00 Safety information for working on vehicles with automatic engine start-stop function (MSA)

Warning!

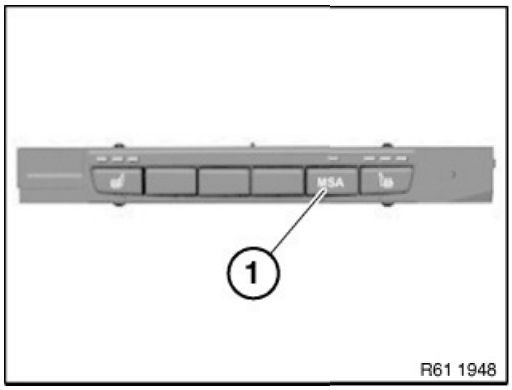
If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

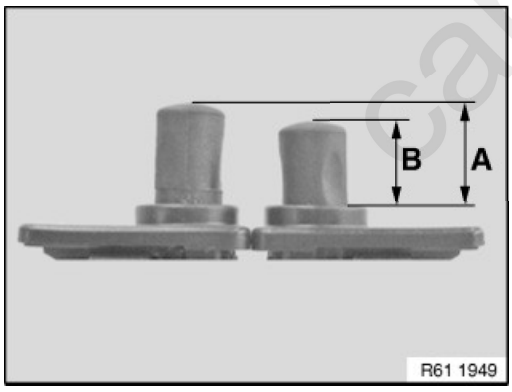
Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:



- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
  - Workshop mode

    A = 10 mm
  - Basic setting (engine hood/bonnet open)

    B = 7 mm

  To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

When working with diagnosis tools:

- Observe instructions in diagnosis tool

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Note:
For further information on automatic engine start-stop function (MSA):

- Refer to the Service Information (bulletin) (for manual transmissions) Service Information (bulletin) 61 01 07 335
- Refer to the Service Information (bulletin) (for automatic transmissions or twin-clutch gearboxes) Service Information (bulletin) 61 01 10 629

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13 31 ... Notes regarding the fuel pressure test (reference pressure: surrounding area)

The characteristic of this version with ambient pressure:

The connection for the vacuum hose of the fuel pressure regulator is located between the throttle valve and the air cleaner and/or on the air cleaner.

Test prerequisite:

The correct fuel pressure regulator has been installed.

- Use the Electronic Parts Catalogue to check whether the correct fuel pressure regulator has been installed for the vehicle:

  Connect test adapter.

The regulating function of the fuel pressure regulator must be ensured under all operating conditions. The fuel pump must always be able to generate a fuel pressure that is higher than the pressure that is adjusted by the pressure regulator.

The DME controls the injection period for which the injection rate is adjusted.

The fuel return line is depressurised at engine standstill and ignition key position 0.The pressure regulator will close at engine standstill and ignition key position 0. The fuel pressure in the feed will be maintained for an extended period of time. A non-return valve will close in the fuel pump. This measure will maintain the fuel pressure in the fuel system. Extended start times are thereby prevented.

- Let the engine run at idle and measure the fuel pressure.

When the measured value is less than the nominal value - 0.2 bar:

- The line cross-sections in the fuel feed are constricted or the fuel filter is plugged,

  or

- The voltage supply to the fuel pump function is not OK: For example, as a result of high contact resistance (corrosion) in the plug connection between the wiring harness and the fuel pump.

When the measured value exceeds the nominal value + 0.2 bar:

- Stop the engine and then monitor the measured value.
- When the measured value drops to the nominal value, the line cross-sections in the fuel return line are constricted or plugged.
- Check the fuel lines for kinks.

If no kinks are visible:

- Replace the return lines.

When the measured value remains too high, the pressure regulator is most likely faulty.

Attention:

There is a low probability that the return line is completely closed due to obstruction. Fuel would then leak out under pressure when the pressure regulator is removed!

- Have a cleaning rag ready and catch and dispose of escaping fuel.
- Do not replace the pressure regulator. Replace the return line instead.
- Let the engine run briefly at idle and then stop the engine.
- Write down the measured value at engine standstill.
- Read the measured value again after about 20 to 30 minutes at engine standstill.

The following check requires special tool 13 3 010 (hose clip).

If the measured value dropped by more than 0.5 bar:

- Start the engine and wait briefly for stable pressure build-up

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- Stop the engine and immediately disconnect the feed line just before the pressure gauge with special tool 13 3 010
- Write down the measured value
- Read the measured value again after about 20 to 30 minutes at engine standstill

The following faults may be present if the measured value now dropped less than 0.5 bar:

- Fault in the feed lines
- Fault in the internal tank feed hose
- Faulty pressure-maintaining stop valve in the fuel pump

Check components. Replace faulty components.

If the measured value dropped again by more than 0.5 bar:

- Replace the pressure regulator

- All fuel hoses and their hose clamps that were loosened during the checks must be replaced.
- Read out fault memory of DME control unit. Check stored fault messages. Rectify fault. Clear diagnostic fault entries from fault memory.

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13 31 035 Removing and installing/replacing the fuel feed line

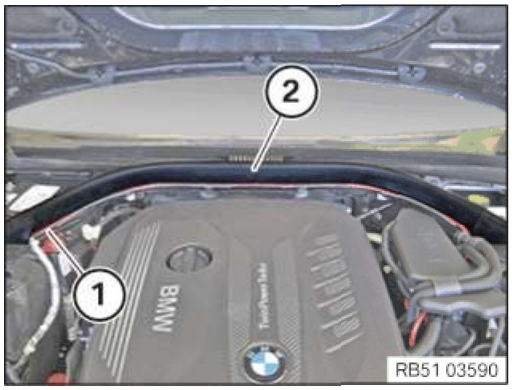
PRELIMINARY WORK

1 – Disconnecting all battery earth leads



- See additional information.

2 – 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.

3 – Removing the acoustic cover

WARNING

Hot surfaces.

Risk of burning!

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

RISK OF DAMAGE

Damage to the acoustic cover.

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

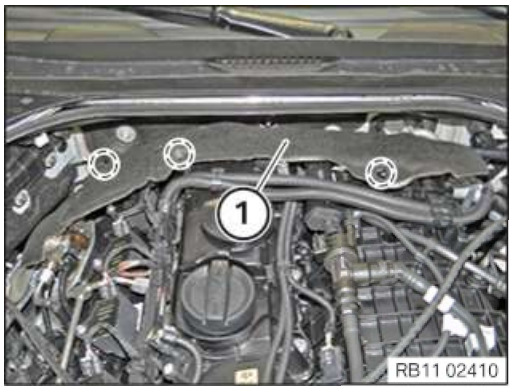
- Disassemble or mount the acoustic cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.

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- Release the acoustic cover (1) towards the top from the rubber mounts (marks).

4 – Removing acoustic cover at rear



- Unclip the acoustic cover (1) in the marked areas and remove it to the top.

5 – Remove all ignition coils.

NOTICE

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

▸ **Removing the ignition coil**

WARNING

Hot surfaces.

Risk of burning!

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

RISK OF DAMAGE

Damage to the ignition coil.

The silicone hose of the ignition coil must not be contaminated by fuel as this can lead to failure of the ignition coil.

- Cover ignition coils using suitable covers when working on the fuel system, if necessary remove them.
- Do not oil or grease the silicone tube of the spark plug connector. The silicone tube is coated with talc to reduce the pulling forces.

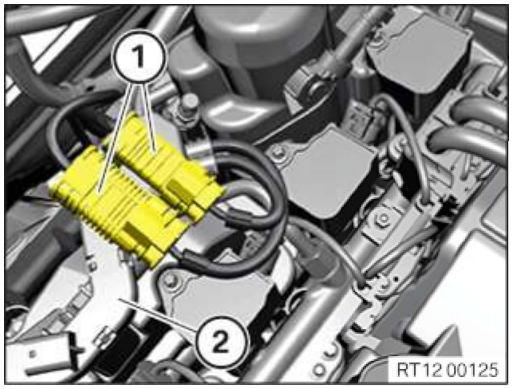
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RISK OF DAMAGE

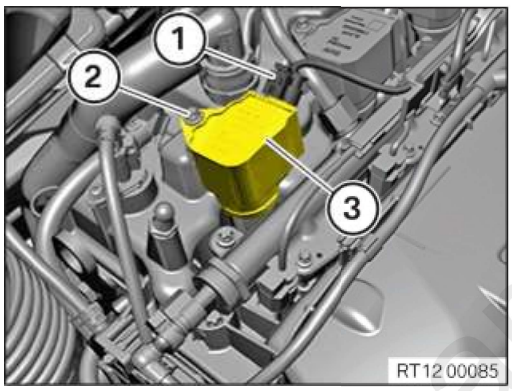
Electrostatic discharge.

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 Information on electrostatic discharge (ESD) protection.



- Disconnect the connector (1) of the front oxygen sensor and the monitoring oxygen sensor from the cable channel (2) and set aside.



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).
- Remove ignition coil (3).

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MAIN WORK

6 – Remove fuel delivery line

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

Damage to the ignition coil.

The silicone hose of the ignition coil must not be contaminated by fuel as this can lead to failure of the ignition coil.

- Cover ignition coils using suitable covers when working on the fuel system, if necessary remove them.
- Do not oil or grease the silicone tube of the spark plug connector. The silicone tube is coated with talc to reduce the pulling forces.

RISK OF DAMAGE

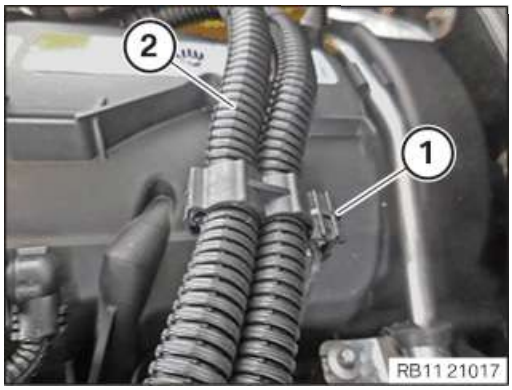
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

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

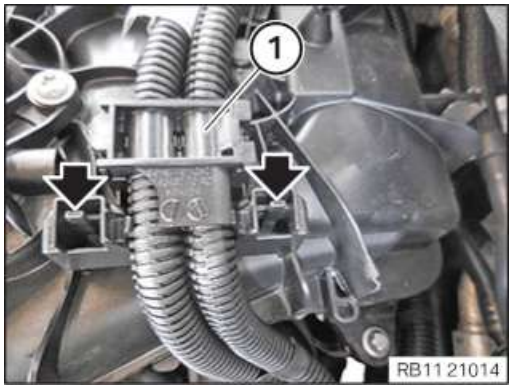
TECHNICAL INFORMATION

Reset special tool in early to avoid bending pressure lines.

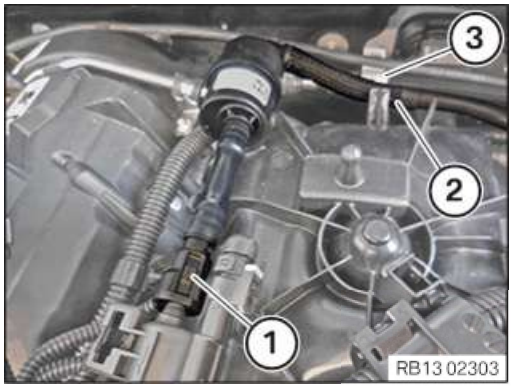


- Loosen clamp (1).
- Guide out wiring harness section (2) for the injectors and ignition coils and place it aside.

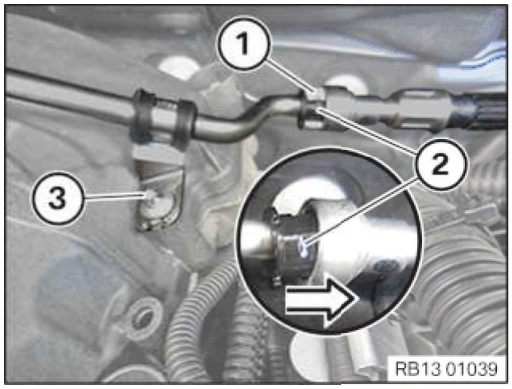
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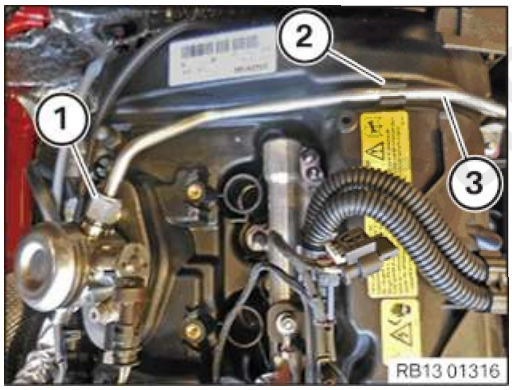
- Unlock the locks (arrows).
- Guide out wiring harness section (1) for the injectors and ignition coils and place it aside.



- Unlock and loosen lock (1).
- Guide tank ventilation line (2) out of clamp (3) and place it aside.

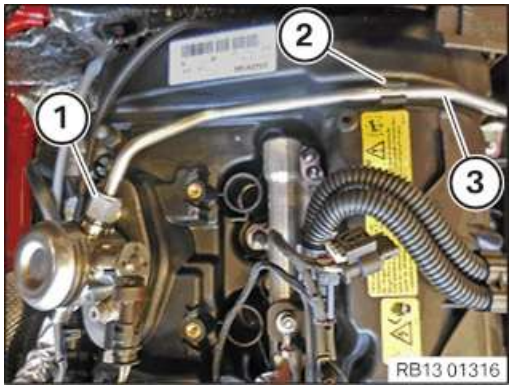


- Unlock and loosen clamp (1).
- Unlock and remove the snap fastener (2) in the direction of the arrow.
- Catch and dispose of escaping fuel.
- Seal the fuel lines with special tools 0 496 567 (13 5 161) and 0 496 568 (13 5 162) from the set of special tools 0 496 565 (13 5 160).
- Loosen screw (3).



- Slacken the union nut (1) on the high pressure pump.
- Catch and dispose of escaping fuel.
- Seal all openings with the special tool .
- Guide the fuel feed line (3) out and remove.
- Make sure that the rubber damper (2) is not lost.

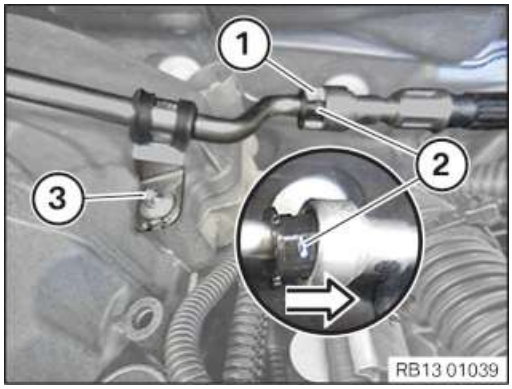
7 – Installing fuel delivery line



- Guide the fuel delivery line (3) in and install.
- Install rubber damper (2).
- Check the rubber damper (2) for the correct fit.
- Tighten the union nut (1) hand-tight.
- Tighten union nut (1).

Fuel delivery line to high pressure pump

M14		Tightening torque	31 Nm

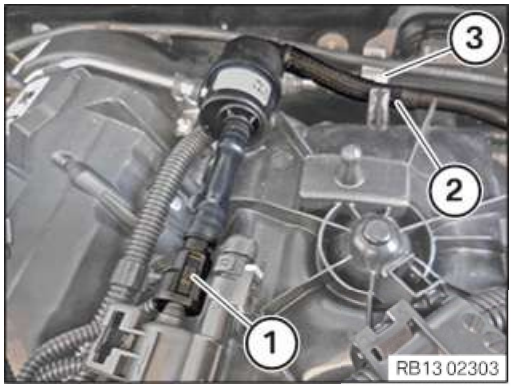


- Slide in and lock the fuel feed line in the direction of the arrow in the snap fastener (2).

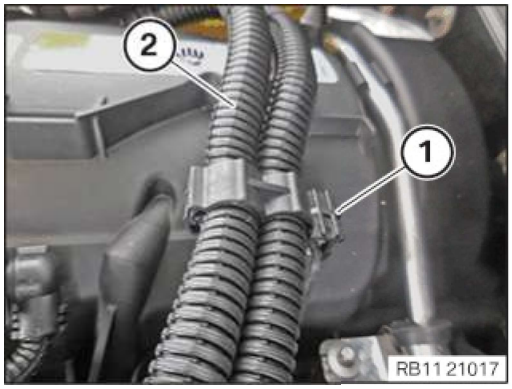
  The fuel feed line must be audibly engage in the snap fastener (2).
- Secure clamps (1).
- Tighten down screw (3).

Fuel line to cylinder head cover

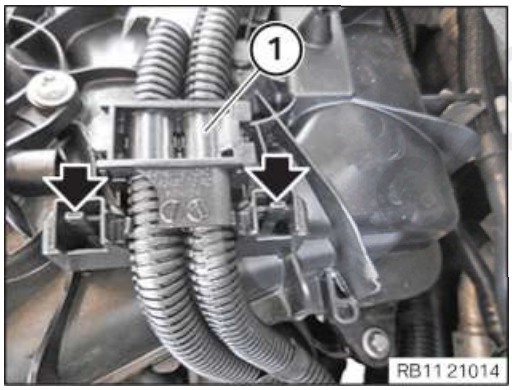
6x18		Tightening torque	6,5 Nm



- Insert and install the tank ventilation line (2).
- Lock (1) must engage audibly.
- Secure the tank ventilation line (2) to the clamp (3).



- Insert and install wiring harness section (2) for injectors and ignition coils.
- Secure clamps (1).



- Insert and install wiring harness section (1) for injectors and ignition coils.
- The locks (arrows) must engage audibly.

POSTPROCESSES

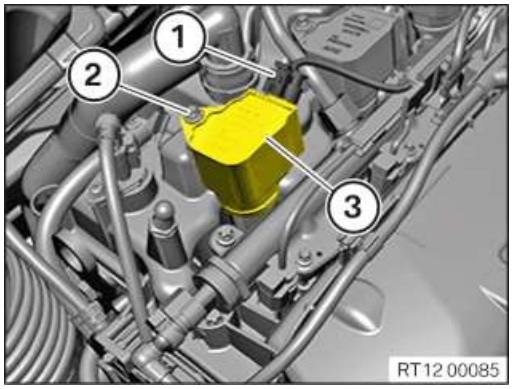
8 – Install all ignition coils

NOTICE

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

▸ **Install ignition coil.**

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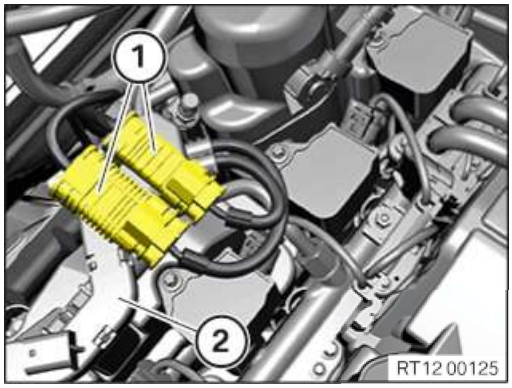
- Install ignition coil (3).
- Tighten down screw (2).

Ignition coil

Screw		Tightening torque	8 Nm

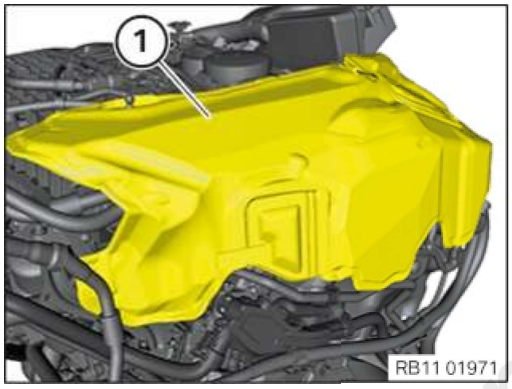
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



- Connect the connector (1) of the front oxygen sensor and the monitoring oxygen sensor on the cable shaft (2).

9 – Installing acoustic cover at rear



- Make sure the acoustic cover (1) is correctly positioned on the rear side of the engine.



- Install the acoustic cover (1) from the top and clip it in into the marked areas.

10 – Install acoustic cover

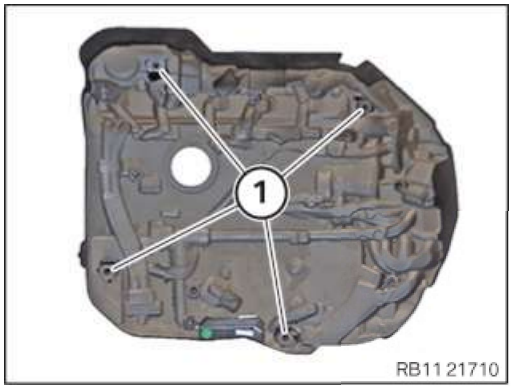
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RISK OF DAMAGE

Damage to the acoustic cover.

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

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

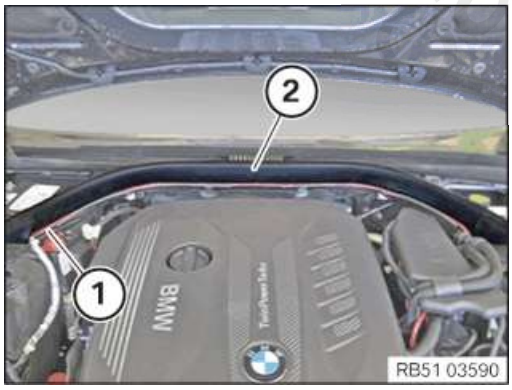


- Check the rubber mount (1) for correct fit in the acoustic cover.



- Install acoustic cover (1) and fix in the rubber mounts (marks).

11 – 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.

12 – Disconnecting all battery earth leads

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- See additional information.

Additional Information

Overview of Tightening Torques

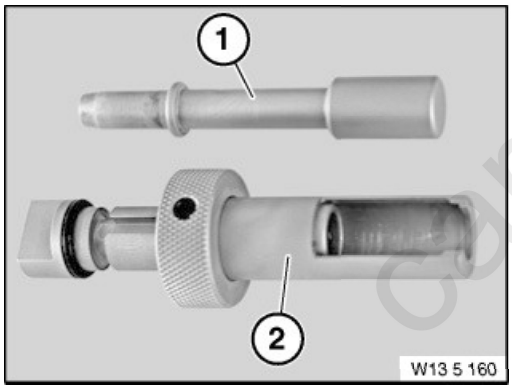
Fuel delivery line to high pressure pump			Used in step 7
M14		Tightening torque	31 Nm

Fuel line to cylinder head cover			Used in step 7
6x18		Tightening torque	6,5 Nm

Ignition coil			Used in step 8
Screw		Tightening torque	8 Nm

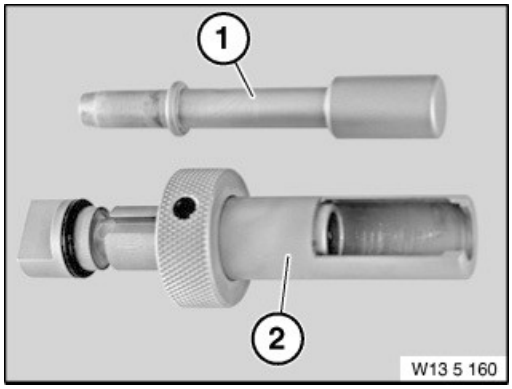
Overview of Special Tools

0 496 567 (13 5 161) Fastener



Common	Used in step 6
Usage	(Cap (2 piece)) For sealing the quick connectors Deletion, only available via tool set
Included in the tool or work	0 496 565
Storage location	
Replaced by	
In connection with	
SI-Number	

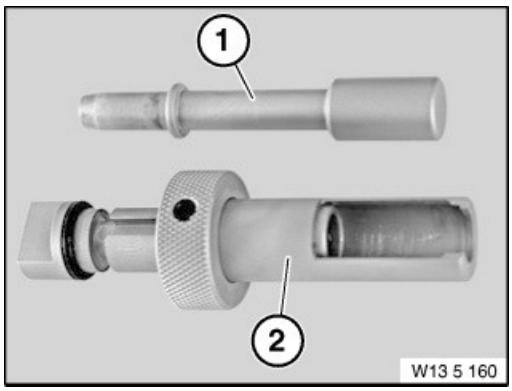
0 496 568 (13 5 162) Fastener



Common	Used in step 6
Usage	(Cap (2 x)) To close off the fuel lines. Discontinued, can only be ordered using complete tool
Included in the tool or work	0 496 565
Storage location	
Replaced by	
In connection with	
SI-Number	

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0 496 565 (13 5 160) Fastener



Common Used in step 6

Usage	(Caps (2x)) To close off the fuel lines when removing and installing the engine.
Included in the tool or work	
Storage location	B26
Replaced by	
In connection with	
SI-Number	01 22 08 (498)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 496 567 (13 5 161)		**Fastener** (Cap (2 piece)) For sealing the quick connectors Deletion, only available via tool set	
2	0 496 568 (13 5 162)		**Fastener** (Cap (2 x)) To close off the fuel lines. Discontinued, can only be ordered using complete tool	

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Links

Repair instructions	Used in step
61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	112
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	112
61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	112
61 20 900 Disconnect and connect battery earth lead (Plug-in Hybrid Electric Vehicle)	112
61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting battery earth lead	112
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61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	112
61 20 900 Disconnecting and connecting battery earth lead	112
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61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting battery earth lead	112
61 20 900 Disconnecting and connecting battery earth lead	112
61 35 ... Notes on ESD protection (Electro Static Discharge)	5

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13 51 017 Removing and installing high pressure pump

WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Detach battery earth lead from battery.
- For additional batteries: Detach all battery earth leads from additional batteries.

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

Only G05 and G07

In vehicles with active anti-roll bar (ARS) the fan cowl must be removed in order to spin the engine.

For additional information see: 17 11 035 Removing and installing/replacing the fan cowl including electric fan

PRELIMINARY WORK

1 – Disconnecting all battery earth leads

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- See additional information.

2 – 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.

3 – Removing the acoustic cover

WARNING

Hot surfaces.

Risk of burning!

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

RISK OF DAMAGE

Damage to the acoustic cover.

