11 12 729 Checking cylinder head for watertightness

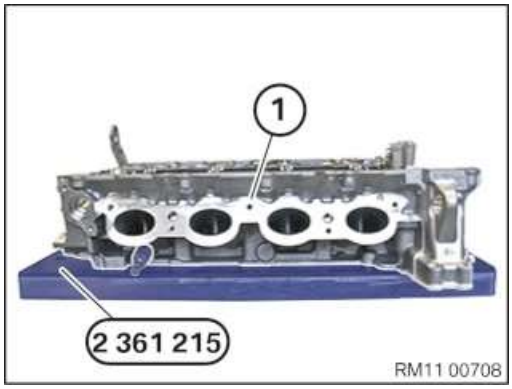
PRELIMINARY WORK

1 – Disassemble cylinder head

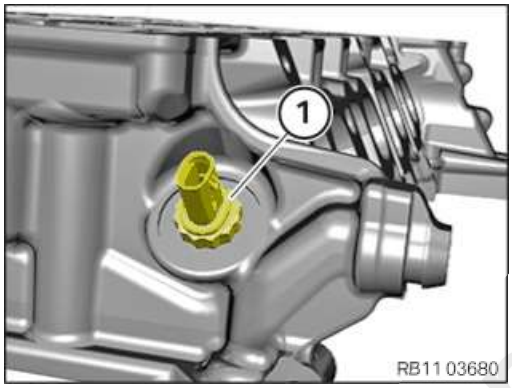
- See additional information.

MAIN WORK

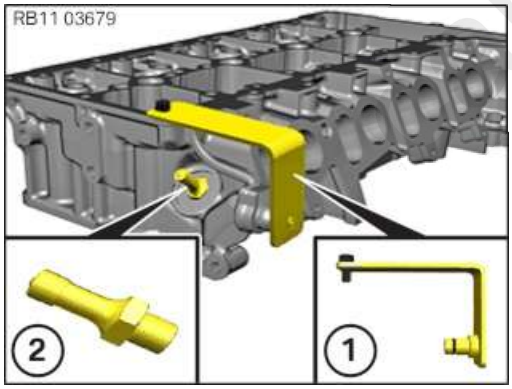
2 – Checking cylinder head for watertightness



- Position the cylinder head (1) on the special tool so that the rubber layer faces the cylinder head (1) and all water ducts at the cylinder head (1) are closed.



- Remove the coolant temperature sensor (1) with the special tool .



- Install special tool (1) 2 405 214 as shown on the cylinder head.
- Tighten down screw.

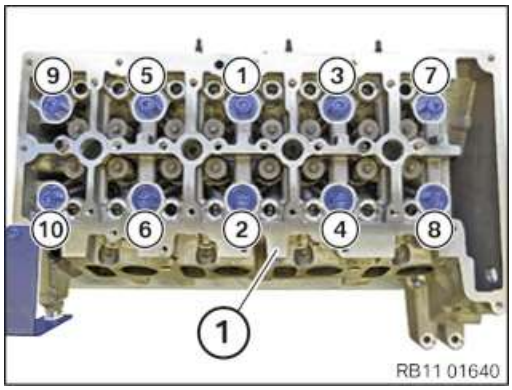
Standard screw connection M6

M6		Tightening torque	8 Nm

- Install valve (2), special tool 2 318 431.

Coolant temperature sensor at cylinder head

Sensor		Tightening torque	3,5 Nm



- Tighten screws in the order (1) to (10).

Cylinder head to special tool

Special tool		Tightening torque	25 Nm

Check

- Heat up the cylinder head.

Check for cylinder head watertightness

Temperature of the cylinder head	60 °C

- Connect compressed air .

Check for cylinder head watertightness

Testing pressure	max. 3,0 bar

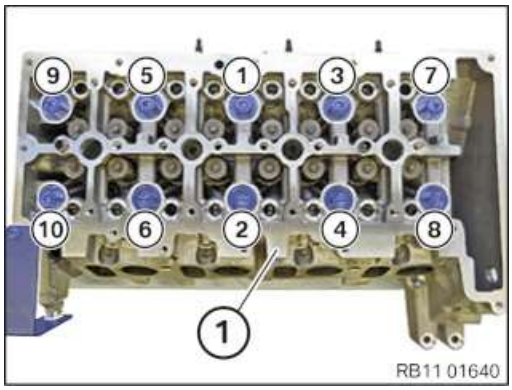
- Check the cylinder head in for tightness in a water bath.

Result

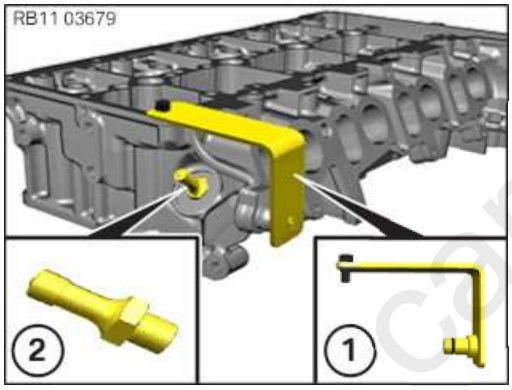
» Air bubbles develop.

Measure

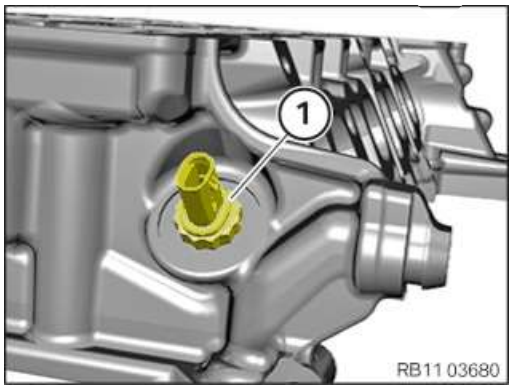
- Check cylinder head at the point of exit of the air bubbles for damage, repair or renew if required.



- Release special tool using the screws from 2 405 214 in the sequence (10) to(1) on the cylinder head (1).



- Release and remove valve (2), special tool 2 318 431.
- Release and remove special tool (1) 2 405 214.



- Tighten the coolant temperature sensor (1) using the special tool .

Coolant temperature sensor at cylinder head

Sensor		Tightening torque	3,5 Nm

POSTPROCESSES

3 – Assembling the cylinder head

- See additional information.

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Additional Information

Overview of Tightening Torques

Standard screw connection M6 — Used in step 2

M6		Tightening torque	8 Nm

Coolant temperature sensor at cylinder head — Used in step 2

Sensor		Tightening torque	3,5 Nm

Cylinder head to special tool — Used in step 2

Special tool		Tightening torque	25 Nm

Overview of Special Tools

2 405 214 Supplementary set



Common — Used in step 2

Usage	For leak-testing cylinder head.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	2318431, 2337568, 2361215
SI-Number	01 23 17 (517)

2 318 431 Device



Common — Used in step 2

Usage	For the leakage test of the cylinder head. [N57S1] For N57 and N57TU, 2337568 is additionally required. The adapter plate with valve is also used for B47D .
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 04 13 (917)

Overview Technical Data

Check for cylinder head watertightness — Used in step 2

Temperature of the cylinder head	60 °C

Check for cylinder head watertightness — Used in step 2

Testing pressure	max. 3,0 bar

Links

Repair instructions	Used in step

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11 12 504 Disassembling and assembling cylinder head (cylinder head removed)	13
11 12 154 Disassemble and assemble cylinder head	13
11 12 154 Disassemble and assemble cylinder head	13
11 12 154 Disassemble and assemble cylinder head	13
11 12 154 Disassemble and assemble cylinder head	13
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11 12 154 Disassemble and assemble cylinder head	13

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11 12 800 Clean cylinder head intake channels and intake plenums

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

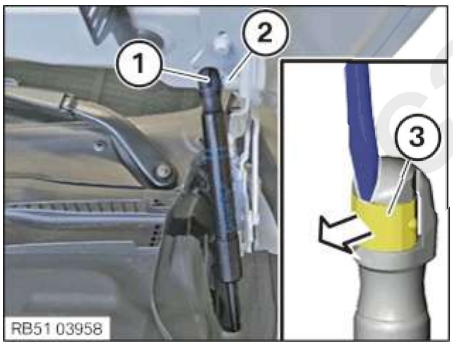
Engine compartment lid is open.

CAUTION

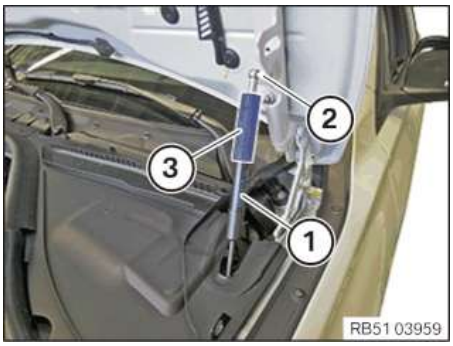
Shutting bonnet or tailgate.

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 – Deactivating the 48 V electrical system

Prerequisite

Ignition is switched off.

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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



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.

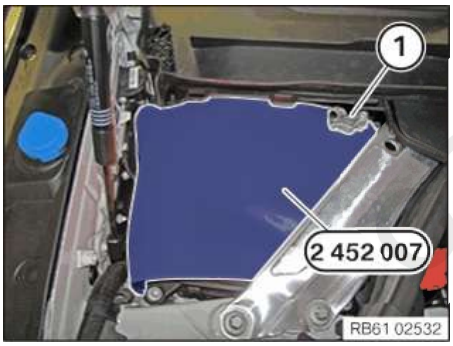
The work “Disconnecting the negative battery cable of the 48-V battery” can be started.



- 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.

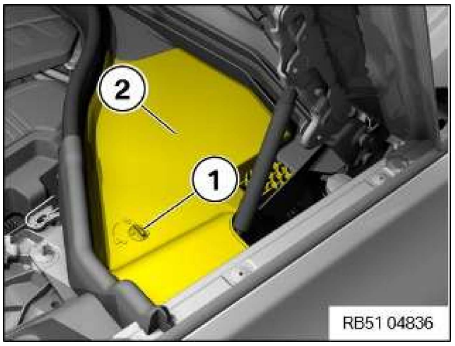
3 – Disconnecting all battery earth leads



- See additional information.

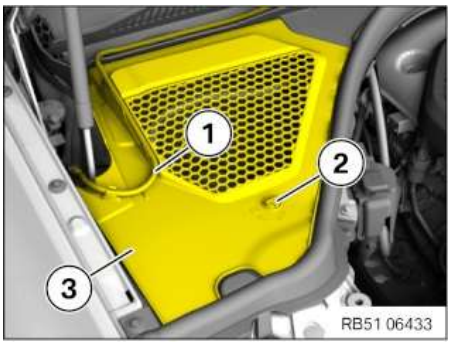
4 – Remove the cover of the engine compartment at the rear left

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- 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.

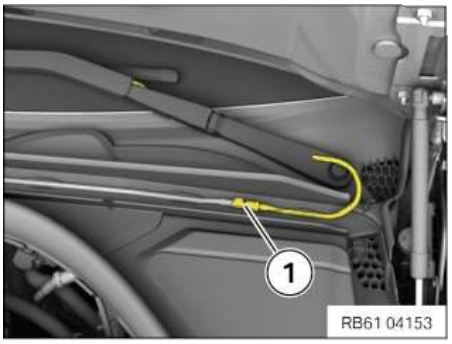
▸ **Remove the wiper arm**

RISK OF DAMAGE

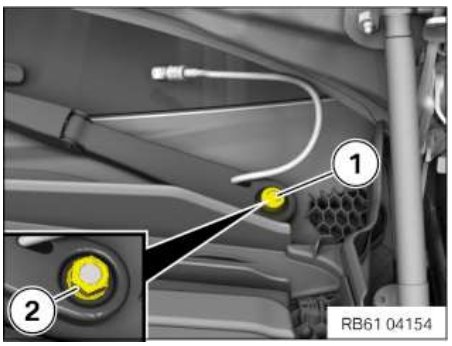
Damage to wiper console.

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.

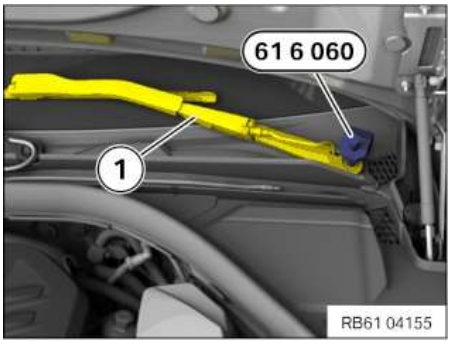


- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.



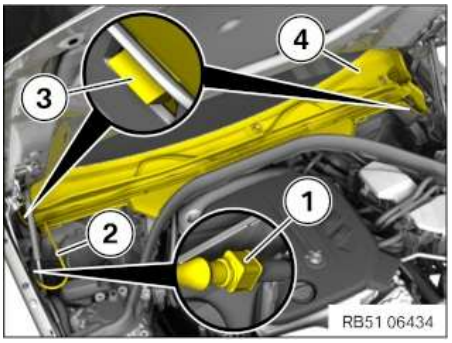
- Remove the protective cap (1).
- Loosen nut (2).

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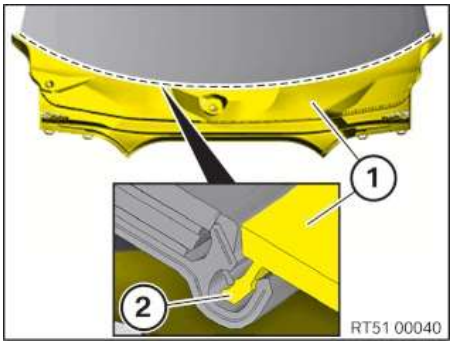


- Pull off the wiper arm (1) using special tool .

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

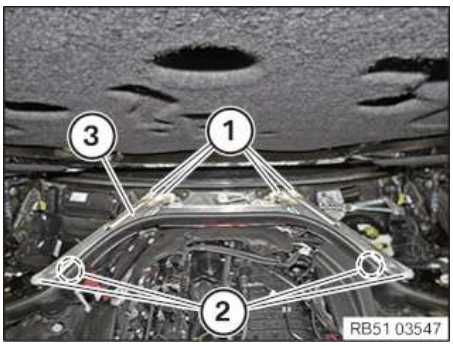


- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

9 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

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

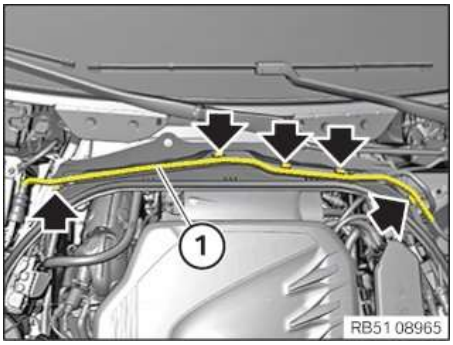


NOTICE

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

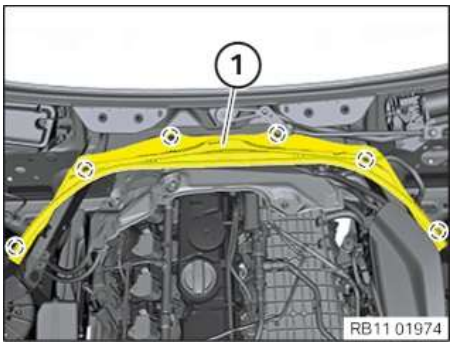
- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.

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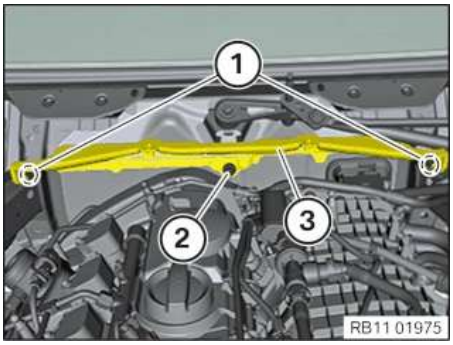
- **Version with mild hybrid technology:**

  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.

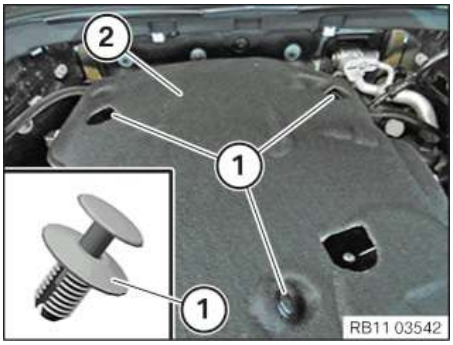
- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation,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



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

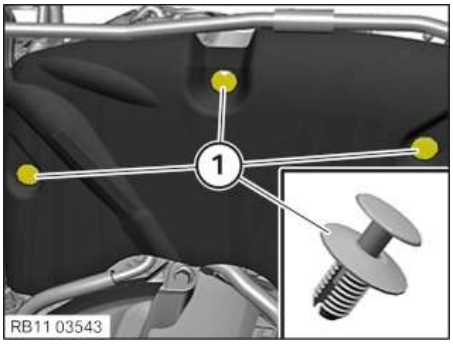
12 – Remove the acoustic cover for the injectors

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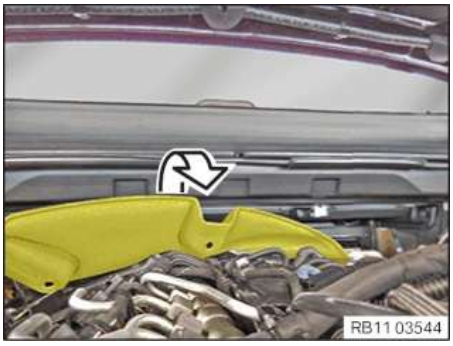


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

13 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).



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

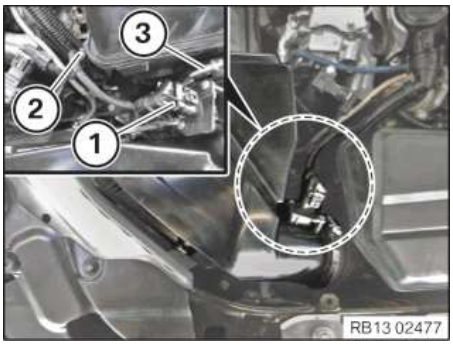
14 – Removing the clean air pipe with the resonator

WARNING

Hot surfaces.

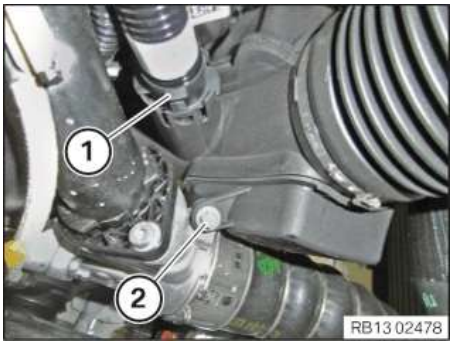
Risk of burning!

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

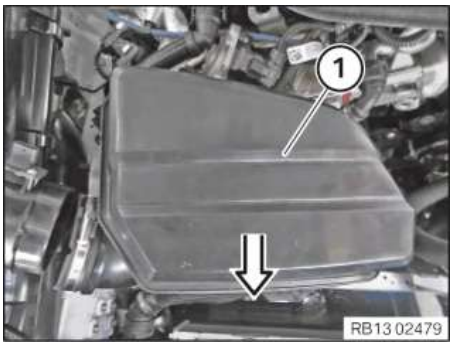


- Unlock plug connection (1) and disconnect.
- Loosen clamp (2).
- Unfasten clamp (3).
- Separate the clean air pipe with resonator from the intake filter housing.

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- 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.

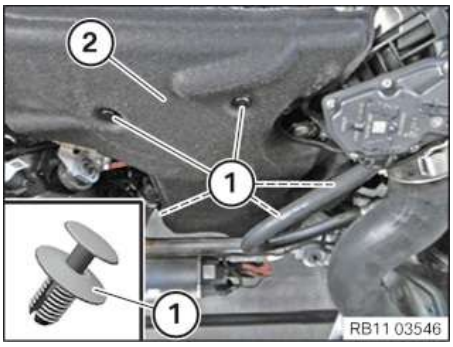
15 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

Risk of burning!

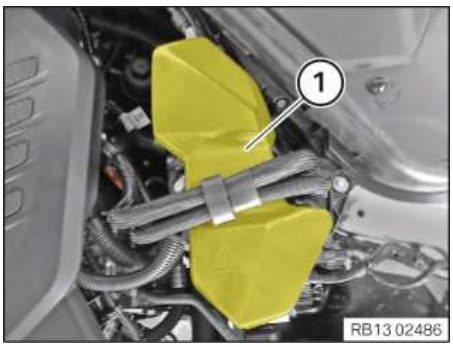
- Perform all work only on components that have cooled down.



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

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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

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

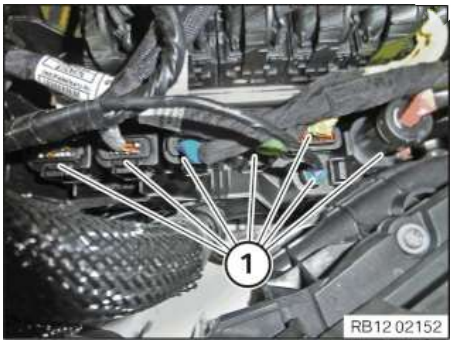
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

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

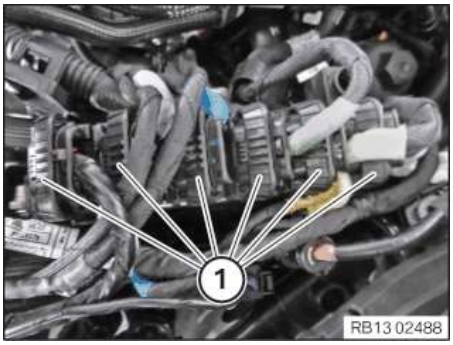
TECHNICAL INFORMATION

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

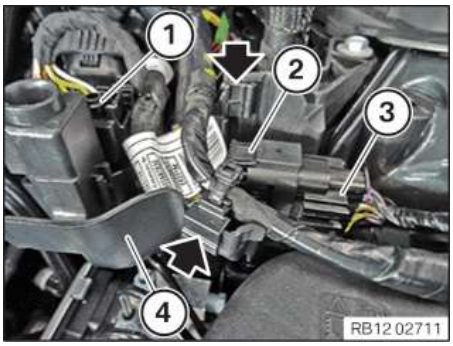


- Unlock and disconnect plug connections (1).

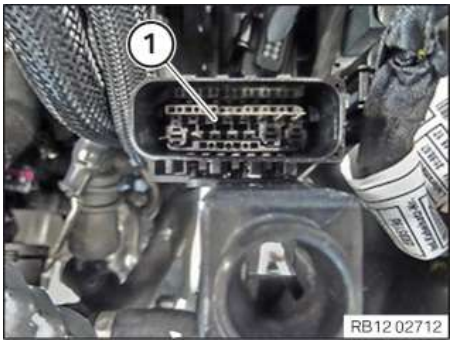
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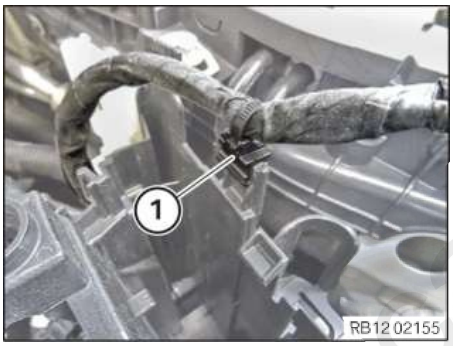
- Unlock and disconnect plug connections (1).



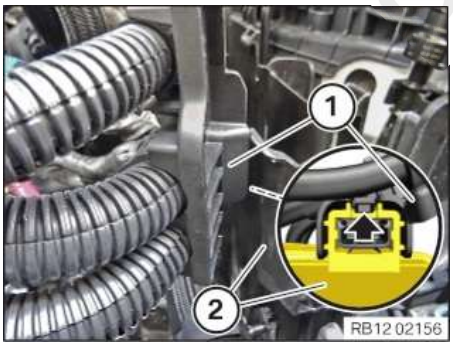
- Unlock plug connection (1) and disconnect.
- Unlock plug connection (2) and disconnect.
- Release the connector (3) and disconnect from the control unit holder (4).
- Release the clamps (arrows).



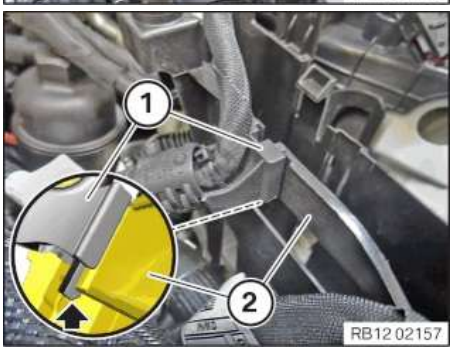
- Unlock plug connection (1) and disconnect.



- Loosen clamp (1).



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

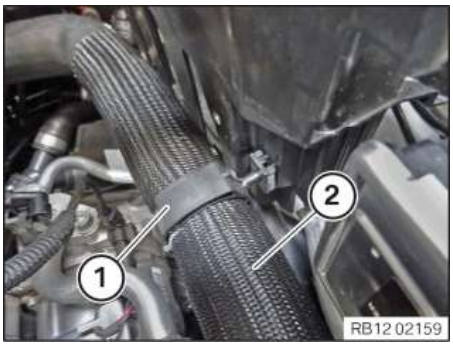


- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).

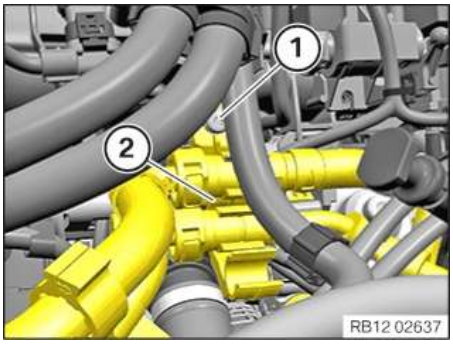
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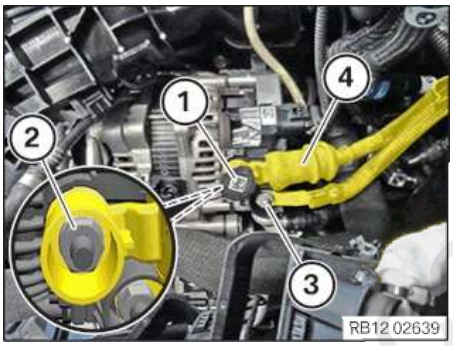
- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.



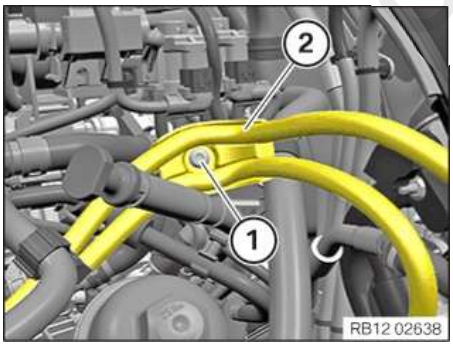
- Unlock holder (1) and feed out coolant line (2) and place it aside.



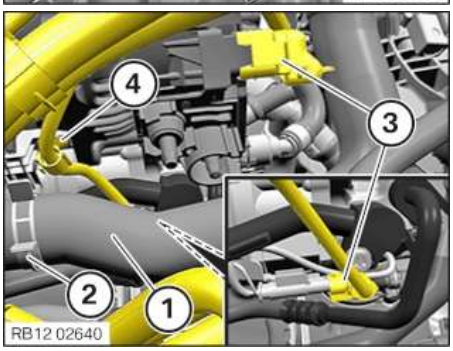
- Release the screw (1).
- Guide out fuel lines (2) and set them aside.



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

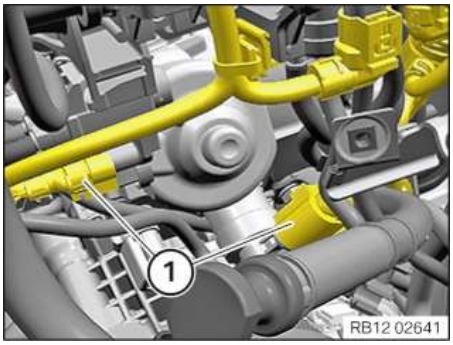


- Release the screw (1).
- Guide out the positive battery cables (2) and set them aside.

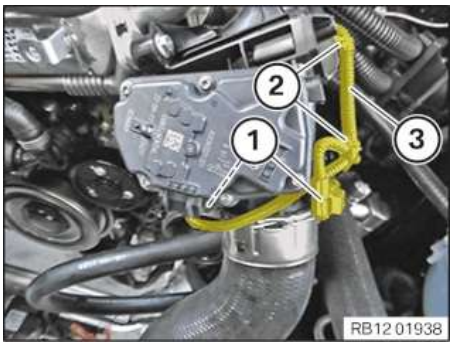


- Release the coolant line (1) from the holder (2) .
- Unlock plug connections (3) and disconnect.
- Loosen clamp (4).

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- Unlock and disconnect plug connections (1).



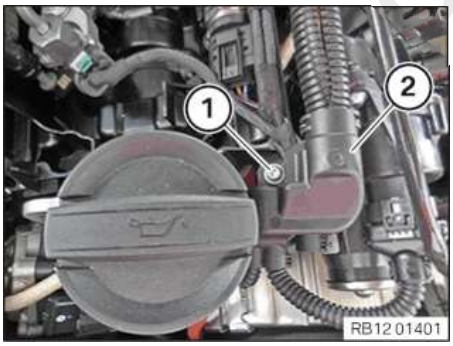
- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.



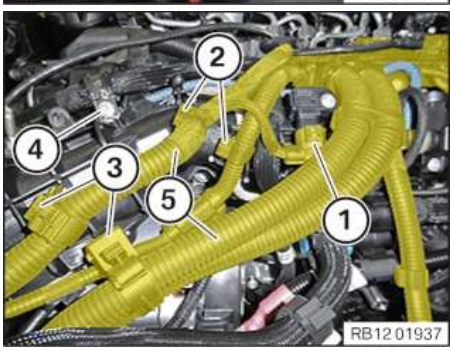
- Unlock and loosen connector (1).



- Unlock plug connection (1) and disconnect.

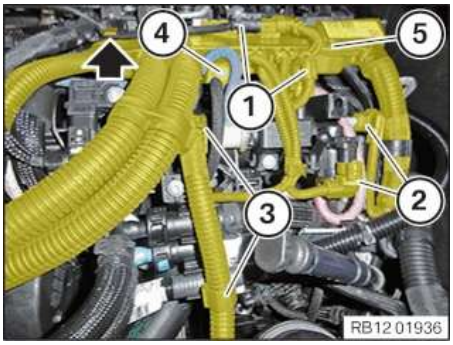


- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.



- 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.

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- 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 – 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.

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)

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RISK OF DAMAGE

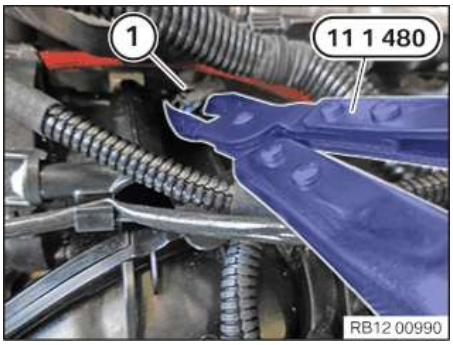
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

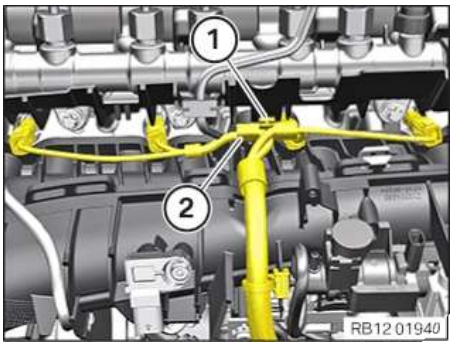
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

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.

19 – Removing the intake plenum

TECHNICAL INFORMATION

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

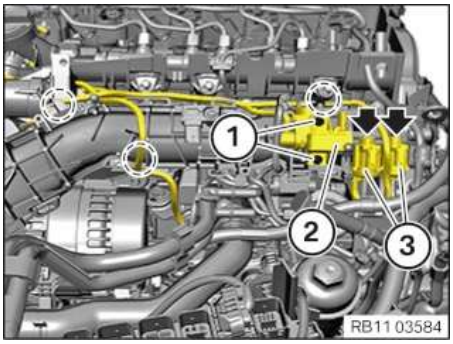
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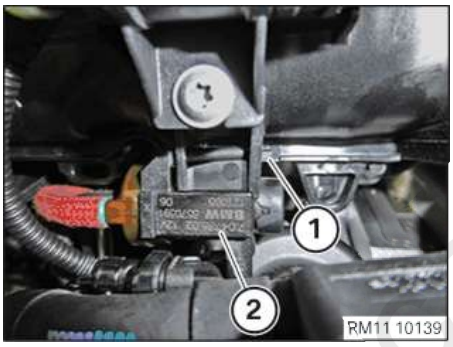
- Unlock clamp (1) and engage in this position.



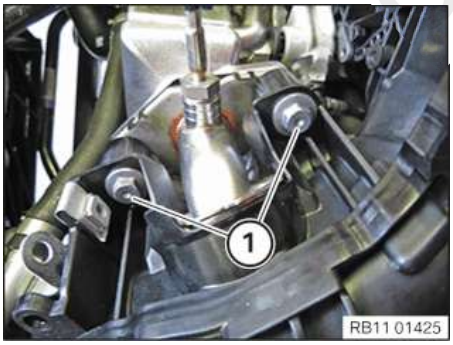
- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.



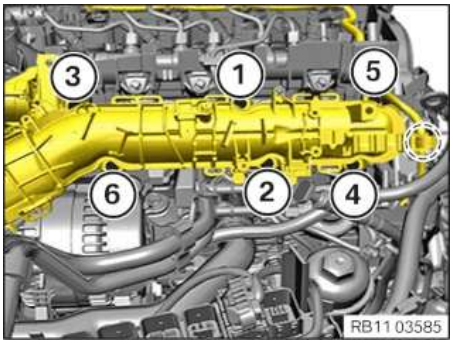
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



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

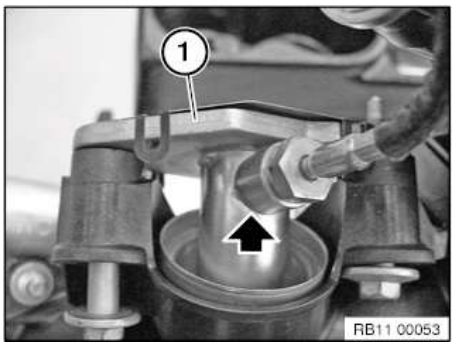


- Loosen screws (1).



- 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.

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

MAIN WORK

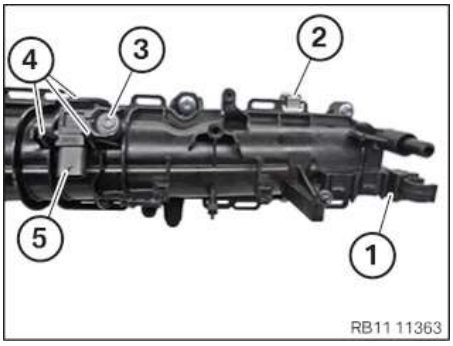
20 – Version 1: Clean intake plenum with the high-pressure cleaner

CAUTION

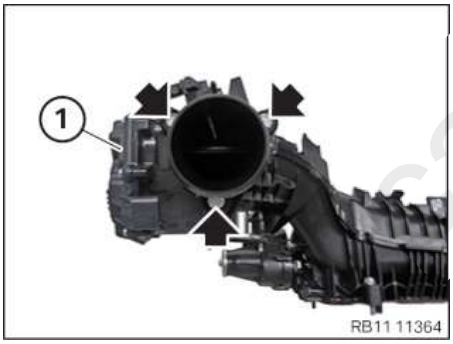
Materials harmful to health.

Contact with fluids harmful to health!

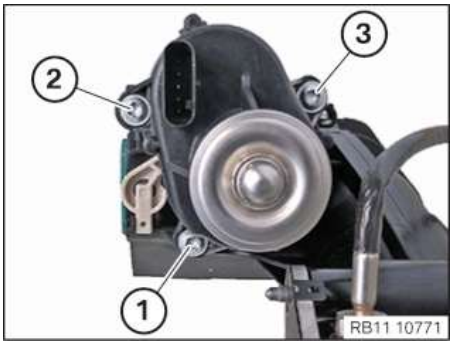
- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.



- Guide out and remove holder (1).
- Feed out and remove the clamp (2).
- Loosen screw (3).
- Unlock the locks (4).
- Remove the charging pressure sensor (5).



- Remove screws (arrows).
- Remove the throttle bodies (1).

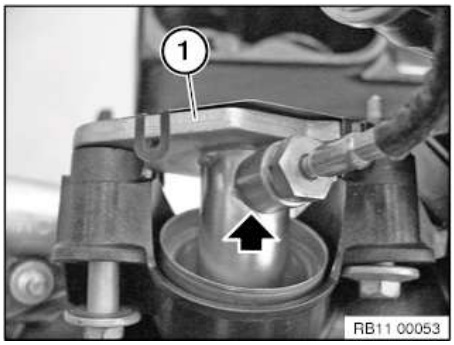


- Loosen screws (1) to (3).

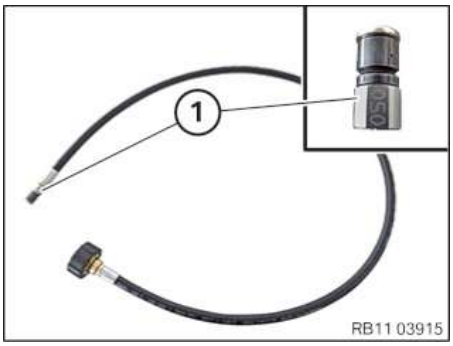
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- Detach the swirl-flap controller with a suitable tool.



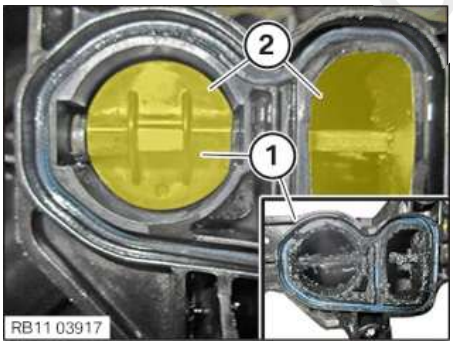
- Remove the exhaust-gas recirculation pipe (1) (arrow).



- Connect the standard rotating pipe cleaning nozzles (1) with a short pressure hose of the high-pressure cleaner.



- Connect short pressure hose with a commercially available high-pressure cleaning gun from the high-pressure cleaner.



NOTICE

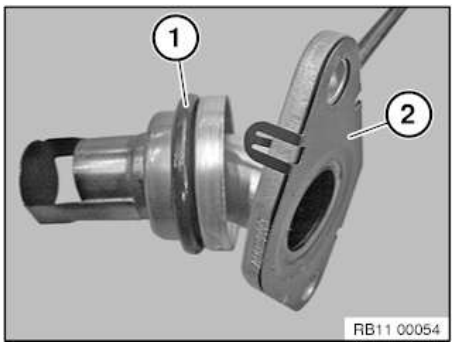
The description is for one component only. The procedure is identical for all further components.

TECHNICAL INFORMATION

- Wear safety goggles.

- Open swirl flap(1).
- Clean intake ports (2) by moving the pipe-cleaning nozzle back and forth.
- Blow out intake plenum with compressed air.

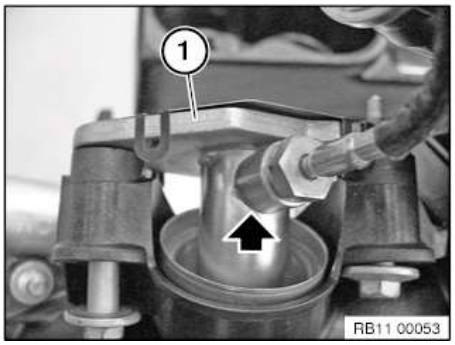
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- Renew O-ring (1).

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

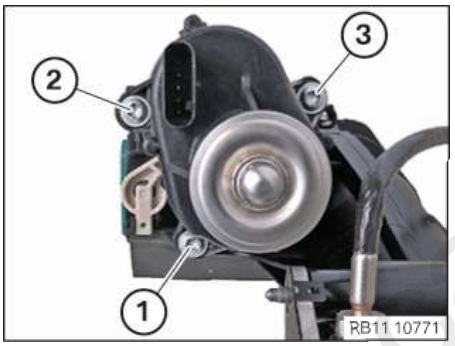
  Parts: Gasket
- Position the seal (2) and clip it in.



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



- Position the swirl-flap controller.
- Engage the drive arm of the swirl-flap controller in the adjustment lever of the intake plenum.



- Tighten screws in the order (1) to (3).

Swirl-flap controller to intake plenum

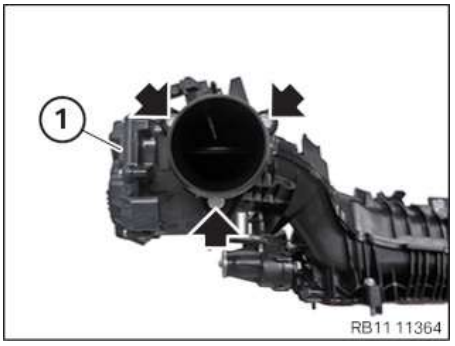
M6 x 16	Tighten the bolts in alternating order until flush.	4 Nm



- Renew the seal (1) between the intake system and the throttle body.

  Parts: Gasket
- Renew the seal (2) between the throttle body and charge air pipe.

  Parts: Gasket



- Feed in and install the throttle body (1).
- Tighten screws (arrows).

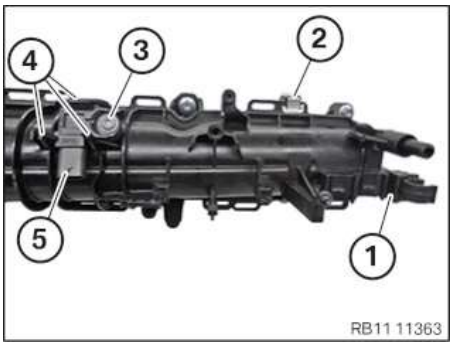
Throttle body to intake plenum

6x50		Tightening torque	7 Nm

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- Clean the charging pressure sensor, replace, if applicable.
- Check the sealing ring (1) for damage and renew where required.
- Lightly coat the sealing ring (1) on the charging pressure sensor with lubricant for the installation.



- Insert and install the charging pressure sensor (5).
- Lock the locks (4).

  The locks (4) must engage audibly.
- Tighten down screw (3).

Charging pressure sensor to intake plenum

TS6X20		Tightening torque	5 Nm

- Feed in and install the clamp (2).
- Insert and install the holder (1).

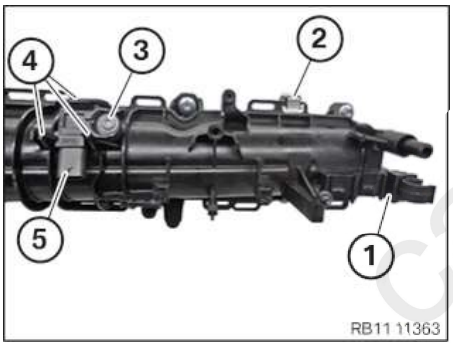
21 – Version 2: Clean intake plenum with the universal cleaner.

CAUTION

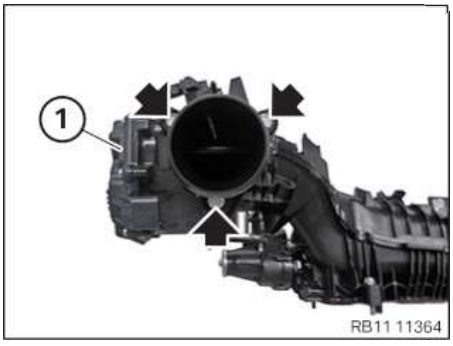
Materials harmful to health.

Contact with fluids harmful to health!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.

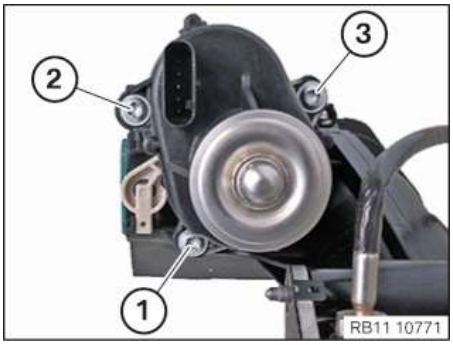


- Guide out and remove holder (1).
- Feed out and remove the clamp (2).
- Loosen screw (3).
- Unlock the locks (4).
- Remove the charging pressure sensor (5).



- Remove screws (arrows).
- Remove the throttle bodies (1).

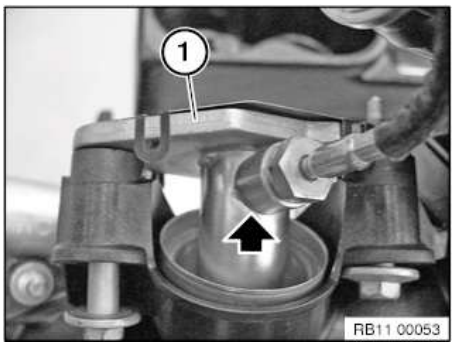
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- Loosen screws (1) to (3).



- Detach the swirl-flap controller with a suitable tool.



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



NOTICE

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

- Mix the cleaning agent in a large collecting vessel.

Cleaning agent

Universal cleaner must be diluted with water.	
Washer fluid	2 parts water, 1 part universal cleaner

Expendable materials: Universal cleaner

- Place the intake system (2) into the collecting vessel.

Cleaning the intake plenum

Soaking time of the cleaning agent	1 h

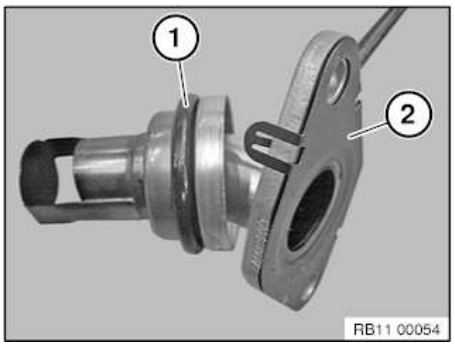
- Clean the intake system (2) with the brushes (1).

Care product

Wheel rim brushes	1x, Set	83192298237

- Then rinse the intake system (2) with water.

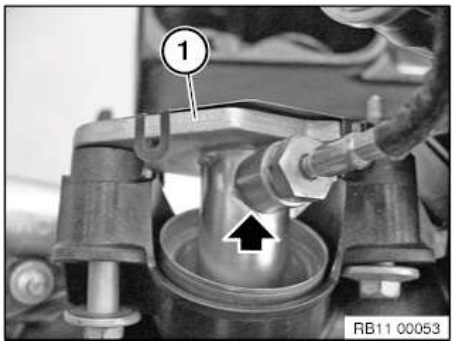
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- Renew O-ring (1).

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

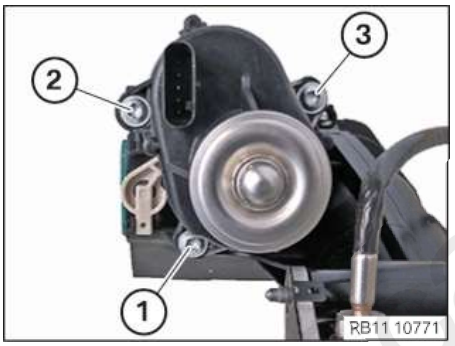
  Parts: Gasket
- Position the seal (2) and clip it in.



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



- Position the swirl-flap controller.
- Engage the drive arm of the swirl-flap controller in the adjustment lever of the intake plenum.



- Tighten screws in the order (1) to (3).

Swirl-flap controller to intake plenum

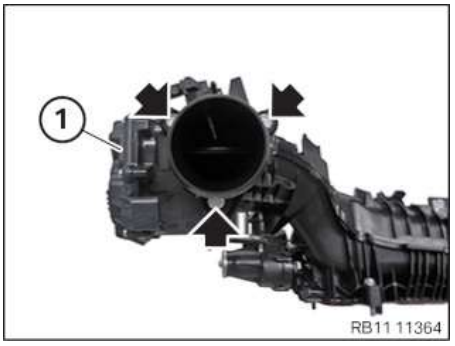
M6 x 16	Tighten the bolts in alternating order until flush.	4 Nm



- Renew the seal (1) between the intake system and the throttle body.

  Parts: Gasket
- Renew the seal (2) between the throttle body and charge air pipe.

  Parts: Gasket



- Feed in and install the throttle body (1).
- Tighten screws (arrows).

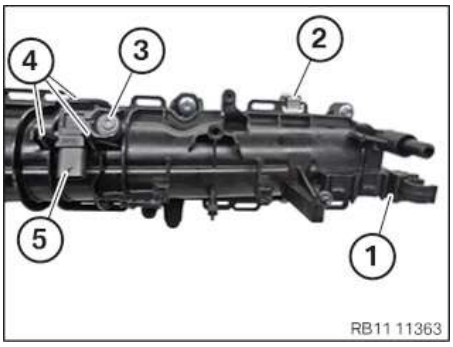
Throttle body to intake plenum

6x50		Tightening torque	7 Nm

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- Clean the charging pressure sensor, replace, if applicable.
- Check the sealing ring (1) for damage and renew where required.
- Lightly coat the sealing ring (1) on the charging pressure sensor with lubricant for the installation.



- Insert and install the charging pressure sensor (5).
- Lock the locks (4).

  The locks (4) must engage audibly.
- Tighten down screw (3).

Charging pressure sensor to intake plenum

TS6X20		Tightening torque	5 Nm

- Feed in and install the clamp (2).
- Insert and install the holder (1).

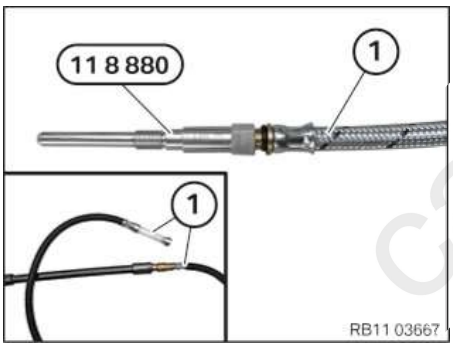
22 – Turn the piston to top dead centre

RISK OF DAMAGE

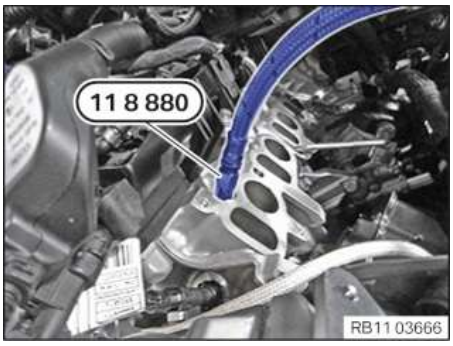
Contaminant or foreign body.

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.



- Connect OT gauge (1) from the set of special tools with special tool 0 496 146 (11 8 880).



- Install special tool 0 496 146 (11 8 880) in place of glow element.

▸ **Turning the engine by hand**

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- Fit special tool 0 493 380 (11 6 480).

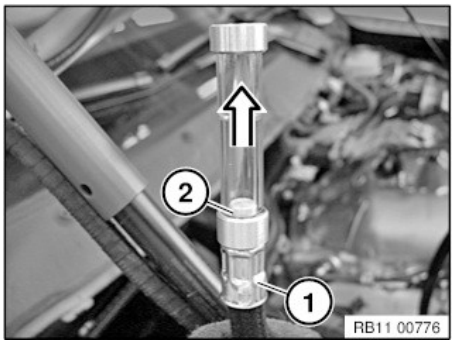
RISK OF DAMAGE

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.

- Turn the engine by hand using special tool 0 493 380 (11 6 480).



- Turn the engine by hand.
- When the piston moves up, the journal (2) in the special tool (1) also moves up.
- In the top dead centre, the piston and also the journal (2) are positioned at the highest point in the special tool (1).
- Turn the piston to the top dead centre.
- After that, the engine must not be rotated further.

» The valves are now closed.



RISK OF DAMAGE

Engine damage due to walnut granules in the combustion chamber.

If walnut granules penetrate the combustion chamber while cleaning the intake ports, engine damage may occur.

- Always clean the intake port with valves of the relevant cylinder closed.
- Set the piston of the relevant cylinder to the top dead centre.
- If walnut granules have entered the combustion chamber: Do **not** turn or start the engine by hand. Disassemble the cylinder head and clean all components.

- Engine must not be rotated further.
- The intake valves (1) must be closed while cleaning.

23 – Cleaning intake ports

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.

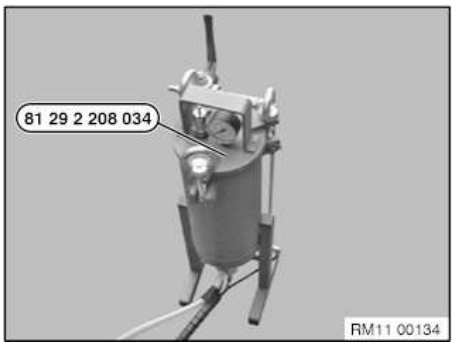
RISK OF DAMAGE

Engine damage due to walnut granules in the combustion chamber.

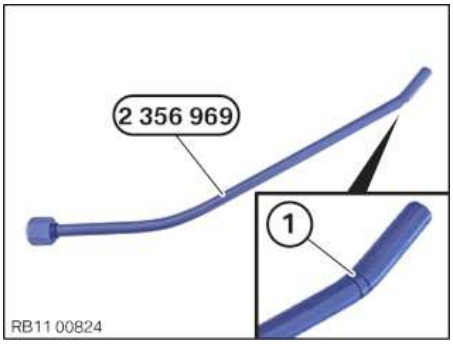
If walnut granules penetrate the combustion chamber while cleaning the intake ports, engine damage may occur.

- Always clean the intake port with valves of the relevant cylinder closed.
- Set the piston of the relevant cylinder to the top dead centre.
- If walnut granules have entered the combustion chamber: Do **not** turn or start the engine by hand. Disassemble the cylinder head and clean all components.

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- Keep the special tool 2 208 034, the walnut granules and a vacuum cleaner ready.



- Have the special tool 2 356 969 ready.

TECHNICAL INFORMATION

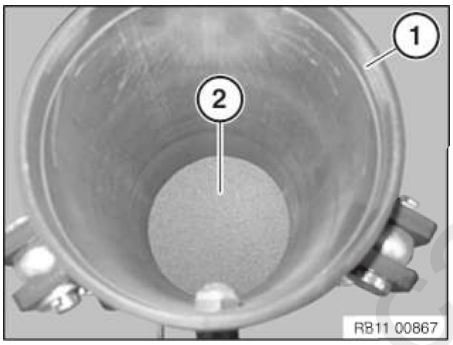
The front area of the blasting wand is marked with two notches. These may additionally be highlighted in colour.

During the blasting process, only pull the blasting wand out of the vacuum adapter until the mark becomes visible.

- Observe the mark (1).



- Stage special tools 2 356 966 and 2 356 967.

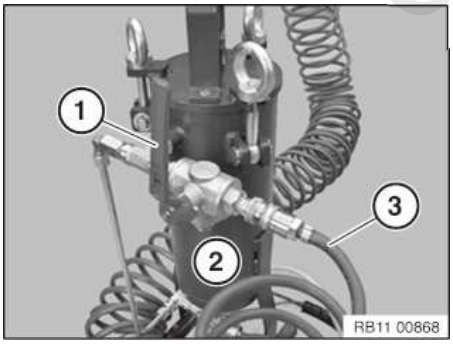


- Open blasting device (1).
- Fill in walnut granules (2).

Walnut granules

Quantity for each blasting process	2 l

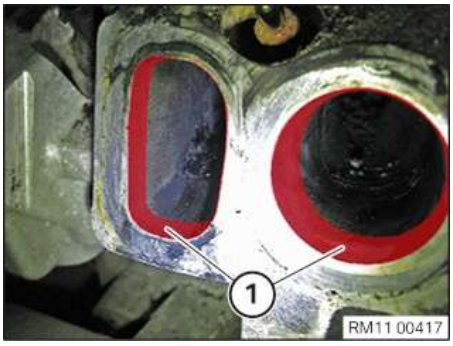
- Close blasting device (1).



- Close the valve (1) on the blasting device (2).
- Connect compressed air (3).

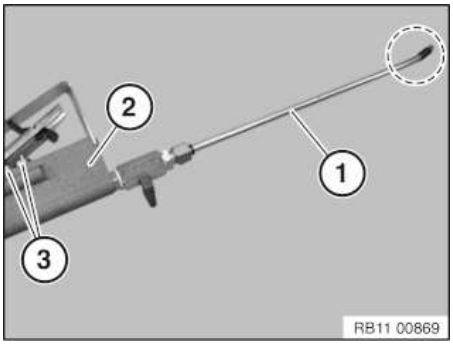
Cleaning the intake ports

Operating pressure	6 bar ... 8 bar



- Clean marked areas (1) with a brush.

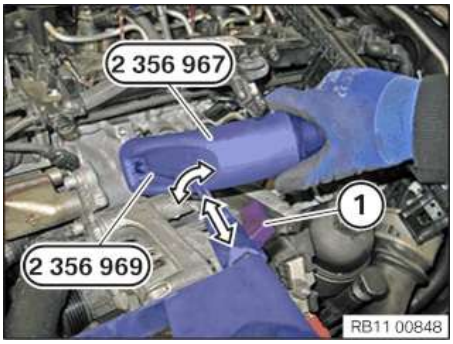
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- Attach the blasting wand (2) to the blasting device (1).



- Connect the special tool 2 356 967 to a vacuum cleaner.
- Insert the special tool 2 356 967 into the swirl port of cylinder 1.

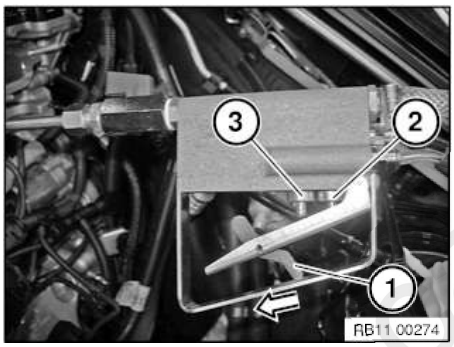


TECHNICAL INFORMATION

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

- Insert the special tool 2 356 969 into the special tool 2 356 967.
- Open the valve (1).
- Move the blasting wand forwards and backwards and rotate.

  This removes any dirt in the tangential port.



- Slide the locking lever (1) forward in the direction of the arrow.
- To release the compressed air: Actuate valve (2).
- To release the walnut granules and the compressed air: Actuate the valves (2) and (3).
- Clean the swirl port.

Cleaning the intake ports

Blast duration with walnut granules	Approx. 20 s
Blast duration with pure compressed air for the complete blowing out of walnut granules	Approx. 10 s

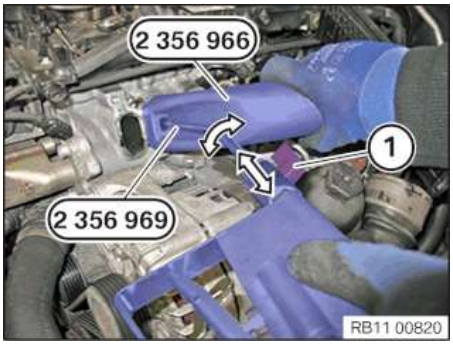
- Close the valve on the blasting wand.

» Check the pressure drop at the pressure measuring device.



- Connect the special tool 2 356 967 to a vacuum cleaner.
- Insert the special tool 2 356 967 into the swirl port of cylinder 1.

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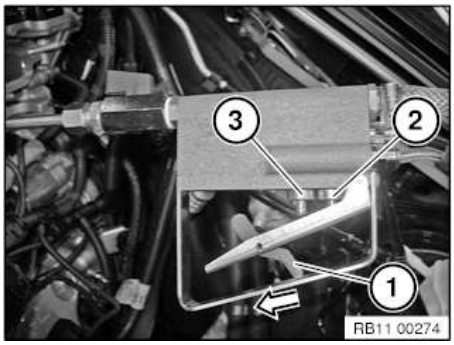


TECHNICAL INFORMATION

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

- Insert the special tool 2 356 969 into the special tool 2 356 967.
- Open the valve (1).
- Move the blasting wand forwards and backwards and rotate.

  This removes any dirt in the swirl port.



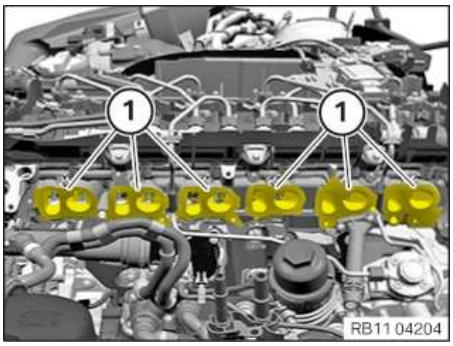
- Slide the locking lever (1) forward in the direction of the arrow.
- To release the compressed air: Actuate valve (2).
- To release the walnut granules and the compressed air: Actuate valves (1) and (2).
- Clean the swirl port.

Cleaning the intake ports

Blast duration with walnut granules	Approx. 20 s
Blast duration with pure compressed air for the complete blowing out of walnut granules	Approx. 10 s

- Close the valve on the blasting wand.

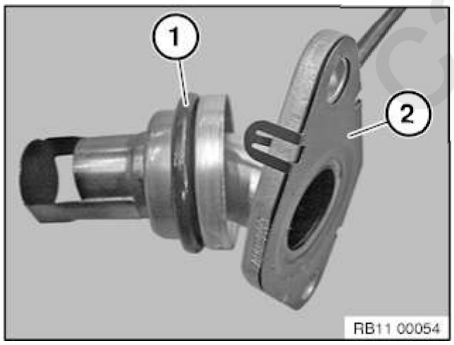
» Check the pressure drop at the pressure measuring device.



- Carry out the following steps one after another on all the other cylinders (1):
  - Turn the piston to top dead centre
  - Clean the intake ports.

POSTPROCESSES

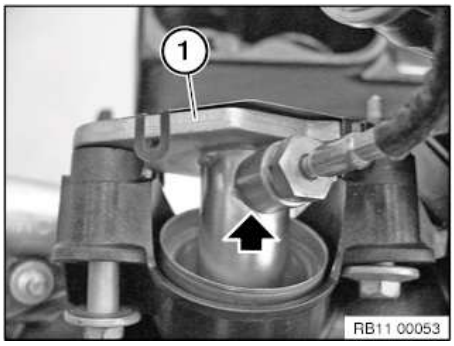
24 – Installing the intake plenum



- Renew O-ring (1).

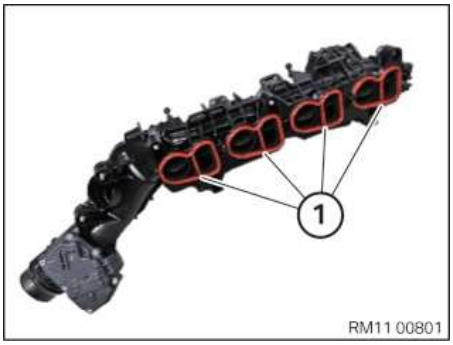
  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

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



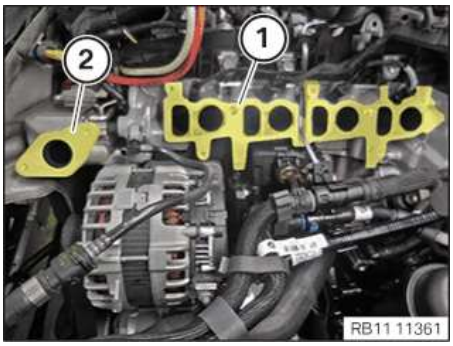
- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).

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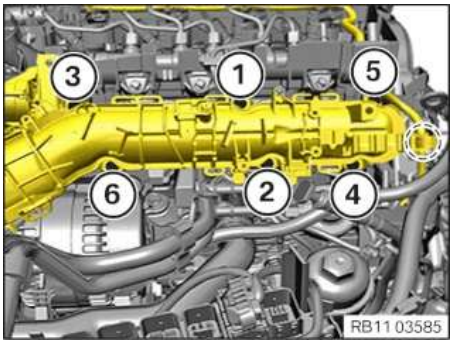


- Renew seals (1).

  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.

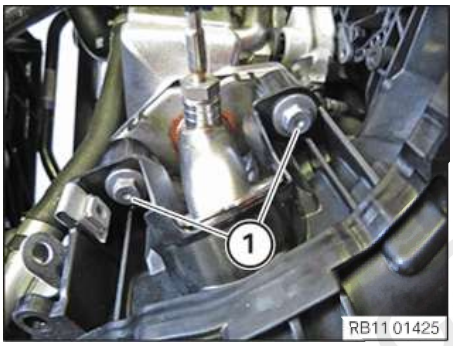


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

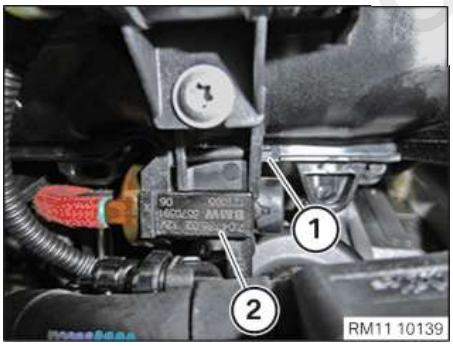
- Attach the wiring harness and fuel lines in the marked area on the intake plenum.



- Tighten the screws (1).

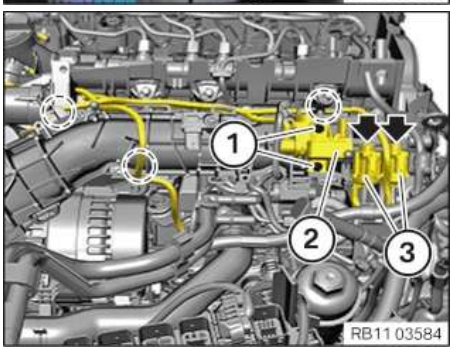
Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm



- 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.

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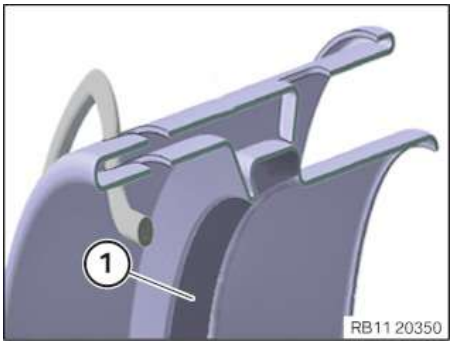


- Check the seal (1) for damage, and renew if necessary.

▸ **Replacing damaged seal**

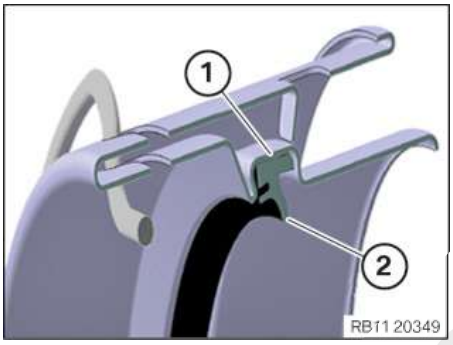
TECHNICAL INFORMATION

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.



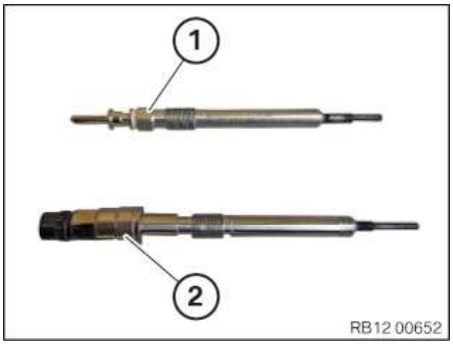
- Connect the pressure pipe to the throttle body until the locks (1) engage on both sides.



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

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25 – Install all glow elements



TECHNICAL INFORMATION

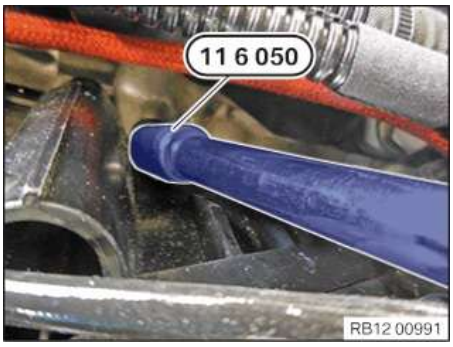
The combustion chamber pressure sensor can and is omitted from a technical point of view.

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**.



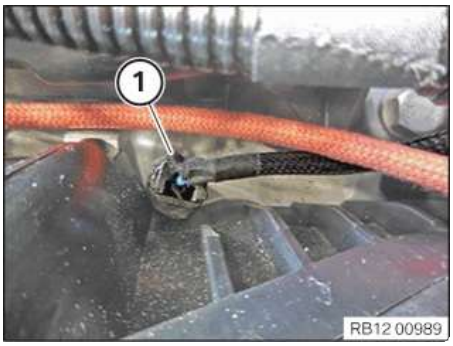
NOTICE

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

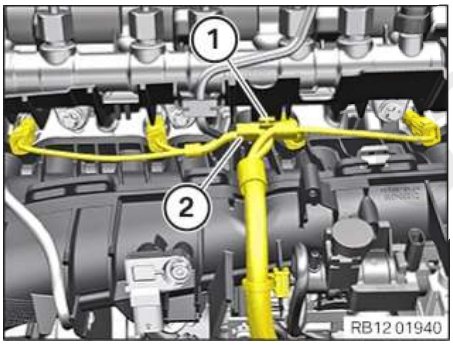


NOTICE

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.

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

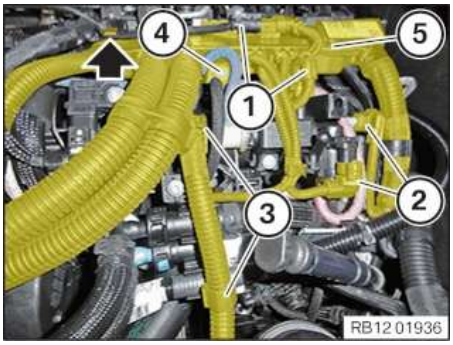
RISK OF DAMAGE

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.

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

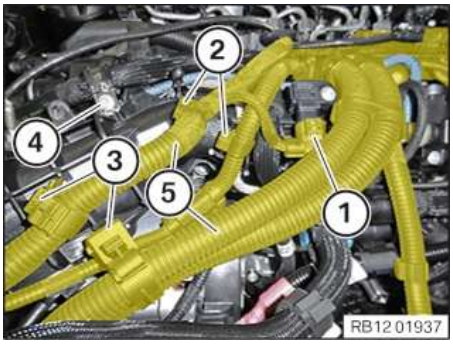
Wiring harness section to manifold

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.



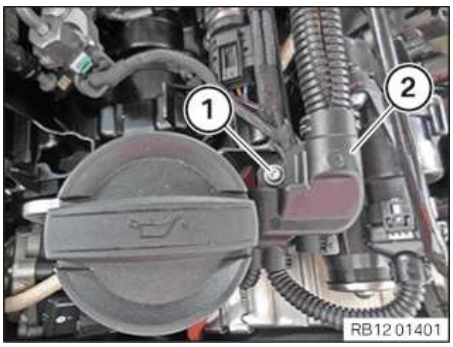
- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

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.

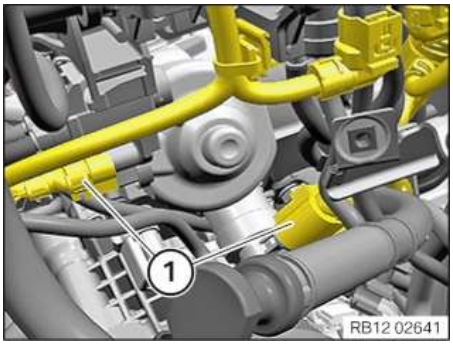
  The connector (1) must engage audibly.



- Connect the connector (1) and lock it.

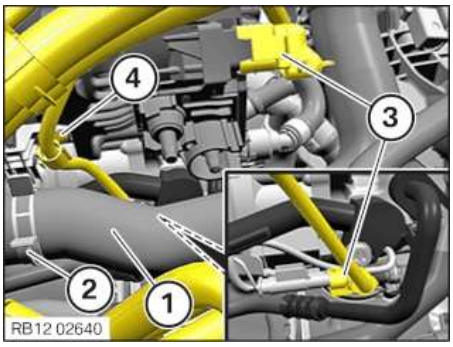
  The connector (1) must engage audibly.

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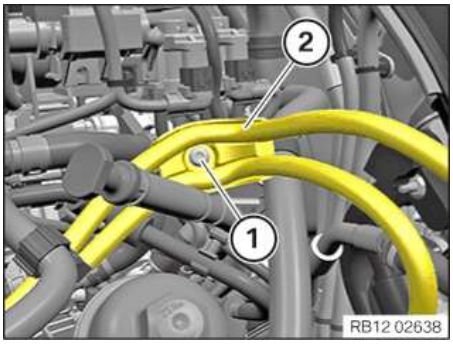
- Connect connectors (1) and lock.

  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



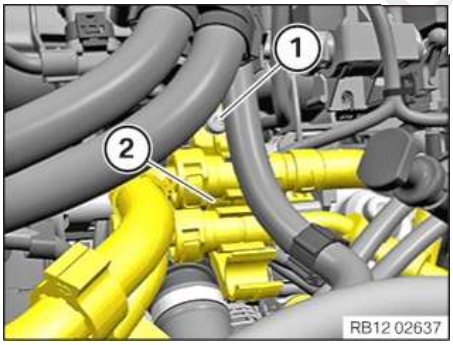
- Feed in and install the positive battery cable (4).
- Feed in and position the positive battery cables (4) .
- Renew the nuts (3) and (2).

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

Battery positive lead on the starter motor generator

M8		Tightening torque	19 Nm

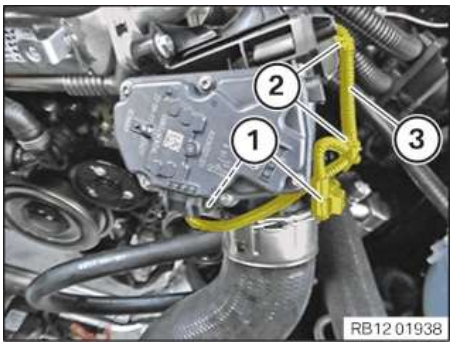
- Guide in and install the lid (1).



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

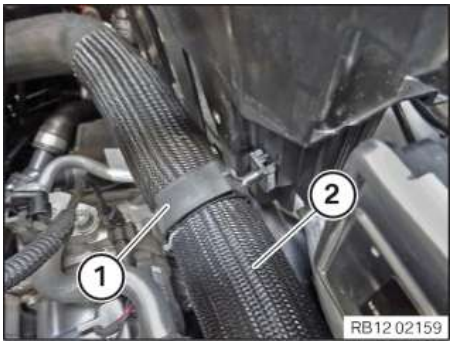
Holder on intake plenum

TS6X20		Tightening torque	5 Nm



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

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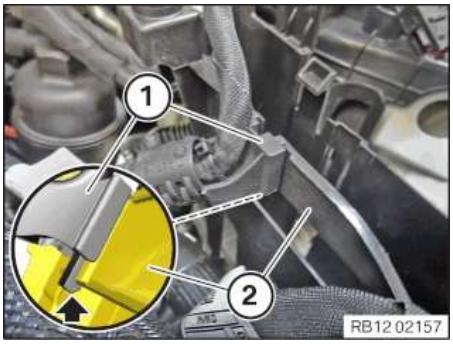
- Feed in and install coolant line (2).
- Lock holder (1).

  The holder (1) must engage audibly.



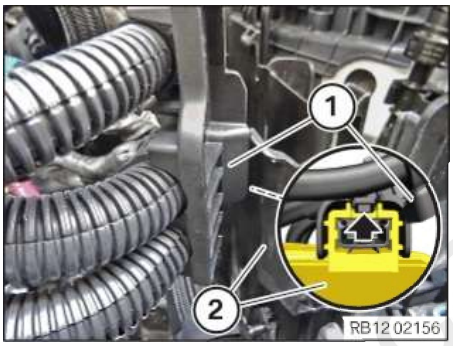
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.



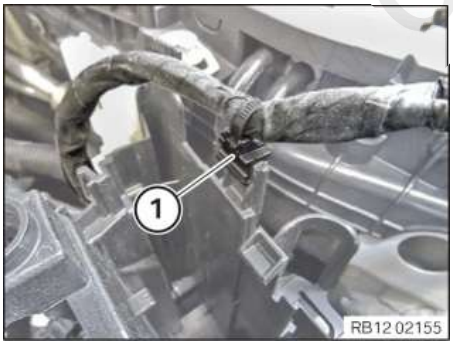
- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.

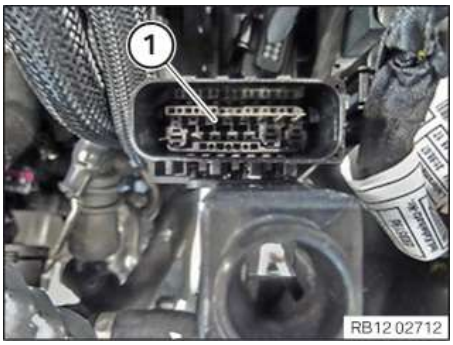


- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.



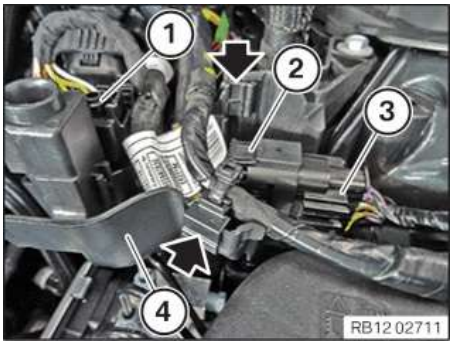
- Secure clamps (1).



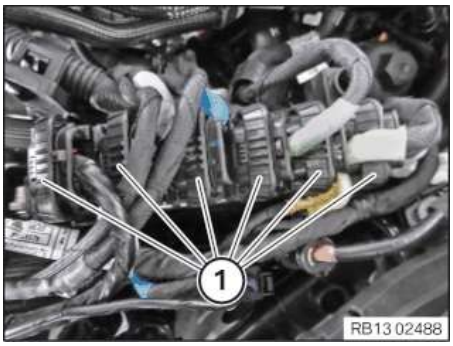
- Feed in and install the connector (1).

  The connector (1) must engage audibly.

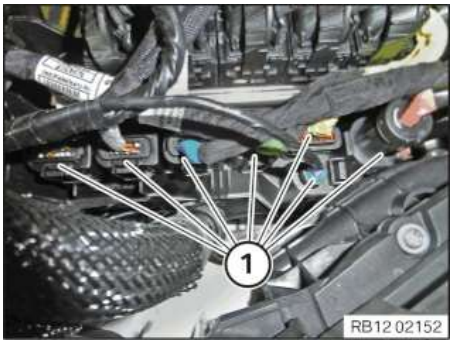
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- Connect connector (3) to control unit holder (4) and lock it.
  The connector (3) must engage audibly.
- Connect connectors (2) and lock.
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.
  The connector (1) must engage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

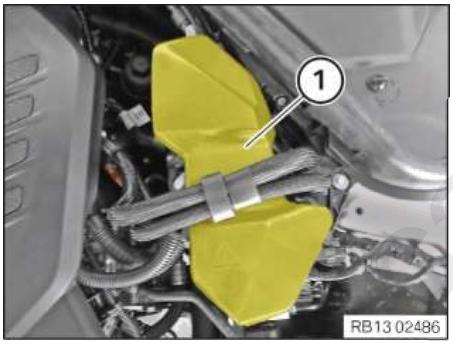


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



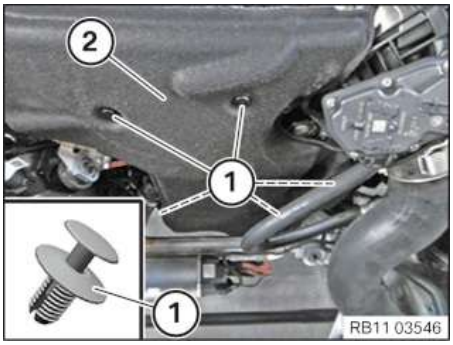
- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.

27 – Install the cover for the DDE control unit



- Insert and install cover (1) into guides.

28 – Install acoustic cover for the engine, front



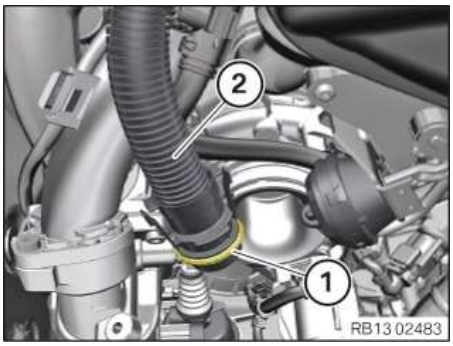
- Feed the acoustic cover (2) in and install.
- Secure the acoustic cover (2) with the expanding rivets (1).

29 – Installing the clean air pipe with resonator

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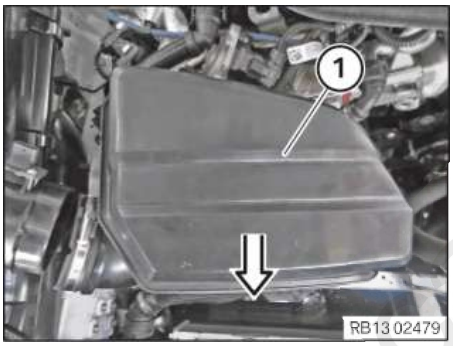
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



- 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.

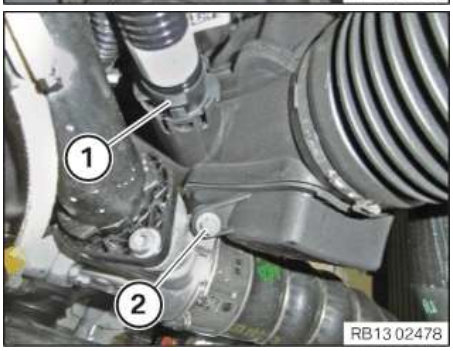


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

  The clamp (1) must engage audibly.

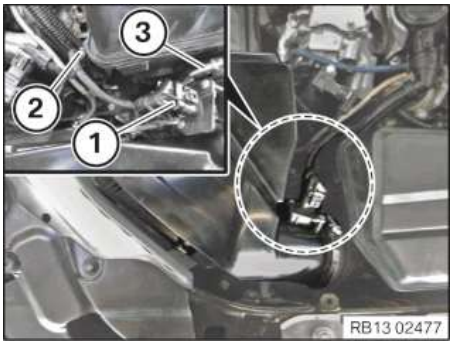


- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm

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

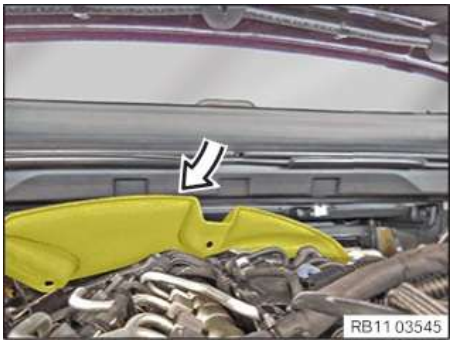
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

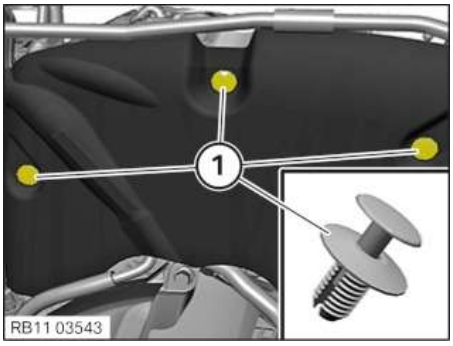
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

30 – Installing acoustic cover at rear

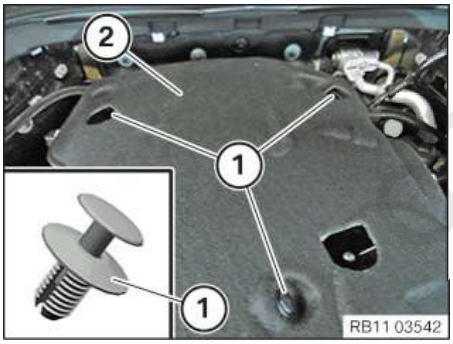


- Guide in the acoustic cover in the direction of the arrow and install it.



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

31 – 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) .

32 – Install acoustic cover

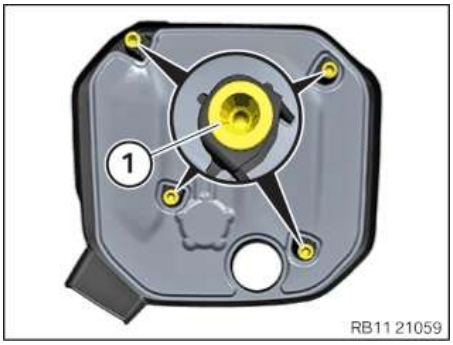
RISK OF DAMAGE

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.

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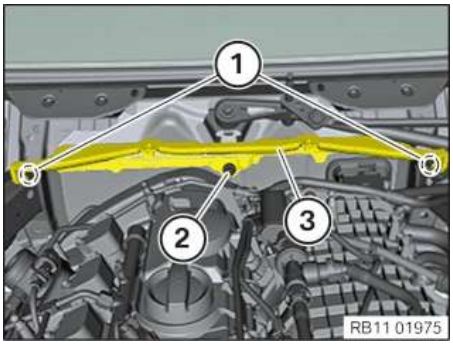


- Check the acoustic cover for correct fit of the rubber mounts (1).



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

33 – Installing centre bulkhead lower section

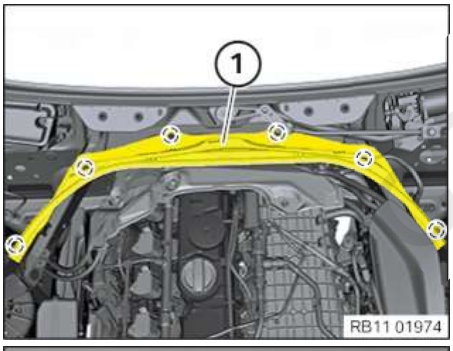


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

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

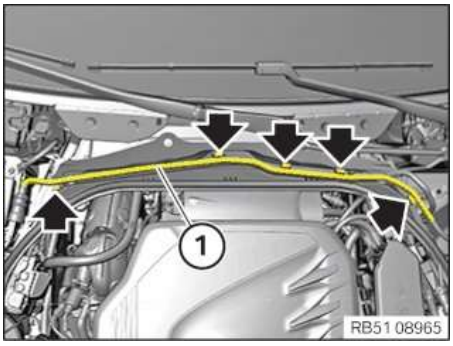
34 – Installing the centre bulkhead upper part



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

Bulkhead upper part to bottom bulkhead

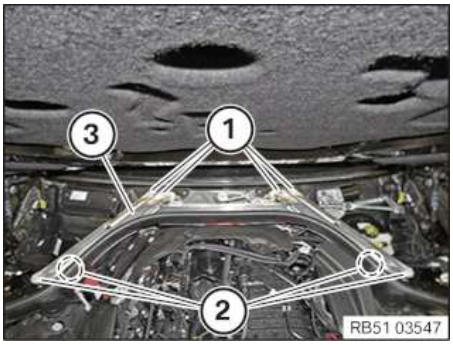
		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

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

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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 °

35 – 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.

36 – Installing cowl panel cover

RISK OF DAMAGE

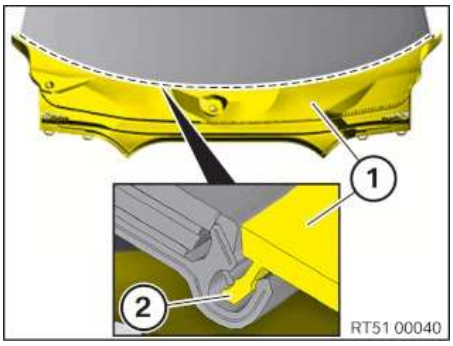
Damage caused by water ingress into the vehicle.

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

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

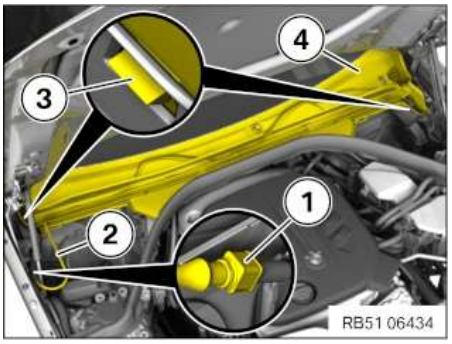
TECHNICAL INFORMATION

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.

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- 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.

37 – Install left and right wiper arm

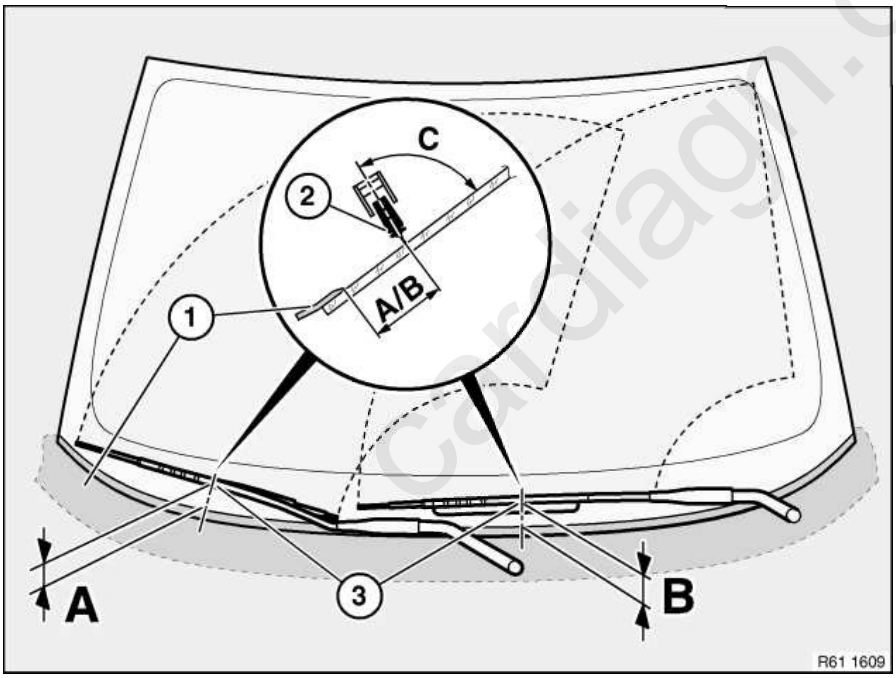
NOTICE

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

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

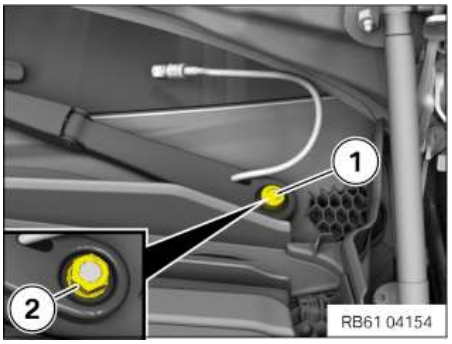
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- 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



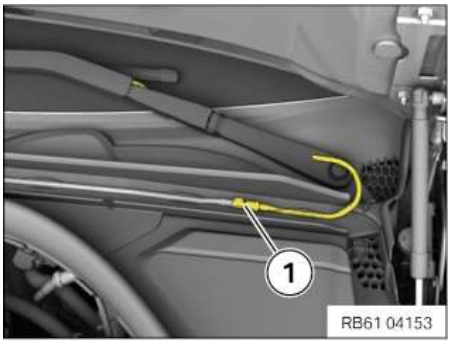
- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

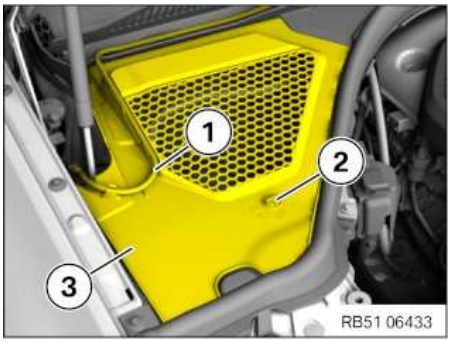
- Connect the protective cap (1).

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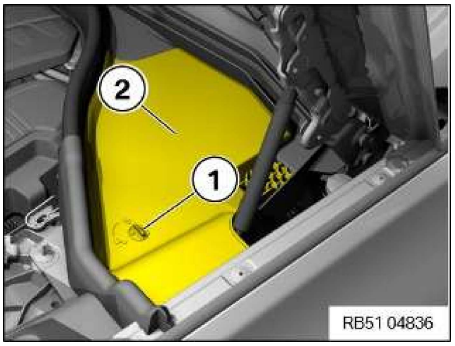
- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

38 – 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.

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



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

40 – Connecting all battery earth leads



- See additional information.

41 – Activating the 48 V electrical system

Prerequisite

Ignition is switched off.

RISK OF DAMAGE

Damage to 48-V battery

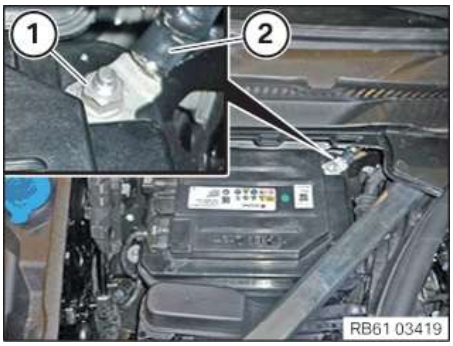
If a 48-V battery that is disconnected from the electrical system is activated, the battery electronics will be damaged.

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

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- 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.

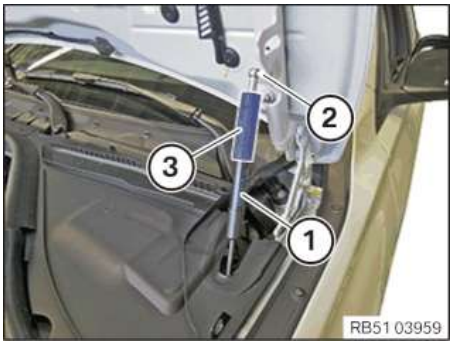
42 – Take bonnet out of the service position

CAUTION

Shutting bonnet or tailgate.

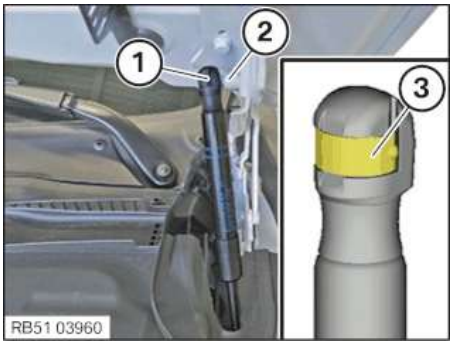
Danger of injury!

- 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.

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- 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

Swirl-flap controller to intake plenum			Used in step 2021
M6 x 16	Tighten the bolts in alternating order until flush.		4 Nm

Throttle body to intake plenum			Used in step 2021
6x50		Tightening torque	7 Nm

Charging pressure sensor to intake plenum			Used in step 2021
TS6X20		Tightening torque	5 Nm

Intake plenum to cylinder head			Used in step 24
M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum			Used in step 24
		Tightening torque	10 Nm

Electric changeover valve to intake plenum			Used in step 24
TS6x20		Tightening torque	5 Nm

Glow elements to cylinder head			Used in step 25
Glow element		Tightening torque	13 Nm

Wiring harness section to manifold			Used in step 26
TS5x20		Tightening torque	3,6 Nm

Standard screw connection 4 Nm			Used in step 26
Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover			Used in step 26
TS5x20		Tightening torque	3,6 Nm

Standard screw connection M6			Used in step 26
M6		Tightening torque	8 Nm

Battery positive lead on the starter motor generator			Used in step 26
M8		Tightening torque	19 Nm

Holder on intake plenum			Used in step 26
TS6X20		Tightening torque	5 Nm

Clean air pipe to exhaust turbocharger			Used in step 29
M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing			Used in step 29
Clamp		Tightening torque	3 Nm

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Bulkhead lower part to body — Used in step 33

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

Bulkhead upper part to bottom bulkhead — Used in step 34

		Tightening torque	3 Nm

Tension strut on bulkhead — Used in step 34

M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome — Used in step 34

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

Windscreen wiper arm — Used in step 37

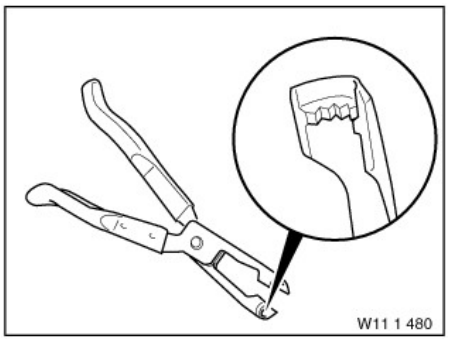
Combination hexagon nut		Tightening torque	35 Nm

Negative battery cable to 48-V battery — Used in step 41

Nut M8		Tightening torque	19 Nm

Overview of Special Tools

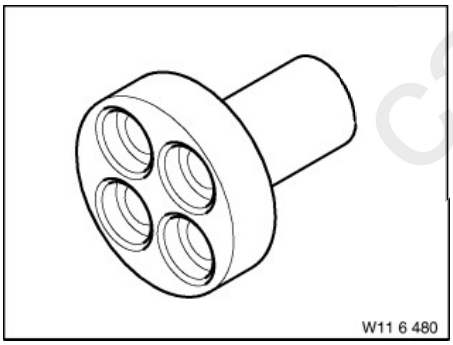
0 490 796 (11 1 480) Pliers



Common — Used in step 18

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)

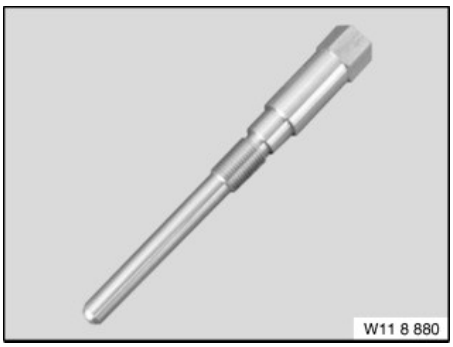
0 493 380 (11 6 480) Connector



Common — Used in step 22

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)

0 496 146 (11 8 880) Adapter

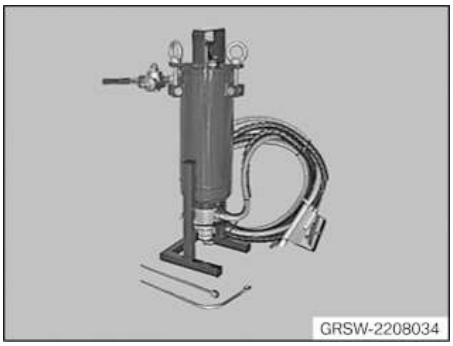


Common — Used in step 22

Usage	For compression testing.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

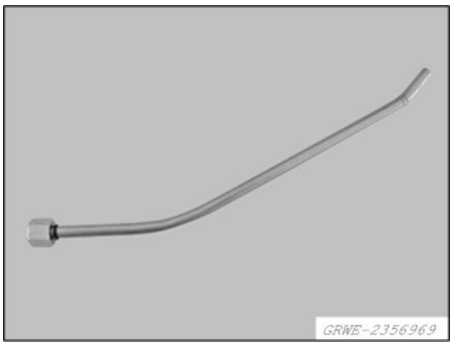
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2 208 034 Blasting material device



Common	Used in step 23
Usage	For cleaning of the intake ports and the intake valves.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	

2 356 969 Beam probe



Common	Used in step 23
Usage	For cleaning of the intake ports and the intake valves.
Included in the tool or work	
Storage location	
Replaced by	
In connection with	Blasting tool 81292208034
SI-Number	08 25 13 (059)

2 356 966 Vacuum adapter



Common	Used in step 23
Usage	For cleaning of the intake ports and the intake valves.
Included in the tool or work	
Storage location	
Replaced by	
In connection with	2208034
SI-Number	08 25 13 (059)

2 356 967 Vacuum adapter



Common	Used in step 23
Usage	For cleaning of the intake ports and the intake valves.
Included in the tool or work	
Storage location	
Replaced by	
In connection with	Blasting tool 81292208034
SI-Number	08 25 13 (059)

Overview Technical Data

Cleaning agent	Used in step 21
Universal cleaner must be diluted with water.	
Washer fluid	2 parts water, 1 part universal cleaner
Expendable materials: Universal cleaner	

Cleaning the intake plenum	Used in step 21
Soaking time of the cleaning agent	1 h

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Walnut granules	Used in step 23
Quantity for each blasting process	2 l

Cleaning the intake ports	Used in step 23
Operating pressure	6 bar ... 8 bar

Cleaning the intake ports	Used in step 23
Blast duration with walnut granules	Approx. 20 s
Blast duration with pure compressed air for the complete blowing out of walnut granules	Approx. 10 s

Distance from window pane edge to wiper blade	Used in step 37
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	241

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	340
61 20 900 Disconnecting and connecting battery earth lead	340
61 20 900 Disconnecting and connecting battery earth lead	340
61 20 900 Disconnecting and connecting battery earth lead	340
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61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	340
61 20 900 Disconnecting and connecting battery earth lead	340
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	340
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	340
61 20 900 Disconnecting and connecting battery earth lead	340
61 20 900 Disconnecting and connecting battery earth lead	340
61 20 900 Disconnecting and connecting battery earth lead	340
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61 20 900 Disconnecting and connecting battery earth lead	340
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	340
61 20 900 Disconnecting and connecting battery earth lead	340
61 20 900 Disconnecting and connecting battery earth lead	340
61 20 900 Disconnecting and connecting battery earth lead	340
61 35 ... Notes on ESD protection (Electro Static Discharge)	1718
61 35 ... Notes on ESD protection (Electro Static Discharge)	1718
12 51 010 Replacing wiring harness section for preheating system	25
12 51 010 Replacing wiring harness section for preheating system	25
12 51 010 Replacing wiring harness section for preheating system	25
12 51 010 Replacing wiring harness section for preheating system	25

Parts

Parts required

Designation	Used in step
Intake system seal to throttle body	20
Throttle body gasket to charge air pipe with integrated temperature sensor for intake air	20
Charging pressure sensor seal to intake system	20
Intake system seal to throttle body	21
Throttle body gasket to charge air pipe with integrated temperature sensor for intake air	21
Charging pressure sensor seal to intake system	21

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11 12 800 Clean cylinder head intake channels and intake plenums

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

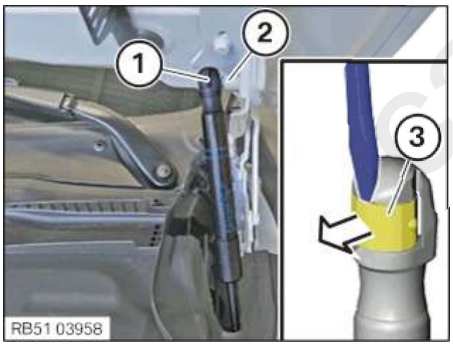
Engine compartment lid is open.

CAUTION

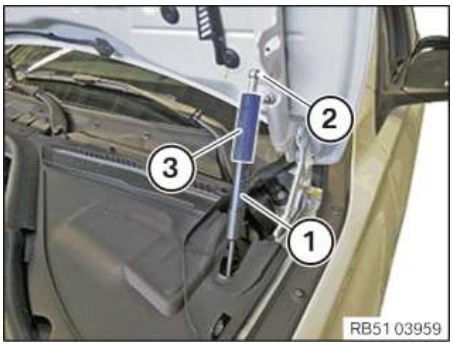
Shutting bonnet or tailgate.

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.

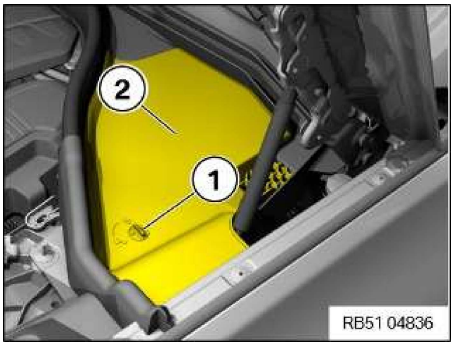
2 – Disconnecting all battery earth leads

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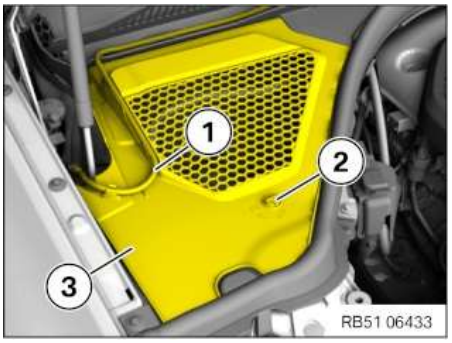
- See additional information.

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 – 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**

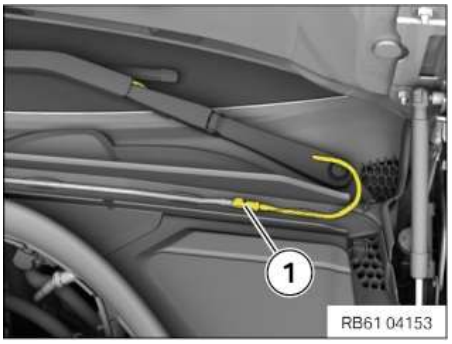
RISK OF DAMAGE

Damage to wiper console.

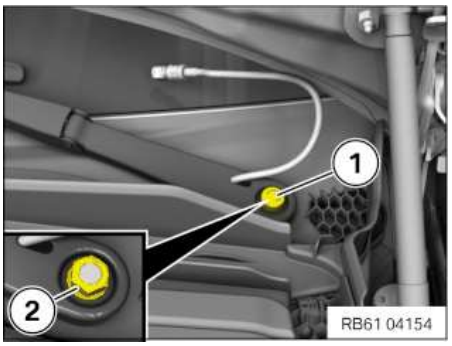
While removing the wiper arms without using special tool, the wiper console can break.

- 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.

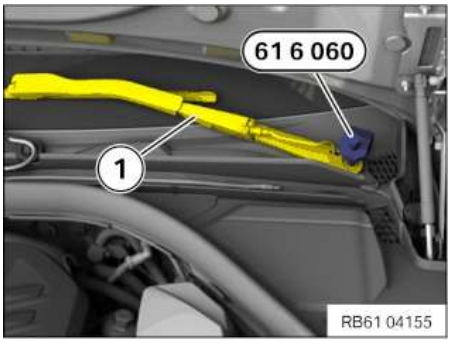
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- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.

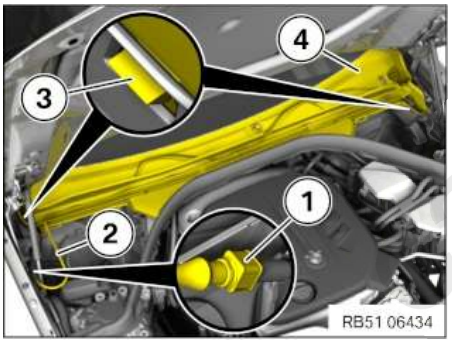


- Remove the protective cap (1).
- Loosen nut (2).

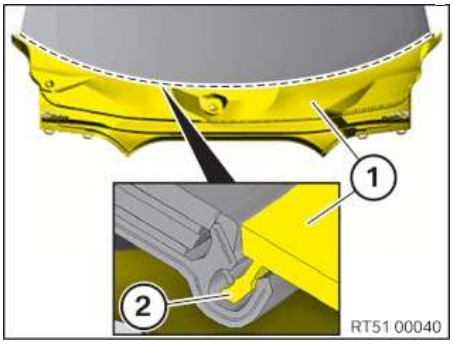


- Pull off the wiper arm (1) using special tool .

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

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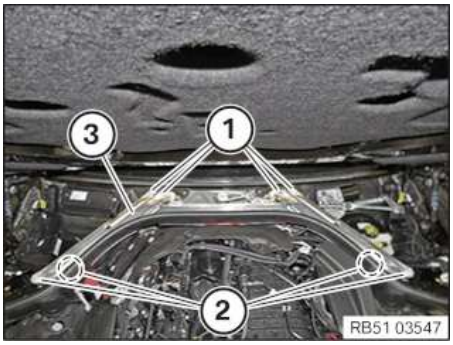


- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

8 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

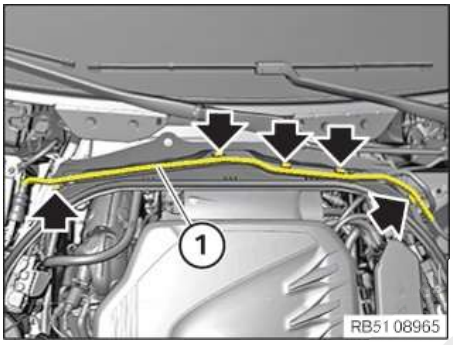
Driving without the strut brace/front-end strut or tension strut is not permitted.



NOTICE

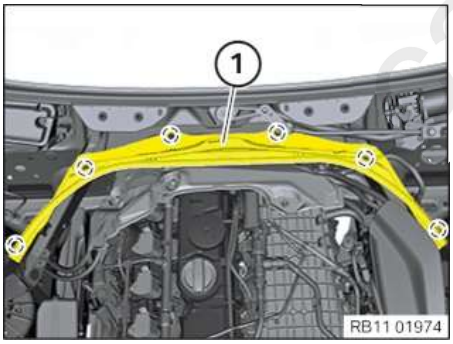
The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

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



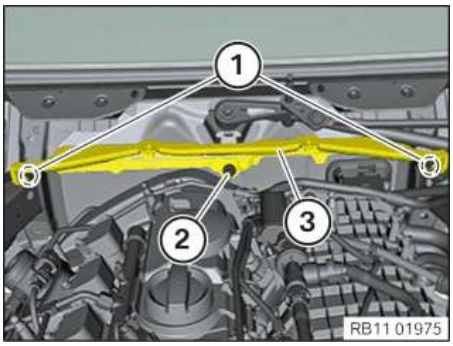
- **Version with mild hybrid technology:**

  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

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RISK OF DAMAGE

Damage to the acoustic cover/design cover.

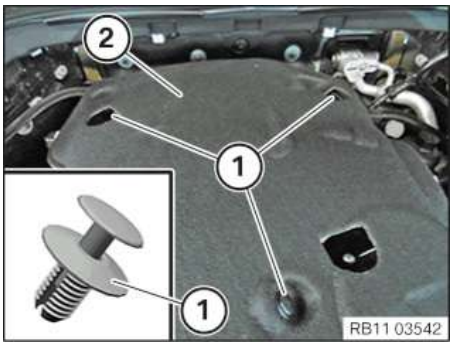
Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- 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.



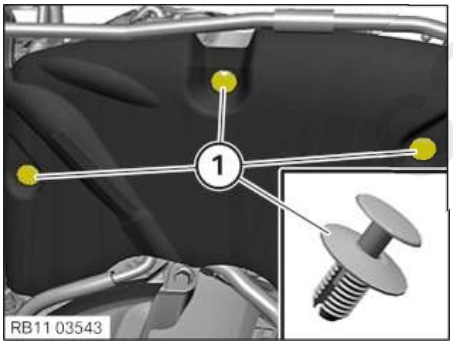
- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

11 – Remove the acoustic cover for the injectors

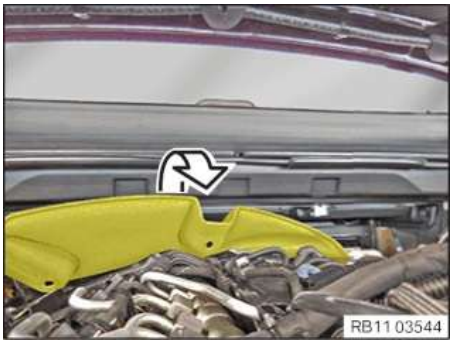


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

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

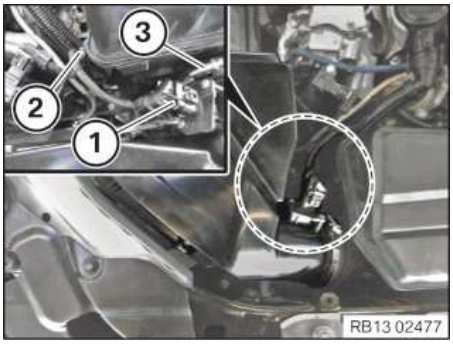
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WARNING

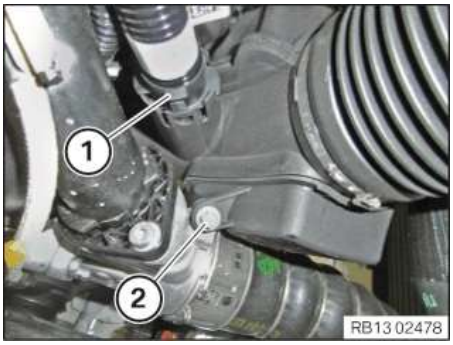
Hot surfaces.

Risk of burning!

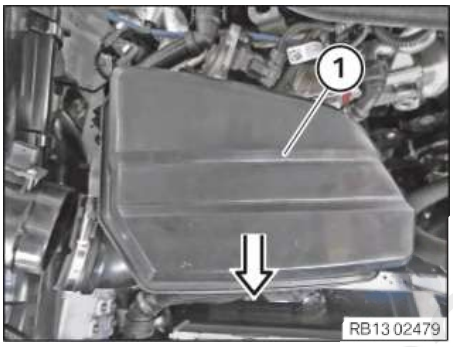
- Perform all work only on components that have cooled down.



- 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.

14 – Remove acoustic cover of the front engine

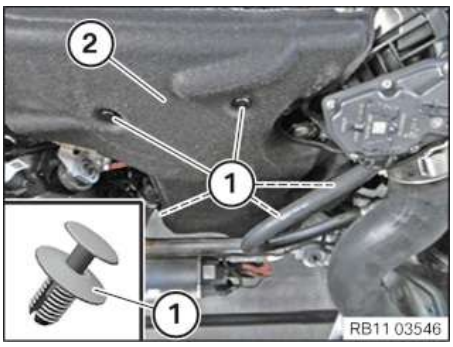
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WARNING

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.

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

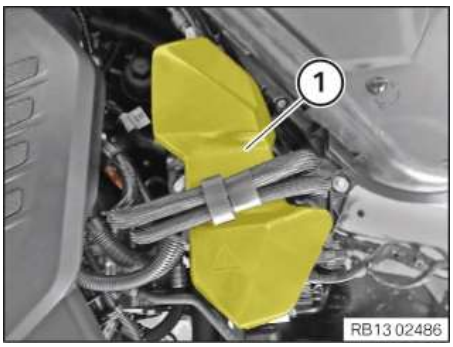
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

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

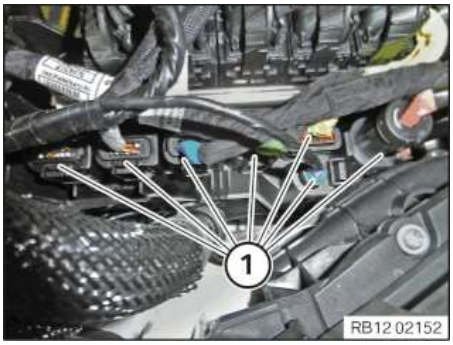
TECHNICAL INFORMATION

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

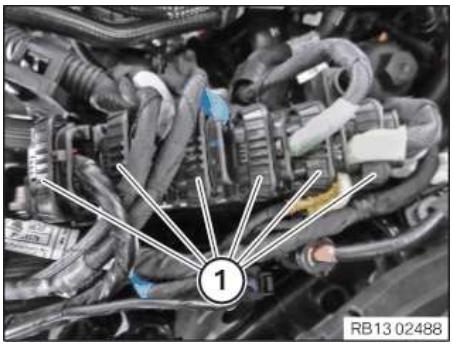


- Pull off cover (1) upwards, feed out and remove.

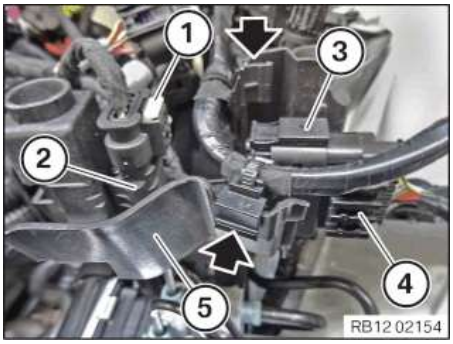
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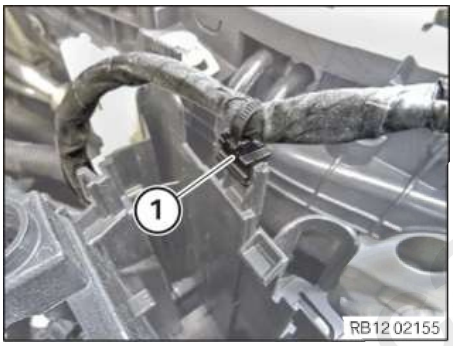
- Unlock and disconnect plug connections (1).



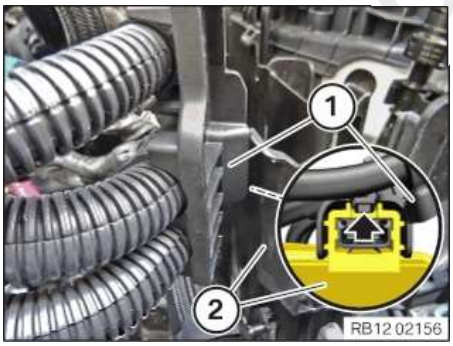
- Unlock and disconnect plug connections (1).



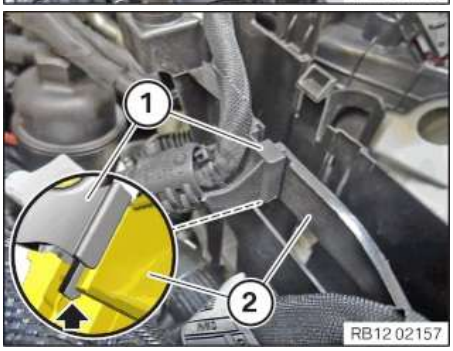
- Unlock plug connection (1) and disconnect.
- Unlock the plug (2) and disconnect from the control unit holder (5).
- Unlock plug connection (3) and disconnect.
- Unlock the plug (4) and disconnect from the control unit holder (5).
- Release the clamps (arrows).



- Loosen clamp (1).



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

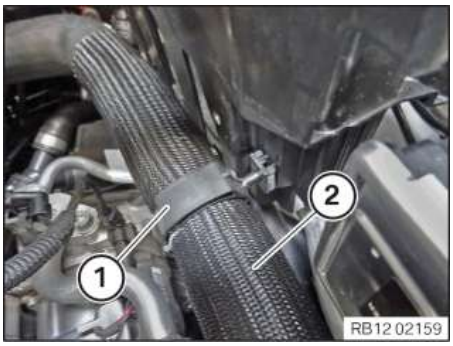


- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).

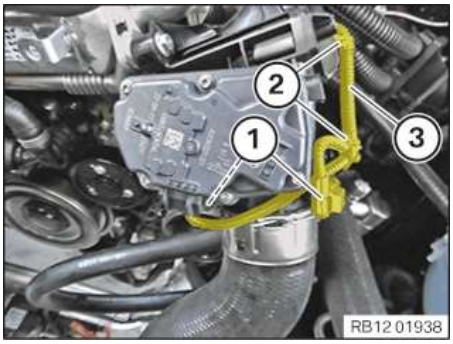
cardiagn.com



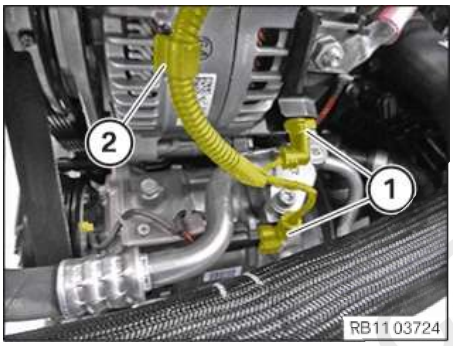
- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.



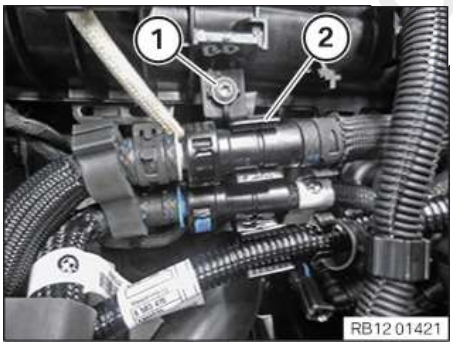
- Unlock holder (1) and feed out coolant line (2) and place it aside.



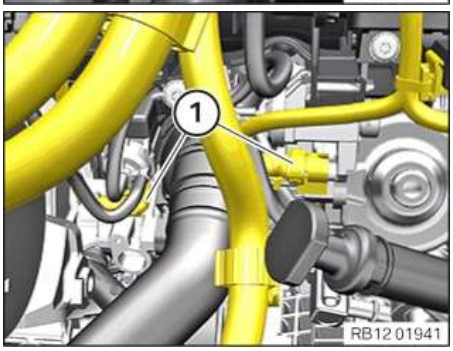
- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.



- 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).

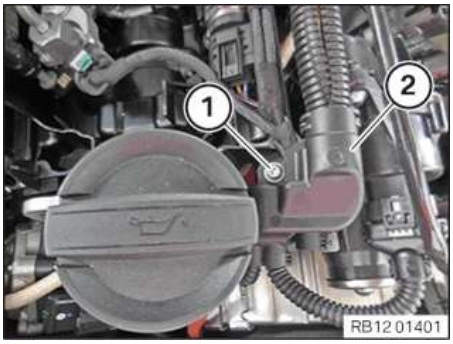
cardiagn.com



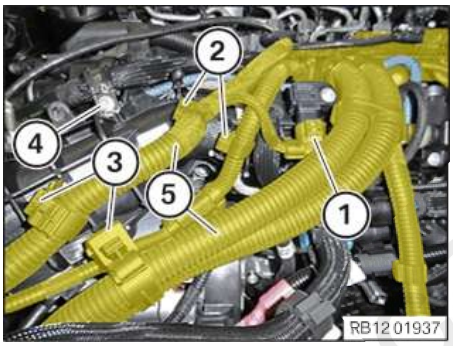
- Unlock and loosen connector (1).



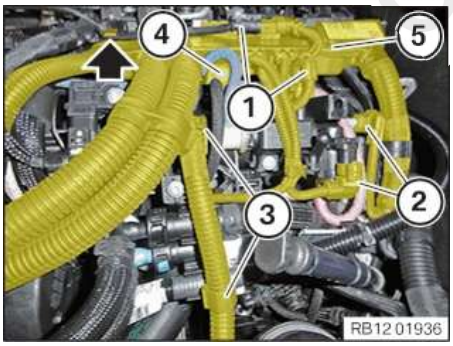
- Unlock plug connection (1) and disconnect.



- 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.

16 – Removing the intake plenum

TECHNICAL INFORMATION

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

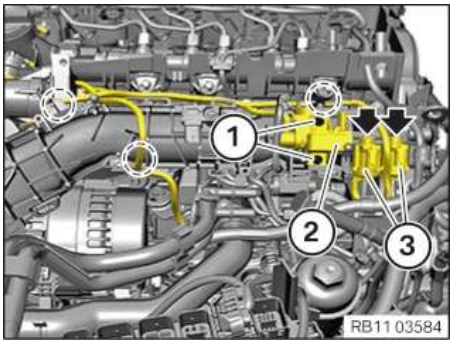
cardiagn.com



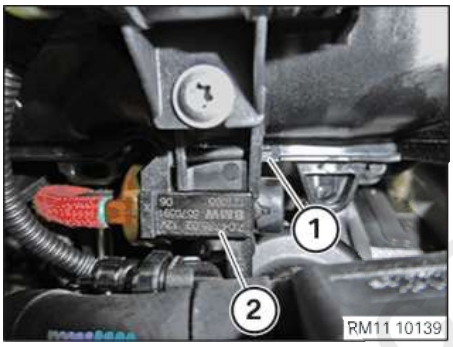
- Unlock clamp (1) and engage in this position.



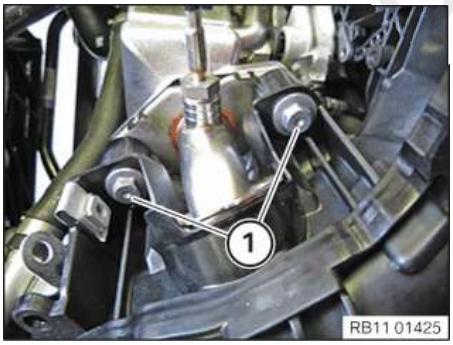
- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.



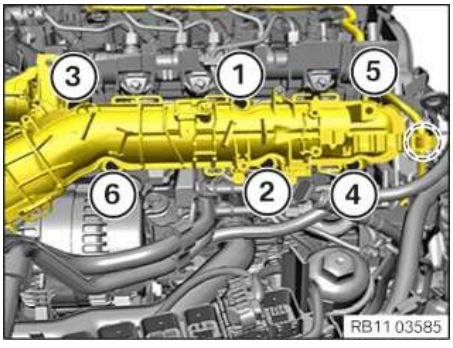
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



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

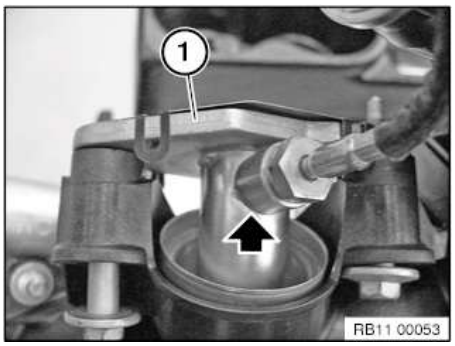


- Loosen screws (1).



- 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.

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

17 – 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.

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)

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RISK OF DAMAGE

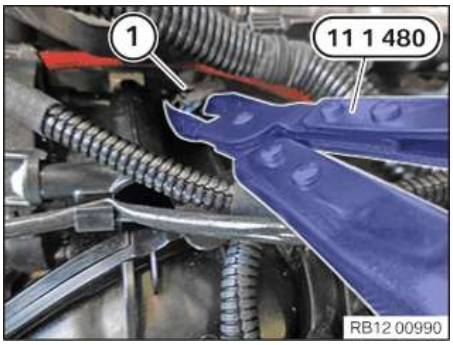
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

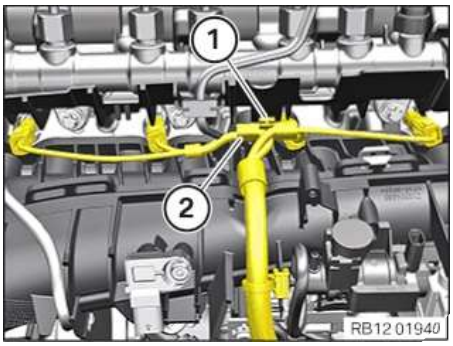
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

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.

MAIN WORK

18 – Version 1: Clean intake plenum with the high-pressure cleaner

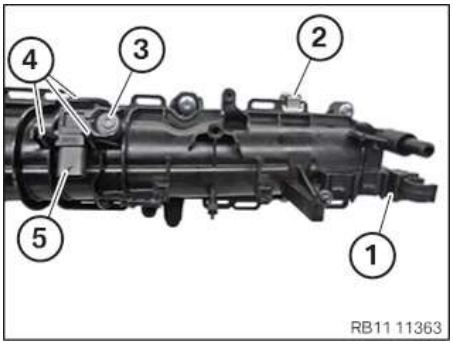
CAUTION

Materials harmful to health.

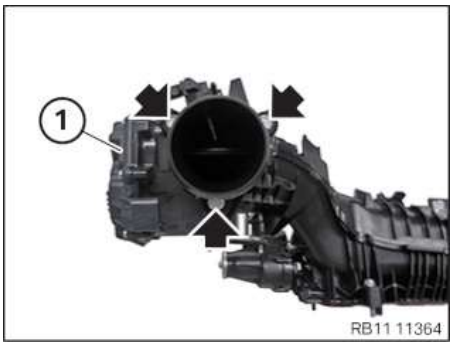
Contact with fluids harmful to health!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.

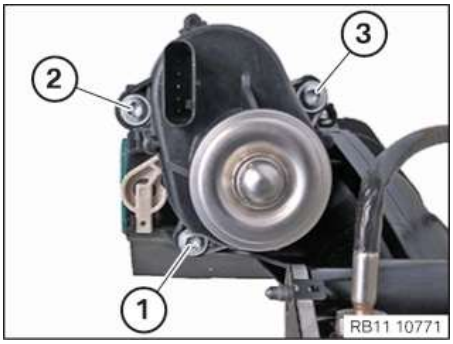
cardiagn.com



- Guide out and remove holder (1).
- Feed out and remove the clamp (2).
- Loosen screw (3).
- Unlock the locks (4).
- Remove the charging pressure sensor (5).



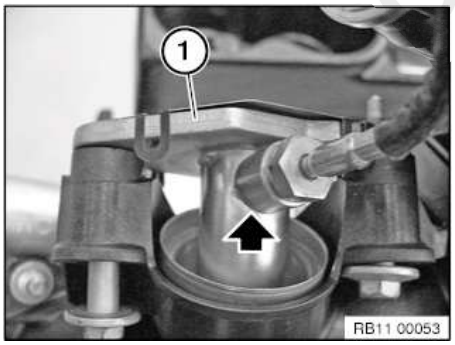
- Remove screws (arrows).
- Remove the throttle bodies (1).



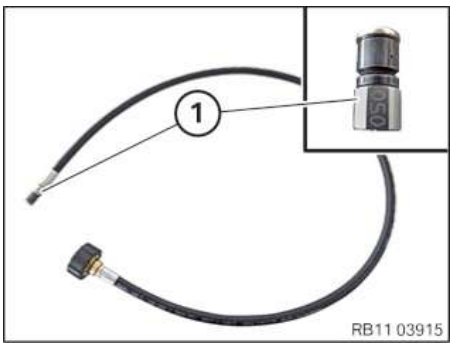
- Loosen screws (1) to (3).



- Detach the swirl-flap controller with a suitable tool.



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

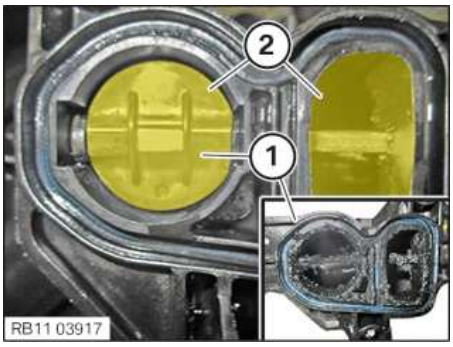


- Connect the standard rotating pipe cleaning nozzles (1) with a short pressure hose of the high-pressure cleaner.

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- Connect short pressure hose with a commercially available high-pressure cleaning gun from the high-pressure cleaner.



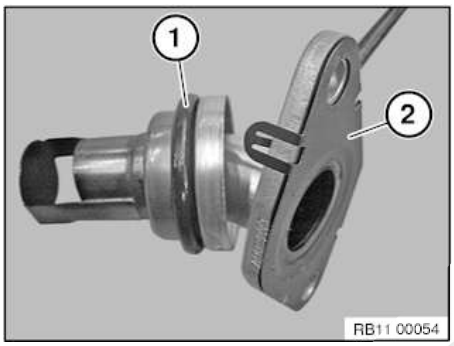
NOTICE

The description is for one component only. The procedure is identical for all further components.

TECHNICAL INFORMATION

- Wear safety goggles.

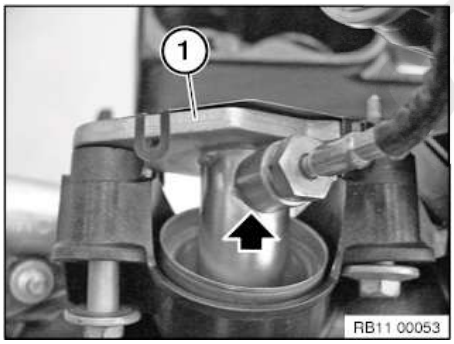
- Open swirl flap(1).
- Clean intake ports (2) by moving the pipe-cleaning nozzle back and forth.
- Blow out intake plenum with compressed air.



- 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.

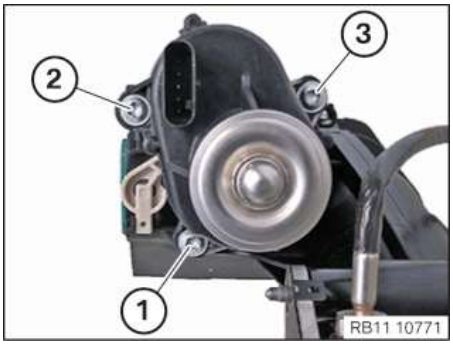


- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).



- Position the swirl-flap controller.
- Engage the drive arm of the swirl-flap controller in the adjustment lever of the intake plenum.

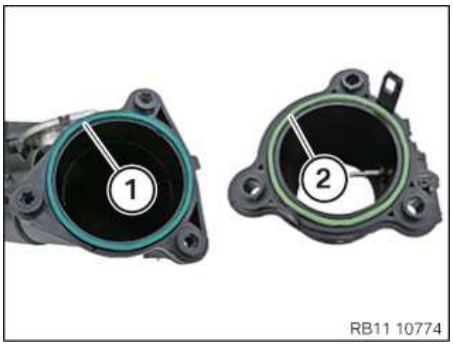
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- Tighten screws in the order (1) to (3).

Swirl-flap controller to intake plenum

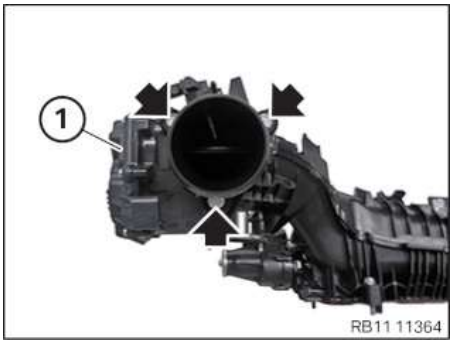
M6 x 16	Tighten the bolts in alternating order until flush.	4 Nm



- Renew the seal (1) between the intake system and the throttle body.

  Parts: Gasket
- Renew the seal (2) between the throttle body and charge air pipe.

  Parts: Gasket



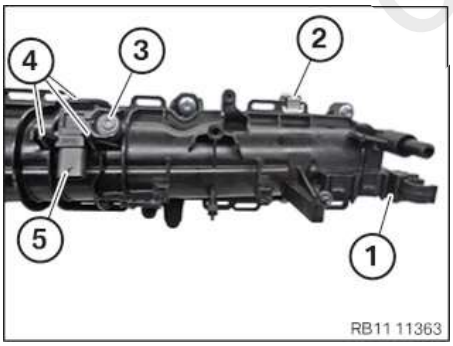
- Feed in and install the throttle body (1).
- Tighten screws (arrows).

Throttle body to intake plenum

6x50		Tightening torque	7 Nm



- Clean the charging pressure sensor, replace, if applicable.
- Check the sealing ring (1) for damage and renew where required.
- Lightly coat the sealing ring (1) on the charging pressure sensor with lubricant for the installation.



- Insert and install the charging pressure sensor (5).
- Lock the locks (4).

  The locks (4) must engage audibly.
- Tighten down screw (3).

Charging pressure sensor to intake plenum

TS6X20		Tightening torque	5 Nm

- Feed in and install the clamp (2).
- Insert and install the holder (1).

19 – Version 2: Clean intake plenum with the universal cleaner.

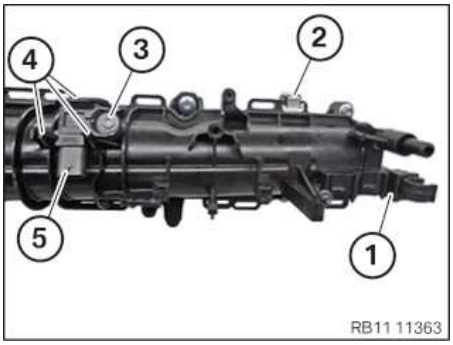
CAUTION

Materials harmful to health.

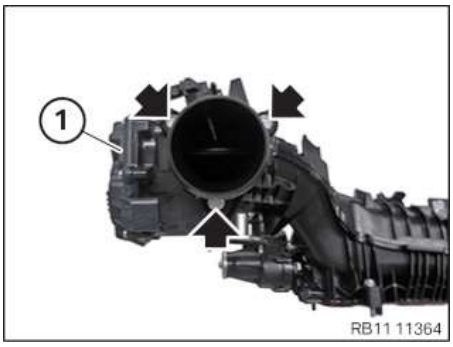
Contact with fluids harmful to health!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.

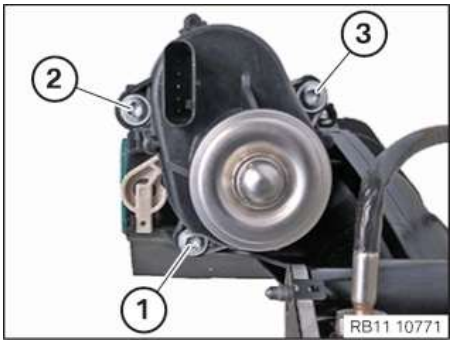
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- Guide out and remove holder (1).
- Feed out and remove the clamp (2).
- Loosen screw (3).
- Unlock the locks (4).
- Remove the charging pressure sensor (5).



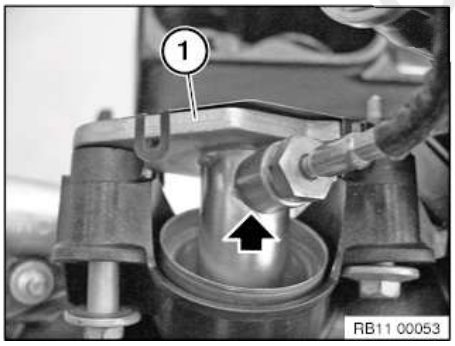
- Remove screws (arrows).
- Remove the throttle bodies (1).



- Loosen screws (1) to (3).

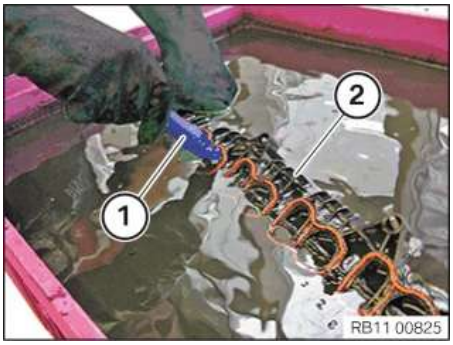


- Detach the swirl-flap controller with a suitable tool.



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

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NOTICE

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

- Mix the cleaning agent in a large collecting vessel.

Cleaning agent

Universal cleaner must be diluted with water.	
Washer fluid	2 parts water, 1 part universal cleaner
Expendable materials: Universal cleaner	

- Place the intake system (2) into the collecting vessel.

Cleaning the intake plenum

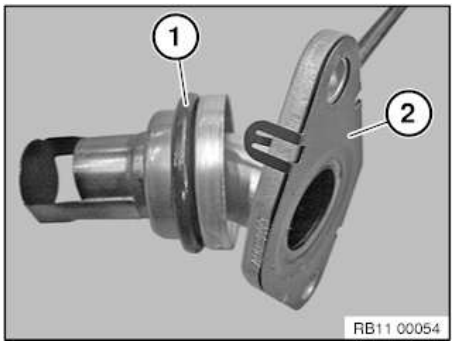
Soaking time of the cleaning agent	1 h

- Clean the intake system (2) with the brushes (1).

Care product

Wheel rim brushes	1x, Set	83192298237

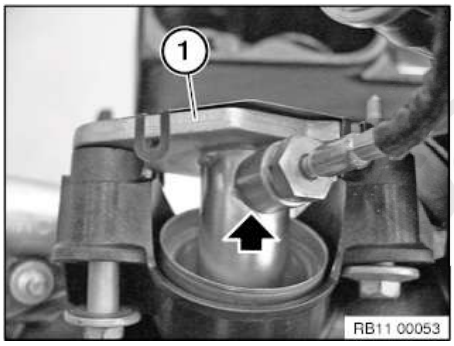
- Then rinse the intake system (2) with water.



- Renew O-ring (1).

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

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

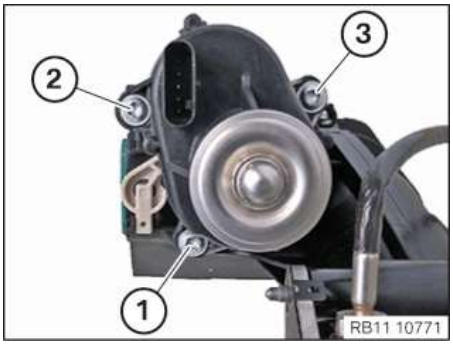


- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).



- Position the swirl-flap controller.
- Engage the drive arm of the swirl-flap controller in the adjustment lever of the intake plenum.

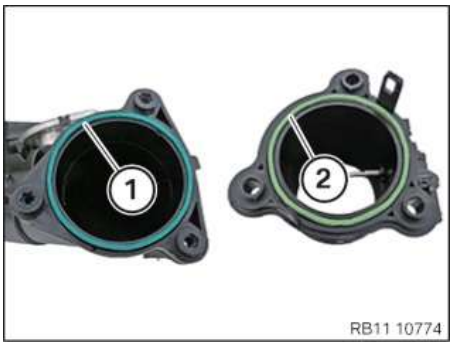
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- Tighten screws in the order (1) to (3).

Swirl-flap controller to intake plenum

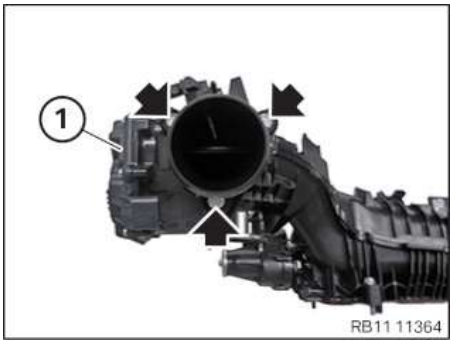
M6 x 16	Tighten the bolts in alternating order until flush.	4 Nm



- Renew the seal (1) between the intake system and the throttle body.

  Parts: Gasket
- Renew the seal (2) between the throttle body and charge air pipe.

  Parts: Gasket



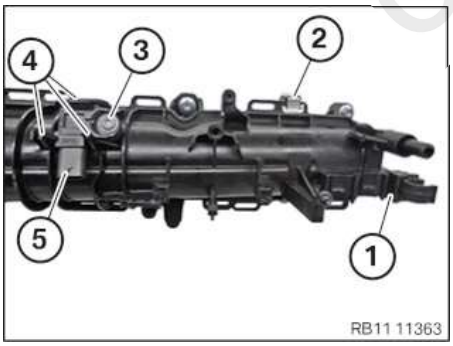
- Feed in and install the throttle body (1).
- Tighten screws (arrows).

Throttle body to intake plenum

6x50		Tightening torque	7 Nm



- Clean the charging pressure sensor, replace, if applicable.
- Check the sealing ring (1) for damage and renew where required.
- Lightly coat the sealing ring (1) on the charging pressure sensor with lubricant for the installation.



- Insert and install the charging pressure sensor (5).
- Lock the locks (4).

  The locks (4) must engage audibly.
- Tighten down screw (3).

Charging pressure sensor to intake plenum

TS6X20		Tightening torque	5 Nm

- Feed in and install the clamp (2).
- Insert and install the holder (1).

20 – Turn the piston to top dead centre

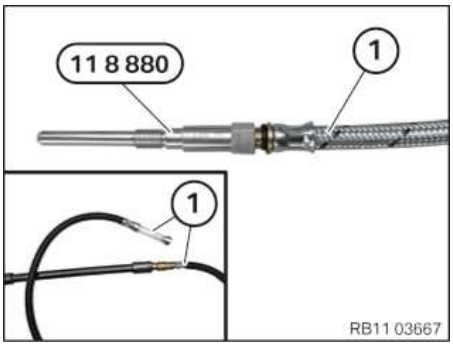
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RISK OF DAMAGE

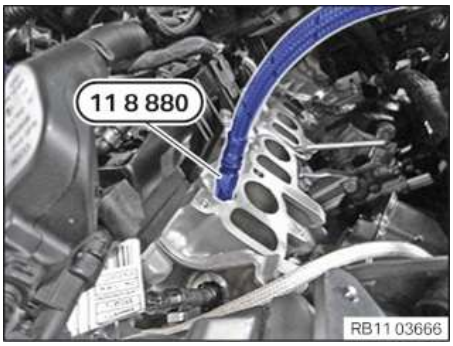
Contaminant or foreign body.

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.



- Connect OT gauge (1) from the set of special tools with special tool 0 496 146 (11 8 880).



- Install special tool 0 496 146 (11 8 880) in place of glow element.

▸ **Turning the engine by hand**



- Fit special tool 0 493 380 (11 6 480).

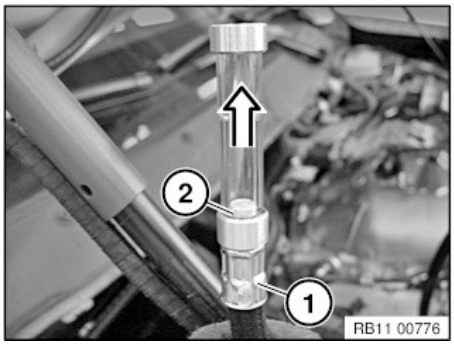
RISK OF DAMAGE

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.

- Turn the engine by hand using special tool 0 493 380 (11 6 480).



- Turn the engine by hand.
- When the piston moves up, the journal (2) in the special tool (1) also moves up.
- In the top dead centre, the piston and also the journal (2) are positioned at the highest point in the special tool (1).
- Turn the piston to the top dead centre.
- After that, the engine must not be rotated further.

» The valves are now closed.

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RISK OF DAMAGE

Engine damage due to walnut granules in the combustion chamber.

If walnut granules penetrate the combustion chamber while cleaning the intake ports, engine damage may occur.

- Always clean the intake port with valves of the relevant cylinder closed.
- Set the piston of the relevant cylinder to the top dead centre.
- If walnut granules have entered the combustion chamber: Do **not** turn or start the engine by hand. Disassemble the cylinder head and clean all components.

- Engine must not be rotated further.
- The intake valves (1) must be closed while cleaning.

21 – Cleaning intake ports

CAUTION

Swirling dirt particles caused by compressed air.

Danger of injury!

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

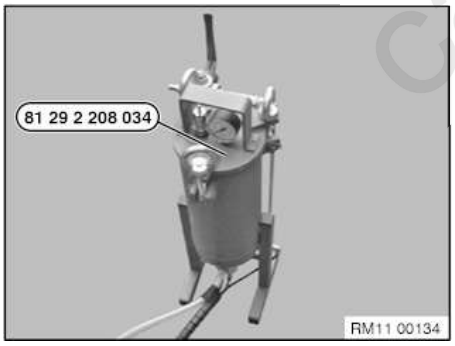
- Wear safety goggles.

RISK OF DAMAGE

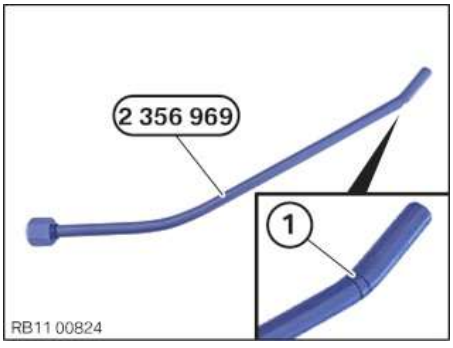
Engine damage due to walnut granules in the combustion chamber.

If walnut granules penetrate the combustion chamber while cleaning the intake ports, engine damage may occur.

- Always clean the intake port with valves of the relevant cylinder closed.
- Set the piston of the relevant cylinder to the top dead centre.
- If walnut granules have entered the combustion chamber: Do **not** turn or start the engine by hand. Disassemble the cylinder head and clean all components.



- Keep the special tool 2 208 034, the walnut granules and a vacuum cleaner ready.



- Have the special tool 2 356 969 ready.

TECHNICAL INFORMATION

The front area of the blasting wand is marked with two notches. These may additionally be highlighted in colour.

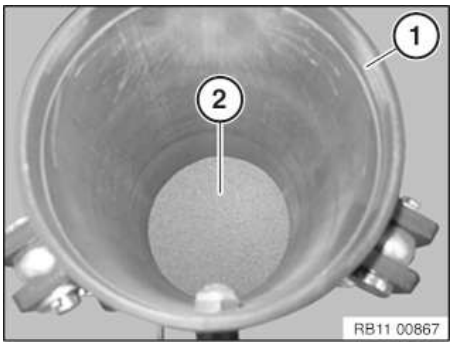
During the blasting process, only pull the blasting wand out of the vacuum adapter until the mark becomes visible.

- Observe the mark (1).

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- Stage special tools 2 356 966 and 2 356 967.

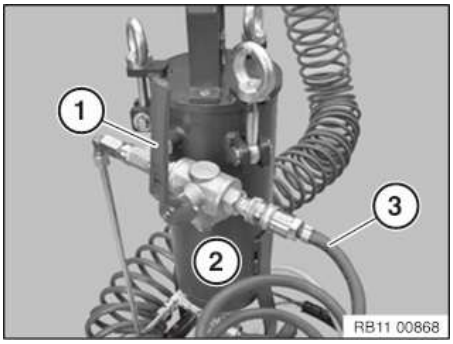


- Open blasting device (1).
- Fill in walnut granules (2).

Walnut granules

Quantity for each blasting process	2 l

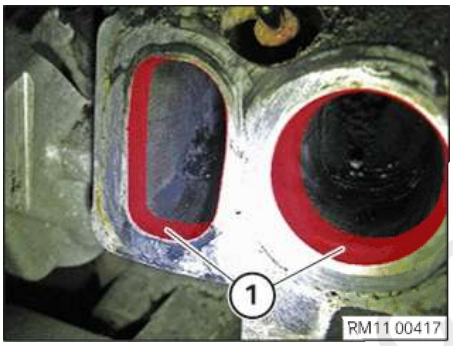
- Close blasting device (1).



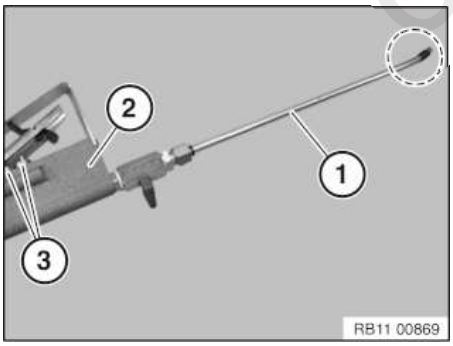
- Close the valve (1) on the blasting device (2).
- Connect compressed air (3).

Cleaning the intake ports

Operating pressure	6 bar ... 8 bar



- Clean marked areas (1) with a brush.

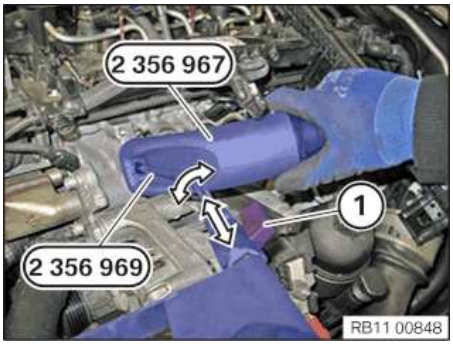


- Attach the blasting wand (2) to the blasting device (1).



- Connect the special tool 2 356 967 to a vacuum cleaner.
- Insert the special tool 2 356 967 into the swirl port of cylinder 1.

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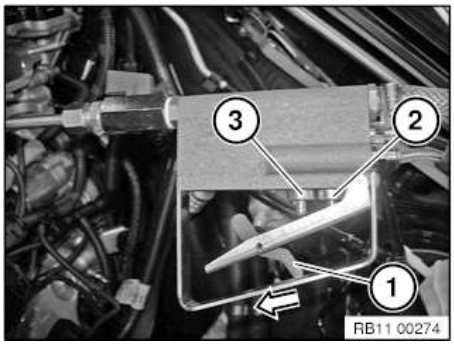


TECHNICAL INFORMATION

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

- Insert the special tool 2 356 969 into the special tool 2 356 967.
- Open the valve (1).
- Move the blasting wand forwards and backwards and rotate.

  This removes any dirt in the tangential port.



- Slide the locking lever (1) forward in the direction of the arrow.
- To release the compressed air: Actuate valve (2).
- To release the walnut granules and the compressed air: Actuate the valves (2) and (3).
- Clean the swirl port.

Cleaning the intake ports

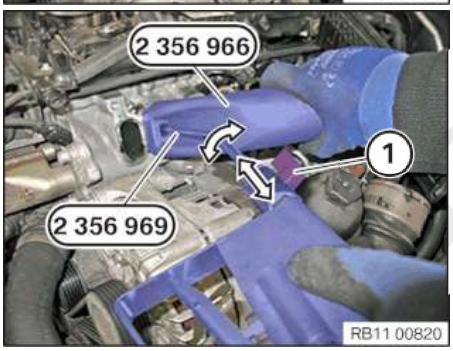
Blast duration with walnut granules	Approx. 20 s
Blast duration with pure compressed air for the complete blowing out of walnut granules	Approx. 10 s

- Close the valve on the blasting wand.

» Check the pressure drop at the pressure measuring device.



- Connect the special tool 2 356 967 to a vacuum cleaner.
- Insert the special tool 2 356 967 into the swirl port of cylinder 1.

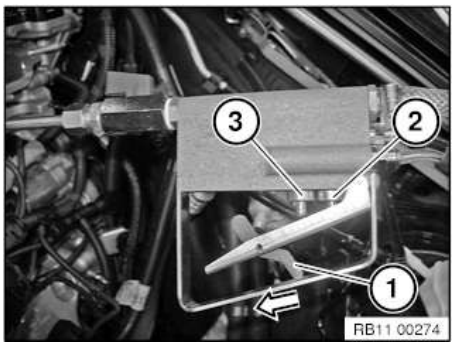


TECHNICAL INFORMATION

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

- Insert the special tool 2 356 969 into the special tool 2 356 967.
- Open the valve (1).
- Move the blasting wand forwards and backwards and rotate.

  This removes any dirt in the swirl port.



- Slide the locking lever (1) forward in the direction of the arrow.
- To release the compressed air: Actuate valve (2).
- To release the walnut granules and the compressed air: Actuate valves (1) and (2).
- Clean the swirl port.

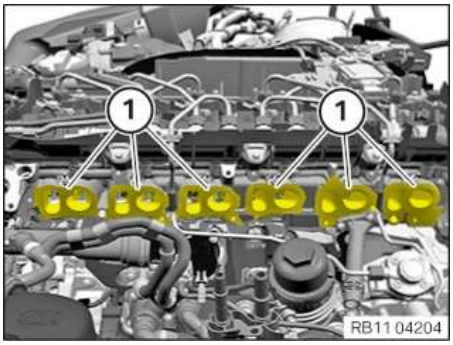
Cleaning the intake ports

Blast duration with walnut granules	Approx. 20 s
Blast duration with pure compressed air for the complete blowing out of walnut granules	Approx. 10 s

- Close the valve on the blasting wand.

» Check the pressure drop at the pressure measuring device.

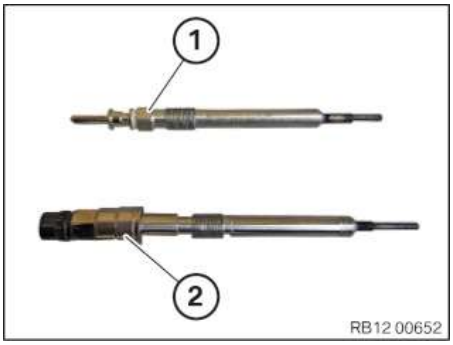
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- Carry out the following steps one after another on all the other cylinders (1):
  - Turn the piston to top dead centre
  - Clean the intake ports.

POSTPROCESSES

22 – Install all glow elements



TECHNICAL INFORMATION

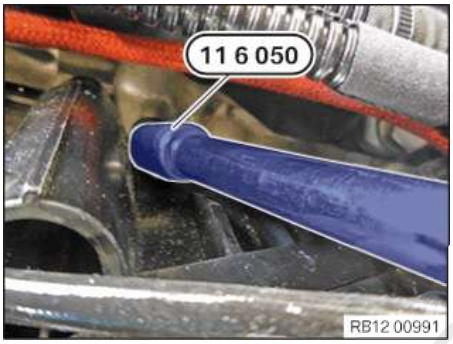
The combustion chamber pressure sensor can and is omitted from a technical point of view.

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**.



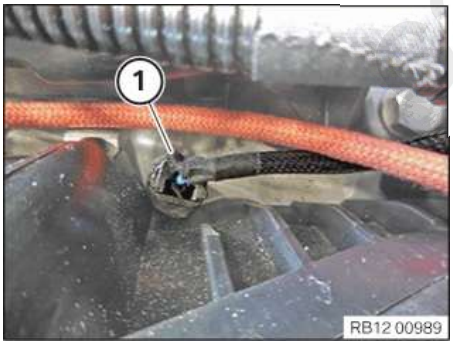
NOTICE

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

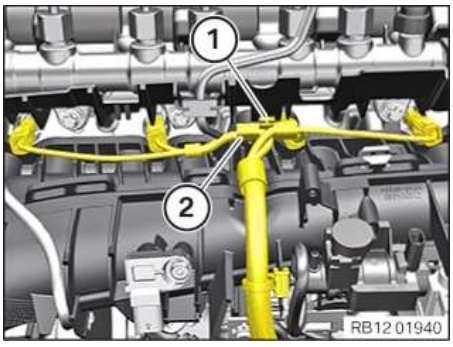


NOTICE

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).

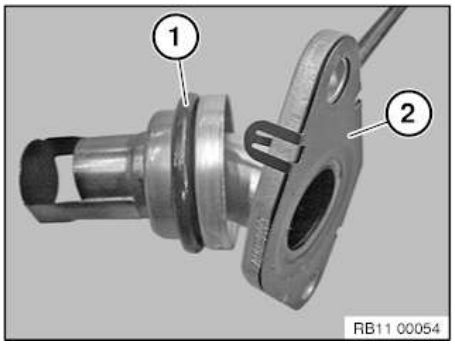
▸ **When replacing the glow element: Teach in glow elements if necessary**

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- Teach in glow elements with the diagnosis system.

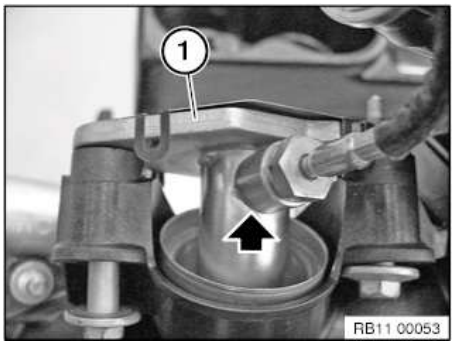
23 – Installing the intake plenum



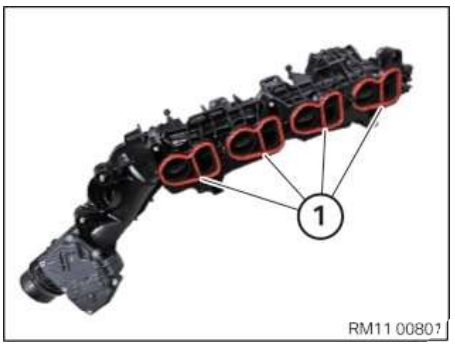
- Renew O-ring (1).

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

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

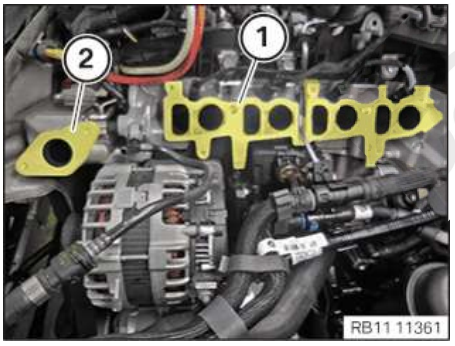


- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).

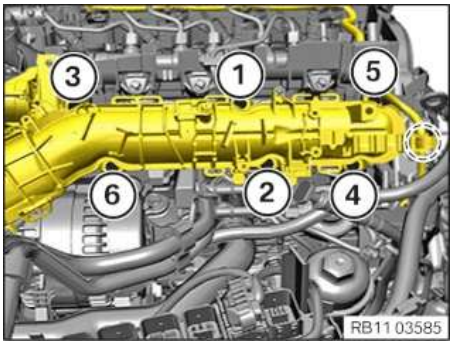


- Renew seals (1).

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



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



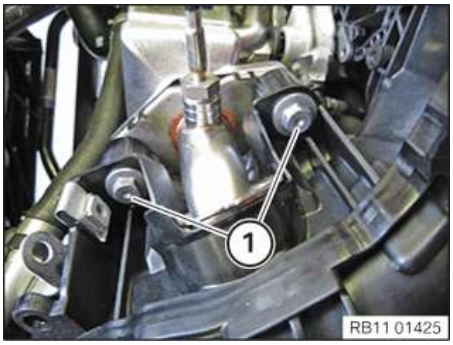
- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

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.

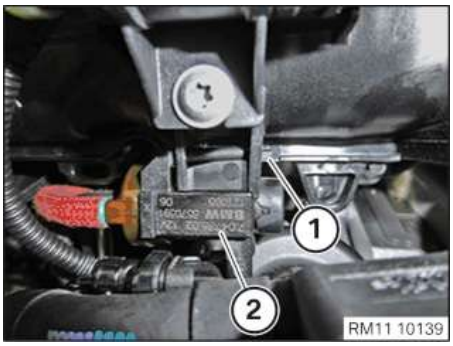
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- Tighten the screws (1).

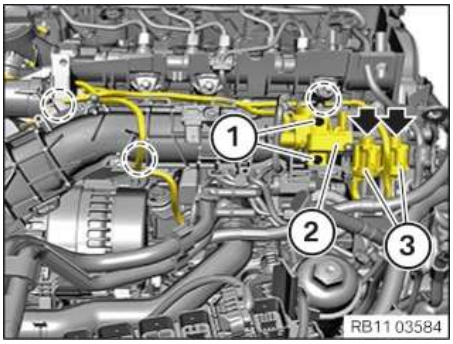
Exhaust-gas recirculation cooler to intake plenum

		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.

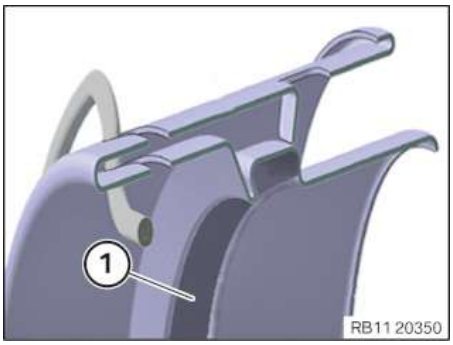


- Check the seal (1) for damage, and renew if necessary.

► **Replacing damaged seal**

TECHNICAL INFORMATION

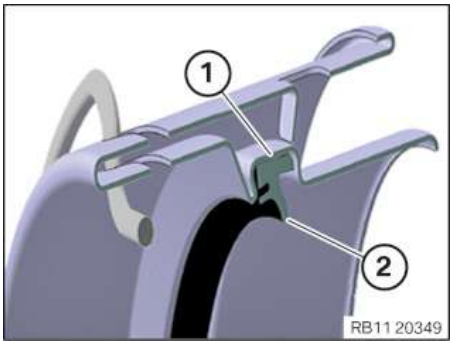
Do not use pointed or sharp-edged tools for the installation and/or removal.



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

  The gasket groove (1) must be clean.

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- 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.

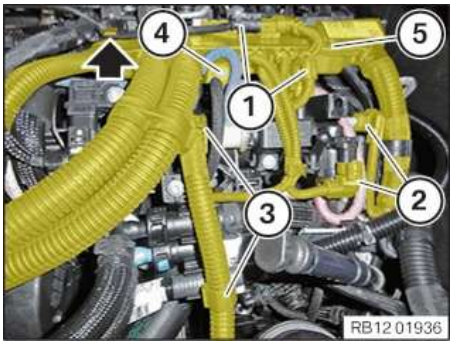
24 – Partially securing the wiring harness section on the intake plenum

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

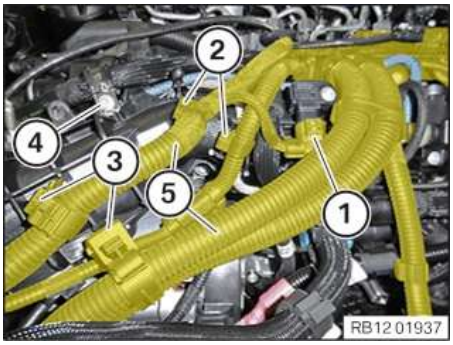
TS5x20		Tightening torque	3,6 Nm

- 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.

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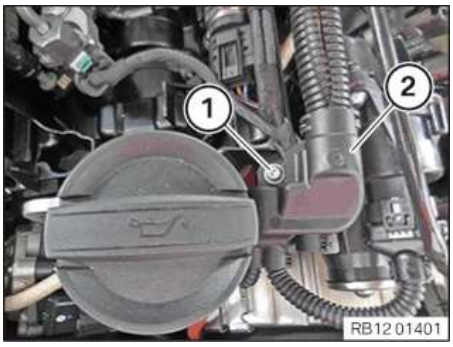
- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

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



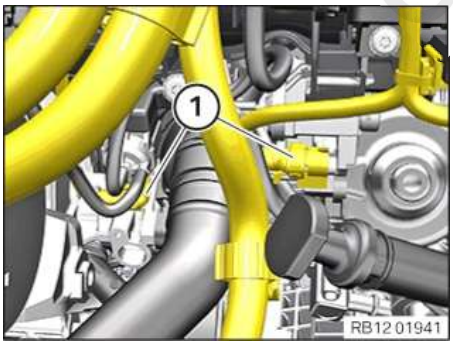
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



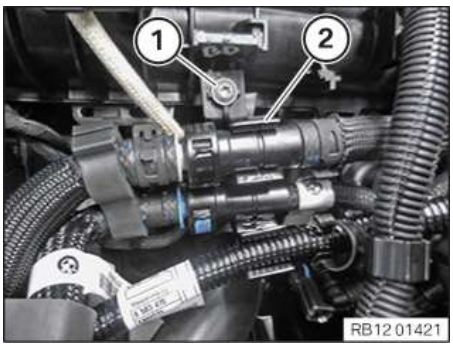
- Connect the connector (1) and lock it.

  The connector (1) must engage audibly.



- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.

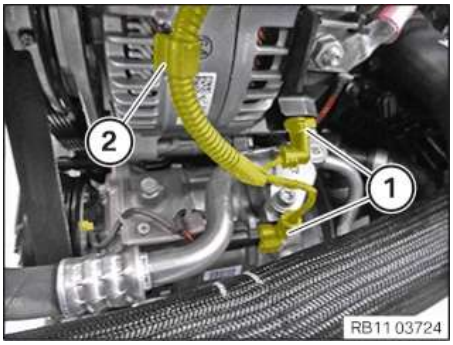


- Insert and install the holder (2).
- Tighten down screw (1).

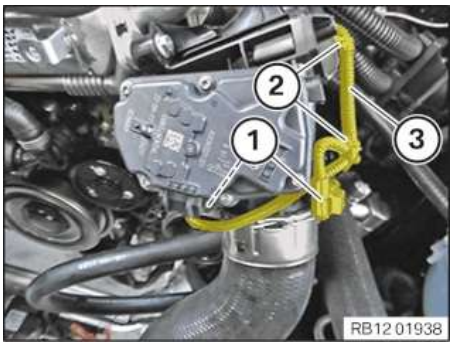
Holder on intake plenum

TS6X20		Tightening torque	5 Nm

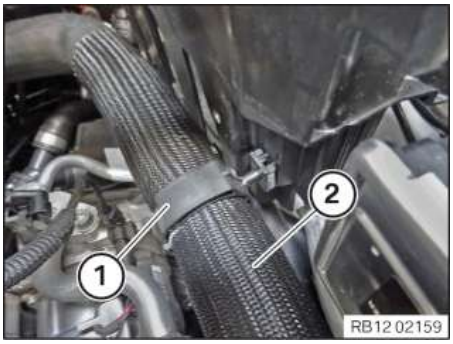
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- Connect the connector (1) and lock it.
  The connectors (1) must engage audibly.
- Secure holder (2) to alternator.



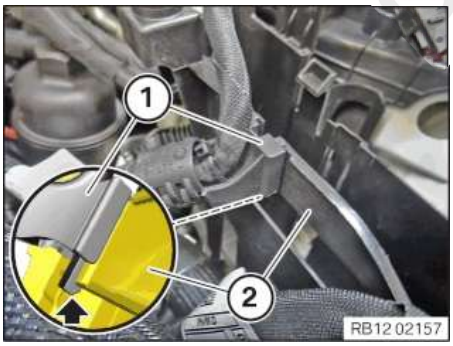
- Guide in the wiring harness section (3) and install.
- Secure clamps (2).
- Connect connectors (1) and lock.



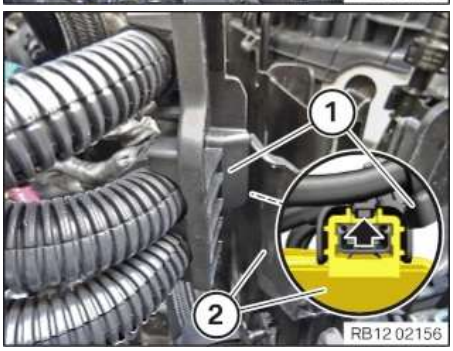
- Feed in and install coolant line (2).
- Lock holder (1).
  The holder (1) must engage audibly.



- Feed in and install the cable clip (1).
  Lock (arrow) must audibly engage.

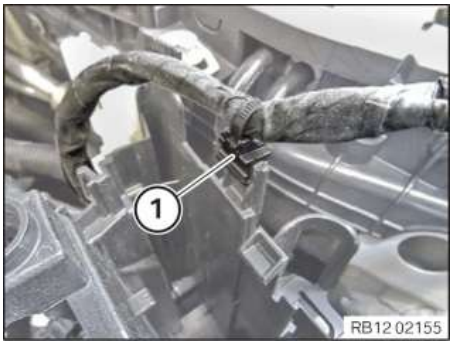


- Connect the cable clip (1) with the control unit holder (2) and lock it.
  Lock (arrow) must audibly engage.

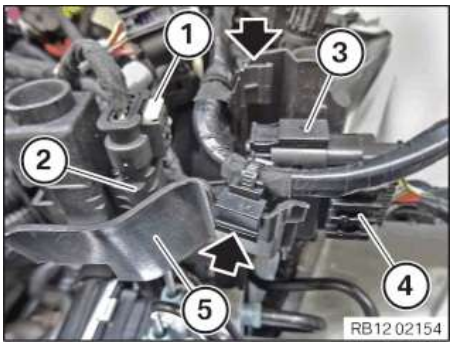


- Connect the cable clip (1) with the control unit holder (2) and lock it.
  Lock (arrow) must audibly engage.

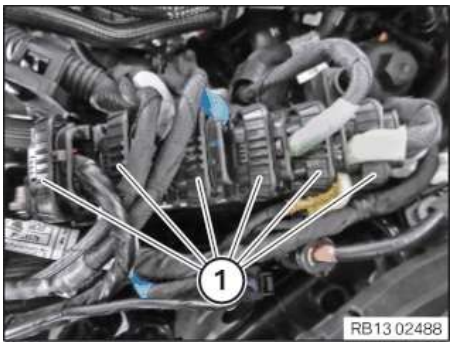
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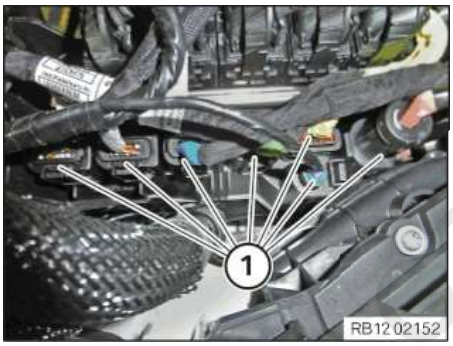
- Secure clamps (1).



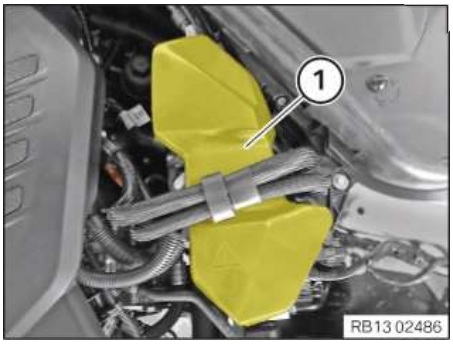
- Connect and lock the connector (4) with the control unit holder (5).
  The connector (4) must engage audibly.
- Connect connectors (3) and lock.
  The connector (3) must engage audibly.
- Connect and lock the connector (2) with the control unit holder (5).
  The connector (2) must engage audibly.
-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



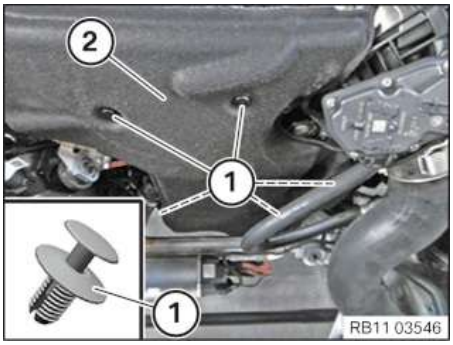
- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



- Insert and install cover (1) into guides.

25 – Install acoustic cover for the engine, front

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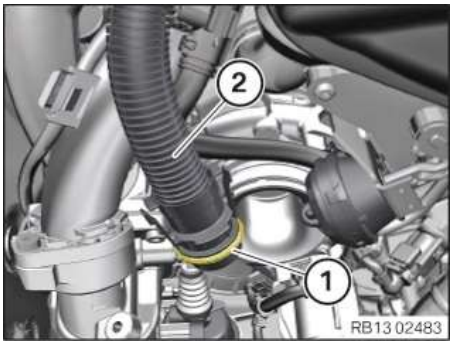


- Feed the acoustic cover (2) in and install.
- Secure the acoustic cover (2) with the expanding rivets (1).

26 – Installing the clean air pipe with resonator



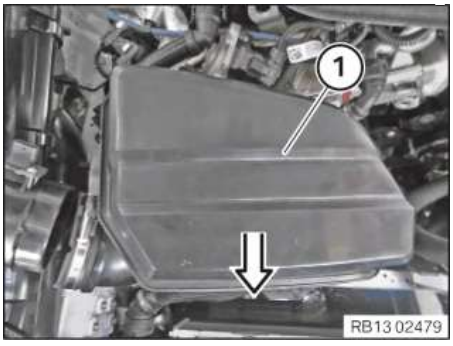
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



- 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.



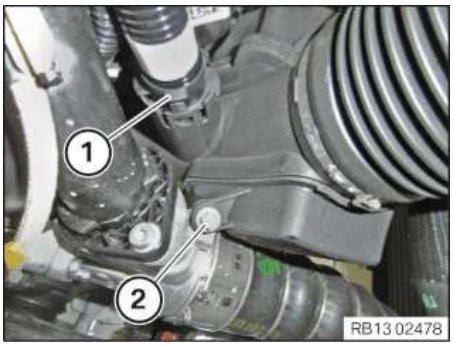
- Press and hold clean air pipe with resonator (1) in the direction of the arrow.

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- Attach and lock the clamp (1).

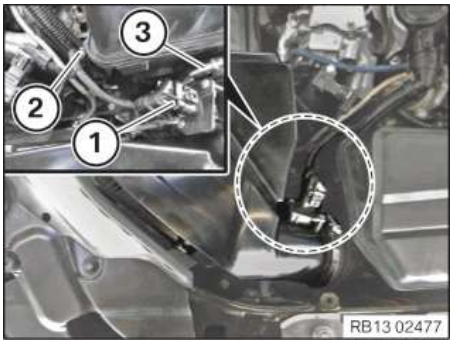
  The clamp (1) must engage audibly.



- 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).

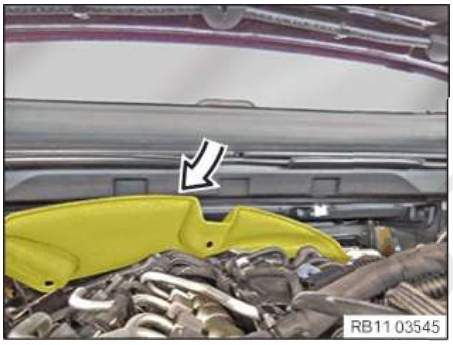
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

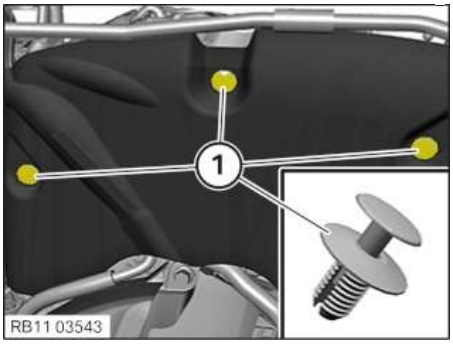
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

27 – Installing acoustic cover at rear



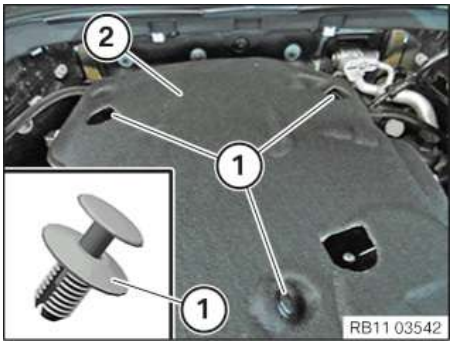
- Guide in the acoustic cover in the direction of the arrow and install it.



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

28 – Install the acoustic cover for the injectors

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

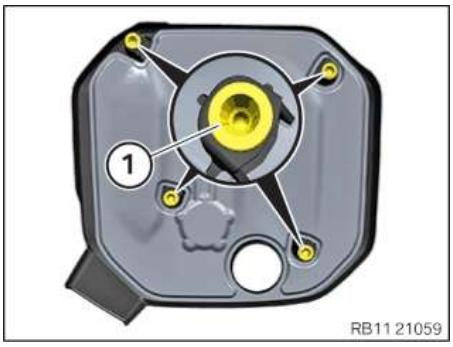
29 – Install acoustic cover

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.

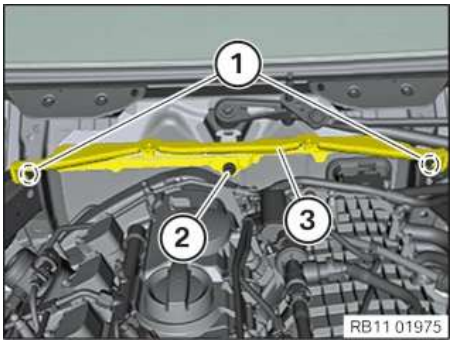


- Check the acoustic cover for correct fit of the rubber mounts (1).



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

30 – Installing centre bulkhead lower section



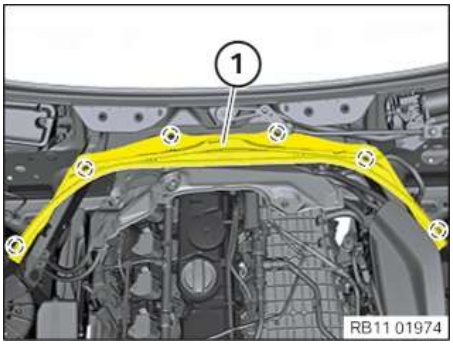
- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

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

31 – Installing the centre bulkhead upper part

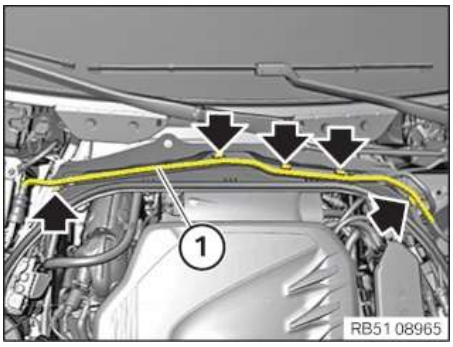
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- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

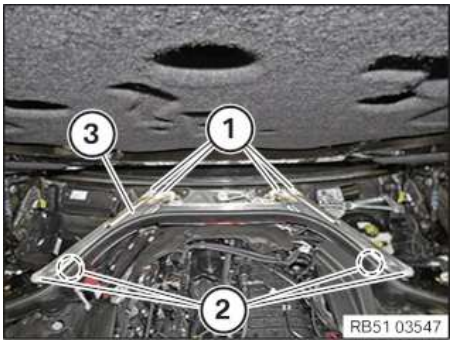
Bulkhead upper part to bottom bulkhead

	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 °

32 – 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.

33 – Installing cowl panel cover

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RISK OF DAMAGE

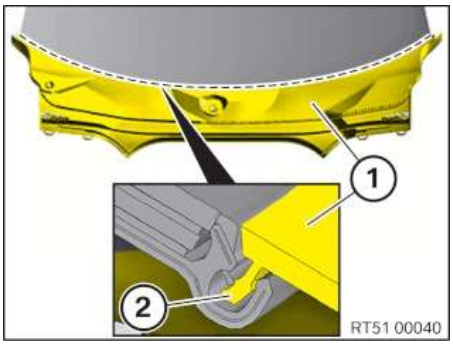
Damage caused by water ingress into the vehicle.

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

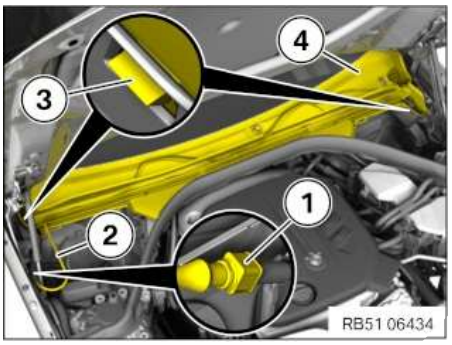
- Ensure correct installation of the components.
- Only use undamaged components.

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.

34 – Install left and right wiper arm

NOTICE

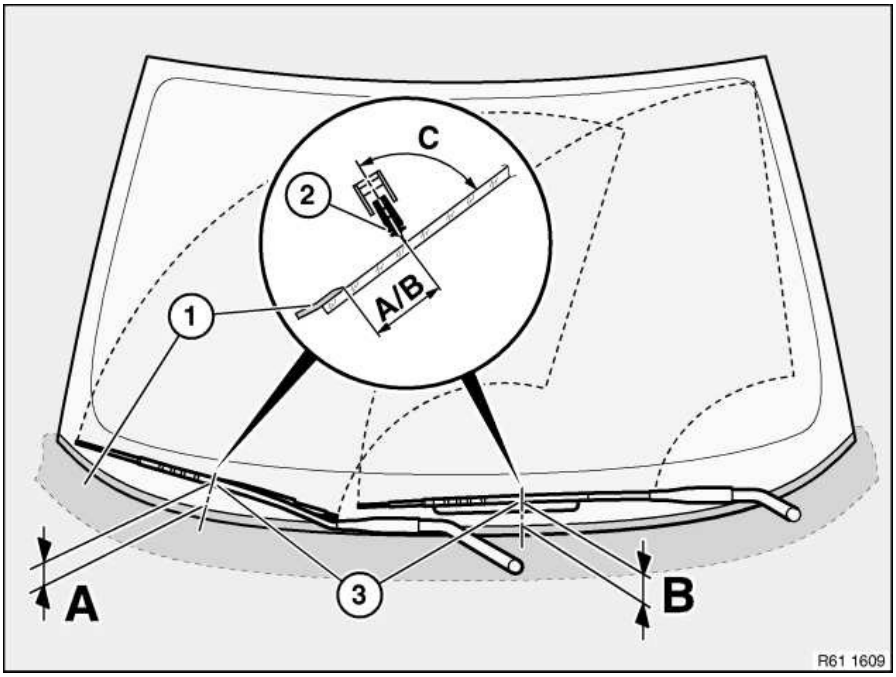
Description is for left component only. Procedure on the right side is identical.

▸ **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.

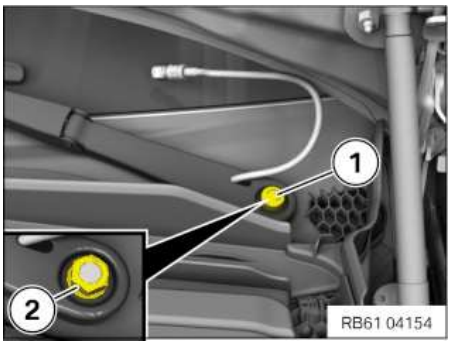
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- Connect the wiper arm (3).
- Correctly position the wiper arm (2) in relation to the window edge (1).

Distance from window pane edge to wiper blade

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

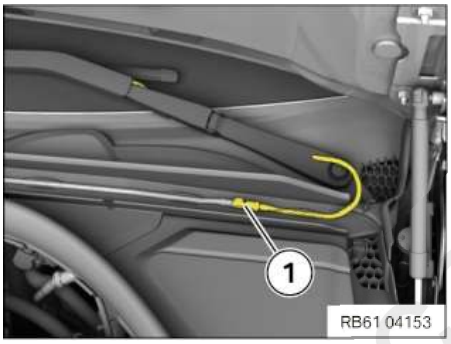


- Tighten nut (2).

Windscreen wiper arm

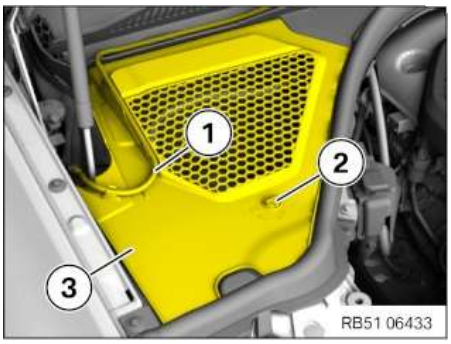
Combination hexagon nut		Tightening torque	35 Nm

- Connect the protective cap (1).



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

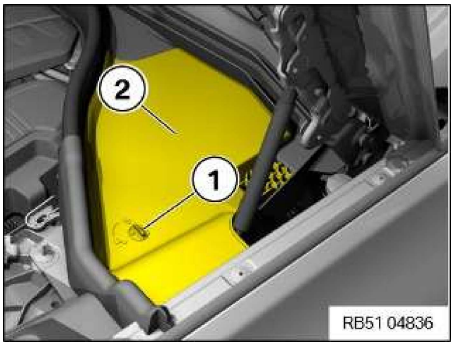
35 – Install the rear right engine compartment cover



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

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

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

37 – Connecting all battery earth leads



- See additional information.

38 – Delete adaptations



- Connect diagnosis system.
  - Power train
  - Digital diesel electronics (DDE)
  - Reset adaptations
  - Delete adaptations

39 – Checking the coolant level and coolant composition

- Check the connections, hose clamps and hoses for coolant residues and damage such as e.g. cracks.
- Check coolant composition in all coolant expansion tanks.

Expendable materials

Technically suitable antifreeze and corrosion inhibitor	

Main group 17

Check

- Check the coolant level in both coolant expansion tanks.

  The filling level in the coolant expansion tank must be between the minimum and maximum mark.
- Inform customer in event of incorrect fluid level and, if necessary, troubleshoot (charged separately).

Result

» Coolant level below the minimum mark.

» Coolant level above the maximum mark.

Measure

- Adjust filling level in the coolant expansion tank to the desired filling level.

  The according amount of coolant must be supplemented or drawn off.

40 – Take bonnet out of the service position

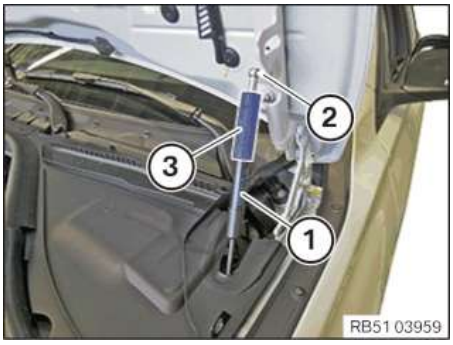
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CAUTION

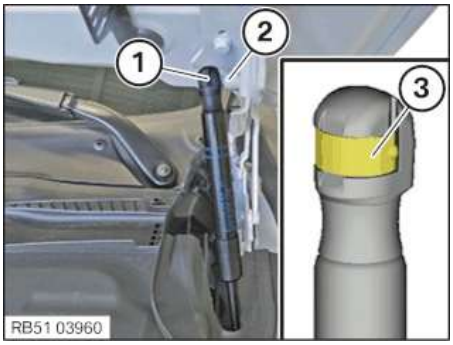
Shutting bonnet or tailgate.

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

Swirl-flap controller to intake plenum			Used in step 1819
M6 x 16	Tighten the bolts in alternating order until flush.		4 Nm

Throttle body to intake plenum			Used in step 1819
6x50		Tightening torque	7 Nm

Charging pressure sensor to intake plenum			Used in step 1819
TS6X20		Tightening torque	5 Nm

Glow elements to cylinder head			Used in step 22
Glow element		Tightening torque	13 Nm

Intake plenum to cylinder head			Used in step 23
M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum			Used in step 23
		Tightening torque	10 Nm

Electric changeover valve to intake plenum			Used in step 23
TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold			Used in step 24
TS5x20		Tightening torque	3,6 Nm

Standard screw connection 4 Nm			Used in step 24
Oval-head screw		Tightening torque	4 Nm

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Wiring harness section to cylinder head cover			Used in step 24
TS5x20		Tightening torque	3,6 Nm

Holder on intake plenum			Used in step 24
TS6X20		Tightening torque	5 Nm

Clean air pipe to exhaust turbocharger			Used in step 26
M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing			Used in step 26
Clamp		Tightening torque	3 Nm

Bulkhead lower part to body			Used in step 30
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead			Used in step 31
		Tightening torque	3 Nm

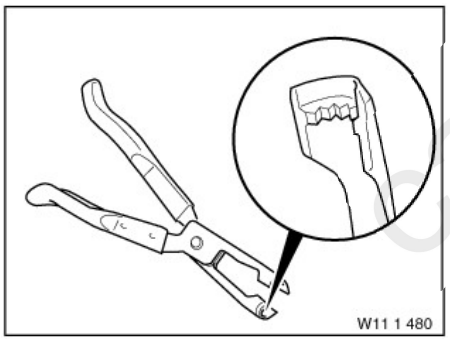
Tension strut on bulkhead			Used in step 31
M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome			Used in step 31
Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm			Used in step 34
Combination hexagon nut		Tightening torque	35 Nm

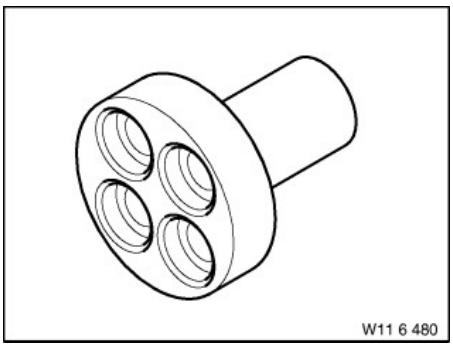
Overview of Special Tools

0 490 796 (11 1 480) Pliers



Common		Used in step 17
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)	

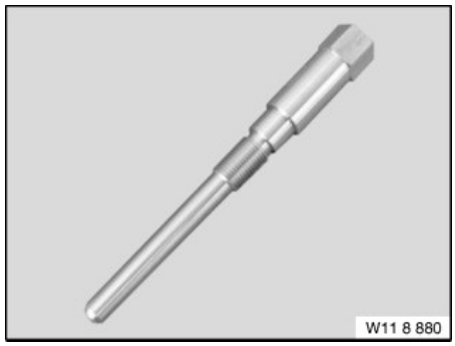
0 493 380 (11 6 480) Connector



Common		Used in step 20
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)	

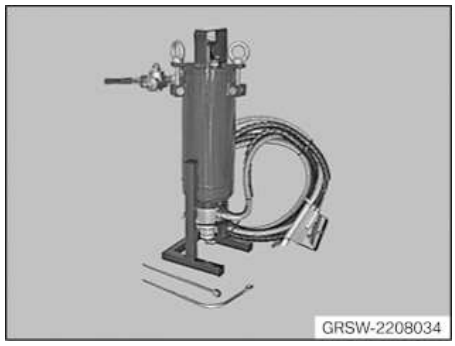
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0 496 146 (11 8 880) Adapter



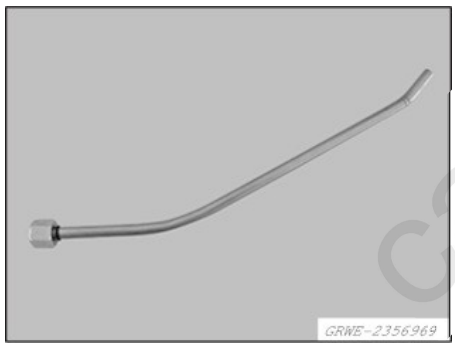
Common	Used in step 20
Usage	For compression testing.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

2 208 034 Blasting material device



Common	Used in step 21
Usage	For cleaning of the intake ports and the intake valves.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	

2 356 969 Beam probe



Common	Used in step 21
Usage	For cleaning of the intake ports and the intake valves.
Included in the tool or work	
Storage location	
Replaced by	
In connection with	Blasting tool 81292208034
SI-Number	08 25 13 (059)

2 356 966 Vacuum adapter



Common	Used in step 21
Usage	For cleaning of the intake ports and the intake valves.
Included in the tool or work	
Storage location	
Replaced by	
In connection with	2208034
SI-Number	08 25 13 (059)

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2 356 967 Vacuum adapter



Common	Used in step 21
Usage	For cleaning of the intake ports and the intake valves.
Included in the tool or work	
Storage location	
Replaced by	
In connection with	Blasting tool 81292208034
SI-Number	08 25 13 (059)

Overview Technical Data

Cleaning agent	Used in step 19
Universal cleaner must be diluted with water.	
Washer fluid	2 parts water, 1 part universal cleaner
Expendable materials: Universal cleaner	

Cleaning the intake plenum	Used in step 19
Soaking time of the cleaning agent	1 h

Walnut granules	Used in step 21
Quantity for each blasting process	2 l

Cleaning the intake ports	Used in step 21
Operating pressure	6 bar ... 8 bar

Cleaning the intake ports	Used in step 21
Blast duration with walnut granules	Approx. 20 s
Blast duration with pure compressed air for the complete blowing out of walnut granules	Approx. 10 s

Distance from window pane edge to wiper blade	Used in step 34
Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

Links

Functional descriptions	Used in step
Reset adaptations	38

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	237
61 20 900 Disconnecting and connecting battery earth lead	237
61 20 900 Disconnecting and connecting battery earth lead	237
61 20 900 Disconnecting and connecting battery earth lead	237
61 20 900 Disconnecting and connecting battery earth lead	237
61 20 900 Disconnecting and connecting battery earth lead	237
61 20 900 Disconnecting and connecting battery earth lead	237
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	237
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	237

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61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	237
61 20 900 Disconnecting and connecting battery earth lead	237
61 20 900 Disconnecting and connecting battery earth lead	237
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	237
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61 20 900 Disconnecting and connecting battery earth lead	237
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Operating materials	**Used in step**
1.0 Requirements made of engine coolant	
2.0 Change interval, coolant change and check, disposal, cleaning the cooling system	
3.0 Approved antifreeze and corrosion inhibitors for BMW, BMWi, MINI and Rolls-Royce	

Operating materials	**Used in step**

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Parts

Parts required

Designation	Used in step
Intake system seal to throttle body	18
Throttle body gasket to charge air pipe with integrated temperature sensor for intake air	18
Charging pressure sensor seal to intake system	18
Intake system seal to throttle body	19
Throttle body gasket to charge air pipe with integrated temperature sensor for intake air	19
Charging pressure sensor seal to intake system	19

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11 12 154 Disassemble and assemble cylinder head

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

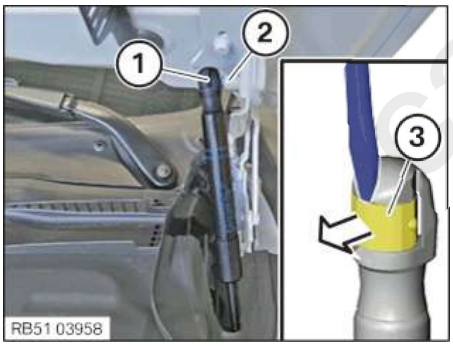
Engine compartment lid is open.

CAUTION

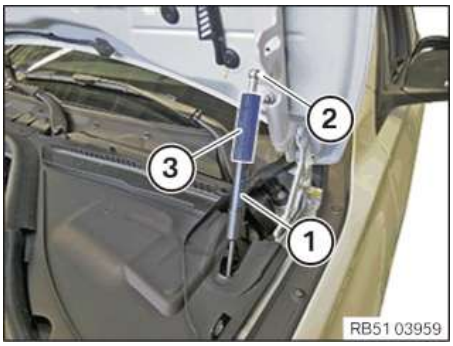
Shutting bonnet or tailgate.

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.



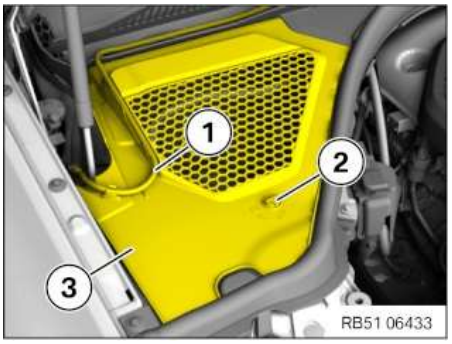
TECHNICAL INFORMATION

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.

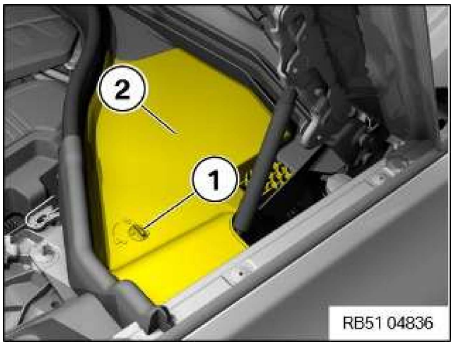
2 – Remove the cover of the rear right engine compartment

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- 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.

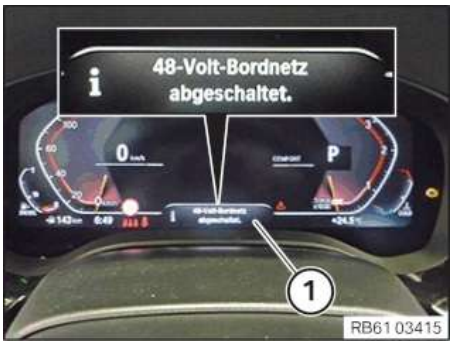
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- Deactivate the 48V electrical system by opening the bonnet.

  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.

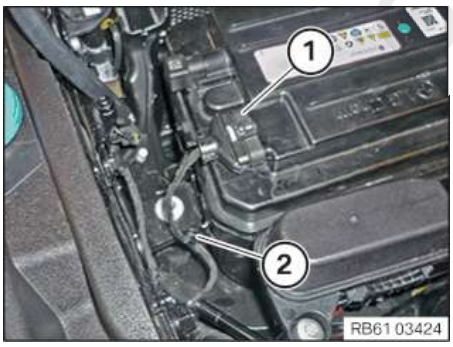
Result

» 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.

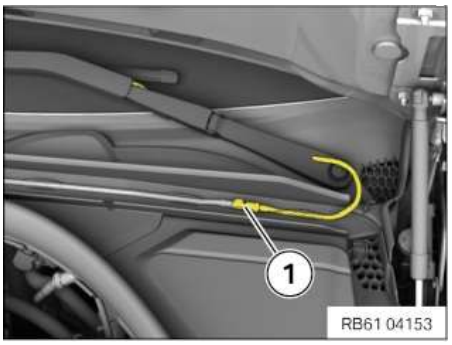
▸ **Remove the wiper arm**

RISK OF DAMAGE

Damage to wiper console.

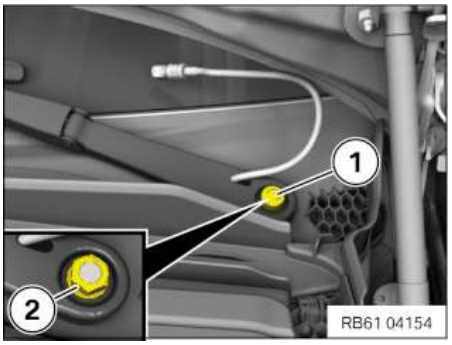
While removing the wiper arms without using special tool, the wiper console can break.

- 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.

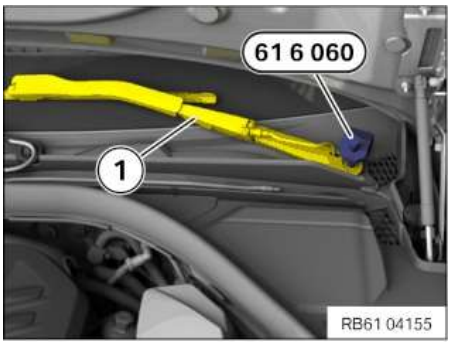


- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.

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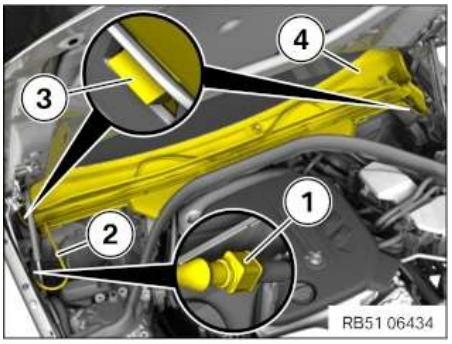


- Remove the protective cap (1).
- Loosen nut (2).

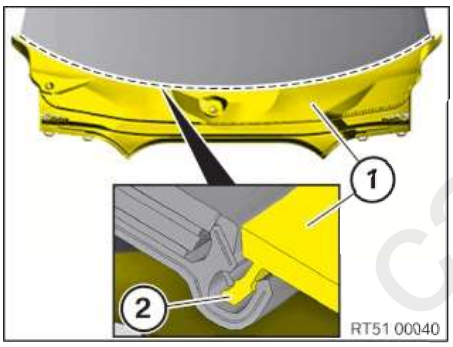


- Pull off the wiper arm (1) using special tool .

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



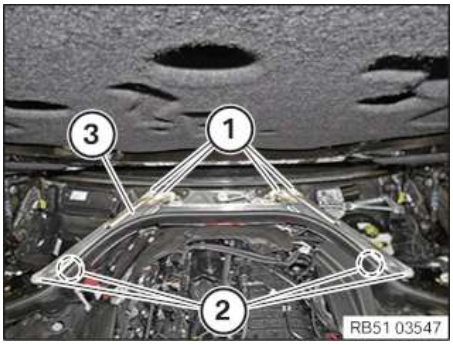
- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

9 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

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

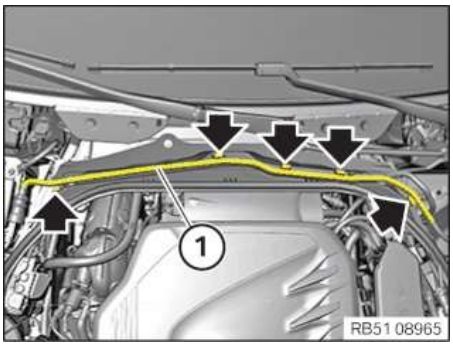
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NOTICE

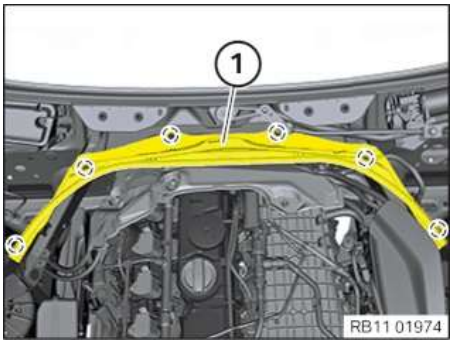
The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

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



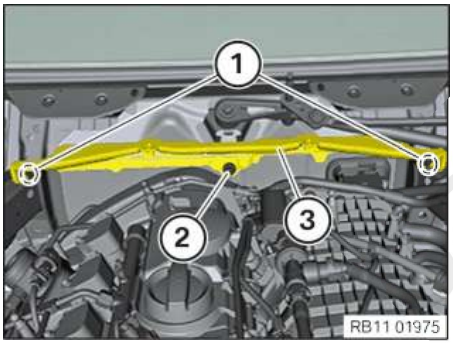
- **Version with mild hybrid technology:**

  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.

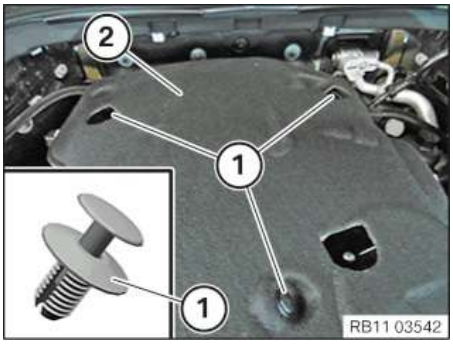
Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- 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.



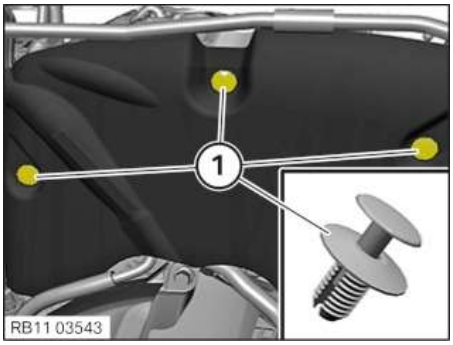
- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

12 – Remove the acoustic cover for the injectors

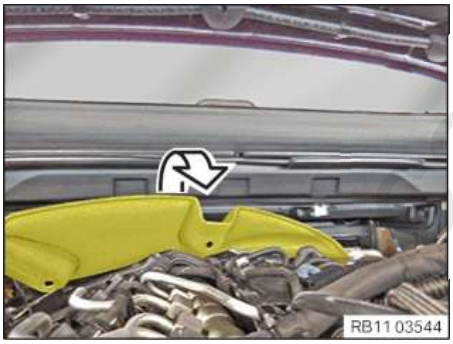


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

13 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).

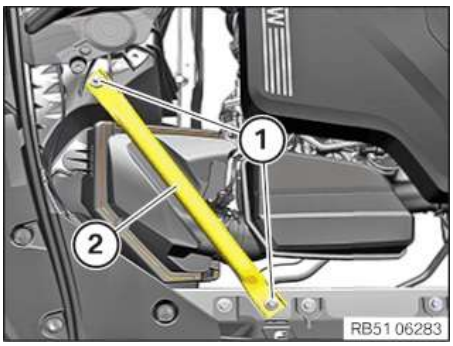


- Guide out and remove the acoustic cover in the direction of the arrow.

14 – Remove right front-end strut

TECHNICAL INFORMATION

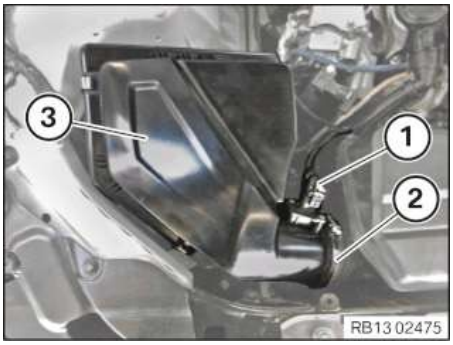
Driving without the strut brace/front-end strut or tension strut is not permitted.



- Loosen screws (1).
- Remove the front-end strut (2).

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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.

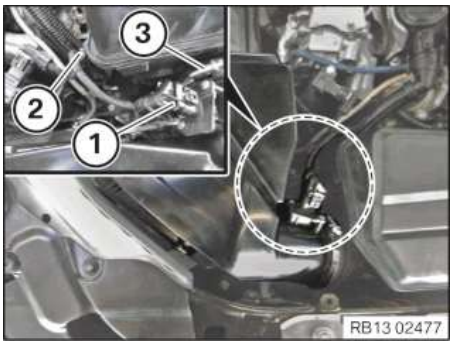
16 – Removing the clean air pipe with the resonator

WARNING

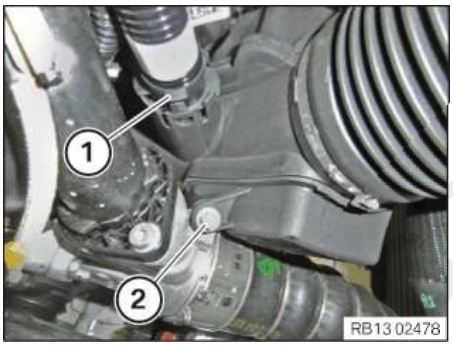
Hot surfaces.

Risk of burning!

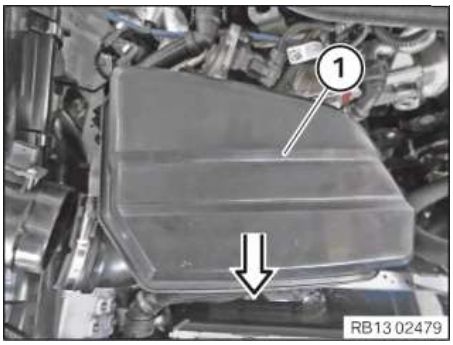
- Perform all work only on components that have cooled down.



- 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.

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- 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!

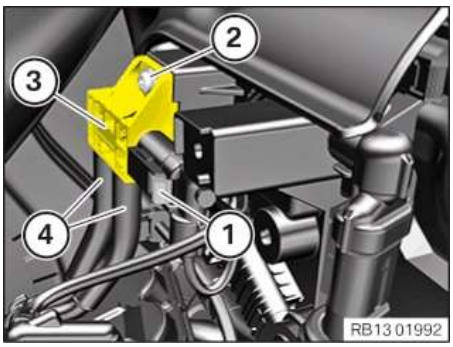
- Perform all work only on components that have cooled down.

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

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WARNING

Hot surfaces.

Risk of burning!

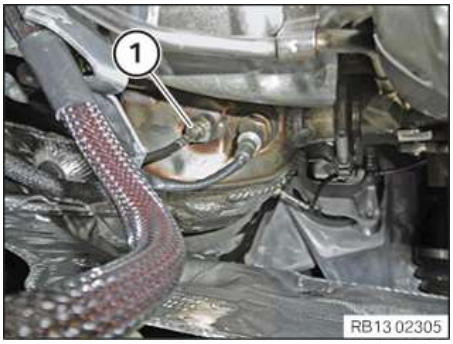
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

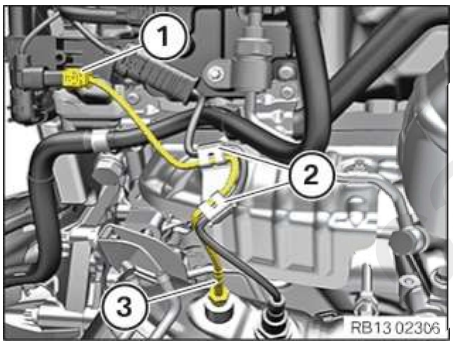
Electrostatic discharge.

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.

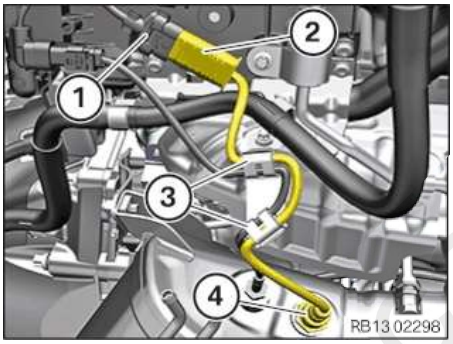
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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.

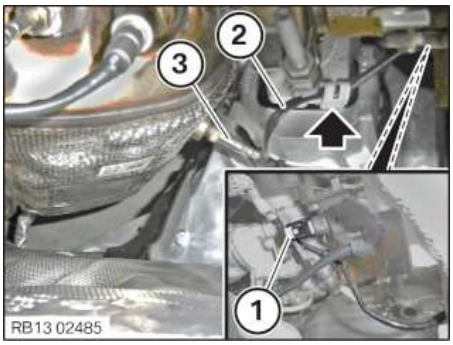
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RISK OF DAMAGE

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)

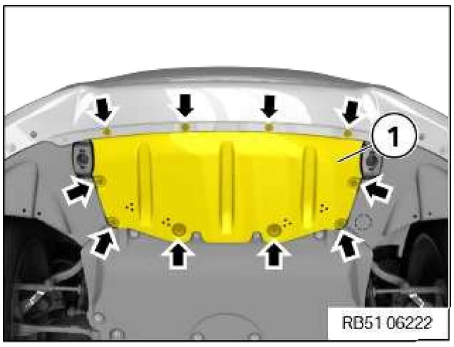


- Unlock plug connection (1) and disconnect.

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).

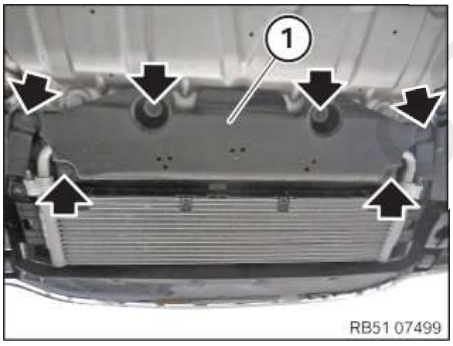
21 – Removing the front underbody protection



- **Version A:**

  Remove screws (arrows).

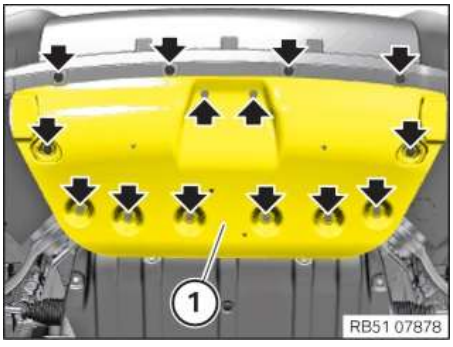
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version B:**

  Remove screws (arrows).

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

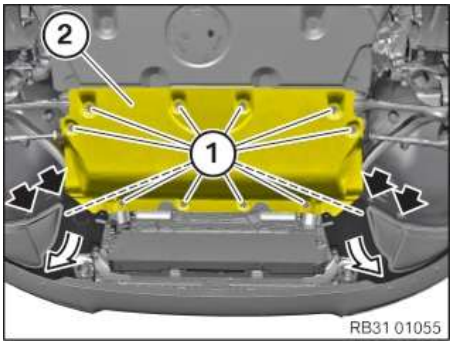


- **Version C:**

  Remove screws (arrows).

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

22 – Remove the underbody protection of the steering gear



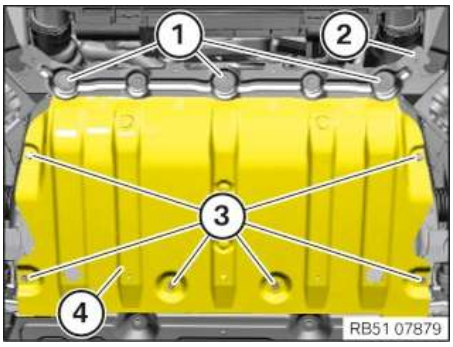
- **Version A:**

  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.

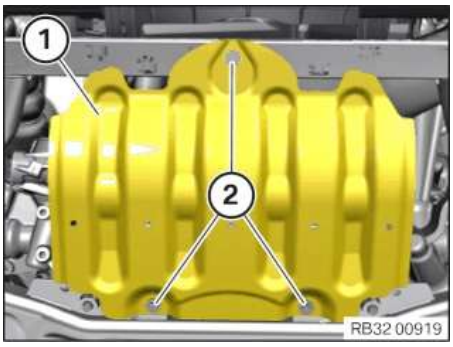
  Loosen screws (3).

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

23 – If installed: Removing the steering underbody protection

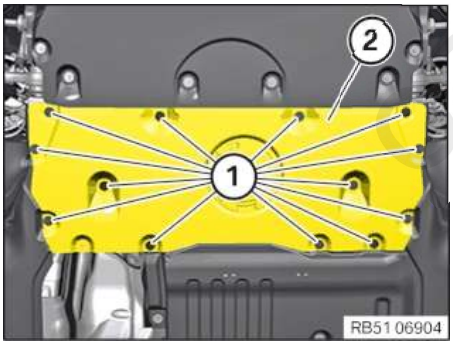
Prerequisite

Front underbody protection has been removed.



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

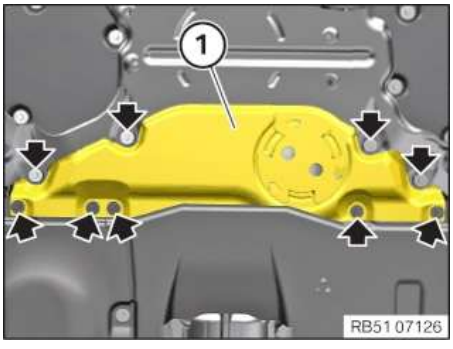
24 – Removing the centre underbody protection



- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .



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

  Remove screws (arrows).

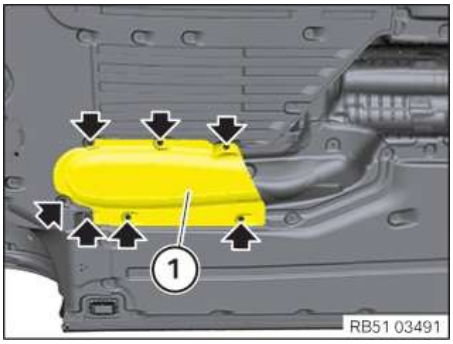
  Feed out and remove the centre underbody protection (1).

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

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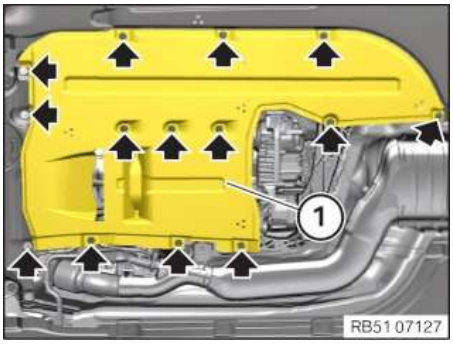
NOTICE

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).

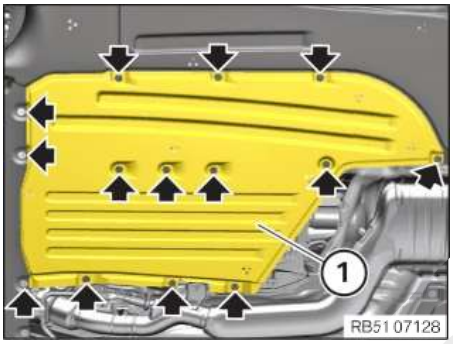
26 – Remove rear underbody protection



- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).

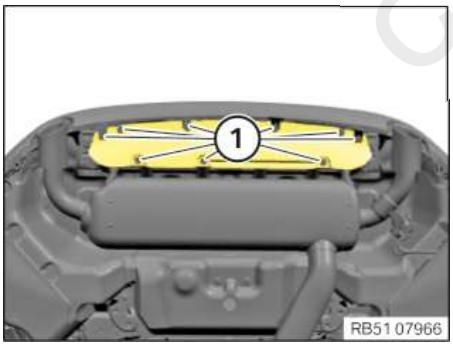


- **Version B:**

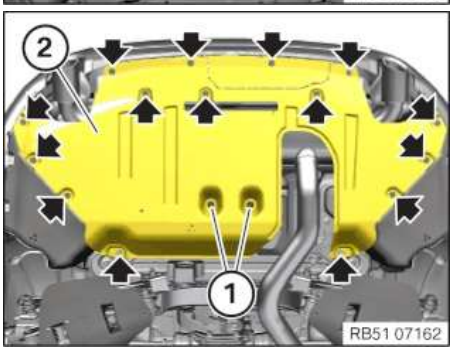
  Remove screws (arrows).

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

27 – Removing the rear diffuser



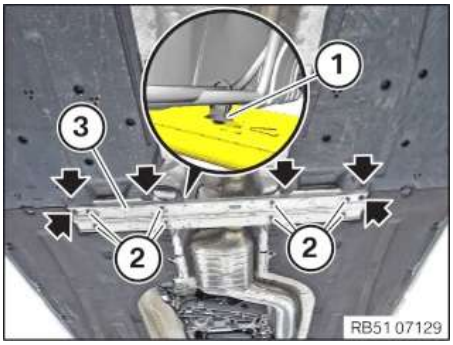
- **Version 1:**
- Release the screws and nuts (1).
- Remove the diffuser.



- **Version 2:**
- Loosen nuts (1).
- Remove screws (arrows).
- Guide out and remove rear diffuser (2).

28 – Remove the connecting support from the tunnel

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- 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!

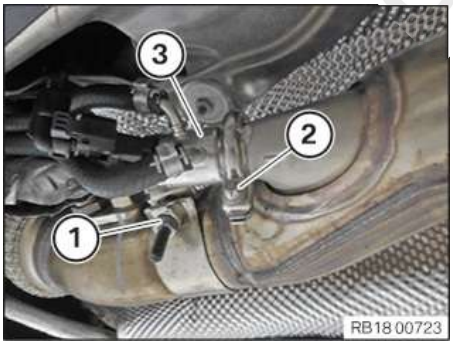
- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

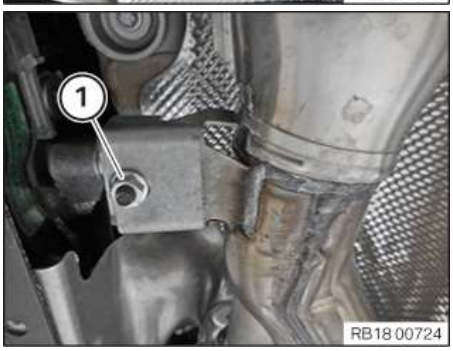
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

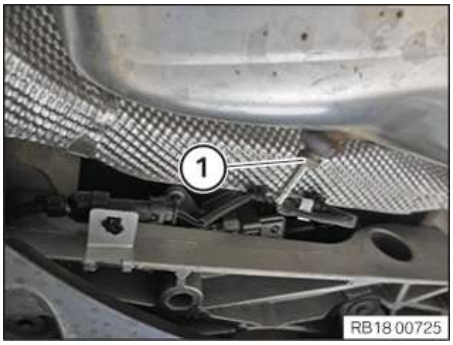


- Unfasten clamp (1).
- Detach the clamp (2) of the SCR metering module (3).
- Detach the SCR metering module (3)from the exhaust system and place to one side.

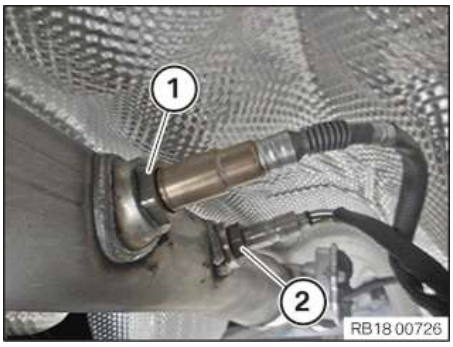


- Loosen nut (1).

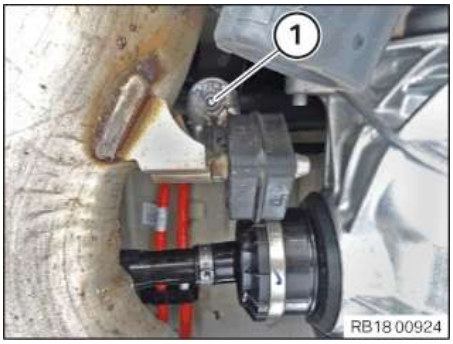
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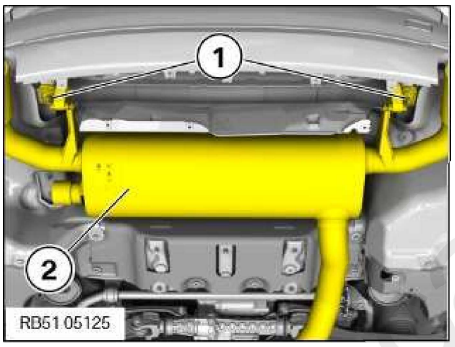
- Detach the exhaust temperature sensor (1) from the exhaust system.



- 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.

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RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

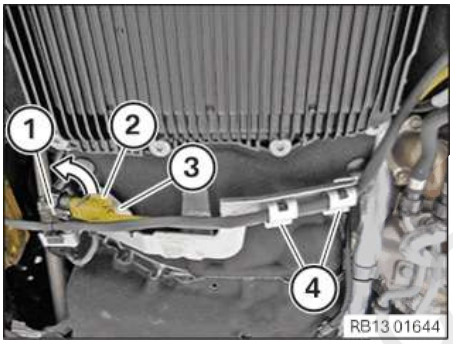
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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.

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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.

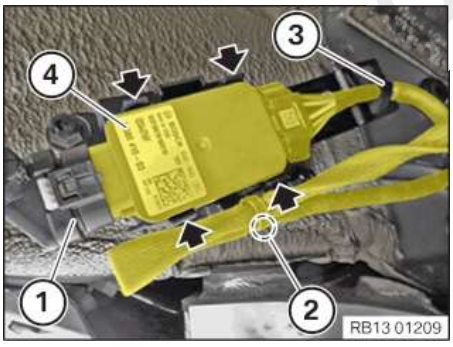
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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

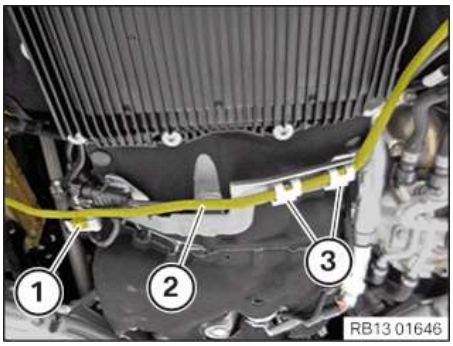
Damage to the nitrogen oxide sensor.

Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

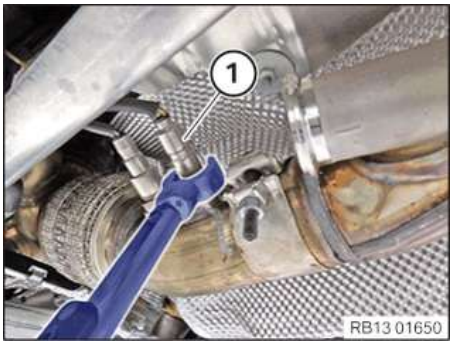
- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug 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.



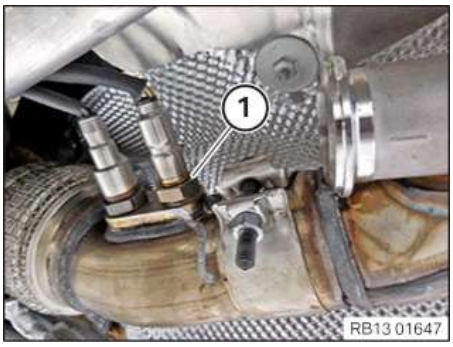
- Unlock plug connection (1) and disconnect.
- Release cable clip in area (2).
- Release line from the holder (3).
- Unclip control unit (4).



- 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!

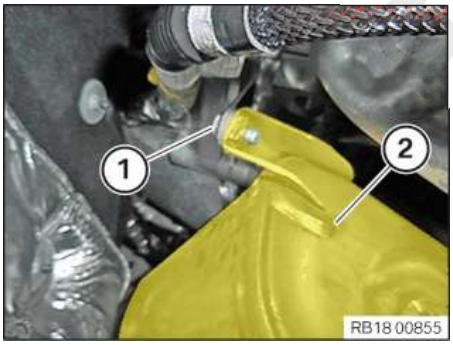
- Perform all work only on components that have cooled down.

CAUTION

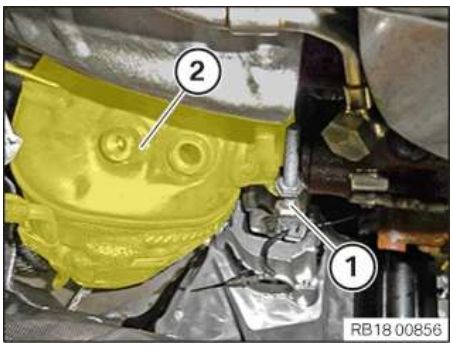
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

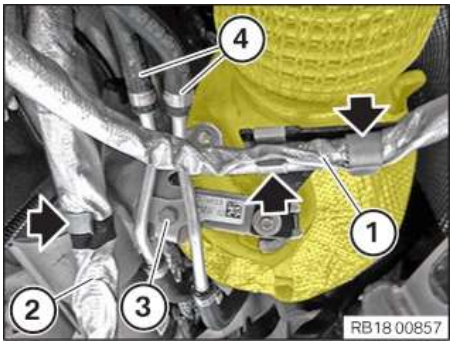


- Release bolt (1) from the holder of diesel particulate filter (2).

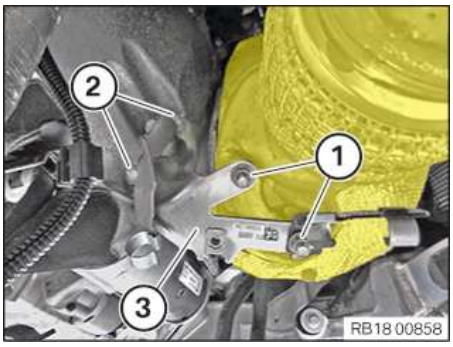


- Loosen V-band clamp (1).
- Feed V-clip (1) out from diesel particulate filter (2) and remove.

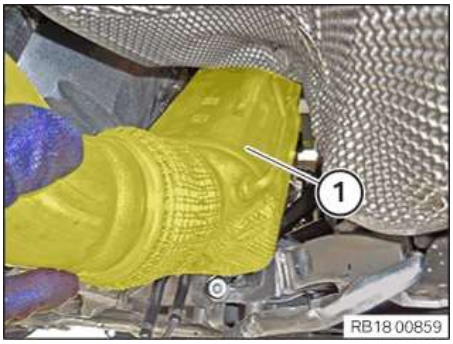
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- Release the metering line (1) from clamps (Arrows).
- Release positive battery cable (2) from starter motor from clamp (Arrow).
- Loosen screw (3).
- Thread off coolant line (4) and place to the side.



- 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.**

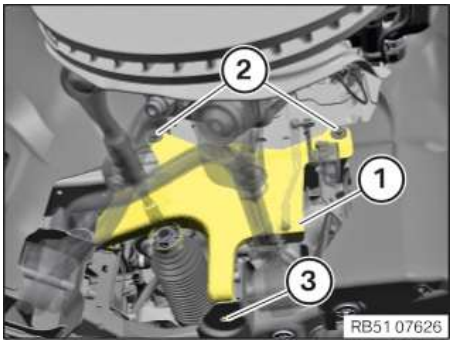
  This process is intended to prevent damage to the brake disc.

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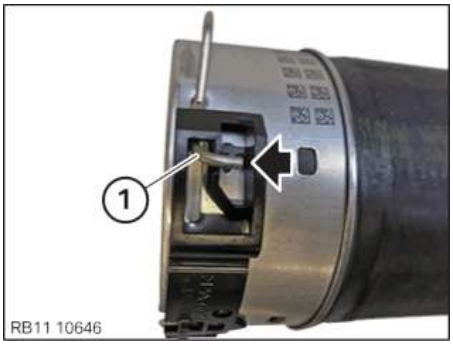
- If several wheels are removed at the same time: Use a piece of chalk to mark on each tyre the axle and side on which the corresponding wheel is fitted.
- Release the wheel bolts (arrows) crosswise and remove the wheel.
- To release and tighten wheel bolts with a security code: Use the correct adapter from the set of special tools .

34 – Remove the cover of the steering assembly



- Loosen screws (2) and (3).
- Remove the cover (1).

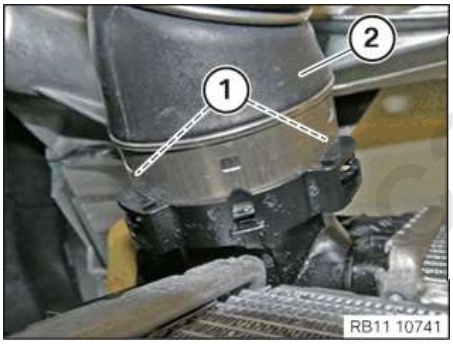
35 – Remove pressure pipe between exhaust turbocharger and charge air cooler



- **Version A:**

  Unlock lock (1).

  The lock (1) must snap audibly into place when unlocked (see arrow).



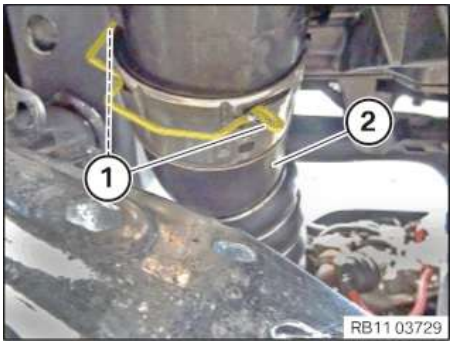
- Unlock the locks (1) on both sides and snap into place.
- Pull off pressure pipe (2) from charge air cooler.



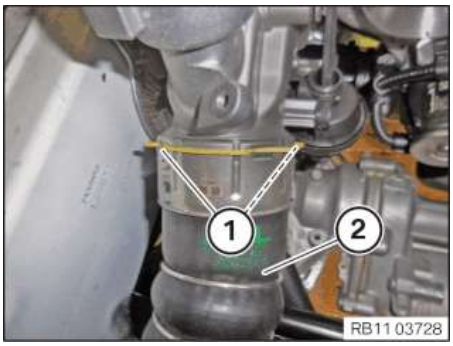
- **Version B:**

  Unlock clamp (1) and engage in this position.

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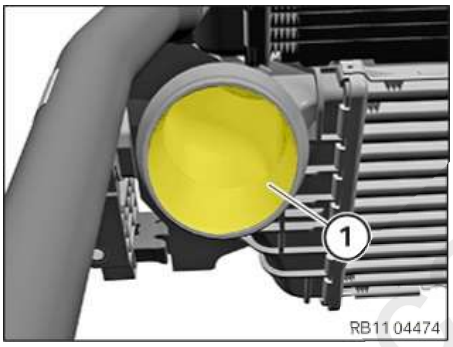
- Unlock the locks (1) and snap into place.
- Pull off pressure pipe (2) from charge air cooler.



- 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.

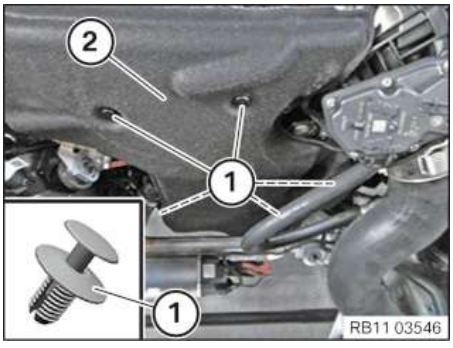
36 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

Risk of burning!

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



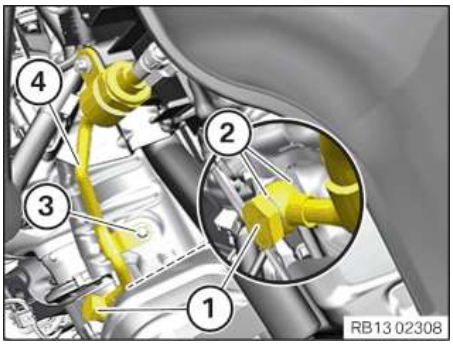
- Release and remove expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

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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.

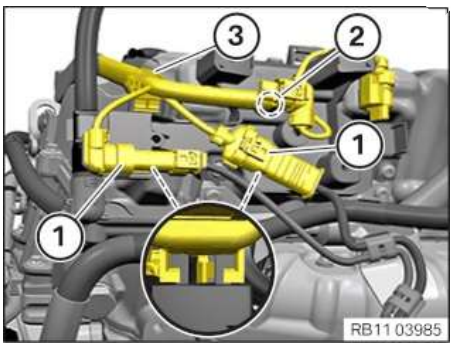
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

Contaminant or foreign body.

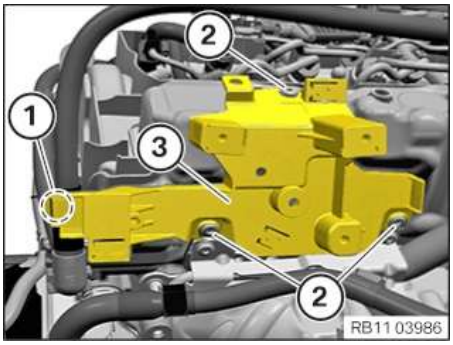
Contamination can result in malfunctions, operating failure or leaks.

- 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.

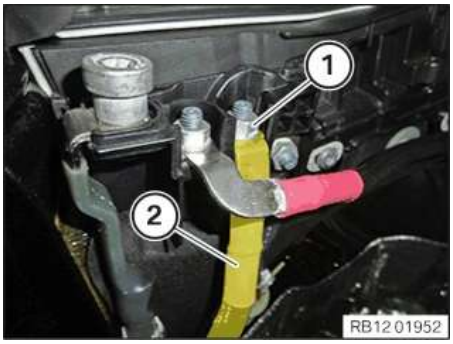
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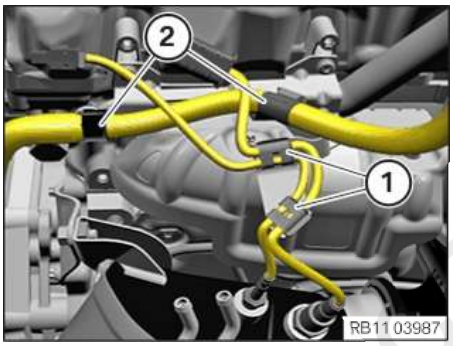
- Release the positive battery cable in the area (1) from the clamp and set it aside.
- Loosen screws (2).
- Feed out holder (3) for the sensor system and remove.



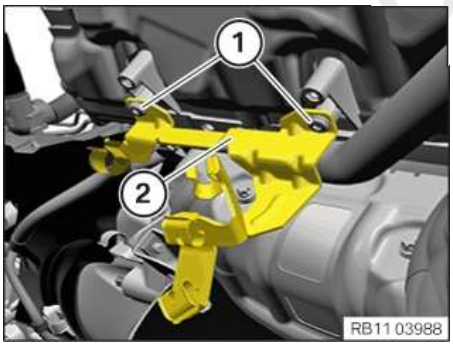
- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.



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



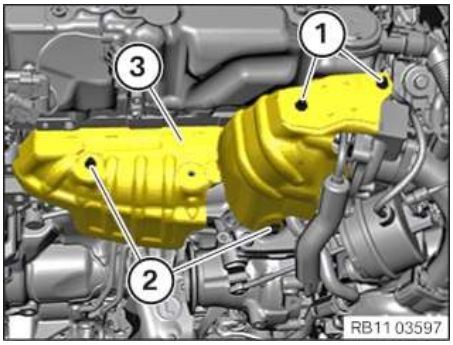
- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



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

39 – Removing heat shield

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- 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

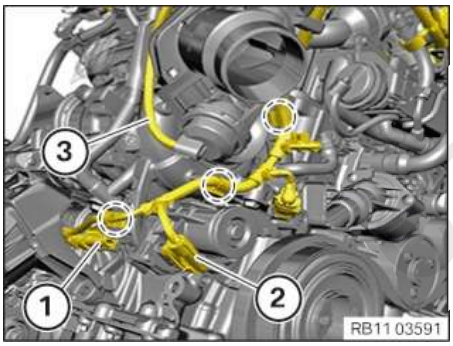
Prior to replacing the exhaust turbocharger: Observe the notes on troubleshooting on the exhaust turbocharger.

For additional information see: FUB-FUB-FB-130003-A10 Troubleshooting on the exhaust turbocharger

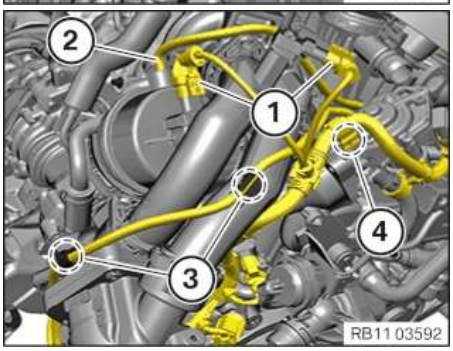
TECHNICAL INFORMATION

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).



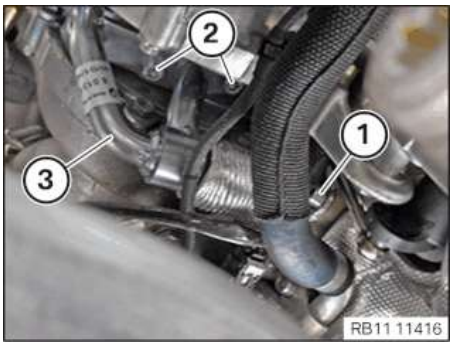
- Unlock plug connections (1) and disconnect.
- Pull off the vacuum hose (2).
- Release the vacuum hose in marked areas (3) from the exhaust turbochargers.
- Release the wiring harness in area (4) from the exhaust-gas recirculation cooler and set it aside.



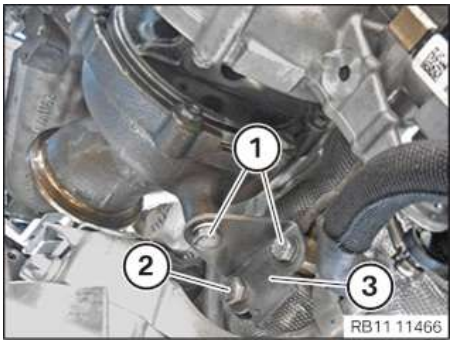
TECHNICAL INFORMATION

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

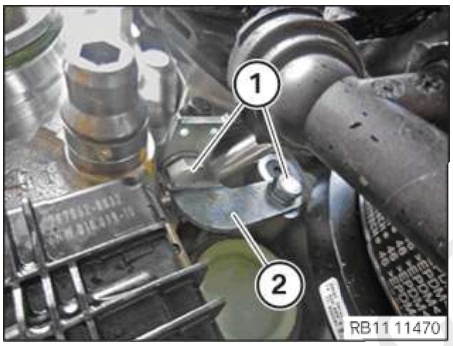
- Release the screws of the oil return line on the crankcase from the right wheel arch.



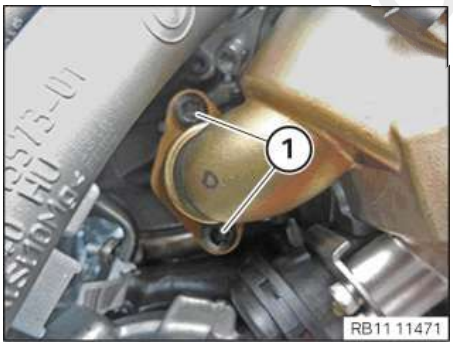
- Release the screw (1).
- Loosen screws (2).
- Remove oil return line (3) from the crankcase.
- Catch and dispose of emerging engine oil.



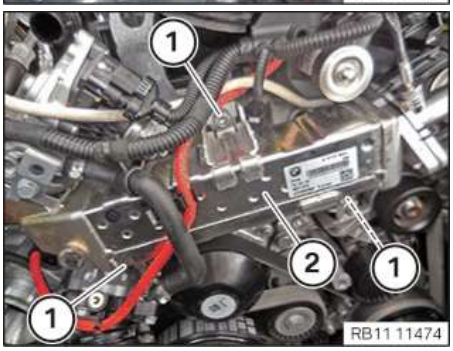
- Unscrew and remove the bolts (1) on the holder (3).
- Slacken screw (2) on holder (3), but do **not** remove.



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

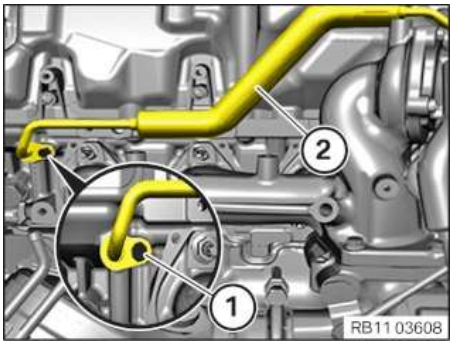


- Loosen screws (1).

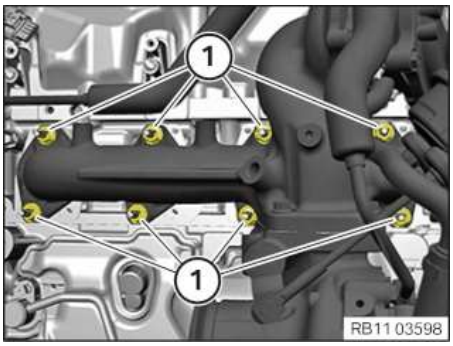


- Slacken screws (1), but do **not** remove.
- Release exhaust-gas recirculation cooler (2) slightly.

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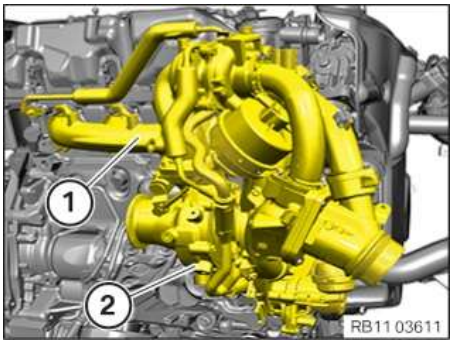
- Loosen screw (1).
- Remove oil feed line (2) for the high-pressure stage exhaust turbocharger from the cylinder head and set it aside.
- Catch and dispose of emerging engine oil.



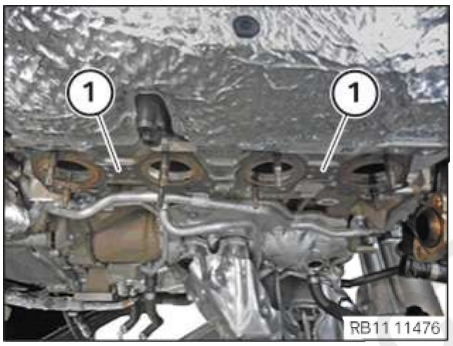
TECHNICAL INFORMATION

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

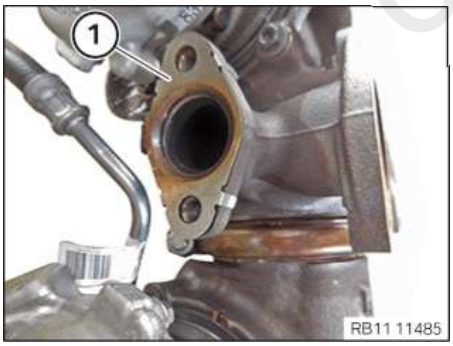
- Loosen nuts (1).



- 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.

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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).

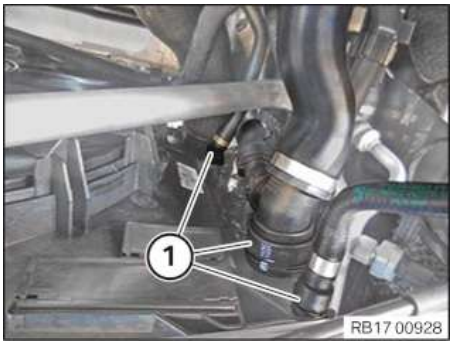
▸ **Avoiding damage to the starter generator due to escaping coolant**

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.

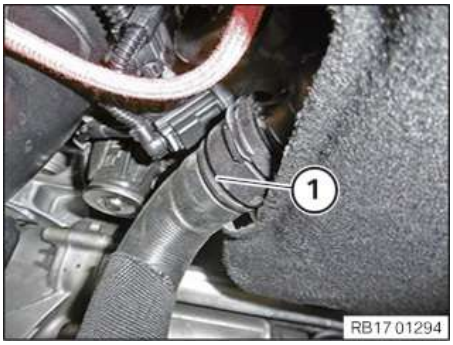


NOTICE

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

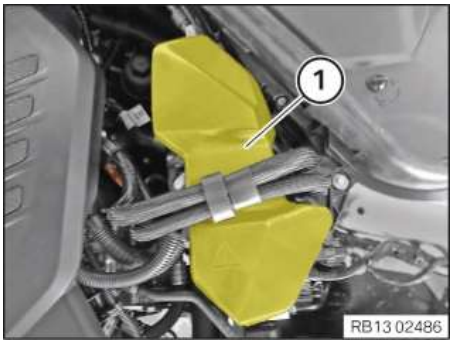
- Unlock all coolant lines (1) and detach.
- Catch and dispose of escaping coolant.

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- 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.

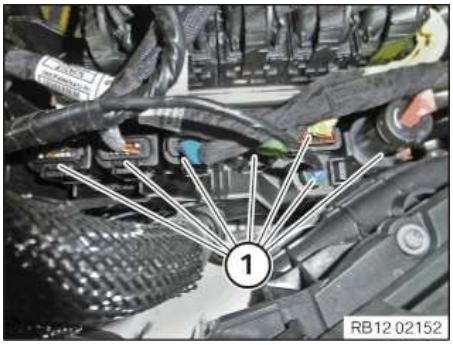
Sheared wires can cause a short circuit.

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

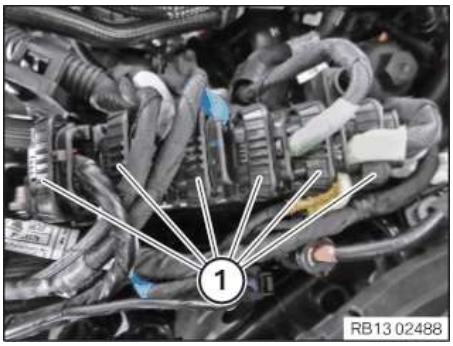
TECHNICAL INFORMATION

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

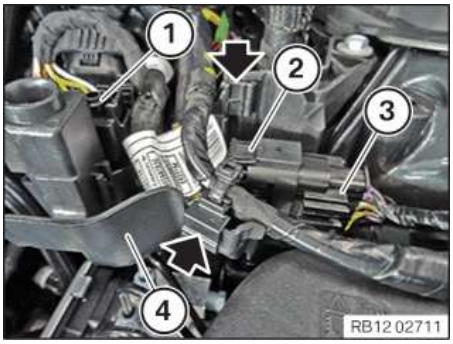
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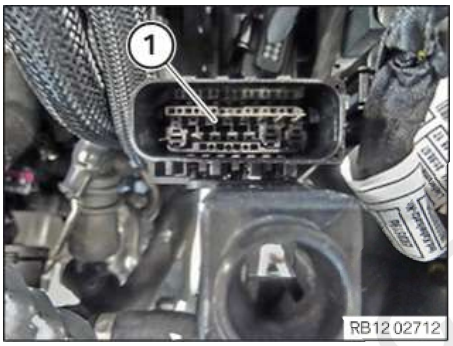
- Unlock and disconnect plug connections (1).



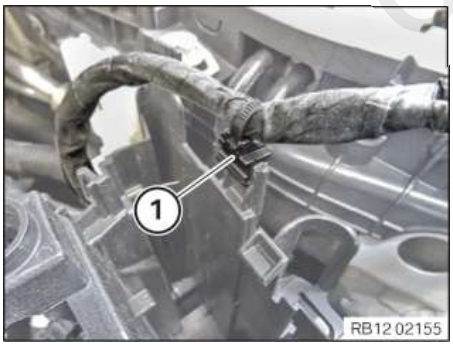
- Unlock and disconnect plug connections (1).



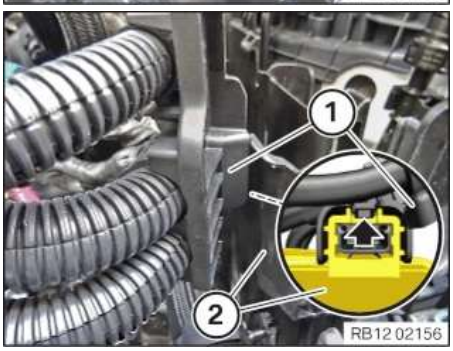
- Unlock plug connection (1) and disconnect.
- Unlock plug connection (2) and disconnect.
- Release the connector (3) and disconnect from the control unit holder (4).
- Release the clamps (arrows).



- Unlock plug connection (1) and disconnect.

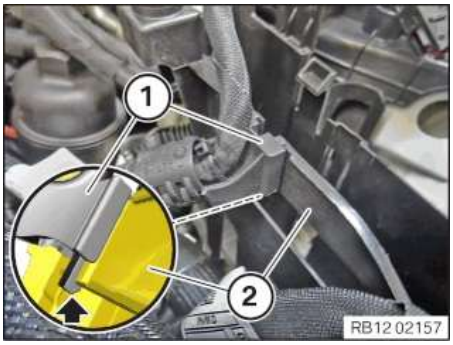


- Loosen clamp (1).



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

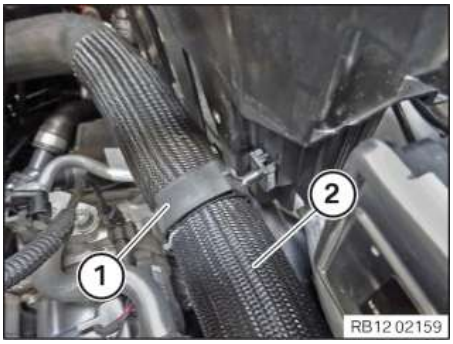
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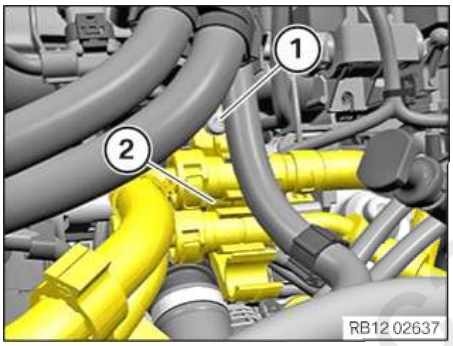
- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).



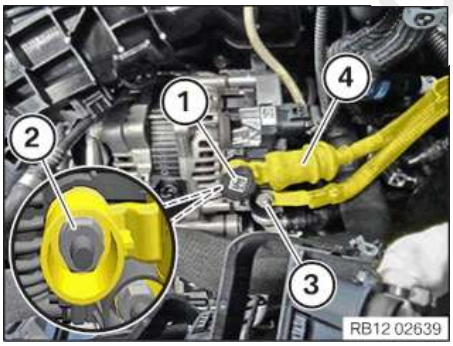
- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.



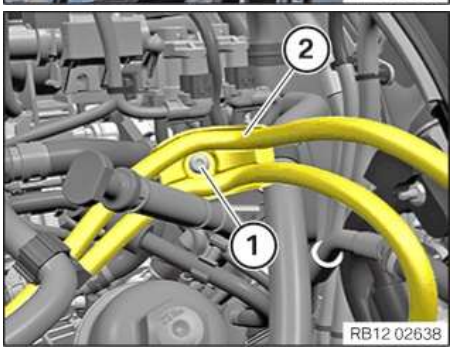
- Unlock holder (1) and feed out coolant line (2) and place it aside.



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

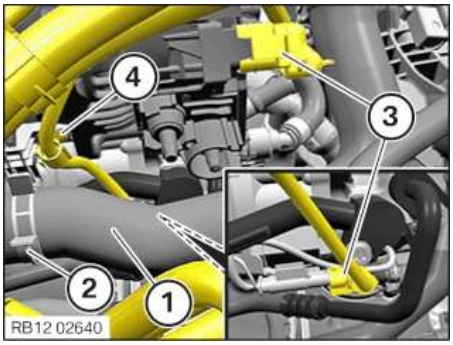


- Guide out and remove the lid (1).
- Release the nuts (2) and (3).
- Feed out positive battery cables (4) and place to one side.

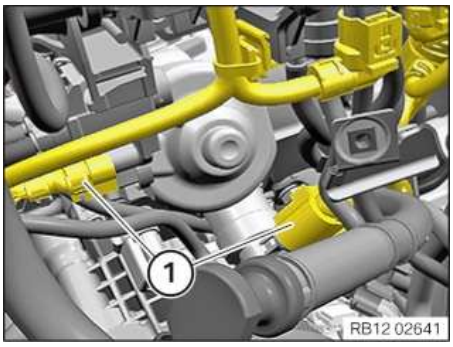


- Release the screw (1).
- Guide out the positive battery cables (2) and set them aside.

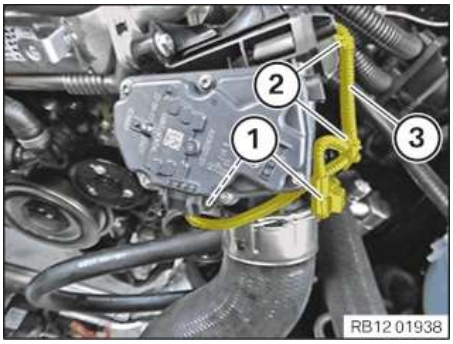
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- Release the coolant line (1) from the holder (2) .
- Unlock plug connections (3) and disconnect.
- Loosen clamp (4).



- Unlock and disconnect plug connections (1).



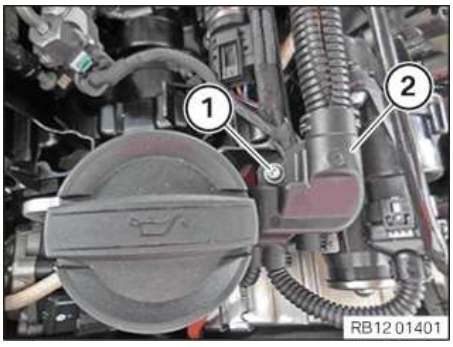
- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.



- Unlock and loosen connector (1).

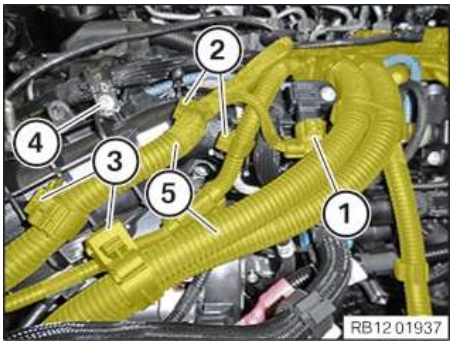


- Unlock plug connection (1) and disconnect.

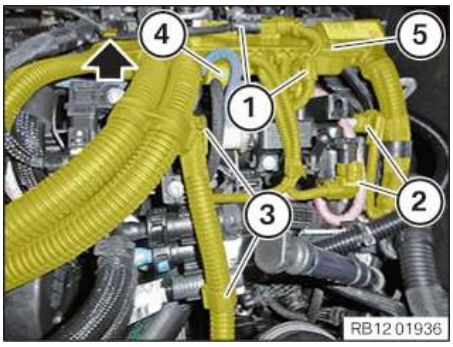


- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.

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- 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

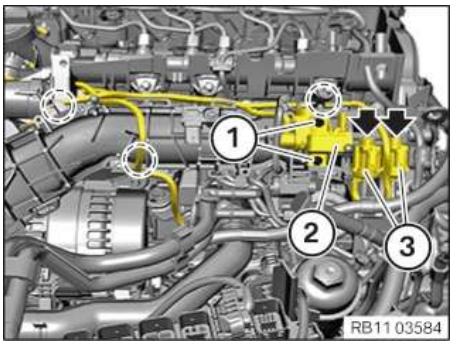
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



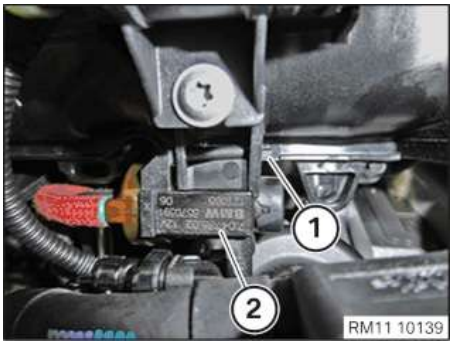
- Unlock clamp (1) and engage in this position.



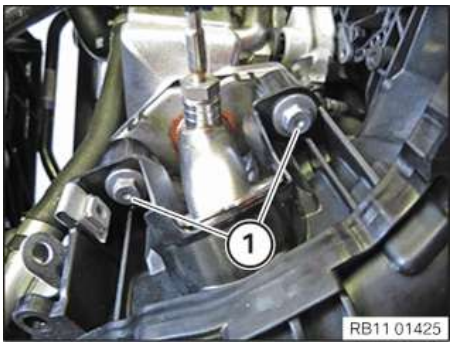
- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.



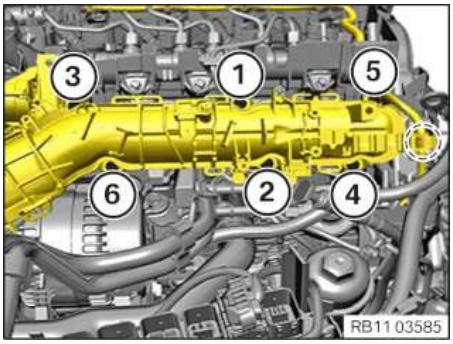
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



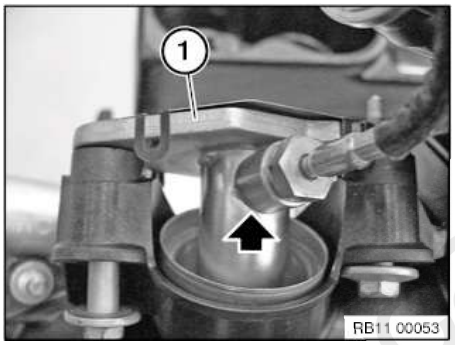
- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.



- 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.

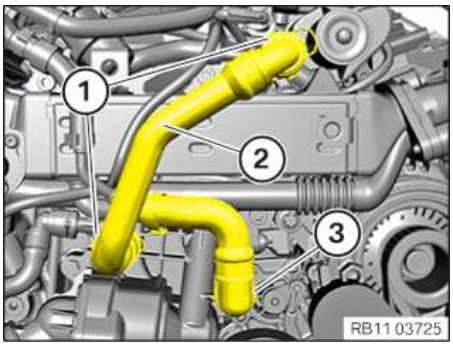
- Cover the starter generator with suitable, watertight auxiliary materials.
- Close off line connections with seal plugs.
- If necessary: Flush the leaked coolant from the starter generator with at least 1 l water.

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- **Version A:**

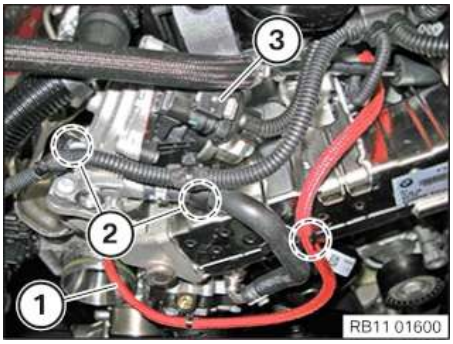
  Unlock and pull off coolant lines (1).



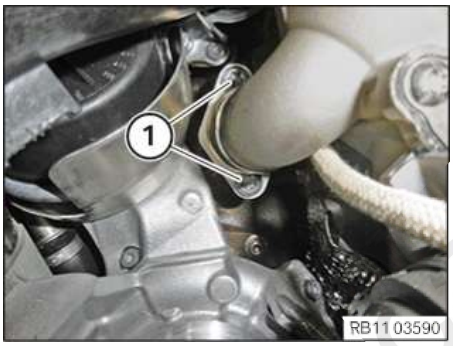
- **Version B:**

  Unlock locks (1) and remove thee coolant line (2).

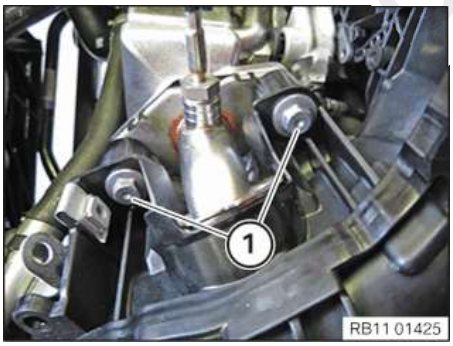
  Unlock coolant line (3) and pull it off the thermostat.



- 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.

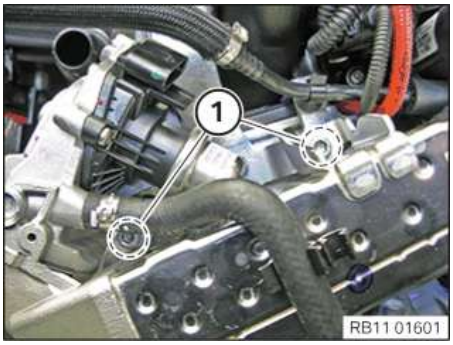


- Loosen the screws (1) on the intake system.



- Loosen the screw (1) below the exhaust-gas recirculation cooler.

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- 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!

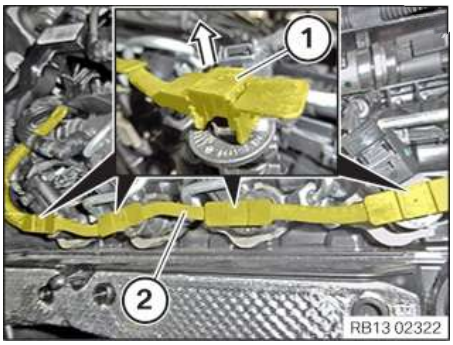
- Perform all work only on components that have cooled down.

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.

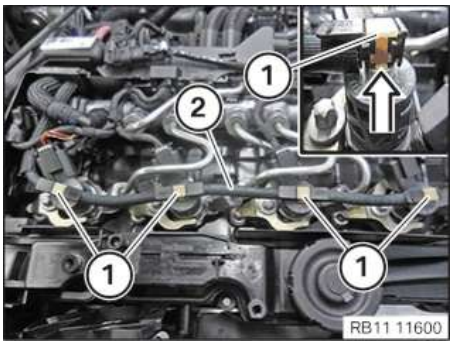


- **Version A:**

  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.



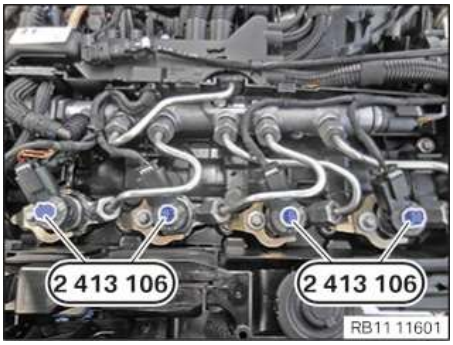
- **Version B:**

  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.

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- 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.

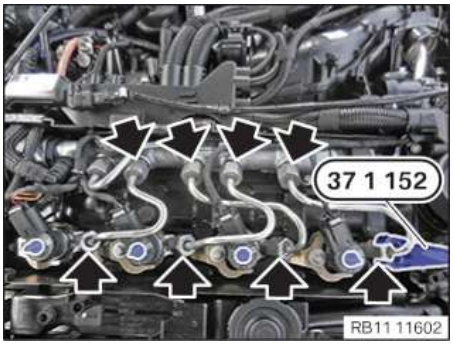
TECHNICAL INFORMATION

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

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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.

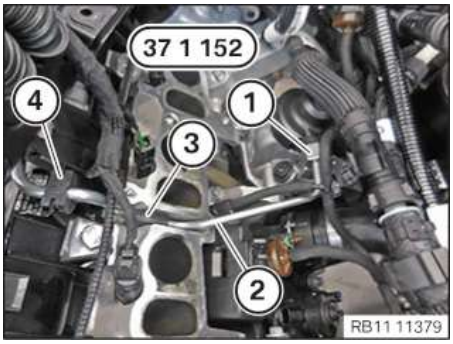
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TECHNICAL INFORMATION

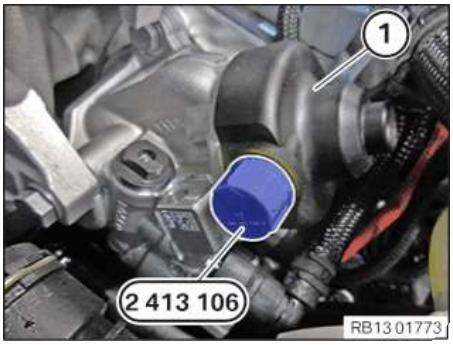
Reset special tool in early to avoid bending pressure lines.



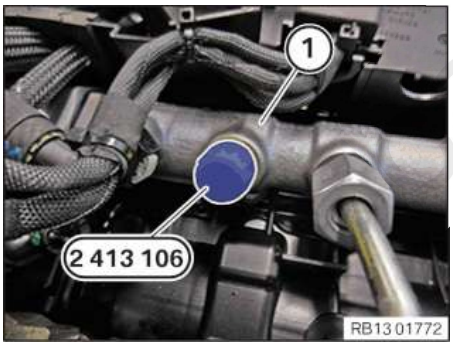
- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.



- 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.

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RISK OF DAMAGE

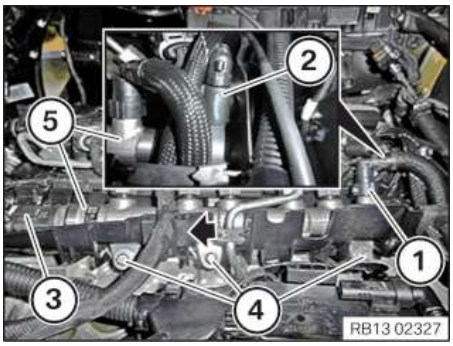
Contaminant or foreign body.

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.

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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

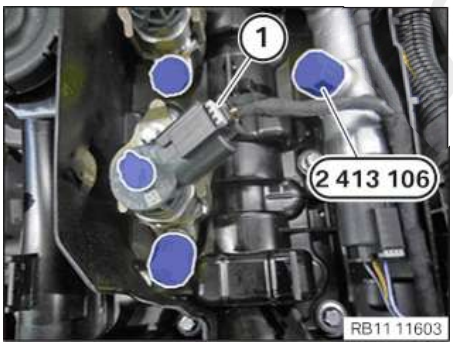
Electrostatic discharge.

Damage to or destruction of electrical components.

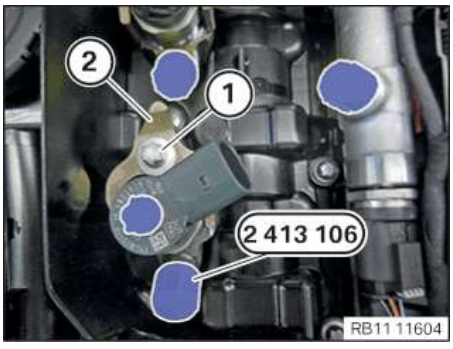
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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**

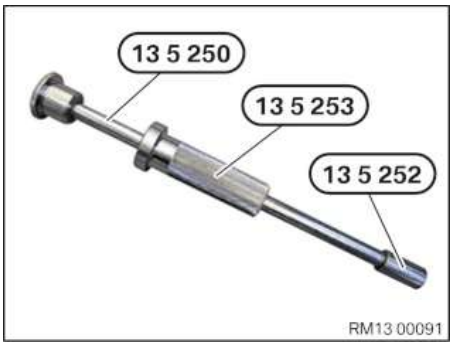
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RISK OF DAMAGE

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.



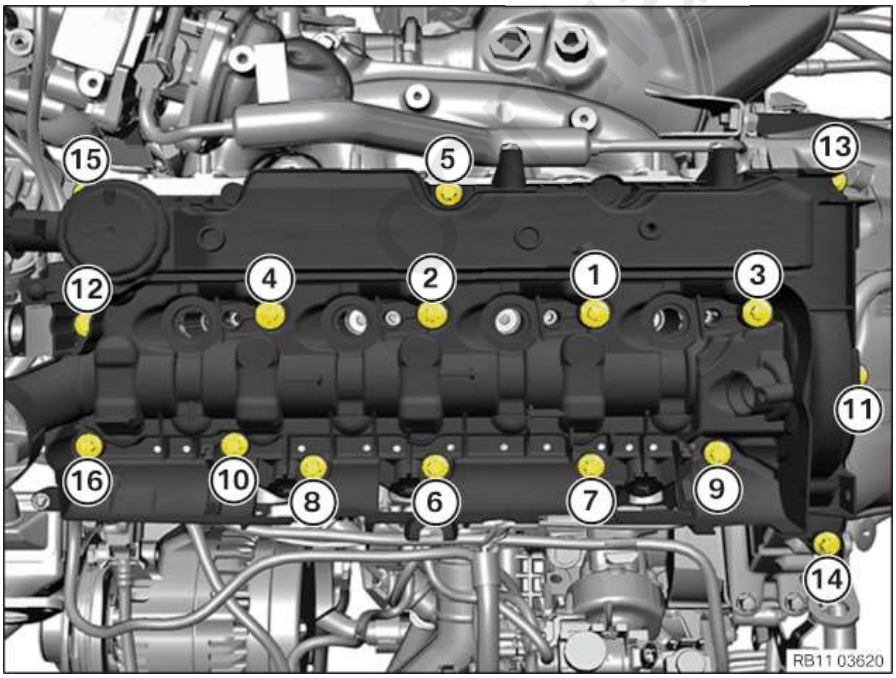
- Unscrew special tool 0 493 339 (13 5 252) from special tool 0 493 321 (13 5 250) and remove special tool 0 493 340 (13 5 253).
- Screw special tool 0 493 339 (13 5 252) back onto special tool 0 493 321 (13 5 250).



- 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



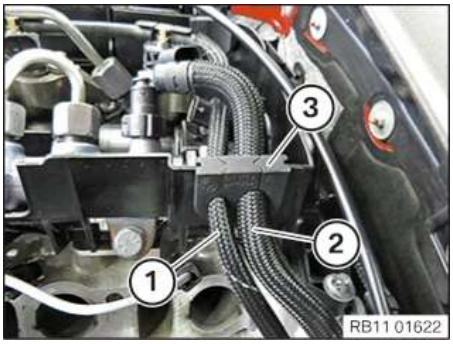
1 - 16 Bolts of the cylinder head cover



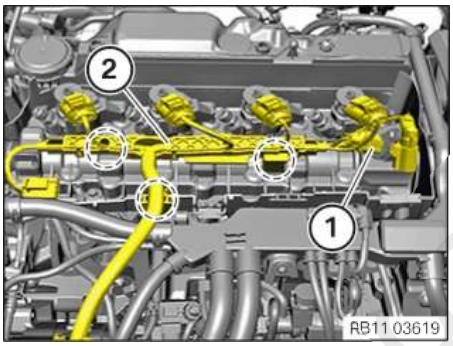
- Unlock and detach the locks.
- Feed the engine ventilation line (1) out and set it aside.



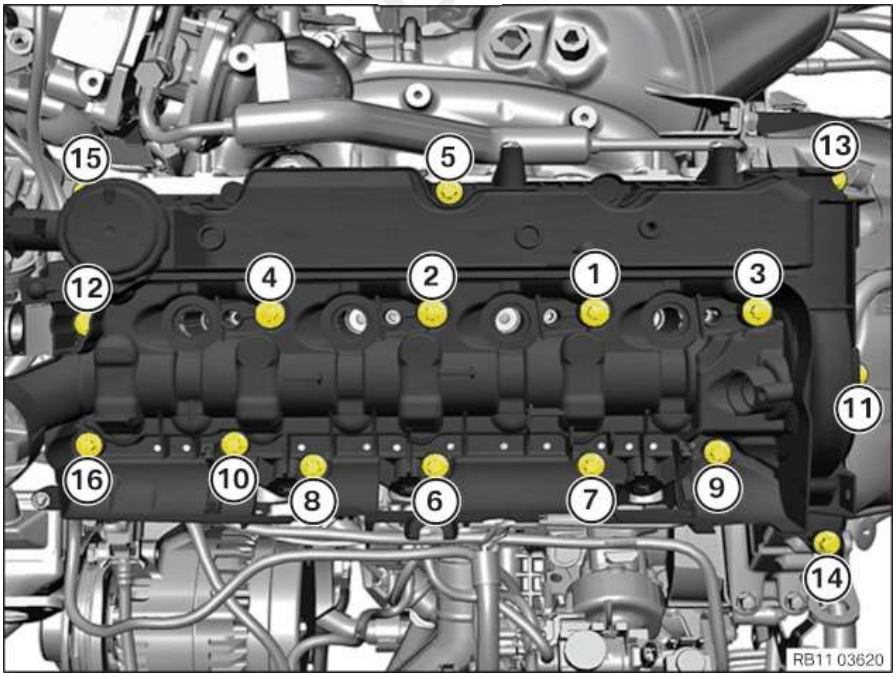
- Feed out and remove the heat shield (1).



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

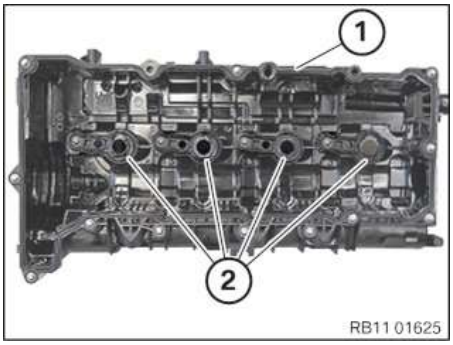


- Unlock connector (1) and pull off.
- Disconnect the wiring harness (2) in the marked areas from the cylinder head cover and set aside.



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

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- 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

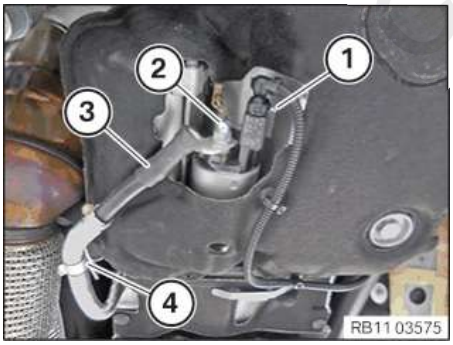
Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

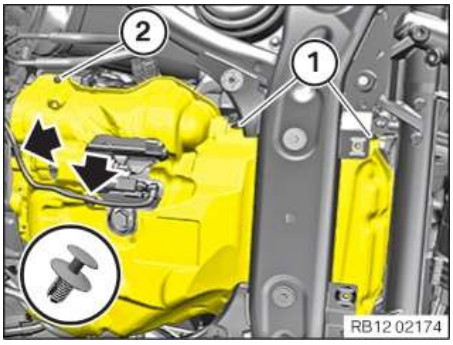
- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

TECHNICAL INFORMATION

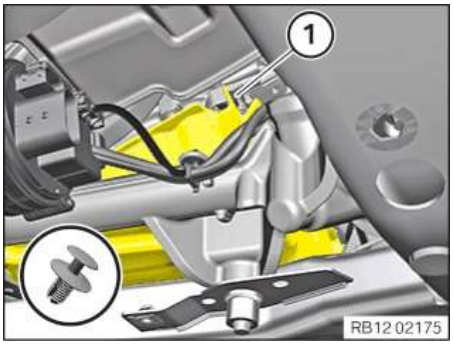
Make sure that the acoustic cover is **not** damaged while removing the starter motor.
A damaged lower acoustic cover can only be renewed when the front axle is lowered.



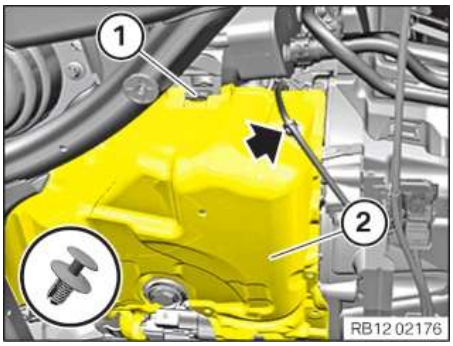
- Unlock plug connection (1) and disconnect.
- Release nut (2).
- Release positive battery cable (3) from holder (4).



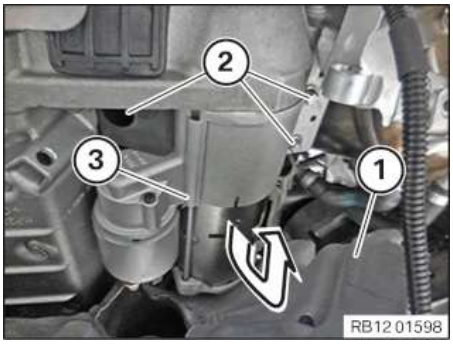
- Loosen the expanding rivet (1).
- Undo fir tree clip (2).
- Release the clamps (arrows).



- 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

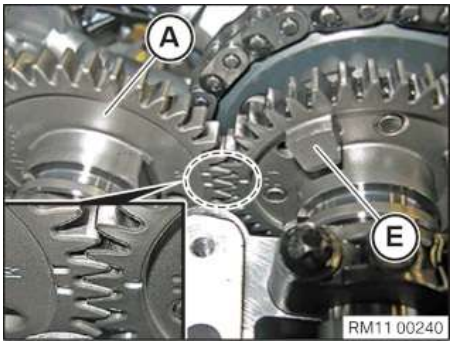
Damage to the engine.

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.

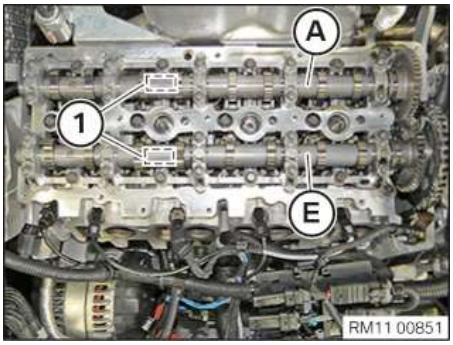
- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

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

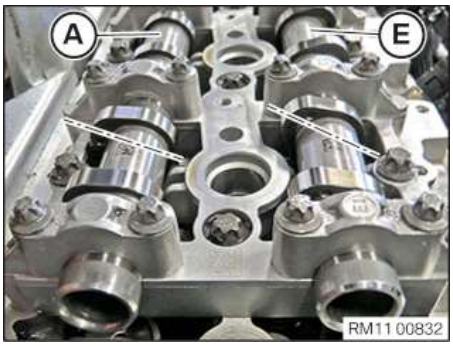


- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.

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

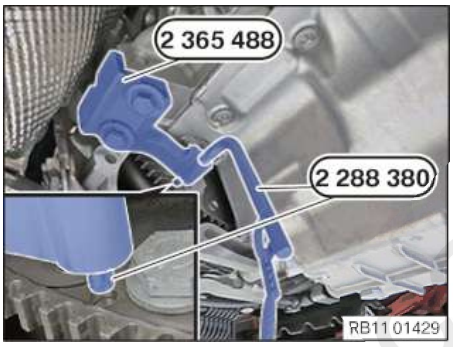


- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- 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.

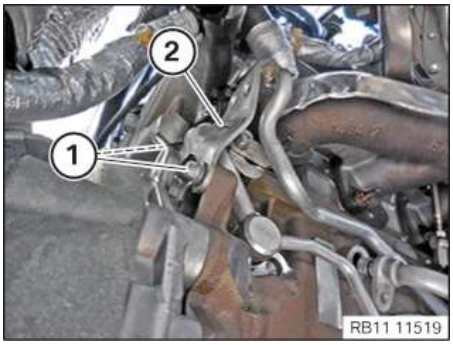
Contamination can result in malfunctions, operating failure or leaks.

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

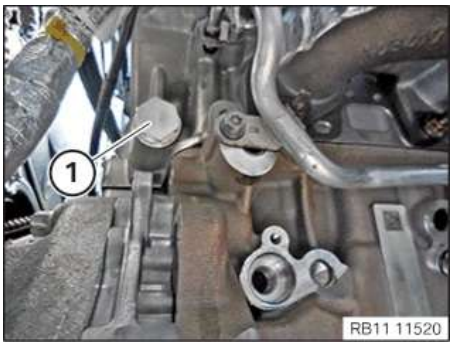
TECHNICAL INFORMATION

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

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

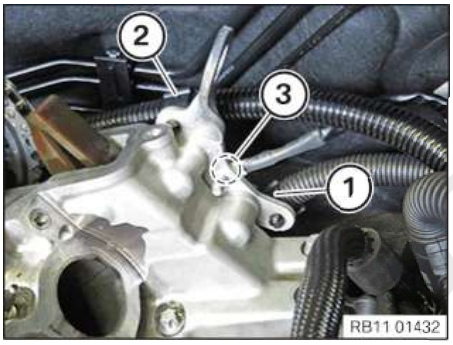


- Loosen the chain tensioner piston (1).
- Catch and dispose of emerging engine oil.

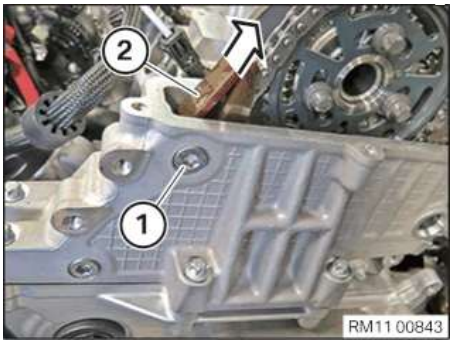


- Feed out and remove the sealing ring (1).

55 – Remove the timing chain guide rail

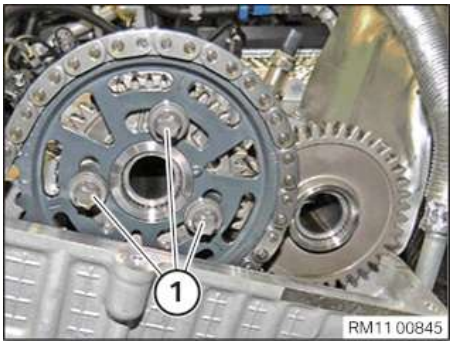


- Loosen the vehicle wiring harness (1) from the bracket.
- Release the positive battery cable (2) from the holder .
- Loosen the screw (3) and remove the grounding cable.



- 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

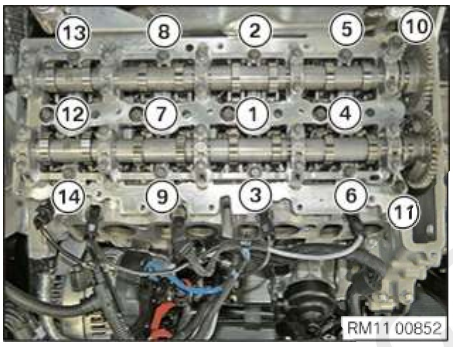


- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

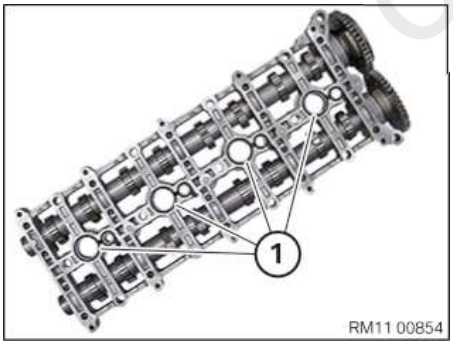
58 – Removing the camshaft support

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.



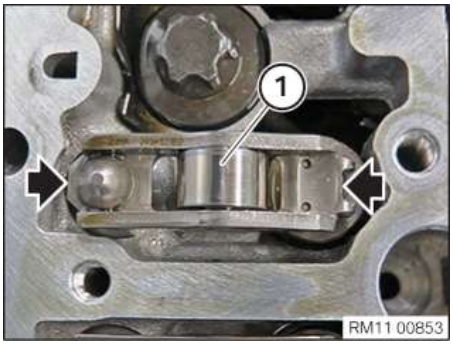
- Unscrew the screws evenly in order (14) to (1) in multiple increments.
- Feed out and remove the camshaft support with the camshafts towards the top.



- Guide out and remove gaskets (1).

59 – Remove roller cam followers

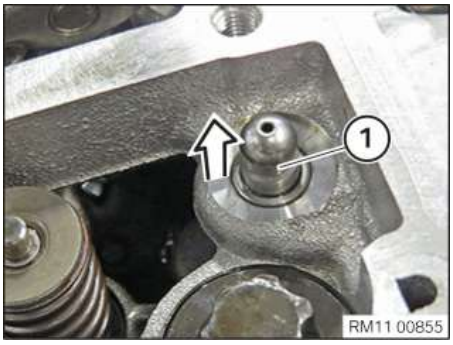
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- Guide out and remove all roller cam followers (1) (arrows).
- Place all roller cam followers (1) in order in special tool 0 495 105 (11 4 480).

  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).

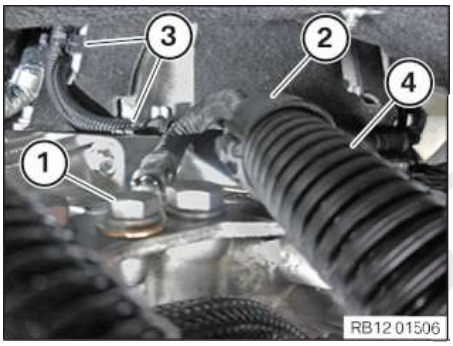
61 – Removing cylinder head

RISK OF DAMAGE

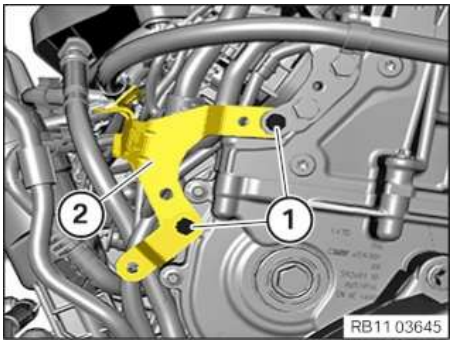
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

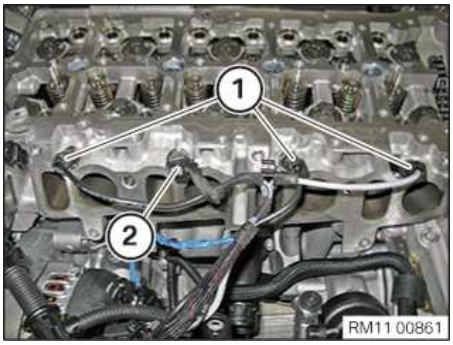


- Loosen screw (1).
- Unlock and loosen holder (2).
- Unlock and loosen the clamps (3).
- Feed out the wiring harness section (4) of the automatic transmission and place to one side.

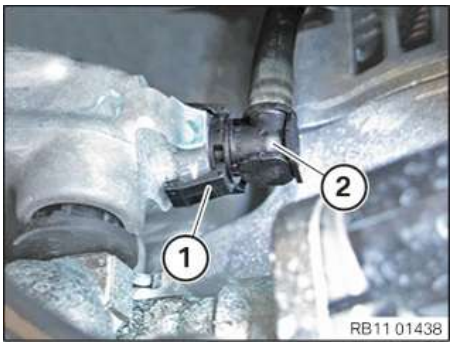


- Loosen screws (1).
- Guide out and remove holder (2).

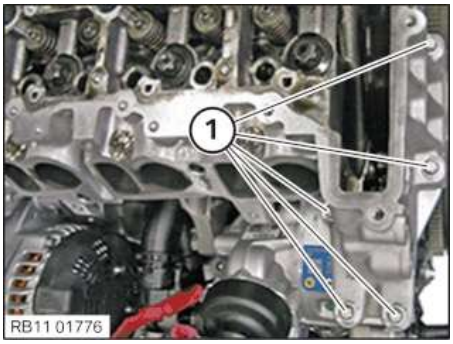
carmanuals.com



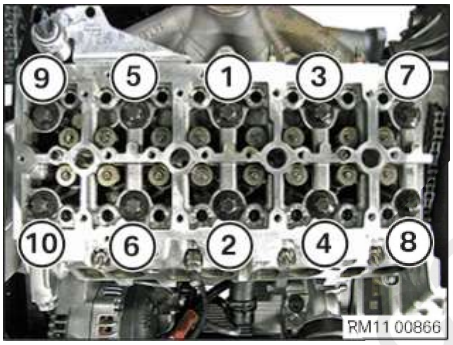
- Release plug connections (1) with special tool 0 495 140 (12 2 300).
- Unlock and disconnect the plug connections (1) and (2).
- Place wiring harness to one side.



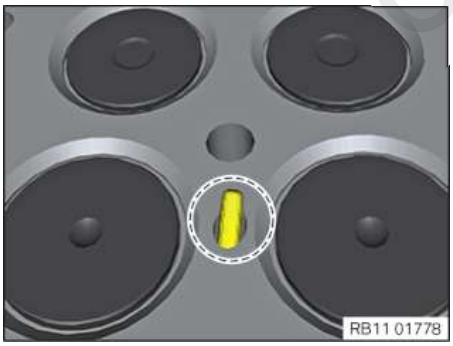
- Release lock (1) of coolant line.
- Remove the coolant line (2) and set it aside.



- 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.

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- 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).

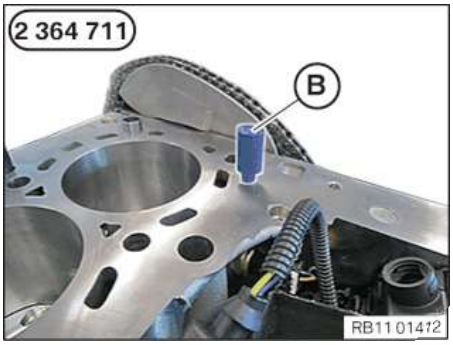
62 – Cleaning the sealing surface

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

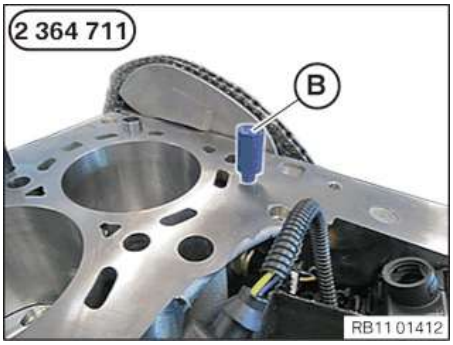
Damage to the surface.

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.

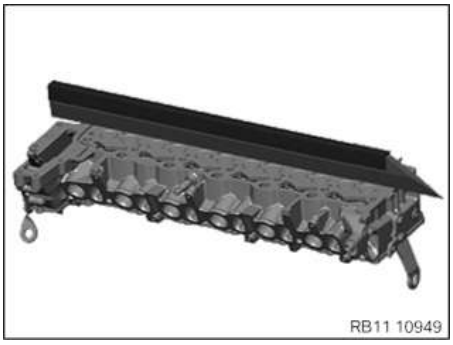
- Clean the sealing surface using special tool 0 495 104 (11 4 472).

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- Remove special tool (B).

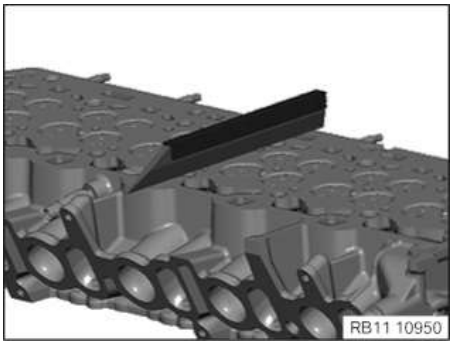
63 – Check the flatness of the cylinder head



- 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

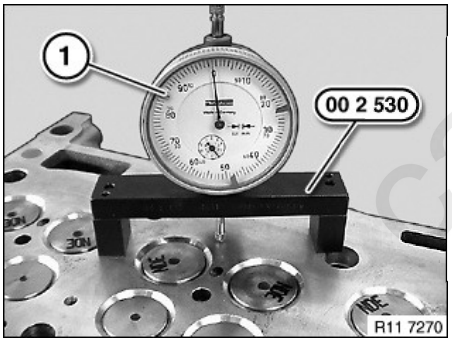


- Check the flatness of the cylinder head crosswise using a straightedge.

Cylinder head flatness

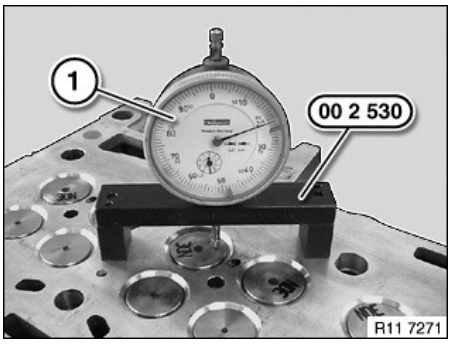
Maximum lengthwise deviation from flatness	0.10 mm
Maximum transverse deviation from flatness	0.05 mm

64 – 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

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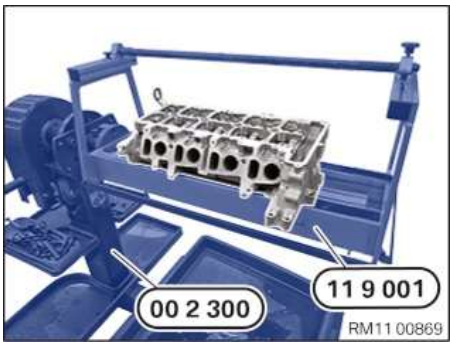
65 – Remove all valve springs

RISK OF DAMAGE

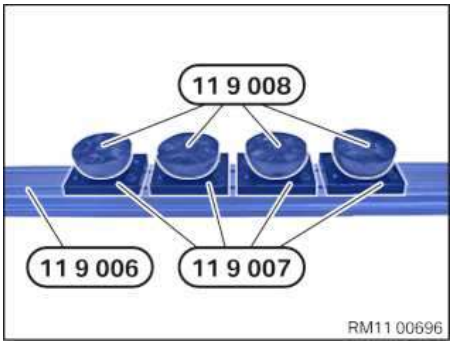
Contaminant or foreign body.

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.



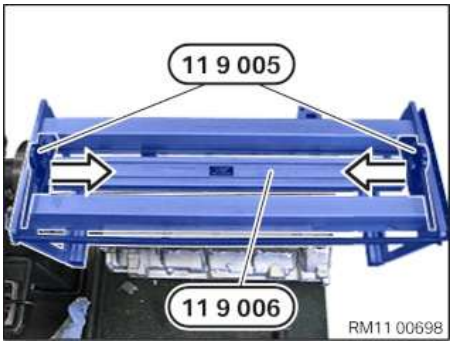
- Mount and screw the cylinder head onto the special tools 0 494 366 (11 9 001) and 0 495 187 (00 2 300).



- 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.



- Position special tools 0 494 373 (11 9 008) as pictured.

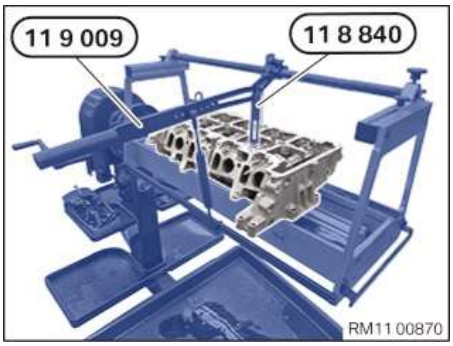


- Turn round special tool 0 494 371 (11 9 006) and insert as shown.
- Lock special tool 0 494 370 (11 9 005)in direction of arrow.

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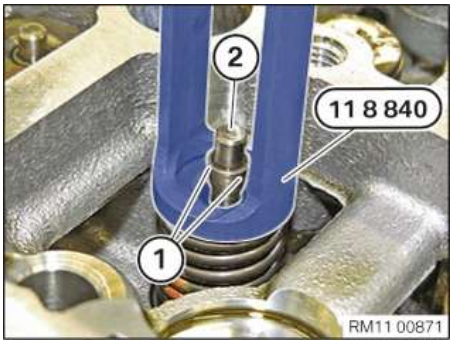


- Lock special tool 0 494 370 (11 9 005)in direction of arrow.
- Move cylinder head with special tool 0 494 362 (11 9 000) through 180° into the installation position.



- 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.

66 – Remove valve stem seals

RISK OF DAMAGE

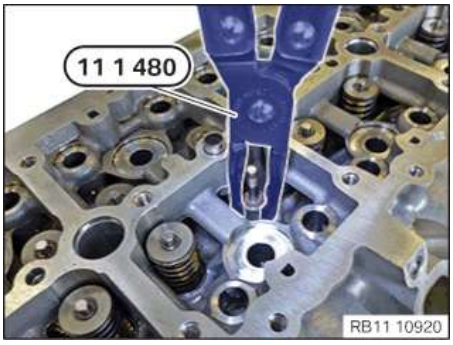
Contaminant or foreign body.

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).

67 – Remove all valves

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RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

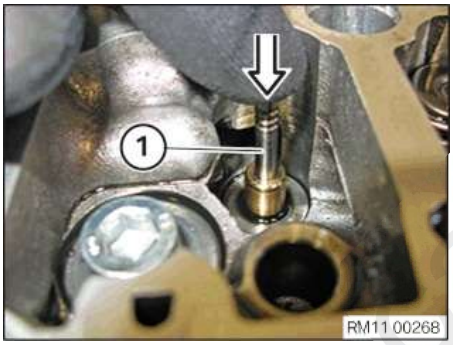
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



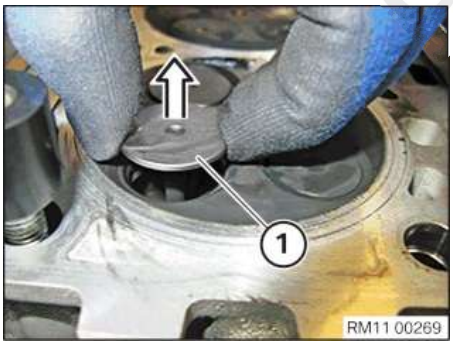
- Turn the cylinder head with the special tool 0 494 362 (11 9 000).
- Unlock the special tool 0 494 370 (11 9 005) in the direction of the arrow.
- Remove special tool 0 494 371 (11 9 006).



- Remove special tool 0 494 373 (11 9 008) if necessary.



- Push the valve stem (1) into the cylinder head in the direction of the arrow.



- Remove the valve (1) in the direction of arrow and store it properly in the special tool 0 495 105 (11 4 480).

68 – Install all valves

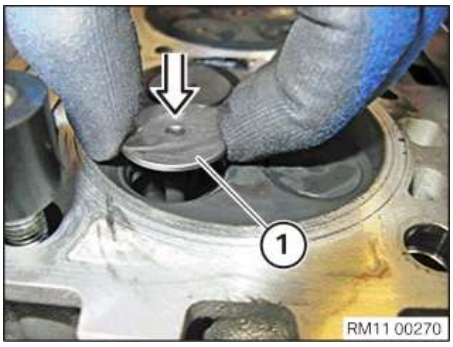
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RISK OF DAMAGE

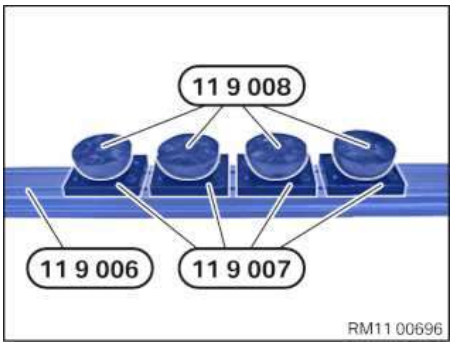
Contaminant or foreign body.

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.



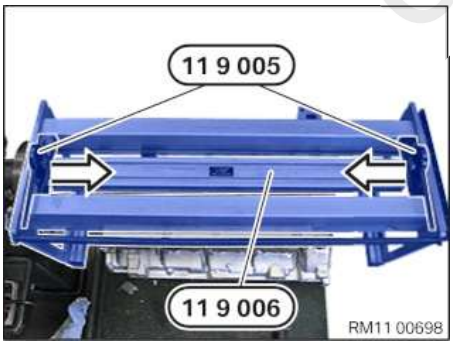
- Insert and install the valve (1) in the direction of the arrow.



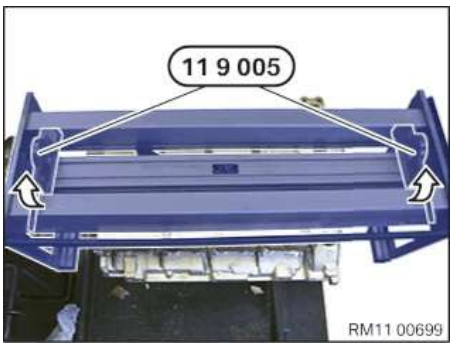
- Prepare the special tools 0 494 371 (11 9 006), 0 494 372 (11 9 007) and 0 494 373 (11 9 008) as shown.



- 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.

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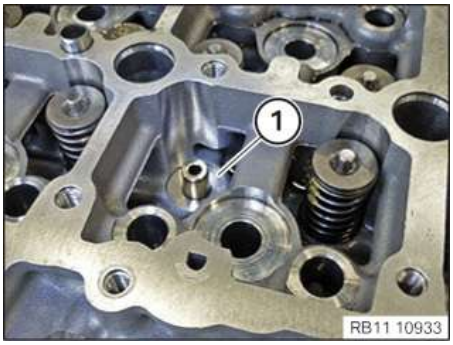
69 – Installing valve stem seals

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.



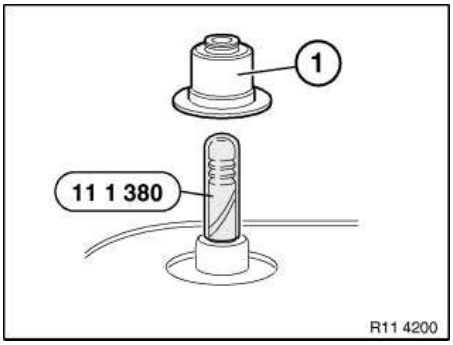
RISK OF DAMAGE

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.

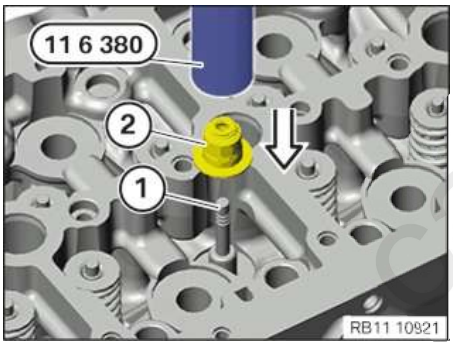
- Do not use any metal-cutting tools.

- 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).



- 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).

70 – Install all valve springs

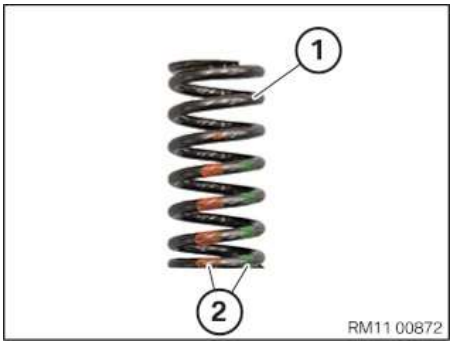
RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

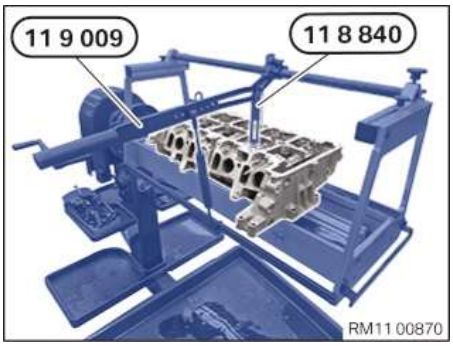
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

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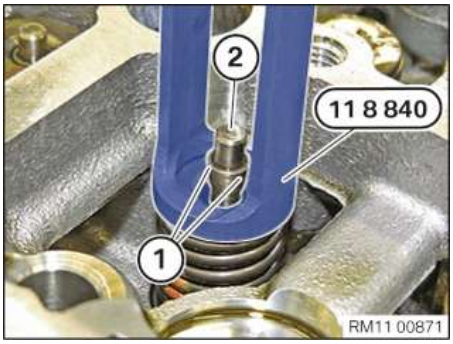
- Ensure that the valve spring (1) is marked using a colour code (2).

  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).

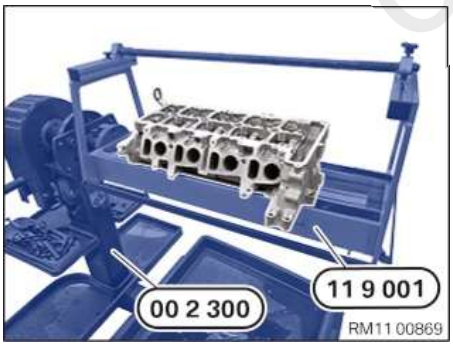
  The **hooks** from the set of special tools 0 494 362 (11 9 000) can be used to **hold** the valve spring in pressed position.



- 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.



- 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.

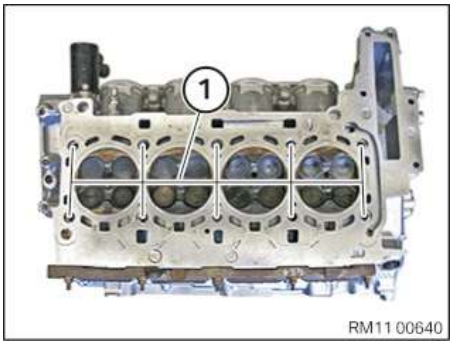


- Unscrew and remove the cylinder head from the special tools 0 494 366 (11 9 001) and 0 495 187 (00 2 300).

POSTPROCESSES

71 – Replace cylinder head gasket

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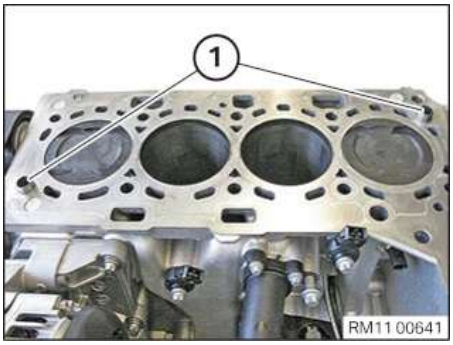
RISK OF DAMAGE

Damage to the surface.

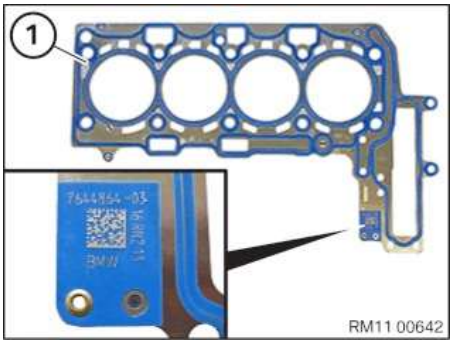
The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.

- Remove oil and dirt residue from the blind holes (1).

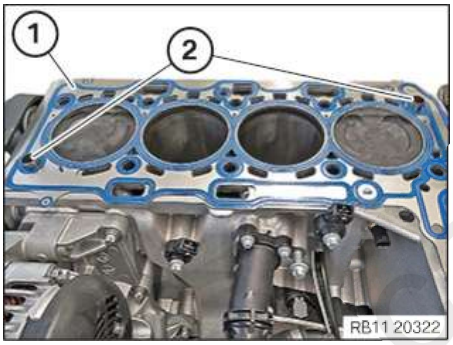


- Check if fitting sleeves (1) fit correctly and check for any damage.



- 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).

72 – 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).

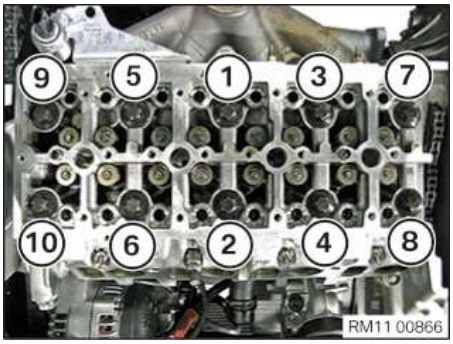
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TECHNICAL INFORMATION

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.

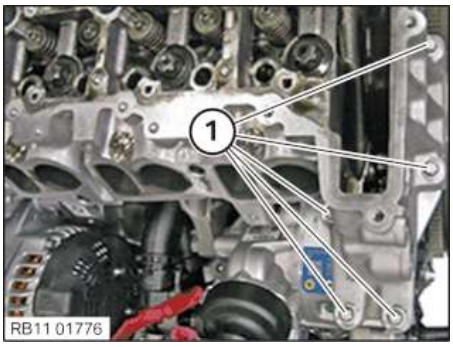


- Position the cylinder head gasket with the previously determined gasket thickness (number of holes).
- Fit new cylinder head screws.

  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

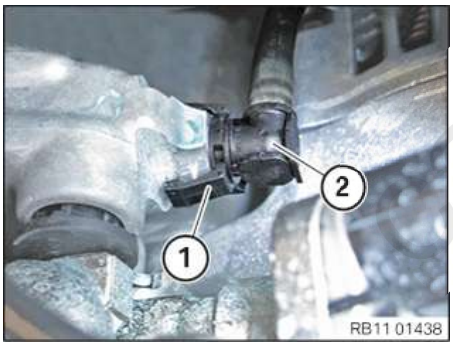
M12x1.5	Renew screws.	1. Tightening torque	50 Nm
		2. Angle of rotation	120 °
		3. Angle of rotation	120 °



- Insert screws (1) and tighten.

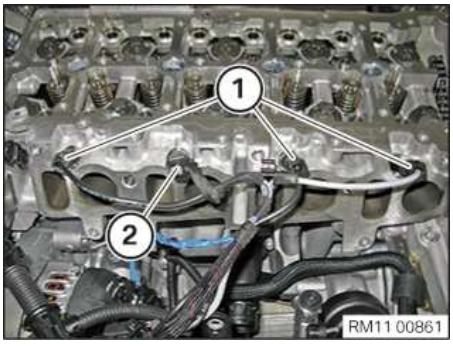
Cylinder head bolt to timing case cover

M8x40		Tightening torque	19 Nm



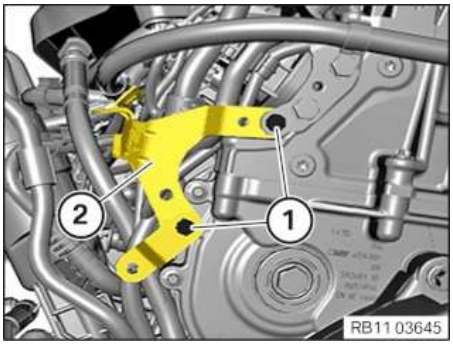
- Fit and lock coolant line (2).

  The lock (1) must engage audibly.



- Connect connectors (1) and (2), then lock.

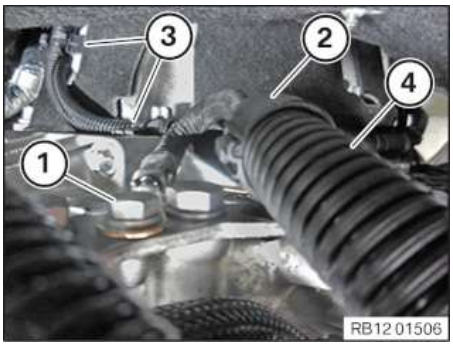
  The connectors (1) and (2) must audibly engage.



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

Standard screw connection M6

M6		Tightening torque	8 Nm

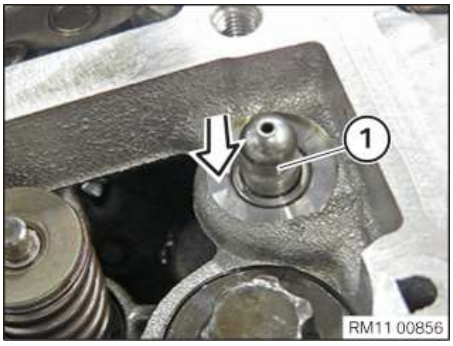


- Guide in the wiring harness section (4) of the automatic transmission and install.
- Lock holder (2).
- Make sure the bracket (2) engages audibly.
- Secure clamps (3).
- Tighten down screw (1).

Ground to cylinder head

M6		Tightening torque	8 Nm

73 – Installing all hydraulic valve clearance compensating elements

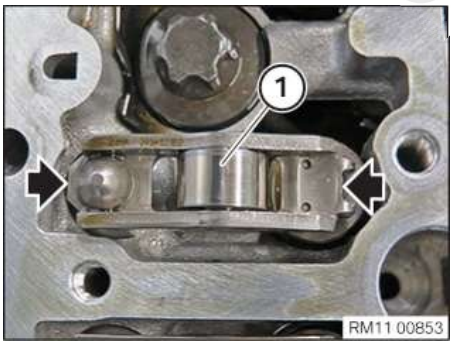


- Make sure to observe the assignment of the roller cam followers to the hydraulic valve clearance compensating elements when reusing the hydraulic valve clearance compensating elements (1).
- Insert and install all hydraulic valve clearance compensating elements (1) in the direction of the arrow.

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).

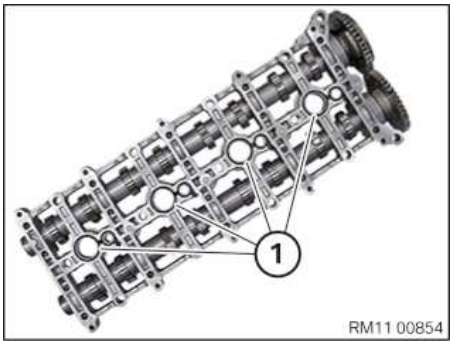
  Roller cam followers (1) that have already been used must be installed in the same place.
- Note the mounting orientation of the roller cam followers (1).
- Oil all roller cam followers (1).

75 – Installing the camshaft support

TECHNICAL INFORMATION

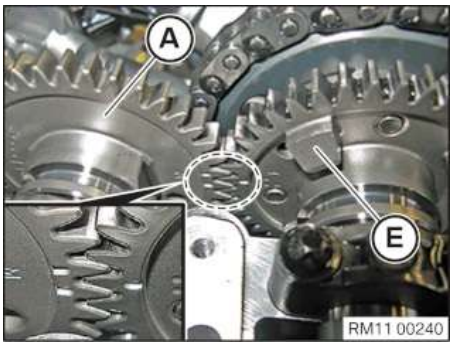
The camshaft is tensioned by the valve springs. Tighten or loosen each screw on the camshaft bearing caps one at a time in the specified sequence and by half a turn only. Repeat procedure.

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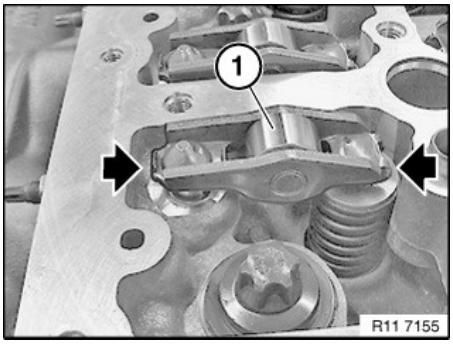


- Renew seals (1).

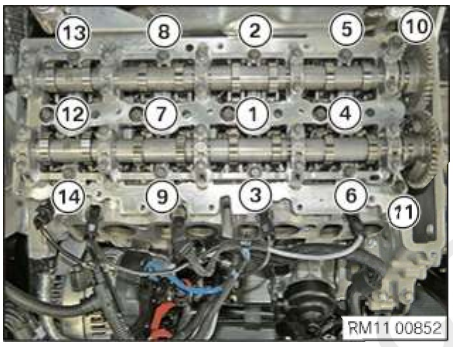
  Parts: Seals
- Insert and install the gaskets (1).



- 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

76 – Installing the special tool to secure the exhaust camshaft

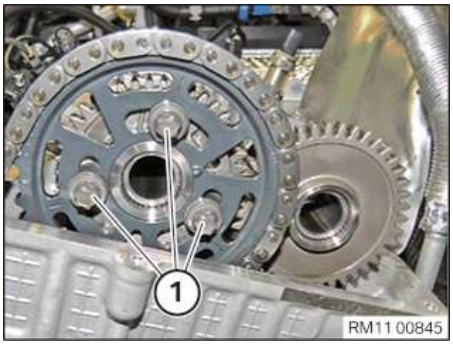


- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

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

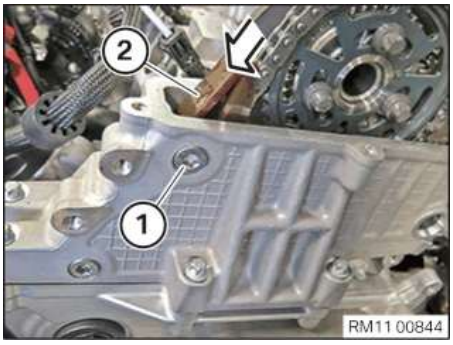
77 – Installing the camshaft sprocket on the intake camshaft

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- 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

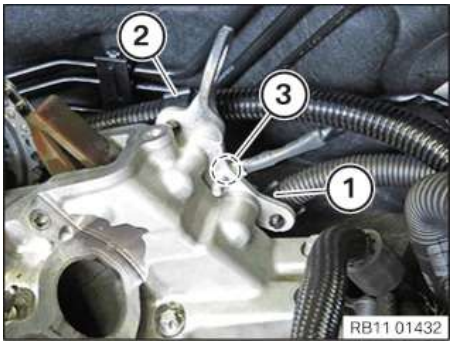


- Position the guide rail (2) in the direction of the arrow.
- Make sure the guide rail (2) is correctly installed at the bottom bearing journal.
- Renew bearing journal (1).

  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



TECHNICAL INFORMATION

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

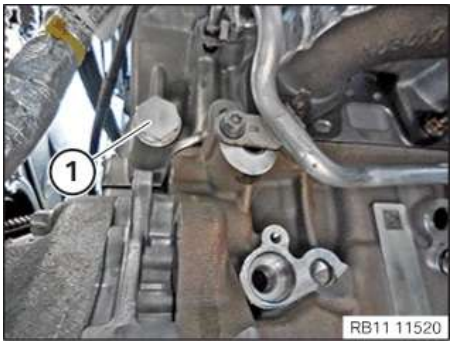
- Place the chain tensioner on a level support pad and slowly compress in the direction of arrow.
- Repeat process twice.



- Renew sealing ring (1).

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

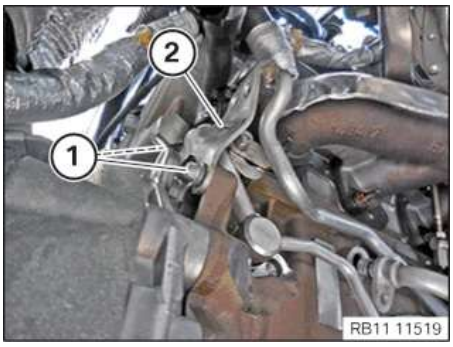
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- Insert and install the chain tensioner piston (1).
- Tighten the chain tensioner piston (1).

Chain tensioner piston to cylinder head

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

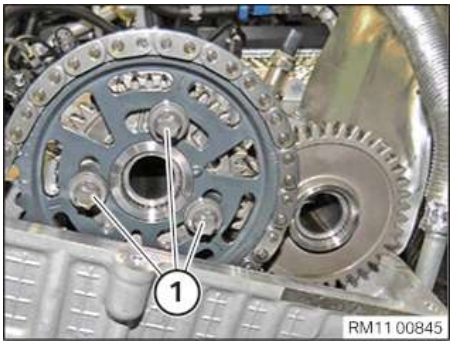


- Insert and install the holder (2).
- Tighten the screws (1).

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

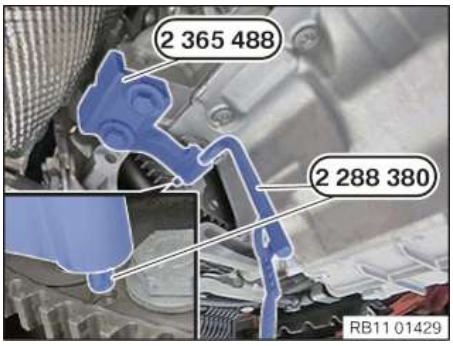
M7x17.			17 Nm

81 – Removing the special tool for fixing the exhaust camshaft



- 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

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RISK OF DAMAGE

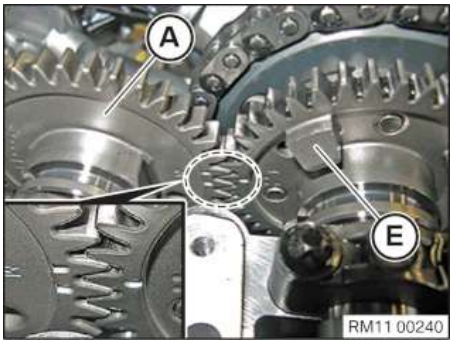
Damage to the engine.

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

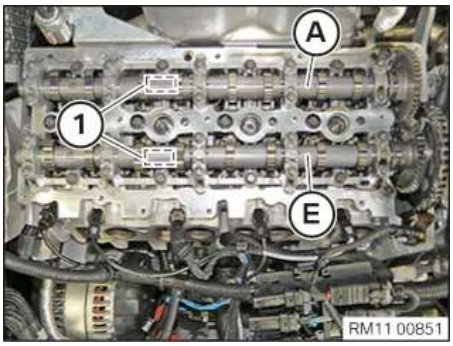
- Turn the combution engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

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

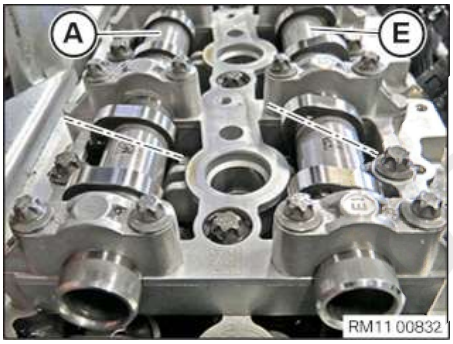
  Do **not** crank the engine in reverse.



- 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.



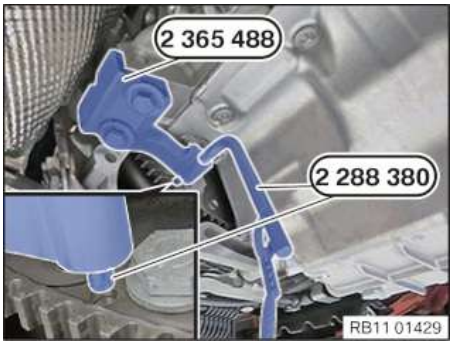
- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- 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.

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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

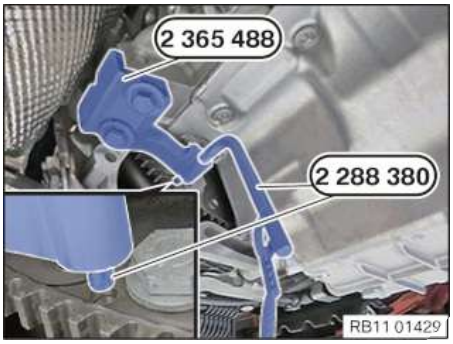
- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

84 – Removing the special tool for fixing the exhaust camshaft



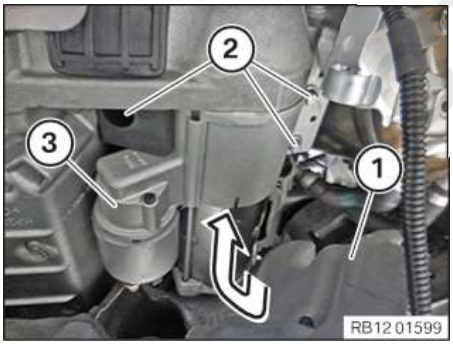
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

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.

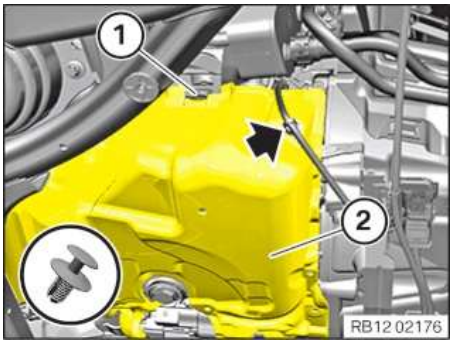
86 – Installing starter motor



- 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).

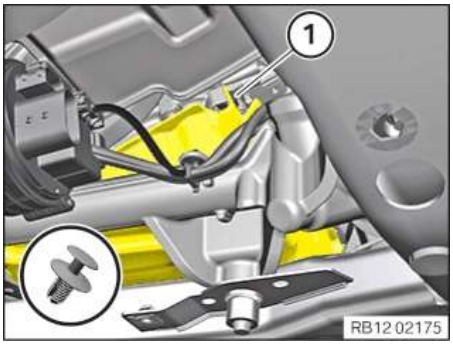
Starter motor to engine

M8X60		Tightening torque	19 Nm

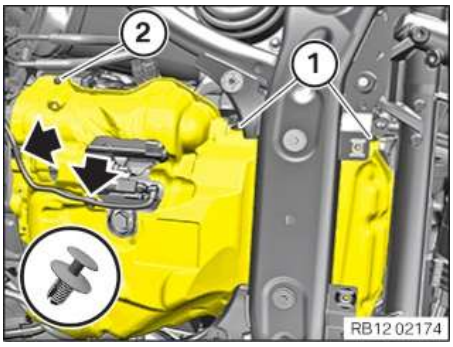


- Position the acoustic cover (2).
- Fasten expanding rivet (1).
- Secure clamp (arrow).

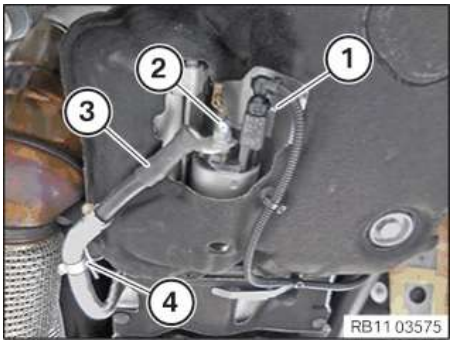
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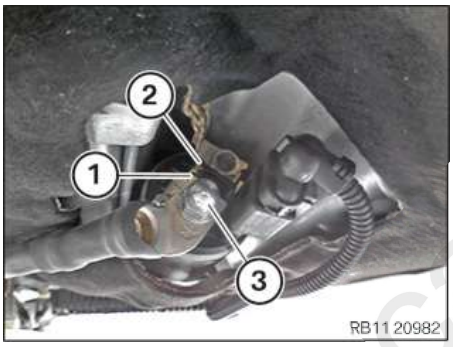
- Fasten expanding rivet (1).



- 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).

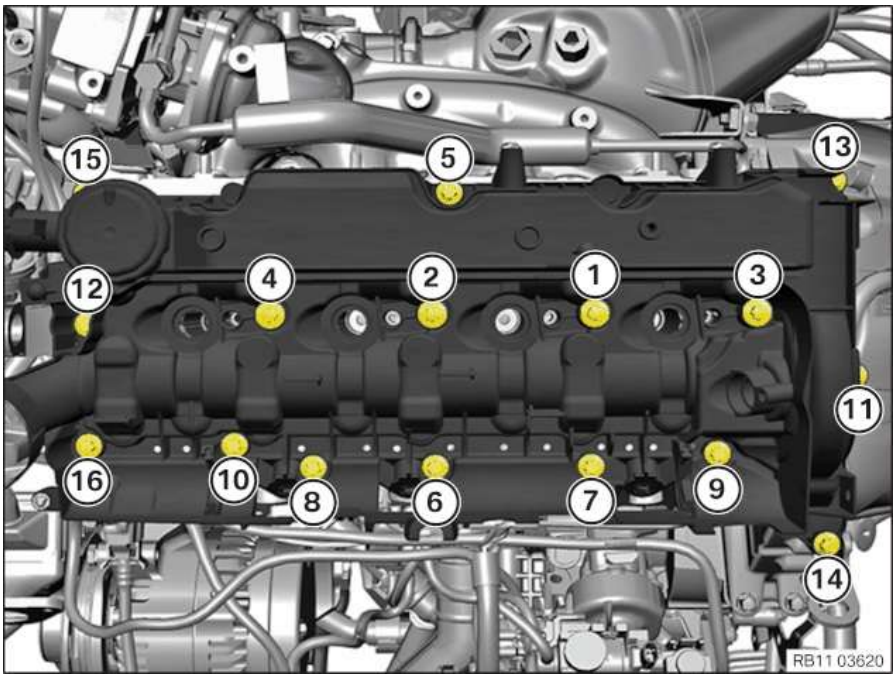
Battery positive lead to starter

M8		Tightening torque	13,5 Nm

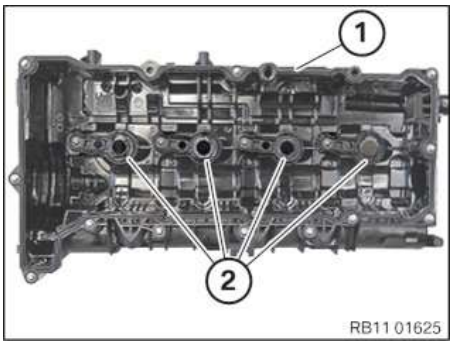
87 – Installing cylinder head cover

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Screw connection of the cylinder head cover

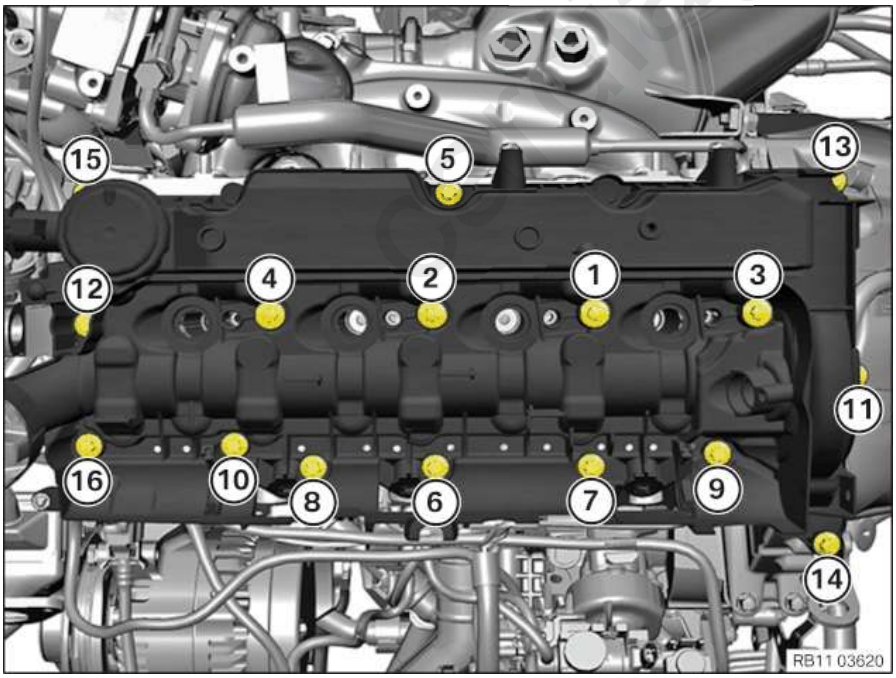


1 - 16 Bolts of the cylinder head cover



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

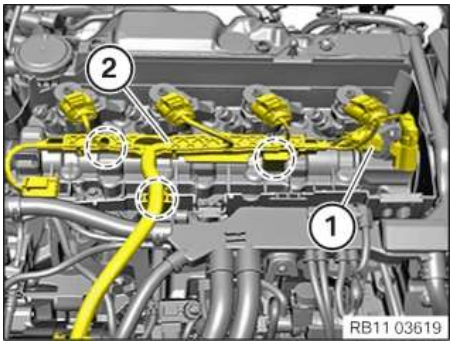
  Parts: Profile seals



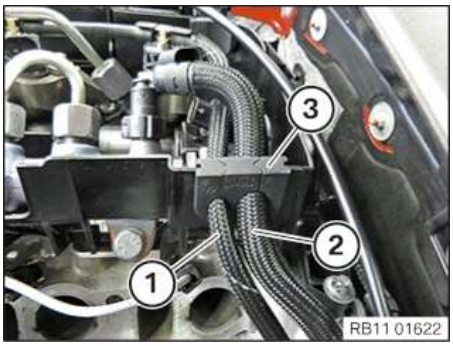
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

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.

88 – 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.

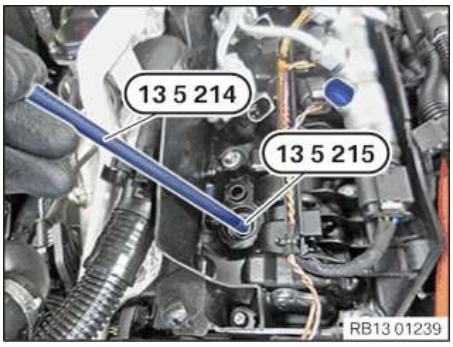
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RISK OF DAMAGE

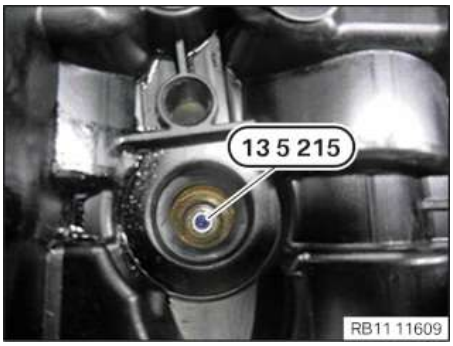
Contaminant or foreign body.

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.



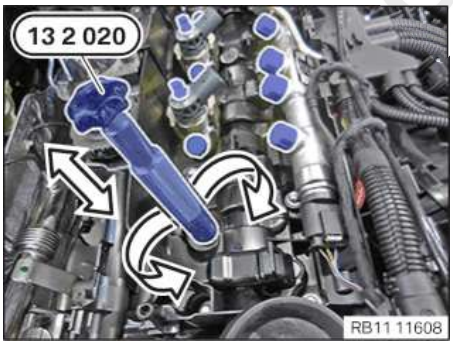
- Check whether the sealing ring remained in the injector shaft and remove the sealing ring as needed.
- Insert the special tool 0 493 763 (13 5 215) with the special tool 0 493 762 (13 5 214) from the set of special tools 0 493 758 (13 5 210) into the injector shaft.
- Remove special tool 0 493 762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



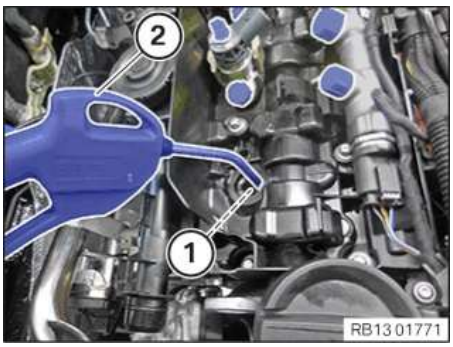
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



- 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).

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- 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.

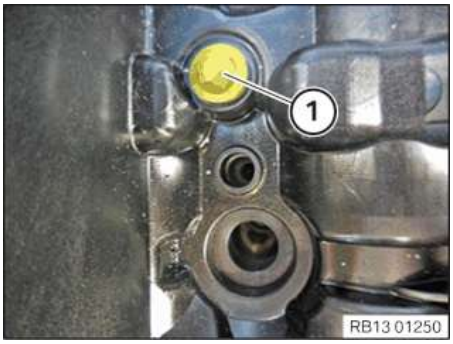
▸ **Check the placement of the clamping claw**

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**

RISK OF DAMAGE

Contaminant or foreign body.

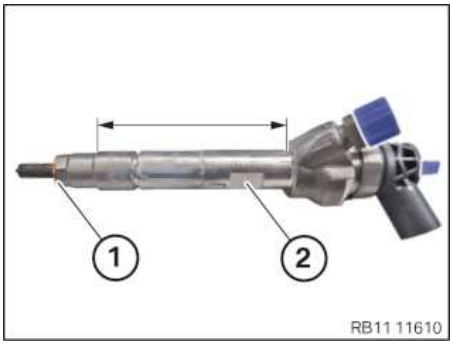
Contamination can result in malfunctions, operating failure or leaks.

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

TECHNICAL INFORMATION

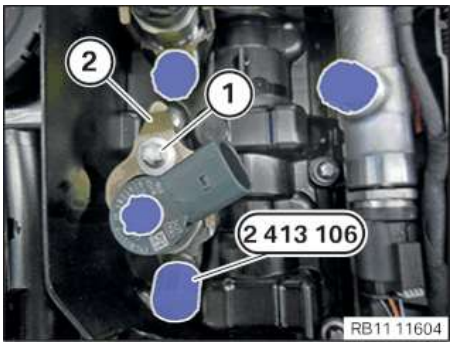
Lightly grease the injector shaft with high temperature-resistant grease.
For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue

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

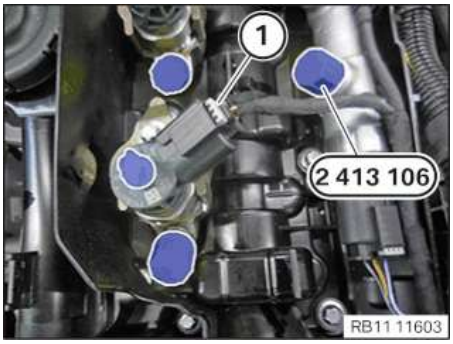
  Parts: Copper sealing ring
- Lightly grease the injector in the marked area with heat-resistant grease before installing the injector (2) in the injector shaft.



- 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.

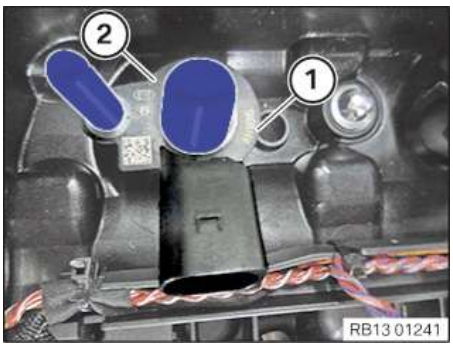
▸ **Replacement: Perform injection quantity compensation**

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.



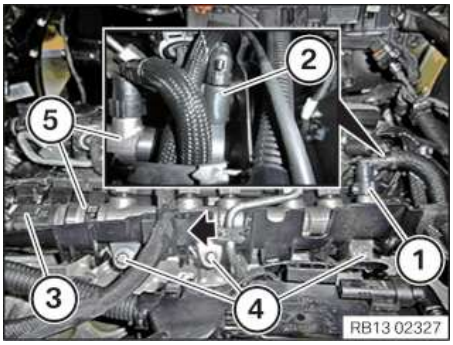
- Read off the adjustment value (1) on the new injector (2).

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- 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.

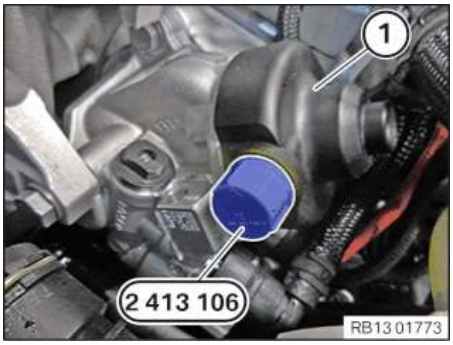
Danger of injury!

- 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.

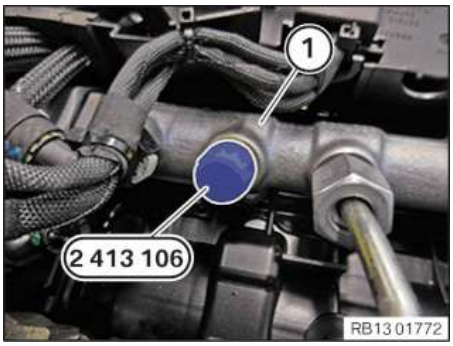
TECHNICAL INFORMATION

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

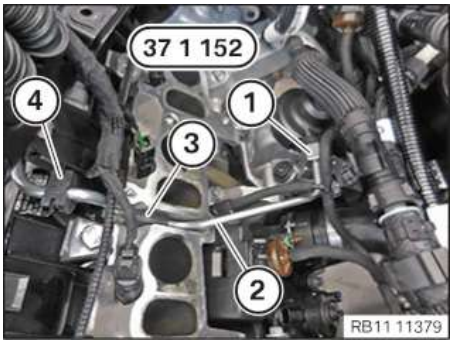
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- Feed out and remove special tool on the high pressure pump (1).



- 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.

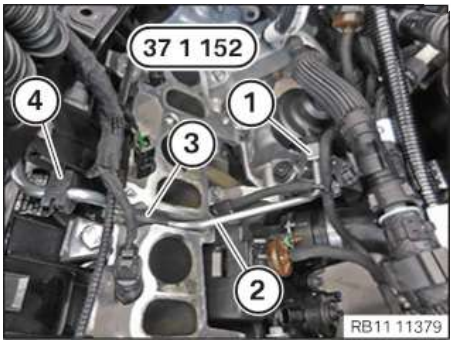
TECHNICAL INFORMATION

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.

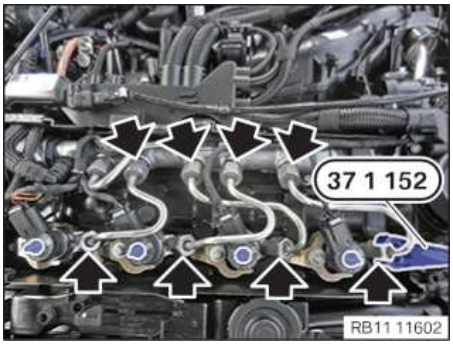
- Tighten union nut (1) on the high pressure pump with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm

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

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- 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.

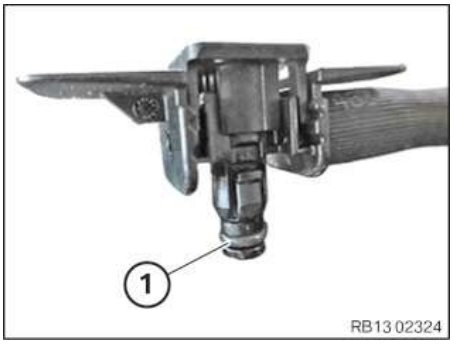
- Tighten the high pressure lines (arrows) with the special tool .

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

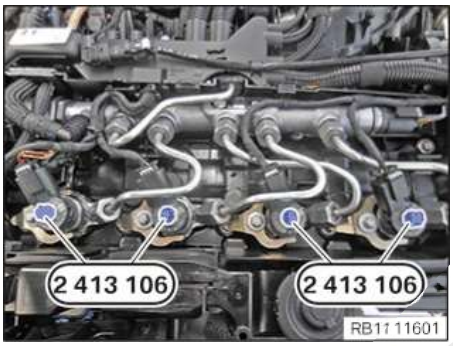


- **Version A:**

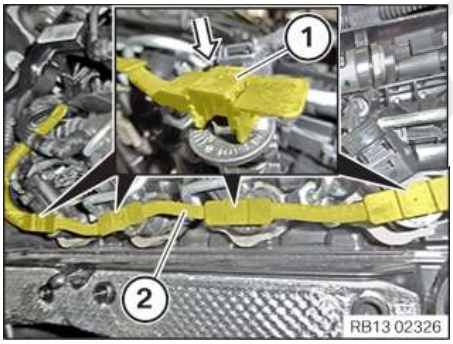
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

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

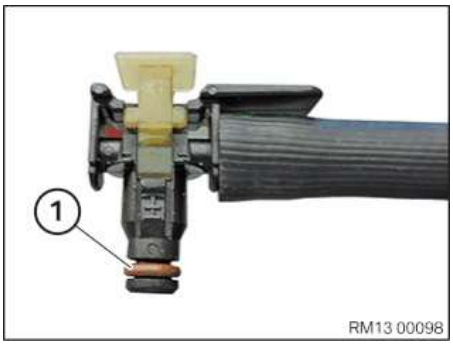
  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.



- 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.



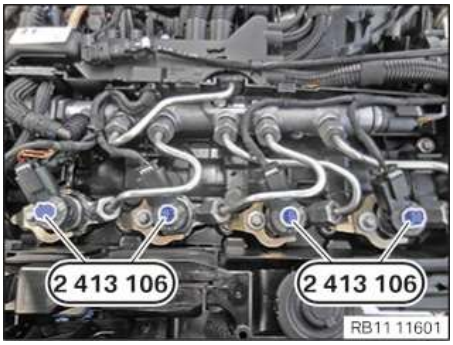
- **Version B**:

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

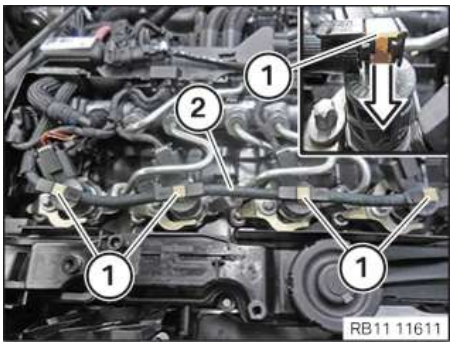
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

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

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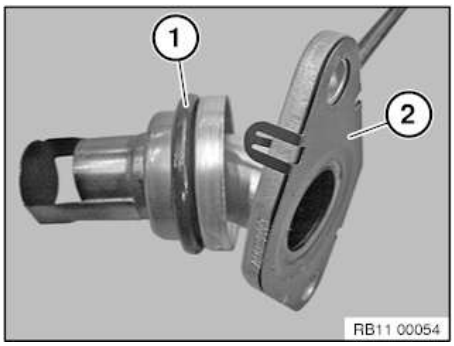


- Feed out the special tools and remove.



- 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.

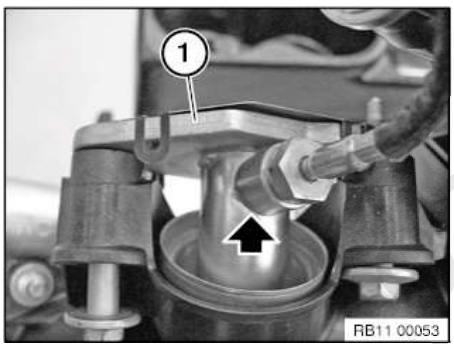
93 – Installing the intake plenum



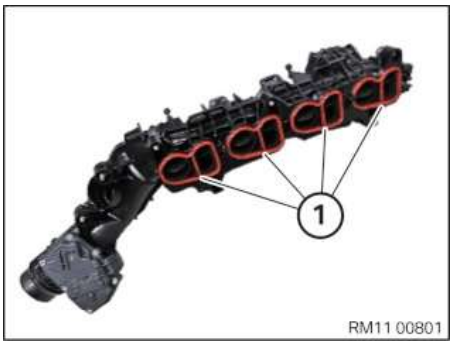
- Renew O-ring (1).

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

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



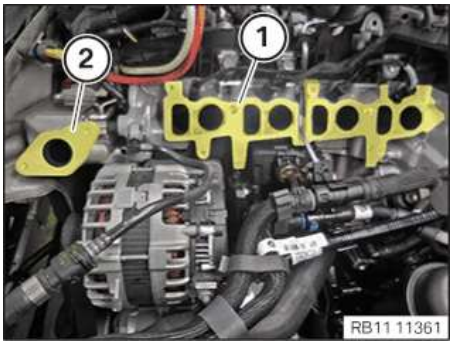
- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).



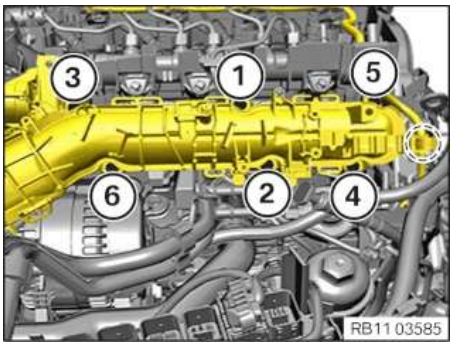
- Renew seals (1).

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

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

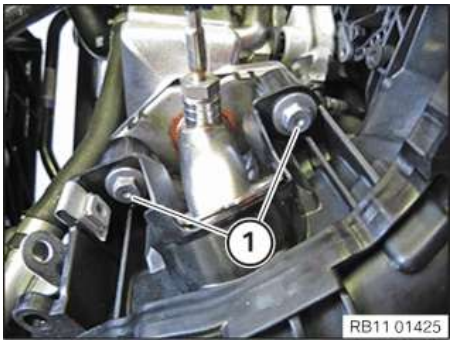


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

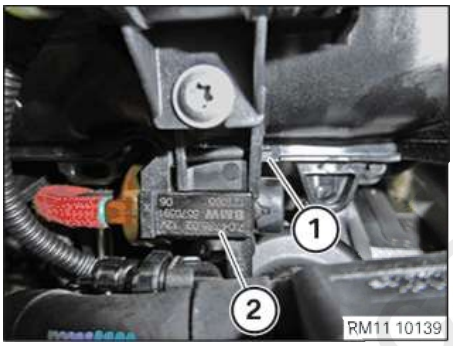
- Attach the wiring harness and fuel lines in the marked area on the intake plenum.



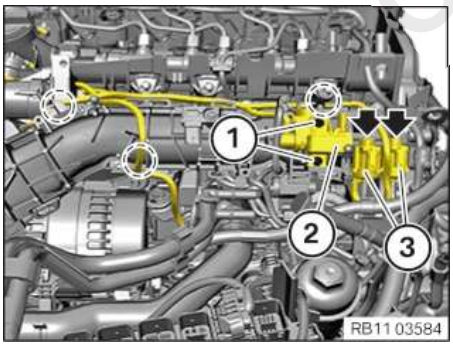
- Tighten the screws (1).

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.



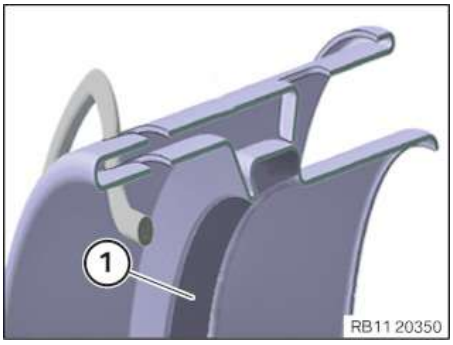
- Check the seal (1) for damage, and renew if necessary.

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▸ **Replacing damaged seal**

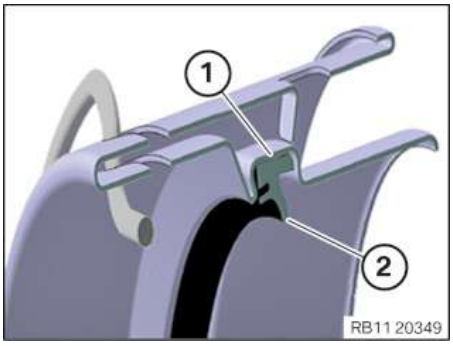
TECHNICAL INFORMATION

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.

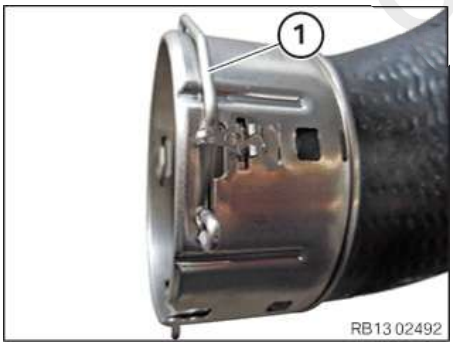
TECHNICAL INFORMATION

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

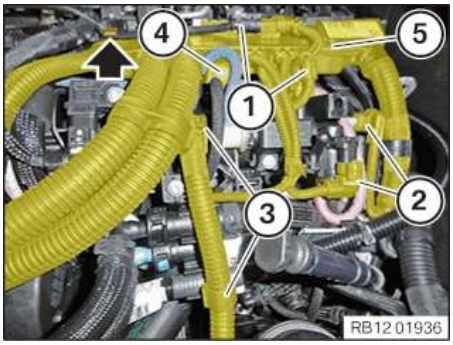
RISK OF DAMAGE

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.

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

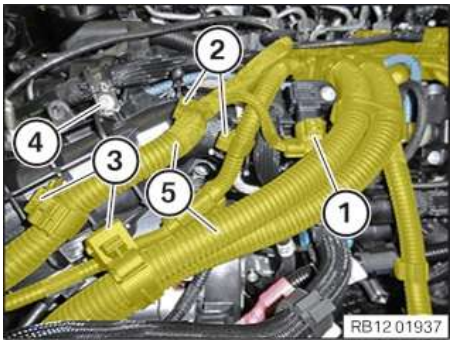
Wiring harness section to manifold

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.



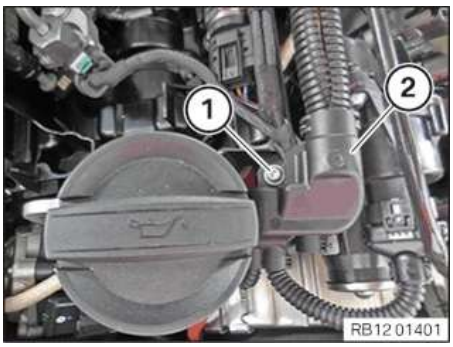
- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

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.

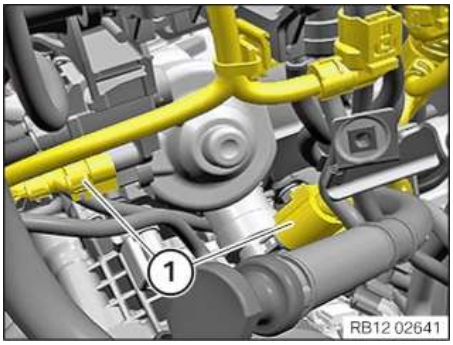
  The connector (1) must engage audibly.



- Connect the connector (1) and lock it.

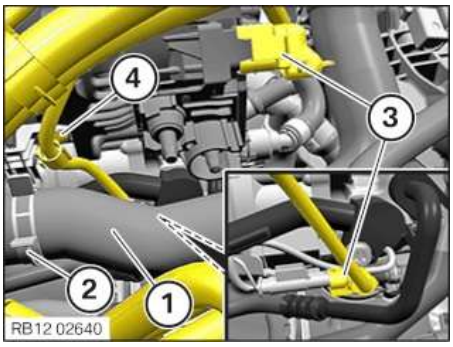
  The connector (1) must engage audibly.

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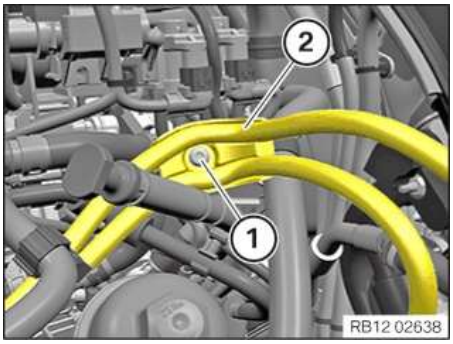
- Connect connectors (1) and lock.

