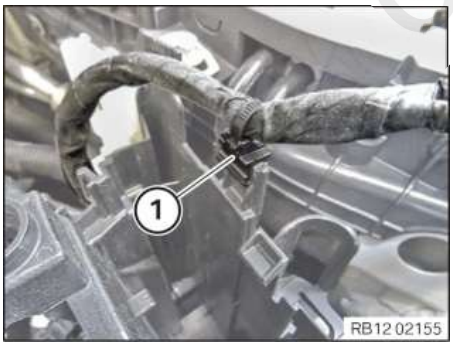
- Unlock and disconnect plug connections (1).



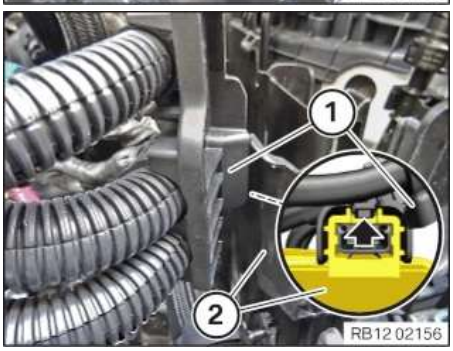
- Unlock plug connection (1) and disconnect.
- Unlock plug connection (2) and disconnect.
- Release the connector (3) and disconnect from the control unit holder (4).
- Release the clamps (arrows).



- Unlock plug connection (1) and disconnect.

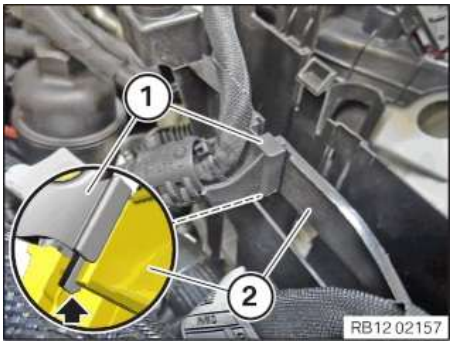


- Loosen clamp (1).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).

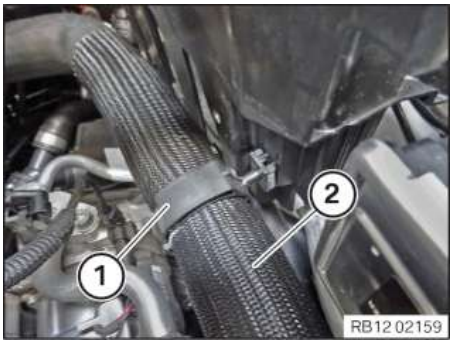
cardiagn.com



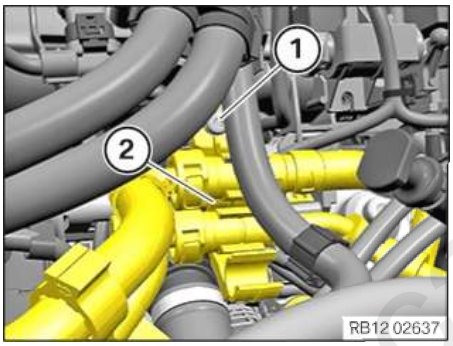
- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).



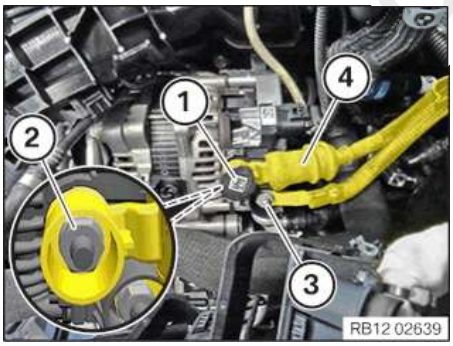
- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.



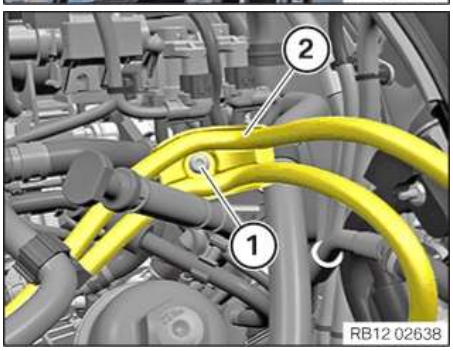
- Unlock holder (1) and feed out coolant line (2) and place it aside.



- Release the screw (1).
- Guide out fuel lines (2) and set them aside.

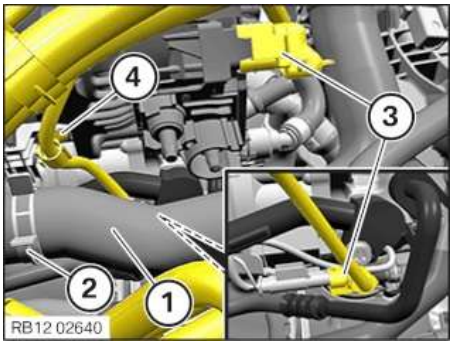


- Guide out and remove the lid (1).
- Release the nuts (2) and (3).
- Feed out positive battery cables (4) and place to one side.

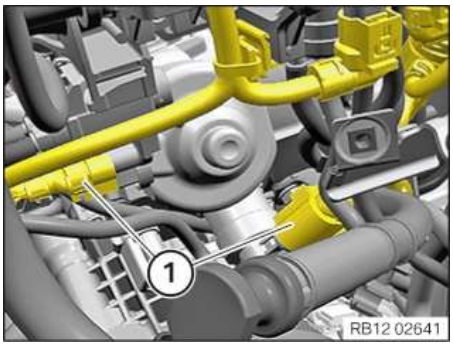


- Release the screw (1).
- Guide out the positive battery cables (2) and set them aside.

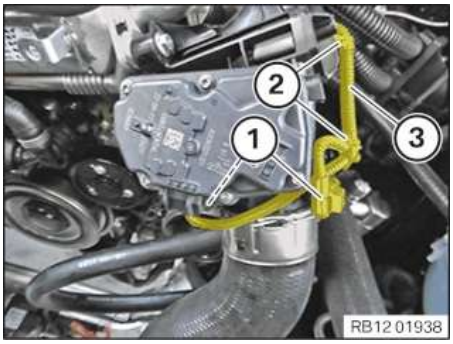
sardiagn.com



- Release the coolant line (1) from the holder (2) .
- Unlock plug connections (3) and disconnect.
- Loosen clamp (4).



- Unlock and disconnect plug connections (1).



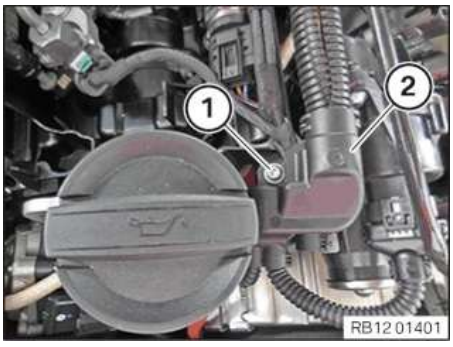
- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.



- Unlock and loosen connector (1).

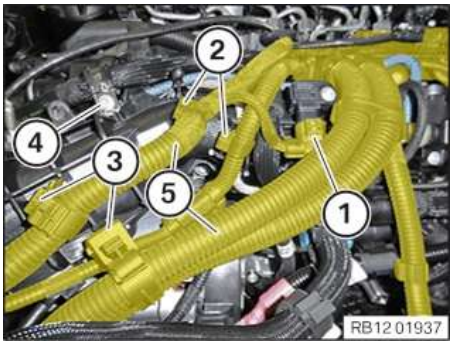


- Unlock plug connection (1) and disconnect.

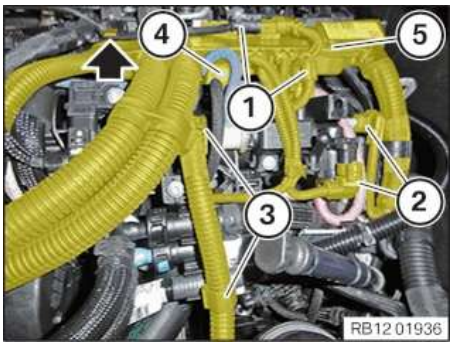


- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.

cardiagn.com



- Unlock plug connection (1) and disconnect.
- Loosen clamps (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.



- Unlock and disconnect plug connections (1).
- Release line from clamp (Arrow).
- Unlock and disconnect plug connections (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.

44 – Removing the intake plenum

TECHNICAL INFORMATION

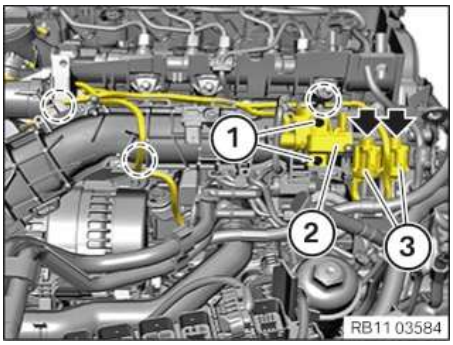
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



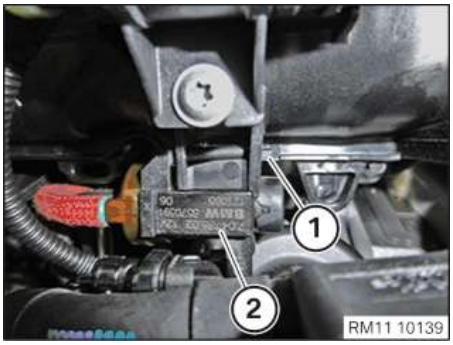
- Unlock clamp (1) and engage in this position.



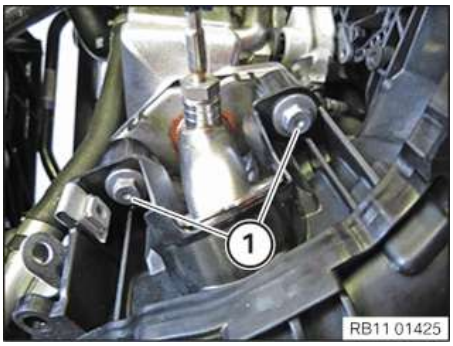
- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.



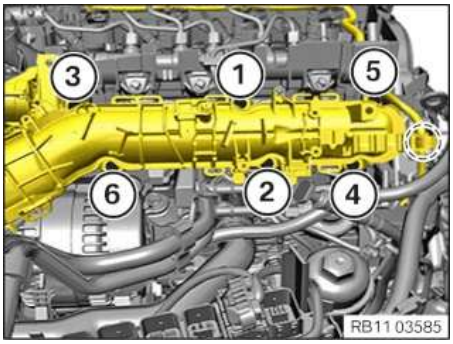
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



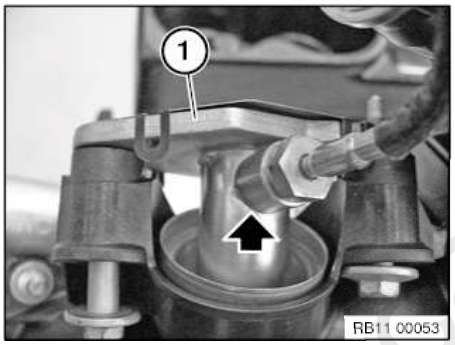
- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.



- Loosen screws (1).



- Detach the leakage oil lines in the marked area from the intake plenum.
- Loosen screws in the order (6) to (1).
- Guide the intake plenum out forwards and remove it.



- Remove the exhaust-gas recirculation pipe (1) (arrow).

45 – Removing the exhaust-gas recirculation cooler

▸ Avoiding damage to the starter generator due to escaping coolant

RISK OF DAMAGE

Escaping coolant on the starter generator.

Damage and operating failure of the starter generator.

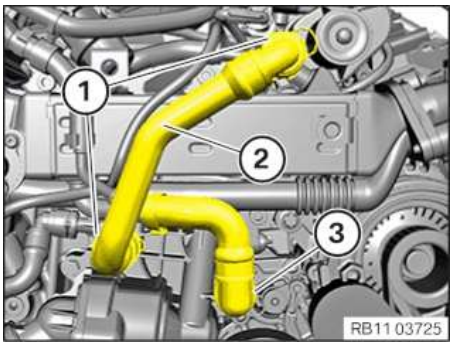
- Cover the starter generator with suitable, watertight auxiliary materials.
- Close off line connections with seal plugs.
- If necessary: Flush the leaked coolant from the starter generator with at least 1 l water.

cardiagn.com



- **Version A:**

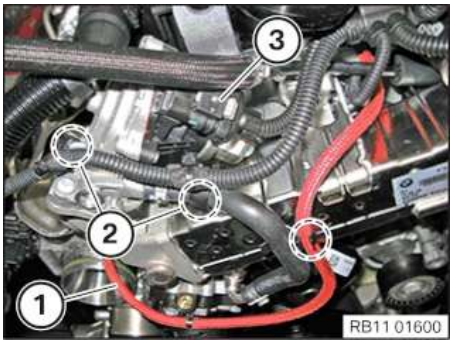
  Unlock and pull off coolant lines (1).



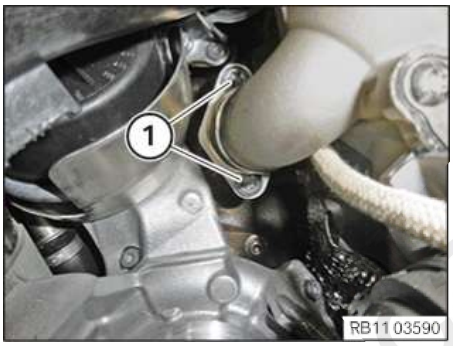
- **Version B:**

  Unlock locks (1) and remove thee coolant line (2).

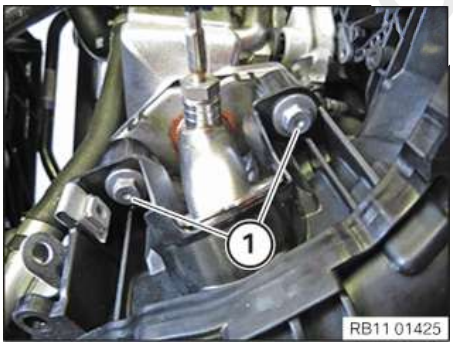
  Unlock coolant line (3) and pull it off the thermostat.



- Loosen the vacuum line (1) from the exhaust-gas recirculation cooler and detach in the highlighted area.
- Loosen the vehicle wiring harness from the exhaust-gas recirculation valve and the coolant line at the clips (2).
- Unlock and disconnect the connector (3) at the exhaust-gas recirculation valve.



- Release the bolts (1) from the exhaust-gas recirculation cooler.

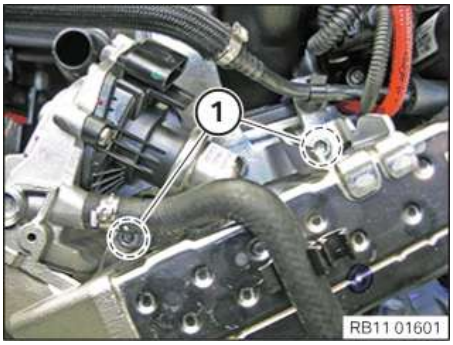


- Loosen the screws (1) on the intake system.



- Loosen the screw (1) below the exhaust-gas recirculation cooler.

cardiagn.com



- Loosen screws (1).
- Remove exhaust-gas recirculation cooler.

46 – Detaching the leakage oil line from the injectors

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

WARNING

Hot surfaces.

Risk of burning!

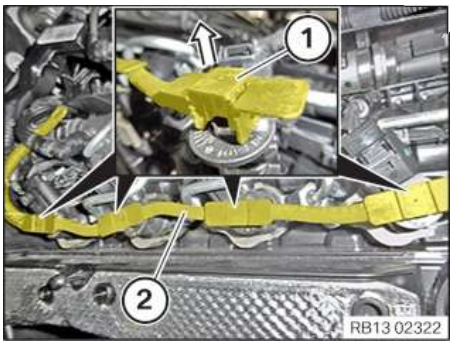
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

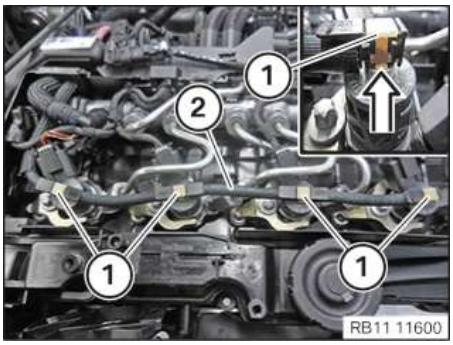


- **Version A:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.



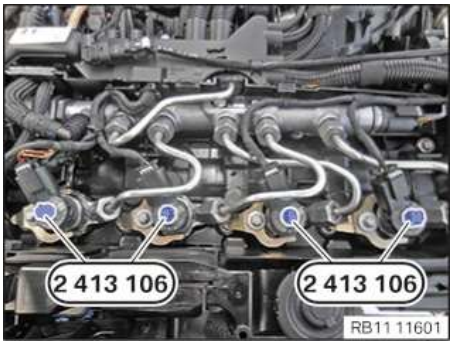
- **Version B:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.

cardiagn.com



- Seal open connections with special tools .

47 – Remove the high pressure lines between the injector and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

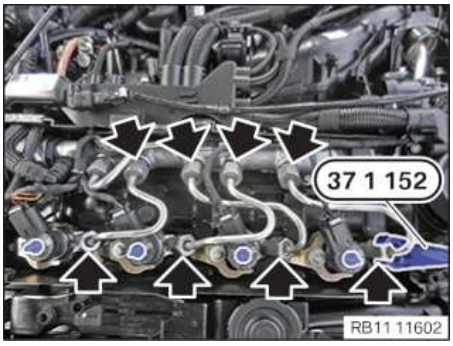
TECHNICAL INFORMATION

If several high pressure lines are removed, ensure that each high pressure line is installed in its original location. Label high pressure lines.

cardiagn.com

TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.



- Release the high pressure lines (arrows) with the special tool .
  Reset the special tool early on to prevent bending of the high pressure line.
- Catch and dispose of escaping fuel.
- Feed out and remove the high pressure lines (arrows).
- Seal off all the open cable connections with the special tool .

48 – Remove the high pressure line between the high pressure pump and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Hot fluids.

Risk of scalding!

- Conduct all work in the vehicle wearing appropriate personal protective equipment only.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

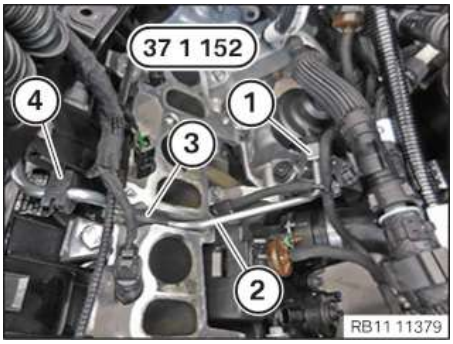
cardiagn.com

TECHNICAL INFORMATION

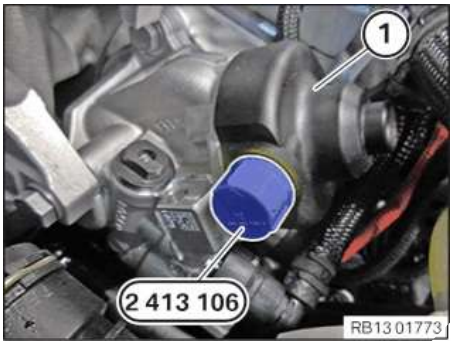
Reset special tool in early to avoid bending pressure lines.



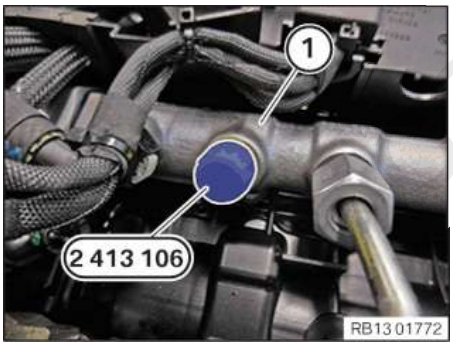
- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.



- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.
- Guide out and remove the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).



- Seal off the opening at the high pressure pump (1) with the special tool .



- Seal off the opening on the rail (1) with the special tool .

49 – Remove high-pressure rail

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

cardiagn.com

RISK OF DAMAGE

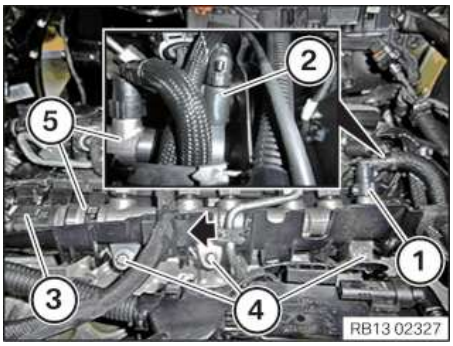
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Unlock and disconnect the fuel return line (1).
- Guide the fuel return line (1) out and set it aside.
- Unlock and disconnect the plug connection (2) on the rail pressure regulating valve.
- Unlock and disconnect the plug connection (3) on the rail pressure sensor.
- Unlock cable clip (Arrow), feed out and place aside.
- Loosen screws (4).
- Thread out and remove the rail (5).

50 – Remove all injection systems

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

cardiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

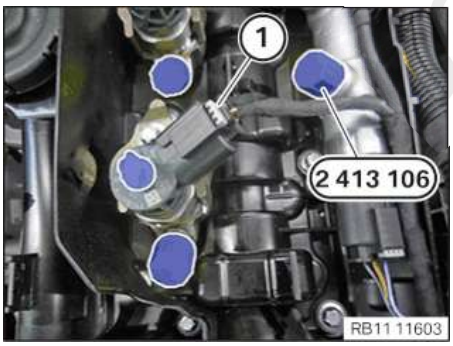
Electrostatic discharge.

Damage to or destruction of electrical components.

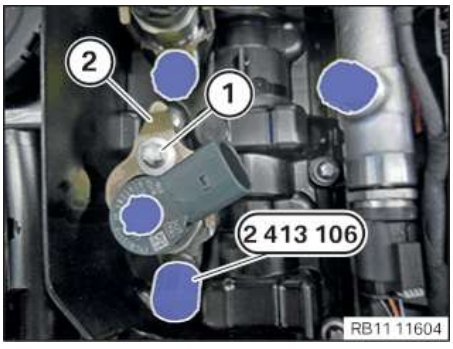
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

TECHNICAL INFORMATION

If several injectors are removed, ensure that each injector is installed at its original location (cylinder). Mark injectors.



- Unlock plug connection (1) and disconnect.



- Loosen screw (1).
- Guide out and remove clamping claw (2).
- Feed out and remove the injector with slight rotational movements.

▸ **Loosen stuck injectors**

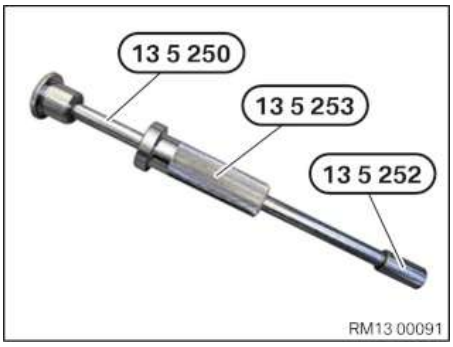
carsdiagn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



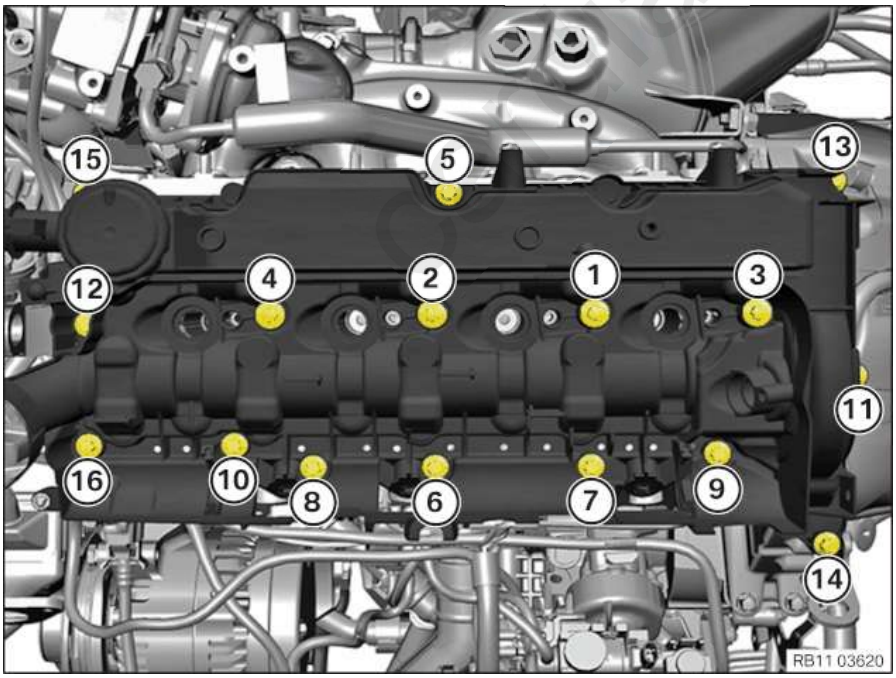
- Unscrew special tool 0 493 339 (13 5 252) from special tool 0 493 321 (13 5 250) and remove special tool 0 493 340 (13 5 253).
- Screw special tool 0 493 339 (13 5 252) back onto special tool 0 493 321 (13 5 250).



- Screw special tool 0 493 321 (13 5 250) with special tool 0 493 339 (13 5 252) onto pressure line connection (1) of injector.
- Release injector (1) with special tools 0 493 321 (13 5 250) and 0 493 339 (13 5 252) by means of **short** back and forth movements and remove.

51 – Removing the cylinder head cover

Screw connection of the cylinder head cover



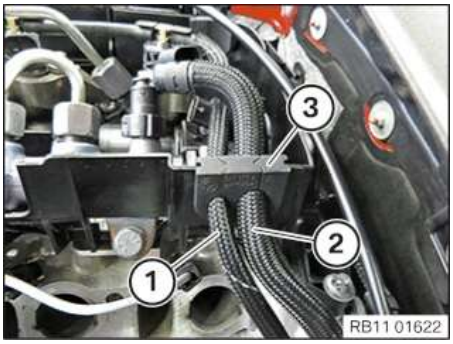
1 - 16 Bolts of the cylinder head cover



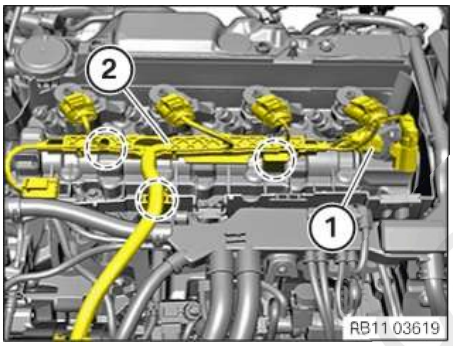
- Unlock and detach the locks.
- Feed the engine ventilation line (1) out and set it aside.



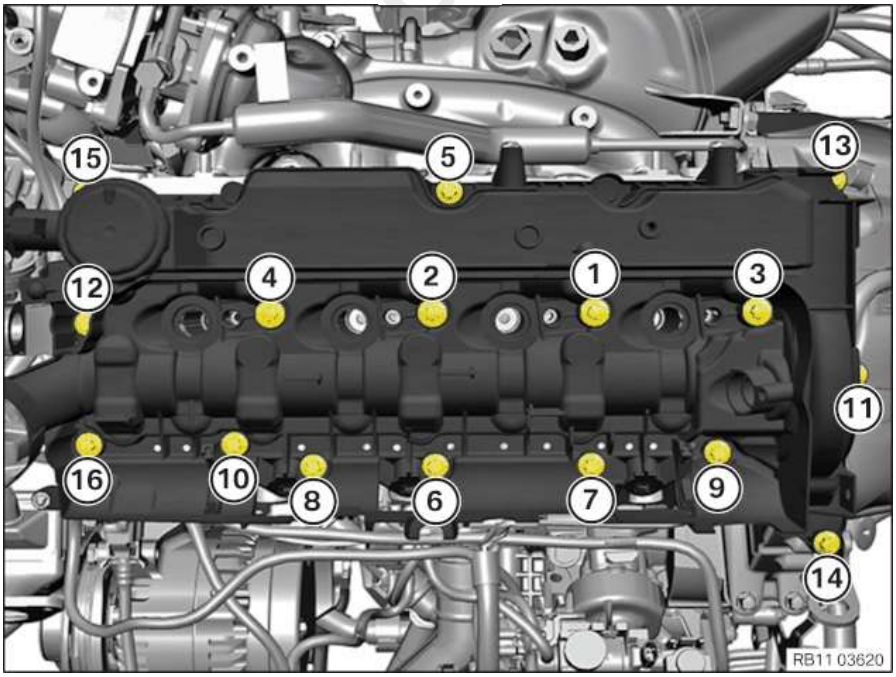
- Feed out and remove the heat shield (1).



- Remove the leakage oil line (1) including the fuel return line (2) and the grommet (3) and put to one side.

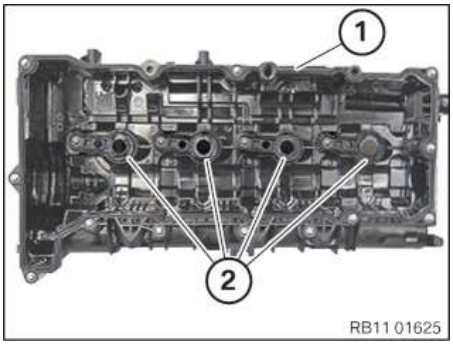


- Unlock connector (1) and pull off.
- Disconnect the wiring harness (2) in the marked areas from the cylinder head cover and set aside.



- Evenly loosen the screws in a sequence from (16) to (1).
- Feed out and remove the cylinder head cover.

cardiagn.com



- Remove the profile seals (1) and (2).

52 – Removing starter motor

Prerequisite

Battery earth leads are disconnected.

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

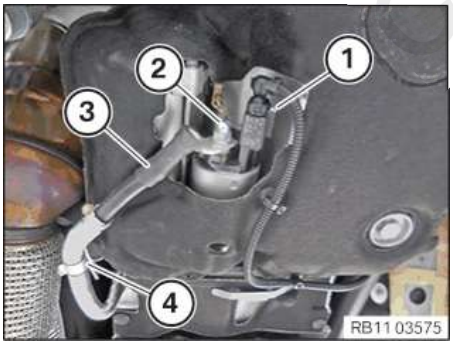
Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

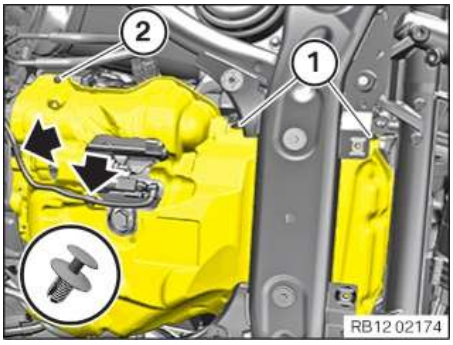
- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

TECHNICAL INFORMATION

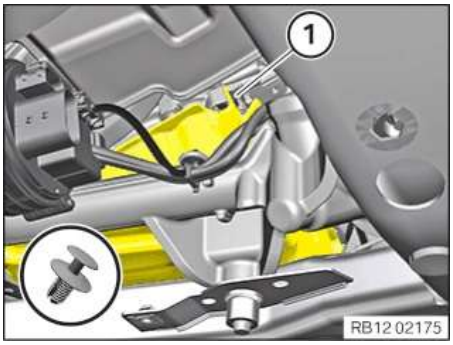
Make sure that the acoustic cover is **not** damaged while removing the starter motor.
A damaged lower acoustic cover can only be renewed when the front axle is lowered.



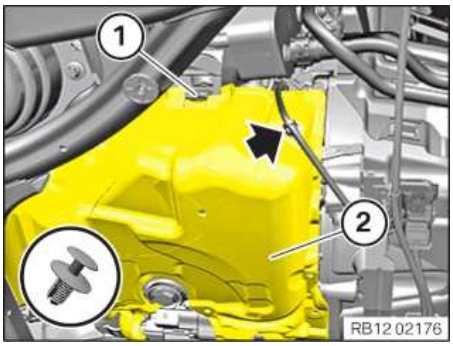
- Unlock plug connection (1) and disconnect.
- Release nut (2).
- Release positive battery cable (3) from holder (4).



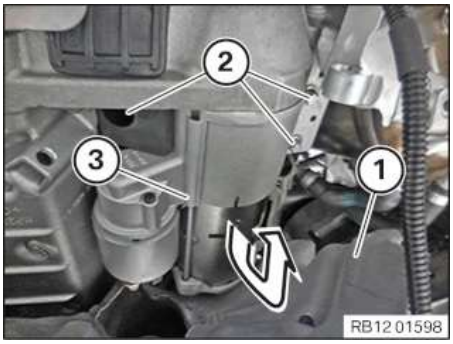
- Loosen the expanding rivet (1).
- Undo fir tree clip (2).
- Release the clamps (arrows).



- Loosen expanding rivet (1).
- Lower the acoustic cover of the oil sump.



- Loosen expanding rivet (1).
- Loosen the clamp (arrow).
- Lower acoustic cover (2).



- Make sure that the acoustic cover (1) is not damaged.
- Carefully press acoustic cover (1) to one side.
- Loosen screws (2).
- Carefully guide out the starter motor (3) in direction of arrow and remove.

53 – Checking camshaft timing



RISK OF DAMAGE

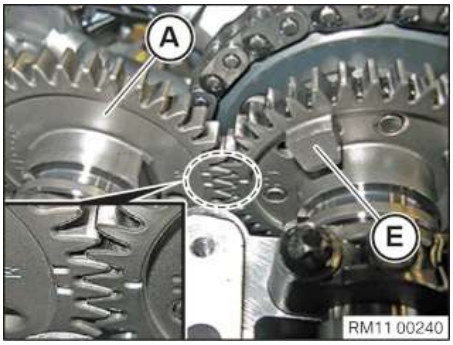
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

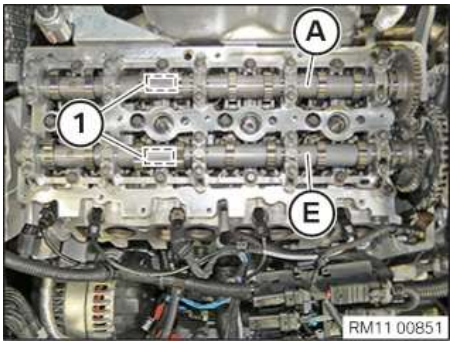
- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

  Do **not** crank the engine in reverse.

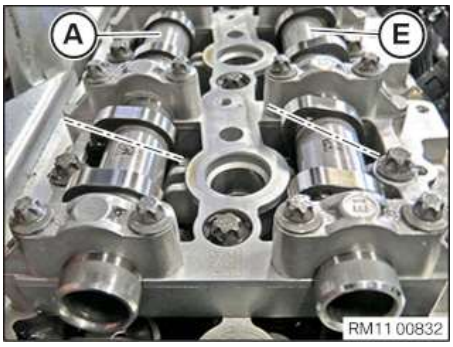


- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.

bordiagn.com



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.

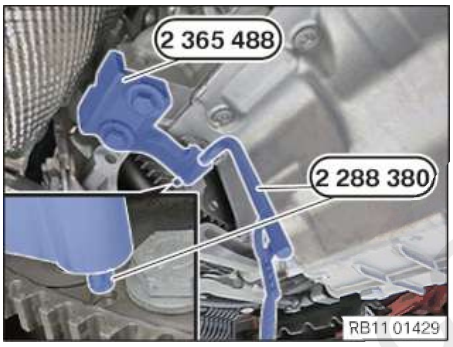


- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

54 – Remove chain tensioner piston

RISK OF DAMAGE

Contaminant or foreign body.

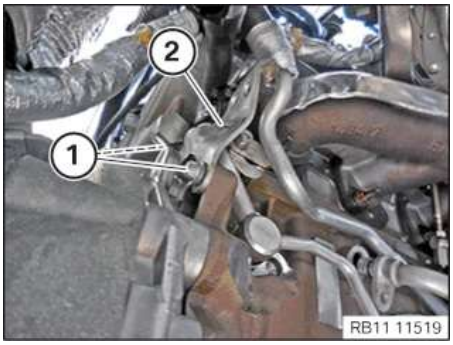
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

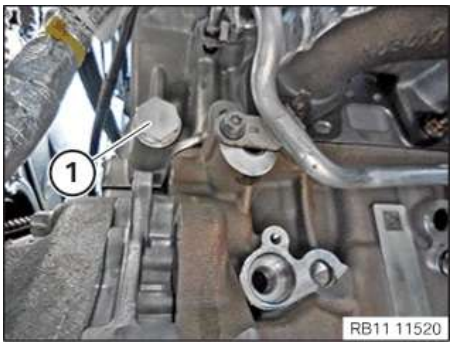
TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

carlogn.com



- Loosen screws (1).
- Guide out and remove holder (2).

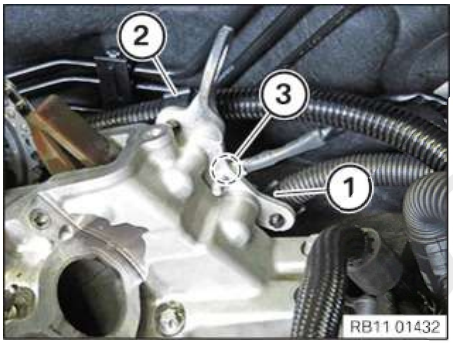


- Loosen the chain tensioner piston (1).
- Catch and dispose of emerging engine oil.

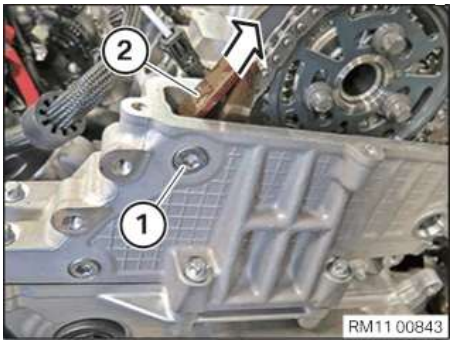


- Feed out and remove the sealing ring (1).

55 – Remove the timing chain guide rail

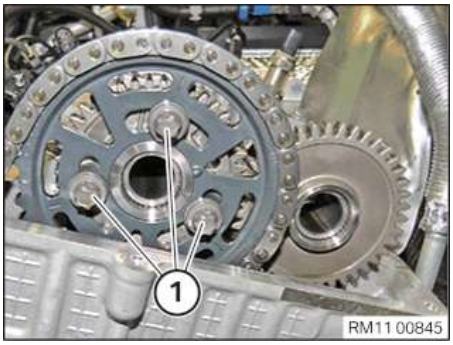


- Loosen the vehicle wiring harness (1) from the bracket.
- Release the positive battery cable (2) from the holder .
- Loosen the screw (3) and remove the grounding cable.



- Remove the bearing journal (1).
- Remove the guide rail (2) in the direction of the arrow.

56 – Removing the camshaft sprocket on the intake camshaft



- Loosen screws (1).
- Secure the drive chain against falling.
- Remove the camshaft sprocket on the intake camshaft.

57 – Removing the special tool for fixing the exhaust camshaft

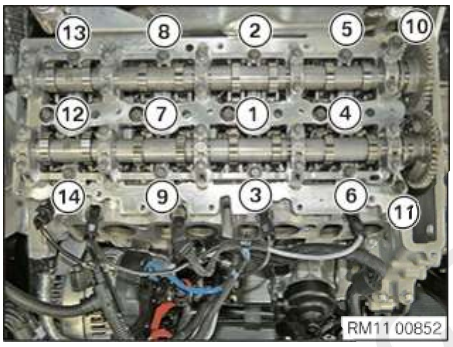


- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

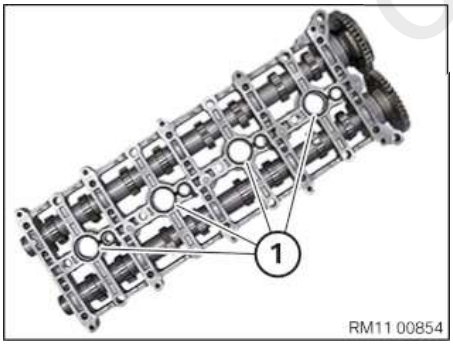
58 – Removing the camshaft support

TECHNICAL INFORMATION

The camshaft is tensioned by the valve springs. Tighten or loosen each screw on the camshaft bearing caps one at a time in the specified sequence and by half a turn only. Repeat procedure.



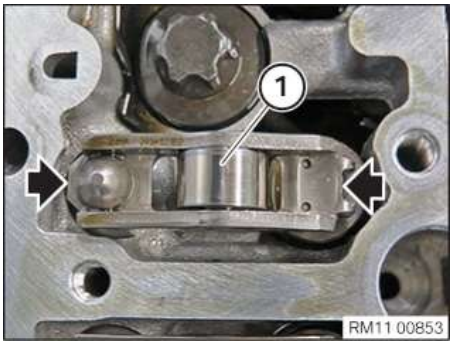
- Unscrew the screws evenly in order (14) to (1) in multiple increments.
- Feed out and remove the camshaft support with the camshafts towards the top.



- Guide out and remove gaskets (1).

59 – Remove roller cam followers

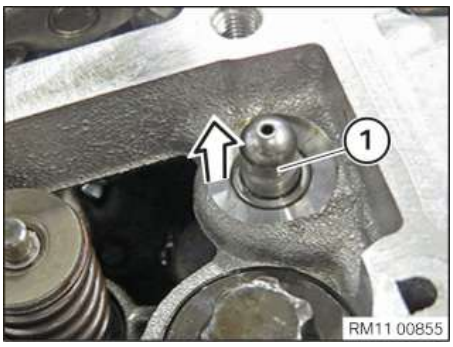
cardiagn.com



- Guide out and remove all roller cam followers (1) (arrows).
- Place all roller cam followers (1) in order in special tool 0 495 105 (11 4 480).

  Roller cam followers that have already been used must be installed in same position again.

60 – Removing all hydraulic valve clearance compensating elements



- Remove all hydraulic valve clearance compensating elements (1) in the direction of the arrow.
- Catch and dispose of emerging engine oil.
- Store all hydraulic valve clearance compensating elements properly arranged on the special tool 0 495 105 (11 4 480).
- Make sure to observe the assignment of the roller cam followers to the hydraulic valve clearance compensating elements when reusing the hydraulic valve clearance compensating elements (1).

61 – Remove all glow elements

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Damage to the glow elements.

Excessive force may damage the glow elements and they may then have to be renewed.

- Handle glow elements with care and do not drop.
- Do not rest the cylinder head on glow elements. Glow elements protrude from the sealing surface of the cylinder head.

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

cardiagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

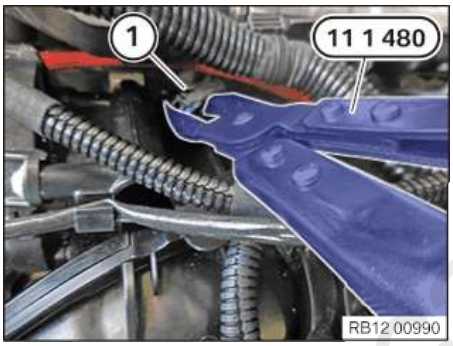
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

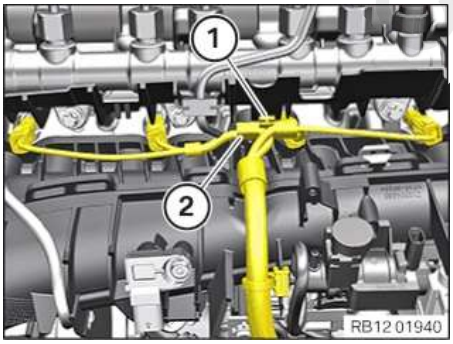
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

NOTICE

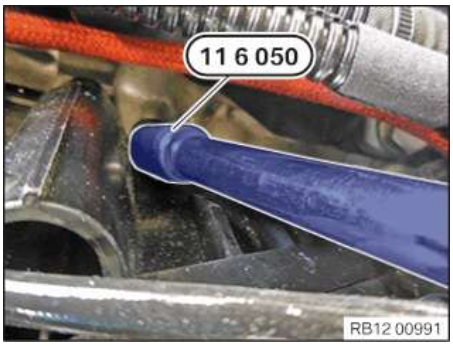
The description is for one component only. The procedure is identical for all further components.



- Unlock and release the connector (1) using special tool 0 490 796 (11 1 480).



- Loosen clamp (1).
- Remove the wiring harness section (2) and put to one side.



- Unscrew the glow elements with the special tool or conventional tools.

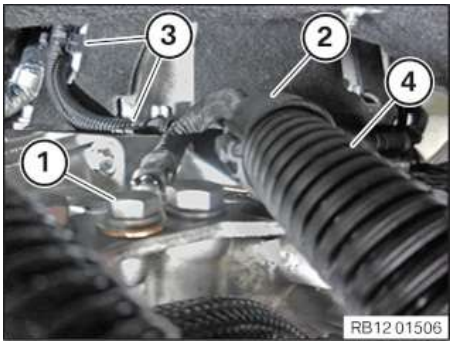
cardiagn.com

RISK OF DAMAGE

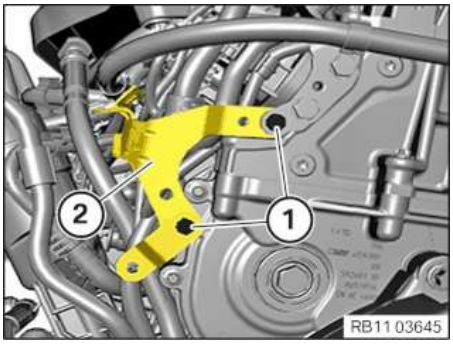
Heavy component.

Heavy components can lead to injury or damage.

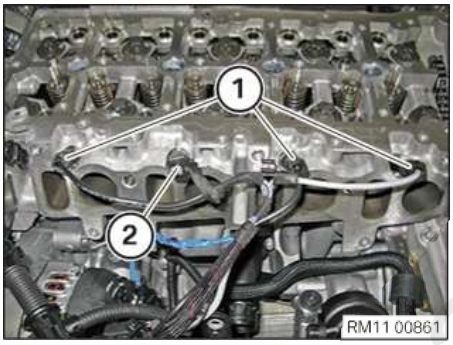
- Remove and install heavy components with the aid of another person/other persons.



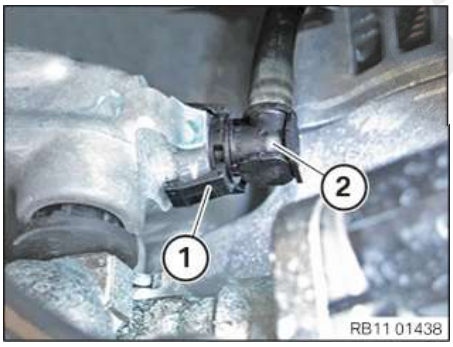
- Loosen screw (1).
- Unlock and loosen holder (2).
- Unlock and loosen the clamps (3).
- Feed out the wiring harness section (4) of the automatic transmission and place to one side.



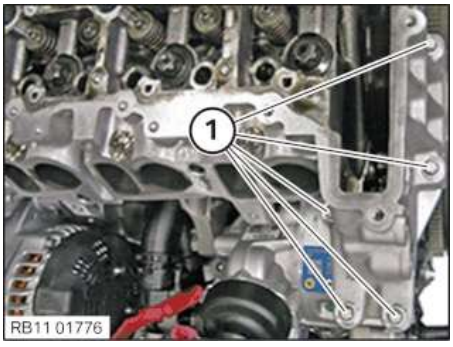
- Loosen screws (1).
- Guide out and remove holder (2).



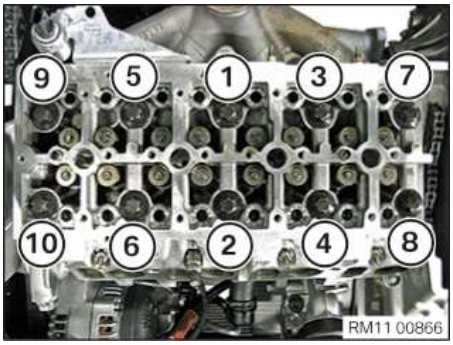
- Release plug connections (1) with special tool 0 495 140 (12 2 300).
- Unlock and disconnect the plug connections (1) and (2).
- Place wiring harness to one side.



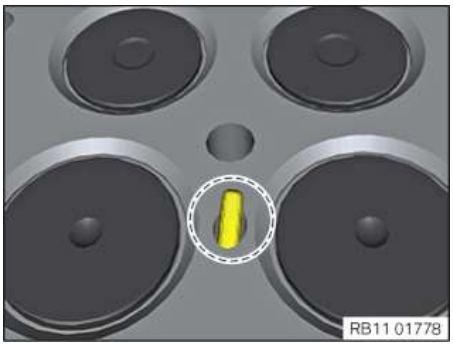
- Release lock (1) of coolant line.
- Remove the coolant line (2) and set it aside.



- Unscrew and remove the bolts (1).



- Release cylinder head bolts from **outside** to **inside** in the order (10) to (1).



RISK OF DAMAGE

Damage to the glow elements.

Excessive force may damage the glow elements and they may then have to be renewed.

- Handle glow elements with care and do not drop.
- Do not rest the cylinder head on glow elements. Glow elements protrude from the sealing surface of the cylinder head.

- Remove the cylinder head with an auxiliary person.



- Check the cylinder head and crankcase for damage.
- Check the fitting sleeves (1) for damage and replace if necessary.

RISK OF DAMAGE

Damage to the surface.

The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.

- Clean the sealing surfaces on the cylinder head and the crankcase using special tool 0 495 102 (11 4 470).

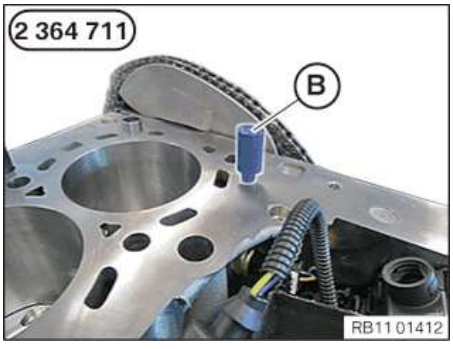
63 – Cleaning the sealing surface

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Lock the front oil duct using special tool (B) from special tool 2 364 711.

cardiagn.com



RISK OF DAMAGE

Damage to the surface.

The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.

- Clean the sealing surface using special tool 0 495 103 (11 4 471).



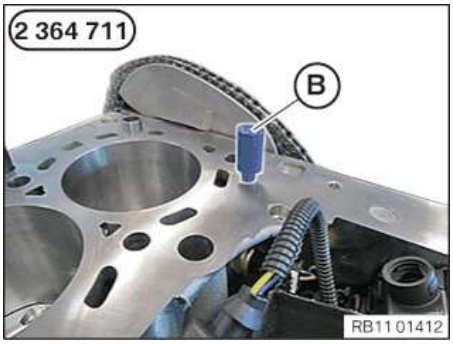
RISK OF DAMAGE

Damage to the surface.

The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

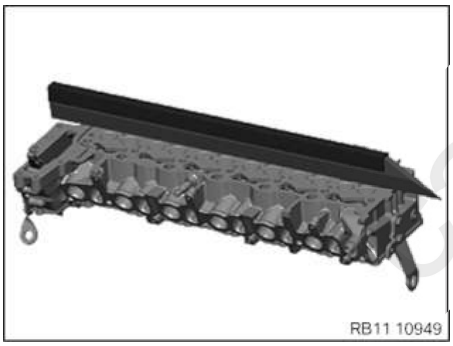
- Do not use any metal-cutting tools.

- Clean the sealing surface using special tool 0 495 104 (11 4 472).



- Remove special tool (B).

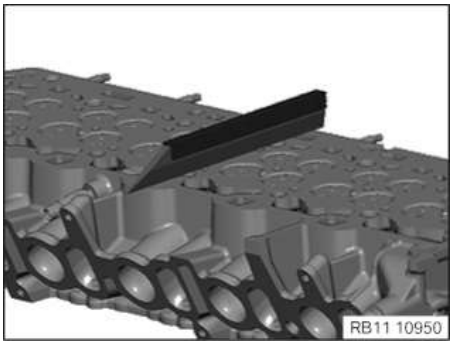
64 – Check the flatness of the cylinder head



- Check the flatness of the cylinder head lengthwise using a straightedge.

Cylinder head flatness

Maximum lengthwise deviation from flatness	0.10 mm
Maximum transverse deviation from flatness	0.05 mm



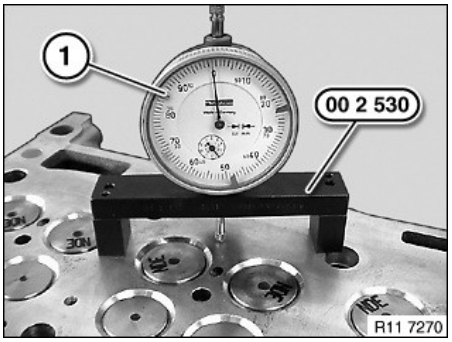
- Check the flatness of the cylinder head crosswise using a straightedge.

Cylinder head flatness

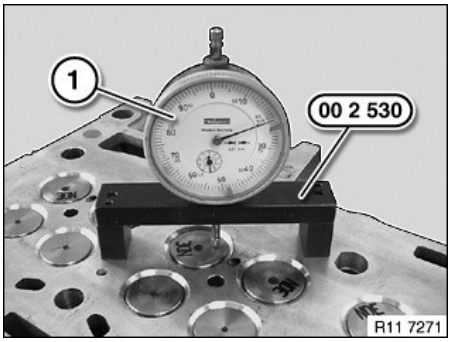
Maximum lengthwise deviation from flatness	0.10 mm
Maximum transverse deviation from flatness	0.05 mm

65 – Checking the valve underprotrusion

cardiagn.com



- Set the dial gauge (1) onto the cleaned cylinder sealing surface with slight preload in special tool 0 490 185 (00 2 530).
- Set dial gauge in mildly preloaded state to "zero".



Check

- Position the dial gauge (1) on the valve with special tool 0 490 185 (00 2 530).
- Measure valve underprotrusion and compare with the setpoint value.

Valve underprotrusion

	0,8 (0.7 - 0,9) mm

Result

» Valve underprotrusion is outside tolerance.

Measure

- Renew cylinder head.

  Parts: Cylinder head

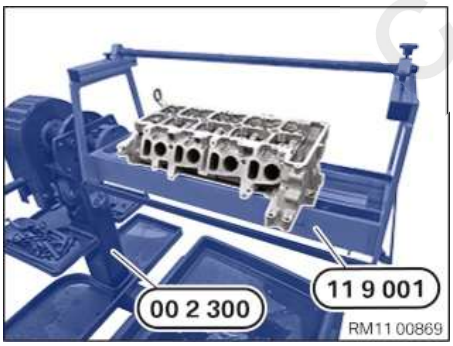
66 – Remove all valve springs

RISK OF DAMAGE

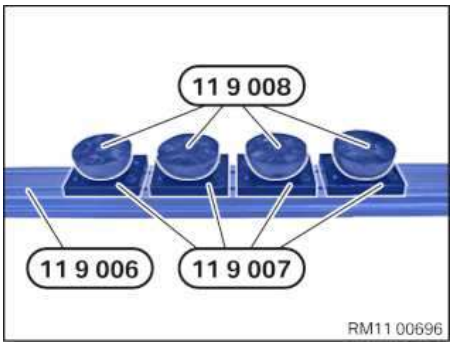
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Mount and screw the cylinder head onto the special tools 0 494 366 (11 9 001) and 0 495 187 (00 2 300).

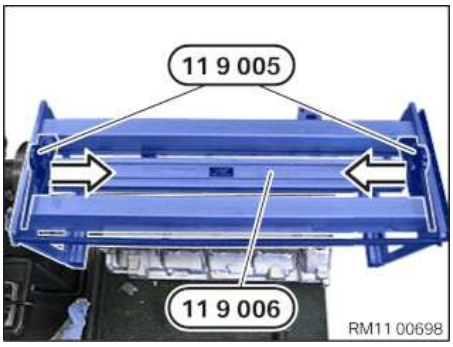


- Prepare the special tools 0 494 371 (11 9 006), 0 494 372 (11 9 007) and 0 494 373 (11 9 008) as shown.

cardiagn.com



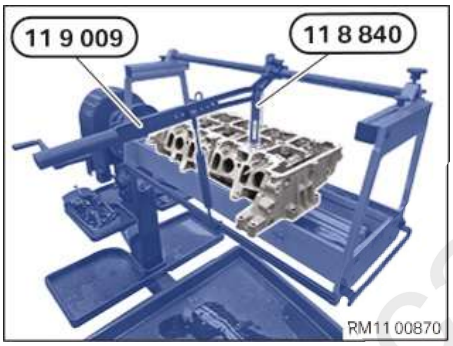
- Position special tools 0 494 373 (11 9 008) as pictured.



- Turn round special tool 0 494 371 (11 9 006) and insert as shown.
- Lock special tool 0 494 370 (11 9 005)in direction of arrow.

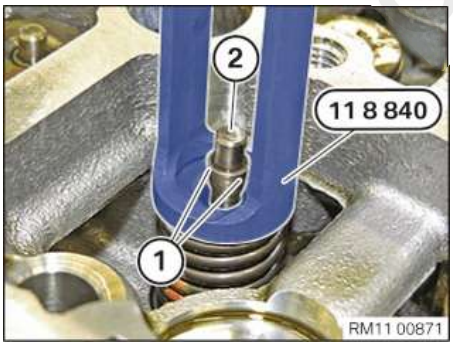


- Lock special tool 0 494 370 (11 9 005)in direction of arrow.
- Move cylinder head with special tool 0 494 362 (11 9 000) through 180° into the installation position.



- Align special tool 0 494 374 (11 9 009) in direction of valve axis.
- Position the special tool 0 496 143 (11 8 840) according to the nut.
- Press down the valve spring on the upper spring cup with the special tools 0 494 374 (11 9 009) and 0 496 143 (11 8 840).

  The **hooks** from the set of special tools 0 494 362 (11 9 000) can be used to **hold** the valve spring in pressed position.



- Keep the valve spring pressed down with the special tool 0 496 143 (11 8 840).
- Remove valve shims (1) of valve (2) with a magnet.
- Feed out valve spring and spring cup and remove.
- Place valve spring, spring cup and valve shims (2) in special tool 0 495 105 (11 4 480) in an orderly manner.

MAIN WORK

67 – Remove valve stem seals

RISK OF DAMAGE

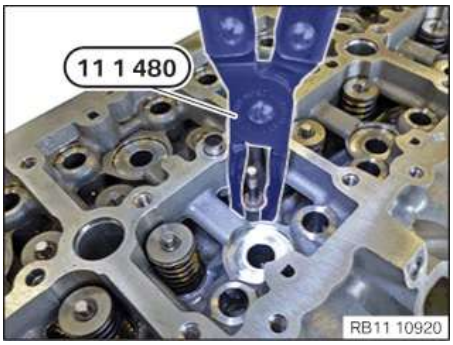
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

NOTICE

The description is for one component only. The procedure is identical for all further components.



- Remove the valve stem seal (1) with the special tool 0 490 796 (11 1 480).

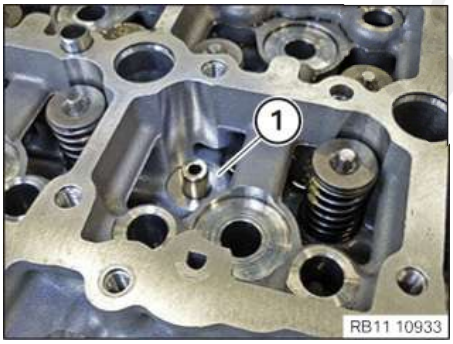
68 – Installing valve stem seals

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



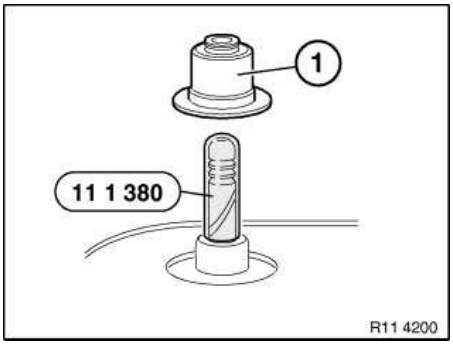
RISK OF DAMAGE

Damage to the surface.

The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.

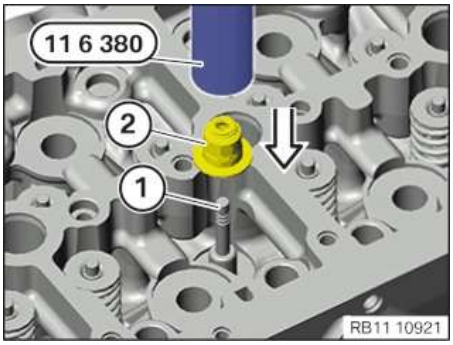
- Clean the contact surfaces (1).



- Fit special tool 0 490 746 (11 1 380).
- Renew the valve stem seal (1).

  Parts: Valve stem seal
- Lubricate and set the valve stem seal (1).

cardiagn.com



- Position the valve stem seals (2) on the valve (1).
- Press down valve stem seal (2) up to the contact surface on the cylinder head using special tool 0 493 249 (11 6 380).

POSTPROCESSES

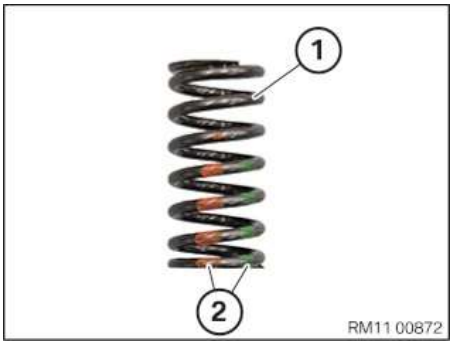
69 – Install all valve springs

RISK OF DAMAGE

Contaminant or foreign body.

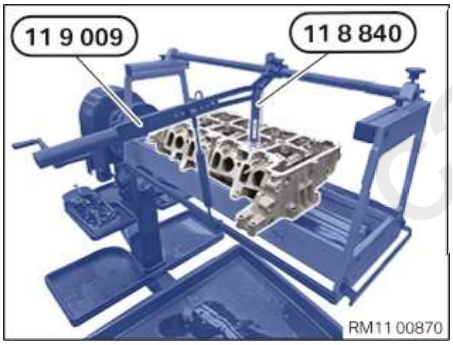
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



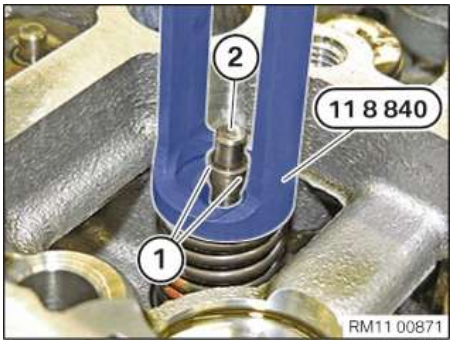
- Ensure that the valve spring (1) is marked using a colour code (2).

  The mounting orientation of the valve spring (1) can be freely chosen.



- Align special tool 0 494 374 (11 9 009) in direction of valve axis.
- Position the special tool 0 496 143 (11 8 840) according to the nut.
- Press down the valve spring on the upper spring cup with the special tools 0 494 374 (11 9 009) and 0 496 143 (11 8 840).

  The **hooks** from the set of special tools 0 494 362 (11 9 000) can be used to **hold** the valve spring in pressed position.

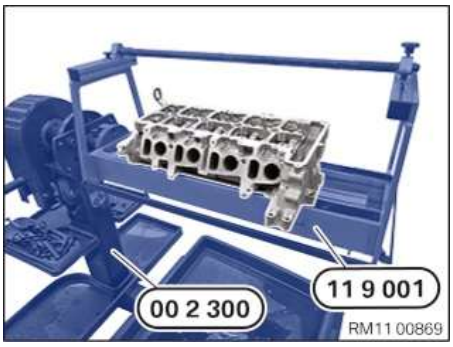


- Keep the valve spring pressed down with the special tool 0 496 143 (11 8 840).
- Insert the valve shims (1) at the valve (2) with the magnet and install.
- Relieve load on valve spring.
- Make sure that the valve shims (1) are installed correctly.

cardiagn.com

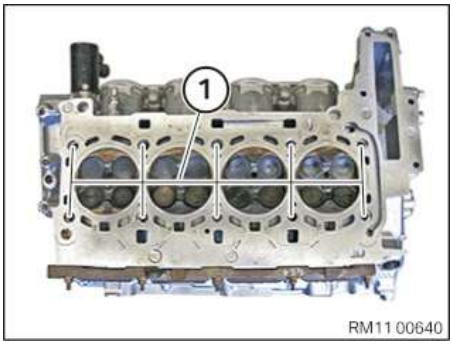


- Unlock the special tool 0 494 370 (11 9 005) in the direction of the arrow.
- Guide the special tool 0 494 371 (11 9 006) out and remove.



- Unscrew and remove the cylinder head from the special tools 0 494 366 (11 9 001) and 0 495 187 (00 2 300).

70 – Replace cylinder head gasket



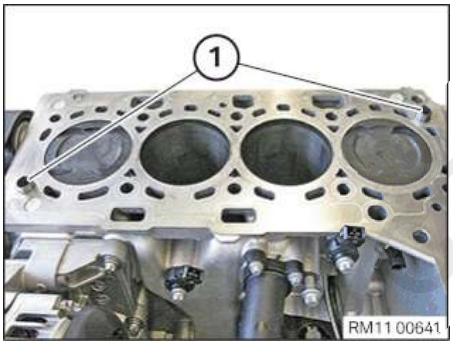
RISK OF DAMAGE

Damage to the surface.

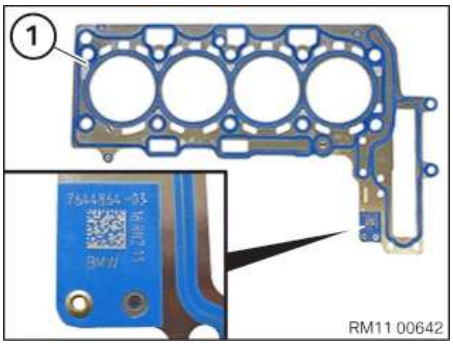
The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.

- Remove oil and dirt residue from the blind holes (1).

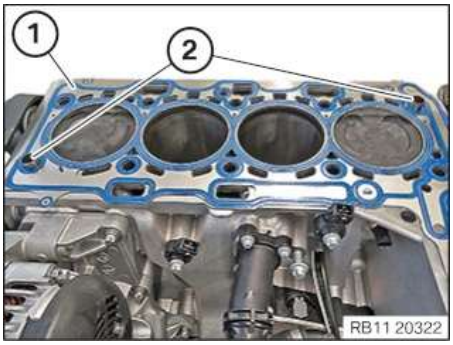


- Check if fitting sleeves (1) fit correctly and check for any damage.



- Identify the cylinder head gasket (1) using the part number.

Note: If the cylinder head is reworked, an additional seal that is 0.3 mm thicker is available for the service.



- Guide in the cylinder head gasket (1) and install.
- Ensure that the cylinder head gasket (1) is installed correctly in the fitting sleeves (2).

71 – Installing the cylinder head

RISK OF DAMAGE

Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

RISK OF DAMAGE

Damage to threads.

Fluid in the threaded hole may damage the thread when screws are tightened in the threads.

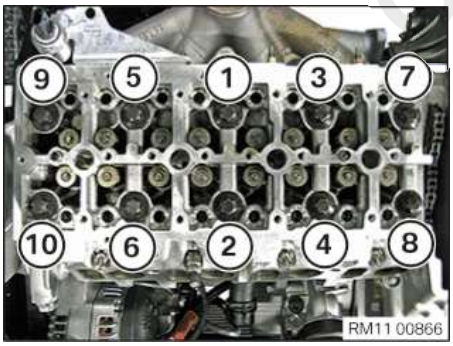
- Dry threaded holes (e.g. using compressed air).

TECHNICAL INFORMATION

Do not remove bolt coating.

TECHNICAL INFORMATION

When assembling, it is essential to observe screwing sequences and tightening torques.
Non-observance of these requirements may result in leaks and damage.



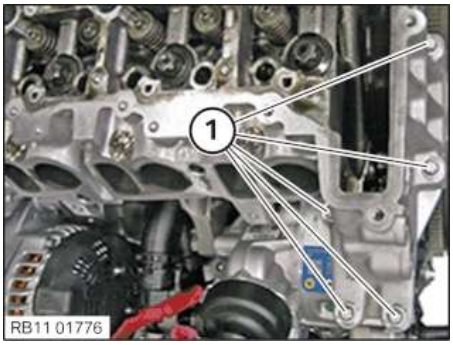
- Position the cylinder head gasket with the previously determined gasket thickness (number of holes).
- Fit new cylinder head screws.

  Parts: Cylinder head bolts
- Position the cylinder head and tighten it with the new cylinder head bolts in the order from (1) to (10).

Cylinder head to crankcase

M12x1.5	Renew screws.	1. Tightening torque	50 Nm
		2. Angle of rotation	120 °
		3. Angle of rotation	120 °

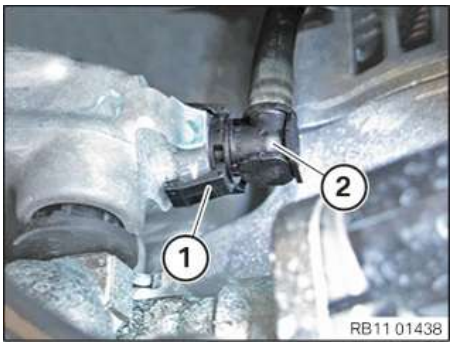
cardiagn.com



- Insert screws (1) and tighten.

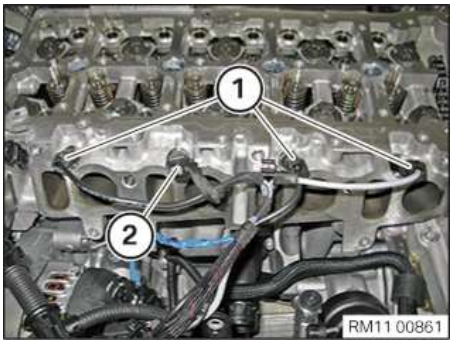
Cylinder head bolt to timing case cover

M8x40		Tightening torque	19 Nm



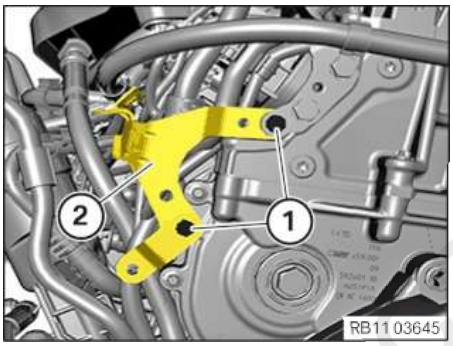
- Fit and lock coolant line (2).

  The lock (1) must engage audibly.



- Connect connectors (1) and (2), then lock.

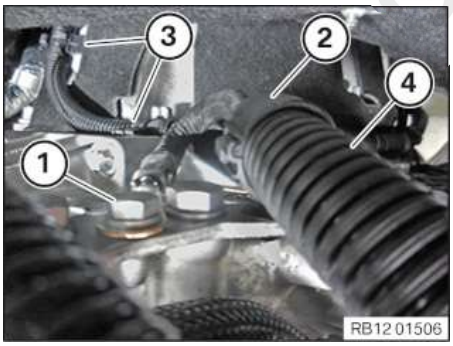
  The connectors (1) and (2) must audibly engage.



- Insert and install the holder (2).
- Tighten the screws (2).

Standard screw connection M6

M6		Tightening torque	8 Nm



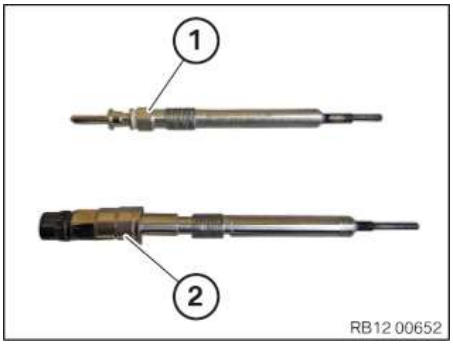
- Guide in the wiring harness section (4) of the automatic transmission and install.
- Lock holder (2).
- Make sure the bracket (2) engages audibly.
- Secure clamps (3).
- Tighten down screw (1).

Ground to cylinder head

M6		Tightening torque	8 Nm

72 – Install all glow elements

cardiagn.com



TECHNICAL INFORMATION

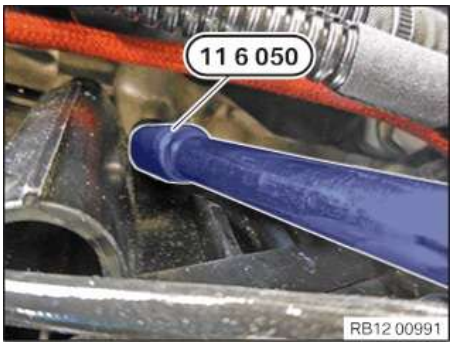
The combustion chamber pressure sensor can and is omitted from a technical point of view.

As an alternative to the combustion chamber pressure sensor, a normal glow element can be installed.

If a glow element is installed as an alternative, the appropriate wiring harness for the glow elements must also be installed.

For more information, see the Electronic Parts Catalogue and other information

- If installed: Install the glow element with **combustion chamber pressure sensor** (2), in the cylinder **2**.
- Install the glow elements (1) in the cylinders **1**, if necessary, **2**, **3** and **4**.