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

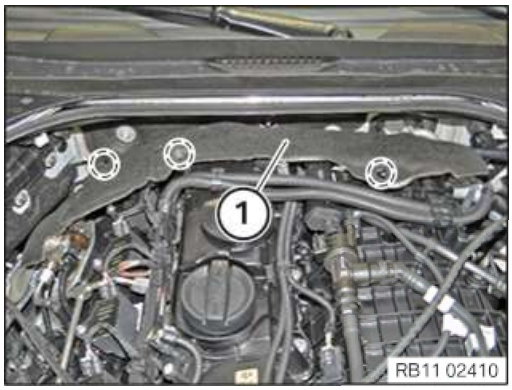
- Disassemble or mount the acoustic cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.

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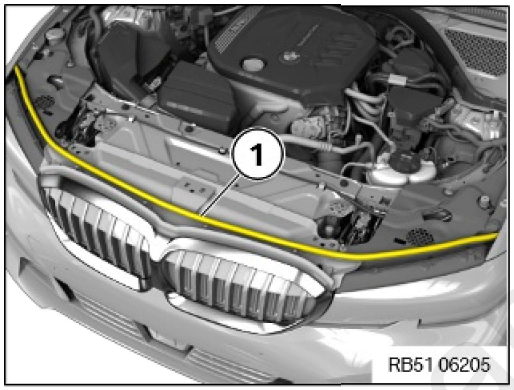
- Release the acoustic cover (1) towards the top from the rubber mounts (marks).

4 – Removing acoustic cover at rear



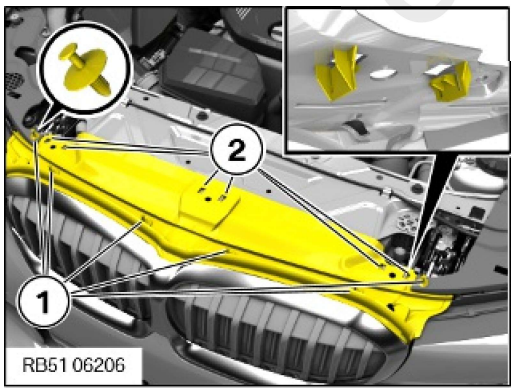
- Unclip the acoustic cover (1) in the marked areas and remove it to the top.

5 – Remove the seal for the bonnet in front



- Pull off front bonnet seal (1) upwards.

6 – Removing the centre engine compartment cover



- Detach all expanding rivets (1).
- Release the cover of the centre engine compartment with the latch mechanisms (2) .
- Feed the cover for the centre engine compartment out to the rear.

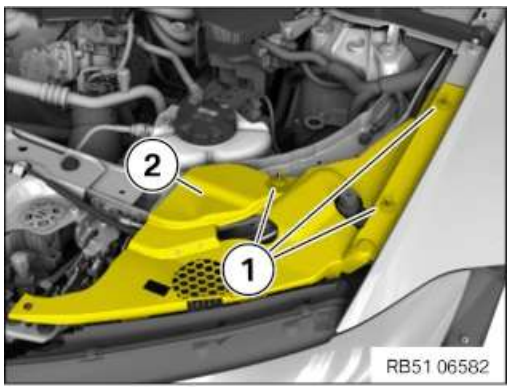
7 – Partially remove the top left and right cover in the engine compartment

NOTICE

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

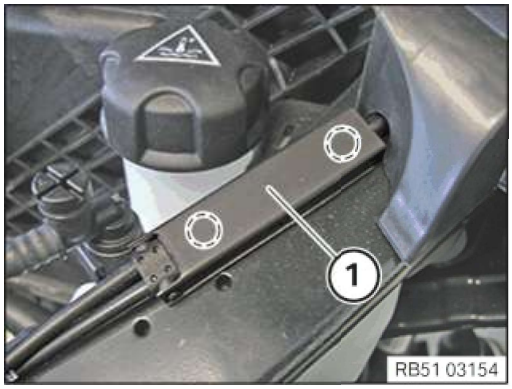
carldiagn.com

► **Removing the cover in the engine compartment on top partially**

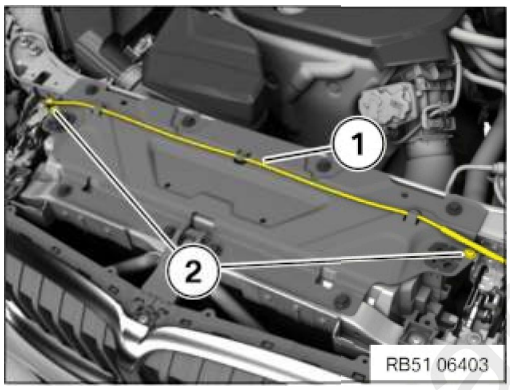


- Loosen the expanding rivet (1).
- Remove the cover in the engine compartment on top (2) partially.

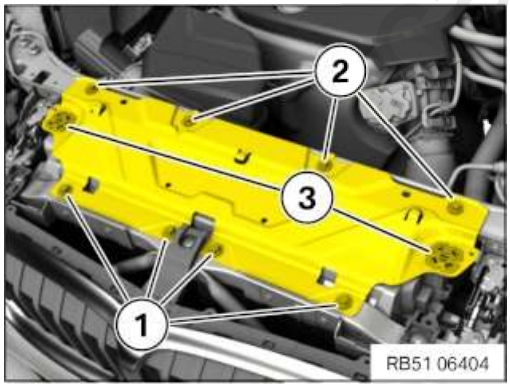
8 – Removing the top cross connection



- Release the housing for the coupling of the Bowden cables (1) from the body.



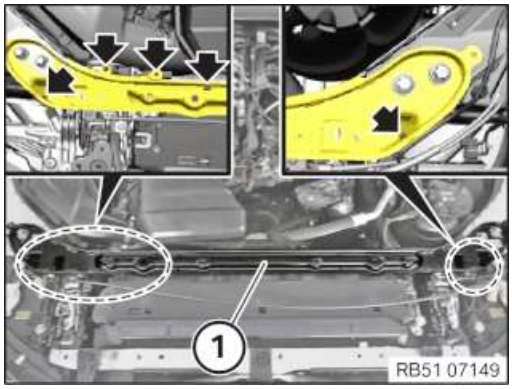
- Detach Bowden cable (1) at the top cross connection.
- Loosen screws (2).



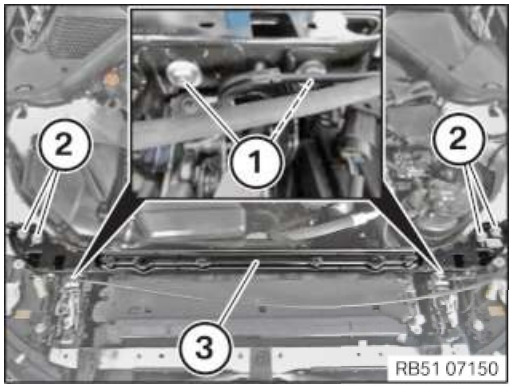
- Loosen screws (1) and (2).
- Remove the top cross connection with the holders(3) towards the top.

9 – Remove the rear top cross connection

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- Release the clips (arrows) in the marked areas from the top rear cross connection (1).

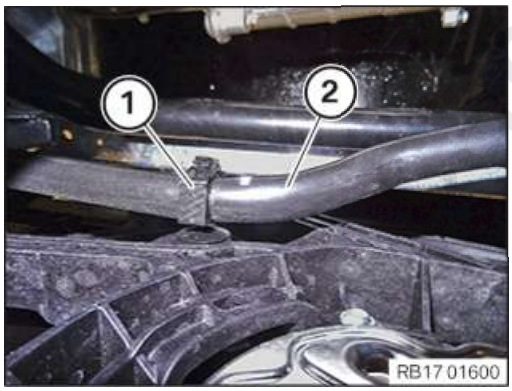


- Loosen screws (1).
- Loosen screws (2).
- Guide out and remove top rear cross connection (3).

10 – Remove fan cowl.

TECHNICAL INFORMATION

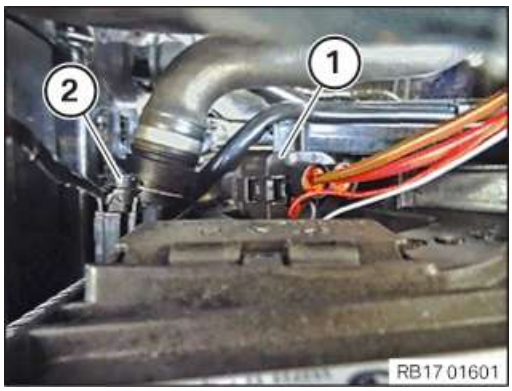
- When the engine is stopped after the end of the journey, it may be necessary to run the electric fan. In rare cases, operation of the electric fan can last up to 11 min. This protects the components. In this case, replacing the electric fan will not remedy the problem!



- **If installed:** Release transmission oil line (2).

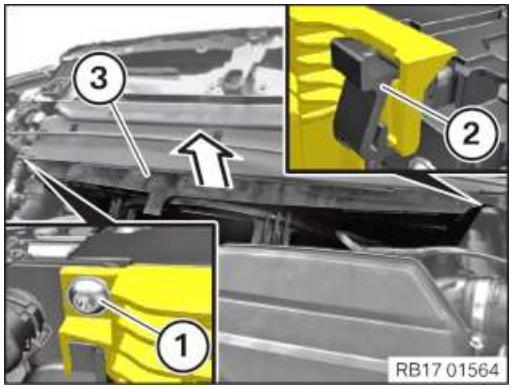
  Unlock the holder (1).

  Thread out transmission oil line (2) and set aside.



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

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- Loosen screw (1).
- Unlock lock (2).
- Guide out and remove fan cowl (3) **carefully** in the direction of the arrow.

11 – Remove all ignition coils.

NOTICE

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

▸ **Removing the ignition coil**

WARNING

Hot surfaces.

Risk of burning!

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

RISK OF DAMAGE

Damage to the ignition coil.

The silicone hose of the ignition coil must not be contaminated by fuel as this can lead to failure of the ignition coil.

- Cover ignition coils using suitable covers when working on the fuel system, if necessary remove them.
- Do not oil or grease the silicone tube of the spark plug connector. The silicone tube is coated with talc to reduce the pulling forces.

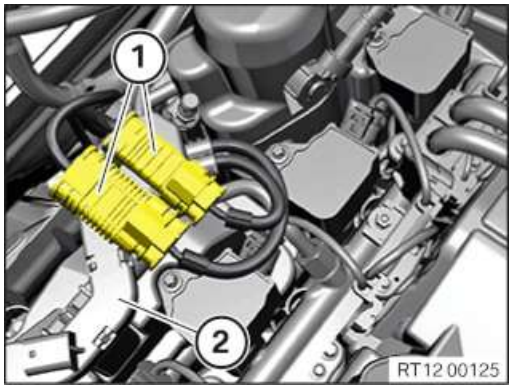
RISK OF DAMAGE

Electrostatic discharge.

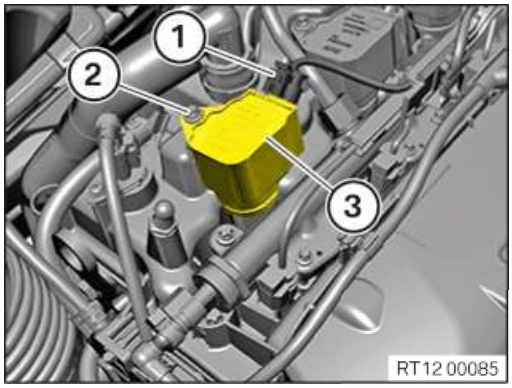
Damage to or destruction of electrical components.

- 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 Information on electrostatic discharge (ESD) protection.

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- Disconnect the connector (1) of the front oxygen sensor and the monitoring oxygen sensor from the cable channel (2) and set aside.



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).
- Remove ignition coil (3).

12 – Remove fuel delivery line

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

Damage to the ignition coil.

The silicone hose of the ignition coil must not be contaminated by fuel as this can lead to failure of the ignition coil.

- Cover ignition coils using suitable covers when working on the fuel system, if necessary remove them.
- Do not oil or grease the silicone tube of the spark plug connector. The silicone tube is coated with talc to reduce the pulling forces.

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RISK OF DAMAGE

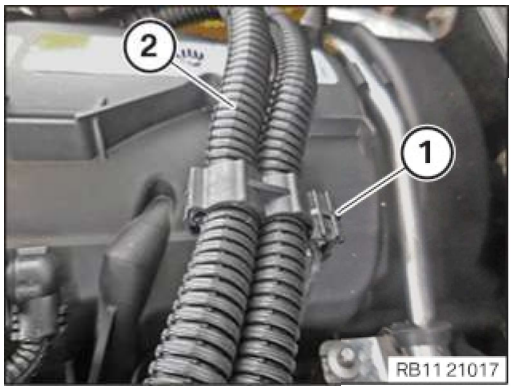
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

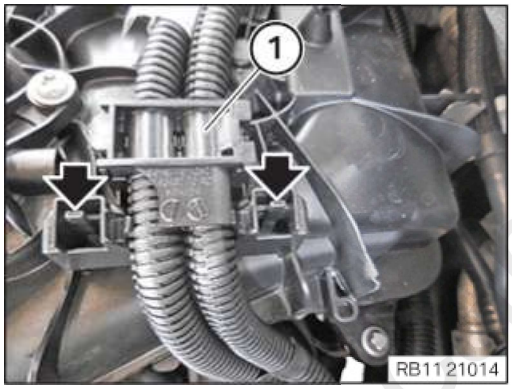
- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

TECHNICAL INFORMATION

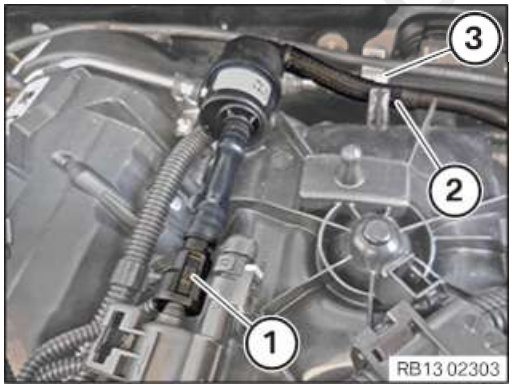
Reset special tool in early to avoid bending pressure lines.



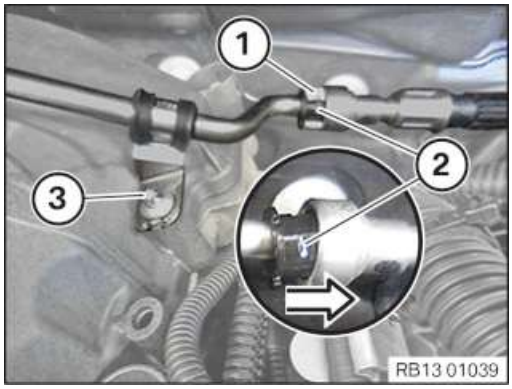
- Loosen clamp (1).
- Guide out wiring harness section (2) for the injectors and ignition coils and place it aside.



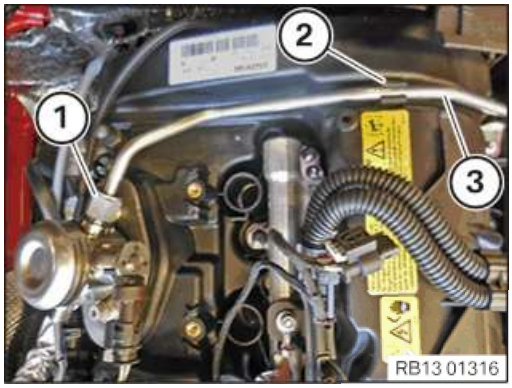
- Unlock the locks (arrows).
- Guide out wiring harness section (1) for the injectors and ignition coils and place it aside.



- Unlock and loosen lock (1).
- Guide tank ventilation line (2) out of clamp (3) and place it aside.



- Unlock and loosen clamp (1).
- Unlock and remove the snap fastener (2) in the direction of the arrow.
- Catch and dispose of escaping fuel.
- Seal the fuel lines with special tools 0 496 567 (13 5 161) and 0 496 568 (13 5 162) from the set of special tools 0 496 565 (13 5 160).
- Loosen screw (3).



- Slacken the union nut (1) on the high pressure pump.
- Catch and dispose of escaping fuel.
- Seal all openings with the special tool .
- Guide the fuel feed line (3) out and remove.
- Make sure that the rubber damper (2) is not lost.

13 – Remove the high pressure line between the high pressure pump and the 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.

CAUTION

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

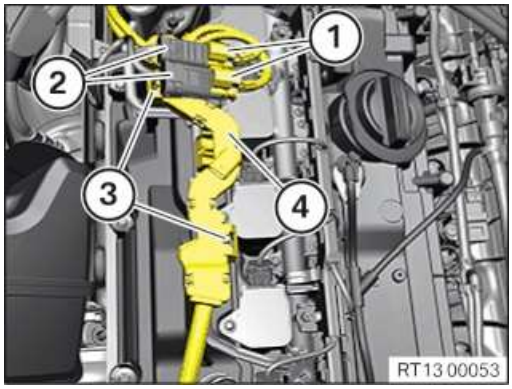
Danger of injury!

- 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.

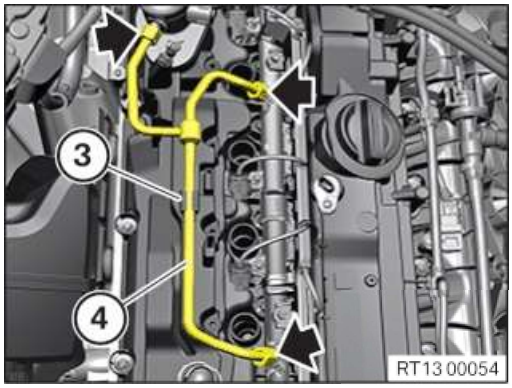
TECHNICAL INFORMATION

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

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- Unlock and disconnect the plug connections (1) and (2).
- Unlock the locks (3).
- Guide out the wiring harness section of the engine wiring harness (4) and set it aside.



- Position a lint-free rag under the union nuts.
- Unscrew union nuts (arrows) with the special tool .
- Catch and dispose of escaping fuel.
- Thread out the high pressure line (4) from the bracket (3) and remove it.
- Feed out and dispose of the lint-free cleaning clothes .

MAIN WORK

14 – Remove high pressure pump

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, 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

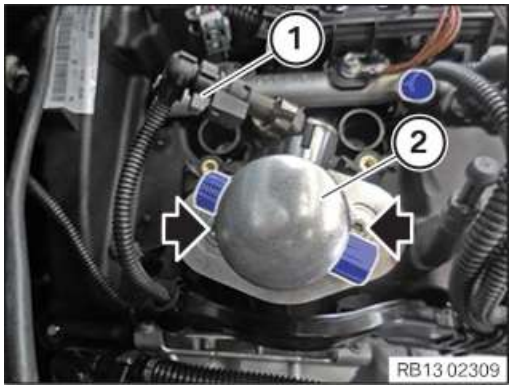
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

TECHNICAL INFORMATION

The high pressure pump can be pre-tensioned by camshaft cams. If when loosening the screws, the high pressure pump is forced out, the engine will have to be turned to bring the camshafts to a different position.

Before installing the high pressure pump, the cam of the high pressure pump drive must be turned to BDC. To do this, twist the engine if necessary in the direction of engine rotation to the central bolt of the crankshaft. Otherwise, it will not be possible to install the high-pressure pump.

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- Unlock plug connection (1) and disconnect.
- Unscrew the bolts (arrows) **in alternating order**.
- Have a rag ready and catch any engine oil that may emerge.
- Feed out high pressure pump (2) and remove.

15 – Install high pressure pump

RISK OF DAMAGE

Damage to the engine.

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

- Always rotate the engine in the correct direction of rotation by hand: a) Clockwise, facing the vibration damper or b) Counter-clockwise, facing the chain drive. (b) only applies when the rear timing chain is installed.

TECHNICAL INFORMATION

Only G05 and G07

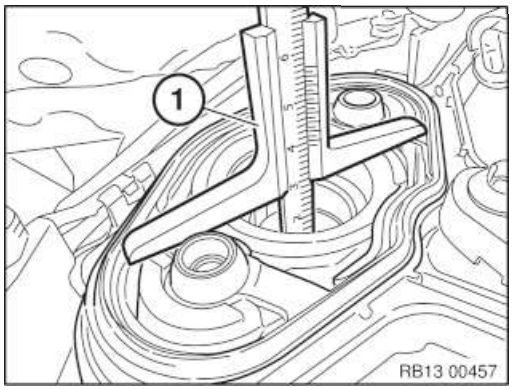
In vehicles with active anti-roll bar (ARS) the fan cowl must be removed in order to spin the engine.

For additional information see: 17 11 035 Removing and installing/replacing the fan cowl including electric fan

TECHNICAL INFORMATION

The high pressure pump can be pre-tensioned by camshaft cams. If when loosening the screws, the high pressure pump is forced out, the engine will have to be turned to bring the camshafts to a different position.

Before installing the high pressure pump, the cam of the high pressure pump drive must be turned to BDC. To do this, twist the engine if necessary in the direction of engine rotation to the central bolt of the crankshaft. Otherwise, it will not be possible to install the high-pressure pump.



- Place the depth gauge (1) flat onto the high pressure pump flange.
- Turn the engine at the central bolt in the direction of engine rotation until the BDC position of the camshaft is reached.

  The depth gauge (1) is in the deepest position.

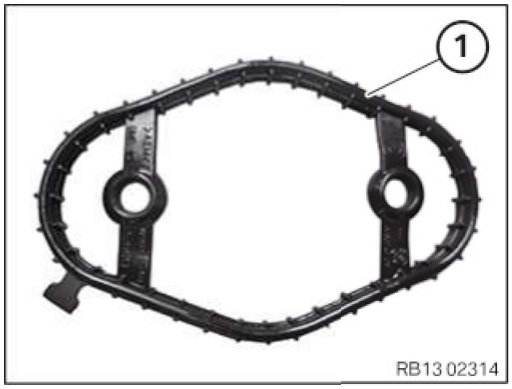
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- Rotate the engine with the special tool 0 493 380 (11 6 480) in the **direction of the arrow** until the cam of the high pressure pump drive is at the **BDC position** .



- Guide out and remove gasket (1).



- Renew the gasket (1).

  Parts: Gasket



TECHNICAL INFORMATION

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

- Check the threads (1) on the high pressure pump flange for sealing compound residue: Remove sealing compound residue as needed.
- Clean the thread (1) with a thread cutter **M6**.
- Make sure that no contamination enters the engine.
- Cover opening at the high pressure pump flange with suitable materials.



TECHNICAL INFORMATION

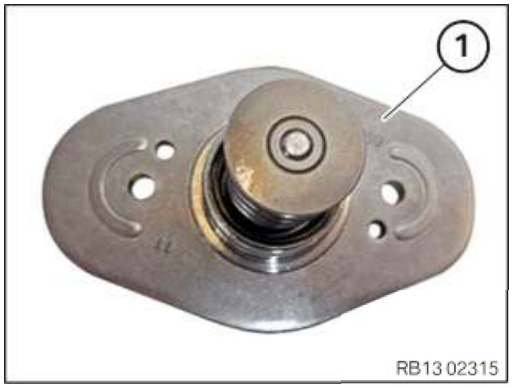
The sealing surfaces must be free from oils, grease and cleaning agents.

- Clean sealing surface (1).

mdiagn.com



- Insert and install the gasket (1).
- Make sure the seal (1) has been correctly positioned in the **highlighted** area.



RISK OF DAMAGE

Damage to the surface.

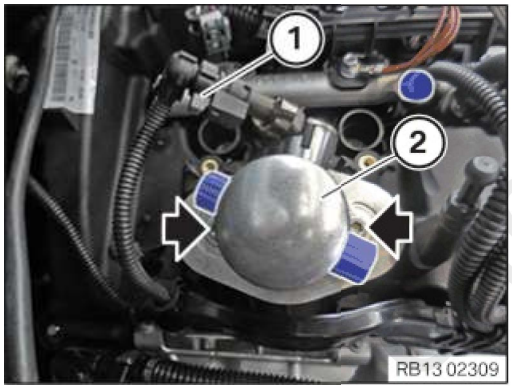
The use of metal-cutting tools (e.g. emery cloth) to clean the surfaces can damage them and lead to leaks or engine damage.

- Do not use any metal-cutting tools.

TECHNICAL INFORMATION

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

- Clean sealing surface (1).



- Feed in and install high pressure pump (2).
- Renew the bolts (arrows).

  Parts: Bolts
- Position screws (arrows) of the high pressure pump (2) and tighten **in alternating order** in **90°** increments.

  Compliance with this specification is imperative to make sure that the piston will not break due to twisting.

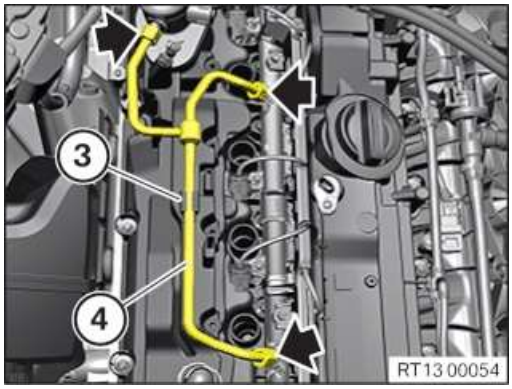
High pressure pump to high pressure pump flange

M6x25	*Renew screws.*	Jointing torque	12 Nm
		Tightening torque	90 °

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

POSTPROCESSES

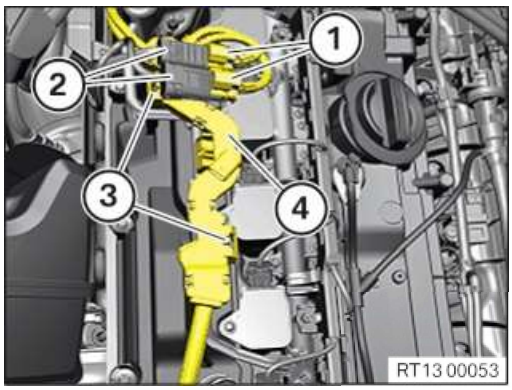
16 – Installing high pressure line between rail and high pressure pump



- Insert the high pressure line (4) into the holder (3) and install.
- Tighten union nuts (arrows) with the special tool .