  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



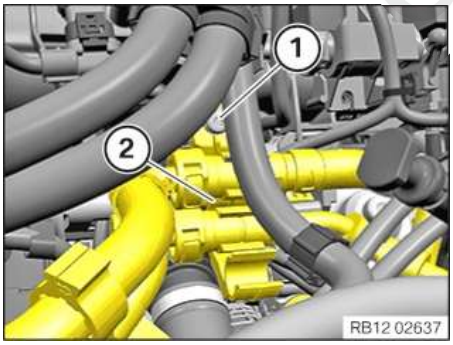
- Feed in and install the positive battery cable (4).
- Feed in and position the positive battery cables (4) .
- Renew the nuts (3) and (2).

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

Battery positive lead on the starter motor generator

M8		Tightening torque	19 Nm

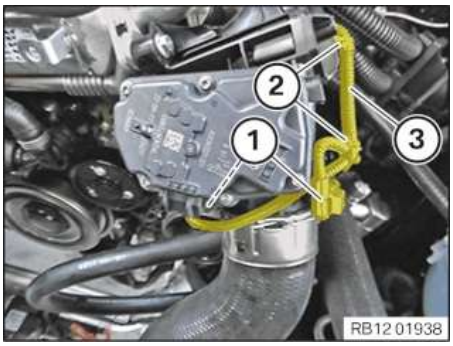
- Guide in and install the lid (1).



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

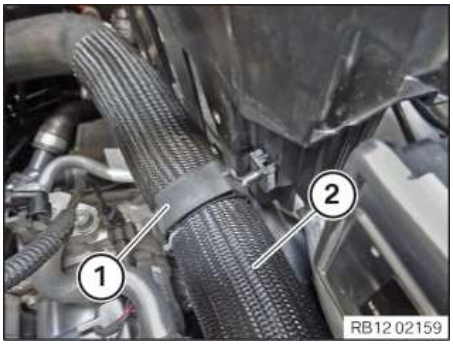
Holder on intake plenum

TS6X20		Tightening torque	5 Nm



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

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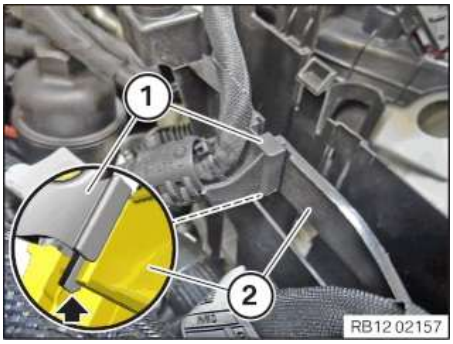
- Feed in and install coolant line (2).
- Lock holder (1).

  The holder (1) must engage audibly.



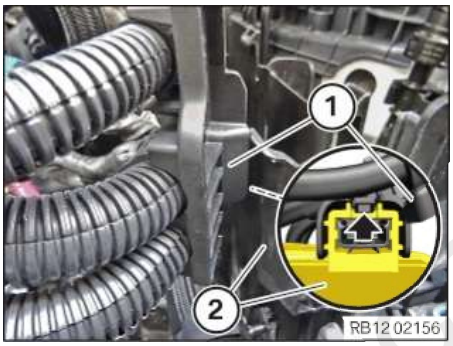
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.



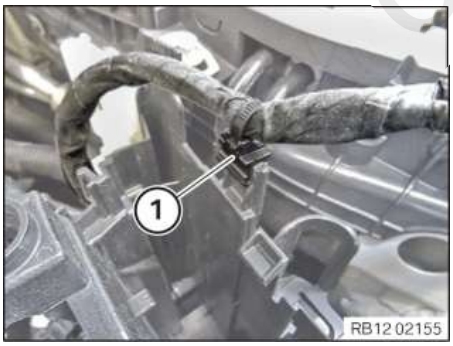
- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.



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

  Lock (arrow) must audibly engage.



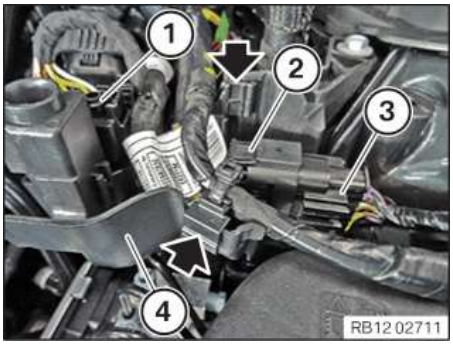
- Secure clamps (1).



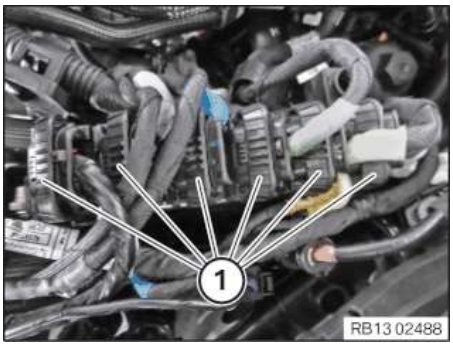
- Feed in and install the connector (1).

  The connector (1) must engage audibly.

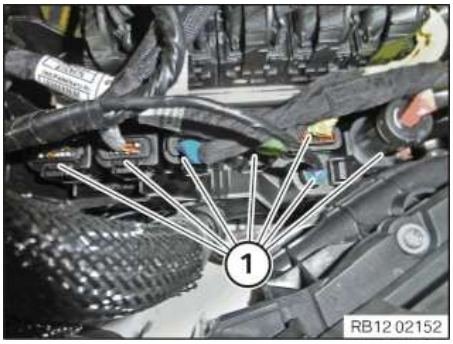
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- Connect connector (3) to control unit holder (4) and lock it.
  The connector (3) must engage audibly.
- Connect connectors (2) and lock.
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.
  The connector (1) must engage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

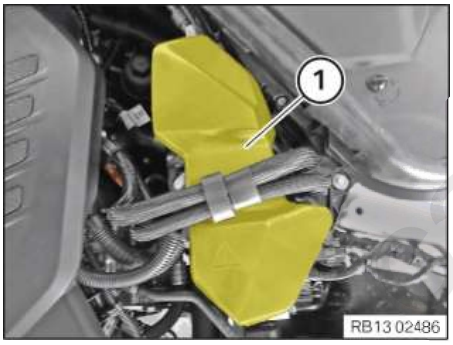


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



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

95 – Install the cover for the DDE control unit

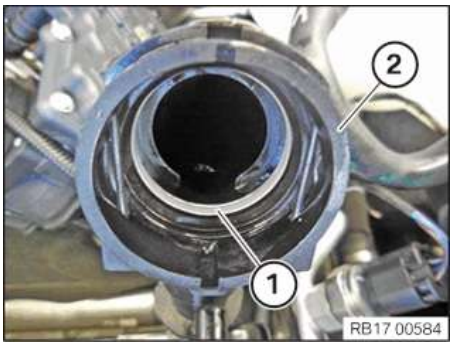


- Insert and install cover (1) into guides.

96 – Connecting the coolant lines

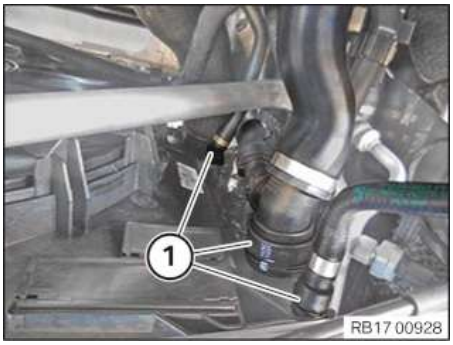
TECHNICAL INFORMATION

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.

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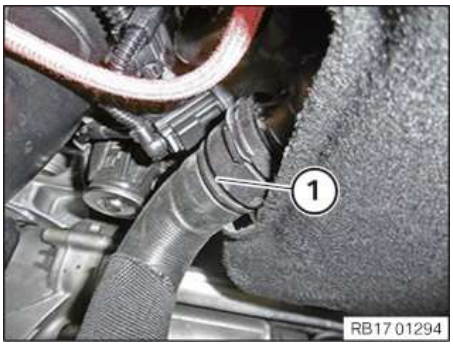


NOTICE

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

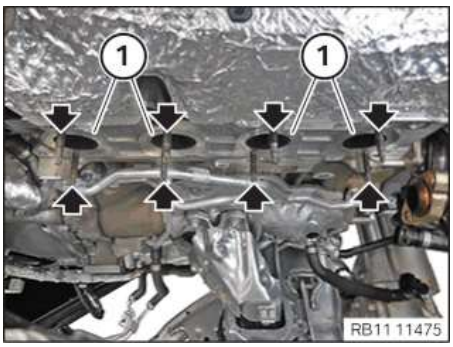
Damage to the surface.

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

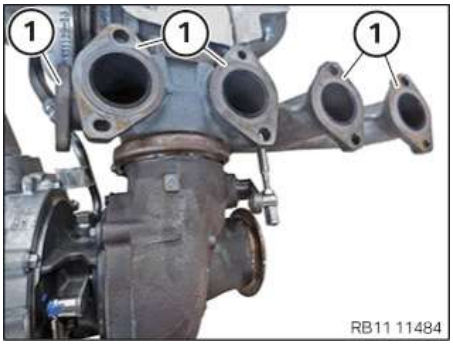
The sealing surfaces must be free from oils, grease and cleaning agents.



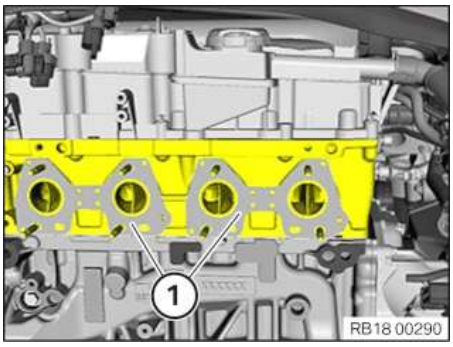
- Check the stud bolts (arrows) on the cylinder head for **correct** fit.
- Clean the connection points (1) with the special tool 0 495 102 (11 4 470).
- Renew gaskets.

  Parts: Seals

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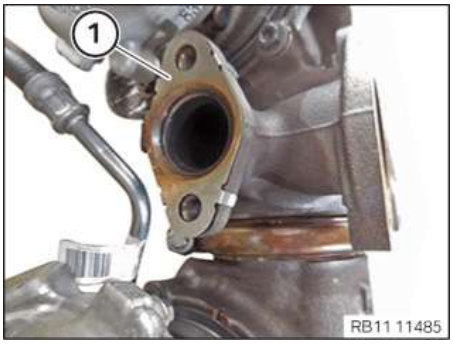
- Clean the connection points (1) on the exhaust manifold with the special tool 0 495 102 (11 4 470).



TECHNICAL INFORMATION

The **coated side** of the seal must be on the side of the exhaust manifold.

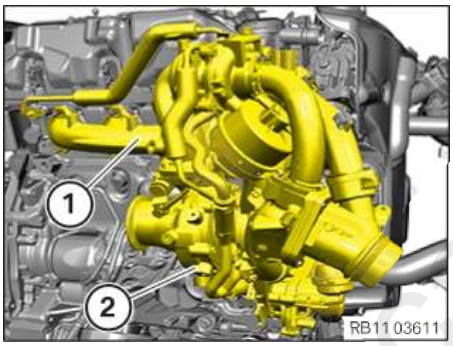
- Insert and install the gaskets (1).



- Renew the seal (1).

  Parts: Gasket

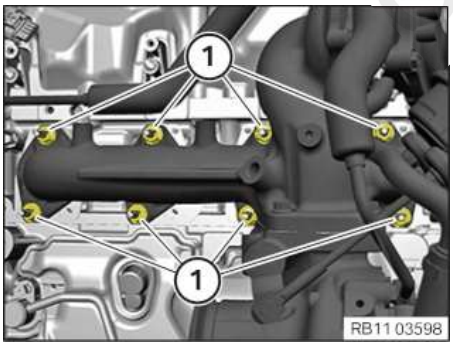
- Insert and install the seal (1).



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.



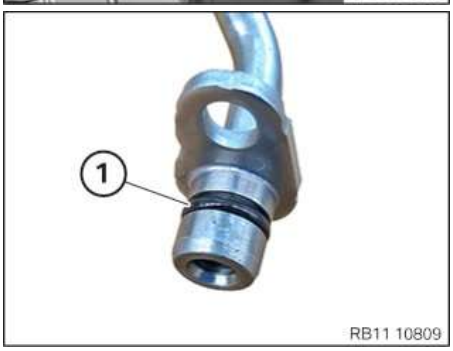
- Renew nuts (1).

  Parts: Nuts

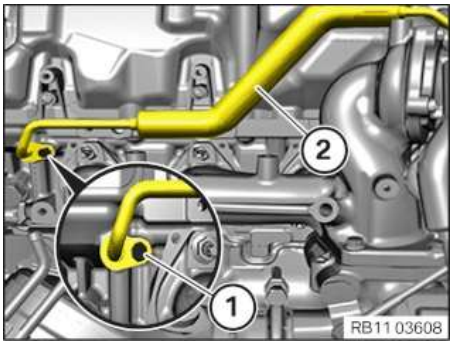
- Tighten the nuts (1) evenly from the inside out.

Exhaust manifold to cylinder head

M7	**If necessary, renew loose stud bolts.**	Tightening torque	11 Nm
	Renew nuts.	Tightening torque	13 Nm



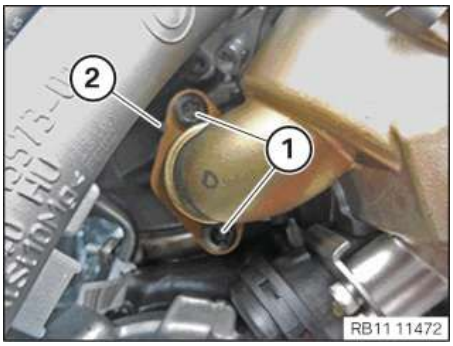
- Check the seal (1) for damage, if necessary, renew the oil feed line.



- 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

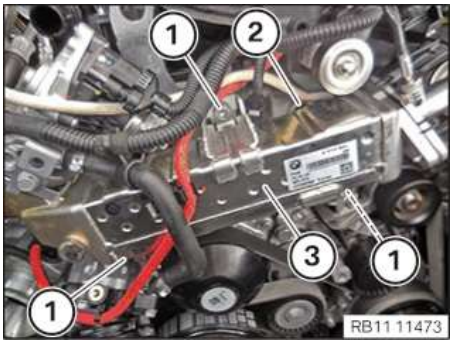


- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

M8x28	Replace screws	Tightening torque	32 Nm

- Ensure that seal (2) is installed.



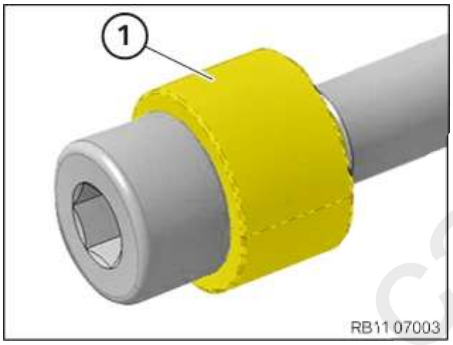
- Position the exhaust-gas recirculation cooler (3).
- Make sure the pipe neck (2) is fitted correctly.
- Tighten the screws (1).

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.



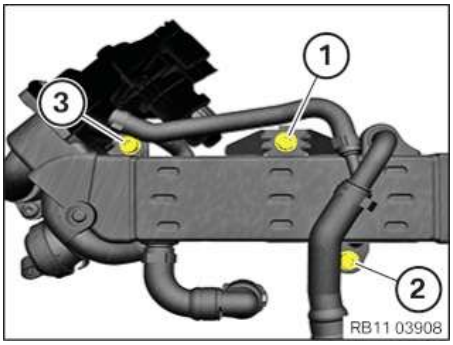
Result

» Screws **without** sleeves (1) are available.

Measure

- Renew screws.

  Parts: Screws (part number 9 886 429)

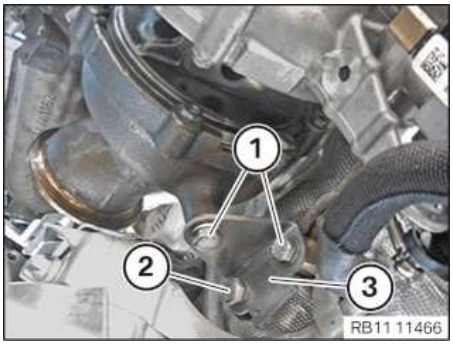


- Tighten the screws (1) to (3).

Exhaust-gas recirculation cooler to cylinder head

M8x20 / M8x28		Tightening torque	19 Nm

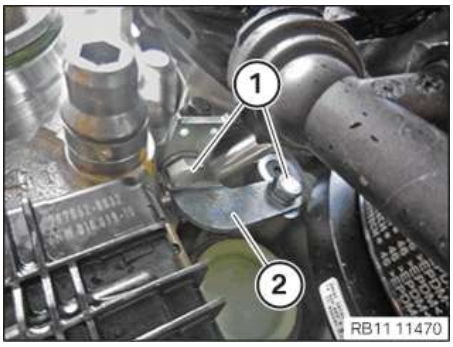
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- Tighten the bolts (1) and (2) on the bracket (3).

Exhaust turbocharger low-pressure stage to crankcase

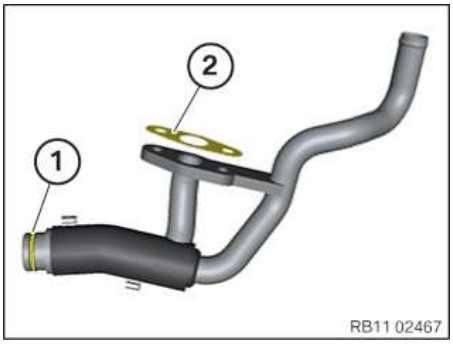
M8X16		Tightening torque	22 Nm



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

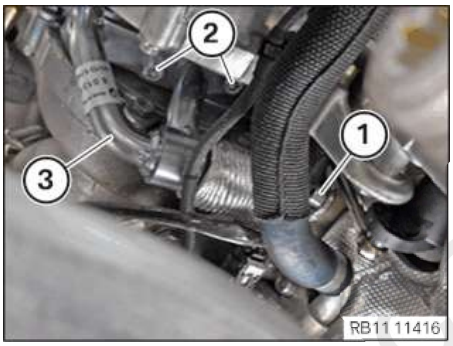
Exhaust turbocharger low-pressure stage to crankcase

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

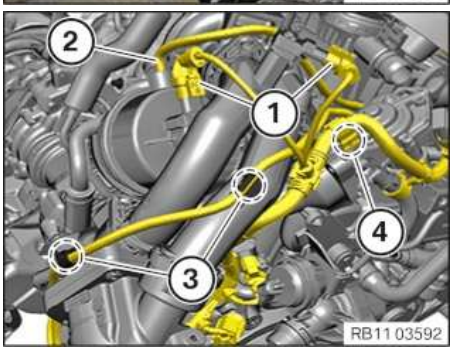
- Install the bolt (1).



- Tighten the screws of the oil return line on the crankcase from the right wheel arch.

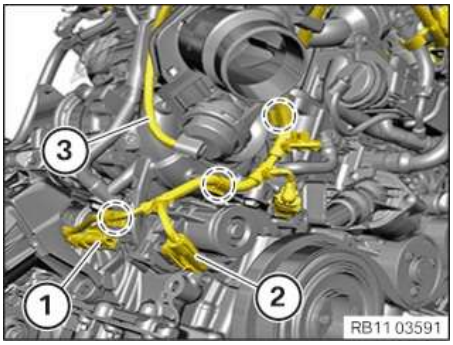
Oil return line to crankcase

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.

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- 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

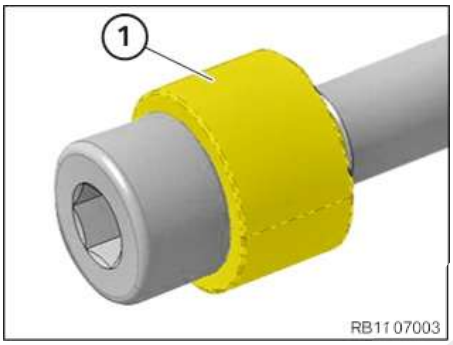
Escaping coolant on the starter generator.

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.

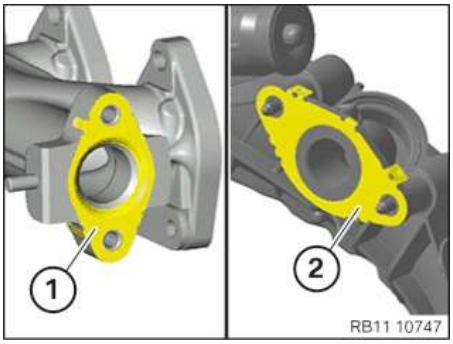
Result

» Screws **without** sleeves (1) are available.

Measure

- Renew screws.

  Parts: Screws (part number 9 886 429)

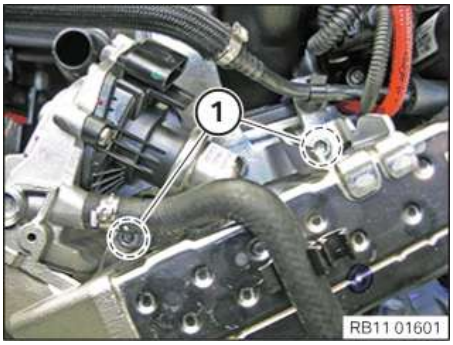


- Renew the seal (1) between the exhaust manifold and the exhaust-gas recirculation cooler.

  Parts: Gasket
- Renew the seal (2) between exhaust-gas recirculation cooler and intake air plenum.

  Parts: Gasket

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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

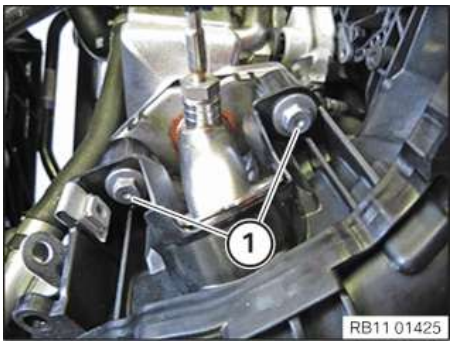
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screw (1) under the exhaust-gas recirculation cooler and then release again.

Exhaust-gas recirculation cooler to cylinder head

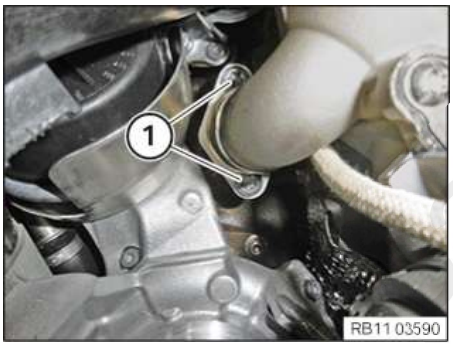
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

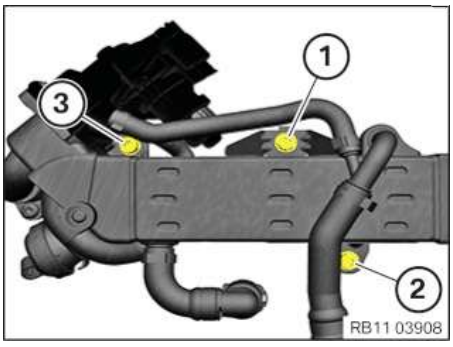
		Tightening torque	10 Nm



- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

M8x28	Replace screws	Tightening torque	32 Nm

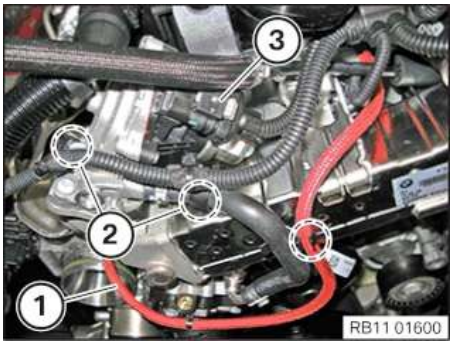


- Tighten screws in the order (1) to (3).

Exhaust-gas recirculation cooler to cylinder head

M8x20 / M8x28		Tightening torque	19 Nm

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- 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.

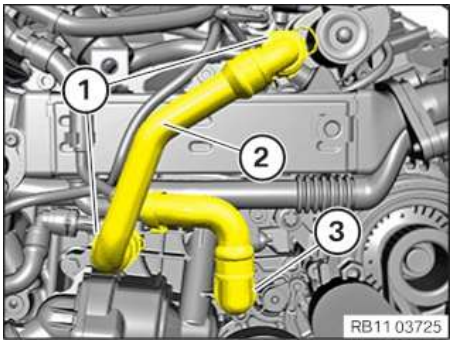


TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.

- **Version A:**

  Connect and audibly lock coolant lines (1).



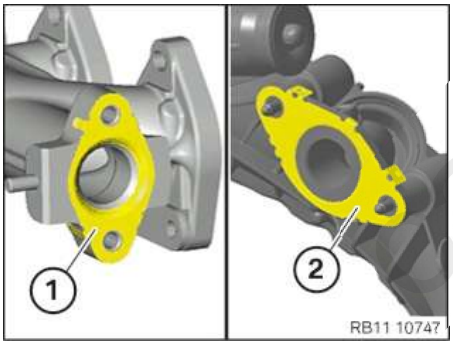
TECHNICAL INFORMATION

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).

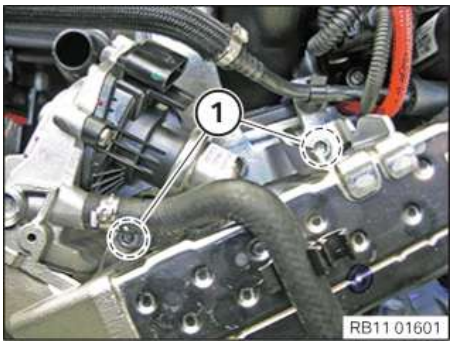
▸ **Installing the exhaust-gas recirculation cooler**



- 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 °

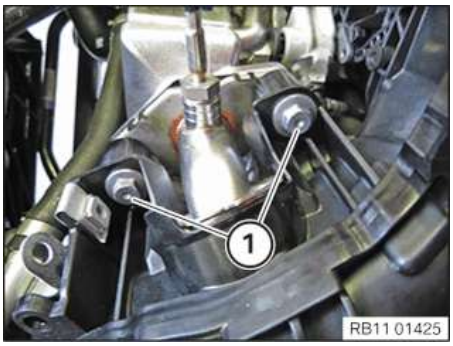
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- Tighten the screw (1) under the exhaust-gas recirculation cooler and then release again.

Exhaust-gas recirculation cooler to cylinder head

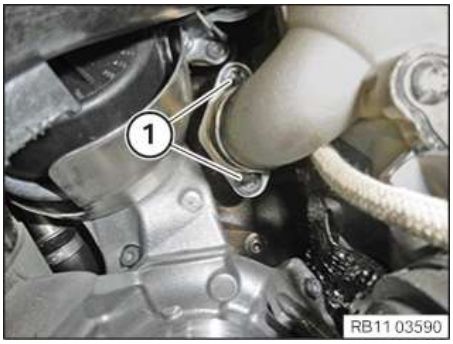
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

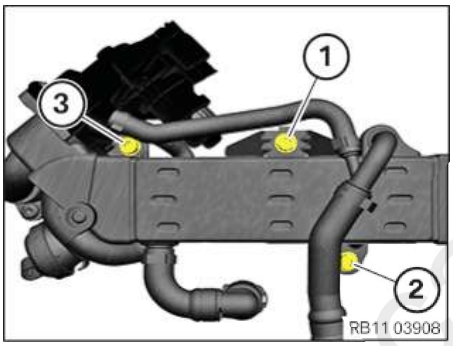
		Tightening torque	10 Nm



- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

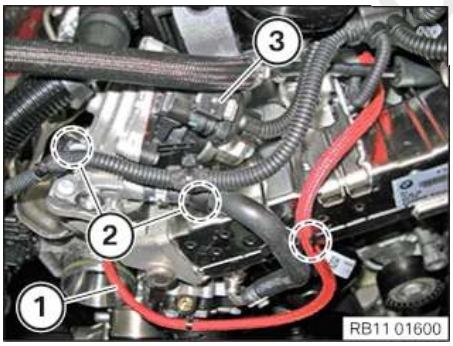
M8x28	Replace screws	Tightening torque	32 Nm



- 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.



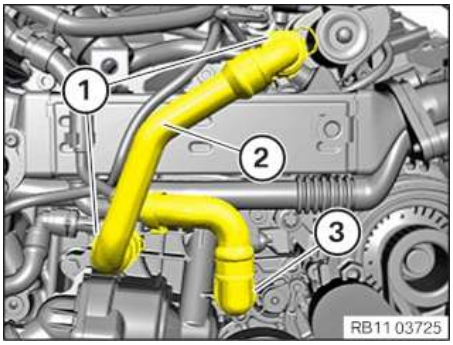
TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.

- **Version A:**

  Connect and audibly lock coolant lines (1).

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TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.

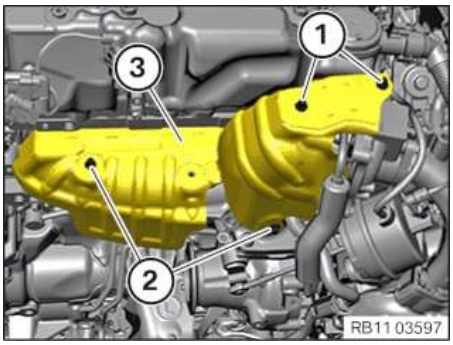
- **Version B:**

  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.

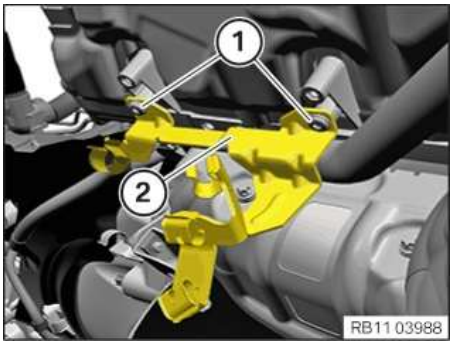
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

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.

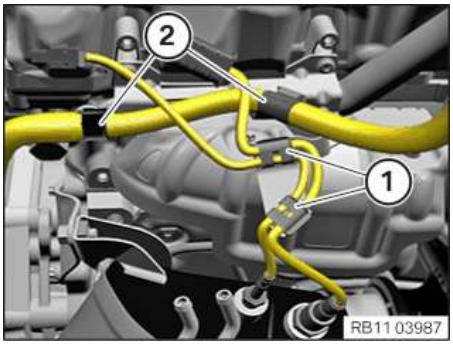


- Insert and install the holder (2).
- Tighten the screws (1).

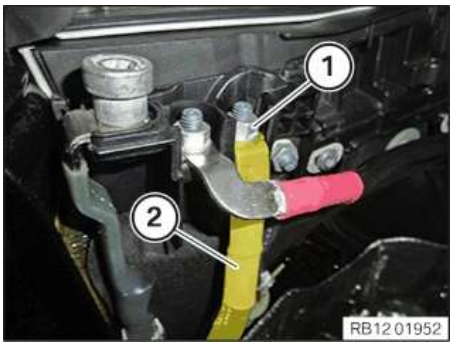
Bracket on cylinder head cover

	Tightening torque	5 Nm

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



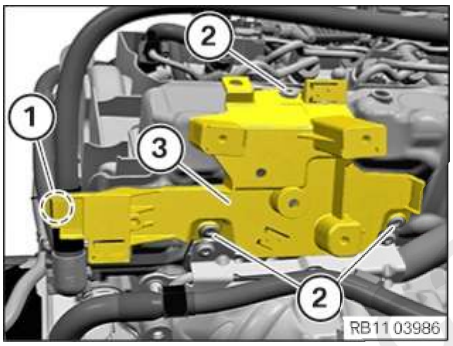
- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

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.

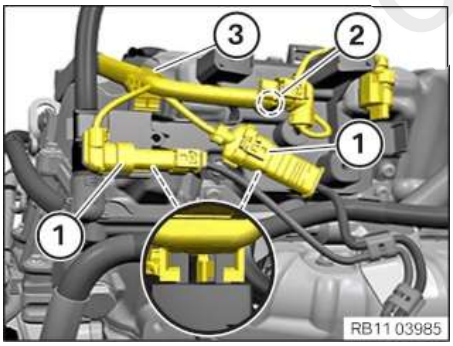


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

		Tightening torque	5 Nm

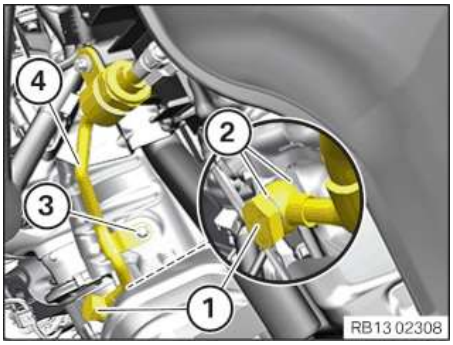
- Fasten the positive battery cable in the area (1) in the clamp.



- 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

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- 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).

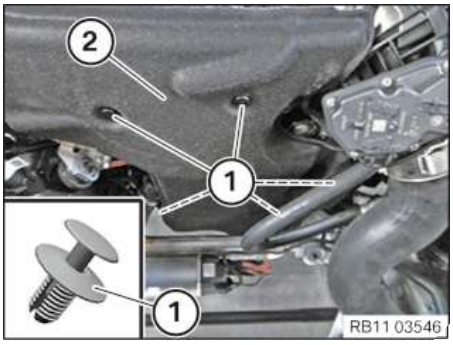
Exhaust gas pressure pipe to sensor system holder

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).

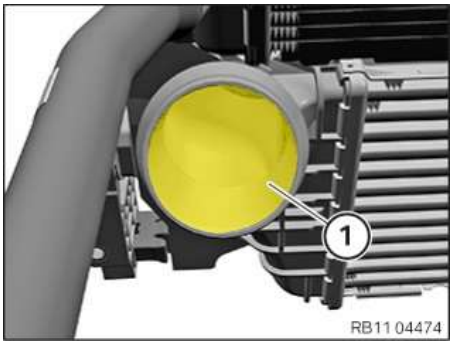
103 – Install pressure pipe between exhaust turbocharger and charge air cooler

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.

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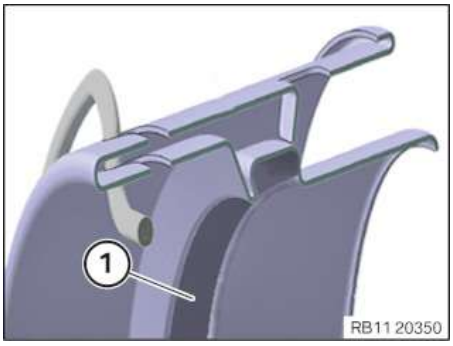
- Check the seal (1) for damage and renew if necessary.

  Parts: Gasket

▸ **Replacing damaged seal**

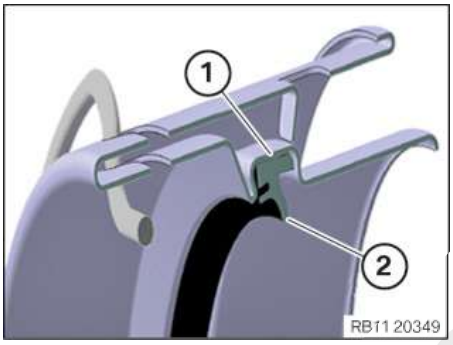
TECHNICAL INFORMATION

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.



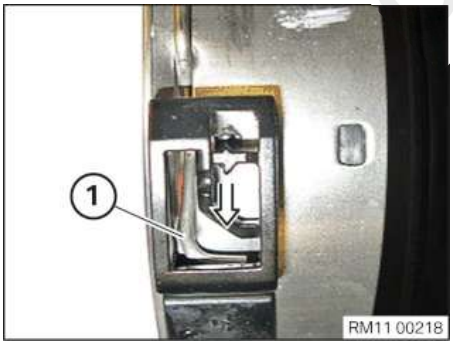
- Renew gasket.

  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.



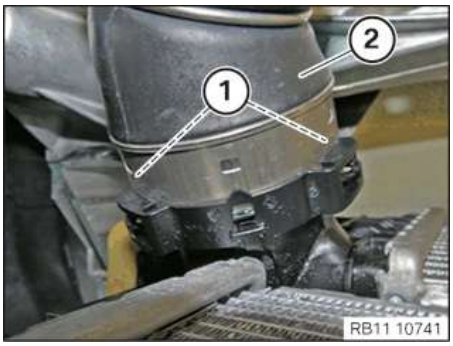
- Pay attention to the installation position:

  The pressure pipe fits on charge air cooler in one installation position only.

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- Install the pressure pipe (1) from the top.



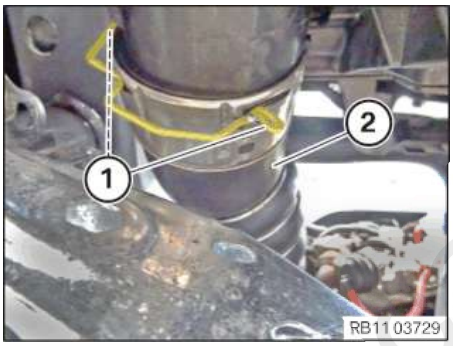
- Connect pressure pipe (2) to charge air cooler.
- Lock the lock (1) on both sides.



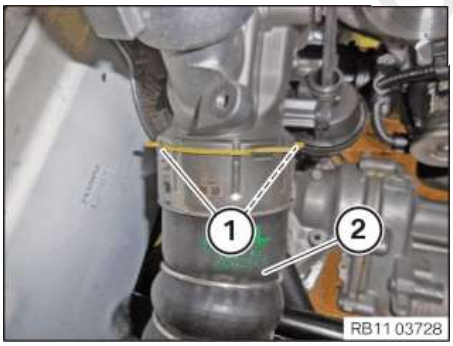
- **Version B:**

  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.



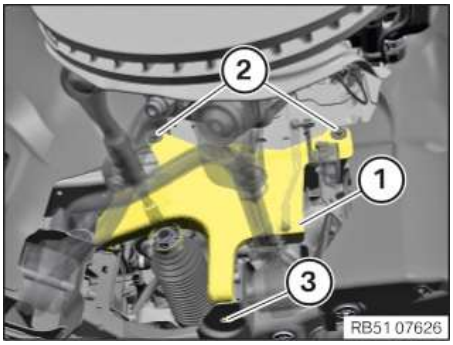
- Place the pressure pipe (2) onto the compressor bypass and ensure that the lock (1) engages audibly.

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.

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- 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.

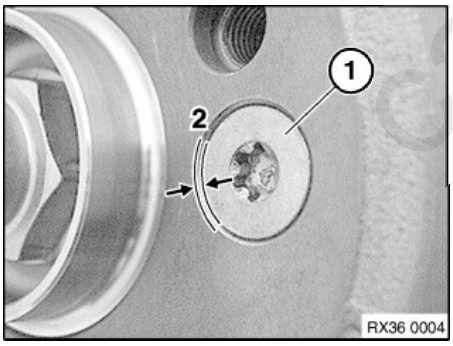
- Remove dirt, grease residues and corrosion from the contact surface with a drill and the special tool 2 344 011.

  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.

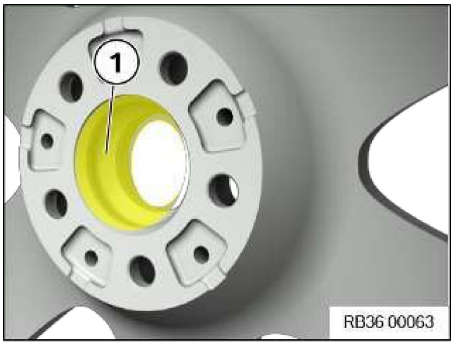
Brake disc to front wheel hub

M8	Renew screw.	Tightening torque	16 Nm

Brake disc to rear wheel hub

M8	Renew screw.	Tightening torque	16 Nm

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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

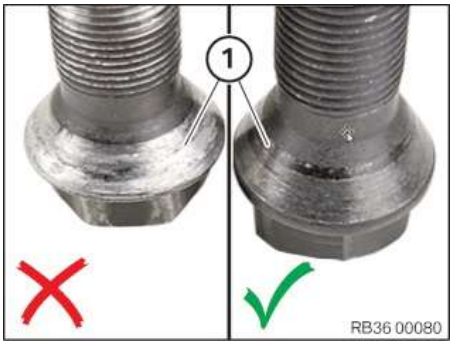
A wheel lift is recommended for easier wheel removal and installation without exertion (see Retailer Equipment Catalogue).

- **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.**



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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

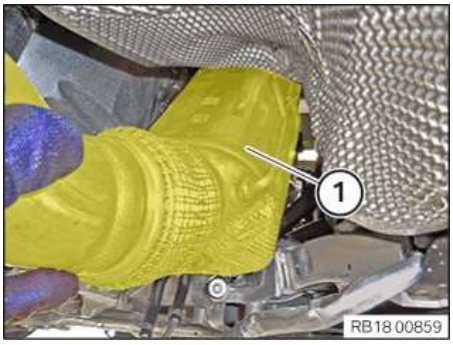
107 – Installing the diesel particulate filter

CAUTION

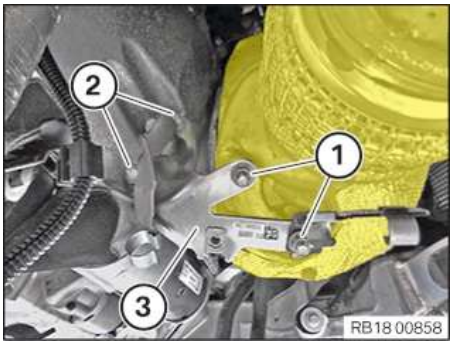
Heavy component.

Heavy components can lead to injury or damage.

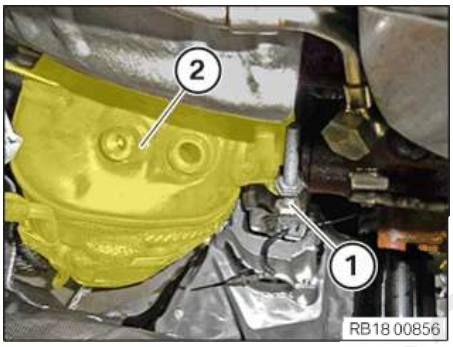
- Remove and install heavy components with the aid of another person/other persons.



- 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**.

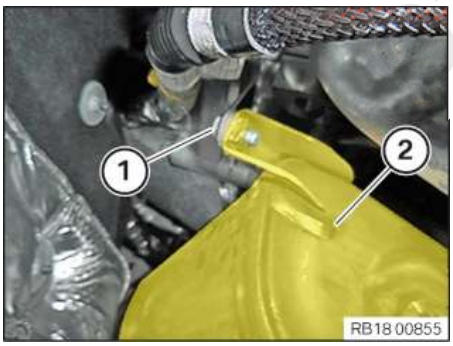


- Renew the V-clip (1).

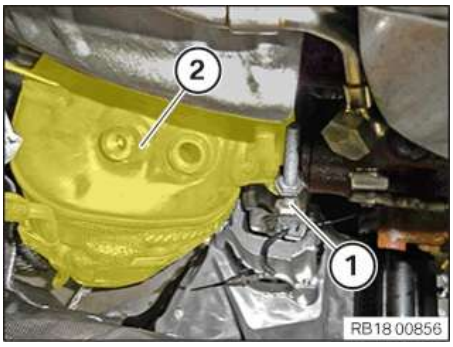
  Parts: V-band clamp
- Feed in and install V-band clamp (1).

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**.

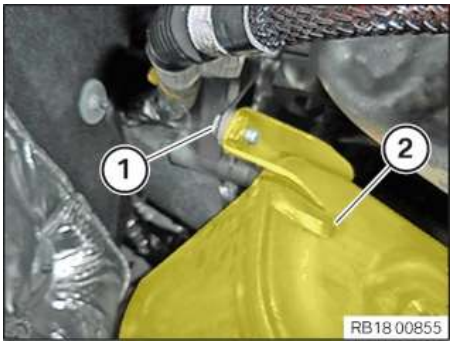


- Tighten the V-clip (1) of the diesel particulate filter (2).

Diesel particulate filter V-clip to exhaust turbocharger

V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

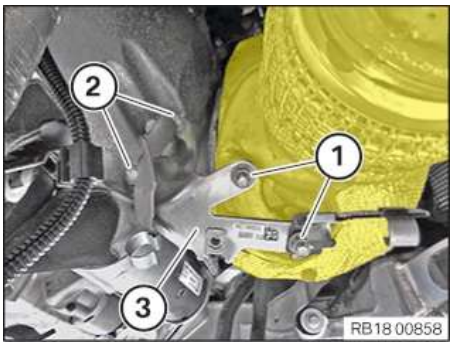
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- Tighten the bolt (1) on the bracket of the diesel particulate filter (2).

Bracket to diesel particulate filter top

M8		Tightening torque	19 Nm



- Tighten the screws (2) on the holder (3).

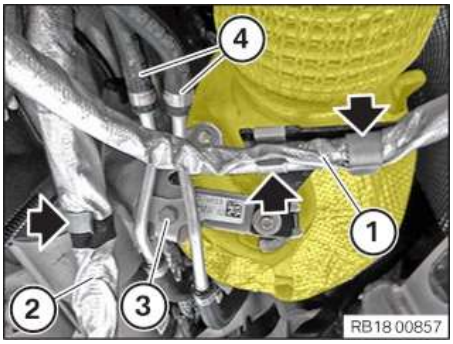
Bracket to transmission for diesel particulate filter holder bottom

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

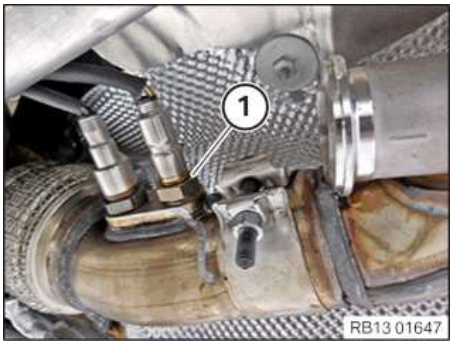
RISK OF DAMAGE



Damage to the nitrogen oxide sensor.

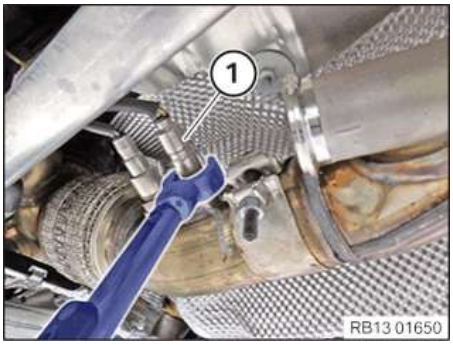
Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

- 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).

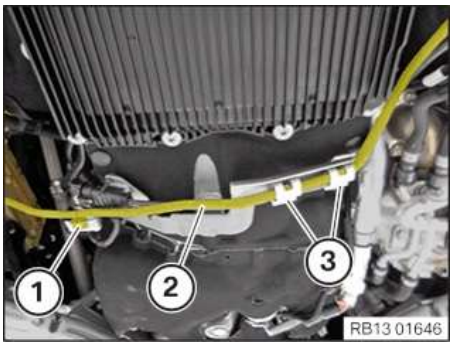
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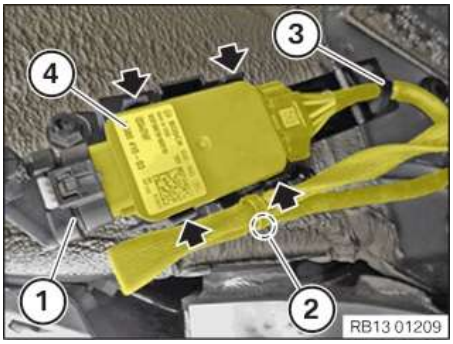
- Tighten the nitrogen oxide sensor (1) using commercially available tools.

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

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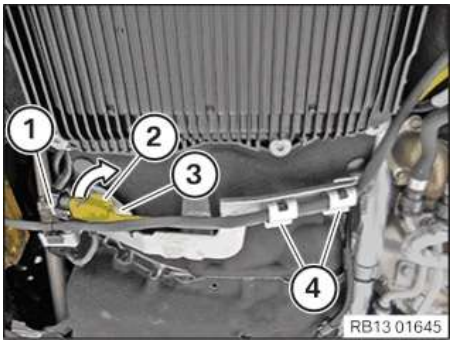
- Insert the monitoring oxygen sensor (1) and install it.



- 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.

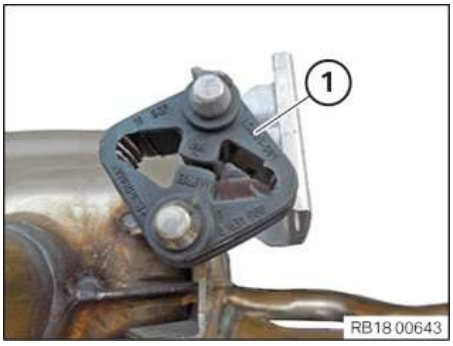
Heavy components can lead to injury or damage.

- 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.

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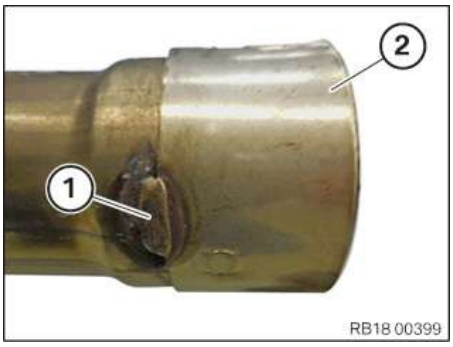


NOTICE

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



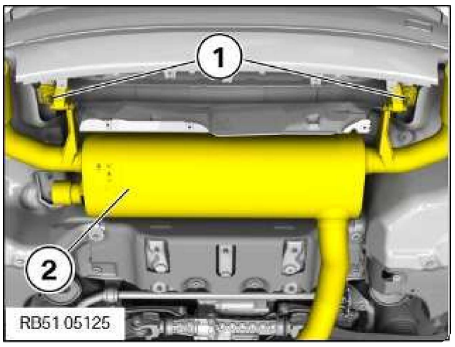
CAUTION

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).

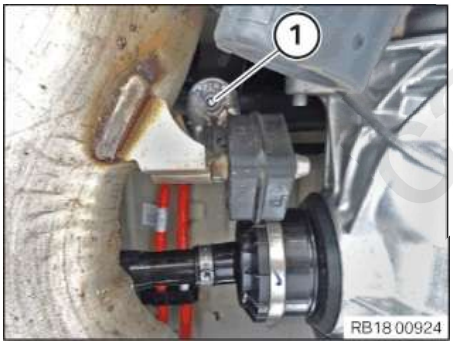


- Insert and install the exhaust system (2).
- Renew nuts (1).

  Parts: Nuts
- Tighten nuts (1).

Rear silencer to body / bumper support

M8	Replace nuts.	Tightening torque	19 Nm

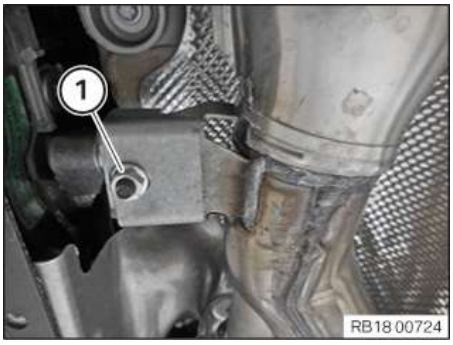


- Renew nut (1) on the rear axle support.

  Parts: Nut
- Tighten nut (1).

Exhaust system to rear axle carrier

M8 nut		Tightening torque	19 Nm

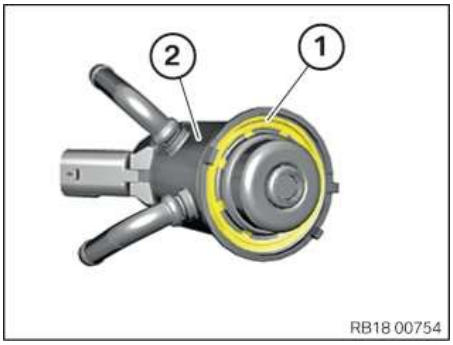


- Tighten nut (1).

Exhaust system to transmission

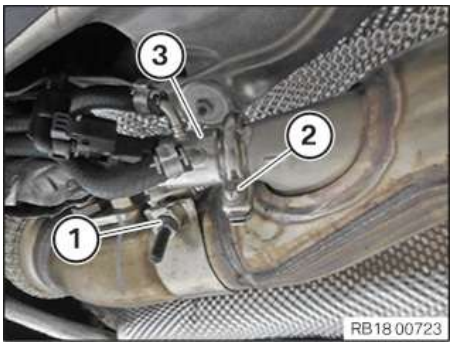
M8		Tightening torque	19 Nm

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- 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

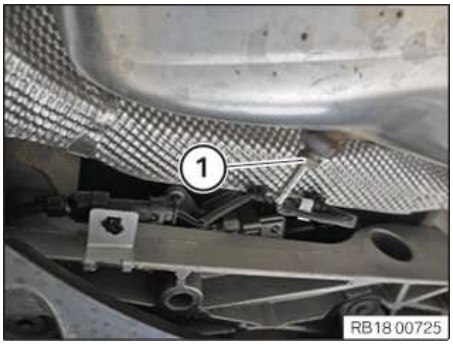
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

- 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

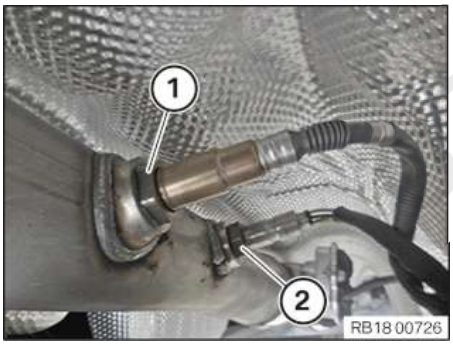
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm



- 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

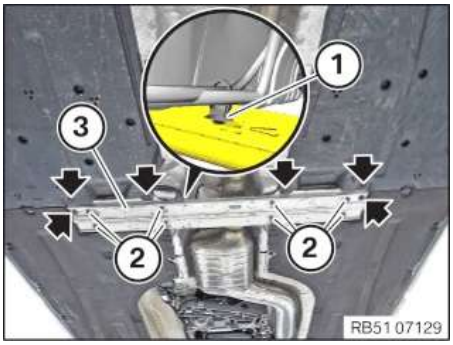
- Install the nitrogen oxide sensor (2) in the exhaust system and tighten.

Nitrogen oxide sensor downstream of SCR catalytic converter

Sensor		Tightening torque	55 Nm

111 – Install the connecting supports on the tunnel

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- Guide in and install connecting support (3) on the tunnel.
- Tighten the screws (2).
- Tighten screws (arrows).

Connecting support to tunnel

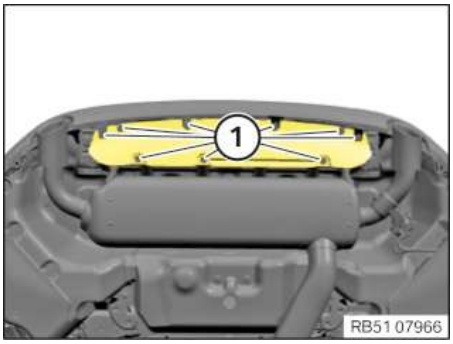
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

NOTICE

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

- Secure the clamp (1).

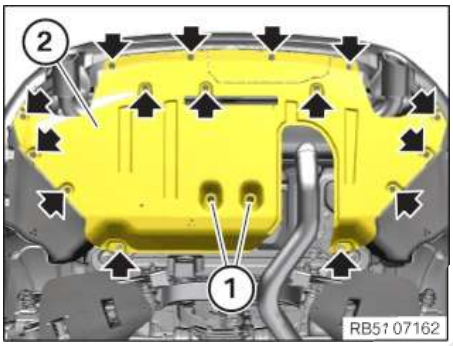
112 – Installing the rear diffuser



- **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

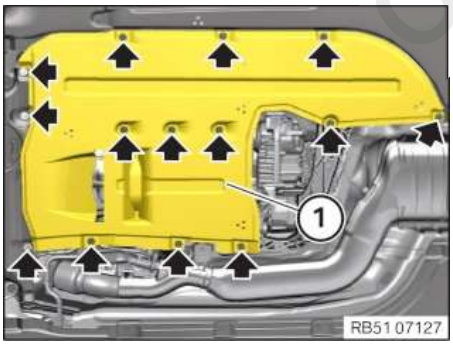
Nuts and screws		Tightening torque	3 Nm

- Tighten nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm

113 – Installing underbody protection at rear



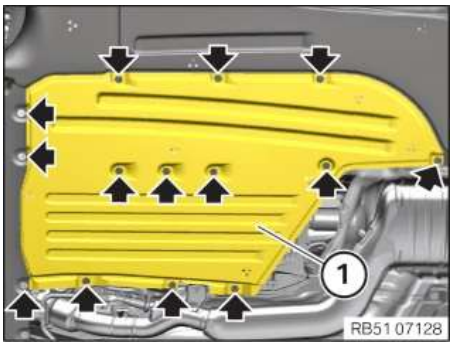
- **Version A:**

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

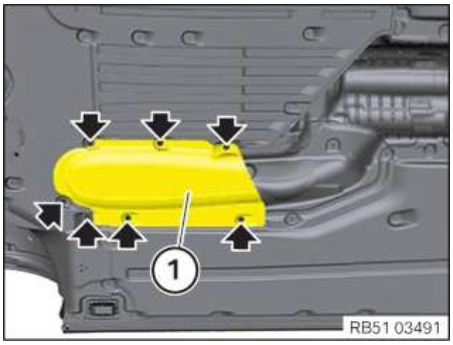
Hexagon screw		Tightening torque	3 Nm

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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.

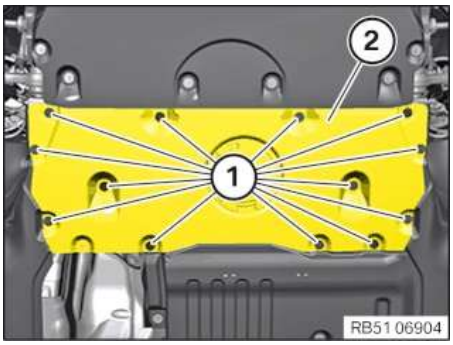


- Insert the underbody panelling (1).
- Tighten screws (arrows).

Underbody panelling

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

115 – Installing the centre underbody protection



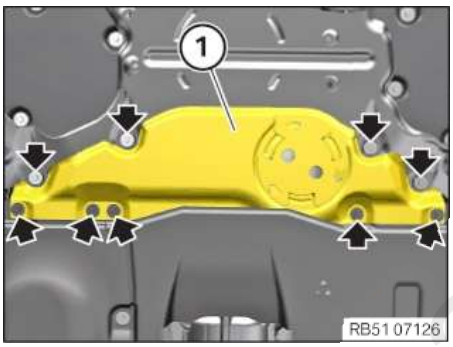
- **Variant with rear wheel drive:**

  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).

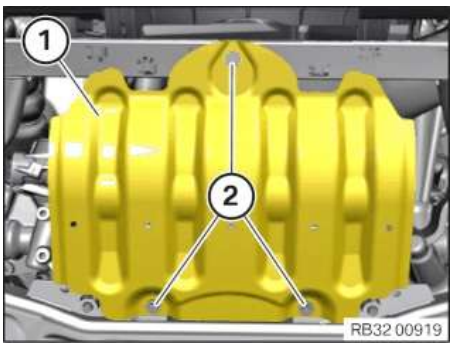
Underbody protection

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

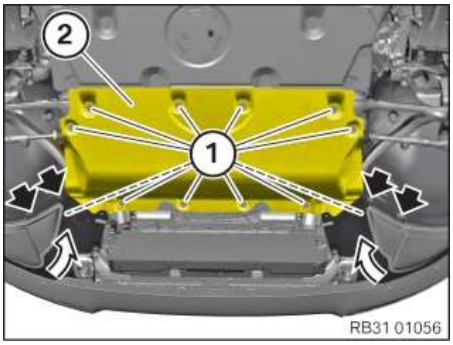
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

117 – Install the underbody protection of the steering gear

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- **Version A:**

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

  Tighten the screws (1).

Underbody protection of the steering gear

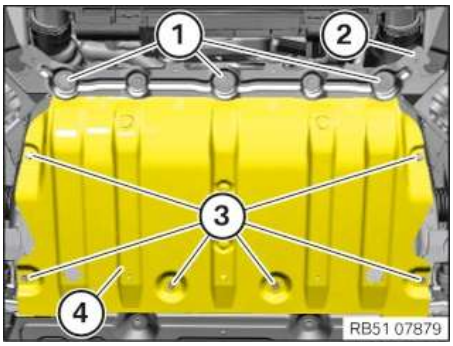
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- 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).

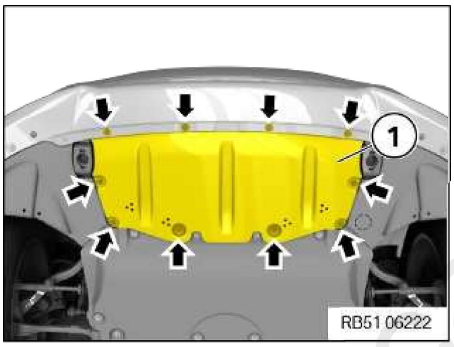
Underbody protection of the steering gear

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



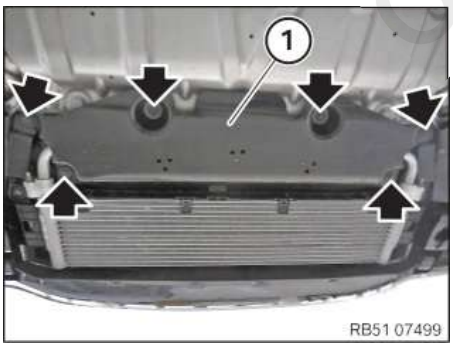
- **Version A:**

  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



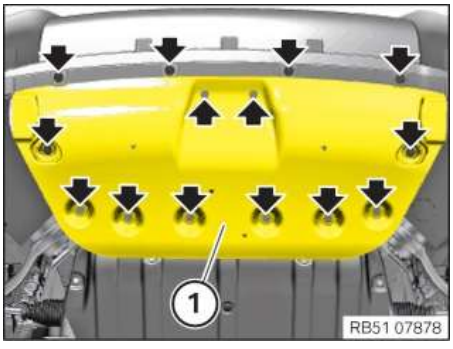
- **Version B:**

  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).

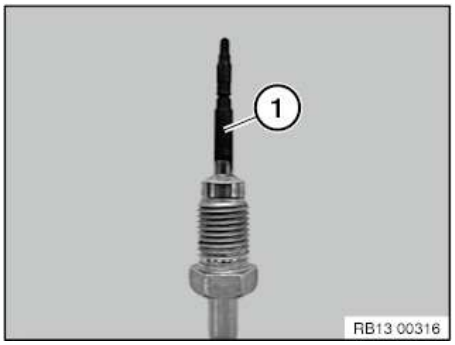
  Tighten screws (arrows).

Underbody protection front

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

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119 – Installing the exhaust temperature sensor for the exhaust system downstream the catalytic converter on the diesel particulate filter



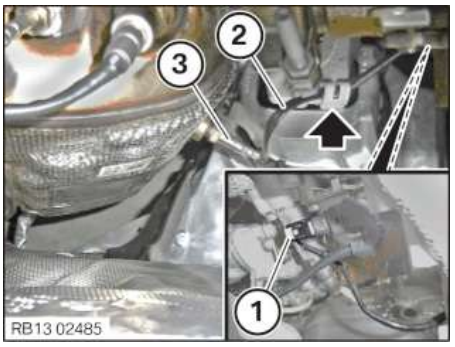
RISK OF DAMAGE

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

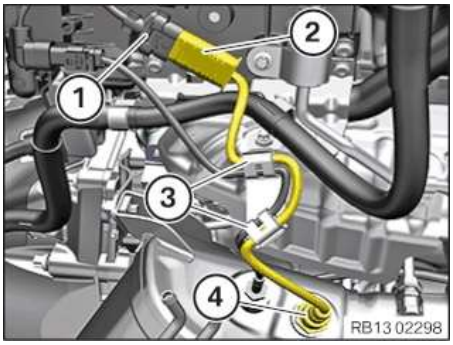


- Insert and install the front oxygen sensor (1).
- Tighten the front oxygen sensor (1) with standard tools.

Front oxygen sensor to top of diesel particulate filter

Sensor		Tightening torque	50 Nm

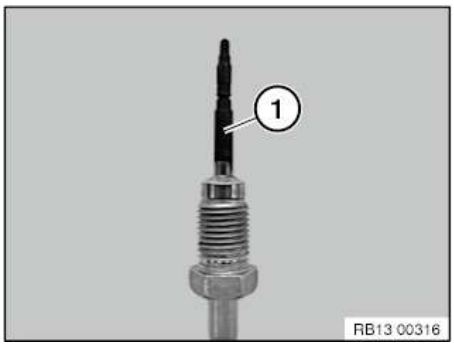
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- Fasten the front oxygen sensor (4) to the clamps (3).
- Connect connectors (2) and lock.
- Connect connectors (1) and lock.

  The connectors (1) and (2) must audibly engage.

121 – Install the exhaust-gas temperature sensor on the diesel particulate filter



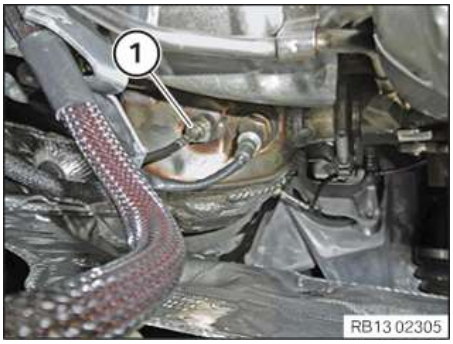
RISK OF DAMAGE

Damage of exhaust temperature sensor.

Damage to exhaust temperature sensors leads to malfunctions.

- Make sure that the gauge tip is not damaged.

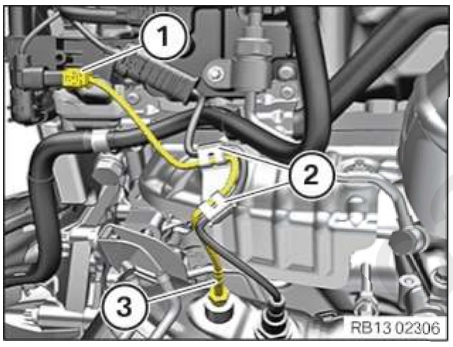
- Check gauge tip (1) for damage.



- 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

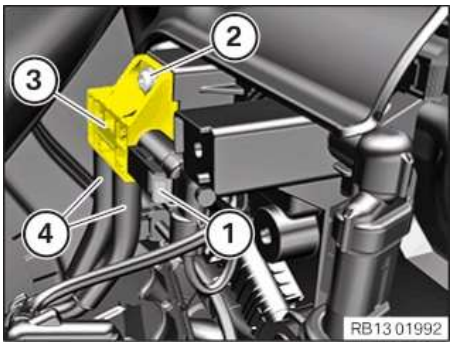
Sensor		Tightening torque	30 Nm



- 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.

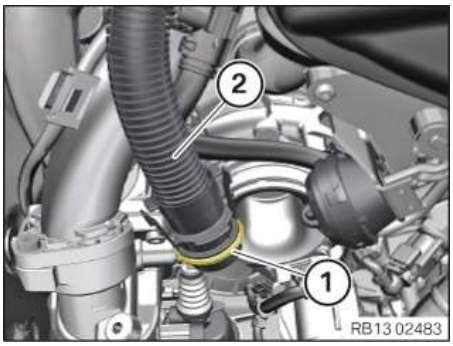
  The connector (1) must engage audibly.

123 – Installing the clean air pipe with resonator

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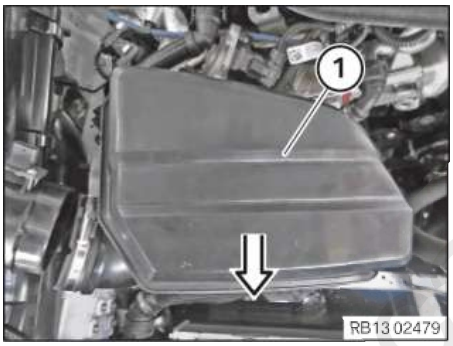
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



- 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.

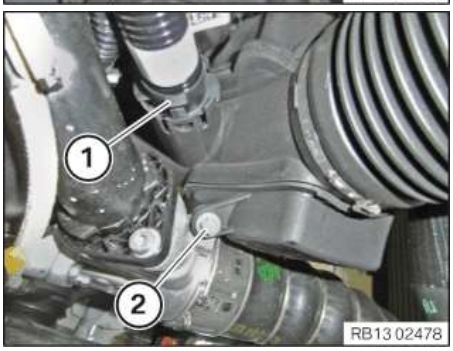


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

  The clamp (1) must engage audibly.

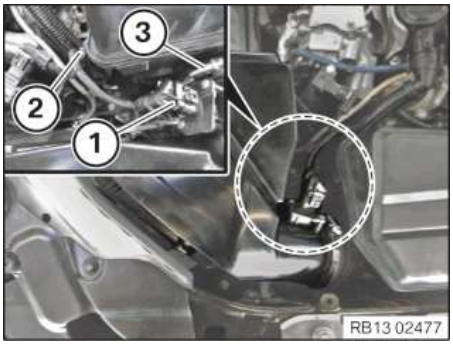


- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm

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

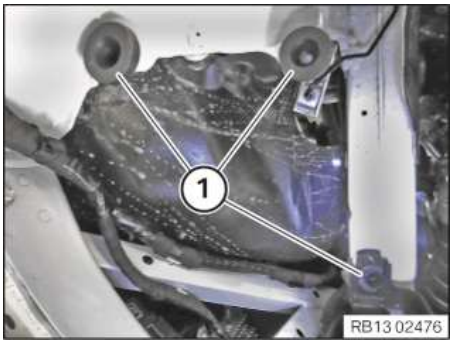
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

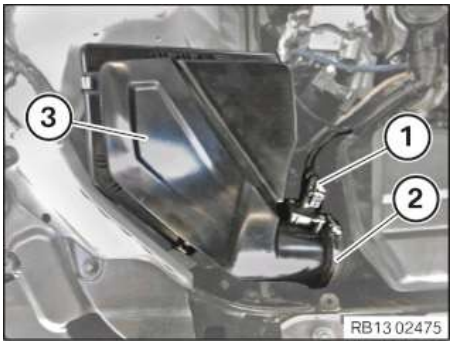
- Secure clamps (2).
- Connect connectors (1) and lock.

  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

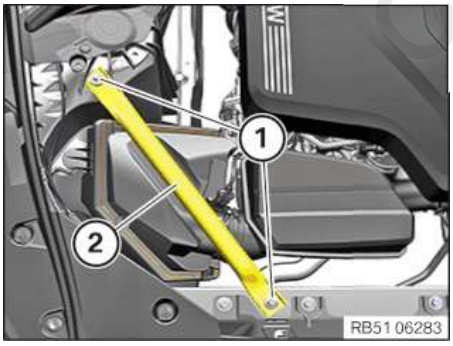
- Connect connectors (1) and lock.

  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.



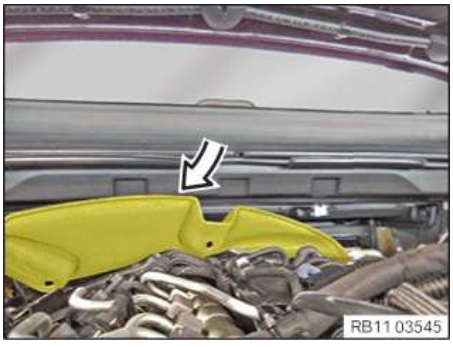
- Install the front-end strut (2).
- Renew screws (1).

  Parts: Screws
- Tighten the screws (1).

Front end strut

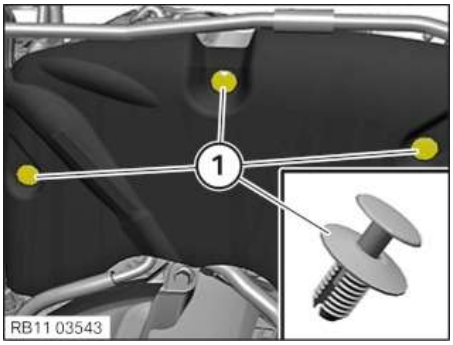
Screw		Tightening torque	56 Nm

126 – Installing acoustic cover at rear



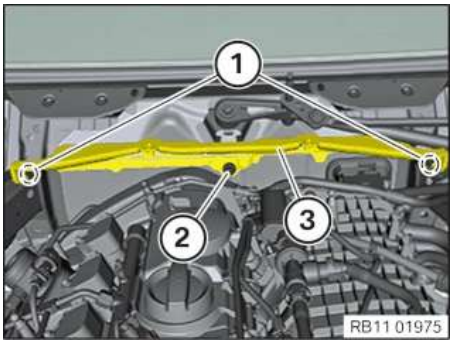
- Guide in the acoustic cover in the direction of the arrow and install it.

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

127 – Installing centre bulkhead lower section

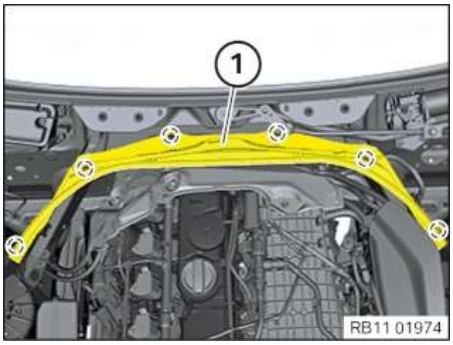


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

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

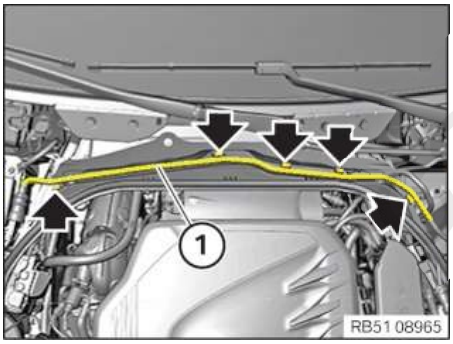
128 – Installing the centre bulkhead upper part



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

Bulkhead upper part to bottom bulkhead

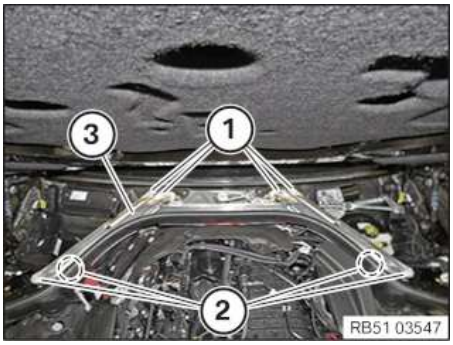
		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

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

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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

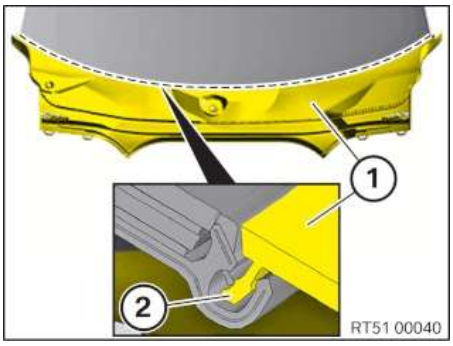
Damage caused by water ingress into the vehicle.

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

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

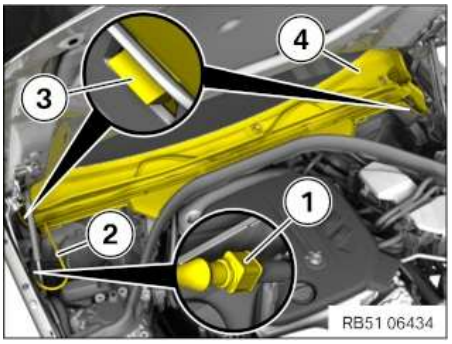
TECHNICAL INFORMATION

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.

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- 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

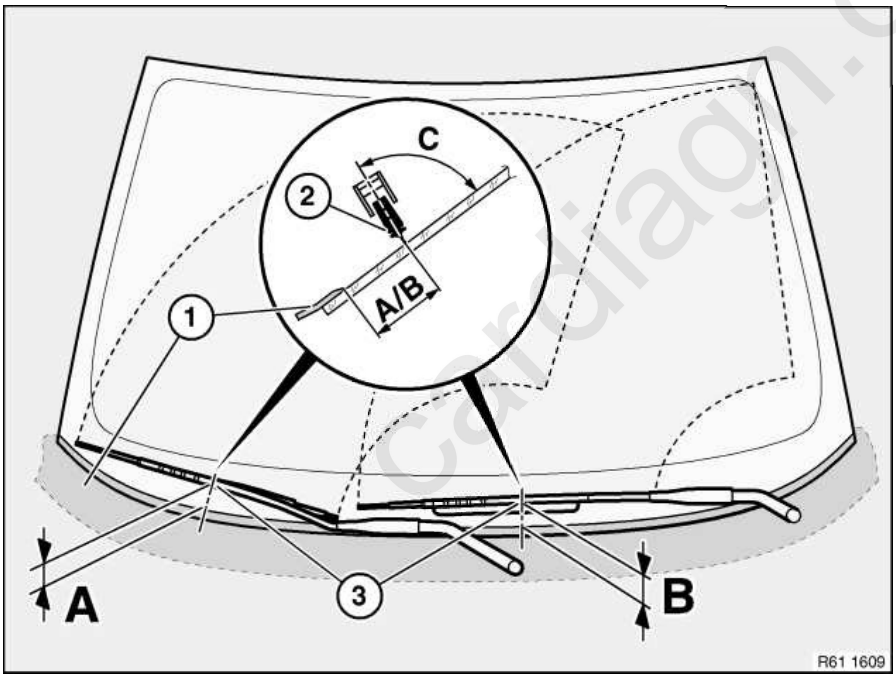
NOTICE

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

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

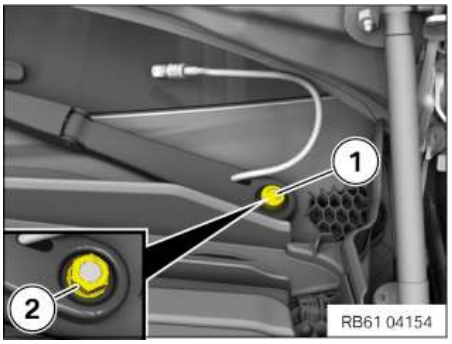
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- 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



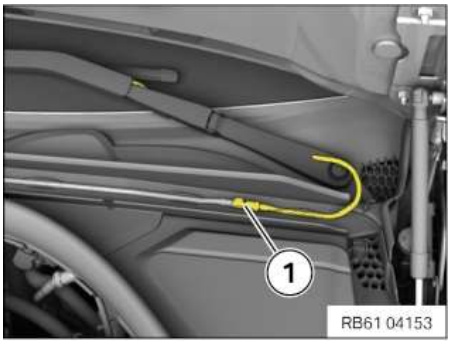
- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

- Connect the protective cap (1).

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- 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

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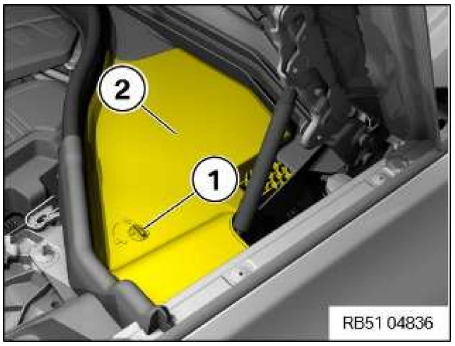


- Connect the connector (1) of the CAN bus and lock it.
- Clip in clip (2).



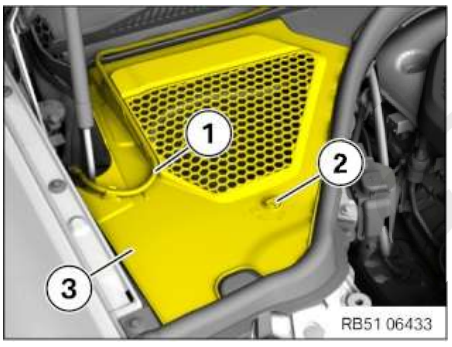
- Activate the 48V electrical system by closing the bonnet.
  The activation takes place automatically.

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

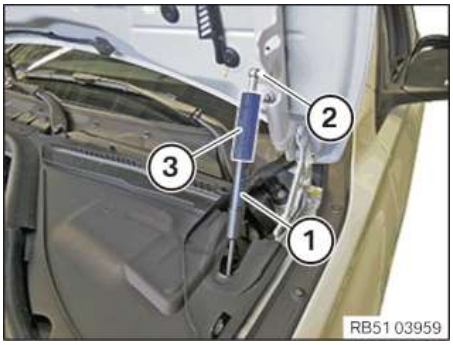
CAUTION

Shutting bonnet or tailgate.

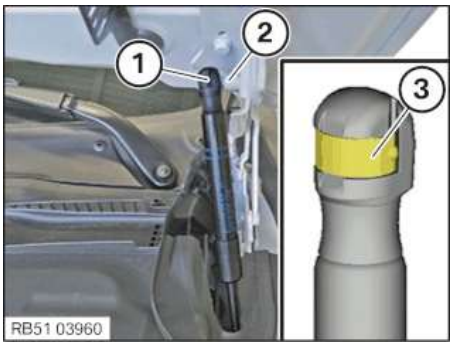
Danger of injury!

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

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- 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).

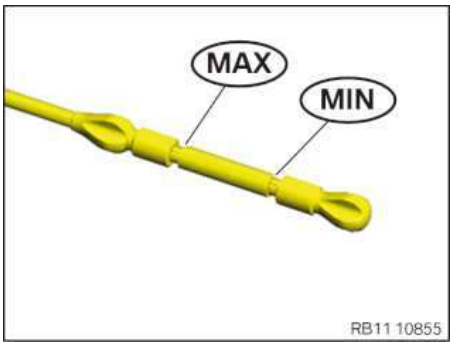
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- Park vehicle on a horizontal surface.
- Stop the engine and wait for 5 minutes.
- Pull out the oil dipstick and wipe off using a lint-free cloth.

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

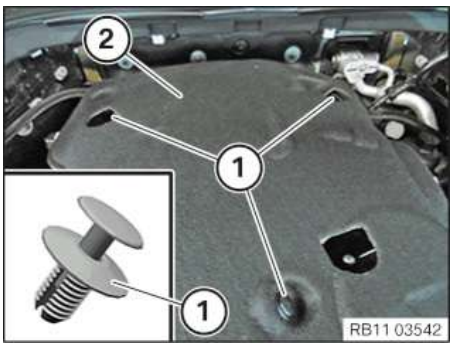
The engine oil level must be between the minimum mark and the maximum mark of the oil dipstick.

- 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) .

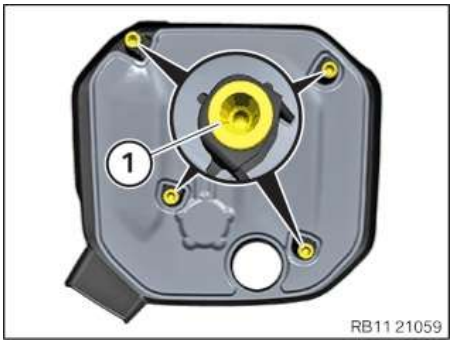
140 – Install acoustic cover

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).

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- 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 72
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 72
M8x40		Tightening torque	19 Nm

Standard screw connection M6			Used in step 7294
M6		Tightening torque	8 Nm

Ground to cylinder head			Used in step 72
M6		Tightening torque	8 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

Cylinder head cover to cylinder head			Used in step 87
M6		Tightening torque.	8,5 Nm

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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

Oil return line to turbocharger — Used in step 97

M6x12	Renew gasket.	Tightening torque	8 Nm

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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

Coolant lines for SCR metering module — Used in step 107

M6X16		Tightening torque	8 Nm

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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

Wheel arch trim panel, front			Used in step 117
Thermoplastic hexagon screw		Tightening torque	2,6 Nm

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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

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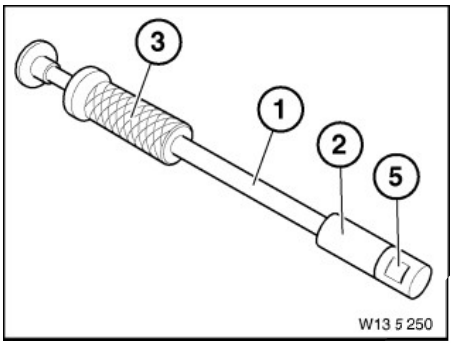
0 493 339 (13 5 252) Bush



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)	

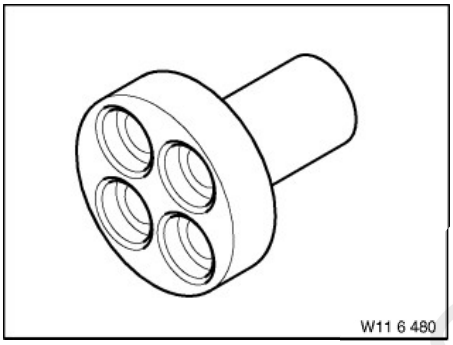
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0 493 340 (13 5 253) Weight



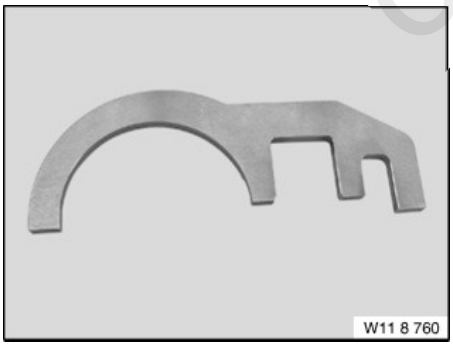
Common	Used in step 50
Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

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)

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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)

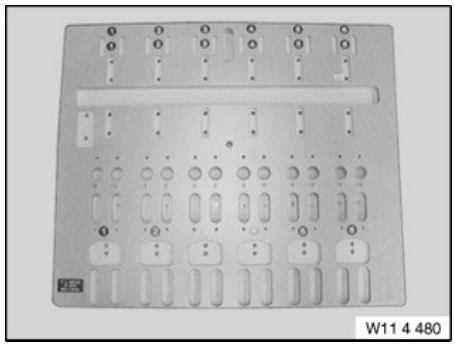
2 288 380 Locating stud



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)

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0 495 105 (11 4 480) oddments tray



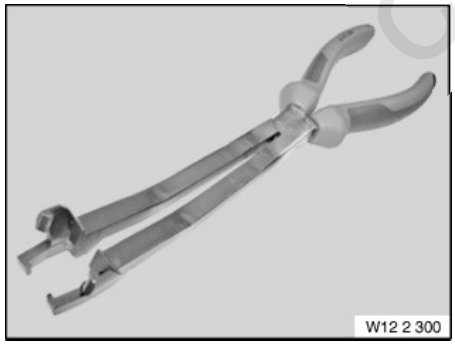
Common Used in step 59606567

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	

0 495 140 (12 2 300) Pliers

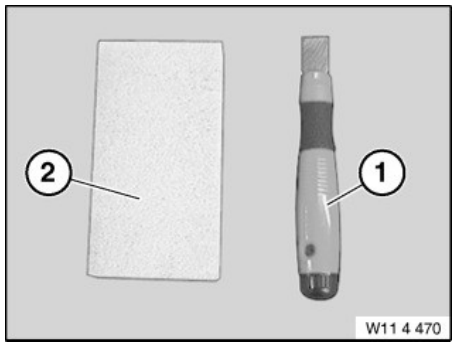


Common Used in step 61

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)

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0 495 102 (11 4 470) Tool



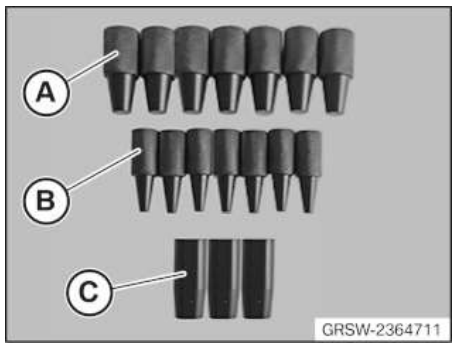
Common Used in step 6197

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 62

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	

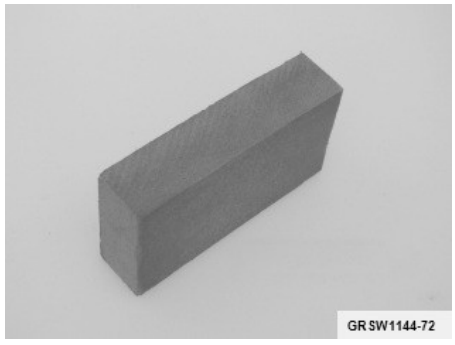
0 495 103 (11 4 471) Scraper



Common Used in step 62

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

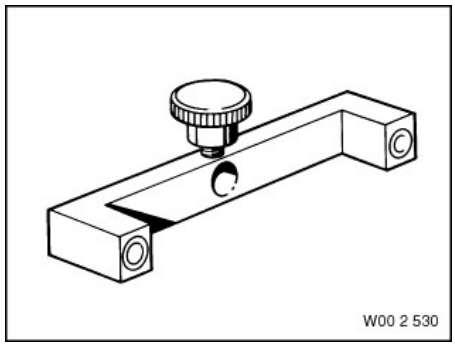


Common Used in step 62

Usage	(grindstone)
Included in the tool or work	0 495 102
Storage location	C52
Replaced by	
In connection with	
SI-Number	

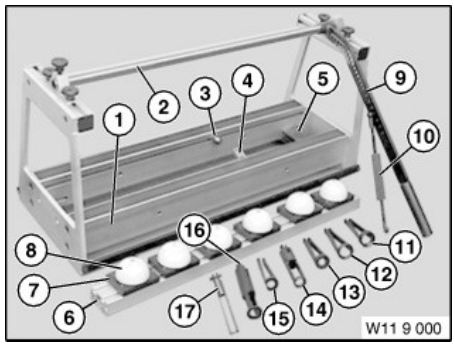
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0 490 185 (00 2 530) Bridge



Common	Used in step 64
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

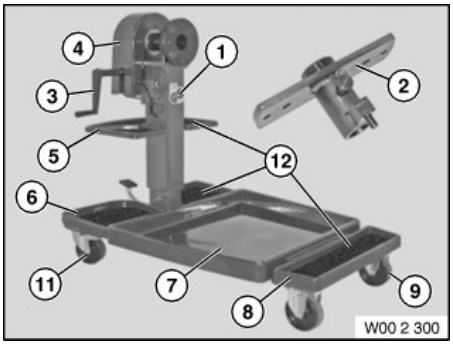


Common	Used in step 6570
Usage	
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 187 (00 2 300) Assembly stand

Used in step 6570

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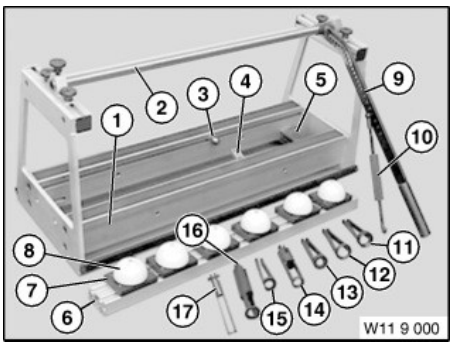
Common

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.	

0 494 371 (11 9 006) Insert

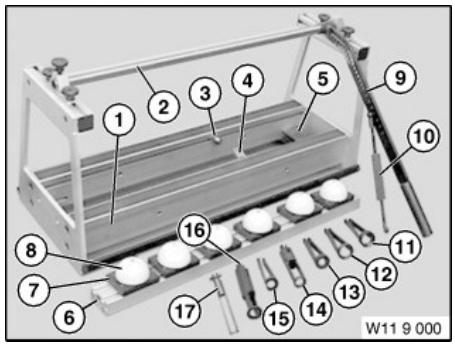


Common Used in step 65676870

Usage	(Aluminium strip)
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

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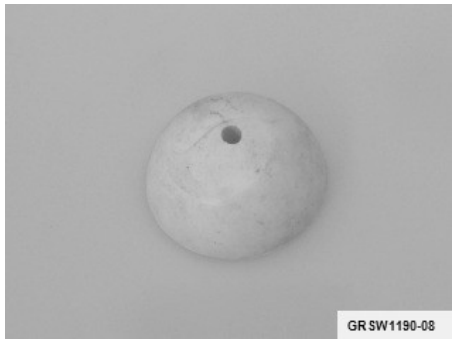
0 494 372 (11 9 007) Shaped part



Common Used in step 6568

Usage	(Shaped part)
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

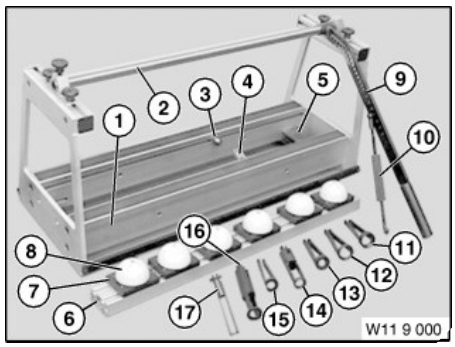
0 494 373 (11 9 008) Shaped part



Common Used in step 656768

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



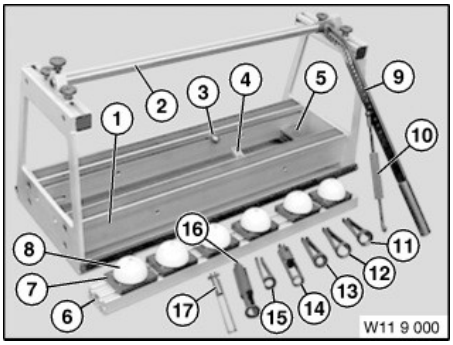
Common Used in step 65676870

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 65676870

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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	

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0 494 374 (11 9 009) Lever



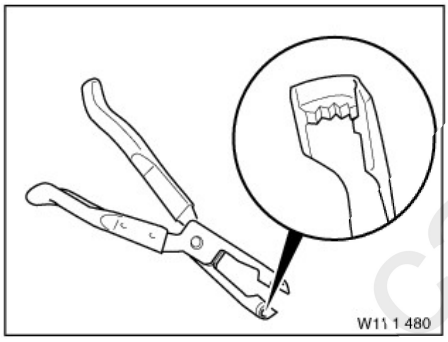
Common	Used in step 6570
Usage	
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 496 143 (11 8 840) Basket



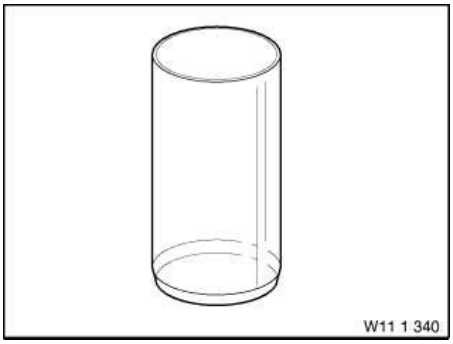
Common	Used in step 6570
Usage	(Valve spring cage) For removing and fitting the valves.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

0 490 796 (11 1 480) Pliers



Common	Used in step 66
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)

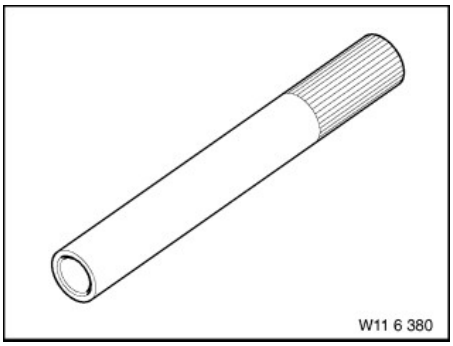
0 490 746 (11 1 380) Holding sleeve



Common	Used in step 69
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	

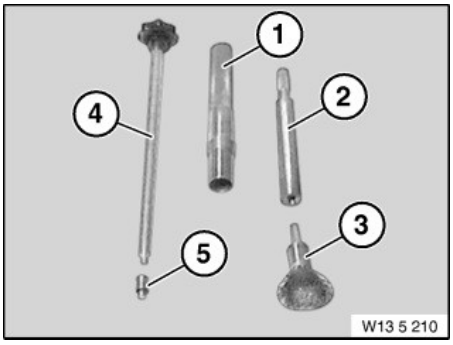
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0 493 249 (11 6 380) Bush



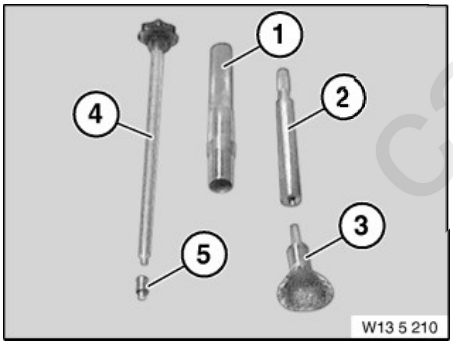
Common	Used in step 69
Usage	For fitting valve stem seal
Included in the tool or work	
Storage location	A9
Replaced by	
In connection with	
SI-Number	01 06 98 (306)

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	

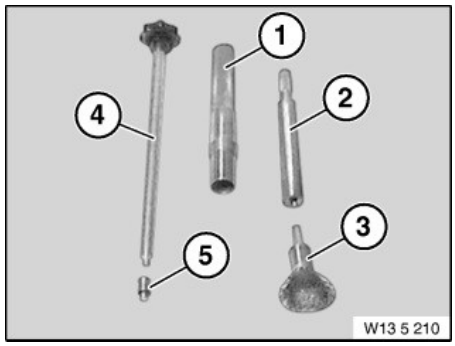
0 493 762 (13 5 214) Rod



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	

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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)

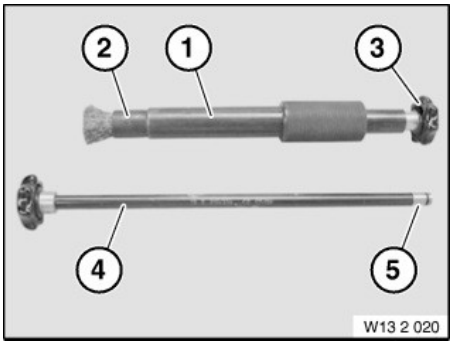
Consisting of

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

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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	
5	0 496 155 (13 2 [illegible])		**Plug** (Seal plug) Available as part of [illegible] only.	

2 344 011 Tool

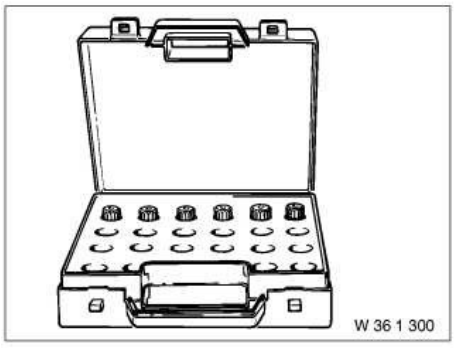


Common Used in step 105

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	

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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	

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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	

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 6570
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 63
Maximum lengthwise deviation from flatness	0.10 mm
Maximum transverse deviation from flatness	0.05 mm

Valve underprotrusion	Used in step 64

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	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

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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	137

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11 12 154 Disassemble and assemble cylinder head

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

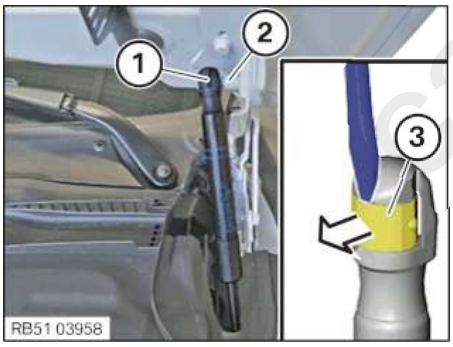
Engine compartment lid is open.

CAUTION

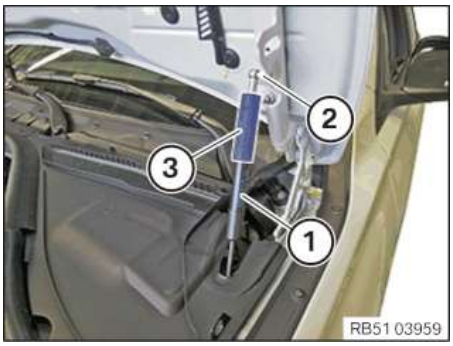
Shutting bonnet or tailgate.

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

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- See additional information.

3 – Removing the acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

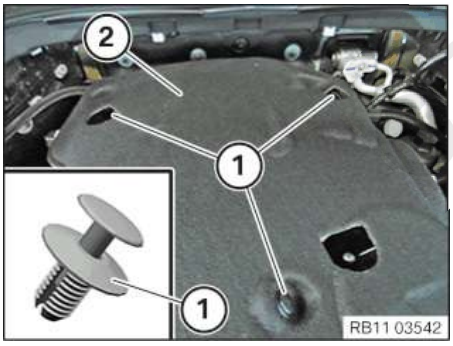
Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- 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.



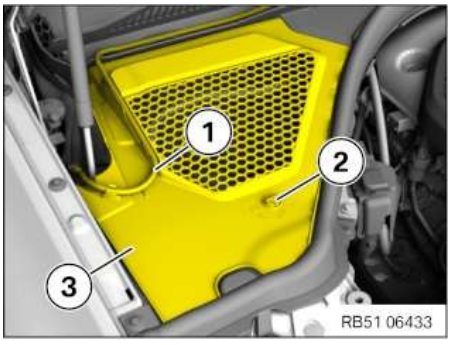
- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

4 – Remove the acoustic cover for the injectors



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

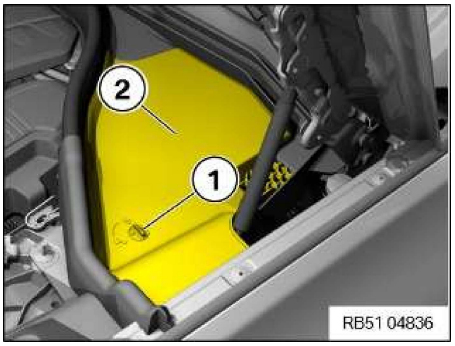
5 – Remove the cover of the rear right engine compartment



- 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

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- 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.

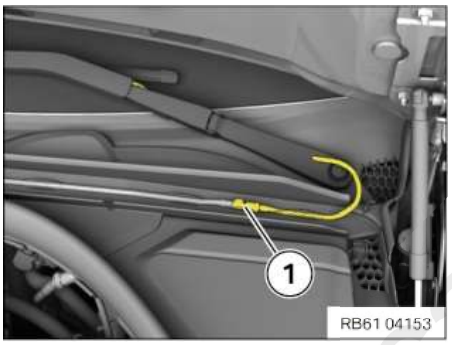
▸ **Remove the wiper arm**

RISK OF DAMAGE

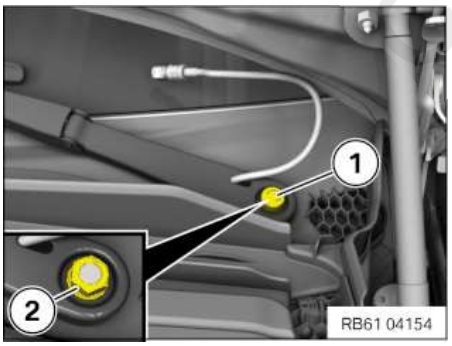
Damage to wiper console.

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

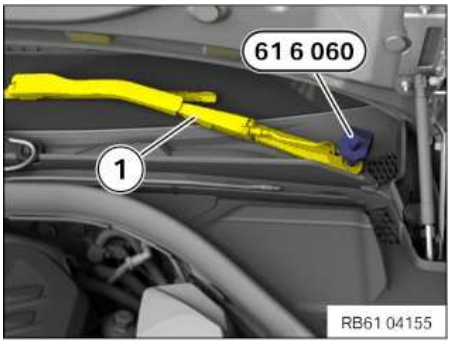
- Removing the wiper arms must be carried out only using the prescribed special tool.
- Do **not** lever off the wiper arm because otherwise the wiper console may break at the predetermined breaking point for active pedestrian protection.



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



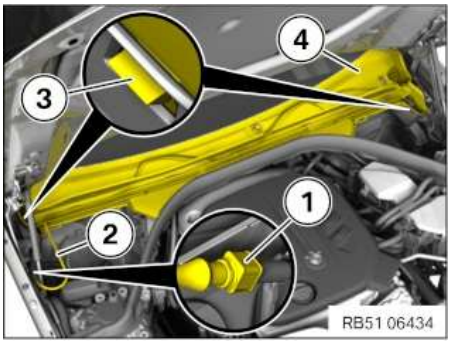
- Remove the protective cap (1).
- Loosen nut (2).



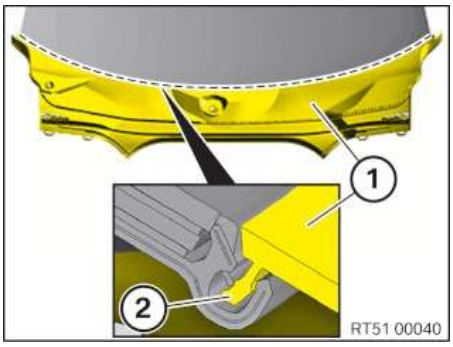
- Pull off the wiper arm (1) using special tool .

8 – Remove cowl panel cover

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- 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

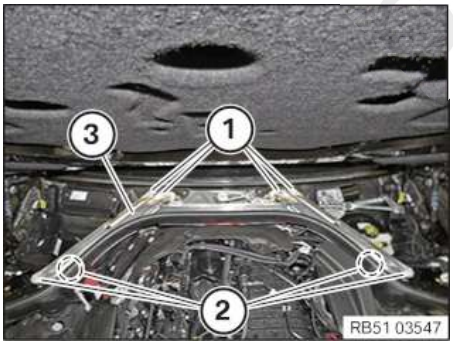


- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

10 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

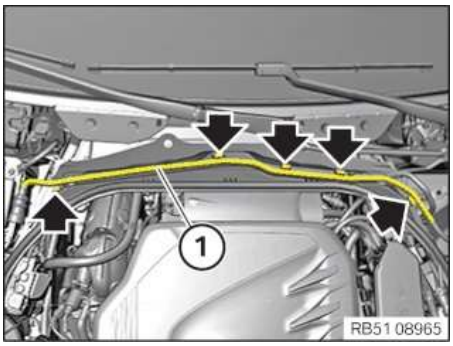
Driving without the strut brace/front-end strut or tension strut is not permitted.



NOTICE

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

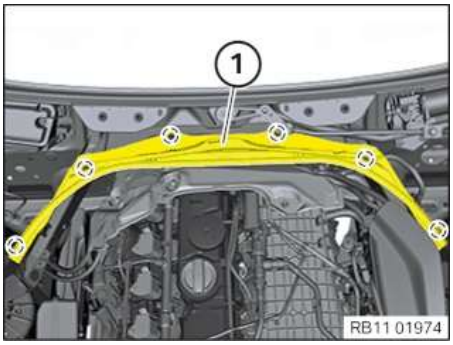
- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.



- **Version with mild hybrid technology:**

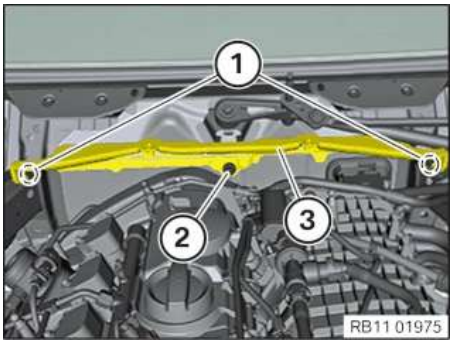
  Unclip the wire (1) at the holders (arrows).

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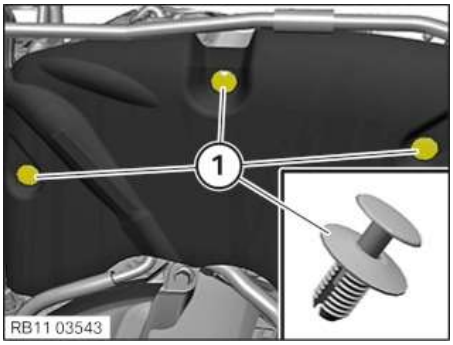
- Unscrew the bolts in the marked areas.
- Remove the centre bulkhead upper part (1).

11 – Removing the centre bulkhead lower section

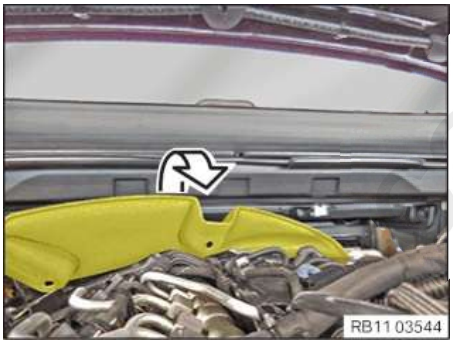


- Loosen screws (1).
- Loosen nut (2).
- Remove the centre bulkhead lower part (3).

12 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).

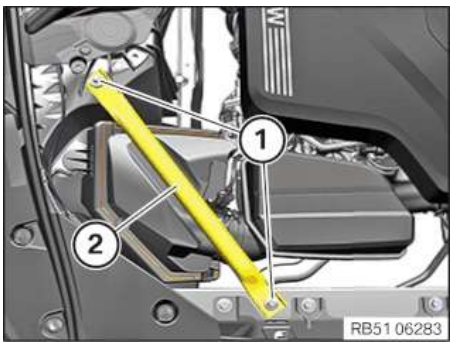


- Guide out and remove the acoustic cover in the direction of the arrow.

13 – Remove right front-end strut

TECHNICAL INFORMATION

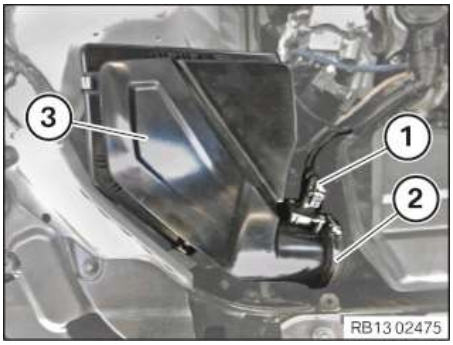
Driving without the strut brace/front-end strut or tension strut is not permitted.



- Loosen screws (1).
- Remove the front-end strut (2).

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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.

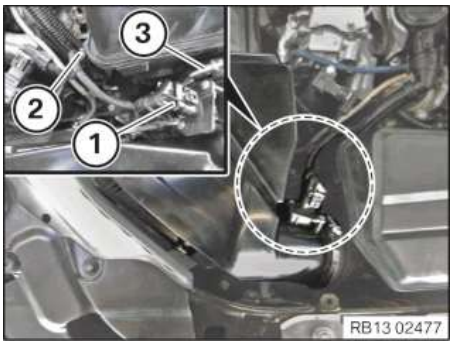
15 – Removing the clean air pipe with the resonator

WARNING

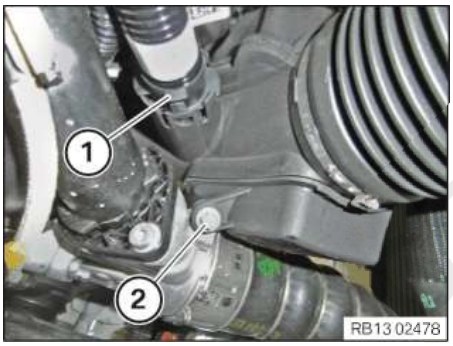
Hot surfaces.

Risk of burning!

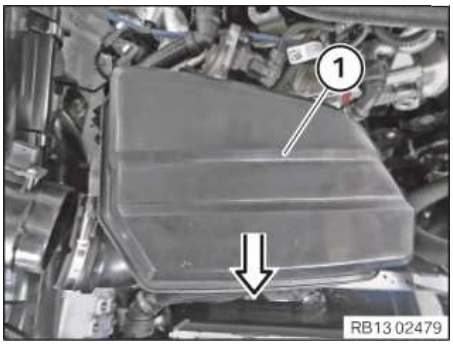
- Perform all work only on components that have cooled down.



- 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!

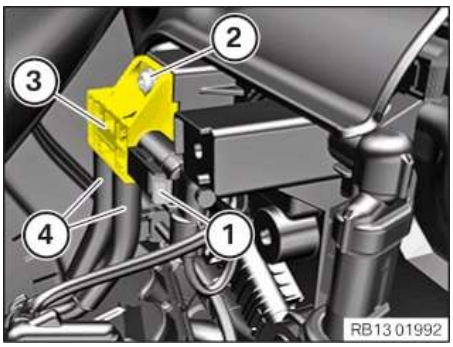
- Perform all work only on components that have cooled down.

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

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WARNING

Hot surfaces.

Risk of burning!

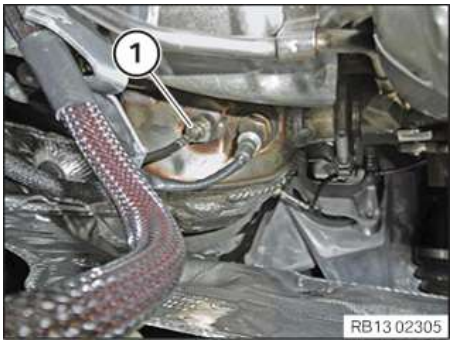
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

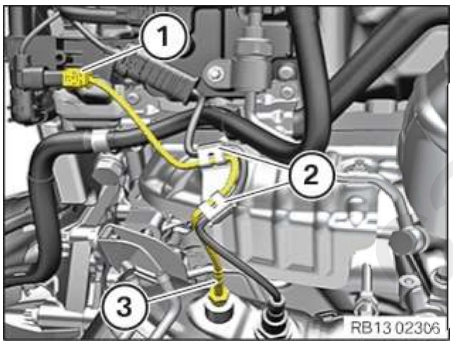
Electrostatic discharge.

Damage to or destruction of electrical components.

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- 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.

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RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

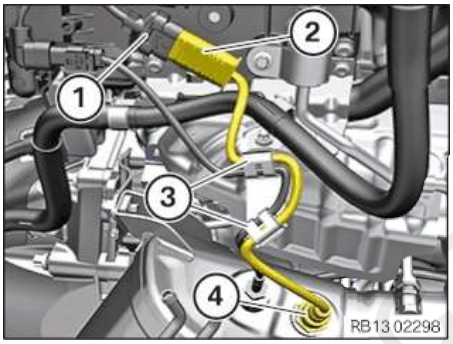
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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.

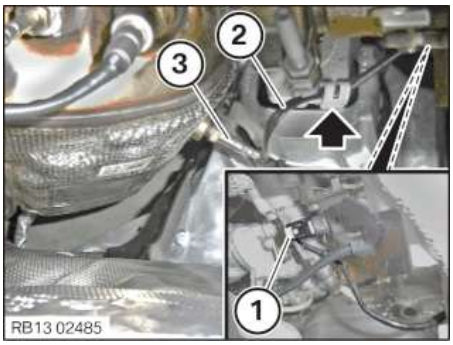
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RISK OF DAMAGE

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)

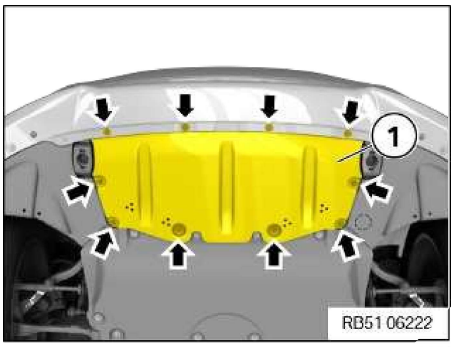


- Unlock plug connection (1) and disconnect.

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).

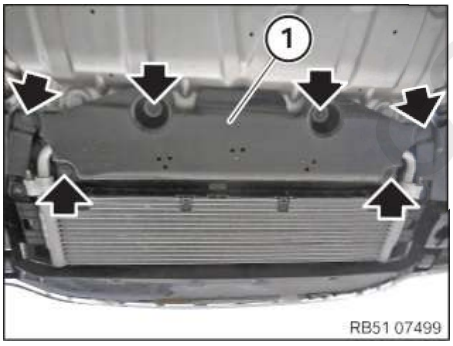
20 – Removing the front underbody protection



- **Version A:**

  Remove screws (arrows).

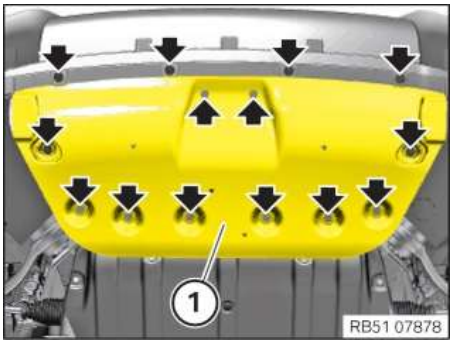
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version B:**

  Remove screws (arrows).

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

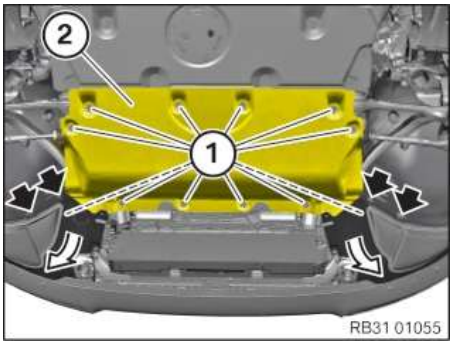


- **Version C:**

  Remove screws (arrows).

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

21 – Remove the underbody protection of the steering gear



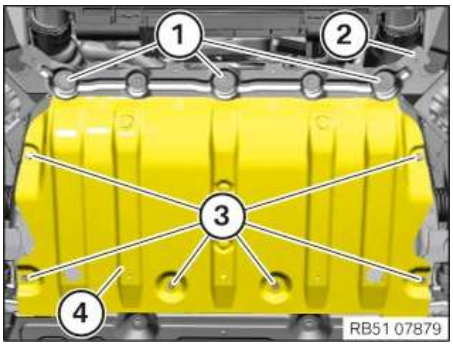
- **Version A:**

  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.

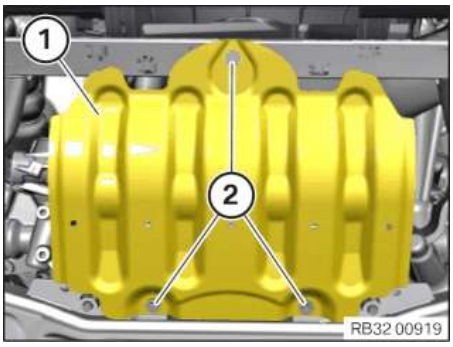
  Loosen screws (3).

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

22 – If installed: Removing the steering underbody protection

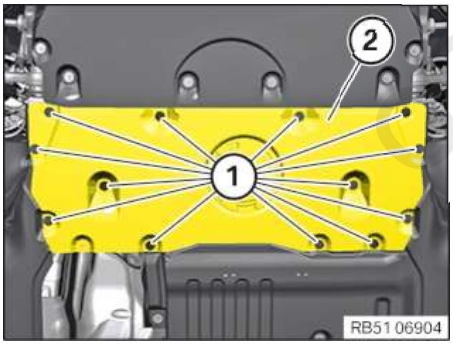
Prerequisite

Front underbody protection has been removed.



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

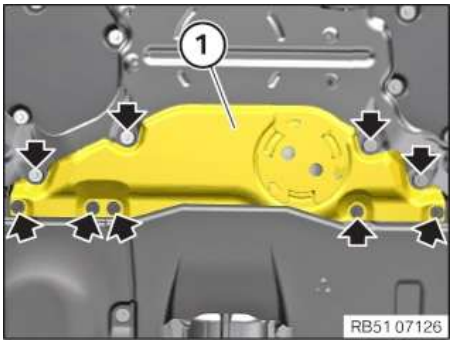
23 – Removing the centre underbody protection



- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .



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

  Remove screws (arrows).

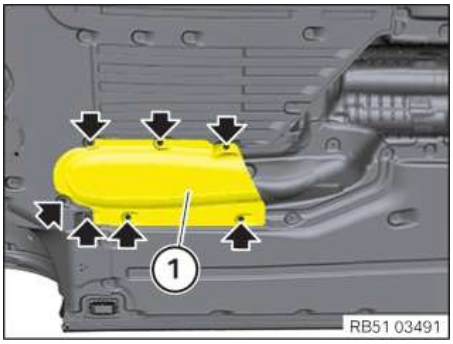
  Feed out and remove the centre underbody protection (1).

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

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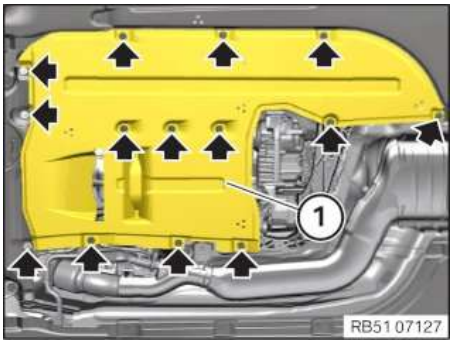
NOTICE

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).

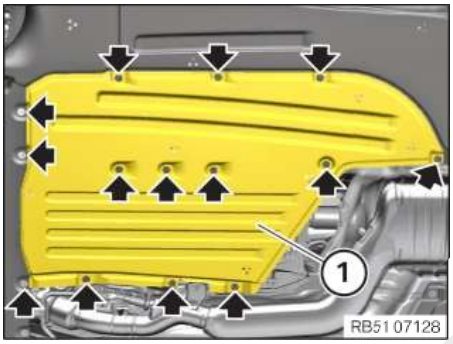
25 – Remove rear underbody protection



- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).

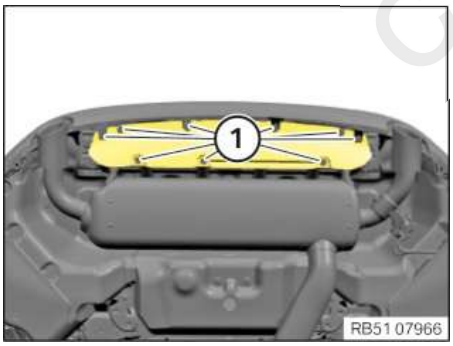


- **Version B:**

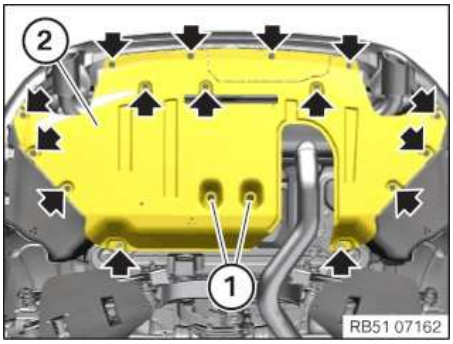
  Remove screws (arrows).

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

26 – Removing the rear diffuser



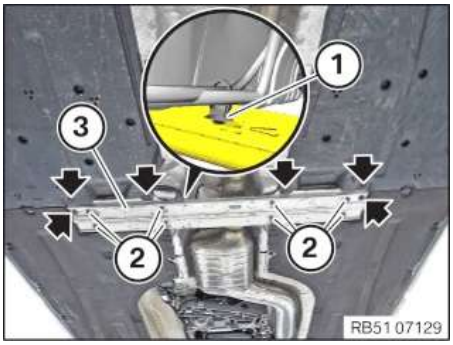
- **Version 1:**
- Release the screws and nuts (1).
- Remove the diffuser.



- **Version 2:**
- Loosen nuts (1).
- Remove screws (arrows).
- Guide out and remove rear diffuser (2).

27 – Remove the connecting support from the tunnel

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- 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!

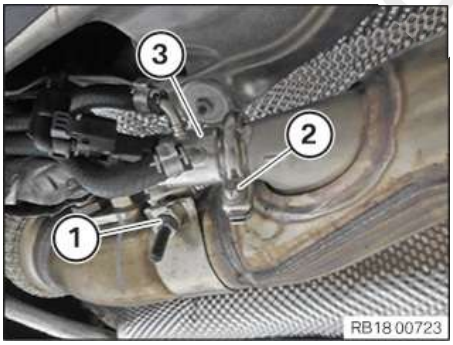
- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

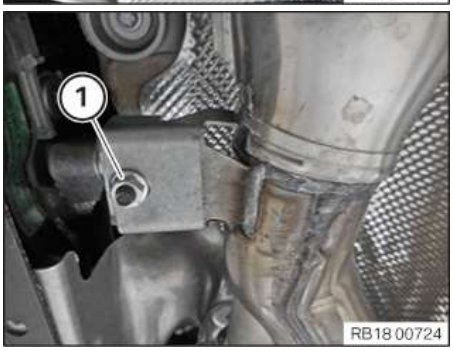
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

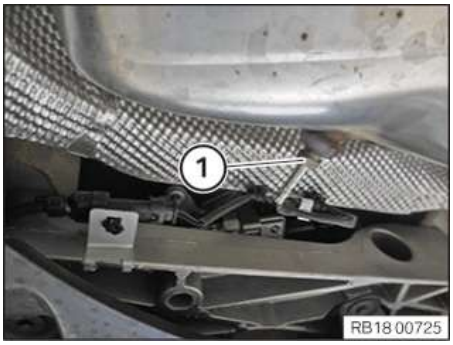


- Unfasten clamp (1).
- Detach the clamp (2) of the SCR metering module (3).
- Detach the SCR metering module (3)from the exhaust system and place to one side.

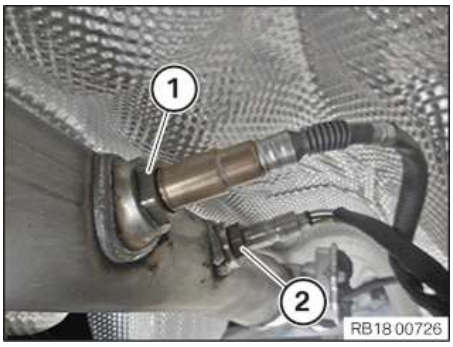


- Loosen nut (1).

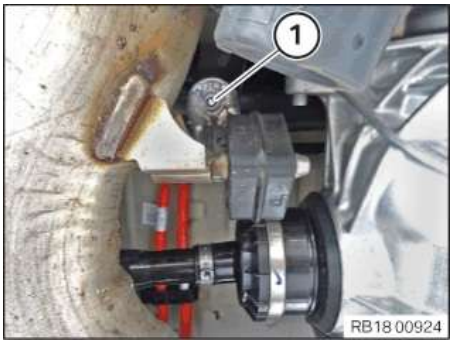
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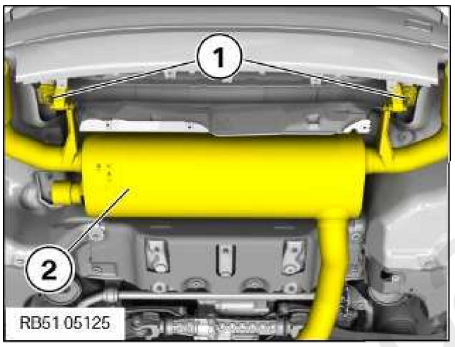
- Detach the exhaust temperature sensor (1) from the exhaust system.



- 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.

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RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

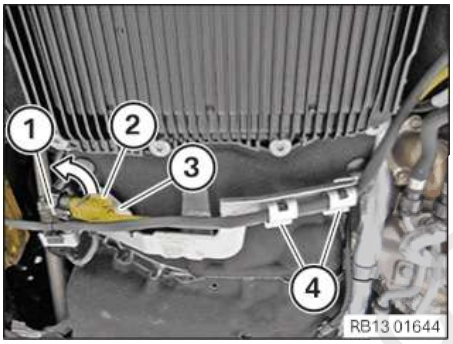
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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.

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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.

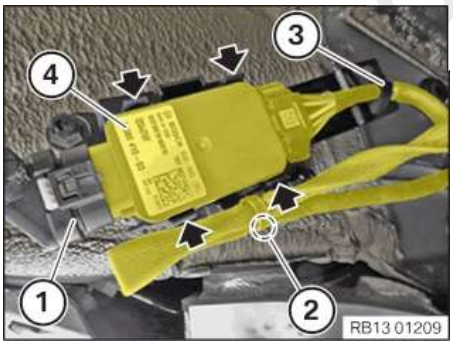
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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

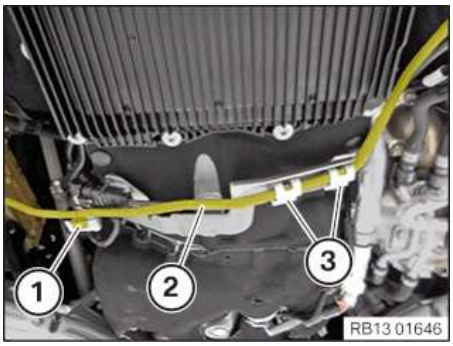
Damage to the nitrogen oxide sensor.

Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

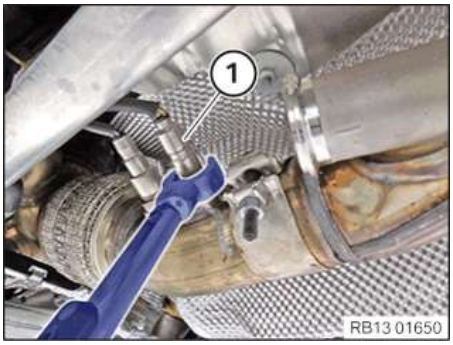
- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug 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.



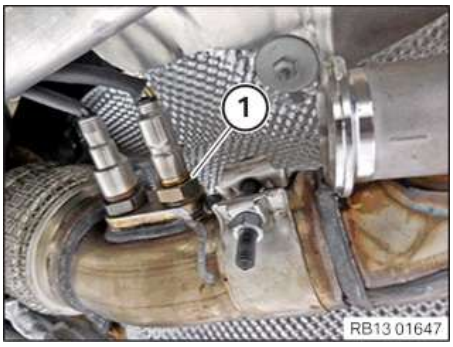
- Unlock plug connection (1) and disconnect.
- Release cable clip in area (2).
- Release line from the holder (3).
- Unclip control unit (4).



- 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!

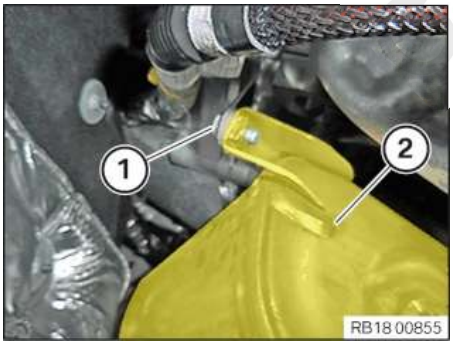
- Perform all work only on components that have cooled down.

CAUTION

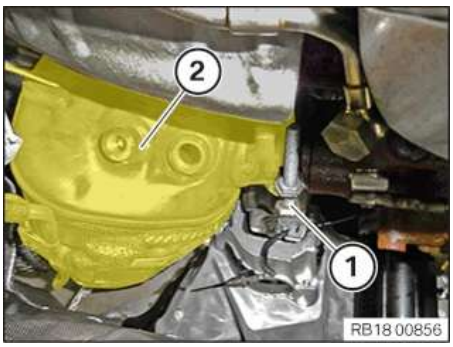
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

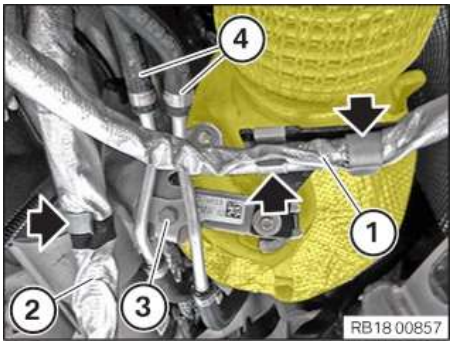


- Release bolt (1) from the holder of diesel particulate filter (2).

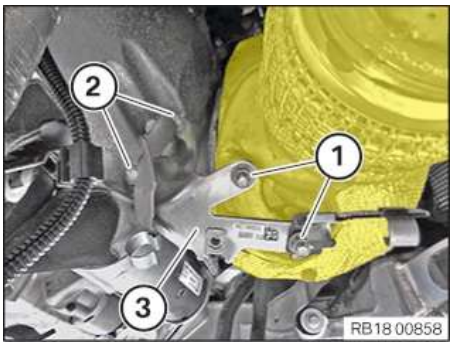


- Loosen V-band clamp (1).
- Feed V-clip (1) out from diesel particulate filter (2) and remove.

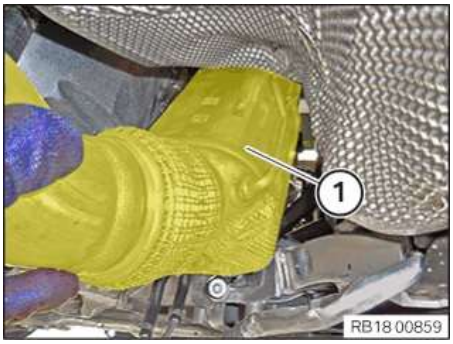
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- Release the metering line (1) from clamps (Arrows).
- Release positive battery cable (2) from starter motor from clamp (Arrow).
- Loosen screw (3).
- Thread off coolant line (4) and place to the side.



- 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.**

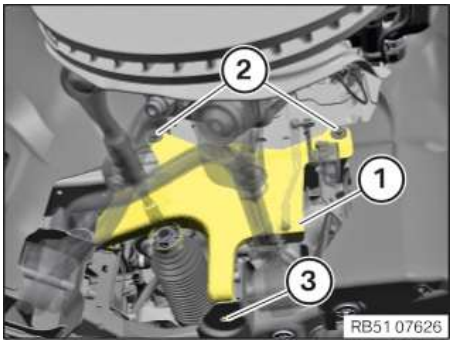
  This process is intended to prevent damage to the brake disc.

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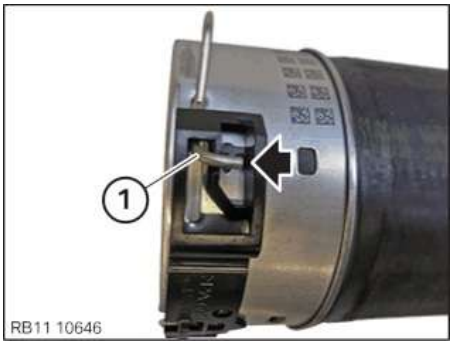
- If several wheels are removed at the same time: Use a piece of chalk to mark on each tyre the axle and side on which the corresponding wheel is fitted.
- Release the wheel bolts (arrows) crosswise and remove the wheel.
- To release and tighten wheel bolts with a security code: Use the correct adapter from the set of special tools .

33 – Remove the cover of the steering assembly



- Loosen screws (2) and (3).
- Remove the cover (1).

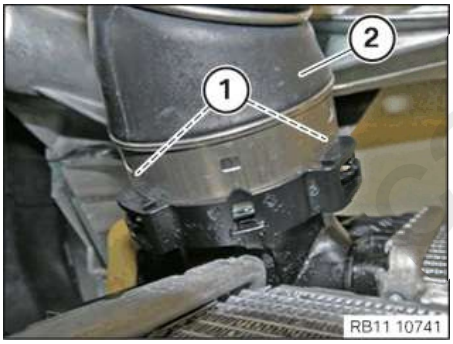
34 – Remove pressure pipe between exhaust turbocharger and charge air cooler



- **Version A:**

  Unlock lock (1).

  The lock (1) must snap audibly into place when unlocked (see arrow).



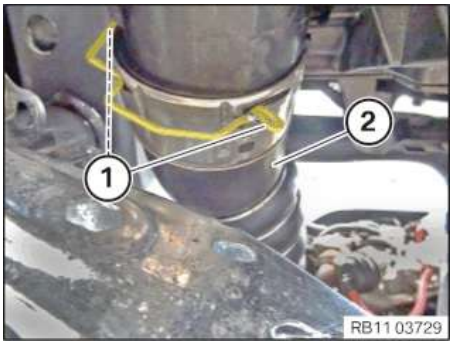
- Unlock the locks (1) on both sides and snap into place.
- Pull off pressure pipe (2) from charge air cooler.



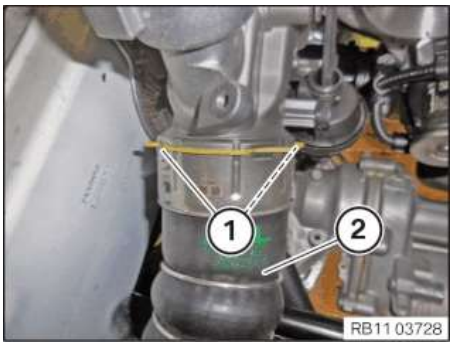
- **Version B:**

  Unlock clamp (1) and engage in this position.

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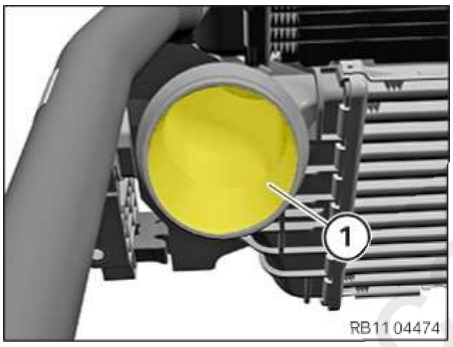
- Unlock the locks (1) and snap into place.
- Pull off pressure pipe (2) from charge air cooler.



- 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.

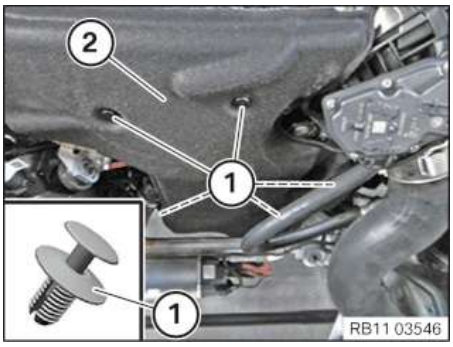
35 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

Risk of burning!

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



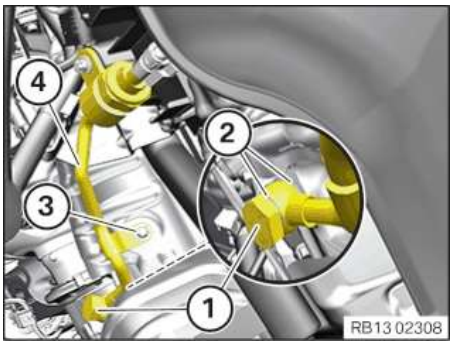
- Release and remove expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

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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.

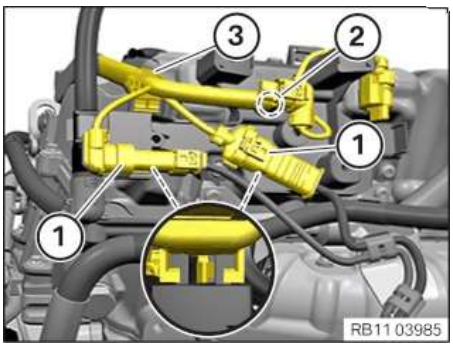
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

Contaminant or foreign body.

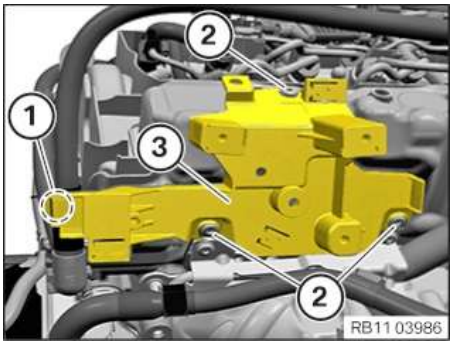
Contamination can result in malfunctions, operating failure or leaks.

- 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.

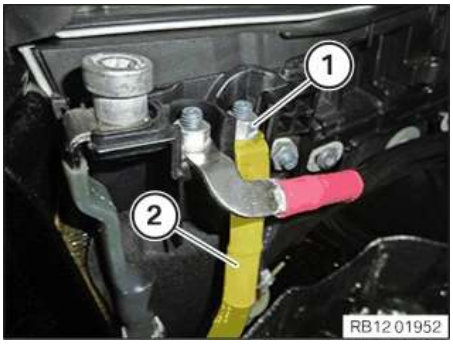
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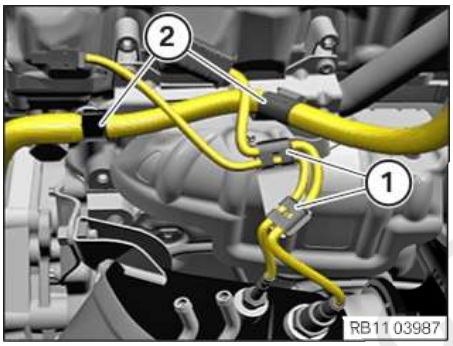
- Release the positive battery cable in the area (1) from the clamp and set it aside.
- Loosen screws (2).
- Feed out holder (3) for the sensor system and remove.



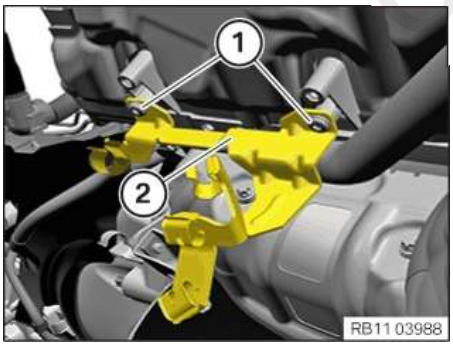
- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.



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



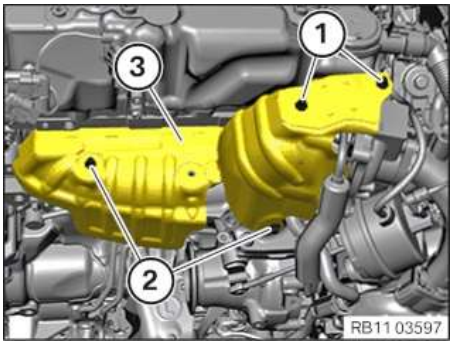
- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



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

38 – Removing heat shield

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- 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.

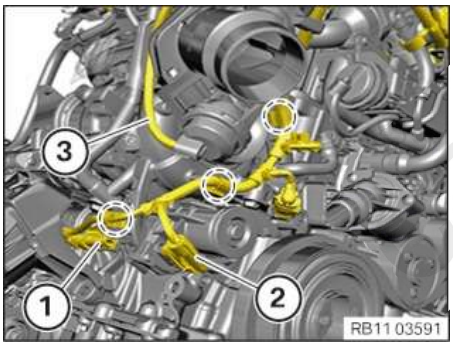
- Remove and install heavy components with the aid of another person/other persons.

TECHNICAL INFORMATION

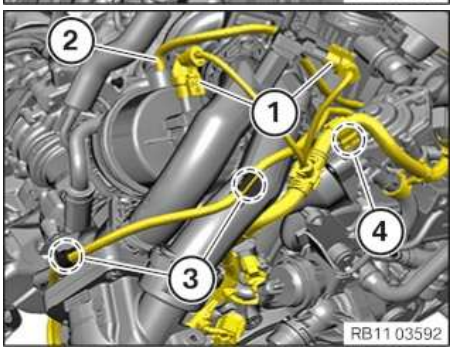
Prior to replacing the exhaust turbocharger: Observe the notes on troubleshooting on the exhaust turbocharger.
For additional information see: FUB-FUB-FB-130003-A10 Troubleshooting on the exhaust turbocharger

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).



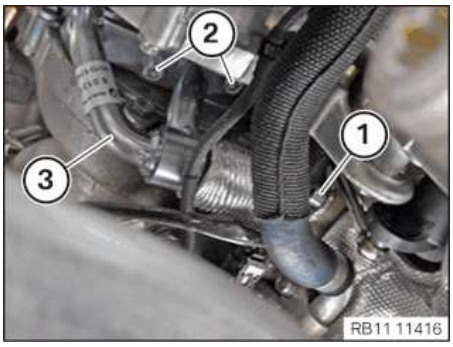
- Unlock plug connections (1) and disconnect.
- Pull off the vacuum hose (2).
- Release the vacuum hose in marked areas (3) from the exhaust turbochargers.
- Release the wiring harness in area (4) from the exhaust-gas recirculation cooler and set it aside.



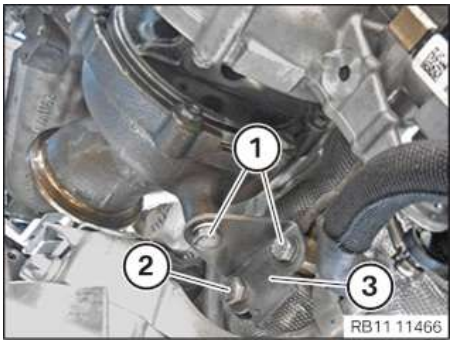
TECHNICAL INFORMATION

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

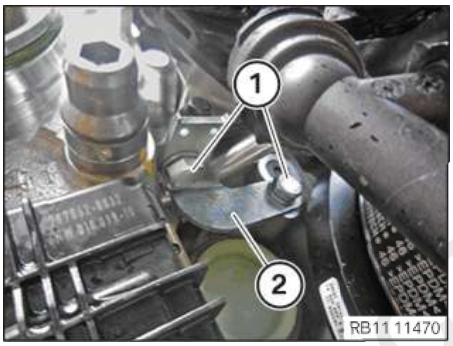
- Release the screws of the oil return line on the crankcase from the right wheel arch.



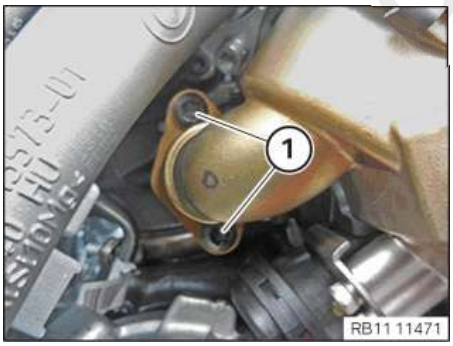
- Release the screw (1).
- Loosen screws (2).
- Remove oil return line (3) from the crankcase.
- Catch and dispose of emerging engine oil.



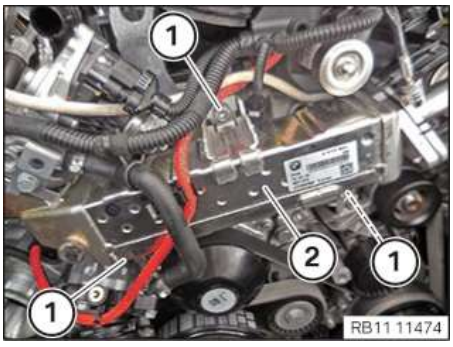
- Unscrew and remove the bolts (1) on the holder (3).
- Slacken screw (2) on holder (3), but do **not** remove.



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

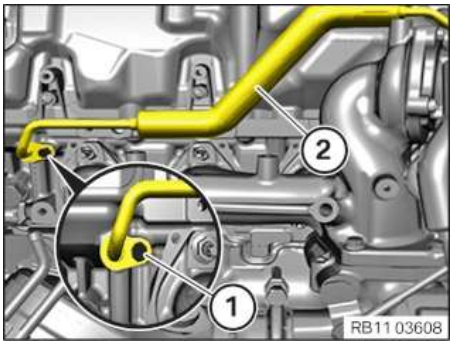


- Loosen screws (1).

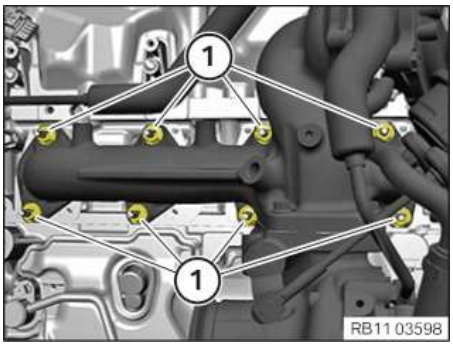


- Slacken screws (1), but do **not** remove.
- Release exhaust-gas recirculation cooler (2) slightly.

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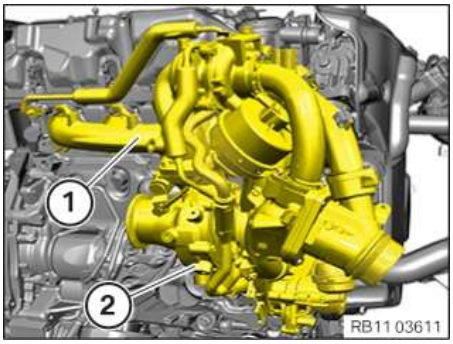
- Loosen screw (1).
- Remove oil feed line (2) for the high-pressure stage exhaust turbocharger from the cylinder head and set it aside.
- Catch and dispose of emerging engine oil.



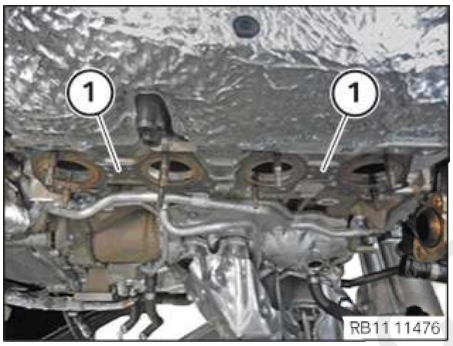
TECHNICAL INFORMATION

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

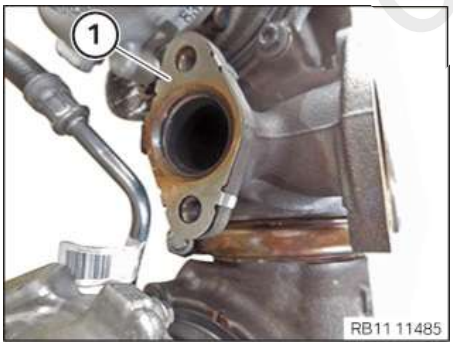
- Loosen nuts (1).



- 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.

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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.

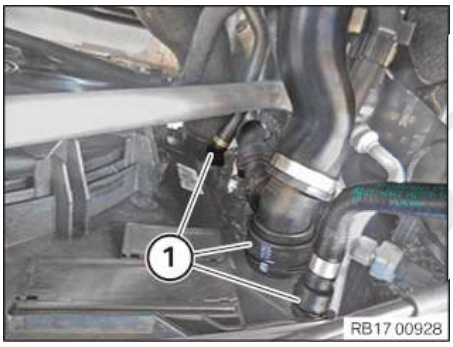
In the case of other removal work involving the draining of part quantities of coolant, the coolant level must be topped up with new coolant.

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

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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

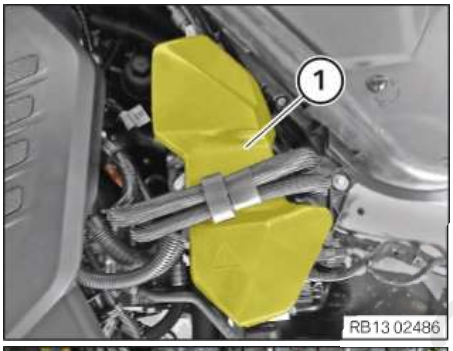
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

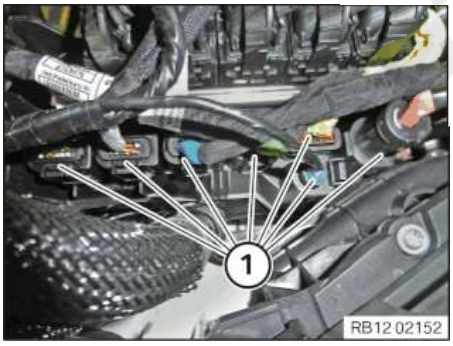
- Do not pull on the wires when disconnecting connectors and plug connections.

TECHNICAL INFORMATION

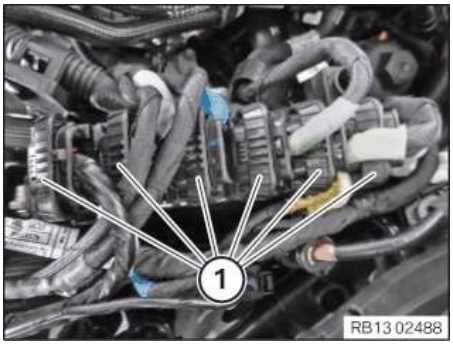
Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.



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

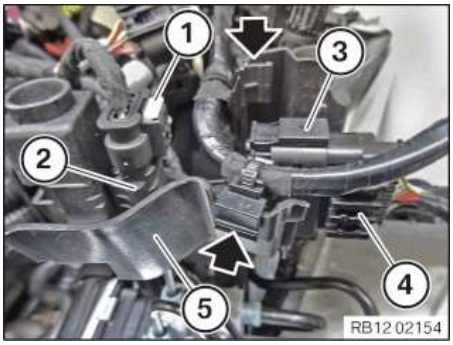


- Unlock and disconnect plug connections (1).

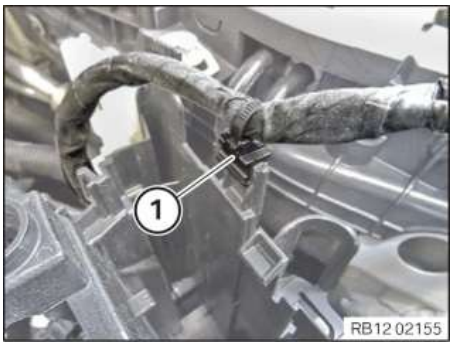


- Unlock and disconnect plug connections (1).

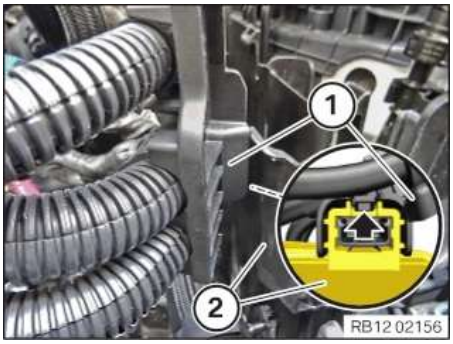
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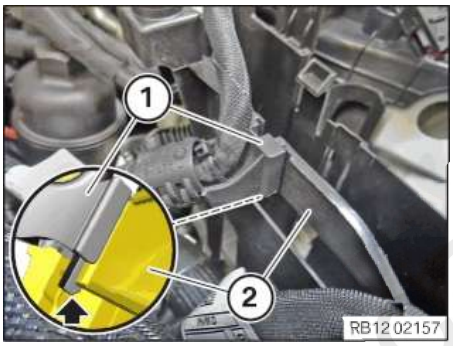
- Unlock plug connection (1) and disconnect.
- Unlock the plug (2) and disconnect from the control unit holder (5).
- Unlock plug connection (3) and disconnect.
- Unlock the plug (4) and disconnect from the control unit holder (5).
- Release the clamps (arrows).



- 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).

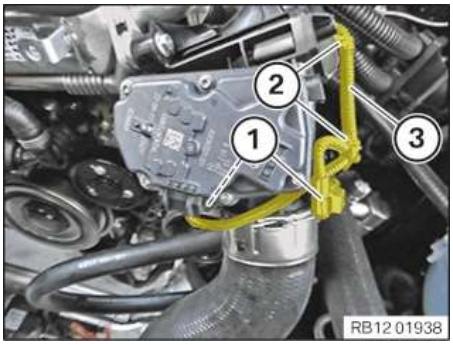


- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.

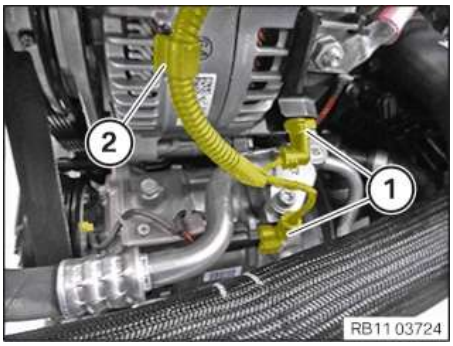


- Unlock holder (1) and feed out coolant line (2) and place it aside.

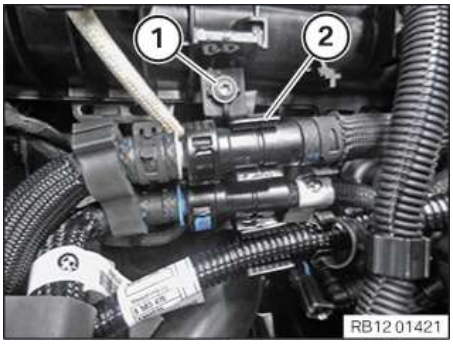
gardiagn.com



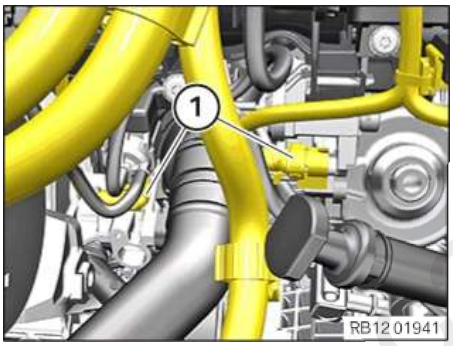
- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.



- 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).

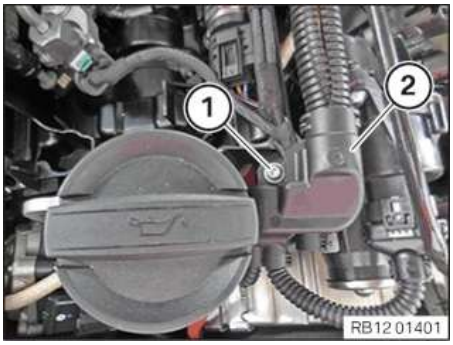


- Unlock and loosen connector (1).

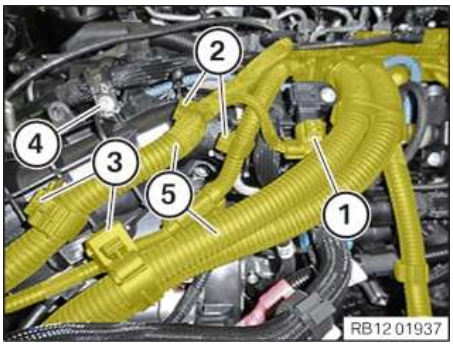


- Unlock plug connection (1) and disconnect.

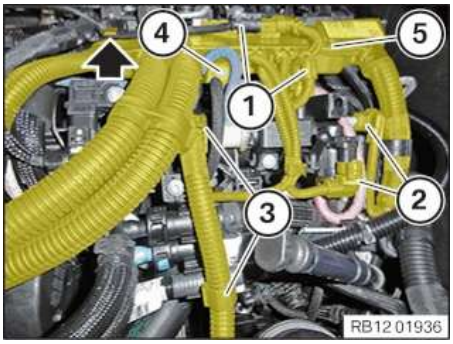
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- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.



- 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.

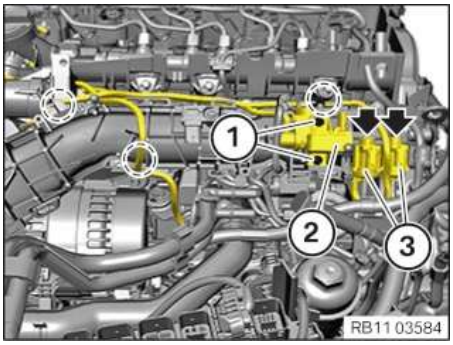


- Unlock clamp (1) and engage in this position.

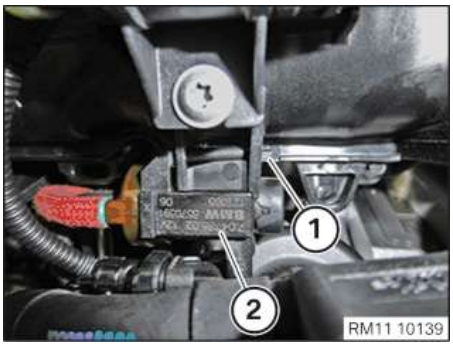


- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.

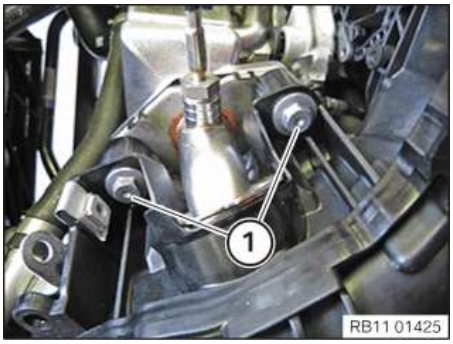
cardiagn.com



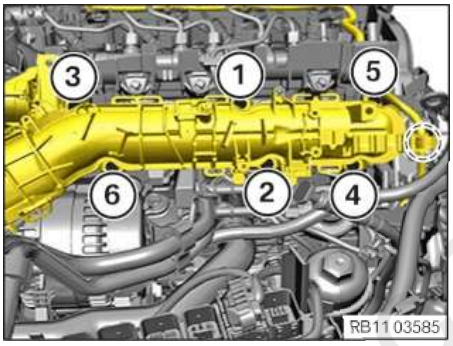
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



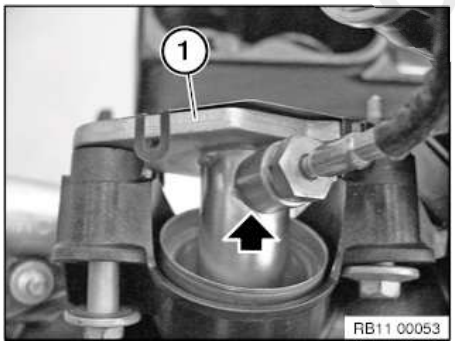
- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.



- 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**

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RISK OF DAMAGE

Escaping coolant on the starter generator.

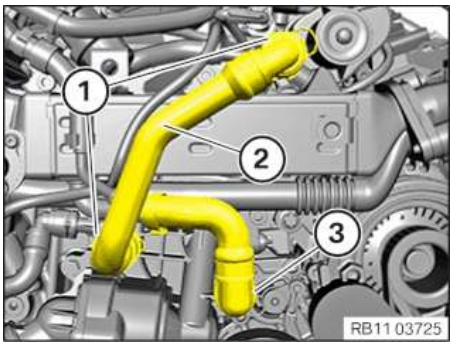
Damage and operating failure of the starter generator.

- 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:**

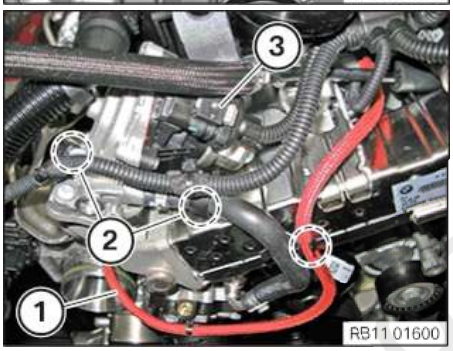
  Unlock and pull off coolant lines (1).



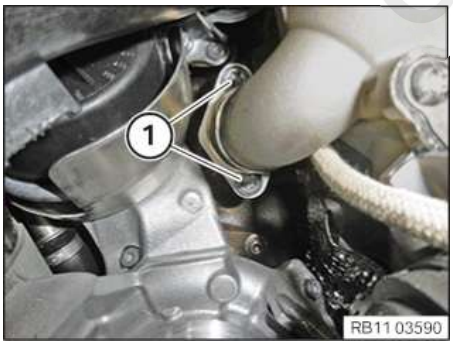
- **Version B:**

  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.

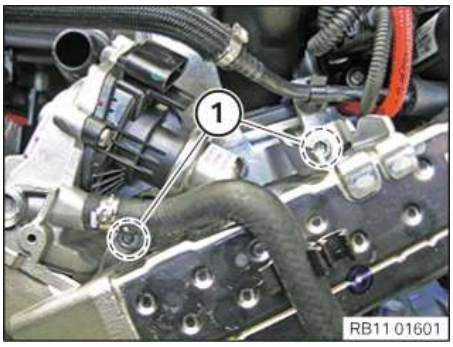


- Loosen the screws (1) on the intake system.

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- 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!

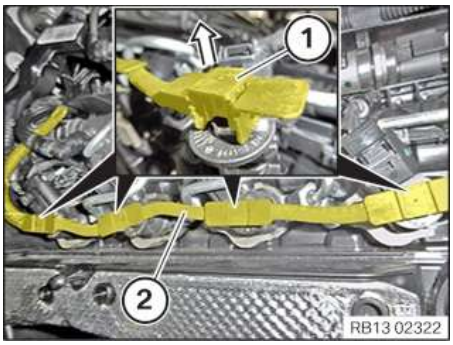
- Perform all work only on components that have cooled down.

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.



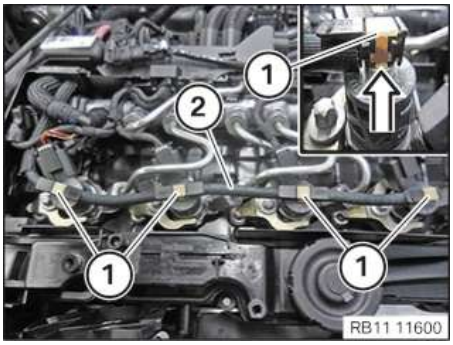
- **Version A:**

  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.

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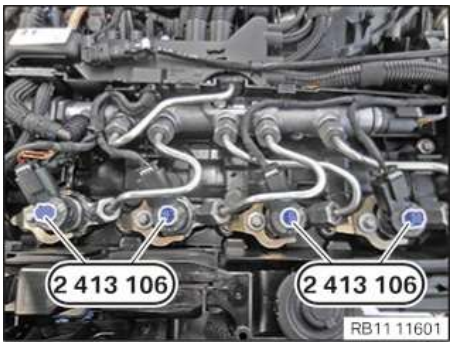


- **Version B:**

  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.

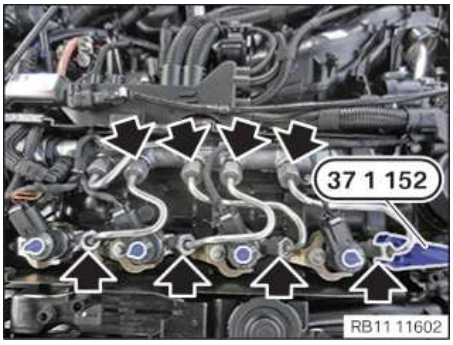
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TECHNICAL INFORMATION

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.

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TECHNICAL INFORMATION

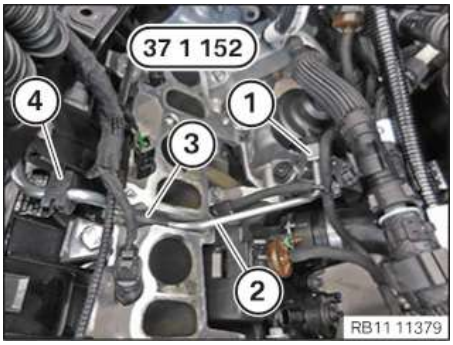
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

TECHNICAL INFORMATION

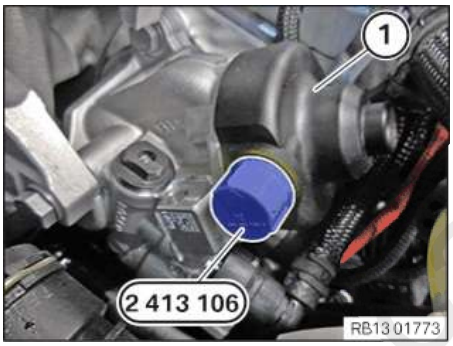
Reset special tool in early to avoid bending pressure lines.



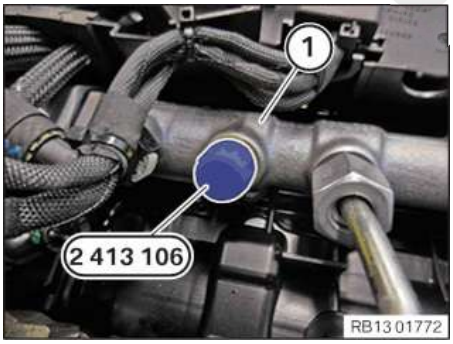
- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.



- 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

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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

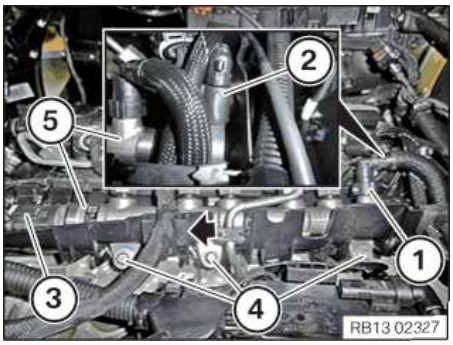
Contaminant or foreign body.

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.

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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

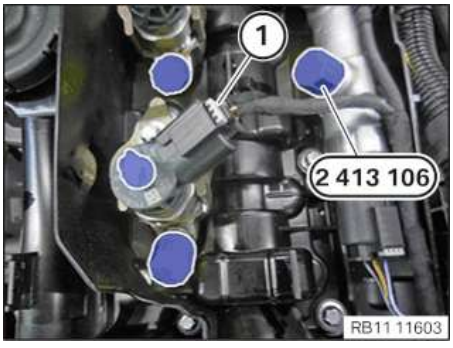
Electrostatic discharge.

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)

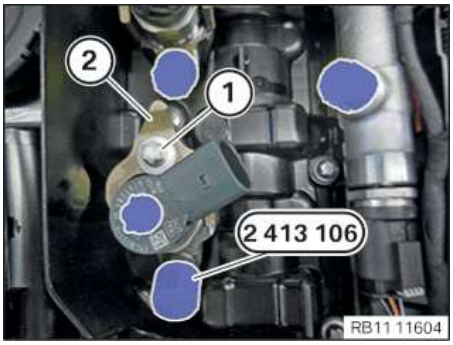
TECHNICAL INFORMATION

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



- Unlock plug connection (1) and disconnect.

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

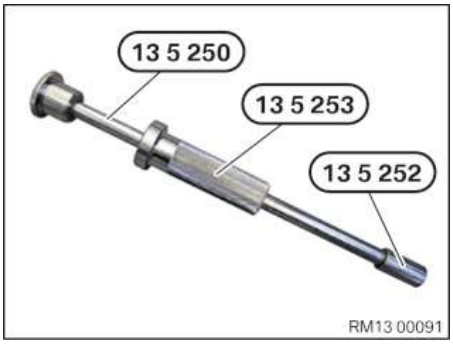
▸ **Loosen stuck injectors**

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).

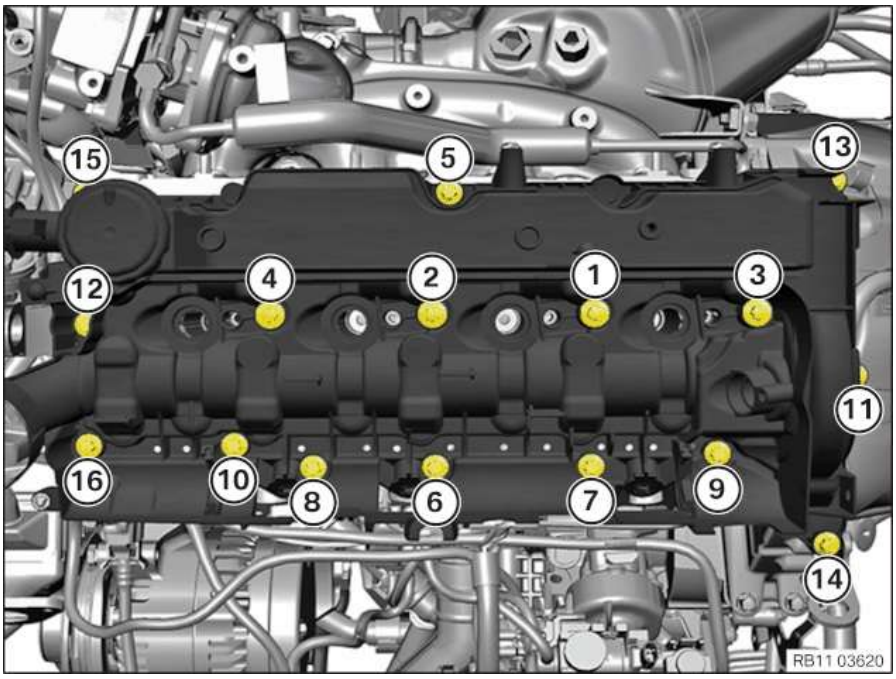


- Screw special tool 0 493 321 (13 5 250) with special tool 0 493 339 (13 5 252) onto pressure line connection (1) of injector.
- Release injector (1) with special tools 0 493 321 (13 5 250) and 0 493 339 (13 5 252) by means of **short** back and forth movements and remove.

49 – Removing the cylinder head cover

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Screw connection of the cylinder head cover



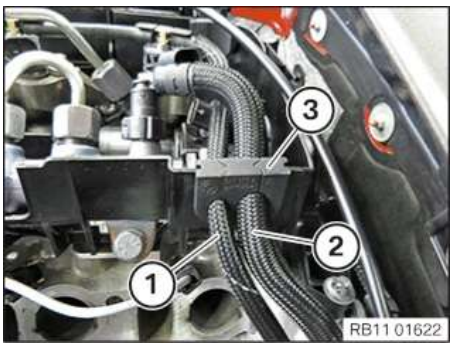
1 - 16 Bolts of the cylinder head cover



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

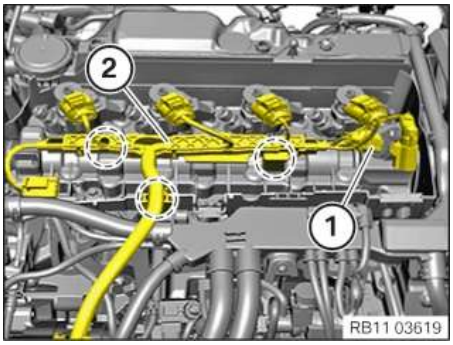


- Feed out and remove the heat shield (1).

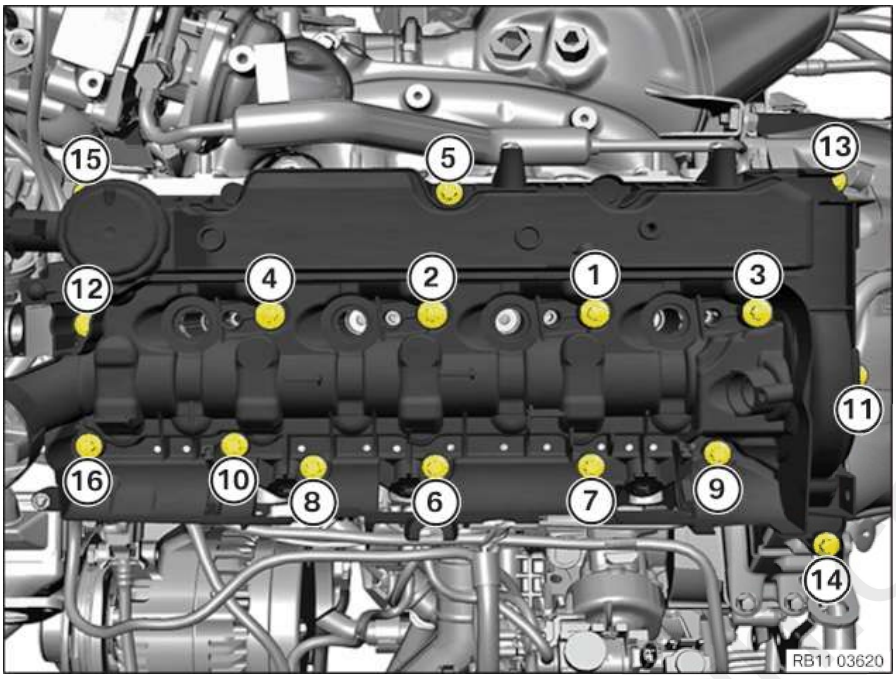


- Remove the leakage oil line (1) including the fuel return line (2) and the grommet (3) and put to one side.

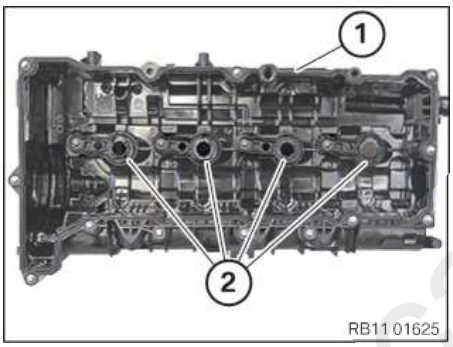
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- Unlock connector (1) and pull off.
- Disconnect the wiring harness (2) in the marked areas from the cylinder head cover and set aside.



- 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.

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WARNING

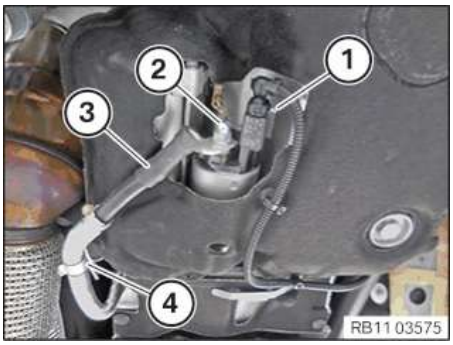
Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

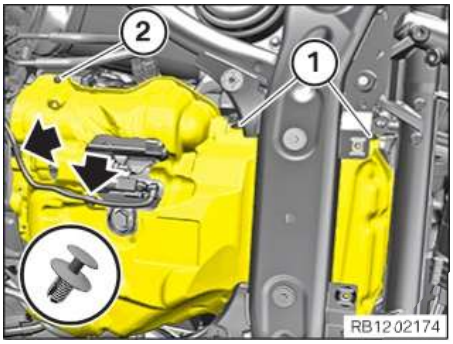
- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

TECHNICAL INFORMATION

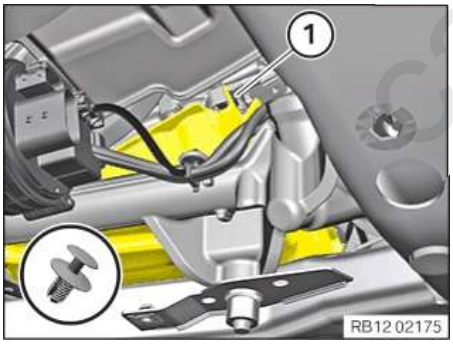
Make sure that the acoustic cover is **not** damaged while removing the starter motor.
A damaged lower acoustic cover can only be renewed when the front axle is lowered.



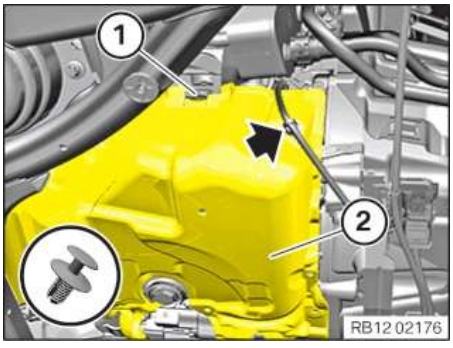
- Unlock plug connection (1) and disconnect.
- Release nut (2).
- Release positive battery cable (3) from holder (4).



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

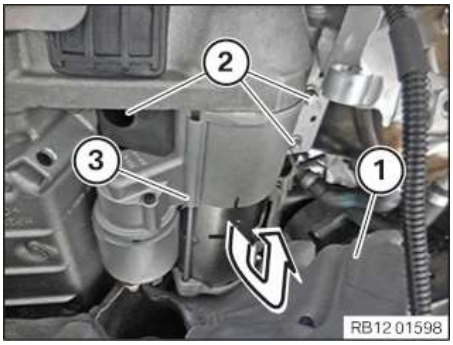


- Loosen expanding rivet (1).
- Lower the acoustic cover of the oil sump.



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

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- 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

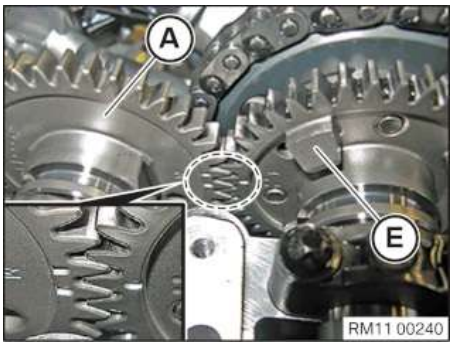
Damage to the engine.

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

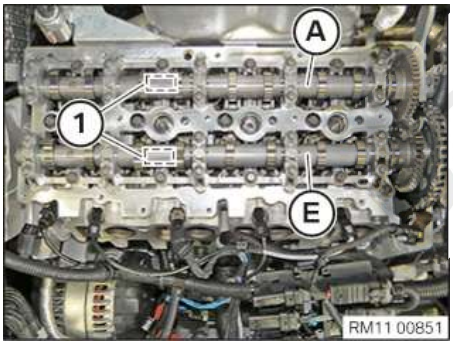
- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

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

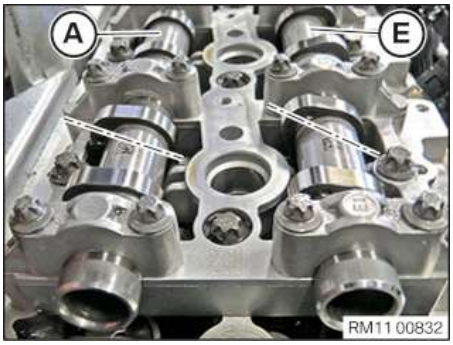
  Do **not** crank the engine in reverse.



- 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.



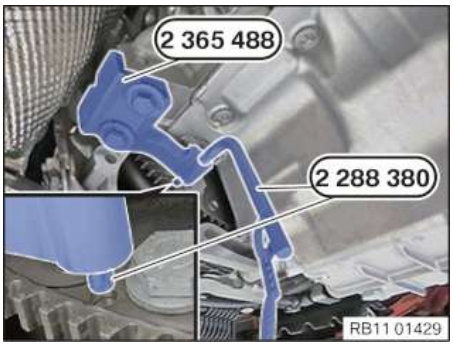
- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.

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- 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

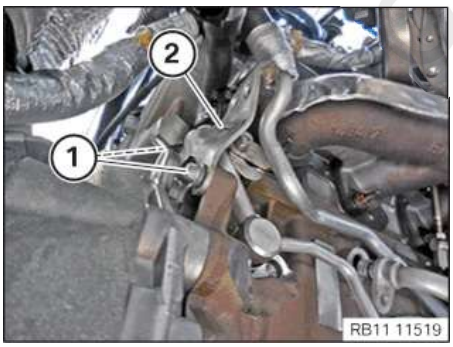
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

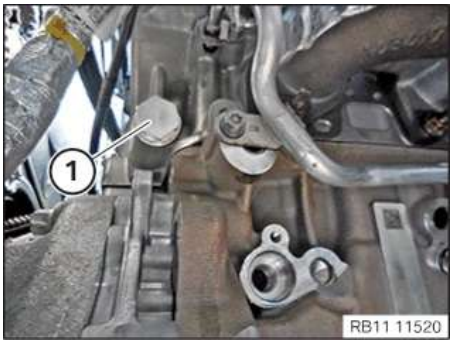
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

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



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



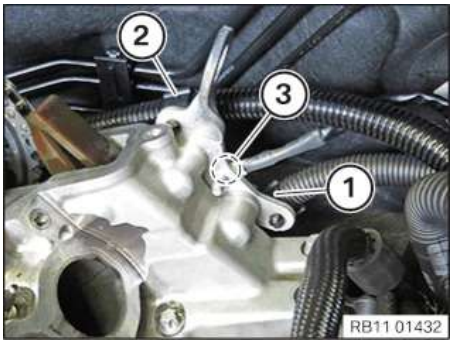
- Loosen the chain tensioner piston (1).
- Catch and dispose of emerging engine oil.

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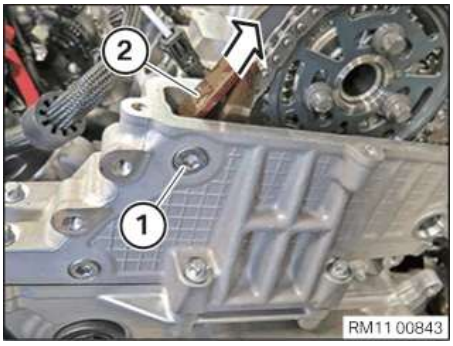


- Feed out and remove the sealing ring (1).

53 – Remove the timing chain guide rail

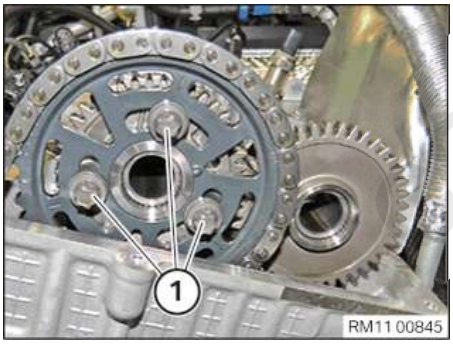


- Loosen the vehicle wiring harness (1) from the bracket.
- Release the positive battery cable (2) from the holder .
- Loosen the screw (3) and remove the grounding cable.



- 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



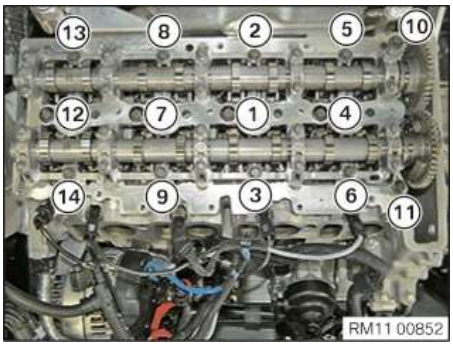
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

56 – Removing the camshaft support

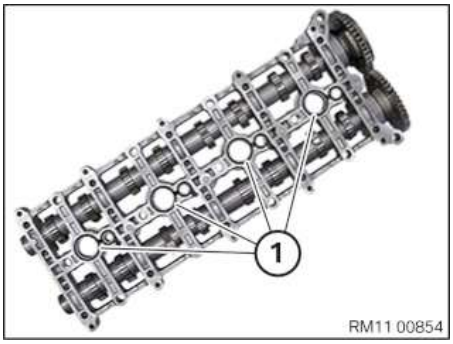
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TECHNICAL INFORMATION

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.

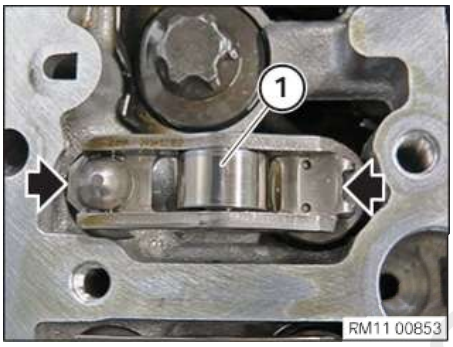


- Unscrew the screws evenly in order (14) to (1) in multiple increments.
- Feed out and remove the camshaft support with the camshafts towards the top.



- Guide out and remove gaskets (1).

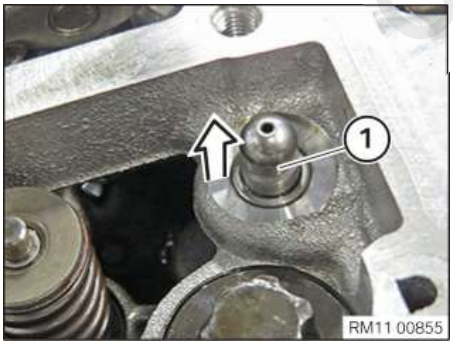
57 – Remove roller cam followers



- 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 – Removing cylinder head

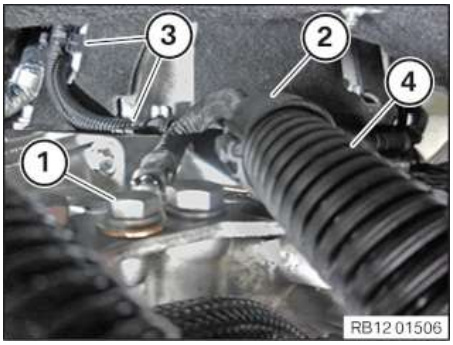
RISK OF DAMAGE

Heavy component.

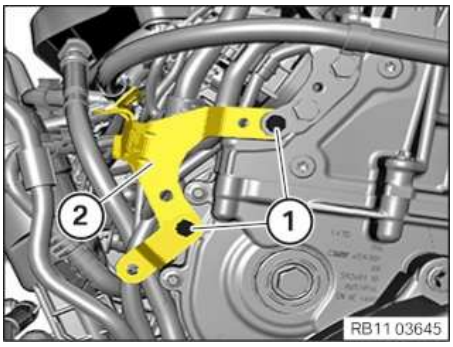
Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

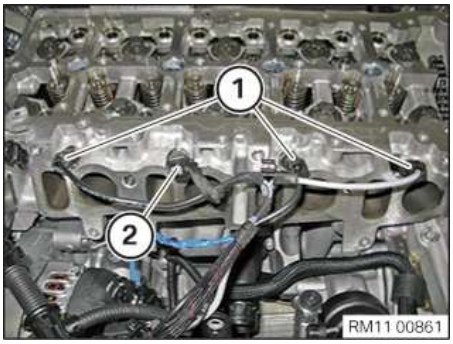
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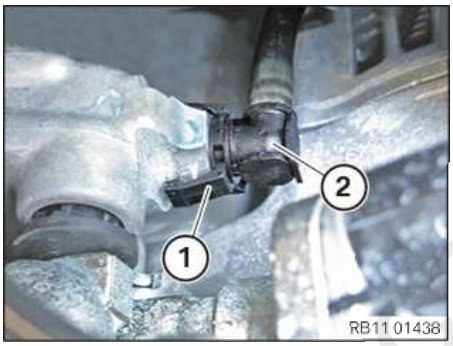
- Loosen screw (1).
- Unlock and loosen holder (2).
- Unlock and loosen the clamps (3).
- Feed out the wiring harness section (4) of the automatic transmission and place to one side.



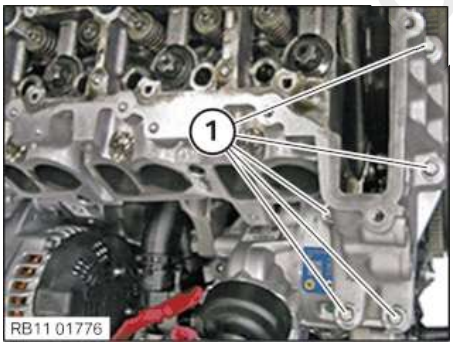
- Loosen screws (1).
- Guide out and remove holder (2).



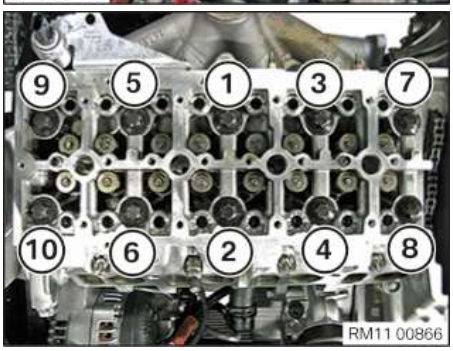
- Release plug connections (1) with special tool 0 495 140 (12 2 300).
- Unlock and disconnect the plug connections (1) and (2).
- Place wiring harness to one side.



- Release lock (1) of coolant line.
- Remove the coolant line (2) and set it aside.

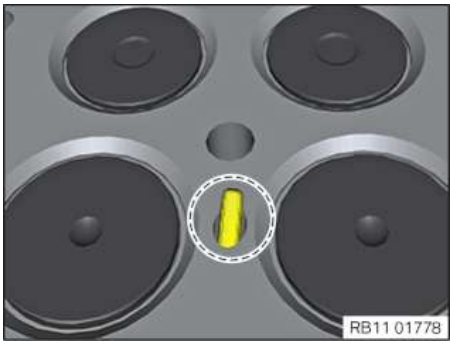


- Unscrew and remove the bolts (1).



- Release cylinder head bolts from **outside** to **inside** in the order (10) to (1).

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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).

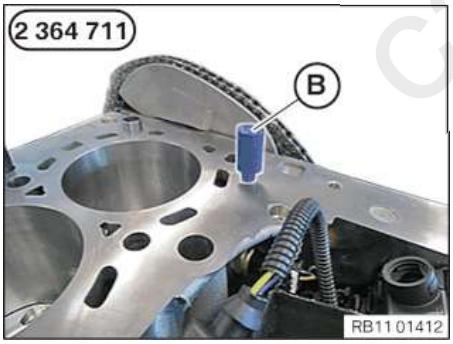
60 – Cleaning the sealing surface

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).

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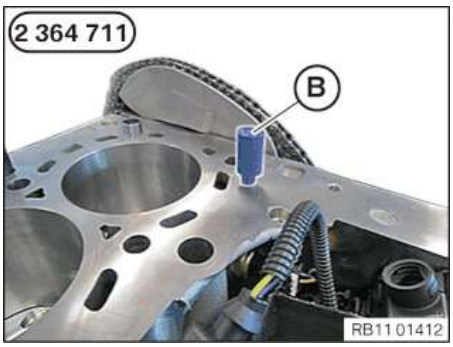
RISK OF DAMAGE

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.

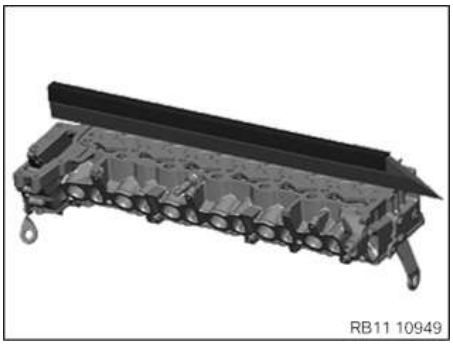
- Do not use any metal-cutting tools.

- Clean the sealing surface using special tool 0 495 104 (11 4 472).



- Remove special tool (B).

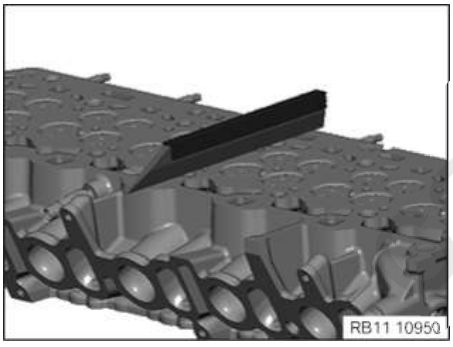
61 – Check the flatness of the cylinder head



- 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

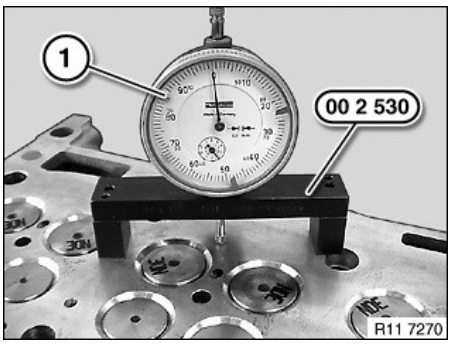


- Check the flatness of the cylinder head crosswise using a straightedge.

Cylinder head flatness

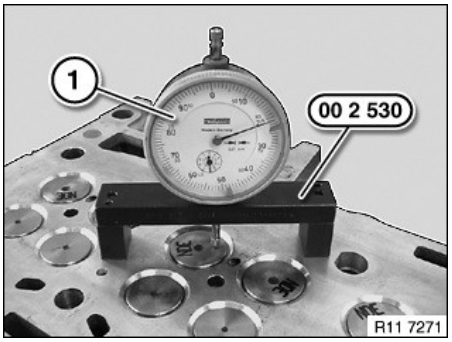
Maximum lengthwise deviation from flatness	0.10 mm
Maximum transverse deviation from flatness	0.05 mm

62 – 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

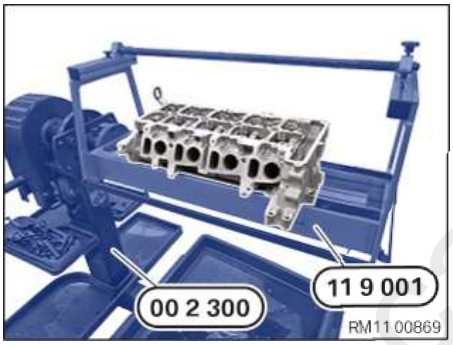
63 – Remove all valve springs

RISK OF DAMAGE

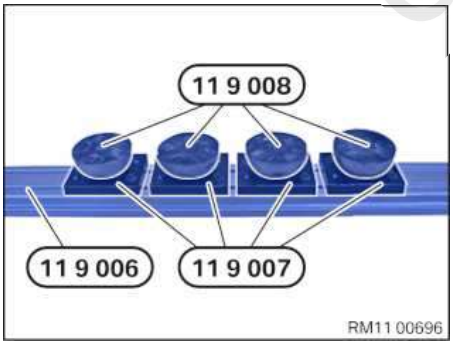
Contaminant or foreign body.

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).

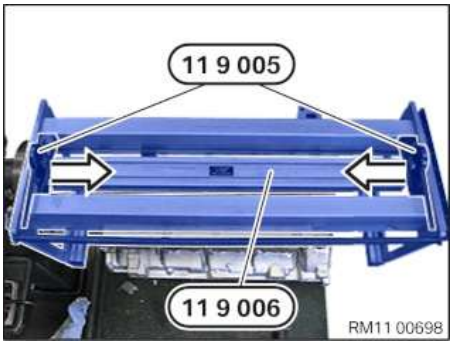


- Prepare the special tools 0 494 371 (11 9 006), 0 494 372 (11 9 007) and 0 494 373 (11 9 008) as shown.

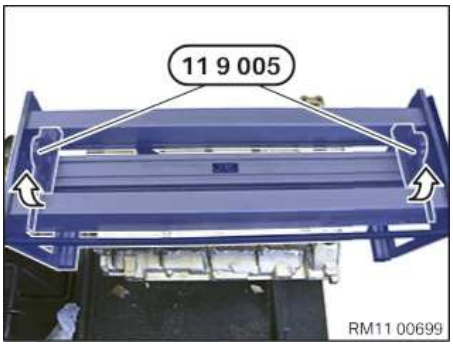


- Position special tools 0 494 373 (11 9 008) as pictured.

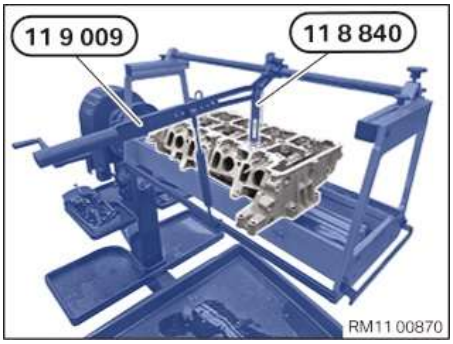
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- Turn round special tool 0 494 371 (11 9 006) and insert as shown.
- Lock special tool 0 494 370 (11 9 005)in direction of arrow.

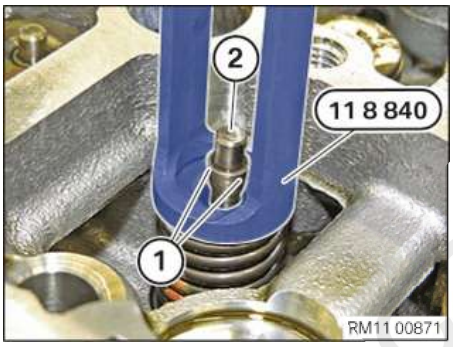


- Lock special tool 0 494 370 (11 9 005)in direction of arrow.
- Move cylinder head with special tool 0 494 362 (11 9 000) through 180° into the installation position.



- 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.

64 – Remove valve stem seals

RISK OF DAMAGE

Contaminant or foreign body.

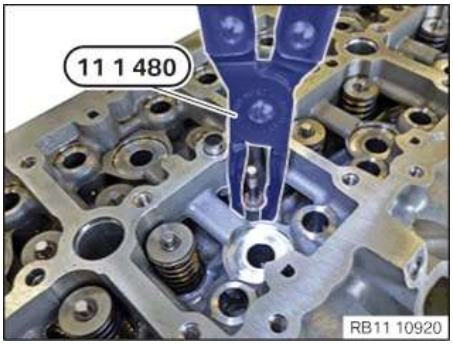
Contamination can result in malfunctions, operating failure or leaks.

- 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.

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- Remove the valve stem seal (1) with the special tool 0 490 796 (11 1 480).

65 – Remove all valves

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

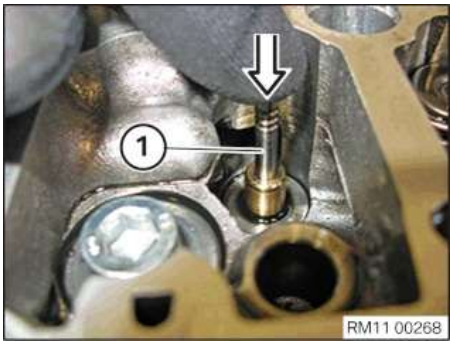
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



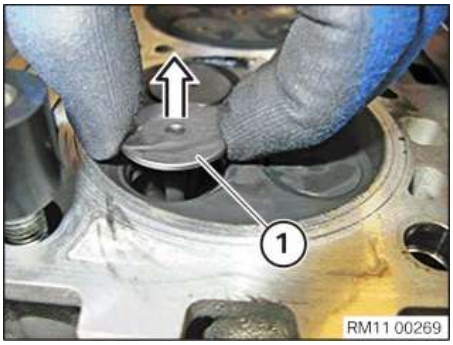
- Turn the cylinder head with the special tool 0 494 362 (11 9 000).
- Unlock the special tool 0 494 370 (11 9 005) in the direction of the arrow.
- Remove special tool 0 494 371 (11 9 006).



- Remove special tool 0 494 373 (11 9 008) if necessary.



- Push the valve stem (1) into the cylinder head in the direction of the arrow.



- Remove the valve (1) in the direction of arrow and store it properly in the special tool 0 495 105 (11 4 480).

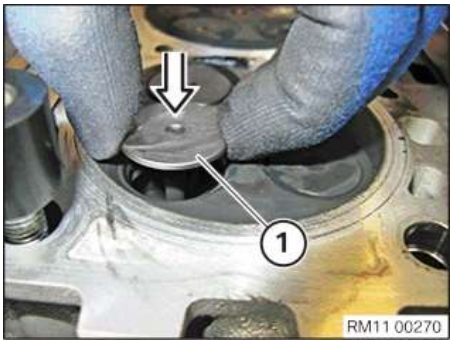
66 – Install all valves

RISK OF DAMAGE

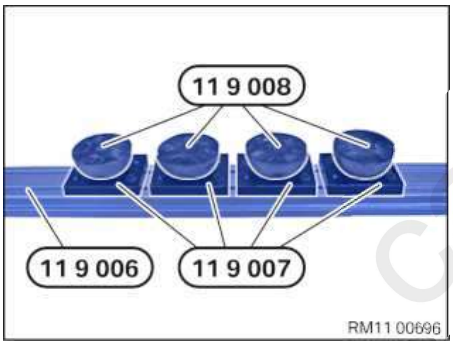
Contaminant or foreign body.

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.



- Insert and install the valve (1) in the direction of the arrow.

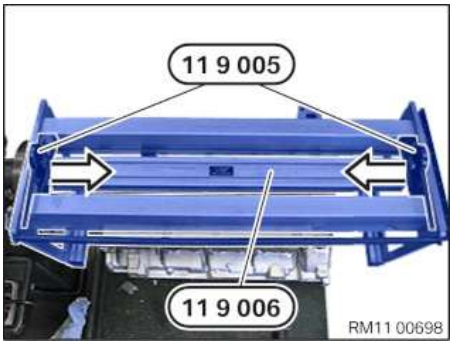


- Prepare the special tools 0 494 371 (11 9 006), 0 494 372 (11 9 007) and 0 494 373 (11 9 008) as shown.

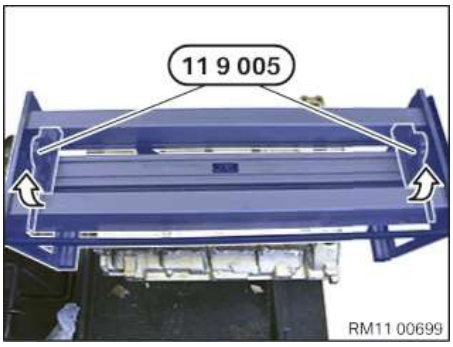


- Position special tools 0 494 373 (11 9 008) as pictured.

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- 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.

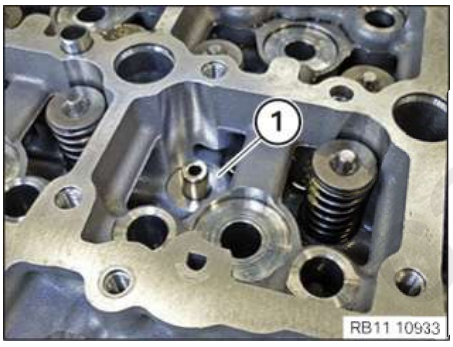
67 – Installing valve stem seals

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.



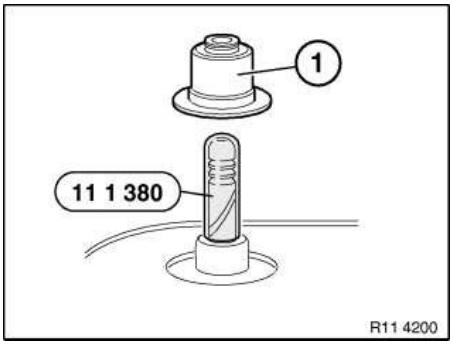
RISK OF DAMAGE

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.

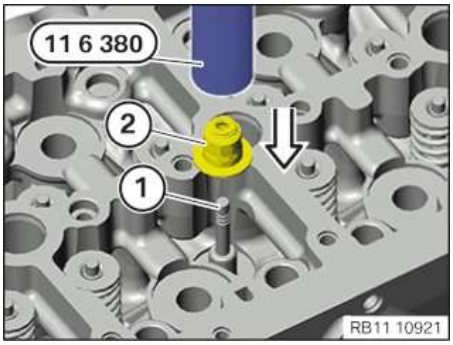
- Do not use any metal-cutting tools.

- 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).



- 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).

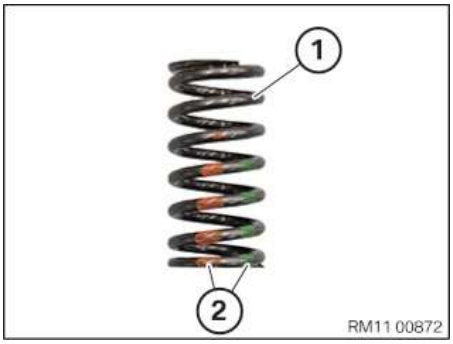
68 – Install all valve springs

RISK OF DAMAGE

Contaminant or foreign body.

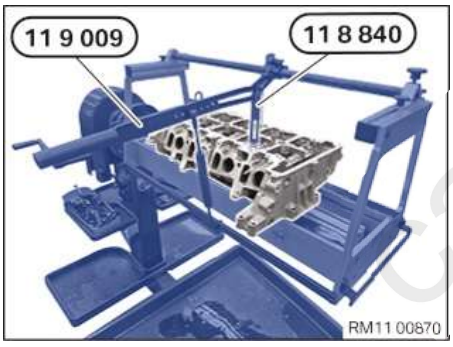
Contamination can result in malfunctions, operating failure or leaks.

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



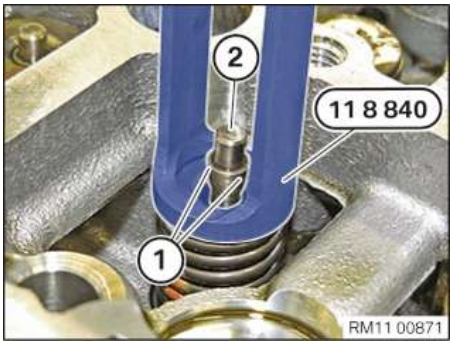
- Ensure that the valve spring (1) is marked using a colour code (2).

  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.

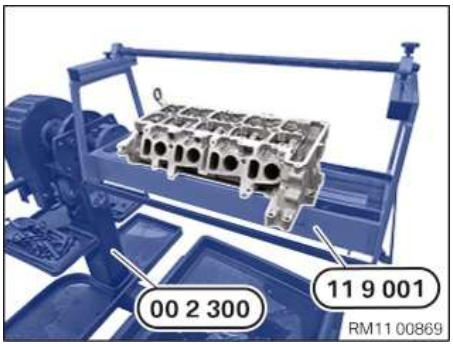


- Keep the valve spring pressed down with the special tool 0 496 143 (11 8 840).
- Insert the valve shims (1) at the valve (2) with the magnet and install.
- Relieve load on valve spring.
- Make sure that the valve shims (1) are installed correctly.

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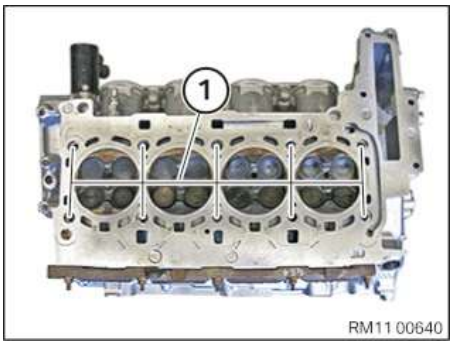
- Unlock the special tool 0 494 370 (11 9 005) in the direction of the arrow.
- Guide the special tool 0 494 371 (11 9 006) out and remove.



- Unscrew and remove the cylinder head from the special tools 0 494 366 (11 9 001) and 0 495 187 (00 2 300).

POSTPROCESSES

69 – Replace cylinder head gasket



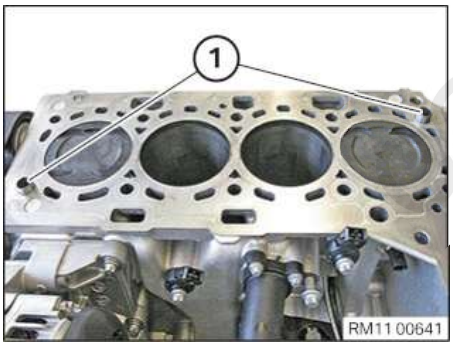
RISK OF DAMAGE

Damage to the surface.

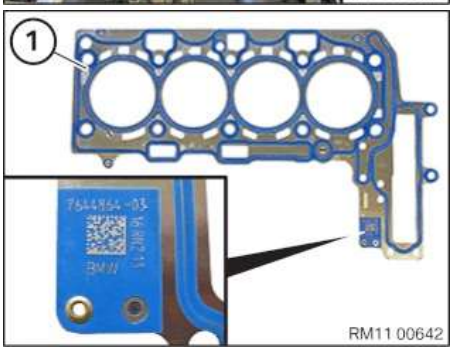
The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.

- Remove oil and dirt residue from the blind holes (1).

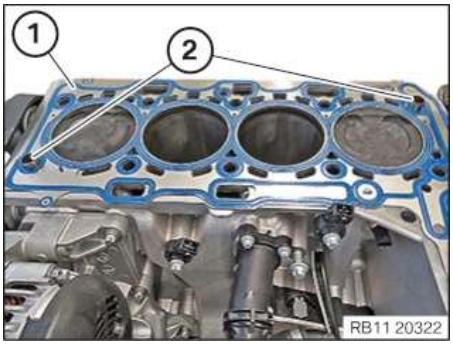


- Check if fitting sleeves (1) fit correctly and check for any damage.



- 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).

70 – 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.

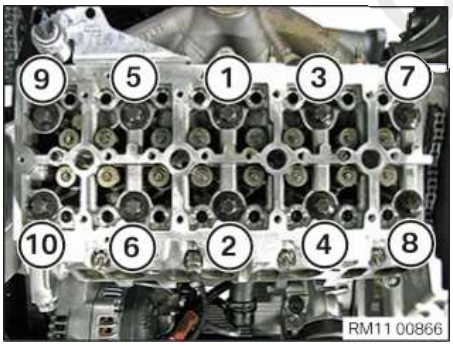
- Dry threaded holes (e.g. using compressed air).

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.



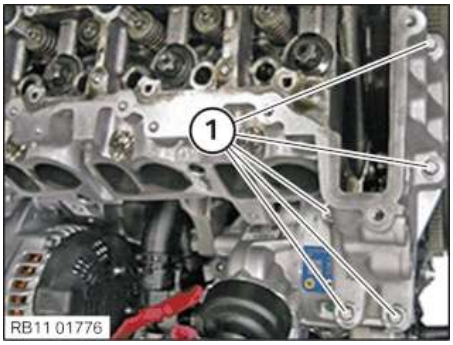
- Position the cylinder head gasket with the previously determined gasket thickness (number of holes).
- Fit new cylinder head screws.

  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 °

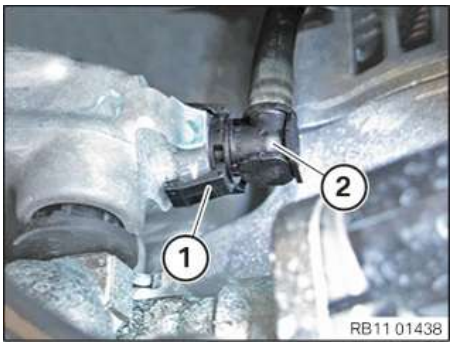
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- Insert screws (1) and tighten.

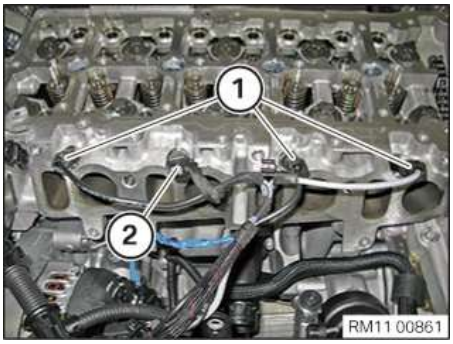
Cylinder head bolt to timing case cover

M8x40		Tightening torque	19 Nm



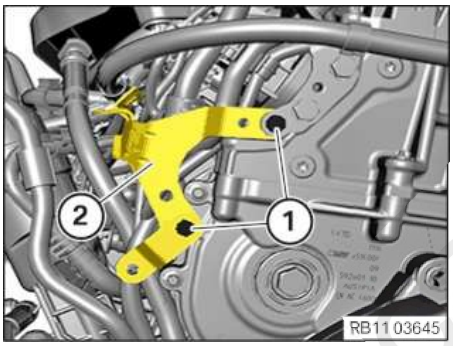
- Fit and lock coolant line (2).

  The lock (1) must engage audibly.



- Connect connectors (1) and (2), then lock.

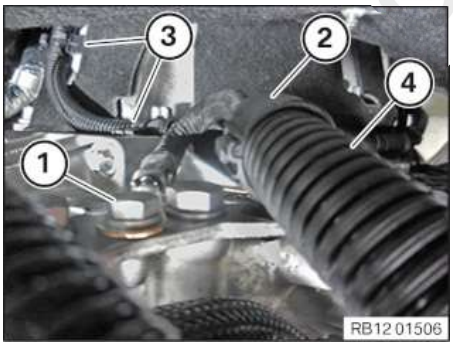
  The connectors (1) and (2) must audibly engage.



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

Standard screw connection M6

M6		Tightening torque	8 Nm



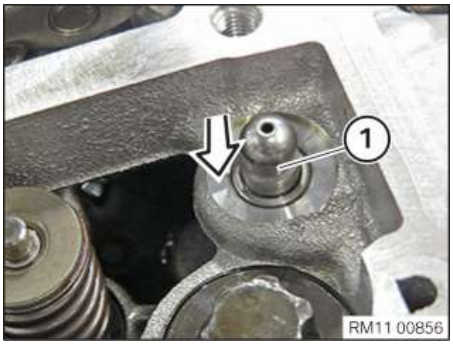
- Guide in the wiring harness section (4) of the automatic transmission and install.
- Lock holder (2).
- Make sure the bracket (2) engages audibly.
- Secure clamps (3).
- Tighten down screw (1).

Ground to cylinder head

M6		Tightening torque	8 Nm

71 – Installing all hydraulic valve clearance compensating elements

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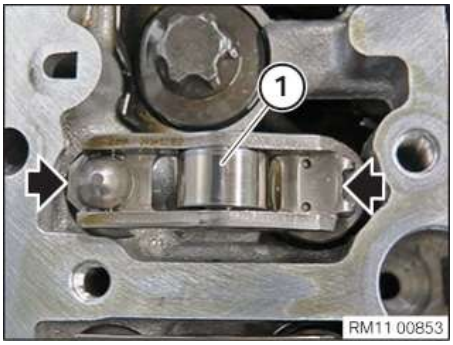


- Make sure to observe the assignment of the roller cam followers to the hydraulic valve clearance compensating elements when reusing the hydraulic valve clearance compensating elements (1).
- Insert and install all hydraulic valve clearance compensating elements (1) in the direction of the arrow.

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.

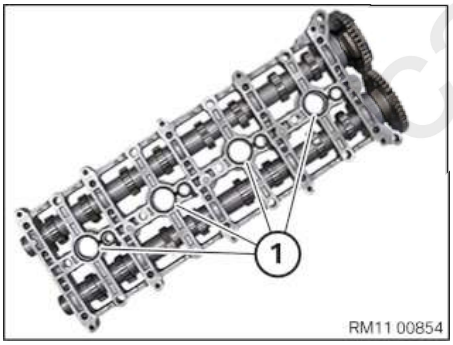
  Parts: Roller cam followers
- Insert all roller cam followers (1) and install them (arrows).

  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

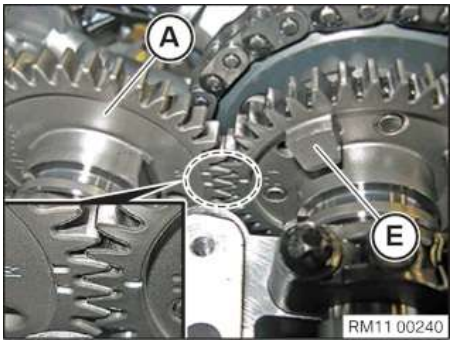
TECHNICAL INFORMATION

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.



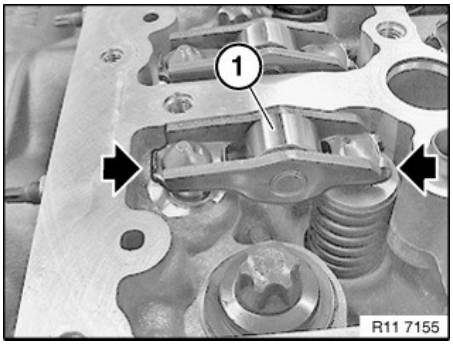
- Renew seals (1).

  Parts: Seals
- Insert and install the gaskets (1).

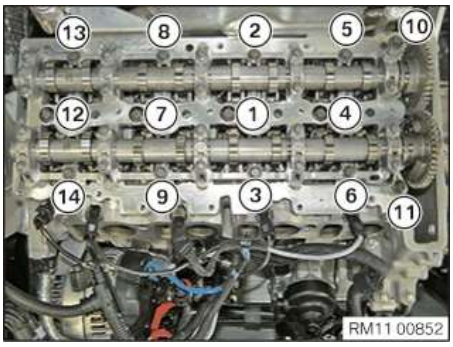


- Make sure the marks on both camshafts (A) and (E) correspond in the **highlighted area**.

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- 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

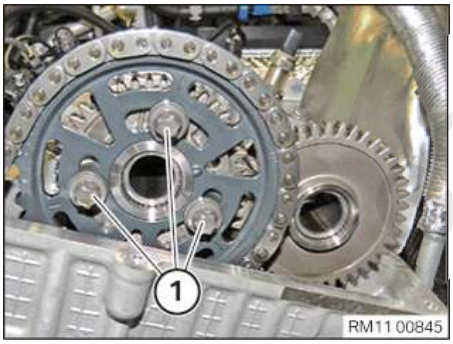
74 – Installing the special tool to secure the exhaust camshaft



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

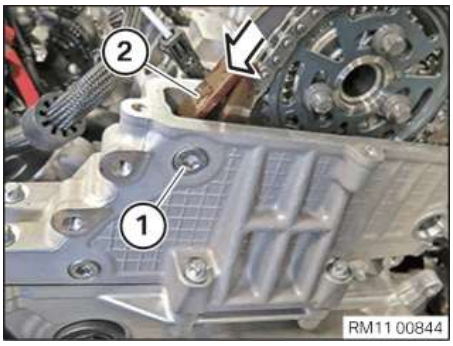
  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.

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



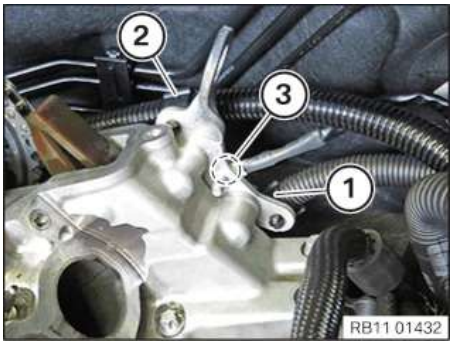
- Position the guide rail (2) in the direction of the arrow.
- Make sure the guide rail (2) is correctly installed at the bottom bearing journal.
- Renew bearing journal (1).

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

Bearing journal to cylinder head

M16x1.5	Replace bearing journal.	Tightening torque	20 Nm

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- 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

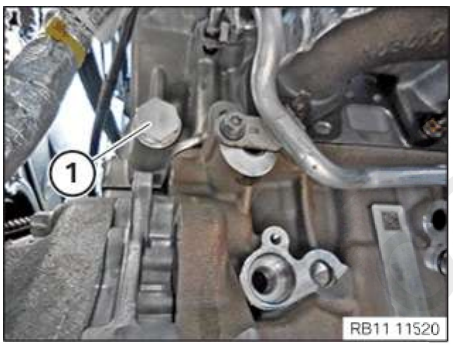
The oil chamber must be drained for reuse of the chain tensioner.

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



- Renew sealing ring (1).

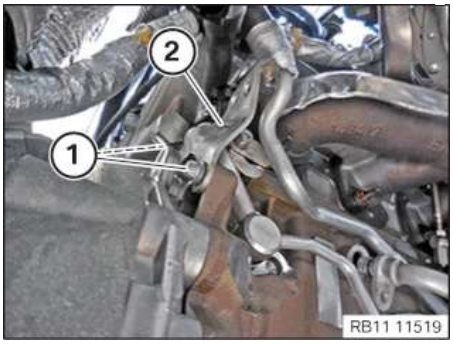
  Parts: Sealing ring
- Insert and install the sealing ring (1).



- 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



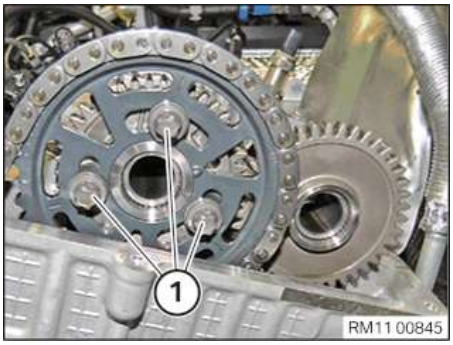
- Insert and install the holder (2).
- Tighten the screws (1).

Holder to crankcase

M8X16		Tightening torque	19 Nm

78 – Tightening the camshaft sprocket on the intake camshaft

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- Tighten the screws (1).

Camshaft sprocket to camshaft

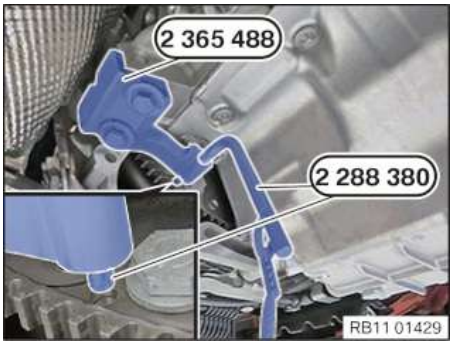
M7x17.			17 Nm

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

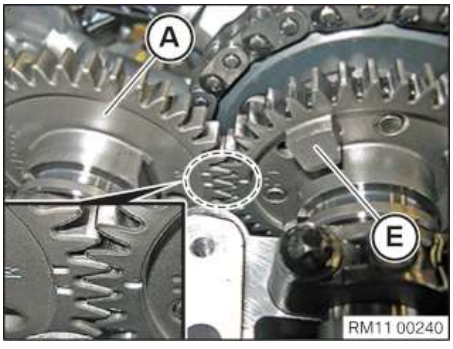
Damage to the engine.

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.

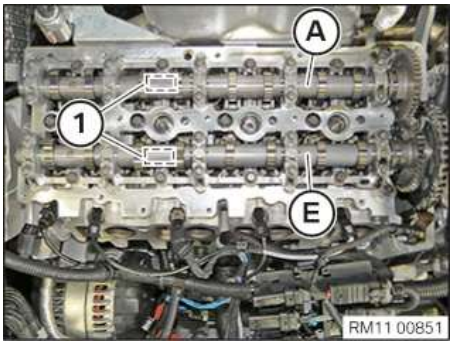
- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

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

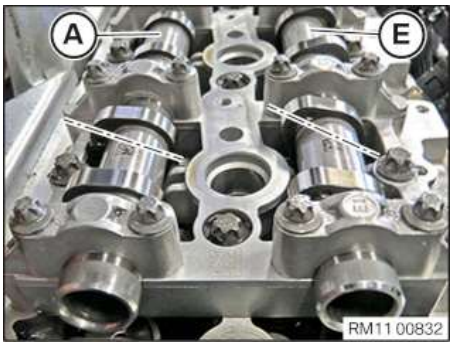


- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.

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

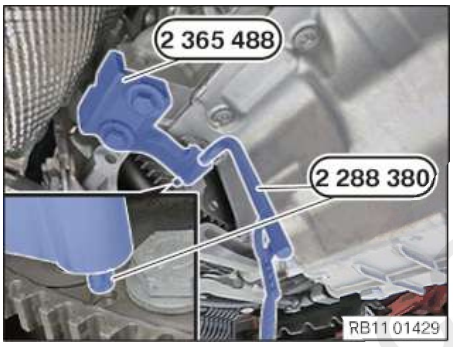


- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- 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

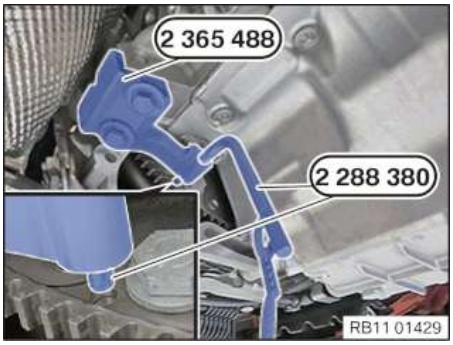
- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

82 – Removing the special tool for fixing the exhaust camshaft



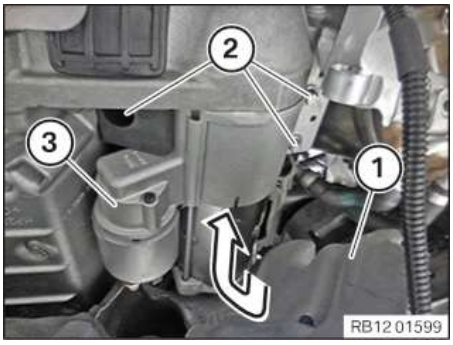
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

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.

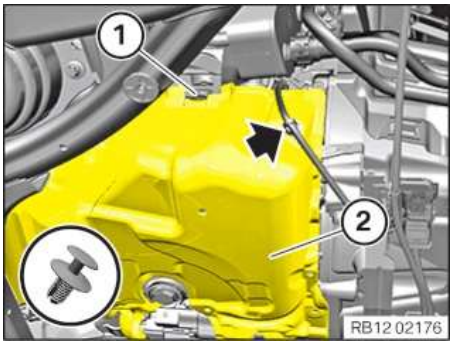
84 – Installing starter motor



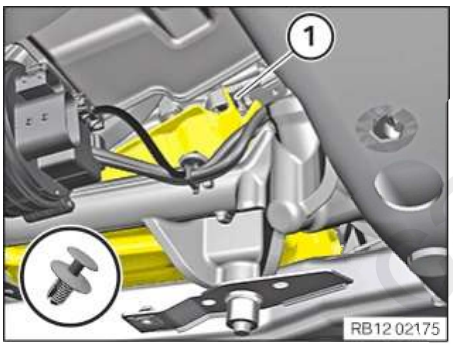
- Make sure that the acoustic cover (1) is not damaged.
- Carefully press the acoustic cover (1) to one side.
- Feed in and install the starter motor (3) in the direction of the arrow.
- Tighten the screws (2).

Starter motor to engine

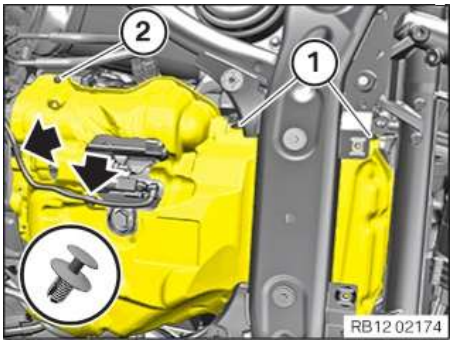
M8X60		Tightening torque	19 Nm



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

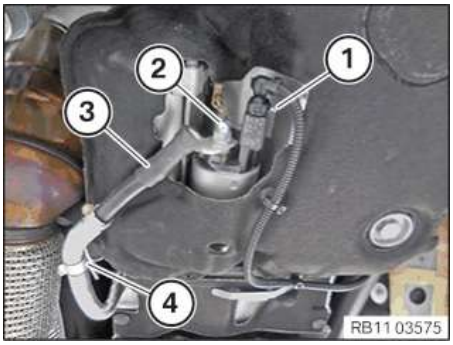


- Fasten expanding rivet (1).

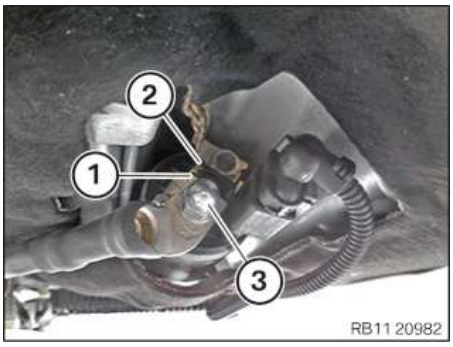


- Secure fir tree clip (2).
- Secure expanding rivet (1).
- Secure the clamps (arrows).

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- 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.

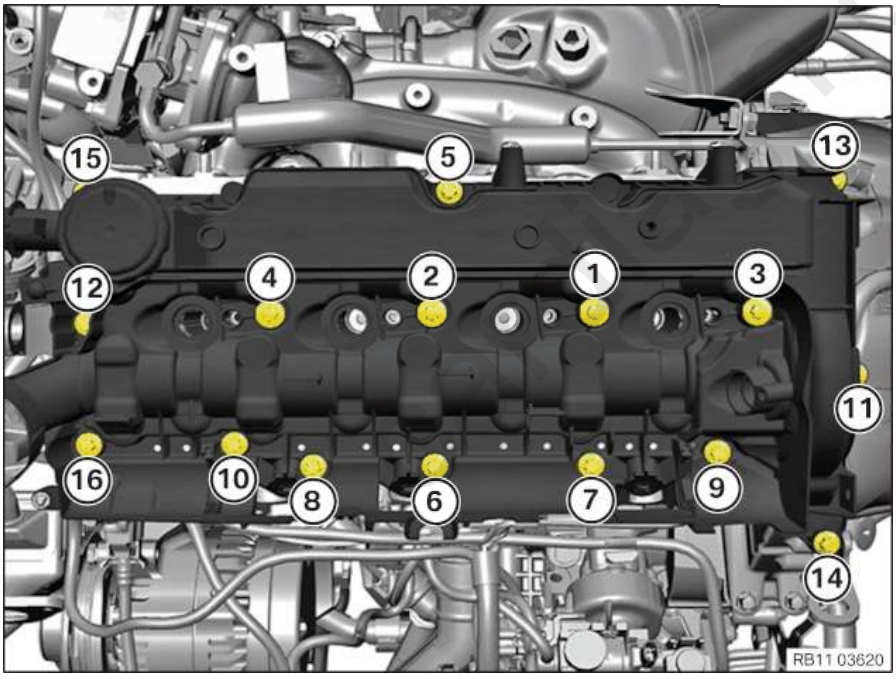
- Attach the positive battery cable (1) **correctly** to anti-twist lock (2).
- Tighten nut (3).

Battery positive lead to starter

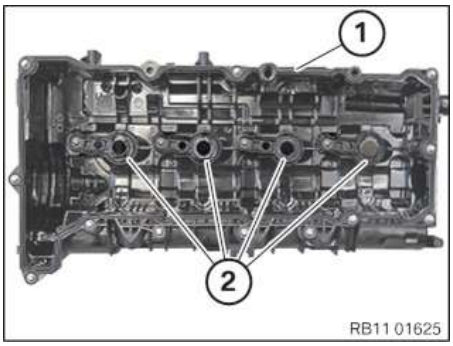
M8		Tightening torque	13,5 Nm

85 – Installing cylinder head cover

Screw connection of the cylinder head cover

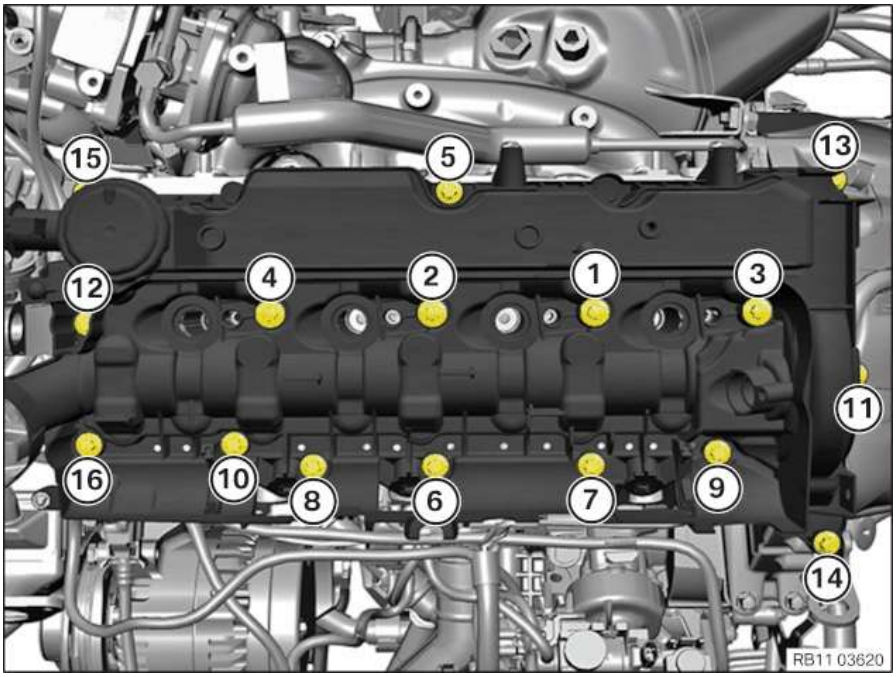


1 - 16 Bolts of the cylinder head cover



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

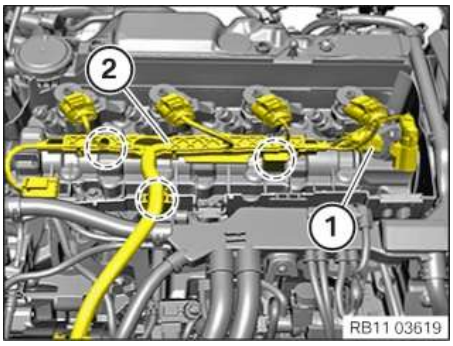
  Parts: Profile seals



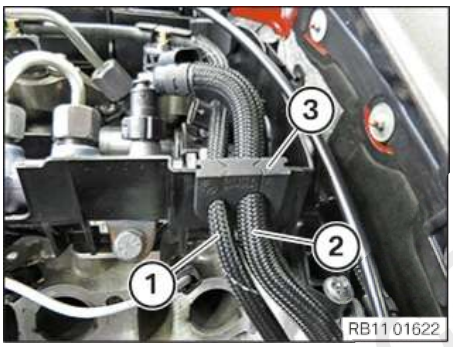
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

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.

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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

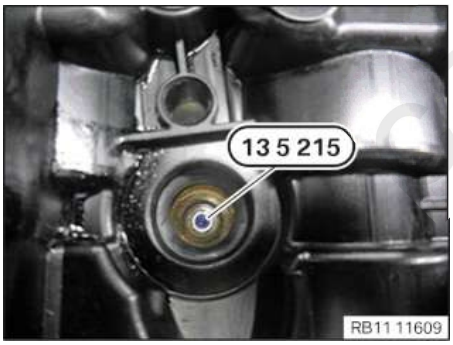
Contaminant or foreign body.

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.



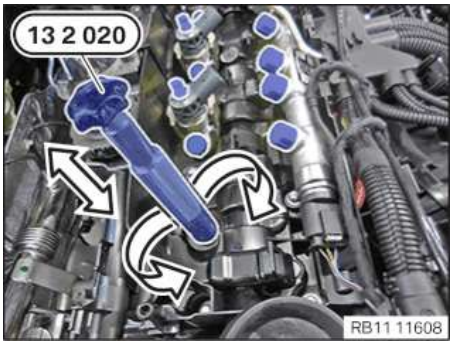
- Check whether the sealing ring remained in the injector shaft and remove the sealing ring as needed.
- Insert the special tool 0 493 763 (13 5 215) with the special tool 0 493 762 (13 5 214) from the set of special tools 0 493 758 (13 5 210) into the injector shaft.
- Remove special tool 0 493 762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



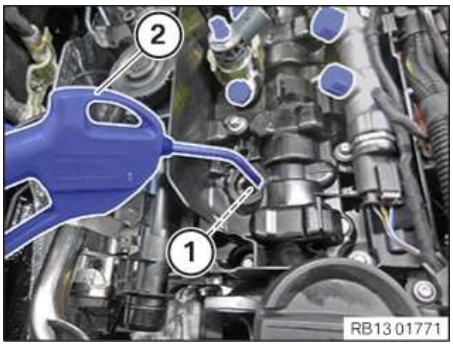
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



- 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.

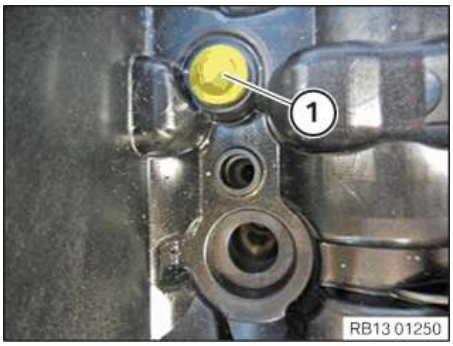
▸ **Check the placement of the clamping claw**

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**

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RISK OF DAMAGE

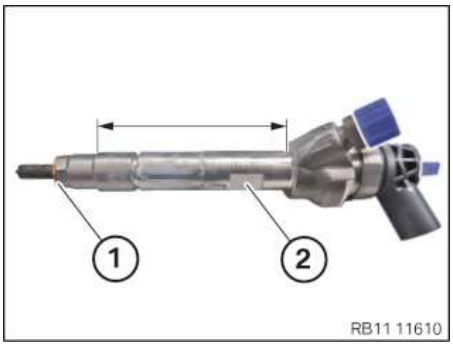
Contaminant or foreign body.

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.

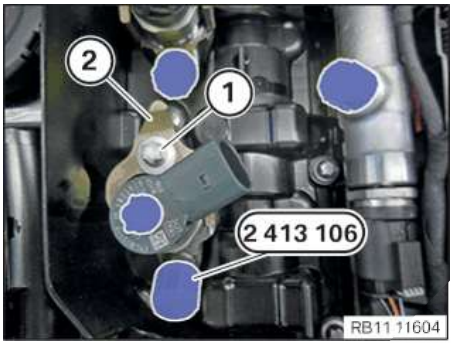
TECHNICAL INFORMATION

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).

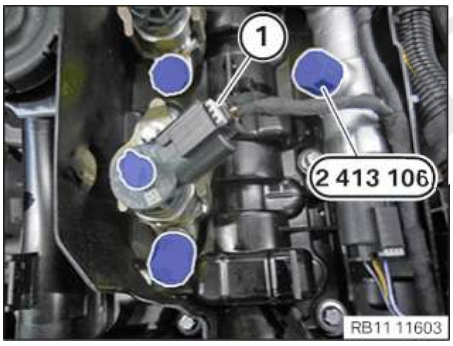
  Parts: Copper sealing ring
- Lightly grease the injector in the marked area with heat-resistant grease before installing the injector (2) in the injector shaft.



- 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**

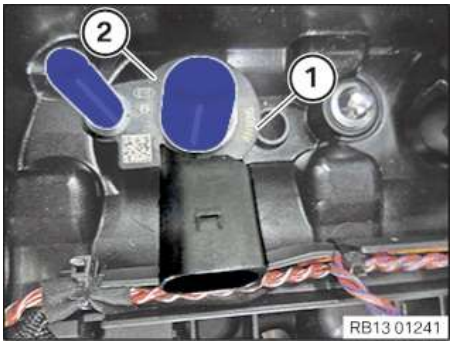
TECHNICAL INFORMATION

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.

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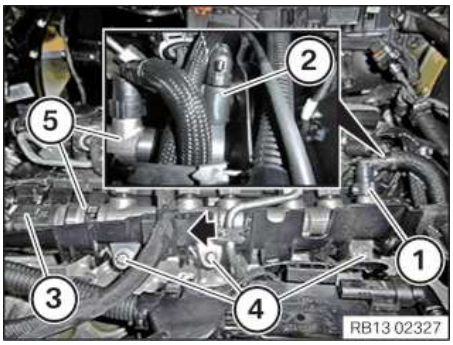


- Read off the adjustment value (1) on the new injector (2).



- 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.

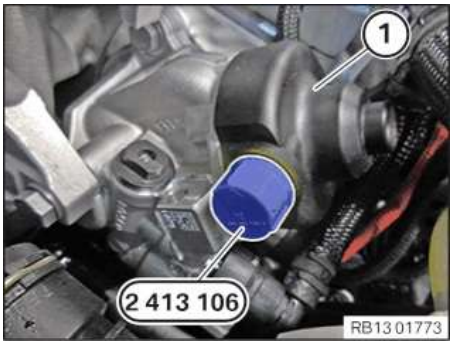
Danger of injury!

- 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.

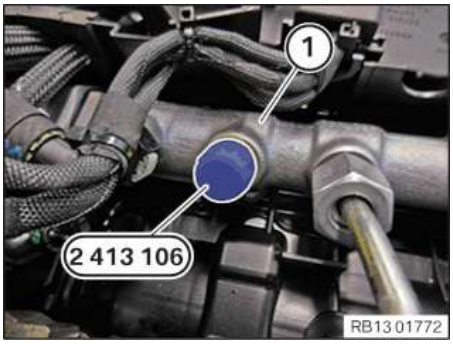
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TECHNICAL INFORMATION

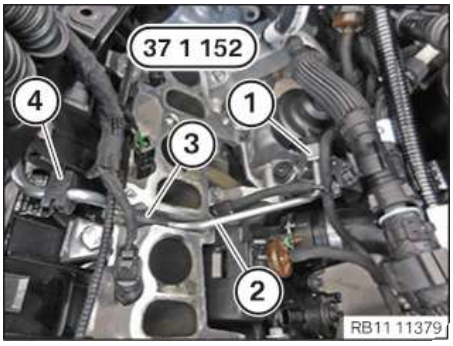
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- 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.

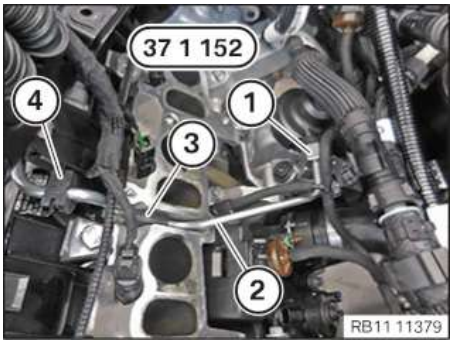
TECHNICAL INFORMATION

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

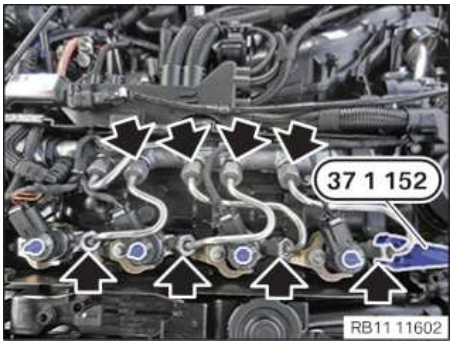
Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- 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

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- 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.

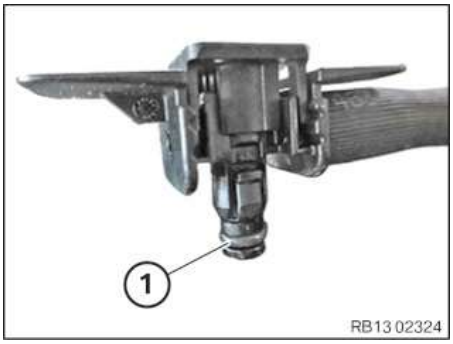
- Tighten the high pressure lines (arrows) with the special tool .

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

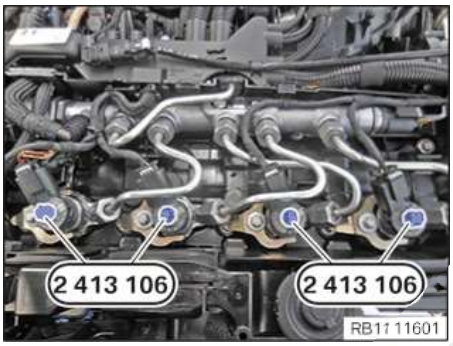


- **Version A:**

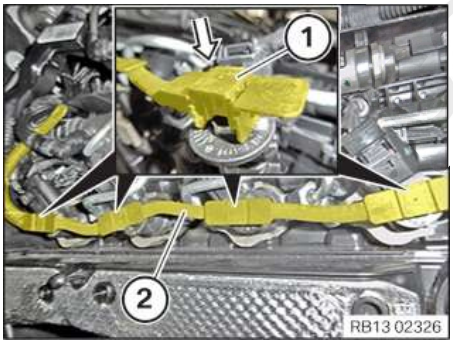
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

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

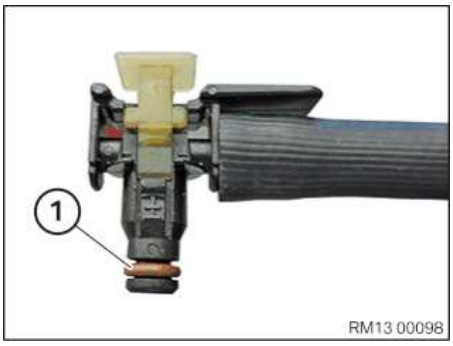
  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.



- 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.



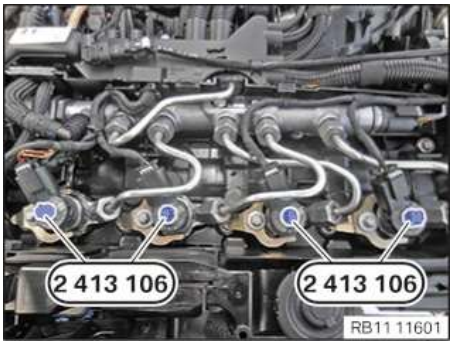
- **Version B**:

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

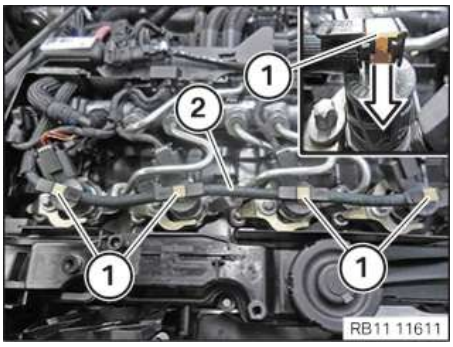
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

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

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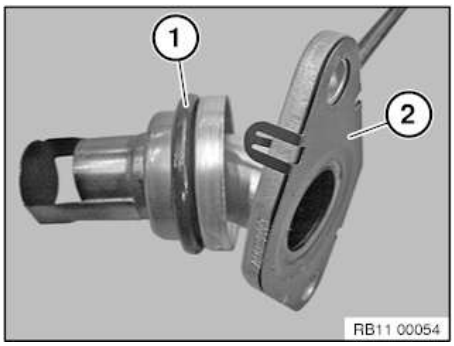


- Feed out the special tools and remove.



- 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.

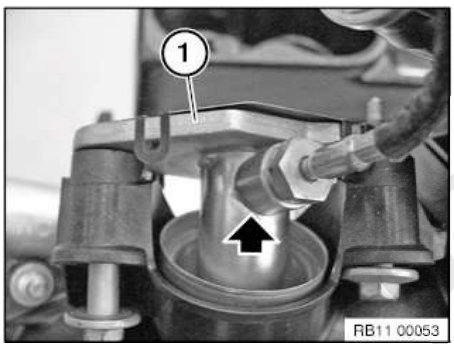
91 – Installing the intake plenum



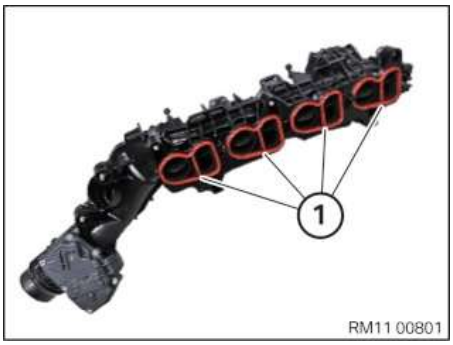
- Renew O-ring (1).

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

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



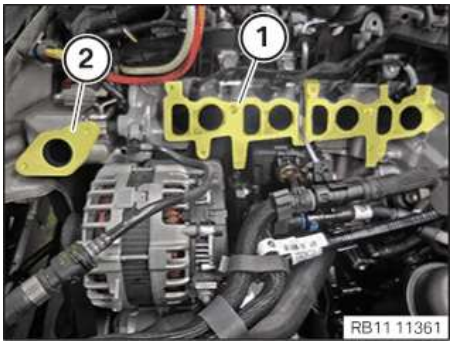
- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).



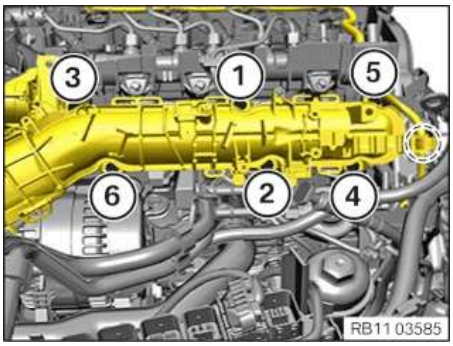
- Renew seals (1).

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

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

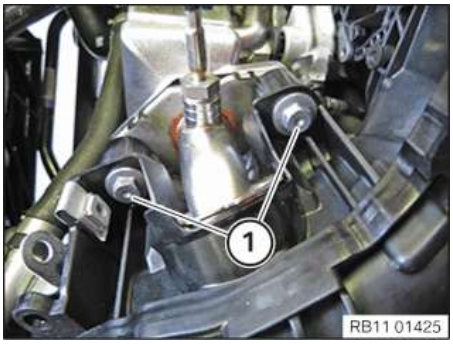


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

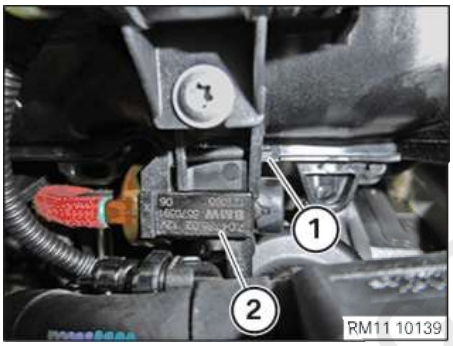
- Attach the wiring harness and fuel lines in the marked area on the intake plenum.



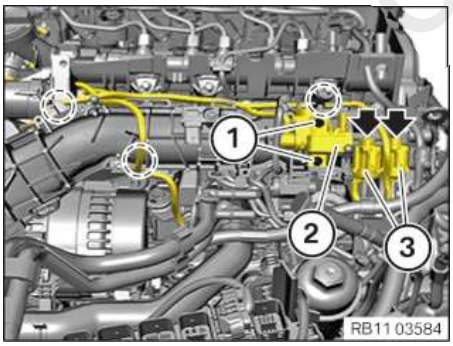
- Tighten the screws (1).

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.



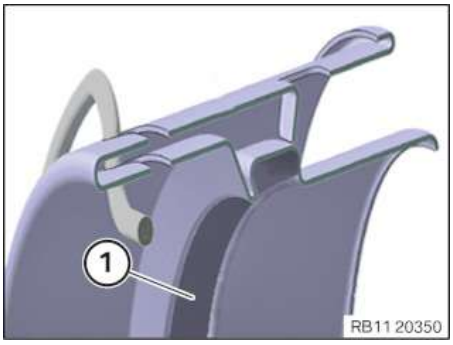
- Check the seal (1) for damage, and renew if necessary.

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▸ **Replacing damaged seal**

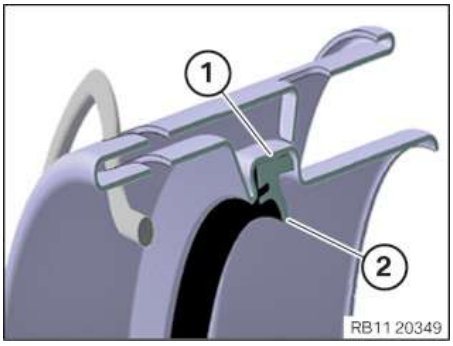
TECHNICAL INFORMATION

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.

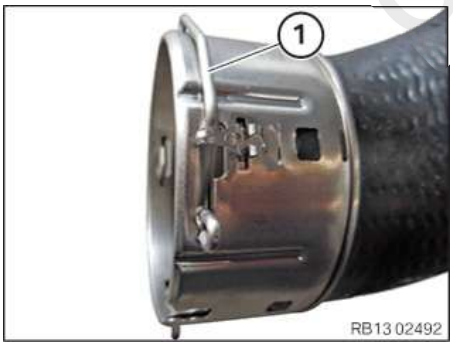
TECHNICAL INFORMATION

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

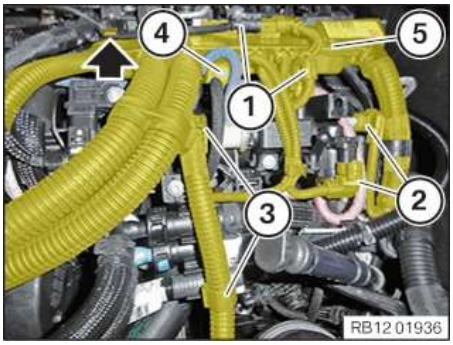
RISK OF DAMAGE

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.

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

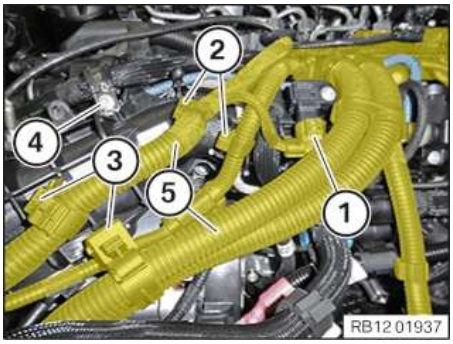
Wiring harness section to manifold

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.



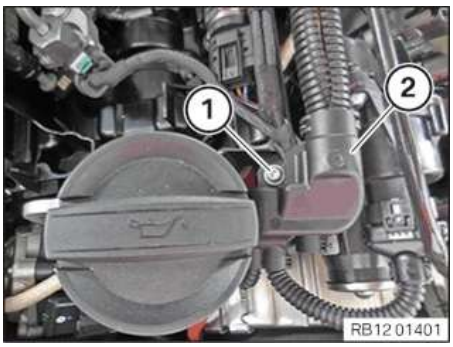
- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

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.

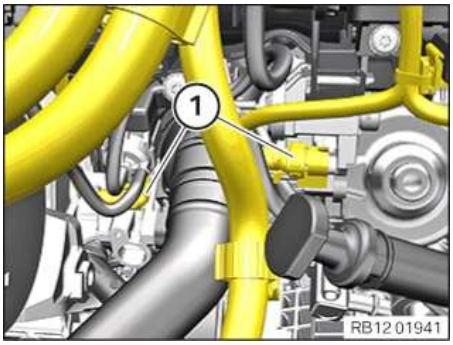
  The connector (1) must engage audibly.



- Connect the connector (1) and lock it.

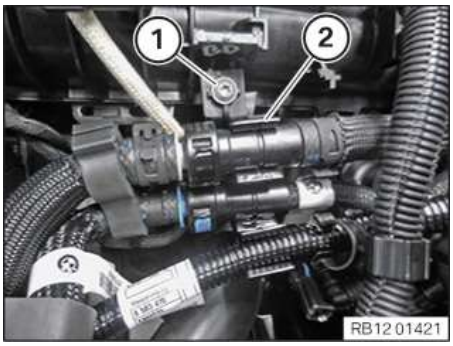
  The connector (1) must engage audibly.

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- Connect connectors (1) and lock.

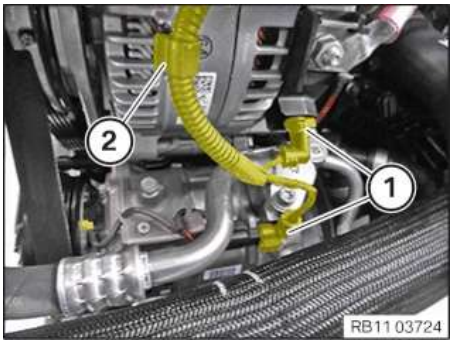
  The connectors (1) must engage audibly.



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

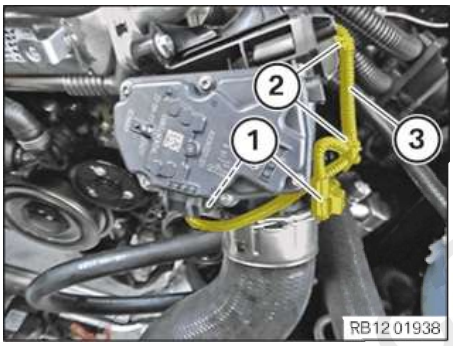
Holder on intake plenum

TS6X20		Tightening torque	5 Nm

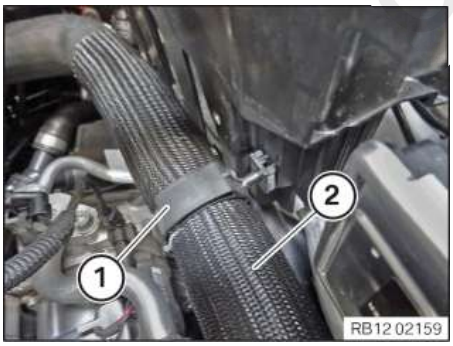


- Connect the connector (1) and lock it.

  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).

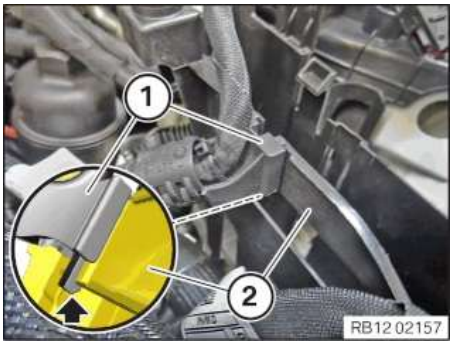
  The holder (1) must engage audibly.



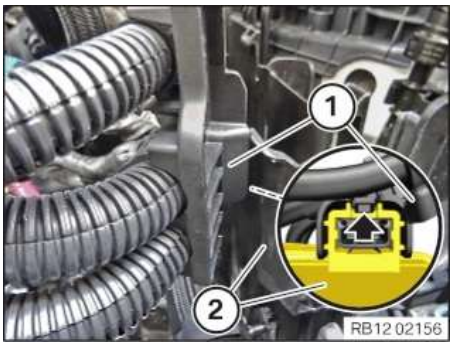
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.

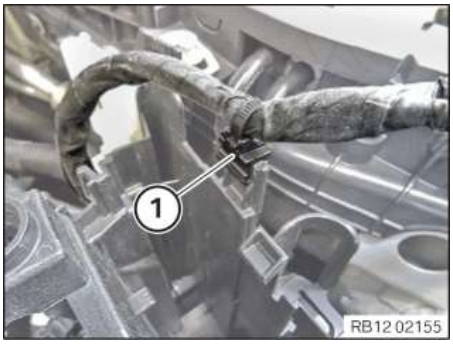
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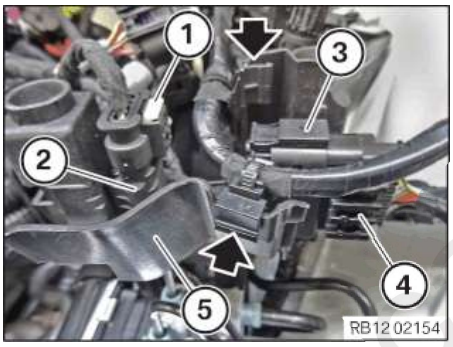
- Connect the cable clip (1) with the control unit holder (2) and lock it.
  Lock (arrow) must audibly engage.



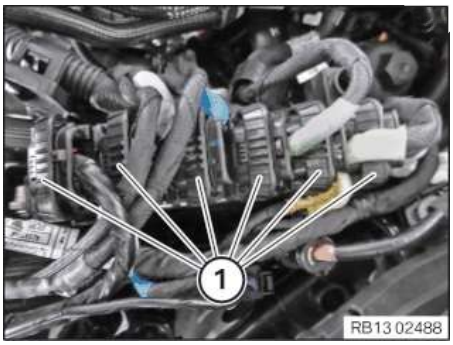
- Connect the cable clip (1) with the control unit holder (2) and lock it.
  Lock (arrow) must audibly engage.



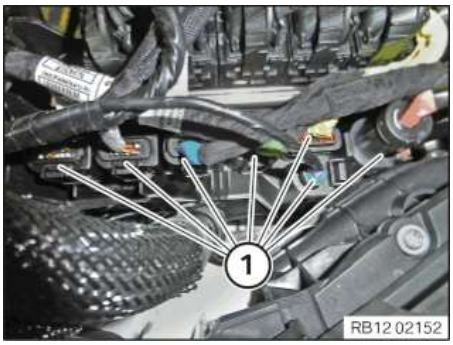
- Secure clamps (1).



- 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).

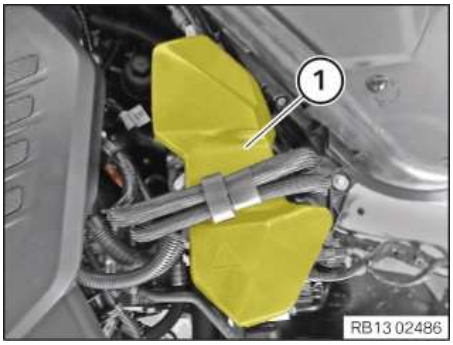


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



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

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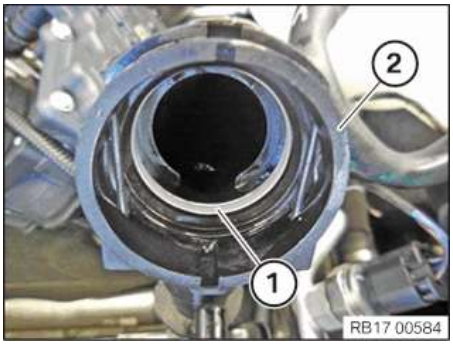


- Insert and install cover (1) into guides.

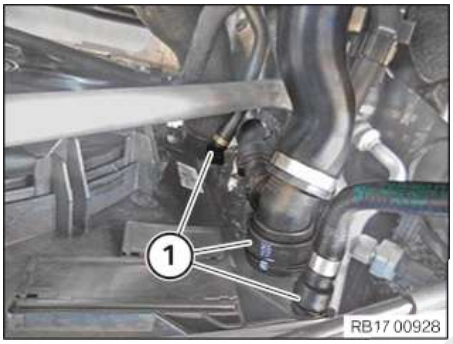
93 – Connecting the coolant lines

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.

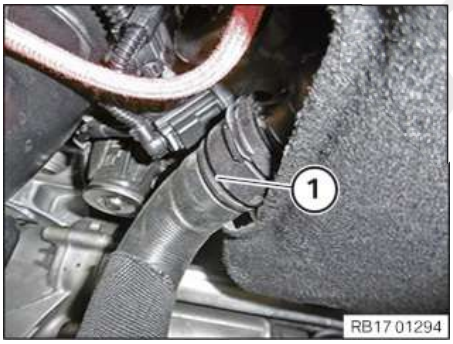


NOTICE

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.

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RISK OF DAMAGE

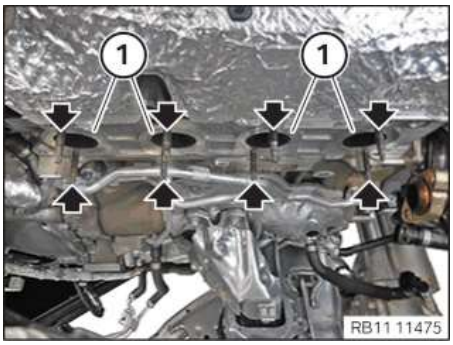
Damage to the surface.

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.

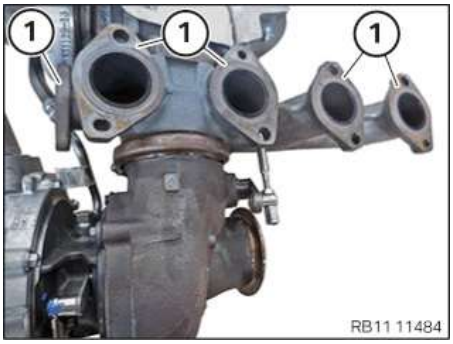
TECHNICAL INFORMATION

The sealing surfaces must be free from oils, grease and cleaning agents.

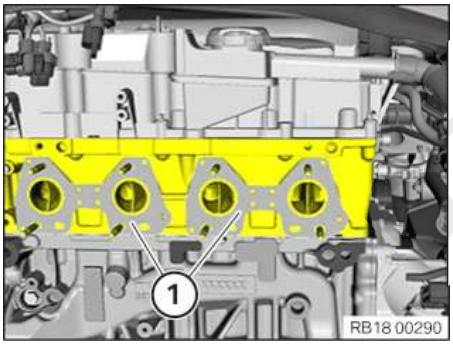


- Check the stud bolts (arrows) on the cylinder head for **correct** fit.
- Clean the connection points (1) with the special tool 0 495 102 (11 4 470).
- Renew gaskets.

  Parts: Seals



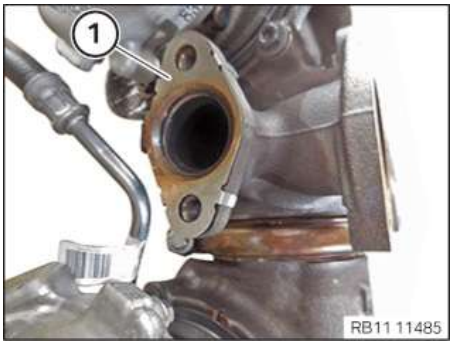
- Clean the connection points (1) on the exhaust manifold with the special tool 0 495 102 (11 4 470).



TECHNICAL INFORMATION

The **coated side** of the seal must be on the side of the exhaust manifold.

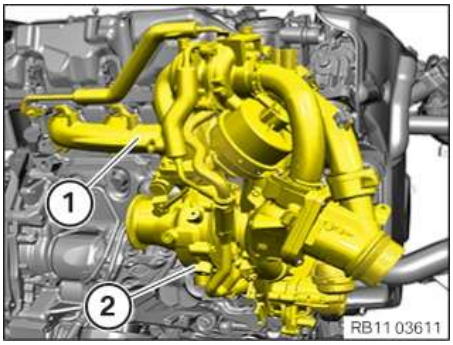
- Insert and install the gaskets (1).



- Renew the seal (1).

  Parts: Gasket
- Insert and install the seal (1).

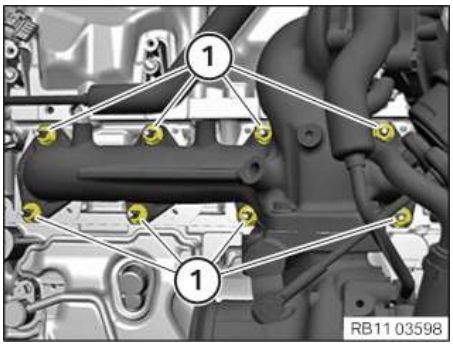
.com



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.



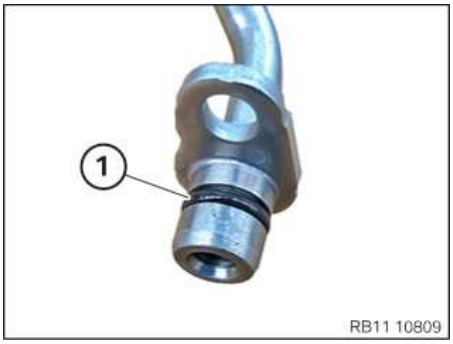
- Renew nuts (1).

  Parts: Nuts

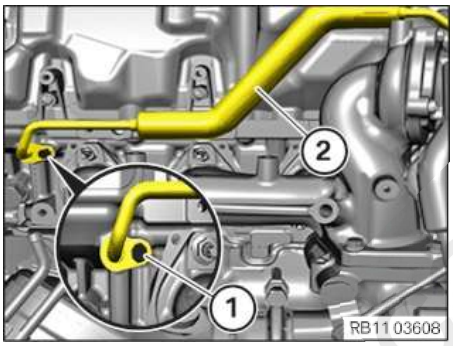
- Tighten the nuts (1) evenly from the inside out.

Exhaust manifold to cylinder head

M7	**If necessary, renew loose stud bolts.**	Tightening torque	11 Nm
	Renew nuts.	Tightening torque	13 Nm



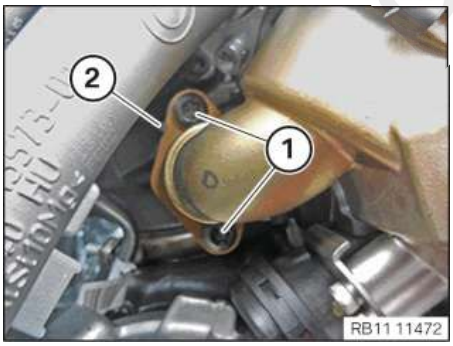
- Check the seal (1) for damage, if necessary, renew the oil feed line.



- 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

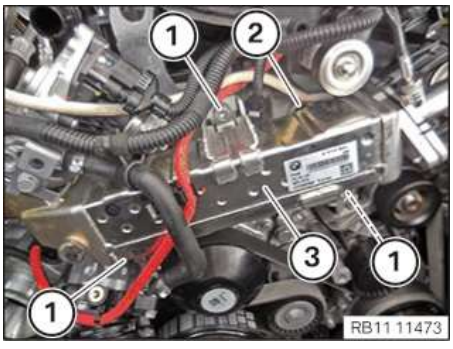


- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

M8x28	Replace screws	Tightening torque	32 Nm

- Ensure that seal (2) is installed.

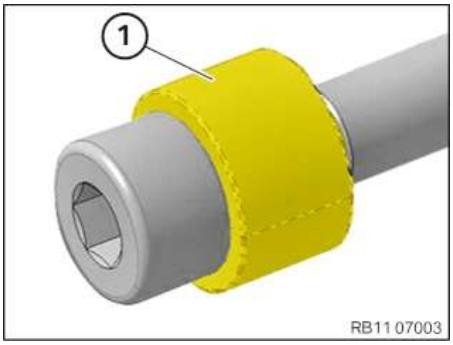


- Position the exhaust-gas recirculation cooler (3).
- Make sure the pipe neck (2) is fitted correctly.
- Tighten the screws (1).

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.

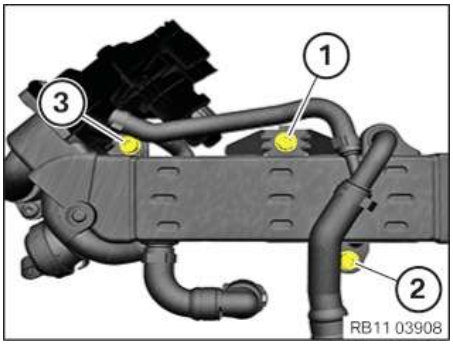
Result

» Screws **without** sleeves (1) are available.

Measure

- Renew screws.

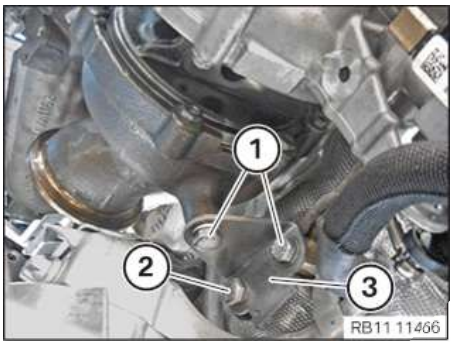
  Parts: Screws (part number 9 886 429)



- Tighten the screws (1) to (3).

Exhaust-gas recirculation cooler to cylinder head

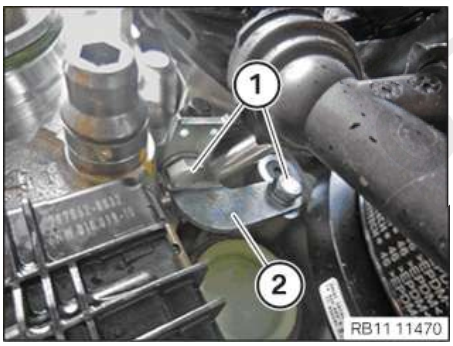
M8x20 / M8x28		Tightening torque	19 Nm



- Tighten the bolts (1) and (2) on the bracket (3).

Exhaust turbocharger low-pressure stage to crankcase

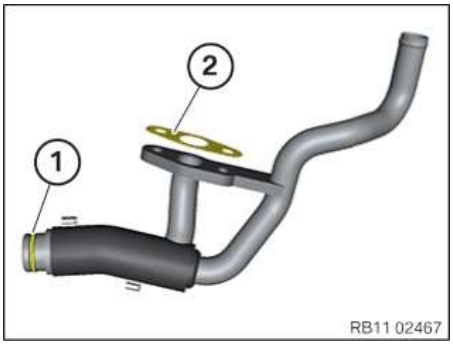
M8X16		Tightening torque	22 Nm



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

Exhaust turbocharger low-pressure stage to crankcase

M8X16		Tightening torque	22 Nm

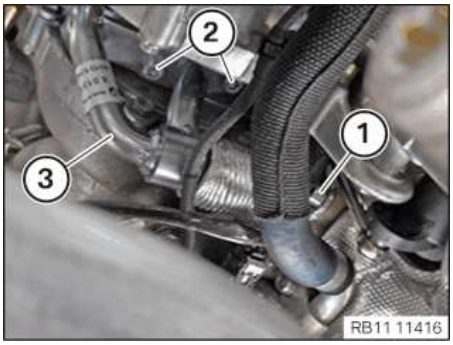


- Renew the gasket (2).

  Parts: Gasket

- Check the O-ring (1) for damage and renew the oil return line as needed.

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- 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

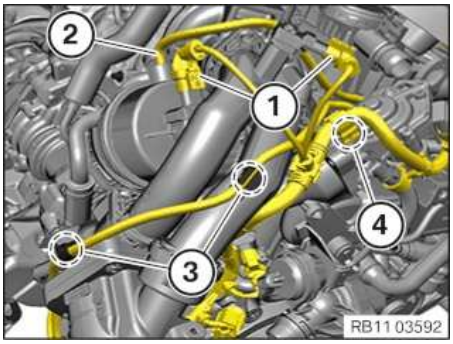
- Install the bolt (1).



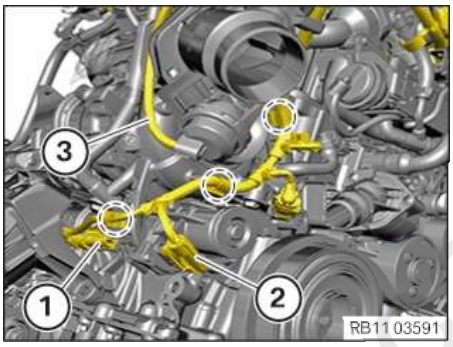
- Tighten the screws of the oil return line on the crankcase from the right wheel arch.

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.

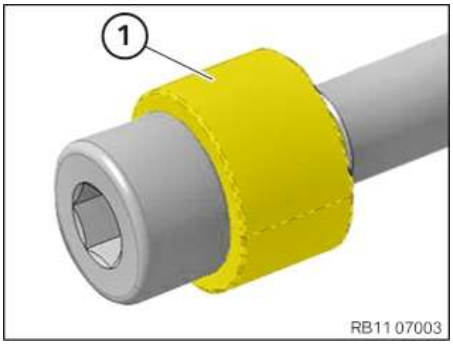
Damage and operating failure of the starter generator.

- 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

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- Check whether the screws **with 10mm** sleeves (1) are available.

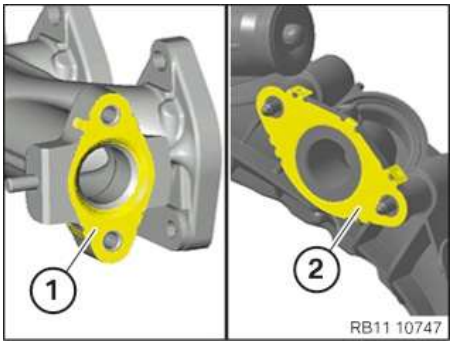
Result

» Screws **without** sleeves (1) are available.

Measure

- Renew screws.

  Parts: Screws (part number 9 886 429)

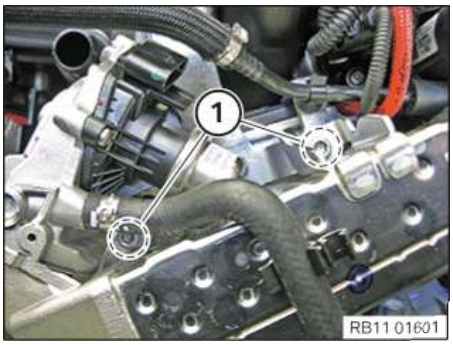


- Renew the seal (1) between the exhaust manifold and the exhaust-gas recirculation cooler.

  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

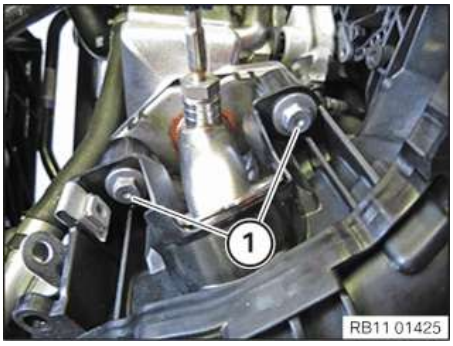
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screw (1) under the exhaust-gas recirculation cooler and then release again.

Exhaust-gas recirculation cooler to cylinder head

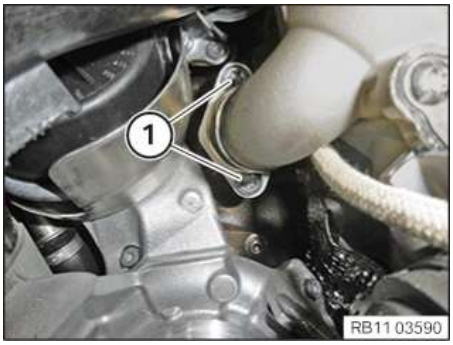
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

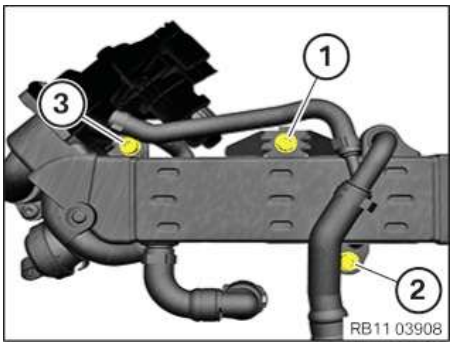
		Tightening torque	10 Nm



- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

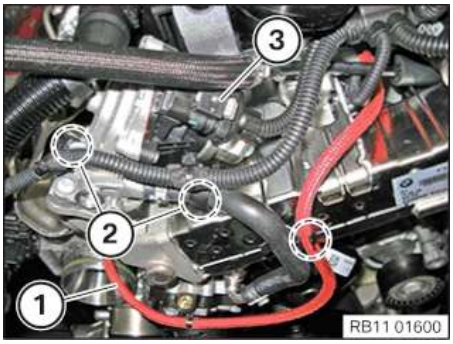
M8x28	Replace screws	Tightening torque	32 Nm



- 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.

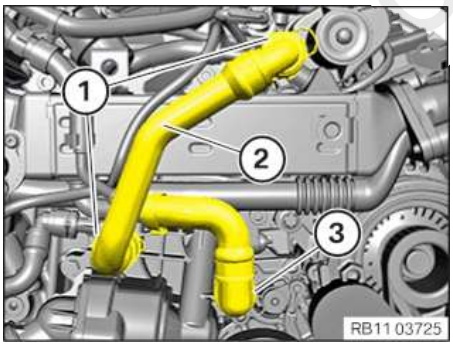


TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.

- **Version A:**

  Connect and audibly lock coolant lines (1).



TECHNICAL INFORMATION

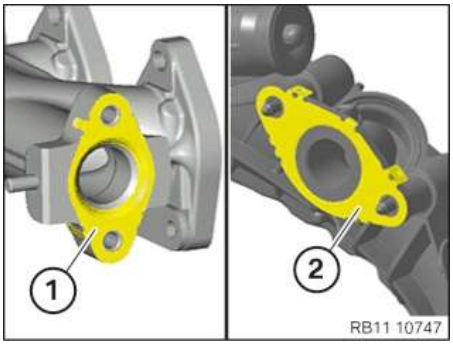
Make sure that the connections are locked correctly. The locks must engage audibly.

- **Version B:**

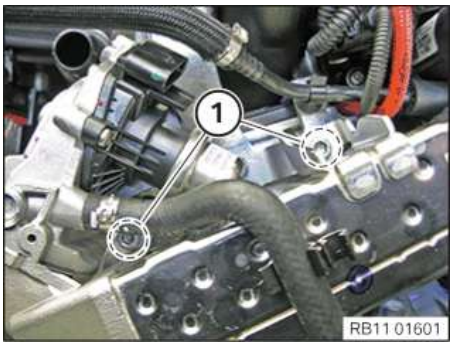
  Connect and audibly lock coolant lines (3).
- Install the coolant line (2).
- Audibly lock the locks (1).

▸ **Installing the exhaust-gas recirculation cooler**

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- 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

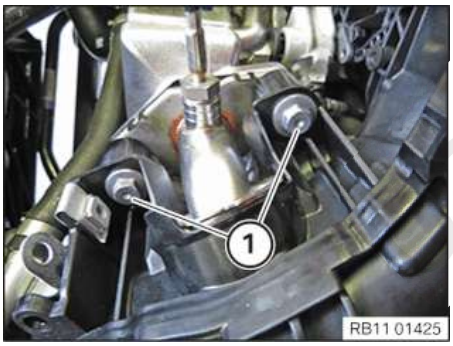
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screw (1) under the exhaust-gas recirculation cooler and then release again.

Exhaust-gas recirculation cooler to cylinder head

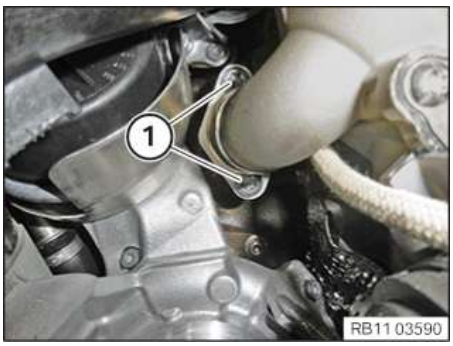
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm

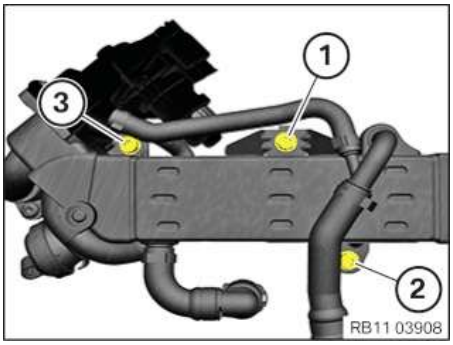


- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

M8x28	Replace screws	Tightening torque	32 Nm

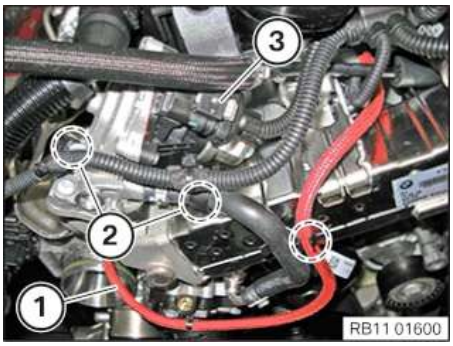
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- Tighten screws in the order (1) to (3).

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.

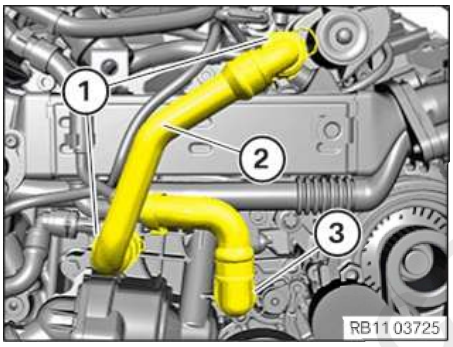


TECHNICAL INFORMATION

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.

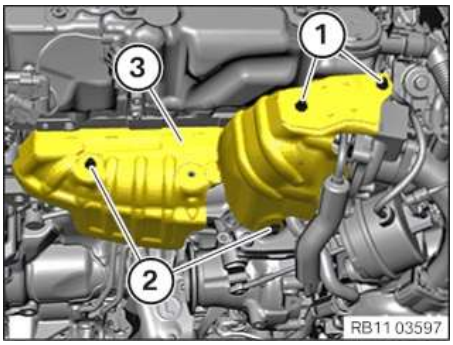
- **Version B:**

  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

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RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

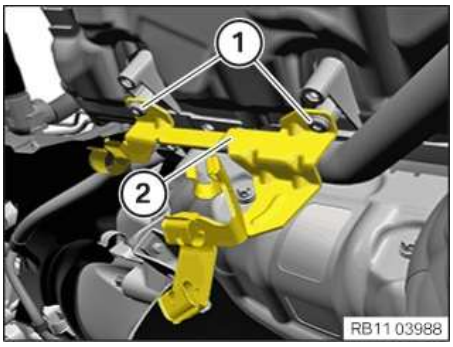
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

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

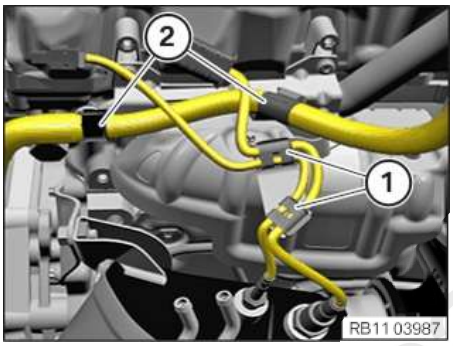
- Route all cables without abrasions, do not trap and crush.



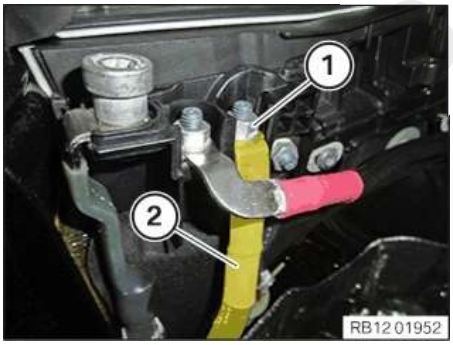
- Insert and install the holder (2).
- Tighten the screws (1).

Bracket on cylinder head cover

	Tightening torque	5 Nm



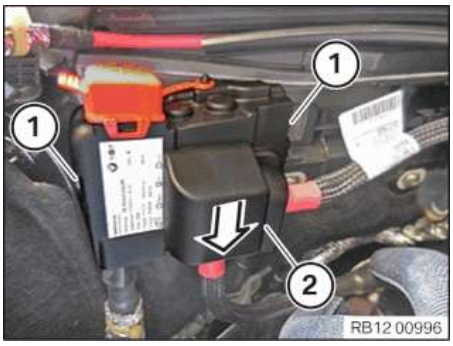
- Secure the positive battery cable in the clamps (2).
- Mount the cable of the exhaust gas sensor system in the clamps (1).



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

Battery positive lead to battery positive terminal

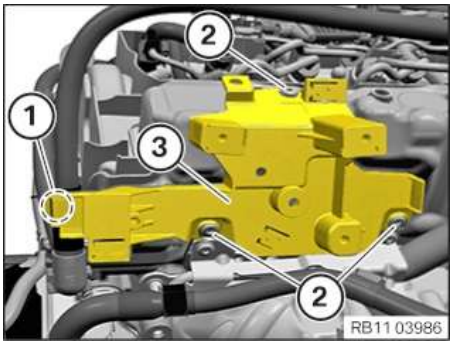
M8		Tightening torque	19 Nm



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

  The locks (1) must engage audibly.

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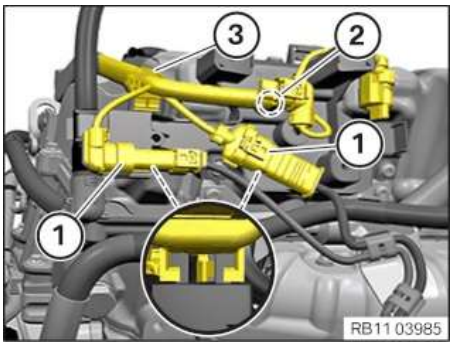


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

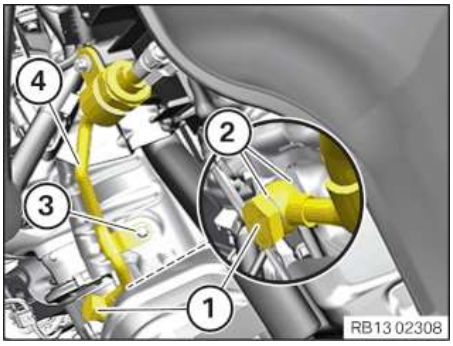
		Tightening torque	5 Nm

- 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).

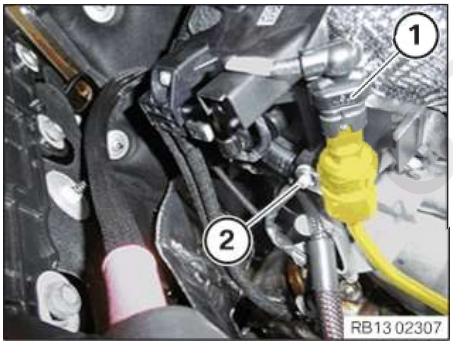
Heat shield to exhaust manifold

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).

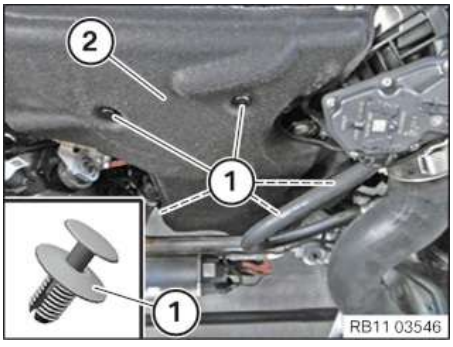
Exhaust gas pressure pipe to sensor system holder

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).

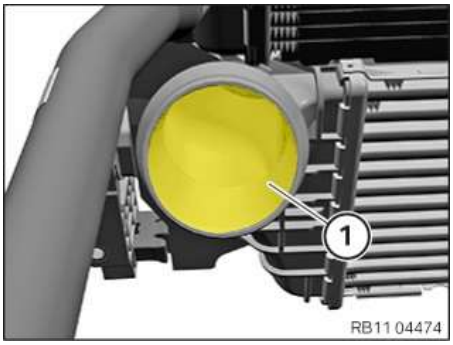
100 – Install pressure pipe between exhaust turbocharger and charge air cooler

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.



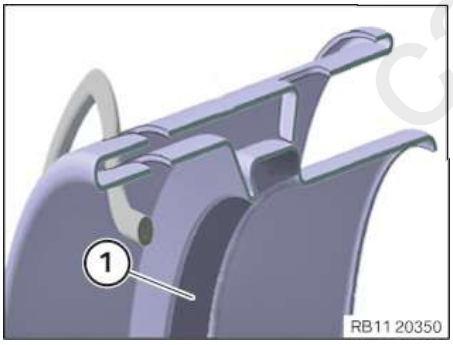
- Check the seal (1) for damage and renew if necessary.

  Parts: Gasket

▸ **Replacing damaged seal**

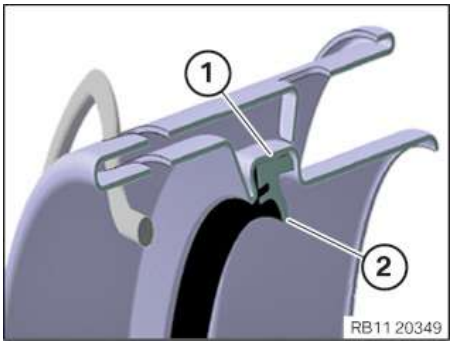
TECHNICAL INFORMATION

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.

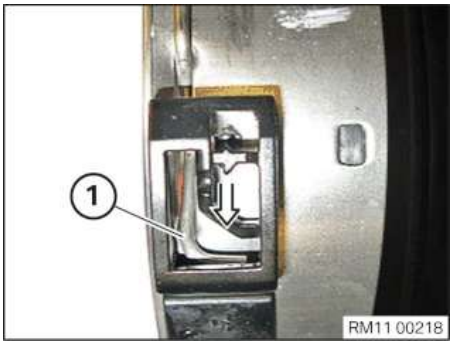
  Parts: Gasket
- Install seal dry without lubricant or mounting agent.

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.

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- **Version A:**

  Lock the lock (1).

  The lock (1) on the pressure pipe must engage audibly.

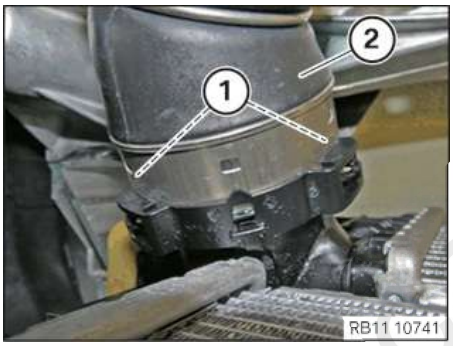


- Pay attention to the installation position:

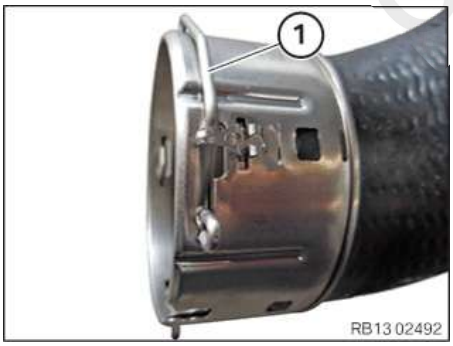
  The pressure pipe fits on charge air cooler in one installation position only.



- Install the pressure pipe (1) from the top.



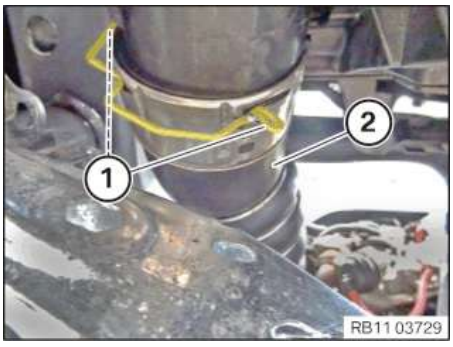
- Connect pressure pipe (2) to charge air cooler.
- Lock the lock (1) on both sides.



- **Version B:**

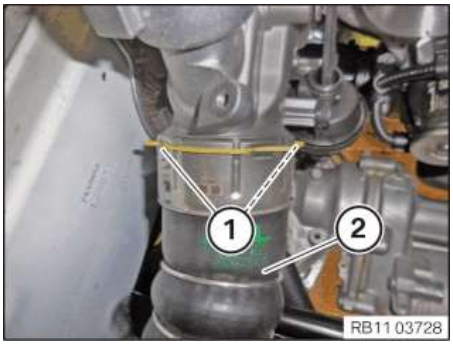
  Lock the lock (1).

  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.

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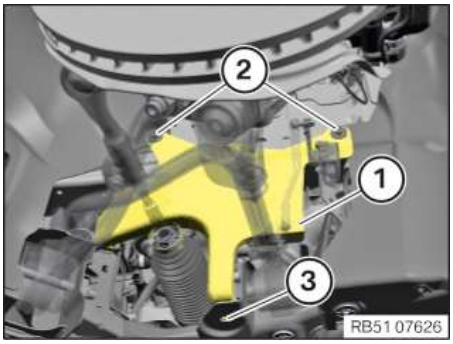


- Place the pressure pipe (2) onto the compressor bypass and ensure that the lock (1) engages audibly.

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.

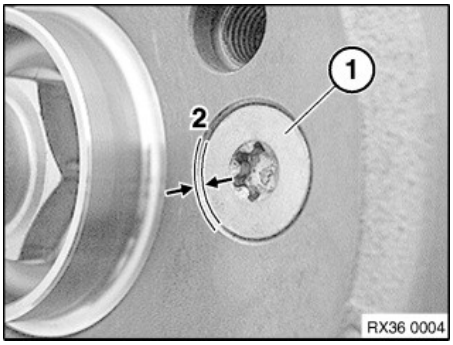
  Do not operate special tool 2 344 011 with an impact screwdriver.
- Degrease the contact surfaces with the universal cleaner (see BMW Group Parts).
- In the event of grease residue in the area of the wheel bolt holes, remove and clean the brake disc.



- 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).

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- Check that the mounting bolt (1) for the brake disc is securely seated.

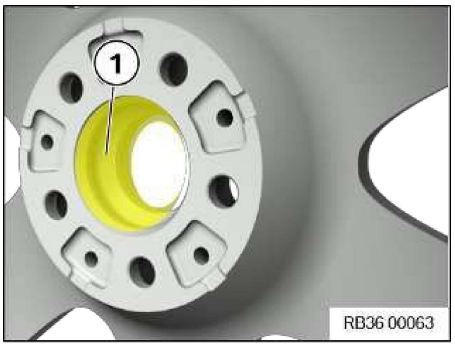
  The mounting bolt (1) for the brake disc **may not** protrude on the contact surface (2) between the brake disc and the wheel rim.

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



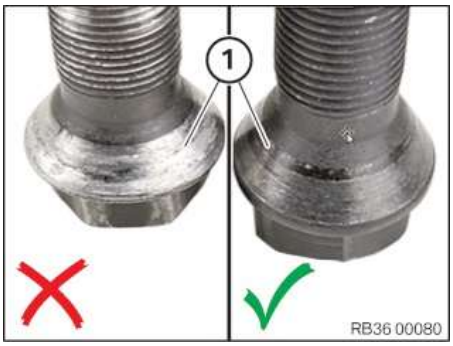
TECHNICAL INFORMATION

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.

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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

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- Renew gasket (1).

  Parts: Gasket

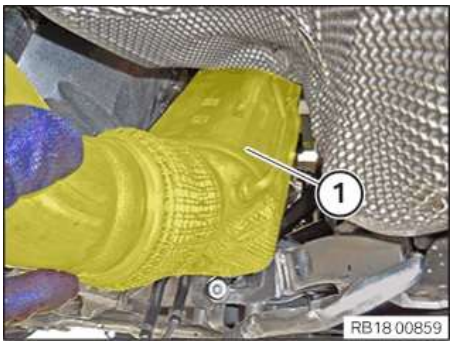
104 – Installing the diesel particulate filter

CAUTION

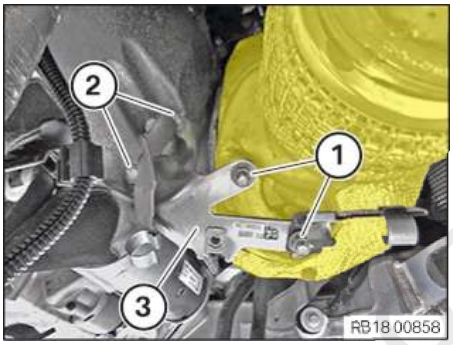
Heavy component.

Heavy components can lead to injury or damage.

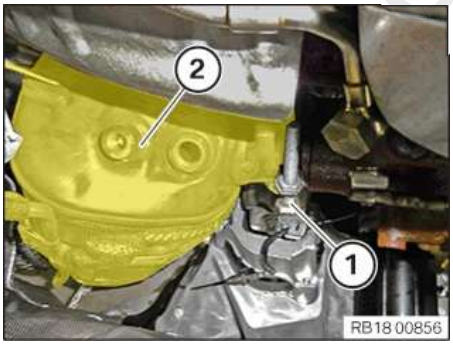
- Remove and install heavy components with the aid of another person/other persons.



- 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**.

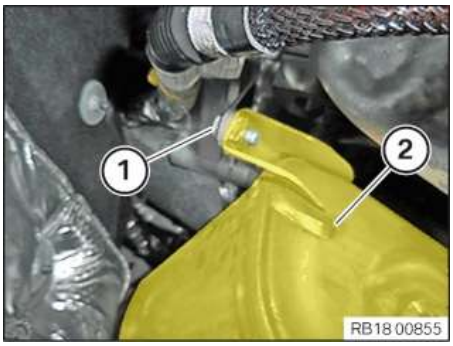


- Renew the V-clip (1).

  Parts: V-band clamp
- Feed in and install V-band clamp (1).

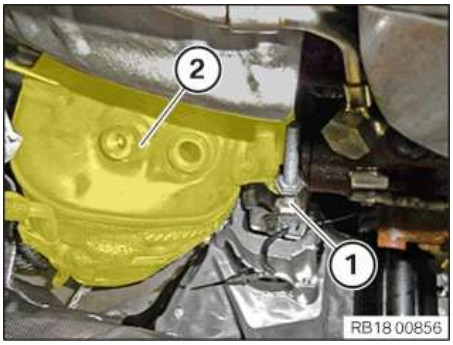
Note: Make sure that the seal between the diesel particulate filter and the exhaust turbocharger is installed correctly.

- 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**.

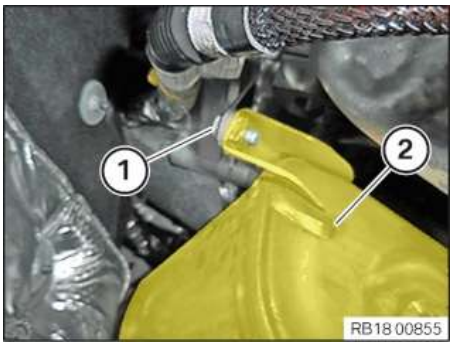
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- Tighten the V-clip (1) of the diesel particulate filter (2).

Diesel particulate filter V-clip to exhaust turbocharger

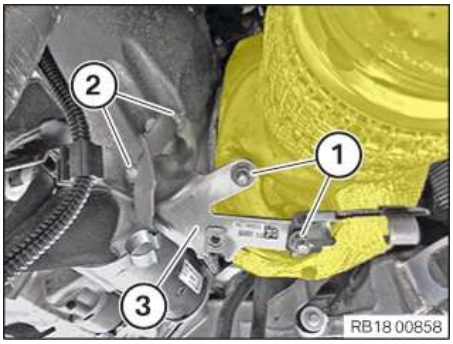
V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm



- 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).

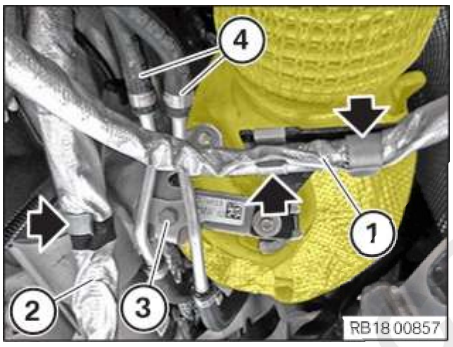
Bracket to transmission for diesel particulate filter holder bottom

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

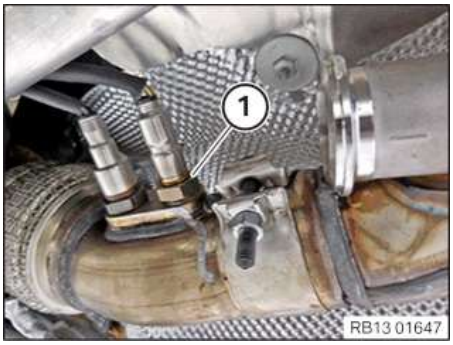
RISK OF DAMAGE

Damage to the nitrogen oxide sensor.

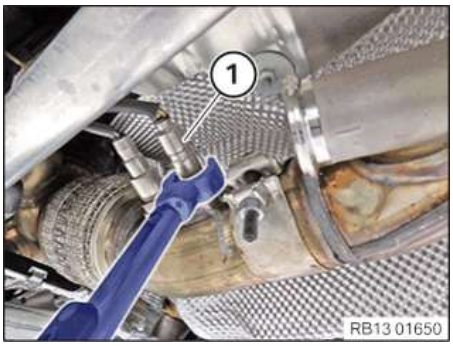
Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

- 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.

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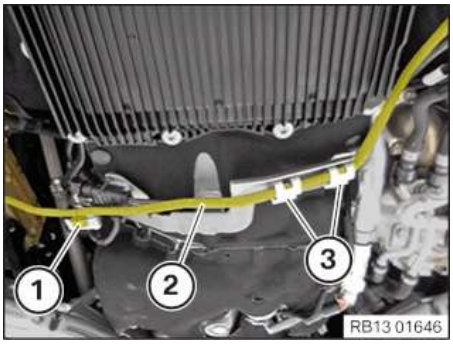
- Feed in and install the nitrogen oxide sensor (1).



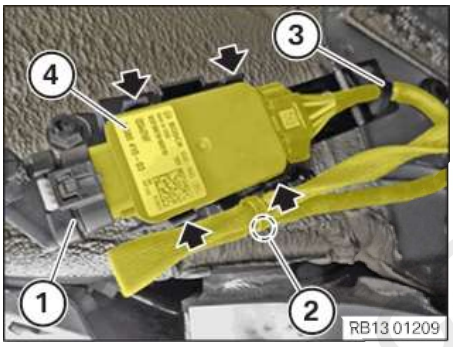
- Tighten the nitrogen oxide sensor (1) using commercially available tools.

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.

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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



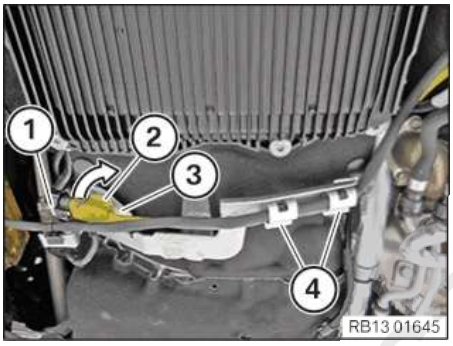
- Insert the monitoring oxygen sensor (1) and install it.



- 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.

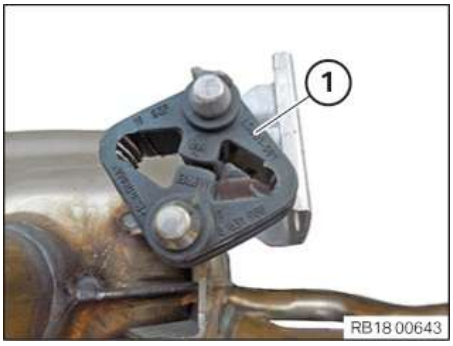
Heavy components can lead to injury or damage.

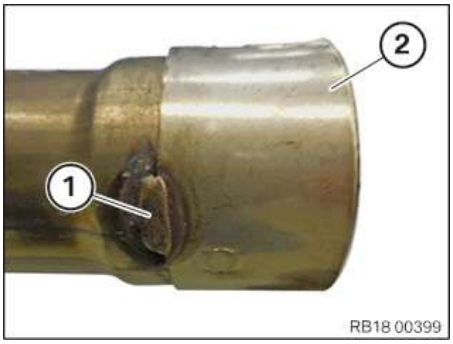
- Remove and install heavy components with the aid of another person/other persons.

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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

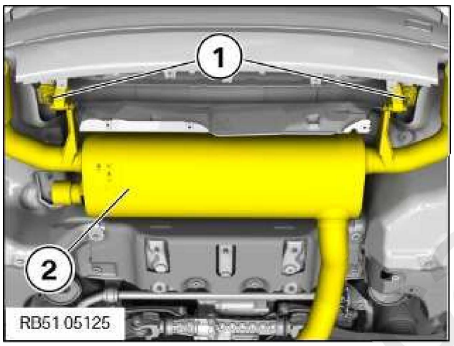
CAUTION

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).

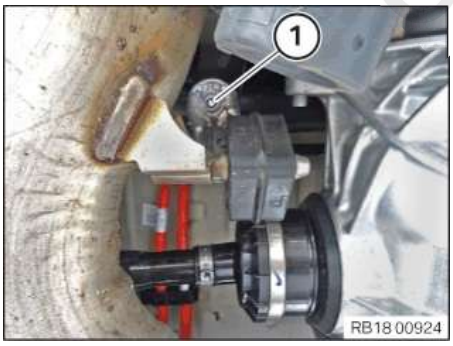


- Insert and install the exhaust system (2).
- Renew nuts (1).

  Parts: Nuts
- Tighten nuts (1).

Rear silencer to body / bumper support

M8	Replace nuts.	Tightening torque	19 Nm

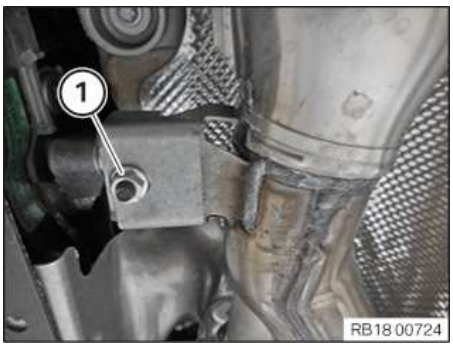


- Renew nut (1) on the rear axle support.

  Parts: Nut
- Tighten nut (1).

Exhaust system to rear axle carrier

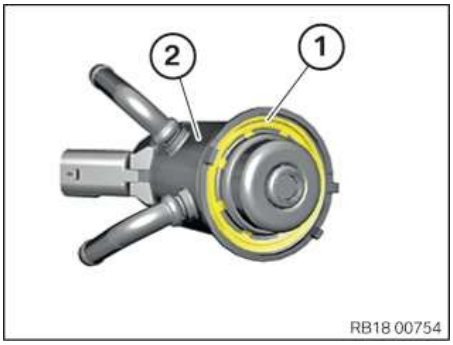
M8 nut		Tightening torque	19 Nm



- Tighten nut (1).

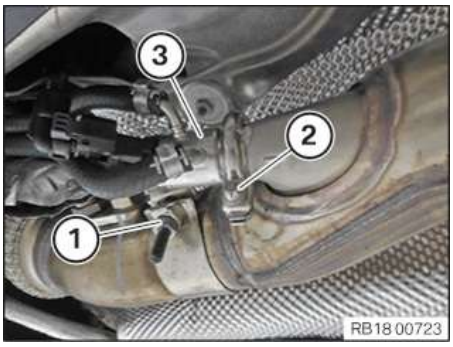
Exhaust system to transmission

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

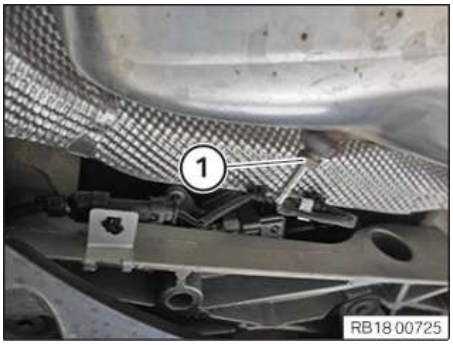
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

- 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

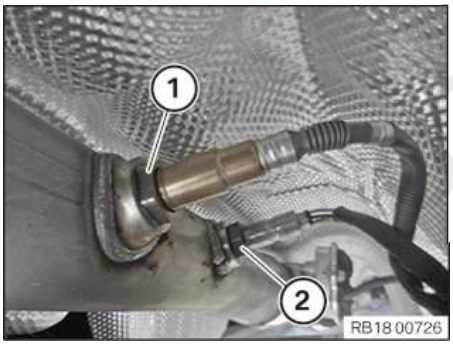
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm



- 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

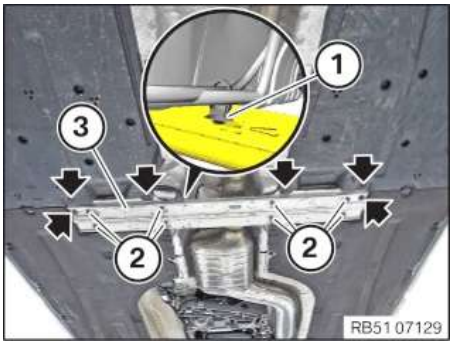
- Install the nitrogen oxide sensor (2) in the exhaust system and tighten.

Nitrogen oxide sensor downstream of SCR catalytic converter

Sensor		Tightening torque	55 Nm

108 – Install the connecting supports on the tunnel

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- Guide in and install connecting support (3) on the tunnel.
- Tighten the screws (2).
- Tighten screws (arrows).

Connecting support to tunnel

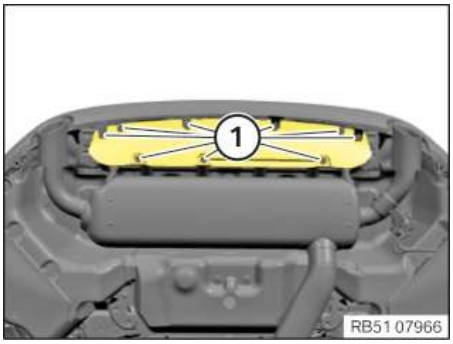
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

NOTICE

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

- Secure the clamp (1).

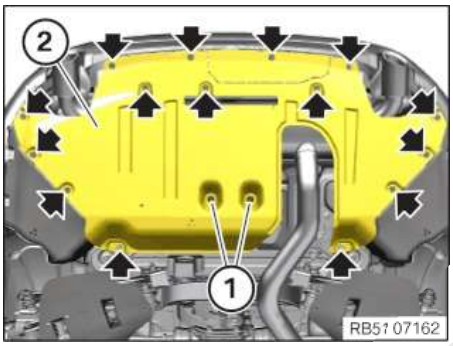
109 – Installing the rear diffuser



- **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

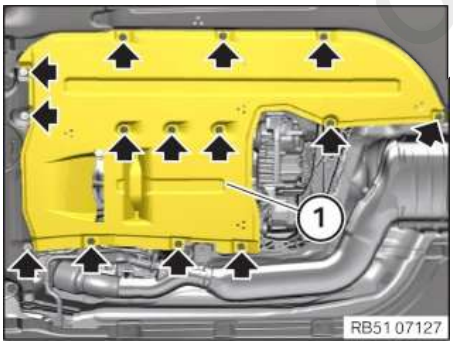
Nuts and screws		Tightening torque	3 Nm

- Tighten nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm

110 – Installing underbody protection at rear



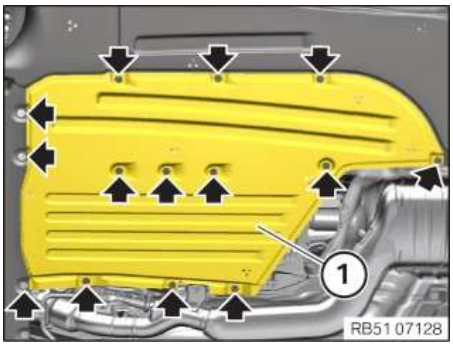
- **Version A:**

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

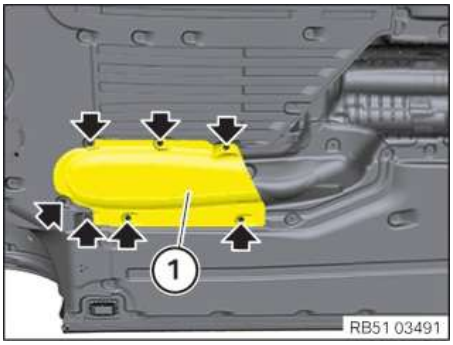
Hexagon screw		Tightening torque	3 Nm

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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.

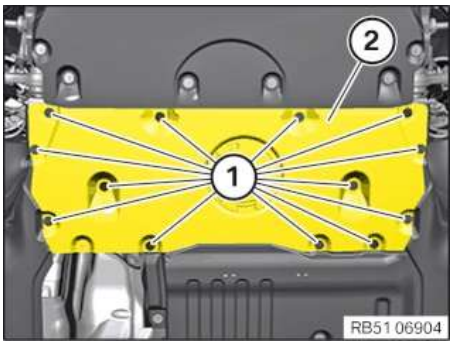


- Insert the underbody panelling (1).
- Tighten screws (arrows).

Underbody panelling

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

112 – Installing the centre underbody protection



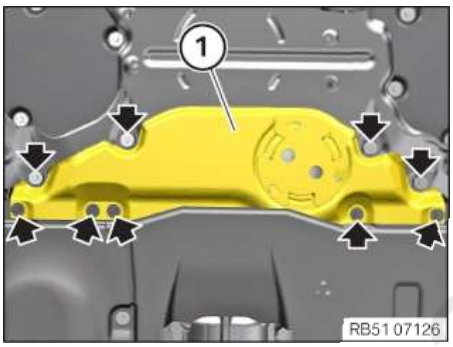
- **Variant with rear wheel drive:**

  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).

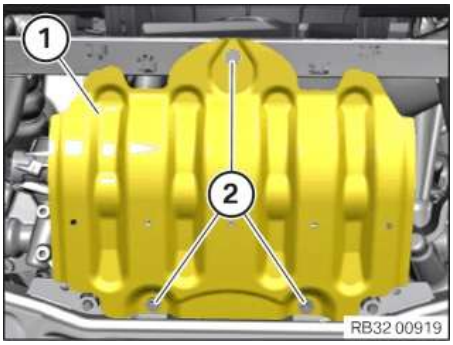
Underbody protection

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

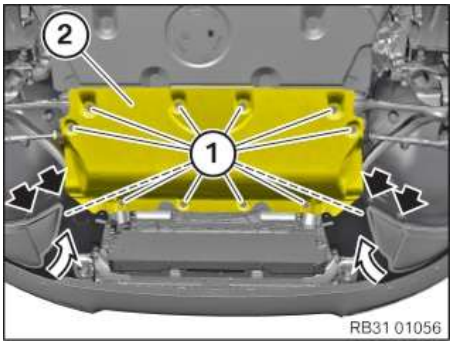
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

114 – Install the underbody protection of the steering gear

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- **Version A:**

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

  Tighten the screws (1).

Underbody protection of the steering gear

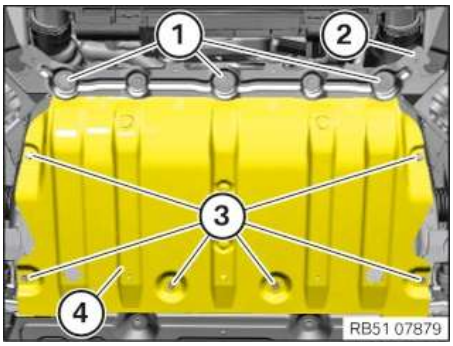
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- 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).

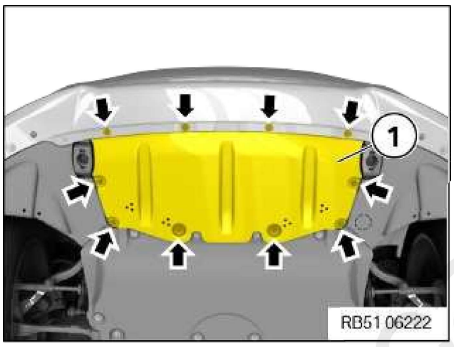
Underbody protection of the steering gear

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



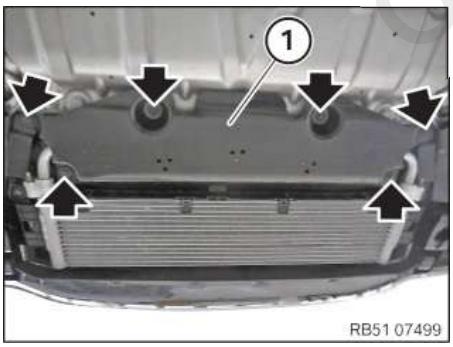
- **Version A:**

  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



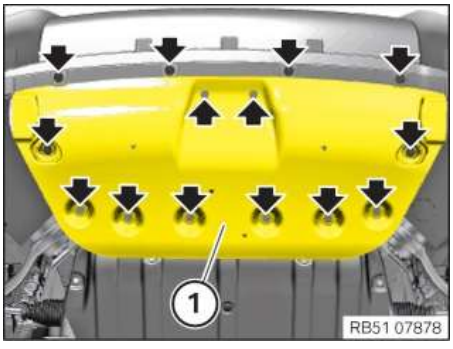
- **Version B:**

  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).

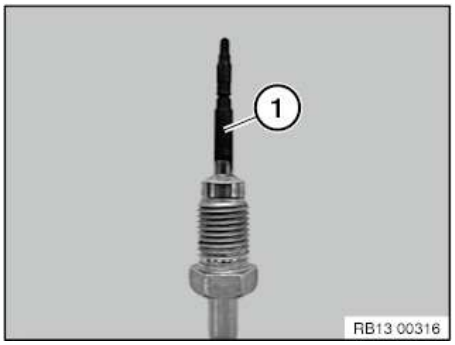
  Tighten screws (arrows).

Underbody protection front

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

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116 – Installing the exhaust temperature sensor for the exhaust system downstream the catalytic converter on the diesel particulate filter



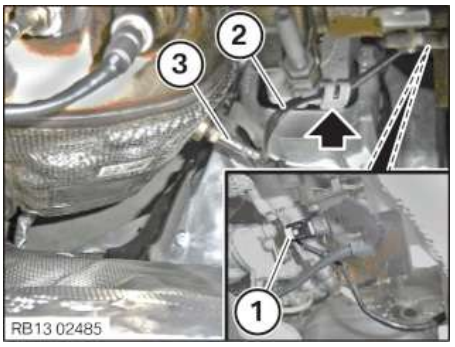
RISK OF DAMAGE

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

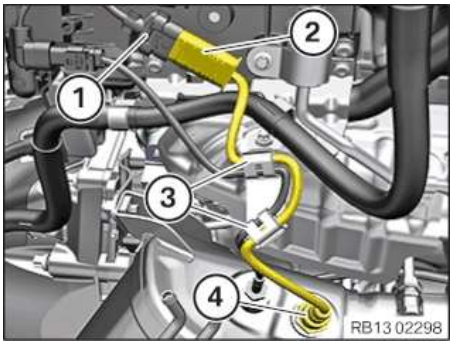


- Insert and install the front oxygen sensor (1).
- Tighten the front oxygen sensor (1) with standard tools.

Front oxygen sensor to top of diesel particulate filter

Sensor		Tightening torque	50 Nm

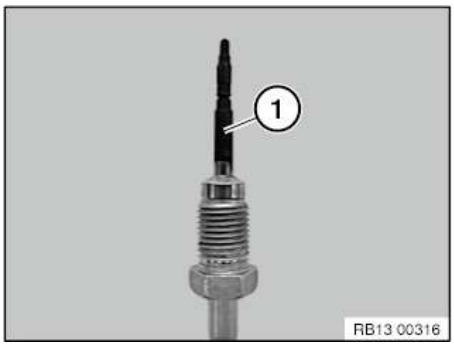
carDiagn.com



- 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



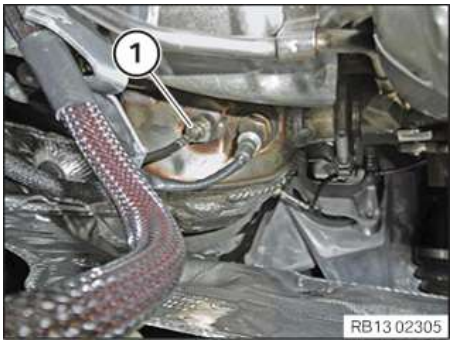
RISK OF DAMAGE

Damage of exhaust temperature sensor.

Damage to exhaust temperature sensors leads to malfunctions.

- Make sure that the gauge tip is not damaged.

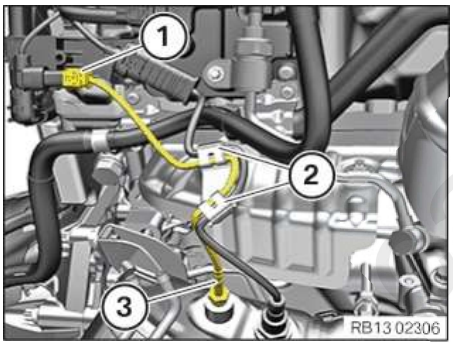
- Check gauge tip (1) for damage.



- 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

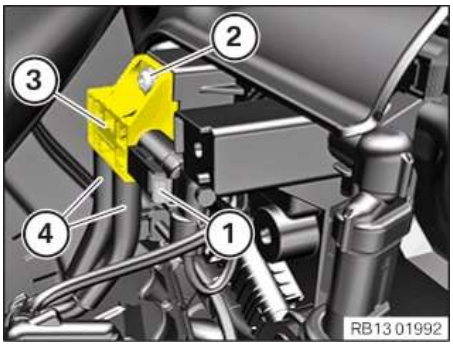
Sensor		Tightening torque	30 Nm



- 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.

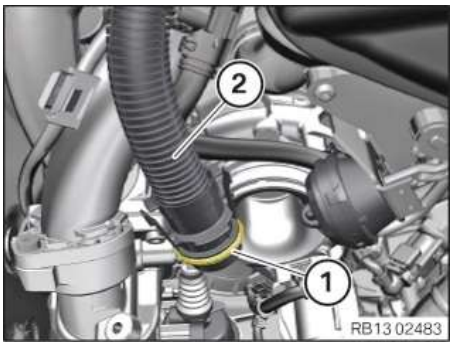
  The connector (1) must engage audibly.

120 – Installing the clean air pipe with resonator

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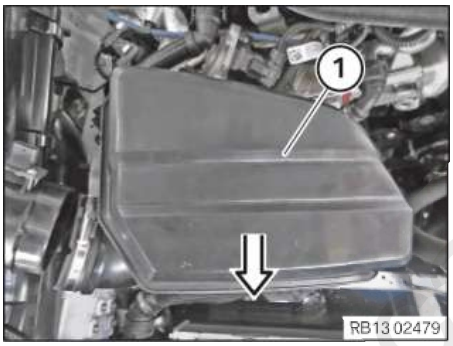
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



- 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.

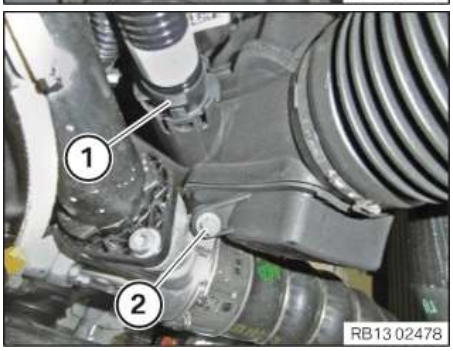


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

  The clamp (1) must engage audibly.

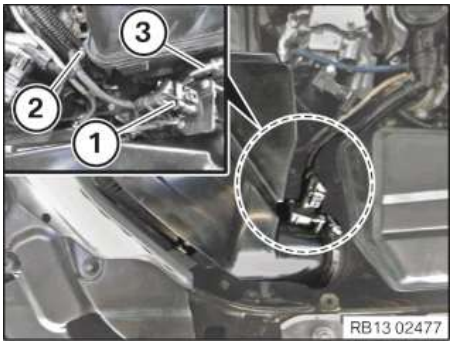


- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm

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

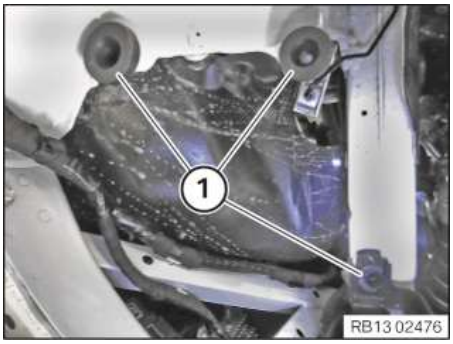
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

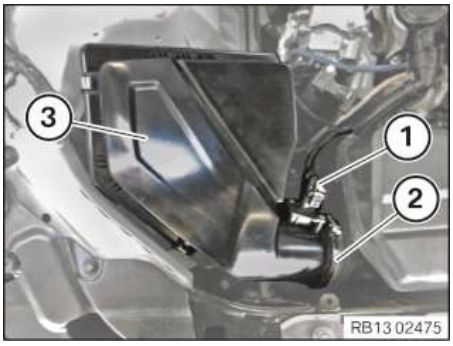
- Secure clamps (2).
- Connect connectors (1) and lock.

  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

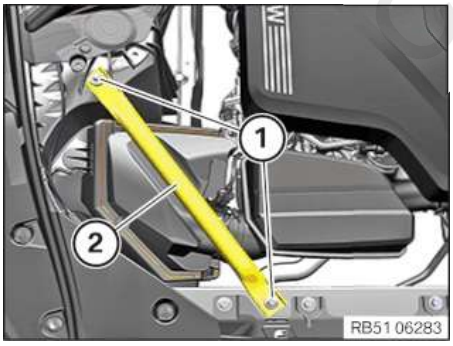
- Connect connectors (1) and lock.

  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.



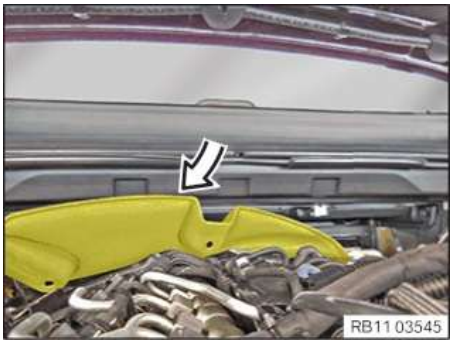
- Install the front-end strut (2).
- Renew screws (1).

  Parts: Screws
- Tighten the screws (1).

Front end strut

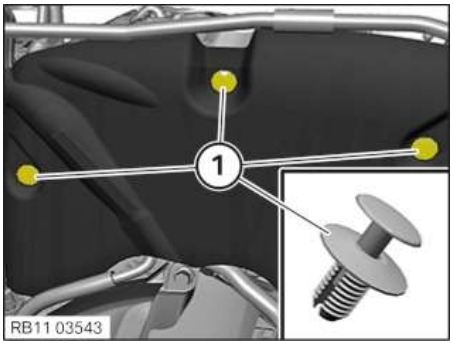
Screw		Tightening torque	56 Nm

123 – Installing acoustic cover at rear



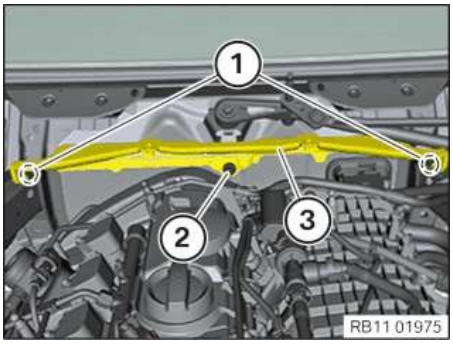
- Guide in the acoustic cover in the direction of the arrow and install it.

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

124 – Installing centre bulkhead lower section

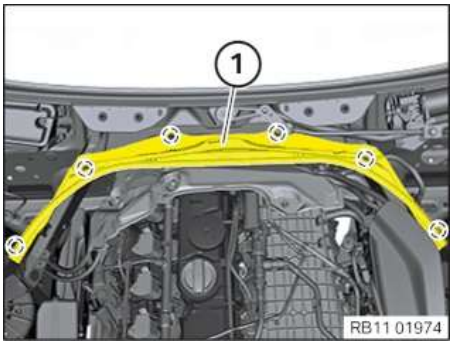


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

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

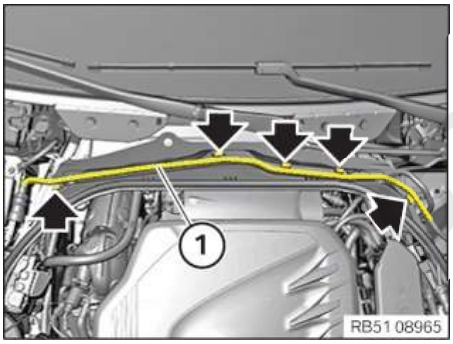
125 – Installing the centre bulkhead upper part



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

Bulkhead upper part to bottom bulkhead

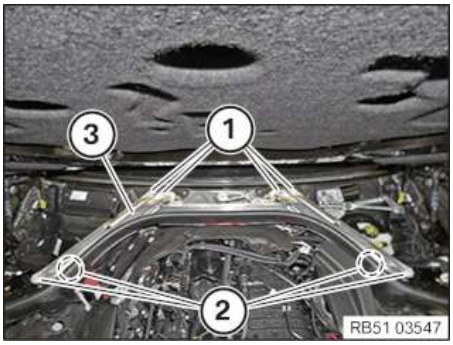
		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

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

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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

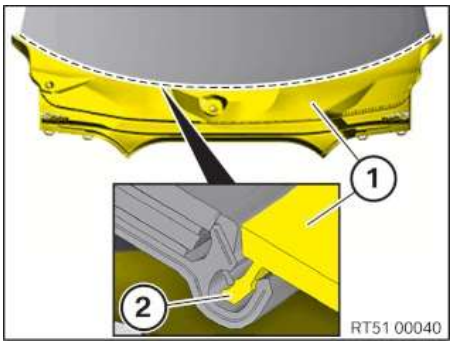
Damage caused by water ingress into the vehicle.

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

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

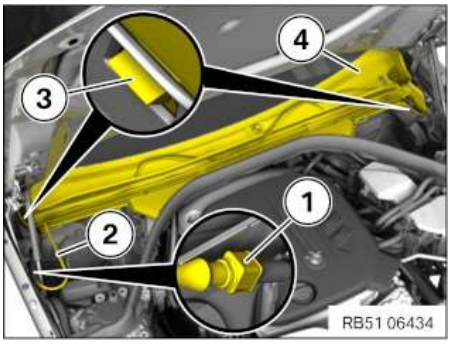
TECHNICAL INFORMATION

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.

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- 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

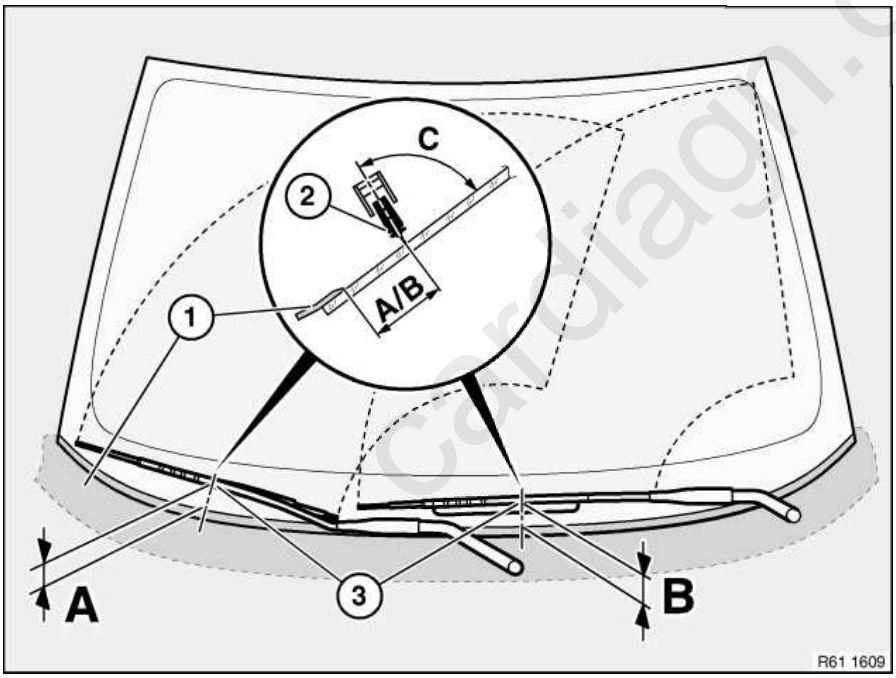
NOTICE

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

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

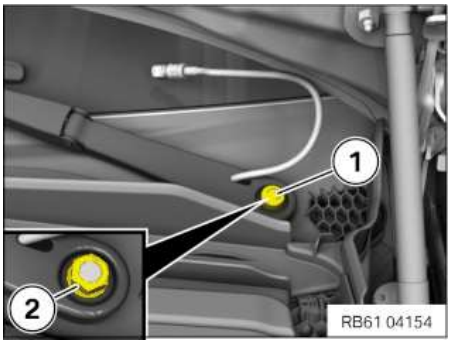
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- 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



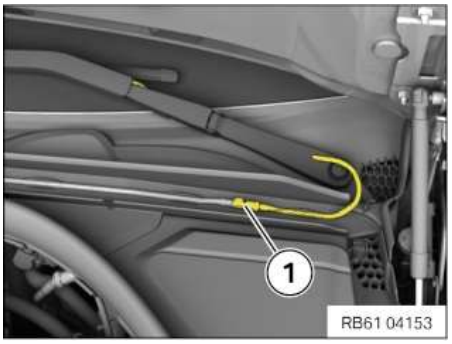
- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

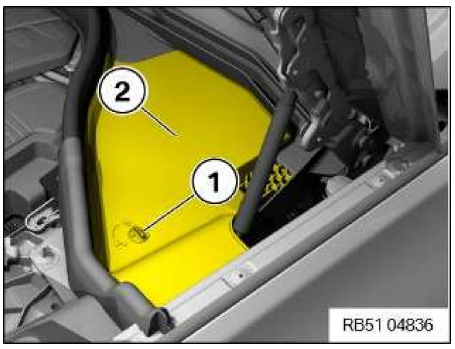
- Connect the protective cap (1).

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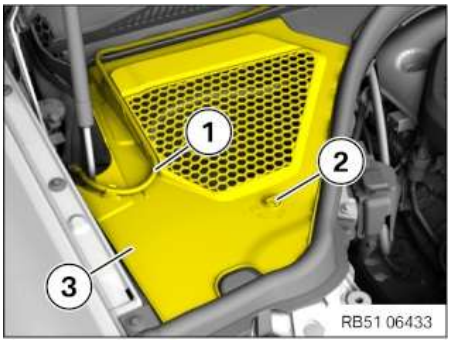
- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

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

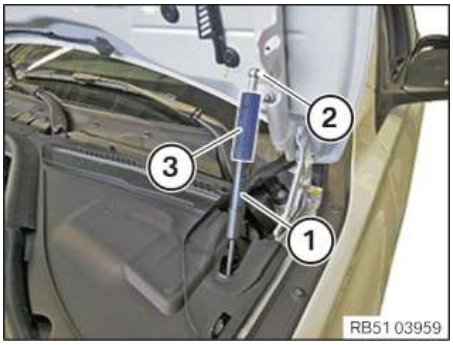
CAUTION

Shutting bonnet or tailgate.

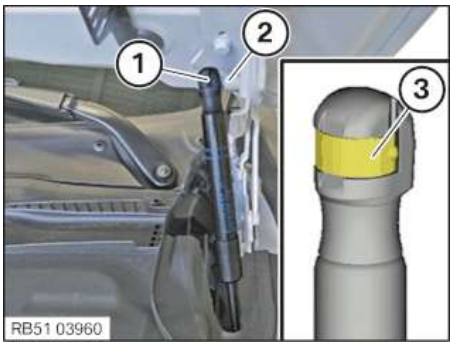
Danger of injury!

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

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- 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).

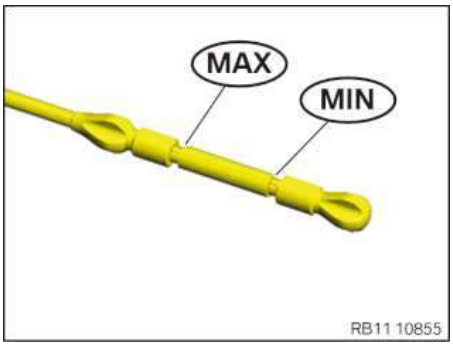
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- Park vehicle on a horizontal surface.
- Stop the engine and wait for 5 minutes.
- Pull out the oil dipstick and wipe off using a lint-free cloth.

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

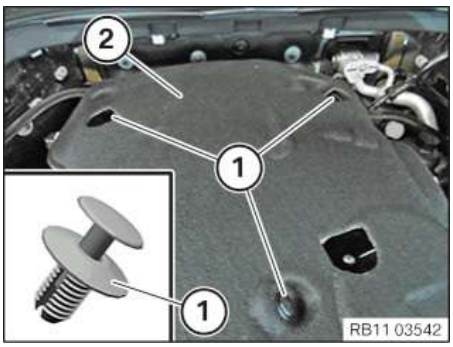
The engine oil level must be between the minimum mark and the maximum mark of the oil dipstick.

- 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) .

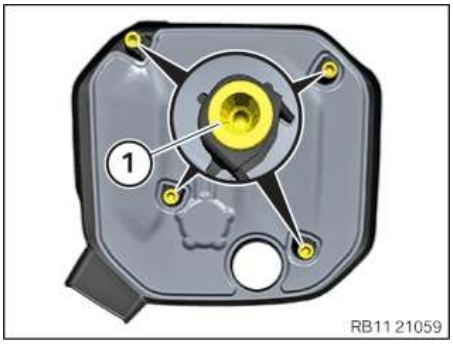
136 – Install acoustic cover

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).

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- 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 70
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 70
M8x40		Tightening torque	19 Nm

Standard screw connection M6			Used in step 70
M6		Tightening torque	8 Nm

Ground to cylinder head			Used in step 70
M6		Tightening torque	8 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

Cylinder head cover to cylinder head			Used in step 85
M6		Tightening torque.	8,5 Nm

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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

Oil return line to crankcase			Used in step 94
M6x12	Check gasket. Renew the seal or line if necessary.	Tightening torque	8 Nm

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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

Nitrogen oxide sensor before SCR catalytic converter — Used in step 105

Sensor		Tightening torque	50 Nm

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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

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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

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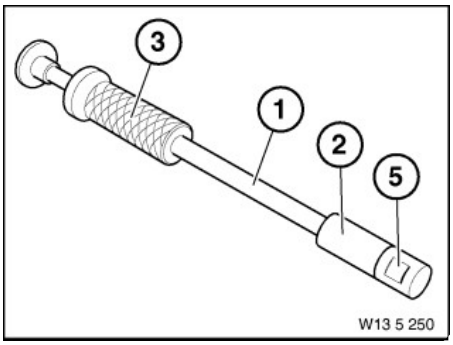
0 493 339 (13 5 252) Bush



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	

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)	

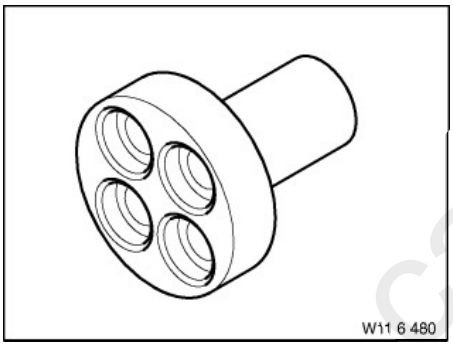
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0 493 340 (13 5 253) Weight



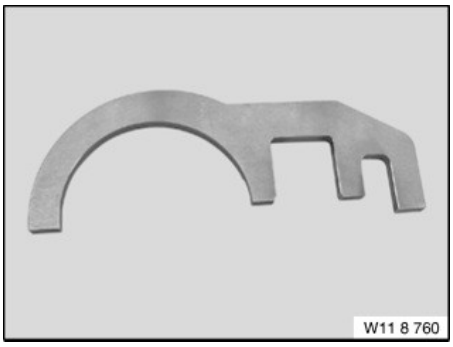
Common	Used in step 48
Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

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)

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)

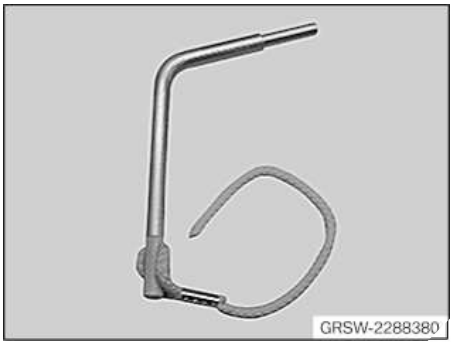
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2 365 488 Adapter



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)

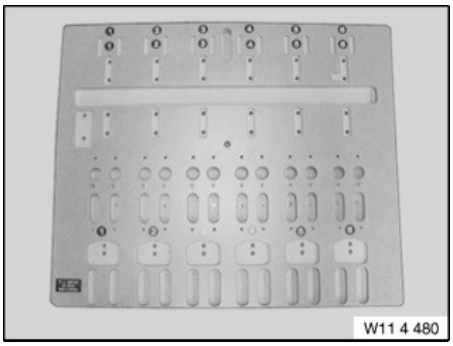
2 288 380 Locating stud



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)

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0 495 105 (11 4 480) oddments tray



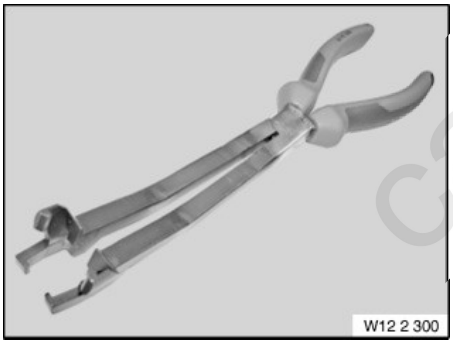
Common Used in step 57586365

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	

0 495 140 (12 2 300) Pliers

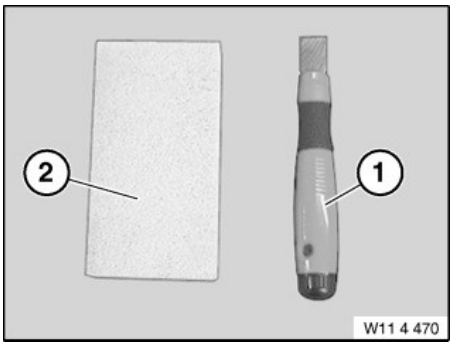


Common Used in step 59

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)

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0 495 102 (11 4 470) Tool

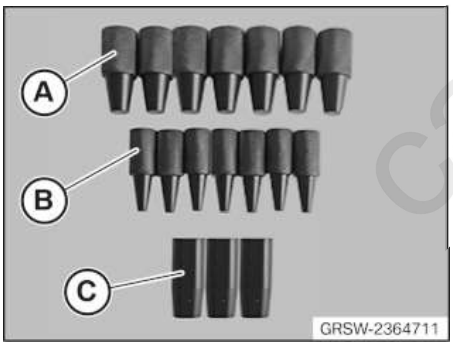


Common	Used in step 5994
Usage	(cleaning kit) For cleaning sealing surfaces on magnesium crankcase/cylinder head.
Included in the tool or work	
Storage location	C52
Replaced by	
In connection with	
SI-Number	01 17 04 (130)

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 60
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	

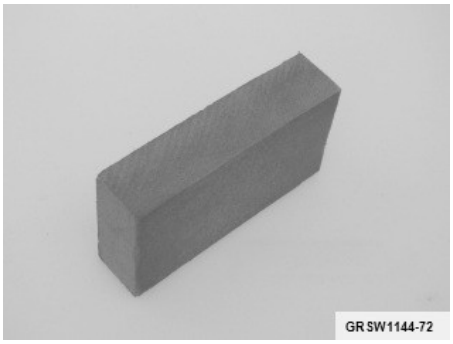
0 495 103 (11 4 471) Scraper



Common	Used in step 60
Usage	
Included in the tool or work	0 495 102
Storage location	C52
Replaced by	
In connection with	
SI-Number	

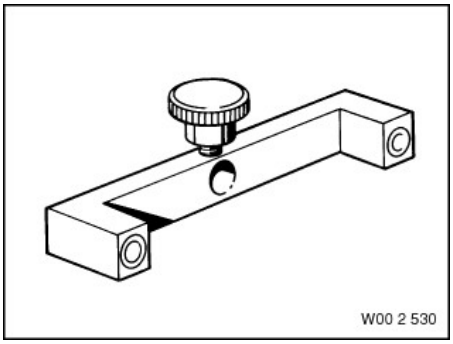
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0 495 104 (11 4 472) Extractor



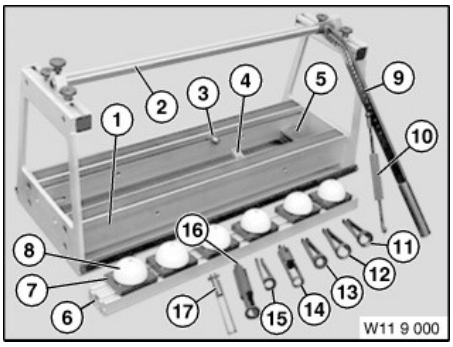
Common	Used in step 60
Usage	(grindstone)
Included in the tool or work	0 495 102
Storage location	C52
Replaced by	
In connection with	
SI-Number	

0 490 185 (00 2 530) Bridge



Common	Used in step 62
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

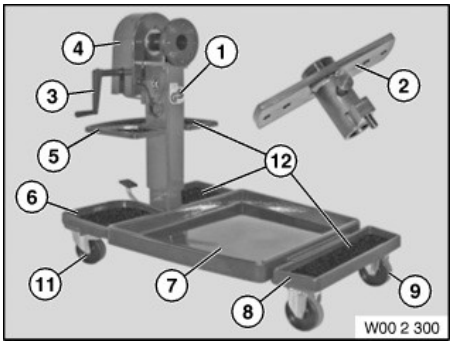


Common	Used in step 6368
Usage	
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 187 (00 2 300) Assembly stand

Used in step 6368

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Common

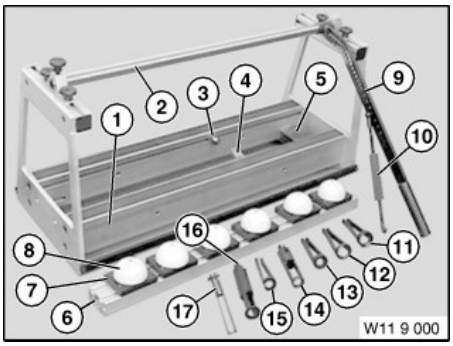
Usage	Assembly stand with universal flange for mounting engines from S85
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 25 04 (155)

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.	

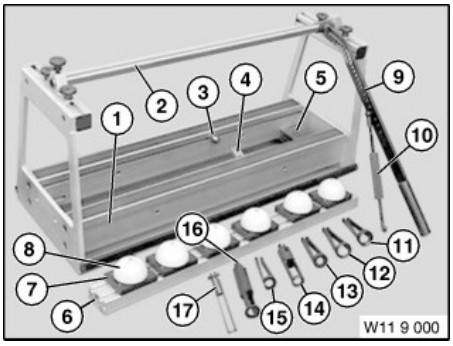
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0 494 371 (11 9 006) Insert



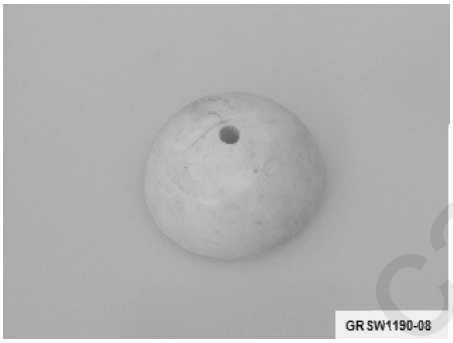
Common	Used in step 63656668
Usage	(Aluminium strip)
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 494 372 (11 9 007) Shaped part



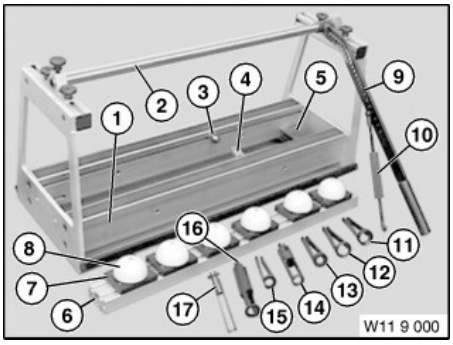
Common	Used in step 6366
Usage	(Shaped part)
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 494 373 (11 9 008) Shaped part



Common	Used in step 636566
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	

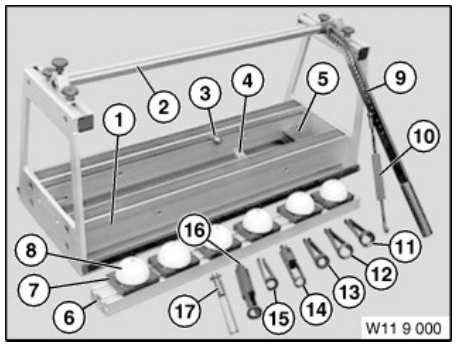
0 494 370 (11 9 005) Quick fastener



Common	Used in step 63656668
Usage	
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

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0 494 362 (11 9 000) Device



Common Used in step 63656668

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	

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0 494 374 (11 9 009) Lever



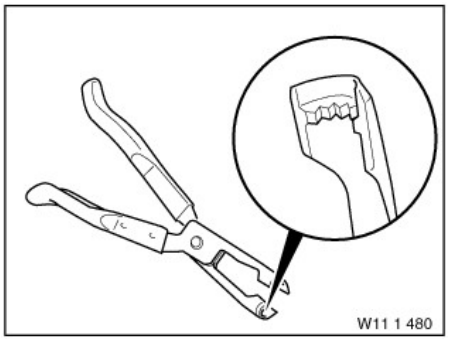
Common	Used in step 6368
Usage	
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 496 143 (11 8 840) Basket



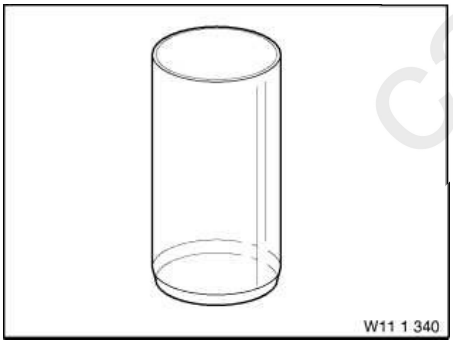
Common	Used in step 6368
Usage	(Valve spring cage) For removing and fitting the valves.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

0 490 796 (11 1 480) Pliers



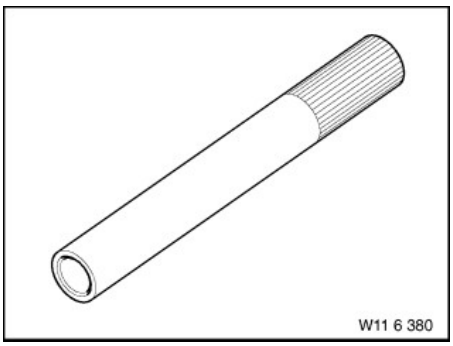
Common	Used in step 64
Usage	For removing valve stem seal
Included in the tool or work	
Storage location	A10
Replaced by	
In connection with	
SI-Number	01 01 93 (621)

0 490 746 (11 1 380) Holding sleeve



Common	Used in step 67
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	

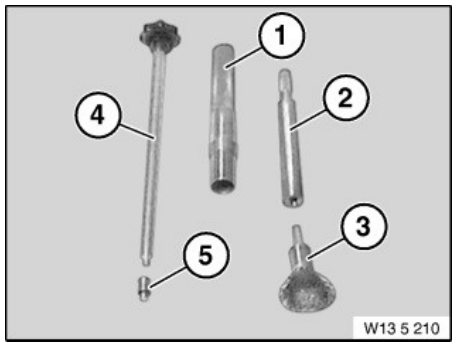
0 493 249 (11 6 380) Bush



Common	Used in step 67
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)

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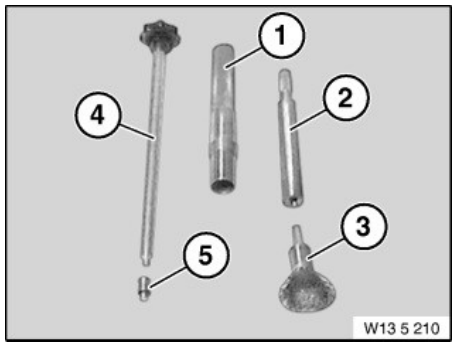
0 493 763 (13 5 215) Plug



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

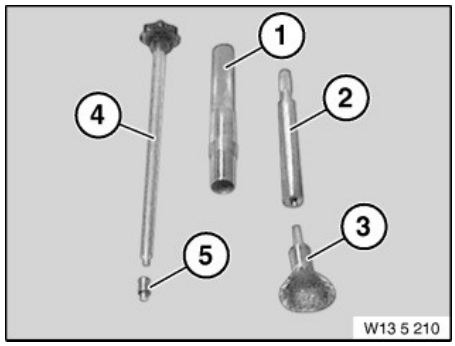


Common Used in step 86

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	

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0 493 758 (13 5 210) Tool



Common Used in step 86

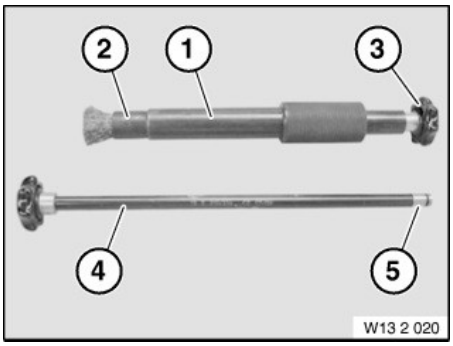
Usage	(Cleaning set) For injector channels
Included in the tool or work	
Storage location	B4
Replaced by	
In connection with	
SI-Number	01 05 00 (574)

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)	

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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.	

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:

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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	

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	

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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



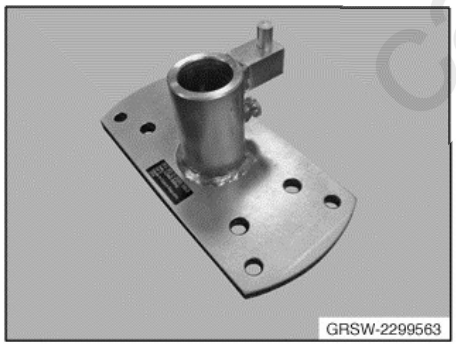
Common	Used in step 32
Usage	(Code 38) With centring bore available separately (see EPC) under 36 13 6 762 343
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

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 6368
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 61

Maximum lengthwise deviation from flatness	0.10 mm
Maximum transverse deviation from flatness	0.05 mm

Valve underprotrusion — Used in step 62

	0,8 (0.7 - 0,9) mm

Distance from window pane edge to wiper blade — Used in step 128

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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**
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61 20 900 Disconnecting and connecting battery earth lead	2131
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61 35 ... Notes on ESD protection (Electro Static Discharge)	1617181929304148
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	133

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11 12 070 Remove and install/replace acoustic cover

1 – 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.