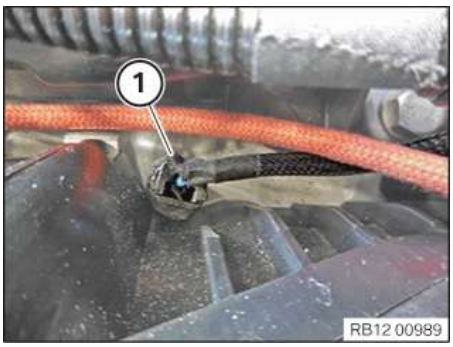
NOTICE

The description is for one component only. The procedure is identical for all further components.

- Screw in and tighten the glow elements with the special tool or conventional tools.

Glow elements to cylinder head

Glow element		Tightening torque	13 Nm

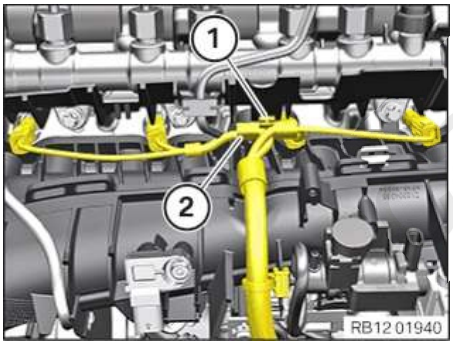


NOTICE

The description is for one component only. The procedure is identical for all further components.

- Connect and lock the connector (1).

  The connector (1) must engage audibly.



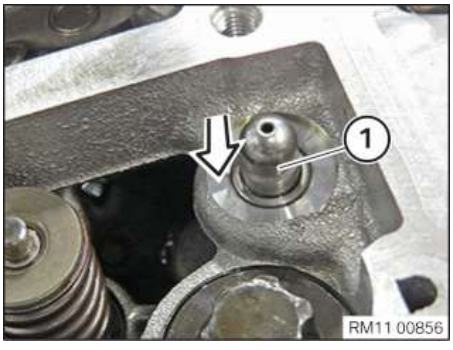
- Guide in the wiring harness section (2) and install.
- Secure clamps (1).

▸ **When replacing the glow element: Teach in glow elements if necessary**



- Teach in glow elements with the diagnosis system.

73 – Installing all hydraulic valve clearance compensating elements



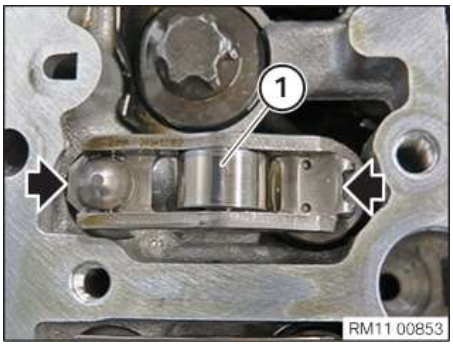
- Make sure to observe the assignment of the roller cam followers to the hydraulic valve clearance compensating elements when reusing the hydraulic valve clearance compensating elements (1).
- Insert and install all hydraulic valve clearance compensating elements (1) in the direction of the arrow.

cardiagn.com

74 – Installing the roller cam followers

TECHNICAL INFORMATION

- Note the installation position of the component. The component may be installed in various installation positions.



- Check all the roller cam followers (1) for damage, and renew if necessary.

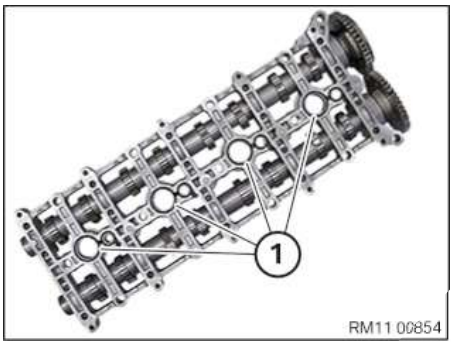
  Parts: Roller cam followers
- Insert all roller cam followers (1) and install them (arrows).

  Roller cam followers (1) that have already been used must be installed in the same place.
- Note the mounting orientation of the roller cam followers (1).
- Oil all roller cam followers (1).

75 – Installing the camshaft support

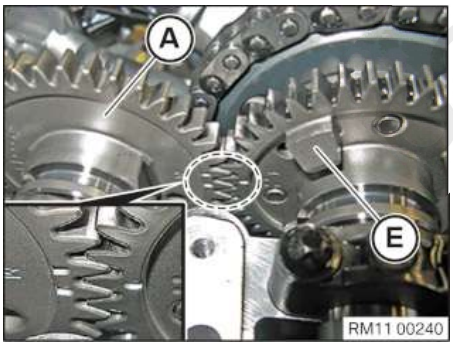
TECHNICAL INFORMATION

The camshaft is tensioned by the valve springs. Tighten or loosen each screw on the camshaft bearing caps one at a time in the specified sequence and by half a turn only. Repeat procedure.

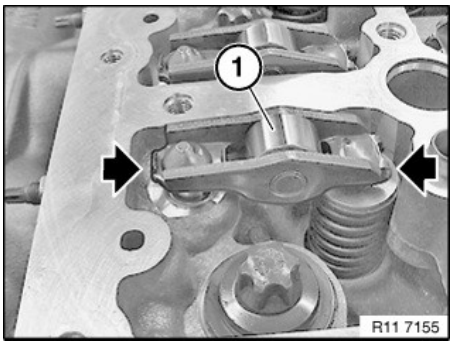


- Renew seals (1).

  Parts: Seals
- Insert and install the gaskets (1).

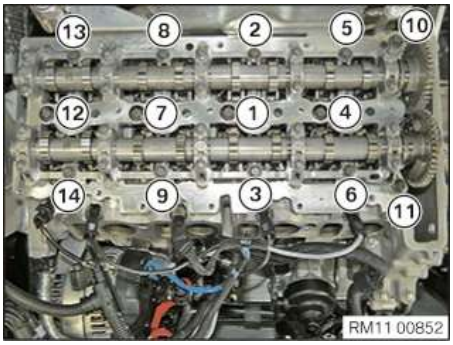


- Make sure the marks on both camshafts (A) and (E) correspond in the **highlighted area**.



- Make sure the roller cam followers (1) have the correct mounting orientation.
- Position the camshaft support (arrows).

bardiagn.com



- Evenly tighten the screws in a sequence from (1) to (14) in several steps.
- Evenly tighten the screws in a sequence from (1) to (14) in several steps.

Camshaft carrier to cylinder head

M7x35		Tightening torque	13 Nm

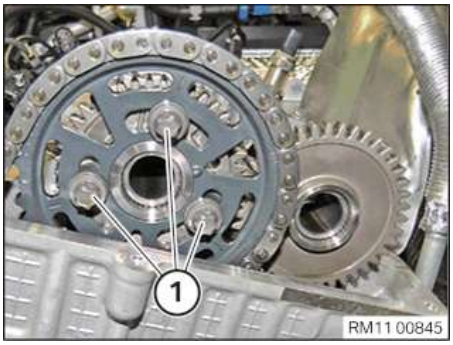
76 – Installing the special tool to secure the exhaust camshaft



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

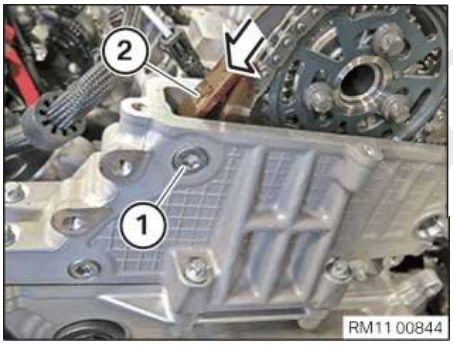
  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.

77 – Installing the camshaft sprocket on the intake camshaft



- Position the drive chain on the camshaft sprocket so that the thread of the screw connections are located in the centre of the elongated holes.
- Position the camshaft sprocket on the intake camshaft.
- Merely apply the screws (1) hand-tight so that the camshaft sprocket can still be moved in relation to the intake camshaft.

78 – Installing the guide rail of the timing chain

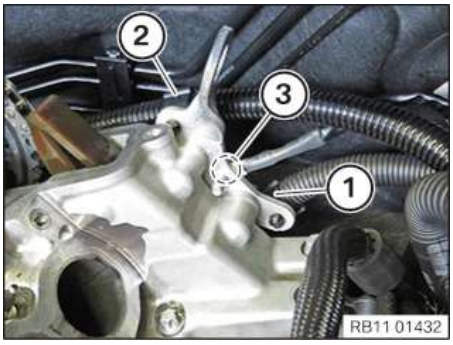


- Position the guide rail (2) in the direction of the arrow.
- Make sure the guide rail (2) is correctly installed at the bottom bearing journal.
- Renew bearing journal (1).

  Parts: Bearing journal
- Tighten the bearing journals (1).

Bearing journal to cylinder head

M16x1.5	Replace bearing journal.	Tightening torque	20 Nm



- Position the grounding cable and tighten the screw (3).

Standard screw connection M8

M8		Tightening torque	19 Nm

- Clip in the positive battery cable (2) into the bracket.
- Clip in the vehicle wiring harness (1) into the bracket.

79 – Installing the chain tensioner piston

cardiagn.com



TECHNICAL INFORMATION

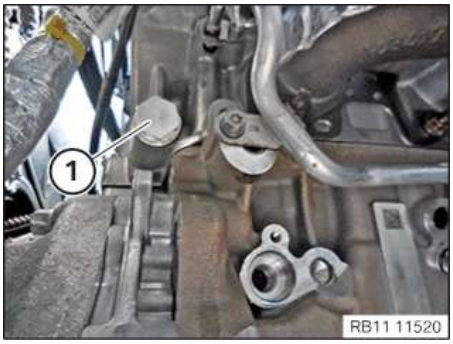
The oil chamber must be drained for reuse of the chain tensioner.

- Place the chain tensioner on a level support pad and slowly compress in the direction of arrow.
- Repeat process twice.



- Renew sealing ring (1).

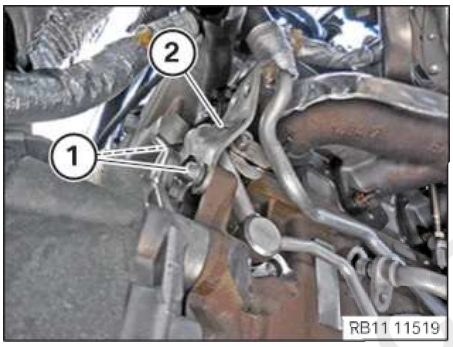
  Parts: Sealing ring
- Insert and install the sealing ring (1).



- Insert and install the chain tensioner piston (1).
- Tighten the chain tensioner piston (1).

Chain tensioner piston to cylinder head

22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

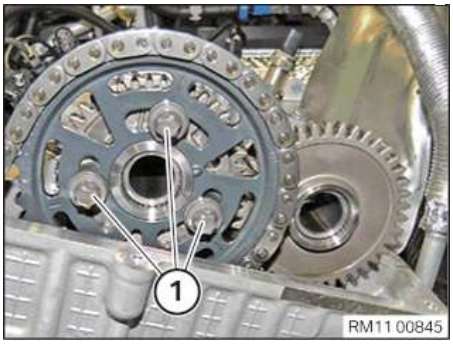


- Insert and install the holder (2).
- Tighten the screws (1).

Holder to crankcase

M8X16		Tightening torque	19 Nm

80 – Tightening the camshaft sprocket on the intake camshaft



- Tighten the screws (1).

Camshaft sprocket to camshaft

M7x17.			17 Nm

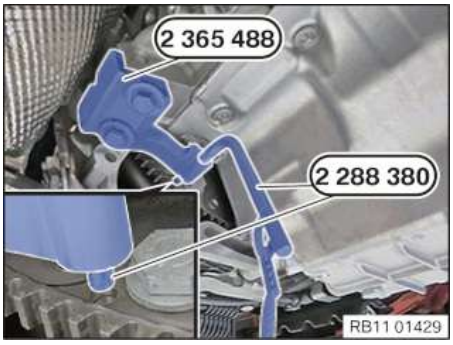
81 – Removing the special tool for fixing the exhaust camshaft

cardiagn.com



- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

82 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

83 – Checking camshaft timing



RISK OF DAMAGE

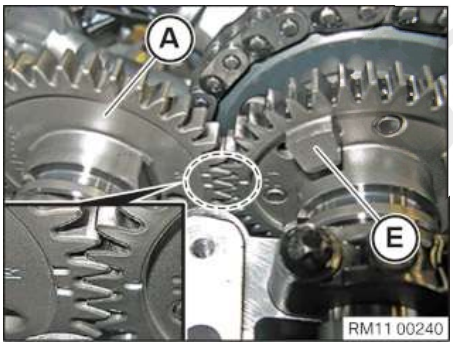
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

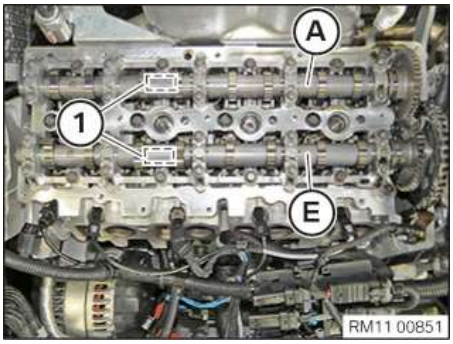
- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

  Do **not** crank the engine in reverse.

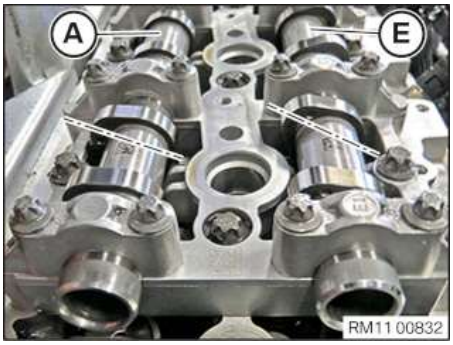


- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.

cardiagn.com

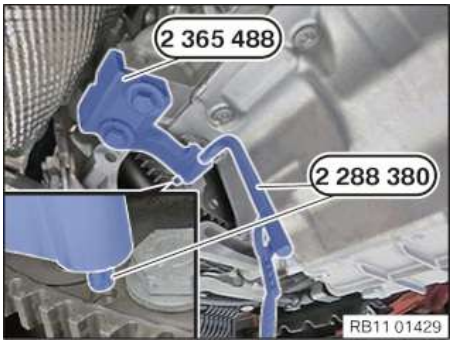


- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

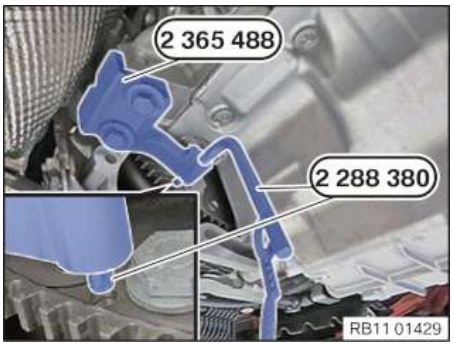
- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

84 – Removing the special tool for fixing the exhaust camshaft



- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

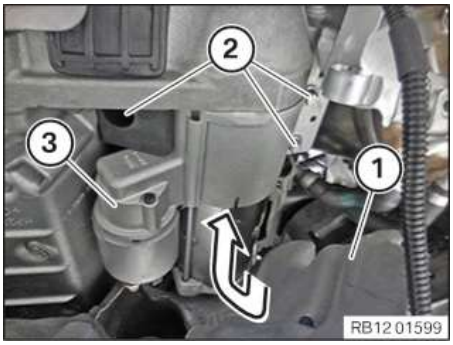
85 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

86 – Installing starter motor

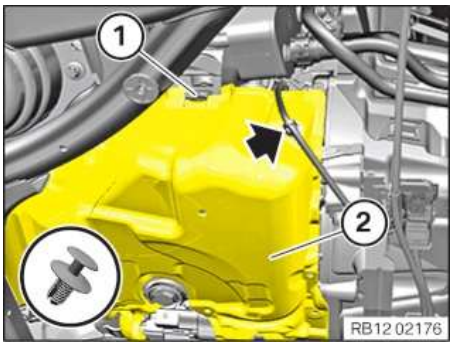
cardiagn.com



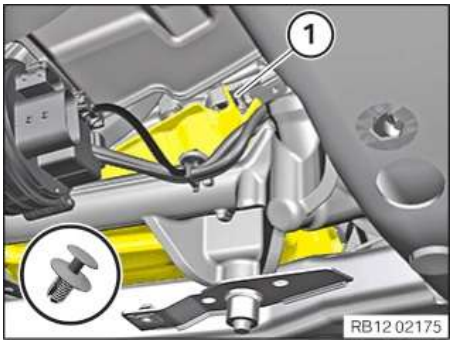
- Make sure that the acoustic cover (1) is not damaged.
- Carefully press the acoustic cover (1) to one side.
- Feed in and install the starter motor (3) in the direction of the arrow.
- Tighten the screws (2).

Starter motor to engine

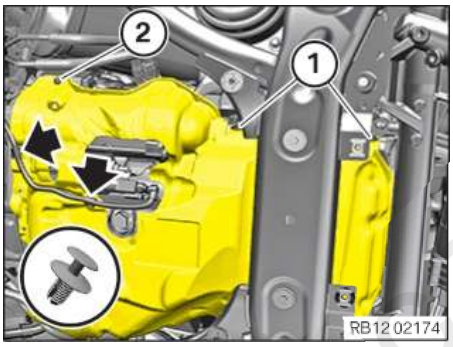
M8X60		Tightening torque	19 Nm



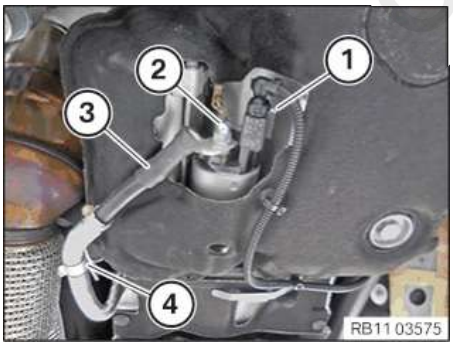
- Position the acoustic cover (2).
- Fasten expanding rivet (1).
- Secure clamp (arrow).



- Fasten expanding rivet (1).

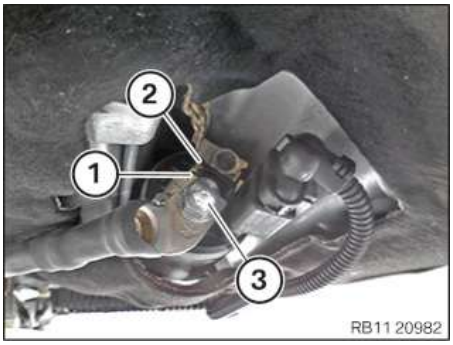


- Secure fir tree clip (2).
- Secure expanding rivet (1).
- Secure the clamps (arrows).



- Fasten positive battery cable(3) in holder (4) and position it on the starter motor.
- Tighten the nut (2) hand-tight.
- Connect the connector (1) and audibly lock it.

cardiagn.com



CAUTION

Improper routing of the positive battery cable.

Risk of short circuits!

- Route the positive battery cable without abrasions and do not trap.

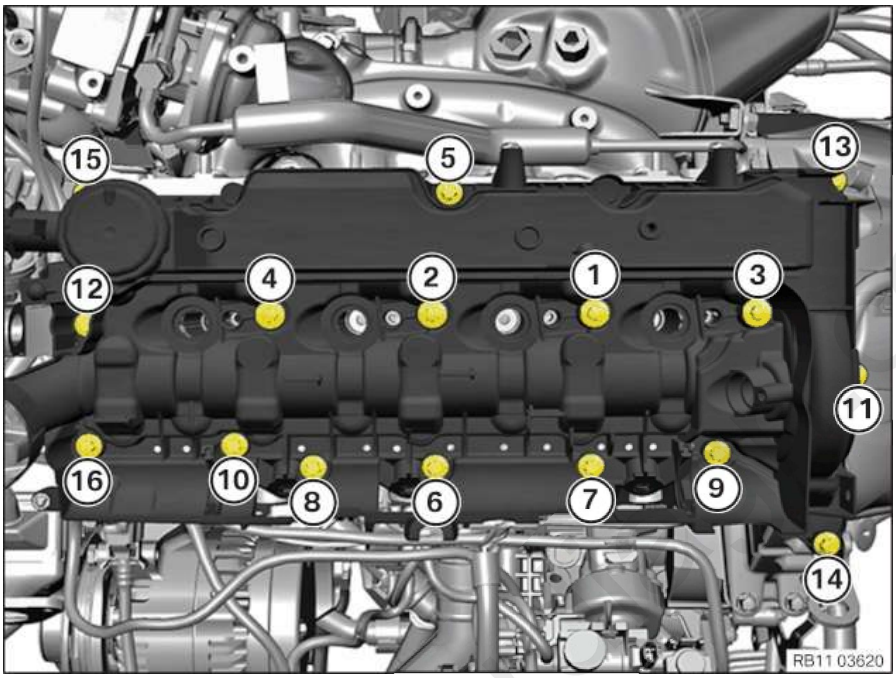
- Attach the positive battery cable (1) **correctly** to anti-twist lock (2).
- Tighten nut (3).

Battery positive lead to starter

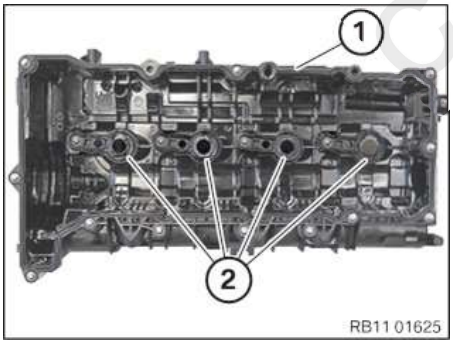
M8		Tightening torque	13,5 Nm

87 – Installing cylinder head cover

Screw connection of the cylinder head cover

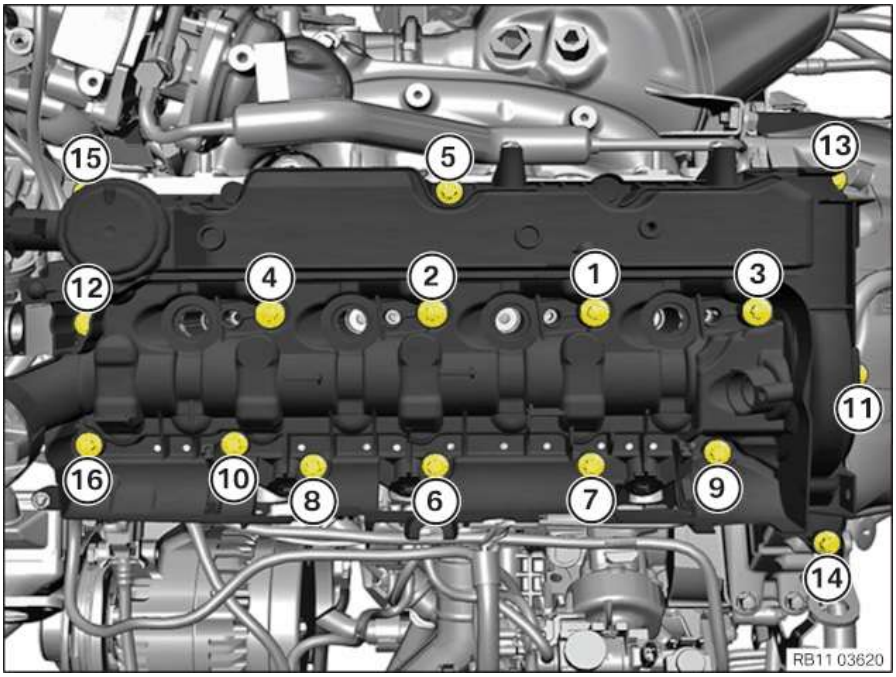


1 - 16 Bolts of the cylinder head cover



- Renew the profile seals (1) and (2) of the cylinder head cover.

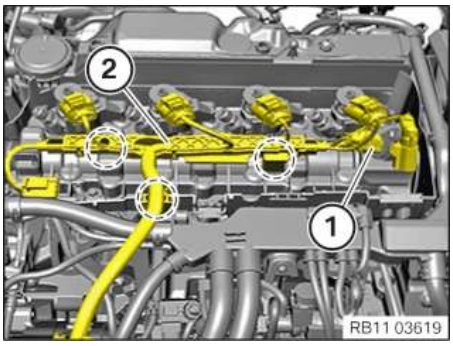
  Parts: Profile seals



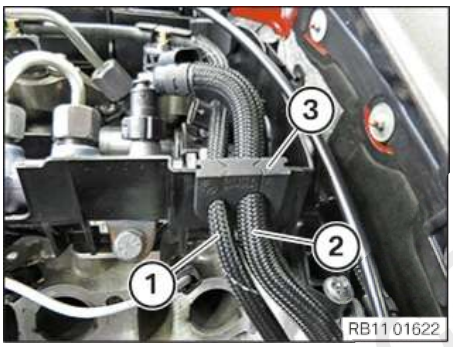
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

Cylinder head cover to cylinder head

M6		Tightening torque.	8,5 Nm



- Position the vehicle wiring harness (2) on the cylinder head cover and fasten in the marked areas.
- Plug in the connector (1) and lock audibly.



- Insert and connect the leakage oil line (1) with the fuel return line (2) and grommet (3).



- Feed in and install the heat shield (1).



- Connect engine ventilation line (1) and lock.

  The locks (arrows) must engage audibly.

cardiagn.com

▸ **Cleaning the injector shafts**

CAUTION

Swirling dirt particles caused by compressed air.

Danger of injury!

- Collect dirt particles, e.g. when blowing out, use cloth to do so.

- Wear safety goggles.

RISK OF DAMAGE

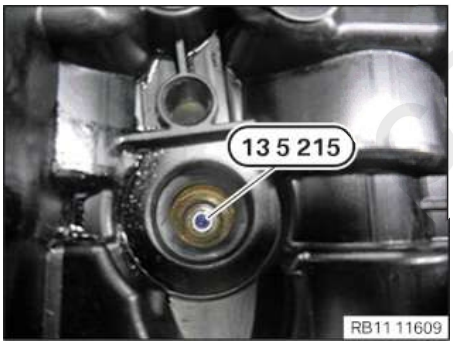
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



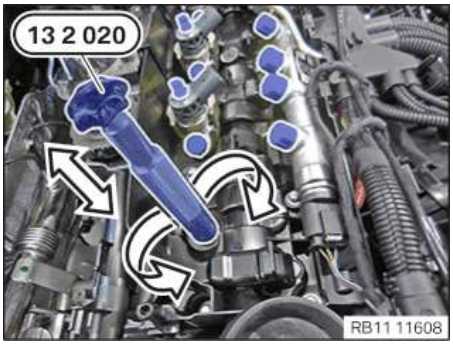
- Check whether the sealing ring remained in the injector shaft and remove the sealing ring as needed.
- Insert the special tool 0 493 763 (13 5 215) with the special tool 0 493 762 (13 5 214) from the set of special tools 0 493 758 (13 5 210) into the injector shaft.
- Remove special tool 0 493 762 (13 5 214).



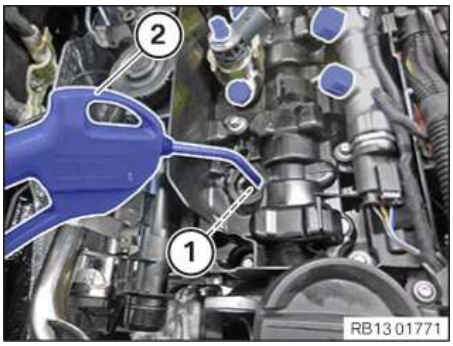
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



- Insert special tool 0 496 150 (13 2 020) into the injector shaft.



- Move special tool 0 496 150 (13 2 020) up and down in the injector shaft with rotational movements in the direction of arrow.
- Feed out special tool 0 496 150 (13 2 020) from the injector shaft and remove.



- Blow out injector shaft (1) with air gun (2).



- Feed the special tool 0 493 762 (13 5 214) into the injector shaft and screw it in with the special tool 0 493 763 (13 5 215).
- Feed out special tool 0 493 762 (13 5 214) with special tool 0 493 763 (13 5 215) from the injector shaft and remove it.

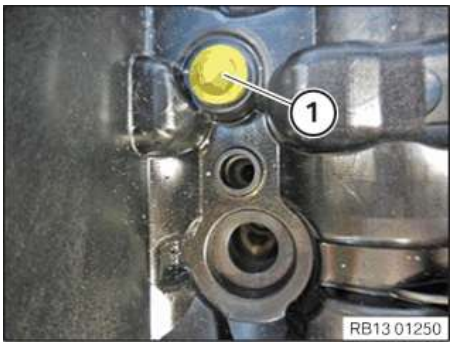
▸ **Check the placement of the clamping claw**

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Tighten down screw (1).

  The clamping claw is positioned on the bolt (1).

Clamping claw facing to cylinder head cover

M6		Tightening torque	10 Nm

▸ **Prepare the injector for installation**

cardiagn.com

RISK OF DAMAGE

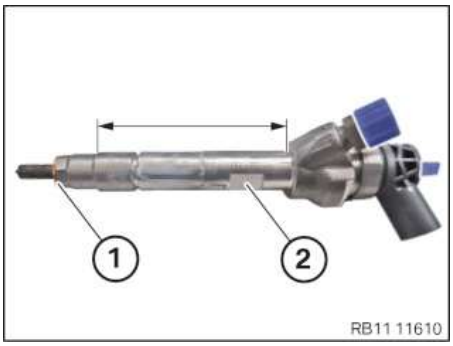
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

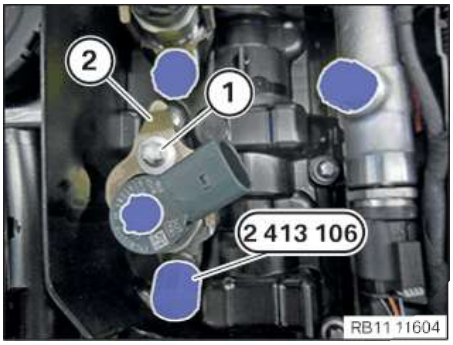
TECHNICAL INFORMATION

Lightly grease the injector shaft with high temperature-resistant grease.
For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



- Renew the copper sealing ring (1) on the injector (2).

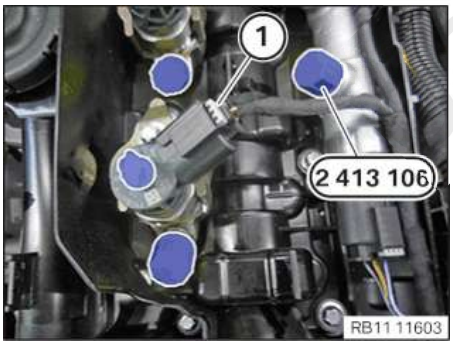
  Parts: Copper sealing ring
- Lightly grease the injector in the marked area with heat-resistant grease before installing the injector (2) in the injector shaft.



- Insert and install the injector .
- Insert and install the clamping claw (2).
- Tighten down screw (1).

Injector to cylinder head cover

M8	Tightening torque	8 Nm
	Angle of rotation	120 °



- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

▸ **Replacement: Perform injection quantity compensation**

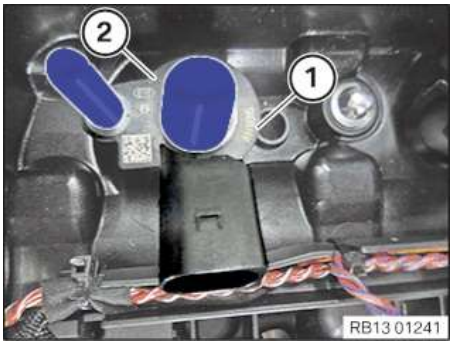
TECHNICAL INFORMATION

If the DDE control unit or an injector has been replaced, it will also be necessary to carry out injection quantity compensation. The adjustment value (7-position letter/number code) is engraved on each injector.

NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

cardiagn.com

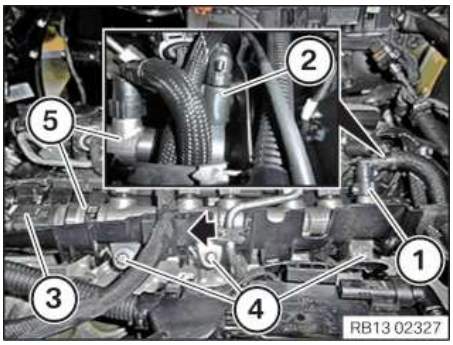


- Read off the adjustment value (1) on the new injector (2).



- Connect diagnosis system:
  - Vehicle identification
  - Function selection
  - Service functions
  - Digital diesel electronics (DDE)
  - Adjustment of injectors
  - Testing schedule
- Start service function with the right arrow button.

89 – Installing the rail



- Insert and install the rail (5).
- Tighten the screws (4).

Rail to cylinder head cover

M8		Tightening torque	19 Nm

- Install and lock cable clip (arrow).

  The cable clip (arrow) must engage audibly.
- Connect and lock the connector (3) at the rail pressure sensor.

  The connector (3) must engage audibly.
- Connect and lock the connector (2) at the rail pressure regulating valve.

  The connector (2) must engage audibly.
- Feed in fuel return line (1) and install.

  The fuel return line (1) must audibly engage.

90 – Installing high pressure line between rail and high pressure pump

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

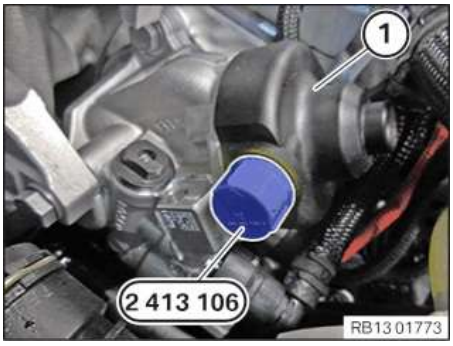
Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

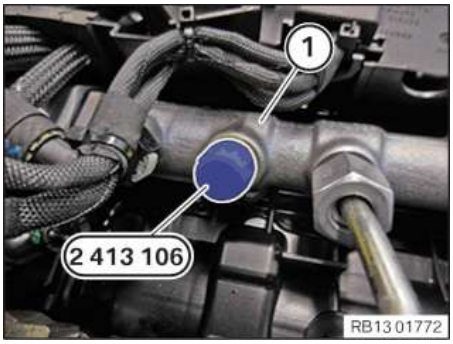
cardiagn.com

TECHNICAL INFORMATION

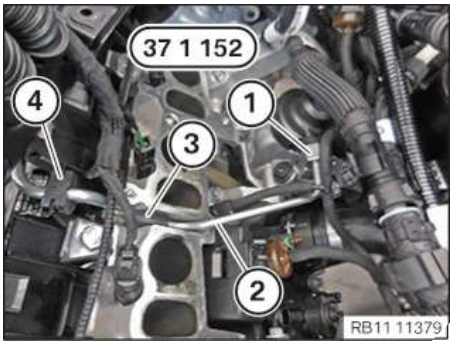
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Feed out and remove special tool on the high pressure pump (1).



- Feed out the special tool on the rail (1) and remove.



- Insert and install the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).
- Hand-tighten the union nut (1) on the high pressure pump.



- Hand-tighten the union nut (1) on the rail.

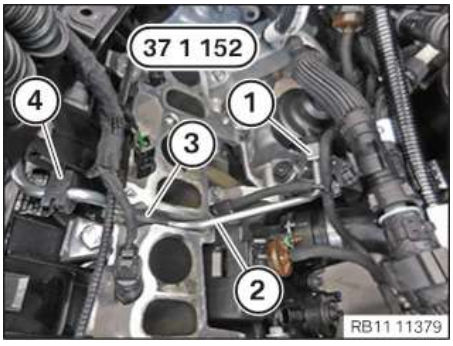
TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten the union nut (1) with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm



- Make sure that the high pressure line (2) is correctly installed with the abrasion protection (3) and the rubber mount (4).

TECHNICAL INFORMATION

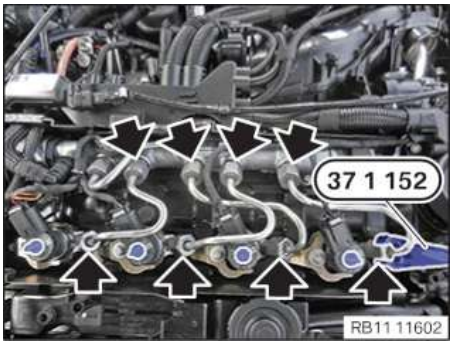
Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten union nut (1) on the high pressure pump with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm

cardiagn.com



- Remove the special tool from all cable connections.
- Feed in and install the high pressure lines (arrows).
- Hand-tighten the high pressure lines (arrows).

TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

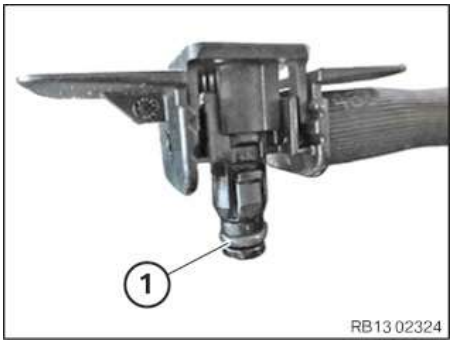
- Tighten the high pressure lines (arrows) with the special tool .

High pressure lines between injector and rail

High-pressure pipe		Tightening torque	24.5 Nm

- Check the high pressure lines (arrows) for tightness (**visual inspection**).

92 – Attach the leakage oil line on the injectors

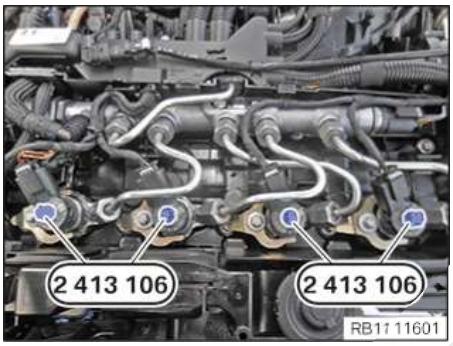


- **Version A:**

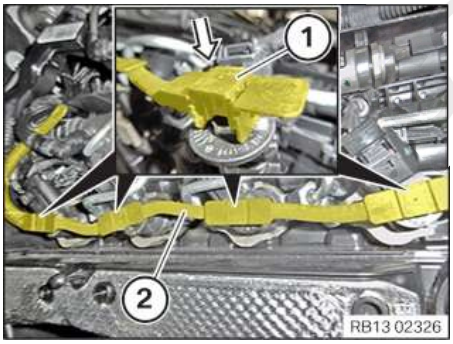
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

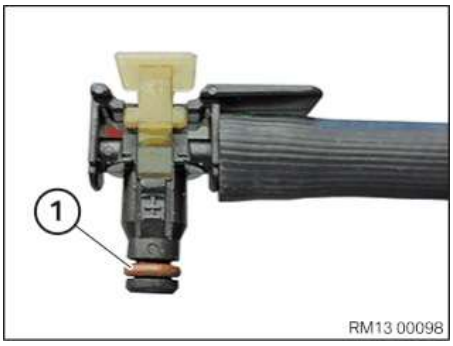
  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.



- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.



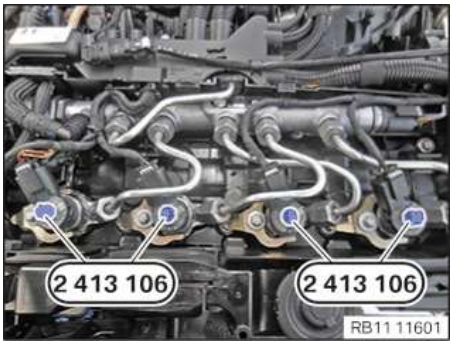
- **Version B**:

  Check sealing ring (1) for damage, renew leakage oil line if necessary.

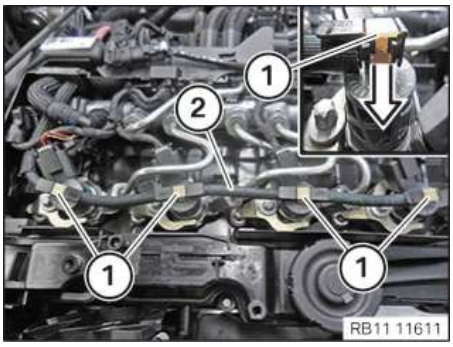
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.

cardiagn.com

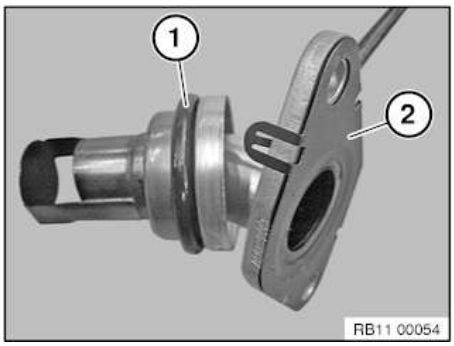


- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.

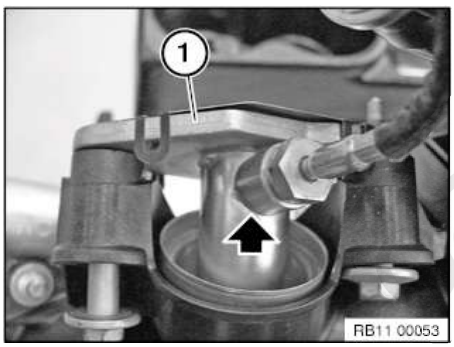
93 – Installing the intake plenum



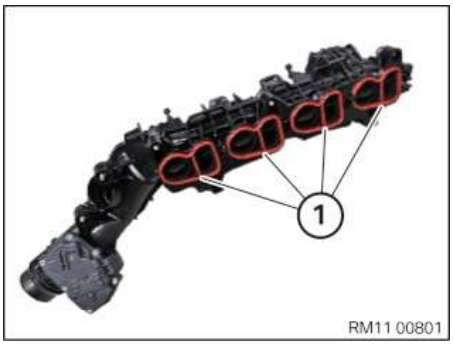
- Renew O-ring (1).

  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

  Parts: Gasket
- Position the seal (2) and clip it in.



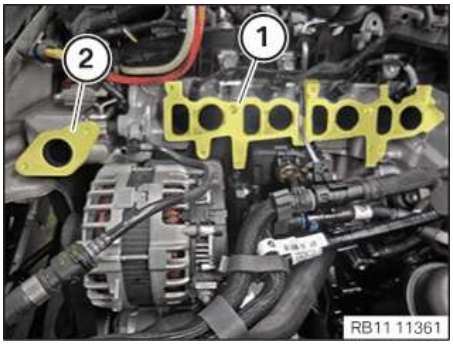
- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).



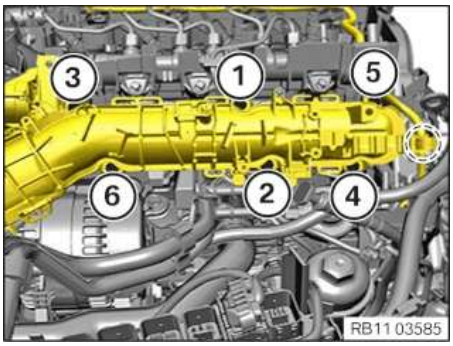
- Renew seals (1).

  Parts: Seals
- Ensure that the seals (1) are firmly mounted on the intake plenum.

cardiagn.com



- Clean connection points (1) at cylinder head.
- Clean the connection point (2) on the exhaust-gas recirculation cooler.

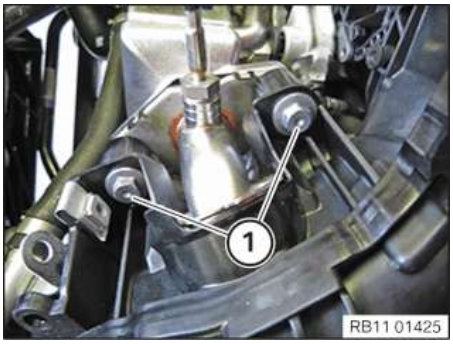


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

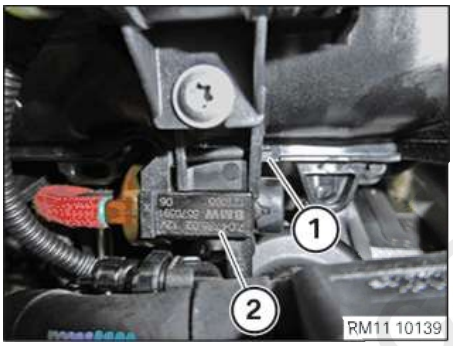
- Attach the wiring harness and fuel lines in the marked area on the intake plenum.



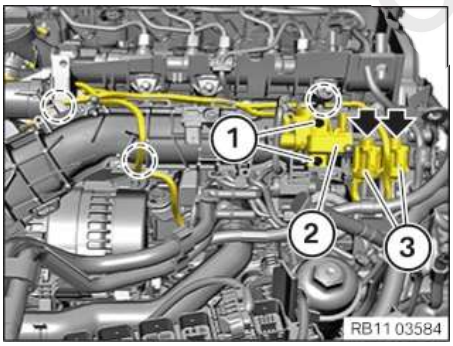
- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm



- Install electric changeover valve (2) from the left to the right in the holder on the intake plenum.
  The lock (1) must audibly engage.



- Install intake plenum electric changeover valve (3) on the intake plenum.
  The locks (arrows) must engage audibly.
- Position the electric changeover valve (2) on the intake plenum.
- Tighten the screws (1).

Electric changeover valve to intake plenum

TS6x20		Tightening torque	5 Nm

- Fasten the vacuum hoses on the intake plenum in the marked areas.



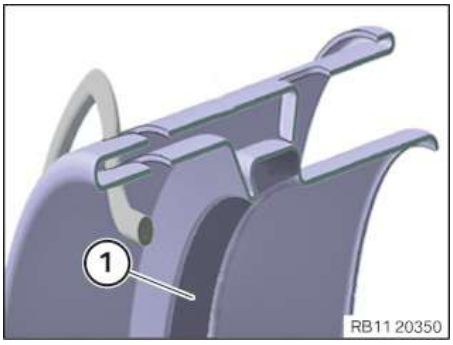
- Check the seal (1) for damage, and renew if necessary.

gardiagn.com

▸ **Replacing damaged seal**

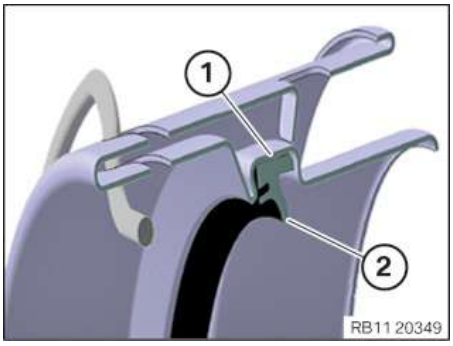
TECHNICAL INFORMATION

Do not use pointed or sharp-edged tools for the installation and/or removal.



- Remove damaged seal.
- Clean gasket groove (1) with a dry towel.

  The gasket groove (1) must be clean.



- Renew gasket.

  Parts: Gasket
- Install seal dry without lubricant or mounting agent.

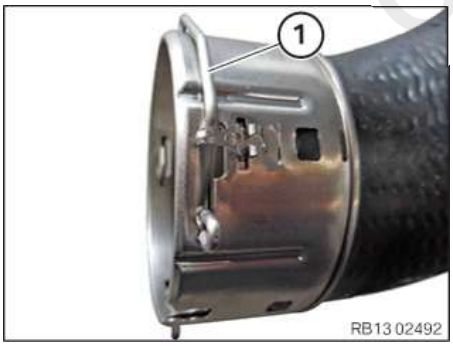
TECHNICAL INFORMATION

Incorrect assembly is possible. Ensure correct installation position.

- Feed in and install the seal.
- Make sure the seal is correctly installed in the gasket groove (1).
- Make sure that the sealing lip (2) is directed inwards as shown.



- Connect the pressure pipe to the throttle body until the locks (1) engage on both sides.



- Check that the locks (1) are correctly seated on the pressure pipe.

94 – Partially securing the wiring harness section on the intake plenum

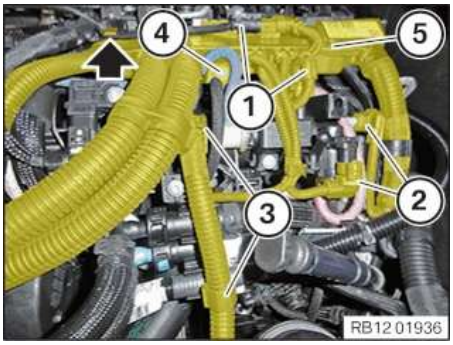
RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

- Route all cables without abrasions, do not trap and crush.

cardiagn.com



- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

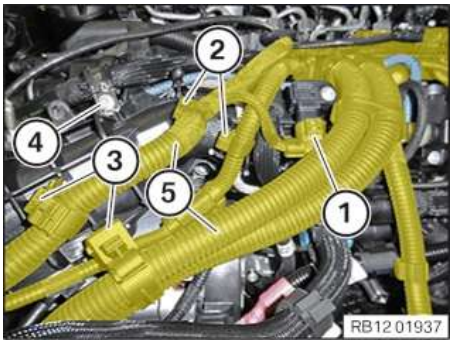
Wiring harness section to manifold

TS5x20		Tightening torque	3,6 Nm

- Secure clamps (3).
- Connect connectors (2) and lock.

  The connectors (2) must engage audibly.
- Secure the line at clamp (Arrow).
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



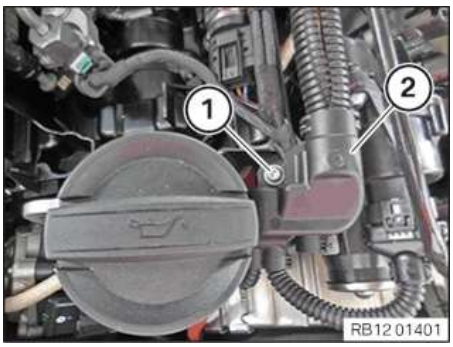
- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

Standard screw connection 4 Nm

Oval-head screw		Tightening torque	4 Nm

- Secure clamps (3).
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



- Guide in the wiring harness section (2) and install.
- Tighten down screw (1).

Wiring harness section to cylinder head cover

TS5x20		Tightening torque	3,6 Nm



- Connect connectors (1) and lock.

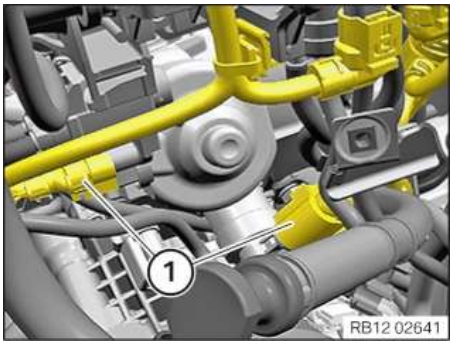
  The connector (1) must engage audibly.



- Connect the connector (1) and lock it.

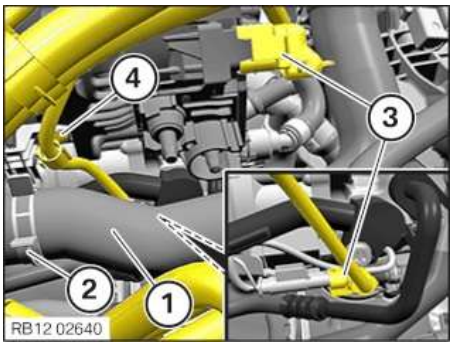
  The connector (1) must engage audibly.

cardiagn.com



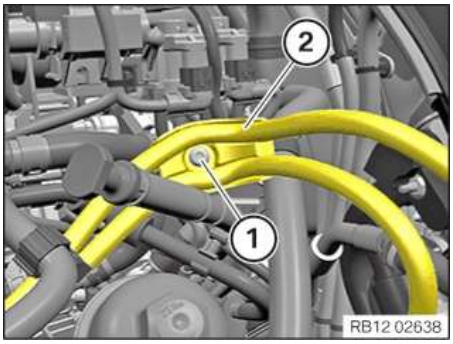
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



- Secure the clamp (4).
- Connect connectors (3) and lock.

  The connectors (3) must engage audibly.
- Feed the coolant line (1) into the holder (2) and install it.



- Feed in and position the positive battery cables (2) .
- Tighten down screw (1).

Standard screw connection M6

M6		Tightening torque	8 Nm



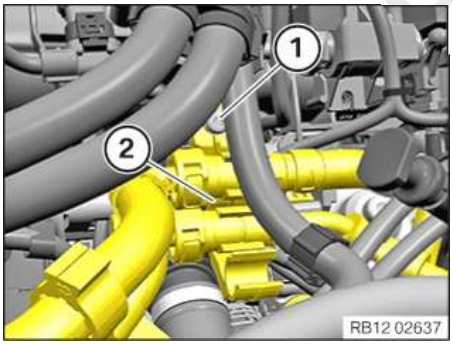
- Feed in and install the positive battery cable (4).
- Feed in and position the positive battery cables (4) .
- Renew the nuts (3) and (2).

  Parts: Nuts
- Tighten nuts (3) and (2).

Battery positive lead on the starter motor generator

M8		Tightening torque	19 Nm

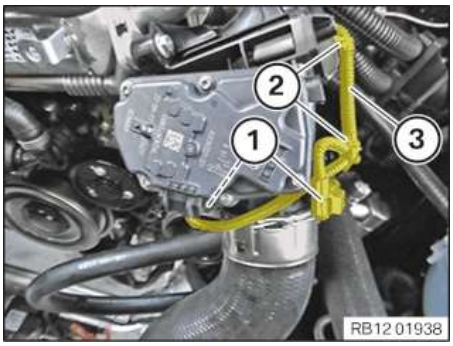
- Guide in and install the lid (1).



- Insert and install the holder (2).
- Tighten down screw (1).

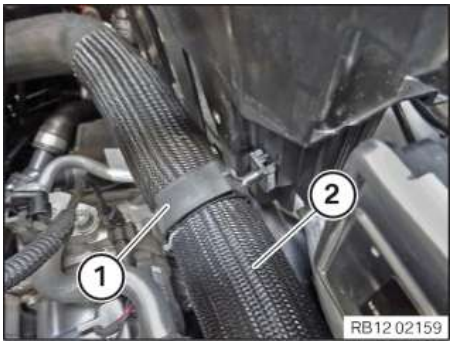
Holder on intake plenum

TS6X20		Tightening torque	5 Nm



- Guide in the wiring harness section (3) and install.
- Secure clamps (2).
- Connect connectors (1) and lock.

cardiagn.com



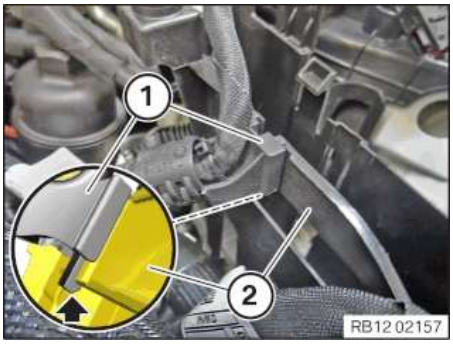
- Feed in and install coolant line (2).
- Lock holder (1).

  The holder (1) must engage audibly.



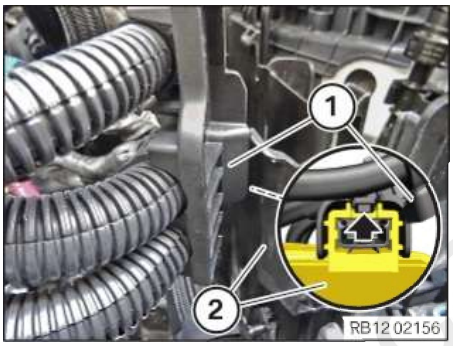
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.



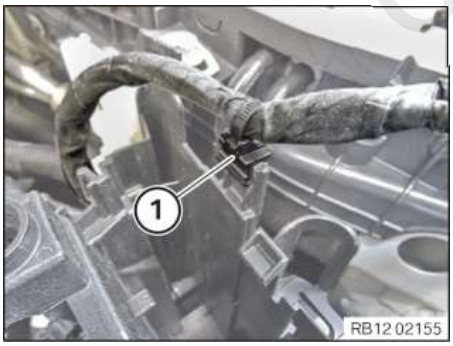
- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.



- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.



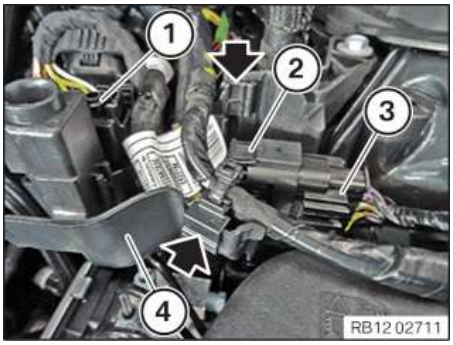
- Secure clamps (1).



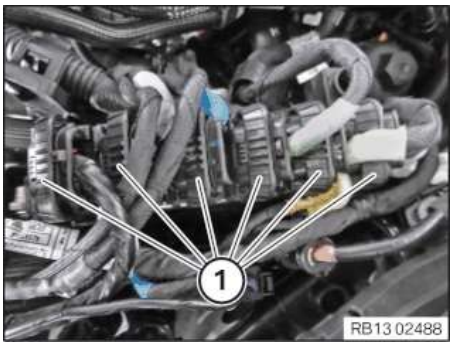
- Feed in and install the connector (1).

  The connector (1) must engage audibly.

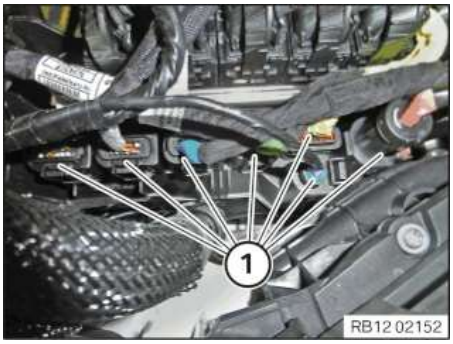
cardiagn.com



- Connect connector (3) to control unit holder (4) and lock it.
  The connector (3) must engage audibly.
- Connect connectors (2) and lock.
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.
  The connector (1) must engage audibly.
- Secure the clamps (arrows).

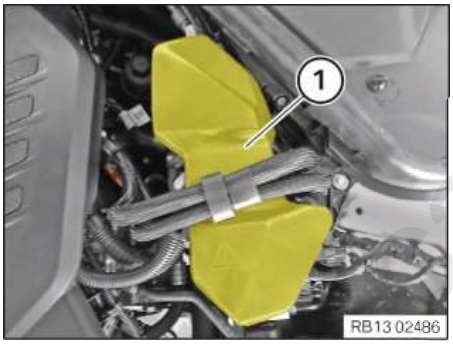


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.

95 – Install the cover for the DDE control unit

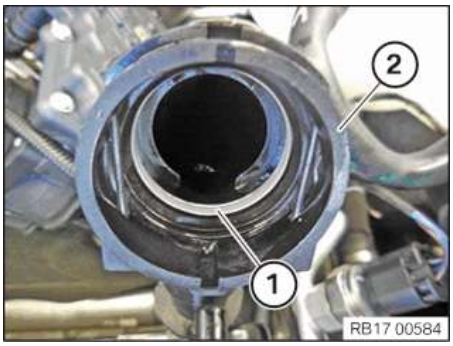


- Insert and install cover (1) into guides.

96 – Connecting the coolant lines

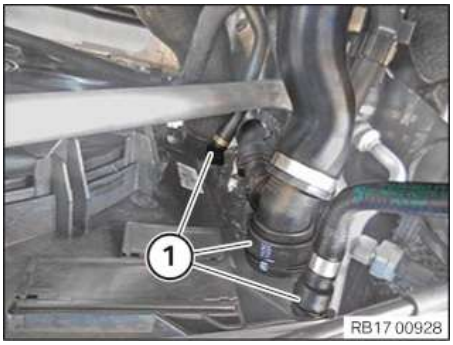
TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.



- Check the sealing ring (1) of the coolant line (2) for damage and renew where required.

cardiagn.com

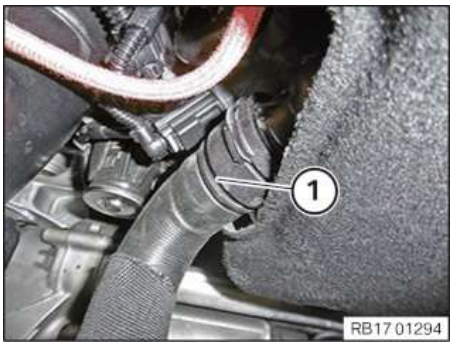


NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

- Connect and lock the coolant lines (1).

  The coolant lines (1) must engage audibly.



- Connect and lock coolant line (1).

  The coolant line (1) must audibly engage.

97 – Installing the high-pressure stage exhaust turbocharger and the low-pressure stage turbocharger

CAUTION

Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

RISK OF DAMAGE

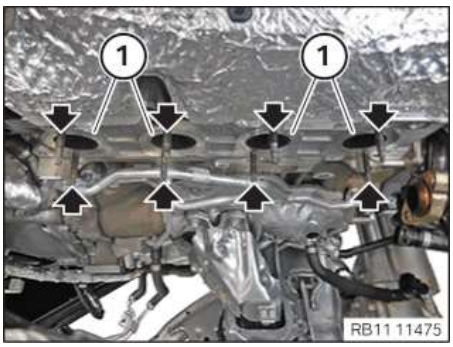
Damage to the surface.

The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.

TECHNICAL INFORMATION

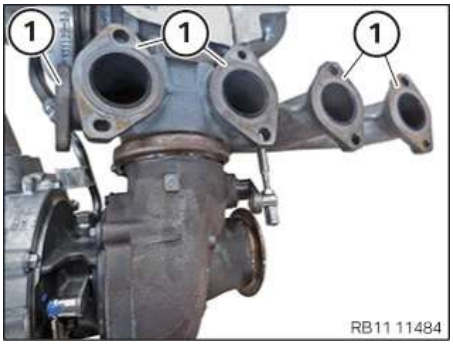
The sealing surfaces must be free from oils, grease and cleaning agents.



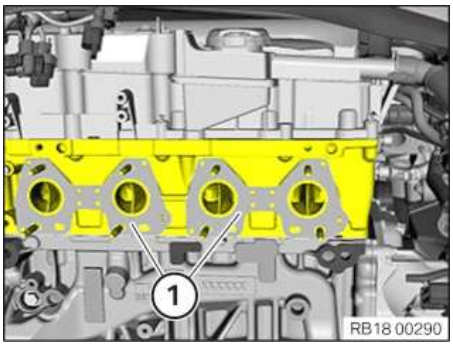
- Check the stud bolts (arrows) on the cylinder head for **correct** fit.
- Clean the connection points (1) with the special tool 0 495 102 (11 4 470).
- Renew gaskets.

  Parts: Seals

cardiagn.com



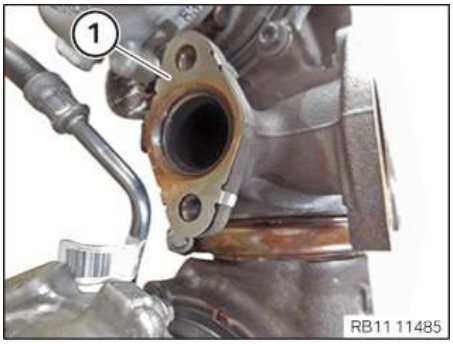
- Clean the connection points (1) on the exhaust manifold with the special tool 0 495 102 (11 4 470).



TECHNICAL INFORMATION

The **coated side** of the seal must be on the side of the exhaust manifold.

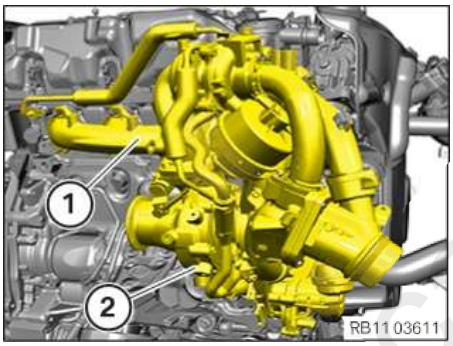
- Insert and install the gaskets (1).



- Renew the seal (1).

  Parts: Gasket

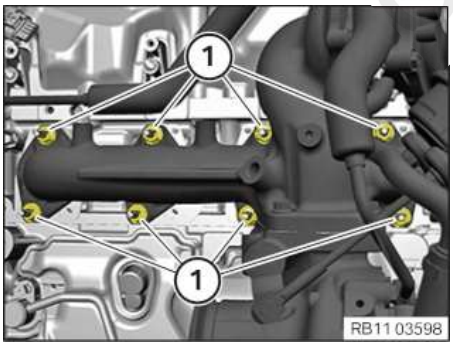
- Insert and install the seal (1).



TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

- Feed in the exhaust manifold (1) with the high-pressure stage exhaust turbocharger and the low-pressure stage turbocharger (2) from the top front and install.



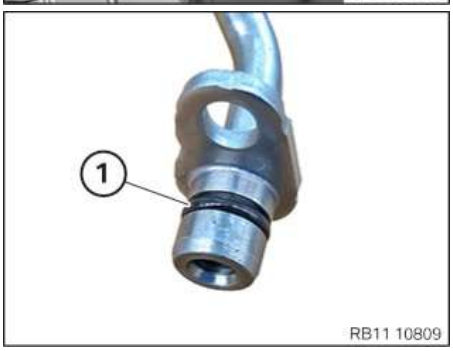
- Renew nuts (1).

  Parts: Nuts

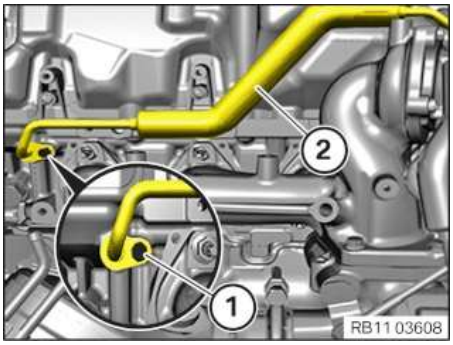
- Tighten the nuts (1) evenly from the inside out.

Exhaust manifold to cylinder head

M7	**If necessary, renew loose stud bolts.**	Tightening torque	11 Nm
	Renew nuts.	Tightening torque	13 Nm



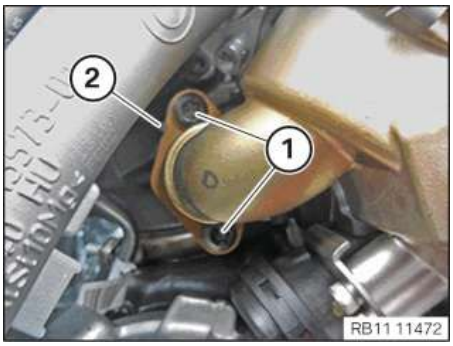
- Check the seal (1) for damage, if necessary, renew the oil feed line.



- Feed in and install the oil feed line (2) for the high-pressure stage exhaust turbocharger.
- Tighten down screw (1).

Oil feed line on cylinder head

M6x12		Tightening torque	8 Nm

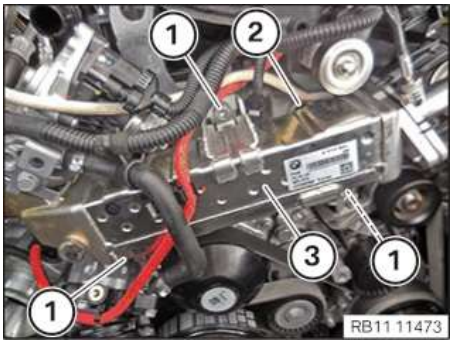


- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

M8x28	Replace screws	Tightening torque	32 Nm

- Ensure that seal (2) is installed.



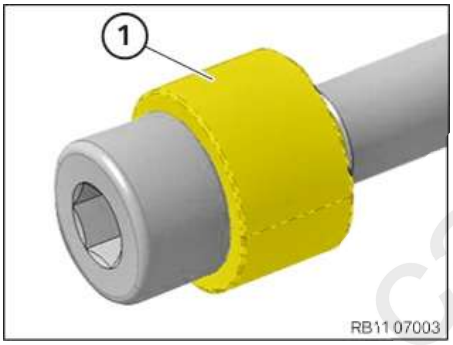
- Position the exhaust-gas recirculation cooler (3).
- Make sure the pipe neck (2) is fitted correctly.
- Tighten the screws (1).

Exhaust-gas recirculation cooler to cylinder head

M8x20 / M8x28		Tightening torque	19 Nm

Check

- Check whether the screws **with the** sleeves (1) (10 mm) are available.



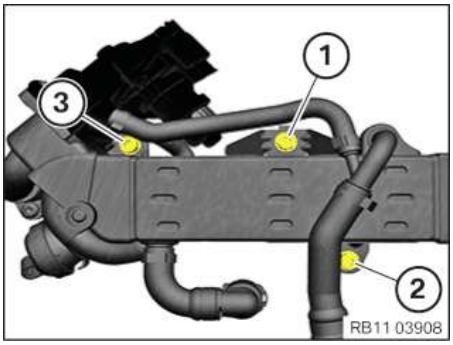
Result

» Screws **without** sleeves (1) are available.

Measure

- Renew screws.

  Parts: Screws (part number 9 886 429)

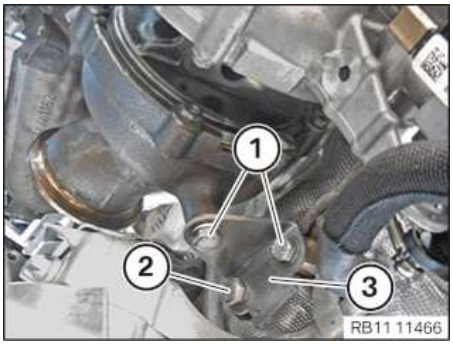


- Tighten the screws (1) to (3).

Exhaust-gas recirculation cooler to cylinder head

M8x20 / M8x28		Tightening torque	19 Nm

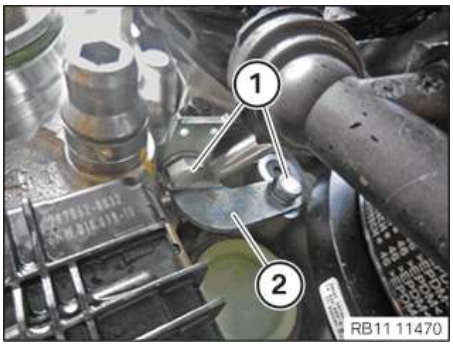
cardiagn.com



- Tighten the bolts (1) and (2) on the bracket (3).

Exhaust turbocharger low-pressure stage to crankcase

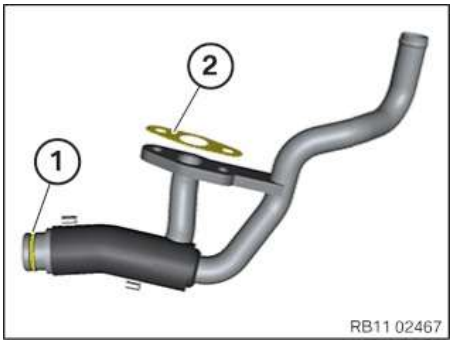
M8X16		Tightening torque	22 Nm



- Insert and install the holder (2).
- Tighten the screws (1).

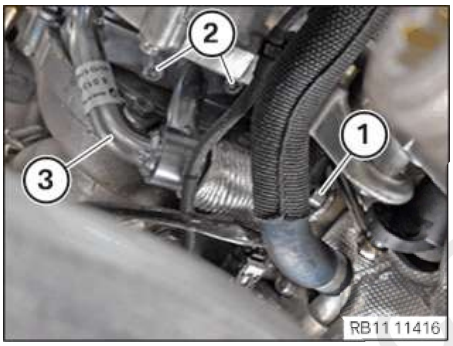
Exhaust turbocharger low-pressure stage to crankcase

M8X16		Tightening torque	22 Nm



- Renew the gasket (2).

  Parts: Gasket
- Check the O-ring (1) for damage and renew the oil return line as needed.



- Install oil return line (3) into crankcase.
- Position oil return line (3) with the seal on the low-pressure stage exhaust turbocharger.
- Tighten the screws (2).

Oil return line to turbocharger

M6x12	Renew gasket.	Tightening torque	8 Nm

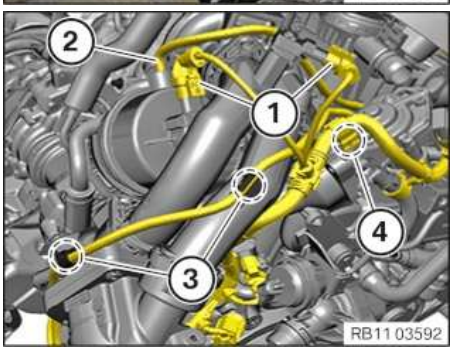
- Install the bolt (1).



- Tighten the screws of the oil return line on the crankcase from the right wheel arch.

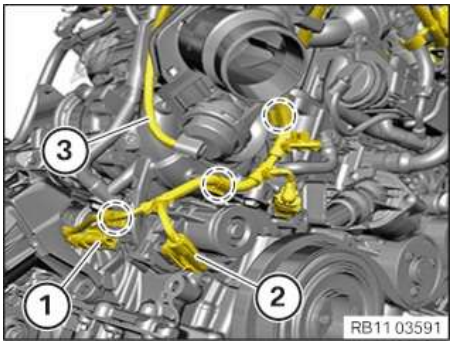
Oil return line to crankcase

M6x12	Check gasket. Renew the seal or line if necessary.	Tightening torque	8 Nm



- Secure the vehicle wiring harness in area (4) to the exhaust-gas recirculation cooler.
- Secure the vacuum hose in the marked areas (3) to the exhaust turbochargers.
- Connect vacuum hose (2).
- Connect all connectors (1) and lock audibly.

carmanualsgn.com



- Connect vacuum hose (3).
- Secure the wiring harness in the marked areas to the exhaust turbochargers.
- Plug in the connector (2) and lock audibly.
- Secure the connector in area (1) to the holder.