High pressure line between rail and high pressure pump

M14x1,5		Tightening torque	33 Nm

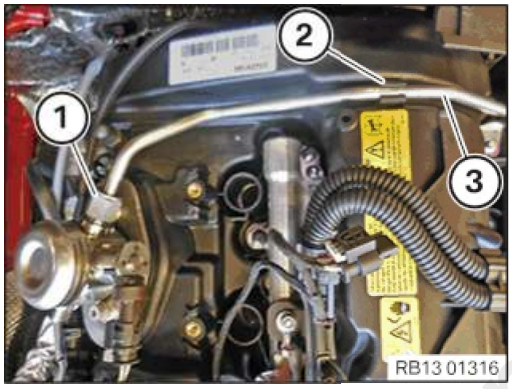


- Insert and install the wiring harness section of the engine wiring harness (4).

  The locks (3) must engage audibly.
- Connect connectors (1) and (2) and lock.

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

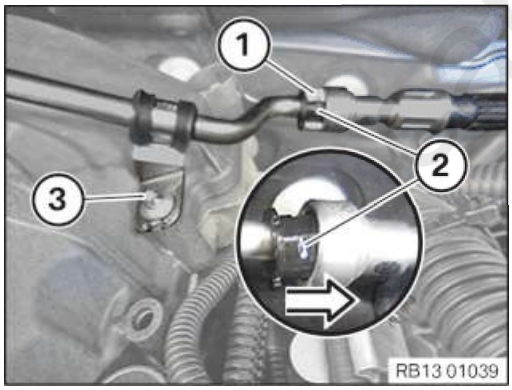
17 – Installing fuel delivery line



- Guide the fuel delivery line (3) in and install.
- Install rubber damper (2).
- Check the rubber damper (2) for the correct fit.
- Tighten the union nut (1) hand-tight.
- Tighten union nut (1).

Fuel delivery line to high pressure pump

M14		Tightening torque	31 Nm

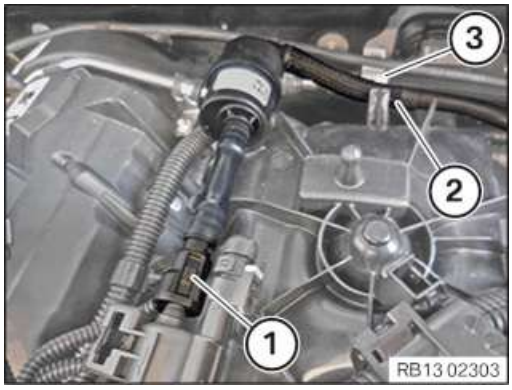


- Slide in and lock the fuel feed line in the direction of the arrow in the snap fastener (2).

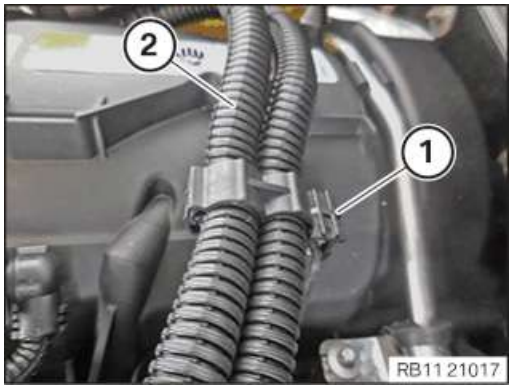
  The fuel feed line must be audibly engage in the snap fastener (2).
- Secure clamps (1).
- Tighten down screw (3).

Fuel line to cylinder head cover

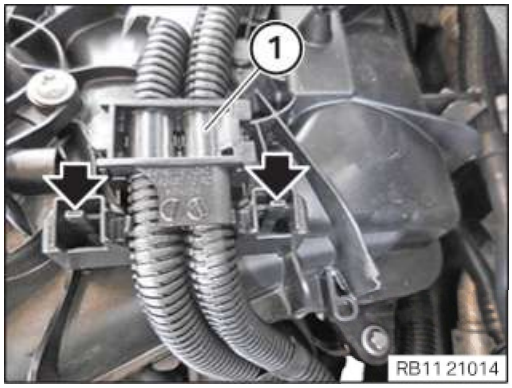
6x18		Tightening torque	6,5 Nm



- Insert and install the tank ventilation line (2).
- Lock (1) must engage audibly.
- Secure the tank ventilation line (2) to the clamp (3).



- Insert and install wiring harness section (2) for injectors and ignition coils.
- Secure clamps (1).



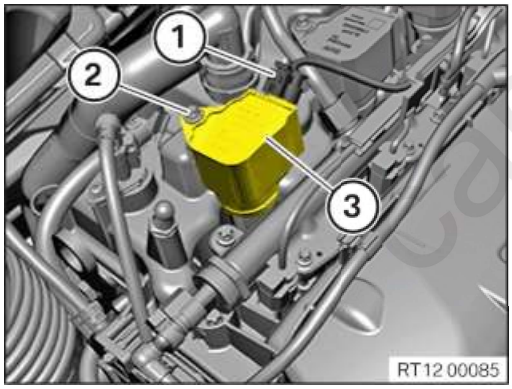
- Insert and install wiring harness section (1) for injectors and ignition coils.
- The locks (arrows) must engage audibly.

18 – Install all ignition coils

NOTICE

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

▸ **Install ignition coil.**



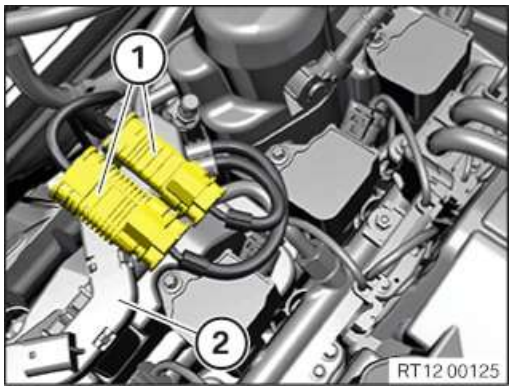
- Install ignition coil (3).
- Tighten down screw (2).

Ignition coil

Screw		Tightening torque	8 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

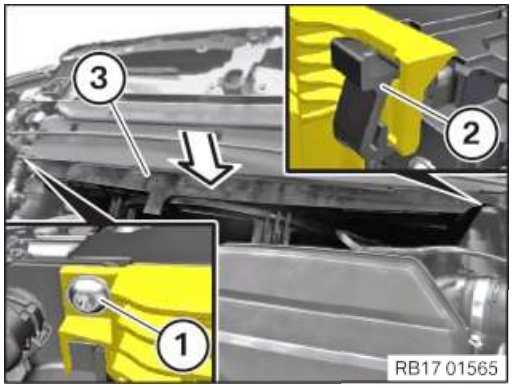


- Connect the connector (1) of the front oxygen sensor and the monitoring oxygen sensor on the cable shaft (2).

19 – Install fan cowl



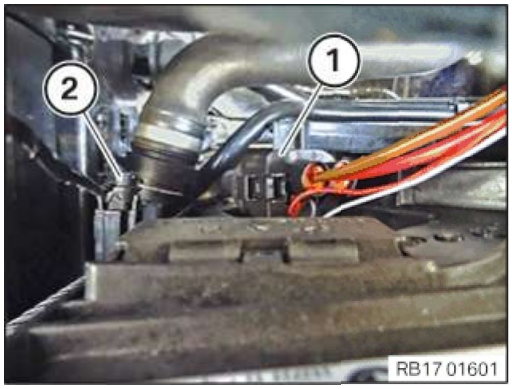
- Feed guides (1) into the radiator.
- Feed guides (2) into the charge air cooler.



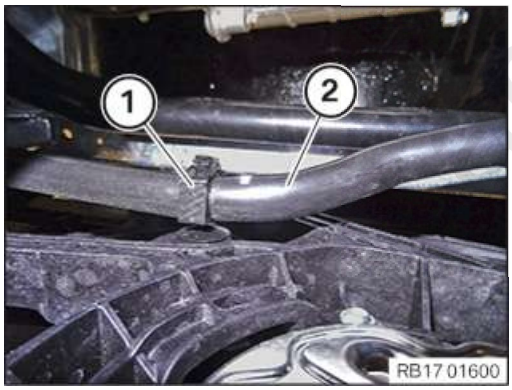
- Guide in and install fan cowl (3) **carefully** in the direction of the arrow.
- Ensure that the lock (2)engages audibly.
- Tighten down screw (1).

Fan cowl with electric fan on radiator

TS6x20		Tightening torque	6,5 Nm



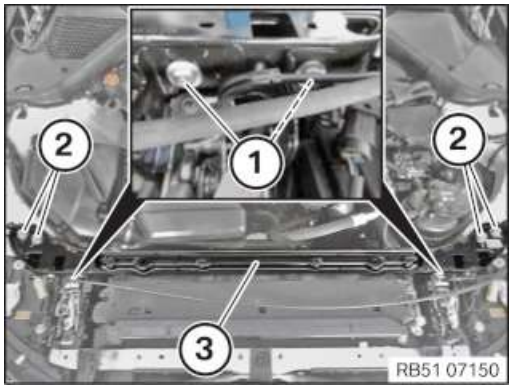
- Connect connectors (2) and lock.
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.
  The connector (1) must engage audibly.



- **If installed:** Secure the transmission oil line (2).
  Insert and install the transmission oil line (2).
  Lock holder (1).

20 – Install the rear top cross connection

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- Guide in and position the top rear cross connection (3).
- Tighten the screws (1).

Top rear cross connection to bonnet catch support

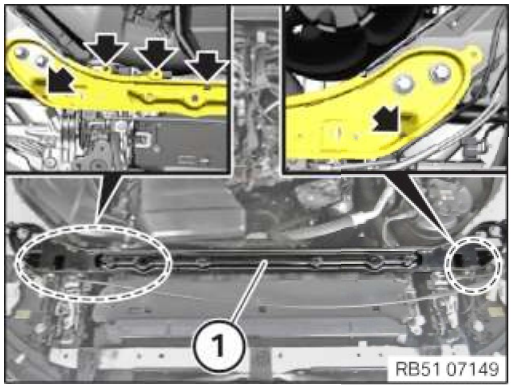
Flat-head screw M6x20		Tightening torque	11,8 Nm

- Renew screws (2).

  Parts: Bolts
- Tighten the screws (2).

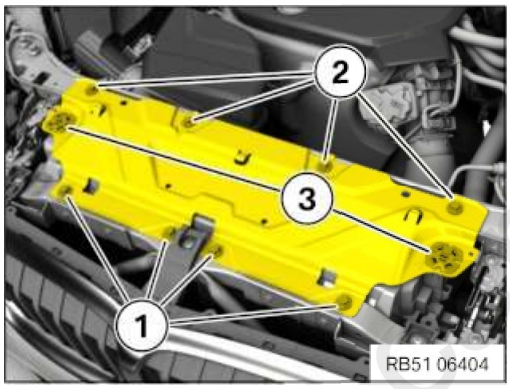
Rear top cross connection to wheel arch carrier support

M10x20 screw	Renew screw.	Jointing torque	56 Nm
		Angle of rotation	90 °



- Secure the clips (arrows) in the marked areas to the top rear cross connection (1).

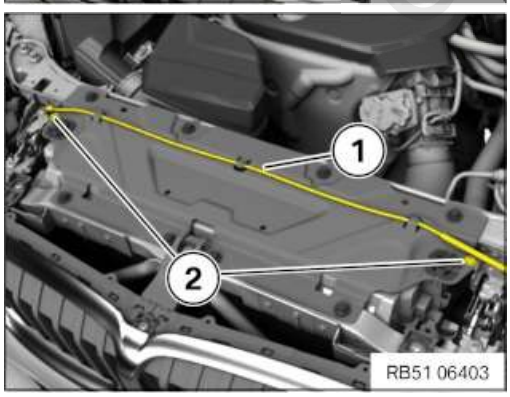
21 – Installing the top cross connection



- Set and position upper cross connection with holders (3) from above.
- Tighten down screws (1) and (2).

Cross connection, top

M8x20		Tightening torque	28 Nm



- Tighten down screws (2).

Cross connection, top

M6x20		Tightening torque	11,8 Nm

- Attach Bowden cable (1) on the upper cross connection.



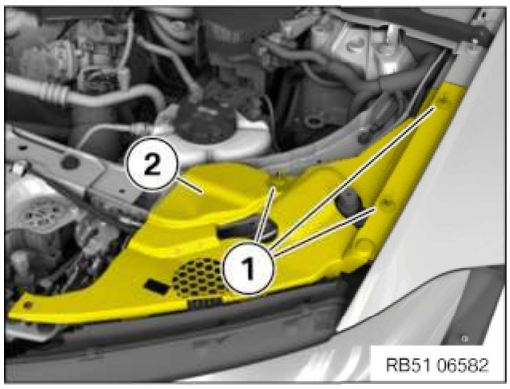
- Clip in the housing for the coupling of the Bowden cables (1).

22 – Install the cover in the engine compartment at top left and right partially

NOTICE

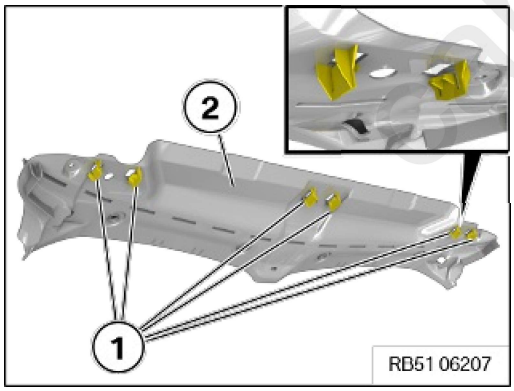
Description is for left component only. Procedure on the right side is identical.

▸ **Installing the cover in the engine compartment on top partially**



- Install the cover in the engine compartment on top (2).
- Secure expanding rivet (1).

23 – Installing cover for engine compartment centre



Check

- Check latch mechanisms (1) of cover for engine compartment centre (2) for damage.

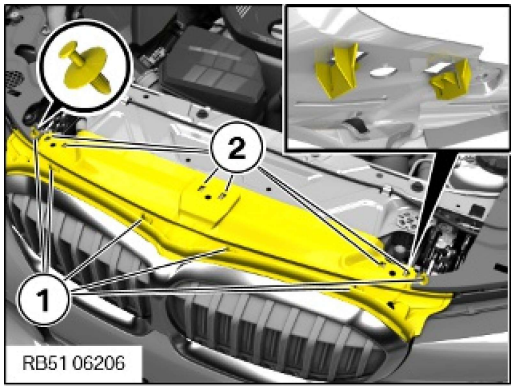
Result

» The latch mechanism (1) is damaged.

Measure

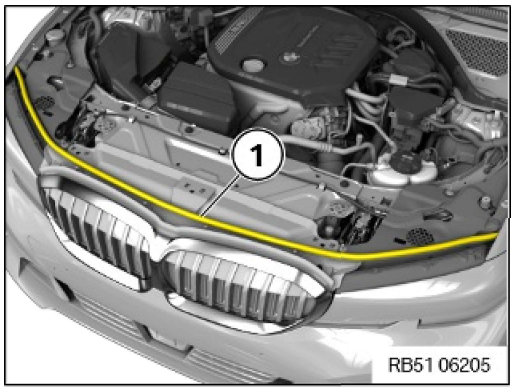
- Renew cover for engine compartment centre (2).

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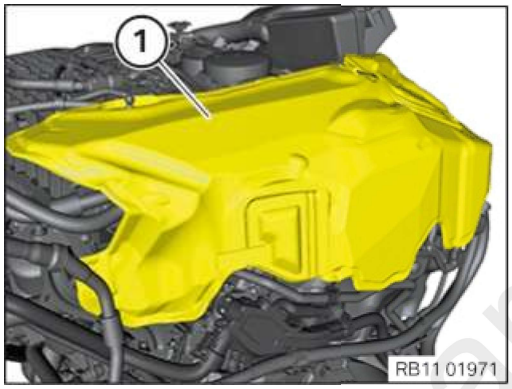
- Guide in the cover for the engine compartment centre from the rear and position it.
- Clip in the cover for the engine compartment centre with latch mechanisms (2).
- Mount all expanding rivets (1).

24 – Install the seal for the front bonnet



- Position the bonnet seal(1) and connect it on the mounting on the bumper and on the headlights.

25 – Installing acoustic cover at rear



- Make sure the acoustic cover (1) is correctly positioned on the rear side of the engine.



- Install the acoustic cover (1) from the top and clip it in into the marked areas.

26 – Install acoustic cover

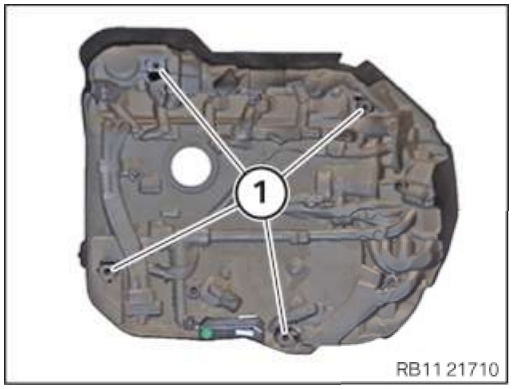
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RISK OF DAMAGE

Damage to the acoustic cover.

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

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

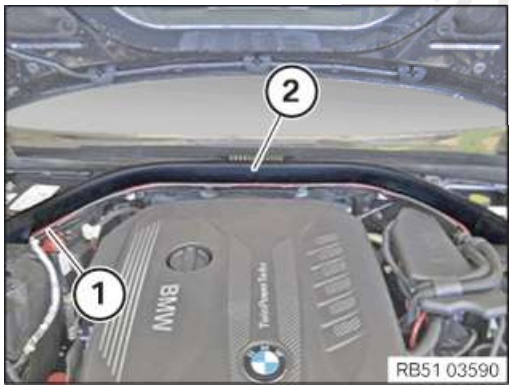


- Check the rubber mount (1) for correct fit in the acoustic cover.



- Install acoustic cover (1) and fix in the rubber mounts (marks).

27 – 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.

28 – Disconnecting all battery earth leads

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- See additional information.

Additional Information

Overview of Tightening Torques

High pressure pump to high pressure pump flange			Used in step 15
M6x25	*Renew screws.*	Jointing torque	12 Nm
		Tightening torque	90 °

High pressure line between rail and high pressure pump			Used in step 16
M14x1,5		Tightening torque	33 Nm

Fuel delivery line to high pressure pump			Used in step 17
M14		Tightening torque	31 Nm

Fuel line to cylinder head cover			Used in step 17
6x18		Tightening torque	6,5 Nm

Ignition coil			Used in step 18
Screw		Tightening torque	8 Nm

Fan cowl with electric fan on radiator			Used in step 19
TS6x20		Tightening torque	6,5 Nm

Top rear cross connection to bonnet catch support			Used in step 20
Flat-head screw M6x20		Tightening torque	11,8 Nm

Rear top cross connection to wheel arch carrier support			Used in step 20
M10x20 screw	Renew screw.	Jointing torque	56 Nm
		Angle of rotation	90 °

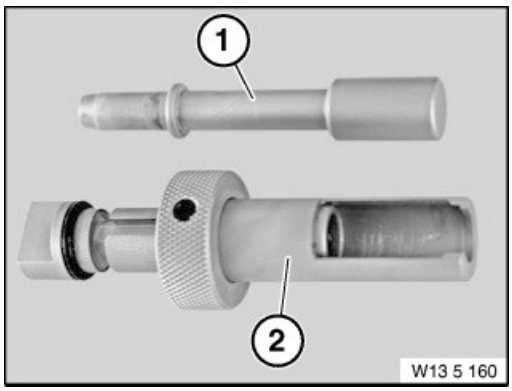
Cross connection, top			Used in step 21
M8x20		Tightening torque	28 Nm

Cross connection, top			Used in step 21
M6x20		Tightening torque	11,8 Nm

Overview of Special Tools

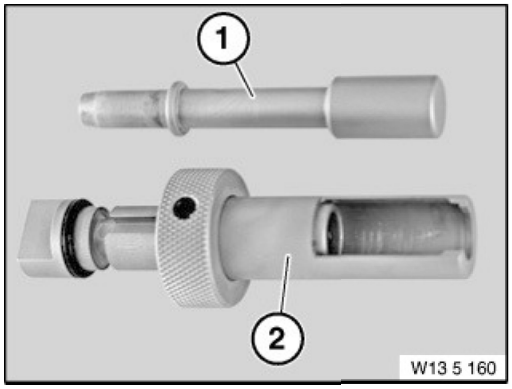
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0 496 567 (13 5 161) Fastener



Common	Used in step 12
Usage	(Cap (2 piece)) For sealing the quick connectors Deletion, only available via tool set
Included in the tool or work	0 496 565
Storage location	
Replaced by	
In connection with	
SI-Number	

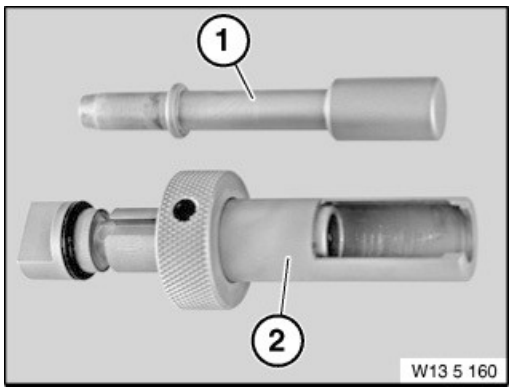
0 496 568 (13 5 162) Fastener



Common	Used in step 12
Usage	(Cap (2 x)) To close off the fuel lines. Discontinued, can only be ordered using complete tool
Included in the tool or work	0 496 565
Storage location	
Replaced by	
In connection with	
SI-Number	

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0 496 565 (13 5 160) Fastener



Common

Used in step 12

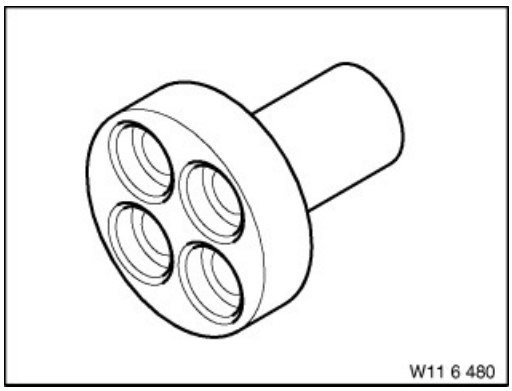
Usage	(Caps (2x)) To close off the fuel lines when removing and installing the engine.
Included in the tool or work	
Storage location	B26
Replaced by	
In connection with	
SI-Number	01 22 08 (498)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 496 567 (13 5 161)		**Fastener** (Cap (2 piece)) For sealing the quick connectors Deletion, only available via tool set	
2	0 496 568 (13 5 162)		**Fastener** (Cap (2 x)) To close off the fuel lines. Discontinued, can only be ordered using complete tool	

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0 493 380 (11 6 480) Connector



Common	Used in step 15
Usage	For turning over engine at crankshaft hub (vibration absorber) when adjusting valve timing
Included in the tool or work	
Storage location	B2
Replaced by	
In connection with	
SI-Number	01 11 98 (338)

Links

Repair instructions	Used in step
61 20 900 Disconnecting and connecting battery earth lead	128
61 20 900 Disconnecting and connecting battery earth lead	128
61 20 900 Disconnecting and connecting battery earth lead	128
61 20 900 Disconnecting and connecting battery earth lead	128
61 20 900 Disconnecting and connecting battery earth lead	128
61 20 900 Disconnecting and connecting battery earth lead	128
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	128
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	128
61 20 900 Disconnecting and connecting battery earth lead	128
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	128
61 20 900 Disconnect and connect battery earth lead (Plug-in Hybrid Electric Vehicle)	128
61 20 900 Disconnecting and connecting battery earth lead	128
61 20 900 Disconnecting and connecting battery earth lead	128
61 20 900 Disconnecting and connecting battery earth lead	128
61 20 900 Disconnecting and connecting battery earth lead	128
61 20 900 Disconnecting and connecting battery earth lead	128
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61 20 900 Disconnecting and connecting battery earth lead	128
61 20 900 Disconnecting and connecting battery earth lead	128
61 20 900 Disconnecting and connecting battery earth lead	128
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	128
61 20 900 Disconnecting and connecting battery earth lead	128
61 20 900 Disconnecting and connecting battery earth lead	128
61 20 900 Disconnecting and connecting battery earth lead	128
61 20 900 Disconnecting and connecting battery earth lead	128
61 20 900 Disconnecting and connecting battery earth lead	128
61 20 900 Disconnecting and connecting battery earth lead	128
61 20 900 Disconnecting and connecting battery earth lead	128
61 35 ... Notes on ESD protection (Electro Static Discharge)	11
17 11 035 Removing and installing/replacing fan cowl with electric fan	15

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13 53 ... Clean the cylinder heads in the area of injectors to prevent sand/dust contamination.

Special tools required:

- 2 302 630

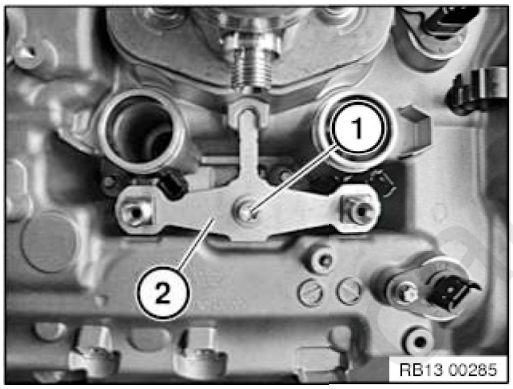
Required tools:

- Commercial vacuum cleaner with a narrow / sharp nozzle

Under dusty/sandy operating conditions, dust and sand settle in columns, joints and cavities on the cylinder head in the area of the injectors. The consequences of non-compliance are malfunctions, damage and early wear / failure of the engine!

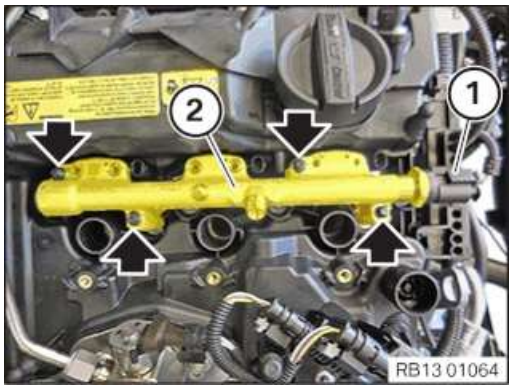
Necessary preliminary work:

- Removing the hold-down device of the injectors or rail



Release screw (1).