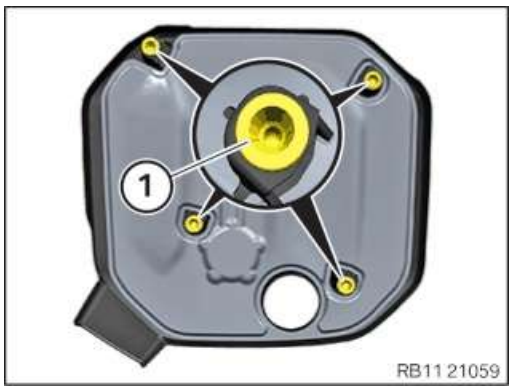
2 – Install acoustic cover

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).

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

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11 12 100 Removing and installing cylinder head

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

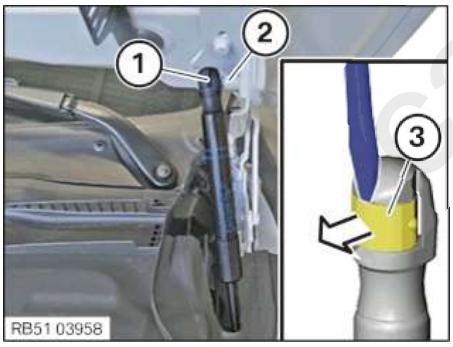
Engine compartment lid is open.

CAUTION

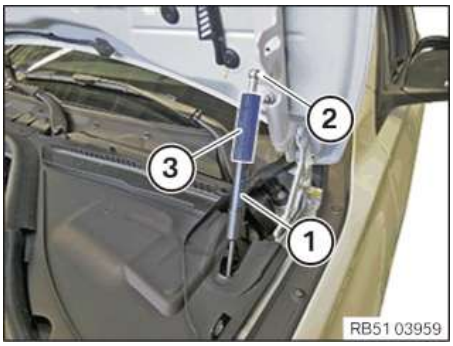
Shutting bonnet or tailgate.

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.



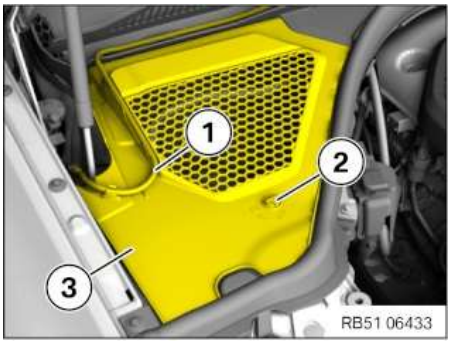
TECHNICAL INFORMATION

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.

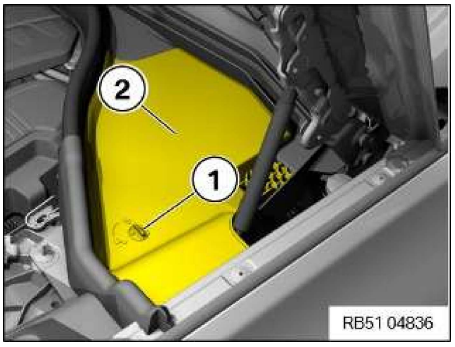
2 – Remove the cover of the rear right engine compartment

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- 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.

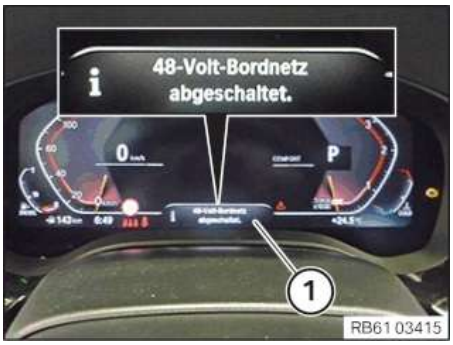
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- Deactivate the 48V electrical system by opening the bonnet.

  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.

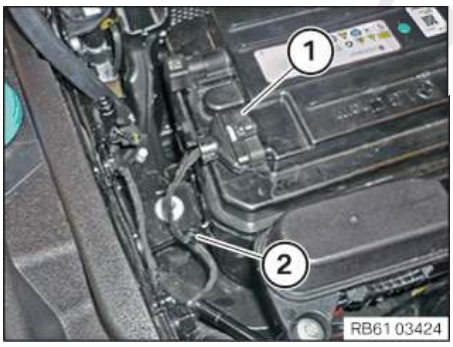
Result

» 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.

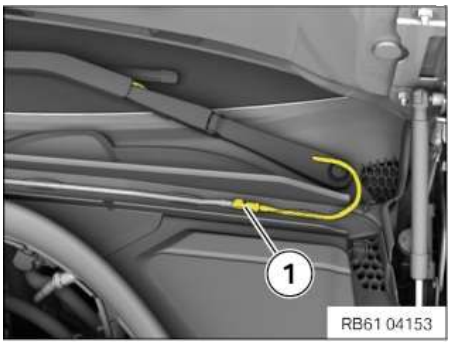
▸ **Remove the wiper arm**

RISK OF DAMAGE

Damage to wiper console.

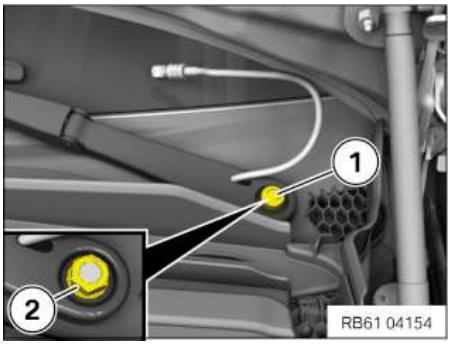
While removing the wiper arms without using special tool, the wiper console can break.

- 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.

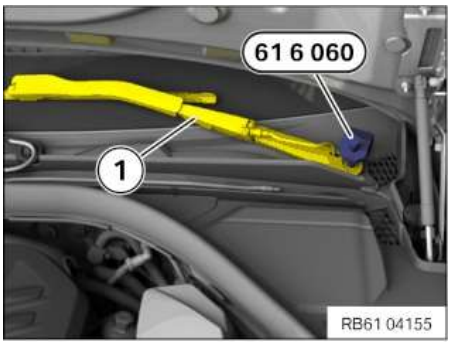


- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.

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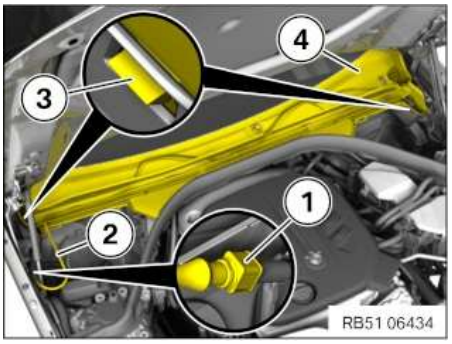


- Remove the protective cap (1).
- Loosen nut (2).

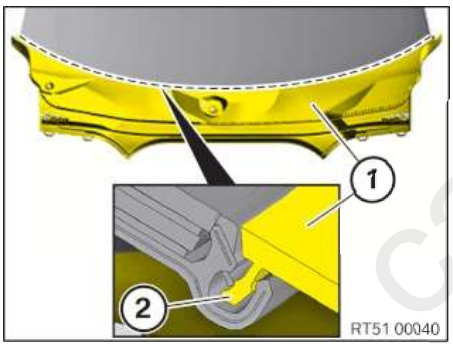


- Pull off the wiper arm (1) using special tool .

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



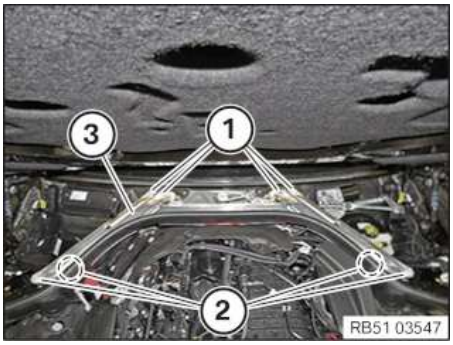
- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

9 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

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

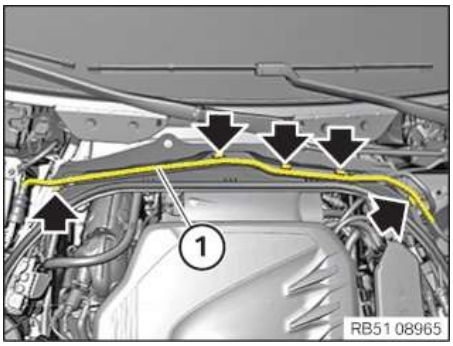
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NOTICE

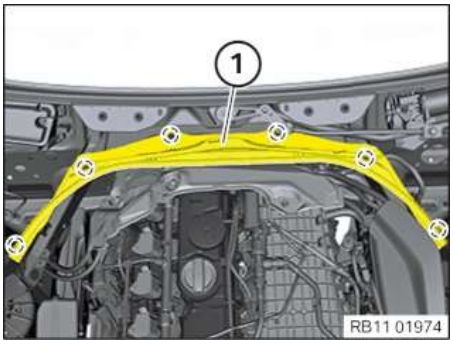
The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

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



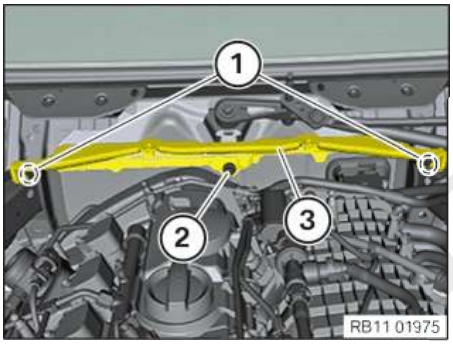
- **Version with mild hybrid technology:**

  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.

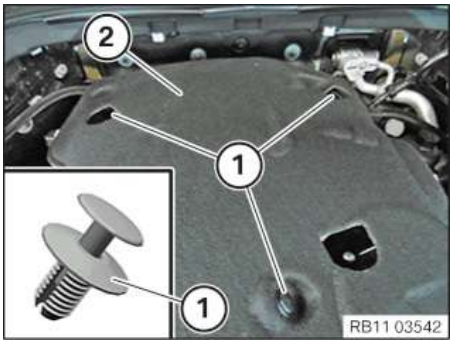
Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- 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.



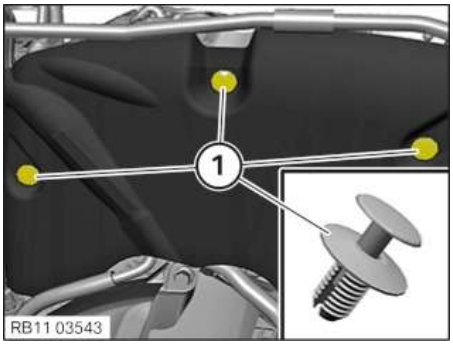
- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

12 – Remove the acoustic cover for the injectors

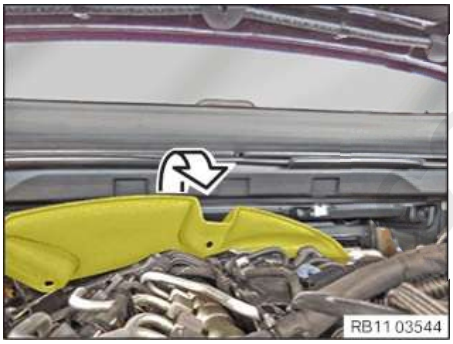


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

13 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).

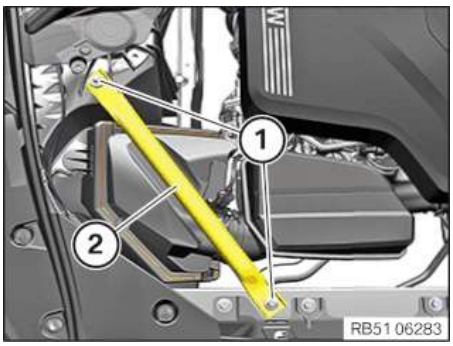


- Guide out and remove the acoustic cover in the direction of the arrow.

14 – Remove right front-end strut

TECHNICAL INFORMATION

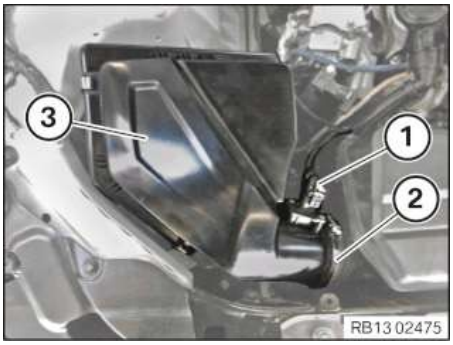
Driving without the strut brace/front-end strut or tension strut is not permitted.



- Loosen screws (1).
- Remove the front-end strut (2).

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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.

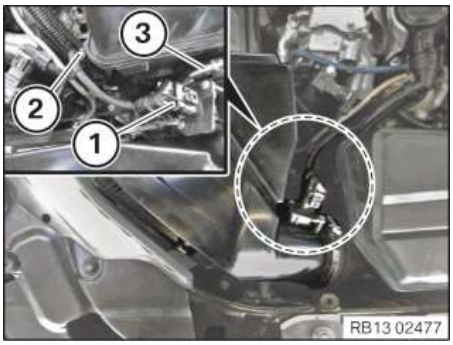
16 – Removing the clean air pipe with the resonator

WARNING

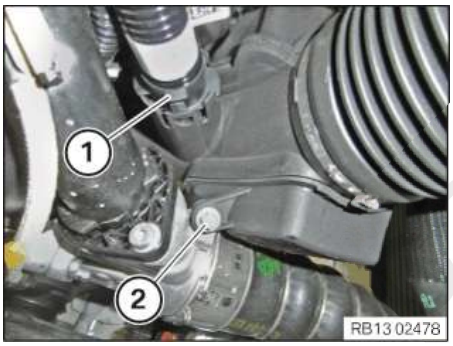
Hot surfaces.

Risk of burning!

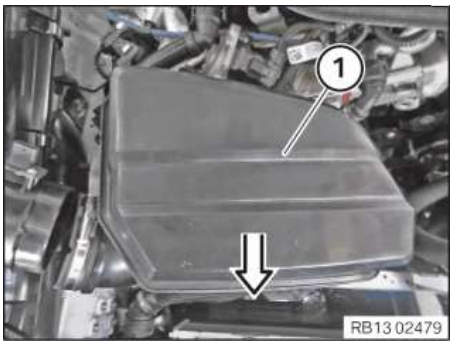
- Perform all work only on components that have cooled down.



- 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.

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- 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!

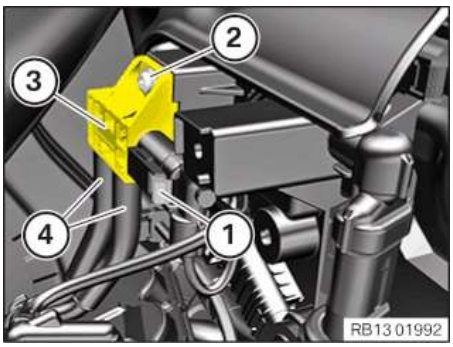
- Perform all work only on components that have cooled down.

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

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WARNING

Hot surfaces.

Risk of burning!

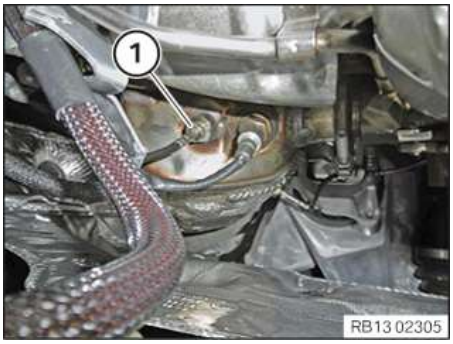
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

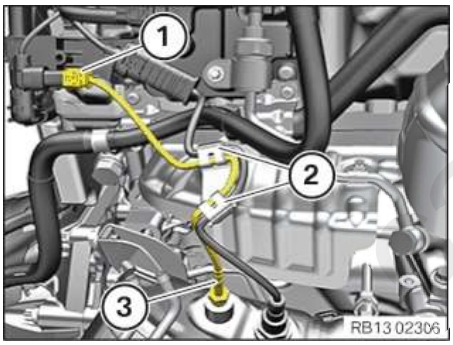
Electrostatic discharge.

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.

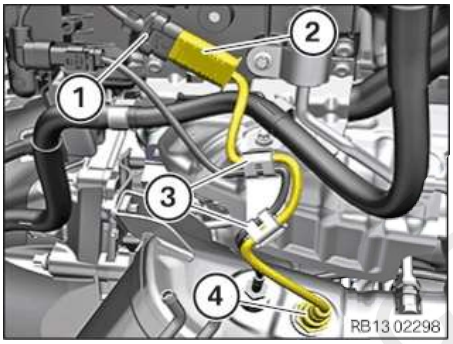
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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.

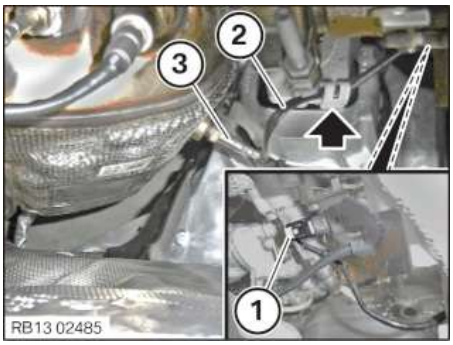
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RISK OF DAMAGE

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)

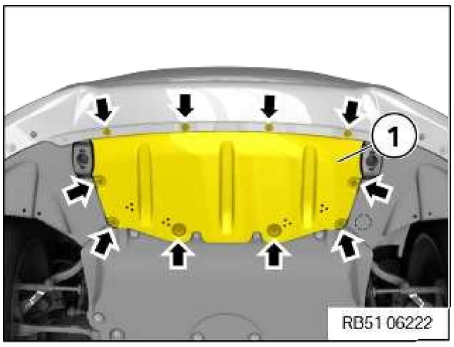


- Unlock plug connection (1) and disconnect.

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).

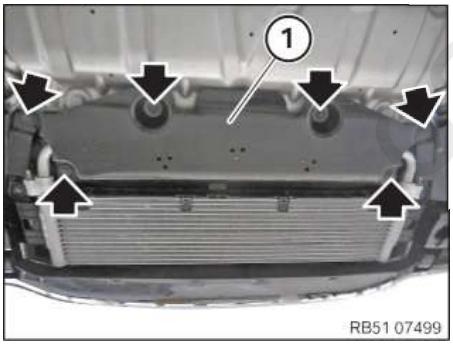
21 – Removing the front underbody protection



- **Version A:**

  Remove screws (arrows).

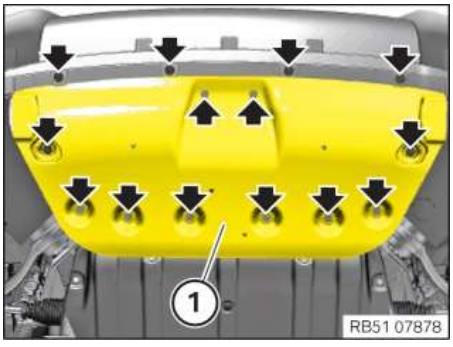
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version B:**

  Remove screws (arrows).

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

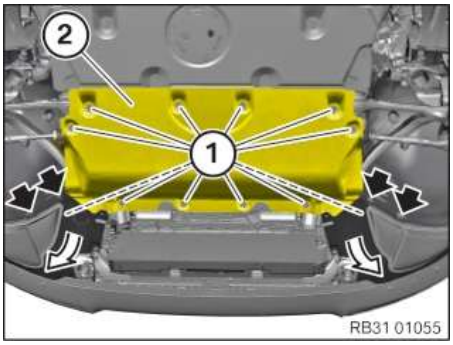


- **Version C:**

  Remove screws (arrows).

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

22 – Remove the underbody protection of the steering gear



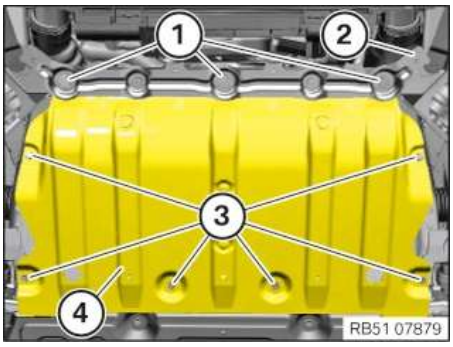
- **Version A:**

  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.

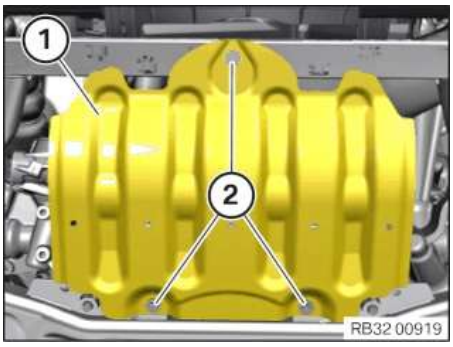
  Loosen screws (3).

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

23 – If installed: Removing the steering underbody protection

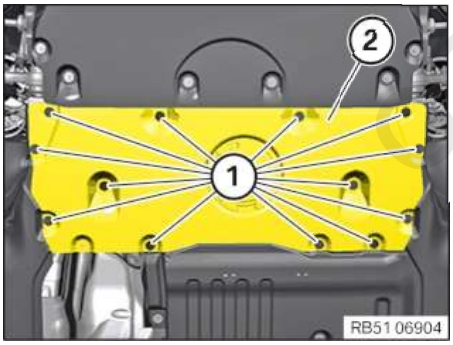
Prerequisite

Front underbody protection has been removed.



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

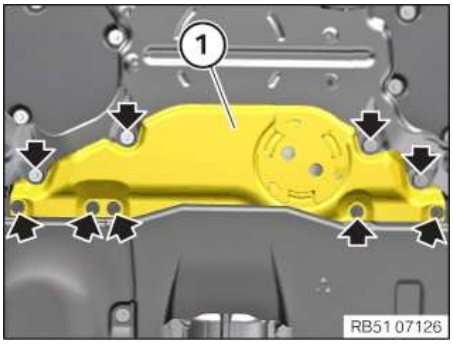
24 – Removing the centre underbody protection



- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .



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

  Remove screws (arrows).

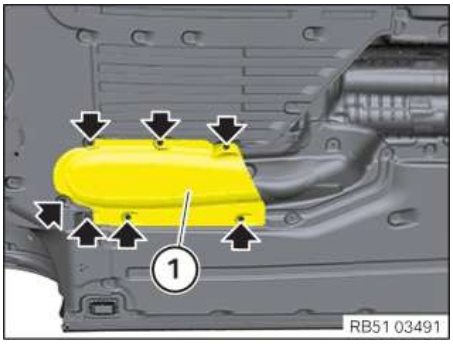
  Feed out and remove the centre underbody protection (1).

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

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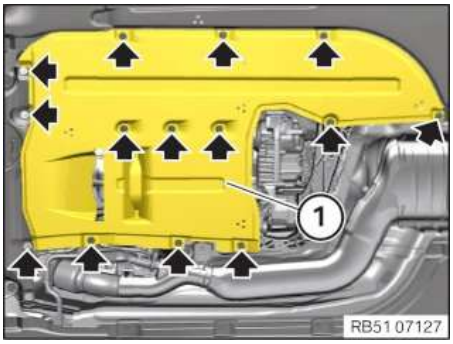
NOTICE

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).

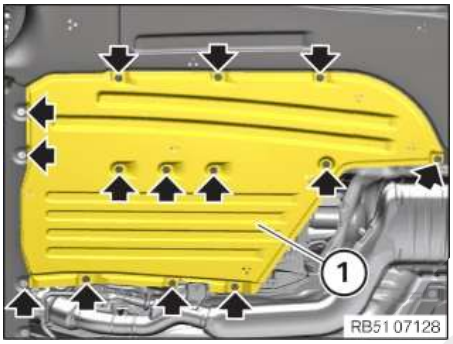
26 – Remove rear underbody protection



- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).

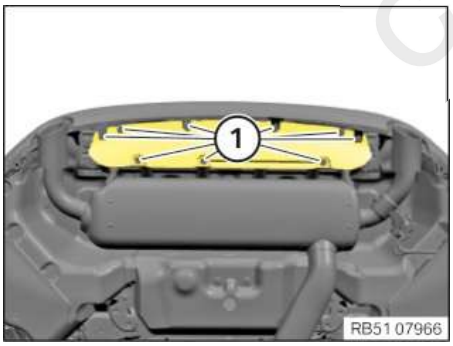


- **Version B:**

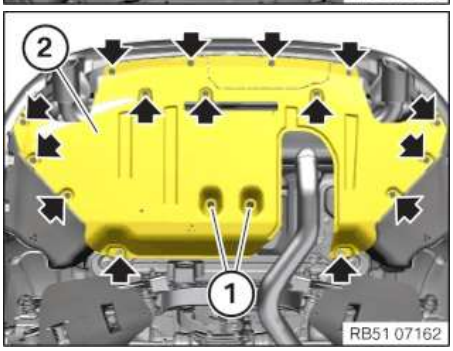
  Remove screws (arrows).

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

27 – Removing the rear diffuser



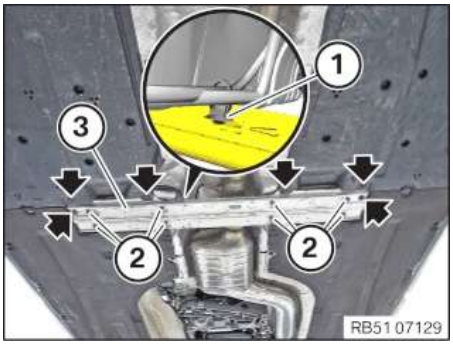
- **Version 1:**
- Release the screws and nuts (1).
- Remove the diffuser.



- **Version 2:**
- Loosen nuts (1).
- Remove screws (arrows).
- Guide out and remove rear diffuser (2).

28 – Remove the connecting support from the tunnel

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- 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!

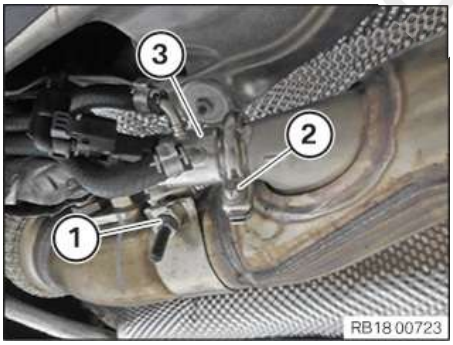
- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

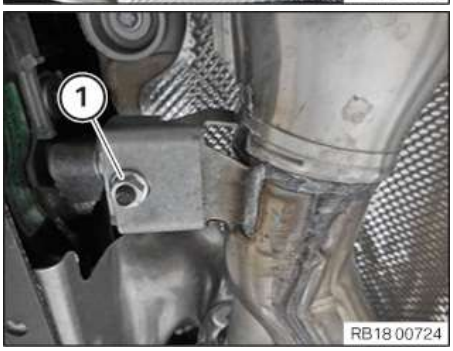
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

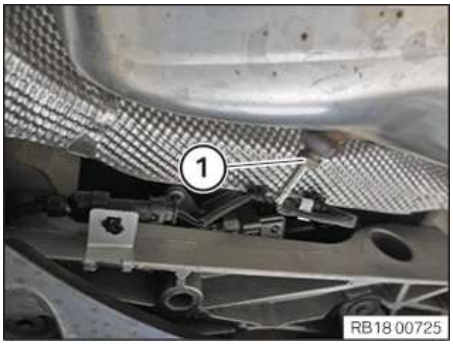


- Unfasten clamp (1).
- Detach the clamp (2) of the SCR metering module (3).
- Detach the SCR metering module (3)from the exhaust system and place to one side.

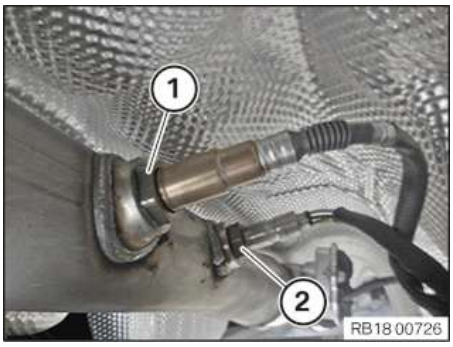


- Loosen nut (1).

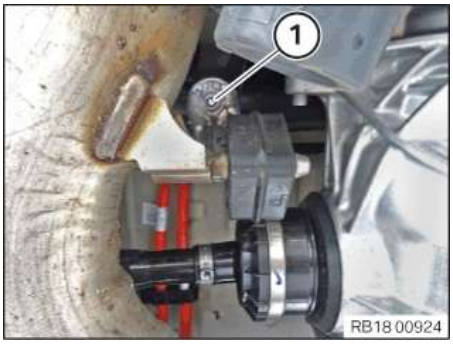
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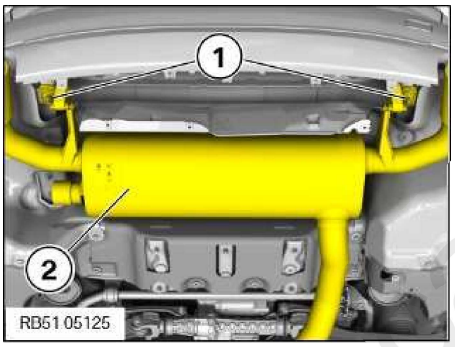
- Detach the exhaust temperature sensor (1) from the exhaust system.



- 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.

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RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

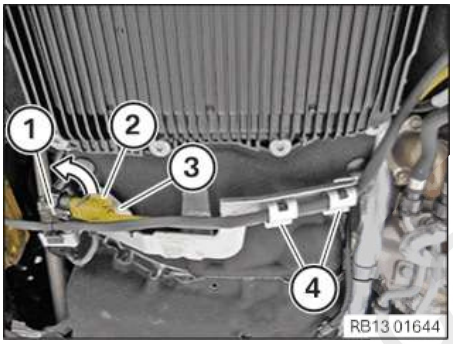
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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.

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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.

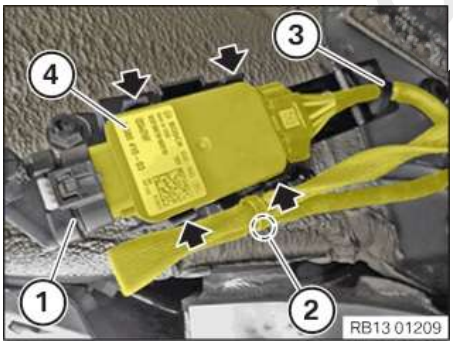
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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

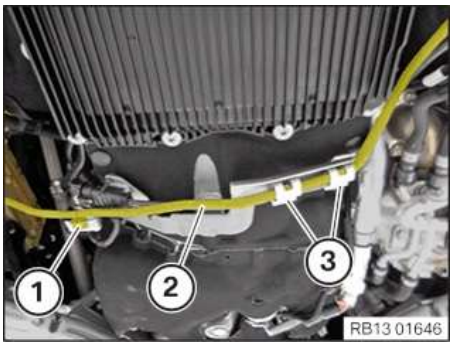
Damage to the nitrogen oxide sensor.

Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

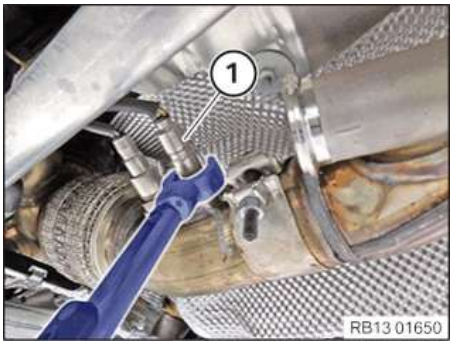
- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug 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.



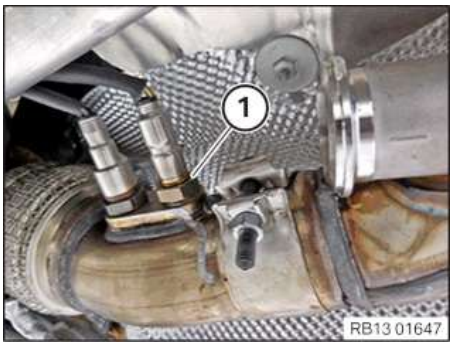
- Unlock plug connection (1) and disconnect.
- Release cable clip in area (2).
- Release line from the holder (3).
- Unclip control unit (4).



- 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!

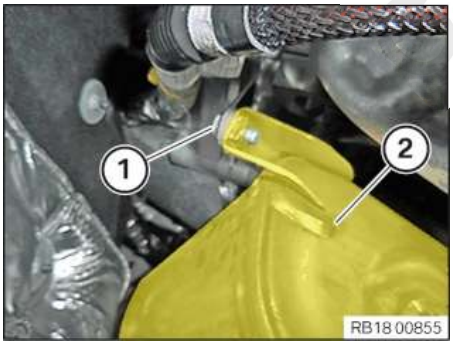
- Perform all work only on components that have cooled down.

CAUTION

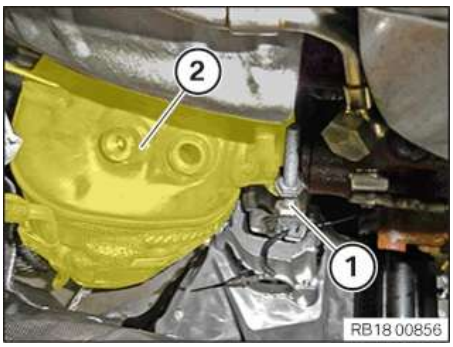
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

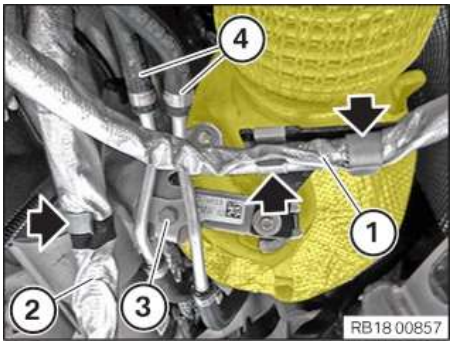


- Release bolt (1) from the holder of diesel particulate filter (2).

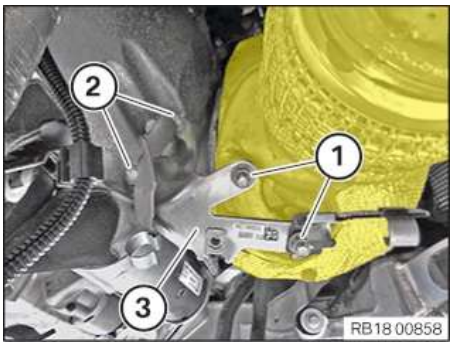


- Loosen V-band clamp (1).
- Feed V-clip (1) out from diesel particulate filter (2) and remove.

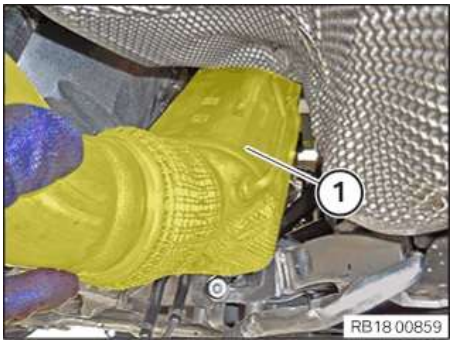
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- Release the metering line (1) from clamps (Arrows).
- Release positive battery cable (2) from starter motor from clamp (Arrow).
- Loosen screw (3).
- Thread off coolant line (4) and place to the side.



- 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.**

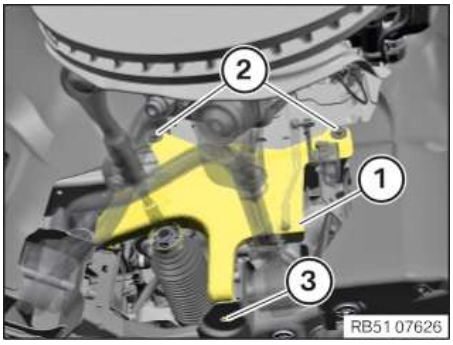
  This process is intended to prevent damage to the brake disc.

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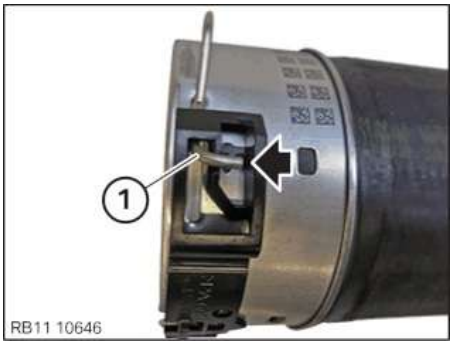
- If several wheels are removed at the same time: Use a piece of chalk to mark on each tyre the axle and side on which the corresponding wheel is fitted.
- Release the wheel bolts (arrows) crosswise and remove the wheel.
- To release and tighten wheel bolts with a security code: Use the correct adapter from the set of special tools .

34 – Remove the cover of the steering assembly



- Loosen screws (2) and (3).
- Remove the cover (1).

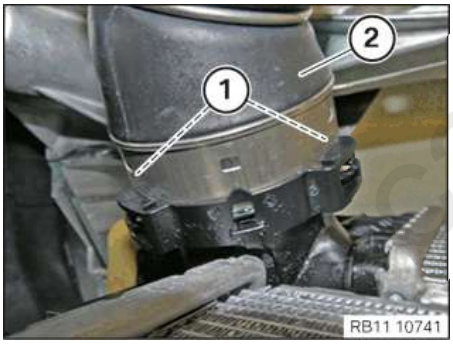
35 – Remove pressure pipe between exhaust turbocharger and charge air cooler



- **Version A:**

  Unlock lock (1).

  The lock (1) must snap audibly into place when unlocked (see arrow).



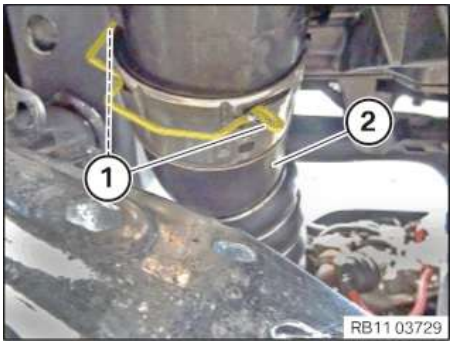
- Unlock the locks (1) on both sides and snap into place.
- Pull off pressure pipe (2) from charge air cooler.



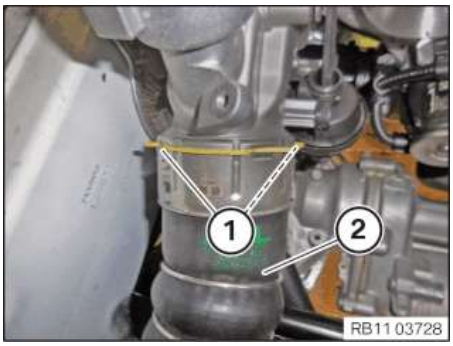
- **Version B:**

  Unlock clamp (1) and engage in this position.

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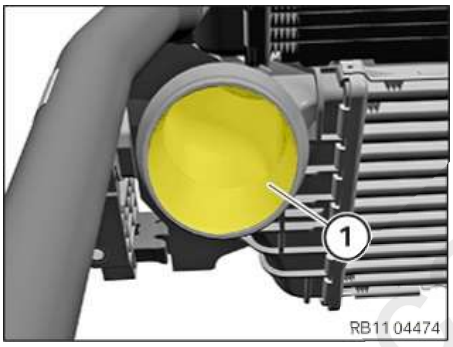
- Unlock the locks (1) and snap into place.
- Pull off pressure pipe (2) from charge air cooler.



- 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.

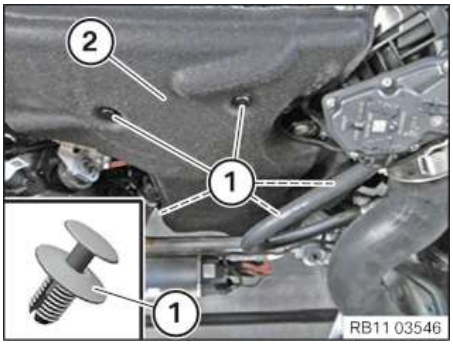
36 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

Risk of burning!

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



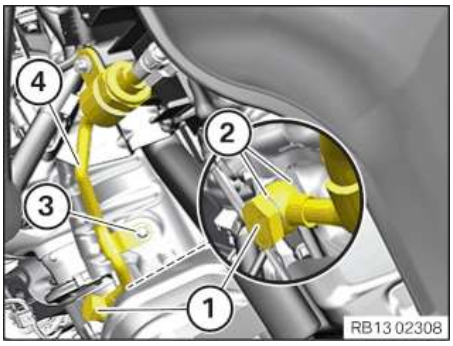
- Release and remove expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

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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.

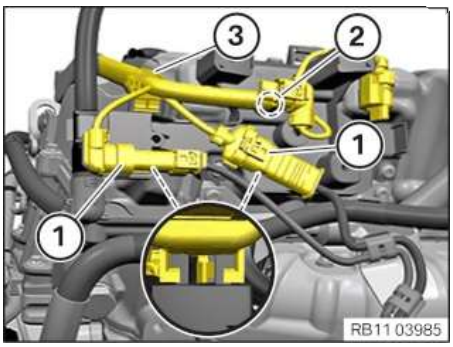
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

Contaminant or foreign body.

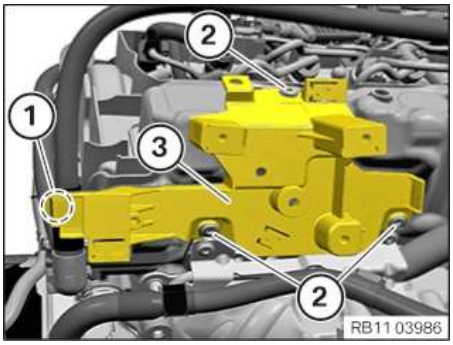
Contamination can result in malfunctions, operating failure or leaks.

- 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.

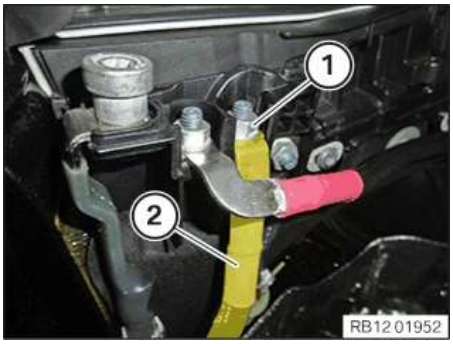
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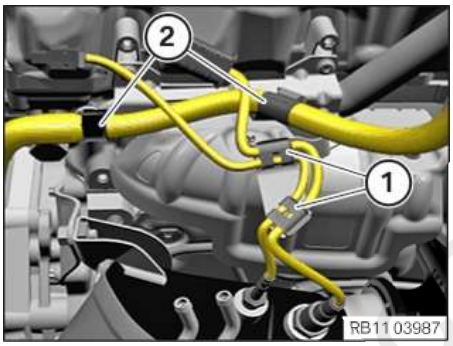
- Release the positive battery cable in the area (1) from the clamp and set it aside.
- Loosen screws (2).
- Feed out holder (3) for the sensor system and remove.



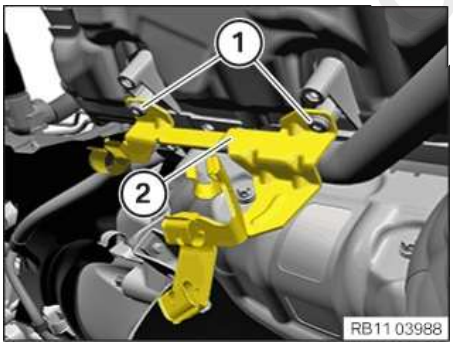
- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.



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



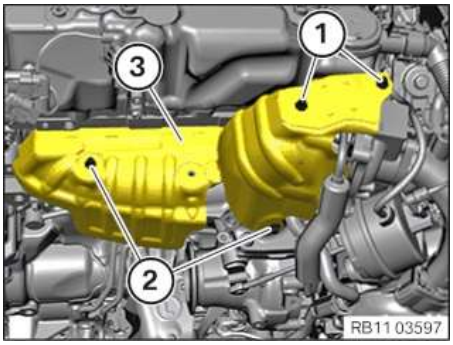
- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



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

39 – Removing heat shield

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- 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

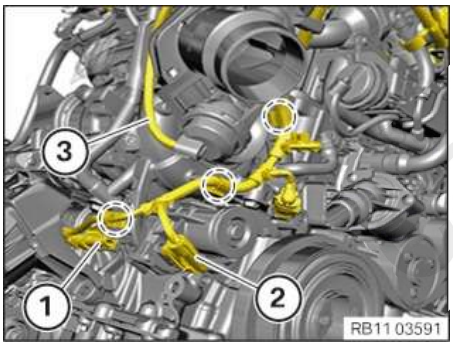
Prior to replacing the exhaust turbocharger: Observe the notes on troubleshooting on the exhaust turbocharger.

For additional information see: FUB-FUB-FB-130003-A10 Troubleshooting on the exhaust turbocharger

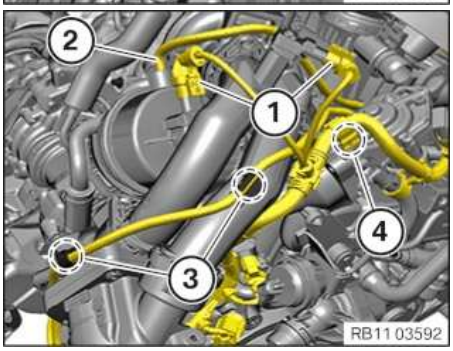
TECHNICAL INFORMATION

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).



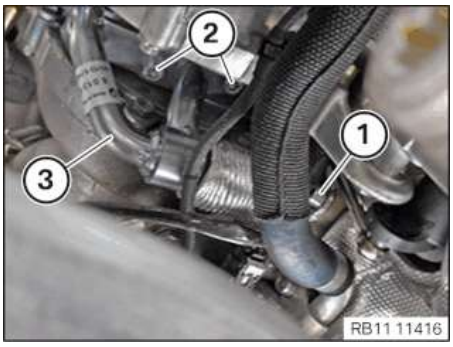
- Unlock plug connections (1) and disconnect.
- Pull off the vacuum hose (2).
- Release the vacuum hose in marked areas (3) from the exhaust turbochargers.
- Release the wiring harness in area (4) from the exhaust-gas recirculation cooler and set it aside.



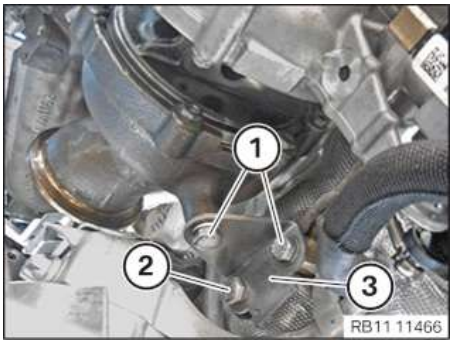
TECHNICAL INFORMATION

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

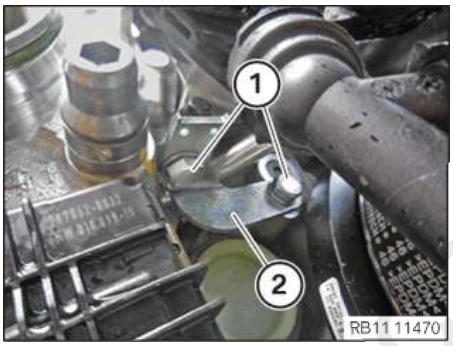
- Release the screws of the oil return line on the crankcase from the right wheel arch.



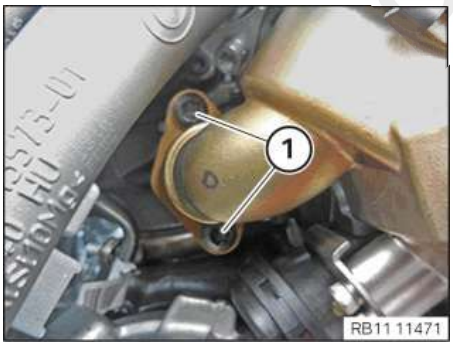
- Release the screw (1).
- Loosen screws (2).
- Remove oil return line (3) from the crankcase.
- Catch and dispose of emerging engine oil.



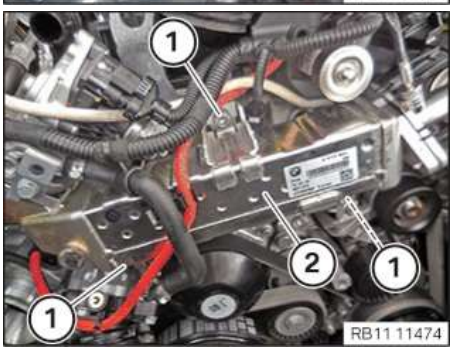
- Unscrew and remove the bolts (1) on the holder (3).
- Slacken screw (2) on holder (3), but do **not** remove.



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

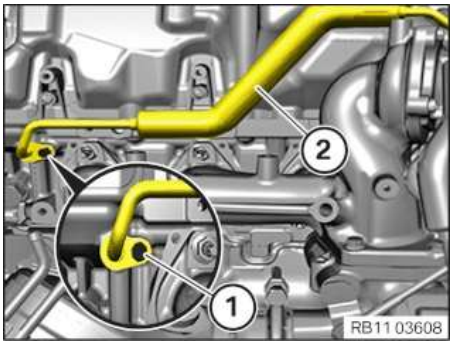


- Loosen screws (1).

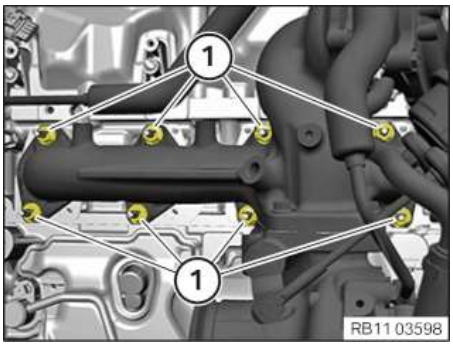


- Slacken screws (1), but do **not** remove.
- Release exhaust-gas recirculation cooler (2) slightly.

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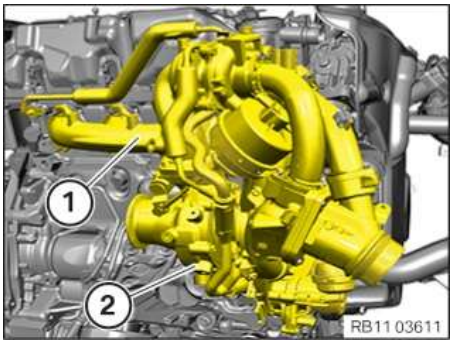
- Loosen screw (1).
- Remove oil feed line (2) for the high-pressure stage exhaust turbocharger from the cylinder head and set it aside.
- Catch and dispose of emerging engine oil.



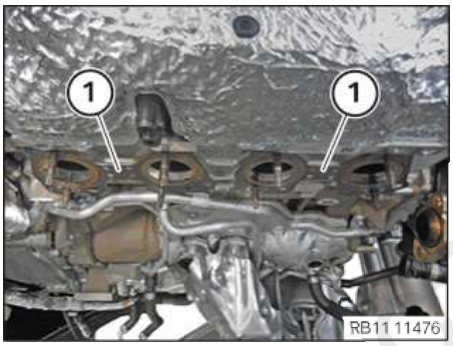
TECHNICAL INFORMATION

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

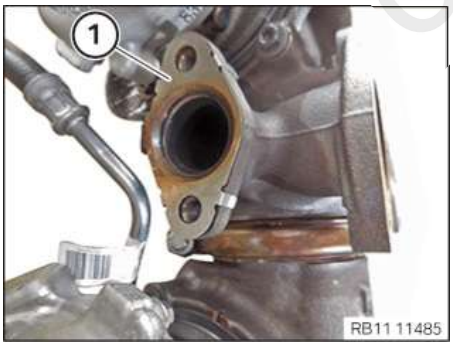
- Loosen nuts (1).



- 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.

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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).

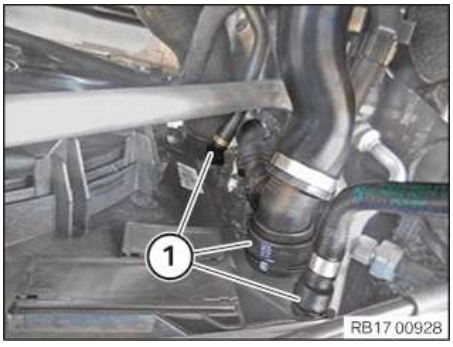
▸ **Avoiding damage to the starter generator due to escaping coolant**

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.

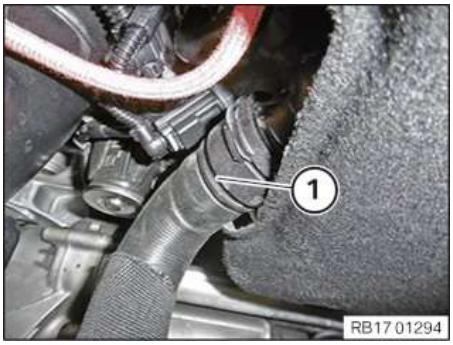


NOTICE

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

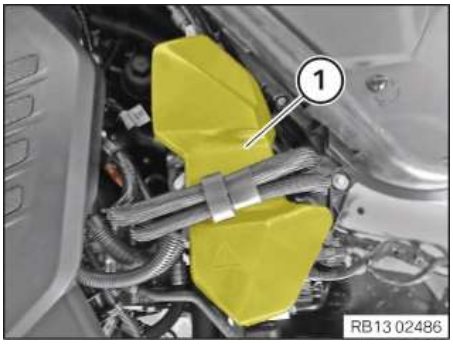
- Unlock all coolant lines (1) and detach.
- Catch and dispose of escaping coolant.

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- 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.

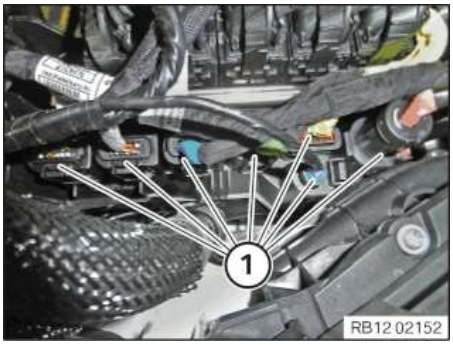
Sheared wires can cause a short circuit.

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

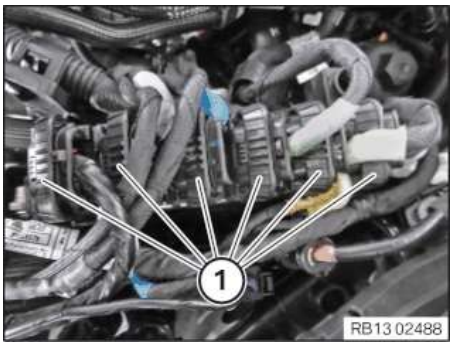
TECHNICAL INFORMATION

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

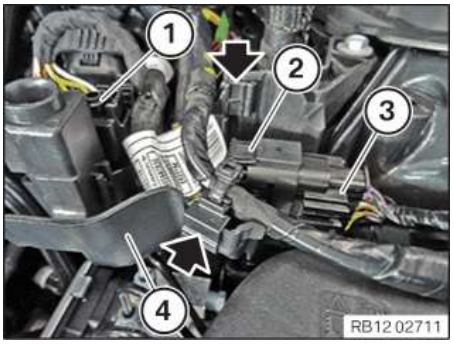
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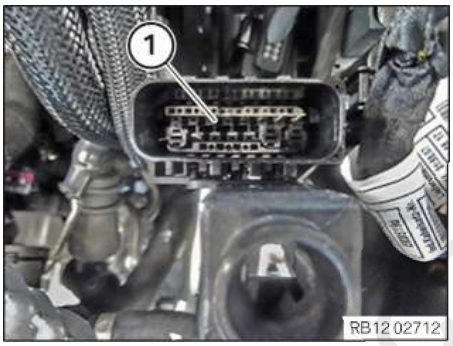
- Unlock and disconnect plug connections (1).



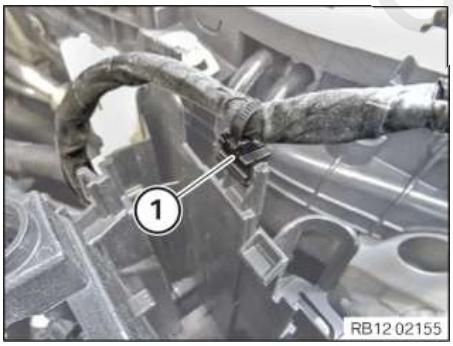
- Unlock and disconnect plug connections (1).



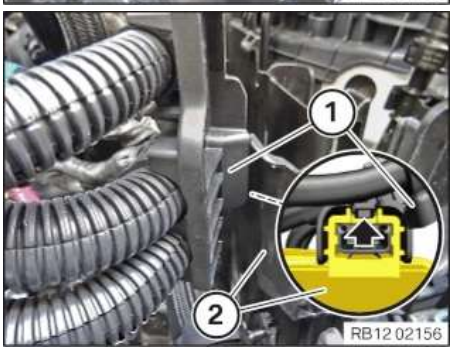
- Unlock plug connection (1) and disconnect.
- Unlock plug connection (2) and disconnect.
- Release the connector (3) and disconnect from the control unit holder (4).
- Release the clamps (arrows).



- Unlock plug connection (1) and disconnect.

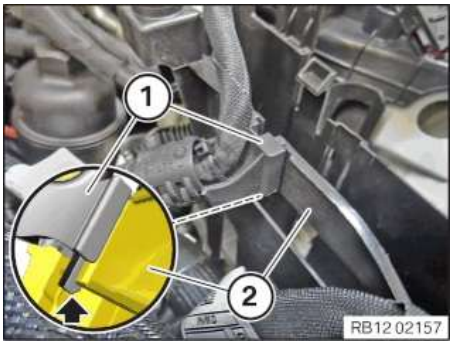


- Loosen clamp (1).



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

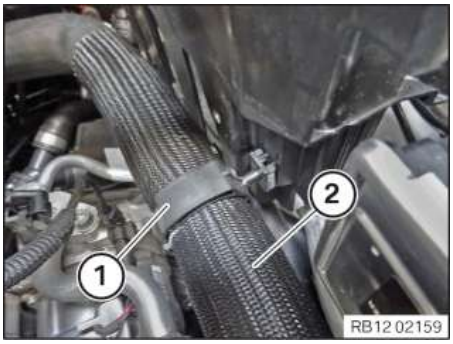
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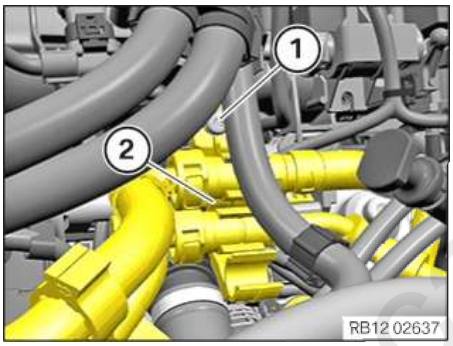
- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).



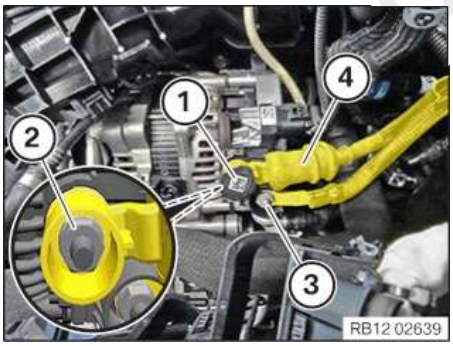
- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.



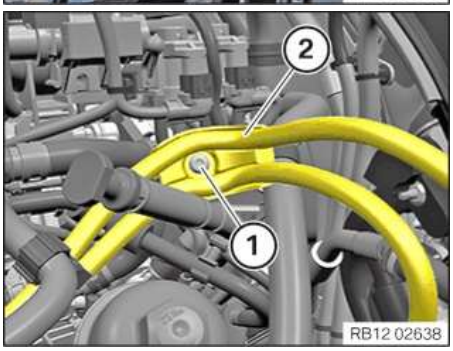
- Unlock holder (1) and feed out coolant line (2) and place it aside.



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

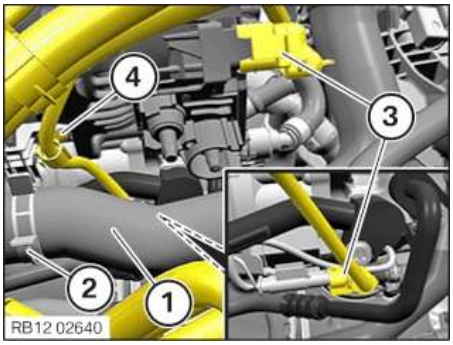


- Guide out and remove the lid (1).
- Release the nuts (2) and (3).
- Feed out positive battery cables (4) and place to one side.

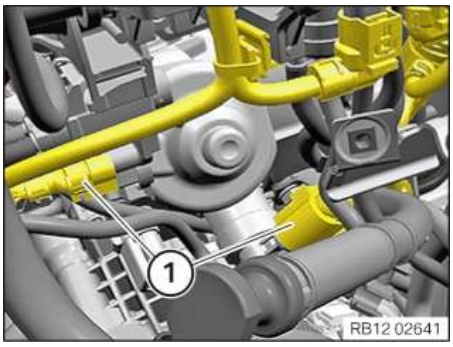


- Release the screw (1).
- Guide out the positive battery cables (2) and set them aside.

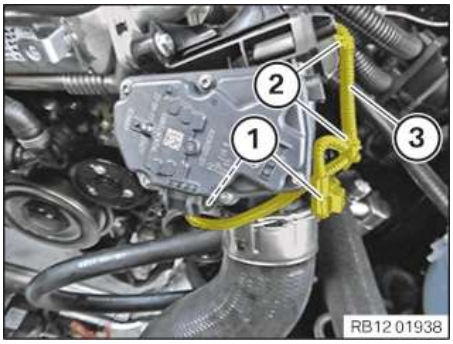
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- Release the coolant line (1) from the holder (2) .
- Unlock plug connections (3) and disconnect.
- Loosen clamp (4).



- Unlock and disconnect plug connections (1).



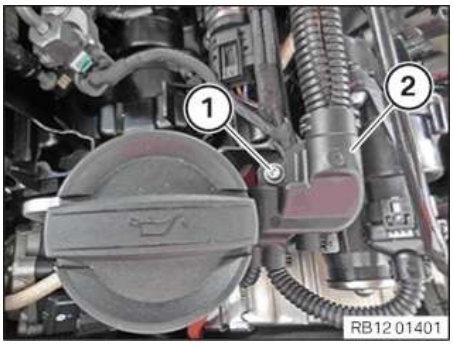
- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.



- Unlock and loosen connector (1).

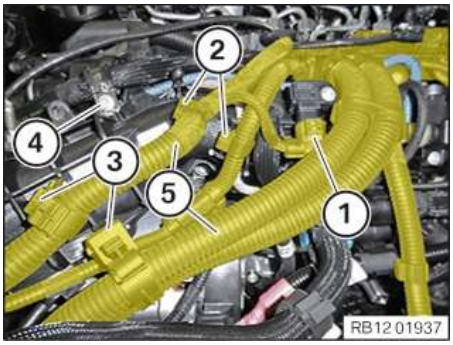


- Unlock plug connection (1) and disconnect.

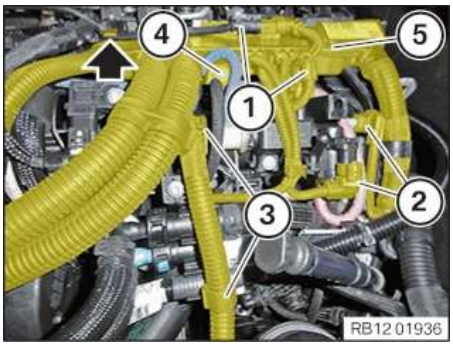


- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.

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- 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

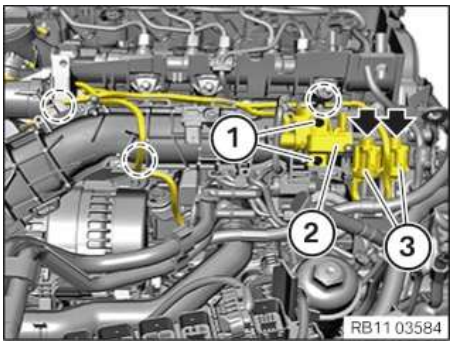
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



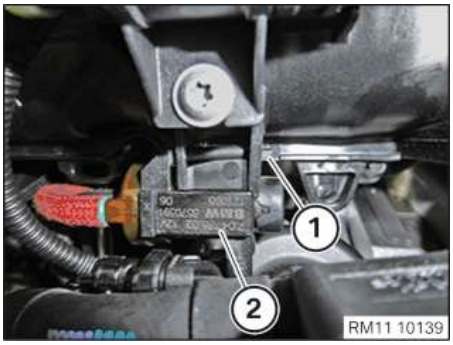
- Unlock clamp (1) and engage in this position.



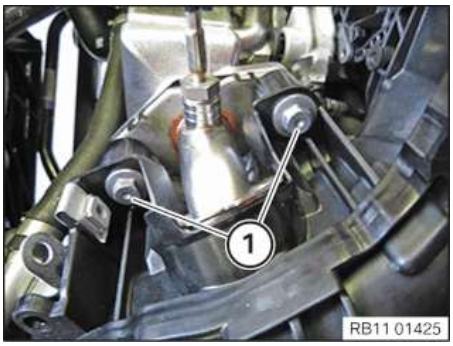
- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.



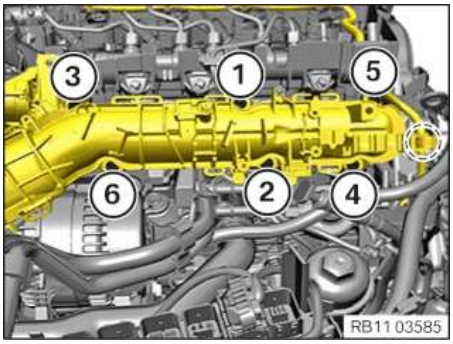
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



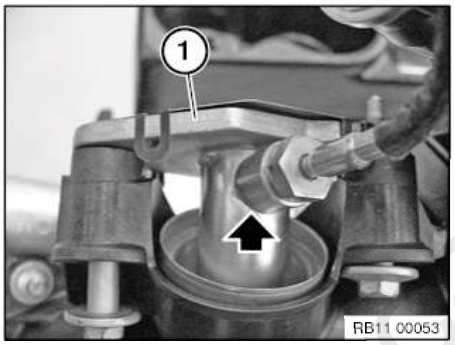
- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.



- 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.

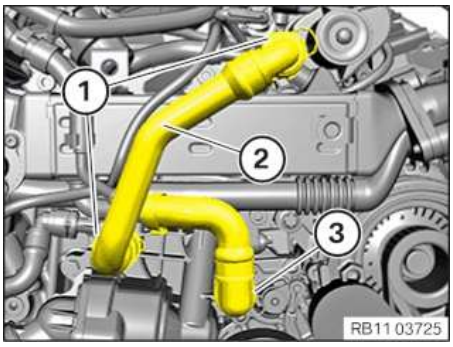
- Cover the starter generator with suitable, watertight auxiliary materials.
- Close off line connections with seal plugs.
- If necessary: Flush the leaked coolant from the starter generator with at least 1 l water.

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- **Version A:**

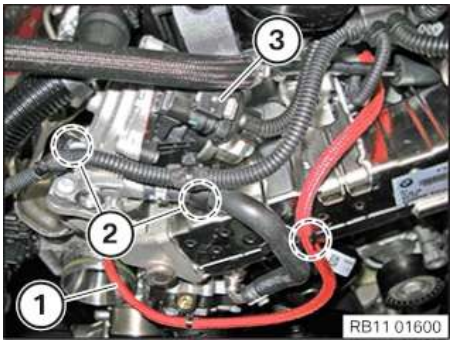
  Unlock and pull off coolant lines (1).



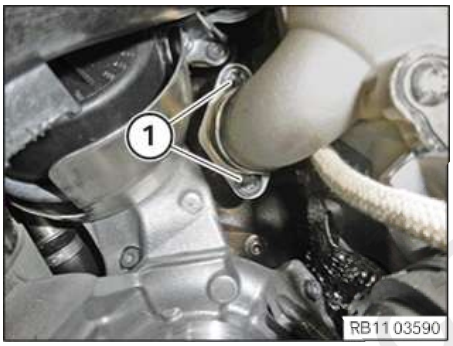
- **Version B:**

  Unlock locks (1) and remove thee coolant line (2).

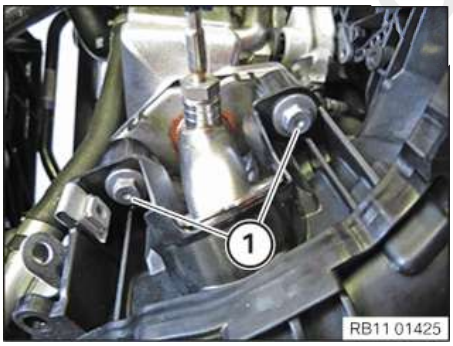
  Unlock coolant line (3) and pull it off the thermostat.



- 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.

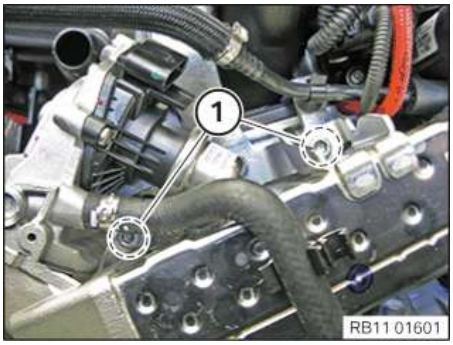


- Loosen the screws (1) on the intake system.



- Loosen the screw (1) below the exhaust-gas recirculation cooler.

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- 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!

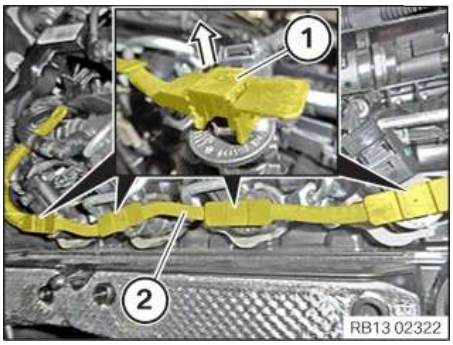
- Perform all work only on components that have cooled down.

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.

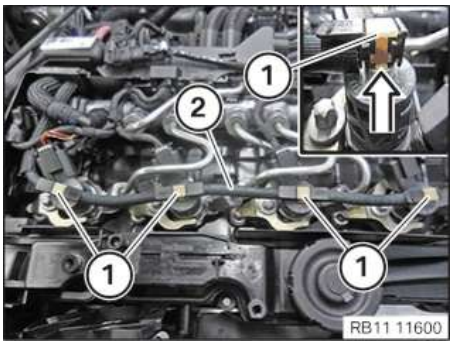


- **Version A:**

  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.



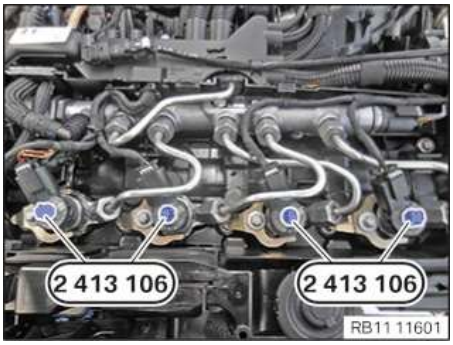
- **Version B:**

  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.

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- 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.

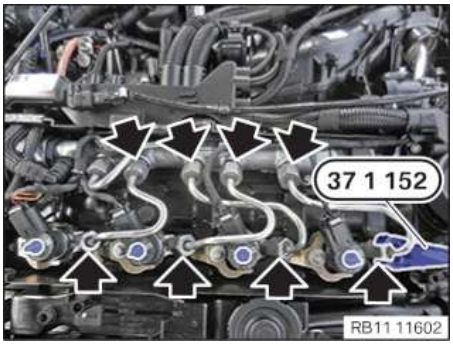
TECHNICAL INFORMATION

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

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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.

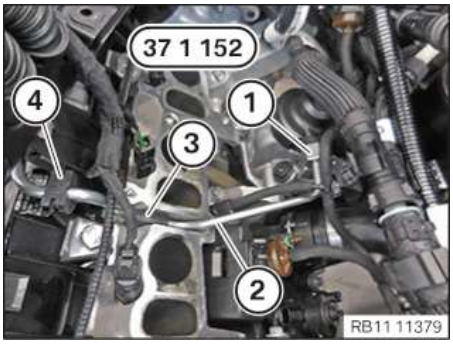
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TECHNICAL INFORMATION

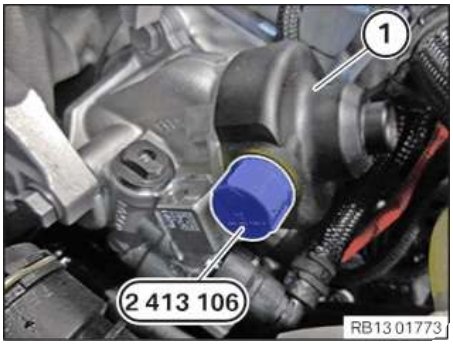
Reset special tool in early to avoid bending pressure lines.



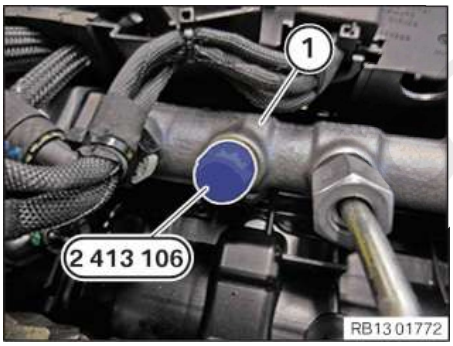
- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.



- 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.

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RISK OF DAMAGE

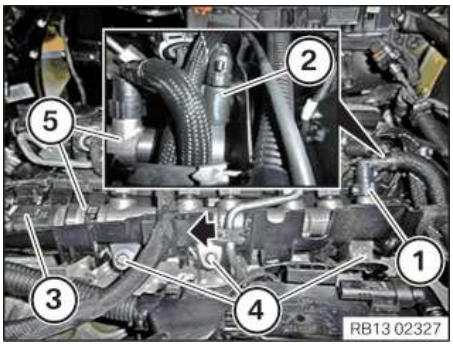
Contaminant or foreign body.

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.

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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

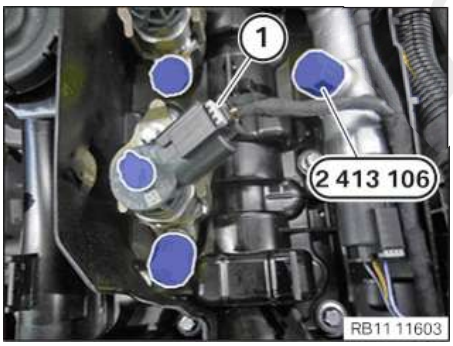
Electrostatic discharge.

Damage to or destruction of electrical components.

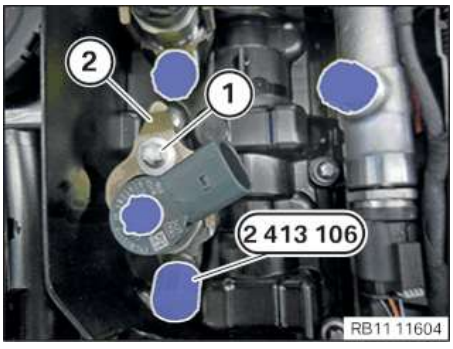
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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**

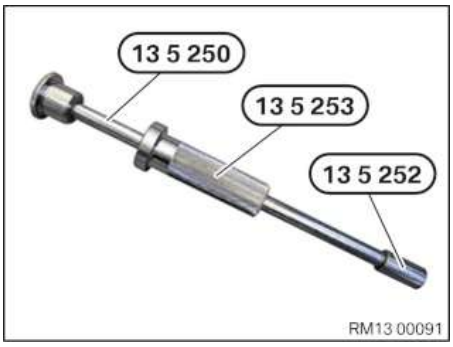
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RISK OF DAMAGE

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.



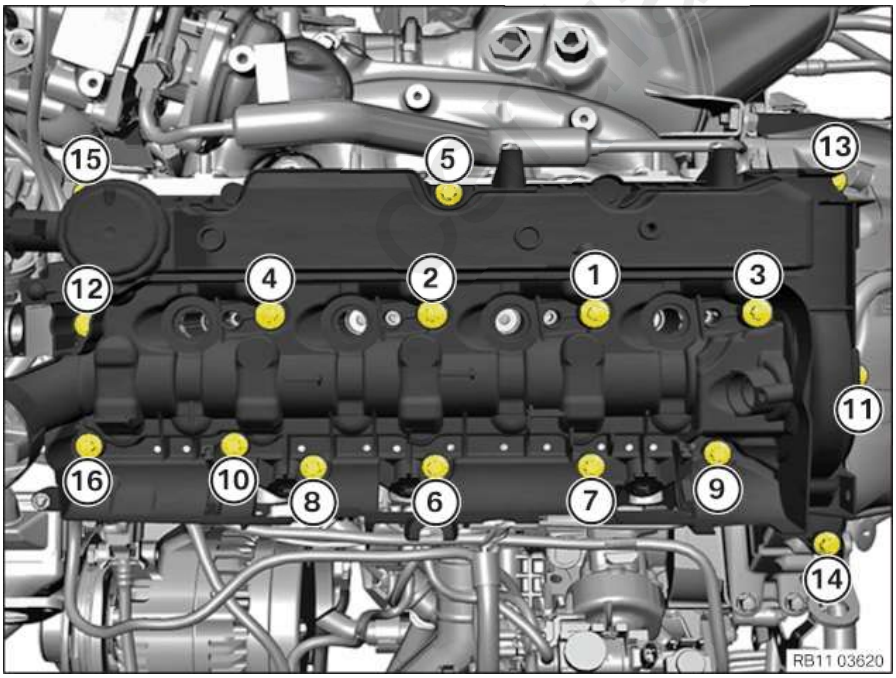
- Unscrew special tool 0 493 339 (13 5 252) from special tool 0 493 321 (13 5 250) and remove special tool 0 493 340 (13 5 253).
- Screw special tool 0 493 339 (13 5 252) back onto special tool 0 493 321 (13 5 250).



- 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



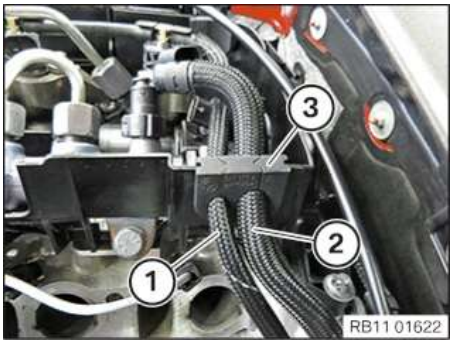
1 - 16 Bolts of the cylinder head cover



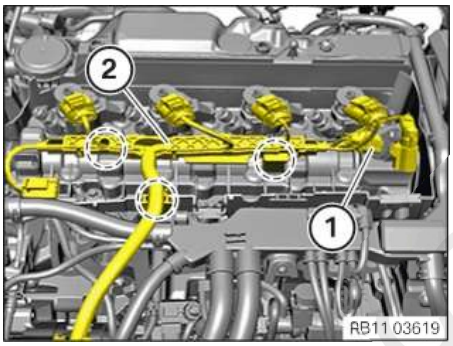
- Unlock and detach the locks.
- Feed the engine ventilation line (1) out and set it aside.



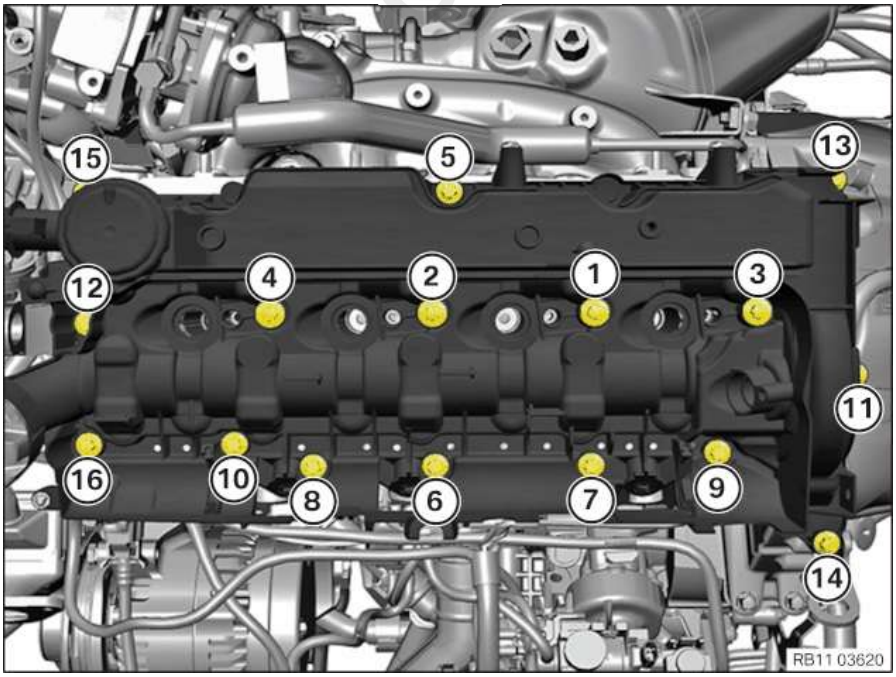
- Feed out and remove the heat shield (1).



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

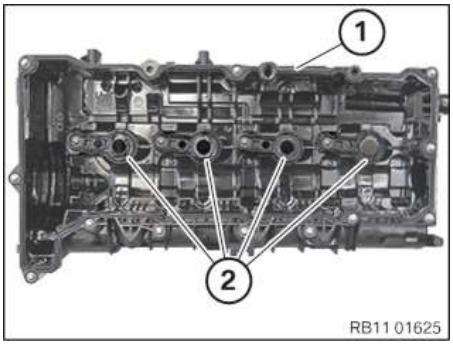


- Unlock connector (1) and pull off.
- Disconnect the wiring harness (2) in the marked areas from the cylinder head cover and set aside.



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

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- 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

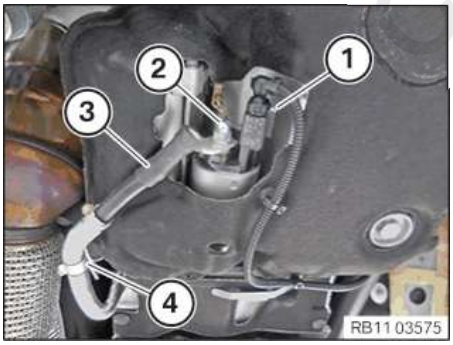
Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

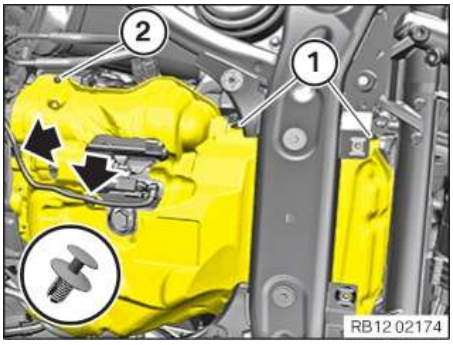
- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

TECHNICAL INFORMATION

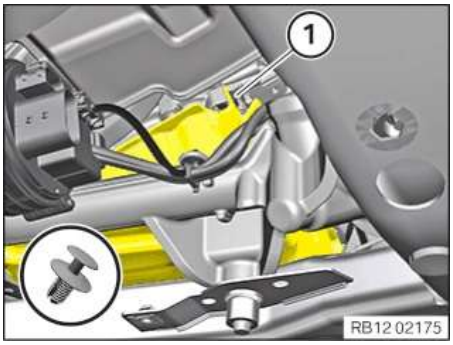
Make sure that the acoustic cover is **not** damaged while removing the starter motor.
A damaged lower acoustic cover can only be renewed when the front axle is lowered.



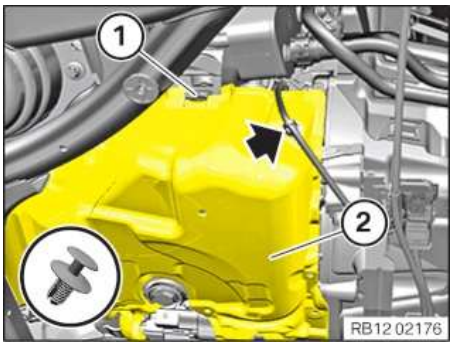
- Unlock plug connection (1) and disconnect.
- Release nut (2).
- Release positive battery cable (3) from holder (4).



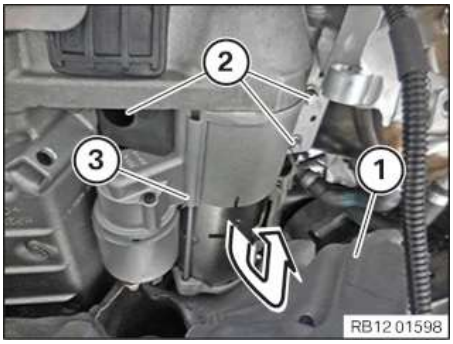
- Loosen the expanding rivet (1).
- Undo fir tree clip (2).
- Release the clamps (arrows).



- 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

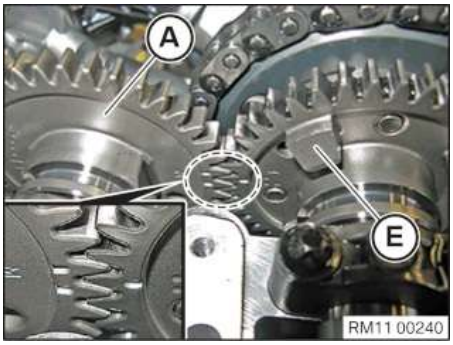
Damage to the engine.

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.

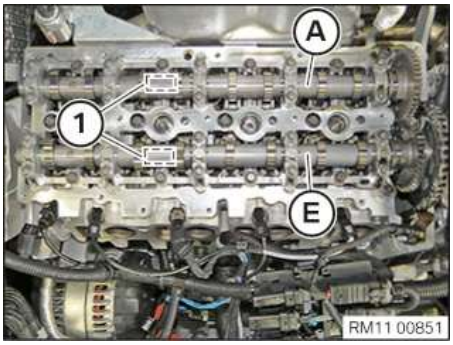
- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

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

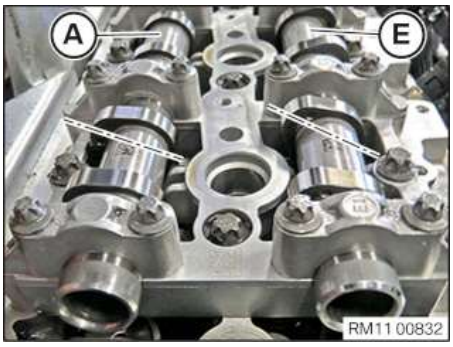


- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.

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

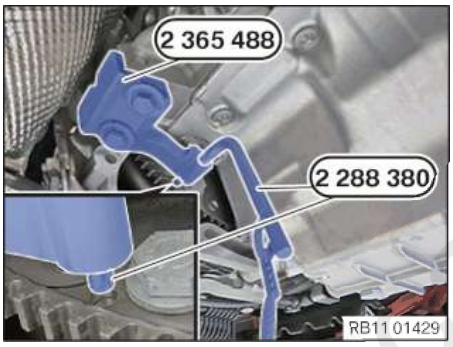


- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- 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.

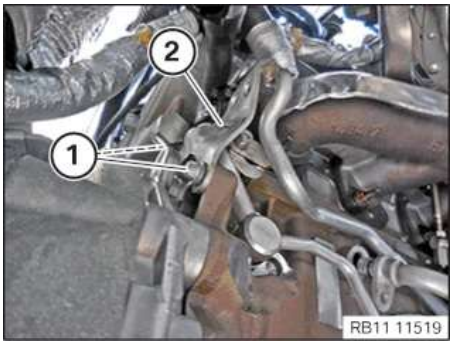
Contamination can result in malfunctions, operating failure or leaks.

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

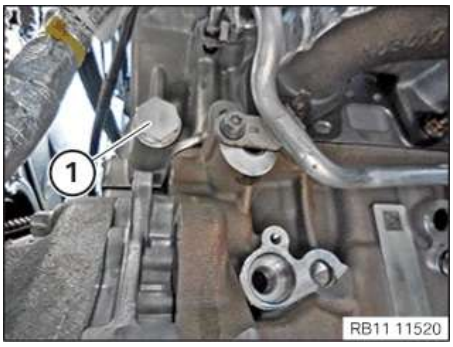
TECHNICAL INFORMATION

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

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

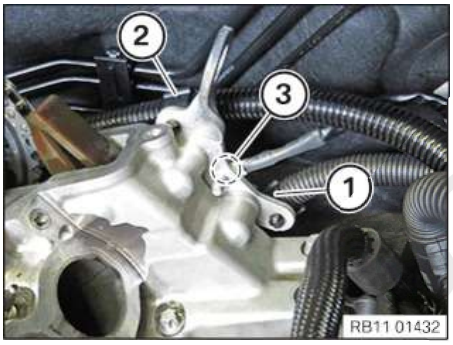


- Loosen the chain tensioner piston (1).
- Catch and dispose of emerging engine oil.

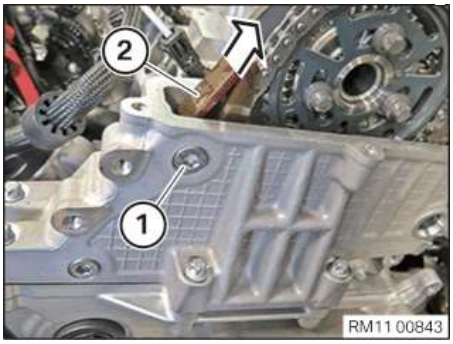


- Feed out and remove the sealing ring (1).

55 – Remove the timing chain guide rail

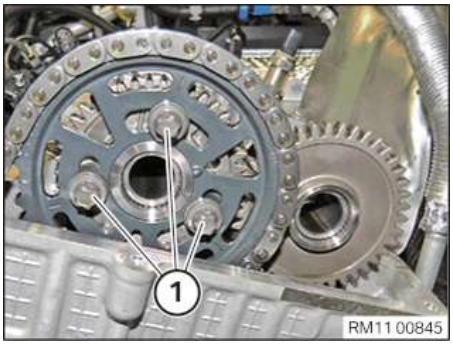


- Loosen the vehicle wiring harness (1) from the bracket.
- Release the positive battery cable (2) from the holder .
- Loosen the screw (3) and remove the grounding cable.



- 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

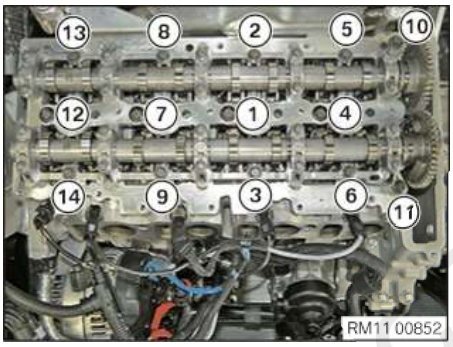


- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

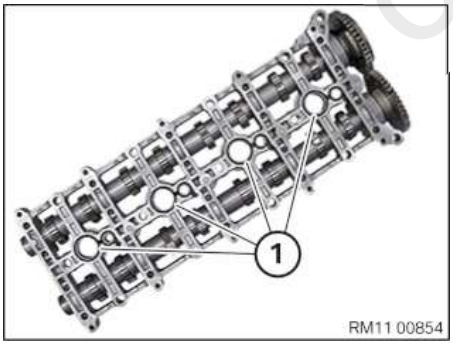
58 – Removing the camshaft support

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.



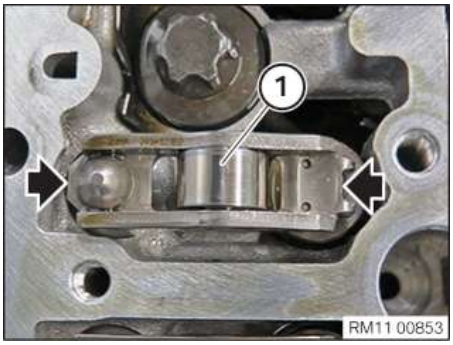
- Unscrew the screws evenly in order (14) to (1) in multiple increments.
- Feed out and remove the camshaft support with the camshafts towards the top.



- Guide out and remove gaskets (1).

59 – Remove roller cam followers

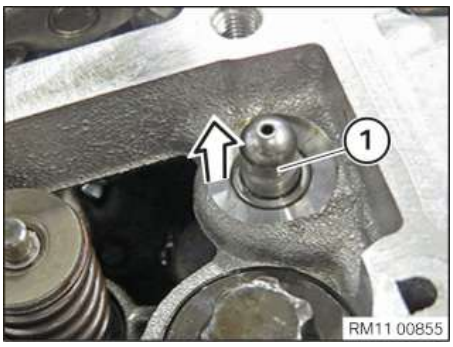
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- Guide out and remove all roller cam followers (1) (arrows).
- Place all roller cam followers (1) in order in special tool 0 495 105 (11 4 480).

  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).

MAIN WORK

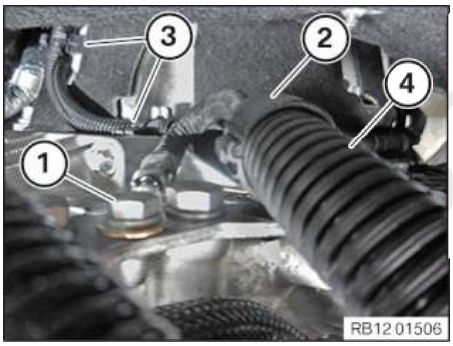
61 – Removing cylinder head

RISK OF DAMAGE

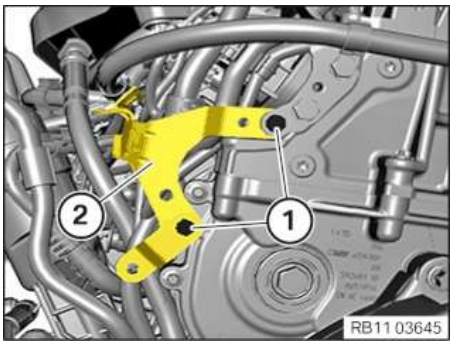
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

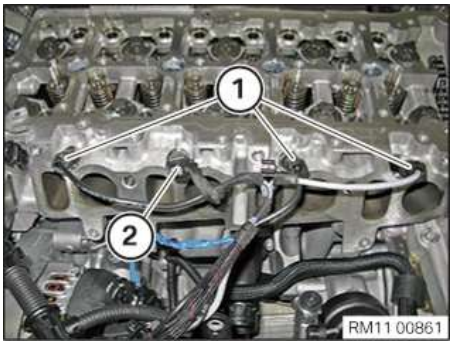


- Loosen screw (1).
- Unlock and loosen holder (2).
- Unlock and loosen the clamps (3).
- Feed out the wiring harness section (4) of the automatic transmission and place to one side.

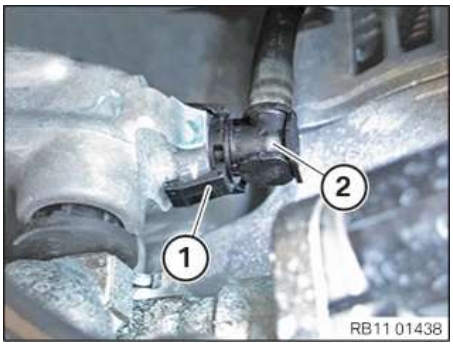


- Loosen screws (1).
- Guide out and remove holder (2).

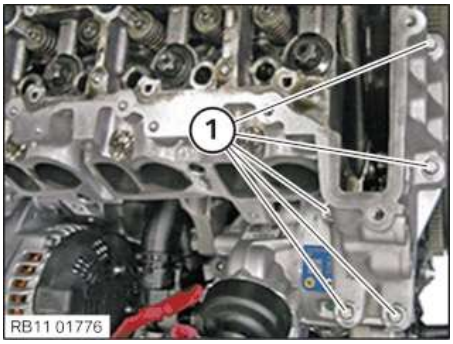
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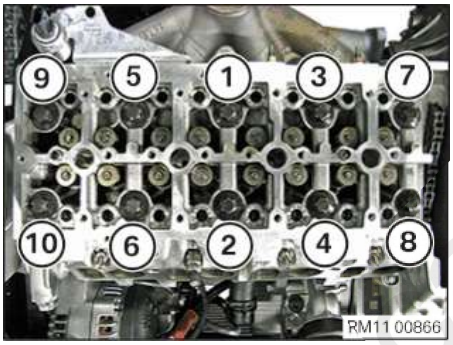
- Release plug connections (1) with special tool 0 495 140 (12 2 300).
- Unlock and disconnect the plug connections (1) and (2).
- Place wiring harness to one side.



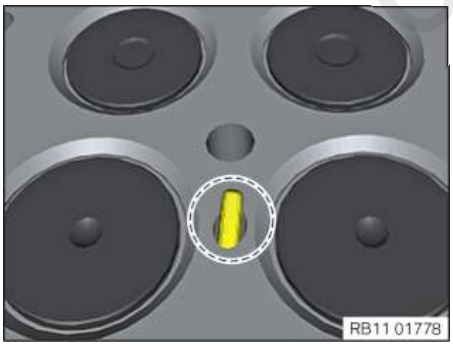
- Release lock (1) of coolant line.
- Remove the coolant line (2) and set it aside.



- 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.

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- 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).

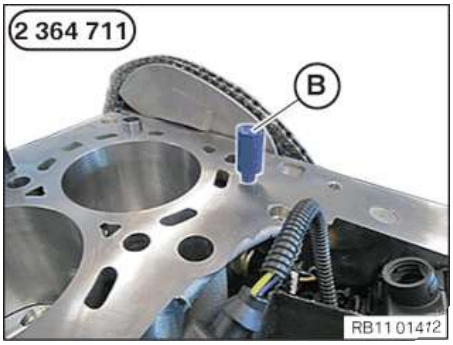
62 – Cleaning the sealing surface

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

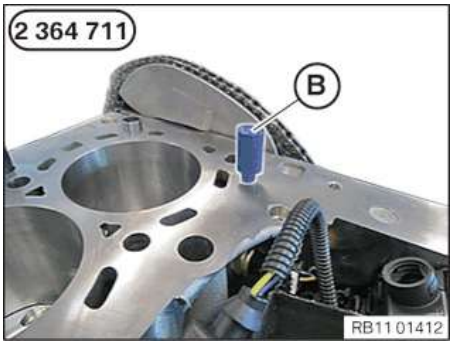
Damage to the surface.

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.

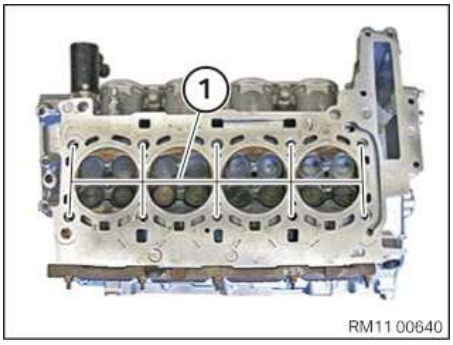
- Clean the sealing surface using special tool 0 495 104 (11 4 472).

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- Remove special tool (B).

63 – Replace cylinder head gasket



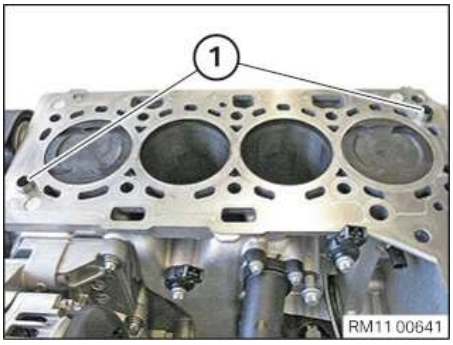
RISK OF DAMAGE

Damage to the surface.

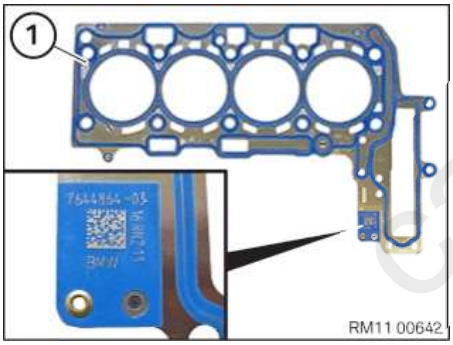
The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.

- Remove oil and dirt residue from the blind holes (1).

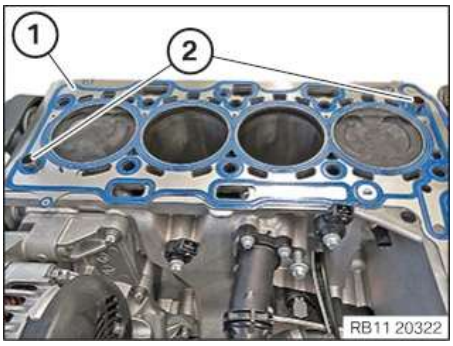


- Check if fitting sleeves (1) fit correctly and check for any damage.



- 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).

64 – Installing the cylinder head

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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.

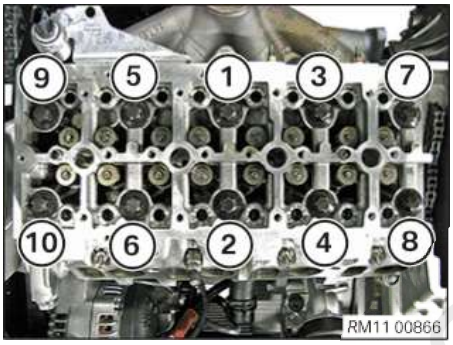
- Dry threaded holes (e.g. using compressed air).

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.

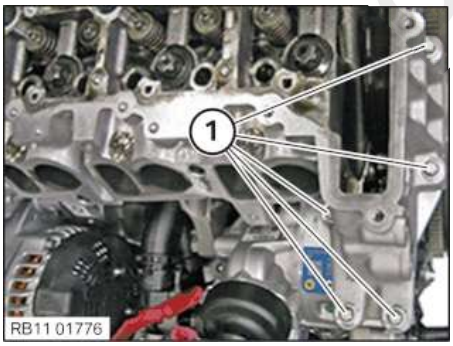


- Position the cylinder head gasket with the previously determined gasket thickness (number of holes).
- Fit new cylinder head screws.

  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

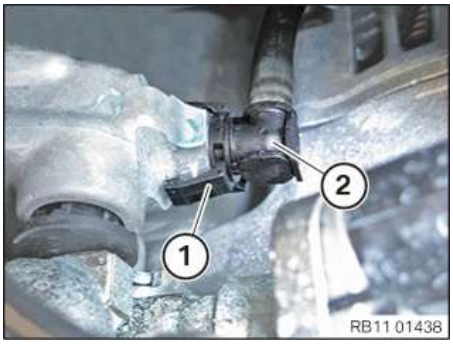
M12x1.5	Renew screws.	1. Tightening torque	50 Nm
		2. Angle of rotation	120 °
		3. Angle of rotation	120 °



- Insert screws (1) and tighten.

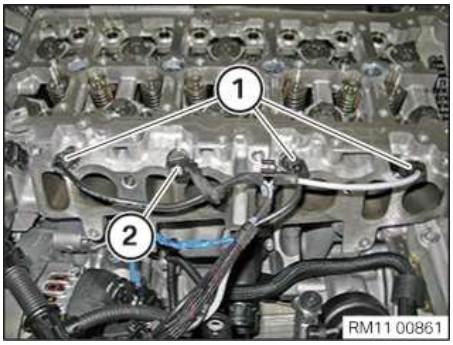
Cylinder head bolt to timing case cover

M8x40		Tightening torque	19 Nm



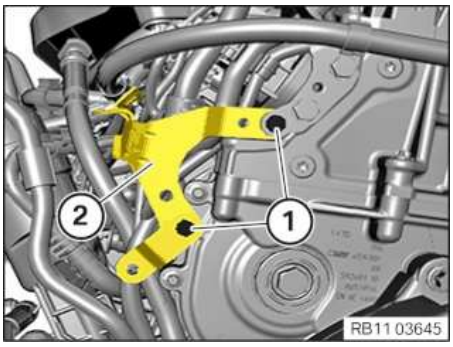
- Fit and lock coolant line (2).

  The lock (1) must engage audibly.



- Connect connectors (1) and (2), then lock.

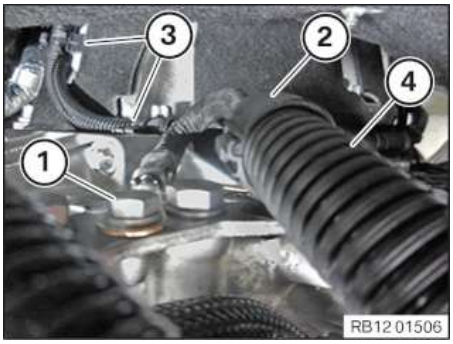
  The connectors (1) and (2) must audibly engage.



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

Standard screw connection M6

M6		Tightening torque	8 Nm



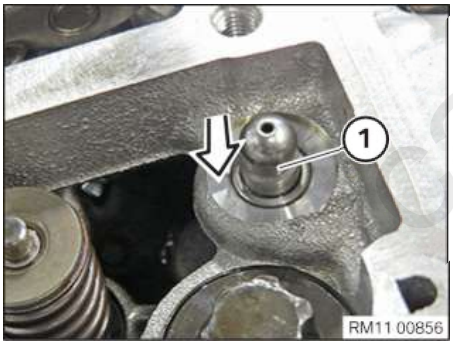
- Guide in the wiring harness section (4) of the automatic transmission and install.
- Lock holder (2).
- Make sure the bracket (2) engages audibly.
- Secure clamps (3).
- Tighten down screw (1).

Ground to cylinder head

M6		Tightening torque	8 Nm

POSTPROCESSES

65 – Installing all hydraulic valve clearance compensating elements



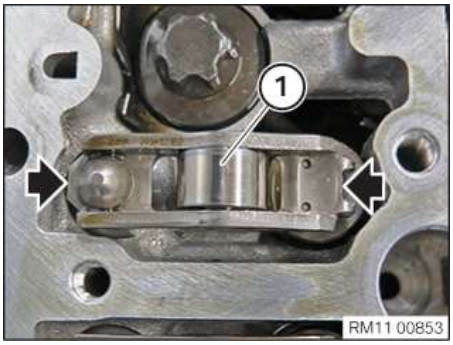
- Make sure to observe the assignment of the roller cam followers to the hydraulic valve clearance compensating elements when reusing the hydraulic valve clearance compensating elements (1).
- Insert and install all hydraulic valve clearance compensating elements (1) in the direction of the arrow.

66 – Installing the roller cam followers

TECHNICAL INFORMATION

- Note the installation position of the component. The component may be installed in various installation positions.

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- Check all the roller cam followers (1) for damage, and renew if necessary.

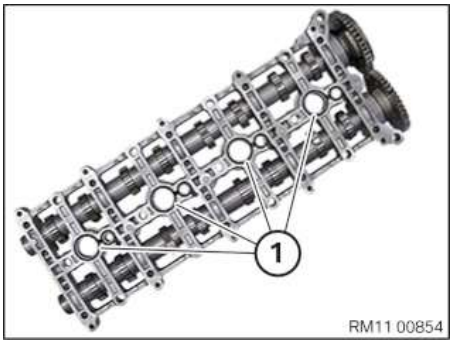
  Parts: Roller cam followers
- Insert all roller cam followers (1) and install them (arrows).

  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).

67 – Installing the camshaft support

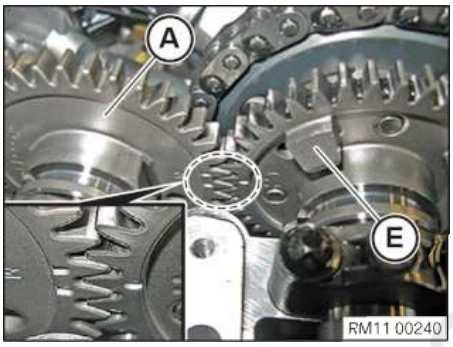
TECHNICAL INFORMATION

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.

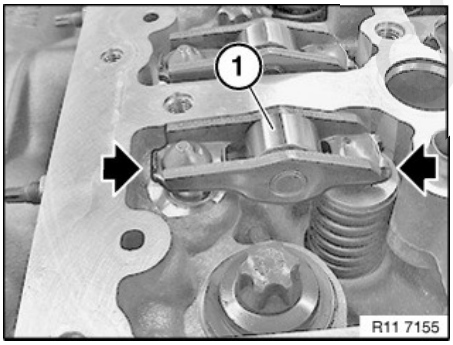


- Renew seals (1).

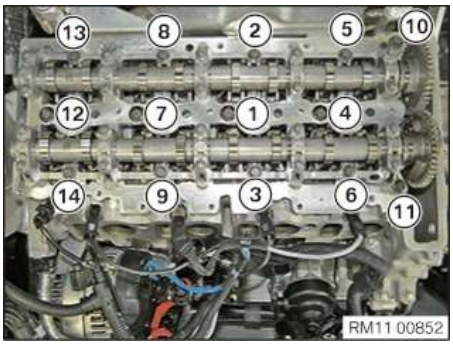
  Parts: Seals
- Insert and install the gaskets (1).



- 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).



- 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

68 – Installing the special tool to secure the exhaust camshaft

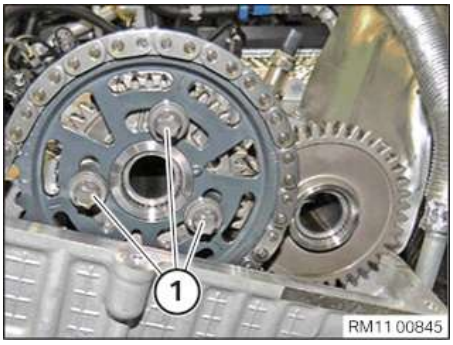
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- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

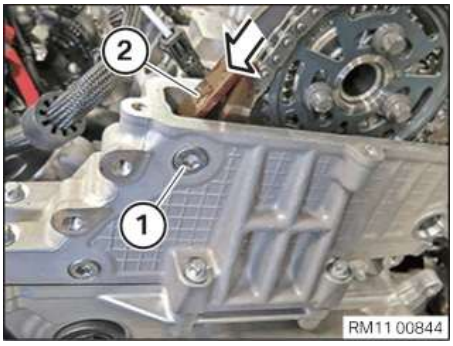
  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.

69 – 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.

70 – Installing the guide rail of the timing chain

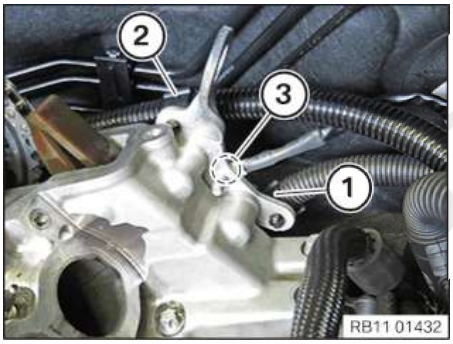


- Position the guide rail (2) in the direction of the arrow.
- Make sure the guide rail (2) is correctly installed at the bottom bearing journal.
- Renew bearing journal (1).

  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.

71 – Installing the chain tensioner piston



TECHNICAL INFORMATION

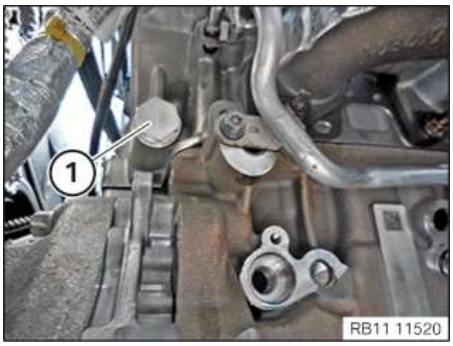
The oil chamber must be drained for reuse of the chain tensioner.

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



- Renew sealing ring (1).

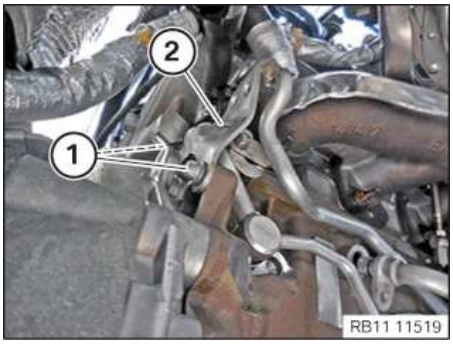
  Parts: Sealing ring
- Insert and install the sealing ring (1).



- 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

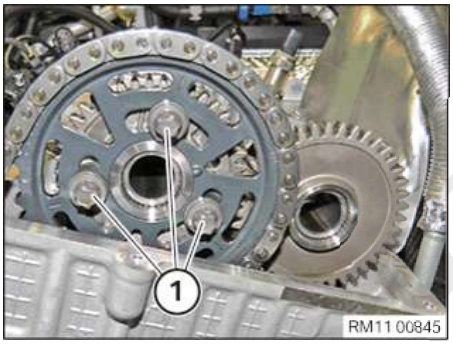


- Insert and install the holder (2).
- Tighten the screws (1).

Holder to crankcase

M8X16		Tightening torque	19 Nm

72 – Tightening the camshaft sprocket on the intake camshaft



- Tighten the screws (1).

Camshaft sprocket to camshaft

M7x17.			17 Nm

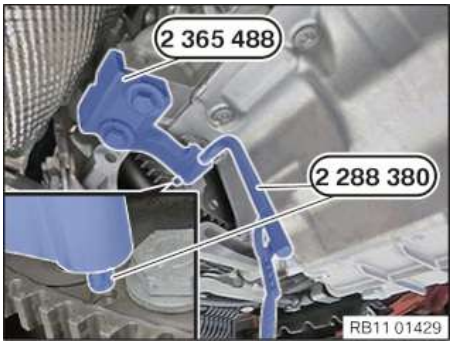
73 – Removing the special tool for fixing the exhaust camshaft



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

74 – Removing the special tool to disconnect the crankshaft

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

75 – Checking camshaft timing



RISK OF DAMAGE

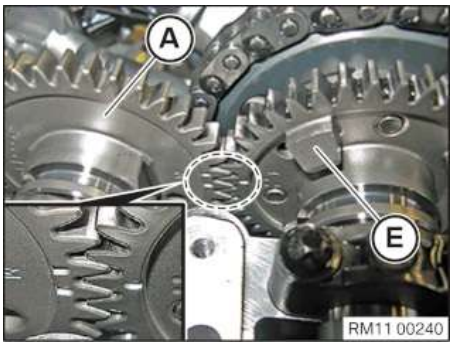
Damage to the engine.

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

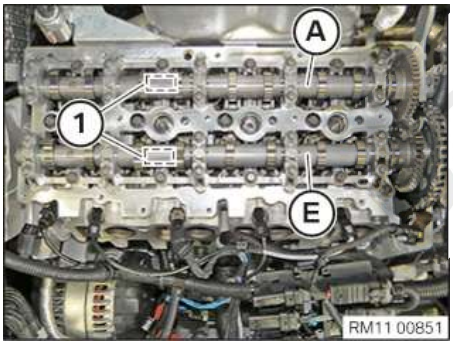
- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

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

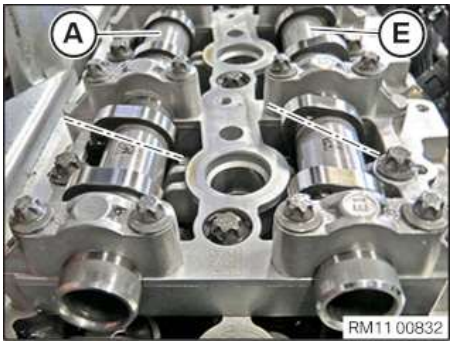
  Do **not** crank the engine in reverse.



- 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.



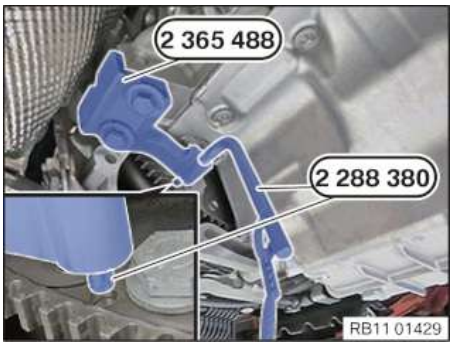
- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.

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- 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

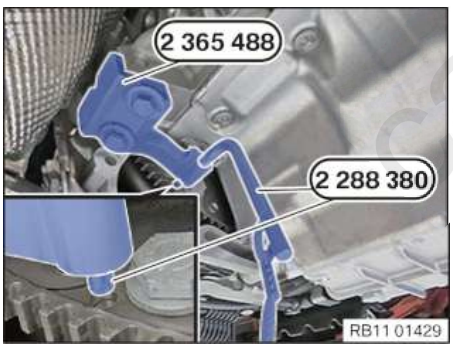
- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

76 – Removing the special tool for fixing the exhaust camshaft



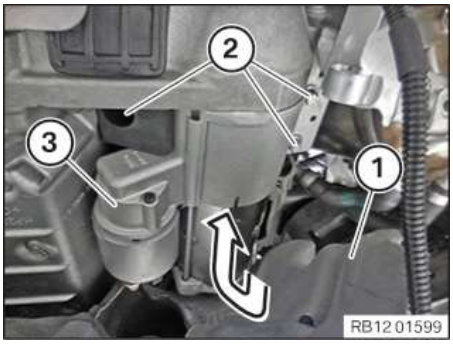
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

77 – Removing the special tool to disconnect the crankshaft



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

78 – Installing starter motor

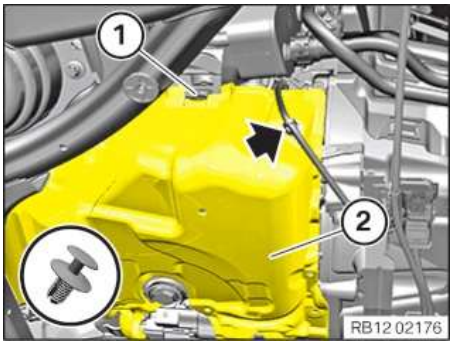


- Make sure that the acoustic cover (1) is not damaged.
- Carefully press the acoustic cover (1) to one side.
- Feed in and install the starter motor (3) in the direction of the arrow.
- Tighten the screws (2).

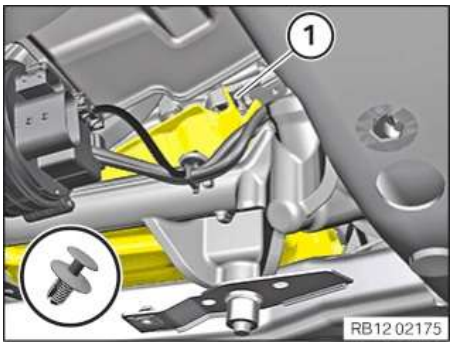
Starter motor to engine

M8X60		Tightening torque	19 Nm

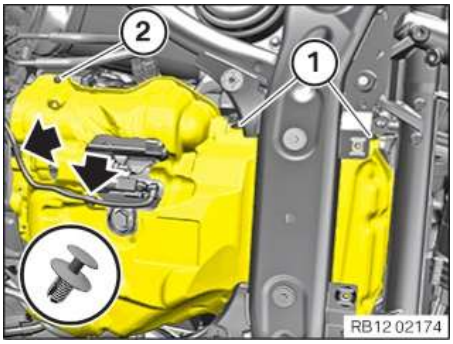
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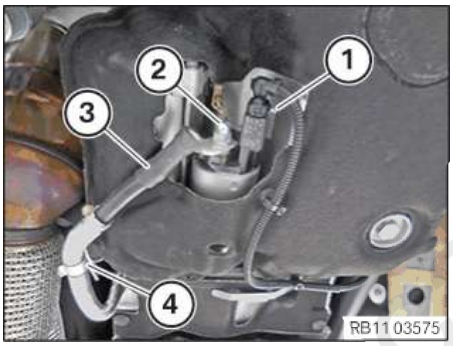
- Position the acoustic cover (2).
- Fasten expanding rivet (1).
- Secure clamp (arrow).



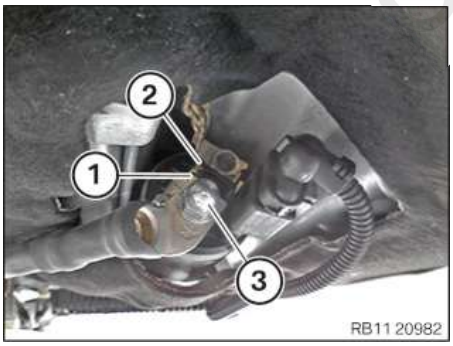
- Fasten expanding rivet (1).



- 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).

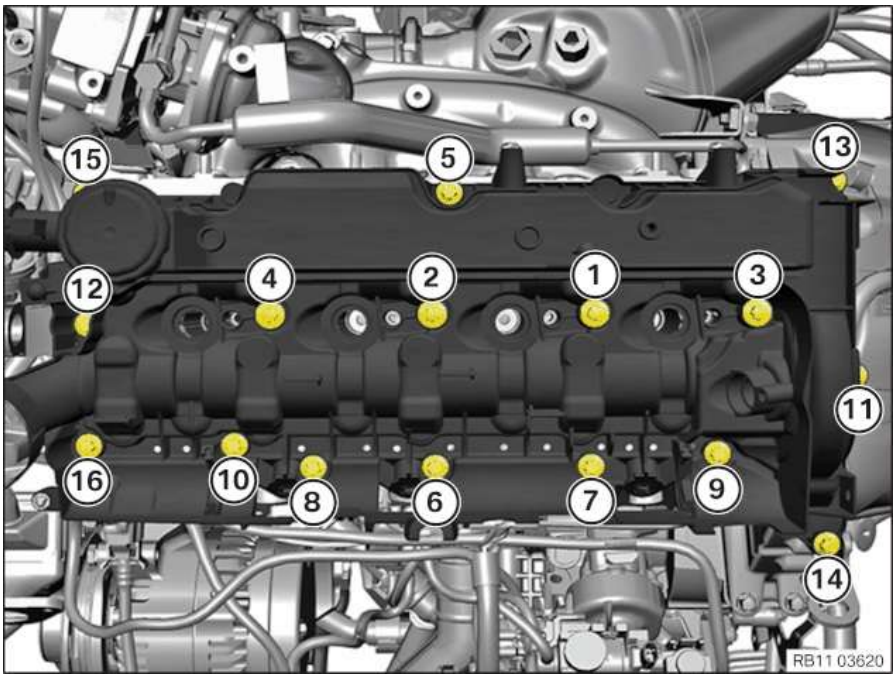
Battery positive lead to starter

M8		Tightening torque	13,5 Nm

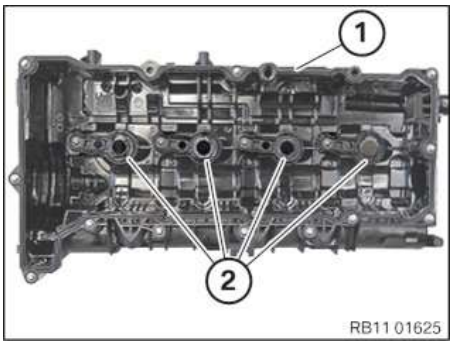
79 – Installing cylinder head cover

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Screw connection of the cylinder head cover

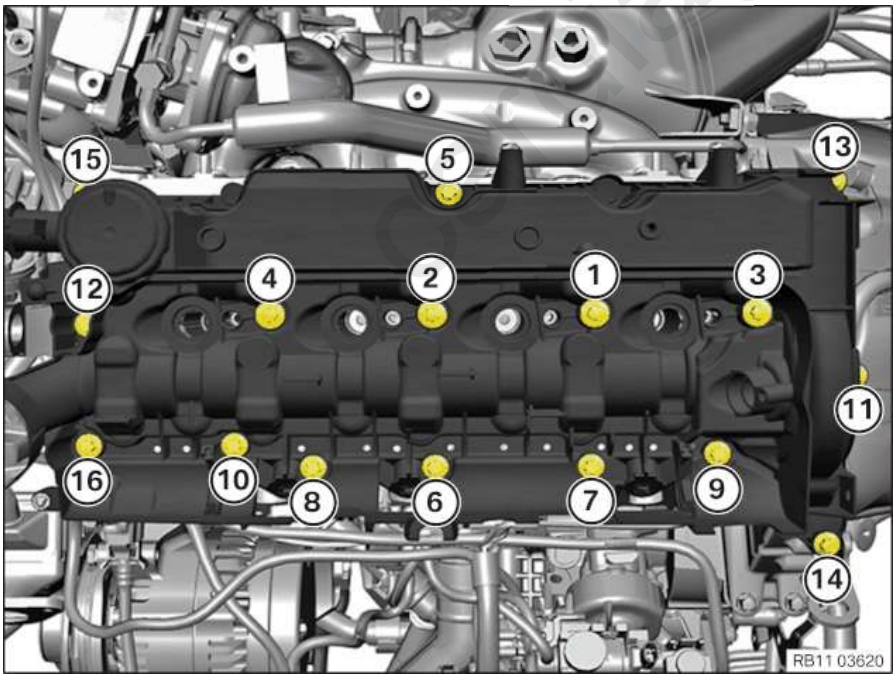


1 - 16 Bolts of the cylinder head cover



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

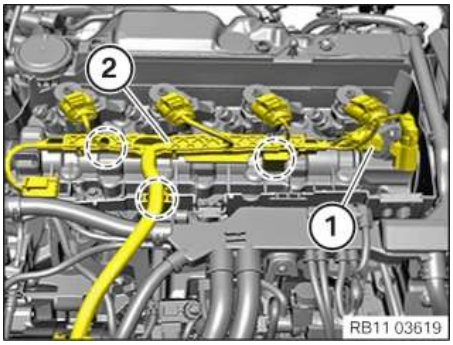
  Parts: Profile seals



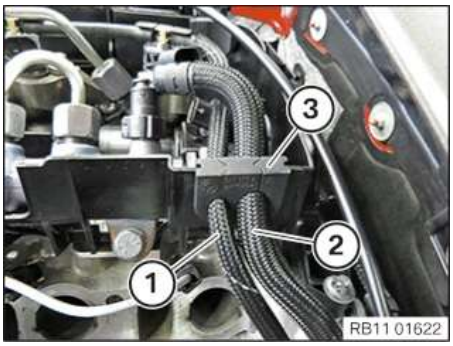
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

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.

80 – 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.

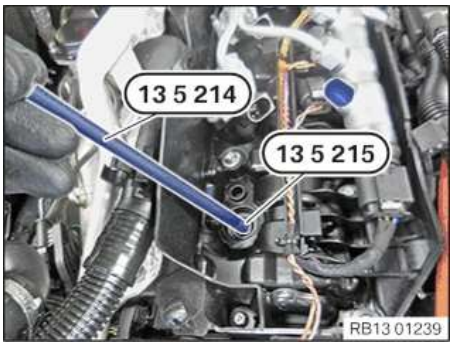
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RISK OF DAMAGE

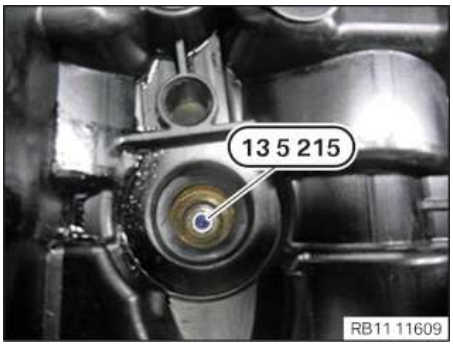
Contaminant or foreign body.

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.



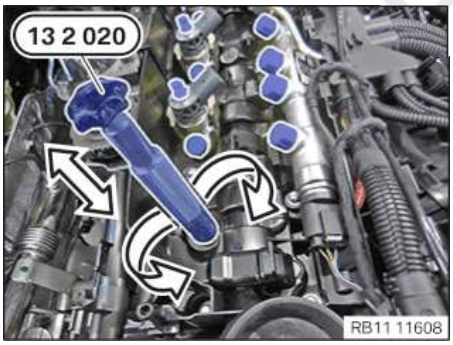
- Check whether the sealing ring remained in the injector shaft and remove the sealing ring as needed.
- Insert the special tool 0 493 763 (13 5 215) with the special tool 0 493 762 (13 5 214) from the set of special tools 0 493 758 (13 5 210) into the injector shaft.
- Remove special tool 0 493 762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



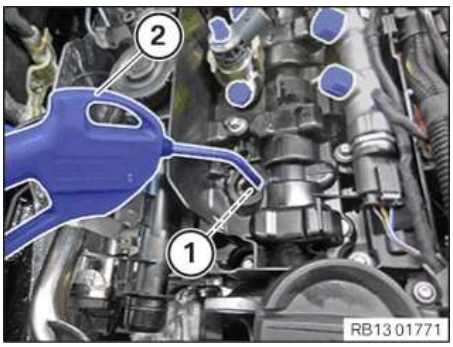
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



- 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).

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- 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.

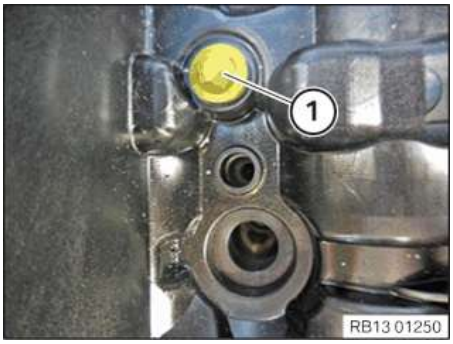
▸ **Check the placement of the clamping claw**

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**

RISK OF DAMAGE

Contaminant or foreign body.

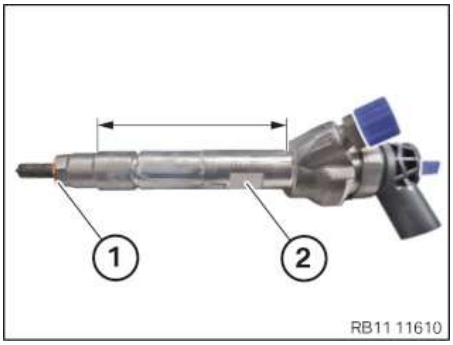
Contamination can result in malfunctions, operating failure or leaks.

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

TECHNICAL INFORMATION

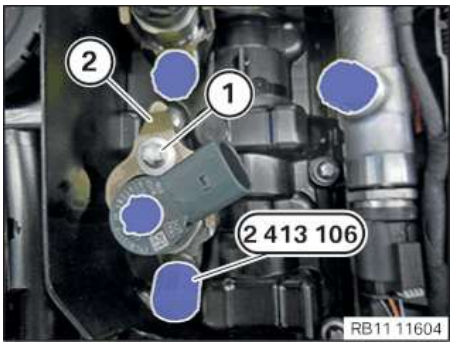
Lightly grease the injector shaft with high temperature-resistant grease.
For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue

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

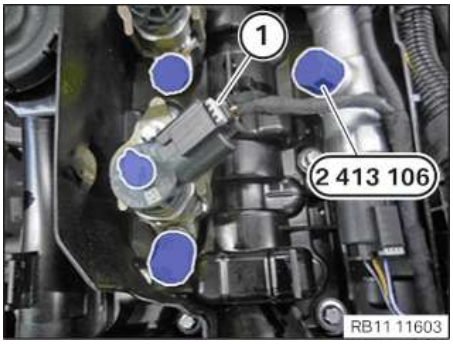
  Parts: Copper sealing ring
- Lightly grease the injector in the marked area with heat-resistant grease before installing the injector (2) in the injector shaft.



- 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.

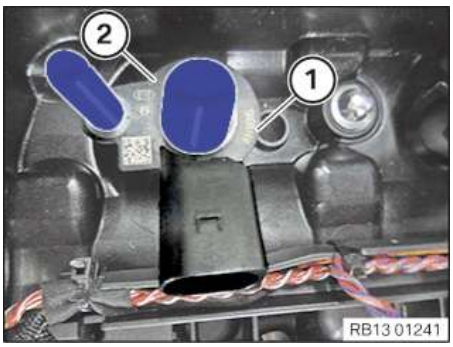
▸ **Replacement: Perform injection quantity compensation**

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.

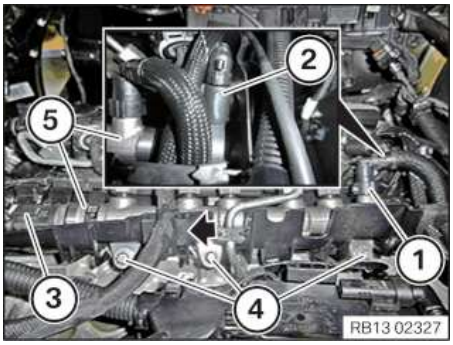


- Read off the adjustment value (1) on the new injector (2).

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- 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.

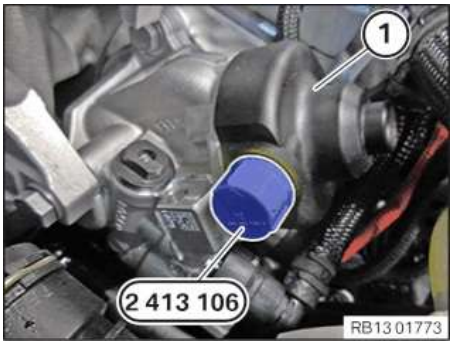
Danger of injury!

- 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.

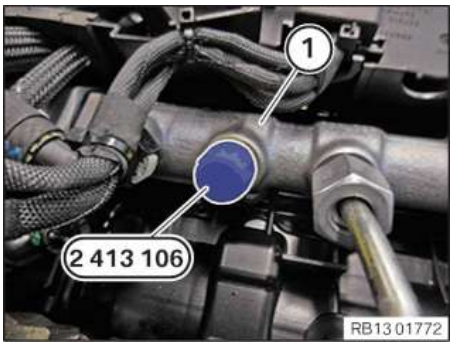
TECHNICAL INFORMATION

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

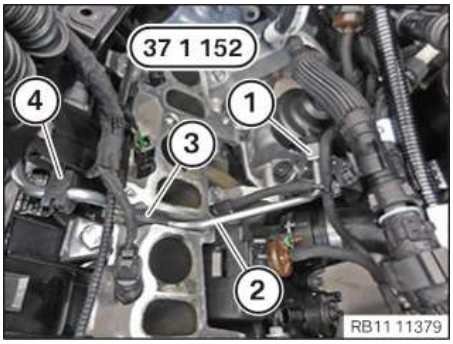
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- Feed out and remove special tool on the high pressure pump (1).



- 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.

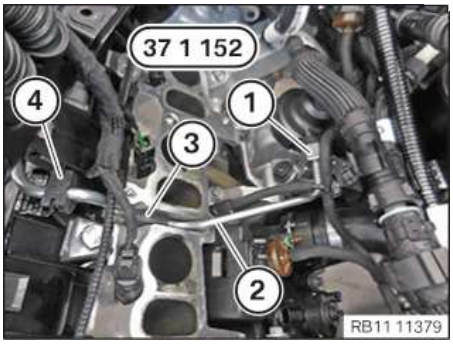
TECHNICAL INFORMATION

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.

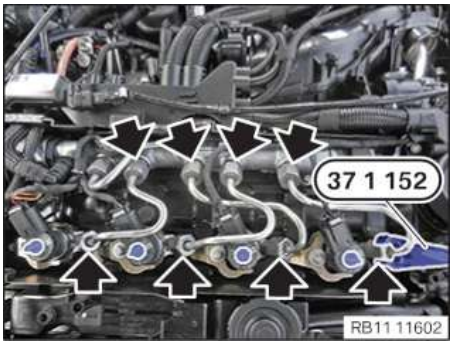
- Tighten union nut (1) on the high pressure pump with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm

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

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- 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.

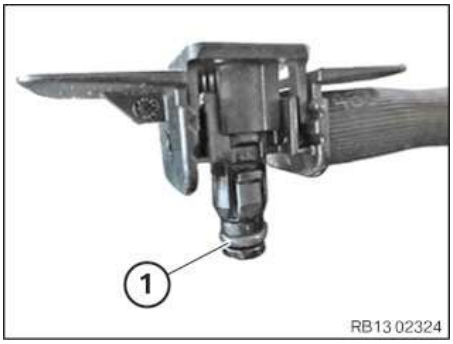
- Tighten the high pressure lines (arrows) with the special tool .

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

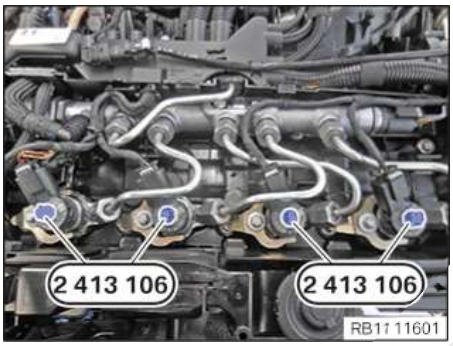


- **Version A:**

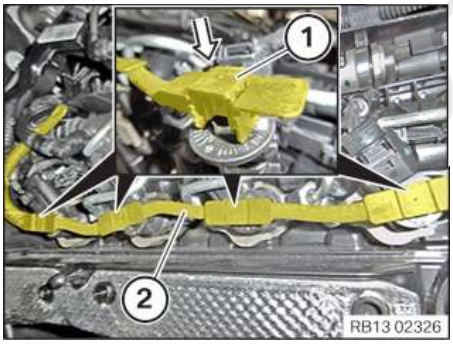
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

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

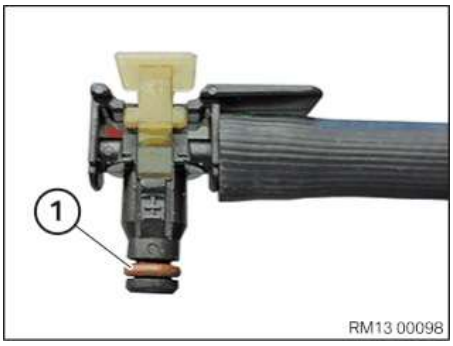
  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.



- 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.



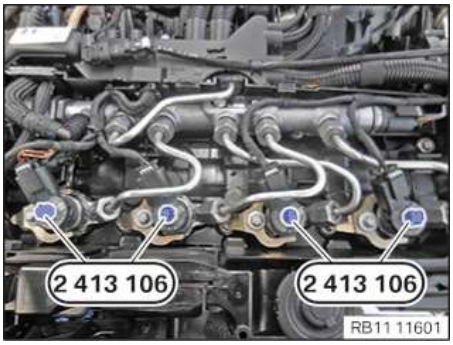
- **Version B**:

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

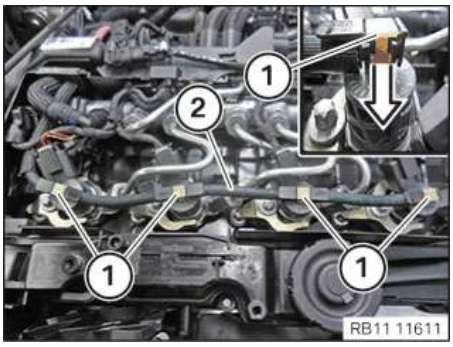
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

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

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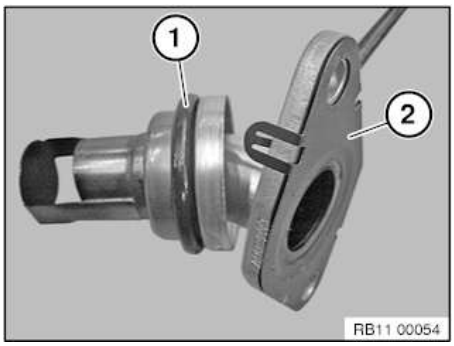


- Feed out the special tools and remove.



- 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.

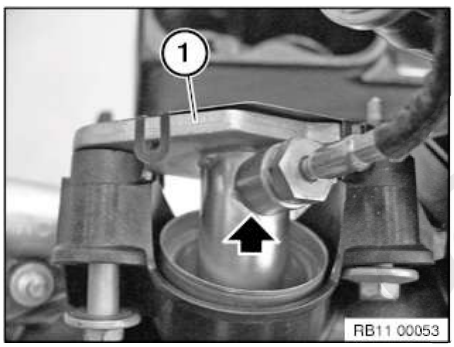
85 – Installing the intake plenum



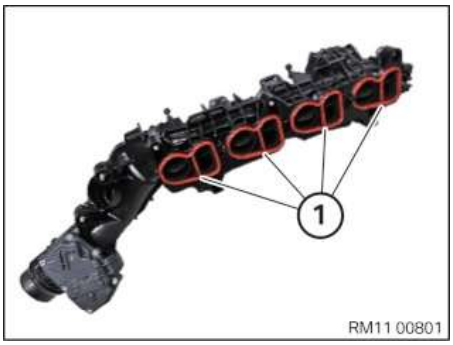
- Renew O-ring (1).

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

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



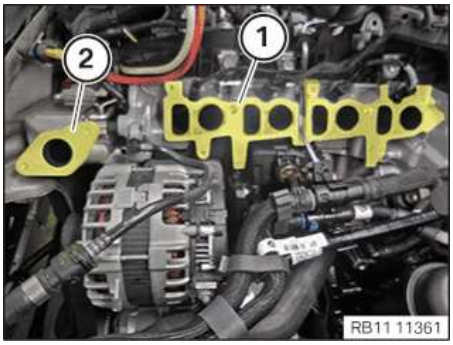
- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).



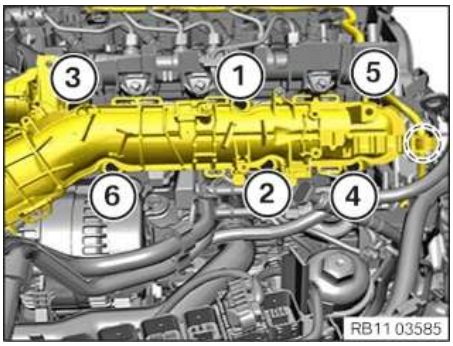
- Renew seals (1).

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

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

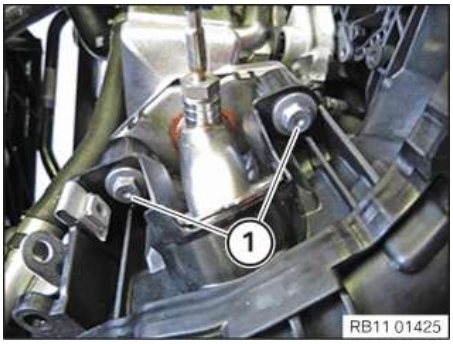


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

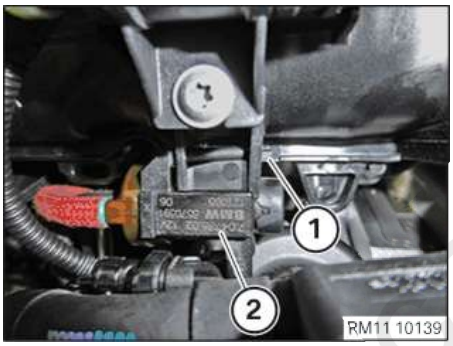
- Attach the wiring harness and fuel lines in the marked area on the intake plenum.



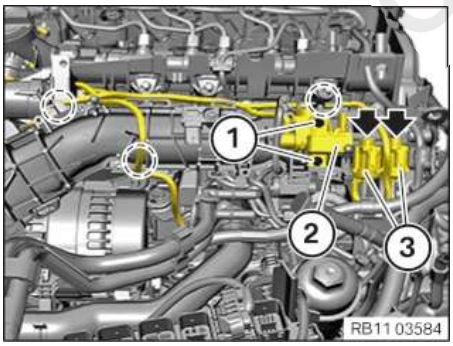
- Tighten the screws (1).

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.



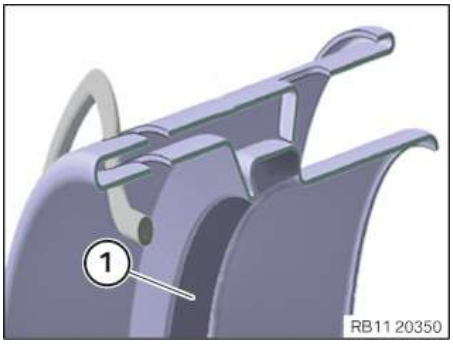
- Check the seal (1) for damage, and renew if necessary.

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▸ **Replacing damaged seal**

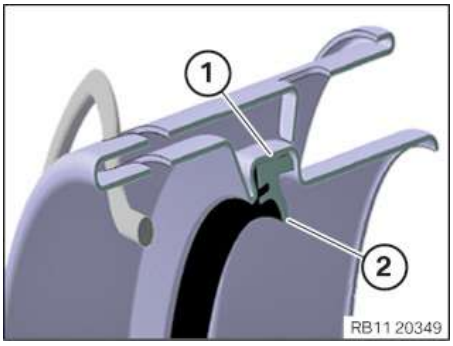
TECHNICAL INFORMATION

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.

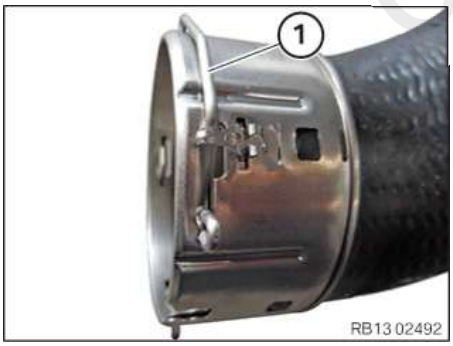
TECHNICAL INFORMATION

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

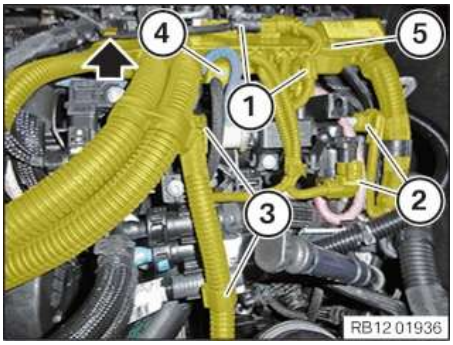
RISK OF DAMAGE

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.

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

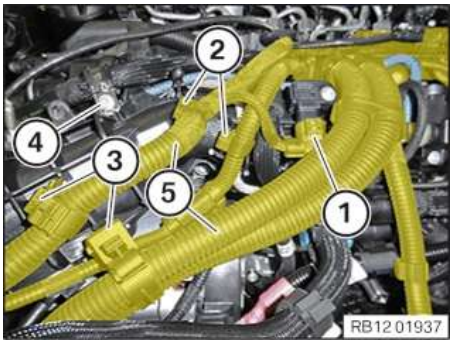
Wiring harness section to manifold

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.



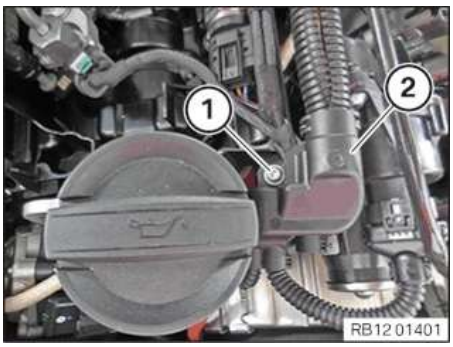
- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

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.

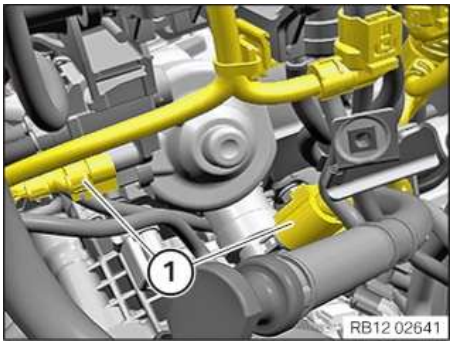
  The connector (1) must engage audibly.



- Connect the connector (1) and lock it.

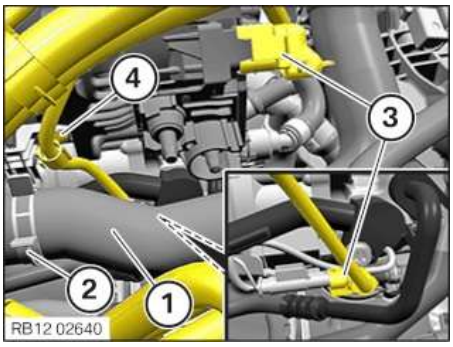
  The connector (1) must engage audibly.

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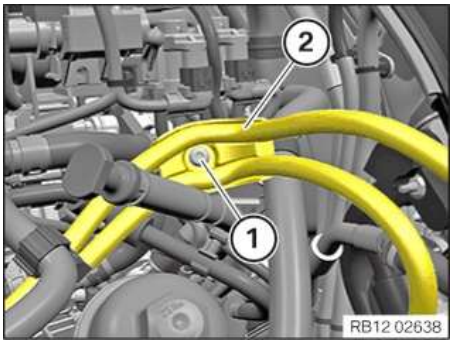
- Connect connectors (1) and lock.

  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



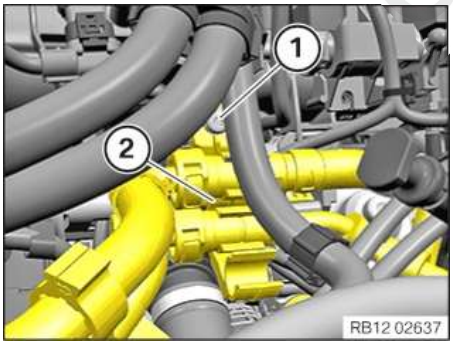
- Feed in and install the positive battery cable (4).
- Feed in and position the positive battery cables (4) .
- Renew the nuts (3) and (2).

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

Battery positive lead on the starter motor generator

M8		Tightening torque	19 Nm

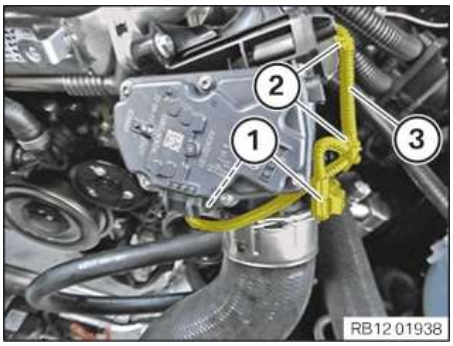
- Guide in and install the lid (1).



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

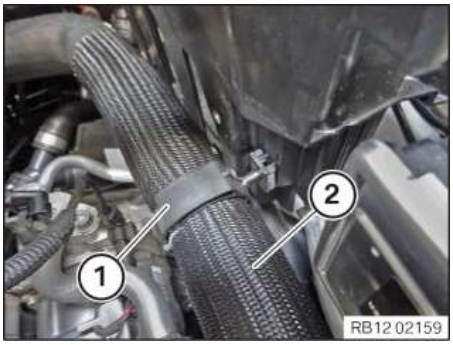
Holder on intake plenum

TS6X20		Tightening torque	5 Nm



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

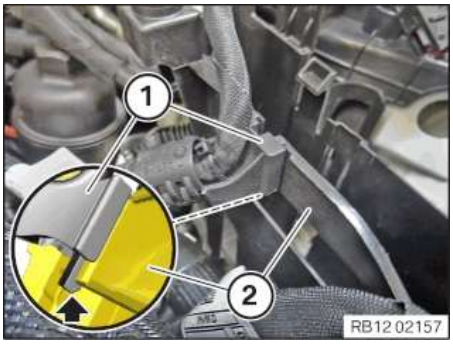
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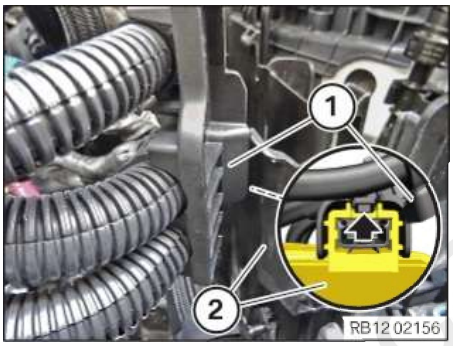
- Feed in and install coolant line (2).
- Lock holder (1).
  The holder (1) must engage audibly.



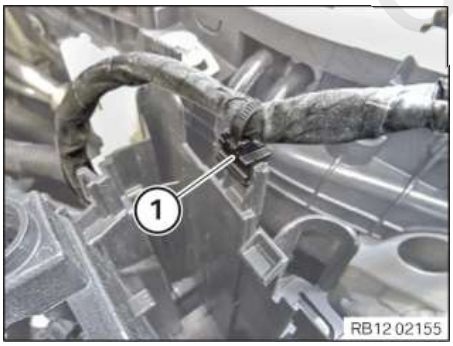
- Feed in and install the cable clip (1).
  Lock (arrow) must audibly engage.



- 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.

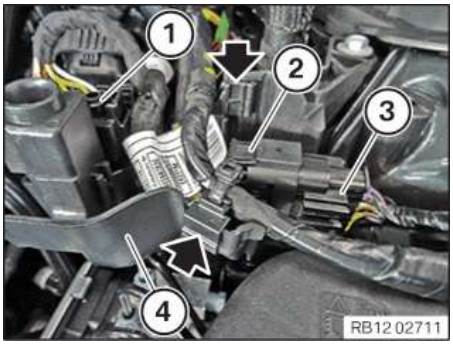


- Secure clamps (1).

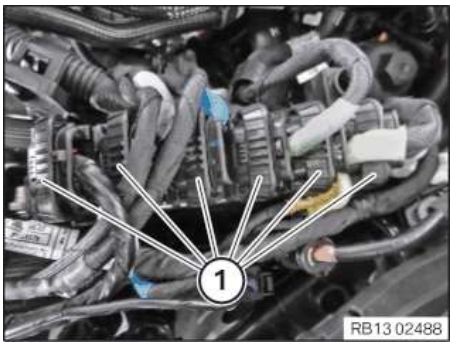


- Feed in and install the connector (1).
  The connector (1) must engage audibly.

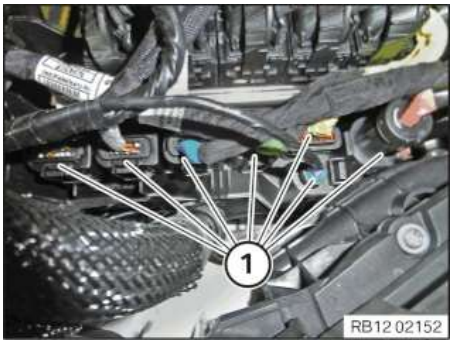
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- Connect connector (3) to control unit holder (4) and lock it.
  The connector (3) must engage audibly.
- Connect connectors (2) and lock.
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.
  The connector (1) must engage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

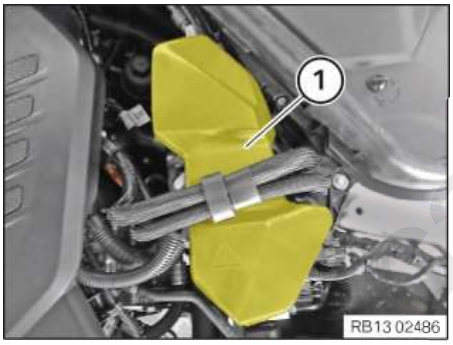


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



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

87 – Install the cover for the DDE control unit

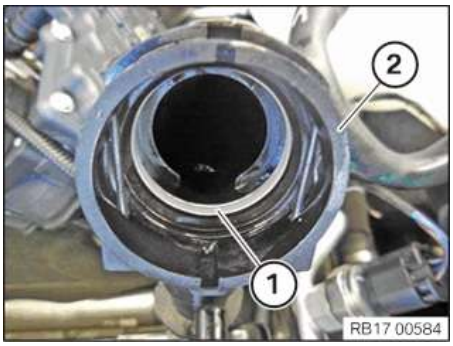


- Insert and install cover (1) into guides.

88 – Connecting the coolant lines

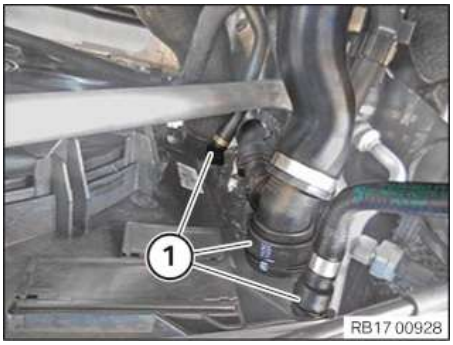
TECHNICAL INFORMATION

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.

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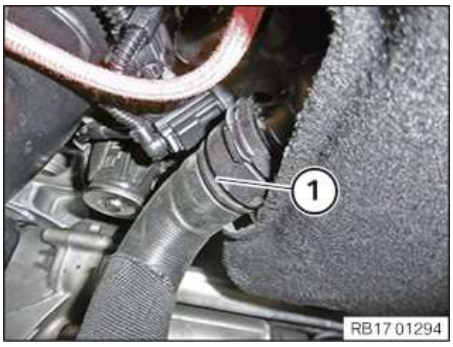


NOTICE

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.

89 – 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

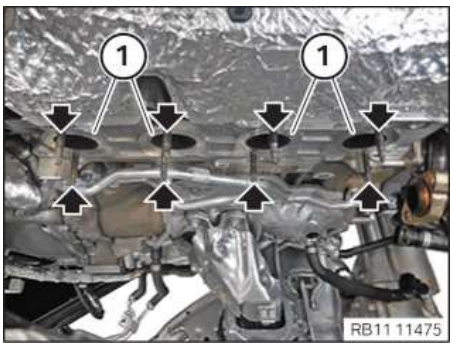
Damage to the surface.

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

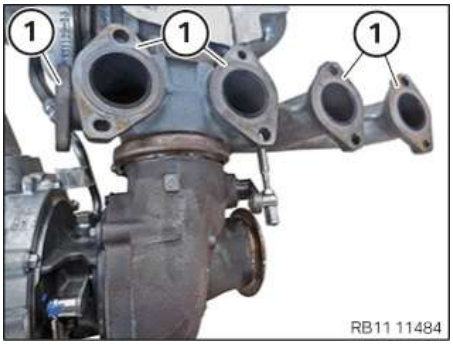
The sealing surfaces must be free from oils, grease and cleaning agents.



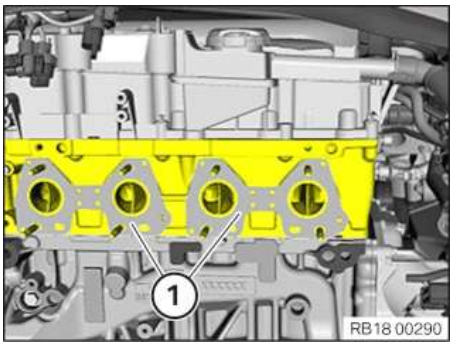
- Check the stud bolts (arrows) on the cylinder head for **correct** fit.
- Clean the connection points (1) with the special tool 0 495 102 (11 4 470).
- Renew gaskets.

  Parts: Seals

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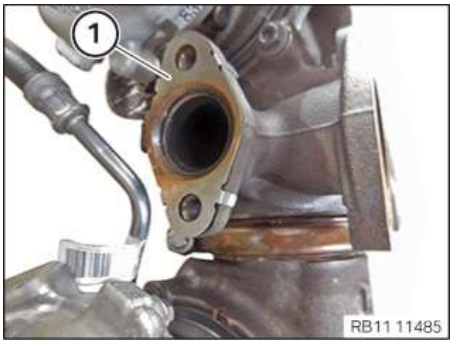
- Clean the connection points (1) on the exhaust manifold with the special tool 0 495 102 (11 4 470).



TECHNICAL INFORMATION

The **coated side** of the seal must be on the side of the exhaust manifold.

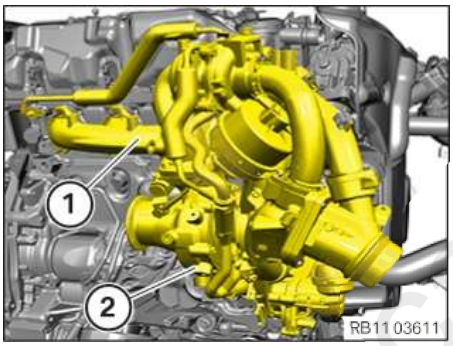
- Insert and install the gaskets (1).



- Renew the seal (1).

  Parts: Gasket

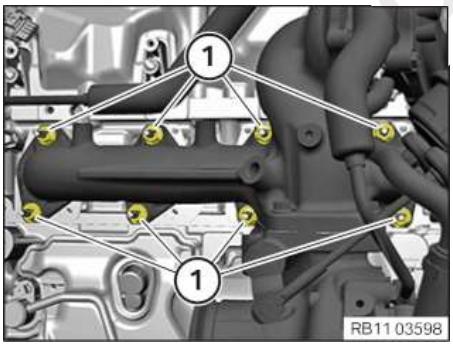
- Insert and install the seal (1).



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.



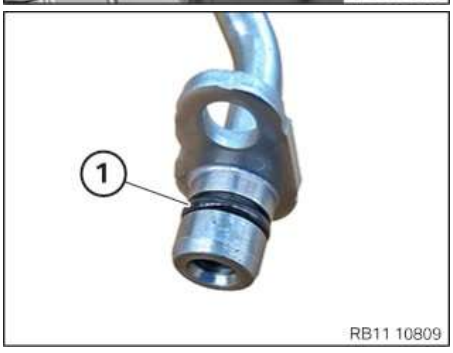
- Renew nuts (1).

  Parts: Nuts

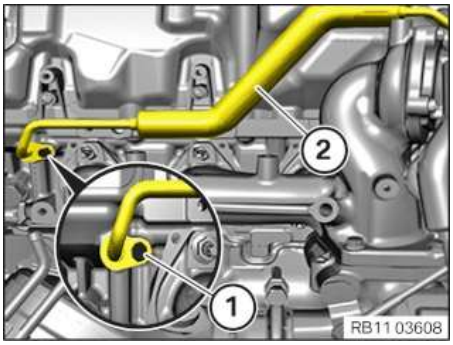
- Tighten the nuts (1) evenly from the inside out.

Exhaust manifold to cylinder head

M7	**If necessary, renew loose stud bolts.**	Tightening torque	11 Nm
	Renew nuts.	Tightening torque	13 Nm



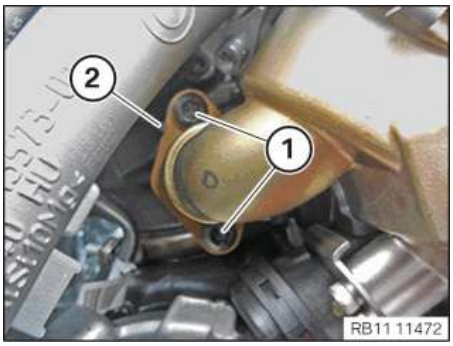
- Check the seal (1) for damage, if necessary, renew the oil feed line.



- 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

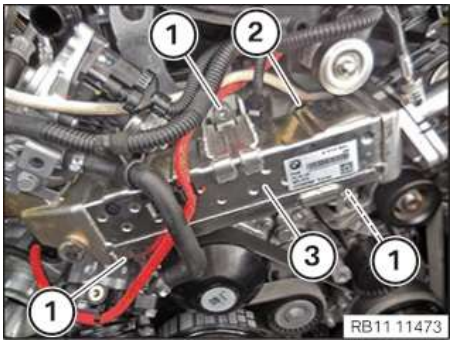


- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

M8x28	Replace screws	Tightening torque	32 Nm

- Ensure that seal (2) is installed.



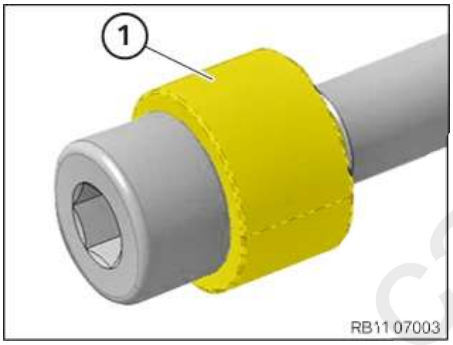
- Position the exhaust-gas recirculation cooler (3).
- Make sure the pipe neck (2) is fitted correctly.
- Tighten the screws (1).

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.



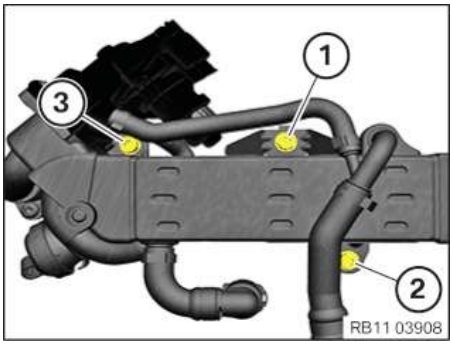
Result

» Screws **without** sleeves (1) are available.

Measure

- Renew screws.

  Parts: Screws (part number 9 886 429)

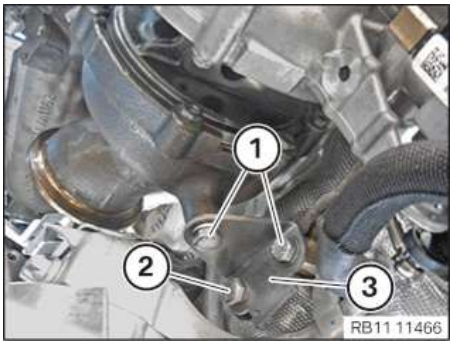


- Tighten the screws (1) to (3).

Exhaust-gas recirculation cooler to cylinder head

M8x20 / M8x28		Tightening torque	19 Nm

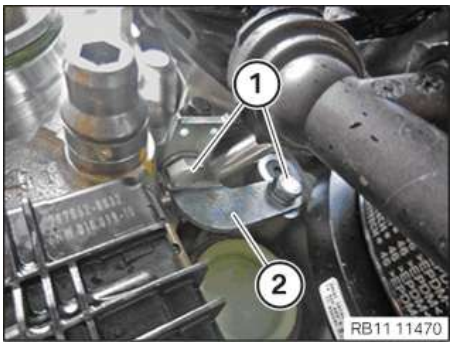
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- Tighten the bolts (1) and (2) on the bracket (3).

Exhaust turbocharger low-pressure stage to crankcase

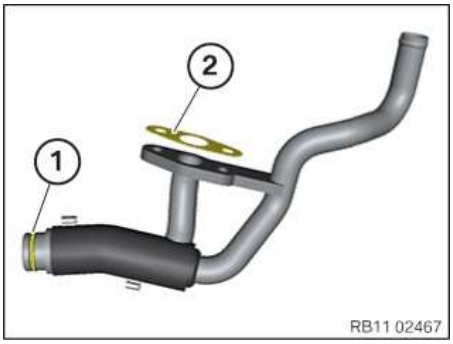
M8X16		Tightening torque	22 Nm



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

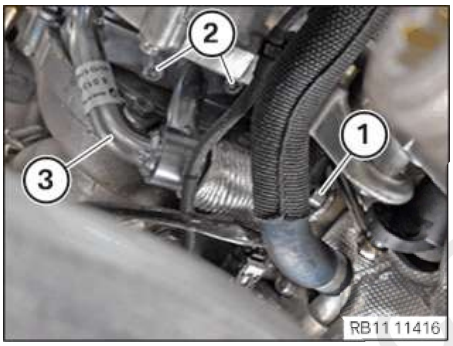
Exhaust turbocharger low-pressure stage to crankcase

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

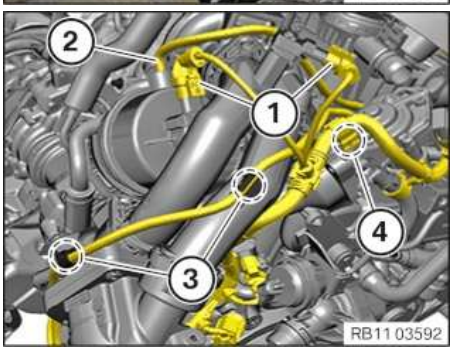
- Install the bolt (1).



- Tighten the screws of the oil return line on the crankcase from the right wheel arch.

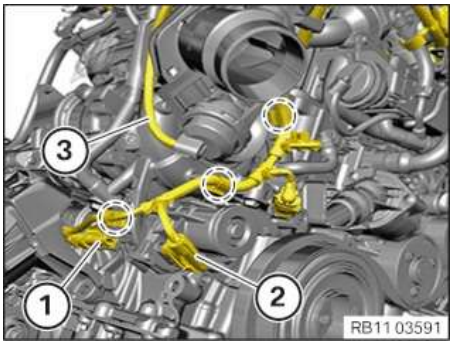
Oil return line to crankcase

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.

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- 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.

90 – Installing the exhaust-gas recirculation cooler

▸ **Avoiding damage to the starter generator due to escaping coolant**

RISK OF DAMAGE

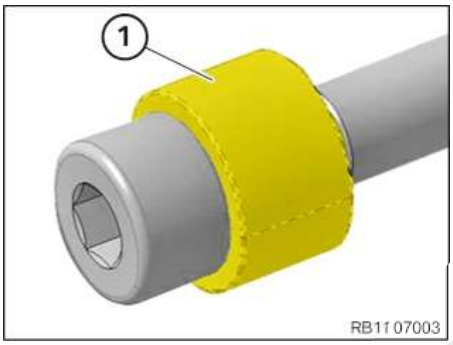
Escaping coolant on the starter generator.

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.

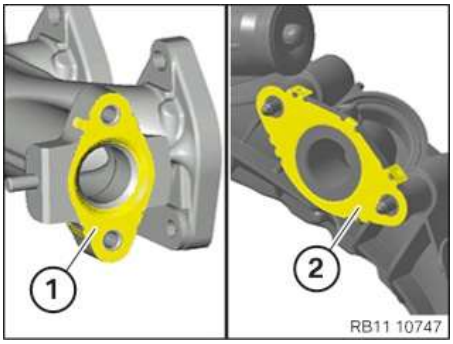
Result

» Screws **without** sleeves (1) are available.

Measure

- Renew screws.

  Parts: Screws (part number 9 886 429)



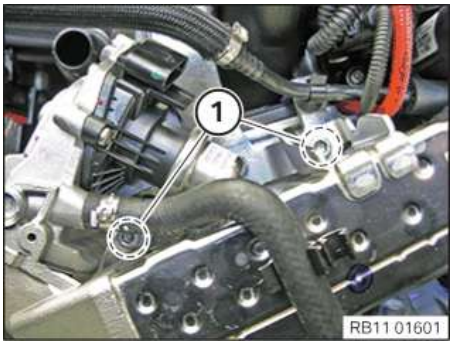
- Renew the seal (1) between the exhaust manifold and the exhaust-gas recirculation cooler.

  Parts: Gasket

- Renew the seal (2) between exhaust-gas recirculation cooler and intake air plenum.

  Parts: Gasket

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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

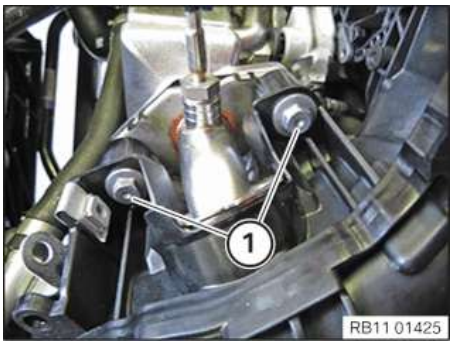
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screw (1) under the exhaust-gas recirculation cooler and then release again.

Exhaust-gas recirculation cooler to cylinder head

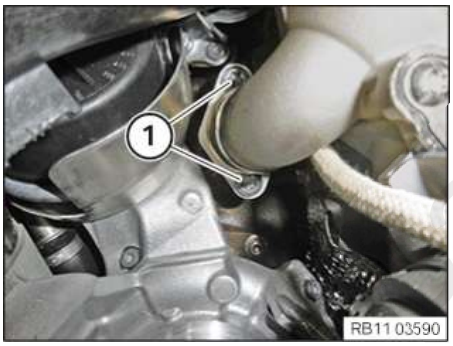
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

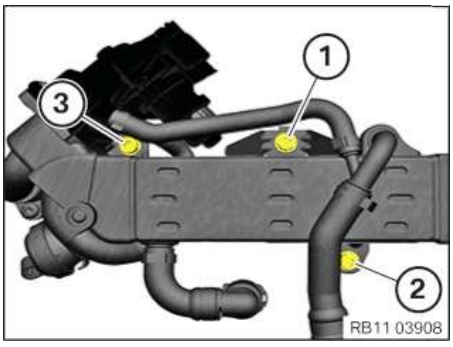
		Tightening torque	10 Nm



- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

M8x28	Replace screws	Tightening torque	32 Nm

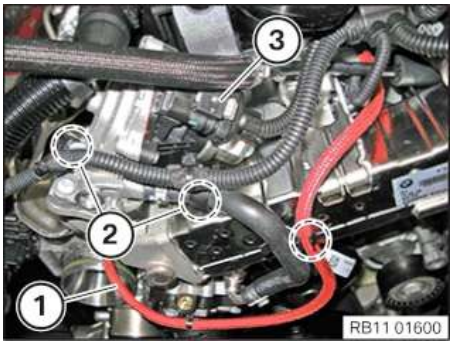


- Tighten screws in the order (1) to (3).

Exhaust-gas recirculation cooler to cylinder head

M8x20 / M8x28		Tightening torque	19 Nm

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- 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.

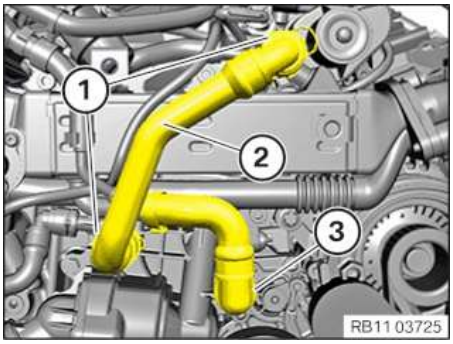


TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.

- **Version A:**

  Connect and audibly lock coolant lines (1).



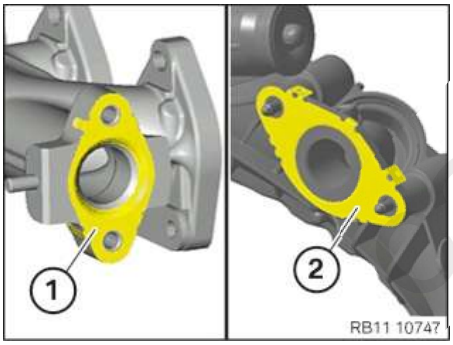
TECHNICAL INFORMATION

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).

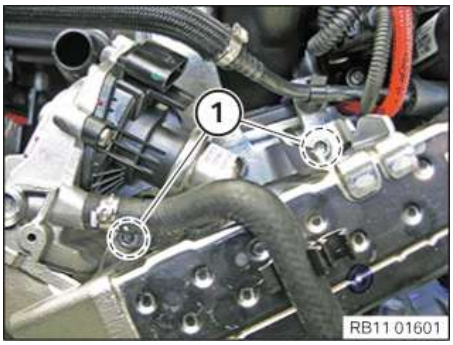
▸ **Installing the exhaust-gas recirculation cooler**



- 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 °

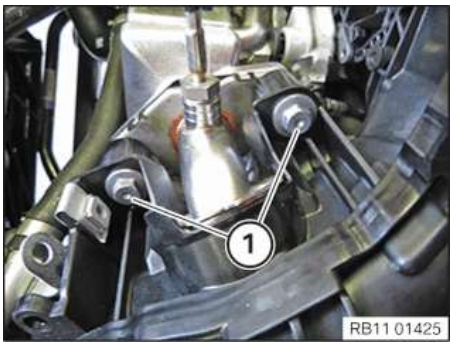
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- Tighten the screw (1) under the exhaust-gas recirculation cooler and then release again.

Exhaust-gas recirculation cooler to cylinder head

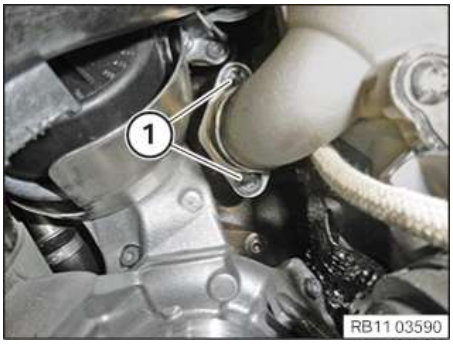
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

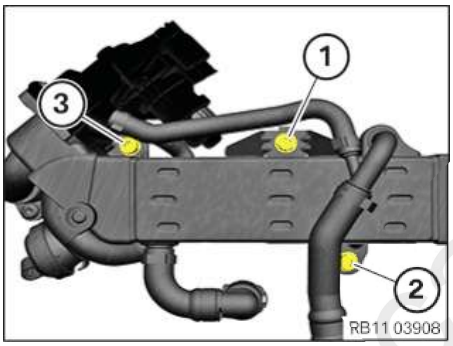
		Tightening torque	10 Nm



- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

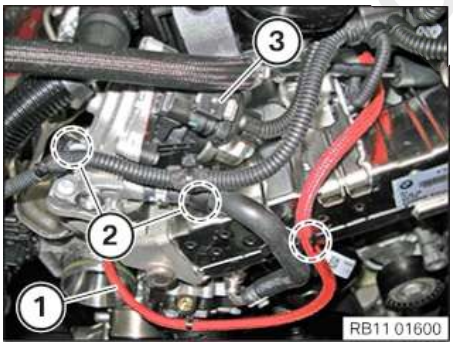
M8x28	Replace screws	Tightening torque	32 Nm



- 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.



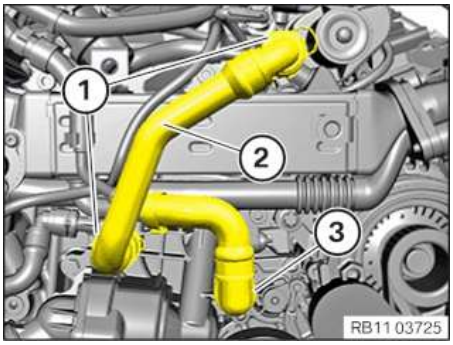
TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.

- **Version A:**

  Connect and audibly lock coolant lines (1).

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TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.

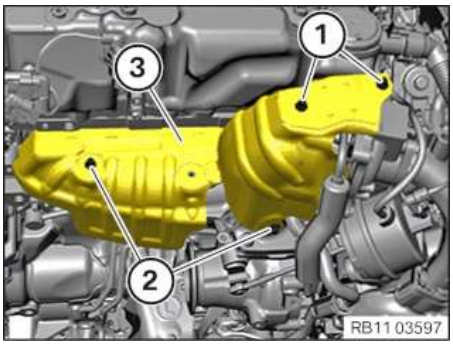
- **Version B:**

  Connect and audibly lock coolant lines (3).

  Install the coolant line (2).

  Audibly lock the locks (1).

91 – 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

92 – 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.

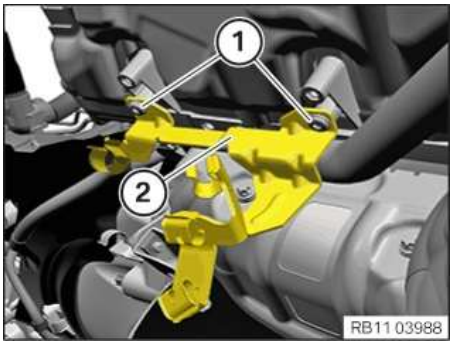
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

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.

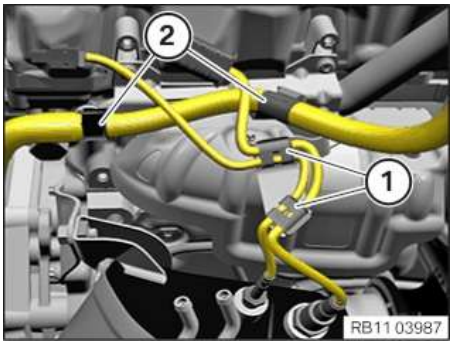


- Insert and install the holder (2).
- Tighten the screws (1).

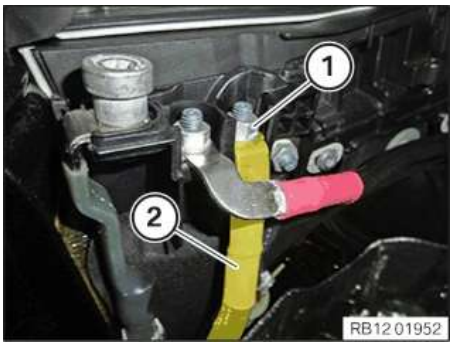
Bracket on cylinder head cover

	Tightening torque	5 Nm

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



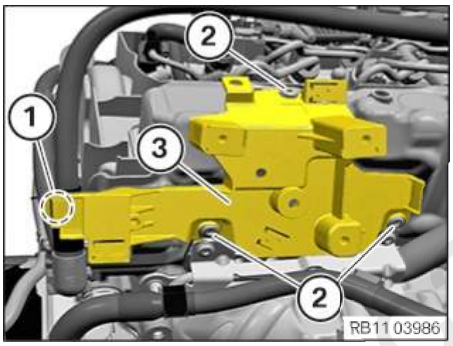
- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

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.

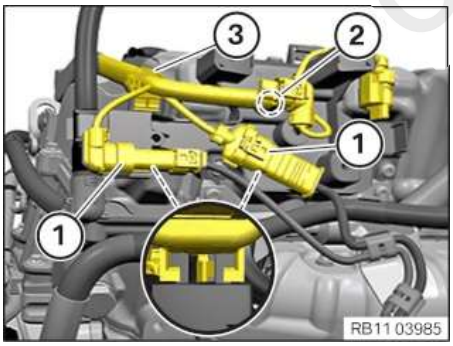


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

		Tightening torque	5 Nm

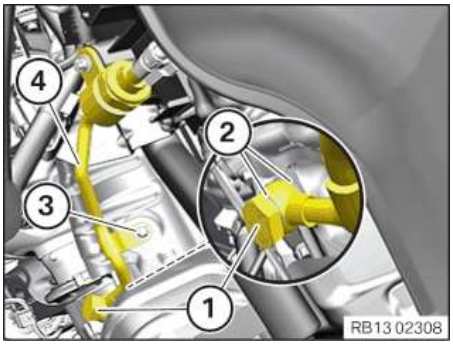
- Fasten the positive battery cable in the area (1) in the clamp.



- 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.

93 – Install the exhaust gas pressure pipe

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- 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).

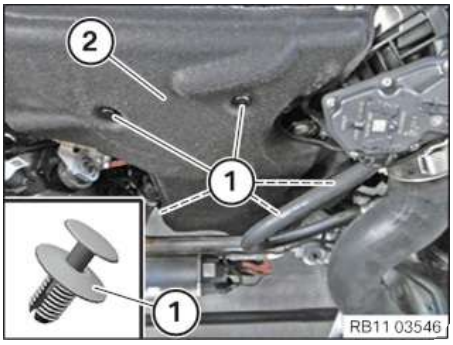
Exhaust gas pressure pipe to sensor system holder

TS6x20		Tightening torque	5,7 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

94 – 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).

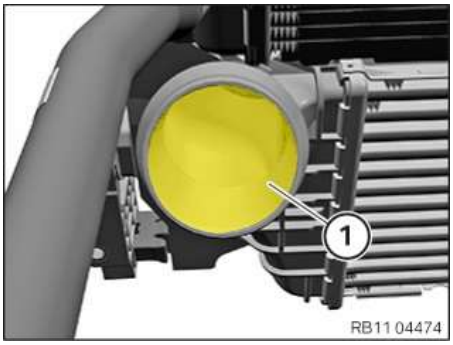
95 – Install pressure pipe between exhaust turbocharger and charge air cooler

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.

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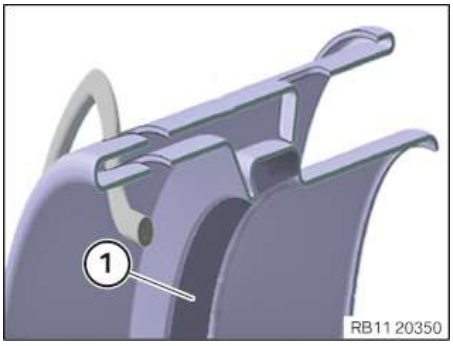
- Check the seal (1) for damage and renew if necessary.

  Parts: Gasket

▸ **Replacing damaged seal**

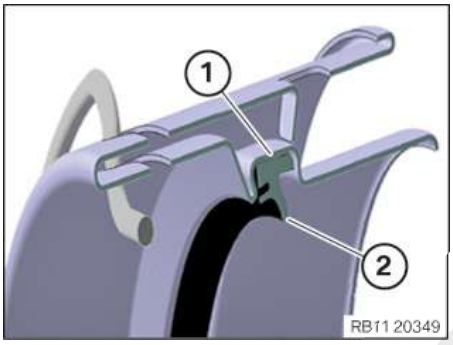
TECHNICAL INFORMATION

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.



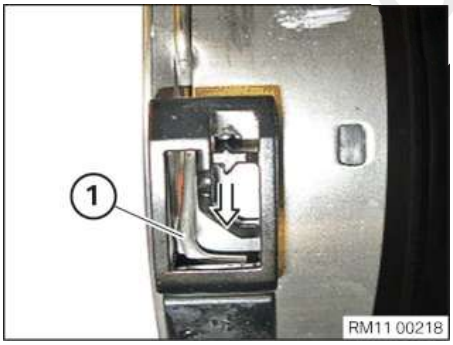
- Renew gasket.

  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.



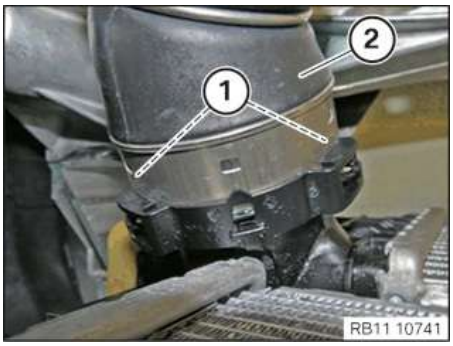
- Pay attention to the installation position:

  The pressure pipe fits on charge air cooler in one installation position only.

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- Install the pressure pipe (1) from the top.



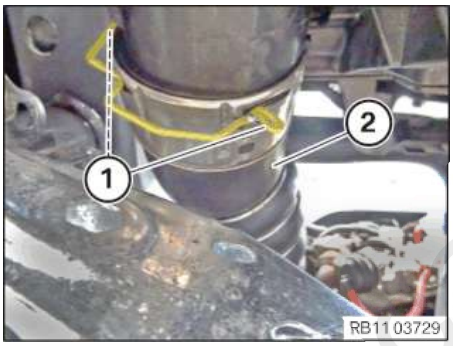
- Connect pressure pipe (2) to charge air cooler.
- Lock the lock (1) on both sides.



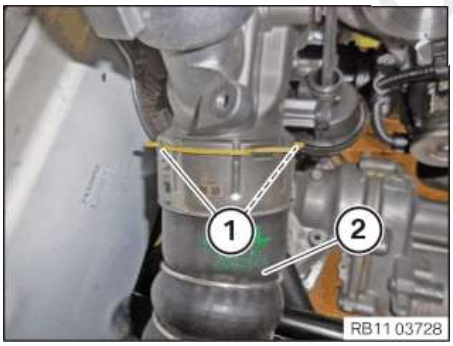
- **Version B:**

  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.



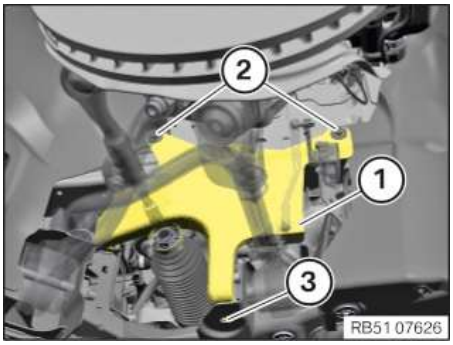
- Place the pressure pipe (2) onto the compressor bypass and ensure that the lock (1) engages audibly.

96 – 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.

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- Position the cover (1).
- Tighten down screws (2) and (3).

Cover, steering unit

Screw		Tightening torque	3 Nm

97 – 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.

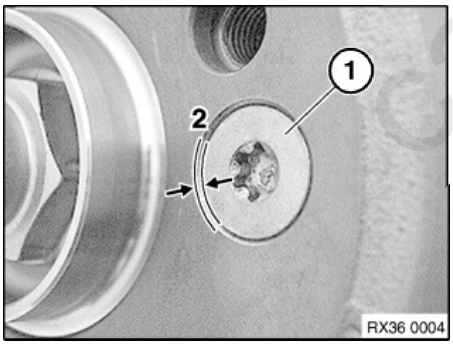
- Remove dirt, grease residues and corrosion from the contact surface with a drill and the special tool 2 344 011.

  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.

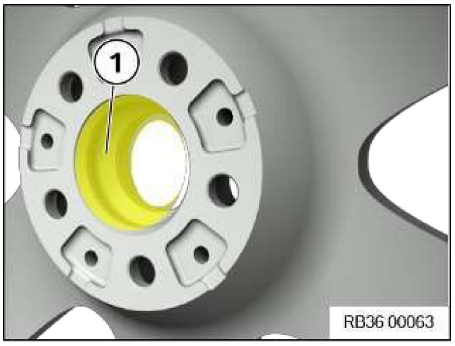
Brake disc to front wheel hub

M8	Renew screw.	Tightening torque	16 Nm

Brake disc to rear wheel hub

M8	Renew screw.	Tightening torque	16 Nm

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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

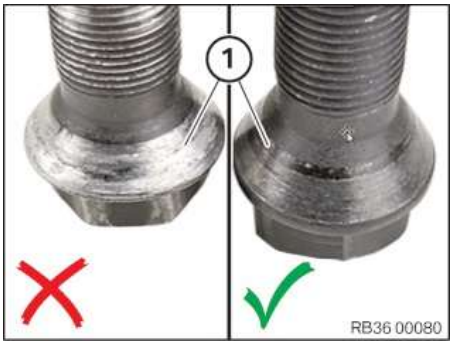
A wheel lift is recommended for easier wheel removal and installation without exertion (see Retailer Equipment Catalogue).

- **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.**



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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.		

98 – Prepare for the installation of the diesel particulate filter



- Renew the V-clip (1).

  Parts: V-band clamp



- Renew gasket (1).

  Parts: Gasket

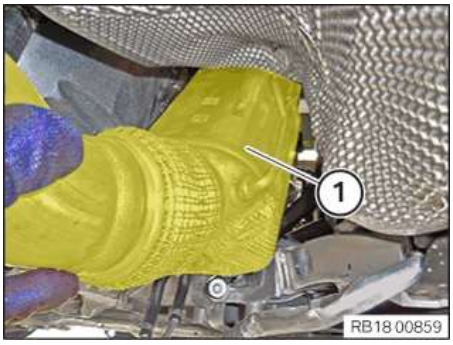
99 – Installing the diesel particulate filter

CAUTION

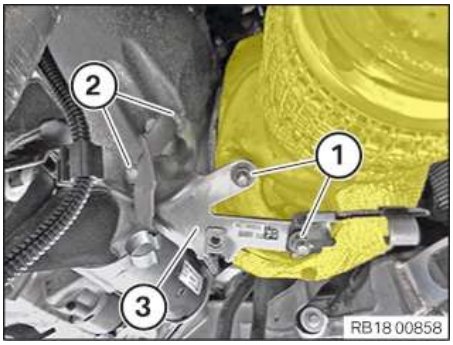
Heavy component.

Heavy components can lead to injury or damage.

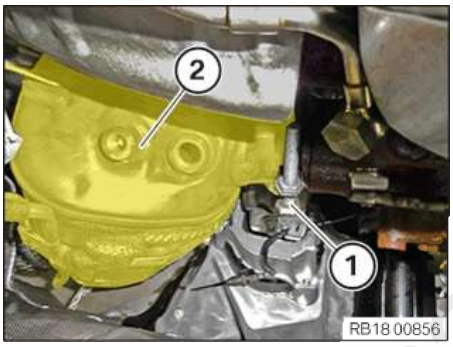
- Remove and install heavy components with the aid of another person/other persons.



- 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**.

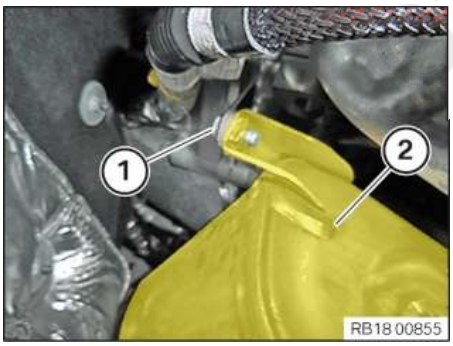


- Renew the V-clip (1).

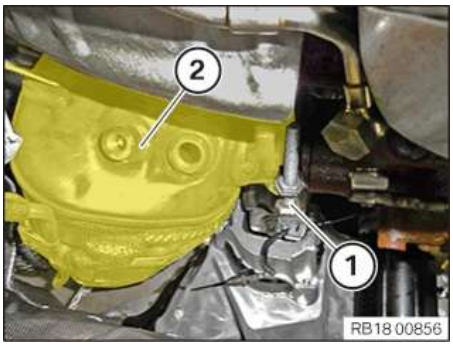
  Parts: V-band clamp
- Feed in and install V-band clamp (1).

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**.

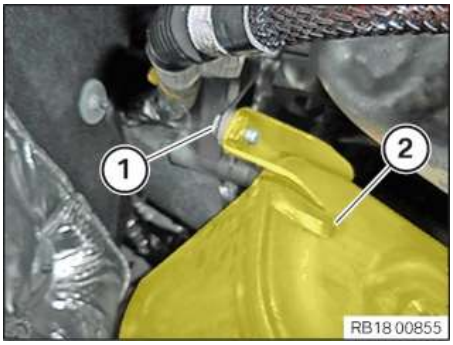


- Tighten the V-clip (1) of the diesel particulate filter (2).

Diesel particulate filter V-clip to exhaust turbocharger

V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

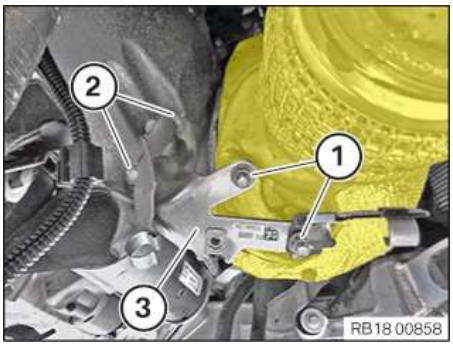
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- Tighten the bolt (1) on the bracket of the diesel particulate filter (2).

Bracket to diesel particulate filter top

M8		Tightening torque	19 Nm



- Tighten the screws (2) on the holder (3).

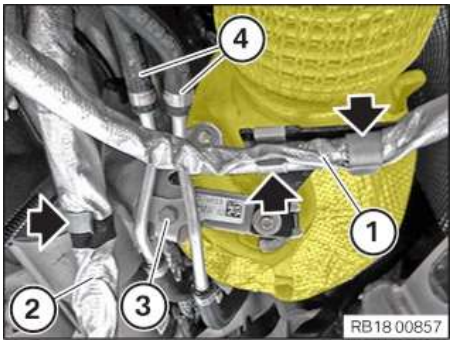
Bracket to transmission for diesel particulate filter holder bottom

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).

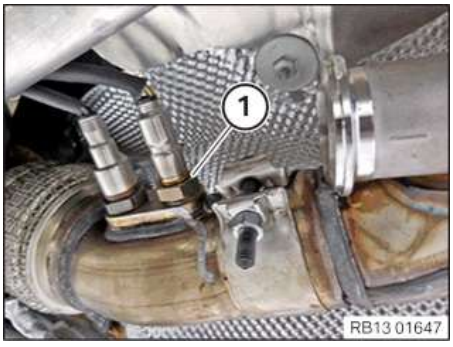
100 – Installing the nitrogen oxide sensor upstream of SCR catalytic converter

RISK OF DAMAGE

Damage to the nitrogen oxide sensor.

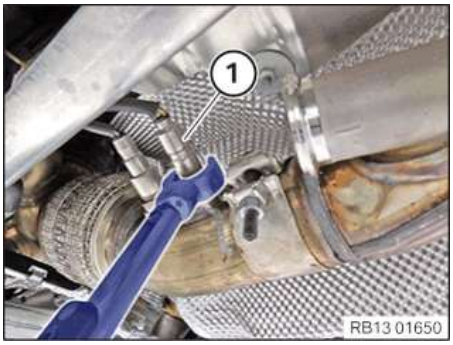
Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

- 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).

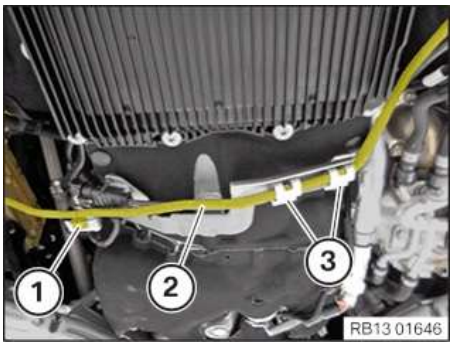
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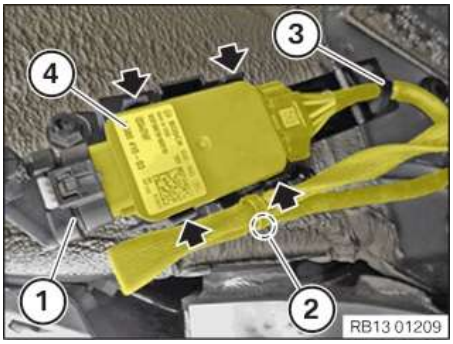
- Tighten the nitrogen oxide sensor (1) using commercially available tools.

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.

101 – 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

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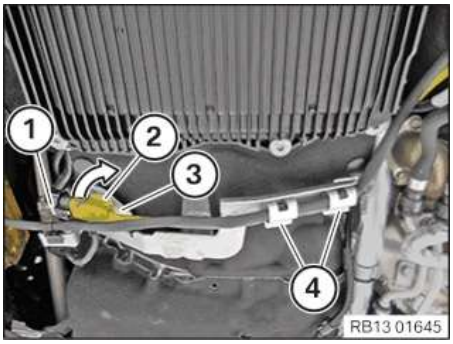
- Insert the monitoring oxygen sensor (1) and install it.



- 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.

102 – 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.

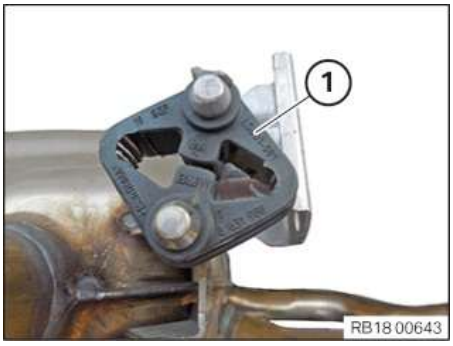
Heavy components can lead to injury or damage.

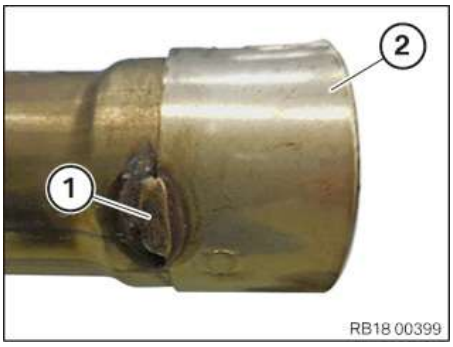
- Remove and install heavy components with the aid of another person/other persons.

TECHNICAL INFORMATION

Mount the exhaust system in voltage-free state, maintaining the tightening sequence from the rear silencer towards the exhaust manifold.

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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

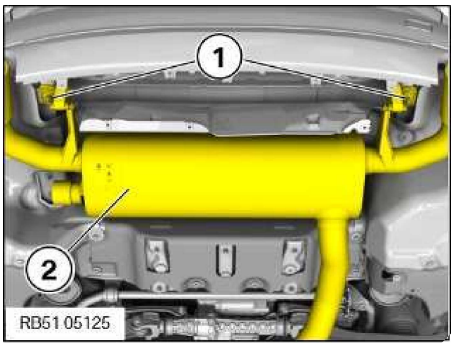
CAUTION

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).

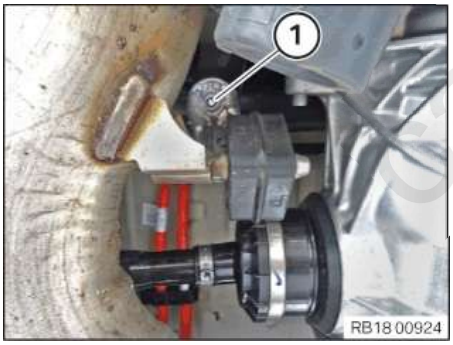


- Insert and install the exhaust system (2).
- Renew nuts (1).

  Parts: Nuts
- Tighten nuts (1).

Rear silencer to body / bumper support

M8	Replace nuts.	Tightening torque	19 Nm

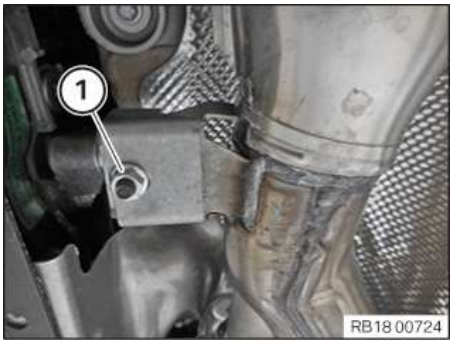


- Renew nut (1) on the rear axle support.

  Parts: Nut
- Tighten nut (1).

Exhaust system to rear axle carrier

M8 nut		Tightening torque	19 Nm

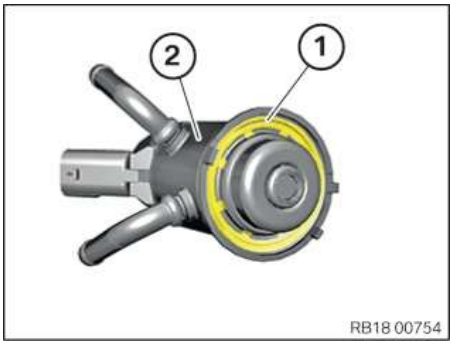


- Tighten nut (1).

Exhaust system to transmission

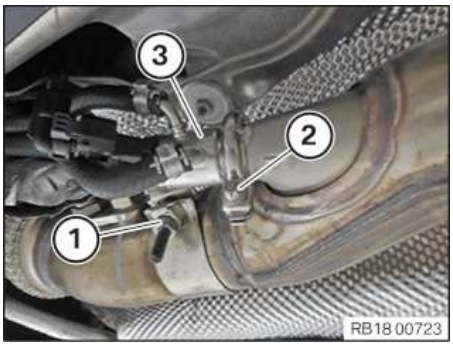
M8		Tightening torque	19 Nm

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- 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

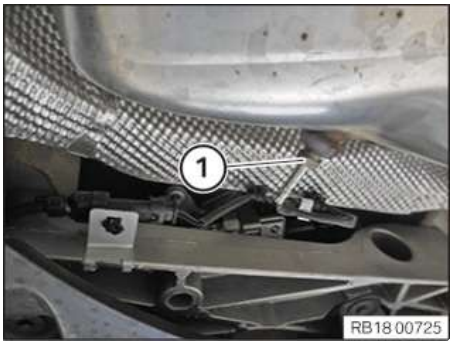
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

- 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

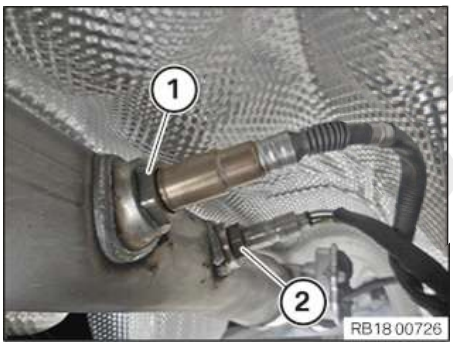
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm



- 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

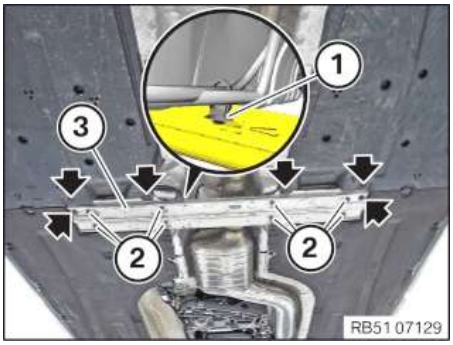
- Install the nitrogen oxide sensor (2) in the exhaust system and tighten.

Nitrogen oxide sensor downstream of SCR catalytic converter

Sensor		Tightening torque	55 Nm

103 – Install the connecting supports on the tunnel

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- Guide in and install connecting support (3) on the tunnel.
- Tighten the screws (2).
- Tighten screws (arrows).

Connecting support to tunnel

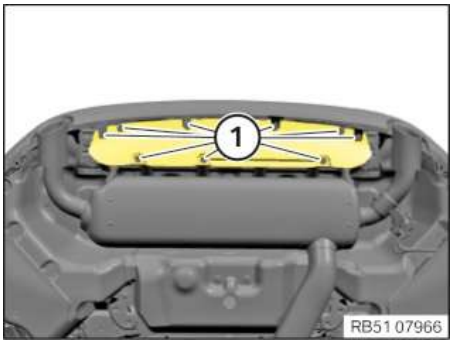
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

NOTICE

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

- Secure the clamp (1).

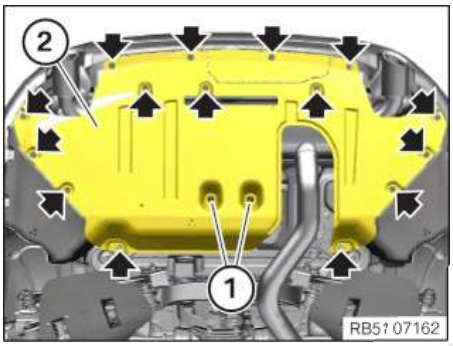
104 – Installing the rear diffuser



- **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

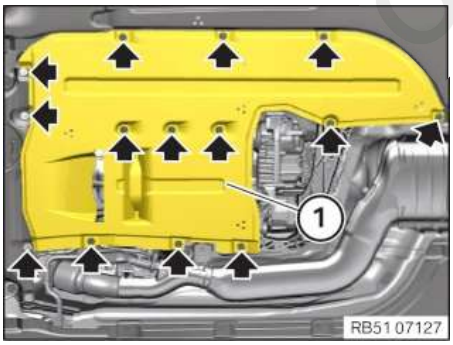
Nuts and screws		Tightening torque	3 Nm

- Tighten nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm

105 – Installing underbody protection at rear



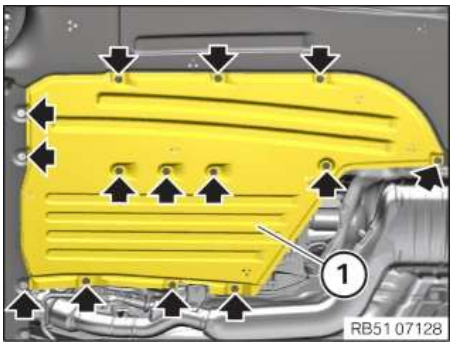
- **Version A:**

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

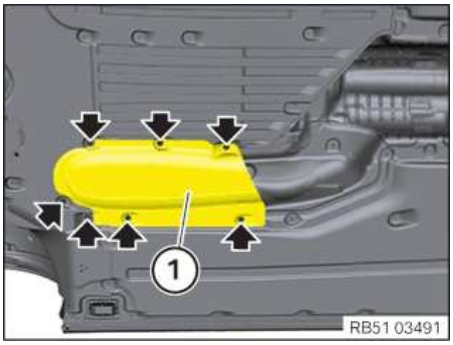
Hexagon screw		Tightening torque	3 Nm

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106 – 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.

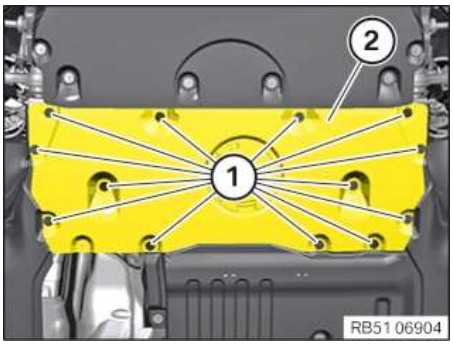


- Insert the underbody panelling (1).
- Tighten screws (arrows).

Underbody panelling

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

107 – Installing the centre underbody protection



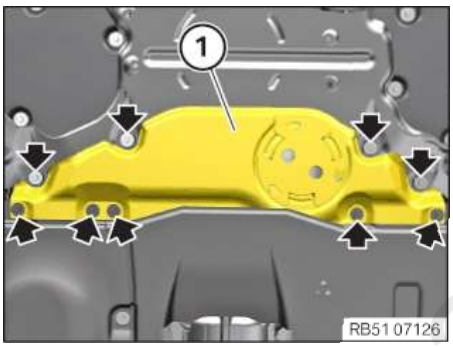
- **Variant with rear wheel drive:**

  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).

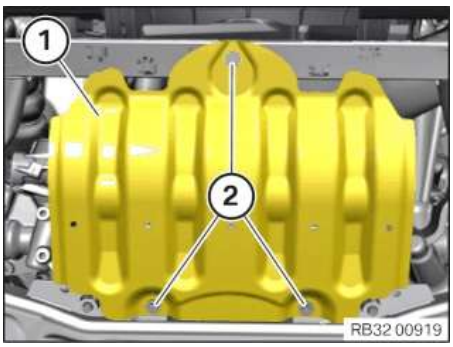
Underbody protection

Hexagon screw		Tightening torque	3 Nm

108 – 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

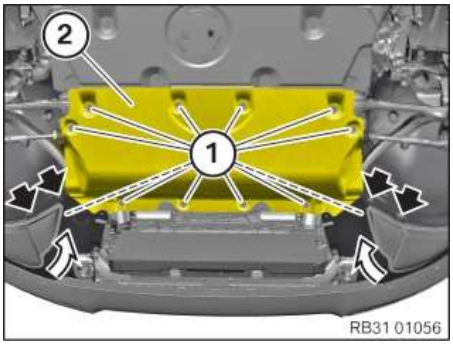
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

109 – Install the underbody protection of the steering gear

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- **Version A:**

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

  Tighten the screws (1).

Underbody protection of the steering gear

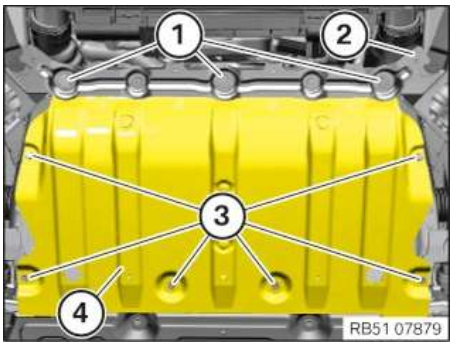
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- 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).

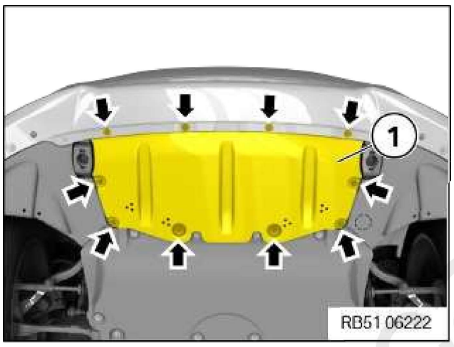
Underbody protection of the steering gear

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).

110 – Installing the front underbody protection



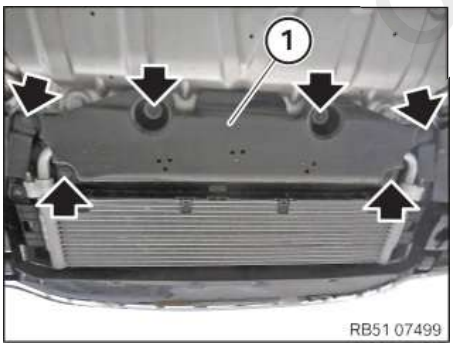
- **Version A:**

  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



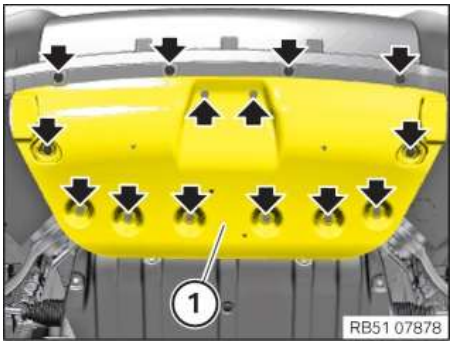
- **Version B:**

  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).

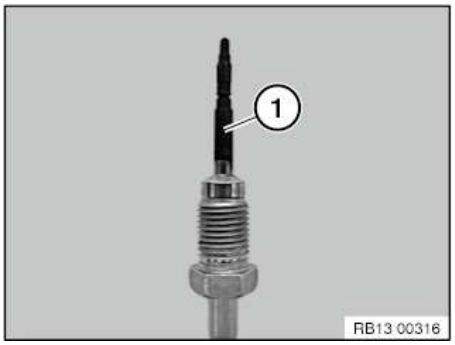
  Tighten screws (arrows).

Underbody protection front

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

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111 – Installing the exhaust temperature sensor for the exhaust system downstream the catalytic converter on the diesel particulate filter



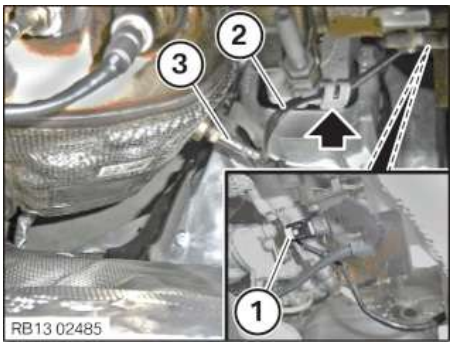
RISK OF DAMAGE

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.

112 – 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

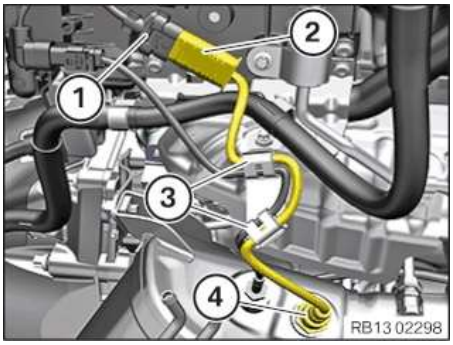


- Insert and install the front oxygen sensor (1).
- Tighten the front oxygen sensor (1) with standard tools.

Front oxygen sensor to top of diesel particulate filter

Sensor		Tightening torque	50 Nm

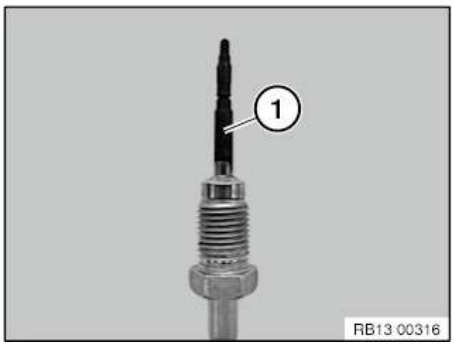
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- Fasten the front oxygen sensor (4) to the clamps (3).
- Connect connectors (2) and lock.
- Connect connectors (1) and lock.

  The connectors (1) and (2) must audibly engage.

113 – Install the exhaust-gas temperature sensor on the diesel particulate filter



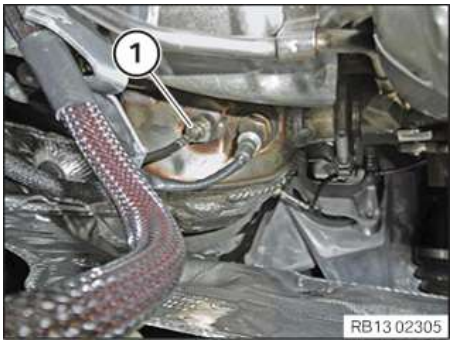
RISK OF DAMAGE

Damage of exhaust temperature sensor.

Damage to exhaust temperature sensors leads to malfunctions.

- Make sure that the gauge tip is not damaged.

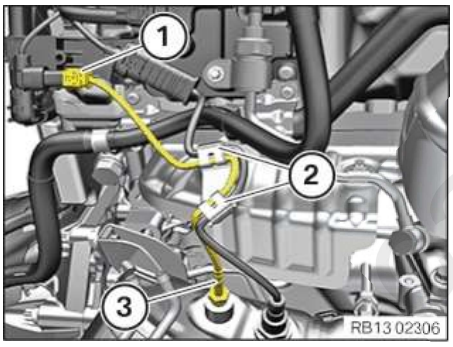
- Check gauge tip (1) for damage.



- 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

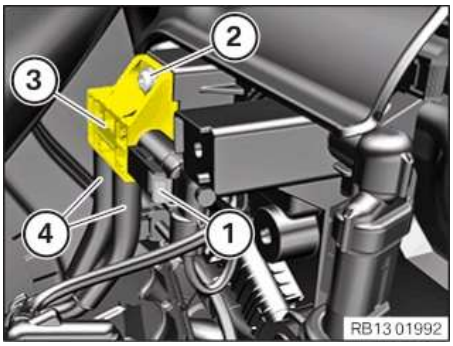
Sensor		Tightening torque	30 Nm



- Secure the exhaust temperature sensor (3) to the clamp (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

114 – 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.

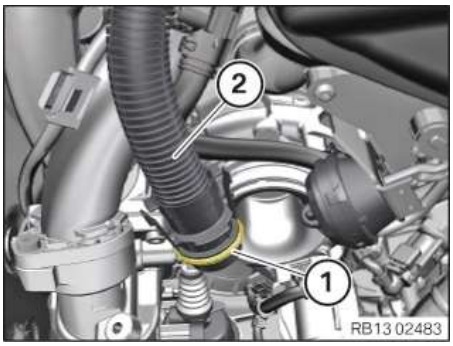
  The connector (1) must engage audibly.

115 – Installing the clean air pipe with resonator

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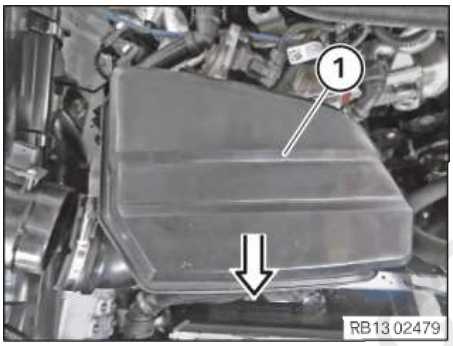
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



- 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.

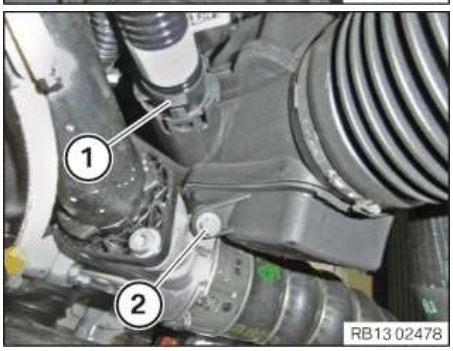


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

  The clamp (1) must engage audibly.

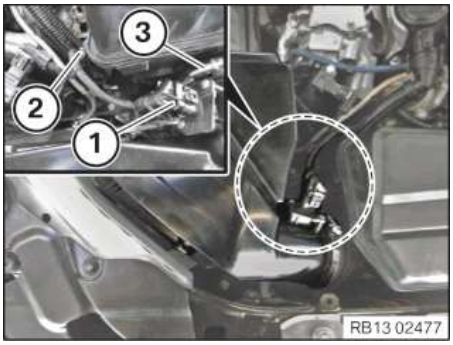


- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm

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

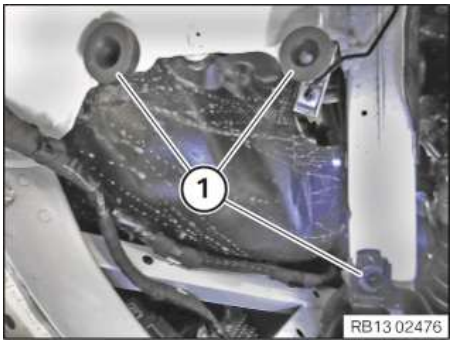
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

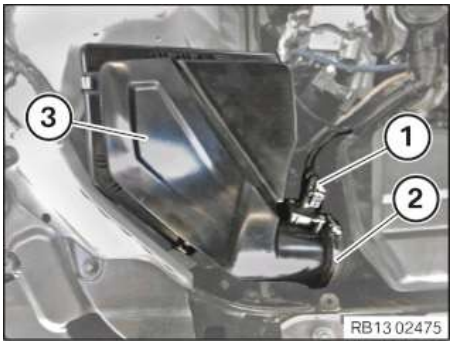
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

116 – 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

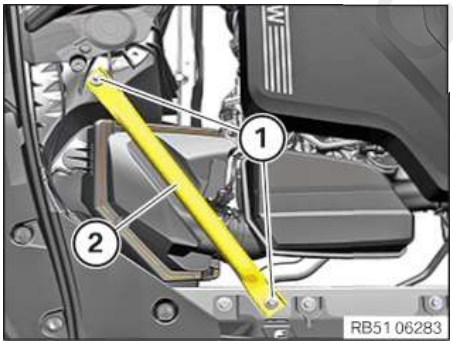
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

117 – Install the right front-end strut

TECHNICAL INFORMATION

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



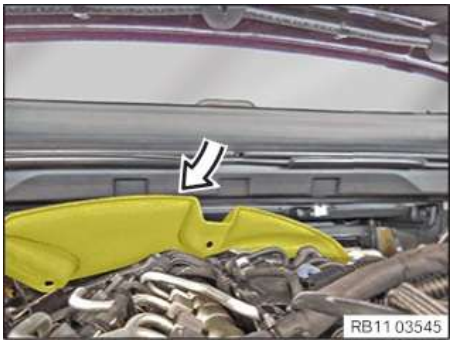
- Install the front-end strut (2).
- Renew screws (1).

  Parts: Screws
- Tighten the screws (1).

Front end strut

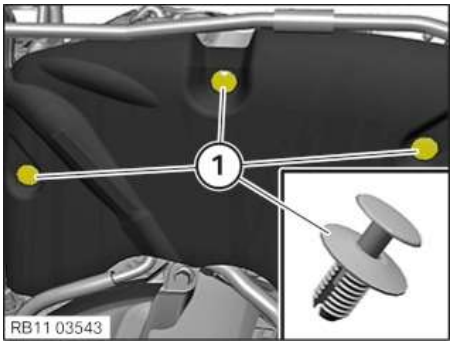
Screw		Tightening torque	56 Nm

118 – Installing acoustic cover at rear



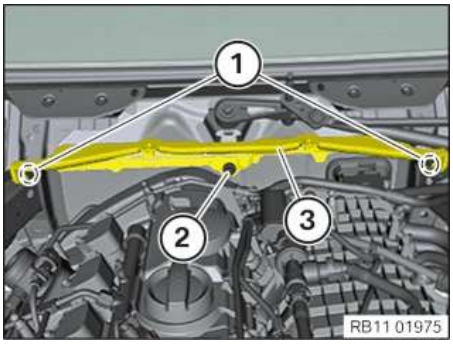
- Guide in the acoustic cover in the direction of the arrow and install it.

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

119 – Installing centre bulkhead lower section

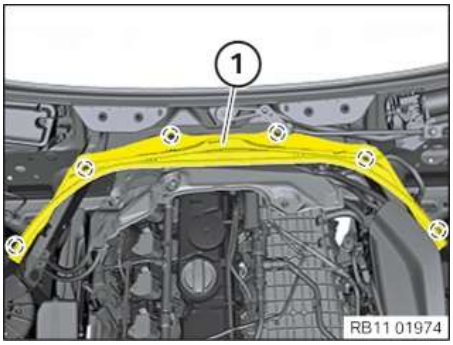


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

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

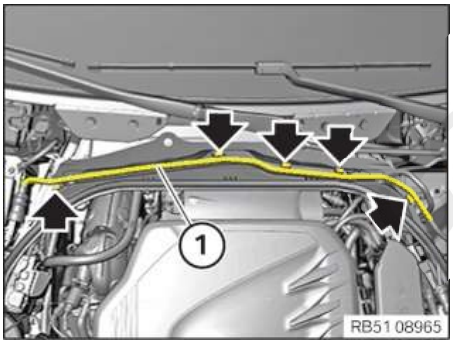
120 – Installing the centre bulkhead upper part



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

Bulkhead upper part to bottom bulkhead

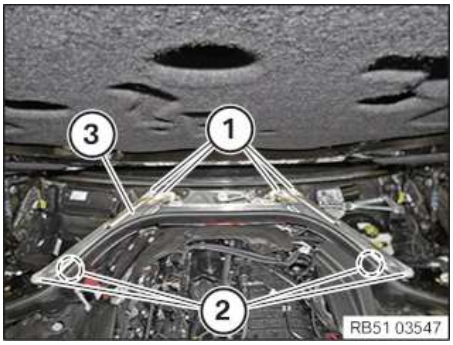
		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

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

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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 °

121 – 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.

122 – Installing cowl panel cover

RISK OF DAMAGE

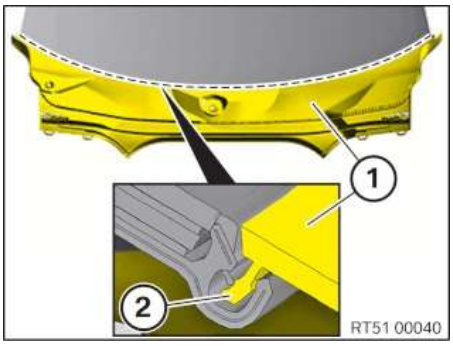
Damage caused by water ingress into the vehicle.

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

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

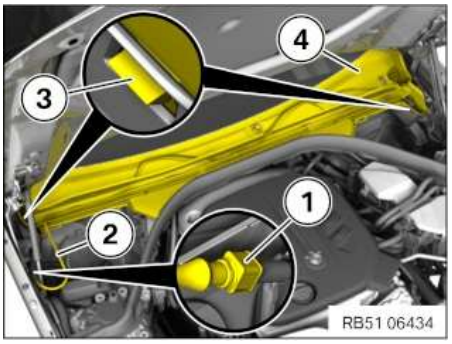
TECHNICAL INFORMATION

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.

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- 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.

123 – Install left and right wiper arm

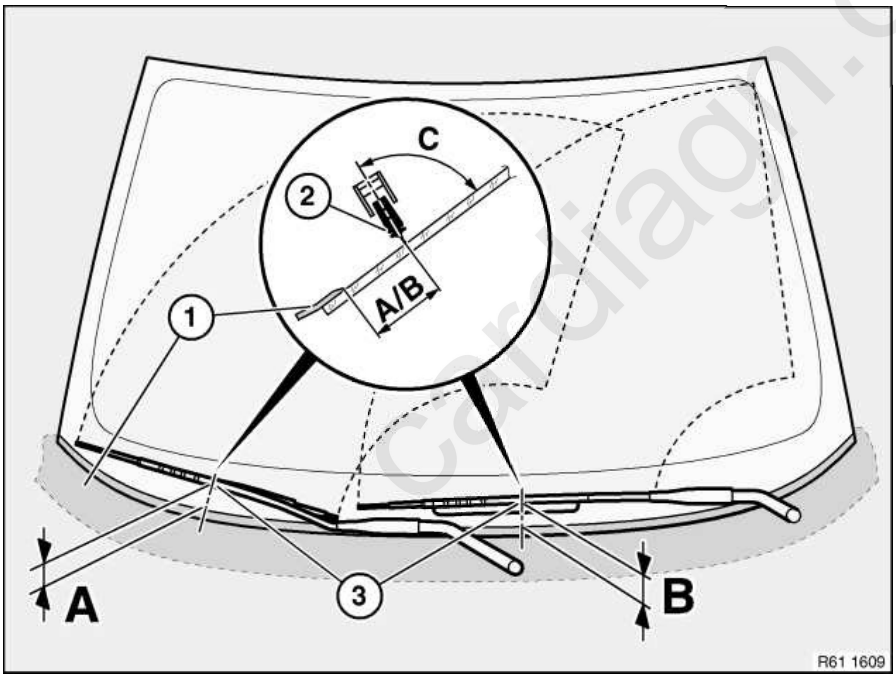
NOTICE

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

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

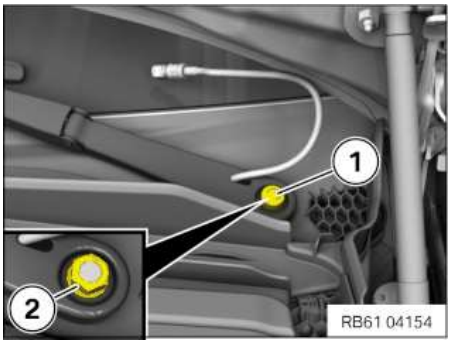
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- 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



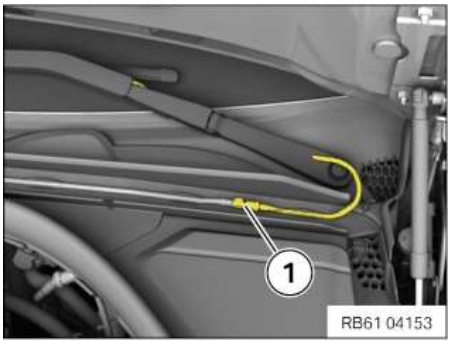
- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

- Connect the protective cap (1).

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

124 – Connecting all battery earth leads



- See additional information.

125 – 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

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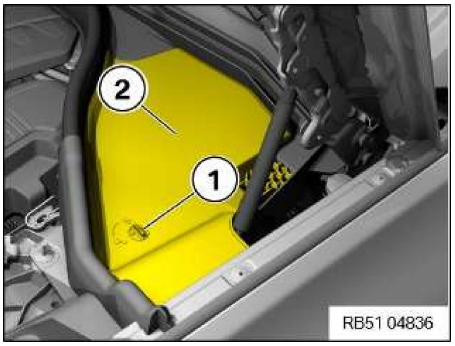


- Connect the connector (1) of the CAN bus and lock it.
- Clip in clip (2).



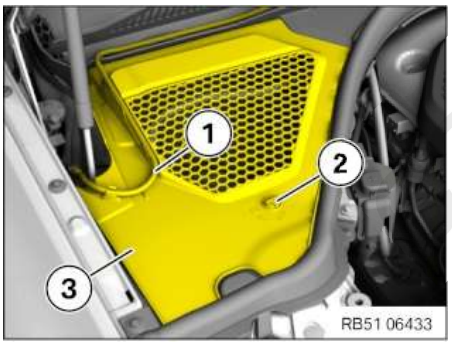
- Activate the 48V electrical system by closing the bonnet.
  The activation takes place automatically.

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



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

127 – 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.

128 – Take bonnet out of the service position

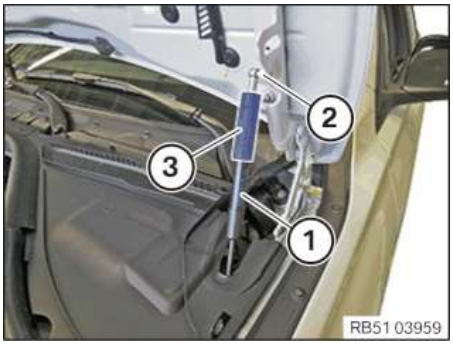
CAUTION

Shutting bonnet or tailgate.

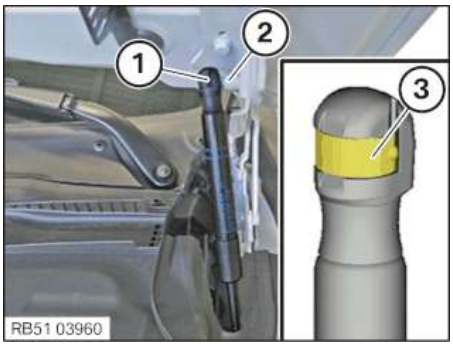
Danger of injury!

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

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- 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.

129 – 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.

130 – 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).

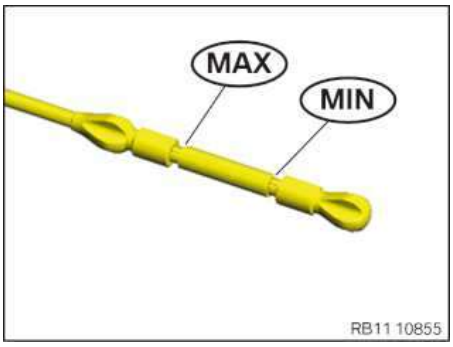
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- Park vehicle on a horizontal surface.
- Stop the engine and wait for 5 minutes.
- Pull out the oil dipstick and wipe off using a lint-free cloth.

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

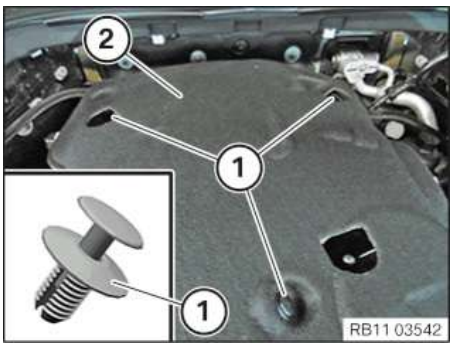
The engine oil level must be between the minimum mark and the maximum mark of the oil dipstick.

- 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

131 – 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) .

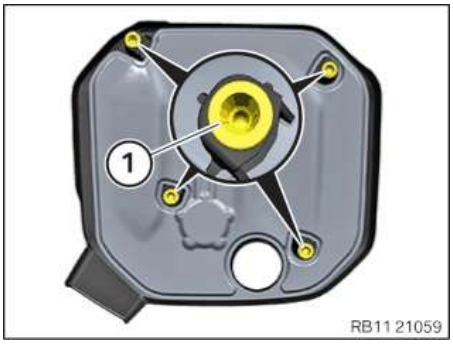
132 – Install acoustic cover

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).

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- 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 5375

M8x60		Tightening torque	19 Nm

Cylinder head to crankcase — Used in step 64

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 64

M8x40		Tightening torque	19 Nm

Standard screw connection M6 — Used in step 6486

M6		Tightening torque	8 Nm

Ground to cylinder head — Used in step 64

M6		Tightening torque	8 Nm

Camshaft carrier to cylinder head — Used in step 67

M7x35		Tightening torque	13 Nm

Bearing journal to cylinder head — Used in step 70

M16x1.5	Replace bearing journal.	Tightening torque	20 Nm

Standard screw connection M8 — Used in step 70

M8		Tightening torque	19 Nm

Chain tensioner piston to cylinder head — Used in step 71

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

Holder to crankcase — Used in step 71

M8X16		Tightening torque	19 Nm

Camshaft sprocket to camshaft — Used in step 72

M7x17.			17 Nm

Starter motor to engine — Used in step 78

M8X60		Tightening torque	19 Nm

Battery positive lead to starter — Used in step 78

M8		Tightening torque	13,5 Nm

Cylinder head cover to cylinder head — Used in step 79

M6		Tightening torque.	8,5 Nm

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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 8590

		Tightening torque	10 Nm

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

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

Exhaust manifold to cylinder head — Used in step 89

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 89

M6x12		Tightening torque	8 Nm

Exhaust-gas recirculation cooler to exhaust manifold — Used in step 8990

M8x28	Replace screws	Tightening torque	32 Nm

Exhaust-gas recirculation cooler to cylinder head — Used in step 8990

M8x20 / M8x28		Tightening torque	19 Nm

Exhaust turbocharger low-pressure stage to crankcase — Used in step 89

M8X16		Tightening torque	22 Nm

Oil return line to turbocharger — Used in step 89

M6x12	Renew gasket.	Tightening torque	8 Nm

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Oil return line to crankcase — Used in step 89

M6x12	Check gasket. Renew the seal or line if necessary.	Tightening torque	8 Nm

Exhaust-gas recirculation cooler to cylinder head — Used in step 90

M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °

Heat shield to exhaust manifold — Used in step 91

M6x12			10 Nm

Bracket on cylinder head cover — Used in step 92

		Tightening torque	5 Nm

Battery positive lead to battery positive terminal — Used in step 92

M8		Tightening torque	19 Nm

Heat shield to exhaust manifold — Used in step 93

M6x12		Tightening torque	10 Nm

Banjo bolt for exhaust pressure pipe to exhaust manifold — Used in step 93

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm

Exhaust gas pressure pipe to sensor system holder — Used in step 93

TS6x20		Tightening torque	5,7 Nm

Cover, steering unit — Used in step 96

Screw		Tightening torque	3 Nm

Brake disc to front wheel hub — Used in step 97

M8	Renew screw.	Tightening torque	16 Nm

Brake disc to rear wheel hub — Used in step 97

M8	Renew screw.	Tightening torque	16 Nm

Wheel bolts — Used in step 97

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 99

V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

Bracket to diesel particulate filter top — Used in step 99

M8		Tightening torque	19 Nm

Bracket to transmission for diesel particulate filter holder bottom — Used in step 99

M8X20		Tightening torque	19 Nm

Lower holder to diesel particulate filter — Used in step 99

M8		Tightening torque	19 Nm

Coolant lines for SCR metering module — Used in step 99

M6X16		Tightening torque	8 Nm

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Nitrogen oxide sensor before SCR catalytic converter			Used in step 100
Sensor		Tightening torque	50 Nm

Monitoring oxygen sensor			Used in step 101
Sensor		Tightening torque	50 Nm

Rear silencer to body / bumper support			Used in step 102
M8	Replace nuts.	Tightening torque	19 Nm

Exhaust system to rear axle carrier			Used in step 102
M8 nut		Tightening torque	19 Nm

Exhaust system to transmission			Used in step 102
M8		Tightening torque	19 Nm

Exhaust system to diesel particle filter			Used in step 102
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

SCR metering module V-clip to exhaust system			Used in step 102
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm

Exhaust-gas temperature sensor upstream of SCR catalytic converter			Used in step 102
Sensor		Tightening torque	30 Nm

Diesel particulate sensor to exhaust system			Used in step 102
Sensor		Tightening torque	50 Nm

Nitrogen oxide sensor downstream of SCR catalytic converter			Used in step 102
Sensor		Tightening torque	55 Nm

Connecting support to tunnel			Used in step 103
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

Diffuser / underbody panelling			Used in step 104
Nuts and screws		Tightening torque	3 Nm

Underbody protection			Used in step 105107
Hexagon screw		Tightening torque	3 Nm

Underbody panelling			Used in step 106
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Underbody protection, steering, to front axle support			Used in step 108
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support			Used in step 108
Hexagon bolt M6		Tightening torque	8 Nm

Underbody protection of the steering gear			Used in step 109
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

Wheel arch trim panel, front			Used in step 109
Thermoplastic hexagon screw		Tightening torque	2,6 Nm

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Underbody protection front			Used in step 110
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 111
Sensor		Tightening torque	30 Nm

Front oxygen sensor to top of diesel particulate filter			Used in step 112
Sensor		Tightening torque	50 Nm

Exhaust-gas temperature sensor to diesel particulate filter			Used in step 113
Sensor		Tightening torque	30 Nm

Differential pressure sensor of diesel particulate filter on cylinder head cover			Used in step 114
TS5x20		Tightening torque	4 Nm

Clamp for the pressure hose on the differential pressure sensor			Used in step 114
Clamp 15–19mm		Tightening torque	3 Nm

Clean air pipe to exhaust turbocharger			Used in step 115
M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing			Used in step 115116
Clamp		Tightening torque	3 Nm

Front end strut			Used in step 117
Screw		Tightening torque	56 Nm

Bulkhead lower part to body			Used in step 119
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead			Used in step 120
		Tightening torque	3 Nm

Tension strut on bulkhead			Used in step 120
M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome			Used in step 120
Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm			Used in step 123
Combination hexagon nut		Tightening torque	35 Nm

Negative battery cable to 48-V battery			Used in step 125
Nut M8		Tightening torque	19 Nm

Overview of Special Tools

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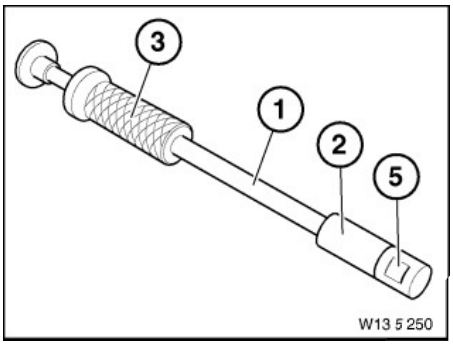
0 493 339 (13 5 252) Bush



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)	

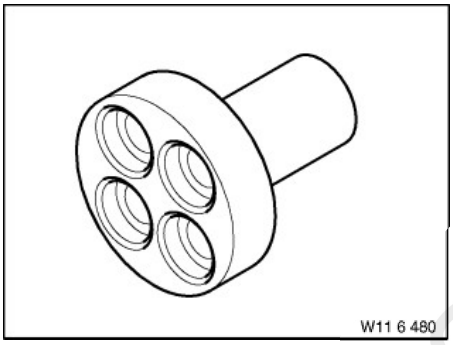
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0 493 340 (13 5 253) Weight



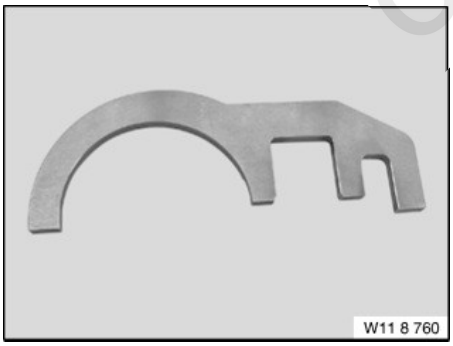
Common	Used in step 50
Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 380 (11 6 480) Connector



Common	Used in step 5375
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 535768737576
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)

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2 365 488 Adapter



Common	Used in step 53747577
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)

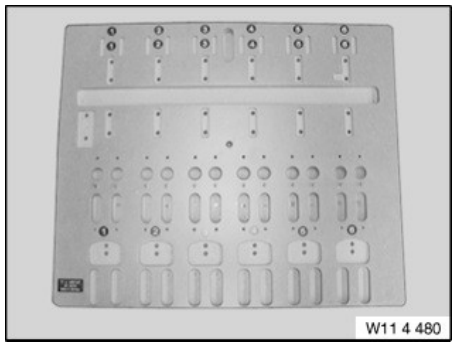
2 288 380 Locating stud



Common	Used in step 53747577
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)

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0 495 105 (11 4 480) oddments tray



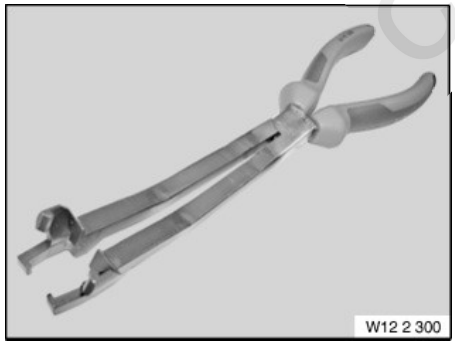
Common Used in step 5960

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	

0 495 140 (12 2 300) Pliers

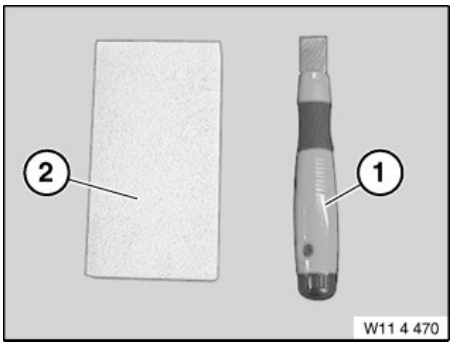


Common Used in step 61

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)

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0 495 102 (11 4 470) Tool



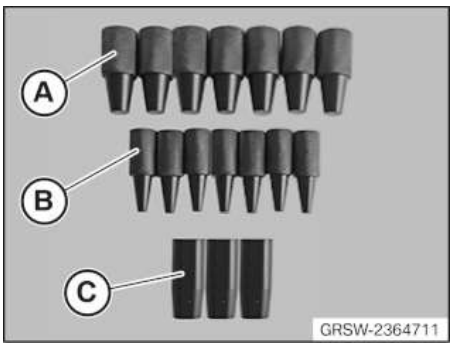
Common Used in step 6189

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 62

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	

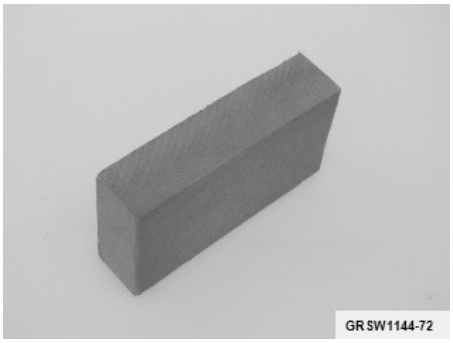
0 495 103 (11 4 471) Scraper



Common Used in step 62

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

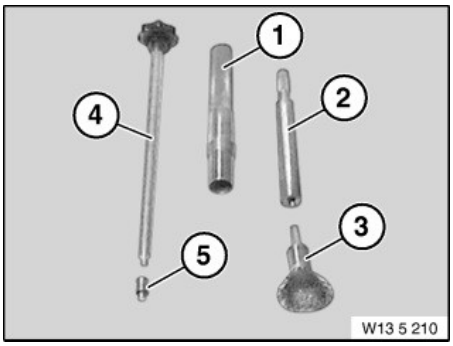


Common Used in step 62

Usage	(grindstone)
Included in the tool or work	0 495 102
Storage location	C52
Replaced by	
In connection with	
SI-Number	

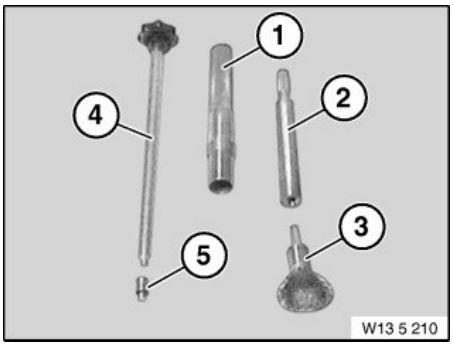
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0 493 763 (13 5 215) Plug



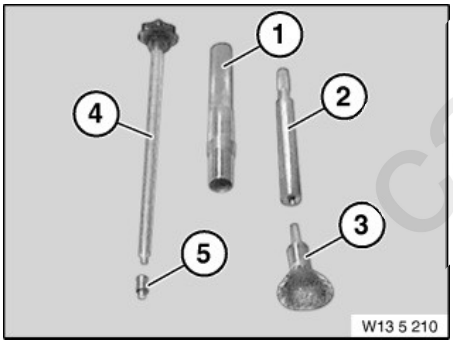
Common	Used in step 80
Usage	(Seal plug)
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

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



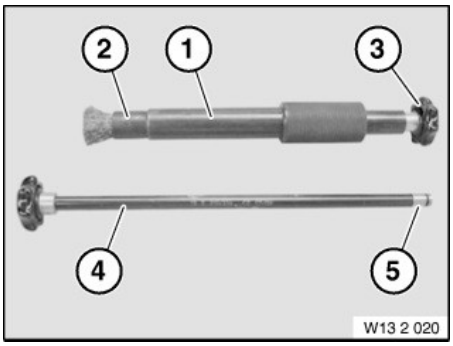
Common	Used in step 80
Usage	(Cleaning set) For injector channels
Included in the tool or work	
Storage location	B4
Replaced by	
In connection with	
SI-Number	01 05 00 (574)

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)	

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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.	

2 344 011 Tool



Common Used in step 97

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:

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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	

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	

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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	

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	

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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	

Overview Technical Data

Distance from window pane edge to wiper blade	Used in step 123
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 130
	1.0 l

Links

Repair instructions (PRE)	Used in step
Notes on 48-V battery	4125

General repair instructions	Used in step
11 00 ... Overview of consumables (Electronic Parts Catalogue)	80

Repair instructions	Used in step
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61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5124
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61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5124
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	5124
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61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5124
61 20 900 Disconnecting and connecting battery earth lead	5124
61 20 900 Disconnecting and connecting battery earth lead	5124
61 20 900 Disconnecting and connecting battery earth lead	5124
61 35 ... Notes on ESD protection (Electro Static Discharge)	1718192030314350
61 35 ... Notes on ESD protection (Electro Static Discharge)	1718192030314350
00 02 001 Raising the vehicle using a vehicle lift	3397
17 00 008 Draining and topping up coolant for high-temperature circuit	129
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	129
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	129
17 00 008 Draining and topping up coolant for high-temperature circuit	129
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	129
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	129
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	129
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	129
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	129
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	129
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	129
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11 12 100 Removing and installing cylinder head

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

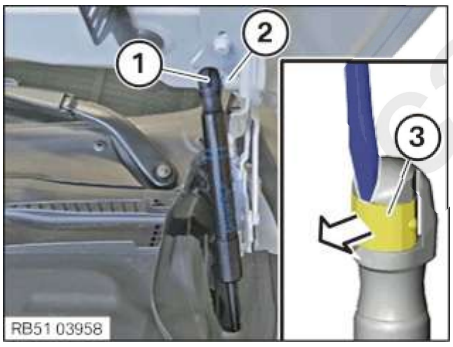
Engine compartment lid is open.

CAUTION

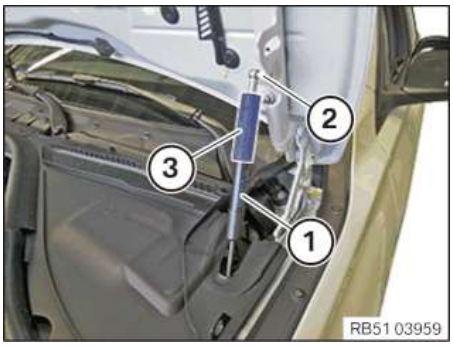
Shutting bonnet or tailgate.

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

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- See additional information.

3 – Removing the acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

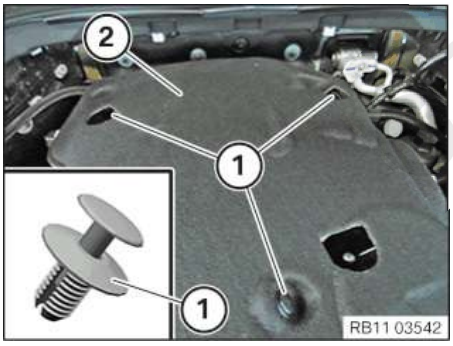
Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- 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.



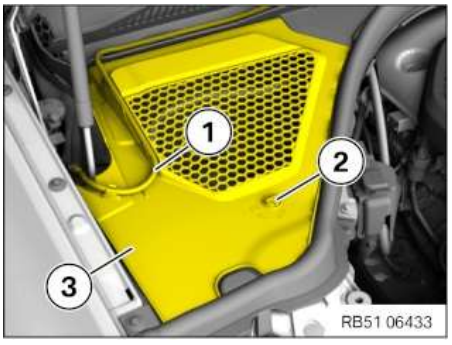
- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

4 – Remove the acoustic cover for the injectors



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

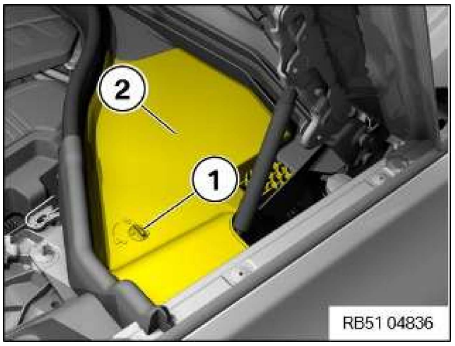
5 – Remove the cover of the rear right engine compartment



- 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

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- 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.

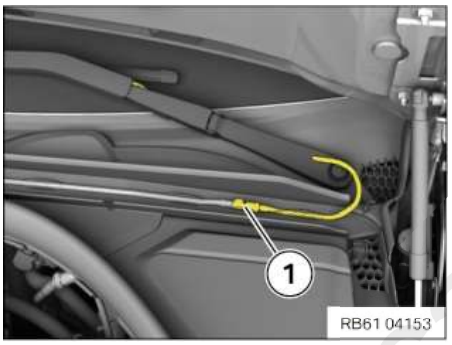
▸ **Remove the wiper arm**

RISK OF DAMAGE

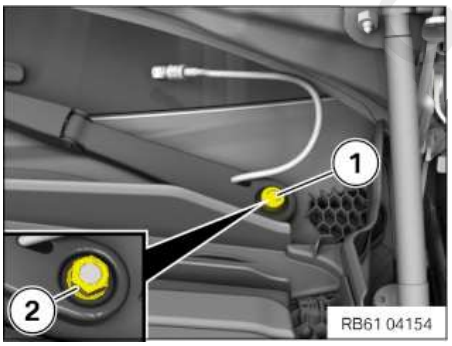
Damage to wiper console.

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

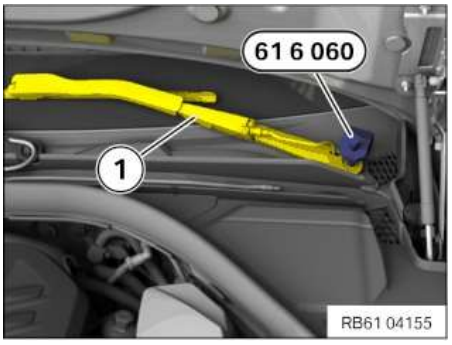
- Removing the wiper arms must be carried out only using the prescribed special tool.
- Do **not** lever off the wiper arm because otherwise the wiper console may break at the predetermined breaking point for active pedestrian protection.



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



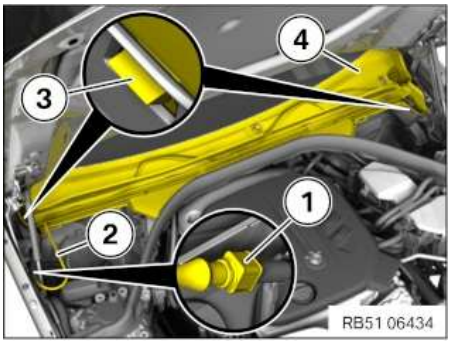
- Remove the protective cap (1).
- Loosen nut (2).



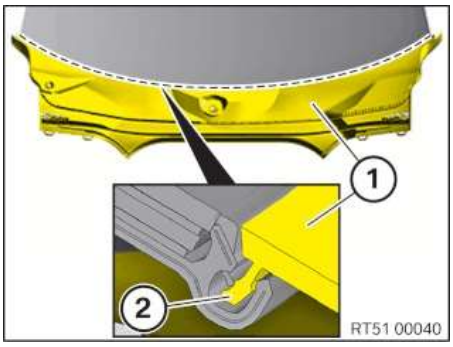
- Pull off the wiper arm (1) using special tool .

8 – Remove cowl panel cover

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- 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

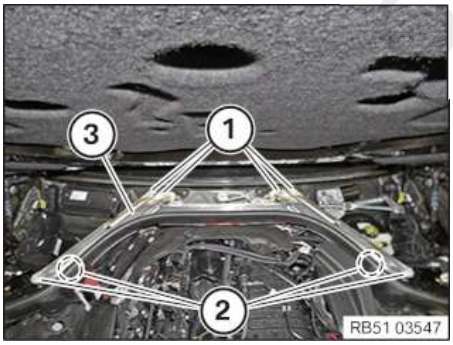


- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

10 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

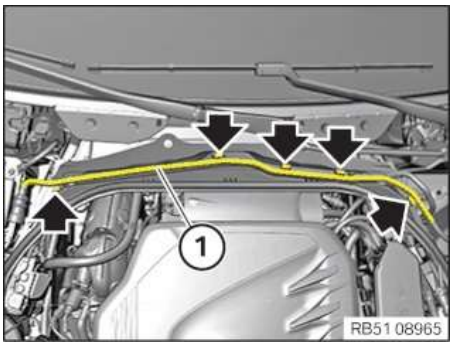
Driving without the strut brace/front-end strut or tension strut is not permitted.



NOTICE

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

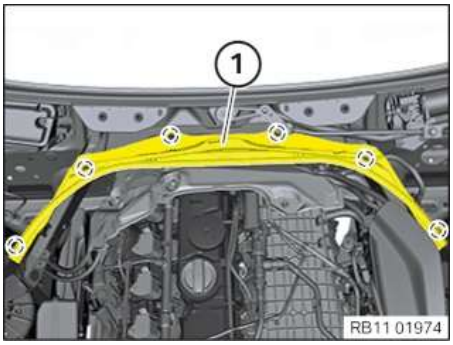
- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.



- **Version with mild hybrid technology:**

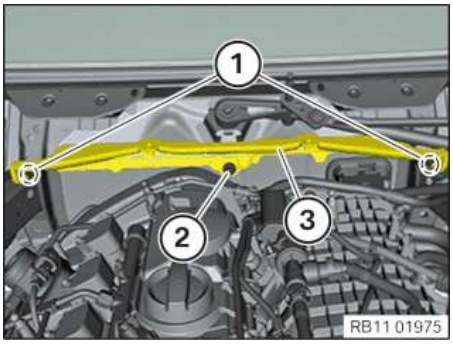
  Unclip the wire (1) at the holders (arrows).

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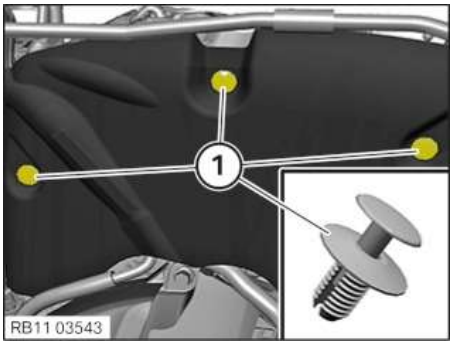
- Unscrew the bolts in the marked areas.
- Remove the centre bulkhead upper part (1).

11 – Removing the centre bulkhead lower section

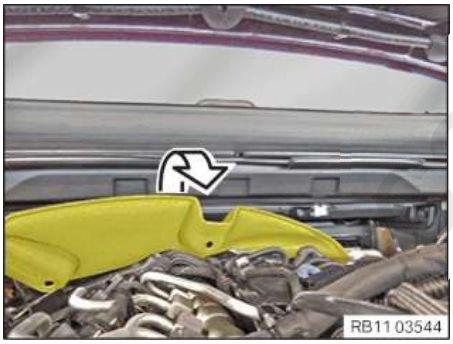


- Loosen screws (1).
- Loosen nut (2).
- Remove the centre bulkhead lower part (3).

12 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).

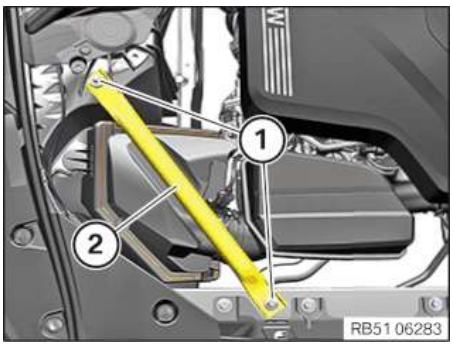


- Guide out and remove the acoustic cover in the direction of the arrow.

13 – Remove right front-end strut

TECHNICAL INFORMATION

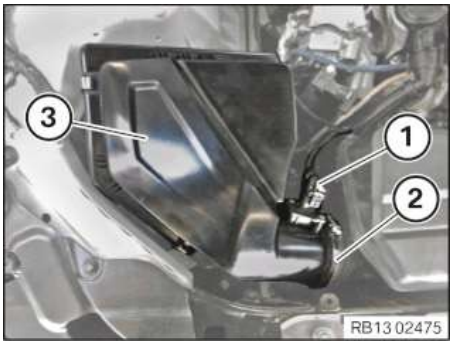
Driving without the strut brace/front-end strut or tension strut is not permitted.



- Loosen screws (1).
- Remove the front-end strut (2).

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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.

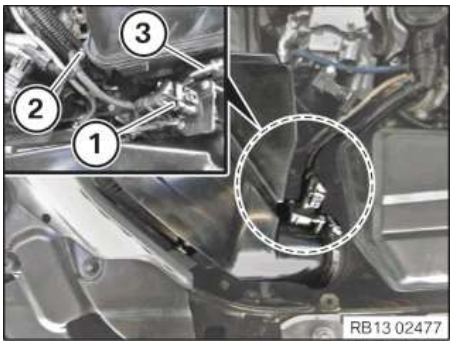
15 – Removing the clean air pipe with the resonator

WARNING

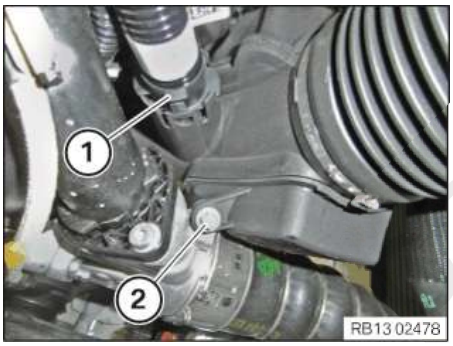
Hot surfaces.

Risk of burning!

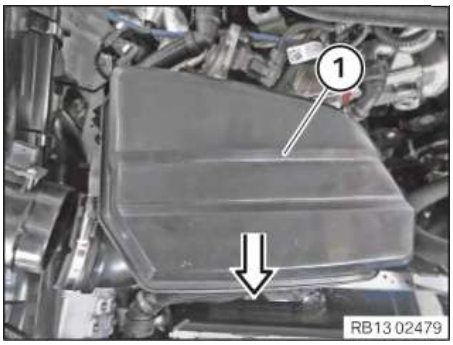
- Perform all work only on components that have cooled down.



- 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!

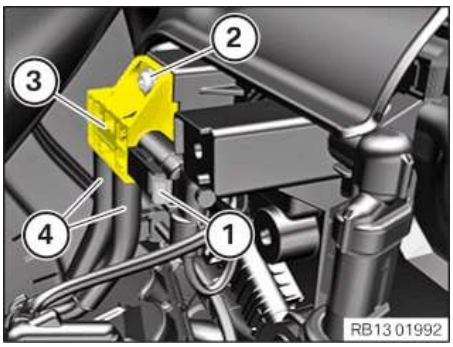
- Perform all work only on components that have cooled down.

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

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WARNING

Hot surfaces.

Risk of burning!

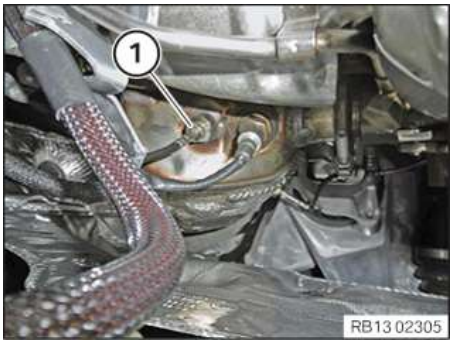
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

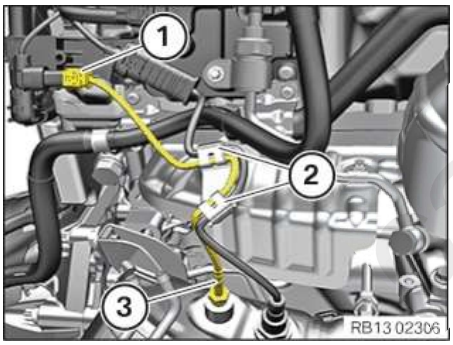
Electrostatic discharge.

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.

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RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

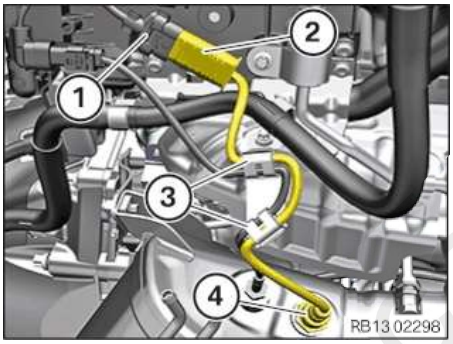
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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.

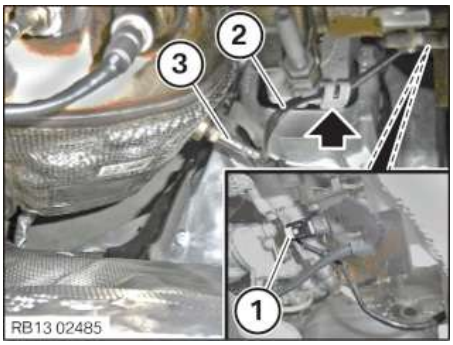
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RISK OF DAMAGE

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)

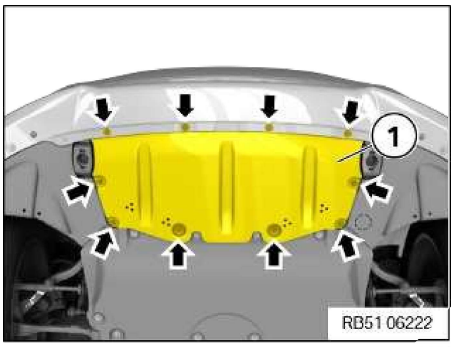


- Unlock plug connection (1) and disconnect.

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).

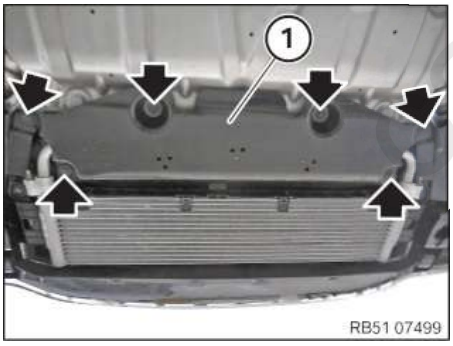
20 – Removing the front underbody protection



- **Version A:**

  Remove screws (arrows).

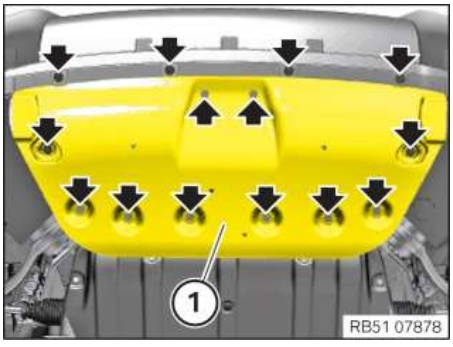
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version B:**

  Remove screws (arrows).

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

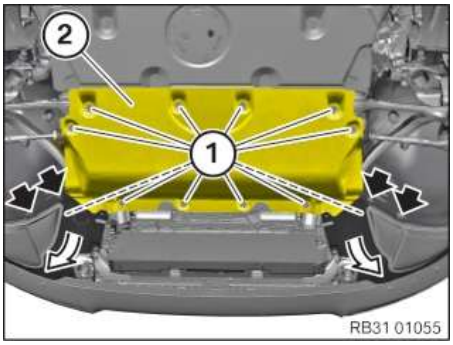


- **Version C:**

  Remove screws (arrows).

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

21 – Remove the underbody protection of the steering gear



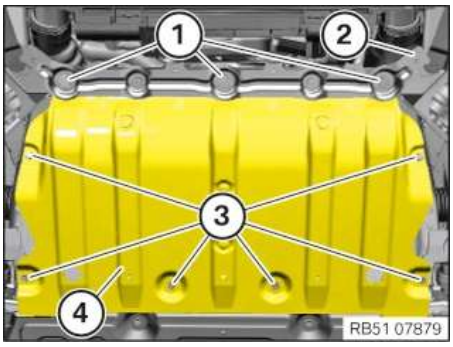
- **Version A:**

  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.

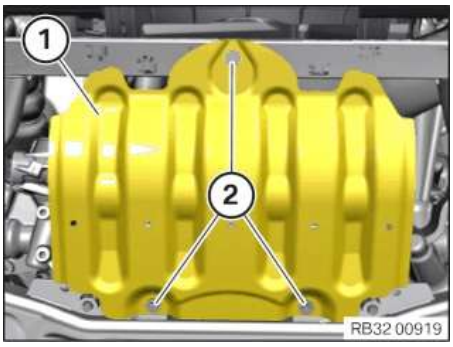
  Loosen screws (3).

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

22 – If installed: Removing the steering underbody protection

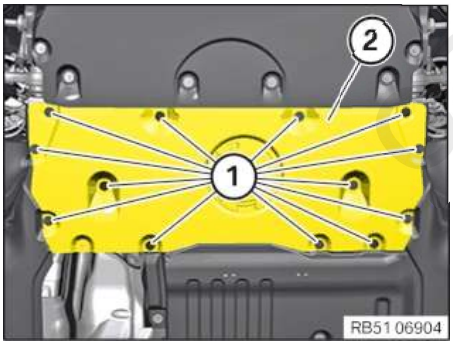
Prerequisite

Front underbody protection has been removed.



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

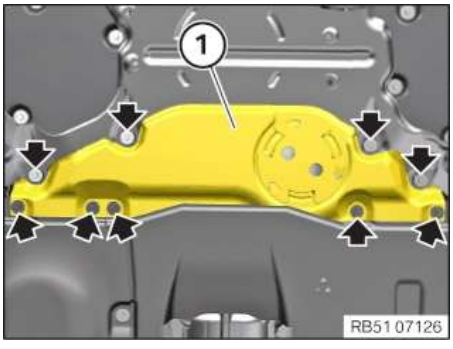
23 – Removing the centre underbody protection



- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .



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

  Remove screws (arrows).

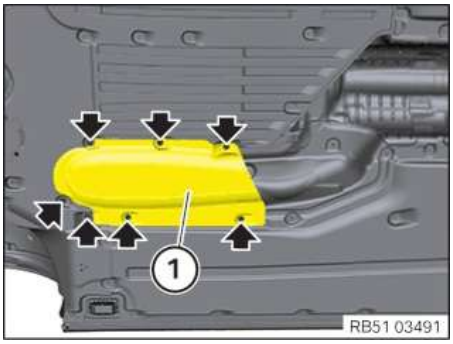
  Feed out and remove the centre underbody protection (1).

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

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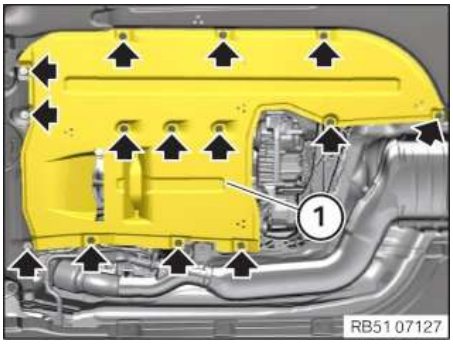
NOTICE

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).

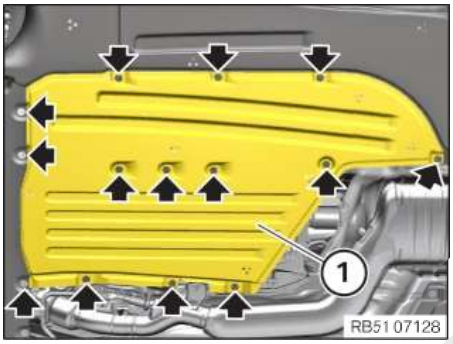
25 – Remove rear underbody protection



- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).

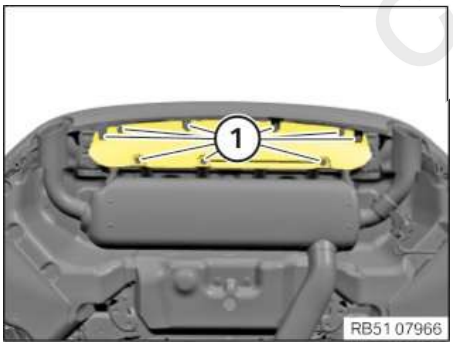


- **Version B:**

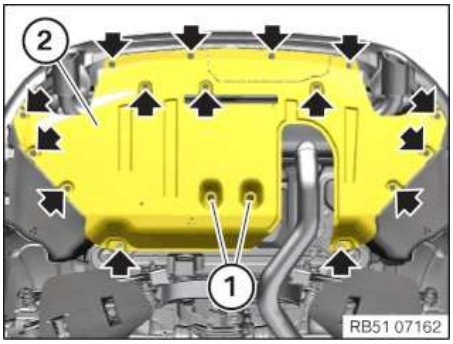
  Remove screws (arrows).

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

26 – Removing the rear diffuser



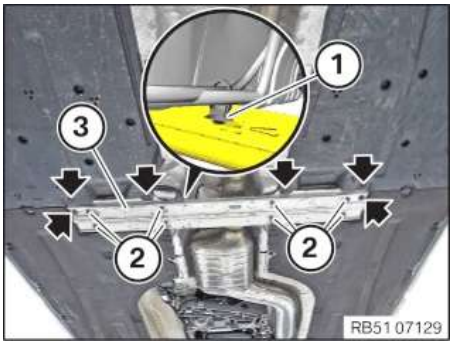
- **Version 1:**
- Release the screws and nuts (1).
- Remove the diffuser.



- **Version 2:**
- Loosen nuts (1).
- Remove screws (arrows).
- Guide out and remove rear diffuser (2).

27 – Remove the connecting support from the tunnel

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- 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!

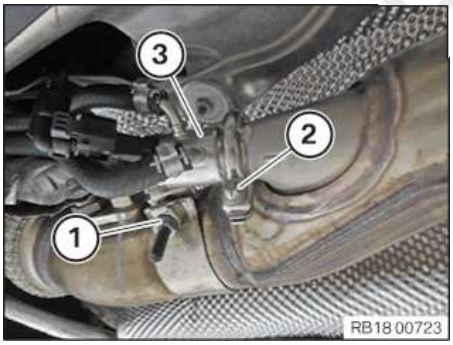
- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

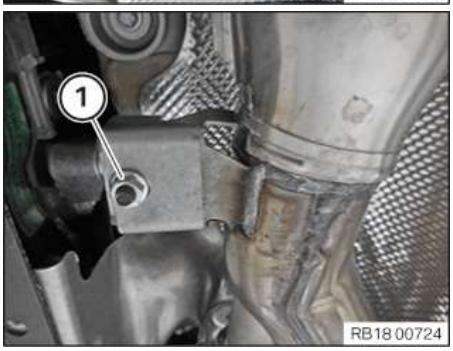
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

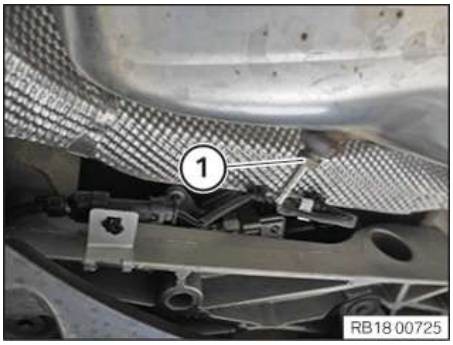


- Unfasten clamp (1).
- Detach the clamp (2) of the SCR metering module (3).
- Detach the SCR metering module (3)from the exhaust system and place to one side.

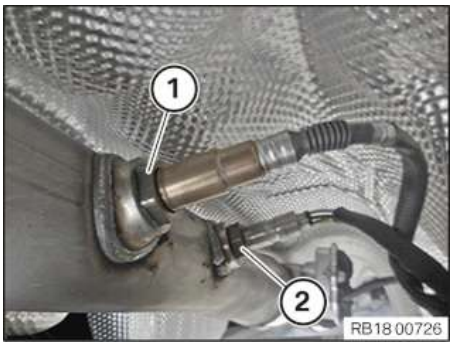


- Loosen nut (1).

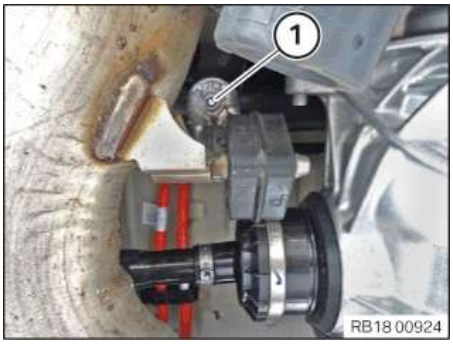
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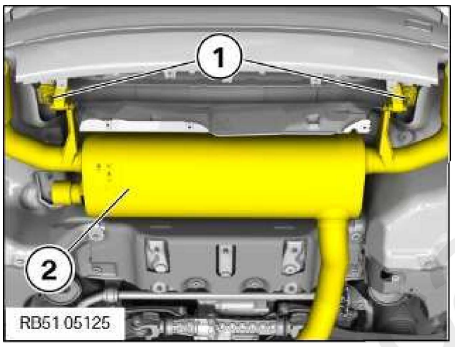
- Detach the exhaust temperature sensor (1) from the exhaust system.



- 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.

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RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

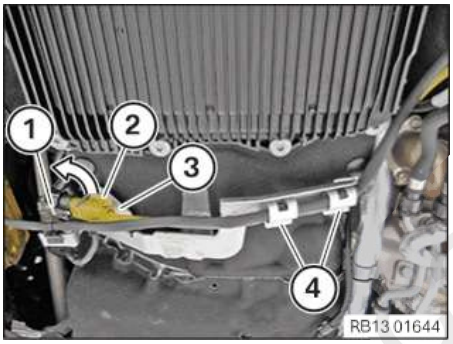
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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.

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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.

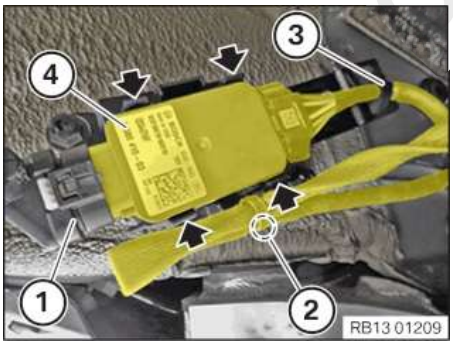
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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

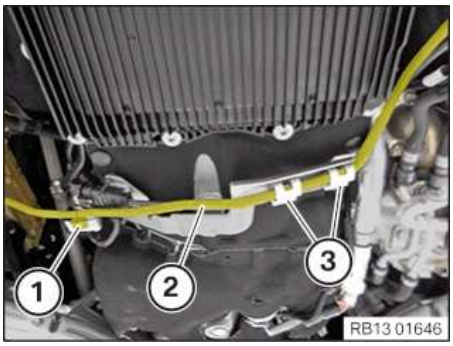
Damage to the nitrogen oxide sensor.

Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

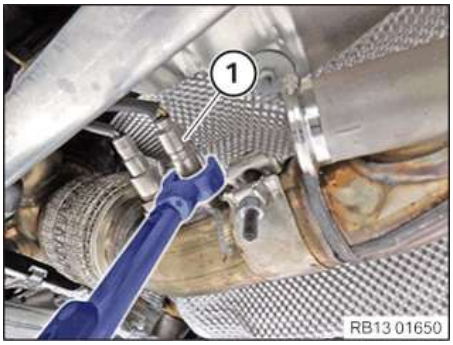
- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug 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.



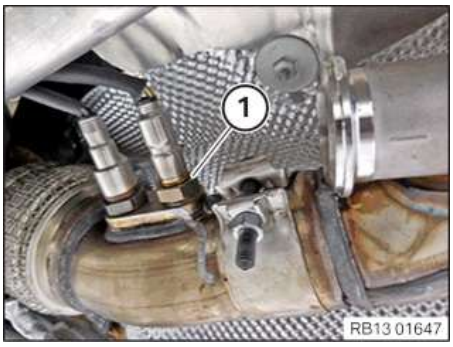
- Unlock plug connection (1) and disconnect.
- Release cable clip in area (2).
- Release line from the holder (3).
- Unclip control unit (4).



- 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!

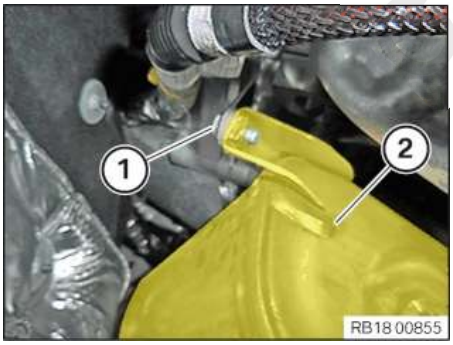
- Perform all work only on components that have cooled down.

CAUTION

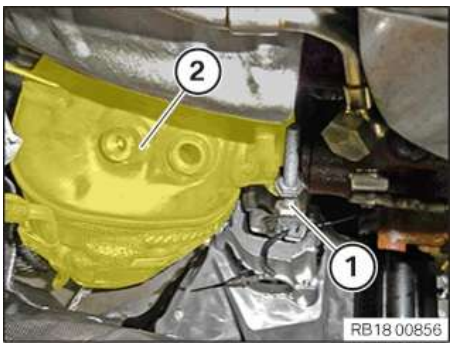
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

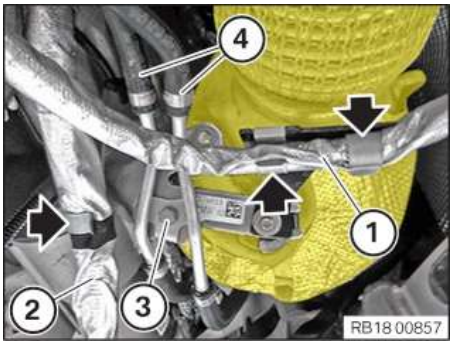


- Release bolt (1) from the holder of diesel particulate filter (2).

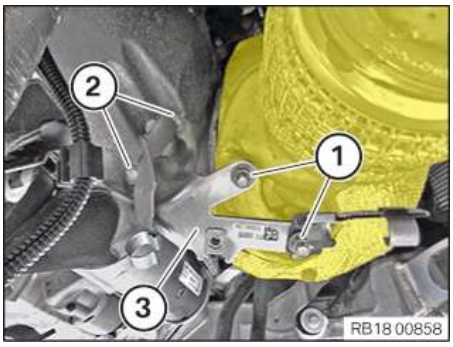


- Loosen V-band clamp (1).
- Feed V-clip (1) out from diesel particulate filter (2) and remove.

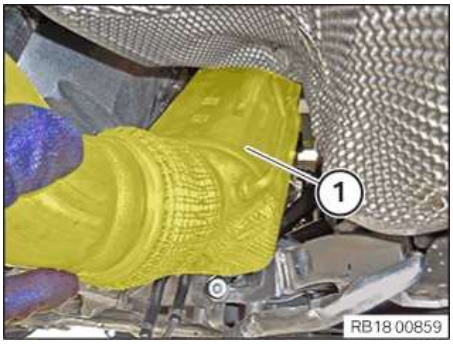
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- Release the metering line (1) from clamps (Arrows).
- Release positive battery cable (2) from starter motor from clamp (Arrow).
- Loosen screw (3).
- Thread off coolant line (4) and place to the side.



- 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.**

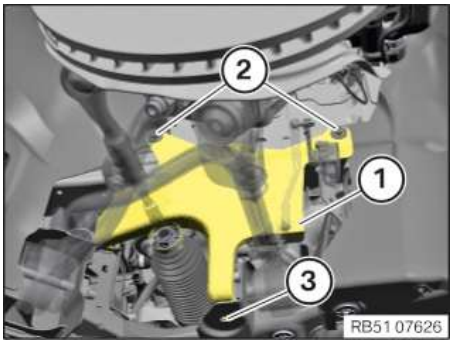
  This process is intended to prevent damage to the brake disc.

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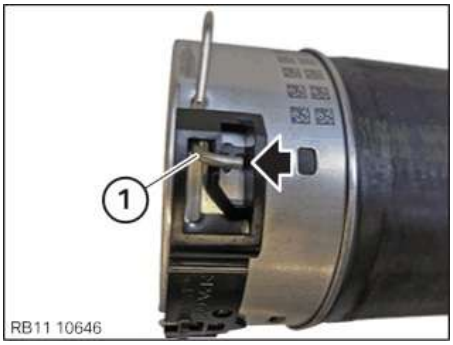
- If several wheels are removed at the same time: Use a piece of chalk to mark on each tyre the axle and side on which the corresponding wheel is fitted.
- Release the wheel bolts (arrows) crosswise and remove the wheel.
- To release and tighten wheel bolts with a security code: Use the correct adapter from the set of special tools .

33 – Remove the cover of the steering assembly



- Loosen screws (2) and (3).
- Remove the cover (1).

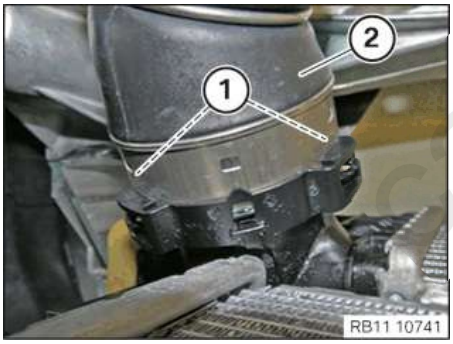
34 – Remove pressure pipe between exhaust turbocharger and charge air cooler



- **Version A:**

  Unlock lock (1).

  The lock (1) must snap audibly into place when unlocked (see arrow).



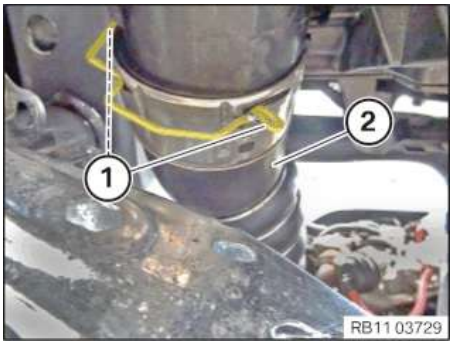
- Unlock the locks (1) on both sides and snap into place.
- Pull off pressure pipe (2) from charge air cooler.



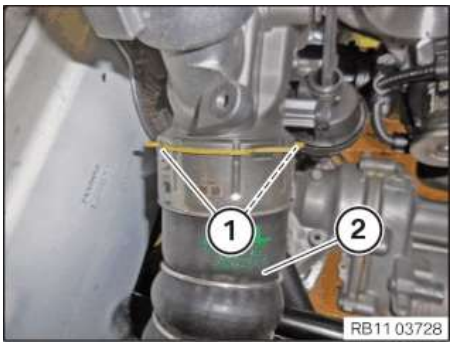
- **Version B:**

  Unlock clamp (1) and engage in this position.

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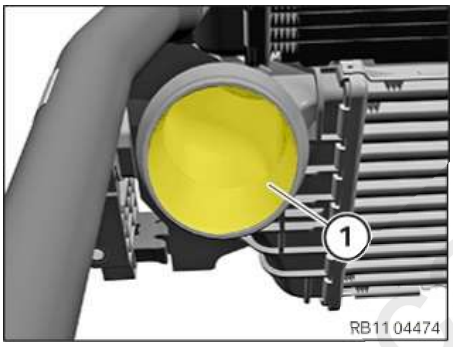
- Unlock the locks (1) and snap into place.
- Pull off pressure pipe (2) from charge air cooler.



- 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.

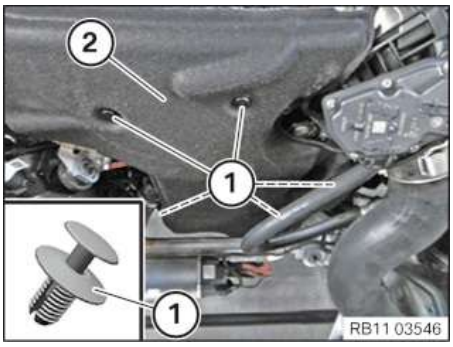
35 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

Risk of burning!

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



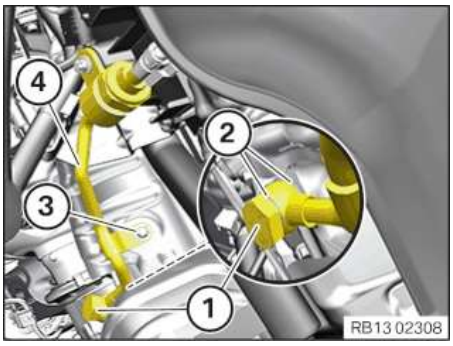
- Release and remove expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

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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.

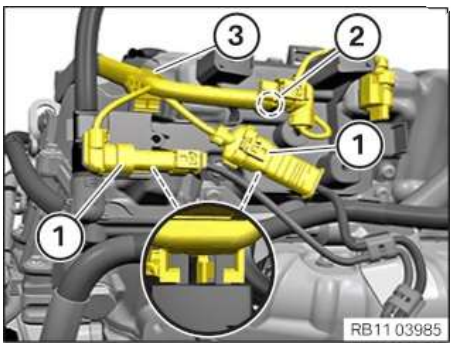
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

Contaminant or foreign body.

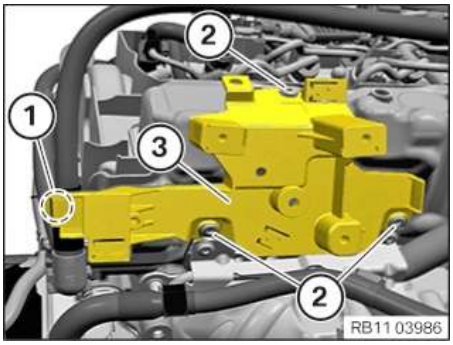
Contamination can result in malfunctions, operating failure or leaks.

- 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.

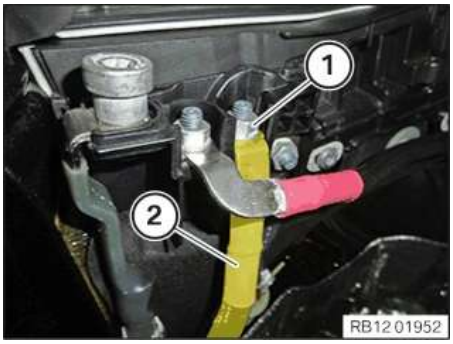
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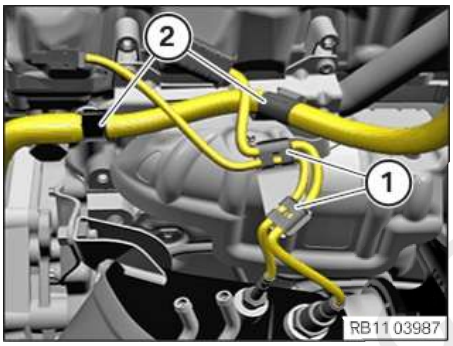
- Release the positive battery cable in the area (1) from the clamp and set it aside.
- Loosen screws (2).
- Feed out holder (3) for the sensor system and remove.



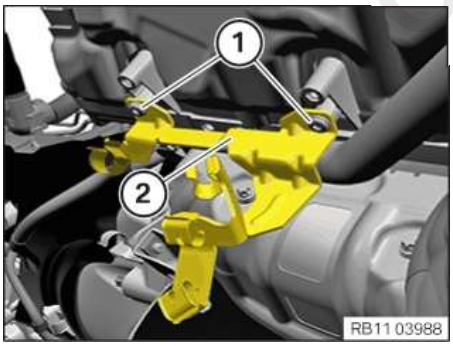
- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.



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



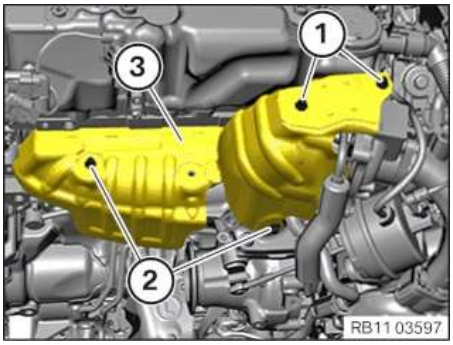
- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



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

38 – Removing heat shield

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- 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.

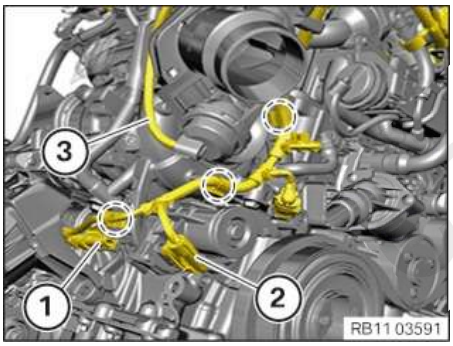
- Remove and install heavy components with the aid of another person/other persons.

TECHNICAL INFORMATION

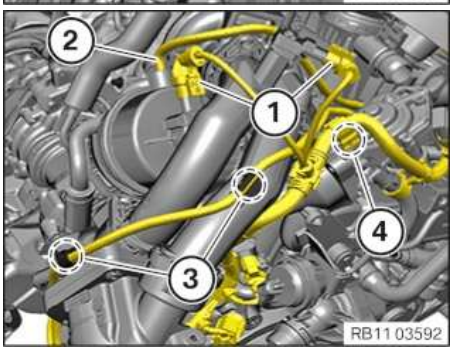
Prior to replacing the exhaust turbocharger: Observe the notes on troubleshooting on the exhaust turbocharger.
For additional information see: FUB-FUB-FB-130003-A10 Troubleshooting on the exhaust turbocharger

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).



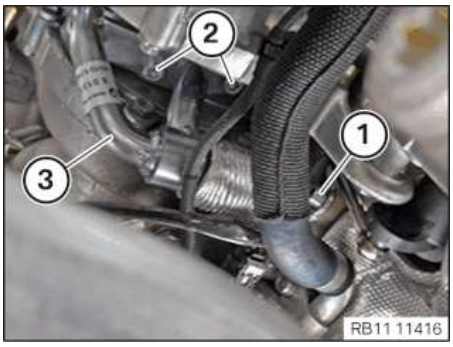
- Unlock plug connections (1) and disconnect.
- Pull off the vacuum hose (2).
- Release the vacuum hose in marked areas (3) from the exhaust turbochargers.
- Release the wiring harness in area (4) from the exhaust-gas recirculation cooler and set it aside.



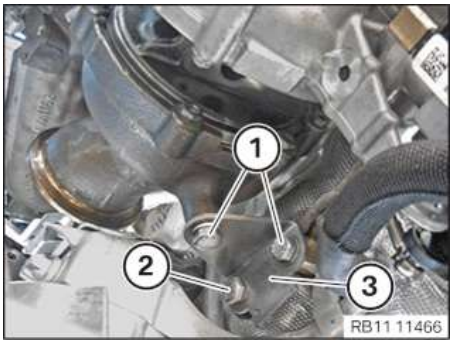
TECHNICAL INFORMATION

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

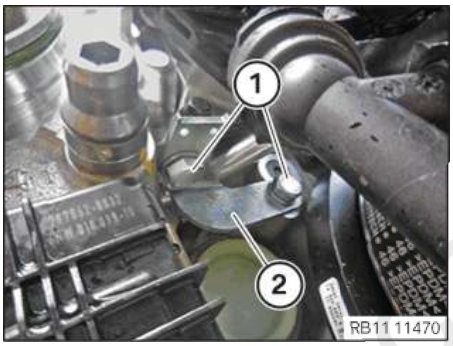
- Release the screws of the oil return line on the crankcase from the right wheel arch.



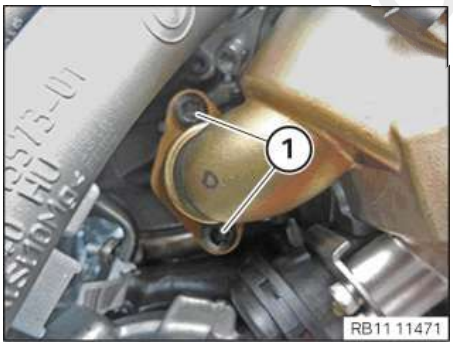
- Release the screw (1).
- Loosen screws (2).
- Remove oil return line (3) from the crankcase.
- Catch and dispose of emerging engine oil.



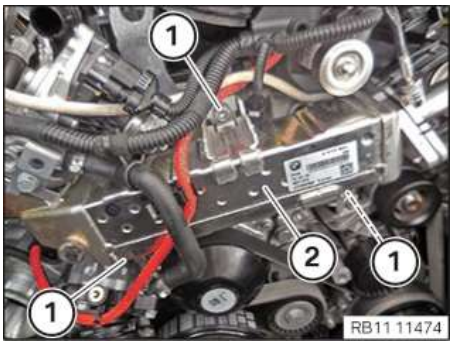
- Unscrew and remove the bolts (1) on the holder (3).
- Slacken screw (2) on holder (3), but do **not** remove.



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

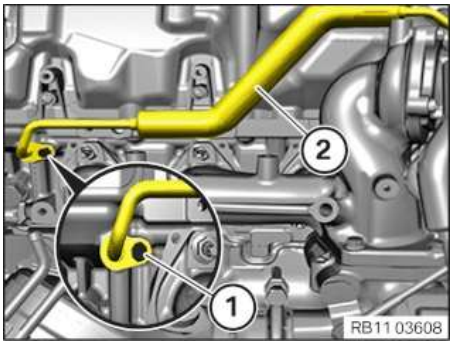


- Loosen screws (1).

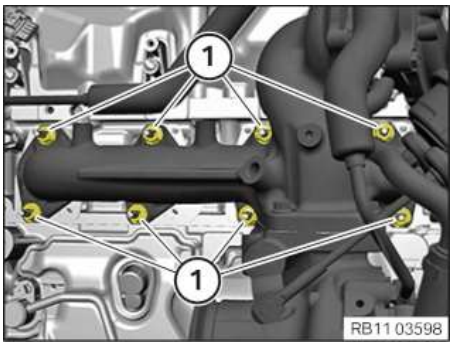


- Slacken screws (1), but do **not** remove.
- Release exhaust-gas recirculation cooler (2) slightly.

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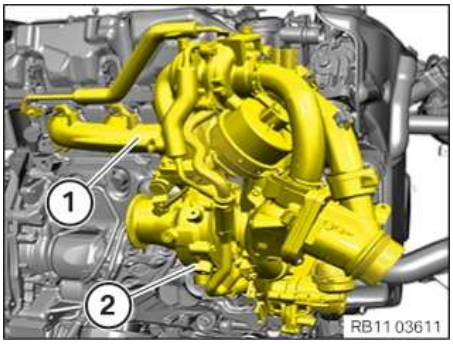
- Loosen screw (1).
- Remove oil feed line (2) for the high-pressure stage exhaust turbocharger from the cylinder head and set it aside.
- Catch and dispose of emerging engine oil.



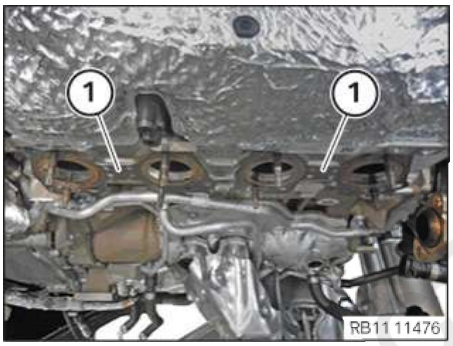
TECHNICAL INFORMATION

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

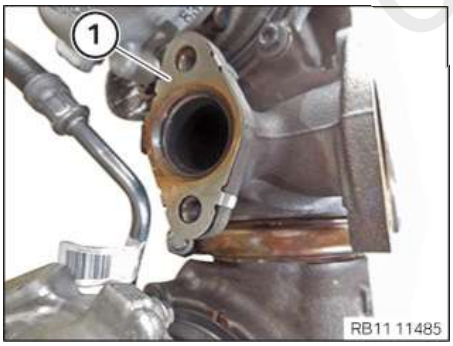
- Loosen nuts (1).



- 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.

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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.

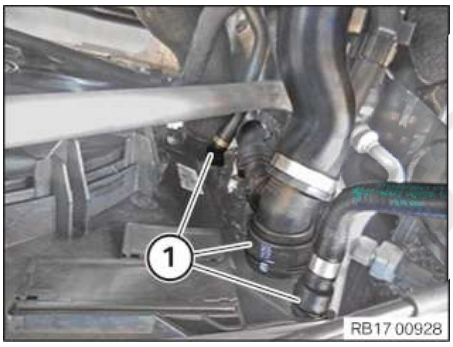
In the case of other removal work involving the draining of part quantities of coolant, the coolant level must be topped up with new coolant.

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

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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

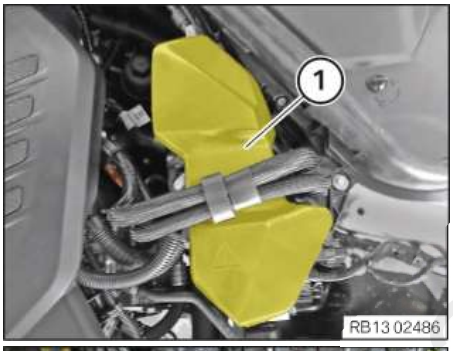
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

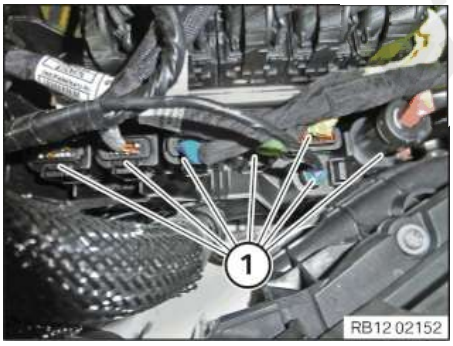
- Do not pull on the wires when disconnecting connectors and plug connections.

TECHNICAL INFORMATION

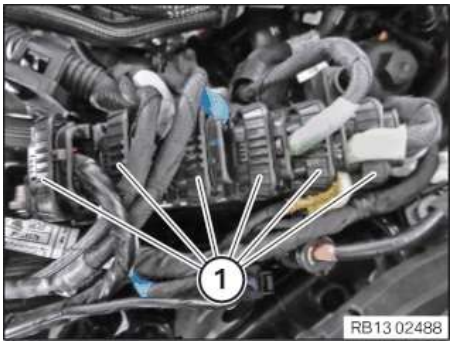
Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.



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

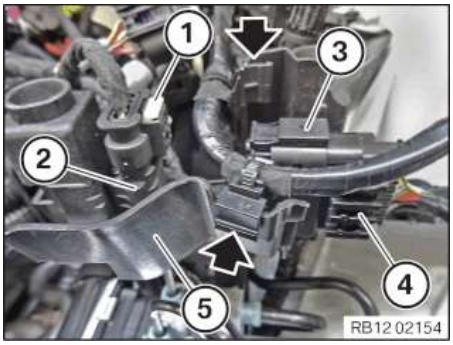


- Unlock and disconnect plug connections (1).

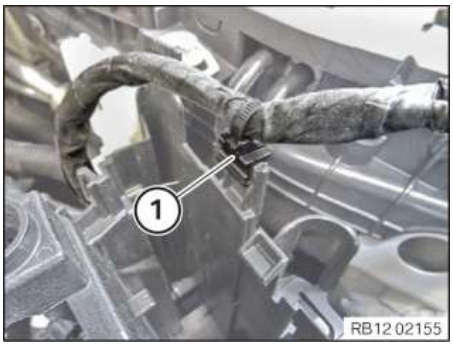


- Unlock and disconnect plug connections (1).

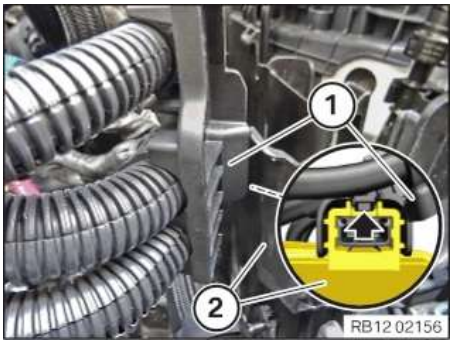
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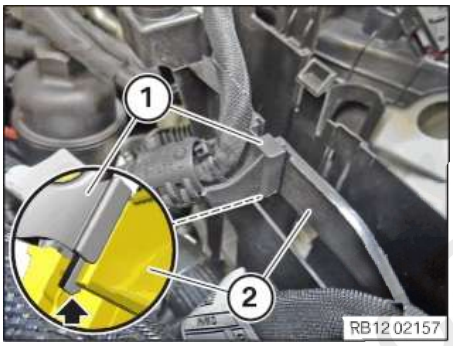
- Unlock plug connection (1) and disconnect.
- Unlock the plug (2) and disconnect from the control unit holder (5).
- Unlock plug connection (3) and disconnect.
- Unlock the plug (4) and disconnect from the control unit holder (5).
- Release the clamps (arrows).



- 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).

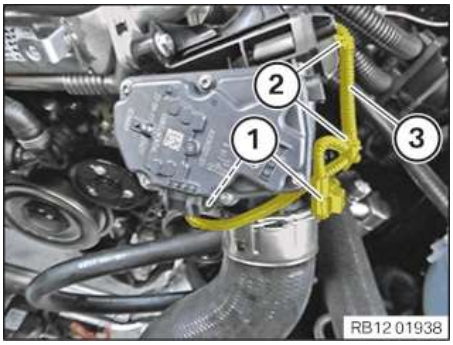


- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.

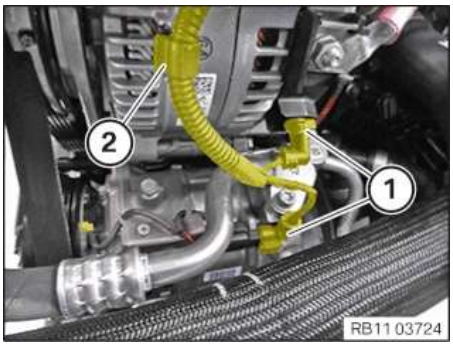


- Unlock holder (1) and feed out coolant line (2) and place it aside.

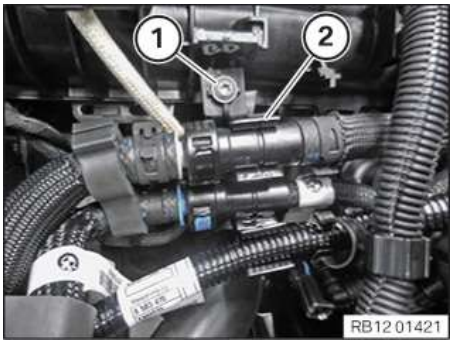
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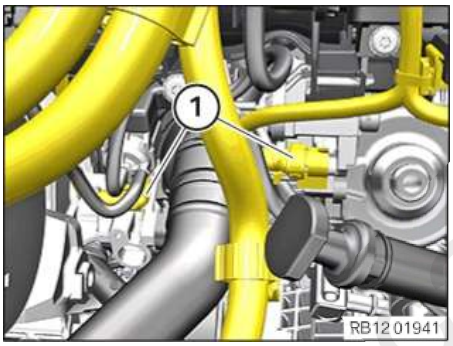
- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.



- 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).

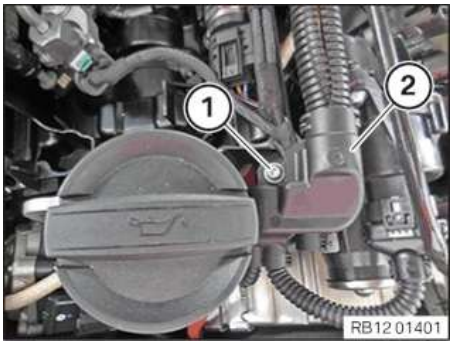


- Unlock and loosen connector (1).

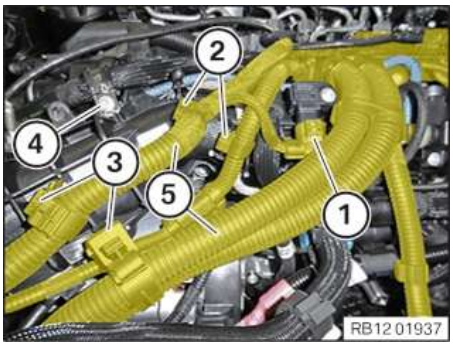


- Unlock plug connection (1) and disconnect.

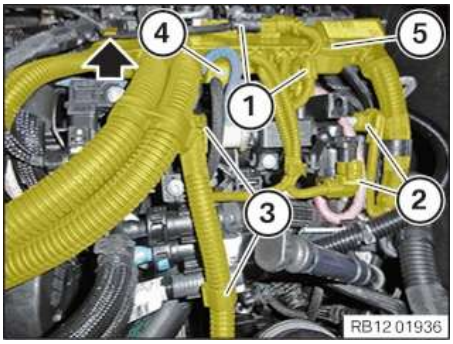
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- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.



- 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.

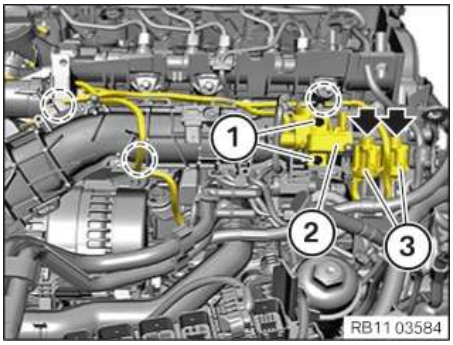


- Unlock clamp (1) and engage in this position.

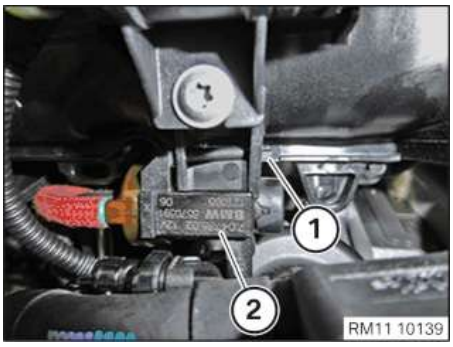


- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.

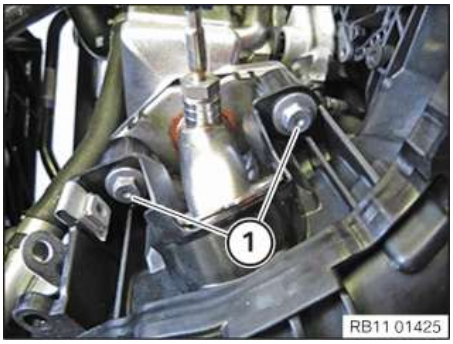
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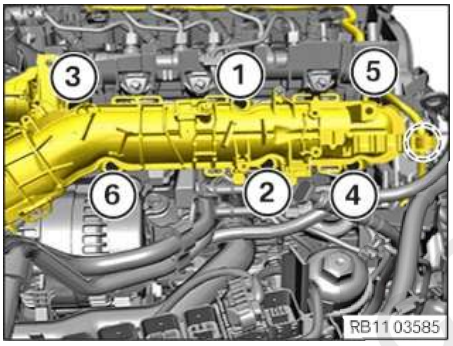
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



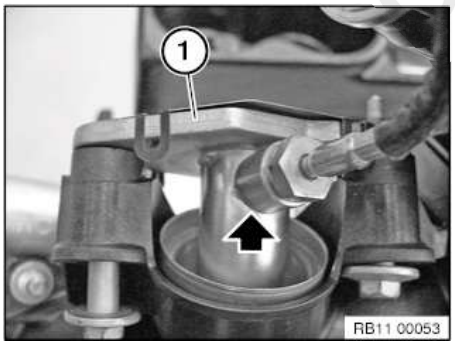
- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.



- 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**

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RISK OF DAMAGE

Escaping coolant on the starter generator.

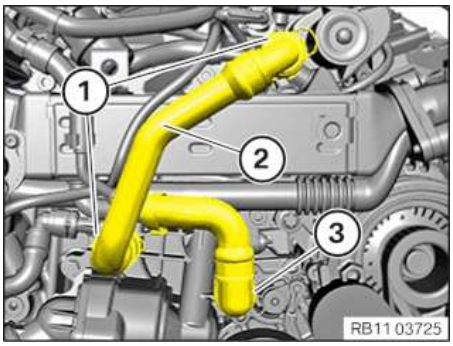
Damage and operating failure of the starter generator.

- 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:**

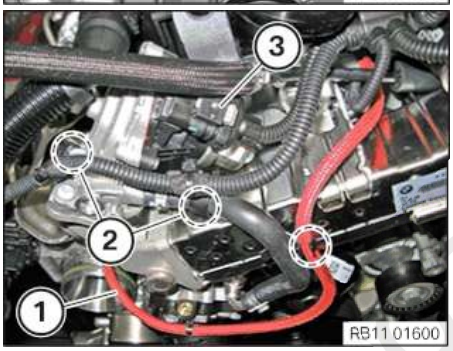
  Unlock and pull off coolant lines (1).



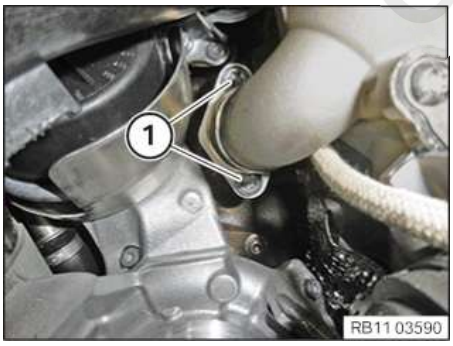
- **Version B:**

  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.

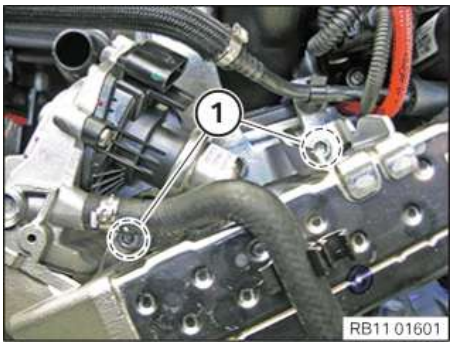


- Loosen the screws (1) on the intake system.

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- 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!

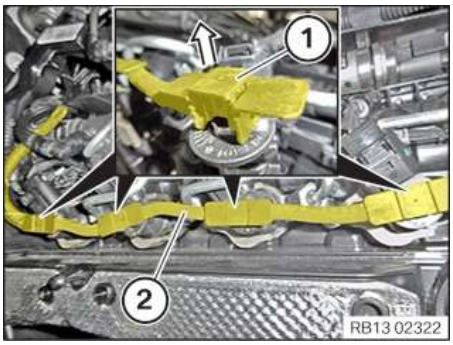
- Perform all work only on components that have cooled down.

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.



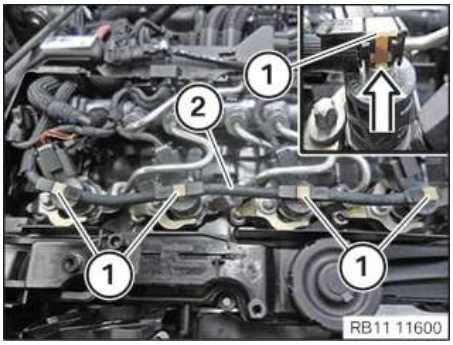
- **Version A:**

  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.

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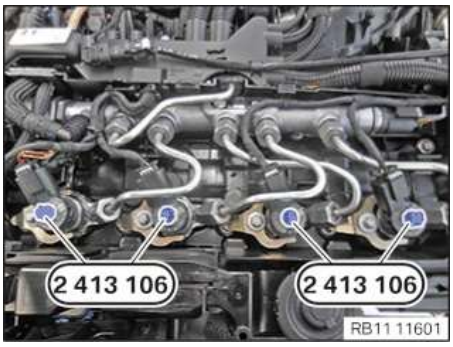


- **Version B:**

  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.

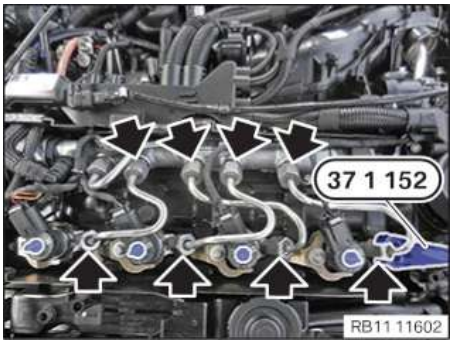
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TECHNICAL INFORMATION

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.

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TECHNICAL INFORMATION

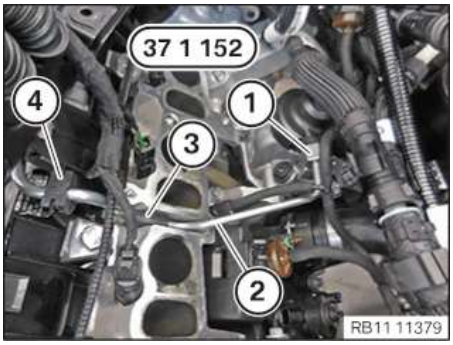
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

TECHNICAL INFORMATION

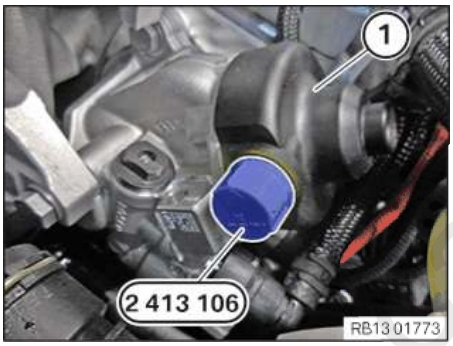
Reset special tool in early to avoid bending pressure lines.



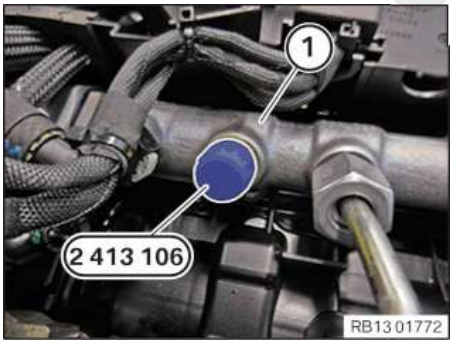
- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.



- 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

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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

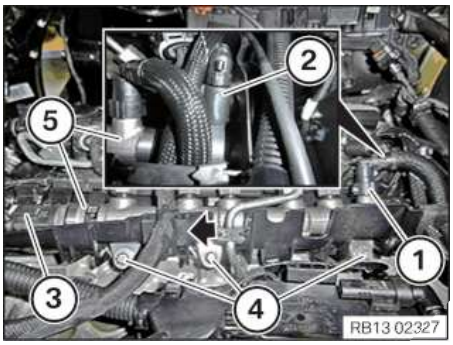
Contaminant or foreign body.

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.

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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

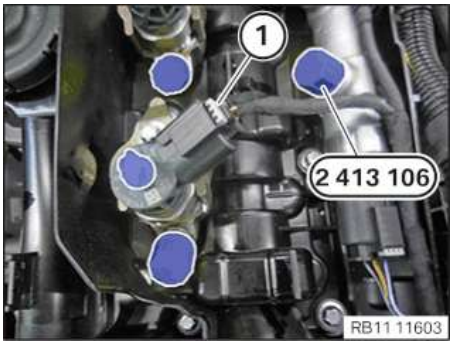
Electrostatic discharge.

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)

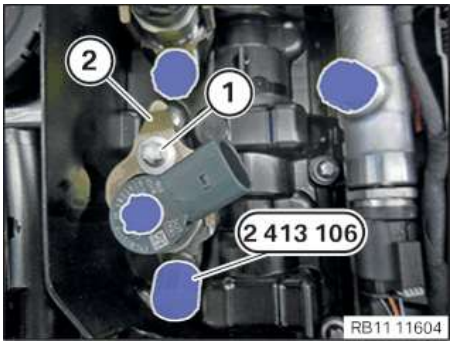
TECHNICAL INFORMATION

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



- Unlock plug connection (1) and disconnect.

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

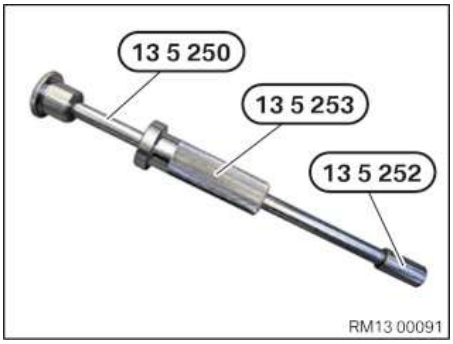
▸ **Loosen stuck injectors**

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).

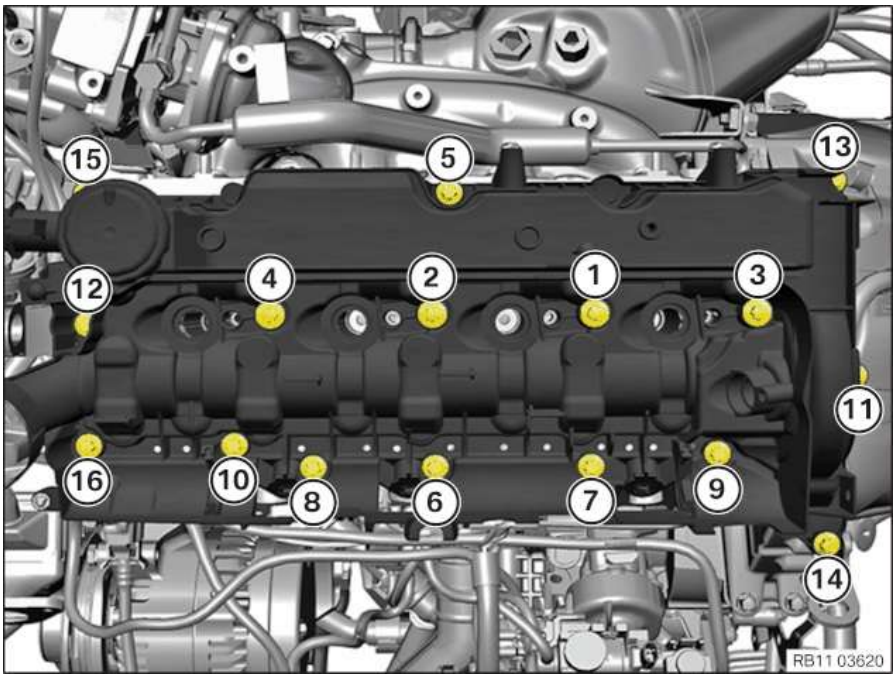


- Screw special tool 0 493 321 (13 5 250) with special tool 0 493 339 (13 5 252) onto pressure line connection (1) of injector.
- Release injector (1) with special tools 0 493 321 (13 5 250) and 0 493 339 (13 5 252) by means of **short** back and forth movements and remove.

49 – Removing the cylinder head cover

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Screw connection of the cylinder head cover



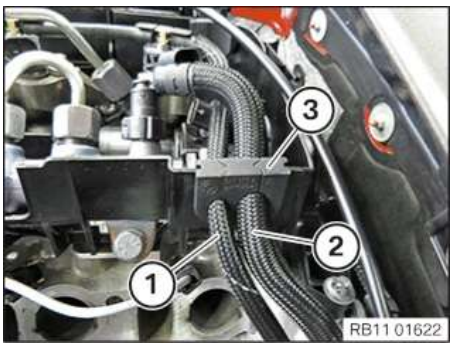
1 - 16 Bolts of the cylinder head cover



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

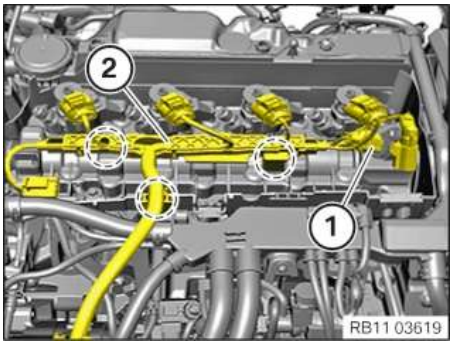


- Feed out and remove the heat shield (1).

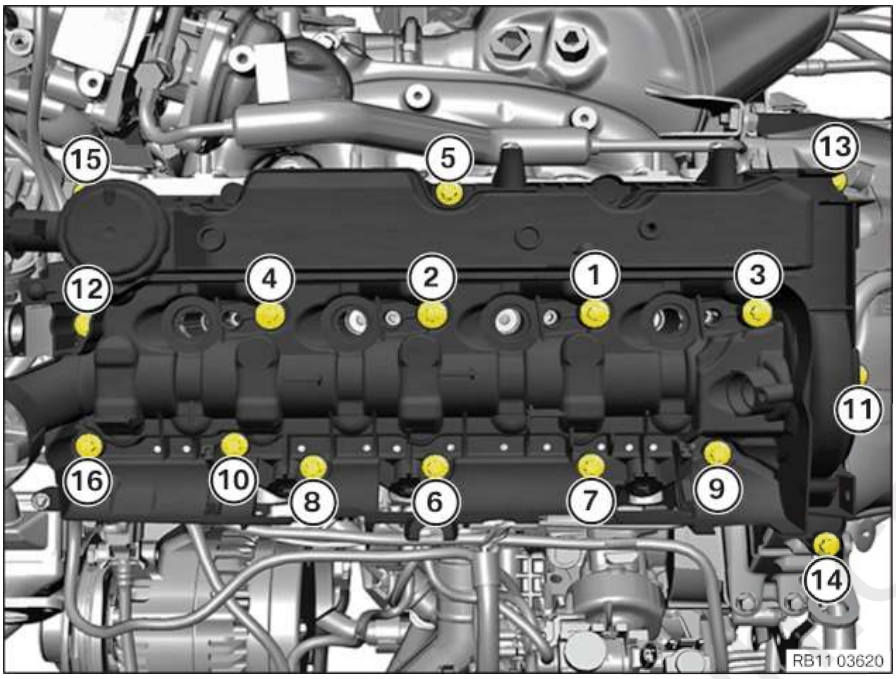


- Remove the leakage oil line (1) including the fuel return line (2) and the grommet (3) and put to one side.

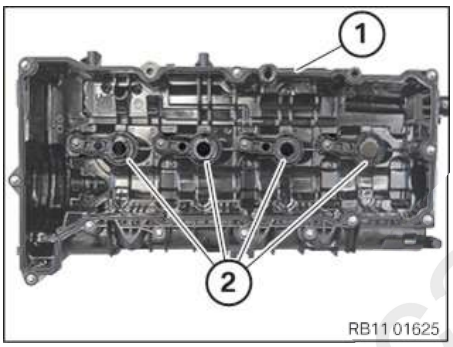
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- Unlock connector (1) and pull off.
- Disconnect the wiring harness (2) in the marked areas from the cylinder head cover and set aside.



- 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.

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WARNING

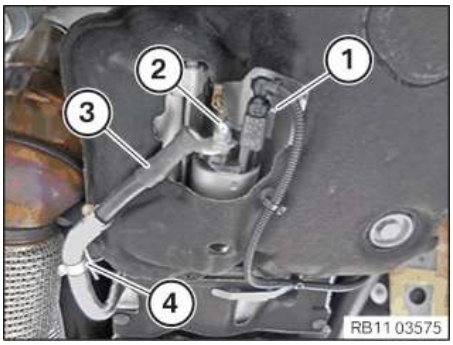
Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

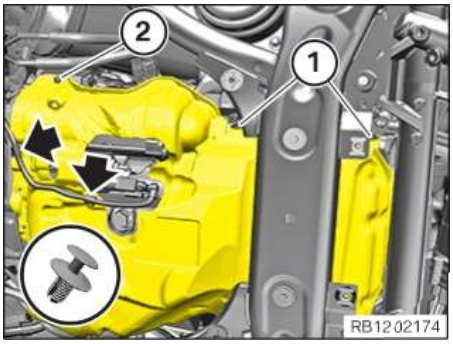
- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

TECHNICAL INFORMATION

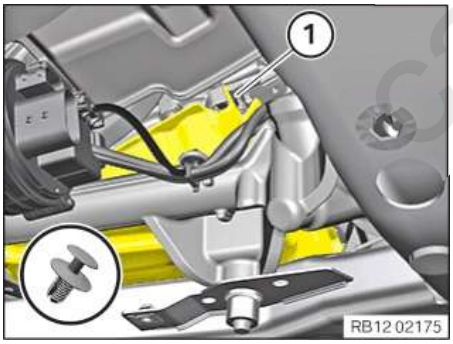
Make sure that the acoustic cover is **not** damaged while removing the starter motor.
A damaged lower acoustic cover can only be renewed when the front axle is lowered.



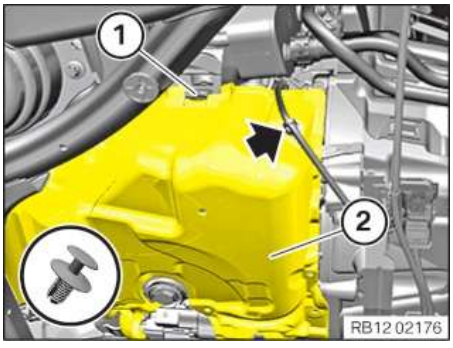
- Unlock plug connection (1) and disconnect.
- Release nut (2).
- Release positive battery cable (3) from holder (4).



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

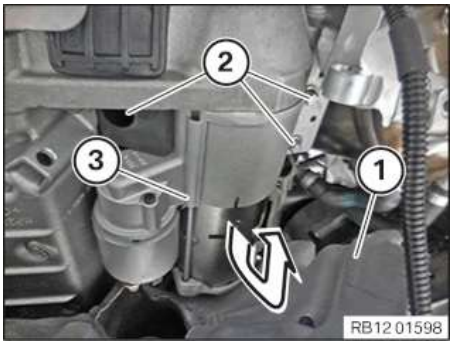


- Loosen expanding rivet (1).
- Lower the acoustic cover of the oil sump.



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

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- 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

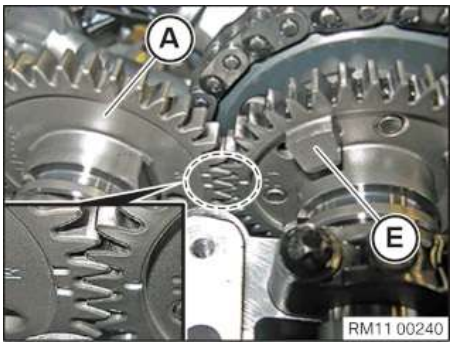
Damage to the engine.

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

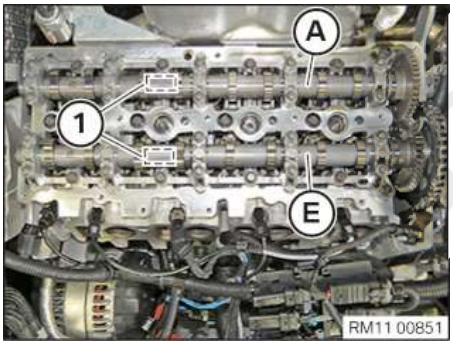
- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

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

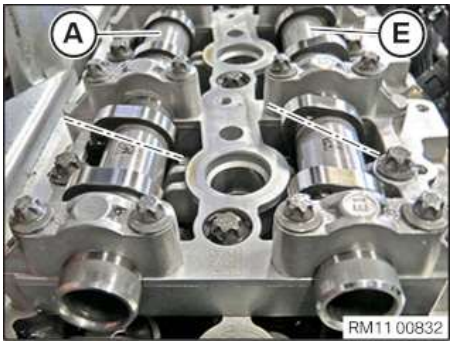
  Do **not** crank the engine in reverse.



- 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.



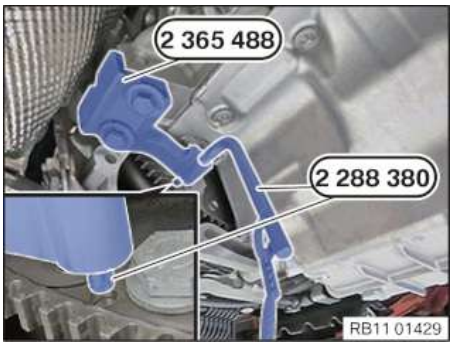
- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.

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- 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

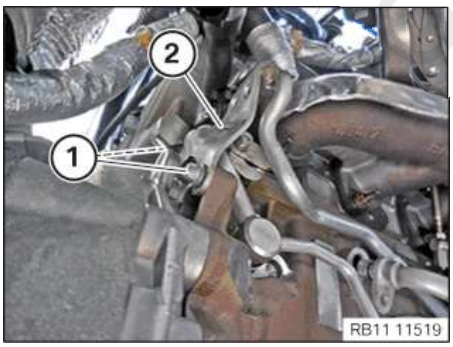
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

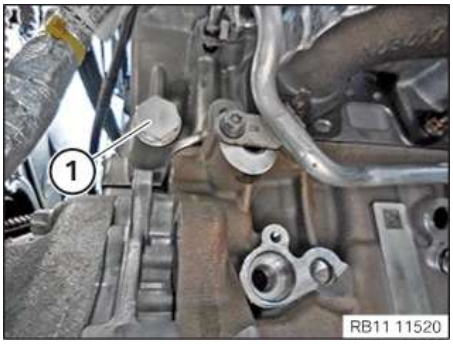
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

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



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



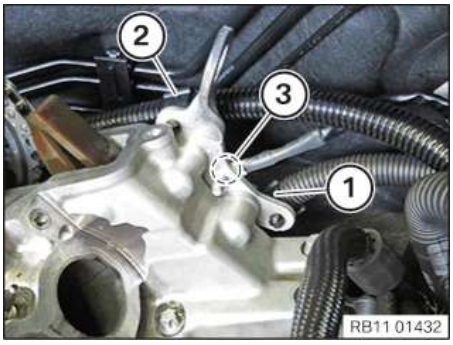
- Loosen the chain tensioner piston (1).
- Catch and dispose of emerging engine oil.

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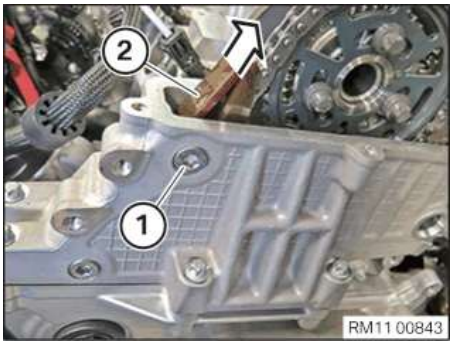


- Feed out and remove the sealing ring (1).

53 – Remove the timing chain guide rail

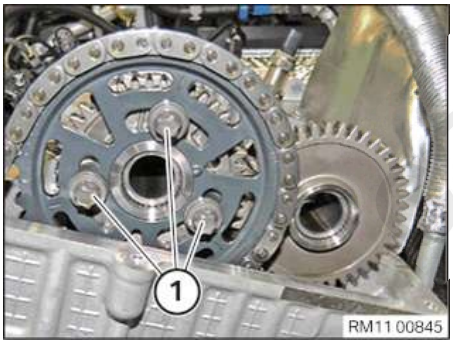


- Loosen the vehicle wiring harness (1) from the bracket.
- Release the positive battery cable (2) from the holder .
- Loosen the screw (3) and remove the grounding cable.



- 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



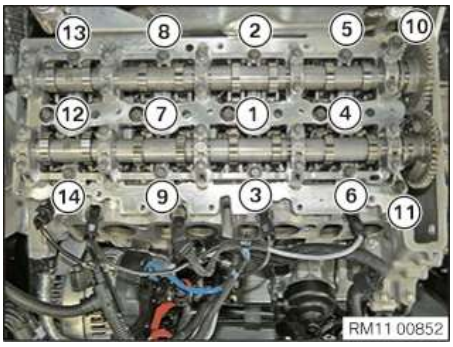
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

56 – Removing the camshaft support

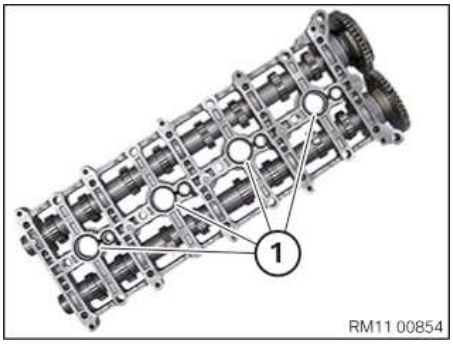
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TECHNICAL INFORMATION

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.

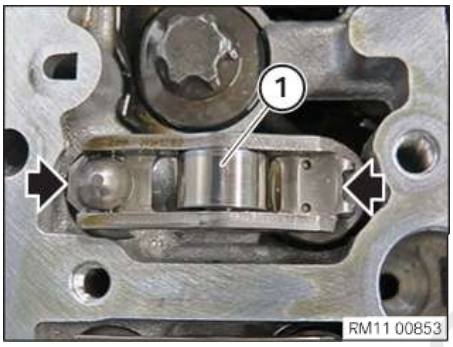


- Unscrew the screws evenly in order (14) to (1) in multiple increments.
- Feed out and remove the camshaft support with the camshafts towards the top.



- Guide out and remove gaskets (1).

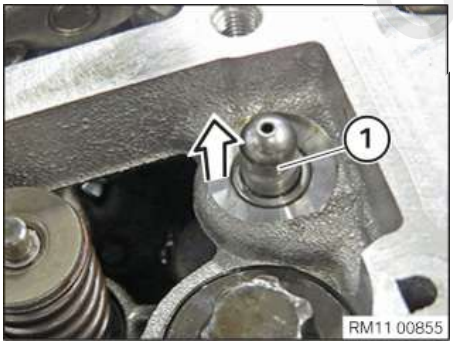
57 – Remove roller cam followers



- 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).

MAIN WORK

59 – Removing cylinder head

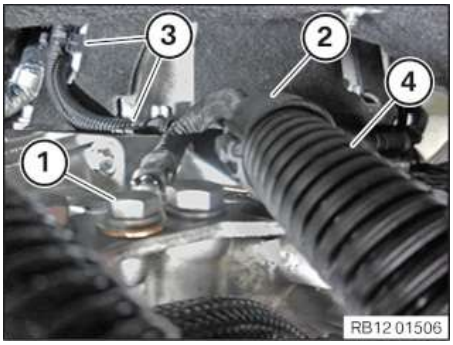
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RISK OF DAMAGE

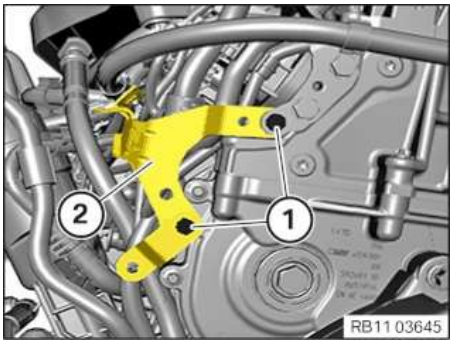
Heavy component.

Heavy components can lead to injury or damage.

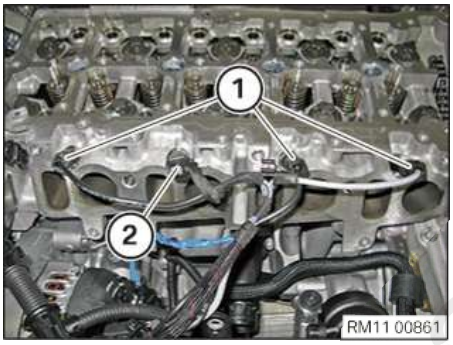
- Remove and install heavy components with the aid of another person/other persons.



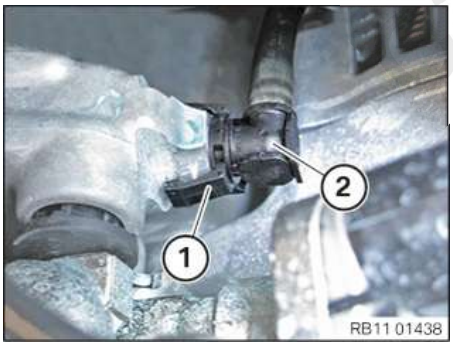
- Loosen screw (1).
- Unlock and loosen holder (2).
- Unlock and loosen the clamps (3).
- Feed out the wiring harness section (4) of the automatic transmission and place to one side.



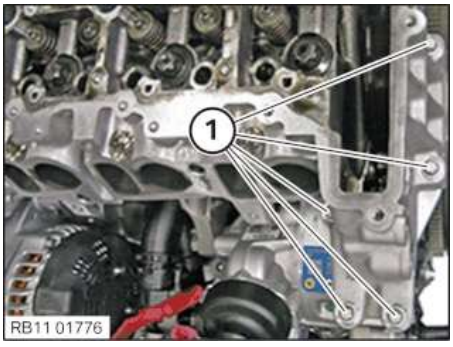
- Loosen screws (1).
- Guide out and remove holder (2).



- 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.

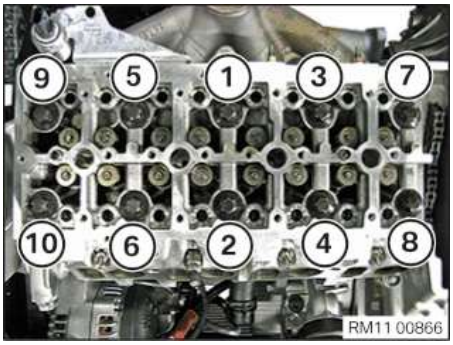


- Release lock (1) of coolant line.
- Remove the coolant line (2) and set it aside.

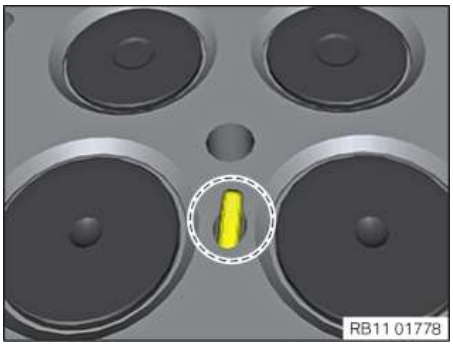


- Unscrew and remove the bolts (1).

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- 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).

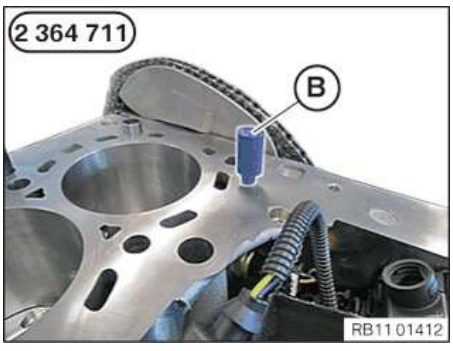
60 – Cleaning the sealing surface

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.

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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).



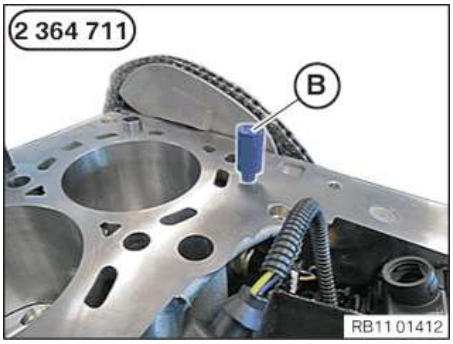
RISK OF DAMAGE

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.

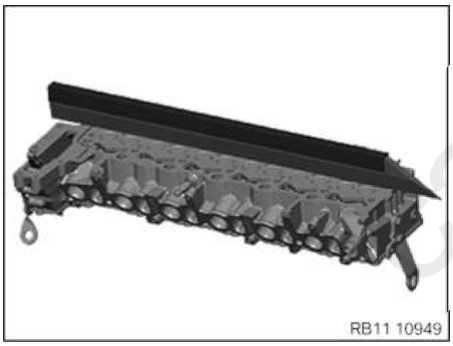
- Do not use any metal-cutting tools.

- Clean the sealing surface using special tool 0 495 104 (11 4 472).



- Remove special tool (B).

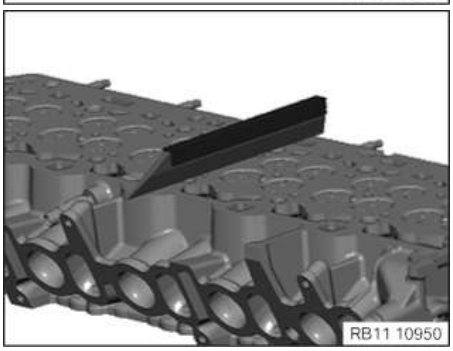
61 – Check the flatness of the cylinder head



- 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



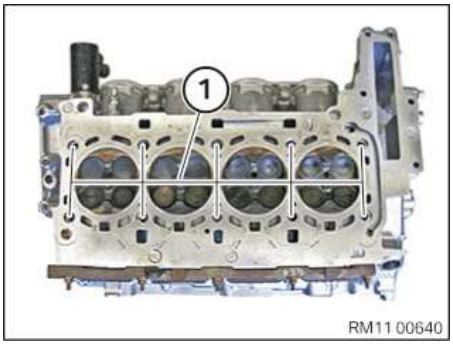
- Check the flatness of the cylinder head crosswise using a straightedge.

Cylinder head flatness

Maximum lengthwise deviation from flatness	0.10 mm
Maximum transverse deviation from flatness	0.05 mm

62 – Replace cylinder head gasket

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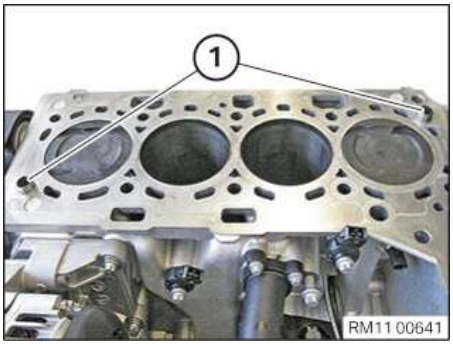
RISK OF DAMAGE

Damage to the surface.

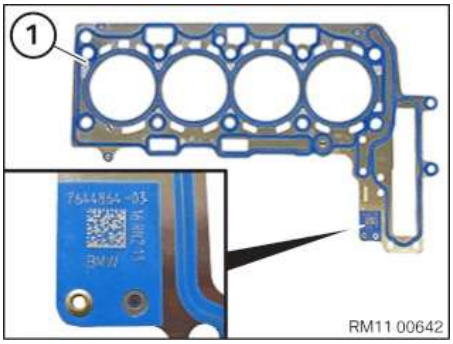
The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.

- Remove oil and dirt residue from the blind holes (1).

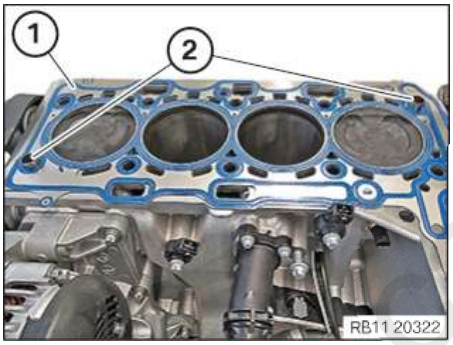


- Check if fitting sleeves (1) fit correctly and check for any damage.



- 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).

63 – 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).

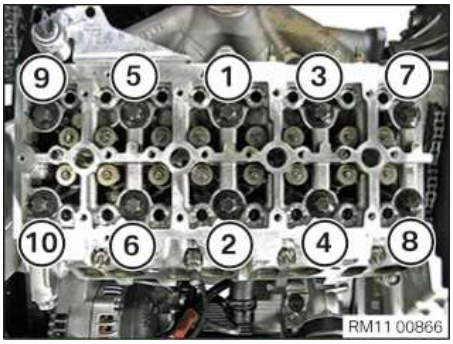
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TECHNICAL INFORMATION

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.

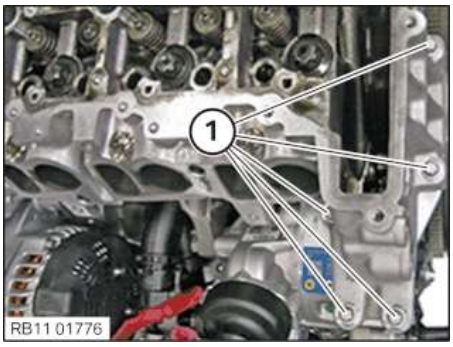


- Position the cylinder head gasket with the previously determined gasket thickness (number of holes).
- Fit new cylinder head screws.

  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

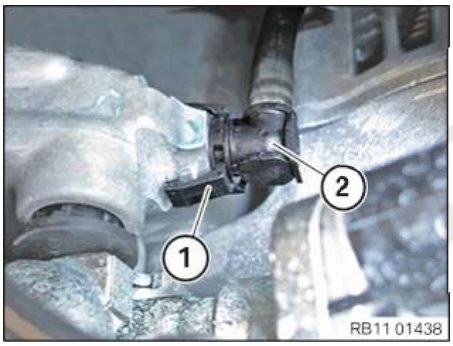
M12x1.5	Renew screws.	1. Tightening torque	50 Nm
		2. Angle of rotation	120 °
		3. Angle of rotation	120 °



- Insert screws (1) and tighten.

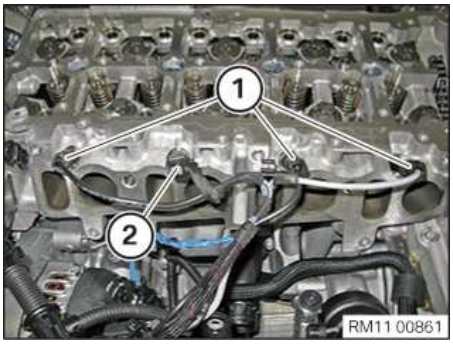
Cylinder head bolt to timing case cover

M8x40		Tightening torque	19 Nm



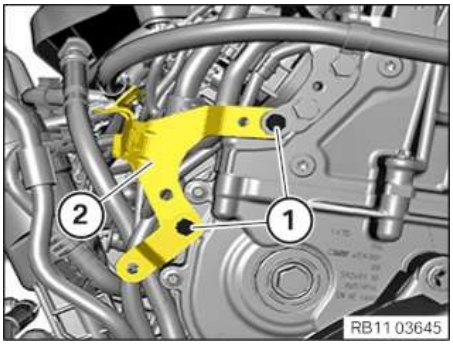
- Fit and lock coolant line (2).

  The lock (1) must engage audibly.



- Connect connectors (1) and (2), then lock.

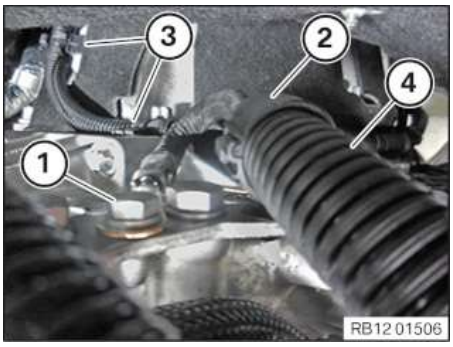
  The connectors (1) and (2) must audibly engage.



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

Standard screw connection M6

M6		Tightening torque	8 Nm



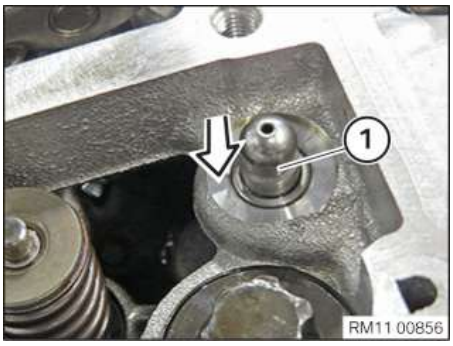
- Guide in the wiring harness section (4) of the automatic transmission and install.
- Lock holder (2).
- Make sure the bracket (2) engages audibly.
- Secure clamps (3).
- Tighten down screw (1).

Ground to cylinder head

M6		Tightening torque	8 Nm

POSTPROCESSES

64 – Installing all hydraulic valve clearance compensating elements

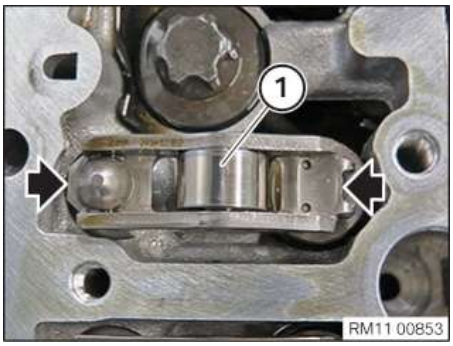


- Make sure to observe the assignment of the roller cam followers to the hydraulic valve clearance compensating elements when reusing the hydraulic valve clearance compensating elements (1).
- Insert and install all hydraulic valve clearance compensating elements (1) in the direction of the arrow.

65 – 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).

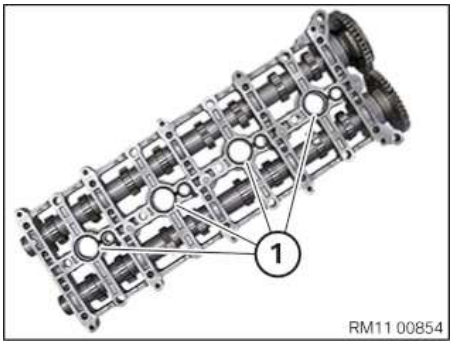
  Roller cam followers (1) that have already been used must be installed in the same place.
- Note the mounting orientation of the roller cam followers (1).
- Oil all roller cam followers (1).

66 – Installing the camshaft support

TECHNICAL INFORMATION

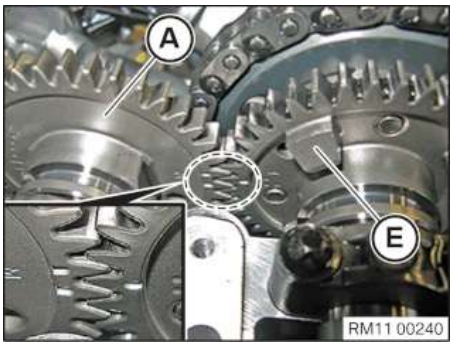
The camshaft is tensioned by the valve springs. Tighten or loosen each screw on the camshaft bearing caps one at a time in the specified sequence and by half a turn only. Repeat procedure.

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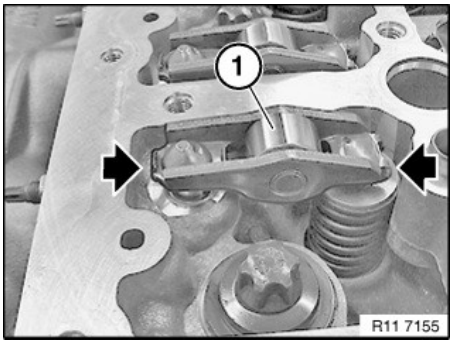


- Renew seals (1).

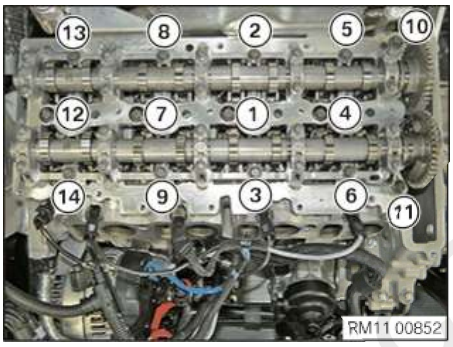
  Parts: Seals
- Insert and install the gaskets (1).



- 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

67 – Installing the special tool to secure the exhaust camshaft

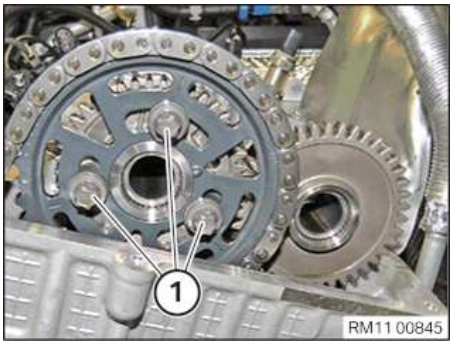


- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

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

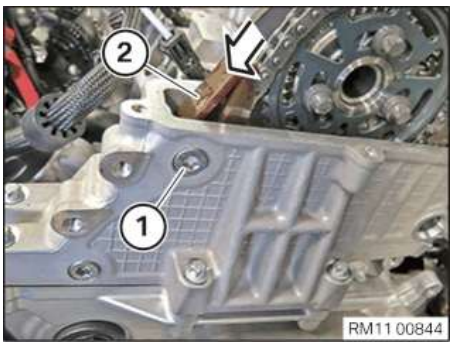
68 – Installing the camshaft sprocket on the intake camshaft

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- 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.

69 – Installing the guide rail of the timing chain

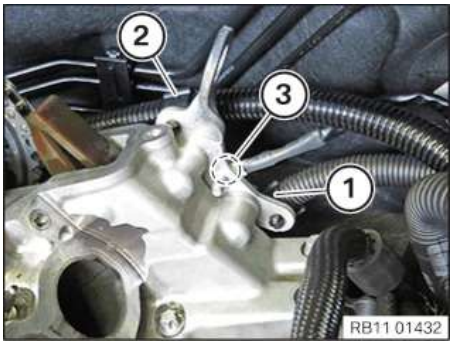


- Position the guide rail (2) in the direction of the arrow.
- Make sure the guide rail (2) is correctly installed at the bottom bearing journal.
- Renew bearing journal (1).

  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.

70 – Installing the chain tensioner piston



TECHNICAL INFORMATION

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

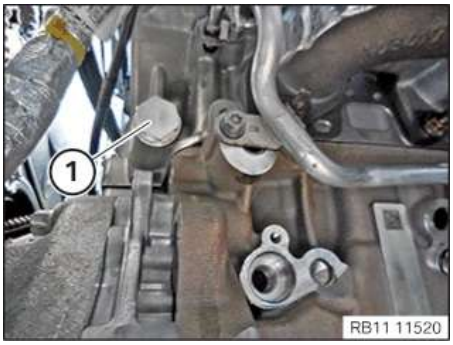
- Place the chain tensioner on a level support pad and slowly compress in the direction of arrow.
- Repeat process twice.



- Renew sealing ring (1).

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

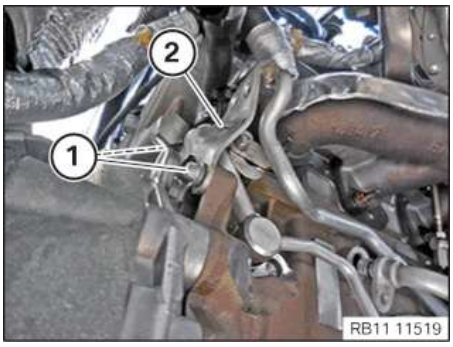
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- Insert and install the chain tensioner piston (1).
- Tighten the chain tensioner piston (1).

Chain tensioner piston to cylinder head

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

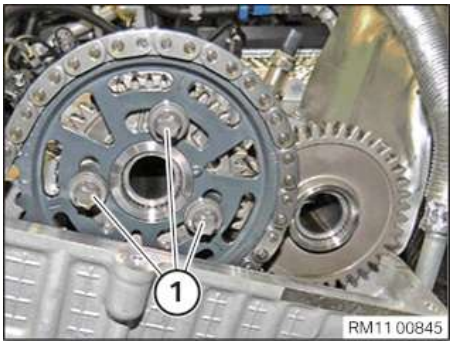


- Insert and install the holder (2).
- Tighten the screws (1).

Holder to crankcase

M8X16		Tightening torque	19 Nm

71 – Tightening the camshaft sprocket on the intake camshaft



- Tighten the screws (1).