98 – Installing the exhaust-gas recirculation cooler

▸ **Avoiding damage to the starter generator due to escaping coolant**

RISK OF DAMAGE

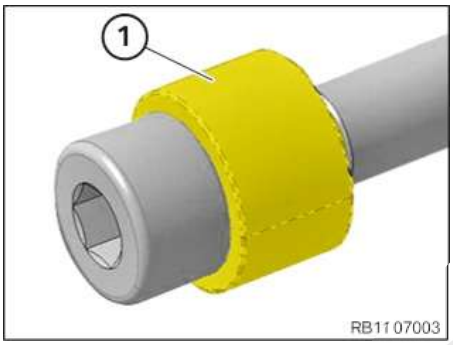
Escaping coolant on the starter generator.

Damage and operating failure of the starter generator.

- Cover the starter generator with suitable, watertight auxiliary materials.
- Close off line connections with seal plugs.
- If necessary: Flush the leaked coolant from the starter generator with at least 1 l water.

▸ **Installing the exhaust-gas recirculation cooler**

Check



- Check whether the screws **with 10mm** sleeves (1) are available.

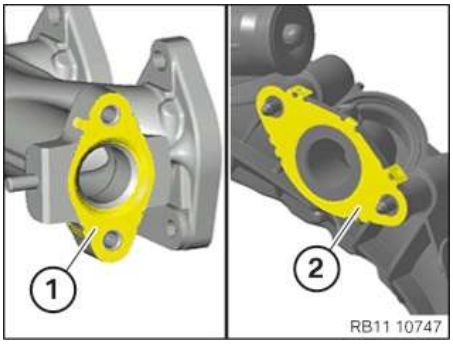
Result

» Screws **without** sleeves (1) are available.

Measure

- Renew screws.

  Parts: Screws (part number 9 886 429)

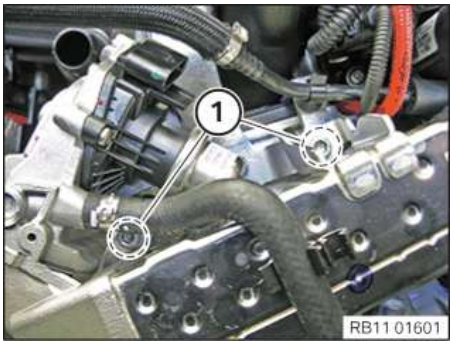


- Renew the seal (1) between the exhaust manifold and the exhaust-gas recirculation cooler.

  Parts: Gasket
- Renew the seal (2) between exhaust-gas recirculation cooler and intake air plenum.

  Parts: Gasket

cardiagn.com



TECHNICAL INFORMATION

When assembling, it is essential to observe screwing sequences and tightening torques. Non-observance of these requirements may result in leaks and damage.

- Tighten the screws (1) and subsequently release them again.

Exhaust-gas recirculation cooler to cylinder head

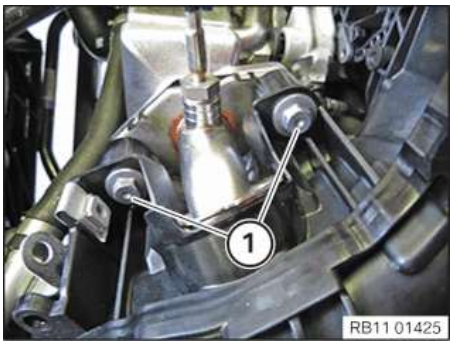
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screw (1) under the exhaust-gas recirculation cooler and then release again.

Exhaust-gas recirculation cooler to cylinder head

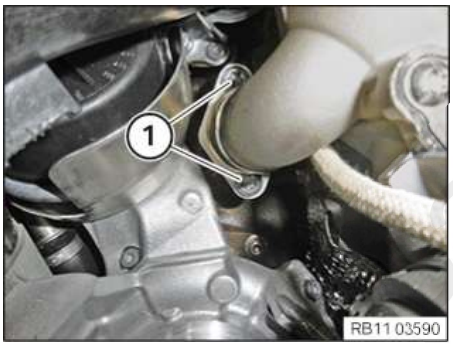
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

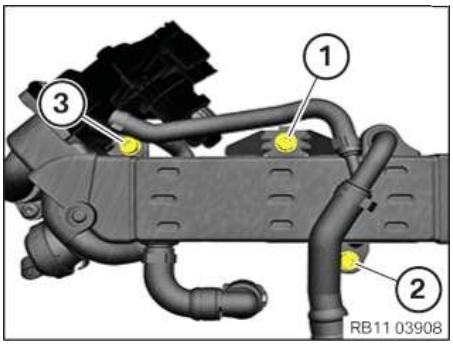
		Tightening torque	10 Nm



- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

M8x28	Replace screws	Tightening torque	32 Nm

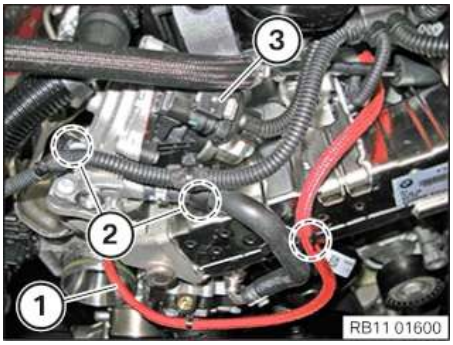


- Tighten screws in the order (1) to (3).

Exhaust-gas recirculation cooler to cylinder head

M8x20 / M8x28		Tightening torque	19 Nm

carofign.com



- Connect the connector (3) to the exhaust-gas recirculation valve.
- Attach the vehicle wiring harness to the clips (2) at the exhaust-gas recirculation valve and at the coolant line.
- Connect the vacuum line (1) to the exhaust-gas recirculation cooler and attach in the highlighted area.

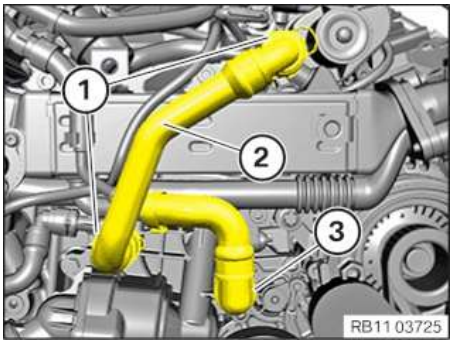


TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.

- **Version A:**

  Connect and audibly lock coolant lines (1).



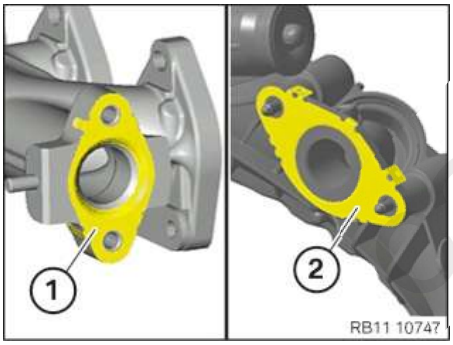
TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.

- **Version B:**

  Connect and audibly lock coolant lines (3).
- Install the coolant line (2).
- Audibly lock the locks (1).

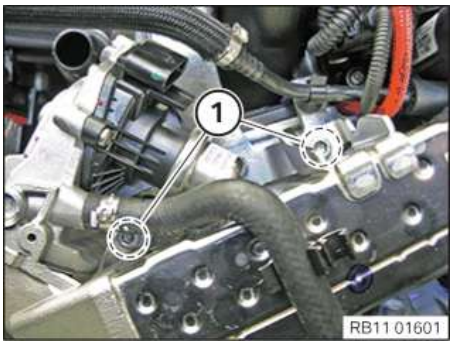
▸ **Installing the exhaust-gas recirculation cooler**



- Renew the seal (1) between the exhaust manifold and the exhaust-gas recirculation cooler.

  Parts: Gasket
- Renew the seal (2) between exhaust-gas recirculation cooler and intake air plenum.

  Parts: Gasket



TECHNICAL INFORMATION

When assembling, it is essential to observe screwing sequences and tightening torques. Non-observance of these requirements may result in leaks and damage.

- Install the exhaust-gas recirculation cooler and fasten with screws (1).
- Tighten the screws (1) and subsequently release them again.

Exhaust-gas recirculation cooler to cylinder head

M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °

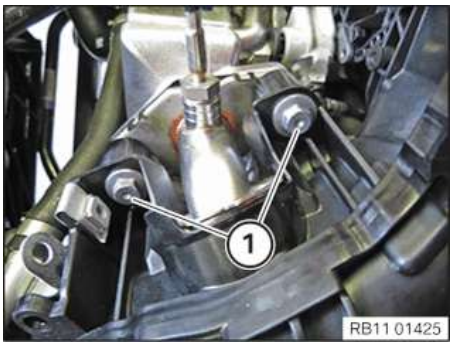
cardiagn.com



- Tighten the screw (1) under the exhaust-gas recirculation cooler and then release again.

Exhaust-gas recirculation cooler to cylinder head

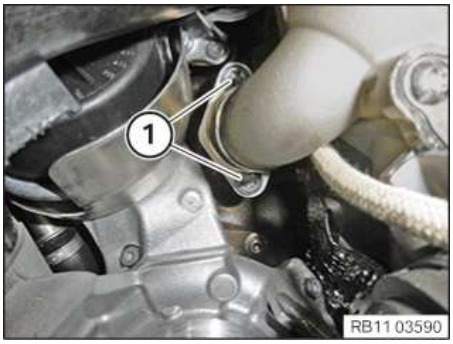
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

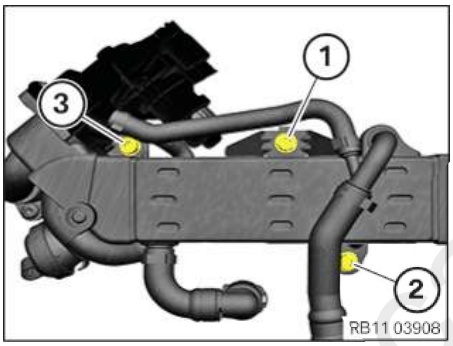
		Tightening torque	10 Nm



- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

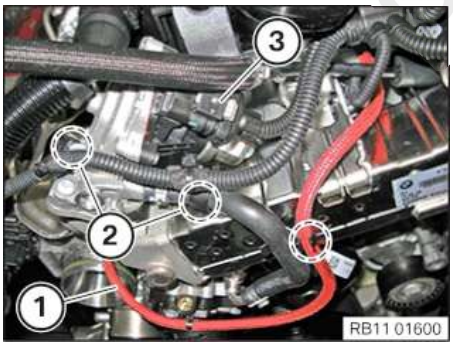
M8x28	Replace screws	Tightening torque	32 Nm



- Tighten screws in the order (1) to (3).

Exhaust-gas recirculation cooler to cylinder head

M8x20 / M8x28	Tightening torque	19 Nm



- Connect the connector (3) to the exhaust-gas recirculation valve.
- Attach the vehicle wiring harness to the clips (2) at the exhaust-gas recirculation valve and at the coolant line.
- Connect the vacuum line (1) to the exhaust-gas recirculation cooler and attach in the highlighted area.



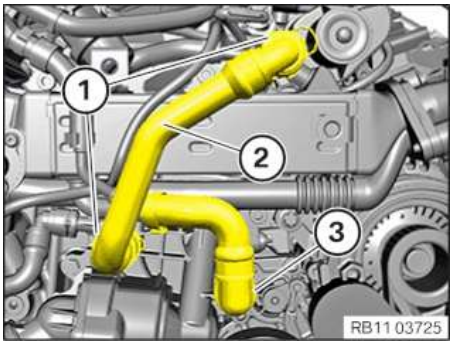
TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.

- **Version A:**

  Connect and audibly lock coolant lines (1).

cardiagn.com



TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.

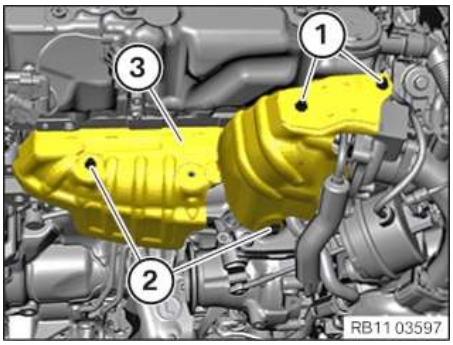
- **Version B:**

  Connect and audibly lock coolant lines (3).

  Install the coolant line (2).

  Audibly lock the locks (1).

99 – Installing heat shield



- Feed in and install the heat shield (3).
- Tighten down screws (1) and (2).

Heat shield to exhaust manifold

M6x12			10 Nm

100 – Installing the sensor bracket on the cylinder head cover

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

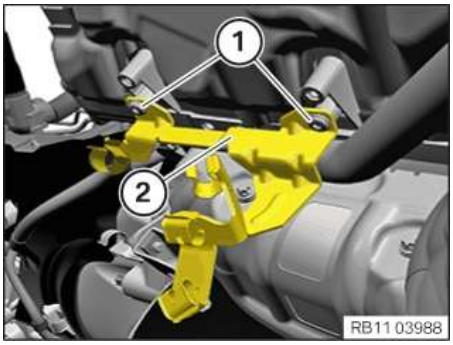
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

- Route all cables without abrasions, do not trap and crush.

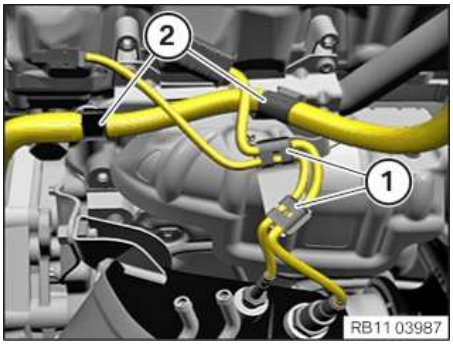


- Insert and install the holder (2).
- Tighten the screws (1).

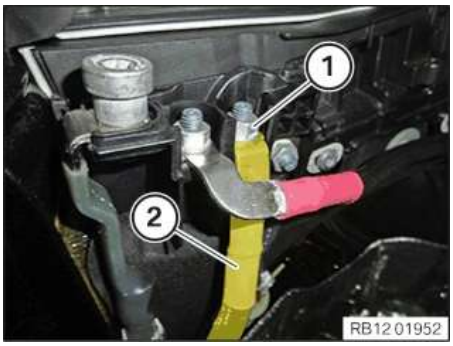
Bracket on cylinder head cover

	Tightening torque	5 Nm

cardiagn.com



- Secure the positive battery cable in the clamps (2).
- Mount the cable of the exhaust gas sensor system in the clamps (1).



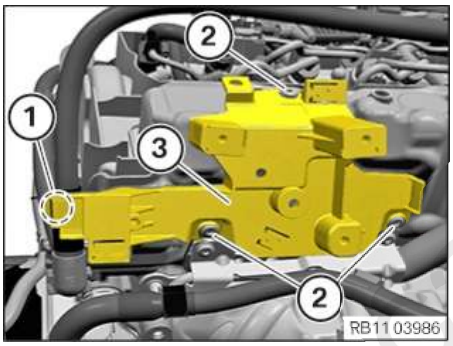
- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

Battery positive lead to battery positive terminal

M8		Tightening torque	19 Nm



- Insert and install the cover (2) in the direction of the arrow.
  The locks (1) must engage audibly.

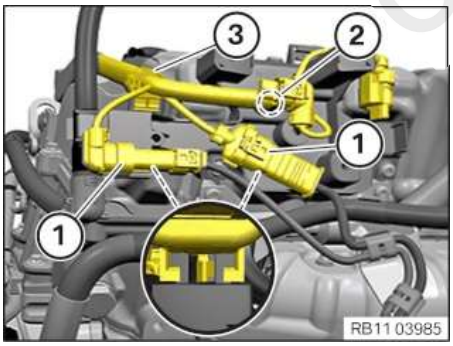


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

		Tightening torque	5 Nm

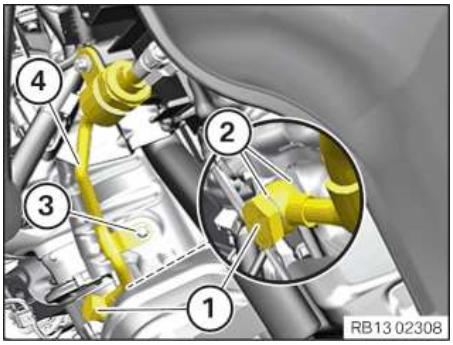
- Fasten the positive battery cable in the area (1) in the clamp.



- Feed in the wiring harness section and fasten it with the clamp (3).
- Fasten the cable clip in the area (2) in the sensor bracket.
- Feed in the connector (1) into the sensor bracket and lock it audibly.
- Plug in the connector (1) and lock audibly.

101 – Install the exhaust gas pressure pipe

cardiagn.com



- Insert and install the exhaust gas pressure pipe (4).
- Replace the sealing rings (2).

  Parts: Sealing ring
- Apply the banjo bolt (1) hand-tight.
- Tighten down screw (3).

Heat shield to exhaust manifold

M6x12		Tightening torque	10 Nm

- Tighten the banjo bolt (1).

Banjo bolt for exhaust pressure pipe to exhaust manifold

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm



- Tighten down screw (2).

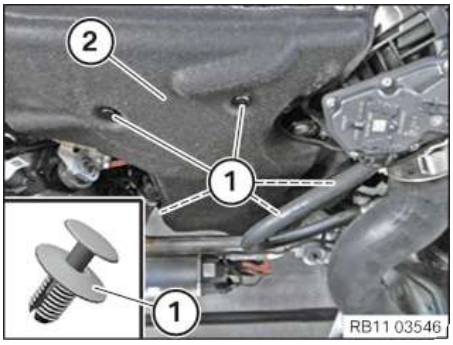
Exhaust gas pressure pipe to sensor system holder

TS6x20		Tightening torque	5,7 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

102 – Install acoustic cover for the engine, front



- Feed the acoustic cover (2) in and install.
- Secure the acoustic cover (2) with the expanding rivets (1).

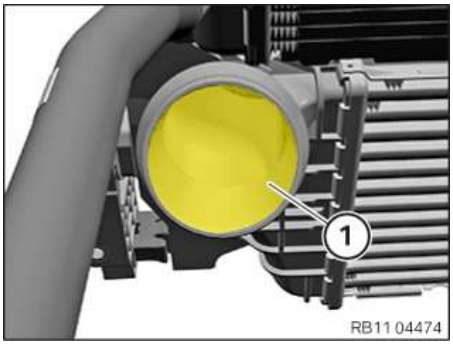
103 – Install pressure pipe between exhaust turbocharger and charge air cooler

RISK OF DAMAGE

Damage to the exhaust turbocharger.

A leak at the pressure pipe can damage the exhaust turbocharger.

- Replace the gaskets and pressure pipe if necessary.



RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

- Remove the auxiliary materials for sealing the opening (1) of the charge air cooler.

cardiagn.com



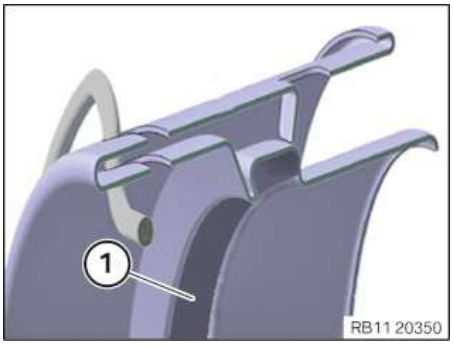
- Check the seal (1) for damage and renew if necessary.

  Parts: Gasket

▸ **Replacing damaged seal**

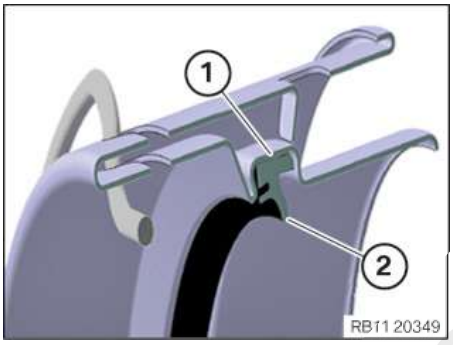
TECHNICAL INFORMATION

Do not use pointed or sharp-edged tools for the installation and/or removal.



- Remove damaged seal.
- Clean gasket groove (1) with a dry towel.

  The gasket groove (1) must be clean.



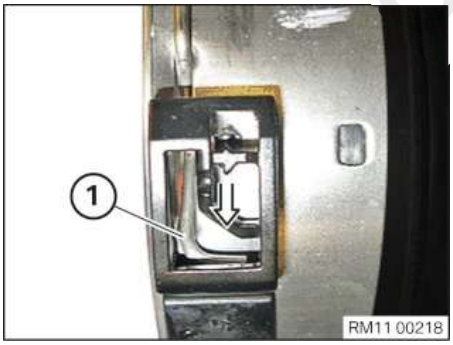
- Renew gasket.

  Parts: Gasket
- Install seal dry without lubricant or mounting agent.

TECHNICAL INFORMATION

Incorrect assembly is possible. Ensure correct installation position.

- Feed in and install the seal.
- Make sure the seal is correctly installed in the gasket groove (1).
- Make sure that the sealing lip (2) is directed inwards as shown.



- **Version A:**

  Lock the lock (1).

  The lock (1) on the pressure pipe must engage audibly.



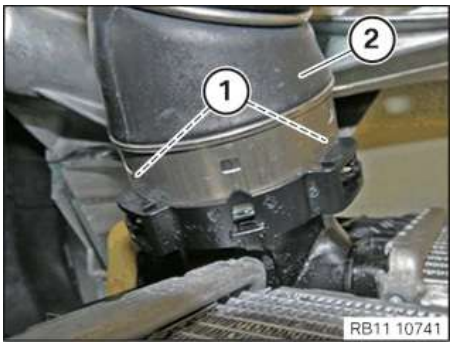
- Pay attention to the installation position:

  The pressure pipe fits on charge air cooler in one installation position only.

carmagn.com



- Install the pressure pipe (1) from the top.



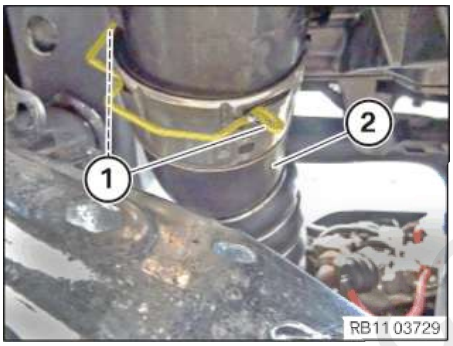
- Connect pressure pipe (2) to charge air cooler.
- Lock the lock (1) on both sides.



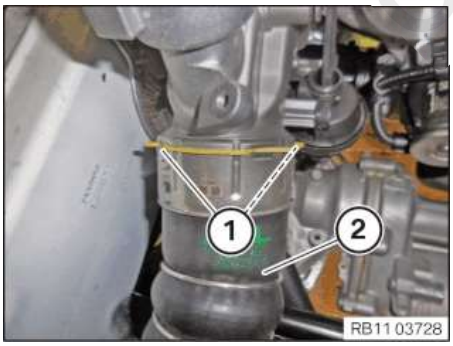
- **Version B:**

  Lock the lock (1).

  The lock (1) on the pressure pipe must engage audibly.



- Attach the pressure pipe (2) to the charge air cooler until the lock (1) engages on both sides.



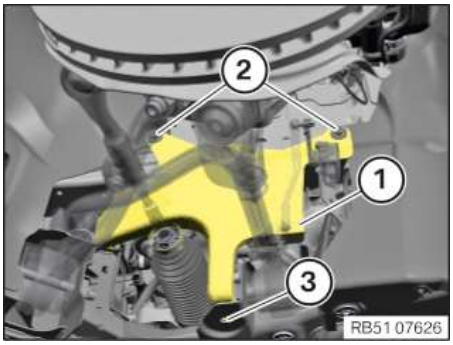
- Place the pressure pipe (2) onto the compressor bypass and ensure that the lock (1) engages audibly.

104 – Install the cover of the steering assembly

TECHNICAL INFORMATION

When tightening the screws, the cover can twist and cause chafe marks on the anti-roll bar (risk of corrosion).
Hold the cover while tightening the screws. Then check the position of the cover.

cardiagn.com



- Position the cover (1).
- Tighten down screws (2) and (3).

Cover, steering unit

Screw		Tightening torque	3 Nm

105 – Installing the front right wheel

▸ **Mounting the wheel**



TECHNICAL INFORMATION

The contact surface between the brake disc and the wheel rim must be clean and free from oil and grease. There is otherwise a risk of the wheel becoming loose at a later time.

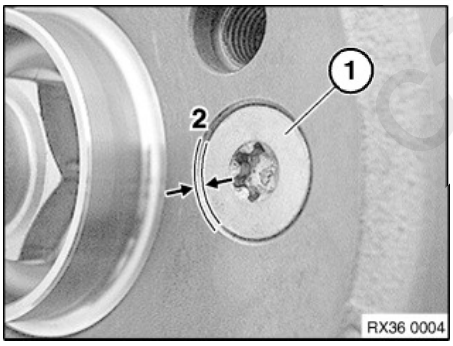
- Remove dirt, grease residues and corrosion from the contact surface with a drill and the special tool 2 344 011.

  Do not operate special tool 2 344 011 with an impact screwdriver.
- Degrease the contact surfaces with the universal cleaner (see BMW Group Parts).
- In the event of grease residue in the area of the wheel bolt holes, remove and clean the brake disc.



- Remove dirt, grease residues and corrosion from the contact surface with a drill and the special tool 2 344 011.

  Do not operate special tool 2 344 011 with an impact screwdriver.
- Degrease the contact surfaces with the universal cleaner (see BMW Group Parts).



- Check that the mounting bolt (1) for the brake disc is securely seated.

  The mounting bolt (1) for the brake disc **may not** protrude on the contact surface (2) between the brake disc and the wheel rim.

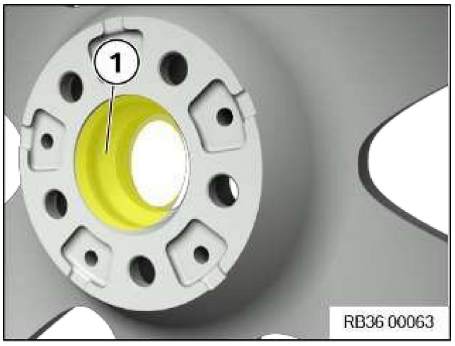
Brake disc to front wheel hub

M8	Renew screw.	Tightening torque	16 Nm

Brake disc to rear wheel hub

M8	Renew screw.	Tightening torque	16 Nm

cardiagn.com



TECHNICAL INFORMATION

Wheel hubs and wheel centering on the models G80, G82 and G83 **must not** be greased.

- Thinly grease the wheel centring (1) in the wheel rim.

Expendable materials

Brake block paste * TU = Trade Unit. TU numbers cannot be ordered! For invoicing purposes only.	3 g, Bag	83192158851
	100 g, Tube	83192158852
	5 g, TU*	83230140233



TECHNICAL INFORMATION

Wheel hubs and wheel centering on the models G80, G82 and G83 **must not** be greased.

- Apply a thin layer of grease to the front and rear wheel hubs (1) to protect against corrosion.

Expendable materials

Brake block paste * TU = Trade Unit. TU numbers cannot be ordered! For invoicing purposes only.	3 g, Bag	83192158851
	100 g, Tube	83192158852
	5 g, TU*	83230140233



TECHNICAL INFORMATION

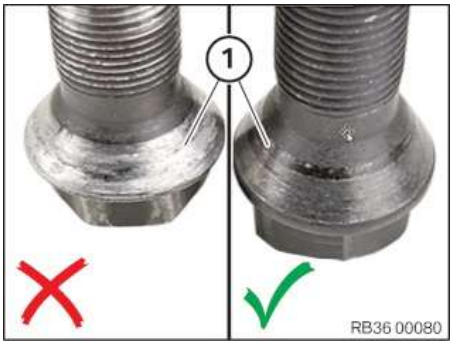
A wheel lift is recommended for easier wheel removal and installation without exertion (see Retailer Equipment Catalogue).

- **In vehicles with M Carbon ceramic brake: The wheel lift must be used to install the wheel.**

  This process is intended to prevent damage to the brake disc.

Check

- **Check wheel bolts for wear.**



cardiagn.com

Result

» Places (> 30%) of the bearing surfaces (1) of the taper on the screw head show a silver wear.

Measure

- Replace wheel bolts.

  Parts: Wheel bolts



TECHNICAL INFORMATION

Never use impact screwdrivers or electric screwdrivers to screw in and tighten the wheel bolts.

The wheel rim must rest uniformly against the brake disc.

In the case of non-original BMW wheel bolts/wheel rims, it may be necessary to retighten the wheel bolts on account of setting properties (refer to the documentation from the manufacturer).

Do not apply oil to new wheel bolts.

- Renew the corroded wheel bolts (arrows).

  Parts: Wheel bolts
- Clean the wheel bolts (arrows).
- Check the wheel bolts (arrows) and threads for damage, renew the wheel bolts (arrows) if necessary.
- Join and tighten the wheel bolts (arrows).

Wheel bolts

M14 / SW17	Screw in wheel bolts and evenly tighten crosswise by hand in order to centre the wheel rim.	Tightening torque	140 Nm
	Tighten wheel bolts to the prescribed tightening torque with a calibrated torque wrench in a crosswise sequence.	Check	140 Nm
	Check all the wheel bolts in the same order or retighten to the prescribed tightening torque again.		

106 – Prepare for the installation of the diesel particulate filter



- Renew the V-clip (1).

  Parts: V-band clamp



- Renew gasket (1).

  Parts: Gasket

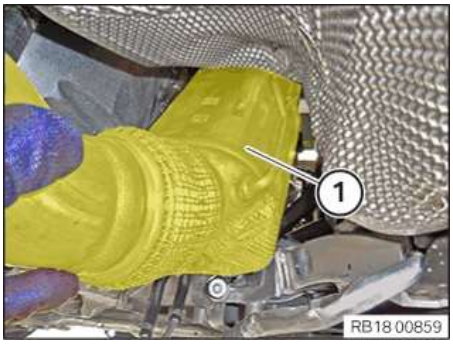
107 – Installing the diesel particulate filter

CAUTION

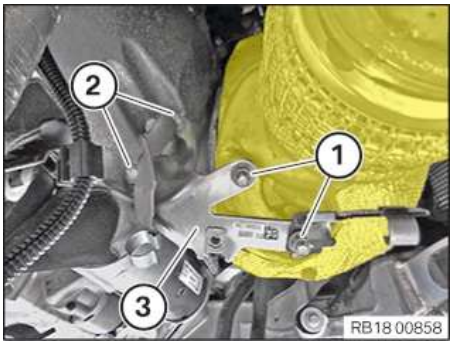
Heavy component.

Heavy components can lead to injury or damage.

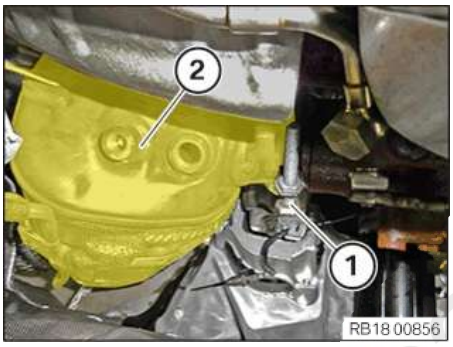
- Remove and install heavy components with the aid of another person/other persons.



- Insert and install the diesel particulate filter (1).



- Insert and install the holder (3).
- **Hand-tighten** the bolts (2).
- Apply the nuts (1) **hand-tight**.

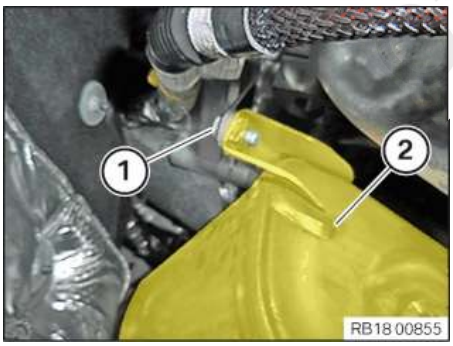


- Renew the V-clip (1).

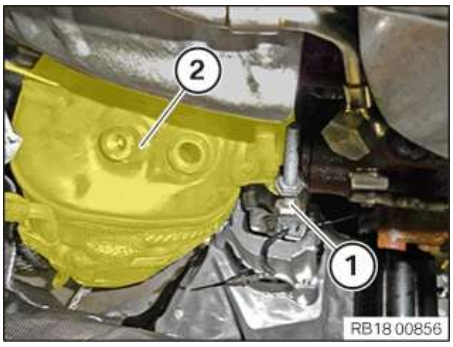
  Parts: V-band clamp
- Feed in and install V-band clamp (1).

Note: Make sure that the seal between the diesel particulate filter and the exhaust turbocharger is installed correctly.

- Position the diesel particulate filter (2) on the exhaust turbocharger .
- Position V-clip (1).
- Apply the V-clip (1) **hand-tight**.



- Feed in screw (1) on the holder of the diesel particulate filter (2) and tighten **hand-tight**.

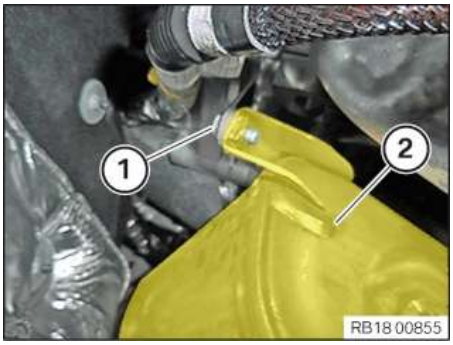


- Tighten the V-clip (1) of the diesel particulate filter (2).

Diesel particulate filter V-clip to exhaust turbocharger

V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

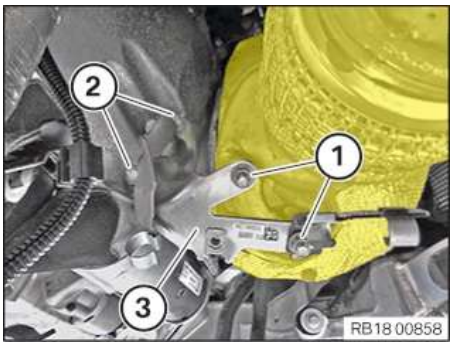
carmanualsonline.com



- Tighten the bolt (1) on the bracket of the diesel particulate filter (2).

Bracket to diesel particulate filter top

M8		Tightening torque	19 Nm



- Tighten the screws (2) on the holder (3).

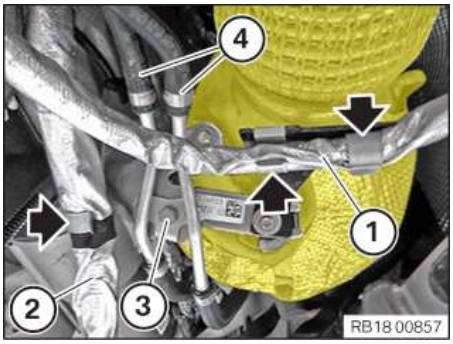
Bracket to transmission for diesel particulate filter holder bottom

M8X20		Tightening torque	19 Nm

- Tighten the nuts (1) on the holder (3).

Lower holder to diesel particulate filter

M8		Tightening torque	19 Nm



- Thread in and install coolant line (4).
- Tighten down screw (3).

Coolant lines for SCR metering module

M6X16		Tightening torque	8 Nm

- Secure the positive battery cable (2) of the starter motor at the clamp (arrow).
- Fasten the metering line (1) on the clamps (arrows).

108 – Installing the nitrogen oxide sensor upstream of SCR catalytic converter

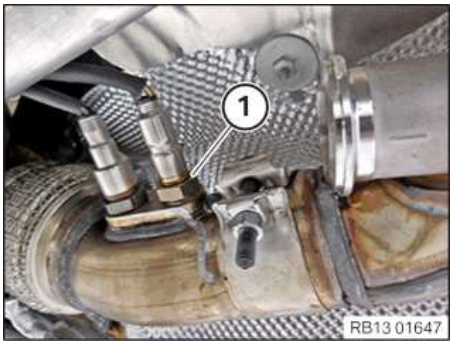
RISK OF DAMAGE



Damage to the nitrogen oxide sensor.

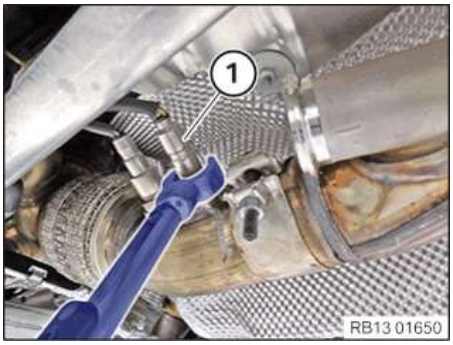
Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



- Feed in and install the nitrogen oxide sensor (1).

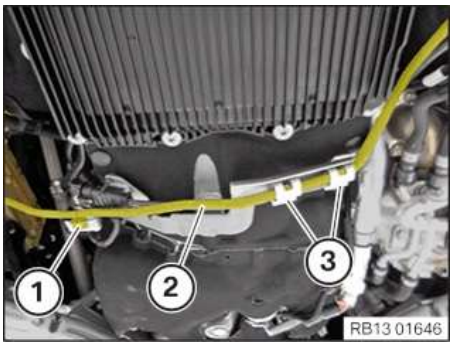
cardiagn.com



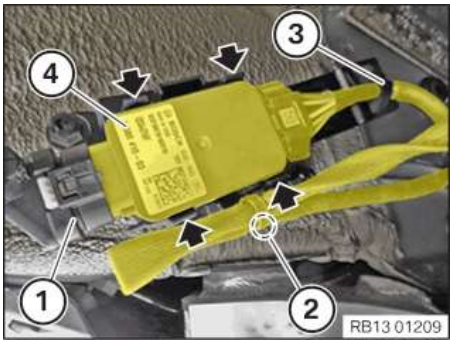
- Tighten the nitrogen oxide sensor (1) using commercially available tools.

Nitrogen oxide sensor before SCR catalytic converter

Sensor		Tightening torque	50 Nm



- Secure the cables (2) to the clamps (3).
- Secure clamps (1).



- Clip in the control unit (4) (arrows).
- Fasten the cable in the holder (3).
- Secure the cable holder (2).
- Plug in the connector (1) and lock audibly.

109 – Installing the monitoring oxygen sensor after the diesel particulate filter

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

TECHNICAL INFORMATION

New oxygen sensors are to be greased lightly and evenly on the thread.

For oxygen sensors that are reused, the following should be observed:

Lightly and evenly grease the oxygen sensor only on the thread. Do not clean and grease that part of the oxygen sensor which protrudes in the exhaust branch (sensor ceramics).

For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue

cardiagn.com



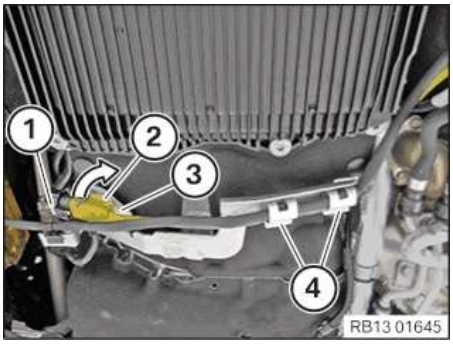
- Insert the monitoring oxygen sensor (1) and install it.



- Tighten the monitoring oxygen sensor (1) with standard tools.

Monitoring oxygen sensor

Sensor		Tightening torque	50 Nm



- Fasten the monitoring oxygen sensor to the clamps (4).
- Secure the connector (2) on the holder (3) in direction of arrow.
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

110 – Installing the exhaust system

CAUTION

Component with heavy weight.

Danger of injury!

- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

Heavy component.

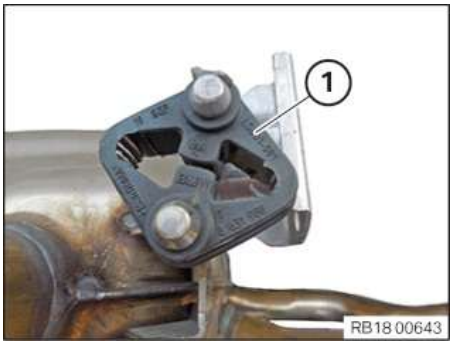
Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

TECHNICAL INFORMATION

Mount the exhaust system in voltage-free state, maintaining the tightening sequence from the rear silencer towards the exhaust manifold.

cardiagn.com

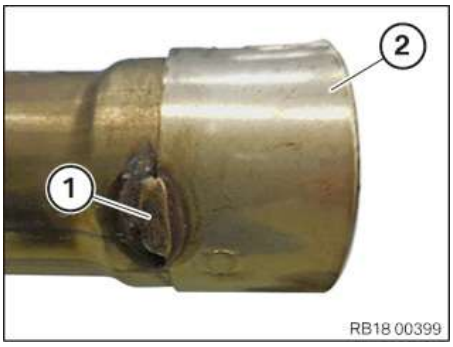


NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

- Check all the rubber mounts (1) of the exhaust system for damage.
- Replaced damaged rubber mounts.

  Parts: Rubber mount



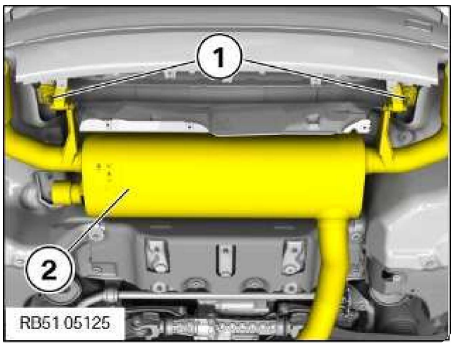
CAUTION

Swarf resulting from sawing or grinding components.

Danger of injury!

- Conduct all work in appropriate personal protective equipment only.
- Wear safety goggles and protective gloves.

- Open the weld seam (1) with a conventional tool.
- Remove the clamp (2).

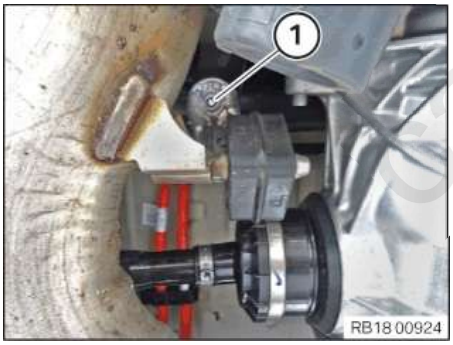


- Insert and install the exhaust system (2).
- Renew nuts (1).

  Parts: Nuts
- Tighten nuts (1).

Rear silencer to body / bumper support

M8	Replace nuts.	Tightening torque	19 Nm

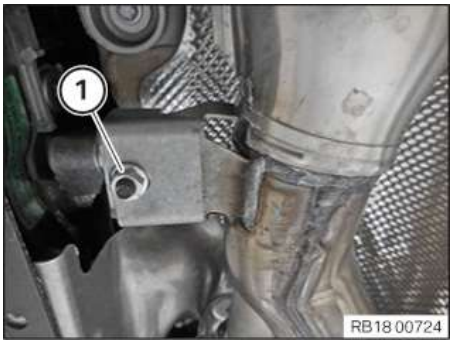


- Renew nut (1) on the rear axle support.

  Parts: Nut
- Tighten nut (1).

Exhaust system to rear axle carrier

M8 nut		Tightening torque	19 Nm

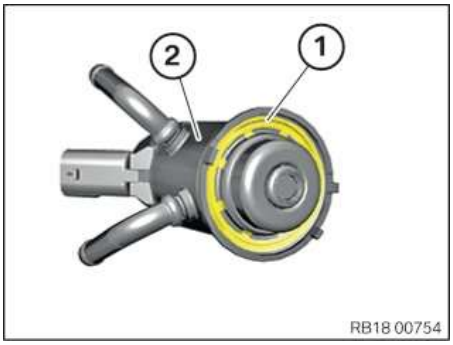


- Tighten nut (1).

Exhaust system to transmission

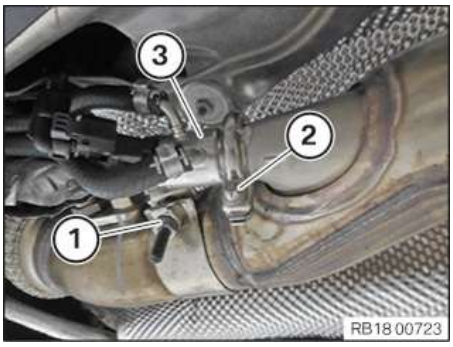
M8		Tightening torque	19 Nm

cardiagn.com



- Renew sealing ring (1) of the SCR metering module (2).

  Parts: Sealing ring



- If necessary, renew clamp (1).

  Parts: Clamp
- Tighten clamp (1).

Exhaust system to diesel particle filter

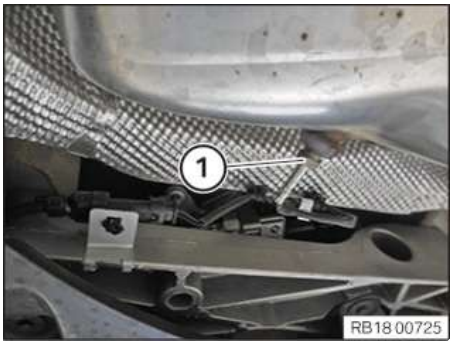
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

- Renew the V-clip (2).

  Parts: V-band clamp
- Install the SCR metering module (3) in the exhaust system.
- Tighten the V-clip (2) of the SCR metering module (3).

SCR metering module V-clip to exhaust system

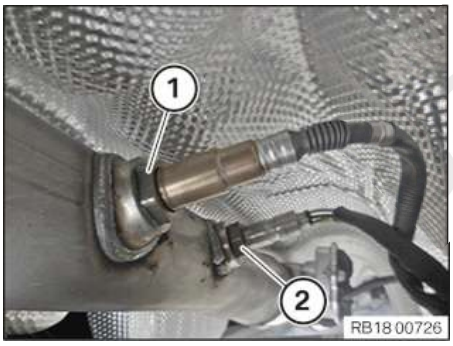
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm



- Install the exhaust temperature sensor (1) in the exhaust system and tighten.

Exhaust-gas temperature sensor upstream of SCR catalytic converter

Sensor		Tightening torque	30 Nm



- Install the diesel particulate sensor (1) in the exhaust system and tighten.

Diesel particulate sensor to exhaust system

Sensor		Tightening torque	50 Nm

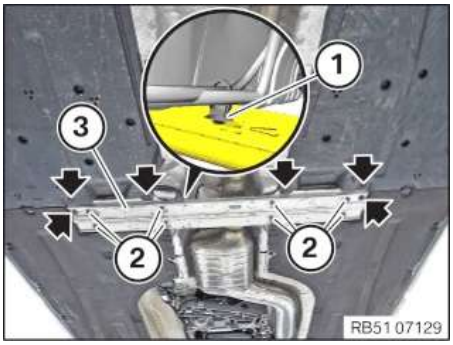
- Install the nitrogen oxide sensor (2) in the exhaust system and tighten.

Nitrogen oxide sensor downstream of SCR catalytic converter

Sensor		Tightening torque	55 Nm

111 – Install the connecting supports on the tunnel

cardiagn.com



- Guide in and install connecting support (3) on the tunnel.
- Tighten the screws (2).
- Tighten screws (arrows).

Connecting support to tunnel

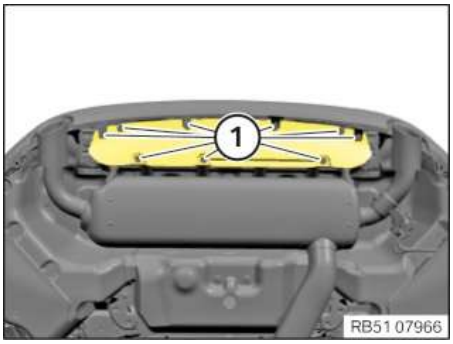
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Secure the clamp (1).

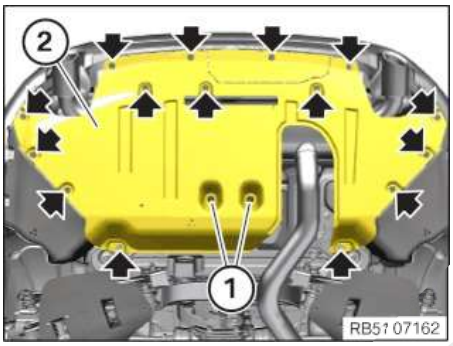
112 – Installing the rear diffuser



- **Version 1:**
- Install the diffuser and tighten the nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm



- **Version 2:**
- Feed in and position the diffuser (2)
- Tighten screws (arrows).

Diffuser / underbody panelling

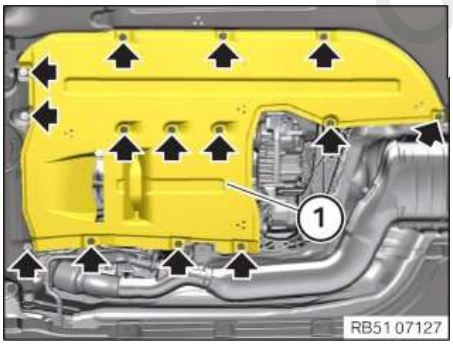
Nuts and screws		Tightening torque	3 Nm

- Tighten nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm

113 – Installing underbody protection at rear



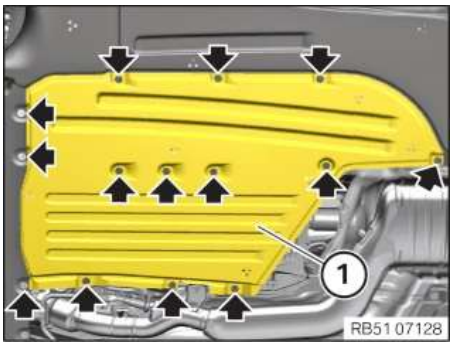
- **Version A:**

Insert and install the rear underbody protection (1).

Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version B:**

Insert and install the rear underbody protection (1).

Tighten screws (arrows).

Underbody protection

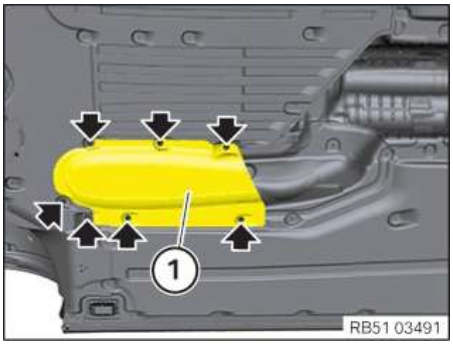
Hexagon screw		Tightening torque	3 Nm

cardiagn.com

114 – Install the underbody panelling of the transmission on the side

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

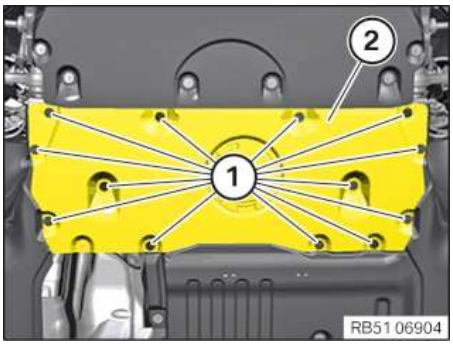


- Insert the underbody panelling (1).
- Tighten screws (arrows).

Underbody panelling

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

115 – Installing the centre underbody protection



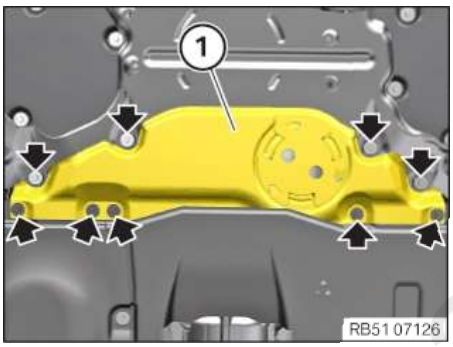
- **Variant with rear wheel drive:**

  Position central underbody protection (2).

  Tighten the screws (1).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version with all-wheel drive:**

  Guide in centre underbody protection (1) and install.

  Tighten screws (arrows).

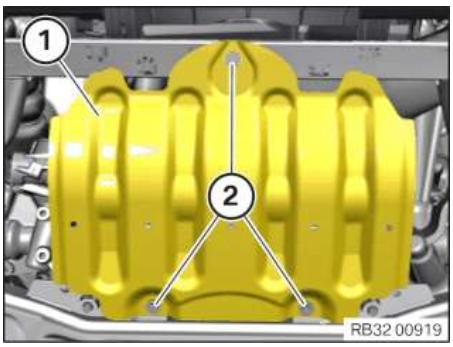
Underbody protection

Hexagon screw		Tightening torque	3 Nm

116 – If installed: Install underbody protection of the steering

Prerequisite

Front underbody protection has been removed.



- Position underbody protection (1).
- Tighten the screws (2).

Underbody protection, steering, to front axle support

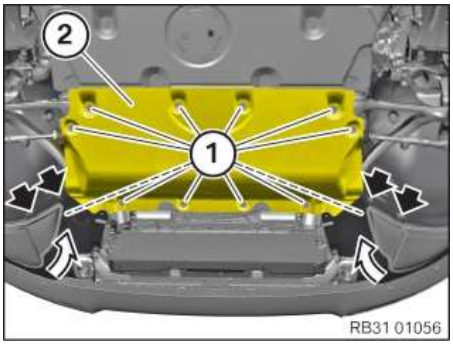
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

117 – Install the underbody protection of the steering gear

cardiagn.com



- **Version A:**

  Position the underbody protection (2) of the steering gear.

  Tighten the screws (1).

Underbody protection of the steering gear

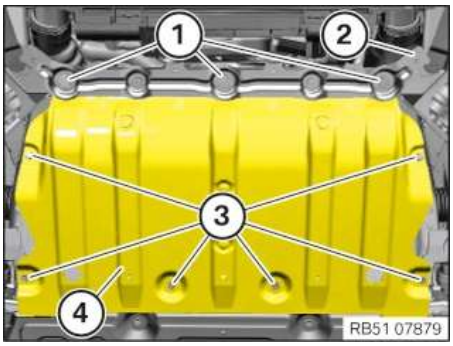
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the bottom wheel arch cover.

  Tighten the screws (arrows) of the lower wheel arch cover on the wheel arch cover.

Wheel arch trim panel, front

Thermoplastic hexagon screw		Tightening torque	2,6 Nm



- **Version B:**

  Feed in the underbody protection (4) of steering gear and install it.

  Tighten the screws (3).

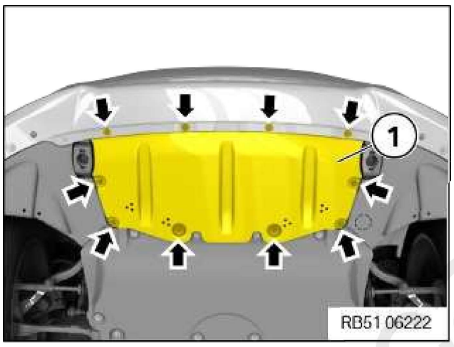
Underbody protection of the steering gear

Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the holder (2) for the underride protection.

  Tighten the screws (1).

118 – Installing the front underbody protection



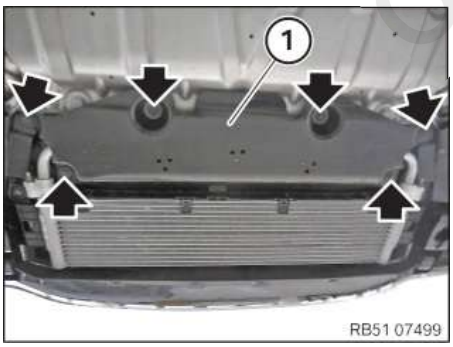
- **Version A:**

  Feed in the front underbody protection (1) towards the front under the bumper panel and position.

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



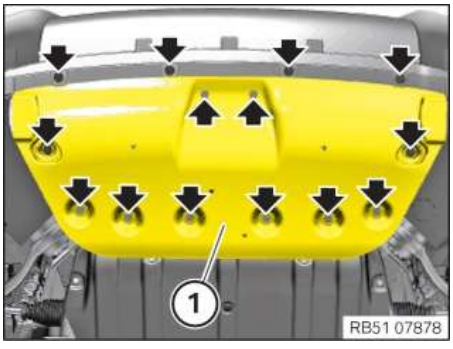
- **Version B:**

  Feed in and position the front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



- **Version C:**

  Feed in and install front underbody protection (1).

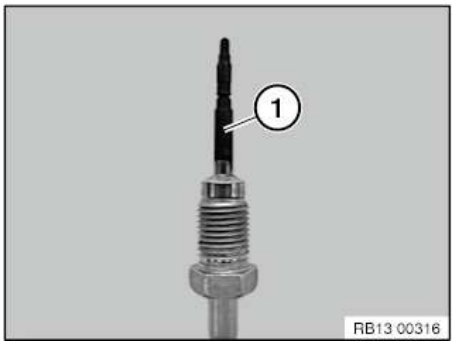
  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

carriagn.com

119 – Installing the exhaust temperature sensor for the exhaust system downstream the catalytic converter on the diesel particulate filter



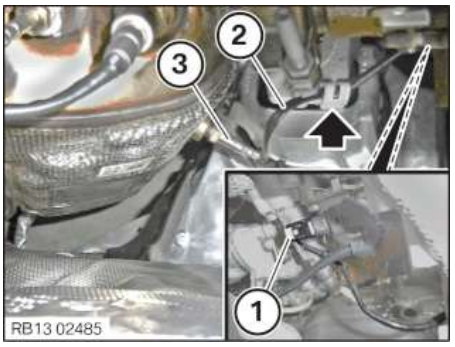
RISK OF DAMAGE

Damage of exhaust temperature sensor.

Damage to exhaust temperature sensors leads to malfunctions.

- Make sure that the gauge tip is not damaged.

- Check the gauge tip (1) for damage.



- Feed in and install the exhaust temperature sensor (3).
- Tighten the exhaust temperature sensor (3).

Exhaust temperature sensor for the exhaust system after catalytic converter before diesel particulate filter

Sensor		Tightening torque	30 Nm

- Secure cable (2) to the clamp (arrow).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

120 – Installing the front oxygen sensor on the diesel particulate filter

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
- The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

TECHNICAL INFORMATION

New oxygen sensors are to be greased lightly and evenly on the thread.

For oxygen sensors that are reused, the following should be observed:

Lightly and evenly grease the oxygen sensor only on the thread. Do not clean and grease that part of the oxygen sensor which protrudes in the exhaust branch (sensor ceramics).

For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue

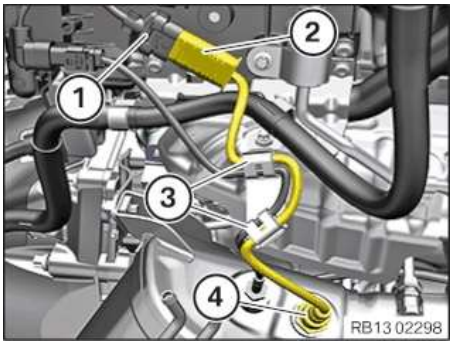


- Insert and install the front oxygen sensor (1).
- Tighten the front oxygen sensor (1) with standard tools.

Front oxygen sensor to top of diesel particulate filter

Sensor		Tightening torque	50 Nm

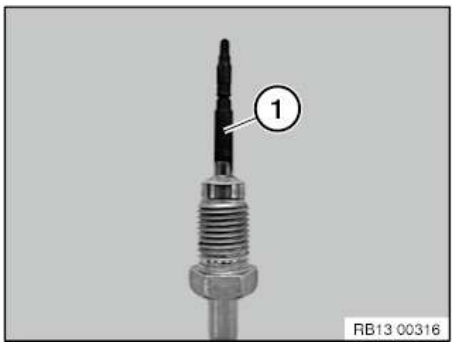
carDiagn.com



- Fasten the front oxygen sensor (4) to the clamps (3).
- Connect connectors (2) and lock.
- Connect connectors (1) and lock.

  The connectors (1) and (2) must audibly engage.

121 – Install the exhaust-gas temperature sensor on the diesel particulate filter



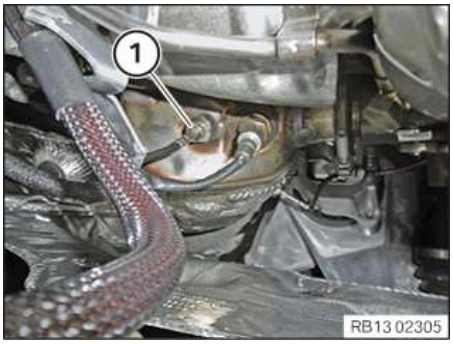
RISK OF DAMAGE

Damage of exhaust temperature sensor.

Damage to exhaust temperature sensors leads to malfunctions.

- Make sure that the gauge tip is not damaged.

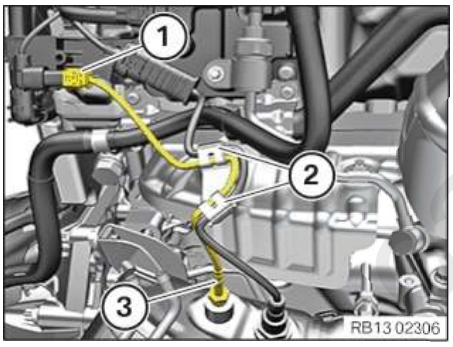
- Check gauge tip (1) for damage.



- Feed in and install the exhaust temperature sensor (1).
- Tighten the exhaust temperature sensor (1) with the special tool .

Exhaust-gas temperature sensor to diesel particulate filter

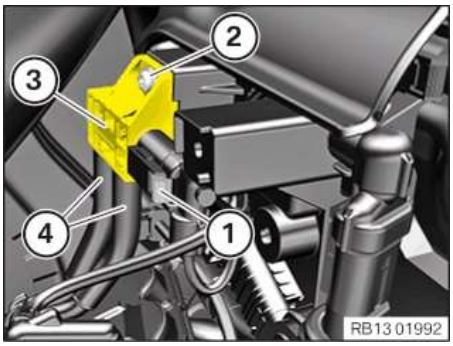
Sensor		Tightening torque	30 Nm



- Secure the exhaust temperature sensor (3) to the clamp (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

122 – Installing the differential pressure sensor for the diesel particulate filter



- Feed in and install the differential pressure sensor (3).
- Tighten down screw (2).

Differential pressure sensor of diesel particulate filter on cylinder head cover

TS5x20		Tightening torque	4 Nm

- Check the pressure hoses (4) for hardening and damage, renew if necessary.
- Connect the pressure hoses (4) and secure them using 15 mm to 19 mm screw clamps.

Clamp for the pressure hose on the differential pressure sensor

Clamp 15–19mm		Tightening torque	3 Nm

- Connect connectors (1) and lock.

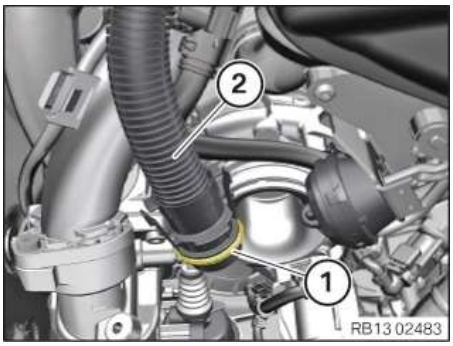
  The connector (1) must engage audibly.

123 – Installing the clean air pipe with resonator

carsign.com



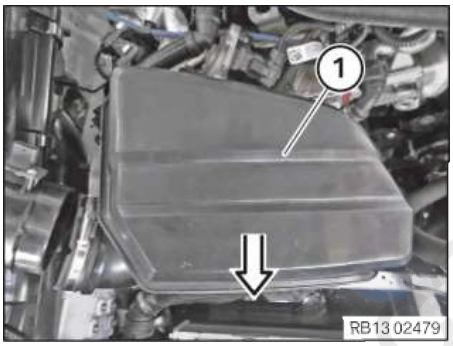
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



- Check the sealing ring (1) for the engine ventilation line (2) for damage and renew where required.



- Feed in and install clean air pipe with resonator (1) in the direction of the arrow.

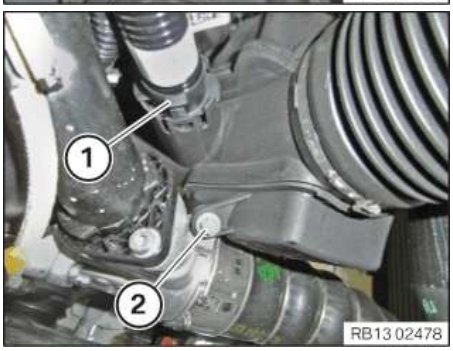


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

  The clamp (1) must engage audibly.

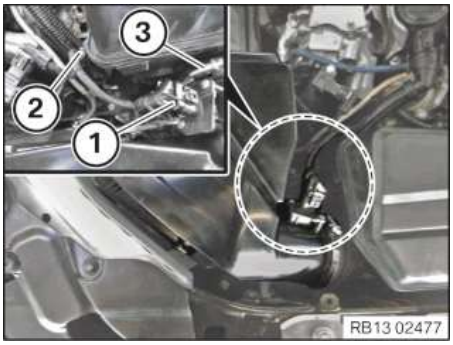


- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm

cardiagn.com



- Connect the clean air pipe with resonator to the intake filter housing.
- Tighten clamp (3).

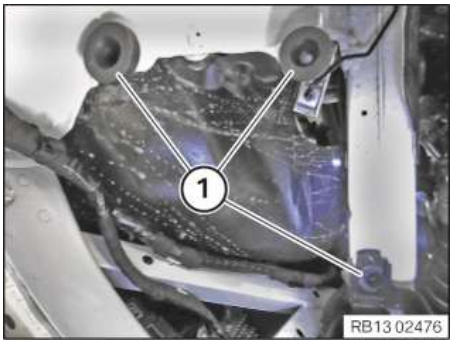
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

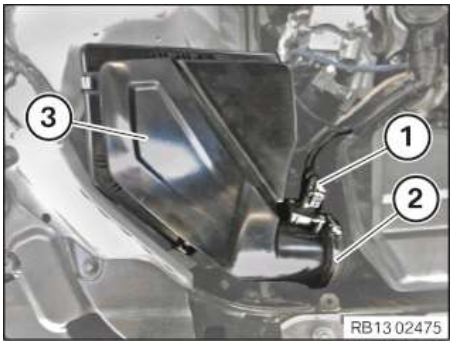
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

124 – Installing intake silencer housing



- Check the rubber mount (1) for correct fit.



- Feed the intake filter housing (3) in and engage it in the rubber mounts.
- Tighten clamp (2).

Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

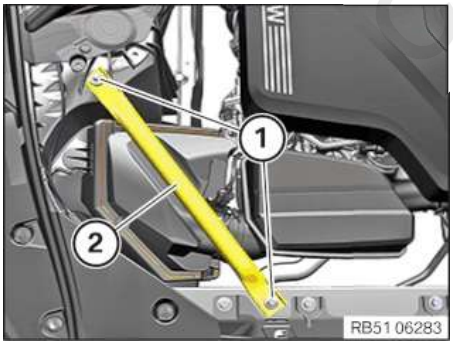
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

125 – Install the right front-end strut

TECHNICAL INFORMATION

Driving without the strut brace/front-end strut or tension strut is not permitted.



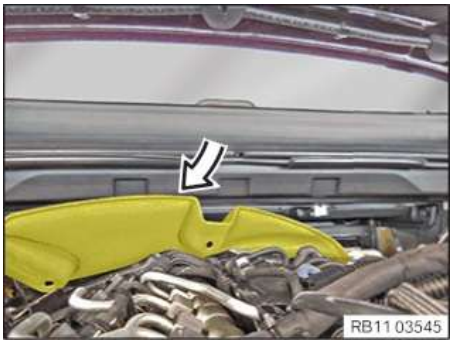
- Install the front-end strut (2).
- Renew screws (1).

  Parts: Screws
- Tighten the screws (1).

Front end strut

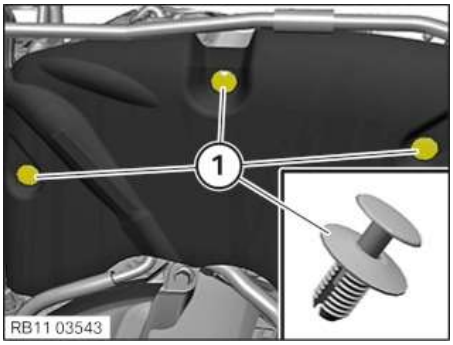
Screw		Tightening torque	56 Nm

126 – Installing acoustic cover at rear



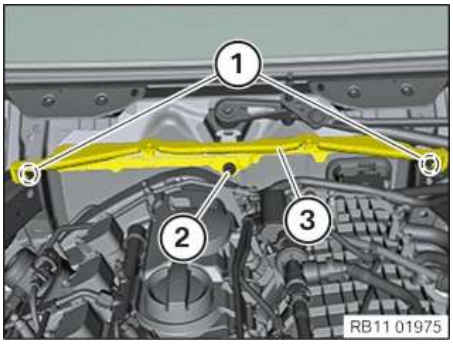
- Guide in the acoustic cover in the direction of the arrow and install it.

cardiagn.com



- Secure acoustic cover with the expanding rivets (1).

127 – Installing centre bulkhead lower section

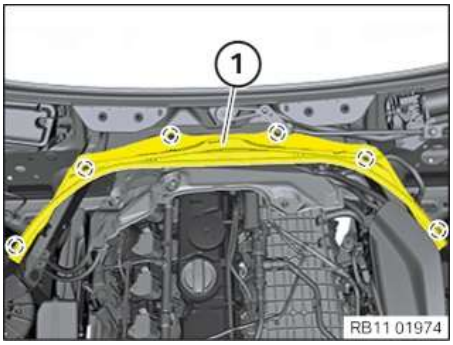


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

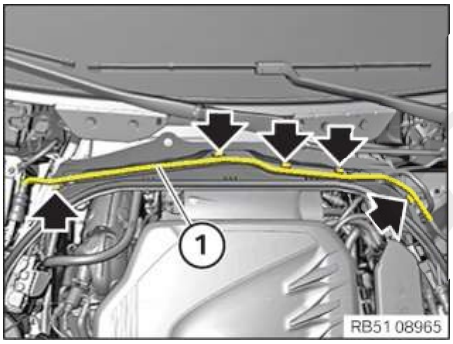
128 – Installing the centre bulkhead upper part



- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

Bulkhead upper part to bottom bulkhead

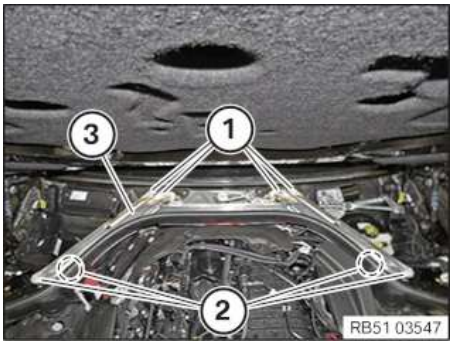
		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

  Clip in the wire (1) into the holders (arrows).

cardiagn.com



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Install the tension strut (3) on the spring strut dome.
- Tighten the screws (1).

Tension strut on bulkhead

M10x25 screw		Tightening torque	56 Nm

- Renew screws (2).

  Parts: Screws
- Tighten the screws (2).

Tension strut to spring strut dome

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

129 – Install the seal for the bonnet



- Press the rear bonnet seal (2) into the guide.
- Feed in cable (1) into the brackets.
- Check that the rear bonnet seal (2) and the cable (1) are seated correctly.

130 – Installing cowl panel cover

RISK OF DAMAGE

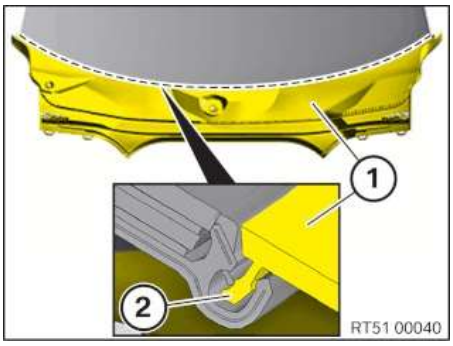
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

- Ensure correct installation of the components.
- Only use undamaged components.

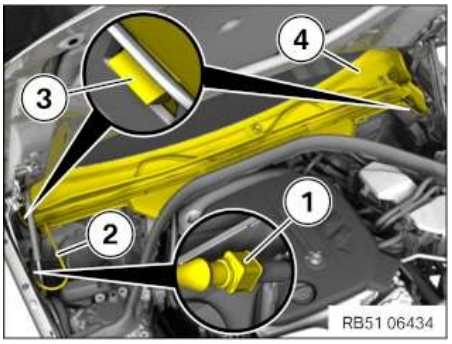
TECHNICAL INFORMATION

Before installing the cowl panel cover it is **mandatory** to check that the 48 V line is routed correctly and fitted tightly.
An incorrectly laid or attached 48 V line can be damaged by the wiper kinematics.



- Push the cowl panel cover (1) into the latch mechanism (2) beginning on the side.

cardiagn.com



- Clip cowl panel cover (4)in by means of the latch mechanisms (3).
- Position windscreen wash hose (2) and connect windscreen wash hose (1)quick lock.