Remove holding-down element (2).



Unlock and disconnect plugs (1).

Loosen M6x70 screws (arrows).

Remove rail (2) upwards.



Protect / Seal all the exposed openings / connections from the entry of any foreign bodies / contamination! Close all the windows and doors of the vehicle. If necessary, check other vehicles and persons in the immediate surroundings.



Wear safety goggles.

Dirt particles may get into your eyes!



Use a vacuum cleaner and compressed air (air gun with a lance) to draw off / blow out any contamination in the area of the injectors thoroughly.

Remove the spark plug in the affected cylinder according to the repair instructions.

Turn the crankshaft at the central screw in the direction of rotation and set the piston on the firing TDC. If necessary, use TDC Finder of pressure tester 81 39 2 302 630 .



Risk of damage – do not turn the crankshaft in reverse.

- Screw in the hose of the pressure loss tester in the spark plug bore and connect it to the pressure loss tester.
- Adjust the pressure loss tester to a low pressure and connect it with compressed air.
- Switch on and keep the vacuum cleaner ready.
- Pull out the injector from the injector bore hole according to the repair instructions and draw off the dust / dirt immediately so that it cannot enter the combustion chamber.
- Deactivate the compressed air only when all the contamination in the cylinder head is removed from the injector bore hole
- Prepare the injector according to the repair instructions and insert it in the cylinder head.
- Install the spark plug according to the repair instructions



It must be ensured that there is no contamination in other openings / bore holes, clean if necessary.

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13 53 318 Remove and install all injectors in the injection system

WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Detach battery earth lead from battery.
- For additional batteries: Detach all battery earth leads from additional batteries.

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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PRELIMINARY WORK

1 – Disconnecting all battery earth leads



- See additional information.

2 – Removing the acoustic cover

WARNING

Hot surfaces.

Risk of burning!

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

RISK OF DAMAGE

Damage to the acoustic cover.

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

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



- Release the acoustic cover (1) towards the top from the rubber mounts (marks).

3 – Removing acoustic cover at rear



- Unclip the acoustic cover (1) in the marked areas and remove it to the top.

4 – Remove all ignition coils.

NOTICE

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

▸ **Removing the ignition coil**

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WARNING

Hot surfaces.

Risk of burning!

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

RISK OF DAMAGE

Damage to the ignition coil.

The silicone hose of the ignition coil must not be contaminated by fuel as this can lead to failure of the ignition coil.

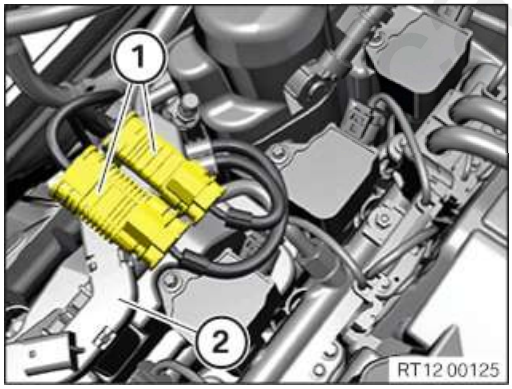
- Cover ignition coils using suitable covers when working on the fuel system, if necessary remove them.
- Do not oil or grease the silicone tube of the spark plug connector. The silicone tube is coated with talc to reduce the pulling forces.

RISK OF DAMAGE

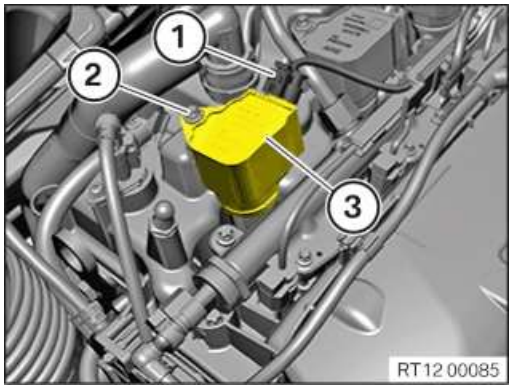
Electrostatic discharge.

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 Information on electrostatic discharge (ESD) protection.



- Disconnect the connector (1) of the front oxygen sensor and the monitoring oxygen sensor from the cable channel (2) and set aside.



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).
- Remove ignition coil (3).

5 – Remove the high pressure line between the high pressure pump and the 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.

CAUTION

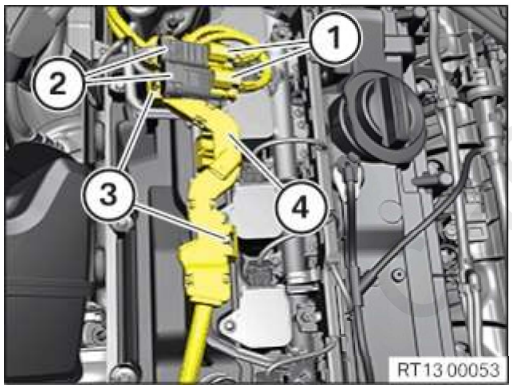
On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

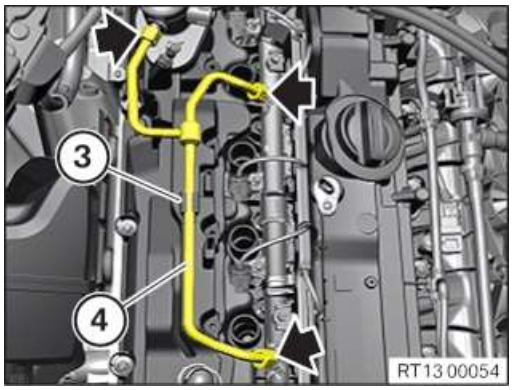
- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

TECHNICAL INFORMATION

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



- Unlock and disconnect the plug connections (1) and (2).
- Unlock the locks (3).
- Guide out the wiring harness section of the engine wiring harness (4) and set it aside.



- Position a lint-free rag under the union nuts.
- Unscrew union nuts (arrows) with the special tool .
- Catch and dispose of escaping fuel.
- Thread out the high pressure line (4) from the bracket (3) and remove it.
- Feed out and dispose of the lint-free cleaning clothes .

MAIN WORK

6 – Removing rail with injectors of cylinders 1 to 3

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, 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 ignition coil.

The silicone hose of the ignition coil must not be contaminated by fuel as this can lead to failure of the ignition coil.

- Cover ignition coils using suitable covers when working on the fuel system, if necessary remove them.
- Do not oil or grease the silicone tube of the spark plug connector. The silicone tube is coated with talc to reduce the pulling forces.

RISK OF DAMAGE

Damage to the injector tips and Teflon ring.

Improper handling of the injector tips and Teflon ring can lead to malfunctioning of the injector.

- Avoid mechanical contact with injector tip.
- When exchanging Teflon ring, hands and work surface must be clean and free of oil. Do not use any lubricating agents.
- Do not use fingernails to slide Teflon ring on.

RISK OF DAMAGE

Damage to injectors.

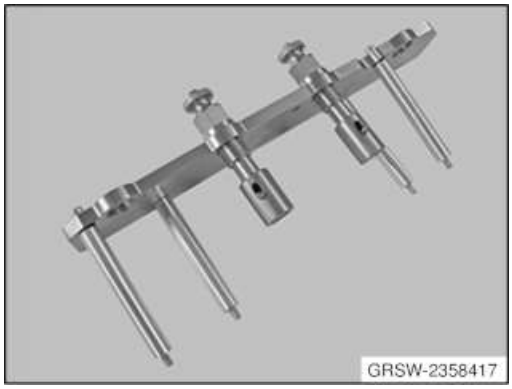
Excessive force may damage the injector and this means having to renew the injector.

- Twist the injectors with a maximum torsional movement of 13 Nm.



- Prepare special tool .

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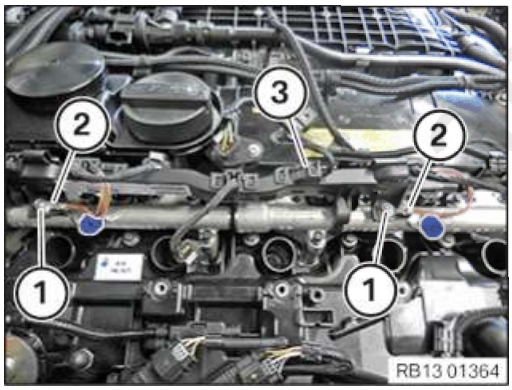
- Prepare special tool 2 358 417.



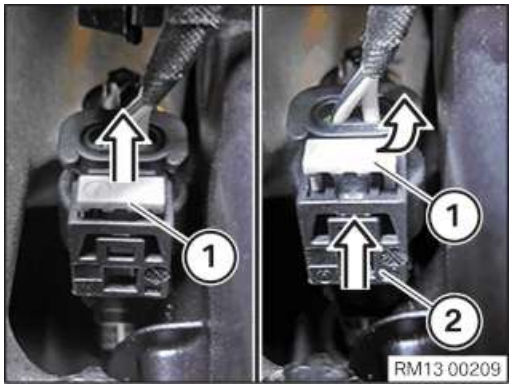
- Prepare special tool .



- Prepare special tool 0 496 106 (11 8 720).

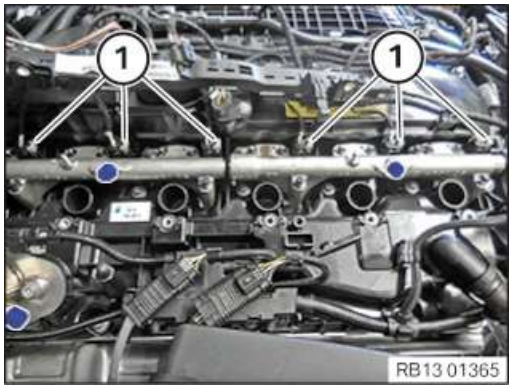


- Loosen nut (1).
- Feed out ground cable (2) and set it aside.
- Feed out cable channel (3) and set it aside.

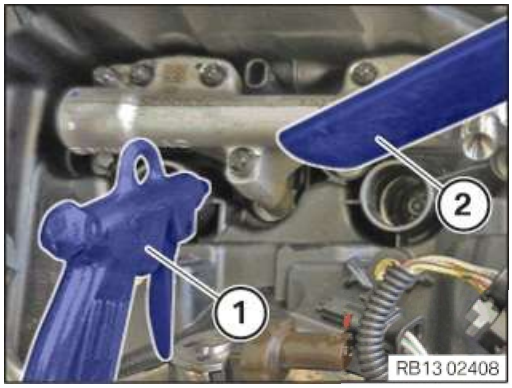


- Unlock lock (1) in direction of arrow from the top.
- Press lock (1) together and release.
- Pull out the connector (2) from the injectors.

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- Unlock and release all connectors (1) of the injectors.

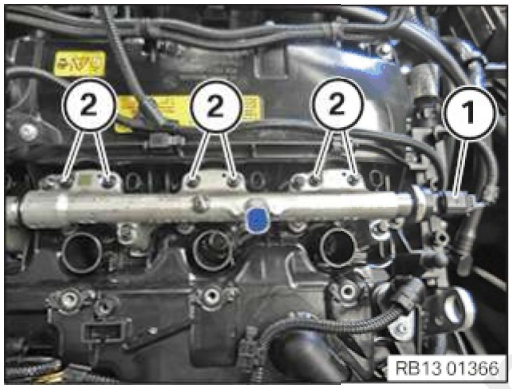


TECHNICAL INFORMATION

In case of dusty / sandy operating conditions of the vehicle, the injector shafts must be cleaned before removal.

For additional information see: 13 53 ... Cleaning the cylinder head in the area of the injectors in case of sandy / dusty contamination

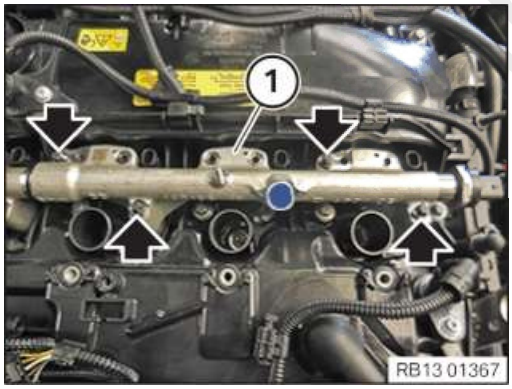
- Before releasing the high pressure lines: Blow out the injector shafts with an air gun(1) with less pressure.
- Simultaneously, draw off the dirt particles with an **explosion proof** vacuum cleaner (2).



- Unlock and loosen connector (1).
- Release screws (M5x30) (2).
- Remove screws (2).

  Do not reuse the bolts (2).

  Parts: Screws (M5x30)
- Catch and dispose of escaping fuel with suitable materials.

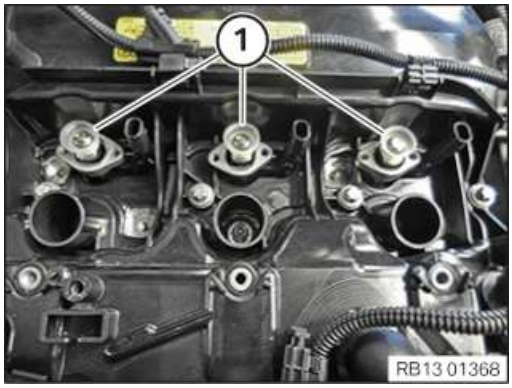


- Unscrew the screws (M6x30) (arrows).

  The screws may not be reused!
- Renew screws.

  Parts: Screws (M6x30)
- Remove rail (1) in upward direction.

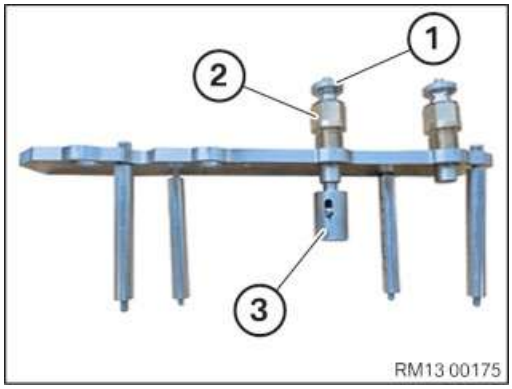
  The injectors remain in the cylinder head.



- Remove the gaskets (1).

  The seals (1) are only required during the initial assembly at the plant and will not be installed again.

mdiagn.com



RISK OF DAMAGE

Damage to injectors.

Excessive force may damage the injector and this means having to renew the injector.

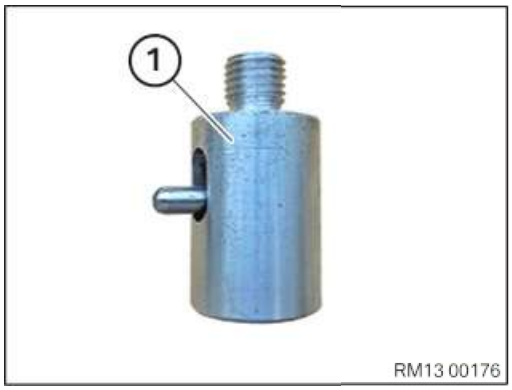
- Twist the injectors with a maximum torsional movement of 13 Nm.

- In the event that the specified value for the tensile force is exceeded: Replace injectors.
- Use the special tool 2 358 417to remove the injectors.

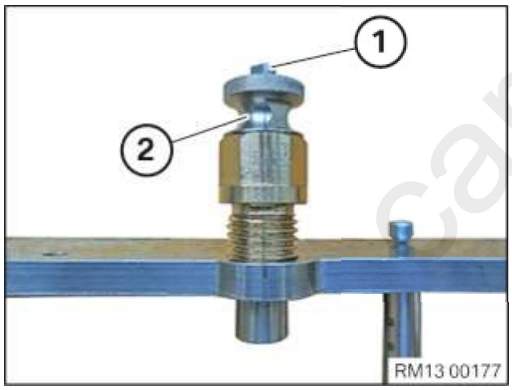
  The special tool 2 358 417 is used to ensure that the tensile force is not exceeded.

  Special tool 2 358 417 consists of:

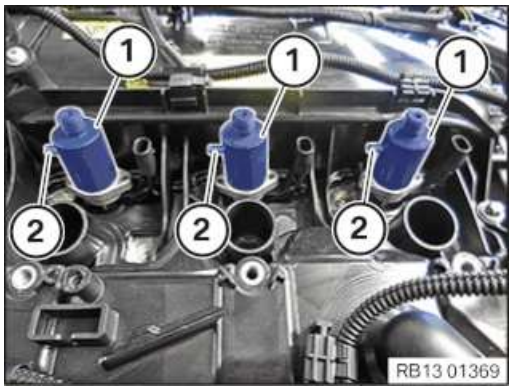
  - **(1)** Threaded sleeves
  - **(2)** Pull-out thread (left-hand thread)
  - **(3)** Mounting for the injectors



- Unscrew the fixture for the injectors (1) from the special tool 2 358 417.



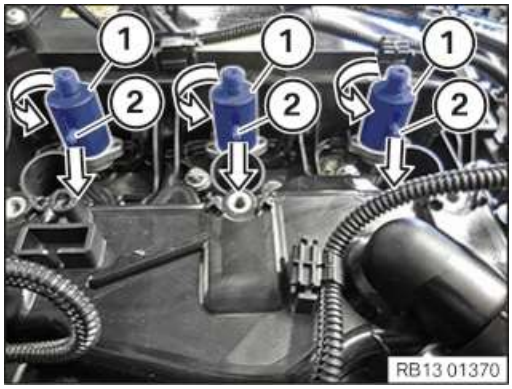
- Press the lock (1) in and remove threaded sleeve (2) from the special tool 2 358 417.



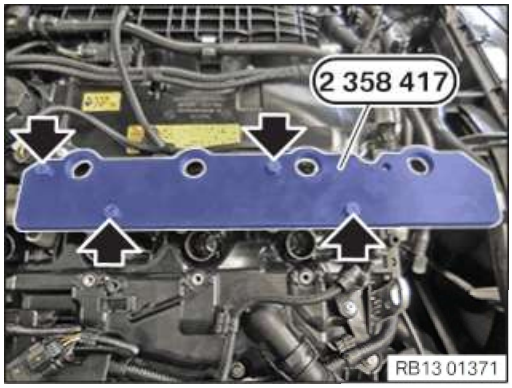
- Install all fixtures (1) for the injectors.

  The fixture (1) is not locked if the lever (2) is on the top.

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- Turn fixtures (1) by 90° and lock the lever (2) downwards.



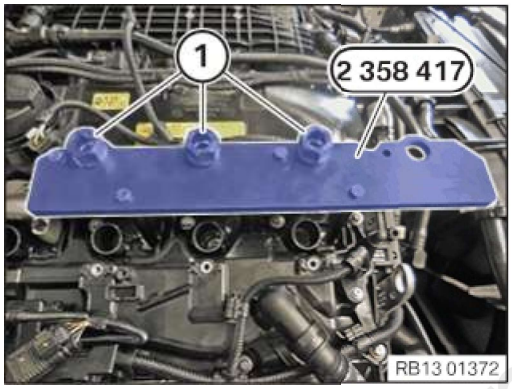
RISK OF DAMAGE

Damage to injectors.

Excessive force may damage the injector and this means having to renew the injector.

- Do not use the puller plate as a support.

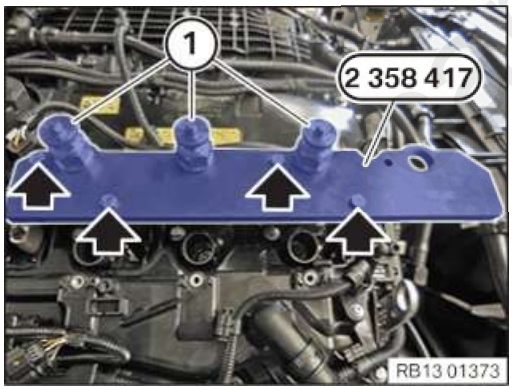
- Attach special tool 2 358 417 to cylinder head.
- Hand-tighten the bolts (arrows).



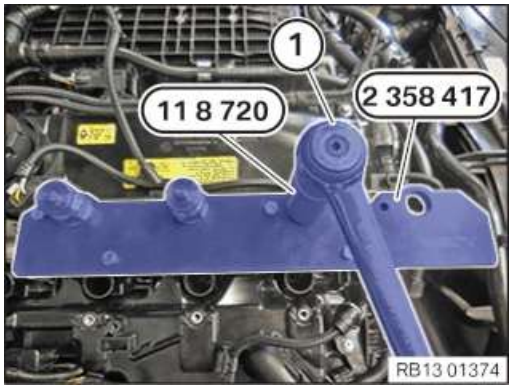
TECHNICAL INFORMATION

The extraction thread is a left-hand thread.

- Screw in pull-out thread (1) on the special tool 2 358 417fully.



- Insert threaded sleeves (1) again and screw threaded sleeves completely onto the fixtures for injectors.
- Then tighten screws (arrows) on special tool 2 358 417 to 5 Nm.



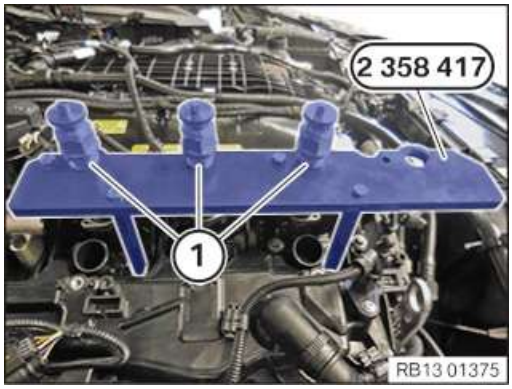
- Adjust torque wrench to 13 Nm **clockwise** .
- Turn torque wrench (1) in **clockwise** direction with special tool 0 496 106 (11 8 720)until the injector is pulled out.

TECHNICAL INFORMATION

If the torque wrench makes a cracking noise when the injector is pulled out, **the injector must be renewed.**

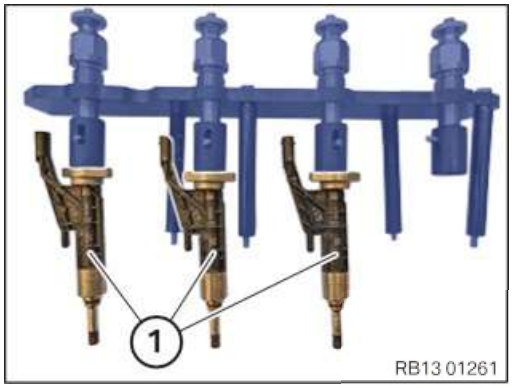
- Disassemble all injectors individually.

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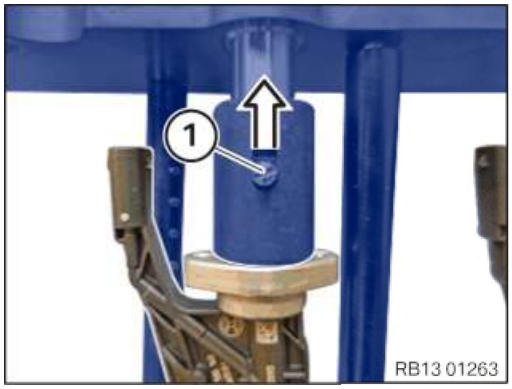


- Before removing the special tool 2 358 417 with the injectors, check if all the injectors were completely pulled out of the cylinder head.

  This can be recognised on the completely visible threads of the sleeves (1).
- Loosen screws on special tool 2 358 417.



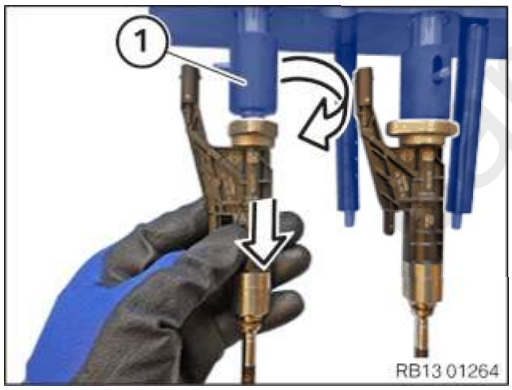
- Carefully remove the special tool 2 358 417with injectors (1) from the cylinder head vertically upwards.
- Place the combination of the special tool 2 358 417 and the injectors (1) flat on a clean table.



NOTICE

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

- Unlock the fixture lock (1) from the top.



- Turn the unlocked fixture (1) by 90°.
- Release and remove the injector downwards.

7 – Removing rail with injectors of cylinders 4 to 6

RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, 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 ignition coil.

The silicone hose of the ignition coil must not be contaminated by fuel as this can lead to failure of the ignition coil.

- Cover ignition coils using suitable covers when working on the fuel system, if necessary remove them.
- Do not oil or grease the silicone tube of the spark plug connector. The silicone tube is coated with talc to reduce the pulling forces.

RISK OF DAMAGE

Damage to the injector tips and Teflon ring.

Improper handling of the injector tips and Teflon ring can lead to malfunctioning of the injector.

- Avoid mechanical contact with injector tip.
- When exchanging Teflon ring, hands and work surface must be clean and free of oil. Do not use any lubricating agents.
- Do not use fingernails to slide Teflon ring on.

RISK OF DAMAGE

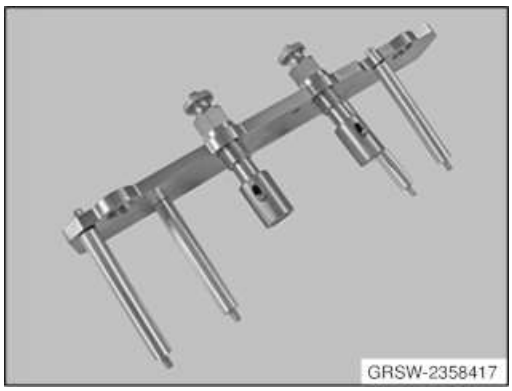
Damage to injectors.

Excessive force may damage the injector and this means having to renew the injector.

- Twist the injectors with a maximum torsional movement of 13 Nm.



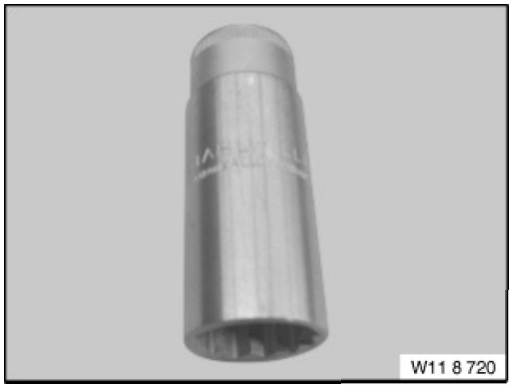
- Prepare special tool .