Camshaft sprocket to camshaft

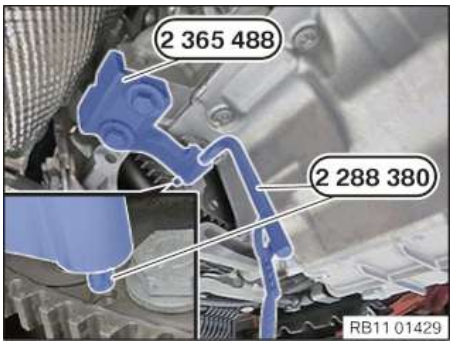
M7x17.			17 Nm

72 – Removing the special tool for fixing the exhaust camshaft



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

73 – Removing the special tool to disconnect the crankshaft



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

74 – Checking camshaft timing

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RISK OF DAMAGE

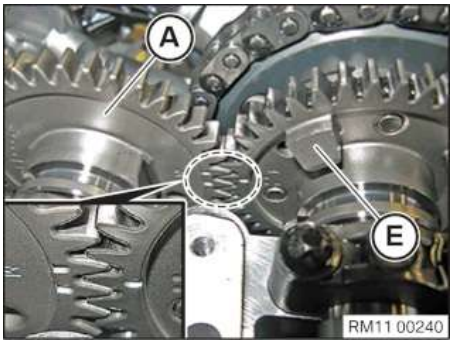
Damage to the engine.

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

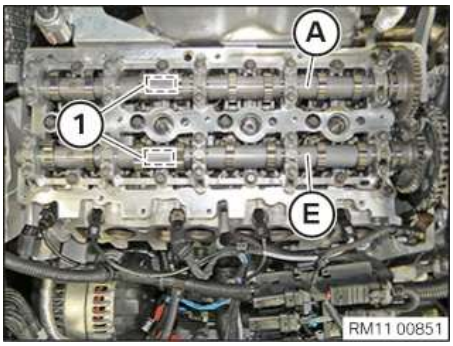
- Turn the combution engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

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

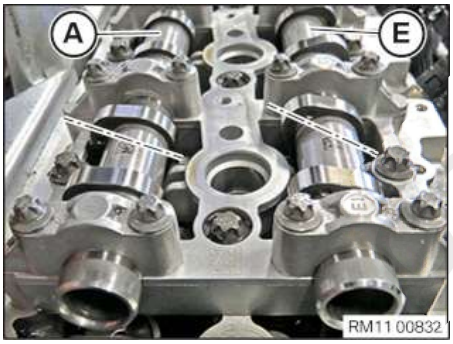
  Do **not** crank the engine in reverse.



- 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.



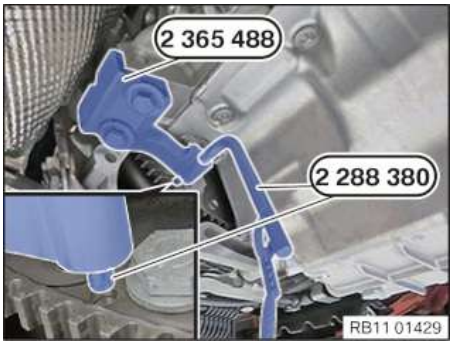
- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- 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.

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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

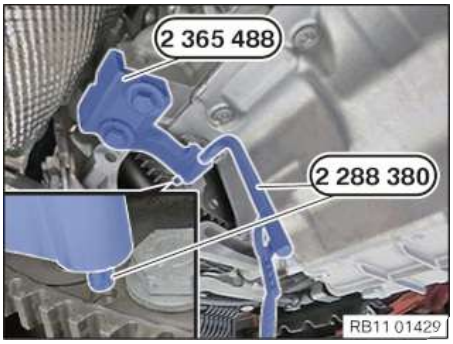
- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

75 – Removing the special tool for fixing the exhaust camshaft



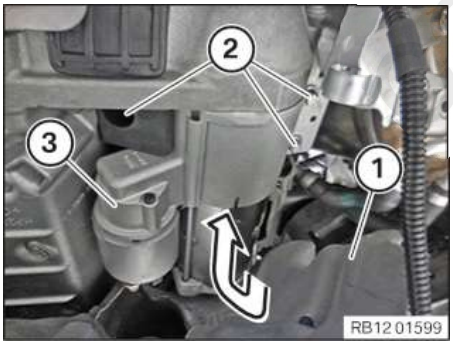
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

76 – Removing the special tool to disconnect the crankshaft



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

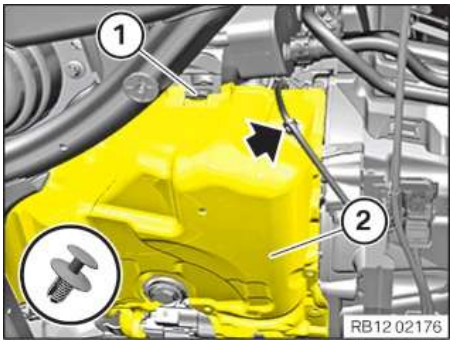
77 – Installing starter motor



- 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).

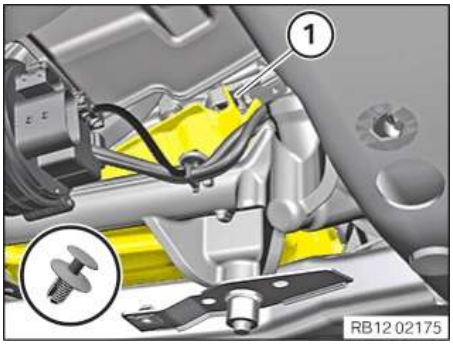
Starter motor to engine

M8X60		Tightening torque	19 Nm

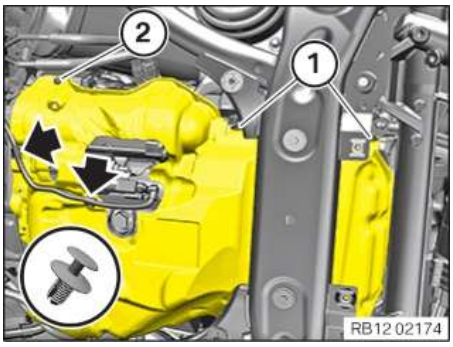


- Position the acoustic cover (2).
- Fasten expanding rivet (1).
- Secure clamp (arrow).

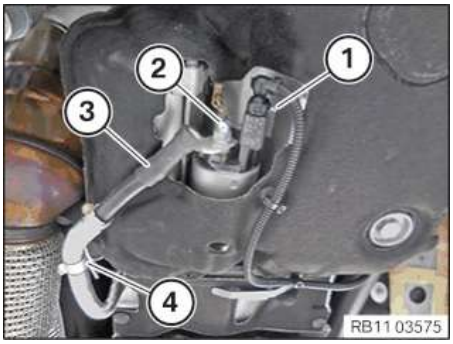
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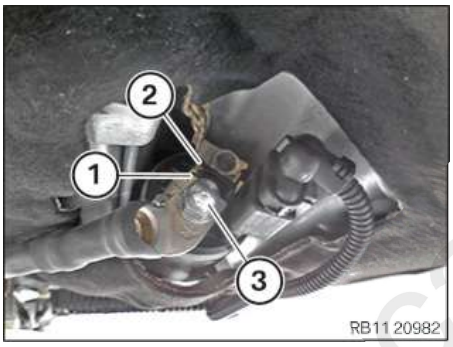
- Fasten expanding rivet (1).



- 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).

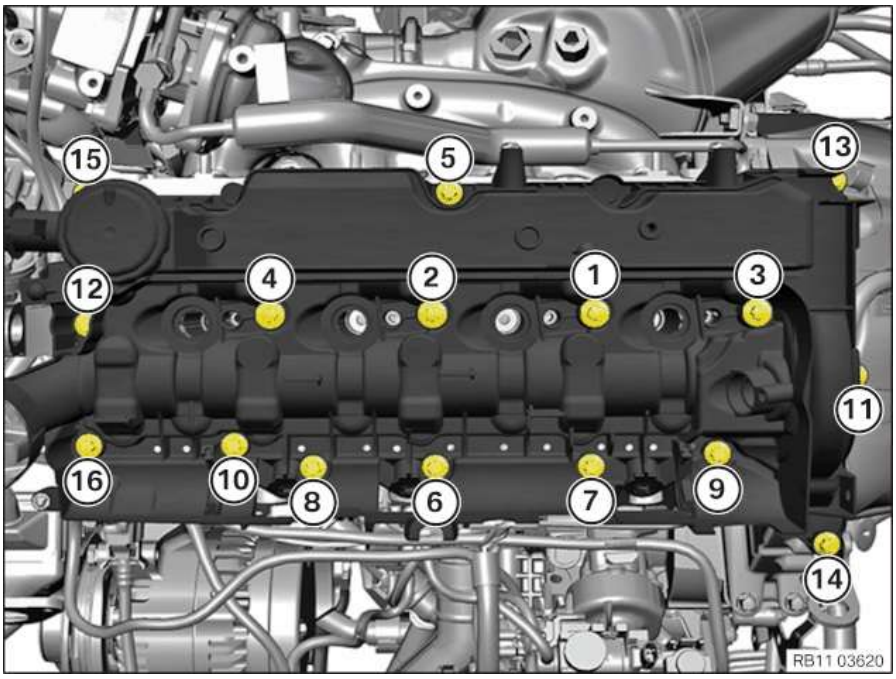
Battery positive lead to starter

M8		Tightening torque	13,5 Nm

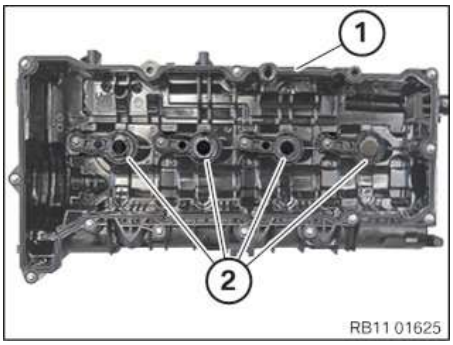
78 – Installing cylinder head cover

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Screw connection of the cylinder head cover

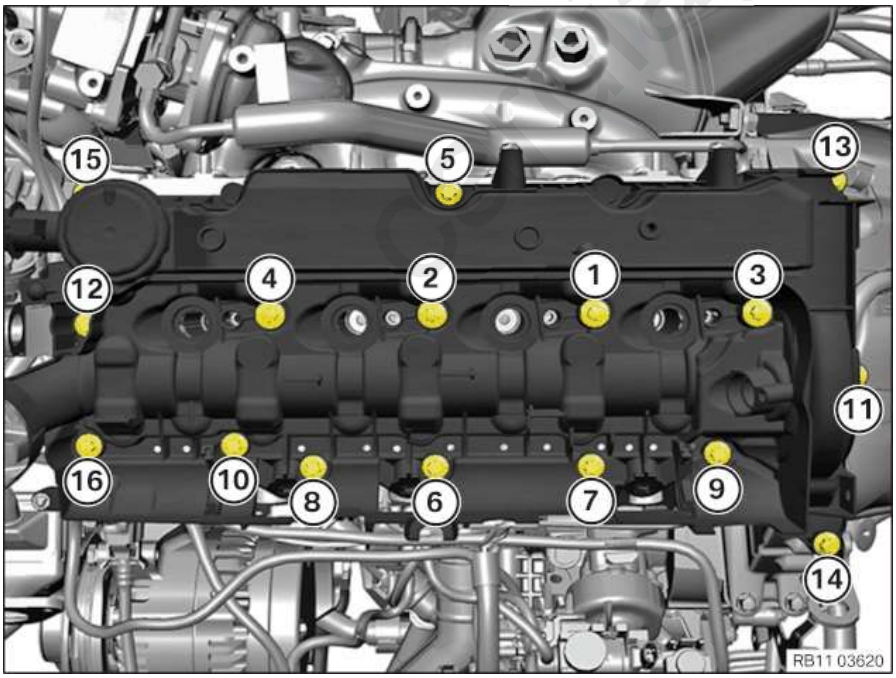


1 - 16 Bolts of the cylinder head cover



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

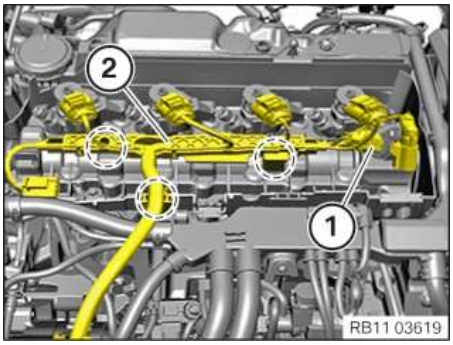
  Parts: Profile seals



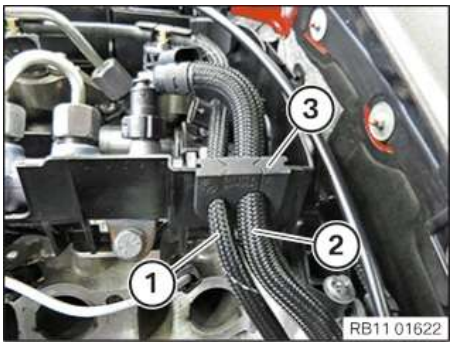
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

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.

79 – 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.

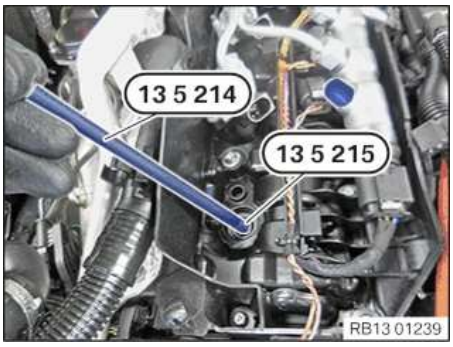
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RISK OF DAMAGE

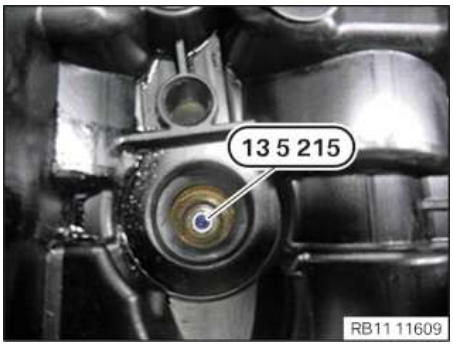
Contaminant or foreign body.

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.



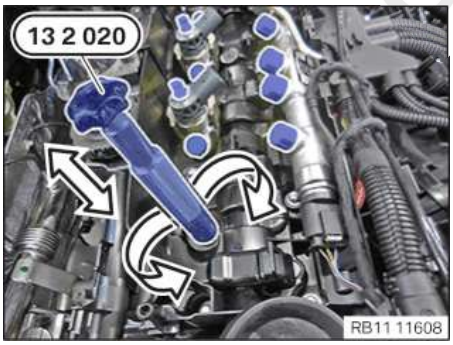
- Check whether the sealing ring remained in the injector shaft and remove the sealing ring as needed.
- Insert the special tool 0 493 763 (13 5 215) with the special tool 0 493 762 (13 5 214) from the set of special tools 0 493 758 (13 5 210) into the injector shaft.
- Remove special tool 0 493 762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



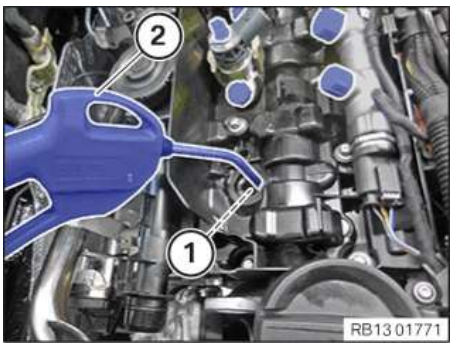
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



- 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).

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- 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.

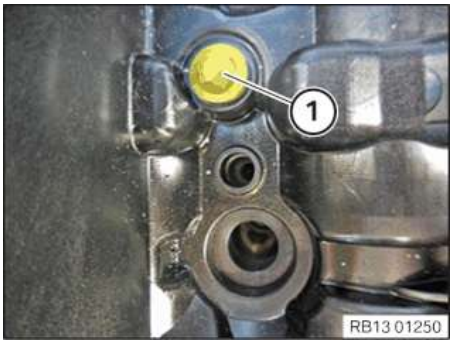
▸ **Check the placement of the clamping claw**

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**

RISK OF DAMAGE

Contaminant or foreign body.

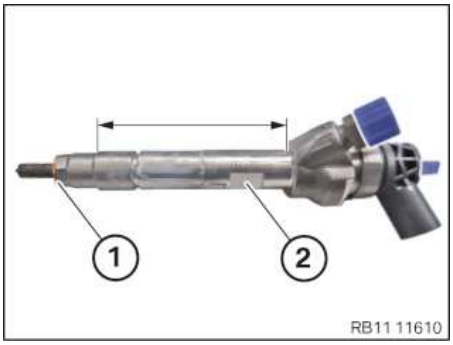
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

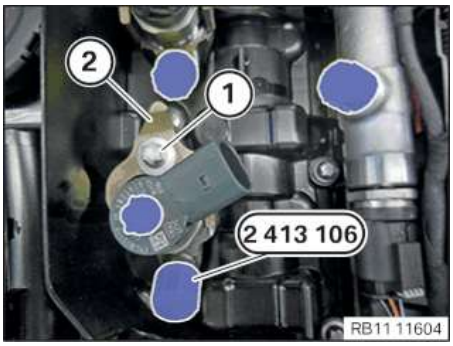
Lightly grease the injector shaft with high temperature-resistant grease.
For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue

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- Renew the copper sealing ring (1) on the injector (2).

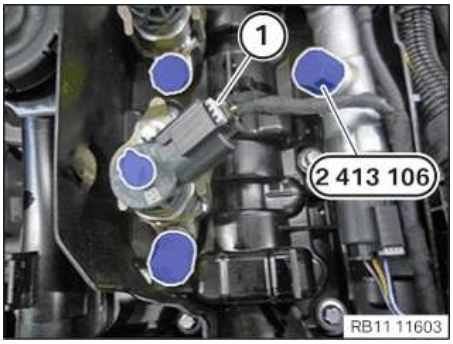
  Parts: Copper sealing ring
- Lightly grease the injector in the marked area with heat-resistant grease before installing the injector (2) in the injector shaft.



- 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.

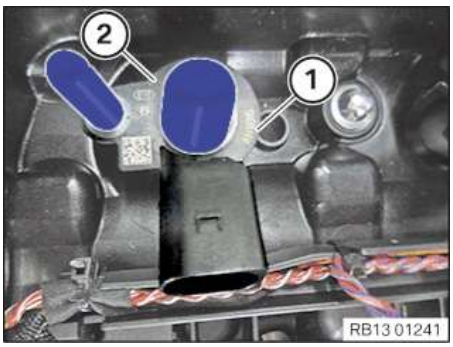
▸ **Replacement: Perform injection quantity compensation**

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.

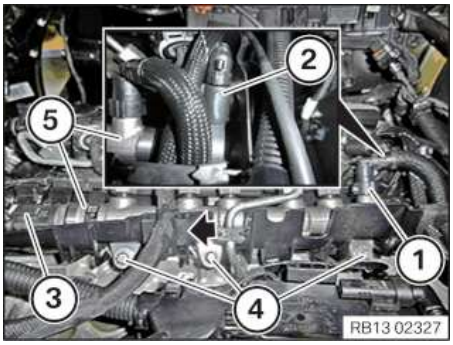


- Read off the adjustment value (1) on the new injector (2).

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- 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.

80 – 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.

81 – 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.

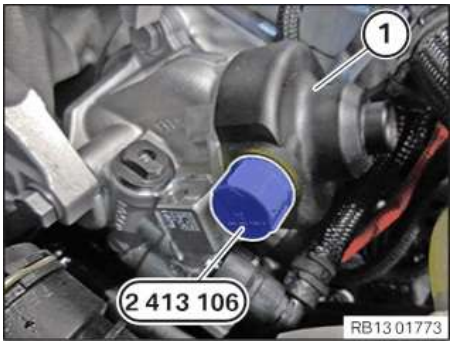
Danger of injury!

- 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.

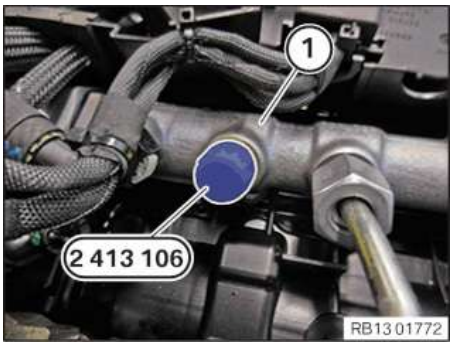
TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

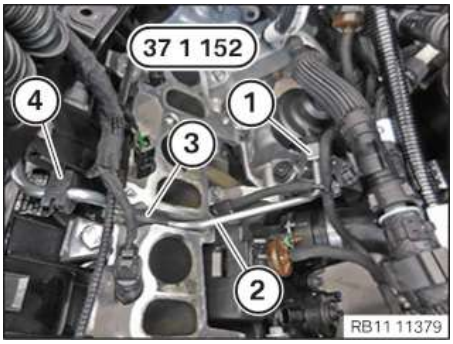
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- Feed out and remove special tool on the high pressure pump (1).



- 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.

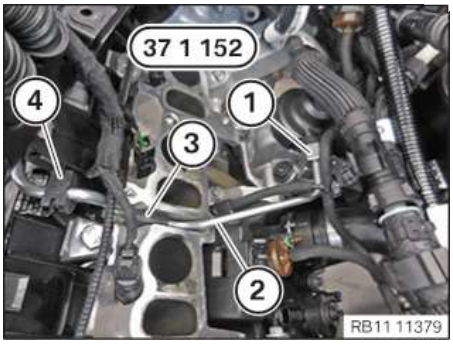
TECHNICAL INFORMATION

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.

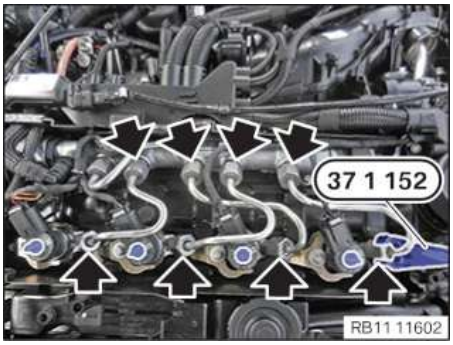
- Tighten union nut (1) on the high pressure pump with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm

82 – Installing the high pressure lines between the injector and the rail

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- 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.

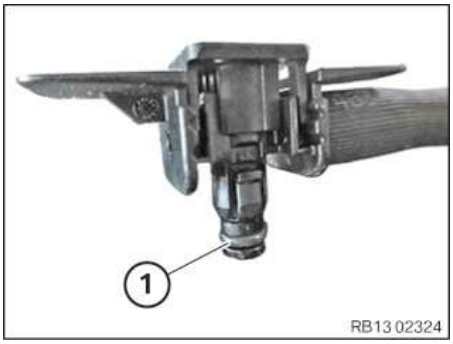
- Tighten the high pressure lines (arrows) with the special tool .

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**).

83 – Attach the leakage oil line on the injectors

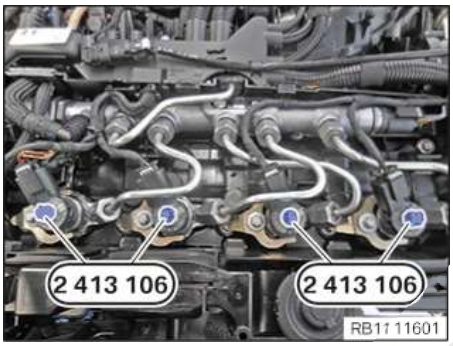


- **Version A:**

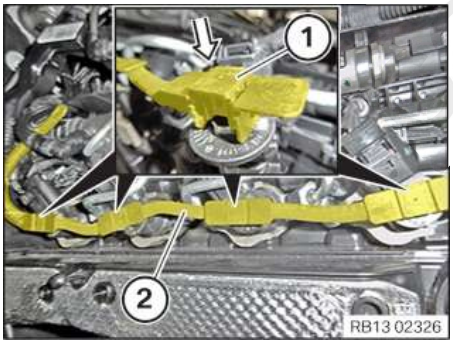
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

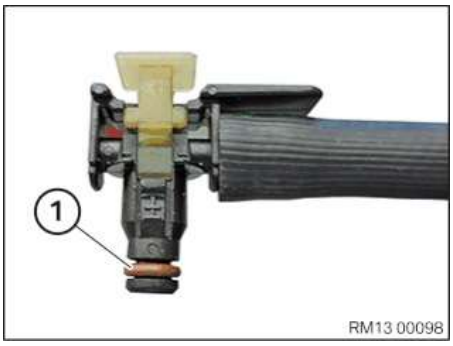
  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.



- 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.



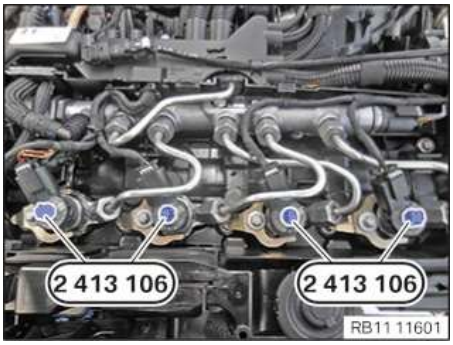
- **Version B**:

  Check sealing ring (1) for damage, renew leakage oil line if necessary.

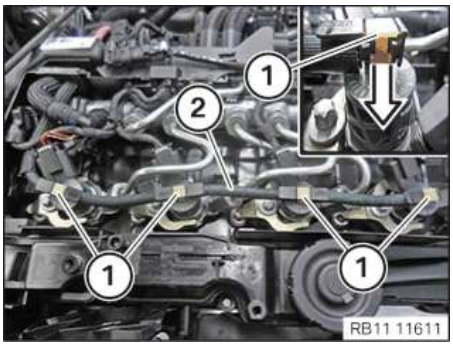
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.

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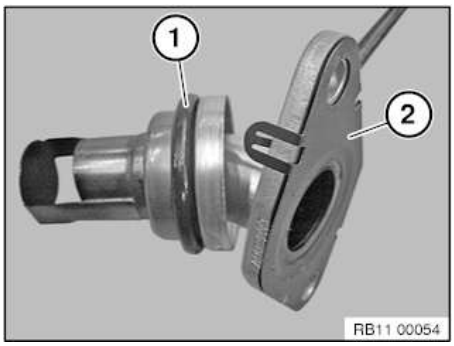


- Feed out the special tools and remove.



- 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.

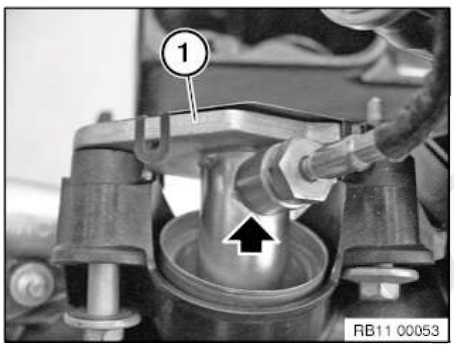
84 – Installing the intake plenum



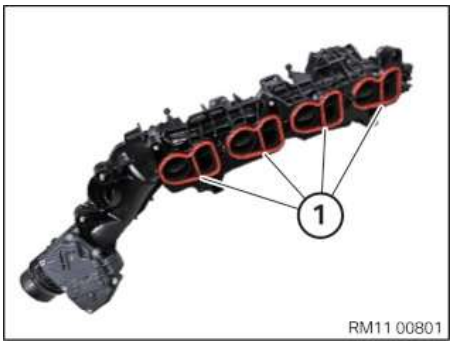
- Renew O-ring (1).

  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

  Parts: Gasket
- Position the seal (2) and clip it in.



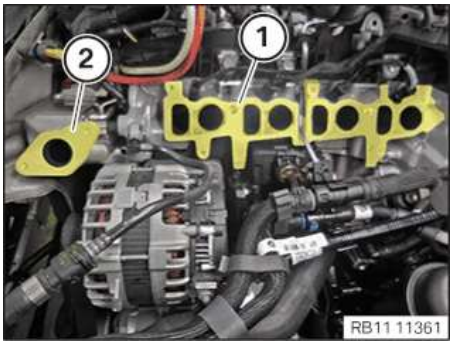
- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).



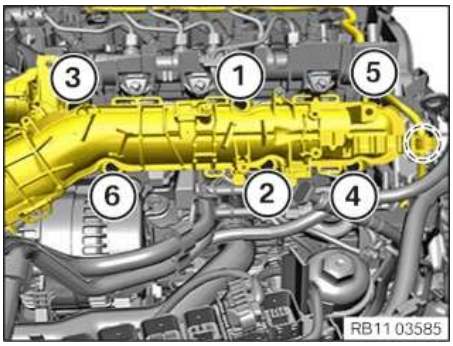
- Renew seals (1).

  Parts: Seals
- Ensure that the seals (1) are firmly mounted on the intake plenum.

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- Clean connection points (1) at cylinder head.
- Clean the connection point (2) on the exhaust-gas recirculation cooler.

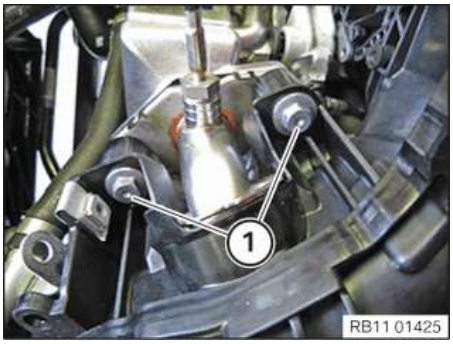


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

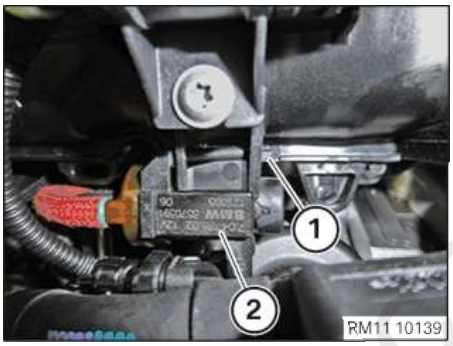
- Attach the wiring harness and fuel lines in the marked area on the intake plenum.



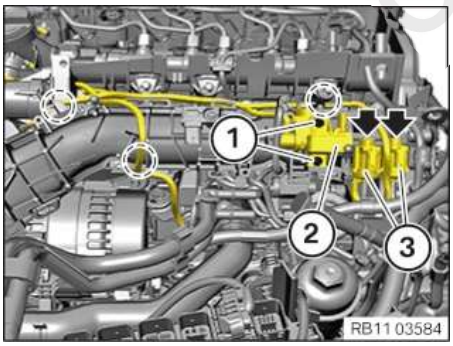
- Tighten the screws (1).

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.



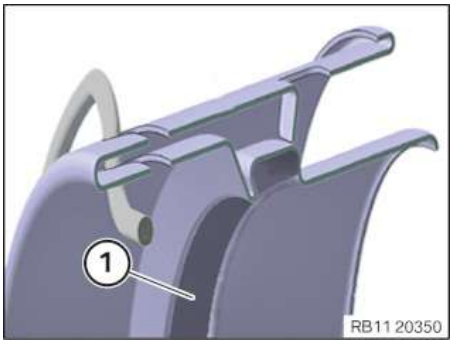
- Check the seal (1) for damage, and renew if necessary.

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▸ **Replacing damaged seal**

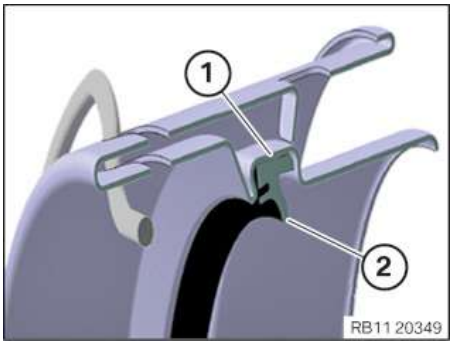
TECHNICAL INFORMATION

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.

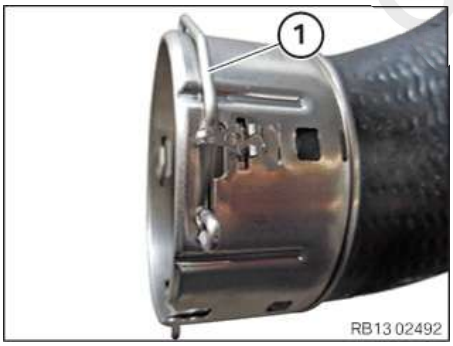
TECHNICAL INFORMATION

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.

85 – Partially securing the wiring harness section on the intake plenum

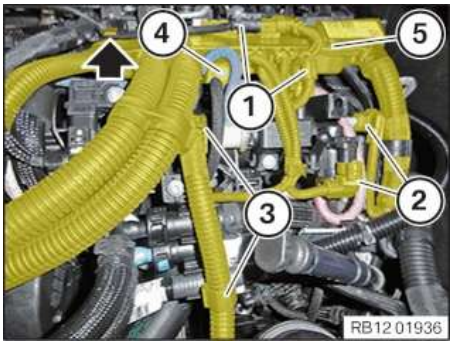
RISK OF DAMAGE

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.

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- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

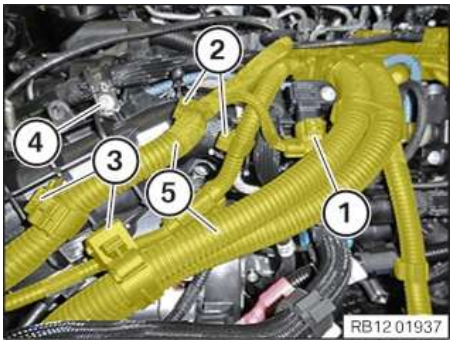
Wiring harness section to manifold

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.



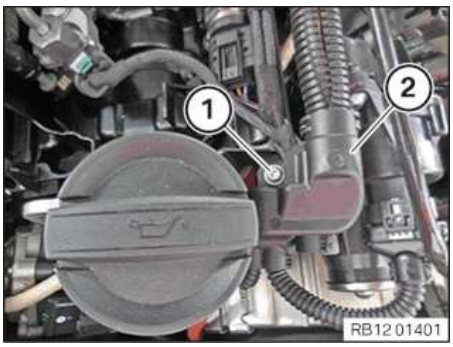
- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

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.

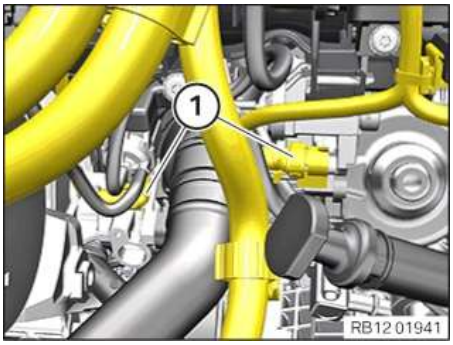
  The connector (1) must engage audibly.



- Connect the connector (1) and lock it.

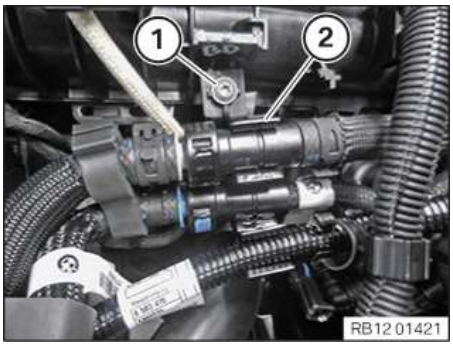
  The connector (1) must engage audibly.

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- Connect connectors (1) and lock.

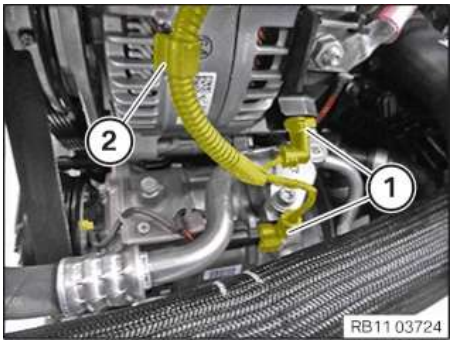
  The connectors (1) must engage audibly.



- Insert and install the holder (2).
- Tighten down screw (1).

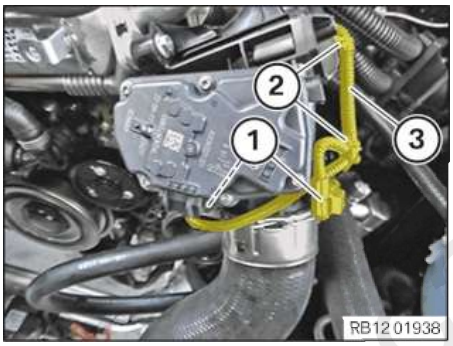
Holder on intake plenum

TS6X20		Tightening torque	5 Nm

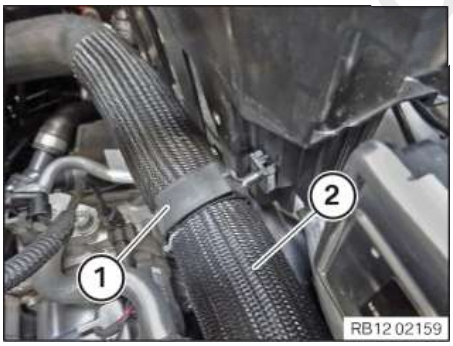


- Connect the connector (1) and lock it.

  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).

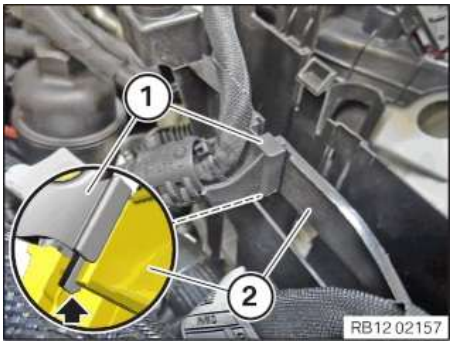
  The holder (1) must engage audibly.



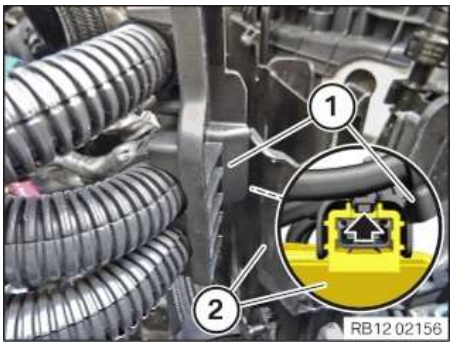
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.

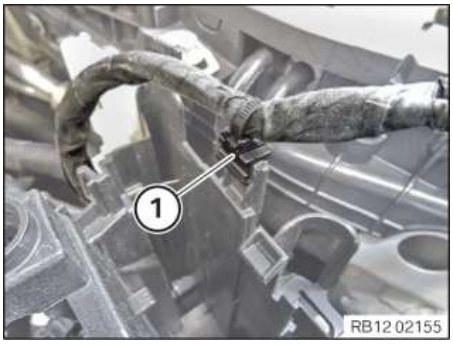
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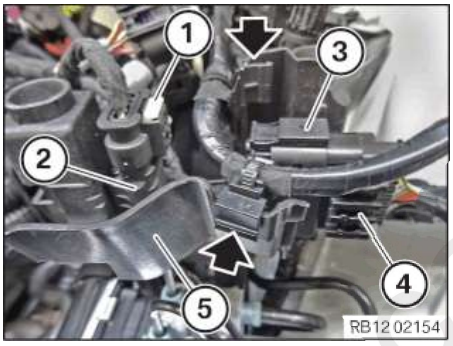
- Connect the cable clip (1) with the control unit holder (2) and lock it.
  Lock (arrow) must audibly engage.



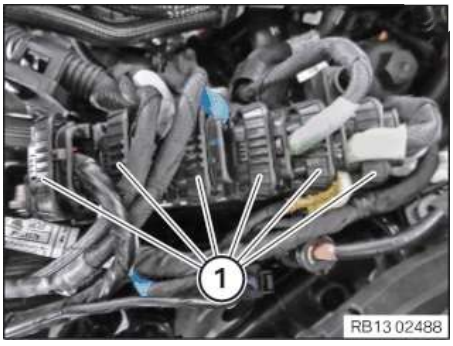
- Connect the cable clip (1) with the control unit holder (2) and lock it.
  Lock (arrow) must audibly engage.



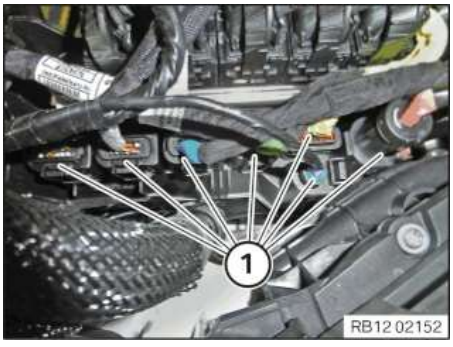
- Secure clamps (1).



- 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).

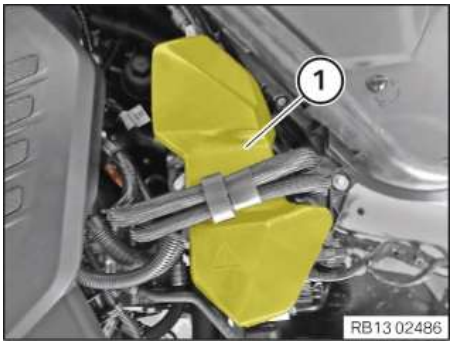


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.

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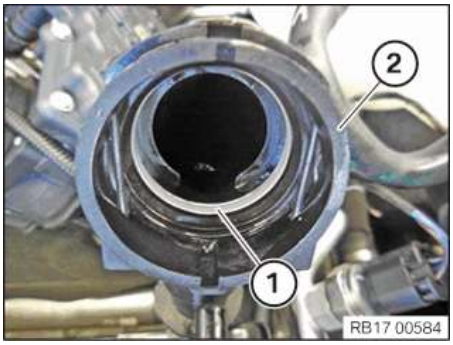


- Insert and install cover (1) into guides.

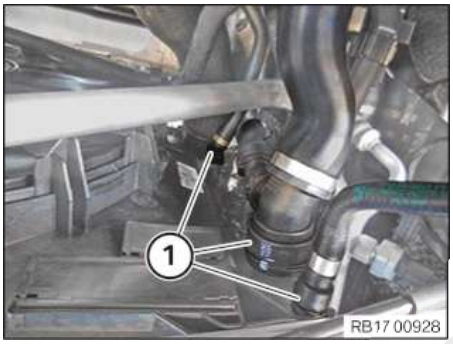
86 – Connecting the coolant lines

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.

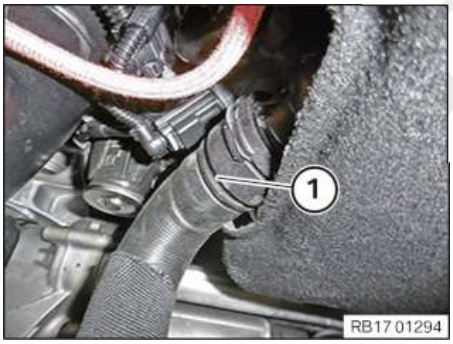


NOTICE

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.

87 – 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.

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RISK OF DAMAGE

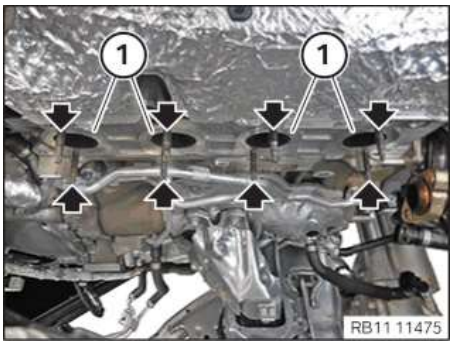
Damage to the surface.

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.

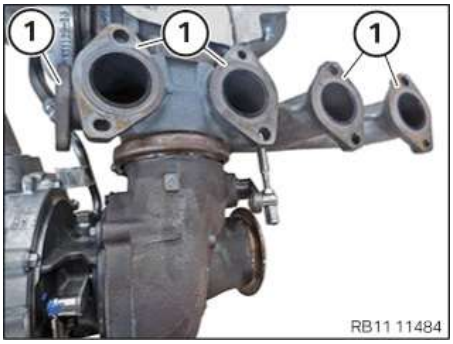
TECHNICAL INFORMATION

The sealing surfaces must be free from oils, grease and cleaning agents.

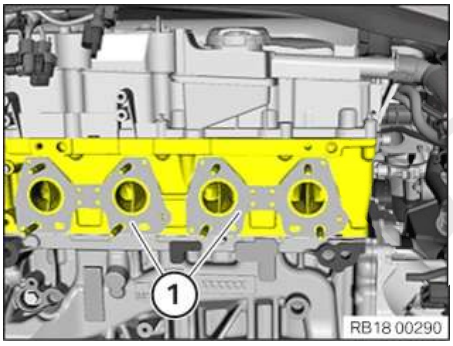


- Check the stud bolts (arrows) on the cylinder head for **correct** fit.
- Clean the connection points (1) with the special tool 0 495 102 (11 4 470).
- Renew gaskets.

  Parts: Seals



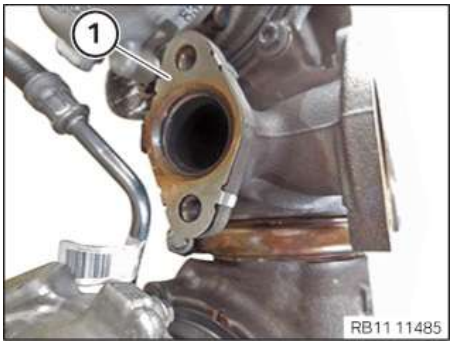
- Clean the connection points (1) on the exhaust manifold with the special tool 0 495 102 (11 4 470).



TECHNICAL INFORMATION

The **coated side** of the seal must be on the side of the exhaust manifold.

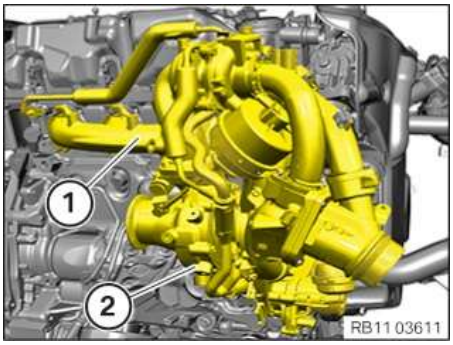
- Insert and install the gaskets (1).



- Renew the seal (1).

  Parts: Gasket
- Insert and install the seal (1).

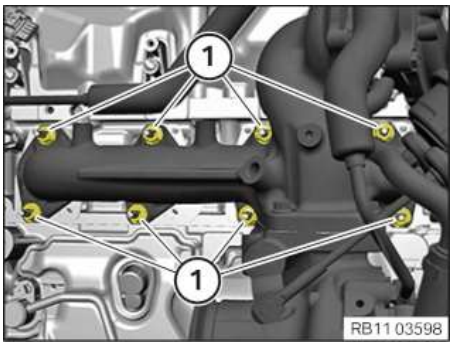
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TECHNICAL INFORMATION

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.



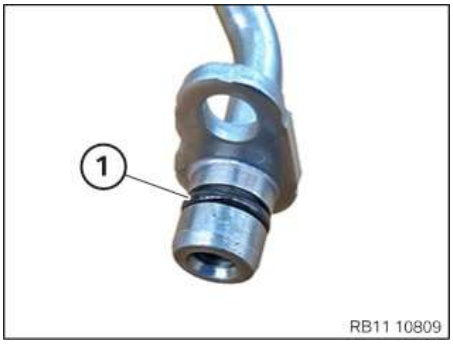
- Renew nuts (1).

  Parts: Nuts

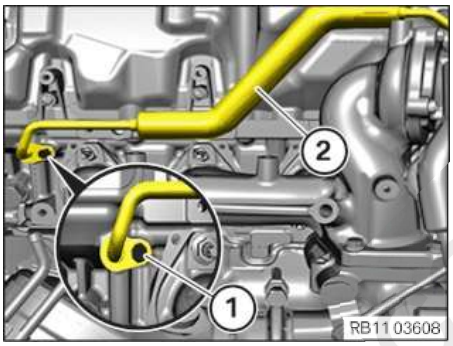
- Tighten the nuts (1) evenly from the inside out.

Exhaust manifold to cylinder head

M7	**If necessary, renew loose stud bolts.**	Tightening torque	11 Nm
	Renew nuts.	Tightening torque	13 Nm



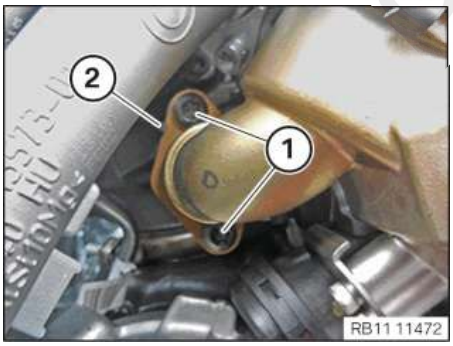
- Check the seal (1) for damage, if necessary, renew the oil feed line.



- 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

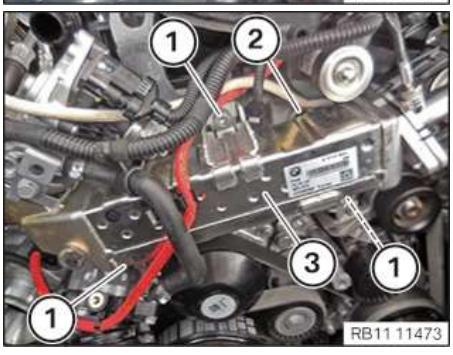


- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

M8x28	Replace screws	Tightening torque	32 Nm

- Ensure that seal (2) is installed.

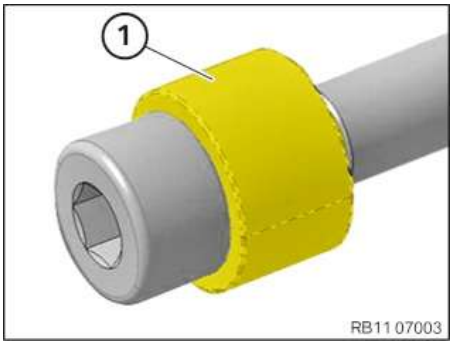


- Position the exhaust-gas recirculation cooler (3).
- Make sure the pipe neck (2) is fitted correctly.
- Tighten the screws (1).

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.

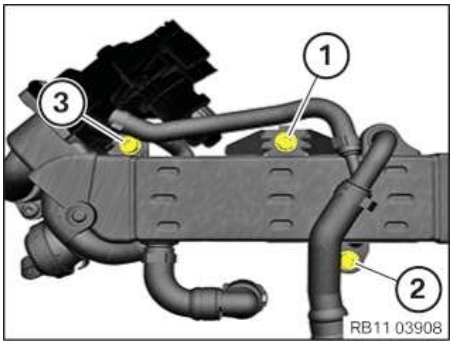
Result

» Screws **without** sleeves (1) are available.

Measure

- Renew screws.

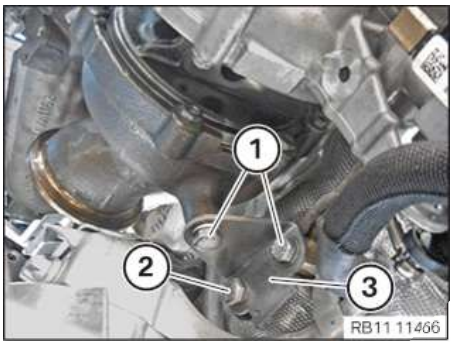
  Parts: Screws (part number 9 886 429)



- Tighten the screws (1) to (3).

Exhaust-gas recirculation cooler to cylinder head

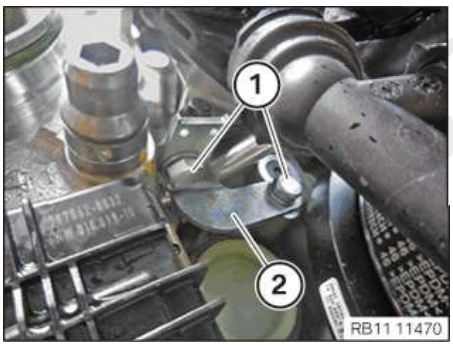
M8x20 / M8x28		Tightening torque	19 Nm



- Tighten the bolts (1) and (2) on the bracket (3).

Exhaust turbocharger low-pressure stage to crankcase

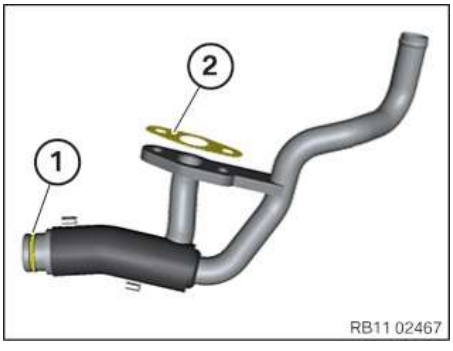
M8X16		Tightening torque	22 Nm



- Insert and install the holder (2).
- Tighten the screws (1).

Exhaust turbocharger low-pressure stage to crankcase

M8X16		Tightening torque	22 Nm

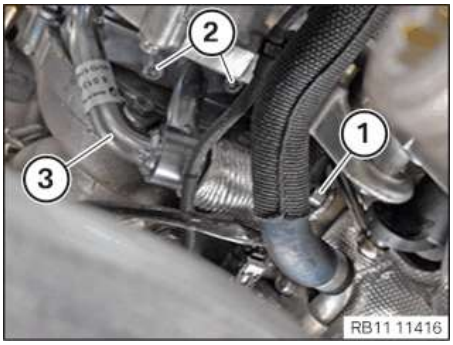


- Renew the gasket (2).

  Parts: Gasket

- Check the O-ring (1) for damage and renew the oil return line as needed.

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- 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

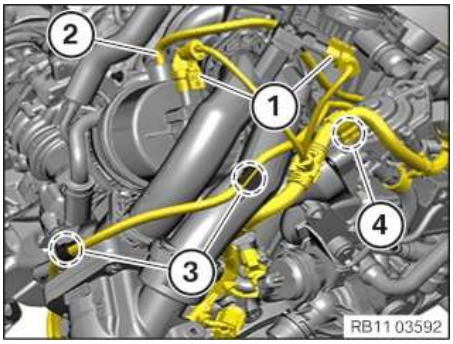
- Install the bolt (1).



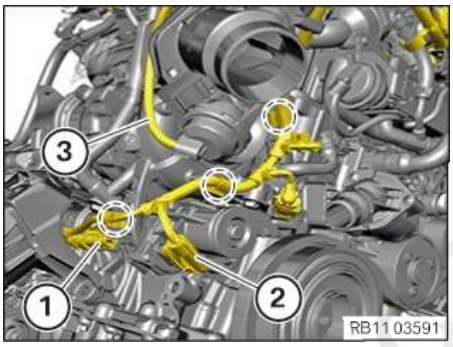
- Tighten the screws of the oil return line on the crankcase from the right wheel arch.

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.

88 – 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.

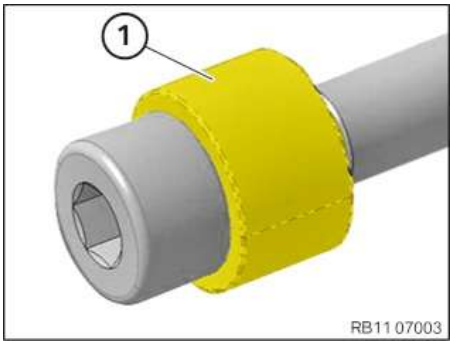
Damage and operating failure of the starter generator.

- 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

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- Check whether the screws **with 10mm** sleeves (1) are available.

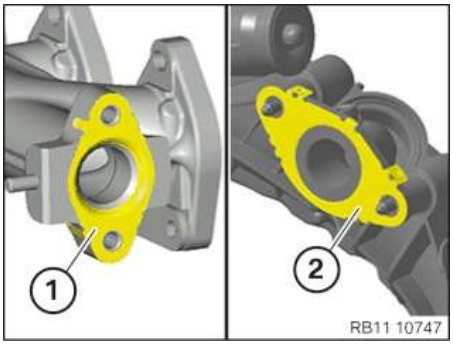
Result

» Screws **without** sleeves (1) are available.

Measure

- Renew screws.

  Parts: Screws (part number 9 886 429)

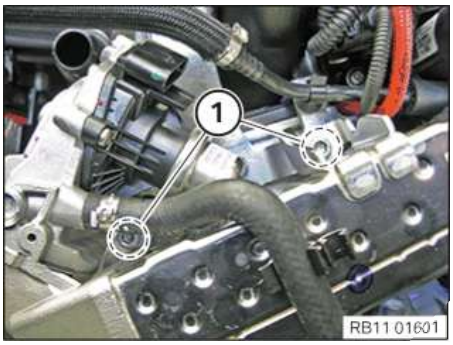


- Renew the seal (1) between the exhaust manifold and the exhaust-gas recirculation cooler.

  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

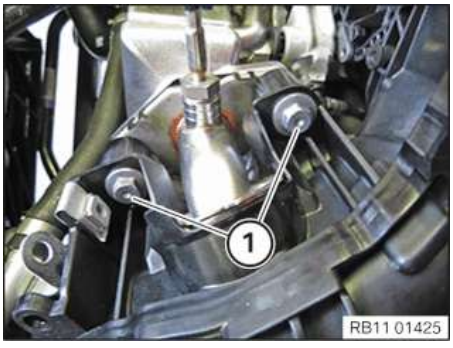
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screw (1) under the exhaust-gas recirculation cooler and then release again.

Exhaust-gas recirculation cooler to cylinder head

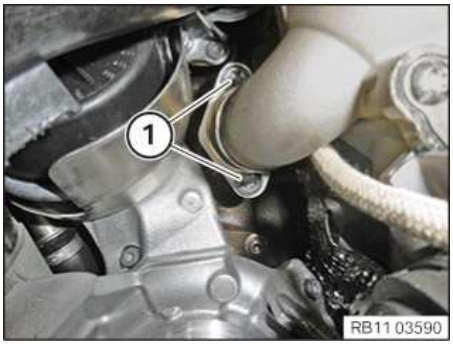
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

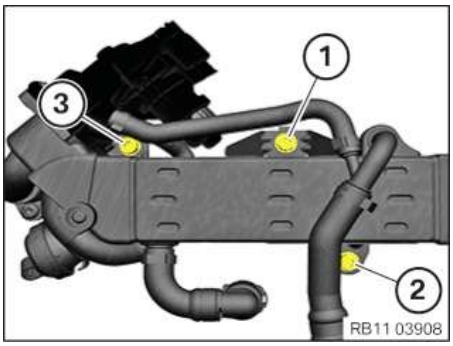
		Tightening torque	10 Nm



- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

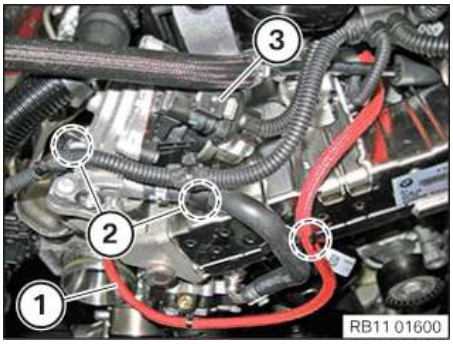
M8x28	Replace screws	Tightening torque	32 Nm



- 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.

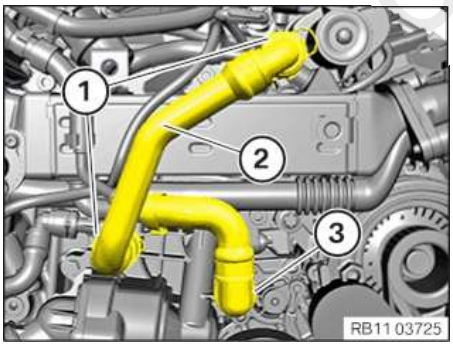


TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.

- **Version A:**

  Connect and audibly lock coolant lines (1).



TECHNICAL INFORMATION

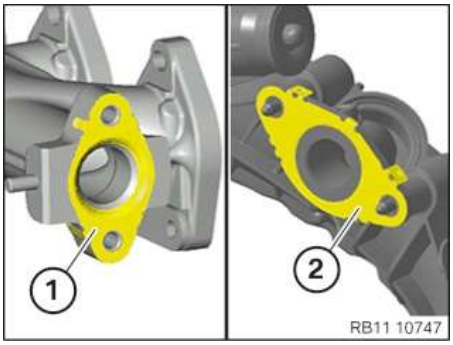
Make sure that the connections are locked correctly. The locks must engage audibly.

- **Version B:**

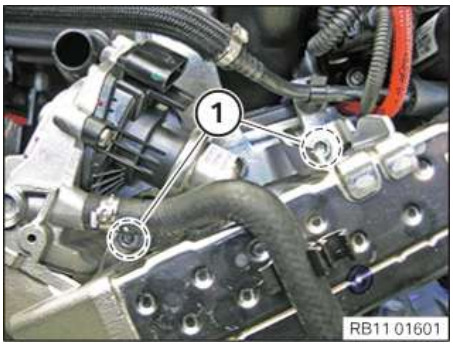
  Connect and audibly lock coolant lines (3).
- Install the coolant line (2).
- Audibly lock the locks (1).

▸ **Installing the exhaust-gas recirculation cooler**

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- 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

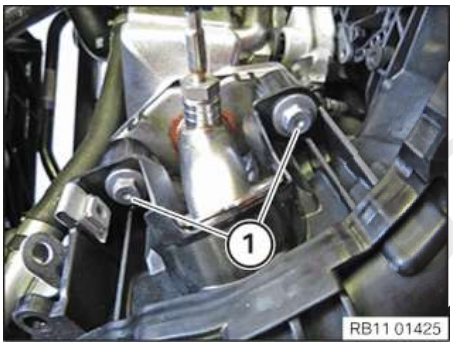
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screw (1) under the exhaust-gas recirculation cooler and then release again.

Exhaust-gas recirculation cooler to cylinder head

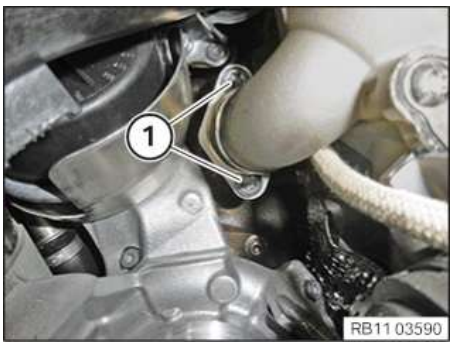
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm

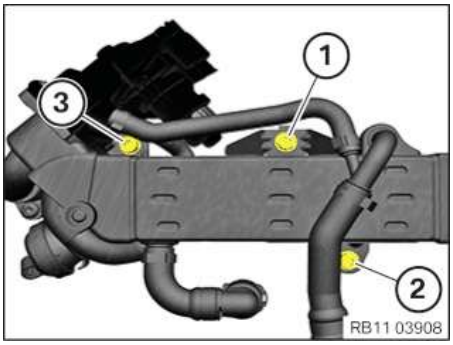


- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

M8x28	Replace screws	Tightening torque	32 Nm

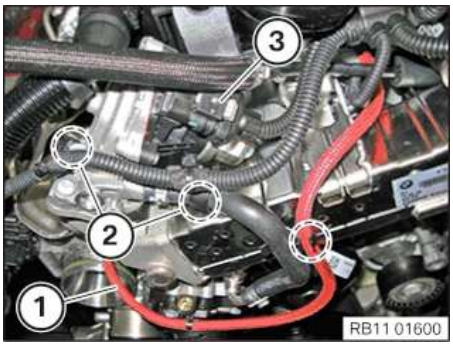
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- Tighten screws in the order (1) to (3).

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.

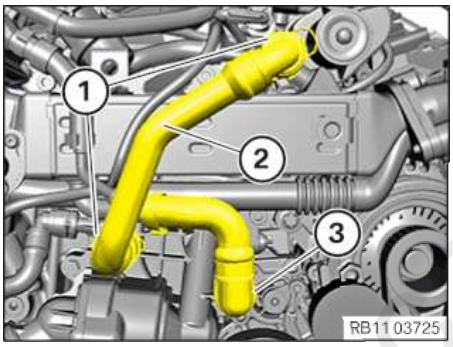


TECHNICAL INFORMATION

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.

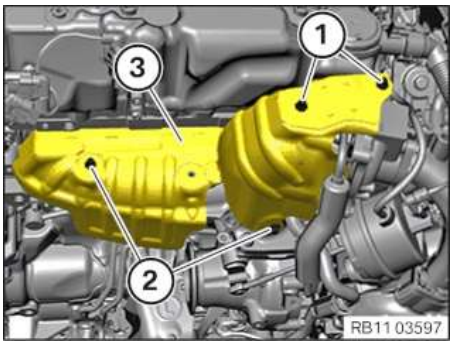
- **Version B:**

  Connect and audibly lock coolant lines (3).

  Install the coolant line (2).

  Audibly lock the locks (1).

89 – 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

90 – Installing the sensor bracket on the cylinder head cover

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RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

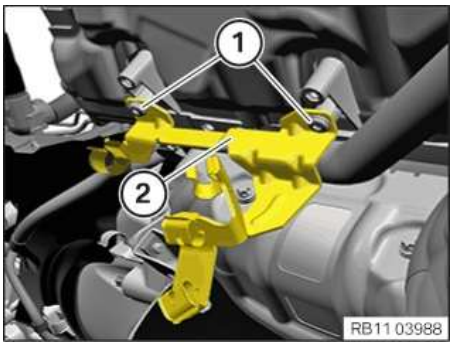
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

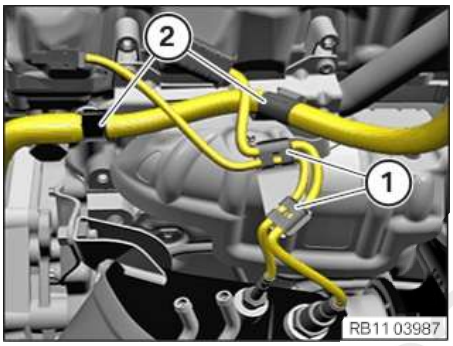
- Route all cables without abrasions, do not trap and crush.



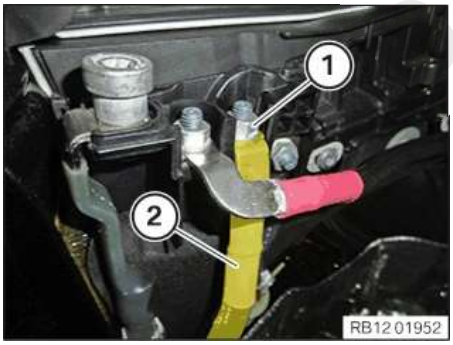
- Insert and install the holder (2).
- Tighten the screws (1).

Bracket on cylinder head cover

	Tightening torque	5 Nm



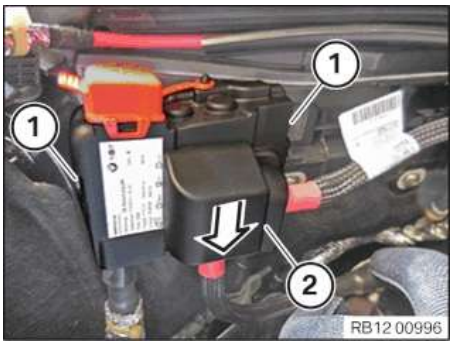
- Secure the positive battery cable in the clamps (2).
- Mount the cable of the exhaust gas sensor system in the clamps (1).



- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

Battery positive lead to battery positive terminal

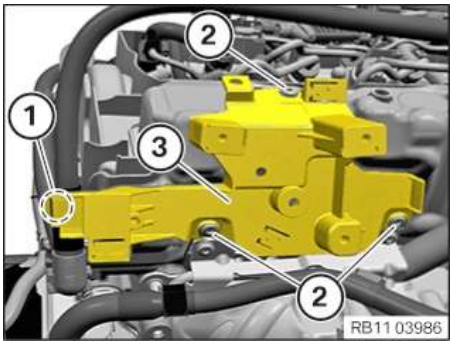
M8		Tightening torque	19 Nm



- Insert and install the cover (2) in the direction of the arrow.

  The locks (1) must engage audibly.

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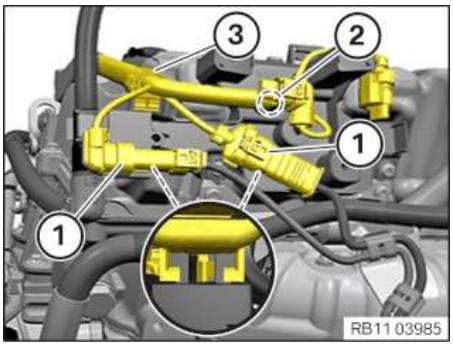


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

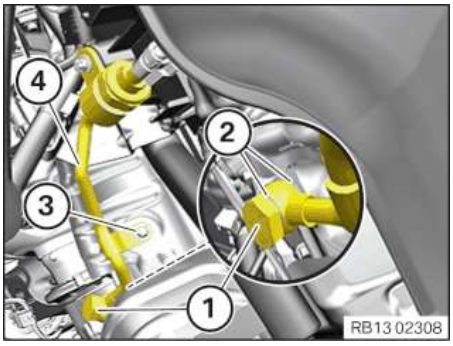
		Tightening torque	5 Nm

- 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.

91 – 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).

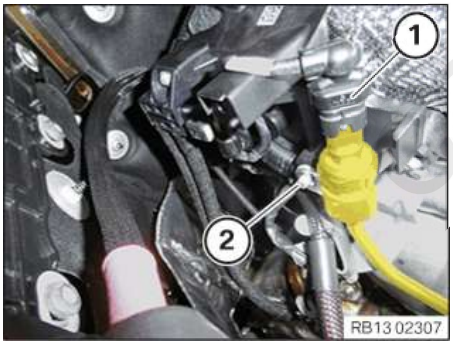
Heat shield to exhaust manifold

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).

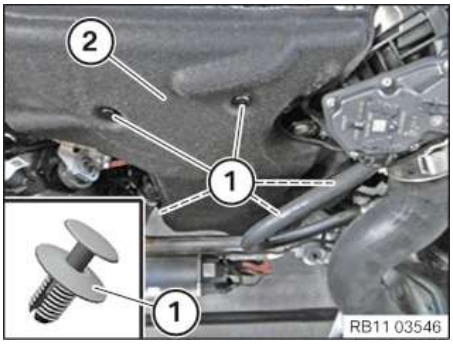
Exhaust gas pressure pipe to sensor system holder

TS6x20		Tightening torque	5,7 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

92 – 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).

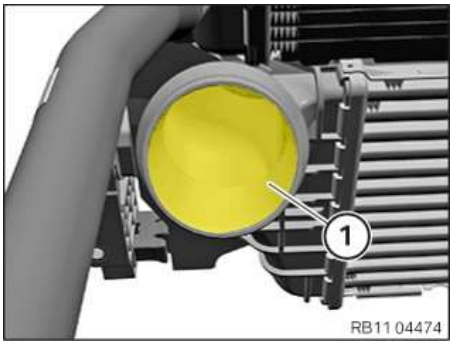
93 – Install pressure pipe between exhaust turbocharger and charge air cooler

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.



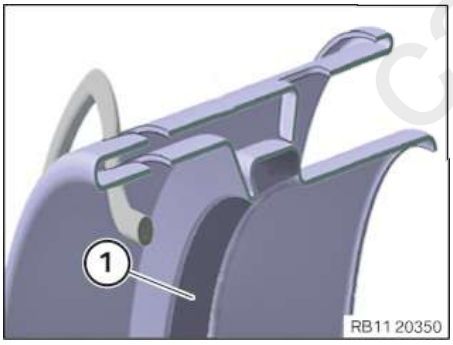
- Check the seal (1) for damage and renew if necessary.

  Parts: Gasket

▸ **Replacing damaged seal**

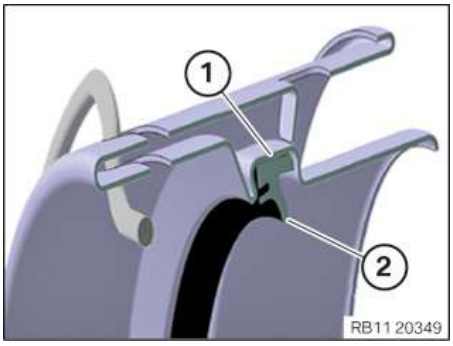
TECHNICAL INFORMATION

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.

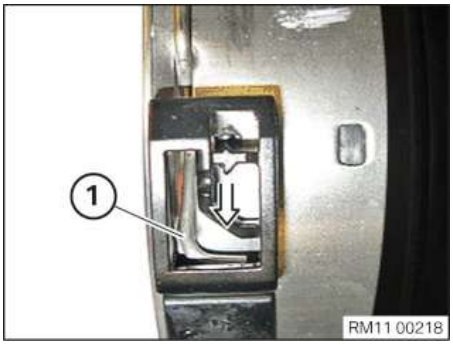
  Parts: Gasket
- Install seal dry without lubricant or mounting agent.

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.

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- **Version A:**

  Lock the lock (1).

  The lock (1) on the pressure pipe must engage audibly.

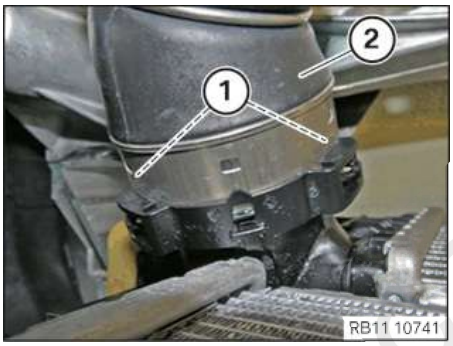


- Pay attention to the installation position:

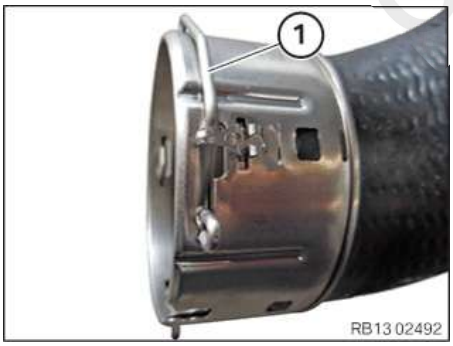
  The pressure pipe fits on charge air cooler in one installation position only.



- Install the pressure pipe (1) from the top.



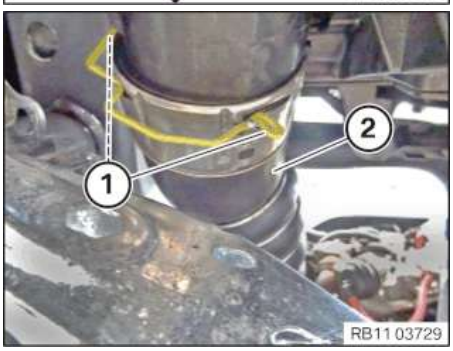
- Connect pressure pipe (2) to charge air cooler.
- Lock the lock (1) on both sides.



- **Version B:**

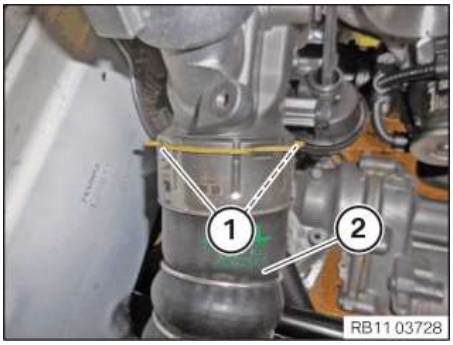
  Lock the lock (1).

  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.

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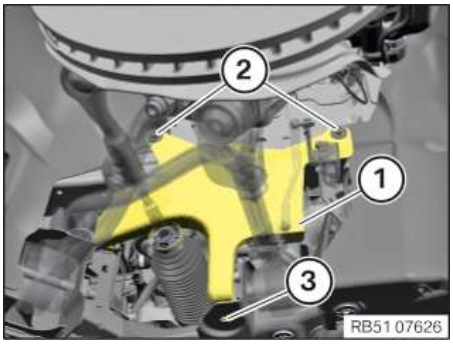


- Place the pressure pipe (2) onto the compressor bypass and ensure that the lock (1) engages audibly.

94 – 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

95 – 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.

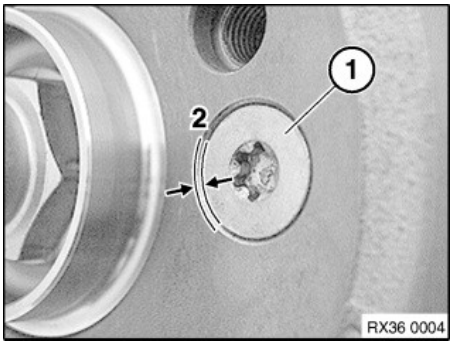
  Do not operate special tool 2 344 011 with an impact screwdriver.
- Degrease the contact surfaces with the universal cleaner (see BMW Group Parts).
- In the event of grease residue in the area of the wheel bolt holes, remove and clean the brake disc.



- 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).

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- Check that the mounting bolt (1) for the brake disc is securely seated.

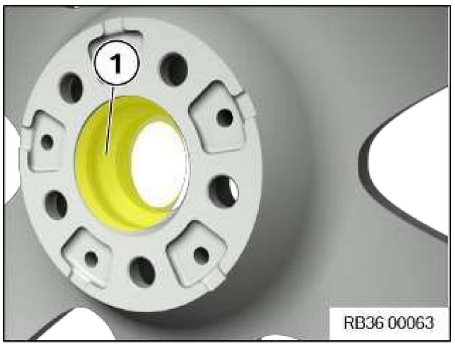
  The mounting bolt (1) for the brake disc **may not** protrude on the contact surface (2) between the brake disc and the wheel rim.

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



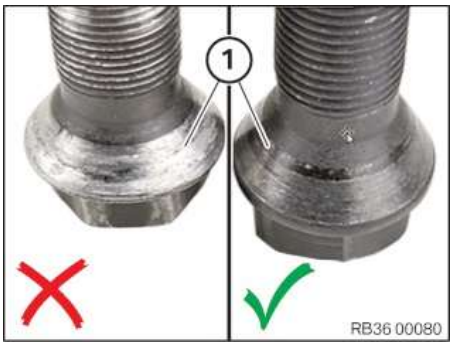
TECHNICAL INFORMATION

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.

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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.		

96 – Prepare for the installation of the diesel particulate filter



- Renew the V-clip (1).

  Parts: V-band clamp

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- Renew gasket (1).

  Parts: Gasket

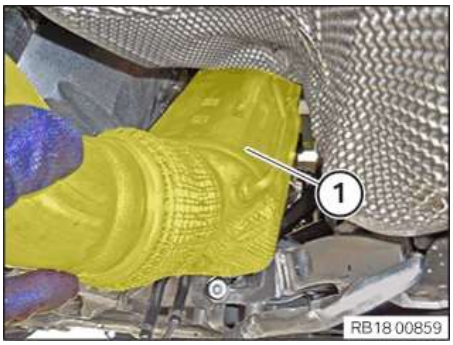
97 – Installing the diesel particulate filter

CAUTION

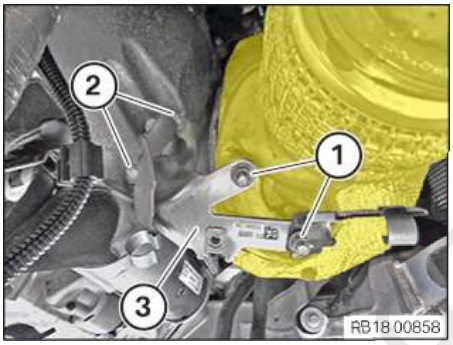
Heavy component.

Heavy components can lead to injury or damage.

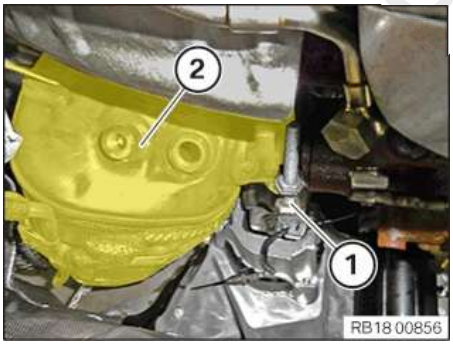
- Remove and install heavy components with the aid of another person/other persons.



- 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**.

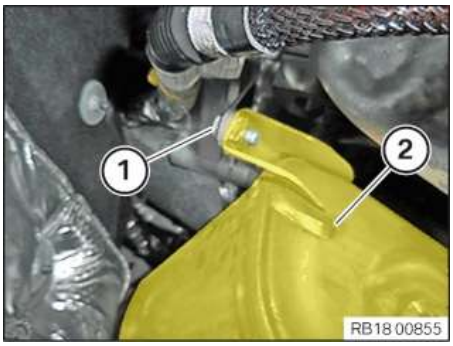


- Renew the V-clip (1).

  Parts: V-band clamp
- Feed in and install V-band clamp (1).

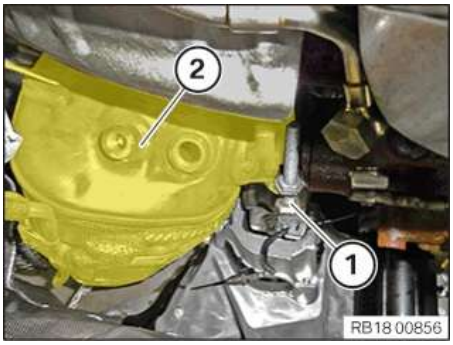
Note: Make sure that the seal between the diesel particulate filter and the exhaust turbocharger is installed correctly.

- 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**.

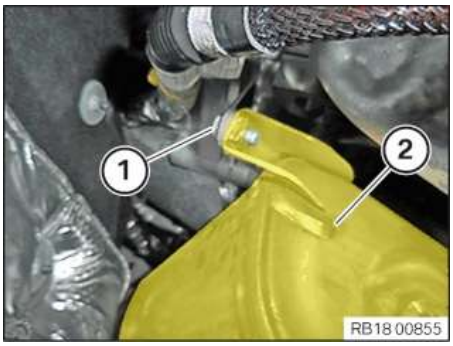
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- Tighten the V-clip (1) of the diesel particulate filter (2).

Diesel particulate filter V-clip to exhaust turbocharger

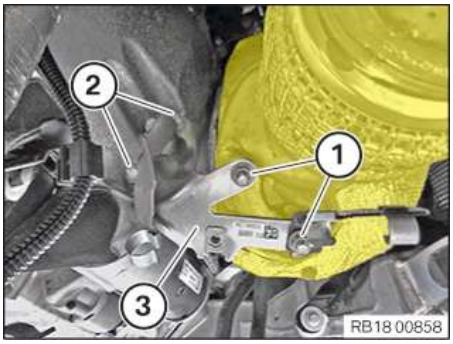
V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm



- 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).

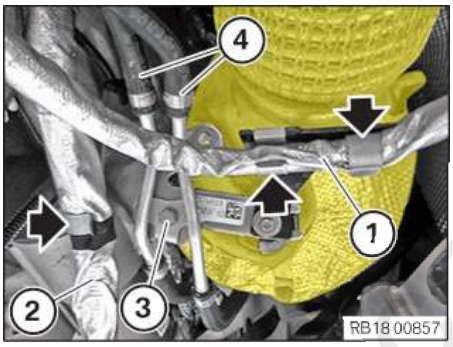
Bracket to transmission for diesel particulate filter holder bottom

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).

98 – Installing the nitrogen oxide sensor upstream of SCR catalytic converter

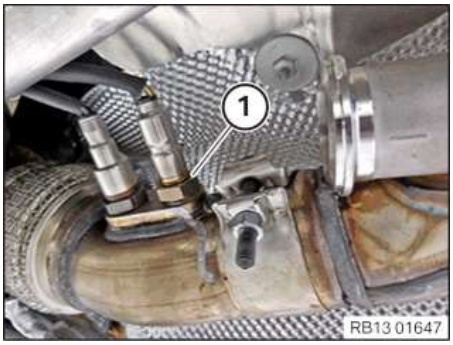
RISK OF DAMAGE

Damage to the nitrogen oxide sensor.

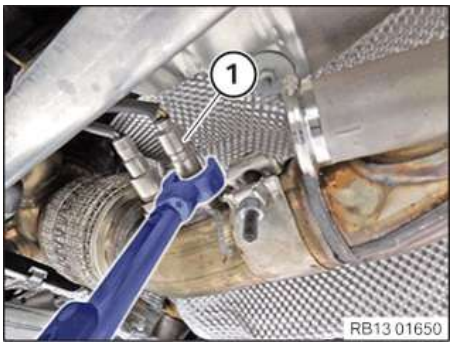
Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

- 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.

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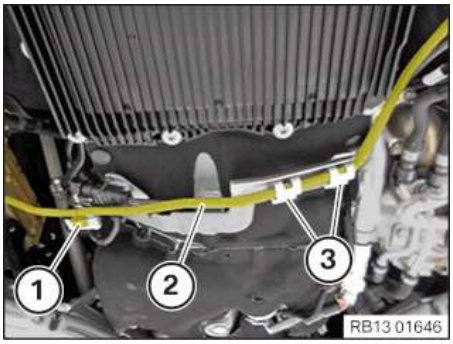
- Feed in and install the nitrogen oxide sensor (1).



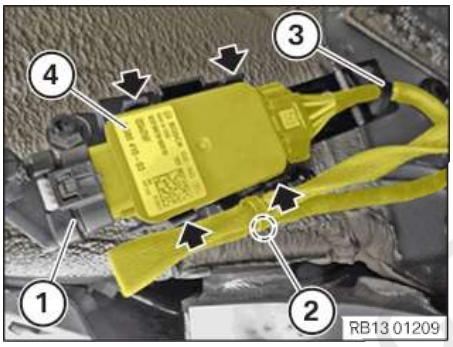
- Tighten the nitrogen oxide sensor (1) using commercially available tools.

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.

99 – 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.

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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



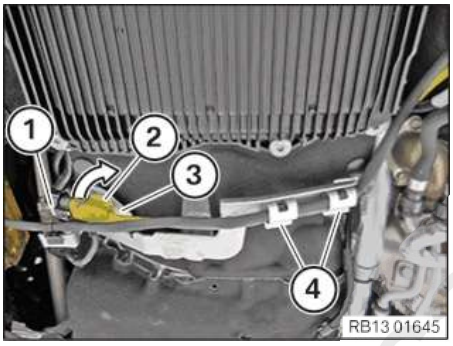
- Insert the monitoring oxygen sensor (1) and install it.



- 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.

100 – 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.

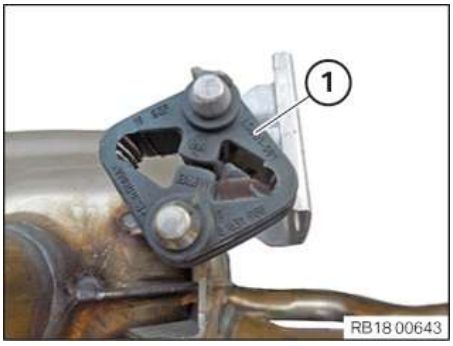
Heavy components can lead to injury or damage.

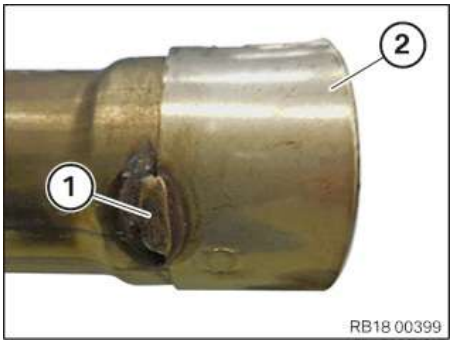
- Remove and install heavy components with the aid of another person/other persons.

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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

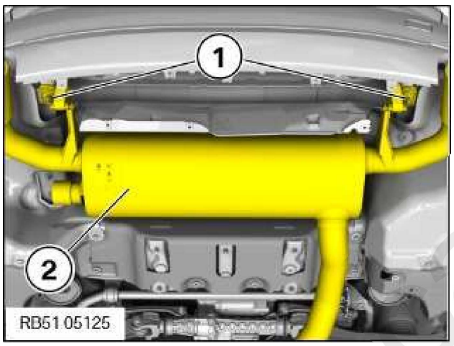
CAUTION

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).

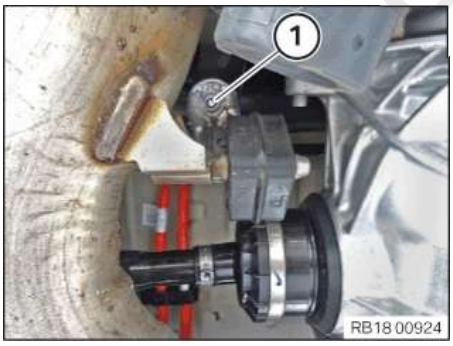


- Insert and install the exhaust system (2).
- Renew nuts (1).

  Parts: Nuts
- Tighten nuts (1).

Rear silencer to body / bumper support

M8	Replace nuts.	Tightening torque	19 Nm

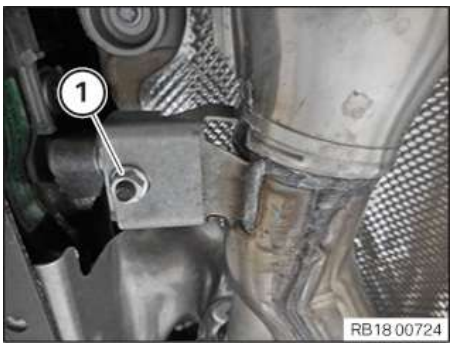


- Renew nut (1) on the rear axle support.

  Parts: Nut
- Tighten nut (1).

Exhaust system to rear axle carrier

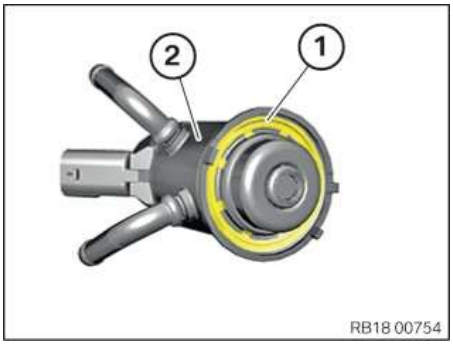
M8 nut		Tightening torque	19 Nm



- Tighten nut (1).

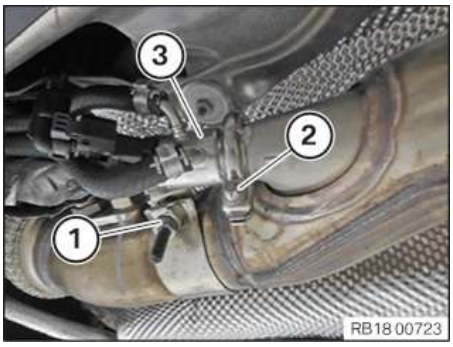
Exhaust system to transmission

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

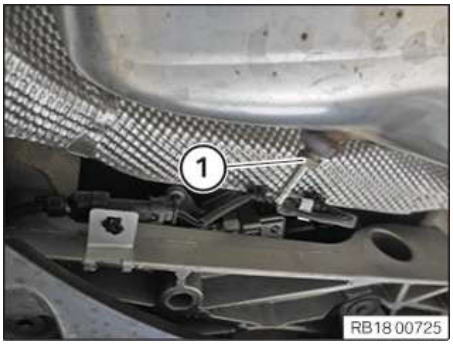
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

- 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

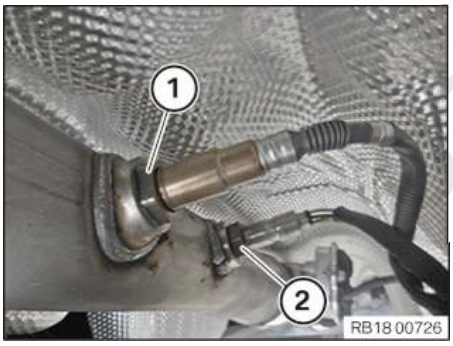
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm



- 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

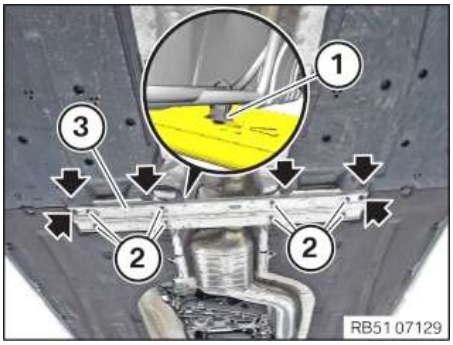
- Install the nitrogen oxide sensor (2) in the exhaust system and tighten.

Nitrogen oxide sensor downstream of SCR catalytic converter

Sensor		Tightening torque	55 Nm

101 – Install the connecting supports on the tunnel

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- Guide in and install connecting support (3) on the tunnel.
- Tighten the screws (2).
- Tighten screws (arrows).

Connecting support to tunnel

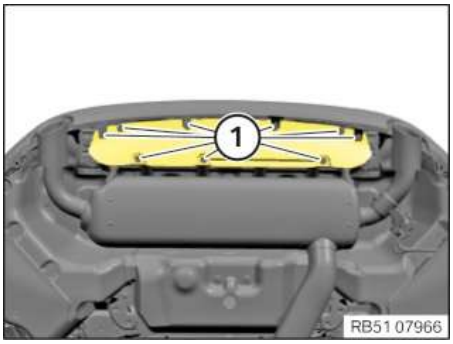
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Secure the clamp (1).

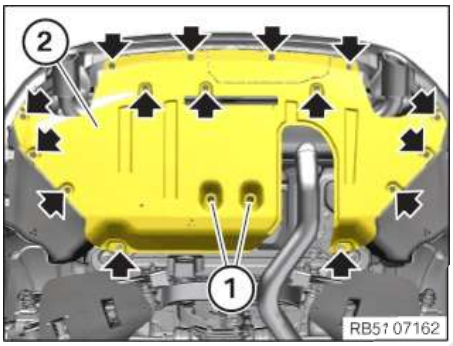
102 – Installing the rear diffuser



- **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

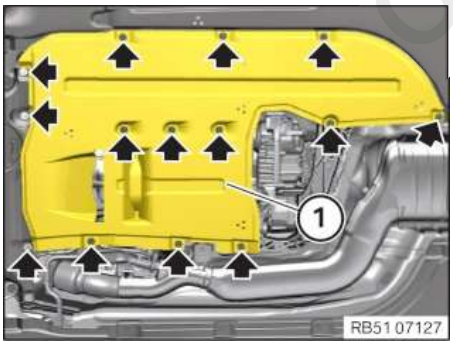
Nuts and screws		Tightening torque	3 Nm

- Tighten nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm

103 – Installing underbody protection at rear



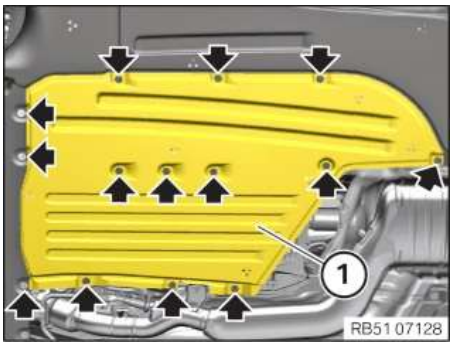
- **Version A:**

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

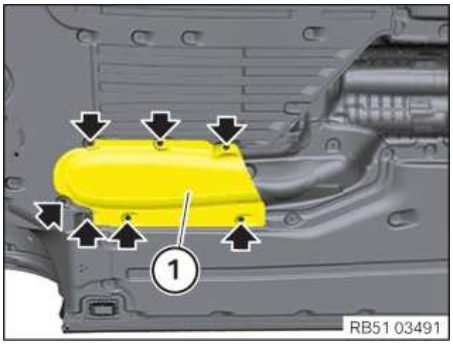
Hexagon screw		Tightening torque	3 Nm

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104 – 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.

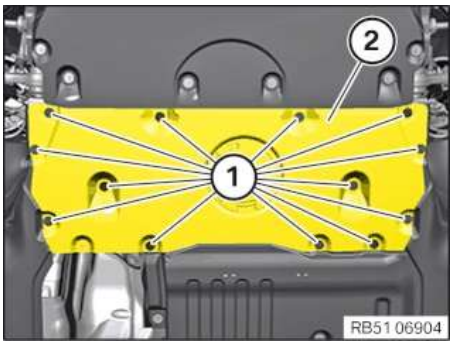


- Insert the underbody panelling (1).
- Tighten screws (arrows).

Underbody panelling

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

105 – Installing the centre underbody protection



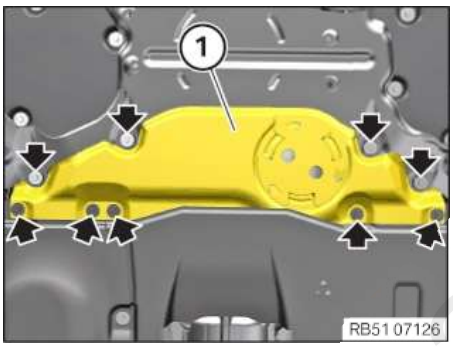
- **Variant with rear wheel drive:**

  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).

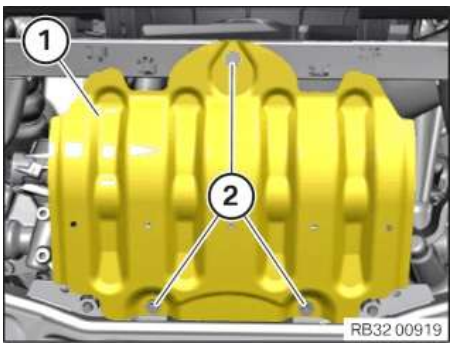
Underbody protection

Hexagon screw		Tightening torque	3 Nm

106 – 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

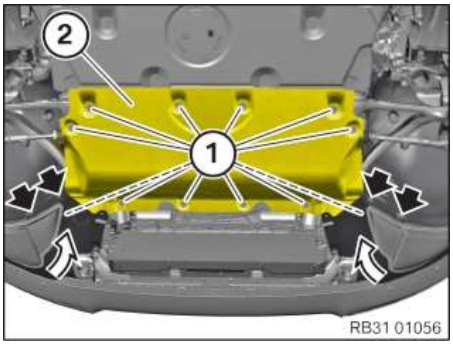
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

107 – Install the underbody protection of the steering gear

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- **Version A:**

  Position the underbody protection (2) of the steering gear.

  Tighten the screws (1).

Underbody protection of the steering gear

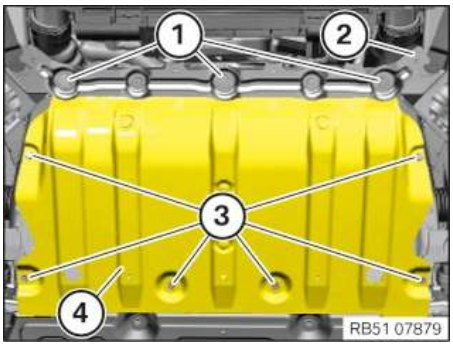
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- 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).

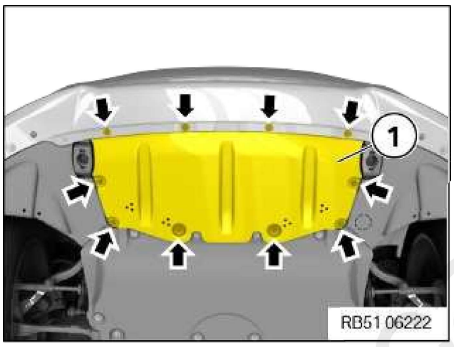
Underbody protection of the steering gear

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).

108 – Installing the front underbody protection



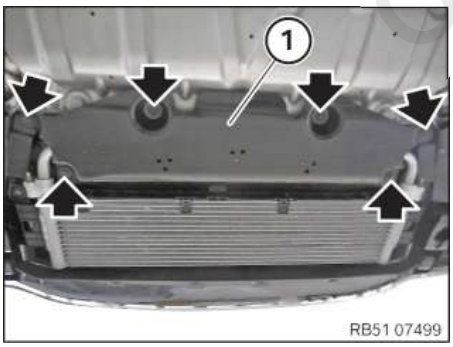
- **Version A:**

  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



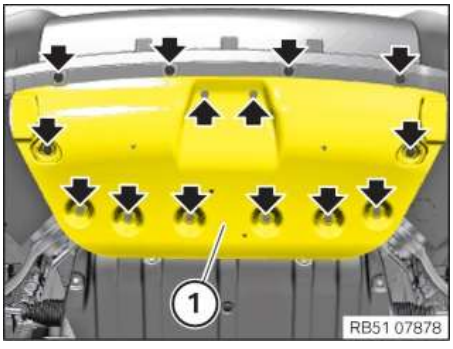
- **Version B:**

  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).

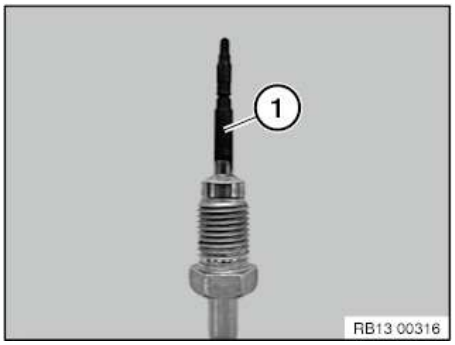
  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

carmanualsdiagn.com

109 – Installing the exhaust temperature sensor for the exhaust system downstream the catalytic converter on the diesel particulate filter



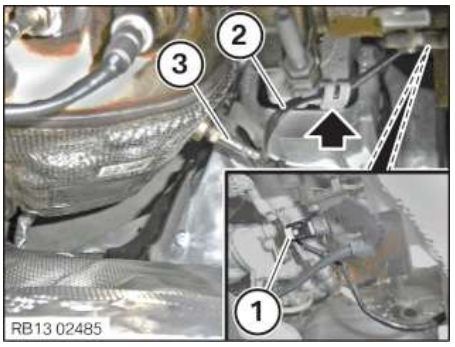
RISK OF DAMAGE

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.

110 – 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

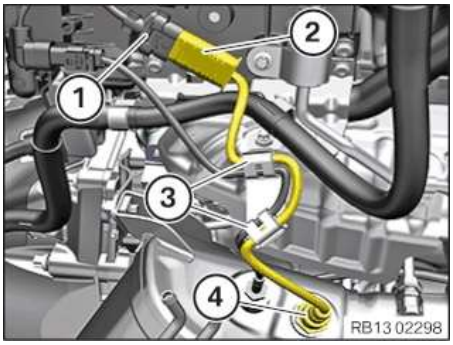


- Insert and install the front oxygen sensor (1).
- Tighten the front oxygen sensor (1) with standard tools.

Front oxygen sensor to top of diesel particulate filter

Sensor		Tightening torque	50 Nm

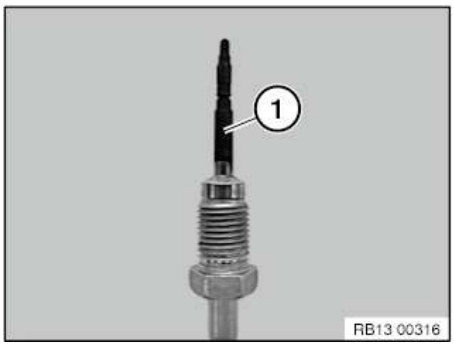
carDiagn.com



- 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.

111 – Install the exhaust-gas temperature sensor on the diesel particulate filter



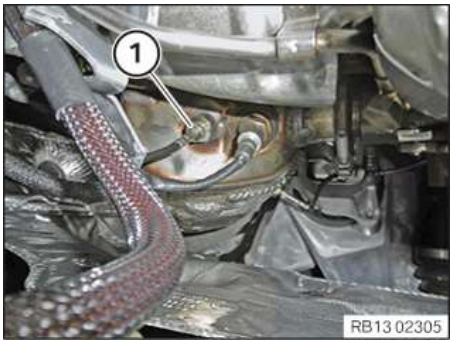
RISK OF DAMAGE

Damage of exhaust temperature sensor.

Damage to exhaust temperature sensors leads to malfunctions.

- Make sure that the gauge tip is not damaged.

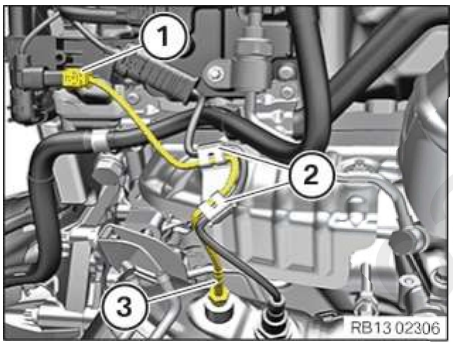
- Check gauge tip (1) for damage.



- 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

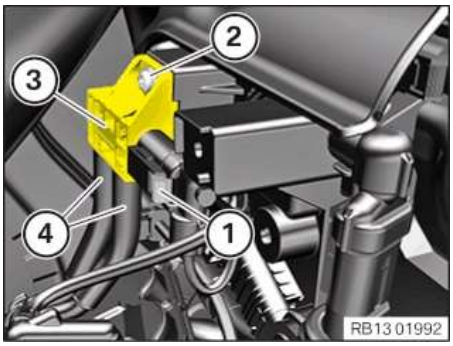
Sensor		Tightening torque	30 Nm



- Secure the exhaust temperature sensor (3) to the clamp (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

112 – 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.

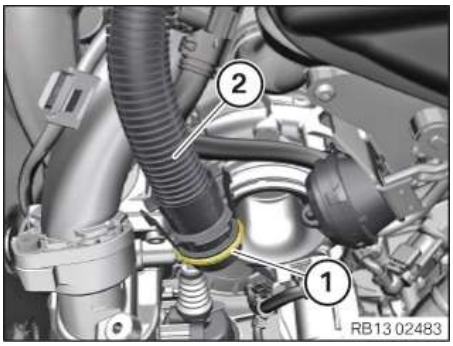
  The connector (1) must engage audibly.

113 – Installing the clean air pipe with resonator

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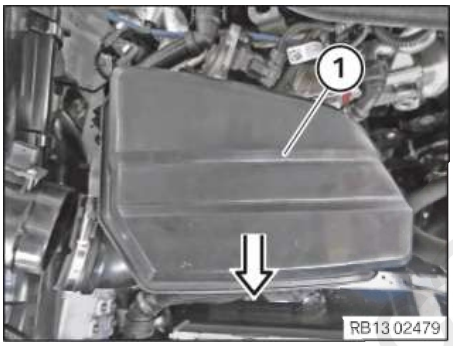
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



- 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.

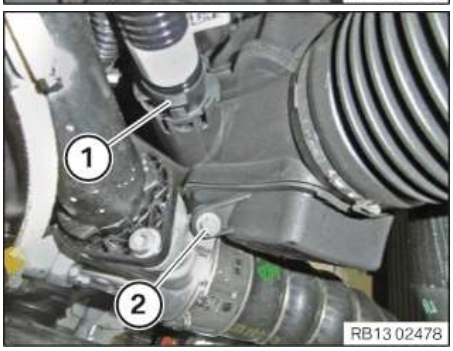


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

  The clamp (1) must engage audibly.

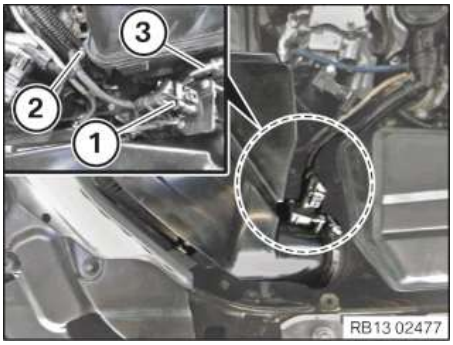


- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm

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- Connect the clean air pipe with resonator to the intake filter housing.
- Tighten clamp (3).

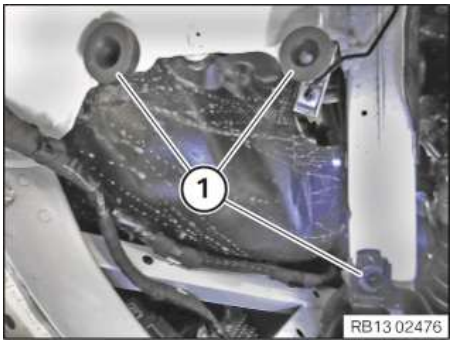
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

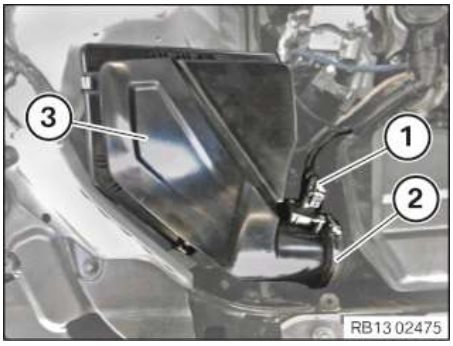
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

114 – 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

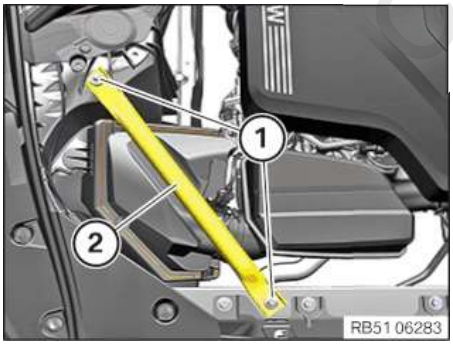
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

115 – Install the right front-end strut

TECHNICAL INFORMATION

Driving without the strut brace/front-end strut or tension strut is not permitted.



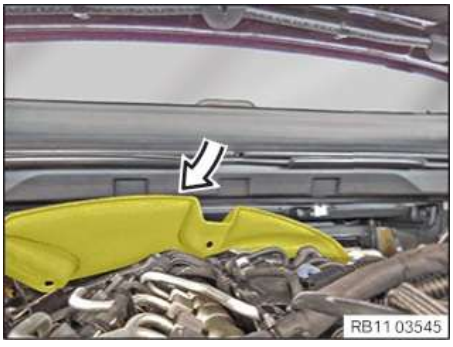
- Install the front-end strut (2).
- Renew screws (1).

  Parts: Screws
- Tighten the screws (1).

Front end strut

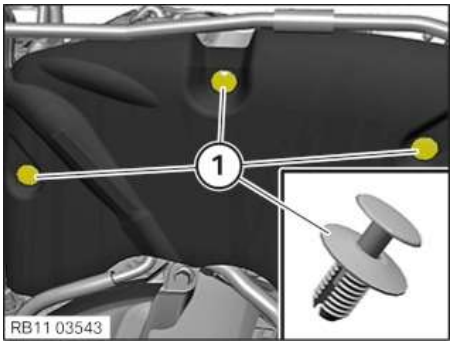
Screw		Tightening torque	56 Nm

116 – Installing acoustic cover at rear



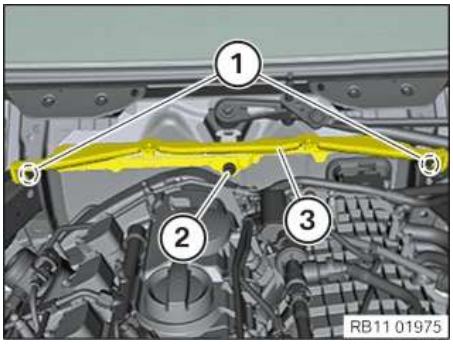
- Guide in the acoustic cover in the direction of the arrow and install it.

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- Secure acoustic cover with the expanding rivets (1).

117 – Installing centre bulkhead lower section

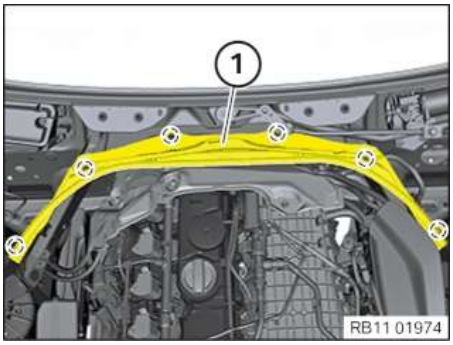


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

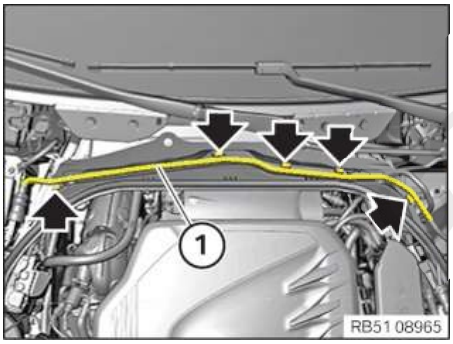
118 – Installing the centre bulkhead upper part



- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

Bulkhead upper part to bottom bulkhead

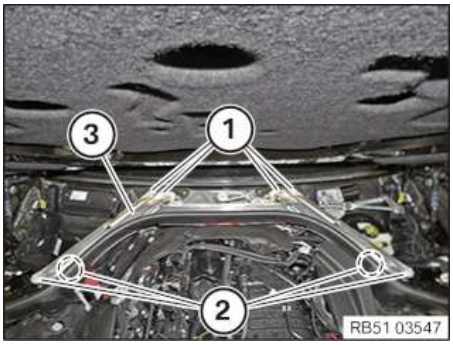
		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

  Clip in the wire (1) into the holders (arrows).

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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 °

119 – 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.

120 – Installing cowl panel cover

RISK OF DAMAGE

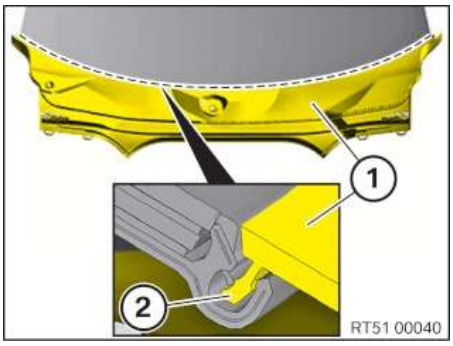
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

- Ensure correct installation of the components.
- Only use undamaged components.

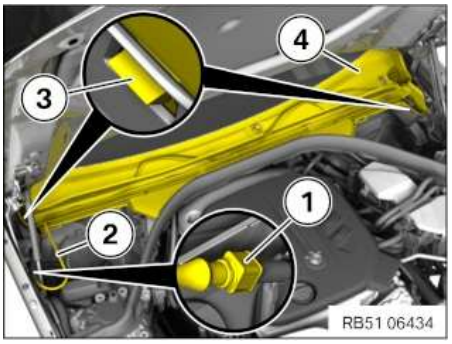
TECHNICAL INFORMATION

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.

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- 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.

121 – Install left and right wiper arm

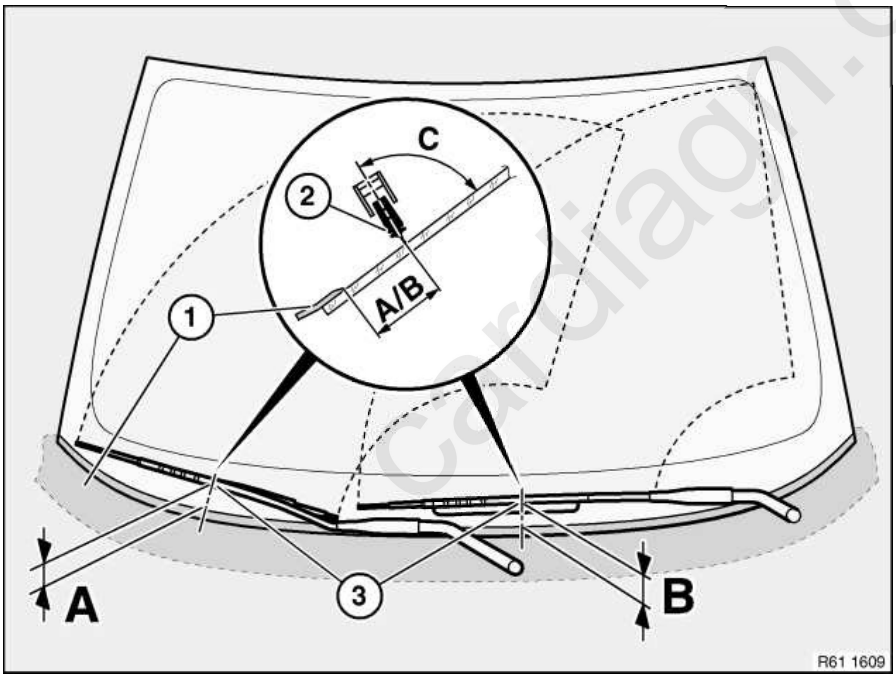
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

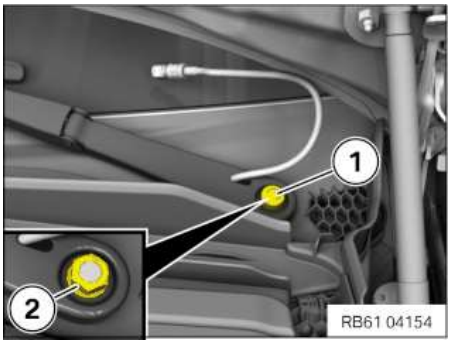
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- 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



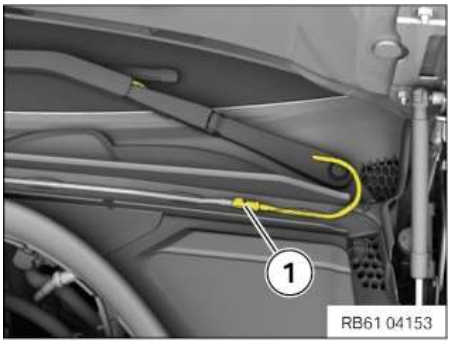
- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

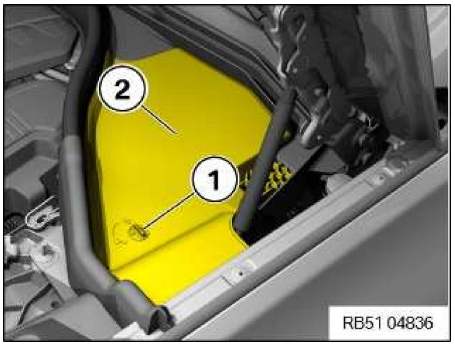
- Connect the protective cap (1).

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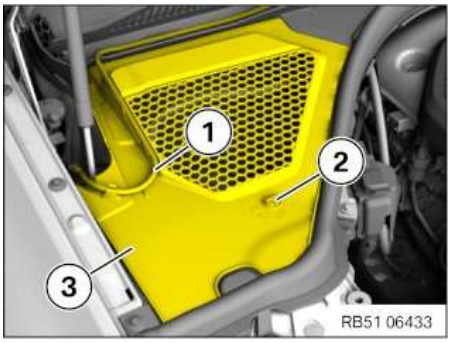
- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

122 – Install the cover of the engine compartment on the rear left



- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

123 – 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.

124 – Connecting all battery earth leads



- See additional information.

125 – Take bonnet out of the service position

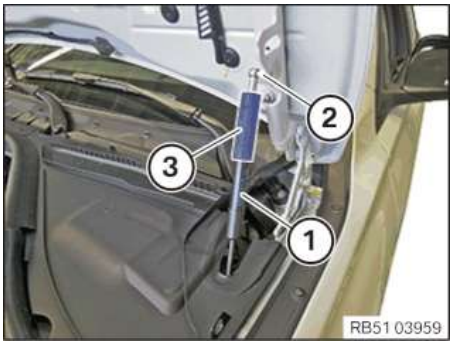
CAUTION

Shutting bonnet or tailgate.

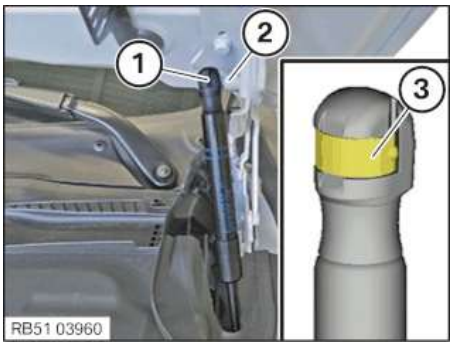
Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.

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- 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.

126 – 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.

127 – 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).

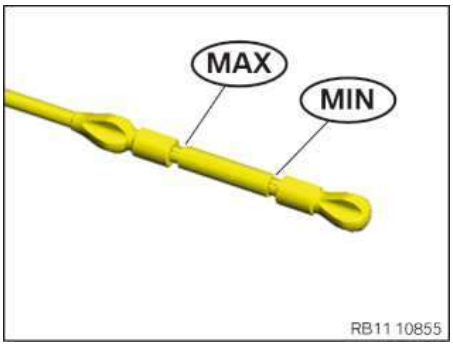
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- Park vehicle on a horizontal surface.
- Stop the engine and wait for 5 minutes.
- Pull out the oil dipstick and wipe off using a lint-free cloth.

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

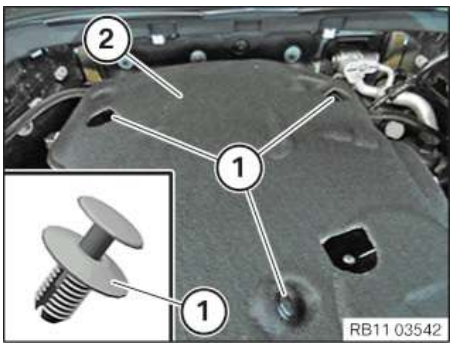
The engine oil level must be between the minimum mark and the maximum mark of the oil dipstick.

- 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

128 – 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) .

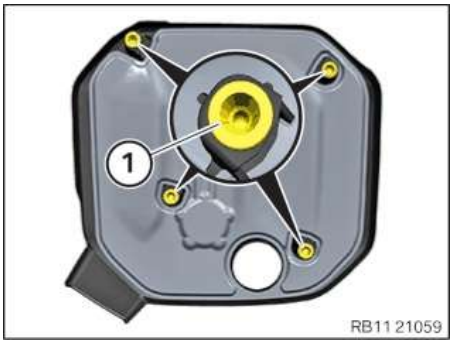
129 – Install acoustic cover

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).

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- 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 5174

M8x60		Tightening torque	19 Nm

Cylinder head to crankcase — Used in step 63

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 63

M8x40		Tightening torque	19 Nm

Standard screw connection M6 — Used in step 63

M6		Tightening torque	8 Nm

Ground to cylinder head — Used in step 63

M6		Tightening torque	8 Nm

Camshaft carrier to cylinder head — Used in step 66

M7x35		Tightening torque	13 Nm

Bearing journal to cylinder head — Used in step 69

M16x1.5	Replace bearing journal.	Tightening torque	20 Nm

Standard screw connection M8 — Used in step 69

M8		Tightening torque	19 Nm

Chain tensioner piston to cylinder head — Used in step 70

22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

Holder to crankcase — Used in step 70

M8X16		Tightening torque	19 Nm

Camshaft sprocket to camshaft — Used in step 71

M7x17.			17 Nm

Starter motor to engine — Used in step 77

M8X60		Tightening torque	19 Nm

Battery positive lead to starter — Used in step 77

M8		Tightening torque	13,5 Nm

Cylinder head cover to cylinder head — Used in step 78

M6		Tightening torque.	8,5 Nm

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Clamping claw facing to cylinder head cover			Used in step 79
M6		Tightening torque	10 Nm

Injector to cylinder head cover			Used in step 79
M8		Tightening torque	8 Nm
		Angle of rotation	120 °

Rail to cylinder head cover			Used in step 80
M8		Tightening torque	19 Nm

High pressure lines between high pressure pump and rail			Used in step 81
High-pressure pipe		Tightening torque	24.5 Nm

High pressure lines between injector and rail			Used in step 82
High-pressure pipe		Tightening torque	24.5 Nm

Intake plenum to cylinder head			Used in step 84
M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum			Used in step 8488
		Tightening torque	10 Nm

Electric changeover valve to intake plenum			Used in step 84
TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold			Used in step 85
TS5x20		Tightening torque	3,6 Nm

Standard screw connection 4 Nm			Used in step 85
Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover			Used in step 85
TS5x20		Tightening torque	3,6 Nm

Holder on intake plenum			Used in step 85
TS6X20		Tightening torque	5 Nm

Exhaust manifold to cylinder head			Used in step 87
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 87
M6x12		Tightening torque	8 Nm

Exhaust-gas recirculation cooler to exhaust manifold			Used in step 8788
M8x28	Replace screws	Tightening torque	32 Nm

Exhaust-gas recirculation cooler to cylinder head			Used in step 8788
M8x20 / M8x28		Tightening torque	19 Nm

Exhaust turbocharger low-pressure stage to crankcase			Used in step 87
M8X16		Tightening torque	22 Nm

Oil return line to turbocharger			Used in step 87
M6x12	Renew gasket.	Tightening torque	8 Nm

Oil return line to crankcase			Used in step 87
M6x12	Check gasket. Renew the seal or line if necessary.	Tightening torque	8 Nm

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Exhaust-gas recirculation cooler to cylinder head — Used in step 88

M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °

Heat shield to exhaust manifold — Used in step 89

M6x12			10 Nm

Bracket on cylinder head cover — Used in step 90

		Tightening torque	5 Nm

Battery positive lead to battery positive terminal — Used in step 90

M8		Tightening torque	19 Nm

Heat shield to exhaust manifold — Used in step 91

M6x12		Tightening torque	10 Nm

Banjo bolt for exhaust pressure pipe to exhaust manifold — Used in step 91

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm

Exhaust gas pressure pipe to sensor system holder — Used in step 91

TS6x20		Tightening torque	5,7 Nm

Cover, steering unit — Used in step 94

Screw		Tightening torque	3 Nm

Brake disc to front wheel hub — Used in step 95

M8	Renew screw.	Tightening torque	16 Nm

Brake disc to rear wheel hub — Used in step 95

M8	Renew screw.	Tightening torque	16 Nm

Wheel bolts — Used in step 95

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 97

V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

Bracket to diesel particulate filter top — Used in step 97

M8		Tightening torque	19 Nm

Bracket to transmission for diesel particulate filter holder bottom — Used in step 97

M8X20		Tightening torque	19 Nm

Lower holder to diesel particulate filter — Used in step 97

M8		Tightening torque	19 Nm

Coolant lines for SCR metering module — Used in step 97

M6X16		Tightening torque	8 Nm

Nitrogen oxide sensor before SCR catalytic converter — Used in step 98

Sensor		Tightening torque	50 Nm

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Monitoring oxygen sensor			Used in step 99
Sensor		Tightening torque	50 Nm

Rear silencer to body / bumper support			Used in step 100
M8	Replace nuts.	Tightening torque	19 Nm

Exhaust system to rear axle carrier			Used in step 100
M8 nut		Tightening torque	19 Nm

Exhaust system to transmission			Used in step 100
M8		Tightening torque	19 Nm

Exhaust system to diesel particle filter			Used in step 100
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

SCR metering module V-clip to exhaust system			Used in step 100
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm

Exhaust-gas temperature sensor upstream of SCR catalytic converter			Used in step 100
Sensor		Tightening torque	30 Nm

Diesel particulate sensor to exhaust system			Used in step 100
Sensor		Tightening torque	50 Nm

Nitrogen oxide sensor downstream of SCR catalytic converter			Used in step 100
Sensor		Tightening torque	55 Nm

Connecting support to tunnel			Used in step 101
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

Diffuser / underbody panelling			Used in step 102
Nuts and screws		Tightening torque	3 Nm

Underbody protection			Used in step 103105
Hexagon screw		Tightening torque	3 Nm

Underbody panelling			Used in step 104
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Underbody protection, steering, to front axle support			Used in step 106
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support			Used in step 106
Hexagon bolt M6		Tightening torque	8 Nm

Underbody protection of the steering gear			Used in step 107
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

Wheel arch trim panel, front			Used in step 107
Thermoplastic hexagon screw		Tightening torque	2,6 Nm

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Underbody protection front			Used in step 108
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 109
Sensor		Tightening torque	30 Nm

Front oxygen sensor to top of diesel particulate filter			Used in step 110
Sensor		Tightening torque	50 Nm

Exhaust-gas temperature sensor to diesel particulate filter			Used in step 111
Sensor		Tightening torque	30 Nm

Differential pressure sensor of diesel particulate filter on cylinder head cover			Used in step 112
TS5x20		Tightening torque	4 Nm

Clamp for the pressure hose on the differential pressure sensor			Used in step 112
Clamp 15–19mm		Tightening torque	3 Nm

Clean air pipe to exhaust turbocharger			Used in step 113
M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing			Used in step 113114
Clamp		Tightening torque	3 Nm

Front end strut			Used in step 115
Screw		Tightening torque	56 Nm

Bulkhead lower part to body			Used in step 117
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead			Used in step 118
		Tightening torque	3 Nm

Tension strut on bulkhead			Used in step 118
M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome			Used in step 118
Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm			Used in step 121
Combination hexagon nut		Tightening torque	35 Nm

Overview of Special Tools

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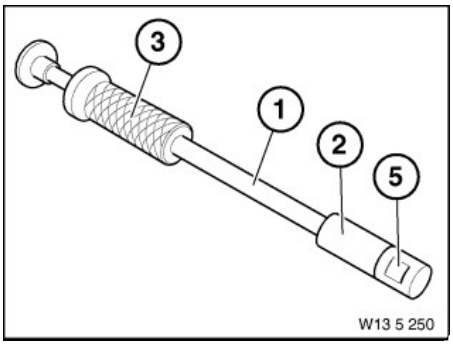
0 493 339 (13 5 252) Bush



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	

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)	

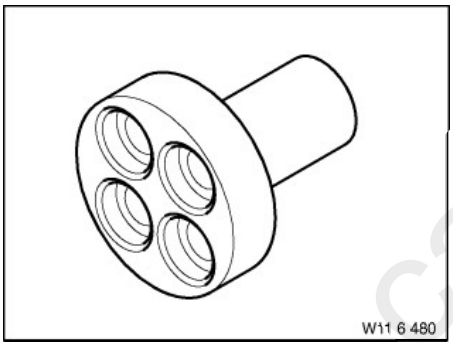
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0 493 340 (13 5 253) Weight



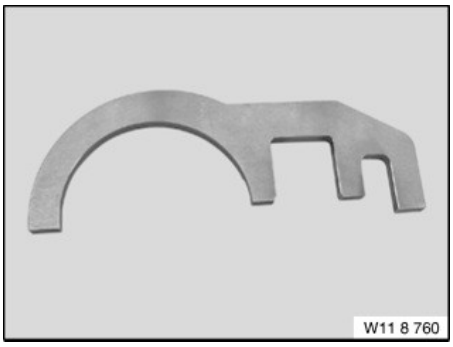
Common	Used in step 48
Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 380 (11 6 480) Connector



Common	Used in step 5174
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 515567727475
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)

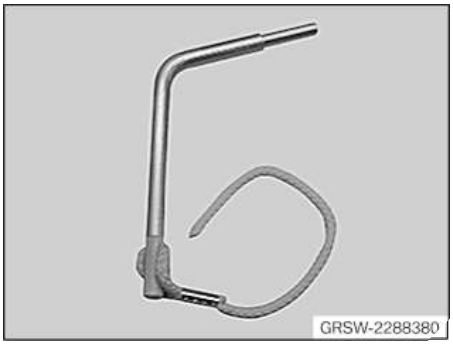
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2 365 488 Adapter



Common	Used in step 51737476
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)

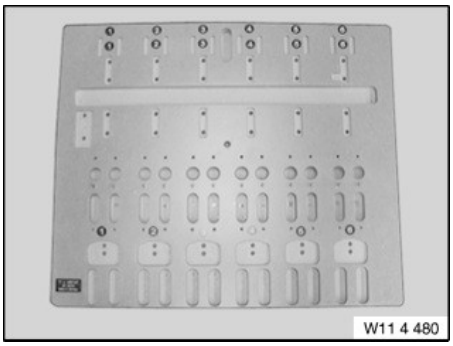
2 288 380 Locating stud



Common	Used in step 51737476
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)

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0 495 105 (11 4 480) oddments tray



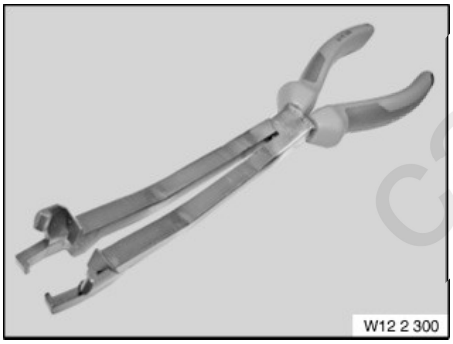
Common Used in step 5758

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	

0 495 140 (12 2 300) Pliers

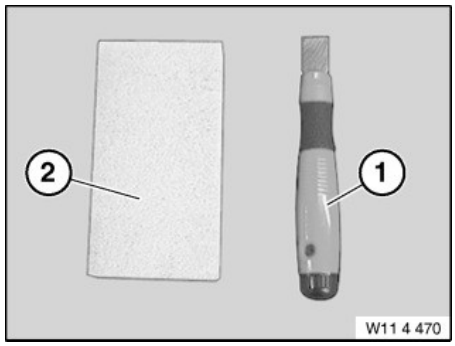


Common Used in step 59

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)

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0 495 102 (11 4 470) Tool



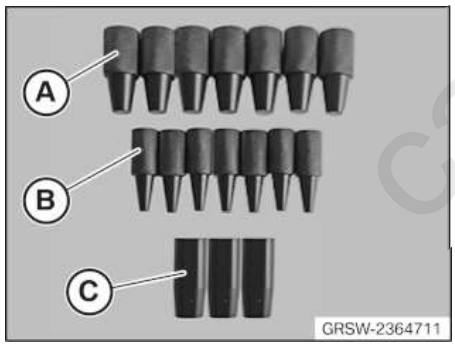
Common	Used in step 5987
Usage	(cleaning kit) For cleaning sealing surfaces on magnesium crankcase/cylinder head.
Included in the tool or work	
Storage location	C52
Replaced by	
In connection with	
SI-Number	01 17 04 (130)

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)	

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2 364 711 Plug



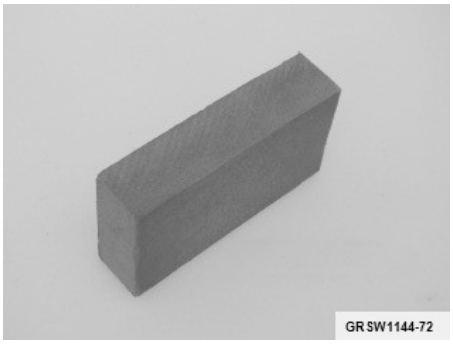
Common	Used in step 60
Usage	For closing the pressure oil holes for cleaning the cylinder head sealing surfaces.
Included in the tool or work	
Storage location	C20
Replaced by	
In connection with	
SI-Number	

0 495 103 (11 4 471) Scraper



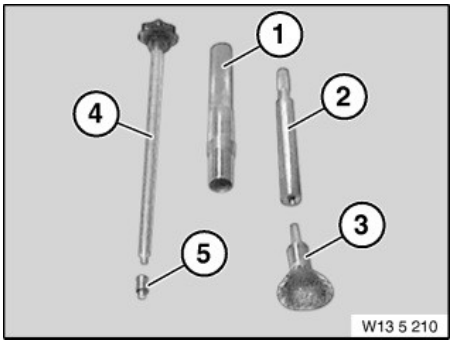
Common	Used in step 60
Usage	
Included in the tool or work	0 495 102
Storage location	C52
Replaced by	
In connection with	
SI-Number	

0 495 104 (11 4 472) Extractor



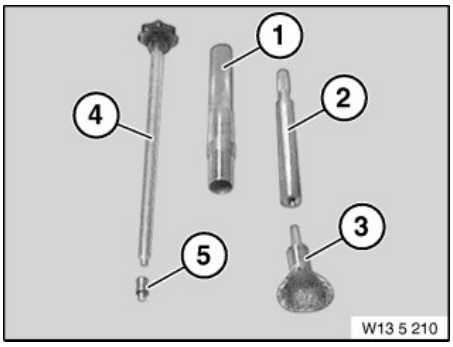
Common	Used in step 60
Usage	(grindstone)
Included in the tool or work	0 495 102
Storage location	C52
Replaced by	
In connection with	
SI-Number	

0 493 763 (13 5 215) Plug



Common	Used in step 79
Usage	(Seal plug)
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

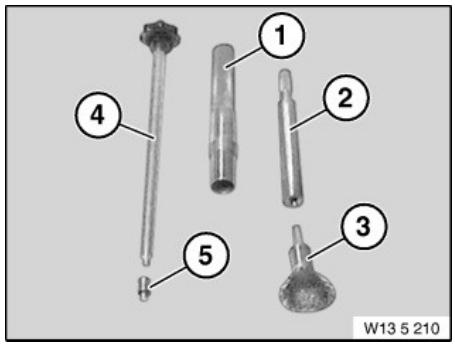
0 493 762 (13 5 214) Rod



Common	Used in step 79
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	

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0 493 758 (13 5 210) Tool



Common Used in step 79

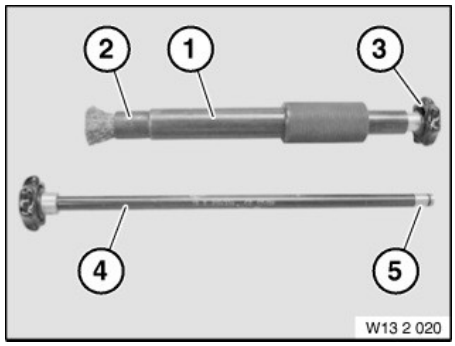
Usage	(Cleaning set) For injector channels
Included in the tool or work	
Storage location	B4
Replaced by	
In connection with	
SI-Number	01 05 00 (574)

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)	

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0 496 150 (13 2 020) Tool



Common Used in step 79

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.	

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2 344 011 Tool



Common	Used in step 95
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	

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	

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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	

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	

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Overview Technical Data

Cylinder head flatness	Used in step 61
Maximum lengthwise deviation from flatness	0.10 mm
Maximum transverse deviation from flatness	0.05 mm

Distance from window pane edge to wiper blade	Used in step 121
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 127
	1.0 l

Links

General repair instructions	Used in step
11 00 ... Overview of consumables (Electronic Parts Catalogue)	79

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2124
61 20 900 Disconnecting and connecting battery earth lead	2124
61 20 900 Disconnecting and connecting battery earth lead	2124
61 20 900 Disconnecting and connecting battery earth lead	2124
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61 20 900 Disconnecting and connecting battery earth lead	2124
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2124
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2124
61 20 900 Disconnecting and connecting battery earth lead	2124
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2124
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	2124
61 20 900 Disconnecting and connecting battery earth lead	2124
61 20 900 Disconnecting and connecting battery earth lead	2124
61 20 900 Disconnecting and connecting battery earth lead	2124
61 20 900 Disconnecting and connecting battery earth lead	2124
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61 20 900 Disconnecting and connecting battery earth lead	2124
61 20 900 Disconnecting and connecting battery earth lead	2124

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61 20 900 Disconnecting and connecting battery earth lead	2124

17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126
17 00 039 Bleeding the cooling system (B36, B38, B46, B48)	126
17 00 039 Bleeding cooling system (B37, B47)	126
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126
17 00 039 Filling and bleeding the high-temperature cooling system vacuum filler device (B48)	126
17 00 008 Draining and topping up the high-temperature coolant circuit	126
17 00 008 Draining and topping up the high-temperature coolant circuit	126
17 00 016 Draining and topping up coolant circuit for Range Extender \PREMIUM	126
17 00 008 Draining and topping up the high-temperature coolant circuit	126
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	126
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	126
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	126
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	126
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	126
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	126
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126
17 00 009 Check the cooling system for watertightness with a special tool (with a tester)	126
17 00 009 Check the cooling system for watertightness with a special tool (with a tester)	126
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126
17 00 008 Draining and topping up coolant for high-temperature circuit	126
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126
17 00 008 Draining and topping up coolant for high-temperature circuit	126
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126

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11 12 000 Removing and installing/sealing cylinder head cover

PRELIMINARY WORK

1 – Bring front compartment lid in the service position

Prerequisite

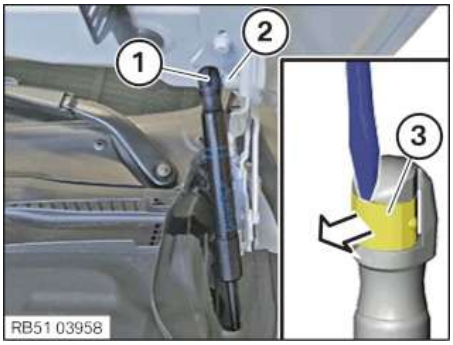
Engine compartment lid is open.

CAUTION

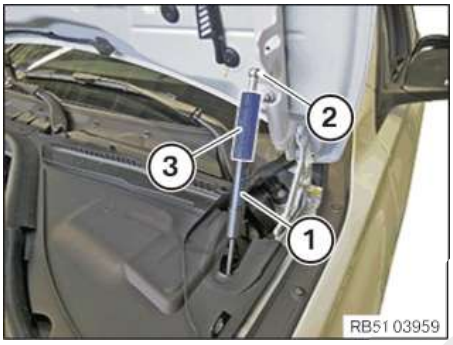
Shutting bonnet or tailgate.

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 – 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.

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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.

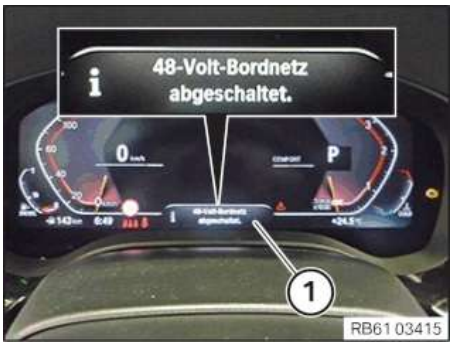
TECHNICAL INFORMATION

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

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

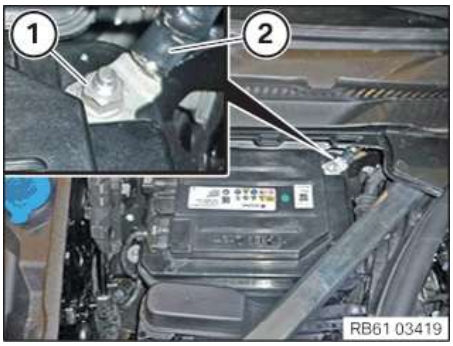
- Exit PAD mode by pressing the START-STOP button once without depressing the brake pedal.

The work “Disconnecting the negative battery cable of the 48-V battery” can be started.

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- 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.

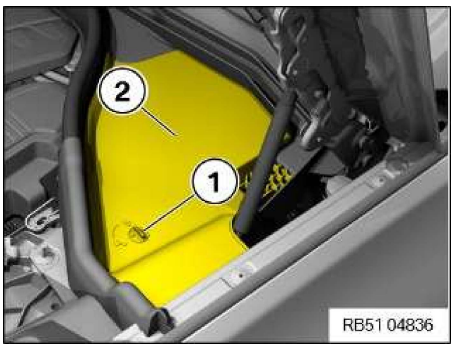
- Cover the vehicle battery with the special tool as shown.
- Position the battery earth lead (1) as shown.

3 – Disconnecting all battery earth leads



- See additional information.

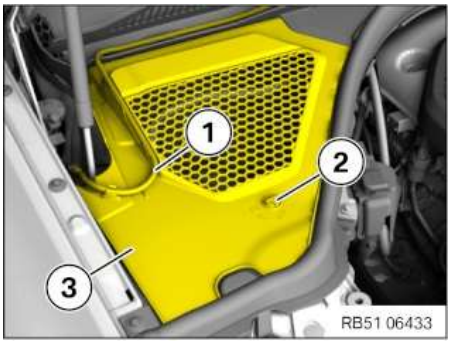
4 – Remove the cover of the engine compartment at the rear left



- Loosen the lock (1).
- Remove the cover (2) of the rear left engine compartment.

5 – Remove the cover of the rear right engine compartment

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- 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.

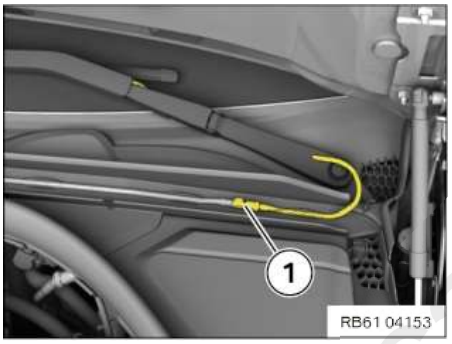
► **Remove the wiper arm**

RISK OF DAMAGE

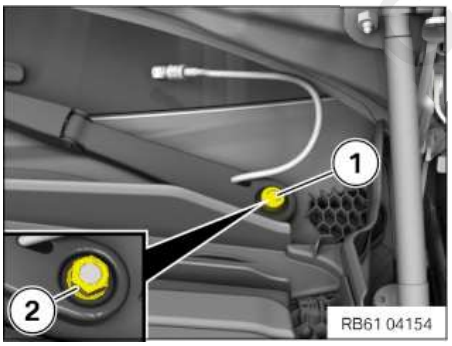
Damage to wiper console.

While removing the wiper arms without using special tool, the wiper console can break.

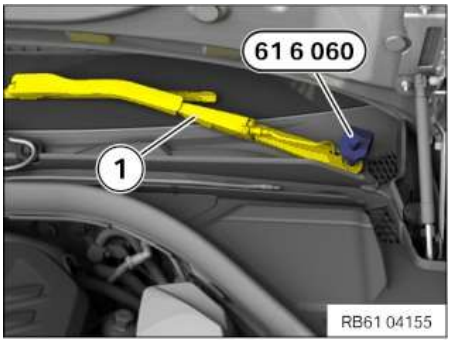
- Removing the wiper arms must be carried out only using the prescribed special tool.
- Do **not** lever off the wiper arm because otherwise the wiper console may break at the predetermined breaking point for active pedestrian protection.



- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.



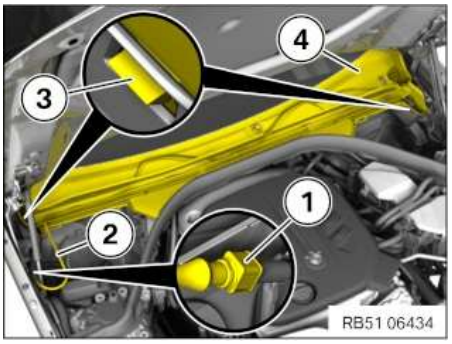
- Remove the protective cap (1).
- Loosen nut (2).



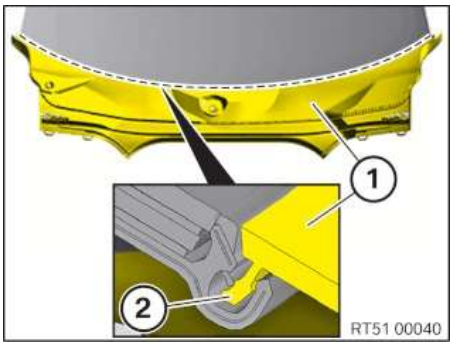
- Pull off the wiper arm (1) using special tool .

7 – Remove cowl panel cover

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- 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

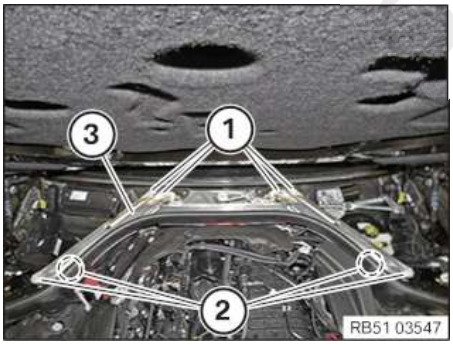


- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

9 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

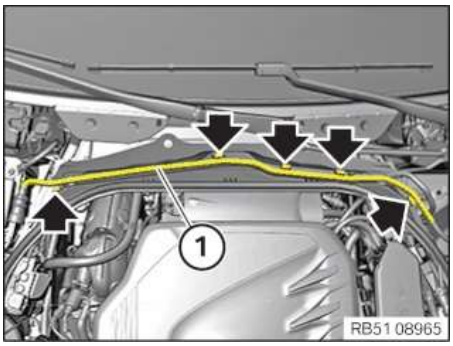
Driving without the strut brace/front-end strut or tension strut is not permitted.



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

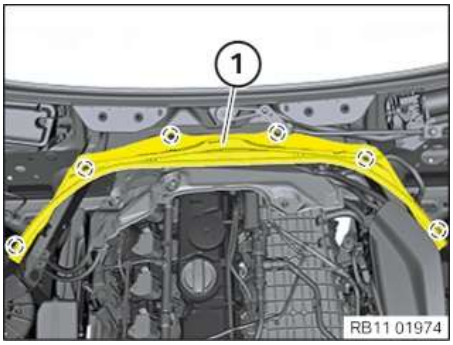
- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.



- **Version with mild hybrid technology:**

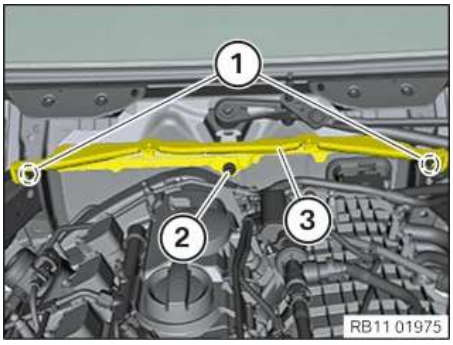
  Unclip the wire (1) at the holders (arrows).

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- 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.

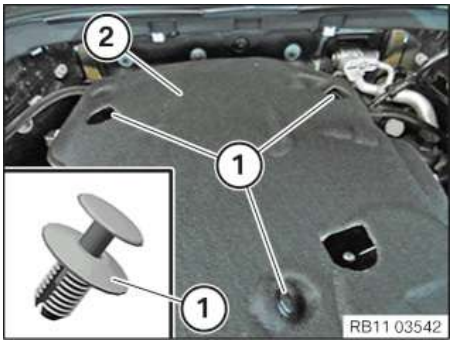
Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- 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.



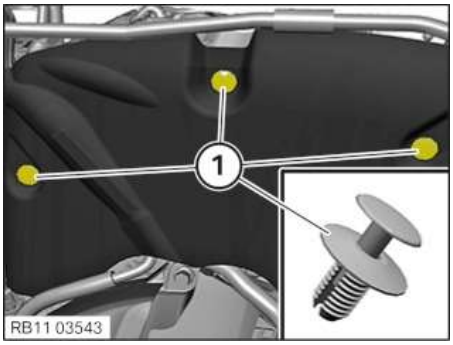
- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

12 – Remove the acoustic cover for the injectors

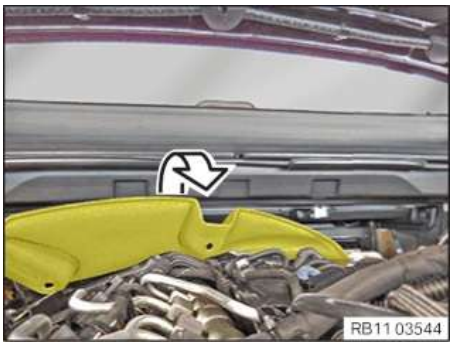


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

13 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).



- Guide out and remove the acoustic cover in the direction of the arrow.

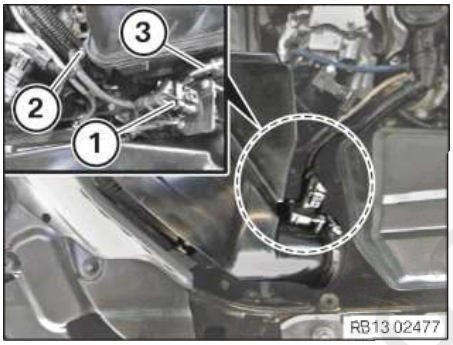
14 – Removing the clean air pipe with the resonator

WARNING

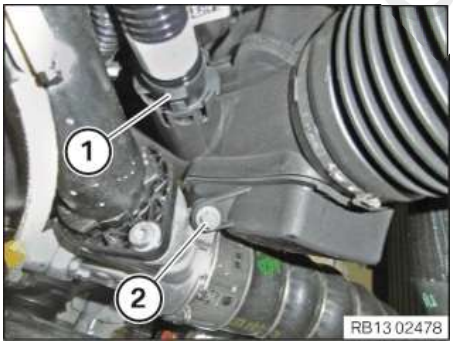
Hot surfaces.

Risk of burning!

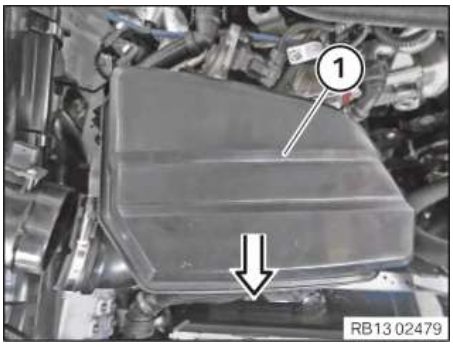
- Perform all work only on components that have cooled down.



- 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.

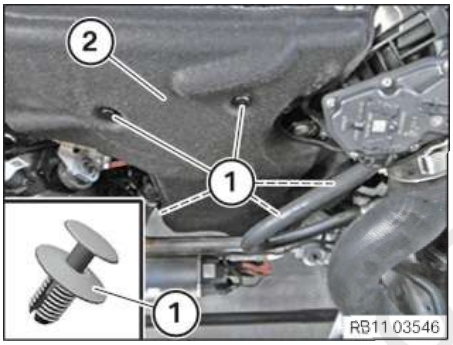
15 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

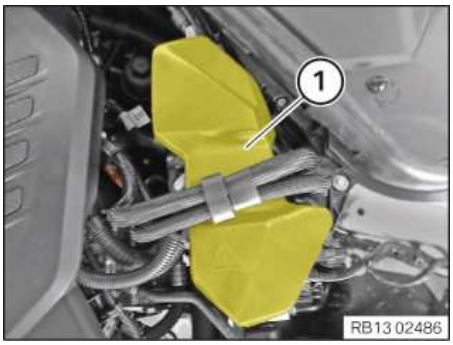
Risk of burning!

- 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

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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

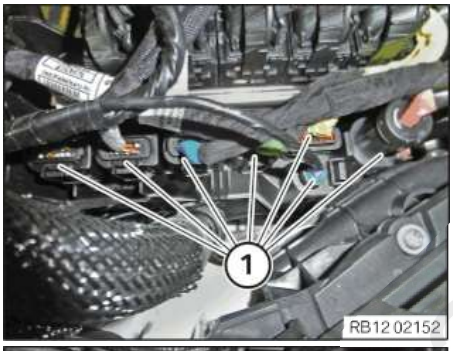
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

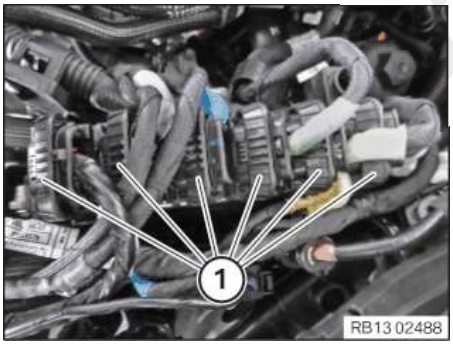
- Do not pull on the wires when disconnecting connectors and plug connections.

TECHNICAL INFORMATION

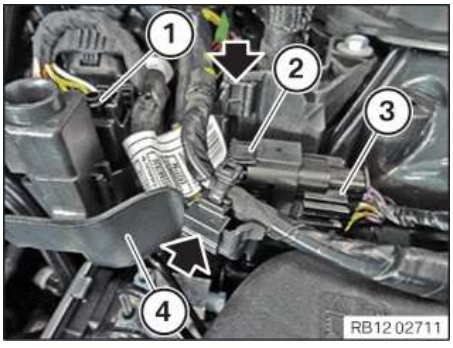
Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.



- Unlock and disconnect plug connections (1).

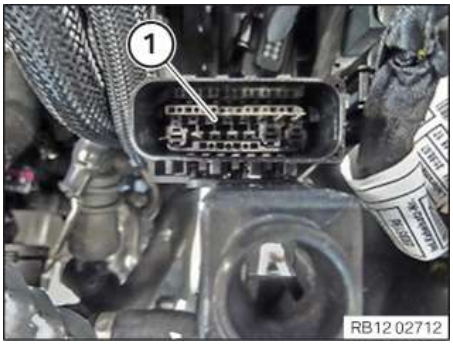


- Unlock and disconnect plug connections (1).

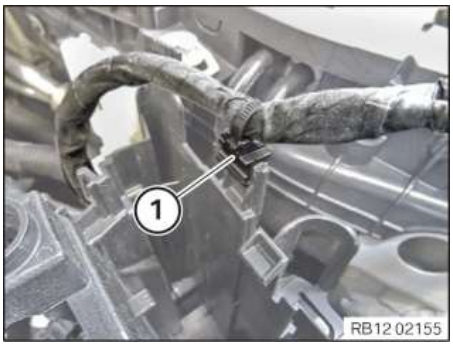


- Unlock plug connection (1) and disconnect.
- Unlock plug connection (2) and disconnect.
- Release the connector (3) and disconnect from the control unit holder (4).
- Release the clamps (arrows).

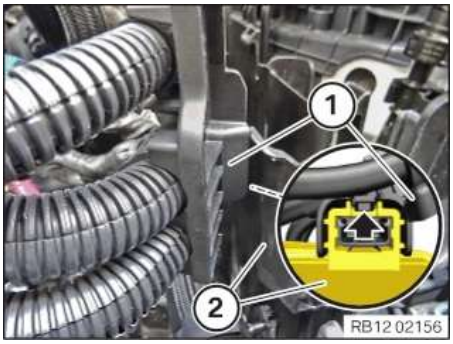
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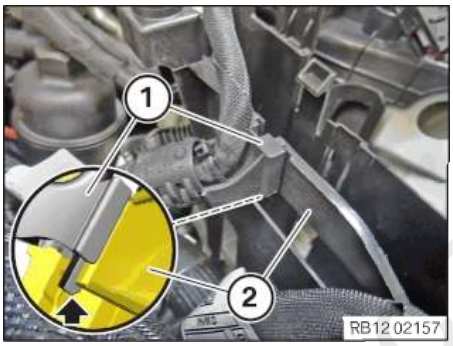
- Unlock plug connection (1) and disconnect.



- 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).

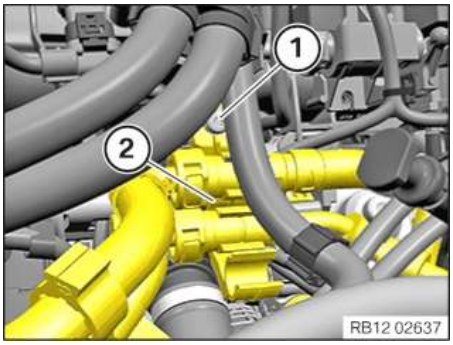


- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.

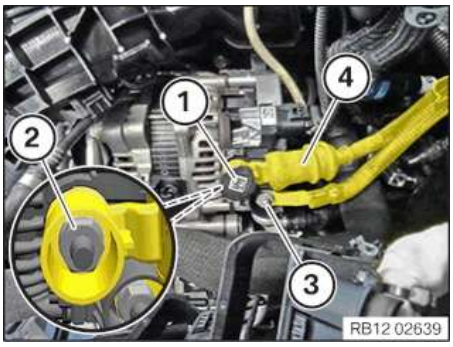


- Unlock holder (1) and feed out coolant line (2) and place it aside.

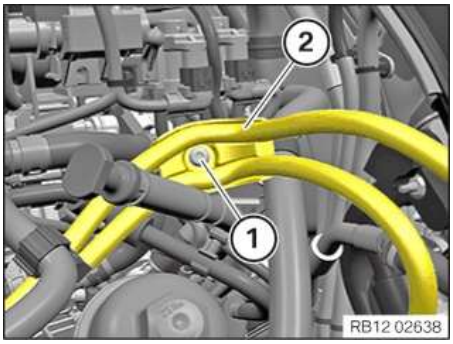
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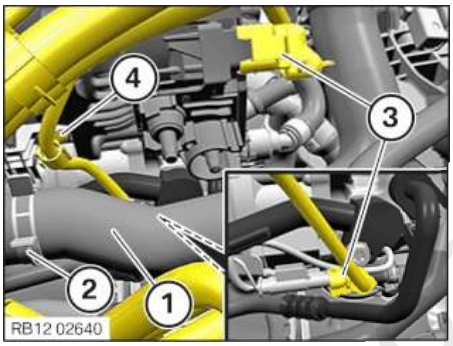
- Release the screw (1).
- Guide out fuel lines (2) and set them aside.



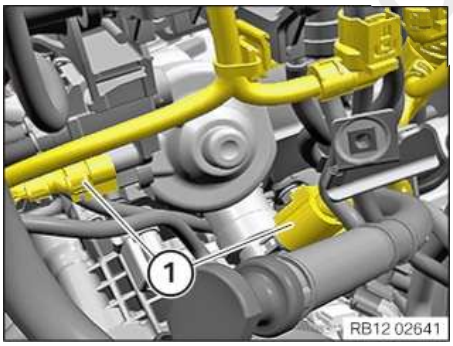
- Guide out and remove the lid (1).
- Release the nuts (2) and (3).
- Feed out positive battery cables (4) and place to one side.



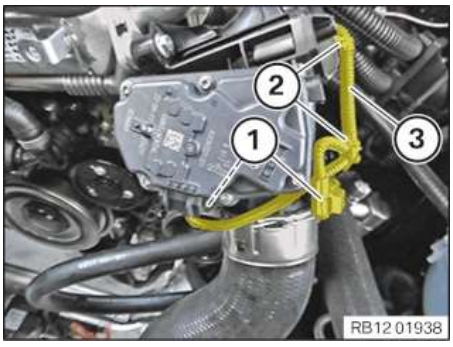
- Release the screw (1).
- Guide out the positive battery cables (2) and set them aside.



- 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.

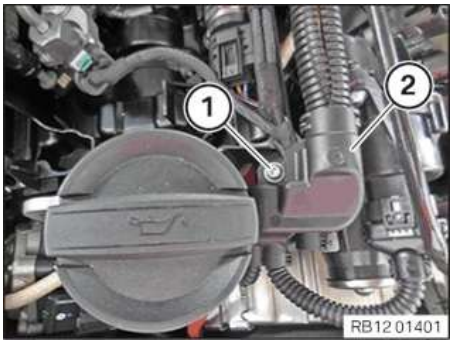
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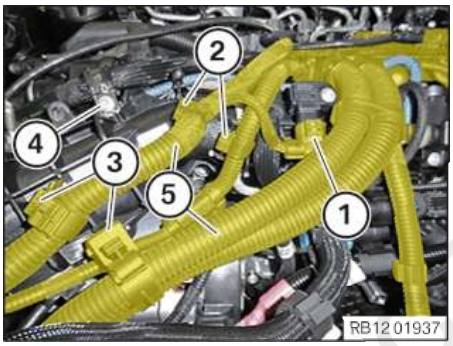
- Unlock and loosen connector (1).



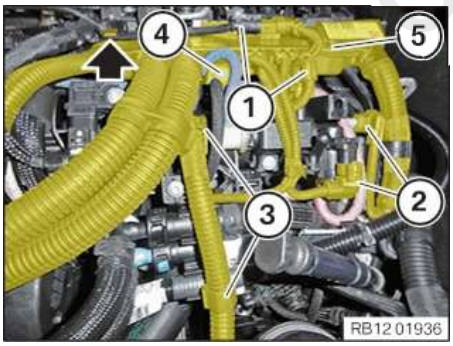
- Unlock plug connection (1) and disconnect.



- 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.

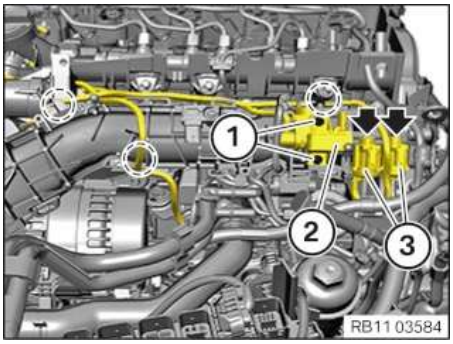
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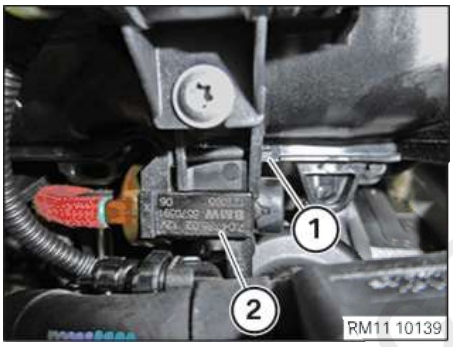
- Unlock clamp (1) and engage in this position.



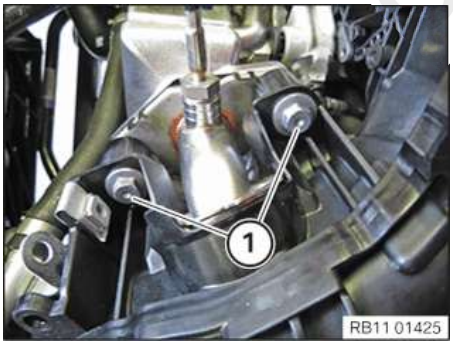
- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.



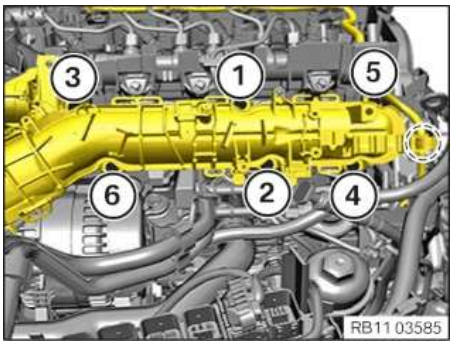
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.

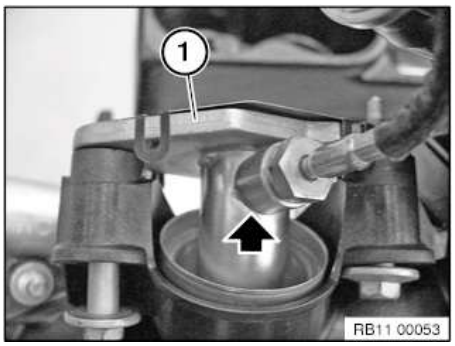


- Loosen screws (1).



- 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.

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- 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!

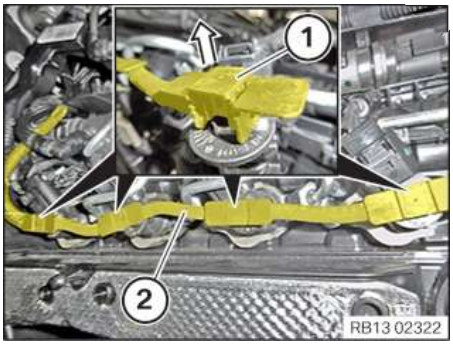
- Perform all work only on components that have cooled down.

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.

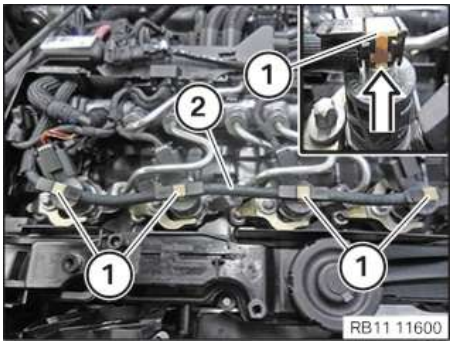


- **Version A:**

  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.



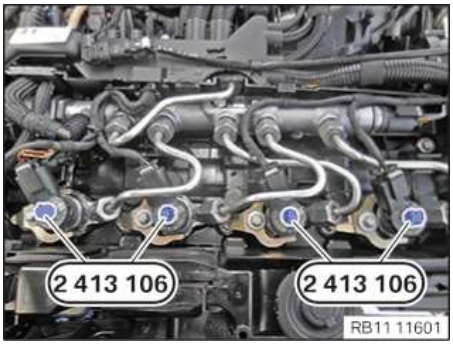
- **Version B:**

  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.

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- 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.

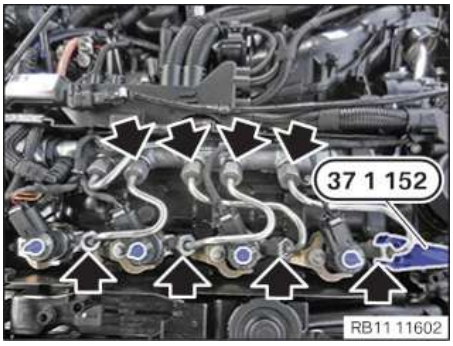
TECHNICAL INFORMATION

If several high pressure lines are removed, ensure that each high pressure line is installed in its original location. Label high pressure lines.

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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.

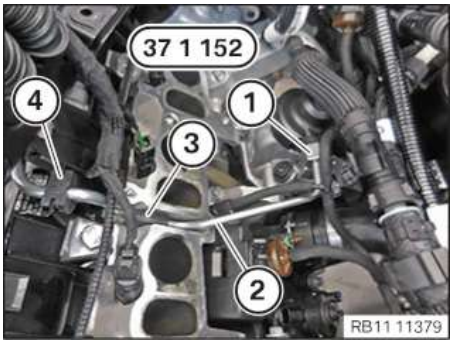
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TECHNICAL INFORMATION

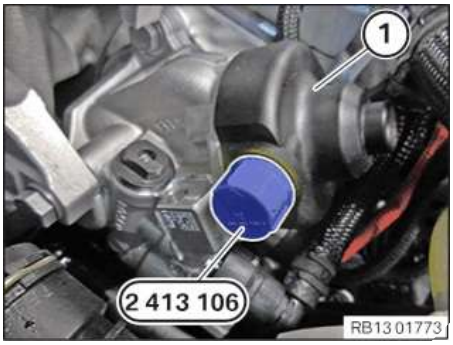
Reset special tool in early to avoid bending pressure lines.



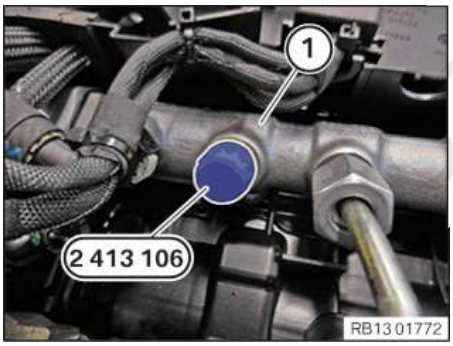
- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.



- 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.

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RISK OF DAMAGE

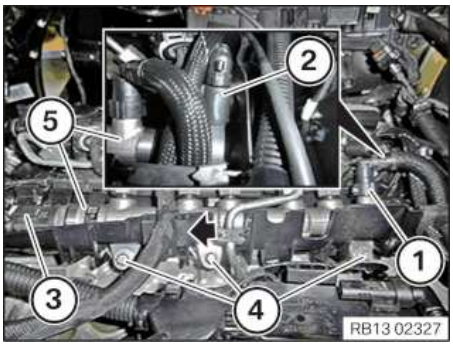
Contaminant or foreign body.

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.

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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

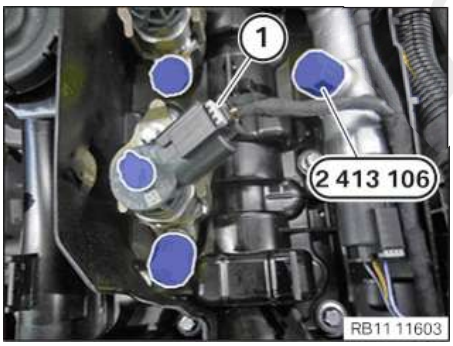
Electrostatic discharge.

Damage to or destruction of electrical components.

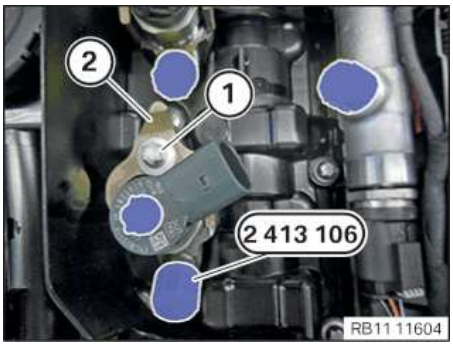
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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**

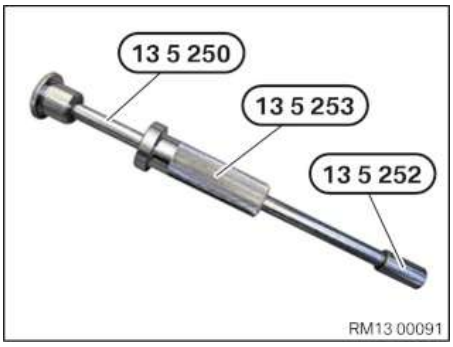
carsdiagn.com

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.

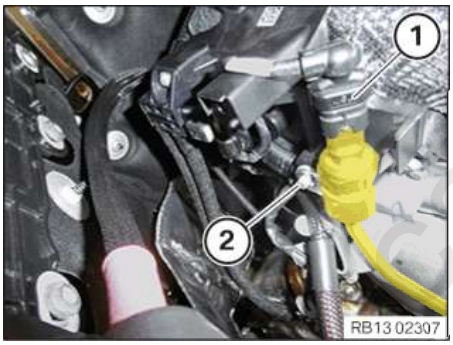


- Unscrew special tool 0 493 339 (13 5 252) from special tool 0 493 321 (13 5 250) and remove special tool 0 493 340 (13 5 253).
- Screw special tool 0 493 339 (13 5 252) back onto special tool 0 493 321 (13 5 250).

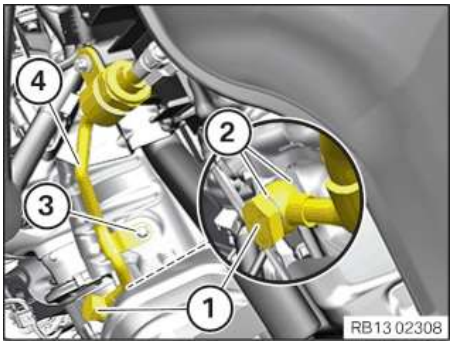


- Screw special tool 0 493 321 (13 5 250) with special tool 0 493 339 (13 5 252) onto pressure line connection (1) of injector.
- Release injector (1) with special tools 0 493 321 (13 5 250) and 0 493 339 (13 5 252) by means of **short** back and forth movements and remove.

24 – Remove the exhaust gas pressure pipe



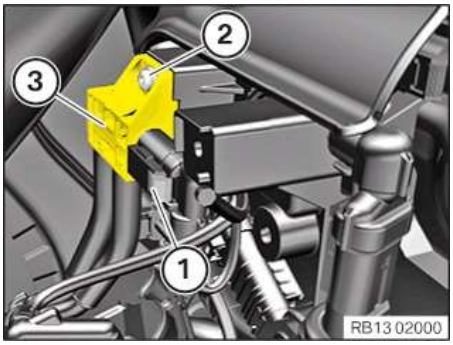
- Unlock plug connection (1) and disconnect.
- Loosen screw (2).



- 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

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- 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.

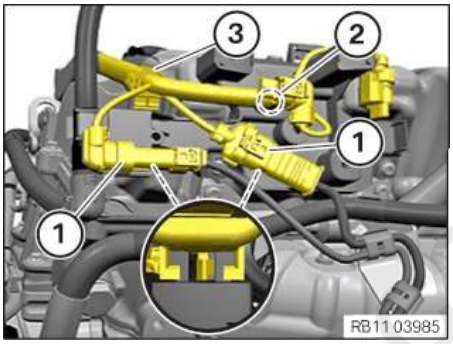
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

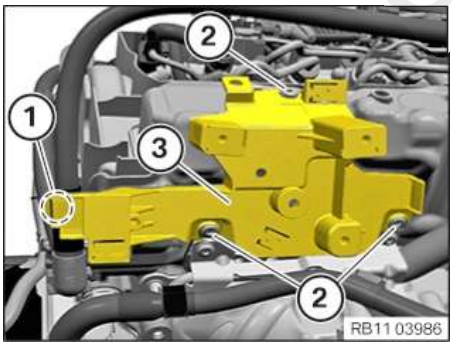
Contaminant or foreign body.

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.

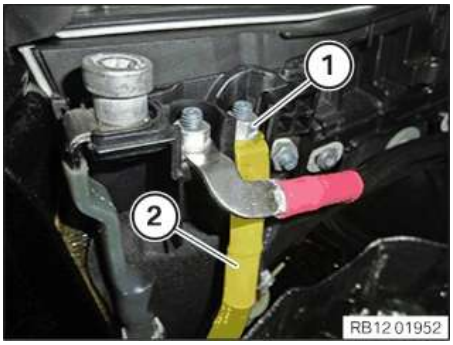


- Release the positive battery cable in the area (1) from the clamp and set it aside.
- Loosen screws (2).
- Feed out holder (3) for the sensor system and remove.

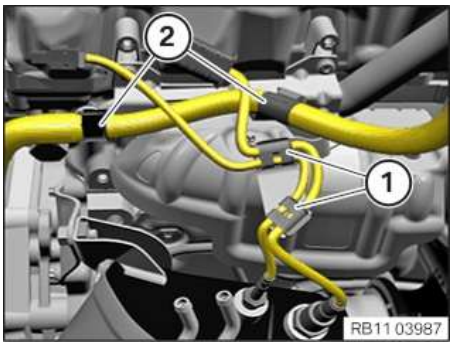


- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.

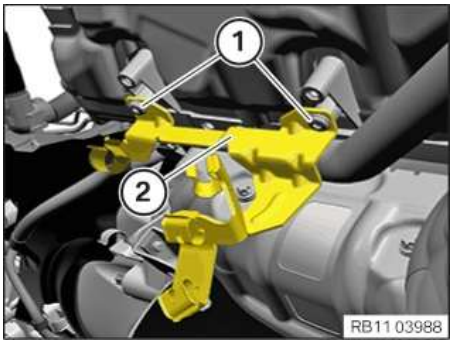
cardiagn.com



- Loosen nut (1).
- Feed out positive battery cable (2) and put to one side.

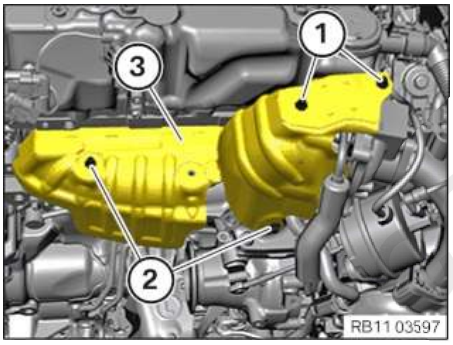


- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



- Loosen screws (1).
- Guide out and remove holder (2).

27 – Removing heat shield



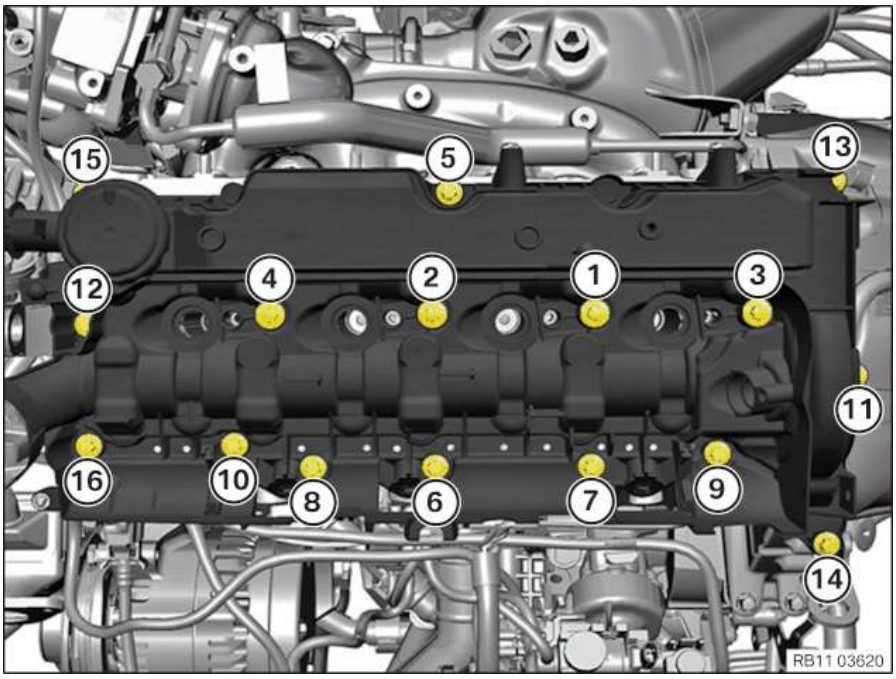
- Loosen screws (1).
- Loosen screws (2).
- Feed out and remove the heat shield (3).

MAIN WORK

28 – Removing the cylinder head cover

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Screw connection of the cylinder head cover



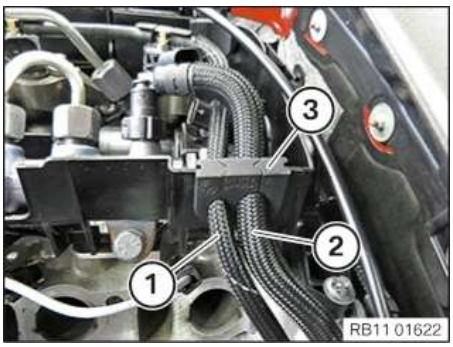
1 - 16 Bolts of the cylinder head cover



- Unlock and detach the locks.
- Feed the engine ventilation line (1) out and set it aside.

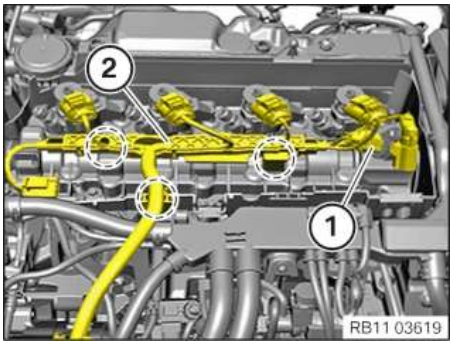


- Feed out and remove the heat shield (1).

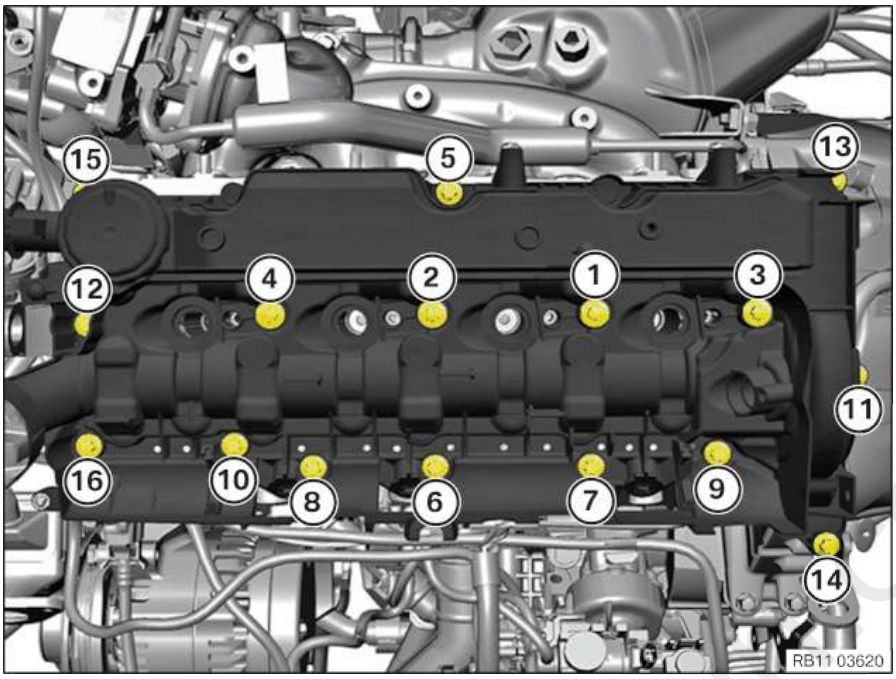


- Remove the leakage oil line (1) including the fuel return line (2) and the grommet (3) and put to one side.

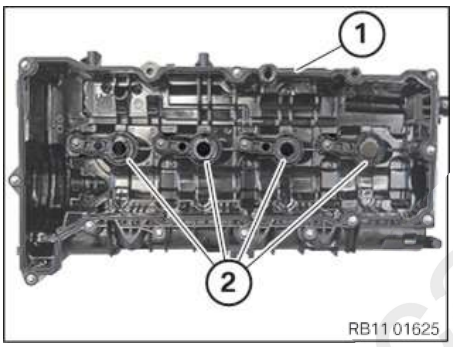
cardiagn.com



- 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.

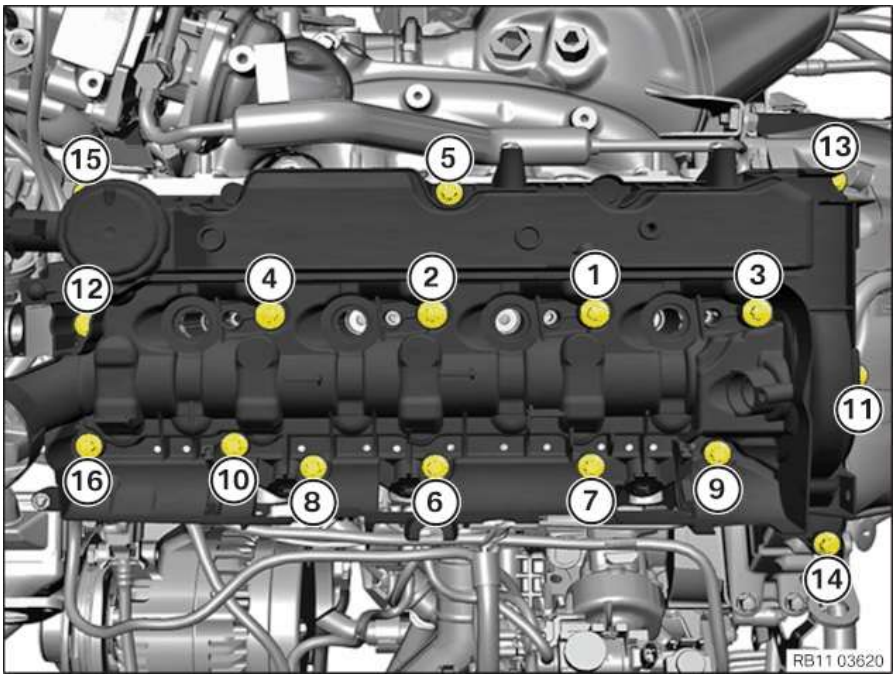


- Remove the profile seals (1) and (2).

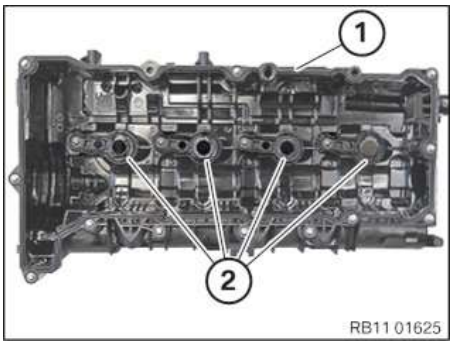
29 – Installing cylinder head cover

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Screw connection of the cylinder head cover

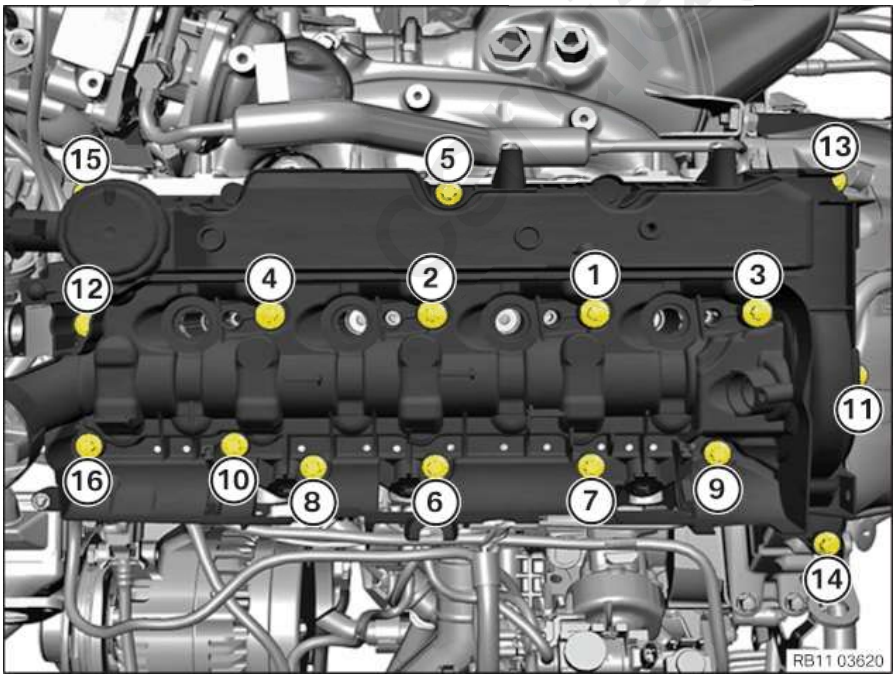


1 - 16 Bolts of the cylinder head cover



- Renew the profile seals (1) and (2) of the cylinder head cover.

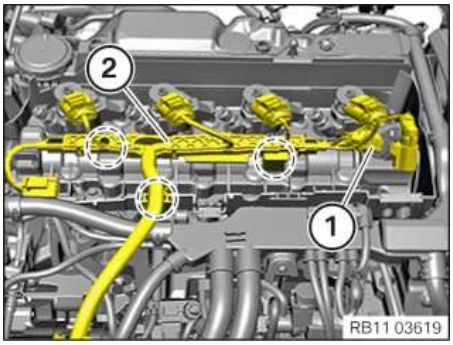
  Parts: Profile seals



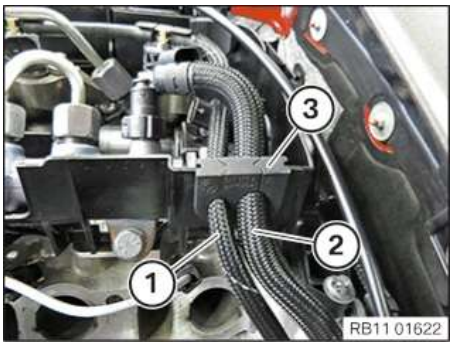
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

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).

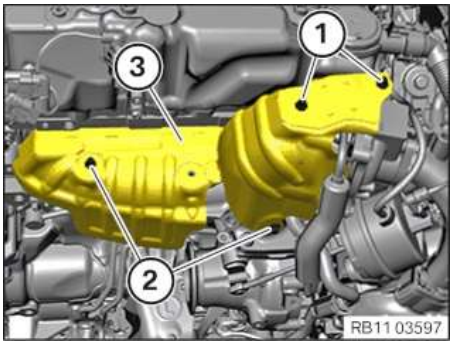


- Connect engine ventilation line (1) and lock.

  The locks (arrows) must engage audibly.

POSTPROCESSES

30 – 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

31 – Installing the sensor bracket on the cylinder head cover

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RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

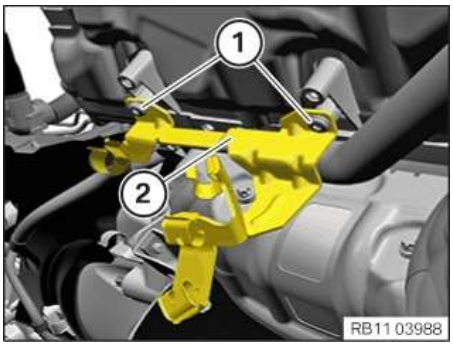
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

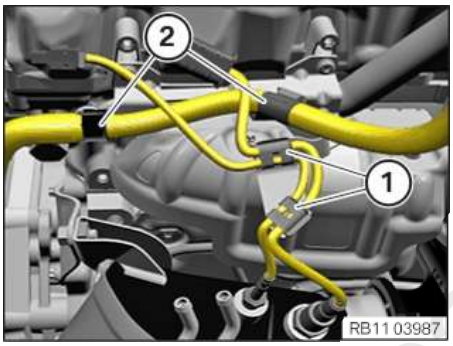
- Route all cables without abrasions, do not trap and crush.



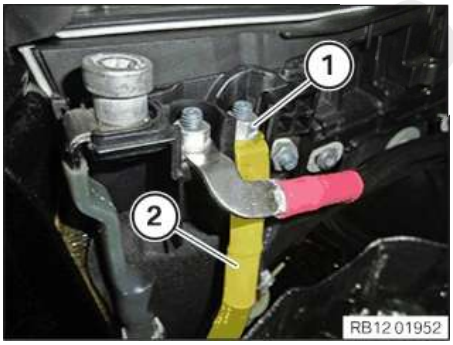
- Insert and install the holder (2).
- Tighten the screws (1).

Bracket on cylinder head cover

	Tightening torque	5 Nm



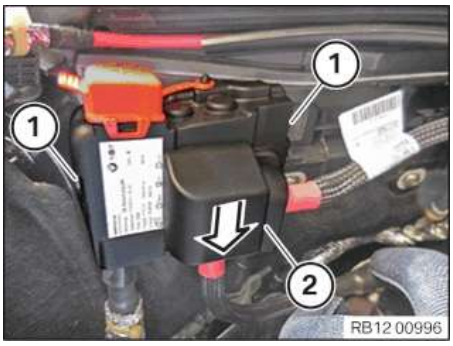
- Secure the positive battery cable in the clamps (2).
- Mount the cable of the exhaust gas sensor system in the clamps (1).



- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

Battery positive lead to battery positive terminal

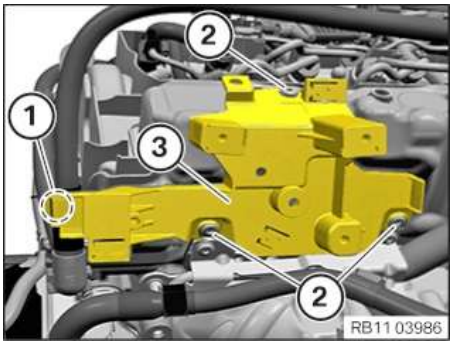
M8		Tightening torque	19 Nm



- Insert and install the cover (2) in the direction of the arrow.

  The locks (1) must engage audibly.

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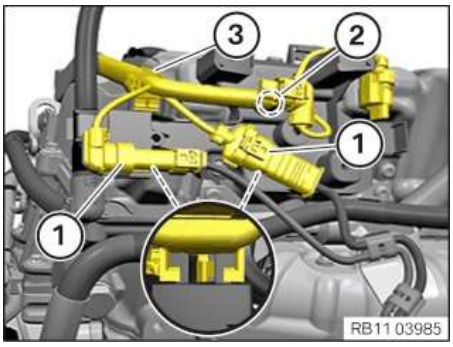


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

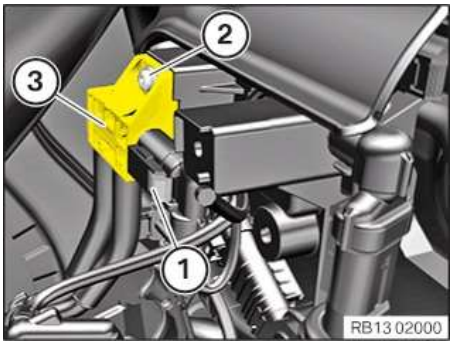
		Tightening torque	5 Nm

- 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.

32 – Securing the differential pressure sensor for the diesel particulate filter



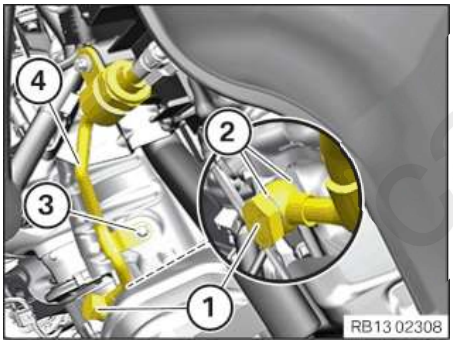
- Feed in and install the differential pressure sensor (3).
- Tighten down screw (2).

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.

33 – 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.

34 – Install all injectors

▸ **Cleaning the injector shafts**

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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

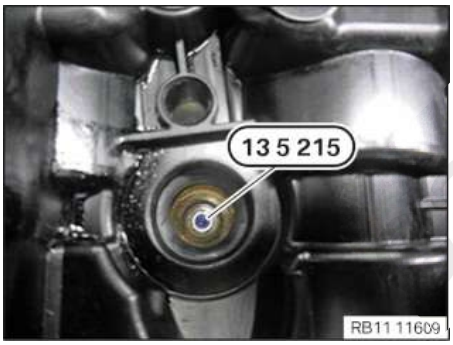
Contaminant or foreign body.

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.



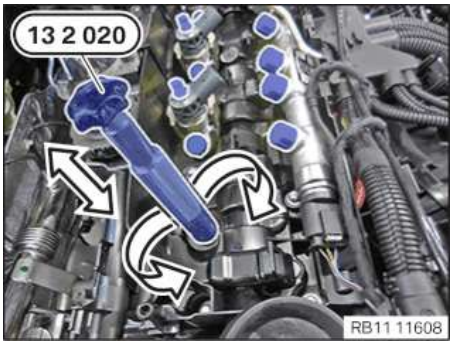
- Check whether the sealing ring remained in the injector shaft and remove the sealing ring as needed.
- Insert the special tool 0 493 763 (13 5 215) with the special tool 0 493 762 (13 5 214) from the set of special tools 0 493 758 (13 5 210) into the injector shaft.
- Remove special tool 0 493 762 (13 5 214).



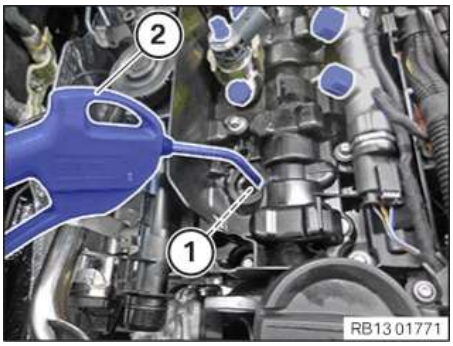
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



- 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.

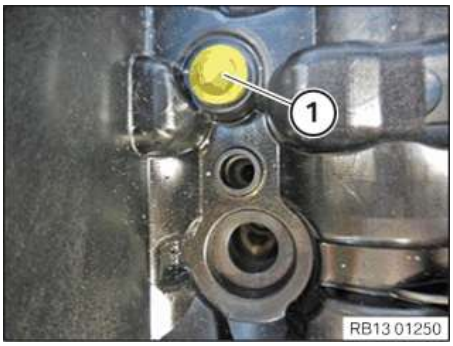
▸ **Check the placement of the clamping claw**

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**

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RISK OF DAMAGE

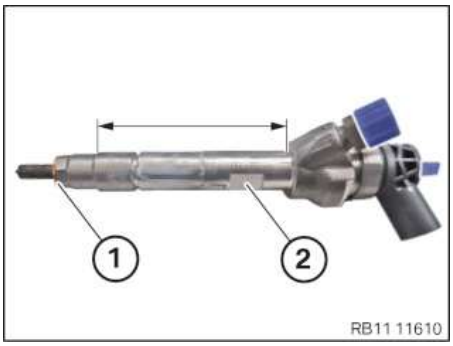
Contaminant or foreign body.

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.

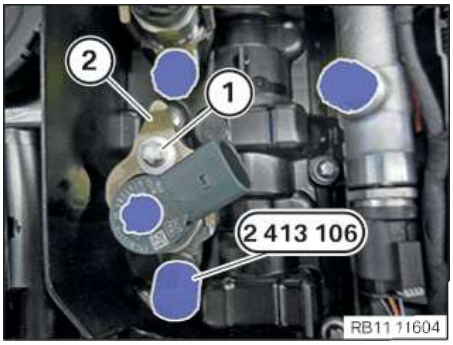
TECHNICAL INFORMATION

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).

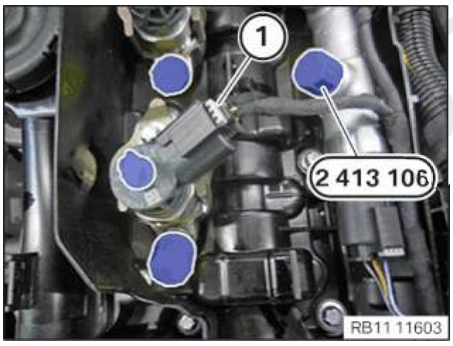
  Parts: Copper sealing ring
- Lightly grease the injector in the marked area with heat-resistant grease before installing the injector (2) in the injector shaft.



- 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**

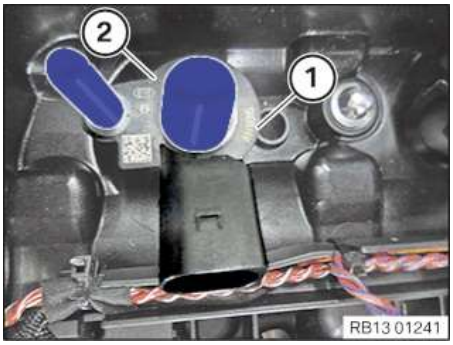
TECHNICAL INFORMATION

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.

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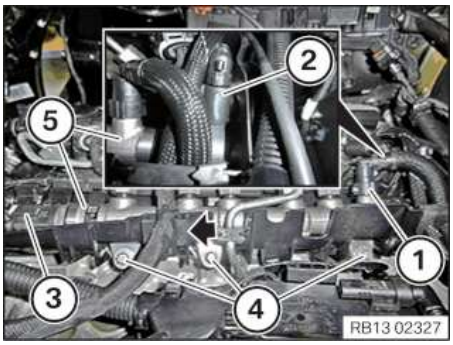


- Read off the adjustment value (1) on the new injector (2).



- 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.

35 – 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.

36 – 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.

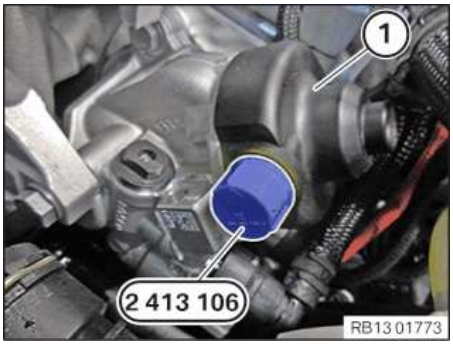
Danger of injury!

- 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.

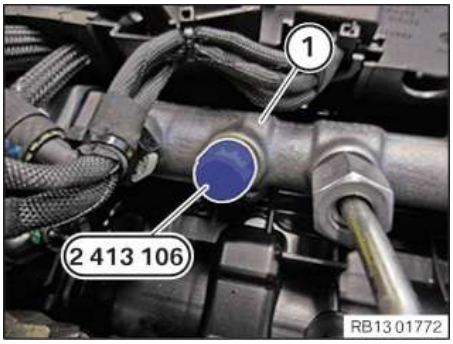
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TECHNICAL INFORMATION

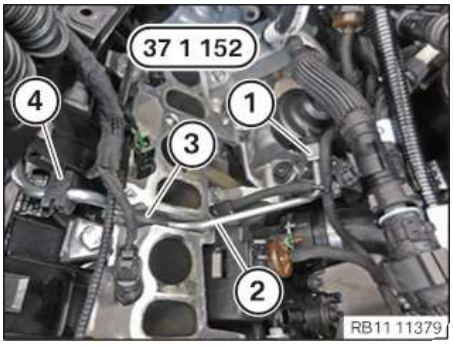
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- 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.

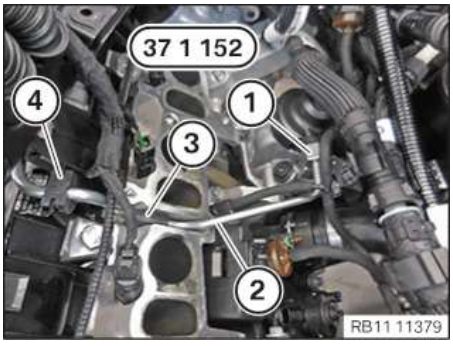
TECHNICAL INFORMATION

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

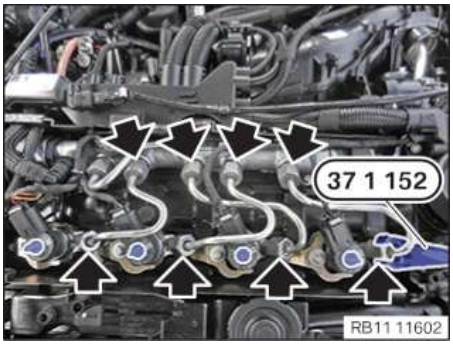
Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- 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

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- 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.

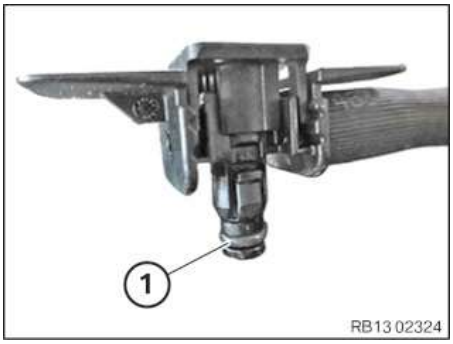
- Tighten the high pressure lines (arrows) with the special tool .

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**).

38 – Attach the leakage oil line on the injectors

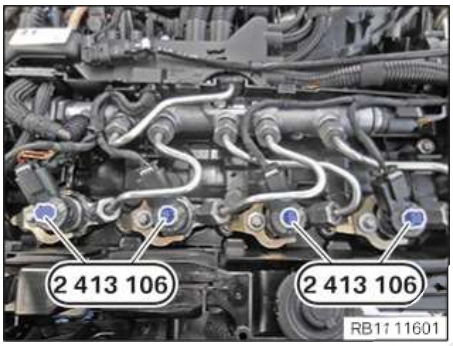


- **Version A:**

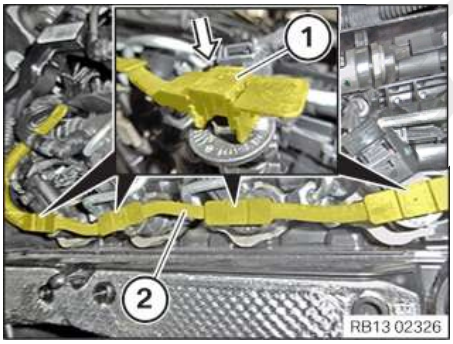
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

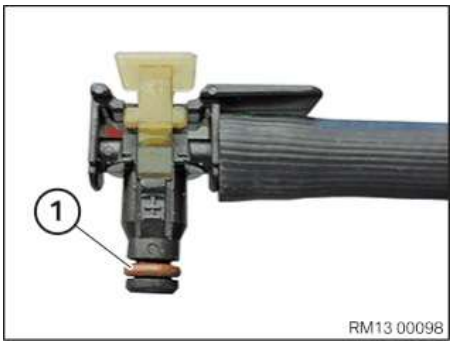
  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.



- 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.



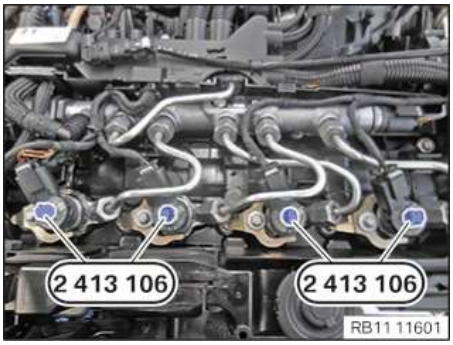
- **Version B**:

  Check sealing ring (1) for damage, renew leakage oil line if necessary.

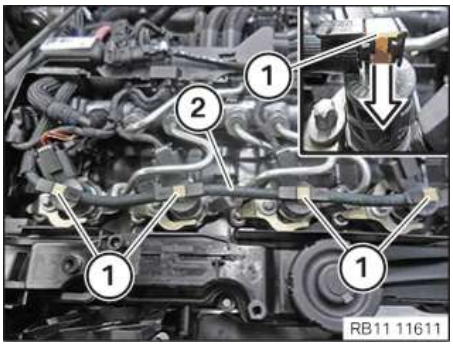
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.

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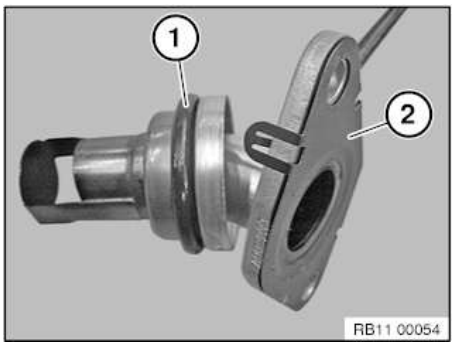


- Feed out the special tools and remove.



- 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.

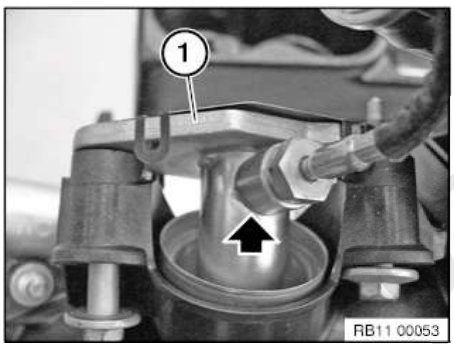
39 – Installing the intake plenum



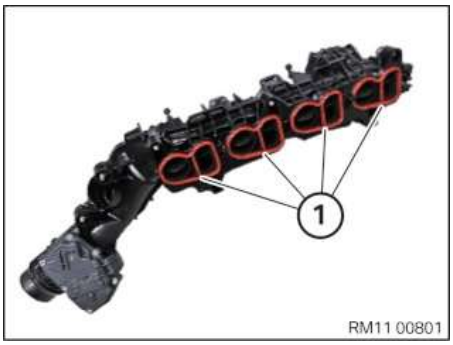
- Renew O-ring (1).

  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

  Parts: Gasket
- Position the seal (2) and clip it in.



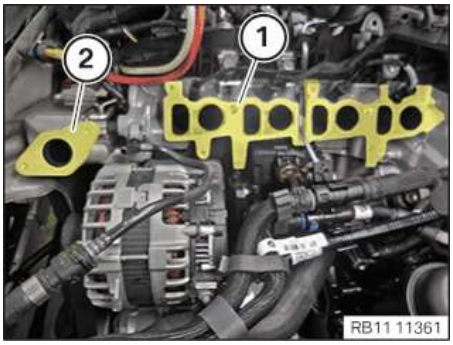
- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).



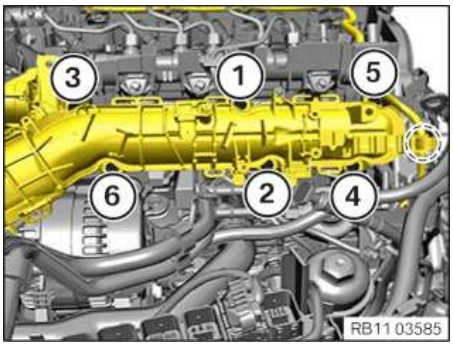
- Renew seals (1).

  Parts: Seals
- Ensure that the seals (1) are firmly mounted on the intake plenum.

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- Clean connection points (1) at cylinder head.
- Clean the connection point (2) on the exhaust-gas recirculation cooler.

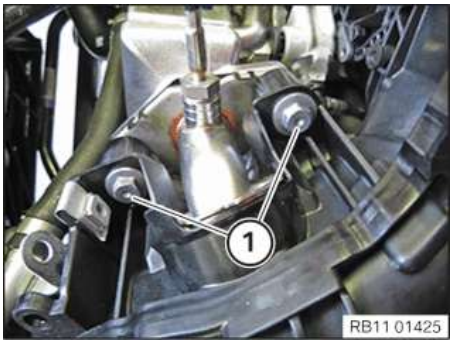


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

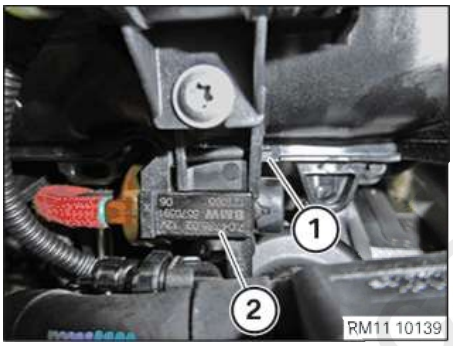
- Attach the wiring harness and fuel lines in the marked area on the intake plenum.



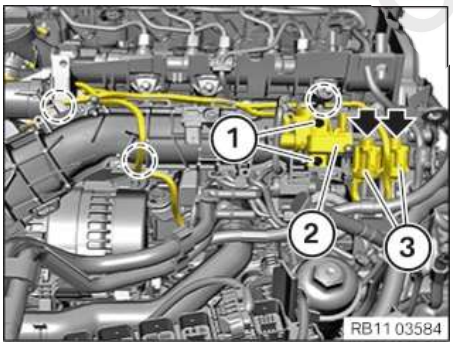
- Tighten the screws (1).

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.



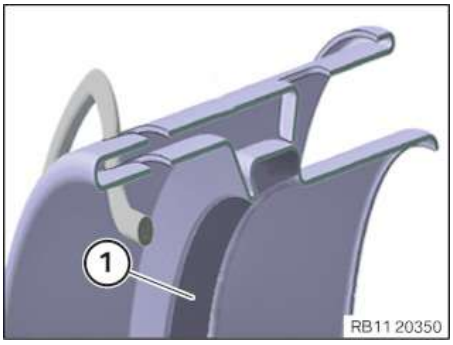
- Check the seal (1) for damage, and renew if necessary.

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▸ **Replacing damaged seal**

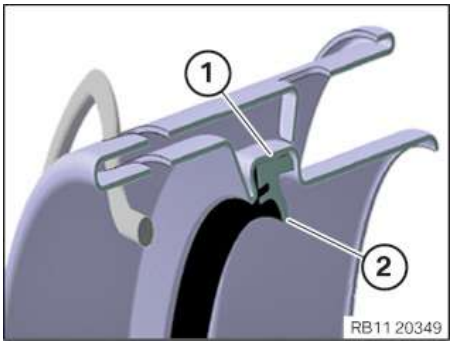
TECHNICAL INFORMATION

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.

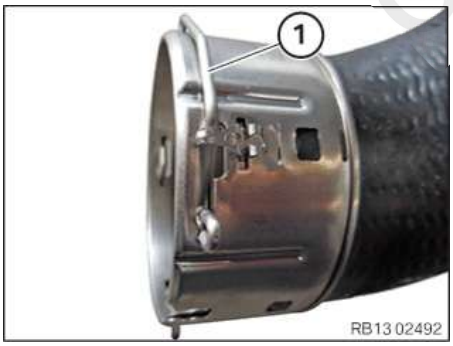
TECHNICAL INFORMATION

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.

40 – Partially securing the wiring harness section on the intake plenum

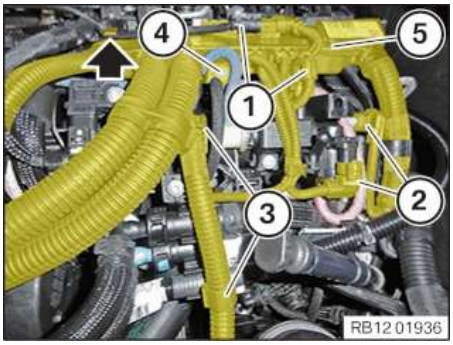
RISK OF DAMAGE

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.

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- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

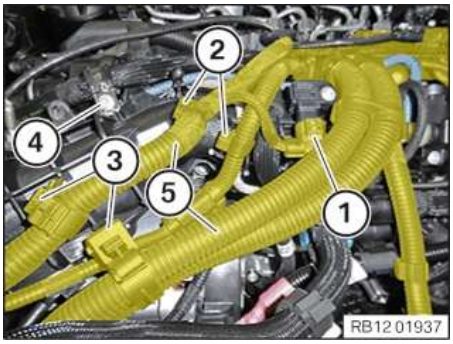
Wiring harness section to manifold

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.



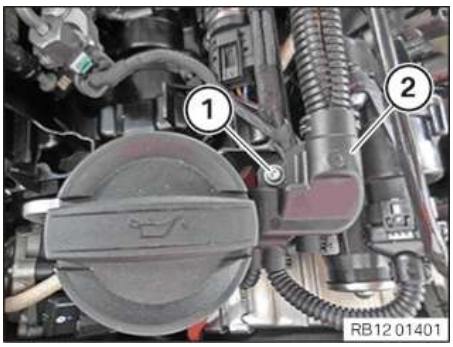
- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

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.

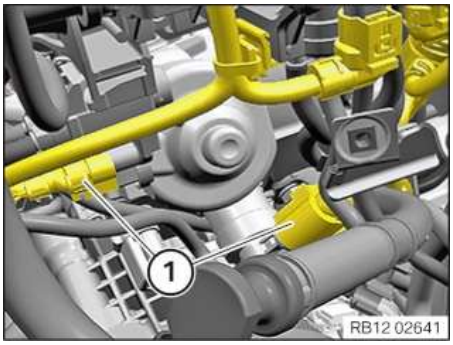
  The connector (1) must engage audibly.



- Connect the connector (1) and lock it.

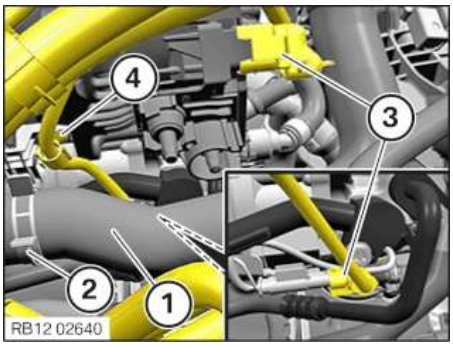
  The connector (1) must engage audibly.

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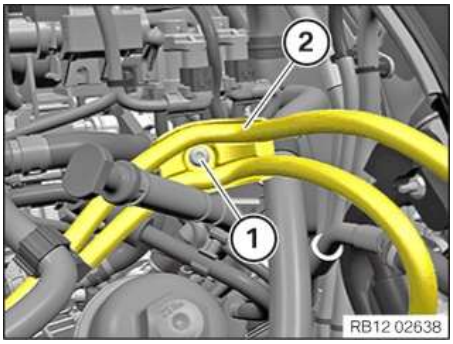
- Connect connectors (1) and lock.

  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



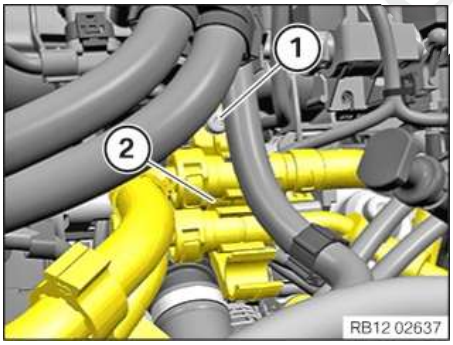
- Feed in and install the positive battery cable (4).
- Feed in and position the positive battery cables (4) .
- Renew the nuts (3) and (2).

  Parts: Nuts
- Tighten nuts (3) and (2).

Battery positive lead on the starter motor generator

M8		Tightening torque	19 Nm

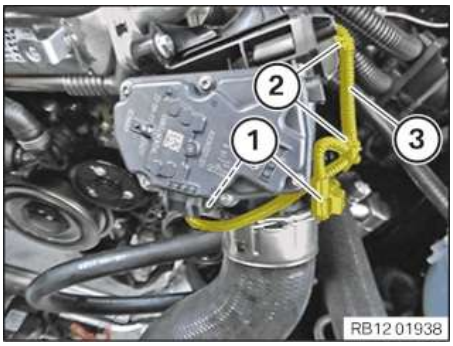
- Guide in and install the lid (1).



- Insert and install the holder (2).
- Tighten down screw (1).

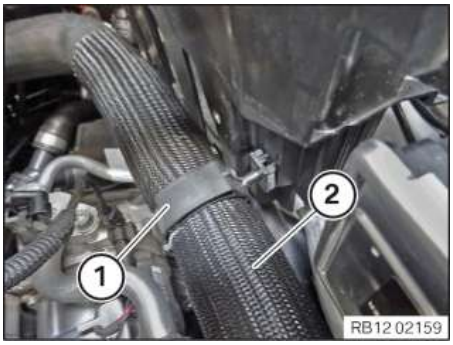
Holder on intake plenum

TS6X20		Tightening torque	5 Nm



- Guide in the wiring harness section (3) and install.
- Secure clamps (2).
- Connect connectors (1) and lock.

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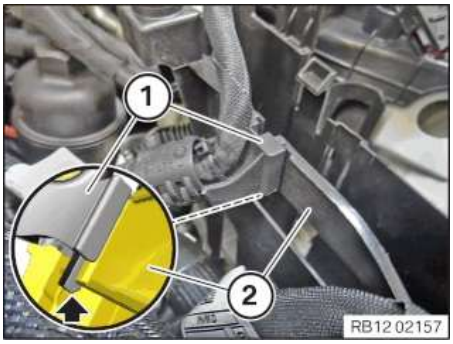
- Feed in and install coolant line (2).
- Lock holder (1).

  The holder (1) must engage audibly.



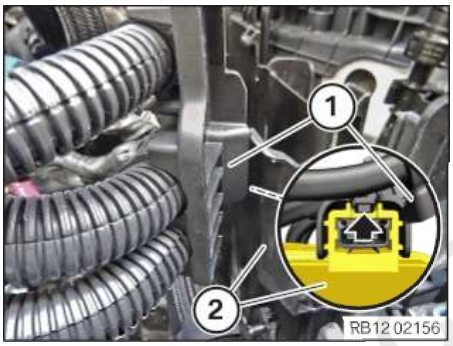
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.



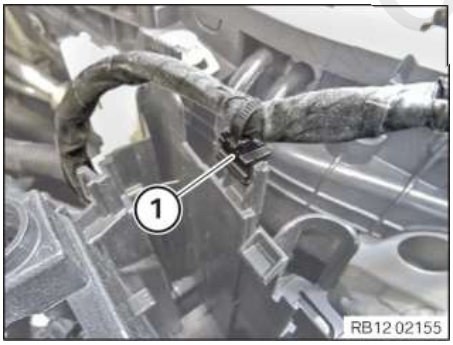
- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.

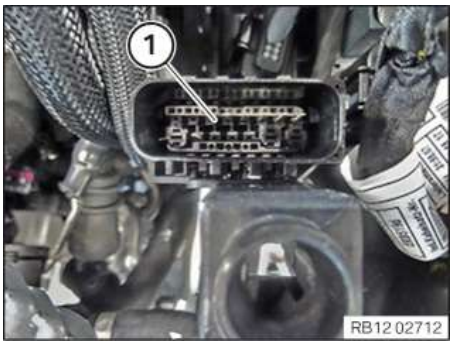


- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.



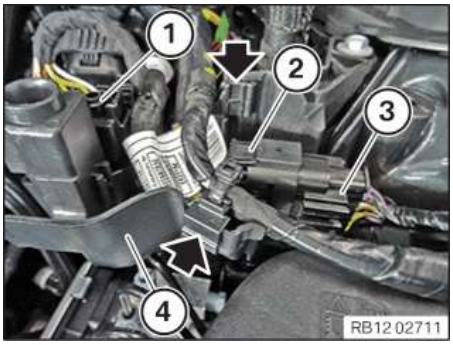
- Secure clamps (1).



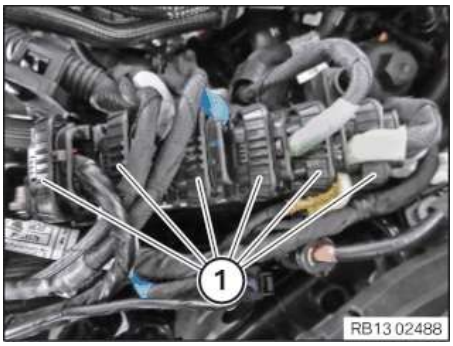
- Feed in and install the connector (1).

  The connector (1) must engage audibly.

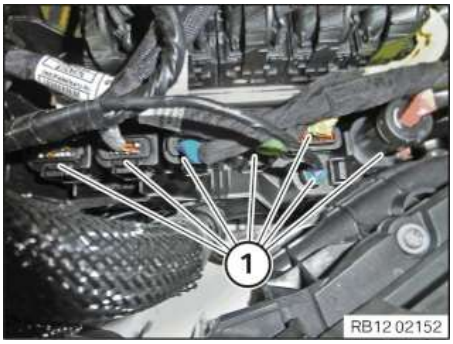
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- Connect connector (3) to control unit holder (4) and lock it.
  The connector (3) must engage audibly.
- Connect connectors (2) and lock.
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.
  The connector (1) must engage audibly.
- Secure the clamps (arrows).

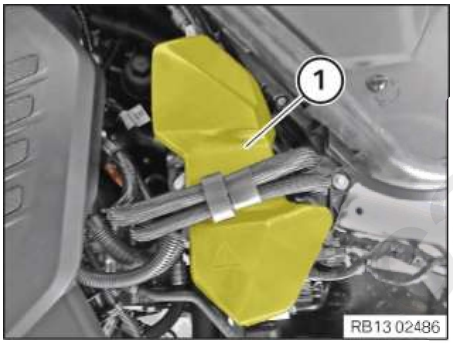


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



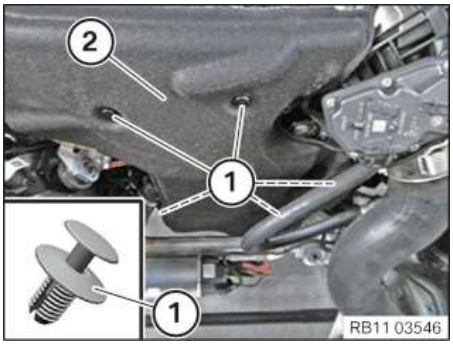
- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.

41 – Install the cover for the DDE control unit



- Insert and install cover (1) into guides.

42 – Install acoustic cover for the engine, front



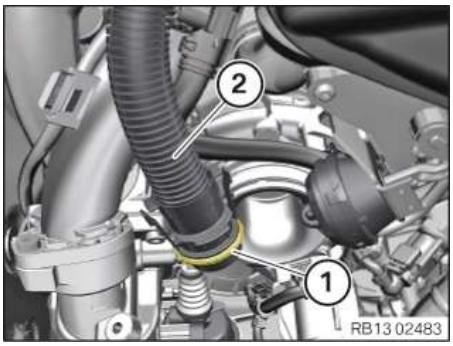
- Feed the acoustic cover (2) in and install.
- Secure the acoustic cover (2) with the expanding rivets (1).

43 – Installing the clean air pipe with resonator

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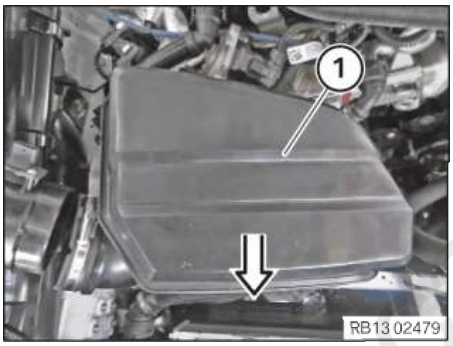
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



- 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.

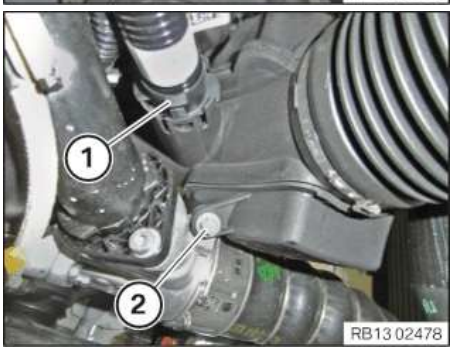


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

  The clamp (1) must engage audibly.

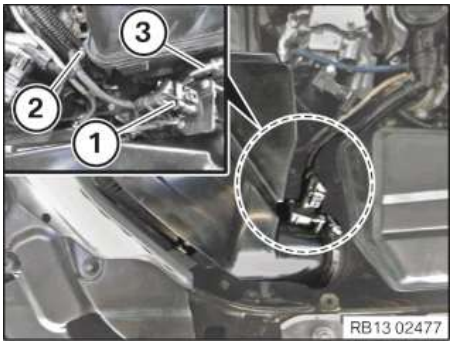


- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm

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- Connect the clean air pipe with resonator to the intake filter housing.
- Tighten clamp (3).

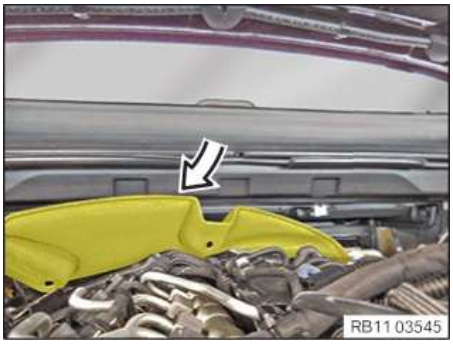
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

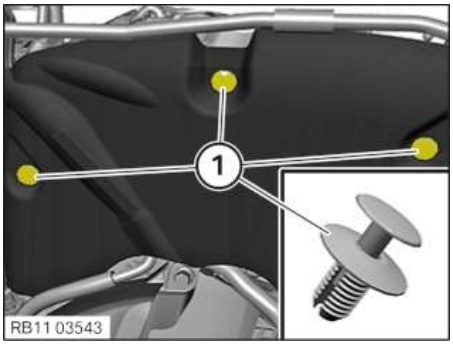
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

44 – Installing acoustic cover at rear

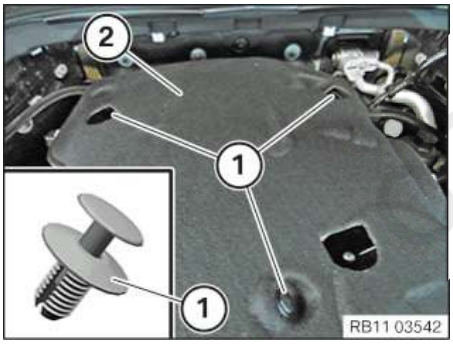


- Guide in the acoustic cover in the direction of the arrow and install it.



- Secure acoustic cover with the expanding rivets (1).

45 – 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) .

46 – Install acoustic cover

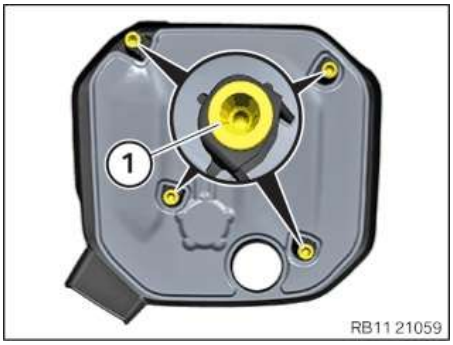
RISK OF DAMAGE

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.

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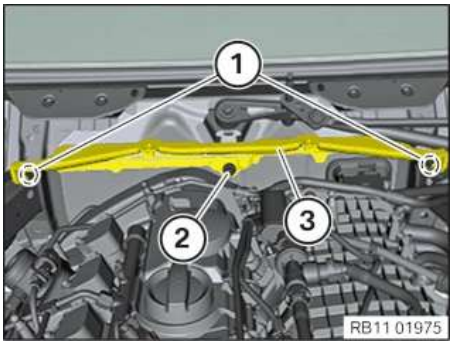


- Check the acoustic cover for correct fit of the rubber mounts (1).



- Clip in the acoustic cover (1) into the holders in the indicated areas.

47 – Installing centre bulkhead lower section

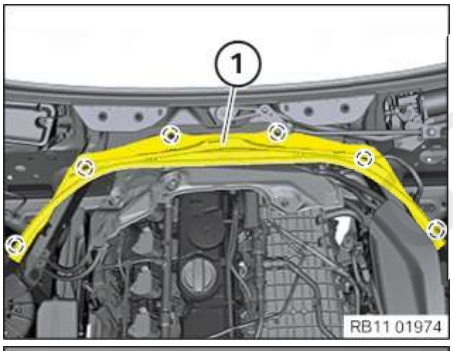


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

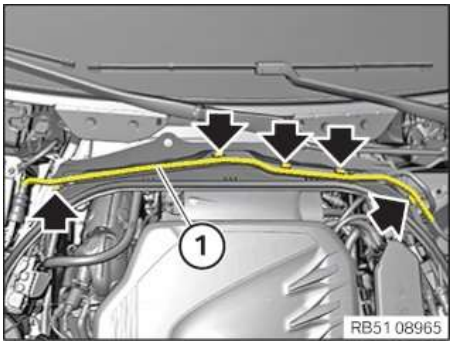
48 – Installing the centre bulkhead upper part



- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

Bulkhead upper part to bottom bulkhead

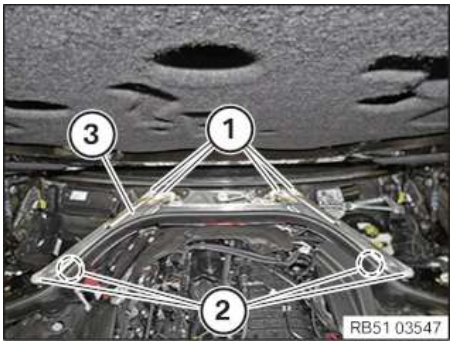
		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

  Clip in the wire (1) into the holders (arrows).

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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 °

49 – 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.

50 – Installing cowl panel cover

RISK OF DAMAGE

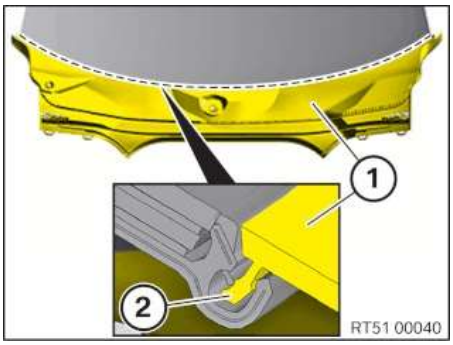
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

- Ensure correct installation of the components.
- Only use undamaged components.

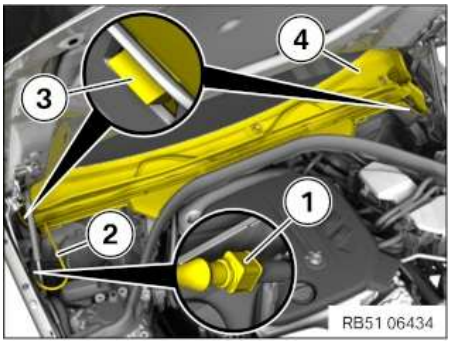
TECHNICAL INFORMATION

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.

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- 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.

51 – Install left and right wiper arm

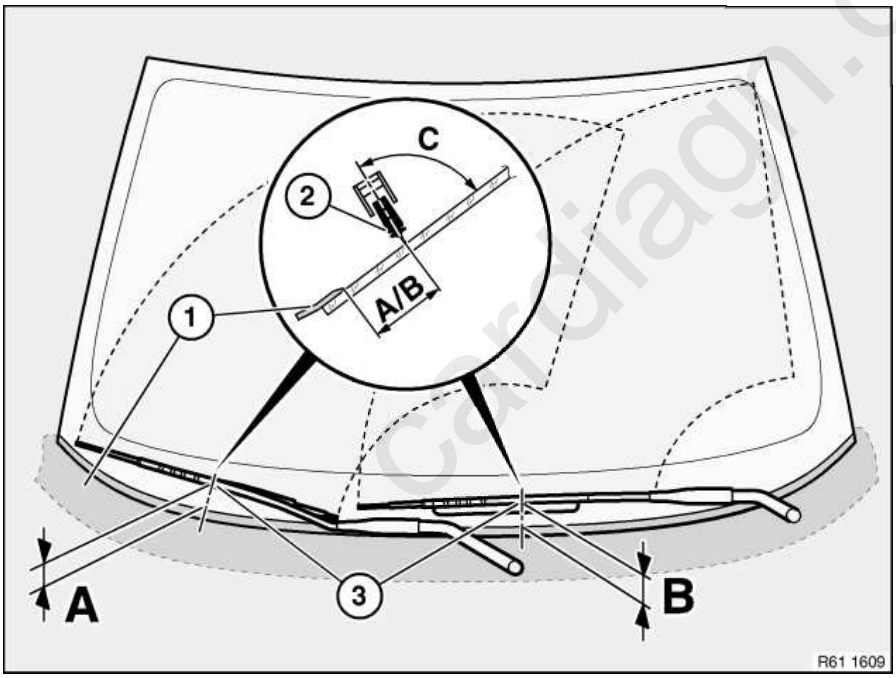
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

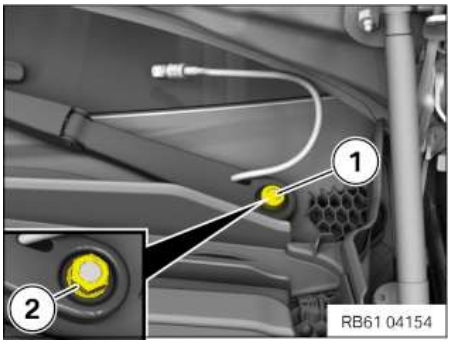
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- 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



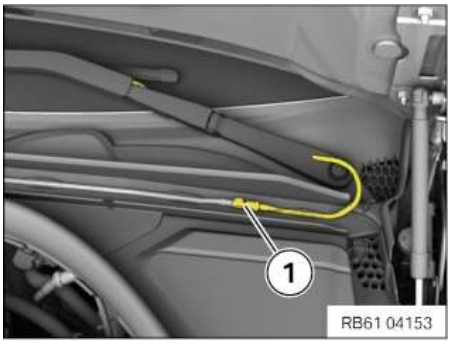
- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

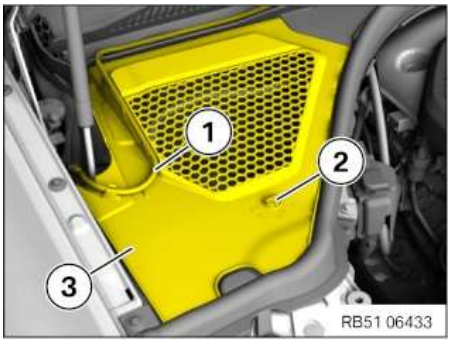
- Connect the protective cap (1).

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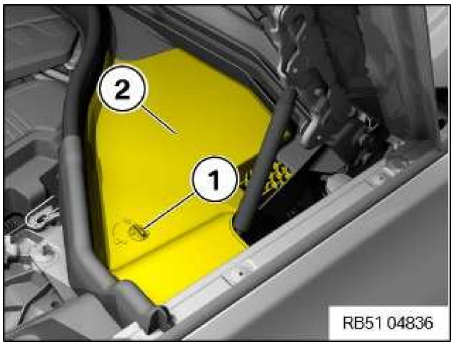
- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

52 – 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.

53 – Install the cover of the engine compartment on the rear left



- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

54 – Connecting all battery earth leads



- See additional information.

55 – Activating the 48 V electrical system

Prerequisite

Ignition is switched off.

RISK OF DAMAGE

Damage to 48-V battery

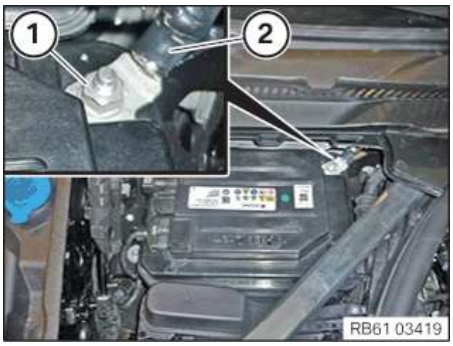
If a 48-V battery that is disconnected from the electrical system is activated, the battery electronics will be damaged.

- Only carry out activation of the 48V electrical system with a completely connected 48-V battery.

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- 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.

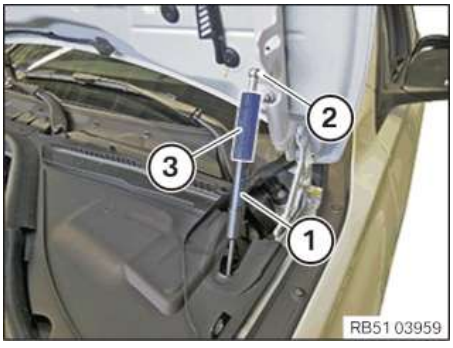
56 – Take bonnet out of the service position

CAUTION

Shutting bonnet or tailgate.

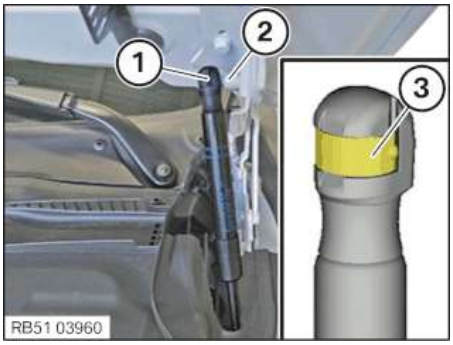
Danger of injury!

- 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.

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- 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

Cylinder head cover to cylinder head			Used in step 29
M6		Tightening torque.	8,5 Nm
Heat shield to exhaust manifold			Used in step 30
M6x12			10 Nm
Bracket on cylinder head cover			Used in step 31
		Tightening torque	5 Nm
Battery positive lead to battery positive terminal			Used in step 31
M8		Tightening torque	19 Nm
Differential pressure sensor of diesel particulate filter on cylinder head cover			Used in step 32
TS5x20		Tightening torque	4 Nm
Heat shield to exhaust manifold			Used in step 33
M6x12		Tightening torque	10 Nm
Banjo bolt for exhaust pressure pipe to exhaust manifold			Used in step 33
Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm
Exhaust gas pressure pipe to sensor system holder			Used in step 33
TS6x20		Tightening torque	5,7 Nm
Clamping claw facing to cylinder head cover			Used in step 34
M6		Tightening torque	10 Nm
Injector to cylinder head cover			Used in step 34
M8		Tightening torque	8 Nm
		Angle of rotation	120 °
Rail to cylinder head cover			Used in step 35
M8		Tightening torque	19 Nm
High pressure lines between high pressure pump and rail			Used in step 36
High-pressure pipe		Tightening torque	24.5 Nm
High pressure lines between injector and rail			Used in step 37
High-pressure pipe		Tightening torque	24.5 Nm
Intake plenum to cylinder head			Used in step 39
M6		Tightening torque	11 Nm

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Exhaust-gas recirculation cooler to intake plenum			Used in step 39
		Tightening torque	10 Nm

Electric changeover valve to intake plenum			Used in step 39
TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold			Used in step 40
TS5x20		Tightening torque	3,6 Nm

Standard screw connection 4 Nm			Used in step 40
Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover			Used in step 40
TS5x20		Tightening torque	3,6 Nm

Standard screw connection M6			Used in step 40
M6		Tightening torque	8 Nm

Battery positive lead on the starter motor generator			Used in step 40
M8		Tightening torque	19 Nm

Holder on intake plenum			Used in step 40
TS6X20		Tightening torque	5 Nm

Clean air pipe to exhaust turbocharger			Used in step 43
M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing			Used in step 43
Clamp		Tightening torque	3 Nm

Bulkhead lower part to body			Used in step 47
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead			Used in step 48
		Tightening torque	3 Nm

Tension strut on bulkhead			Used in step 48
M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome			Used in step 48
Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm			Used in step 51
Combination hexagon nut		Tightening torque	35 Nm

Negative battery cable to 48-V battery			Used in step 55
Nut M8		Tightening torque	19 Nm

Overview of Special Tools

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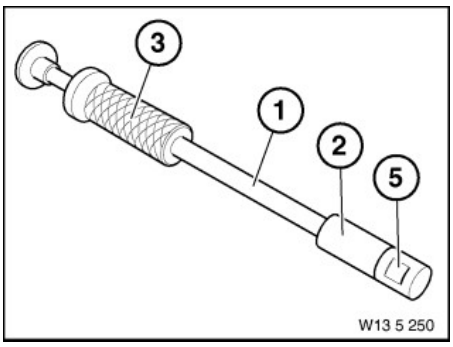
0 493 339 (13 5 252) Bush



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)	

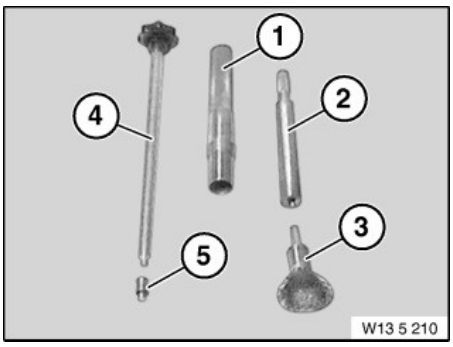
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0 493 340 (13 5 253) Weight



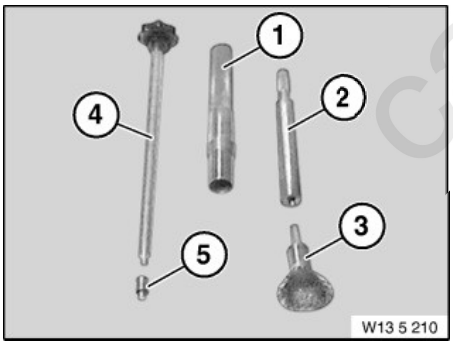
Common	Used in step 23
Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 763 (13 5 215) Plug



Common	Used in step 34
Usage	(Seal plug)
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

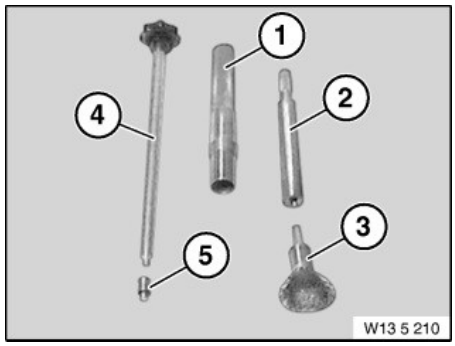
0 493 762 (13 5 214) Rod



Common	Used in step 34
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	

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0 493 758 (13 5 210) Tool



Common

Used in step 34

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)

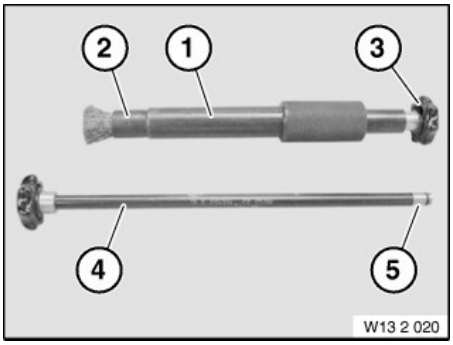
Consisting of

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 34

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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 51

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	255

General repair instructions	Used in step
11 00 ... Overview of consumables (Electronic Parts Catalogue)	34

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	354
61 20 900 Disconnecting and connecting battery earth lead	354
61 20 900 Disconnecting and connecting battery earth lead	354
61 20 900 Disconnecting and connecting battery earth lead	354

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61 20 900 Disconnecting and connecting battery earth lead	354
61 20 900 Disconnecting and connecting battery earth lead	354
61 20 900 Disconnecting and connecting battery earth lead	354
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	354
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	354
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	354
61 20 900 Disconnecting and connecting battery earth lead	354
61 20 900 Disconnecting and connecting battery earth lead	354
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	354
61 20 900 Disconnecting and connecting battery earth lead	354
61 20 900 Disconnecting and connecting battery earth lead	354
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61 20 900 Disconnecting and connecting battery earth lead	354
61 20 900 Disconnecting and connecting battery earth lead	354
61 20 900 Disconnecting and connecting battery earth lead	354
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	354
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	354
61 20 900 Disconnecting and connecting battery earth lead	354
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	354
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	354
61 20 900 Disconnecting and connecting battery earth lead

11 12 000 Removing and installing/sealing cylinder head cover

PRELIMINARY WORK

1 – Bring front compartment lid in the service position

Prerequisite

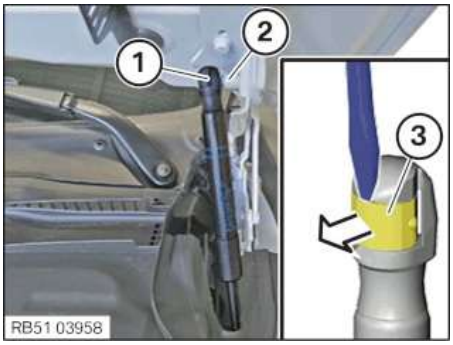
Engine compartment lid is open.

CAUTION

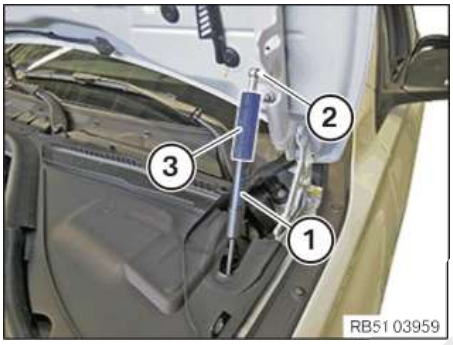
Shutting bonnet or tailgate.

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.

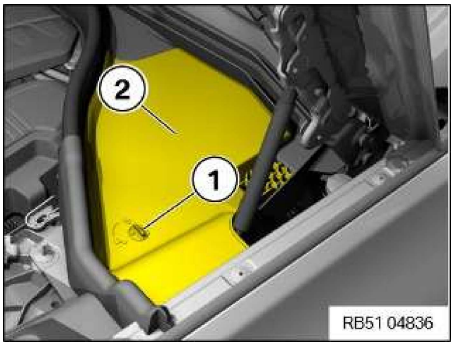
2 – Disconnecting all battery earth leads



- See additional information.

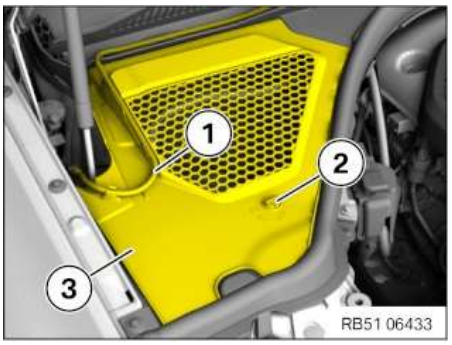
3 – Remove the cover of the engine compartment at the rear left

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- 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.

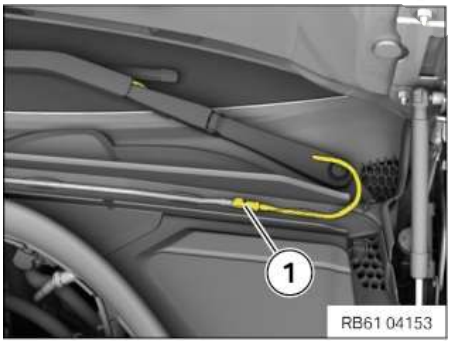
▸ **Remove the wiper arm**

RISK OF DAMAGE

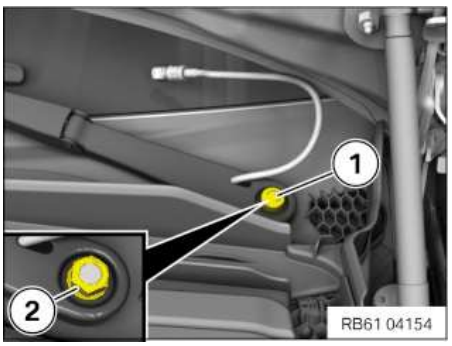
Damage to wiper console.

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.

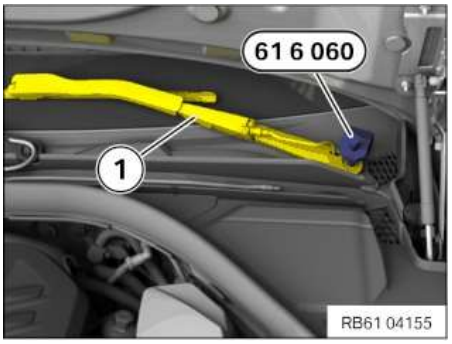


- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.



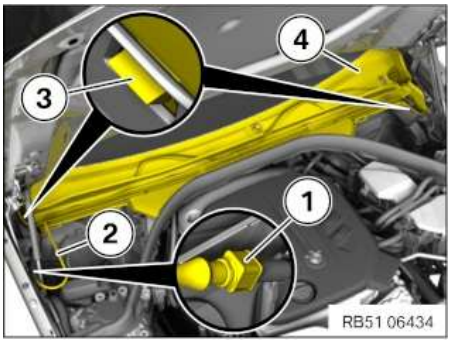
- Remove the protective cap (1).
- Loosen nut (2).

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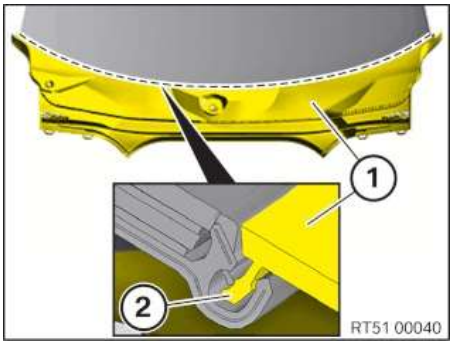


- Pull off the wiper arm (1) using special tool .

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

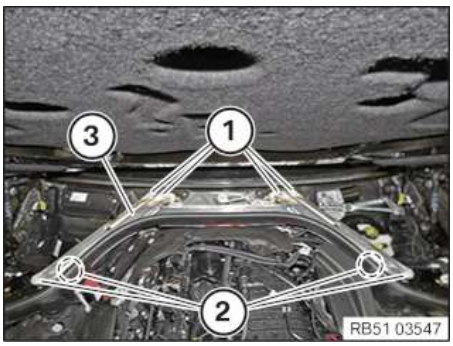


- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

8 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

Driving without the strut brace/front-end strut or tension strut is not permitted.

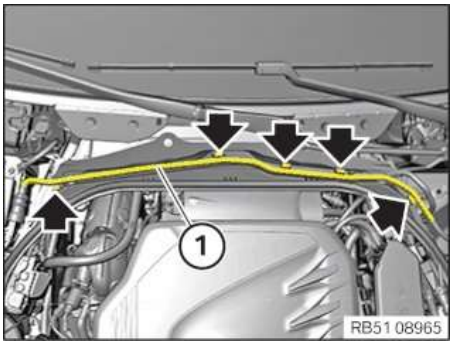


NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

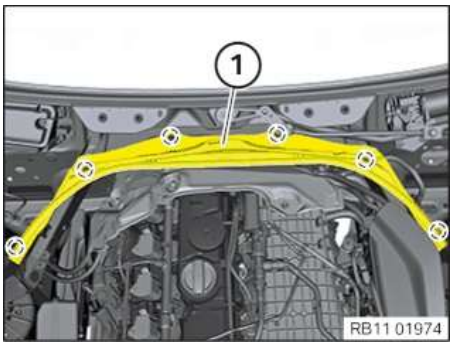
- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.

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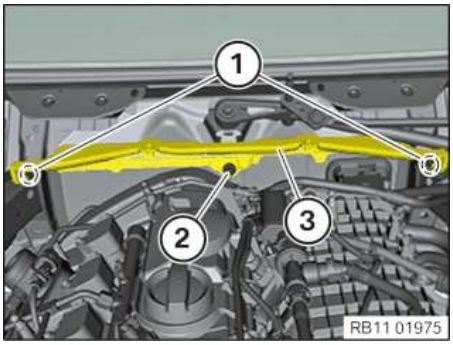
- **Version with mild hybrid technology:**

  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.

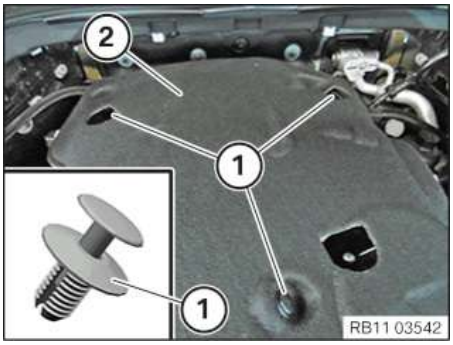
- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

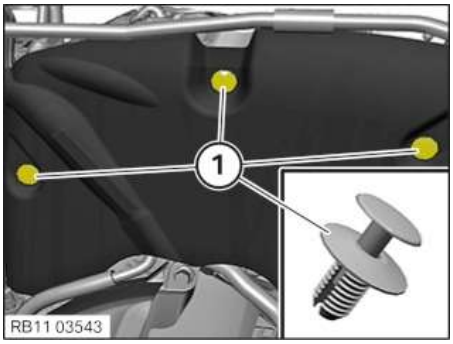
11 – Remove the acoustic cover for the injectors

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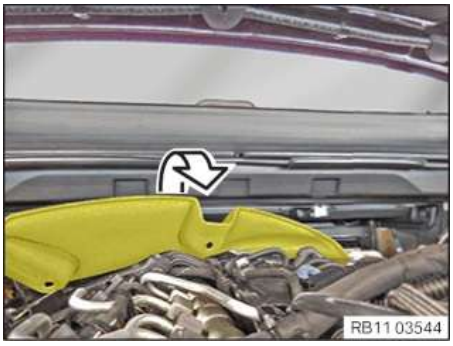


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

12 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).



- Guide out and remove the acoustic cover in the direction of the arrow.

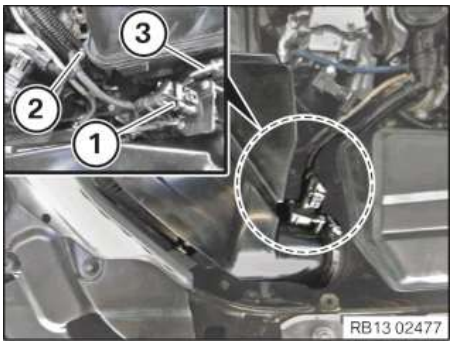
13 – Removing the clean air pipe with the resonator

WARNING

Hot surfaces.

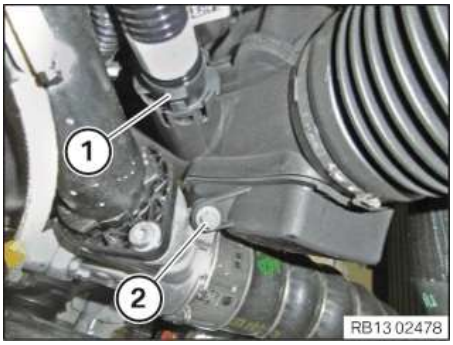
Risk of burning!

- Perform all work only on components that have cooled down.

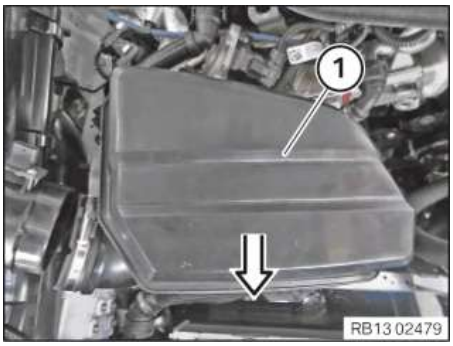


- Unlock plug connection (1) and disconnect.
- Loosen clamp (2).
- Unfasten clamp (3).
- Separate the clean air pipe with resonator from the intake filter housing.

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- 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.

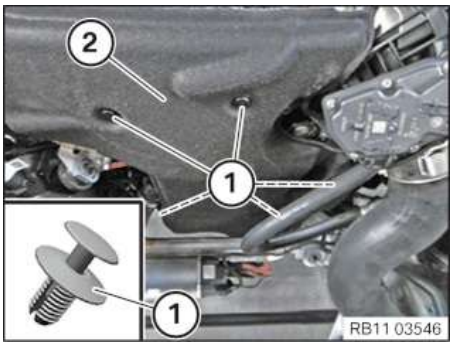
14 – Remove acoustic cover of the front engine

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.

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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

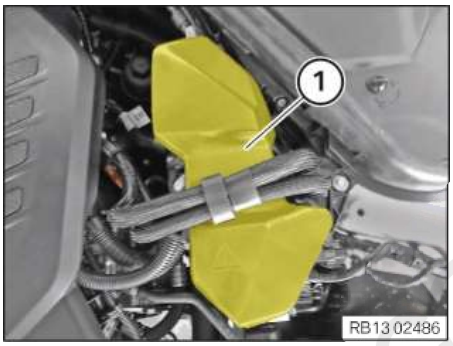
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

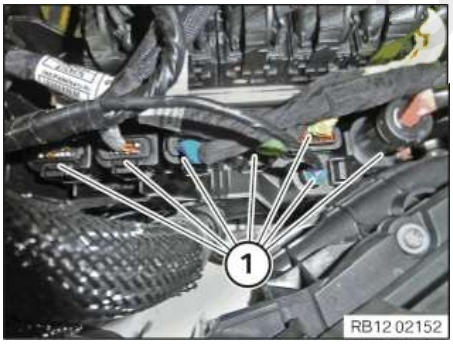
- Do not pull on the wires when disconnecting connectors and plug connections.

TECHNICAL INFORMATION

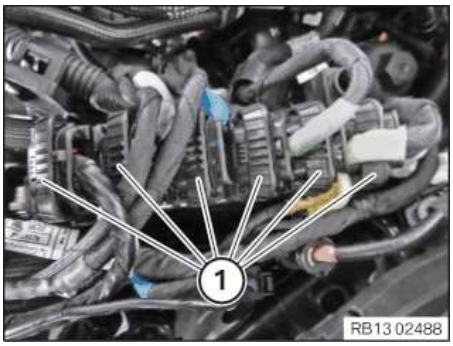
Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.



- Pull off cover (1) upwards, feed out and remove.

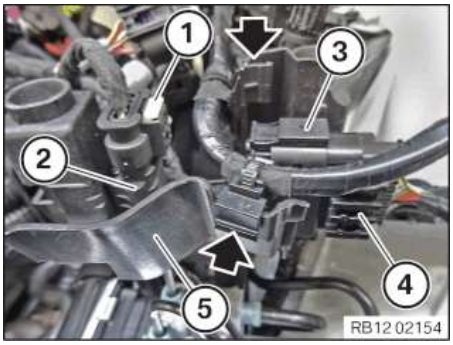


- Unlock and disconnect plug connections (1).

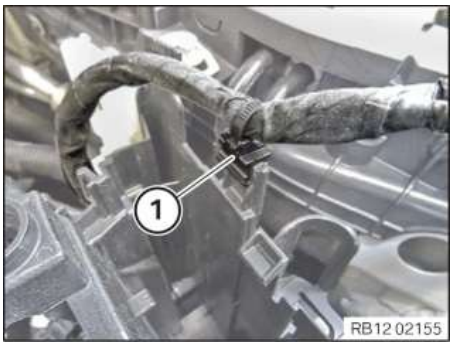


- Unlock and disconnect plug connections (1).

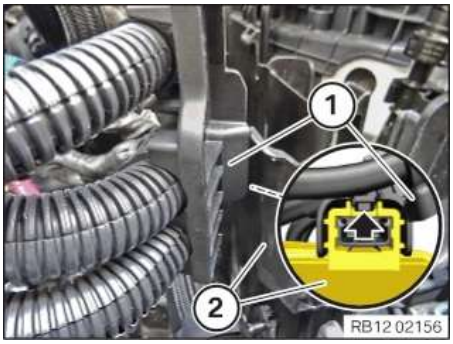
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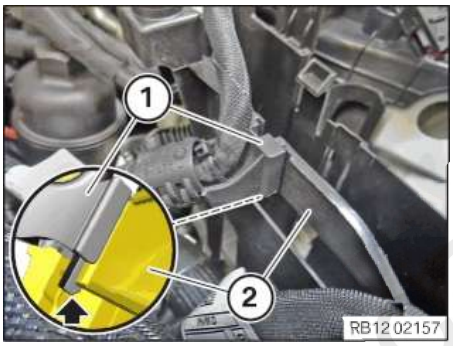
- Unlock plug connection (1) and disconnect.
- Unlock the plug (2) and disconnect from the control unit holder (5).
- Unlock plug connection (3) and disconnect.
- Unlock the plug (4) and disconnect from the control unit holder (5).
- Release the clamps (arrows).



- 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).

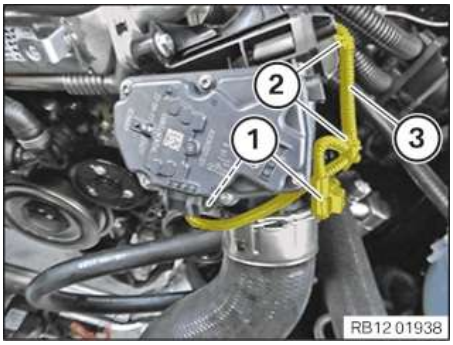


- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.

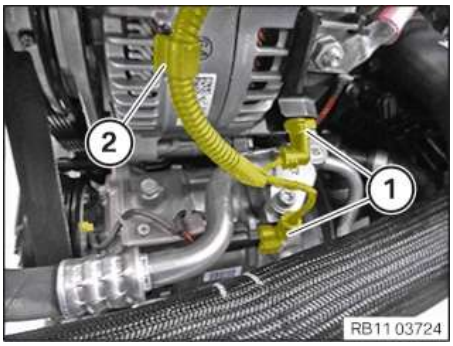


- Unlock holder (1) and feed out coolant line (2) and place it aside.

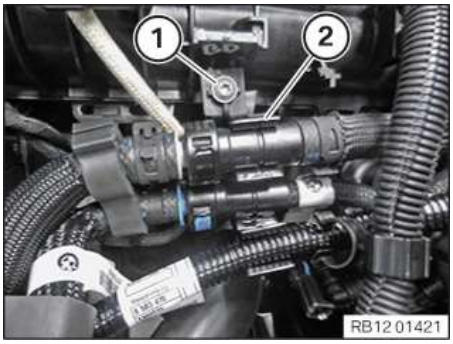
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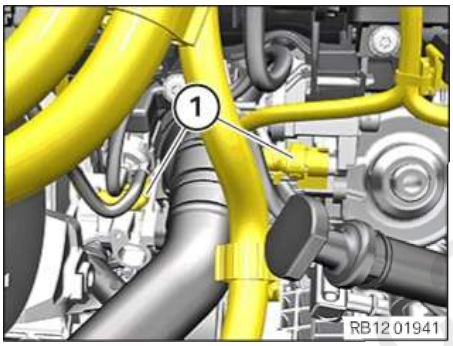
- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.



- 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).

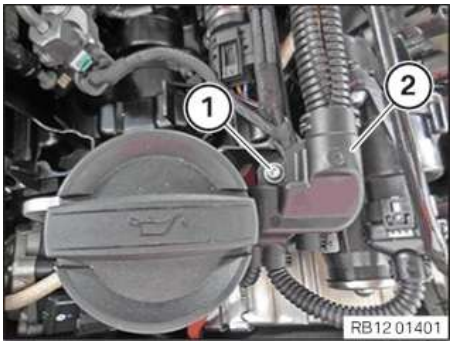


- Unlock and loosen connector (1).

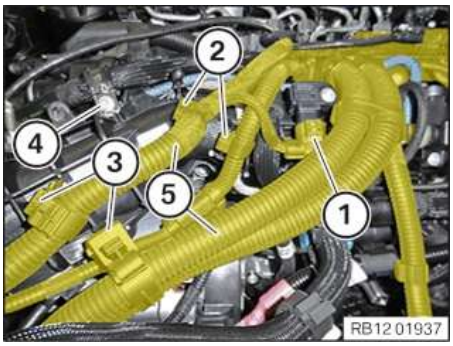


- Unlock plug connection (1) and disconnect.

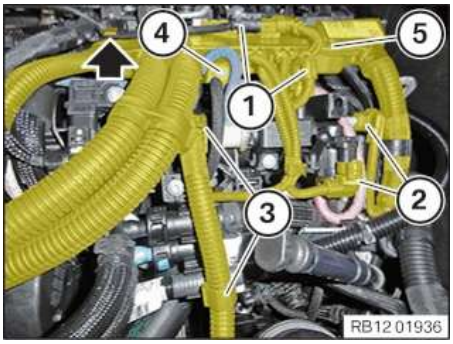
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- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.



- 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.

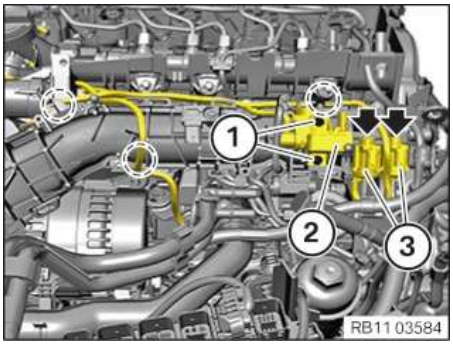


- Unlock clamp (1) and engage in this position.

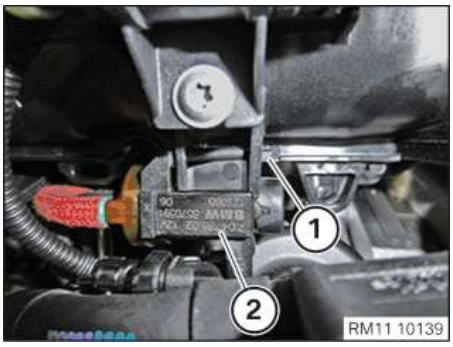


- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.

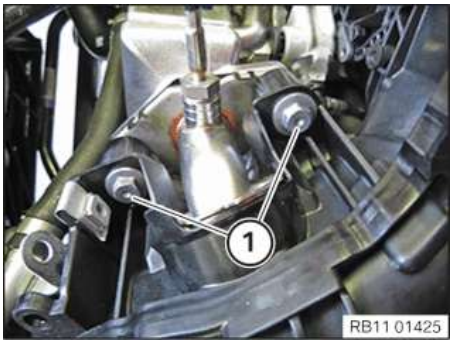
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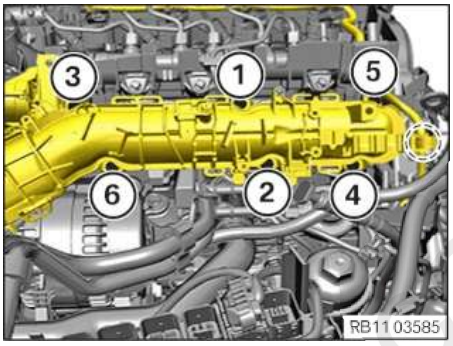
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



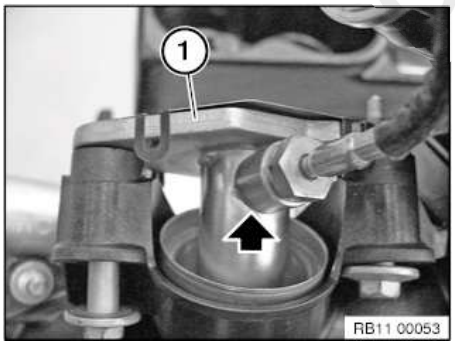
- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.



- 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

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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!

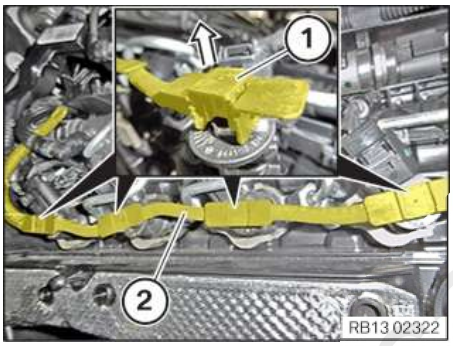
- Perform all work only on components that have cooled down.

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.

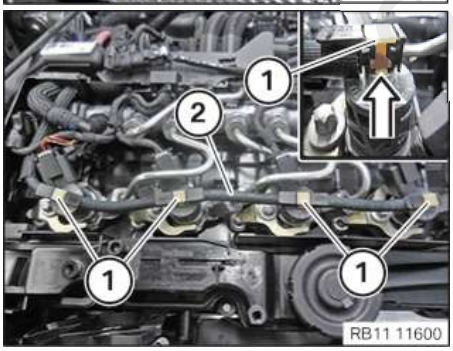


- **Version A:**

  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.

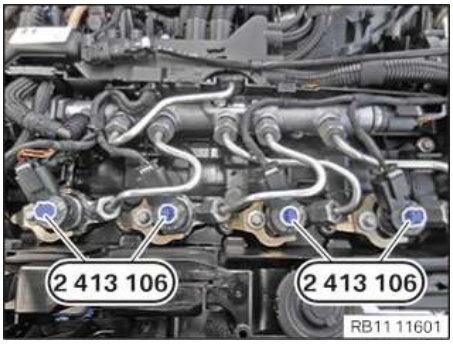


- **Version B:**

  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

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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.

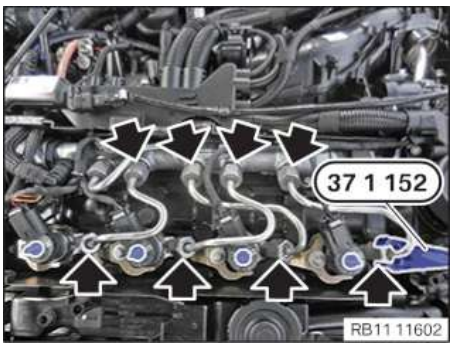
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

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 .

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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.

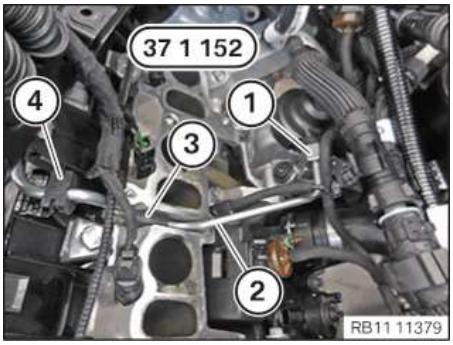
TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.

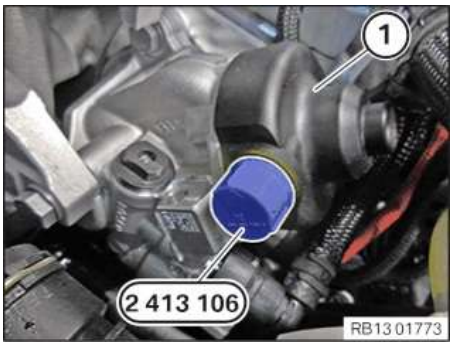


- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.

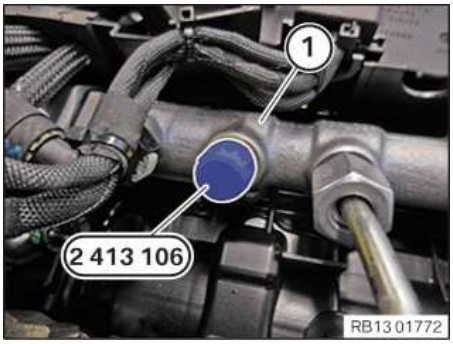
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- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.
- Guide out and remove the high pressure line (2) with the abrasion protection (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.

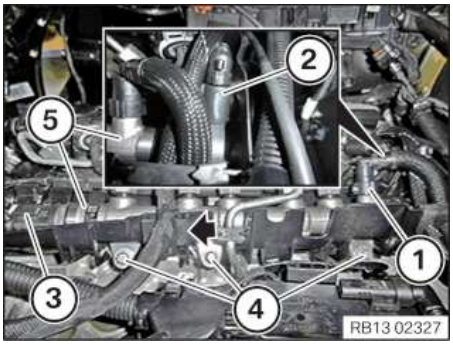
Contamination can result in malfunctions, operating failure or leaks.

- 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.

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- 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.

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RISK OF DAMAGE

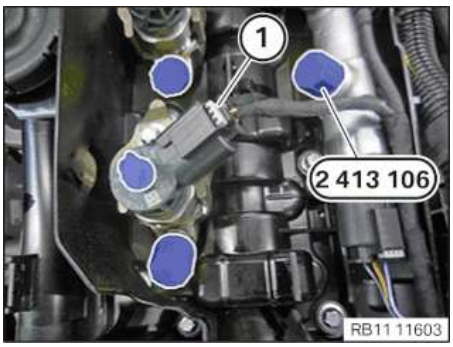
Electrostatic discharge.

Damage to or destruction of electrical components.

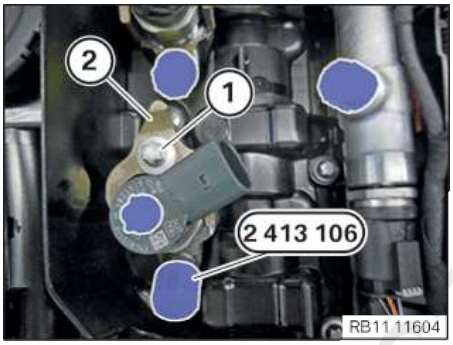
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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**

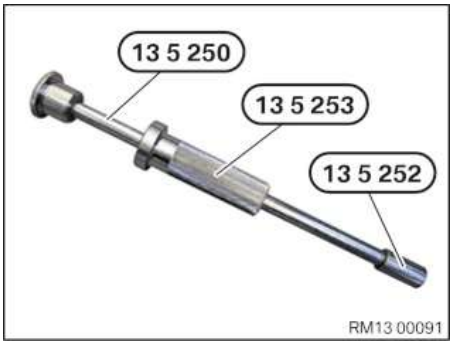
RISK OF DAMAGE

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.

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- 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).

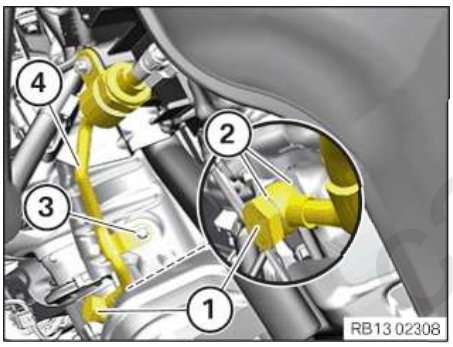


- Screw special tool 0 493 321 (13 5 250) with special tool 0 493 339 (13 5 252) onto pressure line connection (1) of injector.
- Release injector (1) with special tools 0 493 321 (13 5 250) and 0 493 339 (13 5 252) by means of **short** back and forth movements and remove.

22 – Remove the exhaust gas pressure pipe

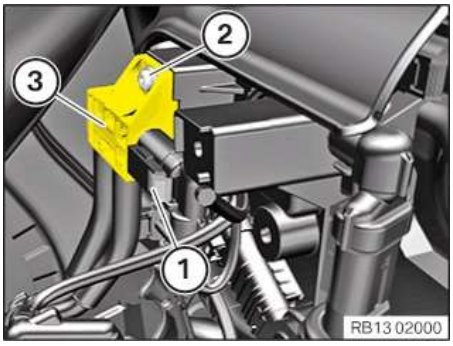


- Unlock plug connection (1) and disconnect.
- Loosen screw (2).



- 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

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RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

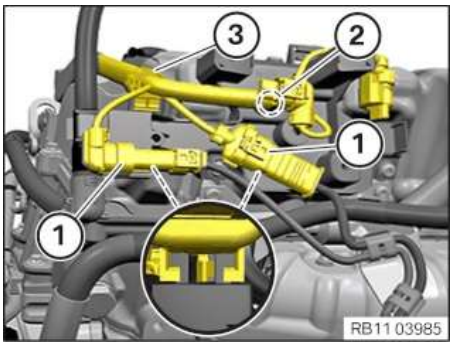
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

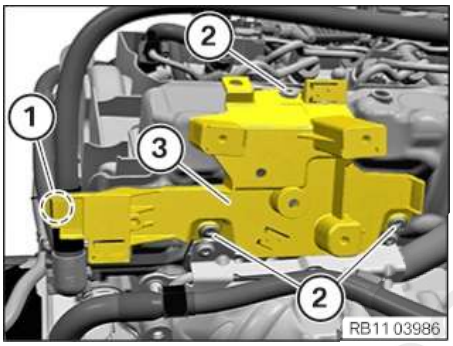
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

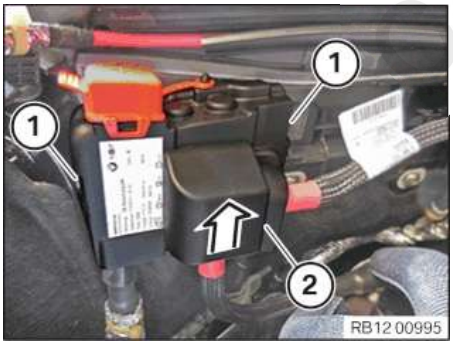
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



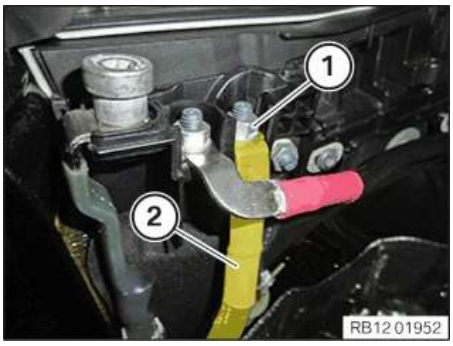
- Unlock plug connection (1) and disconnect.
- Unlock the plug connection (1) and release it from the sensor bracket.
- Release the cable clip in the area (2) from the sensor bracket.
- Release the clamps (3) and set the wiring harness section aside.



- 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.

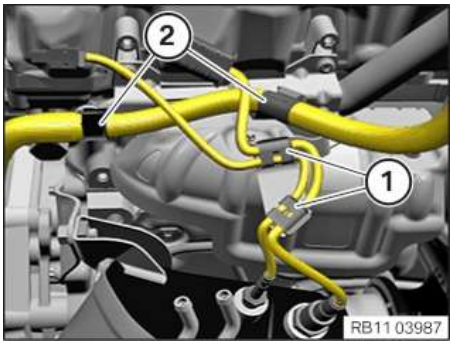


- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.

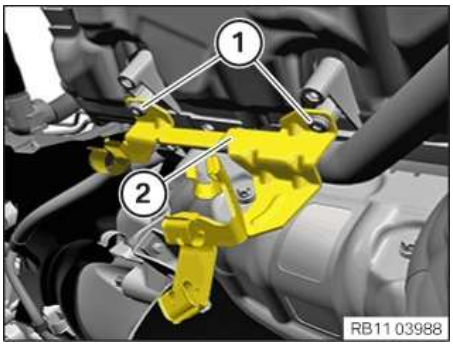


- Loosen nut (1).
- Feed out positive battery cable (2) and put to one side.

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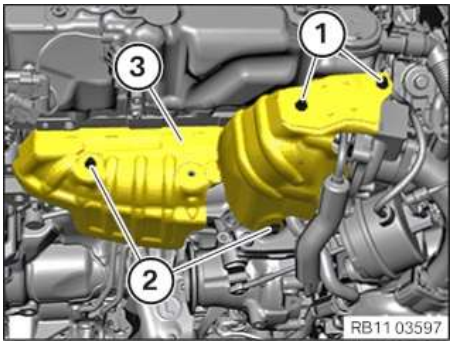


- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



- Loosen screws (1).
- Guide out and remove holder (2).

25 – Removing heat shield

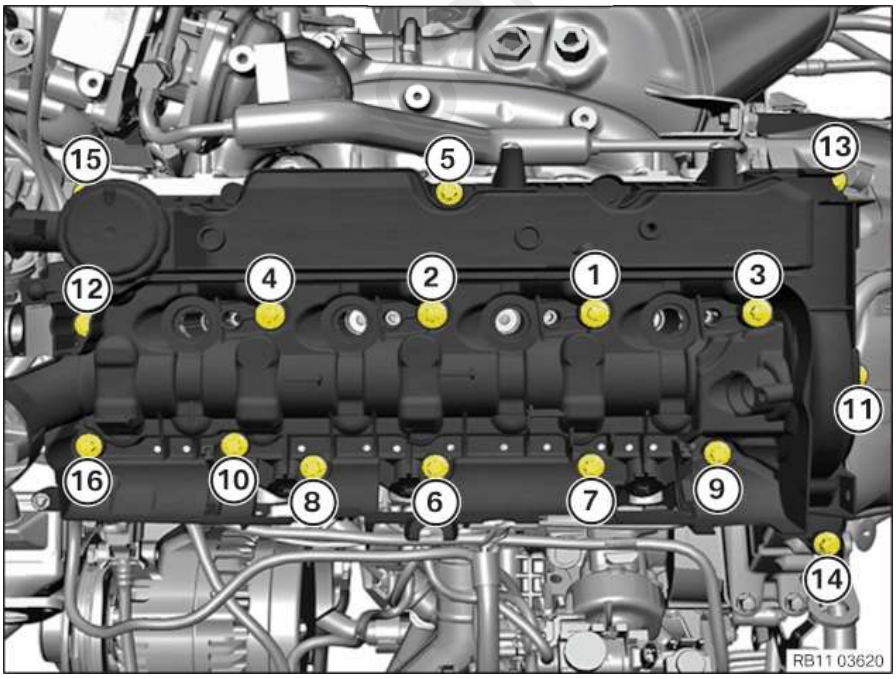


- Loosen screws (1).
- Loosen screws (2).
- Feed out and remove the heat shield (3).

MAIN WORK

26 – Removing the cylinder head cover

Screw connection of the cylinder head cover



1 - 16 Bolts of the cylinder head cover

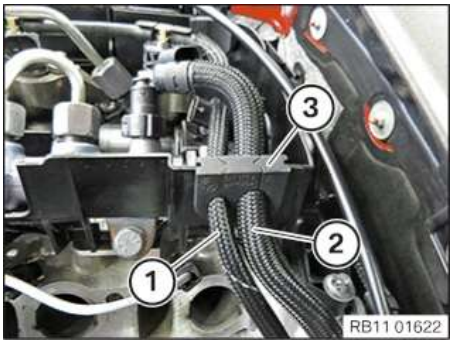
rdiagn.com



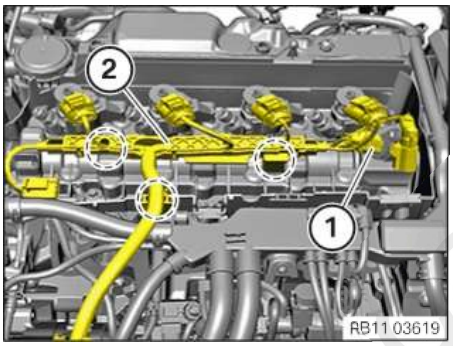
- Unlock and detach the locks.
- Feed the engine ventilation line (1) out and set it aside.



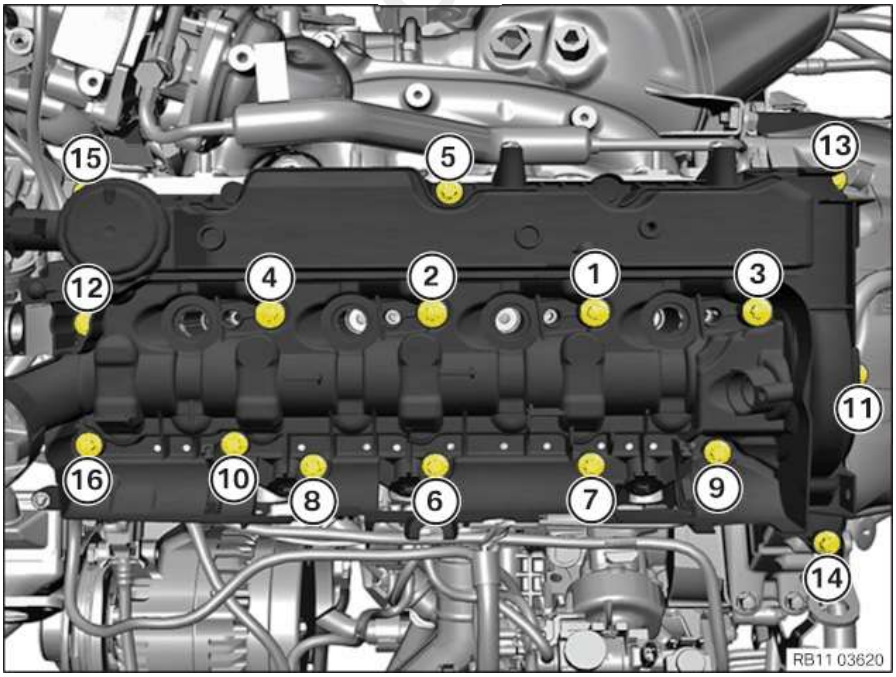
- Feed out and remove the heat shield (1).



- Remove the leakage oil line (1) including the fuel return line (2) and the grommet (3) and put to one side.

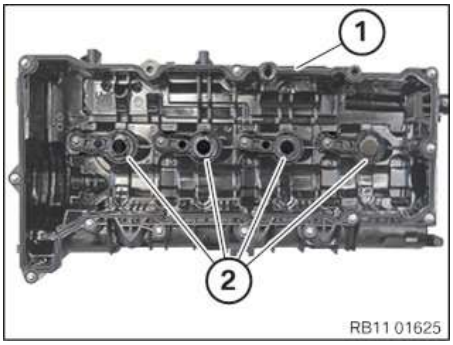


- Unlock connector (1) and pull off.
- Disconnect the wiring harness (2) in the marked areas from the cylinder head cover and set aside.



- Evenly loosen the screws in a sequence from (16) to (1).
- Feed out and remove the cylinder head cover.

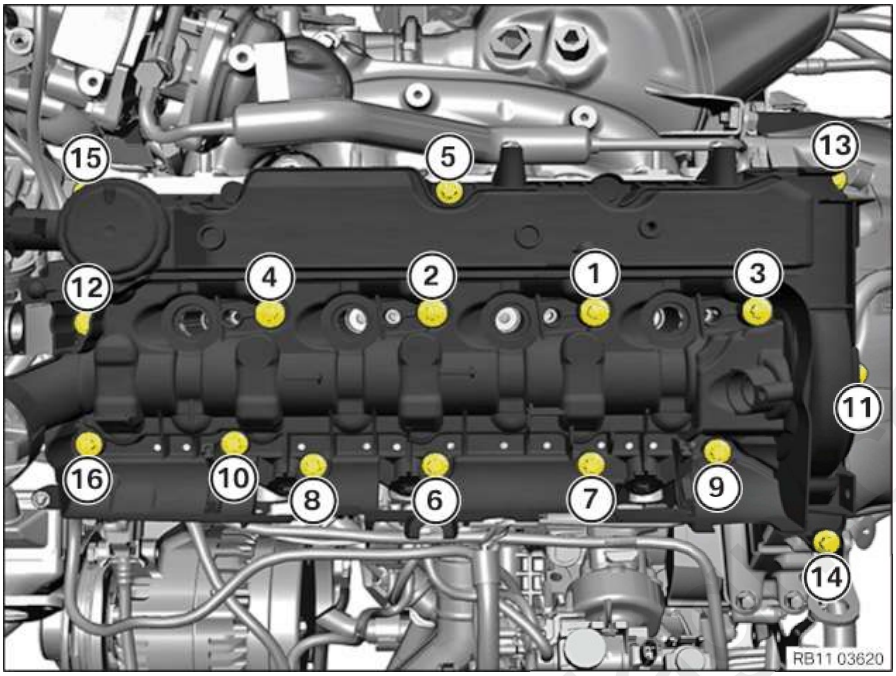
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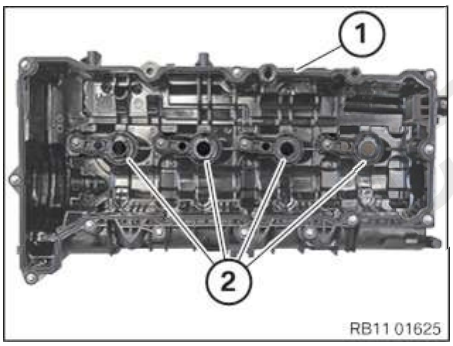
- Remove the profile seals (1) and (2).

27 – Installing cylinder head cover

Screw connection of the cylinder head cover

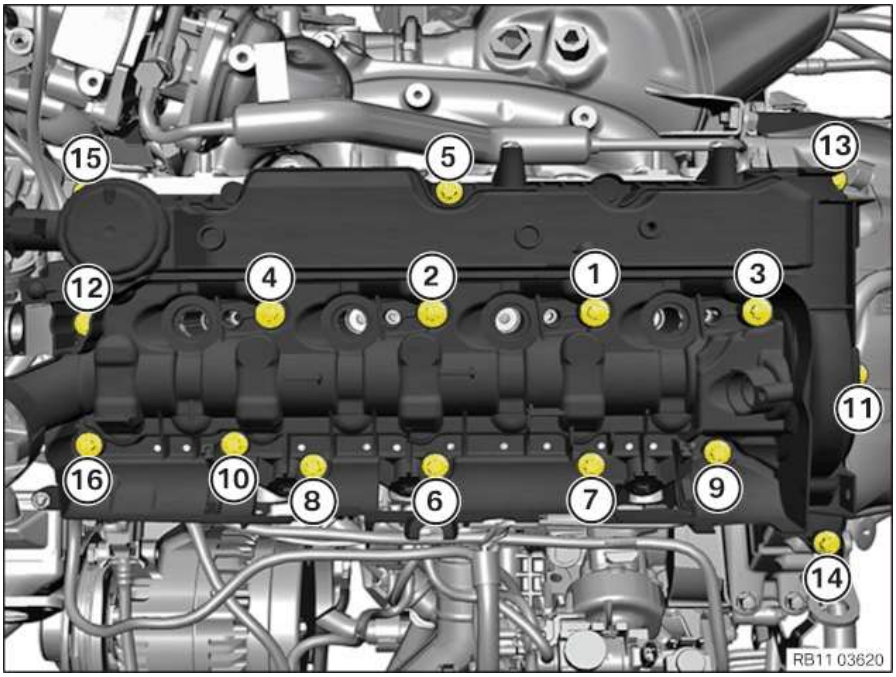


1 - 16 Bolts of the cylinder head cover



- Renew the profile seals (1) and (2) of the cylinder head cover.

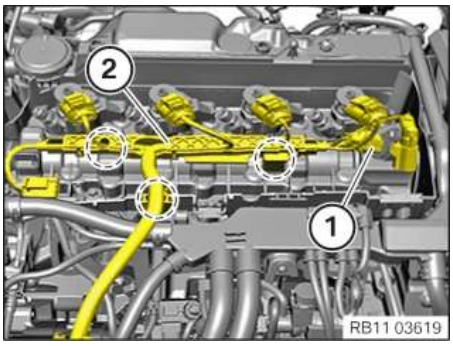
  Parts: Profile seals



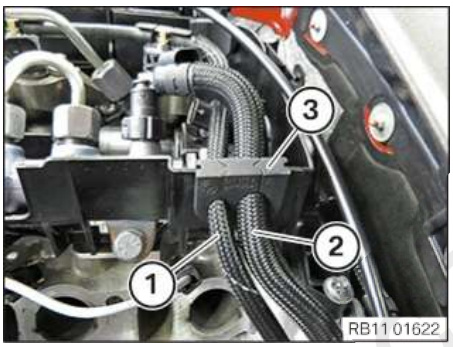
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

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).

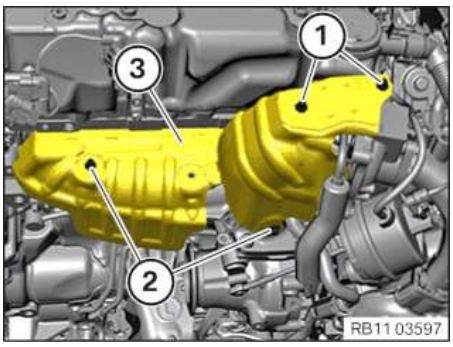


- Connect engine ventilation line (1) and lock.

  The locks (arrows) must engage audibly.

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28 – 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

29 – 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.

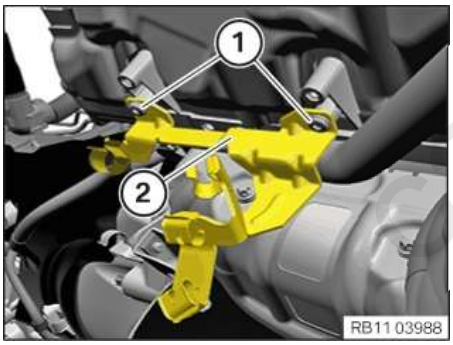
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

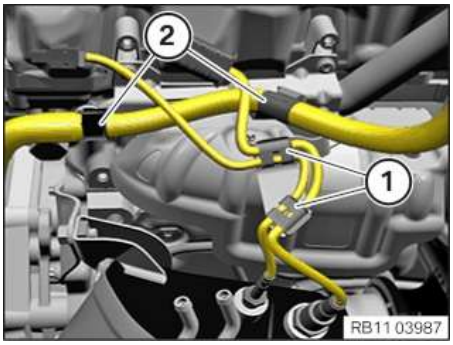
- Route all cables without abrasions, do not trap and crush.



- Insert and install the holder (2).
- Tighten the screws (1).

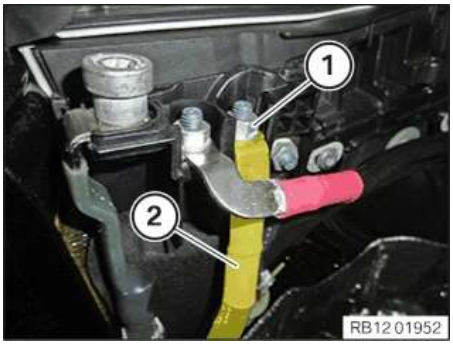
Bracket on cylinder head cover

	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).

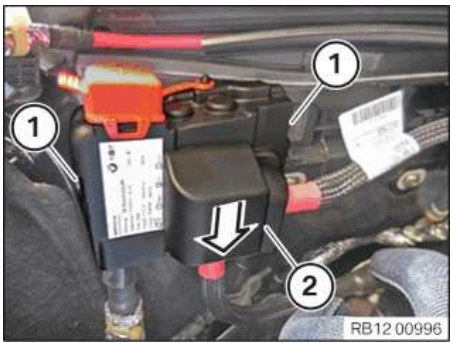
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- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

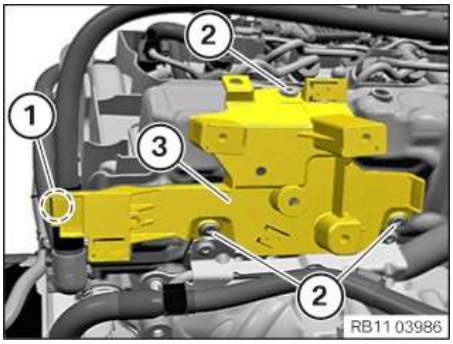
Battery positive lead to battery positive terminal

M8		Tightening torque	19 Nm



- Insert and install the cover (2) in the direction of the arrow.

  The locks (1) must engage audibly.

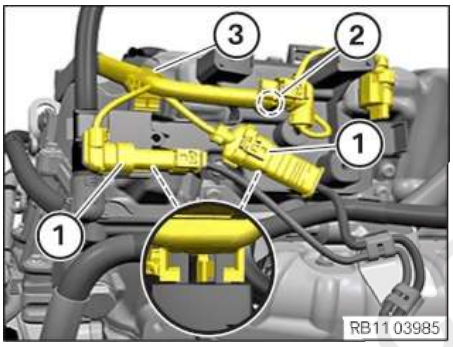


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

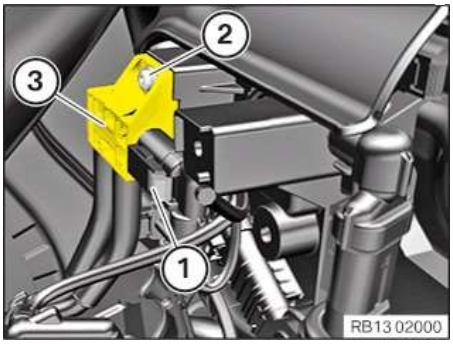
		Tightening torque	5 Nm

- 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.

30 – Securing the differential pressure sensor for the diesel particulate filter



- Feed in and install the differential pressure sensor (3).
- Tighten down screw (2).

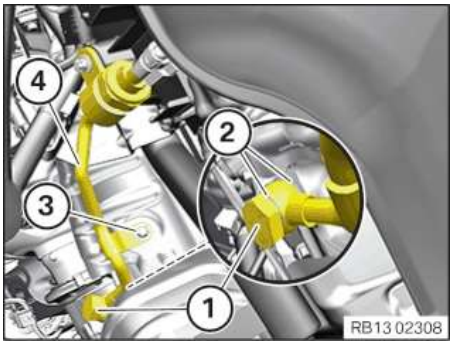
Differential pressure sensor of diesel particulate filter on cylinder head cover

TS5x20		Tightening torque	4 Nm

- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

31 – Install the exhaust gas pressure pipe

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- 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.

32 – Install all injectors

▸ **Cleaning the injector shafts**

CAUTION

Swirling dirt particles caused by compressed air.

Danger of injury!

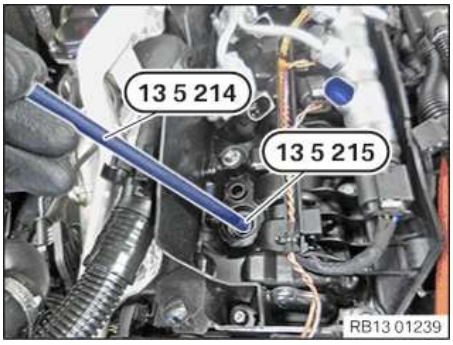
- Collect dirt particles, e.g. when blowing out, use cloth to do so.
- Wear safety goggles.

RISK OF DAMAGE

Contaminant or foreign body.

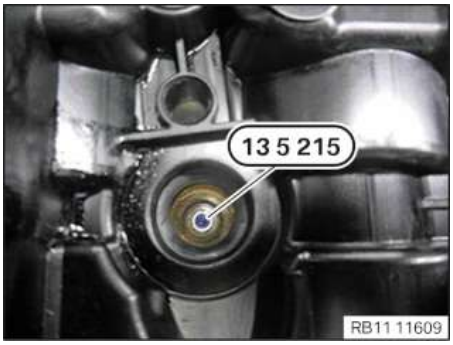
Contamination can result in malfunctions, operating failure or leaks.

- 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).

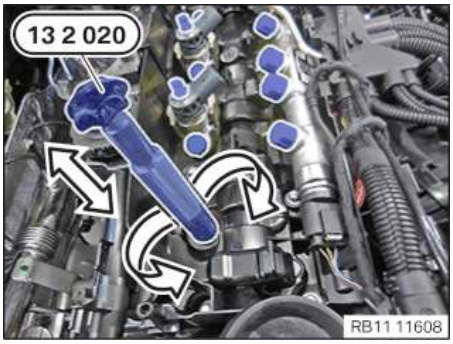
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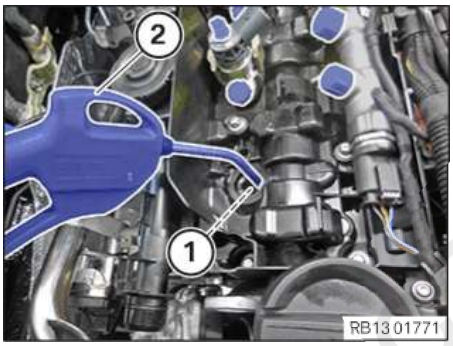
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



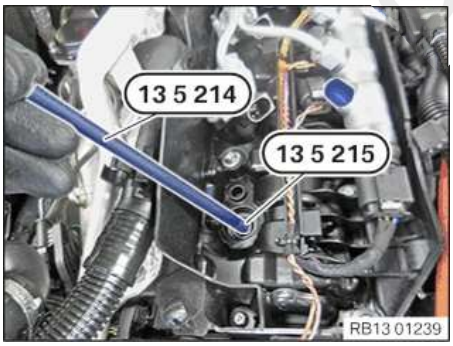
- Insert special tool 0 496 150 (13 2 020) into the injector shaft.



- 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**

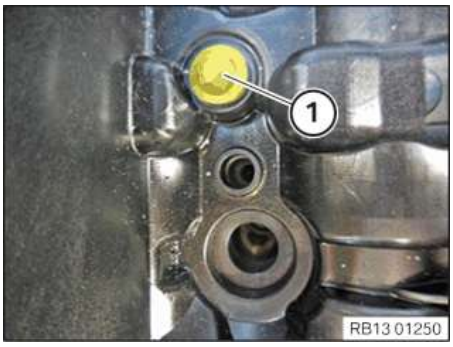
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RISK OF DAMAGE

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

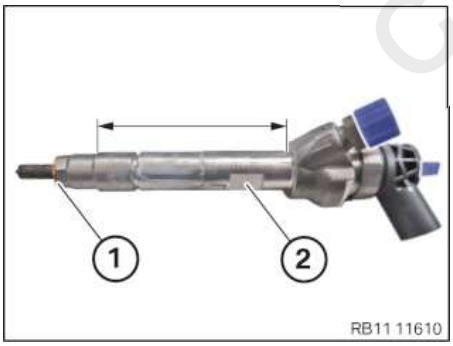
Contaminant or foreign body.

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.

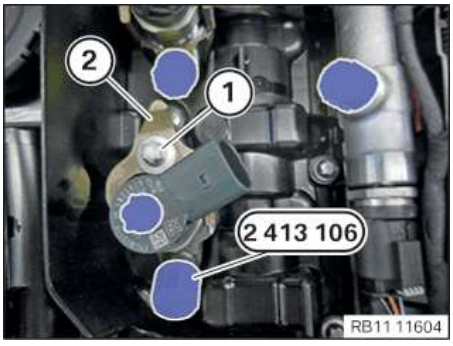
TECHNICAL INFORMATION

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.

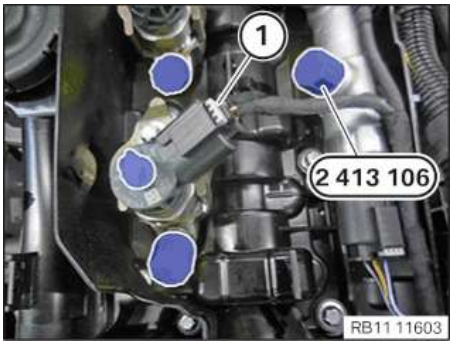


- Insert and install the injector .
- Insert and install the clamping claw (2).
- Tighten down screw (1).

Injector to cylinder head cover

M8		Tightening torque	8 Nm
		Angle of rotation	120 °

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- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

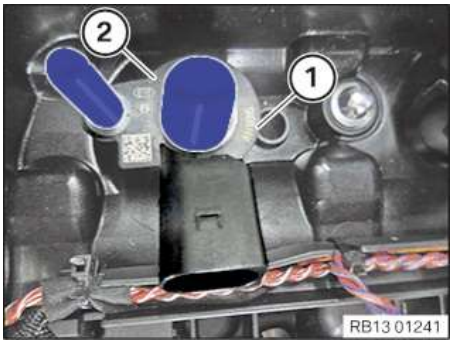
▸ **Replacement: Perform injection quantity compensation**

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.

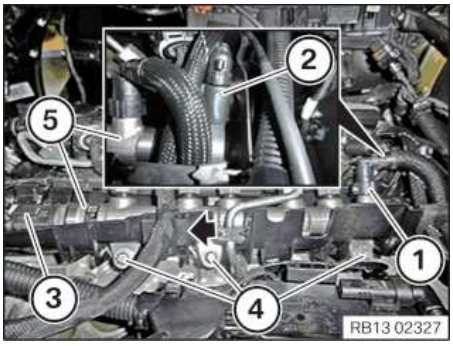


- Read off the adjustment value (1) on the new injector (2).



- 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.

33 – 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.

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34 – 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

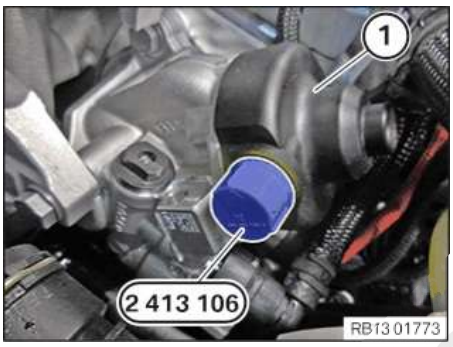
On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

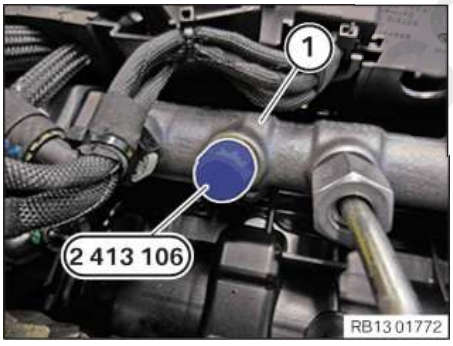
- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

TECHNICAL INFORMATION

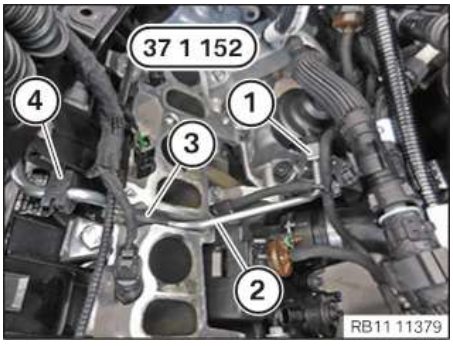
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- 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.

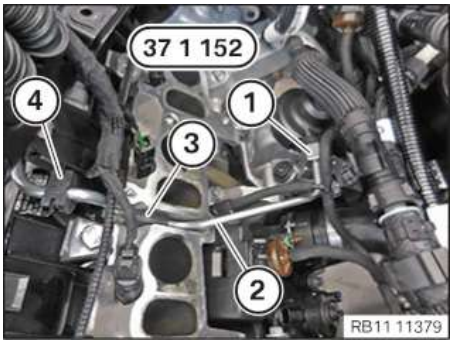
TECHNICAL INFORMATION

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

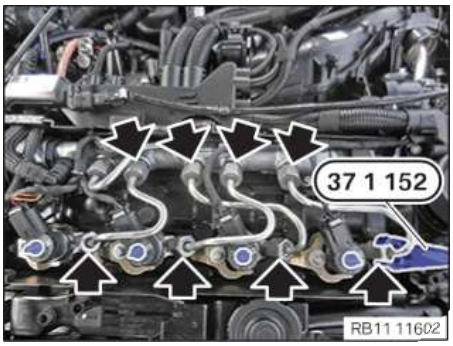
Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- 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

35 – 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.

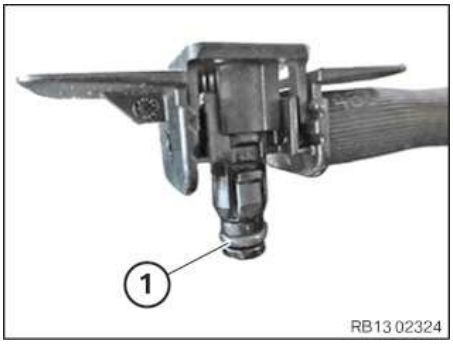
- Tighten the high pressure lines (arrows) with the special tool .

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**).

36 – Attach the leakage oil line on the injectors



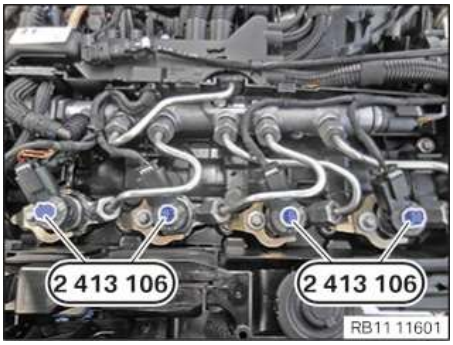
- **Version A:**

  Check sealing ring (1) for damage, renew leakage oil line if necessary.

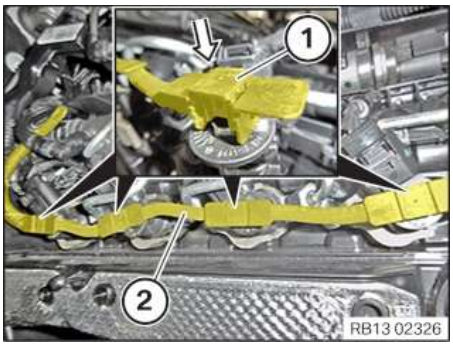
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.

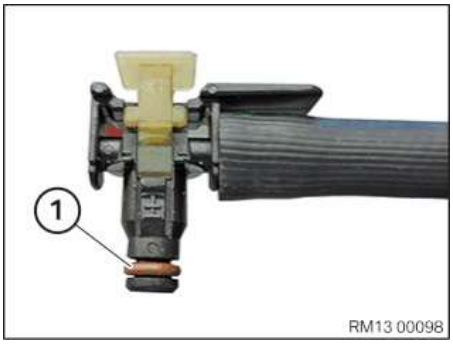
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- Feed out the special tools and remove.



- 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**:

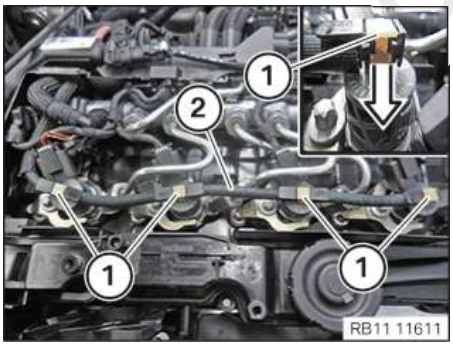
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

  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.



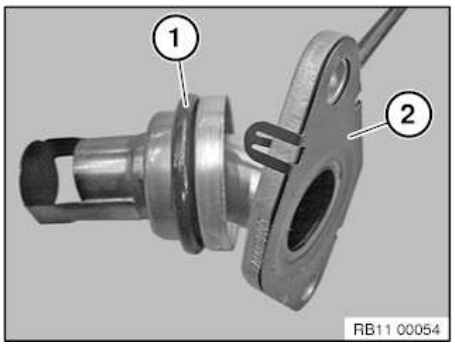
- Feed out the special tools and remove.



- 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.

37 – Installing the intake plenum

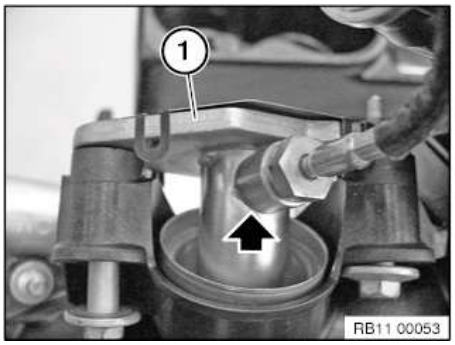
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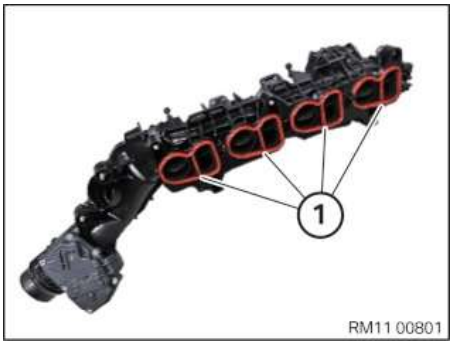
- Renew O-ring (1).

  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

  Parts: Gasket
- Position the seal (2) and clip it in.

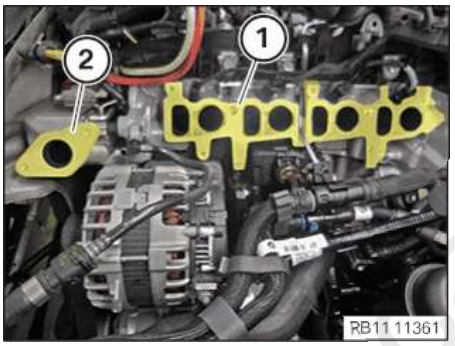


- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).

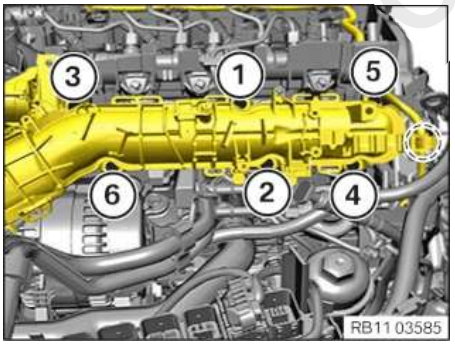


- Renew seals (1).

  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.

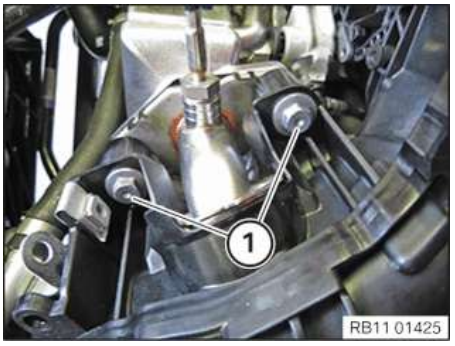


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

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.

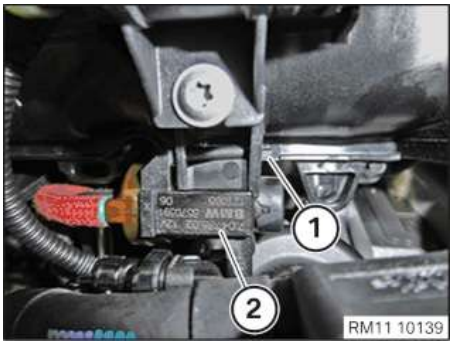


- Tighten the screws (1).

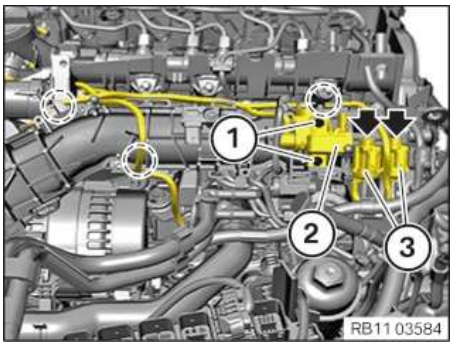
Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm

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- 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.

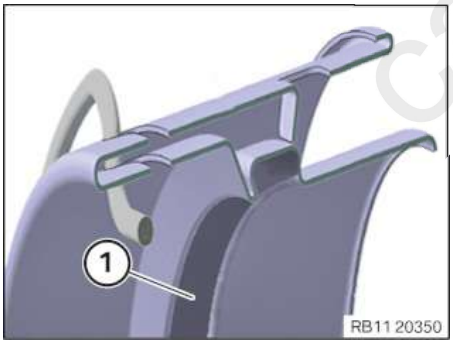


- Check the seal (1) for damage, and renew if necessary.

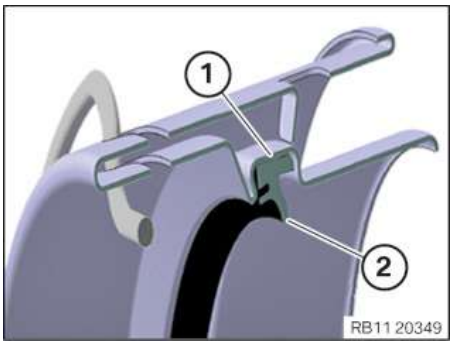
▸ **Replacing damaged seal**

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

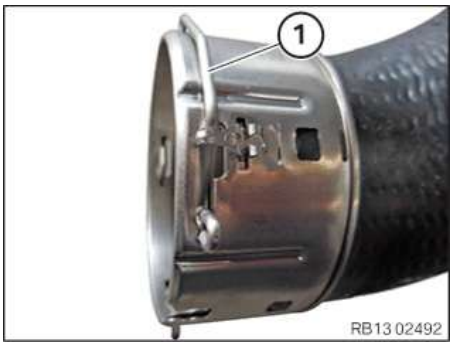
Incorrect assembly is possible. Ensure correct installation position.

- 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.

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- 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.

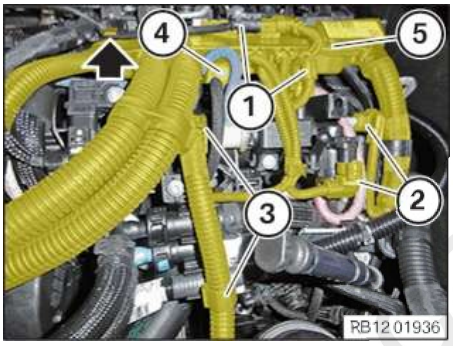
38 – Partially securing the wiring harness section on the intake plenum

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).

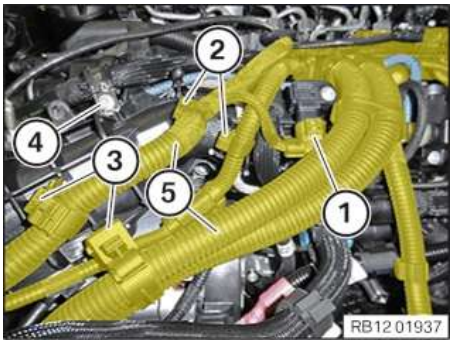
Wiring harness section to manifold

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).

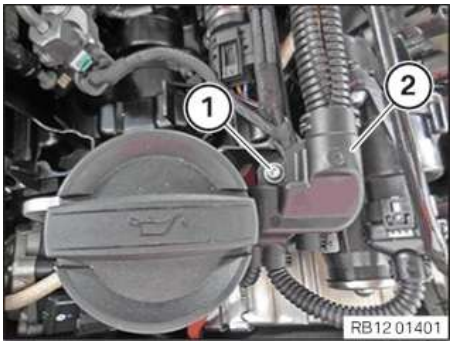
Standard screw connection 4 Nm

Oval-head screw		Tightening torque	4 Nm

- Secure clamps (3).
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

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- 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



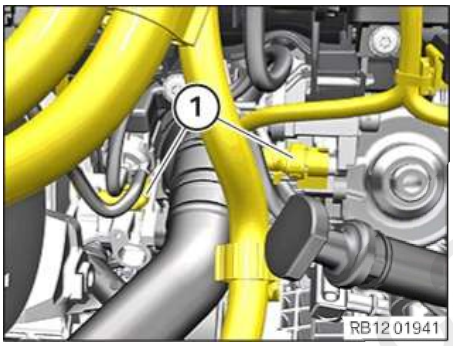
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



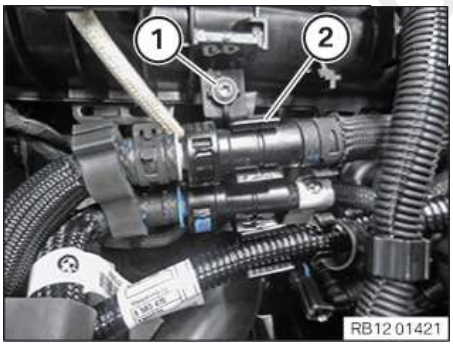
- Connect the connector (1) and lock it.

  The connector (1) must engage audibly.



- Connect connectors (1) and lock.

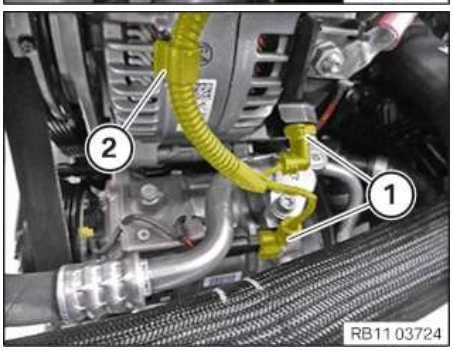
  The connectors (1) must engage audibly.



- Insert and install the holder (2).
- Tighten down screw (1).

Holder on intake plenum

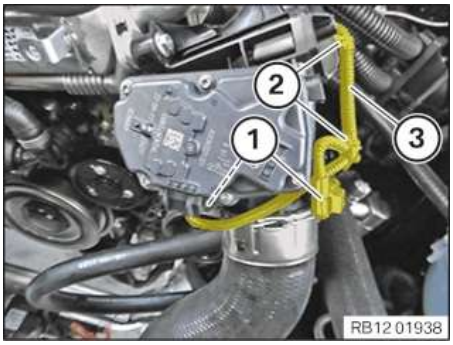
TS6X20		Tightening torque	5 Nm



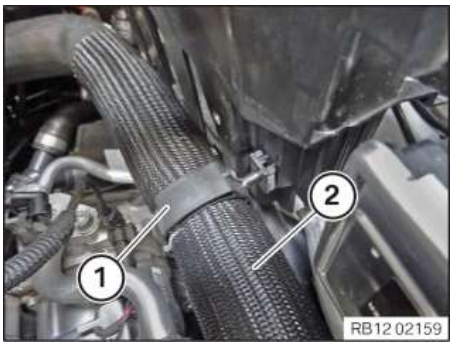
- Connect the connector (1) and lock it.

  The connectors (1) must engage audibly.
- Secure holder (2) to alternator.

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- Guide in the wiring harness section (3) and install.
- Secure clamps (2).
- Connect connectors (1) and lock.



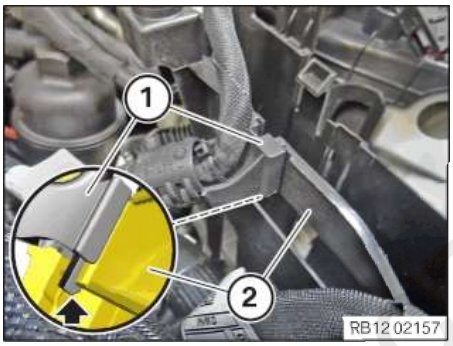
- Feed in and install coolant line (2).
- Lock holder (1).

  The holder (1) must engage audibly.



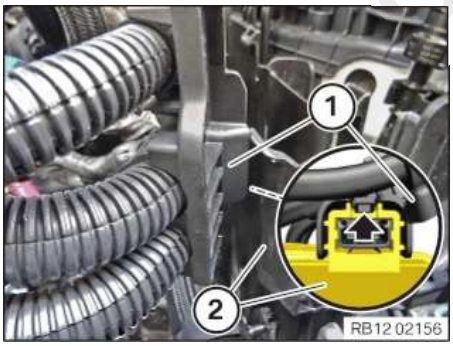
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.



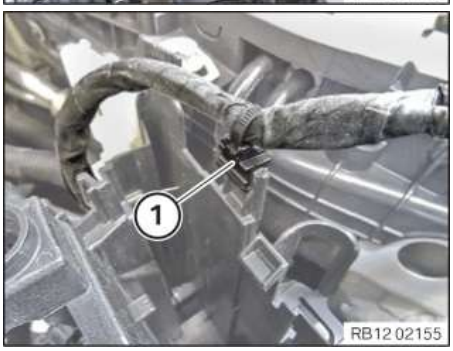
- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.



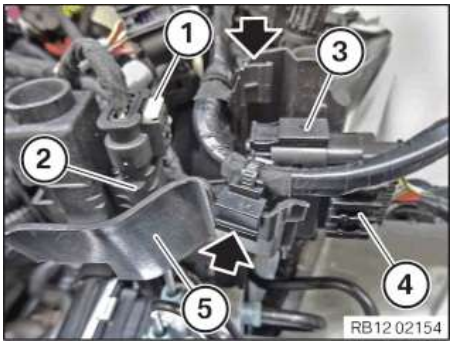
- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.

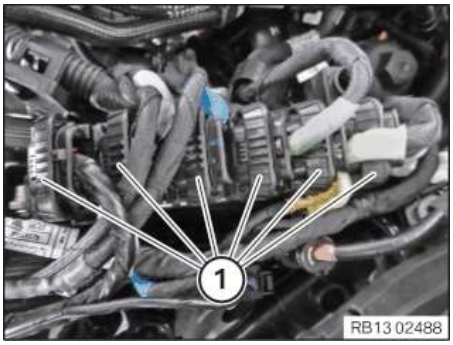


- Secure clamps (1).

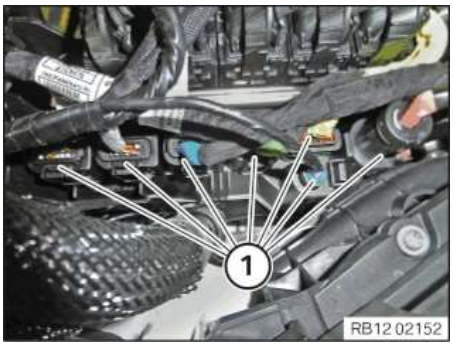
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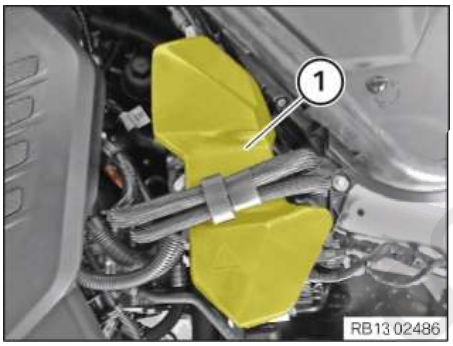
- Connect and lock the connector (4) with the control unit holder (5).
  The connector (4) must engage audibly.
- Connect connectors (3) and lock.
  The connector (3) must engage audibly.
- Connect and lock the connector (2) with the control unit holder (5).
  The connector (2) must engage audibly.
- 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.

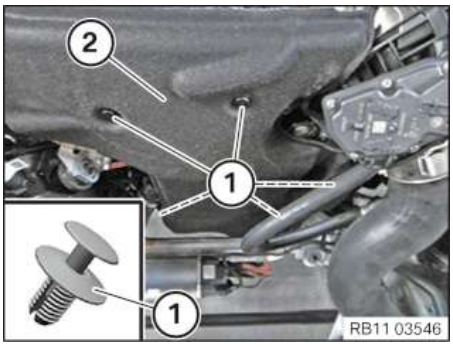


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



- Insert and install cover (1) into guides.

39 – Install acoustic cover for the engine, front



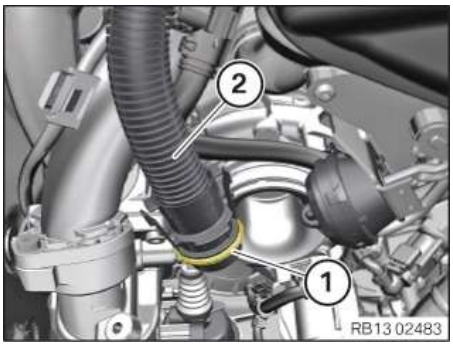
- Feed the acoustic cover (2) in and install.
- Secure the acoustic cover (2) with the expanding rivets (1).

40 – Installing the clean air pipe with resonator

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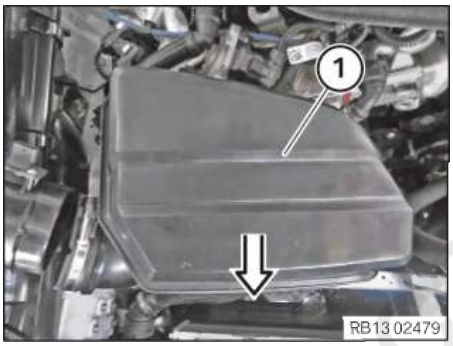
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



- 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.

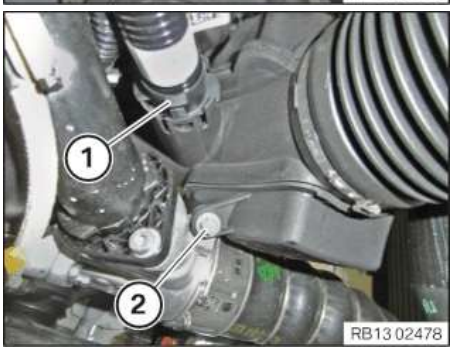


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

  The clamp (1) must engage audibly.

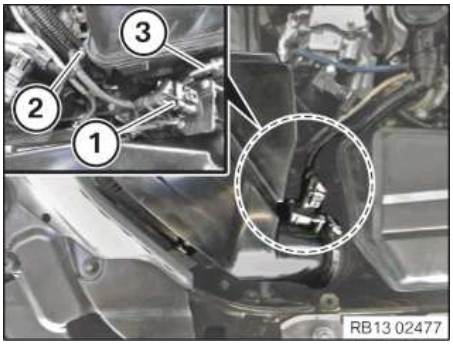


- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm

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- Connect the clean air pipe with resonator to the intake filter housing.
- Tighten clamp (3).

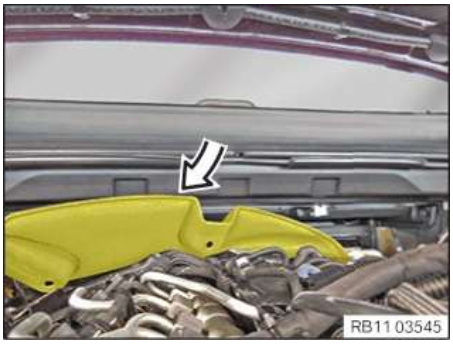
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

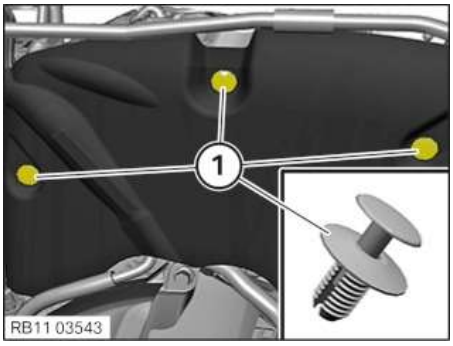
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

41 – Installing acoustic cover at rear

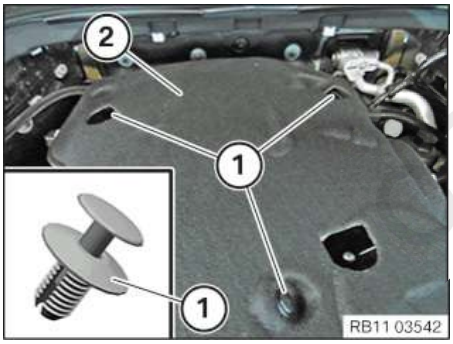


- Guide in the acoustic cover in the direction of the arrow and install it.



- Secure acoustic cover with the expanding rivets (1).

42 – 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) .

43 – Install acoustic cover

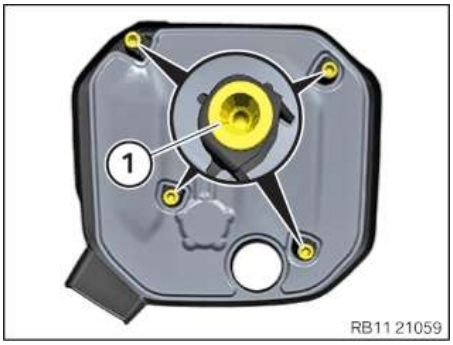
RISK OF DAMAGE

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.

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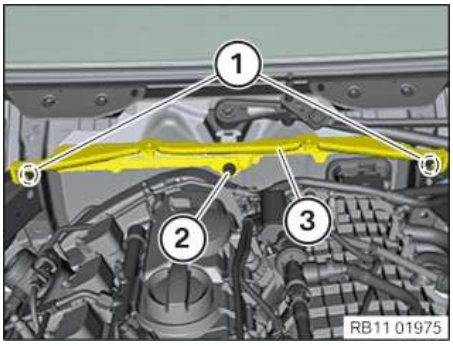


- Check the acoustic cover for correct fit of the rubber mounts (1).



- Clip in the acoustic cover (1) into the holders in the indicated areas.

44 – Installing centre bulkhead lower section

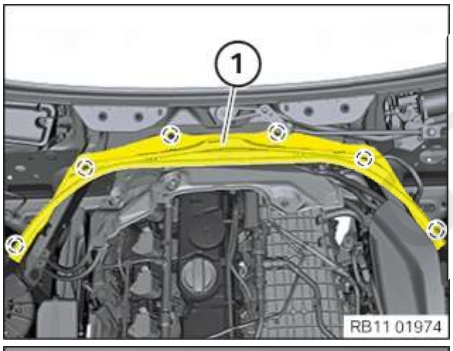


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

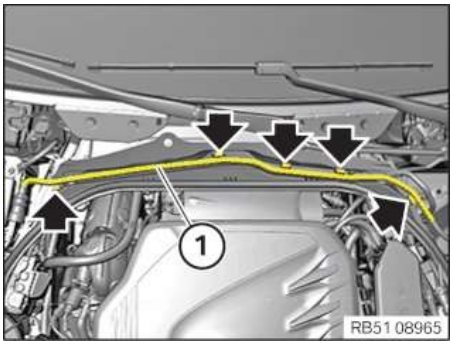
45 – Installing the centre bulkhead upper part



- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

Bulkhead upper part to bottom bulkhead

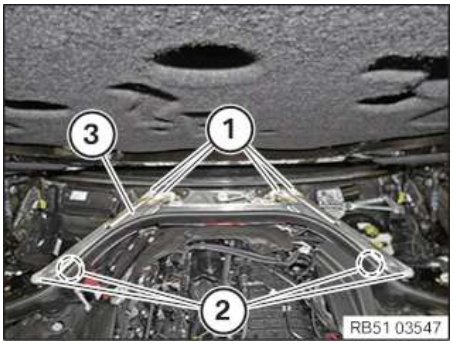
		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

  Clip in the wire (1) into the holders (arrows).

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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 °

46 – 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.

47 – Installing cowl panel cover

RISK OF DAMAGE

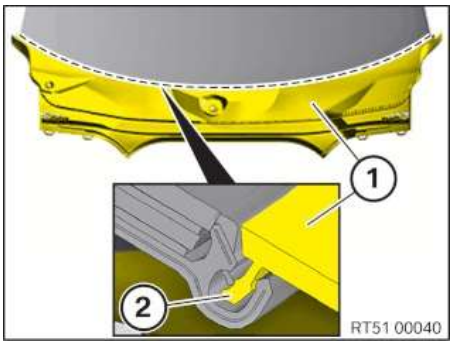
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

- Ensure correct installation of the components.
- Only use undamaged components.

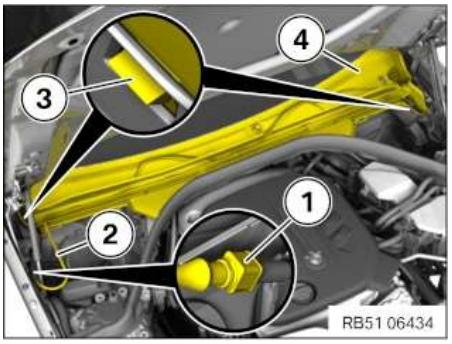
TECHNICAL INFORMATION

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.

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- 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.

48 – Install left and right wiper arm

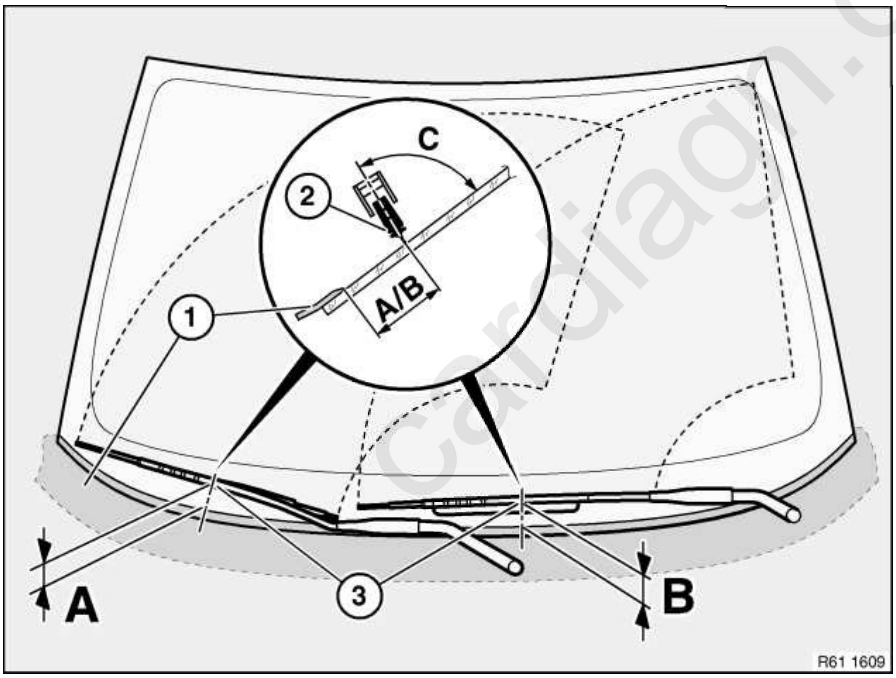
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

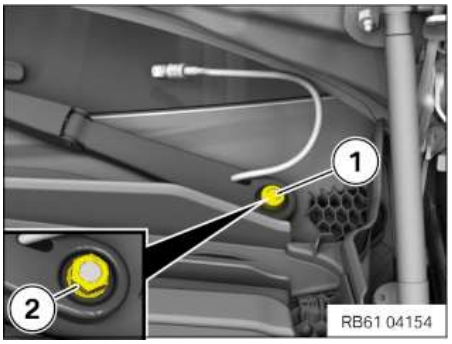
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- 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



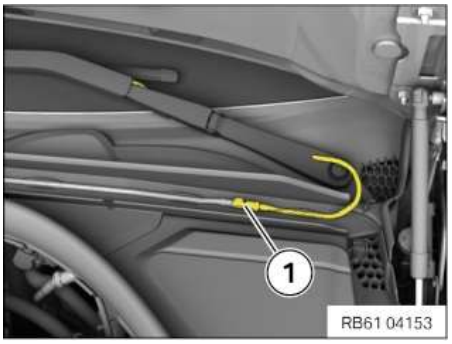
- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

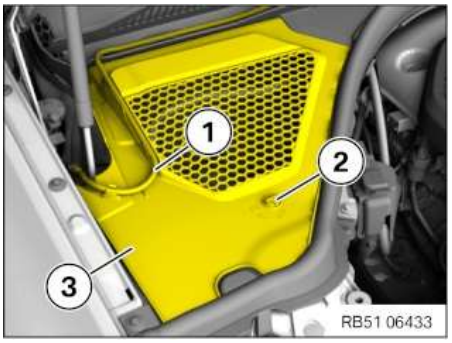
- Connect the protective cap (1).

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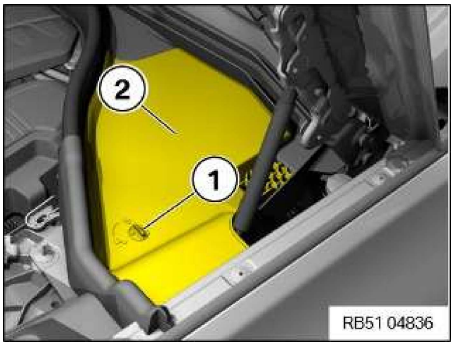
- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

49 – 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.

50 – Install the cover of the engine compartment on the rear left



- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

51 – Connecting all battery earth leads



- See additional information.

52 – Take bonnet out of the service position

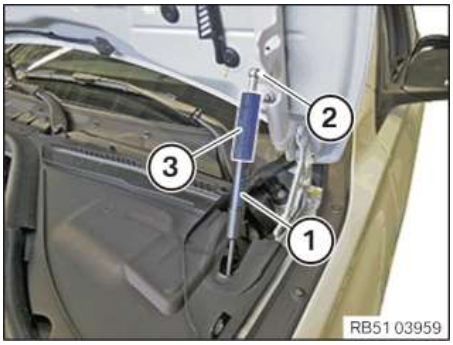
CAUTION

Shutting bonnet or tailgate.

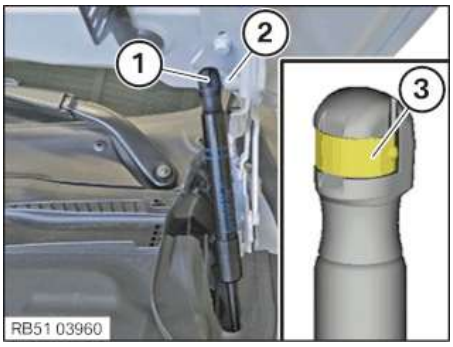
Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.

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- 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

Cylinder head cover to cylinder head			Used in step 27
M6		Tightening torque.	8,5 Nm

Heat shield to exhaust manifold			Used in step 28
M6x12			10 Nm

Bracket on cylinder head cover			Used in step 29
		Tightening torque	5 Nm

Battery positive lead to battery positive terminal			Used in step 29
M8		Tightening torque	19 Nm

Differential pressure sensor of diesel particulate filter on cylinder head cover			Used in step 30
TS5x20		Tightening torque	4 Nm

Heat shield to exhaust manifold			Used in step 31
M6x12		Tightening torque	10 Nm

Banjo bolt for exhaust pressure pipe to exhaust manifold			Used in step 31
Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm

Exhaust gas pressure pipe to sensor system holder			Used in step 31
TS6x20		Tightening torque	5,7 Nm

Clamping claw facing to cylinder head cover			Used in step 32
M6		Tightening torque	10 Nm

Injector to cylinder head cover			Used in step 32
M8		Tightening torque	8 Nm
		Angle of rotation	120 °

Rail to cylinder head cover			Used in step 33
M8		Tightening torque	19 Nm

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High pressure lines between high pressure pump and rail			Used in step 34
High-pressure pipe		Tightening torque	24.5 Nm

High pressure lines between injector and rail			Used in step 35
High-pressure pipe		Tightening torque	24.5 Nm

Intake plenum to cylinder head			Used in step 37
M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum			Used in step 37
		Tightening torque	10 Nm

Electric changeover valve to intake plenum			Used in step 37
TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold			Used in step 38
TS5x20		Tightening torque	3,6 Nm

Standard screw connection 4 Nm			Used in step 38
Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover			Used in step 38
TS5x20		Tightening torque	3,6 Nm

Holder on intake plenum			Used in step 38
TS6X20		Tightening torque	5 Nm

Clean air pipe to exhaust turbocharger			Used in step 40
M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing			Used in step 40
Clamp		Tightening torque	3 Nm

Bulkhead lower part to body			Used in step 44
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead			Used in step 45
		Tightening torque	3 Nm

Tension strut on bulkhead			Used in step 45
M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome			Used in step 45
Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm			Used in step 48
Combination hexagon nut		Tightening torque	35 Nm

Overview of Special Tools

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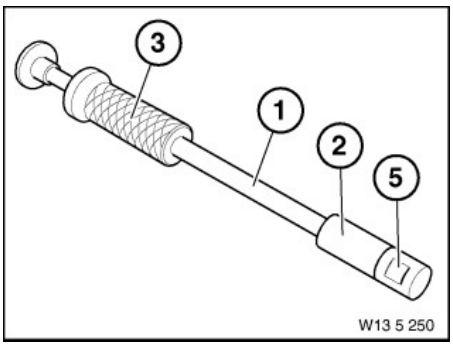
0 493 339 (13 5 252) Bush



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)	

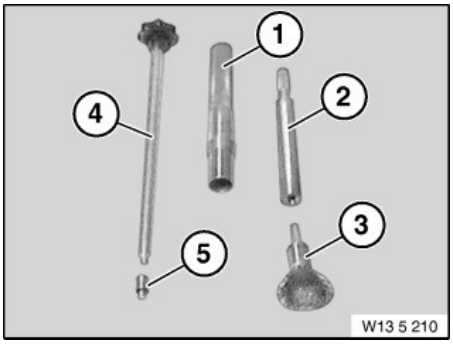
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0 493 340 (13 5 253) Weight



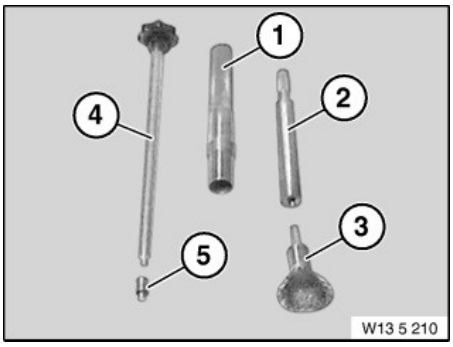
Common	Used in step 21
Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 763 (13 5 215) Plug



Common	Used in step 32
Usage	(Seal plug)
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

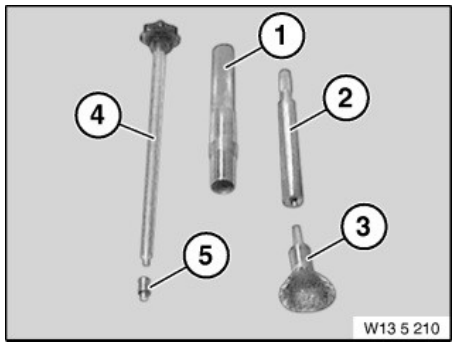
0 493 762 (13 5 214) Rod



Common	Used in step 32
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	

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0 493 758 (13 5 210) Tool



Common

Used in step 32

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)

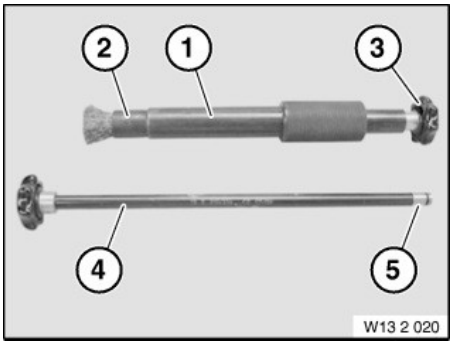
Consisting of

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)	

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0 496 150 (13 2 020) Tool

Used in step 32



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 48

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)	32

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	251
61 20 900 Disconnecting and connecting battery earth lead	251
61 20 900 Disconnecting and connecting battery earth lead	251
61 20 900 Disconnecting and connecting battery earth lead	251
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61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads) 251
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads) 251
61 20 900 Disconnecting and connecting battery earth lead 251
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads) 251
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle) 251
61 20 900 Disconnecting and connecting battery earth lead 251
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61 20 900 Disconnecting and connecting battery earth lead 251
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads) 251
61 20 900 Disconnecting and connecting battery earth lead 251
61 20 900 Disconnecting and connecting battery earth lead 251
61 20 900 Disconnecting and connecting battery earth lead 251
61 35 ... Notes on ESD protection (Electro Static Discharge) 1521
61 35 ... Notes on ESD protection (Electro Static Discharge) 1521

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11 12 161 replace cylinder head

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

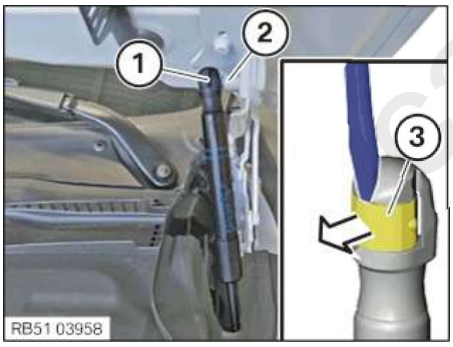
Engine compartment lid is open.

CAUTION

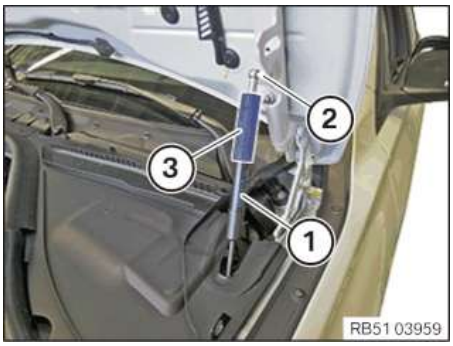
Shutting bonnet or tailgate.

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.



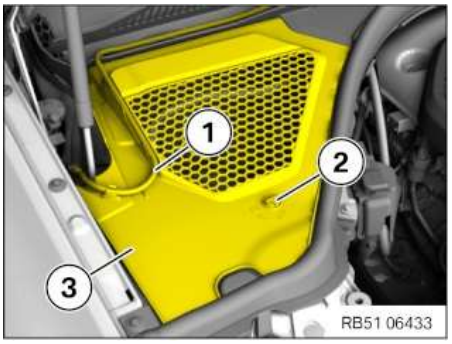
TECHNICAL INFORMATION

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.

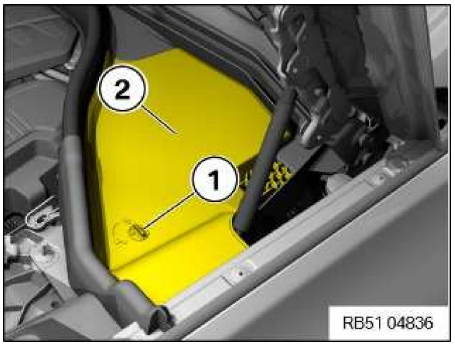
2 – Remove the cover of the rear right engine compartment

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- 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.

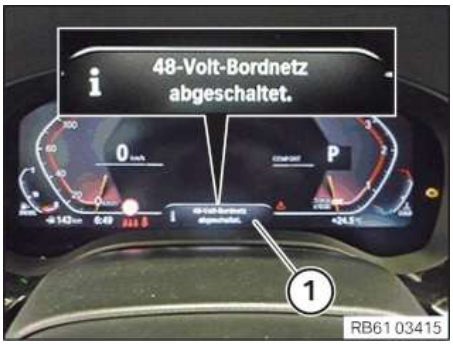
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- Deactivate the 48V electrical system by opening the bonnet.

  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.

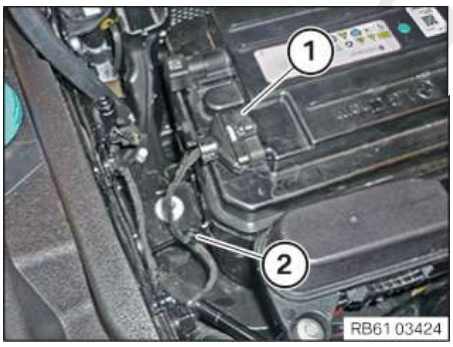
Result

» 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.

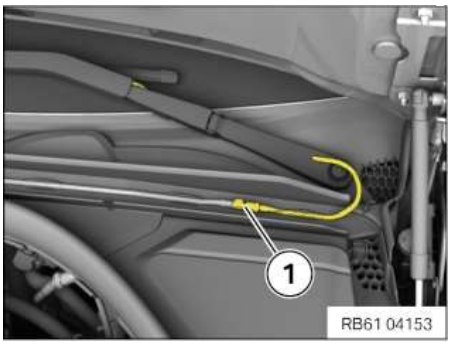
▸ **Remove the wiper arm**

RISK OF DAMAGE

Damage to wiper console.

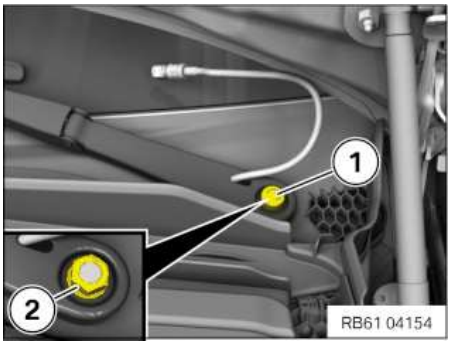
While removing the wiper arms without using special tool, the wiper console can break.

- 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.

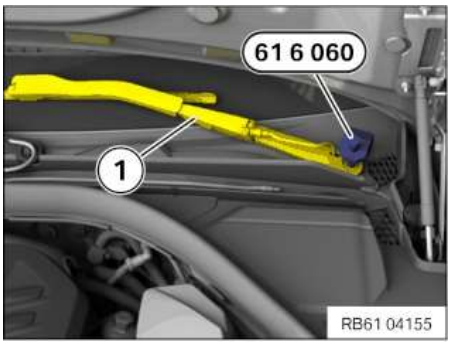


- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.

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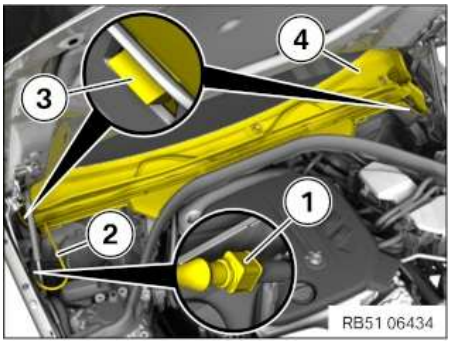


- Remove the protective cap (1).
- Loosen nut (2).

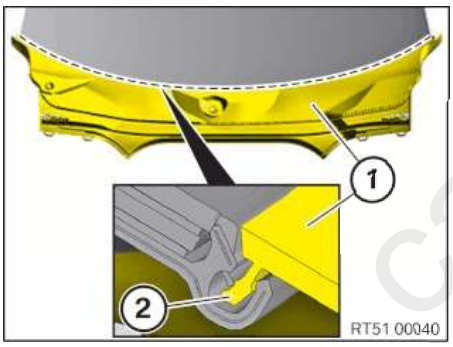


- Pull off the wiper arm (1) using special tool .

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



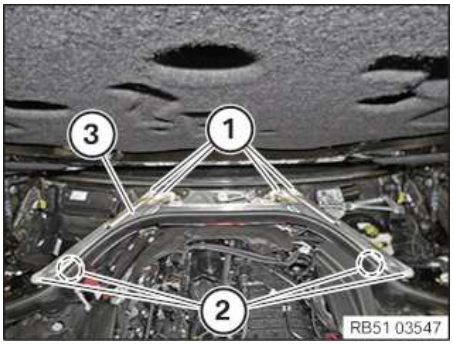
- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

9 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

Driving without the strut brace/front-end strut or tension strut is not permitted.

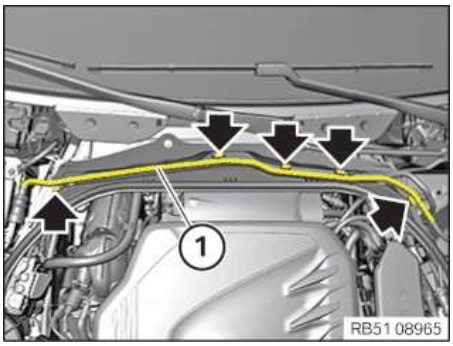
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NOTICE

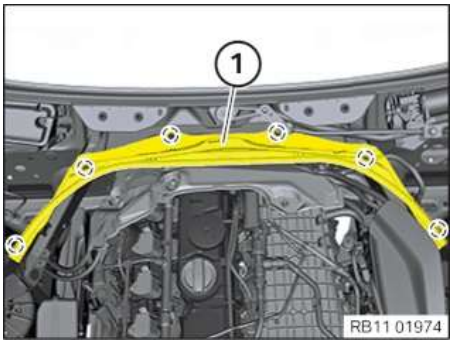
The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.



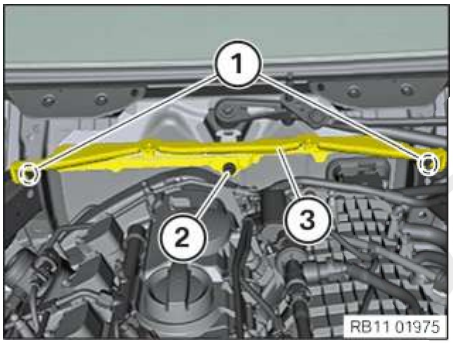
- **Version with mild hybrid technology:**

  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.

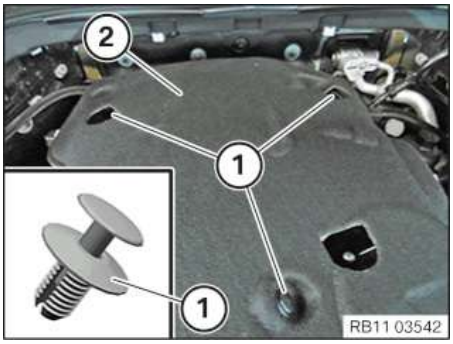
Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- 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.



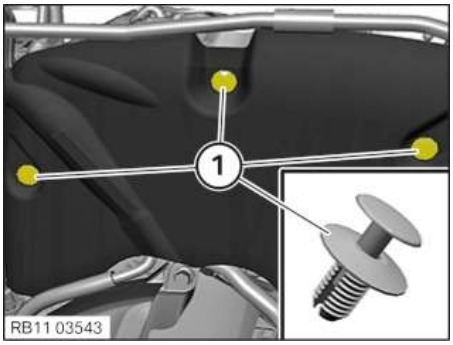
- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

12 – Remove the acoustic cover for the injectors

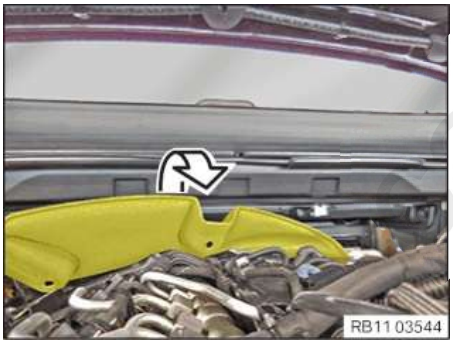


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

13 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).