131 – Install left and right wiper arm

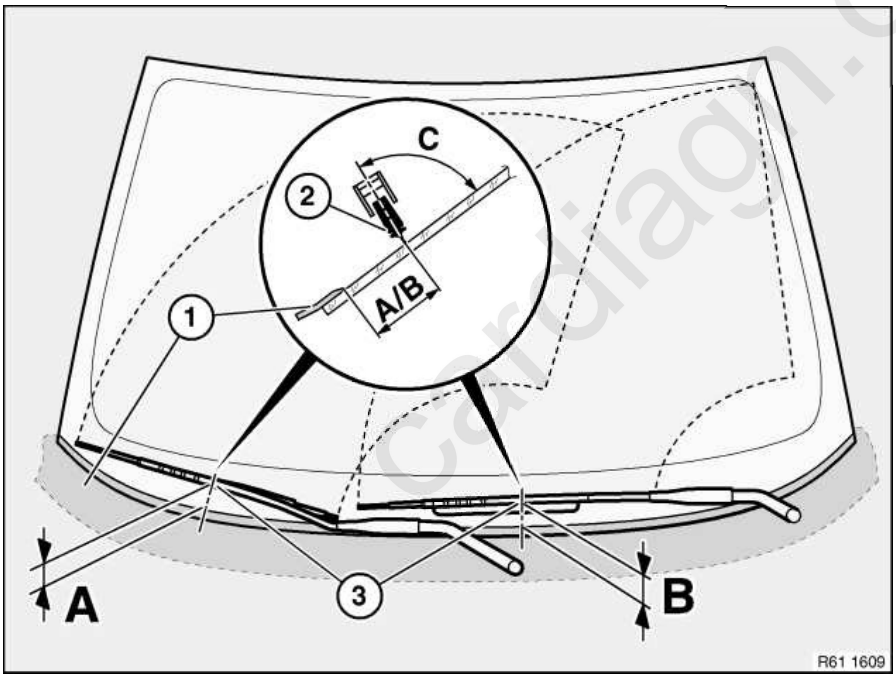
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

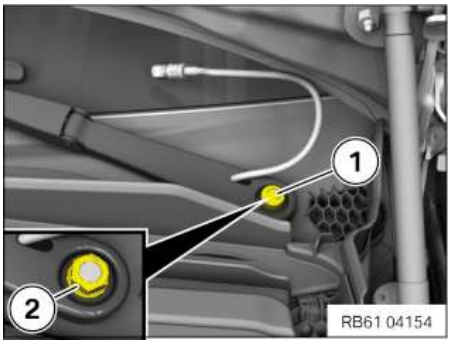
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- Connect the wiper arm (3).
- Correctly position the wiper arm (2) in relation to the window edge (1).

Distance from window pane edge to wiper blade

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm



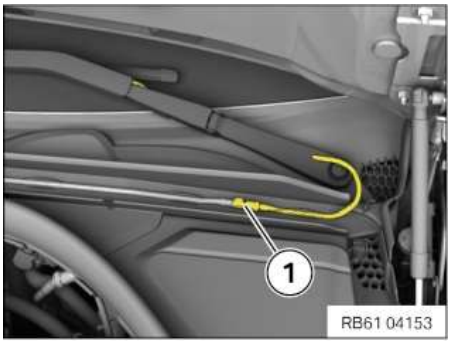
- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

- Connect the protective cap (1).

cardiagn.com



- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

132 – Connecting all battery earth leads



- See additional information.

133 – Activating the 48 V electrical system

Prerequisite

Ignition is switched off.

RISK OF DAMAGE

Damage to 48-V battery

If a 48-V battery that is disconnected from the electrical system is activated, the battery electronics will be damaged.

- Only carry out activation of the 48V electrical system with a completely connected 48-V battery.



- Lift battery earth lead (1).
- Remove special tool .



- Release the negative battery cable (2) of the 48-V battery from the mounting.
- Position the negative battery cable (2) of the 48-V battery on the negative battery terminal.
- Tighten nut (1).

Negative battery cable to 48-V battery

Nut M8		Tightening torque	19 Nm

cardiagn.com

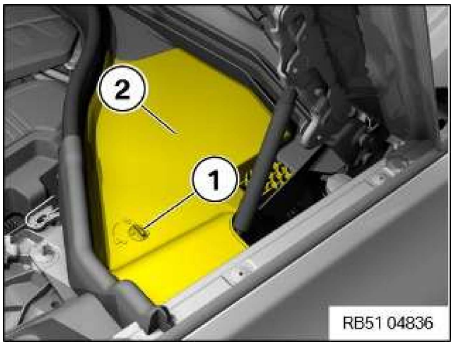


- Connect the connector (1) of the CAN bus and lock it.
- Clip in clip (2).



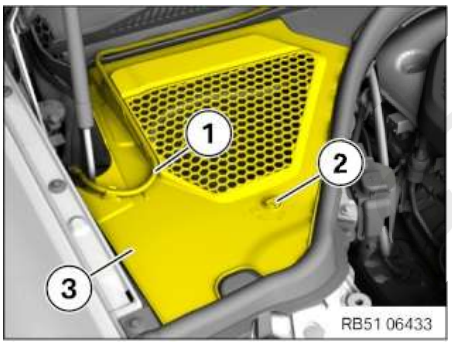
- Activate the 48V electrical system by closing the bonnet.
  The activation takes place automatically.

134 – Install the cover of the engine compartment on the rear left



- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

135 – Install the rear right engine compartment cover



- Position the cover of the engine compartment on the rear right (3).
- Close lock (2).
- Insert washer fluid hose (1) into the guides.

136 – Take bonnet out of the service position

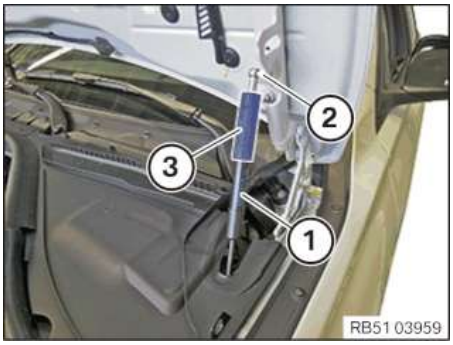
CAUTION

Shutting bonnet or tailgate.

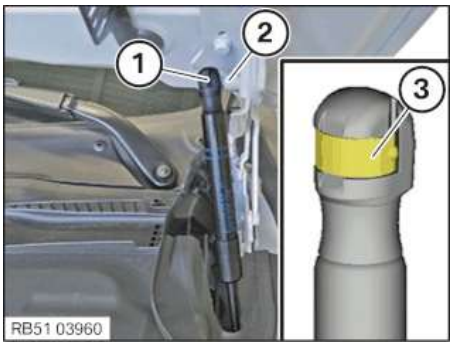
Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.

cardiagn.com



- Support the bonnet by hand.
- Remove the special tool (3) from the ball pin (2).
- Pull off the special tool (3) from the gas pressure spring (1).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.



- Check the clamp (3) is fitted correctly.
- Connect ball socket (1) to ball pin (2).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.

137 – Filling and bleed the high-temperature coolant circuit



TECHNICAL INFORMATION

It is **mandatory** to fill the cooling system before bleeding.
Fill **both** the circuits for high and low-temperature coolant circuits.

- See additional information.

138 – Check engine oil level

Prerequisite
Vehicle is in a horizontal position.

TECHNICAL INFORMATION

Please comply with instructions in Owner's Handbook.

- Carry out an electronic oil measurement.
- Top up engine oil if necessary.

▸ **Check engine oil level**

TECHNICAL INFORMATION

Always check the engine oil level when the engine is at operating temperature (engine oil temperature > 70°C).

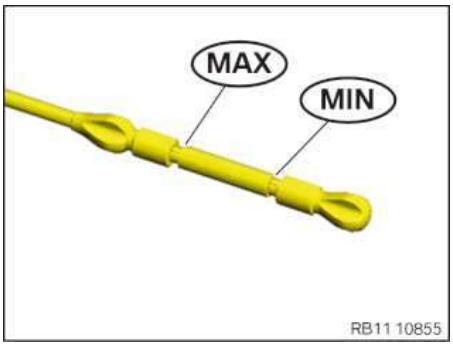
cardiagn.com

- Park vehicle on a horizontal surface.
- Stop the engine and wait for 5 minutes.
- Pull out the oil dipstick and wipe off using a lint-free cloth.

TECHNICAL INFORMATION

Do not pull out or insert the oil dipstick into the guide tube too quickly or slowly.

- Push the oil dipstick into the guide tube up to the limit position and pull it out again.



TECHNICAL INFORMATION

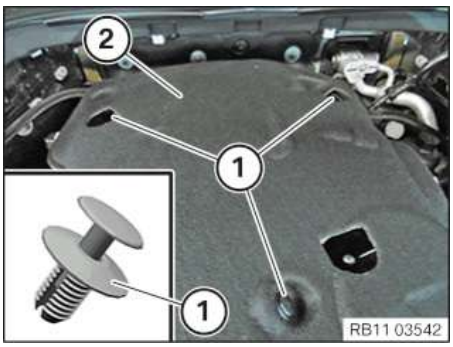
The engine oil level must be between the minimum mark and the maximum mark of the oil dipstick.

- Read the engine oil level on the oil dipstick.
- Top up engine oil if necessary.

Oil quantity between the two markings MIN and MAX of the oil dipstick

1.0 l

139 – Install the acoustic cover for the injectors



- Feed the acoustic cover (2) in and install.
- **If installed:** Secure the acoustic cover (2) with the expanding rivets (1) .

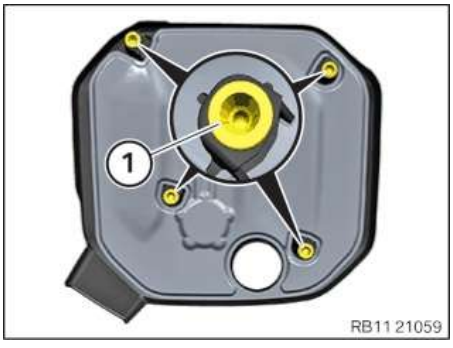
140 – Install acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



- Check the acoustic cover for correct fit of the rubber mounts (1).

cardiagn.com



- Clip in the acoustic cover (1) into the holders in the indicated areas.

Additional Information

Overview of Tightening Torques

Special tool 2 365 488 to engine			Used in step 5383
M8x60		Tightening torque	19 Nm

Cylinder head to crankcase			Used in step 71
M12x1.5	Renew screws.	1. Tightening torque	50 Nm
		2. Angle of rotation	120 °
		3. Angle of rotation	120 °

Cylinder head bolt to timing case cover			Used in step 71
M8x40		Tightening torque	19 Nm

Standard screw connection M6			Used in step 7194
M6		Tightening torque	8 Nm

Ground to cylinder head			Used in step 71
M6		Tightening torque	8 Nm

Glow elements to cylinder head			Used in step 72
Glow element		Tightening torque	13 Nm

Camshaft carrier to cylinder head			Used in step 75
M7x35		Tightening torque	13 Nm

Bearing journal to cylinder head			Used in step 78
M16x1.5	Replace bearing journal.	Tightening torque	20 Nm

Standard screw connection M8			Used in step 78
M8		Tightening torque	19 Nm

Chain tensioner piston to cylinder head			Used in step 79
22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

Holder to crankcase			Used in step 79
M8X16		Tightening torque	19 Nm

Camshaft sprocket to camshaft			Used in step 80
M7x17.			17 Nm

Starter motor to engine			Used in step 86
M8X60		Tightening torque	19 Nm

Battery positive lead to starter			Used in step 86
M8		Tightening torque	13,5 Nm

cardiagn.com

Cylinder head cover to cylinder head			Used in step 87
M6		Tightening torque.	8,5 Nm

Clamping claw facing to cylinder head cover			Used in step 88
M6		Tightening torque	10 Nm

Injector to cylinder head cover			Used in step 88
M8		Tightening torque	8 Nm
		Angle of rotation	120 °

Rail to cylinder head cover			Used in step 89
M8		Tightening torque	19 Nm

High pressure lines between high pressure pump and rail			Used in step 90
High-pressure pipe		Tightening torque	24.5 Nm

High pressure lines between injector and rail			Used in step 91
High-pressure pipe		Tightening torque	24.5 Nm

Intake plenum to cylinder head			Used in step 93
M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum			Used in step 9398
		Tightening torque	10 Nm

Electric changeover valve to intake plenum			Used in step 93
TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold			Used in step 94
TS5x20		Tightening torque	3,6 Nm

Standard screw connection 4 Nm			Used in step 94
Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover			Used in step 94
TS5x20		Tightening torque	3,6 Nm

Battery positive lead on the starter motor generator			Used in step 94
M8		Tightening torque	19 Nm

Holder on intake plenum			Used in step 94
TS6X20		Tightening torque	5 Nm

Exhaust manifold to cylinder head			Used in step 97
M7	**If necessary, renew loose stud bolts.**	Tightening torque	11 Nm
	Renew nuts.	Tightening torque	13 Nm

Oil feed line on cylinder head			Used in step 97
M6x12		Tightening torque	8 Nm

Exhaust-gas recirculation cooler to exhaust manifold			Used in step 9798
M8x28	Replace screws	Tightening torque	32 Nm

Exhaust-gas recirculation cooler to cylinder head			Used in step 9798
M8x20 / M8x28		Tightening torque	19 Nm

Exhaust turbocharger low-pressure stage to crankcase			Used in step 97
M8X16		Tightening torque	22 Nm

cardiagn.com

Oil return line to turbocharger — Used in step 97

M6x12	Renew gasket.	Tightening torque	8 Nm

Oil return line to crankcase — Used in step 97

M6x12	Check gasket. Renew the seal or line if necessary.	Tightening torque	8 Nm

Exhaust-gas recirculation cooler to cylinder head — Used in step 98

M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °

Heat shield to exhaust manifold — Used in step 99

M6x12			10 Nm

Bracket on cylinder head cover — Used in step 100

		Tightening torque	5 Nm

Battery positive lead to battery positive terminal — Used in step 100

M8		Tightening torque	19 Nm

Heat shield to exhaust manifold — Used in step 101

M6x12		Tightening torque	10 Nm

Banjo bolt for exhaust pressure pipe to exhaust manifold — Used in step 101

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm

Exhaust gas pressure pipe to sensor system holder — Used in step 101

TS6x20		Tightening torque	5,7 Nm

Cover, steering unit — Used in step 104

Screw		Tightening torque	3 Nm

Brake disc to front wheel hub — Used in step 105

M8	Renew screw.	Tightening torque	16 Nm

Brake disc to rear wheel hub — Used in step 105

M8	Renew screw.	Tightening torque	16 Nm

Wheel bolts — Used in step 105

M14 / SW17	Screw in wheel bolts and evenly tighten crosswise by hand in order to centre the wheel rim. Tighten wheel bolts to the prescribed tightening torque with a calibrated torque wrench in a crosswise sequence. Check all the wheel bolts in the same order or retighten to the prescribed tightening torque again.	Tightening torque Check	140 Nm 140 Nm

Diesel particulate filter V-clip to exhaust turbocharger — Used in step 107

V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

Bracket to diesel particulate filter top — Used in step 107

M8		Tightening torque	19 Nm

Bracket to transmission for diesel particulate filter holder bottom — Used in step 107

M8X20		Tightening torque	19 Nm

Lower holder to diesel particulate filter — Used in step 107

M8		Tightening torque	19 Nm

cardiagn.com

Coolant lines for SCR metering module			Used in step 107
M6X16		Tightening torque	8 Nm

Nitrogen oxide sensor before SCR catalytic converter			Used in step 108
Sensor		Tightening torque	50 Nm

Monitoring oxygen sensor			Used in step 109
Sensor		Tightening torque	50 Nm

Rear silencer to body / bumper support			Used in step 110
M8	Replace nuts.	Tightening torque	19 Nm

Exhaust system to rear axle carrier			Used in step 110
M8 nut		Tightening torque	19 Nm

Exhaust system to transmission			Used in step 110
M8		Tightening torque	19 Nm

Exhaust system to diesel particle filter			Used in step 110
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

SCR metering module V-clip to exhaust system			Used in step 110
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm

Exhaust-gas temperature sensor upstream of SCR catalytic converter			Used in step 110
Sensor		Tightening torque	30 Nm

Diesel particulate sensor to exhaust system			Used in step 110
Sensor		Tightening torque	50 Nm

Nitrogen oxide sensor downstream of SCR catalytic converter			Used in step 110
Sensor		Tightening torque	55 Nm

Connecting support to tunnel			Used in step 111
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

Diffuser / underbody panelling			Used in step 112
Nuts and screws		Tightening torque	3 Nm

Underbody protection			Used in step 113115
Hexagon screw		Tightening torque	3 Nm

Underbody panelling			Used in step 114
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Underbody protection, steering, to front axle support			Used in step 116
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support			Used in step 116
Hexagon bolt M6		Tightening torque	8 Nm

Underbody protection of the steering gear			Used in step 117
Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

cardiagn.com

Wheel arch trim panel, front			Used in step 117
Thermoplastic hexagon screw		Tightening torque	2,6 Nm

Underbody protection front			Used in step 118
Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Exhaust temperature sensor for the exhaust system after catalytic converter before diesel particulate filter			Used in step 119
Sensor		Tightening torque	30 Nm

Front oxygen sensor to top of diesel particulate filter			Used in step 120
Sensor		Tightening torque	50 Nm

Exhaust-gas temperature sensor to diesel particulate filter			Used in step 121
Sensor		Tightening torque	30 Nm

Differential pressure sensor of diesel particulate filter on cylinder head cover			Used in step 122
TS5x20		Tightening torque	4 Nm

Clamp for the pressure hose on the differential pressure sensor			Used in step 122
Clamp 15–19mm		Tightening torque	3 Nm

Clean air pipe to exhaust turbocharger			Used in step 123
M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing			Used in step 123124
Clamp		Tightening torque	3 Nm

Front end strut			Used in step 125
Screw		Tightening torque	56 Nm

Bulkhead lower part to body			Used in step 127
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead			Used in step 128
		Tightening torque	3 Nm

Tension strut on bulkhead			Used in step 128
M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome			Used in step 128
Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm			Used in step 131
Combination hexagon nut		Tightening torque	35 Nm

Negative battery cable to 48-V battery			Used in step 133
Nut M8		Tightening torque	19 Nm

Overview of Special Tools

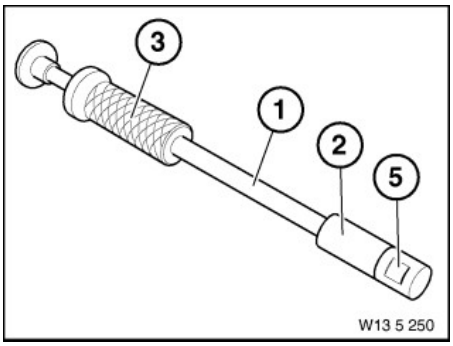
cardiagn.com

0 493 339 (13 5 252) Bush



Common	Used in step 50
Usage	(Threaded bush)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 321 (13 5 250) Puller



Common	Used in step 50
Usage	For removing injector nozzles or injectors from cylinder head
Included in the tool or work	
Storage location	A16
Replaced by	
In connection with	
SI-Number	01 06 98 (306)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 338 (13 5 251)		**Rod** (guide rod)	
2	0 493 339 (13 5 252)		**Bush** (Threaded bush)	
3	0 493 340 (13 5 253)		**Weight** (Weight)	
4	0 493 379 (13 5 254)		**Claw** (Clamping claw) For removal of injector nozzles / engine: M57	
5	0 495 579 (13 5 255)		**Adapter** For removing steering shaft on E85. Refer to SI 01 11 06 (265)	

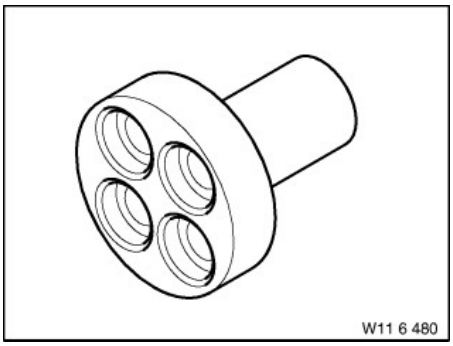
0 493 340 (13 5 253) Weight



Common	Used in step 50
Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

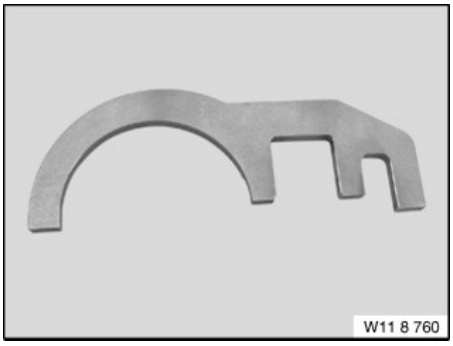
carmagn.com

0 493 380 (11 6 480) Connector



Common	Used in step 5383
Usage	For turning over engine at crankshaft hub (vibration absorber).
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	01 11 98 (338)

0 496 112 (11 8 760) Gauge



Common	Used in step 535776818384
Usage	For securing camshaft at TDC.
Included in the tool or work	
Storage location	B24
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

2 365 488 Adapter



Common	Used in step 53828385
Usage	For disconnecting the crankshaft at the top dead centre. (longitudinal installation with automatic transmission only).
Included in the tool or work	
Storage location	C56
Replaced by	
In connection with	
SI-Number	01 46 14 (191)

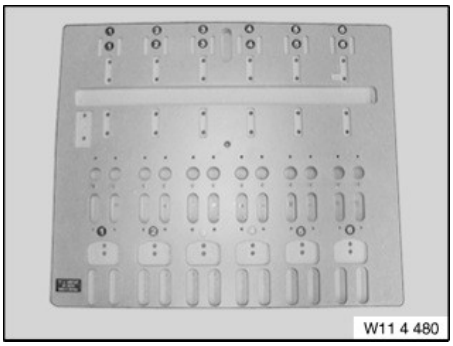
2 288 380 Locating stud



Common	Used in step 53828385
Usage	For disconnecting the crankshaft at the top dead centre. Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).
Included in the tool or work	
Storage location	A56
Replaced by	
In connection with	
SI-Number	01 04 14 (071)

cardiagn.com

0 495 105 (11 4 480) oddments tray



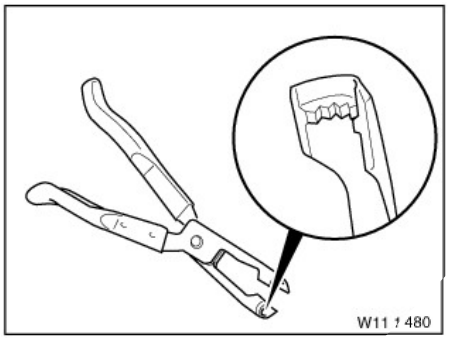
Common Used in step 596066

Usage	(Boards (2 pieces)) For setting down the individual components of the cylinder head.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 17 04 (130)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 495 106 (11 4 481)		**oddments tray** (Board, intake side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	
2	0 495 107 (11 4 482)		**oddments tray** (Board, exhaust side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	

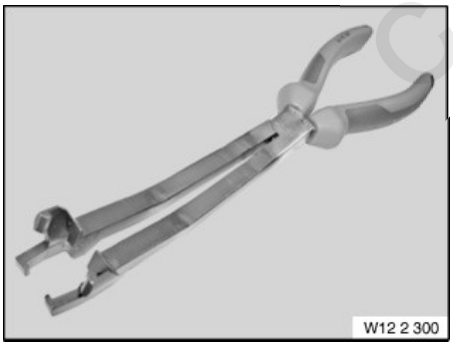
0 490 796 (11 1 480) Pliers



Common Used in step 6167

Usage	For removing valve stem seal
Included in the tool or work	
Storage location	A10
Replaced by	
In connection with	
SI-Number	01 01 93 (621)

0 495 140 (12 2 300) Pliers

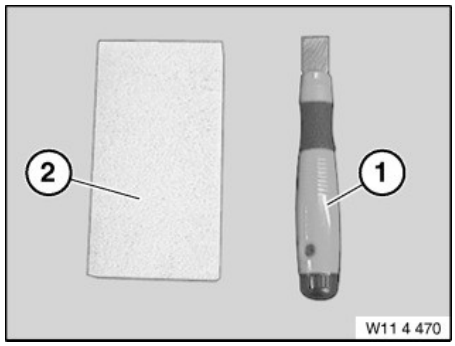


Common Used in step 62

Usage	(Special pliers for glow plug connectors) For unlocking, detaching and attaching glow plug connectors.
Included in the tool or work	
Storage location	A51
Replaced by	
In connection with	
SI-Number	01 19 05 (215)

cardiagn.com

0 495 102 (11 4 470) Tool



Common Used in step 6297

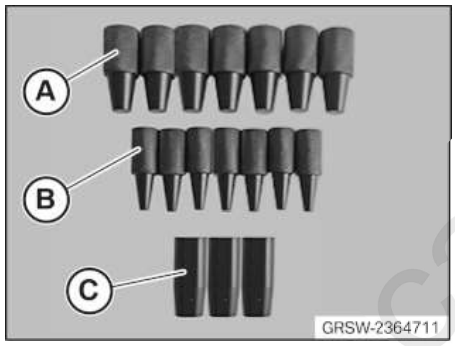
Usage	(cleaning kit) For cleaning sealing surfaces on magnesium crankcase/cylinder head.
Included in the tool or work	
Storage location	C52
Replaced by	
In connection with	
SI-Number	01 17 04 (130)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 495 103 (11 4 471)		**Scraper**	
2	0 495 104 (11 4 472)		**Extractor** (grindstone)	

cardiagn.com

2 364 711 Plug



Common Used in step 63

Usage	For closing the pressure oil holes for cleaning the cylinder head sealing surfaces.
Included in the tool or work	
Storage location	C20
Replaced by	
In connection with	
SI-Number	

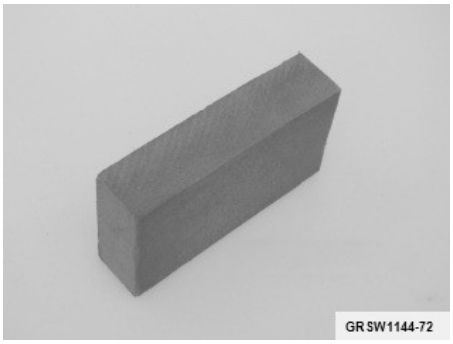
0 495 103 (11 4 471) Scraper



Common Used in step 63

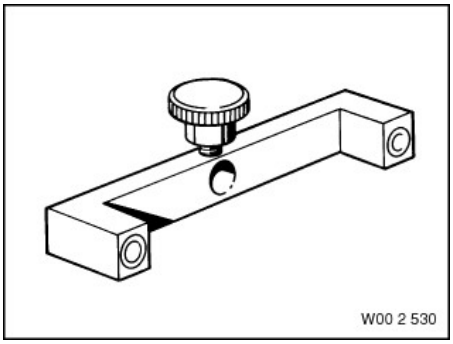
Usage	
Included in the tool or work	0 495 102
Storage location	C52
Replaced by	
In connection with	
SI-Number	

0 495 104 (11 4 472) Extractor



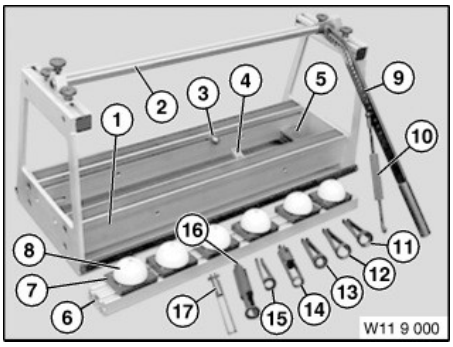
Common	Used in step 63
Usage	(grindstone)
Included in the tool or work	0 495 102
Storage location	C52
Replaced by	
In connection with	
SI-Number	

0 490 185 (00 2 530) Bridge



Common	Used in step 65
Usage	(Measuring bridge) For determining the piston projection (Diesel)
Included in the tool or work	
Storage location	A3
Replaced by	
In connection with	
SI-Number	

0 494 366 (11 9 001) Device

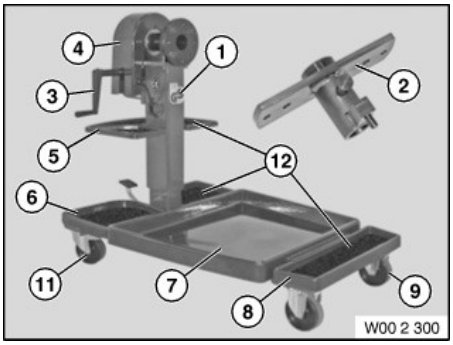


Common	Used in step 6669
Usage	
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 187 (00 2 300) Assembly stand

Used in step 6669

cardiagn.com



Common

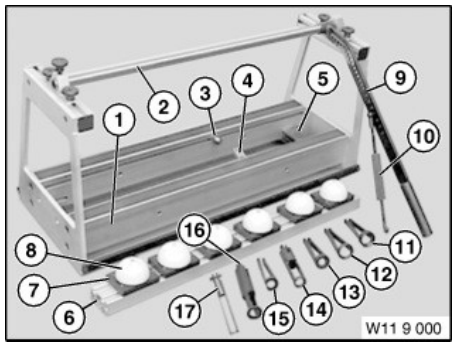
Usage	Assembly stand with universal flange for mounting engines from S85
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 25 04 (155)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 495 188 (00 2 301)		**Assembly stand** available only as complete assembly stand 83 30 0 495 187.	
2	0 495 189 (00 2 302)	2 299 563	**Tool** (Universal flange). Do not use any more!!! Technically locked. Is replaced by a new flange with part number 83 30 2 299 563. All flanges delivered by the end of 2011 will be replaced free of charge. From 2012, only the new flange will be supplied. Also applies to the complete engine mounting stand 00 2 300.	
3	0 495 200 (00 2 303)		**Crank**	
4	0 495 201 (00 2 304)		**Cover** (Protective hood)	
5	0 495 202 (00 2 305)		**oddments tray** (Oddments tray for small parts)	
6	0 495 203 (00 2 306)		**Shaped element** (Rear shaped pan)	
7	0 495 204 (00 2 307)		**Collection pan** (Oil collection pan)	
8	0 495 205 (00 2 308)		**Shaped element** (Front shaped pan)	
9	0 495 206 (00 2 309)		**Wheel** (Front wheel (without stop))	
10	0 495 207 (00 2 311)		**Wheel** (Rear wheel (with stop))	
11	0 495 208 (00 2 312)		**Mat** (Checker mat set)	
2	2 299 563		**Adapter** New adapter for the engine assembly stand. Replacement for 83 30 0 495 189 - 00 2 302.	

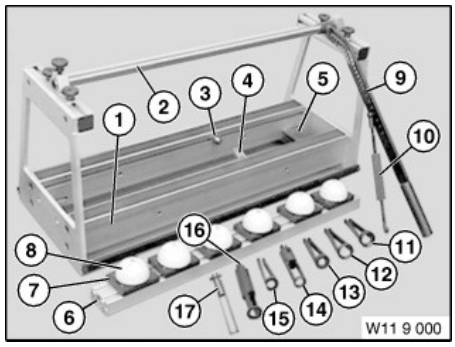
carmagn.com

0 494 371 (11 9 006) Insert



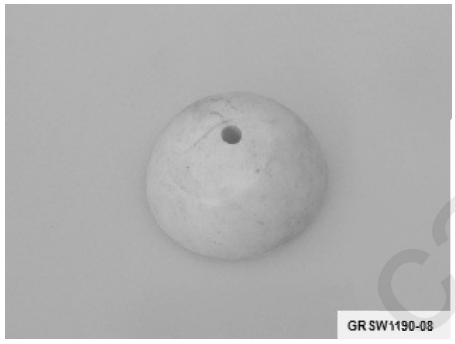
Common	Used in step 6669
Usage	(Aluminium strip)
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 494 372 (11 9 007) Shaped part



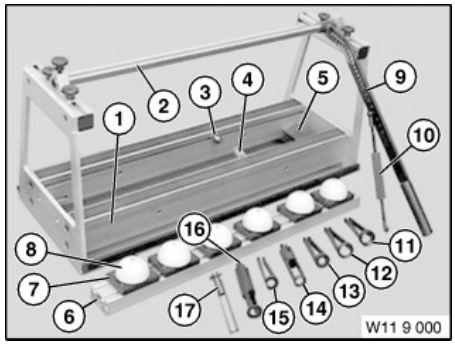
Common	Used in step 66
Usage	(Shaped part)
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 494 373 (11 9 008) Shaped part



Common	Used in step 66
Usage	(Shaped part) Shaped part made of plastic
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

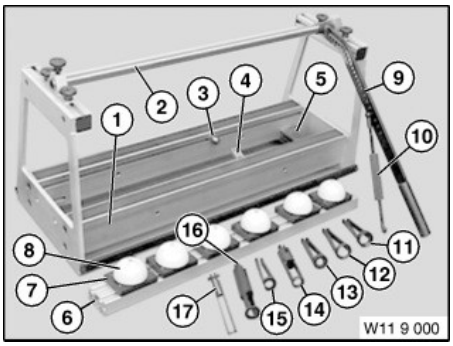
0 494 370 (11 9 005) Quick fastener



Common	Used in step 6669
Usage	
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

cardiagn.com

0 494 362 (11 9 000) Device



Common Used in step 6669

Usage	(Cylinder head expander tool)
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	002300 = 0495187
SI-Number	01 03 02 (833)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 494 366 (11 9 001)		**Device**	
6	0 494 371 (11 9 006)		**Insert** (Aluminium strip)	
11	0 494 376 (11 9 012)		**Basket** (Valve spring cage) Engine M41, M51, S50	
17	0 495 028 (11 9 017)		**Basket** (Valve spring cage) Engine N52	
2	0 494 367 (11 9 002)		**Rod**	
3	0 494 368 (11 9 003)		**Adapter** (Sliding block)	
4	0 494 369 (11 9 004)		**Tab**	
5	0 494 370 (11 9 005)		**Quick fastener**	
7	0 494 372 (11 9 007)		**Shaped part** (shaped part)	
8	0 494 373 (11 9 008)		**Shaped part** (Shaped part) Shaped part made of plastic	
9	0 494 374 (11 9 009)		**Lever**	
10	0 494 375 (11 9 011)		**Hook**	
12	0 494 377 (11 9 013)		**Basket** (Valve spring cage) Engine M43, M73	
13	0 494 378 (11 9 014)		**Basket** (Valve spring cage) Engine M44, M52, M54, M56, M62, S52, S54, S62	
14	0 494 379 (11 9 015)		**Basket** (Valve spring cage) Engine M47, M47TU, M57, M57TU, N40, N42, N62, N73	
15	0 494 380 (11 9 016)		**Basket** (Valve spring cage) Engine M21, M40	

cardiagn.com

0 494 374 (11 9 009) Lever



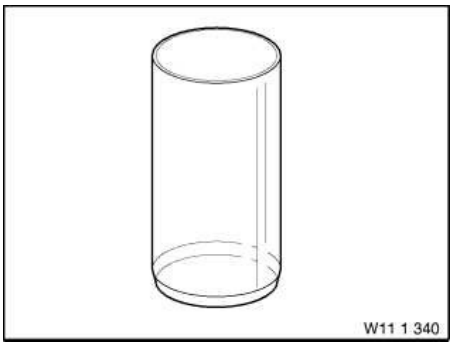
Common	Used in step 6669
Usage	
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 496 143 (11 8 840) Basket



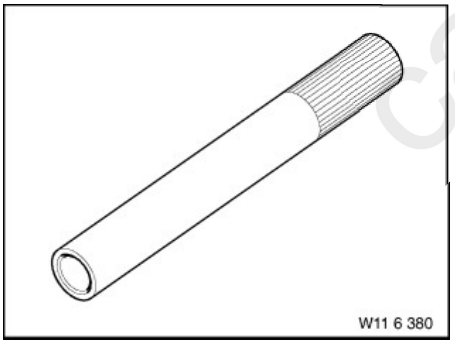
Common	Used in step 6669
Usage	(Valve spring cage) For removing and fitting the valves.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

0 490 746 (11 1 380) Holding sleeve



Common	Used in step 68
Usage	(Assembly sleeve) For fitting the valve stem seal, diameter 7 mm
Included in the tool or work	
Storage location	individual
Replaced by	
In connection with	
SI-Number	

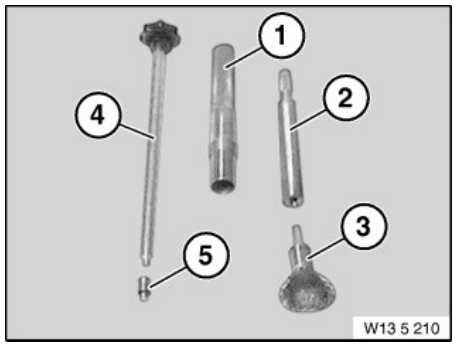
0 493 249 (11 6 380) Bush



Common	Used in step 68
Usage	For fitting valve stem seal
Included in the tool or work	
Storage location	A9
Replaced by	
In connection with	
SI-Number	01 06 98 (306)

cardiagn.com

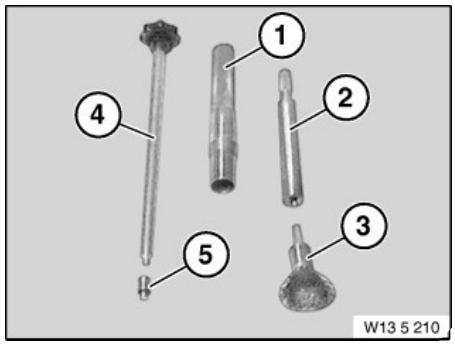
0 493 763 (13 5 215) Plug



Common Used in step 88

Usage	(Seal plug)
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 762 (13 5 214) Rod

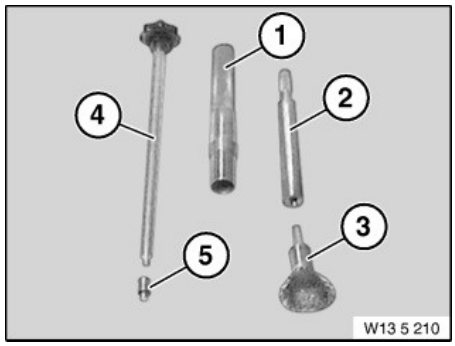


Common Used in step 88

Usage	(Mounting rod) For the seal plug
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

cardiagn.com

0 493 758 (13 5 210) Tool



Common

Used in step 88

Usage	(Cleaning set) For injector channels
Included in the tool or work	
Storage location	B4
Replaced by	
In connection with	
SI-Number	01 05 00 (574)

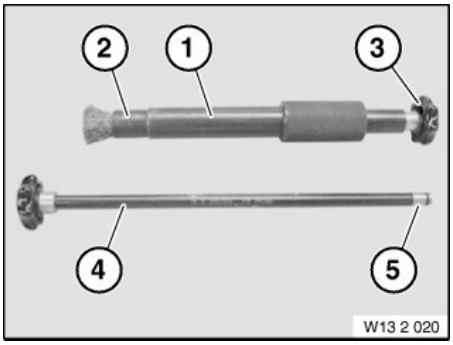
Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 759 (13 5 211)		**Holding sleeve** (Guide sleeve)	
2	0 493 760 (13 5 212)		**Holder** (Brush holder)	
3	0 493 761 (13 5 213)		**Brush head**	
4	0 493 762 (13 5 214)		**Rod** (Mounting rod) For the seal plug	
5	0 493 763 (13 5 215)		**Plug** (Seal plug)	

0 496 150 (13 2 020) Tool

Used in step 88

cardiagn.com



Common

Usage	(Cleaning kit) For cleaning the injector shaft.
Included in the tool or work	
Storage location	A87
Replaced by	
In connection with	
SI-Number	01 07 07 (355)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 496 151 (13 2 021)		**Holding sleeve** (Guide sleeve) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
2	0 496 152 (13 2 022)		**Holder** (Brush holder) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
3	0 496 153 (13 2 023)		**Brush head** Remaining inventories will be sold off, followed by discontinuation and then available as part of complete special tool 13 2 020 = 83 30 0 496 150 only	
4	0 496 154 (13 2 024)		**Rod** (Mounting rod) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
5	0 496 155 (13 2 025)		**Plug** (Seal plug) Available as part of complete special tool 13 2 020 = 83 30 0 496 150 only	Used in step 105

2 344 011 Tool



Common

Usage	Tool (wheel hub grinder) for cleaning the connection of the wheel rim (wheel contact face) to the wheel hub.
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	08 08 12 (872)

Replacement tools:

0 495 221 (36 1 323) Wheel stud



Common Used in step 33

Usage	(Code 30) Code 39 available separately, (see EPC) under 36 13 1 181 259
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

cardiagn.com

0 495 224 (36 1 326) Wheel stud



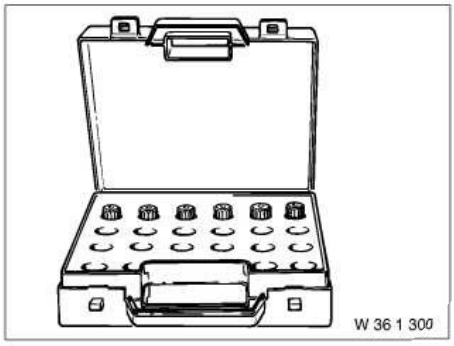
Common	Used in step 33
Usage	(Code 33) With centring bore available separately, (see EPC) under 36 13 6 765 546
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 225 (36 1 327) Wheel stud



Common	Used in step 33
Usage	(Code 34) With centring bore available separately (see EPC) under 36 13 6 765 547
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 226 (36 1 328) Wheel stud



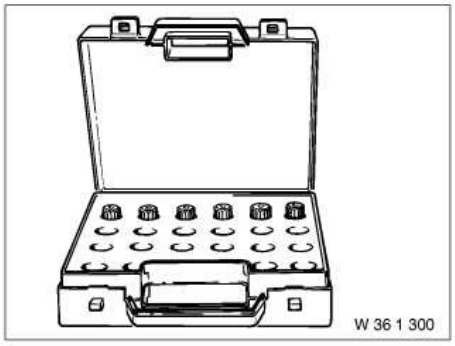
Common	Used in step 33
Usage	(Code 35) With centring bore available separately, (see EPC) under 36 13 6 762 340
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 227 (36 1 329) Wheel stud



Common	Used in step 33
Usage	(Code 36) With centring bore available separately (see EPC) under 36 13 6 762 341
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 228 (36 1 331) Wheel stud



Common	Used in step 33
Usage	(Code 37) With centring bore available separately (see EPC) under 36 13 6 762 342
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

cardiagn.com

0 495 229 (36 1 332) Wheel stud



Common	Used in step 33
Usage	(Code 38) With centring bore available separately (see EPC) under 36 13 6 762 343
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 230 (36 1 333) Wheel stud



Common	Used in step 33
Usage	(Code 40) With centring bore available separately (see EPC) under 36 13 6 762 344
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

2 299 563 Adapter



Common	Used in step 6669
Usage	New adapter for the engine assembly stand. Replacement for 83 30 0 495 189 - 00 2 302.
Included in the tool or work	0 495 187
Storage location	
Replaced by	
In connection with	
SI-Number	

Overview Technical Data

Cylinder head flatness	Used in step 64
Maximum lengthwise deviation from flatness	0.10 mm
Maximum transverse deviation from flatness	0.05 mm

Valve underprotrusion	Used in step 65
	0,8 (0.7 - 0,9) mm

Distance from window pane edge to wiper blade	Used in step 131
Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

Oil quantity between the two markings MIN and MAX of the oil dipstick	Used in step 138
	1.0 l

Links

Repair instructions (PRE)	Used in step
Notes on 48-V battery	4133

General repair instructions	Used in step

cardiagn.com

11 00 ... Overview of consumables (Electronic Parts Catalogue)	88

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5132
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5132
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5132
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5132
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132
61 20 900 Disconnecting and connecting battery earth lead	5132

61 35 ... Notes on ESD protection (Electro Static Discharge)	17181920303143506 1

carsign.com

61 35 ... Notes on ESD protection (Electro Static Discharge)	171819203031435061
00 02 001 Raising the vehicle using a vehicle lift	33105
12 51 010 Replacing wiring harness section for preheating system	72
12 51 010 Replacing wiring harness section for preheating system	72
12 51 010 Replacing wiring harness section for preheating system	72
12 51 010 Replacing wiring harness section for preheating system	72
17 00 008 Draining and topping up coolant for high-temperature circuit	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 008 Draining and topping up coolant for high-temperature circuit	137
17 00 008 Draining and topping up coolant for high-temperature circuit	137
17 00 008 Draining and topping up coolant for high-temperature circuit	137
17 00 008 Draining and topping up coolant for high-temperature circuit	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool

17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	137
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	137
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 009 Check the cooling system for watertightness with a special tool (with a tester)	137
17 00 009 Check the cooling system for watertightness with a special tool (with a tester)	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 008 Draining and topping up coolant for high-temperature circuit	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 008 Draining and topping up coolant for high-temperature circuit	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137

cardiagn.com

11 34 190 Replacing all valve stem seals

WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

RISK OF DAMAGE

Damage to battery terminal, the safety battery terminal or the intelligent battery sensor (IBS).

Damaged battery terminals can lead to malfunctions or vehicle electrical system faults.

- Pull off battery terminal from battery pole by carefully moving to and fro. Do not pry off using a tool.

PRELIMINARY WORK

1 – Bring front compartment lid in the service position

Prerequisite

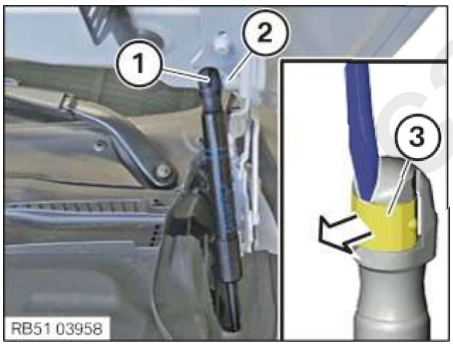
Engine compartment lid is open.

CAUTION

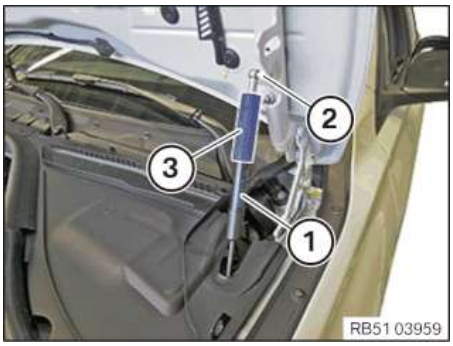
Shutting bonnet or tailgate.

Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.



- Lift clamp (3) slightly using a screwdriver, in the direction of the arrow.
- Lift off ball socket (1) from ball pin (2).
- Repeat the operation on the other side of vehicle.



TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

- Remove the bonnet support and open the bonnet further.
- Pull special tool or or (3) over gas pressure spring (1).
- Place special tool on the ball pin (2) and engage using force.
- Repeat the operation on the other side of vehicle.

2 – Disconnecting all battery earth leads

cardiagn.com



- See additional information.

3 – Removing the acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

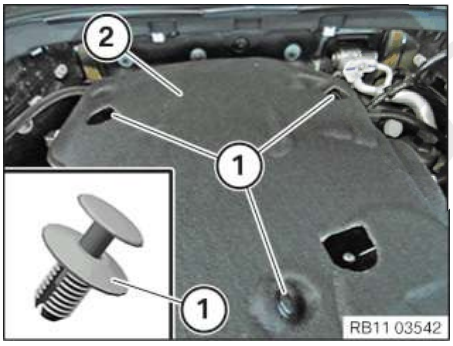
Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



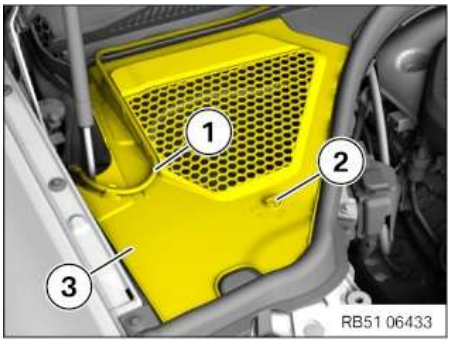
- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

4 – Remove the acoustic cover for the injectors



- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

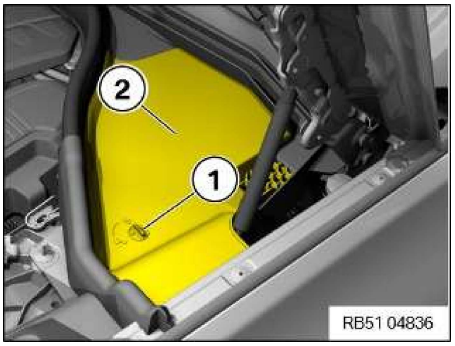
5 – Remove the cover of the rear right engine compartment



- Release washer fluid hose (1) from the guides.
- Loosen the lock (2).
- Remove the cover (3) of the rear right engine compartment.

6 – Remove the cover of the engine compartment at the rear left

cardiagn.com



- Loosen the lock (1).
- Remove the cover (2) of the rear left engine compartment.

7 – Removing the wiper arm on the left and right

NOTICE

Description is for left component only. Procedure on the right side is identical.

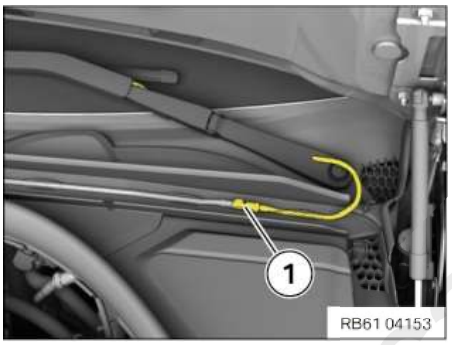
▸ **Remove the wiper arm**

RISK OF DAMAGE

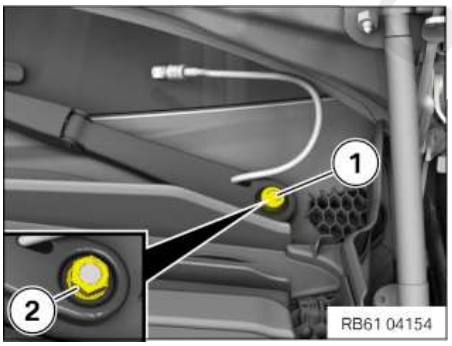
Damage to wiper console.

While removing the wiper arms without using special tool, the wiper console can break.

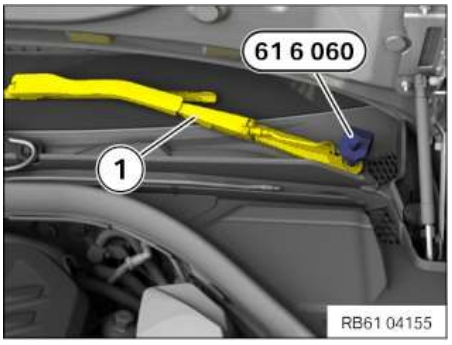
- Removing the wiper arms must be carried out only using the prescribed special tool.
- Do **not** lever off the wiper arm because otherwise the wiper console may break at the predetermined breaking point for active pedestrian protection.



- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.



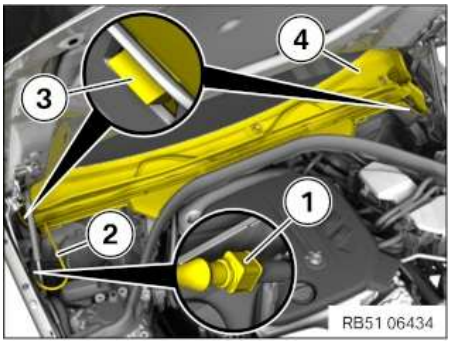
- Remove the protective cap (1).
- Loosen nut (2).



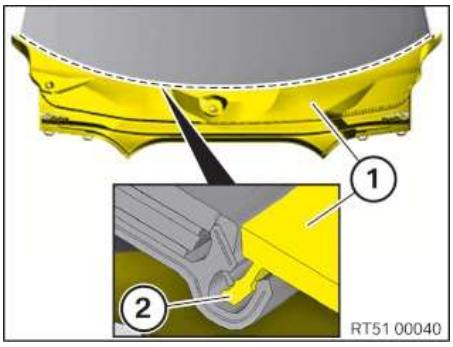
- Pull off the wiper arm (1) using special tool .

8 – Remove cowl panel cover

cardiagn.com



- Release snap fastener (1) of the washer fluid hose (2) and put the washer fluid hose (2) to one side.
- Unclip clips (3) on the cowl panel cover (4).



- Pull the cowl panel cover (1) upward out of the latch mechanism (2) beginning on the side.

9 – Remove the seal for the rear bonnet

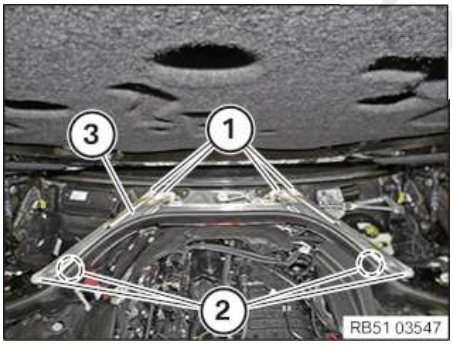


- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

10 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

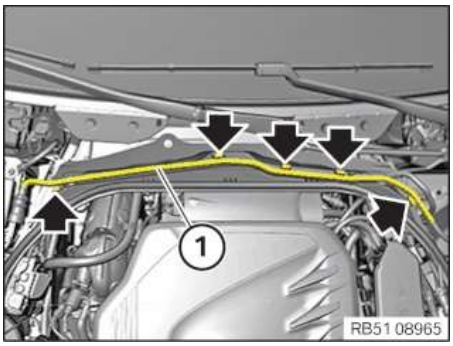
Driving without the strut brace/front-end strut or tension strut is not permitted.



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

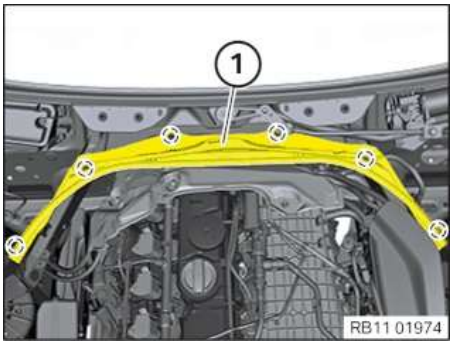
- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.



- **Version with mild hybrid technology:**

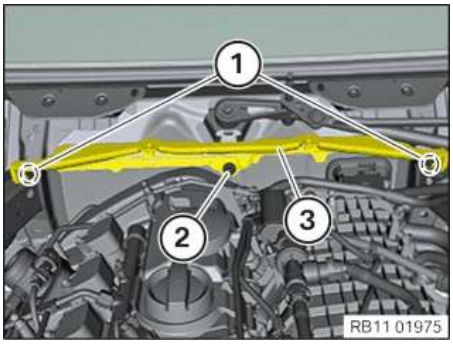
  Unclip the wire (1) at the holders (arrows).

carsdiagn.com



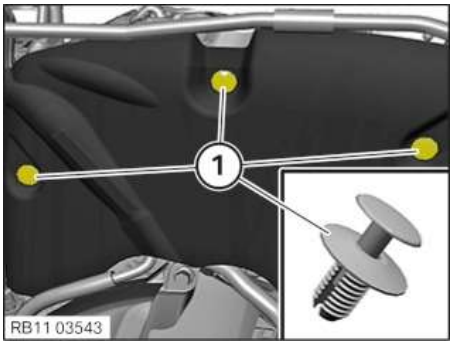
- Unscrew the bolts in the marked areas.
- Remove the centre bulkhead upper part (1).

11 – Removing the centre bulkhead lower section

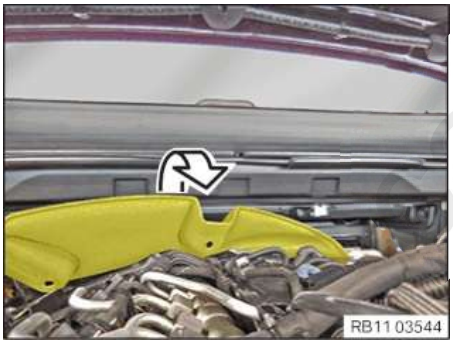


- Loosen screws (1).
- Loosen nut (2).
- Remove the centre bulkhead lower part (3).

12 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).

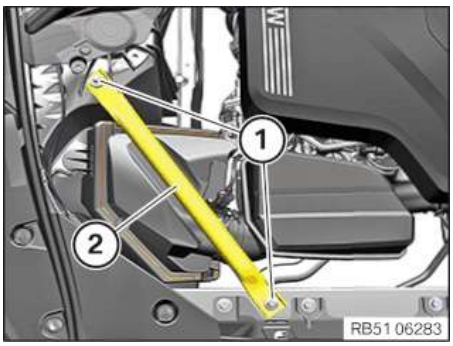


- Guide out and remove the acoustic cover in the direction of the arrow.

13 – Remove right front-end strut

TECHNICAL INFORMATION

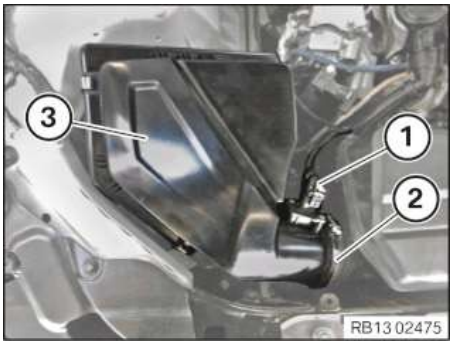
Driving without the strut brace/front-end strut or tension strut is not permitted.



- Loosen screws (1).
- Remove the front-end strut (2).

cardiagn.com

14 – Removing intake silencer housing



- Unlock plug connection (1) and disconnect.
- Unfasten clamp (2).
- Pull out and remove the intake silencer housing (3) from the rubber mounts towards the top.

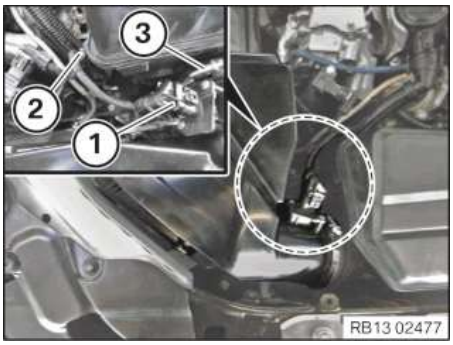
15 – Removing the clean air pipe with the resonator

WARNING

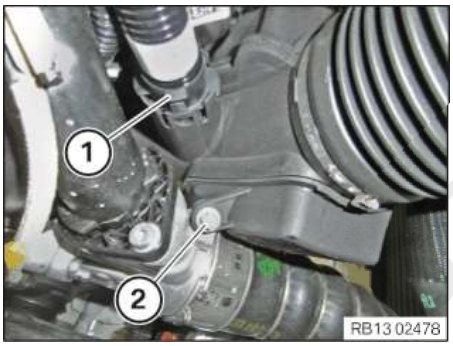
Hot surfaces.

Risk of burning!

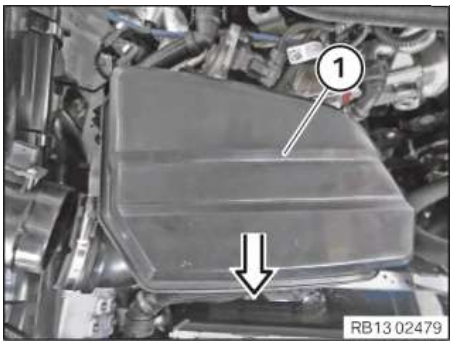
- Perform all work only on components that have cooled down.



- Unlock plug connection (1) and disconnect.
- Loosen clamp (2).
- Unfasten clamp (3).
- Separate the clean air pipe with resonator from the intake filter housing.



- Unlock engine ventilation line (1), disconnect it and place it aside.
- Loosen screw (2).



- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Unlock and loosen clamp (1).



- Feed out and remove clean air pipe with resonator (1) in the direction of the arrow.

16 – Remove differential pressure sensor for the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

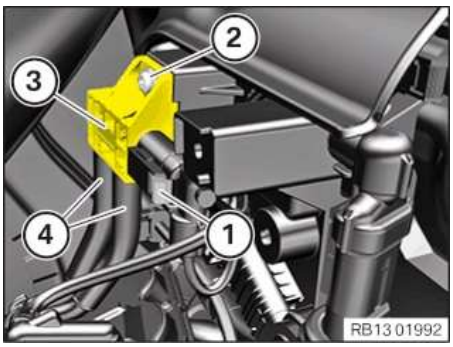
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).
- Pull off pressure hose (4).
- Feed out differential pressure sensor (3) and remove.

17 – Remove the exhaust temperature sensor on the diesel particulate filter

cardiagn.com

WARNING

Hot surfaces.

Risk of burning!

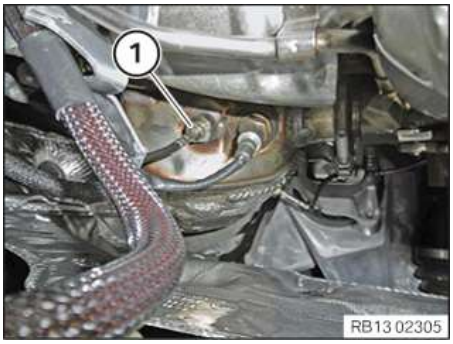
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

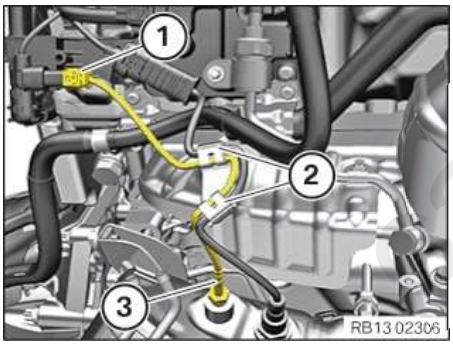
Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)



- Release exhaust temperature sensor (1) using special tool .



- Unlock plug connection (1) and disconnect.
- Remove the exhaust temperature sensor (3) from the clamps (2).
- Feed out and remove exhaust temperature sensor (3).

18 – Removing the front oxygen sensor on the diesel particulate filter on top

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

carlagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

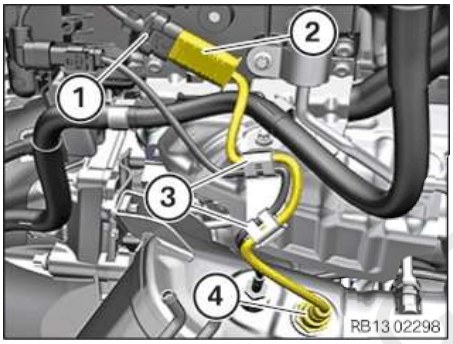
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



- Unlock plug connection (1) and disconnect.
- Unlock and disconnect connector (2).
- Pull the front oxygen sensor (4) out from the clamps (3) and remove it.



- Release the front oxygen sensor (1) with the standard tools and remove it.

19 – Removing the exhaust temperature sensor for the exhaust system downstream the catalytic converter at the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

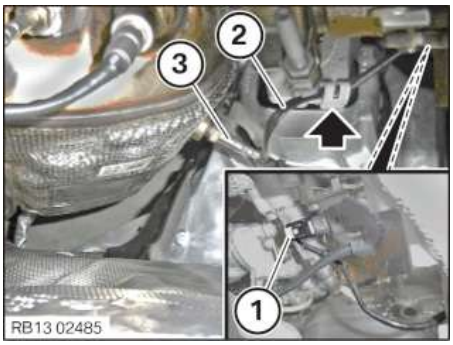
cardiagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

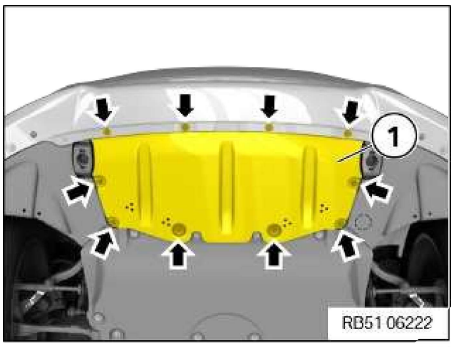


- Unlock plug connection (1) and disconnect.

Note: The exhaust temperature sensor is located near the right engine mount.

- Release cable (2) from the clamps (arrow).
- Loosen exhaust temperature sensor (3).
- Feed out and remove exhaust temperature sensor (3).

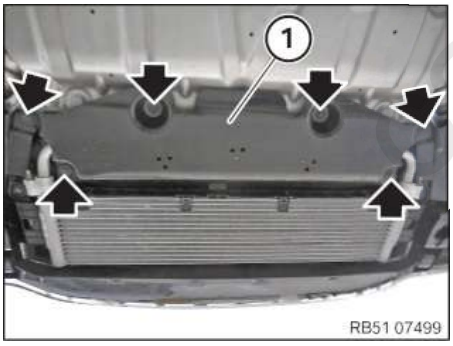
20 – Removing the front underbody protection



- **Version A:**

  Remove screws (arrows).

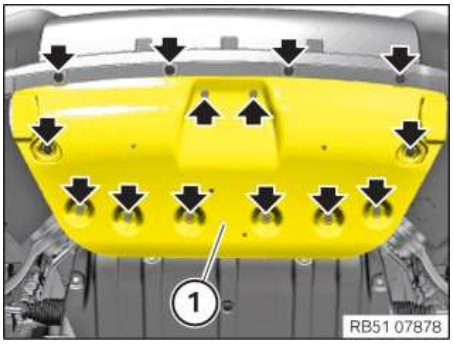
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version B:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

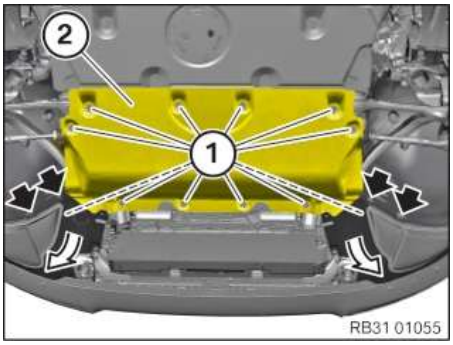


- **Version C:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

21 – Remove the underbody protection of the steering gear



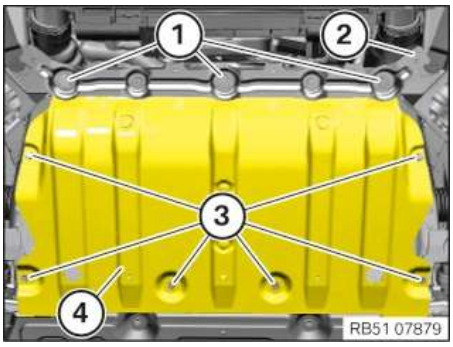
- **Version A:**

  Unscrew the screws (arrows) of the wheel arch cover on the wheel arch cover.

  Fold the bottom wheel arch cover to the side.

  Loosen screws (1).

  Remove the underbody protection (2) of the steering gear.



- **Version B:**

  Loosen screws (1).

  Remove the holder (2) for the underride protection.

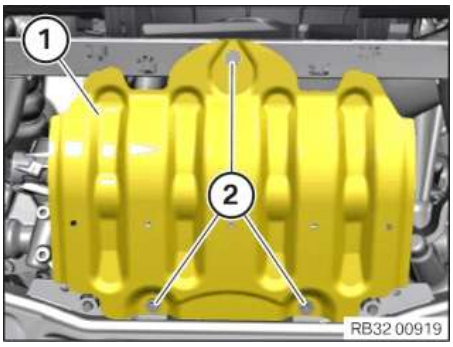
  Loosen screws (3).

  Feed out and remove the underbody protection (4) of the steering gear.

22 – If installed: Removing the steering underbody protection

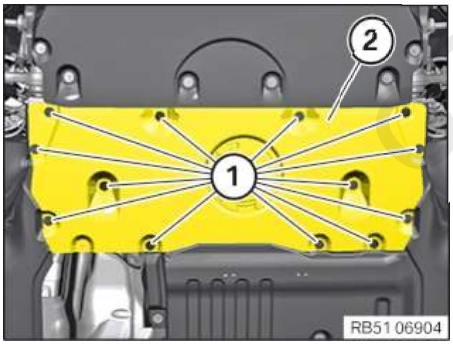
Prerequisite

Front underbody protection has been removed.



- Loosen screws (2).
- Remove underbody protection (1).

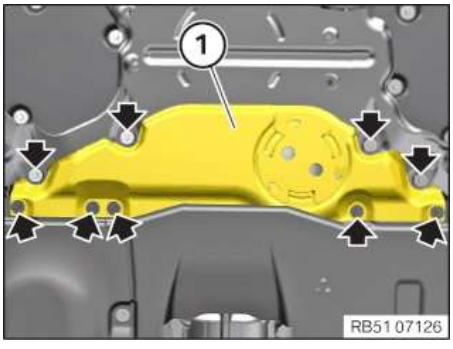
23 – Removing the centre underbody protection



- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .



- **Version with all-wheel drive:**

  Remove screws (arrows).

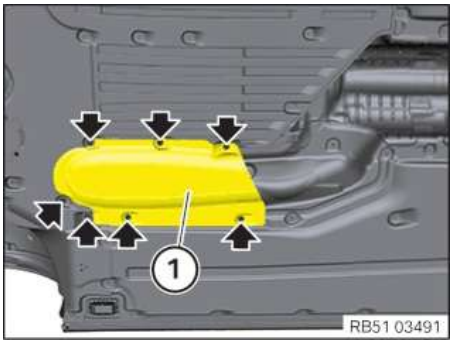
  Feed out and remove the centre underbody protection (1).

24 – Remove the underbody panelling of the transmission on the side

cardiagn.com

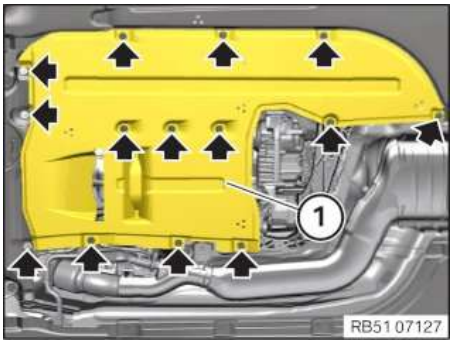
NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.



- Remove screws (arrows).
- Remove the underbody panelling (1).

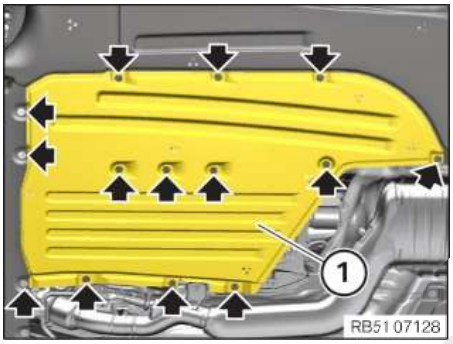
25 – Remove rear underbody protection



- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).

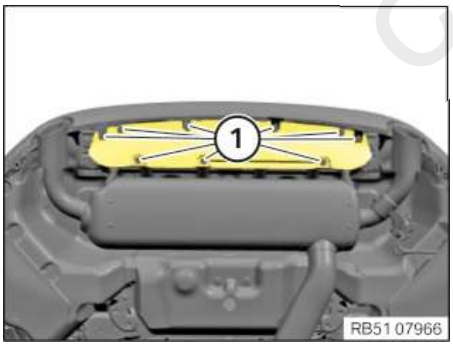


- **Version B:**

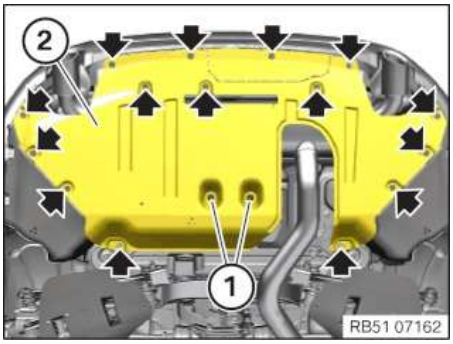
  Remove screws (arrows).

  Guide out rear underbody protection (1) and remove it.

26 – Removing the rear diffuser



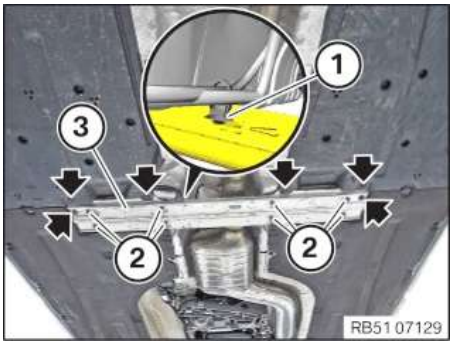
- **Version 1:**
- Release the screws and nuts (1).
- Remove the diffuser.



- **Version 2:**
- Loosen nuts (1).
- Remove screws (arrows).
- Guide out and remove rear diffuser (2).

27 – Remove the connecting support from the tunnel

cardiagn.com



- Remove screws (arrows).

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Loosen clamp (1).
- Loosen screws (2).
- Guide out and remove connecting support (3) on the tunnel.

28 – Remove exhaust system

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

CAUTION

Component with heavy weight.

Danger of injury!

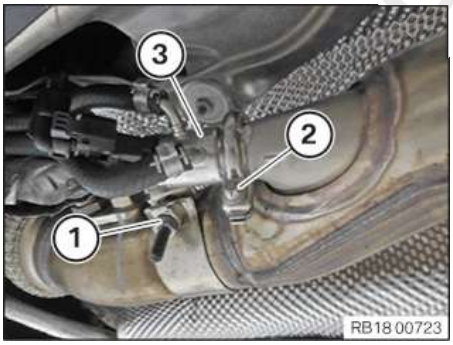
- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

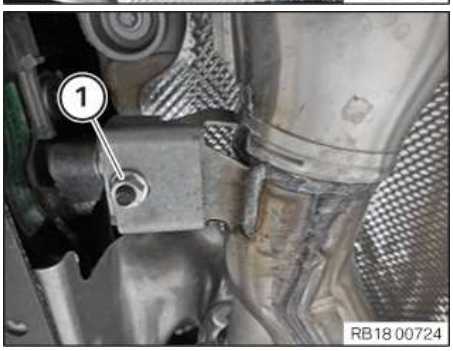
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

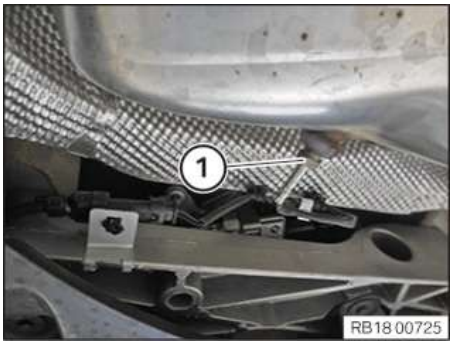


- Unfasten clamp (1).
- Detach the clamp (2) of the SCR metering module (3).
- Detach the SCR metering module (3)from the exhaust system and place to one side.