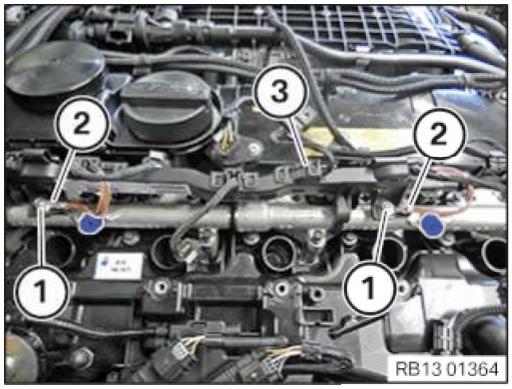
- Prepare special tool 2 358 417.



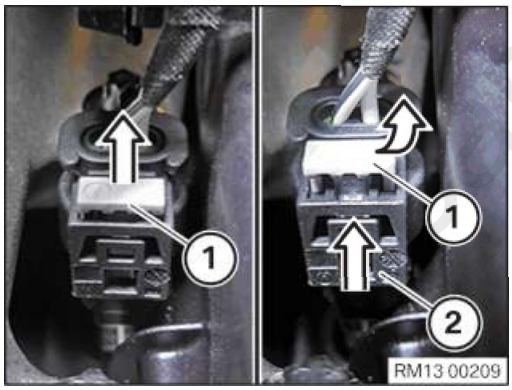
- Prepare special tool .



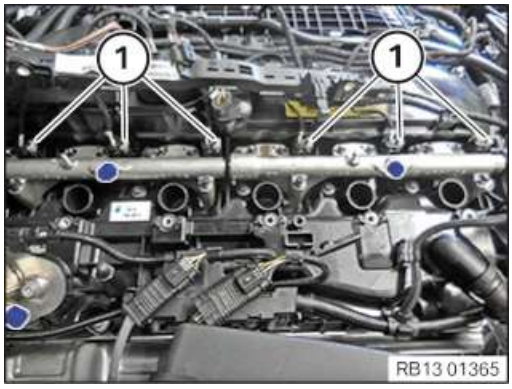
- Prepare special tool 0 496 106 (11 8 720).



- Release nuts (1) .
- Feed out ground cable (2) and set aside.
- Feed out cable channel (3) and set it aside.

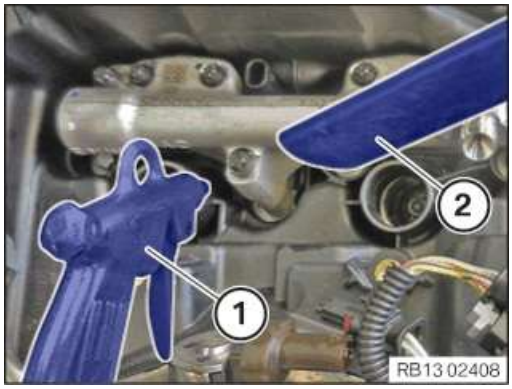


- Unlock lock (1) in direction of arrow upwards.
- Press lock (1) together and release.
- Disconnect the connector (2) from the injectors in the direction of the arrow.



- Unlock and release all connectors (1) of the injectors.

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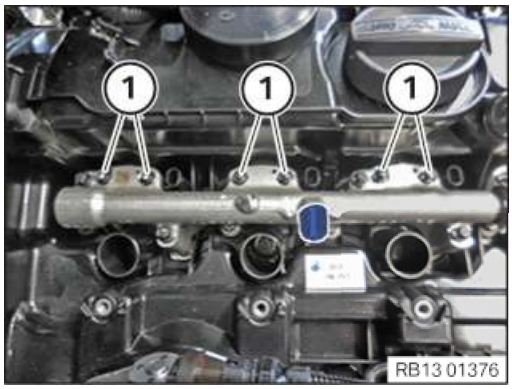


TECHNICAL INFORMATION

In case of dusty / sandy operating conditions of the vehicle, the injector shafts must be cleaned before removal.

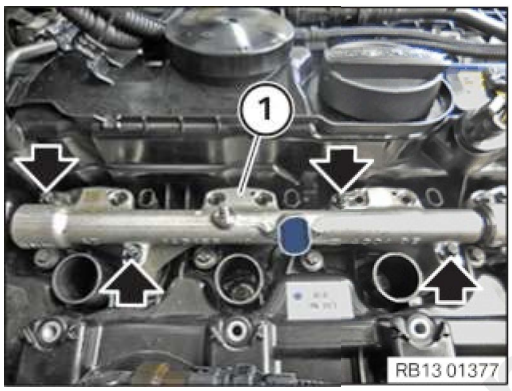
For additional information see: 13 53 ... Cleaning the cylinder head in the area of the injectors in case of sandy / dusty contamination

- Before releasing the high pressure lines: Blow out the injector shaft with an air gun (1) with less pressure.
- Simultaneously, draw the dirt particles off **using an** explosion proof (2) vacuum cleaner.



- Release screws (M5x30) (1).
- Remove screws (M5x30) (1) .

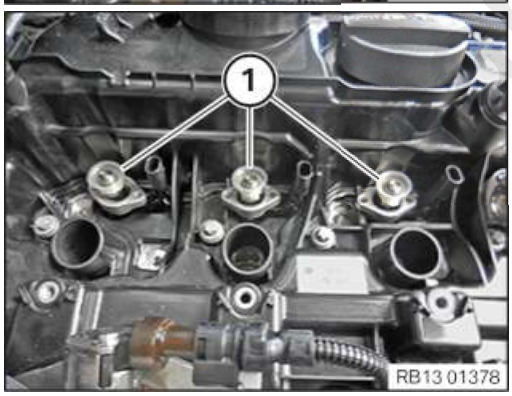
  Do **not** reuse screws (M5x30) (1).
- Catch and dispose of escaping fuel with suitable materials.



- Release screws (M6x30) (arrow).
- Remove screws (M6x30) (arrows).

  Do **not** reuse the screws (M6x30).
- Remove rail (1) upwards.

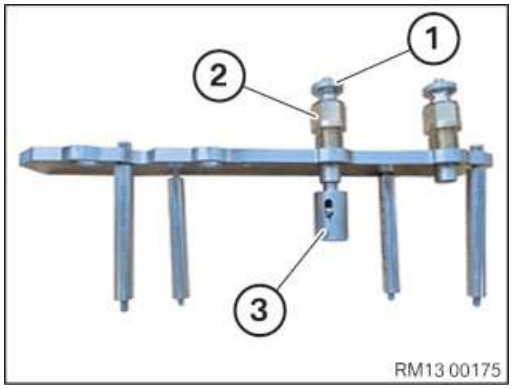
  The injectors remain in the cylinder head.



- Remove seals (1) .

  The seals (1) are required during first assembly within the plant only and will not be installed again.

.com



RISK OF DAMAGE

Damage to injectors.

Excessive force may damage the injector and this means having to renew the injector.

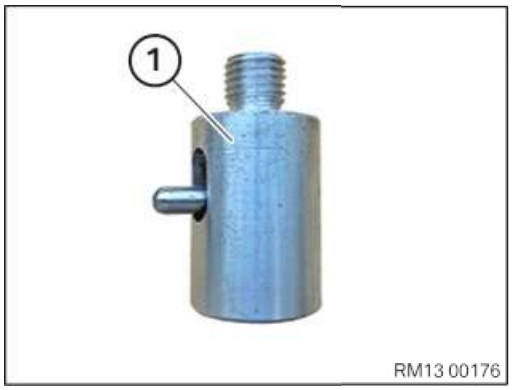
- Twist the injectors with a maximum torsional movement of 13 Nm.

- In the event that the specified value for the tensile force is exceeded: Replace injectors.
- Use the special tool 2 358 417 to remove the injectors.

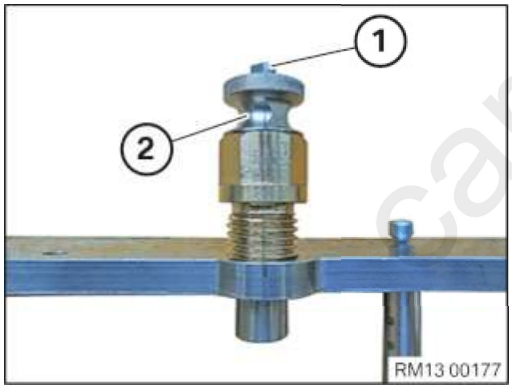
  The special tool 2 358 417 is used to ensure that the tensile force is not exceeded.

  The special tool 2 358 417 consists of:

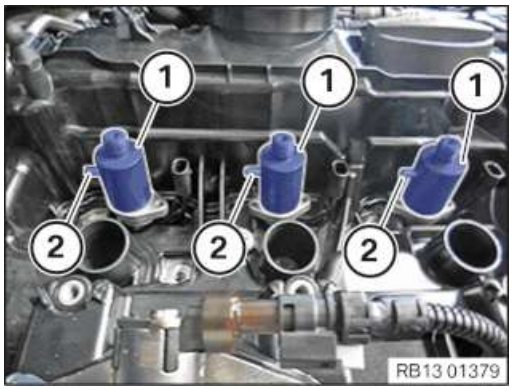
  - (1) Threaded sleeves
  - (2) Pull-out thread (left-hand thread)
  - (3) Mounting for the injectors



- Unscrew the fixture for injectors (1) from special tool 2 358 417.



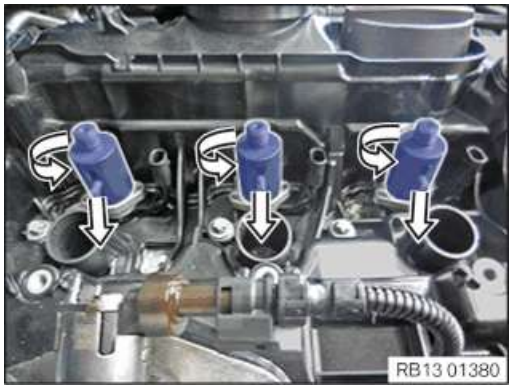
- Press lock (1) in and remove the threaded sleeve (2) from the special tool 2 358 417.



- Install all fixtures (1) for the injectors.

  The fixture (1) is not locked, if the lever is (2) on top.

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- Turn fixtures (1) by 90° and lock the lever (2) downwards.



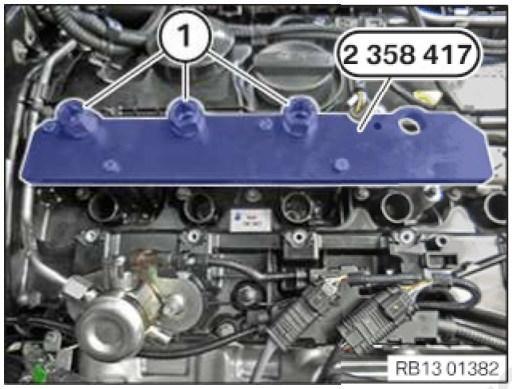
RISK OF DAMAGE

Damage to injectors.

Excessive force may damage the injector and this means having to renew the injector.

- Do not use the puller plate as a support.

- Attach special tool 2 358 417 to cylinder head.
- Hand-tighten the bolts (arrows).



TECHNICAL INFORMATION

The extraction thread is a left-hand thread.

- Screw in pull-out thread (1) on the special tool 2 358 417 fully.



- Insert the threaded sleeves (1) again and screw threaded sleeves completely onto the fixtures for the injectors.
- Then tighten screws (arrows) on special tool 2 358 417 to 5 Nm.



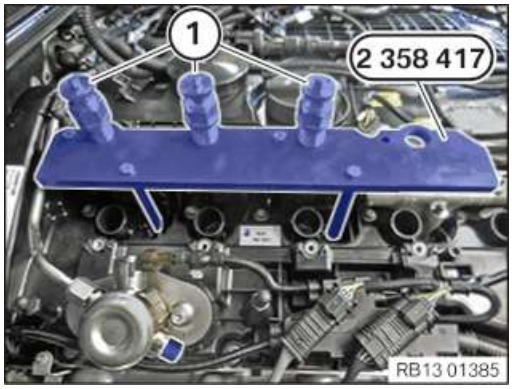
- Adjust torque wrench to 13 Nm **in clockwise** direction.
- Turn the torque wrench (1) with the special tool 0 496 106 (11 8 720) **clockwise**, until the injector is pulled out.

TECHNICAL INFORMATION

If the torque wrench makes a cracking noise when the injector is pulled out, **the injector must be renewed.**

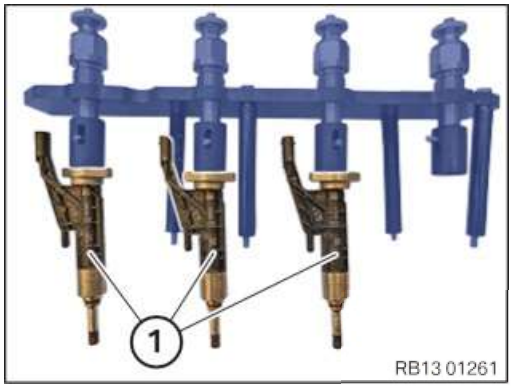
- Disassemble all injectors individually.

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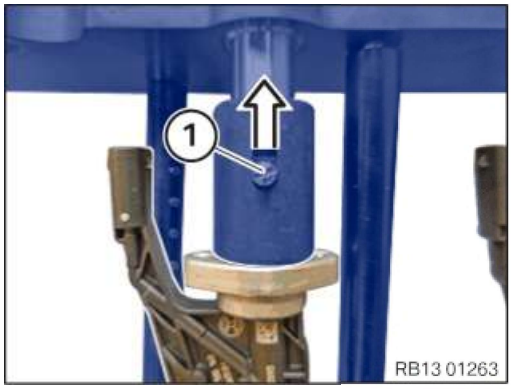


- Before removing the special tool 2 358 417 with the injectors, check if all the injectors were completely pulled out of the cylinder head.

  This can be recognised on the completely visible thread starts of the threaded sleeves (1).
- Loosen screws on special tool 2 358 417.



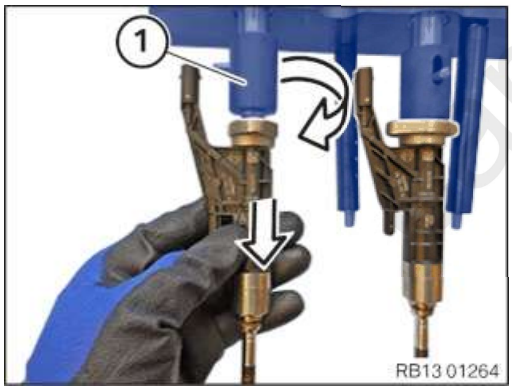
- Carefully remove the special tool 2 358 417 with the injectors (1) vertically straight up from the cylinder head.
- Place the combination of the special tool 2 358 417 and the injectors (1) flat onto a clean table.



NOTICE

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

- Unlock the fixture lock (1) from the top.



- Turn the unlocked fixture(1) by 90°.
- Release and remove the injector downwards.

8 – Prepare the injectors for installation

RISK OF DAMAGE

Damage to the injector tips and Teflon ring.

Improper handling of the injector tips and Teflon ring can lead to malfunctioning of the injector.

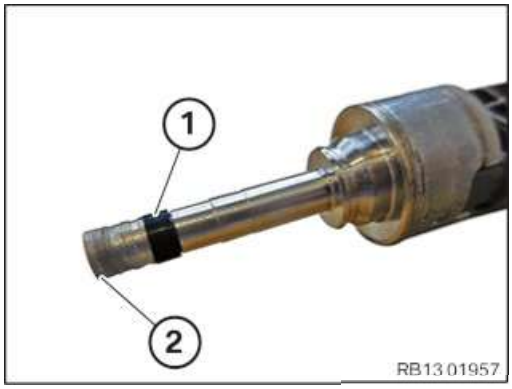
- Avoid mechanical contact with injector tip.
- When exchanging Teflon ring, hands and work surface must be clean and free of oil. Do not use any lubricating agents.
- Do not use fingernails to slide Teflon ring on.

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TECHNICAL INFORMATION

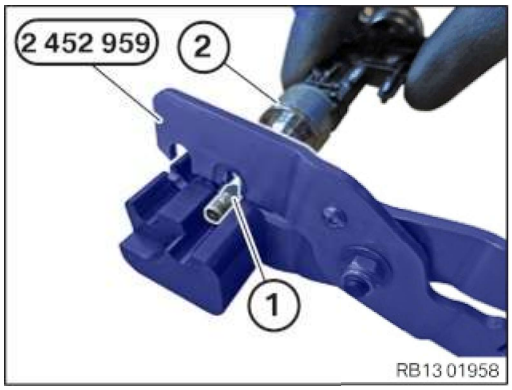
Before re-installing the injector, the Teflon ring must be renewed. Once a Teflon ring has been installed, it may not be re-used. New injectors are supplied with a new Teflon ring.

After the installation of a new Teflon ring on the injectors, the injector must be installed in the cylinder head within 10 minutes or protected with protective caps; otherwise, the Teflon ring will swell.

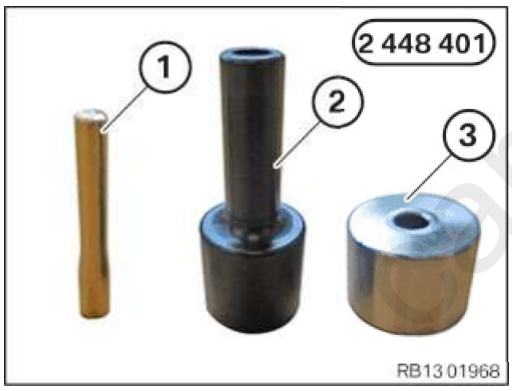


- Before installing the injectors: Renew the Teflon rings (1).

  Parts: Teflon rings
- Avoid mechanical contact with injector tip (2).



- Remove Teflon ring (1) by using special tool 2 452 959 from injector (2).
- If necessary, use a lint-free cloth to clean the cylindrical part of the injector tip. Do not use ultrasonic sound or other auxiliary materials.
- Do **not** clean the injector tip.

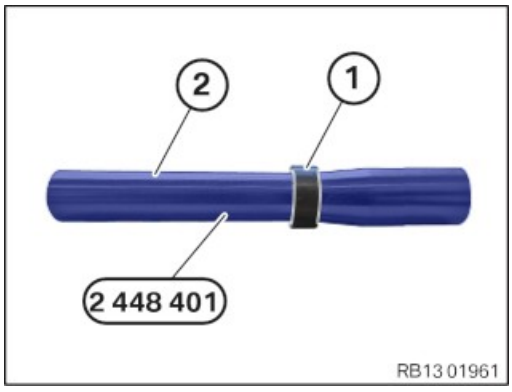


- For the installation of the new Teflon rings: Use the set of special tools 2 448 401:

  (1) Installation cone

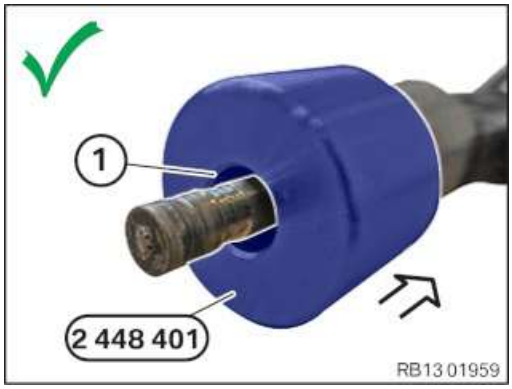
  (2) Sliding sleeve

  (3) Assembly sleeve



- Slide the new Teflon ring (1) onto the installation cone (2) from the set of special tools 2 448 401.

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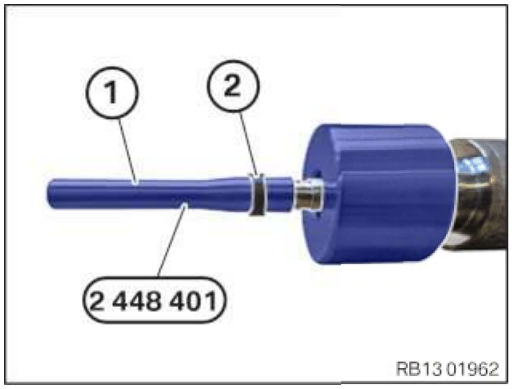
- Make sure the installation position of the assembly sleeve (1) from the set of special tools 2 448 401 is correct:

  The larger diameter of the assembly sleeve (1) must point to the injector tip.

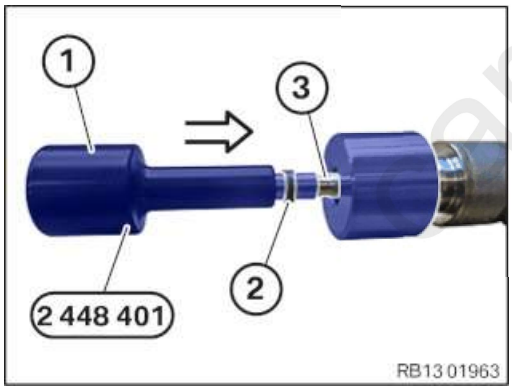


- Make sure the installation position of the assembly sleeve (1) from the set of special tools 2 448 401 is correct:

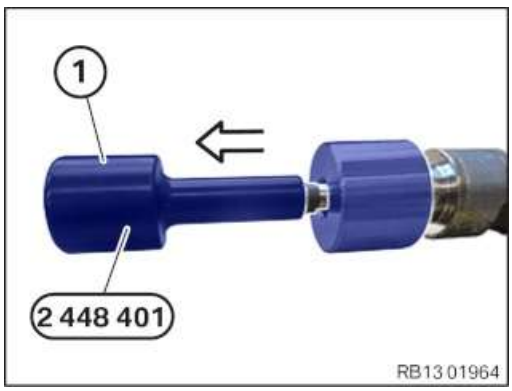
  The assembly sleeve (1) is **not** mounted correctly when the smaller diameter points to the injector tip.



- Mount the Teflon ring (2) with the installation cone (1) from the set of special tools 2 448 401 on the injector tip .

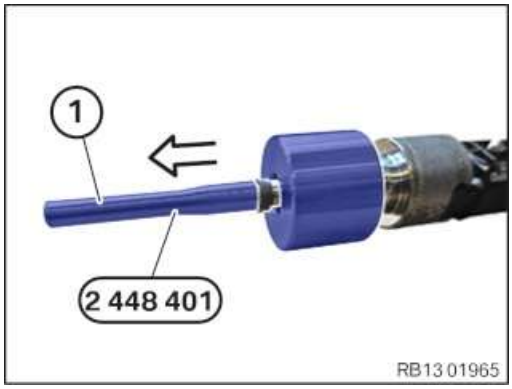


- Use the sliding sleeve (1) from the set of special tools 2 448 401 to push the Teflon ring (2) into the groove (3) on the injector in the direction of the arrow.

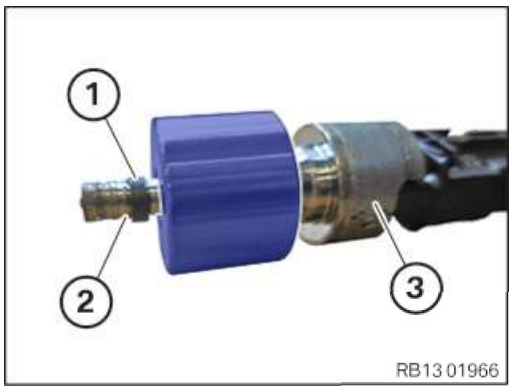


- Thread out the sliding sleeve (1) from the set of special tools 2 448 401 in the direction of the arrow and remove.

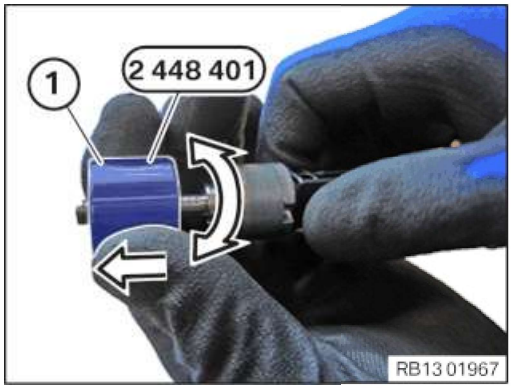
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- Thread out the installation cone (1) from the set of special tools 2 448 401 in the direction of the arrow and remove.

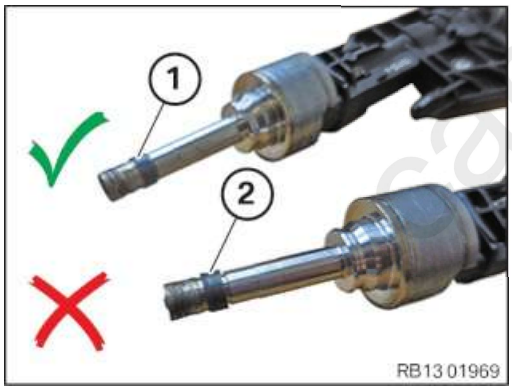


- Make sure that the expanded Teflon ring (1) is properly inserted in the groove (2) of the injector (3) and can be moved easily with your fingers.



- Calibrate the expanded Teflon ring with the assembly sleeve (1) from the set of special tools 2 448 401 to the installation dimension in the direction of the arrow.
- Perform **rotational movements** in increments of 180° synchronous to the **pull-off movement**. Perform the movements slowly and **not** jerky.

  This calibrates the Teflon ring (1) to the installation dimension.
- Thread out and remove the assembly sleeve (1).



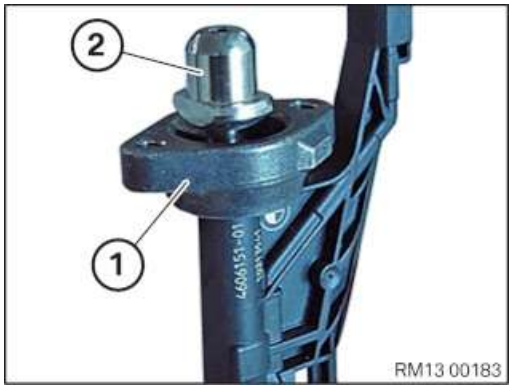
- Check the correct installation dimension of the Teflon ring (1):
  - (1) indicates a correct installation dimension of the Teflon ring.
  - (2) indicates an incorrect installation dimension of the Teflon ring.