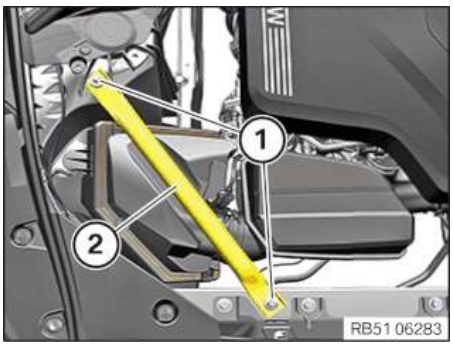


- Guide out and remove the acoustic cover in the direction of the arrow.

14 – Remove right front-end strut

TECHNICAL INFORMATION

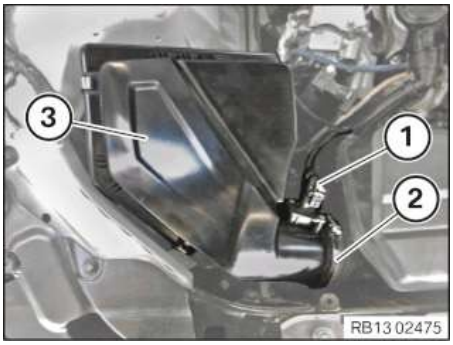
Driving without the strut brace/front-end strut or tension strut is not permitted.



- Loosen screws (1).
- Remove the front-end strut (2).

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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.

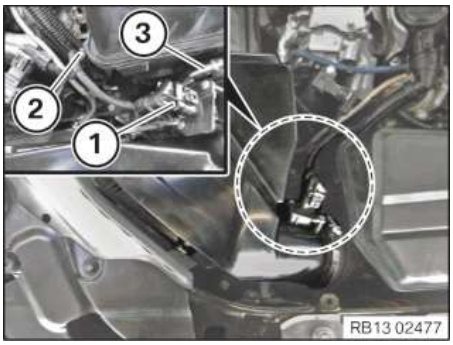
16 – Removing the clean air pipe with the resonator

WARNING

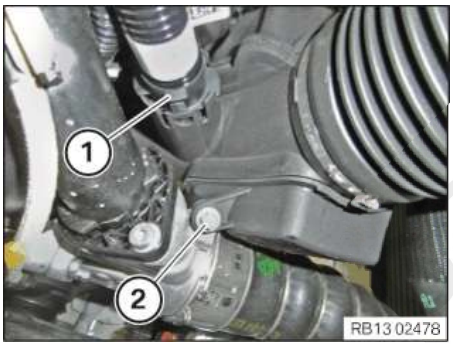
Hot surfaces.

Risk of burning!

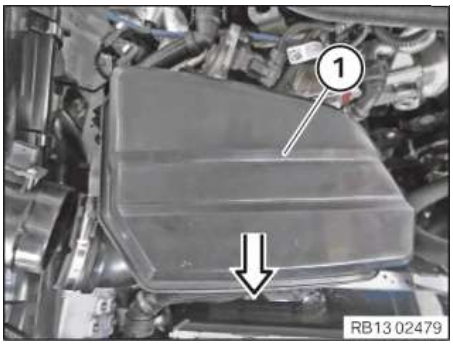
- Perform all work only on components that have cooled down.



- 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.

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- 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!

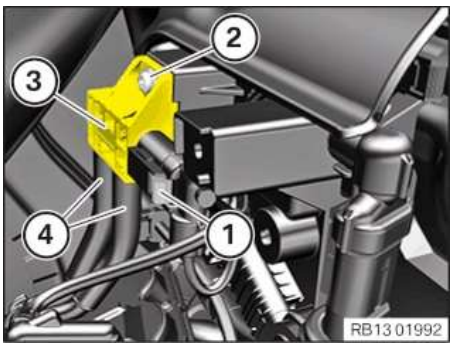
- Perform all work only on components that have cooled down.

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

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WARNING

Hot surfaces.

Risk of burning!

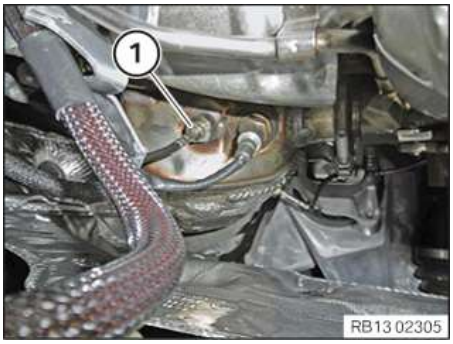
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

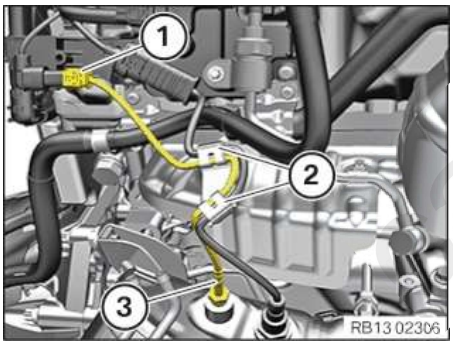
Electrostatic discharge.

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.

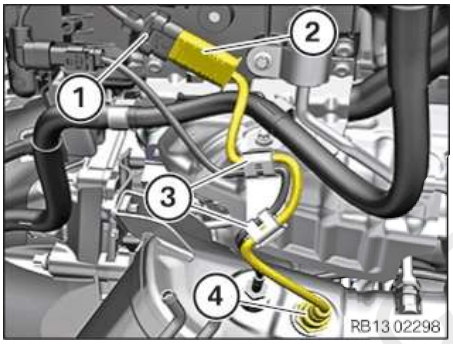
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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.

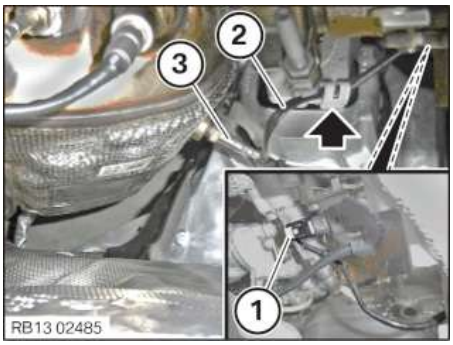
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RISK OF DAMAGE

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)

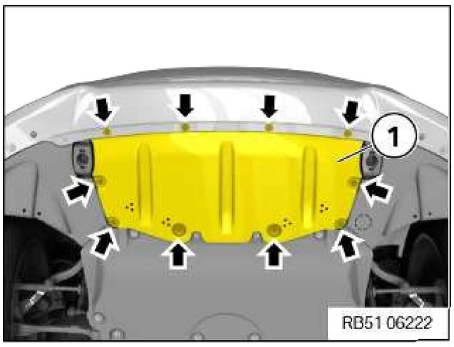


- Unlock plug connection (1) and disconnect.

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).

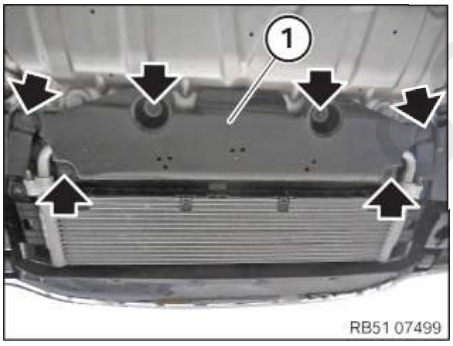
21 – Removing the front underbody protection



- **Version A:**

  Remove screws (arrows).

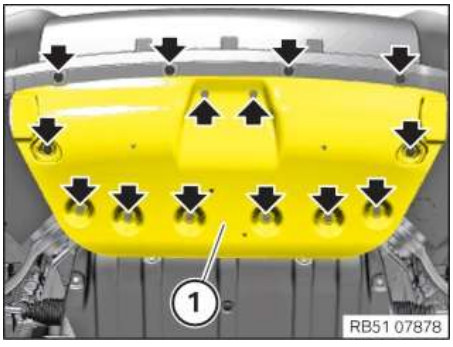
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version B:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

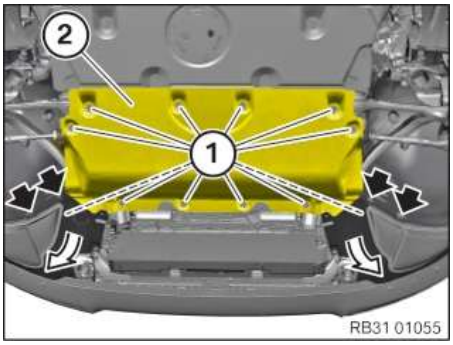


- **Version C:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

22 – Remove the underbody protection of the steering gear



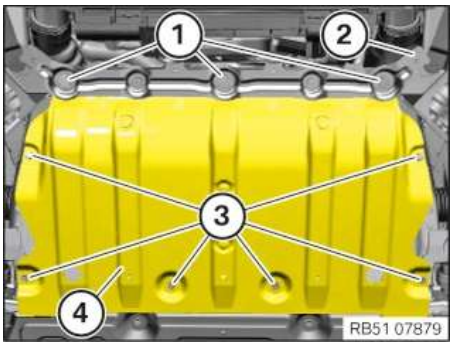
- **Version A:**

  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.

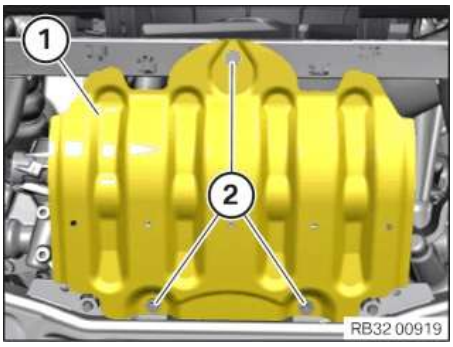
  Loosen screws (3).

  Feed out and remove the underbody protection (4) of the steering gear.

23 – If installed: Removing the steering underbody protection

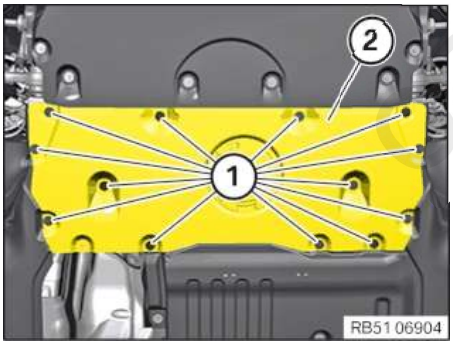
Prerequisite

Front underbody protection has been removed.



- Loosen screws (2).
- Remove underbody protection (1).

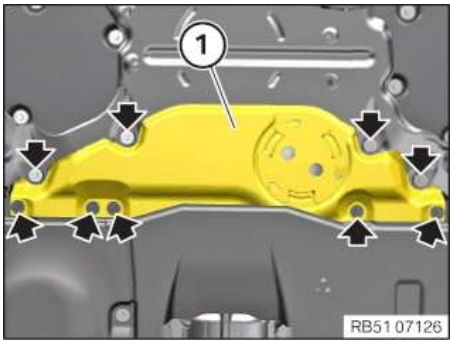
24 – Removing the centre underbody protection



- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .



- **Version with all-wheel drive:**

  Remove screws (arrows).

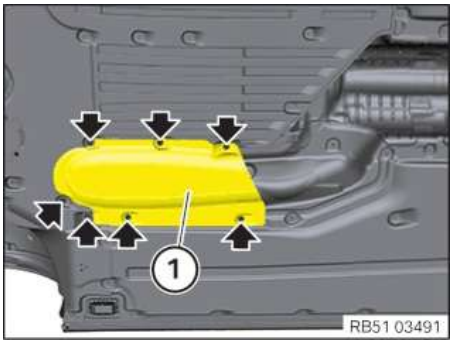
  Feed out and remove the centre underbody protection (1).

25 – Remove the underbody panelling of the transmission on the side

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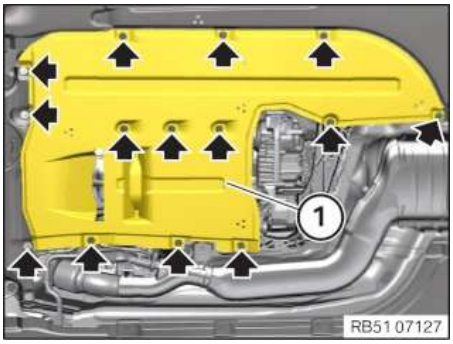
NOTICE

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).

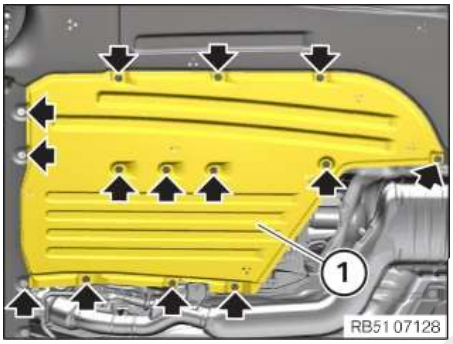
26 – Remove rear underbody protection



- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).

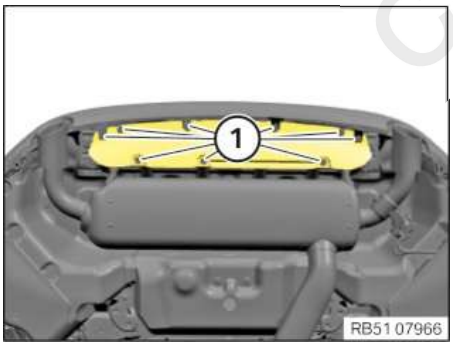


- **Version B:**

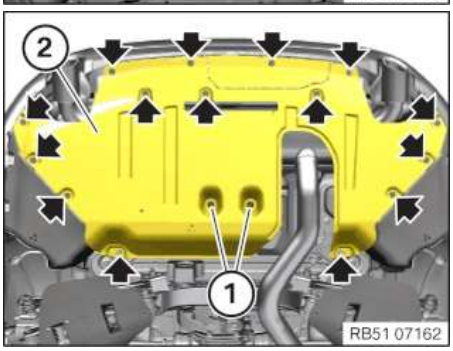
  Remove screws (arrows).

  Guide out rear underbody protection (1) and remove it.

27 – Removing the rear diffuser



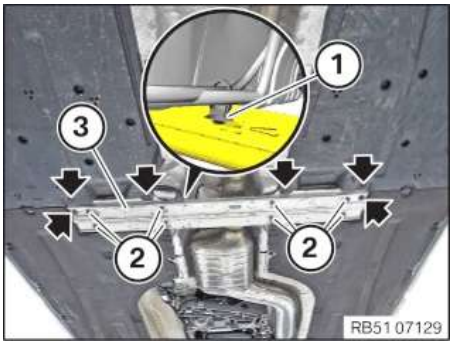
- **Version 1:**
- Release the screws and nuts (1).
- Remove the diffuser.



- **Version 2:**
- Loosen nuts (1).
- Remove screws (arrows).
- Guide out and remove rear diffuser (2).

28 – Remove the connecting support from the tunnel

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- 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!

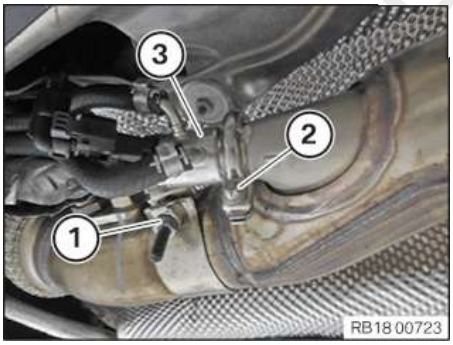
- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

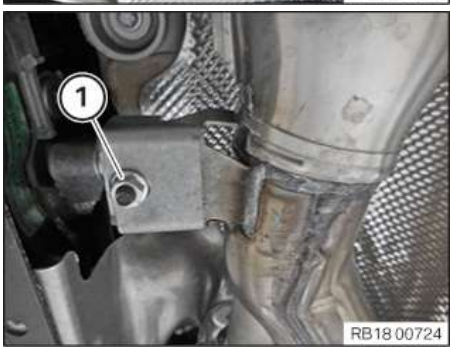
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

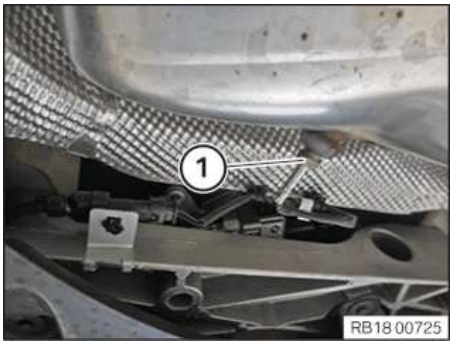


- Unfasten clamp (1).
- Detach the clamp (2) of the SCR metering module (3).
- Detach the SCR metering module (3)from the exhaust system and place to one side.

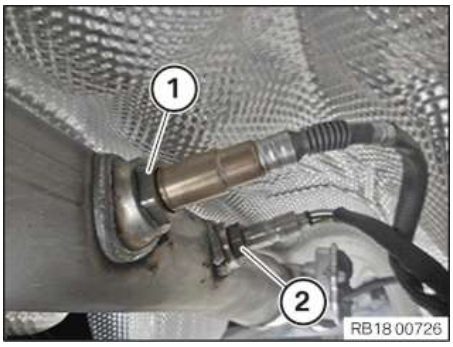


- Loosen nut (1).

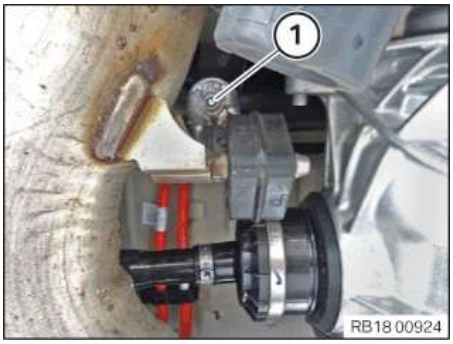
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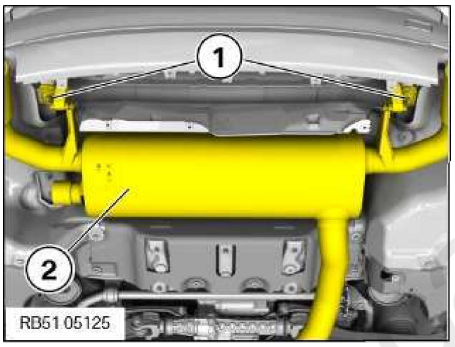
- Detach the exhaust temperature sensor (1) from the exhaust system.



- 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.

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RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

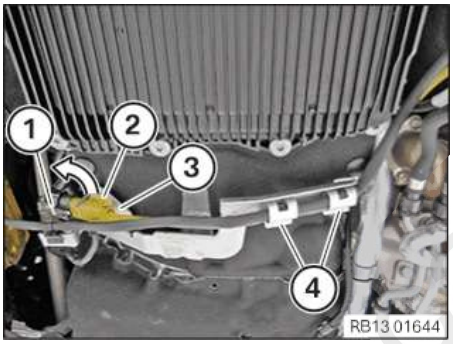
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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.

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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.

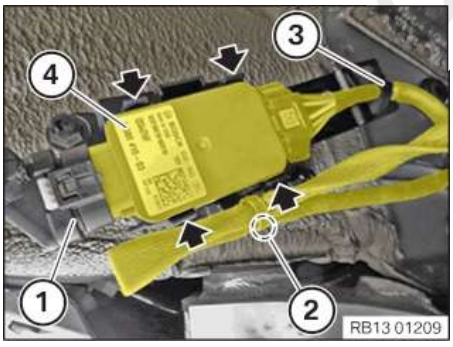
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- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the housings of electrical components. Do not touch pins or multi-pin connectors directly.
- Wear electrically conductive clothing and antistatic shoes (with ESD symbol).
- For additional information see: 61 35 ... Notes for ESD protection (electrostatic discharge)

RISK OF DAMAGE

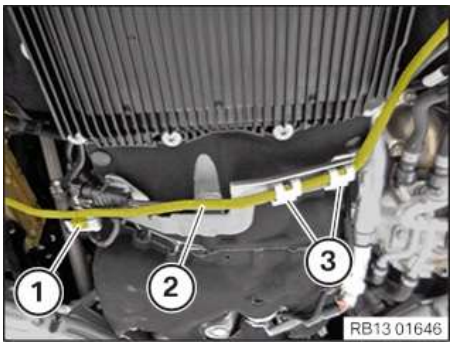
Damage to the nitrogen oxide sensor.

Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

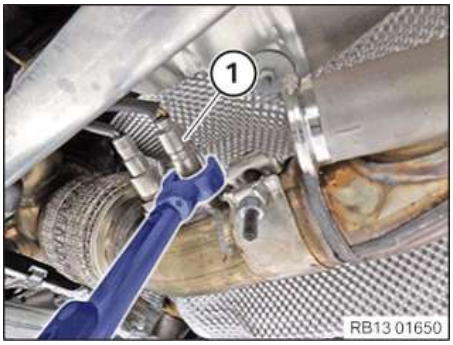
- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug 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.



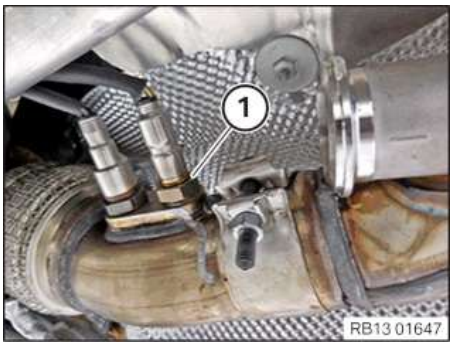
- Unlock plug connection (1) and disconnect.
- Release cable clip in area (2).
- Release line from the holder (3).
- Unclip control unit (4).



- 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!

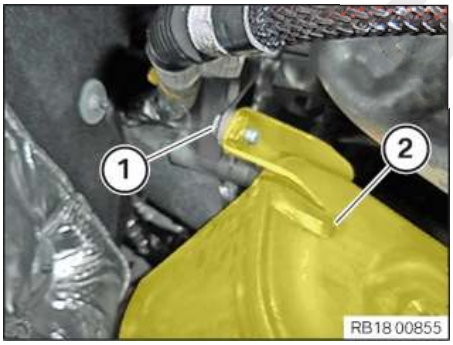
- Perform all work only on components that have cooled down.

CAUTION

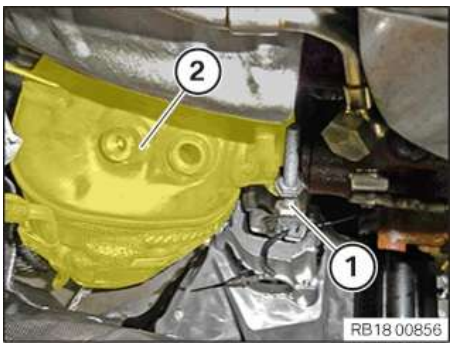
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

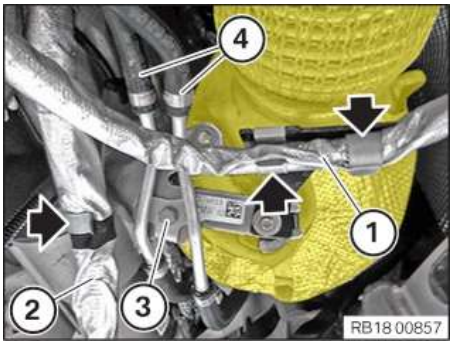


- Release bolt (1) from the holder of diesel particulate filter (2).

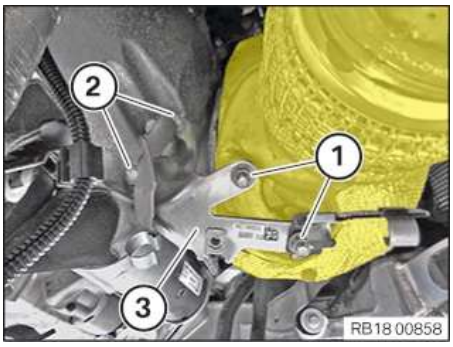


- Loosen V-band clamp (1).
- Feed V-clip (1) out from diesel particulate filter (2) and remove.

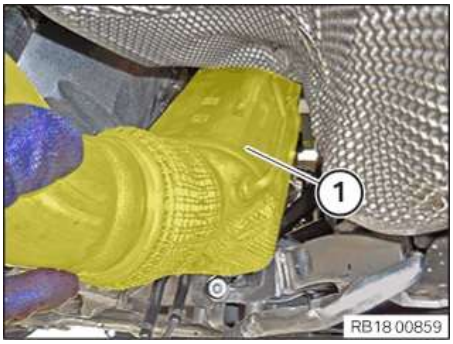
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- Release the metering line (1) from clamps (Arrows).
- Release positive battery cable (2) from starter motor from clamp (Arrow).
- Loosen screw (3).
- Thread off coolant line (4) and place to the side.



- 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.**

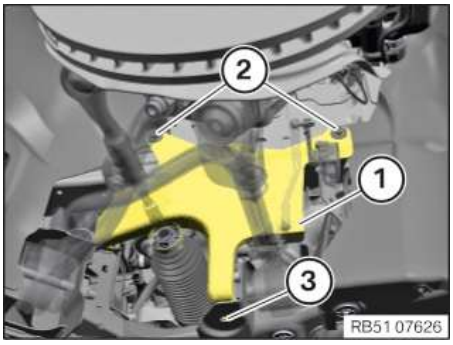
  This process is intended to prevent damage to the brake disc.

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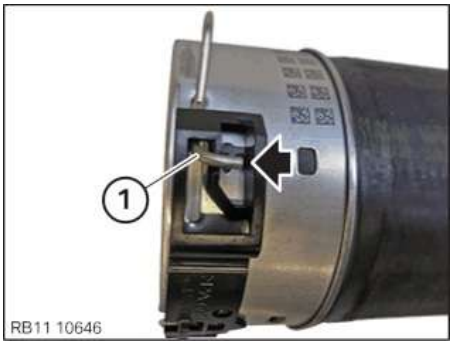
- If several wheels are removed at the same time: Use a piece of chalk to mark on each tyre the axle and side on which the corresponding wheel is fitted.
- Release the wheel bolts (arrows) crosswise and remove the wheel.
- To release and tighten wheel bolts with a security code: Use the correct adapter from the set of special tools .

34 – Remove the cover of the steering assembly



- Loosen screws (2) and (3).
- Remove the cover (1).

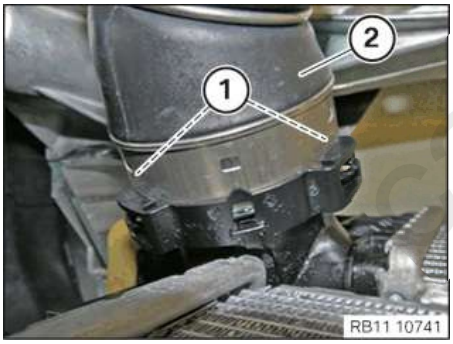
35 – Remove pressure pipe between exhaust turbocharger and charge air cooler



- **Version A:**

  Unlock lock (1).

  The lock (1) must snap audibly into place when unlocked (see arrow).



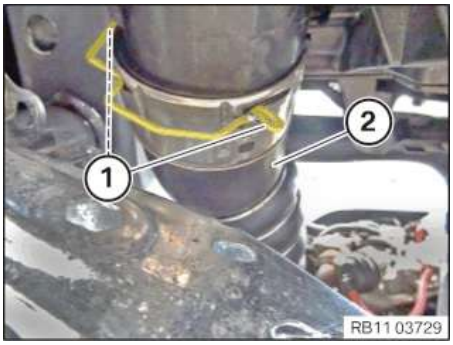
- Unlock the locks (1) on both sides and snap into place.
- Pull off pressure pipe (2) from charge air cooler.



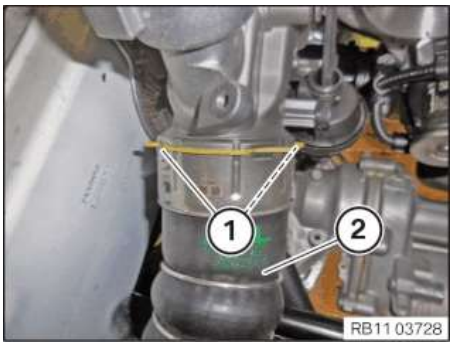
- **Version B:**

  Unlock clamp (1) and engage in this position.

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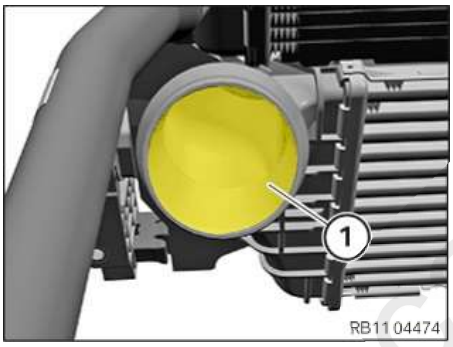
- Unlock the locks (1) and snap into place.
- Pull off pressure pipe (2) from charge air cooler.



- 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.

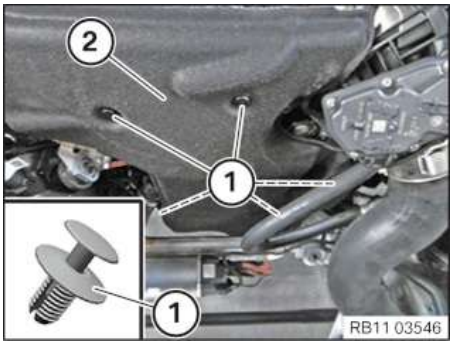
36 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.



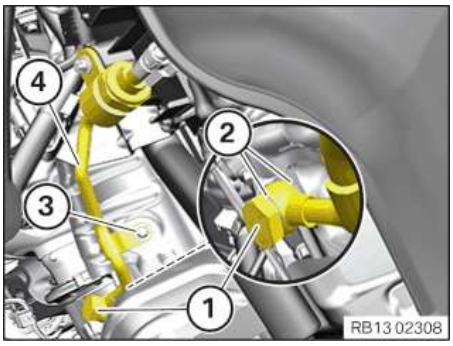
- Release and remove expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

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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.

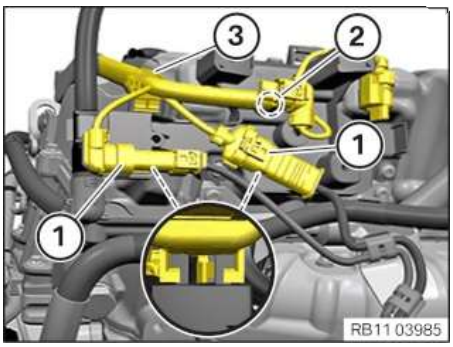
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

Contaminant or foreign body.

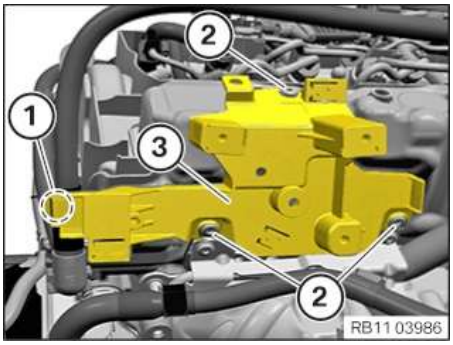
Contamination can result in malfunctions, operating failure or leaks.

- 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.

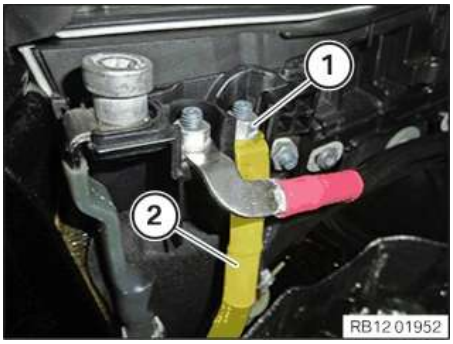
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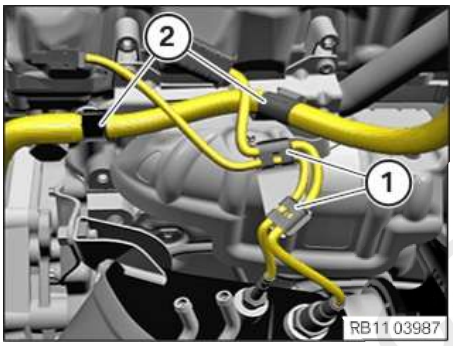
- Release the positive battery cable in the area (1) from the clamp and set it aside.
- Loosen screws (2).
- Feed out holder (3) for the sensor system and remove.



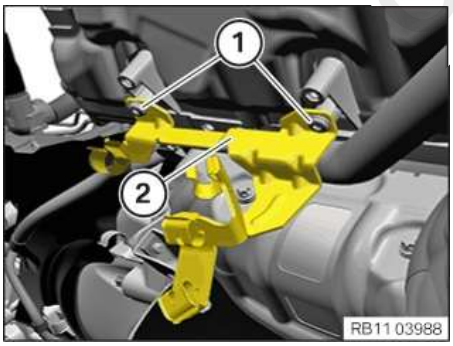
- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.



- Loosen nut (1).
- Feed out positive battery cable (2) and put to one side.



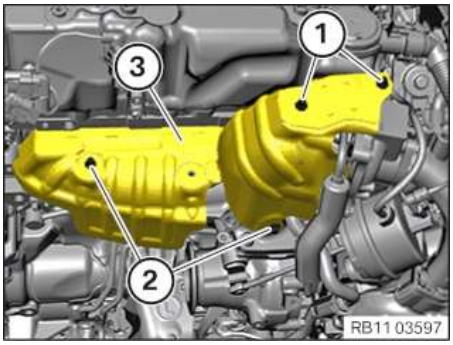
- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



- Loosen screws (1).
- Guide out and remove holder (2).

39 – Removing heat shield

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- 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

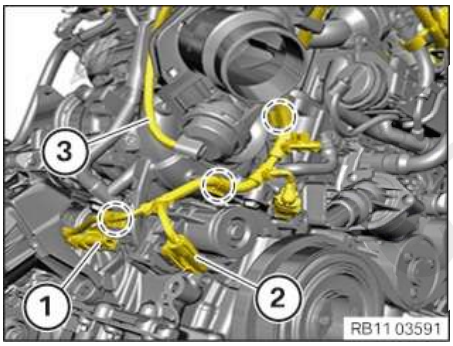
Prior to replacing the exhaust turbocharger: Observe the notes on troubleshooting on the exhaust turbocharger.

For additional information see: FUB-FUB-FB-130003-A10 Troubleshooting on the exhaust turbocharger

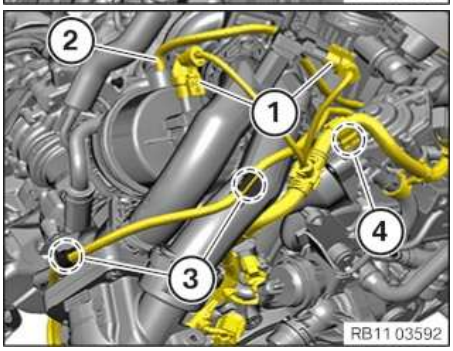
TECHNICAL INFORMATION

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).



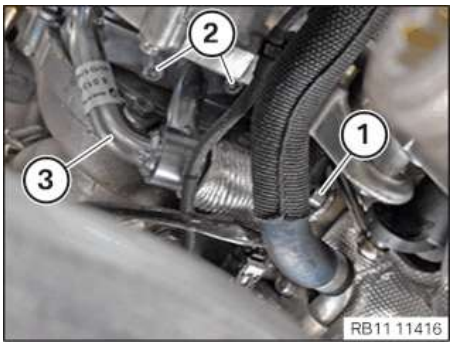
- Unlock plug connections (1) and disconnect.
- Pull off the vacuum hose (2).
- Release the vacuum hose in marked areas (3) from the exhaust turbochargers.
- Release the wiring harness in area (4) from the exhaust-gas recirculation cooler and set it aside.



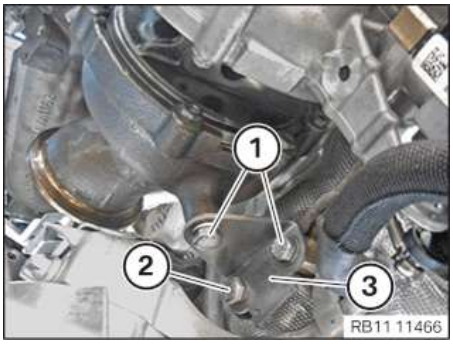
TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

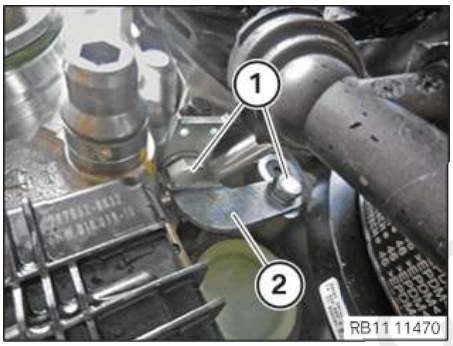
- Release the screws of the oil return line on the crankcase from the right wheel arch.



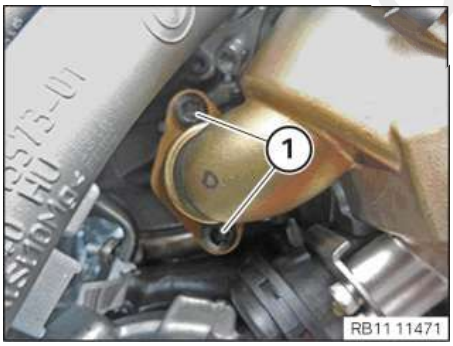
- Release the screw (1).
- Loosen screws (2).
- Remove oil return line (3) from the crankcase.
- Catch and dispose of emerging engine oil.



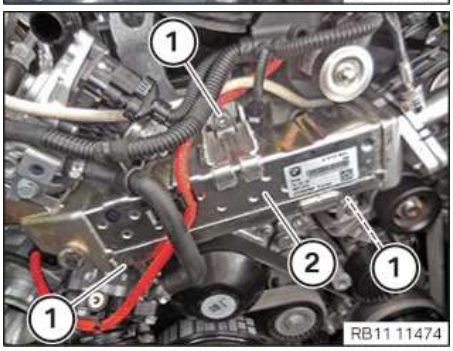
- Unscrew and remove the bolts (1) on the holder (3).
- Slacken screw (2) on holder (3), but do **not** remove.



- Loosen screws (1).
- Guide out and remove holder (2).

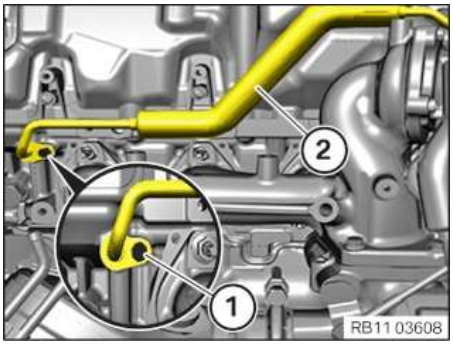


- Loosen screws (1).

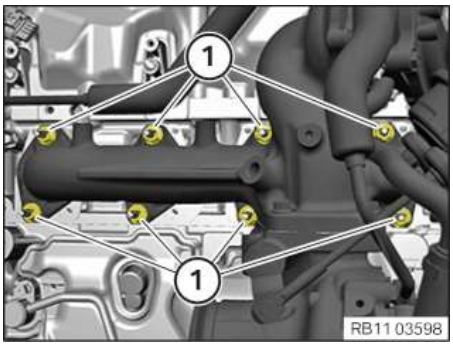


- Slacken screws (1), but do **not** remove.
- Release exhaust-gas recirculation cooler (2) slightly.

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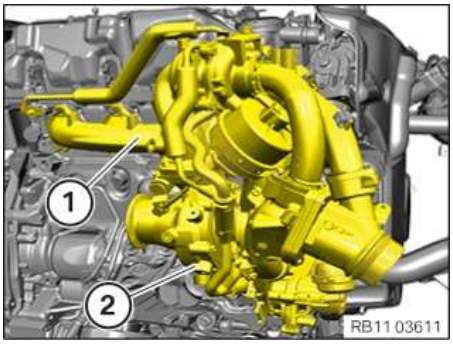
- Loosen screw (1).
- Remove oil feed line (2) for the high-pressure stage exhaust turbocharger from the cylinder head and set it aside.
- Catch and dispose of emerging engine oil.



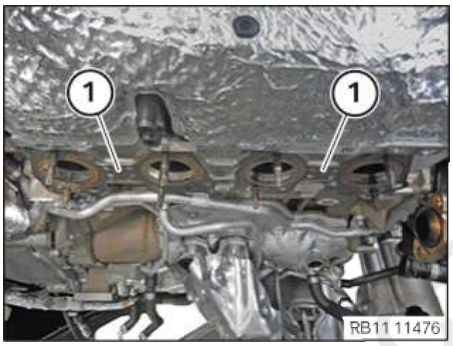
TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

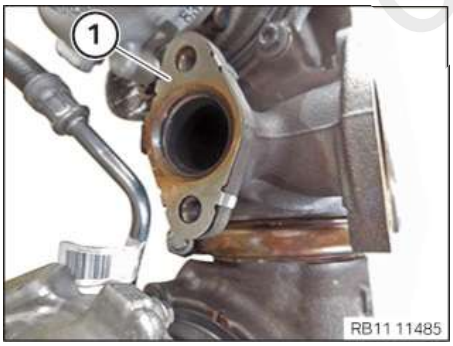
- Loosen nuts (1).



- 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.

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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).

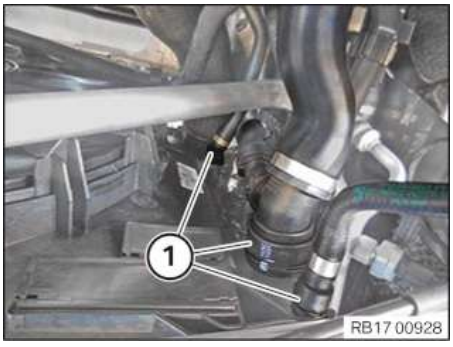
▸ **Avoiding damage to the starter generator due to escaping coolant**

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.

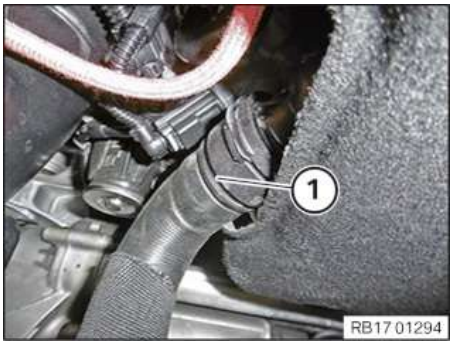


NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

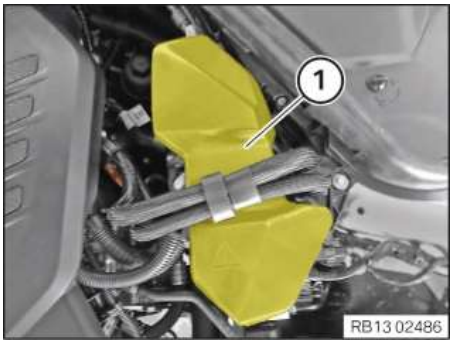
- Unlock all coolant lines (1) and detach.
- Catch and dispose of escaping coolant.

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- 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.

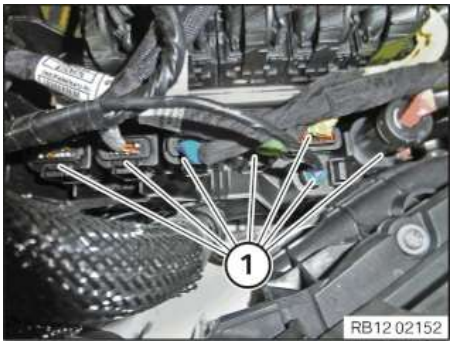
Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

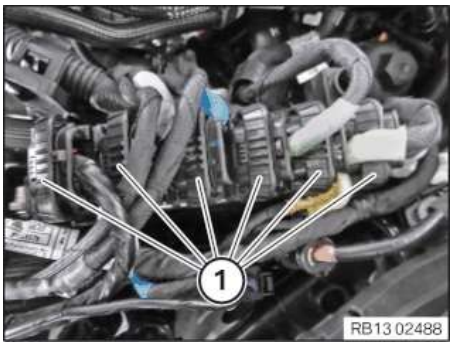
TECHNICAL INFORMATION

Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.

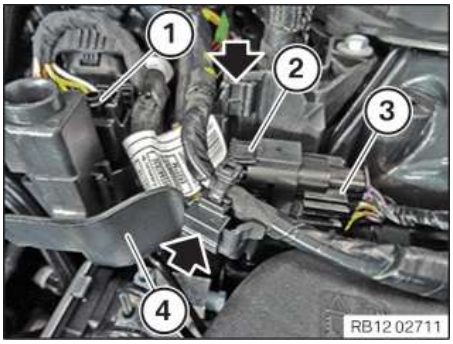
carsign.com



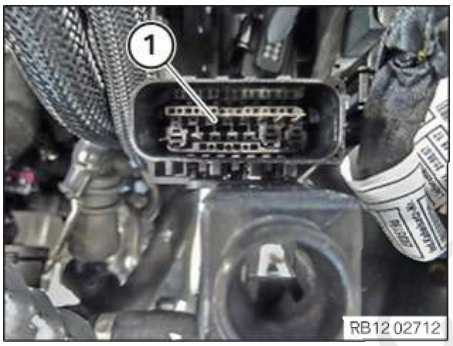
- Unlock and disconnect plug connections (1).



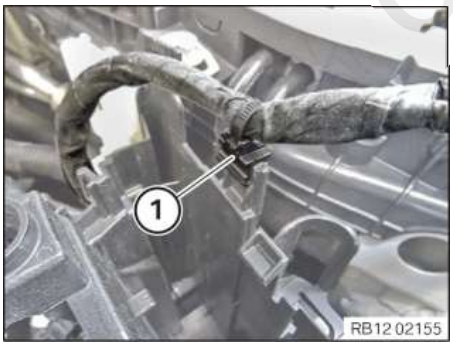
- Unlock and disconnect plug connections (1).



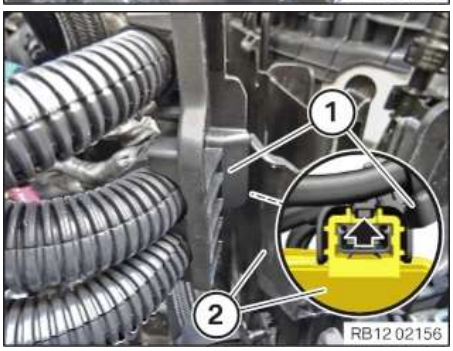
- Unlock plug connection (1) and disconnect.
- Unlock plug connection (2) and disconnect.
- Release the connector (3) and disconnect from the control unit holder (4).
- Release the clamps (arrows).



- Unlock plug connection (1) and disconnect.

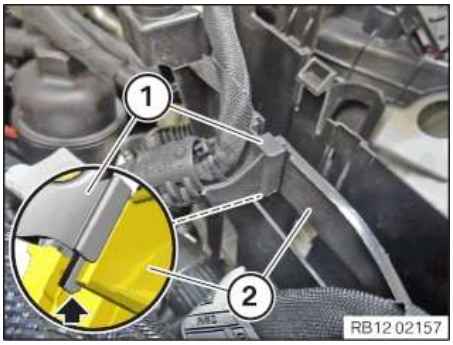


- Loosen clamp (1).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).

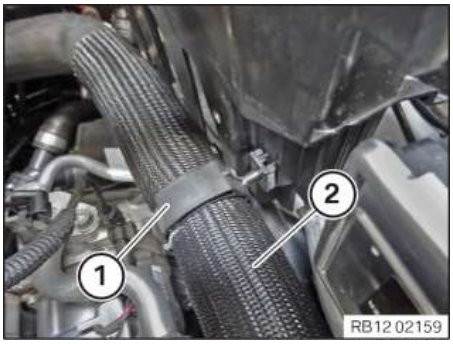
cardiagn.com



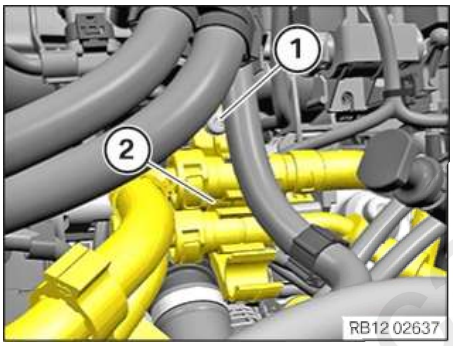
- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).



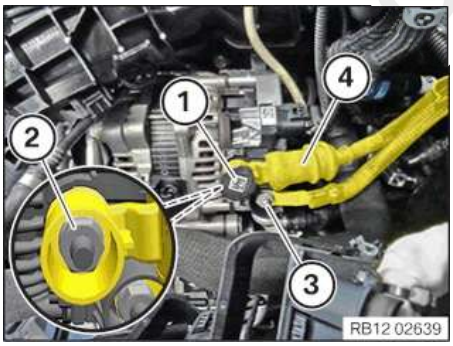
- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.



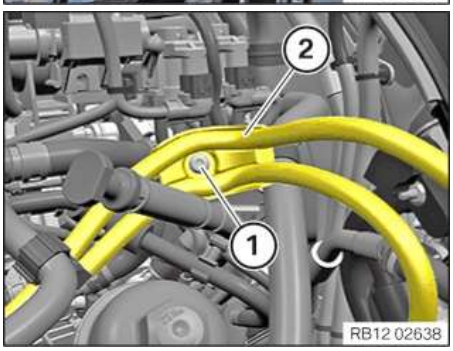
- Unlock holder (1) and feed out coolant line (2) and place it aside.



- Release the screw (1).
- Guide out fuel lines (2) and set them aside.

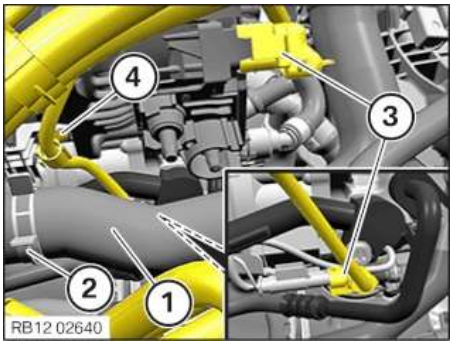


- Guide out and remove the lid (1).
- Release the nuts (2) and (3).
- Feed out positive battery cables (4) and place to one side.

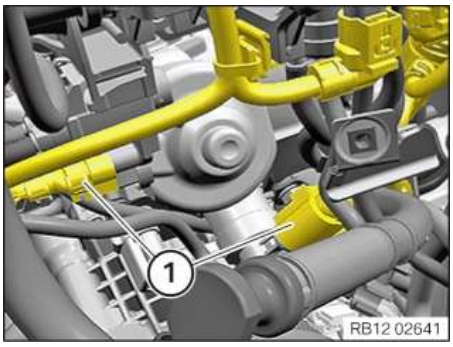


- Release the screw (1).
- Guide out the positive battery cables (2) and set them aside.

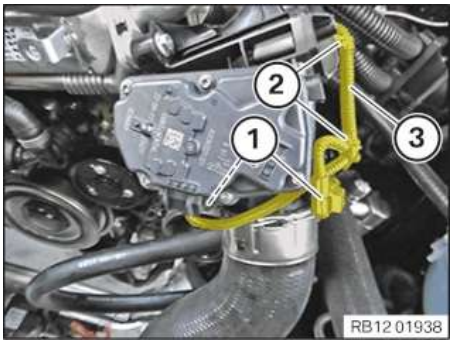
sardiagn.com



- Release the coolant line (1) from the holder (2) .
- Unlock plug connections (3) and disconnect.
- Loosen clamp (4).



- Unlock and disconnect plug connections (1).



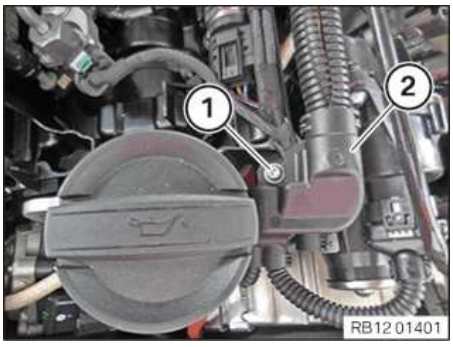
- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.



- Unlock and loosen connector (1).

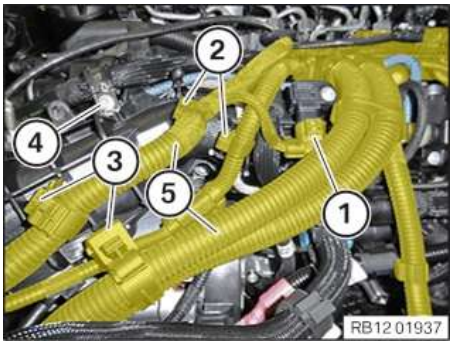


- Unlock plug connection (1) and disconnect.

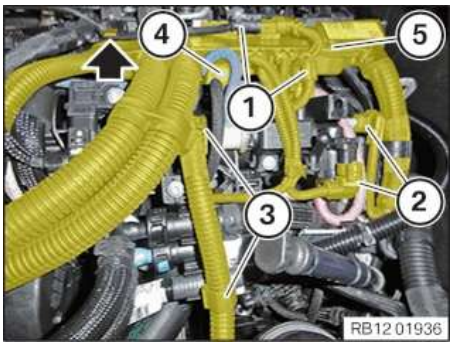


- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.

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- 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

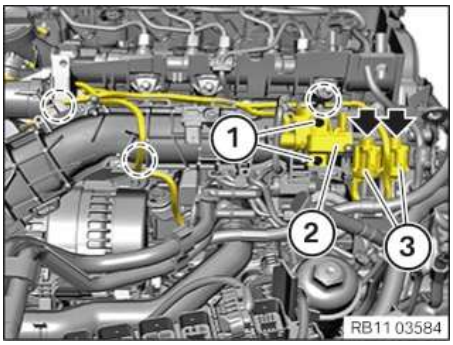
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



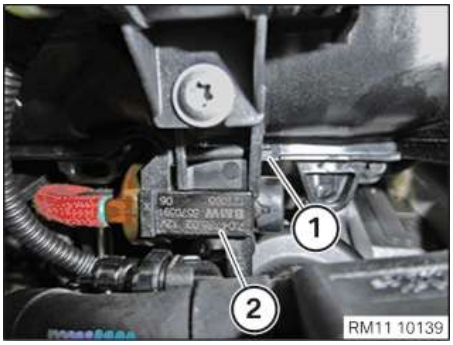
- Unlock clamp (1) and engage in this position.



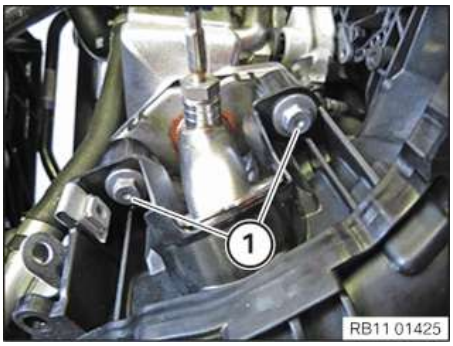
- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.



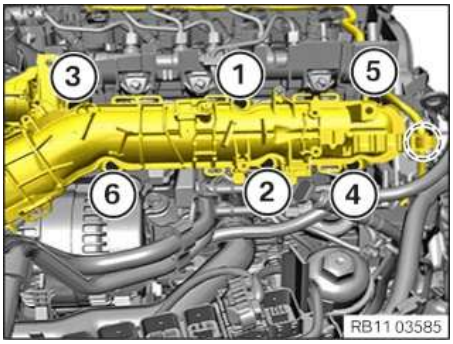
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



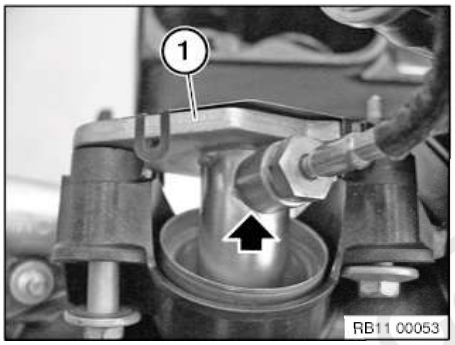
- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.



- 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.

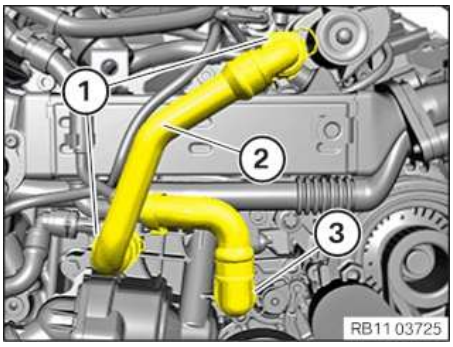
- Cover the starter generator with suitable, watertight auxiliary materials.
- Close off line connections with seal plugs.
- If necessary: Flush the leaked coolant from the starter generator with at least 1 l water.

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- **Version A:**

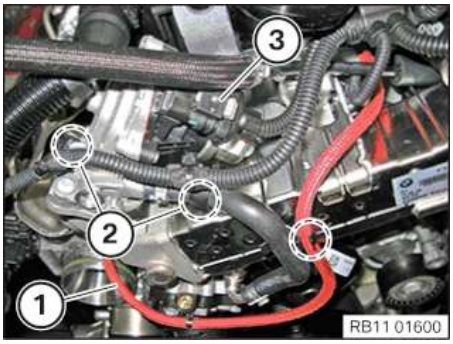
  Unlock and pull off coolant lines (1).



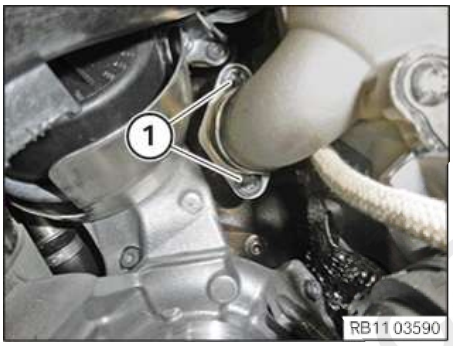
- **Version B:**

  Unlock locks (1) and remove thee coolant line (2).

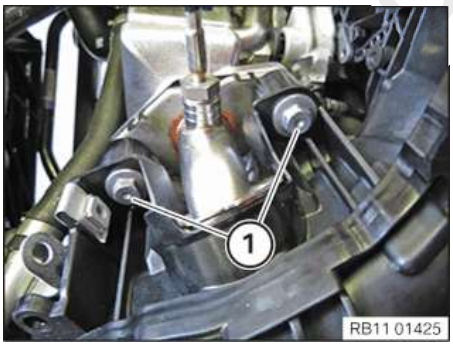
  Unlock coolant line (3) and pull it off the thermostat.



- 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.

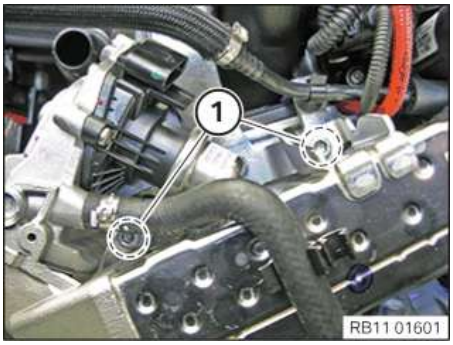


- Loosen the screws (1) on the intake system.



- Loosen the screw (1) below the exhaust-gas recirculation cooler.

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- 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!

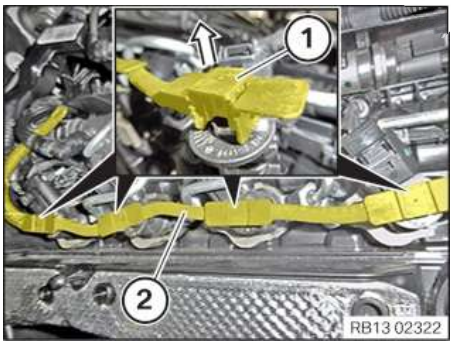
- Perform all work only on components that have cooled down.

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.

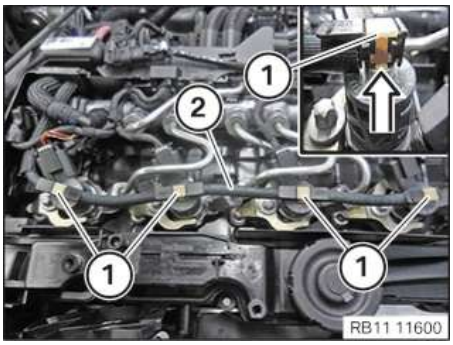


- **Version A:**

  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.



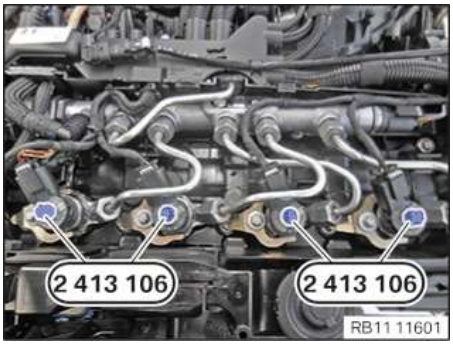
- **Version B:**

  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.

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- 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.

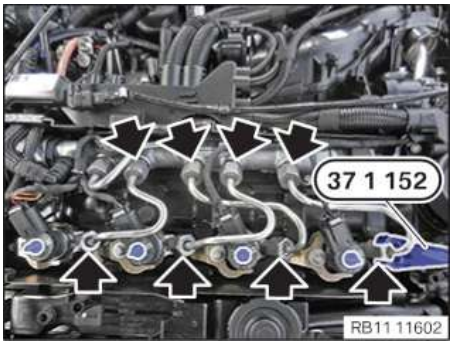
TECHNICAL INFORMATION

If several high pressure lines are removed, ensure that each high pressure line is installed in its original location. Label high pressure lines.

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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.

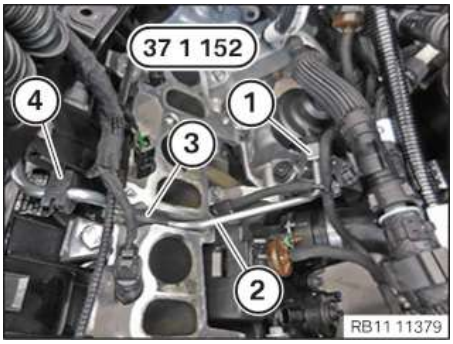
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TECHNICAL INFORMATION

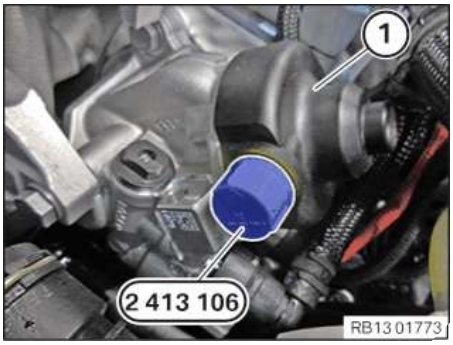
Reset special tool in early to avoid bending pressure lines.



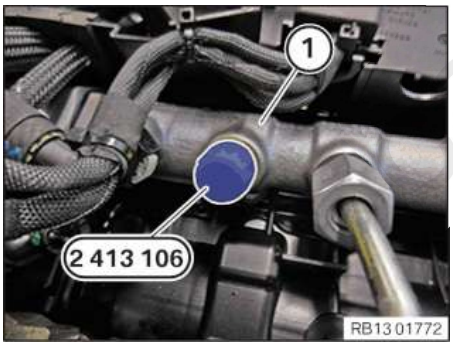
- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.



- 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.

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RISK OF DAMAGE

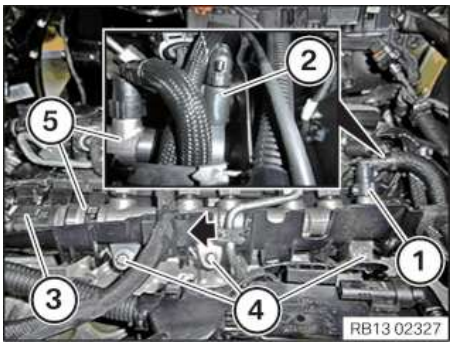
Contaminant or foreign body.

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.

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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

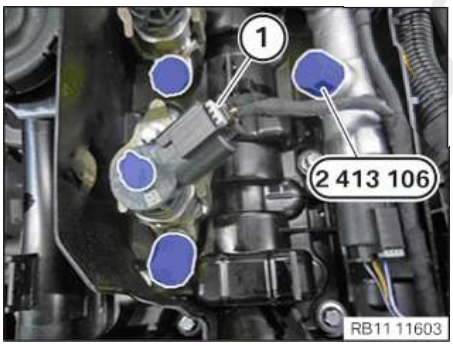
Electrostatic discharge.

Damage to or destruction of electrical components.

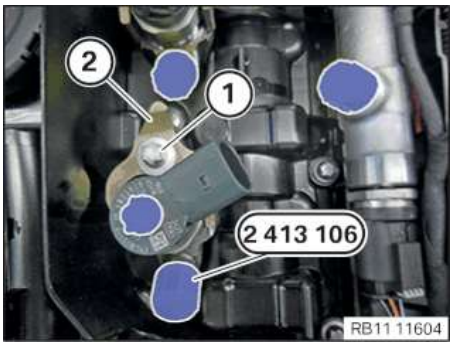
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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**

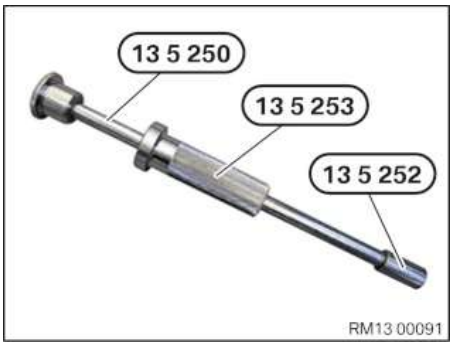
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RISK OF DAMAGE

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.



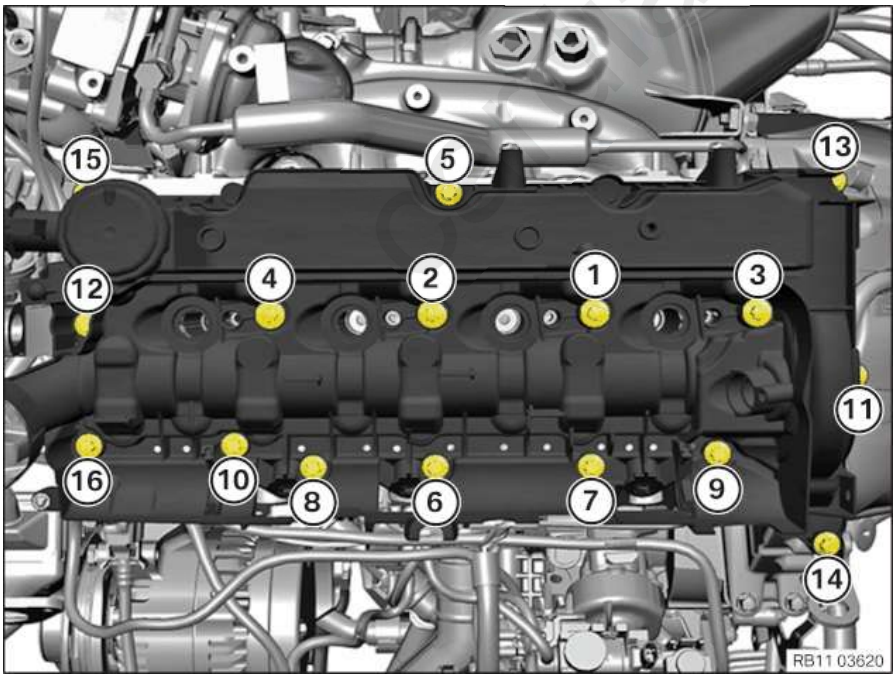
- Unscrew special tool 0 493 339 (13 5 252) from special tool 0 493 321 (13 5 250) and remove special tool 0 493 340 (13 5 253).
- Screw special tool 0 493 339 (13 5 252) back onto special tool 0 493 321 (13 5 250).



- 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



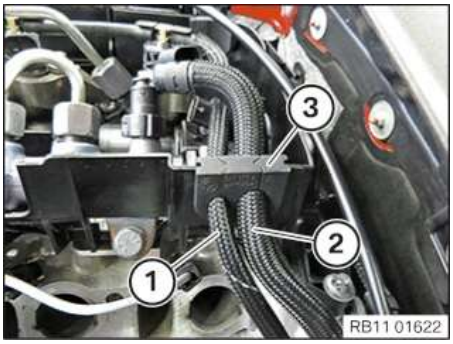
1 - 16 Bolts of the cylinder head cover



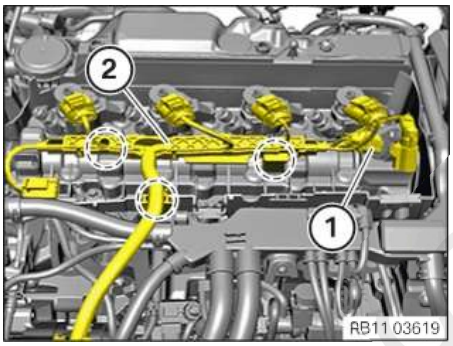
- Unlock and detach the locks.
- Feed the engine ventilation line (1) out and set it aside.



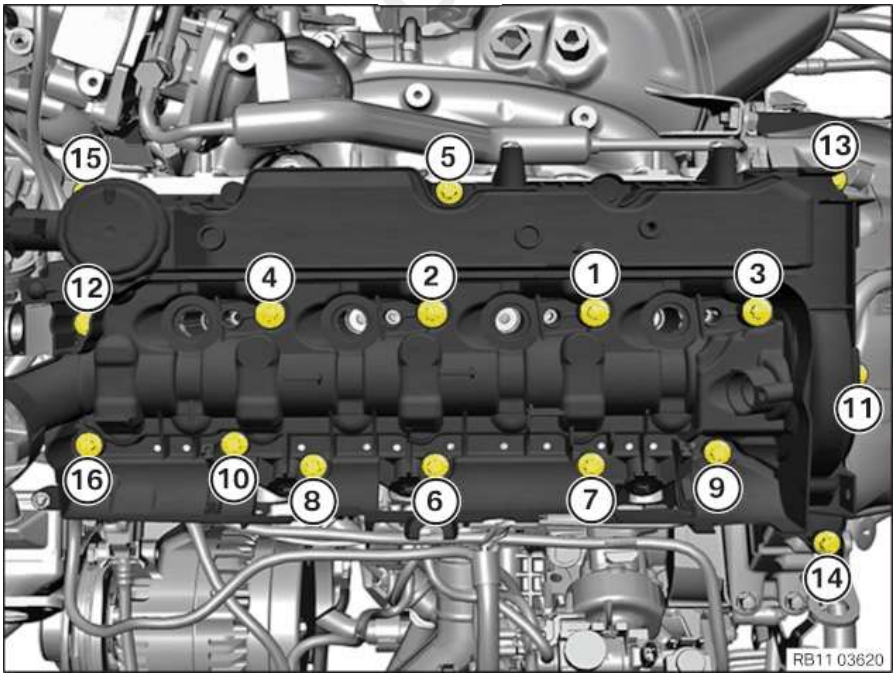
- Feed out and remove the heat shield (1).



- Remove the leakage oil line (1) including the fuel return line (2) and the grommet (3) and put to one side.

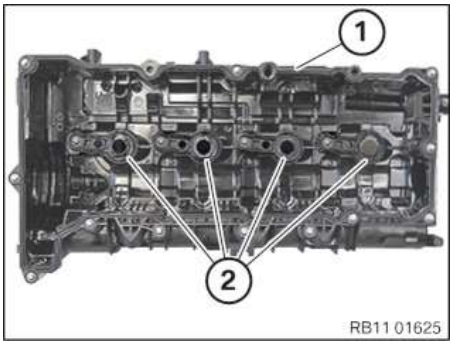


- Unlock connector (1) and pull off.
- Disconnect the wiring harness (2) in the marked areas from the cylinder head cover and set aside.



- Evenly loosen the screws in a sequence from (16) to (1).
- Feed out and remove the cylinder head cover.

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- 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

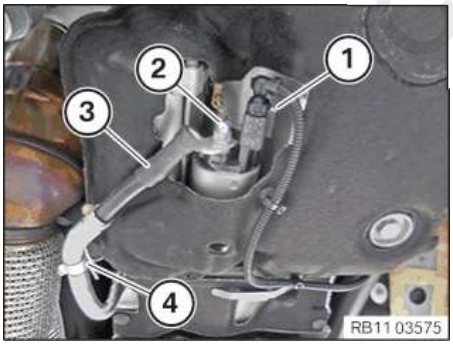
Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

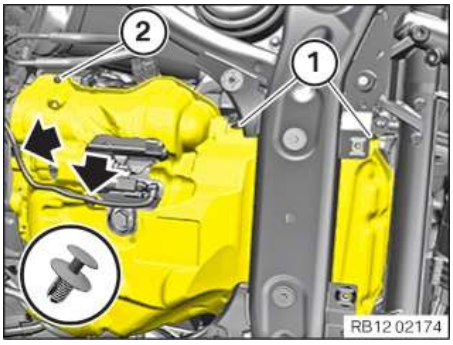
- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

TECHNICAL INFORMATION

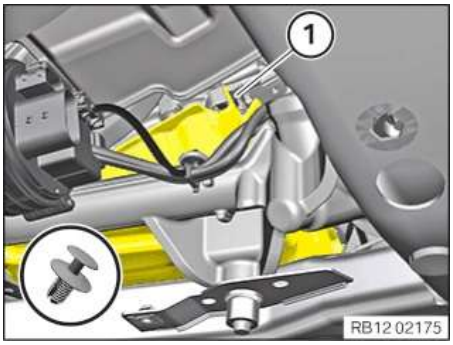
Make sure that the acoustic cover is **not** damaged while removing the starter motor.
A damaged lower acoustic cover can only be renewed when the front axle is lowered.



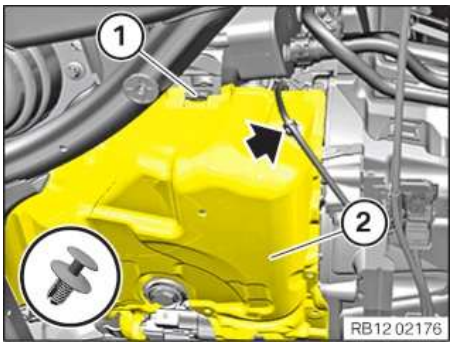
- Unlock plug connection (1) and disconnect.
- Release nut (2).
- Release positive battery cable (3) from holder (4).



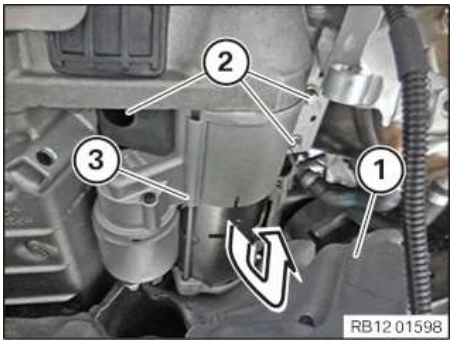
- Loosen the expanding rivet (1).
- Undo fir tree clip (2).
- Release the clamps (arrows).



- 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

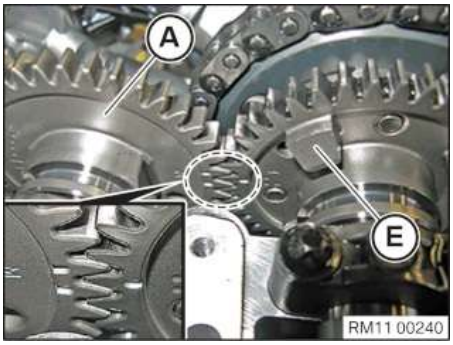
Damage to the engine.

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.

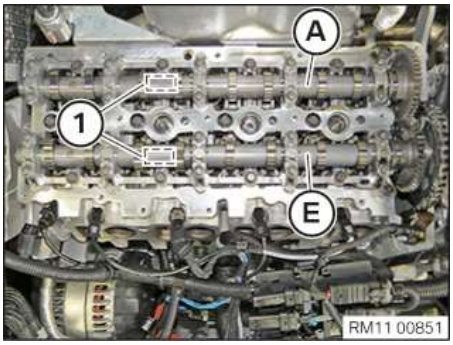
- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

  Do **not** crank the engine in reverse.

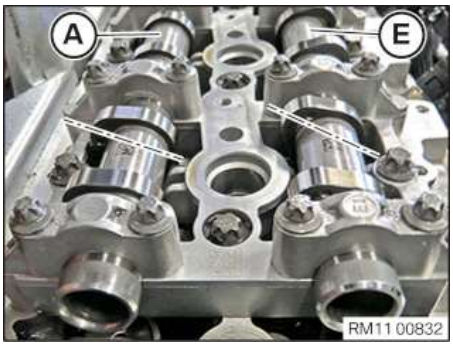


- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.

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- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.

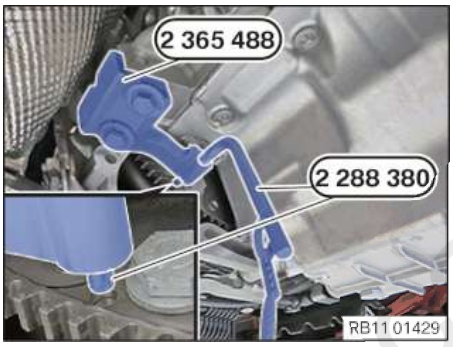


- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- 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.

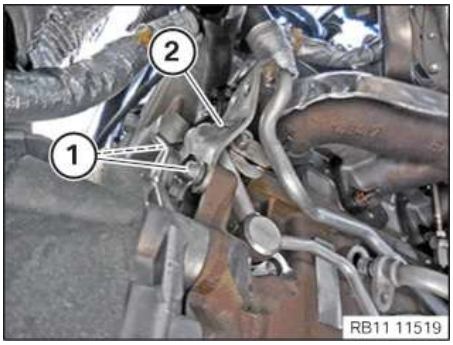
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

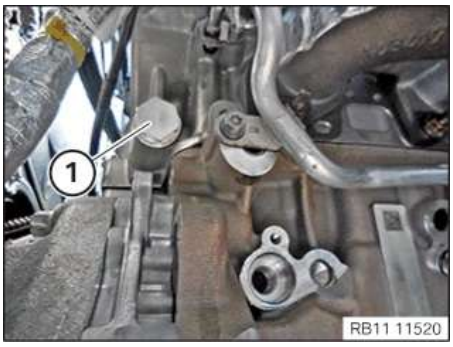
TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

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- Loosen screws (1).
- Guide out and remove holder (2).

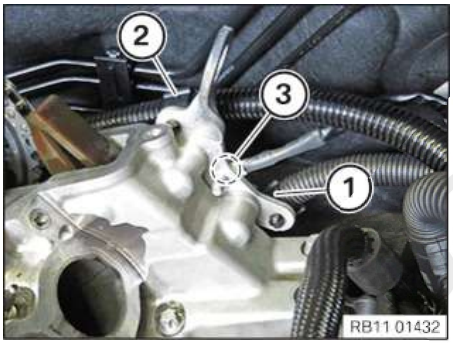


- Loosen the chain tensioner piston (1).
- Catch and dispose of emerging engine oil.

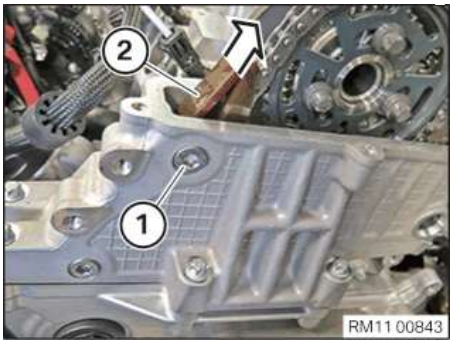


- Feed out and remove the sealing ring (1).

55 – Remove the timing chain guide rail

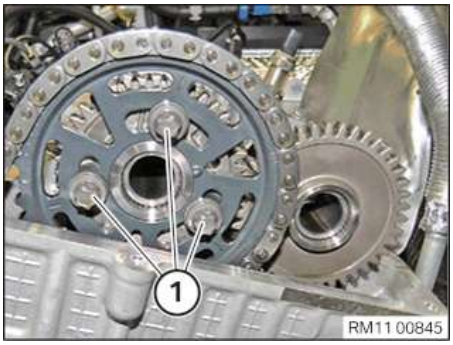


- Loosen the vehicle wiring harness (1) from the bracket.
- Release the positive battery cable (2) from the holder .
- Loosen the screw (3) and remove the grounding cable.



- 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

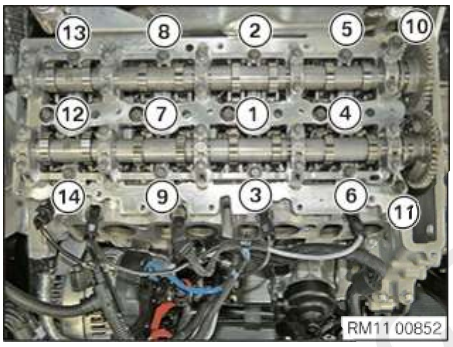


- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

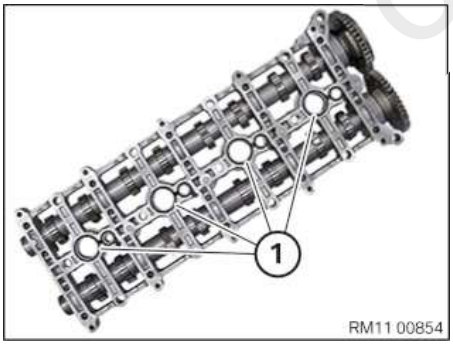
58 – Removing the camshaft support

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.



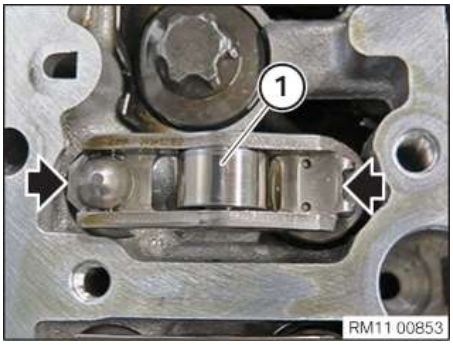
- Unscrew the screws evenly in order (14) to (1) in multiple increments.
- Feed out and remove the camshaft support with the camshafts towards the top.



- Guide out and remove gaskets (1).

59 – Remove roller cam followers

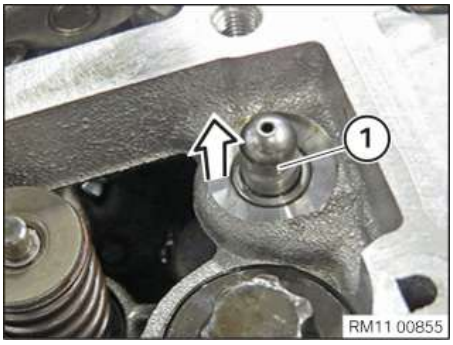
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- Guide out and remove all roller cam followers (1) (arrows).
- Place all roller cam followers (1) in order in special tool 0 495 105 (11 4 480).

  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).

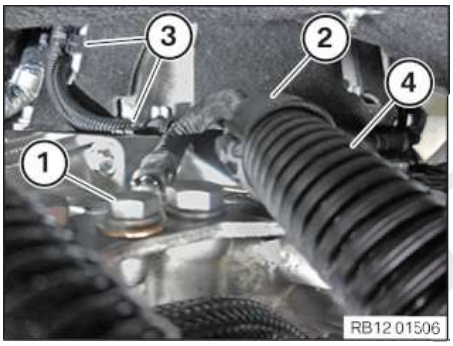
61 – Removing cylinder head

RISK OF DAMAGE

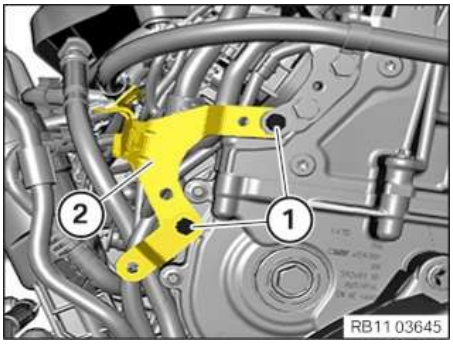
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

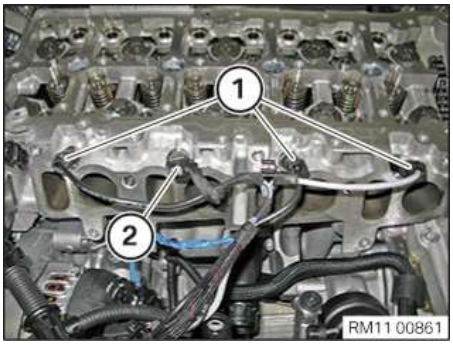


- Loosen screw (1).
- Unlock and loosen holder (2).
- Unlock and loosen the clamps (3).
- Feed out the wiring harness section (4) of the automatic transmission and place to one side.

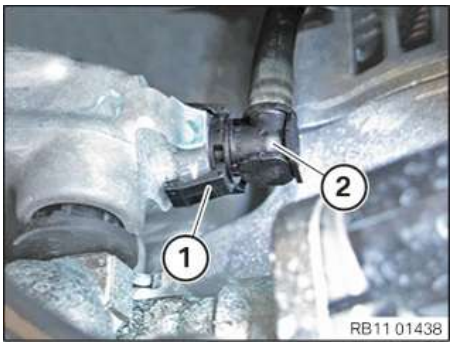


- Loosen screws (1).
- Guide out and remove holder (2).

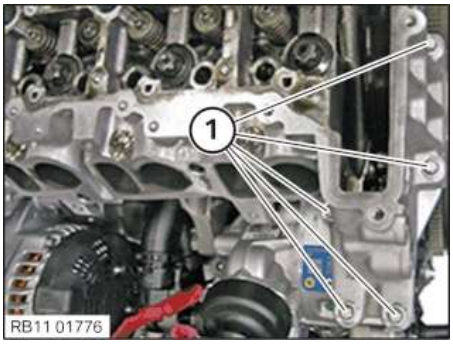
carmanuals.com



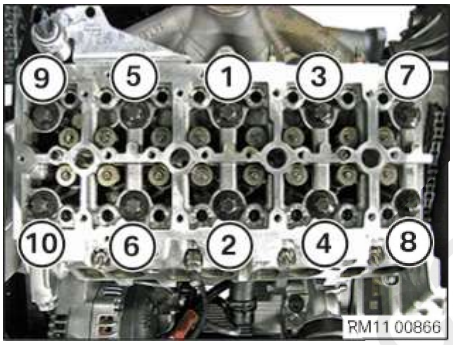
- Release plug connections (1) with special tool 0 495 140 (12 2 300).
- Unlock and disconnect the plug connections (1) and (2).
- Place wiring harness to one side.



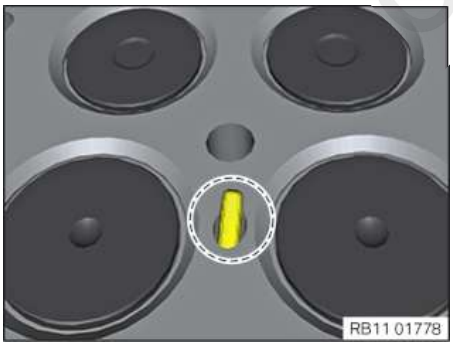
- Release lock (1) of coolant line.
- Remove the coolant line (2) and set it aside.



- 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.

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- 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.

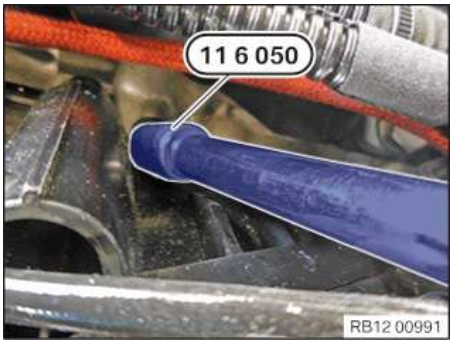
The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.

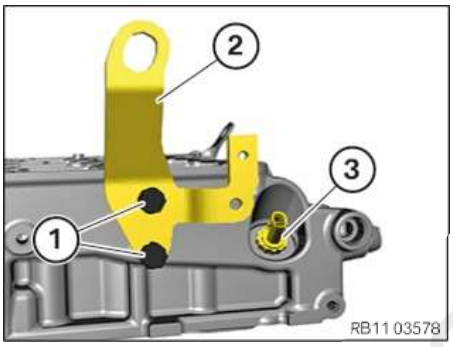
- Clean the sealing surfaces on the cylinder head and the crankcase using special tool 0 495 102 (11 4 470).

MAIN WORK

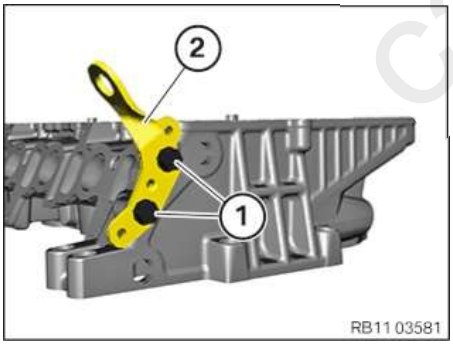
62 – replace cylinder head



- Unscrew the preheating elements with special tool .



- Loosen screws (1).
- Remove mounting lug (2).
- Remove the coolant temperature sensor (2).



- Loosen screws (1).
- Remove mounting lug (2) from cylinder head.

▸ **Remove all valve springs**

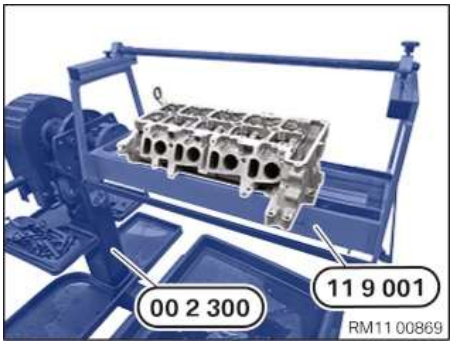
RISK OF DAMAGE

Contaminant or foreign body.

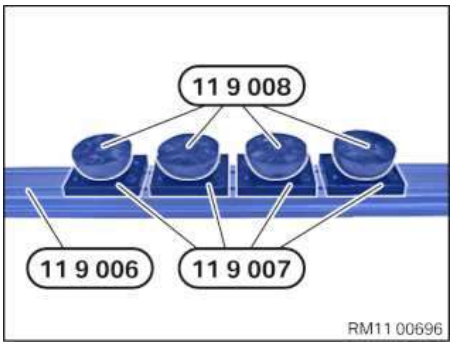
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

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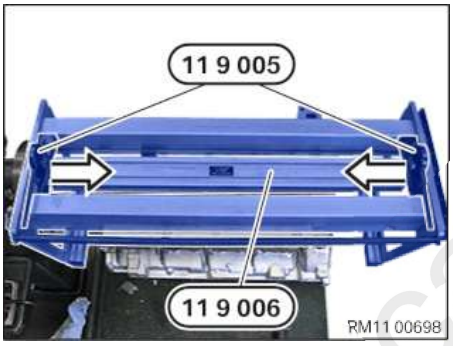
- Mount and screw the cylinder head onto the special tools 0 494 366 (11 9 001) and 0 495 187 (00 2 300).



- 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.



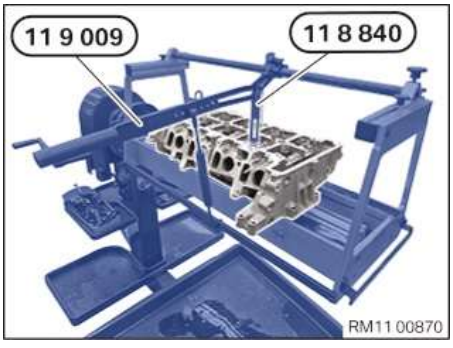
- Position special tools 0 494 373 (11 9 008) as pictured.



- 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.



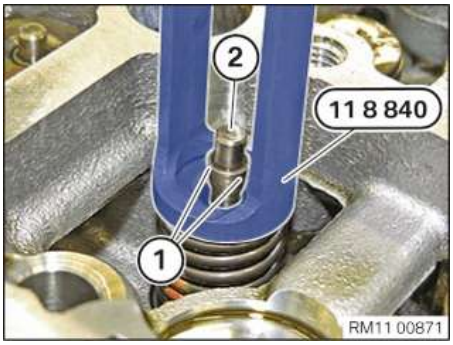
- Lock special tool 0 494 370 (11 9 005)in direction of arrow.
- Move cylinder head with special tool 0 494 362 (11 9 000) through 180° into the installation position.



- 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.

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- 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.

▸ **Remove valve stem seals**

RISK OF DAMAGE

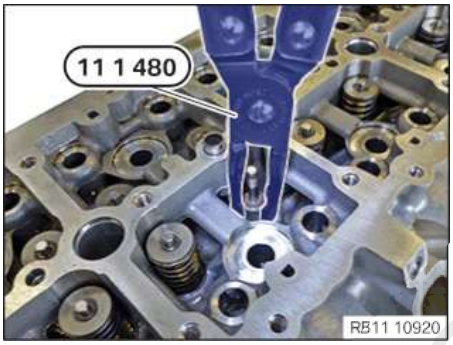
Contaminant or foreign body.

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).

▸ **Remove all valves**

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.

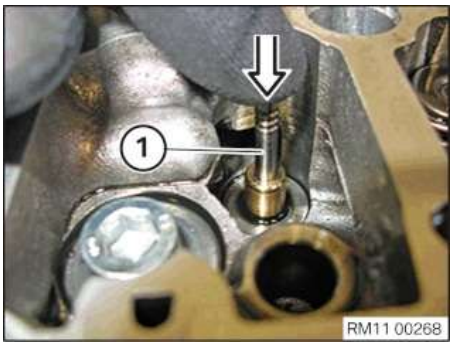


- Turn the cylinder head with the special tool 0 494 362 (11 9 000).
- Unlock the special tool 0 494 370 (11 9 005) in the direction of the arrow.
- Remove special tool 0 494 371 (11 9 006).

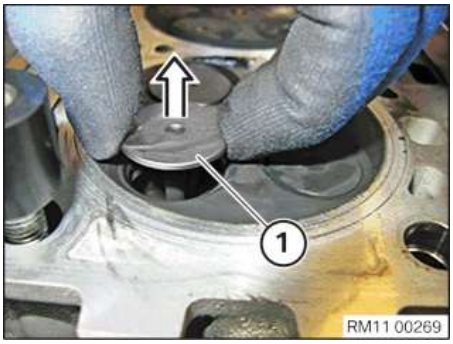
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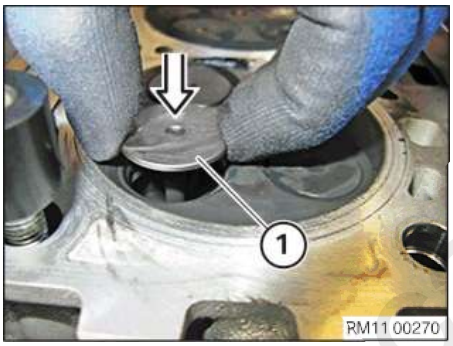
- Remove special tool 0 494 373 (11 9 008) if necessary.



- Push the valve stem (1) into the cylinder head in the direction of the arrow.

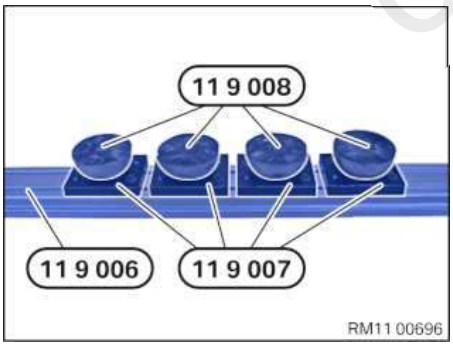


- Remove the valve (1) in the direction of arrow and store it properly in the special tool 0 495 105 (11 4 480).



- Install valves (1) in the new cylinder head.

  Parts: Cylinder head
- Feed valves (1) in the direction of arrow and install.
- **Check the valves for tightness.**

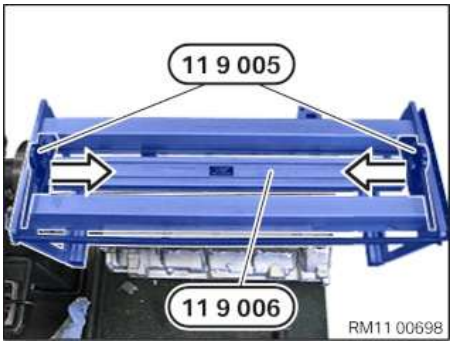


- Prepare the special tools 0 494 371 (11 9 006), 0 494 372 (11 9 007) and 0 494 373 (11 9 008) as shown.

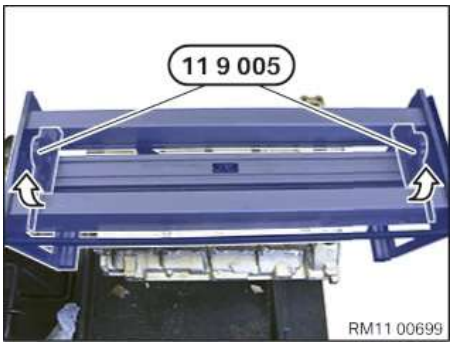


- The special tools 0 494 373 (11 9 008) must be set up accordingly in the next operation.

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- 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.
- Use the special tool 0 494 362 (11 9 000) to bring the cylinder head into the installation position by 180º.

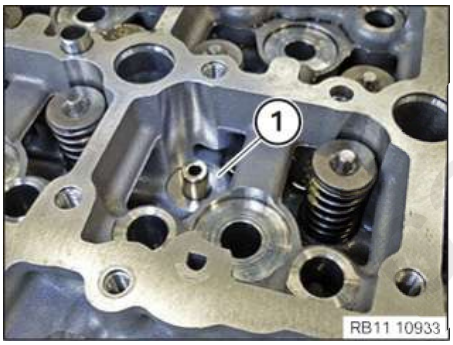
▶ **Installing valve stem seals**

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.



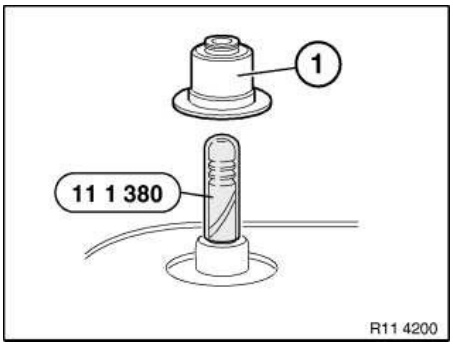
RISK OF DAMAGE

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.

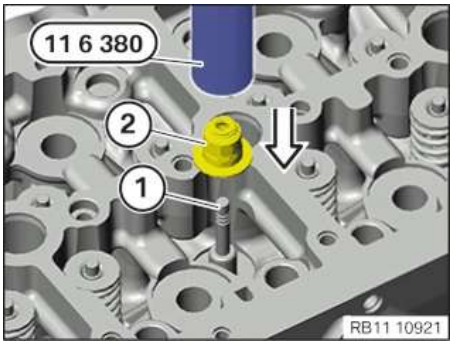
- Do not use any metal-cutting tools.

- 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).



- 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).

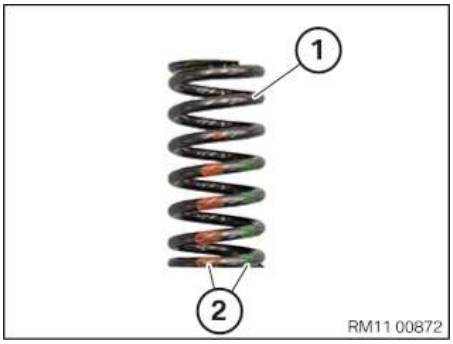
▸ **Install all valve springs**

RISK OF DAMAGE

Contaminant or foreign body.

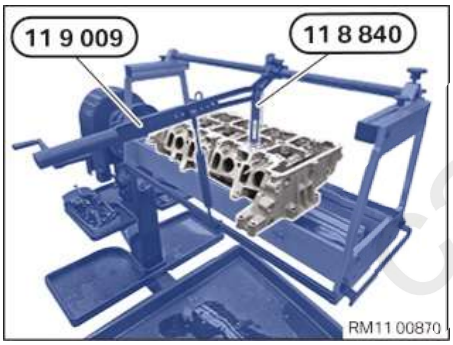
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



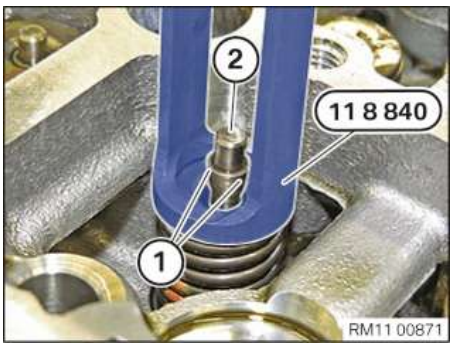
- Ensure that the valve spring (1) is marked using a colour code (2).

  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.

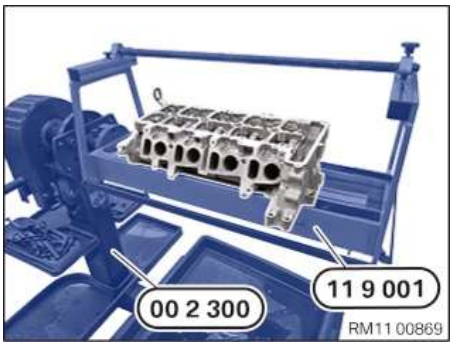


- Keep the valve spring pressed down with the special tool 0 496 143 (11 8 840).
- Insert the valve shims (1) at the valve (2) with the magnet and install.
- Relieve load on valve spring.
- Make sure that the valve shims (1) are installed correctly.

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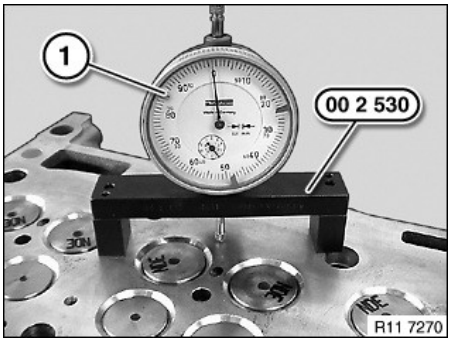


- Unlock the special tool 0 494 370 (11 9 005) in the direction of the arrow.
- Guide the special tool 0 494 371 (11 9 006) out and remove.



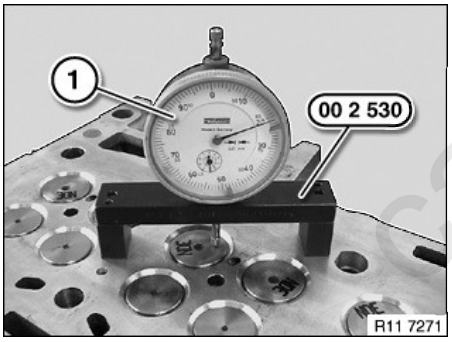
- Unscrew and remove the cylinder head from the special tools 0 494 366 (11 9 001) and 0 495 187 (00 2 300).

▸ **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

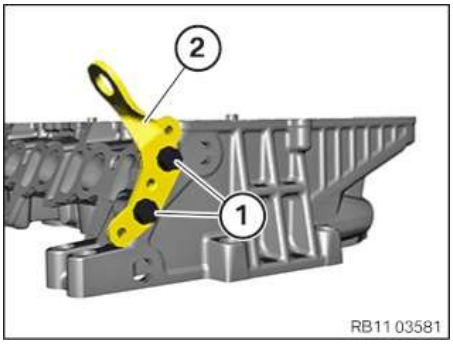
Result

» Valve underprotrusion is outside tolerance.

Measure

- Renew cylinder head.

  Parts: Cylinder head

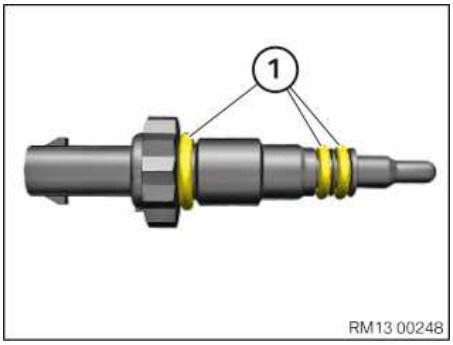


- Install mounting lug (2) on the rear cylinder head.
- Tighten the screws (1).

Standard screw connection M8

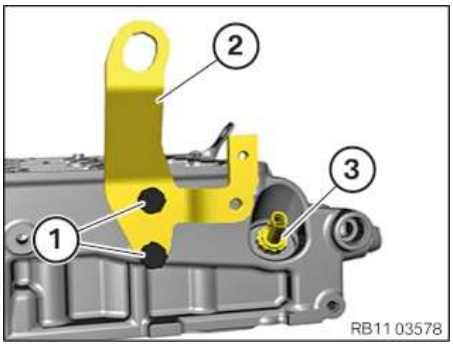
M8		Tightening torque	19 Nm

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- When reusing coolant temperature sensor sealing rings (1), check for damage, renew if necessary.

  Parts: Sealing ring



- Position special tool on cylinder head.
- Tighten the screws (1) of special tool .

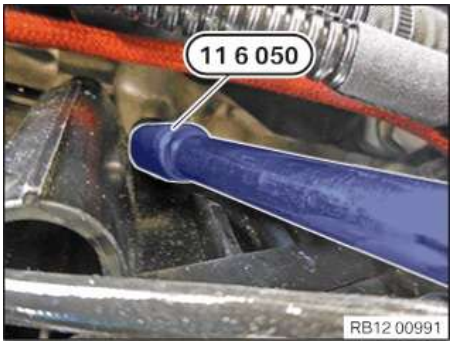
Standard screw connection M8

M8		Tightening torque	19 Nm

- Tighten coolant temperature sensor (1) on new cylinder head (2).

Coolant temperature sensor at cylinder head

Temperature sensor		Tightening torque	3,5 Nm



- Screw in preheating elements using special tool and tighten.

Glow elements to cylinder head

Glow element		Tightening torque	13 Nm

POSTPROCESSES

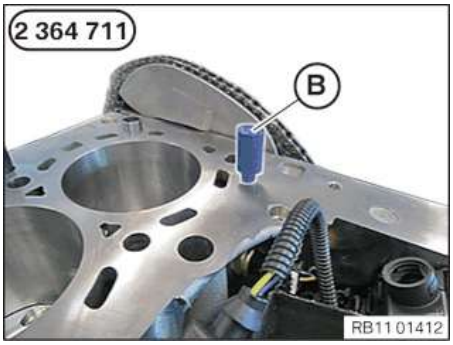
63 – Cleaning the sealing surface

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.

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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).



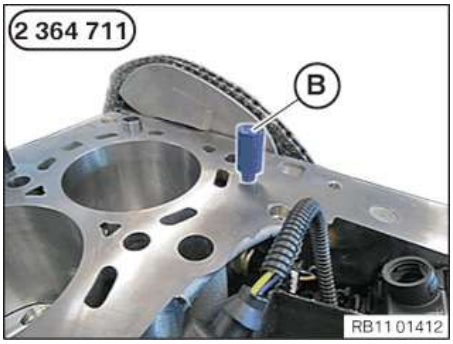
RISK OF DAMAGE

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.

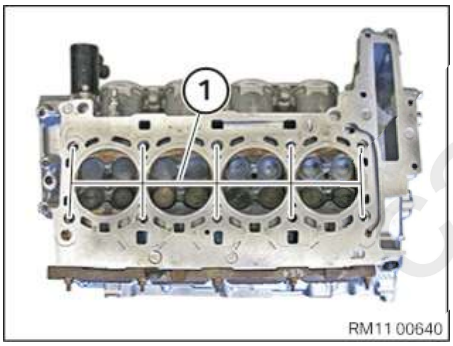
- Do not use any metal-cutting tools.

- Clean the sealing surface using special tool 0 495 104 (11 4 472).



- Remove special tool (B).

64 – Replace cylinder head gasket



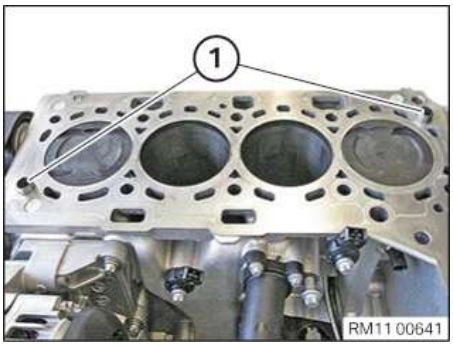
RISK OF DAMAGE

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.

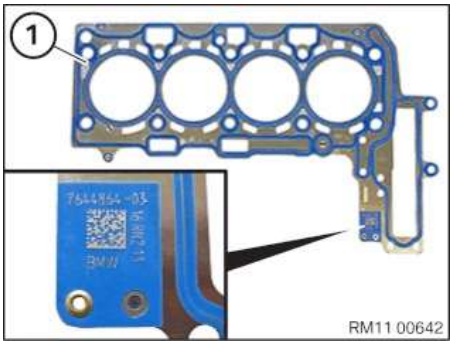
- Do not use any metal-cutting tools.

- Remove oil and dirt residue from the blind holes (1).



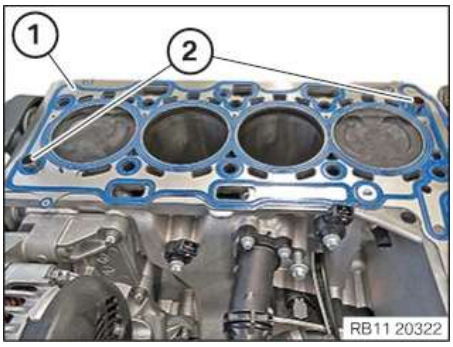
- Check if fitting sleeves (1) fit correctly and check for any damage.

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- 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).

65 – 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).

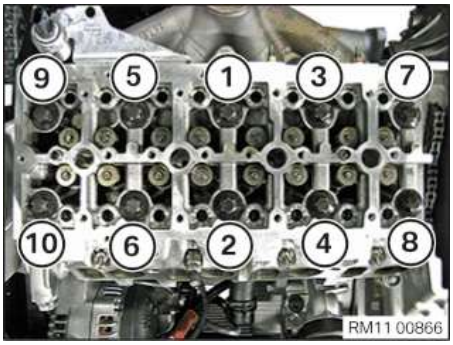
TECHNICAL INFORMATION

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.

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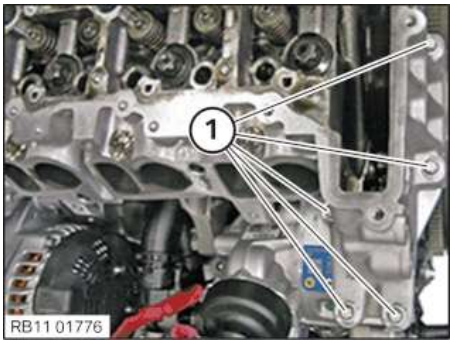


- Position the cylinder head gasket with the previously determined gasket thickness (number of holes).
- Fit new cylinder head screws.

  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

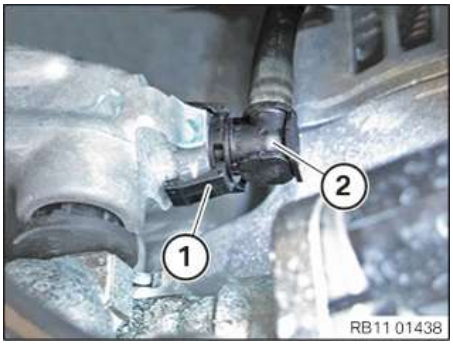
M12x1.5	Renew screws.	1. Tightening torque	50 Nm
		2. Angle of rotation	120 °
		3. Angle of rotation	120 °



- Insert screws (1) and tighten.

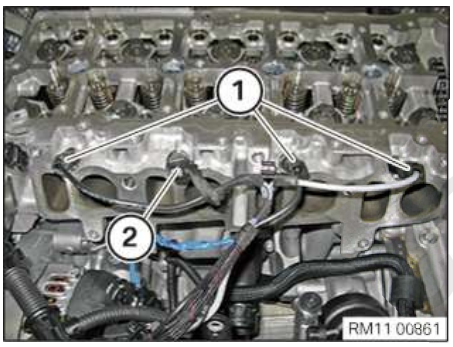
Cylinder head bolt to timing case cover

M8x40		Tightening torque	19 Nm



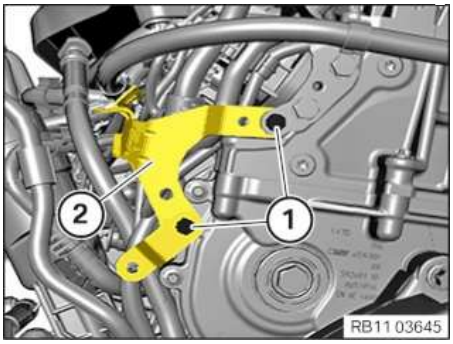
- Fit and lock coolant line (2).

  The lock (1) must engage audibly.



- Connect connectors (1) and (2), then lock.

  The connectors (1) and (2) must audibly engage.

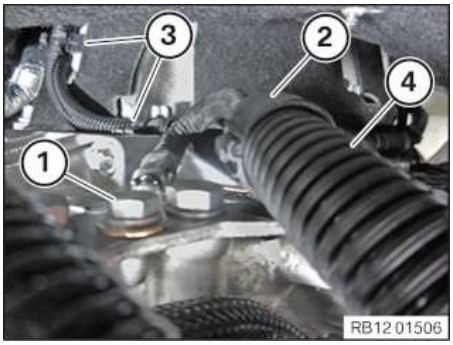


- Insert and install the holder (2).
- Tighten the screws (2).

Standard screw connection M6

M6		Tightening torque	8 Nm

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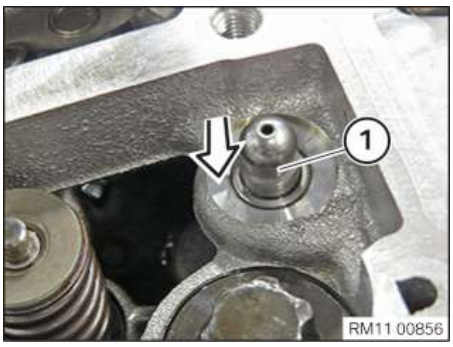


- Guide in the wiring harness section (4) of the automatic transmission and install.
- Lock holder (2).
- Make sure the bracket (2) engages audibly.
- Secure clamps (3).
- Tighten down screw (1).

Ground to cylinder head

M6		Tightening torque	8 Nm

66 – Installing all hydraulic valve clearance compensating elements

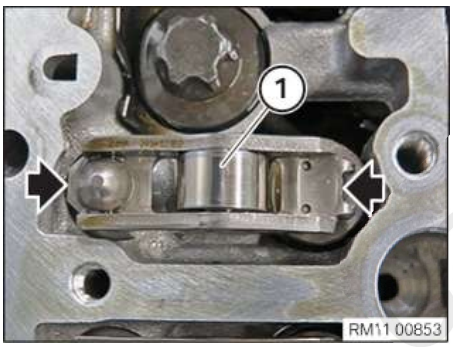


- Make sure to observe the assignment of the roller cam followers to the hydraulic valve clearance compensating elements when reusing the hydraulic valve clearance compensating elements (1).
- Insert and install all hydraulic valve clearance compensating elements (1) in the direction of the arrow.

67 – 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.

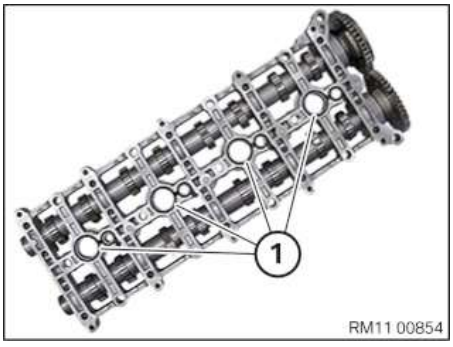
  Parts: Roller cam followers
- Insert all roller cam followers (1) and install them (arrows).

  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).

68 – Installing the camshaft support

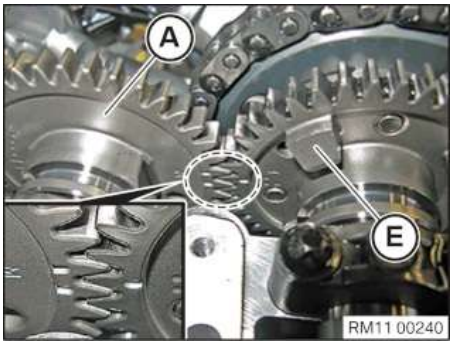
TECHNICAL INFORMATION

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.

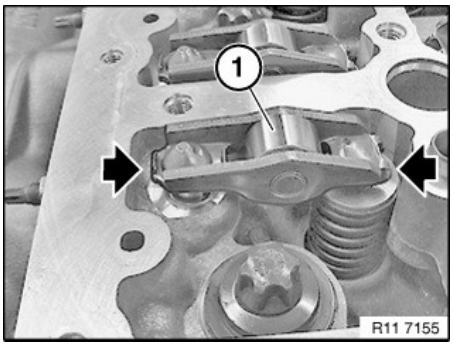


- Renew seals (1).

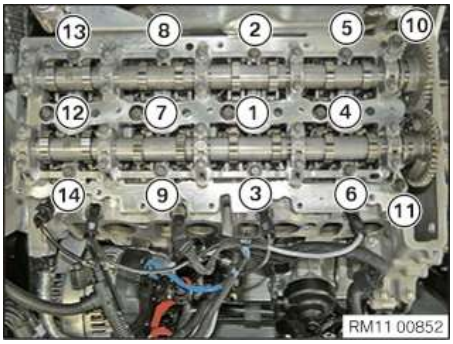
  Parts: Seals
- Insert and install the gaskets (1).



- 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).



- 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

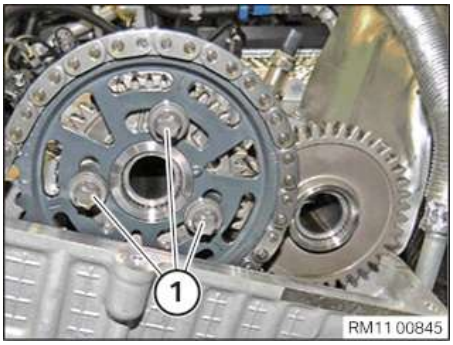
69 – Installing the special tool to secure the exhaust camshaft



- 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.

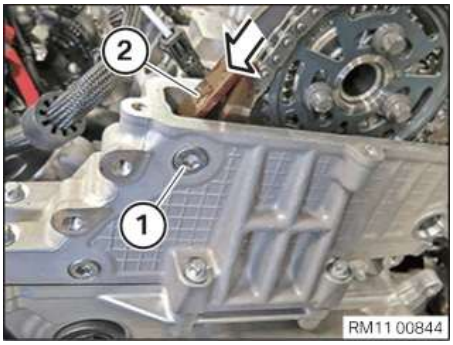
70 – Installing the camshaft sprocket on the intake camshaft



- 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.

71 – Installing the guide rail of the timing chain

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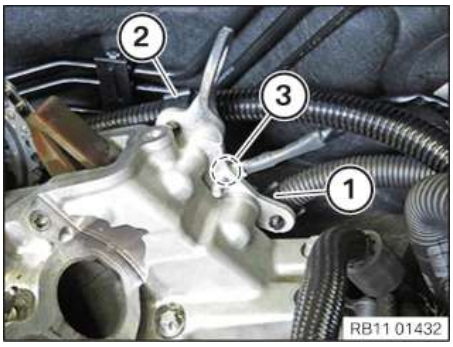


- Position the guide rail (2) in the direction of the arrow.
- Make sure the guide rail (2) is correctly installed at the bottom bearing journal.
- Renew bearing journal (1).

  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.

72 – Installing the chain tensioner piston



TECHNICAL INFORMATION

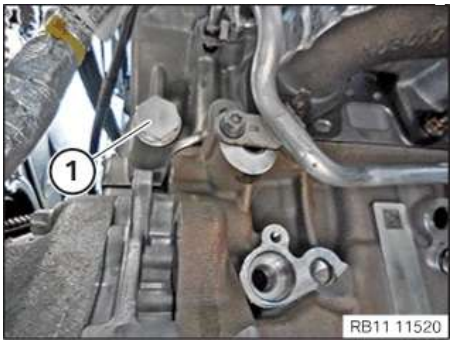
The oil chamber must be drained for reuse of the chain tensioner.

- 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).

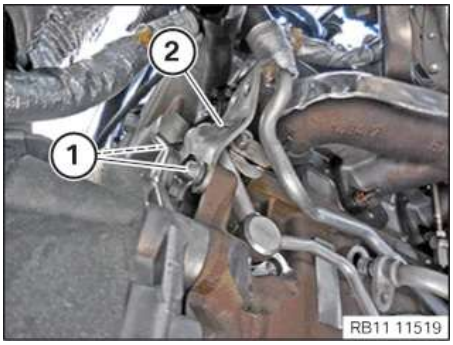


- Insert and install the chain tensioner piston (1).
- Tighten the chain tensioner piston (1).

Chain tensioner piston to cylinder head

22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

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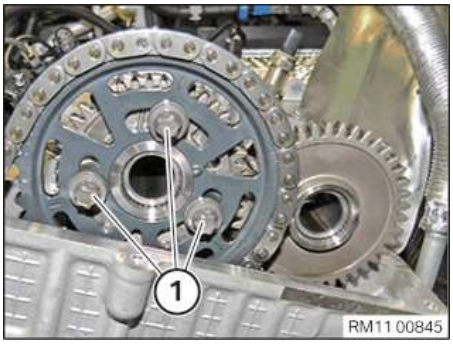


- Insert and install the holder (2).
- Tighten the screws (1).

Holder to crankcase

M8X16		Tightening torque	19 Nm

73 – Tightening the camshaft sprocket on the intake camshaft



- Tighten the screws (1).

Camshaft sprocket to camshaft

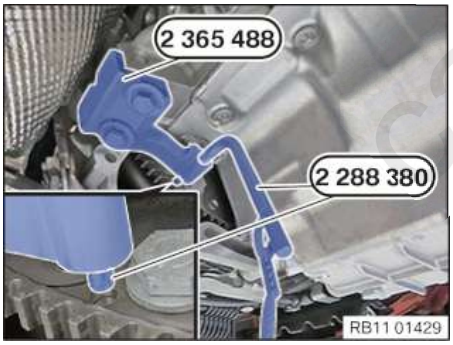
M7x17.			17 Nm

74 – Removing the special tool for fixing the exhaust camshaft



- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

75 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

76 – Checking camshaft timing



RISK OF DAMAGE

Damage to the engine.

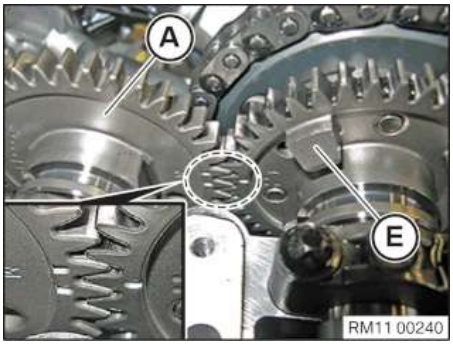
The engine may be damaged if it is manually rotated in the wrong direction.

- 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.

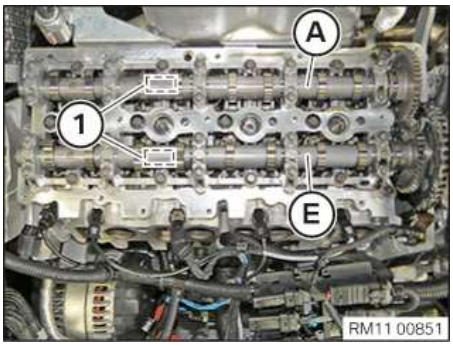
- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

  Do **not** crank the engine in reverse.

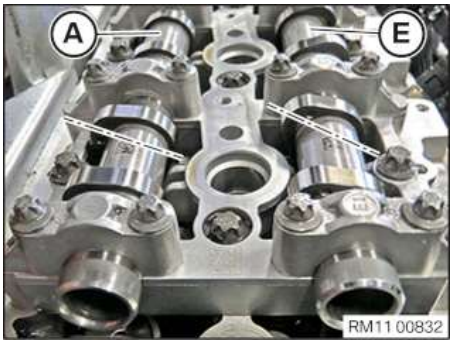
cardiagn.com



- 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.

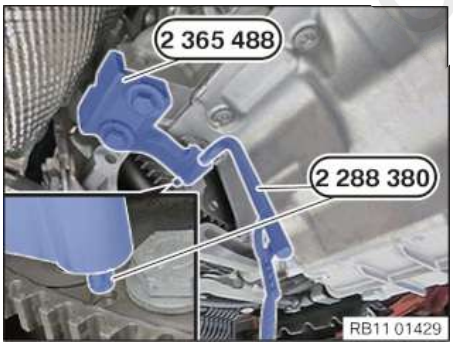


- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- 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.

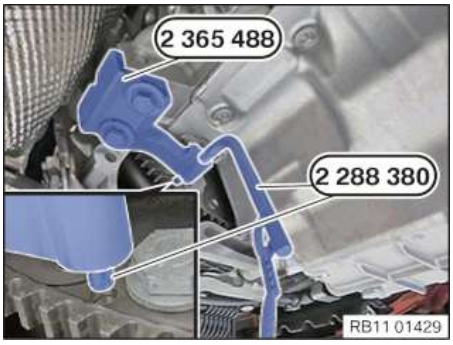
77 – Removing the special tool for fixing the exhaust camshaft

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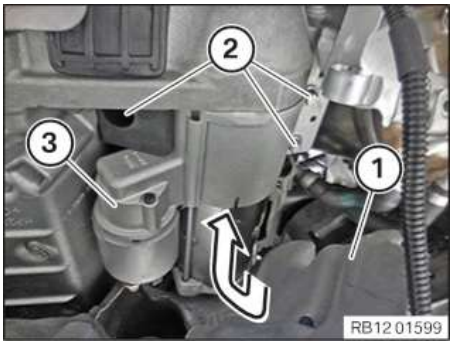
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

78 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

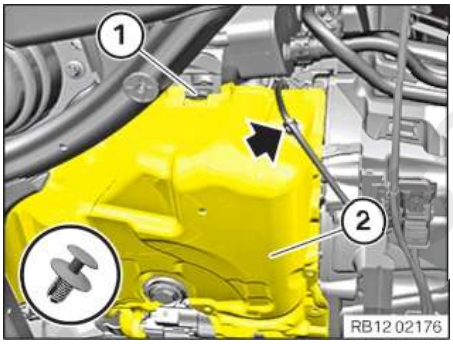
79 – Installing starter motor



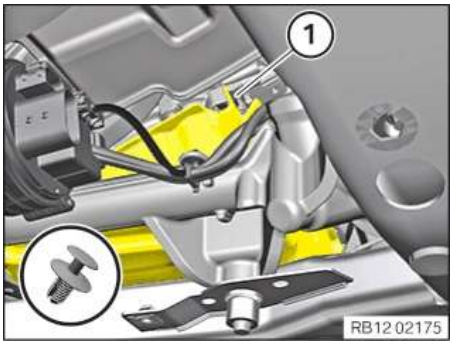
- Make sure that the acoustic cover (1) is not damaged.
- Carefully press the acoustic cover (1) to one side.
- Feed in and install the starter motor (3) in the direction of the arrow.
- Tighten the screws (2).

Starter motor to engine

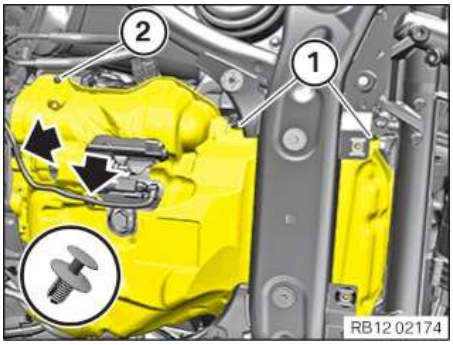
M8X60		Tightening torque	19 Nm



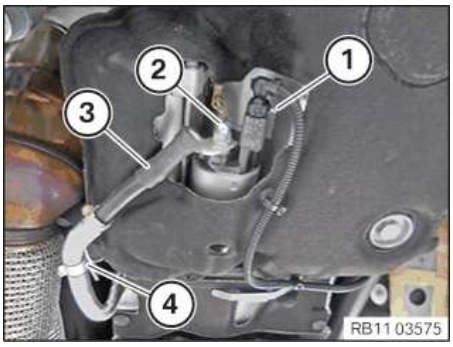
- Position the acoustic cover (2).
- Fasten expanding rivet (1).
- Secure clamp (arrow).



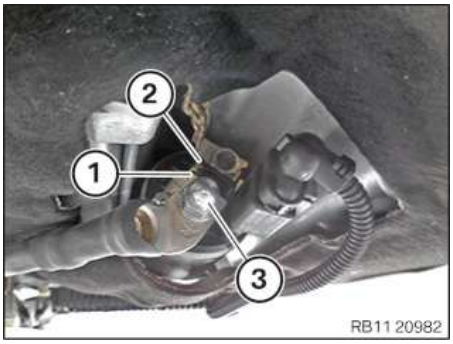
- Fasten expanding rivet (1).



- 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.

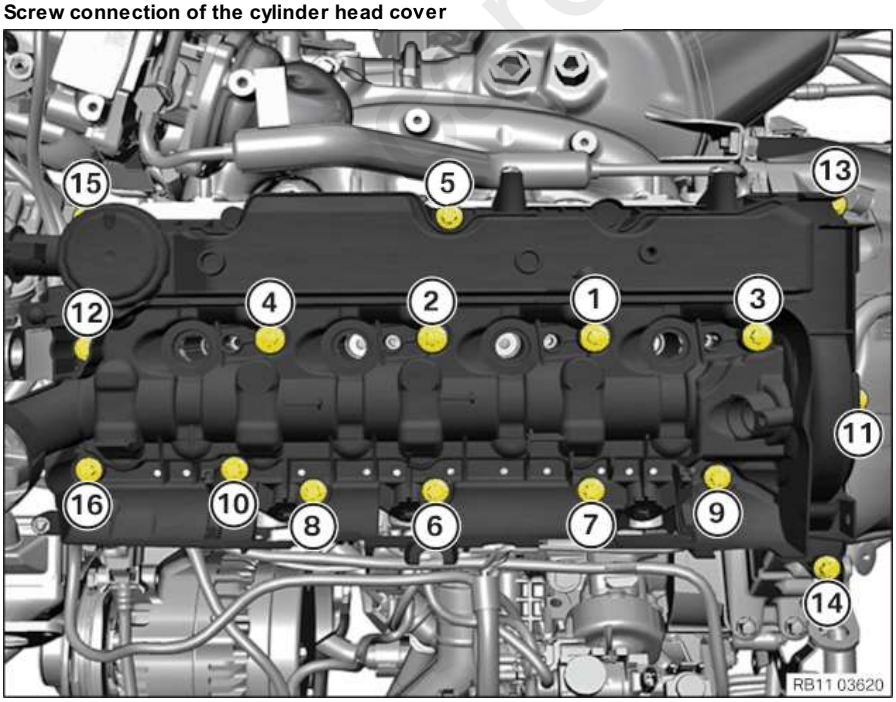
- Attach the positive battery cable (1) **correctly** to anti-twist lock (2).
- Tighten nut (3).

Battery positive lead to starter

M8	Tightening torque	13,5 Nm

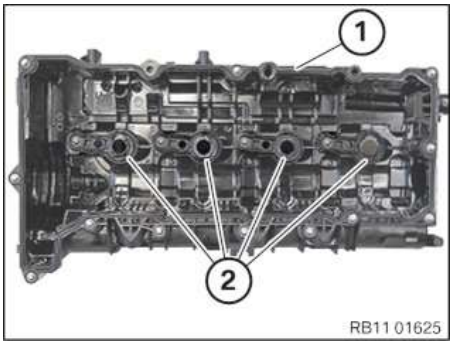
80 – Installing cylinder head cover

Screw connection of the cylinder head cover



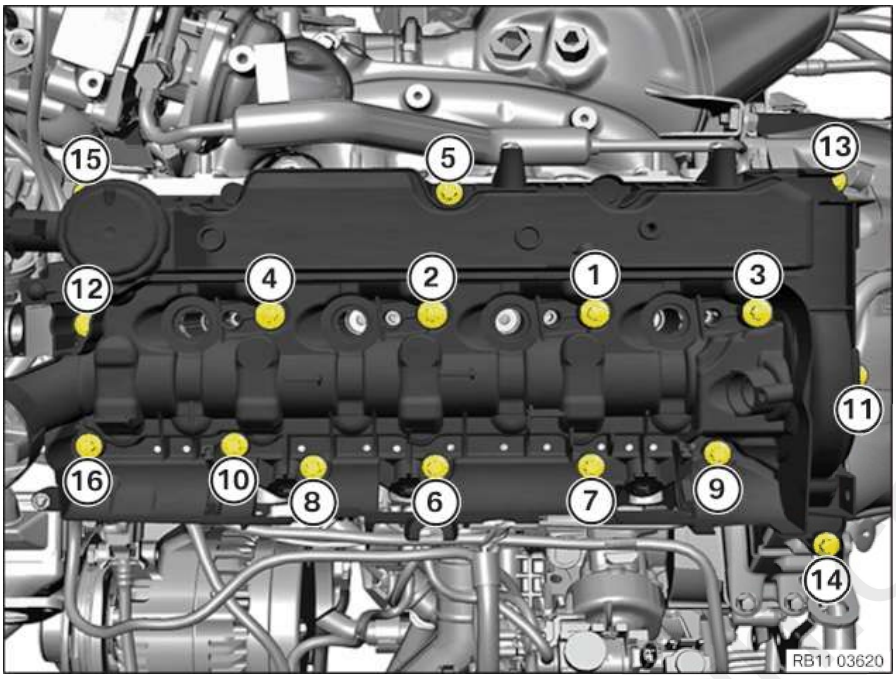
1 - 16 Bolts of the cylinder head cover

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- Renew the profile seals (1) and (2) of the cylinder head cover.

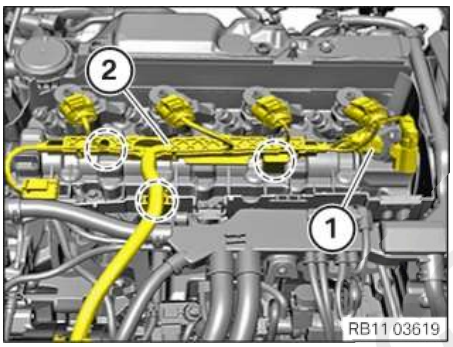
  Parts: Profile seals



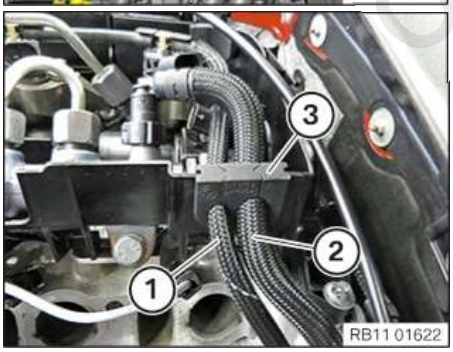
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

Cylinder head cover to cylinder head

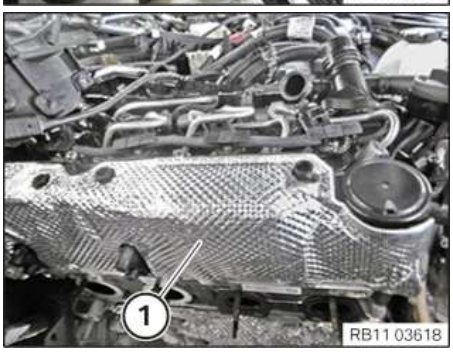
M6		Tightening torque.	8,5 Nm



- 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).

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- Connect engine ventilation line (1) and lock.

  The locks (arrows) must engage audibly.

81 – 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.

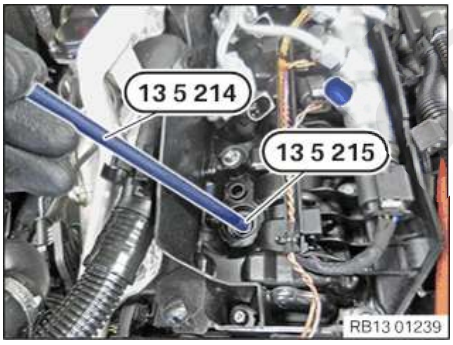
- Wear safety goggles.

RISK OF DAMAGE

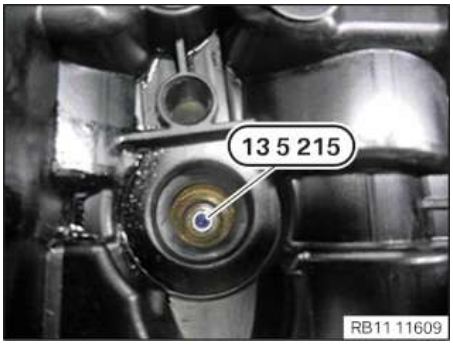
Contaminant or foreign body.

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.

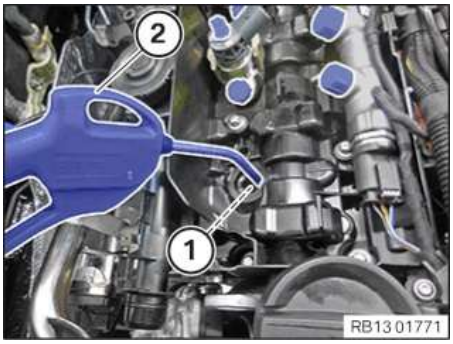
boardiagn.com



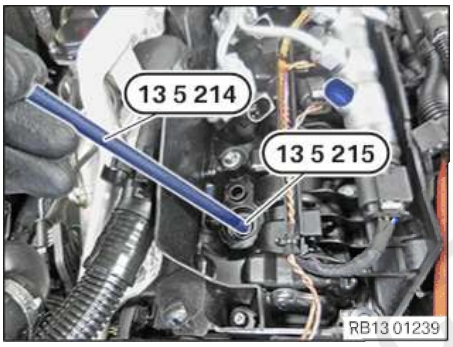
- Insert special tool 0 496 150 (13 2 020) into the injector shaft.



- 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**

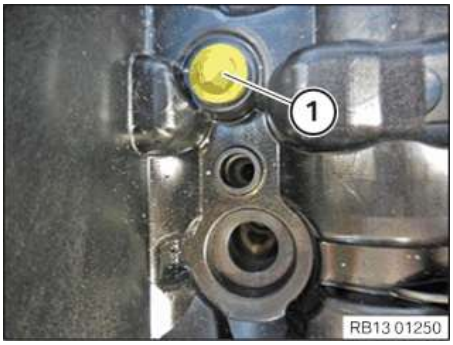
RISK OF DAMAGE

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.

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- 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.

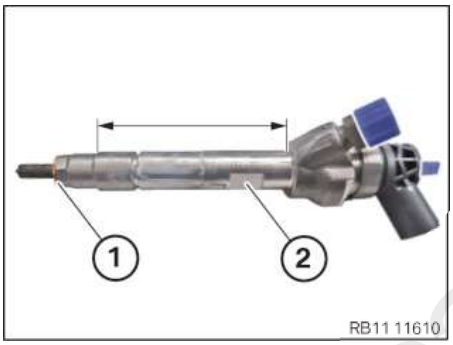
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

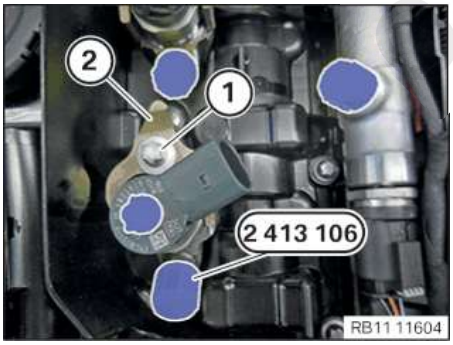
Lightly grease the injector shaft with high temperature-resistant grease.

For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue



- Renew the copper sealing ring (1) on the injector (2).

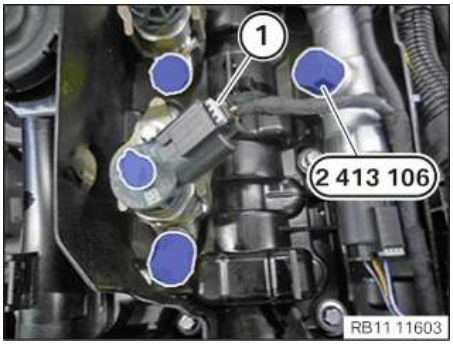
  Parts: Copper sealing ring
- Lightly grease the injector in the marked area with heat-resistant grease before installing the injector (2) in the injector shaft.



- 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 °



- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

▸ **Replacement: Perform injection quantity compensation**

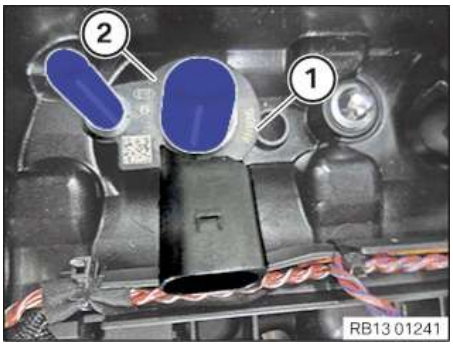
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TECHNICAL INFORMATION

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.

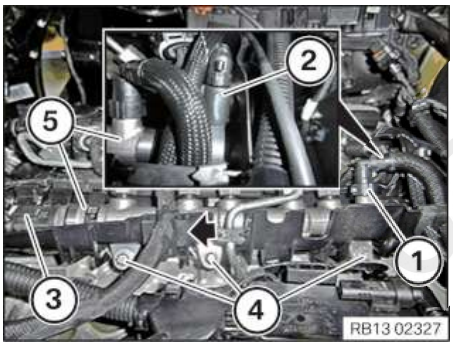


- Read off the adjustment value (1) on the new injector (2).



- 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.

82 – 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.

83 – 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.

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CAUTION

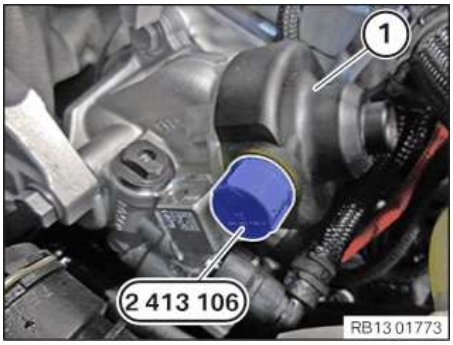
On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

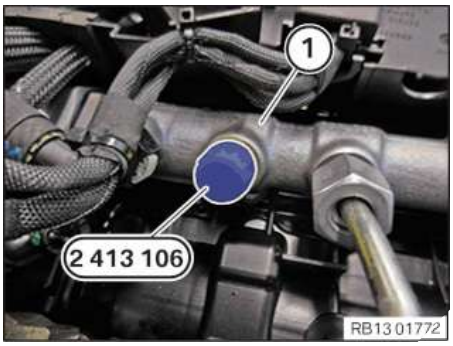
- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

TECHNICAL INFORMATION

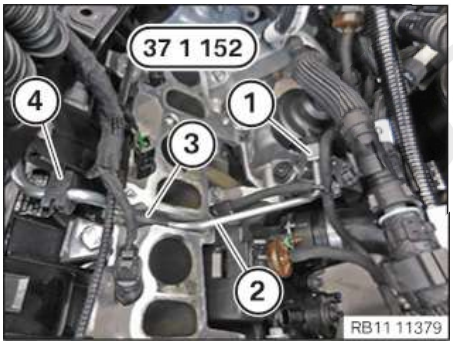
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- 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

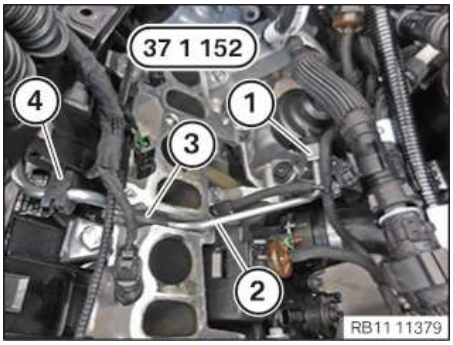
Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- 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

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- Make sure that the high pressure line (2) is correctly installed with the abrasion protection (3) and the rubber mount (4).

TECHNICAL INFORMATION

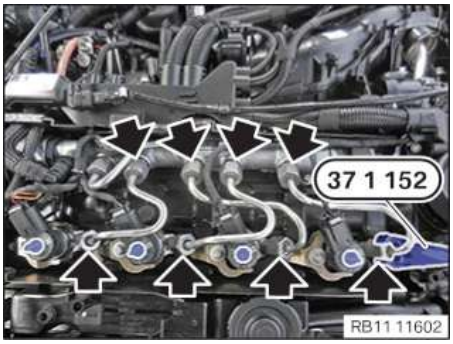
Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- 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

84 – 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.

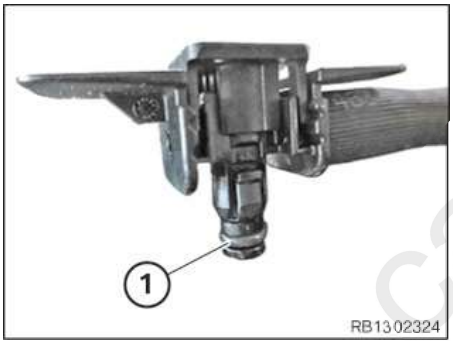
- Tighten the high pressure lines (arrows) with the special tool .

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**).

85 – Attach the leakage oil line on the injectors

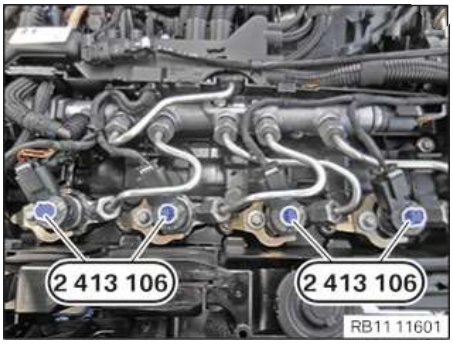


- **Version A:**

  Check sealing ring (1) for damage, renew leakage oil line if necessary.

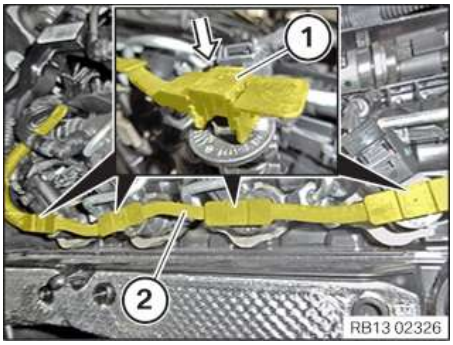
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.

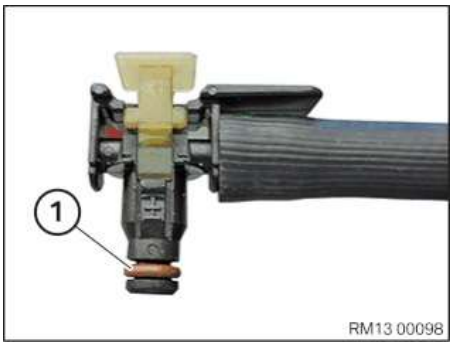


- Feed out the special tools and remove.

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- 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.

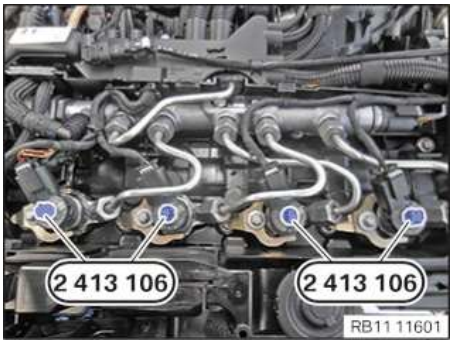


- **Version B**:

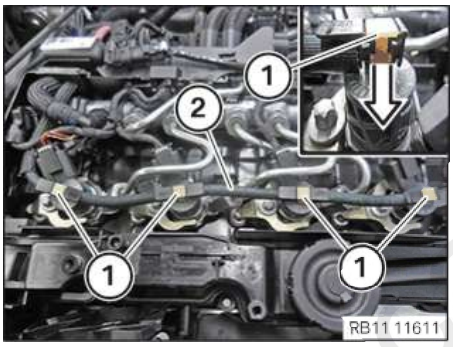
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

  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.

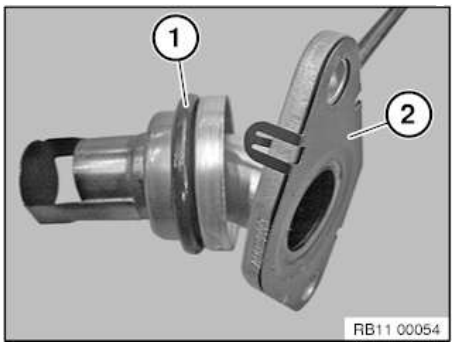


- Feed out the special tools and remove.



- 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.

86 – Installing the intake plenum

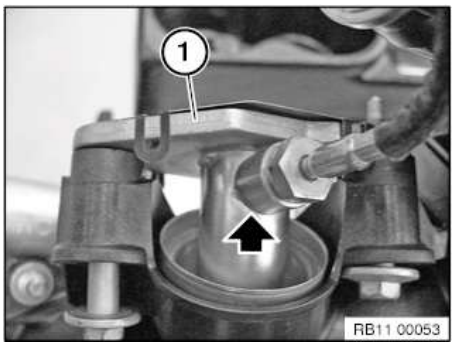


- Renew O-ring (1).

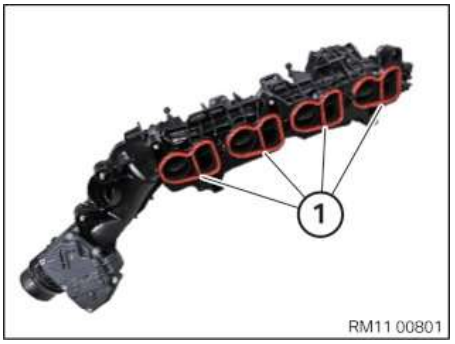
  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

  Parts: Gasket
- Position the seal (2) and clip it in.

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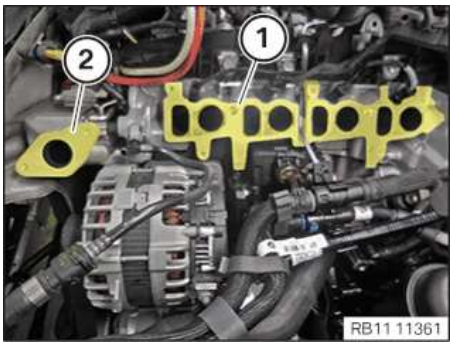


- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).

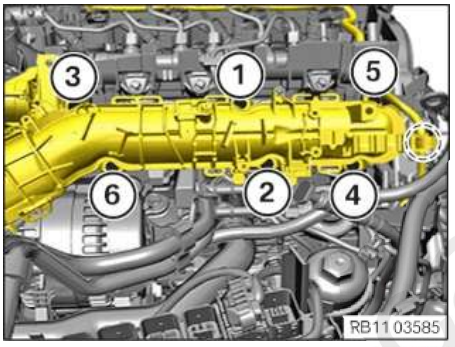


- Renew seals (1).

  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.

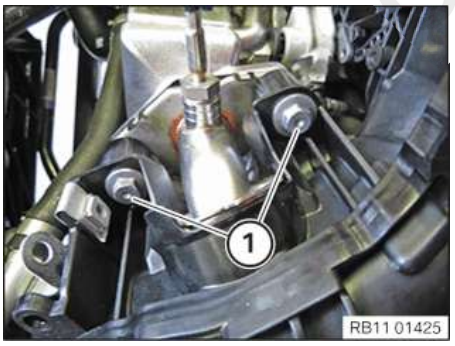


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

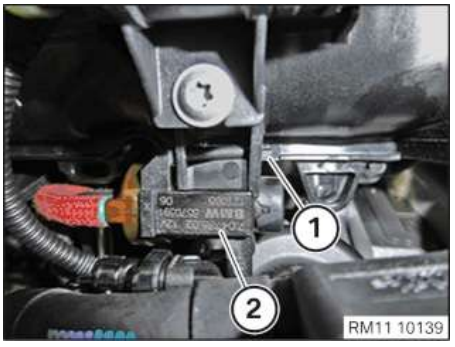
- Attach the wiring harness and fuel lines in the marked area on the intake plenum.



- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

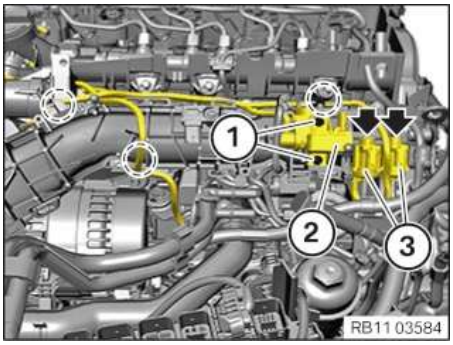
		Tightening torque	10 Nm



- Install electric changeover valve (2) from the left to the right in the holder on the intake plenum.

  The lock (1) must audibly engage.

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- 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.

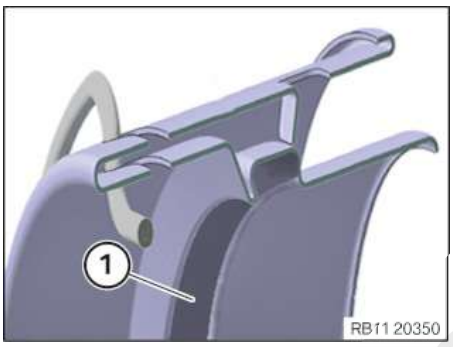


- Check the seal (1) for damage, and renew if necessary.

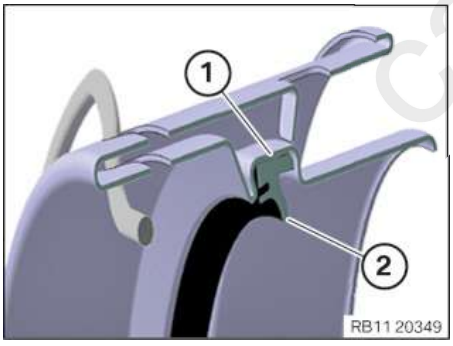
▸ **Replacing damaged seal**

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.



- Connect the pressure pipe to the throttle body until the locks (1) engage on both sides.

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- Check that the locks (1) are correctly seated on the pressure pipe.

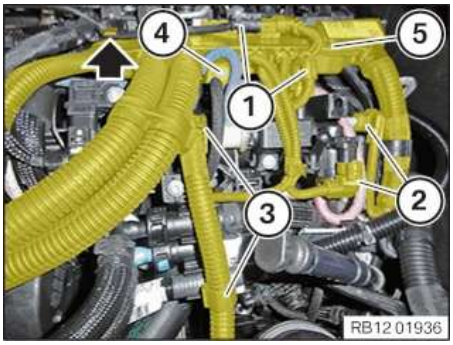
87 – Partially securing the wiring harness section on the intake plenum

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).

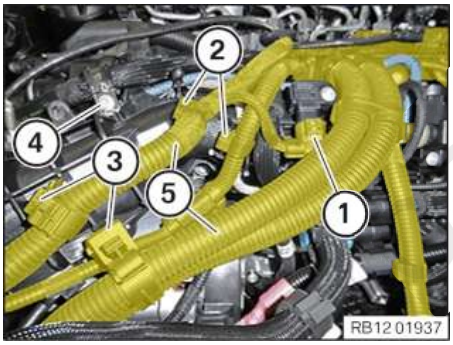
Wiring harness section to manifold

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.



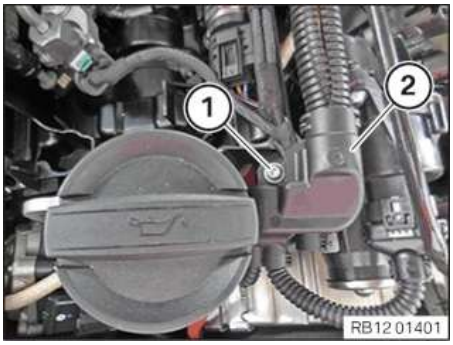
- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

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.



- 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



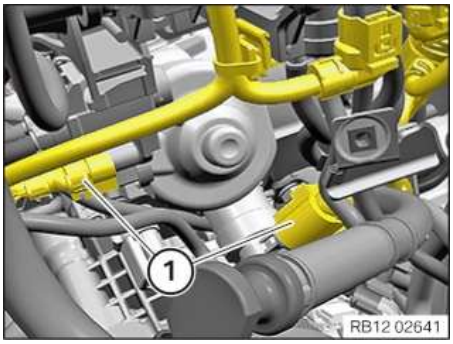
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



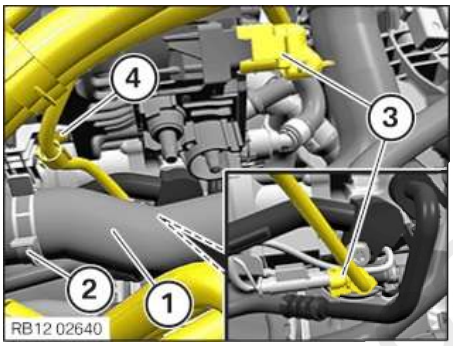
- Connect the connector (1) and lock it.

  The connector (1) must engage audibly.



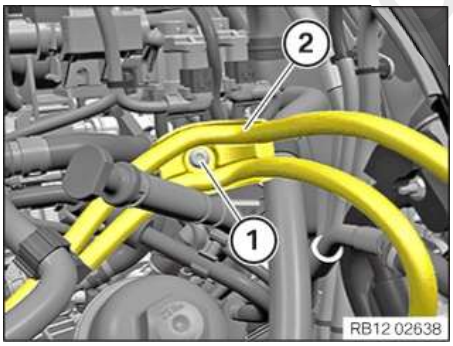
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



- Secure the clamp (4).
- Connect connectors (3) and lock.

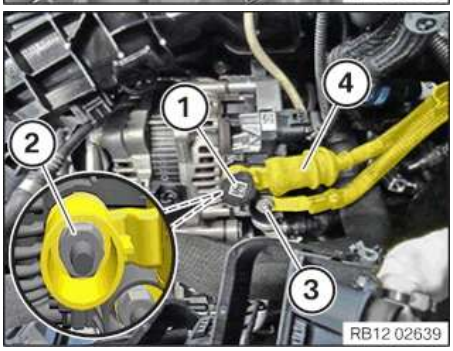
  The connectors (3) must engage audibly.
- Feed the coolant line (1) into the holder (2) and install it.



- Feed in and position the positive battery cables (2) .
- Tighten down screw (1).

Standard screw connection M6

M6		Tightening torque	8 Nm



- Feed in and install the positive battery cable (4).
- Feed in and position the positive battery cables (4) .
- Renew the nuts (3) and (2).

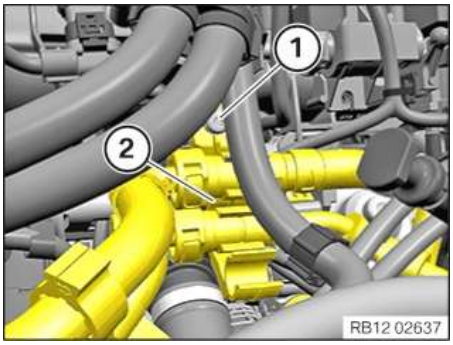
  Parts: Nuts
- Tighten nuts (3) and (2).

Battery positive lead on the starter motor generator

M8		Tightening torque	19 Nm

- Guide in and install the lid (1).

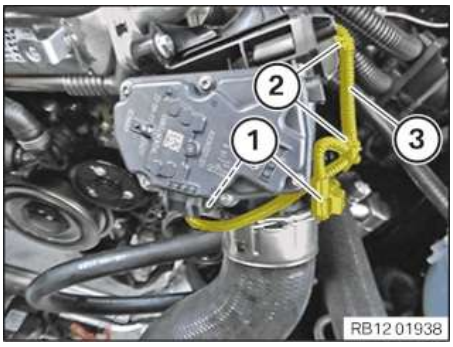
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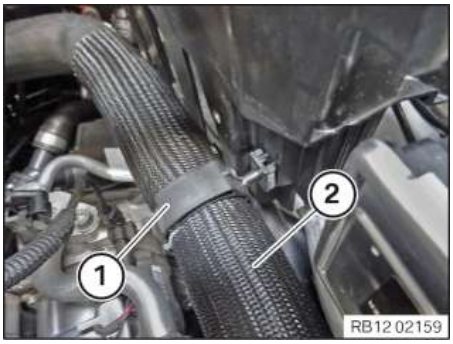
- Insert and install the holder (2).
- Tighten down screw (1).

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.



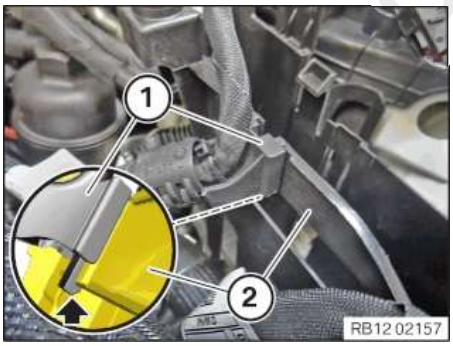
- Feed in and install coolant line (2).
- Lock holder (1).

  The holder (1) must engage audibly.



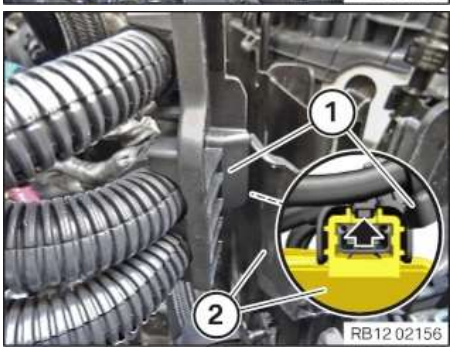
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.



- Connect the cable clip (1) with the control unit holder (2) and lock it.

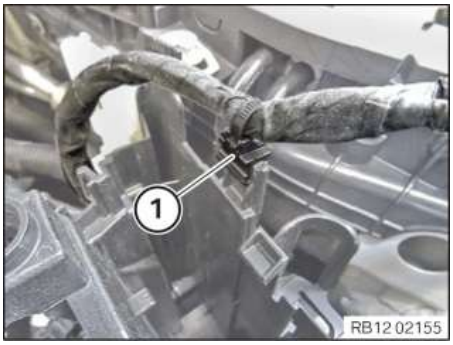
  Lock (arrow) must audibly engage.



- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.

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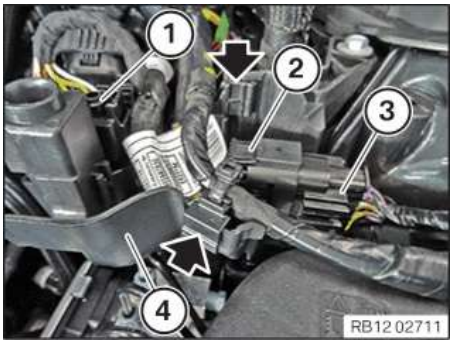


- Secure clamps (1).



- Feed in and install the connector (1).

  The connector (1) must engage audibly.

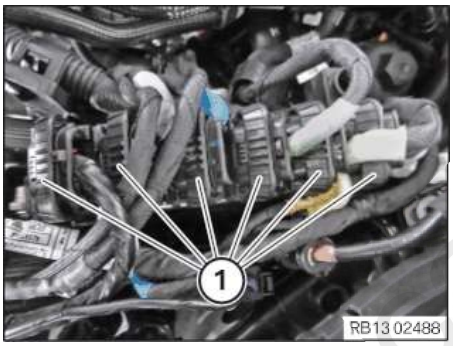


- Connect connector (3) to control unit holder (4) and lock it.

  The connector (3) must engage audibly.
- Connect connectors (2) and lock.

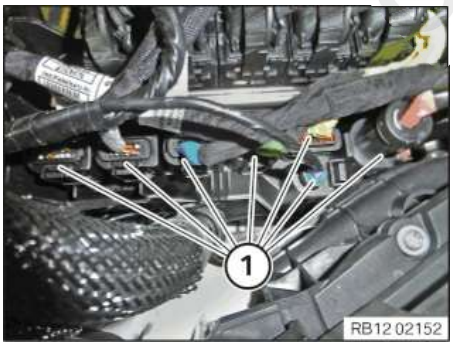
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.
- Secure the clamps (arrows).



- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.

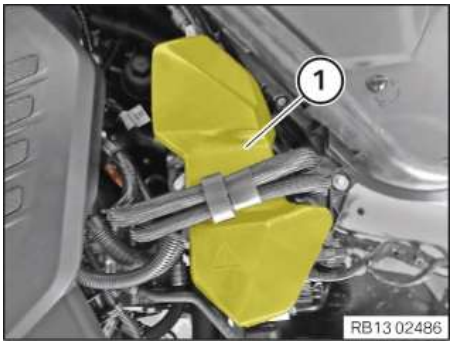


- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.

88 – Install the cover for the DDE control unit

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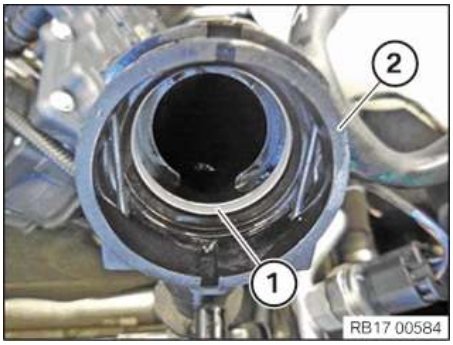


- Insert and install cover (1) into guides.

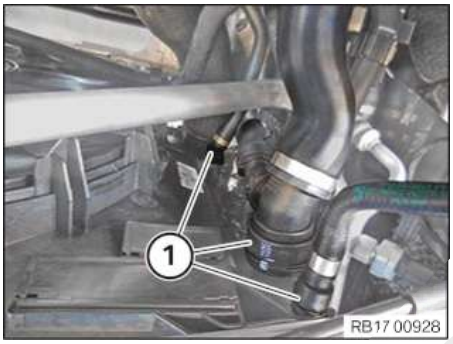
89 – Connecting the coolant lines

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.

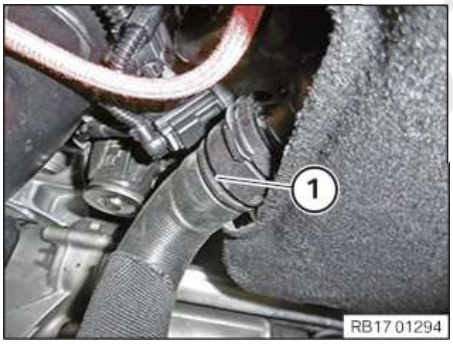


NOTICE

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.

90 – 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.

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RISK OF DAMAGE

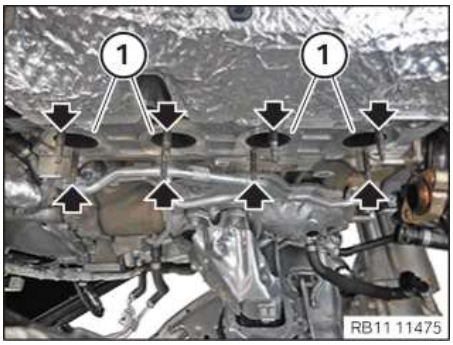
Damage to the surface.

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.

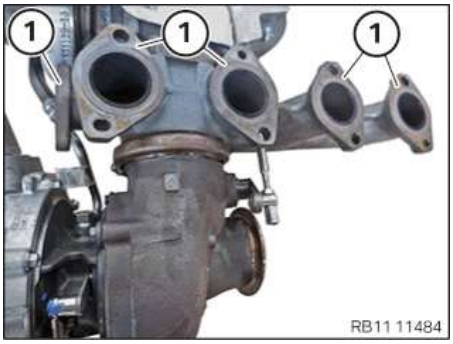
TECHNICAL INFORMATION

The sealing surfaces must be free from oils, grease and cleaning agents.

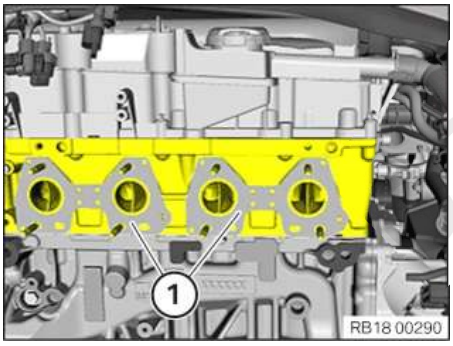


- Check the stud bolts (arrows) on the cylinder head for **correct** fit.
- Clean the connection points (1) with the special tool 0 495 102 (11 4 470).
- Renew gaskets.

  Parts: Seals



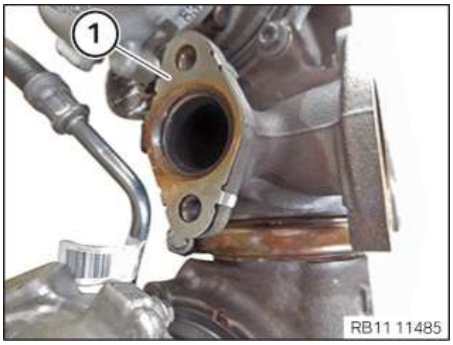
- Clean the connection points (1) on the exhaust manifold with the special tool 0 495 102 (11 4 470).



TECHNICAL INFORMATION

The **coated side** of the seal must be on the side of the exhaust manifold.

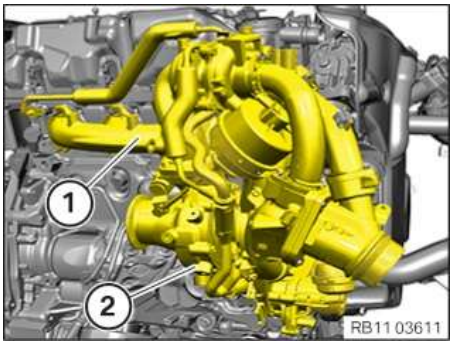
- Insert and install the gaskets (1).



- Renew the seal (1).

  Parts: Gasket
- Insert and install the seal (1).

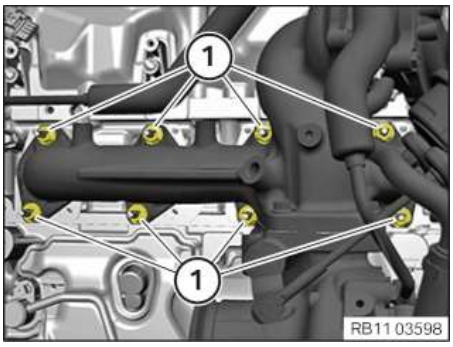
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TECHNICAL INFORMATION

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.



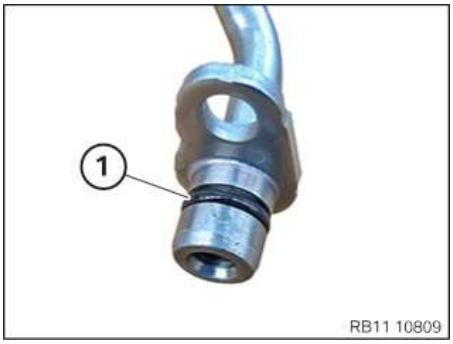
- Renew nuts (1).

  Parts: Nuts

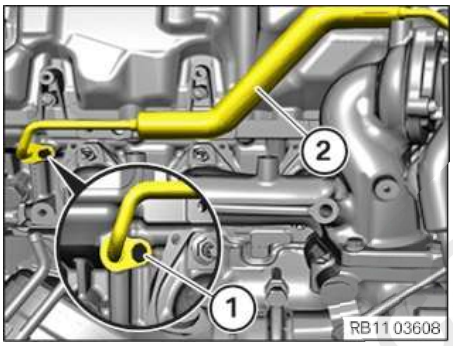
- Tighten the nuts (1) evenly from the inside out.

Exhaust manifold to cylinder head

M7	**If necessary, renew loose stud bolts.**	Tightening torque	11 Nm
	Renew nuts.	Tightening torque	13 Nm



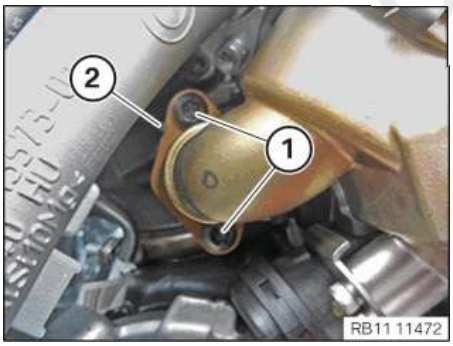
- Check the seal (1) for damage, if necessary, renew the oil feed line.



- 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

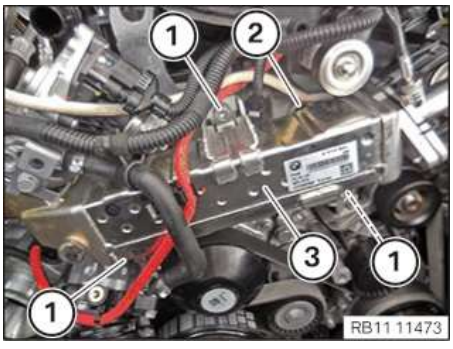


- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

M8x28	Replace screws	Tightening torque	32 Nm

- Ensure that seal (2) is installed.

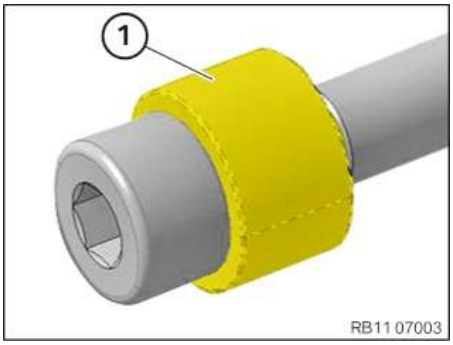


- Position the exhaust-gas recirculation cooler (3).
- Make sure the pipe neck (2) is fitted correctly.
- Tighten the screws (1).

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.

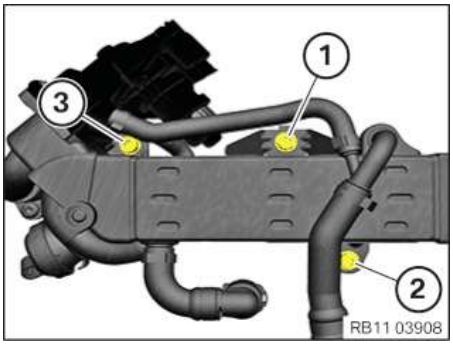
Result

» Screws **without** sleeves (1) are available.

Measure

- Renew screws.

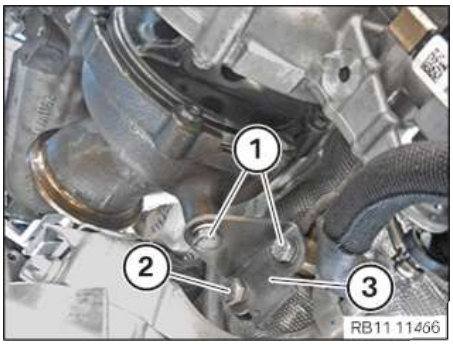
  Parts: Screws (part number 9 886 429)



- Tighten the screws (1) to (3).

Exhaust-gas recirculation cooler to cylinder head

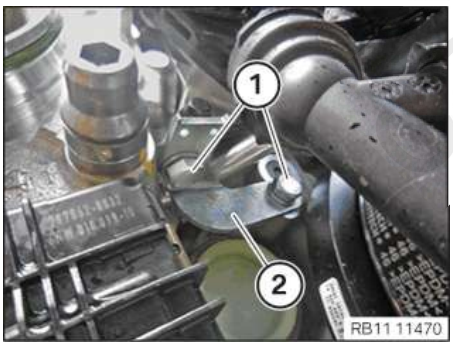
M8x20 / M8x28		Tightening torque	19 Nm



- Tighten the bolts (1) and (2) on the bracket (3).

Exhaust turbocharger low-pressure stage to crankcase

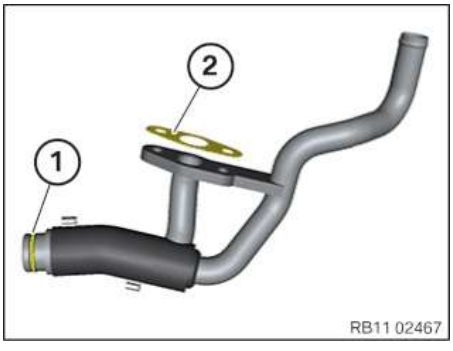
M8X16		Tightening torque	22 Nm



- Insert and install the holder (2).
- Tighten the screws (1).

Exhaust turbocharger low-pressure stage to crankcase

M8X16		Tightening torque	22 Nm

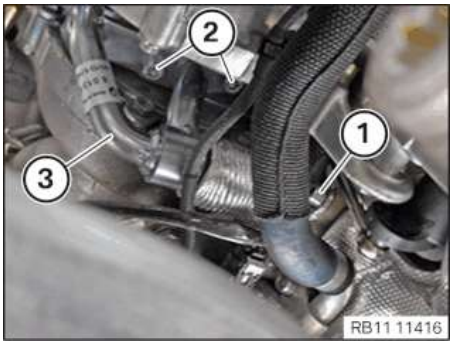


- Renew the gasket (2).

  Parts: Gasket

- Check the O-ring (1) for damage and renew the oil return line as needed.

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- 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

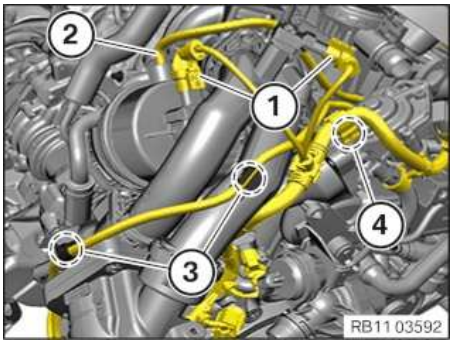
- Install the bolt (1).



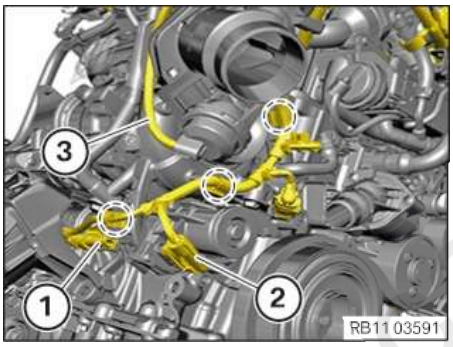
- Tighten the screws of the oil return line on the crankcase from the right wheel arch.

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.

91 – 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.

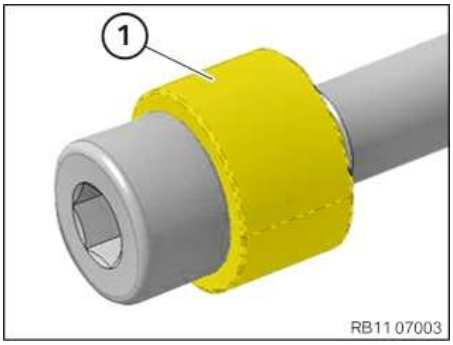
Damage and operating failure of the starter generator.

- 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

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- Check whether the screws **with 10mm** sleeves (1) are available.

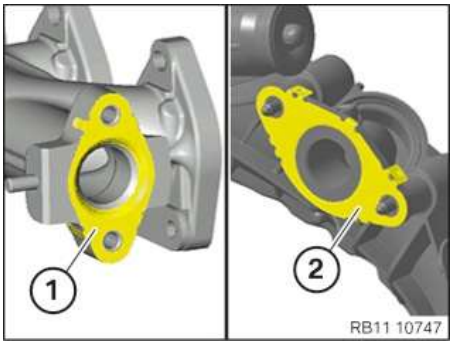
Result

» Screws **without** sleeves (1) are available.

Measure

- Renew screws.

  Parts: Screws (part number 9 886 429)

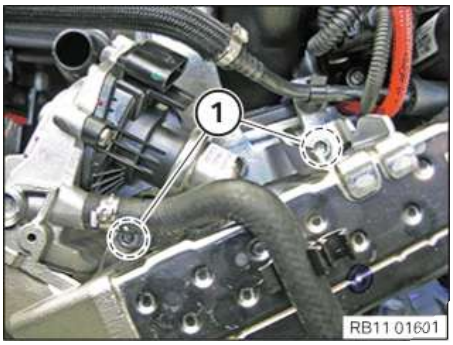


- Renew the seal (1) between the exhaust manifold and the exhaust-gas recirculation cooler.

  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

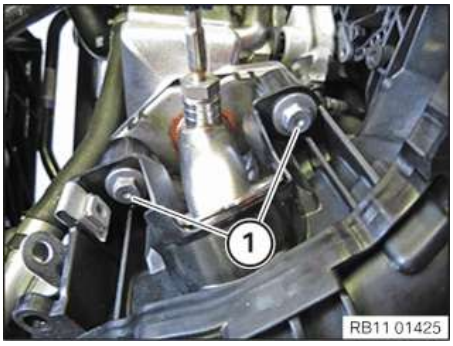
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screw (1) under the exhaust-gas recirculation cooler and then release again.

Exhaust-gas recirculation cooler to cylinder head

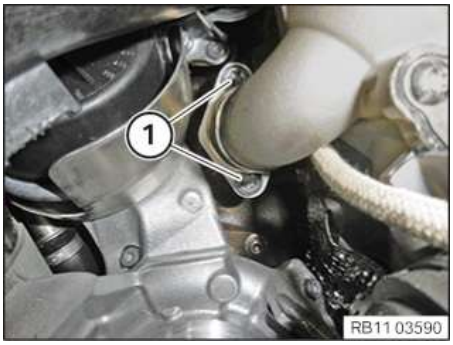
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

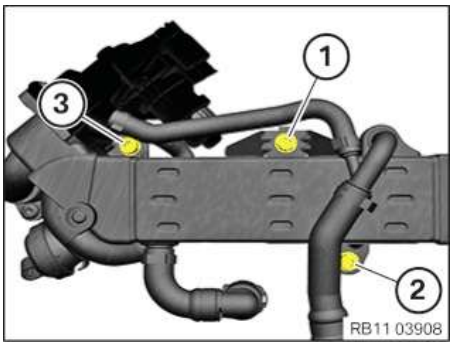
		Tightening torque	10 Nm



- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

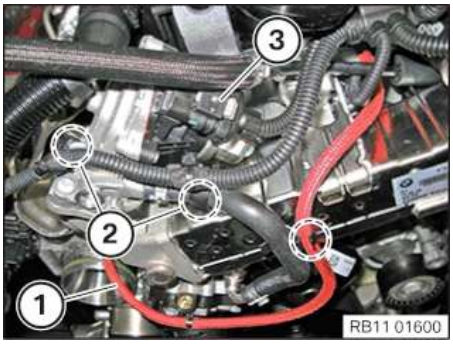
M8x28	Replace screws	Tightening torque	32 Nm



- 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.

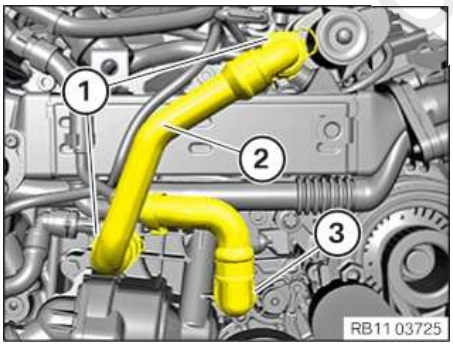


TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.

- **Version A:**

  Connect and audibly lock coolant lines (1).



TECHNICAL INFORMATION

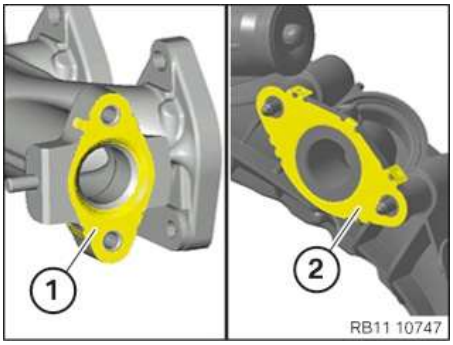
Make sure that the connections are locked correctly. The locks must engage audibly.

- **Version B:**

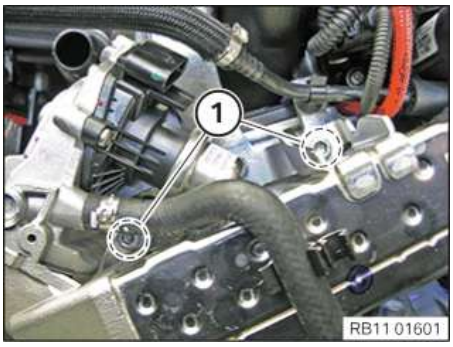
  Connect and audibly lock coolant lines (3).
- Install the coolant line (2).
- Audibly lock the locks (1).

▸ **Installing the exhaust-gas recirculation cooler**

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- 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

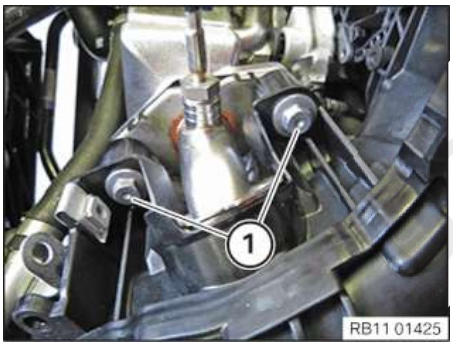
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screw (1) under the exhaust-gas recirculation cooler and then release again.

Exhaust-gas recirculation cooler to cylinder head

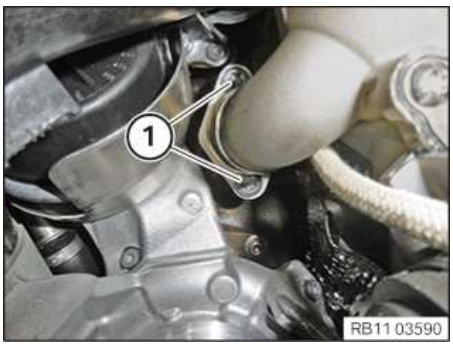
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm

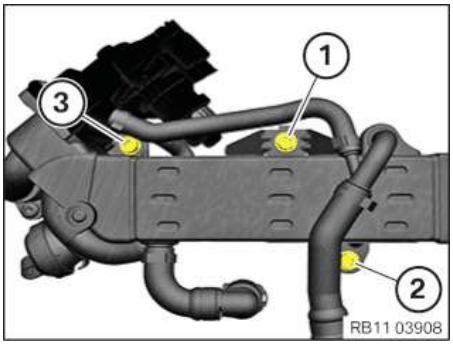


- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

M8x28	Replace screws	Tightening torque	32 Nm

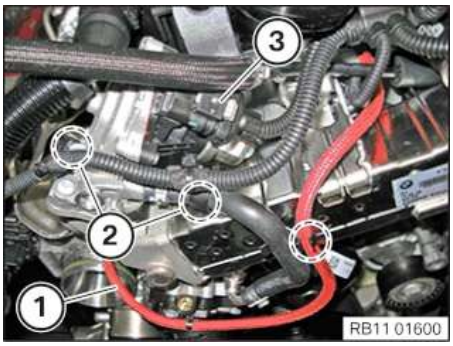
cardiagn.com



- 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.

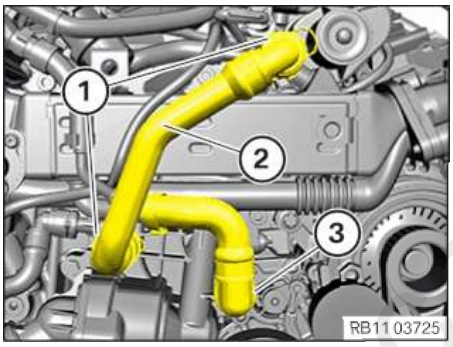


TECHNICAL INFORMATION

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.

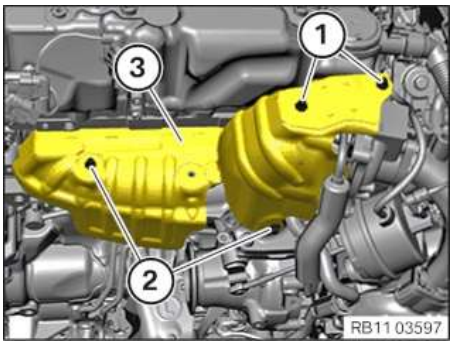
- **Version B:**

  Connect and audibly lock coolant lines (3).

  Install the coolant line (2).

  Audibly lock the locks (1).

92 – 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

93 – Installing the sensor bracket on the cylinder head cover

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RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

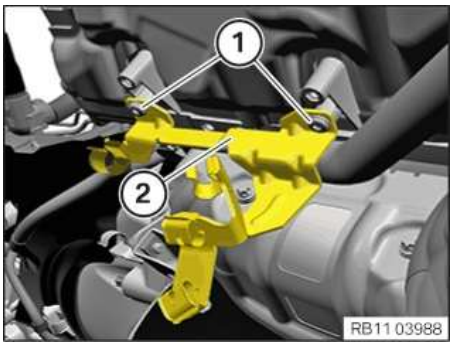
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

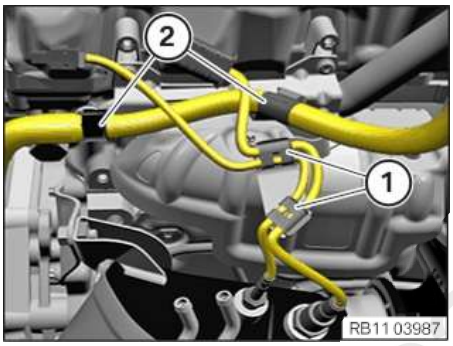
- Route all cables without abrasions, do not trap and crush.



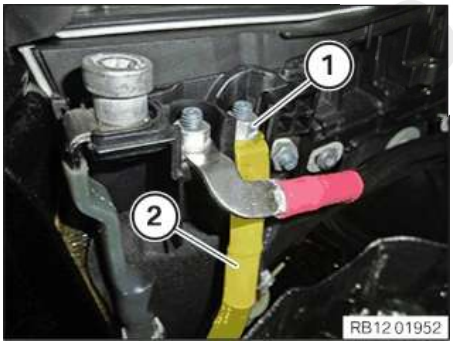
- Insert and install the holder (2).
- Tighten the screws (1).

Bracket on cylinder head cover

	Tightening torque	5 Nm



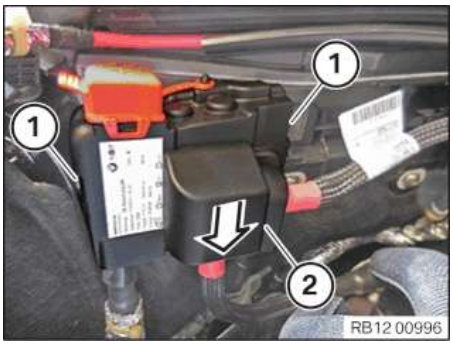
- Secure the positive battery cable in the clamps (2).
- Mount the cable of the exhaust gas sensor system in the clamps (1).



- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

Battery positive lead to battery positive terminal

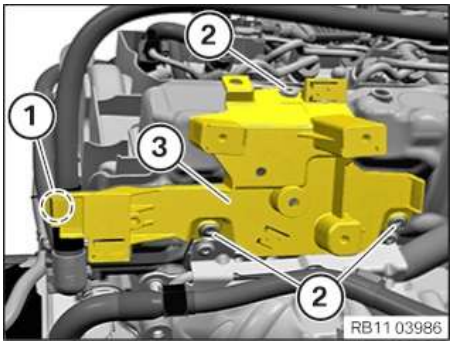
M8		Tightening torque	19 Nm



- Insert and install the cover (2) in the direction of the arrow.

  The locks (1) must engage audibly.

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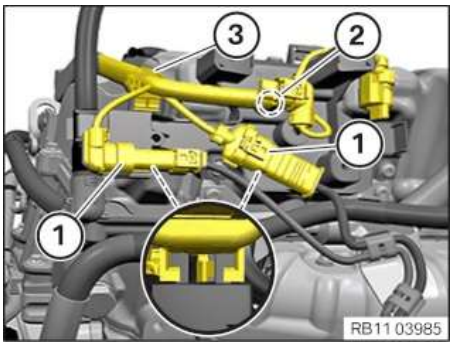


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

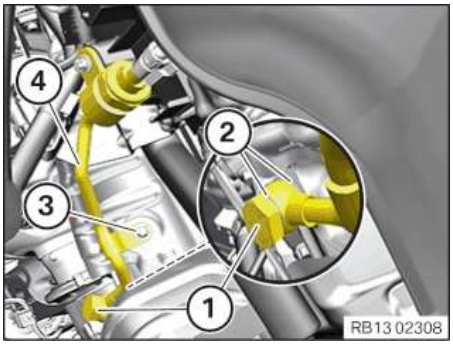
		Tightening torque	5 Nm

- 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.

94 – 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).

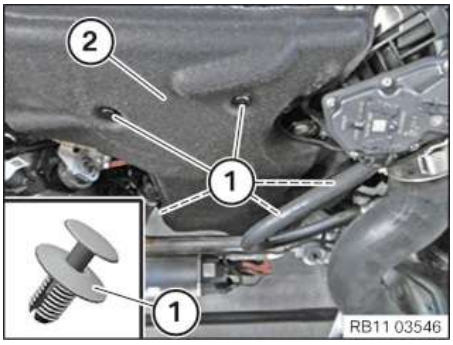
Exhaust gas pressure pipe to sensor system holder

TS6x20		Tightening torque	5,7 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

95 – 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).

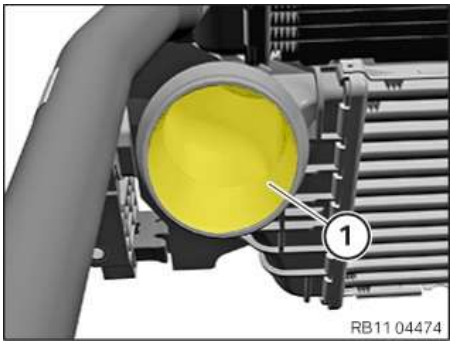
96 – Install pressure pipe between exhaust turbocharger and charge air cooler

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.



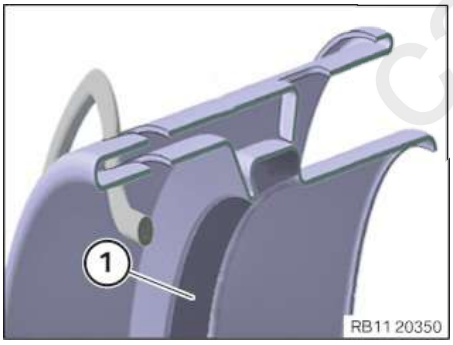
- Check the seal (1) for damage and renew if necessary.

  Parts: Gasket

▸ **Replacing damaged seal**

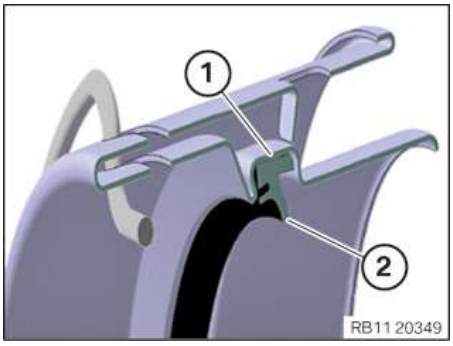
TECHNICAL INFORMATION

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.

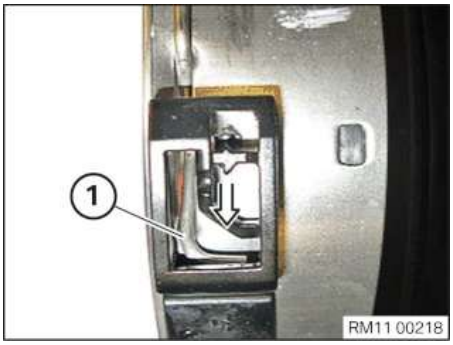
  Parts: Gasket
- Install seal dry without lubricant or mounting agent.

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.

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- **Version A:**

  Lock the lock (1).

  The lock (1) on the pressure pipe must engage audibly.

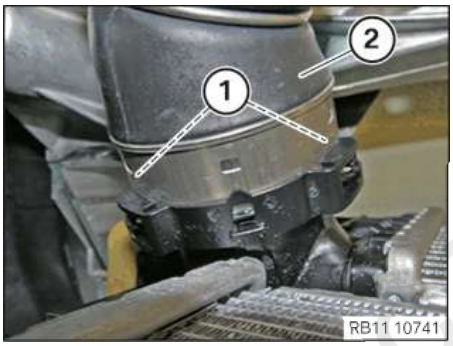


- Pay attention to the installation position:

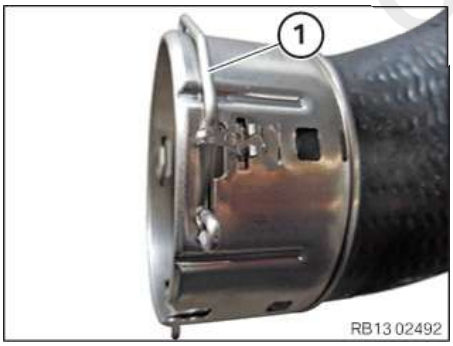
  The pressure pipe fits on charge air cooler in one installation position only.



- Install the pressure pipe (1) from the top.



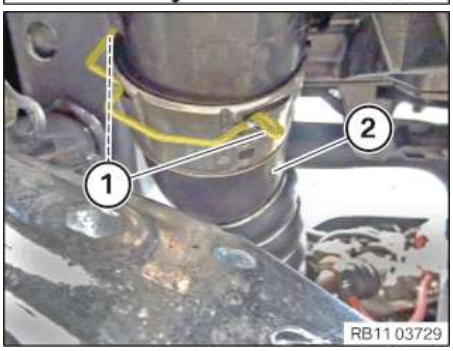
- Connect pressure pipe (2) to charge air cooler.
- Lock the lock (1) on both sides.



- **Version B:**

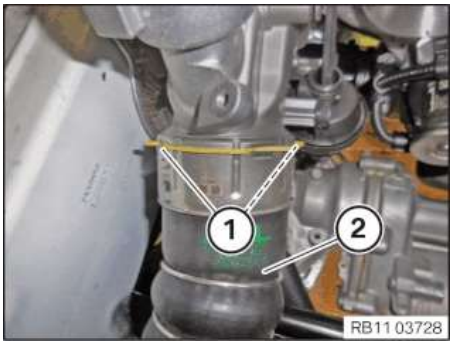
  Lock the lock (1).

  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.

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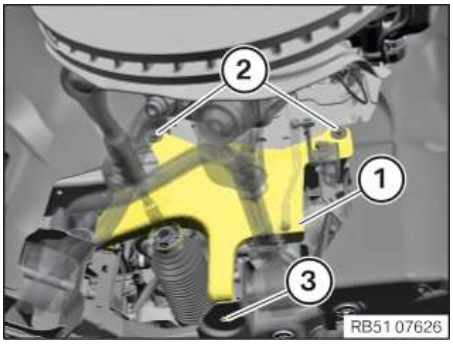


- Place the pressure pipe (2) onto the compressor bypass and ensure that the lock (1) engages audibly.

97 – 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

98 – 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.

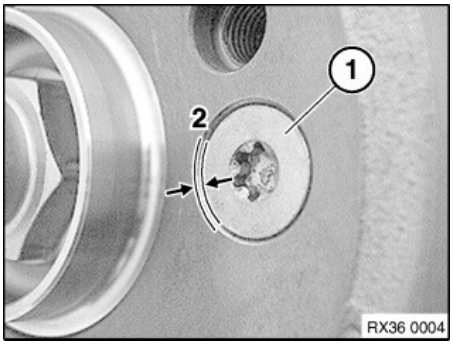
  Do not operate special tool 2 344 011 with an impact screwdriver.
- Degrease the contact surfaces with the universal cleaner (see BMW Group Parts).
- In the event of grease residue in the area of the wheel bolt holes, remove and clean the brake disc.



- 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).

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- Check that the mounting bolt (1) for the brake disc is securely seated.

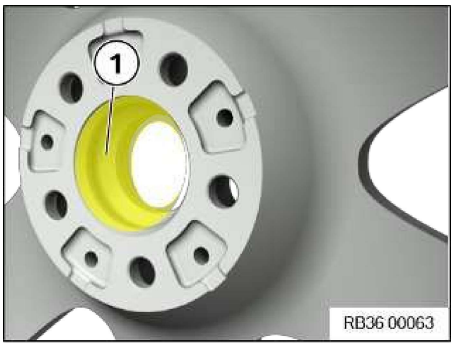
  The mounting bolt (1) for the brake disc **may not** protrude on the contact surface (2) between the brake disc and the wheel rim.

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



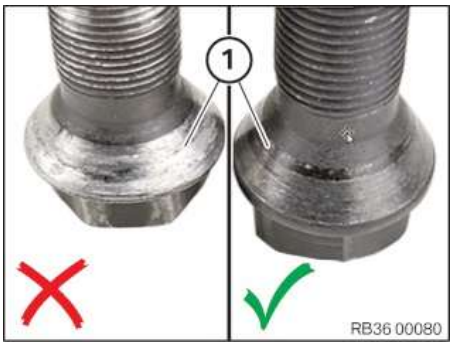
TECHNICAL INFORMATION

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.

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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.		

99 – Prepare for the installation of the diesel particulate filter



- Renew the V-clip (1).

  Parts: V-band clamp

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- Renew gasket (1).

  Parts: Gasket

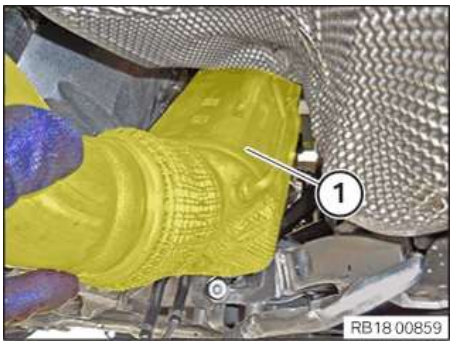
100 – Installing the diesel particulate filter

CAUTION

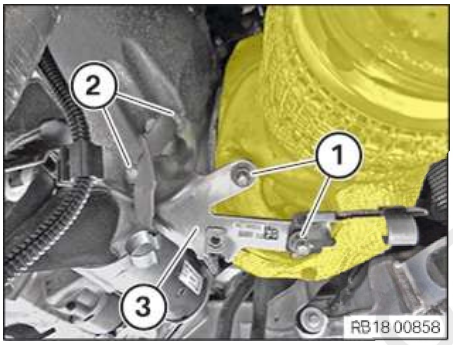
Heavy component.

Heavy components can lead to injury or damage.

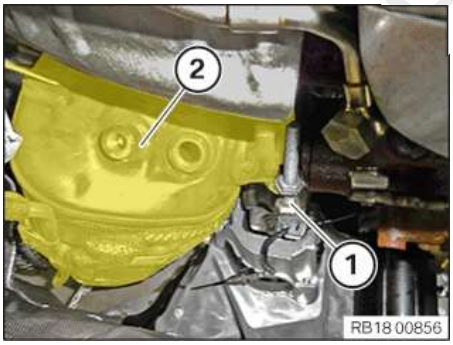
- Remove and install heavy components with the aid of another person/other persons.



- 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**.

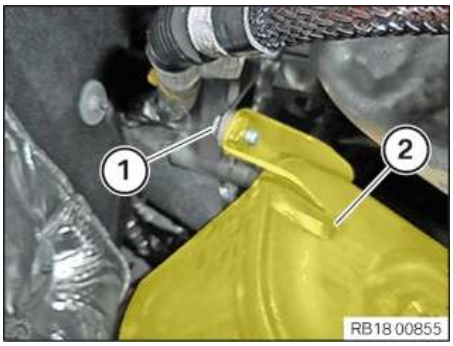


- Renew the V-clip (1).

  Parts: V-band clamp
- Feed in and install V-band clamp (1).

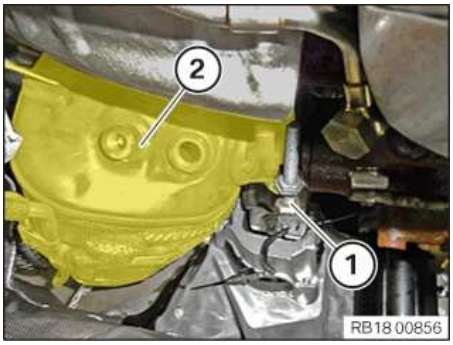
Note: Make sure that the seal between the diesel particulate filter and the exhaust turbocharger is installed correctly.

- 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**.

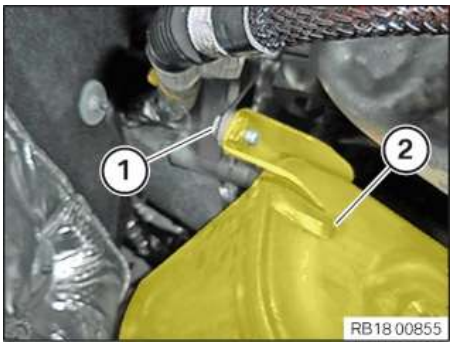
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- Tighten the V-clip (1) of the diesel particulate filter (2).

Diesel particulate filter V-clip to exhaust turbocharger

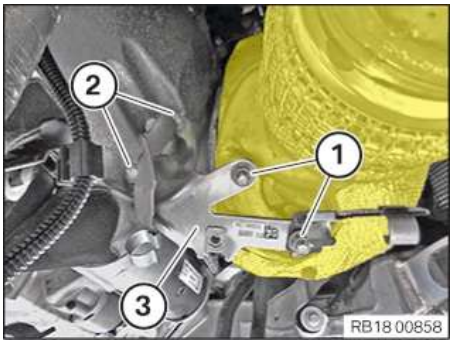
V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm



- 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).

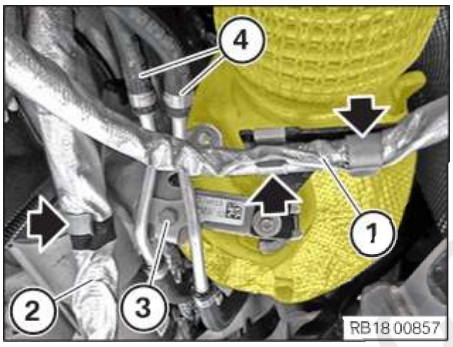
Bracket to transmission for diesel particulate filter holder bottom

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).

101 – Installing the nitrogen oxide sensor upstream of SCR catalytic converter

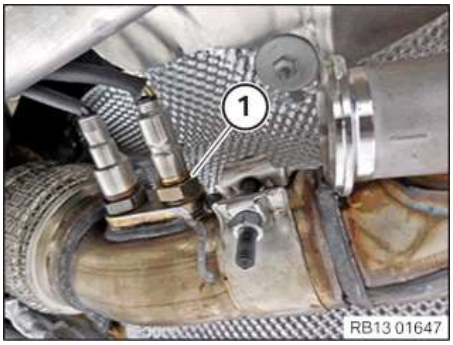
RISK OF DAMAGE

Damage to the nitrogen oxide sensor.

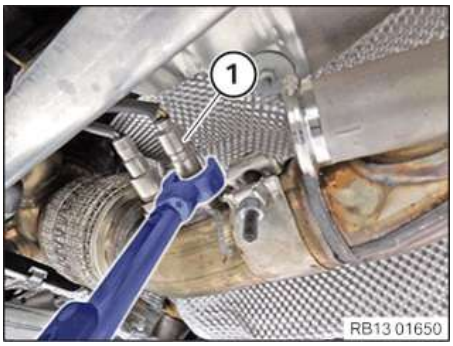
Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

- 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.

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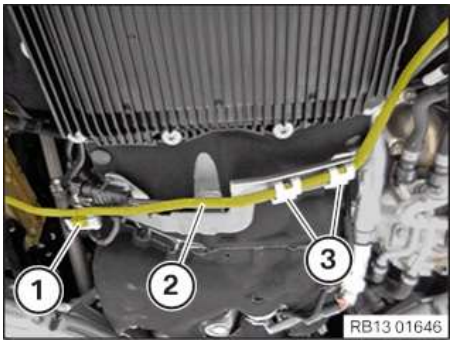
- Feed in and install the nitrogen oxide sensor (1).



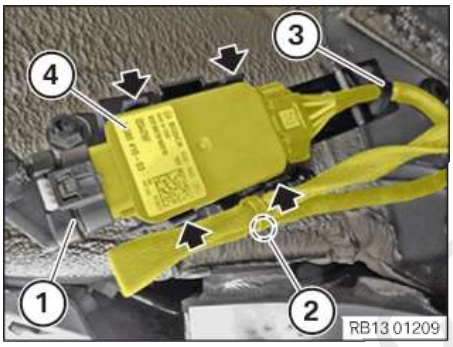
- Tighten the nitrogen oxide sensor (1) using commercially available tools.

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.

102 – 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.

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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



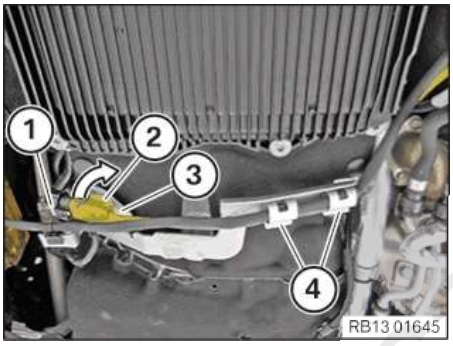
- Insert the monitoring oxygen sensor (1) and install it.



- 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.

103 – 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.

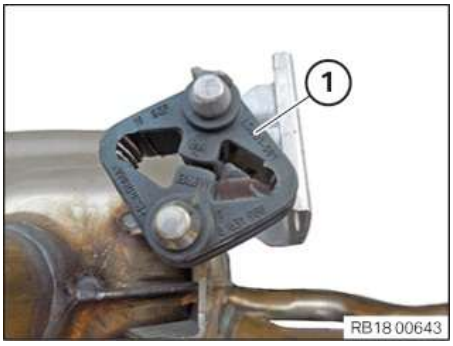
Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

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TECHNICAL INFORMATION

Mount the exhaust system in voltage-free state, maintaining the tightening sequence from the rear silencer towards the exhaust manifold.

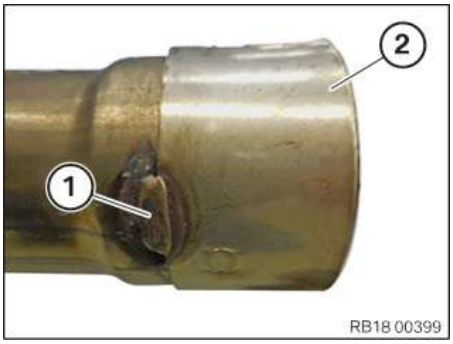


NOTICE

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



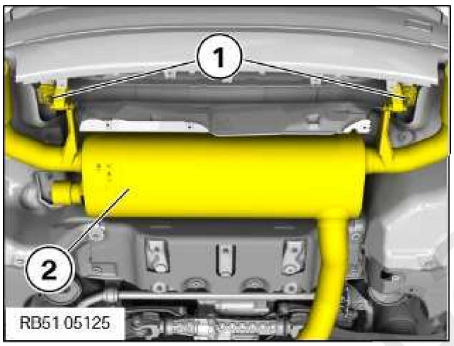
CAUTION

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).

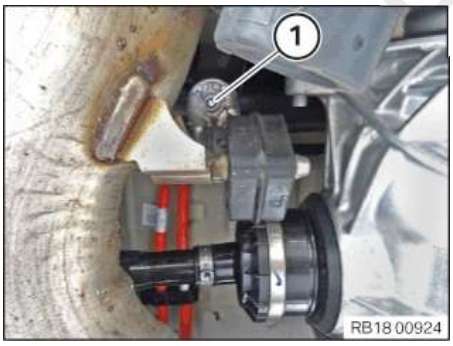


- Insert and install the exhaust system (2).
- Renew nuts (1).

  Parts: Nuts
- Tighten nuts (1).

Rear silencer to body / bumper support

M8	Replace nuts.	Tightening torque	19 Nm

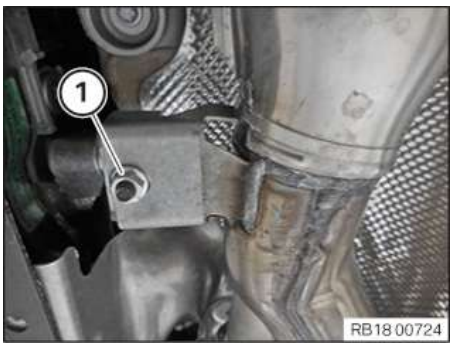


- Renew nut (1) on the rear axle support.

  Parts: Nut
- Tighten nut (1).

Exhaust system to rear axle carrier

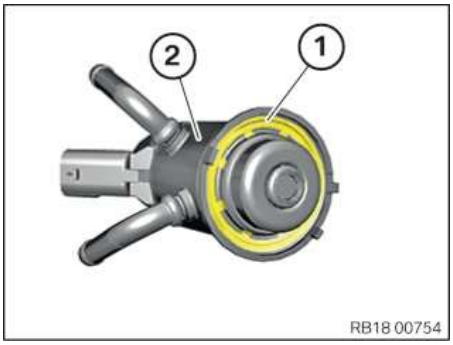
M8 nut		Tightening torque	19 Nm



- Tighten nut (1).

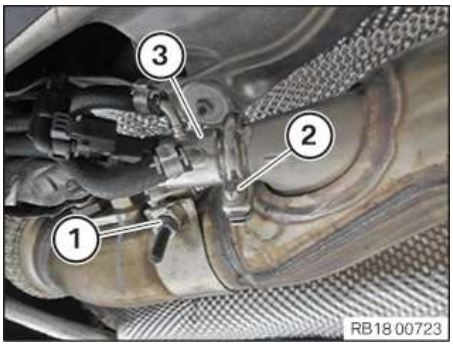
Exhaust system to transmission

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

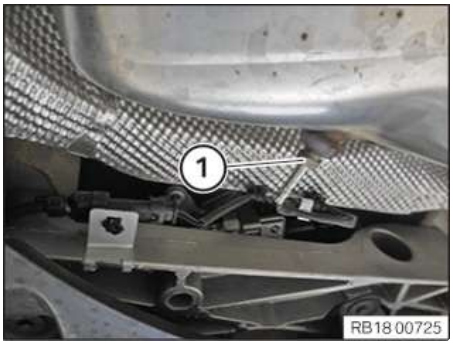
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

- 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

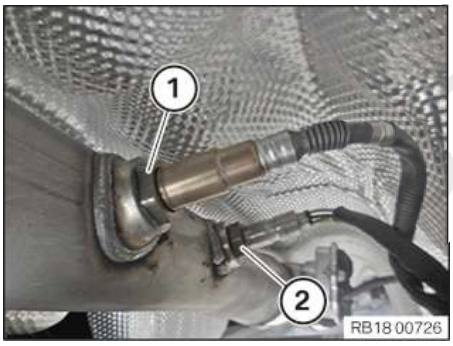
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm



- 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

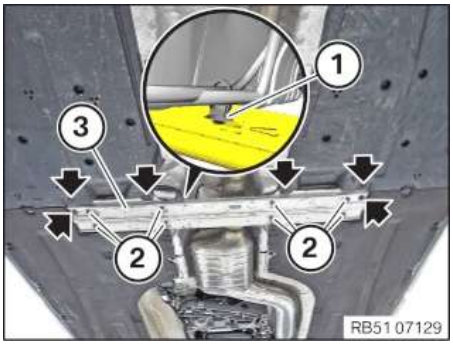
- Install the nitrogen oxide sensor (2) in the exhaust system and tighten.

Nitrogen oxide sensor downstream of SCR catalytic converter

Sensor		Tightening torque	55 Nm

104 – Install the connecting supports on the tunnel

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- Guide in and install connecting support (3) on the tunnel.
- Tighten the screws (2).
- Tighten screws (arrows).

Connecting support to tunnel

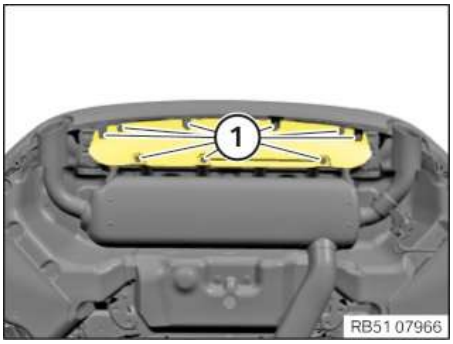
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Secure the clamp (1).

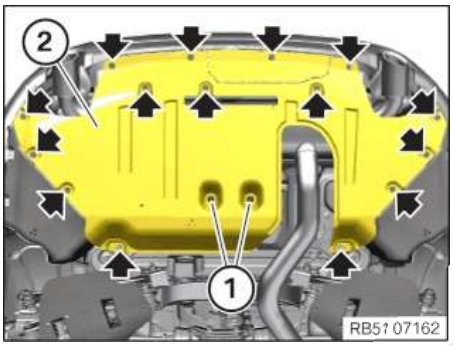
105 – Installing the rear diffuser



- **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

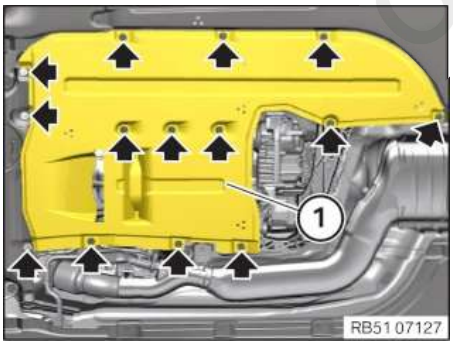
Nuts and screws		Tightening torque	3 Nm

- Tighten nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm

106 – Installing underbody protection at rear



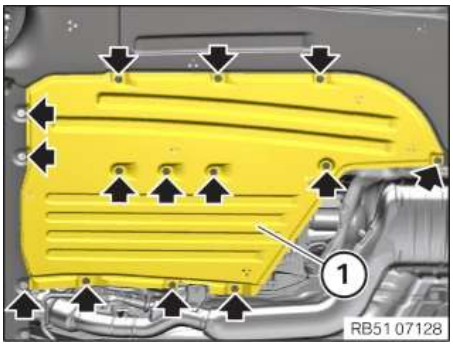
- **Version A:**

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

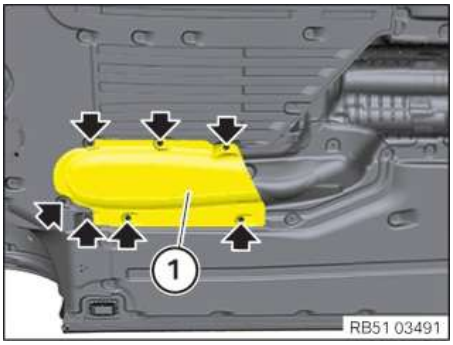
Hexagon screw		Tightening torque	3 Nm

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107 – 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.

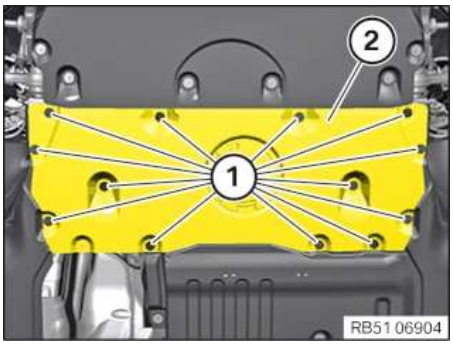


- Insert the underbody panelling (1).
- Tighten screws (arrows).

Underbody panelling

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

108 – Installing the centre underbody protection



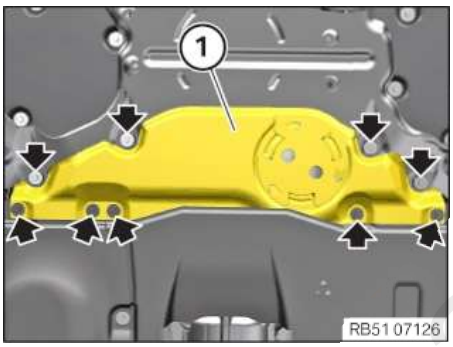
- **Variant with rear wheel drive:**

  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).

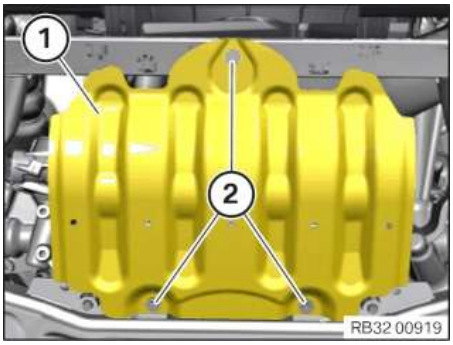
Underbody protection

Hexagon screw		Tightening torque	3 Nm

109 – 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

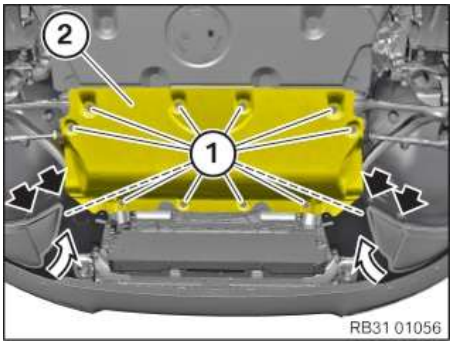
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

110 – Install the underbody protection of the steering gear

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- **Version A:**

  Position the underbody protection (2) of the steering gear.

  Tighten the screws (1).

Underbody protection of the steering gear

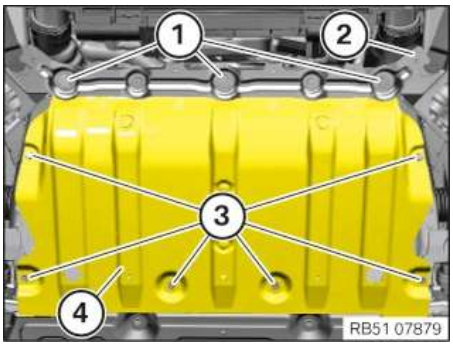
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- 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).

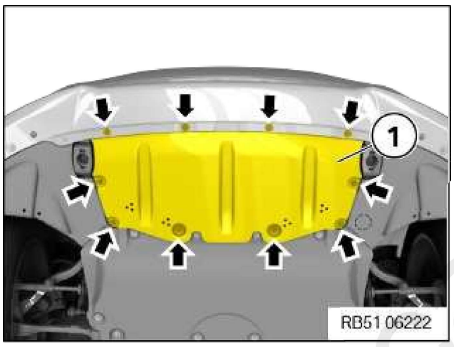
Underbody protection of the steering gear

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).

111 – Installing the front underbody protection



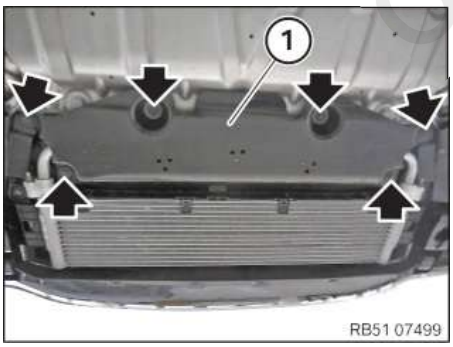
- **Version A:**

  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



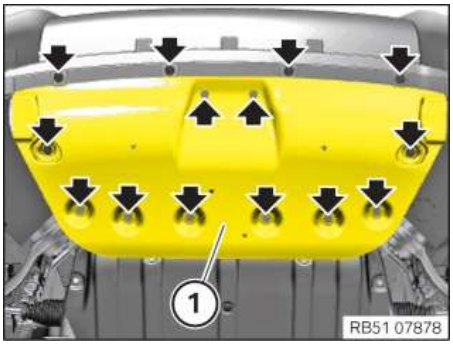
- **Version B:**

  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).

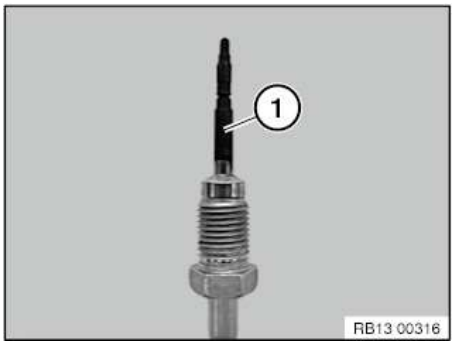
  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

carmanualsonline.com

112 – Installing the exhaust temperature sensor for the exhaust system downstream the catalytic converter on the diesel particulate filter



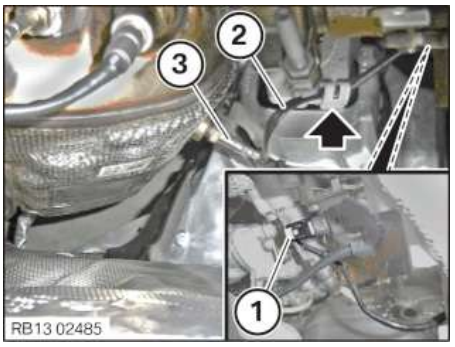
RISK OF DAMAGE

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.

113 – 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

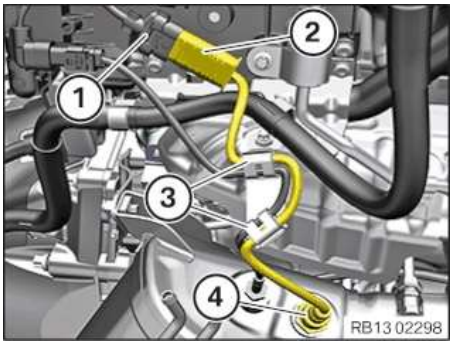


- Insert and install the front oxygen sensor (1).
- Tighten the front oxygen sensor (1) with standard tools.

Front oxygen sensor to top of diesel particulate filter

Sensor		Tightening torque	50 Nm

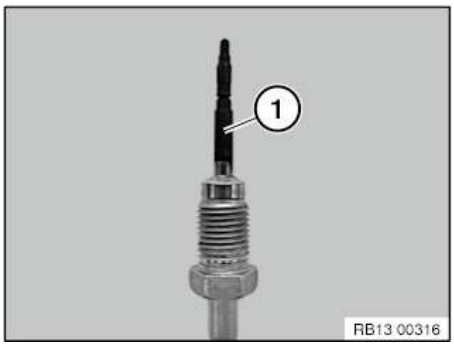
carDiagn.com



- 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.

114 – Install the exhaust-gas temperature sensor on the diesel particulate filter



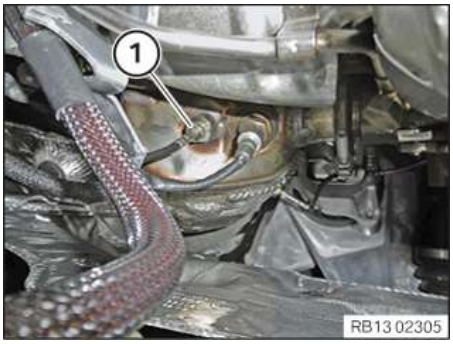
RISK OF DAMAGE

Damage of exhaust temperature sensor.

Damage to exhaust temperature sensors leads to malfunctions.

- Make sure that the gauge tip is not damaged.

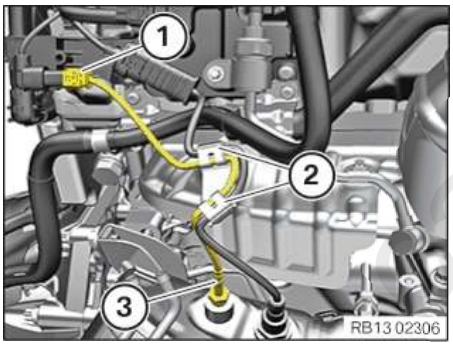
- Check gauge tip (1) for damage.



- 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

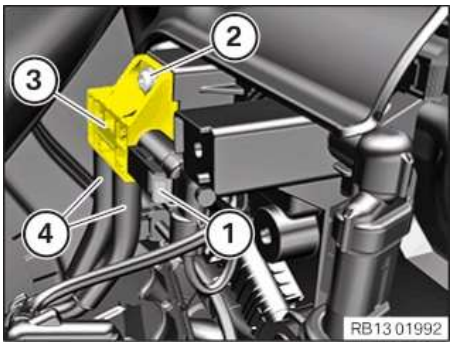
Sensor		Tightening torque	30 Nm



- Secure the exhaust temperature sensor (3) to the clamp (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

115 – 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.

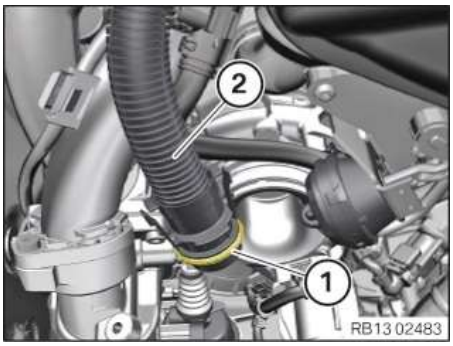
  The connector (1) must engage audibly.

116 – Installing the clean air pipe with resonator

carsign.com



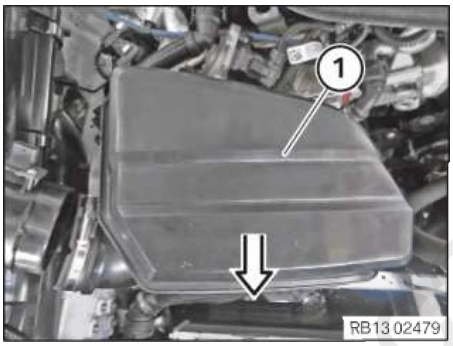
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



- 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.

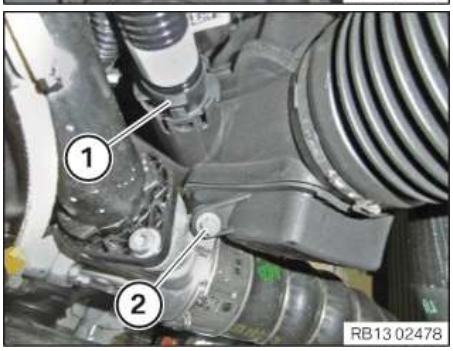


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

  The clamp (1) must engage audibly.

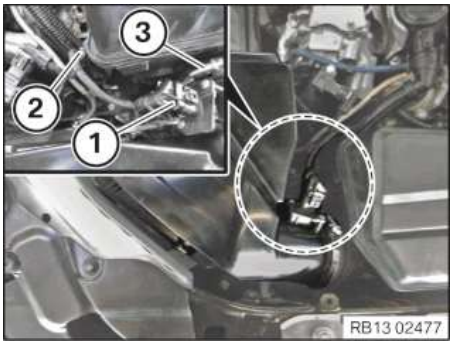


- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm

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- Connect the clean air pipe with resonator to the intake filter housing.
- Tighten clamp (3).

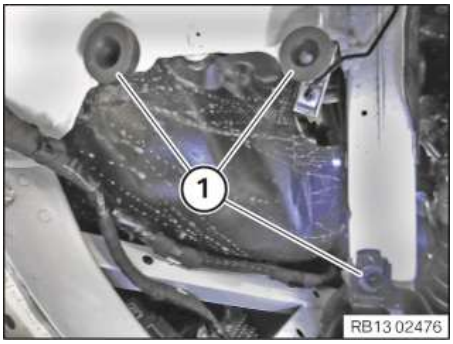
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

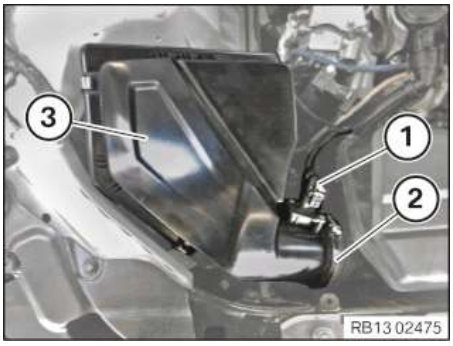
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

117 – 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

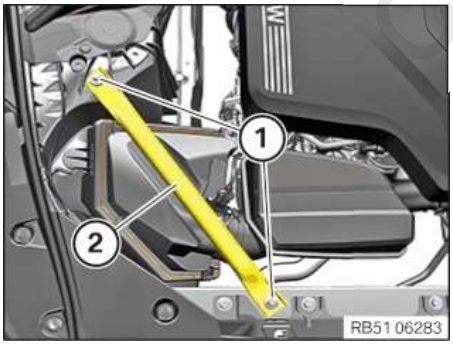
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

118 – Install the right front-end strut

TECHNICAL INFORMATION

Driving without the strut brace/front-end strut or tension strut is not permitted.



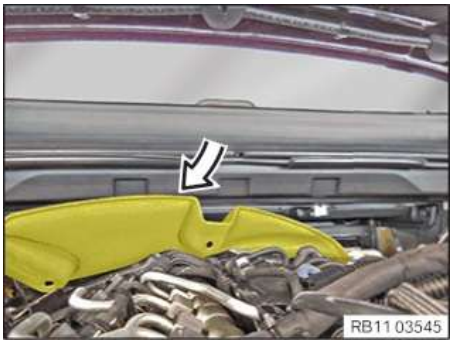
- Install the front-end strut (2).
- Renew screws (1).

  Parts: Screws
- Tighten the screws (1).

Front end strut

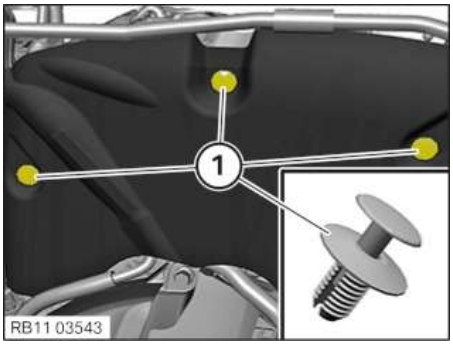
Screw		Tightening torque	56 Nm

119 – Installing acoustic cover at rear



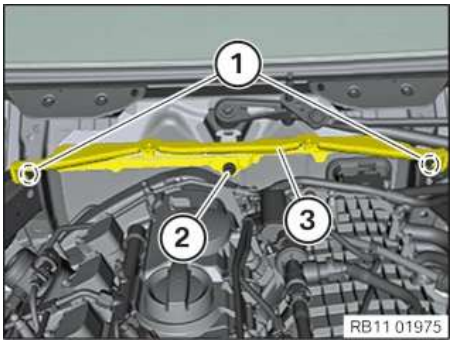
- Guide in the acoustic cover in the direction of the arrow and install it.

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- Secure acoustic cover with the expanding rivets (1).

120 – Installing centre bulkhead lower section

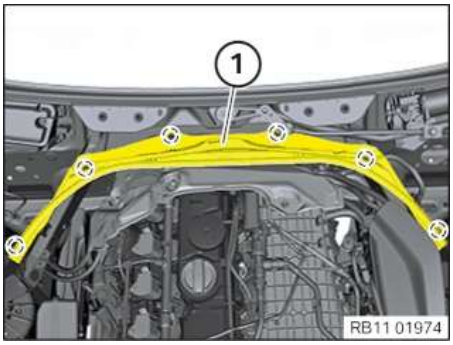


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

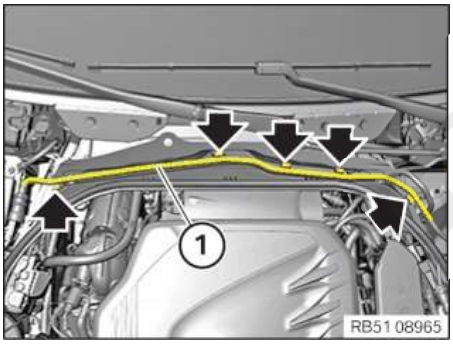
121 – Installing the centre bulkhead upper part



- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

Bulkhead upper part to bottom bulkhead

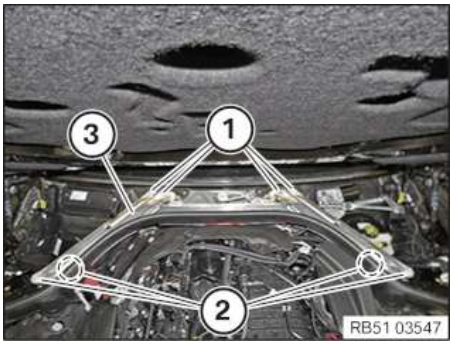
		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

  Clip in the wire (1) into the holders (arrows).

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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 °

122 – 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.

123 – Installing cowl panel cover

RISK OF DAMAGE

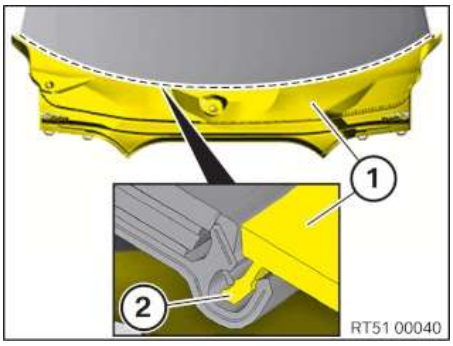
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

- Ensure correct installation of the components.
- Only use undamaged components.

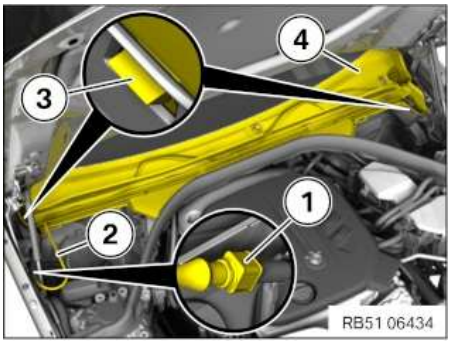
TECHNICAL INFORMATION

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.

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- 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.

124 – Install left and right wiper arm

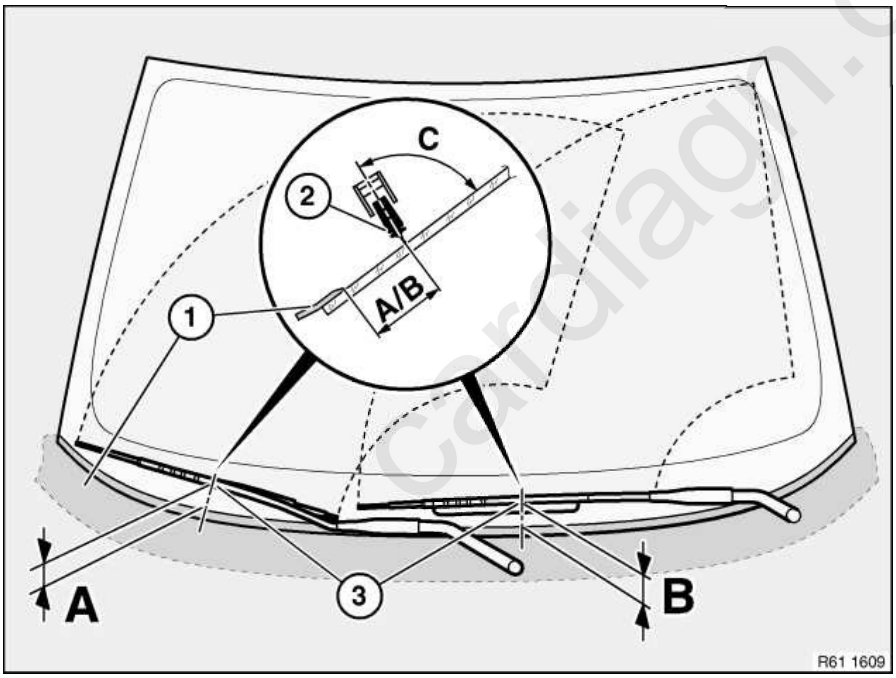
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

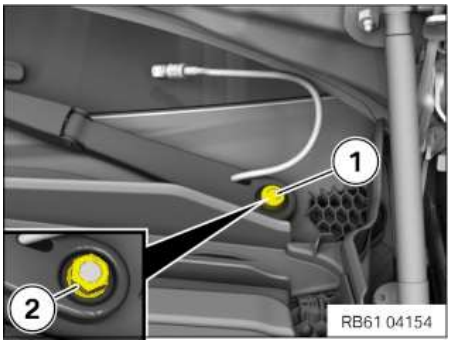
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- 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



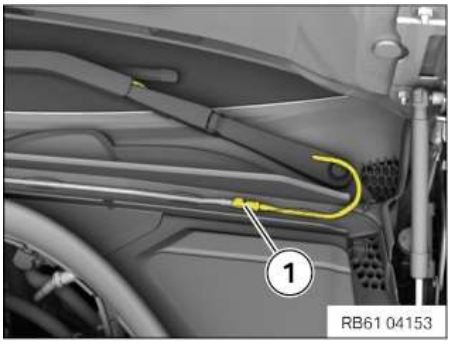
- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

- Connect the protective cap (1).

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- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

125 – Connecting all battery earth leads



- See additional information.

126 – 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

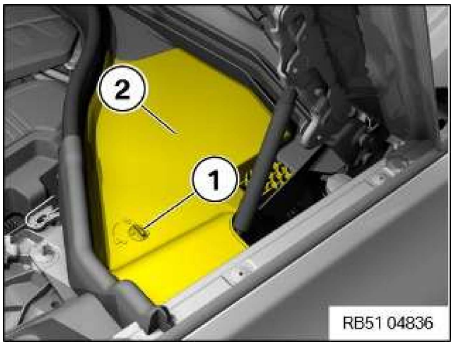


- Connect the connector (1) of the CAN bus and lock it.
- Clip in clip (2).



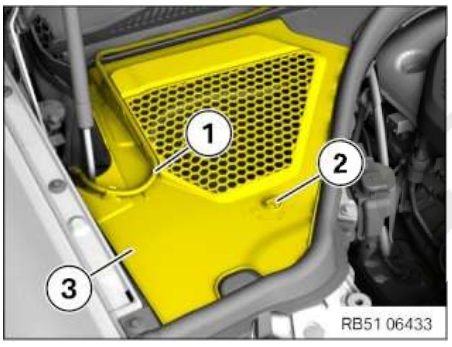
- Activate the 48V electrical system by closing the bonnet.
  The activation takes place automatically.

127 – Install the cover of the engine compartment on the rear left



- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

128 – 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.

129 – Take bonnet out of the service position

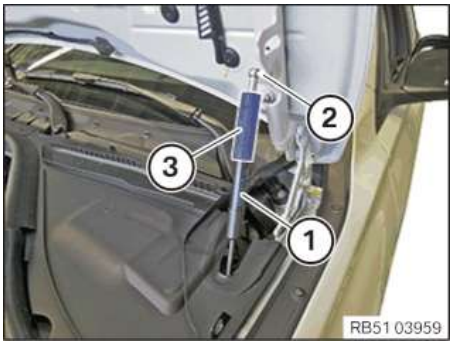
CAUTION

Shutting bonnet or tailgate.

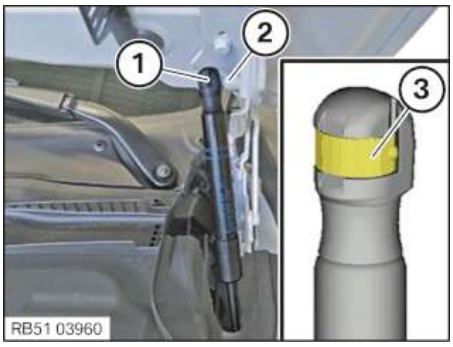
Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.

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- 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.

130 – 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.

131 – 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).

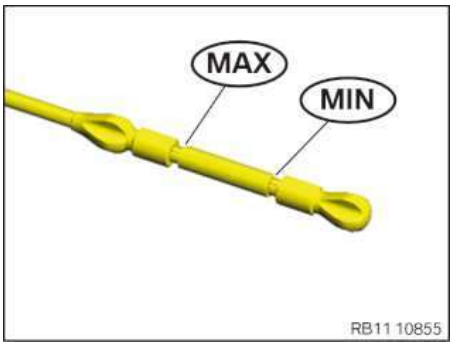
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- Park vehicle on a horizontal surface.
- Stop the engine and wait for 5 minutes.
- Pull out the oil dipstick and wipe off using a lint-free cloth.

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

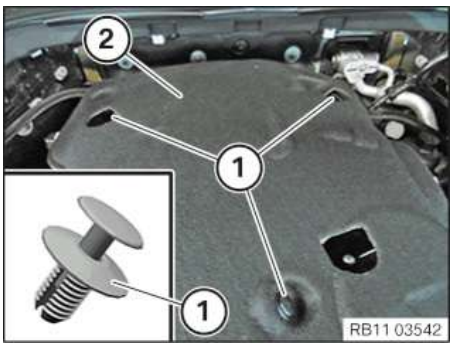
The engine oil level must be between the minimum mark and the maximum mark of the oil dipstick.

- 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

132 – 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) .

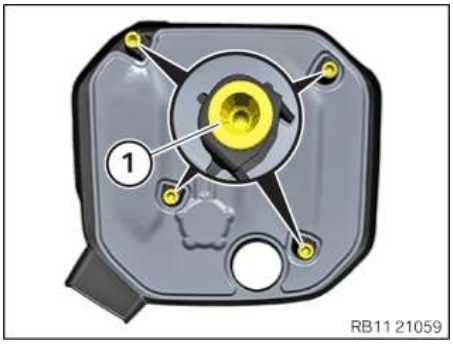
133 – Install acoustic cover

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).

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- 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 5376
M8x60		Tightening torque	19 Nm

Standard screw connection M8			Used in step 6271
M8		Tightening torque	19 Nm

Coolant temperature sensor at cylinder head			Used in step 62
Temperature sensor		Tightening torque	3,5 Nm

Glow elements to cylinder head			Used in step 62
Glow element		Tightening torque	13 Nm

Cylinder head to crankcase			Used in step 65
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 65
M8x40		Tightening torque	19 Nm

Standard screw connection M6			Used in step 6587
M6		Tightening torque	8 Nm

Ground to cylinder head			Used in step 65
M6		Tightening torque	8 Nm

Camshaft carrier to cylinder head			Used in step 68
M7x35		Tightening torque	13 Nm

Bearing journal to cylinder head			Used in step 71
M16x1.5	Replace bearing journal.	Tightening torque	20 Nm

Chain tensioner piston to cylinder head			Used in step 72
22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

Holder to crankcase			Used in step 72
M8X16		Tightening torque	19 Nm

Camshaft sprocket to camshaft			Used in step 73
M7x17.			17 Nm

Starter motor to engine			Used in step 79
M8X60		Tightening torque	19 Nm

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Battery positive lead to starter			Used in step 79
M8		Tightening torque	13,5 Nm

Cylinder head cover to cylinder head			Used in step 80
M6		Tightening torque.	8,5 Nm

Clamping claw facing to cylinder head cover			Used in step 81
M6		Tightening torque	10 Nm

Injector to cylinder head cover			Used in step 81
M8		Tightening torque	8 Nm
		Angle of rotation	120 °

Rail to cylinder head cover			Used in step 82
M8		Tightening torque	19 Nm

High pressure lines between high pressure pump and rail			Used in step 83
High-pressure pipe		Tightening torque	24.5 Nm

High pressure lines between injector and rail			Used in step 84
High-pressure pipe		Tightening torque	24.5 Nm

Intake plenum to cylinder head			Used in step 86
M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum			Used in step 8691
		Tightening torque	10 Nm

Electric changeover valve to intake plenum			Used in step 86
TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold			Used in step 87
TS5x20		Tightening torque	3,6 Nm

Standard screw connection 4 Nm			Used in step 87
Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover			Used in step 87
TS5x20		Tightening torque	3,6 Nm

Battery positive lead on the starter motor generator			Used in step 87
M8		Tightening torque	19 Nm

Holder on intake plenum			Used in step 87
TS6X20		Tightening torque	5 Nm

Exhaust manifold to cylinder head			Used in step 90
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 90
M6x12		Tightening torque	8 Nm

Exhaust-gas recirculation cooler to exhaust manifold			Used in step 9091
M8x28	Replace screws	Tightening torque	32 Nm

Exhaust-gas recirculation cooler to cylinder head			Used in step 9091
M8x20 / M8x28		Tightening torque	19 Nm

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Exhaust turbocharger low-pressure stage to crankcase — Used in step 90

M8X16		Tightening torque	22 Nm

Oil return line to turbocharger — Used in step 90

M6x12	Renew gasket.	Tightening torque	8 Nm

Oil return line to crankcase — Used in step 90

M6x12	Check gasket. Renew the seal or line if necessary.	Tightening torque	8 Nm

Exhaust-gas recirculation cooler to cylinder head — Used in step 91

M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °

Heat shield to exhaust manifold — Used in step 92

M6x12			10 Nm

Bracket on cylinder head cover — Used in step 93

		Tightening torque	5 Nm

Battery positive lead to battery positive terminal — Used in step 93

M8		Tightening torque	19 Nm

Heat shield to exhaust manifold — Used in step 94

M6x12		Tightening torque	10 Nm

Banjo bolt for exhaust pressure pipe to exhaust manifold — Used in step 94

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm

Exhaust gas pressure pipe to sensor system holder — Used in step 94

TS6x20		Tightening torque	5,7 Nm

Cover, steering unit — Used in step 97

Screw		Tightening torque	3 Nm

Brake disc to front wheel hub — Used in step 98

M8	Renew screw.	Tightening torque	16 Nm

Brake disc to rear wheel hub — Used in step 98

M8	Renew screw.	Tightening torque	16 Nm

Wheel bolts — Used in step 98

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 100

V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

Bracket to diesel particulate filter top — Used in step 100

M8		Tightening torque	19 Nm

Bracket to transmission for diesel particulate filter holder bottom — Used in step 100

M8X20		Tightening torque	19 Nm

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Lower holder to diesel particulate filter			Used in step 100
M8		Tightening torque	19 Nm

Coolant lines for SCR metering module			Used in step 100
M6X16		Tightening torque	8 Nm

Nitrogen oxide sensor before SCR catalytic converter			Used in step 101
Sensor		Tightening torque	50 Nm

Monitoring oxygen sensor			Used in step 102
Sensor		Tightening torque	50 Nm

Rear silencer to body / bumper support			Used in step 103
M8	Replace nuts.	Tightening torque	19 Nm

Exhaust system to rear axle carrier			Used in step 103
M8 nut		Tightening torque	19 Nm

Exhaust system to transmission			Used in step 103
M8		Tightening torque	19 Nm

Exhaust system to diesel particle filter			Used in step 103
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

SCR metering module V-clip to exhaust system			Used in step 103
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm

Exhaust-gas temperature sensor upstream of SCR catalytic converter			Used in step 103
Sensor		Tightening torque	30 Nm

Diesel particulate sensor to exhaust system			Used in step 103
Sensor		Tightening torque	50 Nm

Nitrogen oxide sensor downstream of SCR catalytic converter			Used in step 103
Sensor		Tightening torque	55 Nm

Connecting support to tunnel			Used in step 104
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

Diffuser / underbody panelling			Used in step 105
Nuts and screws		Tightening torque	3 Nm

Underbody protection			Used in step 106108
Hexagon screw		Tightening torque	3 Nm

Underbody panelling			Used in step 107
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Underbody protection, steering, to front axle support			Used in step 109
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support			Used in step 109
Hexagon bolt M6		Tightening torque	8 Nm

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Underbody protection of the steering gear — Used in step 110

Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

Wheel arch trim panel, front — Used in step 110

Thermoplastic hexagon screw		Tightening torque	2,6 Nm

Underbody protection front — Used in step 111

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 112

Sensor		Tightening torque	30 Nm

Front oxygen sensor to top of diesel particulate filter — Used in step 113

Sensor		Tightening torque	50 Nm

Exhaust-gas temperature sensor to diesel particulate filter — Used in step 114

Sensor		Tightening torque	30 Nm

Differential pressure sensor of diesel particulate filter on cylinder head cover — Used in step 115

TS5x20		Tightening torque	4 Nm

Clamp for the pressure hose on the differential pressure sensor — Used in step 115

Clamp 15–19mm		Tightening torque	3 Nm

Clean air pipe to exhaust turbocharger — Used in step 116

M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing — Used in step 116117

Clamp		Tightening torque	3 Nm

Front end strut — Used in step 118

Screw		Tightening torque	56 Nm

Bulkhead lower part to body — Used in step 120

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead — Used in step 121

		Tightening torque	3 Nm

Tension strut on bulkhead — Used in step 121

M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome — Used in step 121

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm — Used in step 124

Combination hexagon nut		Tightening torque	35 Nm

Negative battery cable to 48-V battery — Used in step 126

Nut M8		Tightening torque	19 Nm

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Overview of Special Tools

0 493 339 (13 5 252) Bush

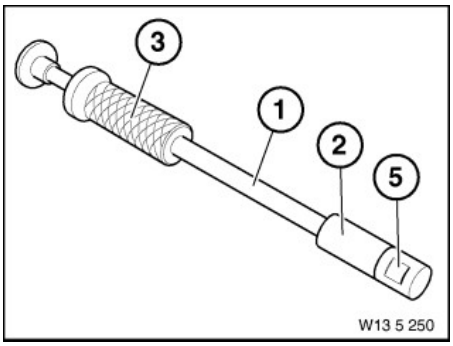


Common Used in step 50

Usage	(Threaded bush)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

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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)	

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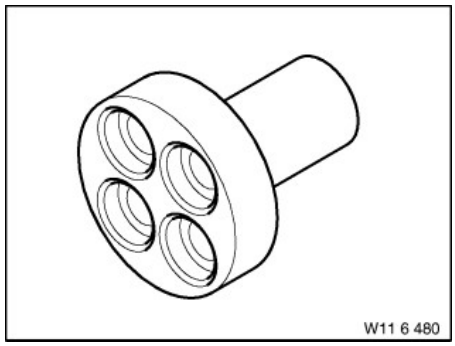
0 493 340 (13 5 253) Weight



Common Used in step 50

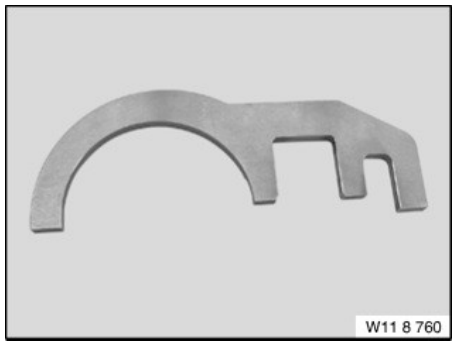
Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 380 (11 6 480) Connector



Common	Used in step 5376
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



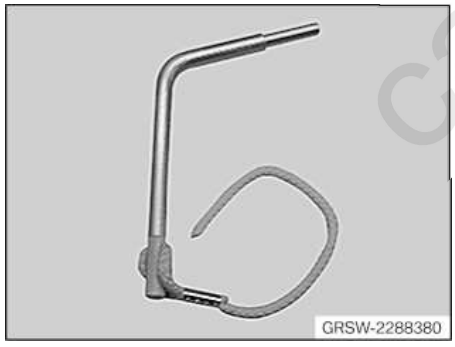
Common	Used in step 535769747677
Usage	For securing camshaft at TDC.
Included in the tool or work	
Storage location	B24
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

2 365 488 Adapter



Common	Used in step 53757678
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)

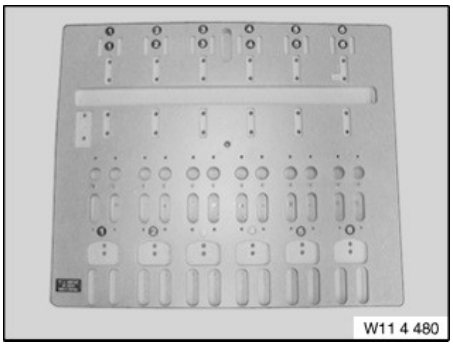
2 288 380 Locating stud



Common	Used in step 53757678
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)

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0 495 105 (11 4 480) oddments tray



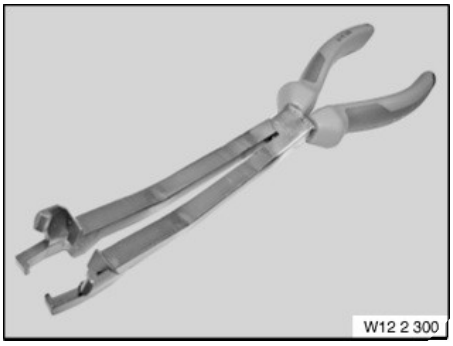
Common Used in step 596062

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	

0 495 140 (12 2 300) Pliers

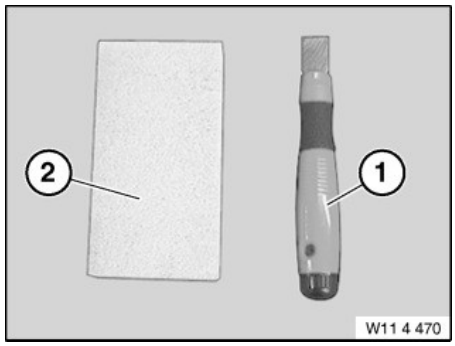


Common Used in step 61

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)

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0 495 102 (11 4 470) Tool



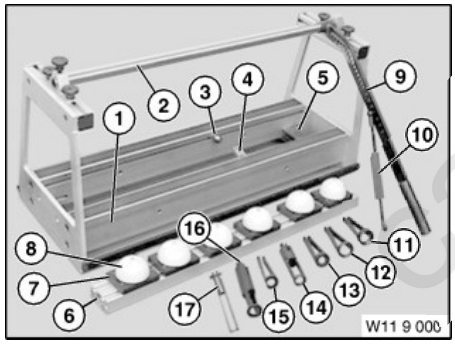
Common Used in step 6190

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)	

0 494 366 (11 9 001) Device



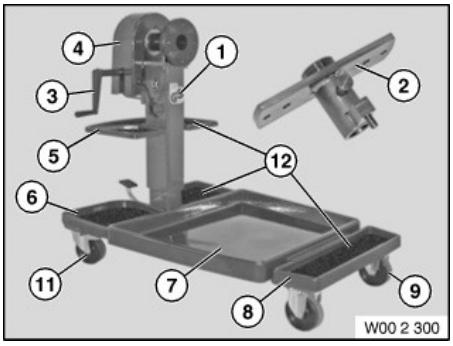
Common Used in step 62

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 62

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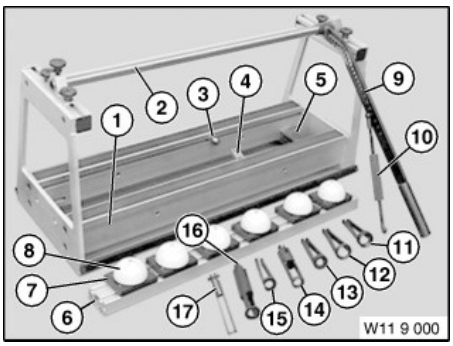
Common

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.	

0 494 371 (11 9 006) Insert

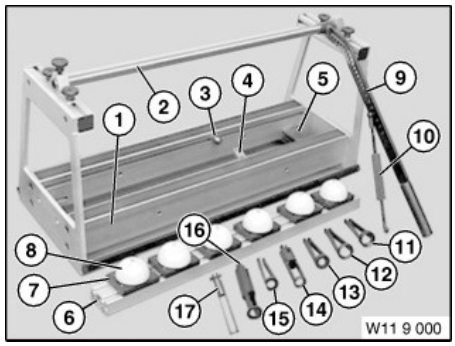


Common Used in step 62

Usage	(Aluminium strip)
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

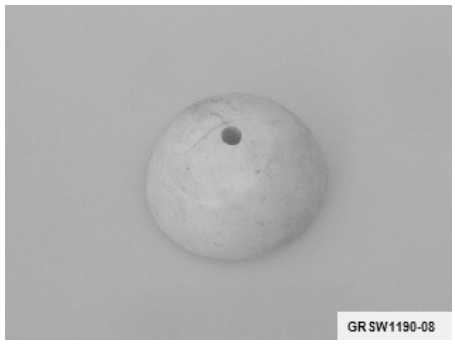
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0 494 372 (11 9 007) Shaped part



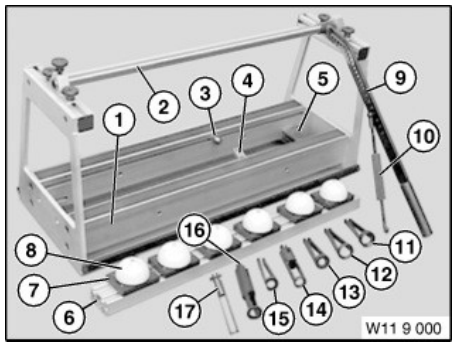
Common	Used in step 62
Usage	(Shaped part)
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 494 373 (11 9 008) Shaped part



Common	Used in step 62
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

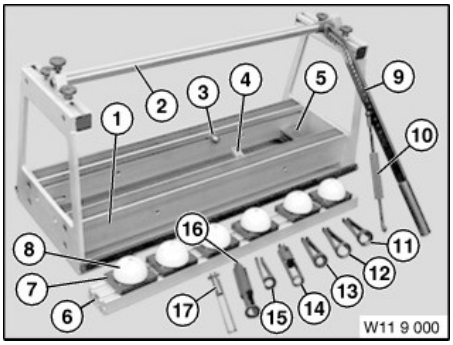


Common	Used in step 62
Usage	
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 494 362 (11 9 000) Device

Used in step 62

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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	

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0 494 374 (11 9 009) Lever



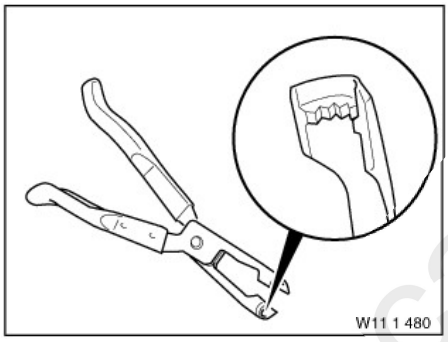
Common	Used in step 62
Usage	
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 496 143 (11 8 840) Basket



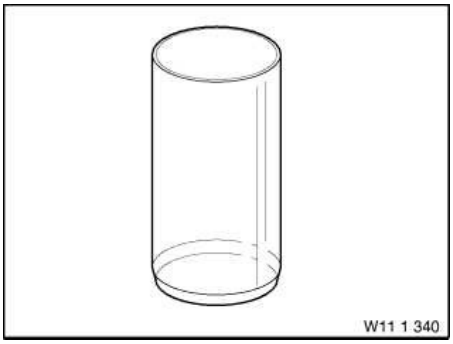
Common	Used in step 62
Usage	(Valve spring cage) For removing and fitting the valves.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

0 490 796 (11 1 480) Pliers



Common	Used in step 62
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)

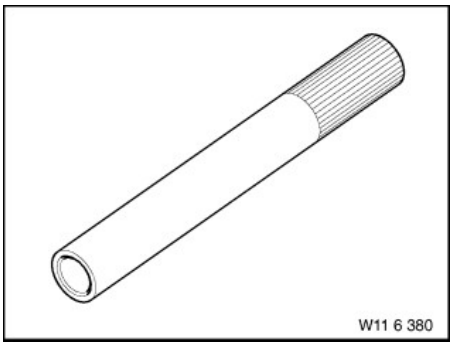
0 490 746 (11 1 380) Holding sleeve



Common	Used in step 62
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	

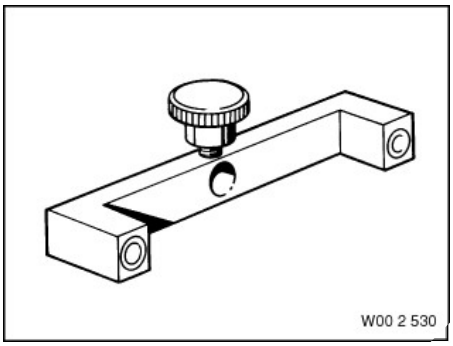
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0 493 249 (11 6 380) Bush



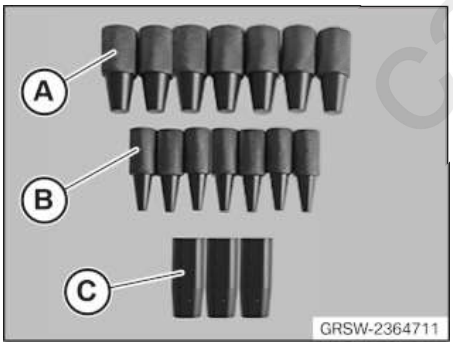
Common	Used in step 62
Usage	For fitting valve stem seal
Included in the tool or work	
Storage location	A9
Replaced by	
In connection with	
SI-Number	01 06 98 (306)

0 490 185 (00 2 530) Bridge



Common	Used in step 62
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	

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	

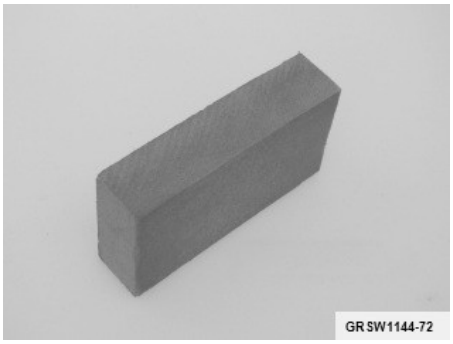
0 495 103 (11 4 471) Scraper



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	

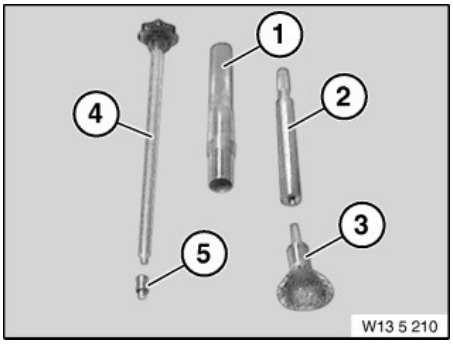
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0 495 104 (11 4 472) Extractor



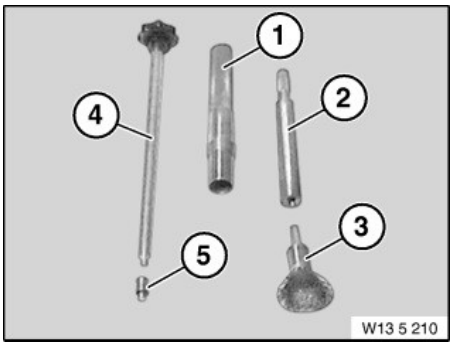
Common	Used in step 63
Usage	(grindstone)
Included in the tool or work	0 495 102
Storage location	C52
Replaced by	
In connection with	
SI-Number	

0 493 763 (13 5 215) Plug



Common	Used in step 81
Usage	(Seal plug)
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

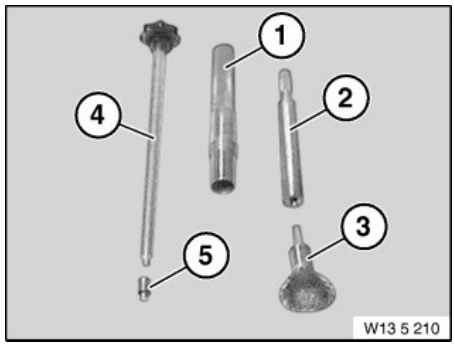
0 493 762 (13 5 214) Rod



Common	Used in step 81
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	

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0 493 758 (13 5 210) Tool



Common Used in step 81

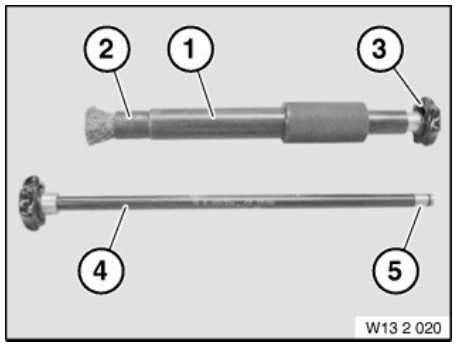
Usage	(Cleaning set) For injector channels
Included in the tool or work	
Storage location	B4
Replaced by	
In connection with	
SI-Number	01 05 00 (574)

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)	

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0 496 150 (13 2 020) Tool



Common Used in step 81

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.	

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2 344 011 Tool



Common	Used in step 98
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	

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	

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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	

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	

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2 299 563 Adapter



Common	Used in step 62
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

Valve underprotrusion	Used in step 62
	0,8 (0.7 - 0,9) mm

Distance from window pane edge to wiper blade	Used in step 124
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 131
	1.0 l

Links

Repair instructions (PRE)	Used in step
Notes on 48-V battery	4126

General repair instructions	Used in step
11 00 ... Overview of consumables (Electronic Parts Catalogue)	81

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5125
61 20 900 Disconnecting and connecting battery earth lead	5125
61 20 900 Disconnecting and connecting battery earth lead	5125
61 20 900 Disconnecting and connecting battery earth lead	5125
61 20 900 Disconnecting and connecting battery earth lead	5125
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61 20 900 Disconnecting and connecting battery earth lead	5125
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5125
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61 20 900 Disconnecting and connecting battery earth lead	5125
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61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5125
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61 20 900 Disconnecting and connecting battery earth lead	5125

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61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5125
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5125
61 20 900 Disconnecting and connecting battery earth lead	5125
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5125
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	5125
61 20 900 Disconnecting and connecting battery earth lead	5125
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11 12 161 replace cylinder head

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

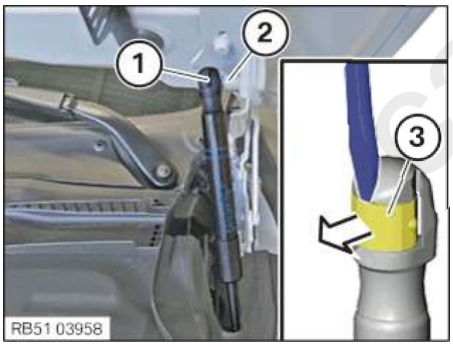
Engine compartment lid is open.

CAUTION

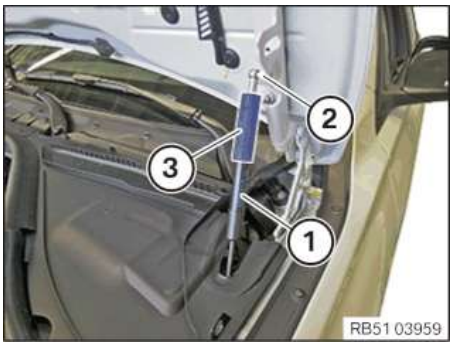
Shutting bonnet or tailgate.

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

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- See additional information.

3 – Removing the acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

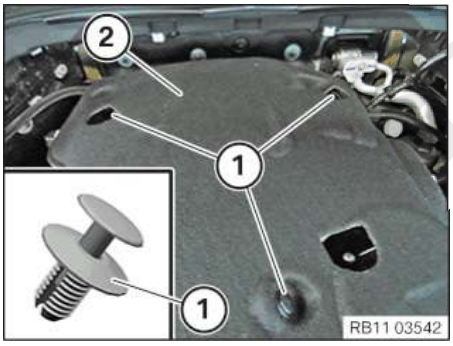
Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- 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.



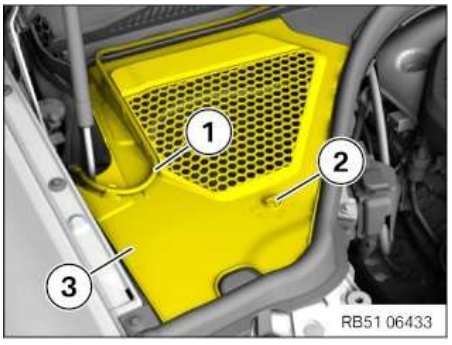
- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

4 – Remove the acoustic cover for the injectors



- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

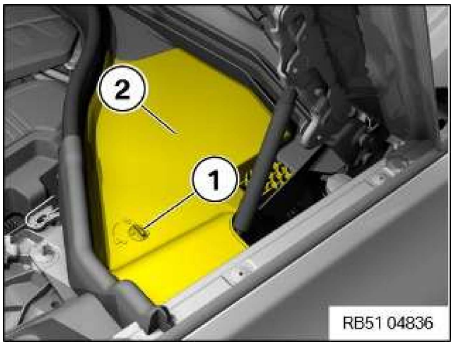
5 – Remove the cover of the rear right engine compartment



- 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

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- 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.

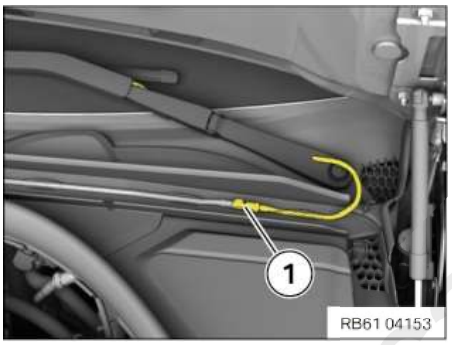
▸ **Remove the wiper arm**

RISK OF DAMAGE

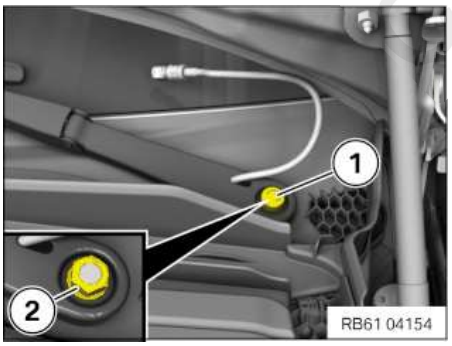
Damage to wiper console.

While removing the wiper arms without using special tool, the wiper console can break.

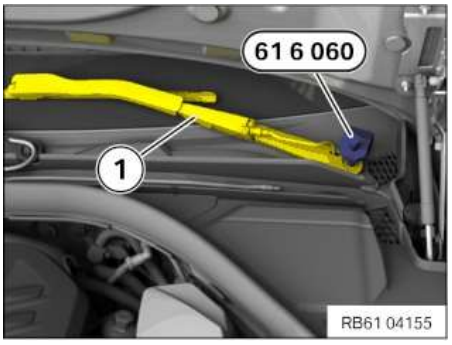
- Removing the wiper arms must be carried out only using the prescribed special tool.
- Do **not** lever off the wiper arm because otherwise the wiper console may break at the predetermined breaking point for active pedestrian protection.



- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.



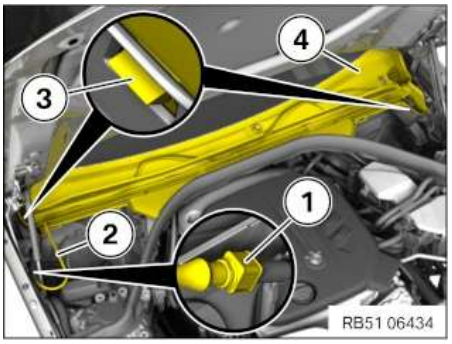
- Remove the protective cap (1).
- Loosen nut (2).



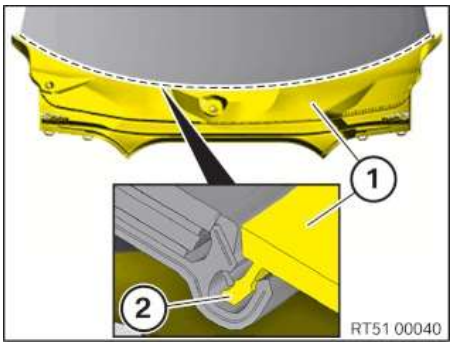
- Pull off the wiper arm (1) using special tool .

8 – Remove cowl panel cover

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- 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

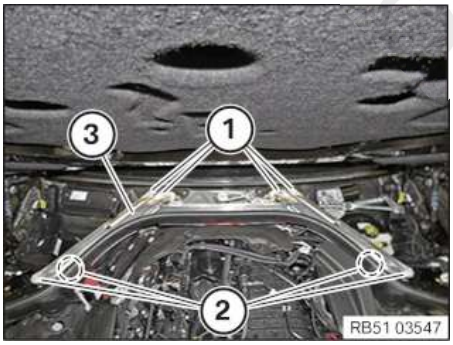


- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

10 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

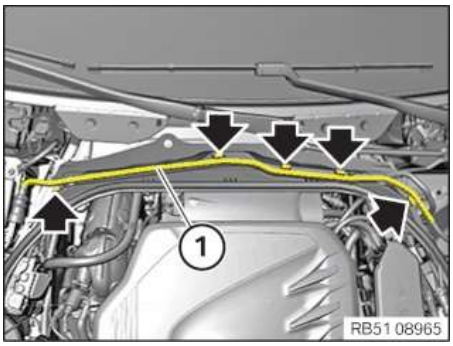
Driving without the strut brace/front-end strut or tension strut is not permitted.



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

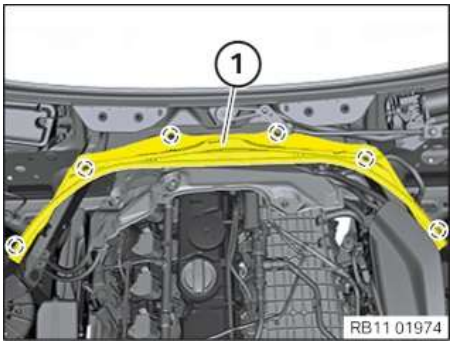
- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.



- **Version with mild hybrid technology:**

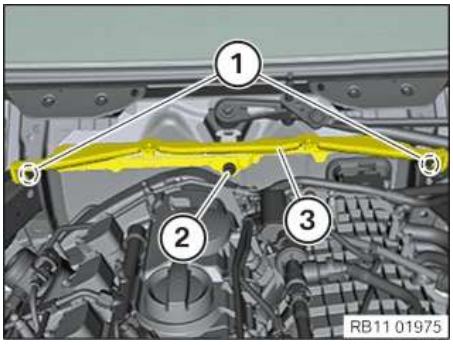
  Unclip the wire (1) at the holders (arrows).

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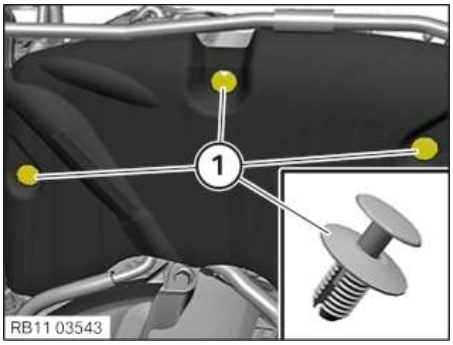
- Unscrew the bolts in the marked areas.
- Remove the centre bulkhead upper part (1).

11 – Removing the centre bulkhead lower section

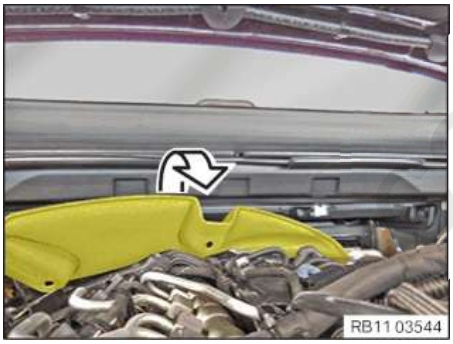


- Loosen screws (1).
- Loosen nut (2).
- Remove the centre bulkhead lower part (3).

12 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).

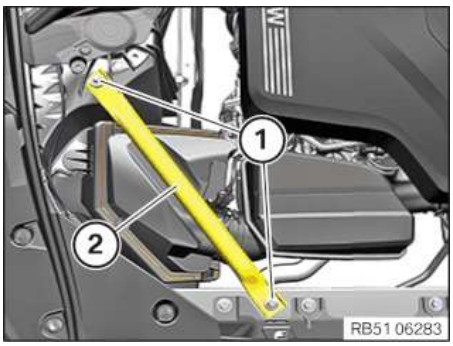


- Guide out and remove the acoustic cover in the direction of the arrow.

13 – Remove right front-end strut

TECHNICAL INFORMATION

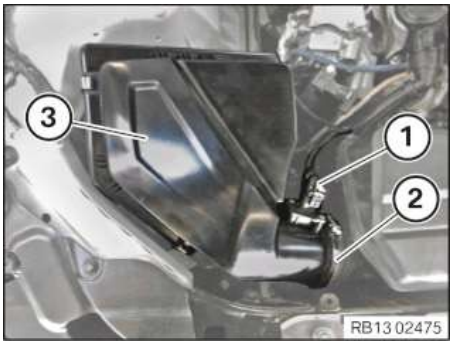
Driving without the strut brace/front-end strut or tension strut is not permitted.



- Loosen screws (1).
- Remove the front-end strut (2).

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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.

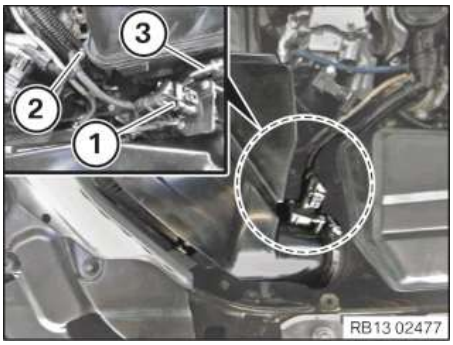
15 – Removing the clean air pipe with the resonator

WARNING

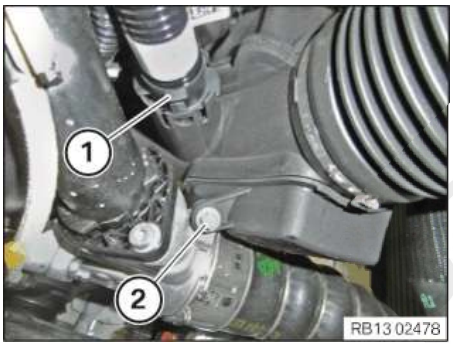
Hot surfaces.

Risk of burning!

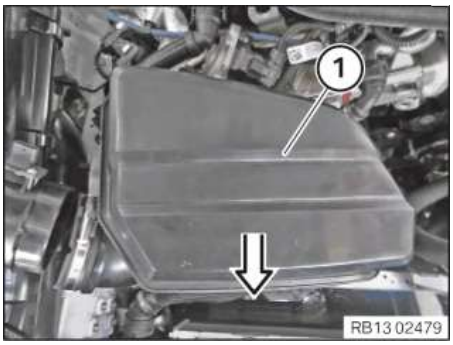
- Perform all work only on components that have cooled down.



- 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!

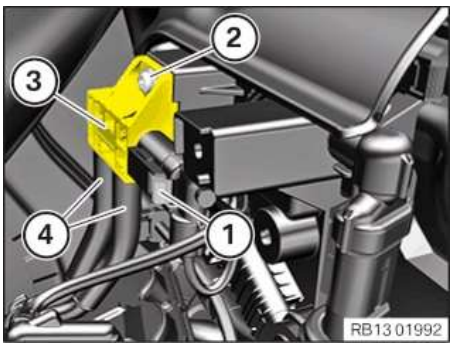
- Perform all work only on components that have cooled down.

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

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WARNING

Hot surfaces.

Risk of burning!

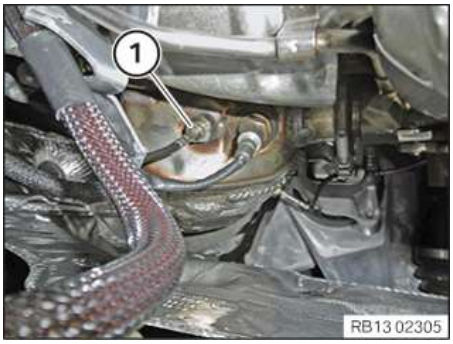
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

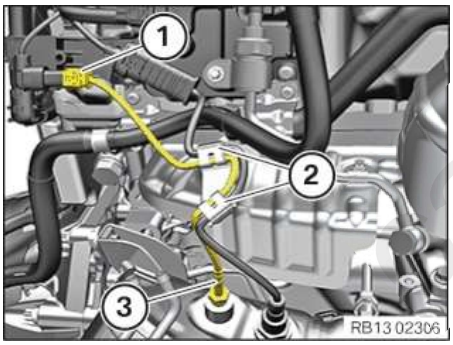
Electrostatic discharge.

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- 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.

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RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

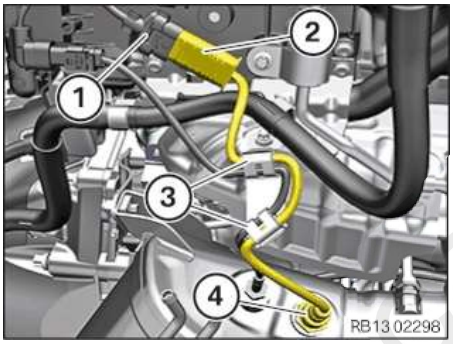
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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.

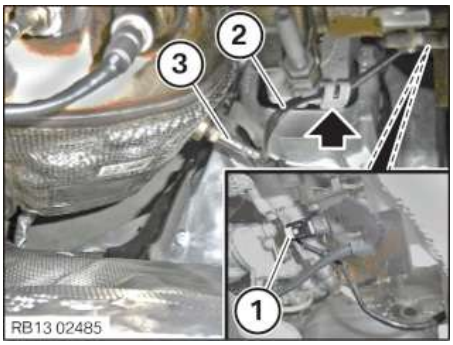
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RISK OF DAMAGE

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)

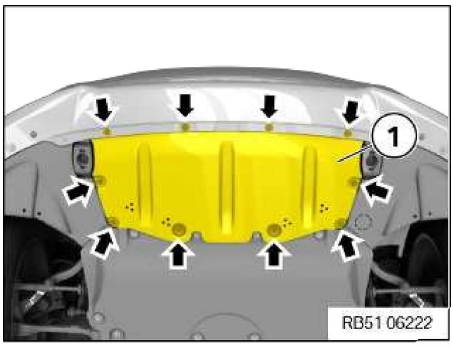


- Unlock plug connection (1) and disconnect.

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).

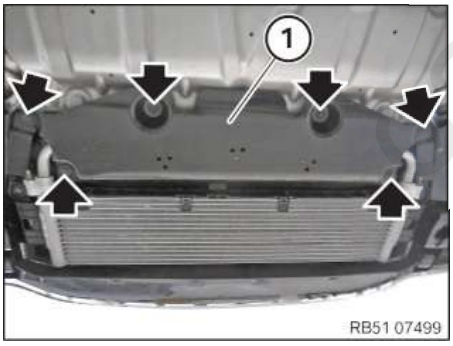
20 – Removing the front underbody protection



- **Version A:**

  Remove screws (arrows).

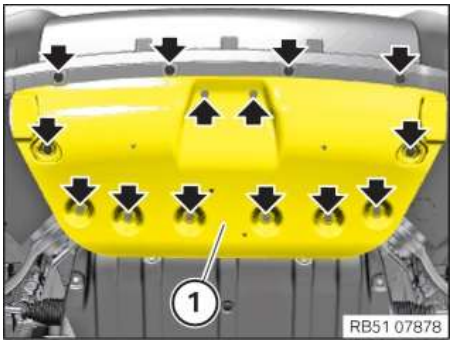
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version B:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

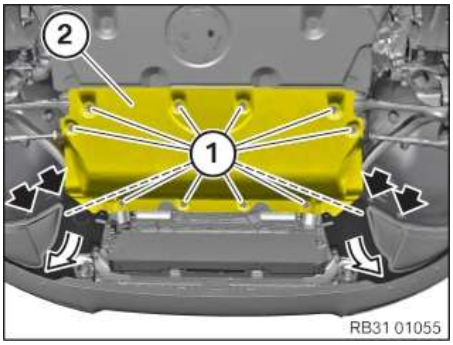


- **Version C:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

21 – Remove the underbody protection of the steering gear



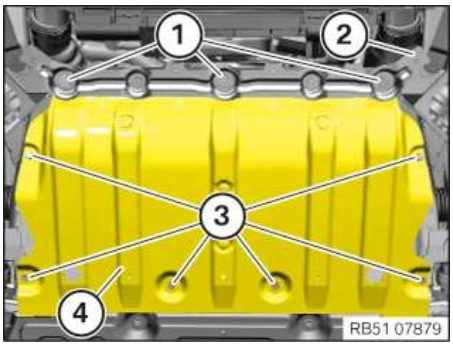
- **Version A:**

  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.

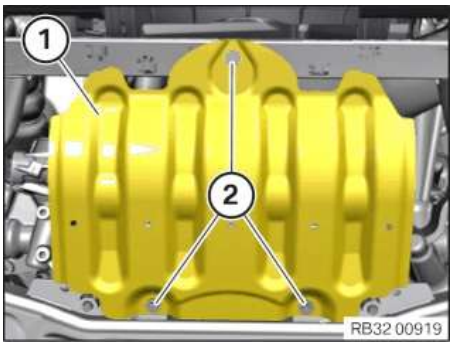
  Loosen screws (3).

  Feed out and remove the underbody protection (4) of the steering gear.

22 – If installed: Removing the steering underbody protection

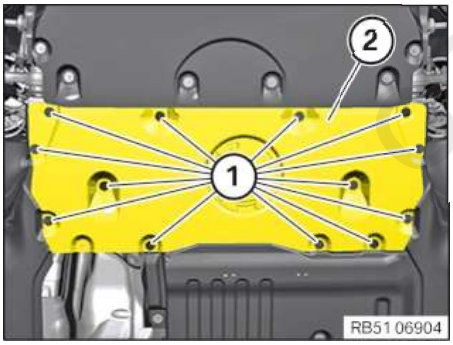
Prerequisite

Front underbody protection has been removed.



- Loosen screws (2).
- Remove underbody protection (1).

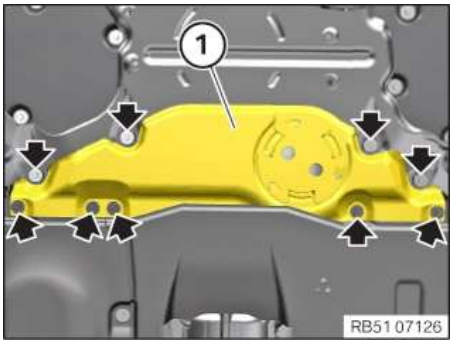
23 – Removing the centre underbody protection



- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .



- **Version with all-wheel drive:**

  Remove screws (arrows).

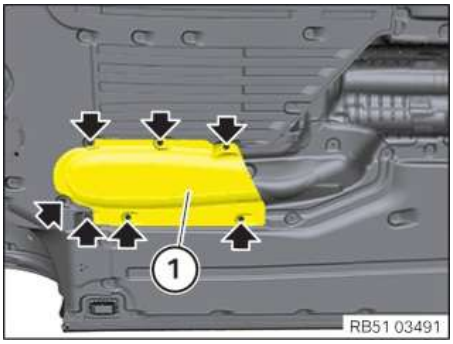
  Feed out and remove the centre underbody protection (1).

24 – Remove the underbody panelling of the transmission on the side

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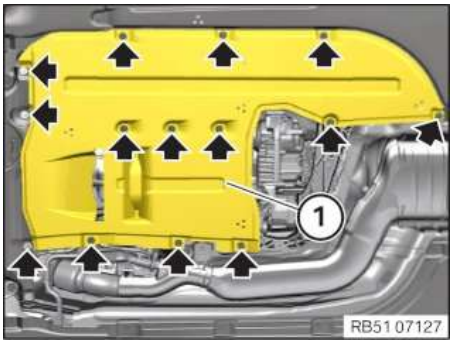
NOTICE

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).

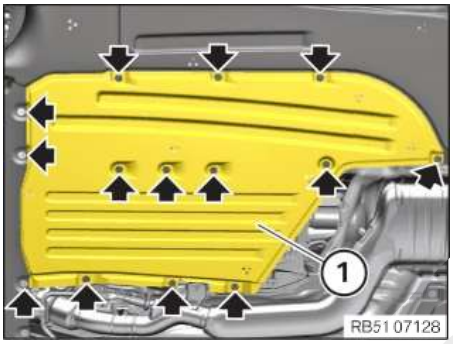
25 – Remove rear underbody protection



- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).

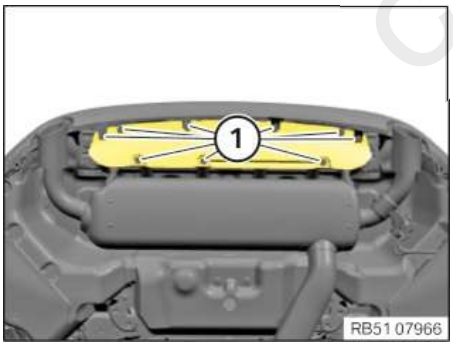


- **Version B:**

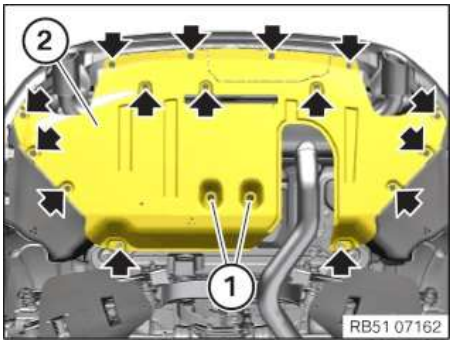
  Remove screws (arrows).

  Guide out rear underbody protection (1) and remove it.

26 – Removing the rear diffuser



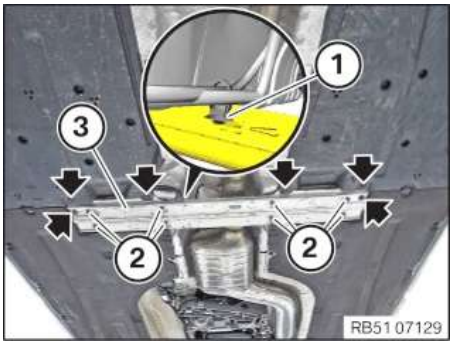
- **Version 1:**
- Release the screws and nuts (1).
- Remove the diffuser.



- **Version 2:**
- Loosen nuts (1).
- Remove screws (arrows).
- Guide out and remove rear diffuser (2).

27 – Remove the connecting support from the tunnel

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- 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!

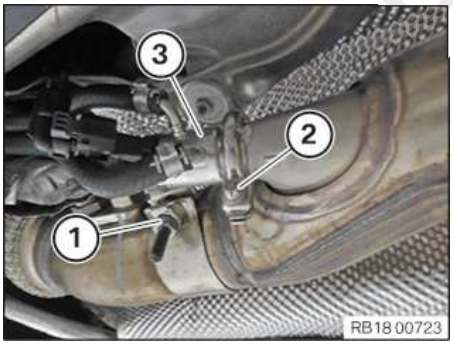
- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

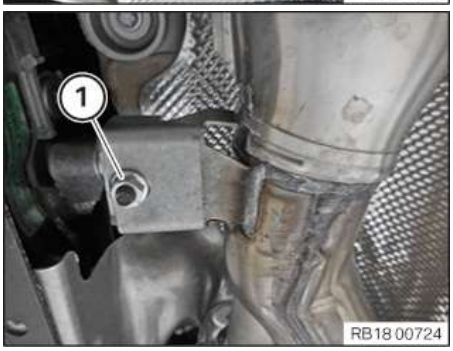
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

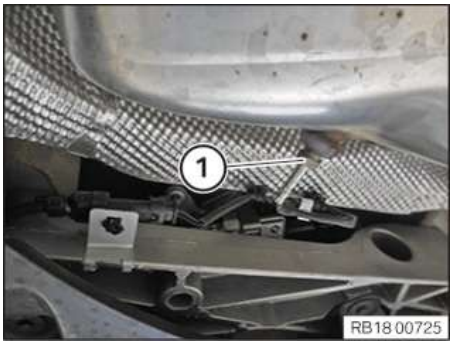


- Unfasten clamp (1).
- Detach the clamp (2) of the SCR metering module (3).
- Detach the SCR metering module (3)from the exhaust system and place to one side.

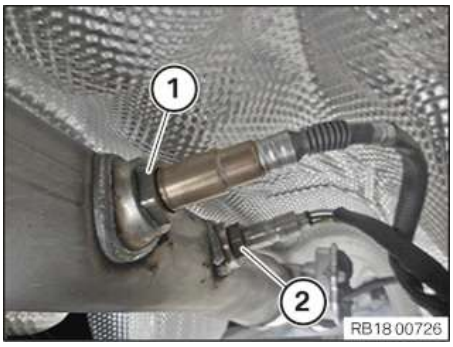


- Loosen nut (1).

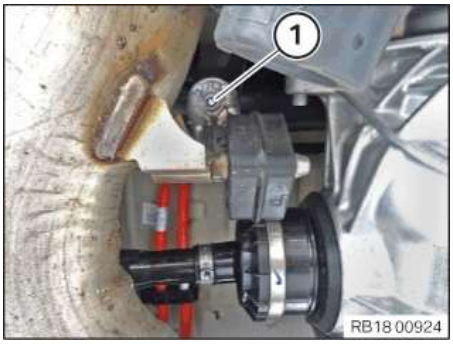
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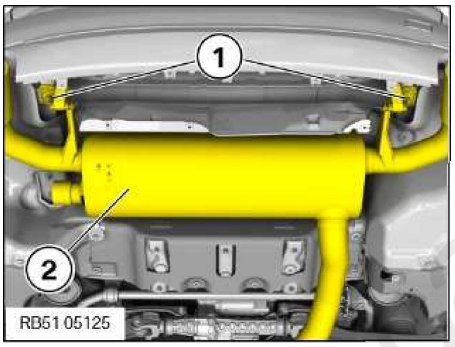
- Detach the exhaust temperature sensor (1) from the exhaust system.



- 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.

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RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

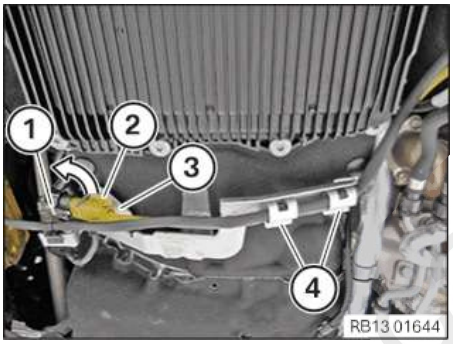
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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.

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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.

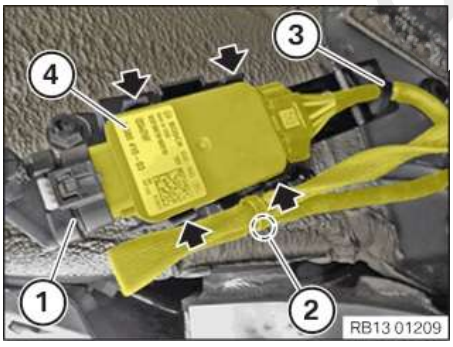
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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

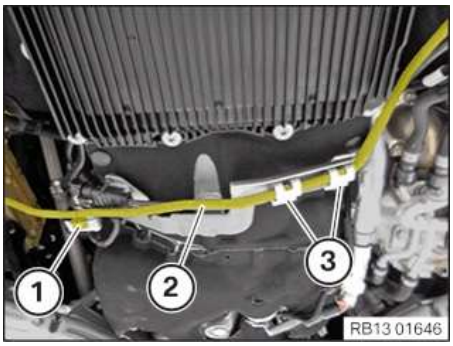
Damage to the nitrogen oxide sensor.

Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

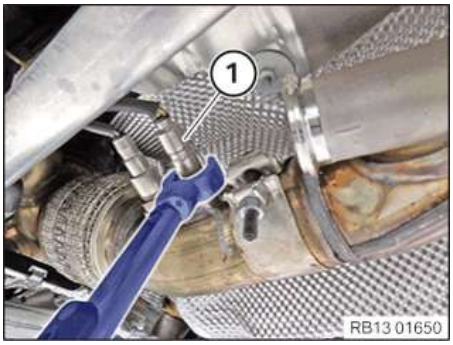
- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug 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.



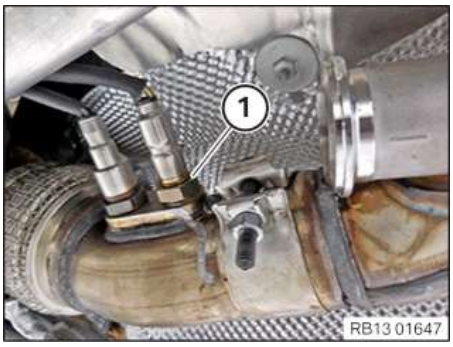
- Unlock plug connection (1) and disconnect.
- Release cable clip in area (2).
- Release line from the holder (3).
- Unclip control unit (4).



- 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!

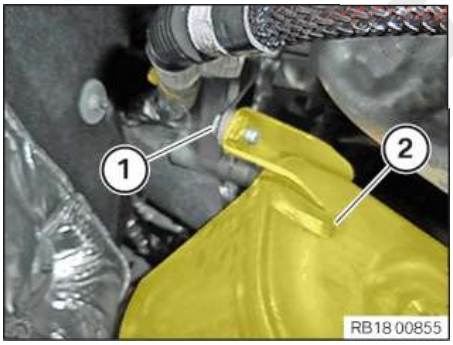
- Perform all work only on components that have cooled down.

CAUTION

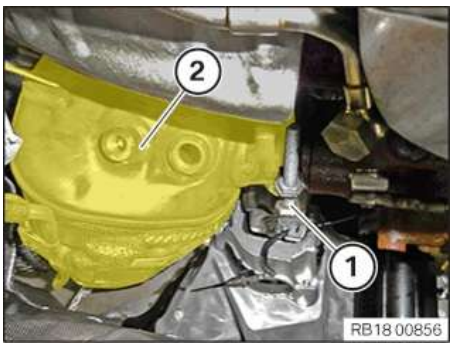
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

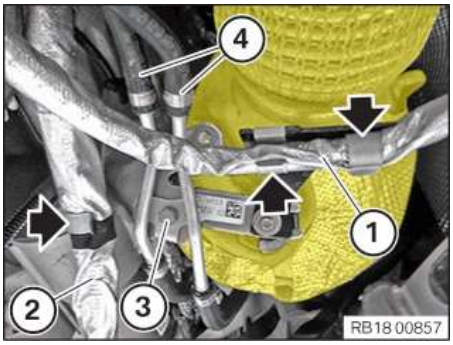


- Release bolt (1) from the holder of diesel particulate filter (2).

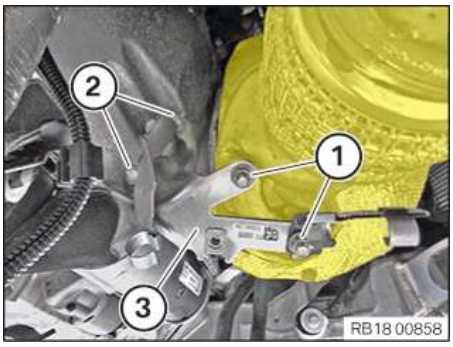


- Loosen V-band clamp (1).
- Feed V-clip (1) out from diesel particulate filter (2) and remove.

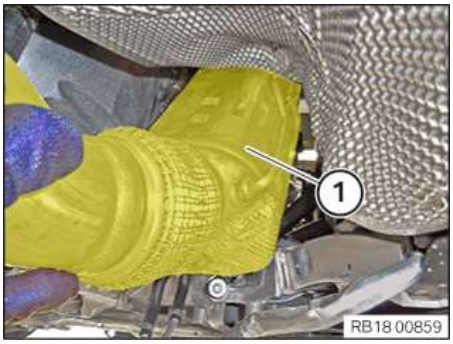
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- Release the metering line (1) from clamps (Arrows).
- Release positive battery cable (2) from starter motor from clamp (Arrow).
- Loosen screw (3).
- Thread off coolant line (4) and place to the side.



- 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.**

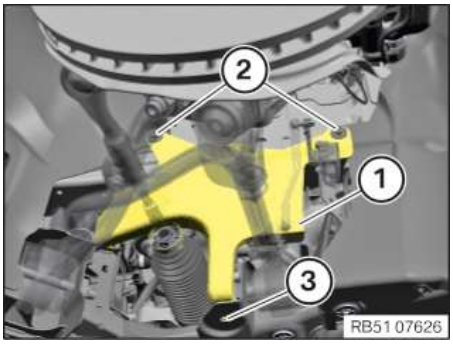
  This process is intended to prevent damage to the brake disc.

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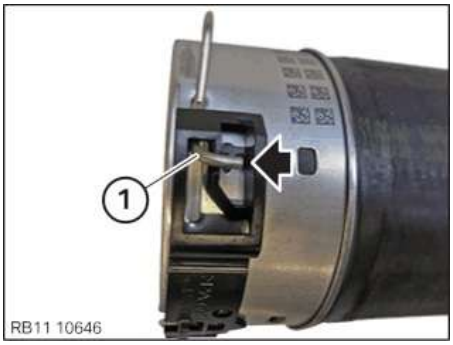
- If several wheels are removed at the same time: Use a piece of chalk to mark on each tyre the axle and side on which the corresponding wheel is fitted.
- Release the wheel bolts (arrows) crosswise and remove the wheel.
- To release and tighten wheel bolts with a security code: Use the correct adapter from the set of special tools .

33 – Remove the cover of the steering assembly



- Loosen screws (2) and (3).
- Remove the cover (1).

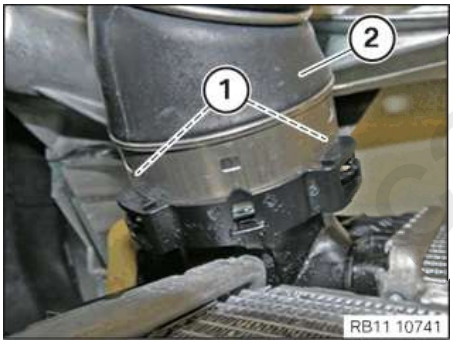
34 – Remove pressure pipe between exhaust turbocharger and charge air cooler



- **Version A:**

  Unlock lock (1).

  The lock (1) must snap audibly into place when unlocked (see arrow).



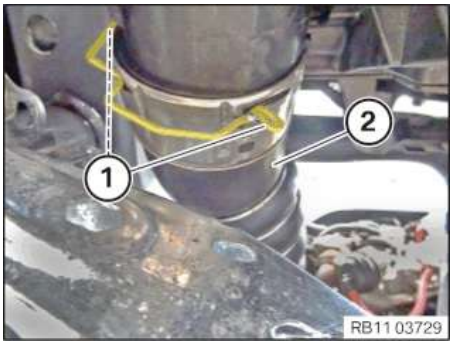
- Unlock the locks (1) on both sides and snap into place.
- Pull off pressure pipe (2) from charge air cooler.



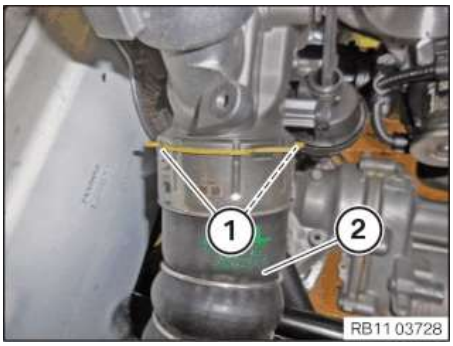
- **Version B:**

  Unlock clamp (1) and engage in this position.

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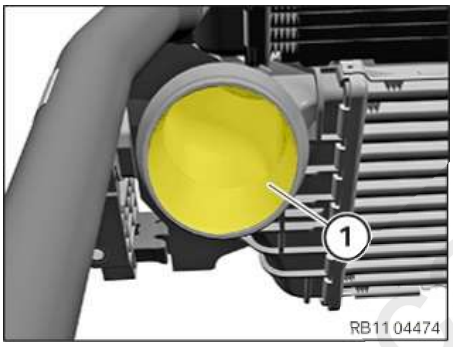
- Unlock the locks (1) and snap into place.
- Pull off pressure pipe (2) from charge air cooler.



- 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.

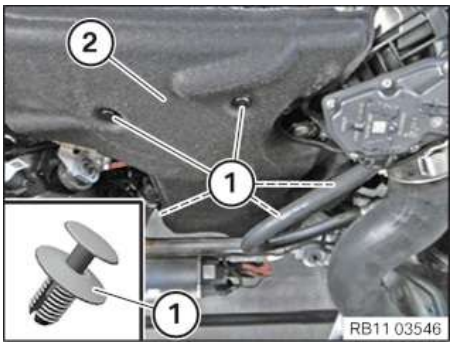
35 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.



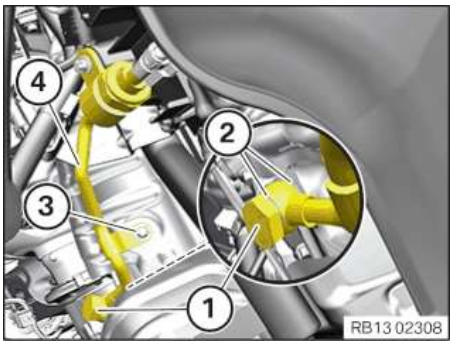
- Release and remove expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

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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.

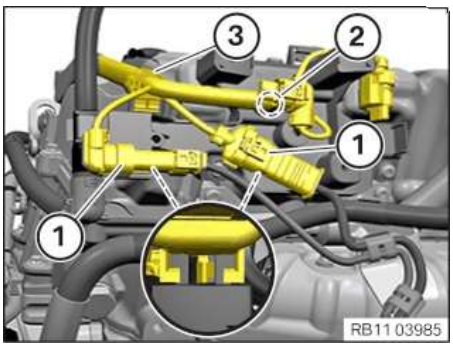
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

Contaminant or foreign body.

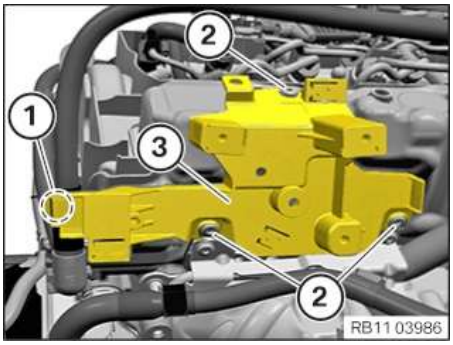
Contamination can result in malfunctions, operating failure or leaks.

- 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.

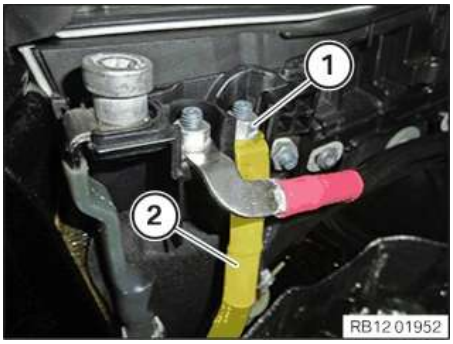
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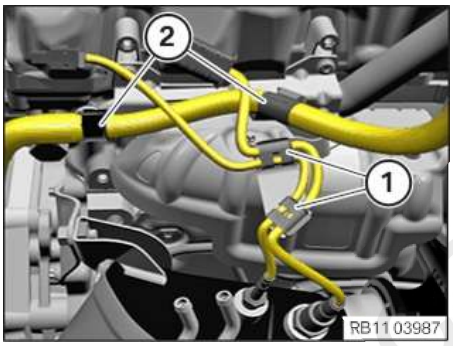
- Release the positive battery cable in the area (1) from the clamp and set it aside.
- Loosen screws (2).
- Feed out holder (3) for the sensor system and remove.



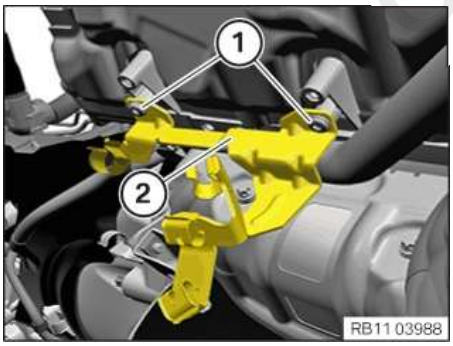
- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.



- Loosen nut (1).
- Feed out positive battery cable (2) and put to one side.



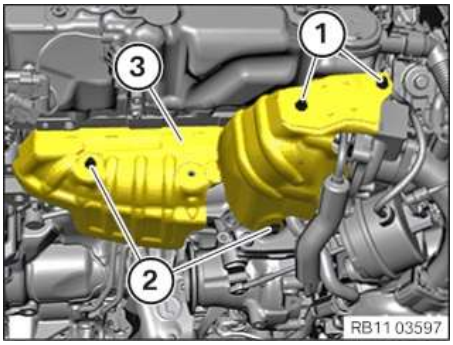
- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



- Loosen screws (1).
- Guide out and remove holder (2).

38 – Removing heat shield

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- 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.

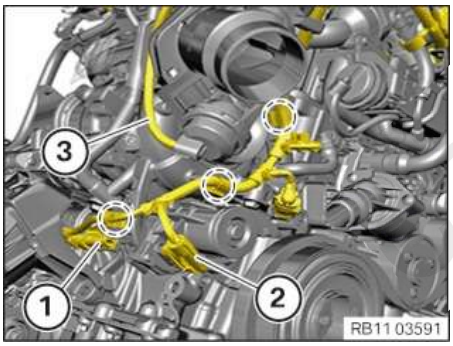
- Remove and install heavy components with the aid of another person/other persons.

TECHNICAL INFORMATION

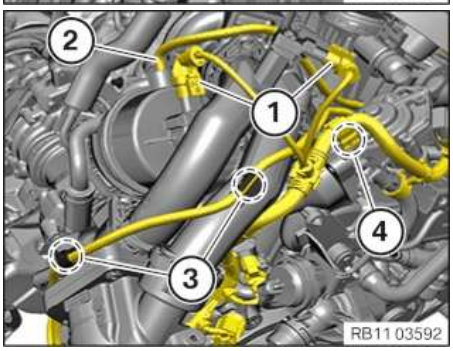
Prior to replacing the exhaust turbocharger: Observe the notes on troubleshooting on the exhaust turbocharger.
For additional information see: FUB-FUB-FB-130003-A10 Troubleshooting on the exhaust turbocharger

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).



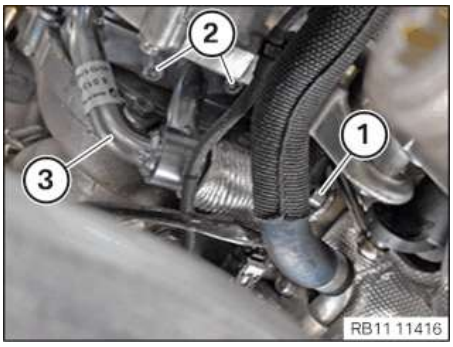
- Unlock plug connections (1) and disconnect.
- Pull off the vacuum hose (2).
- Release the vacuum hose in marked areas (3) from the exhaust turbochargers.
- Release the wiring harness in area (4) from the exhaust-gas recirculation cooler and set it aside.



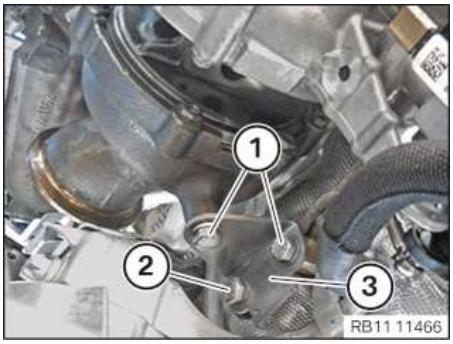
TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

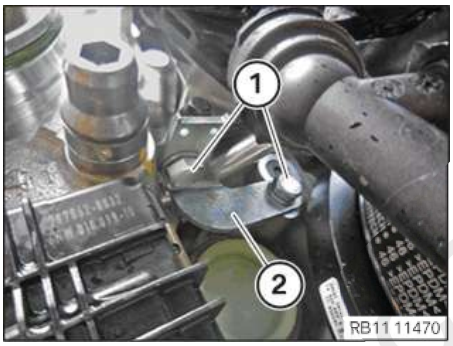
- Release the screws of the oil return line on the crankcase from the right wheel arch.



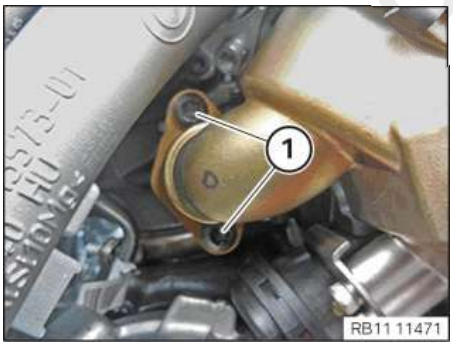
- Release the screw (1).
- Loosen screws (2).
- Remove oil return line (3) from the crankcase.
- Catch and dispose of emerging engine oil.



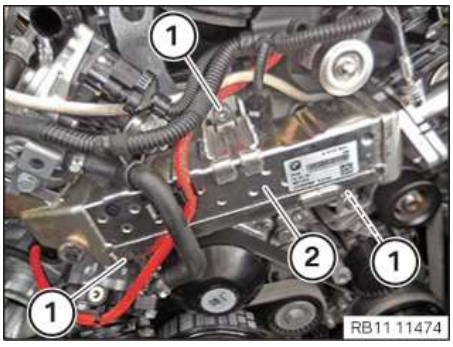
- Unscrew and remove the bolts (1) on the holder (3).
- Slacken screw (2) on holder (3), but do **not** remove.



- Loosen screws (1).
- Guide out and remove holder (2).

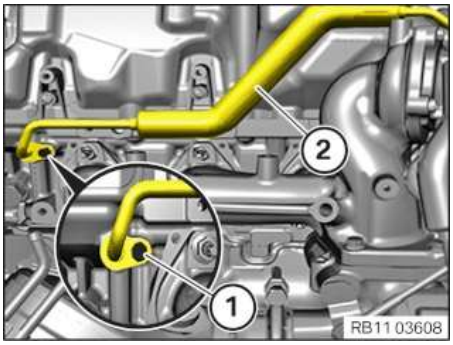


- Loosen screws (1).

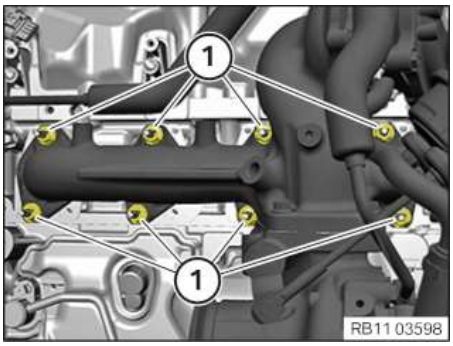


- Slacken screws (1), but do **not** remove.
- Release exhaust-gas recirculation cooler (2) slightly.

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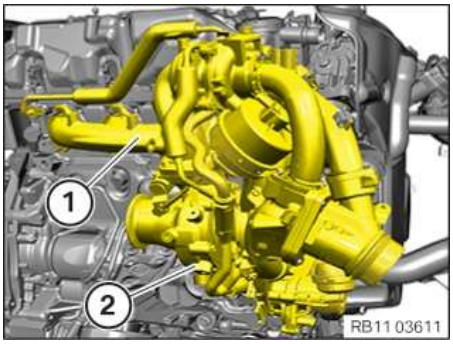
- Loosen screw (1).
- Remove oil feed line (2) for the high-pressure stage exhaust turbocharger from the cylinder head and set it aside.
- Catch and dispose of emerging engine oil.



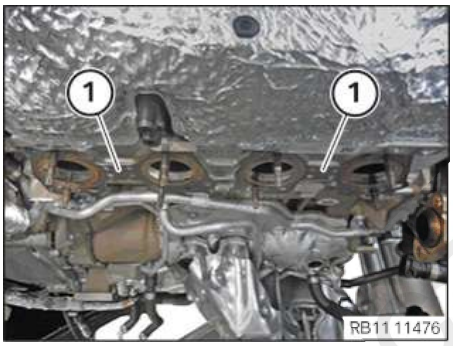
TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

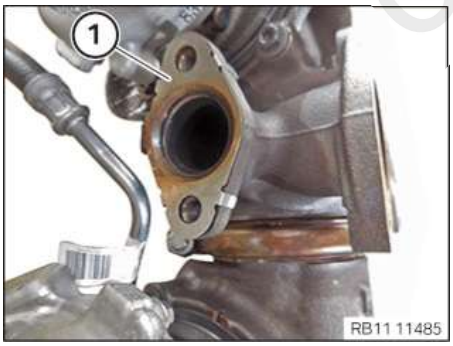
- Loosen nuts (1).



- 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.

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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.

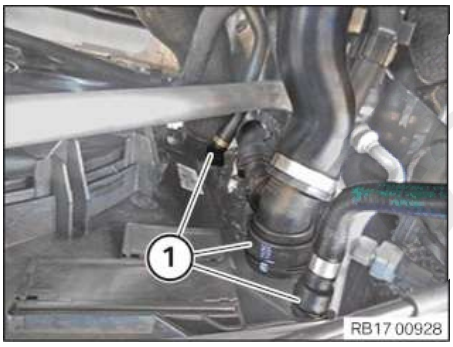
In the case of other removal work involving the draining of part quantities of coolant, the coolant level must be topped up with new coolant.

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

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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

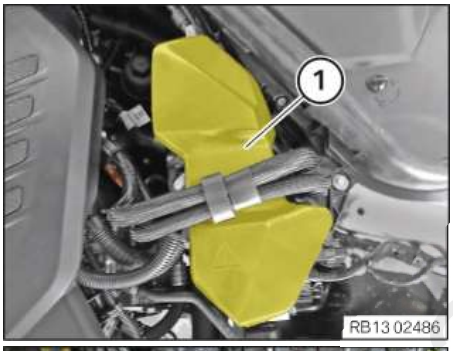
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

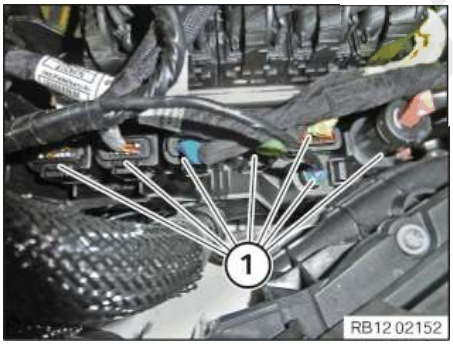
- Do not pull on the wires when disconnecting connectors and plug connections.

TECHNICAL INFORMATION

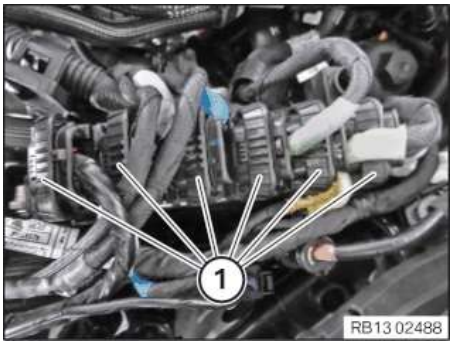
Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.



- Pull off cover (1) upwards, feed out and remove.

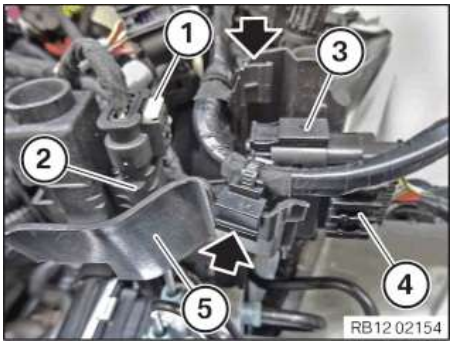


- Unlock and disconnect plug connections (1).

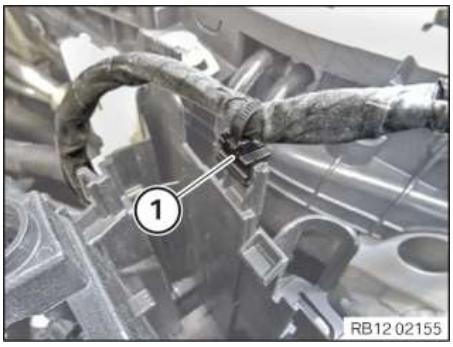


- Unlock and disconnect plug connections (1).

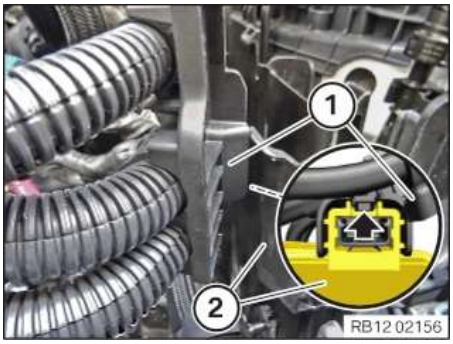
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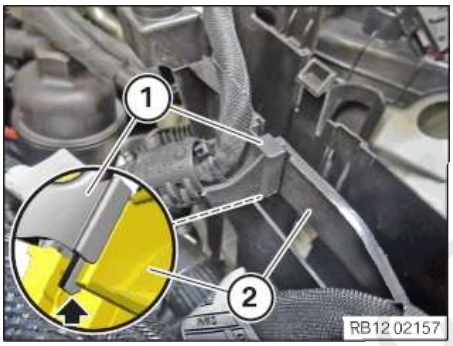
- Unlock plug connection (1) and disconnect.
- Unlock the plug (2) and disconnect from the control unit holder (5).
- Unlock plug connection (3) and disconnect.
- Unlock the plug (4) and disconnect from the control unit holder (5).
- Release the clamps (arrows).



- 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).

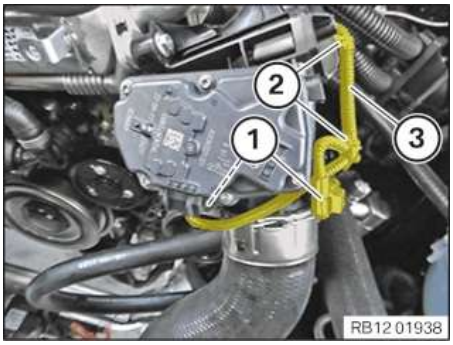


- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.

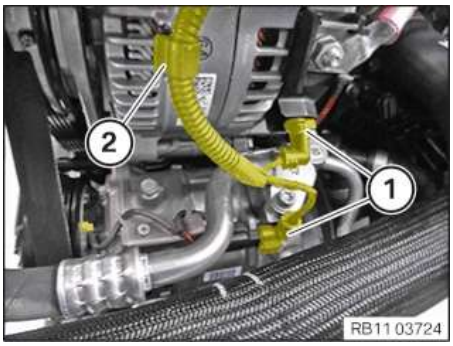


- Unlock holder (1) and feed out coolant line (2) and place it aside.

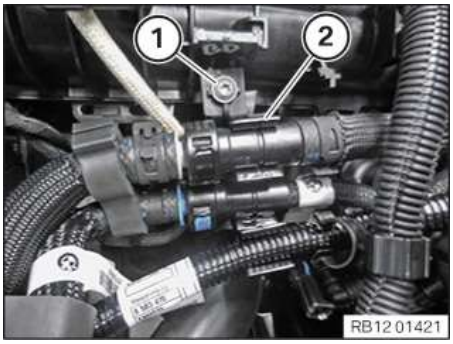
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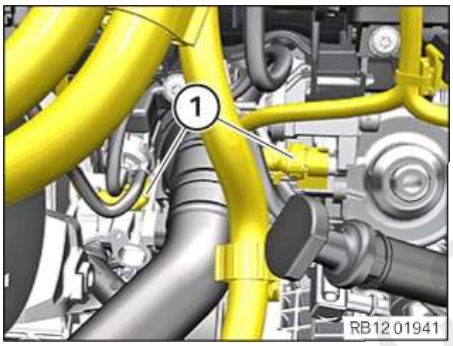
- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.



- 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).

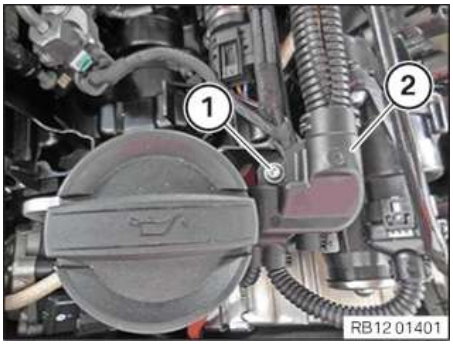


- Unlock and loosen connector (1).

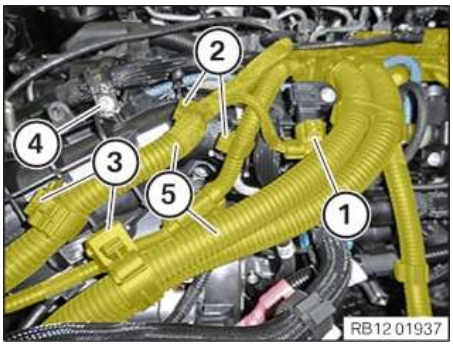


- Unlock plug connection (1) and disconnect.

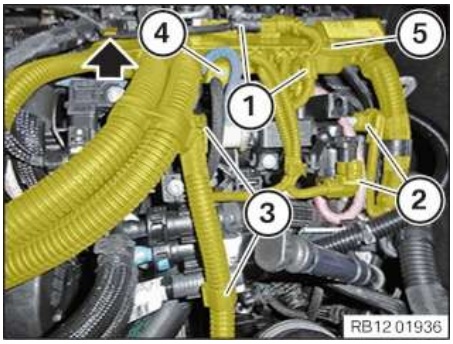
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- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.



- 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.

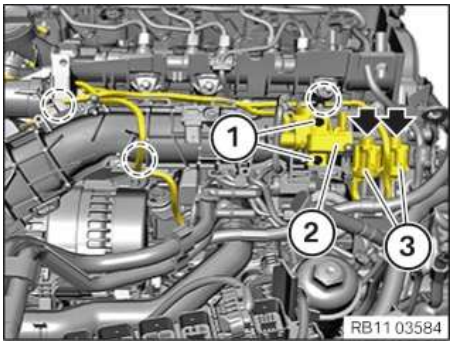


- Unlock clamp (1) and engage in this position.

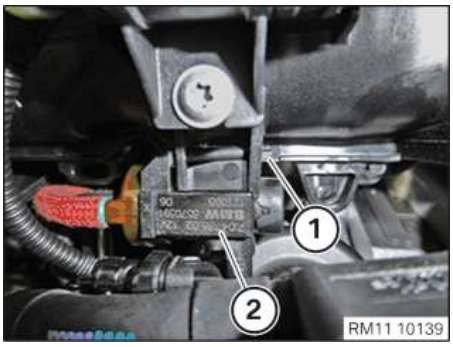


- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.

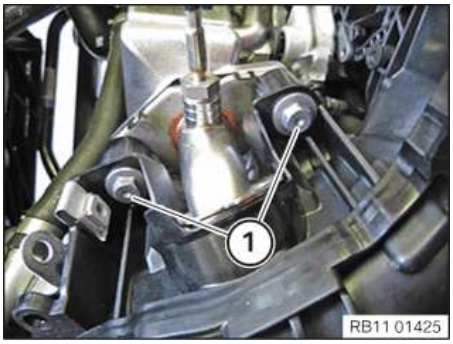
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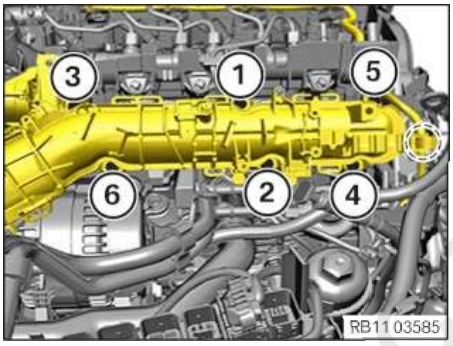
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



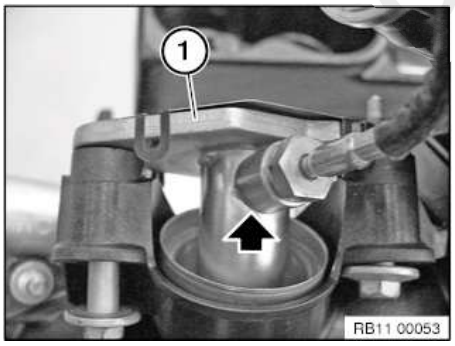
- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.



- 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**

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RISK OF DAMAGE

Escaping coolant on the starter generator.

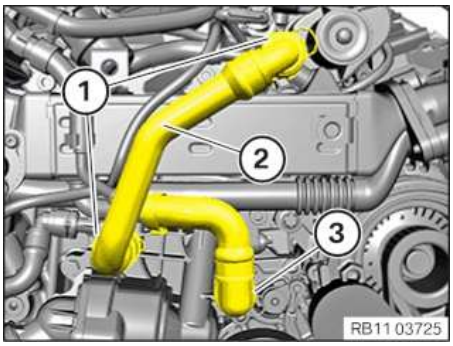
Damage and operating failure of the starter generator.

- 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:**

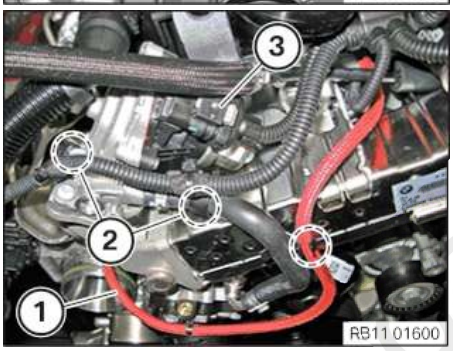
  Unlock and pull off coolant lines (1).



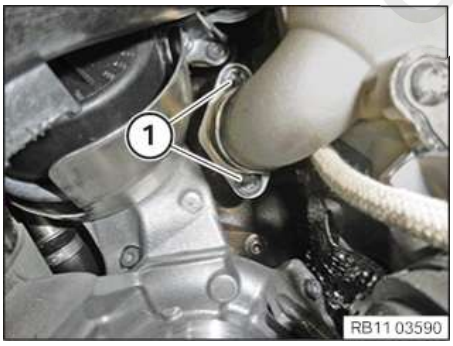
- **Version B:**

  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.

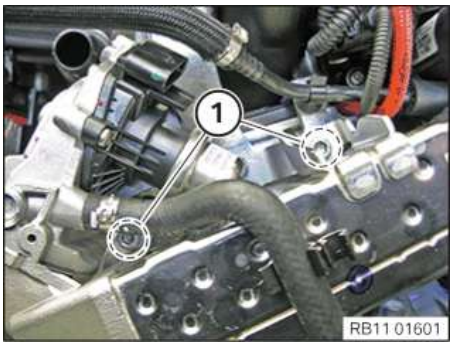


- Loosen the screws (1) on the intake system.

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- 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!

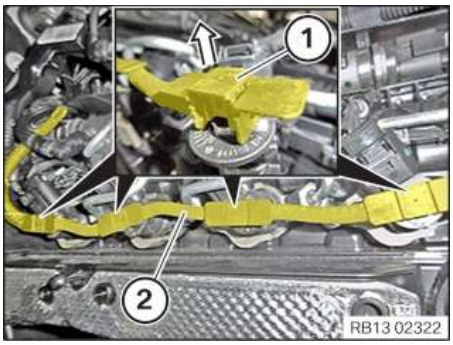
- Perform all work only on components that have cooled down.

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.



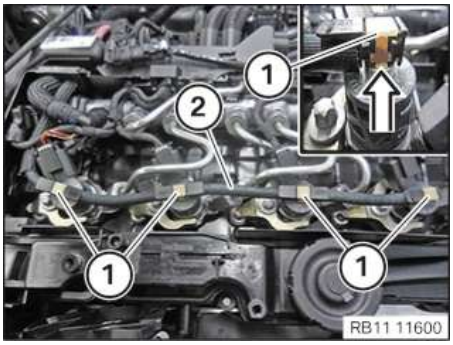
- **Version A:**

  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.

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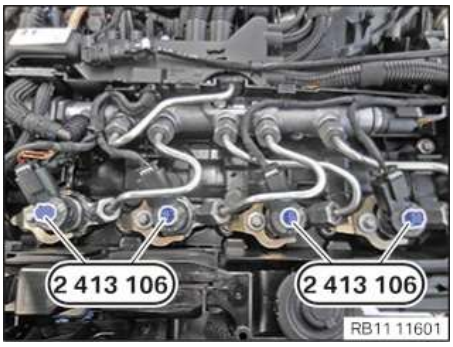


- **Version B:**

  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.

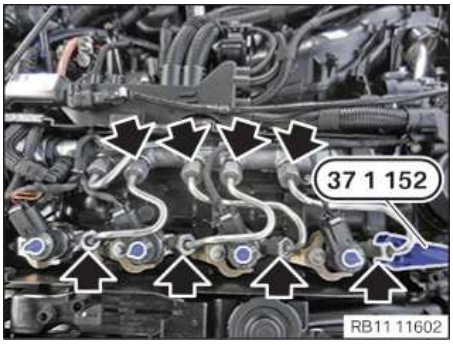
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TECHNICAL INFORMATION

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.

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TECHNICAL INFORMATION

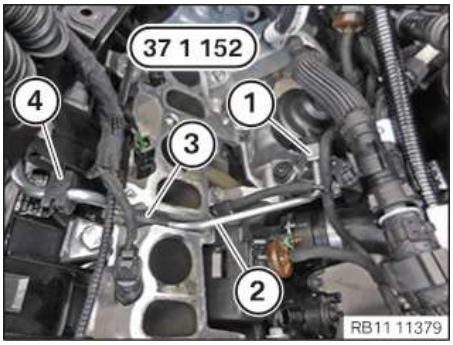
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

TECHNICAL INFORMATION

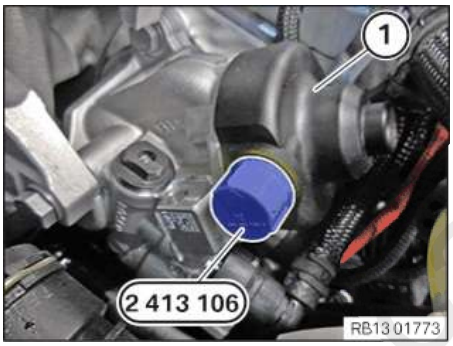
Reset special tool in early to avoid bending pressure lines.



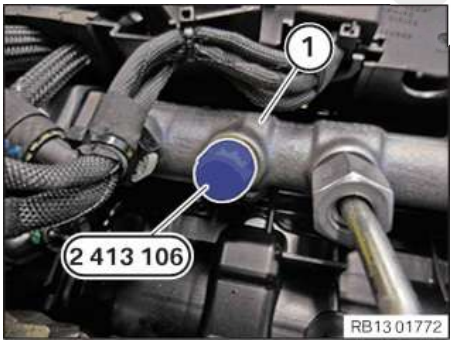
- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.



- 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

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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

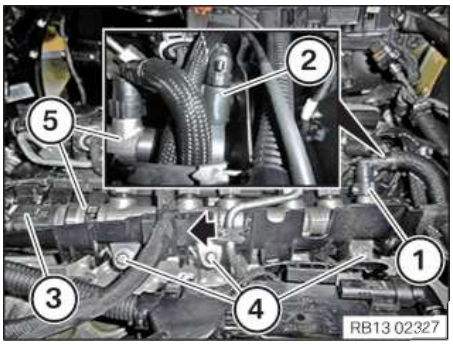
Contaminant or foreign body.

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.

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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

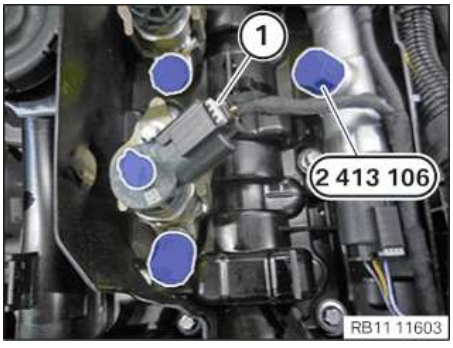
Electrostatic discharge.

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)

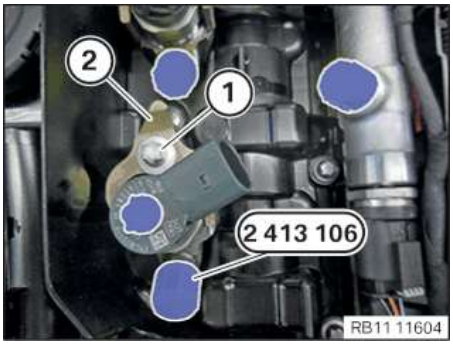
TECHNICAL INFORMATION

If several injectors are removed, ensure that each injector is installed at its original location (cylinder). Mark injectors.



- Unlock plug connection (1) and disconnect.

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- Loosen screw (1).
- Guide out and remove clamping claw (2).
- Feed out and remove the injector with slight rotational movements.

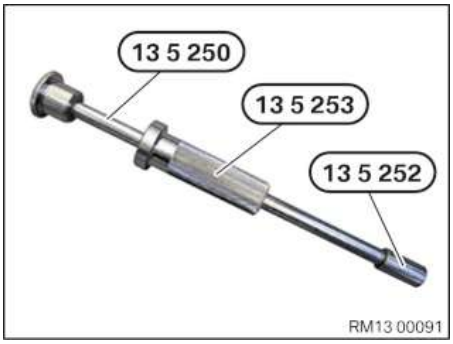
▸ **Loosen stuck injectors**

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).

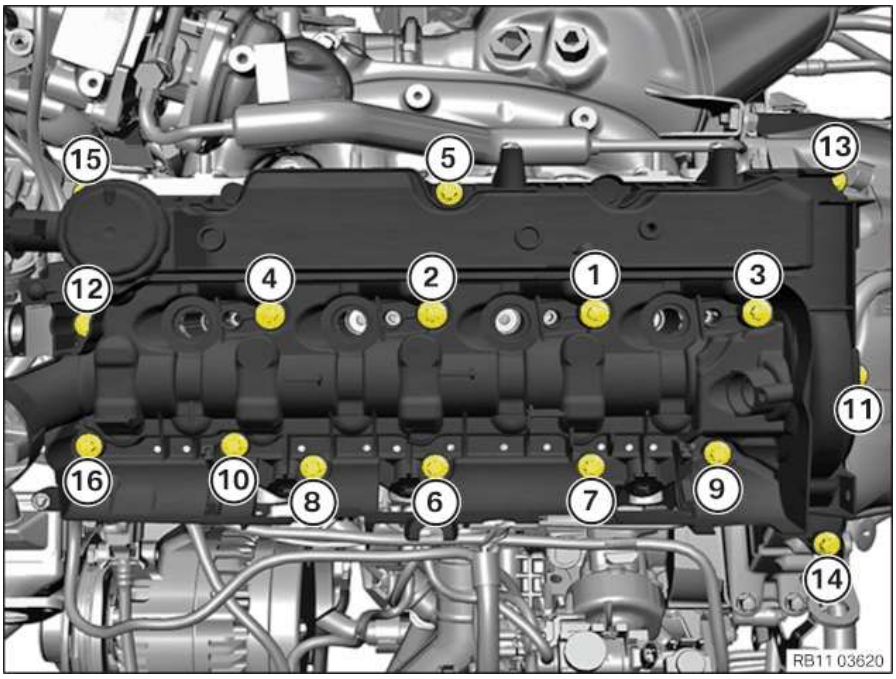


- Screw special tool 0 493 321 (13 5 250) with special tool 0 493 339 (13 5 252) onto pressure line connection (1) of injector.
- Release injector (1) with special tools 0 493 321 (13 5 250) and 0 493 339 (13 5 252) by means of **short** back and forth movements and remove.

49 – Removing the cylinder head cover

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Screw connection of the cylinder head cover



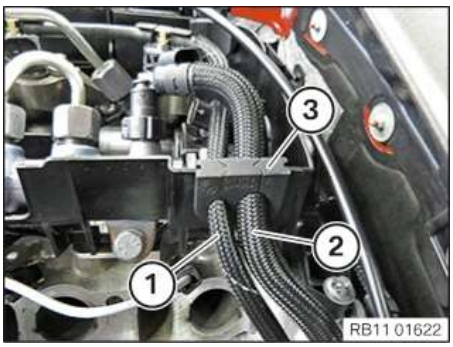
1 - 16 Bolts of the cylinder head cover



- Unlock and detach the locks.
- Feed the engine ventilation line (1) out and set it aside.

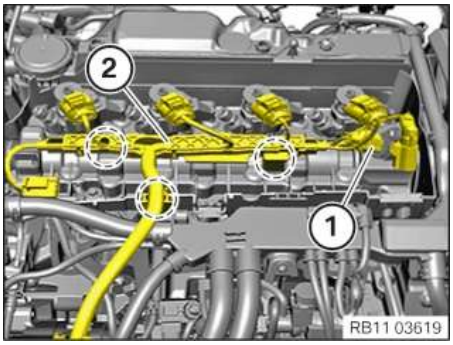


- Feed out and remove the heat shield (1).

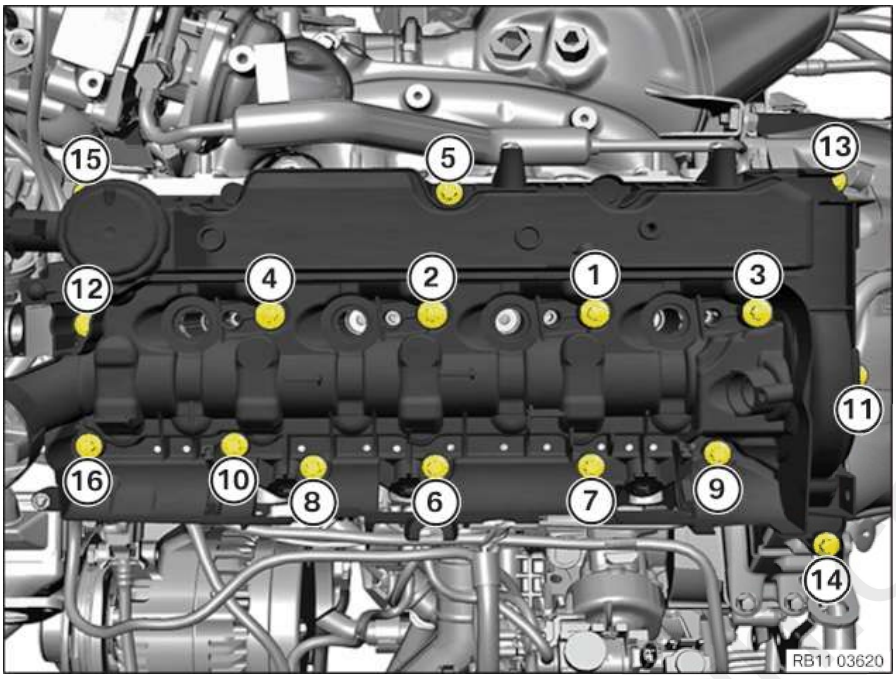


- Remove the leakage oil line (1) including the fuel return line (2) and the grommet (3) and put to one side.

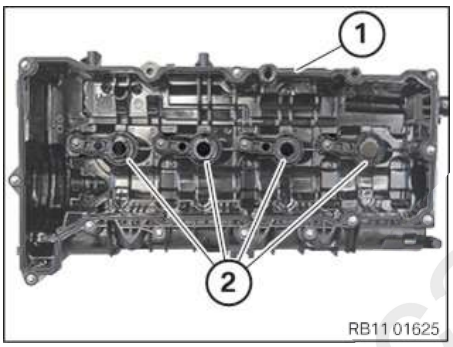
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- Unlock connector (1) and pull off.
- Disconnect the wiring harness (2) in the marked areas from the cylinder head cover and set aside.



- 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.

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WARNING

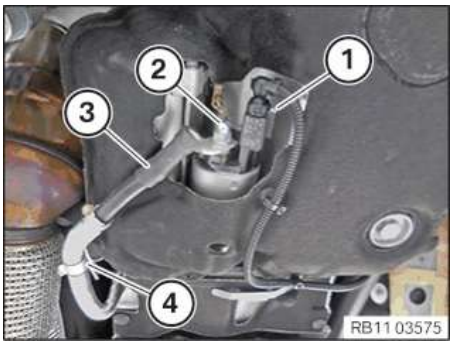
Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

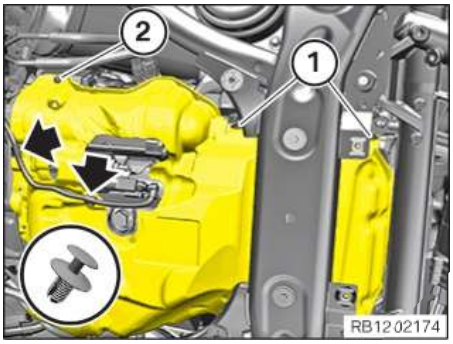
- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

TECHNICAL INFORMATION

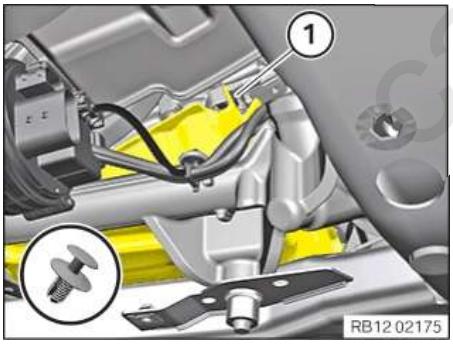
Make sure that the acoustic cover is **not** damaged while removing the starter motor.
A damaged lower acoustic cover can only be renewed when the front axle is lowered.



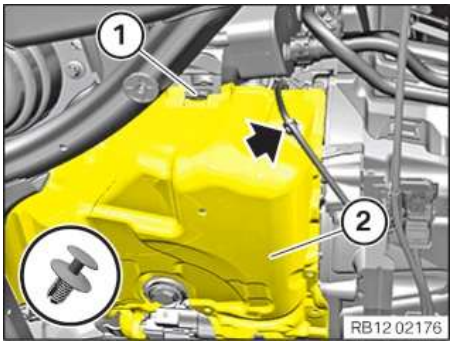
- Unlock plug connection (1) and disconnect.
- Release nut (2).
- Release positive battery cable (3) from holder (4).



- Loosen the expanding rivet (1).
- Undo fir tree clip (2).
- Release the clamps (arrows).

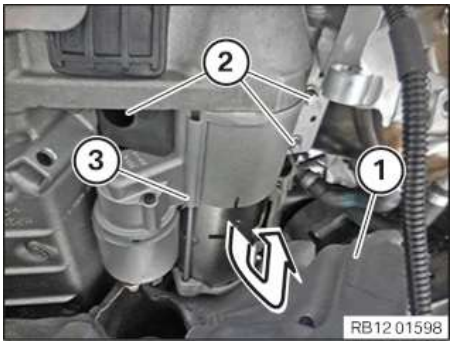


- Loosen expanding rivet (1).
- Lower the acoustic cover of the oil sump.



- Loosen expanding rivet (1).
- Loosen the clamp (arrow).
- Lower acoustic cover (2).

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- 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

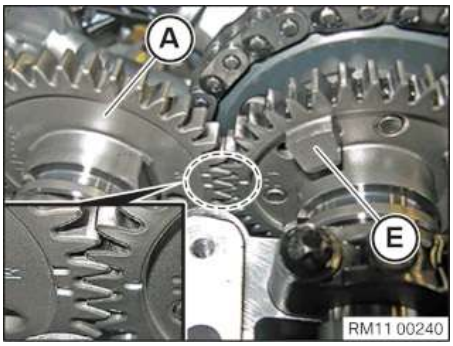
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

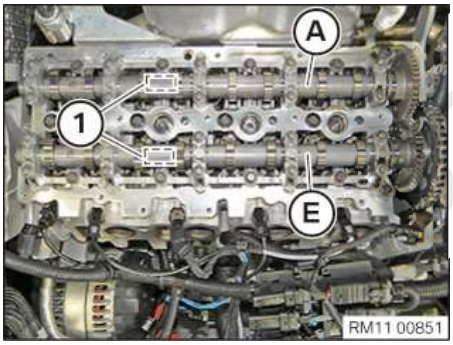
- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

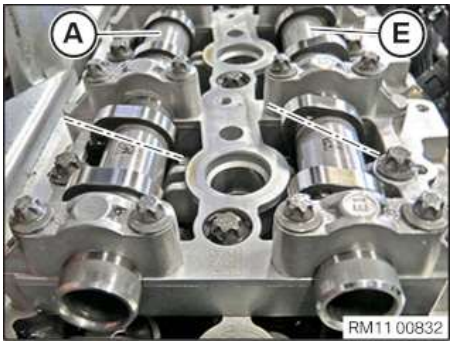
  Do **not** crank the engine in reverse.



- 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.



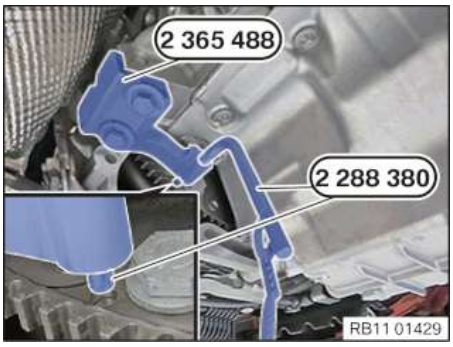
- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.

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- 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

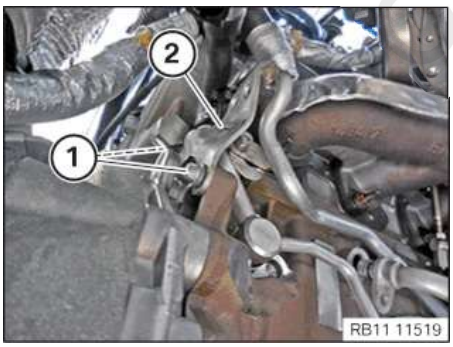
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

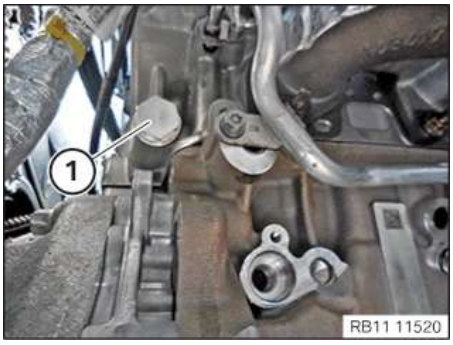
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Loosen screws (1).
- Guide out and remove holder (2).



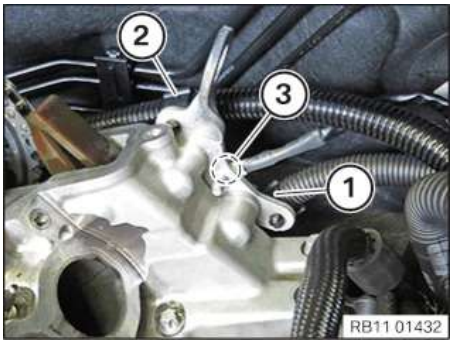
- Loosen the chain tensioner piston (1).
- Catch and dispose of emerging engine oil.

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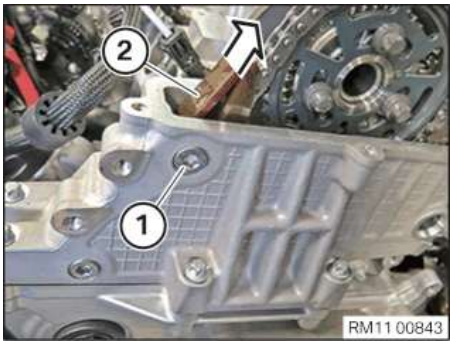


- Feed out and remove the sealing ring (1).

53 – Remove the timing chain guide rail

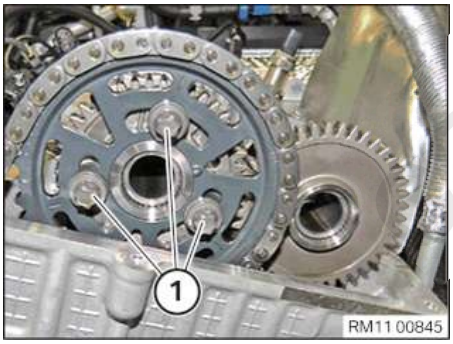


- Loosen the vehicle wiring harness (1) from the bracket.
- Release the positive battery cable (2) from the holder .
- Loosen the screw (3) and remove the grounding cable.



- 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



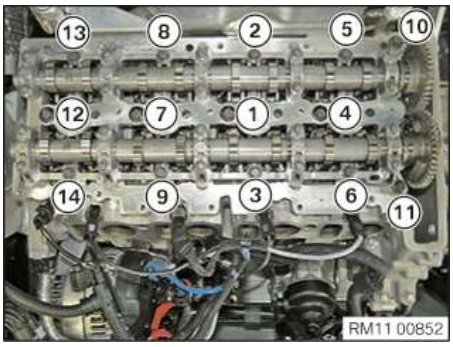
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

56 – Removing the camshaft support

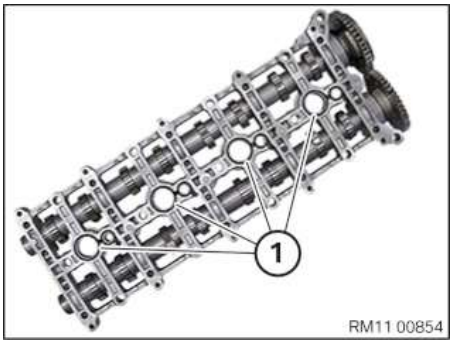
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TECHNICAL INFORMATION

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.

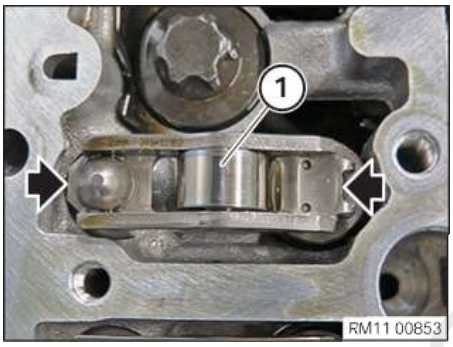


- Unscrew the screws evenly in order (14) to (1) in multiple increments.
- Feed out and remove the camshaft support with the camshafts towards the top.



- Guide out and remove gaskets (1).

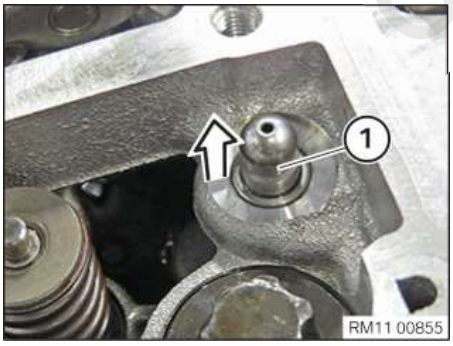
57 – Remove roller cam followers



- 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.

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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

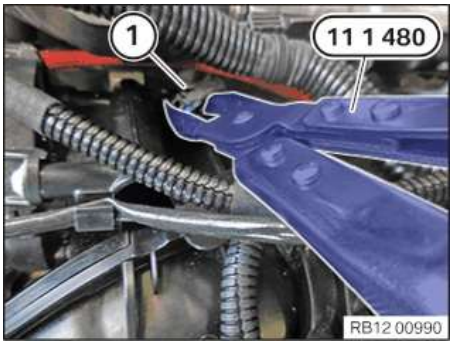
Contaminant or foreign body.

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.