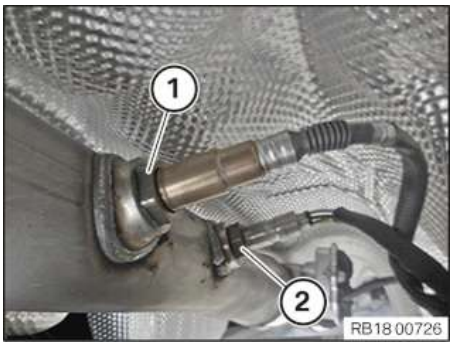


- Loosen nut (1).

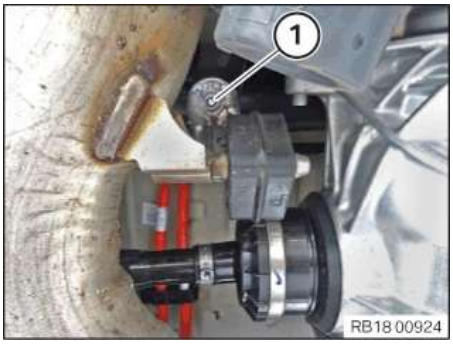
cardiagn.com



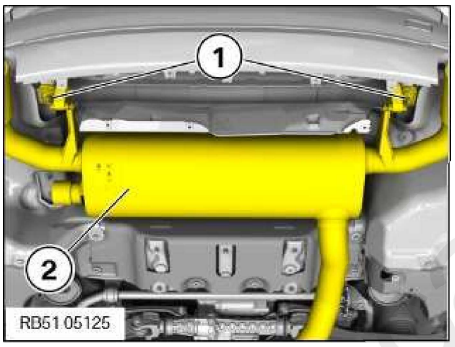
- Detach the exhaust temperature sensor (1) from the exhaust system.



- Release the diesel particulate sensor (1) from the exhaust system and place to one side.
- Release the nitrogen oxide sensor (2) from the exhaust system and place to one side.



- Release the nut (1) on the rear axle support.



- Loosen nuts (1).
- Lower and remove the exhaust system (2) with the assistance of a second person.

29 – Removing the monitoring oxygen sensor after the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

cardiagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

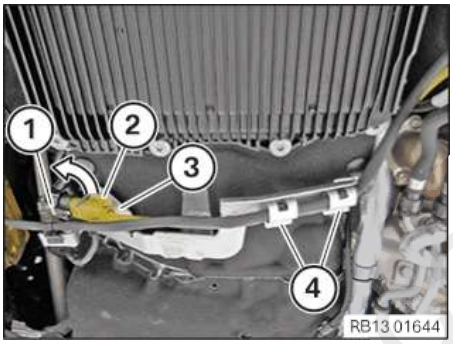
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



- Unlock and loosen connector (1).
- Loosen connector (2) from the holder (3) in direction of arrow.
- Release the monitoring oxygen sensor from the clamps (4).



- Release the monitoring oxygen sensor (1) with the standard tools.



- Thread out the monitoring oxygen sensor (1) and remove it.

carsdiagn.com

30 – Removing the nitrogen oxide sensor before SCR catalytic converter

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

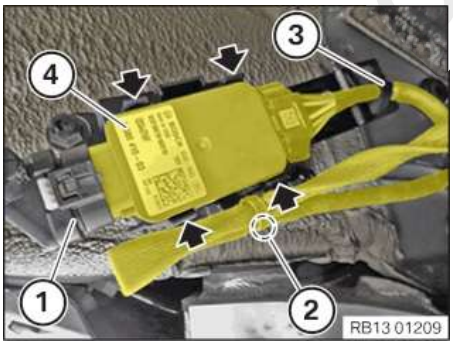
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

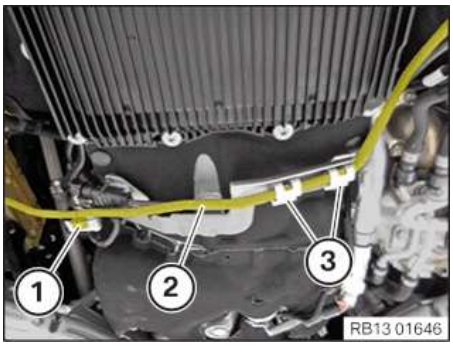
Damage to the nitrogen oxide sensor.

Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

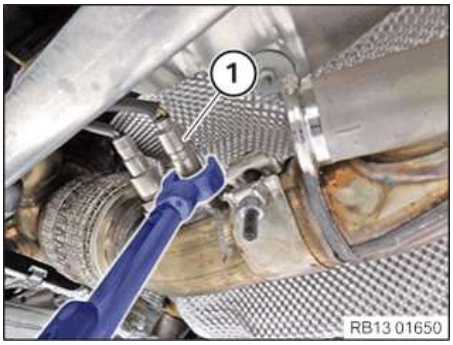
- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
- The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.



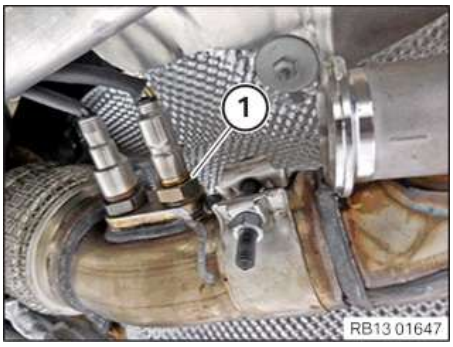
- Unlock plug connection (1) and disconnect.
- Release cable clip in area (2).
- Release line from the holder (3).
- Unclip control unit (4).



- Loosen clamp (1).
- Loosen the cables (2) from the clamps (3).



- Loosen the nitrogen oxide sensor (1) using commercially available tools.



- Feed out and remove the nitrogen oxide sensor (1).

31 – Removing the diesel particulate filter

WARNING

Hot surfaces.

Risk of burning!

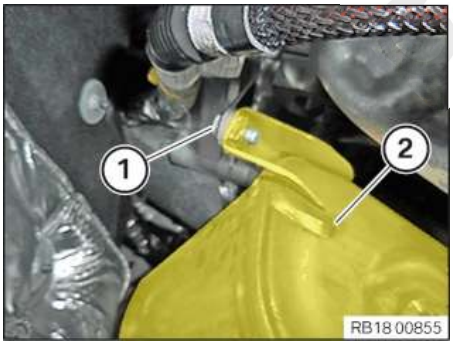
- Perform all work only on components that have cooled down.

CAUTION

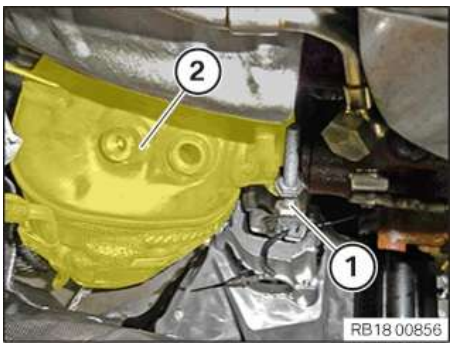
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

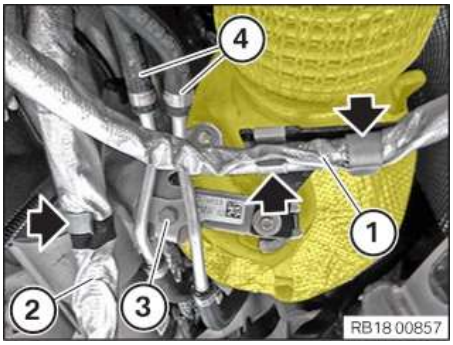


- Release bolt (1) from the holder of diesel particulate filter (2).

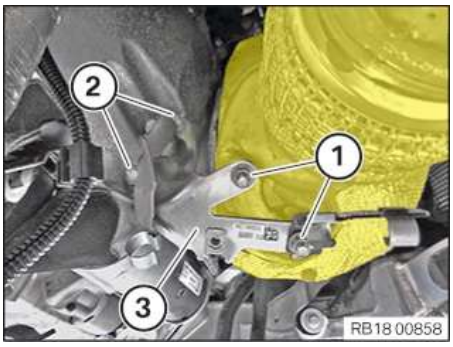


- Loosen V-band clamp (1).
- Feed V-clip (1) out from diesel particulate filter (2) and remove.

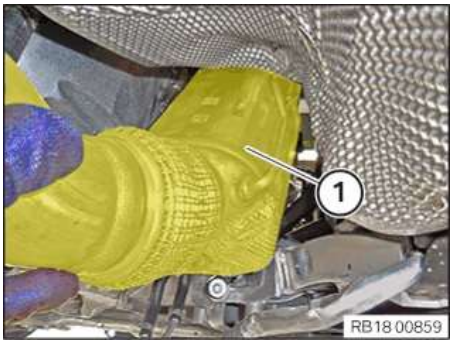
boardiagn.com



- Release the metering line (1) from clamps (Arrows).
- Release positive battery cable (2) from starter motor from clamp (Arrow).
- Loosen screw (3).
- Thread off coolant line (4) and place to the side.



- Loosen nuts (1).
- Loosen screws (2).
- Guide out and remove holder (3).



- Guide out and remove diesel particulate filter (1).

32 – Remove front right wheel

▸ **Removing the wheel**



TECHNICAL INFORMATION

A wheel lift is recommended for easier wheel removal and installation without exertion (see Retailer Equipment Catalogue).

- **In vehicles with M Carbon ceramic brake: The wheel lift must be used to remove the wheel.**

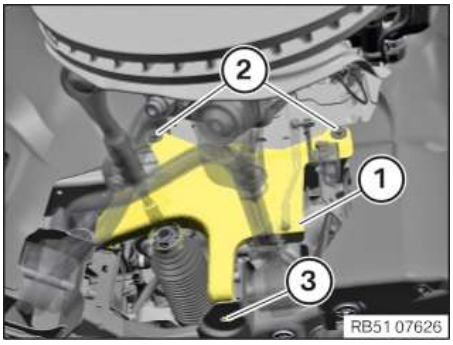
  This process is intended to prevent damage to the brake disc.

carsdiagn.com



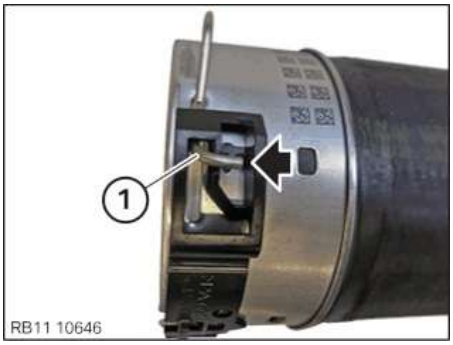
- If several wheels are removed at the same time: Use a piece of chalk to mark on each tyre the axle and side on which the corresponding wheel is fitted.
- Release the wheel bolts (arrows) crosswise and remove the wheel.
- To release and tighten wheel bolts with a security code: Use the correct adapter from the set of special tools .

33 – Remove the cover of the steering assembly



- Loosen screws (2) and (3).
- Remove the cover (1).

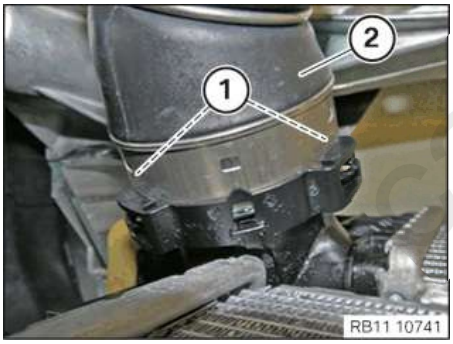
34 – Remove pressure pipe between exhaust turbocharger and charge air cooler



- **Version A:**

  Unlock lock (1).

  The lock (1) must snap audibly into place when unlocked (see arrow).



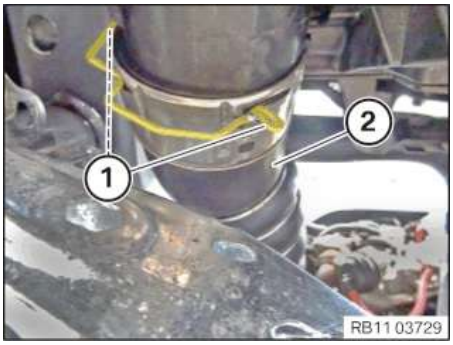
- Unlock the locks (1) on both sides and snap into place.
- Pull off pressure pipe (2) from charge air cooler.



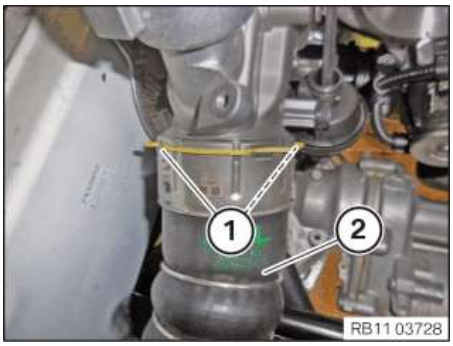
- **Version B:**

  Unlock clamp (1) and engage in this position.

cardiagn.com



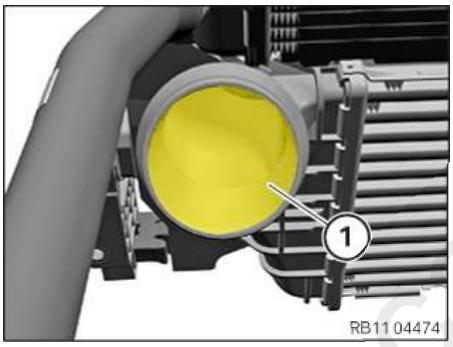
- Unlock the locks (1) and snap into place.
- Pull off pressure pipe (2) from charge air cooler.



- Unlock the lock (1) and engage.
- Pull off pressure pipe (2) from the compressor bypass.



- Remove pressure pipe (1) in upward direction.



NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

- Lock the opening (1) of the charge air cooler with a suitable auxiliary material.

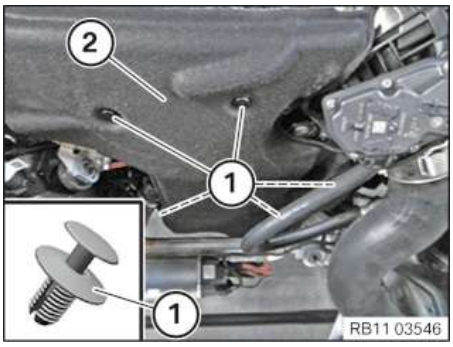
35 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.



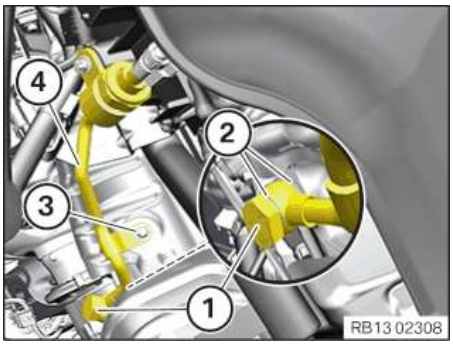
- Release and remove expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

carolagn.com

36 – Remove the exhaust gas pressure pipe



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).



- Unscrew the banjo bolt (1).
- Feed out and remove the sealing rings (2).
- Loosen screw (3).
- Feed out and remove the exhaust gas pressure pipe (4).

37 – Removing the sensor bracket on the cylinder head cover

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

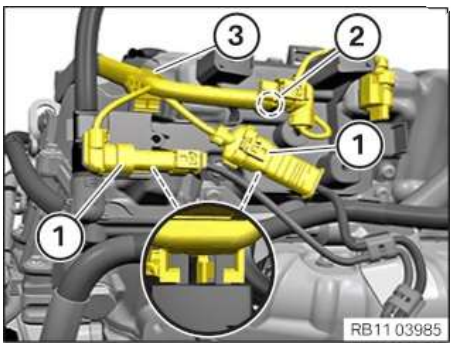
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

Contaminant or foreign body.

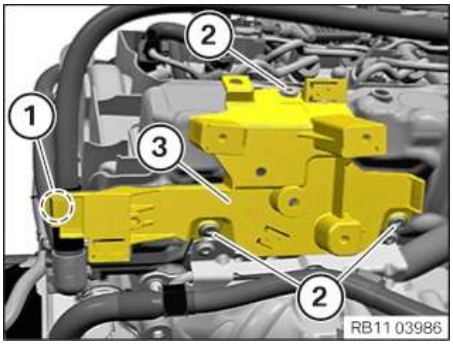
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Unlock plug connection (1) and disconnect.
- Unlock the plug connection (1) and release it from the sensor bracket.
- Release the cable clip in the area (2) from the sensor bracket.
- Release the clamps (3) and set the wiring harness section aside.

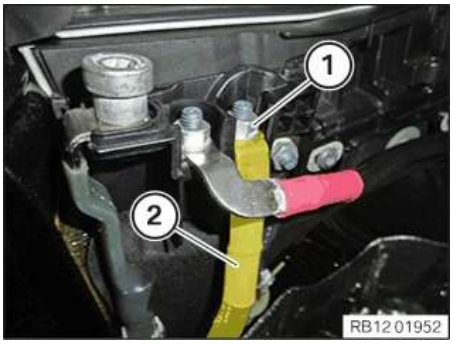
cardiagn.com



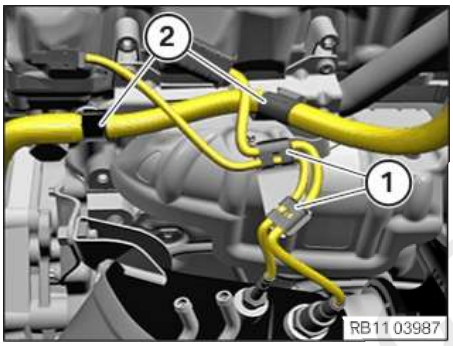
- Release the positive battery cable in the area (1) from the clamp and set it aside.
- Loosen screws (2).
- Feed out holder (3) for the sensor system and remove.



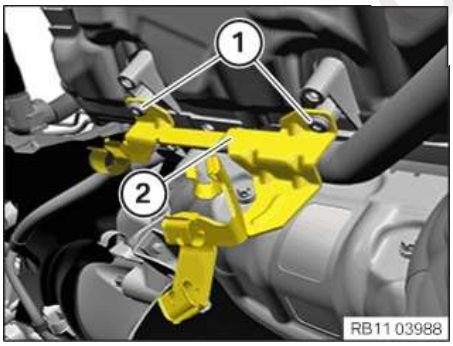
- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.



- Loosen nut (1).
- Feed out positive battery cable (2) and put to one side.



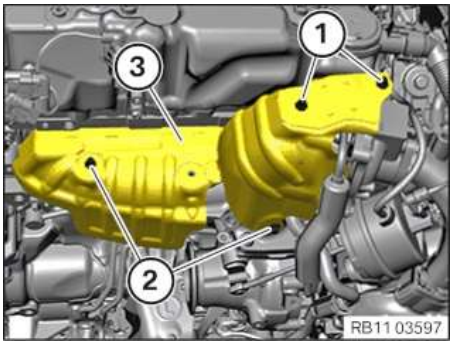
- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



- Loosen screws (1).
- Guide out and remove holder (2).

38 – Removing heat shield

cardiagn.com



- Loosen screws (1).
- Loosen screws (2).
- Feed out and remove the heat shield (3).

39 – Removing the high-pressure stage exhaust turbocharger and low-pressure stage turbocharger

CAUTION

Heavy component.

Heavy components can lead to injury or damage.

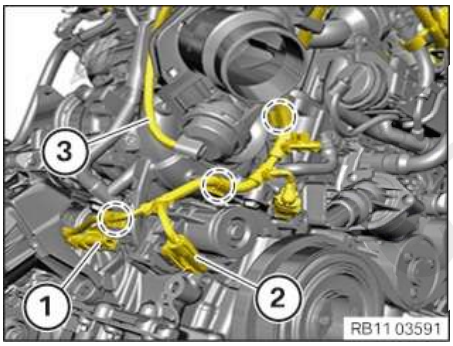
- Remove and install heavy components with the aid of another person/other persons.

TECHNICAL INFORMATION

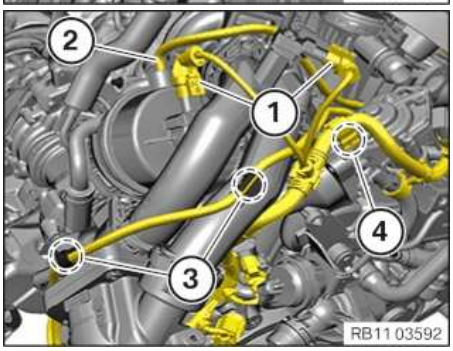
Prior to replacing the exhaust turbocharger: Observe the notes on troubleshooting on the exhaust turbocharger.
For additional information see: FUB-FUB-FB-130003-A10 Troubleshooting on the exhaust turbocharger

TECHNICAL INFORMATION

With exhaust turbocharger damage, it is imperative to observe the additional information.
For additional information see: 11 65 020 Exhaust turbocharger damage due to plugged oil supply lines



- Release plug connection in area (1) from holder.
- Unlock plug connection (2) and disconnect.
- Release the wiring harness in the marked areas from the exhaust turbochargers.
- Pull off the vacuum hose (3).



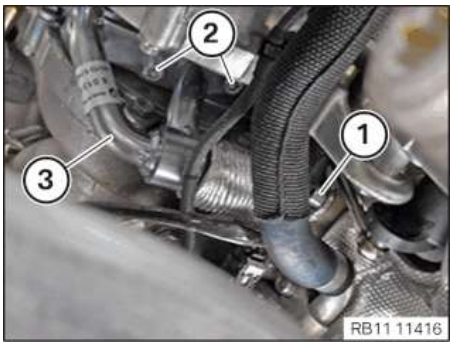
- Unlock plug connections (1) and disconnect.
- Pull off the vacuum hose (2).
- Release the vacuum hose in marked areas (3) from the exhaust turbochargers.
- Release the wiring harness in area (4) from the exhaust-gas recirculation cooler and set it aside.



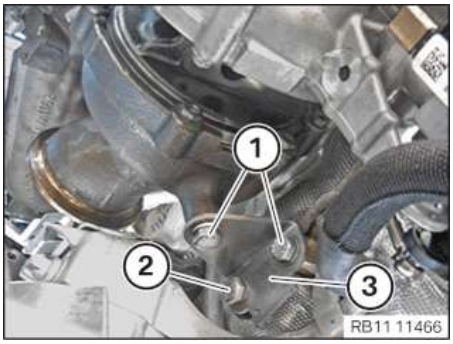
TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

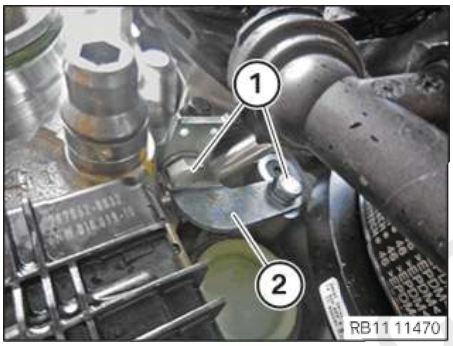
- Release the screws of the oil return line on the crankcase from the right wheel arch.



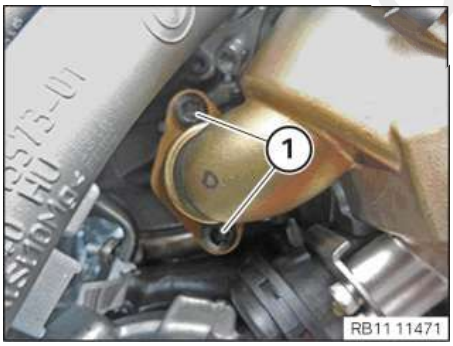
- Release the screw (1).
- Loosen screws (2).
- Remove oil return line (3) from the crankcase.
- Catch and dispose of emerging engine oil.



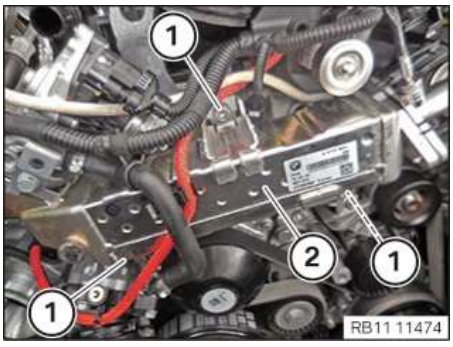
- Unscrew and remove the bolts (1) on the holder (3).
- Slacken screw (2) on holder (3), but do **not** remove.



- Loosen screws (1).
- Guide out and remove holder (2).

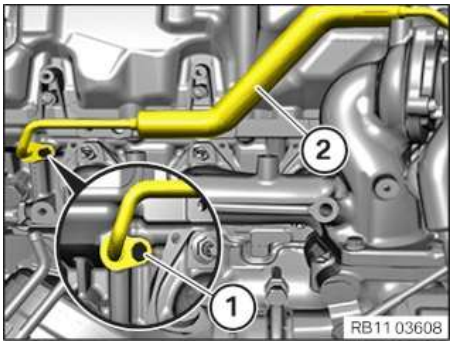


- Loosen screws (1).

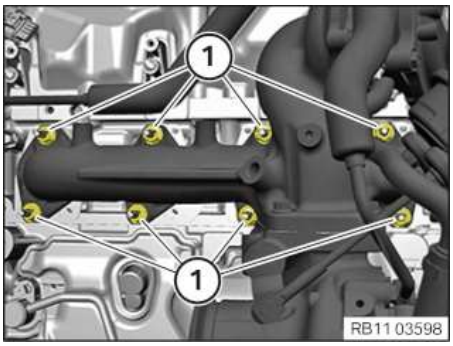


- Slacken screws (1), but do **not** remove.
- Release exhaust-gas recirculation cooler (2) slightly.

cardiagn.com



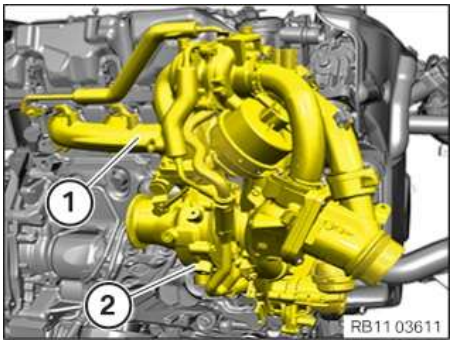
- Loosen screw (1).
- Remove oil feed line (2) for the high-pressure stage exhaust turbocharger from the cylinder head and set it aside.
- Catch and dispose of emerging engine oil.



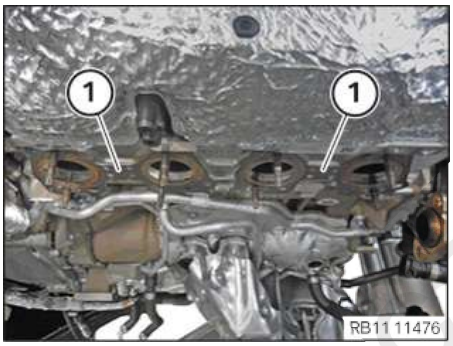
TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

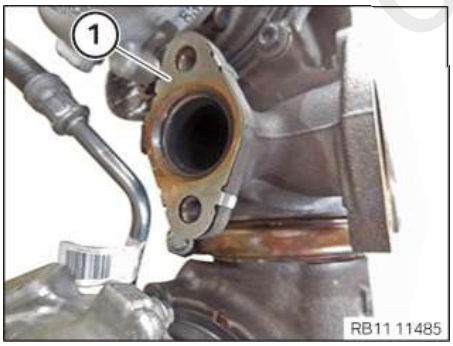
- Loosen nuts (1).



- Guide out exhaust manifold (1) with the high-pressure stage exhaust turbocharger and the low-pressure stage exhaust turbocharger (2) forward towards the top and remove.



- Guide out and remove gaskets (1).



- Guide out and remove gasket (1).

40 – Draining coolant

WARNING

Hot fluids.

Risk of scalding!

- Conduct all work in the vehicle wearing appropriate personal protective equipment only.

cardiagn.com

CAUTION

Materials harmful to health.

Contact with fluids harmful to health!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.

TECHNICAL INFORMATION

Life-long fill of coolant!

Do not reuse used coolant.

When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be emptied and refilled.

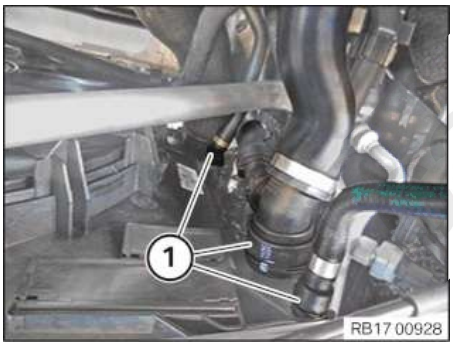
In the case of other removal work involving the draining of part quantities of coolant, the coolant level must be topped up with new coolant.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Loosen sealing cap (1) from the coolant expansion tank.



NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

- Unlock all coolant lines (1) and detach.
- Catch and dispose of escaping coolant.



- Unlock and loosen coolant line (1).
- Catch and dispose of escaping coolant.

41 – Partially releasing the wiring harness section on the intake plenum

cardiagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

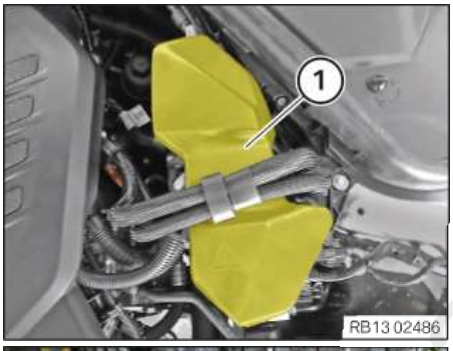
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

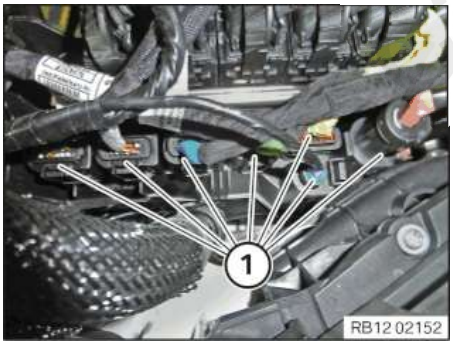
- Do not pull on the wires when disconnecting connectors and plug connections.

TECHNICAL INFORMATION

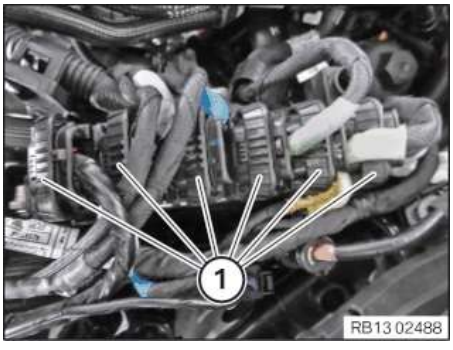
Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.



- Pull off cover (1) upwards, feed out and remove.

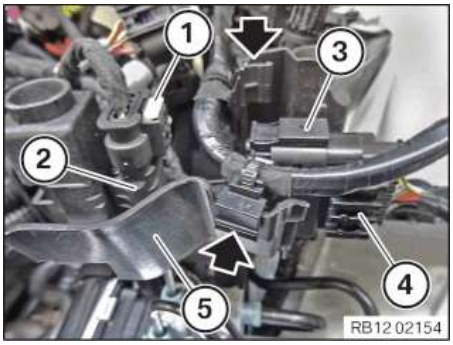


- Unlock and disconnect plug connections (1).

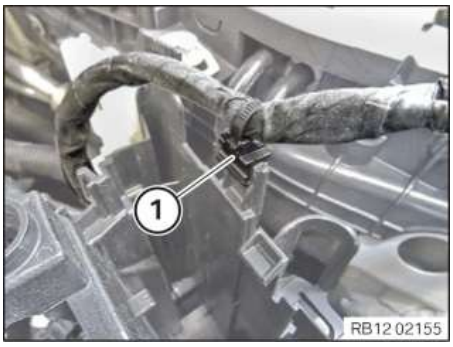


- Unlock and disconnect plug connections (1).

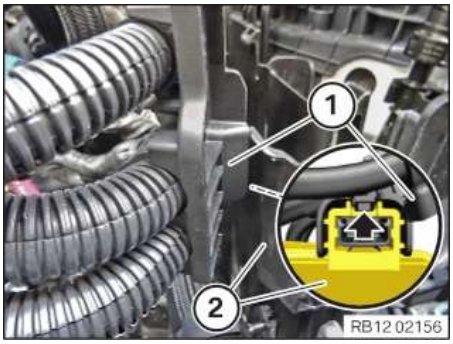
cardiagn.com



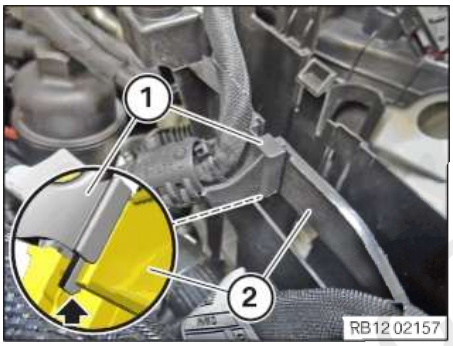
- Unlock plug connection (1) and disconnect.
- Unlock the plug (2) and disconnect from the control unit holder (5).
- Unlock plug connection (3) and disconnect.
- Unlock the plug (4) and disconnect from the control unit holder (5).
- Release the clamps (arrows).



- Loosen clamp (1).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).

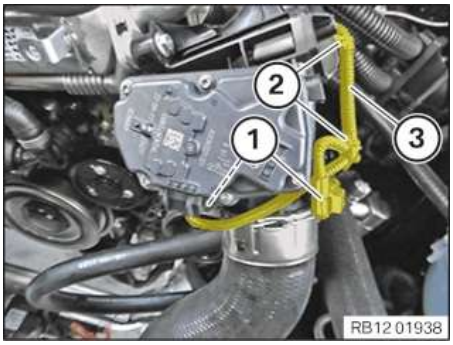


- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.

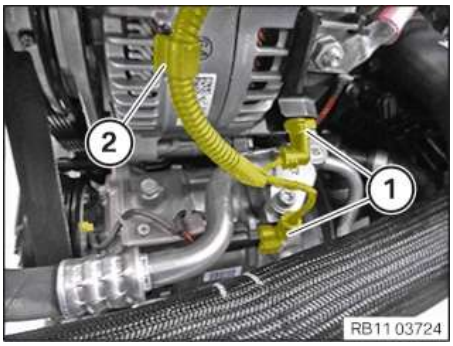


- Unlock holder (1) and feed out coolant line (2) and place it aside.

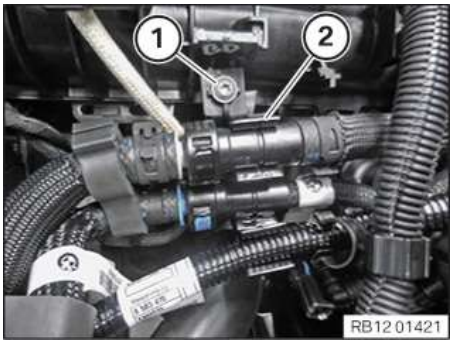
gardiagn.com



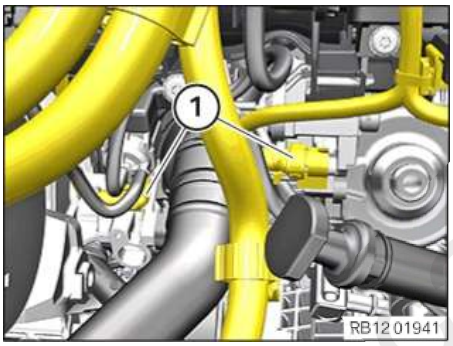
- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.



- Unlock and separate plug connections (1).
- Release the holder (2) from the alternator .



- Loosen screw (1).
- Thread out holder (2) and set aside.



- Unlock and disconnect plug connections (1).

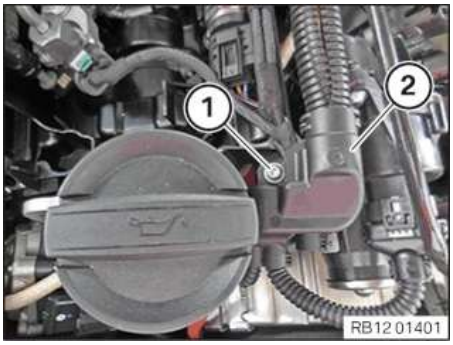


- Unlock and loosen connector (1).

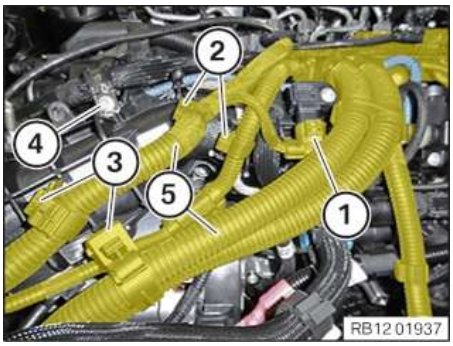


- Unlock plug connection (1) and disconnect.

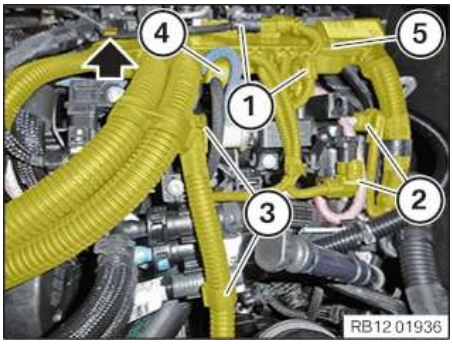
cardiagn.com



- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.



- Unlock plug connection (1) and disconnect.
- Loosen clamps (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.



- Unlock and disconnect plug connections (1).
- Release line from clamp (Arrow).
- Unlock and disconnect plug connections (2).
- Loosen clamps (3).
- Loosen screw (4).
- Remove the wiring harness section (5) and put to one side.

42 – Removing the intake plenum

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

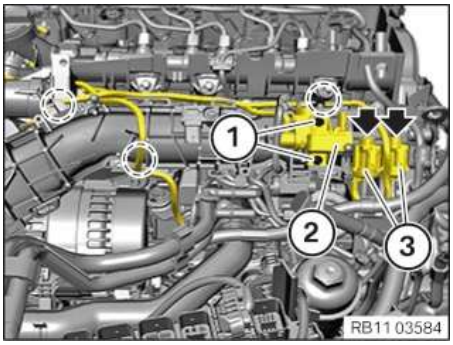


- Unlock clamp (1) and engage in this position.

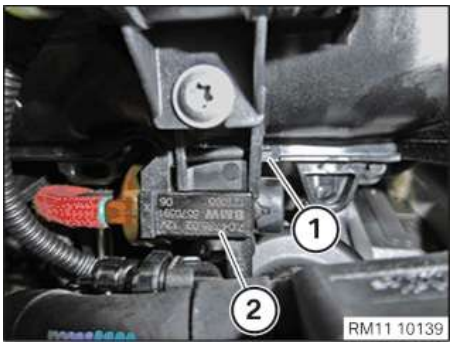


- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.

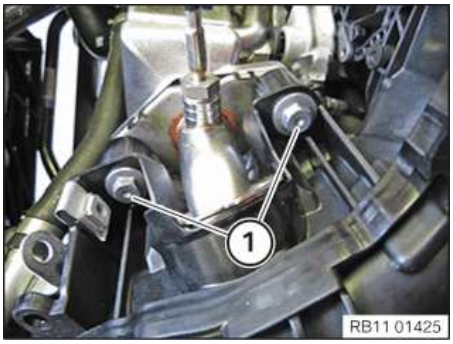
cardiagn.com



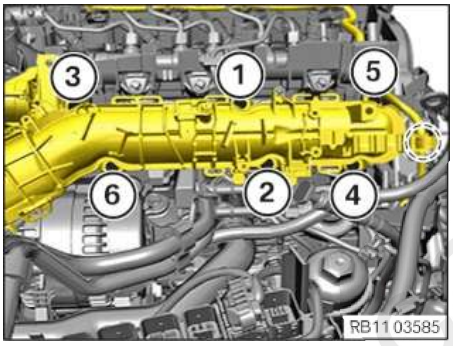
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



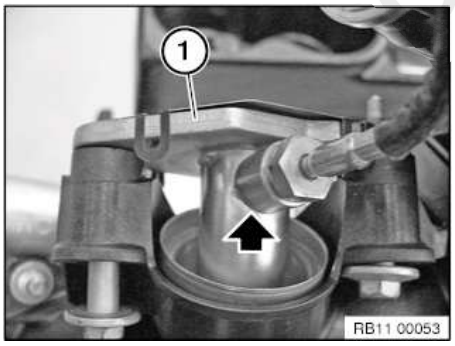
- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.



- Loosen screws (1).



- Detach the leakage oil lines in the marked area from the intake plenum.
- Loosen screws in the order (6) to (1).
- Guide the intake plenum out forwards and remove it.



- Remove the exhaust-gas recirculation pipe (1) (arrow).

43 – Removing the exhaust-gas recirculation cooler

▸ **Avoiding damage to the starter generator due to escaping coolant**

cardiagn.com

RISK OF DAMAGE

Escaping coolant on the starter generator.

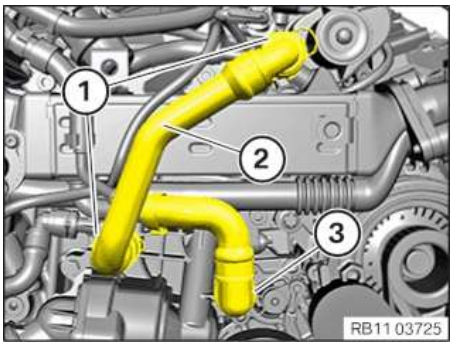
Damage and operating failure of the starter generator.

- Cover the starter generator with suitable, watertight auxiliary materials.
- Close off line connections with seal plugs.
- If necessary: Flush the leaked coolant from the starter generator with at least 1 l water.



- **Version A:**

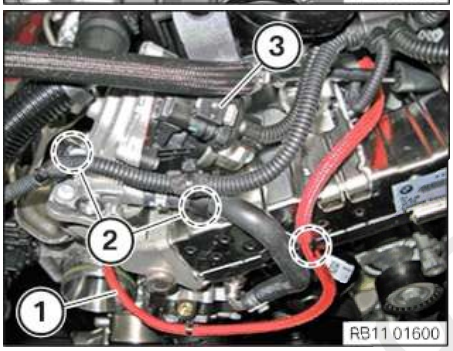
  Unlock and pull off coolant lines (1).



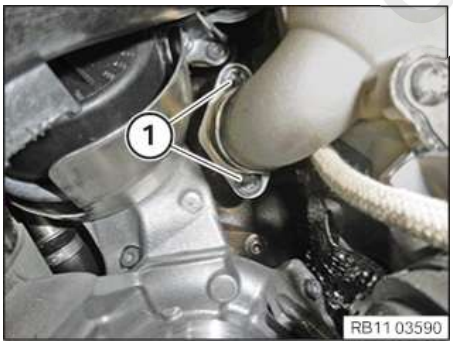
- **Version B:**

  Unlock locks (1) and remove thee coolant line (2).

  Unlock coolant line (3) and pull it off the thermostat.



- Loosen the vacuum line (1) from the exhaust-gas recirculation cooler and detach in the highlighted area.
- Loosen the vehicle wiring harness from the exhaust-gas recirculation valve and the coolant line at the clips (2).
- Unlock and disconnect the connector (3) at the exhaust-gas recirculation valve.



- Release the bolts (1) from the exhaust-gas recirculation cooler.

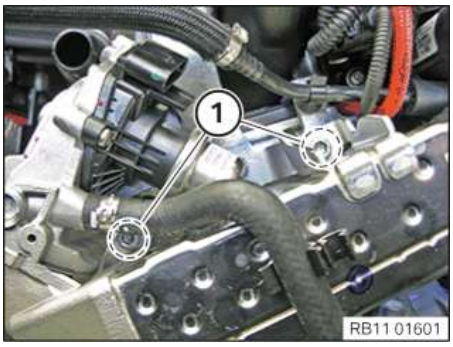


- Loosen the screws (1) on the intake system.

carmagn.com



- Loosen the screw (1) below the exhaust-gas recirculation cooler.



- Loosen screws (1).
- Remove exhaust-gas recirculation cooler.

44 – Detaching the leakage oil line from the injectors

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

WARNING

Hot surfaces.

Risk of burning!

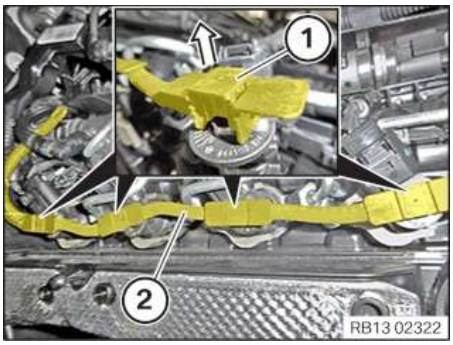
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



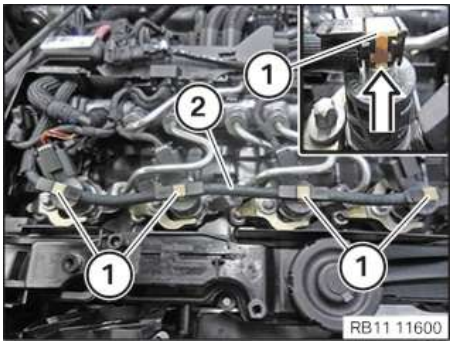
- **Version A:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.

cardiagn.com

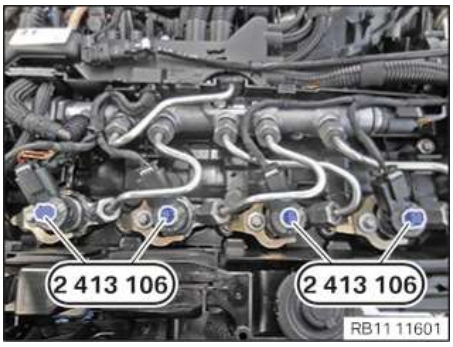


- **Version B:**

  Unlock the locks (1) in the direction of the arrow.

  Remove the leakage oil line (2) and put it to one side.

  Catch and dispose of escaping fuel.



- Seal open connections with special tools .

45 – Remove the high pressure lines between the injector and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

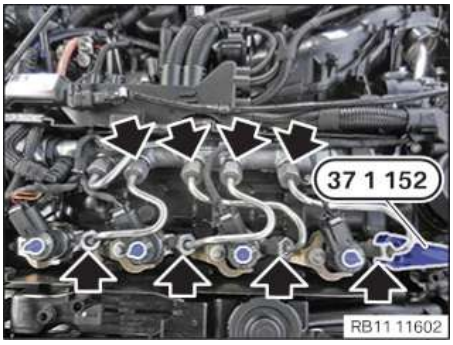
cardiagn.com

TECHNICAL INFORMATION

If several high pressure lines are removed, ensure that each high pressure line is installed in its original location. Label high pressure lines.

TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.



- Release the high pressure lines (arrows) with the special tool .
  Reset the special tool early on to prevent bending of the high pressure line.
- Catch and dispose of escaping fuel.
- Feed out and remove the high pressure lines (arrows).
- Seal off all the open cable connections with the special tool .

46 – Remove the high pressure line between the high pressure pump and the rail

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Hot fluids.

Risk of scalding!

- Conduct all work in the vehicle wearing appropriate personal protective equipment only.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

cardiagn.com

TECHNICAL INFORMATION

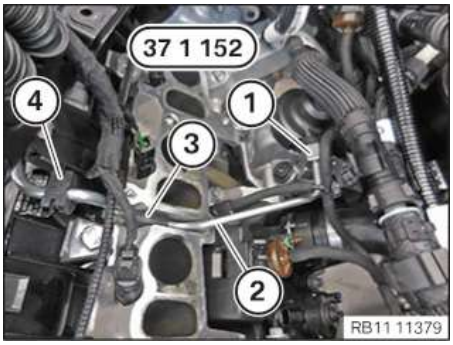
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

TECHNICAL INFORMATION

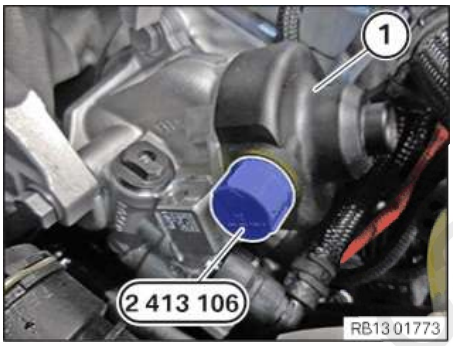
Reset special tool in early to avoid bending pressure lines.



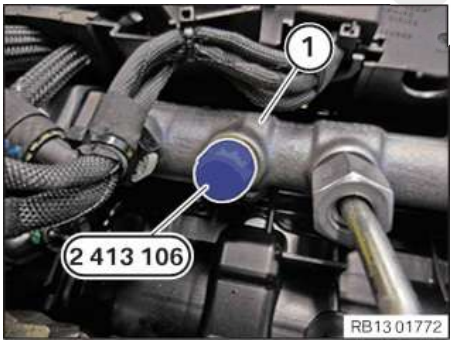
- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.



- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.
- Guide out and remove the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).



- Seal off the opening at the high pressure pump (1) with the special tool .



- Seal off the opening on the rail (1) with the special tool .

47 – Remove high-pressure rail

cardiagn.com

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

RISK OF DAMAGE

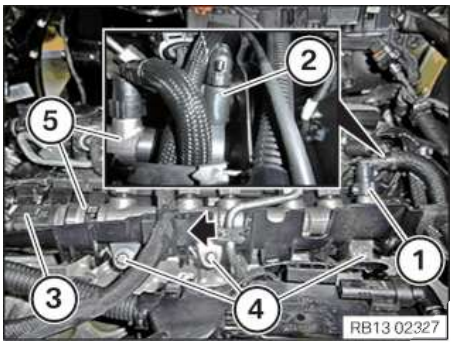
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Unlock and disconnect the fuel return line (1).
- Guide the fuel return line (1) out and set it aside.
- Unlock and disconnect the plug connection (2) on the rail pressure regulating valve.
- Unlock and disconnect the plug connection (3) on the rail pressure sensor.
- Unlock cable clip (Arrow), feed out and place aside.
- Loosen screws (4).
- Thread out and remove the rail (5).

48 – Remove all injection systems

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

cardiagn.com

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

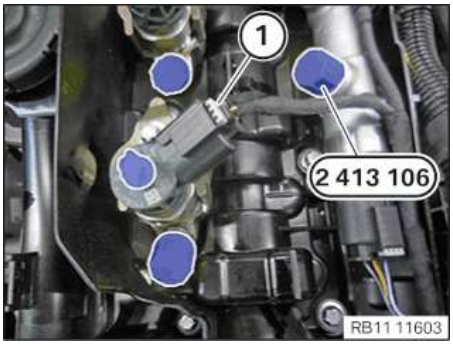
Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

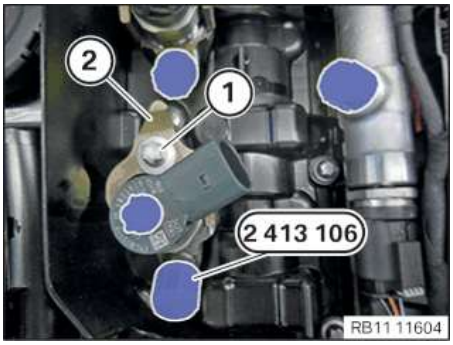
TECHNICAL INFORMATION

If several injectors are removed, ensure that each injector is installed at its original location (cylinder). Mark injectors.



- Unlock plug connection (1) and disconnect.

cardiagn.com



- Loosen screw (1).
- Guide out and remove clamping claw (2).
- Feed out and remove the injector with slight rotational movements.

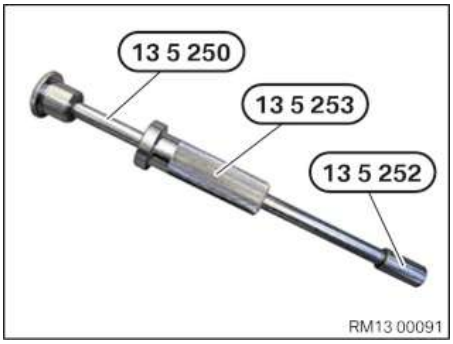
▸ **Loosen stuck injectors**

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Unscrew special tool 0 493 339 (13 5 252) from special tool 0 493 321 (13 5 250) and remove special tool 0 493 340 (13 5 253).
- Screw special tool 0 493 339 (13 5 252) back onto special tool 0 493 321 (13 5 250).

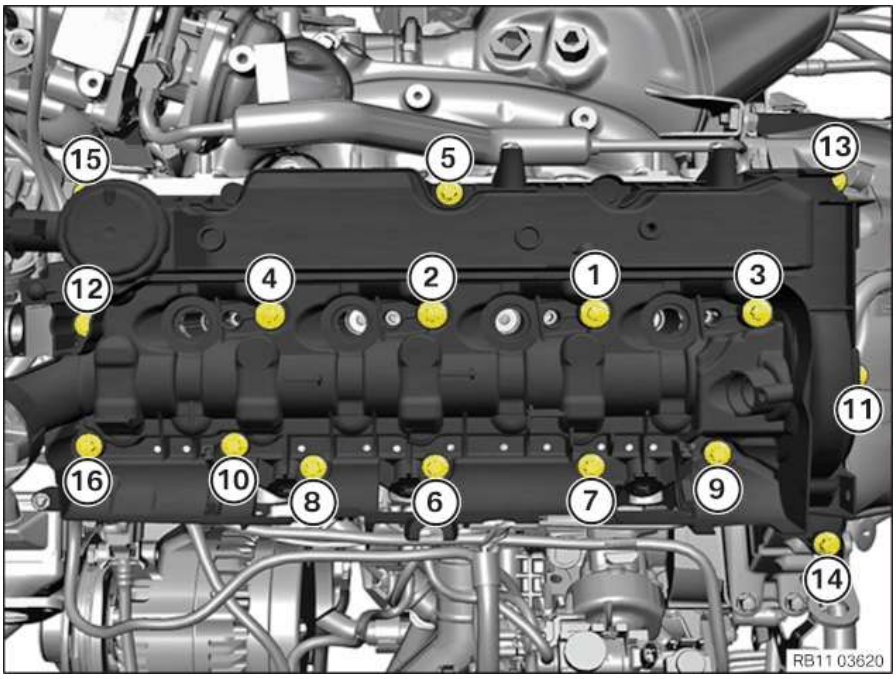


- Screw special tool 0 493 321 (13 5 250) with special tool 0 493 339 (13 5 252) onto pressure line connection (1) of injector.
- Release injector (1) with special tools 0 493 321 (13 5 250) and 0 493 339 (13 5 252) by means of **short** back and forth movements and remove.

49 – Removing the cylinder head cover

carsdiagn.com

Screw connection of the cylinder head cover



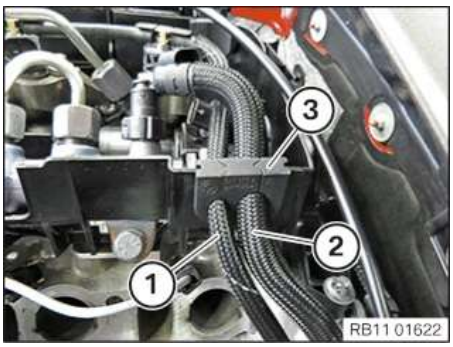
1 - 16 Bolts of the cylinder head cover



- Unlock and detach the locks.
- Feed the engine ventilation line (1) out and set it aside.

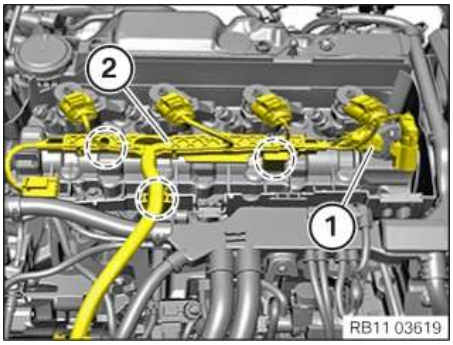


- Feed out and remove the heat shield (1).

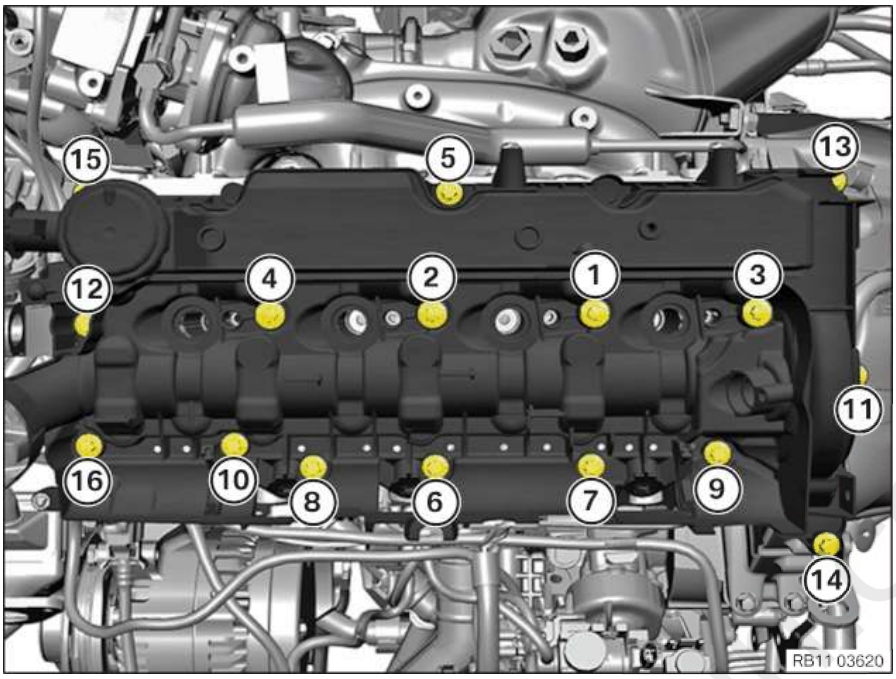


- Remove the leakage oil line (1) including the fuel return line (2) and the grommet (3) and put to one side.

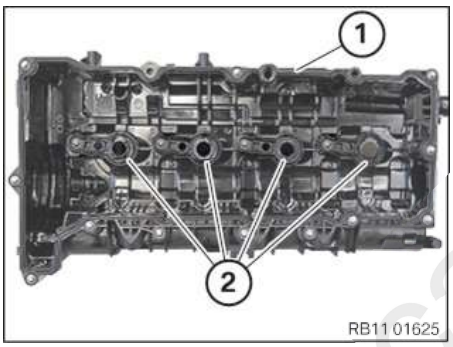
cardiagn.com



- Unlock connector (1) and pull off.
- Disconnect the wiring harness (2) in the marked areas from the cylinder head cover and set aside.



- Evenly loosen the screws in a sequence from (16) to (1).
- Feed out and remove the cylinder head cover.



- Remove the profile seals (1) and (2).

50 – Removing starter motor

Prerequisite

Battery earth leads are disconnected.

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

cardiag.com

WARNING

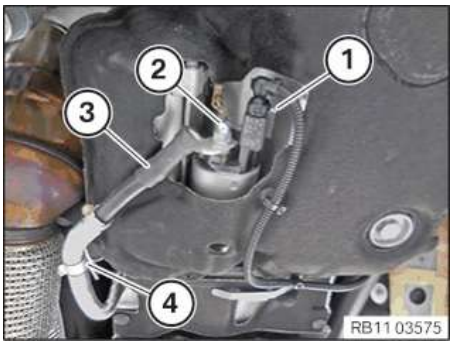
Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

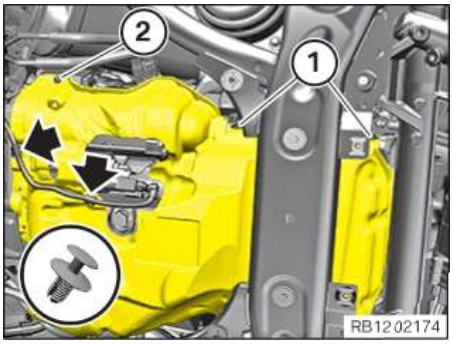
- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

TECHNICAL INFORMATION

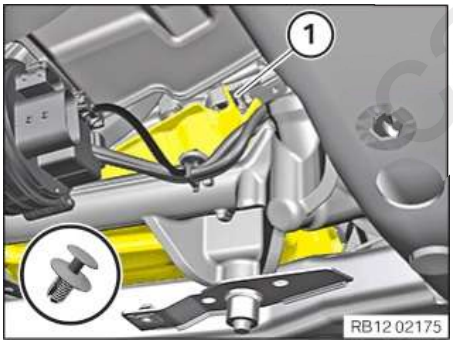
Make sure that the acoustic cover is **not** damaged while removing the starter motor.
A damaged lower acoustic cover can only be renewed when the front axle is lowered.



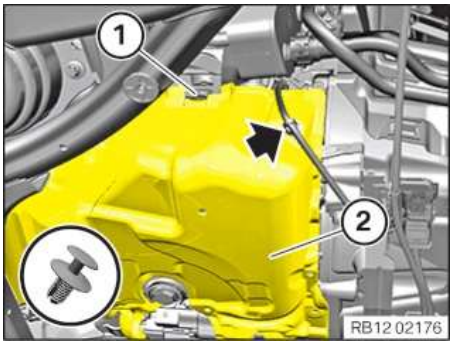
- Unlock plug connection (1) and disconnect.
- Release nut (2).
- Release positive battery cable (3) from holder (4).



- Loosen the expanding rivet (1).
- Undo fir tree clip (2).
- Release the clamps (arrows).

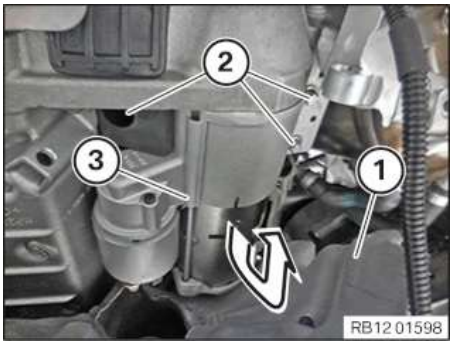


- Loosen expanding rivet (1).
- Lower the acoustic cover of the oil sump.



- Loosen expanding rivet (1).
- Loosen the clamp (arrow).
- Lower acoustic cover (2).

carsdiagn.com



- Make sure that the acoustic cover (1) is not damaged.
- Carefully press acoustic cover (1) to one side.
- Loosen screws (2).
- Carefully guide out the starter motor (3) in direction of arrow and remove.

51 – Checking camshaft timing



RISK OF DAMAGE

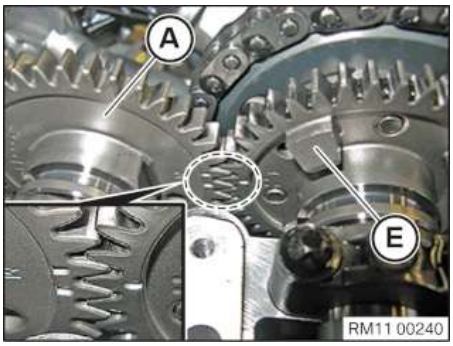
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

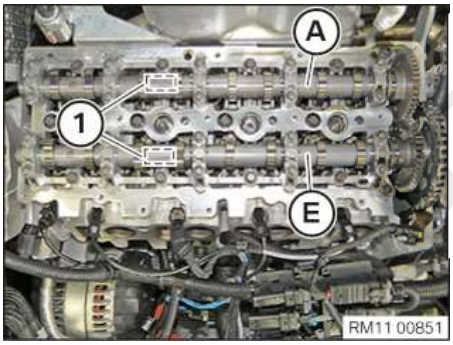
- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

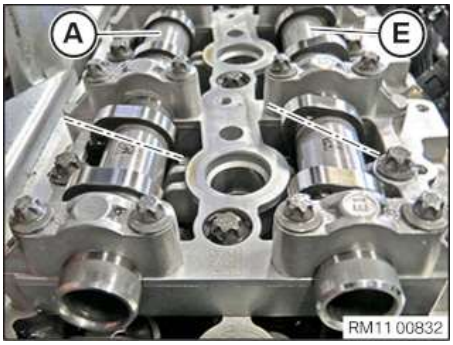
  Do **not** crank the engine in reverse.



- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.



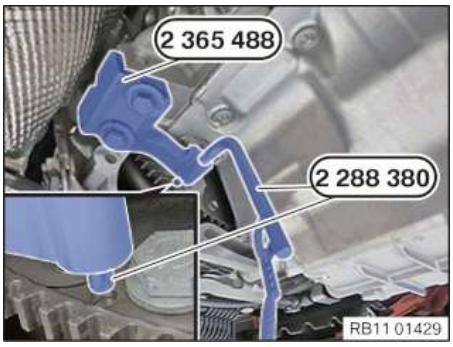
- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.

cardiagn.com



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

52 – Remove chain tensioner piston

RISK OF DAMAGE

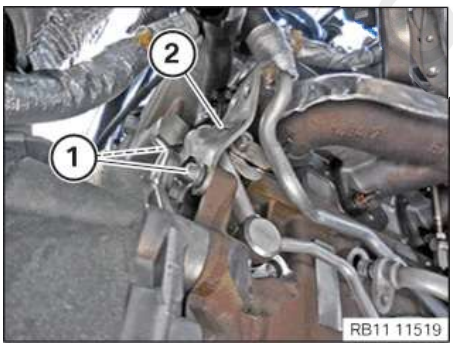
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

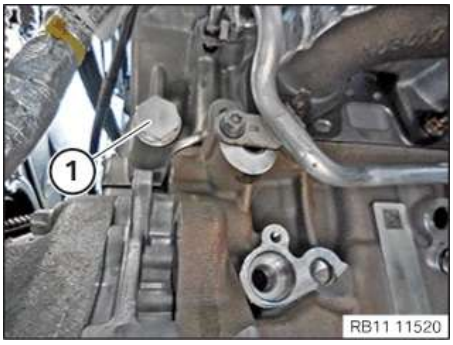
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Loosen screws (1).
- Guide out and remove holder (2).



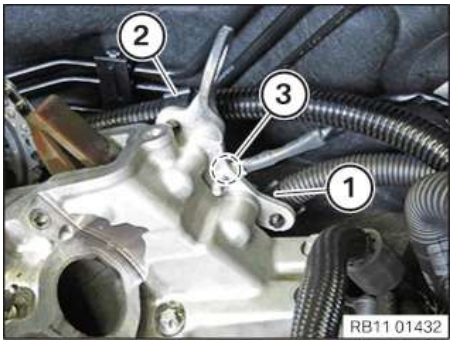
- Loosen the chain tensioner piston (1).
- Catch and dispose of emerging engine oil.

cardiagn.com

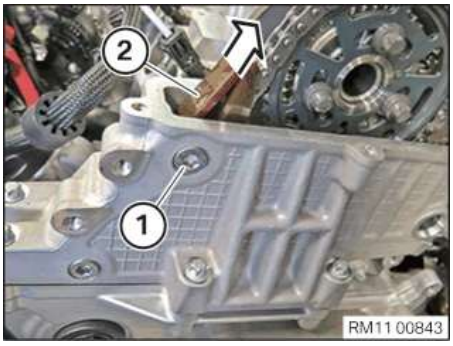


- Feed out and remove the sealing ring (1).

53 – Remove the timing chain guide rail

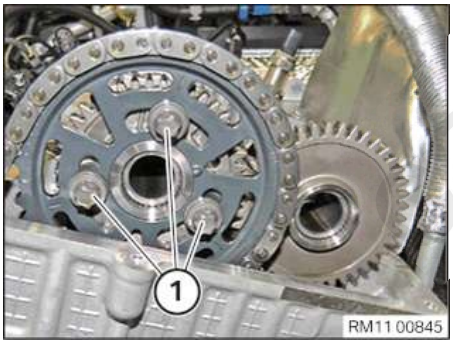


- Loosen the vehicle wiring harness (1) from the bracket.
- Release the positive battery cable (2) from the holder .
- Loosen the screw (3) and remove the grounding cable.



- Remove the bearing journal (1).
- Remove the guide rail (2) in the direction of the arrow.

54 – Removing the camshaft sprocket on the intake camshaft



- Loosen screws (1).
- Secure the drive chain against falling.
- Remove the camshaft sprocket on the intake camshaft.

55 – Removing the special tool for fixing the exhaust camshaft



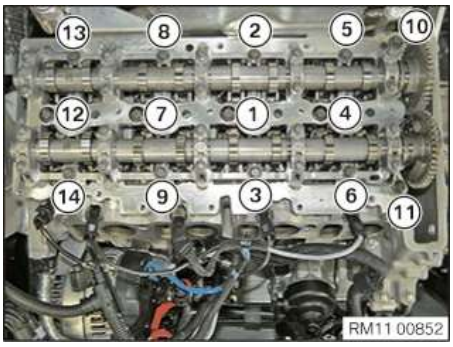
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

56 – Removing the camshaft support

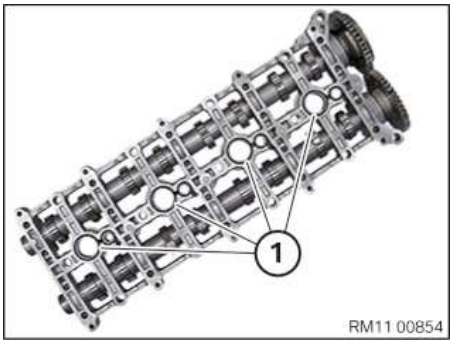
cardiagn.com

TECHNICAL INFORMATION

The camshaft is tensioned by the valve springs. Tighten or loosen each screw on the camshaft bearing caps one at a time in the specified sequence and by half a turn only. Repeat procedure.

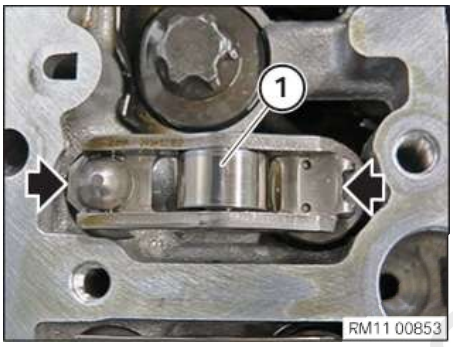


- Unscrew the screws evenly in order (14) to (1) in multiple increments.
- Feed out and remove the camshaft support with the camshafts towards the top.



- Guide out and remove gaskets (1).

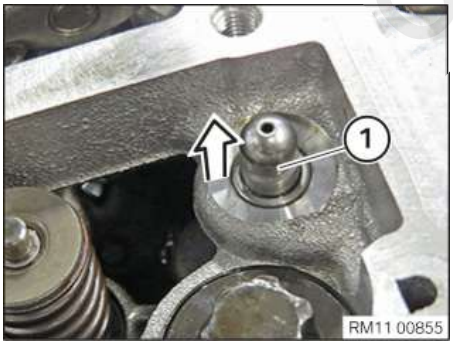
57 – Remove roller cam followers



- Guide out and remove all roller cam followers (1) (arrows).
- Place all roller cam followers (1) in order in special tool 0 495 105 (11 4 480).

  Roller cam followers that have already been used must be installed in same position again.

58 – Removing all hydraulic valve clearance compensating elements



- Remove all hydraulic valve clearance compensating elements (1) in the direction of the arrow.
- Catch and dispose of emerging engine oil.
- Store all hydraulic valve clearance compensating elements properly arranged on the special tool 0 495 105 (11 4 480).
- Make sure to observe the assignment of the roller cam followers to the hydraulic valve clearance compensating elements when reusing the hydraulic valve clearance compensating elements (1).

59 – Remove all glow elements

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

cardiagn.com

RISK OF DAMAGE

Damage to the glow elements.

Excessive force may damage the glow elements and they may then have to be renewed.

- Handle glow elements with care and do not drop.
- Do not rest the cylinder head on glow elements. Glow elements protrude from the sealing surface of the cylinder head.

RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

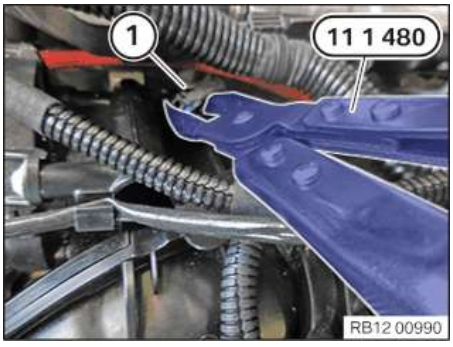
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

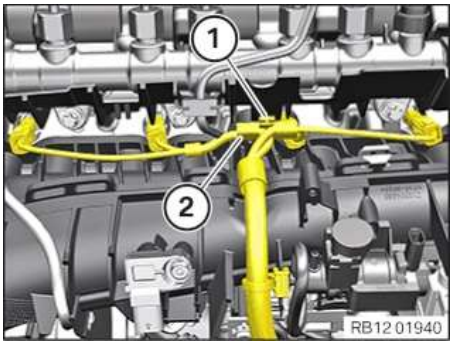
NOTICE

The description is for one component only. The procedure is identical for all further components.

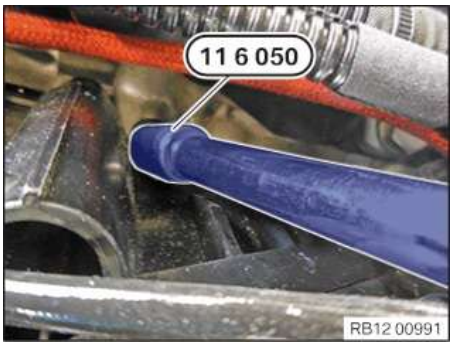


- Unlock and release the connector (1) using special tool 0 490 796 (11 1 480).

cardiagn.com



- Loosen clamp (1).
- Remove the wiring harness section (2) and put to one side.



- Unscrew the glow elements with the special tool or conventional tools.