9 – Installing the high-pressure rail with injectors of the cylinders 4 to 6

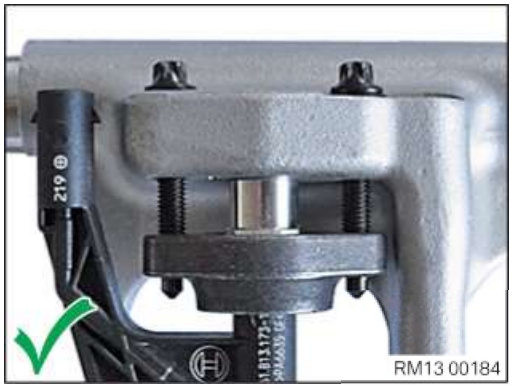
TECHNICAL INFORMATION

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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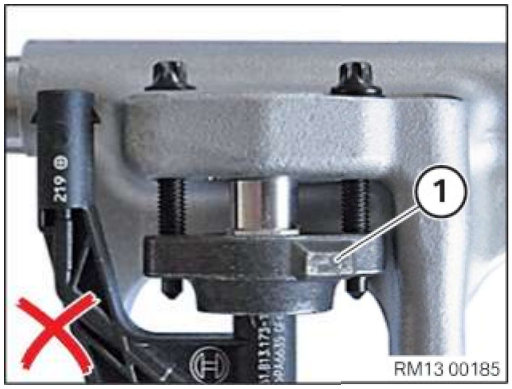


- Mount the holder (1) above the bayonet fitting (2) on the injector.
- **If the holder**(1) **has a cast lug**: Make sure that the holder is installed in the correct position.



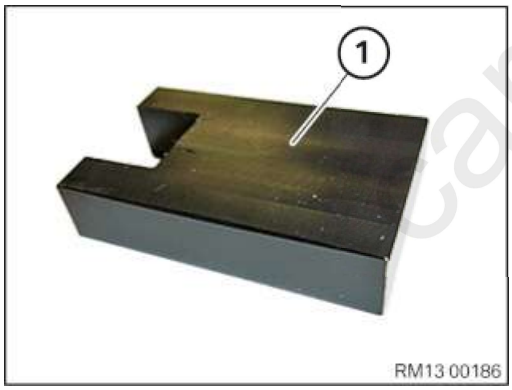
- If applicable, note the position of the cast lug:

  The holder is mounted **correctly** when the cast lug is located at the rear.



- If applicable, note the position of the cast lug:

  The holder is mounted **incorrectly** when the cast lug (1) is in front.



RISK OF DAMAGE

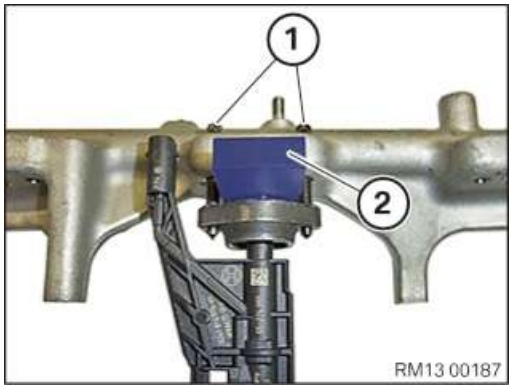
Damage to injectors.

Weld seams on the injector may tear due to incorrect distances between the rail and injector so that the injector must be renewed.

- Insertion of the distance gauge is compulsory.
- Replace distance gauge, if a thickness of 8.5 mm is no longer given in the distance gauge.

- Use the special tool (distance gauge) 2 358 022 (1).

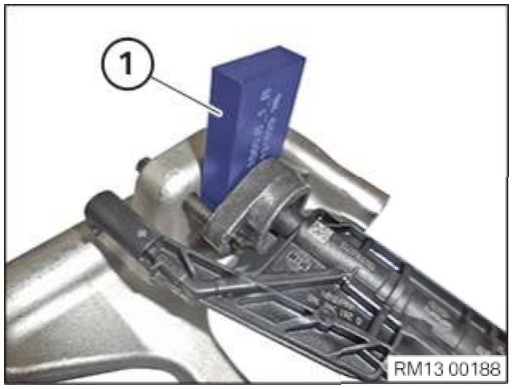
carliagn.com



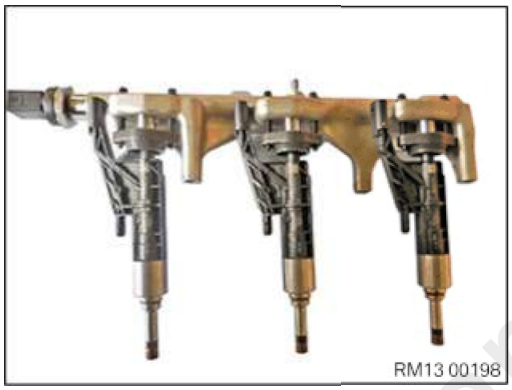
- Replace (M5x30) screws.

  Parts: Screws (M5x30)
- Mount the injectors with the holders and the bolts (M5x30) (1) on the rail.
- Keep the rail on a clean table in such a way that the openings on the rail for the injectors point upwards.

  The electrical injector connections must point to the fuel pressure sensor.
- Slide the special tool (distance gauge) 2 358 022 (2) between the holders and the rail onto the injector head.
- Make sure that the special tool (distance gauge) 2 358 022 (2) rests flat on the retaining bridge.
- Hand-tighten both screws (M5x30) (1) evenly until the special tool (distance gauge) 2 358 022 (2) rests flat against the rail and the holder.



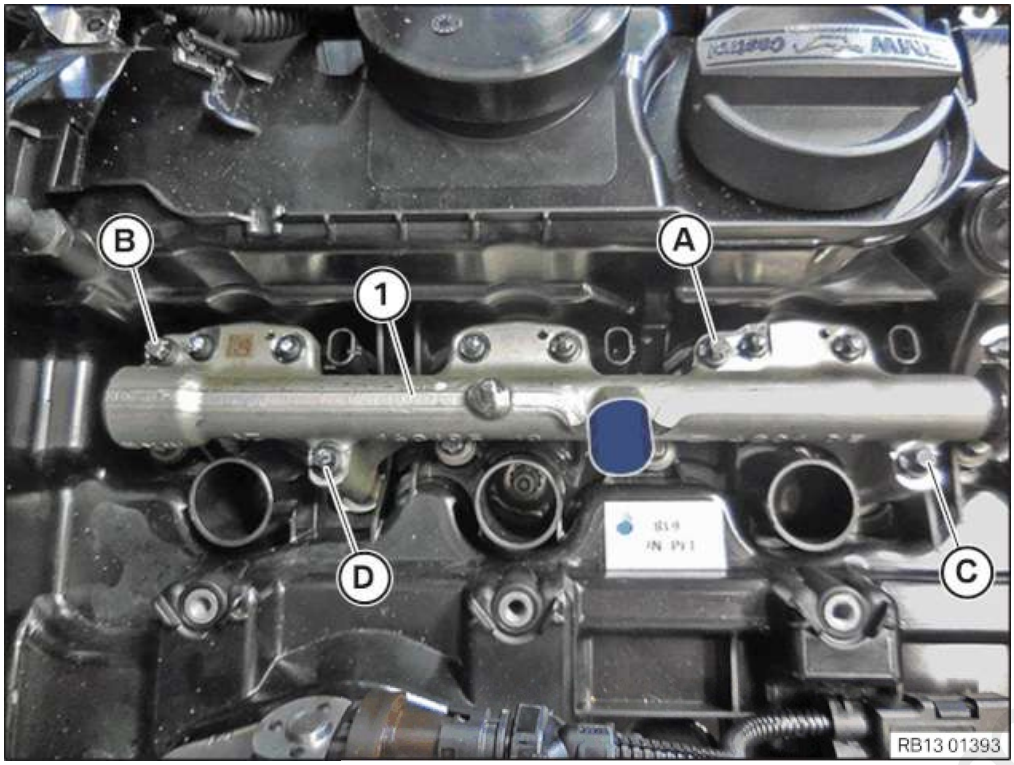
- Remove the special tool (distance gauge) 2 358 022 (1).
- Repeat this operation for all injectors.



- Check injectors for loose fit at the rail.
- Align the electrical injector connections parallel to the rail.

  The injectors must move freely.

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- Renew screws (A) to (D).

  Parts: Bolts
- Attach the rail (1) with the injectors to the cylinder head from the top.
- Make sure the injector tips catch the corresponding holes in the cylinder head.
- Make sure the guides on the injector are properly inserted into the guide bores in the cylinder head.
- Press the rail (1) down until a resistance can be felt; join and hand-tighten the bolts (M6x30) (A) and (B).
- Set the torque wrench to 2 Nm.
- Tighten the screws (A) and (B) in alternating order by **180°** each with the torque wrench until the rail is positioned flush on the cylinder head.

  The figure shows the rail resting flat against the cylinder head.
- Insert bolts (C) and (D).

TECHNICAL INFORMATION

When assembling, it is essential to observe screwing sequences and tightening torques.

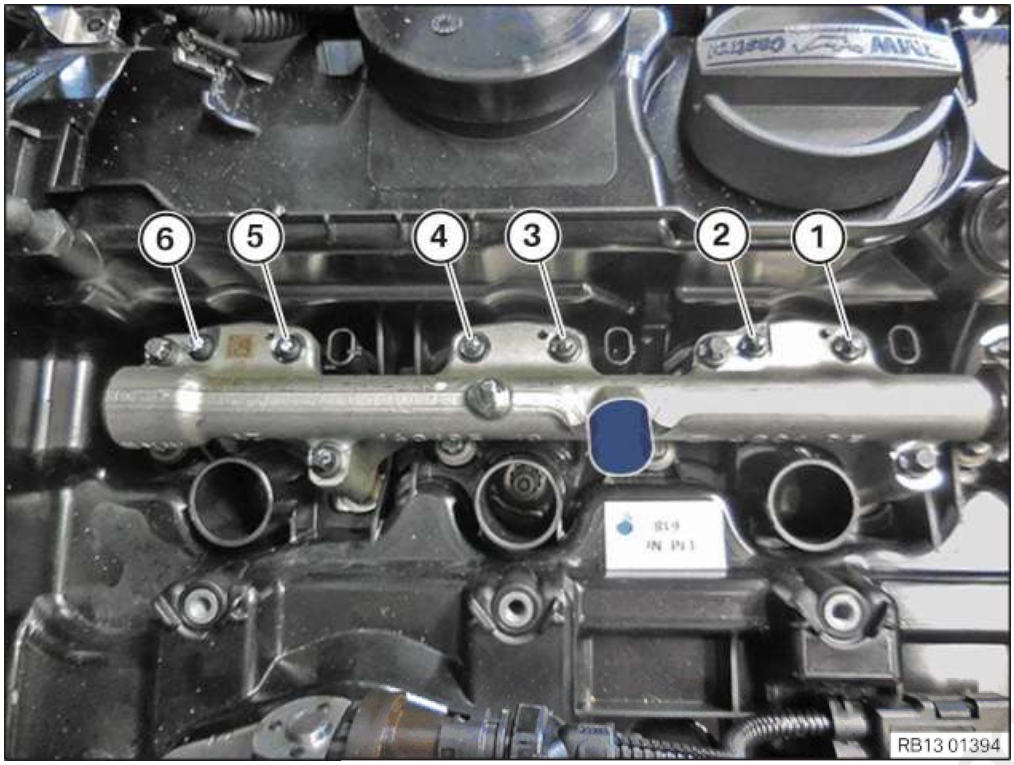
Non-observance of these requirements may result in leaks and damage.

- Tighten bolt (A) to 5 Nm.
- Tighten bolt (D) to 5 Nm.
- Tighten bolt (B) to 5 Nm.
- Tighten bolt (C) to 5 Nm.



- Make sure that the rail (1) rests flat against the cylinder head.

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- Attach a socket to an extension.

  Do not use a reversible ratchet or torque wrench.
- Tighten the bolts (M5x30) in pairs ((1) with (2), (3) with (4), (5) with (6)) in alternating order **90° hand-tight**.
- Set the torque wrench to 5 Nm.

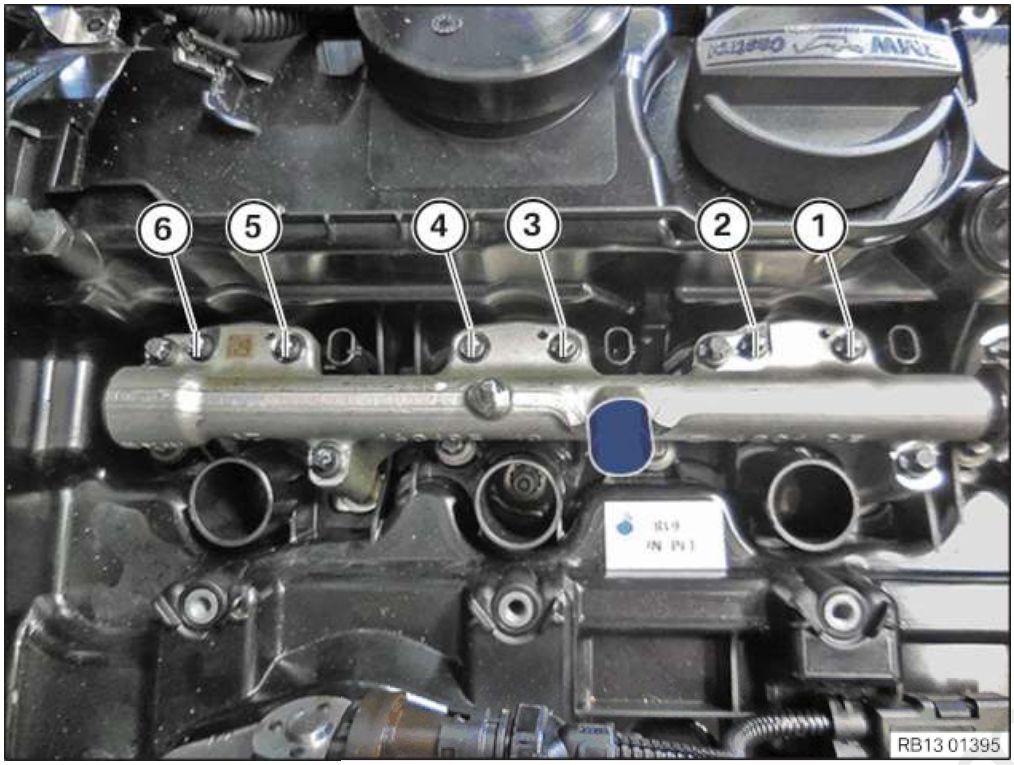
TECHNICAL INFORMATION

When assembling, it is essential to observe screwing sequences and tightening torques.

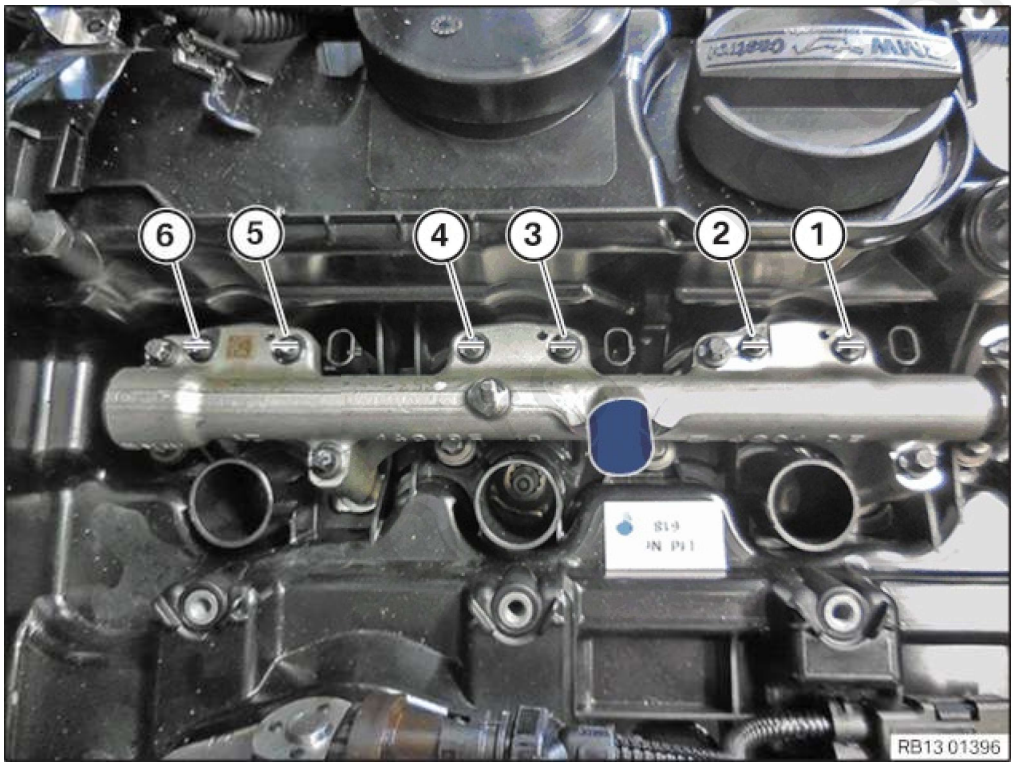
Non-observance of these requirements may result in leaks and damage.

- **Screw the (M5x30) bolts according to the following plan:**
  - **Fuel injector 4:**
  - Tighten screw (1) at an angle of rotation of 90° ±15° with the torque wrench.
  - Tighten screw (2) at an angle of rotation of 90° ±15° with the torque wrench.
  - Repeat the operations for bolts (1) and (2) until both bolts reach a torque of 5 Nm.
  - **Fuel injector 5:**
  - Tighten screw (3) at an angle of rotation of 90° ±15° with the torque wrench.
  - Tighten screw (4) at an angle of rotation of 90° ±15° with the torque wrench.
  - Repeat the operations for bolts (3) and (4) until both bolts reach a torque of 5 Nm.
  - **Fuel injector 6**:
  - Tighten screw (5) at an angle of rotation of 90° ±15° with the torque wrench.
  - Tighten screw (6) at an angle of rotation of 90° ±15° with the torque wrench.
  - Repeat the operations for bolts (5) and (6) until both bolts reach a torque of 5 Nm.

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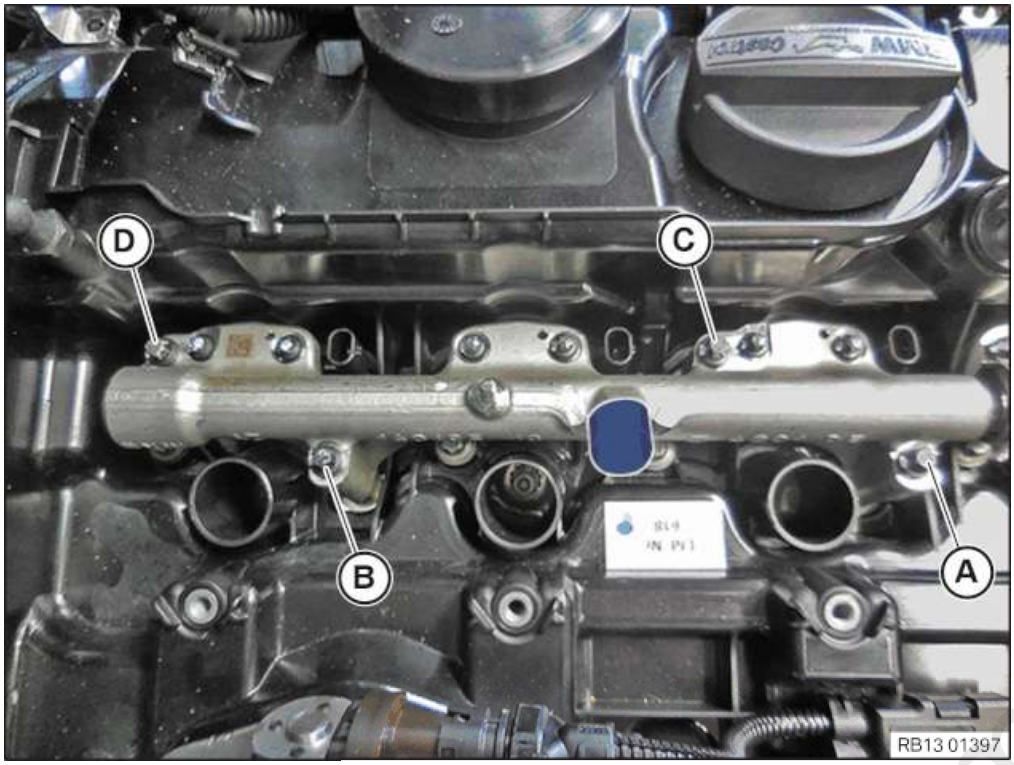


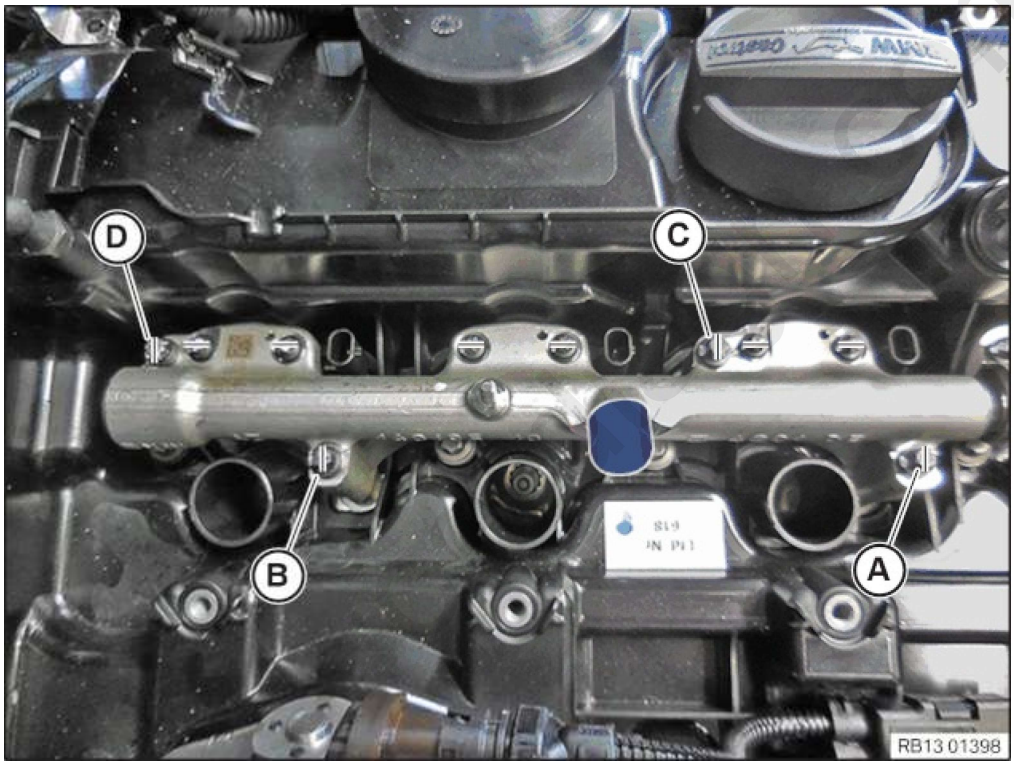
- Mark all bolts (1) to (6) with a vertical line (see figure).
- **Tighten screws using an angle of rotation.**
  - Tighten the screw (1) with an angle of rotation of 90° ±15°.
  - Tighten the screw (2) with an angle of rotation of 90° ±15°.
  - Tighten the screw (3) with an angle of rotation of 90° ±15°.
  - Tighten the screw (4) with an angle of rotation of 90° ±15°.
  - Tighten the screw (5) with an angle of rotation of 90° ±15°.
  - Tighten the screw (6) with an angle of rotation of 90° ±15°.



- Check if all bolts (1) to (6) have been tightened with a 90° ±15° angle of rotation.

  All marks (lines) must be horizontal (see figure).





- Unscrew the bolts (M6x70) (A) to (D).

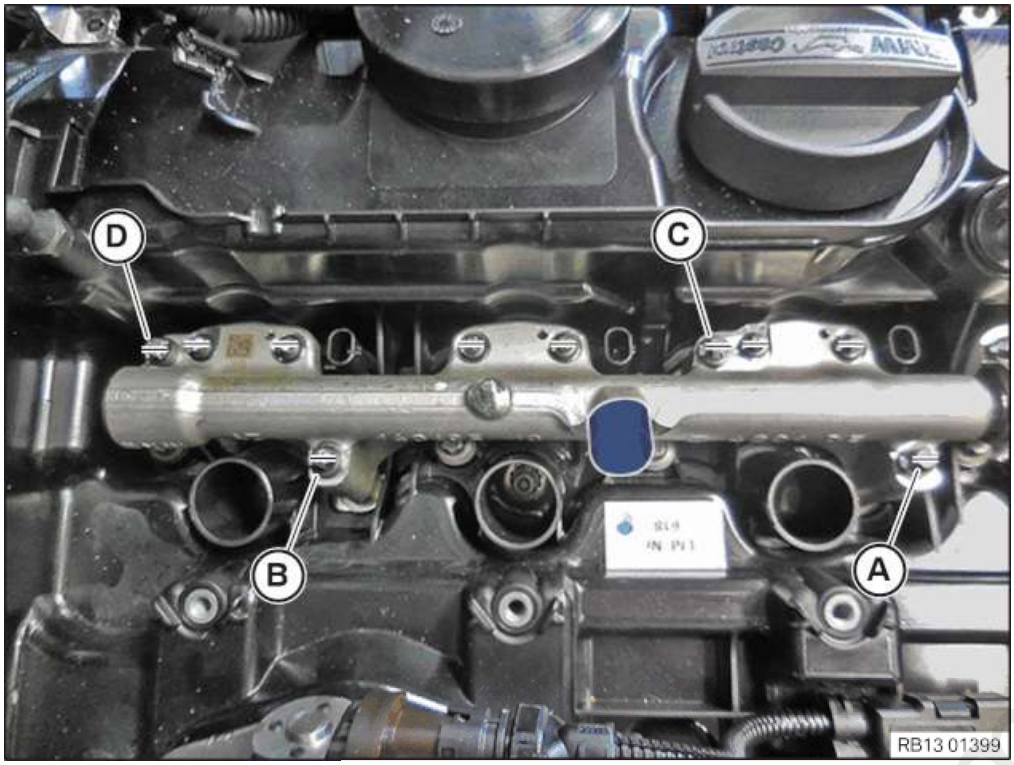
  It is imperative that the bolts are unscrewed.