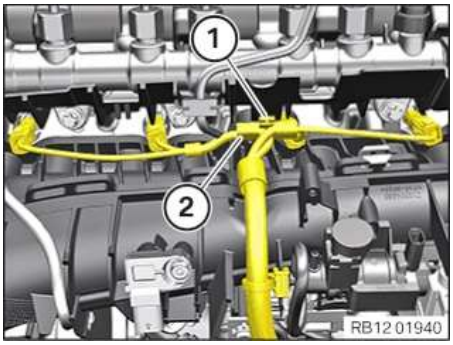
NOTICE

The description is for one component only. The procedure is identical for all further components.

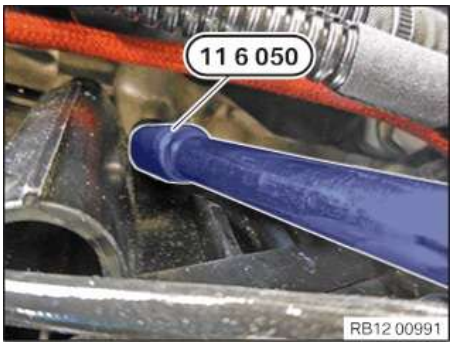


- Unlock and release the connector (1) using special tool 0 490 796 (11 1 480).

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- 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.

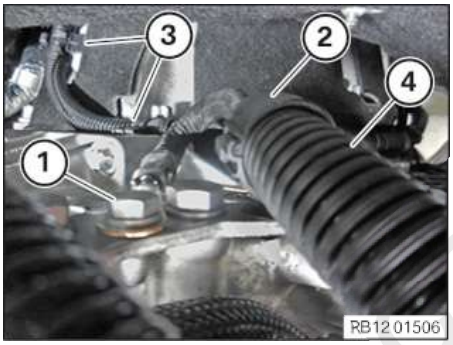
60 – Removing cylinder head

RISK OF DAMAGE

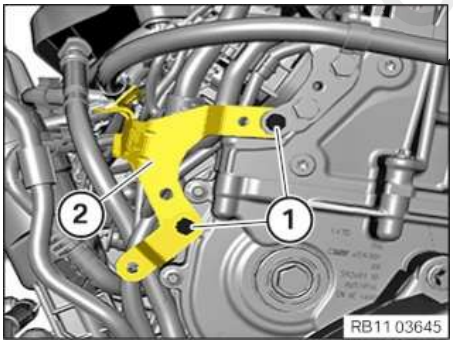
Heavy component.

Heavy components can lead to injury or damage.

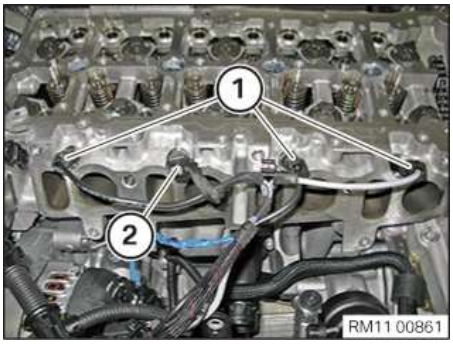
- Remove and install heavy components with the aid of another person/other persons.



- 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.

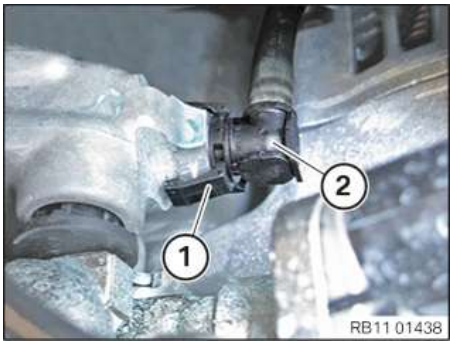


- Loosen screws (1).
- Guide out and remove holder (2).

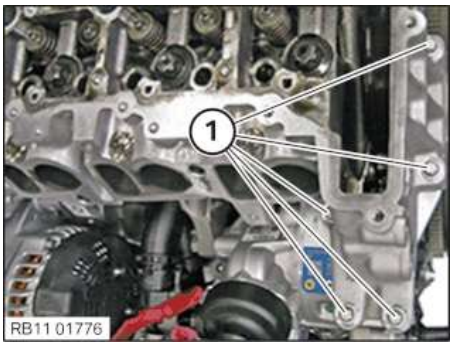


- Release plug connections (1) with special tool 0 495 140 (12 2 300).
- Unlock and disconnect the plug connections (1) and (2).
- Place wiring harness to one side.

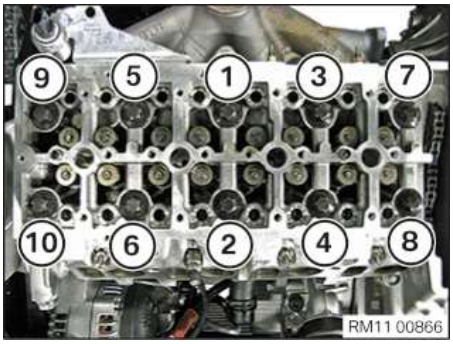
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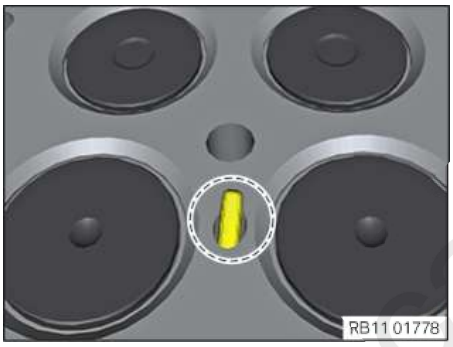
- Release lock (1) of coolant line.
- Remove the coolant line (2) and set it aside.



- 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).

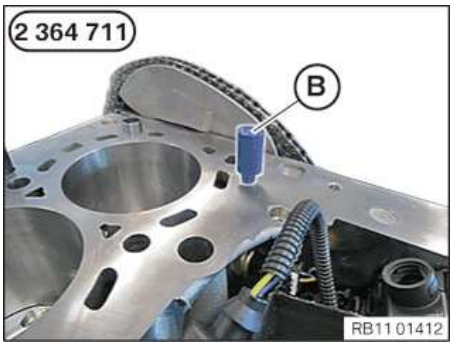
61 – Cleaning the sealing surface

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).



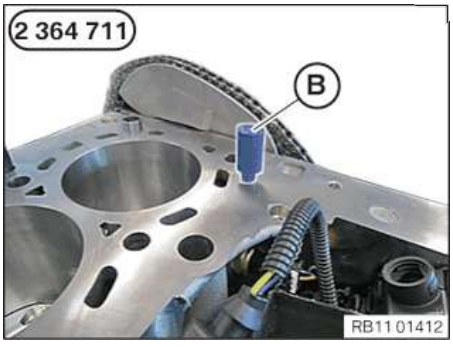
RISK OF DAMAGE

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).

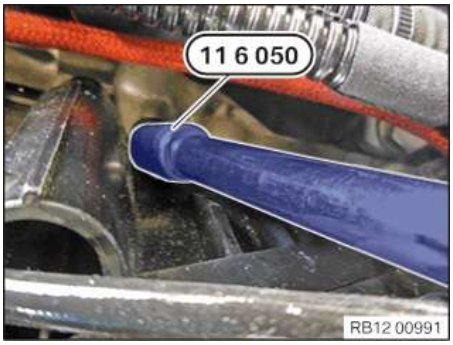


- Remove special tool (B).

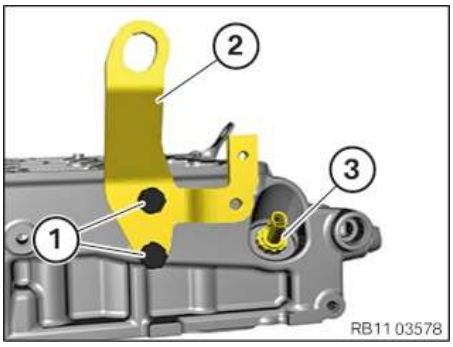
MAIN WORK

62 – replace cylinder head

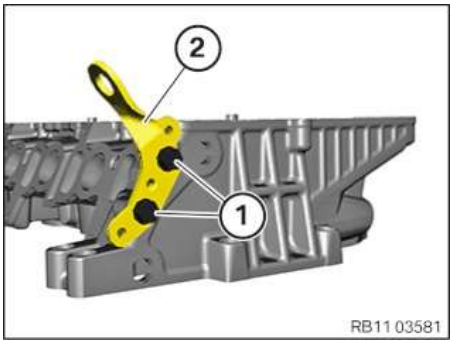
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- Unscrew the preheating elements with special tool .



- Loosen screws (1).
- Remove mounting lug (2).
- Remove the coolant temperature sensor (2).



- Loosen screws (1).
- Remove mounting lug (2) from cylinder head.

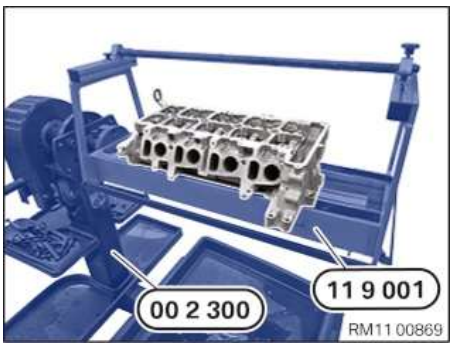
▸ **Remove all valve springs**

RISK OF DAMAGE

Contaminant or foreign body.

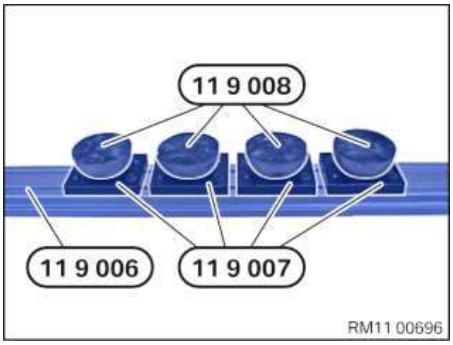
Contamination can result in malfunctions, operating failure or leaks.

- 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).

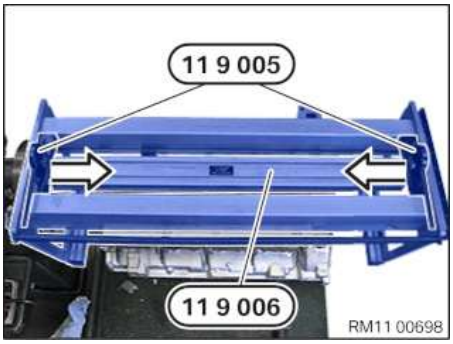
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- Prepare the special tools 0 494 371 (11 9 006), 0 494 372 (11 9 007) and 0 494 373 (11 9 008) as shown.



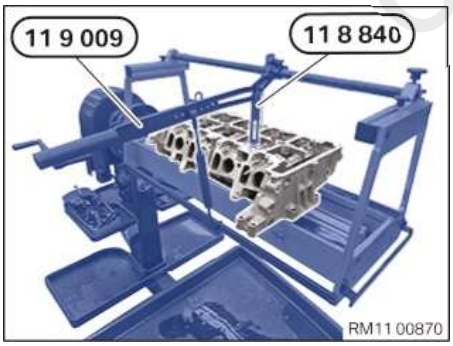
- Position special tools 0 494 373 (11 9 008) as pictured.



- 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.

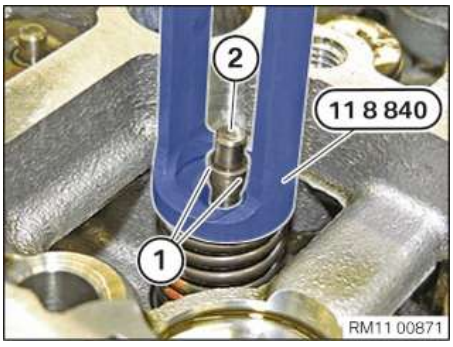


- Lock special tool 0 494 370 (11 9 005)in direction of arrow.
- Move cylinder head with special tool 0 494 362 (11 9 000) through 180° into the installation position.



- 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.



- 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.

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▸ **Remove valve stem seals**

RISK OF DAMAGE

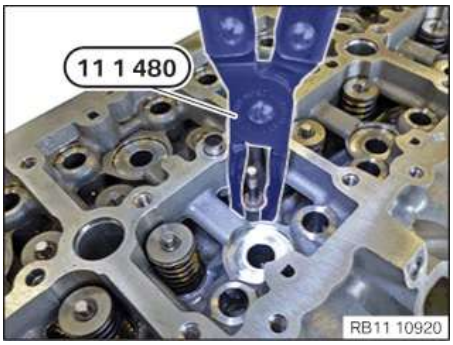
Contaminant or foreign body.

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).

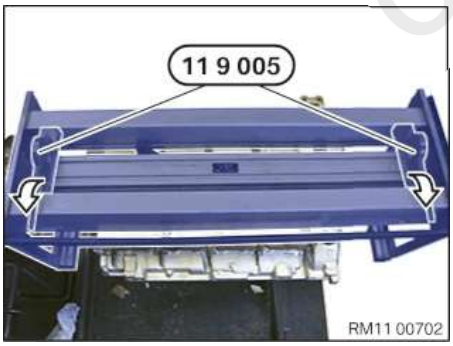
▸ **Remove all valves**

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.

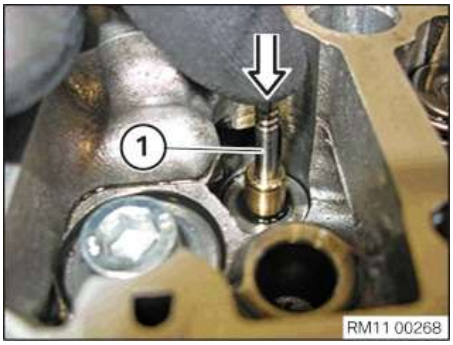


- Turn the cylinder head with the special tool 0 494 362 (11 9 000).
- Unlock the special tool 0 494 370 (11 9 005) in the direction of the arrow.
- Remove special tool 0 494 371 (11 9 006).

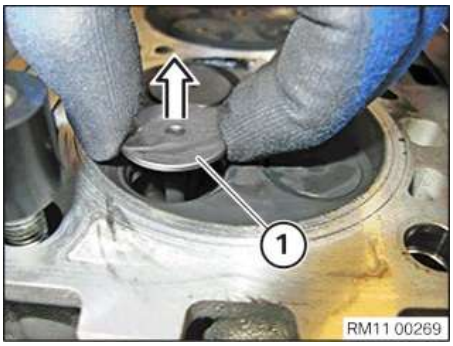


- Remove special tool 0 494 373 (11 9 008) if necessary.

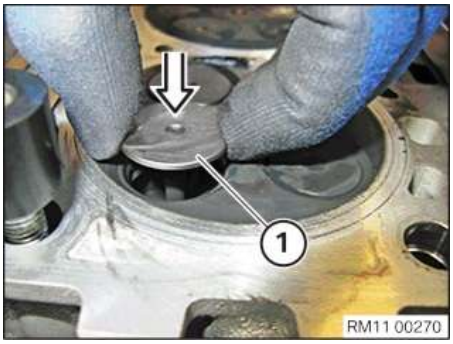
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- Push the valve stem (1) into the cylinder head in the direction of the arrow.

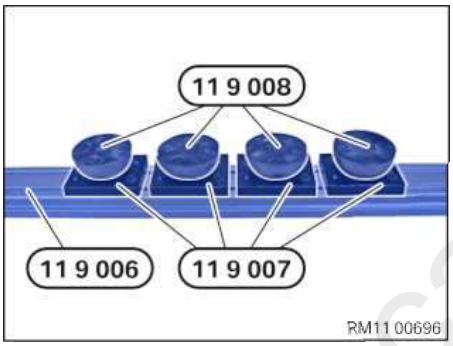


- Remove the valve (1) in the direction of arrow and store it properly in the special tool 0 495 105 (11 4 480).



- Install valves (1) in the new cylinder head.

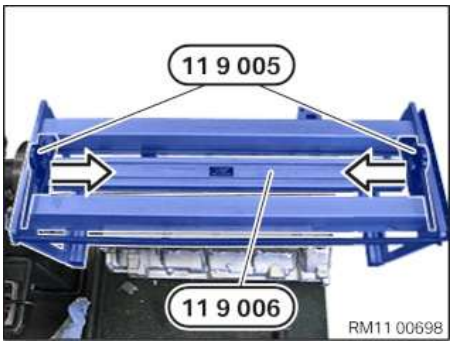
  Parts: Cylinder head
- Feed valves (1) in the direction of arrow and install.
- **Check the valves for tightness.**



- 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.



- The special tools 0 494 373 (11 9 008) must be set up accordingly in the next operation.



- 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.

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- Lock special tool 0 494 370 (11 9 005)in direction of arrow.
- Use the special tool 0 494 362 (11 9 000) to bring the cylinder head into the installation position by 180°.

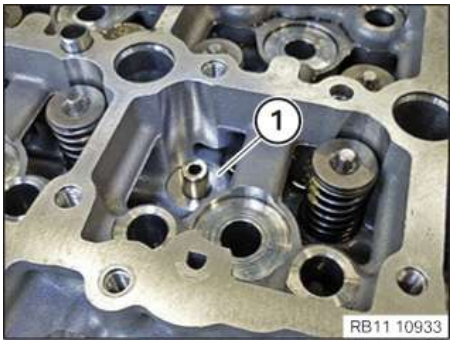
▸ **Installing valve stem seals**

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.



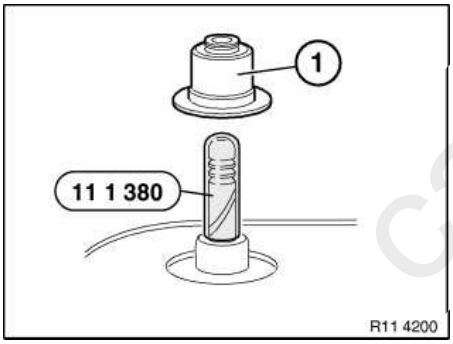
RISK OF DAMAGE

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.

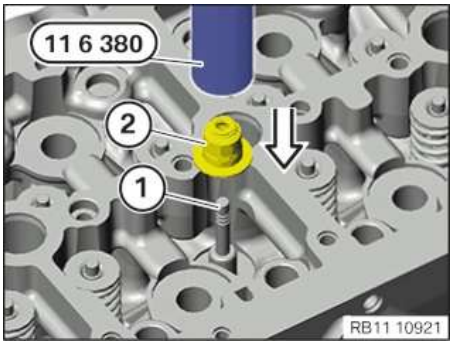
- Do not use any metal-cutting tools.

- 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).



- 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).

▸ **Install all valve springs**

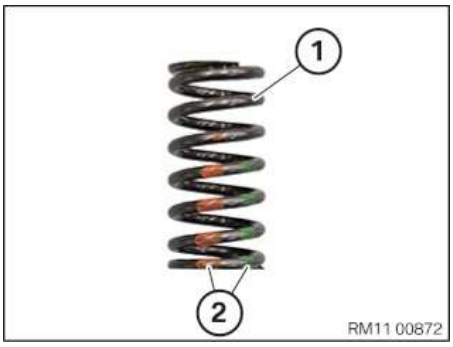
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RISK OF DAMAGE

Contaminant or foreign body.

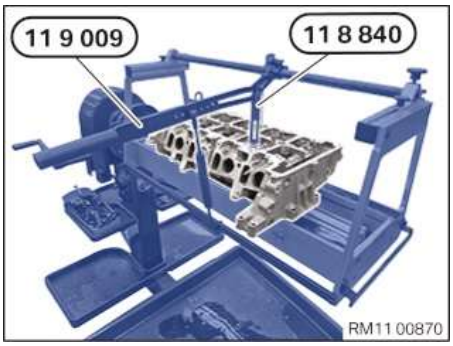
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



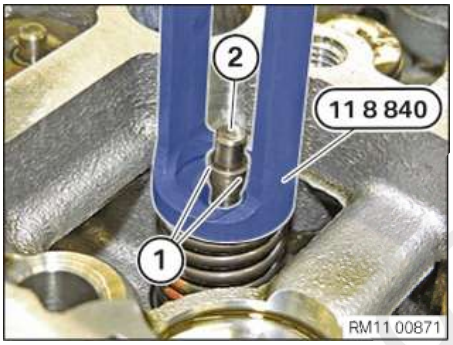
- Ensure that the valve spring (1) is marked using a colour code (2).

  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).

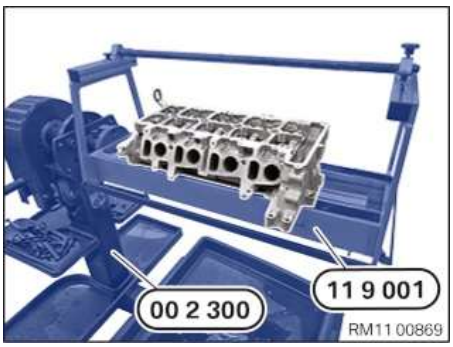
  The **hooks** from the set of special tools 0 494 362 (11 9 000) can be used to **hold** the valve spring in pressed position.



- 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.



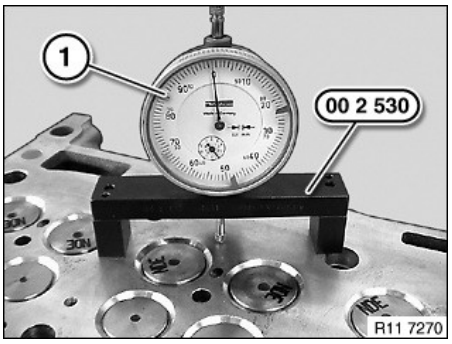
- Unlock the special tool 0 494 370 (11 9 005) in the direction of the arrow.
- Guide the special tool 0 494 371 (11 9 006) out and remove.



- Unscrew and remove the cylinder head from the special tools 0 494 366 (11 9 001) and 0 495 187 (00 2 300).

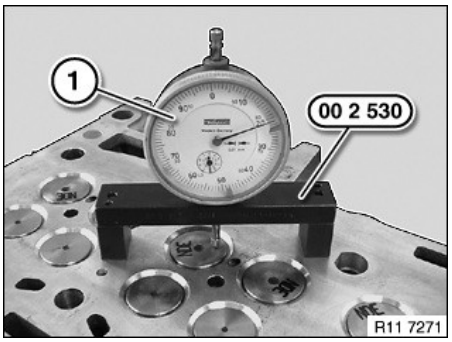
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▸ **Checking the valve underprotrusion**



- 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

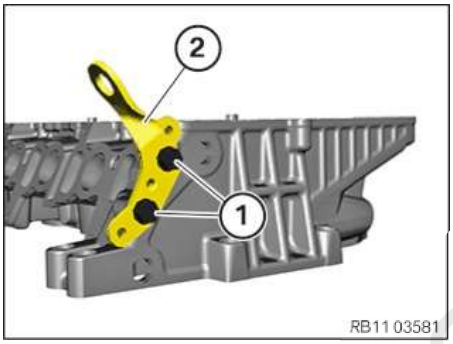
Result

» Valve underprotrusion is outside tolerance.

Measure

- Renew cylinder head.

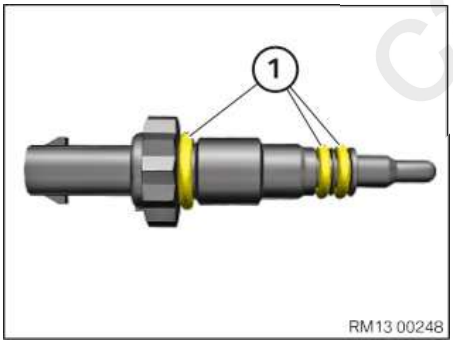
  Parts: Cylinder head



- Install mounting lug (2) on the rear cylinder head.
- Tighten the screws (1).

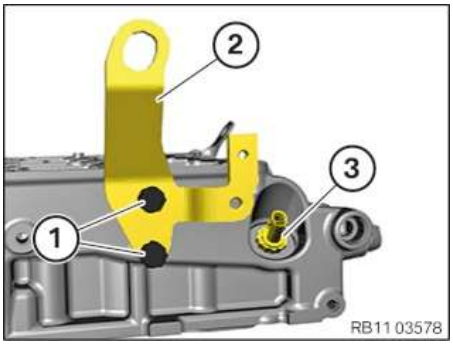
Standard screw connection M8

M8	Tightening torque	19 Nm



- When reusing coolant temperature sensor sealing rings (1), check for damage, renew if necessary.

  Parts: Sealing ring



- Position special tool on cylinder head.
- Tighten the screws (1) of special tool .

Standard screw connection M8

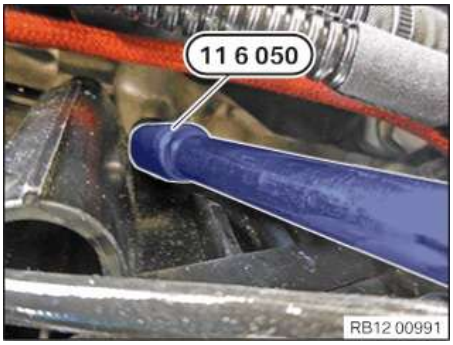
M8		Tightening torque	19 Nm

- Tighten coolant temperature sensor (1) on new cylinder head (2).

Coolant temperature sensor at cylinder head

Temperature sensor		Tightening torque	3,5 Nm

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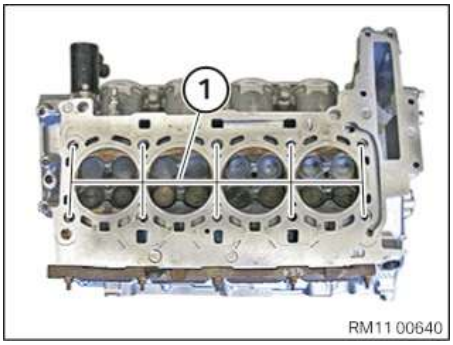
- Screw in preheating elements using special tool and tighten.

Glow elements to cylinder head

Glow element		Tightening torque	13 Nm

POSTPROCESSES

63 – Replace cylinder head gasket

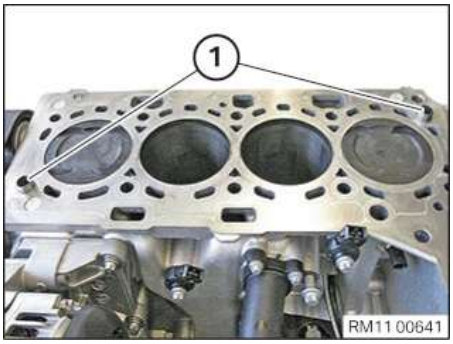


RISK OF DAMAGE

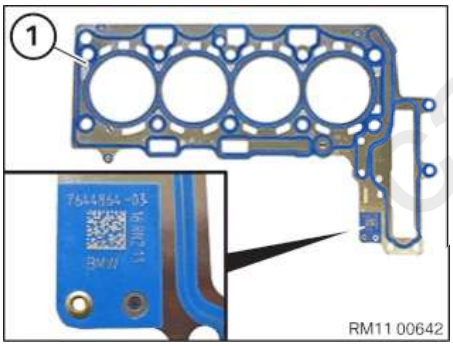
Damage to the surface.

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).

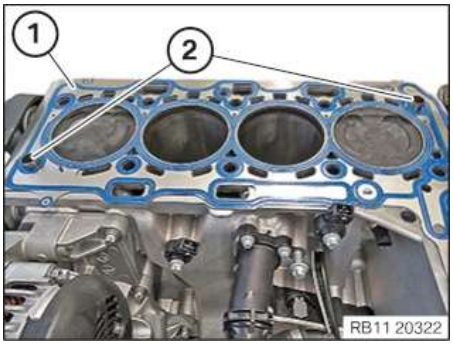


- Check if fitting sleeves (1) fit correctly and check for any damage.



- 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).

64 – Installing the cylinder head

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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.

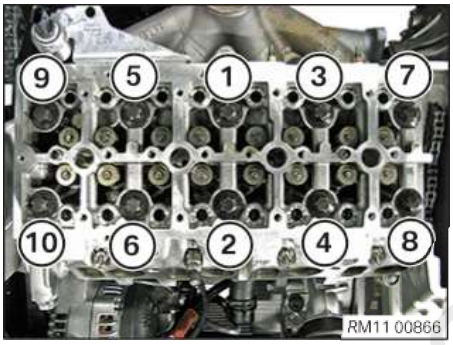
- Dry threaded holes (e.g. using compressed air).

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.

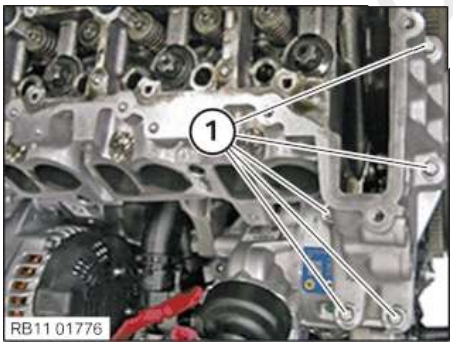


- Position the cylinder head gasket with the previously determined gasket thickness (number of holes).
- Fit new cylinder head screws.

  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

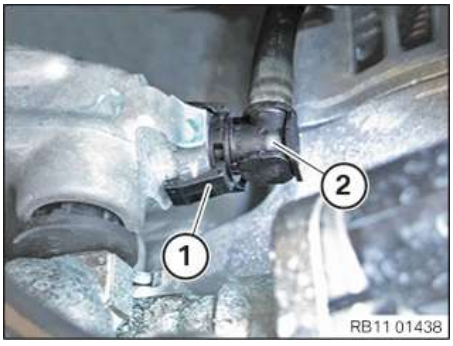
M12x1.5	Renew screws.	1. Tightening torque	50 Nm
		2. Angle of rotation	120 °
		3. Angle of rotation	120 °



- Insert screws (1) and tighten.

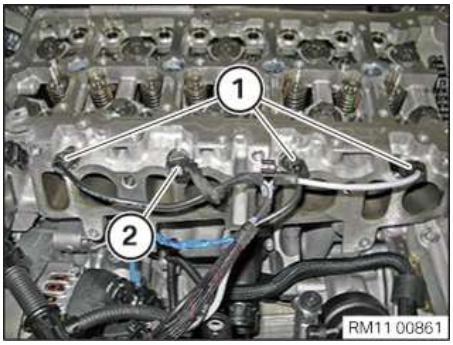
Cylinder head bolt to timing case cover

M8x40		Tightening torque	19 Nm



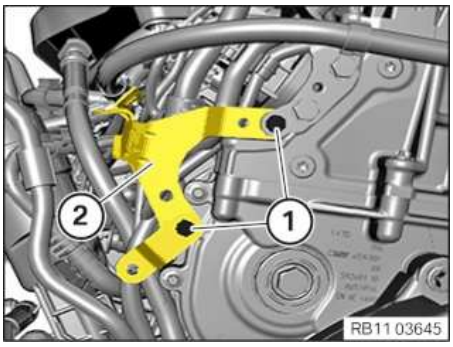
- Fit and lock coolant line (2).

  The lock (1) must engage audibly.



- Connect connectors (1) and (2), then lock.

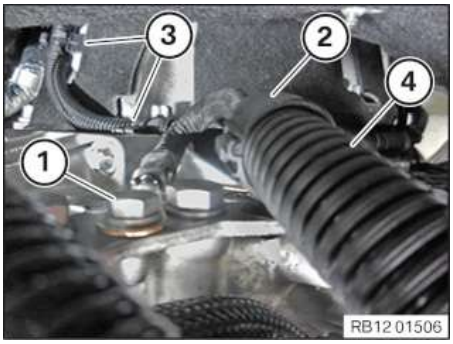
  The connectors (1) and (2) must audibly engage.



- Insert and install the holder (2).
- Tighten the screws (2).

Standard screw connection M6

M6		Tightening torque	8 Nm

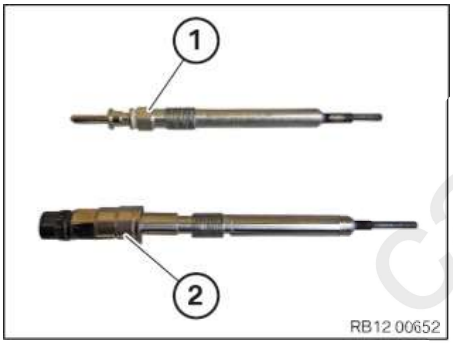


- Guide in the wiring harness section (4) of the automatic transmission and install.
- Lock holder (2).
- Make sure the bracket (2) engages audibly.
- Secure clamps (3).
- Tighten down screw (1).

Ground to cylinder head

M6		Tightening torque	8 Nm

65 – 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

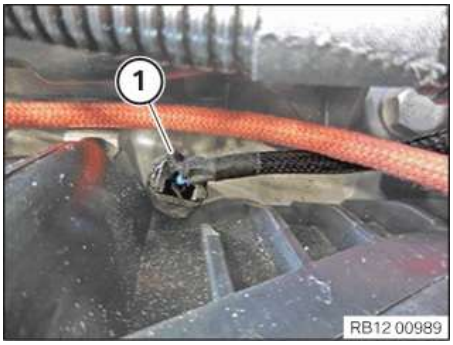
The description is for one component only. The procedure is identical for all further components.

- 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

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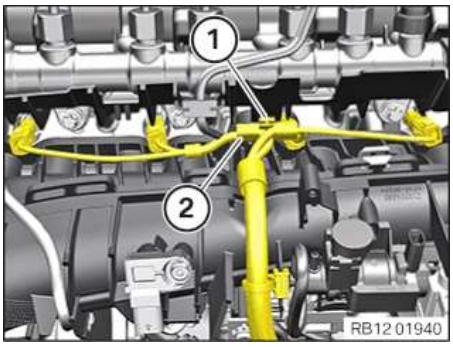


NOTICE

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.



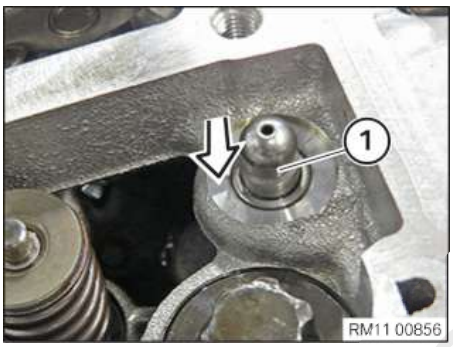
- Guide in the wiring harness section (2) and install.
- Secure clamps (1).

▶ **When replacing the glow element: Teach in glow elements if necessary**



- Teach in glow elements with the diagnosis system.

66 – Installing all hydraulic valve clearance compensating elements

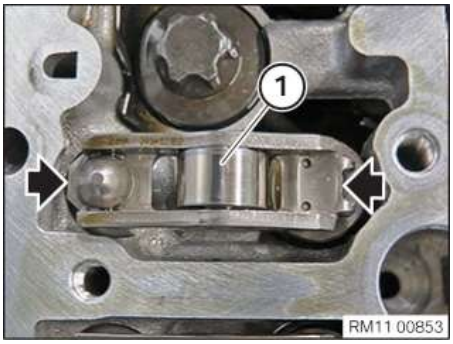


- Make sure to observe the assignment of the roller cam followers to the hydraulic valve clearance compensating elements when reusing the hydraulic valve clearance compensating elements (1).
- Insert and install all hydraulic valve clearance compensating elements (1) in the direction of the arrow.

67 – 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).

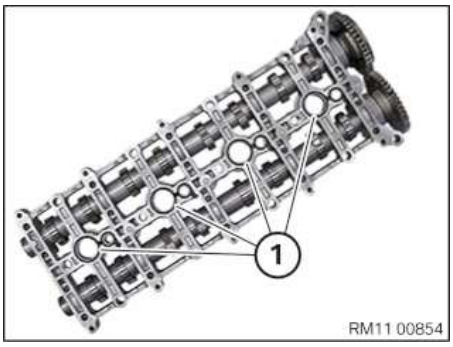
  Roller cam followers (1) that have already been used must be installed in the same place.
- Note the mounting orientation of the roller cam followers (1).
- Oil all roller cam followers (1).

68 – Installing the camshaft support

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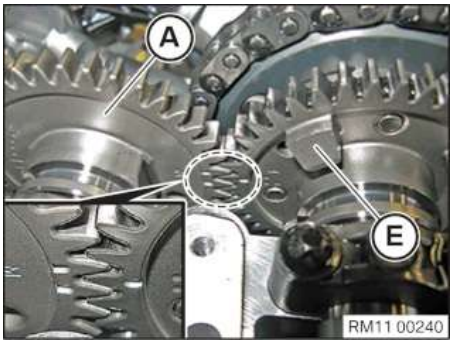
TECHNICAL INFORMATION

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.

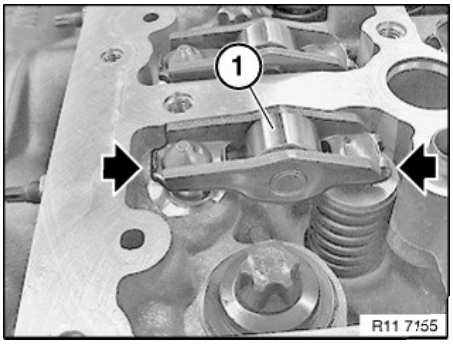


- Renew seals (1).

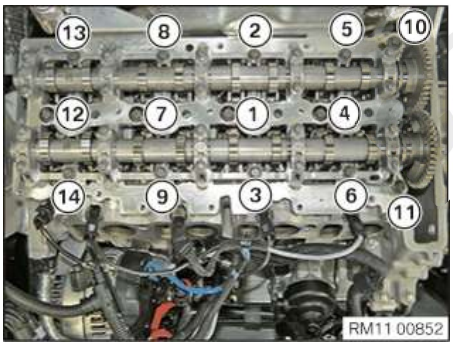
  Parts: Seals
- Insert and install the gaskets (1).



- 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

69 – Installing the special tool to secure the exhaust camshaft

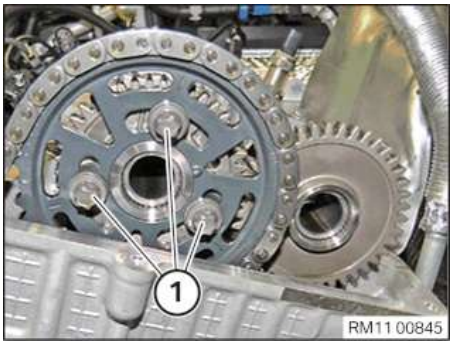


- Place special tool 0 496 112 (11 8 760)on exhaust camshaft.

  Special tool 0 496 112 (11 8 760)must lie flush on cylinder head.

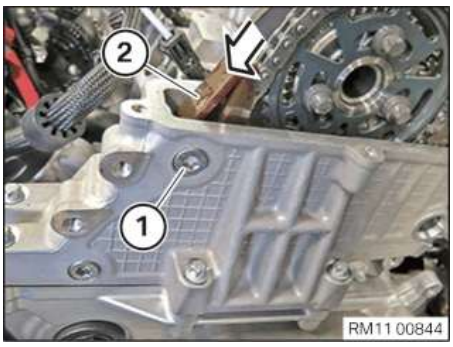
70 – Installing the camshaft sprocket on the intake camshaft

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- 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.

71 – Installing the guide rail of the timing chain

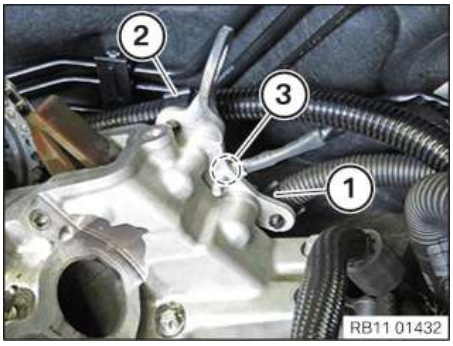


- Position the guide rail (2) in the direction of the arrow.
- Make sure the guide rail (2) is correctly installed at the bottom bearing journal.
- Renew bearing journal (1).

  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.

72 – Installing the chain tensioner piston



TECHNICAL INFORMATION

The oil chamber must be drained for reuse of the chain tensioner.

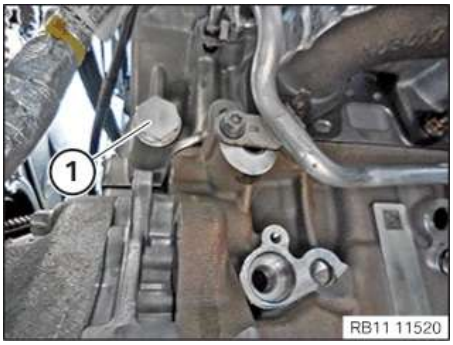
- Place the chain tensioner on a level support pad and slowly compress in the direction of arrow.
- Repeat process twice.



- Renew sealing ring (1).

  Parts: Sealing ring
- Insert and install the sealing ring (1).

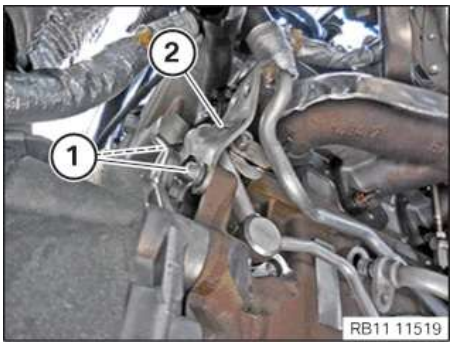
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- Insert and install the chain tensioner piston (1).
- Tighten the chain tensioner piston (1).

Chain tensioner piston to cylinder head

22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

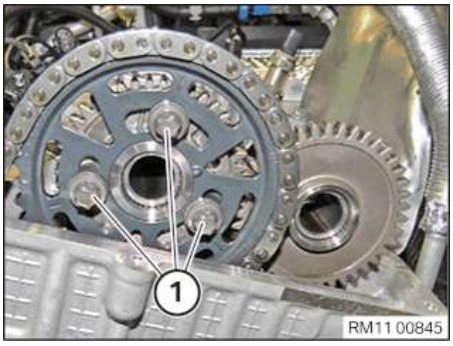


- Insert and install the holder (2).
- Tighten the screws (1).

Holder to crankcase

M8X16		Tightening torque	19 Nm

73 – Tightening the camshaft sprocket on the intake camshaft



- Tighten the screws (1).

Camshaft sprocket to camshaft

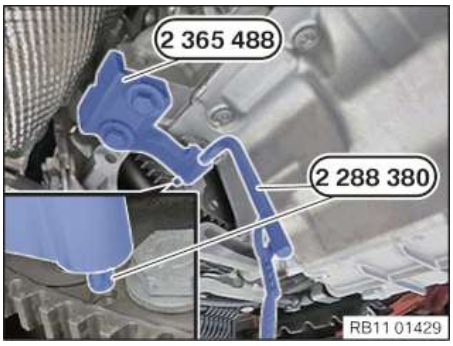
M7x17.			17 Nm

74 – Removing the special tool for fixing the exhaust camshaft



- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

75 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

76 – Checking camshaft timing

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RISK OF DAMAGE

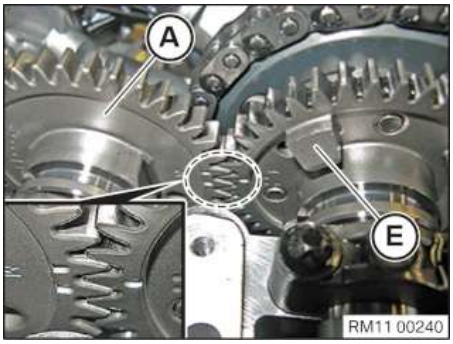
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

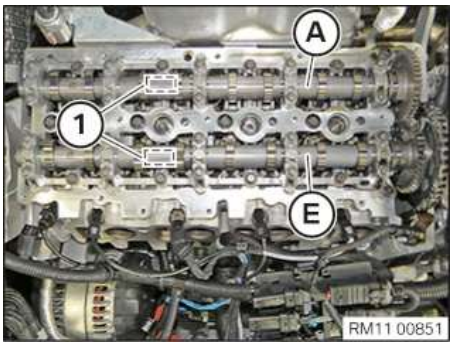
- Turn the combution engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

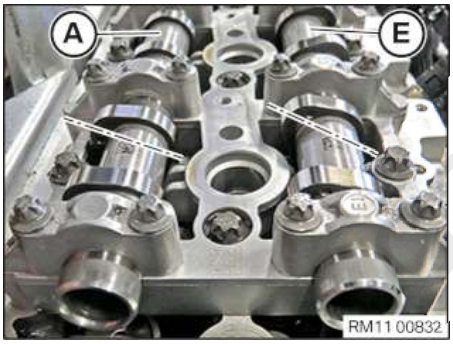
  Do **not** crank the engine in reverse.



- 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.



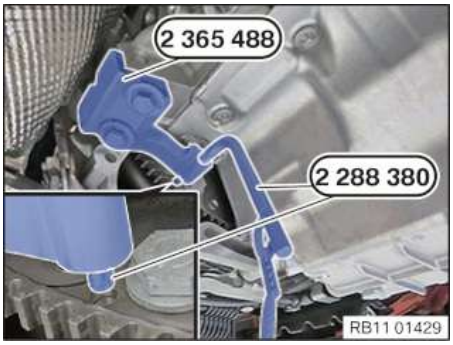
- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- 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.

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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

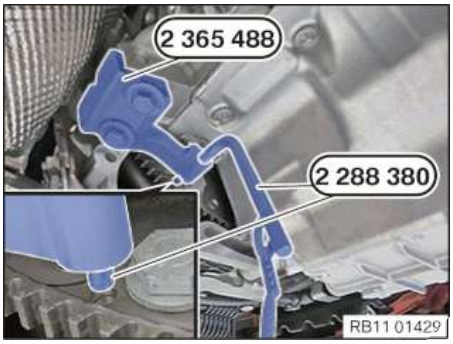
- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

77 – Removing the special tool for fixing the exhaust camshaft



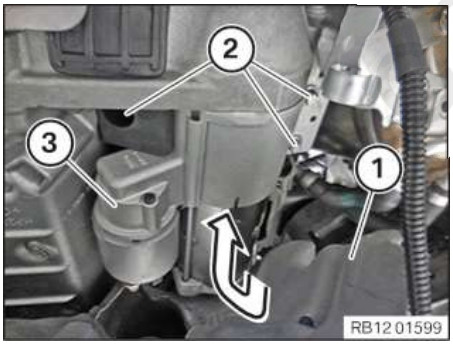
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

78 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

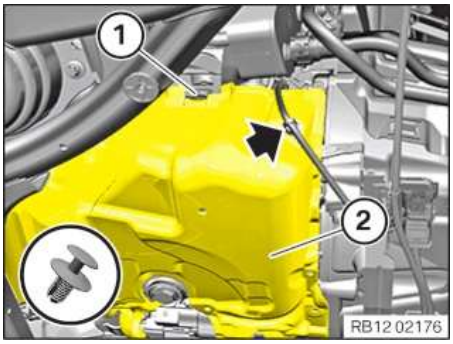
79 – Installing starter motor



- 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).

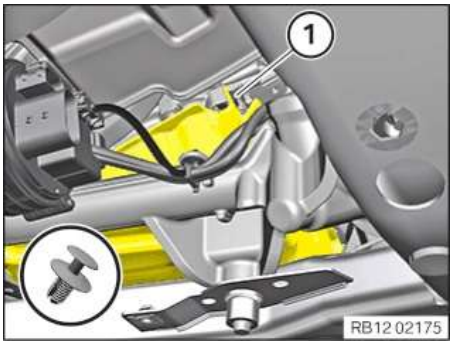
Starter motor to engine

M8X60		Tightening torque	19 Nm

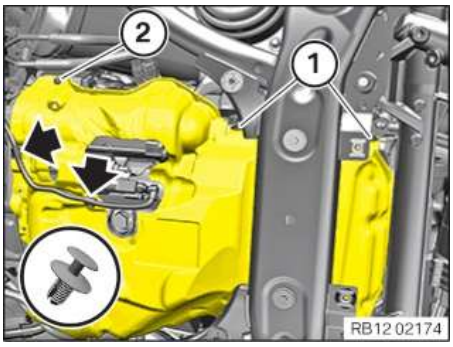


- Position the acoustic cover (2).
- Fasten expanding rivet (1).
- Secure clamp (arrow).

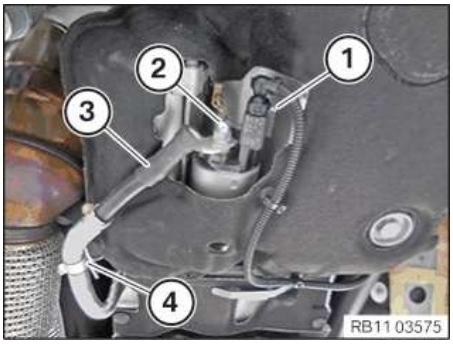
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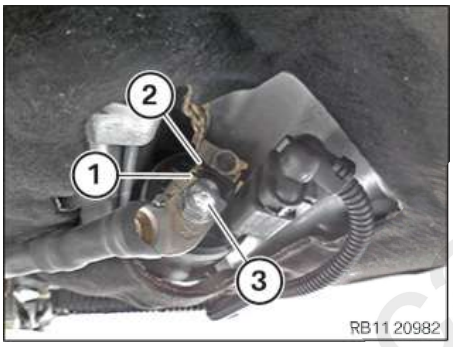
- Fasten expanding rivet (1).



- 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).

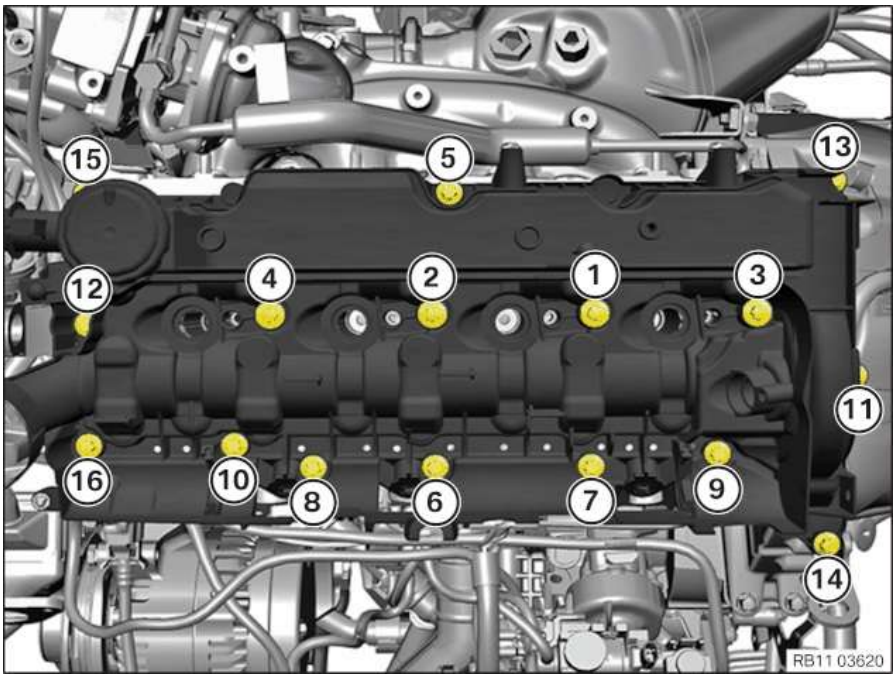
Battery positive lead to starter

M8		Tightening torque	13,5 Nm

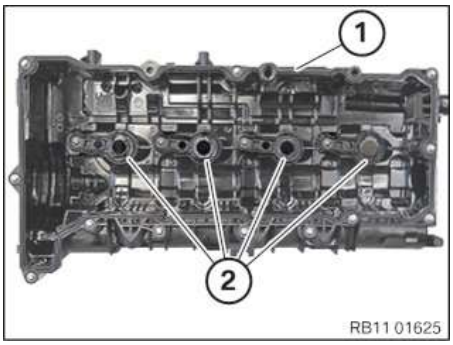
80 – Installing cylinder head cover

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Screw connection of the cylinder head cover

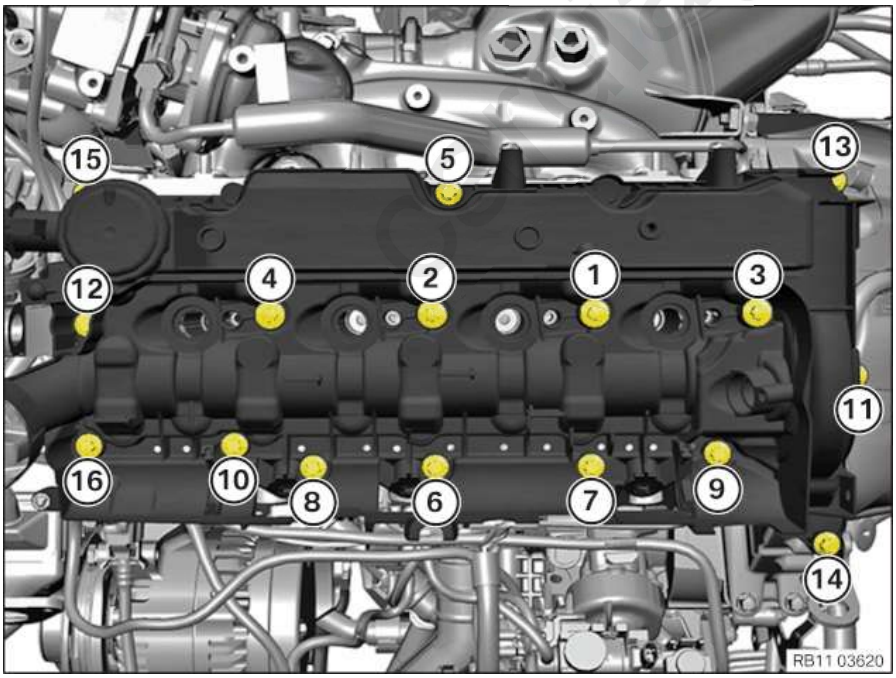


1 - 16 Bolts of the cylinder head cover



- Renew the profile seals (1) and (2) of the cylinder head cover.

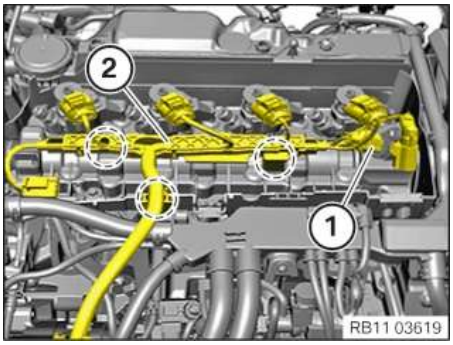
  Parts: Profile seals



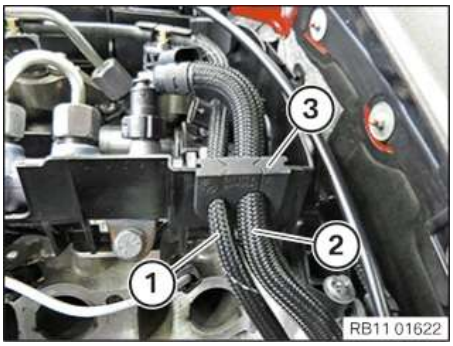
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

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.

81 – 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.

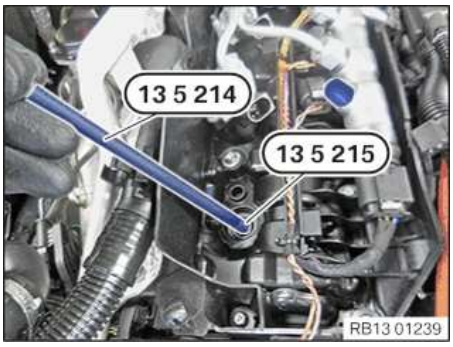
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RISK OF DAMAGE

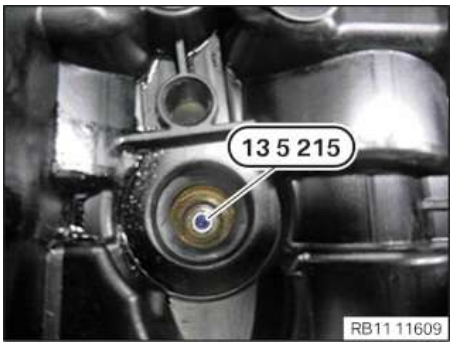
Contaminant or foreign body.

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.



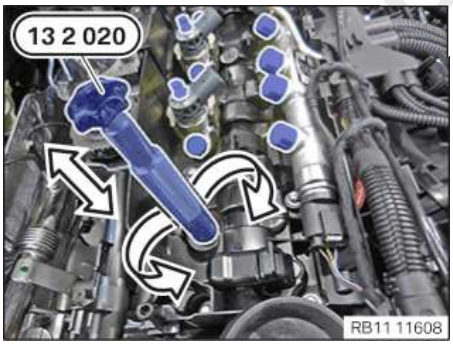
- Check whether the sealing ring remained in the injector shaft and remove the sealing ring as needed.
- Insert the special tool 0 493 763 (13 5 215) with the special tool 0 493 762 (13 5 214) from the set of special tools 0 493 758 (13 5 210) into the injector shaft.
- Remove special tool 0 493 762 (13 5 214).



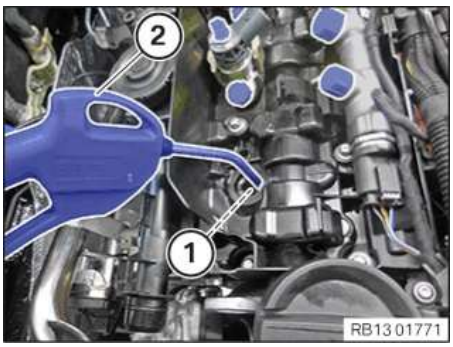
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



- 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).

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- 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.

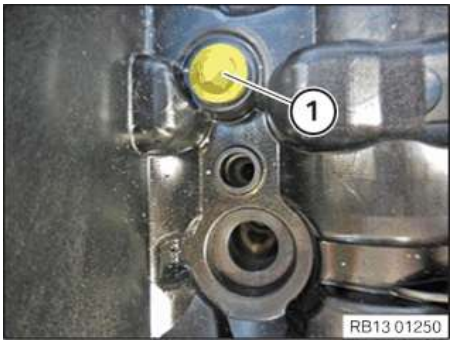
▸ **Check the placement of the clamping claw**

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**

RISK OF DAMAGE

Contaminant or foreign body.

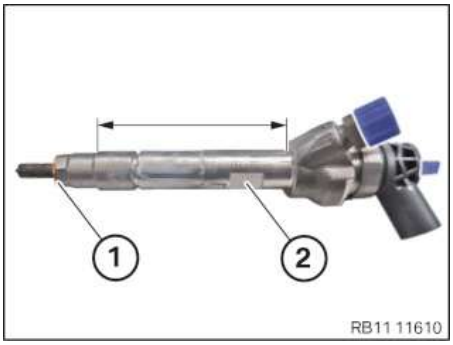
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

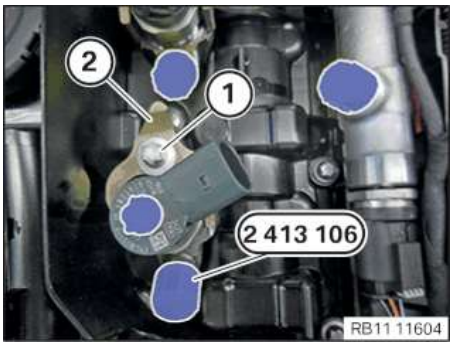
Lightly grease the injector shaft with high temperature-resistant grease.
For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue

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- Renew the copper sealing ring (1) on the injector (2).

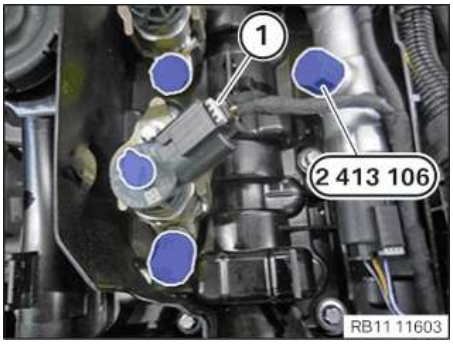
  Parts: Copper sealing ring
- Lightly grease the injector in the marked area with heat-resistant grease before installing the injector (2) in the injector shaft.



- 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.

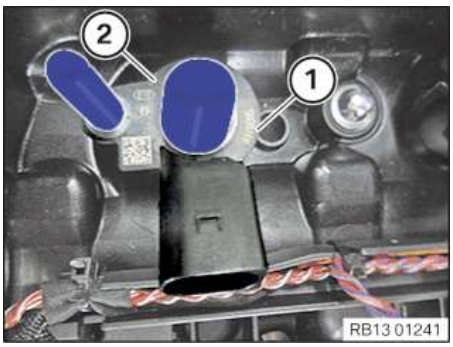
▸ **Replacement: Perform injection quantity compensation**

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.



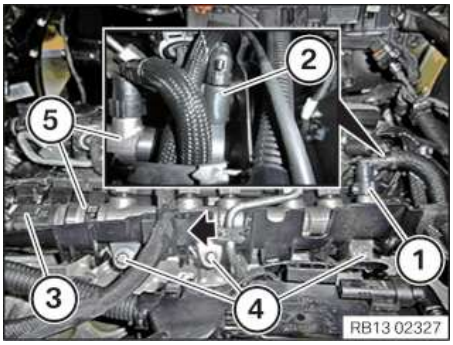
- Read off the adjustment value (1) on the new injector (2).

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- 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.

82 – 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.

83 – 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.

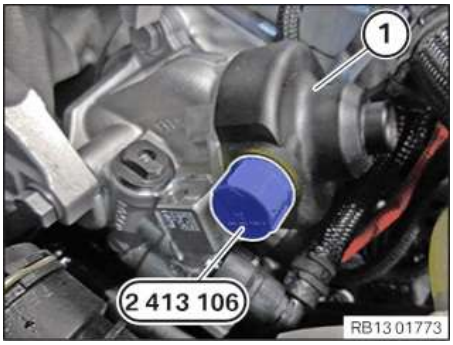
Danger of injury!

- 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.

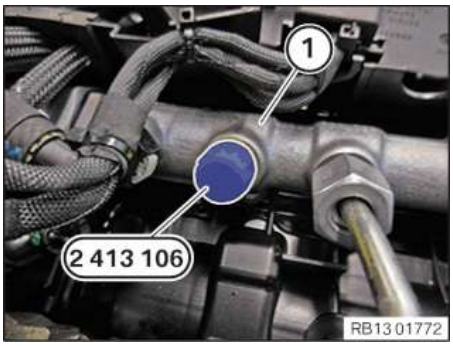
TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

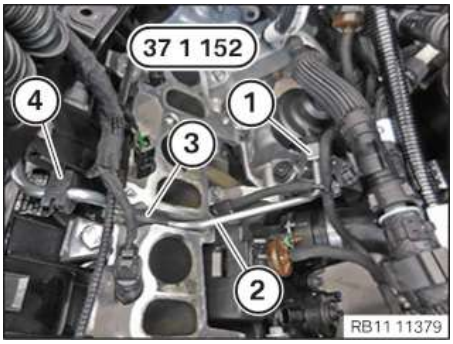
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- Feed out and remove special tool on the high pressure pump (1).



- 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.

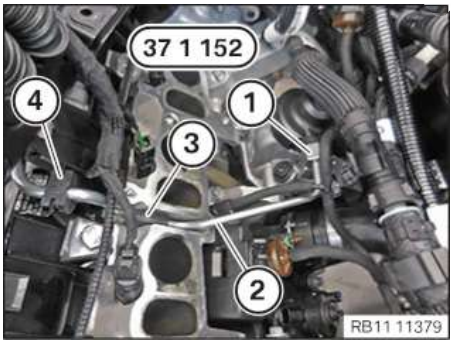
TECHNICAL INFORMATION

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.

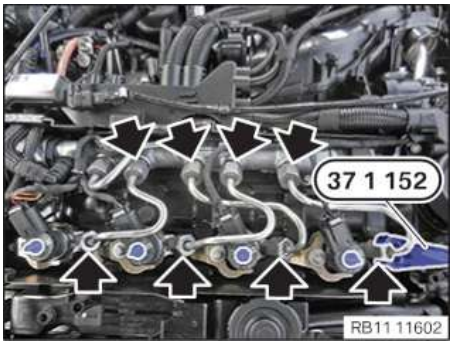
- Tighten union nut (1) on the high pressure pump with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm

84 – Installing the high pressure lines between the injector and the rail

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- 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.

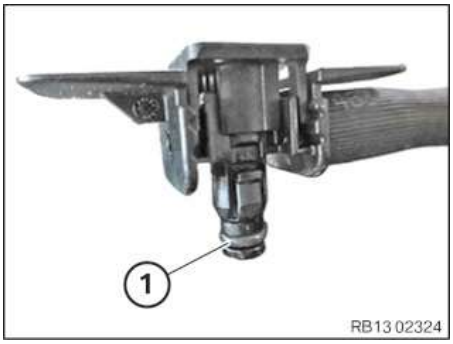
- Tighten the high pressure lines (arrows) with the special tool .

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**).

85 – Attach the leakage oil line on the injectors

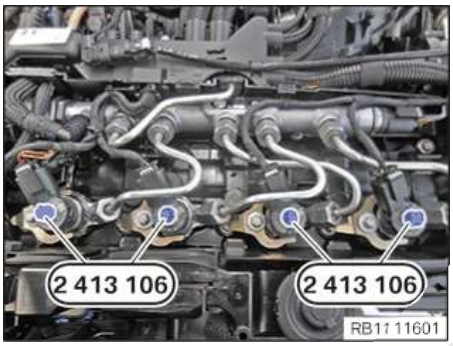


- **Version A:**

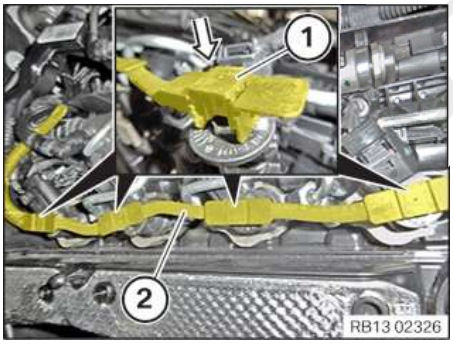
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

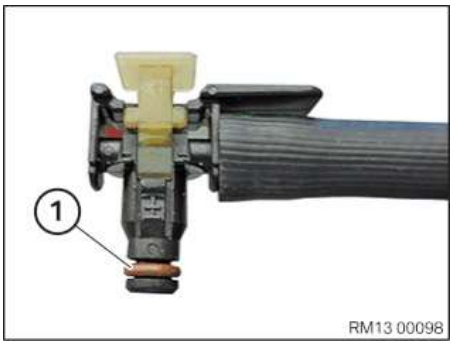
  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.



- 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.



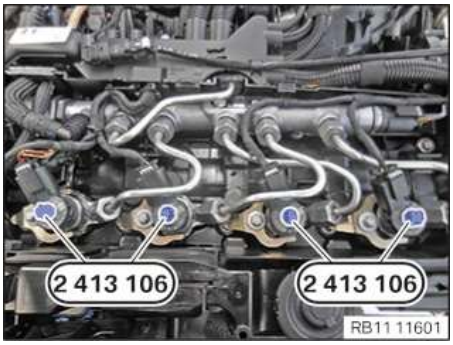
- **Version B**:

  Check sealing ring (1) for damage, renew leakage oil line if necessary.

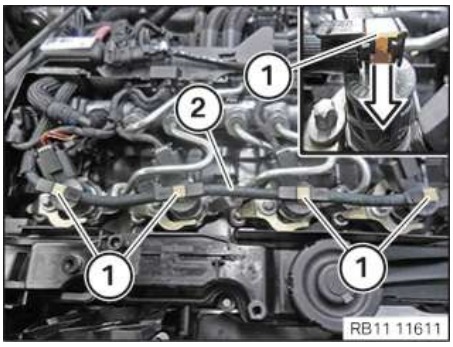
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.

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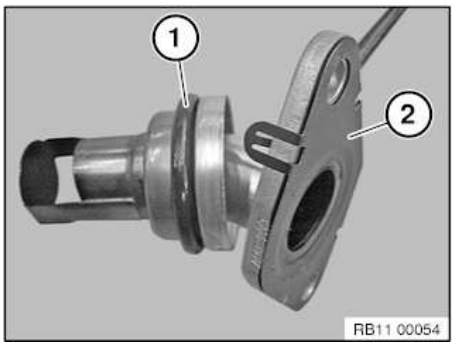


- Feed out the special tools and remove.



- 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.

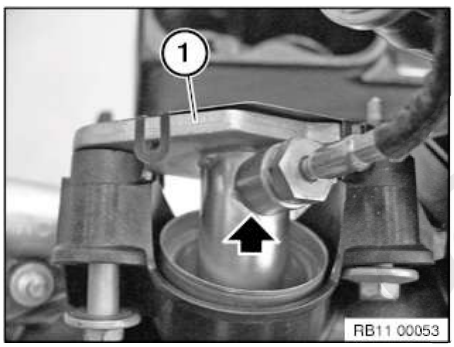
86 – Installing the intake plenum



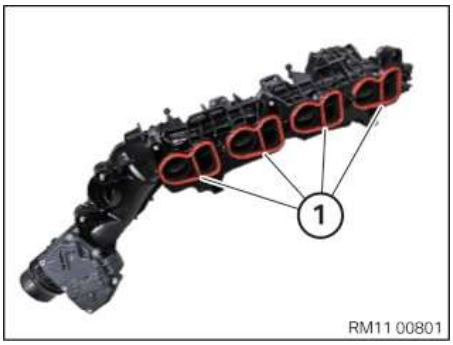
- Renew O-ring (1).

  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

  Parts: Gasket
- Position the seal (2) and clip it in.



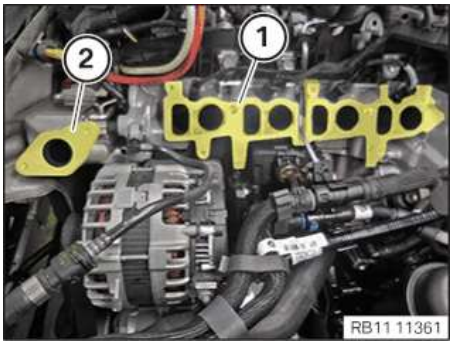
- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).



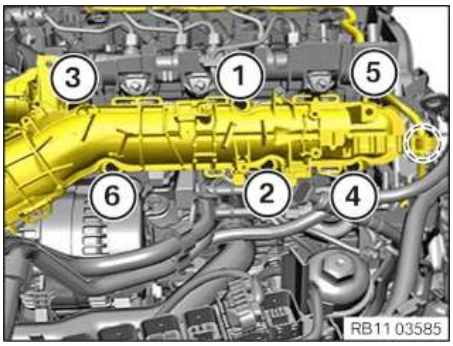
- Renew seals (1).

  Parts: Seals
- Ensure that the seals (1) are firmly mounted on the intake plenum.

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- Clean connection points (1) at cylinder head.
- Clean the connection point (2) on the exhaust-gas recirculation cooler.

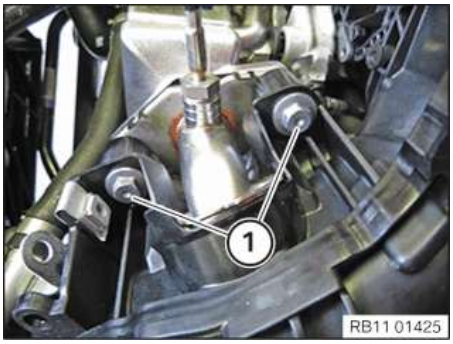


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

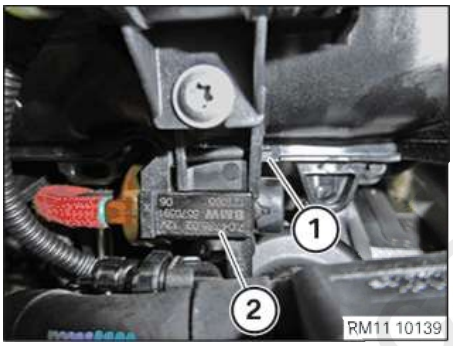
- Attach the wiring harness and fuel lines in the marked area on the intake plenum.



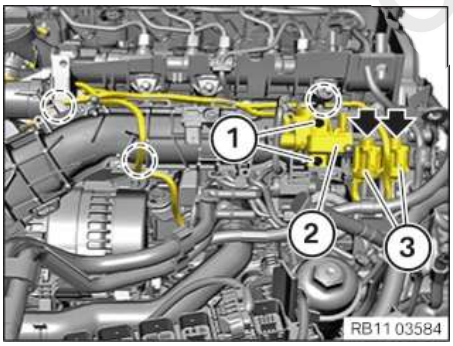
- Tighten the screws (1).

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.



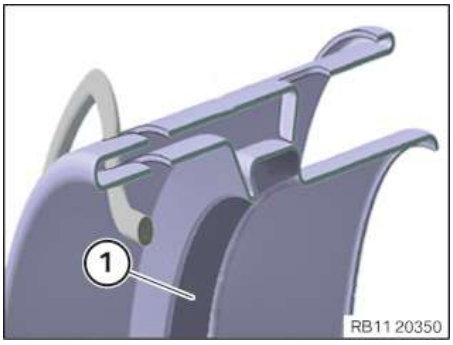
- Check the seal (1) for damage, and renew if necessary.

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▸ **Replacing damaged seal**

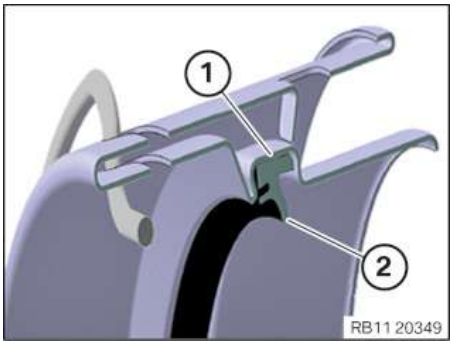
TECHNICAL INFORMATION

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.

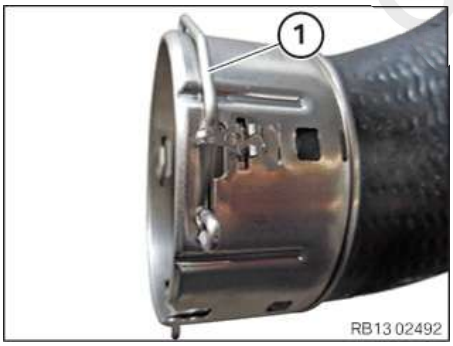
TECHNICAL INFORMATION

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.

87 – Partially securing the wiring harness section on the intake plenum

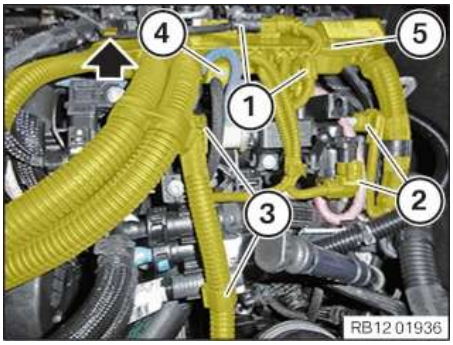
RISK OF DAMAGE

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.

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- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

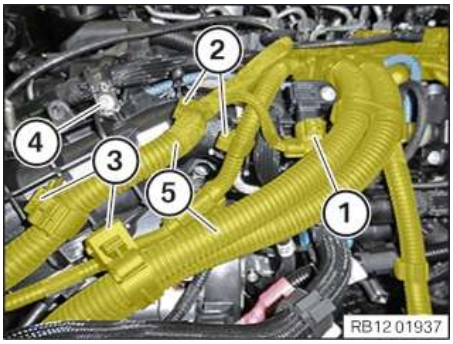
Wiring harness section to manifold

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.



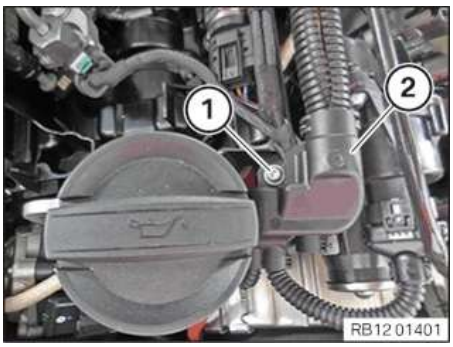
- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

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.

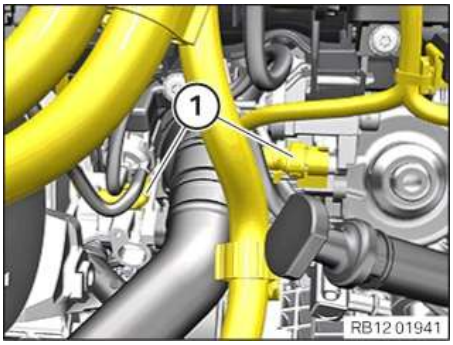
  The connector (1) must engage audibly.



- Connect the connector (1) and lock it.

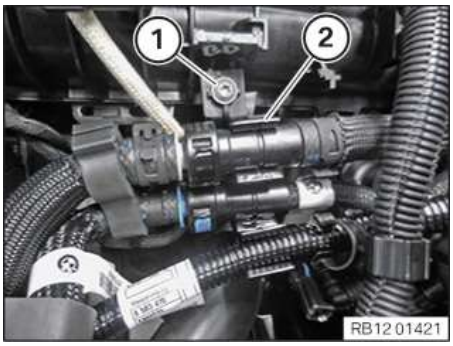
  The connector (1) must engage audibly.

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- Connect connectors (1) and lock.

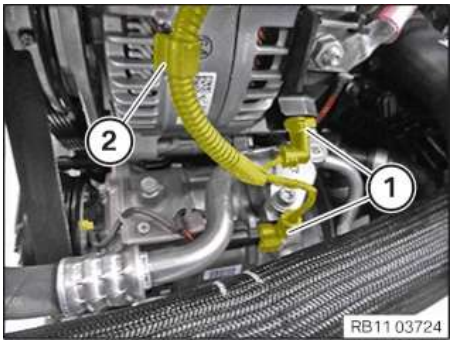
  The connectors (1) must engage audibly.



- Insert and install the holder (2).
- Tighten down screw (1).

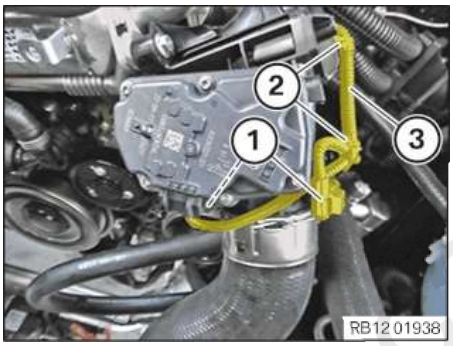
Holder on intake plenum

TS6X20		Tightening torque	5 Nm

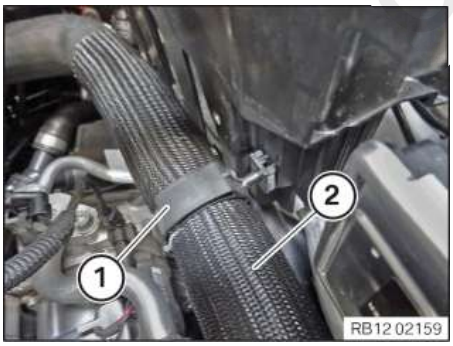


- Connect the connector (1) and lock it.

  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).

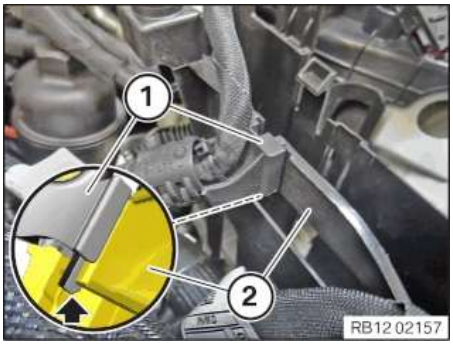
  The holder (1) must engage audibly.



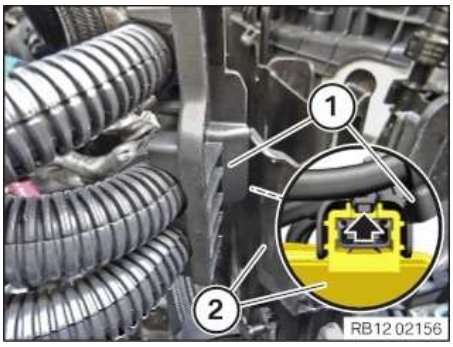
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.

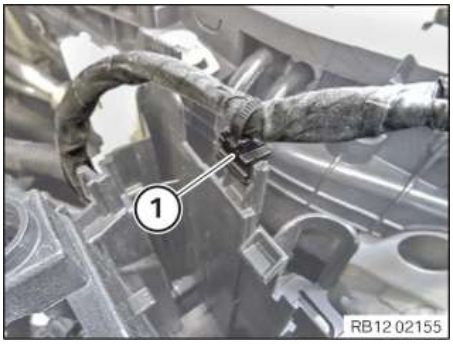
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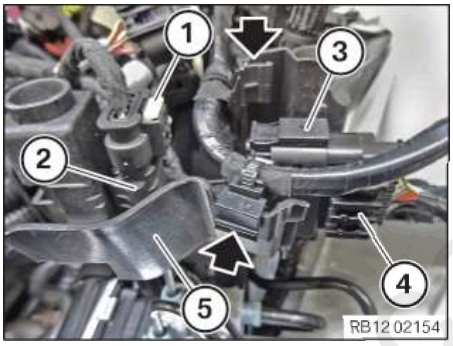
- Connect the cable clip (1) with the control unit holder (2) and lock it.
  Lock (arrow) must audibly engage.



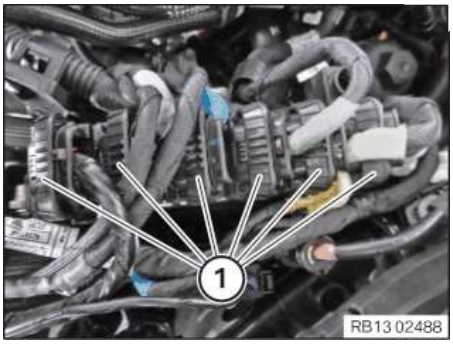
- Connect the cable clip (1) with the control unit holder (2) and lock it.
  Lock (arrow) must audibly engage.



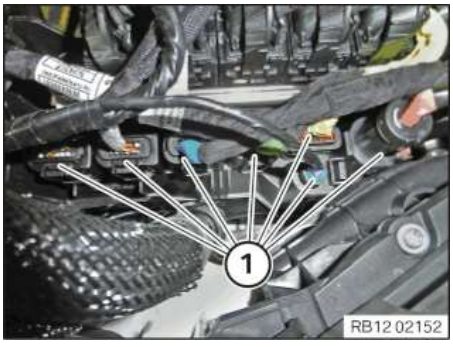
- Secure clamps (1).



- 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).

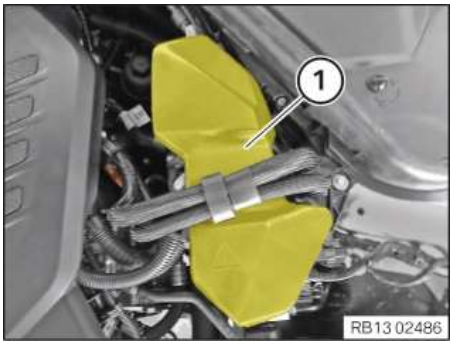


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.

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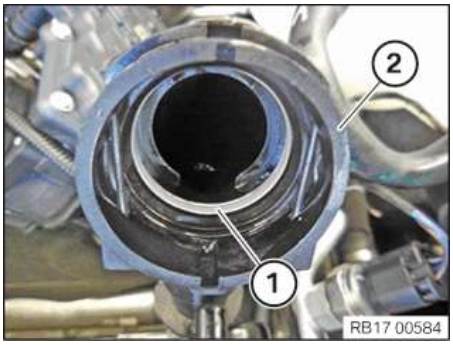


- Insert and install cover (1) into guides.

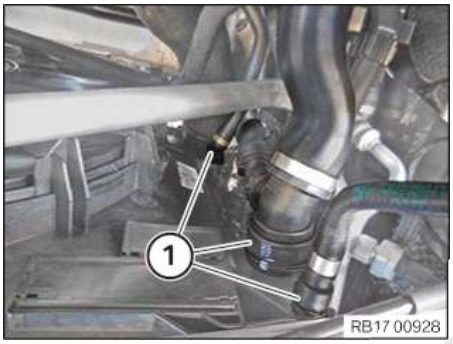
88 – Connecting the coolant lines

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.

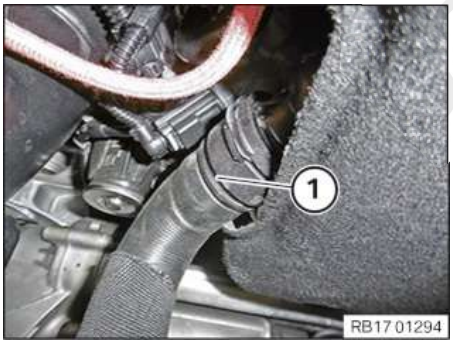


NOTICE

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.

89 – 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.

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RISK OF DAMAGE

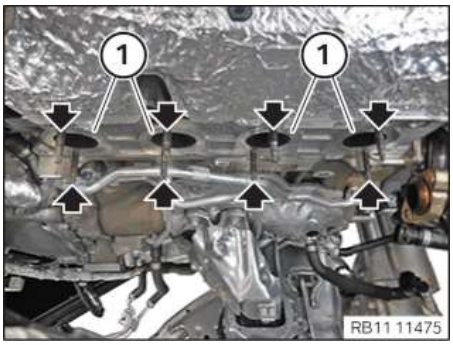
Damage to the surface.

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.

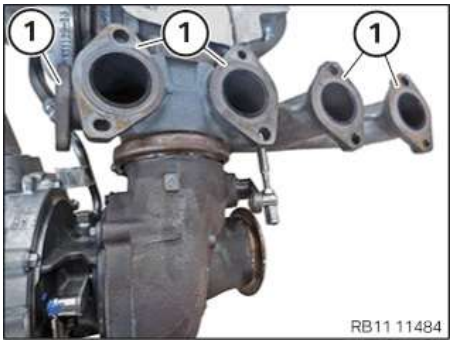
TECHNICAL INFORMATION

The sealing surfaces must be free from oils, grease and cleaning agents.

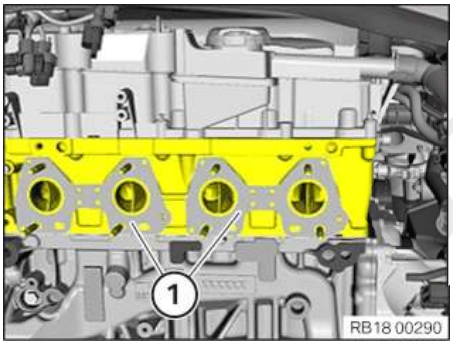


- Check the stud bolts (arrows) on the cylinder head for **correct** fit.
- Clean the connection points (1) with the special tool 0 495 102 (11 4 470).
- Renew gaskets.

  Parts: Seals



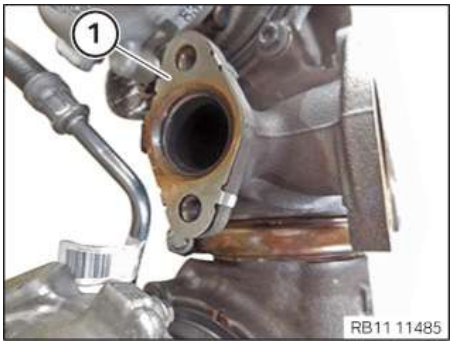
- Clean the connection points (1) on the exhaust manifold with the special tool 0 495 102 (11 4 470).



TECHNICAL INFORMATION

The **coated side** of the seal must be on the side of the exhaust manifold.

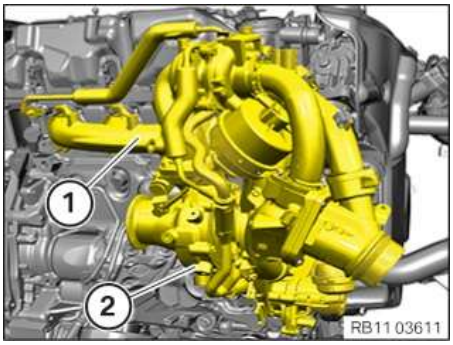
- Insert and install the gaskets (1).



- Renew the seal (1).

  Parts: Gasket
- Insert and install the seal (1).

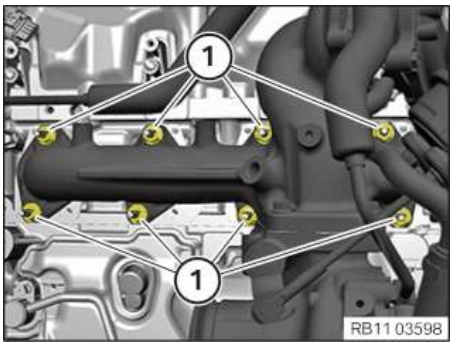
.com



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.



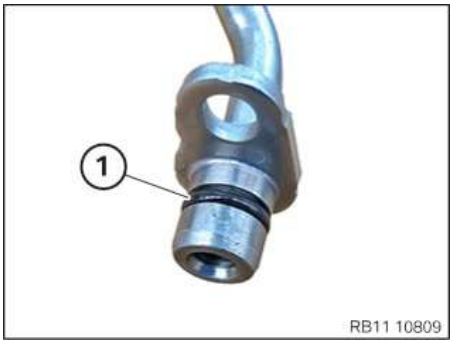
- Renew nuts (1).

  Parts: Nuts

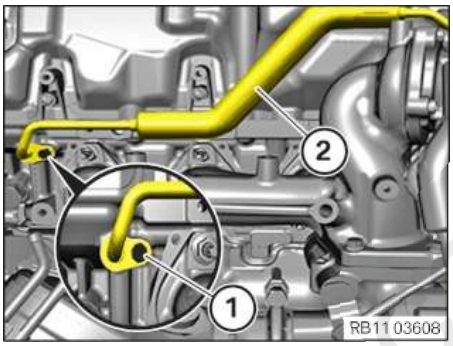
- Tighten the nuts (1) evenly from the inside out.

Exhaust manifold to cylinder head

M7	**If necessary, renew loose stud bolts.**	Tightening torque	11 Nm
	Renew nuts.	Tightening torque	13 Nm



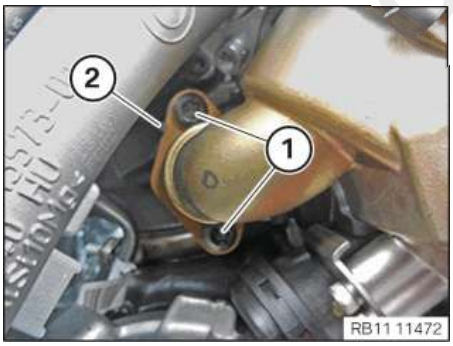
- Check the seal (1) for damage, if necessary, renew the oil feed line.



- 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

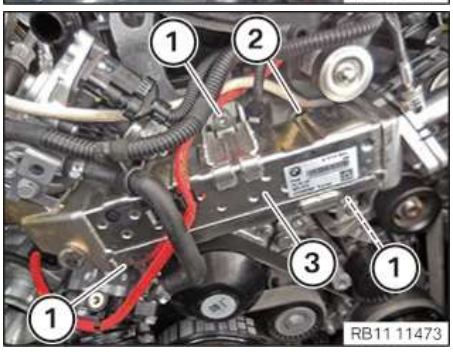


- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

M8x28	Replace screws	Tightening torque	32 Nm

- Ensure that seal (2) is installed.



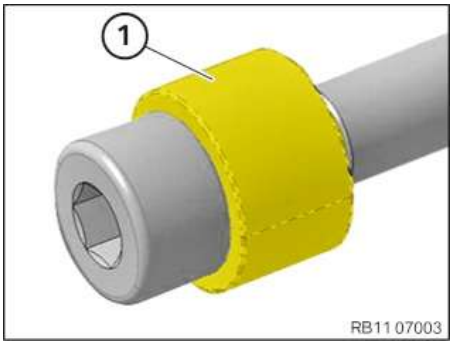
- Position the exhaust-gas recirculation cooler (3).
- Make sure the pipe neck (2) is fitted correctly.
- Tighten the screws (1).

Exhaust-gas recirculation cooler to cylinder head

M8x20 / M8x28		Tightening torque	19 Nm

Check

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- Check whether the screws **with the** sleeves (1) (10 mm) are available.

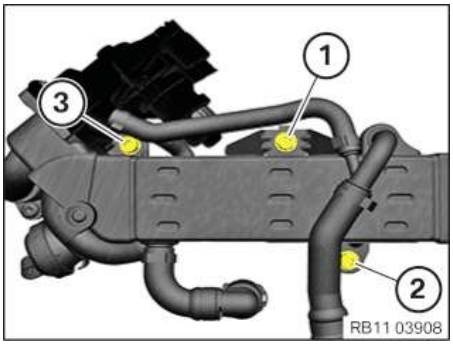
Result

» Screws **without** sleeves (1) are available.

Measure

- Renew screws.

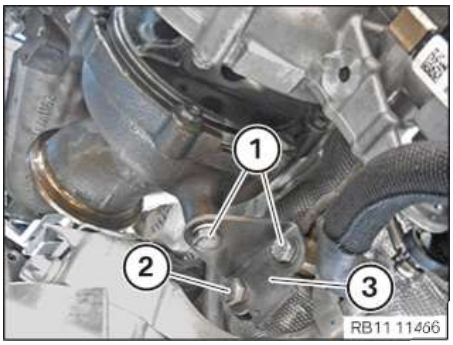
  Parts: Screws (part number 9 886 429)



- Tighten the screws (1) to (3).

Exhaust-gas recirculation cooler to cylinder head

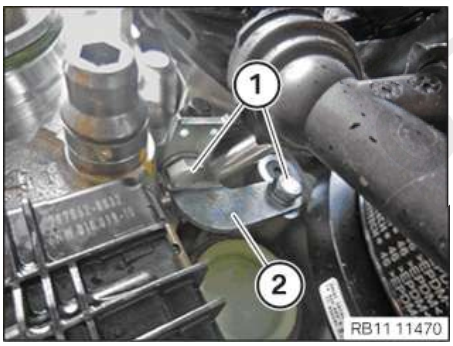
M8x20 / M8x28		Tightening torque	19 Nm



- Tighten the bolts (1) and (2) on the bracket (3).

Exhaust turbocharger low-pressure stage to crankcase

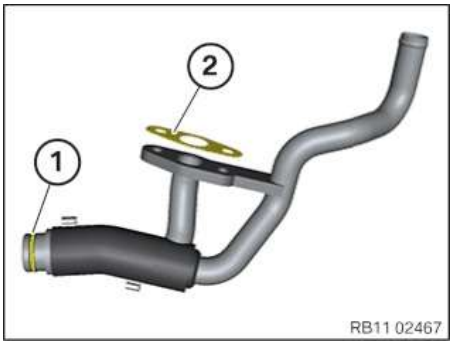
M8X16		Tightening torque	22 Nm



- Insert and install the holder (2).
- Tighten the screws (1).

Exhaust turbocharger low-pressure stage to crankcase

M8X16		Tightening torque	22 Nm

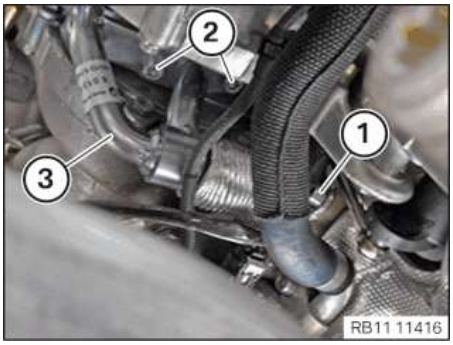


- Renew the gasket (2).

  Parts: Gasket

- Check the O-ring (1) for damage and renew the oil return line as needed.

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- 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

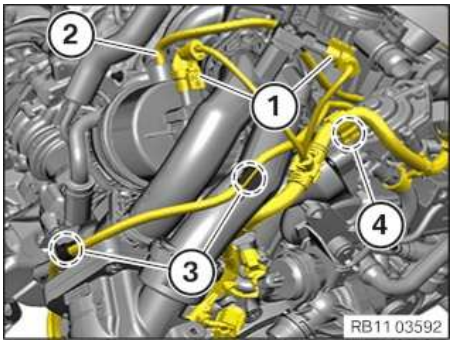
- Install the bolt (1).



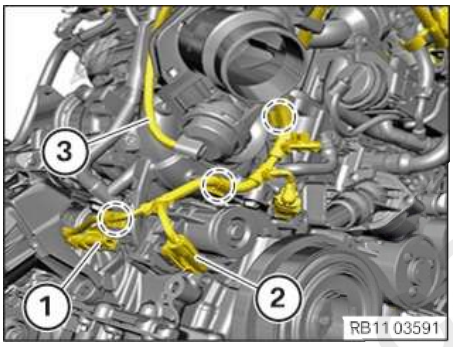
- Tighten the screws of the oil return line on the crankcase from the right wheel arch.

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.

90 – 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.

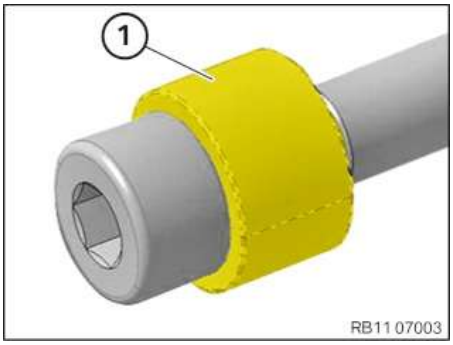
Damage and operating failure of the starter generator.

- 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

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- Check whether the screws **with 10mm** sleeves (1) are available.

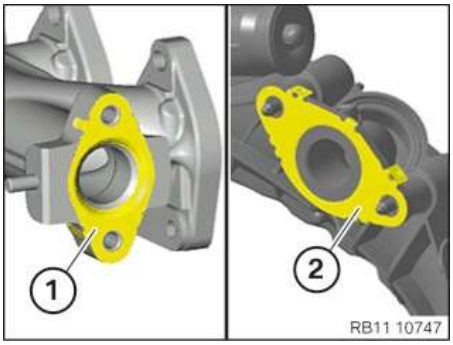
Result

» Screws **without** sleeves (1) are available.

Measure

- Renew screws.

  Parts: Screws (part number 9 886 429)

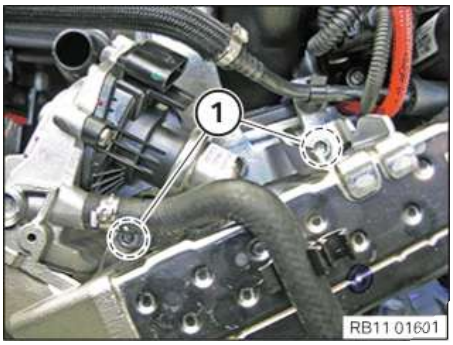


- Renew the seal (1) between the exhaust manifold and the exhaust-gas recirculation cooler.

  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

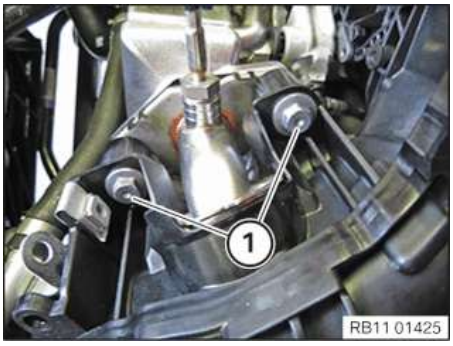
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screw (1) under the exhaust-gas recirculation cooler and then release again.

Exhaust-gas recirculation cooler to cylinder head

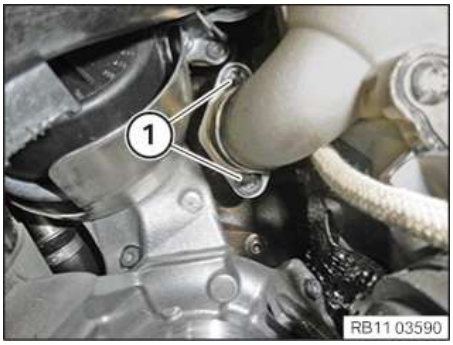
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

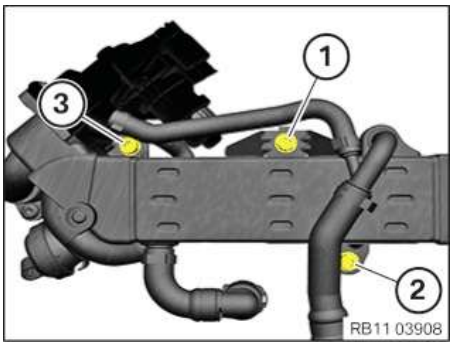
		Tightening torque	10 Nm



- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

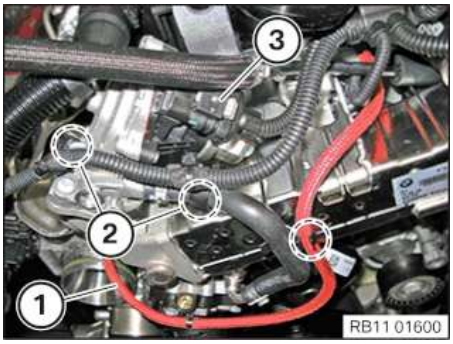
M8x28	Replace screws	Tightening torque	32 Nm



- 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.

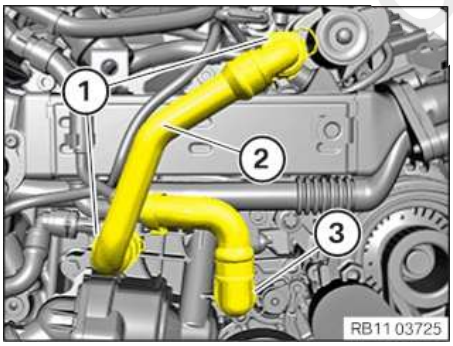


TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.

- **Version A:**

  Connect and audibly lock coolant lines (1).



TECHNICAL INFORMATION

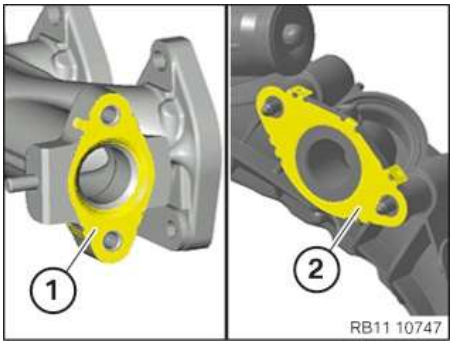
Make sure that the connections are locked correctly. The locks must engage audibly.

- **Version B:**

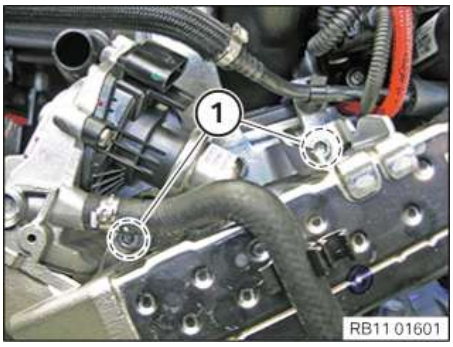
  Connect and audibly lock coolant lines (3).
- Install the coolant line (2).
- Audibly lock the locks (1).

▸ **Installing the exhaust-gas recirculation cooler**

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- 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

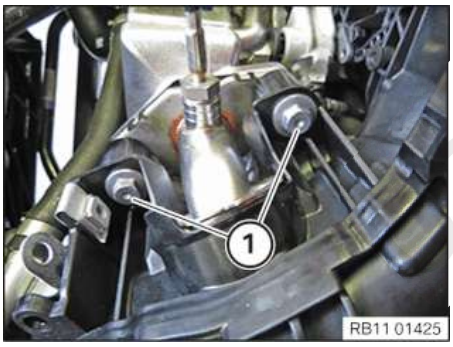
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screw (1) under the exhaust-gas recirculation cooler and then release again.

Exhaust-gas recirculation cooler to cylinder head

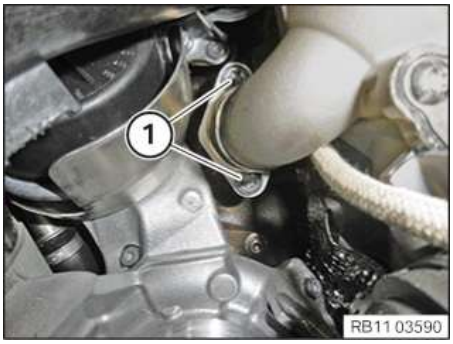
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm

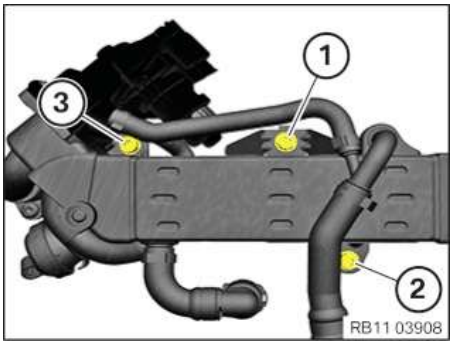


- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

M8x28	Replace screws	Tightening torque	32 Nm

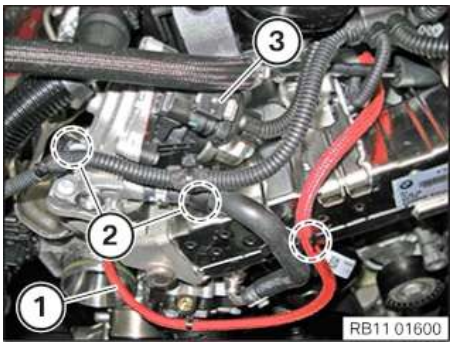
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- Tighten screws in the order (1) to (3).

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.

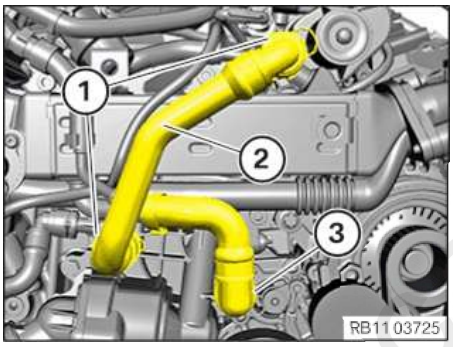


TECHNICAL INFORMATION

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.

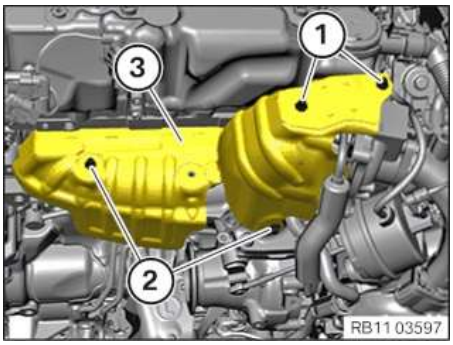
- **Version B:**

  Connect and audibly lock coolant lines (3).

  Install the coolant line (2).

  Audibly lock the locks (1).

91 – 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

92 – Installing the sensor bracket on the cylinder head cover

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RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

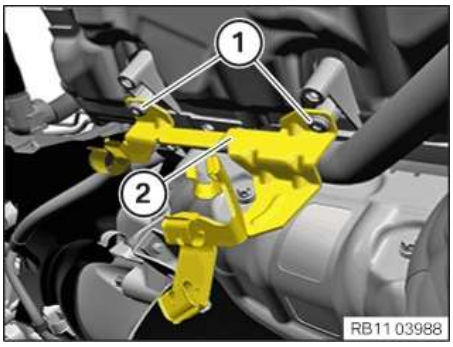
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

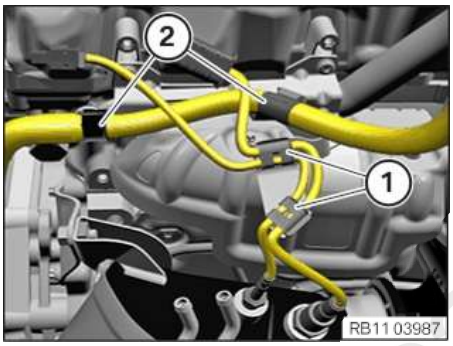
- Route all cables without abrasions, do not trap and crush.



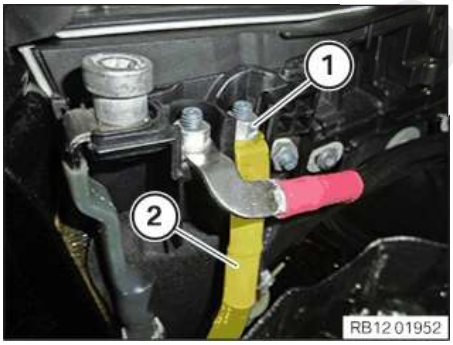
- Insert and install the holder (2).
- Tighten the screws (1).

Bracket on cylinder head cover

	Tightening torque	5 Nm



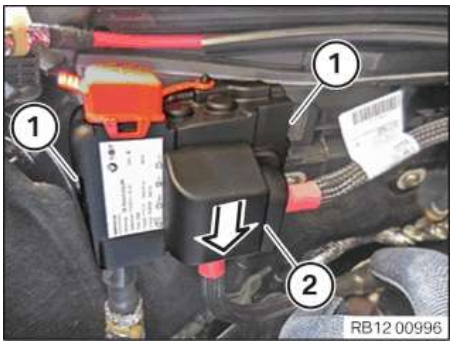
- Secure the positive battery cable in the clamps (2).
- Mount the cable of the exhaust gas sensor system in the clamps (1).



- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

Battery positive lead to battery positive terminal

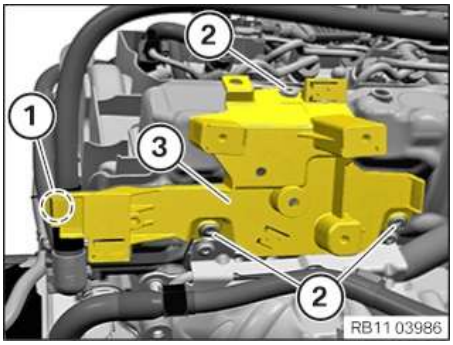
M8		Tightening torque	19 Nm



- Insert and install the cover (2) in the direction of the arrow.

  The locks (1) must engage audibly.

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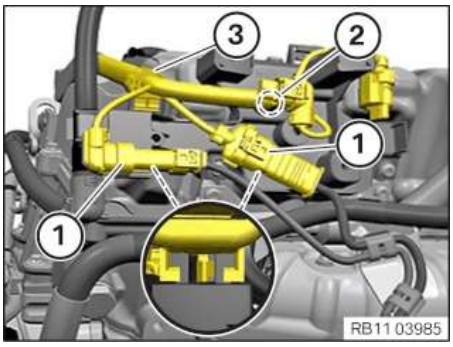


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

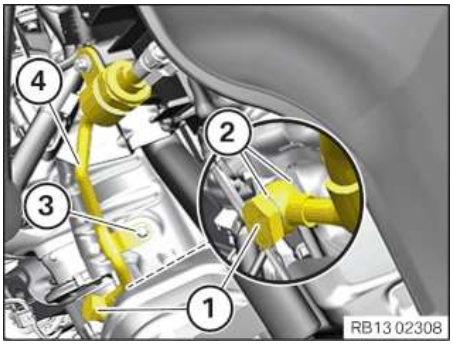
		Tightening torque	5 Nm

- 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.

93 – 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).

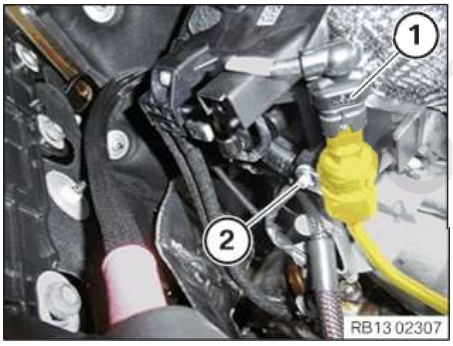
Heat shield to exhaust manifold

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).

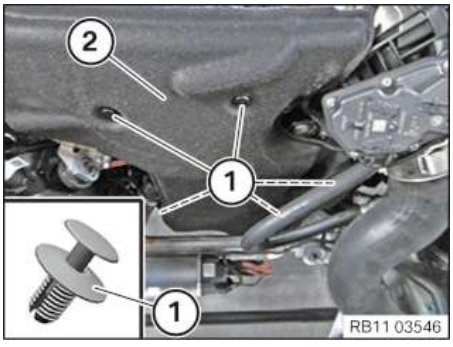
Exhaust gas pressure pipe to sensor system holder

TS6x20		Tightening torque	5,7 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

94 – 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).

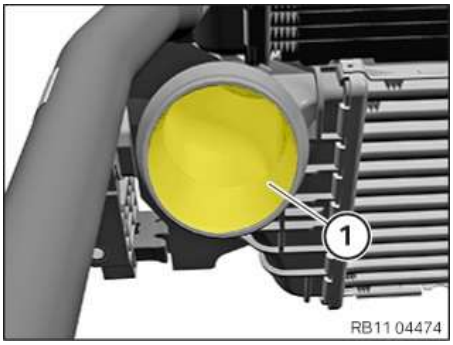
95 – Install pressure pipe between exhaust turbocharger and charge air cooler

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.



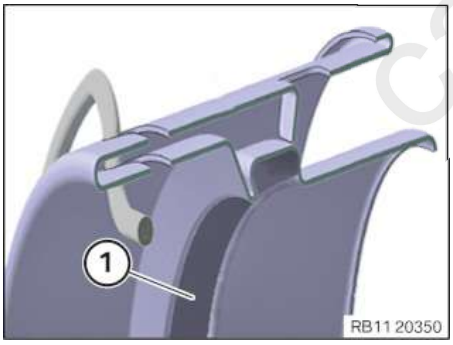
- Check the seal (1) for damage and renew if necessary.

  Parts: Gasket

▸ **Replacing damaged seal**

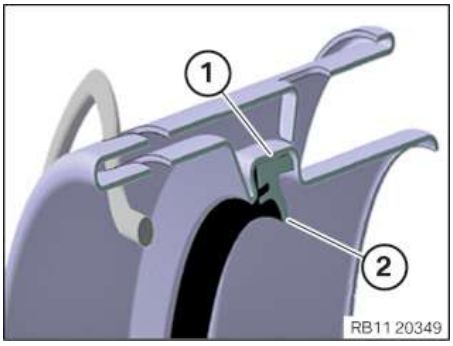
TECHNICAL INFORMATION

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.

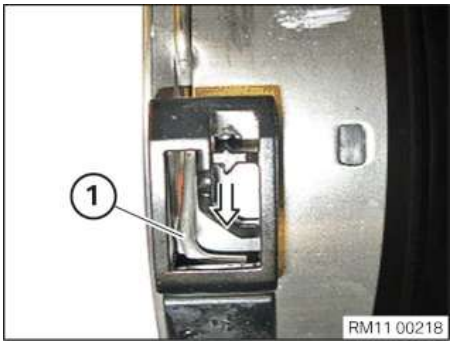
  Parts: Gasket
- Install seal dry without lubricant or mounting agent.

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.

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- **Version A:**

  Lock the lock (1).

  The lock (1) on the pressure pipe must engage audibly.

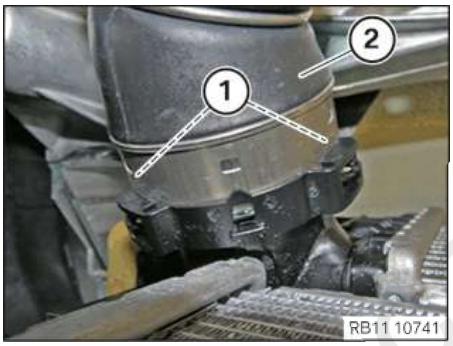


- Pay attention to the installation position:

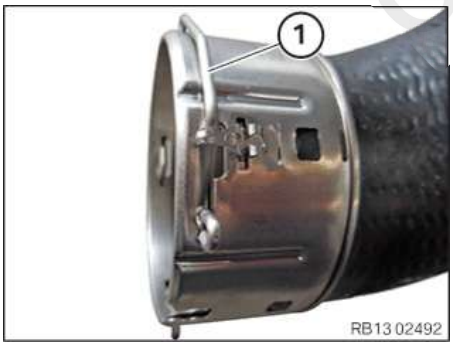
  The pressure pipe fits on charge air cooler in one installation position only.



- Install the pressure pipe (1) from the top.



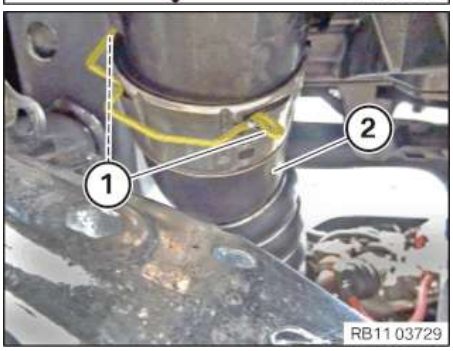
- Connect pressure pipe (2) to charge air cooler.
- Lock the lock (1) on both sides.



- **Version B:**

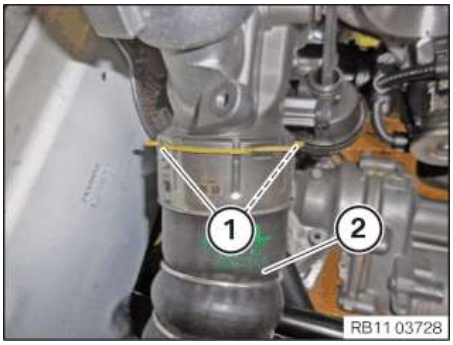
  Lock the lock (1).

  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.

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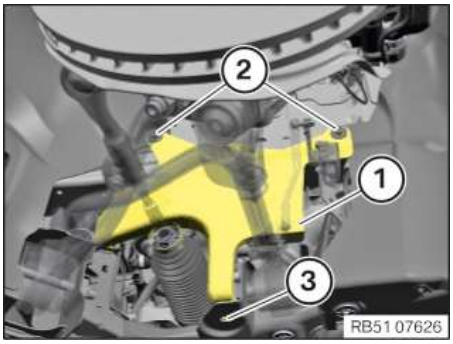


- Place the pressure pipe (2) onto the compressor bypass and ensure that the lock (1) engages audibly.

96 – 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

97 – 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.

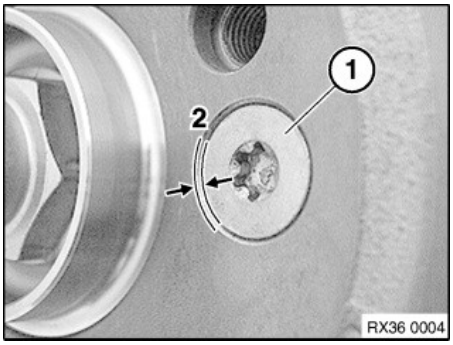
- Remove dirt, grease residues and corrosion from the contact surface with a drill and the special tool 2 344 011.

  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.

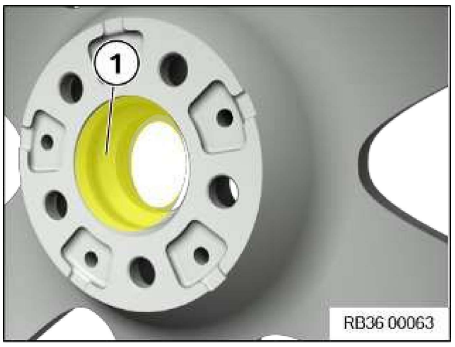
  The mounting bolt (1) for the brake disc **may not** protrude on the contact surface (2) between the brake disc and the wheel rim.

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



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



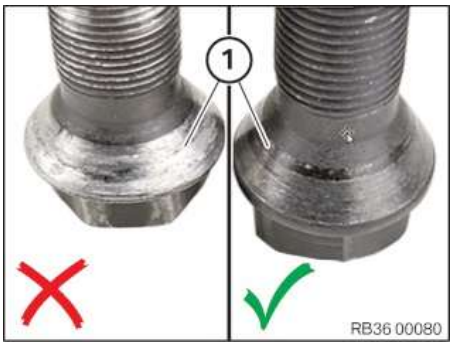
TECHNICAL INFORMATION

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.

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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.		

98 – Prepare for the installation of the diesel particulate filter



- Renew the V-clip (1).

  Parts: V-band clamp

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- Renew gasket (1).

  Parts: Gasket

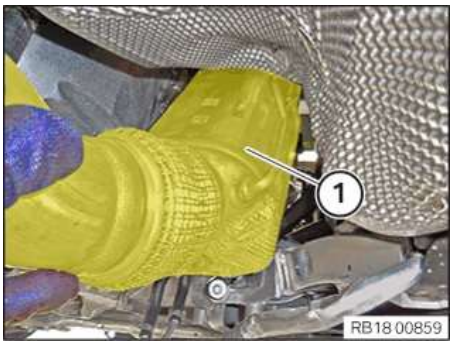
99 – Installing the diesel particulate filter

CAUTION

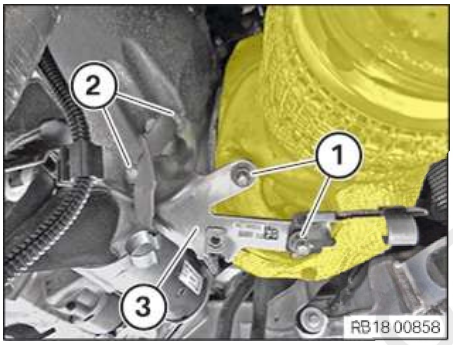
Heavy component.

Heavy components can lead to injury or damage.

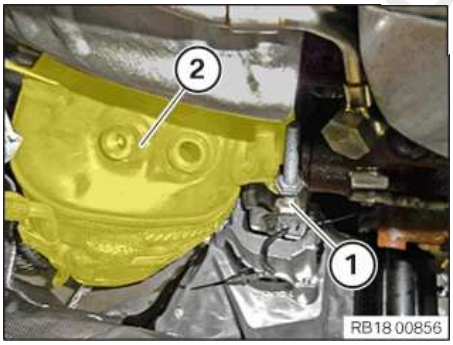
- Remove and install heavy components with the aid of another person/other persons.



- 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**.

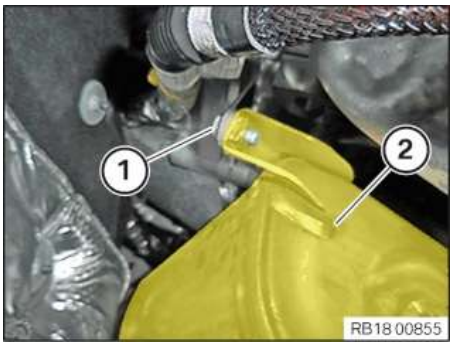


- Renew the V-clip (1).

  Parts: V-band clamp
- Feed in and install V-band clamp (1).

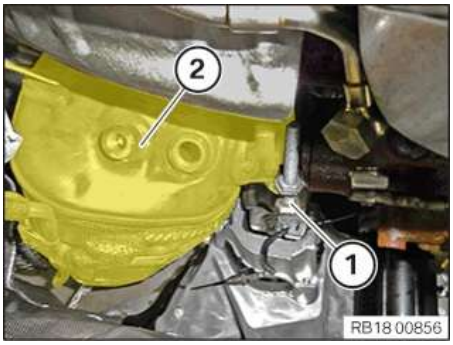
Note: Make sure that the seal between the diesel particulate filter and the exhaust turbocharger is installed correctly.

- 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**.

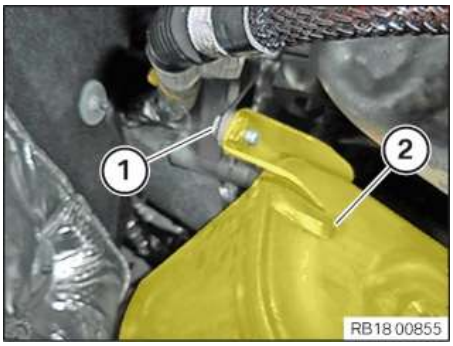
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- Tighten the V-clip (1) of the diesel particulate filter (2).

Diesel particulate filter V-clip to exhaust turbocharger

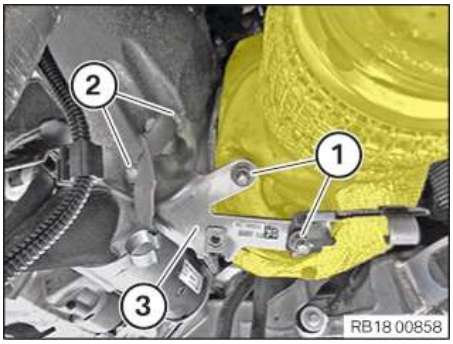
V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm



- 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).

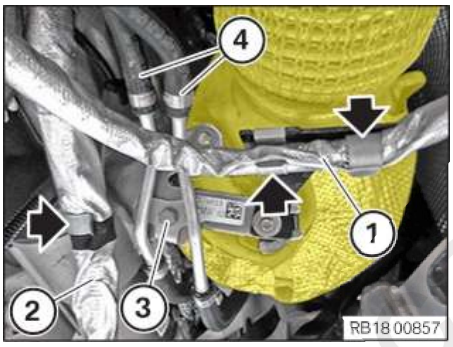
Bracket to transmission for diesel particulate filter holder bottom

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).

100 – Installing the nitrogen oxide sensor upstream of SCR catalytic converter

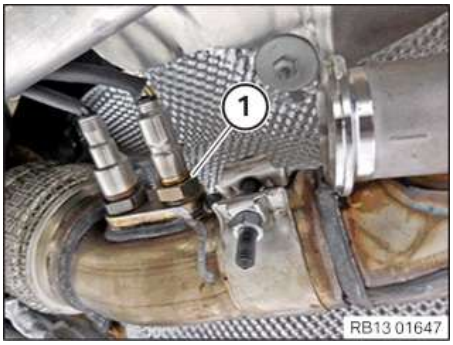
RISK OF DAMAGE

Damage to the nitrogen oxide sensor.

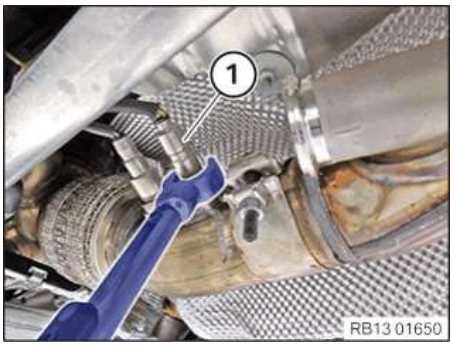
Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

- 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.

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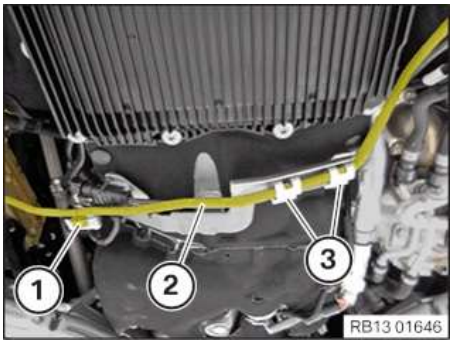
- Feed in and install the nitrogen oxide sensor (1).



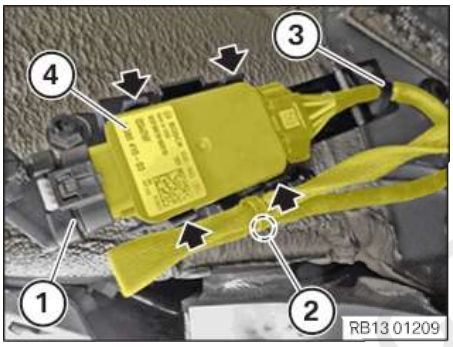
- Tighten the nitrogen oxide sensor (1) using commercially available tools.

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.

101 – 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.

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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



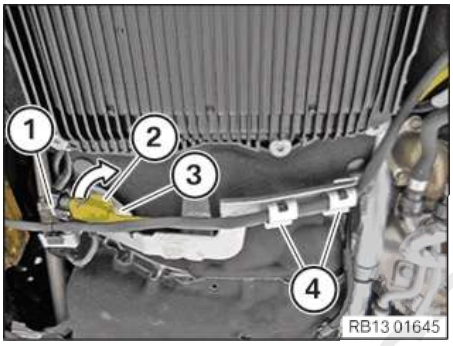
- Insert the monitoring oxygen sensor (1) and install it.



- 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.

102 – 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.

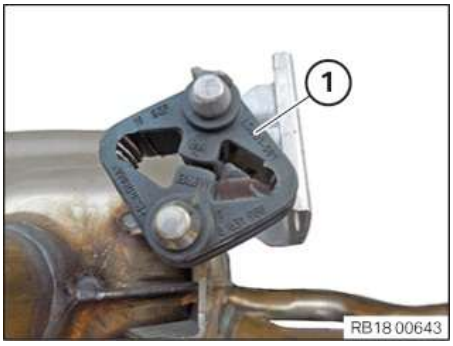
Heavy components can lead to injury or damage.

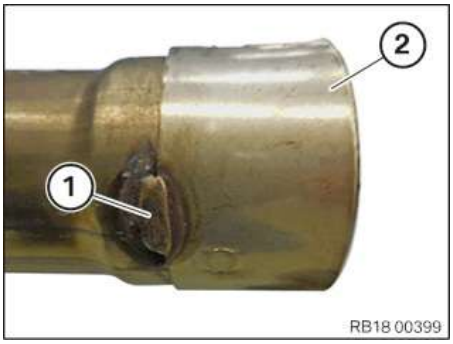
- Remove and install heavy components with the aid of another person/other persons.

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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

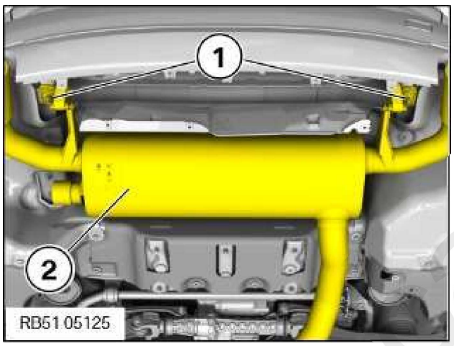
CAUTION

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).

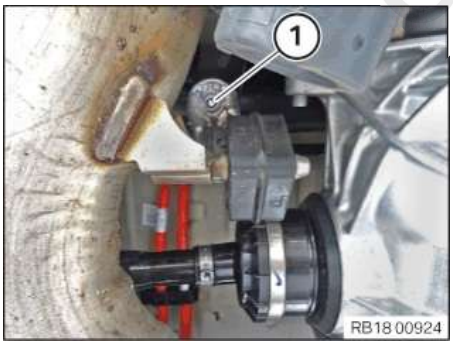


- Insert and install the exhaust system (2).
- Renew nuts (1).

  Parts: Nuts
- Tighten nuts (1).

Rear silencer to body / bumper support

M8	Replace nuts.	Tightening torque	19 Nm

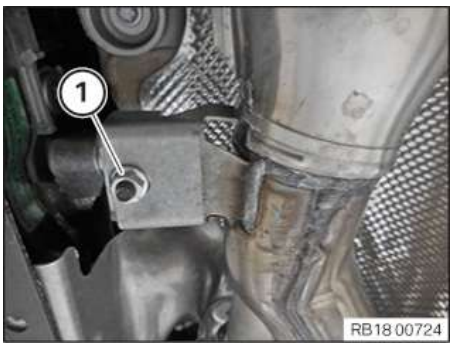


- Renew nut (1) on the rear axle support.

  Parts: Nut
- Tighten nut (1).

Exhaust system to rear axle carrier

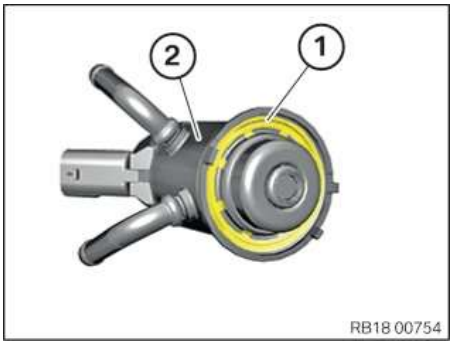
M8 nut		Tightening torque	19 Nm



- Tighten nut (1).

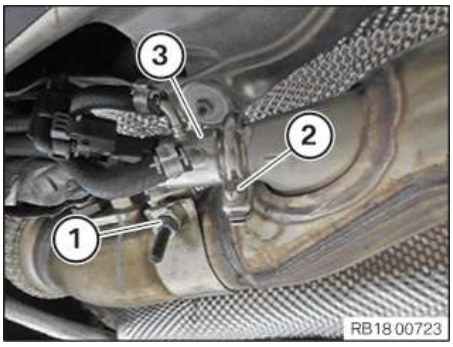
Exhaust system to transmission

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

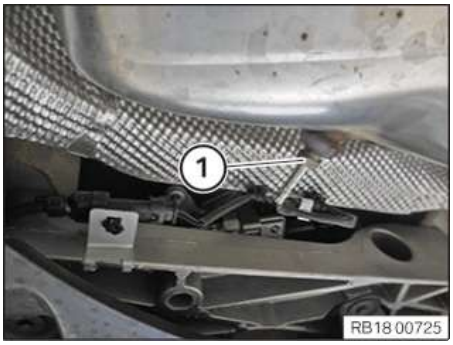
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

- 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

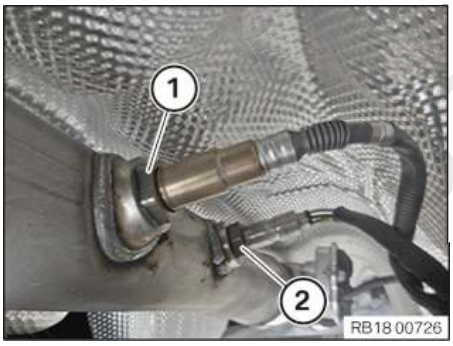
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm



- 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

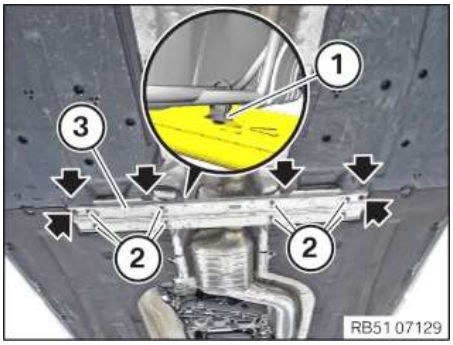
- Install the nitrogen oxide sensor (2) in the exhaust system and tighten.

Nitrogen oxide sensor downstream of SCR catalytic converter

Sensor		Tightening torque	55 Nm

103 – Install the connecting supports on the tunnel

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- Guide in and install connecting support (3) on the tunnel.
- Tighten the screws (2).
- Tighten screws (arrows).

Connecting support to tunnel

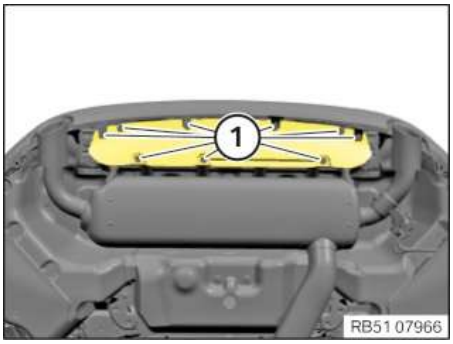
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Secure the clamp (1).

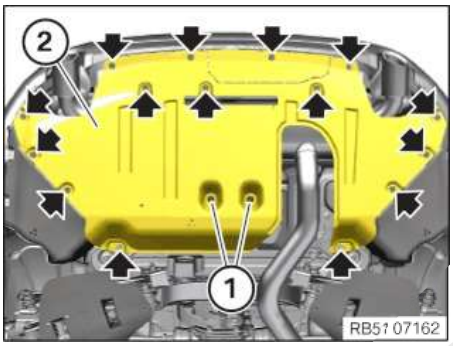
104 – Installing the rear diffuser



- **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

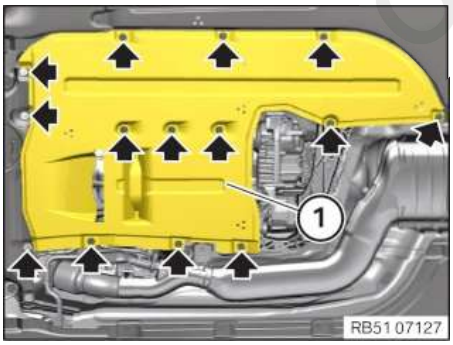
Nuts and screws		Tightening torque	3 Nm

- Tighten nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm

105 – Installing underbody protection at rear



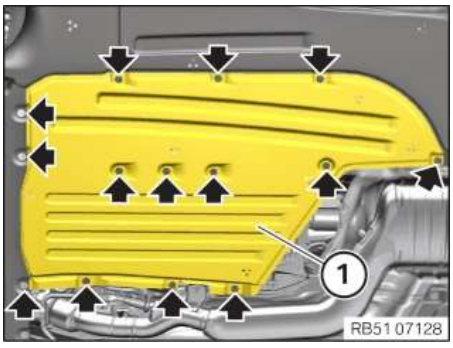
- **Version A:**

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

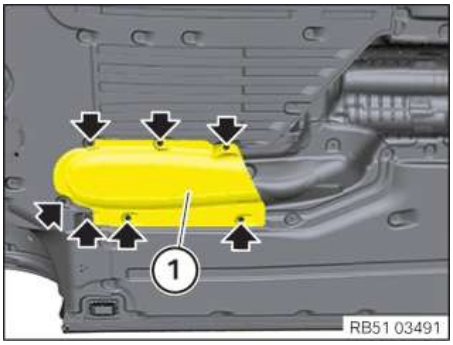
Hexagon screw		Tightening torque	3 Nm

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106 – 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.

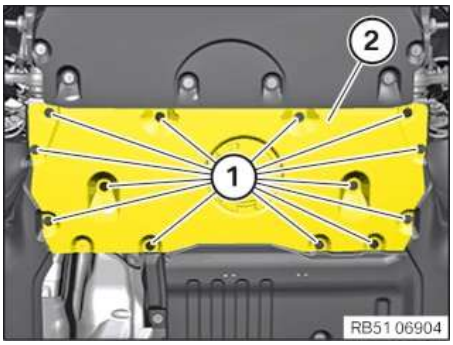


- Insert the underbody panelling (1).
- Tighten screws (arrows).

Underbody panelling

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

107 – Installing the centre underbody protection



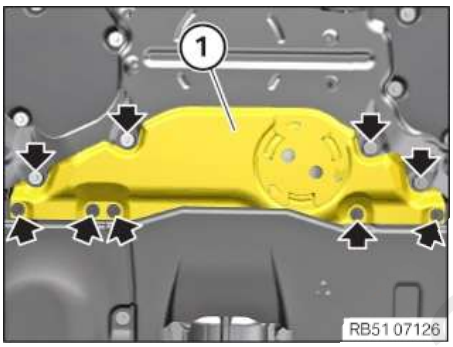
- **Variant with rear wheel drive:**

  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).

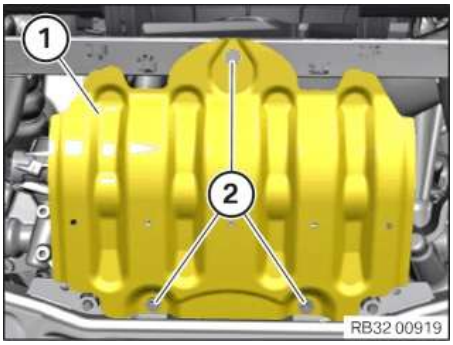
Underbody protection

Hexagon screw		Tightening torque	3 Nm

108 – 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

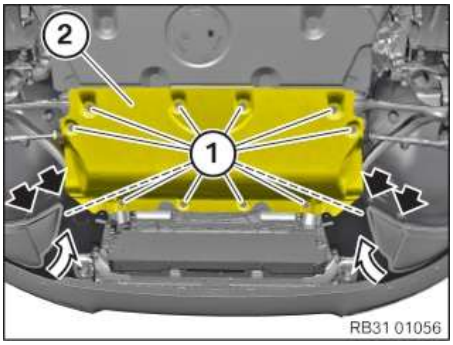
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

109 – Install the underbody protection of the steering gear

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- **Version A:**

  Position the underbody protection (2) of the steering gear.

  Tighten the screws (1).

Underbody protection of the steering gear

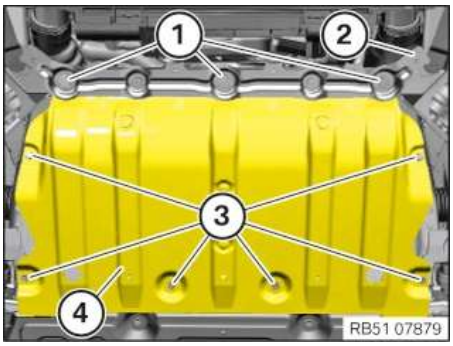
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- 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).

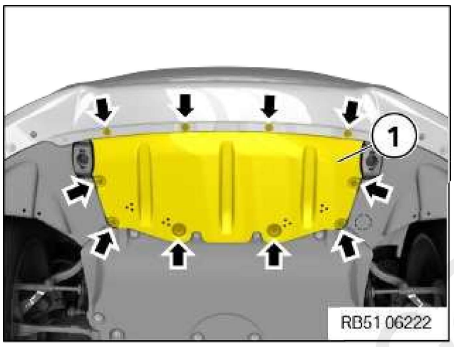
Underbody protection of the steering gear

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).

110 – Installing the front underbody protection



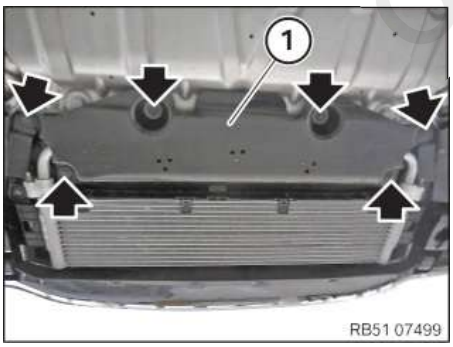
- **Version A:**

  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



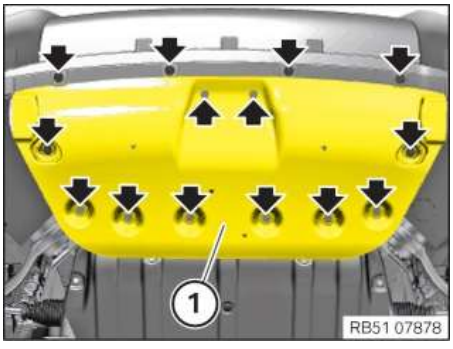
- **Version B:**

  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).

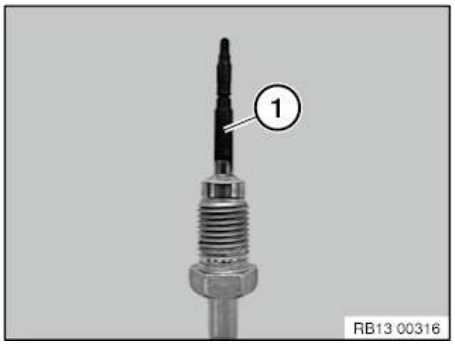
  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

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111 – Installing the exhaust temperature sensor for the exhaust system downstream the catalytic converter on the diesel particulate filter



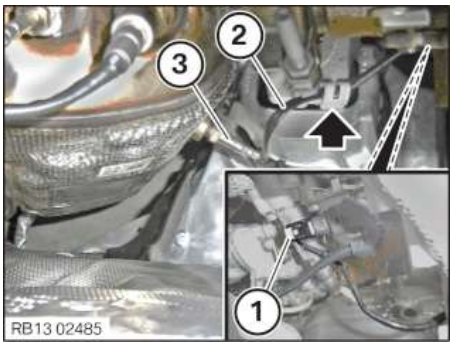
RISK OF DAMAGE

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.

112 – 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

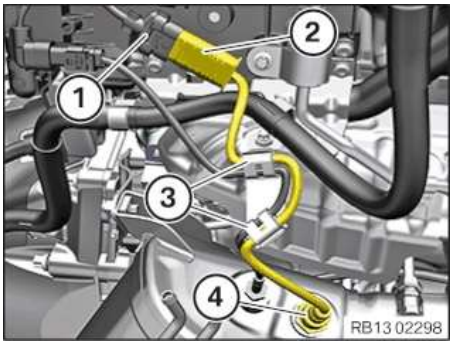


- Insert and install the front oxygen sensor (1).
- Tighten the front oxygen sensor (1) with standard tools.

Front oxygen sensor to top of diesel particulate filter

Sensor		Tightening torque	50 Nm

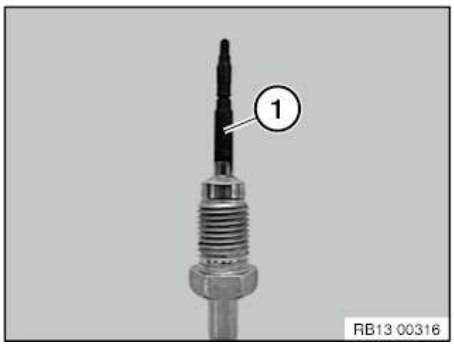
carDiagn.com



- 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.

113 – Install the exhaust-gas temperature sensor on the diesel particulate filter



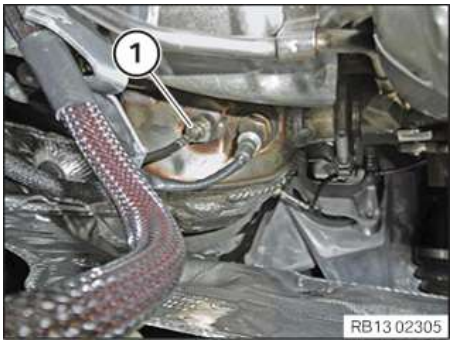
RISK OF DAMAGE

Damage of exhaust temperature sensor.

Damage to exhaust temperature sensors leads to malfunctions.

- Make sure that the gauge tip is not damaged.

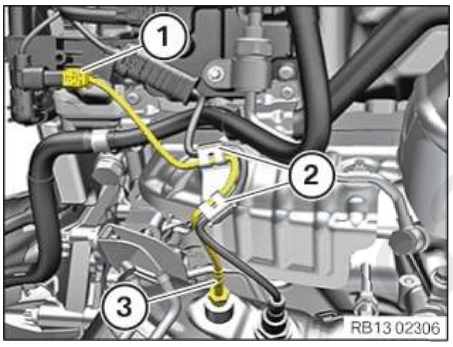
- Check gauge tip (1) for damage.



- 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

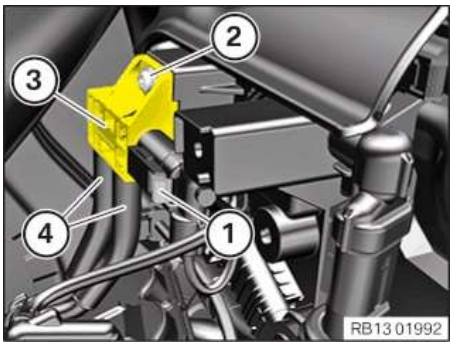
Sensor		Tightening torque	30 Nm



- Secure the exhaust temperature sensor (3) to the clamp (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

114 – 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.

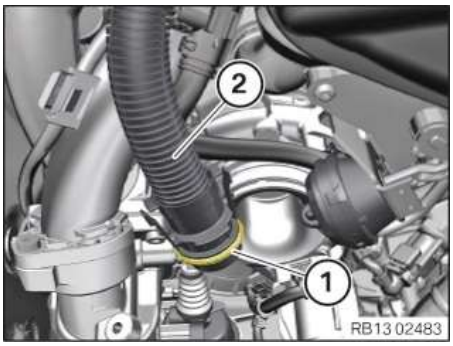
  The connector (1) must engage audibly.

115 – Installing the clean air pipe with resonator

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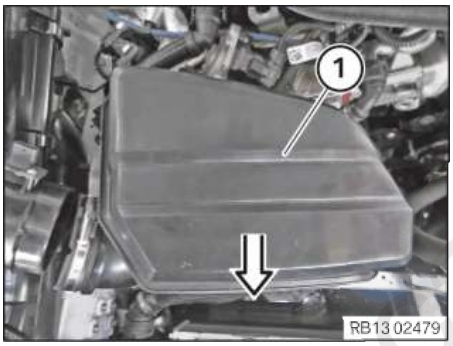
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



- 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.

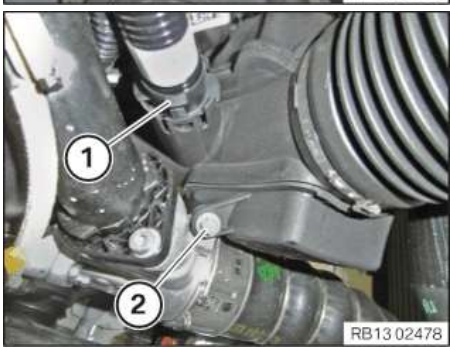


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

  The clamp (1) must engage audibly.

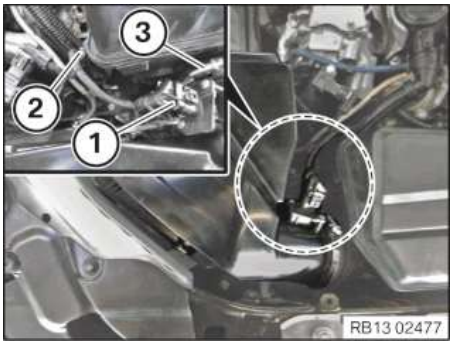


- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm

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- Connect the clean air pipe with resonator to the intake filter housing.
- Tighten clamp (3).

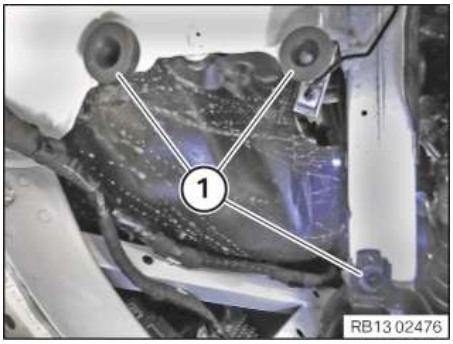
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

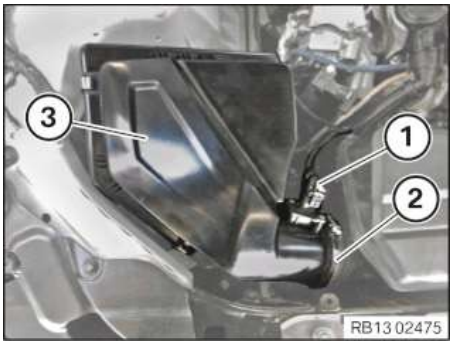
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

116 – 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

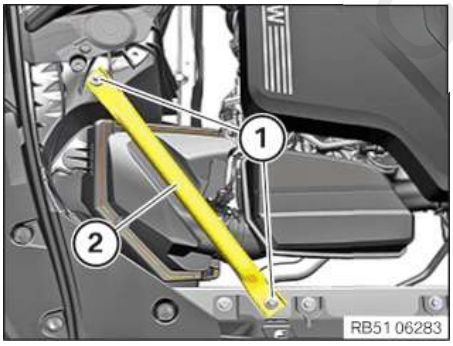
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

117 – Install the right front-end strut

TECHNICAL INFORMATION

Driving without the strut brace/front-end strut or tension strut is not permitted.



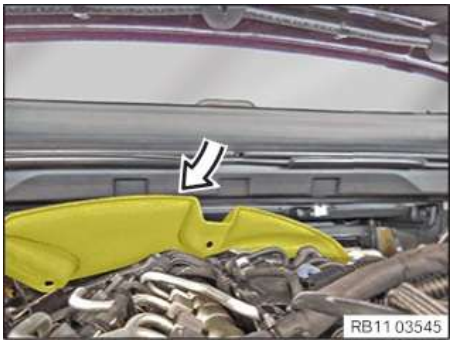
- Install the front-end strut (2).
- Renew screws (1).

  Parts: Screws
- Tighten the screws (1).

Front end strut

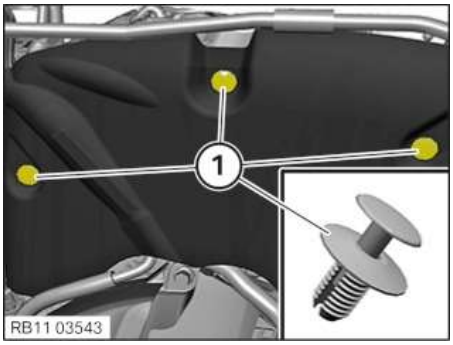
Screw		Tightening torque	56 Nm

118 – Installing acoustic cover at rear



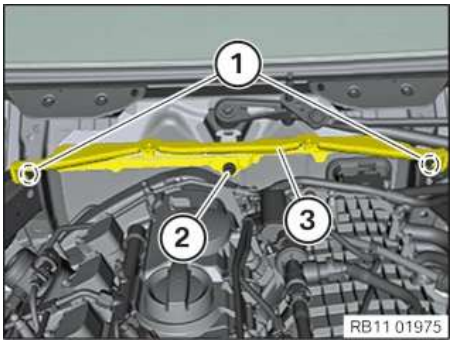
- Guide in the acoustic cover in the direction of the arrow and install it.

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- Secure acoustic cover with the expanding rivets (1).

119 – Installing centre bulkhead lower section

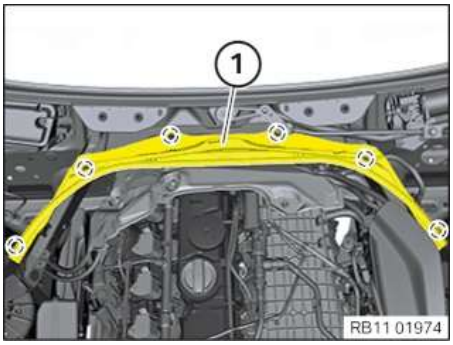


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

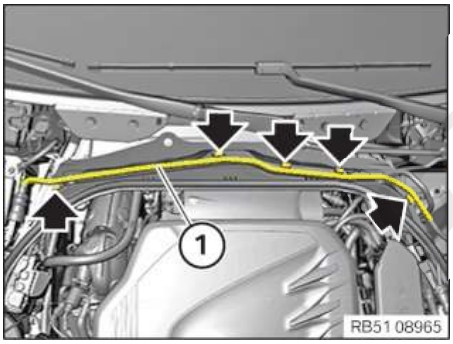
120 – Installing the centre bulkhead upper part



- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

Bulkhead upper part to bottom bulkhead

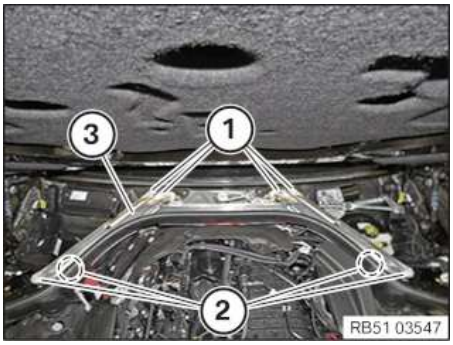
		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

  Clip in the wire (1) into the holders (arrows).

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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 °

121 – 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.

122 – Installing cowl panel cover

RISK OF DAMAGE

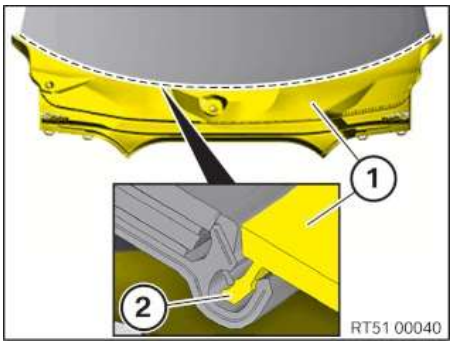
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

- Ensure correct installation of the components.
- Only use undamaged components.

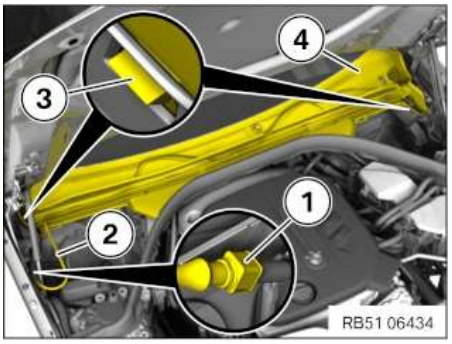
TECHNICAL INFORMATION

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.

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- 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.

123 – Install left and right wiper arm

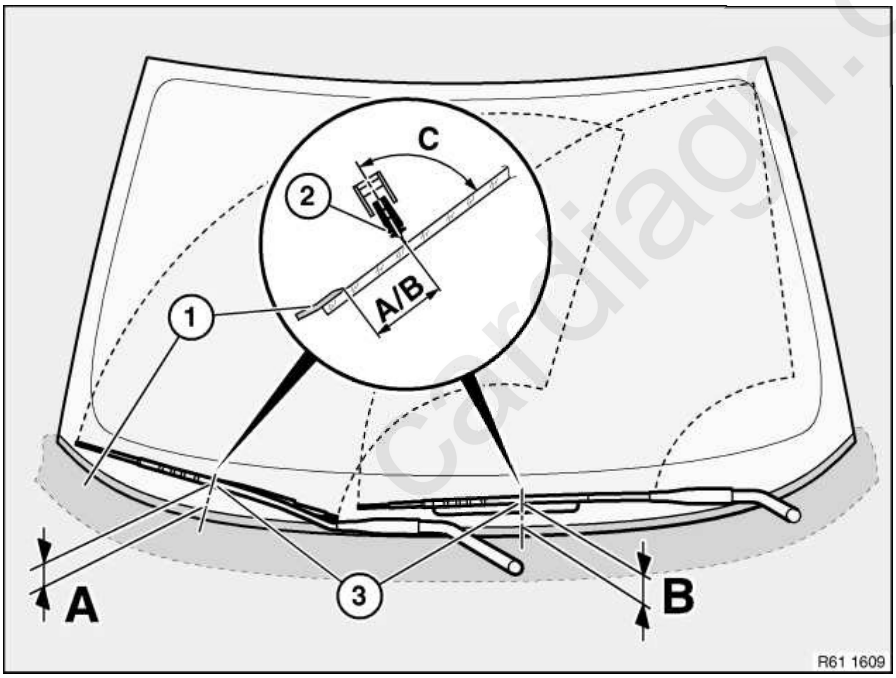
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

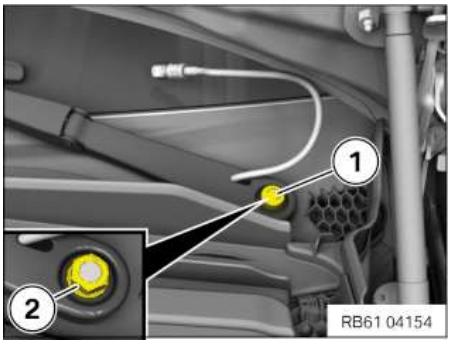
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- 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



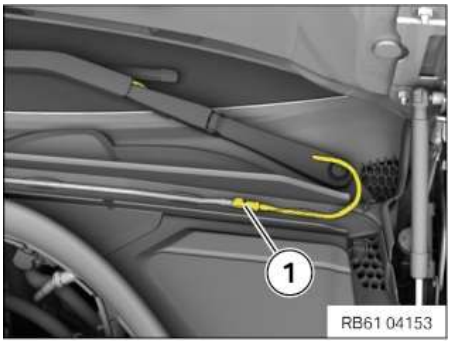
- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

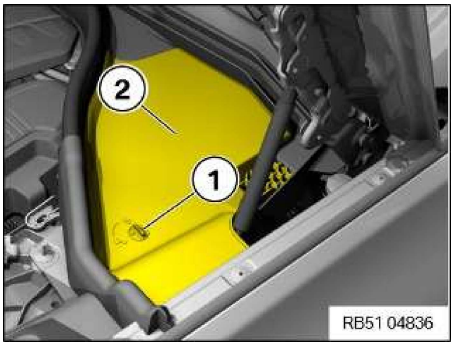
- Connect the protective cap (1).

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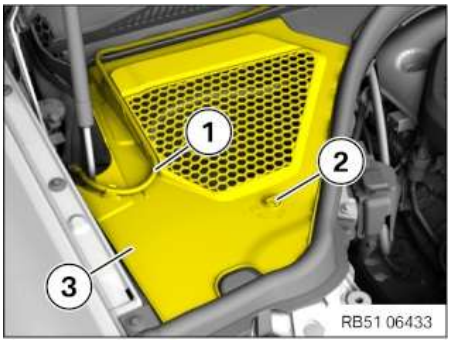
- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

124 – Install the cover of the engine compartment on the rear left



- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

125 – 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.

126 – Connecting all battery earth leads



- See additional information.

127 – Take bonnet out of the service position

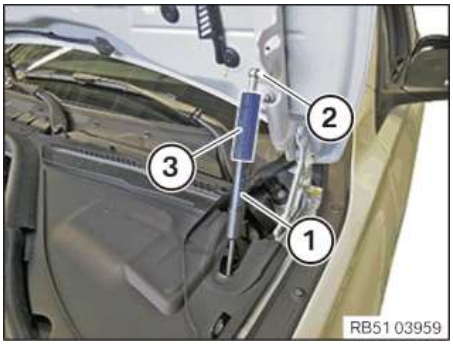
CAUTION

Shutting bonnet or tailgate.

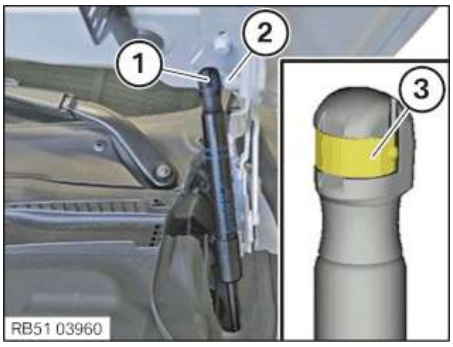
Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.

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- 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.

128 – 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.

129 – 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).

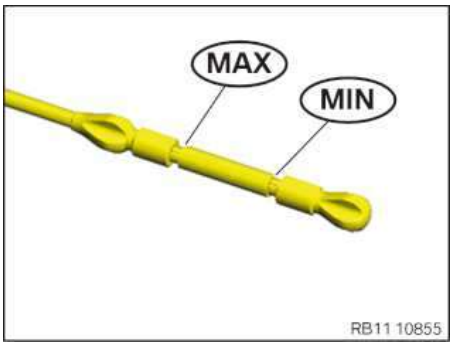
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- Park vehicle on a horizontal surface.
- Stop the engine and wait for 5 minutes.
- Pull out the oil dipstick and wipe off using a lint-free cloth.

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

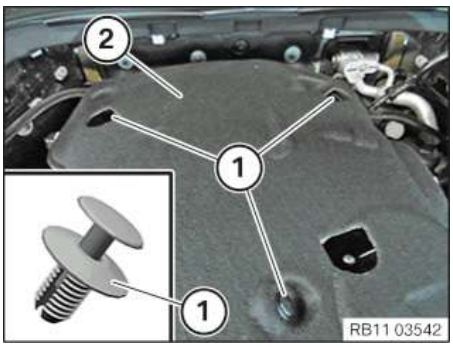
The engine oil level must be between the minimum mark and the maximum mark of the oil dipstick.

- 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

130 – 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) .

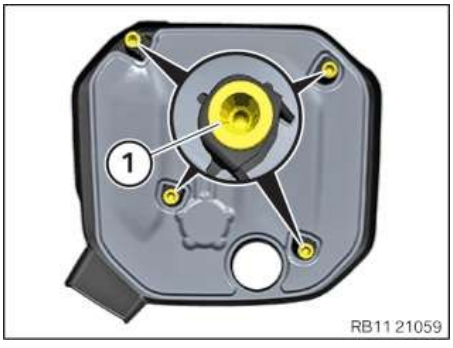
131 – Install acoustic cover

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).

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- 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 5176
M8x60		Tightening torque	19 Nm

Standard screw connection M8			Used in step 6271
M8		Tightening torque	19 Nm

Coolant temperature sensor at cylinder head			Used in step 62
Temperature sensor		Tightening torque	3,5 Nm

Glow elements to cylinder head			Used in step 6265
Glow element		Tightening torque	13 Nm

Cylinder head to crankcase			Used in step 64
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 64
M8x40		Tightening torque	19 Nm

Standard screw connection M6			Used in step 64
M6		Tightening torque	8 Nm

Ground to cylinder head			Used in step 64
M6		Tightening torque	8 Nm

Camshaft carrier to cylinder head			Used in step 68
M7x35		Tightening torque	13 Nm

Bearing journal to cylinder head			Used in step 71
M16x1.5	Replace bearing journal.	Tightening torque	20 Nm

Chain tensioner piston to cylinder head			Used in step 72
22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

Holder to crankcase			Used in step 72
M8X16		Tightening torque	19 Nm

Camshaft sprocket to camshaft			Used in step 73
M7x17.			17 Nm

Starter motor to engine			Used in step 79
M8X60		Tightening torque	19 Nm

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Battery positive lead to starter — Used in step 79

M8		Tightening torque	13,5 Nm

Cylinder head cover to cylinder head — Used in step 80

M6		Tightening torque.	8,5 Nm

Clamping claw facing to cylinder head cover — Used in step 81

M6		Tightening torque	10 Nm

Injector to cylinder head cover — Used in step 81

M8		Tightening torque	8 Nm
		Angle of rotation	120 °

Rail to cylinder head cover — Used in step 82

M8		Tightening torque	19 Nm

High pressure lines between high pressure pump and rail — Used in step 83

High-pressure pipe		Tightening torque	24.5 Nm

High pressure lines between injector and rail — Used in step 84

High-pressure pipe		Tightening torque	24.5 Nm

Intake plenum to cylinder head — Used in step 86

M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum — Used in step 8690

		Tightening torque	10 Nm

Electric changeover valve to intake plenum — Used in step 86

TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold — Used in step 87

TS5x20		Tightening torque	3,6 Nm

Standard screw connection 4 Nm — Used in step 87

Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover — Used in step 87

TS5x20		Tightening torque	3,6 Nm

Holder on intake plenum — Used in step 87

TS6X20		Tightening torque	5 Nm

Exhaust manifold to cylinder head — Used in step 89

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 89

M6x12		Tightening torque	8 Nm

Exhaust-gas recirculation cooler to exhaust manifold — Used in step 8990

M8x28	Replace screws	Tightening torque	32 Nm

Exhaust-gas recirculation cooler to cylinder head — Used in step 8990

M8x20 / M8x28		Tightening torque	19 Nm

Exhaust turbocharger low-pressure stage to crankcase — Used in step 89

M8X16		Tightening torque	22 Nm

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Oil return line to turbocharger — Used in step 89

M6x12	Renew gasket.	Tightening torque	8 Nm

Oil return line to crankcase — Used in step 89

M6x12	Check gasket. Renew the seal or line if necessary.	Tightening torque	8 Nm

Exhaust-gas recirculation cooler to cylinder head — Used in step 90

M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °

Heat shield to exhaust manifold — Used in step 91

M6x12			10 Nm

Bracket on cylinder head cover — Used in step 92

		Tightening torque	5 Nm

Battery positive lead to battery positive terminal — Used in step 92

M8		Tightening torque	19 Nm

Heat shield to exhaust manifold — Used in step 93

M6x12		Tightening torque	10 Nm

Banjo bolt for exhaust pressure pipe to exhaust manifold — Used in step 93

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm

Exhaust gas pressure pipe to sensor system holder — Used in step 93

TS6x20		Tightening torque	5,7 Nm

Cover, steering unit — Used in step 96

Screw		Tightening torque	3 Nm

Brake disc to front wheel hub — Used in step 97

M8	Renew screw.	Tightening torque	16 Nm

Brake disc to rear wheel hub — Used in step 97

M8	Renew screw.	Tightening torque	16 Nm

Wheel bolts — Used in step 97

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 99

V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

Bracket to diesel particulate filter top — Used in step 99

M8		Tightening torque	19 Nm

Bracket to transmission for diesel particulate filter holder bottom — Used in step 99

M8X20		Tightening torque	19 Nm

Lower holder to diesel particulate filter — Used in step 99

M8		Tightening torque	19 Nm

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Coolant lines for SCR metering module			Used in step 99
M6X16		Tightening torque	8 Nm

Nitrogen oxide sensor before SCR catalytic converter			Used in step 100
Sensor		Tightening torque	50 Nm

Monitoring oxygen sensor			Used in step 101
Sensor		Tightening torque	50 Nm

Rear silencer to body / bumper support			Used in step 102
M8	Replace nuts.	Tightening torque	19 Nm

Exhaust system to rear axle carrier			Used in step 102
M8 nut		Tightening torque	19 Nm

Exhaust system to transmission			Used in step 102
M8		Tightening torque	19 Nm

Exhaust system to diesel particle filter			Used in step 102
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

SCR metering module V-clip to exhaust system			Used in step 102
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm

Exhaust-gas temperature sensor upstream of SCR catalytic converter			Used in step 102
Sensor		Tightening torque	30 Nm

Diesel particulate sensor to exhaust system			Used in step 102
Sensor		Tightening torque	50 Nm

Nitrogen oxide sensor downstream of SCR catalytic converter			Used in step 102
Sensor		Tightening torque	55 Nm

Connecting support to tunnel			Used in step 103
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

Diffuser / underbody panelling			Used in step 104
Nuts and screws		Tightening torque	3 Nm

Underbody protection			Used in step 105107
Hexagon screw		Tightening torque	3 Nm

Underbody panelling			Used in step 106
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Underbody protection, steering, to front axle support			Used in step 108
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support			Used in step 108
Hexagon bolt M6		Tightening torque	8 Nm

Underbody protection of the steering gear			Used in step 109
Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

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Wheel arch trim panel, front			Used in step 109
Thermoplastic hexagon screw		Tightening torque	2,6 Nm

Underbody protection front			Used in step 110
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 111
Sensor		Tightening torque	30 Nm

Front oxygen sensor to top of diesel particulate filter			Used in step 112
Sensor		Tightening torque	50 Nm

Exhaust-gas temperature sensor to diesel particulate filter			Used in step 113
Sensor		Tightening torque	30 Nm

Differential pressure sensor of diesel particulate filter on cylinder head cover			Used in step 114
TS5x20		Tightening torque	4 Nm

Clamp for the pressure hose on the differential pressure sensor			Used in step 114
Clamp 15–19mm		Tightening torque	3 Nm

Clean air pipe to exhaust turbocharger			Used in step 115
M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing			Used in step 115116
Clamp		Tightening torque	3 Nm

Front end strut			Used in step 117
Screw		Tightening torque	56 Nm

Bulkhead lower part to body			Used in step 119
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead			Used in step 120
		Tightening torque	3 Nm

Tension strut on bulkhead			Used in step 120
M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome			Used in step 120
Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm			Used in step 123
Combination hexagon nut		Tightening torque	35 Nm

Overview of Special Tools

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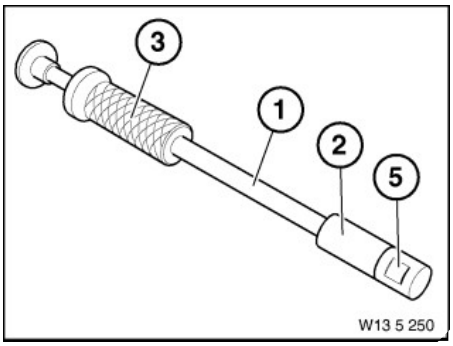
0 493 339 (13 5 252) Bush



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	

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)	

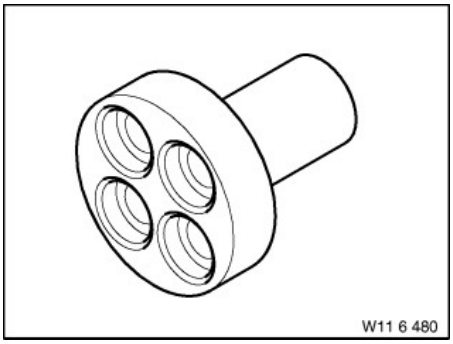
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0 493 340 (13 5 253) Weight



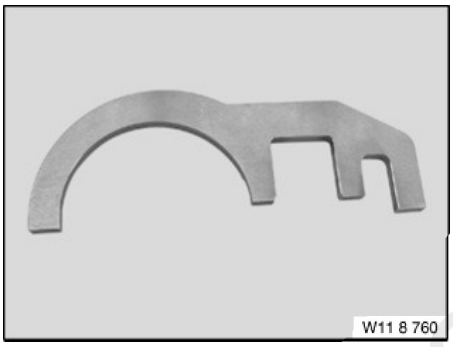
Common	Used in step 48
Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 380 (11 6 480) Connector



Common	Used in step 5176
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 515569747677
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 51757678
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)

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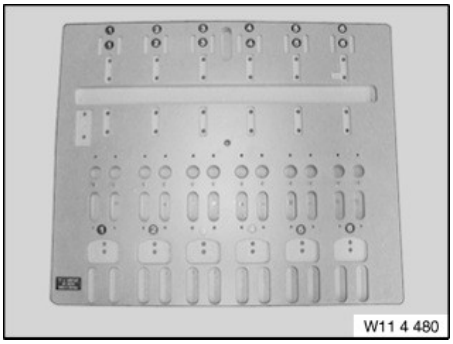
2 288 380 Locating stud



Common Used in step 51757678

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 575862

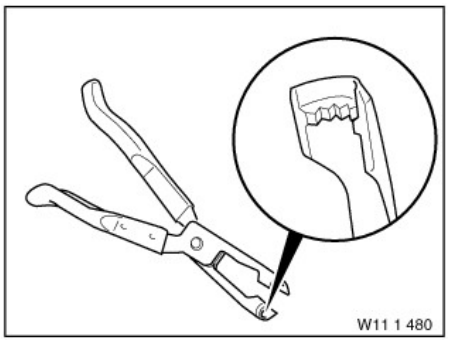
Usage	(Boards (2 pieces)) For setting down the individual components of the cylinder head.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 17 04 (130)

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	

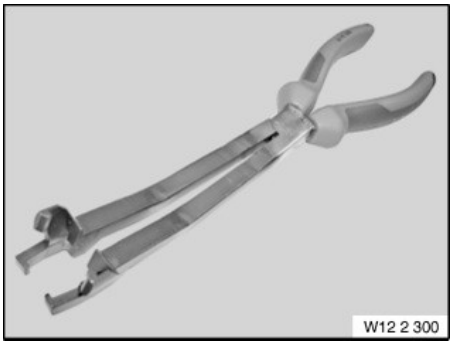
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0 490 796 (11 1 480) Pliers



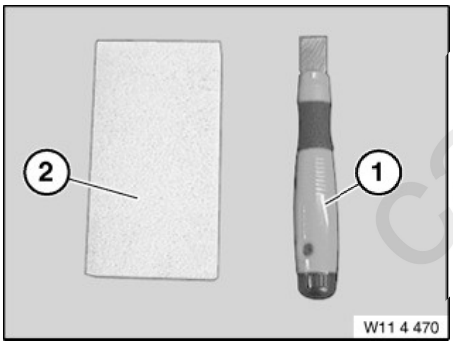
Common	Used in step 5962
Usage	For removing valve stem seal
Included in the tool or work	
Storage location	A10
Replaced by	
In connection with	
SI-Number	01 01 93 (621)

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)

0 495 102 (11 4 470) Tool



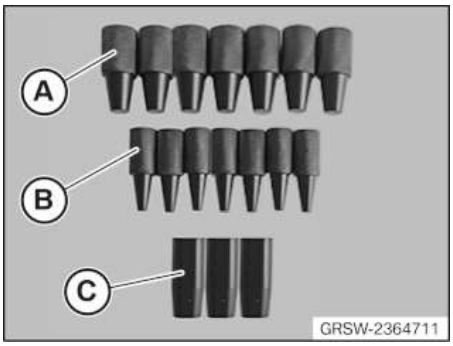
Common	Used in step 6089
Usage	(cleaning kit) For cleaning sealing surfaces on magnesium crankcase/cylinder head.
Included in the tool or work	
Storage location	C52
Replaced by	
In connection with	
SI-Number	01 17 04 (130)

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)	

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2 364 711 Plug



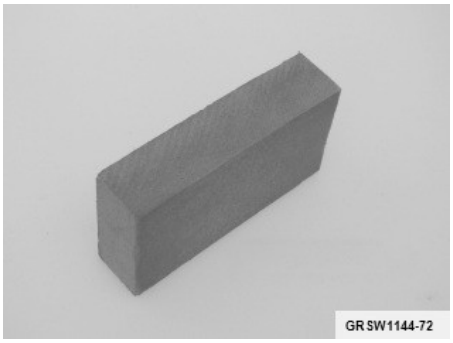
Common	Used in step 61
Usage	For closing the pressure oil holes for cleaning the cylinder head sealing surfaces.
Included in the tool or work	
Storage location	C20
Replaced by	
In connection with	
SI-Number	

0 495 103 (11 4 471) Scraper



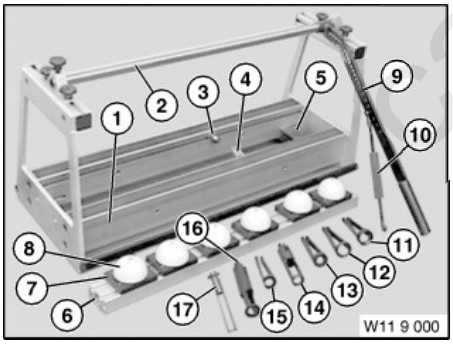
Common	Used in step 61
Usage	
Included in the tool or work	0 495 102
Storage location	C52
Replaced by	
In connection with	
SI-Number	

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	

0 494 366 (11 9 001) Device

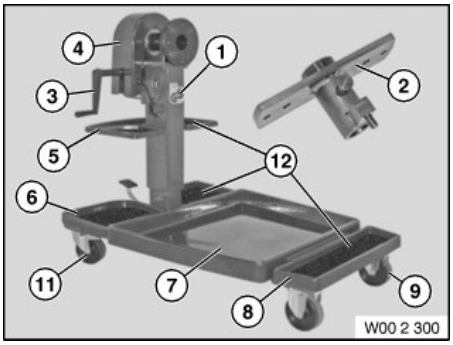


Common	Used in step 62
Usage	
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 187 (00 2 300) Assembly stand

Used in step 62

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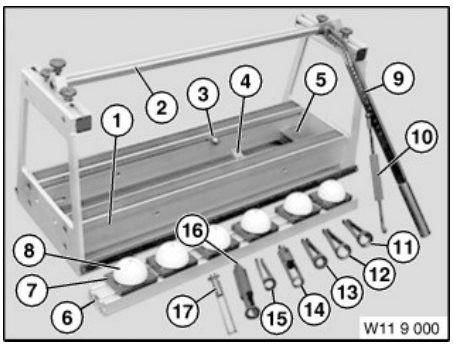
Common

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.	

0 494 371 (11 9 006) Insert

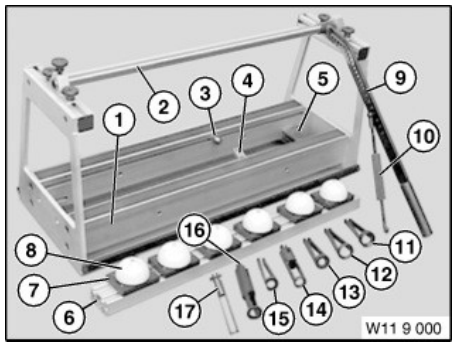


Common Used in step 62

Usage	(Aluminium strip)
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

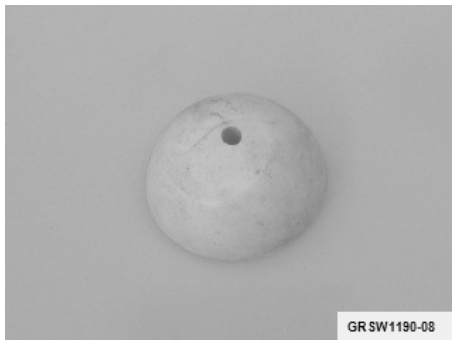
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0 494 372 (11 9 007) Shaped part



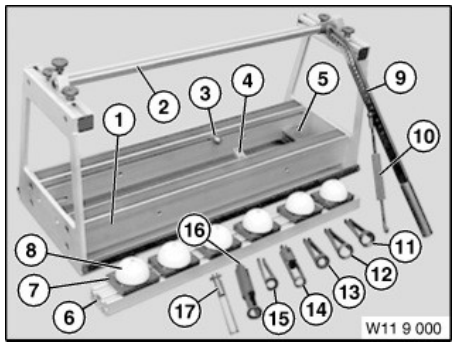
Common	Used in step 62
Usage	(Shaped part)
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 494 373 (11 9 008) Shaped part



Common	Used in step 62
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

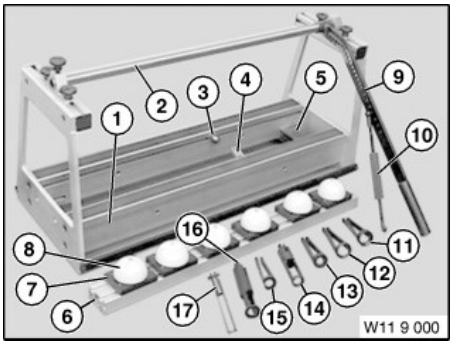


Common	Used in step 62
Usage	
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 494 362 (11 9 000) Device

Used in step 62

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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	

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0 494 374 (11 9 009) Lever



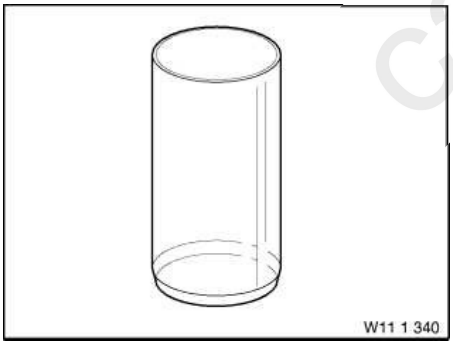
Common	Used in step 62
Usage	
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 496 143 (11 8 840) Basket



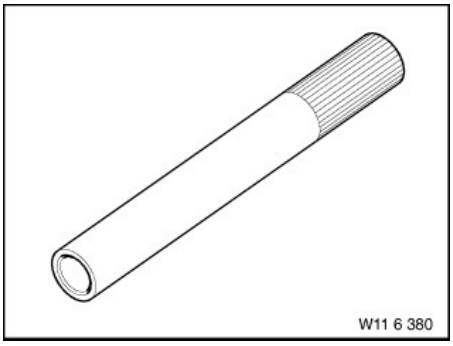
Common	Used in step 62
Usage	(Valve spring cage) For removing and fitting the valves.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

0 490 746 (11 1 380) Holding sleeve



Common	Used in step 62
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	

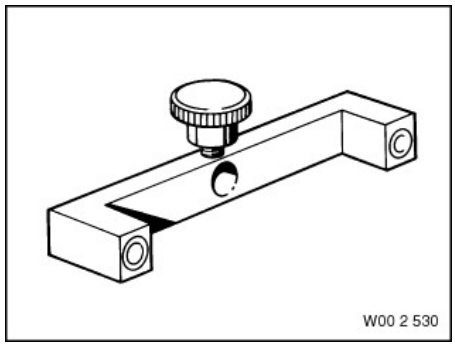
0 493 249 (11 6 380) Bush



Common	Used in step 62
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)

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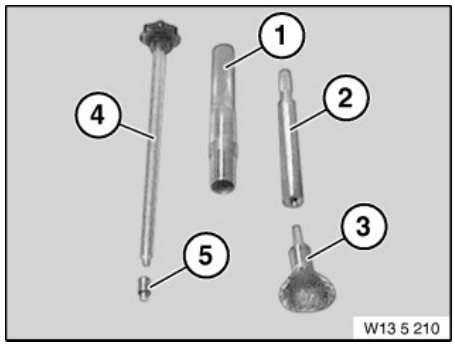
0 490 185 (00 2 530) Bridge



Common Used in step 62

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	

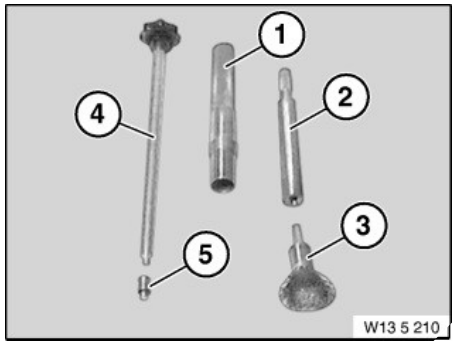
0 493 763 (13 5 215) Plug



Common Used in step 81

Usage	(Seal plug)
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

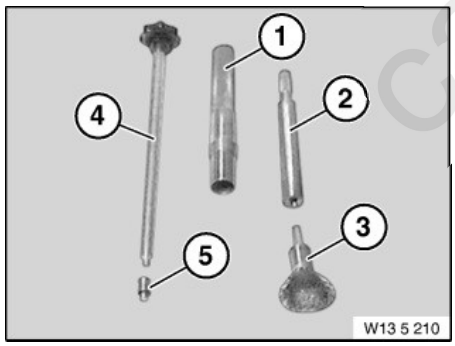
0 493 762 (13 5 214) Rod



Common Used in step 81

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 81

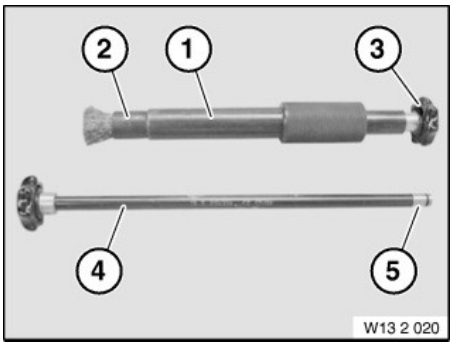
Usage	(Cleaning set) For injector channels
Included in the tool or work	
Storage location	B4
Replaced by	
In connection with	
SI-Number	01 05 00 (574)

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)	

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0 496 150 (13 2 020) Tool



Common Used in step 81

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.	

2 344 011 Tool



Common Used in step 97

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:

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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	

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	

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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	

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0 495 229 (36 1 332) Wheel stud



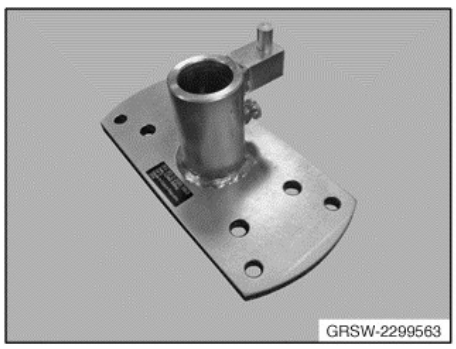
Common	Used in step 32
Usage	(Code 38) With centring bore available separately (see EPC) under 36 13 6 762 343
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

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 62
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

Valve underprotrusion	Used in step 62
	0,8 (0.7 - 0,9) mm

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Distance from window pane edge to wiper blade	Used in step 123
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 129
	1.0 l

Links

General repair instructions	Used in step
11 00 ... Overview of consumables (Electronic Parts Catalogue)	81

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61 20 900 Disconnecting and connecting battery earth lead	2126
61 20 900 Disconnecting and connecting battery earth lead	2126
61 20 900 Disconnecting and connecting battery earth lead	2126
61 20 900 Disconnecting and connecting battery earth lead	2126
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61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2126
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2126
61 20 900 Disconnecting and connecting battery earth lead	2126
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2126
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	2126
61 20 900 Disconnecting and connecting battery earth lead	2126
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61 20 900 Disconnecting and connecting battery earth lead	2126
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61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2126
61 20 900 Disconnecting and connecting battery earth lead	2126
61 20 900 Disconnecting and connecting battery earth lead	2126
61 20 900 Disconnecting and connecting battery earth lead	2126
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61 35 ... Notes on ESD protection (Electro Static Discharge)	161718192930414859
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12 51 010 Replacing wiring harness section for preheating system	65
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17 00 008 Draining and topping up coolant for high-temperature circuit	128
17 00 008 Draining and topping up coolant for high-temperature circuit	128
17 00 008 Draining and topping up coolant for high-temperature circuit	128
17 00 039 Bleed the cooling system and check it for watertightness with the special tool

17 00 039 Bleed the cooling system and check it for watertightness with the special tool	128
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	128
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17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	128
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	128
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	128
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	128
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	128
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	128
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	128
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	128
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	128
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	128
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	128
17 00 008 Draining and topping up coolant for high-temperature circuit	128
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	128
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	128
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	128

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11 12 631 replace cylinder head

PRELIMINARY WORK

1 – Remove cylinder head.

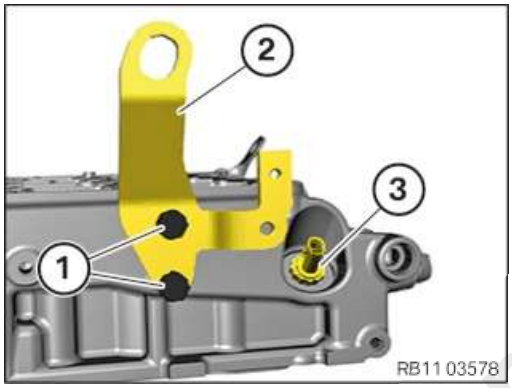
- See additional information.

MAIN WORK

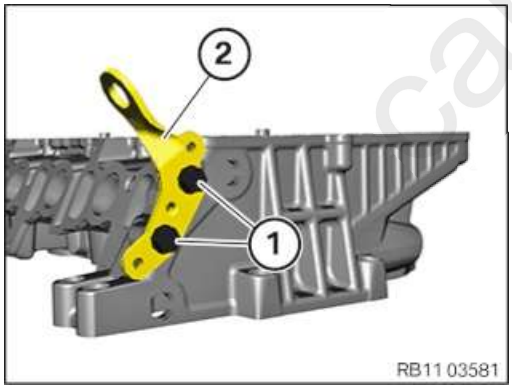
2 – replace cylinder head



- Unscrew the preheating elements with special tool .



- Loosen screws (1).
- Remove mounting lug (2).
- Remove the coolant temperature sensor (2).



- Loosen screws (1).
- Remove mounting lug (2) from cylinder head.

▸ **Remove all valve springs**

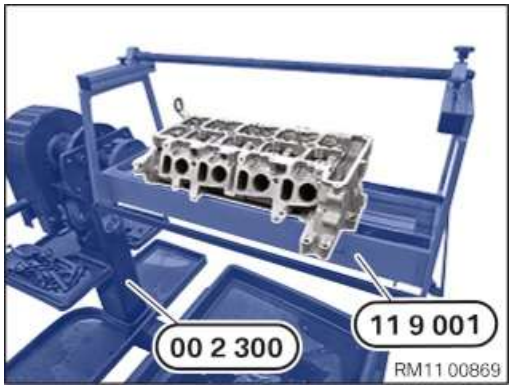
RISK OF DAMAGE

Contaminant or foreign body.

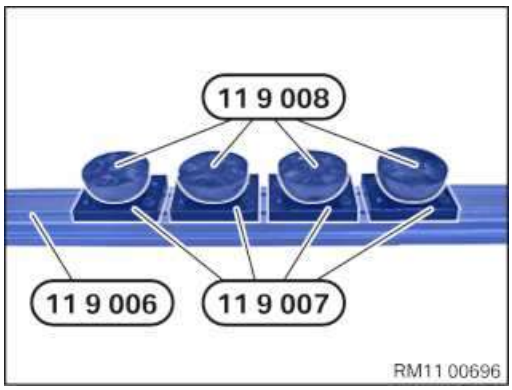
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

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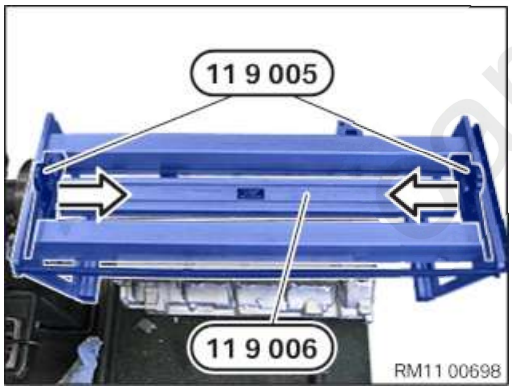
- Mount and screw the cylinder head onto the special tools 0 494 366 (11 9 001) and 0 495 187 (00 2 300).



- 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.

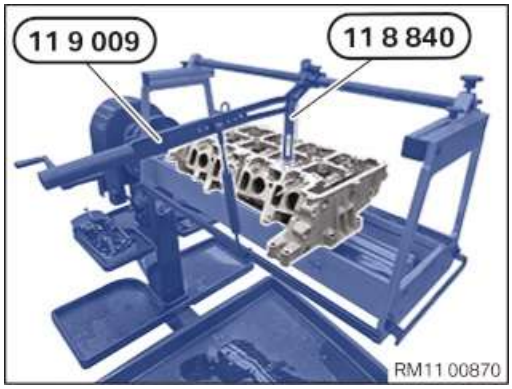


- Turn round special tool 0 494 371 (11 9 006) and insert as shown.
- Lock special tool 0 494 370 (11 9 005)in direction of arrow.



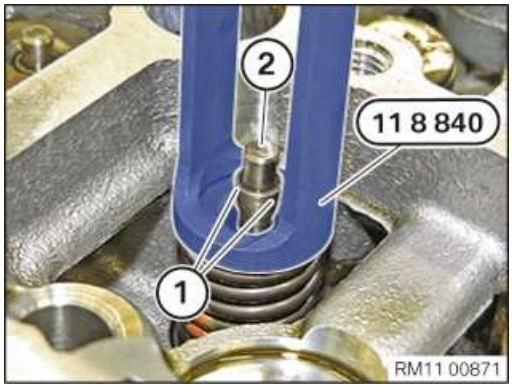
- Lock special tool 0 494 370 (11 9 005)in direction of arrow.
- Move cylinder head with special tool 0 494 362 (11 9 000) through 180° into the installation position.

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- 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.

▸ **Remove valve stem seals**

RISK OF DAMAGE

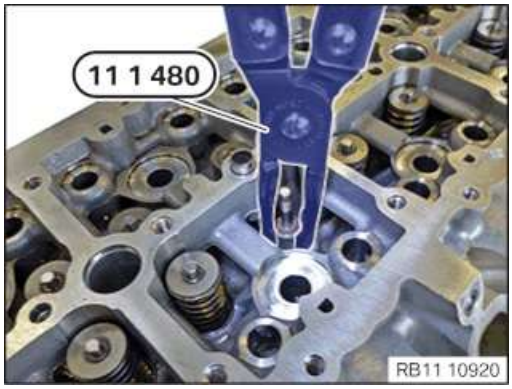
Contaminant or foreign body.

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).

▸ **Remove all valves**

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RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

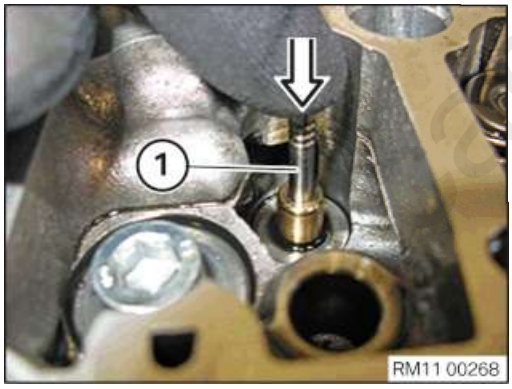
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



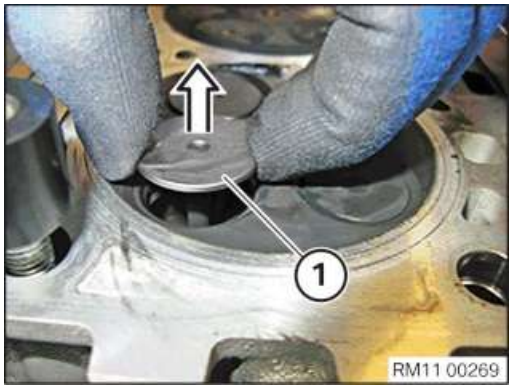
- Turn the cylinder head with the special tool 0 494 362 (11 9 000).
- Unlock the special tool 0 494 370 (11 9 005) in the direction of the arrow.
- Remove special tool 0 494 371 (11 9 006).



- Remove special tool 0 494 373 (11 9 008) if necessary.

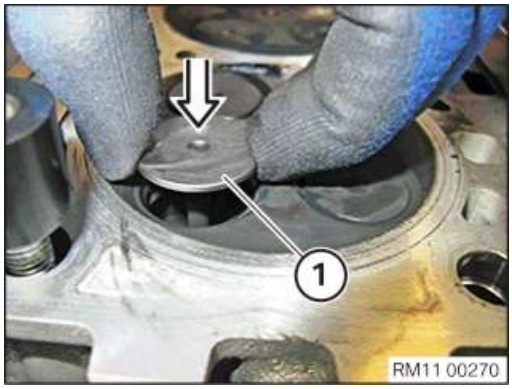


- Push the valve stem (1) into the cylinder head in the direction of the arrow.



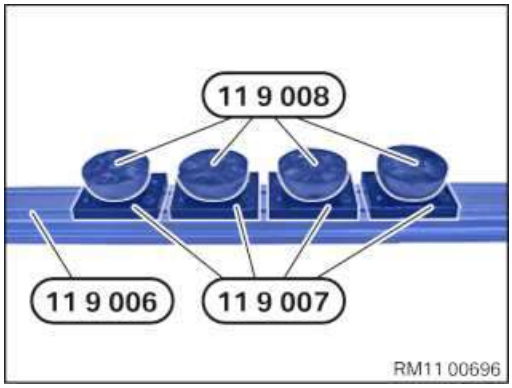
- Remove the valve (1) in the direction of arrow and store it properly in the special tool 0 495 105 (11 4 480).

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- Install valves (1) in the new cylinder head.

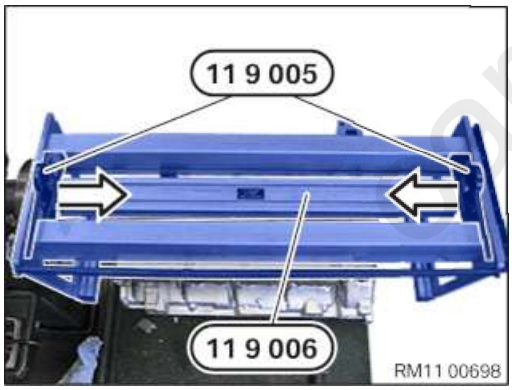
  Parts: Cylinder head
- Feed valves (1) in the direction of arrow and install.
- **Check the valves for tightness.**



- 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.



- The special tools 0 494 373 (11 9 008) must be set up accordingly in the next operation.



- 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.
- Use the special tool 0 494 362 (11 9 000) to bring the cylinder head into the installation position by 180º.

▸ **Installing valve stem seals**

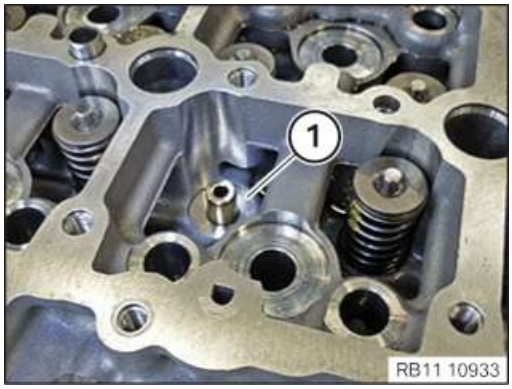
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RISK OF DAMAGE

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.



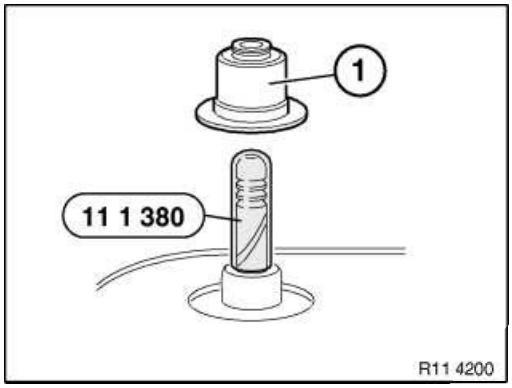
RISK OF DAMAGE

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.

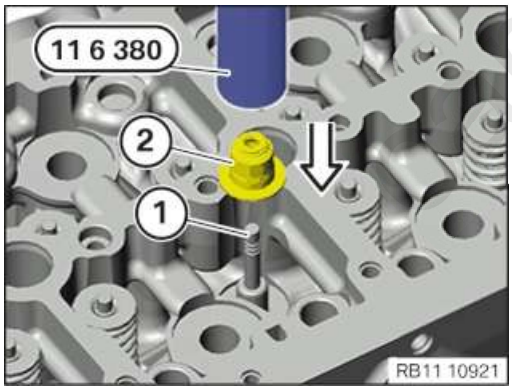
- Do not use any metal-cutting tools.

- 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).



- 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).

▸ **Install all valve springs**

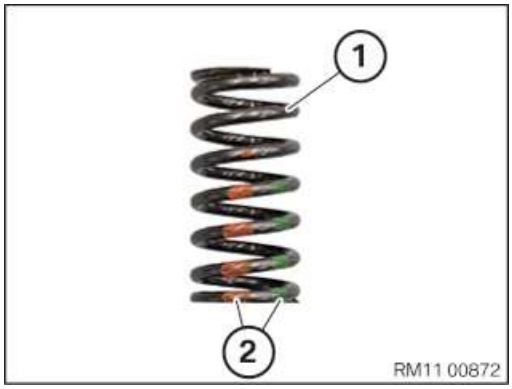
RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

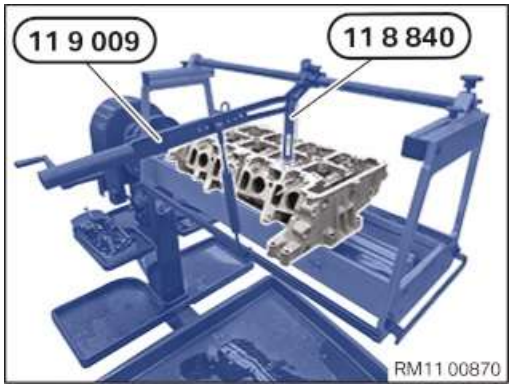
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

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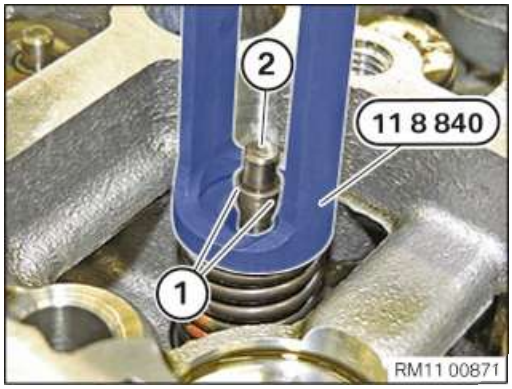
- Ensure that the valve spring (1) is marked using a colour code (2).

  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).

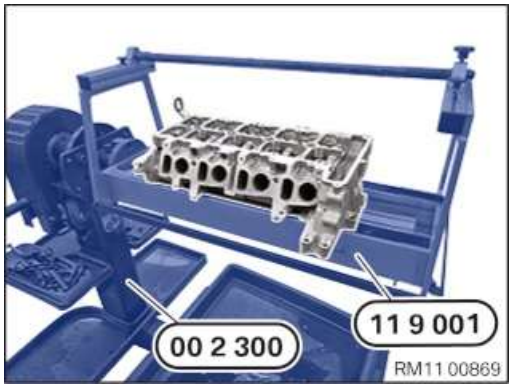
  The **hooks** from the set of special tools 0 494 362 (11 9 000) can be used to **hold** the valve spring in pressed position.



- 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.



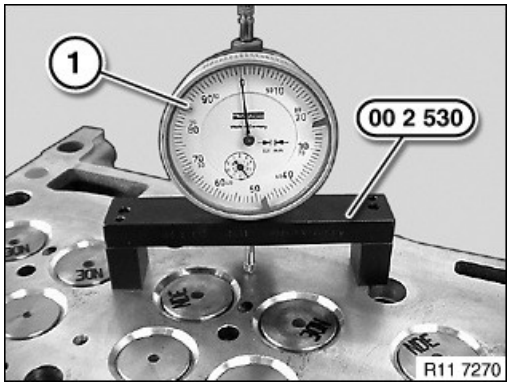
- Unlock the special tool 0 494 370 (11 9 005) in the direction of the arrow.
- Guide the special tool 0 494 371 (11 9 006) out and remove.



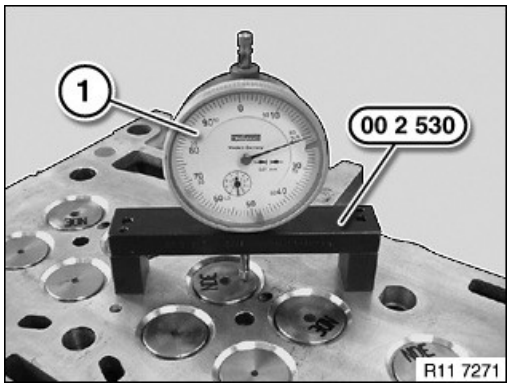
- Unscrew and remove the cylinder head from the special tools 0 494 366 (11 9 001) and 0 495 187 (00 2 300).

▸ **Checking the valve underprotrusion**

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- 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

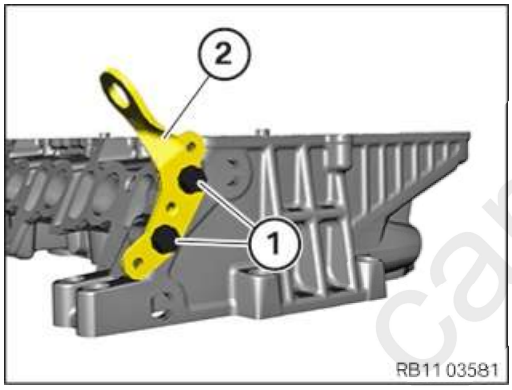
Result

» Valve underprotrusion is outside tolerance.

Measure

- Renew cylinder head.

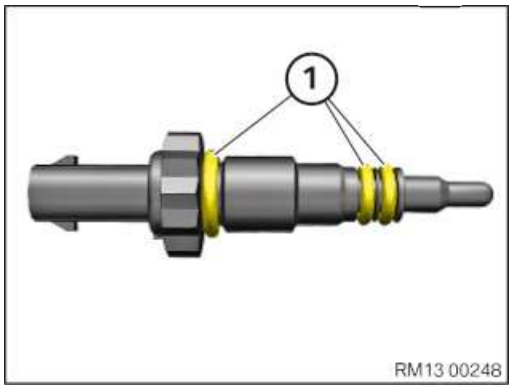
  Parts: Cylinder head



- Install mounting lug (2) on the rear cylinder head.
- Tighten the screws (1).

Standard screw connection M8

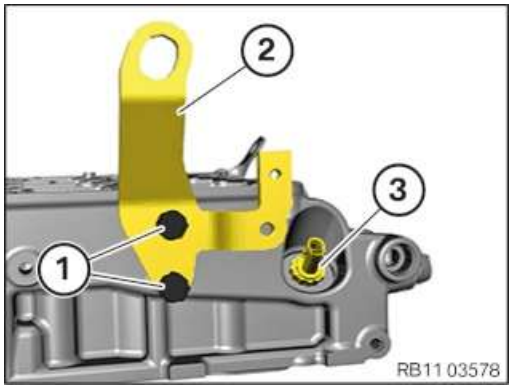
M8		Tightening torque	19 Nm



- When reusing coolant temperature sensor sealing rings (1), check for damage, renew if necessary.

  Parts: Sealing ring

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- Position special tool on cylinder head.
- Tighten the screws (1) of special tool .

Standard screw connection M8

M8		Tightening torque	19 Nm

- Tighten coolant temperature sensor (1) on new cylinder head (2).

Coolant temperature sensor at cylinder head

Temperature sensor		Tightening torque	3,5 Nm



- Screw in preheating elements using special tool and tighten.

Glow elements to cylinder head

Glow element		Tightening torque	13 Nm

POSTPROCESSES

3 – Installing the cylinder head

- See additional information.

Additional Information

Overview of Tightening Torques

Standard screw connection M8 Used in step 2

M8		Tightening torque	19 Nm

Coolant temperature sensor at cylinder head Used in step 2

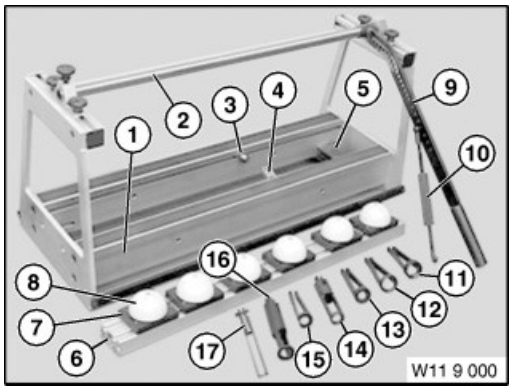
Temperature sensor		Tightening torque	3,5 Nm

Glow elements to cylinder head Used in step 2

Glow element		Tightening torque	13 Nm

Overview of Special Tools

0 494 366 (11 9 001) Device

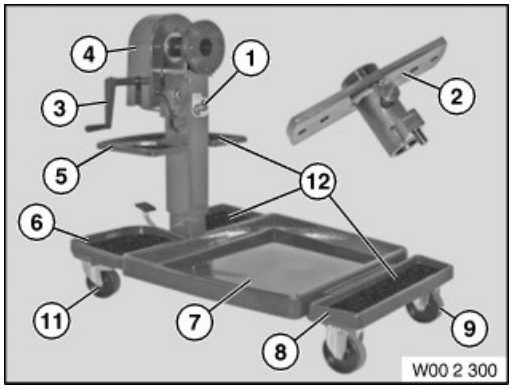


Common Used in step 2

Usage	
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

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0 495 187 (00 2 300) Assembly stand



Common

Used in step 2

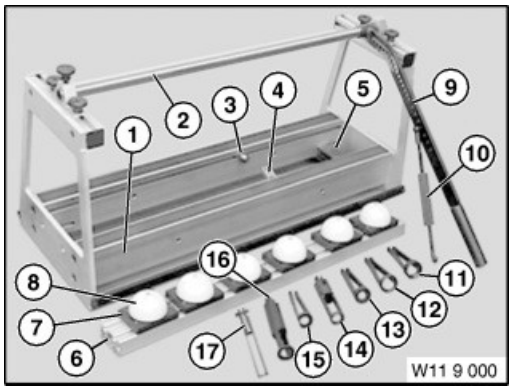
Usage	Assembly stand with universal flange for mounting engines from S85
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 25 04 (155)

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.	

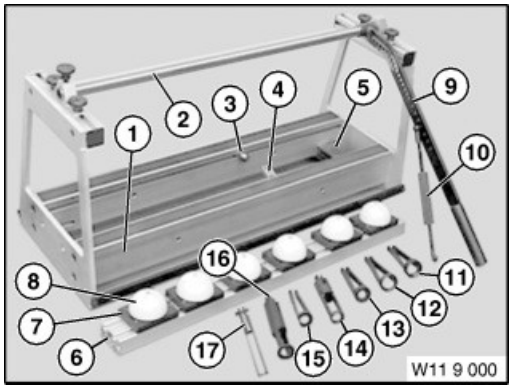
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0 494 371 (11 9 006) Insert



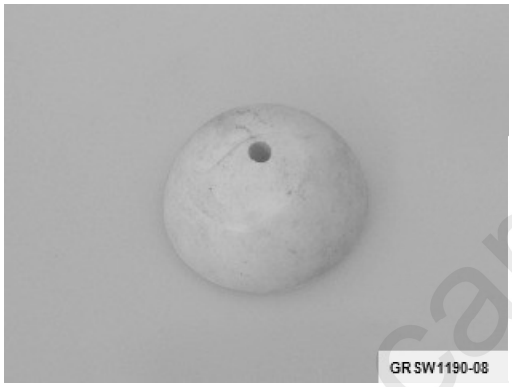
Common	Used in step 2
Usage	(Aluminium strip)
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 494 372 (11 9 007) Shaped part



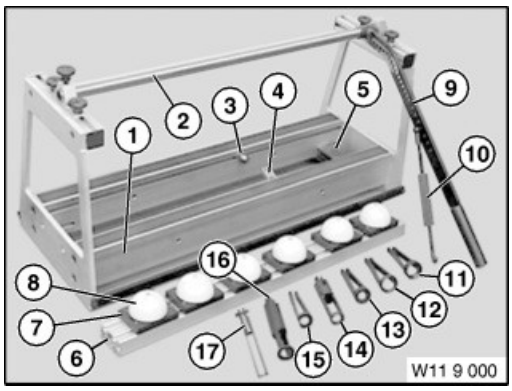
Common	Used in step 2
Usage	(Shaped part)
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 494 373 (11 9 008) Shaped part



Common	Used in step 2
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

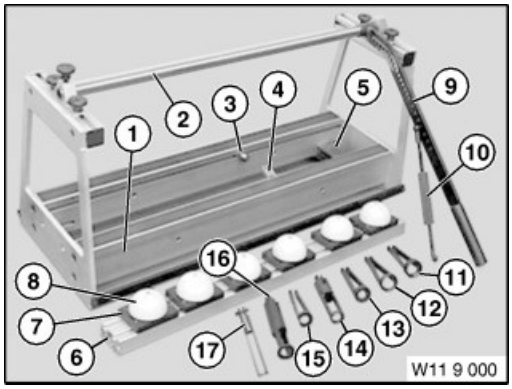


Common	Used in step 2
Usage	
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

0 494 362 (11 9 000) Device

Used in step 2

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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	

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0 494 374 (11 9 009) Lever



Common Used in step 2

Usage	
Included in the tool or work	0 494 362
Storage location	
Replaced by	
In connection with	
SI-Number	

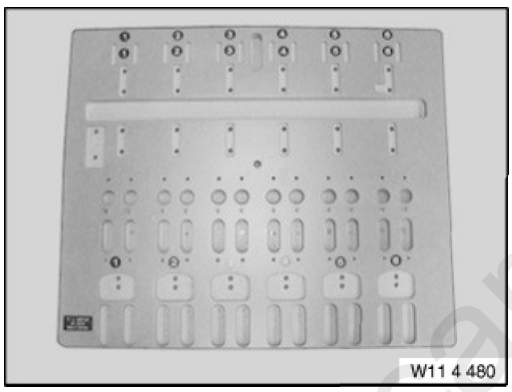
0 496 143 (11 8 840) Basket



Common Used in step 2

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)

0 495 105 (11 4 480) oddments tray



Common Used in step 2

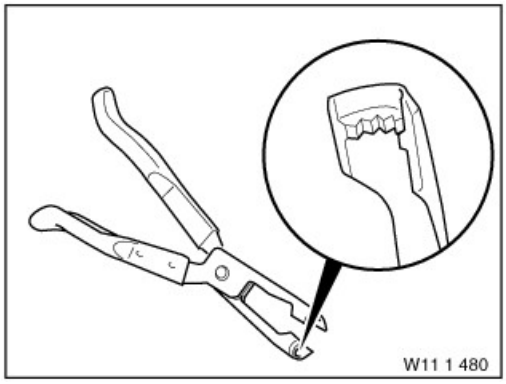
Usage	(Boards (2 pieces)) For setting down the individual components of the cylinder head.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 17 04 (130)

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	

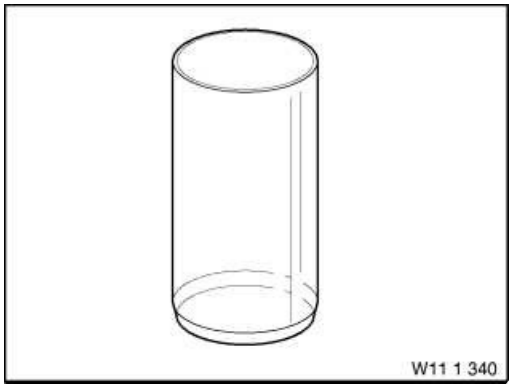
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0 490 796 (11 1 480) Pliers



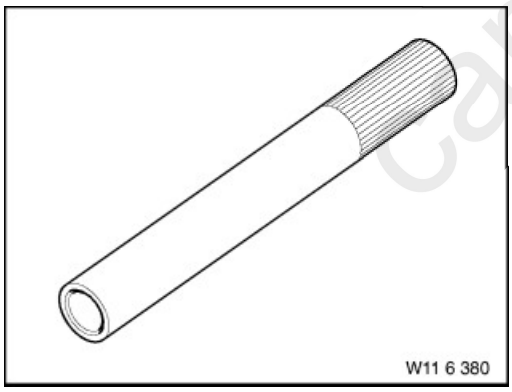
Common	Used in step 2
Usage	For removing valve stem seal
Included in the tool or work	
Storage location	A10
Replaced by	
In connection with	
SI-Number	01 01 93 (621)

0 490 746 (11 1 380) Holding sleeve



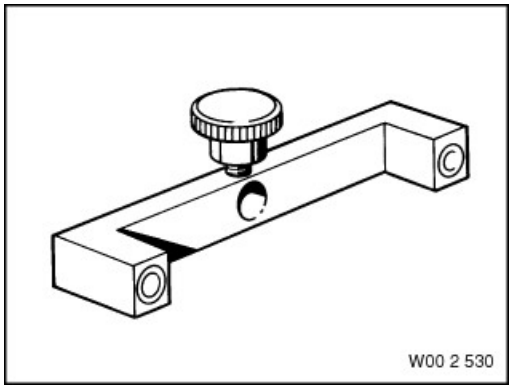
Common	Used in step 2
Usage	(Assembly sleeve) For fitting the valve stem seal, diameter 7 mm
Included in the tool or work	
Storage location	individual
Replaced by	
In connection with	
SI-Number	

0 493 249 (11 6 380) Bush



Common	Used in step 2
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)

0 490 185 (00 2 530) Bridge



Common	Used in step 2
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	

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Replacement tools:

2 299 563 Adapter



Common	Used in step 2
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

Valve underprotrusion	Used in step 2
	0,8 (0.7 - 0,9) mm

Links

Repair instructions	Used in step
11 12 100 Removing and installing cylinder head	13
11 12 100 Removing and installing cylinder head	13
11 12 100 Removing and installing cylinder head	13
11 12 100 Removing and installing cylinder head	13
11 12 100 Removing and installing cylinder head	13
11 12 100 Removing and installing cylinder head	13
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11 12 100 Removing and installing cylinder head	13
11 12 100 Removing and installing cylinder head	13
11 12 100 Removing and installing cylinder head	13
11 12 100 Remove and install/replace the cylinder head	13
11 12 100 Removing and installing cylinder head	13
11 12 100 Removing and installing cylinder head	13
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11 12 100 Removing and installing cylinder head 13
11 12 100 Removing and installing cylinder head 13
11 12 100 Removing and installing cylinder head 13
11 12 100 Removing and installing cylinder head 13
11 12 100 Removing and installing cylinder head

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11 12 101 Replace cylinder head gasket

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

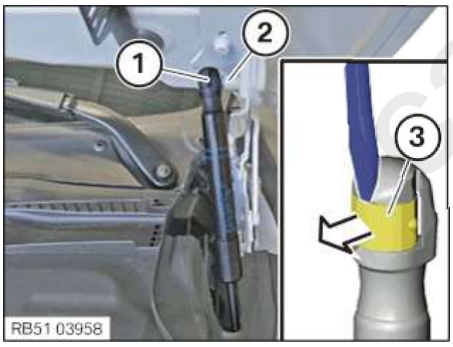
Engine compartment lid is open.

CAUTION

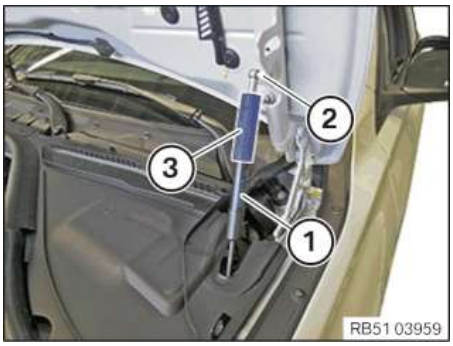
Shutting bonnet or tailgate.

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.



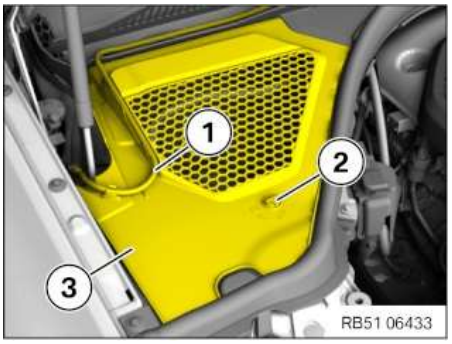
TECHNICAL INFORMATION

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.

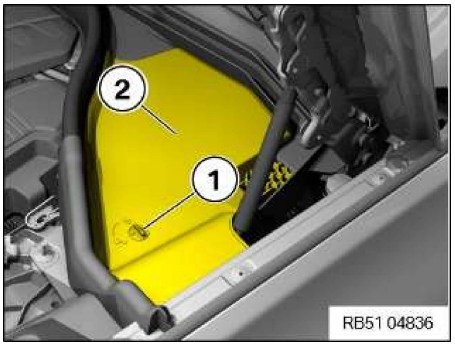
2 – Remove the cover of the rear right engine compartment

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- 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.

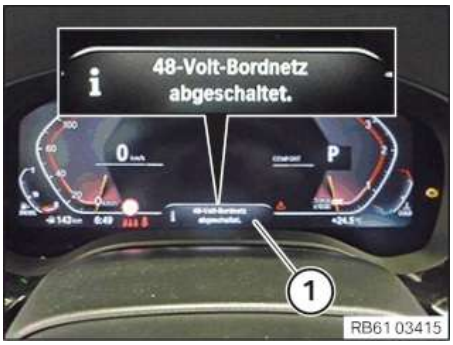
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- Deactivate the 48V electrical system by opening the bonnet.

  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.

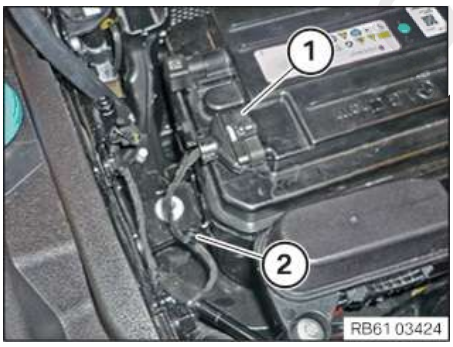
Result

» 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.

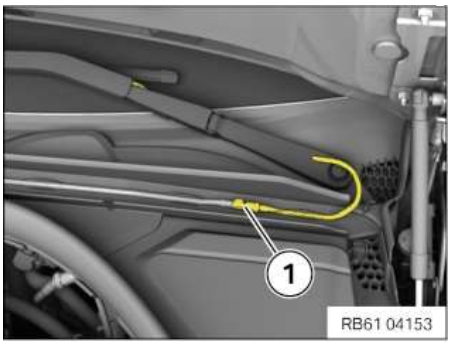
▸ **Remove the wiper arm**

RISK OF DAMAGE

Damage to wiper console.

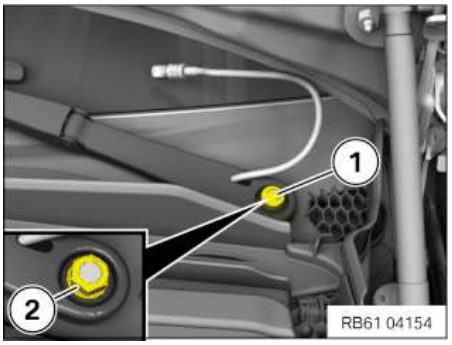
While removing the wiper arms without using special tool, the wiper console can break.

- 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.

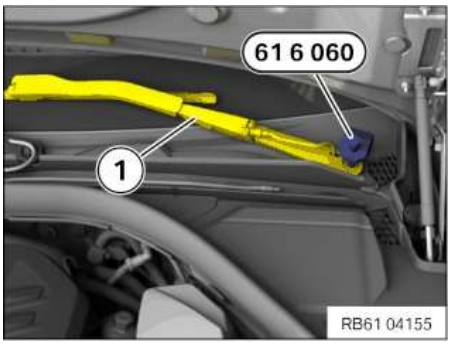


- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.

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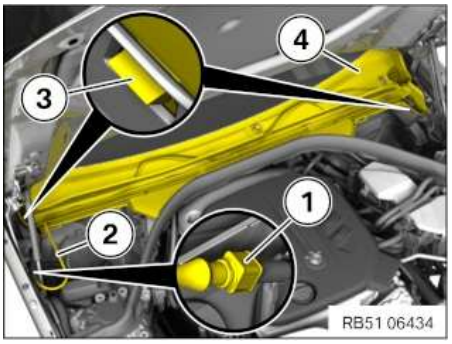


- Remove the protective cap (1).
- Loosen nut (2).

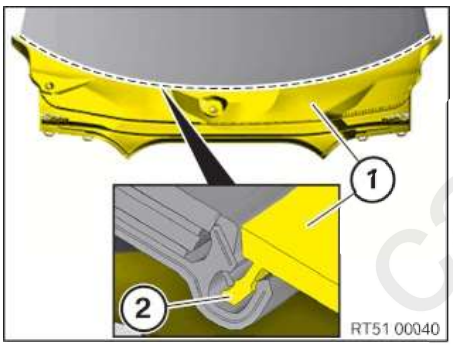


- Pull off the wiper arm (1) using special tool .

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



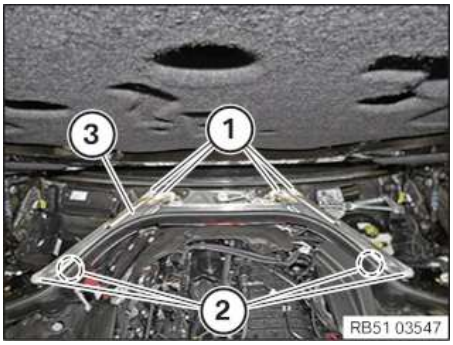
- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

9 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

Driving without the strut brace/front-end strut or tension strut is not permitted.

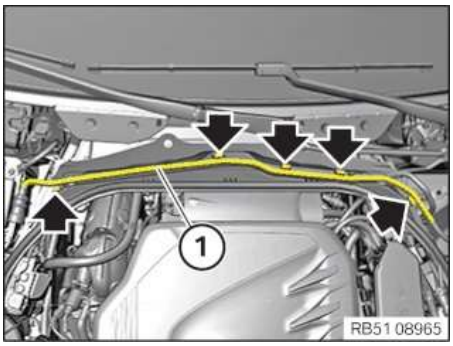
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NOTICE

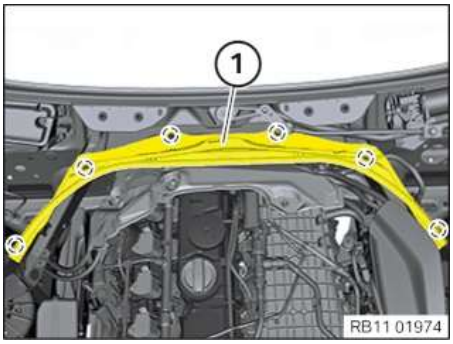
The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.



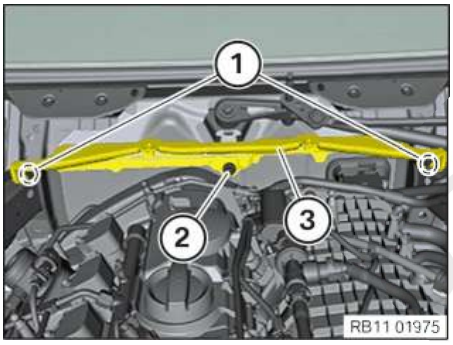
- **Version with mild hybrid technology:**

  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.

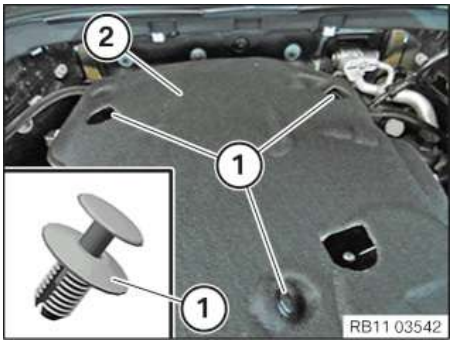
Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- 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.



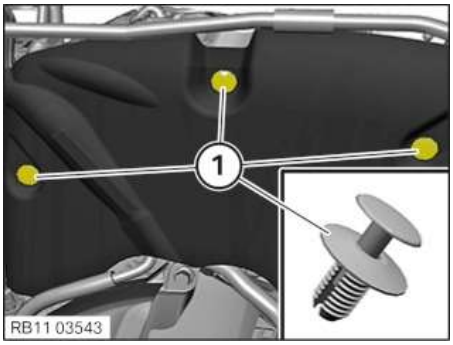
- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

12 – Remove the acoustic cover for the injectors

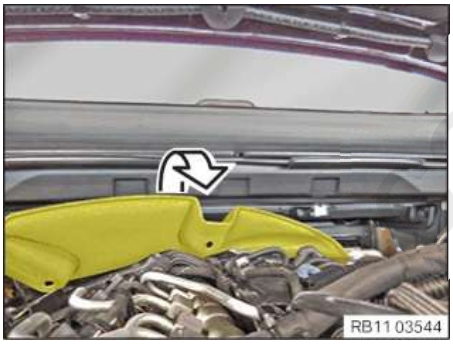


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

13 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).

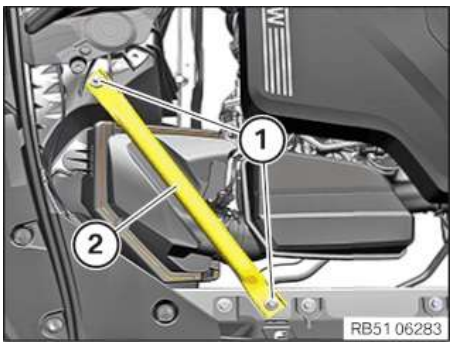


- Guide out and remove the acoustic cover in the direction of the arrow.

14 – Remove right front-end strut

TECHNICAL INFORMATION

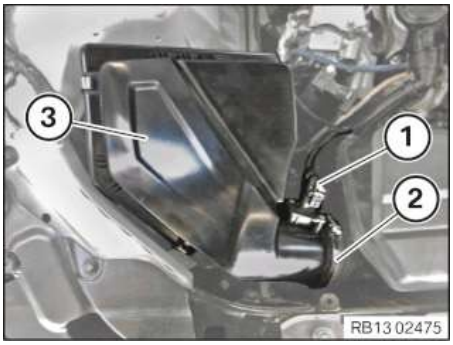
Driving without the strut brace/front-end strut or tension strut is not permitted.



- Loosen screws (1).
- Remove the front-end strut (2).

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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.

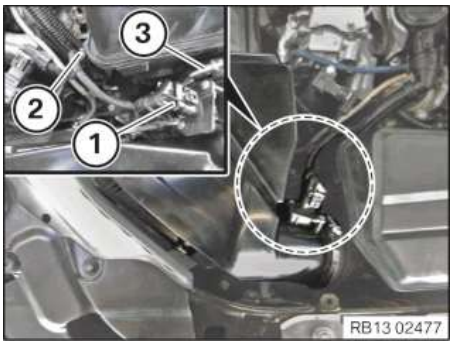
16 – Removing the clean air pipe with the resonator

WARNING

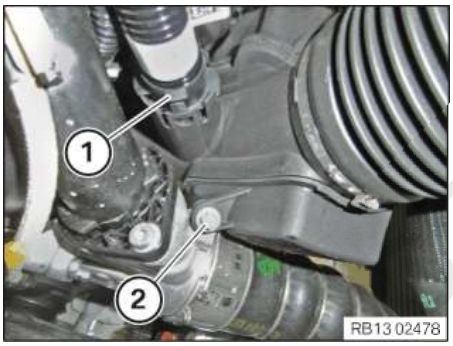
Hot surfaces.

Risk of burning!

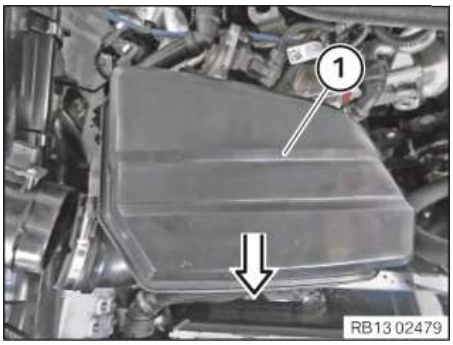
- Perform all work only on components that have cooled down.



- 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.

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- 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!

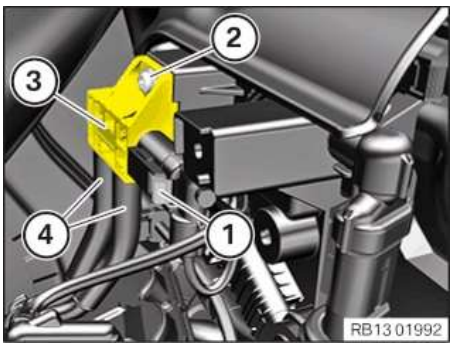
- Perform all work only on components that have cooled down.

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

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WARNING

Hot surfaces.

Risk of burning!

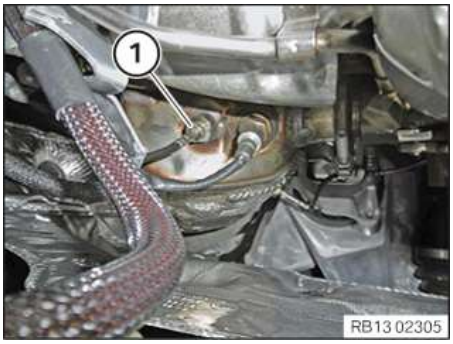
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

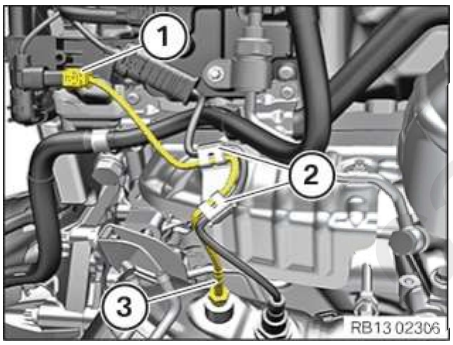
Electrostatic discharge.

Damage to or destruction of electrical components.

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- 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.

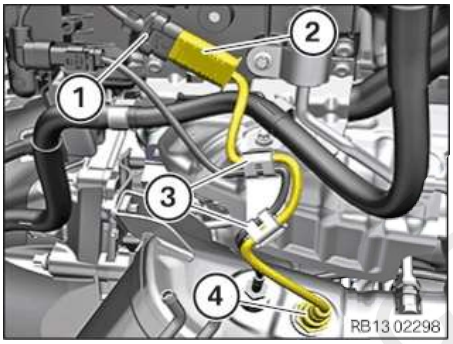
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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.

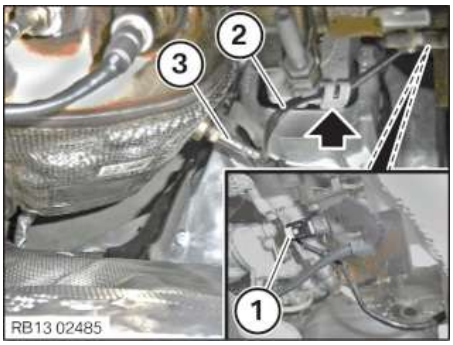
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RISK OF DAMAGE

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)

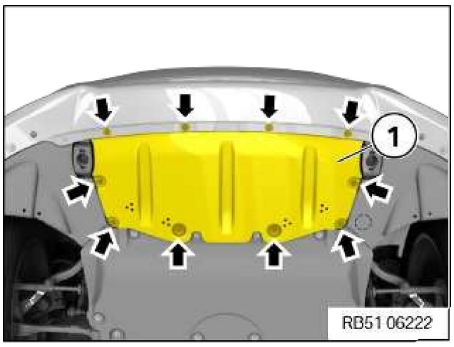


- Unlock plug connection (1) and disconnect.

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).

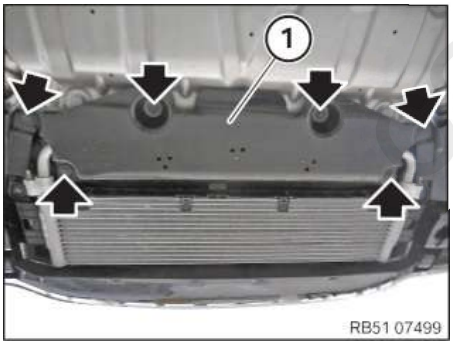
21 – Removing the front underbody protection



- **Version A:**

  Remove screws (arrows).

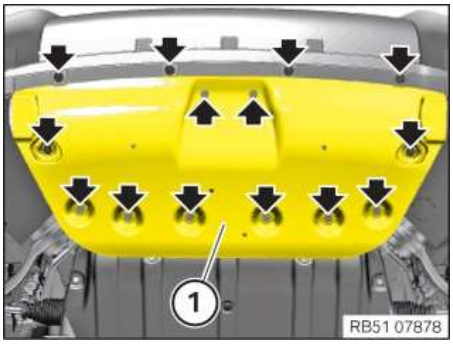
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version B:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

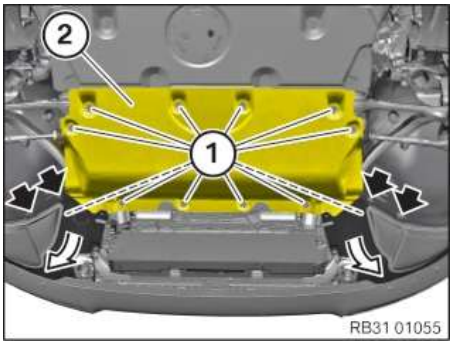


- **Version C:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

22 – Remove the underbody protection of the steering gear



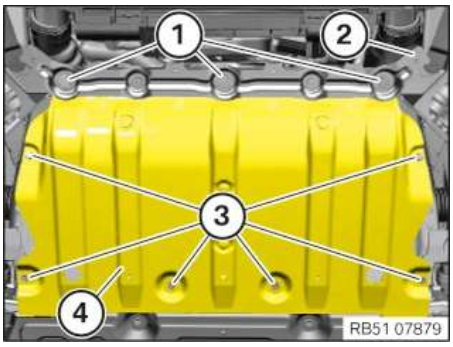
- **Version A:**

  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.

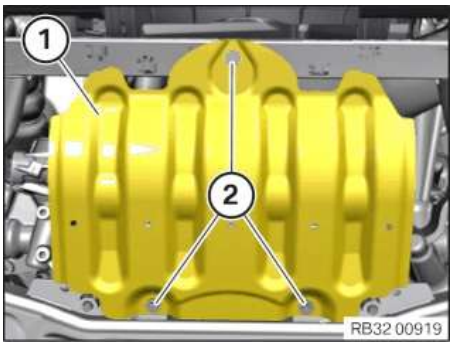
  Loosen screws (3).

  Feed out and remove the underbody protection (4) of the steering gear.

23 – If installed: Removing the steering underbody protection

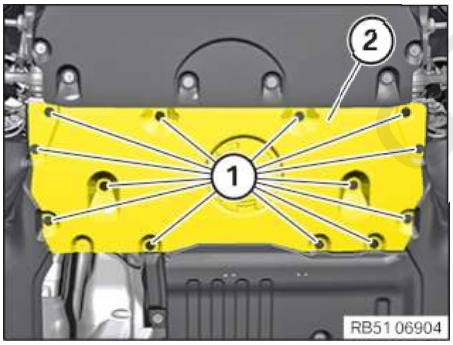
Prerequisite

Front underbody protection has been removed.



- Loosen screws (2).
- Remove underbody protection (1).

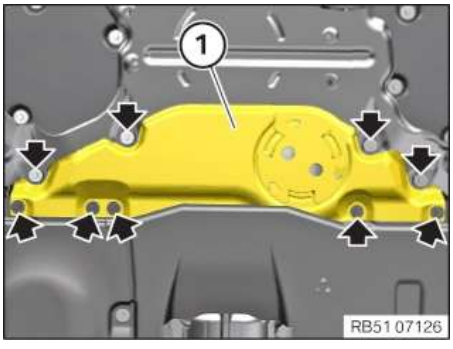
24 – Removing the centre underbody protection



- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .



- **Version with all-wheel drive:**

  Remove screws (arrows).

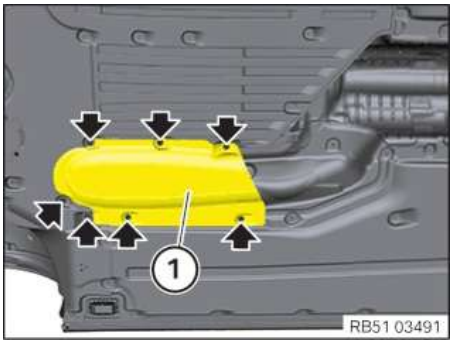
  Feed out and remove the centre underbody protection (1).

25 – Remove the underbody panelling of the transmission on the side

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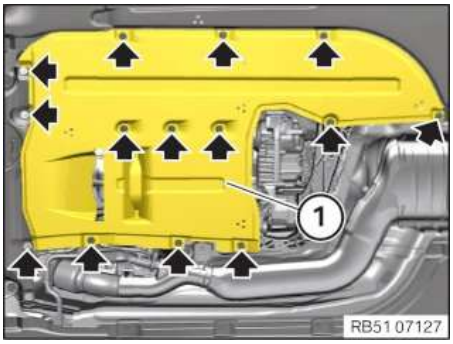
NOTICE

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).

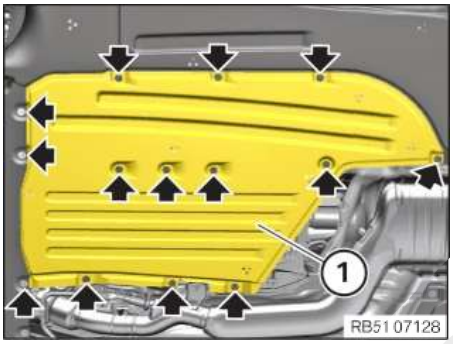
26 – Remove rear underbody protection



- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).

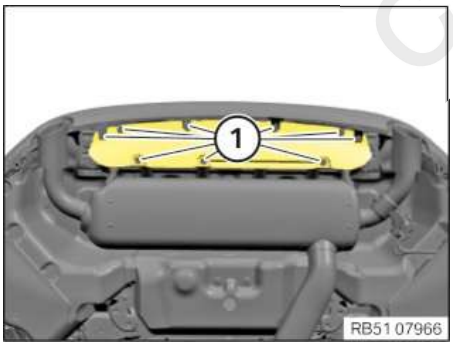


- **Version B:**

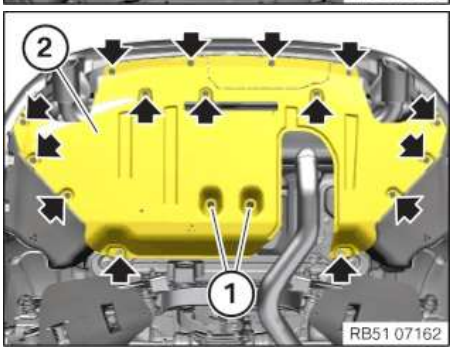
  Remove screws (arrows).

  Guide out rear underbody protection (1) and remove it.

27 – Removing the rear diffuser



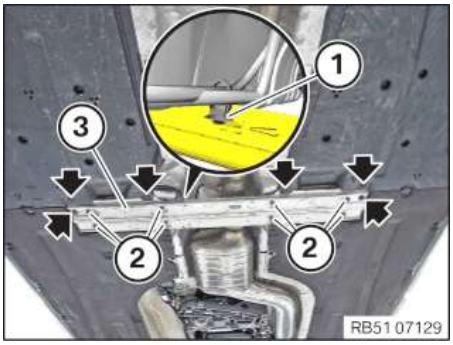
- **Version 1:**
- Release the screws and nuts (1).
- Remove the diffuser.



- **Version 2:**
- Loosen nuts (1).
- Remove screws (arrows).
- Guide out and remove rear diffuser (2).

28 – Remove the connecting support from the tunnel

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- 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!

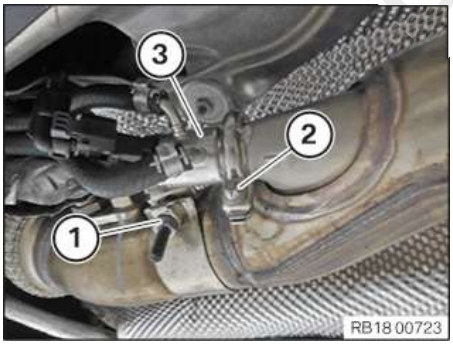
- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

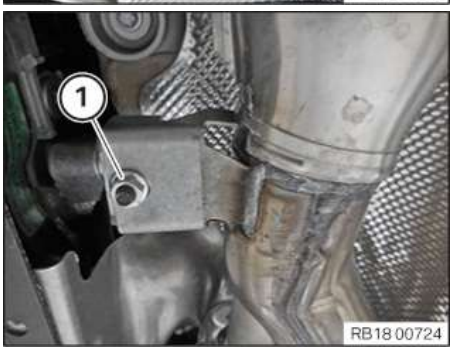
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

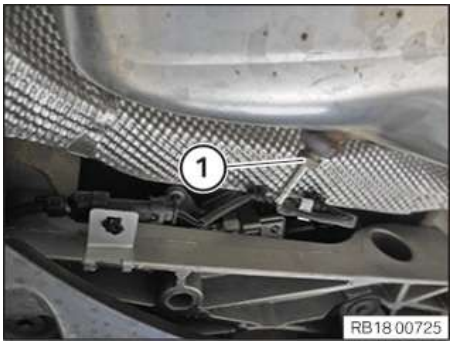


- Unfasten clamp (1).
- Detach the clamp (2) of the SCR metering module (3).
- Detach the SCR metering module (3)from the exhaust system and place to one side.

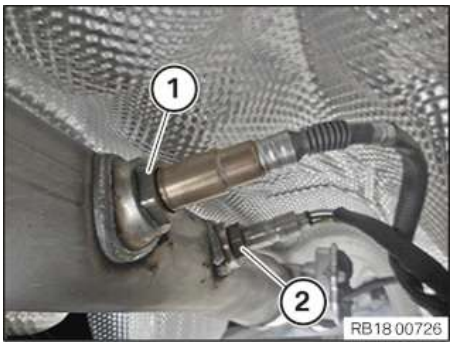


- Loosen nut (1).

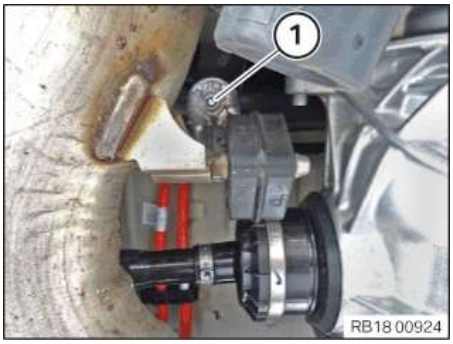
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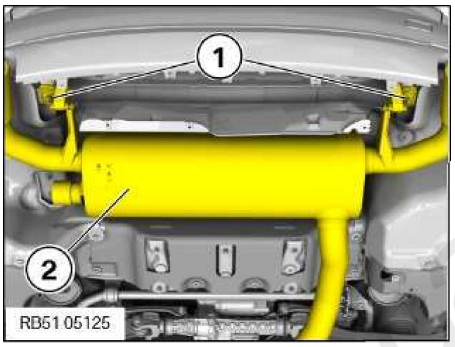
- Detach the exhaust temperature sensor (1) from the exhaust system.



- 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.

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RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

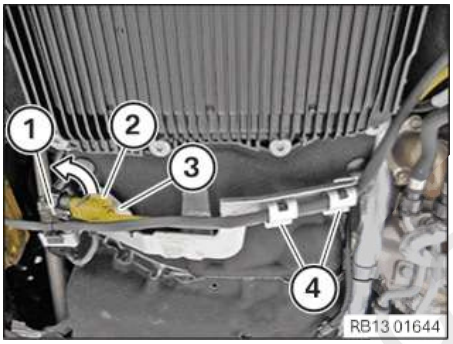
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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.

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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.

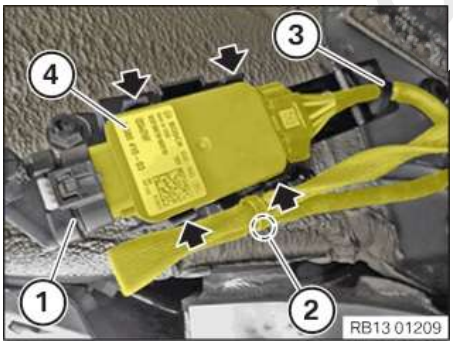
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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

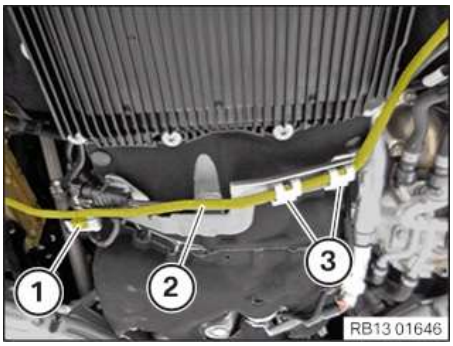
Damage to the nitrogen oxide sensor.

Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

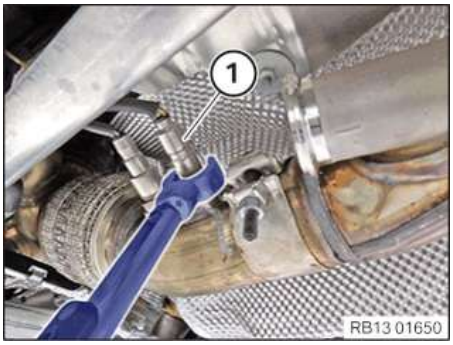
- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug 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.



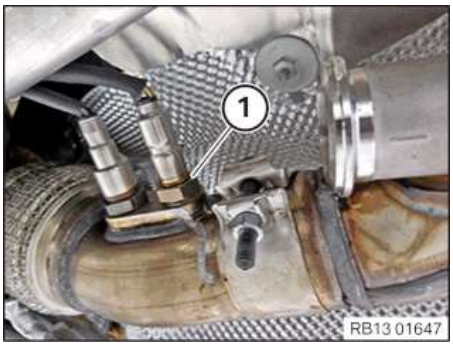
- Unlock plug connection (1) and disconnect.
- Release cable clip in area (2).
- Release line from the holder (3).
- Unclip control unit (4).



- 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!

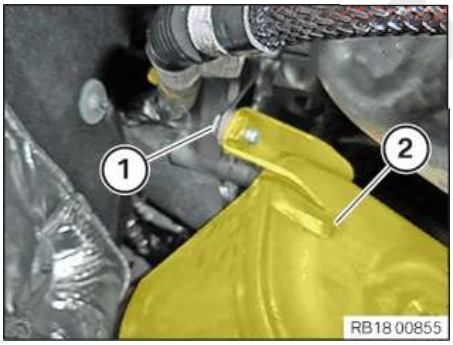
- Perform all work only on components that have cooled down.

CAUTION

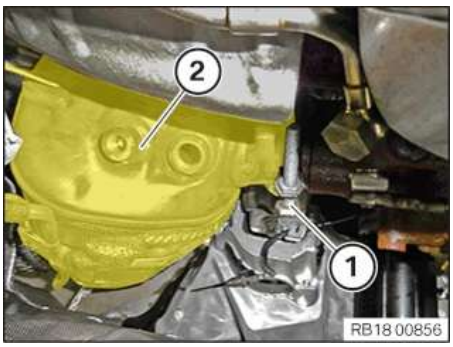
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

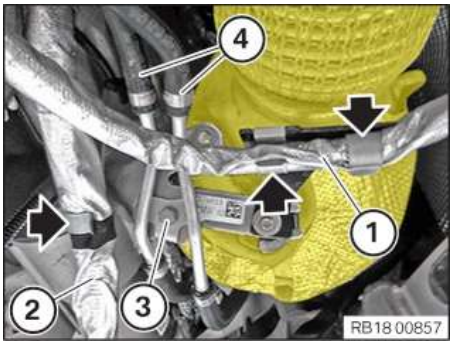


- Release bolt (1) from the holder of diesel particulate filter (2).

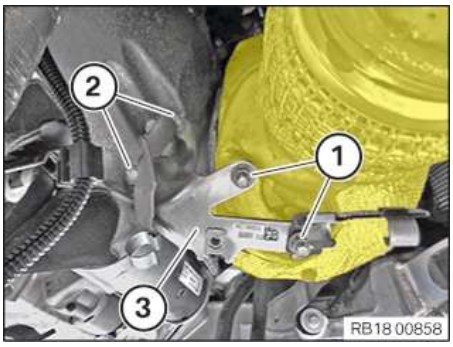


- Loosen V-band clamp (1).
- Feed V-clip (1) out from diesel particulate filter (2) and remove.

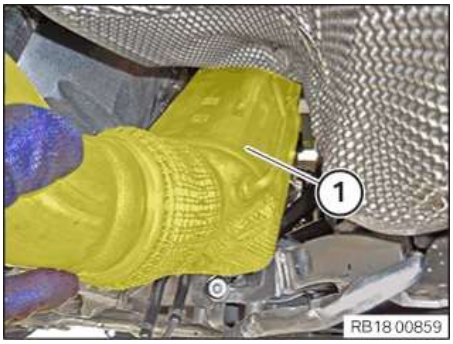
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- Release the metering line (1) from clamps (Arrows).
- Release positive battery cable (2) from starter motor from clamp (Arrow).
- Loosen screw (3).
- Thread off coolant line (4) and place to the side.



- 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.**

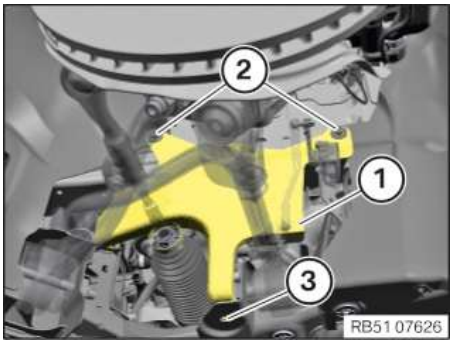
  This process is intended to prevent damage to the brake disc.

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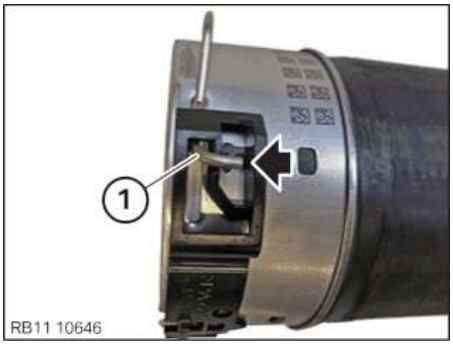
- If several wheels are removed at the same time: Use a piece of chalk to mark on each tyre the axle and side on which the corresponding wheel is fitted.
- Release the wheel bolts (arrows) crosswise and remove the wheel.
- To release and tighten wheel bolts with a security code: Use the correct adapter from the set of special tools .

34 – Remove the cover of the steering assembly



- Loosen screws (2) and (3).
- Remove the cover (1).

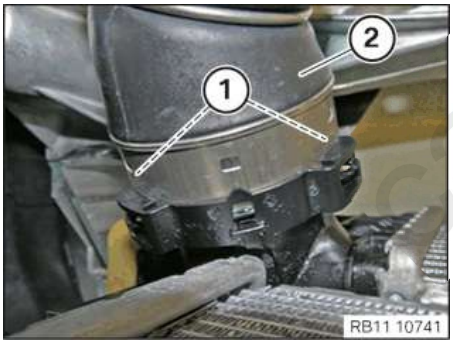
35 – Remove pressure pipe between exhaust turbocharger and charge air cooler



- **Version A:**

  Unlock lock (1).

  The lock (1) must snap audibly into place when unlocked (see arrow).



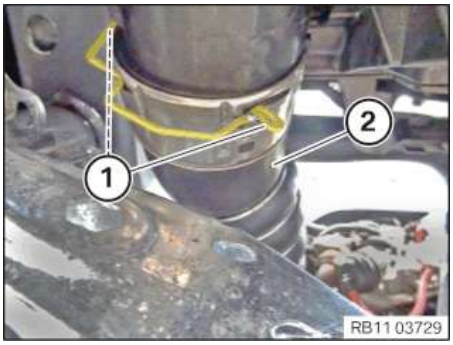
- Unlock the locks (1) on both sides and snap into place.
- Pull off pressure pipe (2) from charge air cooler.



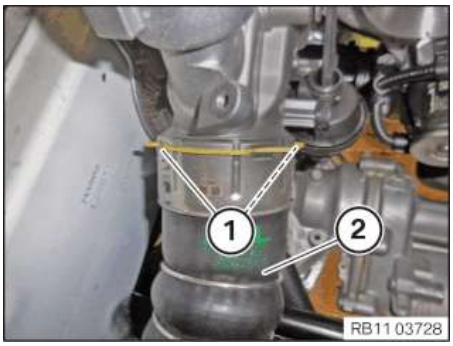
- **Version B:**

  Unlock clamp (1) and engage in this position.

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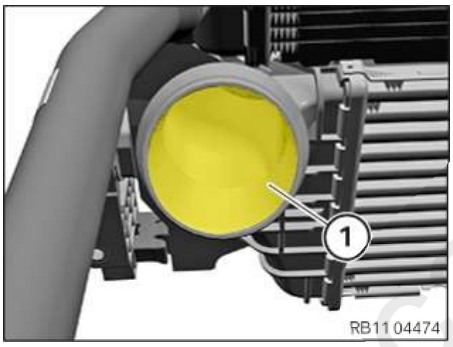
- Unlock the locks (1) and snap into place.
- Pull off pressure pipe (2) from charge air cooler.



- 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.

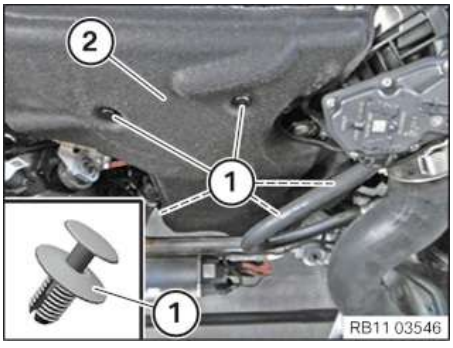
36 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.



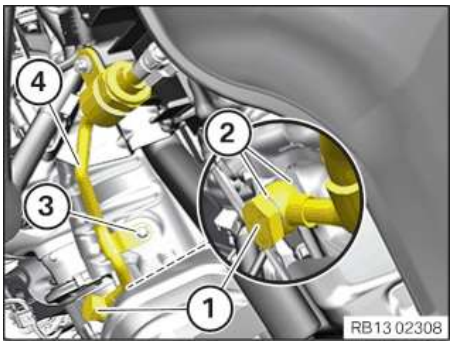
- Release and remove expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

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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.

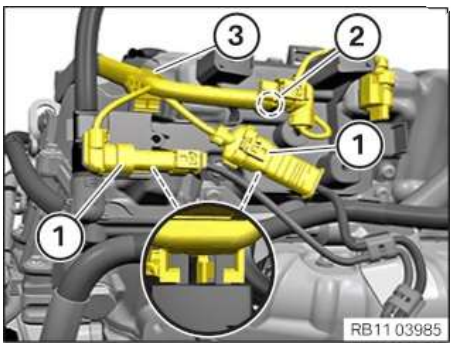
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

Contaminant or foreign body.

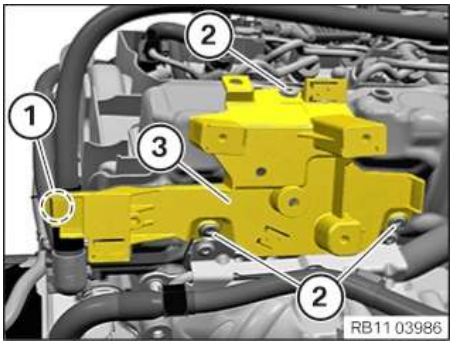
Contamination can result in malfunctions, operating failure or leaks.

- 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.

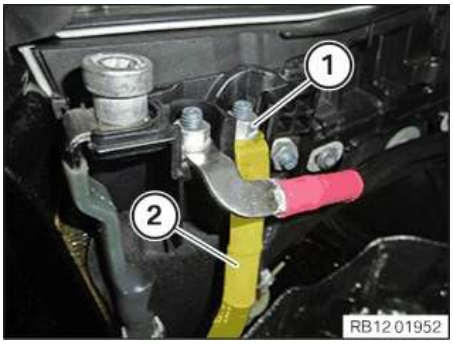
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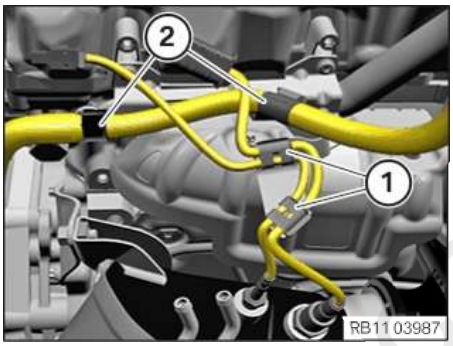
- Release the positive battery cable in the area (1) from the clamp and set it aside.
- Loosen screws (2).
- Feed out holder (3) for the sensor system and remove.



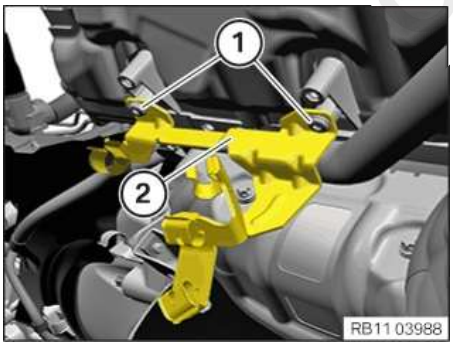
- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.



- Loosen nut (1).
- Feed out positive battery cable (2) and put to one side.



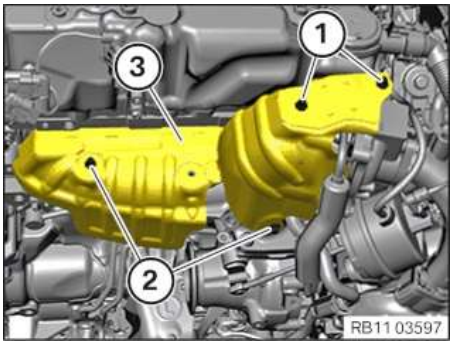
- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



- Loosen screws (1).
- Guide out and remove holder (2).

39 – Removing heat shield

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- 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

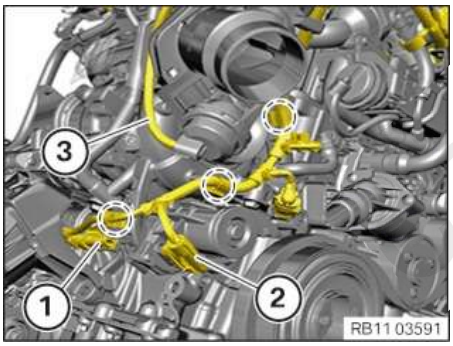
Prior to replacing the exhaust turbocharger: Observe the notes on troubleshooting on the exhaust turbocharger.

For additional information see: FUB-FUB-FB-130003-A10 Troubleshooting on the exhaust turbocharger

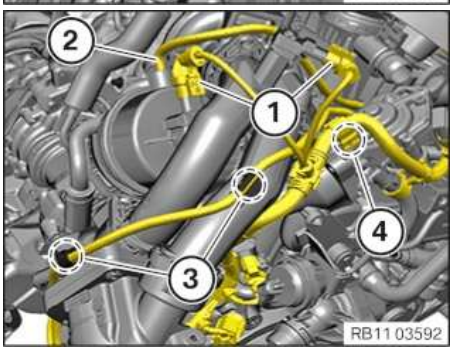
TECHNICAL INFORMATION

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).



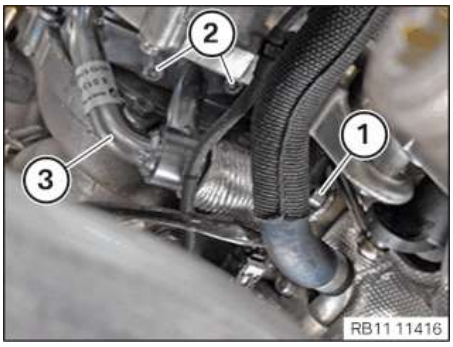
- Unlock plug connections (1) and disconnect.
- Pull off the vacuum hose (2).
- Release the vacuum hose in marked areas (3) from the exhaust turbochargers.
- Release the wiring harness in area (4) from the exhaust-gas recirculation cooler and set it aside.



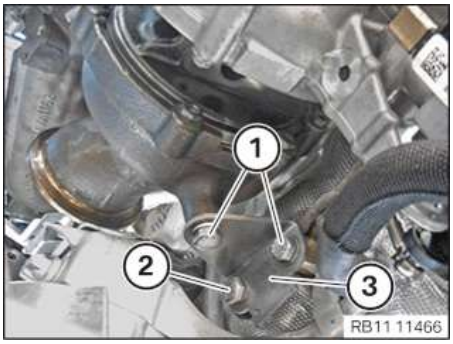
TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

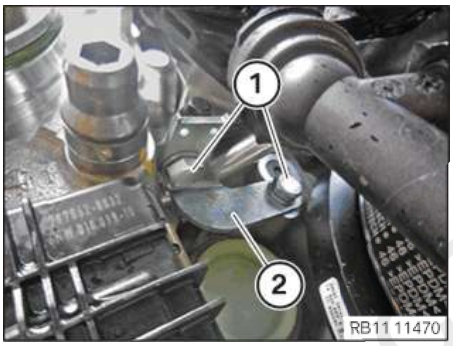
- Release the screws of the oil return line on the crankcase from the right wheel arch.



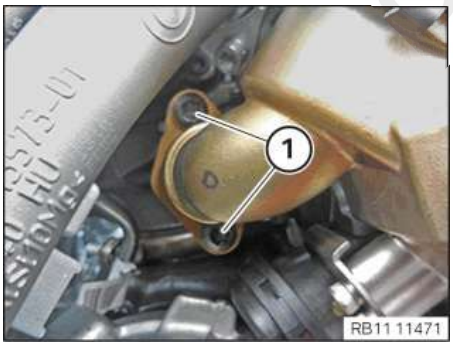
- Release the screw (1).
- Loosen screws (2).
- Remove oil return line (3) from the crankcase.
- Catch and dispose of emerging engine oil.



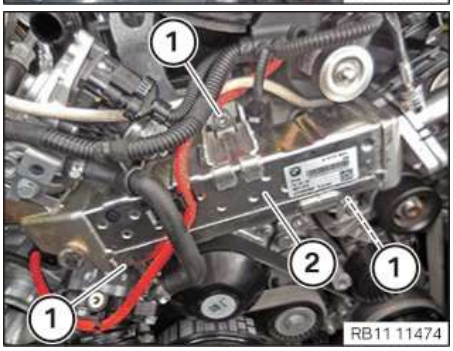
- Unscrew and remove the bolts (1) on the holder (3).
- Slacken screw (2) on holder (3), but do **not** remove.



- Loosen screws (1).
- Guide out and remove holder (2).

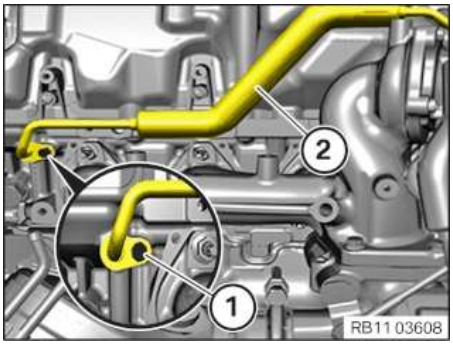


- Loosen screws (1).

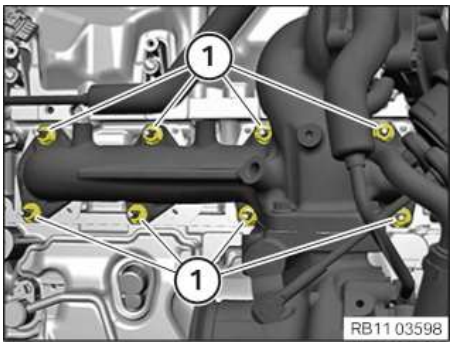


- Slacken screws (1), but do **not** remove.
- Release exhaust-gas recirculation cooler (2) slightly.

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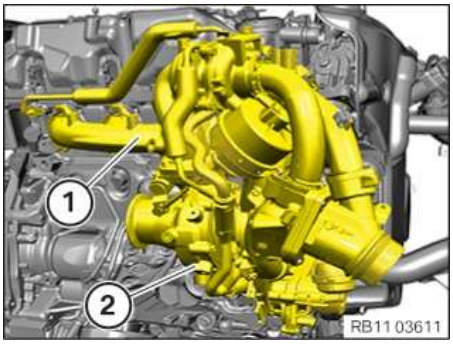
- Loosen screw (1).
- Remove oil feed line (2) for the high-pressure stage exhaust turbocharger from the cylinder head and set it aside.
- Catch and dispose of emerging engine oil.



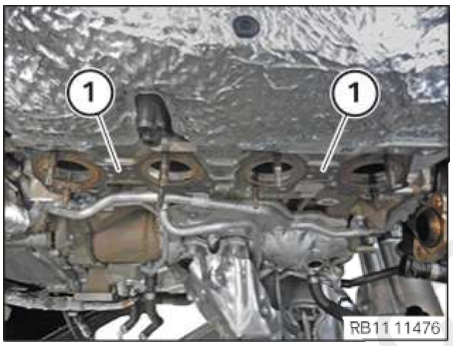
TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

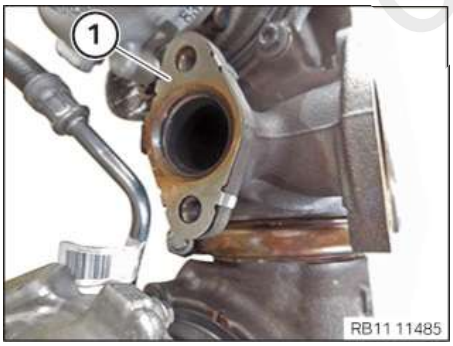
- Loosen nuts (1).



- 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.

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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).

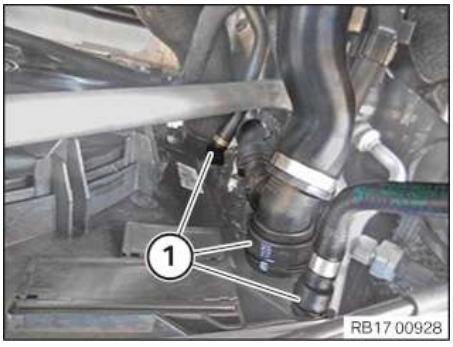
▸ **Avoiding damage to the starter generator due to escaping coolant**

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.

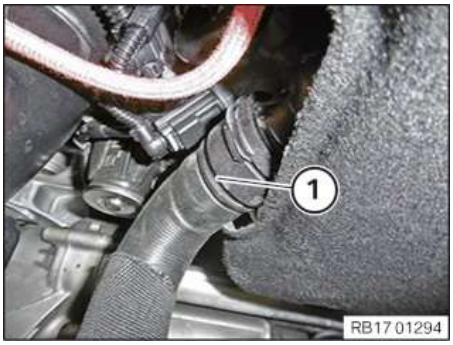


NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

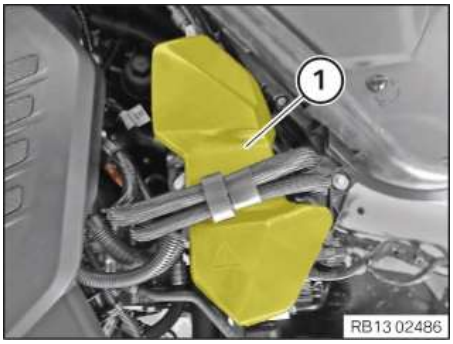
- Unlock all coolant lines (1) and detach.
- Catch and dispose of escaping coolant.

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- 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.

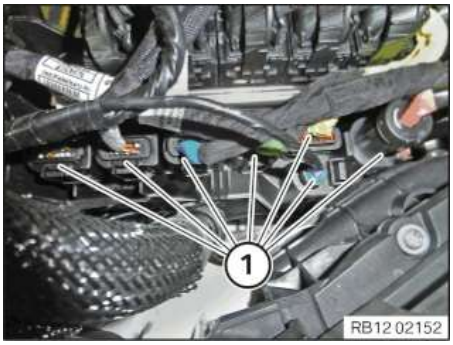
Sheared wires can cause a short circuit.

- Do not pull on the wires when disconnecting connectors and plug connections.

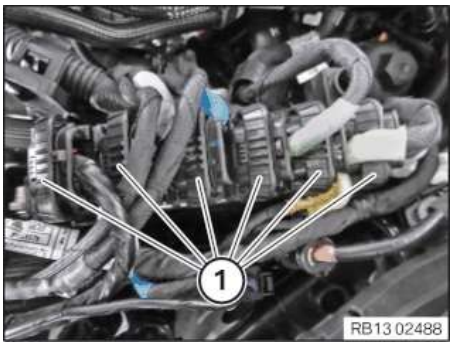
TECHNICAL INFORMATION

Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.

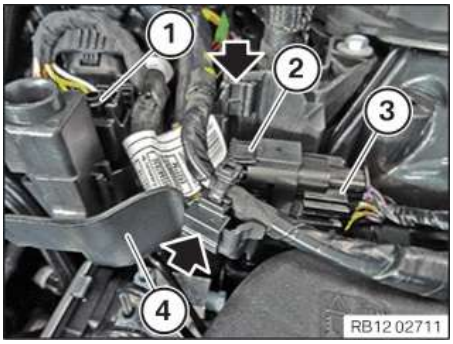
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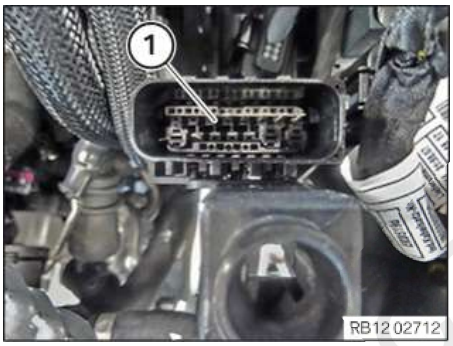
- Unlock and disconnect plug connections (1).



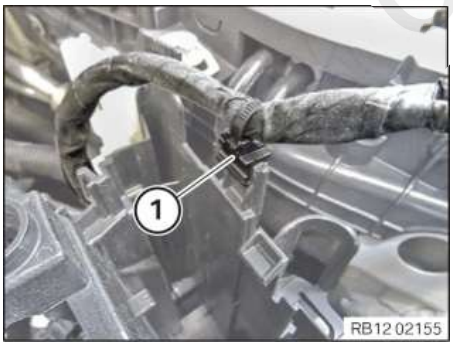
- Unlock and disconnect plug connections (1).



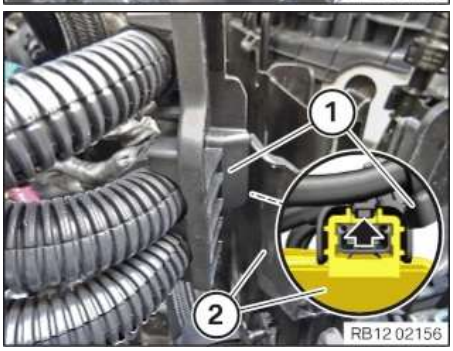
- Unlock plug connection (1) and disconnect.
- Unlock plug connection (2) and disconnect.
- Release the connector (3) and disconnect from the control unit holder (4).
- Release the clamps (arrows).



- Unlock plug connection (1) and disconnect.

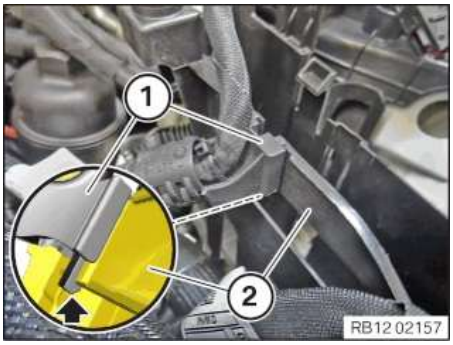


- Loosen clamp (1).



- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).

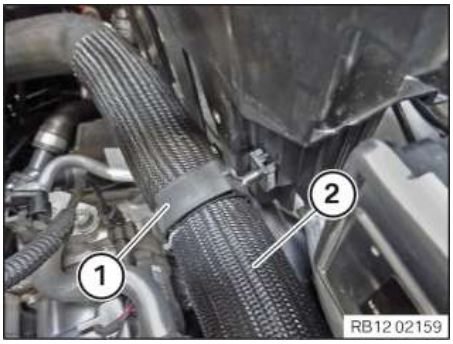
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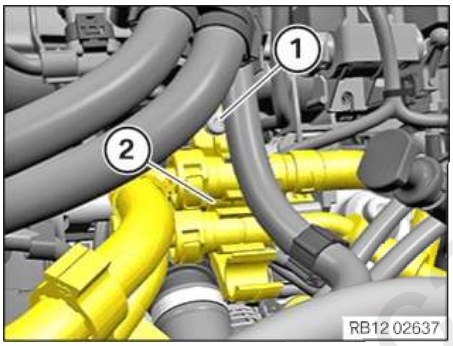
- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).



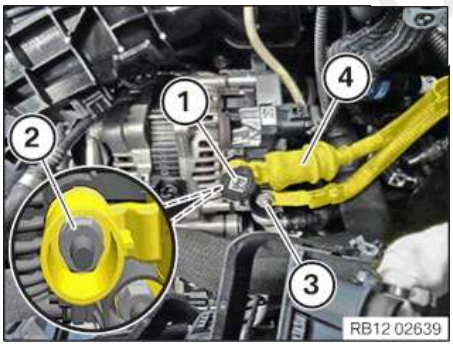
- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.



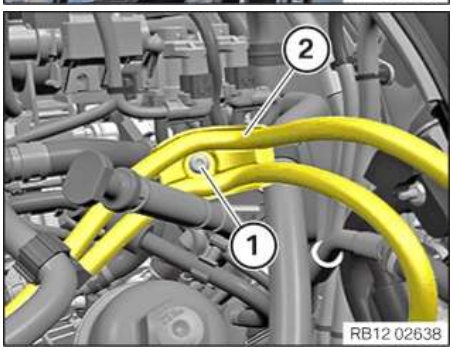
- Unlock holder (1) and feed out coolant line (2) and place it aside.



- Release the screw (1).
- Guide out fuel lines (2) and set them aside.

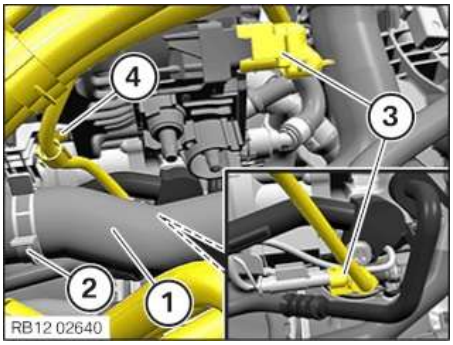


- Guide out and remove the lid (1).
- Release the nuts (2) and (3).
- Feed out positive battery cables (4) and place to one side.

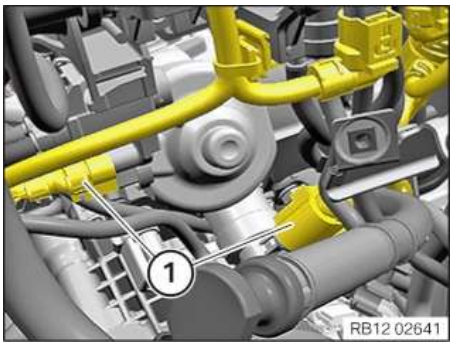


- Release the screw (1).
- Guide out the positive battery cables (2) and set them aside.

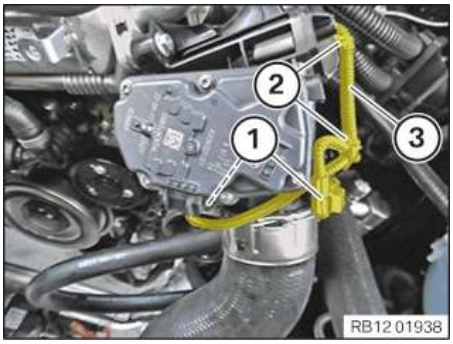
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- Release the coolant line (1) from the holder (2) .
- Unlock plug connections (3) and disconnect.
- Loosen clamp (4).



- Unlock and disconnect plug connections (1).



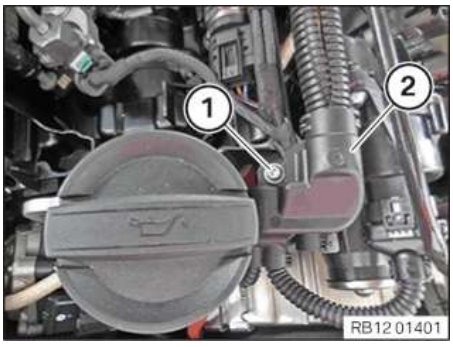
- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.



- Unlock and loosen connector (1).

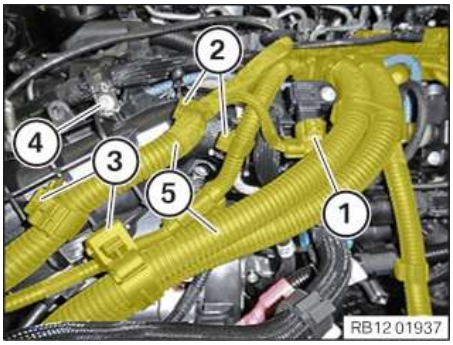


- Unlock plug connection (1) and disconnect.

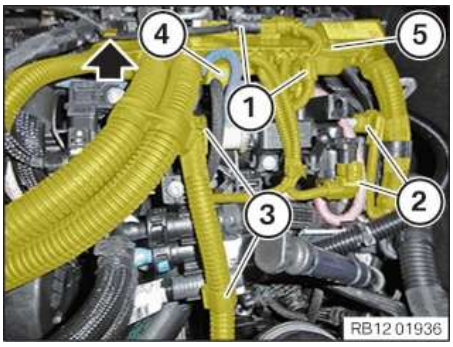


- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.

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- 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

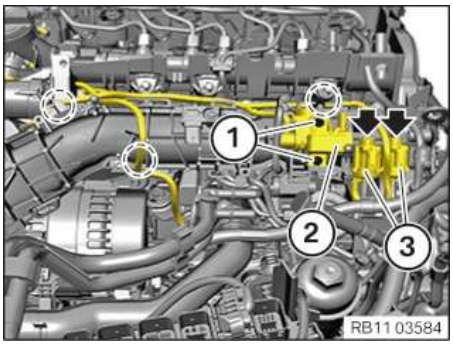
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



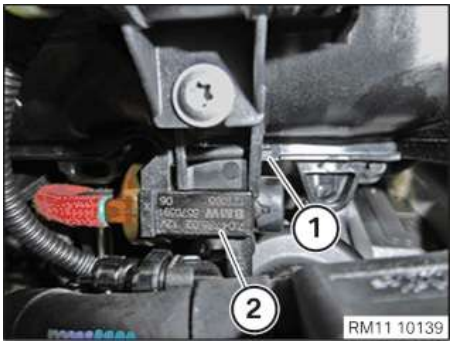
- Unlock clamp (1) and engage in this position.



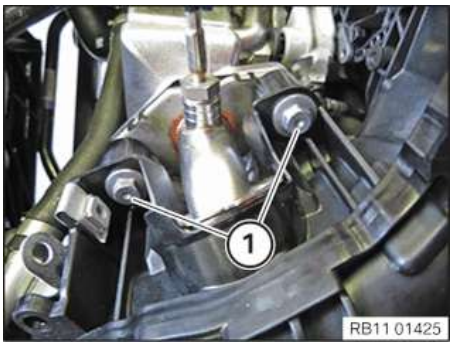
- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.



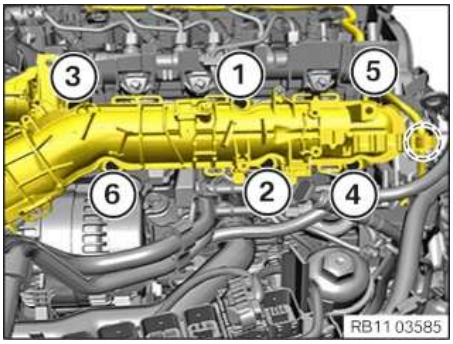
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



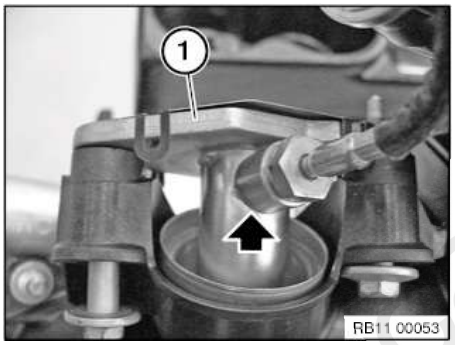
- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.



- 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.

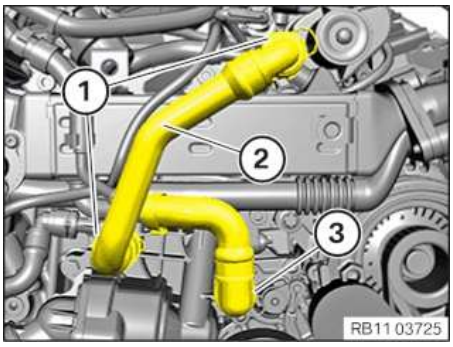
- Cover the starter generator with suitable, watertight auxiliary materials.
- Close off line connections with seal plugs.
- If necessary: Flush the leaked coolant from the starter generator with at least 1 l water.

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- **Version A:**

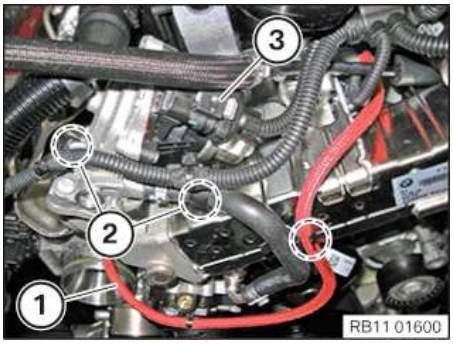
  Unlock and pull off coolant lines (1).



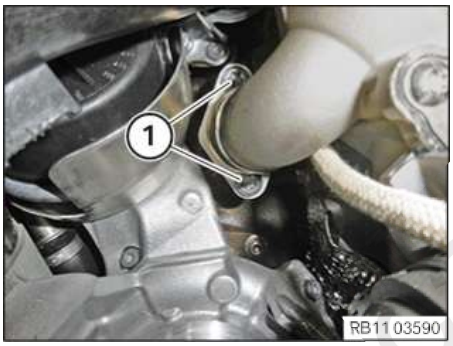
- **Version B:**

  Unlock locks (1) and remove thee coolant line (2).

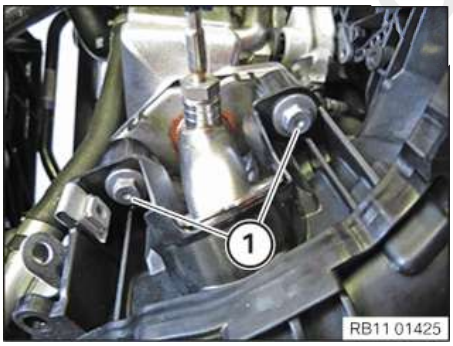
  Unlock coolant line (3) and pull it off the thermostat.



- 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.

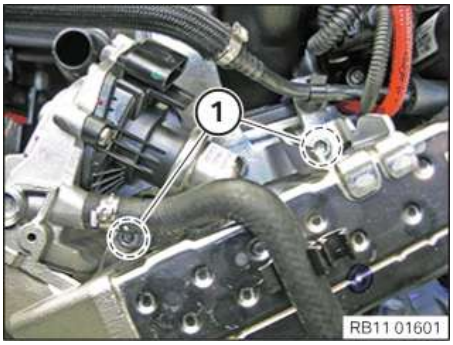


- Loosen the screws (1) on the intake system.



- Loosen the screw (1) below the exhaust-gas recirculation cooler.

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- 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!

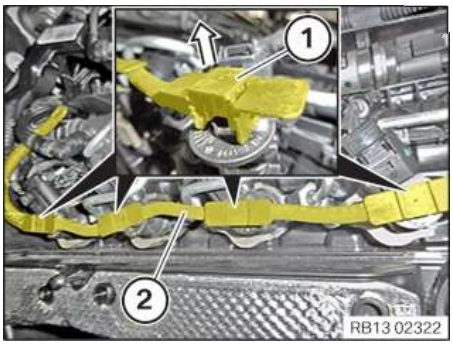
- Perform all work only on components that have cooled down.

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.

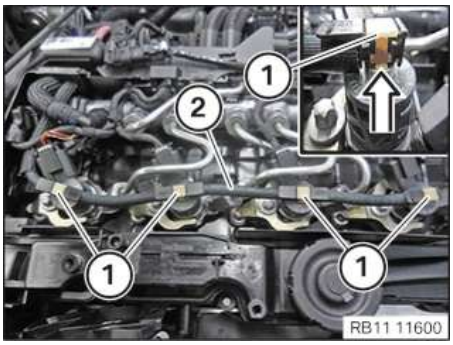


- **Version A:**

  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.



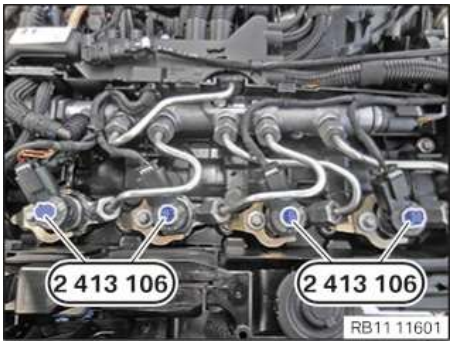
- **Version B:**

  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.

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- 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.

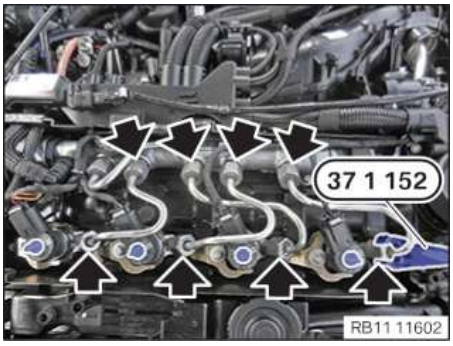
TECHNICAL INFORMATION

If several high pressure lines are removed, ensure that each high pressure line is installed in its original location. Label high pressure lines.

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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.

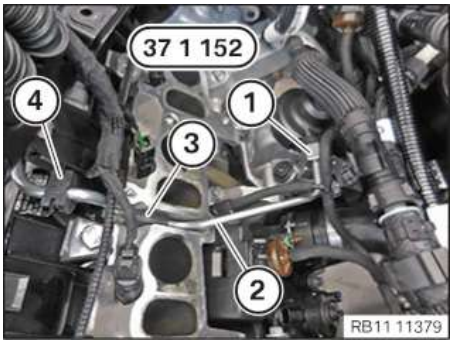
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TECHNICAL INFORMATION

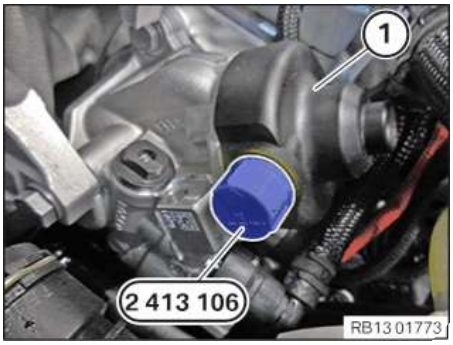
Reset special tool in early to avoid bending pressure lines.



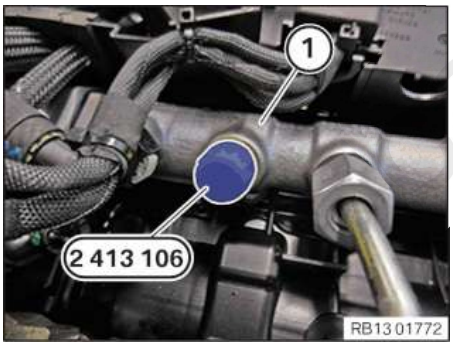
- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.



- 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.

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RISK OF DAMAGE

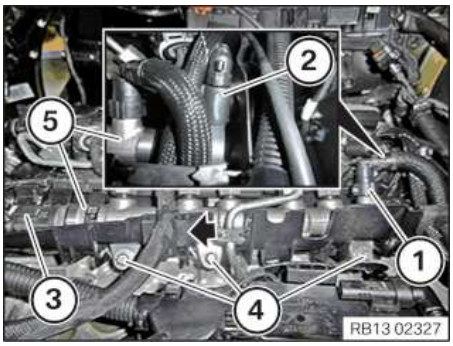
Contaminant or foreign body.

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.

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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

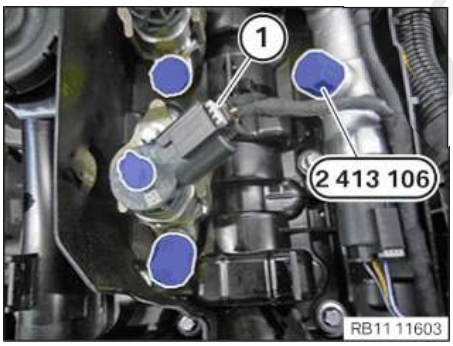
Electrostatic discharge.

Damage to or destruction of electrical components.

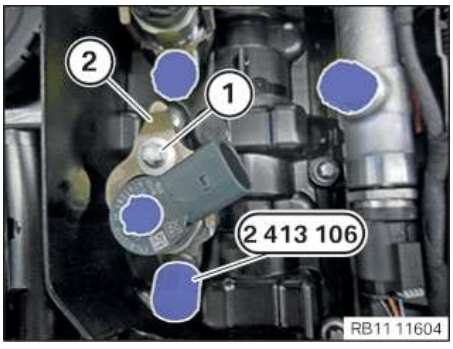
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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**

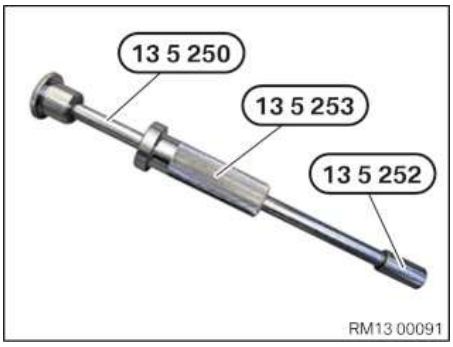
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RISK OF DAMAGE

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.



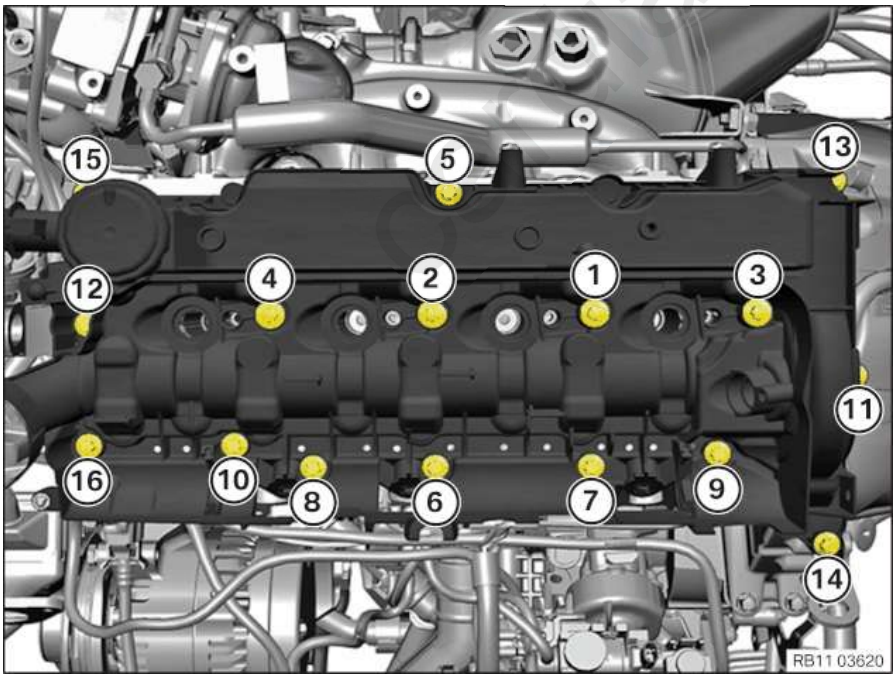
- Unscrew special tool 0 493 339 (13 5 252) from special tool 0 493 321 (13 5 250) and remove special tool 0 493 340 (13 5 253).
- Screw special tool 0 493 339 (13 5 252) back onto special tool 0 493 321 (13 5 250).



- 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



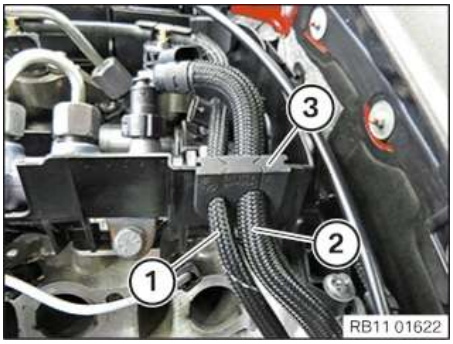
1 - 16 Bolts of the cylinder head cover



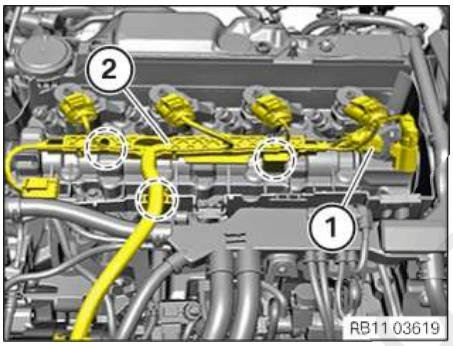
- Unlock and detach the locks.
- Feed the engine ventilation line (1) out and set it aside.



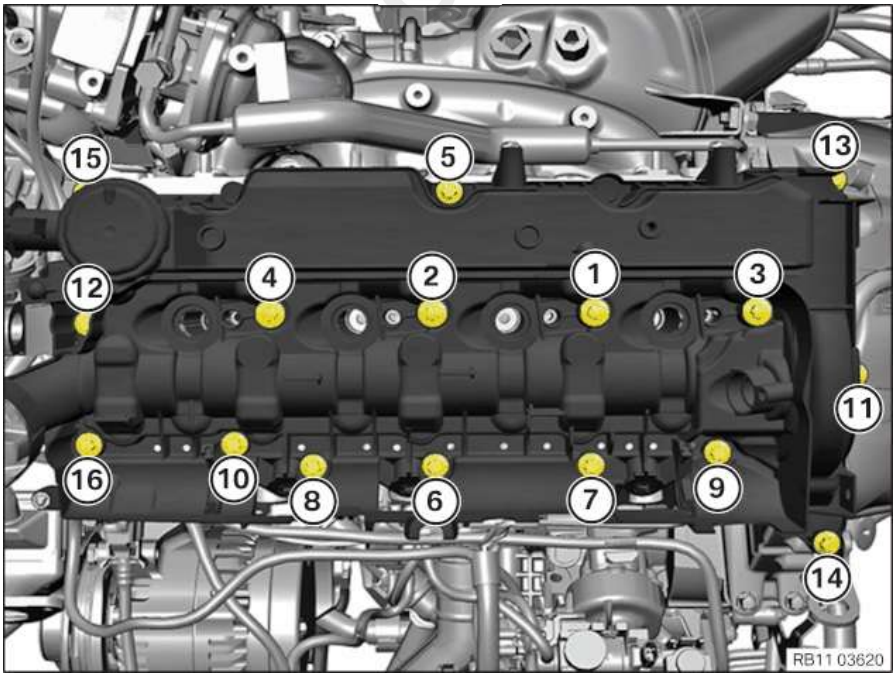
- Feed out and remove the heat shield (1).



- Remove the leakage oil line (1) including the fuel return line (2) and the grommet (3) and put to one side.

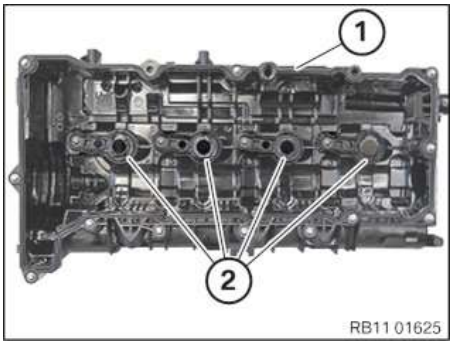


- Unlock connector (1) and pull off.
- Disconnect the wiring harness (2) in the marked areas from the cylinder head cover and set aside.



- Evenly loosen the screws in a sequence from (16) to (1).
- Feed out and remove the cylinder head cover.

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- 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

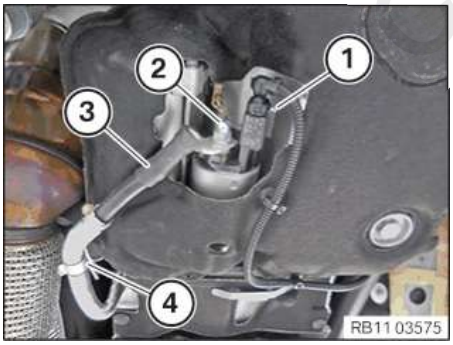
Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

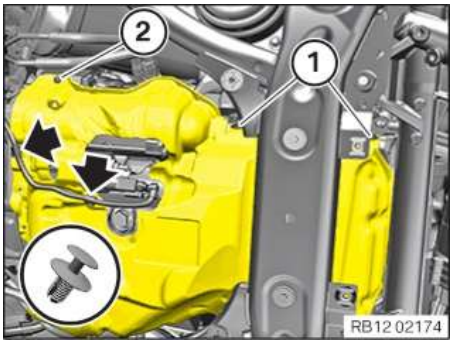
- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

TECHNICAL INFORMATION

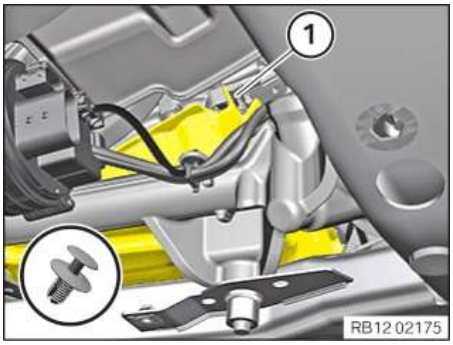
Make sure that the acoustic cover is **not** damaged while removing the starter motor.
A damaged lower acoustic cover can only be renewed when the front axle is lowered.



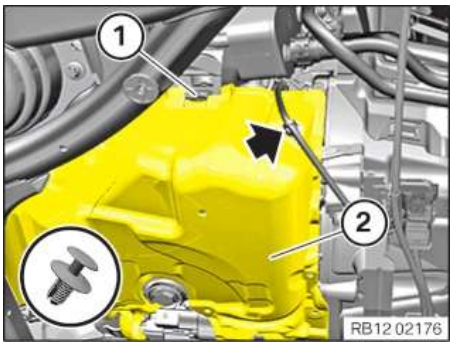
- Unlock plug connection (1) and disconnect.
- Release nut (2).
- Release positive battery cable (3) from holder (4).



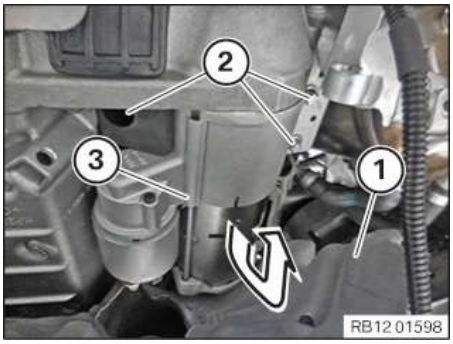
- Loosen the expanding rivet (1).
- Undo fir tree clip (2).
- Release the clamps (arrows).



- 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

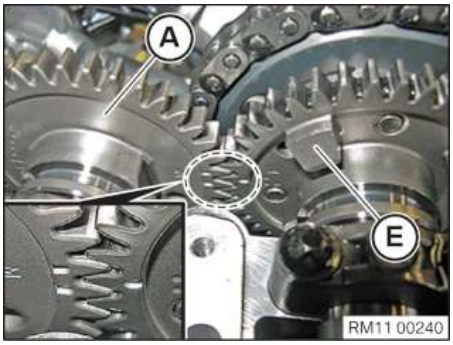
Damage to the engine.

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.

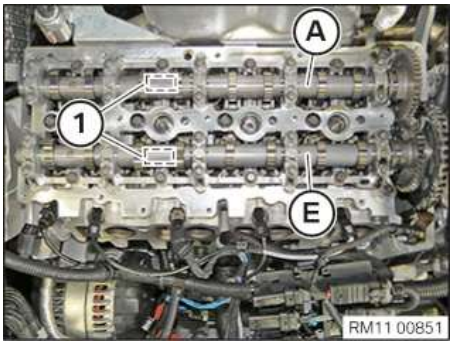
- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

  Do **not** crank the engine in reverse.

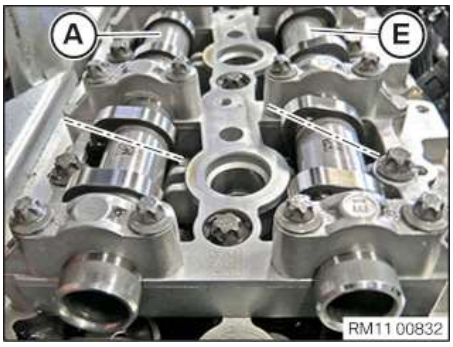


- Make sure the marks on both camshafts (A) and (E) correspond in the highlighted area.

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- Make sure the exhaust camshaft (A) and the intake camshaft (E) show the part number (1) from the top respectively.

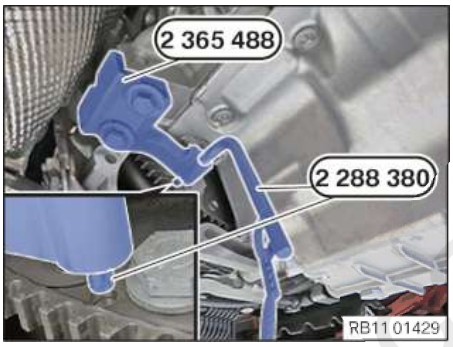


- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- 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.

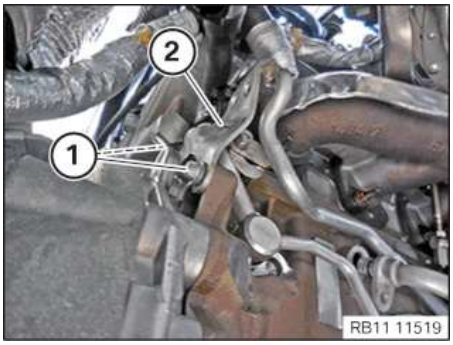
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

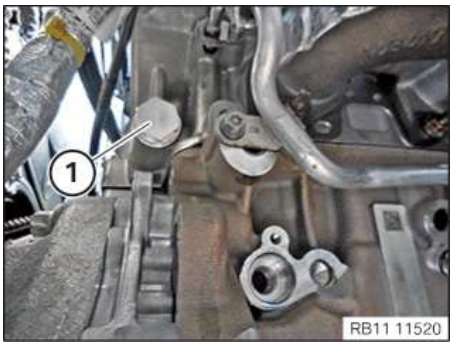
TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

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- Loosen screws (1).
- Guide out and remove holder (2).

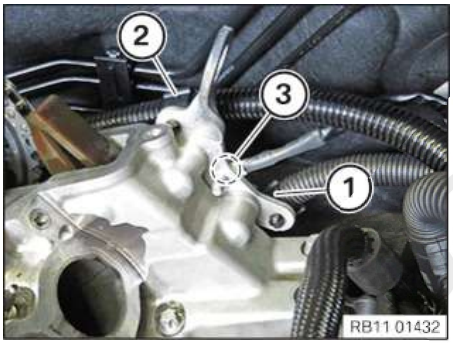


- Loosen the chain tensioner piston (1).
- Catch and dispose of emerging engine oil.

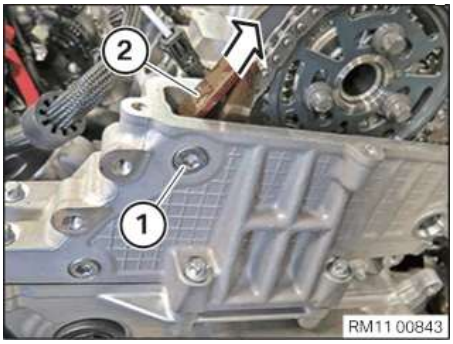


- Feed out and remove the sealing ring (1).

55 – Remove the timing chain guide rail

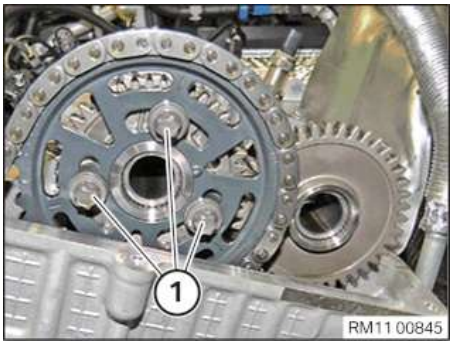


- Loosen the vehicle wiring harness (1) from the bracket.
- Release the positive battery cable (2) from the holder .
- Loosen the screw (3) and remove the grounding cable.



- 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

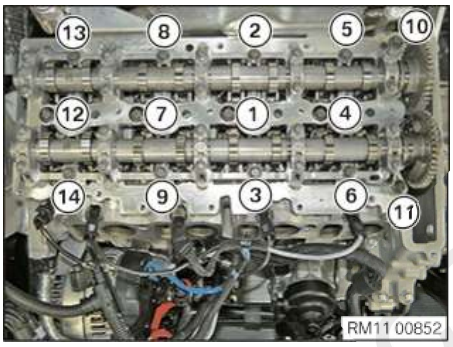


- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

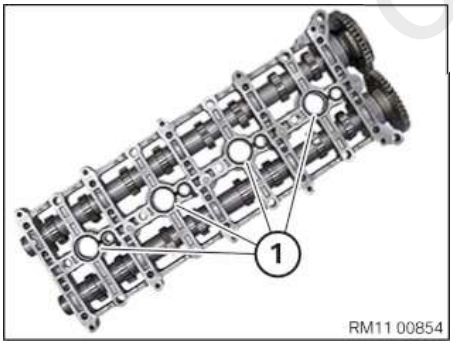
58 – Removing the camshaft support

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.



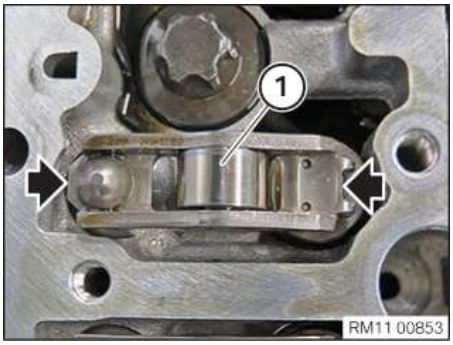
- Unscrew the screws evenly in order (14) to (1) in multiple increments.
- Feed out and remove the camshaft support with the camshafts towards the top.



- Guide out and remove gaskets (1).

59 – Remove roller cam followers

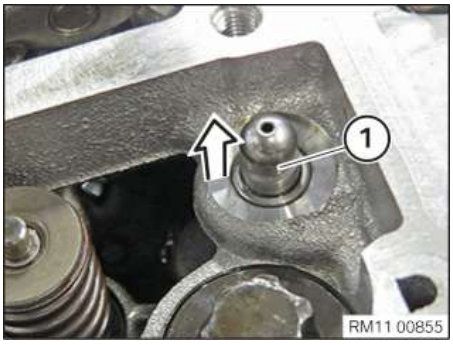
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- Guide out and remove all roller cam followers (1) (arrows).
- Place all roller cam followers (1) in order in special tool 0 495 105 (11 4 480).

  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).

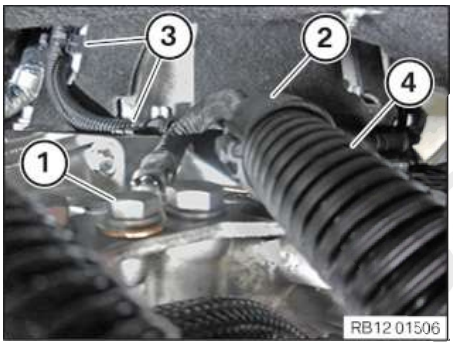
61 – Removing cylinder head

RISK OF DAMAGE

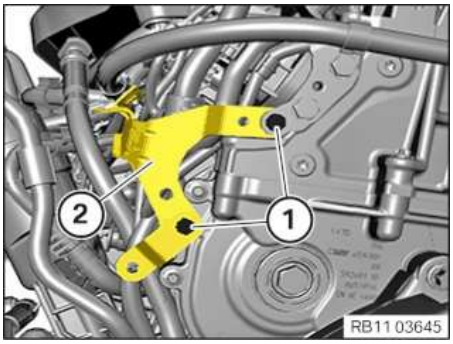
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

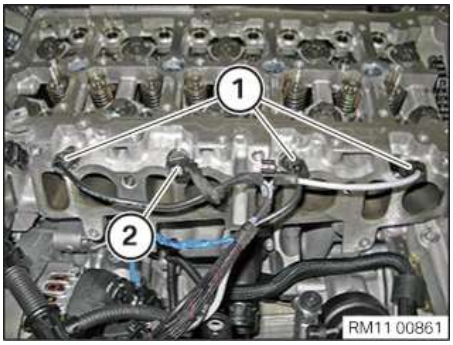


- Loosen screw (1).
- Unlock and loosen holder (2).
- Unlock and loosen the clamps (3).
- Feed out the wiring harness section (4) of the automatic transmission and place to one side.

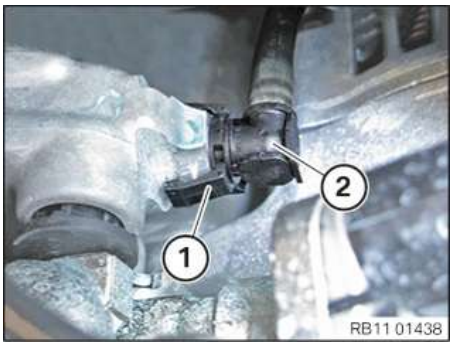


- Loosen screws (1).
- Guide out and remove holder (2).

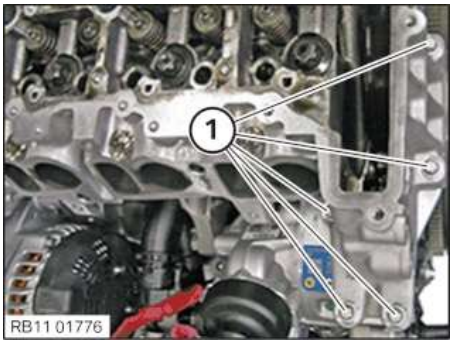
carmanuals.com



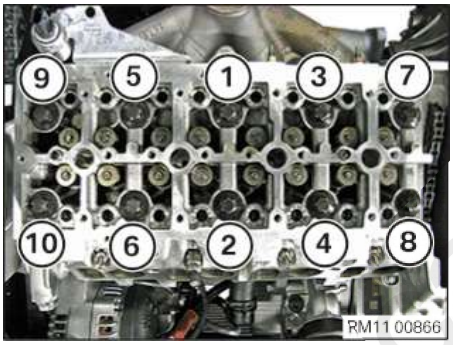
- Release plug connections (1) with special tool 0 495 140 (12 2 300).
- Unlock and disconnect the plug connections (1) and (2).
- Place wiring harness to one side.



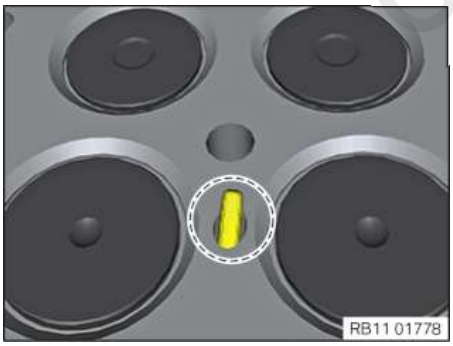
- Release lock (1) of coolant line.
- Remove the coolant line (2) and set it aside.



- 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.

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- 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).

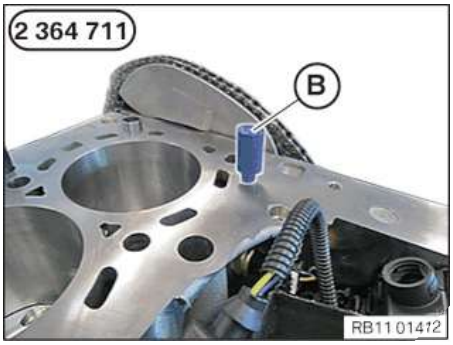
62 – Cleaning the sealing surface

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

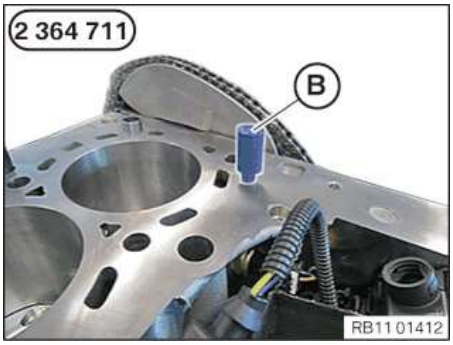
Damage to the surface.

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.

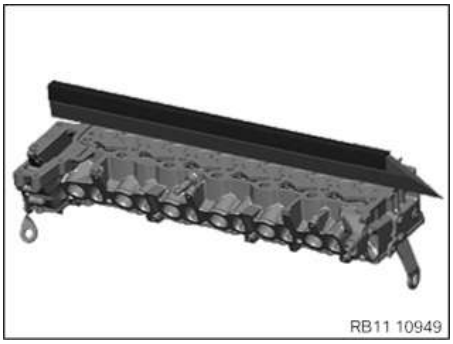
- Clean the sealing surface using special tool 0 495 104 (11 4 472).

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- Remove special tool (B).

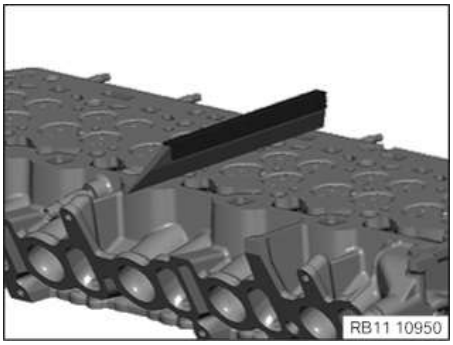
63 – Check the flatness of the cylinder head



- 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



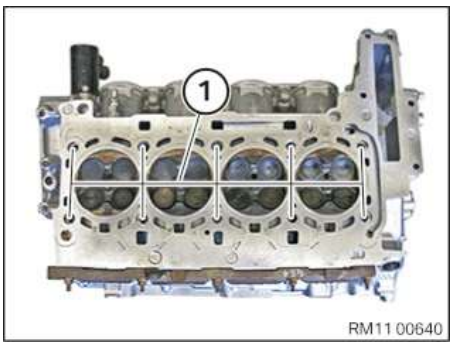
- Check the flatness of the cylinder head crosswise using a straightedge.

Cylinder head flatness

Maximum lengthwise deviation from flatness	0.10 mm
Maximum transverse deviation from flatness	0.05 mm

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64 – Replace cylinder head gasket



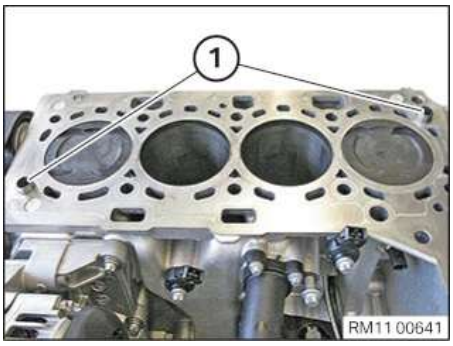
RISK OF DAMAGE

Damage to the surface.

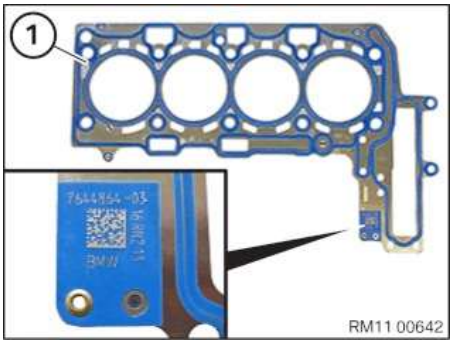
The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.

- Remove oil and dirt residue from the blind holes (1).

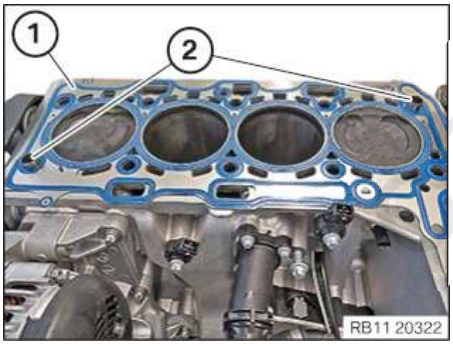


- Check if fitting sleeves (1) fit correctly and check for any damage.



- 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).

POSTPROCESSES

65 – Installing the cylinder head

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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.

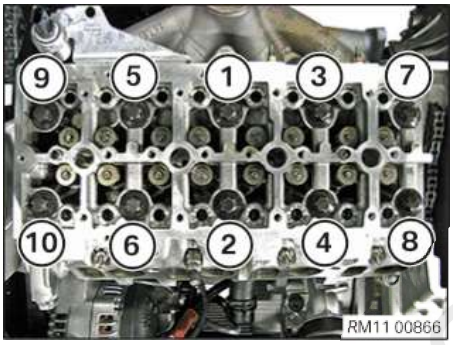
- Dry threaded holes (e.g. using compressed air).

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.

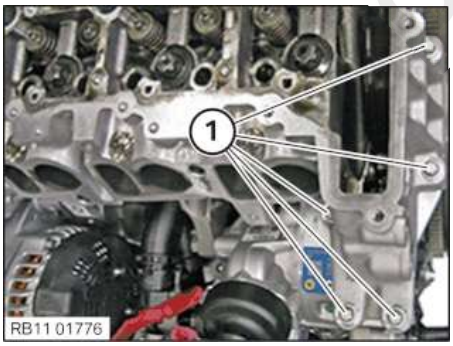


- Position the cylinder head gasket with the previously determined gasket thickness (number of holes).
- Fit new cylinder head screws.

  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

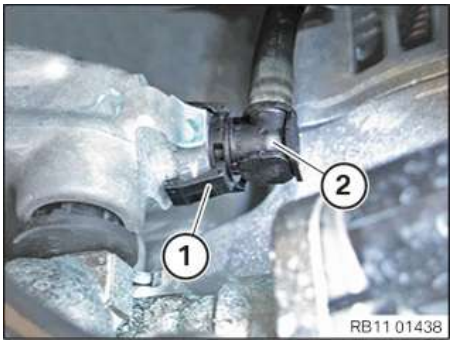
M12x1.5	Renew screws.	1. Tightening torque	50 Nm
		2. Angle of rotation	120 °
		3. Angle of rotation	120 °



- Insert screws (1) and tighten.

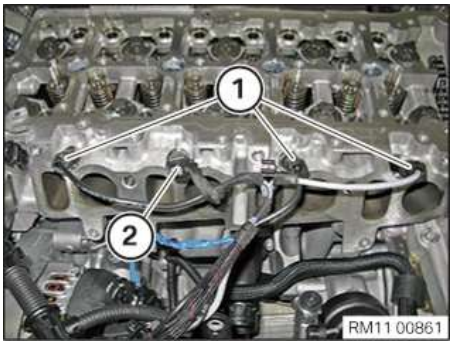
Cylinder head bolt to timing case cover

M8x40		Tightening torque	19 Nm



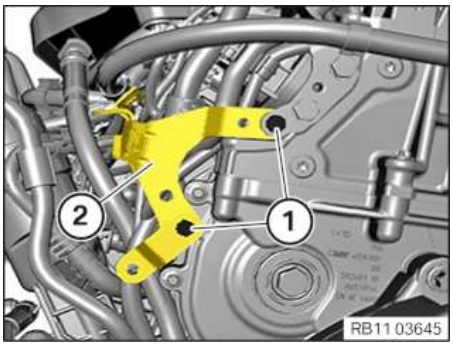
- Fit and lock coolant line (2).

  The lock (1) must engage audibly.



- Connect connectors (1) and (2), then lock.

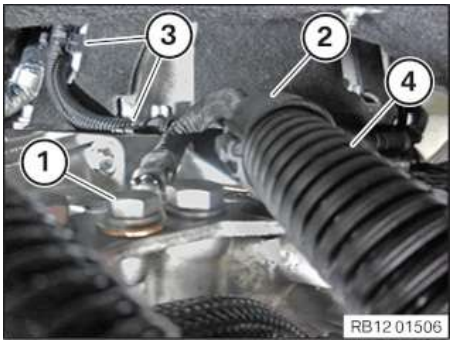
  The connectors (1) and (2) must audibly engage.



- Insert and install the holder (2).
- Tighten the screws (2).

Standard screw connection M6

M6		Tightening torque	8 Nm

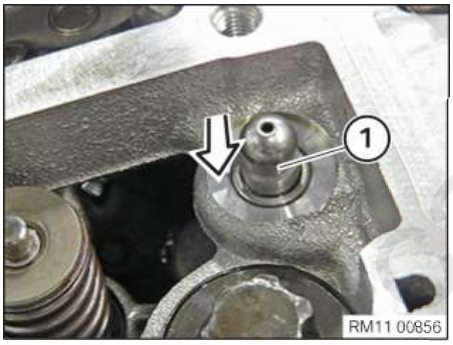


- Guide in the wiring harness section (4) of the automatic transmission and install.
- Lock holder (2).
- Make sure the bracket (2) engages audibly.
- Secure clamps (3).
- Tighten down screw (1).

Ground to cylinder head

M6		Tightening torque	8 Nm

66 – Installing all hydraulic valve clearance compensating elements

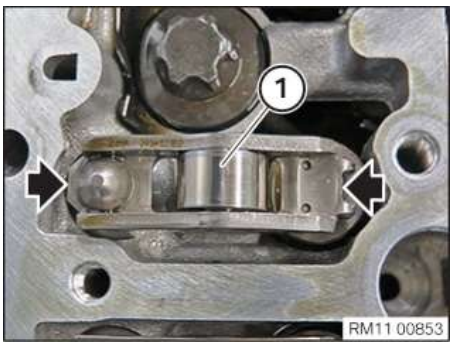


- Make sure to observe the assignment of the roller cam followers to the hydraulic valve clearance compensating elements when reusing the hydraulic valve clearance compensating elements (1).
- Insert and install all hydraulic valve clearance compensating elements (1) in the direction of the arrow.

67 – 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).

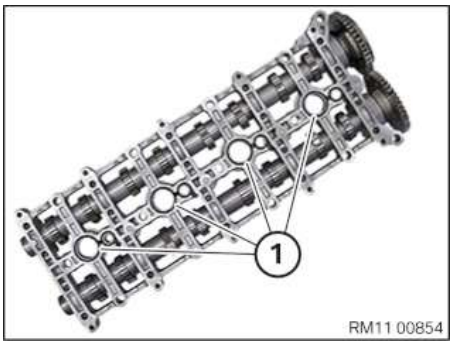
  Roller cam followers (1) that have already been used must be installed in the same place.
- Note the mounting orientation of the roller cam followers (1).
- Oil all roller cam followers (1).

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68 – Installing the camshaft support

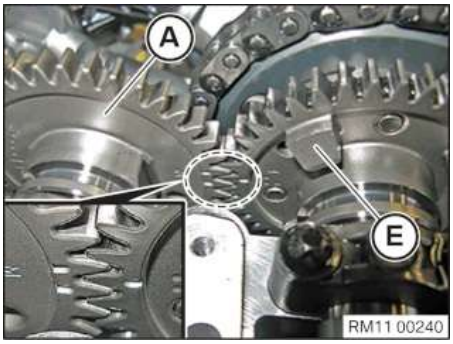
TECHNICAL INFORMATION

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.

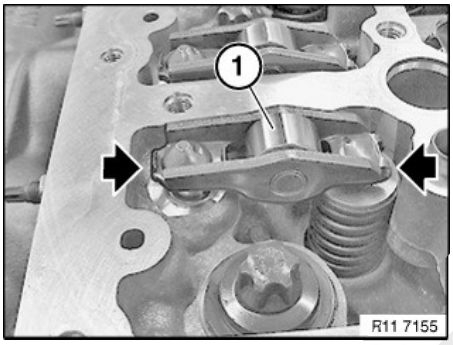


- Renew seals (1).

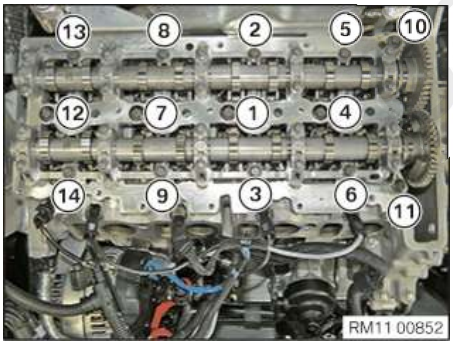
  Parts: Seals
- Insert and install the gaskets (1).



- 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).



- 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

69 – Installing the special tool to secure the exhaust camshaft

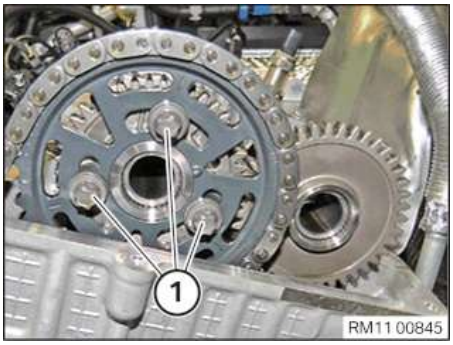


- Place special tool 0 496 112 (11 8 760) on exhaust camshaft.

  Special tool 0 496 112 (11 8 760) must lie flush on cylinder head.

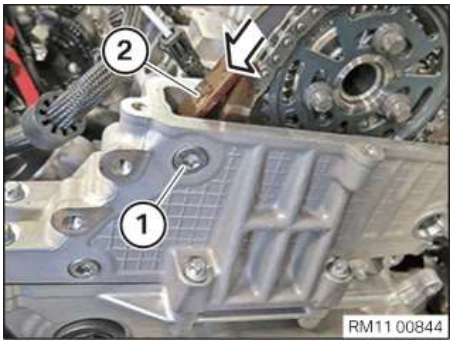
70 – Installing the camshaft sprocket on the intake camshaft

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- 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.

71 – Installing the guide rail of the timing chain

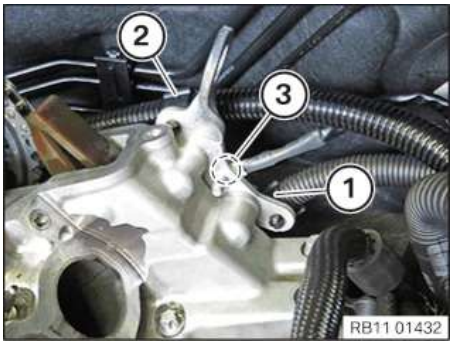


- Position the guide rail (2) in the direction of the arrow.
- Make sure the guide rail (2) is correctly installed at the bottom bearing journal.
- Renew bearing journal (1).

  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.

72 – Installing the chain tensioner piston



TECHNICAL INFORMATION

The oil chamber must be drained for reuse of the chain tensioner.

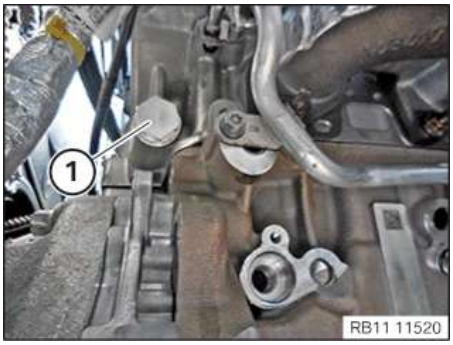
- Place the chain tensioner on a level support pad and slowly compress in the direction of arrow.
- Repeat process twice.



- Renew sealing ring (1).

  Parts: Sealing ring
- Insert and install the sealing ring (1).

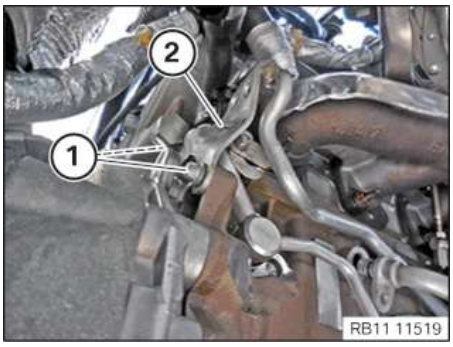
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- Insert and install the chain tensioner piston (1).
- Tighten the chain tensioner piston (1).

Chain tensioner piston to cylinder head

22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

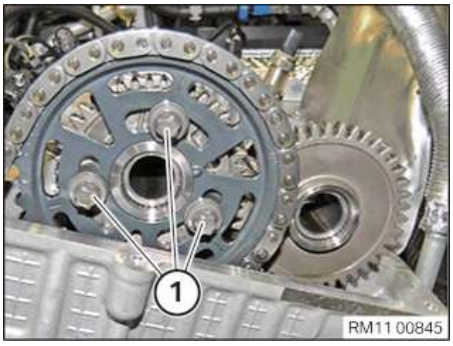


- Insert and install the holder (2).
- Tighten the screws (1).

Holder to crankcase

M8X16		Tightening torque	19 Nm

73 – Tightening the camshaft sprocket on the intake camshaft



- Tighten the screws (1).

Camshaft sprocket to camshaft

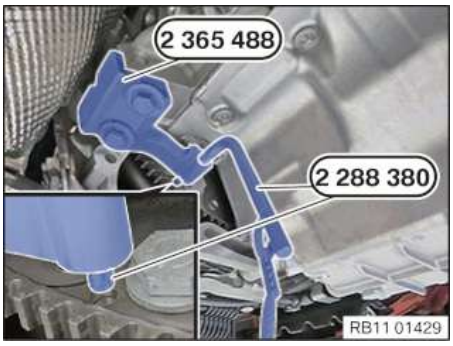
M7x17.			17 Nm

74 – Removing the special tool for fixing the exhaust camshaft



- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

75 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

76 – Checking camshaft timing

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RISK OF DAMAGE

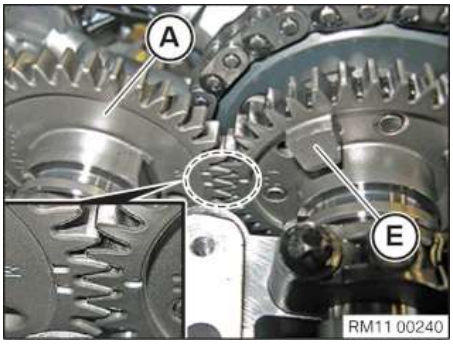
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

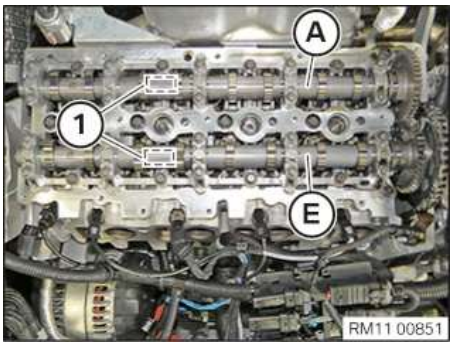
- Turn the combution engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

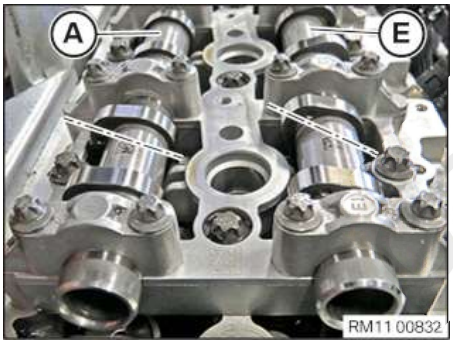
  Do **not** crank the engine in reverse.



- 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.



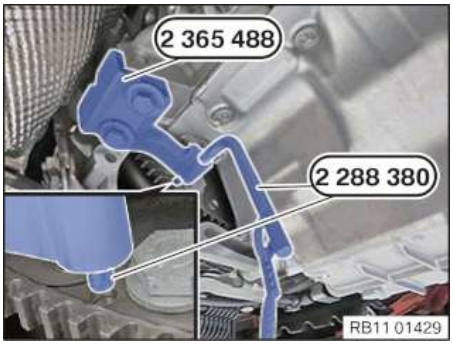
- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- 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.

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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

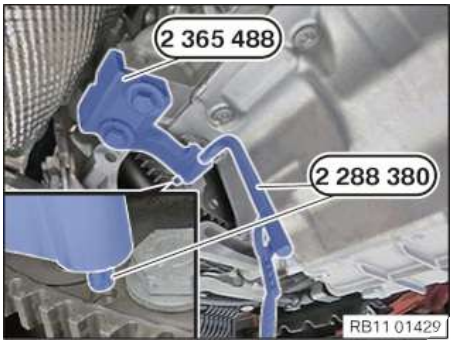
- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

77 – Removing the special tool for fixing the exhaust camshaft



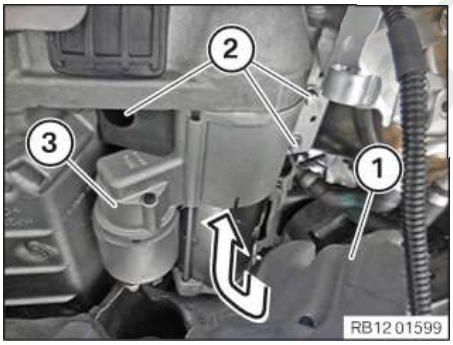
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

78 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

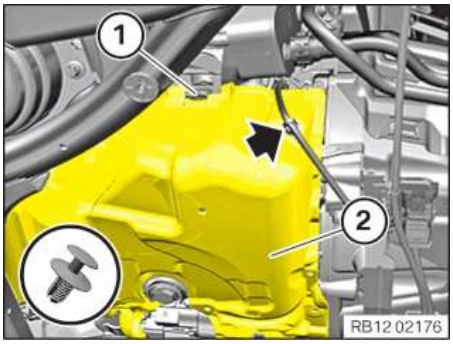
79 – Installing starter motor



- 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).

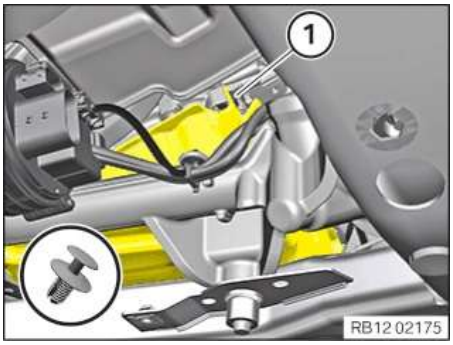
Starter motor to engine

M8X60		Tightening torque	19 Nm

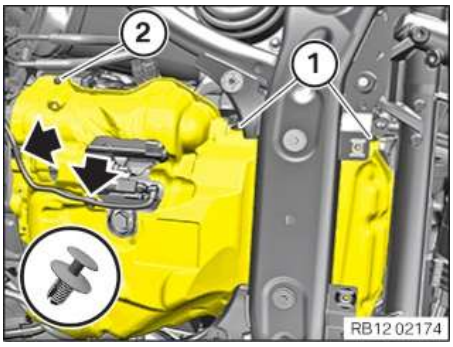


- Position the acoustic cover (2).
- Fasten expanding rivet (1).
- Secure clamp (arrow).

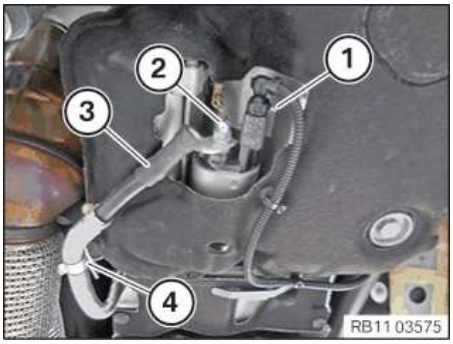
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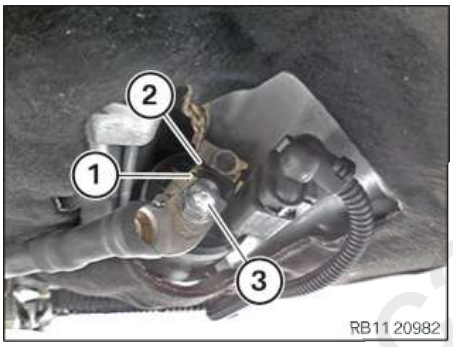
- Fasten expanding rivet (1).



- 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).

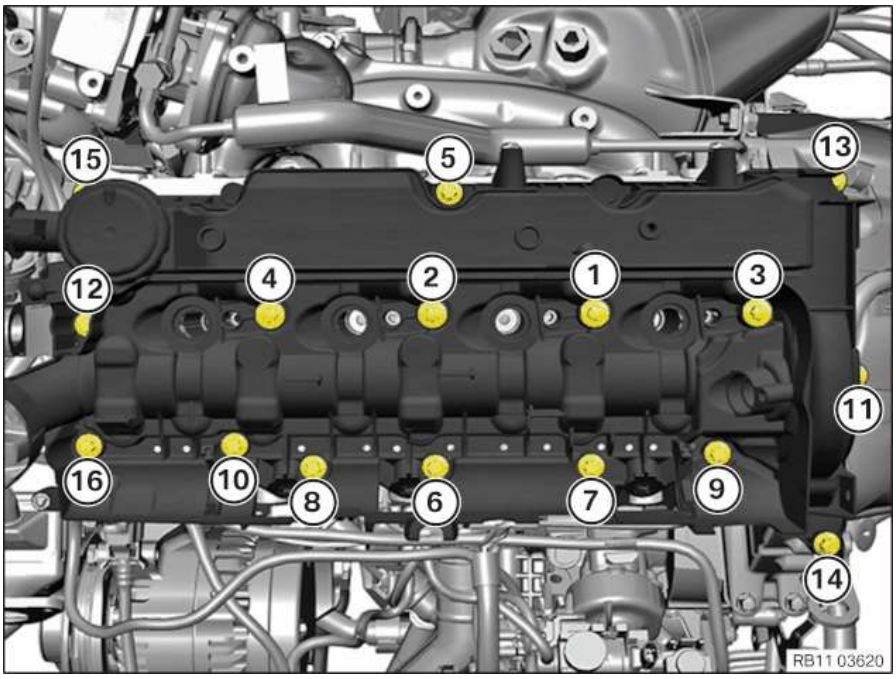
Battery positive lead to starter

M8		Tightening torque	13,5 Nm

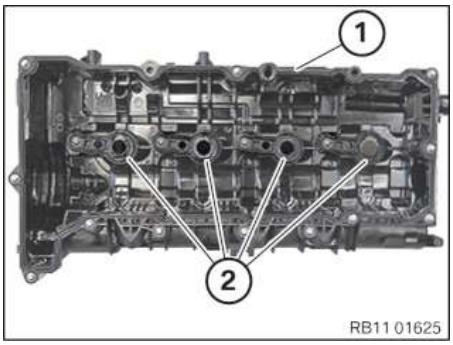
80 – Installing cylinder head cover

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Screw connection of the cylinder head cover

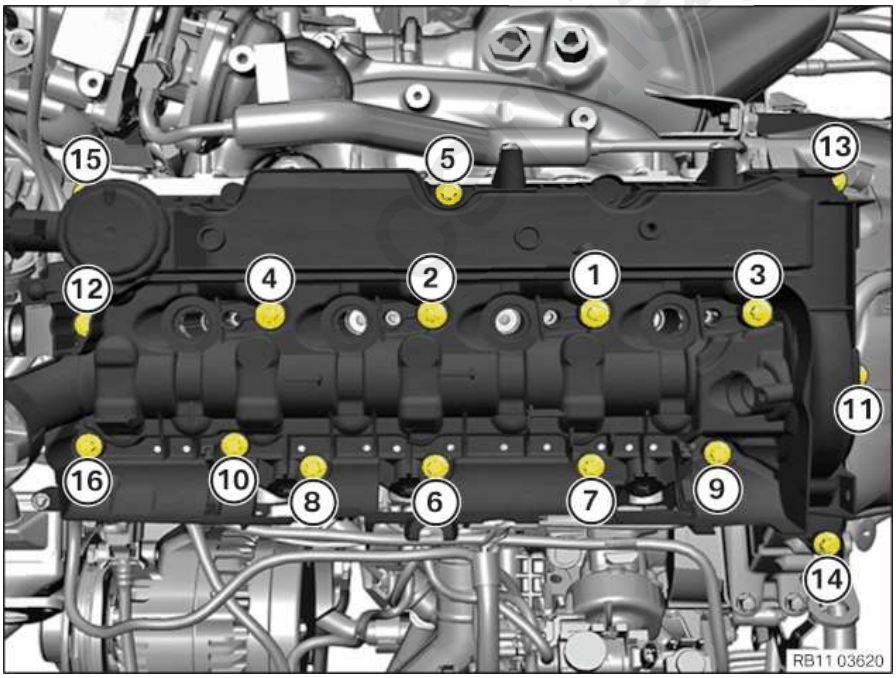


1 - 16 Bolts of the cylinder head cover



- Renew the profile seals (1) and (2) of the cylinder head cover.

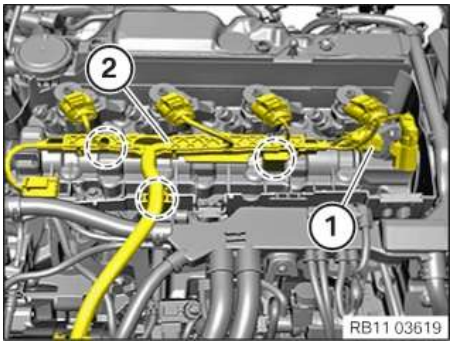
  Parts: Profile seals



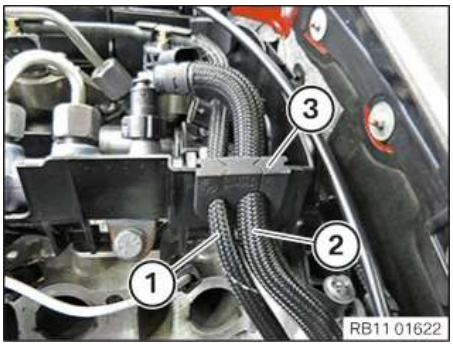
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

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.

81 – 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.

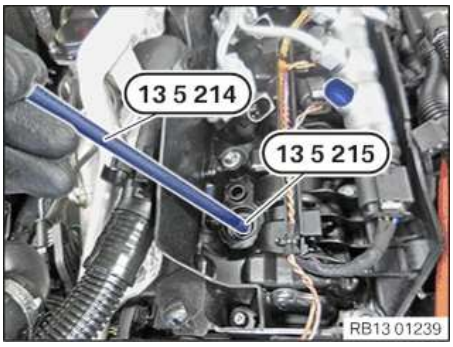
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RISK OF DAMAGE

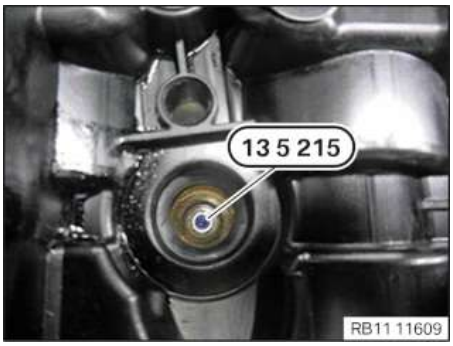
Contaminant or foreign body.

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.



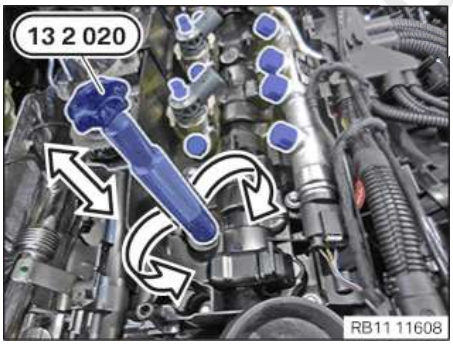
- Check whether the sealing ring remained in the injector shaft and remove the sealing ring as needed.
- Insert the special tool 0 493 763 (13 5 215) with the special tool 0 493 762 (13 5 214) from the set of special tools 0 493 758 (13 5 210) into the injector shaft.
- Remove special tool 0 493 762 (13 5 214).



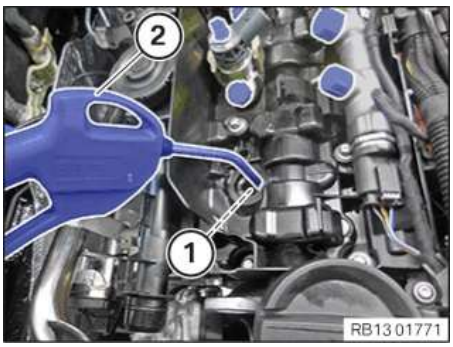
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



- 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).

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- 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.

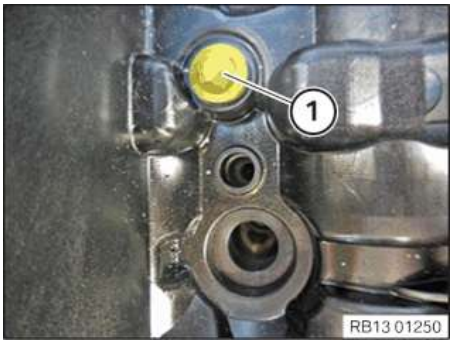
▸ **Check the placement of the clamping claw**

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**

RISK OF DAMAGE

Contaminant or foreign body.

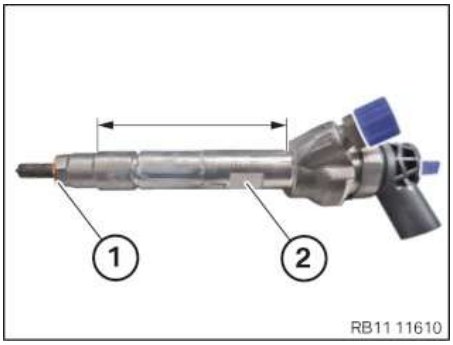
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

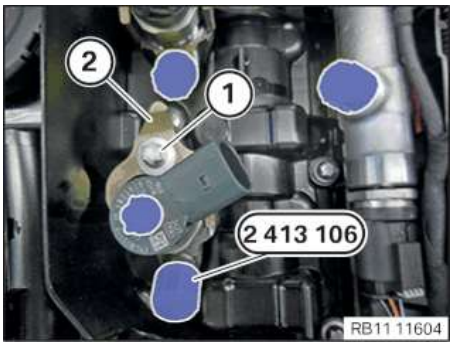
Lightly grease the injector shaft with high temperature-resistant grease.
For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue

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- Renew the copper sealing ring (1) on the injector (2).

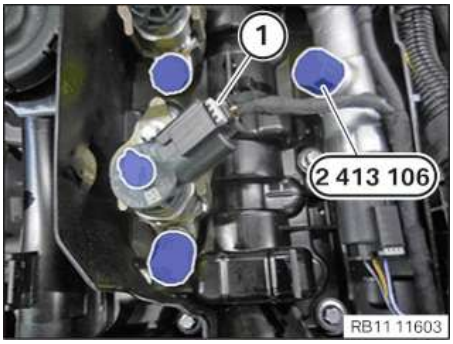
  Parts: Copper sealing ring
- Lightly grease the injector in the marked area with heat-resistant grease before installing the injector (2) in the injector shaft.



- 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.

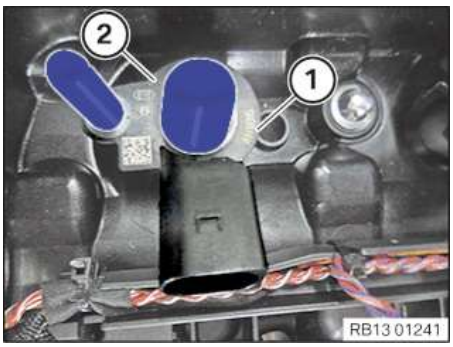
▸ **Replacement: Perform injection quantity compensation**

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.

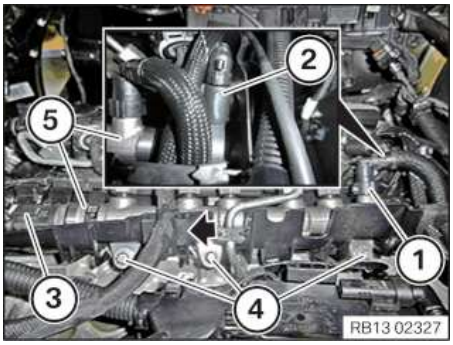


- Read off the adjustment value (1) on the new injector (2).

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- 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.

82 – 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.

83 – 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.

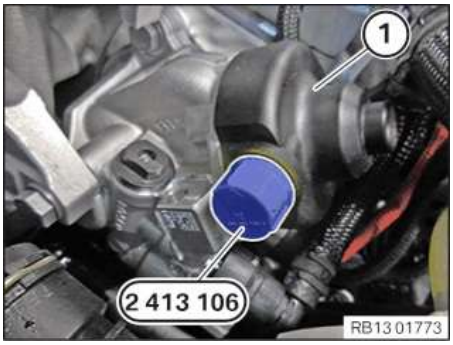
Danger of injury!

- 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.

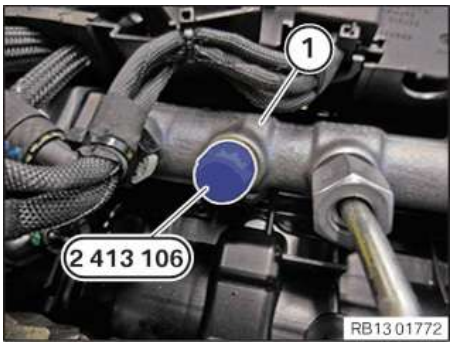
TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

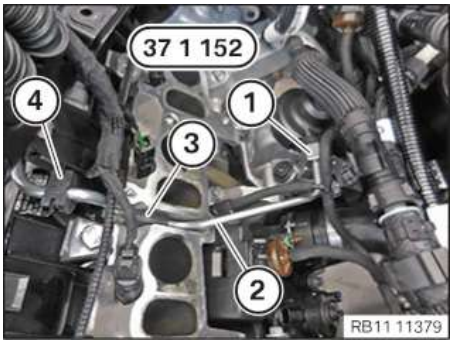
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- Feed out and remove special tool on the high pressure pump (1).



- 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.

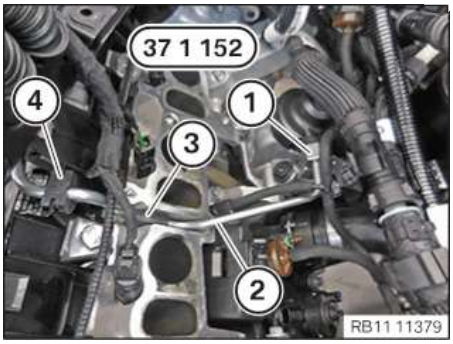
TECHNICAL INFORMATION

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.

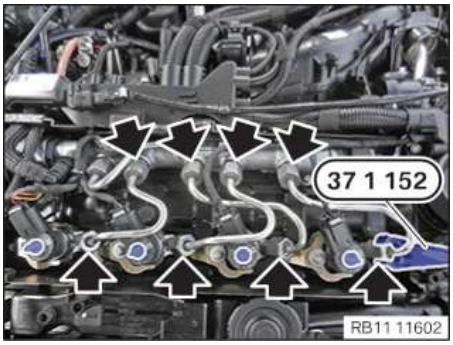
- Tighten union nut (1) on the high pressure pump with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm

84 – Installing the high pressure lines between the injector and the rail

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- 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.

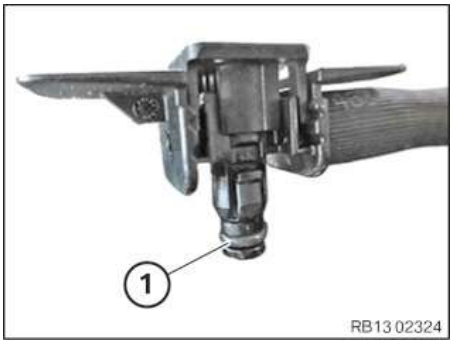
- Tighten the high pressure lines (arrows) with the special tool .

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**).

85 – Attach the leakage oil line on the injectors

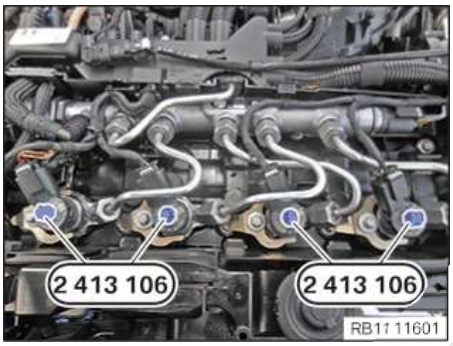


- **Version A:**

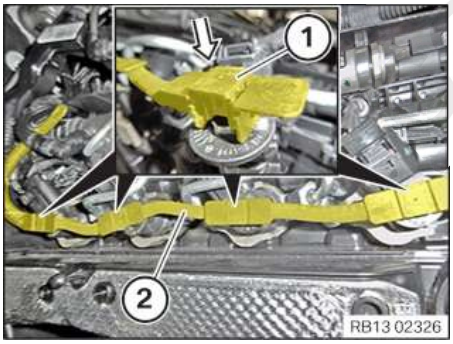
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

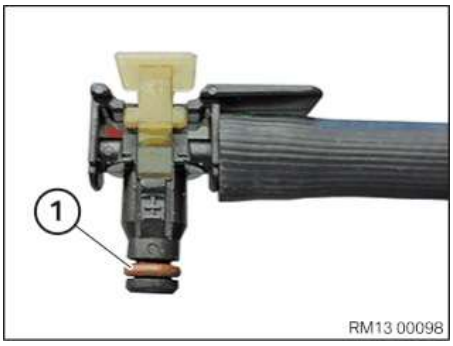
  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.



- 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.



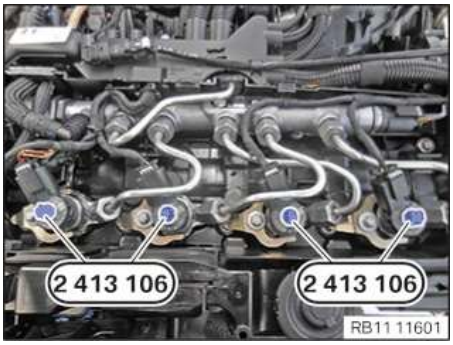
- **Version B**:

  Check sealing ring (1) for damage, renew leakage oil line if necessary.