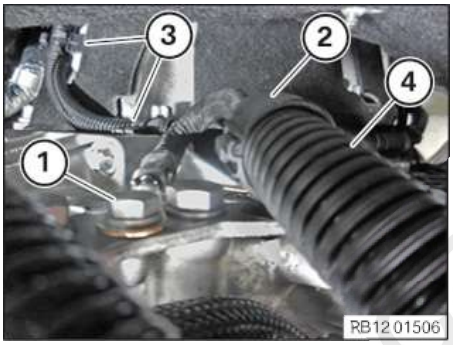
60 – Removing cylinder head

RISK OF DAMAGE

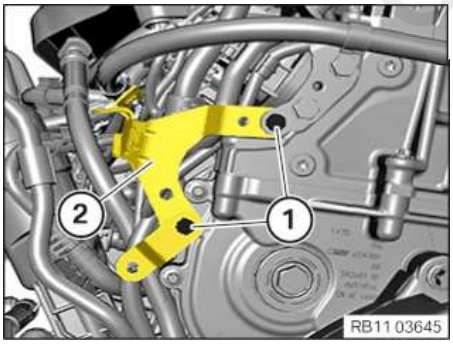
Heavy component.

Heavy components can lead to injury or damage.

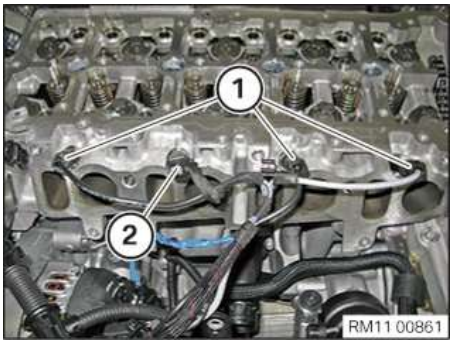
- Remove and install heavy components with the aid of another person/other persons.



- Loosen screw (1).
- Unlock and loosen holder (2).
- Unlock and loosen the clamps (3).
- Feed out the wiring harness section (4) of the automatic transmission and place to one side.

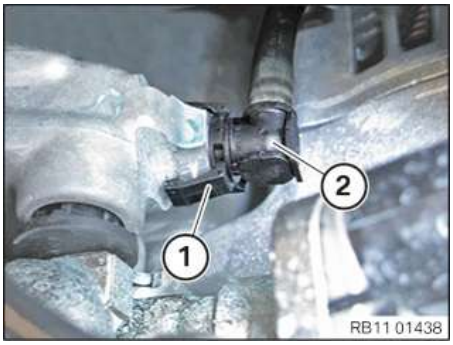


- Loosen screws (1).
- Guide out and remove holder (2).

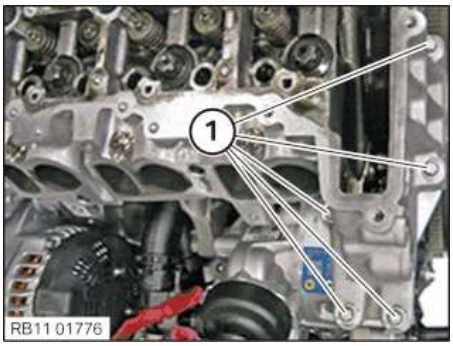


- Release plug connections (1) with special tool 0 495 140 (12 2 300).
- Unlock and disconnect the plug connections (1) and (2).
- Place wiring harness to one side.

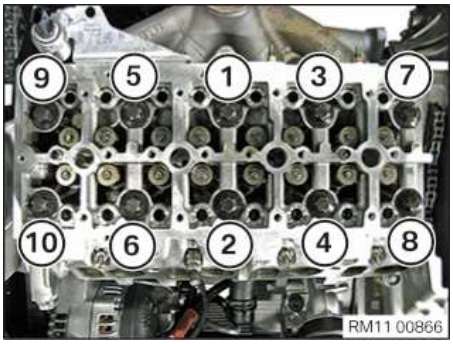
cardiagn.com



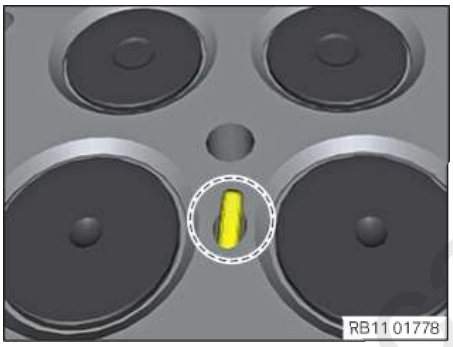
- Release lock (1) of coolant line.
- Remove the coolant line (2) and set it aside.



- Unscrew and remove the bolts (1).



- Release cylinder head bolts from **outside** to **inside** in the order (10) to (1).



RISK OF DAMAGE

Damage to the glow elements.

Excessive force may damage the glow elements and they may then have to be renewed.

- Handle glow elements with care and do not drop.
- Do not rest the cylinder head on glow elements. Glow elements protrude from the sealing surface of the cylinder head.

- Remove the cylinder head with an auxiliary person.



- Check the cylinder head and crankcase for damage.
- Check the fitting sleeves (1) for damage and replace if necessary.

RISK OF DAMAGE

Damage to the surface.

The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.

- Clean the sealing surfaces on the cylinder head and the crankcase using special tool 0 495 102 (11 4 470).

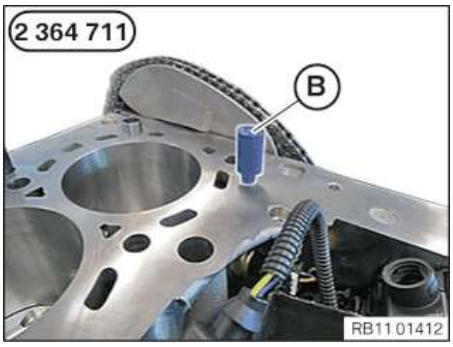
61 – Cleaning the sealing surface

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Lock the front oil duct using special tool (B) from special tool 2 364 711.



RISK OF DAMAGE

Damage to the surface.

The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.

- Clean the sealing surface using special tool 0 495 103 (11 4 471).



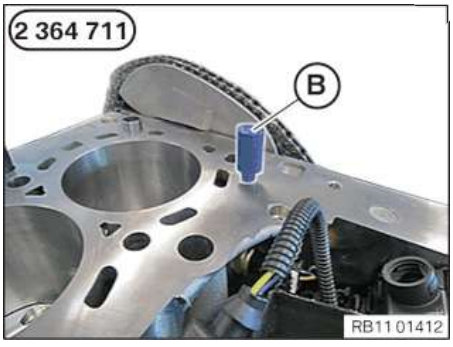
RISK OF DAMAGE

Damage to the surface.

The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.

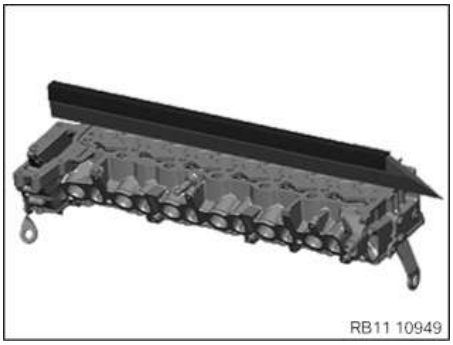
- Clean the sealing surface using special tool 0 495 104 (11 4 472).



- Remove special tool (B).

62 – Check the flatness of the cylinder head

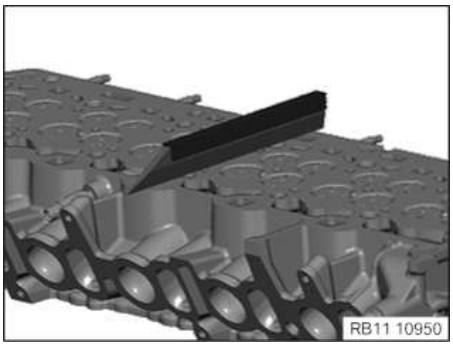
carsdiagn.com



- Check the flatness of the cylinder head lengthwise using a straightedge.

Cylinder head flatness

Maximum lengthwise deviation from flatness	0.10 mm
Maximum transverse deviation from flatness	0.05 mm

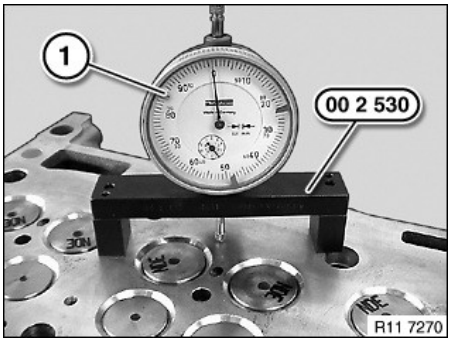


- Check the flatness of the cylinder head crosswise using a straightedge.

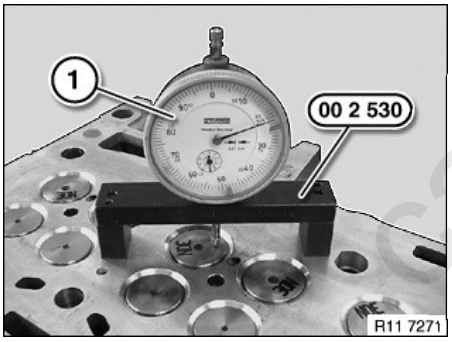
Cylinder head flatness

Maximum lengthwise deviation from flatness	0.10 mm
Maximum transverse deviation from flatness	0.05 mm

63 – Checking the valve underprotrusion



- Set the dial gauge (1) onto the cleaned cylinder sealing surface with slight preload in special tool 0 490 185 (00 2 530).
- Set dial gauge in mildly preloaded state to "zero".



Check

- Position the dial gauge (1) on the valve with special tool 0 490 185 (00 2 530).
- Measure valve underprotrusion and compare with the setpoint value.

Valve underprotrusion

	0,8 (0.7 - 0,9) mm

Result

» Valve underprotrusion is outside tolerance.

Measure

- Renew cylinder head.

  Parts: Cylinder head

64 – Remove all valve springs

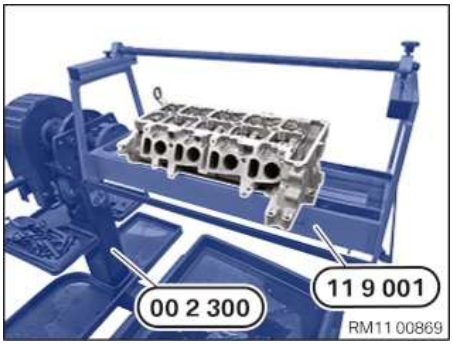
RISK OF DAMAGE

Contaminant or foreign body.

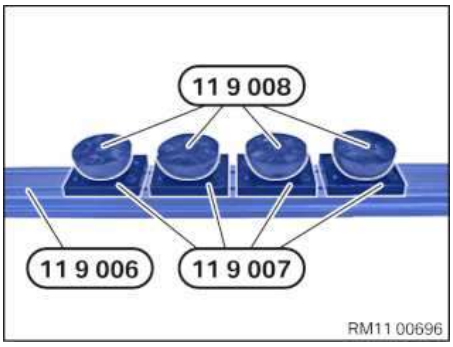
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

cardiagn.com



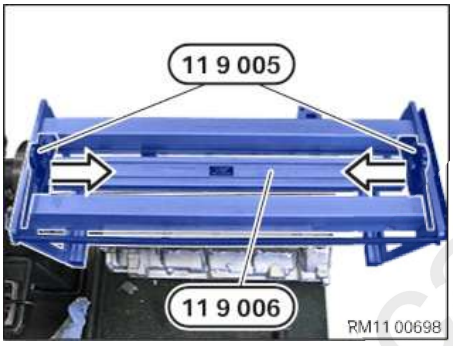
- Mount and screw the cylinder head onto the special tools 0 494 366 (11 9 001) and 0 495 187 (00 2 300).



- Prepare the special tools 0 494 371 (11 9 006), 0 494 372 (11 9 007) and 0 494 373 (11 9 008) as shown.



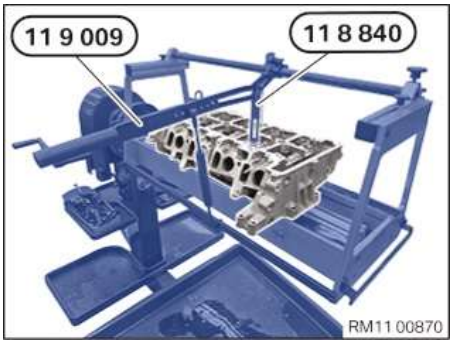
- Position special tools 0 494 373 (11 9 008) as pictured.



- Turn round special tool 0 494 371 (11 9 006) and insert as shown.
- Lock special tool 0 494 370 (11 9 005)in direction of arrow.



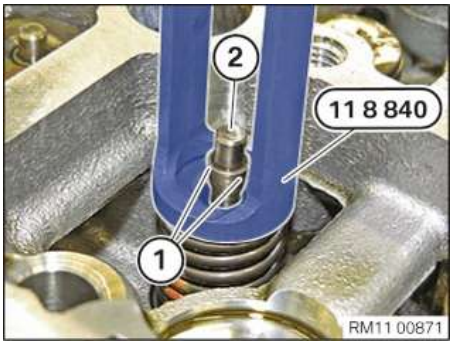
- Lock special tool 0 494 370 (11 9 005)in direction of arrow.
- Move cylinder head with special tool 0 494 362 (11 9 000) through 180° into the installation position.



- Align special tool 0 494 374 (11 9 009) in direction of valve axis.
- Position the special tool 0 496 143 (11 8 840) according to the nut.
- Press down the valve spring on the upper spring cup with the special tools 0 494 374 (11 9 009) and 0 496 143 (11 8 840).

  The **hooks** from the set of special tools 0 494 362 (11 9 000) can be used to **hold** the valve spring in pressed position.

cardiagn.com



- Keep the valve spring pressed down with the special tool 0 496 143 (11 8 840).
- Remove valve shims (1) of valve (2) with a magnet.
- Feed out valve spring and spring cup and remove.
- Place valve spring, spring cup and valve shims (2) in special tool 0 495 105 (11 4 480) in an orderly manner.

MAIN WORK

65 – Remove valve stem seals

RISK OF DAMAGE

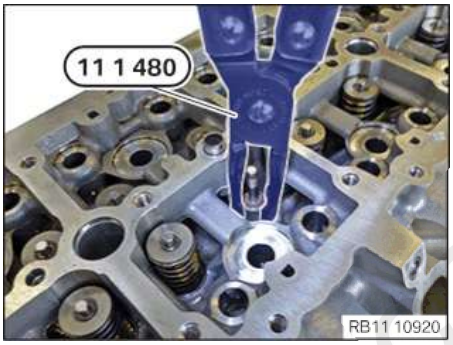
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

NOTICE

The description is for one component only. The procedure is identical for all further components.



- Remove the valve stem seal (1) with the special tool 0 490 796 (11 1 480).

66 – Installing valve stem seals

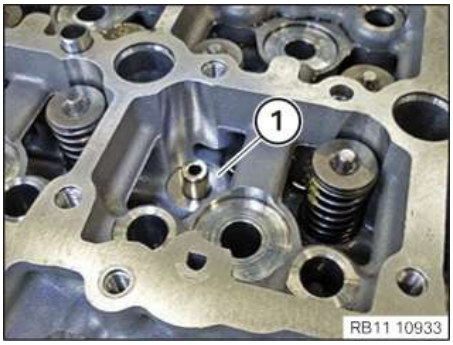
RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

cardiagn.com



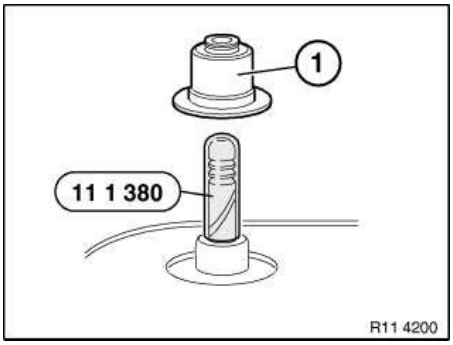
RISK OF DAMAGE

Damage to the surface.

The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

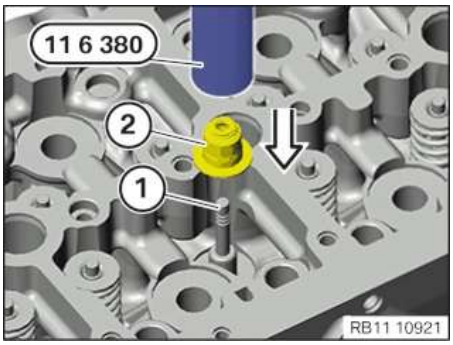
- Do not use any metal-cutting tools.

- Clean the contact surfaces (1).



- Fit special tool 0 490 746 (11 1 380).
- Renew the valve stem seal (1).

  Parts: Valve stem seal
- Lubricate and set the valve stem seal (1).



- Position the valve stem seals (2) on the valve (1).
- Press down valve stem seal (2) up to the contact surface on the cylinder head using special tool 0 493 249 (11 6 380).

POSTPROCESSES

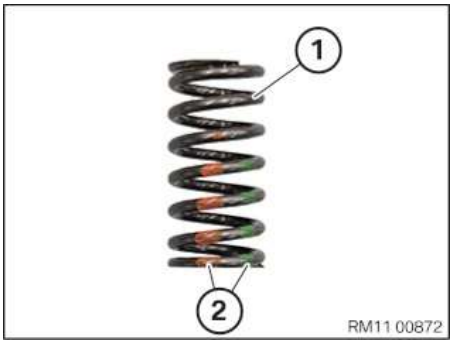
67 – Install all valve springs

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

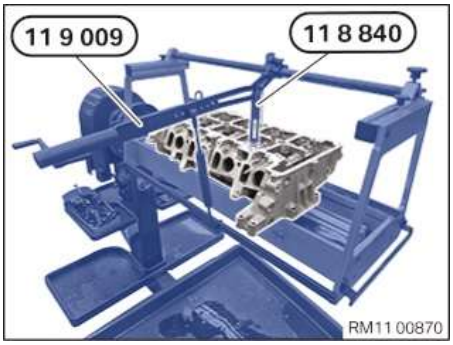
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Ensure that the valve spring (1) is marked using a colour code (2).

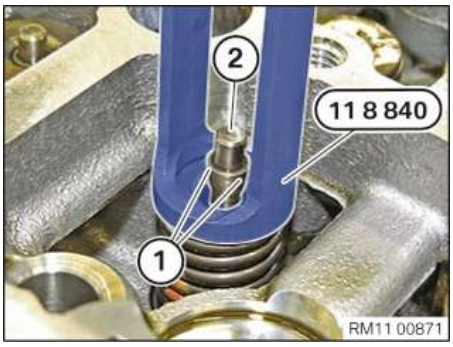
  The mounting orientation of the valve spring (1) can be freely chosen.

cardiagn.com



- Align special tool 0 494 374 (11 9 009) in direction of valve axis.
- Position the special tool 0 496 143 (11 8 840) according to the nut.
- Press down the valve spring on the upper spring cup with the special tools 0 494 374 (11 9 009) and 0 496 143 (11 8 840).

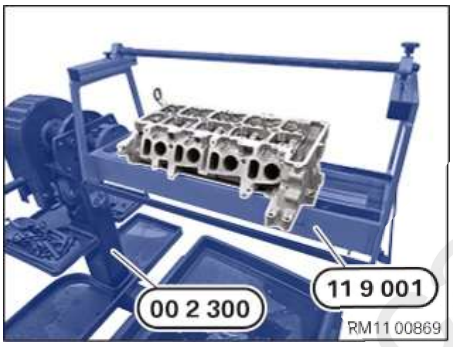
  The **hooks** from the set of special tools 0 494 362 (11 9 000) can be used to **hold** the valve spring in pressed position.



- Keep the valve spring pressed down with the special tool 0 496 143 (11 8 840).
- Insert the valve shims (1) at the valve (2) with the magnet and install.
- Relieve load on valve spring.
- Make sure that the valve shims (1) are installed correctly.

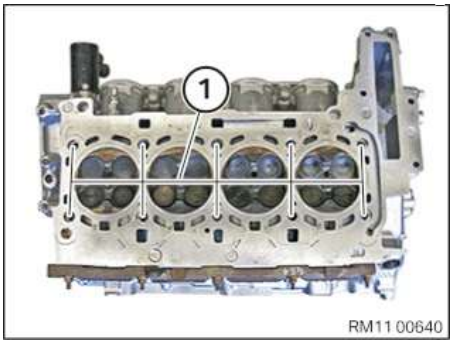


- Unlock the special tool 0 494 370 (11 9 005) in the direction of the arrow.
- Guide the special tool 0 494 371 (11 9 006) out and remove.



- Unscrew and remove the cylinder head from the special tools 0 494 366 (11 9 001) and 0 495 187 (00 2 300).

68 – Replace cylinder head gasket



RISK OF DAMAGE

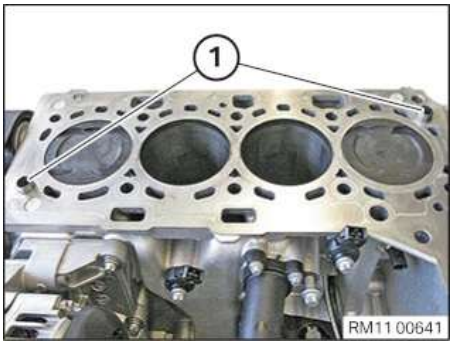
Damage to the surface.

The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

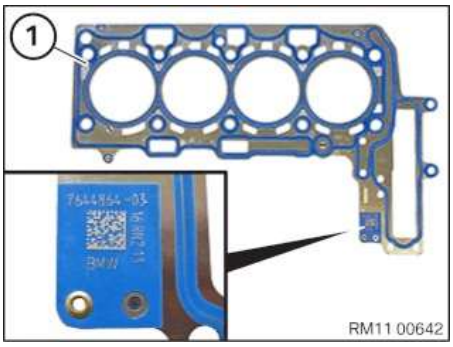
- Do not use any metal-cutting tools.

- Remove oil and dirt residue from the blind holes (1).

cardiagn.com

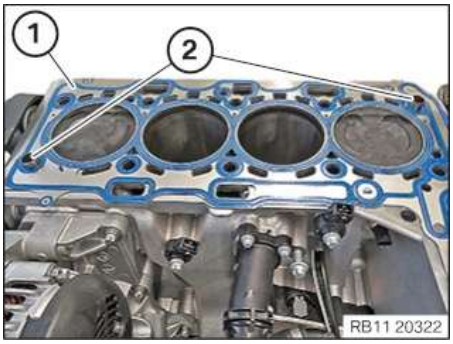


- Check if fitting sleeves (1) fit correctly and check for any damage.



- Identify the cylinder head gasket (1) using the part number.

Note: If the cylinder head is reworked, an additional seal that is 0.3 mm thicker is available for the service.



- Guide in the cylinder head gasket (1) and install.
- Ensure that the cylinder head gasket (1) is installed correctly in the fitting sleeves (2).

69 – Installing the cylinder head

RISK OF DAMAGE

Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

RISK OF DAMAGE

Damage to threads.

Fluid in the threaded hole may damage the thread when screws are tightened in the threads.

- Dry threaded holes (e.g. using compressed air).

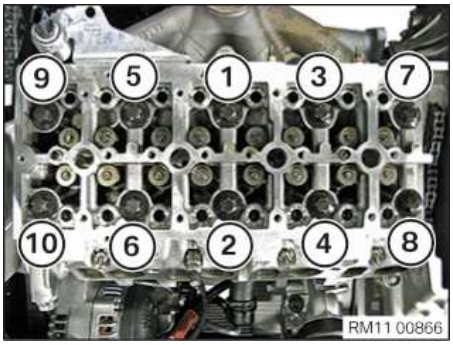
TECHNICAL INFORMATION

Do not remove bolt coating.

TECHNICAL INFORMATION

When assembling, it is essential to observe screwing sequences and tightening torques.
Non-observance of these requirements may result in leaks and damage.

cardiagn.com

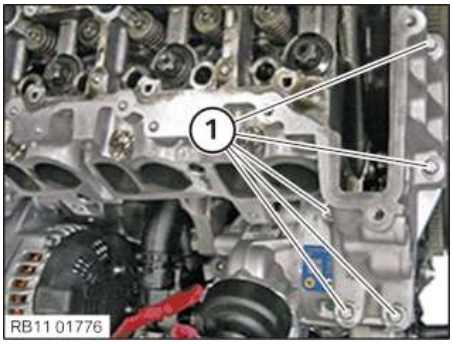


- Position the cylinder head gasket with the previously determined gasket thickness (number of holes).
- Fit new cylinder head screws.

  Parts: Cylinder head bolts
- Position the cylinder head and tighten it with the new cylinder head bolts in the order from (1) to (10).

Cylinder head to crankcase

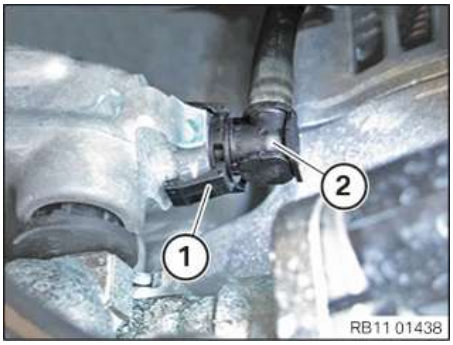
M12x1.5	Renew screws.	1. Tightening torque	50 Nm
		2. Angle of rotation	120 °
		3. Angle of rotation	120 °



- Insert screws (1) and tighten.

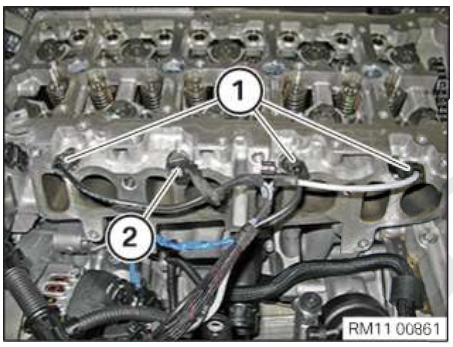
Cylinder head bolt to timing case cover

M8x40		Tightening torque	19 Nm



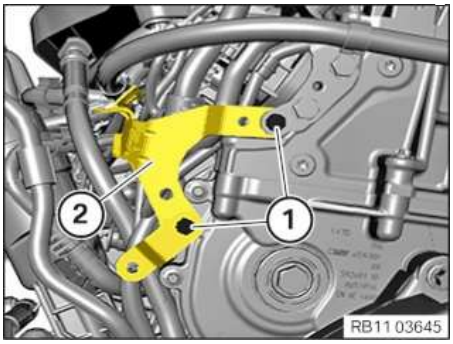
- Fit and lock coolant line (2).

  The lock (1) must engage audibly.



- Connect connectors (1) and (2), then lock.

  The connectors (1) and (2) must audibly engage.

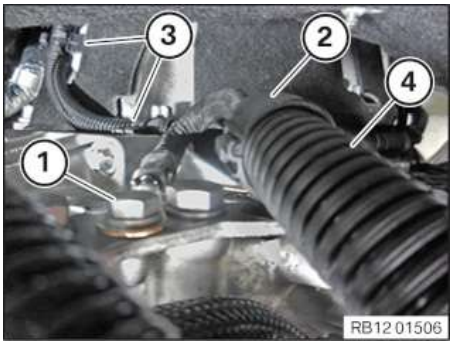


- Insert and install the holder (2).
- Tighten the screws (2).

Standard screw connection M6

M6		Tightening torque	8 Nm

cardiagn.com

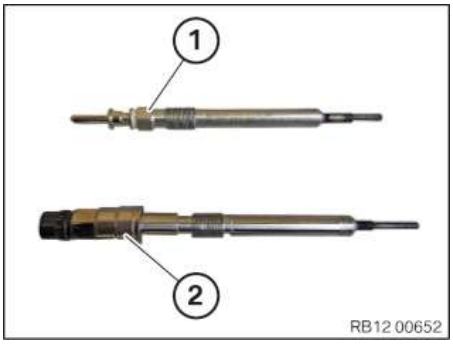


- Guide in the wiring harness section (4) of the automatic transmission and install.
- Lock holder (2).
- Make sure the bracket (2) engages audibly.
- Secure clamps (3).
- Tighten down screw (1).

Ground to cylinder head

M6		Tightening torque	8 Nm

70 – Install all glow elements



TECHNICAL INFORMATION

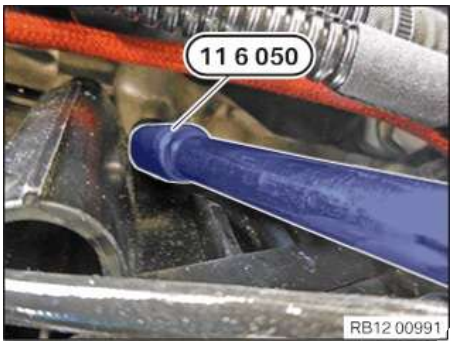
The combustion chamber pressure sensor can and is omitted from a technical point of view.

As an alternative to the combustion chamber pressure sensor, a normal glow element can be installed.

If a glow element is installed as an alternative, the appropriate wiring harness for the glow elements must also be installed.

For more information, see the Electronic Parts Catalogue and other information

- If installed: Install the glow element with **combustion chamber pressure sensor** (2), in the cylinder **2**.
- Install the glow elements (1) in the cylinders **1**, if necessary, **2**, **3** and **4**.



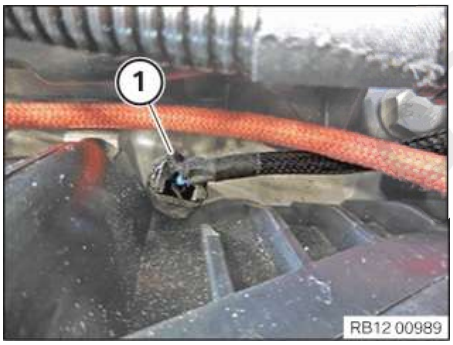
NOTICE

The description is for one component only. The procedure is identical for all further components.

- Screw in and tighten the glow elements with the special tool or conventional tools.

Glow elements to cylinder head

Glow element		Tightening torque	13 Nm

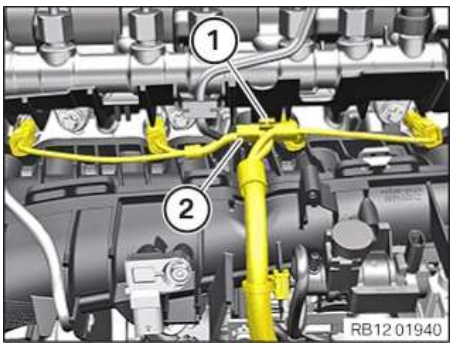


NOTICE

The description is for one component only. The procedure is identical for all further components.

- Connect and lock the connector (1).

  The connector (1) must engage audibly.

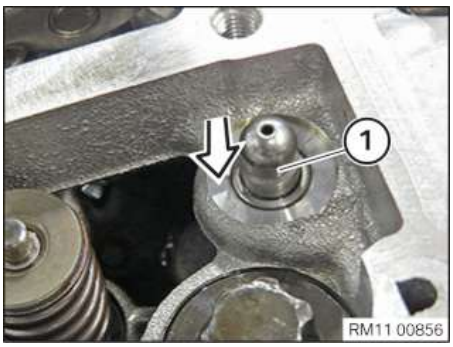


- Guide in the wiring harness section (2) and install.
- Secure clamps (1).

▸ **When replacing the glow element: Teach in glow elements if necessary**

- Teach in glow elements with the diagnosis system.

71 – Installing all hydraulic valve clearance compensating elements

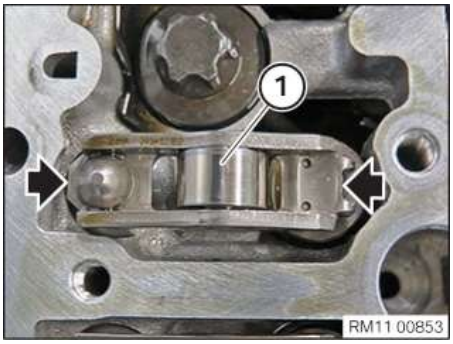


- Make sure to observe the assignment of the roller cam followers to the hydraulic valve clearance compensating elements when reusing the hydraulic valve clearance compensating elements (1).
- Insert and install all hydraulic valve clearance compensating elements (1) in the direction of the arrow.

72 – Installing the roller cam followers

TECHNICAL INFORMATION

- Note the installation position of the component. The component may be installed in various installation positions.



- Check all the roller cam followers (1) for damage, and renew if necessary.

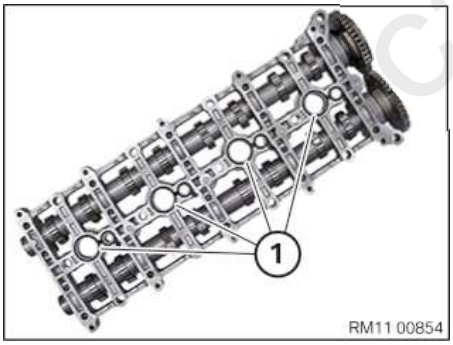
  Parts: Roller cam followers
- Insert all roller cam followers (1) and install them (arrows).

  Roller cam followers (1) that have already been used must be installed in the same place.
- Note the mounting orientation of the roller cam followers (1).
- Oil all roller cam followers (1).

73 – Installing the camshaft support

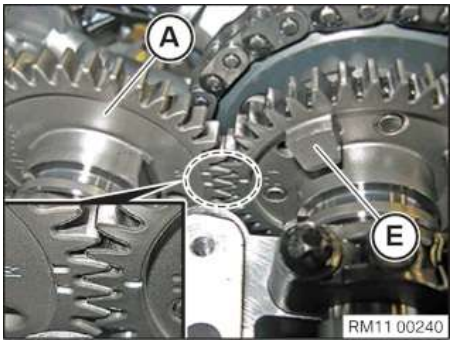
TECHNICAL INFORMATION

The camshaft is tensioned by the valve springs. Tighten or loosen each screw on the camshaft bearing caps one at a time in the specified sequence and by half a turn only. Repeat procedure.



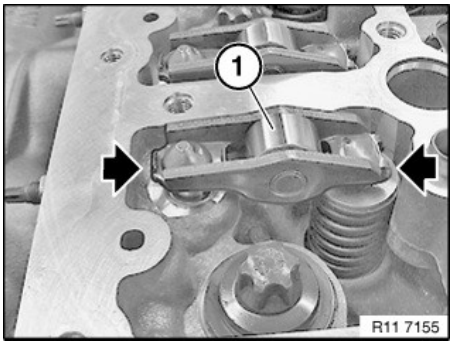
- Renew seals (1).

  Parts: Seals
- Insert and install the gaskets (1).

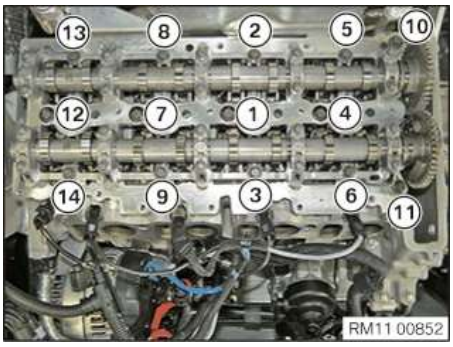


- Make sure the marks on both camshafts (A) and (E) correspond in the **highlighted area**.

cardiagn.com



- Make sure the roller cam followers (1) have the correct mounting orientation.
- Position the camshaft support (arrows).



- Evenly tighten the screws in a sequence from (1) to (14) in several steps.
- Evenly tighten the screws in a sequence from (1) to (14) in several steps.

Camshaft carrier to cylinder head

M7x35		Tightening torque	13 Nm

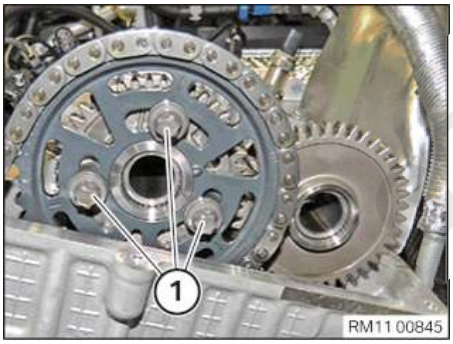
74 – Installing the special tool to secure the exhaust camshaft



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

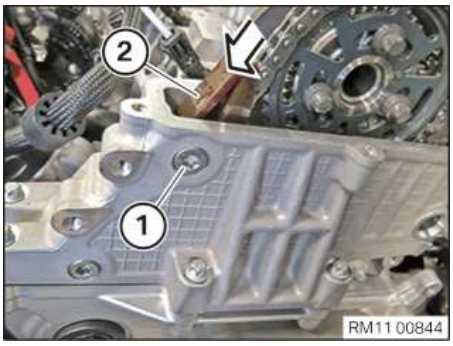
  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.

75 – Installing the camshaft sprocket on the intake camshaft



- Position the drive chain on the camshaft sprocket so that the thread of the screw connections are located in the centre of the elongated holes.
- Position the camshaft sprocket on the intake camshaft.
- Merely apply the screws (1) hand-tight so that the camshaft sprocket can still be moved in relation to the intake camshaft.

76 – Installing the guide rail of the timing chain



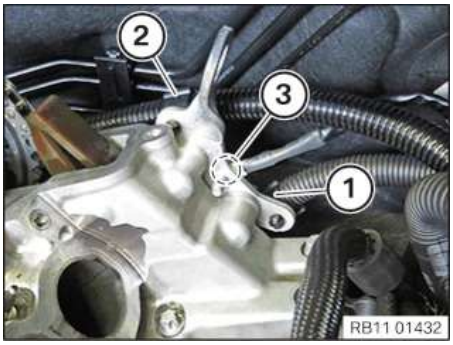
- Position the guide rail (2) in the direction of the arrow.
- Make sure the guide rail (2) is correctly installed at the bottom bearing journal.
- Renew bearing journal (1).

  Parts: Bearing journal
- Tighten the bearing journals (1).

Bearing journal to cylinder head

M16x1.5	Replace bearing journal.	Tightening torque	20 Nm

carlagn.com



- Position the grounding cable and tighten the screw (3).

Standard screw connection M8

M8		Tightening torque	19 Nm

- Clip in the positive battery cable (2) into the bracket.
- Clip in the vehicle wiring harness (1) into the bracket.

77 – Installing the chain tensioner piston



TECHNICAL INFORMATION

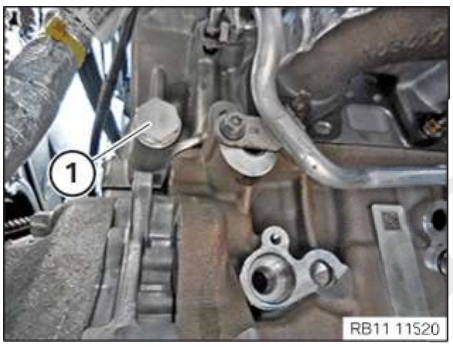
The oil chamber must be drained for reuse of the chain tensioner.

- Place the chain tensioner on a level support pad and slowly compress in the direction of arrow.
- Repeat process twice.



- Renew sealing ring (1).

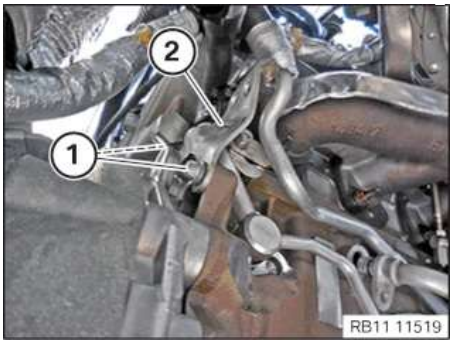
  Parts: Sealing ring
- Insert and install the sealing ring (1).



- Insert and install the chain tensioner piston (1).
- Tighten the chain tensioner piston (1).

Chain tensioner piston to cylinder head

22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm



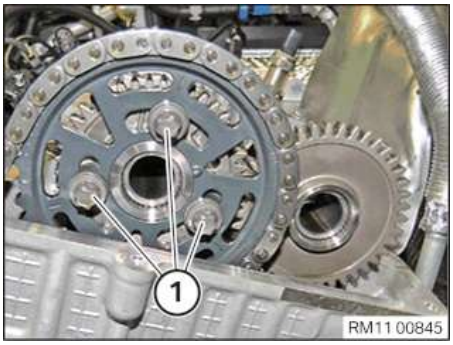
- Insert and install the holder (2).
- Tighten the screws (1).

Holder to crankcase

M8X16		Tightening torque	19 Nm

78 – Tightening the camshaft sprocket on the intake camshaft

carsbgn.com



- Tighten the screws (1).

Camshaft sprocket to camshaft

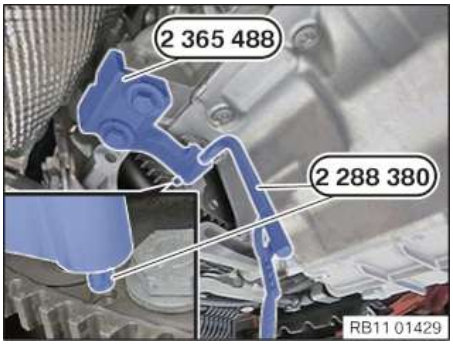
M7x17.			17 Nm

79 – Removing the special tool for fixing the exhaust camshaft



- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

80 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

81 – Checking camshaft timing



RISK OF DAMAGE

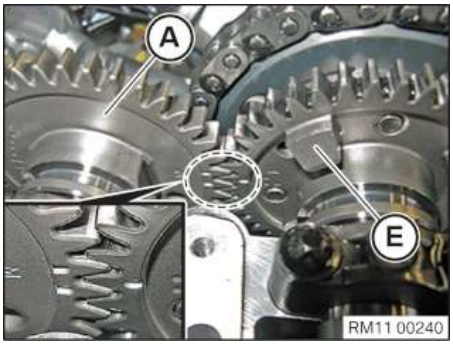
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

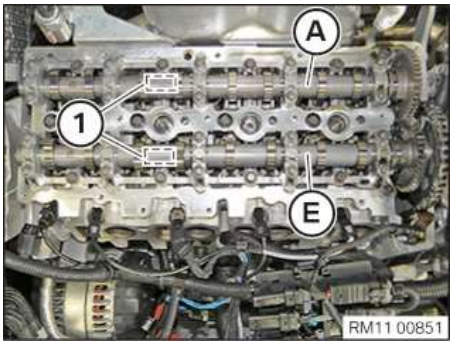
- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

  Do **not** crank the engine in reverse.

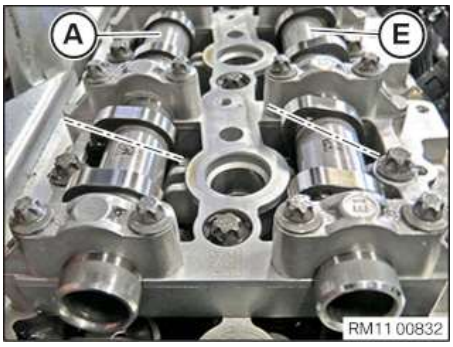


- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.

carsdiagn.com



- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.

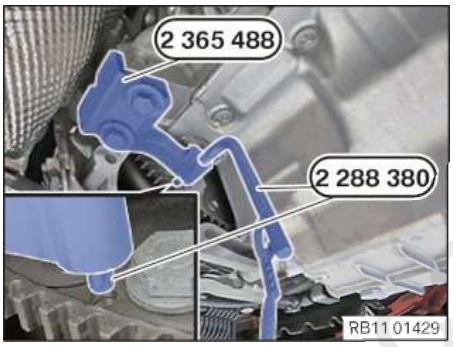


- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.



TECHNICAL INFORMATION

If the check finds that the timings are incorrect, the timings must be adjusted.
For additional information, see: 1131 ... Adjust the timings of the camshafts.

- Position special tool 2 365 488 and tighten the screws.

Special tool 2 365 488 to engine

M8x60		Tightening torque	19 Nm

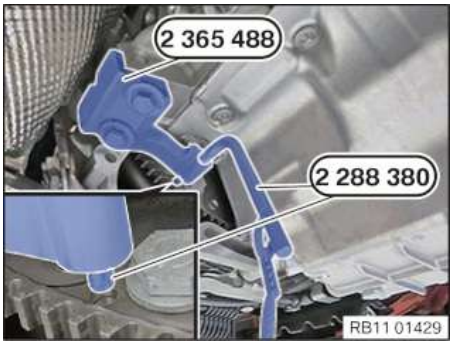
- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

82 – Removing the special tool for fixing the exhaust camshaft



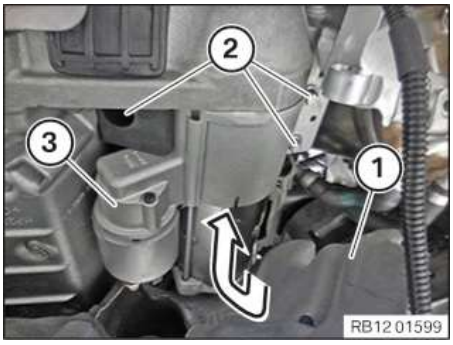
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

83 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

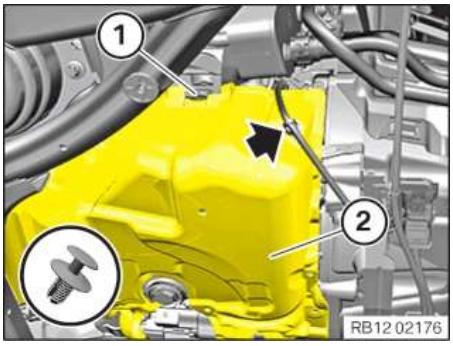
84 – Installing starter motor



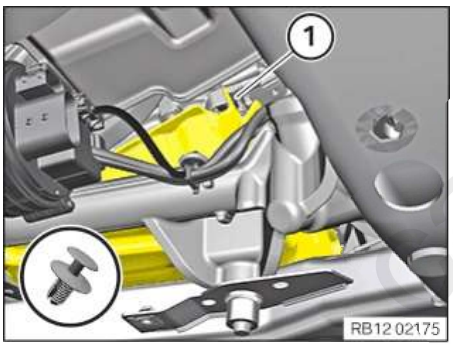
- Make sure that the acoustic cover (1) is not damaged.
- Carefully press the acoustic cover (1) to one side.
- Feed in and install the starter motor (3) in the direction of the arrow.
- Tighten the screws (2).

Starter motor to engine

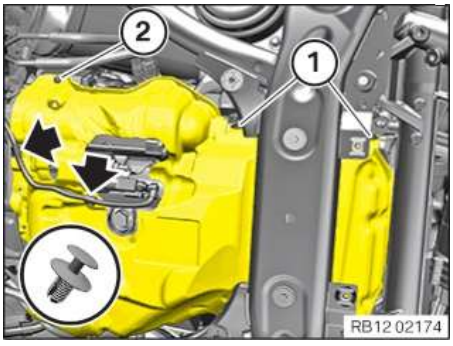
M8X60		Tightening torque	19 Nm



- Position the acoustic cover (2).
- Fasten expanding rivet (1).
- Secure clamp (arrow).

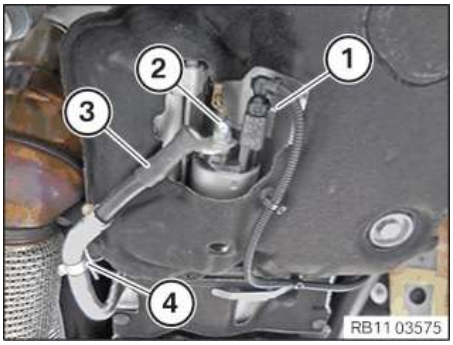


- Fasten expanding rivet (1).

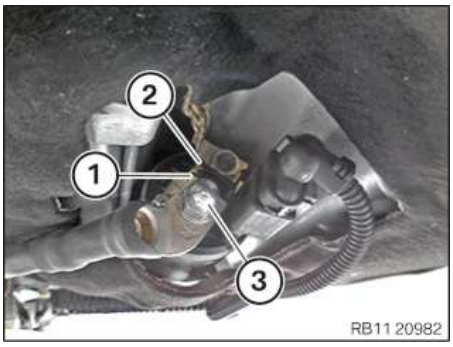


- Secure fir tree clip (2).
- Secure expanding rivet (1).
- Secure the clamps (arrows).

cardiagn.com



- Fasten positive battery cable(3) in holder (4) and position it on the starter motor.
- Tighten the nut (2) hand-tight.
- Connect the connector (1) and audibly lock it.



CAUTION

Improper routing of the positive battery cable.

Risk of short circuits!

- Route the positive battery cable without abrasions and do not trap.

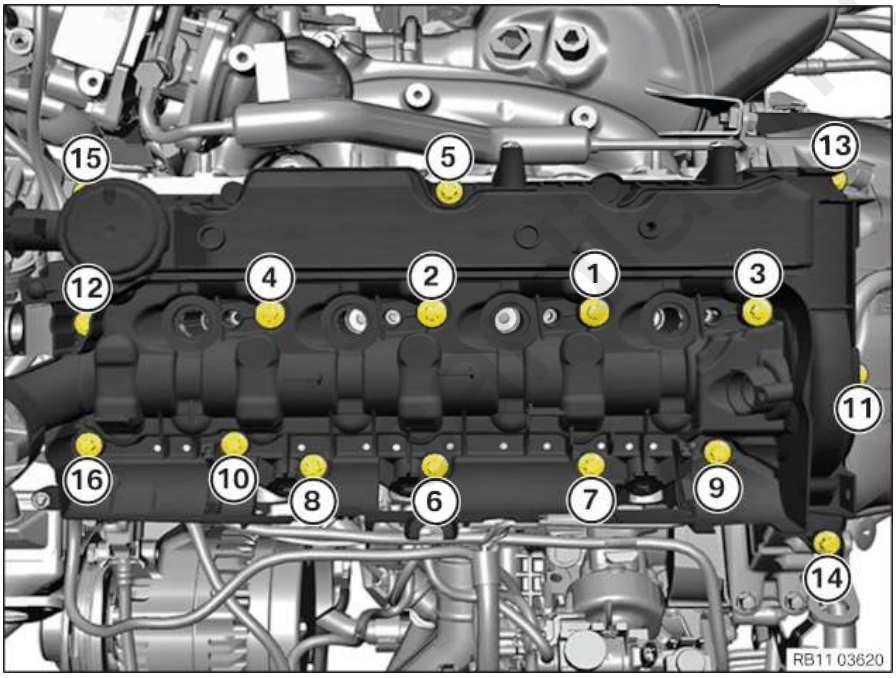
- Attach the positive battery cable (1) **correctly** to anti-twist lock (2).
- Tighten nut (3).

Battery positive lead to starter

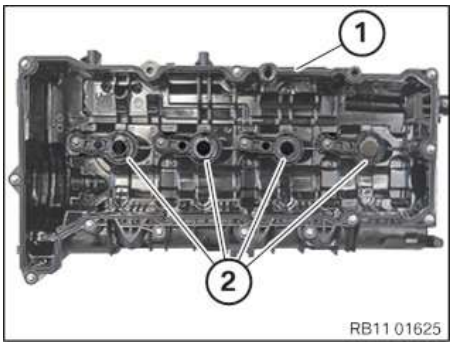
M8		Tightening torque	13,5 Nm

85 – Installing cylinder head cover

Screw connection of the cylinder head cover

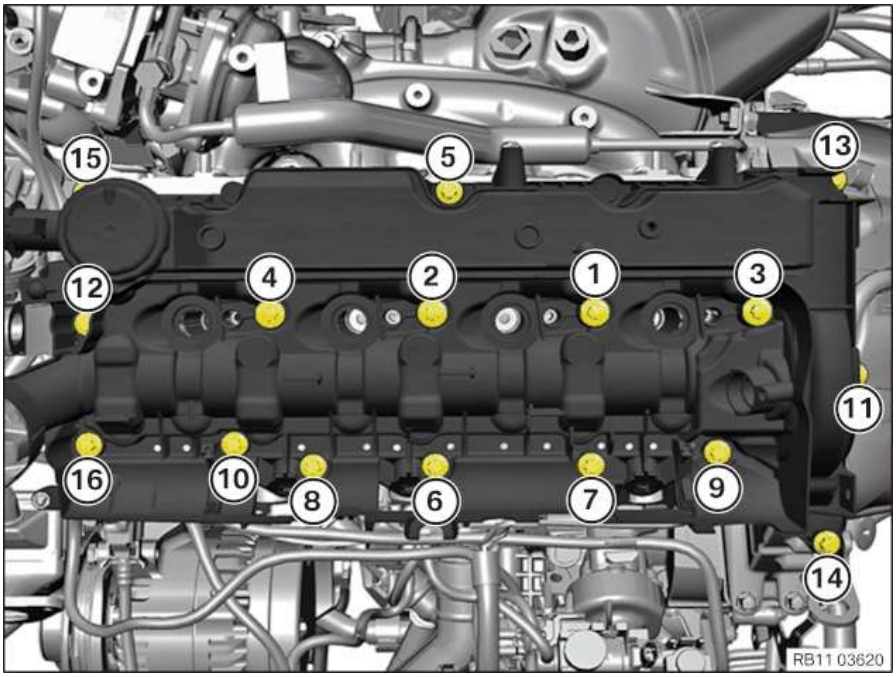


1 - 16 Bolts of the cylinder head cover



- Renew the profile seals (1) and (2) of the cylinder head cover.

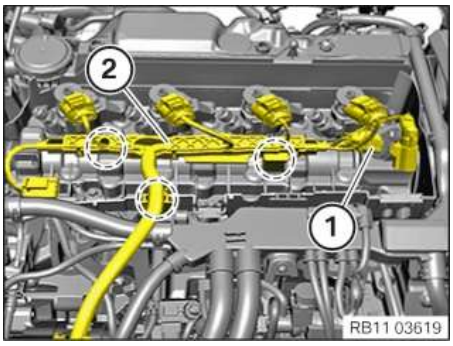
  Parts: Profile seals



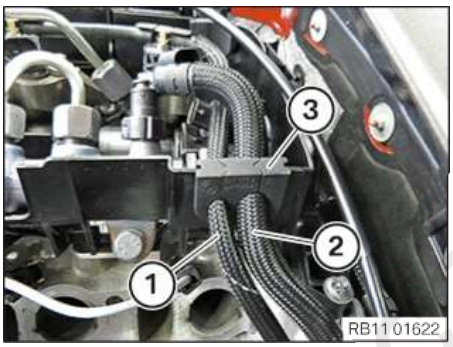
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

Cylinder head cover to cylinder head

M6		Tightening torque.	8,5 Nm



- Position the vehicle wiring harness (2) on the cylinder head cover and fasten in the marked areas.
- Plug in the connector (1) and lock audibly.



- Insert and connect the leakage oil line (1) with the fuel return line (2) and grommet (3).



- Feed in and install the heat shield (1).



- Connect engine ventilation line (1) and lock.

  The locks (arrows) must engage audibly.

cardiagn.com

86 – Install all injectors

▸ **Cleaning the injector shafts**

CAUTION

Swirling dirt particles caused by compressed air.

Danger of injury!

- Collect dirt particles, e.g. when blowing out, use cloth to do so.

- Wear safety goggles.

RISK OF DAMAGE

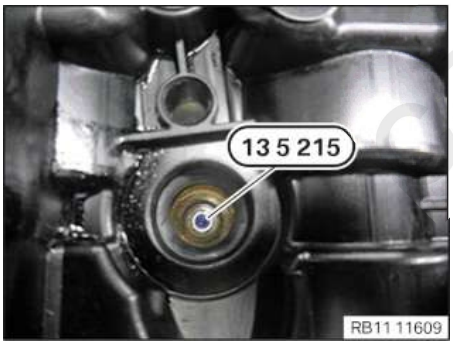
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



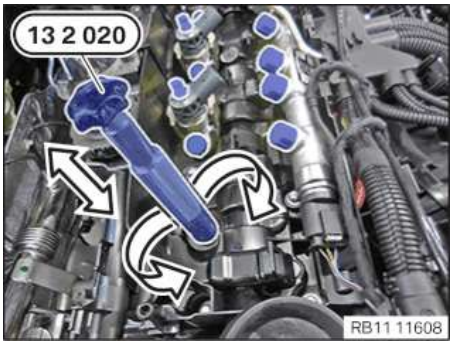
- Check whether the sealing ring remained in the injector shaft and remove the sealing ring as needed.
- Insert the special tool 0 493 763 (13 5 215) with the special tool 0 493 762 (13 5 214) from the set of special tools 0 493 758 (13 5 210) into the injector shaft.
- Remove special tool 0 493 762 (13 5 214).



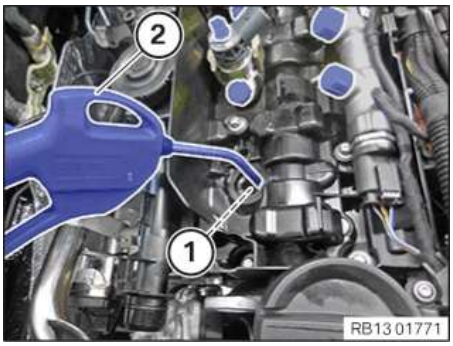
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



- Insert special tool 0 496 150 (13 2 020) into the injector shaft.



- Move special tool 0 496 150 (13 2 020) up and down in the injector shaft with rotational movements in the direction of arrow.
- Feed out special tool 0 496 150 (13 2 020) from the injector shaft and remove.



- Blow out injector shaft (1) with air gun (2).



- Feed the special tool 0 493 762 (13 5 214) into the injector shaft and screw it in with the special tool 0 493 763 (13 5 215).
- Feed out special tool 0 493 762 (13 5 214) with special tool 0 493 763 (13 5 215) from the injector shaft and remove it.

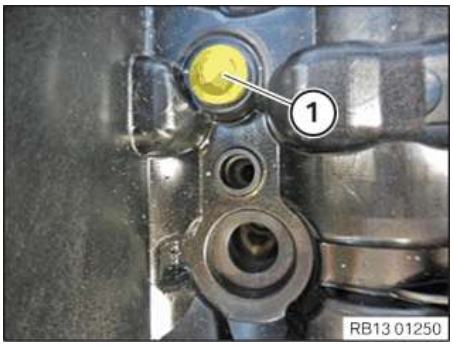
▸ **Check the placement of the clamping claw**

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



- Tighten down screw (1).

  The clamping claw is positioned on the bolt (1).

Clamping claw facing to cylinder head cover

M6		Tightening torque	10 Nm

▸ **Prepare the injector for installation**

cardiagn.com

RISK OF DAMAGE

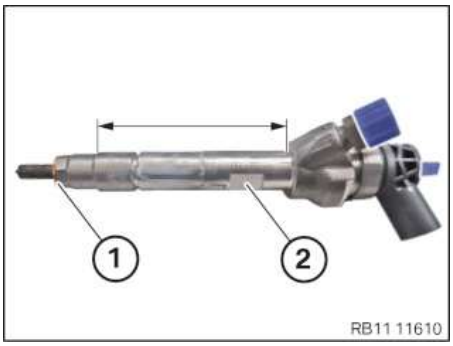
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

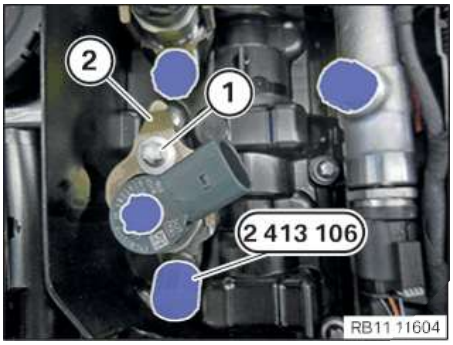
TECHNICAL INFORMATION

Lightly grease the injector shaft with high temperature-resistant grease.
For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



- Renew the copper sealing ring (1) on the injector (2).

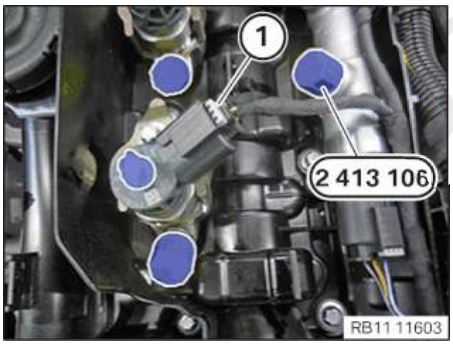
  Parts: Copper sealing ring
- Lightly grease the injector in the marked area with heat-resistant grease before installing the injector (2) in the injector shaft.



- Insert and install the injector .
- Insert and install the clamping claw (2).
- Tighten down screw (1).

Injector to cylinder head cover

M8	Tightening torque	8 Nm
	Angle of rotation	120 °



- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

▸ **Replacement: Perform injection quantity compensation**

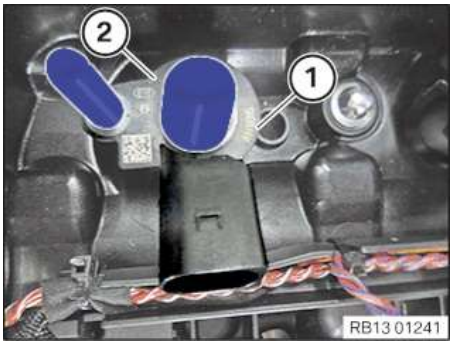
TECHNICAL INFORMATION

If the DDE control unit or an injector has been replaced, it will also be necessary to carry out injection quantity compensation. The adjustment value (7-position letter/number code) is engraved on each injector.

NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

cardiagn.com

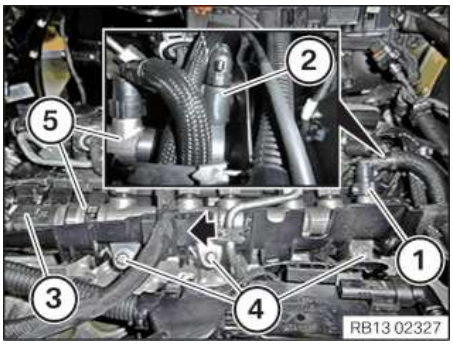


- Read off the adjustment value (1) on the new injector (2).



- Connect diagnosis system:
  - Vehicle identification
  - Function selection
  - Service functions
  - Digital diesel electronics (DDE)
  - Adjustment of injectors
  - Testing schedule
- Start service function with the right arrow button.

87 – Installing the rail



- Insert and install the rail (5).
- Tighten the screws (4).

Rail to cylinder head cover

M8		Tightening torque	19 Nm

- Install and lock cable clip (arrow).

  The cable clip (arrow) must engage audibly.
- Connect and lock the connector (3) at the rail pressure sensor.

  The connector (3) must engage audibly.
- Connect and lock the connector (2) at the rail pressure regulating valve.

  The connector (2) must engage audibly.
- Feed in fuel return line (1) and install.

  The fuel return line (1) must audibly engage.

88 – Installing high pressure line between rail and high pressure pump

WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.

CAUTION

On releasing high pressure line, fuel may emerge at high speed.

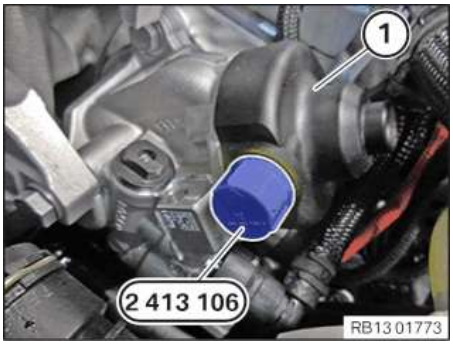
Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

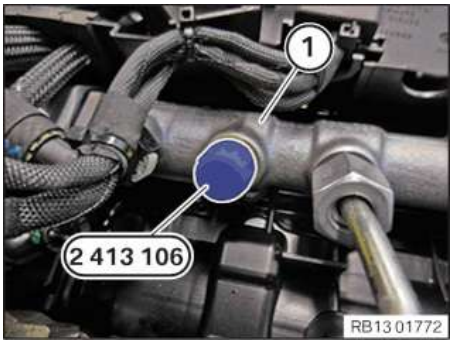
cardiagn.com

TECHNICAL INFORMATION

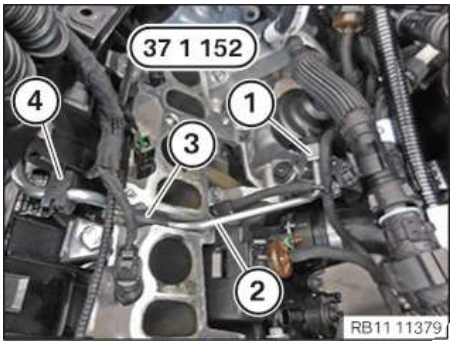
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Feed out and remove special tool on the high pressure pump (1).



- Feed out the special tool on the rail (1) and remove.



- Insert and install the high pressure line (2) with the abrasion protection (3) and the rubber mount (4).
- Hand-tighten the union nut (1) on the high pressure pump.



- Hand-tighten the union nut (1) on the rail.

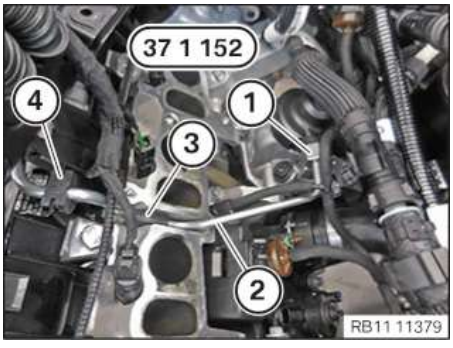
TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten the union nut (1) with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm



- Make sure that the high pressure line (2) is correctly installed with the abrasion protection (3) and the rubber mount (4).

TECHNICAL INFORMATION

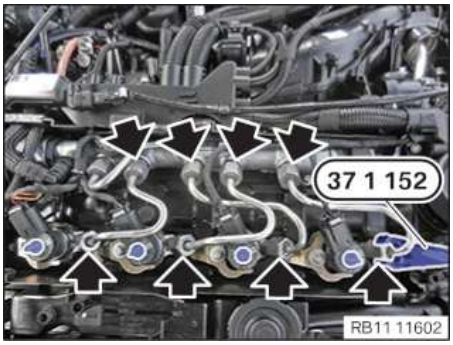
Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- Tighten union nut (1) on the high pressure pump with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm

cardiagn.com



- Remove the special tool from all cable connections.
- Feed in and install the high pressure lines (arrows).
- Hand-tighten the high pressure lines (arrows).

TECHNICAL INFORMATION

Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

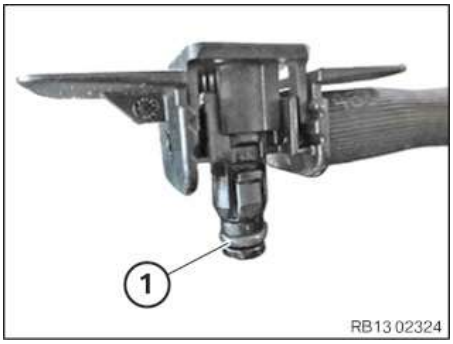
- Tighten the high pressure lines (arrows) with the special tool .

High pressure lines between injector and rail

High-pressure pipe		Tightening torque	24.5 Nm

- Check the high pressure lines (arrows) for tightness (**visual inspection**).

90 – Attach the leakage oil line on the injectors

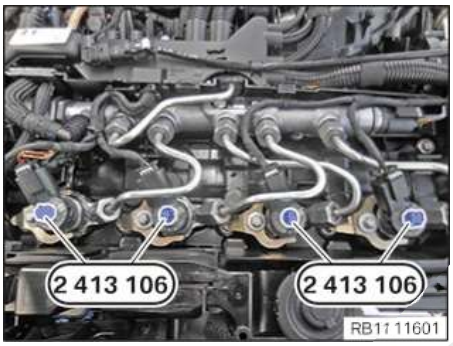


- **Version A:**

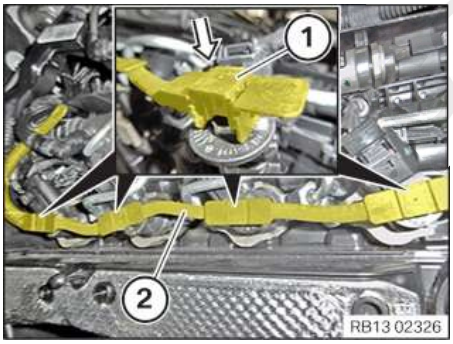
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

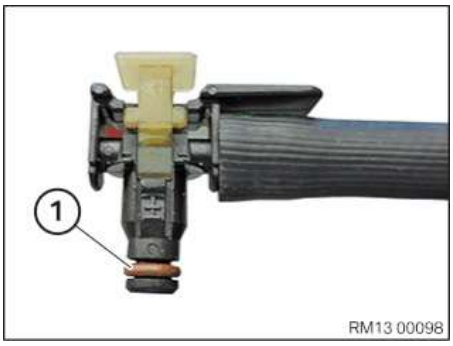
  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.



- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.



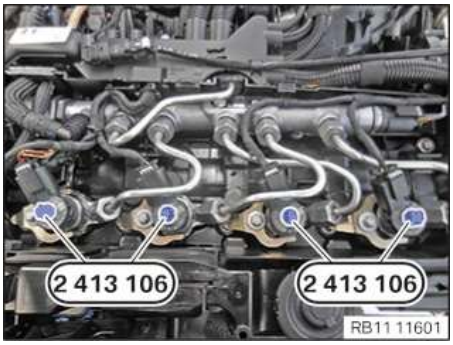
- **Version B**:

  Check sealing ring (1) for damage, renew leakage oil line if necessary.

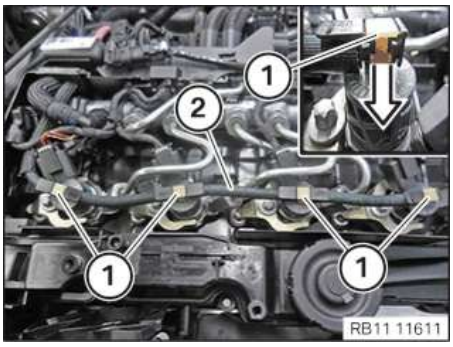
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.

ardiagn.com

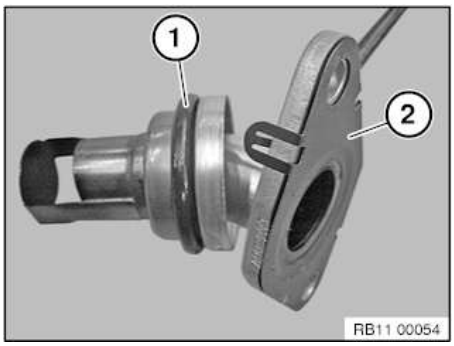


- Feed out the special tools and remove.



- Feed in leakage oil line (2) and install.
- Lock the locks (1) in the direction of the arrow.
- Ensure that the locks (1) engage audibly.

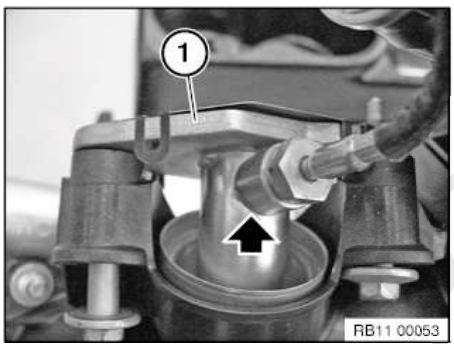
91 – Installing the intake plenum



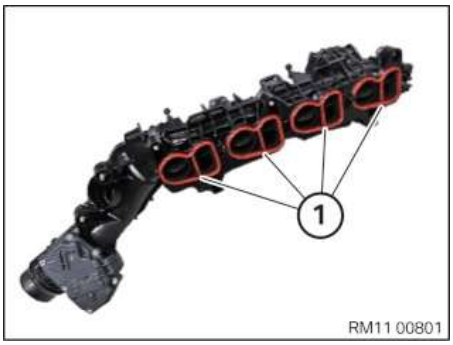
- Renew O-ring (1).

  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

  Parts: Gasket
- Position the seal (2) and clip it in.



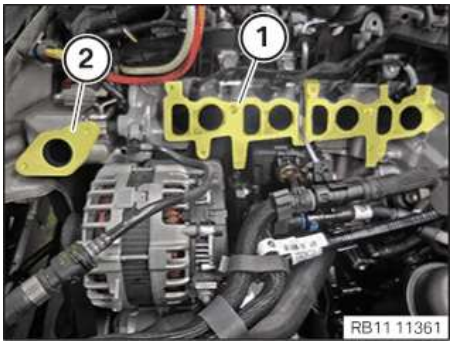
- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).



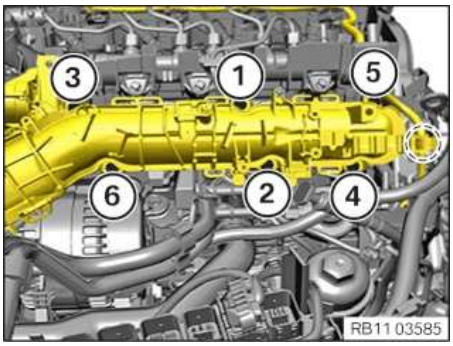
- Renew seals (1).

  Parts: Seals
- Ensure that the seals (1) are firmly mounted on the intake plenum.

cardiagn.com



- Clean connection points (1) at cylinder head.
- Clean the connection point (2) on the exhaust-gas recirculation cooler.

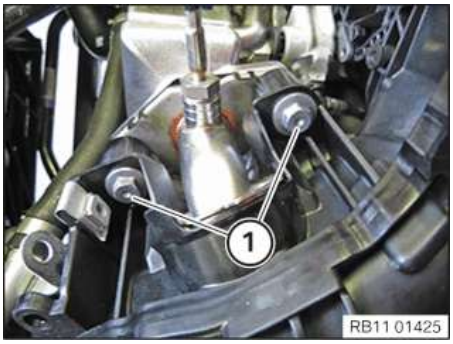


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

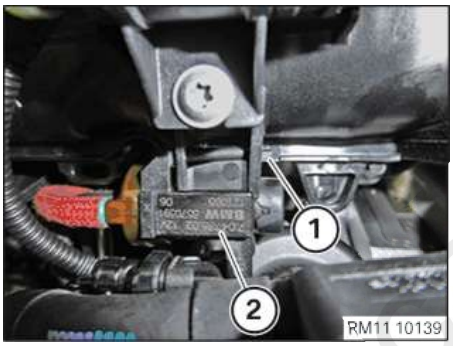
- Attach the wiring harness and fuel lines in the marked area on the intake plenum.