TECHNICAL INFORMATION

When assembling, it is essential to observe screwing sequences and tightening torques.

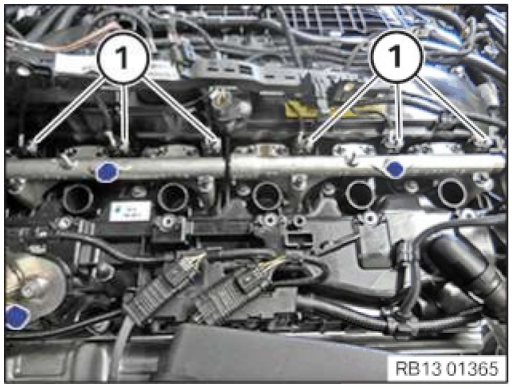
Non-observance of these requirements may result in leaks and damage.

- Tighten bolt (A) to 5 Nm.
- Tighten bolt (D) to 5 Nm.
- Tighten bolt (B) to 5 Nm.
- Tighten bolt (C) to 5 Nm.
- Mark all bolts (A) to (D) with a vertical line (see figure).
- Tighten bolts (M6x70) (A) to (D) to a 90° angle of rotation.



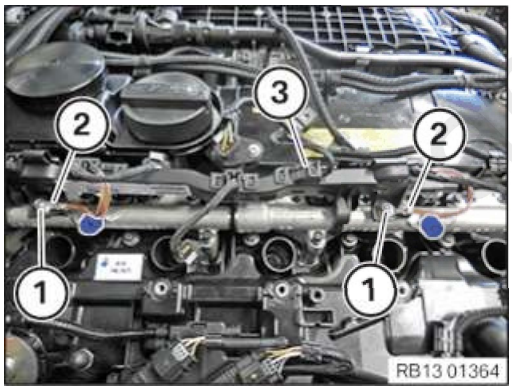
- Check if all bolts (A) to (D) have been tightened with a 90° angle of rotation.

  All marks (lines) must be horizontal (see figure).



- Connect and lock all connectors (1) to the injectors.

  All connectors (1) must engage audibly.



- Thread in cable channel (3) and install.
- Thread in ground cable (2) and install.
- Tighten nuts (1).

Ground cable to rail

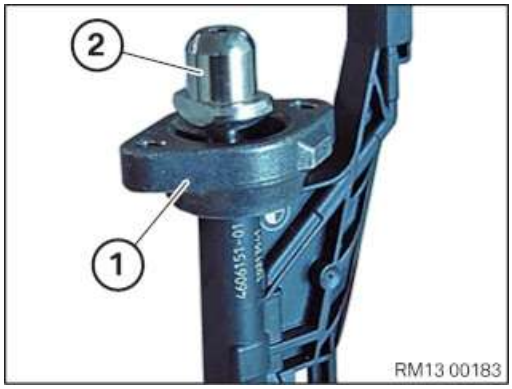
M6			5 Nm

10 – Installing rail with injectors of cylinders 1 to 3

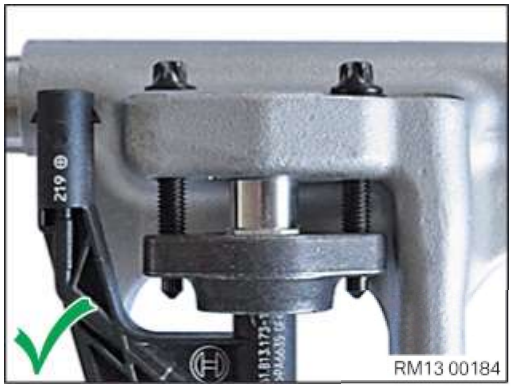
TECHNICAL INFORMATION

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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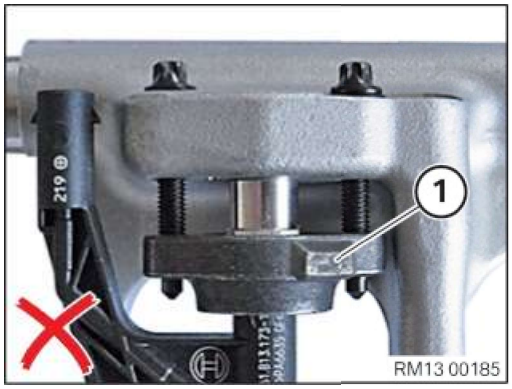


- Mount the holder (1) above the bayonet fitting (2) on the injector.
- **If there is a cast lug on the holder** (1) **:** Make sure that the holder is installed in the correct position.



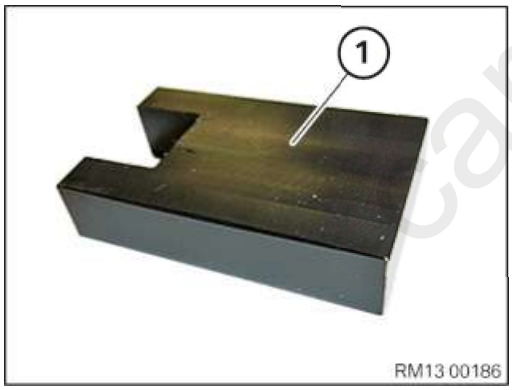
- Observe position of cast lug:

  The holder is mounted **correctly** when the cast lug is located at the rear.



- Observe position of cast lug:

  The holder is mounted **incorrectly** when the cast lug (1) is in front.



RISK OF DAMAGE

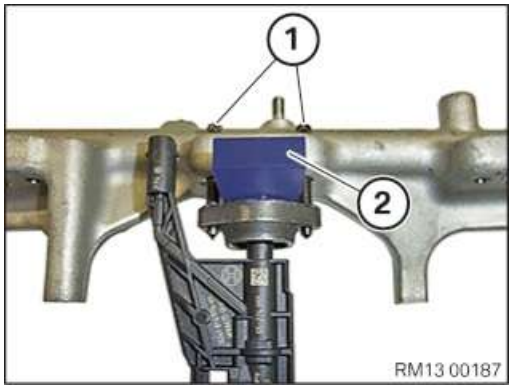
Damage to injectors.

Weld seams on the injector may tear due to incorrect distances between the rail and injector so that the injector must be renewed.

- Insertion of the distance gauge is compulsory.
- Replace distance gauge, if a thickness of 8.5 mm is no longer given in the distance gauge.

- Use special tool 2 358 022(1) .

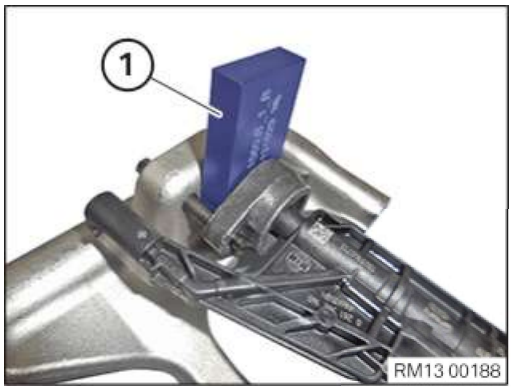
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- Replace (M5x30) screws.

  Parts: Screws (M5x30)
- Mount the injectors with the holders and the bolts (M5x30) (1) on the rail.
- Keep the rail on a clean table in such a way that the openings on the rail for the injectors point upwards.

  The electrical injector connections must point to the fuel pressure sensor.
- Slide special tool 2 358 022 (2) between the holders and the rail onto the injector head.
- Make sure the special tool 2 358 022 (2) rests flat on the retaining bridge.
- Hand-tighten both screws (M5x30) (1) uniformly until the special tool 2 358 022 (2) rests flat against the rail and the holder.



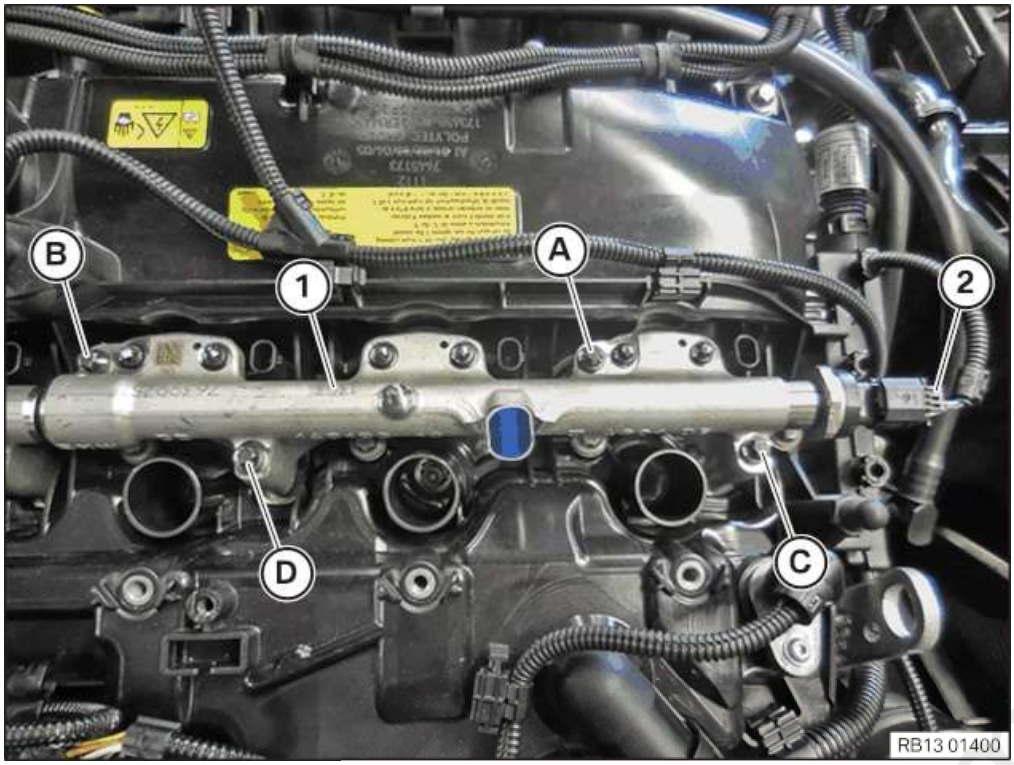
- Remove special tool 2 358 022(1) .
- Repeat this operation for all injectors.



- Check injectors for loose fit at the rail.
- Align the electrical injector connections parallel to the rail.

  The injectors must move freely.

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- Renew screws (A) to (D).

  Parts: Bolts
- Attach the rail (1) with the injectors to the cylinder head from the top.
- Make sure the injector tips catch the corresponding holes for the injectors in the cylinder head.
- Make sure the guides on the injector are properly inserted into the guide bores in the cylinder head.
- Press rail (1) down until a resistance can be felt; join and hand-tighten screws (M6x30) (A) and (B).
- Tighten screws (A) and (B) alternately by **180°** each with the torque wrench until the rail is positioned on the cylinder head.

  The figure shows the rail resting flat against the cylinder head.
- Insert screws (C) and (D).

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.

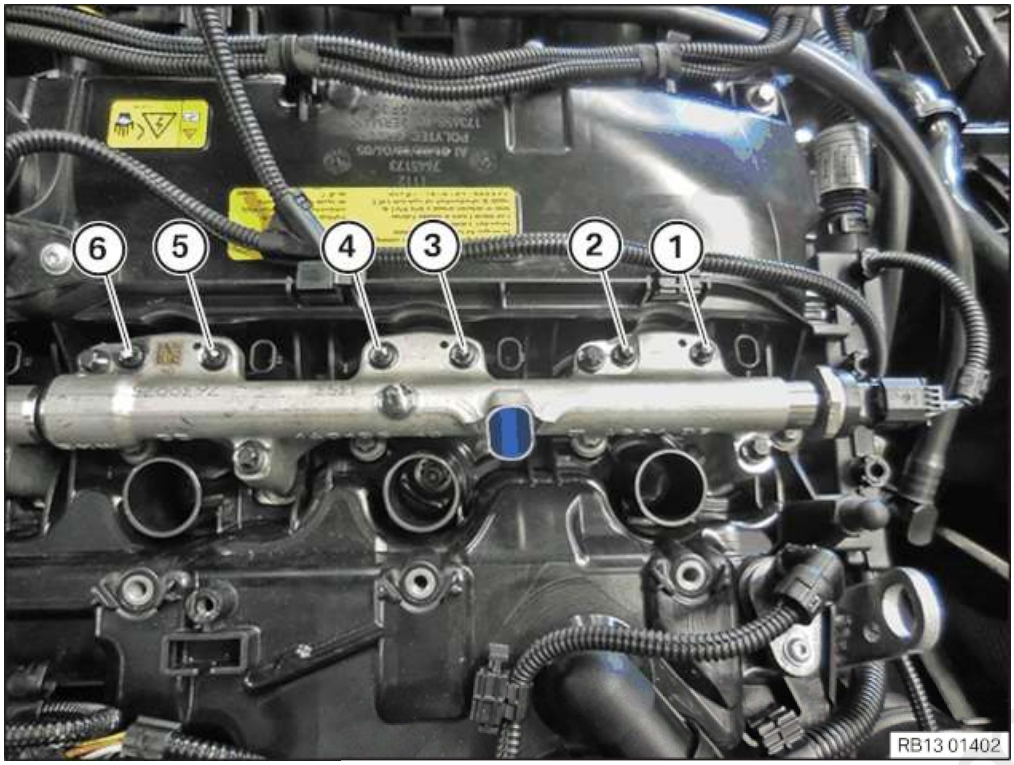
- Tighten screw (A) to 5 Nm.
- Tighten screw (D) to 5 Nm.
- Tighten screw (B) to 5 Nm.
- Tighten screw (C) to 5 Nm.
- Connect and lock the connector (2).

  The connector (2) must engage audibly.



- Make sure that the rail (1) rests flat against the cylinder head.

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- Attach a socket to an extension.

  Do not use a reversible ratchet or torque wrench.
- Hand-tighten screws (M5x30) in pairs ((1) with (2), (3) with (4), (5) with (6)) alternately by **90°**.
- Set torque wrench to 5 Nm.

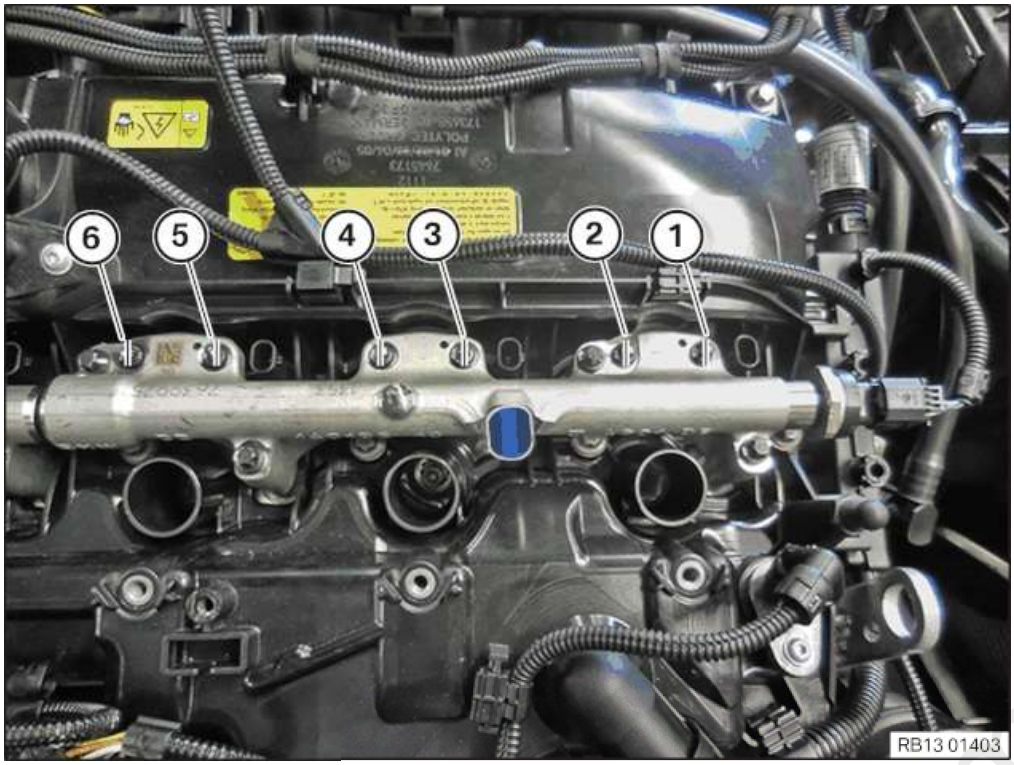
TECHNICAL INFORMATION

When assembling, it is essential to observe screwing sequences and tightening torques.

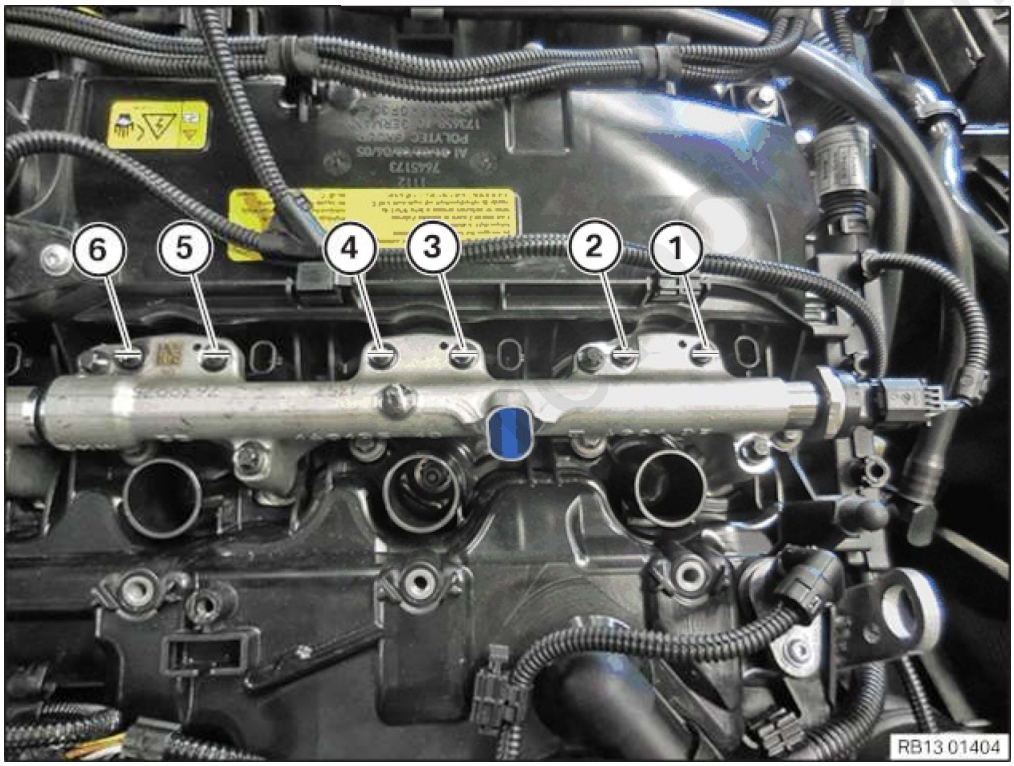
Non-observance of these requirements may result in leaks and damage.

- **Screw the (M5x30) bolts according to the following plan:**
  - **Fuel injector 1:**
  - Tighten screw (1) at an angle of rotation of 90° ±15° with the torque wrench.
  - Tighten screw (2) at an angle of rotation of 90° ±15° with the torque wrench.
  - Repeat the operations for bolts (1) and (2) until both bolts reach a torque of 5 Nm.
  - **Fuel injector 2:**
  - Tighten screw (3) at an angle of rotation of 90° ±15° with the torque wrench.
  - Tighten screw (4) at an angle of rotation of 90° ±15° with the torque wrench.
  - Repeat the operations for bolts (3) and (4) until both bolts reach a torque of 5 Nm.
  - **Fuel injector 3**:
  - Tighten screw (5) at an angle of rotation of 90° ±15° with the torque wrench.
  - Tighten screw (6) at an angle of rotation of 90° ±15° with the torque wrench.
  - Repeat the operations for bolts (5) and (6) until both bolts reach a torque of 5 Nm.

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- Mark all bolts (1) to (6) with a line (see figure).
- **Tighten screws using an angle of rotation.**
  - Tighten the screw (1) with an angle of rotation of 90° ±15°.
  - Tighten the screw (2) with an angle of rotation of 90° ±15°.
  - Tighten the screw (3) with an angle of rotation of 90° ±15°.
  - Tighten the screw (4) with an angle of rotation of 90° ±15°.
  - Tighten the screw (5) with an angle of rotation of 90° ±15°.
  - Tighten the screw (6) with an angle of rotation of 90° ±15°.



- Check if all bolts (1) to (6) have been tightened with a 90° ±15° angle of rotation.

  All markings (lines) must be horizontal (see Figure).



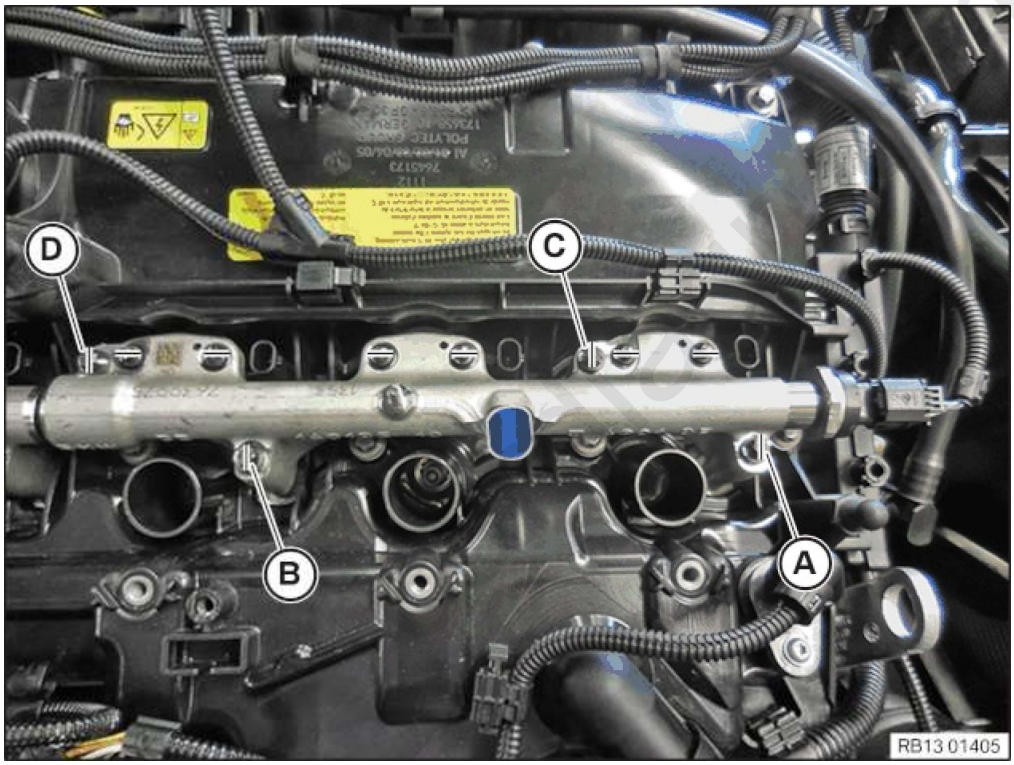
- Release screws (M6x70) (A) to (D) **without fail**.

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 screw (A) to 5 Nm.
- Tighten screw (D) to 5 Nm.
- Tighten screw (B) to 5 Nm.
- Tighten screw (C) to 5 Nm.

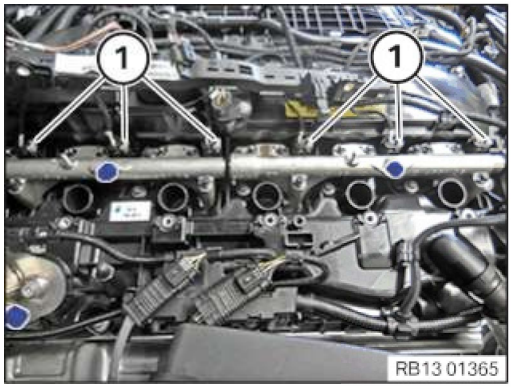


- Mark all the bolts (A) to (D) with a vertical line (see Figure).
- Tighten bolts (M6x70) (A) to (D) with an angle of rotation of 90°.



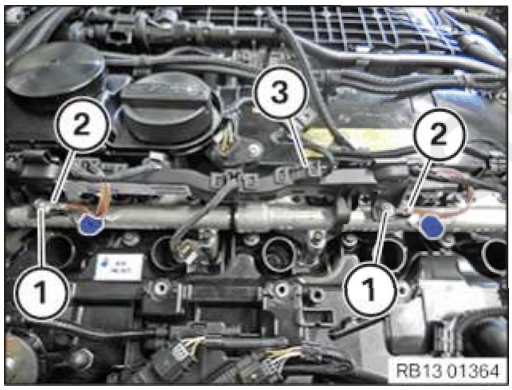
- Check whether all screws (A) to (D) have been tightened with an angle of rotation of 90°.

  All marks (lines) must be horizontal (see figure).



- Connect and lock all the connectors (1) to the injectors.

  All connectors (1) must engage audibly.



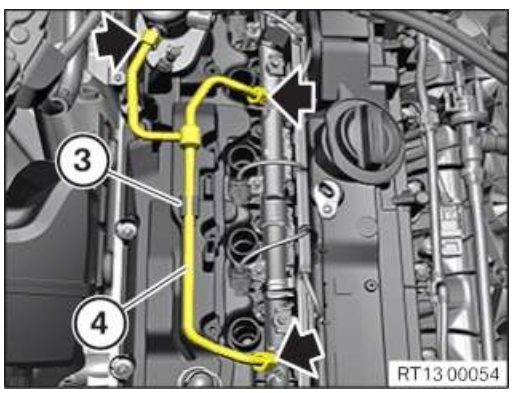
- Thread the cable channel (3) in and install.
- Thread in ground cable (2) and install.
- Tighten nuts (1).