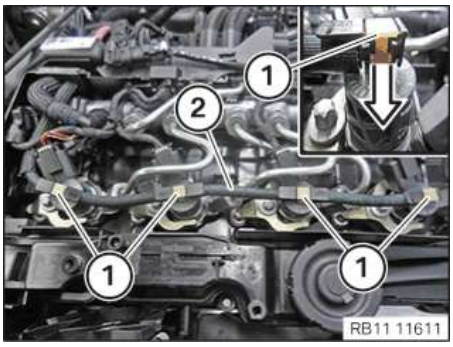
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.

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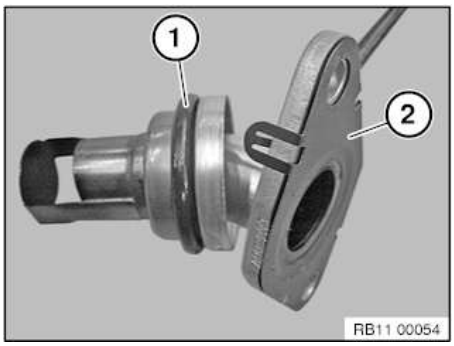


- Feed out the special tools and remove.



- 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.

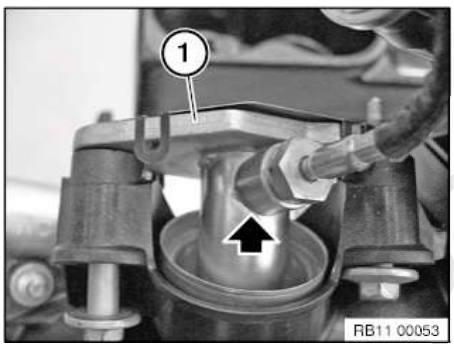
86 – Installing the intake plenum



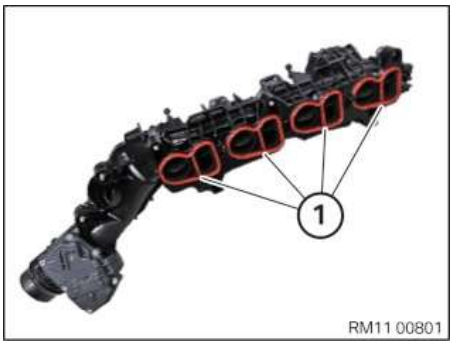
- Renew O-ring (1).

  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

  Parts: Gasket
- Position the seal (2) and clip it in.



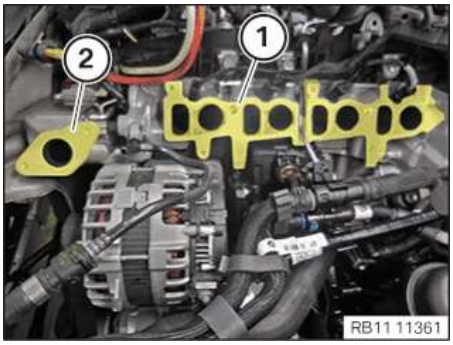
- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).



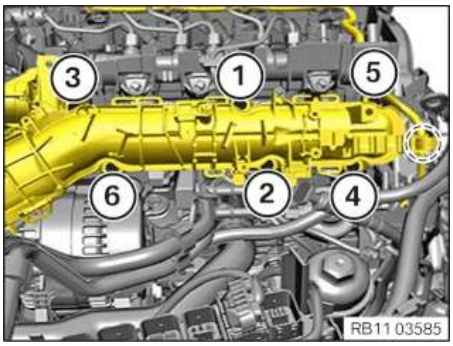
- Renew seals (1).

  Parts: Seals
- Ensure that the seals (1) are firmly mounted on the intake plenum.

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- Clean connection points (1) at cylinder head.
- Clean the connection point (2) on the exhaust-gas recirculation cooler.

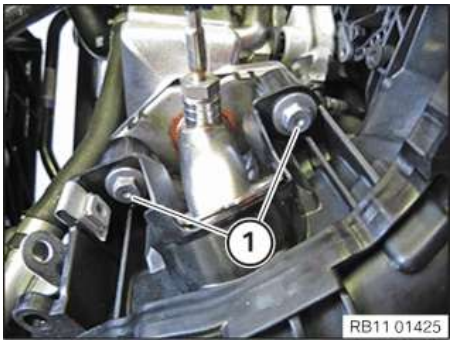


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

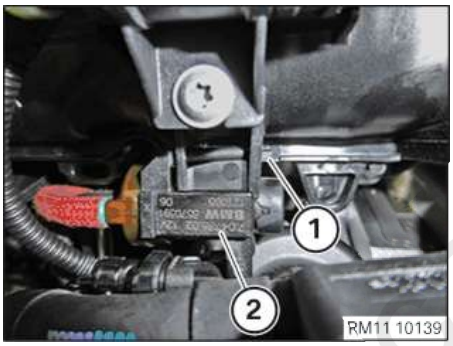
- Attach the wiring harness and fuel lines in the marked area on the intake plenum.



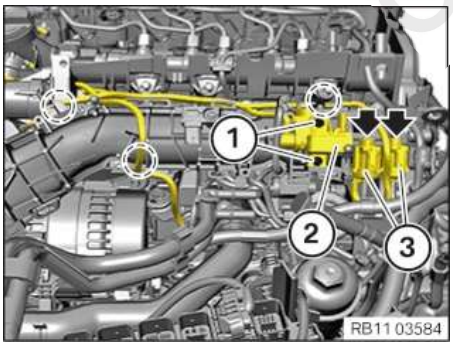
- Tighten the screws (1).

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.



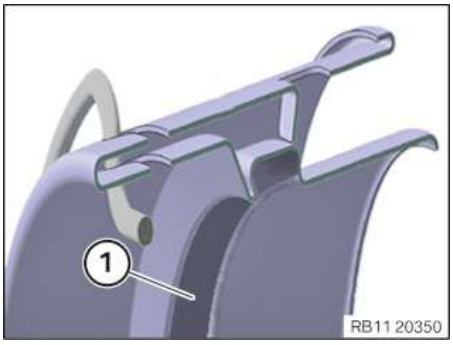
- Check the seal (1) for damage, and renew if necessary.

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▸ **Replacing damaged seal**

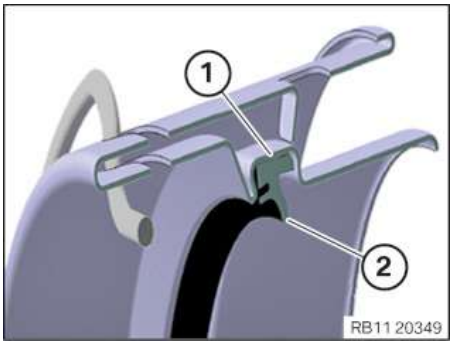
TECHNICAL INFORMATION

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.

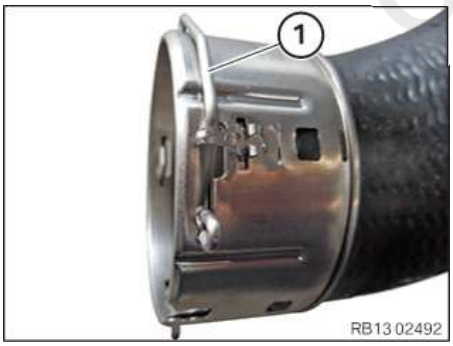
TECHNICAL INFORMATION

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.

87 – Partially securing the wiring harness section on the intake plenum

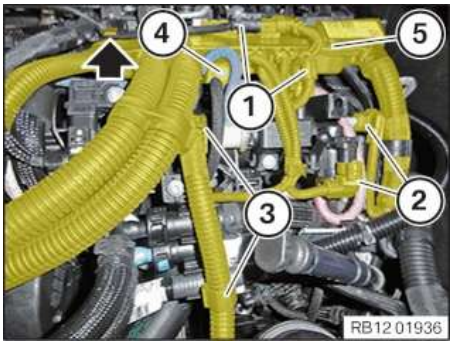
RISK OF DAMAGE

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.

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- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

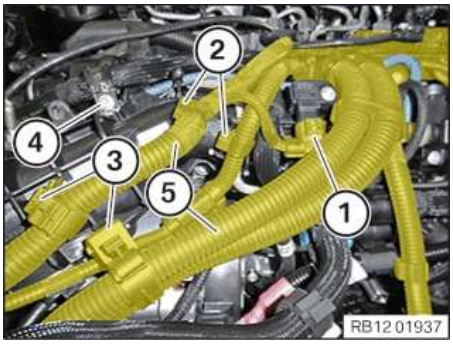
Wiring harness section to manifold

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.



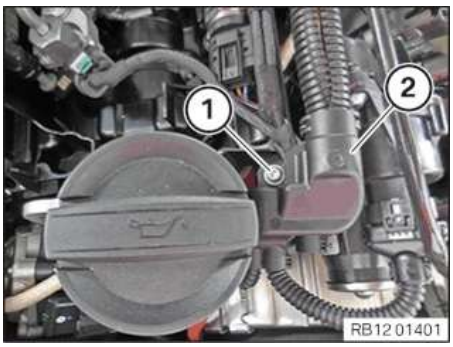
- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

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.

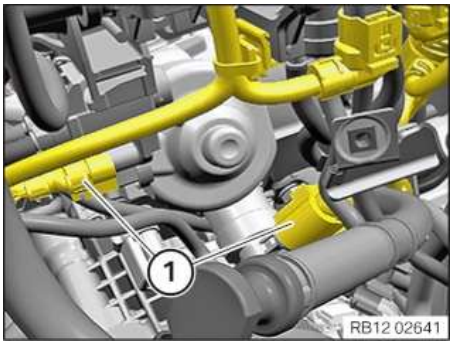
  The connector (1) must engage audibly.



- Connect the connector (1) and lock it.

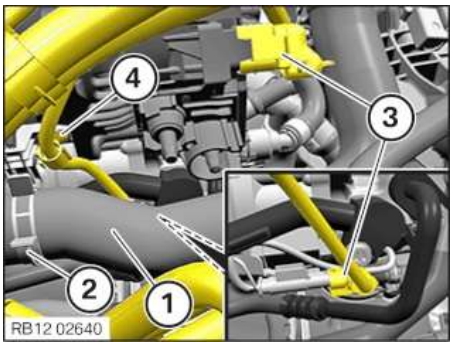
  The connector (1) must engage audibly.

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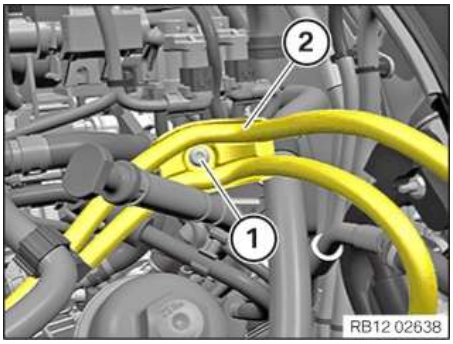
- Connect connectors (1) and lock.

  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



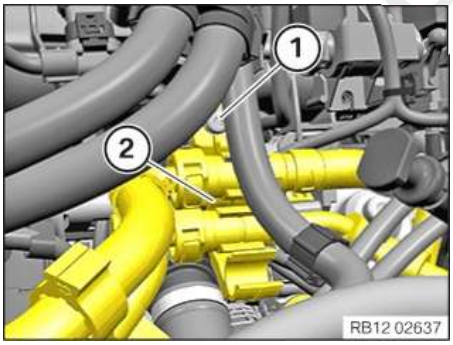
- Feed in and install the positive battery cable (4).
- Feed in and position the positive battery cables (4) .
- Renew the nuts (3) and (2).

  Parts: Nuts
- Tighten nuts (3) and (2).

Battery positive lead on the starter motor generator

M8		Tightening torque	19 Nm

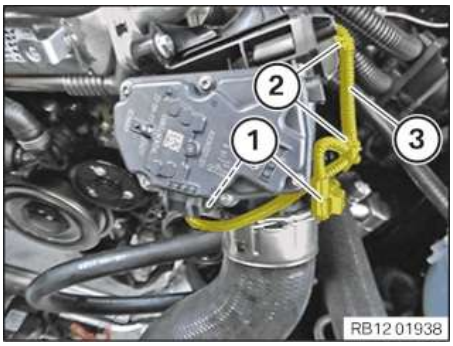
- Guide in and install the lid (1).



- Insert and install the holder (2).
- Tighten down screw (1).

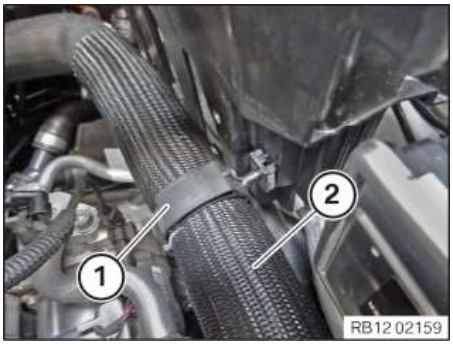
Holder on intake plenum

TS6X20		Tightening torque	5 Nm



- Guide in the wiring harness section (3) and install.
- Secure clamps (2).
- Connect connectors (1) and lock.

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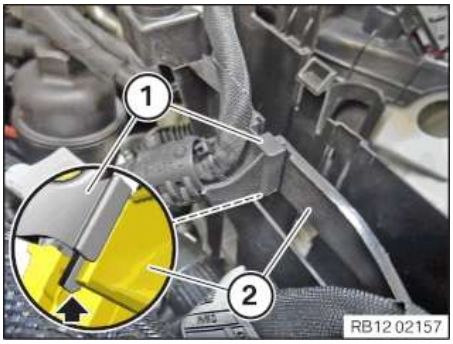
- Feed in and install coolant line (2).
- Lock holder (1).

  The holder (1) must engage audibly.



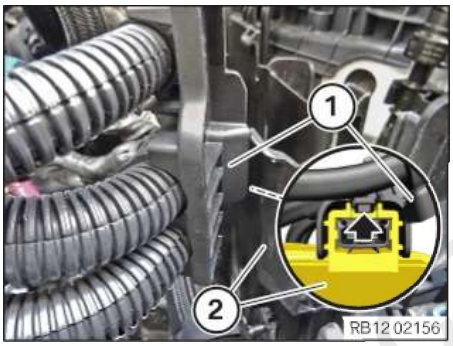
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.



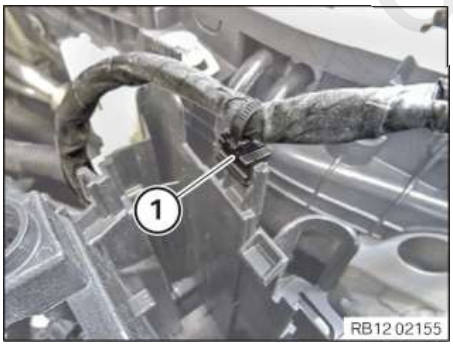
- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.



- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.



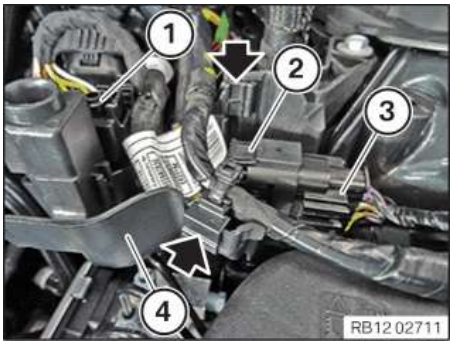
- Secure clamps (1).



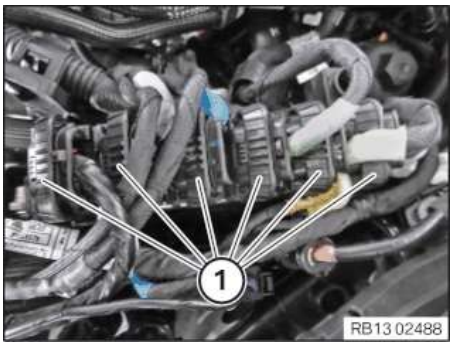
- Feed in and install the connector (1).

  The connector (1) must engage audibly.

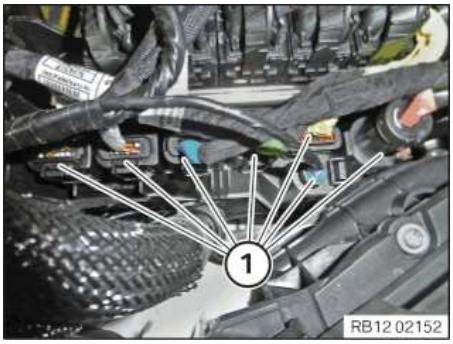
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- Connect connector (3) to control unit holder (4) and lock it.
  The connector (3) must engage audibly.
- Connect connectors (2) and lock.
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.
  The connector (1) must engage audibly.
- Secure the clamps (arrows).

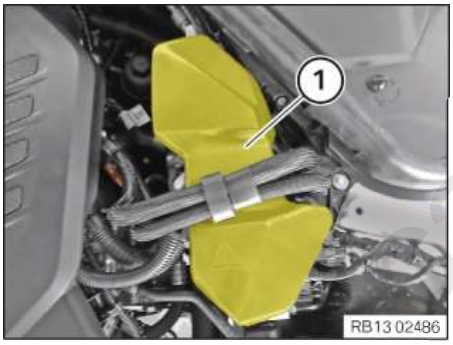


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.

88 – Install the cover for the DDE control unit

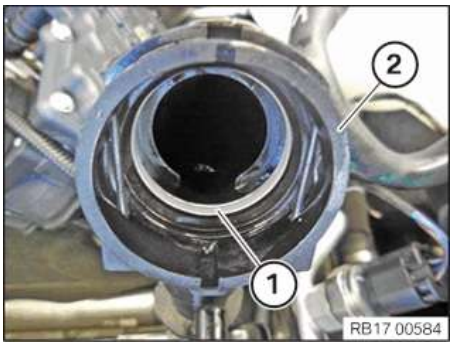


- Insert and install cover (1) into guides.

89 – Connecting the coolant lines

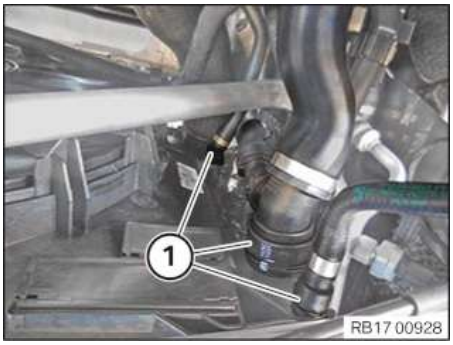
TECHNICAL INFORMATION

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.

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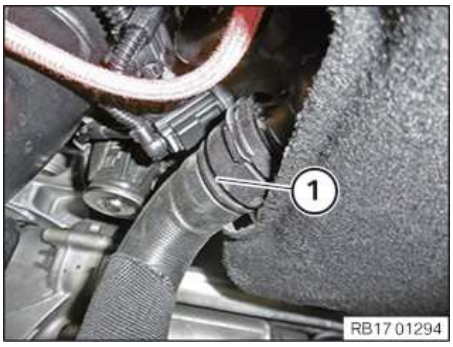


NOTICE

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.

90 – 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

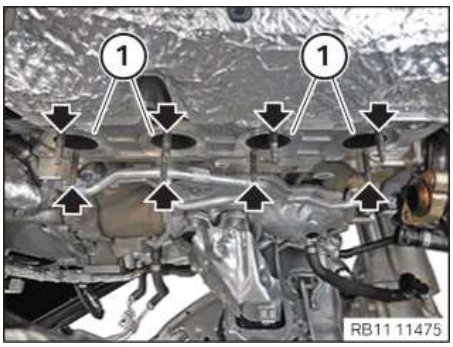
Damage to the surface.

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

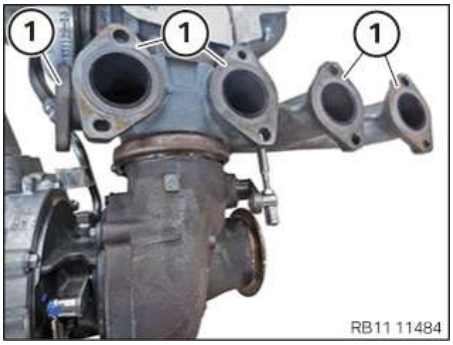
The sealing surfaces must be free from oils, grease and cleaning agents.



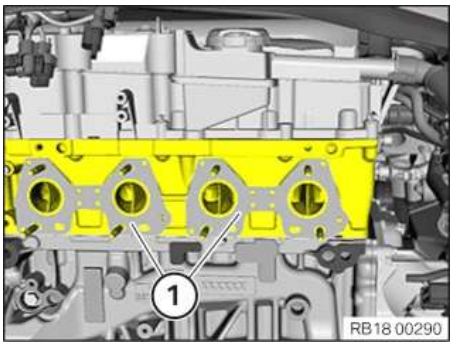
- Check the stud bolts (arrows) on the cylinder head for **correct** fit.
- Clean the connection points (1) with the special tool 0 495 102 (11 4 470).
- Renew gaskets.

  Parts: Seals

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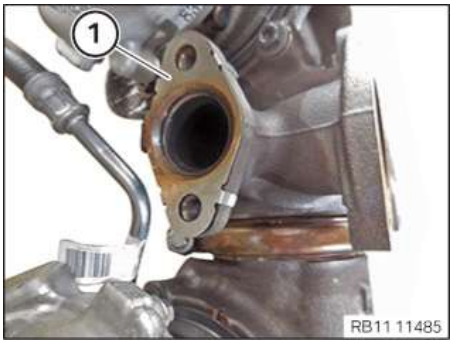
- Clean the connection points (1) on the exhaust manifold with the special tool 0 495 102 (11 4 470).



TECHNICAL INFORMATION

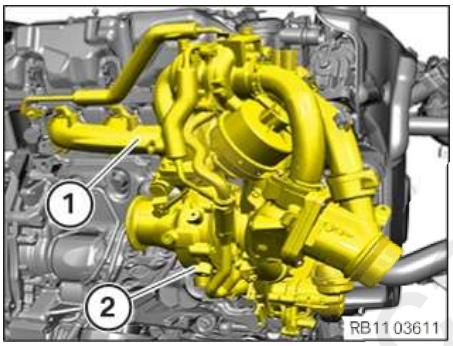
The **coated side** of the seal must be on the side of the exhaust manifold.

- Insert and install the gaskets (1).



- Renew the seal (1).

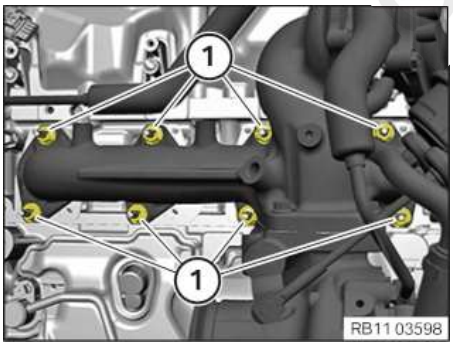
  Parts: Gasket
- Insert and install the seal (1).



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.

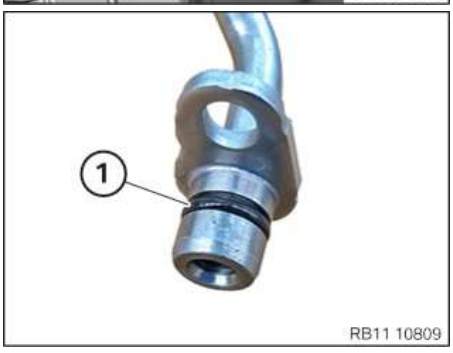


- Renew nuts (1).

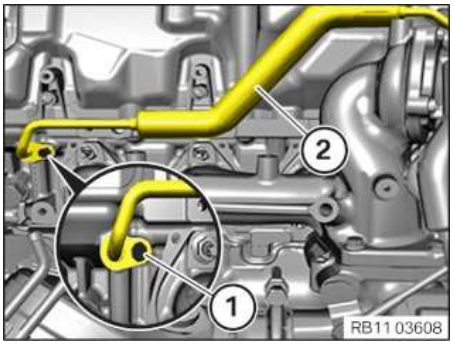
  Parts: Nuts
- Tighten the nuts (1) evenly from the inside out.

Exhaust manifold to cylinder head

M7	**If necessary, renew loose stud bolts.**	Tightening torque	11 Nm
	Renew nuts.	Tightening torque	13 Nm



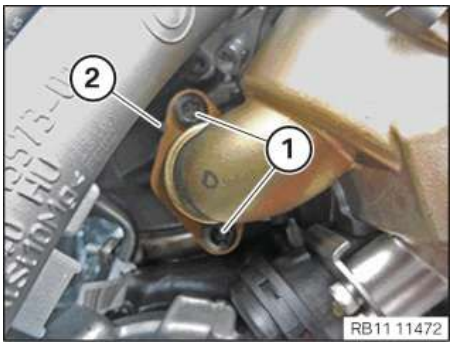
- Check the seal (1) for damage, if necessary, renew the oil feed line.



- 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

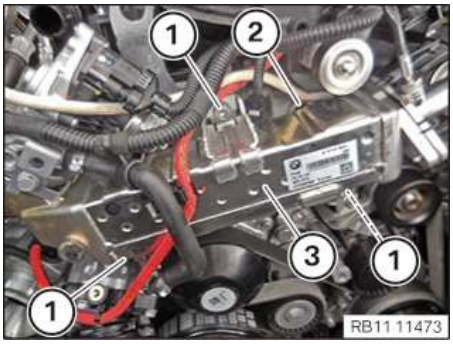


- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

M8x28	Replace screws	Tightening torque	32 Nm

- Ensure that seal (2) is installed.



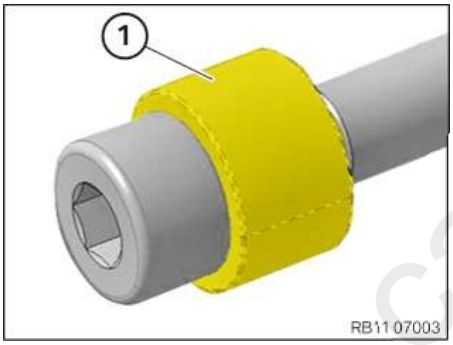
- Position the exhaust-gas recirculation cooler (3).
- Make sure the pipe neck (2) is fitted correctly.
- Tighten the screws (1).

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.



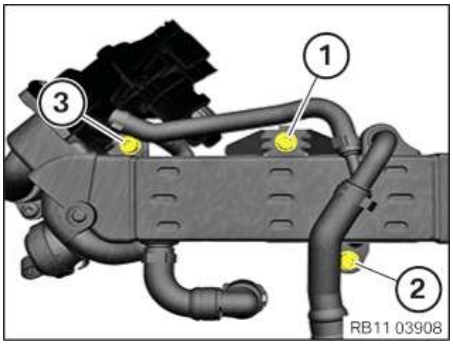
Result

» Screws **without** sleeves (1) are available.

Measure

- Renew screws.

  Parts: Screws (part number 9 886 429)

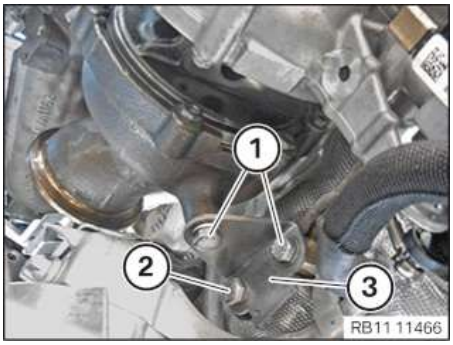


- Tighten the screws (1) to (3).

Exhaust-gas recirculation cooler to cylinder head

M8x20 / M8x28		Tightening torque	19 Nm

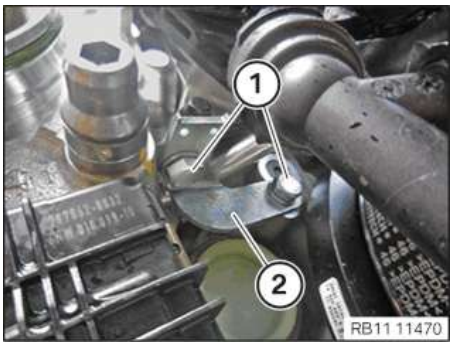
cardiagn.com



- Tighten the bolts (1) and (2) on the bracket (3).

Exhaust turbocharger low-pressure stage to crankcase

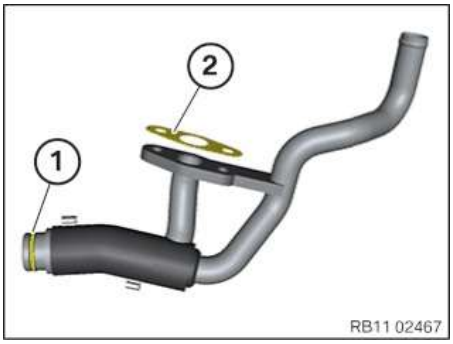
M8X16		Tightening torque	22 Nm



- Insert and install the holder (2).
- Tighten the screws (1).

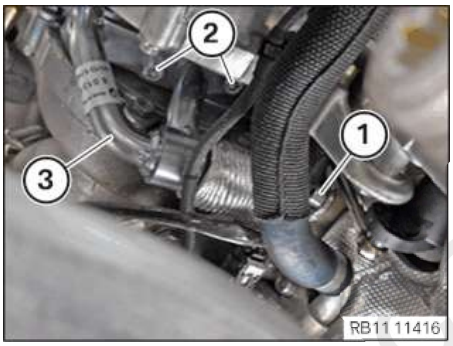
Exhaust turbocharger low-pressure stage to crankcase

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

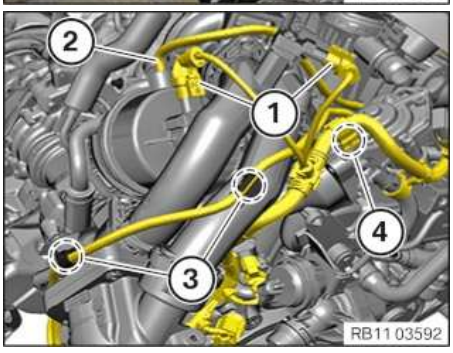
- Install the bolt (1).



- Tighten the screws of the oil return line on the crankcase from the right wheel arch.

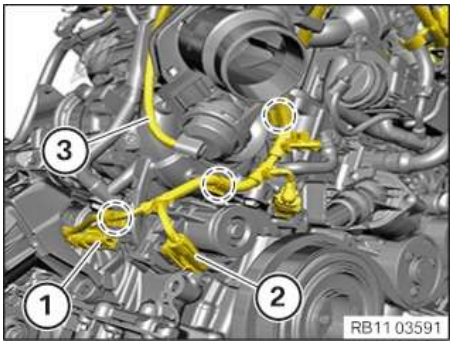
Oil return line to crankcase

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.

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- 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.

91 – Installing the exhaust-gas recirculation cooler

▸ **Avoiding damage to the starter generator due to escaping coolant**

RISK OF DAMAGE

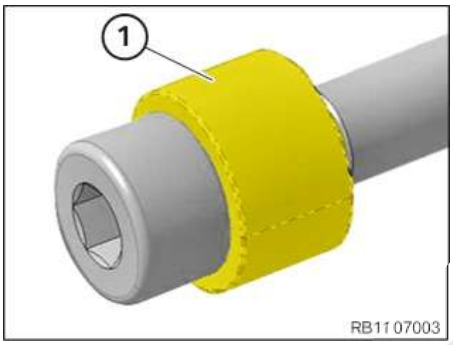
Escaping coolant on the starter generator.

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.

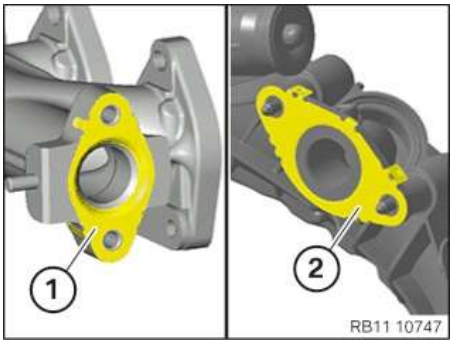
Result

» Screws **without** sleeves (1) are available.

Measure

- Renew screws.

  Parts: Screws (part number 9 886 429)



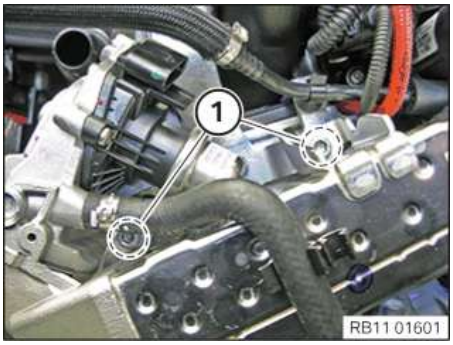
- Renew the seal (1) between the exhaust manifold and the exhaust-gas recirculation cooler.

  Parts: Gasket

- Renew the seal (2) between exhaust-gas recirculation cooler and intake air plenum.

  Parts: Gasket

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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

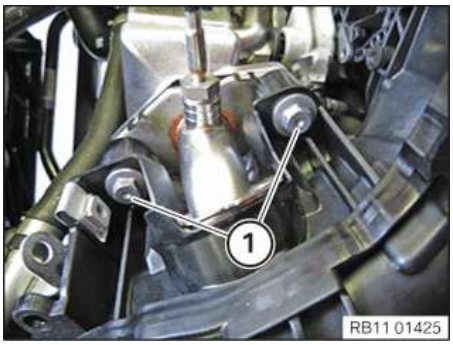
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screw (1) under the exhaust-gas recirculation cooler and then release again.

Exhaust-gas recirculation cooler to cylinder head

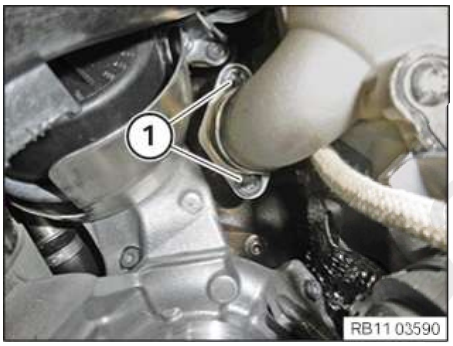
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

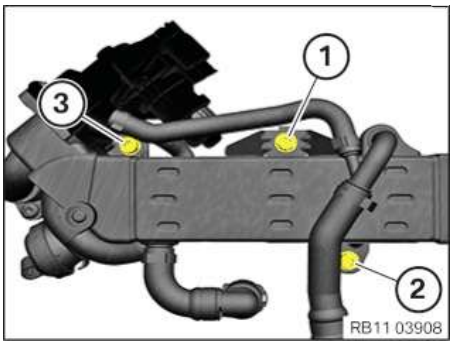
		Tightening torque	10 Nm



- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

M8x28	Replace screws	Tightening torque	32 Nm

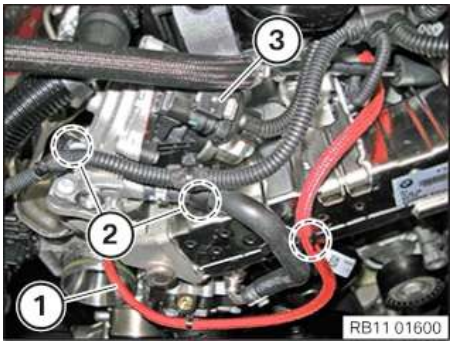


- Tighten screws in the order (1) to (3).

Exhaust-gas recirculation cooler to cylinder head

M8x20 / M8x28		Tightening torque	19 Nm

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- 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.

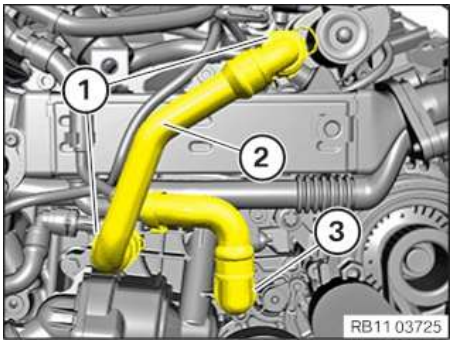


TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.

- **Version A:**

  Connect and audibly lock coolant lines (1).



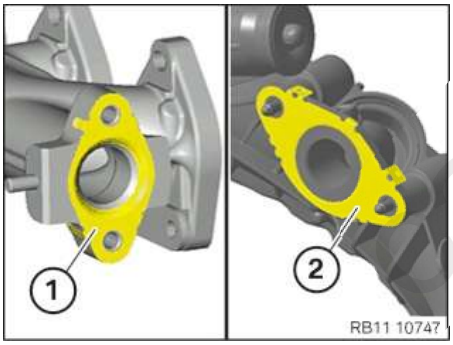
TECHNICAL INFORMATION

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).

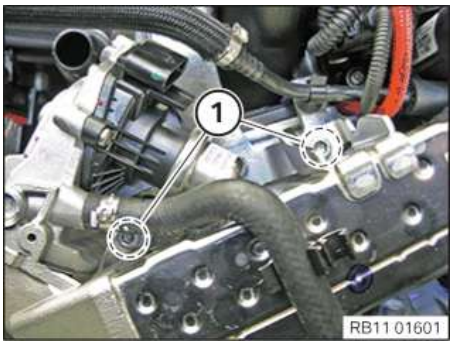
▸ **Installing the exhaust-gas recirculation cooler**



- 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 °

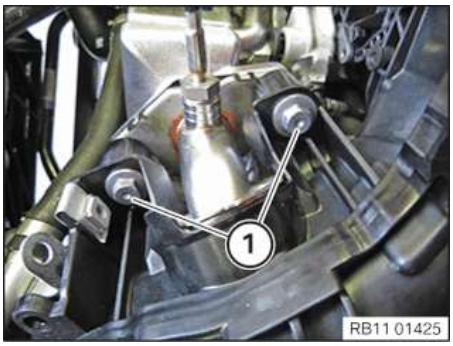
cardiagn.com



- Tighten the screw (1) under the exhaust-gas recirculation cooler and then release again.

Exhaust-gas recirculation cooler to cylinder head

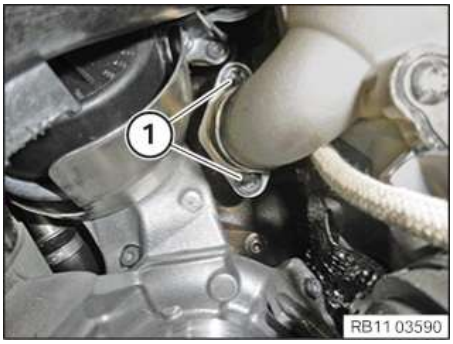
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

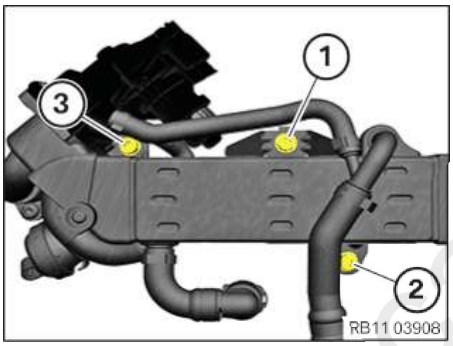
		Tightening torque	10 Nm



- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

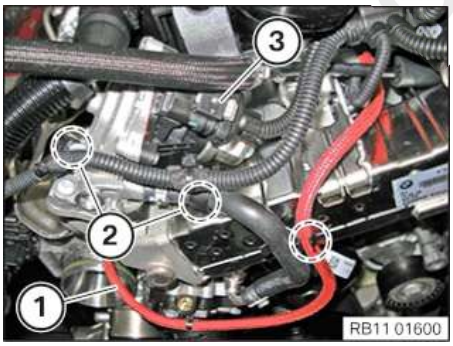
M8x28	Replace screws	Tightening torque	32 Nm



- 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.



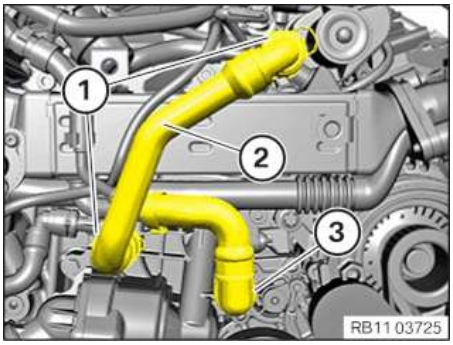
TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.

- **Version A:**

  Connect and audibly lock coolant lines (1).

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TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.

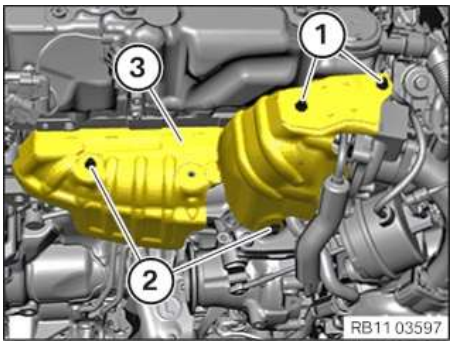
- **Version B:**

  Connect and audibly lock coolant lines (3).

  Install the coolant line (2).

  Audibly lock the locks (1).

92 – 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

93 – 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.

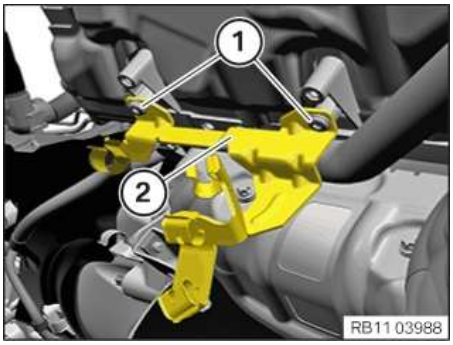
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

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.

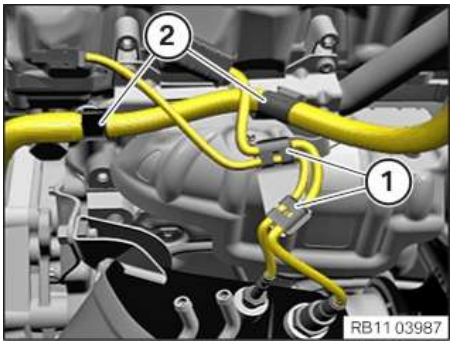


- Insert and install the holder (2).
- Tighten the screws (1).

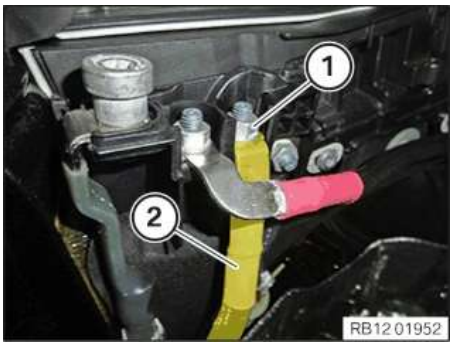
Bracket on cylinder head cover

	Tightening torque	5 Nm

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- Secure the positive battery cable in the clamps (2).
- Mount the cable of the exhaust gas sensor system in the clamps (1).



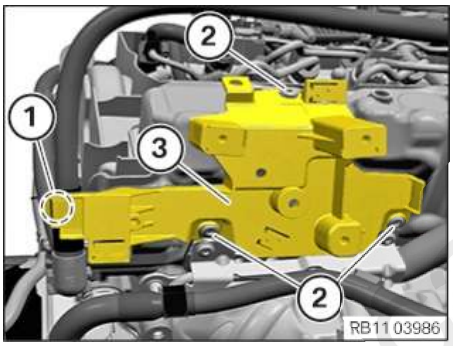
- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

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.

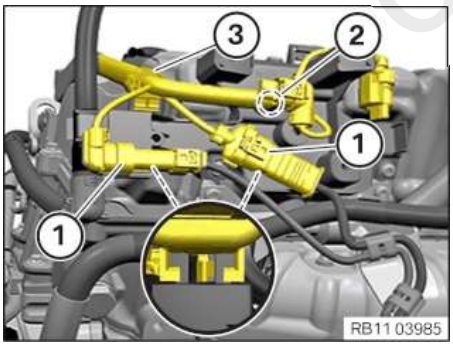


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

		Tightening torque	5 Nm

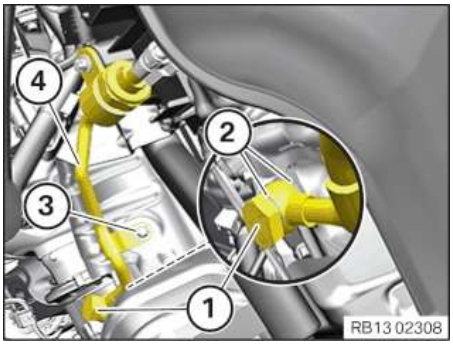
- Fasten the positive battery cable in the area (1) in the clamp.



- 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.

94 – Install the exhaust gas pressure pipe

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- 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).

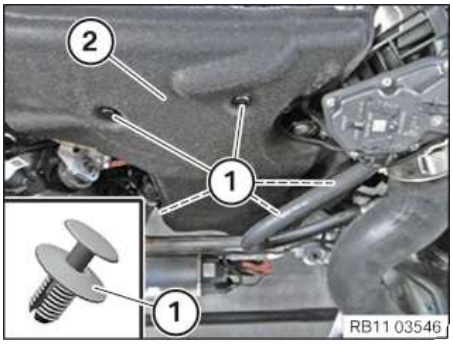
Exhaust gas pressure pipe to sensor system holder

TS6x20		Tightening torque	5,7 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

95 – 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).

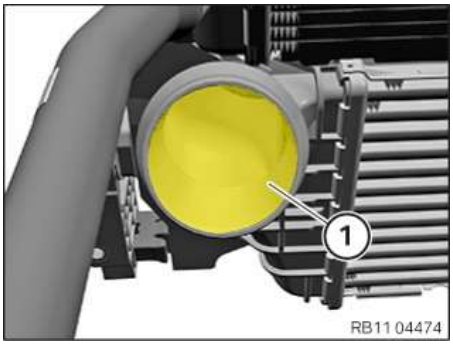
96 – Install pressure pipe between exhaust turbocharger and charge air cooler

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.

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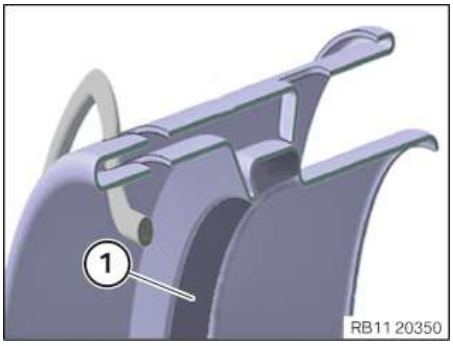
- Check the seal (1) for damage and renew if necessary.

  Parts: Gasket

▸ **Replacing damaged seal**

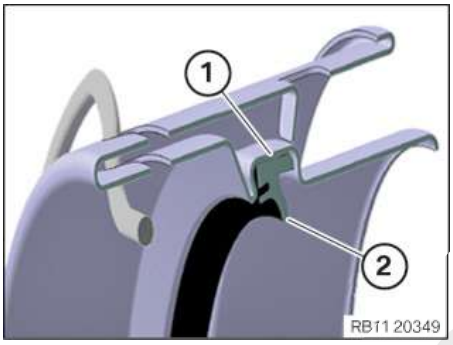
TECHNICAL INFORMATION

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.



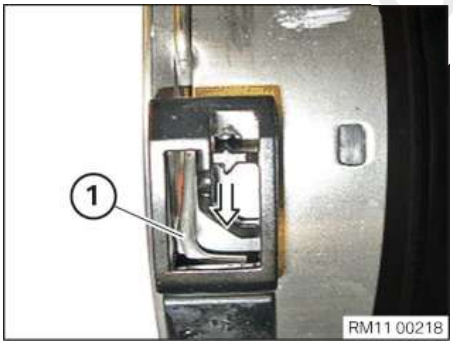
- Renew gasket.

  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.



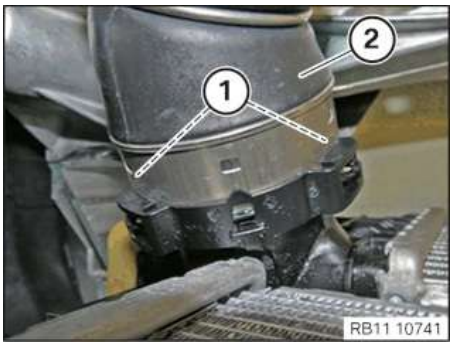
- Pay attention to the installation position:

  The pressure pipe fits on charge air cooler in one installation position only.

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- Install the pressure pipe (1) from the top.



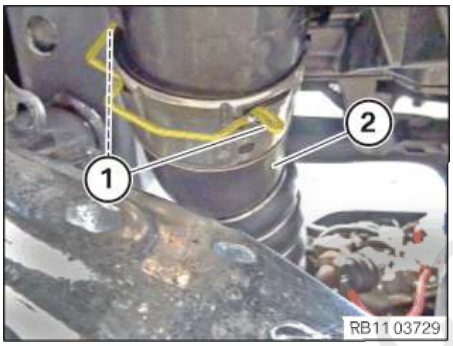
- Connect pressure pipe (2) to charge air cooler.
- Lock the lock (1) on both sides.



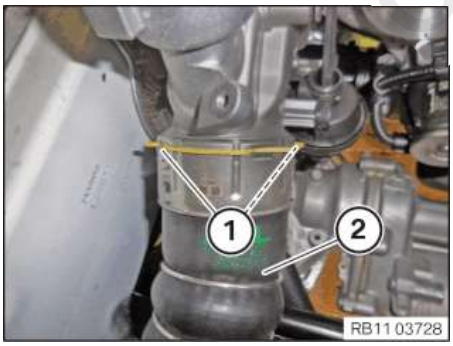
- **Version B:**

  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.



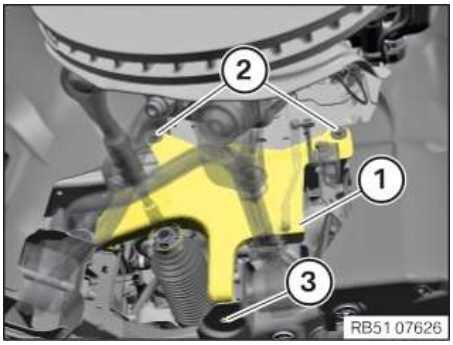
- Place the pressure pipe (2) onto the compressor bypass and ensure that the lock (1) engages audibly.

97 – 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.

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- Position the cover (1).
- Tighten down screws (2) and (3).

Cover, steering unit

Screw		Tightening torque	3 Nm

98 – 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.

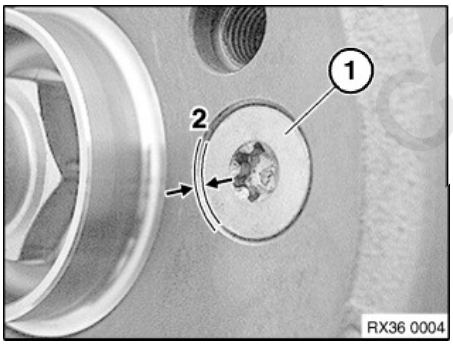
- Remove dirt, grease residues and corrosion from the contact surface with a drill and the special tool 2 344 011.

  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.

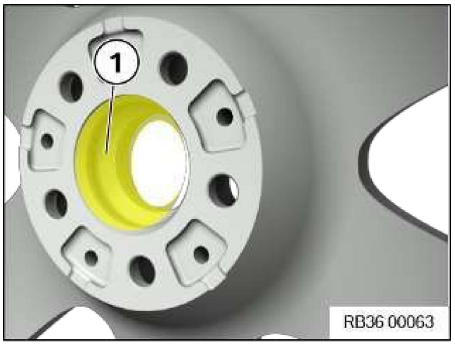
Brake disc to front wheel hub

M8	Renew screw.	Tightening torque	16 Nm

Brake disc to rear wheel hub

M8	Renew screw.	Tightening torque	16 Nm

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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

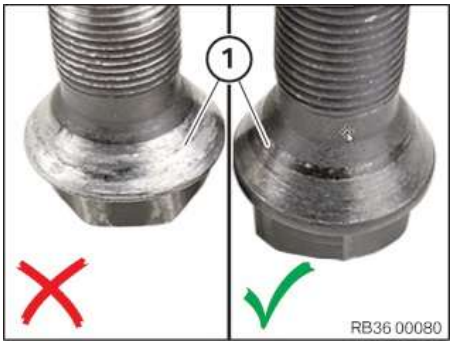
A wheel lift is recommended for easier wheel removal and installation without exertion (see Retailer Equipment Catalogue).

- **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.**



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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.		

99 – Prepare for the installation of the diesel particulate filter



- Renew the V-clip (1).

  Parts: V-band clamp



- Renew gasket (1).

  Parts: Gasket

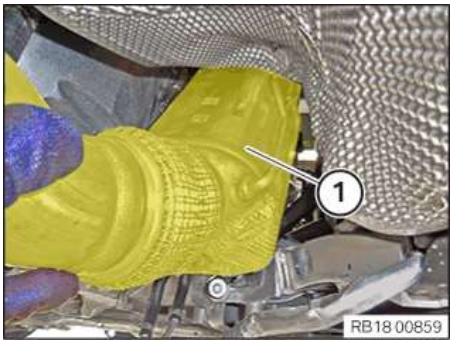
100 – Installing the diesel particulate filter

CAUTION

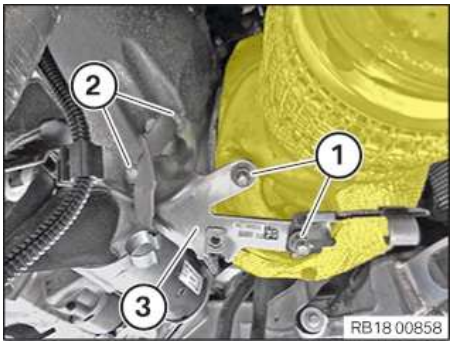
Heavy component.

Heavy components can lead to injury or damage.

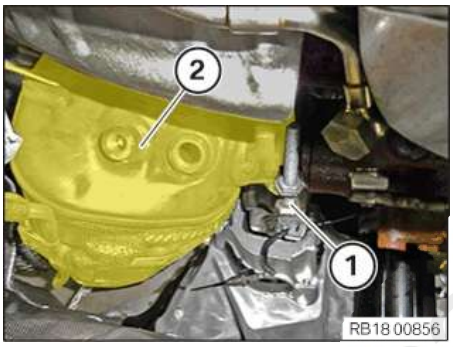
- Remove and install heavy components with the aid of another person/other persons.



- 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**.

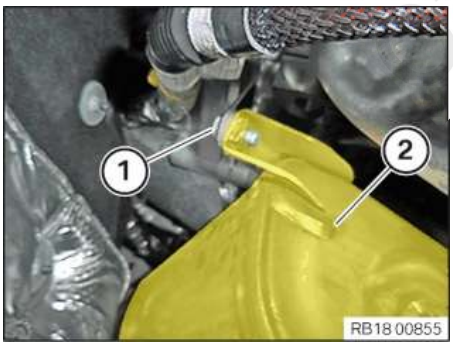


- Renew the V-clip (1).

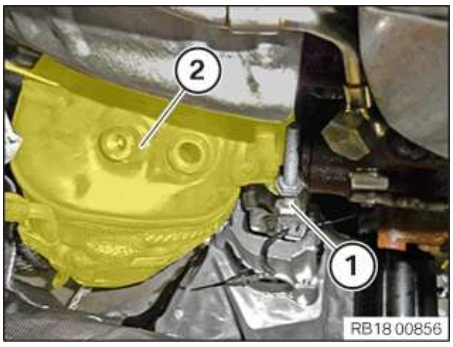
  Parts: V-band clamp
- Feed in and install V-band clamp (1).

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**.



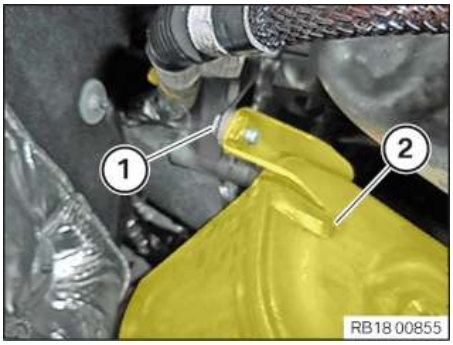
- Feed in screw (1) on the holder of the diesel particulate filter (2) and tighten **hand-tight**.



- Tighten the V-clip (1) of the diesel particulate filter (2).

Diesel particulate filter V-clip to exhaust turbocharger

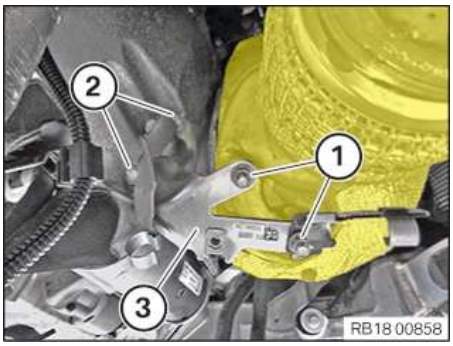
V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm



- 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).

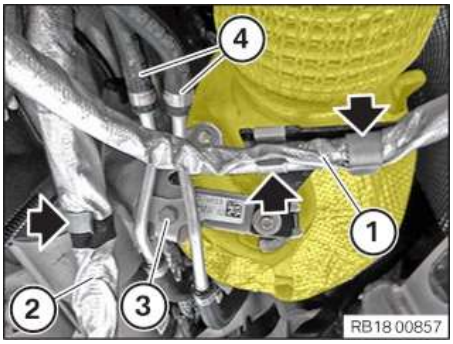
Bracket to transmission for diesel particulate filter holder bottom

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).

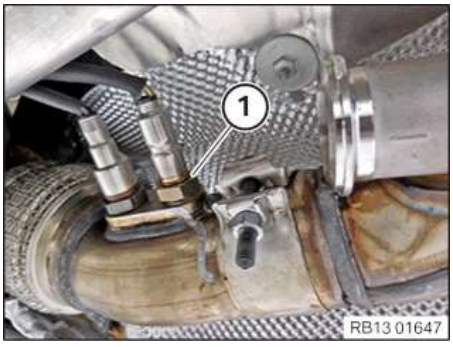
101 – Installing the nitrogen oxide sensor upstream of SCR catalytic converter

RISK OF DAMAGE

Damage to the nitrogen oxide sensor.

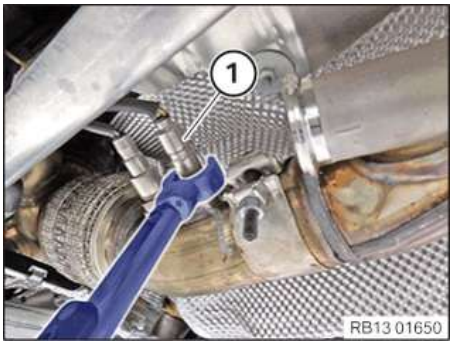
Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

- 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).

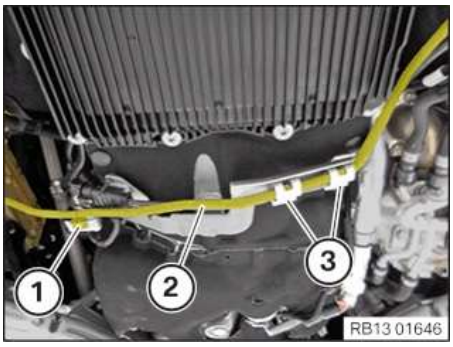
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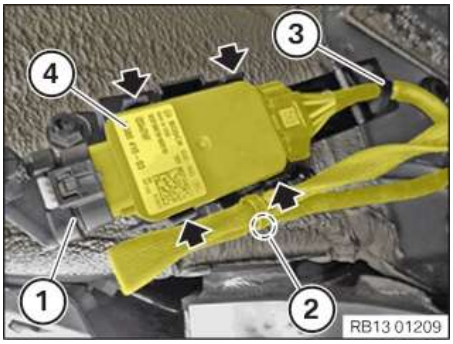
- Tighten the nitrogen oxide sensor (1) using commercially available tools.

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.

102 – 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

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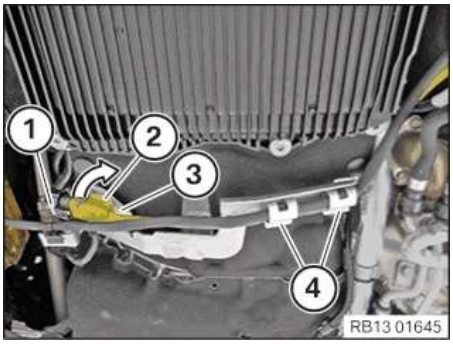
- Insert the monitoring oxygen sensor (1) and install it.



- 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.

103 – 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.

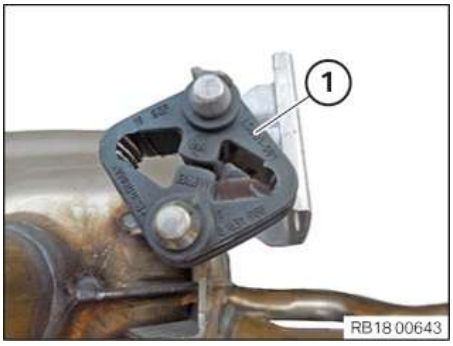
Heavy components can lead to injury or damage.

- 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.

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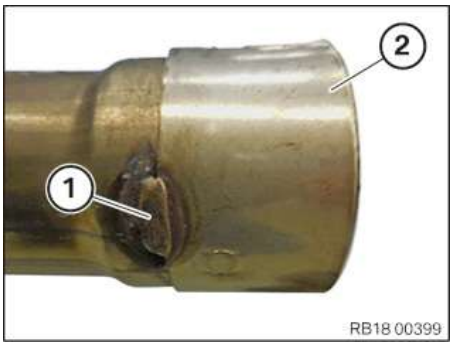


NOTICE

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



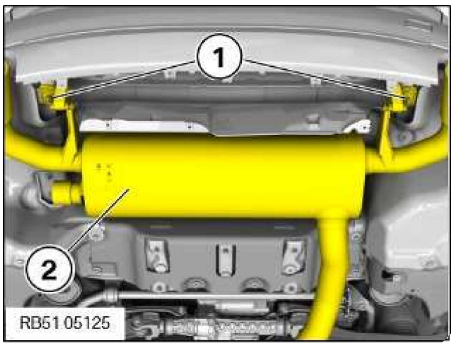
CAUTION

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).

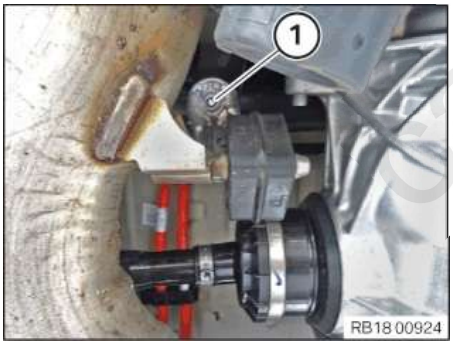


- Insert and install the exhaust system (2).
- Renew nuts (1).

  Parts: Nuts
- Tighten nuts (1).

Rear silencer to body / bumper support

M8	Replace nuts.	Tightening torque	19 Nm

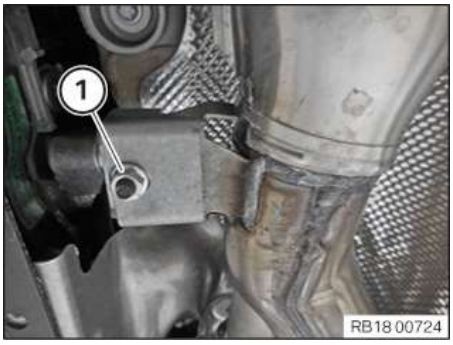


- Renew nut (1) on the rear axle support.

  Parts: Nut
- Tighten nut (1).

Exhaust system to rear axle carrier

M8 nut		Tightening torque	19 Nm

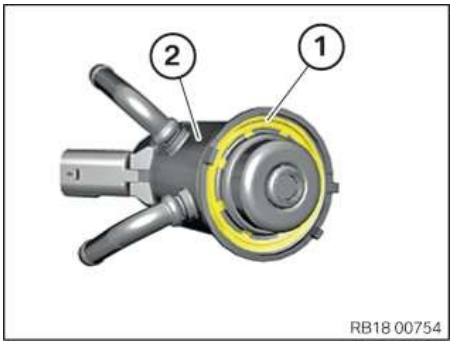


- Tighten nut (1).

Exhaust system to transmission

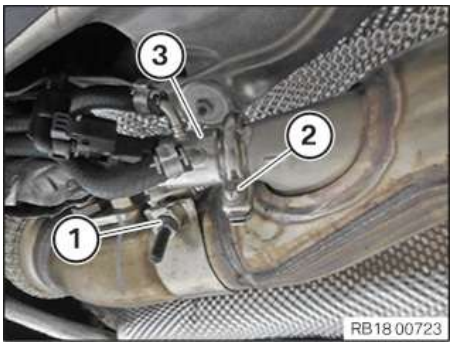
M8		Tightening torque	19 Nm

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- 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

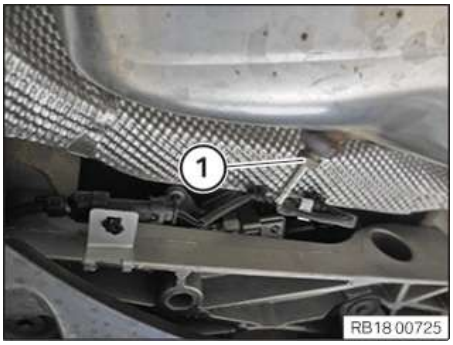
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

- 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

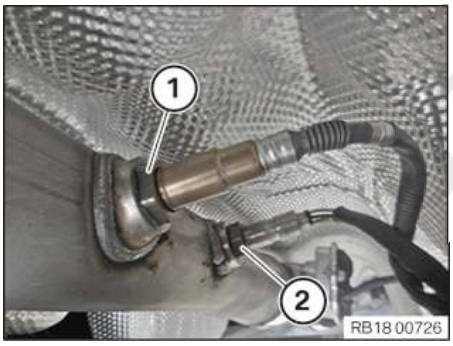
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm



- 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

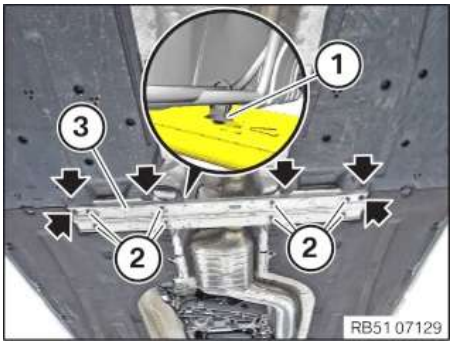
- Install the nitrogen oxide sensor (2) in the exhaust system and tighten.

Nitrogen oxide sensor downstream of SCR catalytic converter

Sensor		Tightening torque	55 Nm

104 – Install the connecting supports on the tunnel

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- Guide in and install connecting support (3) on the tunnel.
- Tighten the screws (2).
- Tighten screws (arrows).

Connecting support to tunnel

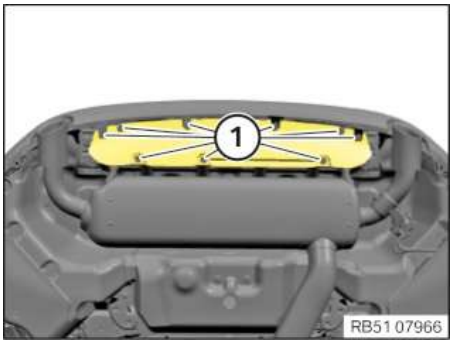
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Secure the clamp (1).

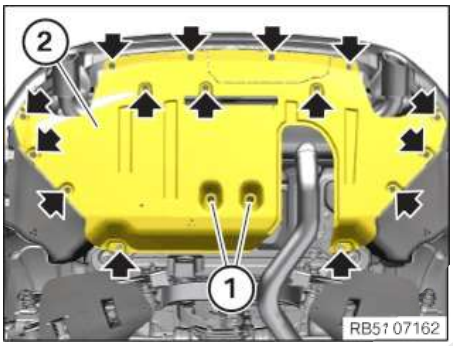
105 – Installing the rear diffuser



- **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

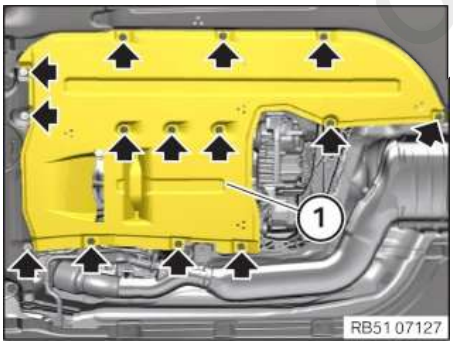
Nuts and screws		Tightening torque	3 Nm

- Tighten nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm

106 – Installing underbody protection at rear



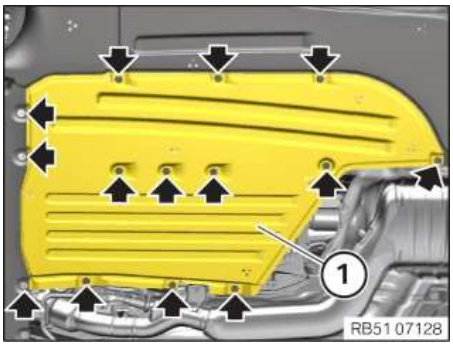
- **Version A:**

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

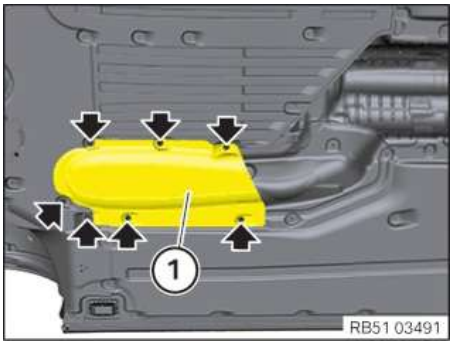
Hexagon screw		Tightening torque	3 Nm

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107 – 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.

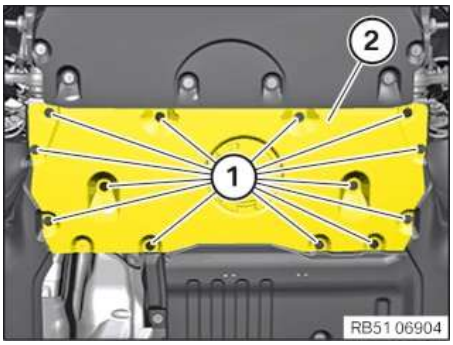


- Insert the underbody panelling (1).
- Tighten screws (arrows).

Underbody panelling

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

108 – Installing the centre underbody protection



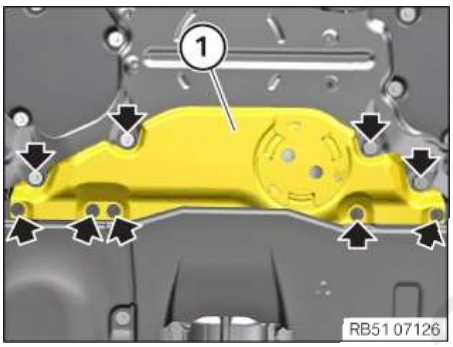
- **Variant with rear wheel drive:**

  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).

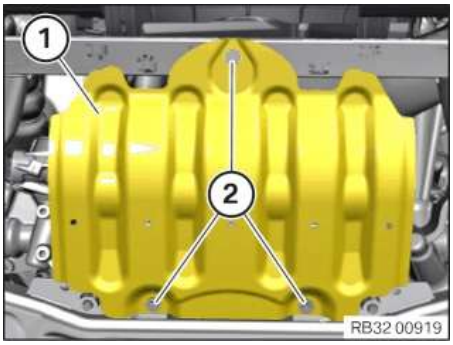
Underbody protection

Hexagon screw		Tightening torque	3 Nm

109 – 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

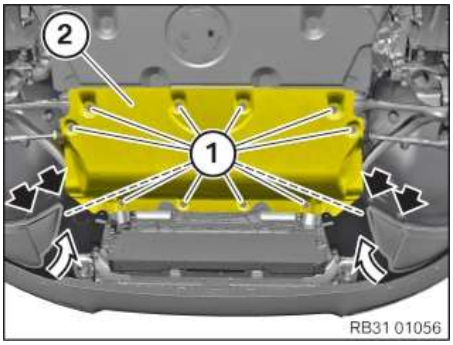
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

110 – Install the underbody protection of the steering gear

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- **Version A:**

  Position the underbody protection (2) of the steering gear.

  Tighten the screws (1).

Underbody protection of the steering gear

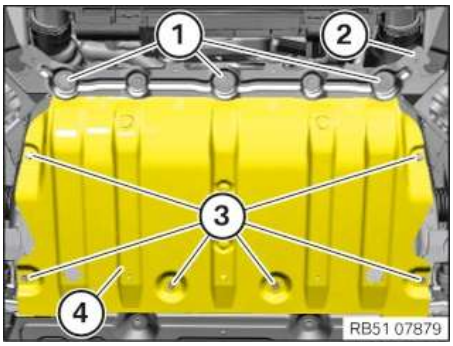
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- 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).

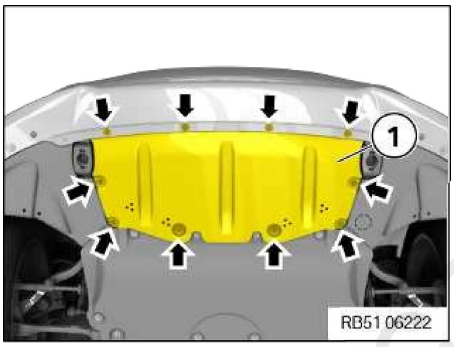
Underbody protection of the steering gear

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).

111 – Installing the front underbody protection



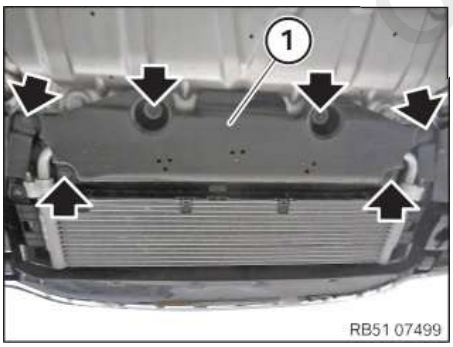
- **Version A:**

  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



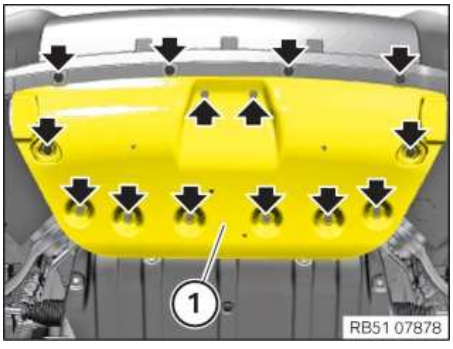
- **Version B:**

  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).

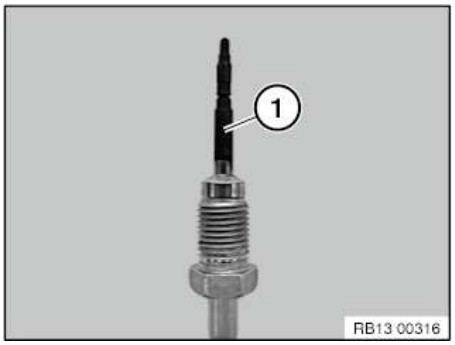
  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

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112 – Installing the exhaust temperature sensor for the exhaust system downstream the catalytic converter on the diesel particulate filter



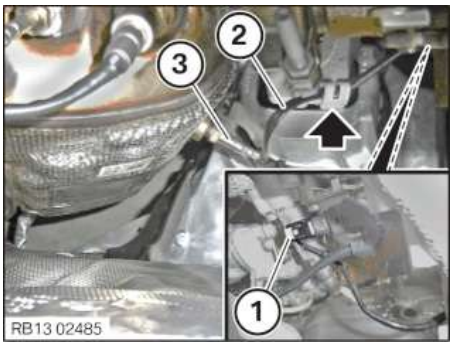
RISK OF DAMAGE

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.

113 – 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

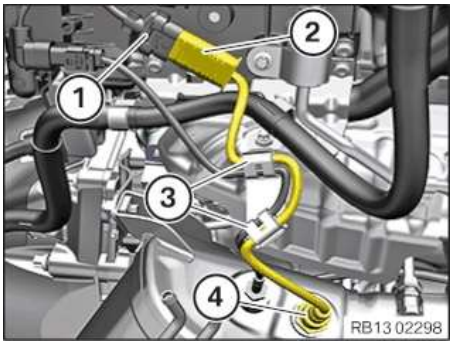


- Insert and install the front oxygen sensor (1).
- Tighten the front oxygen sensor (1) with standard tools.

Front oxygen sensor to top of diesel particulate filter

Sensor		Tightening torque	50 Nm

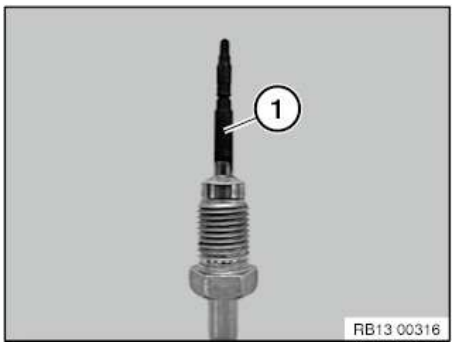
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- Fasten the front oxygen sensor (4) to the clamps (3).
- Connect connectors (2) and lock.
- Connect connectors (1) and lock.

  The connectors (1) and (2) must audibly engage.

114 – Install the exhaust-gas temperature sensor on the diesel particulate filter



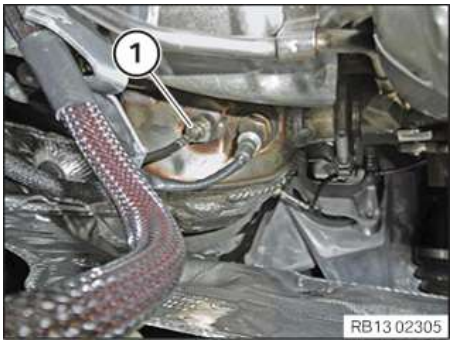
RISK OF DAMAGE

Damage of exhaust temperature sensor.

Damage to exhaust temperature sensors leads to malfunctions.

- Make sure that the gauge tip is not damaged.

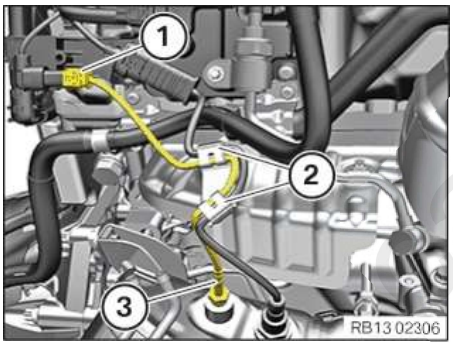
- Check gauge tip (1) for damage.



- 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

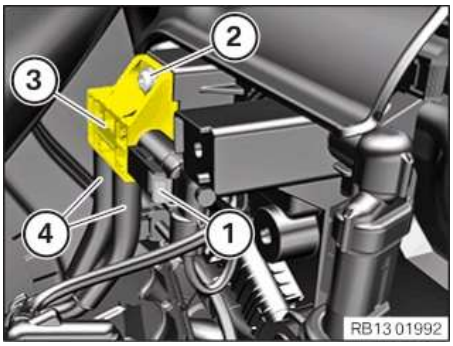
Sensor		Tightening torque	30 Nm



- Secure the exhaust temperature sensor (3) to the clamp (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

115 – 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.

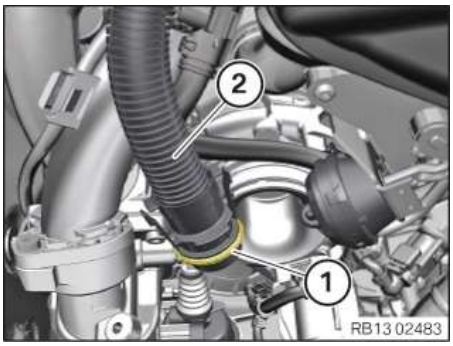
  The connector (1) must engage audibly.

116 – Installing the clean air pipe with resonator

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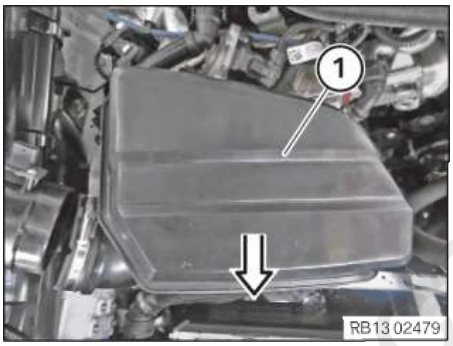
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



- 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.

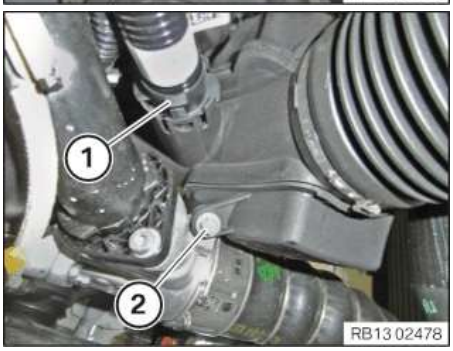


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

  The clamp (1) must engage audibly.

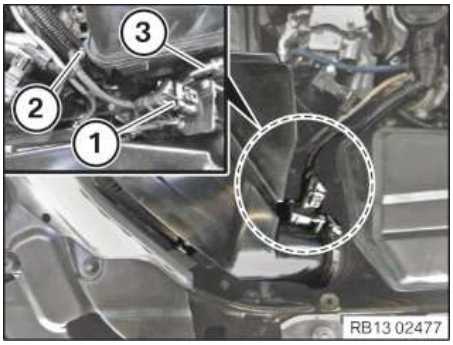


- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm

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- Connect the clean air pipe with resonator to the intake filter housing.
- Tighten clamp (3).

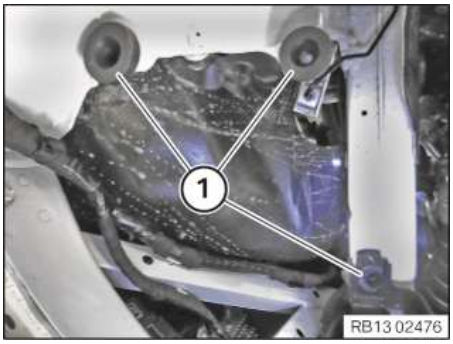
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

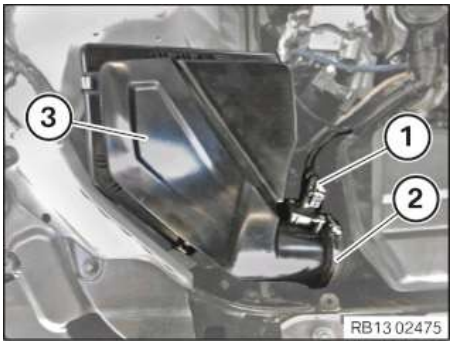
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

117 – 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

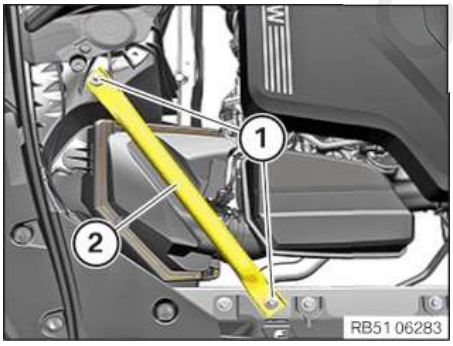
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

118 – Install the right front-end strut

TECHNICAL INFORMATION

Driving without the strut brace/front-end strut or tension strut is not permitted.



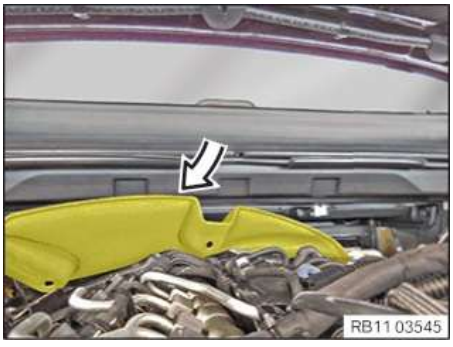
- Install the front-end strut (2).
- Renew screws (1).

  Parts: Screws
- Tighten the screws (1).

Front end strut

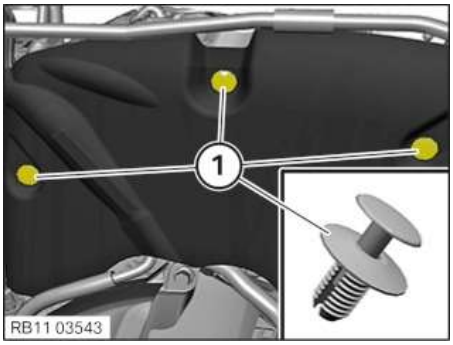
Screw		Tightening torque	56 Nm

119 – Installing acoustic cover at rear



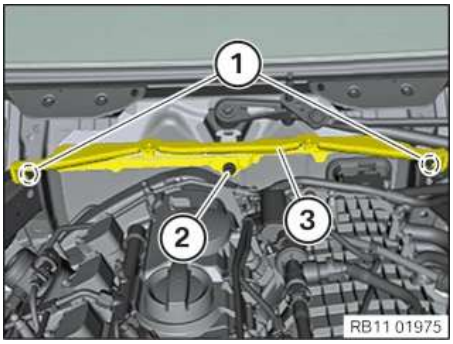
- Guide in the acoustic cover in the direction of the arrow and install it.

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- Secure acoustic cover with the expanding rivets (1).

120 – Installing centre bulkhead lower section

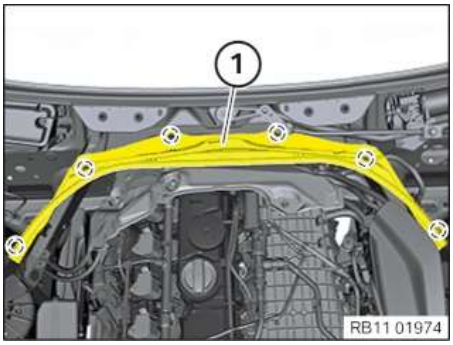


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

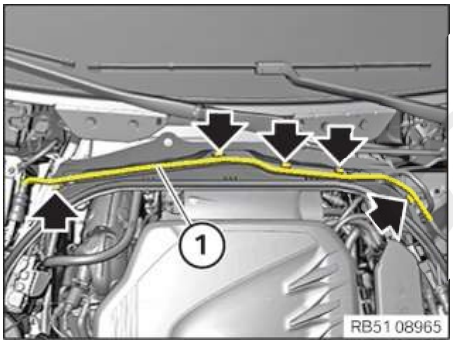
121 – Installing the centre bulkhead upper part



- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

Bulkhead upper part to bottom bulkhead

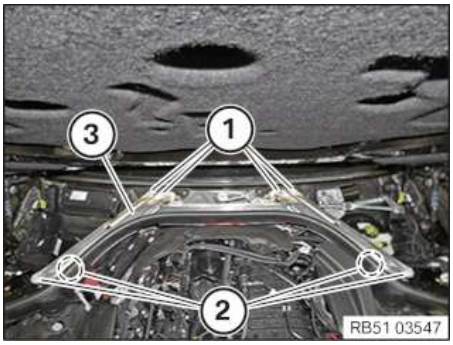
		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

  Clip in the wire (1) into the holders (arrows).

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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 °

122 – 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.

123 – Installing cowl panel cover

RISK OF DAMAGE

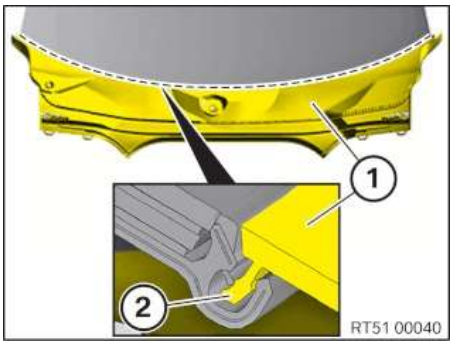
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

- Ensure correct installation of the components.
- Only use undamaged components.

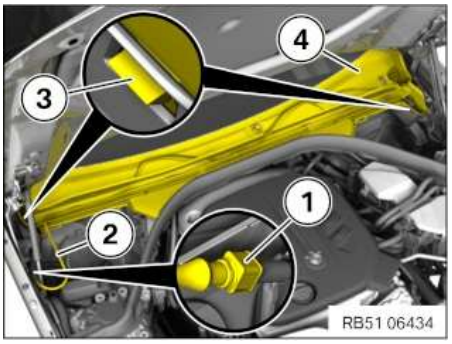
TECHNICAL INFORMATION

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.

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- 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.

124 – Install left and right wiper arm

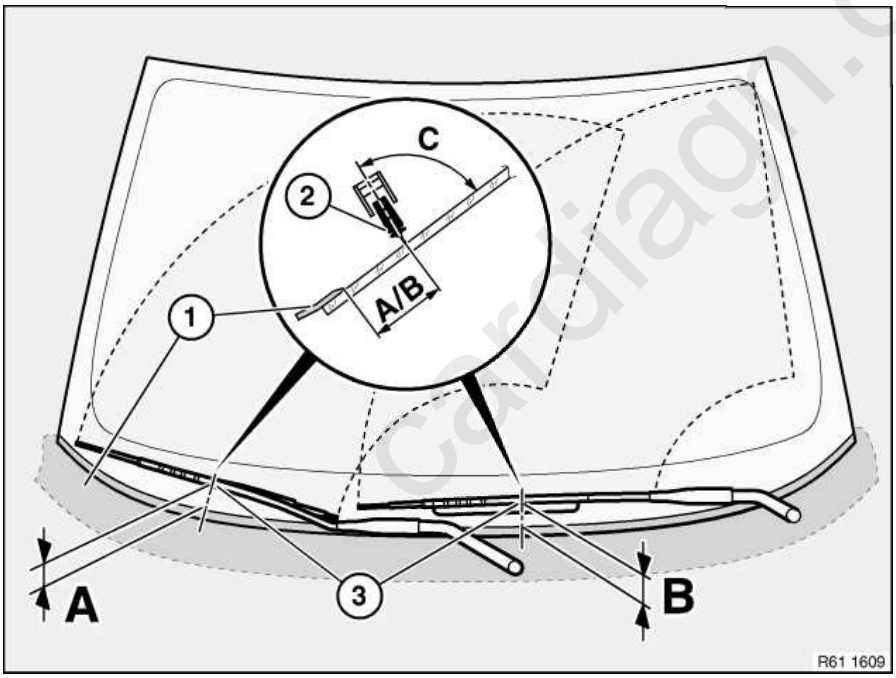
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

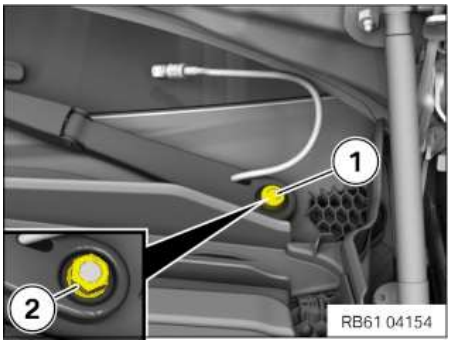
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- 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



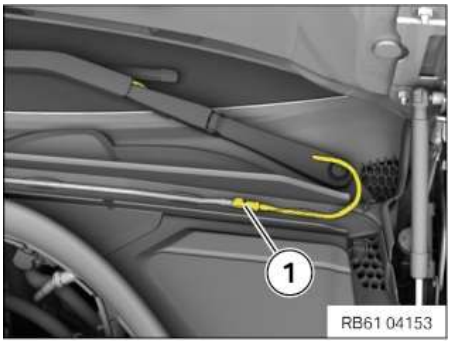
- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

- Connect the protective cap (1).

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- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

125 – Connecting all battery earth leads



- See additional information.

126 – 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

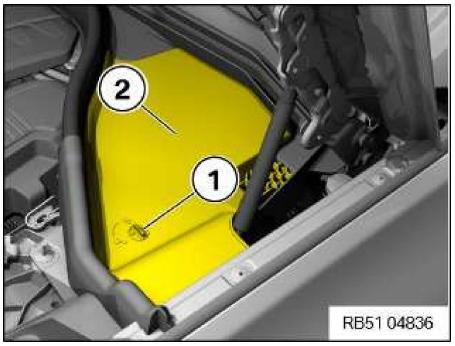


- Connect the connector (1) of the CAN bus and lock it.
- Clip in clip (2).



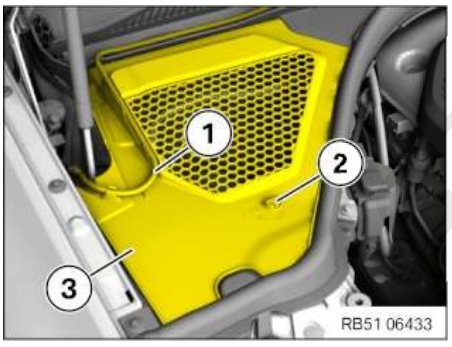
- Activate the 48V electrical system by closing the bonnet.
  The activation takes place automatically.

127 – Install the cover of the engine compartment on the rear left



- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

128 – 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.

129 – Take bonnet out of the service position

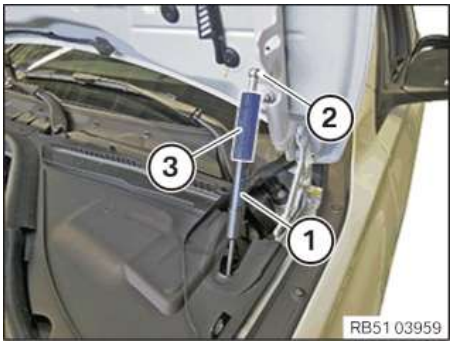
CAUTION

Shutting bonnet or tailgate.

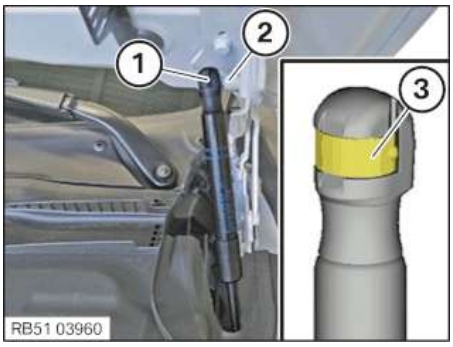
Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.

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- 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.

130 – 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.

131 – 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).

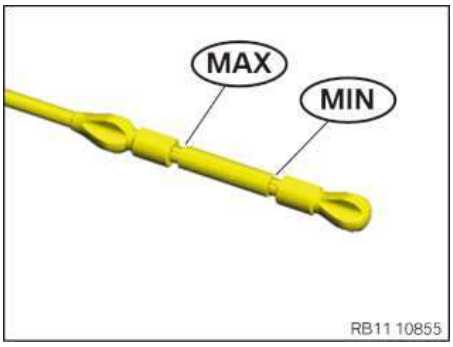
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- Park vehicle on a horizontal surface.
- Stop the engine and wait for 5 minutes.
- Pull out the oil dipstick and wipe off using a lint-free cloth.

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

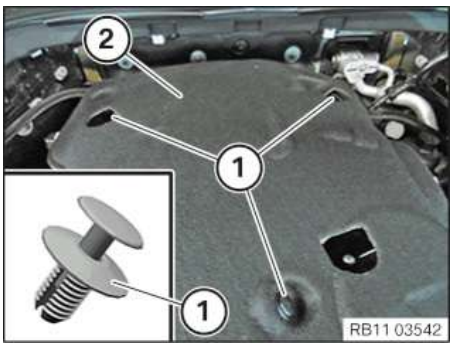
The engine oil level must be between the minimum mark and the maximum mark of the oil dipstick.

- 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

132 – 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) .

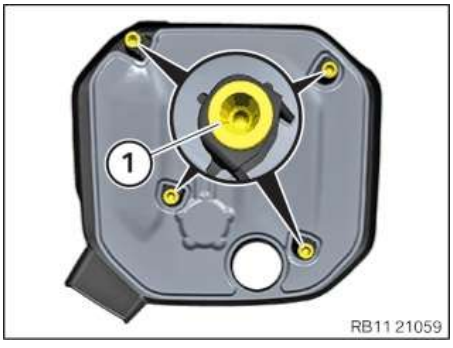
133 – Install acoustic cover

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).

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- 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 5376
M8x60		Tightening torque	19 Nm

Cylinder head to crankcase			Used in step 65
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 65
M8x40		Tightening torque	19 Nm

Standard screw connection M6			Used in step 6587
M6		Tightening torque	8 Nm

Ground to cylinder head			Used in step 65
M6		Tightening torque	8 Nm

Camshaft carrier to cylinder head			Used in step 68
M7x35		Tightening torque	13 Nm

Bearing journal to cylinder head			Used in step 71
M16x1.5	Replace bearing journal.	Tightening torque	20 Nm

Standard screw connection M8			Used in step 71
M8		Tightening torque	19 Nm

Chain tensioner piston to cylinder head			Used in step 72
22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

Holder to crankcase			Used in step 72
M8X16		Tightening torque	19 Nm

Camshaft sprocket to camshaft			Used in step 73
M7x17.			17 Nm

Starter motor to engine			Used in step 79
M8X60		Tightening torque	19 Nm

Battery positive lead to starter			Used in step 79
M8		Tightening torque	13,5 Nm

Cylinder head cover to cylinder head			Used in step 80
M6		Tightening torque.	8,5 Nm

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Clamping claw facing to cylinder head cover — Used in step 81

M6		Tightening torque	10 Nm

Injector to cylinder head cover — Used in step 81

M8		Tightening torque	8 Nm
		Angle of rotation	120 °

Rail to cylinder head cover — Used in step 82

M8		Tightening torque	19 Nm

High pressure lines between high pressure pump and rail — Used in step 83

High-pressure pipe		Tightening torque	24.5 Nm

High pressure lines between injector and rail — Used in step 84

High-pressure pipe		Tightening torque	24.5 Nm

Intake plenum to cylinder head — Used in step 86

M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum — Used in step 8691

		Tightening torque	10 Nm

Electric changeover valve to intake plenum — Used in step 86

TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold — Used in step 87

TS5x20		Tightening torque	3,6 Nm

Standard screw connection 4 Nm — Used in step 87

Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover — Used in step 87

TS5x20		Tightening torque	3,6 Nm

Battery positive lead on the starter motor generator — Used in step 87

M8		Tightening torque	19 Nm

Holder on intake plenum — Used in step 87

TS6X20		Tightening torque	5 Nm

Exhaust manifold to cylinder head — Used in step 90

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 90

M6x12		Tightening torque	8 Nm

Exhaust-gas recirculation cooler to exhaust manifold — Used in step 9091

M8x28	Replace screws	Tightening torque	32 Nm

Exhaust-gas recirculation cooler to cylinder head — Used in step 9091

M8x20 / M8x28		Tightening torque	19 Nm

Exhaust turbocharger low-pressure stage to crankcase — Used in step 90

M8X16		Tightening torque	22 Nm

Oil return line to turbocharger — Used in step 90

M6x12	Renew gasket.	Tightening torque	8 Nm

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Oil return line to crankcase — Used in step 90

M6x12	Check gasket. Renew the seal or line if necessary.	Tightening torque	8 Nm

Exhaust-gas recirculation cooler to cylinder head — Used in step 91

M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °

Heat shield to exhaust manifold — Used in step 92

M6x12			10 Nm

Bracket on cylinder head cover — Used in step 93

		Tightening torque	5 Nm

Battery positive lead to battery positive terminal — Used in step 93

M8		Tightening torque	19 Nm

Heat shield to exhaust manifold — Used in step 94

M6x12		Tightening torque	10 Nm

Banjo bolt for exhaust pressure pipe to exhaust manifold — Used in step 94

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm

Exhaust gas pressure pipe to sensor system holder — Used in step 94

TS6x20		Tightening torque	5,7 Nm

Cover, steering unit — Used in step 97

Screw		Tightening torque	3 Nm

Brake disc to front wheel hub — Used in step 98

M8	Renew screw.	Tightening torque	16 Nm

Brake disc to rear wheel hub — Used in step 98

M8	Renew screw.	Tightening torque	16 Nm

Wheel bolts — Used in step 98

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 100

V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

Bracket to diesel particulate filter top — Used in step 100

M8		Tightening torque	19 Nm

Bracket to transmission for diesel particulate filter holder bottom — Used in step 100

M8X20		Tightening torque	19 Nm

Lower holder to diesel particulate filter — Used in step 100

M8		Tightening torque	19 Nm

Coolant lines for SCR metering module — Used in step 100

M6X16		Tightening torque	8 Nm

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Nitrogen oxide sensor before SCR catalytic converter			Used in step 101
Sensor		Tightening torque	50 Nm

Monitoring oxygen sensor			Used in step 102
Sensor		Tightening torque	50 Nm

Rear silencer to body / bumper support			Used in step 103
M8	Replace nuts.	Tightening torque	19 Nm

Exhaust system to rear axle carrier			Used in step 103
M8 nut		Tightening torque	19 Nm

Exhaust system to transmission			Used in step 103
M8		Tightening torque	19 Nm

Exhaust system to diesel particle filter			Used in step 103
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

SCR metering module V-clip to exhaust system			Used in step 103
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm

Exhaust-gas temperature sensor upstream of SCR catalytic converter			Used in step 103
Sensor		Tightening torque	30 Nm

Diesel particulate sensor to exhaust system			Used in step 103
Sensor		Tightening torque	50 Nm

Nitrogen oxide sensor downstream of SCR catalytic converter			Used in step 103
Sensor		Tightening torque	55 Nm

Connecting support to tunnel			Used in step 104
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

Diffuser / underbody panelling			Used in step 105
Nuts and screws		Tightening torque	3 Nm

Underbody protection			Used in step 106108
Hexagon screw		Tightening torque	3 Nm

Underbody panelling			Used in step 107
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Underbody protection, steering, to front axle support			Used in step 109
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support			Used in step 109
Hexagon bolt M6		Tightening torque	8 Nm

Underbody protection of the steering gear			Used in step 110
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

Wheel arch trim panel, front			Used in step 110
Thermoplastic hexagon screw		Tightening torque	2,6 Nm

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Underbody protection front			Used in step 111
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 112
Sensor		Tightening torque	30 Nm

Front oxygen sensor to top of diesel particulate filter			Used in step 113
Sensor		Tightening torque	50 Nm

Exhaust-gas temperature sensor to diesel particulate filter			Used in step 114
Sensor		Tightening torque	30 Nm

Differential pressure sensor of diesel particulate filter on cylinder head cover			Used in step 115
TS5x20		Tightening torque	4 Nm

Clamp for the pressure hose on the differential pressure sensor			Used in step 115
Clamp 15–19mm		Tightening torque	3 Nm

Clean air pipe to exhaust turbocharger			Used in step 116
M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing			Used in step 116117
Clamp		Tightening torque	3 Nm

Front end strut			Used in step 118
Screw		Tightening torque	56 Nm

Bulkhead lower part to body			Used in step 120
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead			Used in step 121
		Tightening torque	3 Nm

Tension strut on bulkhead			Used in step 121
M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome			Used in step 121
Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm			Used in step 124
Combination hexagon nut		Tightening torque	35 Nm

Negative battery cable to 48-V battery			Used in step 126
Nut M8		Tightening torque	19 Nm

Overview of Special Tools

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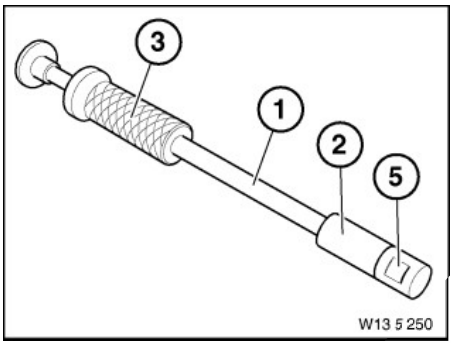
0 493 339 (13 5 252) Bush



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)	

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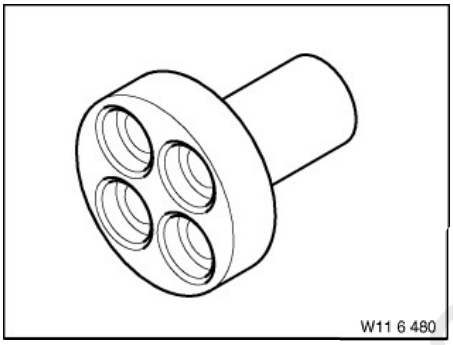
0 493 340 (13 5 253) Weight



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	

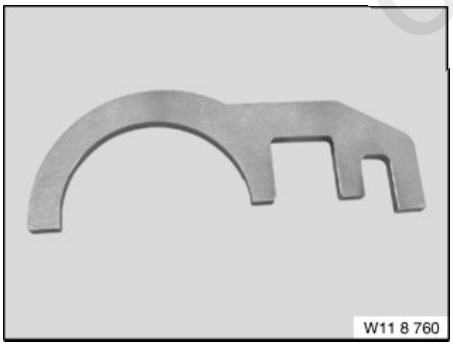
0 493 380 (11 6 480) Connector



Common Used in step 5376

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 535769747677

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)

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2 365 488 Adapter



Common	Used in step 53757678
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)

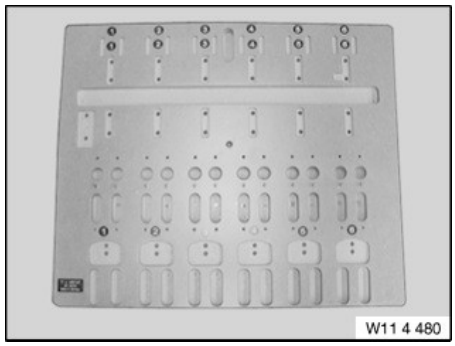
2 288 380 Locating stud



Common	Used in step 53757678
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)

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0 495 105 (11 4 480) oddments tray



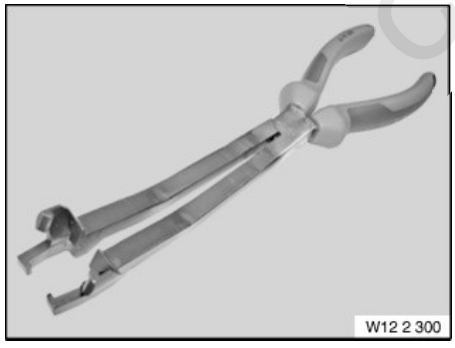
Common Used in step 5960

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	

0 495 140 (12 2 300) Pliers

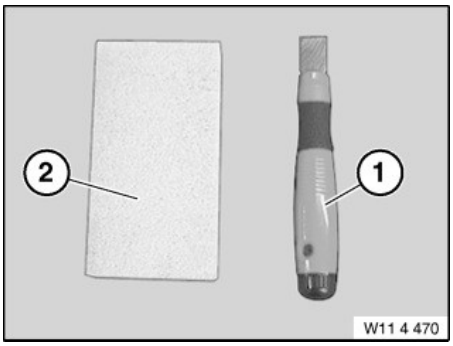


Common Used in step 61

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)

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0 495 102 (11 4 470) Tool



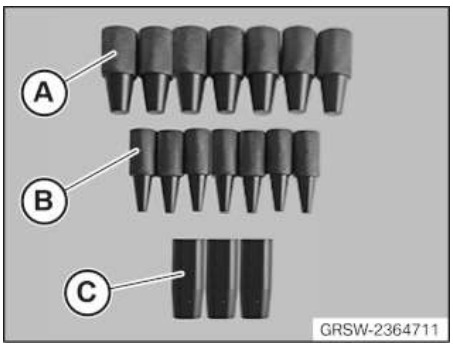
Common Used in step 6190

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 62

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	

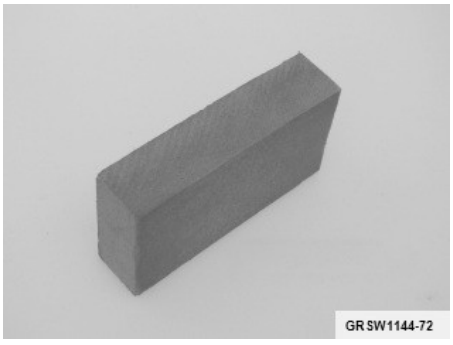
0 495 103 (11 4 471) Scraper



Common Used in step 62

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

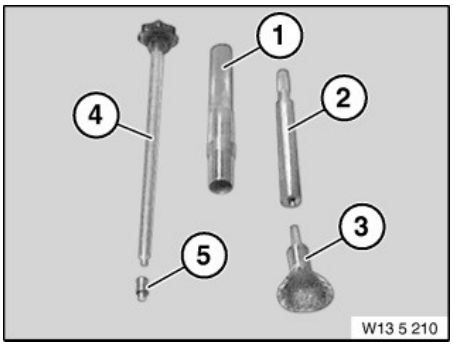


Common Used in step 62

Usage	(grindstone)
Included in the tool or work	0 495 102
Storage location	C52
Replaced by	
In connection with	
SI-Number	

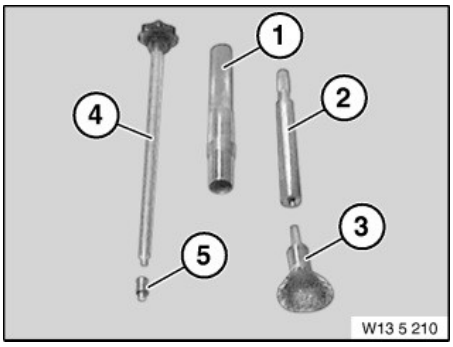
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0 493 763 (13 5 215) Plug



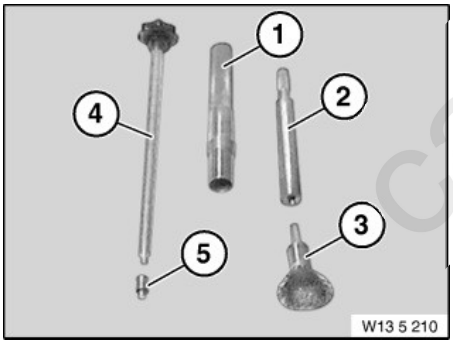
Common	Used in step 81
Usage	(Seal plug)
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 762 (13 5 214) Rod



Common	Used in step 81
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



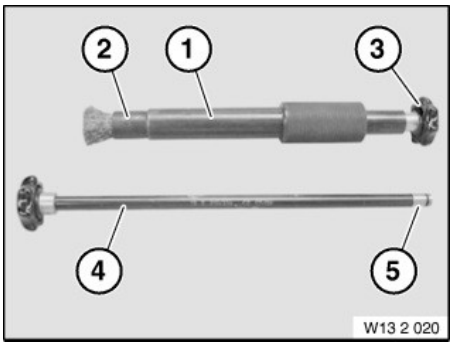
Common	Used in step 81
Usage	(Cleaning set) For injector channels
Included in the tool or work	
Storage location	B4
Replaced by	
In connection with	
SI-Number	01 05 00 (574)

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)	

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0 496 150 (13 2 020) Tool



Common Used in step 81

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.	

2 344 011 Tool



Common Used in step 98

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:

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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	

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	

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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	

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	

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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	

Overview Technical Data

Cylinder head flatness	Used in step 63
Maximum lengthwise deviation from flatness	0.10 mm
Maximum transverse deviation from flatness	0.05 mm

Distance from window pane edge to wiper blade	Used in step 124
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 131
	1.0 l

Links

Repair instructions (PRE)	Used in step
Notes on 48-V battery	4126

General repair instructions	Used in step
11 00 ... Overview of consumables (Electronic Parts Catalogue)	81

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5125
61 20 900 Disconnecting and connecting battery earth lead	5125
61 20 900 Disconnecting and connecting battery earth lead	5125
61 20 900 Disconnecting and connecting battery earth lead	5125
61 20 900 Disconnecting and connecting battery earth lead	5125
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61 20 900 Disconnecting and connecting battery earth lead	5125
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5125
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5125
61 20 900 Disconnecting and connecting battery earth lead	5125
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	5125
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	5125
61 20 900 Disconnecting and connecting battery earth lead	5125
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61 20 900 Disconnecting and connecting battery earth lead	5125
61 20 900 Disconnecting and connecting battery earth lead	5125
61 20 900 Disconnecting and connecting battery earth lead	5125
61 35 ... Notes on ESD protection (Electro Static Discharge)	1718192030314350
61 35 ... Notes on ESD protection (Electro Static Discharge)	1718192030314350
00 02 001 Raising the vehicle using a vehicle lift	3398
17 00 008 Draining and topping up coolant for high-temperature circuit	130
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	130
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	130
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	130
17 00 008 Draining and topping up coolant for high-temperature circuit	130
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	130
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	130
17 00 039 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	130
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	130
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	130
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	130
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	130
17 00 039 Bleeding the cooling system (B36, B38, B46, B48)	130
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	130
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	130
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	130
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	130
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	130
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	130
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	130
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	130
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	130
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	130
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	130
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	130
17 00 009 Check the cooling system for watertightness with a special tool (with a tester)	130
17 00 009 Check the cooling system for watertightness with a special tool (with a tester)	130
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	130
17 00 008 Draining and topping up coolant for high-temperature circuit	130
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	130
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	130
17 00 008 Draining and topping up coolant for high-temperature circuit	130

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11 12 101 Replace cylinder head gasket

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

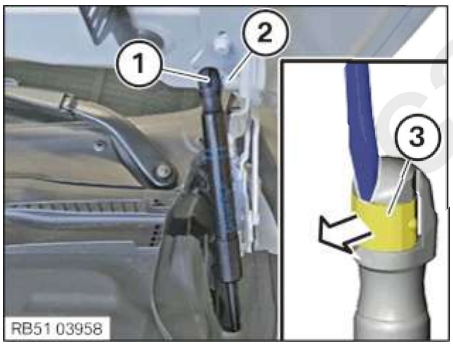
Engine compartment lid is open.

CAUTION

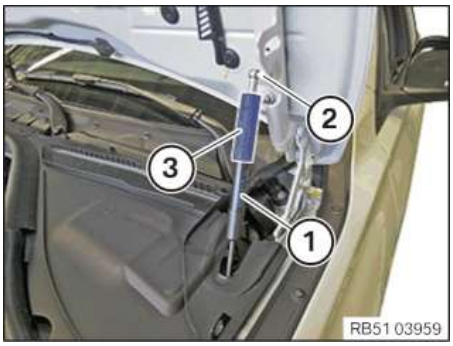
Shutting bonnet or tailgate.

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

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- See additional information.

3 – Removing the acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

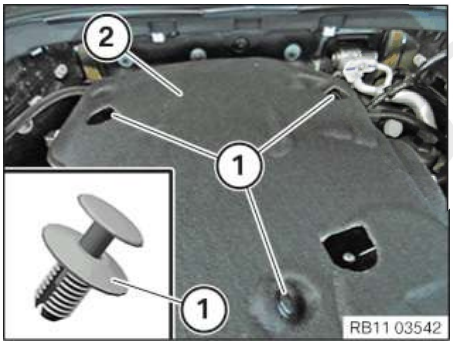
Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- 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.



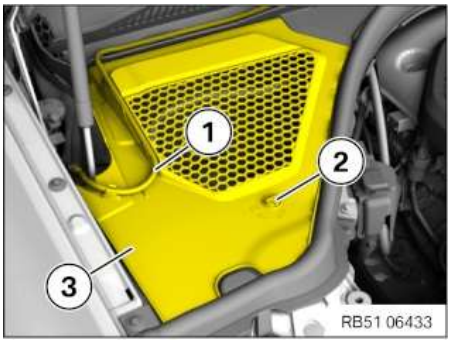
- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

4 – Remove the acoustic cover for the injectors



- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

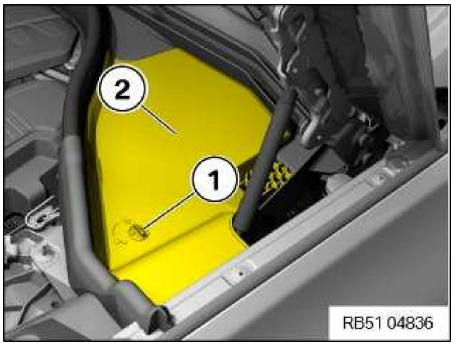
5 – Remove the cover of the rear right engine compartment



- 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

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- 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.

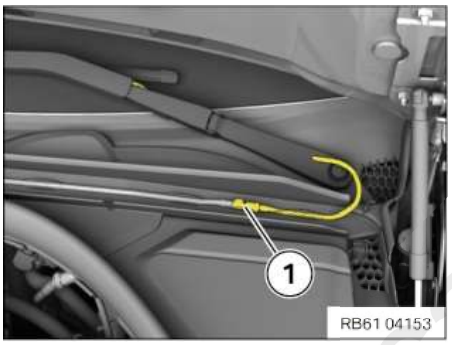
▸ **Remove the wiper arm**

RISK OF DAMAGE

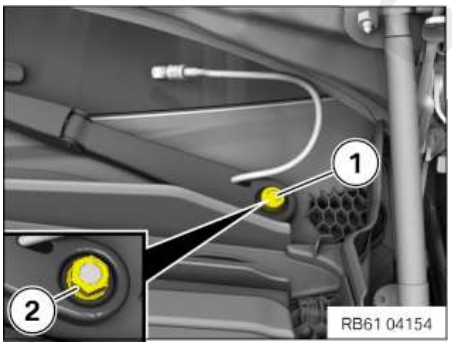
Damage to wiper console.

While removing the wiper arms without using special tool, the wiper console can break.

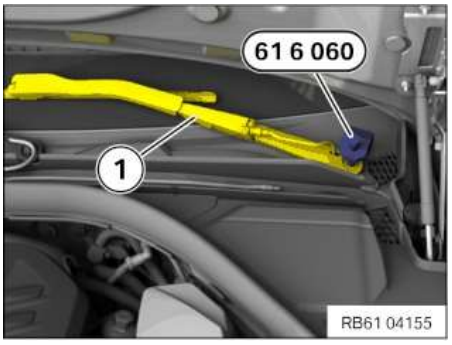
- Removing the wiper arms must be carried out only using the prescribed special tool.
- Do **not** lever off the wiper arm because otherwise the wiper console may break at the predetermined breaking point for active pedestrian protection.



- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.



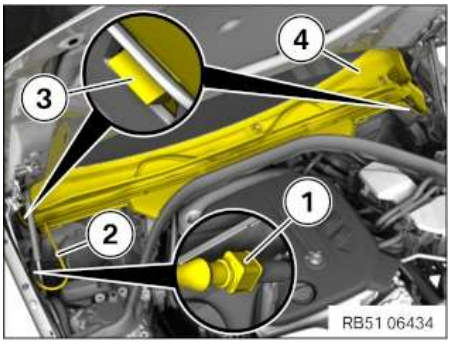
- Remove the protective cap (1).
- Loosen nut (2).



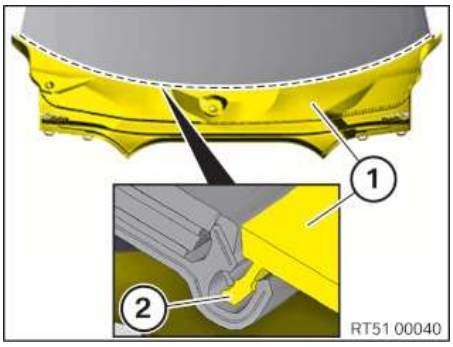
- Pull off the wiper arm (1) using special tool .

8 – Remove cowl panel cover

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- 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

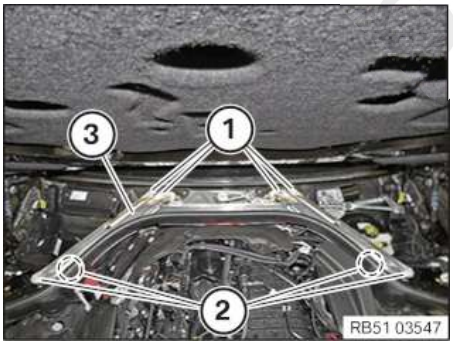


- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

10 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

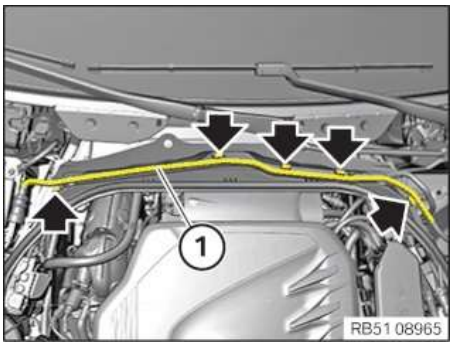
Driving without the strut brace/front-end strut or tension strut is not permitted.



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

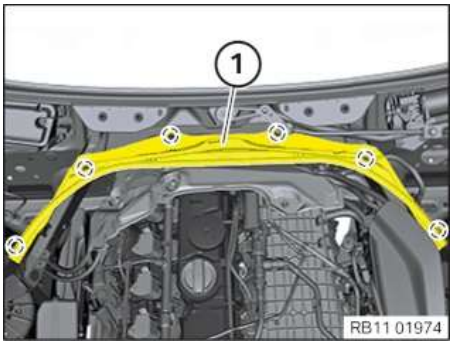
- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.



- **Version with mild hybrid technology:**

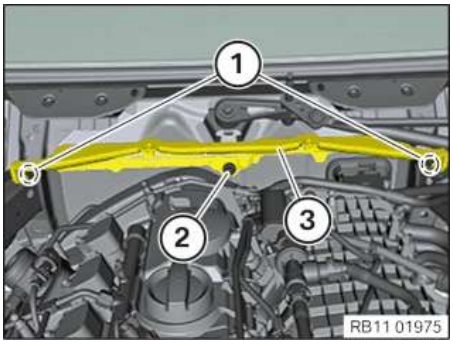
  Unclip the wire (1) at the holders (arrows).

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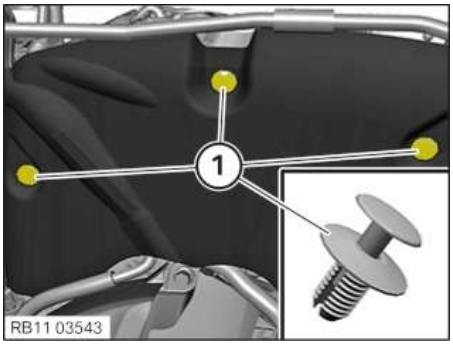
- Unscrew the bolts in the marked areas.
- Remove the centre bulkhead upper part (1).

11 – Removing the centre bulkhead lower section

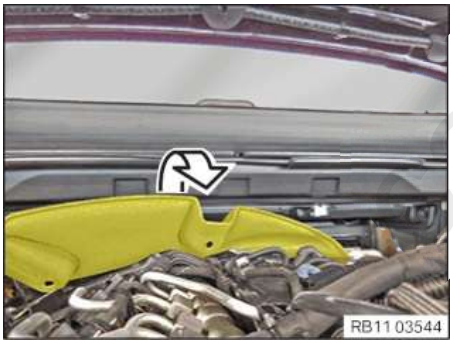


- Loosen screws (1).
- Loosen nut (2).
- Remove the centre bulkhead lower part (3).

12 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).

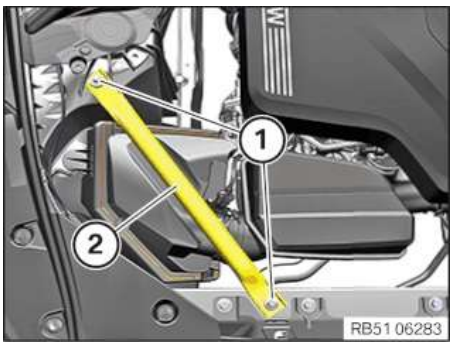


- Guide out and remove the acoustic cover in the direction of the arrow.

13 – Remove right front-end strut

TECHNICAL INFORMATION

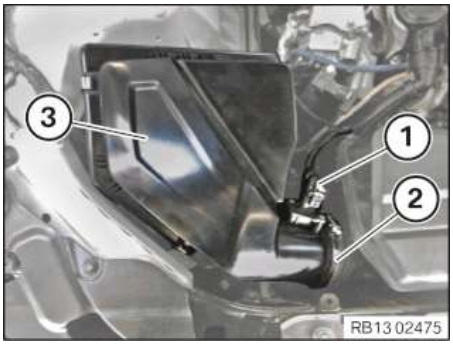
Driving without the strut brace/front-end strut or tension strut is not permitted.



- Loosen screws (1).
- Remove the front-end strut (2).

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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.

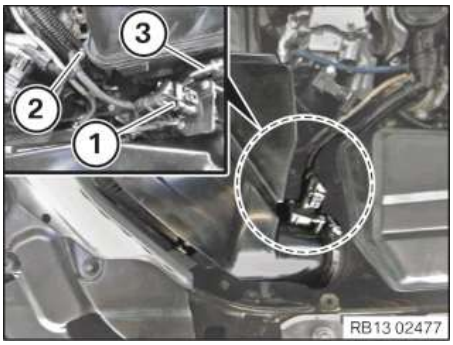
15 – Removing the clean air pipe with the resonator

WARNING

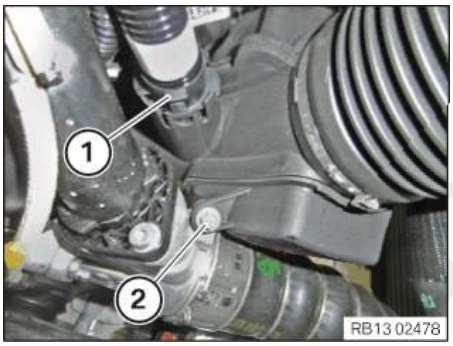
Hot surfaces.

Risk of burning!

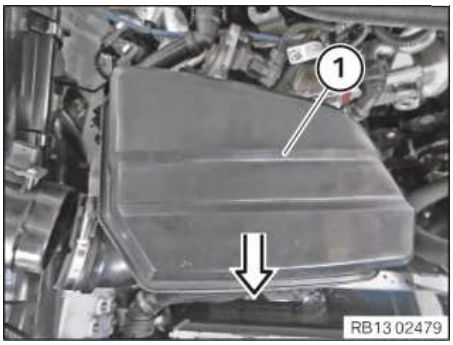
- Perform all work only on components that have cooled down.



- 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!

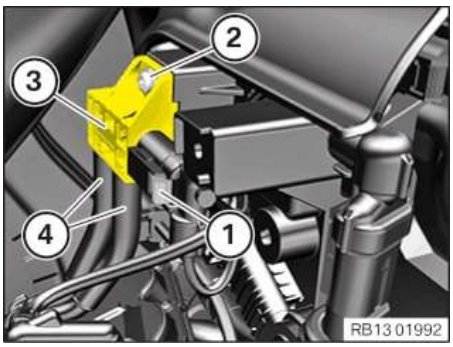
- Perform all work only on components that have cooled down.

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

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WARNING

Hot surfaces.

Risk of burning!

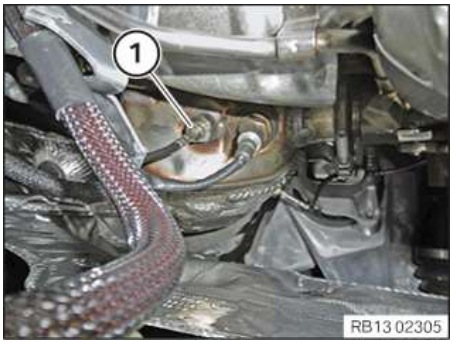
- Perform all work only on components that have cooled down.

RISK OF DAMAGE

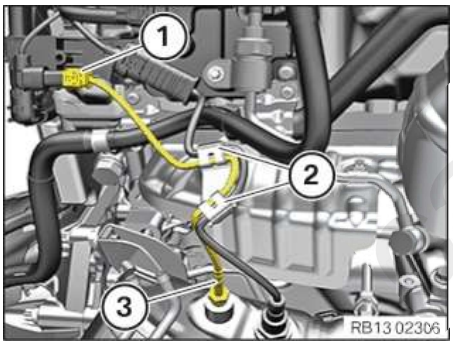
Electrostatic discharge.

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.

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RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

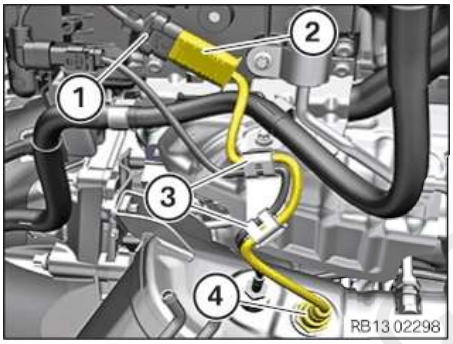
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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.

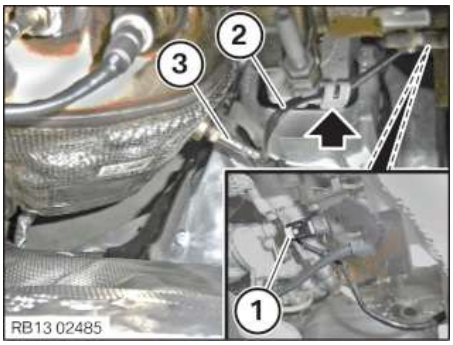
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RISK OF DAMAGE

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)

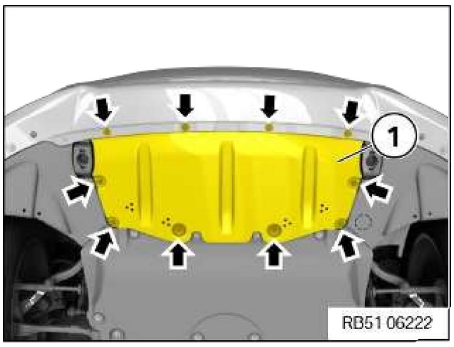


- Unlock plug connection (1) and disconnect.

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).

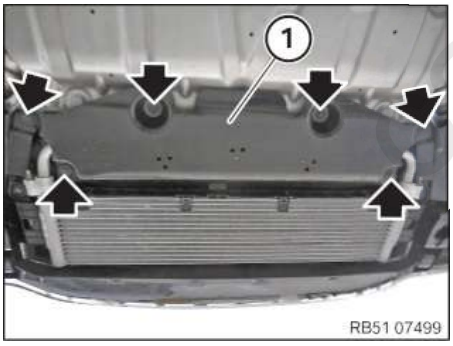
20 – Removing the front underbody protection



- **Version A:**

  Remove screws (arrows).

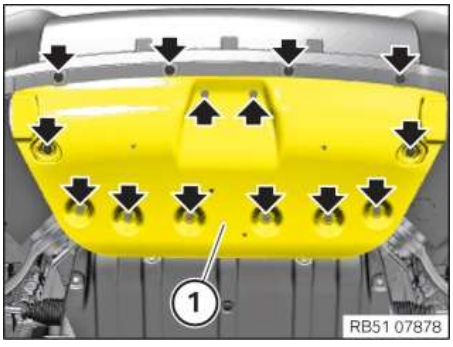
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version B:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

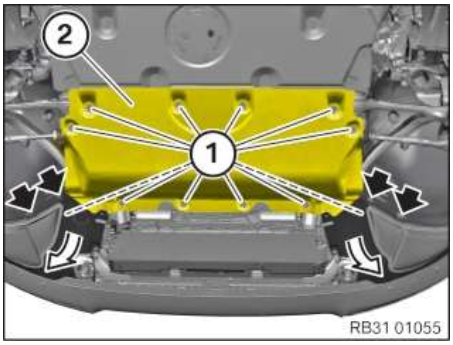


- **Version C:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

21 – Remove the underbody protection of the steering gear



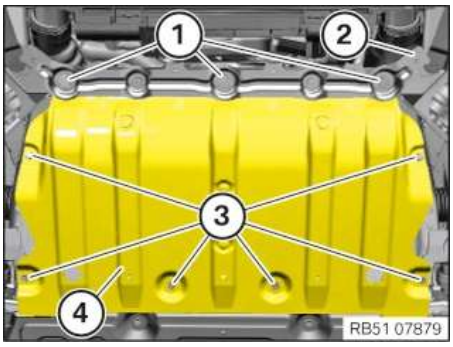
- **Version A:**

  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.

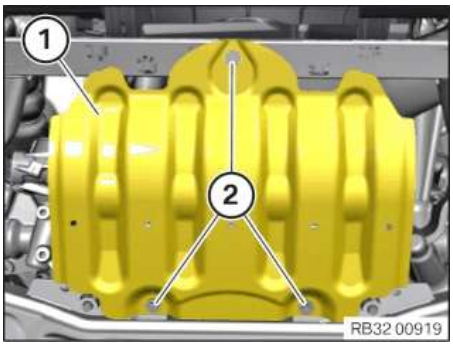
  Loosen screws (3).

  Feed out and remove the underbody protection (4) of the steering gear.

22 – If installed: Removing the steering underbody protection

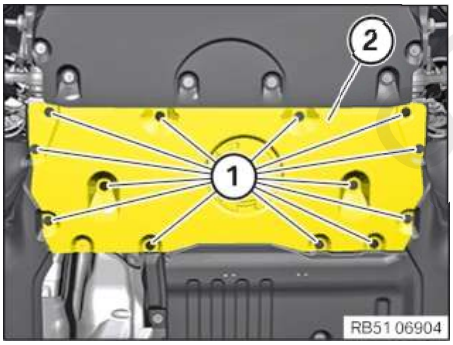
Prerequisite

Front underbody protection has been removed.



- Loosen screws (2).
- Remove underbody protection (1).

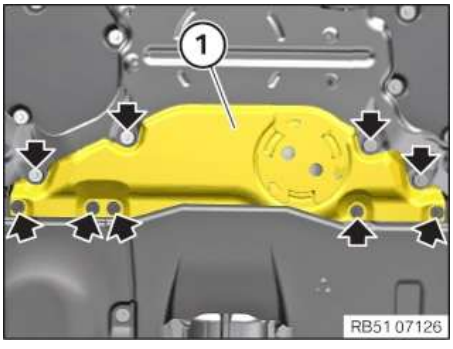
23 – Removing the centre underbody protection



- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .



- **Version with all-wheel drive:**

  Remove screws (arrows).

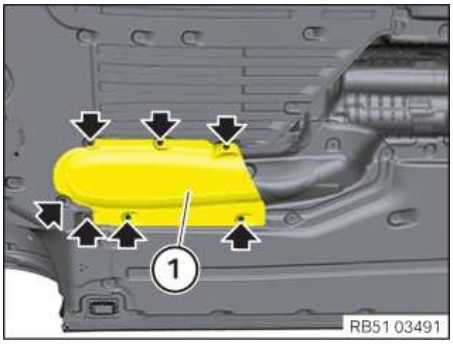
  Feed out and remove the centre underbody protection (1).

24 – Remove the underbody panelling of the transmission on the side

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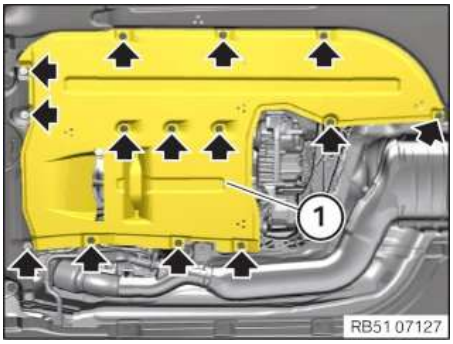
NOTICE

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).

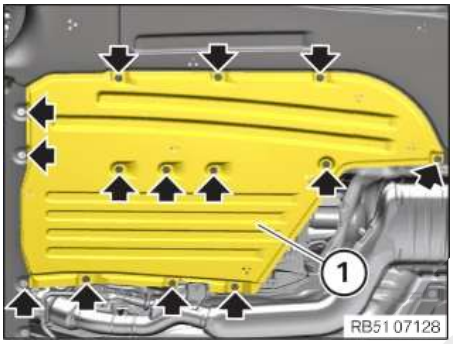
25 – Remove rear underbody protection



- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).

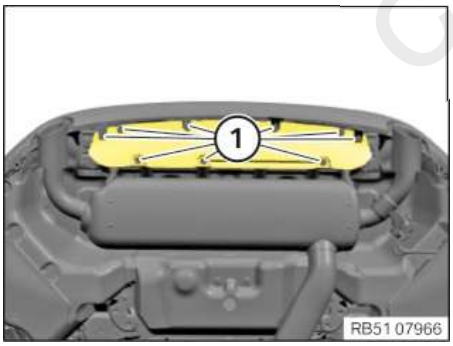


- **Version B:**

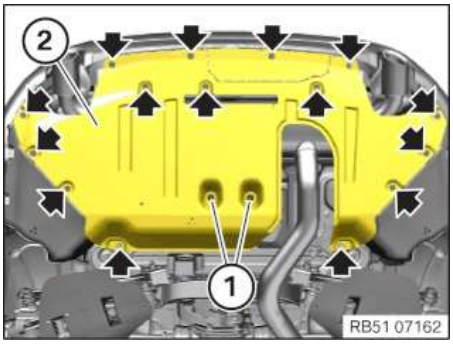
  Remove screws (arrows).

  Guide out rear underbody protection (1) and remove it.

26 – Removing the rear diffuser



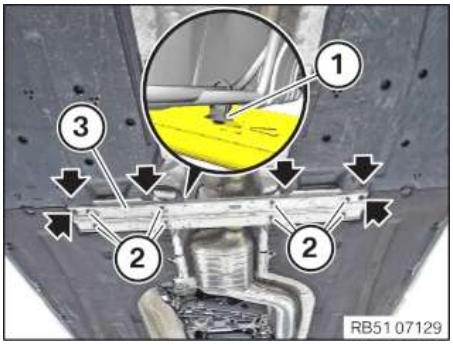
- **Version 1:**
- Release the screws and nuts (1).
- Remove the diffuser.



- **Version 2:**
- Loosen nuts (1).
- Remove screws (arrows).
- Guide out and remove rear diffuser (2).

27 – Remove the connecting support from the tunnel

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- 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!

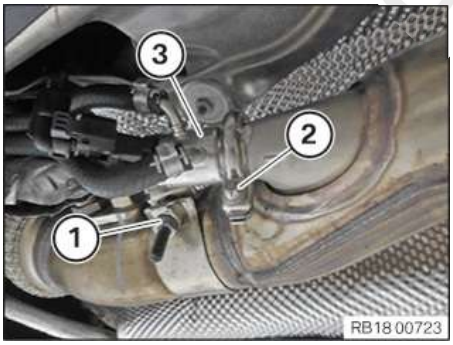
- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

CAUTION

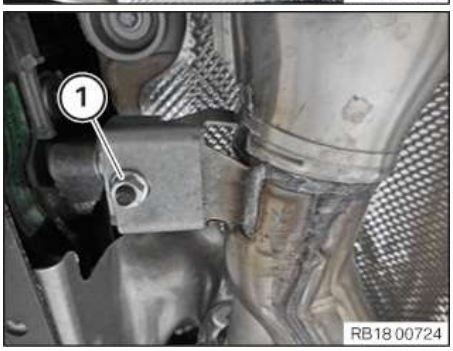
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

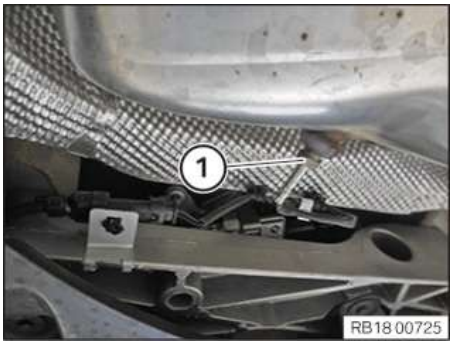


- Unfasten clamp (1).
- Detach the clamp (2) of the SCR metering module (3).
- Detach the SCR metering module (3)from the exhaust system and place to one side.

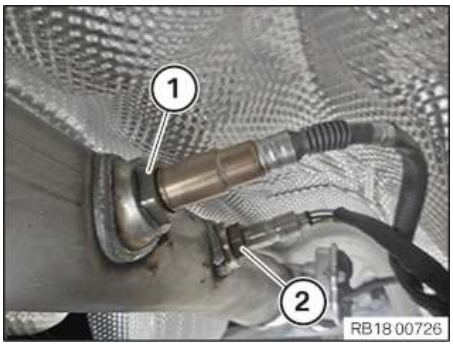


- Loosen nut (1).

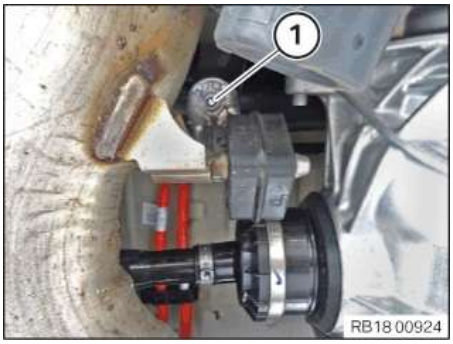
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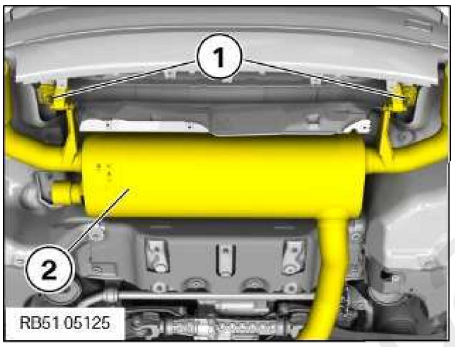
- Detach the exhaust temperature sensor (1) from the exhaust system.



- 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.

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RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

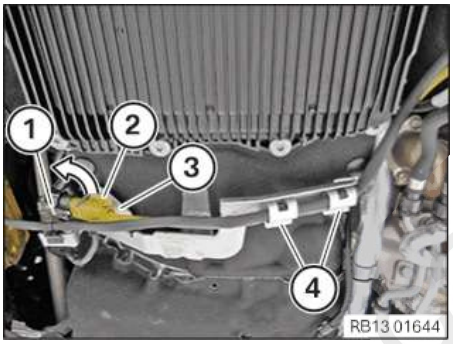
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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.

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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.

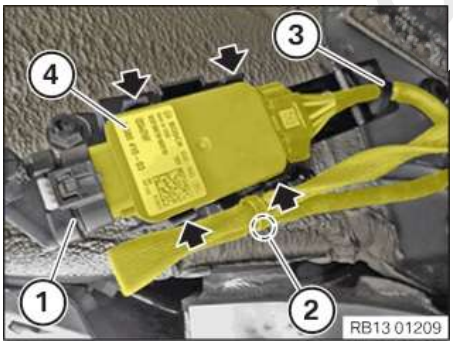
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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

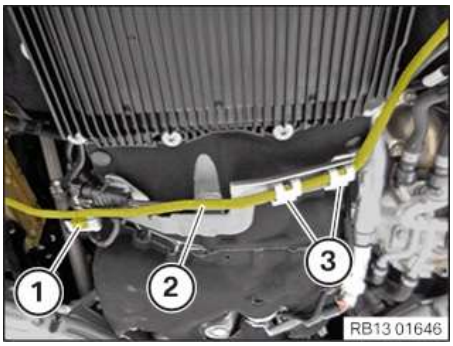
Damage to the nitrogen oxide sensor.

Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

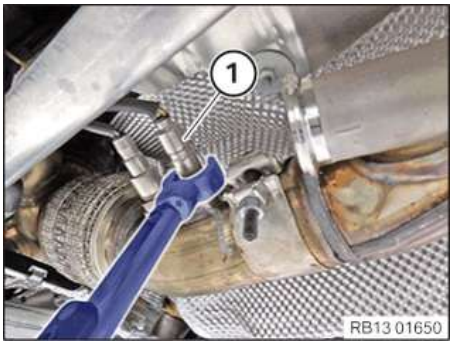
- Remove the protective cap on the sensor only when screwing the sensor on to the exhaust system.
- Do not use mounting aids, cleaning agents, gaseous and liquid agents in workplaces, storage areas and during transport.
- Contaminations (particles, dust exposure, moisture, etc.) in the area of the plug 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.



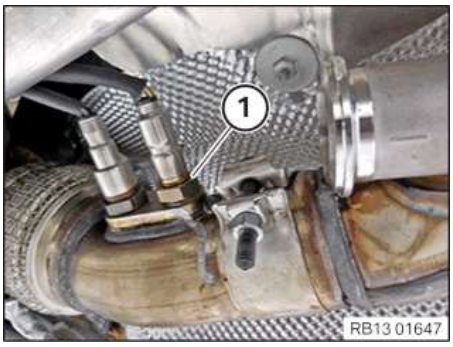
- Unlock plug connection (1) and disconnect.
- Release cable clip in area (2).
- Release line from the holder (3).
- Unclip control unit (4).



- 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!

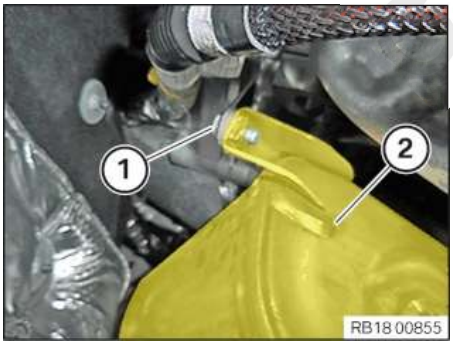
- Perform all work only on components that have cooled down.

CAUTION

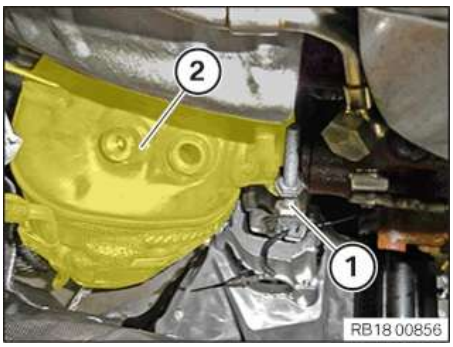
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

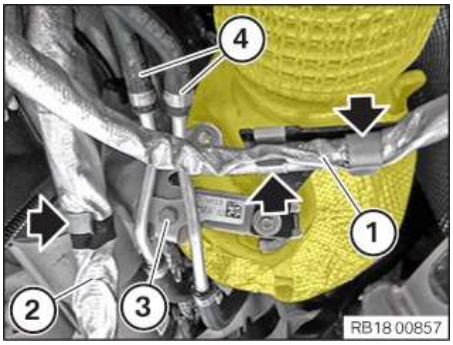


- Release bolt (1) from the holder of diesel particulate filter (2).

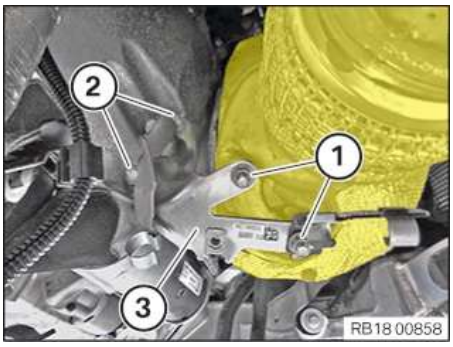


- Loosen V-band clamp (1).
- Feed V-clip (1) out from diesel particulate filter (2) and remove.

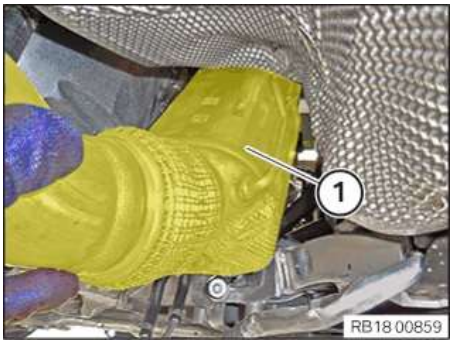
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- Release the metering line (1) from clamps (Arrows).
- Release positive battery cable (2) from starter motor from clamp (Arrow).
- Loosen screw (3).
- Thread off coolant line (4) and place to the side.



- 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.**

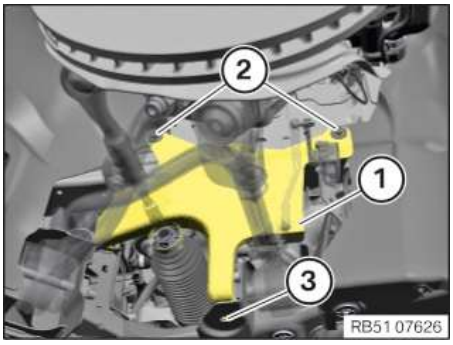
  This process is intended to prevent damage to the brake disc.

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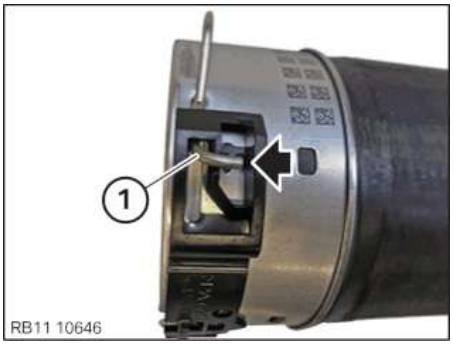
- If several wheels are removed at the same time: Use a piece of chalk to mark on each tyre the axle and side on which the corresponding wheel is fitted.
- Release the wheel bolts (arrows) crosswise and remove the wheel.
- To release and tighten wheel bolts with a security code: Use the correct adapter from the set of special tools .

33 – Remove the cover of the steering assembly



- Loosen screws (2) and (3).
- Remove the cover (1).

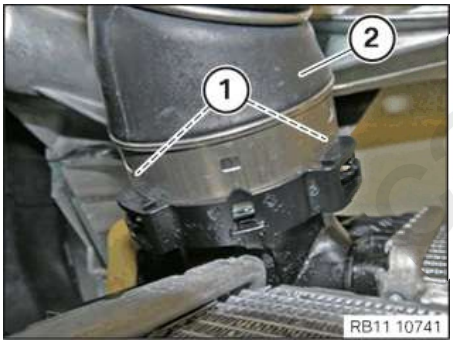
34 – Remove pressure pipe between exhaust turbocharger and charge air cooler



- **Version A:**

  Unlock lock (1).

  The lock (1) must snap audibly into place when unlocked (see arrow).



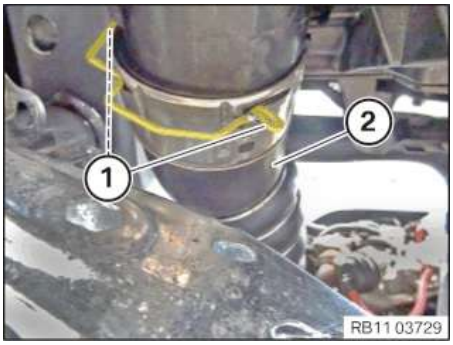
- Unlock the locks (1) on both sides and snap into place.
- Pull off pressure pipe (2) from charge air cooler.



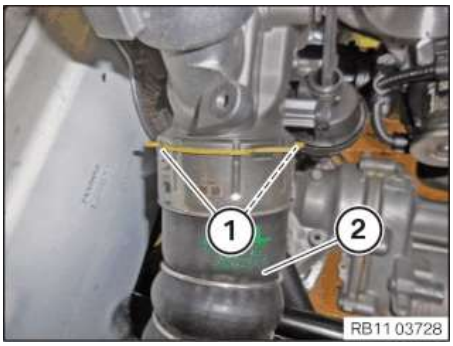
- **Version B:**

  Unlock clamp (1) and engage in this position.

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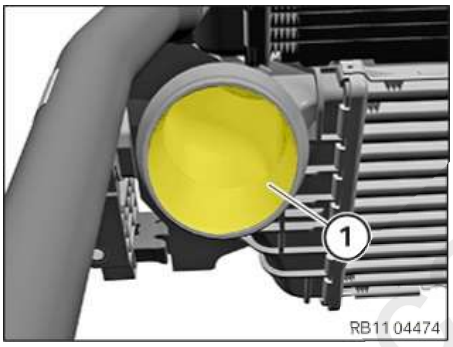
- Unlock the locks (1) and snap into place.
- Pull off pressure pipe (2) from charge air cooler.



- 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.

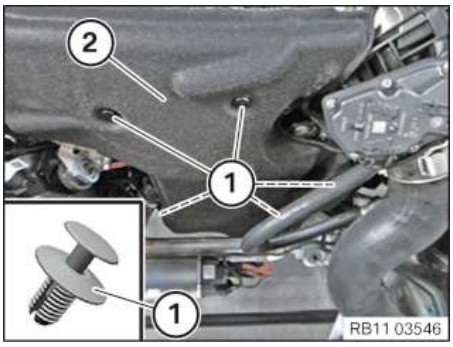
35 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.



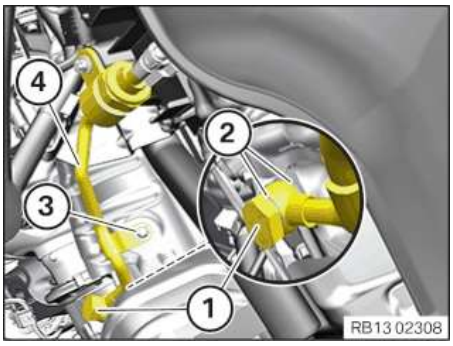
- Release and remove expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

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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.

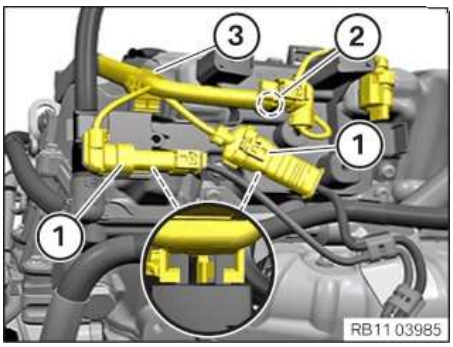
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

Contaminant or foreign body.

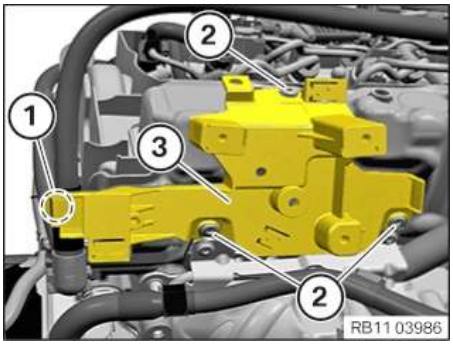
Contamination can result in malfunctions, operating failure or leaks.

- 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.

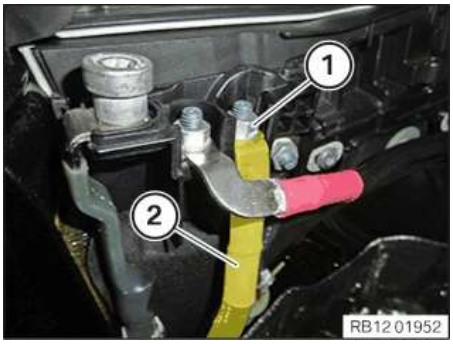
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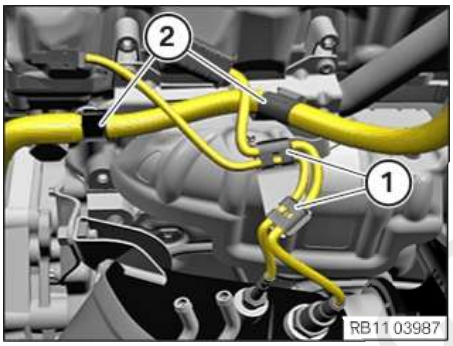
- Release the positive battery cable in the area (1) from the clamp and set it aside.
- Loosen screws (2).
- Feed out holder (3) for the sensor system and remove.



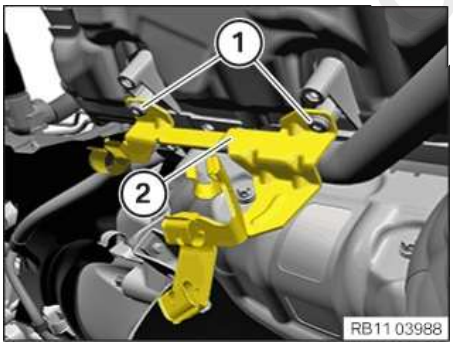
- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.



- Loosen nut (1).
- Feed out positive battery cable (2) and put to one side.



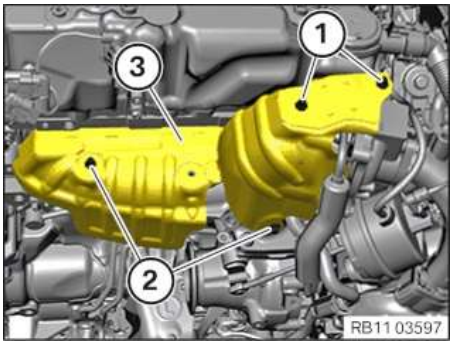
- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



- Loosen screws (1).
- Guide out and remove holder (2).

38 – Removing heat shield

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- 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.

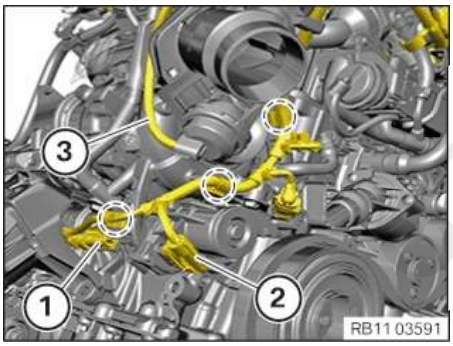
- Remove and install heavy components with the aid of another person/other persons.

TECHNICAL INFORMATION

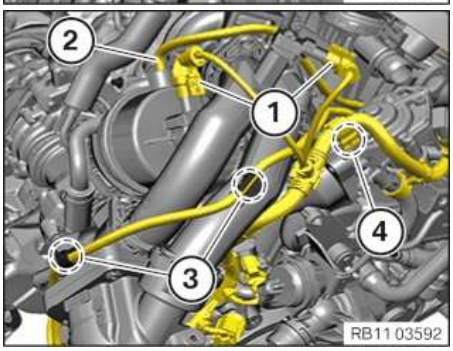
Prior to replacing the exhaust turbocharger: Observe the notes on troubleshooting on the exhaust turbocharger.
For additional information see: FUB-FUB-FB-130003-A10 Troubleshooting on the exhaust turbocharger

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).



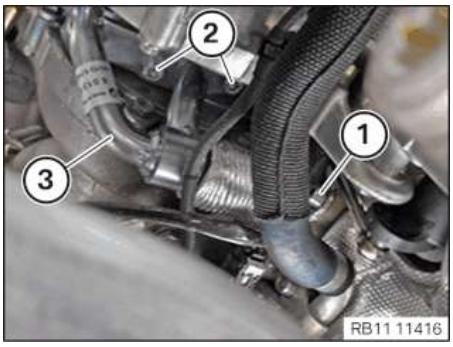
- Unlock plug connections (1) and disconnect.
- Pull off the vacuum hose (2).
- Release the vacuum hose in marked areas (3) from the exhaust turbochargers.
- Release the wiring harness in area (4) from the exhaust-gas recirculation cooler and set it aside.



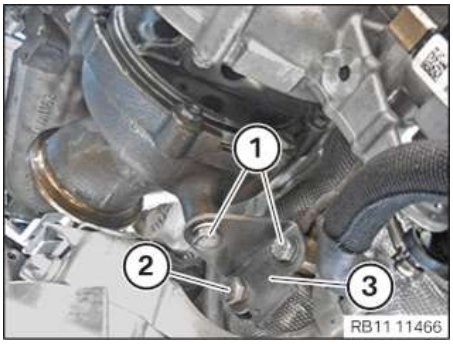
TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

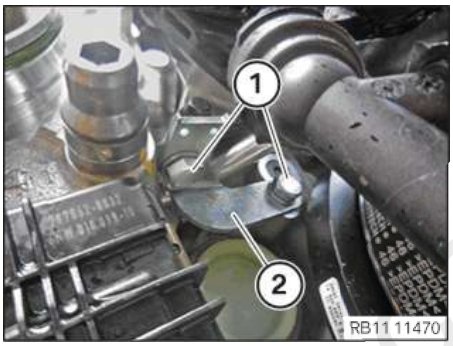
- Release the screws of the oil return line on the crankcase from the right wheel arch.



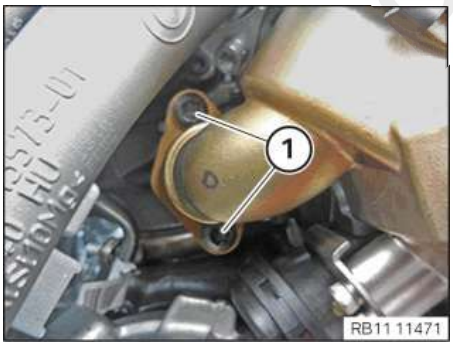
- Release the screw (1).
- Loosen screws (2).
- Remove oil return line (3) from the crankcase.
- Catch and dispose of emerging engine oil.



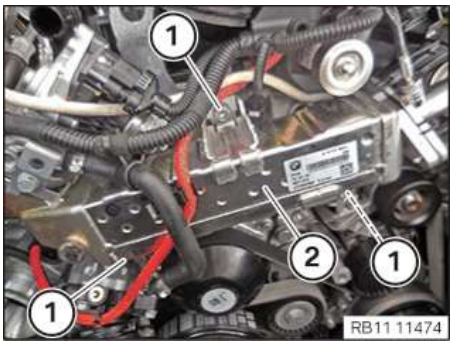
- Unscrew and remove the bolts (1) on the holder (3).
- Slacken screw (2) on holder (3), but do **not** remove.



- Loosen screws (1).
- Guide out and remove holder (2).

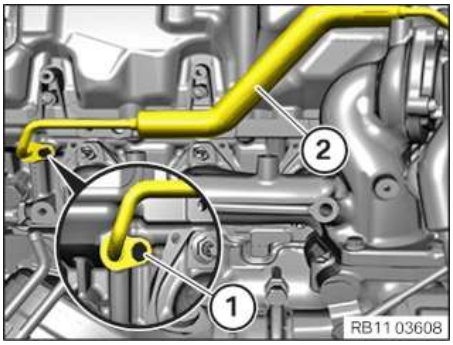


- Loosen screws (1).

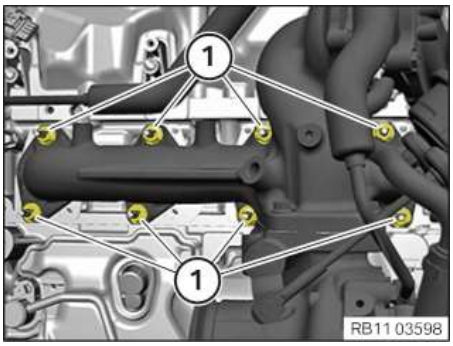


- Slacken screws (1), but do **not** remove.
- Release exhaust-gas recirculation cooler (2) slightly.

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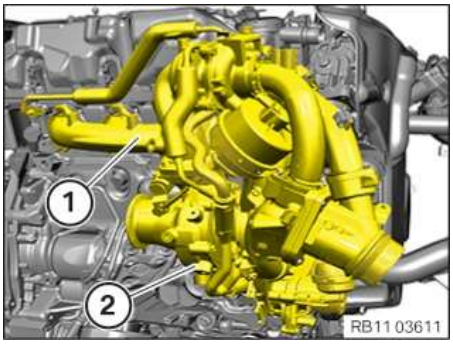
- Loosen screw (1).
- Remove oil feed line (2) for the high-pressure stage exhaust turbocharger from the cylinder head and set it aside.
- Catch and dispose of emerging engine oil.



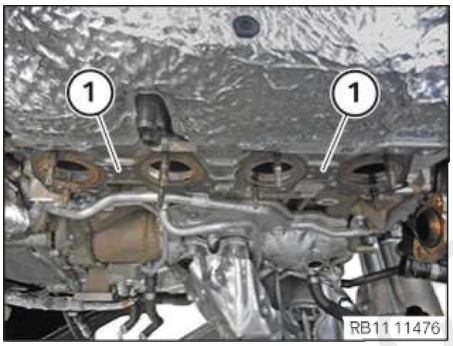
TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

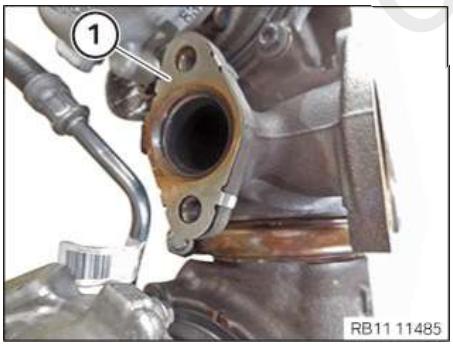
- Loosen nuts (1).



- 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.

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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.

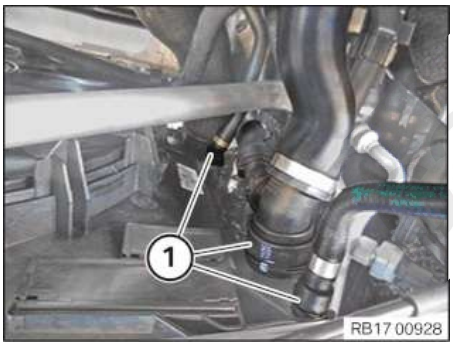
In the case of other removal work involving the draining of part quantities of coolant, the coolant level must be topped up with new coolant.

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

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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

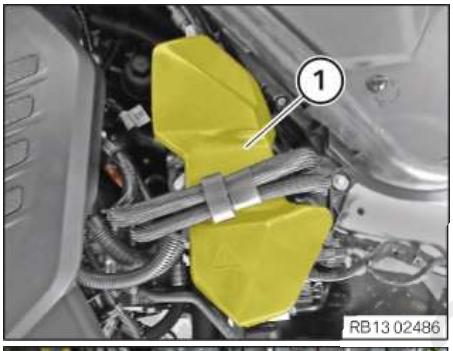
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

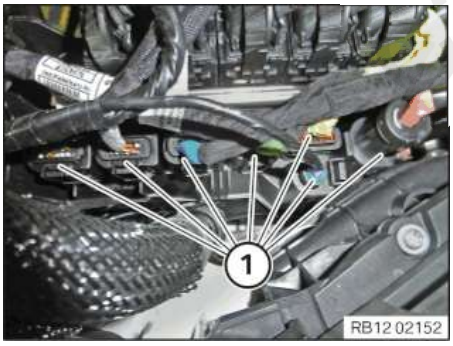
- Do not pull on the wires when disconnecting connectors and plug connections.

TECHNICAL INFORMATION

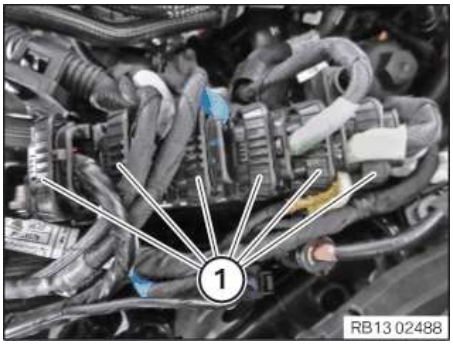
Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.



- Pull off cover (1) upwards, feed out and remove.

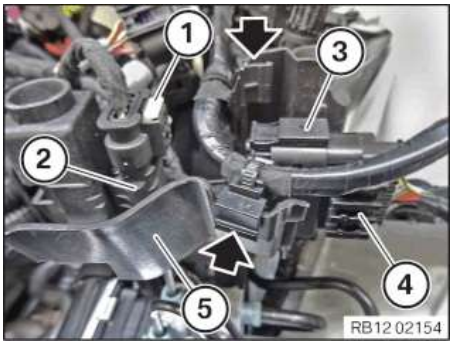


- Unlock and disconnect plug connections (1).

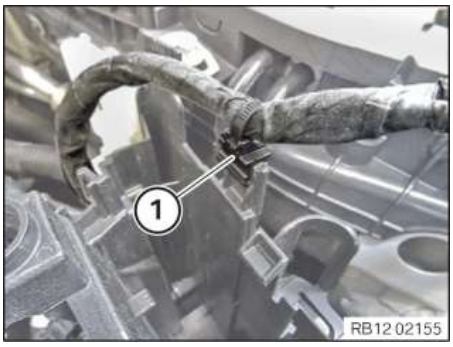


- Unlock and disconnect plug connections (1).

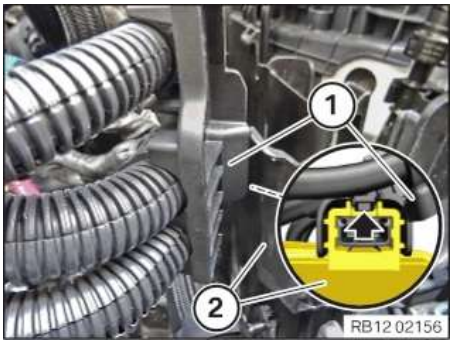
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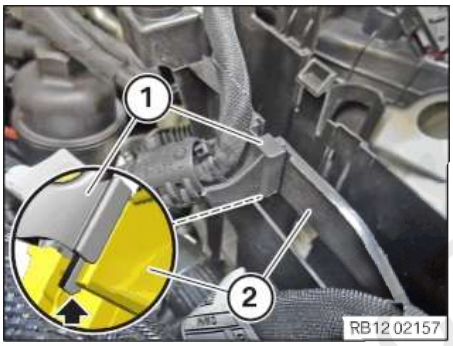
- Unlock plug connection (1) and disconnect.
- Unlock the plug (2) and disconnect from the control unit holder (5).
- Unlock plug connection (3) and disconnect.
- Unlock the plug (4) and disconnect from the control unit holder (5).
- Release the clamps (arrows).



- 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).

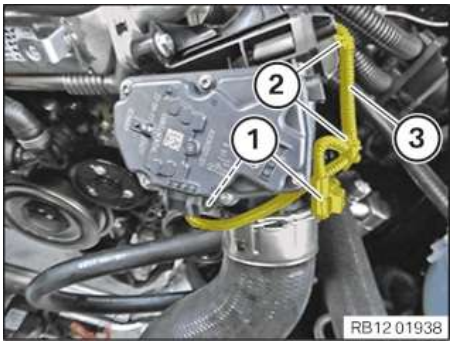


- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.

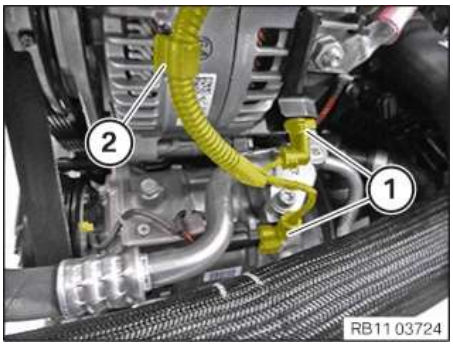


- Unlock holder (1) and feed out coolant line (2) and place it aside.

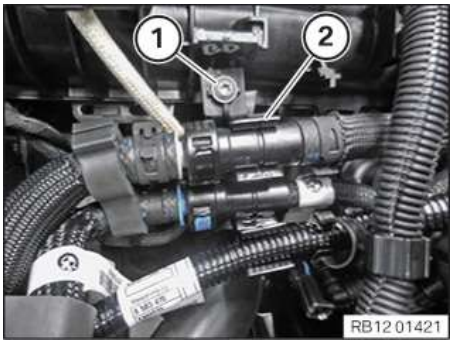
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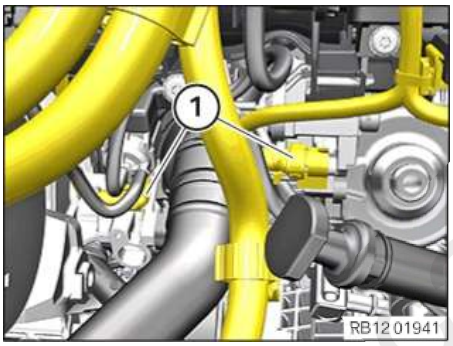
- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.



- 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).

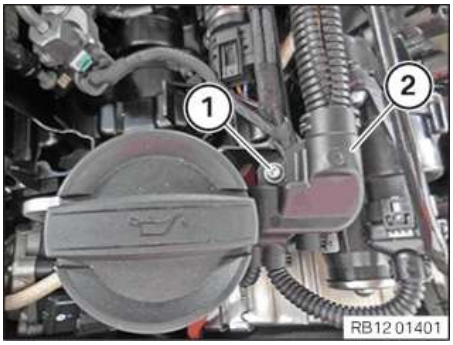


- Unlock and loosen connector (1).

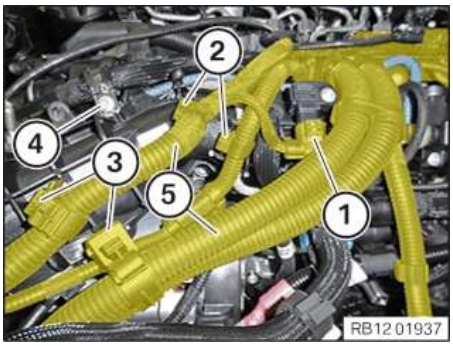


- Unlock plug connection (1) and disconnect.

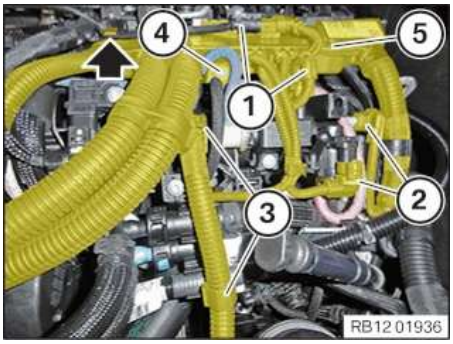
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- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.



- 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.

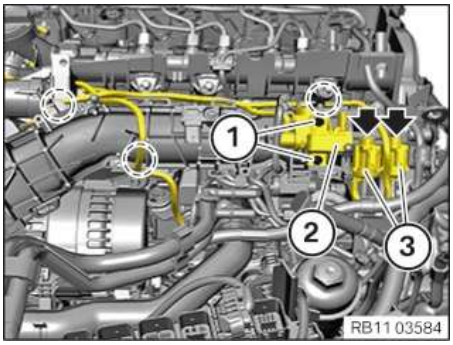


- Unlock clamp (1) and engage in this position.

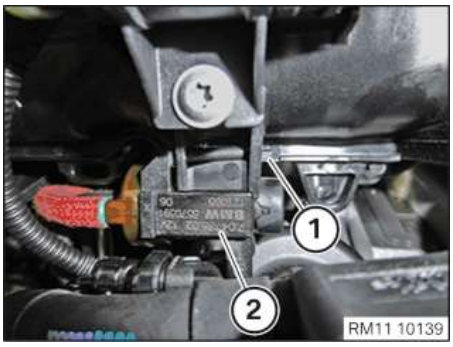


- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.

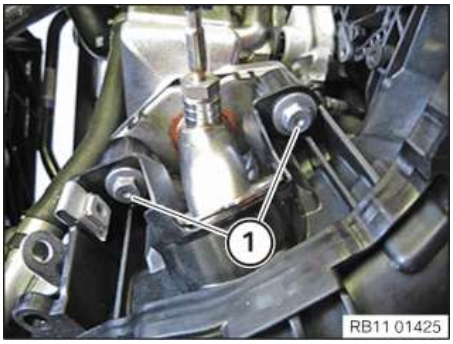
cardiagn.com



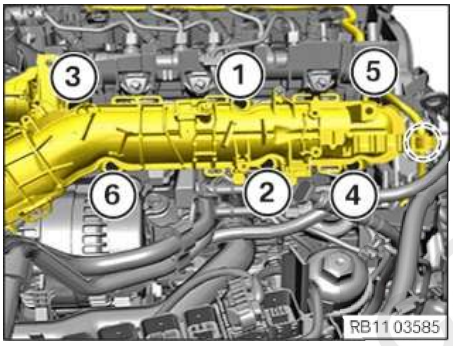
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



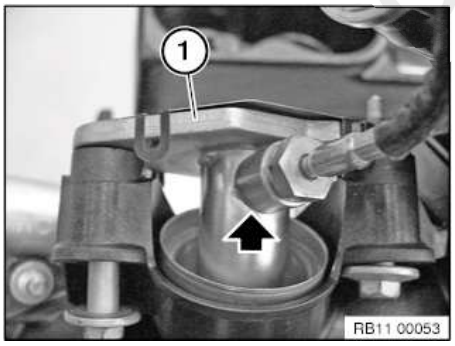
- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.



- 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**

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RISK OF DAMAGE

Escaping coolant on the starter generator.

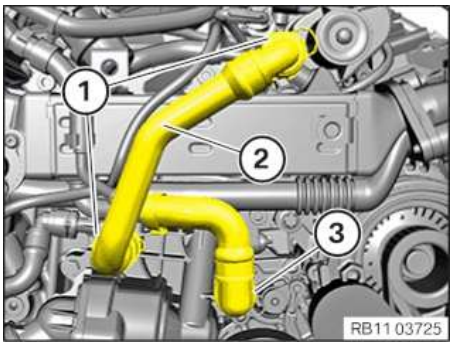
Damage and operating failure of the starter generator.

- 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:**

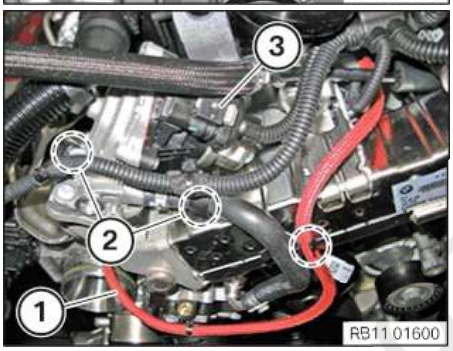
  Unlock and pull off coolant lines (1).



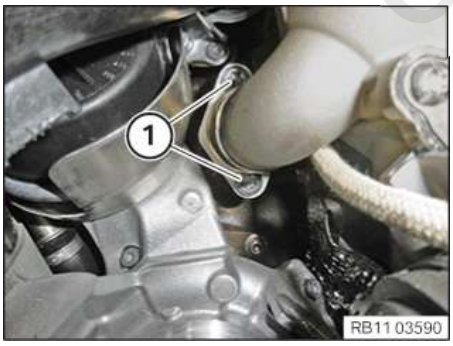
- **Version B:**

  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.

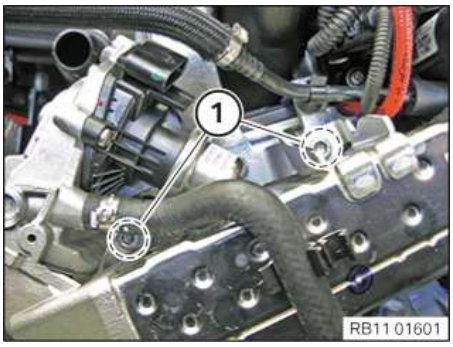


- Loosen the screws (1) on the intake system.

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- 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!

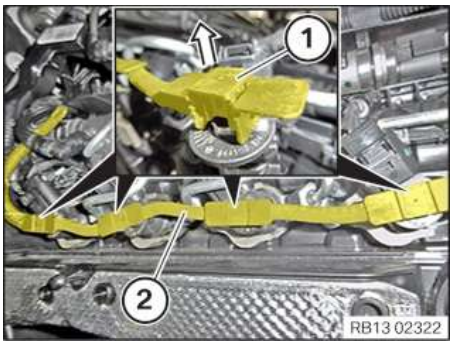
- Perform all work only on components that have cooled down.

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.



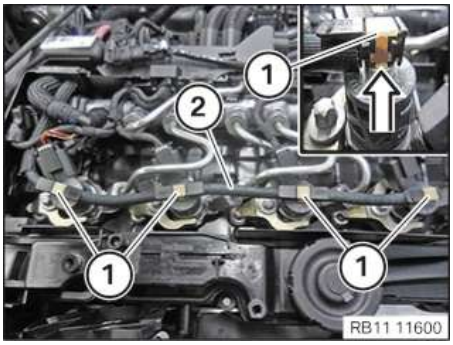
- **Version A:**

  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.

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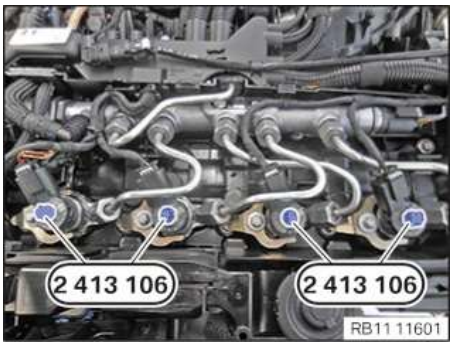


- **Version B:**

  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.

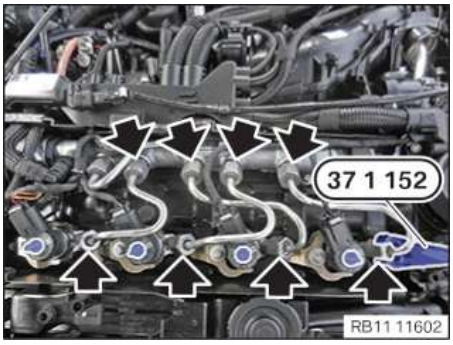
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TECHNICAL INFORMATION

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.

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TECHNICAL INFORMATION

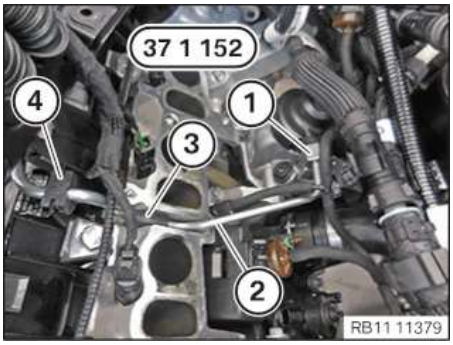
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

TECHNICAL INFORMATION

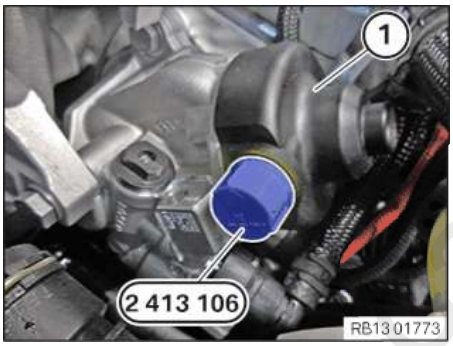
Reset special tool in early to avoid bending pressure lines.



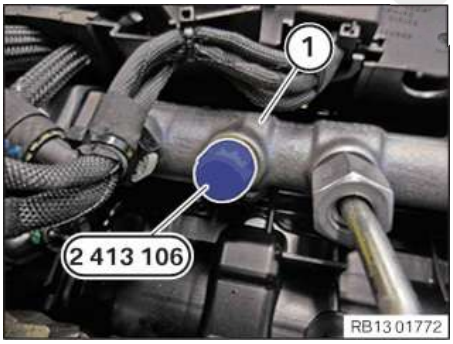
- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.



- 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

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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

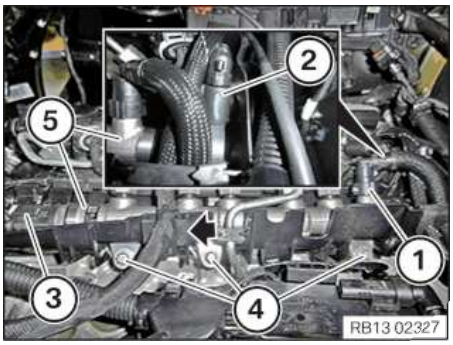
Contaminant or foreign body.

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.

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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

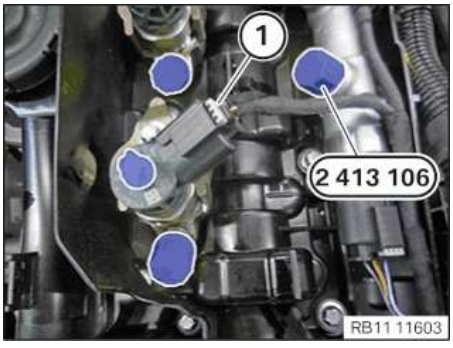
Electrostatic discharge.

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)

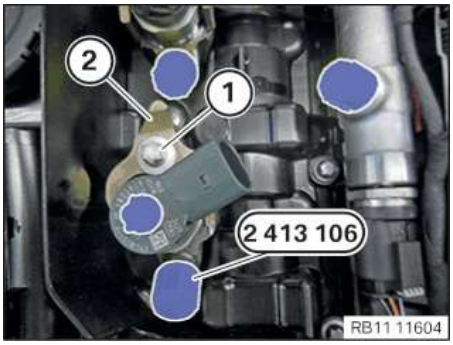
TECHNICAL INFORMATION

If several injectors are removed, ensure that each injector is installed at its original location (cylinder). Mark injectors.



- Unlock plug connection (1) and disconnect.

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- Loosen screw (1).
- Guide out and remove clamping claw (2).
- Feed out and remove the injector with slight rotational movements.

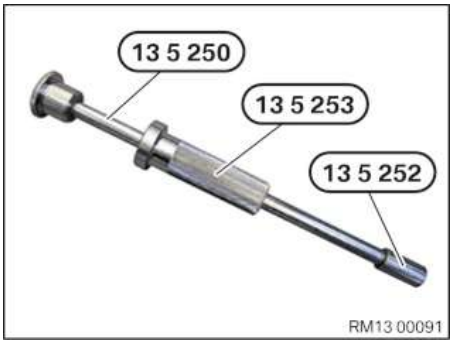
▸ **Loosen stuck injectors**

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).

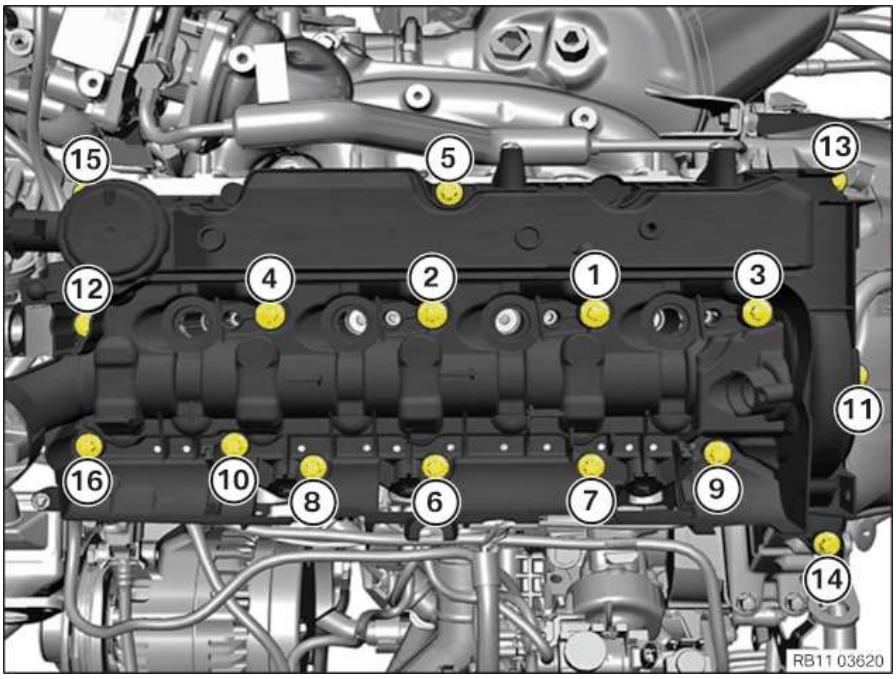


- Screw special tool 0 493 321 (13 5 250) with special tool 0 493 339 (13 5 252) onto pressure line connection (1) of injector.
- Release injector (1) with special tools 0 493 321 (13 5 250) and 0 493 339 (13 5 252) by means of **short** back and forth movements and remove.

49 – Removing the cylinder head cover

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Screw connection of the cylinder head cover



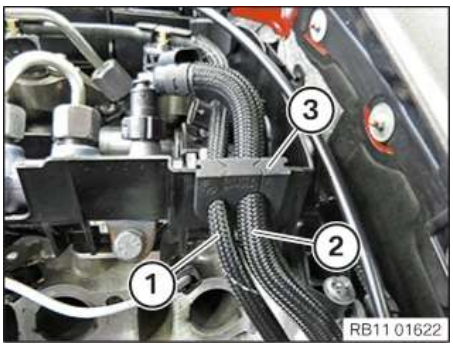
1 - 16 Bolts of the cylinder head cover



- Unlock and detach the locks.
- Feed the engine ventilation line (1) out and set it aside.

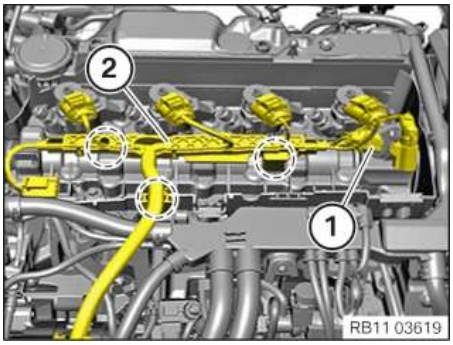


- Feed out and remove the heat shield (1).

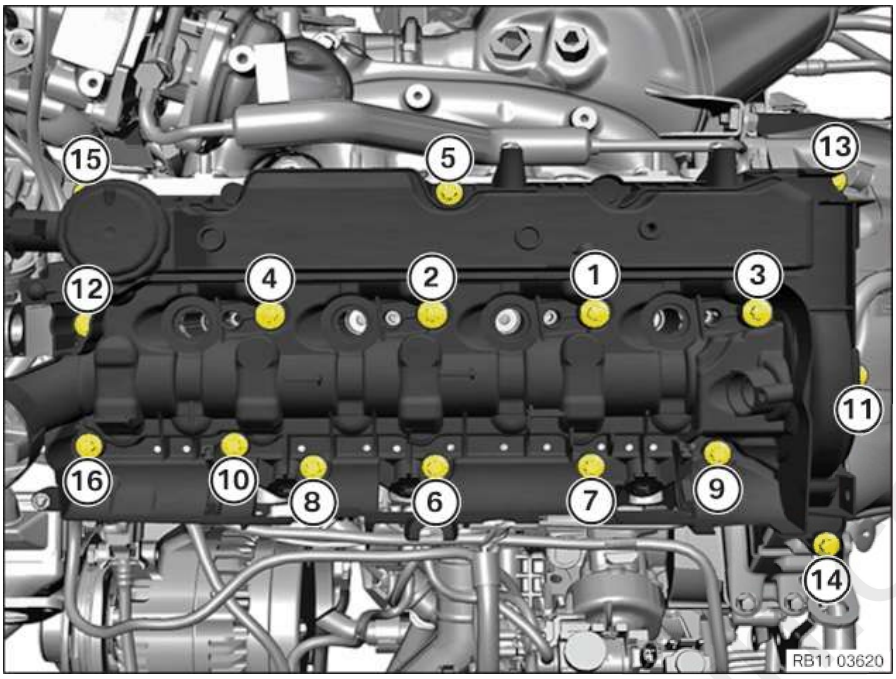


- Remove the leakage oil line (1) including the fuel return line (2) and the grommet (3) and put to one side.

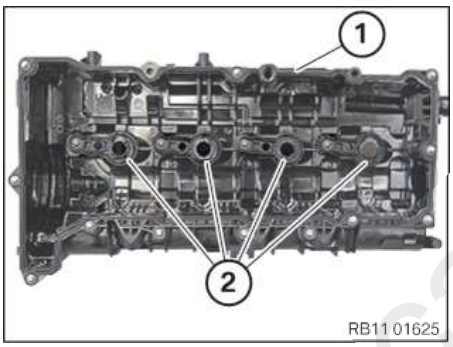
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- Unlock connector (1) and pull off.
- Disconnect the wiring harness (2) in the marked areas from the cylinder head cover and set aside.



- 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.

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WARNING

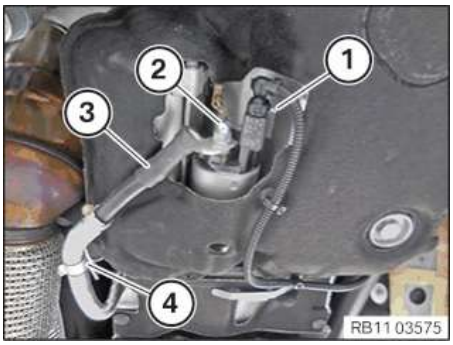
Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

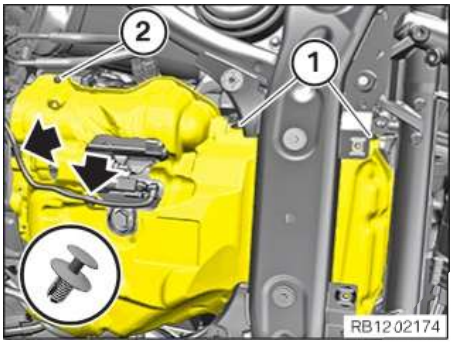
- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

TECHNICAL INFORMATION

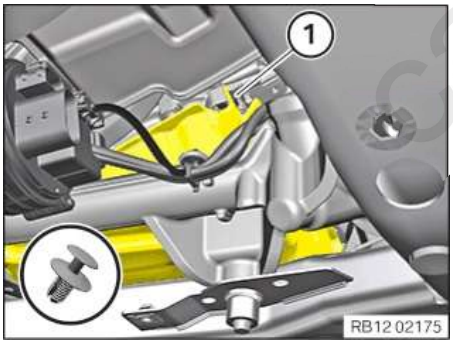
Make sure that the acoustic cover is **not** damaged while removing the starter motor.
A damaged lower acoustic cover can only be renewed when the front axle is lowered.



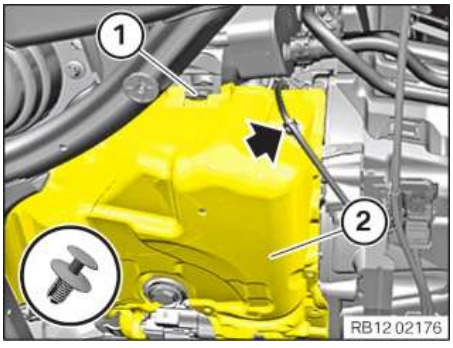
- Unlock plug connection (1) and disconnect.
- Release nut (2).
- Release positive battery cable (3) from holder (4).



- Loosen the expanding rivet (1).
- Undo fir tree clip (2).
- Release the clamps (arrows).

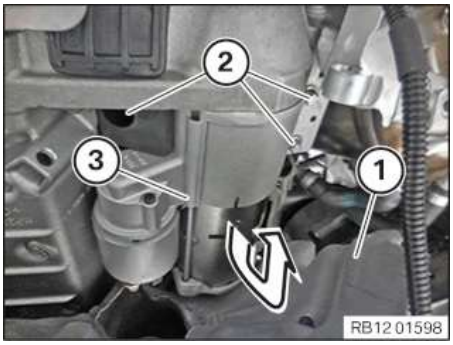


- Loosen expanding rivet (1).
- Lower the acoustic cover of the oil sump.



- Loosen expanding rivet (1).
- Loosen the clamp (arrow).
- Lower acoustic cover (2).

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- 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

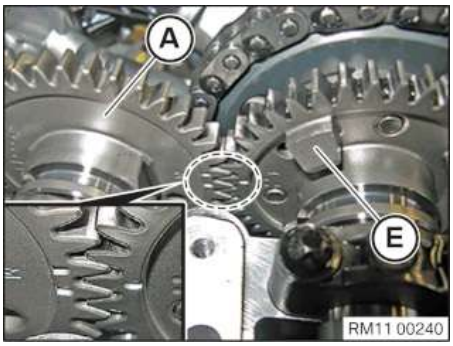
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

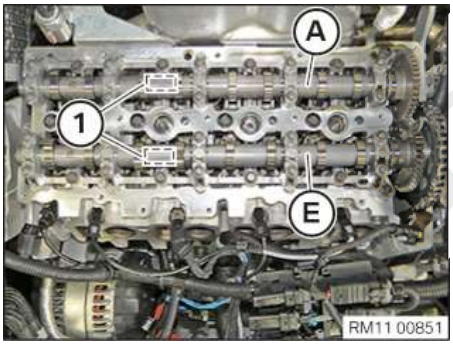
- Turn the combustion engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

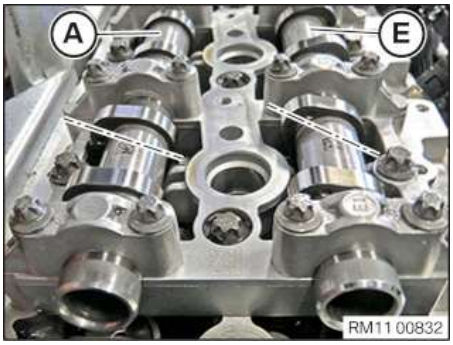
  Do **not** crank the engine in reverse.



- 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.



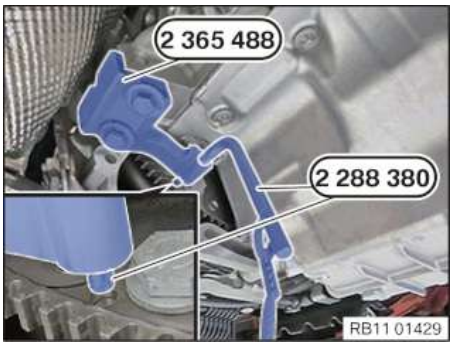
- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.

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- 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

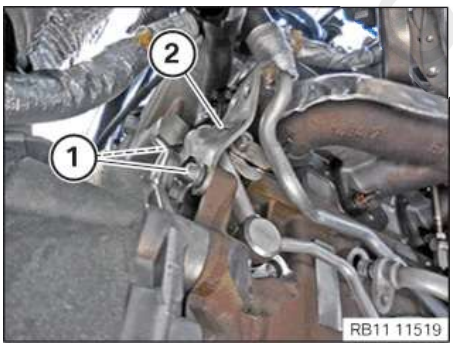
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

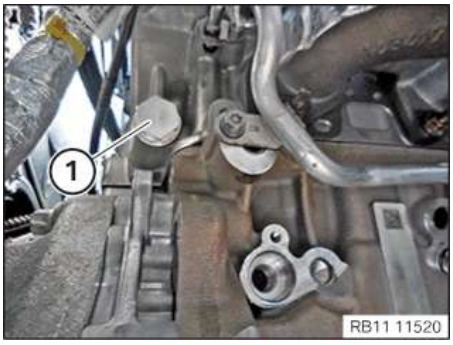
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Loosen screws (1).
- Guide out and remove holder (2).



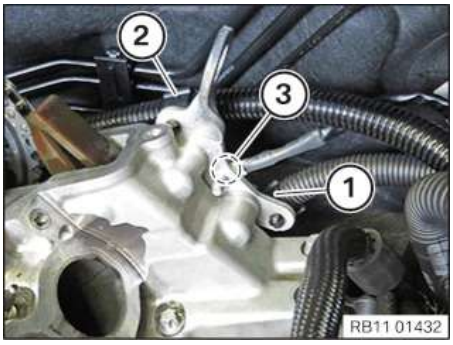
- Loosen the chain tensioner piston (1).
- Catch and dispose of emerging engine oil.

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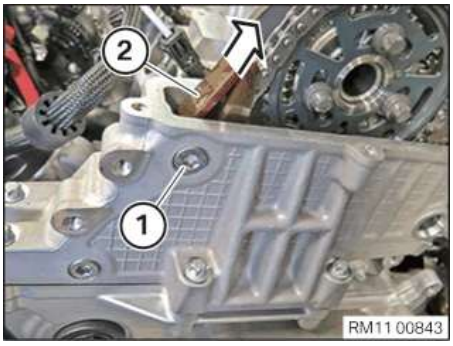


- Feed out and remove the sealing ring (1).

53 – Remove the timing chain guide rail

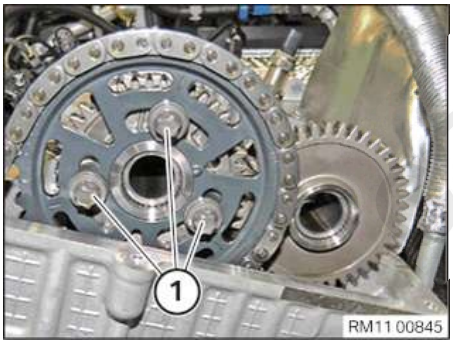


- Loosen the vehicle wiring harness (1) from the bracket.
- Release the positive battery cable (2) from the holder .
- Loosen the screw (3) and remove the grounding cable.



- 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



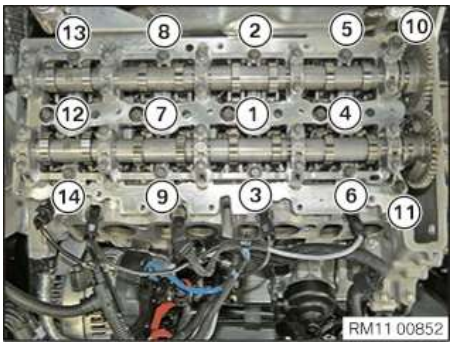
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

56 – Removing the camshaft support

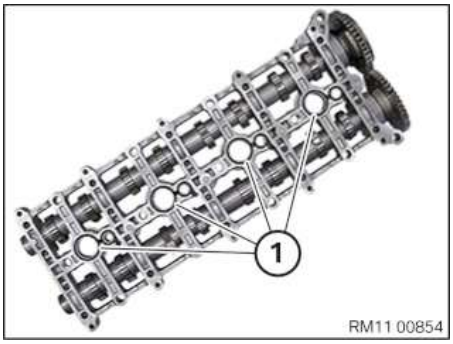
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TECHNICAL INFORMATION

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.

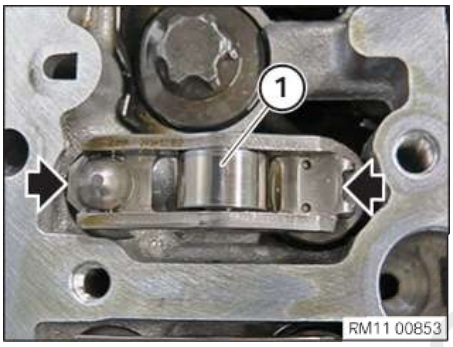


- Unscrew the screws evenly in order (14) to (1) in multiple increments.
- Feed out and remove the camshaft support with the camshafts towards the top.



- Guide out and remove gaskets (1).

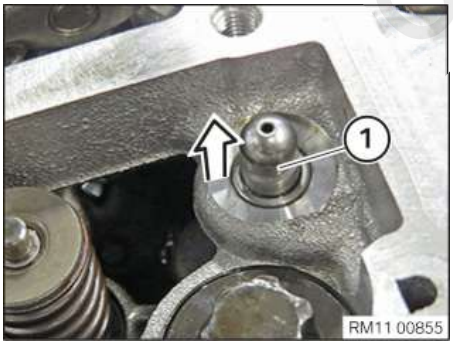
57 – Remove roller cam followers



- 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 – Removing cylinder head

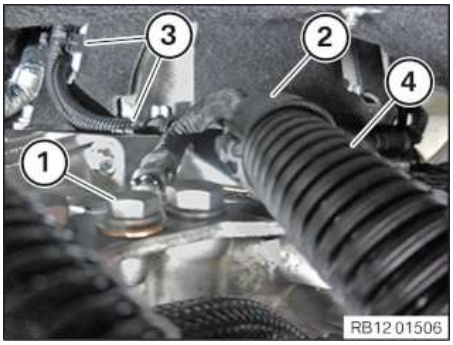
RISK OF DAMAGE

Heavy component.

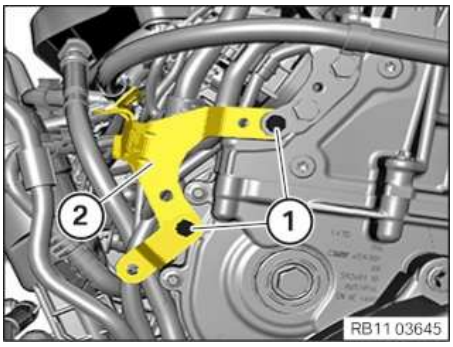
Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

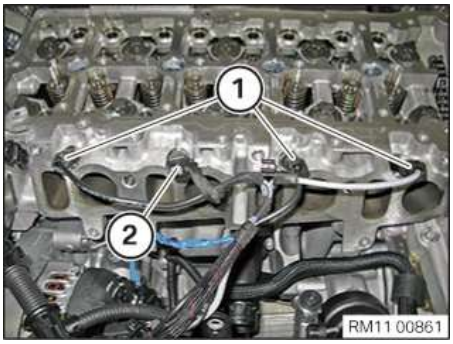
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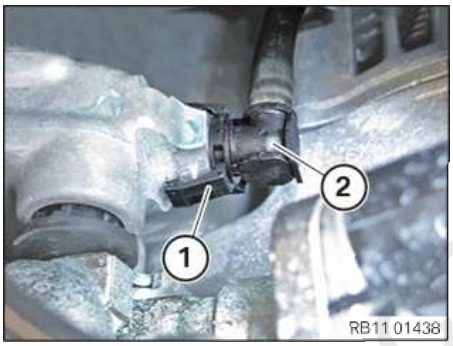
- Loosen screw (1).
- Unlock and loosen holder (2).
- Unlock and loosen the clamps (3).
- Feed out the wiring harness section (4) of the automatic transmission and place to one side.



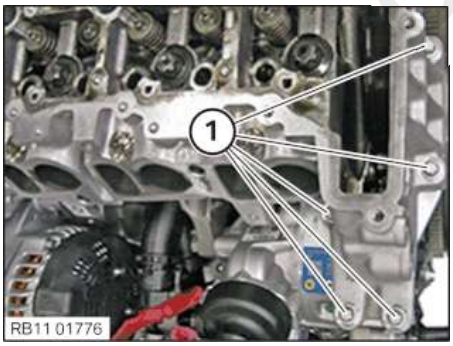
- Loosen screws (1).
- Guide out and remove holder (2).



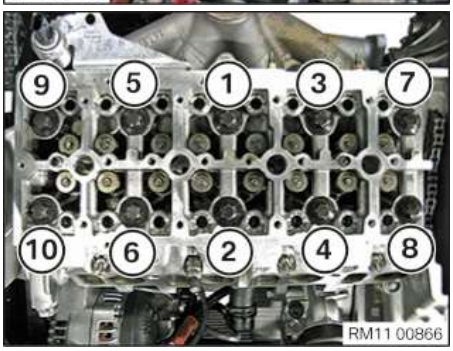
- Release plug connections (1) with special tool 0 495 140 (12 2 300).
- Unlock and disconnect the plug connections (1) and (2).
- Place wiring harness to one side.



- Release lock (1) of coolant line.
- Remove the coolant line (2) and set it aside.

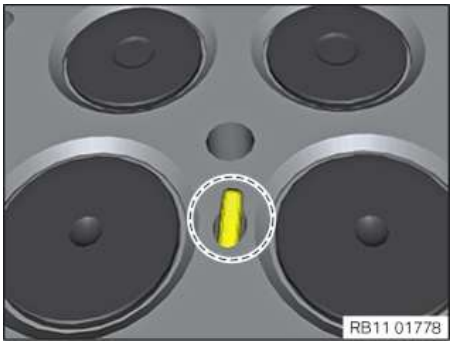


- Unscrew and remove the bolts (1).



- Release cylinder head bolts from **outside** to **inside** in the order (10) to (1).

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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).

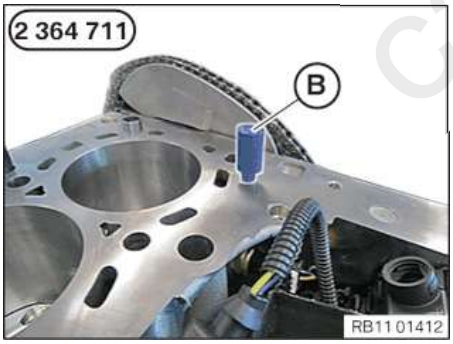
60 – Cleaning the sealing surface

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).

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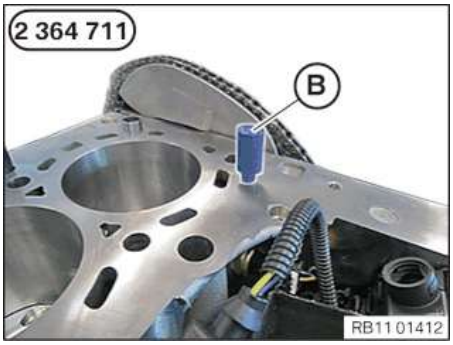
RISK OF DAMAGE

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.

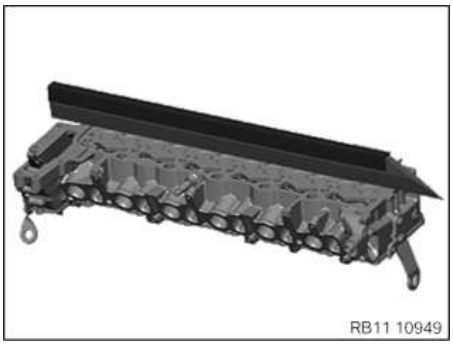
- Do not use any metal-cutting tools.

- Clean the sealing surface using special tool 0 495 104 (11 4 472).



- Remove special tool (B).

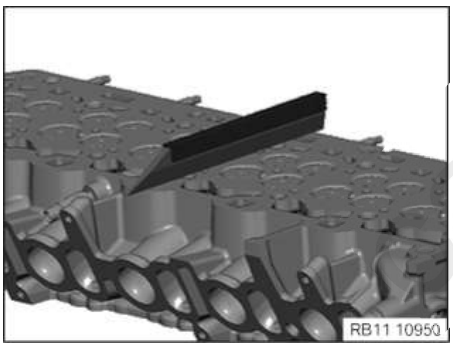
61 – Check the flatness of the cylinder head



- 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



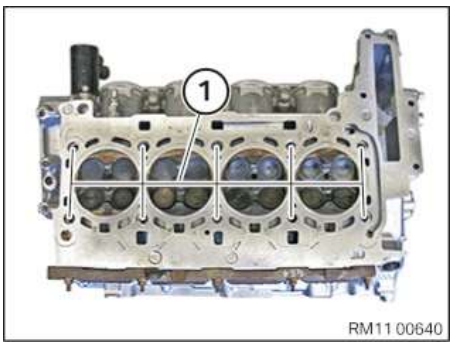
- Check the flatness of the cylinder head crosswise using a straightedge.

Cylinder head flatness

Maximum lengthwise deviation from flatness	0.10 mm
Maximum transverse deviation from flatness	0.05 mm

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62 – Replace cylinder head gasket



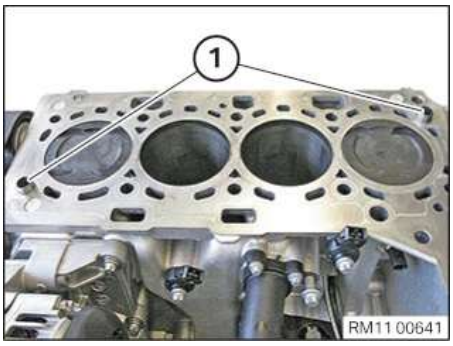
RISK OF DAMAGE

Damage to the surface.

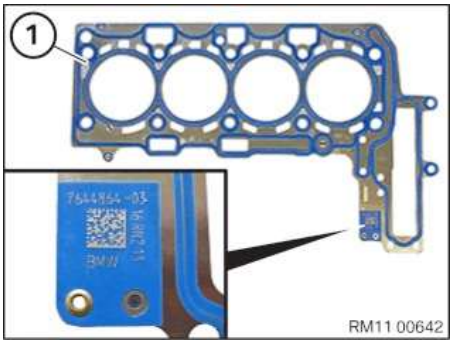
The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.

- Remove oil and dirt residue from the blind holes (1).

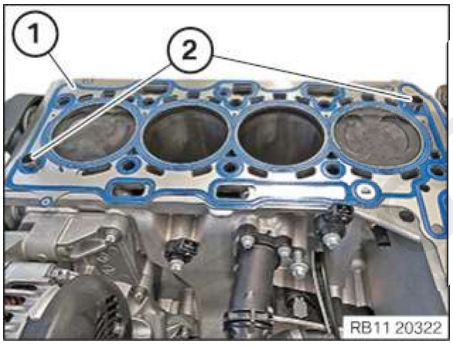


- Check if fitting sleeves (1) fit correctly and check for any damage.



- 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).

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POSTPROCESSES

63 – 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.

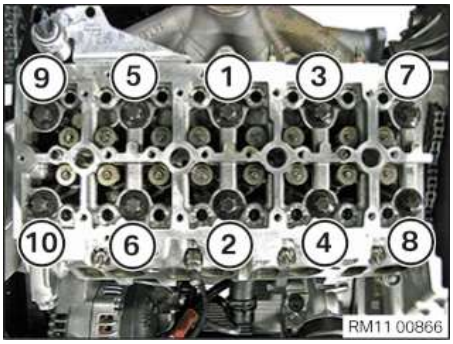
- Dry threaded holes (e.g. using compressed air).

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.

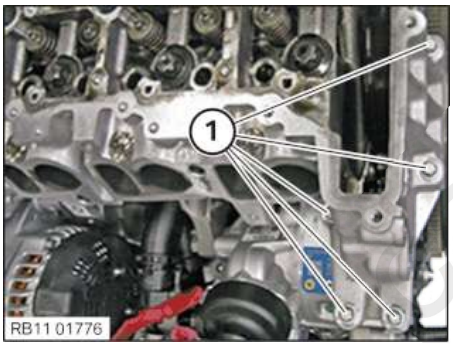


- Position the cylinder head gasket with the previously determined gasket thickness (number of holes).
- Fit new cylinder head screws.

  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

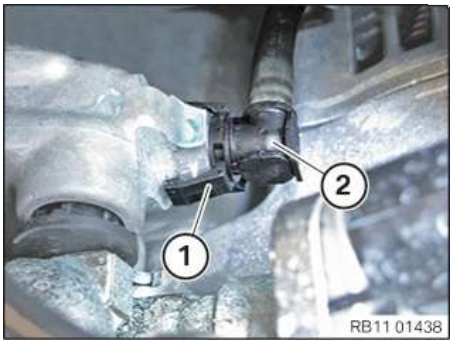
M12x1.5	Renew screws.	1. Tightening torque	50 Nm
		2. Angle of rotation	120 °
		3. Angle of rotation	120 °



- Insert screws (1) and tighten.

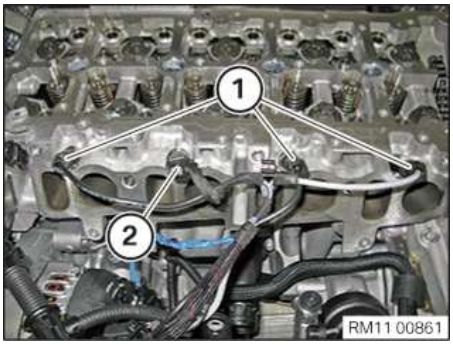
Cylinder head bolt to timing case cover

M8x40		Tightening torque	19 Nm



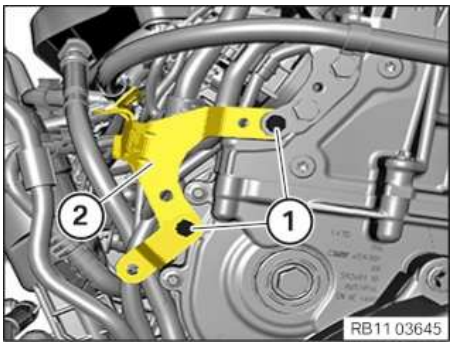
- Fit and lock coolant line (2).

  The lock (1) must engage audibly.



- Connect connectors (1) and (2), then lock.

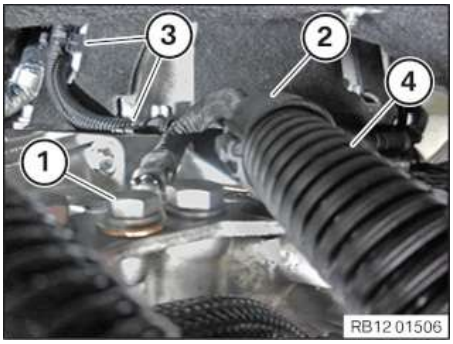
  The connectors (1) and (2) must audibly engage.



- Insert and install the holder (2).
- Tighten the screws (2).

Standard screw connection M6

M6		Tightening torque	8 Nm

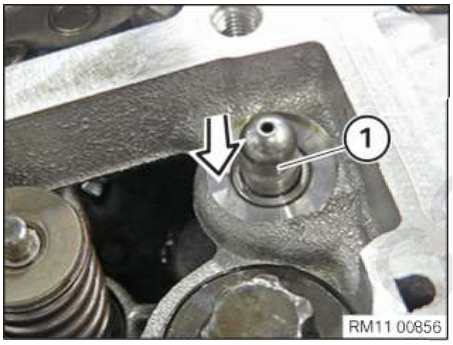


- Guide in the wiring harness section (4) of the automatic transmission and install.
- Lock holder (2).
- Make sure the bracket (2) engages audibly.
- Secure clamps (3).
- Tighten down screw (1).

Ground to cylinder head

M6		Tightening torque	8 Nm

64 – Installing all hydraulic valve clearance compensating elements

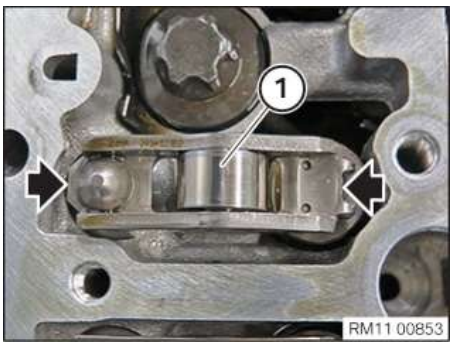


- Make sure to observe the assignment of the roller cam followers to the hydraulic valve clearance compensating elements when reusing the hydraulic valve clearance compensating elements (1).
- Insert and install all hydraulic valve clearance compensating elements (1) in the direction of the arrow.

65 – 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).

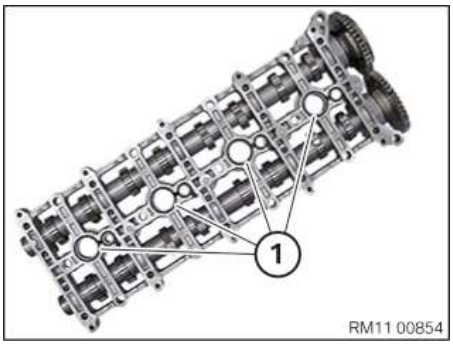
  Roller cam followers (1) that have already been used must be installed in the same place.
- Note the mounting orientation of the roller cam followers (1).
- Oil all roller cam followers (1).

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66 – Installing the camshaft support

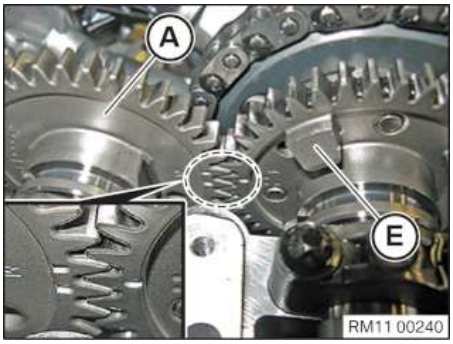
TECHNICAL INFORMATION

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.

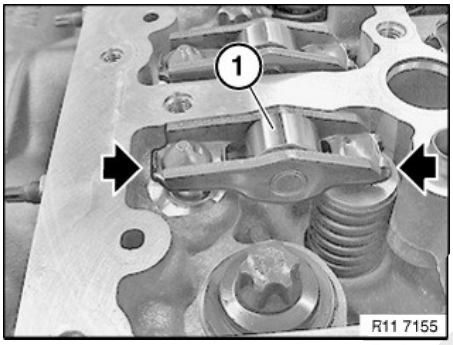


- Renew seals (1).

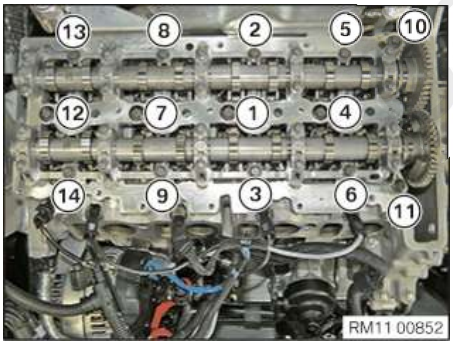
  Parts: Seals
- Insert and install the gaskets (1).



- 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).



- 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

67 – Installing the special tool to secure the exhaust camshaft

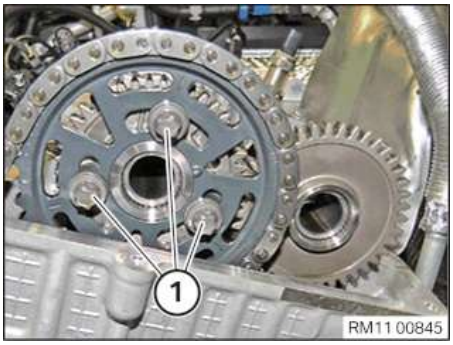


- Place special tool 0 496 112 (11 8 760) on exhaust camshaft.

  Special tool 0 496 112 (11 8 760) must lie flush on cylinder head.

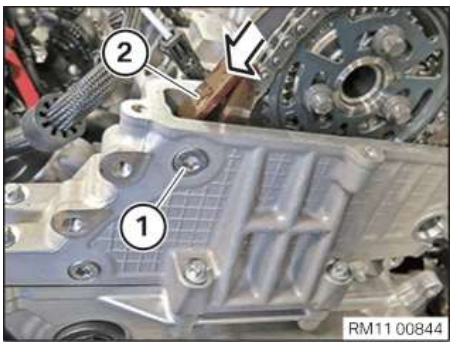
68 – Installing the camshaft sprocket on the intake camshaft

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- 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.

69 – Installing the guide rail of the timing chain

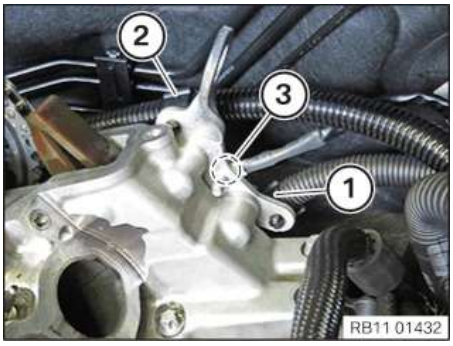


- Position the guide rail (2) in the direction of the arrow.
- Make sure the guide rail (2) is correctly installed at the bottom bearing journal.
- Renew bearing journal (1).

  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.

70 – Installing the chain tensioner piston



TECHNICAL INFORMATION

The oil chamber must be drained for reuse of the chain tensioner.

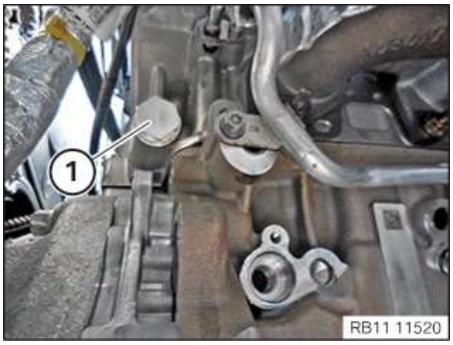
- Place the chain tensioner on a level support pad and slowly compress in the direction of arrow.
- Repeat process twice.



- Renew sealing ring (1).

  Parts: Sealing ring
- Insert and install the sealing ring (1).

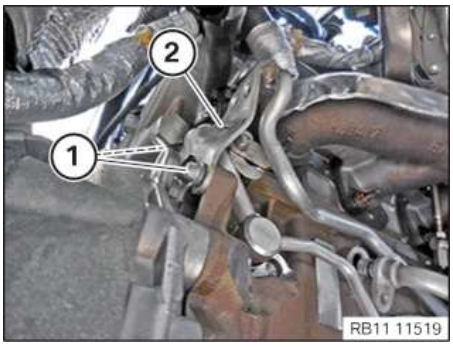
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- Insert and install the chain tensioner piston (1).
- Tighten the chain tensioner piston (1).

Chain tensioner piston to cylinder head

22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

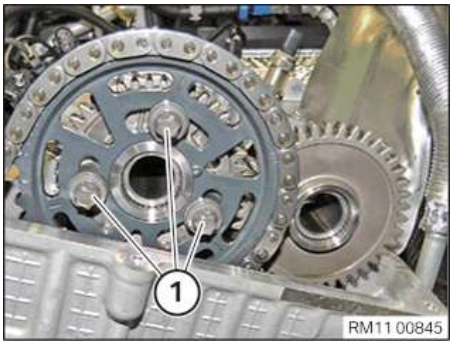


- Insert and install the holder (2).
- Tighten the screws (1).

Holder to crankcase

M8X16		Tightening torque	19 Nm

71 – Tightening the camshaft sprocket on the intake camshaft



- Tighten the screws (1).

Camshaft sprocket to camshaft

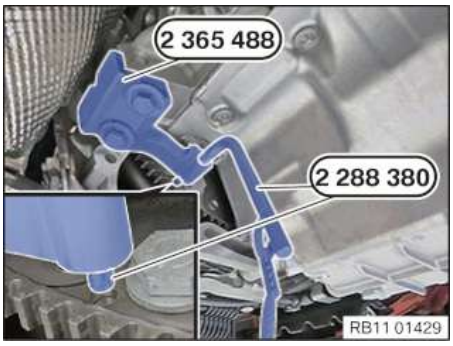
M7x17.			17 Nm

72 – Removing the special tool for fixing the exhaust camshaft



- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

73 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

74 – Checking camshaft timing

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RISK OF DAMAGE

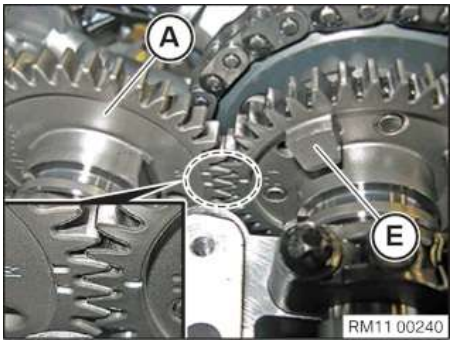
Damage to the engine.

The engine may be damaged if it is manually rotated in the wrong direction.

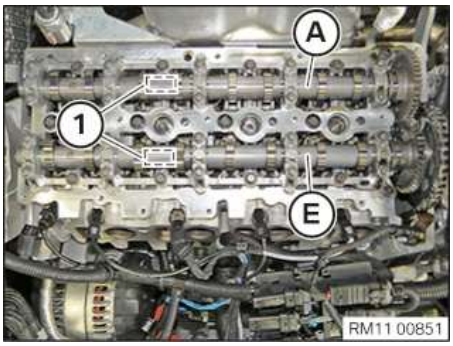
- Turn the combution engine exclusively by hand in the correct direction of rotation: a) Clockwise, facing the vibration damper or b) Anticlockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

- Crank the engine with special tool 0 493 380 (11 6 480) on cylinder 1 to TDC firing position.

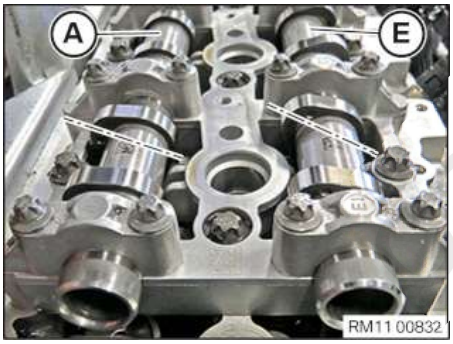
  Do **not** crank the engine in reverse.



- 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.



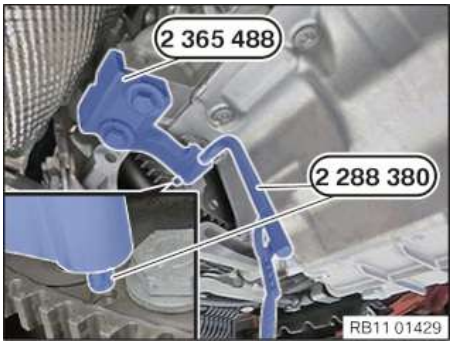
- Make sure the cam on the intake camshaft (E) on cylinder 1 is pointing upwards at an angle.
- Make sure the cam on the exhaust camshaft (A) on cylinder 1 is pointing towards the outside left at an angle.



- 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.

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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

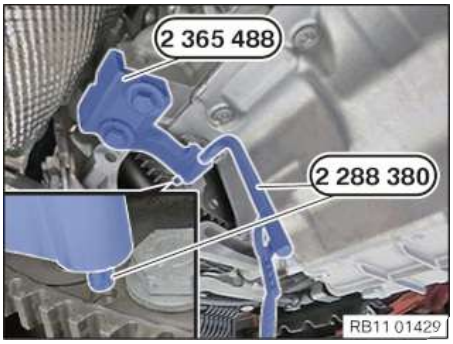
- Block crankshaft at cylinder in 1 TDC firing position with special tool 2 288 380.

75 – Removing the special tool for fixing the exhaust camshaft



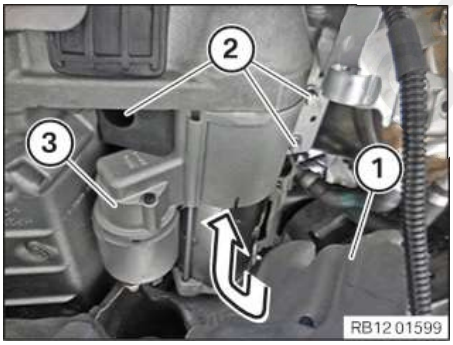
- Remove the special tool 0 496 112 (11 8 760) to fix the exhaust camshaft.

76 – Removing the special tool to disconnect the crankshaft



- Remove special tool 2 288 380.
- Release screws and remove the special tool 2 365 488.

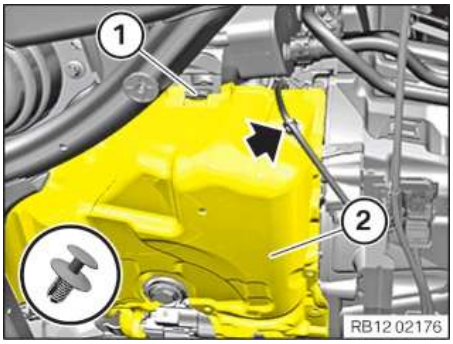
77 – Installing starter motor



- 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).

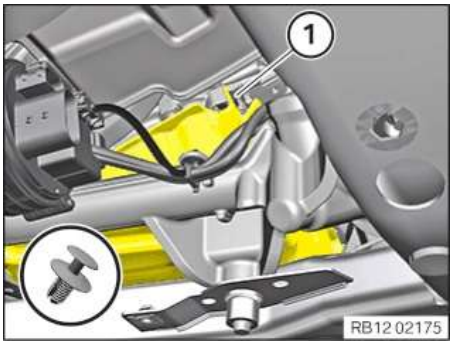
Starter motor to engine

M8X60		Tightening torque	19 Nm

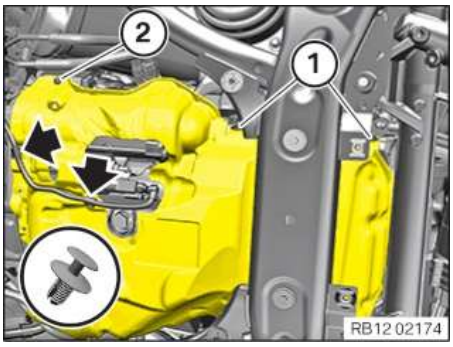


- Position the acoustic cover (2).
- Fasten expanding rivet (1).
- Secure clamp (arrow).

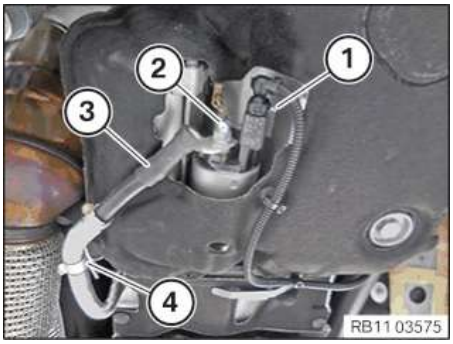
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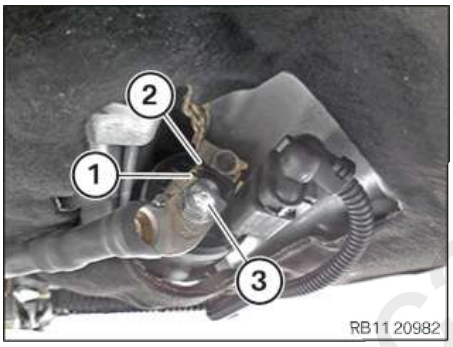
- Fasten expanding rivet (1).



- 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).

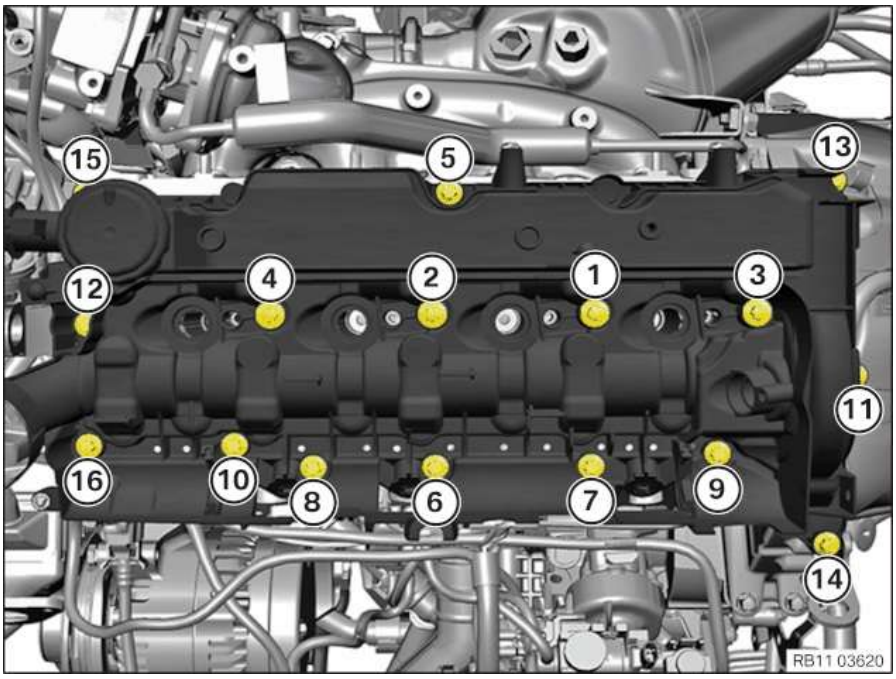
Battery positive lead to starter

M8		Tightening torque	13,5 Nm

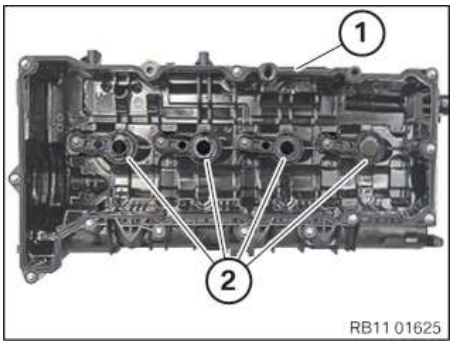
78 – Installing cylinder head cover

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Screw connection of the cylinder head cover

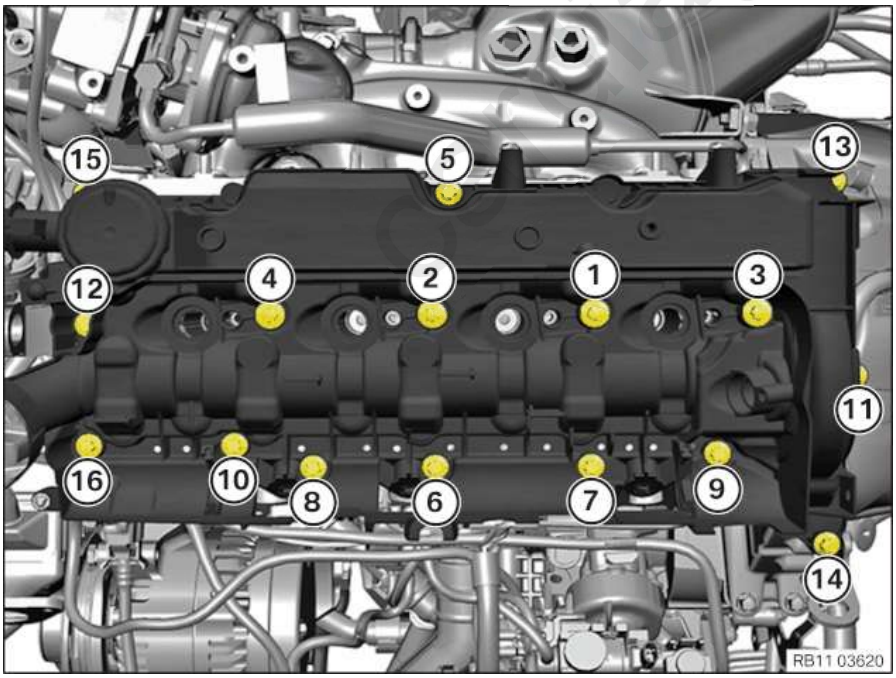


1 - 16 Bolts of the cylinder head cover



- Renew the profile seals (1) and (2) of the cylinder head cover.

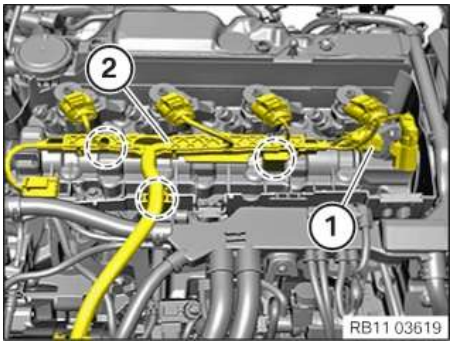
  Parts: Profile seals



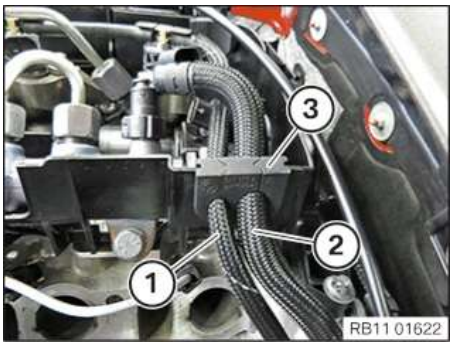
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

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.

79 – 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.

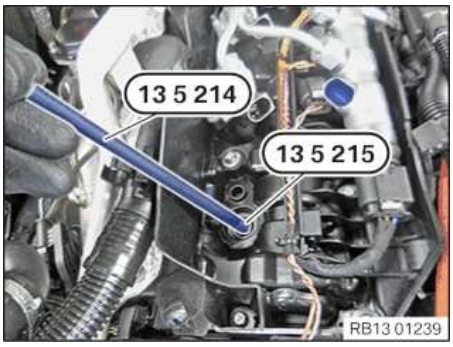
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RISK OF DAMAGE

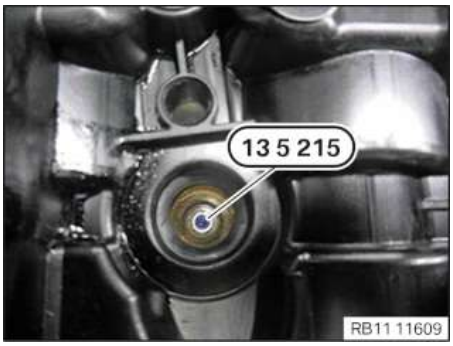
Contaminant or foreign body.

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.



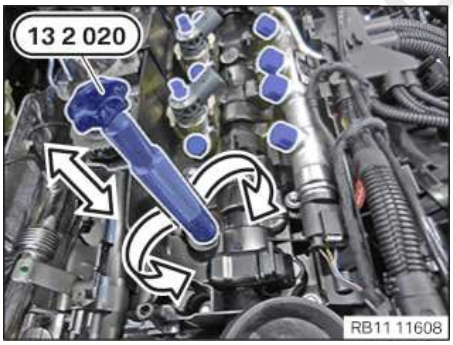
- Check whether the sealing ring remained in the injector shaft and remove the sealing ring as needed.
- Insert the special tool 0 493 763 (13 5 215) with the special tool 0 493 762 (13 5 214) from the set of special tools 0 493 758 (13 5 210) into the injector shaft.
- Remove special tool 0 493 762 (13 5 214).



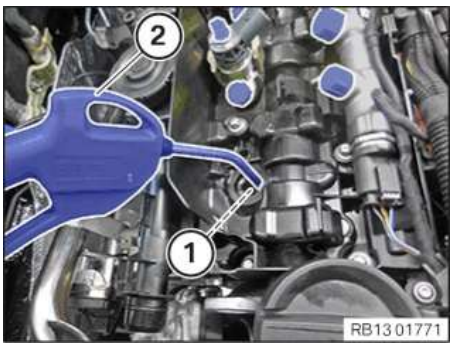
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



- 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).

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- 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.

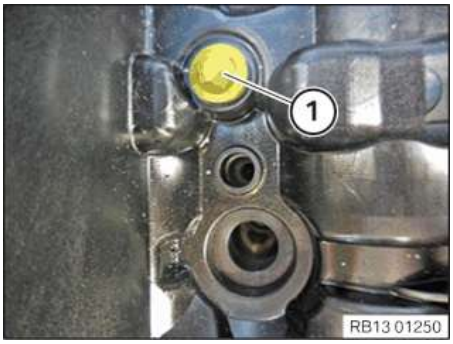
▸ **Check the placement of the clamping claw**

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**

RISK OF DAMAGE

Contaminant or foreign body.

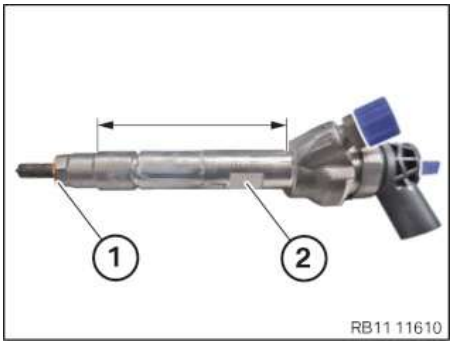
Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

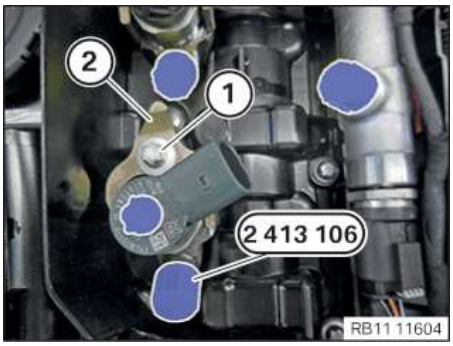
Lightly grease the injector shaft with high temperature-resistant grease.
For additional information see: 11 00 ... Overview of consumables in Electronic Parts Catalogue

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- Renew the copper sealing ring (1) on the injector (2).

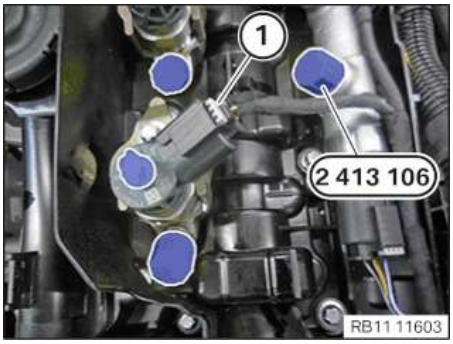
  Parts: Copper sealing ring
- Lightly grease the injector in the marked area with heat-resistant grease before installing the injector (2) in the injector shaft.



- 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.

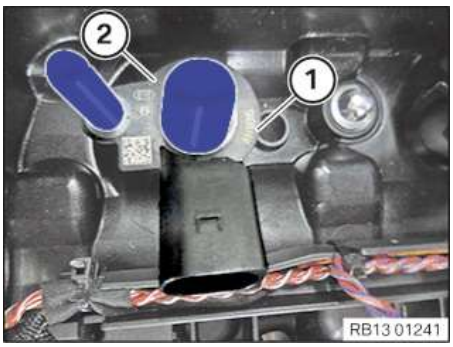
▸ **Replacement: Perform injection quantity compensation**

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.

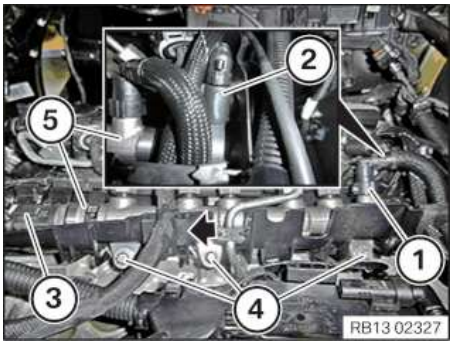


- Read off the adjustment value (1) on the new injector (2).

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- 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.

80 – 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.

81 – 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.

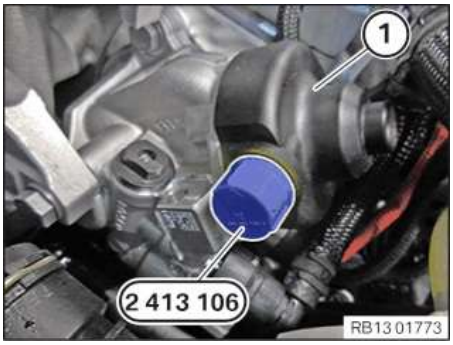
Danger of injury!

- 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.

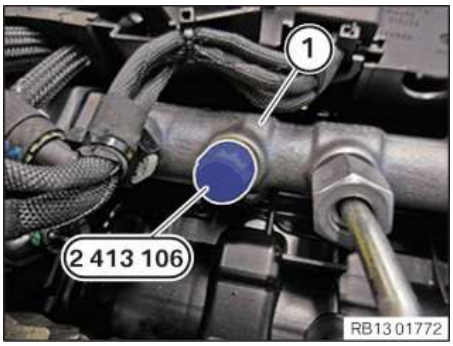
TECHNICAL INFORMATION

Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

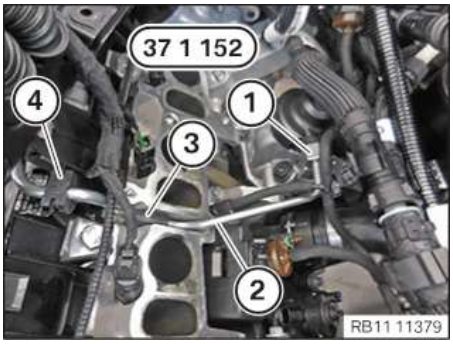
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- Feed out and remove special tool on the high pressure pump (1).



- 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.

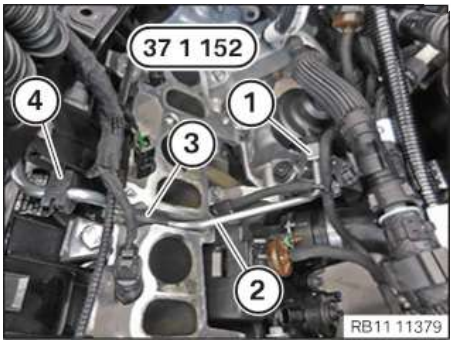
TECHNICAL INFORMATION

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.

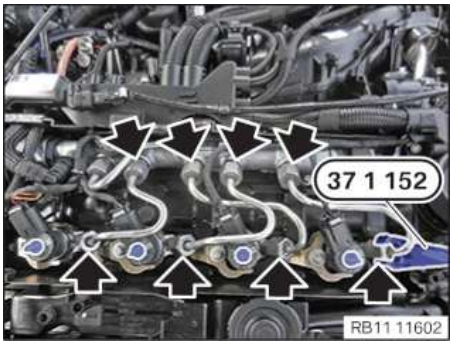
- Tighten union nut (1) on the high pressure pump with the special tool .

High pressure lines between high pressure pump and rail

High-pressure pipe		Tightening torque	24.5 Nm

82 – Installing the high pressure lines between the injector and the rail

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- 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.

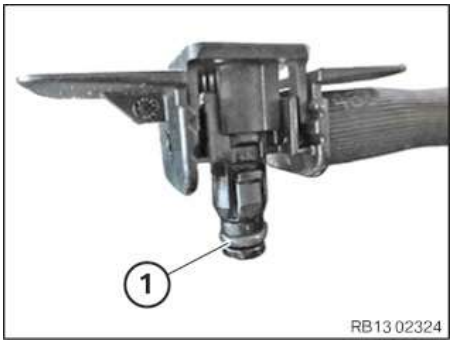
- Tighten the high pressure lines (arrows) with the special tool .

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**).

83 – Attach the leakage oil line on the injectors

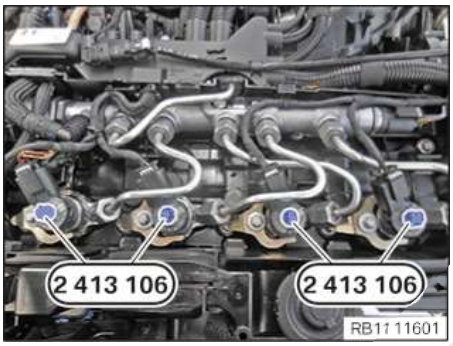


- **Version A:**

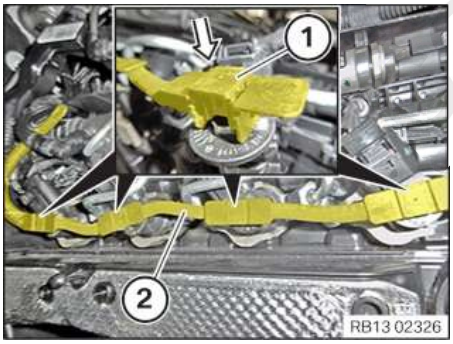
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

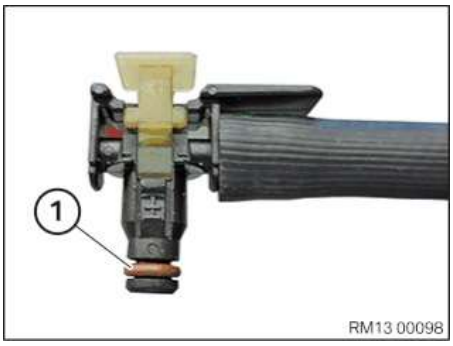
  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.



- 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.



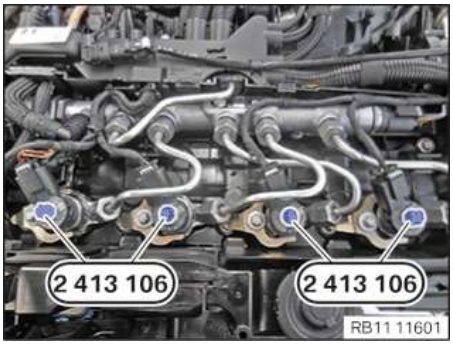
- **Version B**:

  Check sealing ring (1) for damage, renew leakage oil line if necessary.

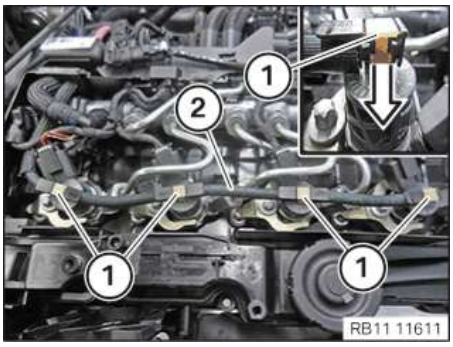
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.

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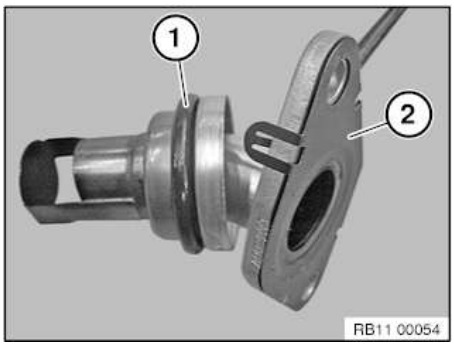


- Feed out the special tools and remove.



- 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.

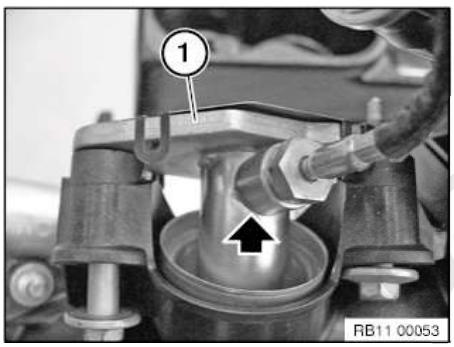
84 – Installing the intake plenum



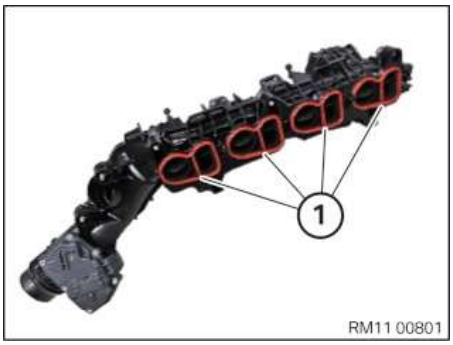
- Renew O-ring (1).

  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

  Parts: Gasket
- Position the seal (2) and clip it in.



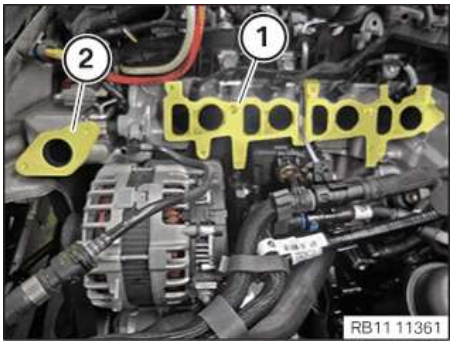
- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).



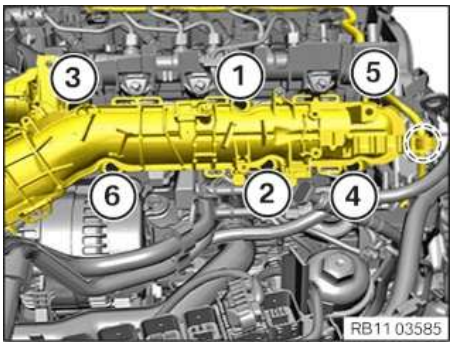
- Renew seals (1).

  Parts: Seals
- Ensure that the seals (1) are firmly mounted on the intake plenum.

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- Clean connection points (1) at cylinder head.
- Clean the connection point (2) on the exhaust-gas recirculation cooler.

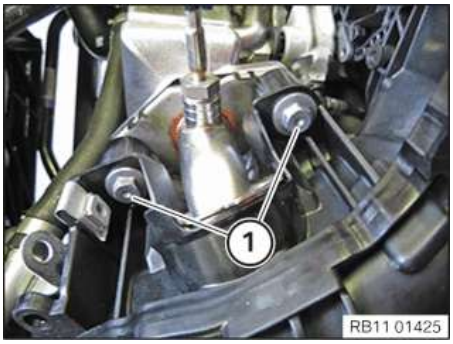


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

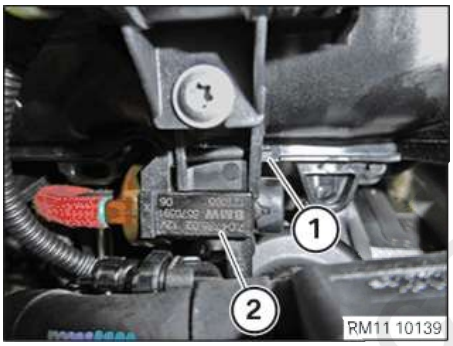
- Attach the wiring harness and fuel lines in the marked area on the intake plenum.



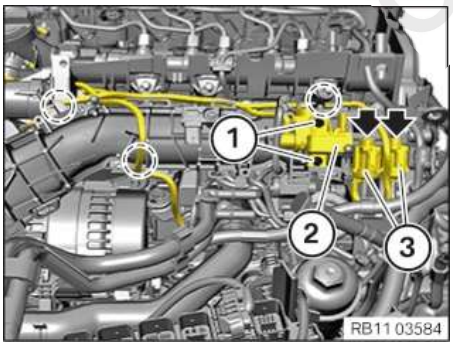
- Tighten the screws (1).

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.



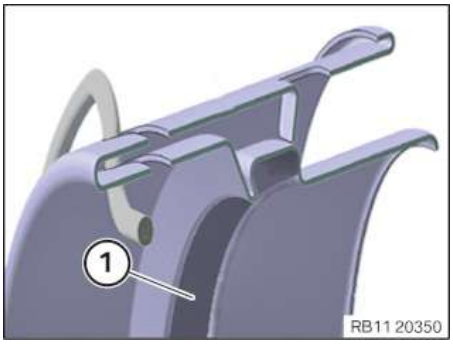
- Check the seal (1) for damage, and renew if necessary.

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▸ **Replacing damaged seal**

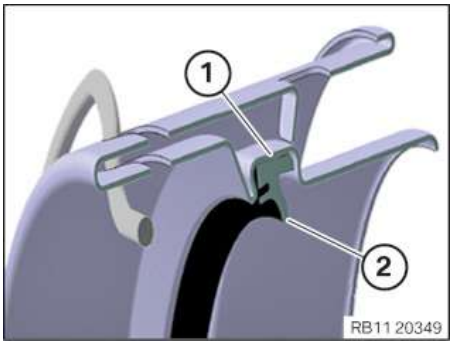
TECHNICAL INFORMATION

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.

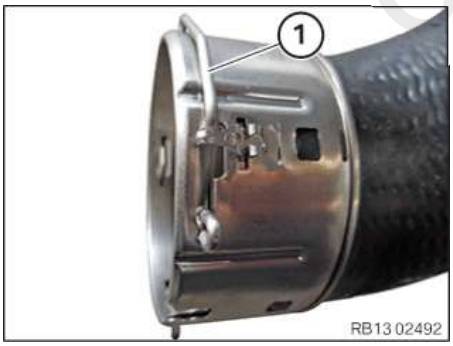
TECHNICAL INFORMATION

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.

85 – Partially securing the wiring harness section on the intake plenum

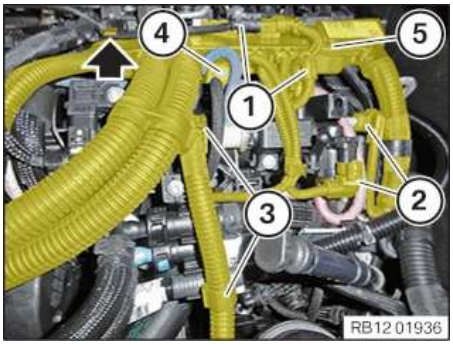
RISK OF DAMAGE

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.

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- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

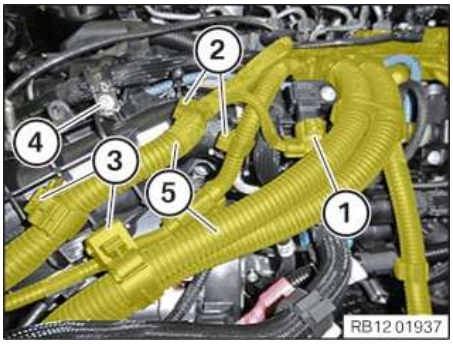
Wiring harness section to manifold

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.



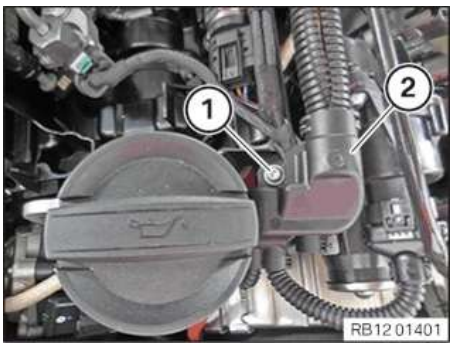
- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

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.

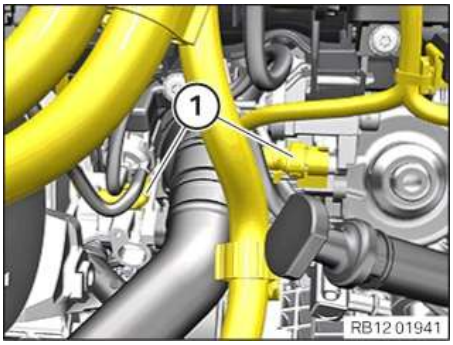
  The connector (1) must engage audibly.



- Connect the connector (1) and lock it.

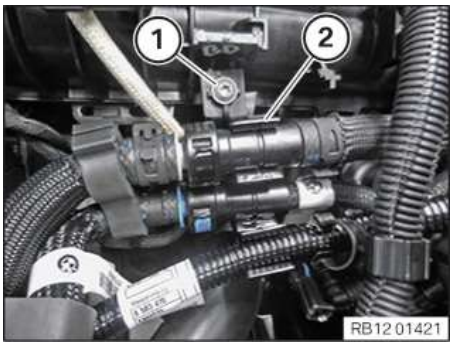
  The connector (1) must engage audibly.

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- Connect connectors (1) and lock.

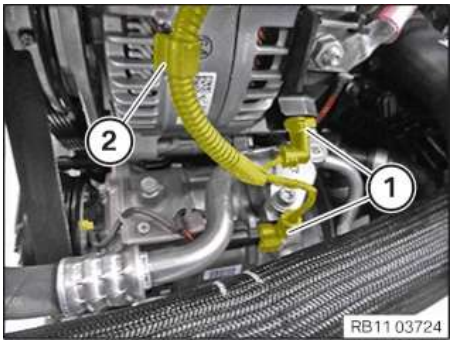
  The connectors (1) must engage audibly.



- Insert and install the holder (2).
- Tighten down screw (1).

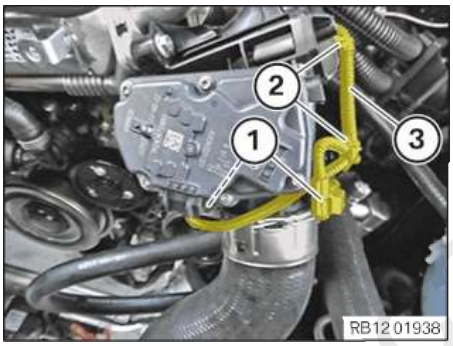
Holder on intake plenum

TS6X20		Tightening torque	5 Nm

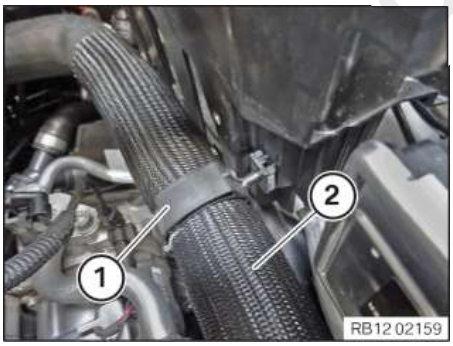


- Connect the connector (1) and lock it.

  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).

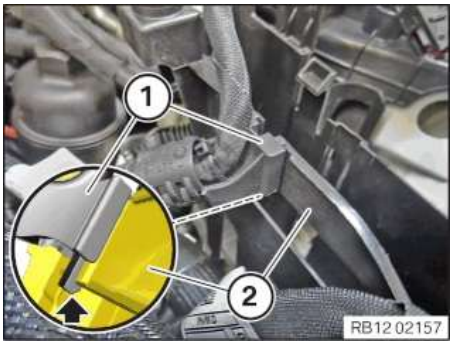
  The holder (1) must engage audibly.



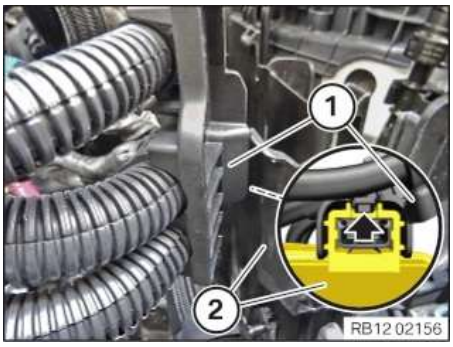
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.

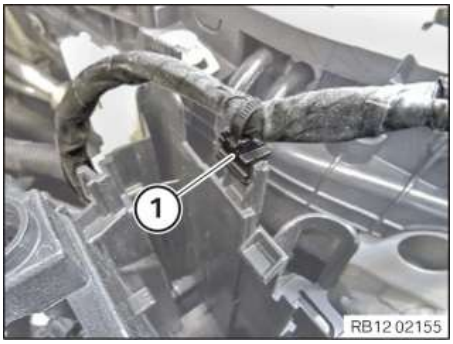
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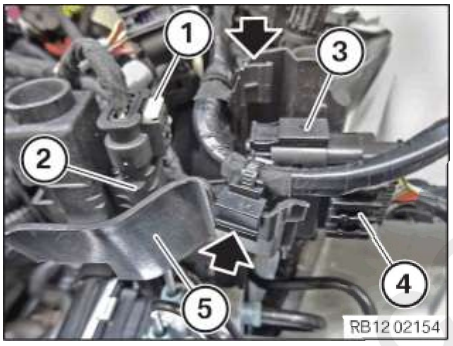
- Connect the cable clip (1) with the control unit holder (2) and lock it.
  Lock (arrow) must audibly engage.



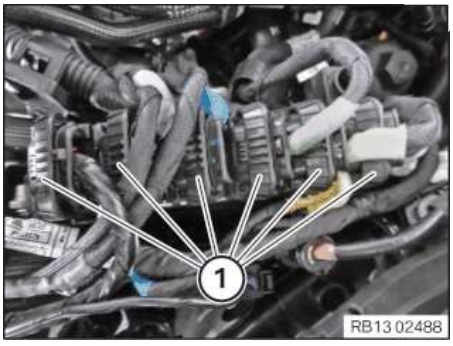
- Connect the cable clip (1) with the control unit holder (2) and lock it.
  Lock (arrow) must audibly engage.



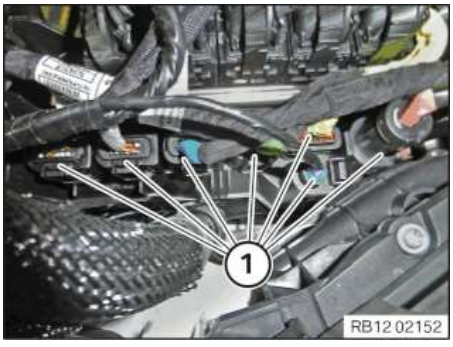
- Secure clamps (1).



- 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).

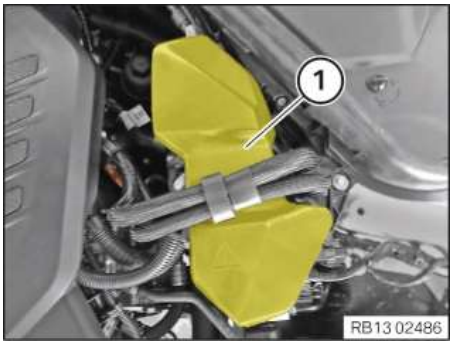


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.

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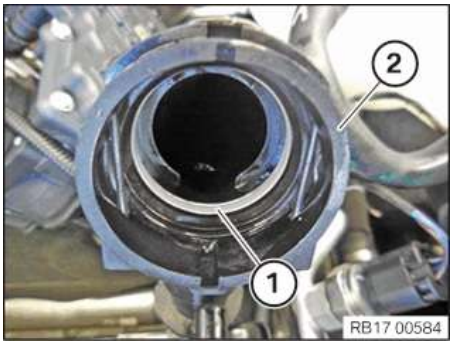


- Insert and install cover (1) into guides.

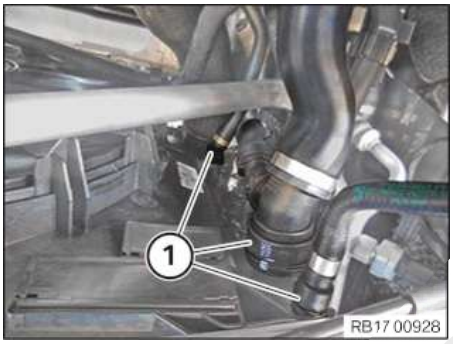
86 – Connecting the coolant lines

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.

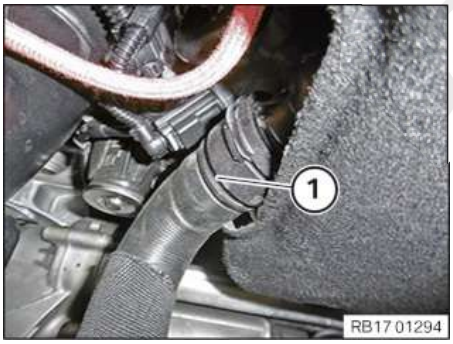


NOTICE

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.

87 – 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.

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RISK OF DAMAGE

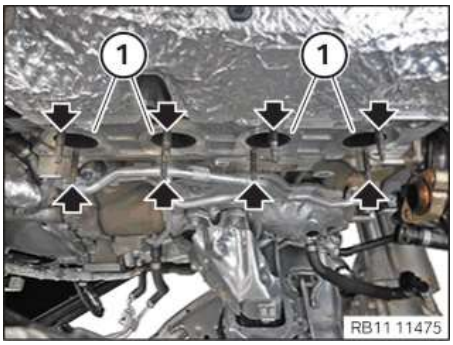
Damage to the surface.

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.

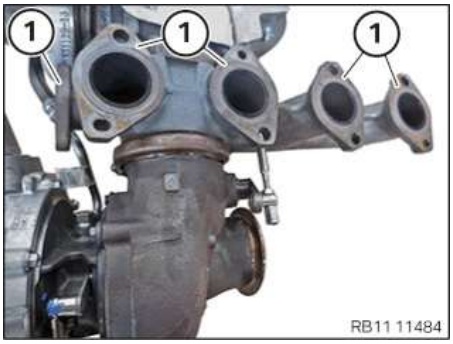
TECHNICAL INFORMATION

The sealing surfaces must be free from oils, grease and cleaning agents.

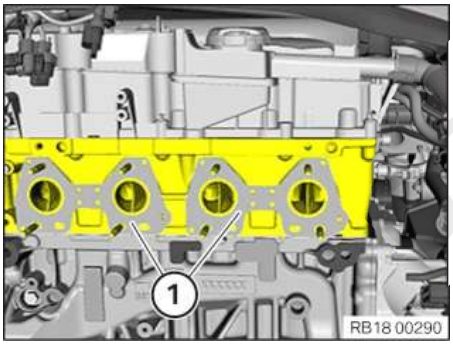


- Check the stud bolts (arrows) on the cylinder head for **correct** fit.
- Clean the connection points (1) with the special tool 0 495 102 (11 4 470).
- Renew gaskets.

  Parts: Seals



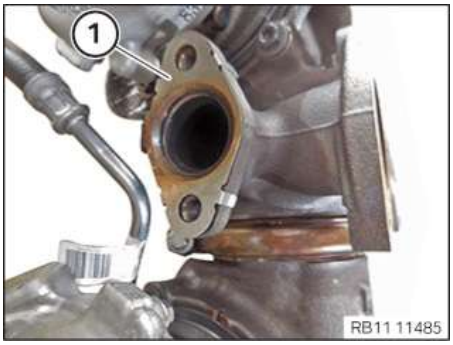
- Clean the connection points (1) on the exhaust manifold with the special tool 0 495 102 (11 4 470).



TECHNICAL INFORMATION

The **coated side** of the seal must be on the side of the exhaust manifold.

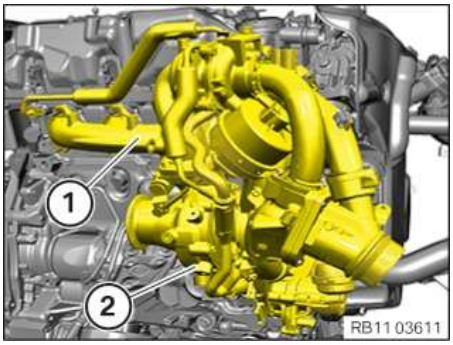
- Insert and install the gaskets (1).



- Renew the seal (1).

  Parts: Gasket
- Insert and install the seal (1).

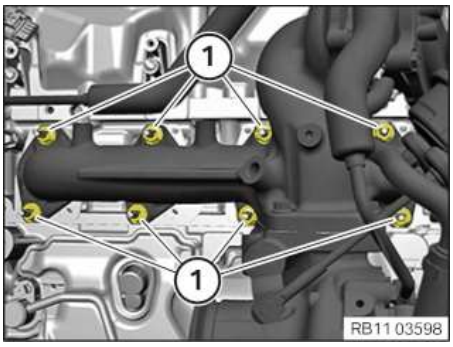
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TECHNICAL INFORMATION

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.



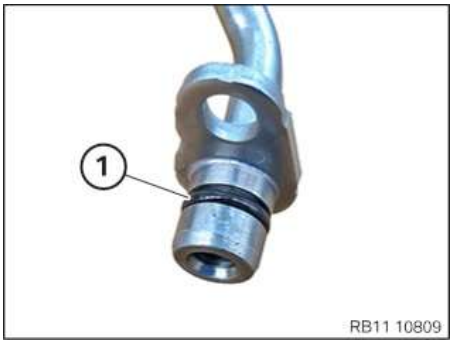
- Renew nuts (1).

  Parts: Nuts

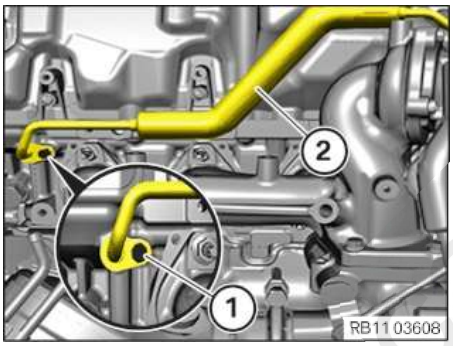
- Tighten the nuts (1) evenly from the inside out.

Exhaust manifold to cylinder head

M7	**If necessary, renew loose stud bolts.**	Tightening torque	11 Nm
	Renew nuts.	Tightening torque	13 Nm



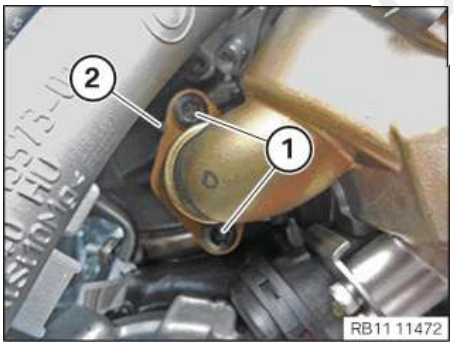
- Check the seal (1) for damage, if necessary, renew the oil feed line.



- 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

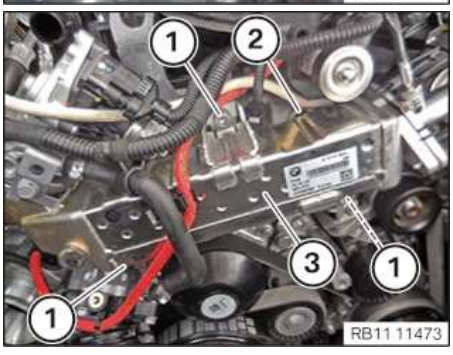


- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

M8x28	Replace screws	Tightening torque	32 Nm

- Ensure that seal (2) is installed.

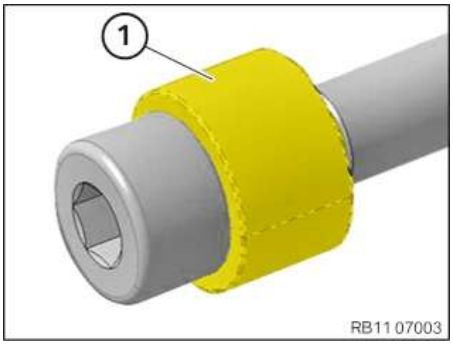


- Position the exhaust-gas recirculation cooler (3).
- Make sure the pipe neck (2) is fitted correctly.
- Tighten the screws (1).

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.

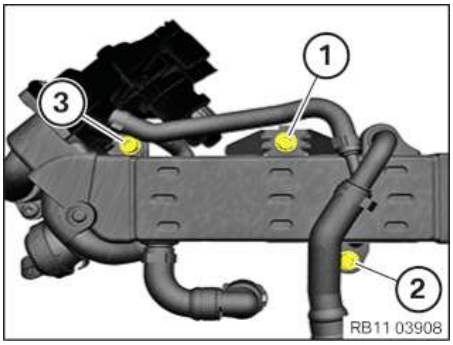
Result

» Screws **without** sleeves (1) are available.

Measure

- Renew screws.

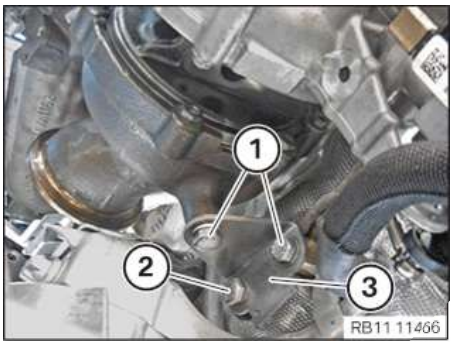
  Parts: Screws (part number 9 886 429)



- Tighten the screws (1) to (3).

Exhaust-gas recirculation cooler to cylinder head

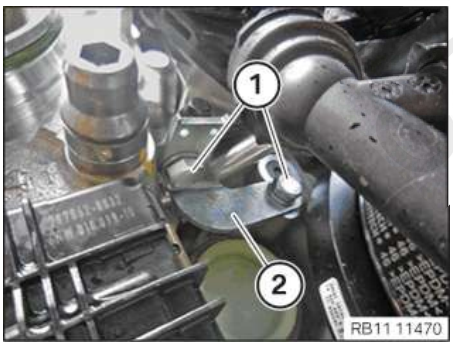
M8x20 / M8x28		Tightening torque	19 Nm



- Tighten the bolts (1) and (2) on the bracket (3).

Exhaust turbocharger low-pressure stage to crankcase

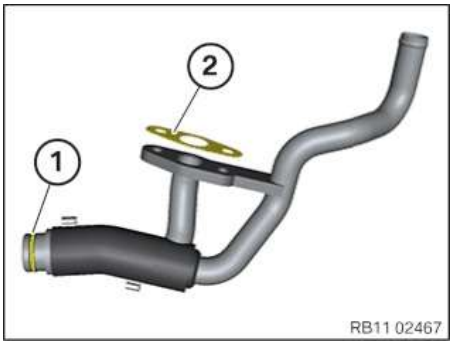
M8X16		Tightening torque	22 Nm



- Insert and install the holder (2).
- Tighten the screws (1).

Exhaust turbocharger low-pressure stage to crankcase

M8X16		Tightening torque	22 Nm

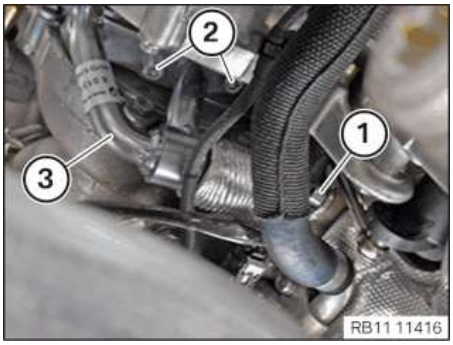


- Renew the gasket (2).

  Parts: Gasket

- Check the O-ring (1) for damage and renew the oil return line as needed.

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- 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

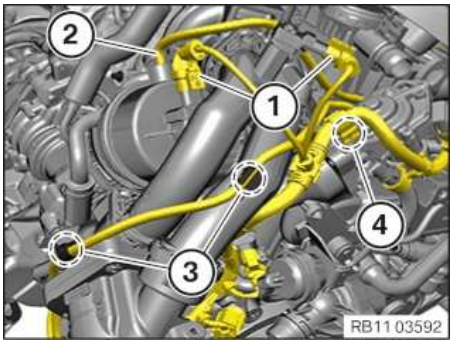
- Install the bolt (1).



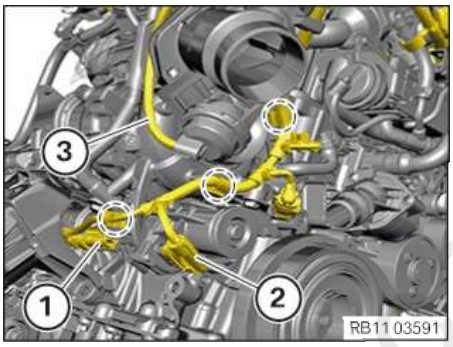
- Tighten the screws of the oil return line on the crankcase from the right wheel arch.

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.

88 – 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.

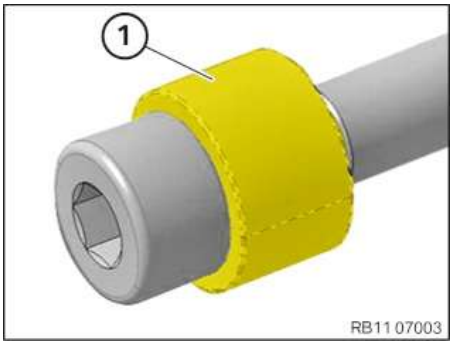
Damage and operating failure of the starter generator.

- 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

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- Check whether the screws **with 10mm** sleeves (1) are available.

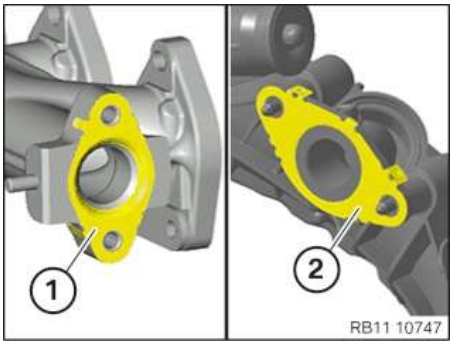
Result

» Screws **without** sleeves (1) are available.

Measure

- Renew screws.

  Parts: Screws (part number 9 886 429)

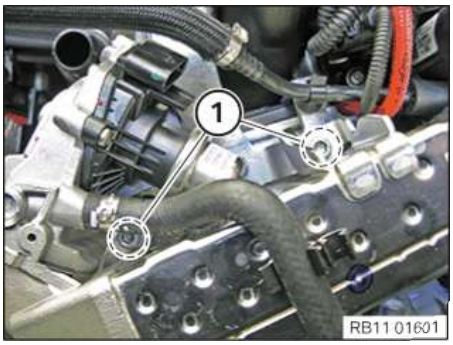


- Renew the seal (1) between the exhaust manifold and the exhaust-gas recirculation cooler.

  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

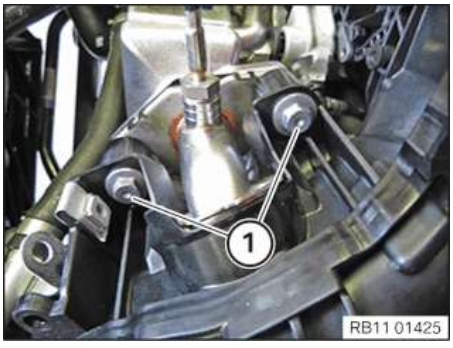
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screw (1) under the exhaust-gas recirculation cooler and then release again.

Exhaust-gas recirculation cooler to cylinder head

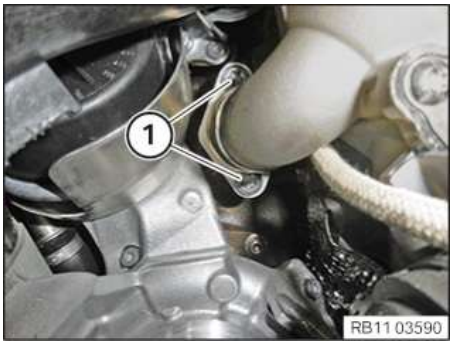
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

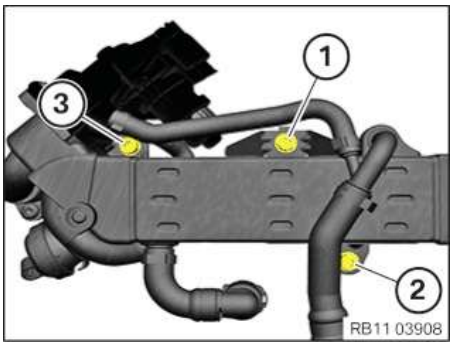
		Tightening torque	10 Nm



- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

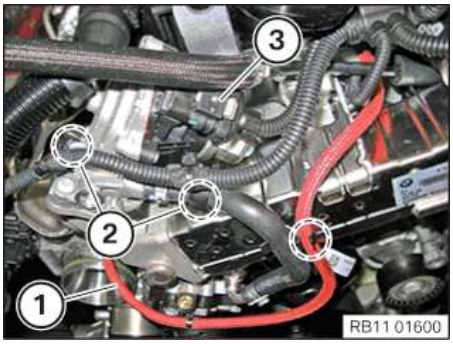
M8x28	Replace screws	Tightening torque	32 Nm



- 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.

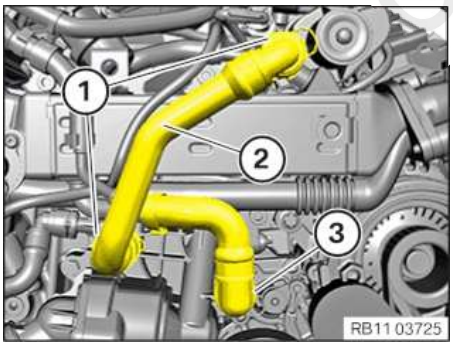


TECHNICAL INFORMATION

Make sure that the connections are locked correctly. The locks must engage audibly.

- **Version A:**

  Connect and audibly lock coolant lines (1).



TECHNICAL INFORMATION

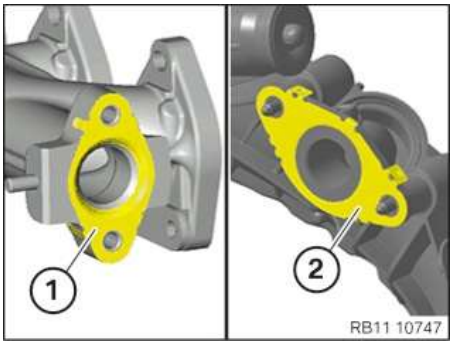
Make sure that the connections are locked correctly. The locks must engage audibly.

- **Version B:**

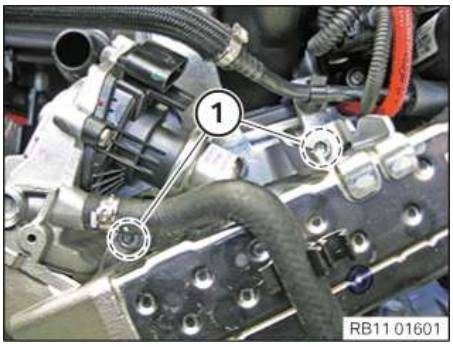
  Connect and audibly lock coolant lines (3).
- Install the coolant line (2).
- Audibly lock the locks (1).

▸ **Installing the exhaust-gas recirculation cooler**

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- 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

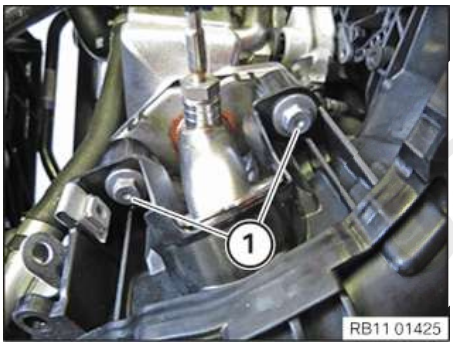
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screw (1) under the exhaust-gas recirculation cooler and then release again.

Exhaust-gas recirculation cooler to cylinder head

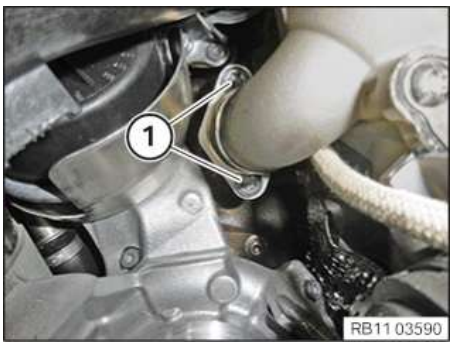
M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °



- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm

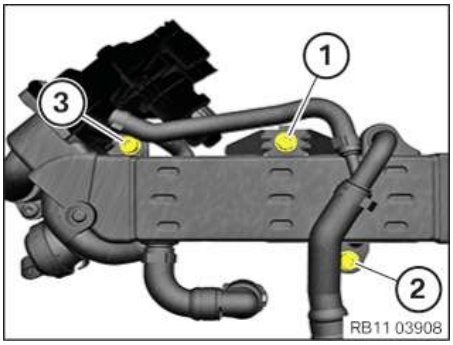


- Tighten the screws (1).

Exhaust-gas recirculation cooler to exhaust manifold

M8x28	Replace screws	Tightening torque	32 Nm

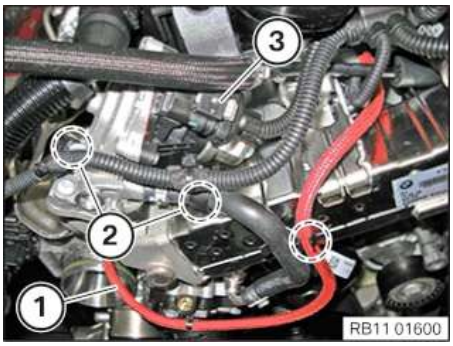
cardiagn.com



- 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.

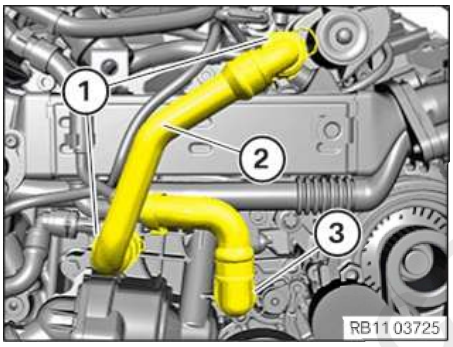


TECHNICAL INFORMATION

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.

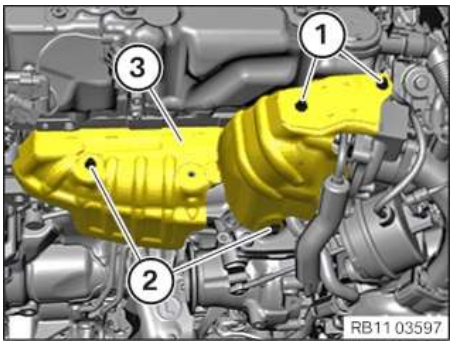
- **Version B:**

  Connect and audibly lock coolant lines (3).

  Install the coolant line (2).

  Audibly lock the locks (1).

89 – 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

90 – Installing the sensor bracket on the cylinder head cover

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RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

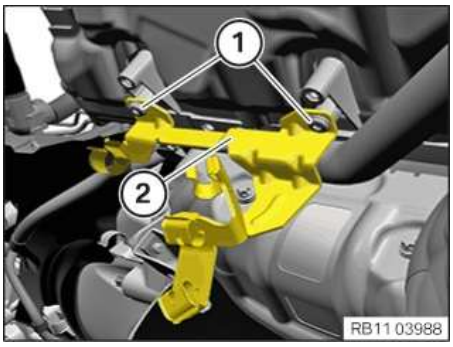
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

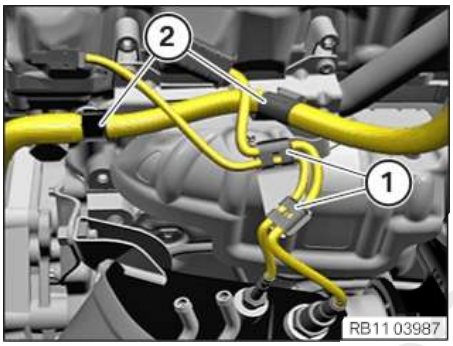
- Route all cables without abrasions, do not trap and crush.



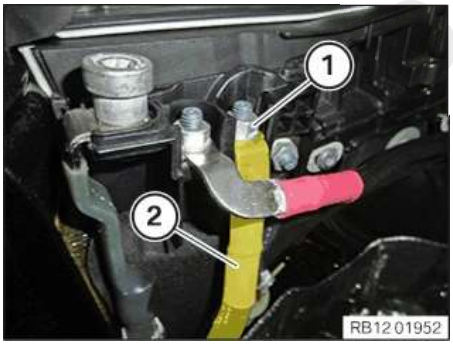
- Insert and install the holder (2).
- Tighten the screws (1).

Bracket on cylinder head cover

	Tightening torque	5 Nm



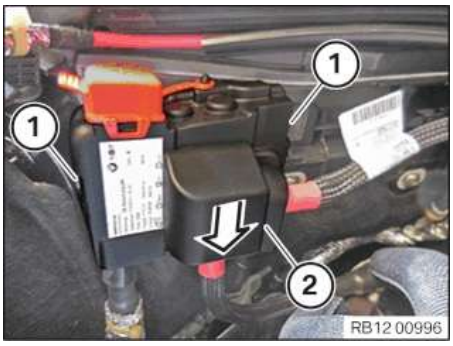
- Secure the positive battery cable in the clamps (2).
- Mount the cable of the exhaust gas sensor system in the clamps (1).



- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

Battery positive lead to battery positive terminal

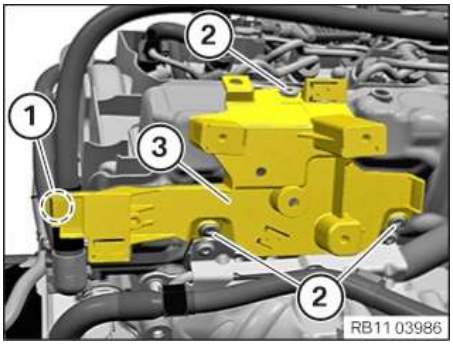
M8		Tightening torque	19 Nm



- Insert and install the cover (2) in the direction of the arrow.

  The locks (1) must engage audibly.

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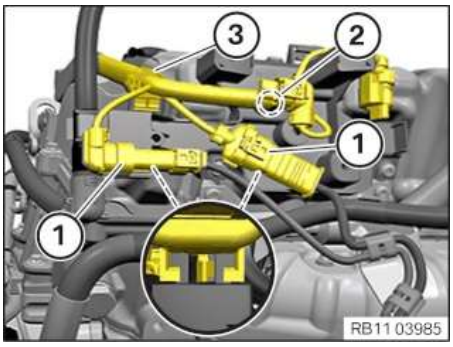


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

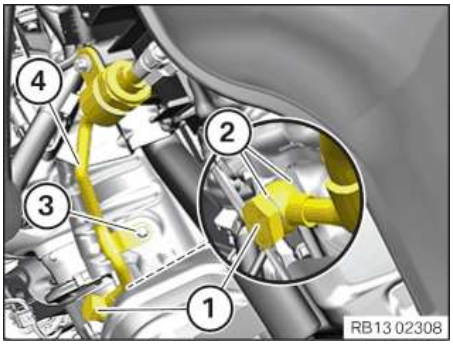
		Tightening torque	5 Nm

- 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.

91 – 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).

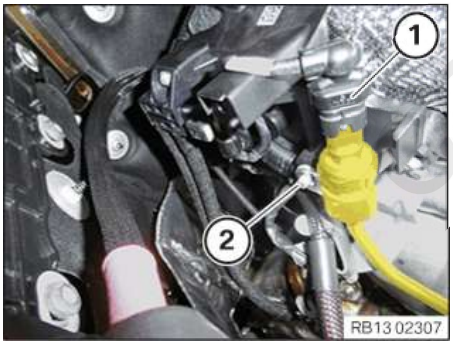
Heat shield to exhaust manifold

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).

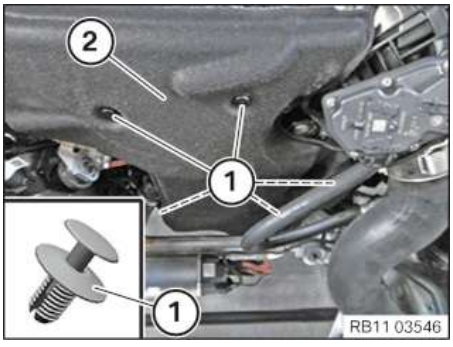
Exhaust gas pressure pipe to sensor system holder

TS6x20		Tightening torque	5,7 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

92 – 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).

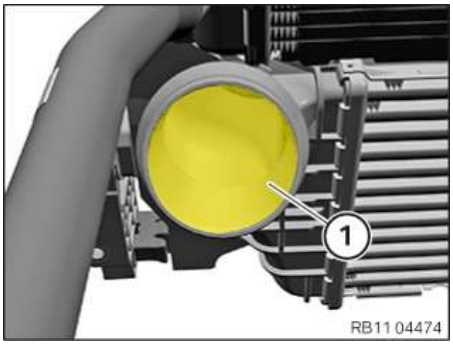
93 – Install pressure pipe between exhaust turbocharger and charge air cooler

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.



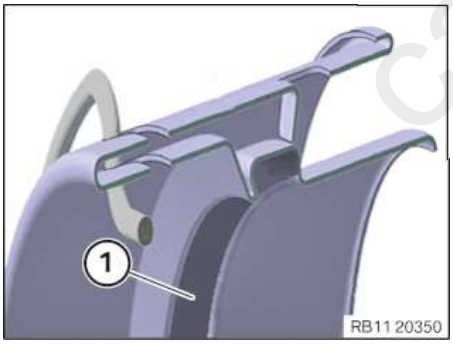
- Check the seal (1) for damage and renew if necessary.

  Parts: Gasket

▸ **Replacing damaged seal**

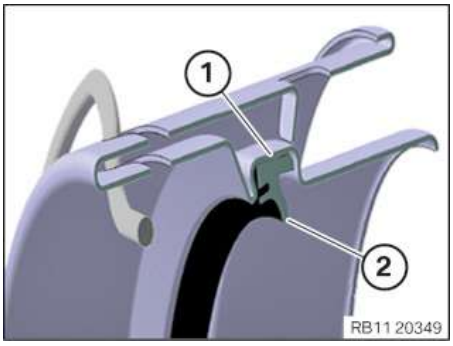
TECHNICAL INFORMATION

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.

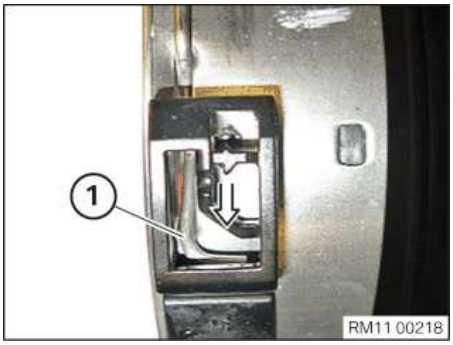
  Parts: Gasket
- Install seal dry without lubricant or mounting agent.

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.

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- **Version A:**

  Lock the lock (1).

  The lock (1) on the pressure pipe must engage audibly.

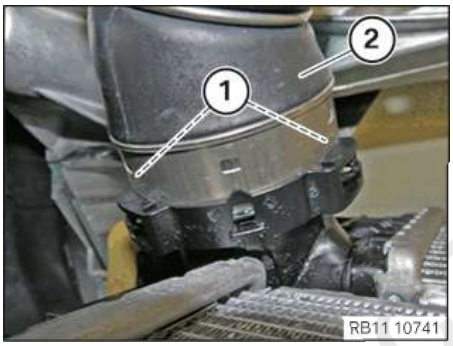


- Pay attention to the installation position:

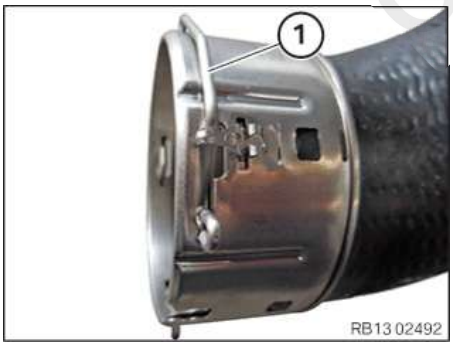
  The pressure pipe fits on charge air cooler in one installation position only.



- Install the pressure pipe (1) from the top.



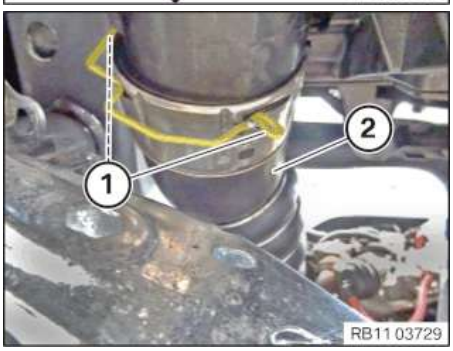
- Connect pressure pipe (2) to charge air cooler.
- Lock the lock (1) on both sides.



- **Version B:**

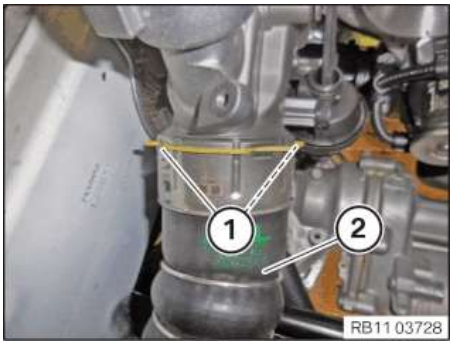
  Lock the lock (1).

  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.

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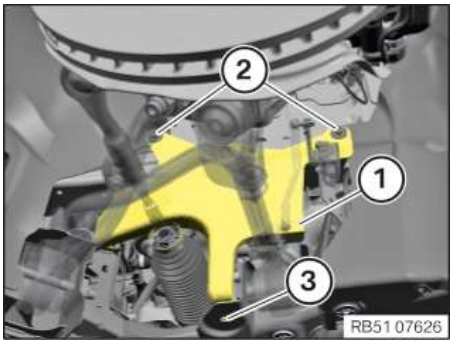


- Place the pressure pipe (2) onto the compressor bypass and ensure that the lock (1) engages audibly.

94 – 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

95 – 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.

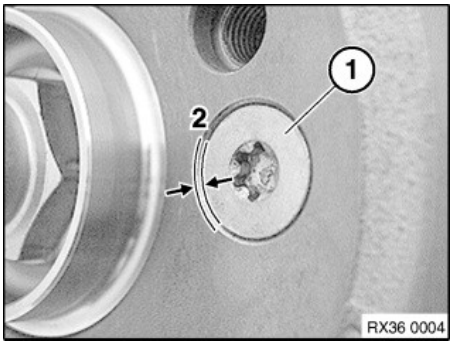
  Do not operate special tool 2 344 011 with an impact screwdriver.
- Degrease the contact surfaces with the universal cleaner (see BMW Group Parts).
- In the event of grease residue in the area of the wheel bolt holes, remove and clean the brake disc.



- 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).

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- Check that the mounting bolt (1) for the brake disc is securely seated.

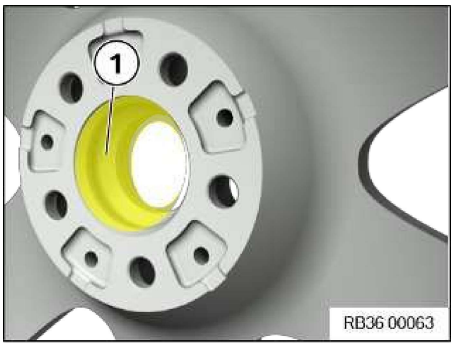
  The mounting bolt (1) for the brake disc **may not** protrude on the contact surface (2) between the brake disc and the wheel rim.

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



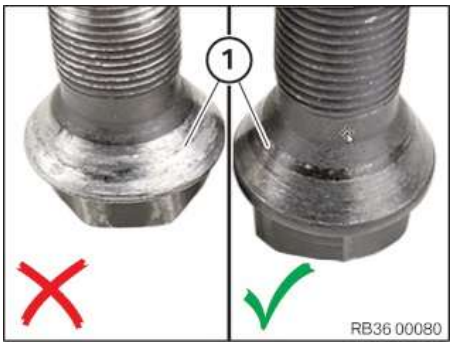
TECHNICAL INFORMATION

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.

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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.		

96 – Prepare for the installation of the diesel particulate filter



- Renew the V-clip (1).

  Parts: V-band clamp

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- Renew gasket (1).

  Parts: Gasket

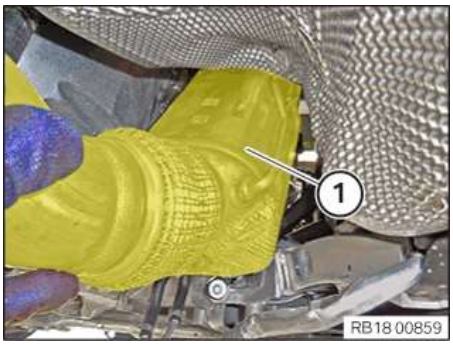
97 – Installing the diesel particulate filter

CAUTION

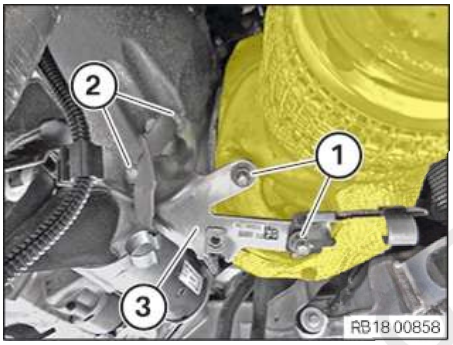
Heavy component.

Heavy components can lead to injury or damage.

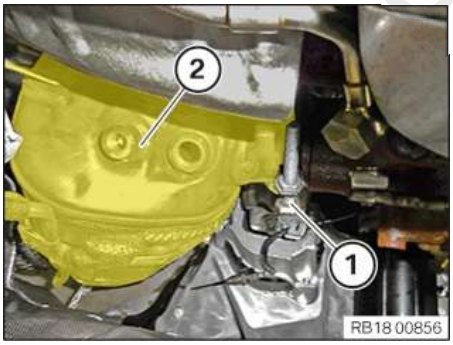
- Remove and install heavy components with the aid of another person/other persons.



- 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**.

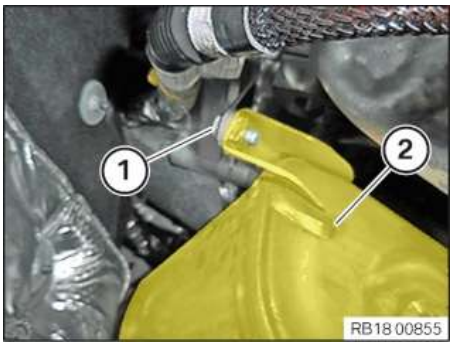


- Renew the V-clip (1).

  Parts: V-band clamp
- Feed in and install V-band clamp (1).

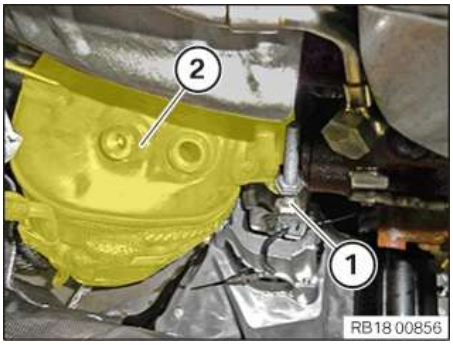
Note: Make sure that the seal between the diesel particulate filter and the exhaust turbocharger is installed correctly.

- 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**.

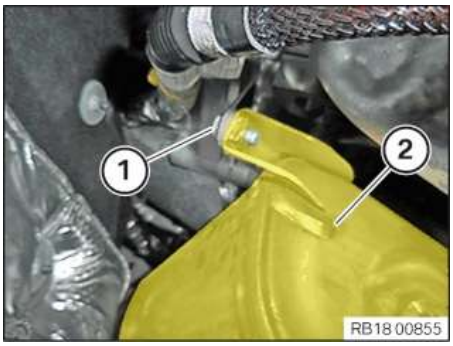
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- Tighten the V-clip (1) of the diesel particulate filter (2).

Diesel particulate filter V-clip to exhaust turbocharger

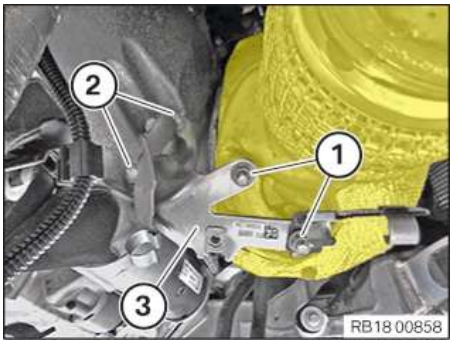
V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm



- 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).

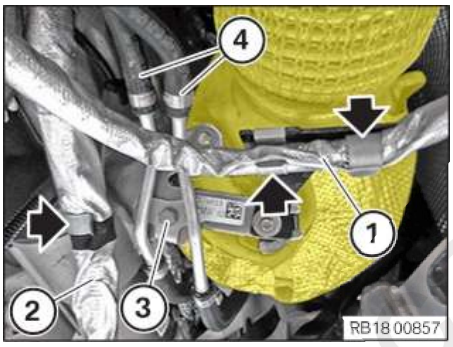
Bracket to transmission for diesel particulate filter holder bottom

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).

98 – Installing the nitrogen oxide sensor upstream of SCR catalytic converter

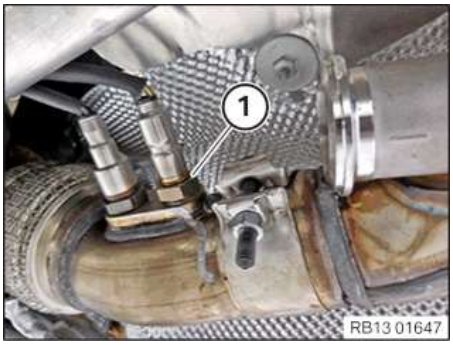
RISK OF DAMAGE

Damage to the nitrogen oxide sensor.

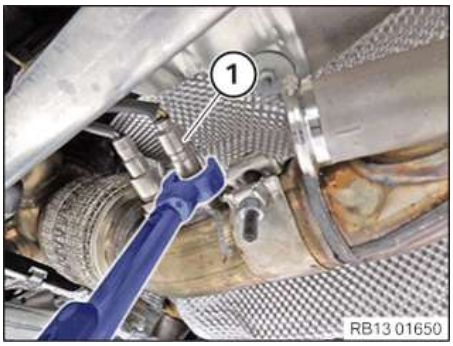
Failure of the nitrogen oxide sensor due to contamination or preliminary mechanical damage.

- 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.

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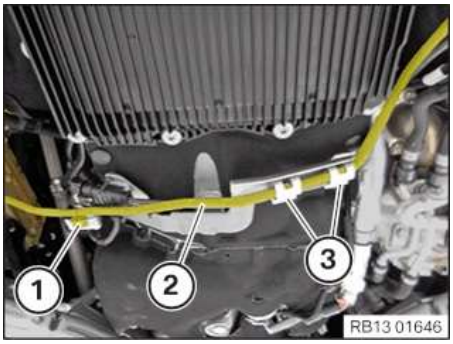
- Feed in and install the nitrogen oxide sensor (1).



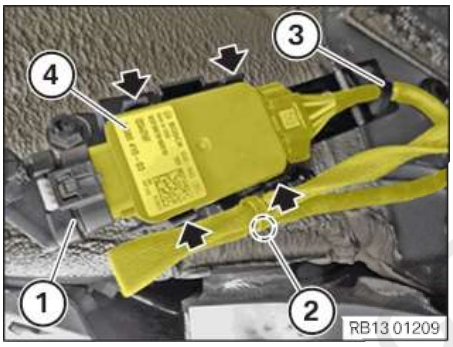
- Tighten the nitrogen oxide sensor (1) using commercially available tools.

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.

99 – 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.

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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



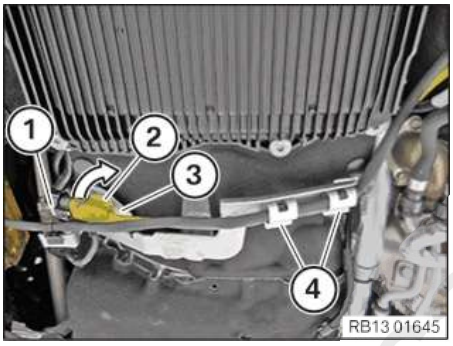
- Insert the monitoring oxygen sensor (1) and install it.



- 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.

100 – 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.

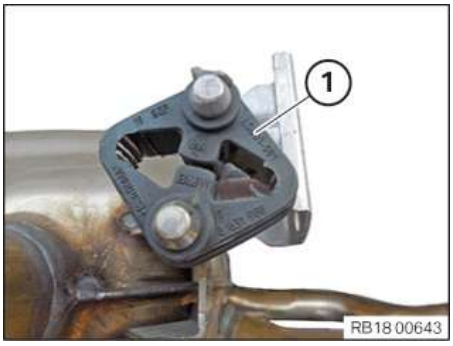
Heavy components can lead to injury or damage.

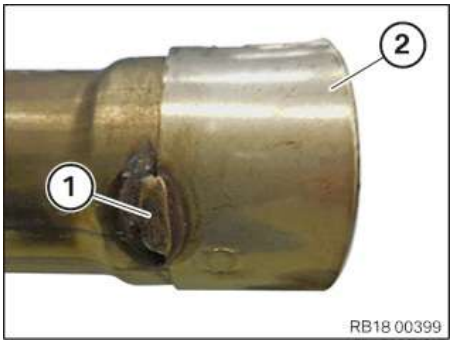
- Remove and install heavy components with the aid of another person/other persons.

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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

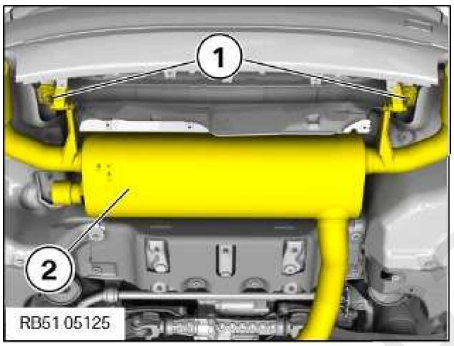
CAUTION

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).

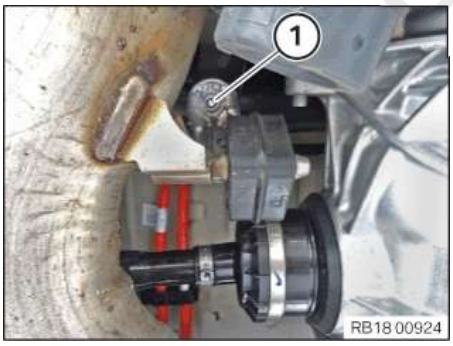


- Insert and install the exhaust system (2).
- Renew nuts (1).

  Parts: Nuts
- Tighten nuts (1).

Rear silencer to body / bumper support

M8	Replace nuts.	Tightening torque	19 Nm

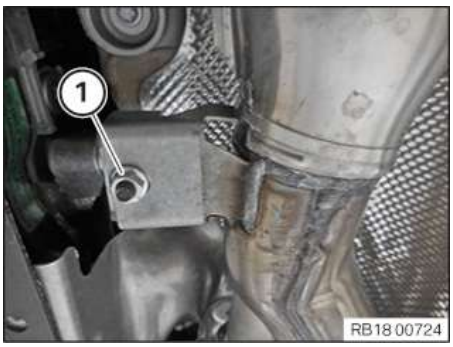


- Renew nut (1) on the rear axle support.

  Parts: Nut
- Tighten nut (1).

Exhaust system to rear axle carrier

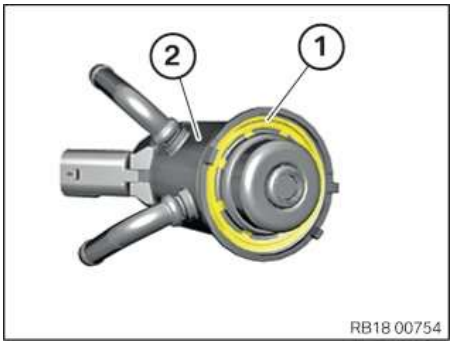
M8 nut		Tightening torque	19 Nm



- Tighten nut (1).

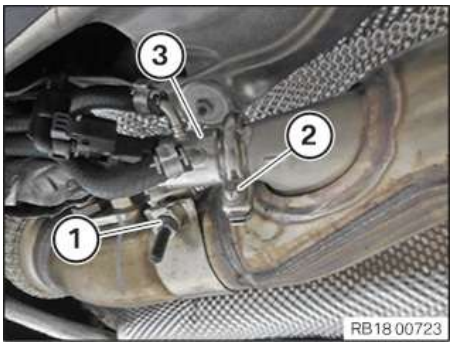
Exhaust system to transmission

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

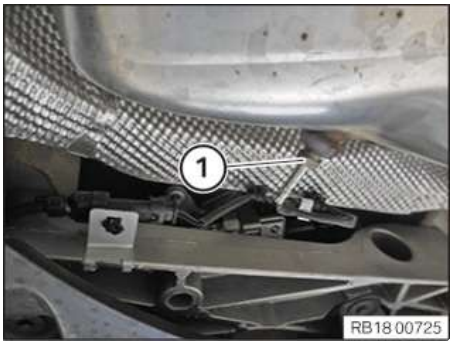
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

- 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

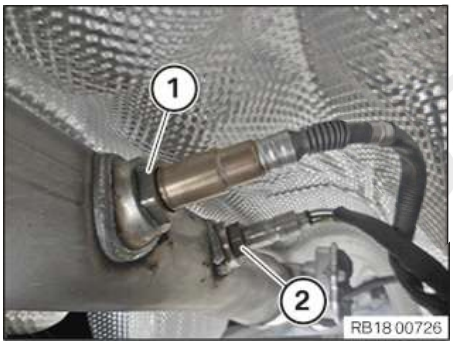
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm



- 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

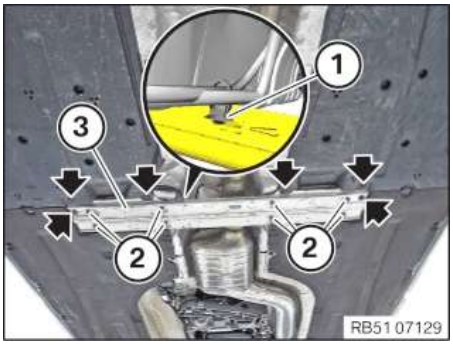
- Install the nitrogen oxide sensor (2) in the exhaust system and tighten.

Nitrogen oxide sensor downstream of SCR catalytic converter

Sensor		Tightening torque	55 Nm

101 – Install the connecting supports on the tunnel

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- Guide in and install connecting support (3) on the tunnel.
- Tighten the screws (2).
- Tighten screws (arrows).

Connecting support to tunnel

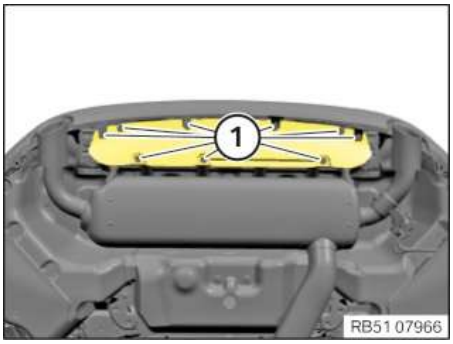
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Secure the clamp (1).

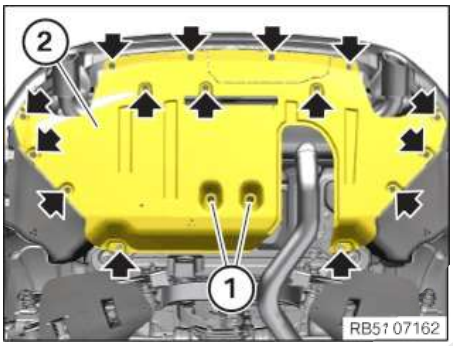
102 – Installing the rear diffuser



- **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

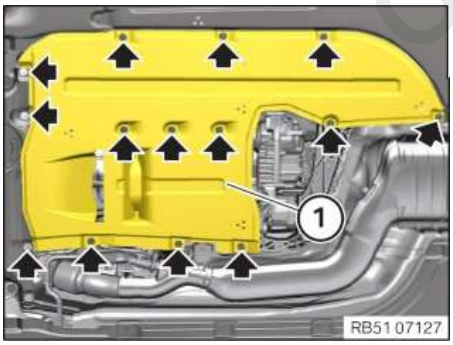
Nuts and screws		Tightening torque	3 Nm

- Tighten nuts (1).

Diffuser / underbody panelling

Nuts and screws		Tightening torque	3 Nm

103 – Installing underbody protection at rear



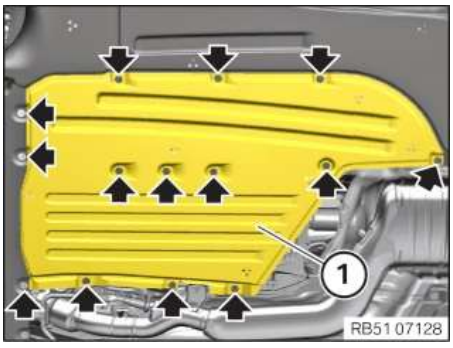
- **Version A:**

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

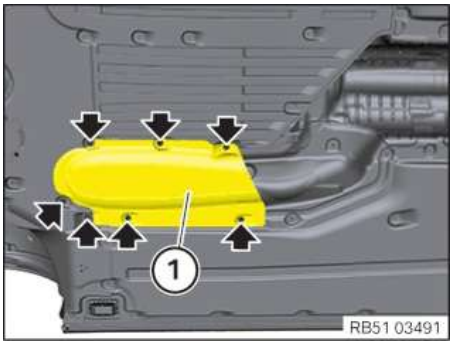
Hexagon screw		Tightening torque	3 Nm

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104 – 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.

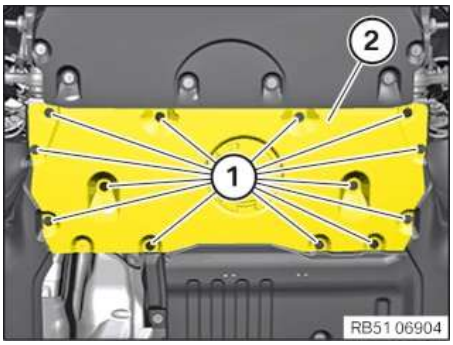


- Insert the underbody panelling (1).
- Tighten screws (arrows).

Underbody panelling

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

105 – Installing the centre underbody protection



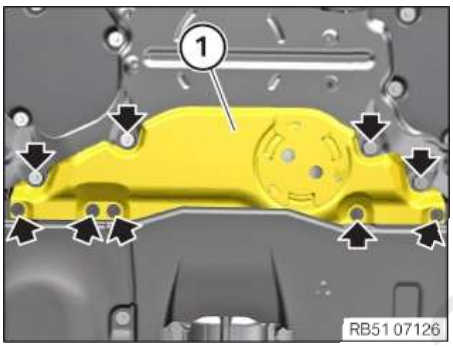
- **Variant with rear wheel drive:**

  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).

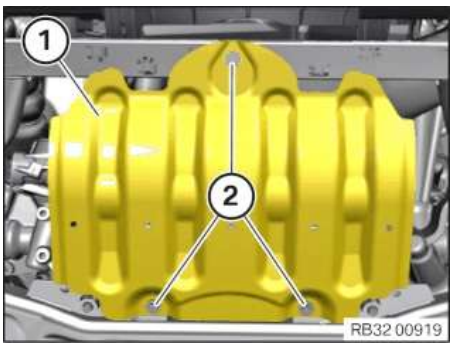
Underbody protection

Hexagon screw		Tightening torque	3 Nm

106 – 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

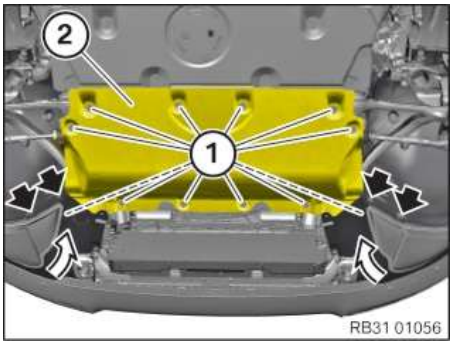
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

107 – Install the underbody protection of the steering gear

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- **Version A:**

  Position the underbody protection (2) of the steering gear.

  Tighten the screws (1).

Underbody protection of the steering gear

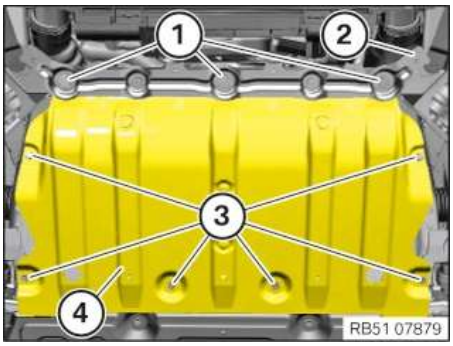
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- 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).

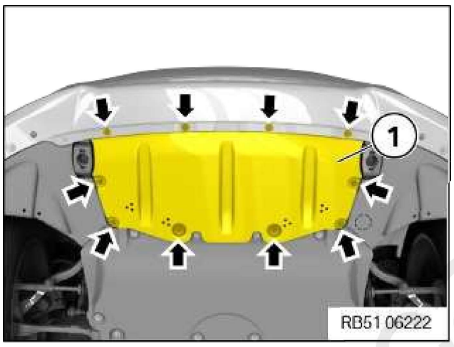
Underbody protection of the steering gear

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).

108 – Installing the front underbody protection



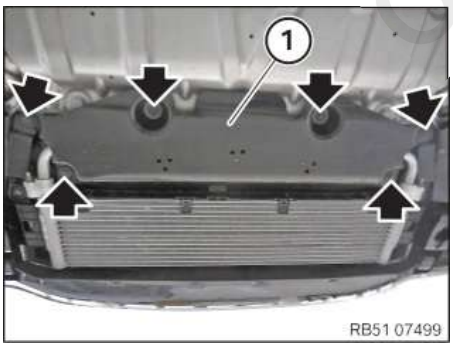
- **Version A:**

  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



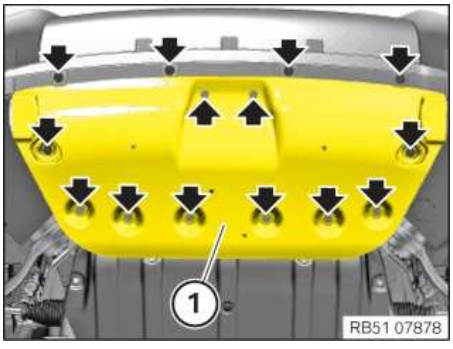
- **Version B:**

  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).

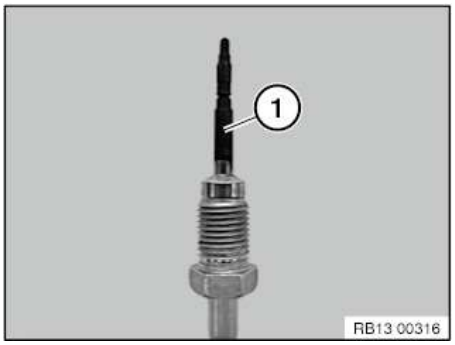
  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

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109 – Installing the exhaust temperature sensor for the exhaust system downstream the catalytic converter on the diesel particulate filter



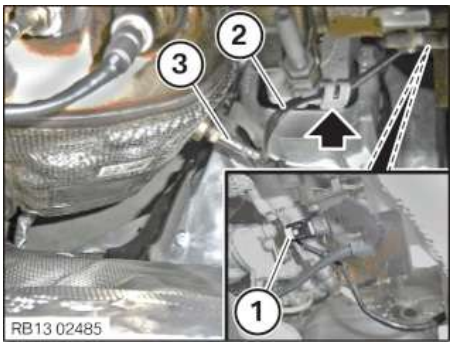
RISK OF DAMAGE

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.

110 – 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

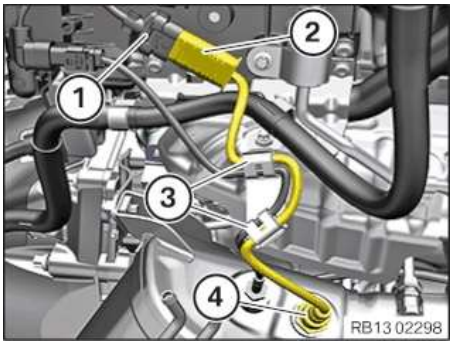


- Insert and install the front oxygen sensor (1).
- Tighten the front oxygen sensor (1) with standard tools.

Front oxygen sensor to top of diesel particulate filter

Sensor		Tightening torque	50 Nm

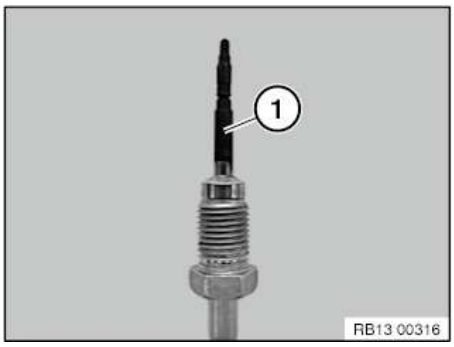
carDiagn.com



- 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.

111 – Install the exhaust-gas temperature sensor on the diesel particulate filter



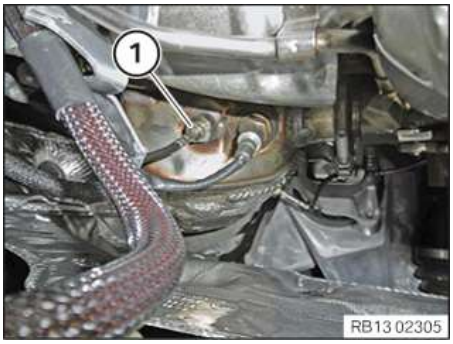
RISK OF DAMAGE

Damage of exhaust temperature sensor.

Damage to exhaust temperature sensors leads to malfunctions.

- Make sure that the gauge tip is not damaged.

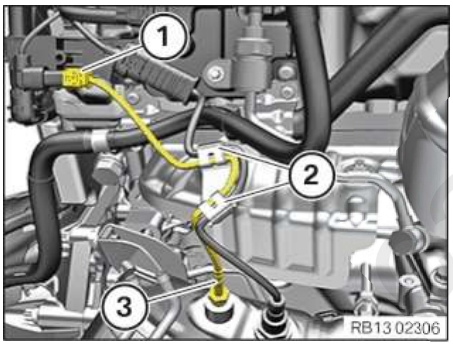
- Check gauge tip (1) for damage.



- 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

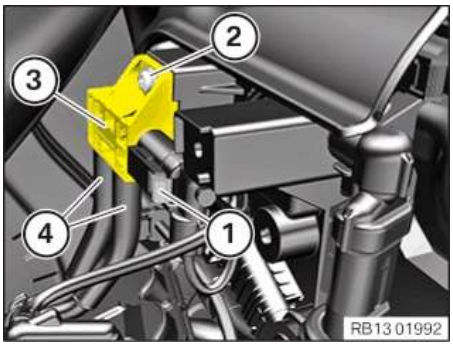
Sensor		Tightening torque	30 Nm



- Secure the exhaust temperature sensor (3) to the clamp (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

112 – 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.

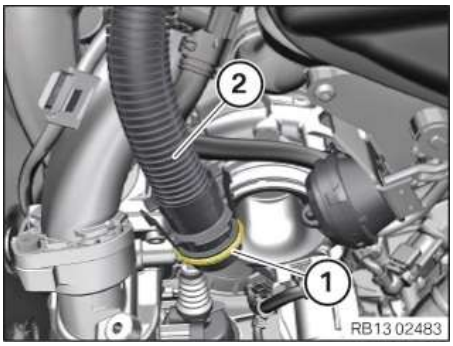
  The connector (1) must engage audibly.

113 – Installing the clean air pipe with resonator

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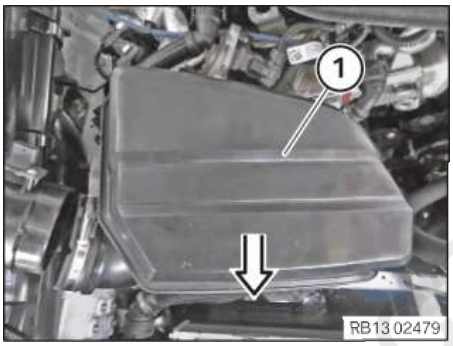
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



- 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.

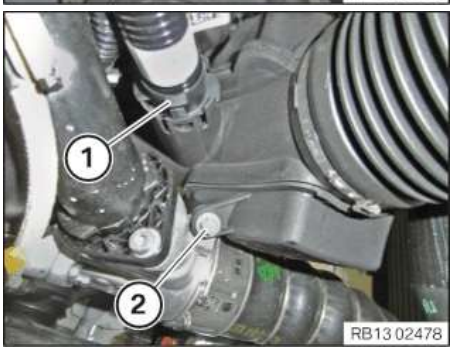


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

  The clamp (1) must engage audibly.

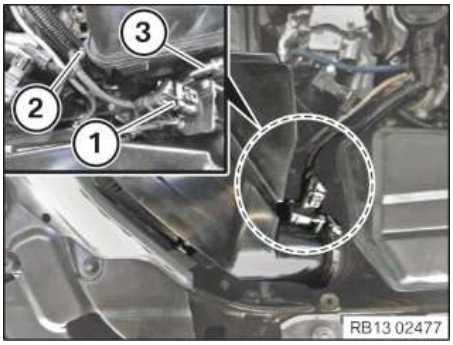


- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm

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- Connect the clean air pipe with resonator to the intake filter housing.
- Tighten clamp (3).

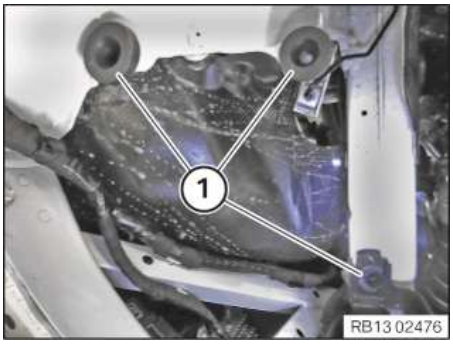
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

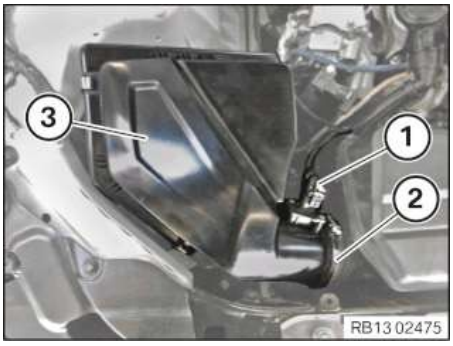
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

114 – 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

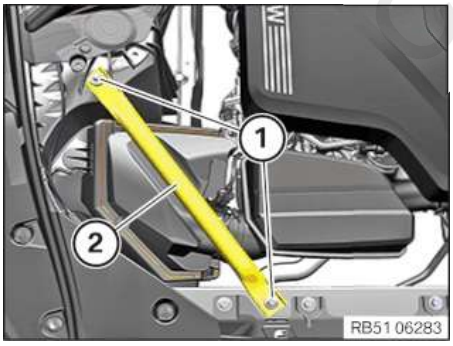
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

115 – Install the right front-end strut

TECHNICAL INFORMATION

Driving without the strut brace/front-end strut or tension strut is not permitted.



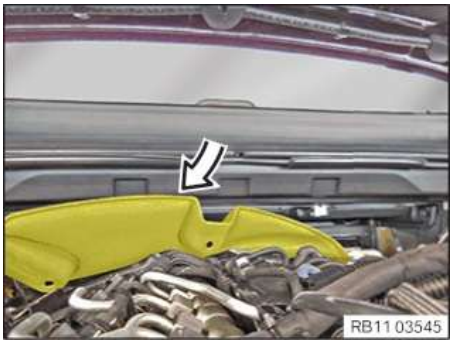
- Install the front-end strut (2).
- Renew screws (1).

  Parts: Screws
- Tighten the screws (1).

Front end strut

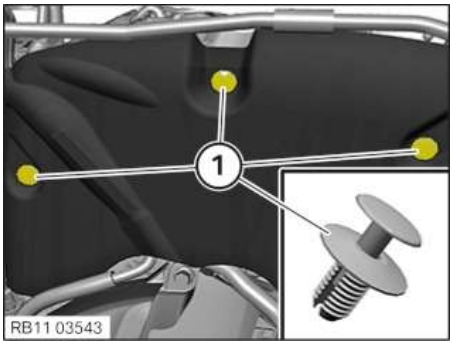
Screw		Tightening torque	56 Nm

116 – Installing acoustic cover at rear



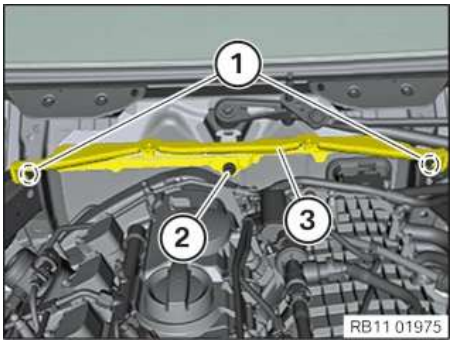
- Guide in the acoustic cover in the direction of the arrow and install it.

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- Secure acoustic cover with the expanding rivets (1).

117 – Installing centre bulkhead lower section

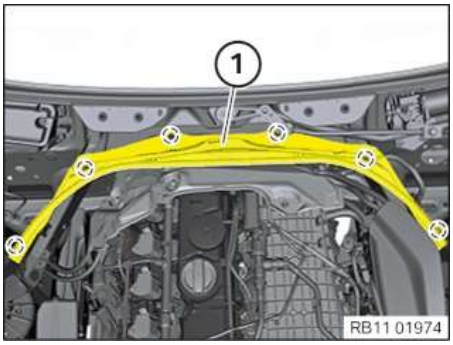


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

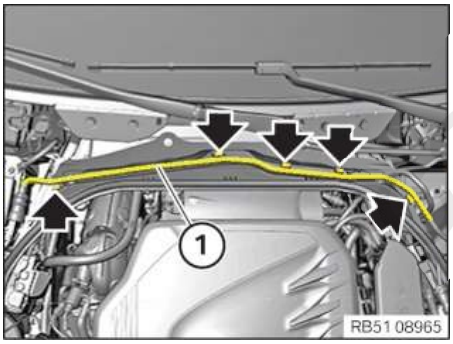
118 – Installing the centre bulkhead upper part



- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

Bulkhead upper part to bottom bulkhead

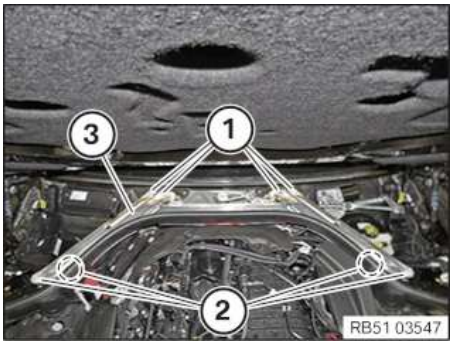
		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

  Clip in the wire (1) into the holders (arrows).

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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 °

119 – 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.

120 – Installing cowl panel cover

RISK OF DAMAGE

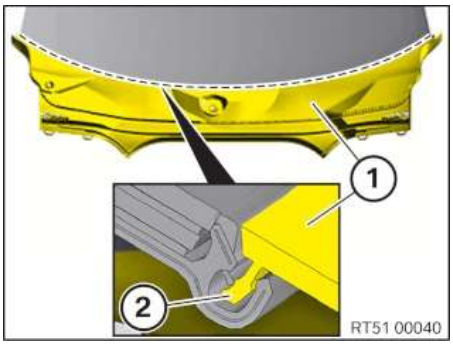
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

- Ensure correct installation of the components.
- Only use undamaged components.

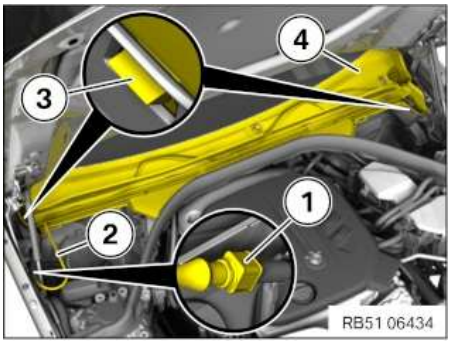
TECHNICAL INFORMATION

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.

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- 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.

121 – Install left and right wiper arm

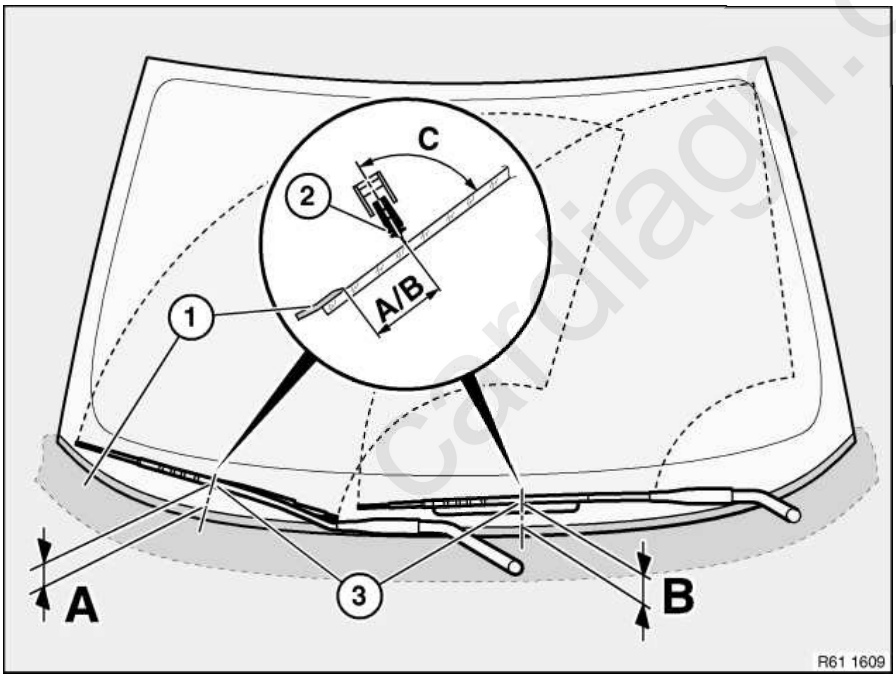
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

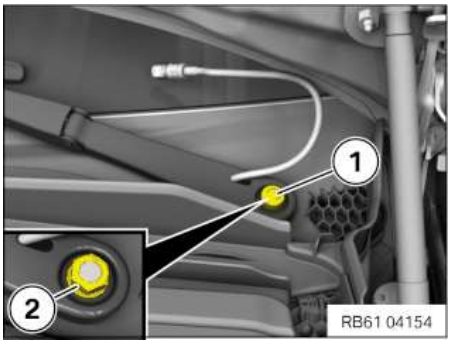
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- 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



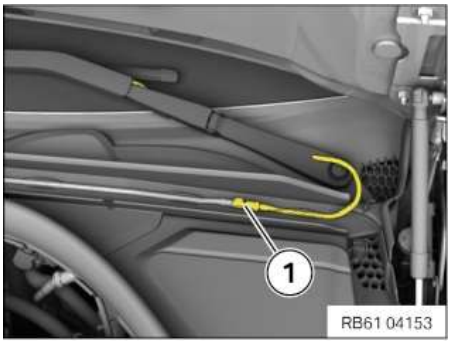
- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

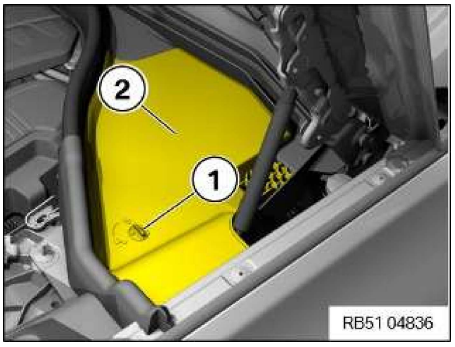
- Connect the protective cap (1).

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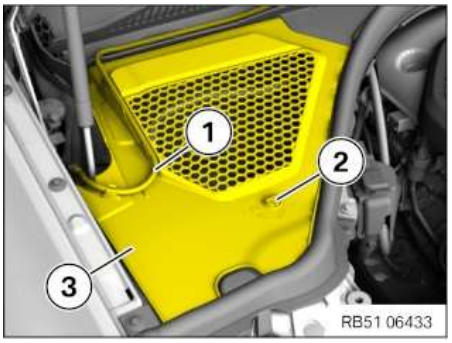
- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

122 – Install the cover of the engine compartment on the rear left



- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

123 – 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.

124 – Connecting all battery earth leads



- See additional information.

125 – Take bonnet out of the service position

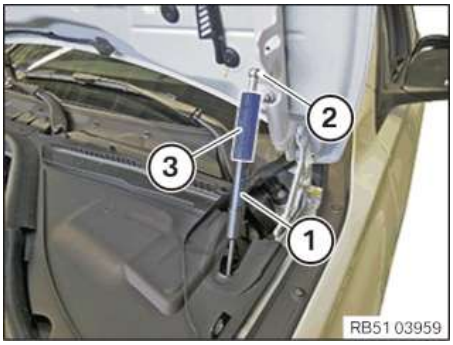
CAUTION

Shutting bonnet or tailgate.

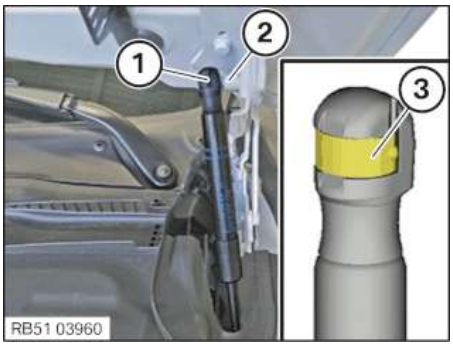
Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.

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- 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.

126 – 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.

127 – 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).

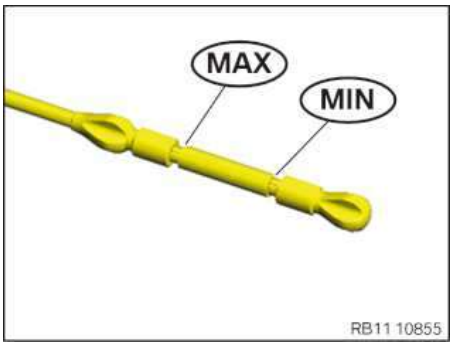
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- Park vehicle on a horizontal surface.
- Stop the engine and wait for 5 minutes.
- Pull out the oil dipstick and wipe off using a lint-free cloth.

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

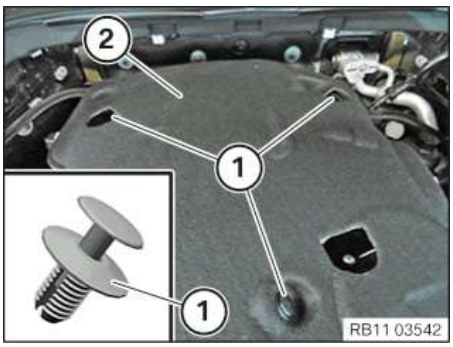
The engine oil level must be between the minimum mark and the maximum mark of the oil dipstick.

- 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

128 – 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) .

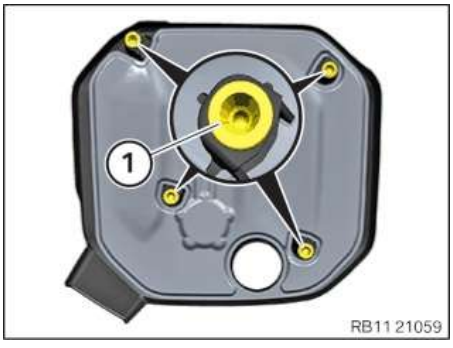
129 – Install acoustic cover

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).

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- 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 5174

M8x60		Tightening torque	19 Nm

Cylinder head to crankcase — Used in step 63

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 63

M8x40		Tightening torque	19 Nm

Standard screw connection M6 — Used in step 63

M6		Tightening torque	8 Nm

Ground to cylinder head — Used in step 63

M6		Tightening torque	8 Nm

Camshaft carrier to cylinder head — Used in step 66

M7x35		Tightening torque	13 Nm

Bearing journal to cylinder head — Used in step 69

M16x1.5	Replace bearing journal.	Tightening torque	20 Nm

Standard screw connection M8 — Used in step 69

M8		Tightening torque	19 Nm

Chain tensioner piston to cylinder head — Used in step 70

22 x 1.5	Replace sealing ring, oil thread.	Tightening torque	70 Nm

Holder to crankcase — Used in step 70

M8X16		Tightening torque	19 Nm

Camshaft sprocket to camshaft — Used in step 71

M7x17.			17 Nm

Starter motor to engine — Used in step 77

M8X60		Tightening torque	19 Nm

Battery positive lead to starter — Used in step 77

M8		Tightening torque	13,5 Nm

Cylinder head cover to cylinder head — Used in step 78

M6		Tightening torque.	8,5 Nm

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Clamping claw facing to cylinder head cover			Used in step 79
M6		Tightening torque	10 Nm

Injector to cylinder head cover			Used in step 79
M8		Tightening torque	8 Nm
		Angle of rotation	120 °

Rail to cylinder head cover			Used in step 80
M8		Tightening torque	19 Nm

High pressure lines between high pressure pump and rail			Used in step 81
High-pressure pipe		Tightening torque	24.5 Nm

High pressure lines between injector and rail			Used in step 82
High-pressure pipe		Tightening torque	24.5 Nm

Intake plenum to cylinder head			Used in step 84
M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum			Used in step 8488
		Tightening torque	10 Nm

Electric changeover valve to intake plenum			Used in step 84
TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold			Used in step 85
TS5x20		Tightening torque	3,6 Nm

Standard screw connection 4 Nm			Used in step 85
Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover			Used in step 85
TS5x20		Tightening torque	3,6 Nm

Holder on intake plenum			Used in step 85
TS6X20		Tightening torque	5 Nm

Exhaust manifold to cylinder head			Used in step 87
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 87
M6x12		Tightening torque	8 Nm

Exhaust-gas recirculation cooler to exhaust manifold			Used in step 8788
M8x28	Replace screws	Tightening torque	32 Nm

Exhaust-gas recirculation cooler to cylinder head			Used in step 8788
M8x20 / M8x28		Tightening torque	19 Nm

Exhaust turbocharger low-pressure stage to crankcase			Used in step 87
M8X16		Tightening torque	22 Nm

Oil return line to turbocharger			Used in step 87
M6x12	Renew gasket.	Tightening torque	8 Nm

Oil return line to crankcase			Used in step 87
M6x12	Check gasket. Renew the seal or line if necessary.	Tightening torque	8 Nm

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Exhaust-gas recirculation cooler to cylinder head — Used in step 88

M8x20 / M8x28		Tightening torque	5 Nm
		Release angle	90 °

Heat shield to exhaust manifold — Used in step 89

M6x12			10 Nm

Bracket on cylinder head cover — Used in step 90

		Tightening torque	5 Nm

Battery positive lead to battery positive terminal — Used in step 90

M8		Tightening torque	19 Nm

Heat shield to exhaust manifold — Used in step 91

M6x12		Tightening torque	10 Nm

Banjo bolt for exhaust pressure pipe to exhaust manifold — Used in step 91

Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm

Exhaust gas pressure pipe to sensor system holder — Used in step 91

TS6x20		Tightening torque	5,7 Nm

Cover, steering unit — Used in step 94

Screw		Tightening torque	3 Nm

Brake disc to front wheel hub — Used in step 95

M8	Renew screw.	Tightening torque	16 Nm

Brake disc to rear wheel hub — Used in step 95

M8	Renew screw.	Tightening torque	16 Nm

Wheel bolts — Used in step 95

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 97

V-band clamp	Renew V-band clamp.	Tightening torque	15 Nm

Bracket to diesel particulate filter top — Used in step 97

M8		Tightening torque	19 Nm

Bracket to transmission for diesel particulate filter holder bottom — Used in step 97

M8X20		Tightening torque	19 Nm

Lower holder to diesel particulate filter — Used in step 97

M8		Tightening torque	19 Nm

Coolant lines for SCR metering module — Used in step 97

M6X16		Tightening torque	8 Nm

Nitrogen oxide sensor before SCR catalytic converter — Used in step 98

Sensor		Tightening torque	50 Nm

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Monitoring oxygen sensor			Used in step 99
Sensor		Tightening torque	50 Nm

Rear silencer to body / bumper support			Used in step 100
M8	Replace nuts.	Tightening torque	19 Nm

Exhaust system to rear axle carrier			Used in step 100
M8 nut		Tightening torque	19 Nm

Exhaust system to transmission			Used in step 100
M8		Tightening torque	19 Nm

Exhaust system to diesel particle filter			Used in step 100
M8	If necessary, renew clamp.	Tightening torque	26 ±2 Nm

SCR metering module V-clip to exhaust system			Used in step 100
V-band clamp	Renew V-band clamp.	Tightening torque	8 Nm

Exhaust-gas temperature sensor upstream of SCR catalytic converter			Used in step 100
Sensor		Tightening torque	30 Nm

Diesel particulate sensor to exhaust system			Used in step 100
Sensor		Tightening torque	50 Nm

Nitrogen oxide sensor downstream of SCR catalytic converter			Used in step 100
Sensor		Tightening torque	55 Nm

Connecting support to tunnel			Used in step 101
M8x25 screw		Tightening torque	20 Nm
Screw		Tightening torque	3 Nm

Diffuser / underbody panelling			Used in step 102
Nuts and screws		Tightening torque	3 Nm

Underbody protection			Used in step 103105
Hexagon screw		Tightening torque	3 Nm

Underbody panelling			Used in step 104
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Underbody protection, steering, to front axle support			Used in step 106
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support			Used in step 106
Hexagon bolt M6		Tightening torque	8 Nm

Underbody protection of the steering gear			Used in step 107
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

Wheel arch trim panel, front			Used in step 107
Thermoplastic hexagon screw		Tightening torque	2,6 Nm

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Underbody protection front			Used in step 108
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 109
Sensor		Tightening torque	30 Nm

Front oxygen sensor to top of diesel particulate filter			Used in step 110
Sensor		Tightening torque	50 Nm

Exhaust-gas temperature sensor to diesel particulate filter			Used in step 111
Sensor		Tightening torque	30 Nm

Differential pressure sensor of diesel particulate filter on cylinder head cover			Used in step 112
TS5x20		Tightening torque	4 Nm

Clamp for the pressure hose on the differential pressure sensor			Used in step 112
Clamp 15–19mm		Tightening torque	3 Nm

Clean air pipe to exhaust turbocharger			Used in step 113
M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing			Used in step 113114
Clamp		Tightening torque	3 Nm

Front end strut			Used in step 115
Screw		Tightening torque	56 Nm

Bulkhead lower part to body			Used in step 117
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead			Used in step 118
		Tightening torque	3 Nm

Tension strut on bulkhead			Used in step 118
M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome			Used in step 118
Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm			Used in step 121
Combination hexagon nut		Tightening torque	35 Nm

Overview of Special Tools

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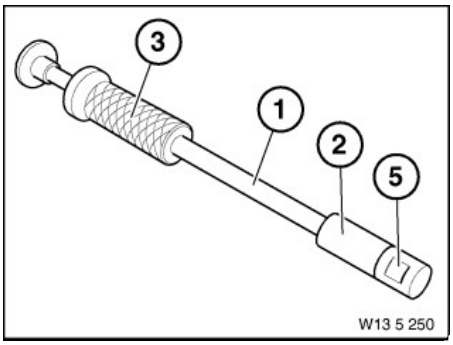
0 493 339 (13 5 252) Bush



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	

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)	

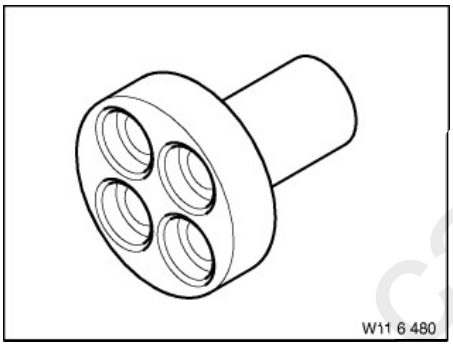
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0 493 340 (13 5 253) Weight



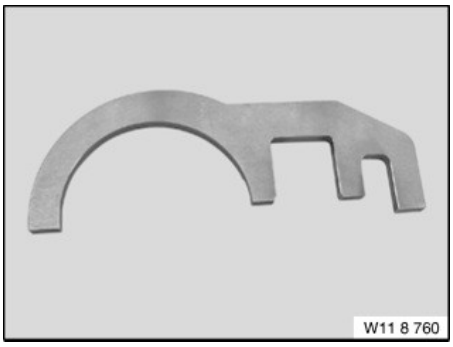
Common	Used in step 48
Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

0 493 380 (11 6 480) Connector



Common	Used in step 5174
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 515567727475
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)

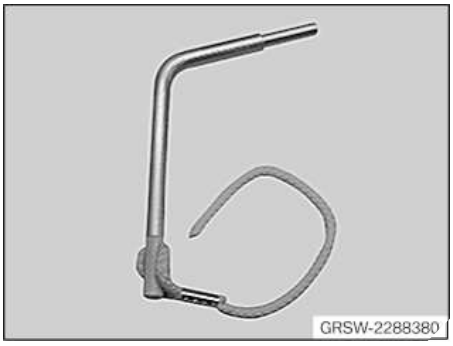
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2 365 488 Adapter



Common	Used in step 51737476
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)

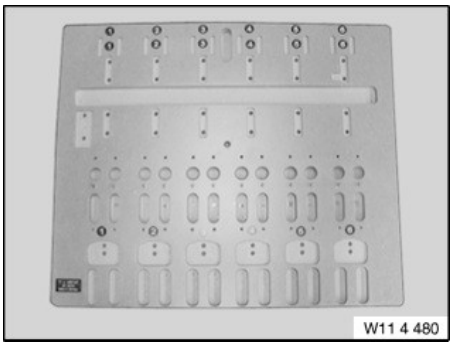
2 288 380 Locating stud



Common	Used in step 51737476
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)

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0 495 105 (11 4 480) oddments tray



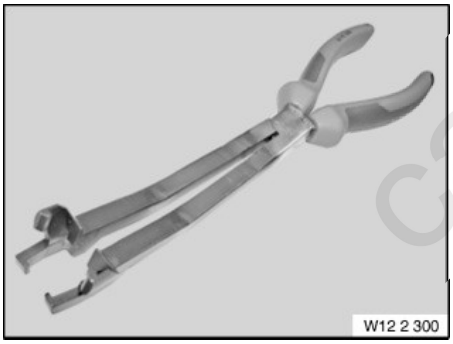
Common Used in step 5758

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	

0 495 140 (12 2 300) Pliers

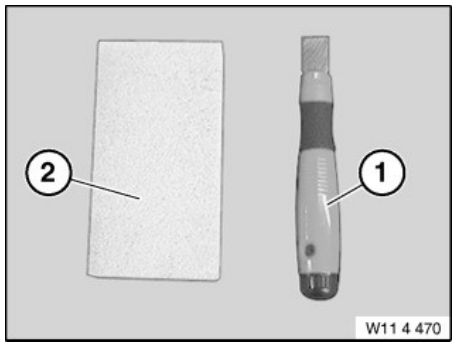


Common Used in step 59

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)

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0 495 102 (11 4 470) Tool



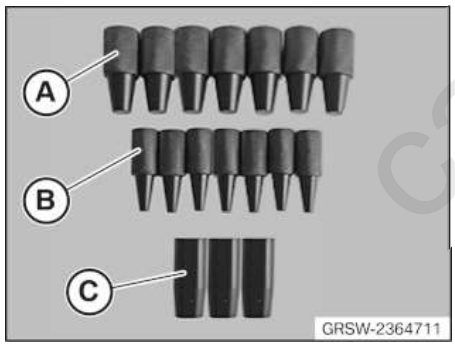
Common	Used in step 5987
Usage	(cleaning kit) For cleaning sealing surfaces on magnesium crankcase/cylinder head.
Included in the tool or work	
Storage location	C52
Replaced by	
In connection with	
SI-Number	01 17 04 (130)

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)	

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2 364 711 Plug



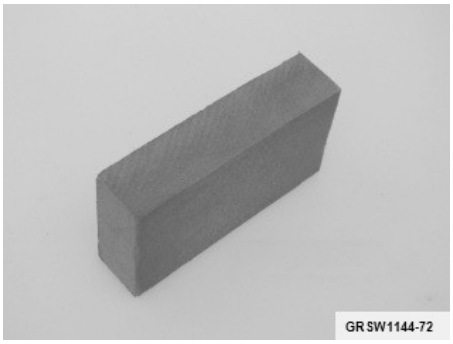
Common	Used in step 60
Usage	For closing the pressure oil holes for cleaning the cylinder head sealing surfaces.
Included in the tool or work	
Storage location	C20
Replaced by	
In connection with	
SI-Number	

0 495 103 (11 4 471) Scraper



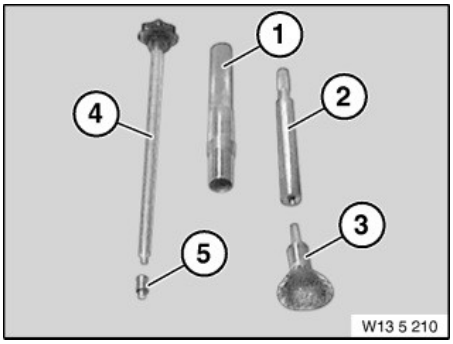
Common	Used in step 60
Usage	
Included in the tool or work	0 495 102
Storage location	C52
Replaced by	
In connection with	
SI-Number	

0 495 104 (11 4 472) Extractor



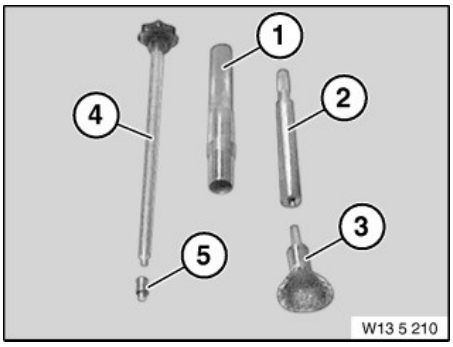
Common	Used in step 60
Usage	(grindstone)
Included in the tool or work	0 495 102
Storage location	C52
Replaced by	
In connection with	
SI-Number	

0 493 763 (13 5 215) Plug



Common	Used in step 79
Usage	(Seal plug)
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

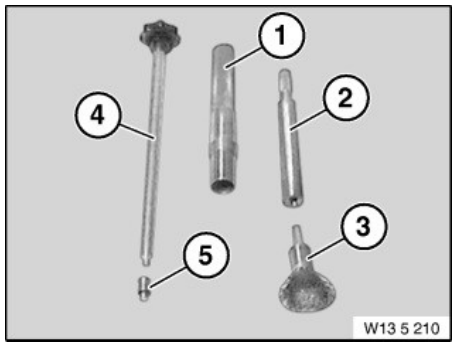
0 493 762 (13 5 214) Rod



Common	Used in step 79
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	

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0 493 758 (13 5 210) Tool



Common Used in step 79

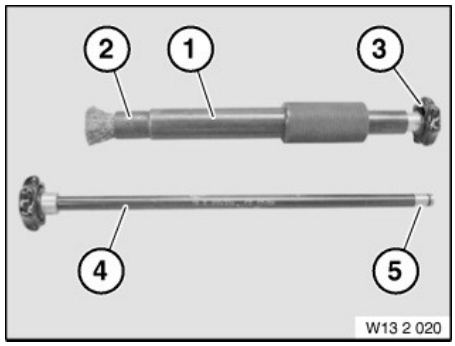
Usage	(Cleaning set) For injector channels
Included in the tool or work	
Storage location	B4
Replaced by	
In connection with	
SI-Number	01 05 00 (574)

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)	

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0 496 150 (13 2 020) Tool



Common Used in step 79

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.	