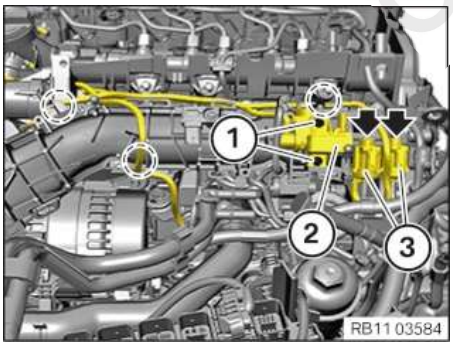
- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm



- Install electric changeover valve (2) from the left to the right in the holder on the intake plenum.
  The lock (1) must audibly engage.



- Install intake plenum electric changeover valve (3) on the intake plenum.
  The locks (arrows) must engage audibly.
- Position the electric changeover valve (2) on the intake plenum.
- Tighten the screws (1).

Electric changeover valve to intake plenum

TS6x20		Tightening torque	5 Nm

- Fasten the vacuum hoses on the intake plenum in the marked areas.



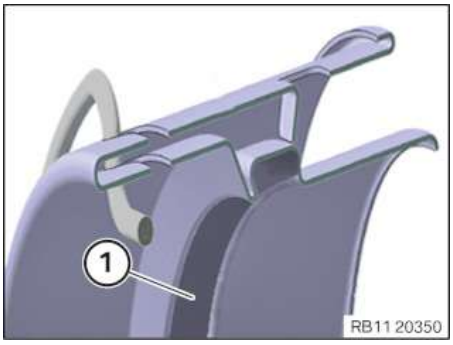
- Check the seal (1) for damage, and renew if necessary.

gardiagn.com

▸ **Replacing damaged seal**

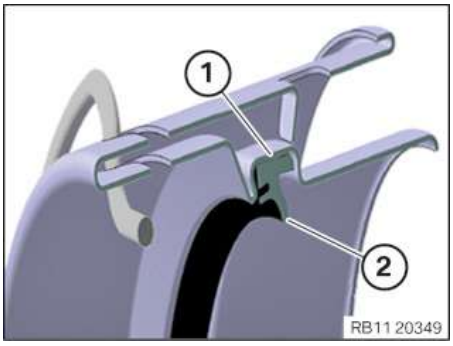
TECHNICAL INFORMATION

Do not use pointed or sharp-edged tools for the installation and/or removal.



- Remove damaged seal.
- Clean gasket groove (1) with a dry towel.

  The gasket groove (1) must be clean.



- Renew gasket.

  Parts: Gasket
- Install seal dry without lubricant or mounting agent.

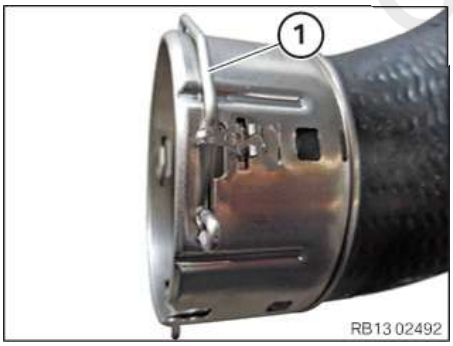
TECHNICAL INFORMATION

Incorrect assembly is possible. Ensure correct installation position.

- Feed in and install the seal.
- Make sure the seal is correctly installed in the gasket groove (1).
- Make sure that the sealing lip (2) is directed inwards as shown.



- Connect the pressure pipe to the throttle body until the locks (1) engage on both sides.



- Check that the locks (1) are correctly seated on the pressure pipe.

92 – Partially securing the wiring harness section on the intake plenum

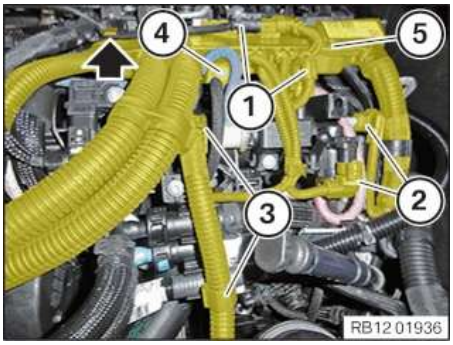
RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

- Route all cables without abrasions, do not trap and crush.

carsdiagn.com



- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

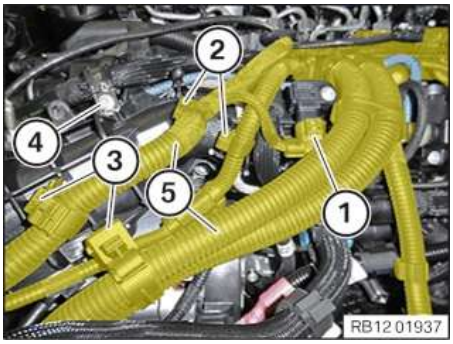
Wiring harness section to manifold

TS5x20		Tightening torque	3,6 Nm

- Secure clamps (3).
- Connect connectors (2) and lock.

  The connectors (2) must engage audibly.
- Secure the line at clamp (Arrow).
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



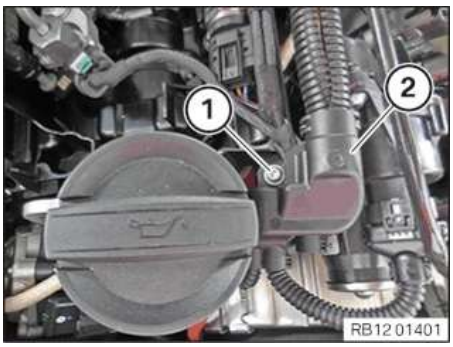
- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

Standard screw connection 4 Nm

Oval-head screw		Tightening torque	4 Nm

- Secure clamps (3).
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



- Guide in the wiring harness section (2) and install.
- Tighten down screw (1).

Wiring harness section to cylinder head cover

TS5x20		Tightening torque	3,6 Nm



- Connect connectors (1) and lock.

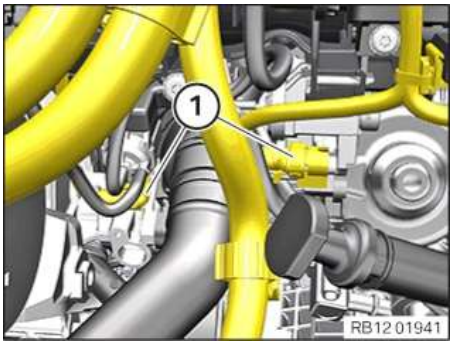
  The connector (1) must engage audibly.



- Connect the connector (1) and lock it.

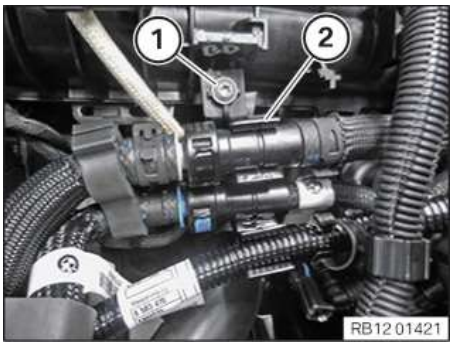
  The connector (1) must engage audibly.

cardiagn.com



- Connect connectors (1) and lock.

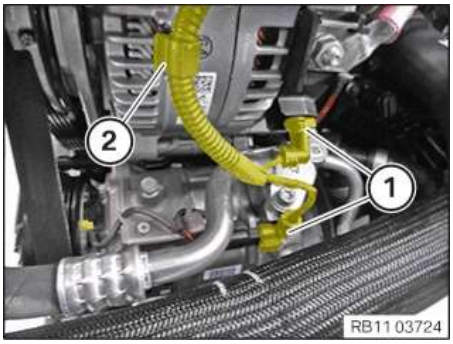
  The connectors (1) must engage audibly.



- Insert and install the holder (2).
- Tighten down screw (1).

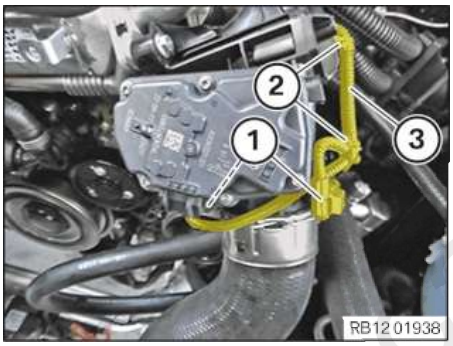
Holder on intake plenum

TS6X20		Tightening torque	5 Nm

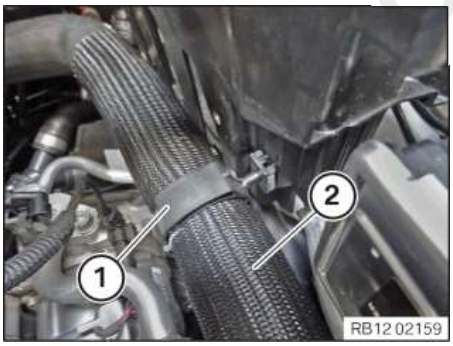


- Connect the connector (1) and lock it.

  The connectors (1) must engage audibly.
- Secure holder (2) to alternator.



- Guide in the wiring harness section (3) and install.
- Secure clamps (2).
- Connect connectors (1) and lock.



- Feed in and install coolant line (2).
- Lock holder (1).

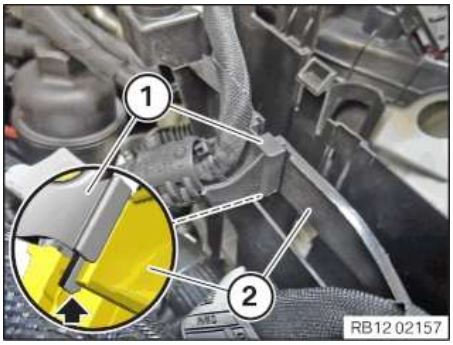
  The holder (1) must engage audibly.



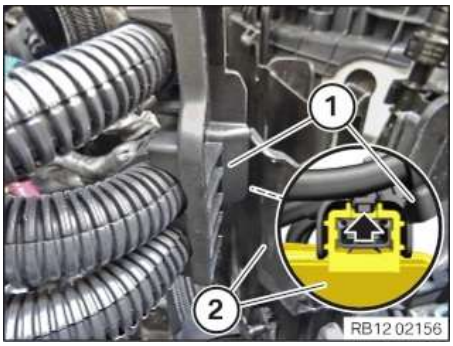
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.

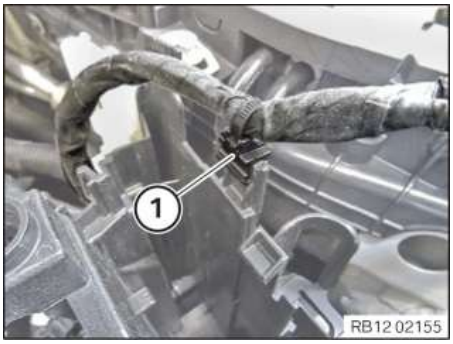
cardiagn.com



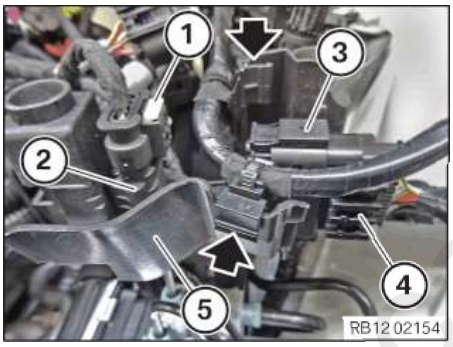
- Connect the cable clip (1) with the control unit holder (2) and lock it.
  Lock (arrow) must audibly engage.



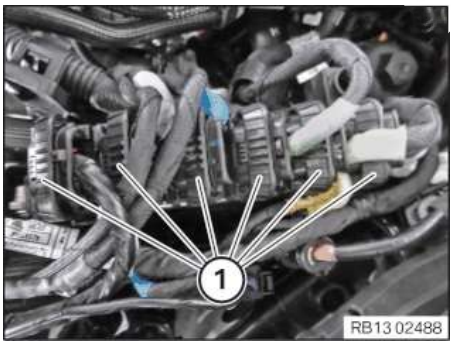
- Connect the cable clip (1) with the control unit holder (2) and lock it.
  Lock (arrow) must audibly engage.



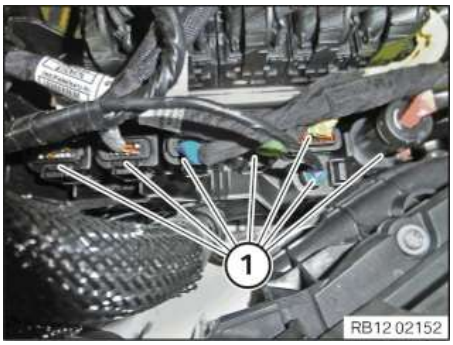
- Secure clamps (1).



- Connect and lock the connector (4) with the control unit holder (5).
  The connector (4) must engage audibly.
- Connect connectors (3) and lock.
  The connector (3) must engage audibly.
- Connect and lock the connector (2) with the control unit holder (5).
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.
  The connector (1) must engage audibly.
- Secure the clamps (arrows).

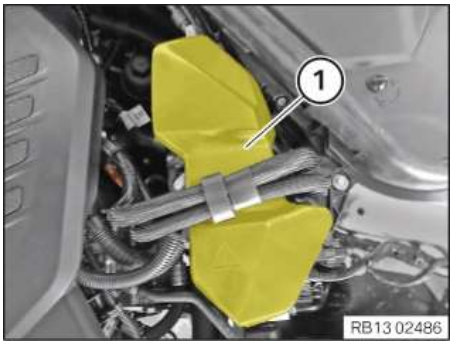


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.

cardiagn.com

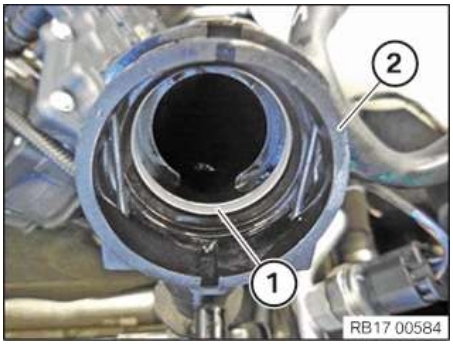


- Insert and install cover (1) into guides.

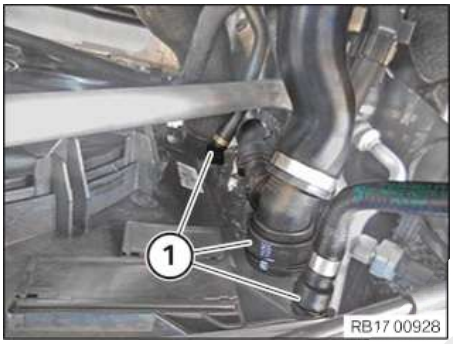
93 – Connecting the coolant lines

TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.



- Check the sealing ring (1) of the coolant line (2) for damage and renew where required.

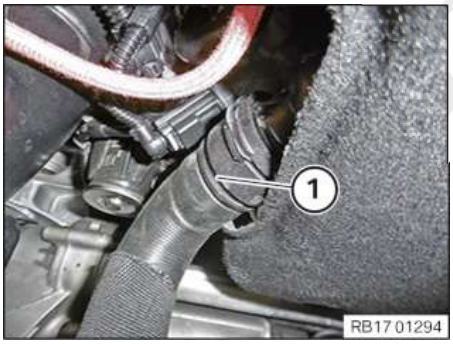


NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

- Connect and lock the coolant lines (1).

  The coolant lines (1) must engage audibly.



- Connect and lock coolant line (1).

  The coolant line (1) must audibly engage.

94 – Installing the high-pressure stage exhaust turbocharger and the low-pressure stage turbocharger

CAUTION

Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

cardiagn.com

RISK OF DAMAGE

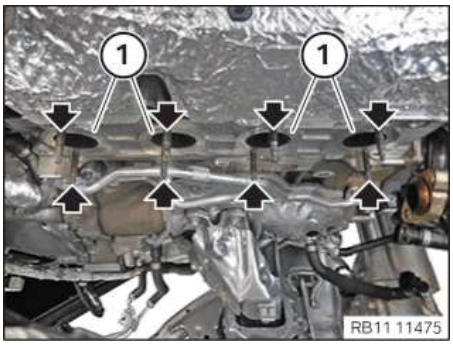
Damage to the surface.

The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.

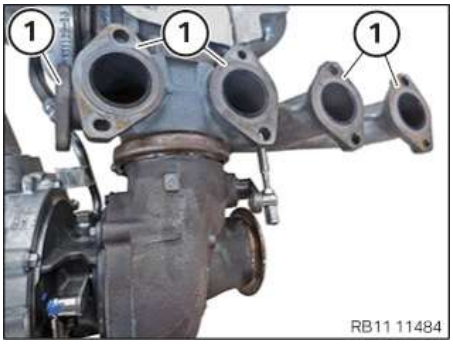
TECHNICAL INFORMATION

The sealing surfaces must be free from oils, grease and cleaning agents.

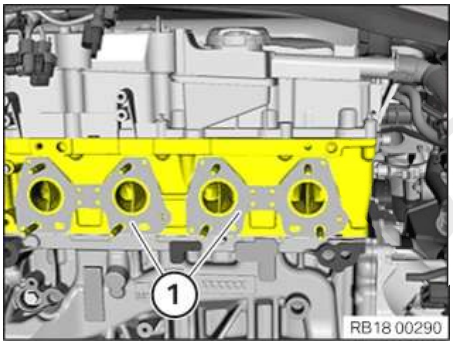


- Check the stud bolts (arrows) on the cylinder head for **correct** fit.
- Clean the connection points (1) with the special tool 0 495 102 (11 4 470).
- Renew gaskets.

  Parts: Seals



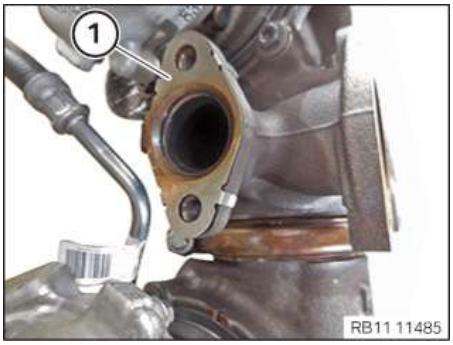
- Clean the connection points (1) on the exhaust manifold with the special tool 0 495 102 (11 4 470).



TECHNICAL INFORMATION

The **coated side** of the seal must be on the side of the exhaust manifold.

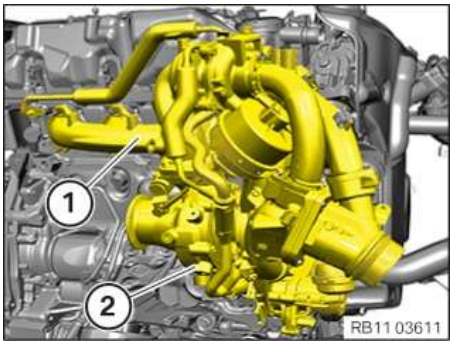
- Insert and install the gaskets (1).



- Renew the seal (1).

  Parts: Gasket
- Insert and install the seal (1).

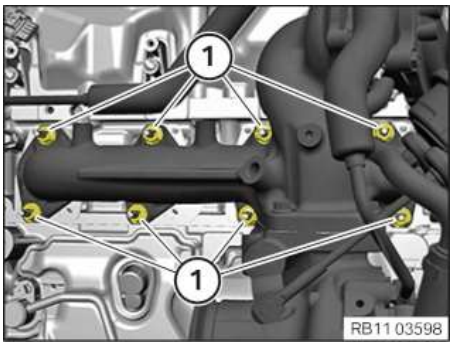
.com



TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

- Feed in the exhaust manifold (1) with the high-pressure stage exhaust turbocharger and the low-pressure stage turbocharger (2) from the top front and install.



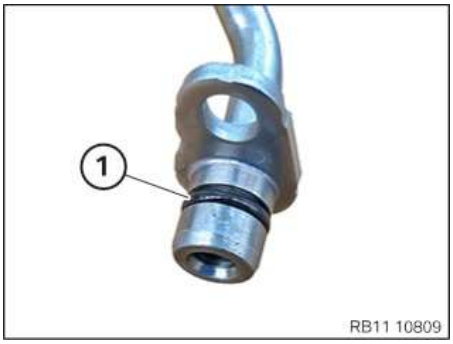
- Renew nuts (1).

  Parts: Nuts

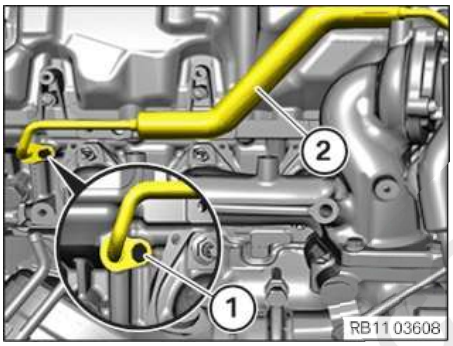
- Tighten the nuts (1) evenly from the inside out.

Exhaust manifold to cylinder head

M7	**If necessary, renew loose stud bolts.**	Tightening torque	11 Nm
	Renew nuts.	Tightening torque	13 Nm



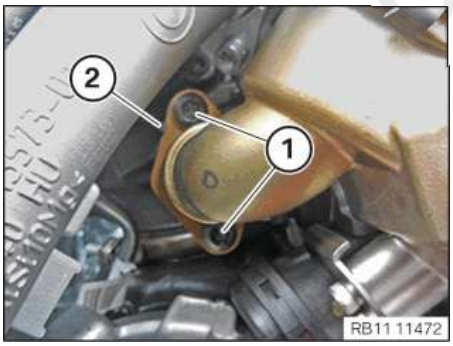
- Check the seal (1) for damage, if necessary, renew the oil feed line.



- Feed in and install the oil feed line (2) for the high-pressure stage exhaust turbocharger.
- Tighten down screw (1).

Oil feed line on cylinder head

M6x12		Tightening torque	8 Nm

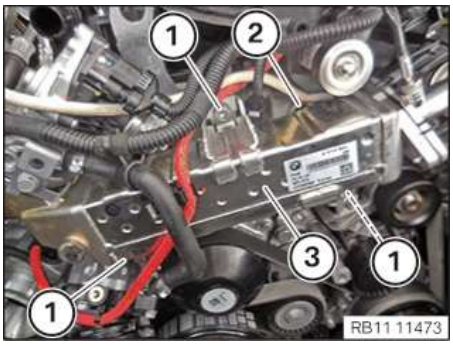


- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

M8x28	Replace screws	Tightening torque	32 Nm

- Ensure that seal (2) is installed.

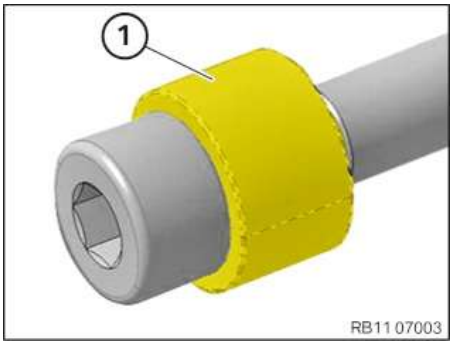


- Position the exhaust-gas recirculation cooler (3).
- Make sure the pipe neck (2) is fitted correctly.
- Tighten the screws (1).

Exhaust-gas recirculation cooler to cylinder head

M8x20 / M8x28		Tightening torque	19 Nm

Check



- Check whether the screws **with the** sleeves (1) (10 mm) are available.

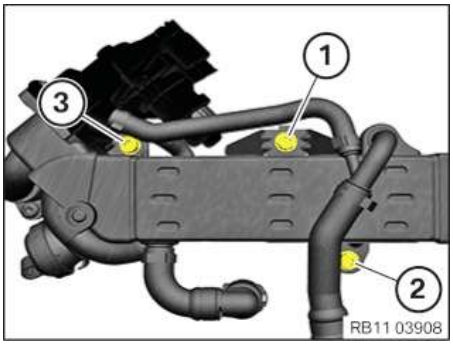
Result

» Screws **without** sleeves (1) are available.

Measure

- Renew screws.

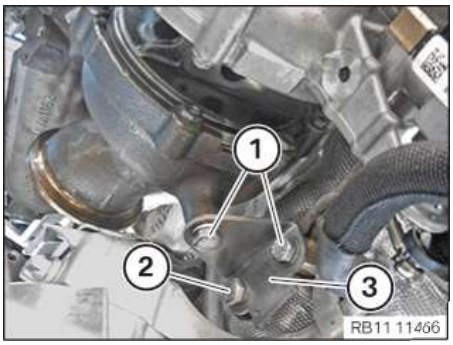
  Parts: Screws (part number 9 886 429)



- Tighten the screws (1) to (3).

Exhaust-gas recirculation cooler to cylinder head

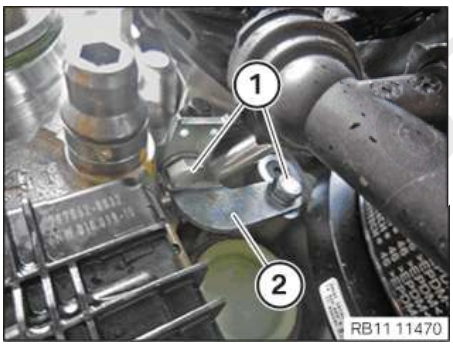
M8x20 / M8x28		Tightening torque	19 Nm



- Tighten the bolts (1) and (2) on the bracket (3).

Exhaust turbocharger low-pressure stage to crankcase

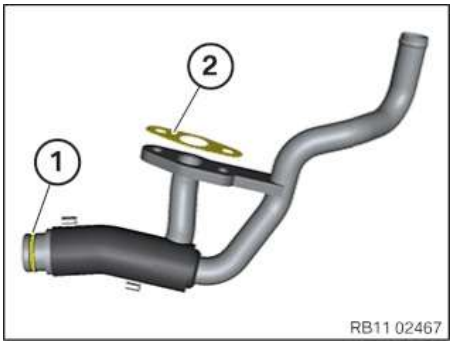
M8X16		Tightening torque	22 Nm



- Insert and install the holder (2).
- Tighten the screws (1).

Exhaust turbocharger low-pressure stage to crankcase

M8X16		Tightening torque	22 Nm

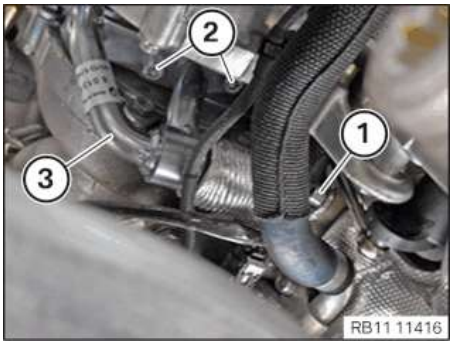


- Renew the gasket (2).

  Parts: Gasket

- Check the O-ring (1) for damage and renew the oil return line as needed.

bordiagn.com



- Install oil return line (3) into crankcase.
- Position oil return line (3) with the seal on the low-pressure stage exhaust turbocharger.
- Tighten the screws (2).

Oil return line to turbocharger

M6x12	Renew gasket.	Tightening torque	8 Nm

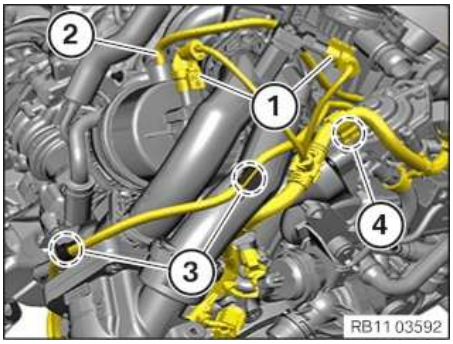
- Install the bolt (1).



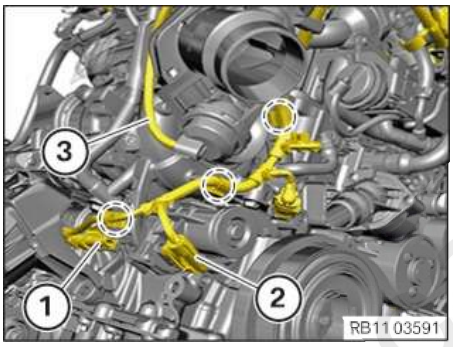
- Tighten the screws of the oil return line on the crankcase from the right wheel arch.

Oil return line to crankcase

M6x12	Check gasket. Renew the seal or line if necessary.	Tightening torque	8 Nm



- Secure the vehicle wiring harness in area (4) to the exhaust-gas recirculation cooler.
- Secure the vacuum hose in the marked areas (3) to the exhaust turbochargers.
- Connect vacuum hose (2).
- Connect all connectors (1) and lock audibly.



- Connect vacuum hose (3).
- Secure the wiring harness in the marked areas to the exhaust turbochargers.
- Plug in the connector (2) and lock audibly.
- Secure the connector in area (1) to the holder.

95 – Installing the exhaust-gas recirculation cooler

▸ **Avoiding damage to the starter generator due to escaping coolant**

RISK OF DAMAGE

Escaping coolant on the starter generator.

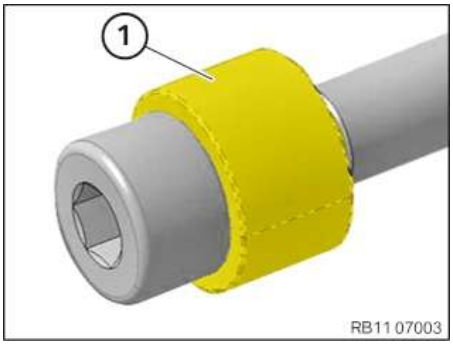
Damage and operating failure of the starter generator.

- Cover the starter generator with suitable, watertight auxiliary materials.
- Close off line connections with seal plugs.
- If necessary: Flush the leaked coolant from the starter generator with at least 1 l water.

▸ **Installing the exhaust-gas recirculation cooler**

Check

cardiagn.com



- Check whether the screws **with 10mm** sleeves (1) are available.

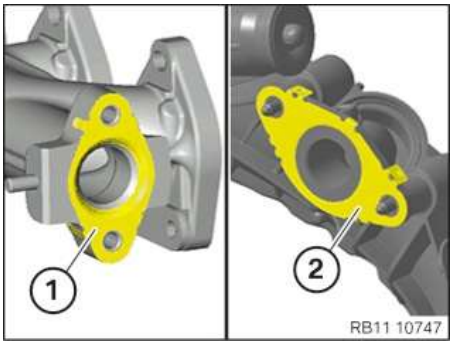
Result

» Screws **without** sleeves (1) are available.

Measure

- Renew screws.

  Parts: Screws (part number 9 886 429)

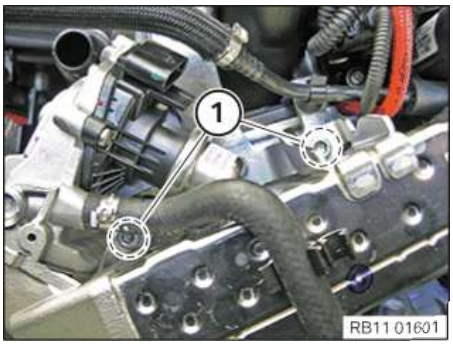


- Renew the seal (1) between the exhaust manifold and the exhaust-gas recirculation cooler.

  Parts: Gasket

- Renew the seal (2) between exhaust-gas recirculation cooler and intake air plenum.

  Parts: Gasket



TECHNICAL INFORMATION

When assembling, it is essential to observe screwing sequences and tightening torques. Non-observance of these requirements may result in leaks and damage.

- Tighten the screws (1) and subsequently release them again.

Exhaust-gas recirculation cooler to cylinder head

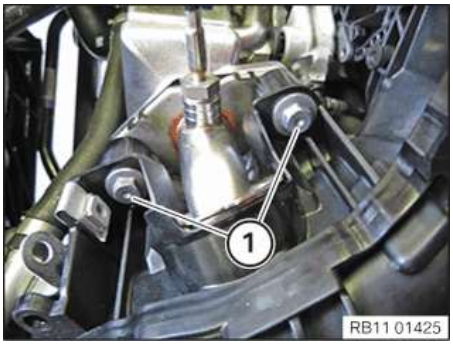
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screw (1) under the exhaust-gas recirculation cooler and then release again.

Exhaust-gas recirculation cooler to cylinder head

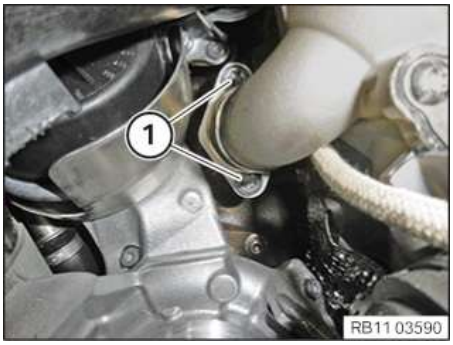
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

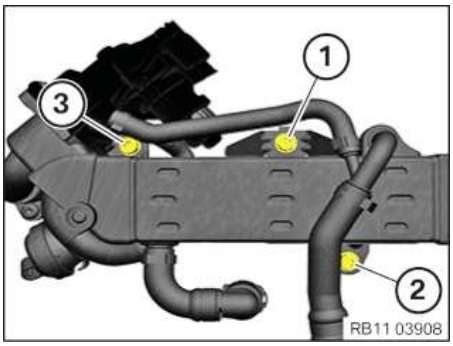
		Tightening torque	10 Nm



- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

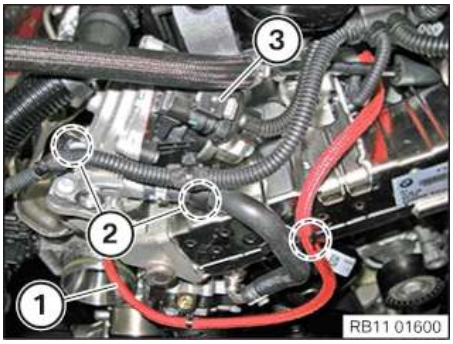
M8x28	Replace screws	Tightening torque	32 Nm



- Tighten screws in the order (1) to (3).

Exhaust-gas recirculation cooler to cylinder head

M8x20 / M8x28		Tightening torque	19 Nm



- Connect the connector (3) to the exhaust-gas recirculation valve.
- Attach the vehicle wiring harness to the clips (2) at the exhaust-gas recirculation valve and at the coolant line.
- Connect the vacuum line (1) to the exhaust-gas recirculation cooler and attach in the highlighted area.

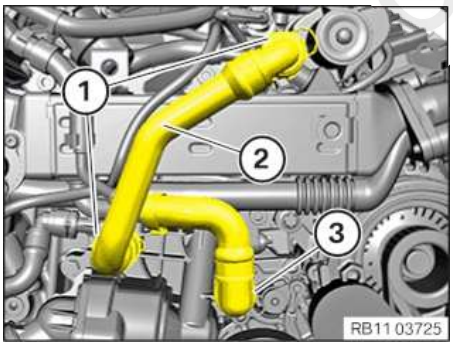


TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.

- **Version A:**

  Connect and audibly lock coolant lines (1).



TECHNICAL INFORMATION

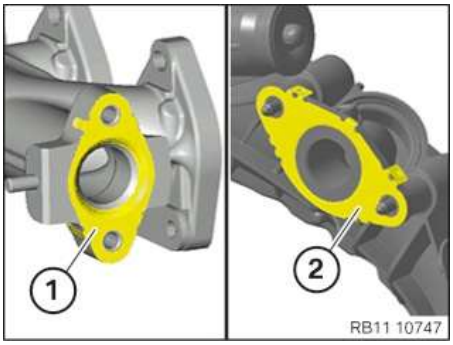
Make sure that the connections are locked correctly. The locks must engage audibly.

- **Version B:**

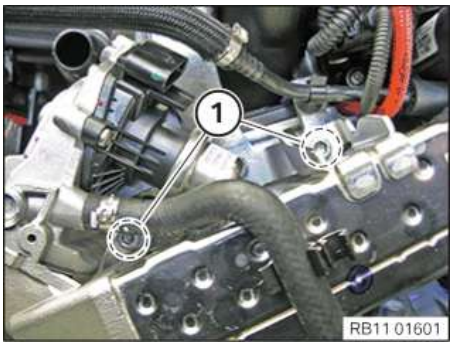
  Connect and audibly lock coolant lines (3).
- Install the coolant line (2).
- Audibly lock the locks (1).

▸ **Installing the exhaust-gas recirculation cooler**

galaagn.com



- Renew the seal (1) between the exhaust manifold and the exhaust-gas recirculation cooler.
  Parts: Gasket
- Renew the seal (2) between exhaust-gas recirculation cooler and intake air plenum.
  Parts: Gasket



TECHNICAL INFORMATION

When assembling, it is essential to observe screwing sequences and tightening torques. Non-observance of these requirements may result in leaks and damage.

- Install the exhaust-gas recirculation cooler and fasten with screws (1).
- Tighten the screws (1) and subsequently release them again.

Exhaust-gas recirculation cooler to cylinder head

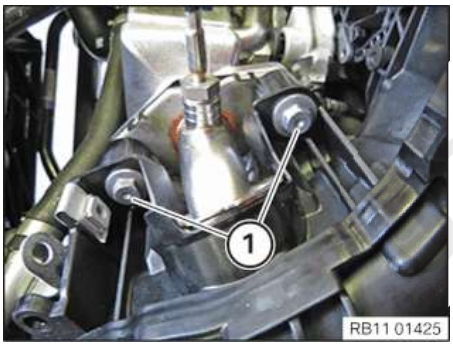
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screw (1) under the exhaust-gas recirculation cooler and then release again.

Exhaust-gas recirculation cooler to cylinder head

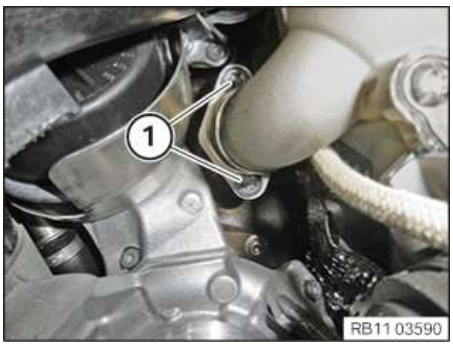
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm

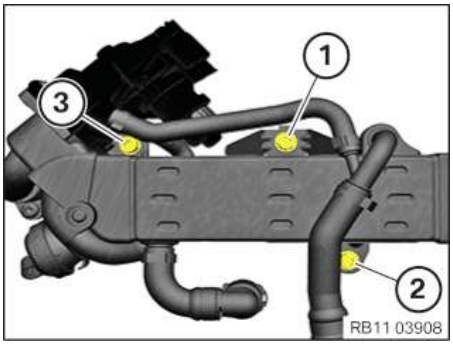


- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

M8x28	Replace screws	Tightening torque	32 Nm

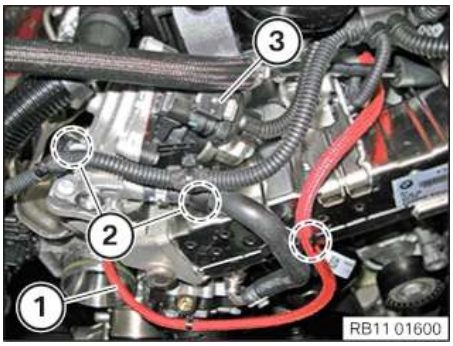
cardiagn.com



- Tighten screws in the order (1) to (3).

Exhaust-gas recirculation cooler to cylinder head

M8x20 / M8x28		Tightening torque	19 Nm



- Connect the connector (3) to the exhaust-gas recirculation valve.
- Attach the vehicle wiring harness to the clips (2) at the exhaust-gas recirculation valve and at the coolant line.
- Connect the vacuum line (1) to the exhaust-gas recirculation cooler and attach in the highlighted area.

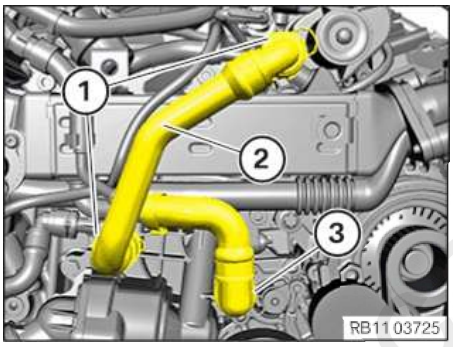


TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.

- **Version A:**

  Connect and audibly lock coolant lines (1).



TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.

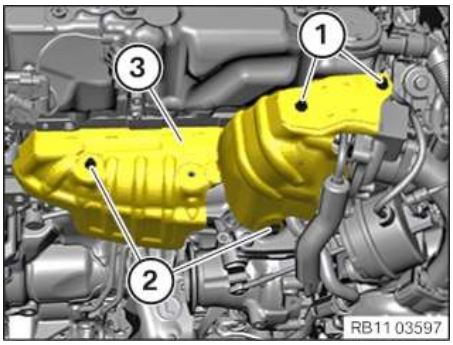
- **Version B:**

  Connect and audibly lock coolant lines (3).

  Install the coolant line (2).

  Audibly lock the locks (1).

96 – Installing heat shield



- Feed in and install the heat shield (3).
- Tighten down screws (1) and (2).

Heat shield to exhaust manifold

M6x12			10 Nm

97 – Installing the sensor bracket on the cylinder head cover

carlogn.com

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

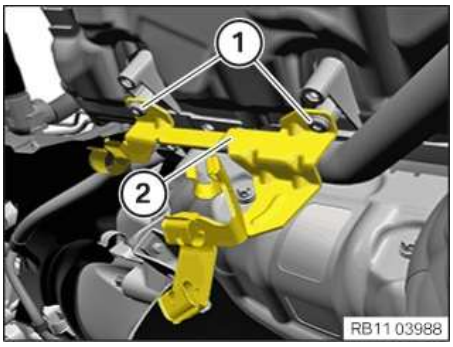
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

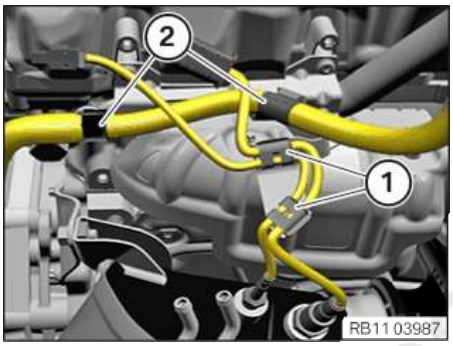
- Route all cables without abrasions, do not trap and crush.



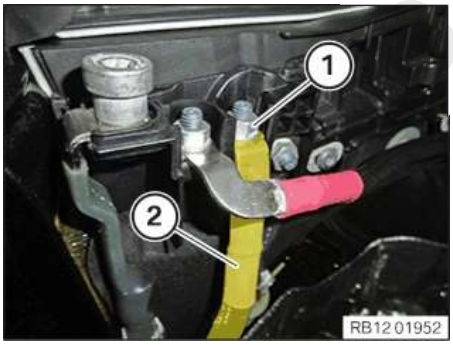
- Insert and install the holder (2).
- Tighten the screws (1).

Bracket on cylinder head cover

	Tightening torque	5 Nm



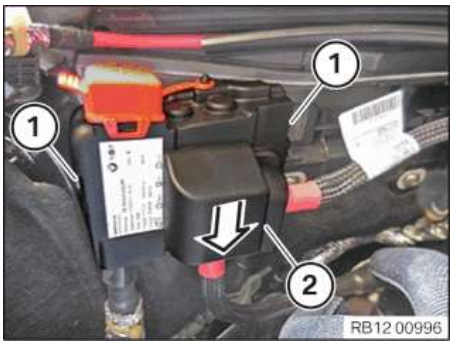
- Secure the positive battery cable in the clamps (2).
- Mount the cable of the exhaust gas sensor system in the clamps (1).



- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

Battery positive lead to battery positive terminal

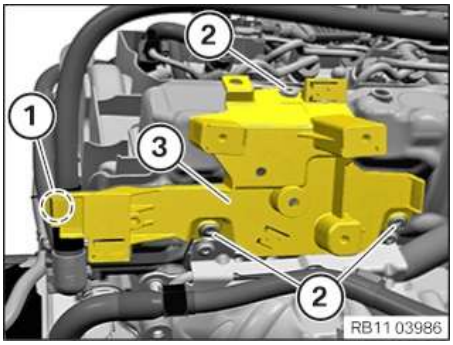
M8		Tightening torque	19 Nm



- Insert and install the cover (2) in the direction of the arrow.

  The locks (1) must engage audibly.

cardiagn.com

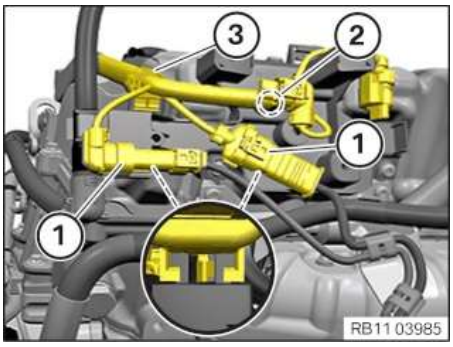


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

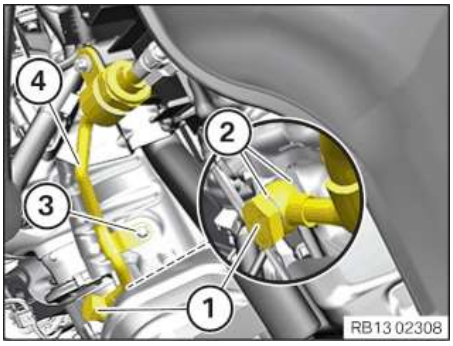
		Tightening torque	5 Nm

- Fasten the positive battery cable in the area (1) in the clamp.



- Feed in the wiring harness section and fasten it with the clamp (3).
- Fasten the cable clip in the area (2) in the sensor bracket.
- Feed in the connector (1) into the sensor bracket and lock it audibly.
- Plug in the connector (1) and lock audibly.

98 – Install the exhaust gas pressure pipe



- Insert and install the exhaust gas pressure pipe (4).
- Replace the sealing rings (2).

  Parts: Sealing ring
- Apply the banjo bolt (1) hand-tight.
- Tighten down screw (3).

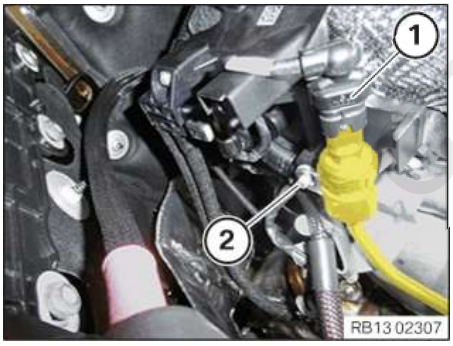
Heat shield to exhaust manifold

M6x12		Tightening torque	10 Nm

- Tighten the banjo bolt (1).

Banjo bolt for exhaust pressure pipe to exhaust manifold

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm



- Tighten down screw (2).

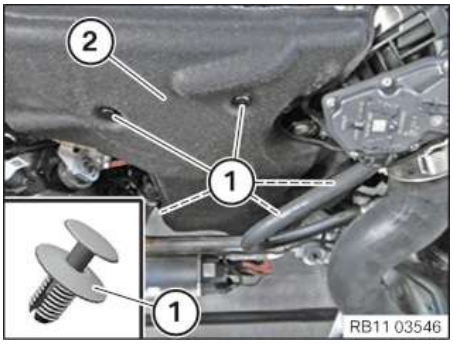
Exhaust gas pressure pipe to sensor system holder

TS6x20		Tightening torque	5,7 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

99 – Install acoustic cover for the engine, front



- Feed the acoustic cover (2) in and install.
- Secure the acoustic cover (2) with the expanding rivets (1).

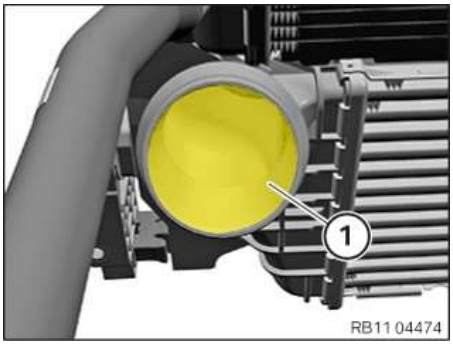
100 – Install pressure pipe between exhaust turbocharger and charge air cooler

RISK OF DAMAGE

Damage to the exhaust turbocharger.

A leak at the pressure pipe can damage the exhaust turbocharger.

- Replace the gaskets and pressure pipe if necessary.



RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

- Remove the auxiliary materials for sealing the opening (1) of the charge air cooler.



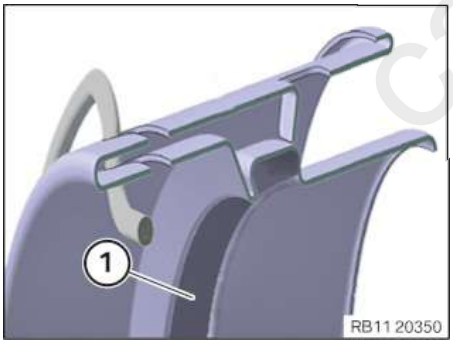
- Check the seal (1) for damage and renew if necessary.

  Parts: Gasket

▸ **Replacing damaged seal**

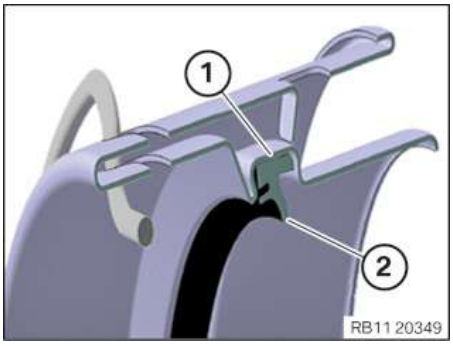
TECHNICAL INFORMATION

Do not use pointed or sharp-edged tools for the installation and/or removal.



- Remove damaged seal.
- Clean gasket groove (1) with a dry towel.

  The gasket groove (1) must be clean.



- Renew gasket.

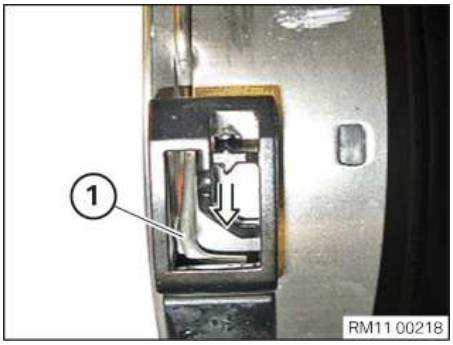
  Parts: Gasket
- Install seal dry without lubricant or mounting agent.

TECHNICAL INFORMATION

Incorrect assembly is possible. Ensure correct installation position.

- Feed in and install the seal.
- Make sure the seal is correctly installed in the gasket groove (1).
- Make sure that the sealing lip (2) is directed inwards as shown.

cardiagn.com



- **Version A:**

  Lock the lock (1).

  The lock (1) on the pressure pipe must engage audibly.

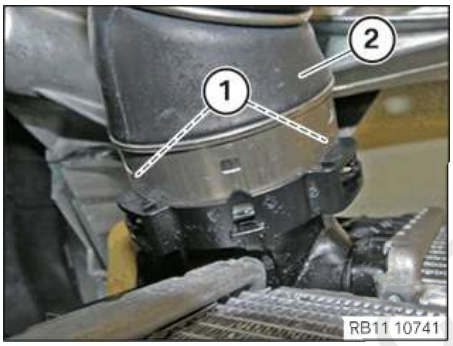


- Pay attention to the installation position:

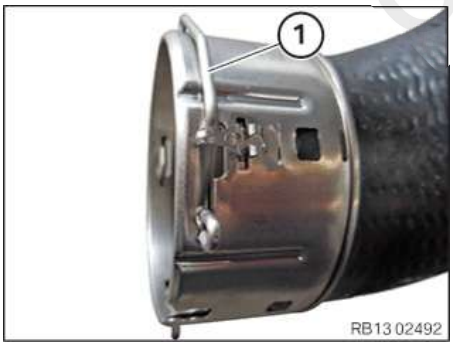
  The pressure pipe fits on charge air cooler in one installation position only.



- Install the pressure pipe (1) from the top.



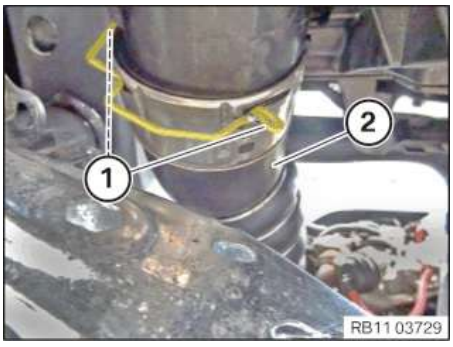
- Connect pressure pipe (2) to charge air cooler.
- Lock the lock (1) on both sides.



- **Version B:**

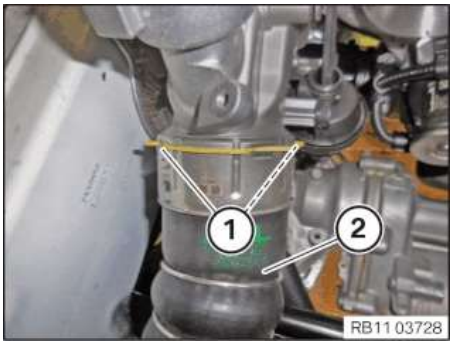
  Lock the lock (1).

  The lock (1) on the pressure pipe must engage audibly.



- Attach the pressure pipe (2) to the charge air cooler until the lock (1) engages on both sides.

cardiagn.com

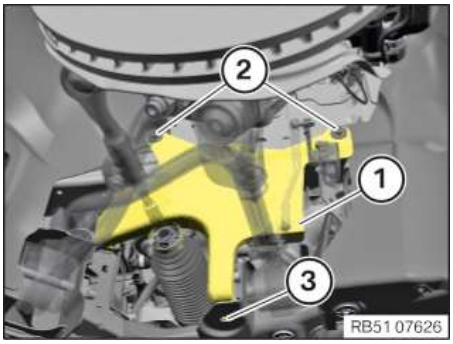


- Place the pressure pipe (2) onto the compressor bypass and ensure that the lock (1) engages audibly.

101 – Install the cover of the steering assembly

TECHNICAL INFORMATION

When tightening the screws, the cover can twist and cause chafe marks on the anti-roll bar (risk of corrosion).
Hold the cover while tightening the screws. Then check the position of the cover.



- Position the cover (1).
- Tighten down screws (2) and (3).

Cover, steering unit

Screw		Tightening torque	3 Nm

102 – Installing the front right wheel

▸ **Mounting the wheel**



TECHNICAL INFORMATION

The contact surface between the brake disc and the wheel rim must be clean and free from oil and grease. There is otherwise a risk of the wheel becoming loose at a later time.

- Remove dirt, grease residues and corrosion from the contact surface with a drill and the special tool 2 344 011.

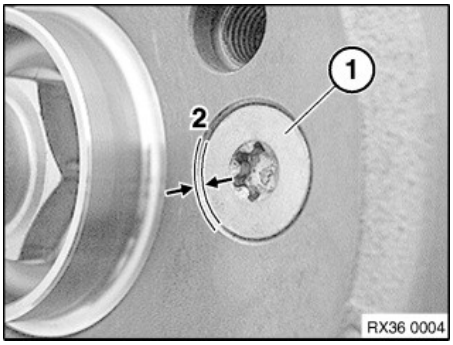
  Do not operate special tool 2 344 011 with an impact screwdriver.
- Degrease the contact surfaces with the universal cleaner (see BMW Group Parts).
- In the event of grease residue in the area of the wheel bolt holes, remove and clean the brake disc.



- Remove dirt, grease residues and corrosion from the contact surface with a drill and the special tool 2 344 011.

  Do not operate special tool 2 344 011 with an impact screwdriver.
- Degrease the contact surfaces with the universal cleaner (see BMW Group Parts).

carDiagn.com



- Check that the mounting bolt (1) for the brake disc is securely seated.

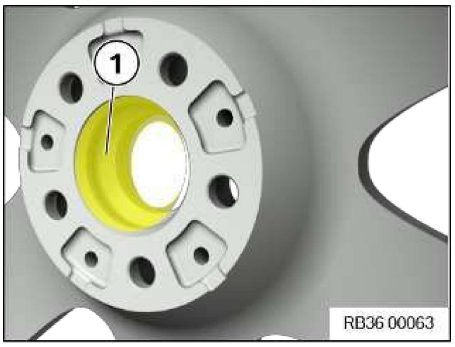
  The mounting bolt (1) for the brake disc **may not** protrude on the contact surface (2) between the brake disc and the wheel rim.

Brake disc to front wheel hub

M8	Renew screw.	Tightening torque	16 Nm

Brake disc to rear wheel hub

M8	Renew screw.	Tightening torque	16 Nm



TECHNICAL INFORMATION

Wheel hubs and wheel centering on the models G80, G82 and G83 **must not** be greased.

- Thinly grease the wheel centring (1) in the wheel rim.

Expendable materials

Brake block paste * TU = Trade Unit. TU numbers cannot be ordered! For invoicing purposes only.	3 g, Bag	83192158851
	100 g, Tube	83192158852
	5 g, TU*	83230140233



TECHNICAL INFORMATION

Wheel hubs and wheel centering on the models G80, G82 and G83 **must not** be greased.

- Apply a thin layer of grease to the front and rear wheel hubs (1) to protect against corrosion.

Expendable materials

Brake block paste * TU = Trade Unit. TU numbers cannot be ordered! For invoicing purposes only.	3 g, Bag	83192158851
	100 g, Tube	83192158852
	5 g, TU*	83230140233



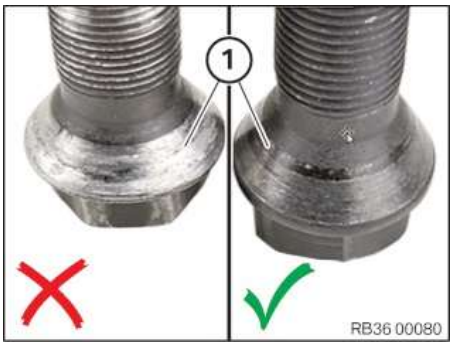
TECHNICAL INFORMATION

A wheel lift is recommended for easier wheel removal and installation without exertion (see Retailer Equipment Catalogue).

- **In vehicles with M Carbon ceramic brake: The wheel lift must be used to install the wheel.**

  This process is intended to prevent damage to the brake disc.

carmagn.com



Check

- **Check wheel bolts for wear.**

Result

» Places (> 30%) of the bearing surfaces (1) of the taper on the screw head show a silver wear.

Measure

- Replace wheel bolts.

  Parts: Wheel bolts



TECHNICAL INFORMATION

Never use impact screwdrivers or electric screwdrivers to screw in and tighten the wheel bolts.

The wheel rim must rest uniformly against the brake disc.

In the case of non-original BMW wheel bolts/wheel rims, it may be necessary to retighten the wheel bolts on account of setting properties (refer to the documentation from the manufacturer).

Do not apply oil to new wheel bolts.

- Renew the corroded wheel bolts (arrows).

  Parts: Wheel bolts
- Clean the wheel bolts (arrows).
- Check the wheel bolts (arrows) and threads for damage, renew the wheel bolts (arrows) if necessary.
- Join and tighten the wheel bolts (arrows).

Wheel bolts

M14 / SW17	Screw in wheel bolts and evenly tighten crosswise by hand in order to centre the wheel rim.	Tightening torque	140 Nm
	Tighten wheel bolts to the prescribed tightening torque with a calibrated torque wrench in a crosswise sequence.	Check	140 Nm
	Check all the wheel bolts in the same order or retighten to the prescribed tightening torque again.		

103 – Prepare for the installation of the diesel particulate filter



- Renew the V-clip (1).

  Parts: V-band clamp

cardiagn.com



- Renew gasket (1).

  Parts: Gasket

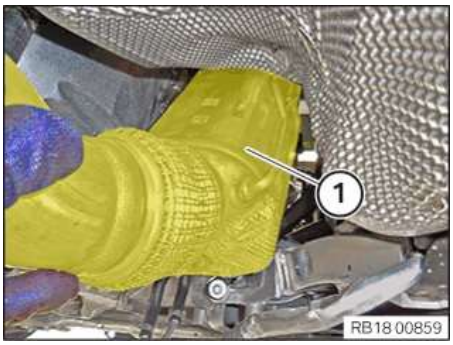
104 – Installing the diesel particulate filter

CAUTION

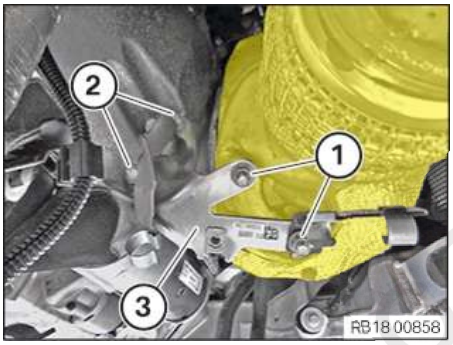
Heavy component.

Heavy components can lead to injury or damage.

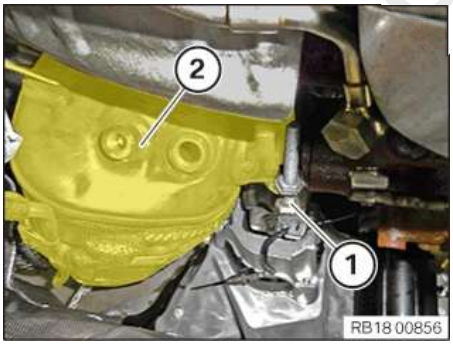
- Remove and install heavy components with the aid of another person/other persons.



- Insert and install the diesel particulate filter (1).



- Insert and install the holder (3).
- **Hand-tighten** the bolts (2).
- Apply the nuts (1) **hand-tight**.

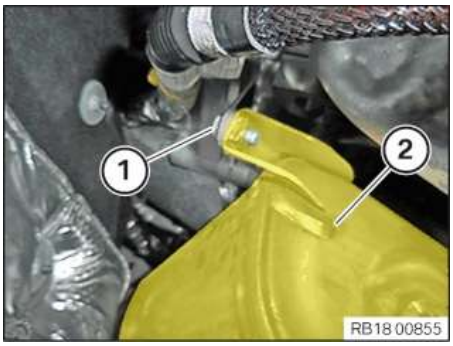


- Renew the V-clip (1).

  Parts: V-band clamp
- Feed in and install V-band clamp (1).

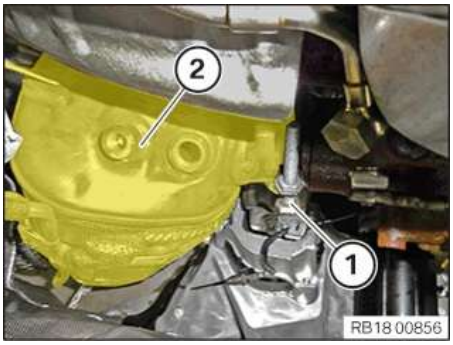
Note: Make sure that the seal between the diesel particulate filter and the exhaust turbocharger is installed correctly.

- Position the diesel particulate filter (2) on the exhaust turbocharger .
- Position V-clip (1).
- Apply the V-clip (1) **hand-tight**.



- Feed in screw (1) on the holder of the diesel particulate filter (2) and tighten **hand-tight**.

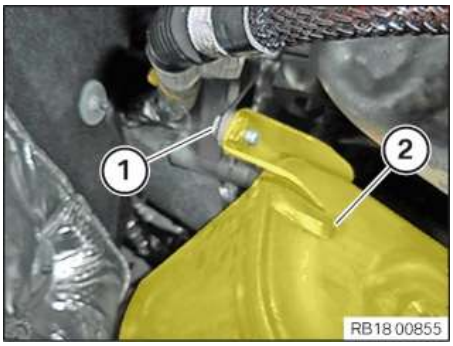
cardiagn.com



- Tighten the V-clip (1) of the diesel particulate filter (2).

Diesel particulate filter V-clip to exhaust turbocharger

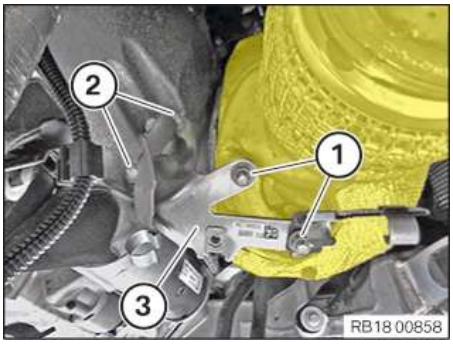
V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm



- Tighten the bolt (1) on the bracket of the diesel particulate filter (2).

Bracket to diesel particulate filter top

M8		Tightening torque	19 Nm



- Tighten the screws (2) on the holder (3).

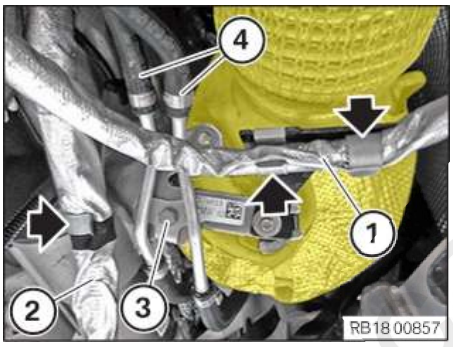
Bracket to transmission for diesel particulate filter holder bottom

M8X20		Tightening torque	19 Nm

- Tighten the nuts (1) on the holder (3).

Lower holder to diesel particulate filter

M8		Tightening torque	19 Nm



- Thread in and install coolant line (4).
- Tighten down screw (3).

Coolant lines for SCR metering module

M6X16		Tightening torque	8 Nm

- Secure the positive battery cable (2) of the starter motor at the clamp (arrow).
- Fasten the metering line (1) on the clamps (arrows).

105 – Installing the nitrogen oxide sensor upstream of SCR catalytic converter

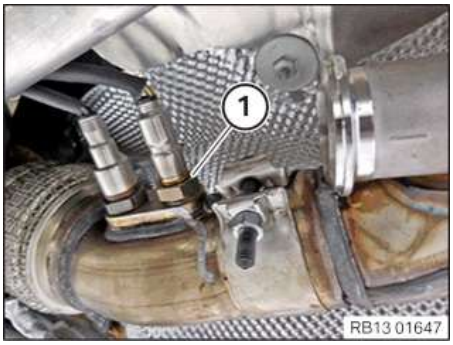
RISK OF DAMAGE

Damage to the nitrogen oxide sensor.

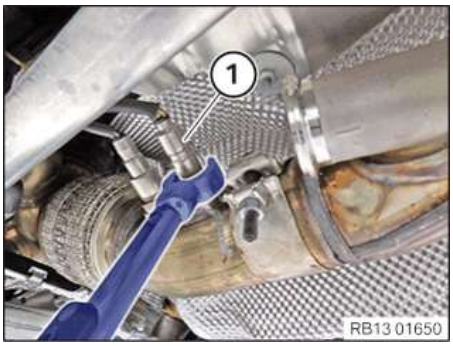
Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
- The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

cardiagn.com



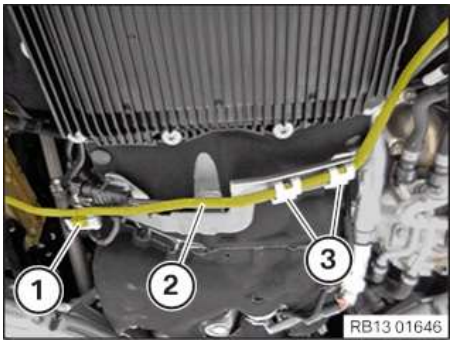
- Feed in and install the nitrogen oxide sensor (1).



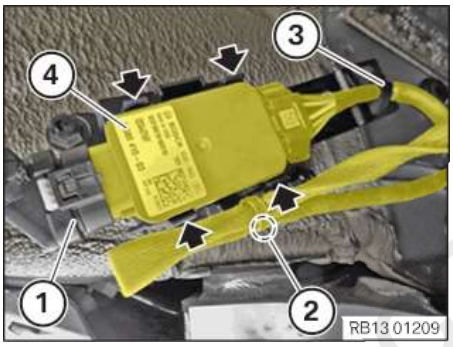
- Tighten the nitrogen oxide sensor (1) using commercially available tools.

Nitrogen oxide sensor before SCR catalytic converter

Sensor		Tightening torque	50 Nm



- Secure the cables (2) to the clamps (3).
- Secure clamps (1).



- Clip in the control unit (4) (arrows).
- Fasten the cable in the holder (3).
- Secure the cable holder (2).
- Plug in the connector (1) and lock audibly.

106 – Installing the monitoring oxygen sensor after the diesel particulate filter

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
  - The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

cardiagn.com

TECHNICAL INFORMATION

New oxygen sensors are to be greased lightly and evenly on the thread.

For oxygen sensors that are reused, the following should be observed:

Lightly and evenly grease the oxygen sensor only on the thread. Do not clean and grease that part of the oxygen sensor which protrudes in the exhaust branch (sensor ceramics).

For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



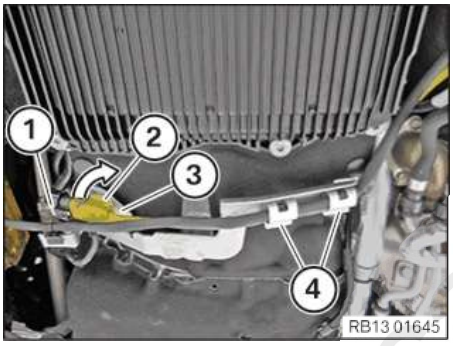
- Insert the monitoring oxygen sensor (1) and install it.



- Tighten the monitoring oxygen sensor (1) with standard tools.

Monitoring oxygen sensor

Sensor		Tightening torque	50 Nm



- Fasten the monitoring oxygen sensor to the clamps (4).
- Secure the connector (2) on the holder (3) in direction of arrow.
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

107 – Installing the exhaust system

CAUTION

Component with heavy weight.

Danger of injury!

- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

Heavy component.

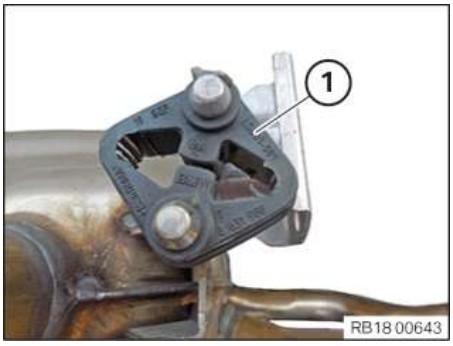
Heavy components can lead to injury or damage.

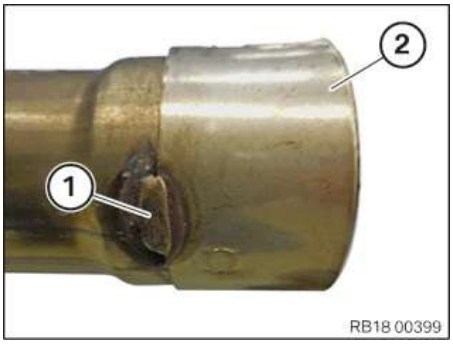
- Remove and install heavy components with the aid of another person/other persons.

cardiagn.com

TECHNICAL INFORMATION

Mount the exhaust system in voltage-free state, maintaining the tightening sequence from the rear silencer towards the exhaust manifold.





NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

- Check all the rubber mounts (1) of the exhaust system for damage.
- Replaced damaged rubber mounts.

  Parts: Rubber mount

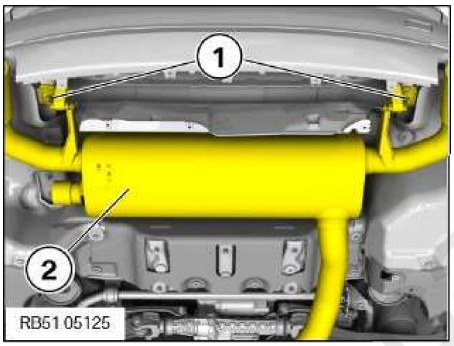
CAUTION

Swarf resulting from sawing or grinding components.

Danger of injury!

- Conduct all work in appropriate personal protective equipment only.
- Wear safety goggles and protective gloves.

- Open the weld seam (1) with a conventional tool.
- Remove the clamp (2).

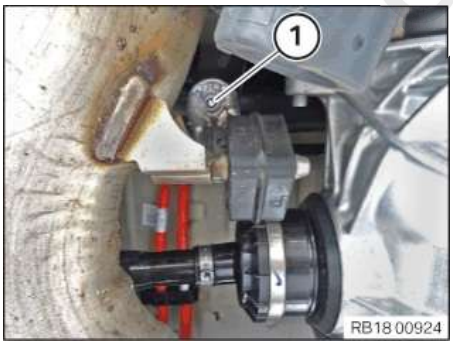


- Insert and install the exhaust system (2).
- Renew nuts (1).

  Parts: Nuts
- Tighten nuts (1).

Rear silencer to body / bumper support

M8	Replace nuts.	Tightening torque	19 Nm

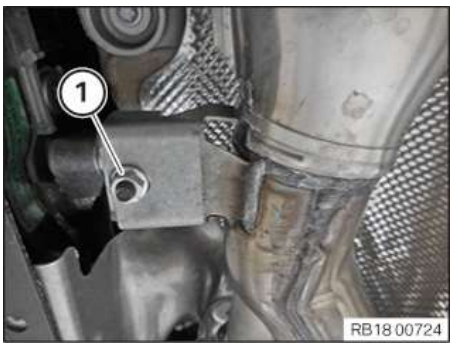


- Renew nut (1) on the rear axle support.

  Parts: Nut
- Tighten nut (1).

Exhaust system to rear axle carrier

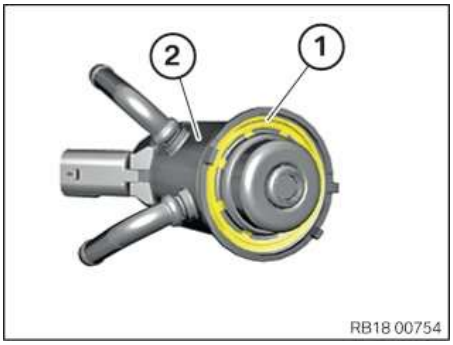
M8 nut		Tightening torque	19 Nm



- Tighten nut (1).

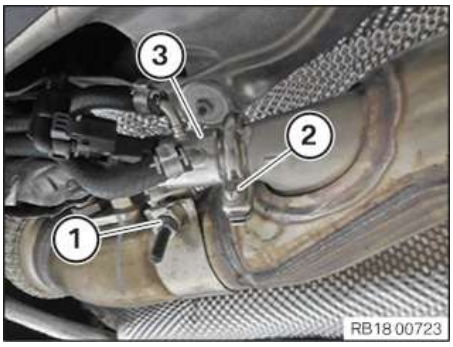
Exhaust system to transmission

M8		Tightening torque	19 Nm



- Renew sealing ring (1) of the SCR metering module (2).

  Parts: Sealing ring



- If necessary, renew clamp (1).

  Parts: Clamp
- Tighten clamp (1).

Exhaust system to diesel particle filter

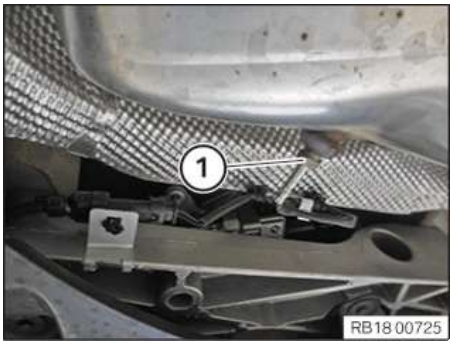
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

- Renew the V-clip (2).

  Parts: V-band clamp
- Install the SCR metering module (3) in the exhaust system.
- Tighten the V-clip (2) of the SCR metering module (3).

SCR metering module V-clip to exhaust system

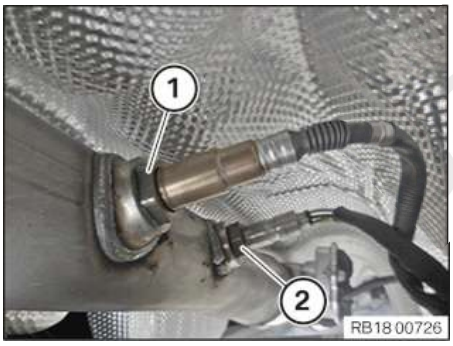
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm



- Install the exhaust temperature sensor (1) in the exhaust system and tighten.

Exhaust-gas temperature sensor upstream of SCR catalytic converter

Sensor		Tightening torque	30 Nm



- Install the diesel particulate sensor (1) in the exhaust system and tighten.

Diesel particulate sensor to exhaust system

Sensor		Tightening torque	50 Nm

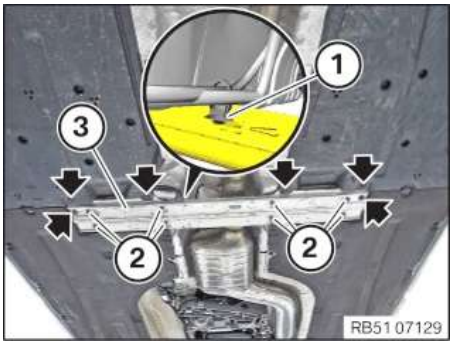
- Install the nitrogen oxide sensor (2) in the exhaust system and tighten.

Nitrogen oxide sensor downstream of SCR catalytic converter

Sensor		Tightening torque	55 Nm

108 – Install the connecting supports on the tunnel

cardiagn.com



- Guide in and install connecting support (3) on the tunnel.
- Tighten the screws (2).
- Tighten screws (arrows).

Connecting support to tunnel

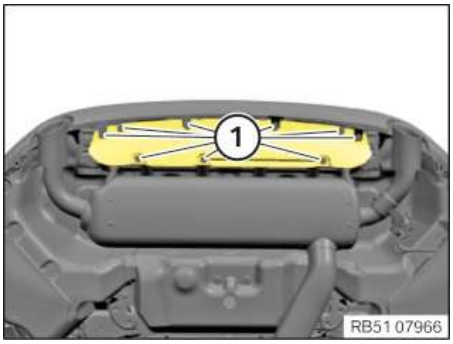
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Secure the clamp (1).

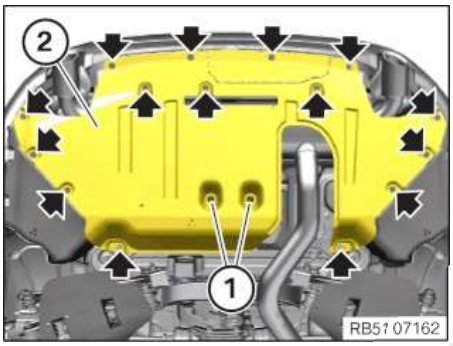
109 – Installing the rear diffuser



- **Version 1:**
- Install the diffuser and tighten the nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm



- **Version 2:**
- Feed in and position the diffuser (2)
- Tighten screws (arrows).

Diffuser / underbody panelling

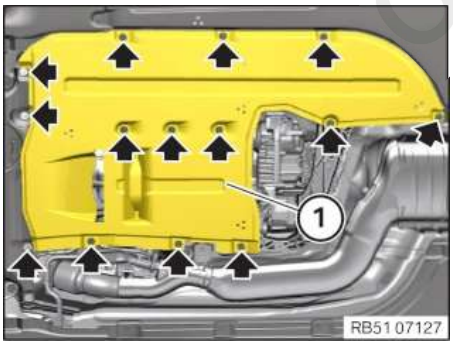
Nuts and screws		Tightening torque	3 Nm

- Tighten nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm

110 – Installing underbody protection at rear



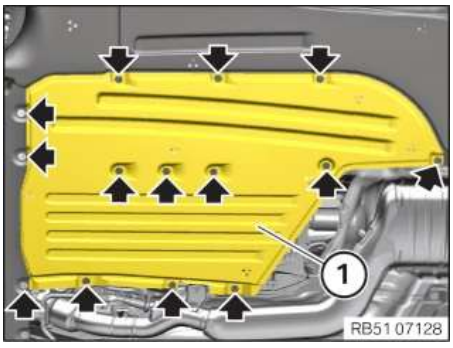
- **Version A:**

Insert and install the rear underbody protection (1).

Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version B:**

Insert and install the rear underbody protection (1).

Tighten screws (arrows).

Underbody protection

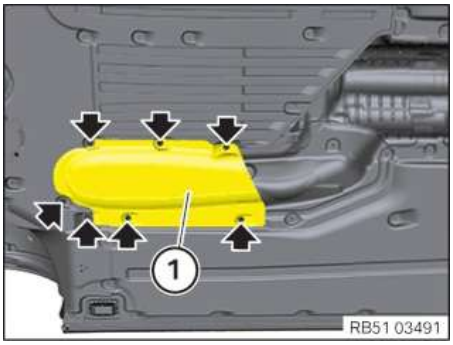
Hexagon screw		Tightening torque	3 Nm

cardiagn.com

111 – Install the underbody panelling of the transmission on the side

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

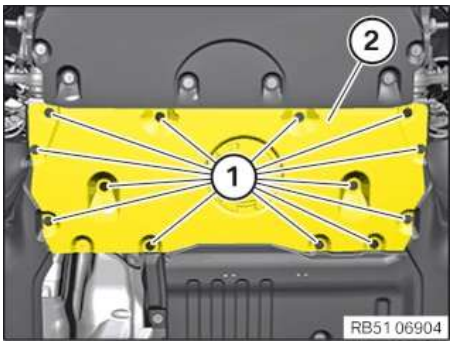


- Insert the underbody panelling (1).
- Tighten screws (arrows).

Underbody panelling

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

112 – Installing the centre underbody protection



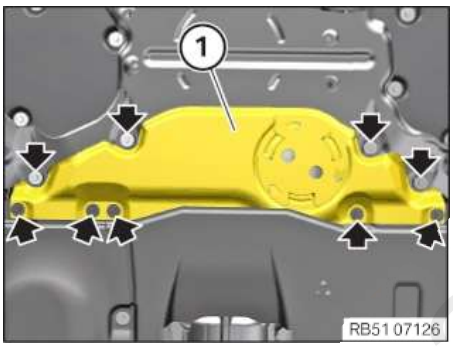
- **Variant with rear wheel drive:**

  Position central underbody protection (2).

  Tighten the screws (1).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version with all-wheel drive:**

  Guide in centre underbody protection (1) and install.

  Tighten screws (arrows).

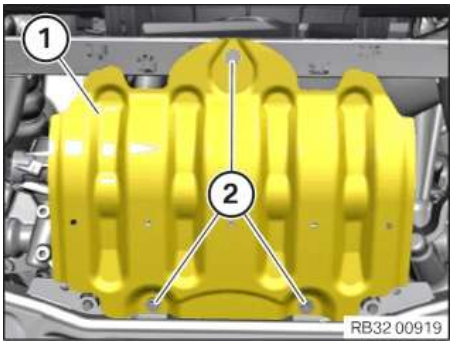
Underbody protection

Hexagon screw		Tightening torque	3 Nm

113 – If installed: Install underbody protection of the steering

Prerequisite

Front underbody protection has been removed.



- Position underbody protection (1).
- Tighten the screws (2).

Underbody protection, steering, to front axle support

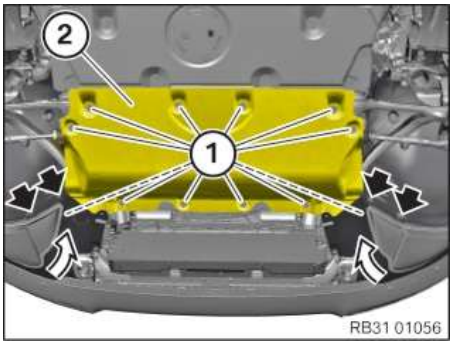
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

114 – Install the underbody protection of the steering gear

cardiagn.com



- **Version A:**

  Position the underbody protection (2) of the steering gear.

  Tighten the screws (1).

Underbody protection of the steering gear

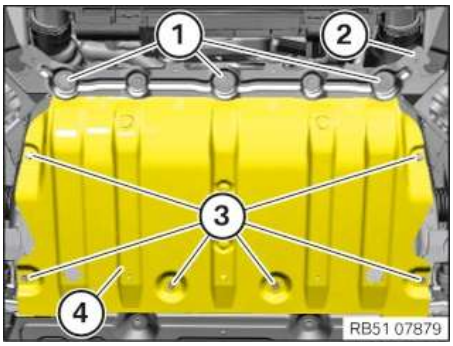
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the bottom wheel arch cover.

  Tighten the screws (arrows) of the lower wheel arch cover on the wheel arch cover.

Wheel arch trim panel, front

Thermoplastic hexagon screw		Tightening torque	2,6 Nm



- **Version B:**

  Feed in the underbody protection (4) of steering gear and install it.

  Tighten the screws (3).

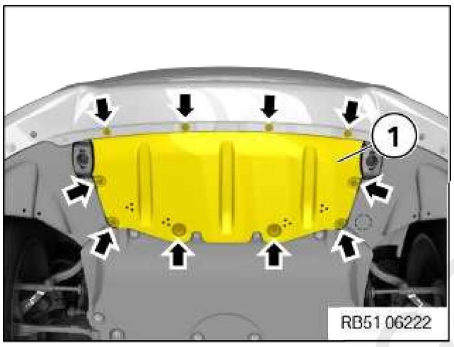
Underbody protection of the steering gear

Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the holder (2) for the underride protection.

  Tighten the screws (1).

115 – Installing the front underbody protection



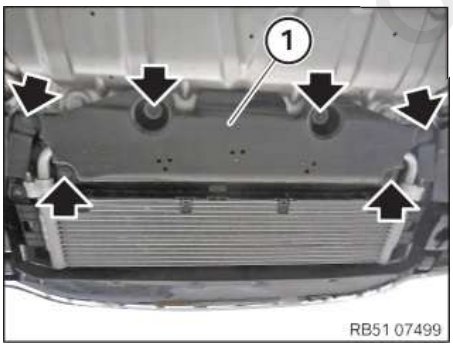
- **Version A:**

  Feed in the front underbody protection (1) towards the front under the bumper panel and position.

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



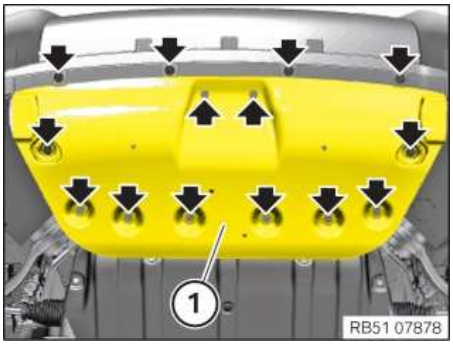
- **Version B:**

  Feed in and position the front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm



- **Version C:**

  Feed in and install front underbody protection (1).

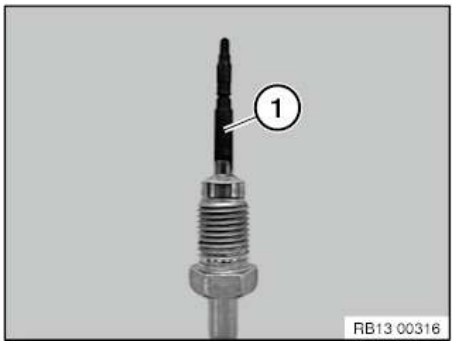
  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

carlagn.com

116 – Installing the exhaust temperature sensor for the exhaust system downstream the catalytic converter on the diesel particulate filter



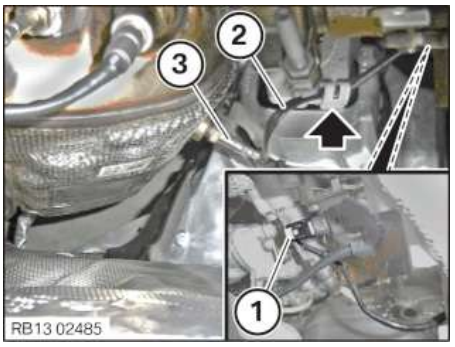
RISK OF DAMAGE

Damage of exhaust temperature sensor.

Damage to exhaust temperature sensors leads to malfunctions.

- Make sure that the gauge tip is not damaged.

- Check the gauge tip (1) for damage.



- Feed in and install the exhaust temperature sensor (3).
- Tighten the exhaust temperature sensor (3).

Exhaust temperature sensor for the exhaust system after catalytic converter before diesel particulate filter

Sensor		Tightening torque	30 Nm

- Secure cable (2) to the clamp (arrow).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

117 – Installing the front oxygen sensor on the diesel particulate filter

RISK OF DAMAGE

Damage to the front oxygen sensor or monitoring oxygen sensor.

Failure of the front oxygen sensor or monitoring oxygen sensor due to contamination or preliminary mechanical damage.

- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug and socket connection and the sensor must be avoided.
- Mechanical loads (impacts on the sensor or the control unit, tensile loads on the cable, etc.) must be avoided.
- Do not continue using component if these specifications are deviated from.
- The installation location (exhaust system) must be dry. If necessary, dry the installation location with compressed air.

TECHNICAL INFORMATION

New oxygen sensors are to be greased lightly and evenly on the thread.

For oxygen sensors that are reused, the following should be observed:

Lightly and evenly grease the oxygen sensor only on the thread. Do not clean and grease that part of the oxygen sensor which protrudes in the exhaust branch (sensor ceramics).

For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue

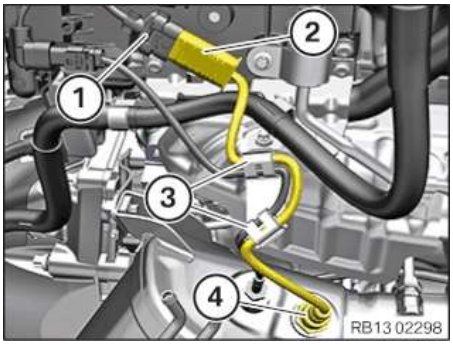


- Insert and install the front oxygen sensor (1).
- Tighten the front oxygen sensor (1) with standard tools.

Front oxygen sensor to top of diesel particulate filter

Sensor		Tightening torque	50 Nm

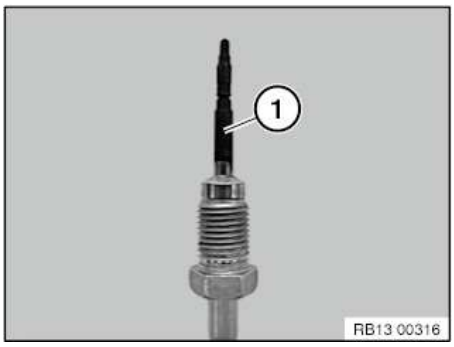
carDiagn.com



- Fasten the front oxygen sensor (4) to the clamps (3).
- Connect connectors (2) and lock.
- Connect connectors (1) and lock.

  The connectors (1) and (2) must audibly engage.

118 – Install the exhaust-gas temperature sensor on the diesel particulate filter



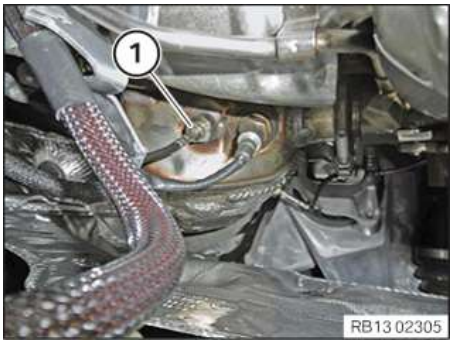
RISK OF DAMAGE

Damage of exhaust temperature sensor.

Damage to exhaust temperature sensors leads to malfunctions.

- Make sure that the gauge tip is not damaged.

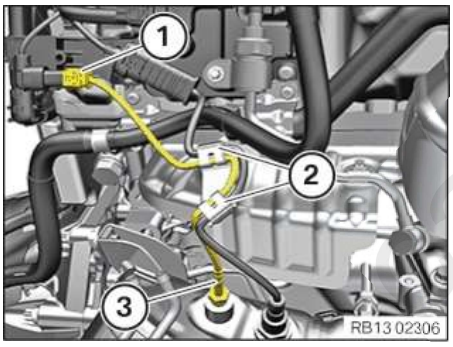
- Check gauge tip (1) for damage.



- Feed in and install the exhaust temperature sensor (1).
- Tighten the exhaust temperature sensor (1) with the special tool .

Exhaust-gas temperature sensor to diesel particulate filter

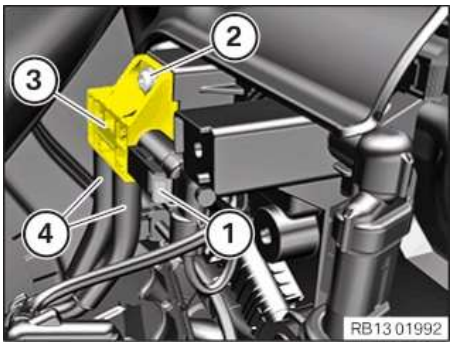
Sensor		Tightening torque	30 Nm



- Secure the exhaust temperature sensor (3) to the clamp (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

119 – Installing the differential pressure sensor for the diesel particulate filter



- Feed in and install the differential pressure sensor (3).
- Tighten down screw (2).

Differential pressure sensor of diesel particulate filter on cylinder head cover

TS5x20		Tightening torque	4 Nm

- Check the pressure hoses (4) for hardening and damage, renew if necessary.
- Connect the pressure hoses (4) and secure them using 15 mm to 19 mm screw clamps.

Clamp for the pressure hose on the differential pressure sensor

Clamp 15–19mm		Tightening torque	3 Nm

- Connect connectors (1) and lock.

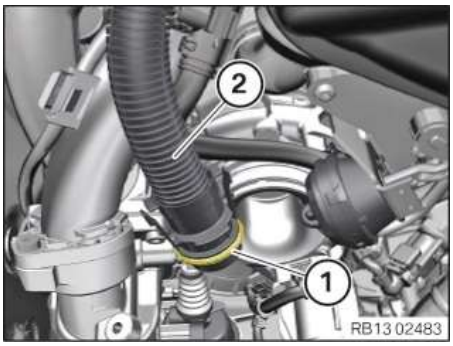
  The connector (1) must engage audibly.

120 – Installing the clean air pipe with resonator

carsign.com



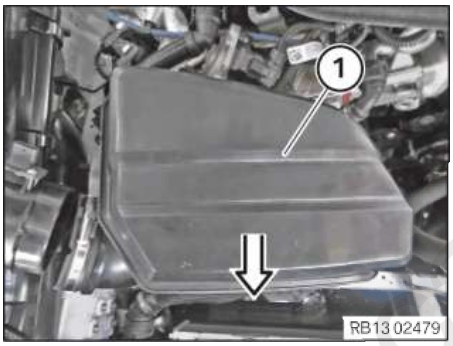
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



- Check the sealing ring (1) for the engine ventilation line (2) for damage and renew where required.



- Feed in and install clean air pipe with resonator (1) in the direction of the arrow.

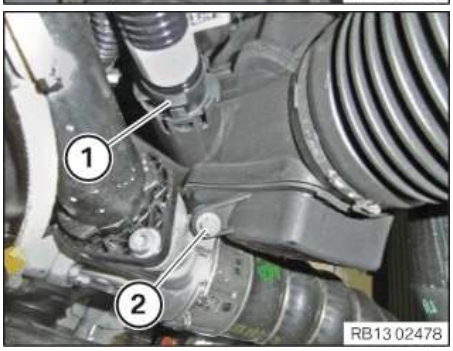


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

  The clamp (1) must engage audibly.

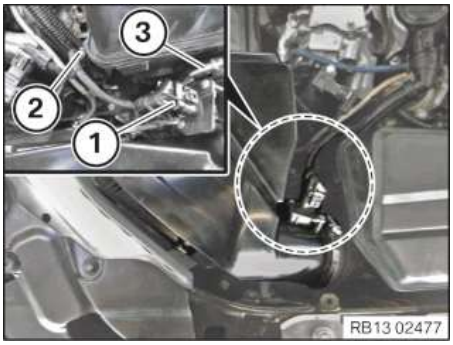


- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm

cardiagn.com



- Connect the clean air pipe with resonator to the intake filter housing.
- Tighten clamp (3).

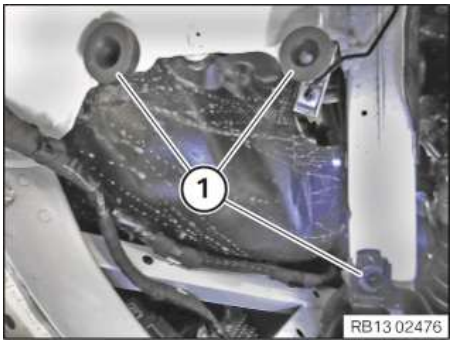
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

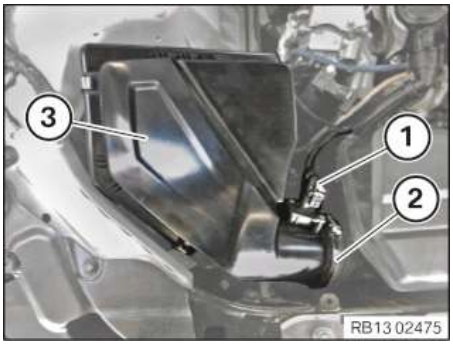
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

121 – Installing intake silencer housing



- Check the rubber mount (1) for correct fit.



- Feed the intake filter housing (3) in and engage it in the rubber mounts.
- Tighten clamp (2).

Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

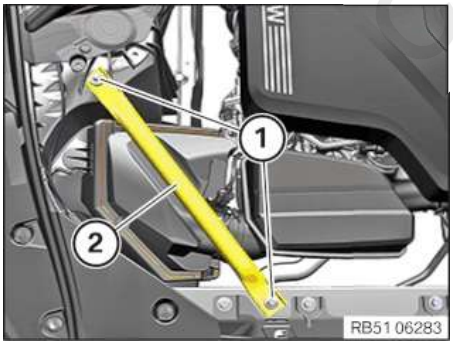
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

122 – Install the right front-end strut

TECHNICAL INFORMATION

Driving without the strut brace/front-end strut or tension strut is not permitted.



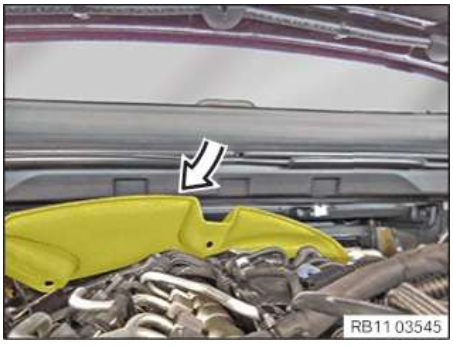
- Install the front-end strut (2).
- Renew screws (1).

  Parts: Screws
- Tighten the screws (1).

Front end strut

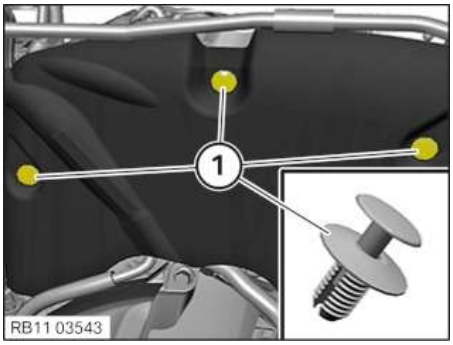
Screw		Tightening torque	56 Nm

123 – Installing acoustic cover at rear



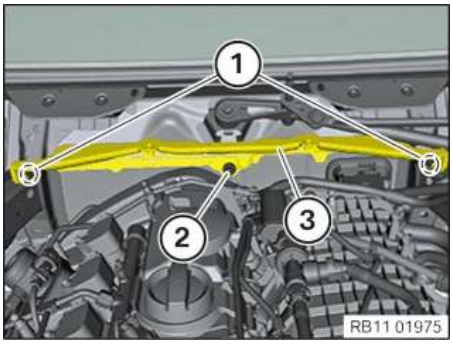
- Guide in the acoustic cover in the direction of the arrow and install it.

cardiagn.com



- Secure acoustic cover with the expanding rivets (1).

124 – Installing centre bulkhead lower section

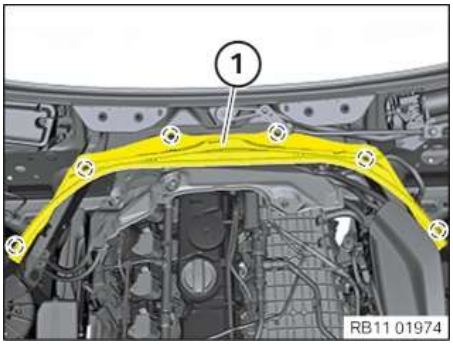


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

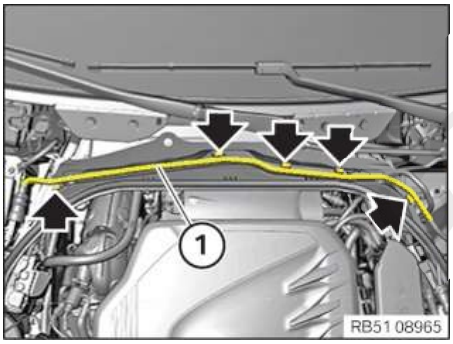
125 – Installing the centre bulkhead upper part



- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

Bulkhead upper part to bottom bulkhead

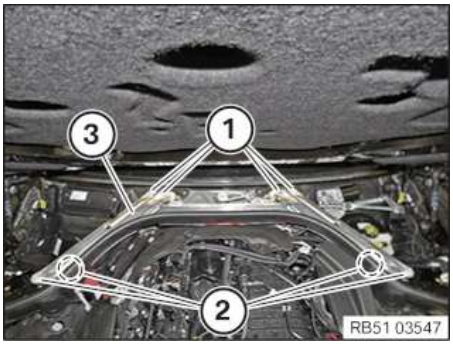
		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

  Clip in the wire (1) into the holders (arrows).

cardiagn.com



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Install the tension strut (3) on the spring strut dome.
- Tighten the screws (1).

Tension strut on bulkhead

M10x25 screw		Tightening torque	56 Nm

- Renew screws (2).

  Parts: Screws
- Tighten the screws (2).

Tension strut to spring strut dome

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

126 – Install the seal for the bonnet



- Press the rear bonnet seal (2) into the guide.
- Feed in cable (1) into the brackets.
- Check that the rear bonnet seal (2) and the cable (1) are seated correctly.

127 – Installing cowl panel cover

RISK OF DAMAGE

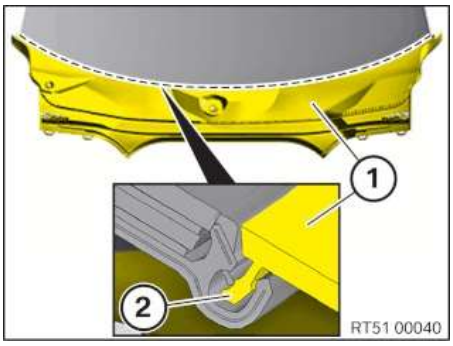
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

- Ensure correct installation of the components.
- Only use undamaged components.

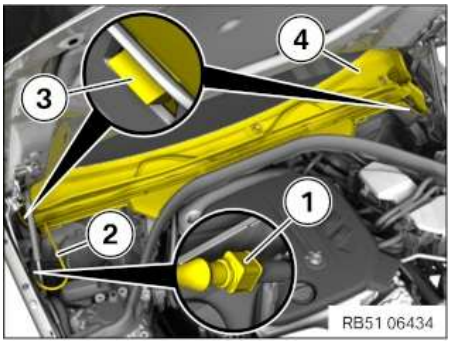
TECHNICAL INFORMATION

Before installing the cowl panel cover it is **mandatory** to check that the 48 V line is routed correctly and fitted tightly.
An incorrectly laid or attached 48 V line can be damaged by the wiper kinematics.



- Push the cowl panel cover (1) into the latch mechanism (2) beginning on the side.

cardiagn.com



- Clip cowl panel cover (4)in by means of the latch mechanisms (3).
- Position windscreen wash hose (2) and connect windscreen wash hose (1)quick lock.

128 – Install left and right wiper arm

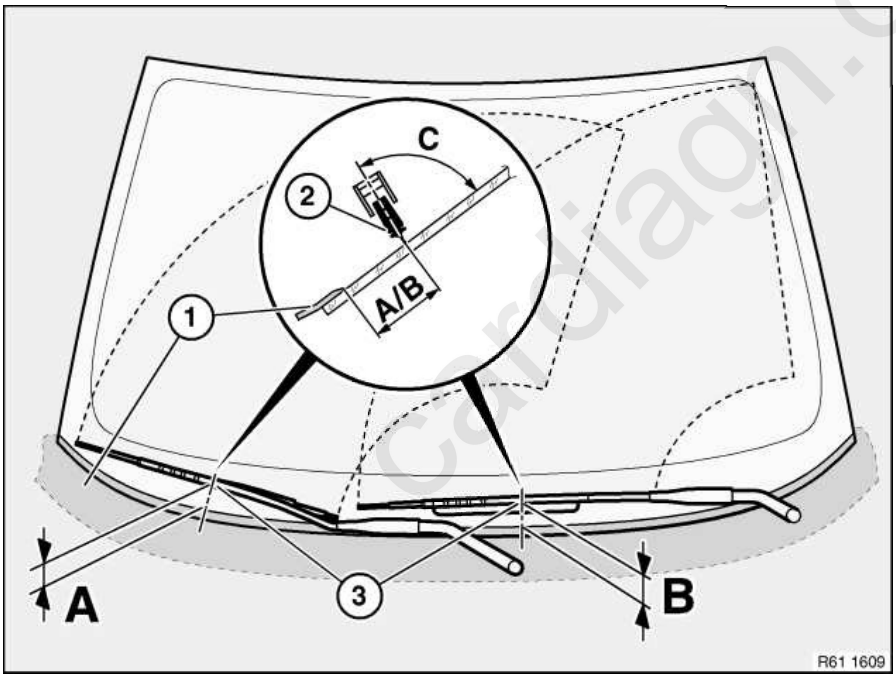
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

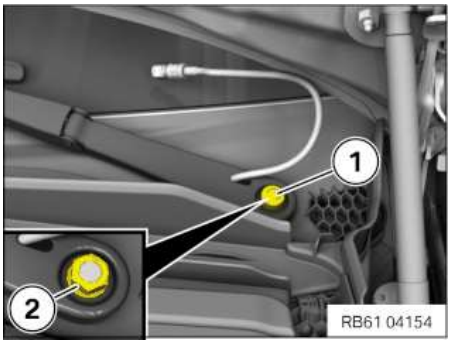
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- Connect the wiper arm (3).
- Correctly position the wiper arm (2) in relation to the window edge (1).

Distance from window pane edge to wiper blade

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm



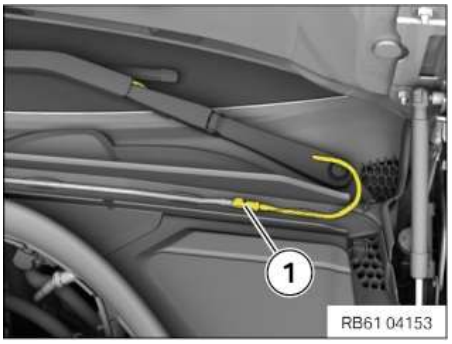
- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

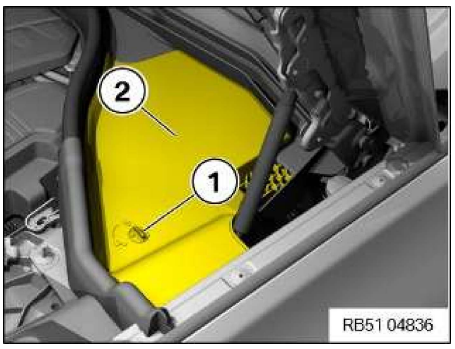
- Connect the protective cap (1).

cardiagn.com



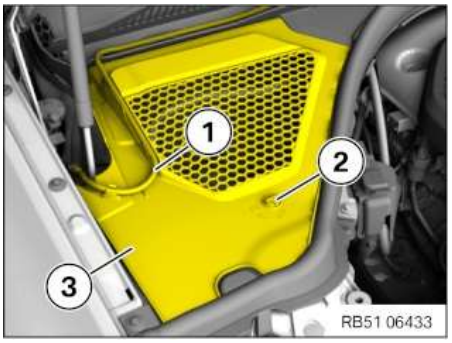
- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

129 – Install the cover of the engine compartment on the rear left



- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

130 – Install the rear right engine compartment cover



- Position the cover of the engine compartment on the rear right (3).
- Close lock (2).
- Insert washer fluid hose (1) into the guides.

131 – Connecting all battery earth leads



- See additional information.

132 – Take bonnet out of the service position

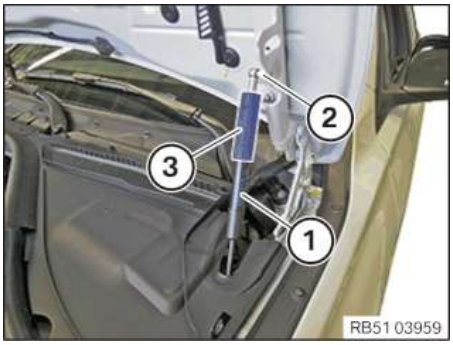
CAUTION

Shutting bonnet or tailgate.

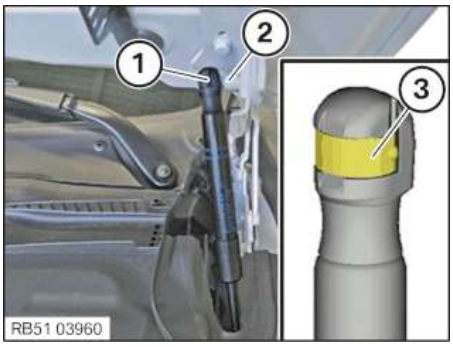
Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.

cardiagn.com



- Support the bonnet by hand.
- Remove the special tool (3) from the ball pin (2).
- Pull off the special tool (3) from the gas pressure spring (1).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.



- Check the clamp (3) is fitted correctly.
- Connect ball socket (1) to ball pin (2).
- Continue to support the bonnet and repeat the operation on the other side of vehicle.

133 – Filling and bleed the high-temperature coolant circuit



TECHNICAL INFORMATION

It is **mandatory** to fill the cooling system before bleeding.
Fill **both** the circuits for high and low-temperature coolant circuits.

- See additional information.

134 – Check engine oil level

Prerequisite
Vehicle is in a horizontal position.

TECHNICAL INFORMATION

Please comply with instructions in Owner's Handbook.

- Carry out an electronic oil measurement.
- Top up engine oil if necessary.

▸ **Check engine oil level**

TECHNICAL INFORMATION

Always check the engine oil level when the engine is at operating temperature (engine oil temperature > 70°C).

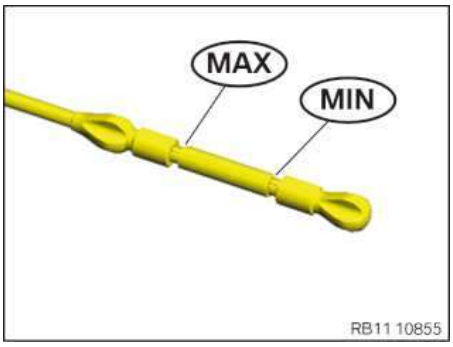
cardiagn.com

- Park vehicle on a horizontal surface.
- Stop the engine and wait for 5 minutes.
- Pull out the oil dipstick and wipe off using a lint-free cloth.

TECHNICAL INFORMATION

Do not pull out or insert the oil dipstick into the guide tube too quickly or slowly.

- Push the oil dipstick into the guide tube up to the limit position and pull it out again.



TECHNICAL INFORMATION

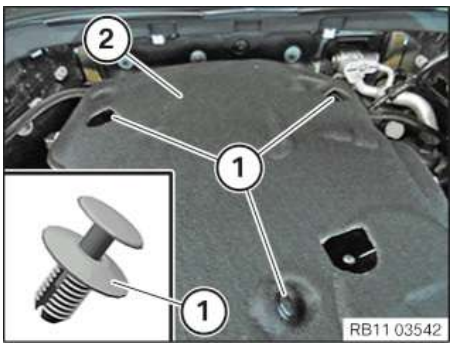
The engine oil level must be between the minimum mark and the maximum mark of the oil dipstick.

- Read the engine oil level on the oil dipstick.
- Top up engine oil if necessary.

Oil quantity between the two markings MIN and MAX of the oil dipstick

1.0 l

135 – Install the acoustic cover for the injectors



- Feed the acoustic cover (2) in and install.
- **If installed:** Secure the acoustic cover (2) with the expanding rivets (1) .

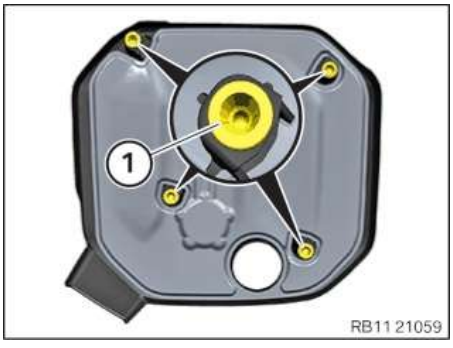
136 – Install acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



- Check the acoustic cover for correct fit of the rubber mounts (1).

cardiagn.com



- Clip in the acoustic cover (1) into the holders in the indicated areas.

Additional Information

Overview of Tightening Torques

Special tool 2 365 488 to engine			Used in step 5181
M8x60		Tightening torque	19 Nm

Cylinder head to crankcase			Used in step 69
M12x1.5	Renew screws.	1. Tightening torque	50 Nm
		2. Angle of rotation	120 °
		3. Angle of rotation	120 °

Cylinder head bolt to timing case cover			Used in step 69
M8x40		Tightening torque	19 Nm

Standard screw connection M6			Used in step 69
M6		Tightening torque	8 Nm

Ground to cylinder head			Used in step 69
M6		Tightening torque	8 Nm

Glow elements to cylinder head			Used in step 70
Glow element		Tightening torque	13 Nm

Camshaft carrier to cylinder head			Used in step 73
M7x35		Tightening torque	13 Nm

Bearing journal to cylinder head			Used in step 76
M16x1.5	Replace bearing journal.	Tightening torque	20 Nm

Standard screw connection M8			Used in step 76
M8		Tightening torque	19 Nm

Chain tensioner piston to cylinder head			Used in step 77
22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

Holder to crankcase			Used in step 77
M8X16		Tightening torque	19 Nm

Camshaft sprocket to camshaft			Used in step 78
M7x17.			17 Nm

Starter motor to engine			Used in step 84
M8X60		Tightening torque	19 Nm

Battery positive lead to starter			Used in step 84
M8		Tightening torque	13,5 Nm

cardiagn.com

Cylinder head cover to cylinder head			Used in step 85
M6		Tightening torque.	8,5 Nm

Clamping claw facing to cylinder head cover			Used in step 86
M6		Tightening torque	10 Nm

Injector to cylinder head cover			Used in step 86
M8		Tightening torque	8 Nm
		Angle of rotation	120 °

Rail to cylinder head cover			Used in step 87
M8		Tightening torque	19 Nm

High pressure lines between high pressure pump and rail			Used in step 88
High-pressure pipe		Tightening torque	24.5 Nm

High pressure lines between injector and rail			Used in step 89
High-pressure pipe		Tightening torque	24.5 Nm

Intake plenum to cylinder head			Used in step 91
M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum			Used in step 9195
		Tightening torque	10 Nm

Electric changeover valve to intake plenum			Used in step 91
TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold			Used in step 92
TS5x20		Tightening torque	3,6 Nm

Standard screw connection 4 Nm			Used in step 92
Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover			Used in step 92
TS5x20		Tightening torque	3,6 Nm

Holder on intake plenum			Used in step 92
TS6X20		Tightening torque	5 Nm

Exhaust manifold to cylinder head			Used in step 94
M7	**If necessary, renew loose stud bolts.**	Tightening torque	11 Nm
	Renew nuts.	Tightening torque	13 Nm

Oil feed line on cylinder head			Used in step 94
M6x12		Tightening torque	8 Nm

Exhaust-gas recirculation cooler to exhaust manifold			Used in step 9495
M8x28	Replace screws	Tightening torque	32 Nm

Exhaust-gas recirculation cooler to cylinder head			Used in step 9495
M8x20 / M8x28		Tightening torque	19 Nm

Exhaust turbocharger low-pressure stage to crankcase			Used in step 94
M8X16		Tightening torque	22 Nm

Oil return line to turbocharger			Used in step 94
M6x12	Renew gasket.	Tightening torque	8 Nm

cardiagn.com

Oil return line to crankcase — Used in step 94

M6x12	Check gasket. Renew the seal or line if necessary.	Tightening torque	8 Nm

Exhaust-gas recirculation cooler to cylinder head — Used in step 95

M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °

Heat shield to exhaust manifold — Used in step 96

M6x12			10 Nm

Bracket on cylinder head cover — Used in step 97

		Tightening torque	5 Nm

Battery positive lead to battery positive terminal — Used in step 97

M8		Tightening torque	19 Nm

Heat shield to exhaust manifold — Used in step 98

M6x12		Tightening torque	10 Nm

Banjo bolt for exhaust pressure pipe to exhaust manifold — Used in step 98

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm

Exhaust gas pressure pipe to sensor system holder — Used in step 98

TS6x20		Tightening torque	5,7 Nm

Cover, steering unit — Used in step 101

Screw		Tightening torque	3 Nm

Brake disc to front wheel hub — Used in step 102

M8	Renew screw.	Tightening torque	16 Nm

Brake disc to rear wheel hub — Used in step 102

M8	Renew screw.	Tightening torque	16 Nm

Wheel bolts — Used in step 102

M14 / SW17	Screw in wheel bolts and evenly tighten crosswise by hand in order to centre the wheel rim. Tighten wheel bolts to the prescribed tightening torque with a calibrated torque wrench in a crosswise sequence. Check all the wheel bolts in the same order or retighten to the prescribed tightening torque again.	Tightening torque Check	140 Nm 140 Nm

Diesel particulate filter V-clip to exhaust turbocharger — Used in step 104

V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

Bracket to diesel particulate filter top — Used in step 104

M8		Tightening torque	19 Nm

Bracket to transmission for diesel particulate filter holder bottom — Used in step 104

M8X20		Tightening torque	19 Nm

Lower holder to diesel particulate filter — Used in step 104

M8		Tightening torque	19 Nm

Coolant lines for SCR metering module — Used in step 104

M6X16		Tightening torque	8 Nm

cardiagn.com

Nitrogen oxide sensor before SCR catalytic converter			Used in step 105
Sensor		Tightening torque	50 Nm

Monitoring oxygen sensor			Used in step 106
Sensor		Tightening torque	50 Nm

Rear silencer to body / bumper support			Used in step 107
M8	Replace nuts.	Tightening torque	19 Nm

Exhaust system to rear axle carrier			Used in step 107
M8 nut		Tightening torque	19 Nm

Exhaust system to transmission			Used in step 107
M8		Tightening torque	19 Nm

Exhaust system to diesel particle filter			Used in step 107
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

SCR metering module V-clip to exhaust system			Used in step 107
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm

Exhaust-gas temperature sensor upstream of SCR catalytic converter			Used in step 107
Sensor		Tightening torque	30 Nm

Diesel particulate sensor to exhaust system			Used in step 107
Sensor		Tightening torque	50 Nm

Nitrogen oxide sensor downstream of SCR catalytic converter			Used in step 107
Sensor		Tightening torque	55 Nm

Connecting support to tunnel			Used in step 108
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

Diffuser / underbody panelling			Used in step 109
Nuts and screws		Tightening torque	3 Nm

Underbody protection			Used in step 110112
Hexagon screw		Tightening torque	3 Nm

Underbody panelling			Used in step 111
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Underbody protection, steering, to front axle support			Used in step 113
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support			Used in step 113
Hexagon bolt M6		Tightening torque	8 Nm

Underbody protection of the steering gear			Used in step 114
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

Wheel arch trim panel, front			Used in step 114
Thermoplastic hexagon screw		Tightening torque	2,6 Nm

cardiagn.com

Underbody protection front — Used in step 115

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Exhaust temperature sensor for the exhaust system after catalytic converter before diesel particulate filter — Used in step 116

Sensor		Tightening torque	30 Nm

Front oxygen sensor to top of diesel particulate filter — Used in step 117

Sensor		Tightening torque	50 Nm

Exhaust-gas temperature sensor to diesel particulate filter — Used in step 118

Sensor		Tightening torque	30 Nm

Differential pressure sensor of diesel particulate filter on cylinder head cover — Used in step 119

TS5x20		Tightening torque	4 Nm

Clamp for the pressure hose on the differential pressure sensor — Used in step 119

Clamp 15–19mm		Tightening torque	3 Nm

Clean air pipe to exhaust turbocharger — Used in step 120

M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing — Used in step 120121

Clamp		Tightening torque	3 Nm

Front end strut — Used in step 122

Screw		Tightening torque	56 Nm

Bulkhead lower part to body — Used in step 124

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead — Used in step 125

		Tightening torque	3 Nm

Tension strut on bulkhead — Used in step 125

M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome — Used in step 125

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm — Used in step 128

Combination hexagon nut		Tightening torque	35 Nm

Overview of Special Tools

0 493 339 (13 5 252) Bush

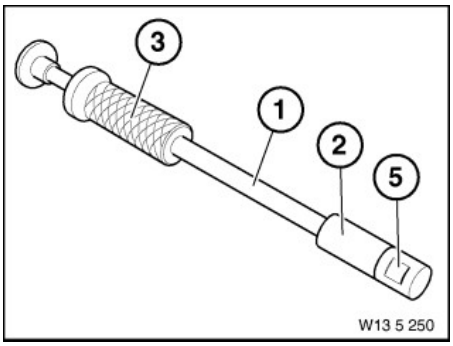


Common — Used in step 48

Usage	(Threaded bush)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

cardiagn.com

0 493 321 (13 5 250) Puller



Common Used in step 48

Usage	For removing injector nozzles or injectors from cylinder head
Included in the tool or work	
Storage location	A16
Replaced by	
In connection with	
SI-Number	01 06 98 (306)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 338 (13 5 251)		**Rod** (guide rod)	
2	0 493 339 (13 5 252)		**Bush** (Threaded bush)	
3	0 493 340 (13 5 253)		**Weight** (Weight)	
4	0 493 379 (13 5 254)		**Claw** (Clamping claw) For removal of injector nozzles / engine: M57	
5	0 495 579 (13 5 255)		**Adapter** For removing steering shaft on E85. Refer to SI 01 11 06 (265)	

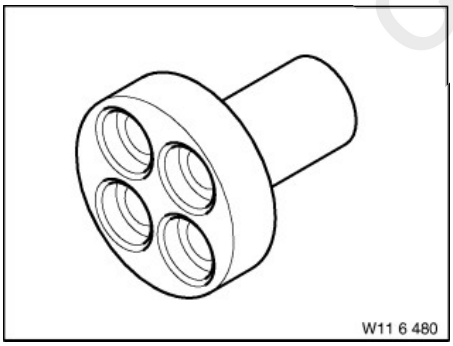
0 493 340 (13 5 253) Weight



Common Used in step 48

Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 380 (11 6 480) Connector

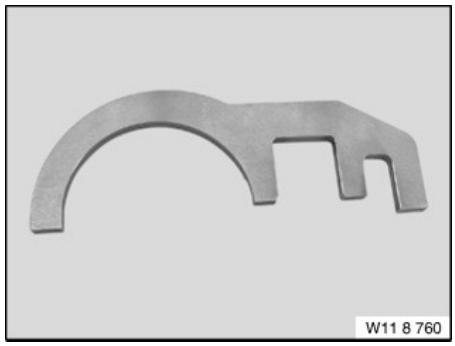


Common Used in step 5181

Usage	For turning over engine at crankshaft hub (vibration absorber).
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	01 11 98 (338)

carbiagn.com

0 496 112 (11 8 760) Gauge



Common	Used in step 515574798182
Usage	For securing camshaft at TDC.
Included in the tool or work	
Storage location	B24
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

2 365 488 Adapter



Common	Used in step 51808183
Usage	For disconnecting the crankshaft at the top dead centre. (longitudinal installation with automatic transmission only).
Included in the tool or work	
Storage location	C56
Replaced by	
In connection with	
SI-Number	01 46 14 (191)

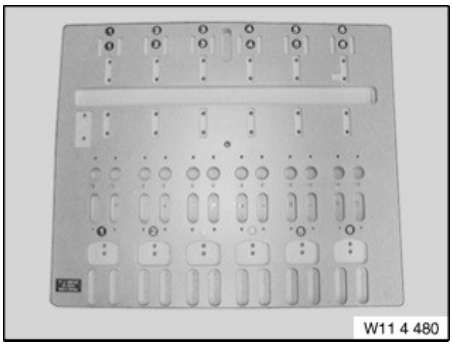
2 288 380 Locating stud



Common	Used in step 51808183
Usage	For disconnecting the crankshaft at the top dead centre. Contour-graphic silhouette foil is included in delivery specification. Further information on the contour-graphic silhouette foil can be found in service information 00 22 13 (969).
Included in the tool or work	
Storage location	A56
Replaced by	
In connection with	
SI-Number	01 04 14 (071)

cardiagn.com

0 495 105 (11 4 480) oddments tray



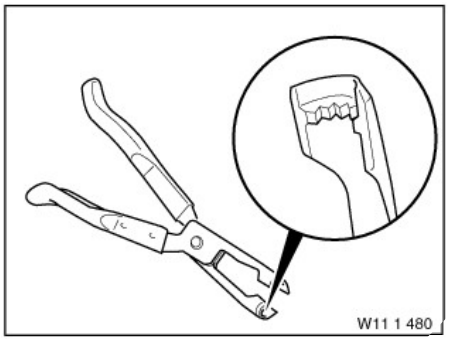
Common Used in step 575864

Usage	(Boards (2 pieces)) For setting down the individual components of the cylinder head.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 17 04 (130)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 495 106 (11 4 481)		**oddments tray** (Board, intake side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	
2	0 495 107 (11 4 482)		**oddments tray** (Board, exhaust side) Discontinued, only available as part of complete special tool 11 4 480 = 83 30 0 495 105	

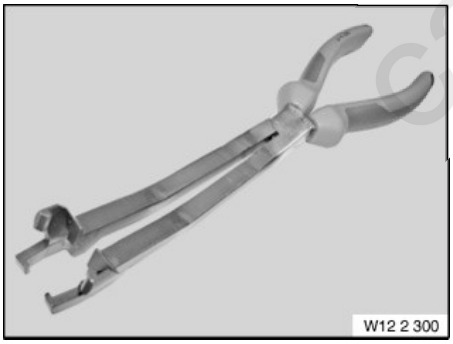
0 490 796 (11 1 480) Pliers



Common Used in step 5965

Usage	For removing valve stem seal
Included in the tool or work	
Storage location	A10
Replaced by	
In connection with	
SI-Number	01 01 93 (621)

0 495 140 (12 2 300) Pliers

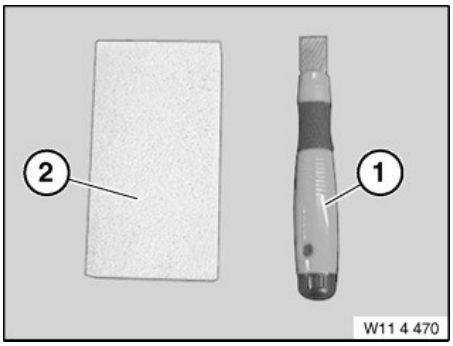


Common Used in step 60

Usage	(Special pliers for glow plug connectors) For unlocking, detaching and attaching glow plug connectors.
Included in the tool or work	
Storage location	A51
Replaced by	
In connection with	
SI-Number	01 19 05 (215)

sardiagn.com

0 495 102 (11 4 470) Tool



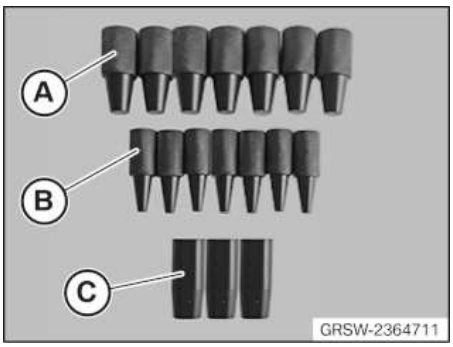
Common Used in step 6094

Usage	(cleaning kit) For cleaning sealing surfaces on magnesium crankcase/cylinder head.
Included in the tool or work	
Storage location	C52
Replaced by	
In connection with	
SI-Number	01 17 04 (130)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 495 103 (11 4 471)		**Scraper**	
2	0 495 104 (11 4 472)		**Extractor** (grindstone)	

2 364 711 Plug



Common Used in step 61

Usage	For closing the pressure oil holes for cleaning the cylinder head sealing surfaces.
Included in the tool or work	
Storage location	C20
Replaced by	
In connection with	
SI-Number	

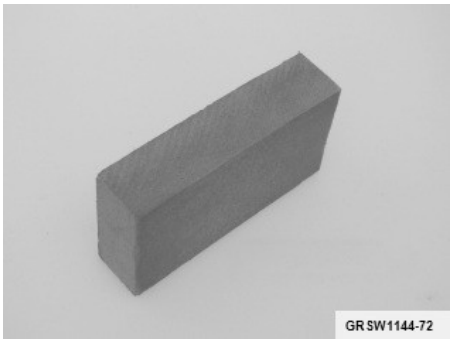
0 495 103 (11 4 471) Scraper



Common Used in step 61

Usage	
Included in the tool or work	0 495 102
Storage location	C52
Replaced by	
In connection with	
SI-Number	

0 495 104 (11 4 472) Extractor

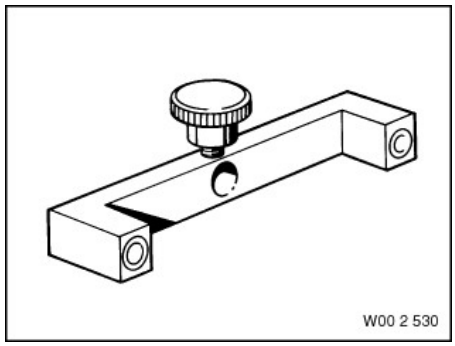


Common Used in step 61

Usage	(grindstone)
Included in the tool or work	0 495 102
Storage location	C52
Replaced by	
In connection with	
SI-Number	

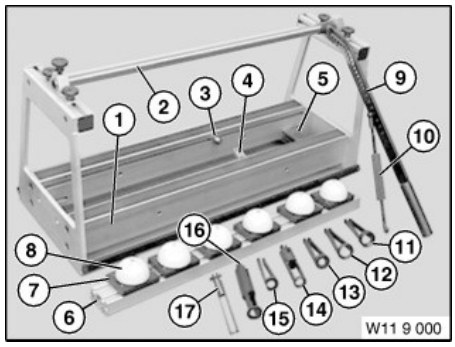
cardiagn.com

0 490 185 (00 2 530) Bridge



Common	Used in step 63
Usage	(Measuring bridge) For determining the piston projection (Diesel)
Included in the tool or work	
Storage location	A3
Replaced by	
In connection with	
SI-Number	

0 494 366 (11 9 001) Device

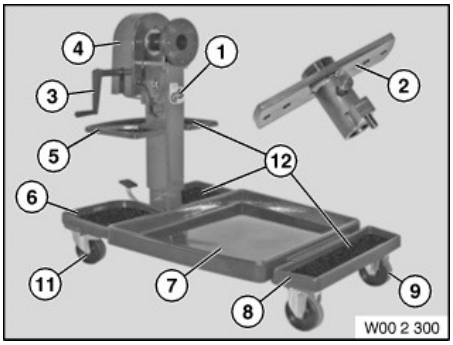


Common	Used in step 6467
Usage	
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 187 (00 2 300) Assembly stand

Used in step 6467

cardiagn.com



Common

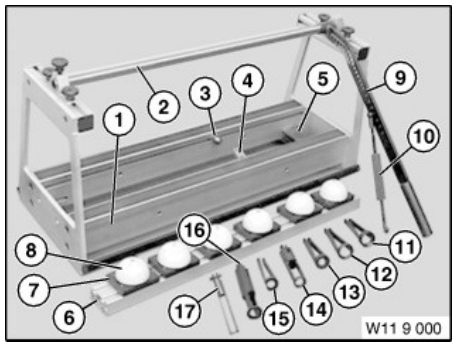
Usage	Assembly stand with universal flange for mounting engines from S85
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 25 04 (155)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 495 188 (00 2 301)		**Assembly stand** available only as complete assembly stand 83 30 0 495 187.	
2	0 495 189 (00 2 302)	2 299 563	**Tool** (Universal flange). Do not use any more!!! Technically locked. Is replaced by a new flange with part number 83 30 2 299 563. All flanges delivered by the end of 2011 will be replaced free of charge. From 2012, only the new flange will be supplied. Also applies to the complete engine mounting stand 00 2 300.	
3	0 495 200 (00 2 303)		**Crank**	
4	0 495 201 (00 2 304)		**Cover** (Protective hood)	
5	0 495 202 (00 2 305)		**oddments tray** (Oddments tray for small parts)	
6	0 495 203 (00 2 306)		**Shaped element** (Rear shaped pan)	
7	0 495 204 (00 2 307)		**Collection pan** (Oil collection pan)	
8	0 495 205 (00 2 308)		**Shaped element** (Front shaped pan)	
9	0 495 206 (00 2 309)		**Wheel** (Front wheel (without stop))	
10	0 495 207 (00 2 311)		**Wheel** (Rear wheel (with stop))	
11	0 495 208 (00 2 312)		**Mat** (Checker mat set)	
2	2 299 563		**Adapter** New adapter for the engine assembly stand. Replacement for 83 30 0 495 189 - 00 2 302.	

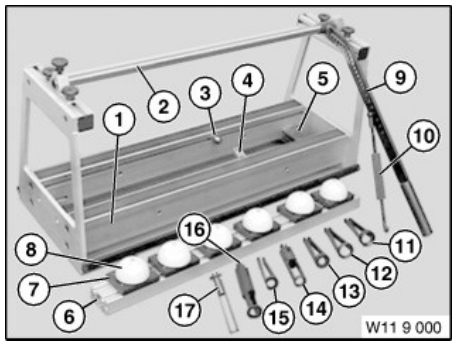
cardiagn.com

0 494 371 (11 9 006) Insert



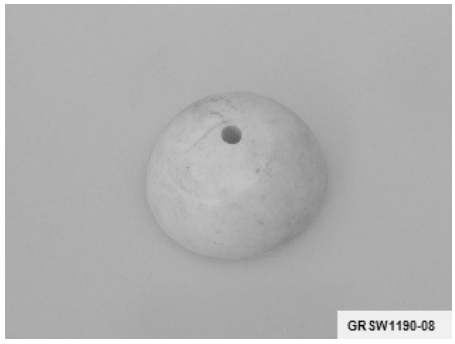
Common	Used in step 6467
Usage	(Aluminium strip)
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 494 372 (11 9 007) Shaped part



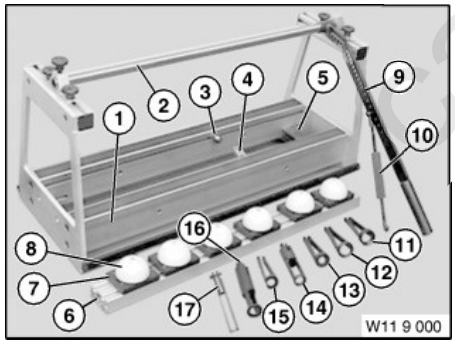
Common	Used in step 64
Usage	(Shaped part)
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 494 373 (11 9 008) Shaped part



Common	Used in step 64
Usage	(Shaped part) Shaped part made of plastic
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 494 370 (11 9 005) Quick fastener

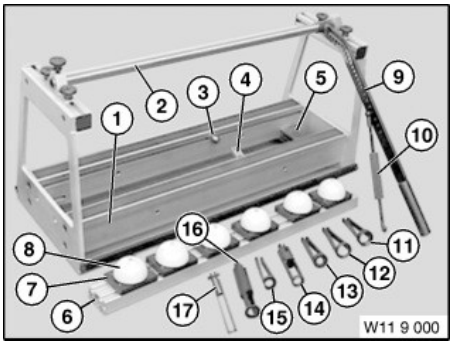


Common	Used in step 6467
Usage	
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 494 362 (11 9 000) Device

Used in step 6467

cardiagn.com



Common

Usage	(Cylinder head expander tool)
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	002300 = 0495187
SI-Number	01 03 02 (833)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 494 366 (11 9 001)		**Device**	
6	0 494 371 (11 9 006)		**Insert** (Aluminium strip)	
11	0 494 376 (11 9 012)		**Basket** (Valve spring cage) Engine M41, M51, S50	
17	0 495 028 (11 9 017)		**Basket** (Valve spring cage) Engine N52	
2	0 494 367 (11 9 002)		**Rod**	
3	0 494 368 (11 9 003)		**Adapter** (Sliding block)	
4	0 494 369 (11 9 004)		**Tab**	
5	0 494 370 (11 9 005)		**Quick fastener**	
7	0 494 372 (11 9 007)		**Shaped part** (shaped part)	
8	0 494 373 (11 9 008)		**Shaped part** (Shaped part) Shaped part made of plastic	
9	0 494 374 (11 9 009)		**Lever**	
10	0 494 375 (11 9 011)		**Hook**	
12	0 494 377 (11 9 013)		**Basket** (Valve spring cage) Engine M43, M73	
13	0 494 378 (11 9 014)		**Basket** (Valve spring cage) Engine M44, M52, M54, M56, M62, S52, S54, S62	
14	0 494 379 (11 9 015)		**Basket** (Valve spring cage) Engine M47, M47TU, M57, M57TU, N40, N42, N62, N73	
15	0 494 380 (11 9 016)		**Basket** (Valve spring cage) Engine M21, M40	

cardiagn.com

0 494 374 (11 9 009) Lever



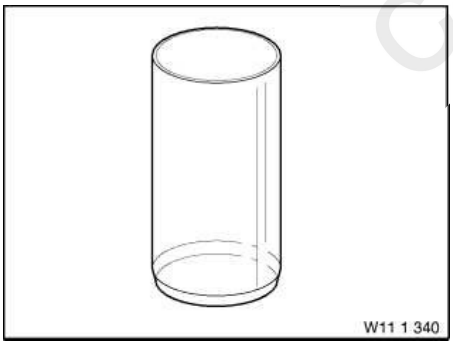
Common	Used in step 6467
Usage	
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 496 143 (11 8 840) Basket



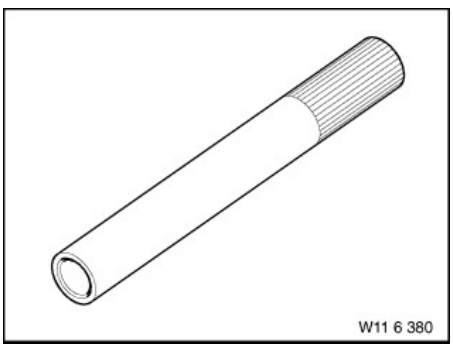
Common	Used in step 6467
Usage	(Valve spring cage) For removing and fitting the valves.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

0 490 746 (11 1 380) Holding sleeve



Common	Used in step 66
Usage	(Assembly sleeve) For fitting the valve stem seal, diameter 7 mm
Included in the tool or work	
Storage location	individual
Replaced by	
In connection with	
SI-Number	

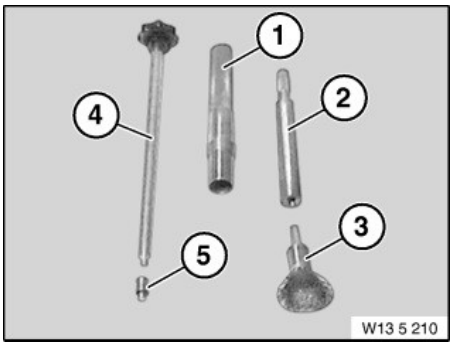
0 493 249 (11 6 380) Bush



Common	Used in step 66
Usage	For fitting valve stem seal
Included in the tool or work	
Storage location	A9
Replaced by	
In connection with	
SI-Number	01 06 98 (306)

cardiagn.com

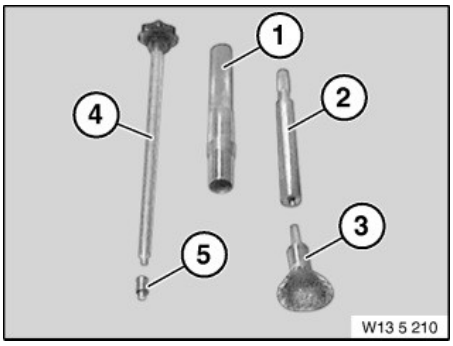
0 493 763 (13 5 215) Plug



Common Used in step 86

Usage	(Seal plug)
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 762 (13 5 214) Rod

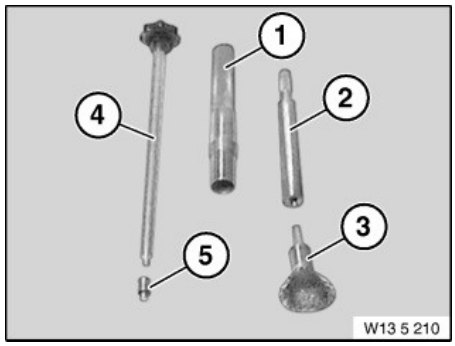


Common Used in step 86

Usage	(Mounting rod) For the seal plug
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

cardiagn.com

0 493 758 (13 5 210) Tool



Common Used in step 86

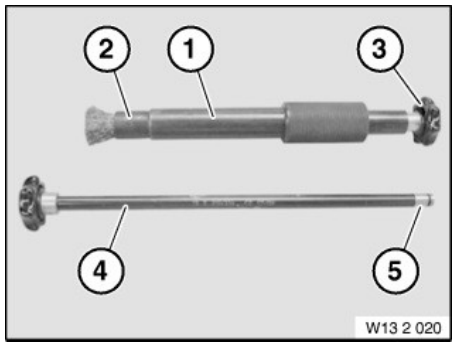
Usage	(Cleaning set) For injector channels
Included in the tool or work	
Storage location	B4
Replaced by	
In connection with	
SI-Number	01 05 00 (574)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 493 759 (13 5 211)		**Holding sleeve** (Guide sleeve)	
2	0 493 760 (13 5 212)		**Holder** (Brush holder)	
3	0 493 761 (13 5 213)		**Brush head**	
4	0 493 762 (13 5 214)		**Rod** (Mounting rod) For the seal plug	
5	0 493 763 (13 5 215)		**Plug** (Seal plug)	

cardiagn.com

0 496 150 (13 2 020) Tool



Common Used in step 86

Usage	(Cleaning kit) For cleaning the injector shaft.
Included in the tool or work	
Storage location	A87
Replaced by	
In connection with	
SI-Number	01 07 07 (355)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 496 151 (13 2 021)		**Holding sleeve** (Guide sleeve) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
2	0 496 152 (13 2 022)		**Holder** (Brush holder) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
3	0 496 153 (13 2 023)		**Brush head** Remaining inventories will be sold off, followed by discontinuation and then available as part of complete special tool 13 2 020 = 83 30 0 496 150 only	
4	0 496 154 (13 2 024)		**Rod** (Mounting rod) sale of existing inventories then discontinued and available as part of set of special tools 13 2 020 = 83 30 0 496 150 only	
5	0 496 155 (13 2 025)		**Plug** (Seal plug) Available as part of complete special tool 13 2 020 = 83 30 0 496 150 only.	

cardiagn.com

2 344 011 Tool



Common	Used in step 102
Usage	Tool (wheel hub grinder) for cleaning the connection of the wheel rim (wheel contact face) to the wheel hub.
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	08 08 12 (872)

Replacement tools:

0 495 221 (36 1 323) Wheel stud



Common	Used in step 32
Usage	(Code 30) Code 39 available separately, (see EPC) under 36 13 1 181 259
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 224 (36 1 326) Wheel stud



Common	Used in step 32
Usage	(Code 33) With centring bore available separately, (see EPC) under 36 13 6 765 546
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

cardiagn.com

0 495 225 (36 1 327) Wheel stud



Common	Used in step 32
Usage	(Code 34) With centring bore available separately (see EPC) under 36 13 6 765 547
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 226 (36 1 328) Wheel stud



Common	Used in step 32
Usage	(Code 35) With centring bore available separately, (see EPC) under 36 13 6 762 340
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 227 (36 1 329) Wheel stud



Common	Used in step 32
Usage	(Code 36) With centring bore available separately (see EPC) under 36 13 6 762 341
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 228 (36 1 331) Wheel stud



Common	Used in step 32
Usage	(Code 37) With centring bore available separately (see EPC) under 36 13 6 762 342
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 229 (36 1 332) Wheel stud



Common	Used in step 32
Usage	(Code 38) With centring bore available separately (see EPC) under 36 13 6 762 343
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

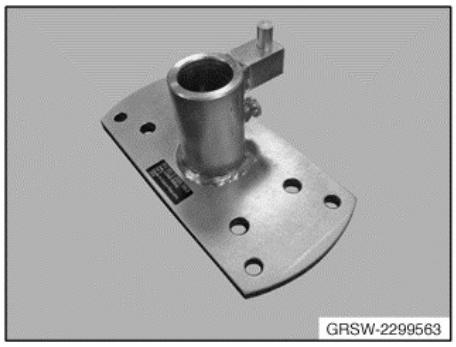
cardiagn.com

0 495 230 (36 1 333) Wheel stud



Common	Used in step 32
Usage	(Code 40) With centring bore available separately (see EPC) under 36 13 6 762 344
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

2 299 563 Adapter



Common	Used in step 6467
Usage	New adapter for the engine assembly stand. Replacement for 83 30 0 495 189 - 00 2 302.
Included in the tool or work	0 495 187
Storage location	
Replaced by	
In connection with	
SI-Number	

Overview Technical Data

Cylinder head flatness	Used in step 62
Maximum lengthwise deviation from flatness	0.10 mm
Maximum transverse deviation from flatness	0.05 mm

Valve underprotrusion	Used in step 63
	0,8 (0.7 - 0,9) mm

Distance from window pane edge to wiper blade	Used in step 128
Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

Oil quantity between the two markings MIN and MAX of the oil dipstick	Used in step 134
	1.0 l

Links

General repair instructions	Used in step
11 00 ... Overview of consumables (Electronic Parts Catalogue)	86

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2131
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2131
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2131

cardiagn.com

61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2131
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2131
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 20 900 Disconnecting and connecting battery earth lead	2131
61 35 ... Notes on ESD protection (Electro Static Discharge)	161718192930414859
61 35 ... Notes on ESD protection (Electro Static Discharge)	161718192930414859
00 02 001 Raising the vehicle using a vehicle lift	32102
12 51 010 Replacing wiring harness section for preheating system	70
12 51 010 Replacing wiring harness section for preheating system	70
12 51 010 Replacing wiring harness section for preheating system	70
12 51 010 Replacing wiring harness section for preheating system	70
17 00 008 Draining and topping up coolant for high-temperature circuit	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 008 Draining and topping up coolant for high-temperature circuit	133
17 00 008 Draining and topping up coolant for high-temperature circuit	133

carlagn.com

17 00 008 Draining and topping up coolant for high-temperature circuit	133
17 00 008 Draining and topping up coolant for high-temperature circuit	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleeding the cooling system (B36, B38, B46, B48)	133
17 00 039 Bleeding cooling system (B37, B47)	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Filling and bleeding the high-temperature cooling system vacuum filler device (B48)	133
17 00 008 Draining and topping up the high-temperature coolant circuit	133
17 00 008 Draining and topping up the high-temperature coolant circuit	133
17 00 016 Draining and topping up coolant circuit for Range Extender \PREMIUM	133
17 00 008 Draining and topping up the high-temperature coolant circuit	133
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	133
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	133
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133

carmagn.com

17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 009 Check the cooling system for watertightness with a special tool (with a tester)	133
17 00 009 Check the cooling system for watertightness with a special tool (with a tester)	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 008 Draining and topping up coolant for high-temperature circuit	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 008 Draining and topping up coolant for high-temperature circuit	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133

cardiagn.com