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2 344 011 Tool



Common	Used in step 95
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	

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	

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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	

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	

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Overview Technical Data

Cylinder head flatness	Used in step 61
Maximum lengthwise deviation from flatness	0.10 mm
Maximum transverse deviation from flatness	0.05 mm

Distance from window pane edge to wiper blade	Used in step 121
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 127
	1.0 l

Links

General repair instructions	Used in step
11 00 ... Overview of consumables (Electronic Parts Catalogue)	79

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2124
61 20 900 Disconnecting and connecting battery earth lead	2124
61 20 900 Disconnecting and connecting battery earth lead	2124
61 20 900 Disconnecting and connecting battery earth lead	2124
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61 20 900 Disconnecting and connecting battery earth lead	2124
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61 20 900 Disconnecting and connecting battery earth lead	2124
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2124
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2124
61 20 900 Disconnecting and connecting battery earth lead	2124
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	2124
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	2124
61 20 900 Disconnecting and connecting battery earth lead	2124
61 20 900 Disconnecting and connecting battery earth lead	2124
61 20 900 Disconnecting and connecting battery earth lead	2124
61 20 900 Disconnecting and connecting battery earth lead	2124
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61 20 900 Disconnecting and connecting battery earth lead	2124
61 20 900 Disconnecting and connecting battery earth lead	2124

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61 20 900 Disconnecting and connecting battery earth lead	2124

17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126
17 00 039 Bleeding the cooling system (B36, B38, B46, B48)	126
17 00 039 Bleeding cooling system (B37, B47)	126
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126
17 00 039 Filling and bleeding the high-temperature cooling system vacuum filler device (B48)	126
17 00 008 Draining and topping up the high-temperature coolant circuit	126
17 00 008 Draining and topping up the high-temperature coolant circuit	126
17 00 016 Draining and topping up coolant circuit for Range Extender \PREMIUM	126
17 00 008 Draining and topping up the high-temperature coolant circuit	126
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	126
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	126
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	126
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	126
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	126
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	126
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126
17 00 009 Check the cooling system for watertightness with a special tool (with a tester)	126
17 00 009 Check the cooling system for watertightness with a special tool (with a tester)	126
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126
17 00 008 Draining and topping up coolant for high-temperature circuit	126
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126
17 00 008 Draining and topping up coolant for high-temperature circuit	126
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	126

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11 12 001 Replace the cylinder head cover

PRELIMINARY WORK

1 – Bring front compartment lid in the service position

Prerequisite

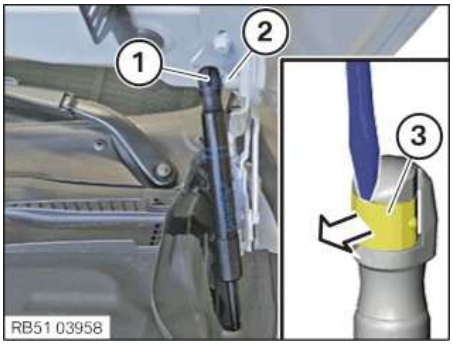
Engine compartment lid is open.

CAUTION

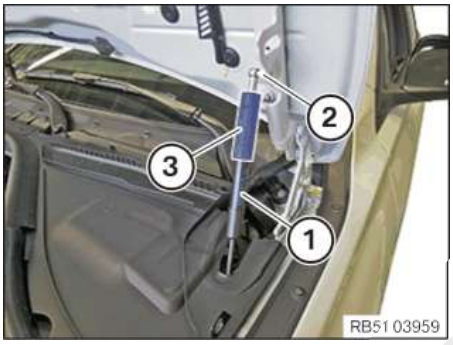
Shutting bonnet or tailgate.

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 – 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.

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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.

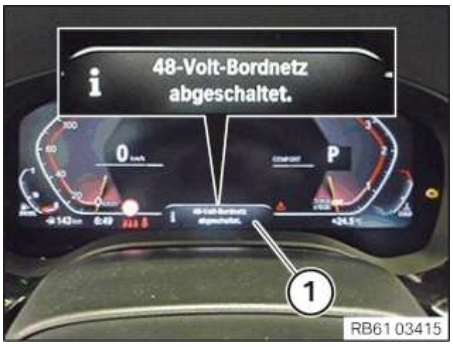
TECHNICAL INFORMATION

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

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

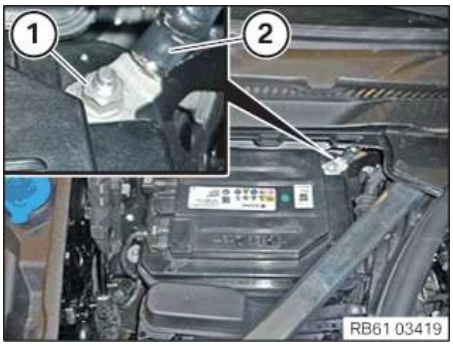
- Exit PAD mode by pressing the START-STOP button once without depressing the brake pedal.

The work “Disconnecting the negative battery cable of the 48-V battery” can be started.

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- 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.

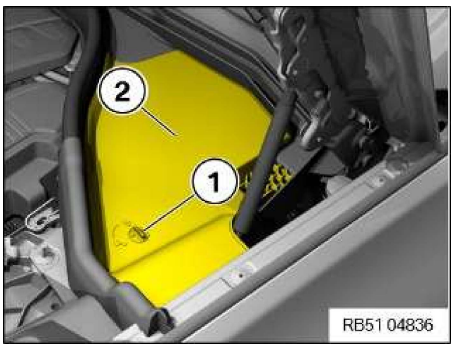
- Cover the vehicle battery with the special tool as shown.
- Position the battery earth lead (1) as shown.

3 – Disconnecting all battery earth leads



- See additional information.

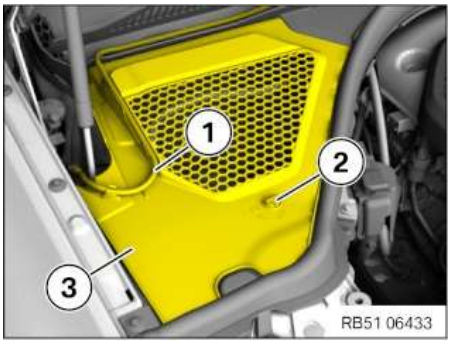
4 – Remove the cover of the engine compartment at the rear left



- Loosen the lock (1).
- Remove the cover (2) of the rear left engine compartment.

5 – Remove the cover of the rear right engine compartment

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- 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.

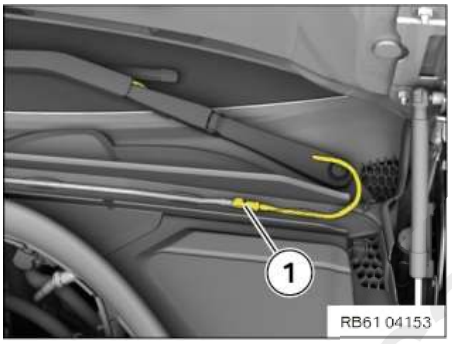
► **Remove the wiper arm**

RISK OF DAMAGE

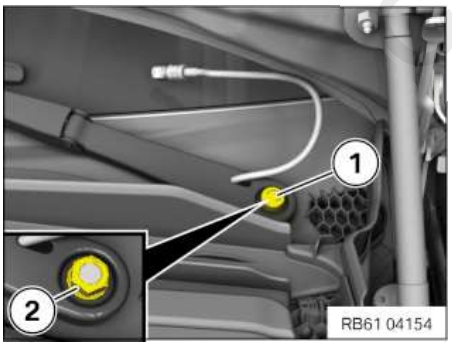
Damage to wiper console.

While removing the wiper arms without using special tool, the wiper console can break.

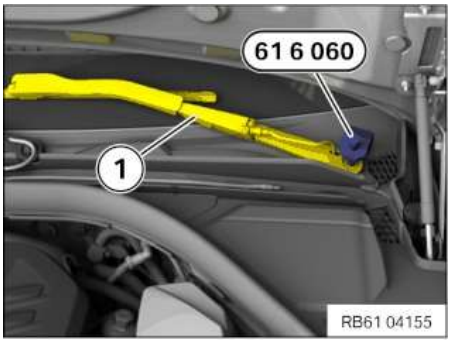
- Removing the wiper arms must be carried out only using the prescribed special tool.
- Do **not** lever off the wiper arm because otherwise the wiper console may break at the predetermined breaking point for active pedestrian protection.



- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.



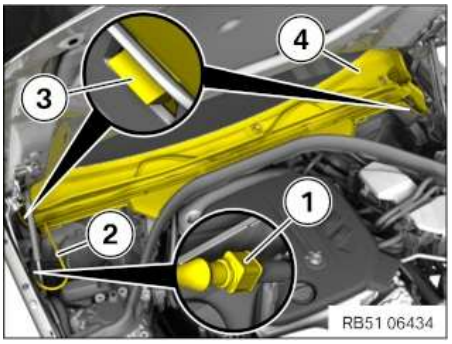
- Remove the protective cap (1).
- Loosen nut (2).



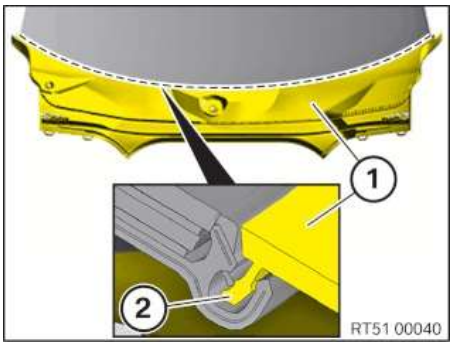
- Pull off the wiper arm (1) using special tool .

7 – Remove cowl panel cover

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- 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

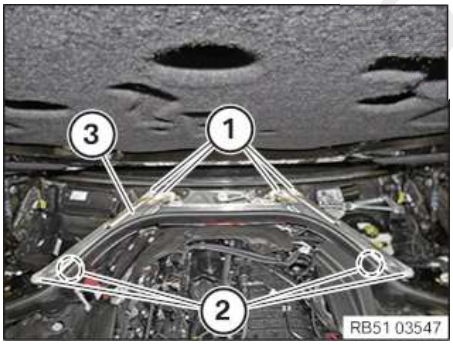


- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

9 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

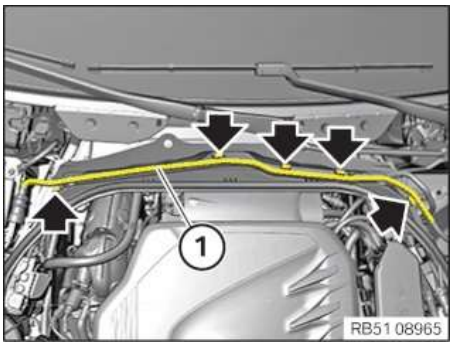
Driving without the strut brace/front-end strut or tension strut is not permitted.



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

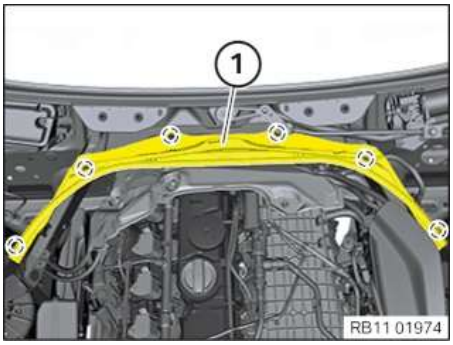
- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.



- **Version with mild hybrid technology:**

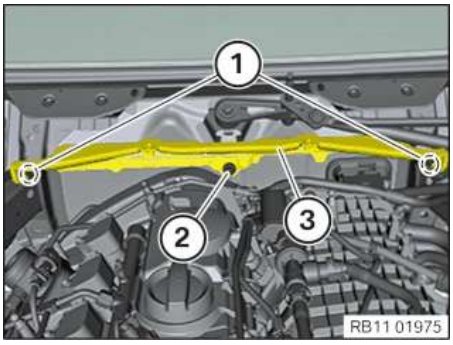
  Unclip the wire (1) at the holders (arrows).

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- 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.

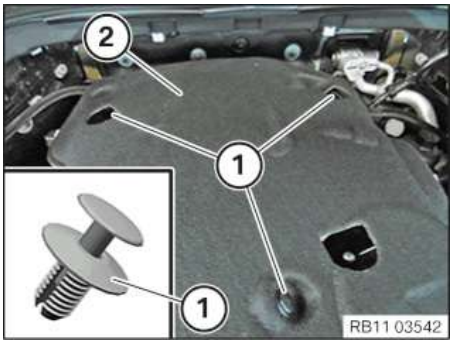
Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- 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.



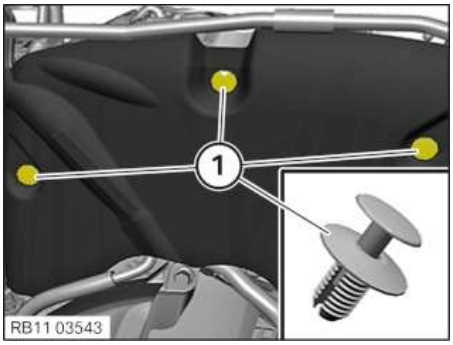
- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

12 – Remove the acoustic cover for the injectors

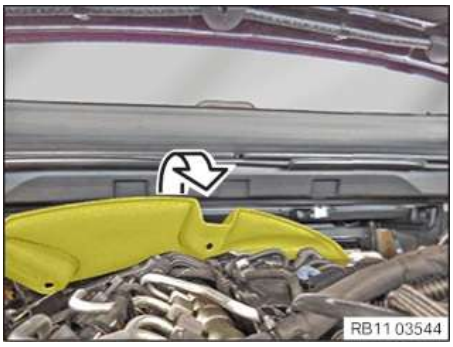


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

13 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).



- Guide out and remove the acoustic cover in the direction of the arrow.

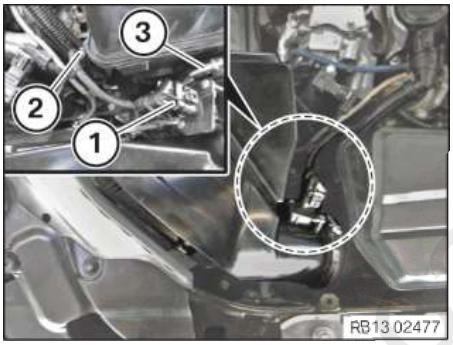
14 – Removing the clean air pipe with the resonator

WARNING

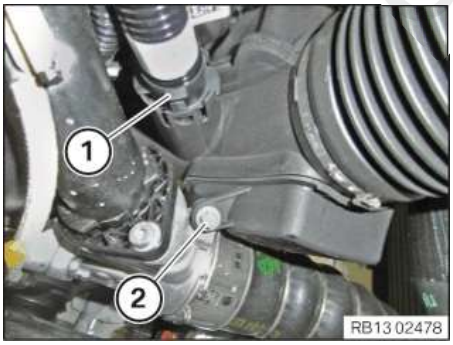
Hot surfaces.

Risk of burning!

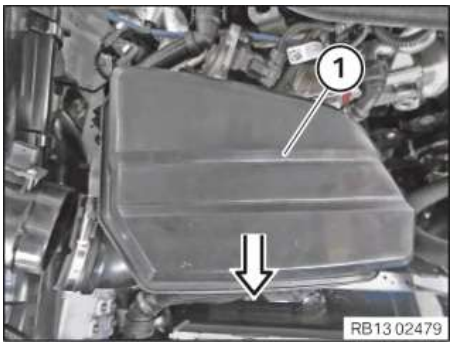
- Perform all work only on components that have cooled down.



- 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.

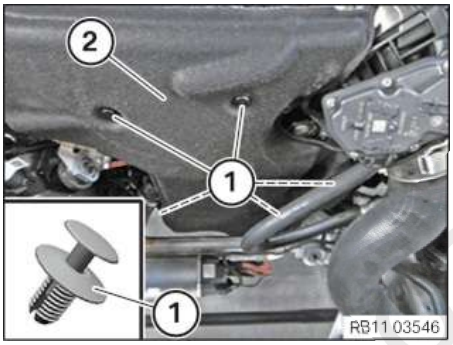
15 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

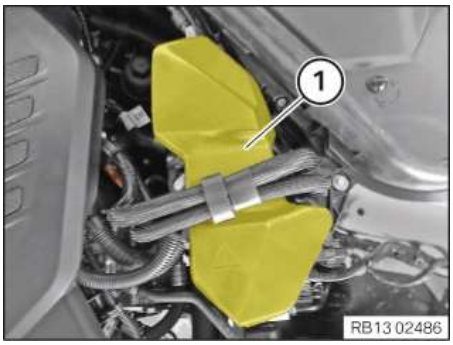
Risk of burning!

- 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

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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

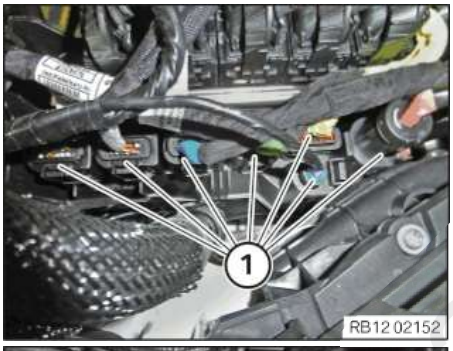
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

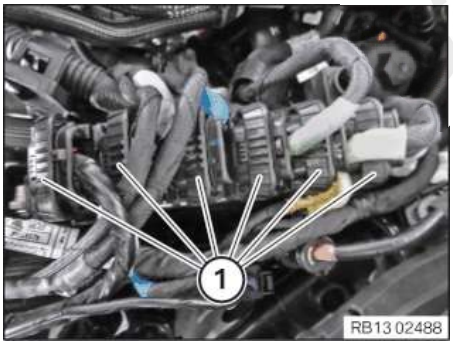
- Do not pull on the wires when disconnecting connectors and plug connections.

TECHNICAL INFORMATION

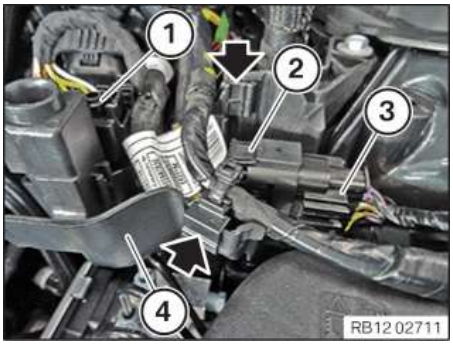
Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.



- Unlock and disconnect plug connections (1).

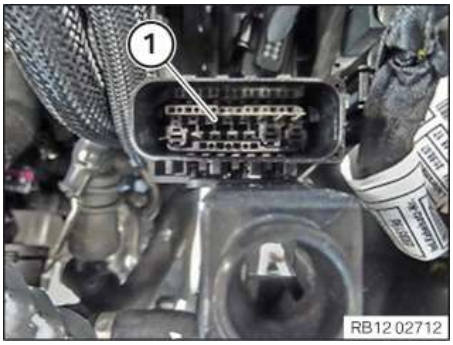


- Unlock and disconnect plug connections (1).

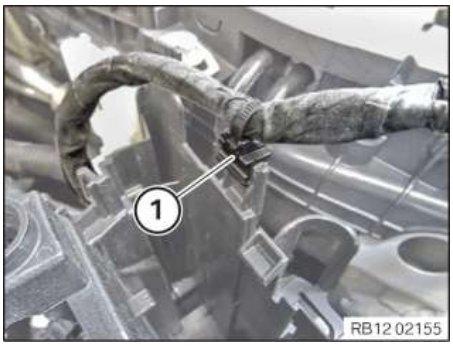


- Unlock plug connection (1) and disconnect.
- Unlock plug connection (2) and disconnect.
- Release the connector (3) and disconnect from the control unit holder (4).
- Release the clamps (arrows).

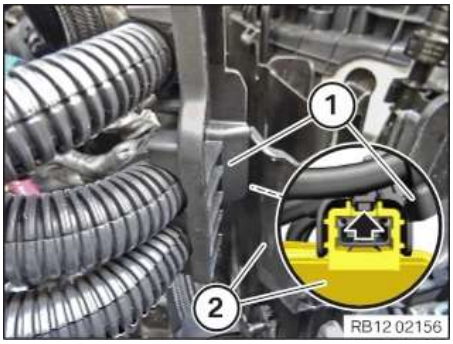
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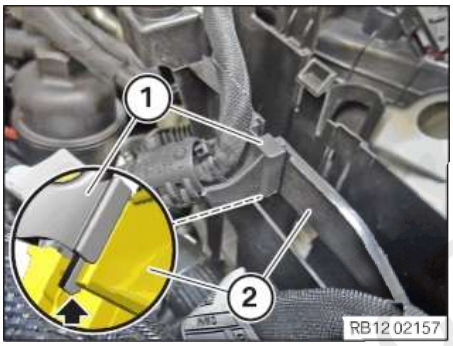
- Unlock plug connection (1) and disconnect.



- 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).

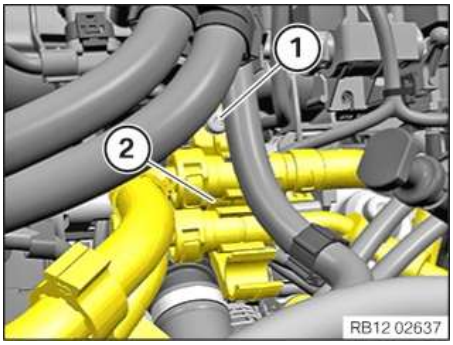


- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.

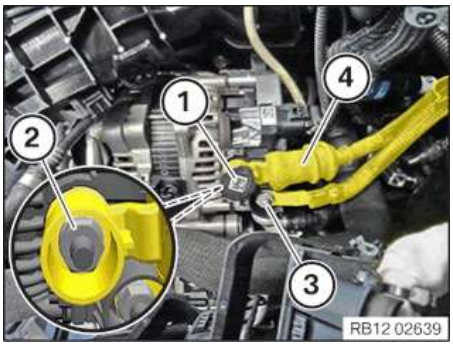


- Unlock holder (1) and feed out coolant line (2) and place it aside.

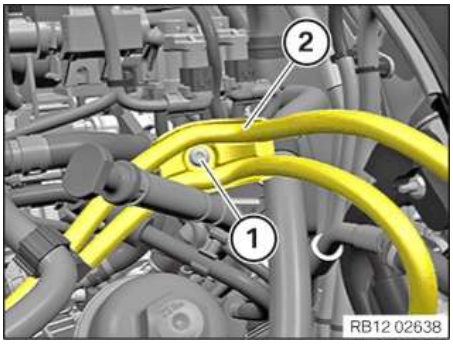
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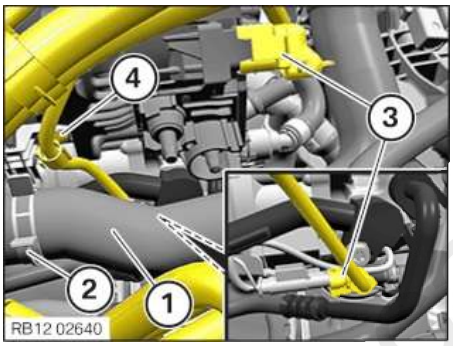
- Release the screw (1).
- Guide out fuel lines (2) and set them aside.



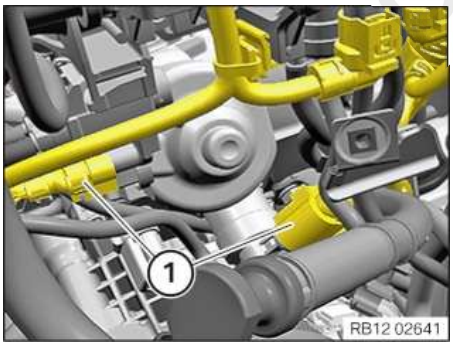
- Guide out and remove the lid (1).
- Release the nuts (2) and (3).
- Feed out positive battery cables (4) and place to one side.



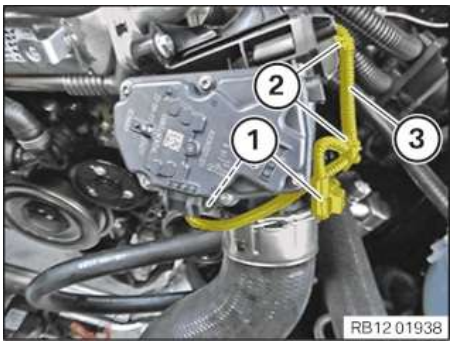
- Release the screw (1).
- Guide out the positive battery cables (2) and set them aside.



- 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.

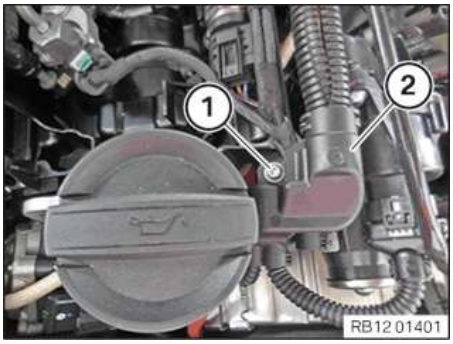
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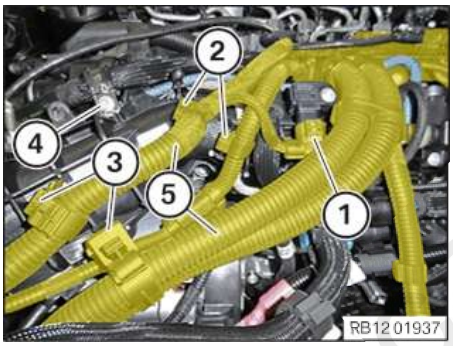
- Unlock and loosen connector (1).



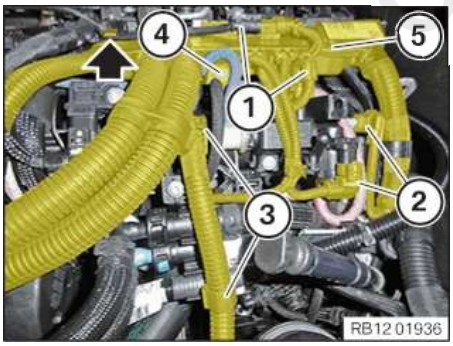
- Unlock plug connection (1) and disconnect.



- 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.

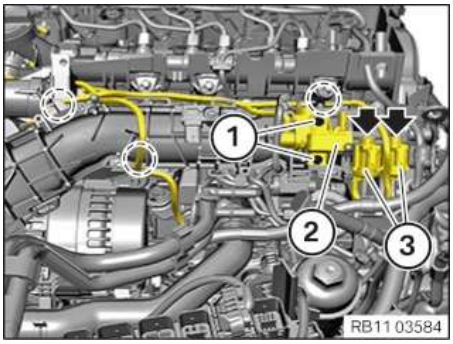
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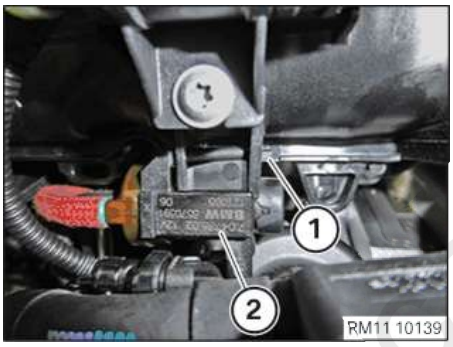
- Unlock clamp (1) and engage in this position.



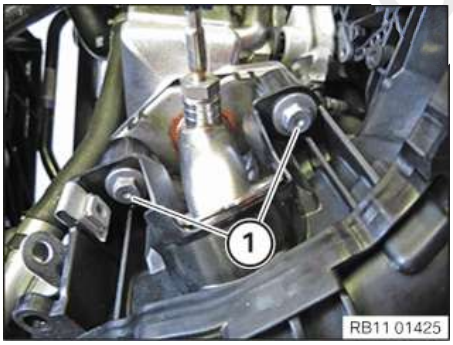
- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.



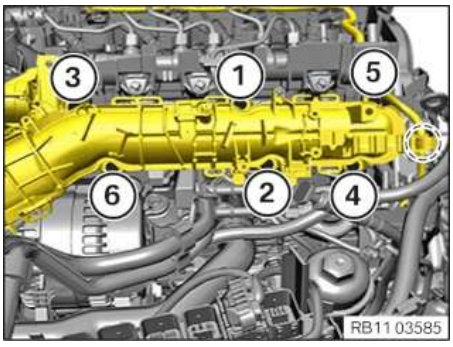
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.

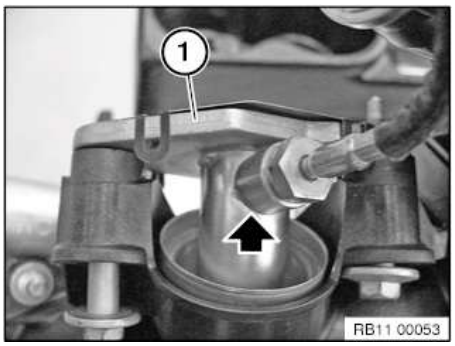


- Loosen screws (1).



- 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.

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- 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!

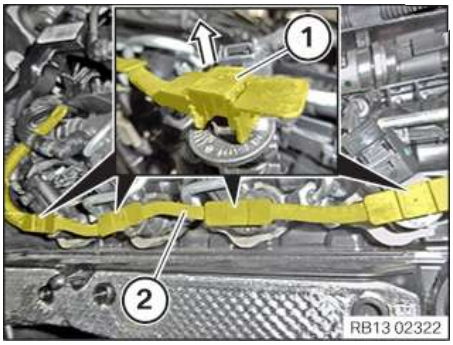
- Perform all work only on components that have cooled down.

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.

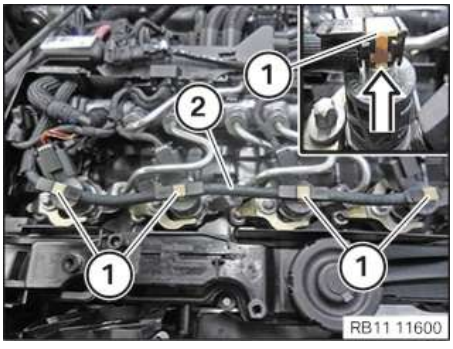


- **Version A:**

  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.



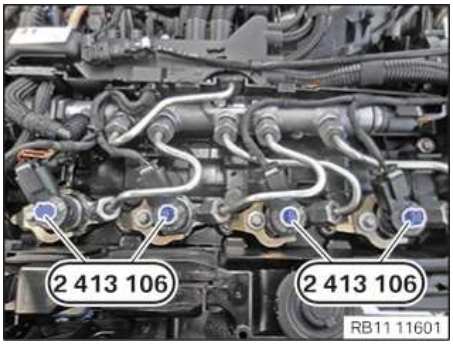
- **Version B:**

  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.

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- 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.

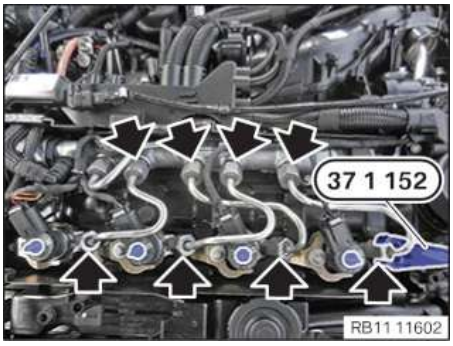
TECHNICAL INFORMATION

If several high pressure lines are removed, ensure that each high pressure line is installed in its original location. Label high pressure lines.

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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.

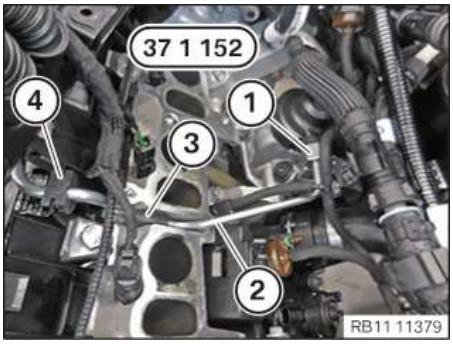
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TECHNICAL INFORMATION

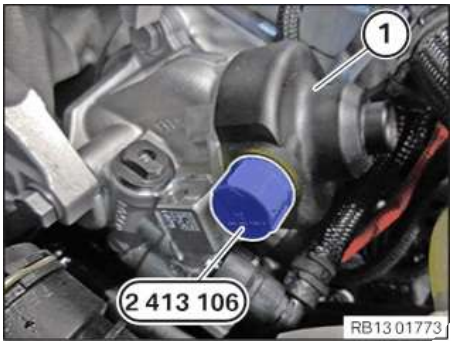
Reset special tool in early to avoid bending pressure lines.



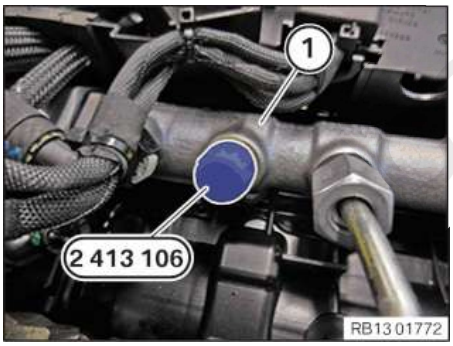
- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.



- 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.

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RISK OF DAMAGE

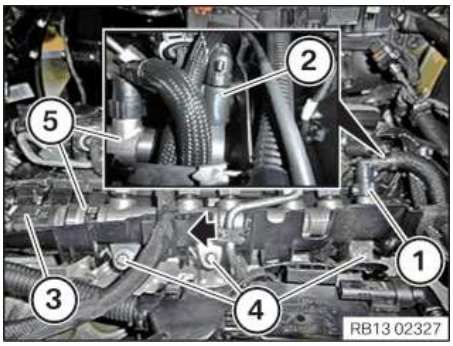
Contaminant or foreign body.

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.

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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

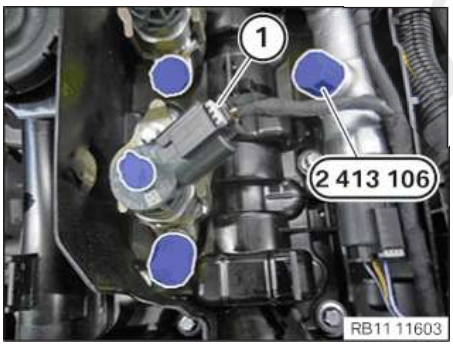
Electrostatic discharge.

Damage to or destruction of electrical components.

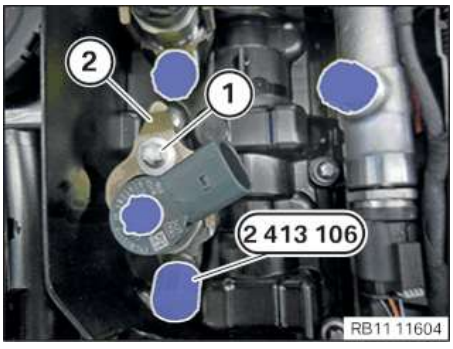
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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**

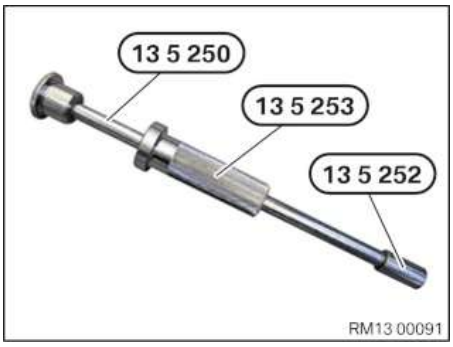
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RISK OF DAMAGE

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.

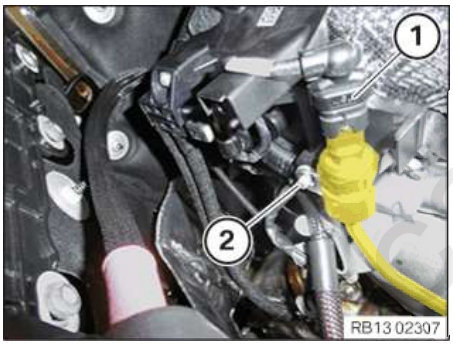


- Unscrew special tool 0 493 339 (13 5 252) from special tool 0 493 321 (13 5 250) and remove special tool 0 493 340 (13 5 253).
- Screw special tool 0 493 339 (13 5 252) back onto special tool 0 493 321 (13 5 250).

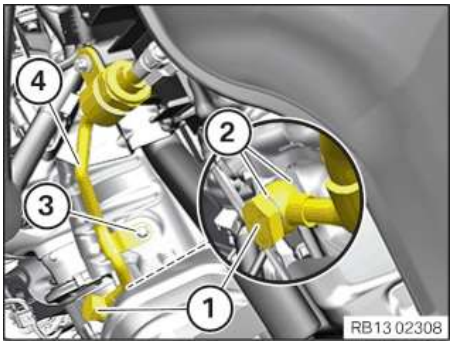


- Screw special tool 0 493 321 (13 5 250) with special tool 0 493 339 (13 5 252) onto pressure line connection (1) of injector.
- Release injector (1) with special tools 0 493 321 (13 5 250) and 0 493 339 (13 5 252) by means of **short** back and forth movements and remove.

24 – Remove the exhaust gas pressure pipe



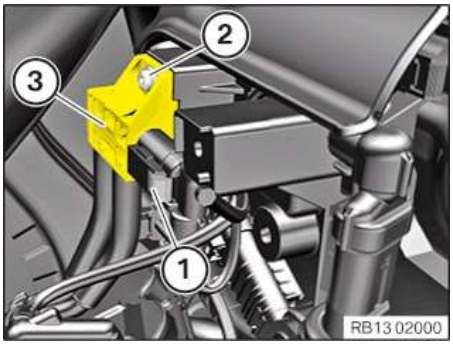
- Unlock plug connection (1) and disconnect.
- Loosen screw (2).



- 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

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- 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.

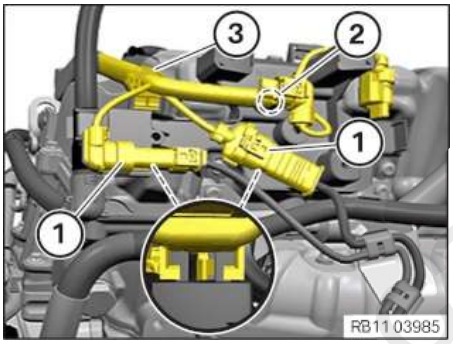
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

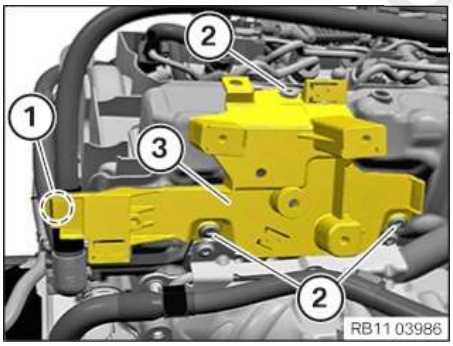
Contaminant or foreign body.

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.

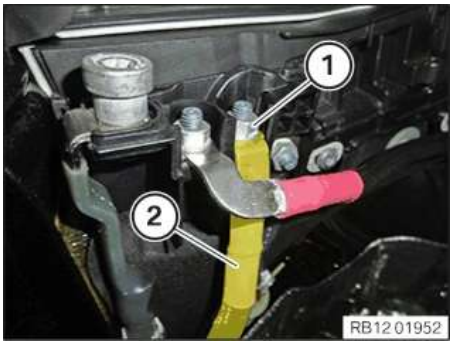


- Release the positive battery cable in the area (1) from the clamp and set it aside.
- Loosen screws (2).
- Feed out holder (3) for the sensor system and remove.

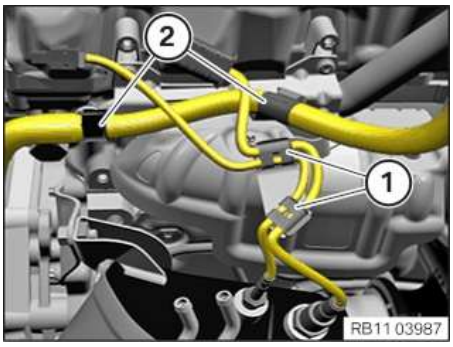


- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.

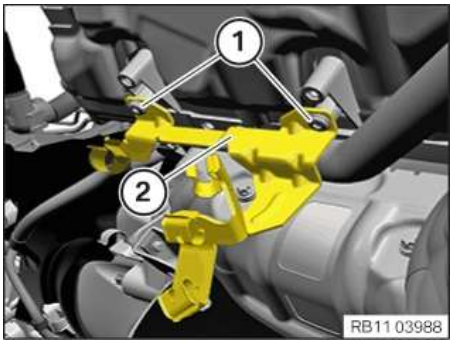
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- Loosen nut (1).
- Feed out positive battery cable (2) and put to one side.

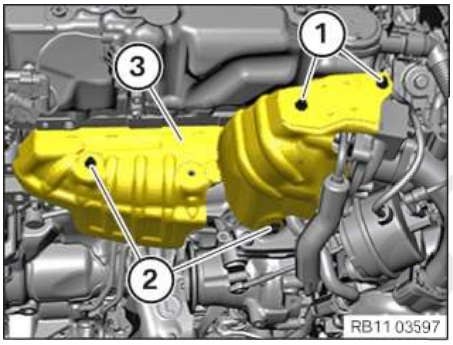


- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



- Loosen screws (1).
- Guide out and remove holder (2).

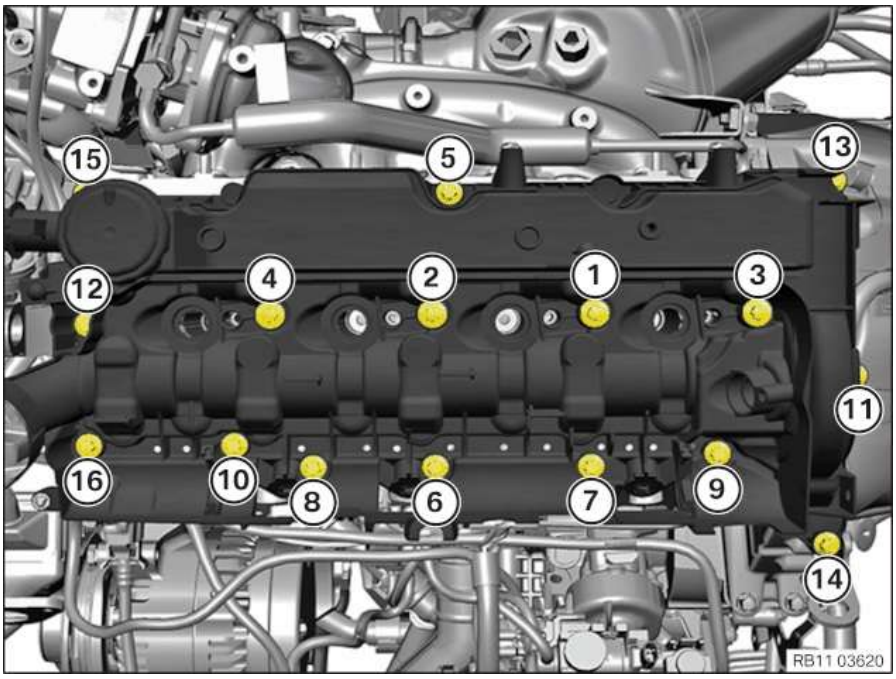
27 – Removing heat shield



- 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



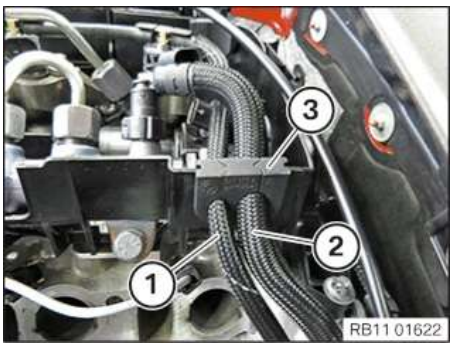
1 - 16 Bolts of the cylinder head cover



- Unlock and detach the locks.
- Feed the engine ventilation line (1) out and set it aside.

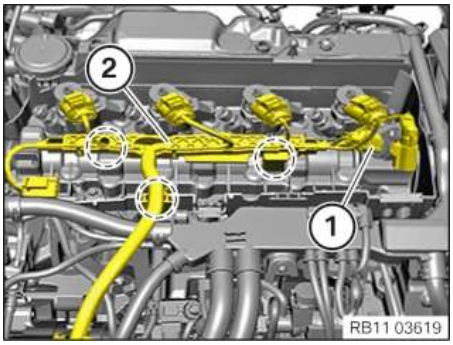


- Feed out and remove the heat shield (1).

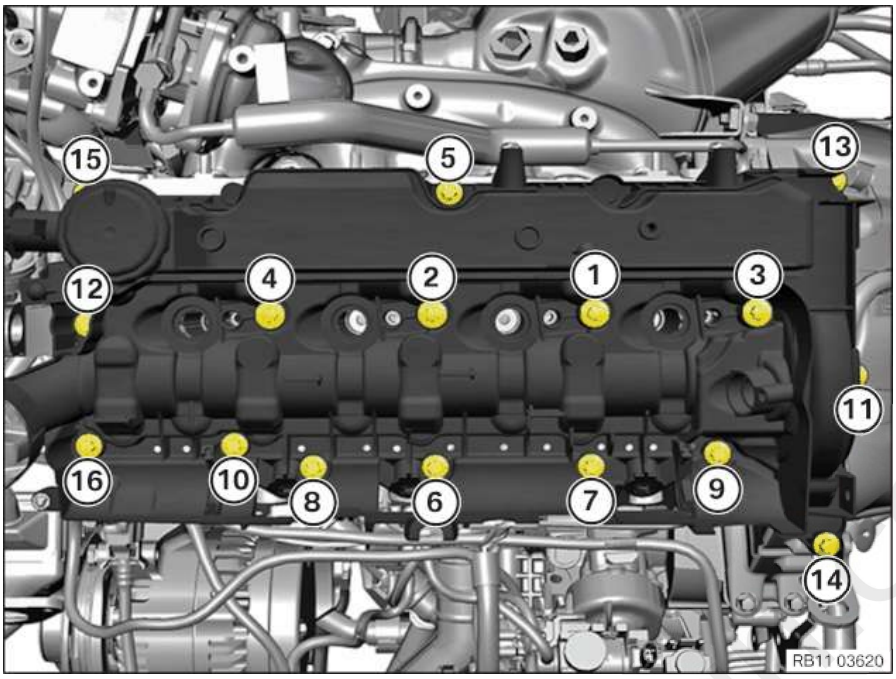


- Remove the leakage oil line (1) including the fuel return line (2) and the grommet (3) and put to one side.

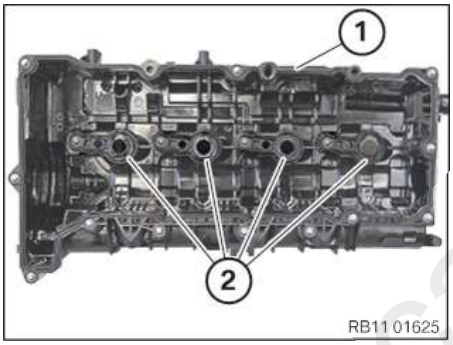
cardiagn.com



- 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).

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29 – Renewing the cylinder head cover

RISK OF DAMAGE

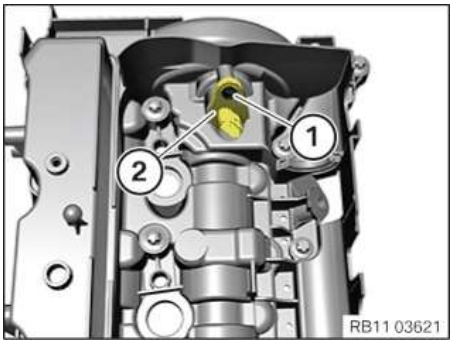
Electrostatic discharge.

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)

NOTICE

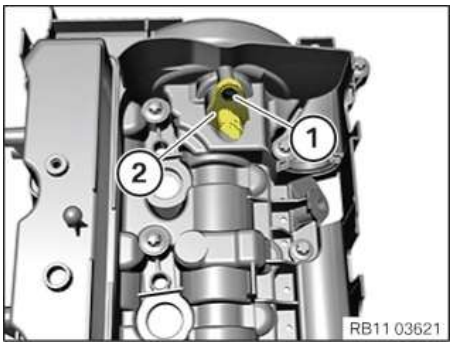
Schematic diagram is for example purposes. Some parts may differ in certain details.



- Loosen screw (1).
- Feed out and remove the camshaft sensor (2).



- Check the sealing ring (1) for damage and renew where required.



- Guide in camshaft sensor (2) into the new cylinder head cover and install it.

  Parts: Cylinder head cover
- Tighten down screw (1).

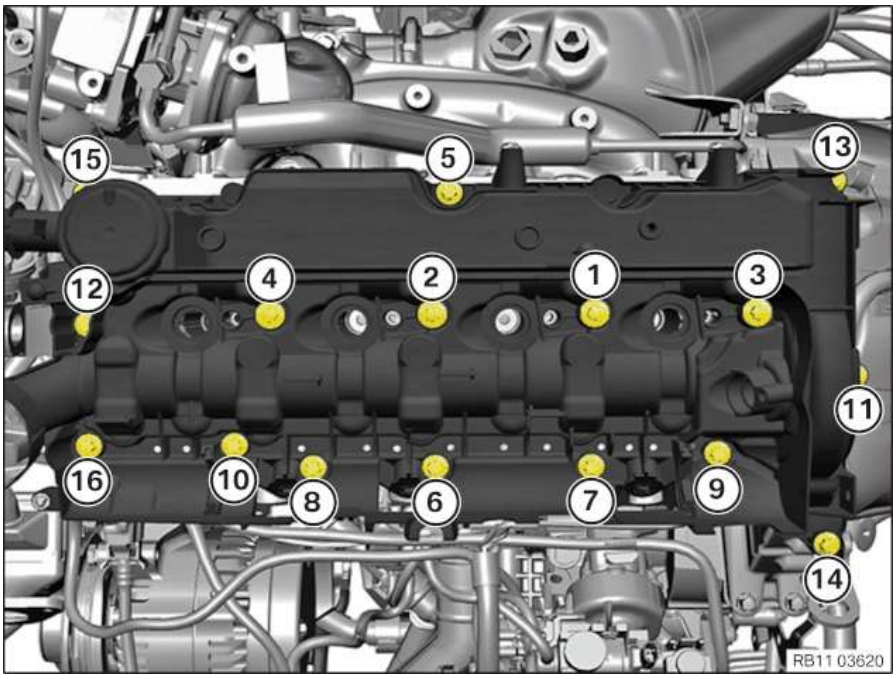
Camshaft sensor to cylinder head cover

TS5x20		Tightening torque	4 Nm

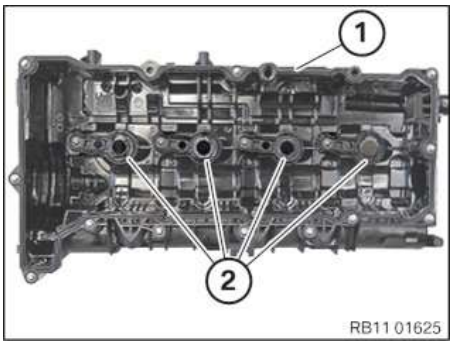
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30 – Installing cylinder head cover

Screw connection of the cylinder head cover

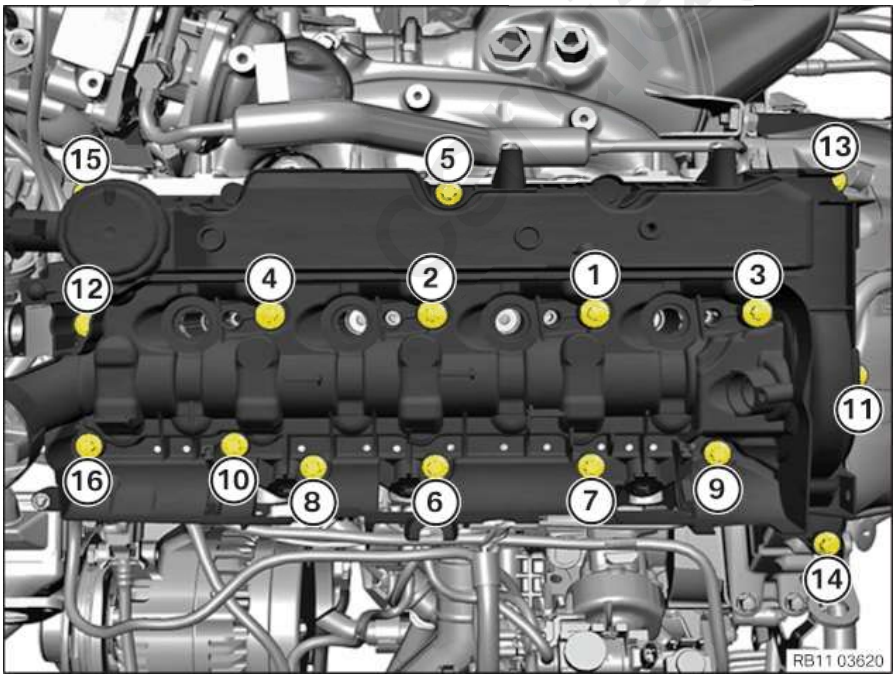


1 - 16 Bolts of the cylinder head cover



- Renew the profile seals (1) and (2) of the cylinder head cover.

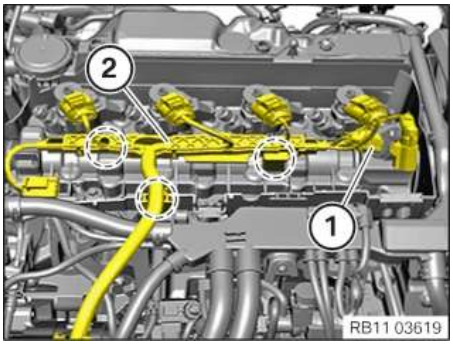
  Parts: Profile seals



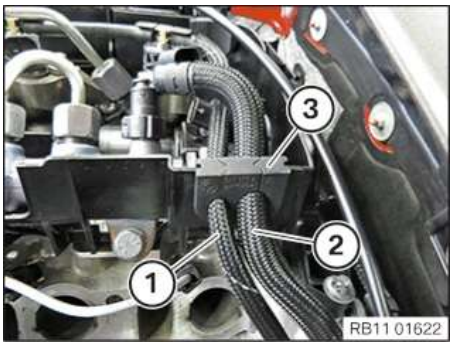
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

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).



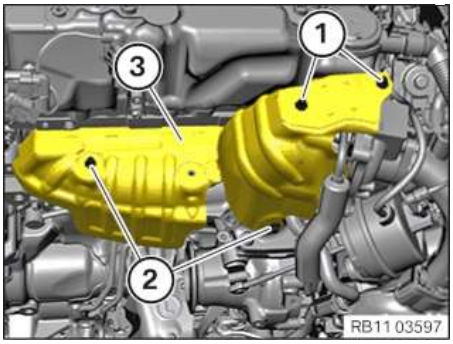
- Feed in and install the heat shield (1).



- Connect engine ventilation line (1) and lock.

  The locks (arrows) must engage audibly.

31 – 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

32 – Installing the sensor bracket on the cylinder head cover

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RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

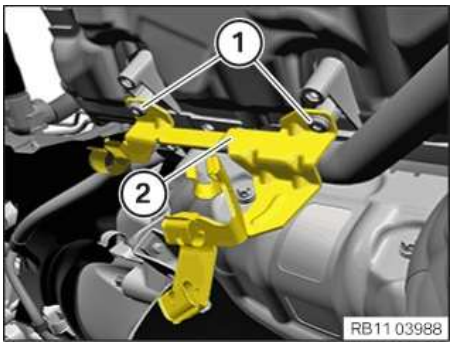
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

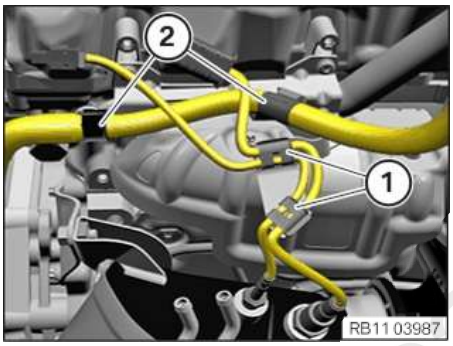
- Route all cables without abrasions, do not trap and crush.



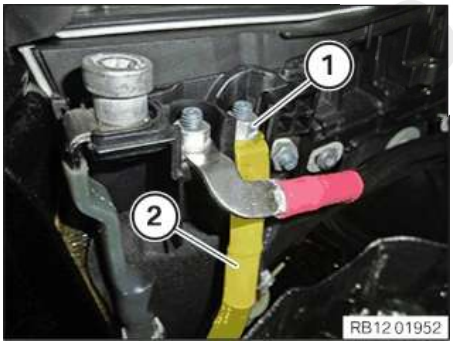
- Insert and install the holder (2).
- Tighten the screws (1).

Bracket on cylinder head cover

	Tightening torque	5 Nm



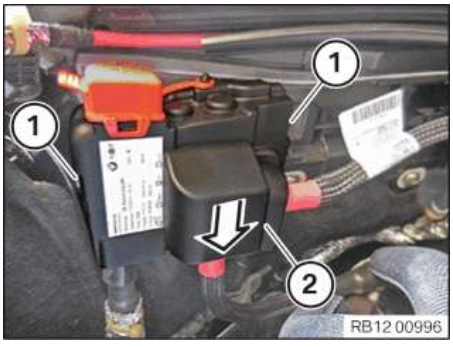
- Secure the positive battery cable in the clamps (2).
- Mount the cable of the exhaust gas sensor system in the clamps (1).



- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

Battery positive lead to battery positive terminal

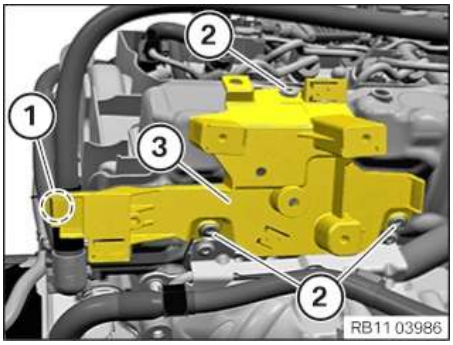
M8		Tightening torque	19 Nm



- Insert and install the cover (2) in the direction of the arrow.

  The locks (1) must engage audibly.

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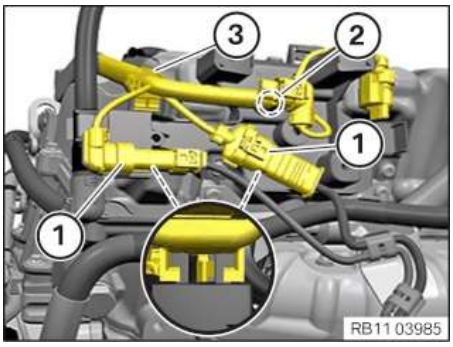


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

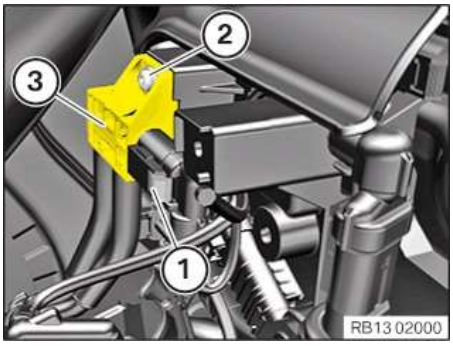
		Tightening torque	5 Nm

- 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.

33 – Securing the differential pressure sensor for the diesel particulate filter



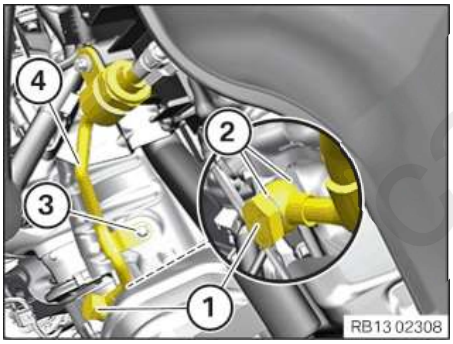
- Feed in and install the differential pressure sensor (3).
- Tighten down screw (2).

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.

34 – 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.

35 – Install all injectors

▸ **Cleaning the injector shafts**

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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

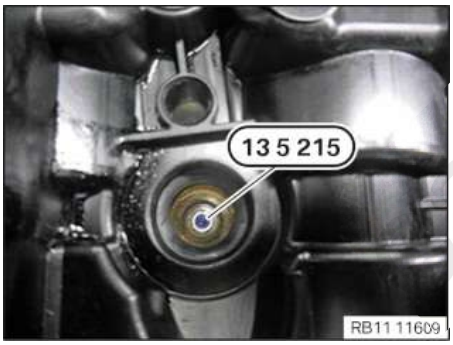
Contaminant or foreign body.

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.



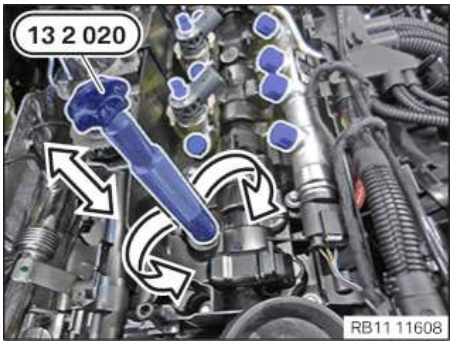
- Check whether the sealing ring remained in the injector shaft and remove the sealing ring as needed.
- Insert the special tool 0 493 763 (13 5 215) with the special tool 0 493 762 (13 5 214) from the set of special tools 0 493 758 (13 5 210) into the injector shaft.
- Remove special tool 0 493 762 (13 5 214).



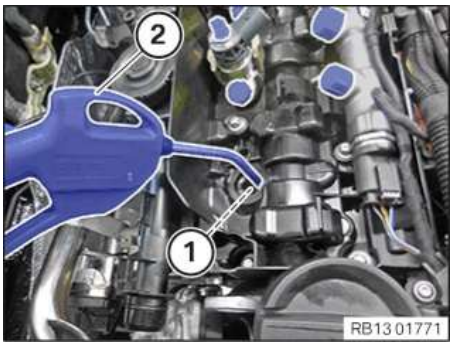
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



- 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.

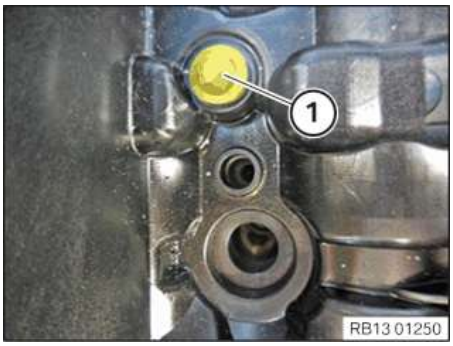
▸ **Check the placement of the clamping claw**

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**

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RISK OF DAMAGE

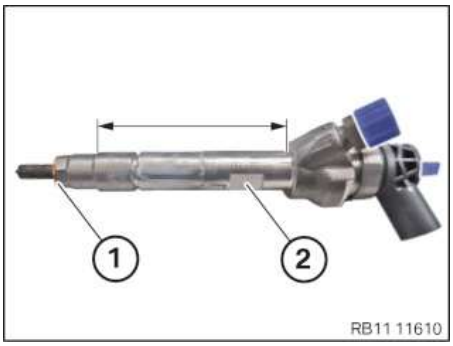
Contaminant or foreign body.

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.

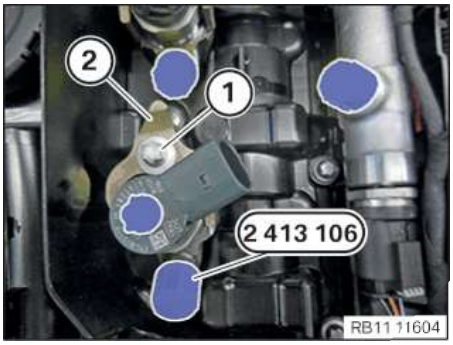
TECHNICAL INFORMATION

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).

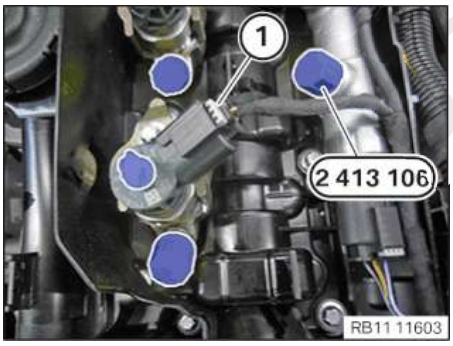
  Parts: Copper sealing ring
- Lightly grease the injector in the marked area with heat-resistant grease before installing the injector (2) in the injector shaft.



- 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**

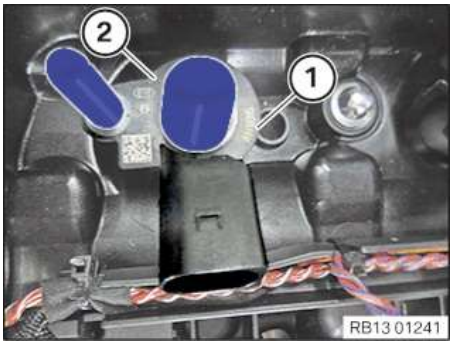
TECHNICAL INFORMATION

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.

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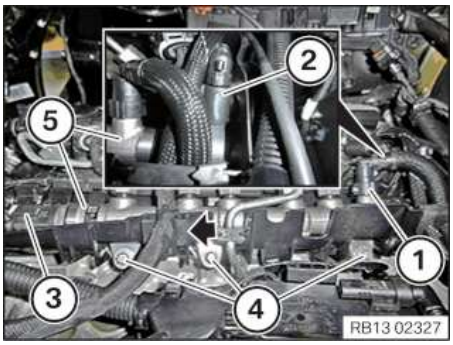


- Read off the adjustment value (1) on the new injector (2).



- 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.

36 – 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.

37 – 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.

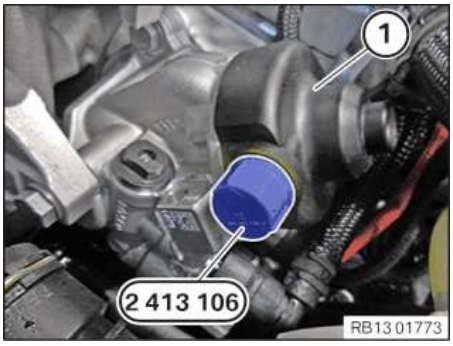
Danger of injury!

- 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.

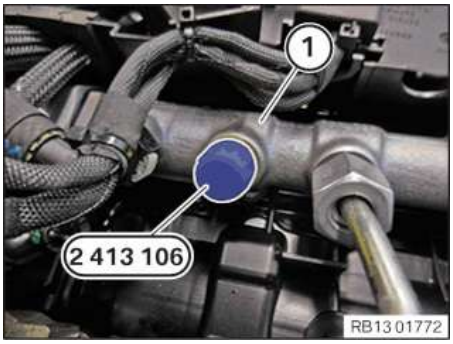
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TECHNICAL INFORMATION

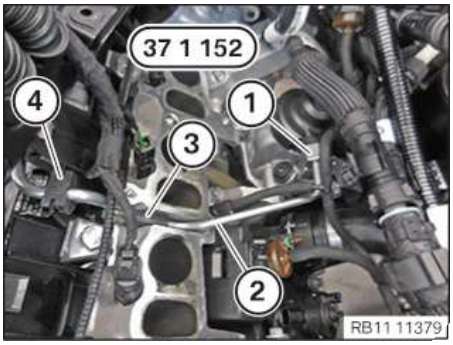
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- 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.

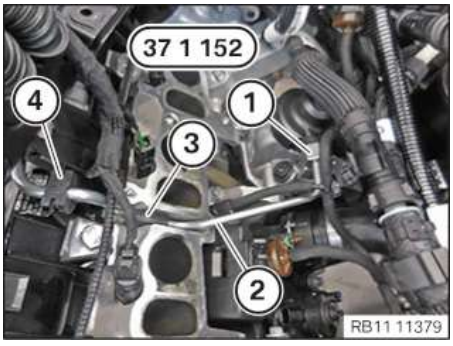
TECHNICAL INFORMATION

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

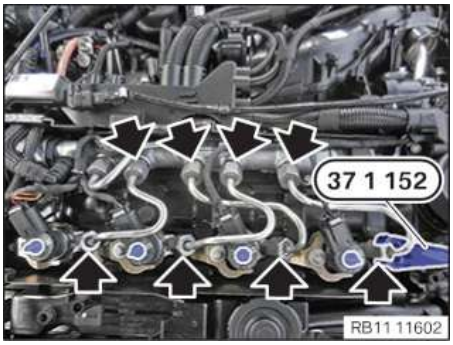
Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- 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

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- 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.

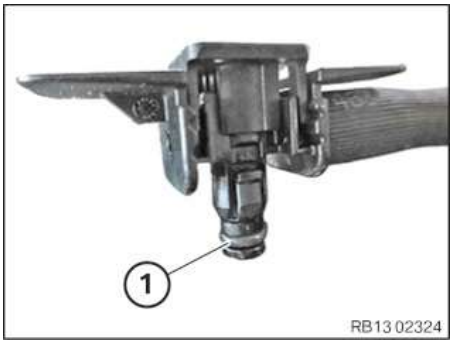
- Tighten the high pressure lines (arrows) with the special tool .

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**).

39 – Attach the leakage oil line on the injectors

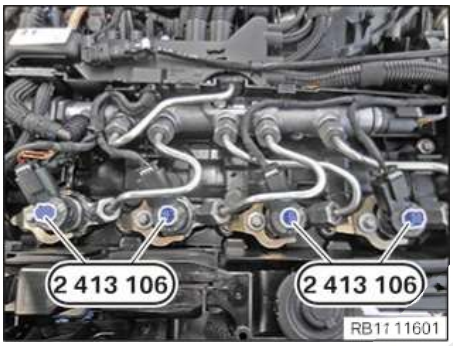


- **Version A:**

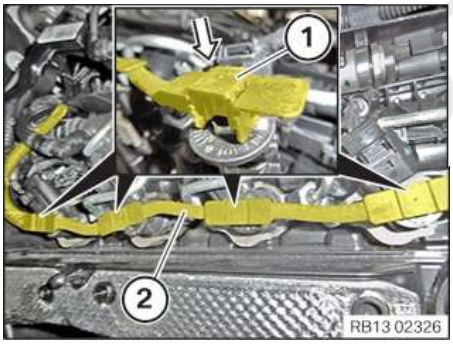
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

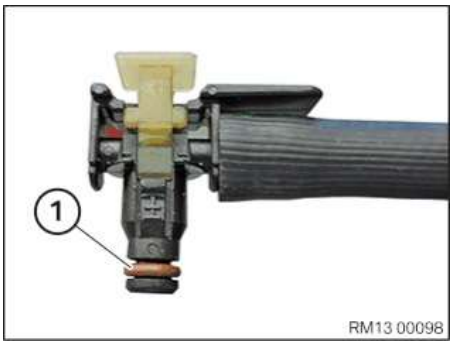
  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.



- 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.



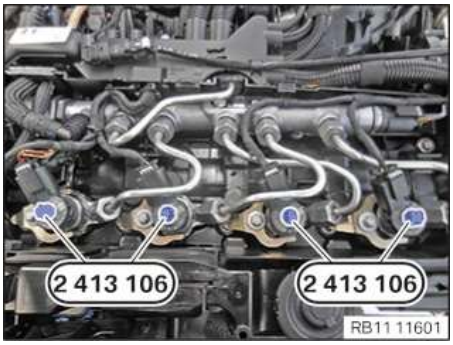
- **Version B**:

  Check sealing ring (1) for damage, renew leakage oil line if necessary.

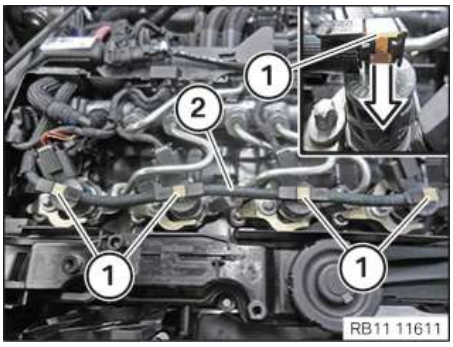
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.

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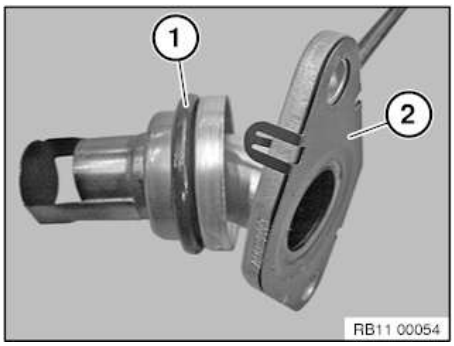


- Feed out the special tools and remove.



- 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.

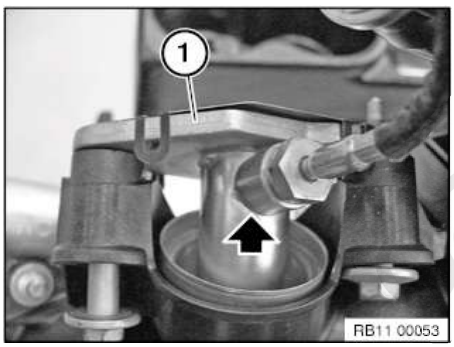
40 – Installing the intake plenum



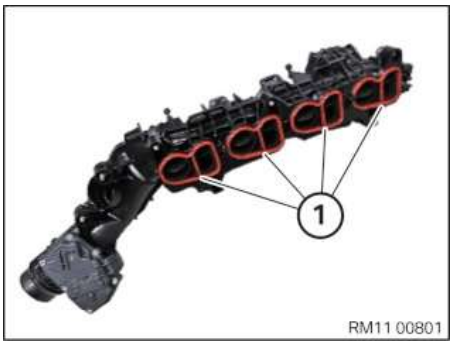
- Renew O-ring (1).

  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

  Parts: Gasket
- Position the seal (2) and clip it in.



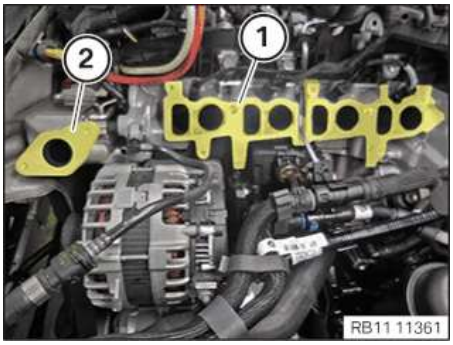
- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).



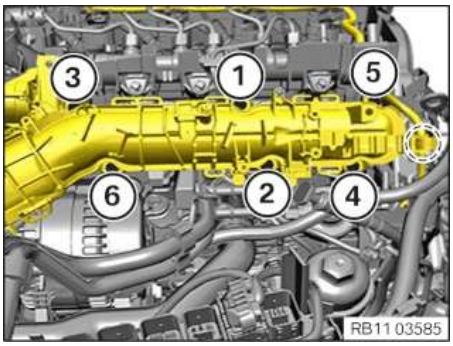
- Renew seals (1).

  Parts: Seals
- Ensure that the seals (1) are firmly mounted on the intake plenum.

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- Clean connection points (1) at cylinder head.
- Clean the connection point (2) on the exhaust-gas recirculation cooler.

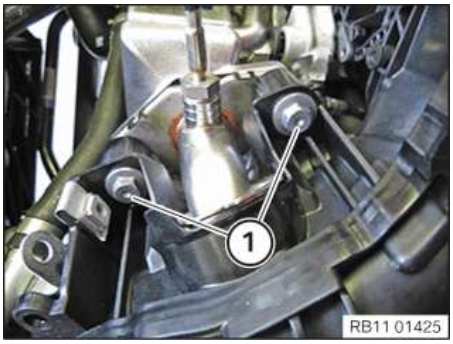


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

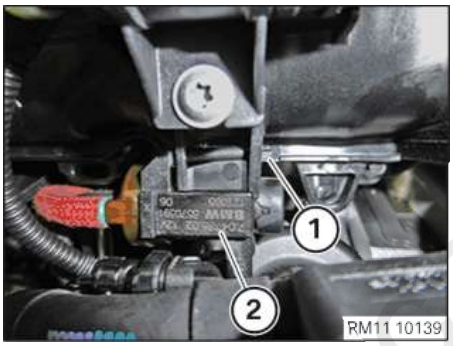
- Attach the wiring harness and fuel lines in the marked area on the intake plenum.



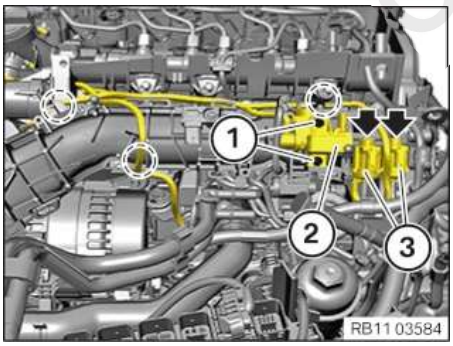
- Tighten the screws (1).

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.



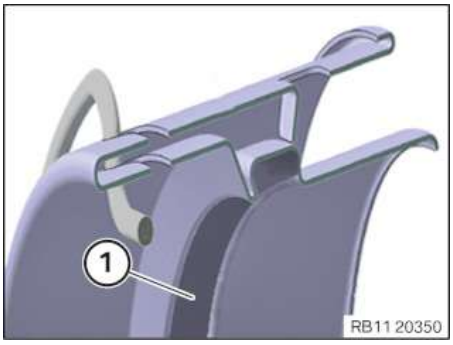
- Check the seal (1) for damage, and renew if necessary.

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▸ **Replacing damaged seal**

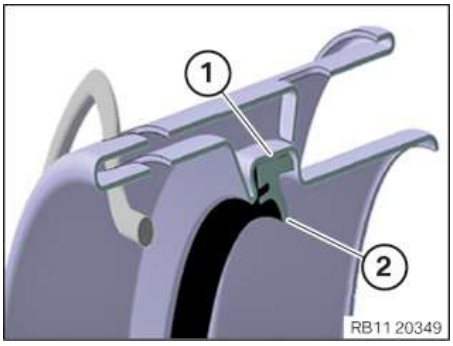
TECHNICAL INFORMATION

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.

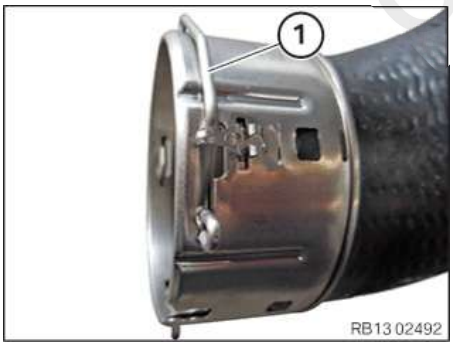
TECHNICAL INFORMATION

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.

41 – Partially securing the wiring harness section on the intake plenum

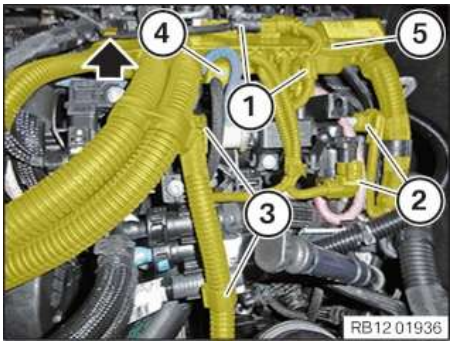
RISK OF DAMAGE

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.

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- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

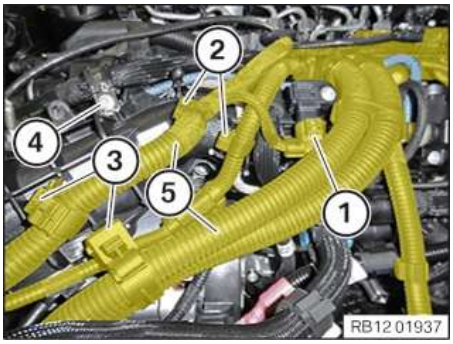
Wiring harness section to manifold

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.



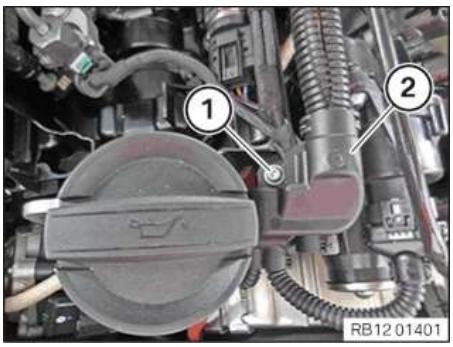
- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

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.

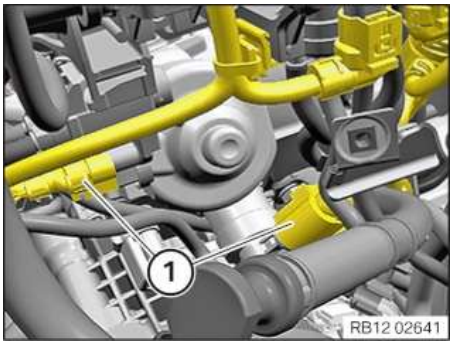
  The connector (1) must engage audibly.



- Connect the connector (1) and lock it.

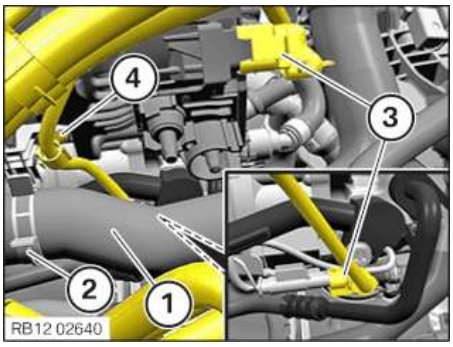
  The connector (1) must engage audibly.

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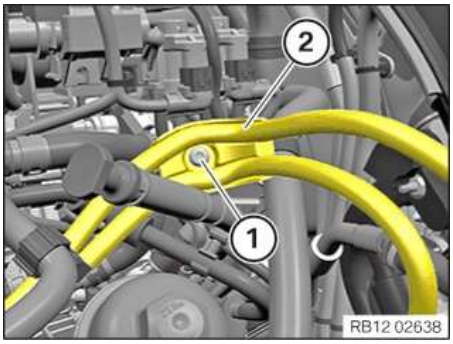
- Connect connectors (1) and lock.

  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



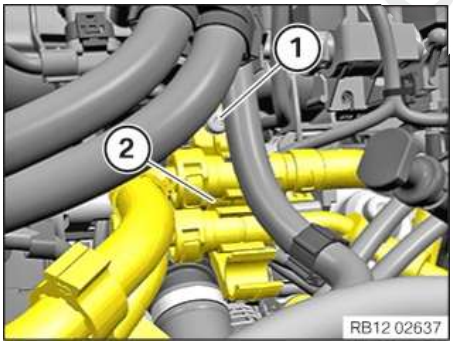
- Feed in and install the positive battery cable (4).
- Feed in and position the positive battery cables (4) .
- Renew the nuts (3) and (2).

  Parts: Nuts
- Tighten nuts (3) and (2).

Battery positive lead on the starter motor generator

M8		Tightening torque	19 Nm

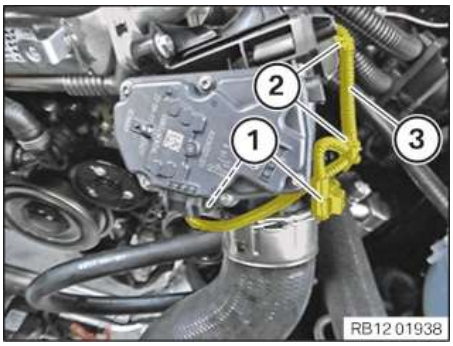
- Guide in and install the lid (1).



- Insert and install the holder (2).
- Tighten down screw (1).

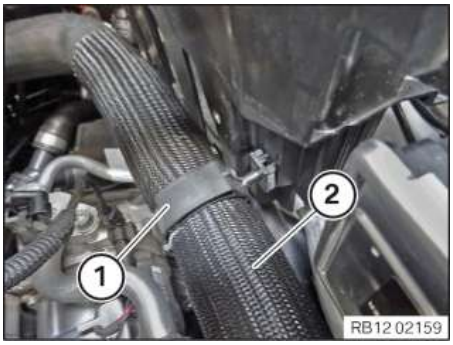
Holder on intake plenum

TS6X20		Tightening torque	5 Nm



- Guide in the wiring harness section (3) and install.
- Secure clamps (2).
- Connect connectors (1) and lock.

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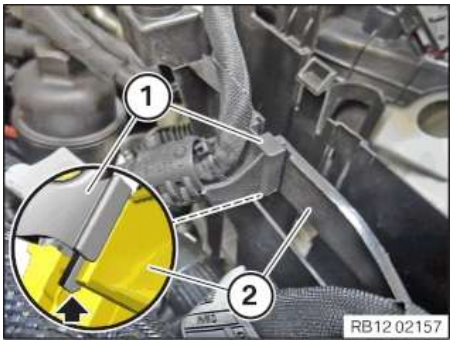
- Feed in and install coolant line (2).
- Lock holder (1).

  The holder (1) must engage audibly.



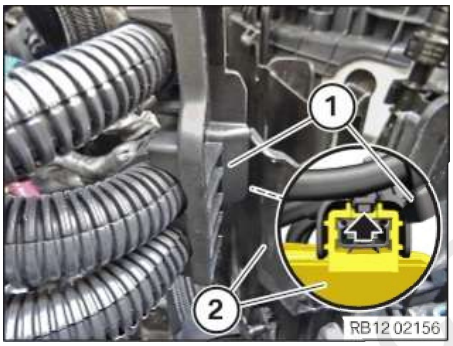
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.



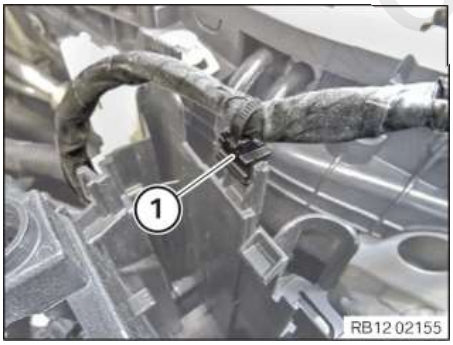
- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.

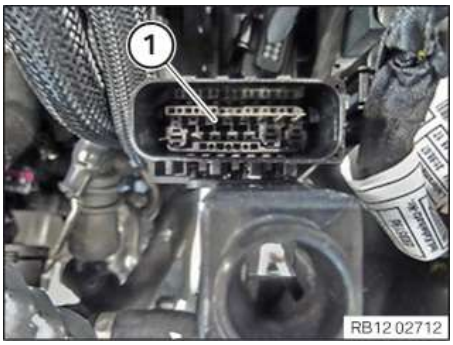


- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.



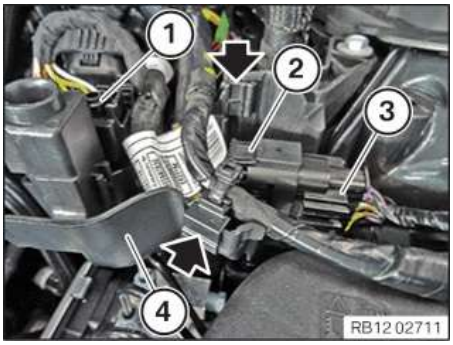
- Secure clamps (1).



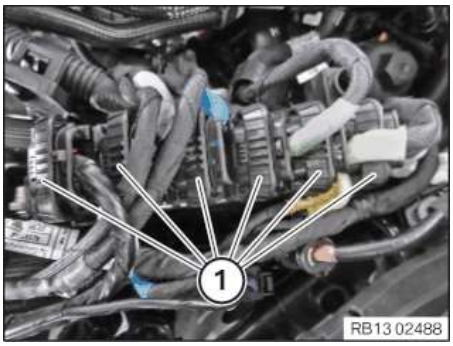
- Feed in and install the connector (1).

  The connector (1) must engage audibly.

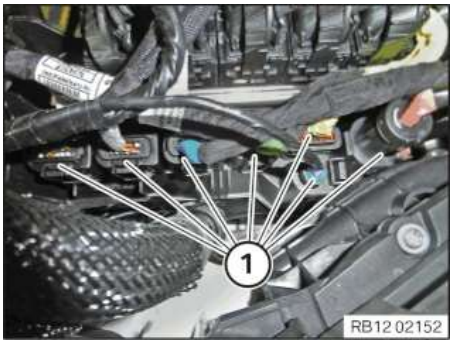
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- Connect connector (3) to control unit holder (4) and lock it.
  The connector (3) must engage audibly.
- Connect connectors (2) and lock.
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.
  The connector (1) must engage audibly.
- Secure the clamps (arrows).

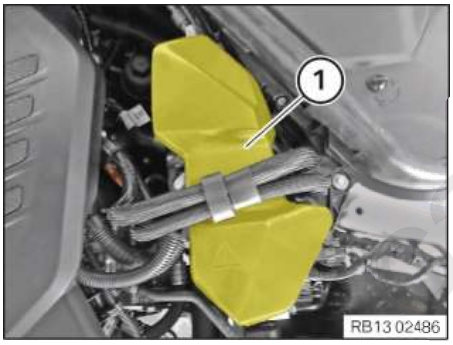


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



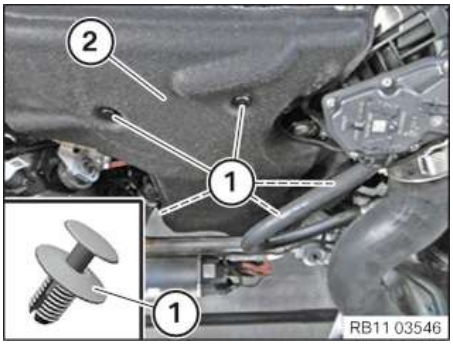
- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.

42 – Install the cover for the DDE control unit



- Insert and install cover (1) into guides.

43 – Install acoustic cover for the engine, front



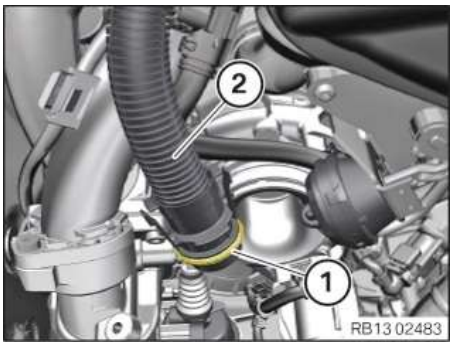
- Feed the acoustic cover (2) in and install.
- Secure the acoustic cover (2) with the expanding rivets (1).

44 – Installing the clean air pipe with resonator

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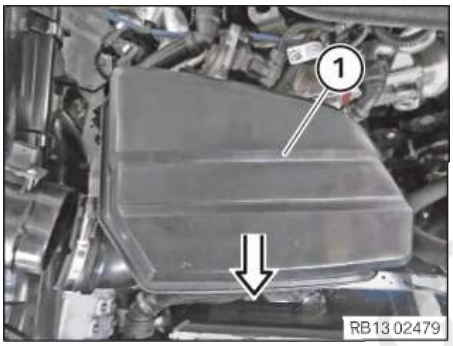
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



- 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.

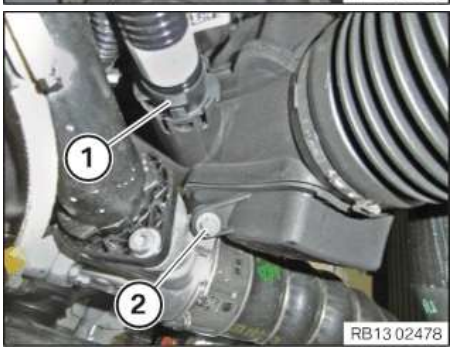


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

  The clamp (1) must engage audibly.

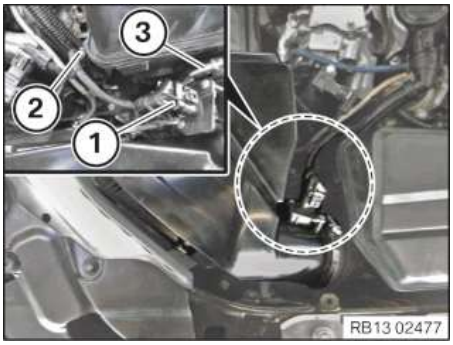


- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm

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- Connect the clean air pipe with resonator to the intake filter housing.
- Tighten clamp (3).

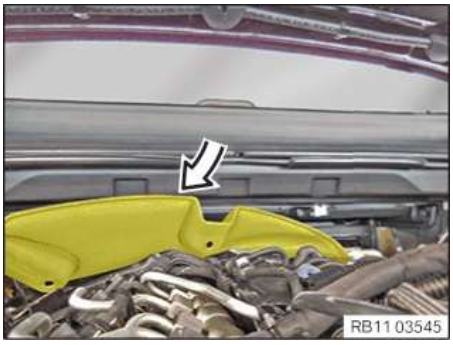
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

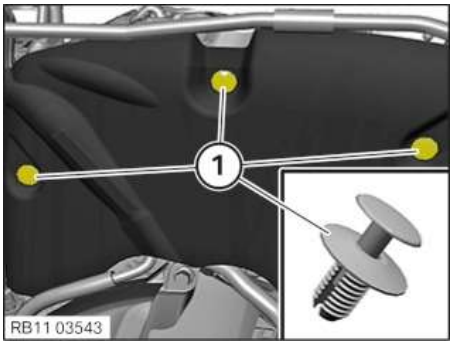
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

45 – Installing acoustic cover at rear

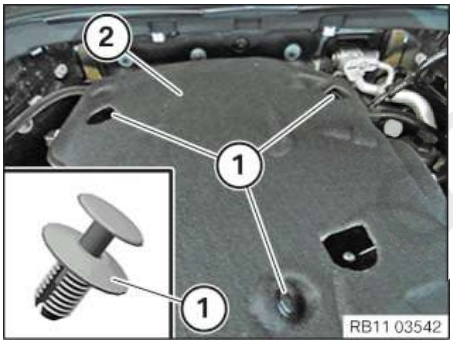


- Guide in the acoustic cover in the direction of the arrow and install it.



- Secure acoustic cover with the expanding rivets (1).

46 – 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) .

47 – Install acoustic cover

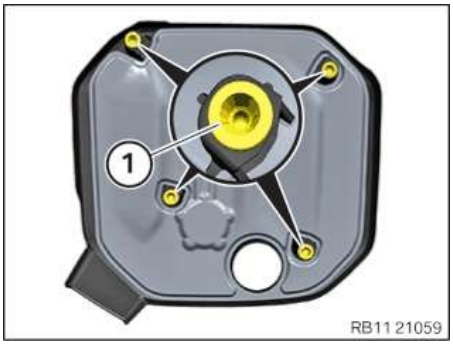
RISK OF DAMAGE

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.

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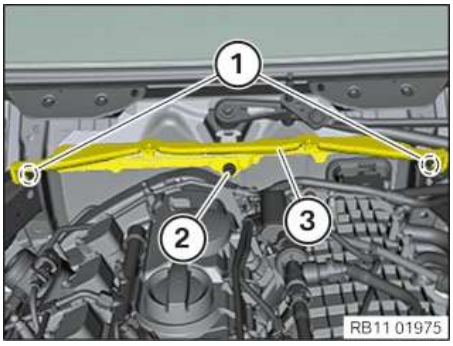


- Check the acoustic cover for correct fit of the rubber mounts (1).



- Clip in the acoustic cover (1) into the holders in the indicated areas.

48 – Installing centre bulkhead lower section

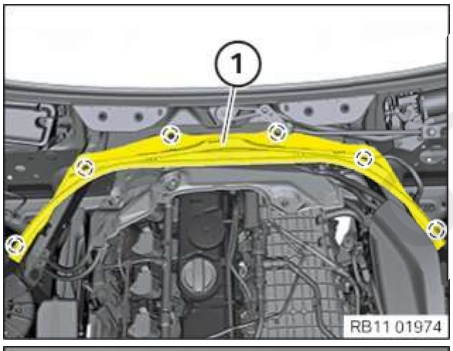


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

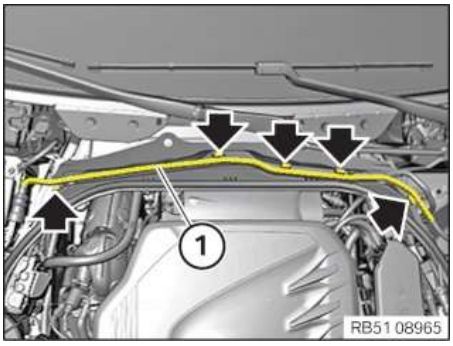
49 – Installing the centre bulkhead upper part



- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

Bulkhead upper part to bottom bulkhead

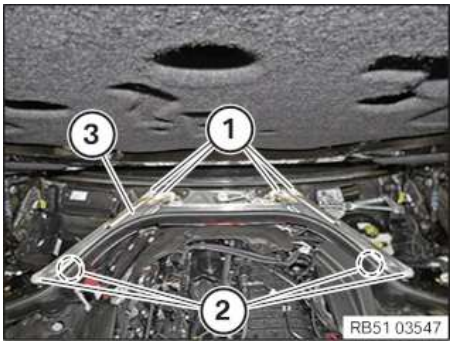
		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

  Clip in the wire (1) into the holders (arrows).

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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 °

50 – 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.

51 – Installing cowl panel cover

RISK OF DAMAGE

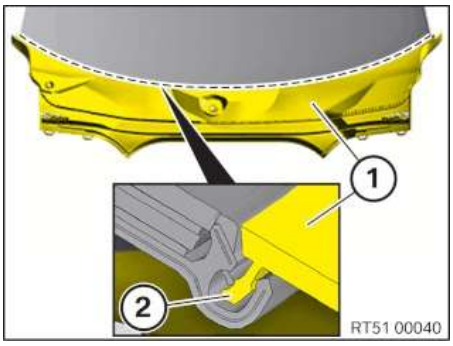
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

- Ensure correct installation of the components.
- Only use undamaged components.

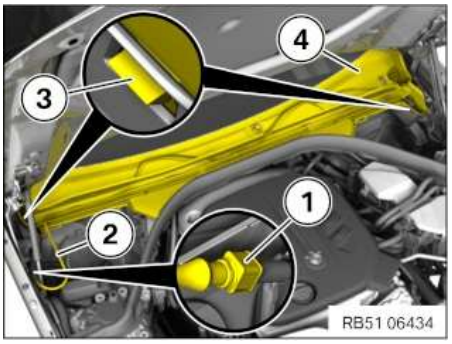
TECHNICAL INFORMATION

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.

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- 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.

52 – Install left and right wiper arm

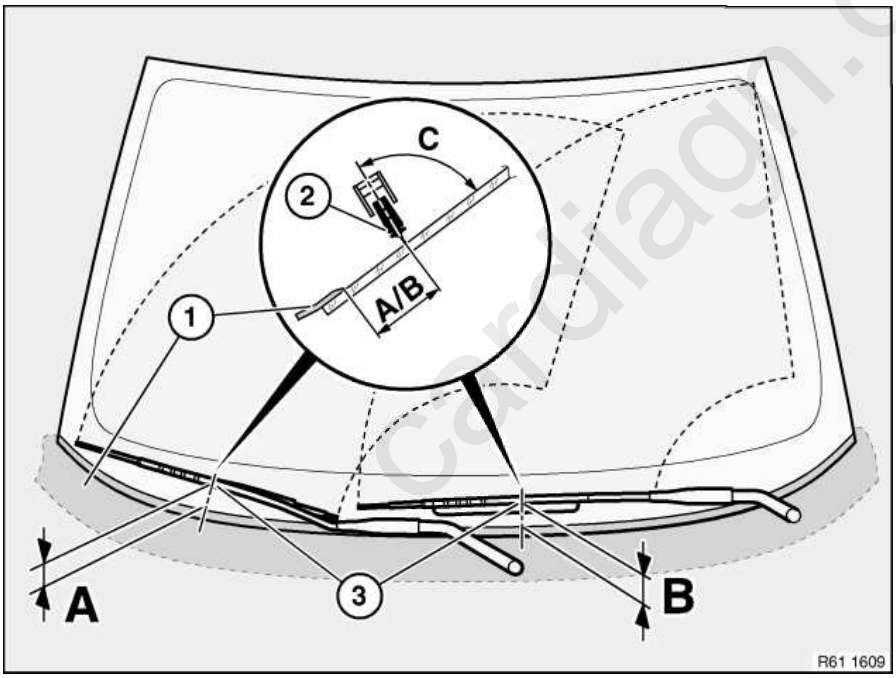
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

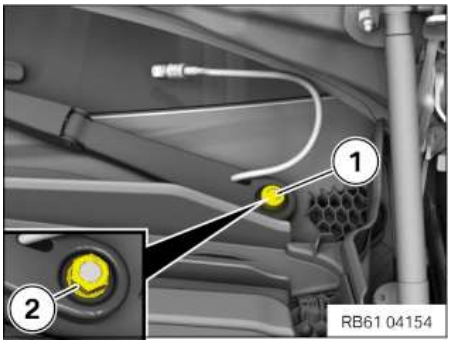
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- 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



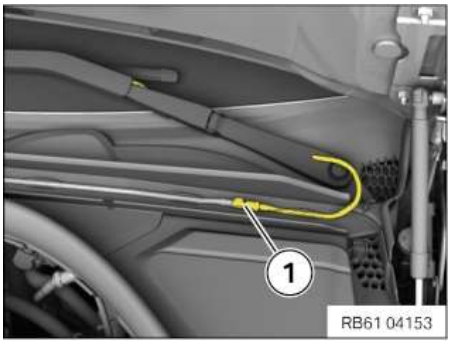
- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

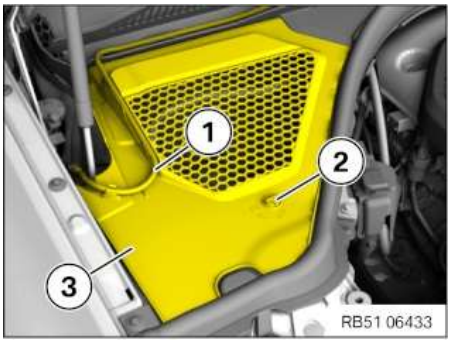
- Connect the protective cap (1).

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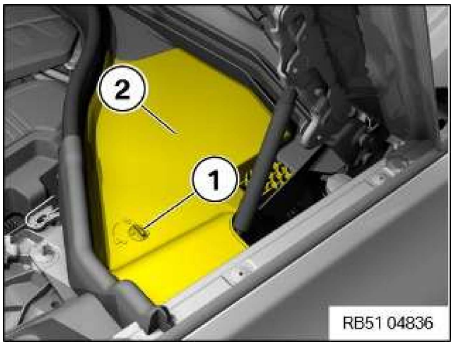
- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

53 – 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.

54 – Install the cover of the engine compartment on the rear left



- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

55 – Connecting all battery earth leads



- See additional information.

56 – Activating the 48 V electrical system

Prerequisite

Ignition is switched off.

RISK OF DAMAGE

Damage to 48-V battery

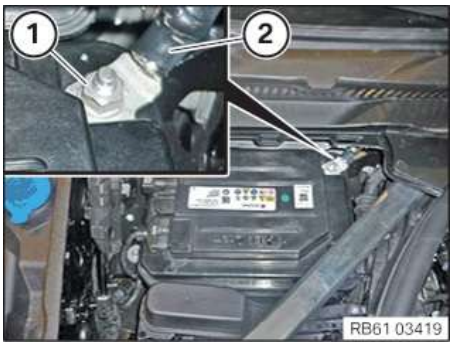
If a 48-V battery that is disconnected from the electrical system is activated, the battery electronics will be damaged.

- Only carry out activation of the 48V electrical system with a completely connected 48-V battery.

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- 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.

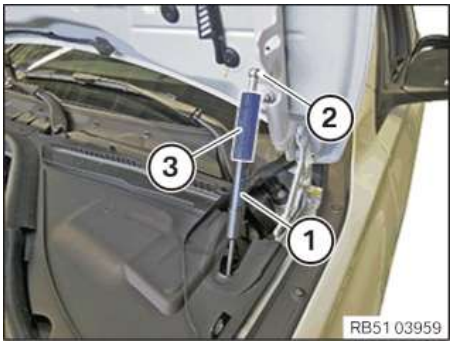
57 – Take bonnet out of the service position

CAUTION

Shutting bonnet or tailgate.

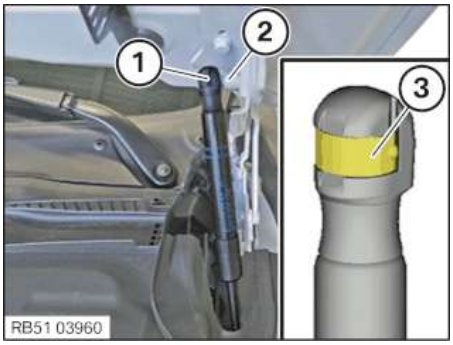
Danger of injury!

- 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.

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- 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

Camshaft sensor to cylinder head cover			Used in step 29
TS5x20		Tightening torque	4 Nm

Cylinder head cover to cylinder head			Used in step 30
M6		Tightening torque.	8,5 Nm

Heat shield to exhaust manifold			Used in step 31
M6x12			10 Nm

Bracket on cylinder head cover			Used in step 32
		Tightening torque	5 Nm

Battery positive lead to battery positive terminal			Used in step 32
M8		Tightening torque	19 Nm

Differential pressure sensor of diesel particulate filter on cylinder head cover			Used in step 33
TS5x20		Tightening torque	4 Nm

Heat shield to exhaust manifold			Used in step 34
M6x12		Tightening torque	10 Nm

Banjo bolt for exhaust pressure pipe to exhaust manifold			Used in step 34
Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm

Exhaust gas pressure pipe to sensor system holder			Used in step 34
TS6x20		Tightening torque	5,7 Nm

Clamping claw facing to cylinder head cover			Used in step 35
M6		Tightening torque	10 Nm

Injector to cylinder head cover			Used in step 35
M8		Tightening torque	8 Nm
		Angle of rotation	120 °

Rail to cylinder head cover			Used in step 36
M8		Tightening torque	19 Nm

High pressure lines between high pressure pump and rail			Used in step 37
High-pressure pipe		Tightening torque	24.5 Nm

High pressure lines between injector and rail			Used in step 38
High-pressure pipe		Tightening torque	24.5 Nm

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Intake plenum to cylinder head			Used in step 40
M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum			Used in step 40
		Tightening torque	10 Nm

Electric changeover valve to intake plenum			Used in step 40
TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold			Used in step 41
TS5x20		Tightening torque	3,6 Nm

Standard screw connection 4 Nm			Used in step 41
Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover			Used in step 41
TS5x20		Tightening torque	3,6 Nm

Standard screw connection M6			Used in step 41
M6		Tightening torque	8 Nm

Battery positive lead on the starter motor generator			Used in step 41
M8		Tightening torque	19 Nm

Holder on intake plenum			Used in step 41
TS6X20		Tightening torque	5 Nm

Clean air pipe to exhaust turbocharger			Used in step 44
M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing			Used in step 44
Clamp		Tightening torque	3 Nm

Bulkhead lower part to body			Used in step 48
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead			Used in step 49
		Tightening torque	3 Nm

Tension strut on bulkhead			Used in step 49
M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome			Used in step 49
Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm			Used in step 52
Combination hexagon nut		Tightening torque	35 Nm

Negative battery cable to 48-V battery			Used in step 56
Nut M8		Tightening torque	19 Nm

Overview of Special Tools

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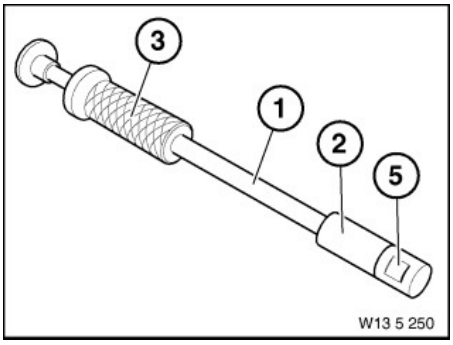
0 493 339 (13 5 252) Bush



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)	

0 493 340 (13 5 253) Weight

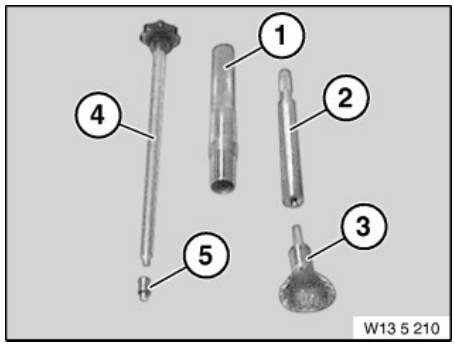


Common Used in step 23

Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

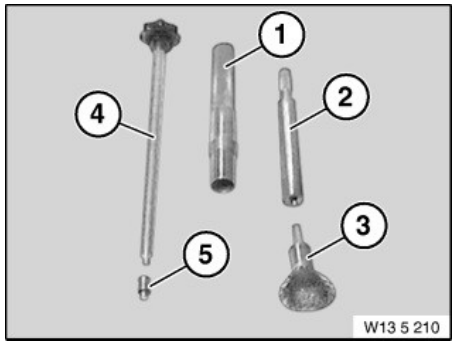
carlagn.com

0 493 763 (13 5 215) Plug



Common	Used in step 35
Usage	(Seal plug)
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

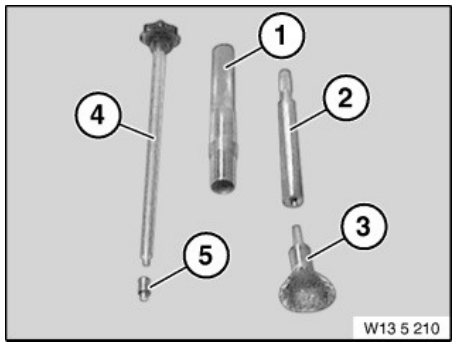
0 493 762 (13 5 214) Rod



Common	Used in step 35
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	

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0 493 758 (13 5 210) Tool



Common Used in step 35

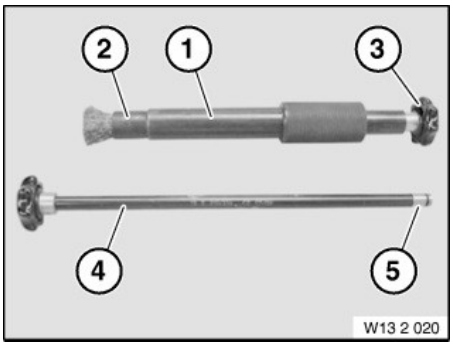
Usage	(Cleaning set) For injector channels
Included in the tool or work	
Storage location	B4
Replaced by	
In connection with	
SI-Number	01 05 00 (574)

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)	

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0 496 150 (13 2 020) Tool



Common Used in step 35

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.	

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Overview Technical Data

Distance from window pane edge to wiper blade Used in step 52

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	256

General repair instructions	Used in step
11 00 ... Overview of consumables (Electronic Parts Catalogue)	35

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	355
61 20 900 Disconnecting and connecting battery earth lead	355
61 20 900 Disconnecting and connecting battery earth lead	355
61 20 900 Disconnecting and connecting battery earth lead	355
61 20 900 Disconnecting and connecting battery earth lead	355
61 20 900 Disconnecting and connecting battery earth lead	355
61 20 900 Disconnecting and connecting battery earth lead	355
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	355
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61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	355
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	355
61 20 900 Disconnecting and connecting battery earth lead	355
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	355
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	355
61 20 900 Disconnecting and connecting battery earth lead	355
61 20 900 Disconnecting and connecting battery earth lead	355
61 20 900 Disconnecting and connecting battery earth lead	355
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61 20 900 Disconnecting and connecting battery earth lead	355
61 20 900 Disconnecting and connecting battery earth lead	355
61 20 900 Disconnecting and connecting battery earth lead	355
61 20 900 Disconnecting and connecting battery earth lead	355
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	355
61 20 900 Disconnecting and connecting battery earth lead	355
61 20 900 Disconnecting and connecting battery earth lead	355
61 20 900 Disconnecting and connecting battery earth lead	355
61 35 ... Notes on ESD protection (Electro Static Discharge)	172329
61 35 ... Notes on ESD protection (Electro Static Discharge)	172329

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11 12 001 Replace the cylinder head cover

PRELIMINARY WORK

1 – Bring front compartment lid in the service position

Prerequisite

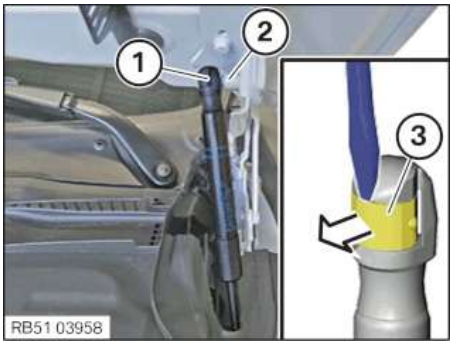
Engine compartment lid is open.

CAUTION

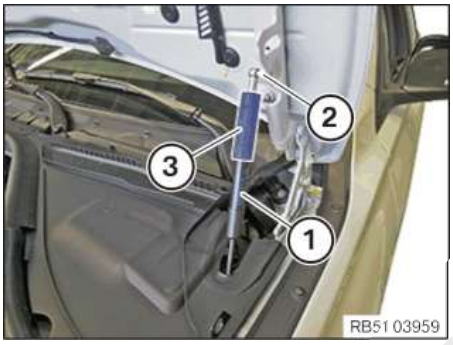
Shutting bonnet or tailgate.

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.

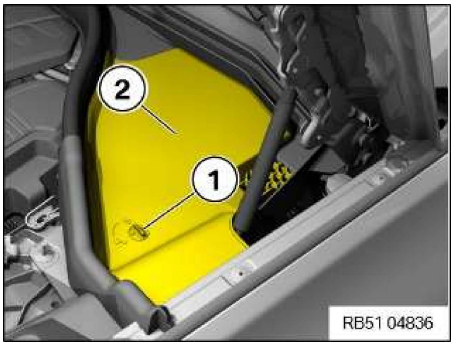
2 – Disconnecting all battery earth leads



- See additional information.

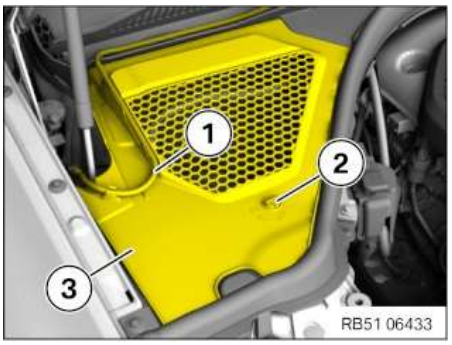
3 – Remove the cover of the engine compartment at the rear left

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- 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.

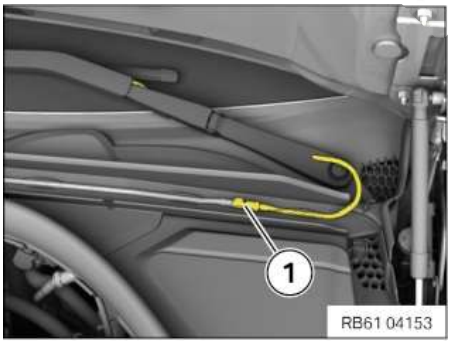
▸ **Remove the wiper arm**

RISK OF DAMAGE

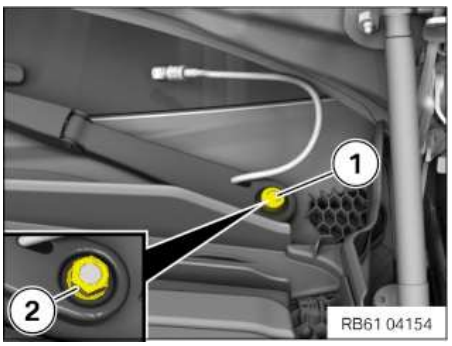
Damage to wiper console.

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.

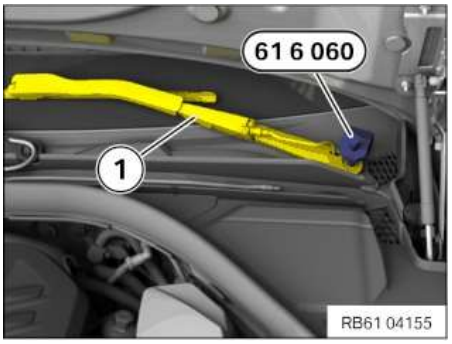


- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.



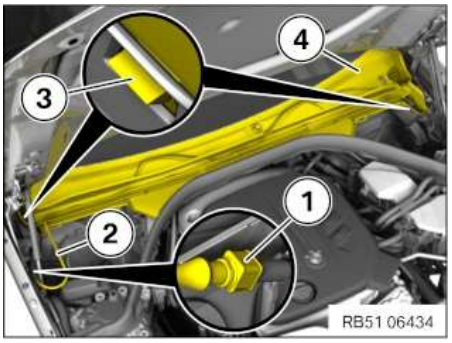
- Remove the protective cap (1).
- Loosen nut (2).

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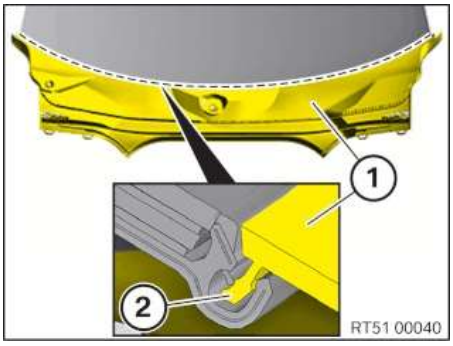


- Pull off the wiper arm (1) using special tool .

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

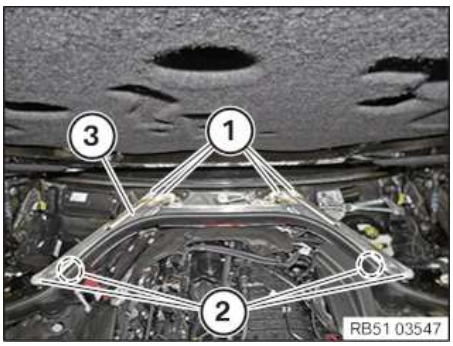


- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

8 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

Driving without the strut brace/front-end strut or tension strut is not permitted.

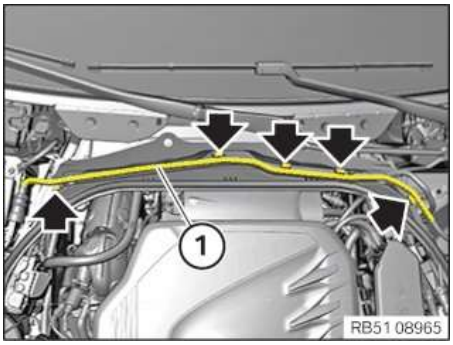


NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

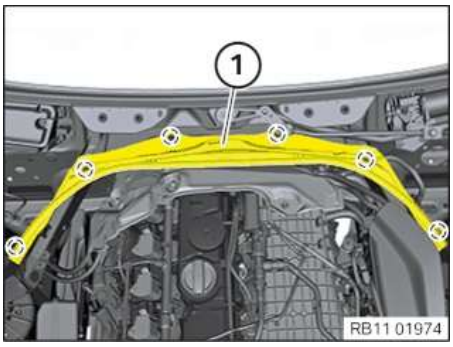
- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.

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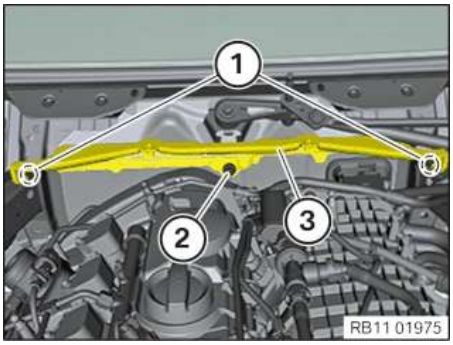
- **Version with mild hybrid technology:**

  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.

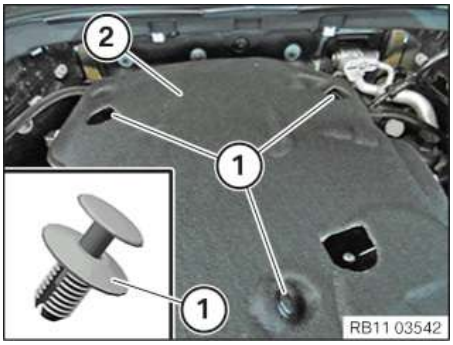
- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

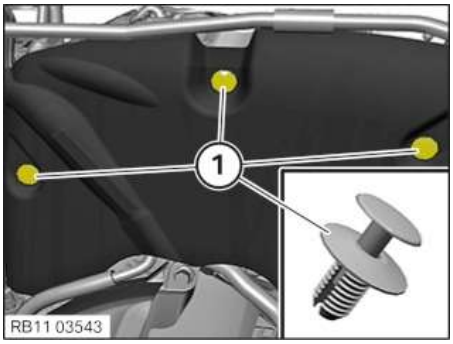
11 – Remove the acoustic cover for the injectors

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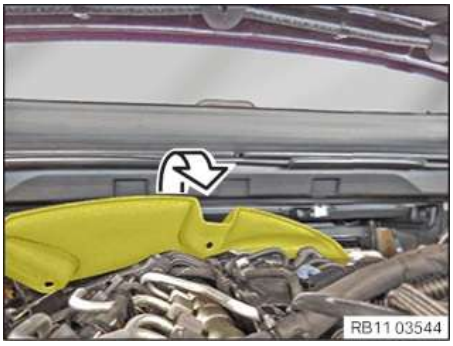


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

12 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).



- Guide out and remove the acoustic cover in the direction of the arrow.

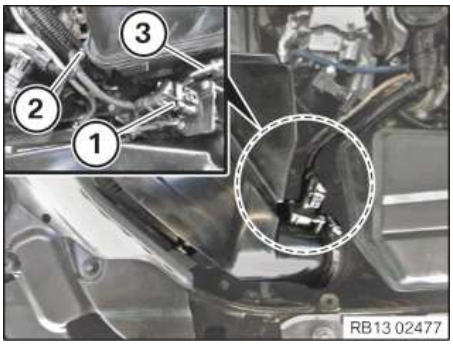
13 – Removing the clean air pipe with the resonator

WARNING

Hot surfaces.

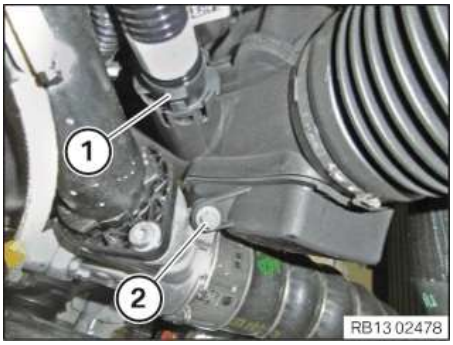
Risk of burning!

- Perform all work only on components that have cooled down.

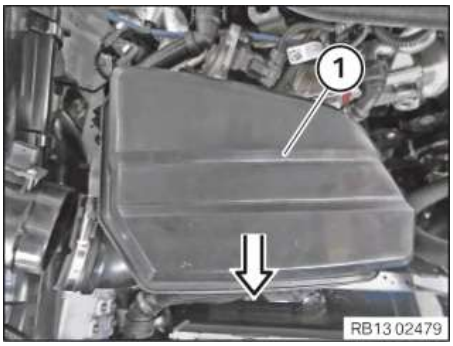


- Unlock plug connection (1) and disconnect.
- Loosen clamp (2).
- Unfasten clamp (3).
- Separate the clean air pipe with resonator from the intake filter housing.

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- 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.

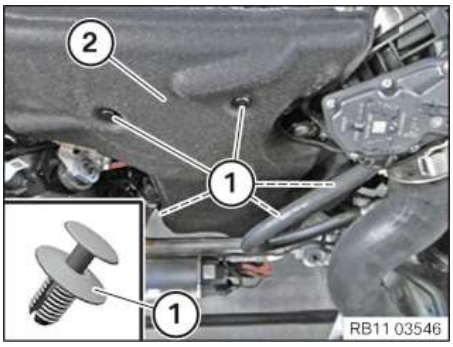
14 – Remove acoustic cover of the front engine

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.

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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

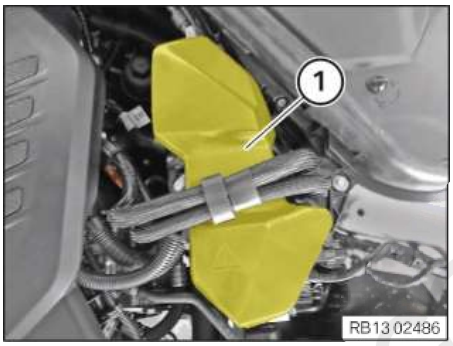
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

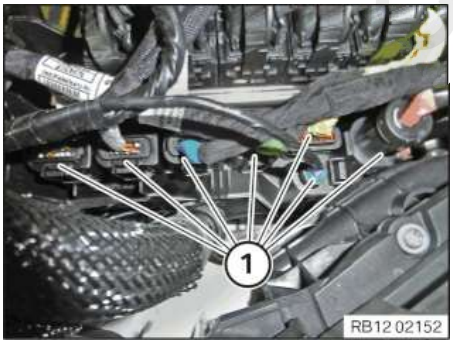
- Do not pull on the wires when disconnecting connectors and plug connections.

TECHNICAL INFORMATION

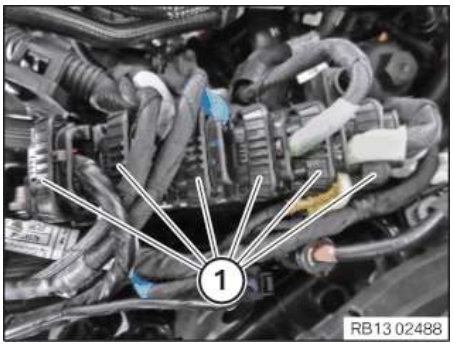
Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.



- Pull off cover (1) upwards, feed out and remove.

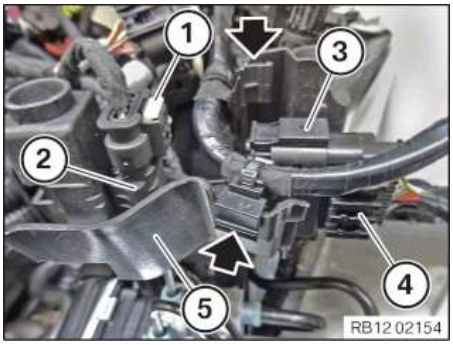


- Unlock and disconnect plug connections (1).

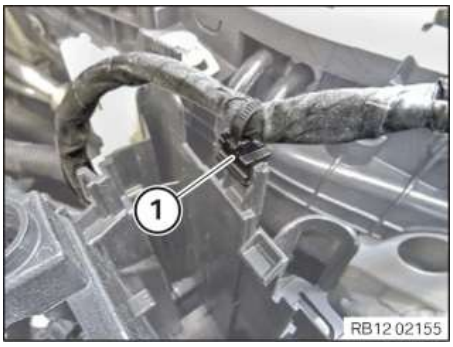


- Unlock and disconnect plug connections (1).

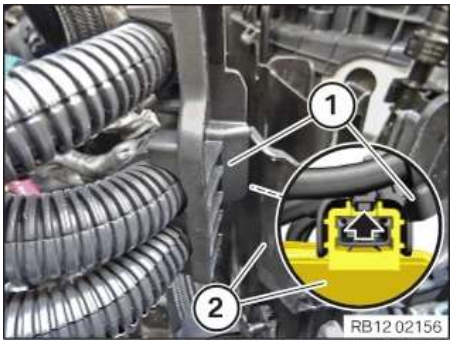
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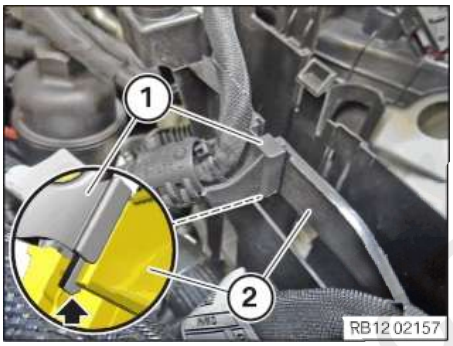
- Unlock plug connection (1) and disconnect.
- Unlock the plug (2) and disconnect from the control unit holder (5).
- Unlock plug connection (3) and disconnect.
- Unlock the plug (4) and disconnect from the control unit holder (5).
- Release the clamps (arrows).



- 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).

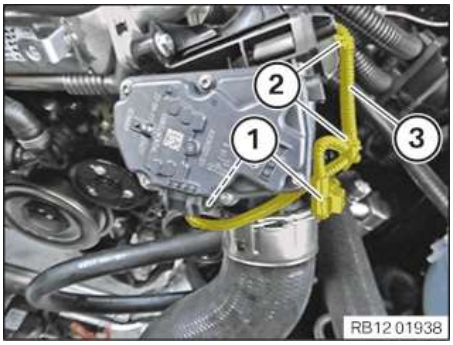


- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.

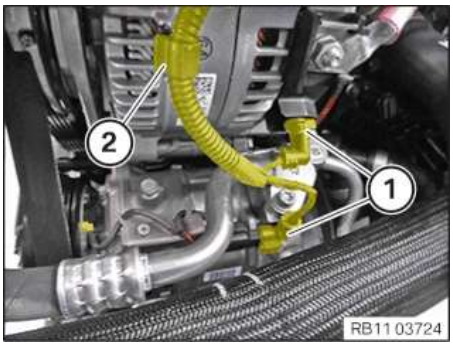


- Unlock holder (1) and feed out coolant line (2) and place it aside.

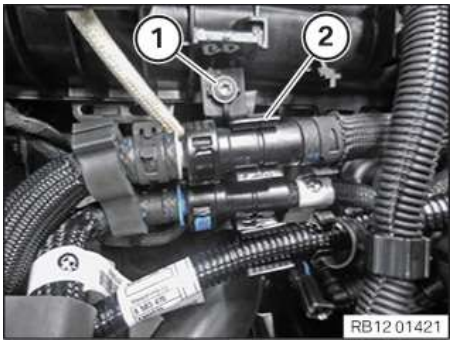
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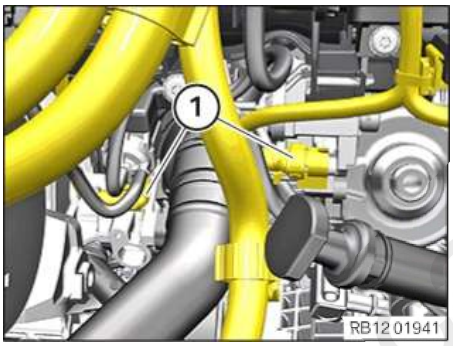
- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.



- 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).

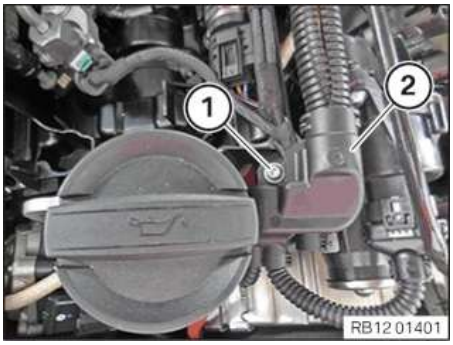


- Unlock and loosen connector (1).

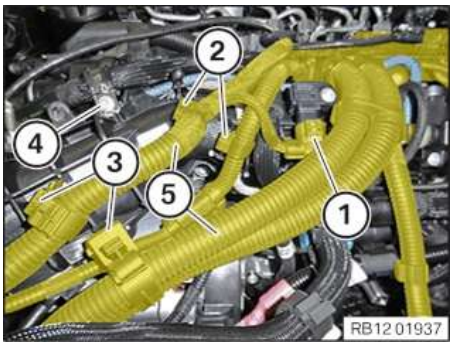


- Unlock plug connection (1) and disconnect.

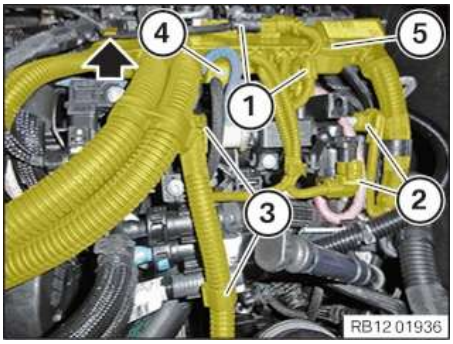
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- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.



- 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.

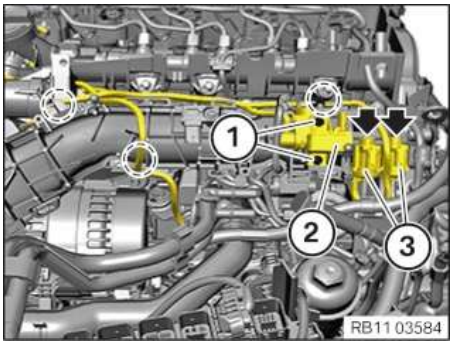


- Unlock clamp (1) and engage in this position.

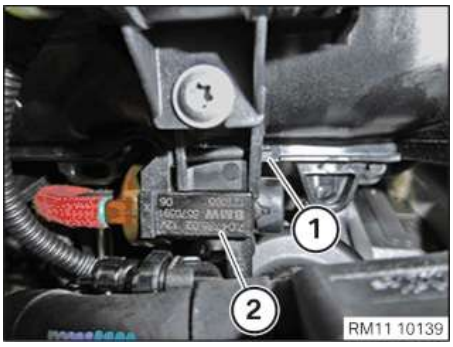


- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.

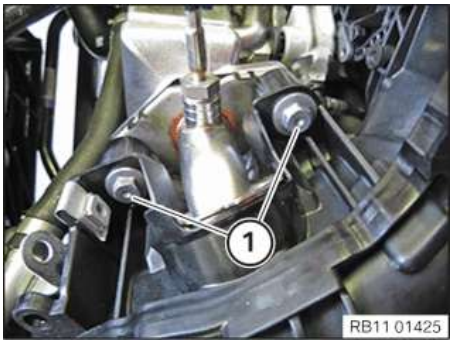
cardiagn.com



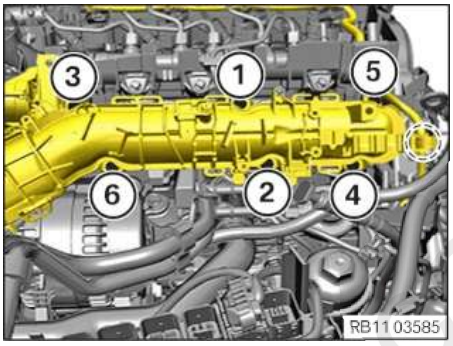
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



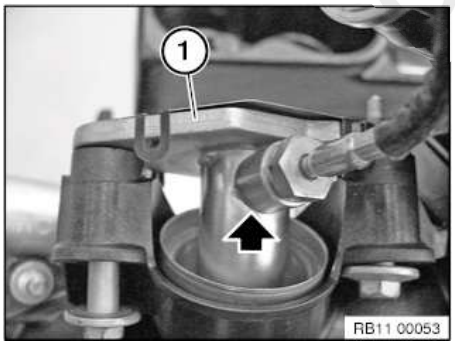
- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.



- 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

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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!

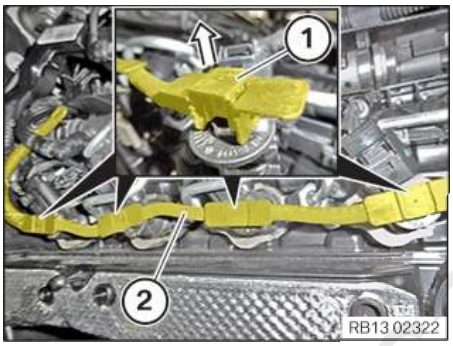
- Perform all work only on components that have cooled down.

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.

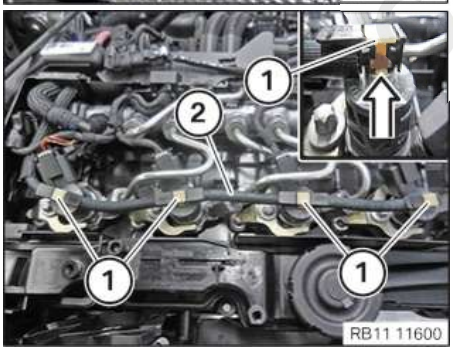


- **Version A:**

  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.

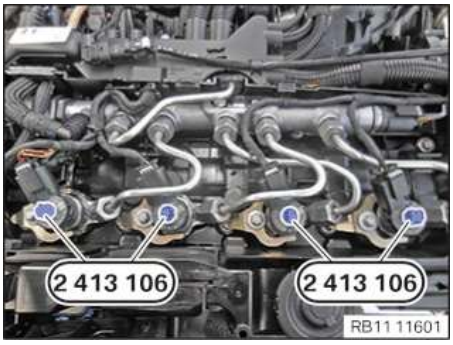


- **Version B:**

  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

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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.

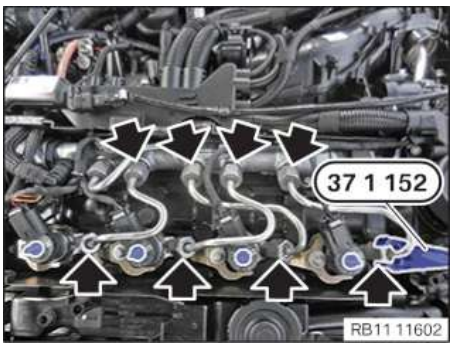
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

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 .

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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.

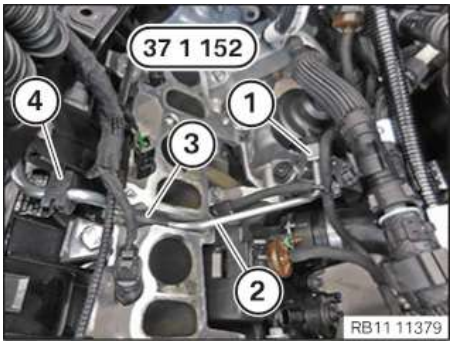
TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.

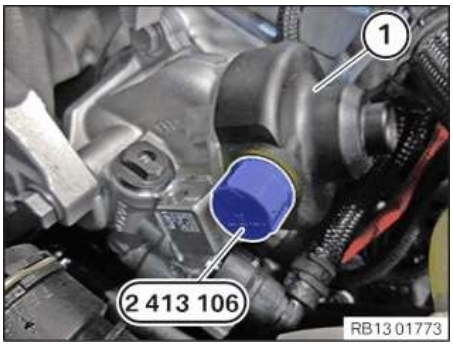


- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.

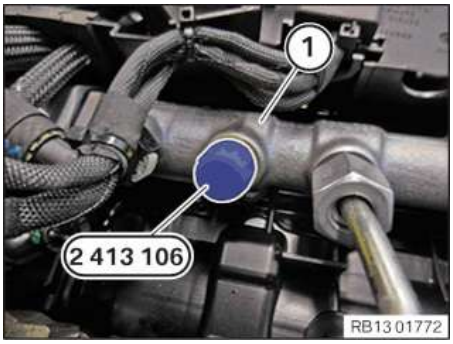
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- Loosen union nut (1) with special tool .
- Reset the special tool in good time in order to avoid bending the high pressure line.
- Catch and dispose of escaping fuel.
- Guide out and remove the high pressure line (2) with the abrasion protection (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.

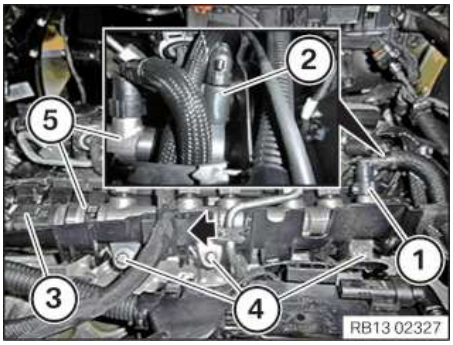
Contamination can result in malfunctions, operating failure or leaks.

- 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.

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- 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.

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RISK OF DAMAGE

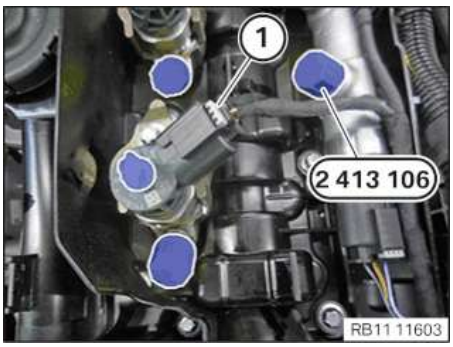
Electrostatic discharge.

Damage to or destruction of electrical components.

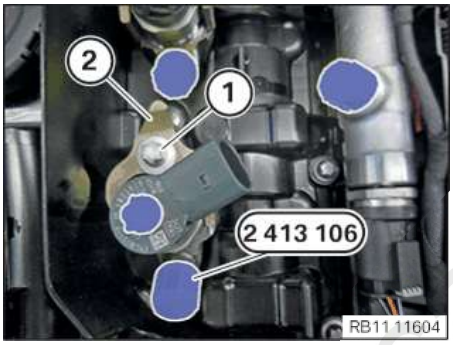
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the 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**

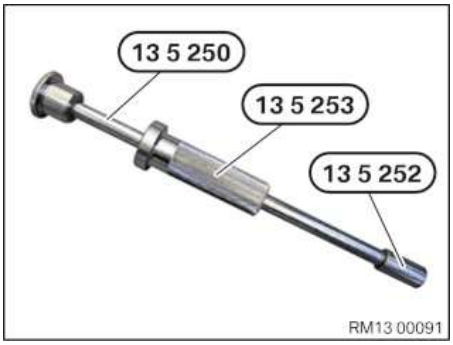
RISK OF DAMAGE

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.

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- 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).

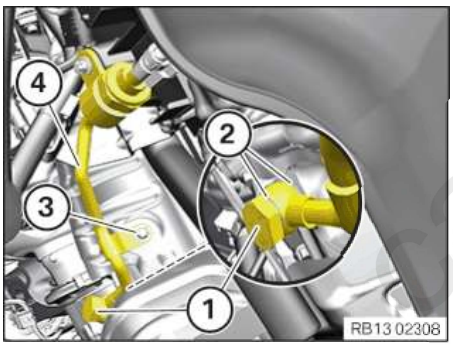


- Screw special tool 0 493 321 (13 5 250) with special tool 0 493 339 (13 5 252) onto pressure line connection (1) of injector.
- Release injector (1) with special tools 0 493 321 (13 5 250) and 0 493 339 (13 5 252) by means of **short** back and forth movements and remove.

22 – Remove the exhaust gas pressure pipe

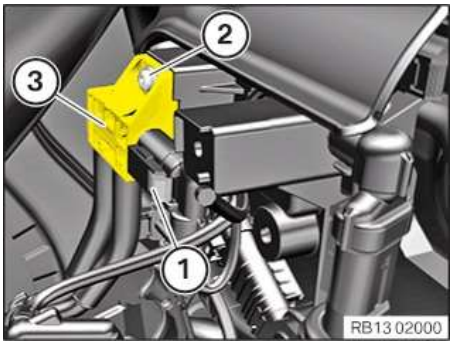


- Unlock plug connection (1) and disconnect.
- Loosen screw (2).



- 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

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RISK OF DAMAGE

Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

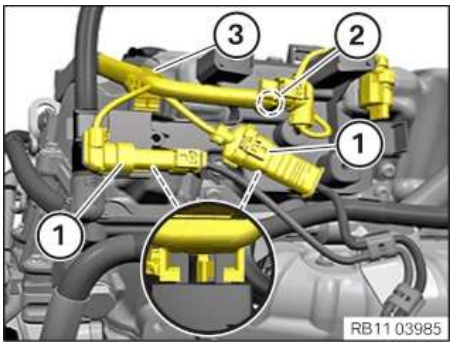
- Do not pull on the wires when disconnecting connectors and plug connections.

RISK OF DAMAGE

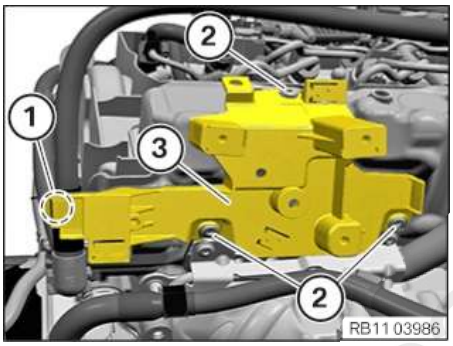
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

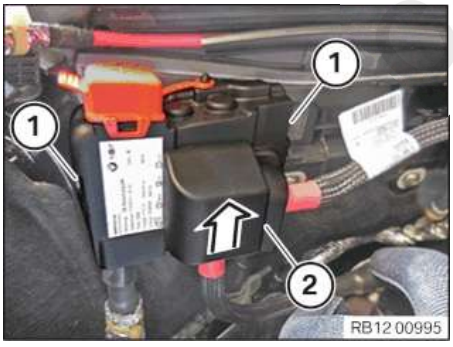
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.



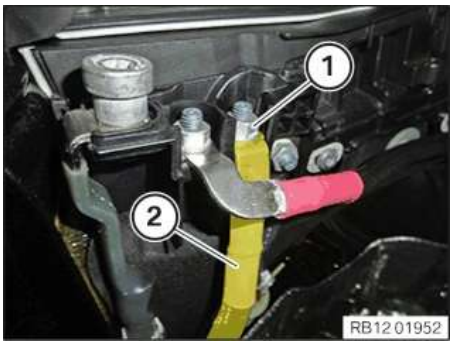
- Unlock plug connection (1) and disconnect.
- Unlock the plug connection (1) and release it from the sensor bracket.
- Release the cable clip in the area (2) from the sensor bracket.
- Release the clamps (3) and set the wiring harness section aside.



- 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.

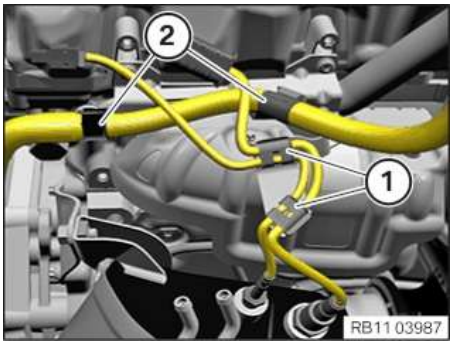


- Unlock the locks (1).
- Guide and remove cover (2) in direction of arrow.

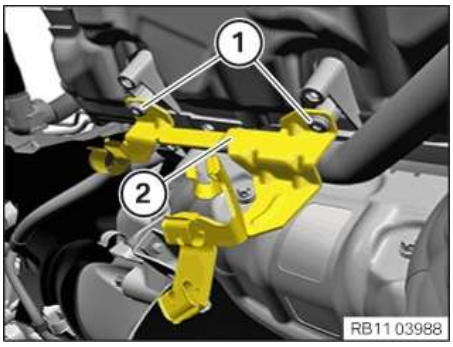


- Loosen nut (1).
- Feed out positive battery cable (2) and put to one side.

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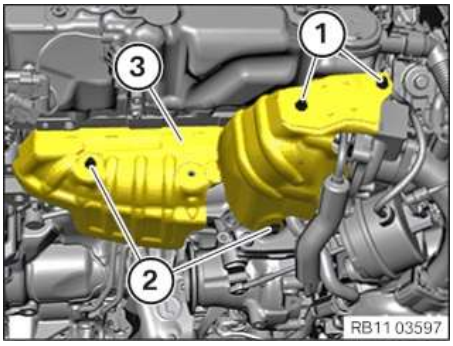


- Release the cable of the exhaust gas sensor system from the clamps (1).
- Release the positive battery cable from the clamps (2).



- Loosen screws (1).
- Guide out and remove holder (2).

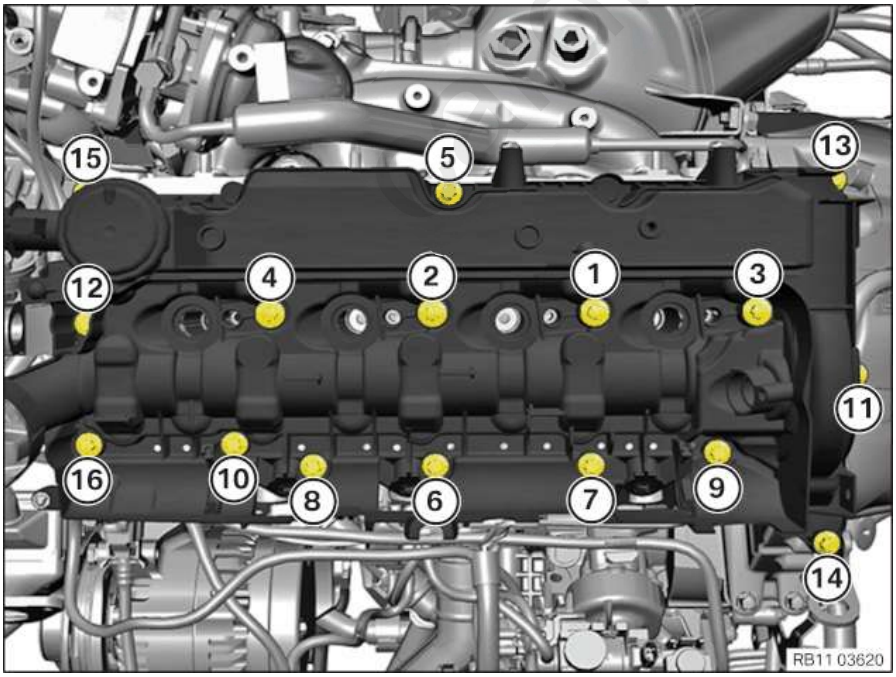
25 – Removing heat shield



- 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

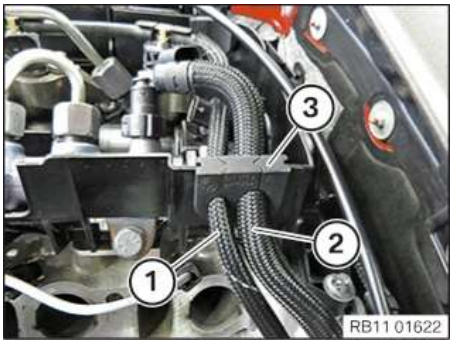
diagn.com



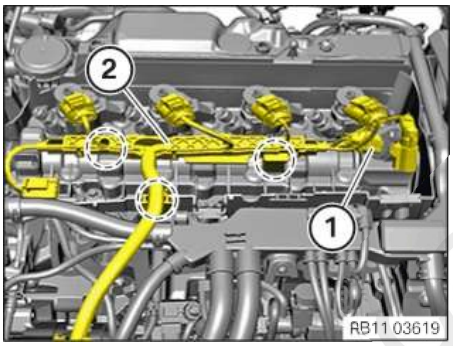
- Unlock and detach the locks.
- Feed the engine ventilation line (1) out and set it aside.



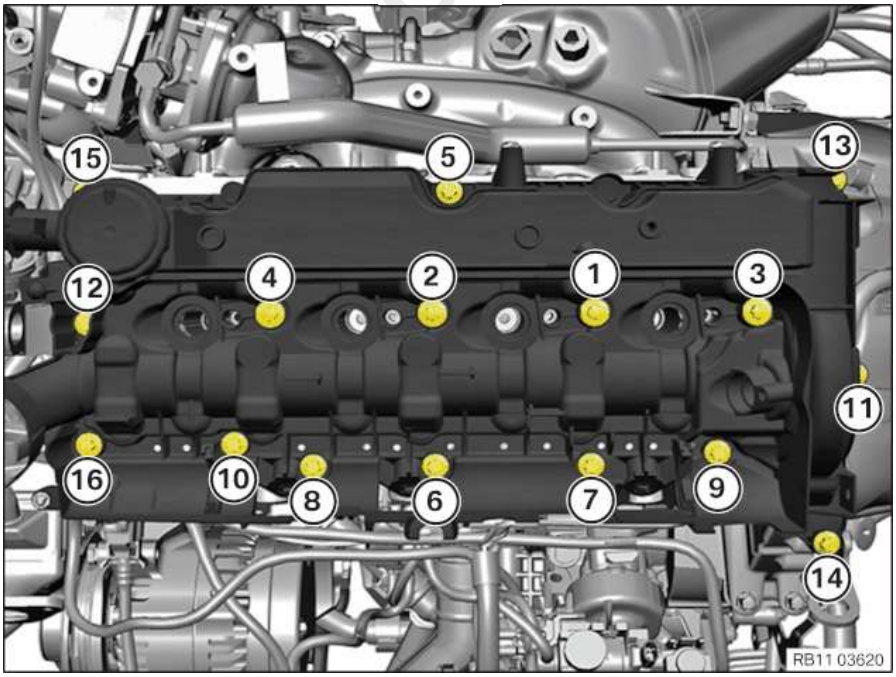
- Feed out and remove the heat shield (1).



- Remove the leakage oil line (1) including the fuel return line (2) and the grommet (3) and put to one side.

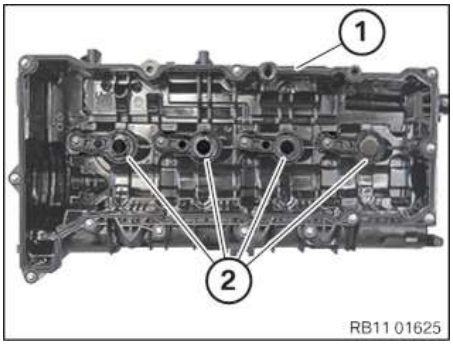


- Unlock connector (1) and pull off.
- Disconnect the wiring harness (2) in the marked areas from the cylinder head cover and set aside.



- Evenly loosen the screws in a sequence from (16) to (1).
- Feed out and remove the cylinder head cover.

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- Remove the profile seals (1) and (2).

MAIN WORK

27 – Renewing the cylinder head cover

RISK OF DAMAGE

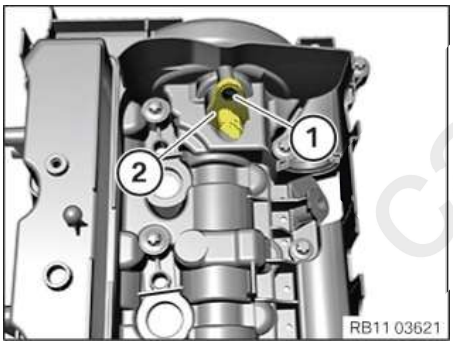
Electrostatic discharge.

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)

NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

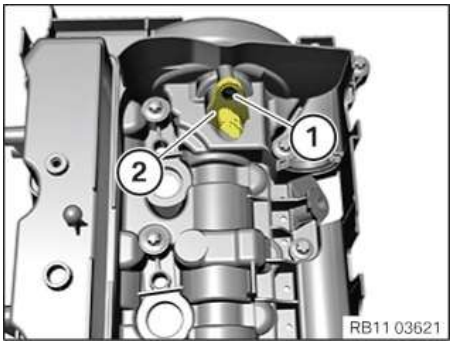


- Loosen screw (1).
- Feed out and remove the camshaft sensor (2).



- Check the sealing ring (1) for damage and renew where required.

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- Guide in camshaft sensor (2) into the new cylinder head cover and install it.

  Parts: Cylinder head cover
- Tighten down screw (1).

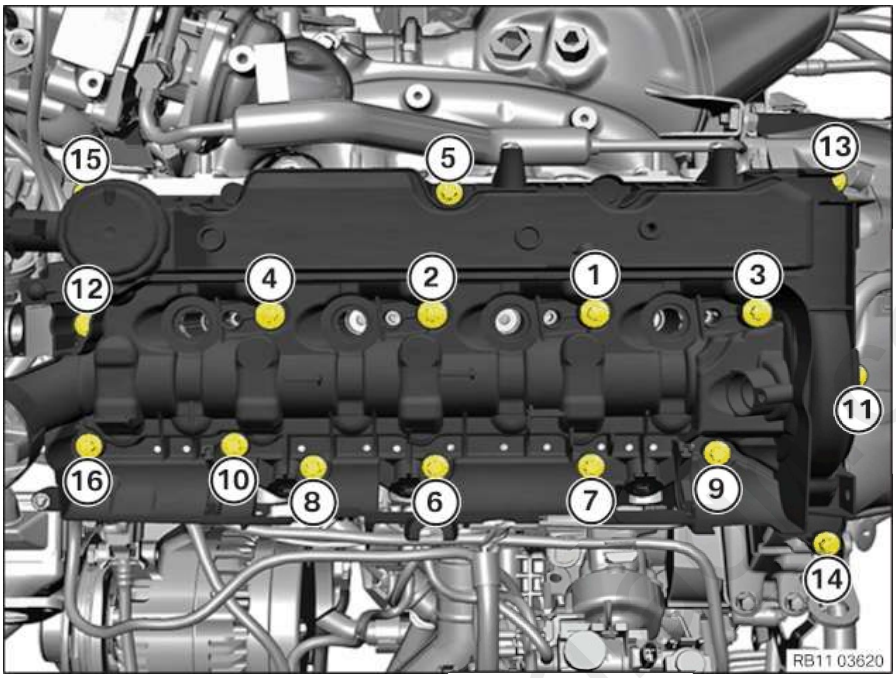
Camshaft sensor to cylinder head cover

TS5x20		Tightening torque	4 Nm

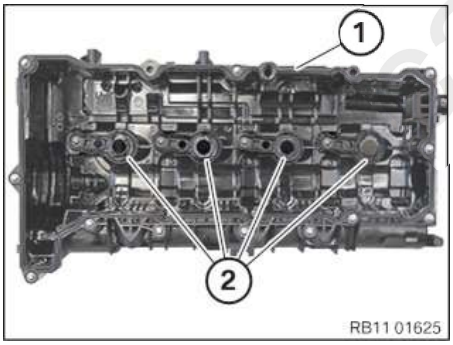
POSTPROCESSES

28 – Installing cylinder head cover

Screw connection of the cylinder head cover

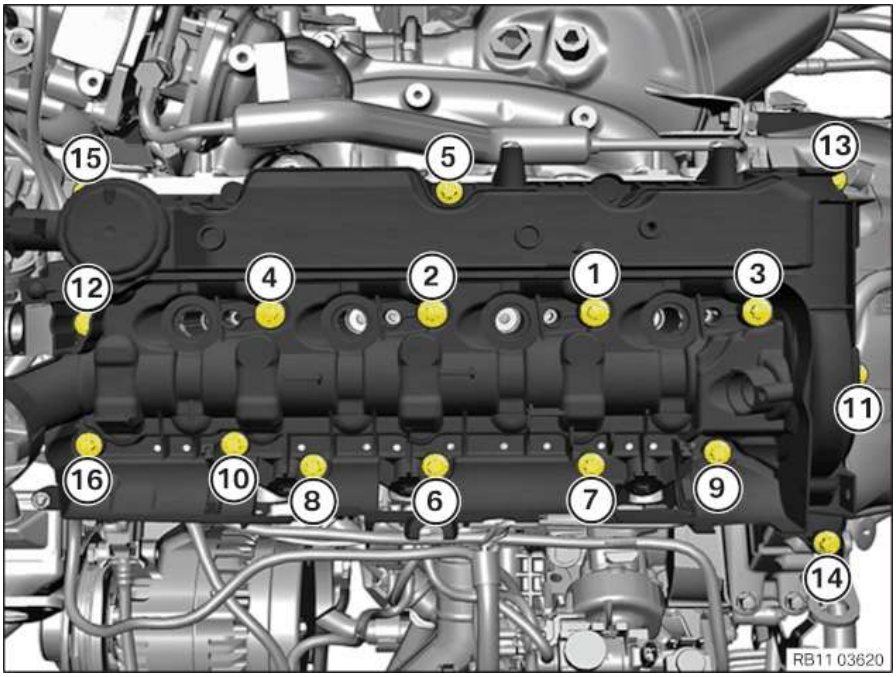


1 - 16 Bolts of the cylinder head cover



- Renew the profile seals (1) and (2) of the cylinder head cover.

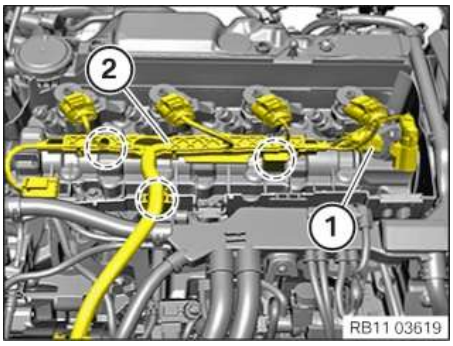
  Parts: Profile seals



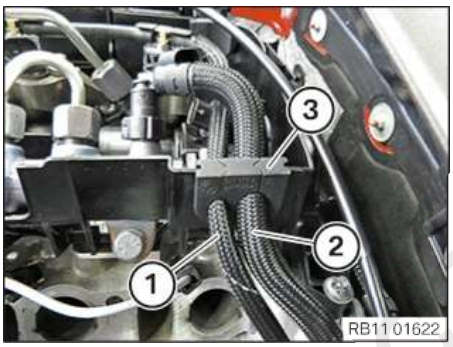
- Insert and install the cylinder head cover.
- Tighten screws in the order (1) to (16).

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).

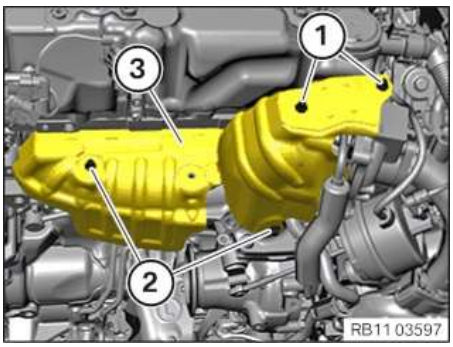


- Connect engine ventilation line (1) and lock.

  The locks (arrows) must engage audibly.

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29 – 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

30 – 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.

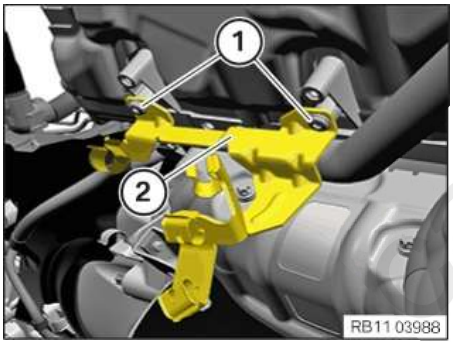
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

Trapped, crushed or damaged cables may cause short circuits and malfunctions.

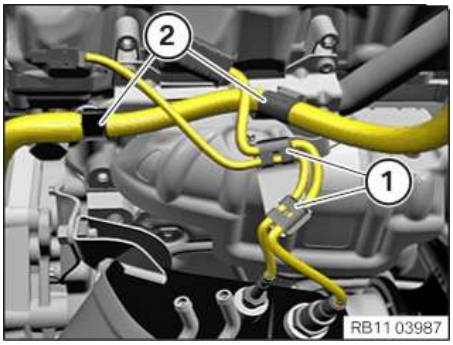
- Route all cables without abrasions, do not trap and crush.



- Insert and install the holder (2).
- Tighten the screws (1).

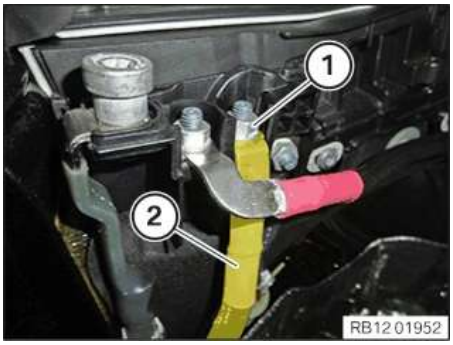
Bracket on cylinder head cover

	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).

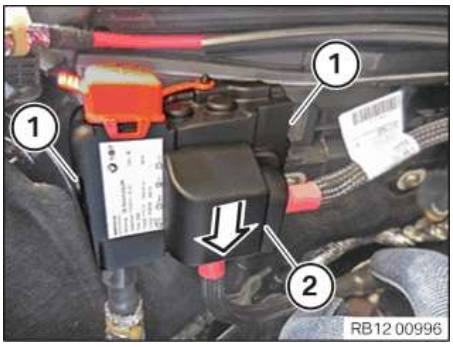
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- Insert the positive battery cable (2) and install it.
- Tighten nut (1).

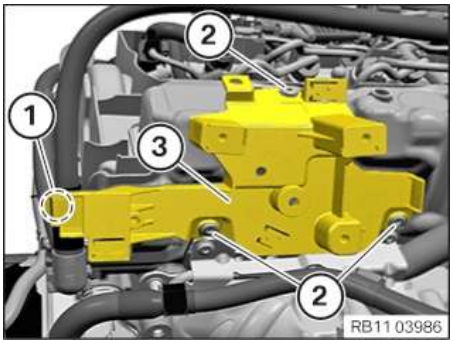
Battery positive lead to battery positive terminal

M8		Tightening torque	19 Nm



- Insert and install the cover (2) in the direction of the arrow.

  The locks (1) must engage audibly.

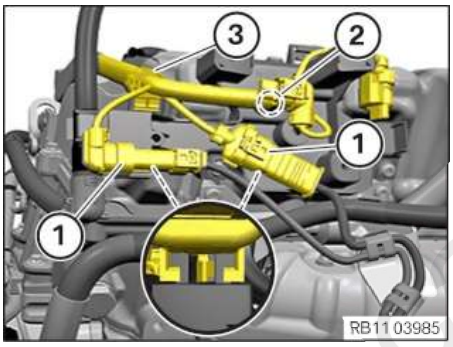


- Feed in and install the sensor bracket (3).
- Tighten the screws (2).

Bracket on cylinder head cover

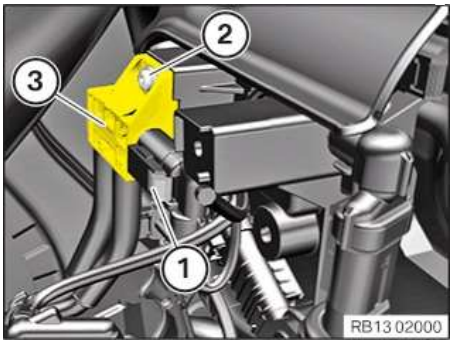
		Tightening torque	5 Nm

- 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.

31 – Securing the differential pressure sensor for the diesel particulate filter



- Feed in and install the differential pressure sensor (3).
- Tighten down screw (2).

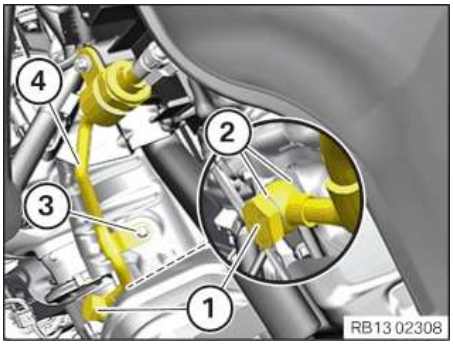
Differential pressure sensor of diesel particulate filter on cylinder head cover

TS5x20		Tightening torque	4 Nm

- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

32 – Install the exhaust gas pressure pipe

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- 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.

33 – Install all injectors

▸ **Cleaning the injector shafts**

CAUTION

Swirling dirt particles caused by compressed air.

Danger of injury!

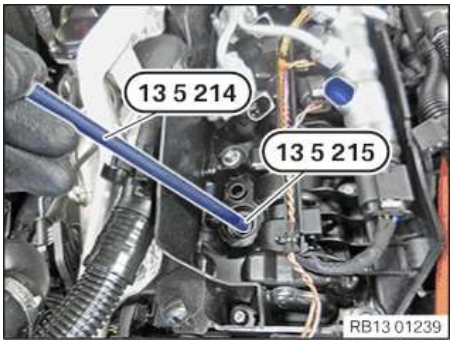
- Collect dirt particles, e.g. when blowing out, use cloth to do so.
- Wear safety goggles.

RISK OF DAMAGE

Contaminant or foreign body.

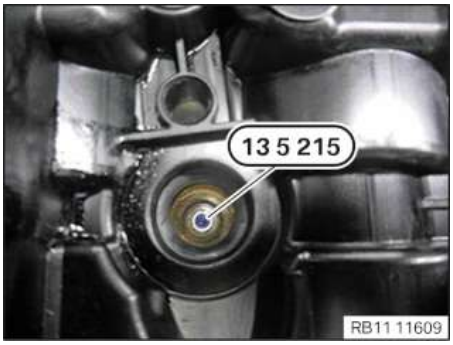
Contamination can result in malfunctions, operating failure or leaks.

- 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).

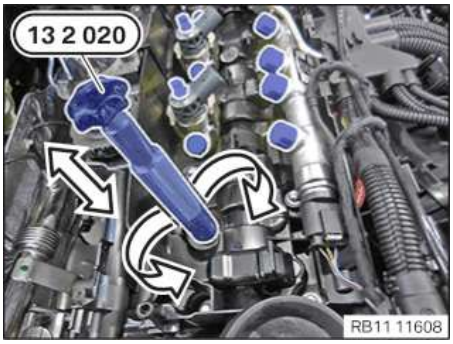
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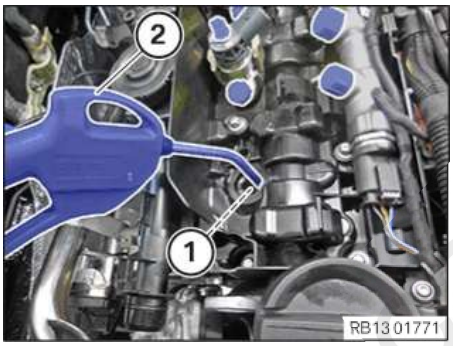
- After insertion, special tool 0 493 763 (13 5 215) must remain in the injector shaft after cleaning without fail.



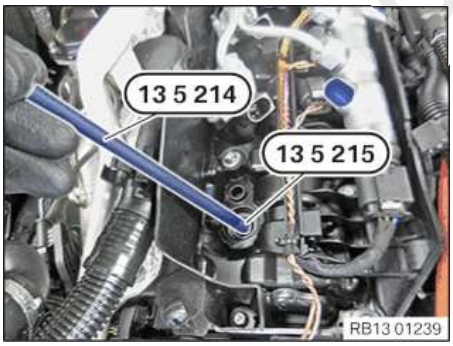
- Insert special tool 0 496 150 (13 2 020) into the injector shaft.



- 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**

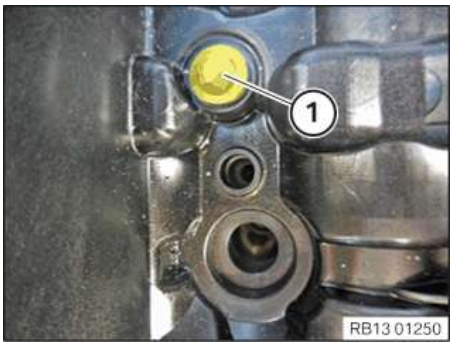
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RISK OF DAMAGE

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

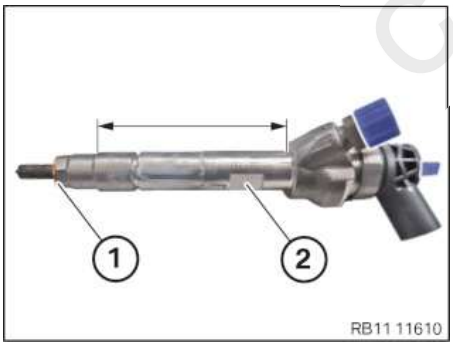
Contaminant or foreign body.

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.

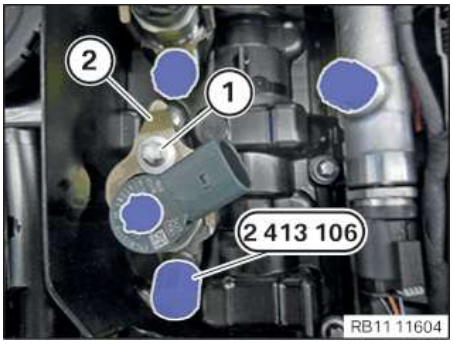
TECHNICAL INFORMATION

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.

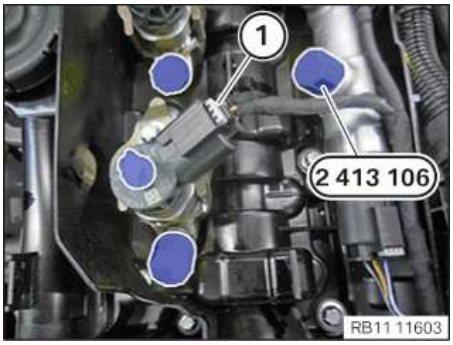


- Insert and install the injector .
- Insert and install the clamping claw (2).
- Tighten down screw (1).

Injector to cylinder head cover

M8		Tightening torque	8 Nm
		Angle of rotation	120 °

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- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.

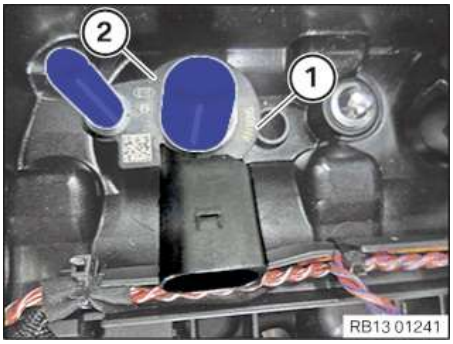
▸ **Replacement: Perform injection quantity compensation**

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.

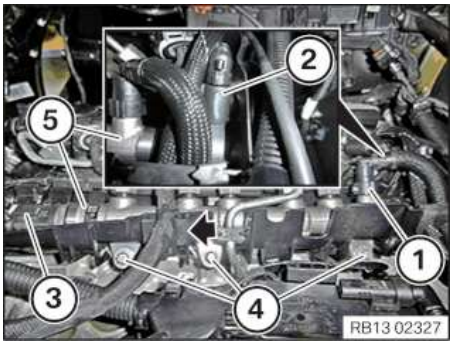


- Read off the adjustment value (1) on the new injector (2).



- 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.

34 – 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.

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35 – 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

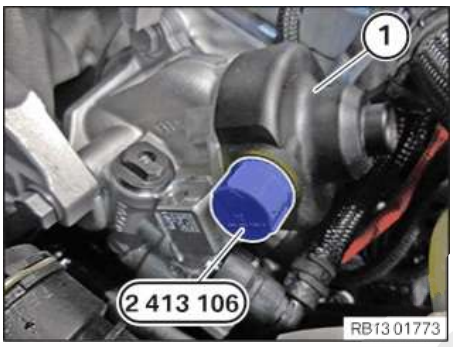
On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

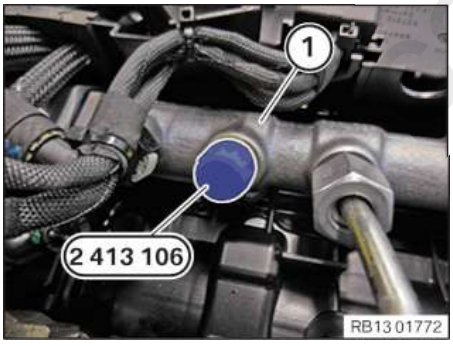
- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

TECHNICAL INFORMATION

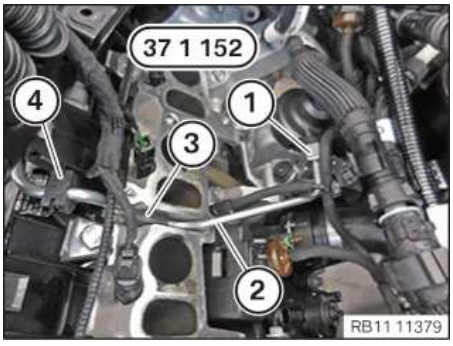
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- 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.

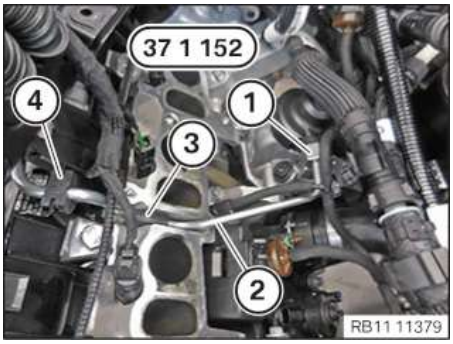
TECHNICAL INFORMATION

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

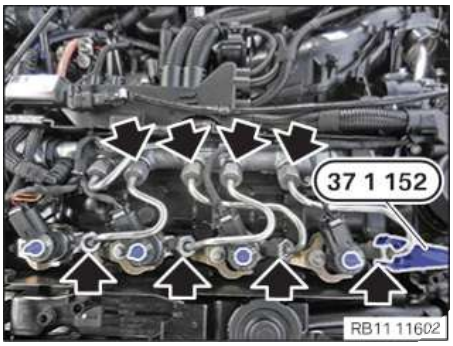
Renew high pressure lines when the tightening torque exceeds the maximum of 30 Nm.

- 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

36 – 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.

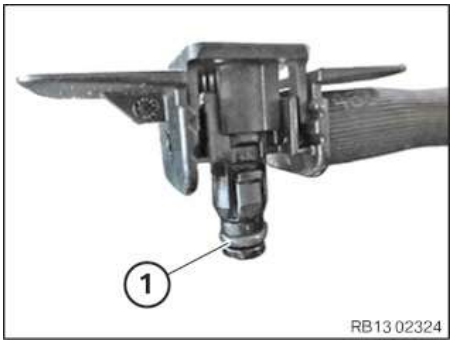
- Tighten the high pressure lines (arrows) with the special tool .

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**).

37 – Attach the leakage oil line on the injectors



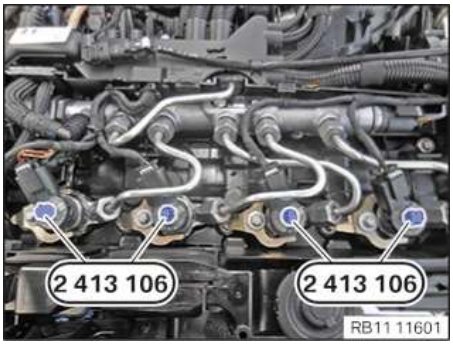
- **Version A:**

  Check sealing ring (1) for damage, renew leakage oil line if necessary.

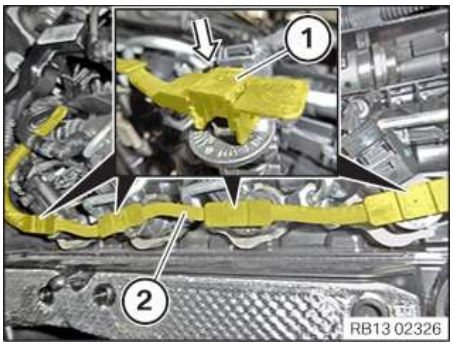
  Damaged sealing rings may cause malfunctions during fuel pressure build-up.

  Coat the sealing ring (1) with lubricant before connecting the leakage oil line to the injector.

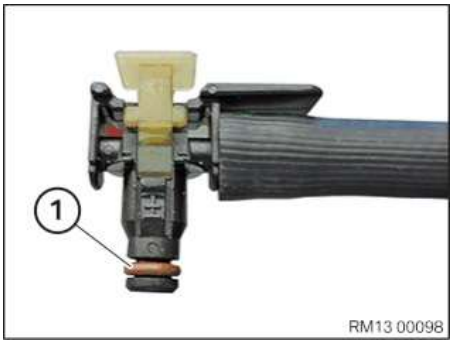
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- Feed out the special tools and remove.



- 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**:

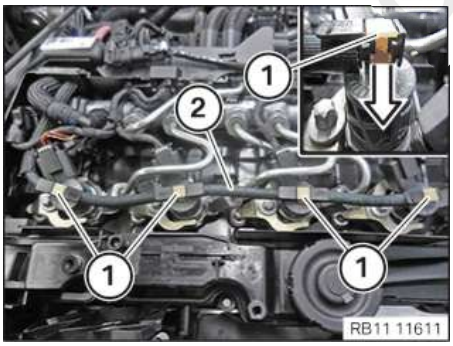
  Check sealing ring (1) for damage, renew leakage oil line if necessary.

  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.



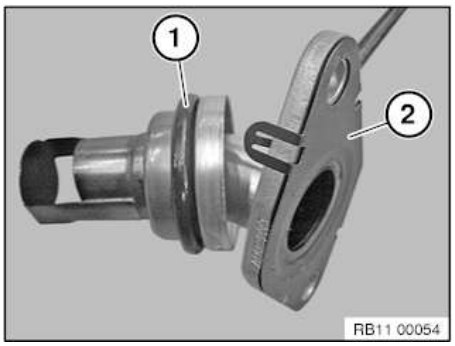
- Feed out the special tools and remove.



- 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.

38 – Installing the intake plenum

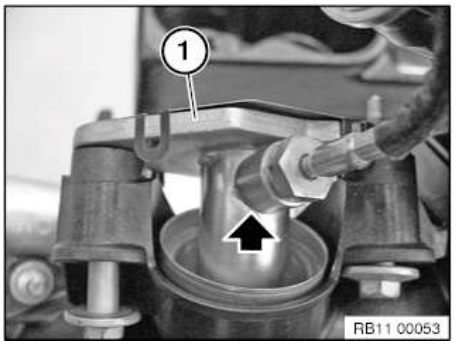
cardiagn.com



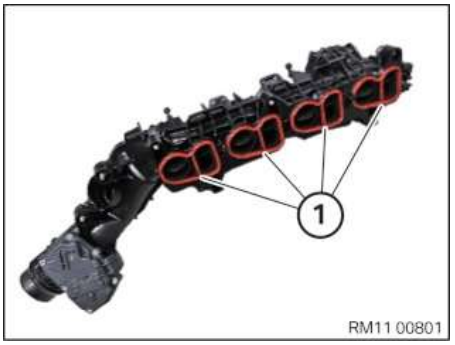
- Renew O-ring (1).

  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

  Parts: Gasket
- Position the seal (2) and clip it in.

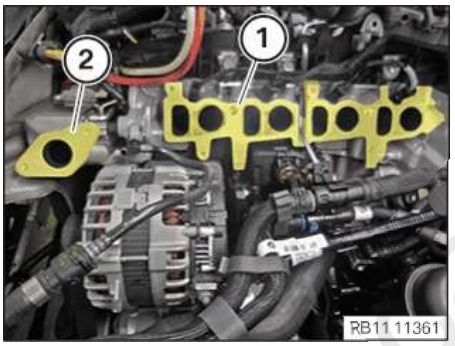


- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).

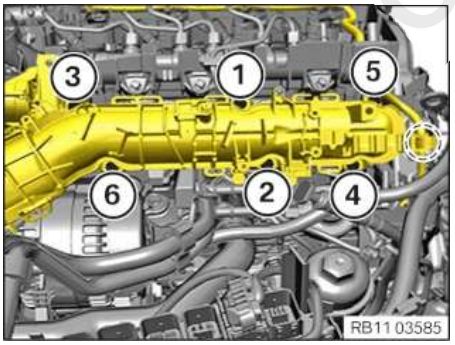


- Renew seals (1).

  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.

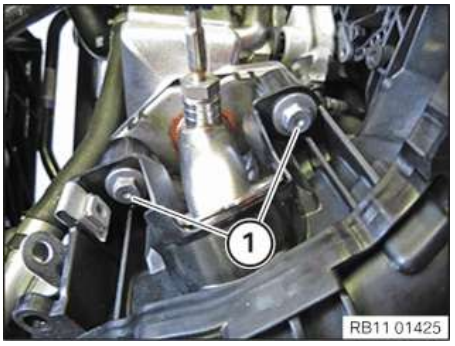


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

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.

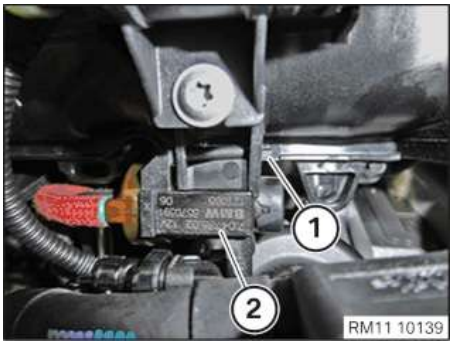


- Tighten the screws (1).

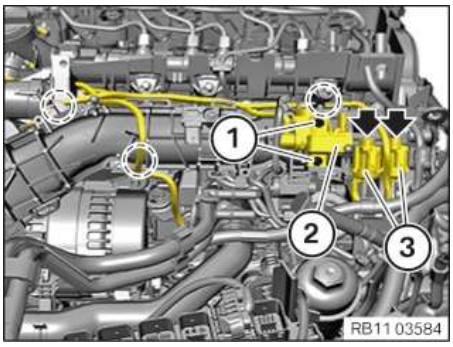
Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm

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- 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.

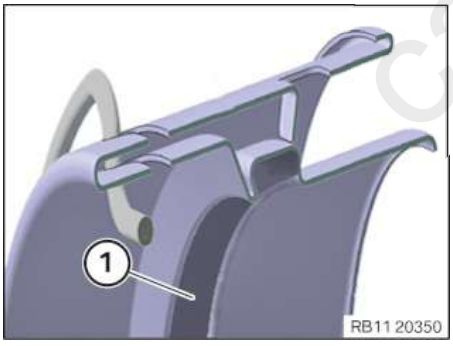


- Check the seal (1) for damage, and renew if necessary.

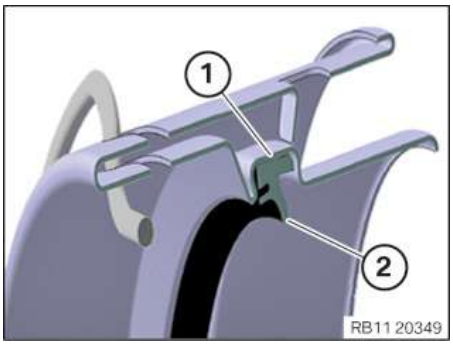
▸ **Replacing damaged seal**

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

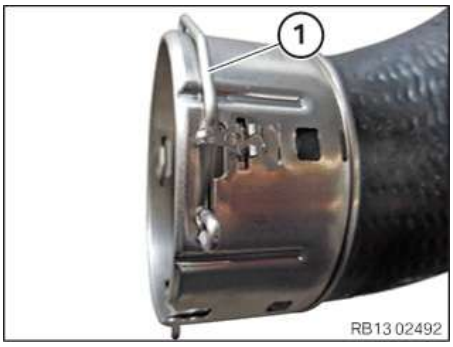
Incorrect assembly is possible. Ensure correct installation position.

- 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.

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- 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.

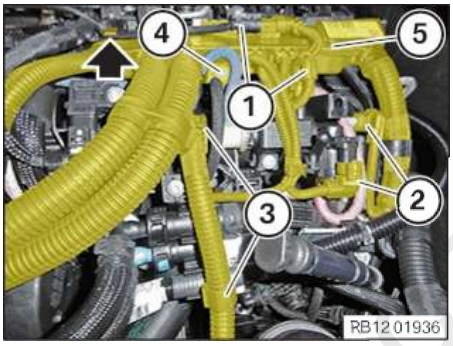
39 – Partially securing the wiring harness section on the intake plenum

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).

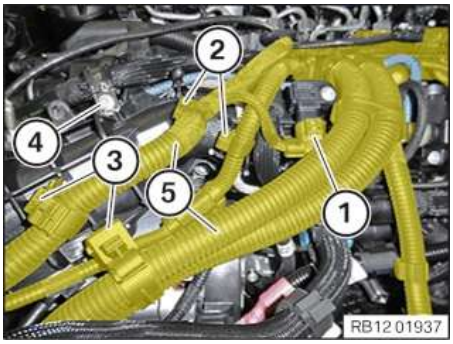
Wiring harness section to manifold

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).

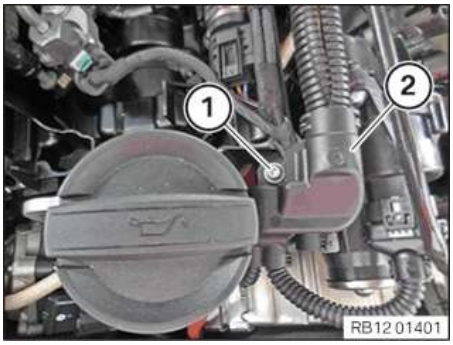
Standard screw connection 4 Nm

Oval-head screw		Tightening torque	4 Nm

- Secure clamps (3).
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

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- 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



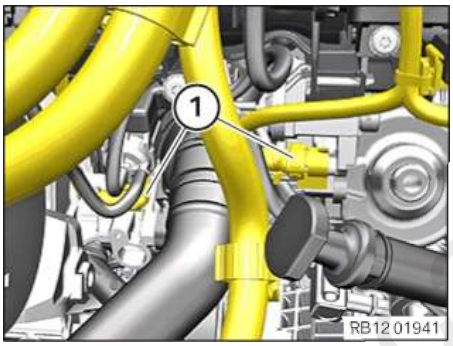
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



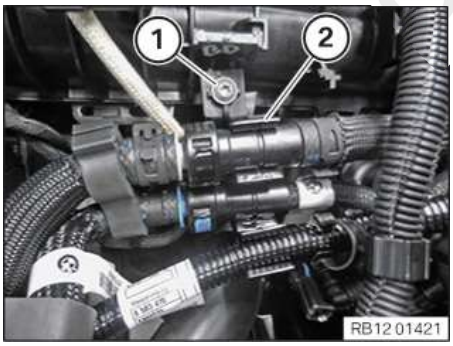
- Connect the connector (1) and lock it.

  The connector (1) must engage audibly.



- Connect connectors (1) and lock.

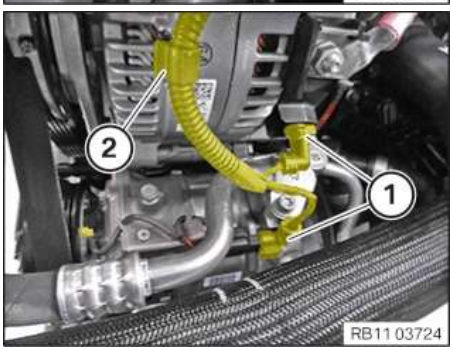
  The connectors (1) must engage audibly.



- Insert and install the holder (2).
- Tighten down screw (1).

Holder on intake plenum

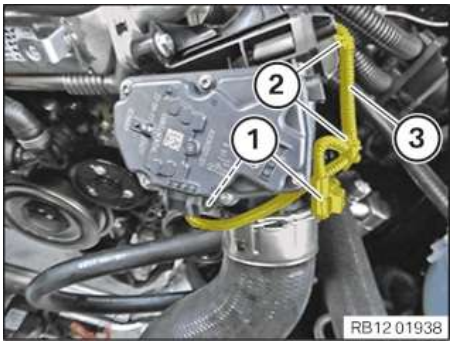
TS6X20		Tightening torque	5 Nm



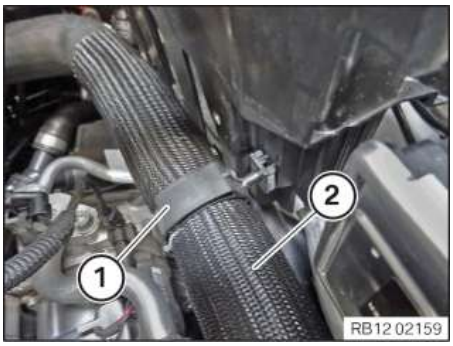
- Connect the connector (1) and lock it.

  The connectors (1) must engage audibly.
- Secure holder (2) to alternator.

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- Guide in the wiring harness section (3) and install.
- Secure clamps (2).
- Connect connectors (1) and lock.



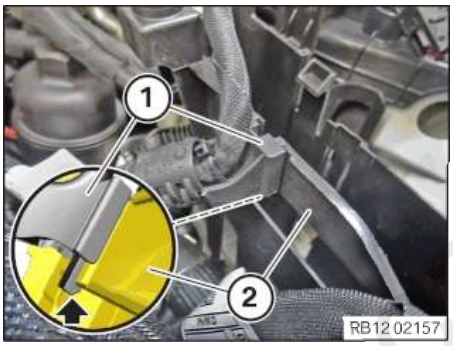
- Feed in and install coolant line (2).
- Lock holder (1).

  The holder (1) must engage audibly.



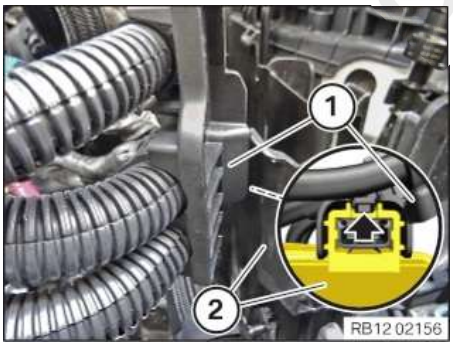
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.



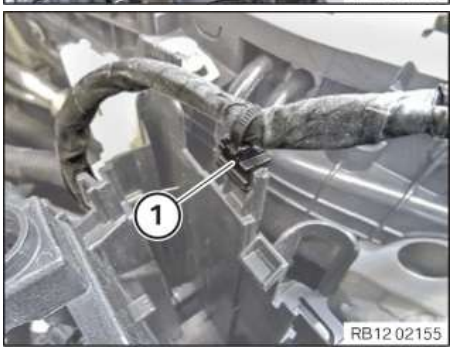
- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.



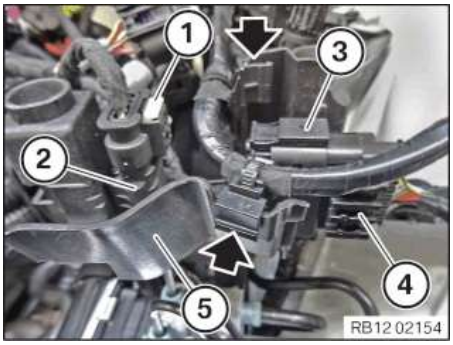
- Connect the cable clip (1) with the control unit holder (2) and lock it.

  Lock (arrow) must audibly engage.

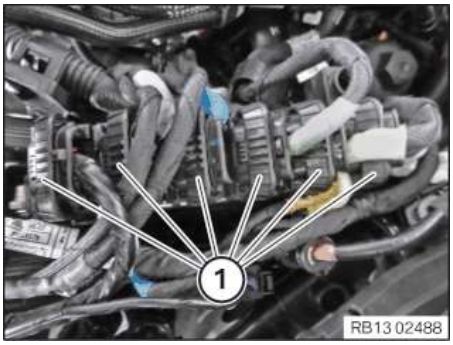


- Secure clamps (1).

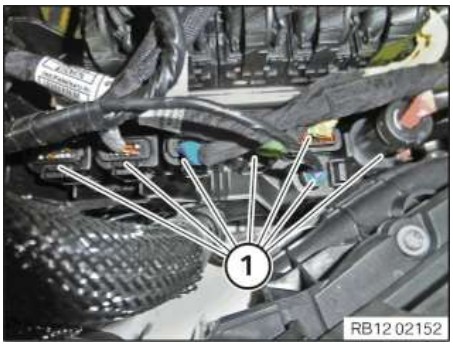
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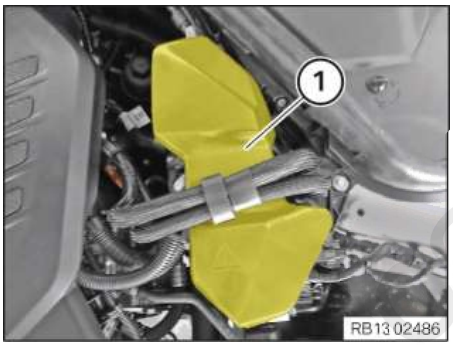
- Connect and lock the connector (4) with the control unit holder (5).
  The connector (4) must engage audibly.
- Connect connectors (3) and lock.
  The connector (3) must engage audibly.
- Connect and lock the connector (2) with the control unit holder (5).
  The connector (2) must engage audibly.
- 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.

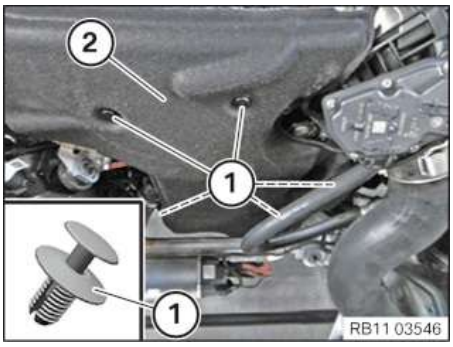


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



- Insert and install cover (1) into guides.

40 – Install acoustic cover for the engine, front



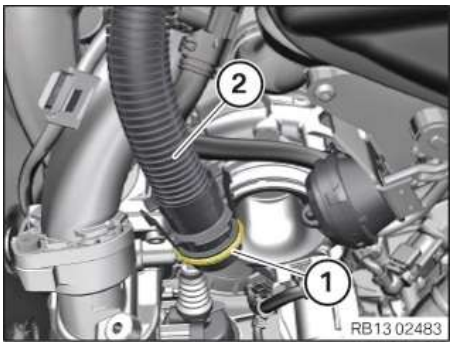
- Feed the acoustic cover (2) in and install.
- Secure the acoustic cover (2) with the expanding rivets (1).

41 – Installing the clean air pipe with resonator

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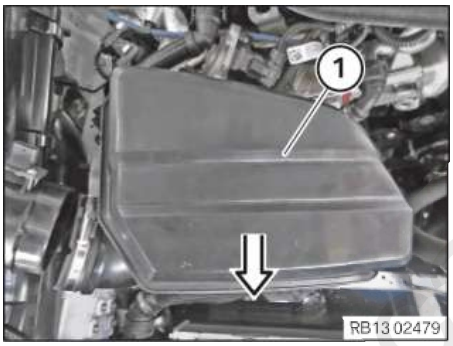
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



- 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.

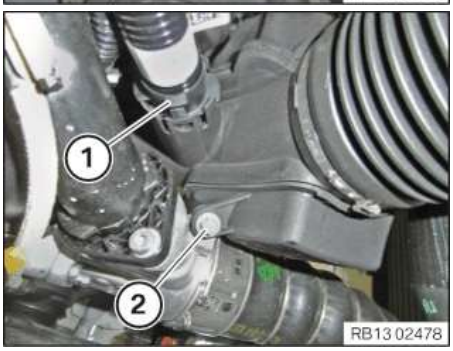


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

  The clamp (1) must engage audibly.

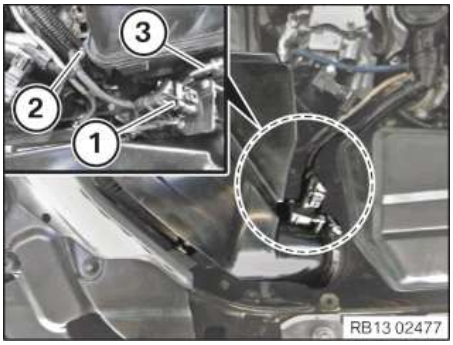


- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm

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- Connect the clean air pipe with resonator to the intake filter housing.
- Tighten clamp (3).

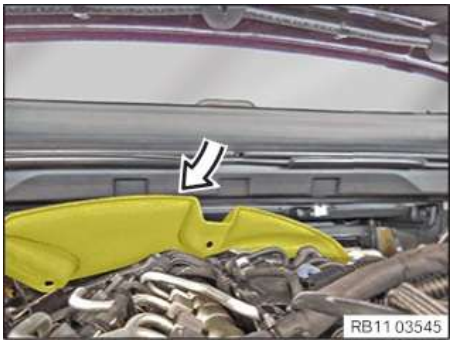
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

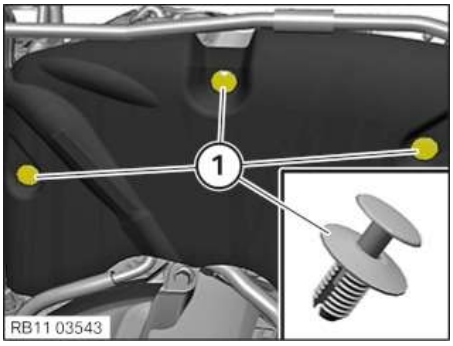
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

42 – Installing acoustic cover at rear

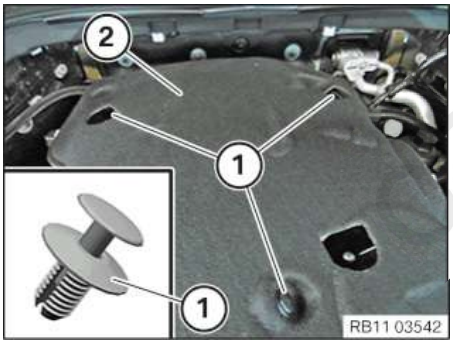


- Guide in the acoustic cover in the direction of the arrow and install it.



- Secure acoustic cover with the expanding rivets (1).

43 – 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) .

44 – Install acoustic cover

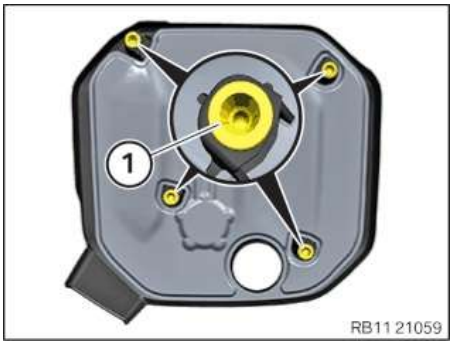
RISK OF DAMAGE

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.

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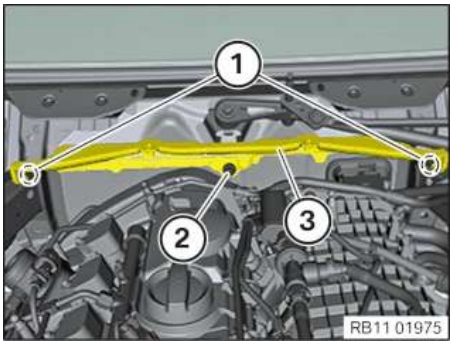


- Check the acoustic cover for correct fit of the rubber mounts (1).



- Clip in the acoustic cover (1) into the holders in the indicated areas.

45 – Installing centre bulkhead lower section

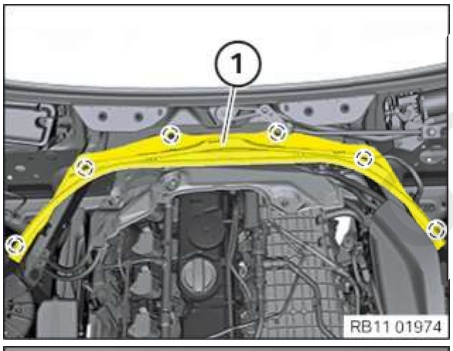


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

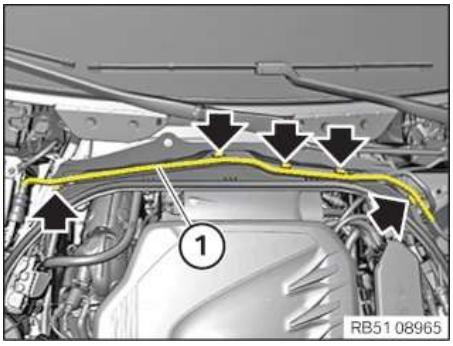
46 – Installing the centre bulkhead upper part



- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

Bulkhead upper part to bottom bulkhead

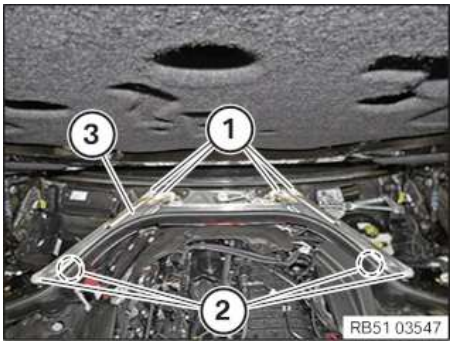
		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

  Clip in the wire (1) into the holders (arrows).

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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 °

47 – 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.

48 – Installing cowl panel cover

RISK OF DAMAGE

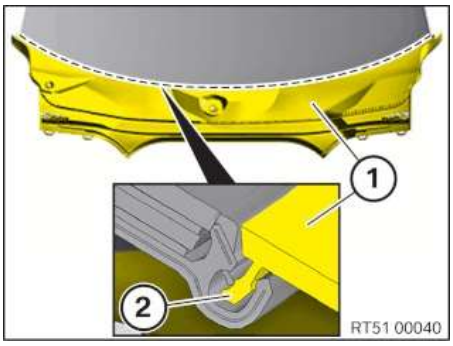
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

- Ensure correct installation of the components.
- Only use undamaged components.

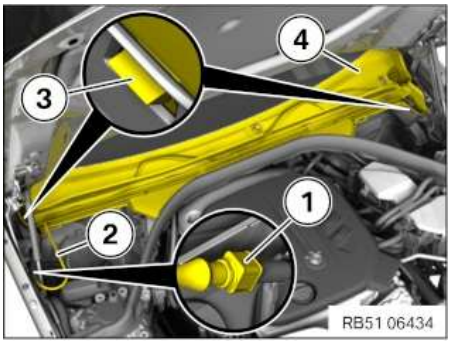
TECHNICAL INFORMATION

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.

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- 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.

49 – Install left and right wiper arm

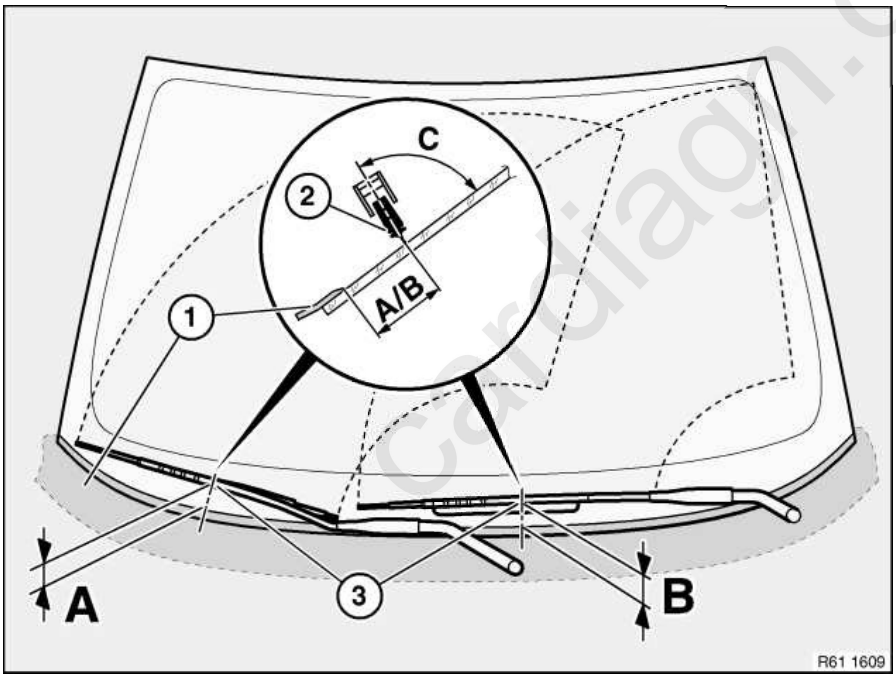
NOTICE

Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

TECHNICAL INFORMATION

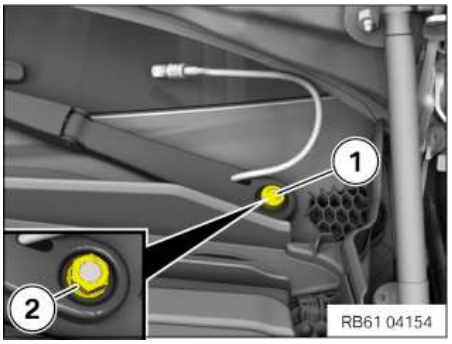
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



- 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



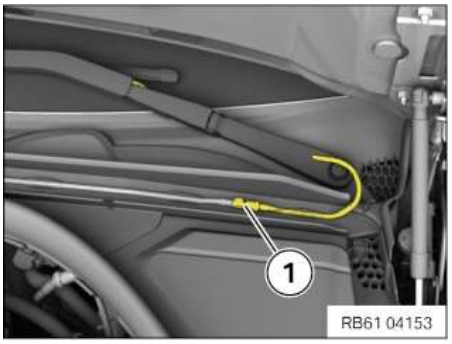
- Tighten nut (2).

Windscreen wiper arm

Combination hexagon nut		Tightening torque	35 Nm

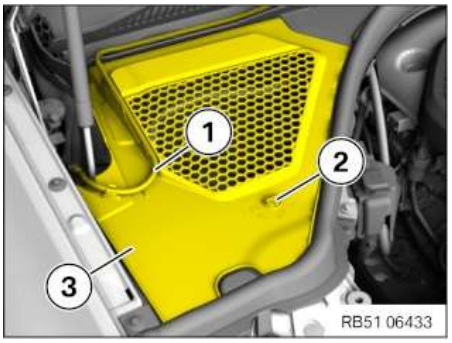
- Connect the protective cap (1).

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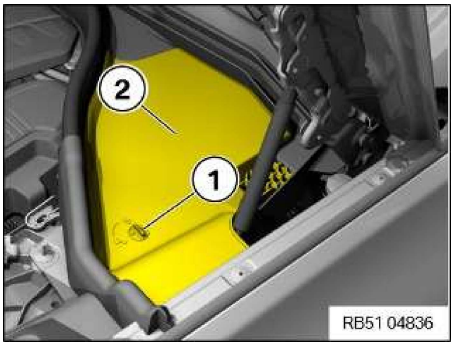
- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

50 – 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.

51 – Install the cover of the engine compartment on the rear left



- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

52 – Connecting all battery earth leads



- See additional information.

53 – Take bonnet out of the service position

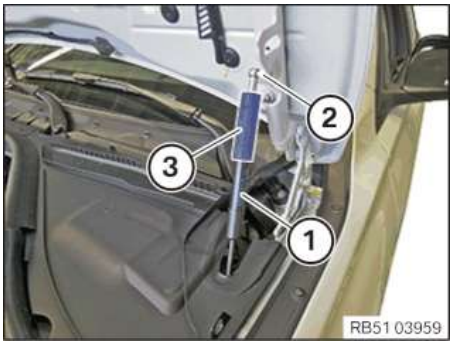
CAUTION

Shutting bonnet or tailgate.

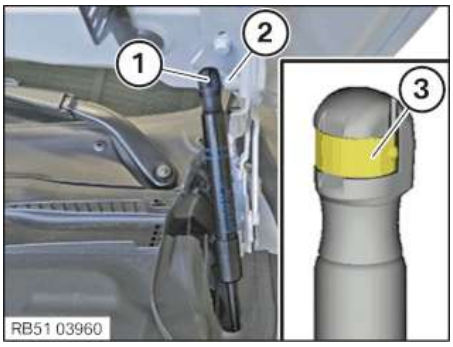
Danger of injury!

- Support bonnet/tailgate in fully open position with the aid of a suitable device.

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- 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

Camshaft sensor to cylinder head cover			Used in step 27
TS5x20		Tightening torque	4 Nm

Cylinder head cover to cylinder head			Used in step 28
M6		Tightening torque.	8,5 Nm

Heat shield to exhaust manifold			Used in step 29
M6x12			10 Nm

Bracket on cylinder head cover			Used in step 30
		Tightening torque	5 Nm

Battery positive lead to battery positive terminal			Used in step 30
M8		Tightening torque	19 Nm

Differential pressure sensor of diesel particulate filter on cylinder head cover			Used in step 31
TS5x20		Tightening torque	4 Nm

Heat shield to exhaust manifold			Used in step 32
M6x12		Tightening torque	10 Nm

Banjo bolt for exhaust pressure pipe to exhaust manifold			Used in step 32
Hollow bolt	Renew sealing rings.	Tightening torque	30 Nm

Exhaust gas pressure pipe to sensor system holder			Used in step 32
TS6x20		Tightening torque	5,7 Nm

Clamping claw facing to cylinder head cover			Used in step 33
M6		Tightening torque	10 Nm

Injector to cylinder head cover			Used in step 33
M8		Tightening torque	8 Nm
		Angle of rotation	120 °

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Rail to cylinder head cover			Used in step 34
M8		Tightening torque	19 Nm

High pressure lines between high pressure pump and rail			Used in step 35
High-pressure pipe		Tightening torque	24.5 Nm

High pressure lines between injector and rail			Used in step 36
High-pressure pipe		Tightening torque	24.5 Nm

Intake plenum to cylinder head			Used in step 38
M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum			Used in step 38
		Tightening torque	10 Nm

Electric changeover valve to intake plenum			Used in step 38
TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold			Used in step 39
TS5x20		Tightening torque	3,6 Nm

Standard screw connection 4 Nm			Used in step 39
Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover			Used in step 39
TS5x20		Tightening torque	3,6 Nm

Holder on intake plenum			Used in step 39
TS6X20		Tightening torque	5 Nm

Clean air pipe to exhaust turbocharger			Used in step 41
M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing			Used in step 41
Clamp		Tightening torque	3 Nm

Bulkhead lower part to body			Used in step 45
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead			Used in step 46
		Tightening torque	3 Nm

Tension strut on bulkhead			Used in step 46
M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome			Used in step 46
Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm			Used in step 49
Combination hexagon nut		Tightening torque	35 Nm

Overview of Special Tools

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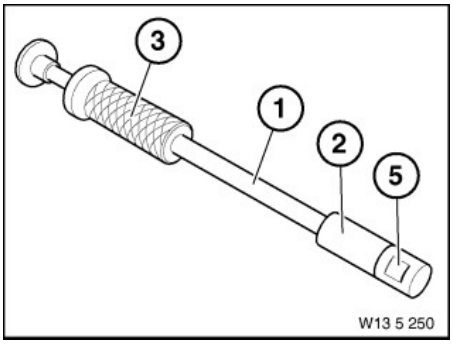
0 493 339 (13 5 252) Bush



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)	

0 493 340 (13 5 253) Weight

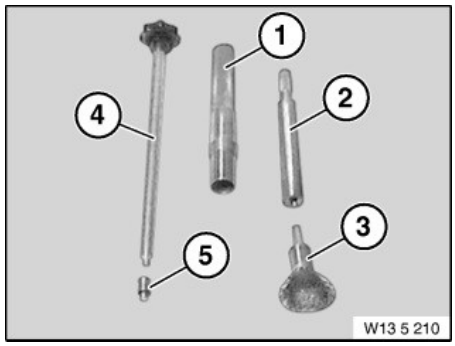


Common Used in step 21

Usage	(Weight)
Included in the tool or work	0 493 321
Storage location	
Replaced by	
In connection with	
SI-Number	

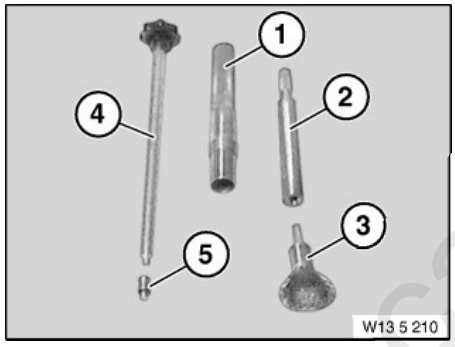
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0 493 763 (13 5 215) Plug



Common	Used in step 33
Usage	(Seal plug)
Included in the tool or work	0 493 758
Storage location	
Replaced by	
In connection with	
SI-Number	

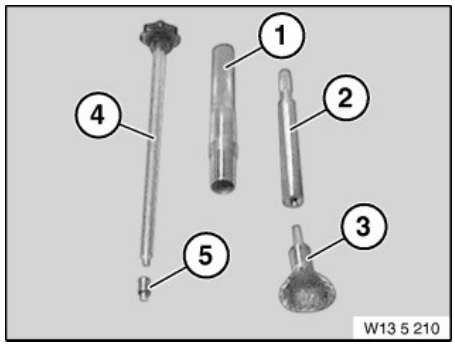
0 493 762 (13 5 214) Rod



Common	Used in step 33
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	

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0 493 758 (13 5 210) Tool



Common Used in step 33

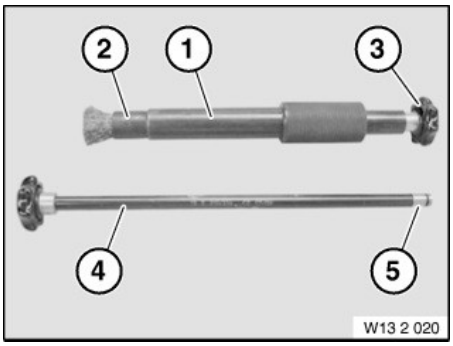
Usage	(Cleaning set) For injector channels
Included in the tool or work	
Storage location	B4
Replaced by	
In connection with	
SI-Number	01 05 00 (574)

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)	

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0 496 150 (13 2 020) Tool



Common Used in step 33

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.	

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Overview Technical Data

Distance from window pane edge to wiper blade Used in step 49

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)	33

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	252
61 20 900 Disconnecting and connecting battery earth lead	252
61 20 900 Disconnecting and connecting battery earth lead	252
61 20 900 Disconnecting and connecting battery earth lead	252
61 20 900 Disconnecting and connecting battery earth lead	252
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61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	252
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	252
61 20 900 Disconnecting and connecting battery earth lead	252
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	252
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	252
61 20 900 Disconnecting and connecting battery earth lead	252
61 20 900 Disconnecting and connecting battery earth lead	252
61 20 900 Disconnecting and connecting battery earth lead	252
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61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	252
61 20 900 Disconnecting and connecting battery earth lead	252

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61 20 900 Disconnecting and connecting battery earth lead 252

61 20 900 Disconnecting and connecting battery earth lead 252

61 35 ... Notes on ESD protection (Electro Static Discharge) 152127

61 35 ... Notes on ESD protection (Electro Static Discharge) 152127

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11 14 300 Remove and install/replace the acoustic cover for the injectors

PRELIMINARY WORK

1 – 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.

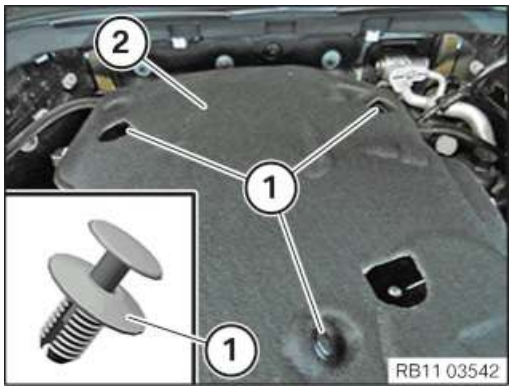
- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

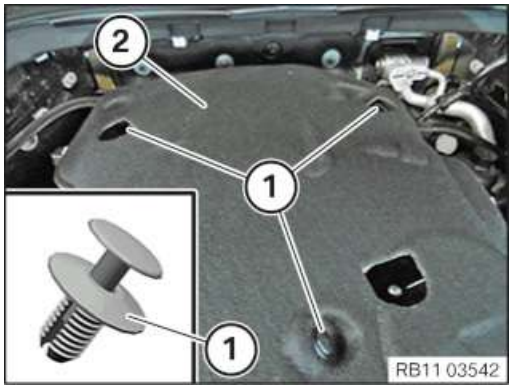
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2 – Remove the acoustic cover for the injectors



- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

3 – 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) .

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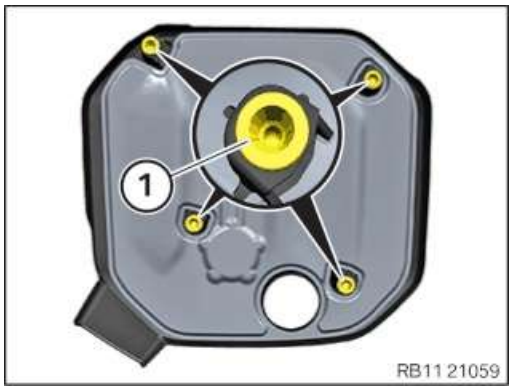
4 – Install acoustic cover

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.

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11 14 290 Removing and installing/renewing front engine acoustic cover

PRELIMINARY WORK

1 – 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.

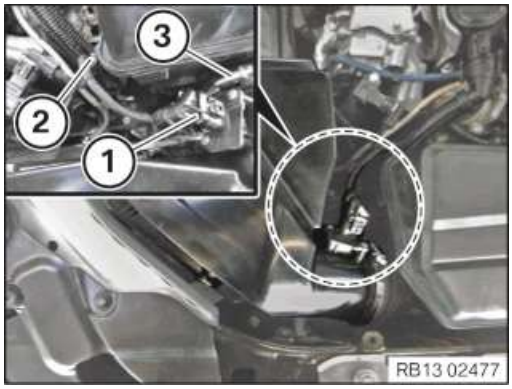
2 – Removing the clean air pipe with the resonator

WARNING

Hot surfaces.

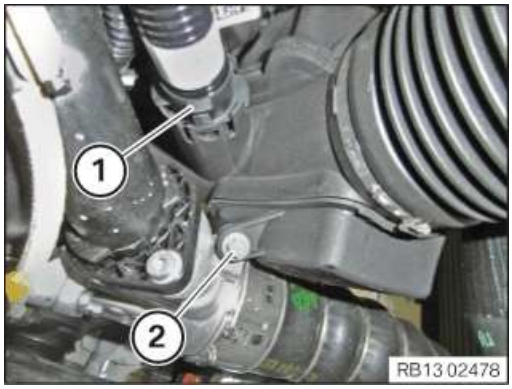
Risk of burning!

- Perform all work only on components that have cooled down.

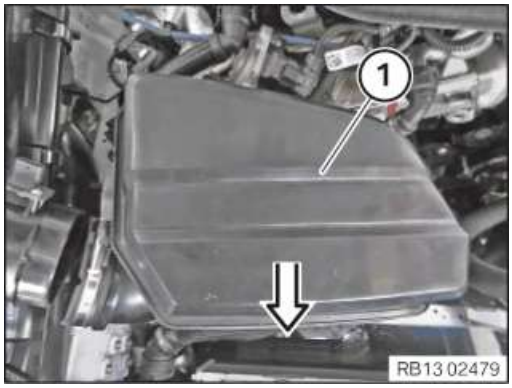


- Unlock plug connection (1) and disconnect.
- Loosen clamp (2).
- Unfasten clamp (3).
- Separate the clean air pipe with resonator from the intake filter housing.

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- 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.

audiagn.com

MAIN WORK

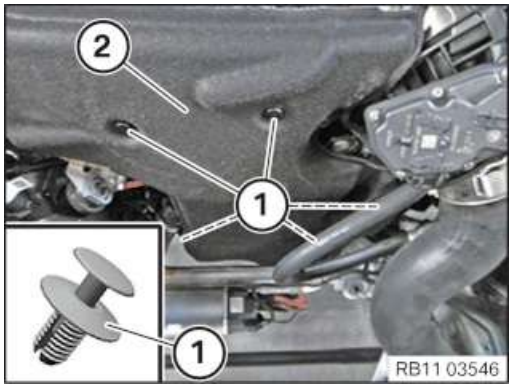
3 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

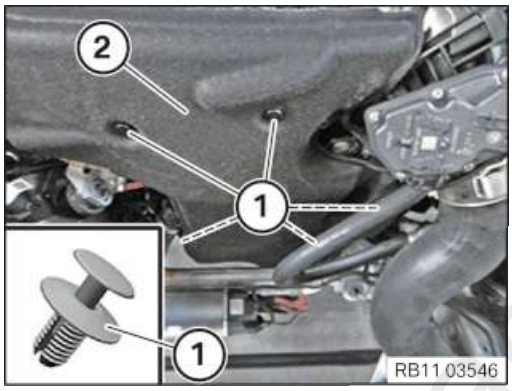
Risk of burning!

- Perform all work only on components that have cooled down.



- Release and remove expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

4 – 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).

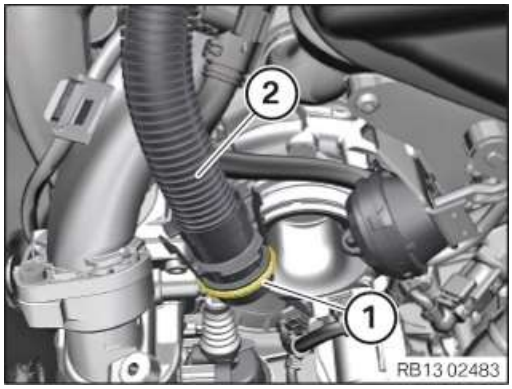
cardiagn.com

POSTPROCESSES

5 – Installing the clean air pipe with resonator



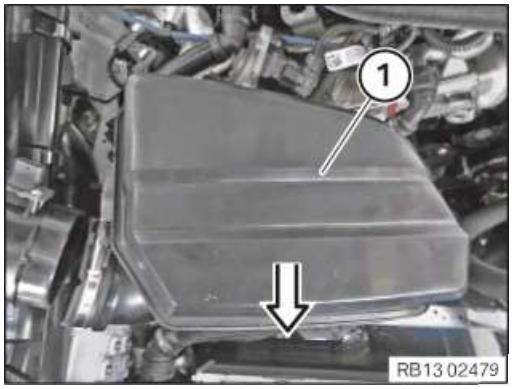
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



- 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.

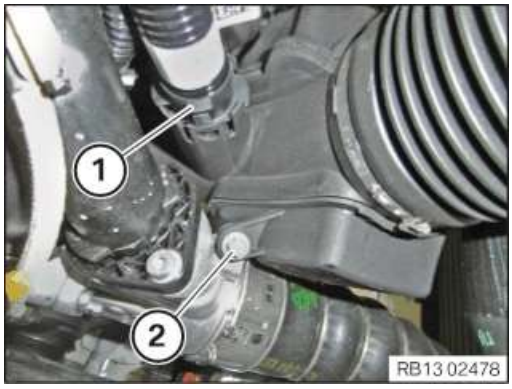


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

  The clamp (1) must engage audibly.

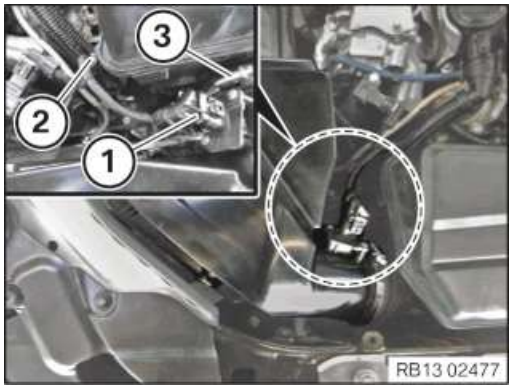


- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm

rdiagn.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.

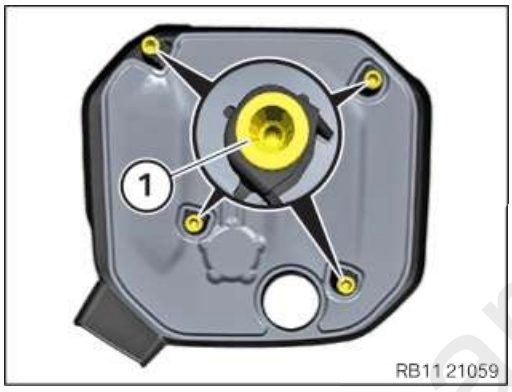
6 – Install acoustic cover

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.

Additional Information

Overview of Tightening Torques

Clean air pipe to exhaust turbocharger Used in step 5

M6X20		Tightening torque	8 Nm

ardiagn.com

Clean air pipe to upper section of intake filter housing Used in step 5

Clamp		Tightening torque	3 Nm

cardiagn.com

11 14 270 Removing and installing/replacing the rear acoustic cover

PRELIMINARY WORK

1 – Bring front compartment lid in the service position

Prerequisite

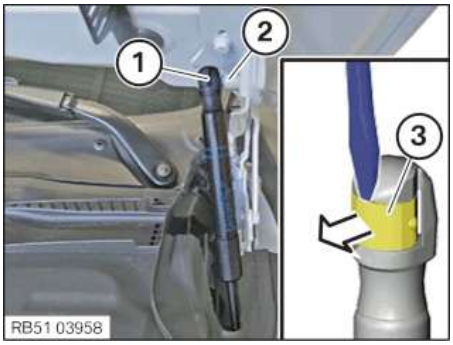
Engine compartment lid is open.

CAUTION

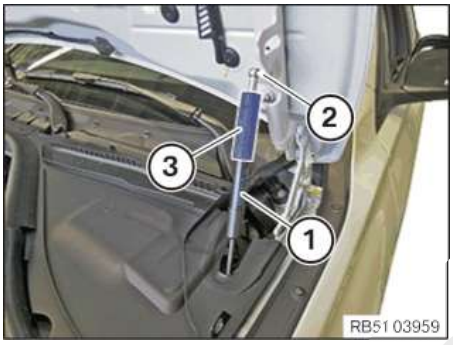
Shutting bonnet or tailgate.

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.

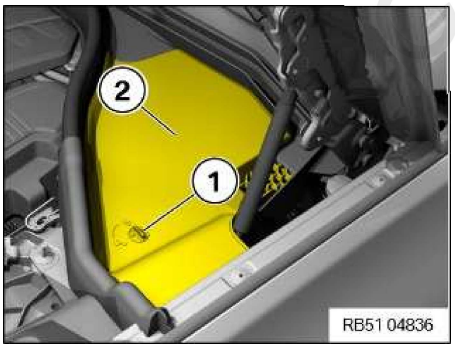


TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

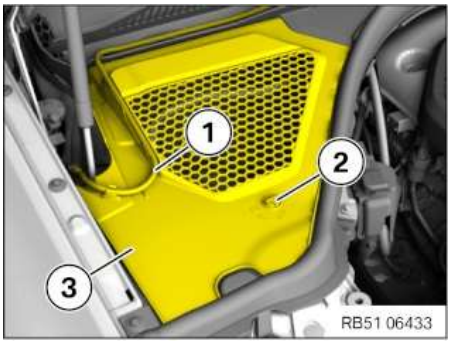
- Remove the bonnet support and open the bonnet further.
- Pull special tool or or (3) over gas pressure spring (1).
- Place special tool on the ball pin (2) and engage using force.
- Repeat the operation on the other side of vehicle.

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 – Removing the wiper arm on the left and right

NOTICE

Description is for left component only. Procedure on the right side is identical.

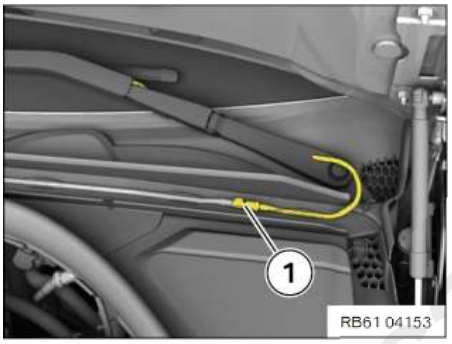
► **Remove the wiper arm**

RISK OF DAMAGE

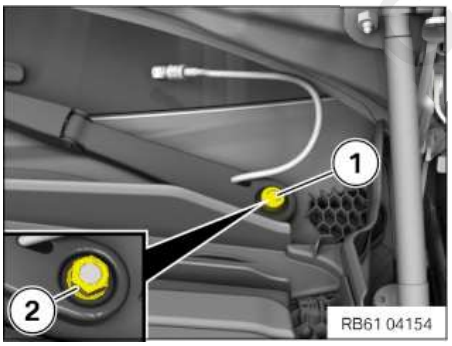
Damage to wiper console.

While removing the wiper arms without using special tool, the wiper console can break.

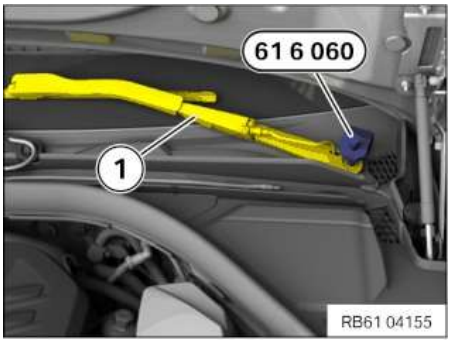
- Removing the wiper arms must be carried out only using the prescribed special tool.
- Do **not** lever off the wiper arm because otherwise the wiper console may break at the predetermined breaking point for active pedestrian protection.



- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.



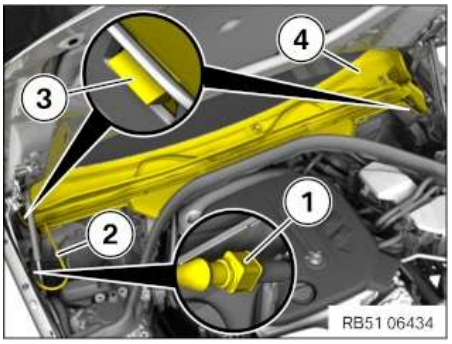
- Remove the protective cap (1).
- Loosen nut (2).



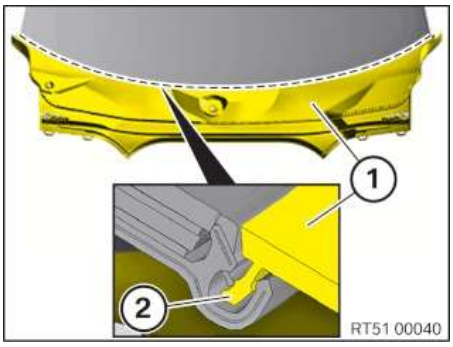
- Pull off the wiper arm (1) using special tool .

5 – Remove cowl panel cover

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- 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 – Remove the seal for the rear bonnet

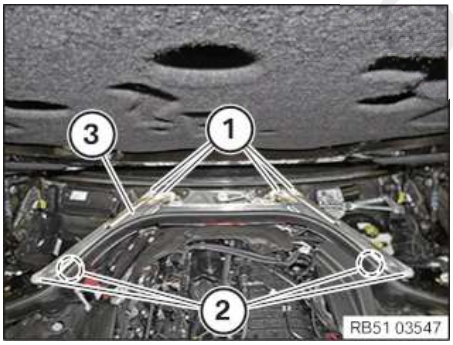


- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

7 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

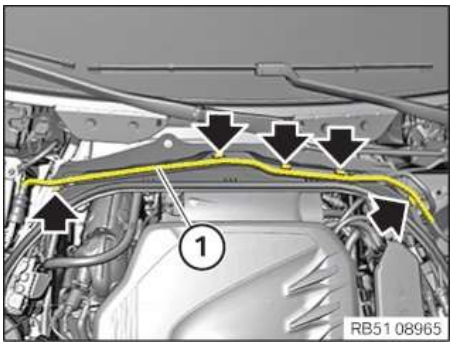
Driving without the strut brace/front-end strut or tension strut is not permitted.



NOTICE

The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

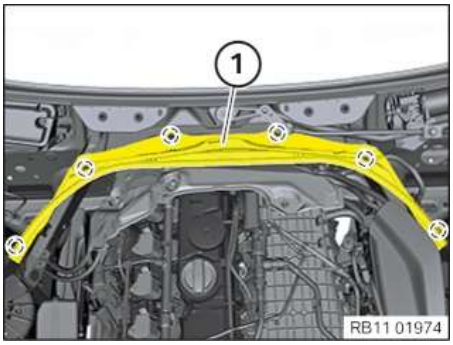
- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.



- **Version with mild hybrid technology:**

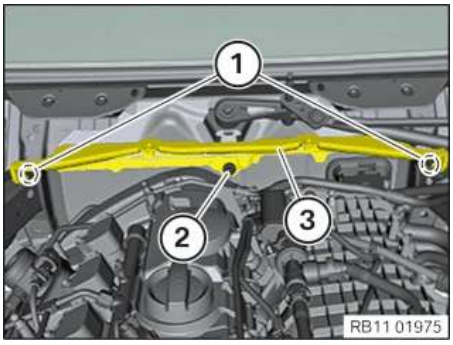
  Unclip the wire (1) at the holders (arrows).

carsdiagn.com



- Unscrew the bolts in the marked areas.
- Remove the centre bulkhead upper part (1).

8 – Removing the centre bulkhead lower section



- Loosen screws (1).
- Loosen nut (2).
- Remove the centre bulkhead lower part (3).

9 – Removing the acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

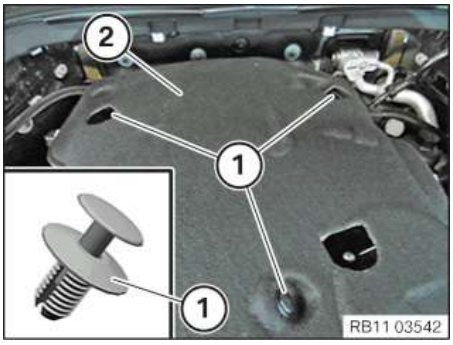
Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

- 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.



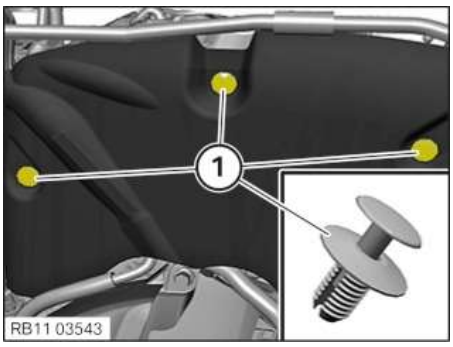
- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

10 – Remove the acoustic cover for the injectors

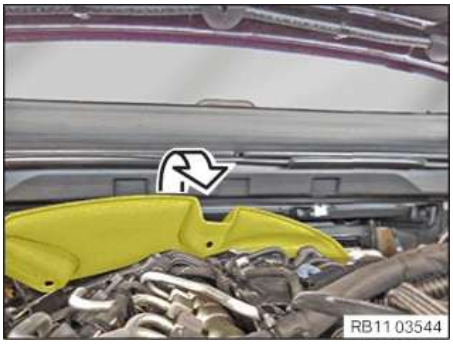


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

11 – Removing acoustic cover at rear

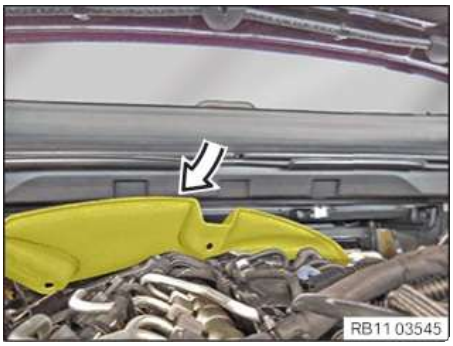


- Loosen the expanding rivet (1).

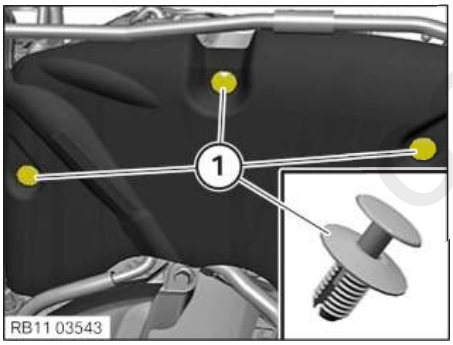


- Guide out and remove the acoustic cover in the direction of the arrow.

12 – Installing acoustic cover at rear



- Guide in the acoustic cover in the direction of the arrow and install it.

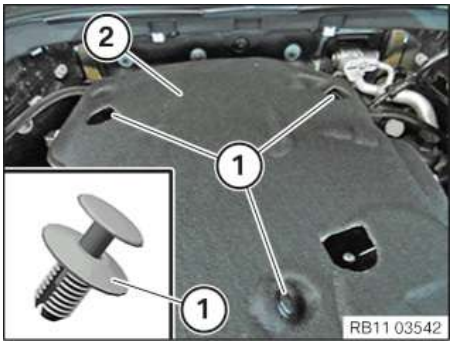


- Secure acoustic cover with the expanding rivets (1).

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POSTPROCESSES

13 – 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) .

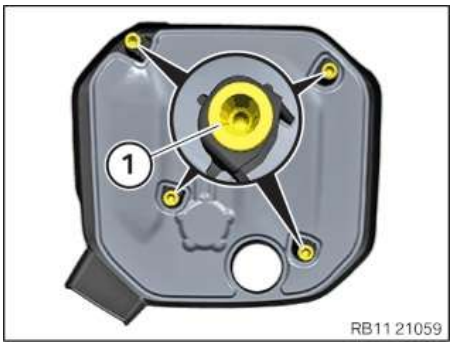
14 – Install acoustic cover

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.

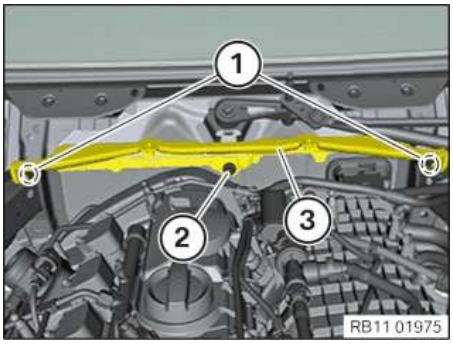


- Check the acoustic cover for correct fit of the rubber mounts (1).



- Clip in the acoustic cover (1) into the holders in the indicated areas.

15 – Installing centre bulkhead lower section



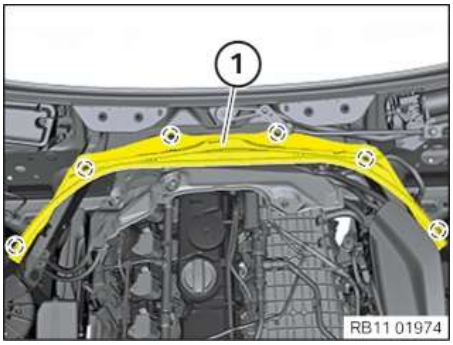
- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

16 – Installing the centre bulkhead upper part

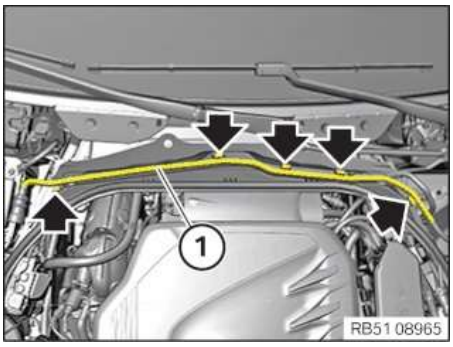
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- Position the centre bulkhead upper part (1).
- Tighten the bolts in the marked areas.

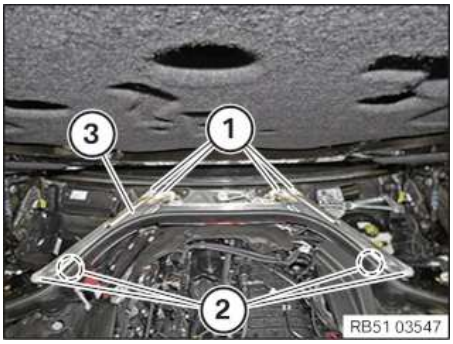
Bulkhead upper part to bottom bulkhead

	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 °

17 – 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.

18 – Installing cowl panel cover

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RISK OF DAMAGE

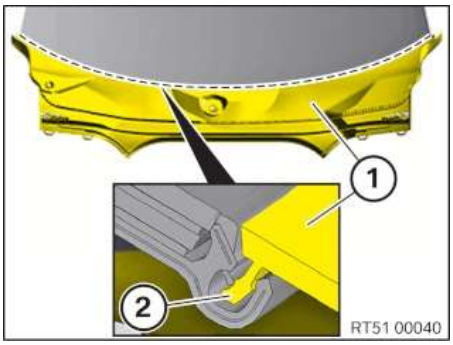
Damage caused by water ingress into the vehicle.

Water ingress into the vehicle may result in damage to components, malfunctions and corrosion.

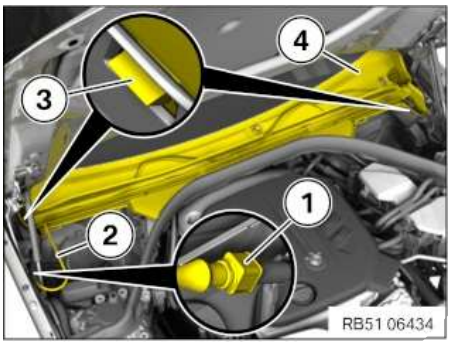
- Ensure correct installation of the components.
- Only use undamaged components.

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.

19 – Install left and right wiper arm

NOTICE

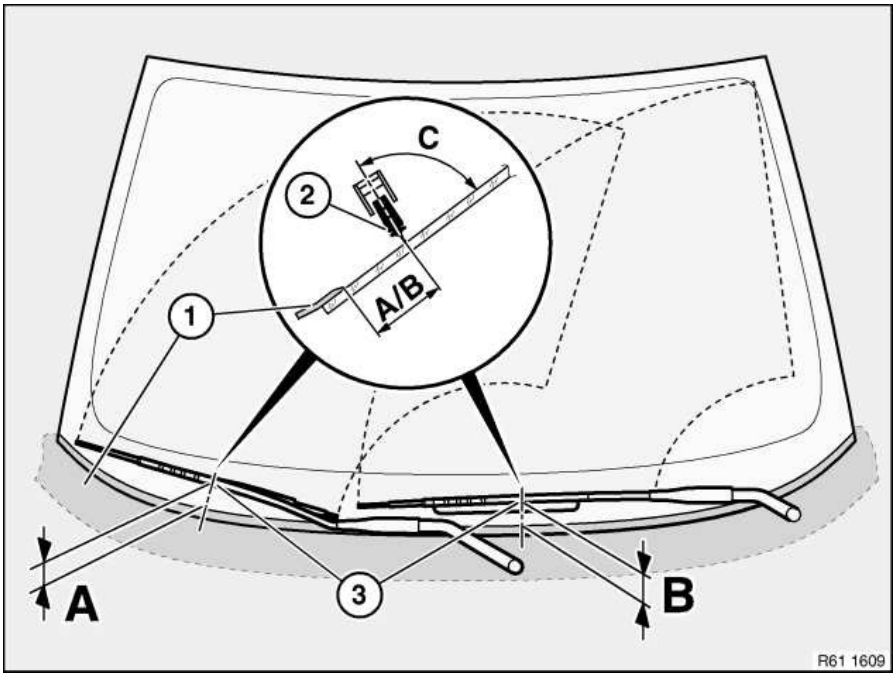
Description is for left component only. Procedure on the right side is identical.

▸ **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.

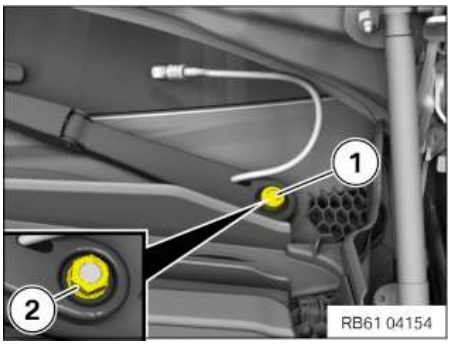
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- Connect the wiper arm (3).
- Correctly position the wiper arm (2) in relation to the window edge (1).

Distance from window pane edge to wiper blade

Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

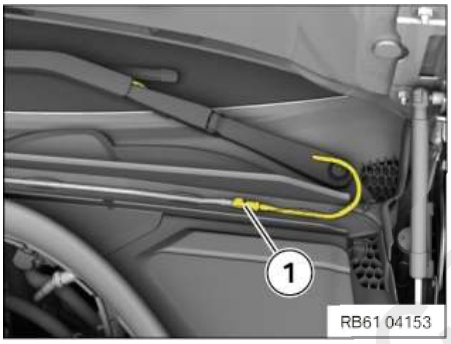


- Tighten nut (2).

Windscreen wiper arm

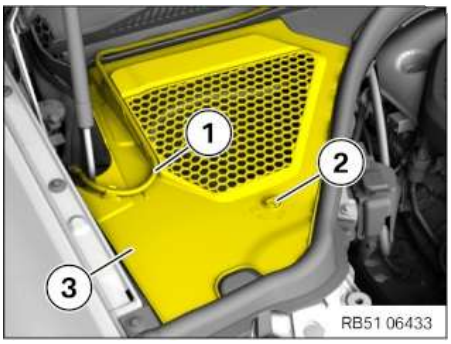
Combination hexagon nut		Tightening torque	35 Nm

- Connect the protective cap (1).



- Feed washer fluid hose (1) into the cowl panel guide and connect at the separation point.

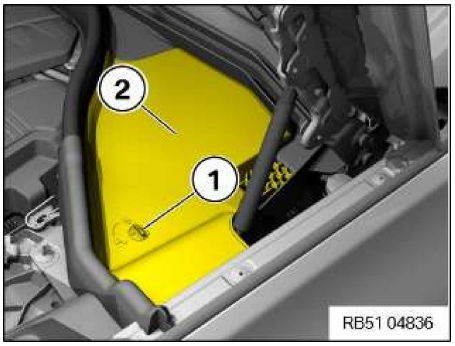
20 – Install the rear right engine compartment cover



- Position the cover of the engine compartment on the rear right (3).
- Close lock (2).
- Insert washer fluid hose (1) into the guides.

21 – Install the cover of the engine compartment on the rear left

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- Position the engine compartment cover at the rear left (2) .
- Close lock (1).

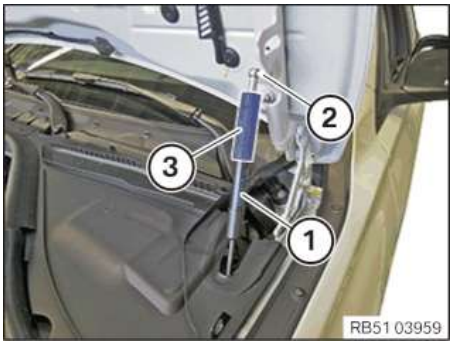
22 – Take bonnet out of the service position

CAUTION

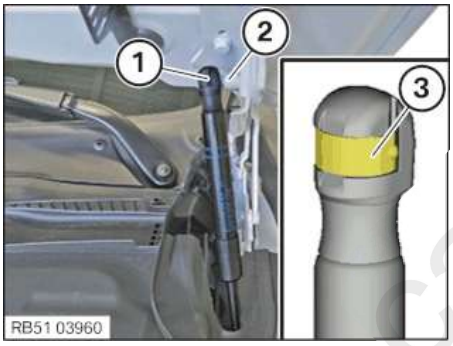
Shutting bonnet or tailgate.

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

Bulkhead lower part to body — Used in step 15

Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead — Used in step 16

		Tightening torque	3 Nm

Tension strut on bulkhead — Used in step 16

M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome — Used in step 16

Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

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Windscreen wiper arm			Used in step 19
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 19
Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

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11 14 005 Replacing front crankshaft seal

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 – 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.

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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

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.

2 – Disconnecting all battery earth leads



- 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.

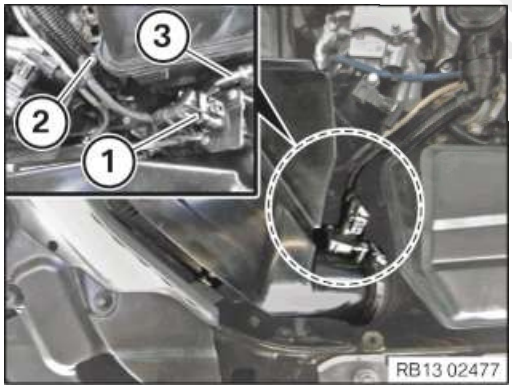
4 – Removing the clean air pipe with the resonator

WARNING

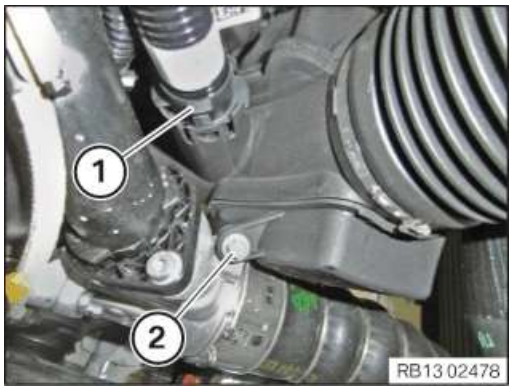
Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

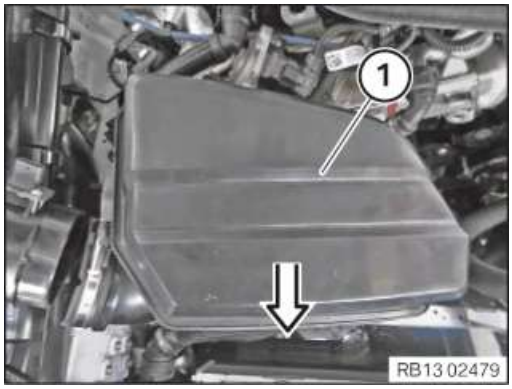


- Unlock plug connection (1) and disconnect.
- Loosen clamp (2).
- Unfasten clamp (3).
- Separate the clean air pipe with resonator from the intake filter housing.



- Unlock engine ventilation line (1), disconnect it and place it aside.
- Loosen screw (2).

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- 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.

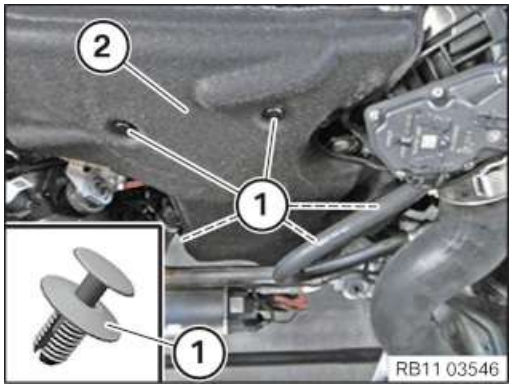
5 – Remove acoustic cover of the front engine

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.

6 – Removing the drive belt for the starter motor generator

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CAUTION

Spring preload.

Danger of injury!

- The use of the specified special tool (tool) is mandatory.
- The described operation must be carried out properly.

CAUTION

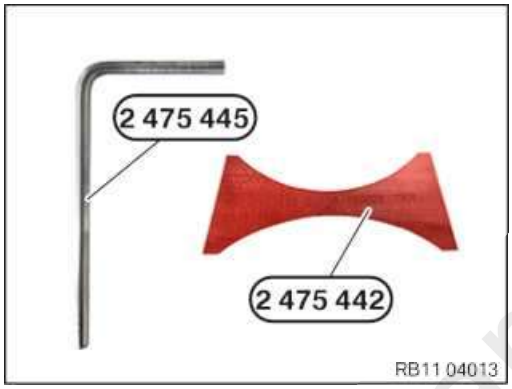
Component with preload.

Danger of injury!

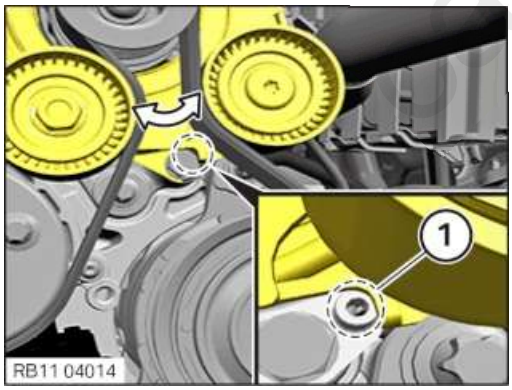
- Reduce preload as far as possible before disassembly. Relieve component.

TECHNICAL INFORMATION

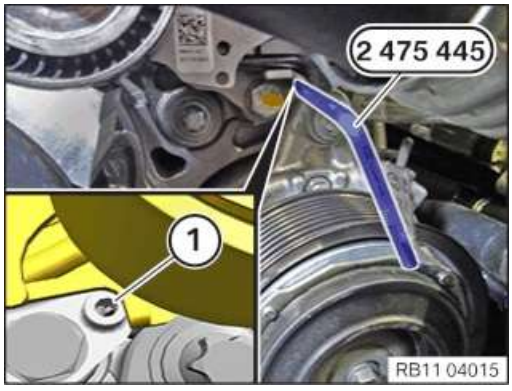
The drive belt must be replaced if contaminated with coolant- and oil residues.



- Prepare the special tool 2 475 442 and the special tool 2 475 445.

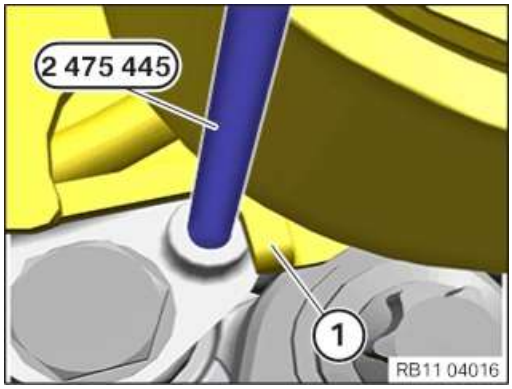


- Position the belt tensioner in the direction of the arrow so that the bore hole is visible in the area (1).

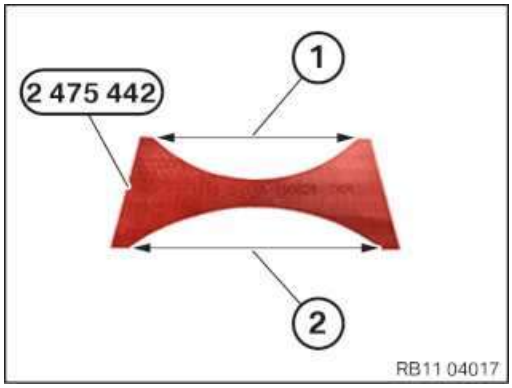


- Guide in the special tool 2 475 445 and install it in the bore hole (1).

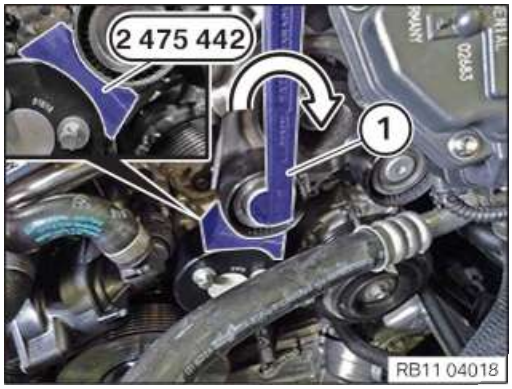
  The special tool 2 475 445 must rest against the starter motor generator.



- Ensure that the belt tensioner (1) is supported on the special tool 2 475 445.



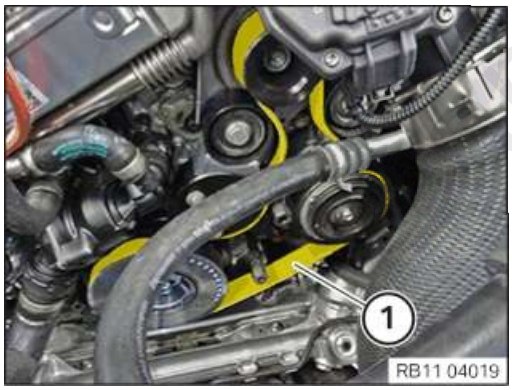
- Ensure that the radius (1) of the special tool 2 475 442 supports the tensioning pulley of the belt tensioner.
- Ensure that the radius (2) of the special tool 2 475 442 is supported on the belt pulley of the coolant pump.



TECHNICAL INFORMATION

Conduct the following operation with the assistance of a second person.

- Twist the tensioning pulley (1) in the direction of the arrow.
- Guide in and install the special tool 2 475 442 between the belt pulley of the coolant pump and the tensioning pulley.

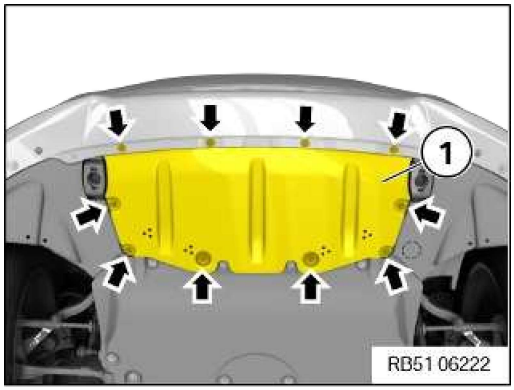


TECHNICAL INFORMATION

If the drive belt is reused: Mark direction of travel and reinstall drive belt in same direction of travel.

- Guide out and remove the drive belt (1) for the starter motor generator.

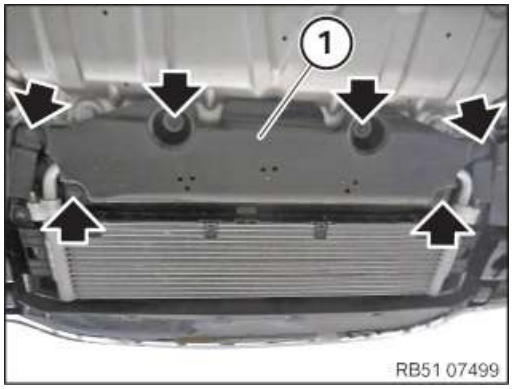
7 – Removing the front underbody protection



- **Version A:**

  Remove screws (arrows).

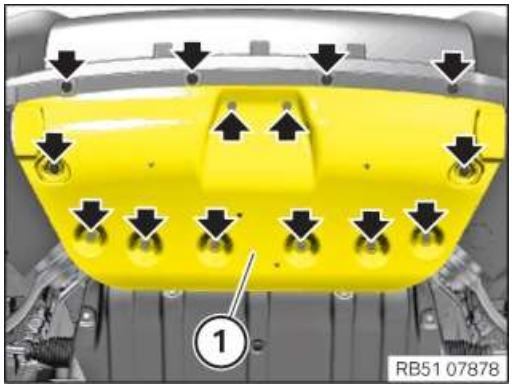
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version B:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

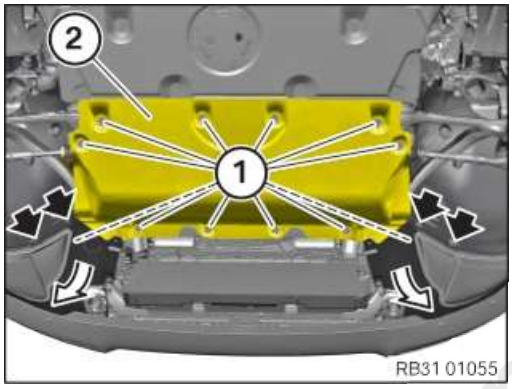


- **Version C:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

8 – Remove the underbody protection of the steering gear



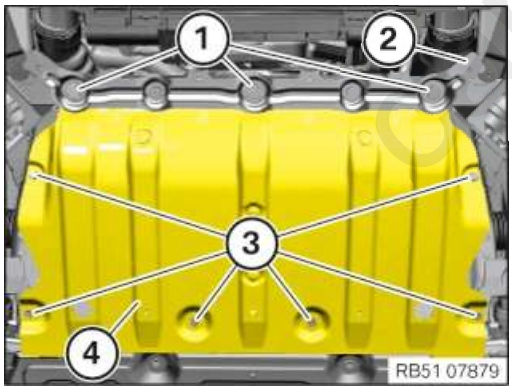
- **Version A:**

  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:**

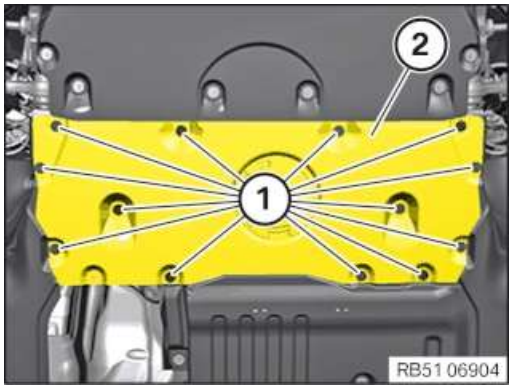
  Loosen screws (1).

  Remove the holder (2) for the underride protection.

  Loosen screws (3).

  Feed out and remove the underbody protection (4) of the steering gear.

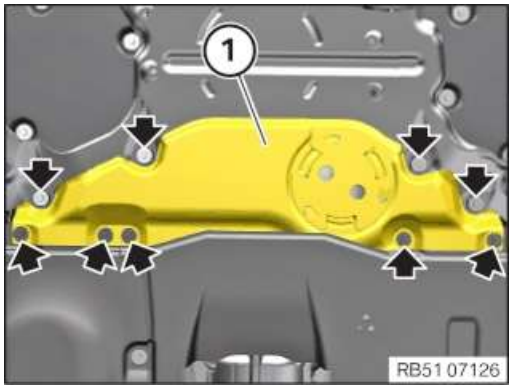
9 – Removing the centre underbody protection



- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .

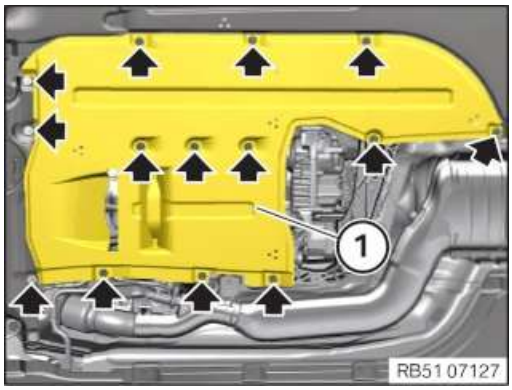


- **Version with all-wheel drive:**

  Remove screws (arrows).

  Feed out and remove the centre underbody protection (1).

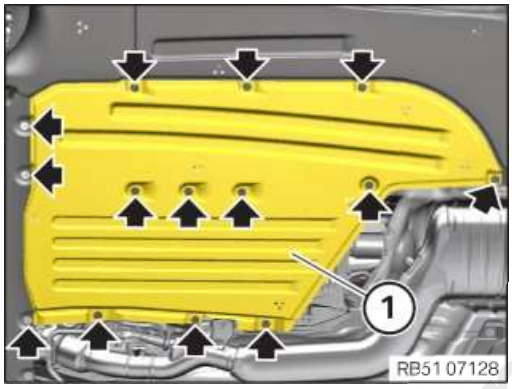
10 – Remove rear underbody protection



- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).



- **Version B:**

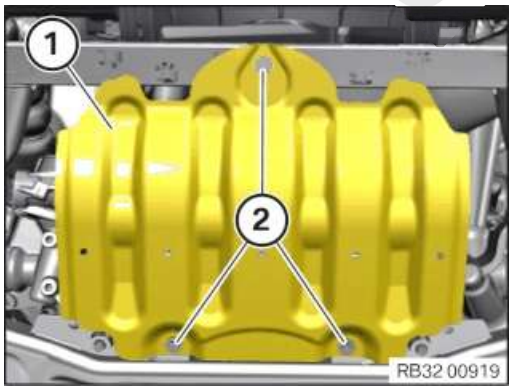
  Remove screws (arrows).

  Guide out rear underbody protection (1) and remove it.

11 – If installed: Removing the steering underbody protection

Prerequisite

Front underbody protection has been removed.



- Loosen screws (2).
- Remove underbody protection (1).

12 – Removing starter motor

Prerequisite

Battery earth leads are disconnected.

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WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

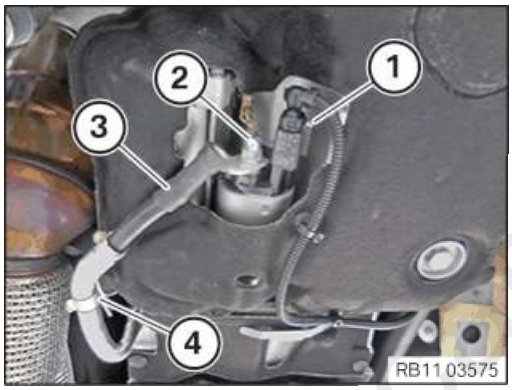
Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

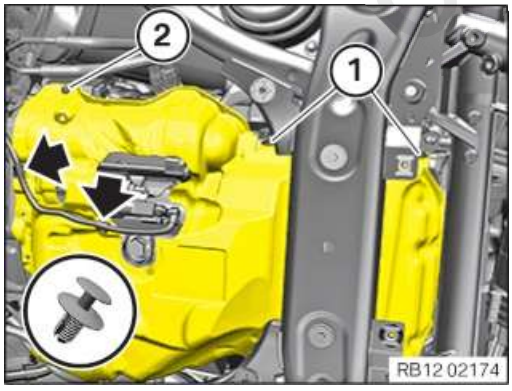
- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

TECHNICAL INFORMATION

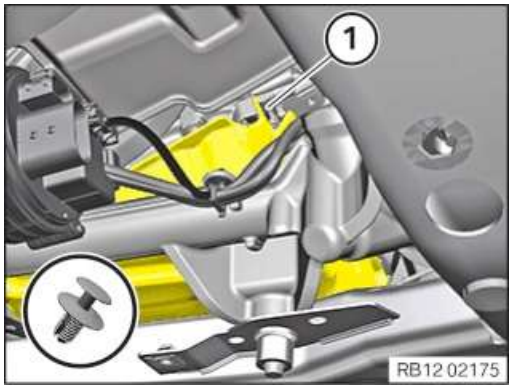
Make sure that the acoustic cover is **not** damaged while removing the starter motor.
A damaged lower acoustic cover can only be renewed when the front axle is lowered.



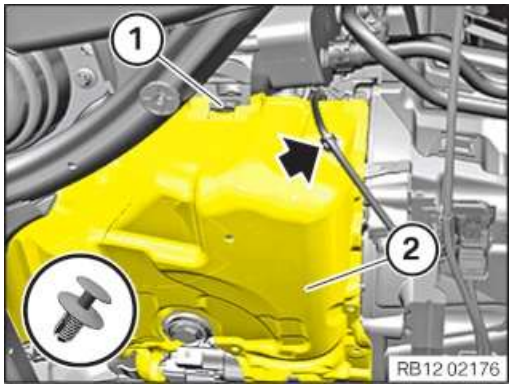
- Unlock plug connection (1) and disconnect.
- Release nut (2).
- Release positive battery cable (3) from holder (4).



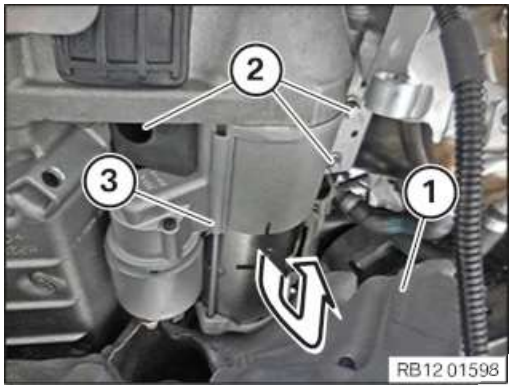
- Loosen the expanding rivet (1).
- Undo fir tree clip (2).
- Release the clamps (arrows).



- Loosen expanding rivet (1).
- Lower the acoustic cover of the oil sump.

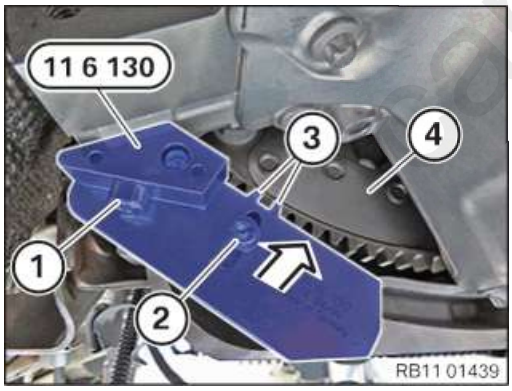


- Loosen expanding rivet (1).
- Loosen the clamp (arrow).
- Lower acoustic cover (2).



- 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.

13 – Removing the vibration damper



- Position the special tool 0 496 595 (11 6 130) and secure it on the timing case cover using the bolt (1).

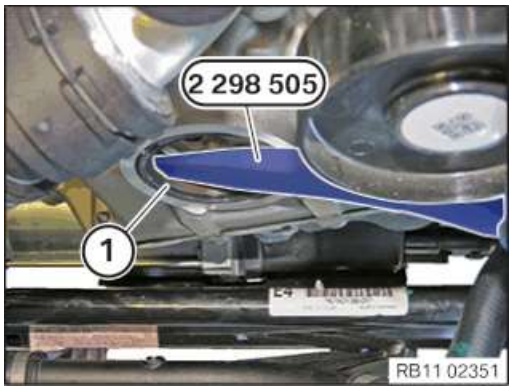
  The special tool 0 496 595 (11 6 130) must lie flat on the transmission housing.
- Slide the counter support with the bolt (2) up until the teeth (3) engage completely in the gearing of the flywheel.
- If necessary, turn the engine in the direction of rotation until the teeth (3) engage completely in the gearing of the flywheel (4).
- Tighten the screw (2).



- Loosen screws (1).
- Remove vibration damper.

MAIN WORK

14 – Remove the crankshaft seal



- Lever out the crankshaft seal (1) with the special tool 2 298 505.

  Do not scratch the sealing surface on the engine block.

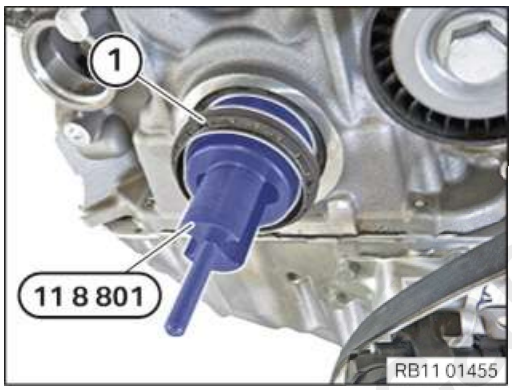
15 – Install the crankshaft seal



TECHNICAL INFORMATION

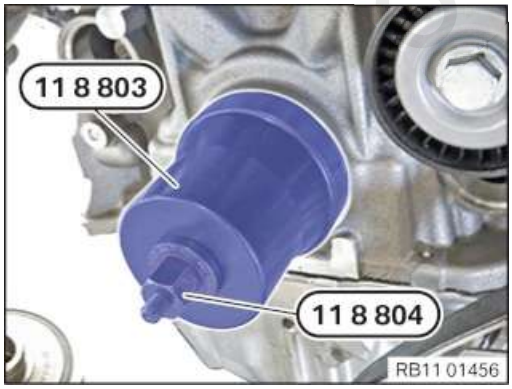
The radial shaft seal must be installed dry. Do not use engine oil or lubricant.

- Secure special tool 0 496 128 (11 8 801) with special tool 0 496 129 (11 8 802) to the crankshaft.



- Position the crankshaft seal (1) on the special tool 0 496 128 (11 8 801).

  Parts: Crankshaft seal



- Draw in the crankshaft sealing ring with the special tools 0 496 130 (11 8 803) and 0 496 131 (11 8 804).
- Screw in special tool 0 496 130 (11 8 803) until it is flush with the crankcase.

POSTPROCESSES

16 – Installing the vibration damper

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RISK OF DAMAGE

Radial shaft seal damage.

When installing the vibration damper, the rotary shaft seal can be damaged.

- The special tool must be used to install the vibration damper.

TECHNICAL INFORMATION

When removing and installing or replacing the vibration damper, the rotary shaft seal must be replaced.



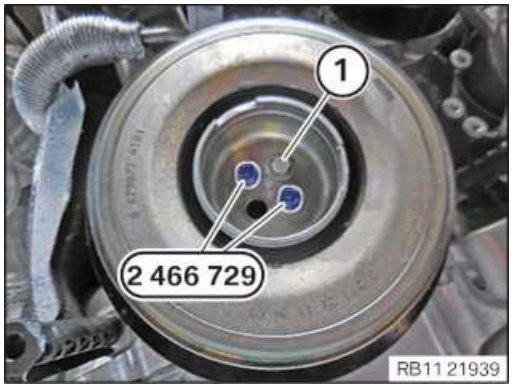
- Clean the sealing surface (1) from oil and contamination.



- Screw the special tool 2 466 729 hand-tight into the crankshaft.



- Insert vibration damper (1) into the special tool 2 466 729 and install.



- Renew screws (1).

  Parts: Screws
- Hand-tight the bolts (1).
- Guide the special tool 2 466 729 out and remove.

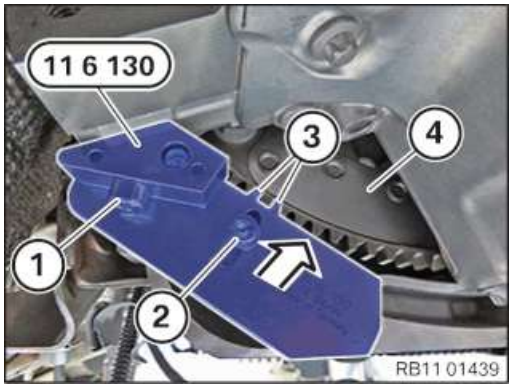


- Renew all remaining screws (1).

  Parts: Screws
- Tighten the screws (1).

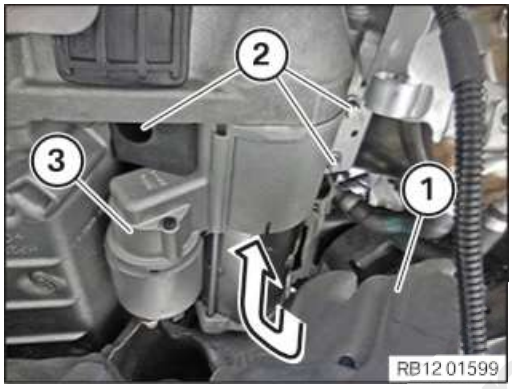
Vibration damper with belt pulley to crankshaft

M10x65	Renew screws.	Jointing torque	40 Nm
		Angle of rotation	120 °



- Loosen screw (2).
- Release the gearing (3) of the counter support from the flywheel (4).
- Unscrew the screw (1) and remove the special tool 0 496 595 (11 6 130).

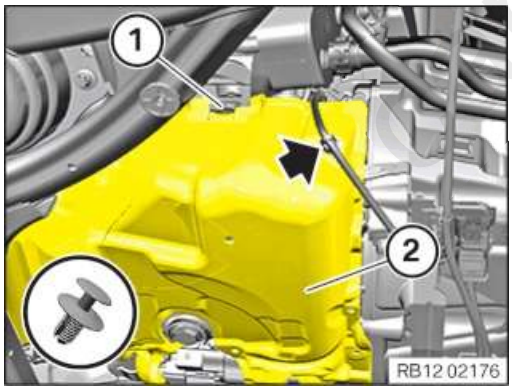
17 – Installing starter motor



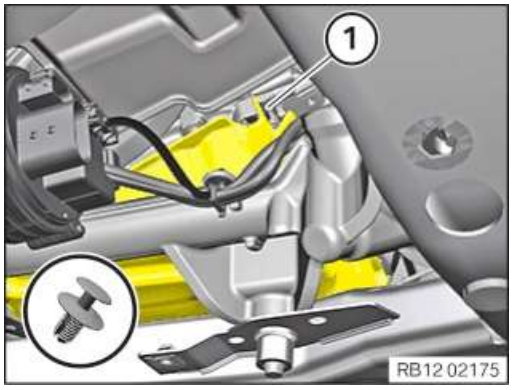
- Make sure that the acoustic cover (1) is not damaged.
- Carefully press the acoustic cover (1) to one side.
- Feed in and install the starter motor (3) in the direction of the arrow.
- Tighten the screws (2).

Starter motor to engine

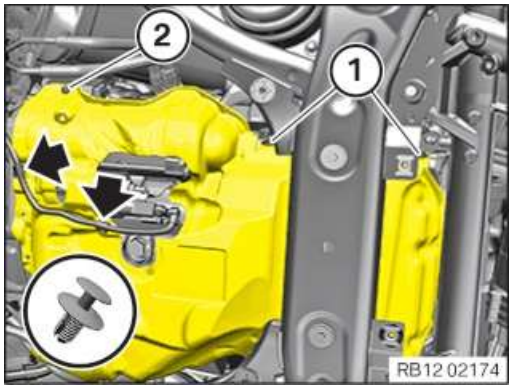
M8X60		Tightening torque	19 Nm



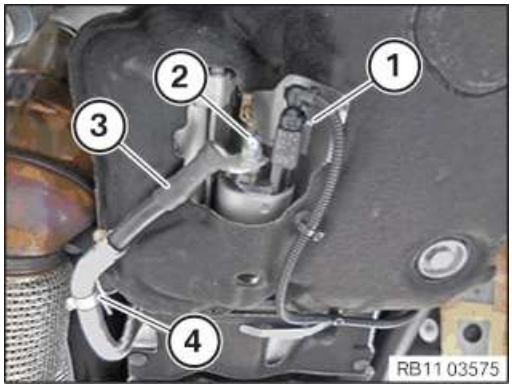
- Position the acoustic cover (2).
- Fasten expanding rivet (1).
- Secure clamp (arrow).



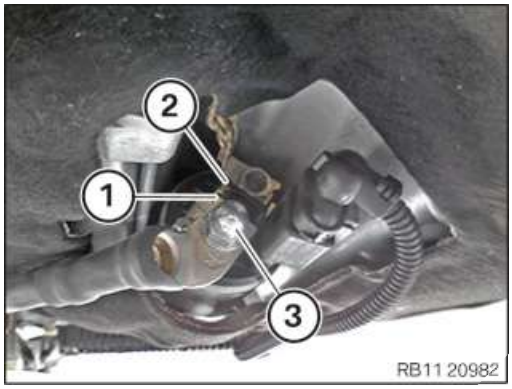
- Fasten expanding rivet (1).



- 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).

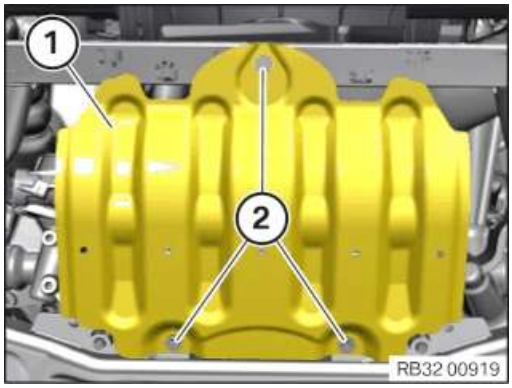
Battery positive lead to starter

M8		Tightening torque	13,5 Nm

18 – 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

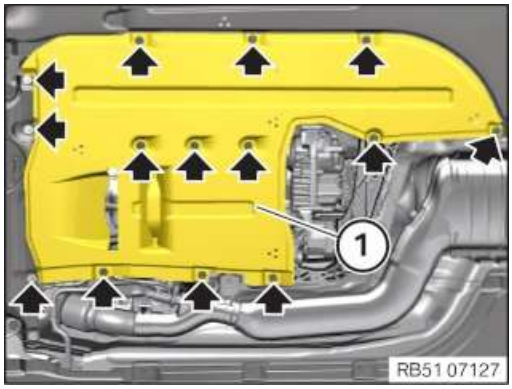
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

19 – Installing underbody protection at rear

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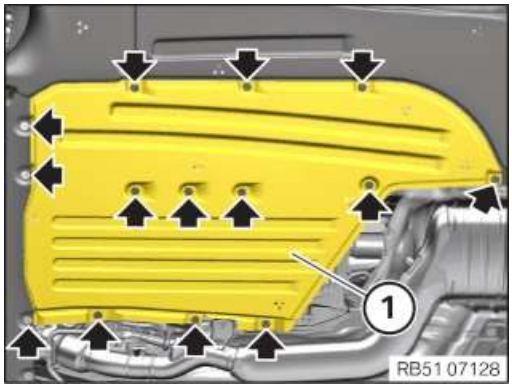
- **Version A:**

  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version B:**

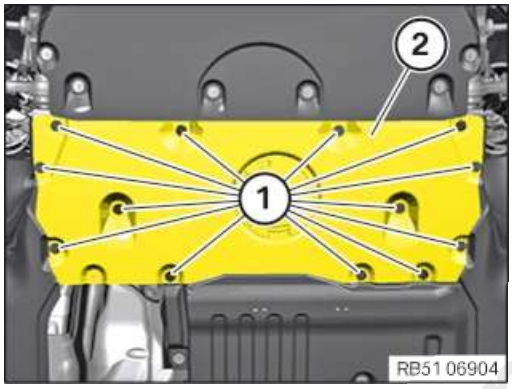
  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm

20 – Installing the centre underbody protection



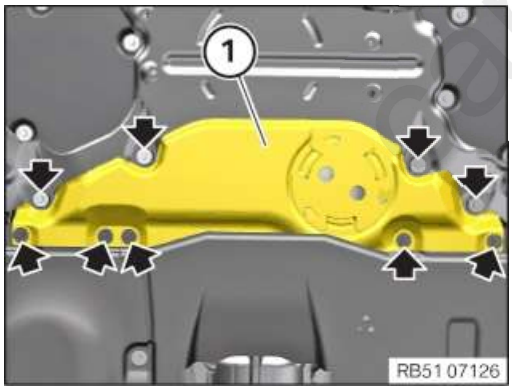
- **Variant with rear wheel drive:**

  Position central underbody protection (2).

  Tighten the screws (1).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version with all-wheel drive:**

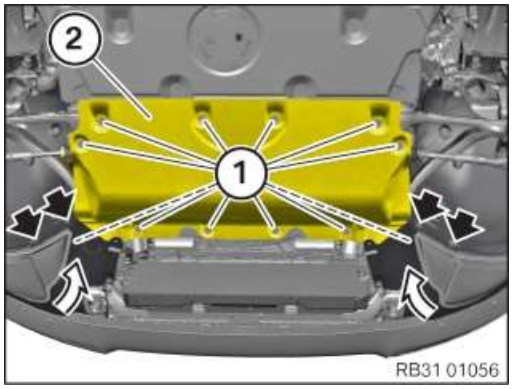
  Guide in centre underbody protection (1) and install.

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm

21 – 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

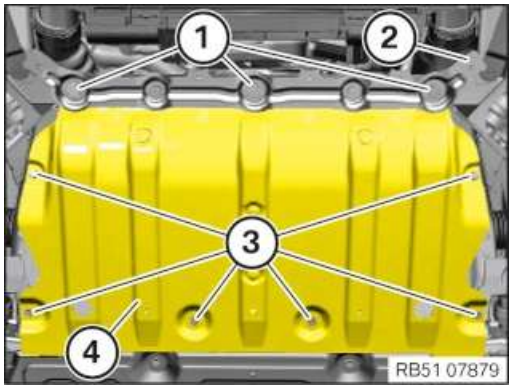
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- 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).

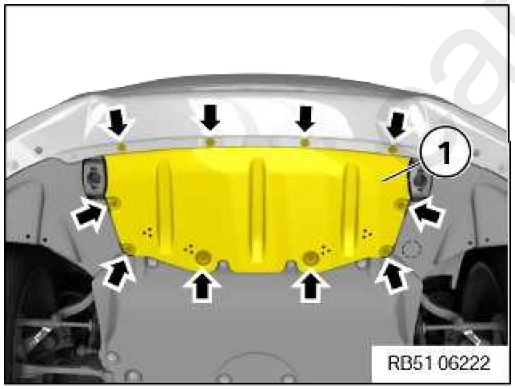
Underbody protection of the steering gear

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).

22 – Installing the front underbody protection



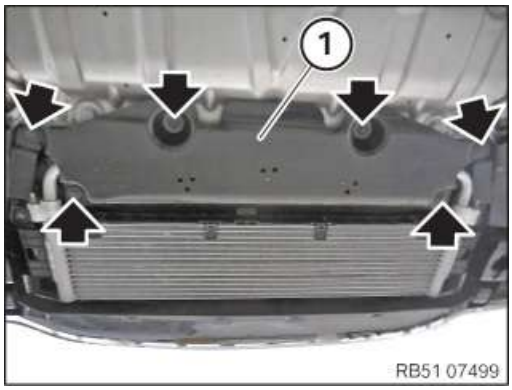
- **Version A:**

  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:**

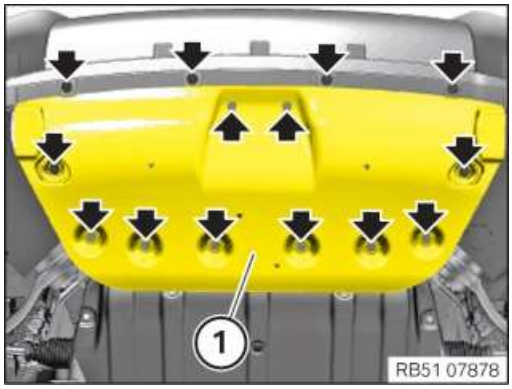
  Feed in and position the front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

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- **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

23 – Installing the drive belt for the starter motor generator

CAUTION

Spring preload.

Danger of injury!

- The use of the specified special tool (tool) is mandatory.
- The described operation must be carried out properly.

CAUTION

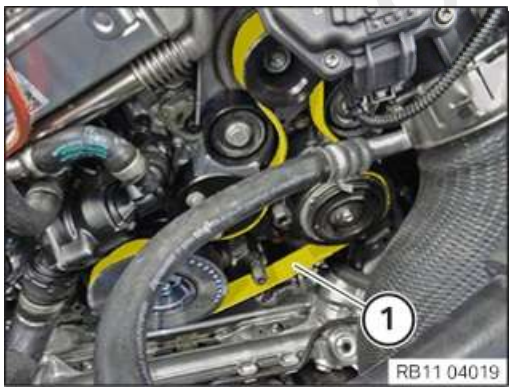
Component with preload.

Danger of injury!

- Reduce preload as far as possible before disassembly. Relieve component.

TECHNICAL INFORMATION

The drive belt must be replaced if contaminated with coolant- and oil residues.

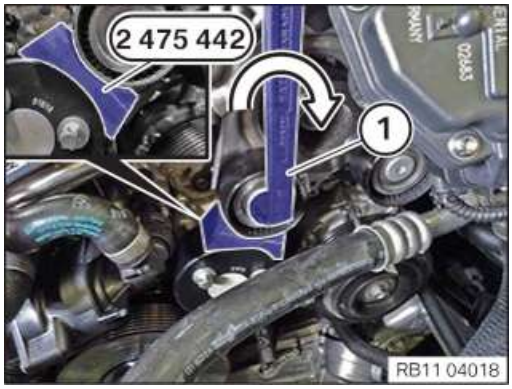


TECHNICAL INFORMATION

If the drive belt is reused: Mark direction of travel and reinstall drive belt in same direction of travel.

- Feed in and install the drive belt (1) for the starter motor generator.

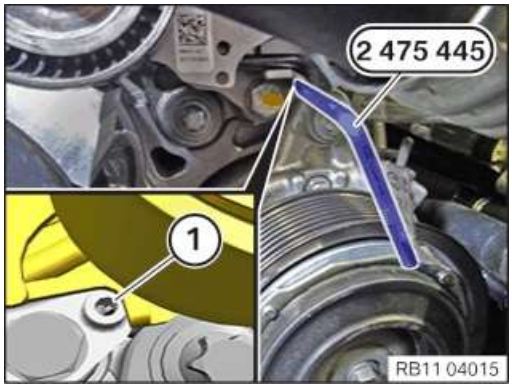
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TECHNICAL INFORMATION

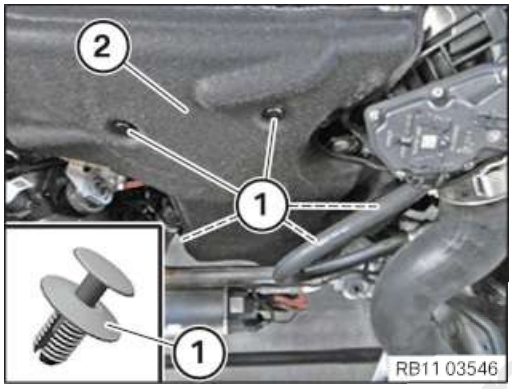
Conduct the following operation with the assistance of a second person.

- Turn the tensioning pulley in (1) in the direction of arrow.
- Feed out the special tool 2 475 442 between the belt pulley of the coolant pump and the tensioning pulley and remove it.



- Feed out the special tool 2 475 445 from the bore hole (1) and remove it.

24 – Install acoustic cover for the engine, front

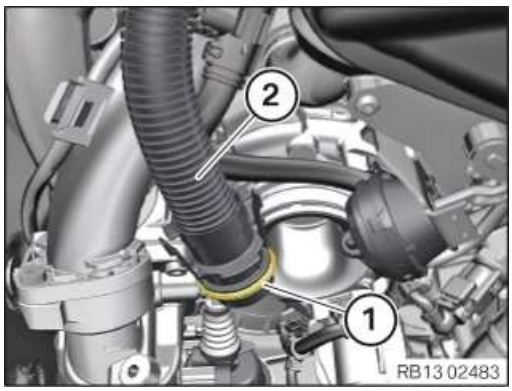


- Feed the acoustic cover (2) in and install.
- Secure the acoustic cover (2) with the expanding rivets (1).

25 – Installing the clean air pipe with resonator



- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.

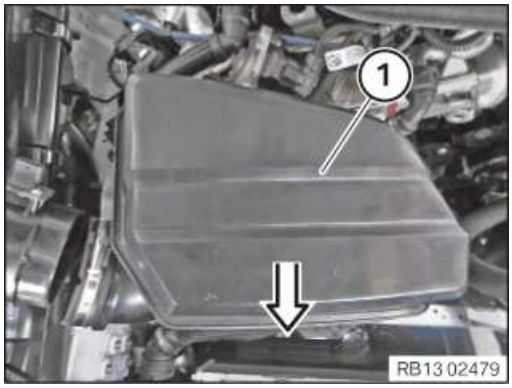


- Check the sealing ring (1) for the engine ventilation line (2) for damage and renew where required.

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- Feed in and install clean air pipe with resonator (1) in the direction of the arrow.

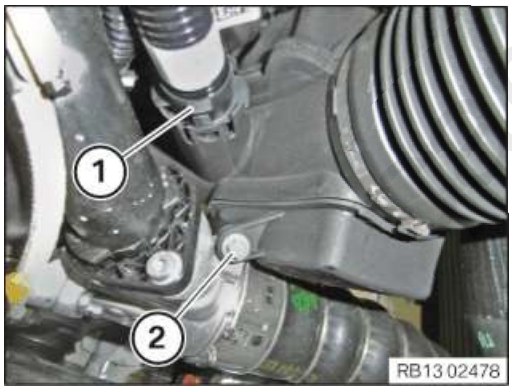


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

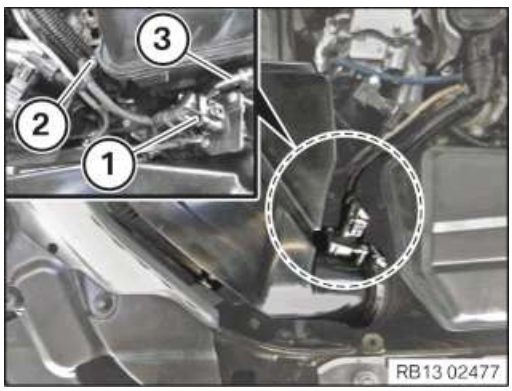
  The clamp (1) must engage audibly.



- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm



- 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.

26 – Install acoustic cover

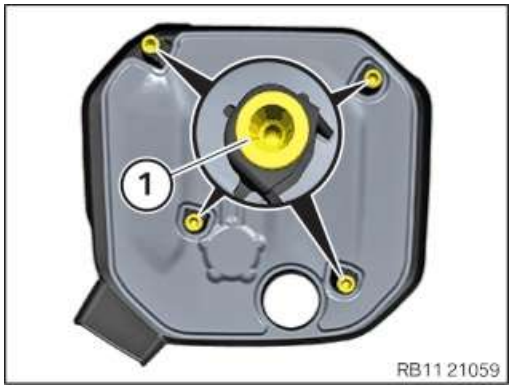
fdiagn.com

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.

27 – Connecting all battery earth leads



- See additional information.

28 – Activating the 48 V electrical system

Prerequisite

Ignition is switched off.

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RISK OF DAMAGE

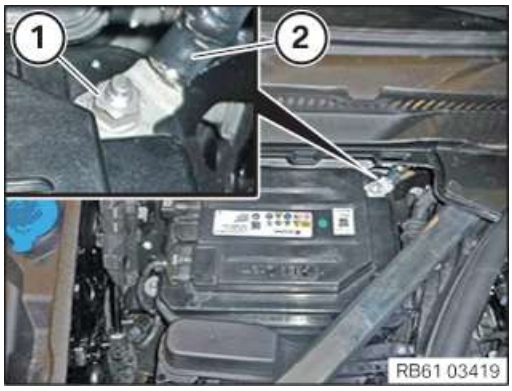
Damage to 48-V battery

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.

Additional Information

Overview of Tightening Torques

Vibration damper with belt pulley to crankshaft — Used in step 16

M10x65	Renew screws.	Jointing torque	40 Nm
		Angle of rotation	120 °

Starter motor to engine — Used in step 17

M8X60		Tightening torque	19 Nm

Battery positive lead to starter — Used in step 17

M8		Tightening torque	13,5 Nm

Underbody protection, steering, to front axle support — Used in step 18

Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support — Used in step 18

Hexagon bolt M6		Tightening torque	8 Nm

Underbody protection — Used in step 1920

Hexagon screw		Tightening torque	3 Nm

Underbody protection of the steering gear — Used in step 21

Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

Wheel arch trim panel, front — Used in step 21

Thermoplastic hexagon screw		Tightening torque	2,6 Nm

Underbody protection front — Used in step 22

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Clean air pipe to exhaust turbocharger — Used in step 25

M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing — Used in step 25

Clamp		Tightening torque	3 Nm

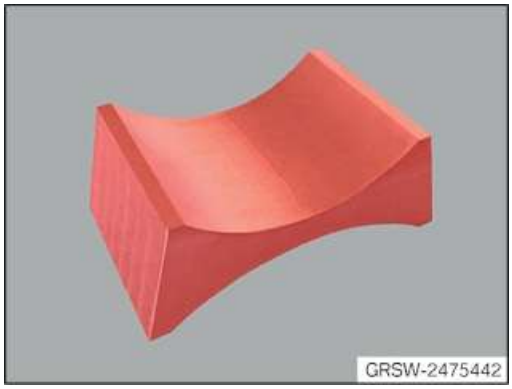
Negative battery cable to 48-V battery — Used in step 28

Nut M8		Tightening torque	19 Nm

Overview of Special Tools

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2 475 442 Removal and installation tool



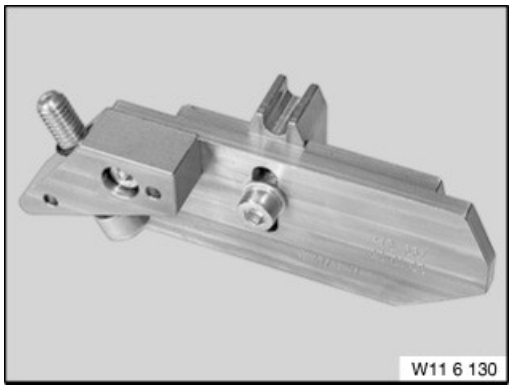
Common	Used in step 623
Usage	For removing and installing the drive belt of the ancillary components.
Included in the tool or work	
Storage location	A8
Replaced by	
In connection with	83302475445
SI-Number	01 19 19 (668)

2 475 445 Pin



Common	Used in step 623
Usage	Tool for drive belt of 48 V ancillary components
Included in the tool or work	
Storage location	A8
Replaced by	
In connection with	83302475442 83302475444
SI-Number	01 19 19 (668)

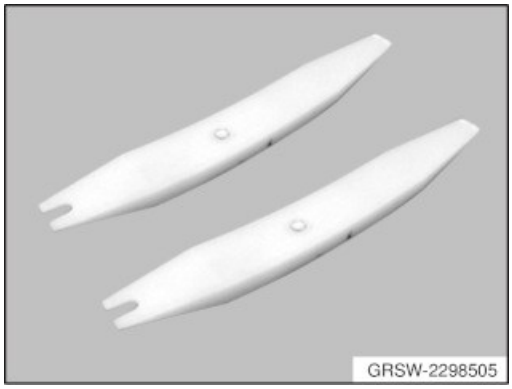
0 496 595 (11 6 130) Holder



Common	Used in step 1316
Usage	(counter support) For securing flywheel when releasing and tightening down screw connection of vibration absorber. Series: E90, E91, E92 with 4WD.
Included in the tool or work	
Storage location	B26
Replaced by	
In connection with	
SI-Number	01 05 09 (519)

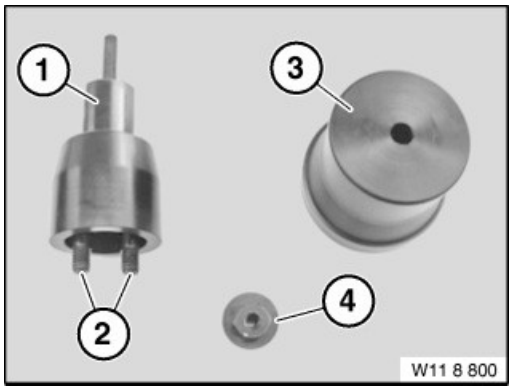
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2 298 505 Wedge



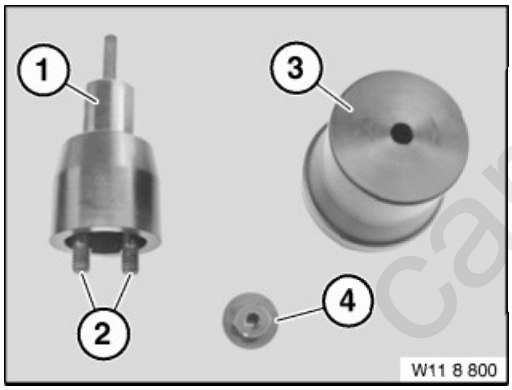
Common	Used in step 14
Usage	Set (delivery of 2 pieces)
Included in the tool or work	
Storage location	C34
Replaced by	
In connection with	
SI-Number	01 03 12 (792)

0 496 128 (11 8 801) Basic body



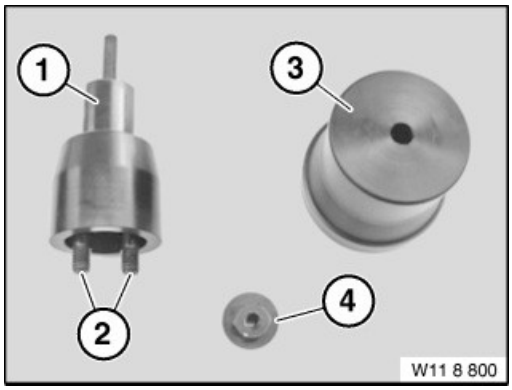
Common	Used in step 15
Usage	Available only as a complete tool set 11 8 800 = 83 30 0 496 127 - as of 30.11.2011
Included in the tool or work	0 496 127
Storage location	
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

0 496 129 (11 8 802) Screw



Common	Used in step 15
Usage	(Set of screws) Can only be ordered as part of complete tool 11 9 660 = 0495955
Included in the tool or work	0 496 127
Storage location	
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

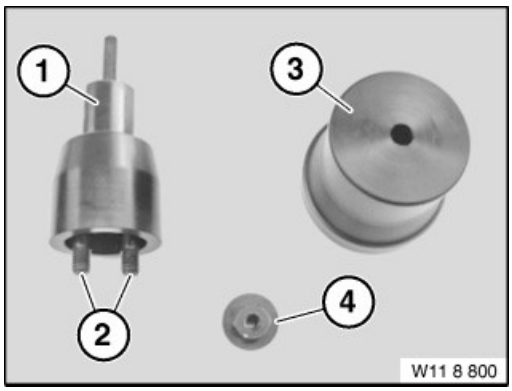
0 496 130 (11 8 803) Holding sleeve



Common	Used in step 15
Usage	(Thrust piece) sale of existing inventory and then available as part of complete tool set 11 8 800 = 83 30 0 496 127 only - as of 30.11.2011
Included in the tool or work	0 496 127
Storage location	
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

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0 496 131 (11 8 804) Nut



Common	Used in step 15
Usage	(Nut with collar) available as part of set of tools 11 8 800 = 83 30 0 496 127 only - as of 30.11.2011
Included in the tool or work	0 496 127
Storage location	
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

2 466 729 Fitting aid



Common	Used in step 16
Usage	For the installation of the vibration damper. Engine: B48, B58. Contour-graphic silhouette foil is included in the delivery specification.
Included in the tool or work	
Storage location	B55
Replaced by	
In connection with	
SI-Number	01 07 18 (545)

Links

Repair instructions (PRE)	Used in step
Notes on 48-V battery	128

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	227
61 20 900 Disconnecting and connecting battery earth lead	227
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61 20 900 Disconnecting and connecting battery earth lead	227
61 20 900 Disconnecting and connecting battery earth lead	227
61 20 900 Disconnecting and connecting battery earth lead	227
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	227
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	227
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	227
61 20 900 Disconnecting and connecting battery earth lead	227
61 20 900 Disconnecting and connecting battery earth lead	227
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	227
61 20 900 Disconnecting and connecting battery earth lead	227
61 20 900 Disconnecting and connecting battery earth lead	227

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61 20 900 Disconnecting and connecting battery earth lead	227
61 20 900 Disconnecting and connecting battery earth lead	227
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61 20 900 Disconnecting and connecting battery earth lead	227
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61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	227
61 20 900 Disconnecting and connecting battery earth lead	227
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	227
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	227
61 20 900 Disconnecting and connecting battery earth lead

11 14 005 Replacing front crankshaft seal

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 – Disconnecting all battery earth leads



- See additional information.

2 – 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.

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- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

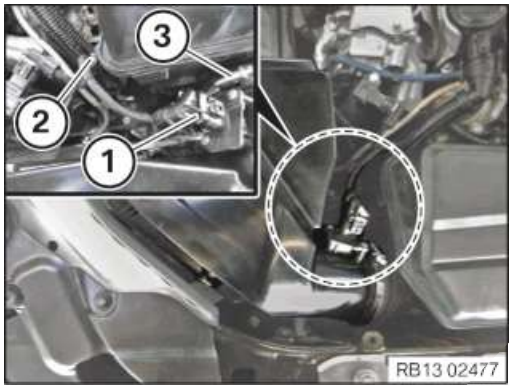
3 – Removing the clean air pipe with the resonator

WARNING

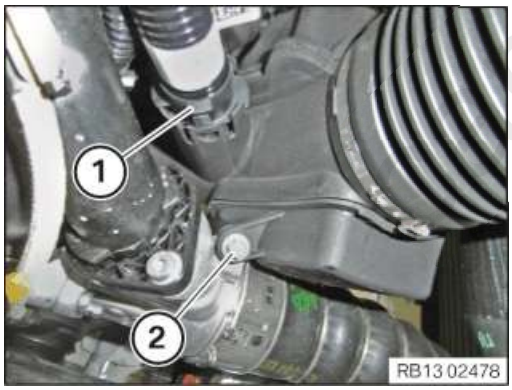
Hot surfaces.

Risk of burning!

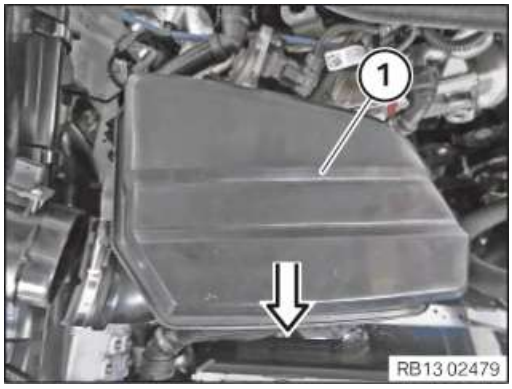
- Perform all work only on components that have cooled down.



- 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.

rdiagn.com



- Unlock and loosen clamp (1).



- Feed out and remove clean air pipe with resonator (1) in the direction of the arrow.

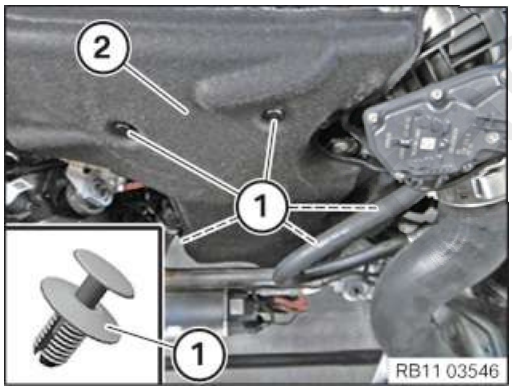
4 – Remove acoustic cover of the front engine

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.

5 – Removing the drive belt for alternator

CAUTION

Spring preload.

Danger of injury!

- The use of the specified special tool (tool) is mandatory.
- The described operation must be carried out properly.

CAUTION

Component with preload.

Danger of injury!

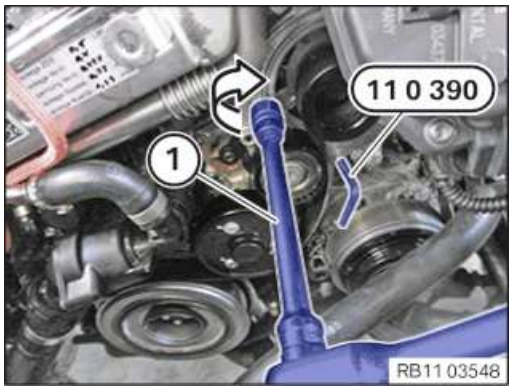
- Reduce preload as far as possible before disassembly. Relieve component.

TECHNICAL INFORMATION

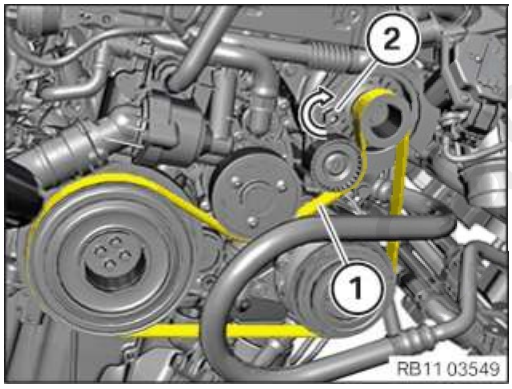
If the drive belt is reused: Mark direction of travel and reinstall drive belt in same direction of travel.

TECHNICAL INFORMATION

The drive belt must be replaced if contaminated with coolant- and oil residues.

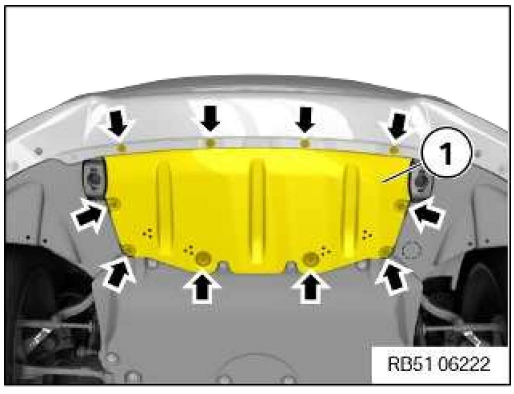


- If reusing the drive belt for alternator: Mark the direction of rotation.
- Relax the belt tensioner in the direction of the arrow using a standard tool (1).
- Fix the belt tensioner with the special tool 0 496 268 (11 0 390).



- Relieve belt tensioner at hexagon head (2) in direction of arrow up to limit position.
- Guide out and remove drive belt for alternator (1).

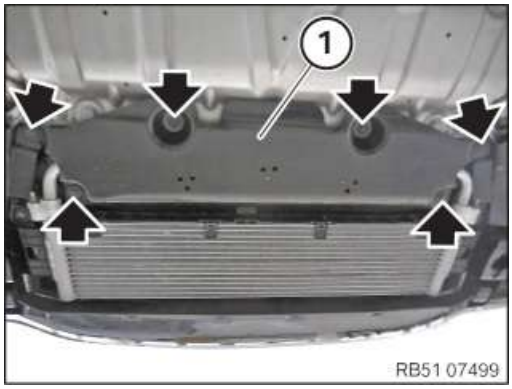
6 – Removing the front underbody protection



- **Version A:**

  Remove screws (arrows).

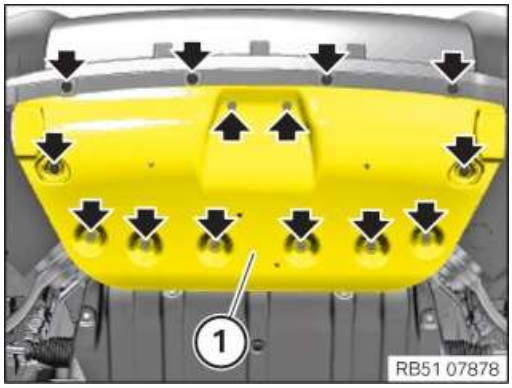
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version B:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

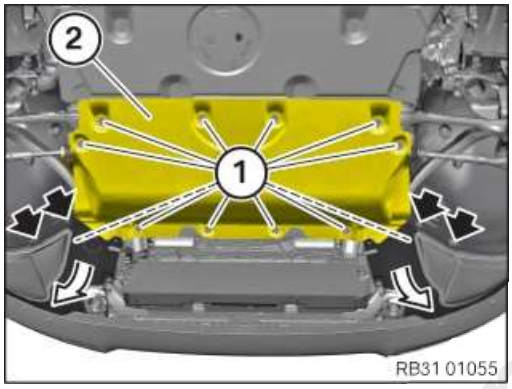


- **Version C:**

  Remove screws (arrows).

  Guide out front underbody protection (1) and remove it.

7 – Remove the underbody protection of the steering gear



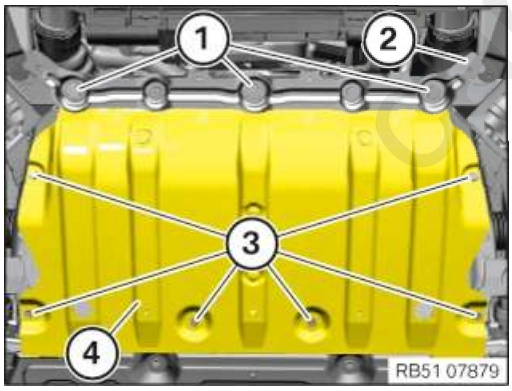
- **Version A:**

  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:**

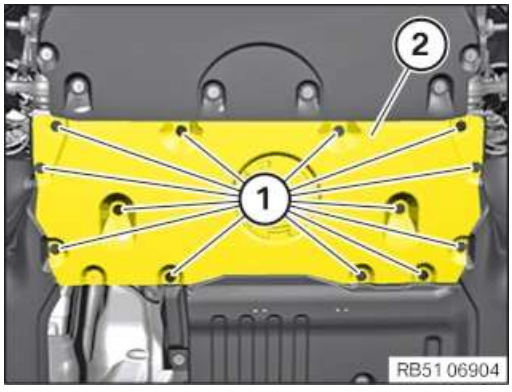
  Loosen screws (1).

  Remove the holder (2) for the underride protection.

  Loosen screws (3).

  Feed out and remove the underbody protection (4) of the steering gear.

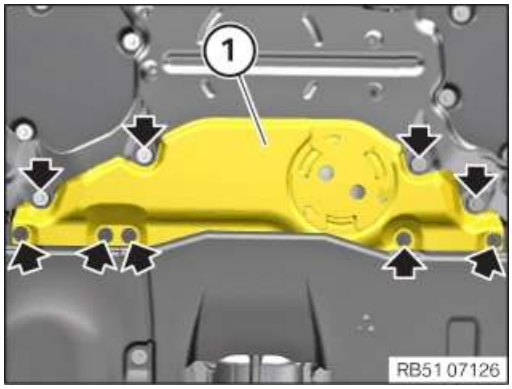
8 – Removing the centre underbody protection



- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .

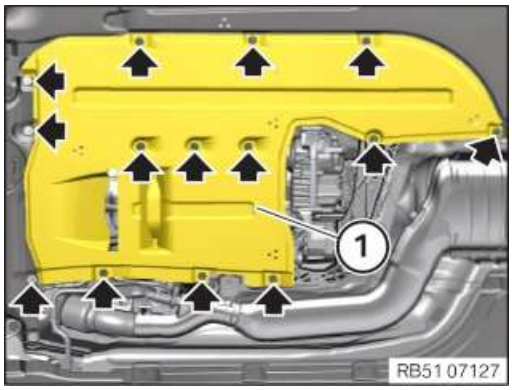


- **Version with all-wheel drive:**

  Remove screws (arrows).

  Feed out and remove the centre underbody protection (1).

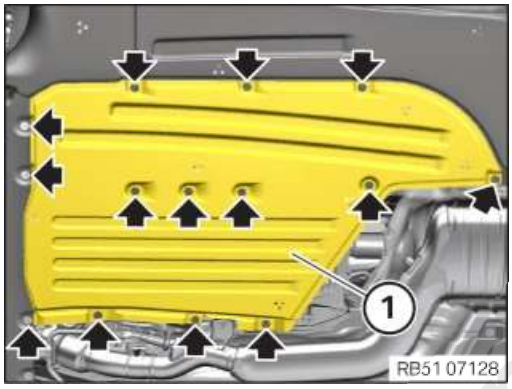
9 – Remove rear underbody protection



- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).



- **Version B:**

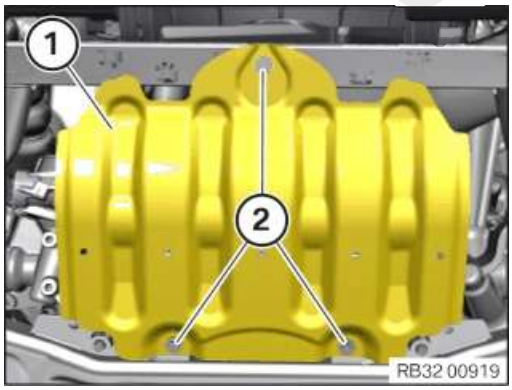
  Remove screws (arrows).

  Guide out rear underbody protection (1) and remove it.

10 – If installed: Removing the steering underbody protection

Prerequisite

Front underbody protection has been removed.



- Loosen screws (2).
- Remove underbody protection (1).

11 – Removing starter motor

Prerequisite

Battery earth leads are disconnected.

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WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.

WARNING

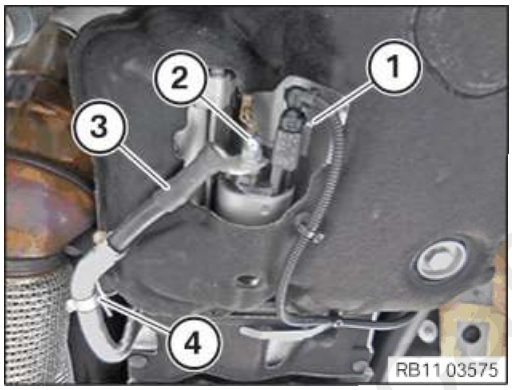
Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

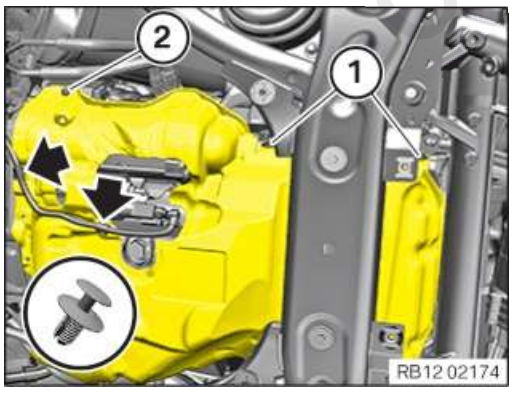
- Make sure that **no charger** is connected to the jump start support point in the engine compartment.
- Detach battery earth lead from battery.
- With auxiliary batteries: Detach all battery earth leads from additional batteries.

TECHNICAL INFORMATION

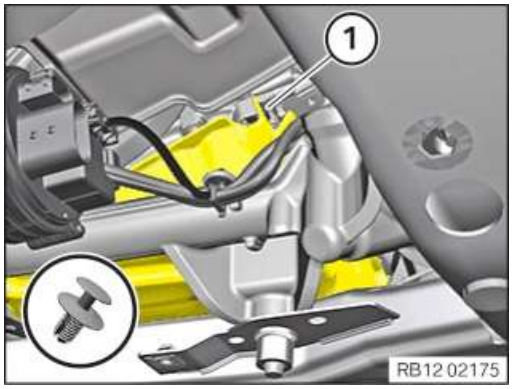
Make sure that the acoustic cover is **not** damaged while removing the starter motor.
A damaged lower acoustic cover can only be renewed when the front axle is lowered.



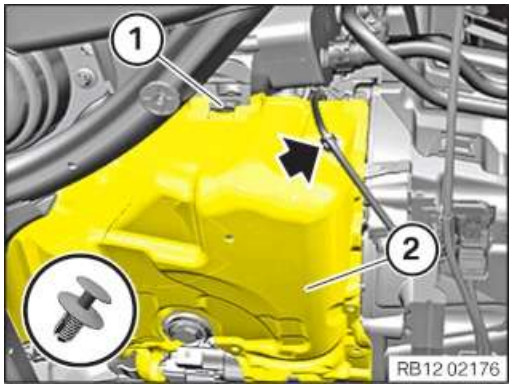
- Unlock plug connection (1) and disconnect.
- Release nut (2).
- Release positive battery cable (3) from holder (4).



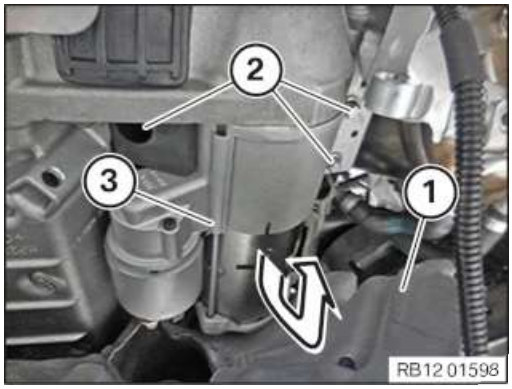
- Loosen the expanding rivet (1).
- Undo fir tree clip (2).
- Release the clamps (arrows).



- Loosen expanding rivet (1).
- Lower the acoustic cover of the oil sump.

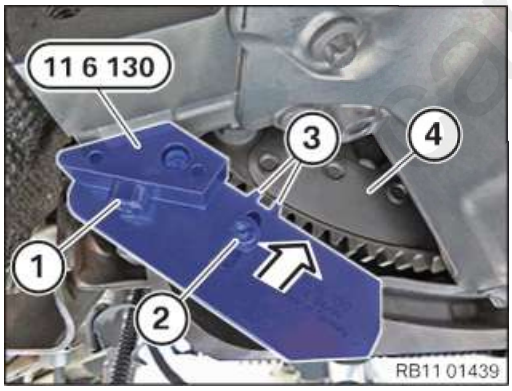


- Loosen expanding rivet (1).
- Loosen the clamp (arrow).
- Lower acoustic cover (2).



- 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.

12 – Removing the vibration damper



- Position the special tool 0 496 595 (11 6 130) and secure it on the timing case cover using the bolt (1).

  The special tool 0 496 595 (11 6 130) must lie flat on the transmission housing.
- Slide the counter support with the bolt (2) up until the teeth (3) engage completely in the gearing of the flywheel.
- If necessary, turn the engine in the direction of rotation until the teeth (3) engage completely in the gearing of the flywheel (4).
- Tighten the screw (2).

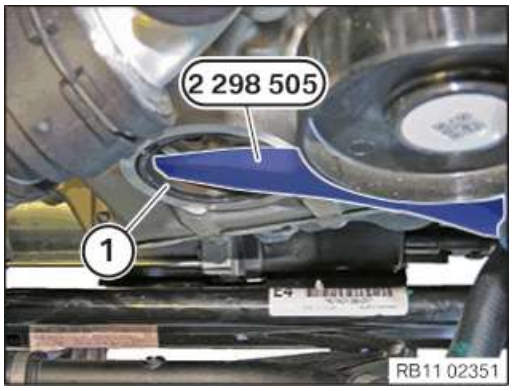


- Loosen screws (1).
- Remove vibration damper.

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MAIN WORK

13 – Remove the crankshaft seal



- Lever out the crankshaft seal (1) with the special tool 2 298 505.

  Do not scratch the sealing surface on the engine block.

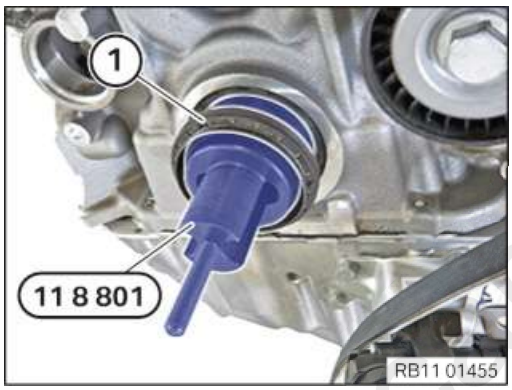
14 – Install the crankshaft seal



TECHNICAL INFORMATION

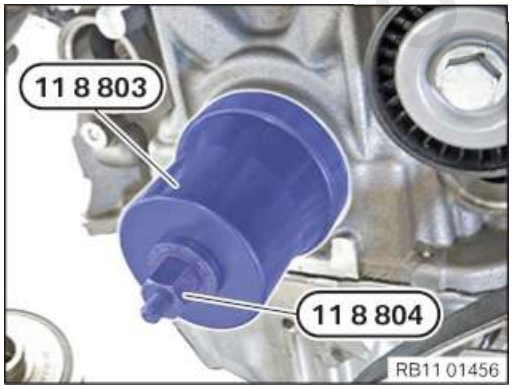
The radial shaft seal must be installed dry. Do not use engine oil or lubricant.

- Secure special tool 0 496 128 (11 8 801) with special tool 0 496 129 (11 8 802) to the crankshaft.



- Position the crankshaft seal (1) on the special tool 0 496 128 (11 8 801).

  Parts: Crankshaft seal



- Draw in the crankshaft sealing ring with the special tools 0 496 130 (11 8 803) and 0 496 131 (11 8 804).
- Screw in special tool 0 496 130 (11 8 803) until it is flush with the crankcase.

POSTPROCESSES

15 – Installing the vibration damper

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RISK OF DAMAGE

Radial shaft seal damage.

When installing the vibration damper, the rotary shaft seal can be damaged.

- The special tool must be used to install the vibration damper.

TECHNICAL INFORMATION

When removing and installing or replacing the vibration damper, the rotary shaft seal must be replaced.



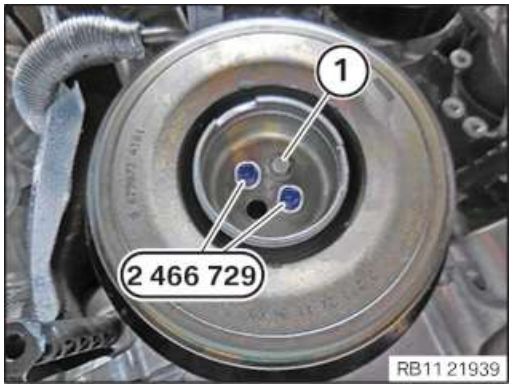
- Clean the sealing surface (1) from oil and contamination.



- Screw the special tool 2 466 729 hand-tight into the crankshaft.



- Insert vibration damper (1) into the special tool 2 466 729 and install.



- Renew screws (1).

  Parts: Screws
- Hand-tight the bolts (1).
- Guide the special tool 2 466 729 out and remove.

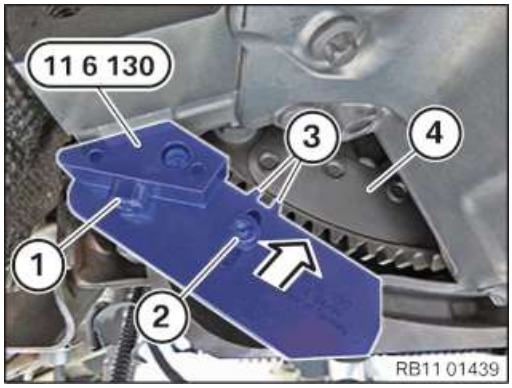


- Renew all remaining screws (1).

  Parts: Screws
- Tighten the screws (1).

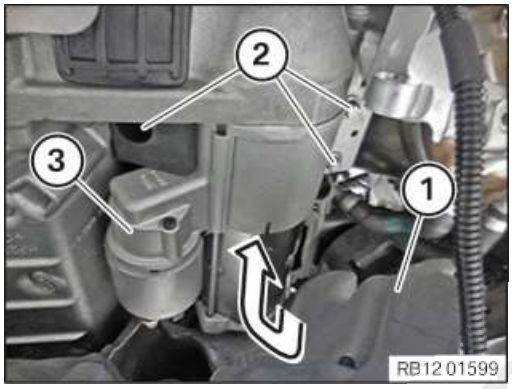
Vibration damper with belt pulley to crankshaft

M10x65	Renew screws.	Jointing torque	40 Nm
		Angle of rotation	120 °



- Loosen screw (2).
- Release the gearing (3) of the counter support from the flywheel (4).
- Unscrew the screw (1) and remove the special tool 0 496 595 (11 6 130).

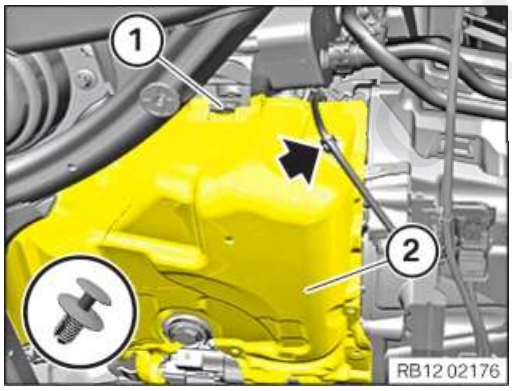
16 – Installing starter motor



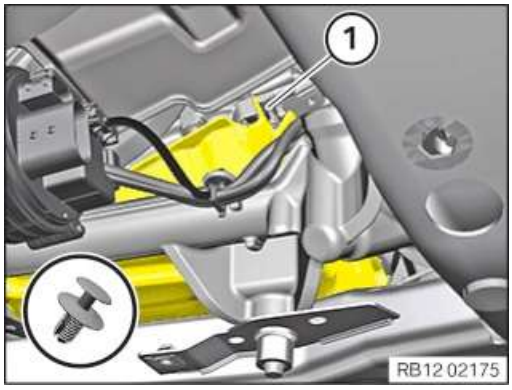
- Make sure that the acoustic cover (1) is not damaged.
- Carefully press the acoustic cover (1) to one side.
- Feed in and install the starter motor (3) in the direction of the arrow.
- Tighten the screws (2).

Starter motor to engine

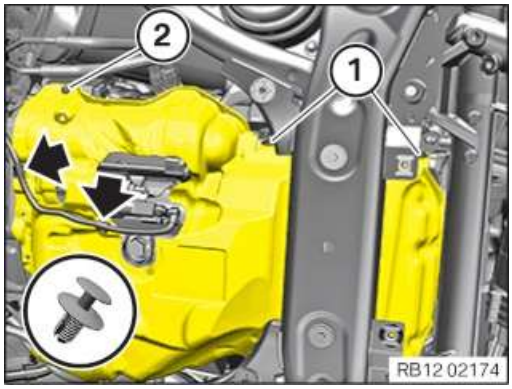
M8X60		Tightening torque	19 Nm



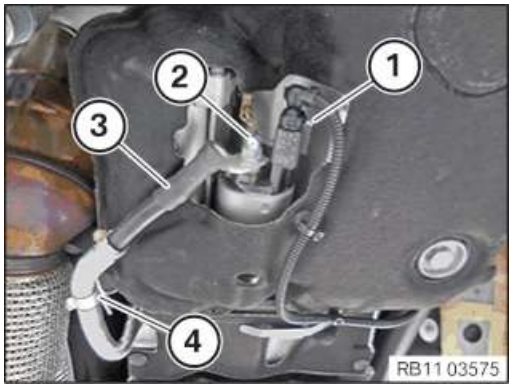
- Position the acoustic cover (2).
- Fasten expanding rivet (1).
- Secure clamp (arrow).



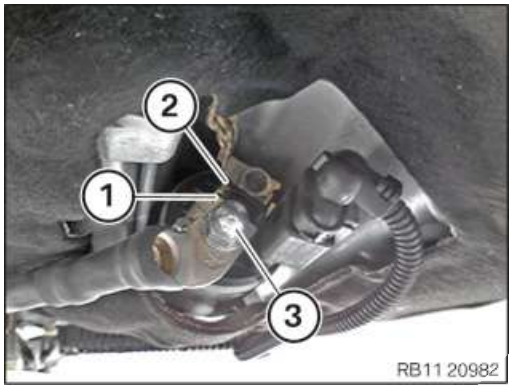
- Fasten expanding rivet (1).



- 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).

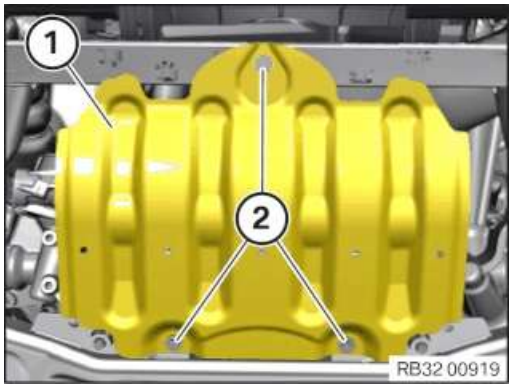
Battery positive lead to starter

M8		Tightening torque	13,5 Nm

17 – 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

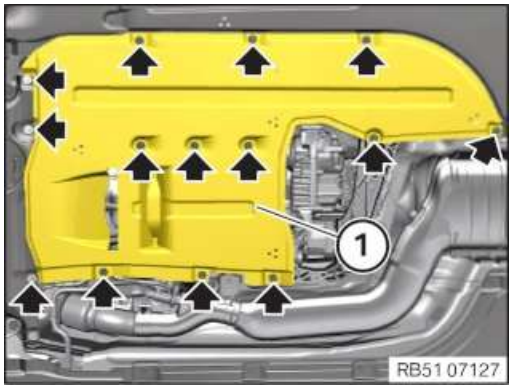
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

18 – Installing underbody protection at rear

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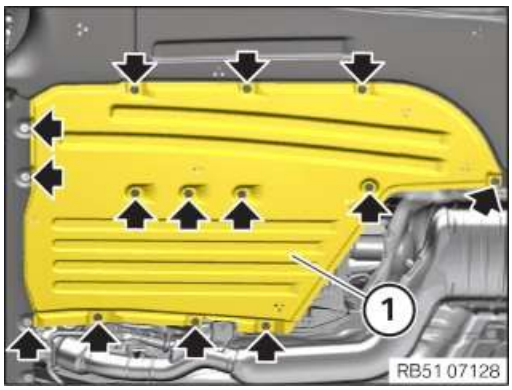
- **Version A:**

  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version B:**

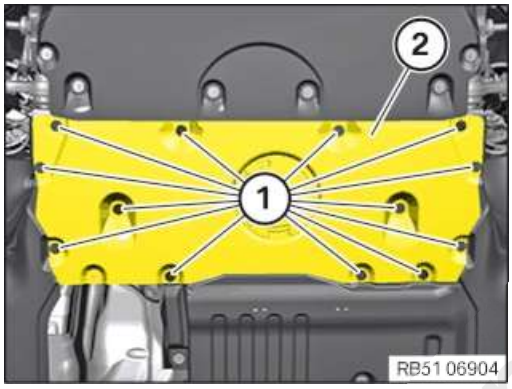
  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm

19 – Installing the centre underbody protection



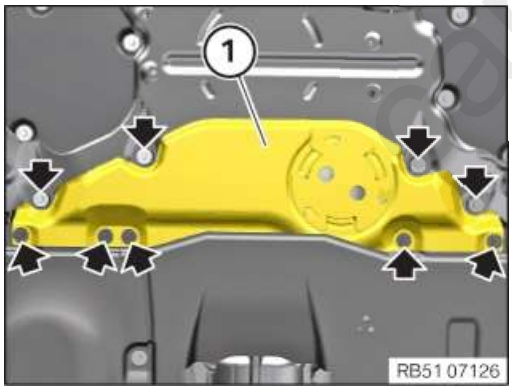
- **Variant with rear wheel drive:**

  Position central underbody protection (2).

  Tighten the screws (1).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version with all-wheel drive:**

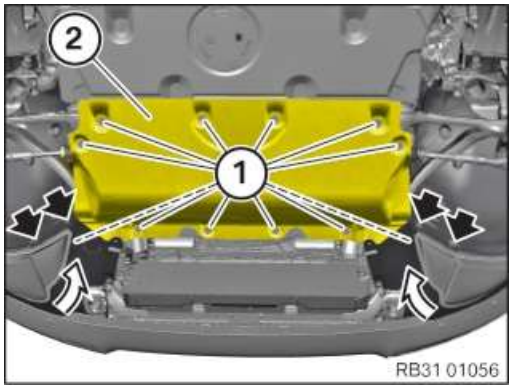
  Guide in centre underbody protection (1) and install.

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm

20 – 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

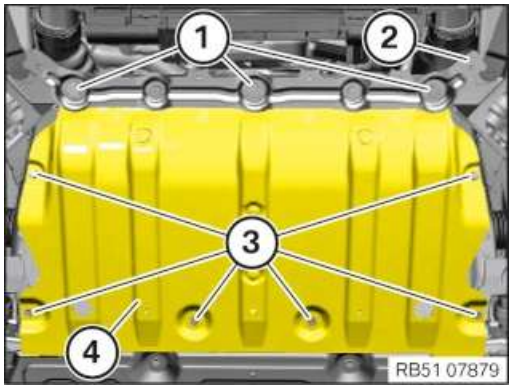
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- 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).

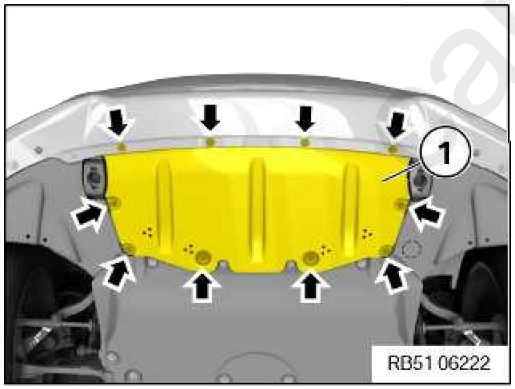
Underbody protection of the steering gear

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).

21 – Installing the front underbody protection



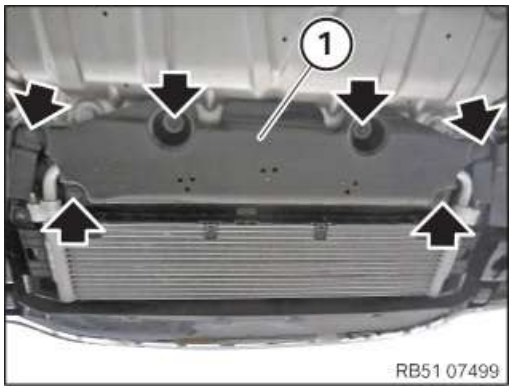
- **Version A:**

  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:**

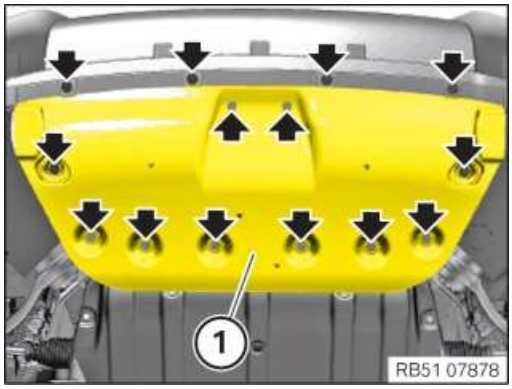
  Feed in and position the front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

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- **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

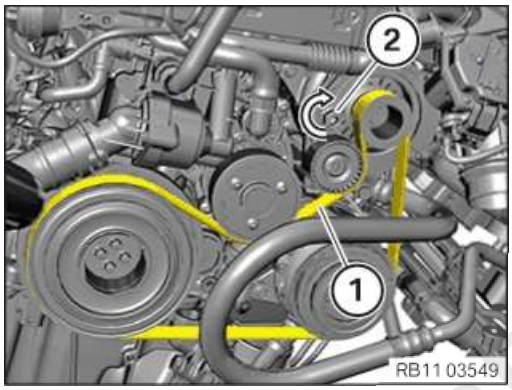
22 – Installing the drive belt for alternator

TECHNICAL INFORMATION

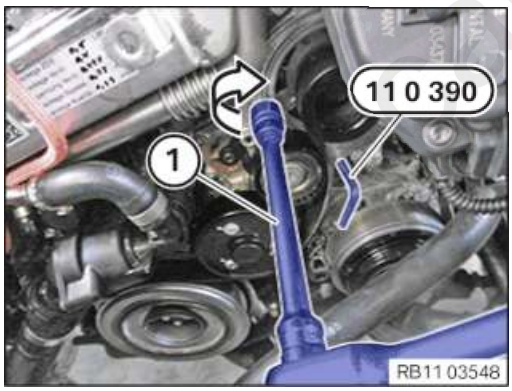
If the drive belt is reused: Mark direction of travel and reinstall drive belt in same direction of travel.

TECHNICAL INFORMATION

The drive belt must be replaced if contaminated with coolant- and oil residues.

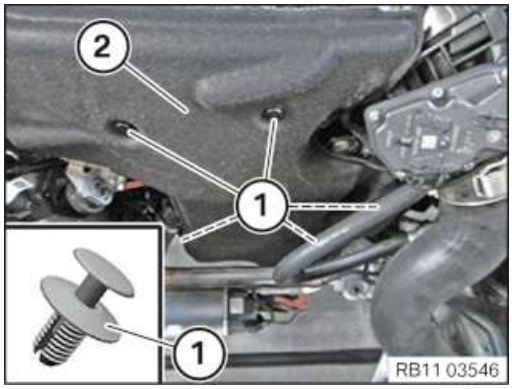


- Check drive belt for alternator (1) for coolant and oil residues and, if necessary, renew it.
- Relieve belt tensioner at hexagon head (2) up to limit position in direction of arrow.
- Install drive belt for alternator (1).



- Increase the preload of the belt tensioner using conventional tool (1) in the direction of arrow until the special tool 0 496 268 (11 0 390) can be removed.
- Remove special tool 0 496 268 (11 0 390).
- Stretch the drive belt for the alternator.

23 – Install acoustic cover for the engine, front

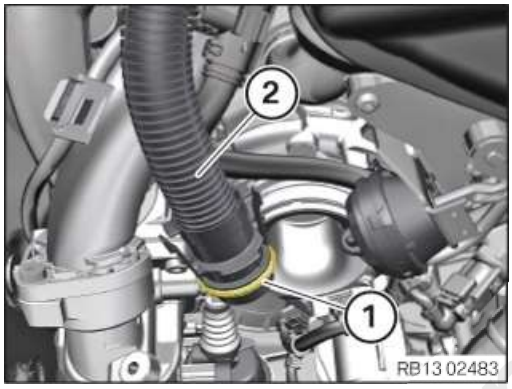


- Feed the acoustic cover (2) in and install.
- Secure the acoustic cover (2) with the expanding rivets (1).

24 – Installing the clean air pipe with resonator



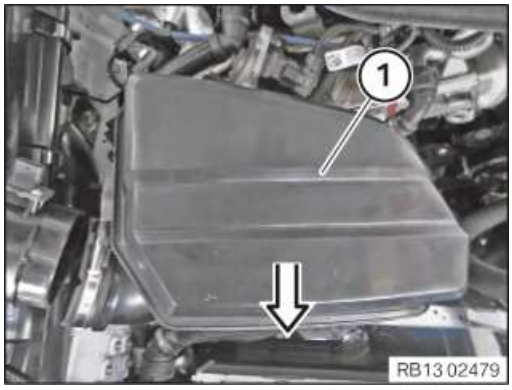
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



- 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.

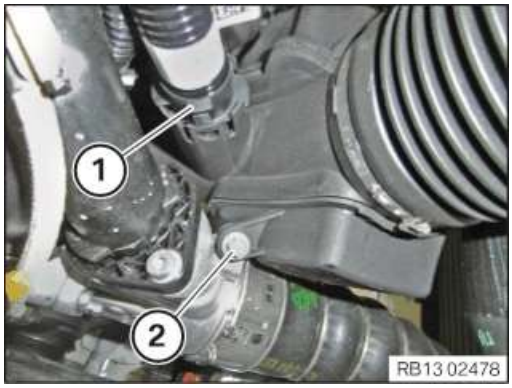


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

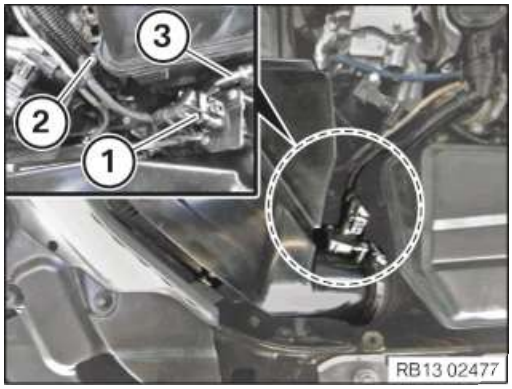
  The clamp (1) must engage audibly.



- 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.

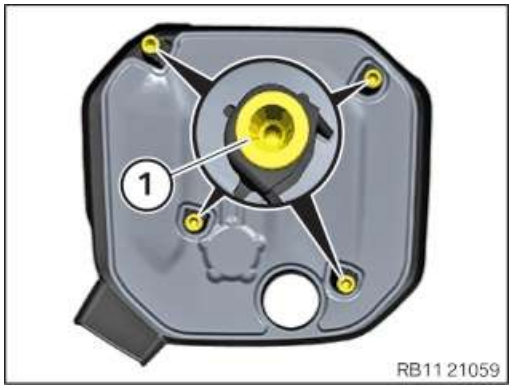
25 – Install acoustic cover

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).

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- Clip in the acoustic cover (1) into the holders in the indicated areas.

26 – Connecting all battery earth leads



- See additional information.

27 – 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).

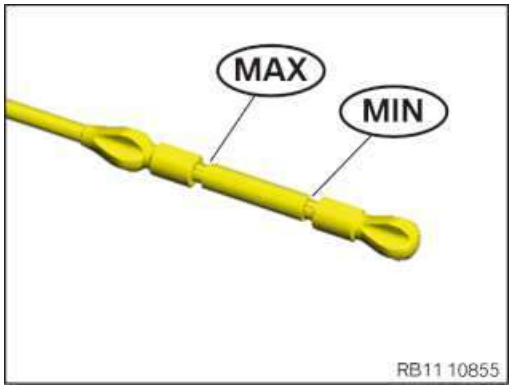
- Park vehicle on a horizontal surface.
- Stop the engine and wait for 5 minutes.
- Pull out the oil dipstick and wipe off using a lint-free cloth.

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.

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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

Additional Information

Overview of Tightening Torques

Vibration damper with belt pulley to crankshaft — Used in step 15

M10x65	Renew screws.	Jointing torque Angle of rotation	40 Nm 120 °

Starter motor to engine — Used in step 16

M8X60		Tightening torque	19 Nm

Battery positive lead to starter — Used in step 16

M8		Tightening torque	13,5 Nm

Underbody protection, steering, to front axle support — Used in step 17

Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support — Used in step 17

Hexagon bolt M6		Tightening torque	8 Nm

Underbody protection — Used in step 1819

Hexagon screw		Tightening torque	3 Nm

Underbody protection of the steering gear — Used in step 20

Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

Wheel arch trim panel, front — Used in step 20

Thermoplastic hexagon screw		Tightening torque	2,6 Nm

Underbody protection front — Used in step 21

Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Clean air pipe to exhaust turbocharger — Used in step 24

M6X20		Tightening torque	8 Nm

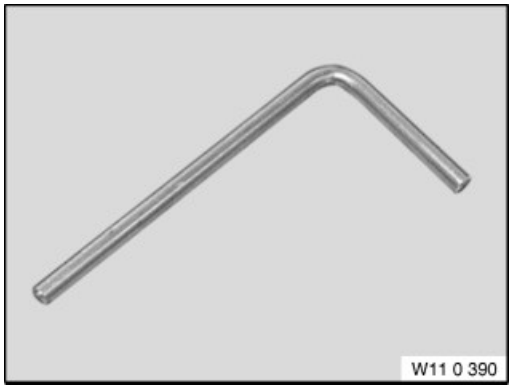
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Clean air pipe to upper section of intake filter housing Used in step 24

Clamp		Tightening torque	3 Nm

Overview of Special Tools

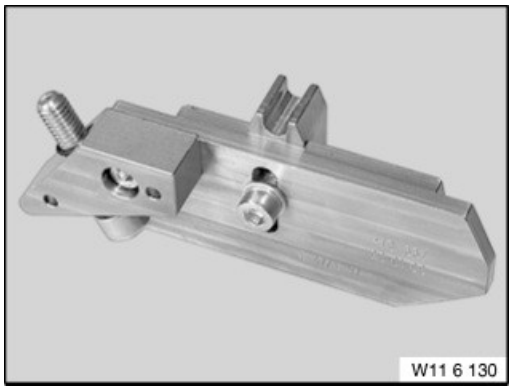
0 496 268 (11 0 390) Pin



Common Used in step 522

Usage	(roll pin) For securing new tensioning pulley (poly-V belt)
Included in the tool or work	
Storage location	B24
Replaced by	
In connection with	
SI-Number	01 15 07 (390)

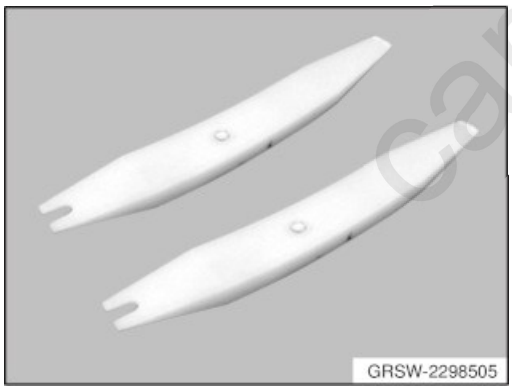
0 496 595 (11 6 130) Holder



Common Used in step 1215

Usage	(counter support) For securing flywheel when releasing and tightening down screw connection of vibration absorber. Series: E90, E91, E92 with 4WD.
Included in the tool or work	
Storage location	B26
Replaced by	
In connection with	
SI-Number	01 05 09 (519)

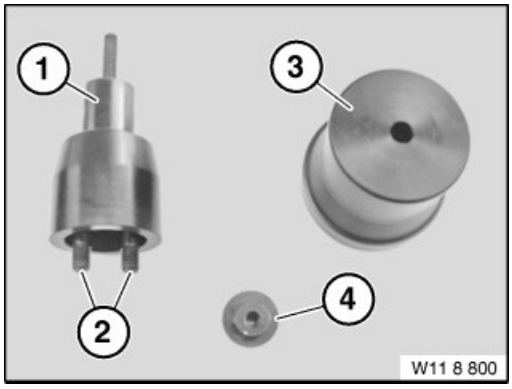
2 298 505 Wedge



Common Used in step 13

Usage	Set (delivery of 2 pieces)
Included in the tool or work	
Storage location	C34
Replaced by	
In connection with	
SI-Number	01 03 12 (792)

0 496 128 (11 8 801) Basic body

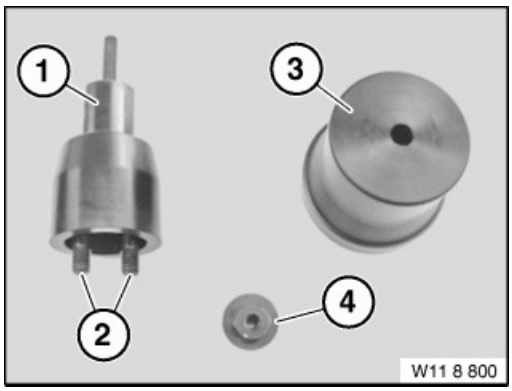


Common Used in step 14

Usage	Available only as a complete tool set 11 8 800 = 83 30 0 496 127 - as of 30.11.2011
Included in the tool or work	0 496 127
Storage location	
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

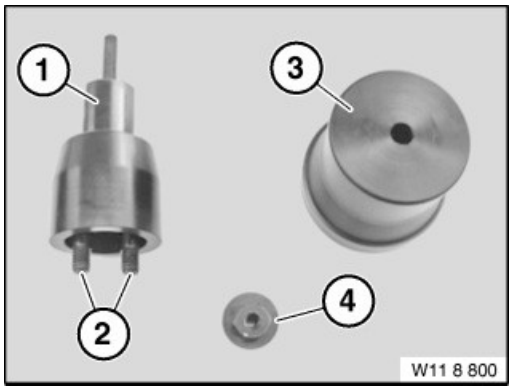
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0 496 129 (11 8 802) Screw



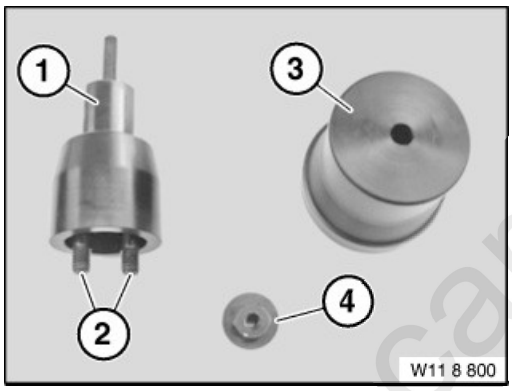
Common	Used in step 14
Usage	(Set of screws) Can only be ordered as part of complete tool 11 9 660 = 0495955
Included in the tool or work	0 496 127
Storage location	
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

0 496 130 (11 8 803) Holding sleeve



Common	Used in step 14
Usage	(Thrust piece) sale of existing inventory and then available as part of complete tool set 11 8 800 = 83 30 0 496 127 only - as of 30.11.2011
Included in the tool or work	0 496 127
Storage location	
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

0 496 131 (11 8 804) Nut



Common	Used in step 14
Usage	(Nut with collar) available as part of set of tools 11 8 800 = 83 30 0 496 127 only - as of 30.11.2011
Included in the tool or work	0 496 127
Storage location	
Replaced by	
In connection with	
SI-Number	01 05 07 (353)

2 466 729 Fitting aid



Common	Used in step 15
Usage	For the installation of the vibration damper. Engine: B48, B58. Contour-graphic silhouette foil is included in the delivery specification.
Included in the tool or work	
Storage location	B55
Replaced by	
In connection with	
SI-Number	01 07 18 (545)

Overview Technical Data

Oil quantity between the two markings MIN and MAX of the oil dipstick Used in step 27

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Links

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	126
61 20 900 Disconnecting and connecting battery earth lead	126
61 20 900 Disconnecting and connecting battery earth lead	126
61 20 900 Disconnecting and connecting battery earth lead	126
61 20 900 Disconnecting and connecting battery earth lead	126
61 20 900 Disconnecting and connecting battery earth lead	126
61 20 900 Disconnecting and connecting battery earth lead	126
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	126
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	126
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61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	126
61 20 900 Disconnecting and connecting battery earth lead	126
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61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	126
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	126
61 20 900 Disconnecting and connecting battery earth lead	126
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	126
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle)	126
61 20 900 Disconnecting and connecting battery earth lead	126
61 20 900 Disconnecting and connecting battery earth lead	126
61 20 900 Disconnecting and connecting battery earth lead	126
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61 20 900 Disconnecting and connecting battery earth lead	126
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61 20 900 Disconnecting and connecting battery earth lead	126
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	126
61 20 900 Disconnecting and connecting battery earth lead	126
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61 20 900 Disconnecting and connecting battery earth lead	126

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