Ground cable to rail

M6			5 Nm

POSTPROCESSES

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

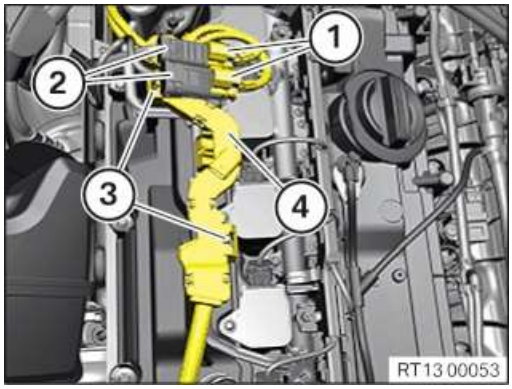


- Insert the high pressure line (4) into the holder (3) and install.
- Tighten union nuts (arrows) with the special tool .

High pressure line between rail and high pressure pump

M14x1,5		Tightening torque	33 Nm

rdiagn.com



- Insert and install the wiring harness section of the engine wiring harness (4).

  The locks (3) must engage audibly.
- Connect connectors (1) and (2) and lock.

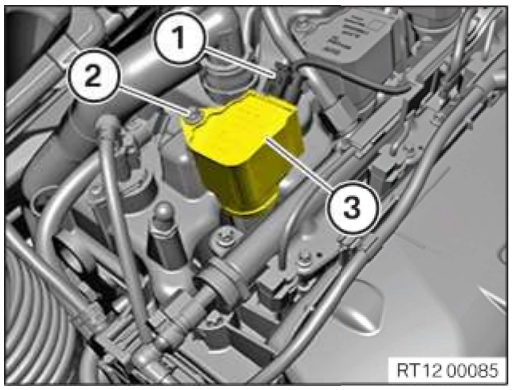
  The connectors (1) and (2) must audibly engage.

12 – Install all ignition coils

NOTICE

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

▶ Install ignition coil.



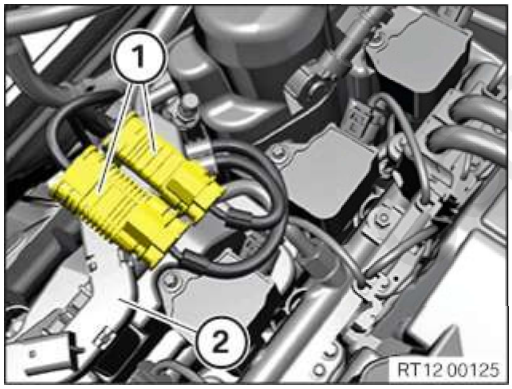
- Install ignition coil (3).
- Tighten down screw (2).

Ignition coil

Screw		Tightening torque	8 Nm

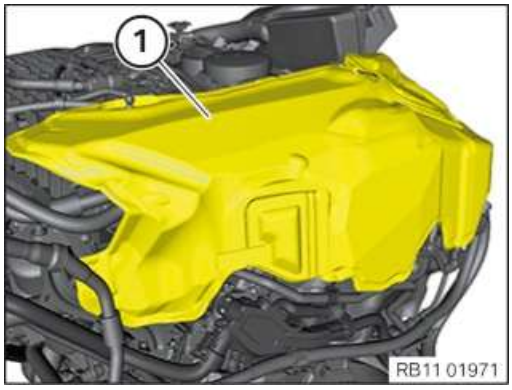
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



- Connect the connector (1) of the front oxygen sensor and the monitoring oxygen sensor on the cable shaft (2).

13 – Installing acoustic cover at rear



- Make sure the acoustic cover (1) is correctly positioned on the rear side of the engine.

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- Install the acoustic cover (1) from the top and clip it in into the marked areas.

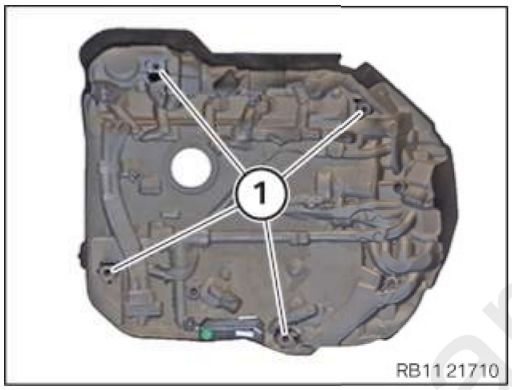
14 – Install acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover.

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

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



- Check the rubber mount (1) for correct fit in the acoustic cover.



- Install acoustic cover (1) and fix in the rubber mounts (marks).

15 – Disconnecting all battery earth leads

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- See additional information.

16 – Reset ultra-small quantity adaptation

TECHNICAL INFORMATION

If the DME control unit or an injector is renewed, minimum quantity adaptation must be reset. If an injector has been replaced on cylinder side, the minimum quantity adaptation must also be reset.



- Connect the diagnosis system to reset the minimum quantity adaptation:
  - Read out vehicle data
  - Identification without vehicle test
  - Start vehicle test
  - Vehicle handling
  - Service functions
  - Power train
  - Engine electronics
  - Adjustment functions
  - Delete adaptations
  - Reset adaptation values
  - Reset ultra-small quantity adaptation

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Additional Information

Overview of Tightening Torques

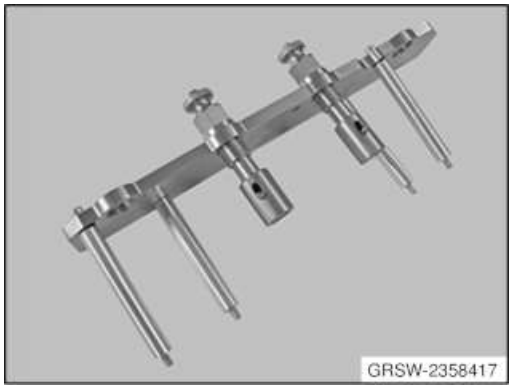
Ground cable to rail			Used in step 910
M6			5 Nm

High pressure line between rail and high pressure pump			Used in step 11
M14x1,5		Tightening torque	33 Nm

Ignition coil			Used in step 12
Screw		Tightening torque	8 Nm

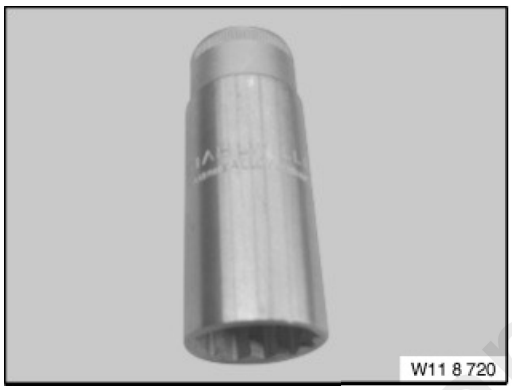
Overview of Special Tools

2 358 417 Device



Common	Used in step 67
Usage	For removing and installing injectors. 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	A57
Replaced by	
In connection with	
SI-Number	01 13 14 (098)

0 496 106 (11 8 720) Socket WAF 46



Common	Used in step 67
Usage	(Long socket SW24) For removal and installation of oil pressure sensor. (Stahlwille or HAZET)
Included in the tool or work	
Storage location	C20
Replaced by	
In connection with	
SI-Number	01 04 07 (352)

2 452 959 Pliers



Common	Used in step 8
Usage	For disassembly of the PTFE sealing rings on the injector HDEV5 & HDEV6. Replaces 0495757 (SWZ number 13 0 191). 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	A5
Replaced by	
In connection with	
SI-Number	01 07 17 (487)

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2 448 401 Fitting aid



Common	Used in step 8
Usage	For installation of PTFE rings on injector. Contour-graphic silhouette foil is included in the delivery specification. Further information on the contour-graphic silhouette foil is included in service information 00 22 13 (969).
Included in the tool or work	
Storage location	C55
Replaced by	
In connection with	
SI-Number	01 07 17 (487)

2 358 022 Gauge



Common	Used in step 910
Usage	To position the injector during installation. 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 13 14 (098)

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Links

Repair instructions	Used in step
61 20 900 Disconnecting and connecting battery earth lead	115
61 20 900 Disconnecting and connecting battery earth lead	115
61 20 900 Disconnecting and connecting battery earth lead	115
61 20 900 Disconnecting and connecting battery earth lead	115
61 20 900 Disconnecting and connecting battery earth lead	115
61 20 900 Disconnecting and connecting battery earth lead	115
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	115
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	115
61 20 900 Disconnecting and connecting battery earth lead	115
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	115
61 20 900 Disconnect and connect battery earth lead (Plug-in Hybrid Electric Vehicle)	115
61 20 900 Disconnecting and connecting battery earth lead	115

61 20 900 Disconnecting and connecting battery earth lead	115
61 20 900 Disconnecting and connecting battery earth lead	115
61 20 900 Disconnecting and connecting battery earth lead	115
61 20 900 Disconnecting and connecting battery earth lead	115
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61 20 900 Disconnecting and connecting battery earth lead	115
61 20 900 Disconnecting and connecting battery earth lead	115
61 20 900 Disconnecting and connecting battery earth lead	115
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	115
61 20 900 Disconnecting and connecting battery earth lead	115
61 20 900 Disconnecting and connecting battery earth lead	115
61 20 900 Disconnecting and connecting battery earth lead	115
61 20 900 Disconnecting and connecting battery earth lead	115
61 20 900 Disconnecting and connecting battery earth lead	115
61 20 900 Disconnecting and connecting battery earth lead	115
61 20 900 Disconnecting and connecting battery earth lead	115
61 35 ... Notes on ESD protection (Electro Static Discharge)	4
13 53 ... Clean the cylinder heads in the area of injectors to prevent sand/dust contamination.	67

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13 53 180 Replace pressure line

WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Detach battery earth lead from battery.
- For additional batteries: Detach all battery earth leads from additional batteries.

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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PRELIMINARY WORK

1 – Disconnecting all battery earth leads



- See additional information.

2 – Removing the acoustic cover

WARNING

Hot surfaces.

Risk of burning!

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

RISK OF DAMAGE

Damage to the acoustic cover.

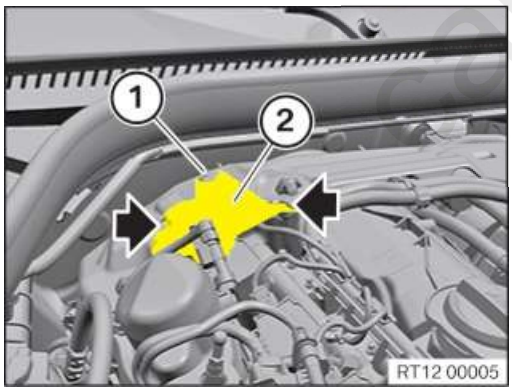
Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover.

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



- Release the acoustic cover (1) towards the top from the rubber mounts (marks).

3 – Release the service opening of the sound insulation at the top of the engine



- Detach the service opening (2) in the marked areas (arrows) and twist it to the side at the pivot point (1).

4 – Remove all ignition coils.

NOTICE

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

▸ **Removing the ignition coil**

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WARNING

Hot surfaces.

Risk of burning!

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

RISK OF DAMAGE

Damage to the ignition coil.

The silicone hose of the ignition coil must not be contaminated by fuel as this can lead to failure of the ignition coil.

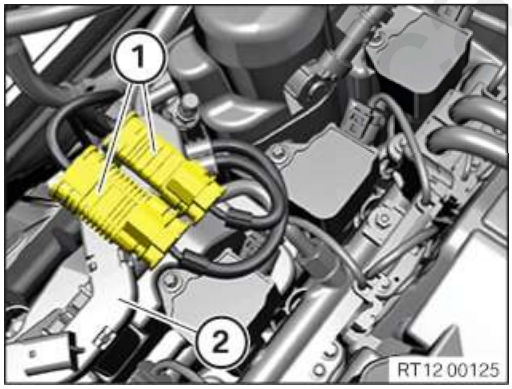
- Cover ignition coils using suitable covers when working on the fuel system, if necessary remove them.
- Do not oil or grease the silicone tube of the spark plug connector. The silicone tube is coated with talc to reduce the pulling forces.

RISK OF DAMAGE

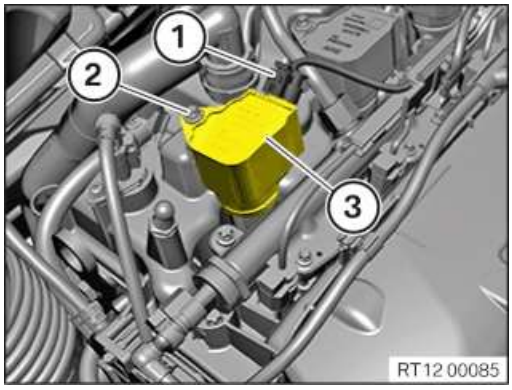
Electrostatic discharge.

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 Information on electrostatic discharge (ESD) protection.



- Disconnect the connector (1) of the front oxygen sensor and the monitoring oxygen sensor from the cable channel (2) and set aside.



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).
- Remove ignition coil (3).

5 – Remove the high pressure line between the high pressure pump and the 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.

CAUTION

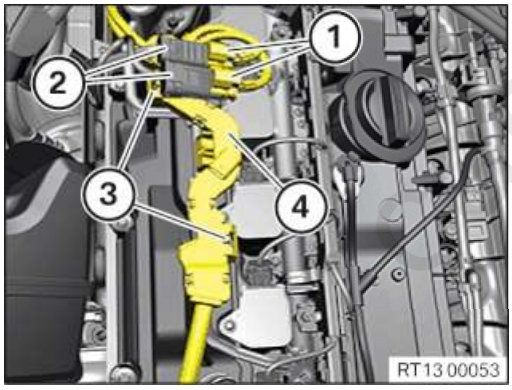
On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

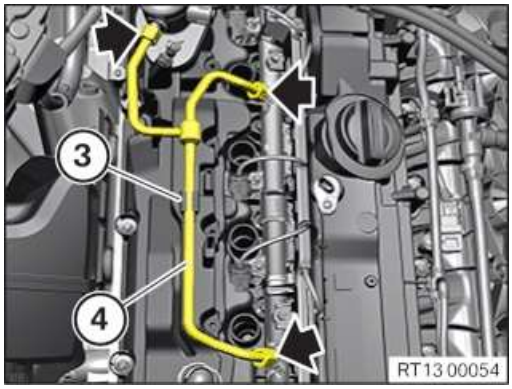
- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

TECHNICAL INFORMATION

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

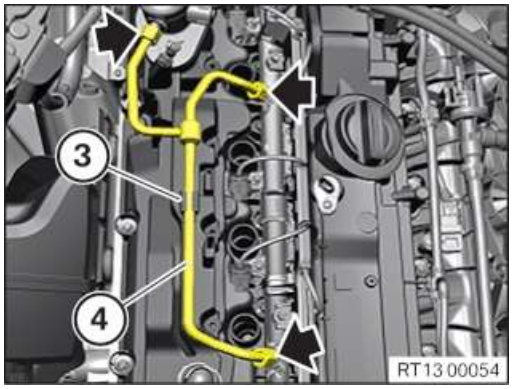


- Unlock and disconnect the plug connections (1) and (2).
- Unlock the locks (3).
- Guide out the wiring harness section of the engine wiring harness (4) and set it aside.



- Position a lint-free rag under the union nuts.
- Unscrew union nuts (arrows) with the special tool .
- Catch and dispose of escaping fuel.
- Thread out the high pressure line (4) from the bracket (3) and remove it.
- Feed out and dispose of the lint-free cleaning clothes .

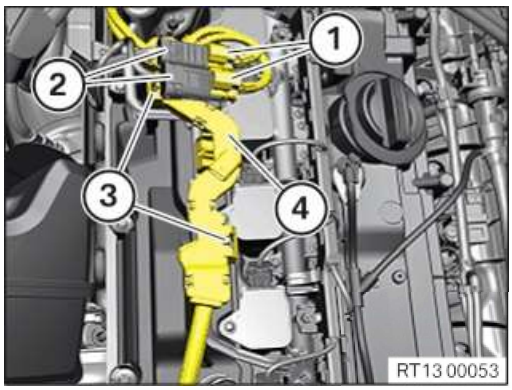
6 – Installing high pressure line between rail and high pressure pump



- Insert the high pressure line (4) into the holder (3) and install.
- Tighten union nuts (arrows) with the special tool .

High pressure line between rail and high pressure pump

M14x1,5		Tightening torque	33 Nm



- Insert and install the wiring harness section of the engine wiring harness (4).

  The locks (3) must engage audibly.
- Connect connectors (1) and (2) and lock.

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

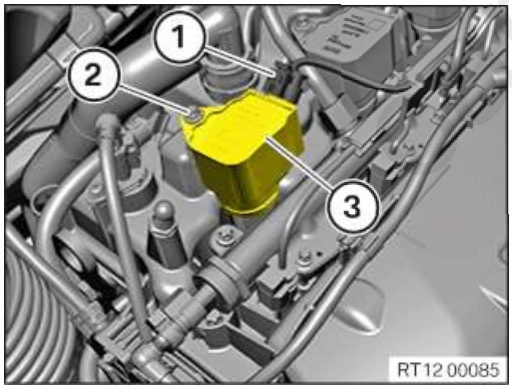
POSTPROCESSES

7 – Install all ignition coils

NOTICE

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

▸ **Install ignition coil.**



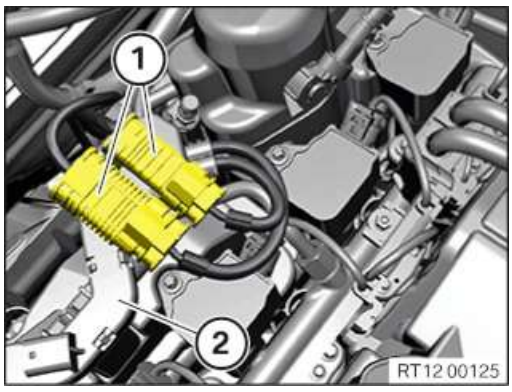
- Install ignition coil (3).
- Tighten down screw (2).

Ignition coil

Screw		Tightening torque	8 Nm

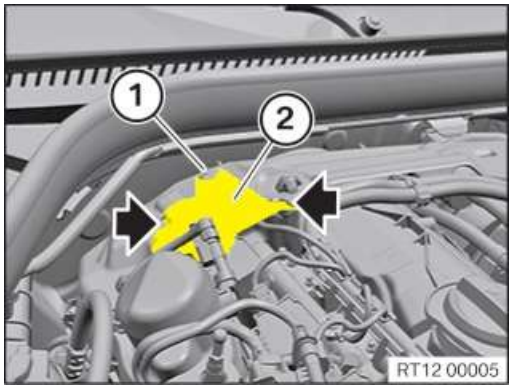
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



- Connect the connector (1) of the front oxygen sensor and the monitoring oxygen sensor on the cable shaft (2).

8 – Mounting the service opening in sound insulation on top of engine



- Turn the sound insulation (2) at the pivot point (1) to the installation position and guide it in where marked (arrows).

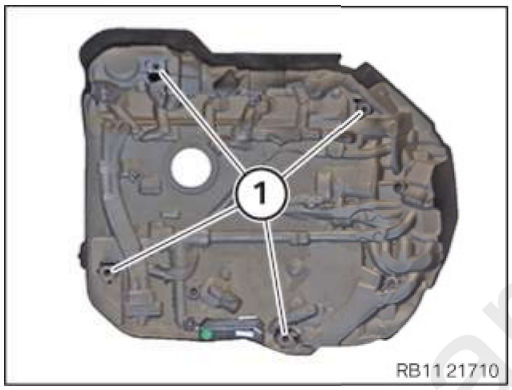
9 – Install acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover.

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

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



- Check the rubber mount (1) for correct fit in the acoustic cover.



- Install acoustic cover (1) and fix in the rubber mounts (marks).

10 – Disconnecting all battery earth leads

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- See additional information.

Additional Information

Overview of Tightening Torques

High pressure line between rail and high pressure pump			Used in step 6
M14x1,5		Tightening torque	33 Nm

Ignition coil			Used in step 7
Screw		Tightening torque	8 Nm

Overview of Special Tools

Links

Repair instructions	Used in step
61 20 900 Disconnecting and connecting battery earth lead	110
61 20 900 Disconnecting and connecting battery earth lead	110
61 20 900 Disconnecting and connecting battery earth lead	110
61 20 900 Disconnecting and connecting battery earth lead	110
61 20 900 Disconnecting and connecting battery earth lead	110
61 20 900 Disconnecting and connecting battery earth lead	110
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	110
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	110
61 20 900 Disconnecting and connecting battery earth lead	110
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	110
61 20 900 Disconnect and connect battery earth lead (Plug-in Hybrid Electric Vehicle)	110
61 20 900 Disconnecting and connecting battery earth lead	110
61 20 900 Disconnecting and connecting battery earth lead	110
61 20 900 Disconnecting and connecting battery earth lead	110
61 20 900 Disconnecting and connecting battery earth lead	110
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61 20 900 Disconnecting and connecting battery earth lead	110
61 20 900 Disconnecting and connecting battery earth lead	110
61 20 900 Disconnecting and connecting battery earth lead	110
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	110

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61 20 900 Disconnecting and connecting battery earth lead	110
61 20 900 Disconnecting and connecting battery earth lead	110
61 20 900 Disconnecting and connecting battery earth lead	110
61 20 900 Disconnecting and connecting battery earth lead	110
61 20 900 Disconnecting and connecting battery earth lead	110
61 20 900 Disconnecting and connecting battery earth lead	110
61 20 900 Disconnecting and connecting battery earth lead	110
61 35 ... Notes on ESD protection (Electro Static Discharge)	4

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13 53 596 Replacing the high-pressure fuel sensor

WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Detach battery earth lead from battery.
- For additional batteries: Detach all battery earth leads from additional batteries.

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1 – Disconnecting all battery earth leads



- See additional information.

2 – Removing the acoustic cover

WARNING

Hot surfaces.

Risk of burning!

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

RISK OF DAMAGE

Damage to the acoustic cover.

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

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



- Release the acoustic cover (1) towards the top from the rubber mounts (marks).

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3 – Remove the rail pressure sensor

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

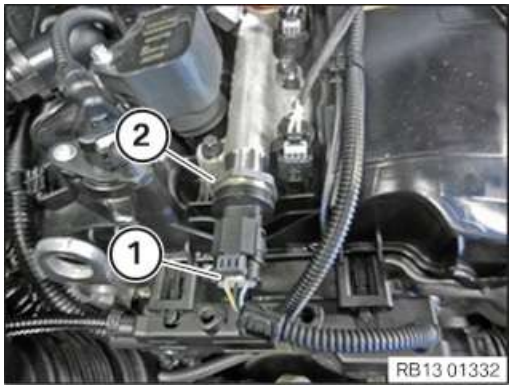
Electrostatic discharge.

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 Information on electrostatic discharge (ESD) protection.

TECHNICAL INFORMATION

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

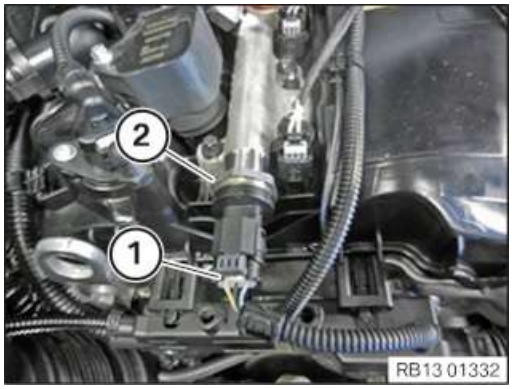


- Unlock plug connection (1) and disconnect.
- Remove the rail pressure sensor (2).
- Catch and dispose of escaping fuel.

4 – Install the rail pressure sensor

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4 – Install the rail pressure sensor



- Insert and install the rail pressure sensor (2).
- Tighten the rail pressure sensor (2).

Rail pressure sensor

M14x1,5	Grease thread lightly.	Tightening sequence	30 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.
- Check fuel system for leak tightness.

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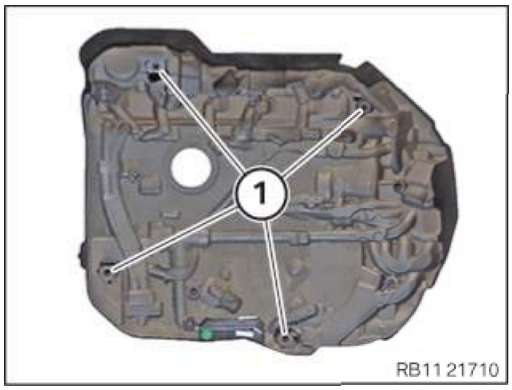
5 – Install acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover.

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

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



- Check the rubber mount (1) for correct fit in the acoustic cover.



- Install acoustic cover (1) and fix in the rubber mounts (marks).

6 – Disconnecting all battery earth leads



- See additional information.

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Additional Information

Overview of Tightening Torques

Rail pressure sensor Used in step 4

M14x1,5	Grease thread lightly.	Tightening sequence	30 Nm

Links

Repair instructions	Used in step
61 20 900 Disconnecting and connecting battery earth lead	16
61 20 900 Disconnecting and connecting battery earth lead	16
61 20 900 Disconnecting and connecting battery earth lead	16
61 20 900 Disconnecting and connecting battery earth lead	16
61 20 900 Disconnecting and connecting battery earth lead	16
61 20 900 Disconnecting and connecting battery earth lead	16
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	16
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	16
61 20 900 Disconnecting and connecting battery earth lead	16
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	16
61 20 900 Disconnect and connect battery earth lead (Plug-in Hybrid Electric Vehicle)	16
61 20 900 Disconnecting and connecting battery earth lead	16
61 20 900 Disconnecting and connecting battery earth lead	16
61 20 900 Disconnecting and connecting battery earth lead	16
61 20 900 Disconnecting and connecting battery earth lead	16
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61 20 900 Disconnecting and connecting battery earth lead	16
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61 20 900 Disconnecting and connecting battery earth lead	16
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	16
61 20 900 Disconnecting and connecting battery earth lead	16
61 20 900 Disconnecting and connecting battery earth lead	16
61 20 900 Disconnecting and connecting battery earth lead	16
61 20 900 Disconnecting and connecting battery earth lead	16
61 20 900 Disconnecting and connecting battery earth lead	16
61 20 900 Disconnecting and connecting battery earth lead	16
61 20 900 Disconnecting and connecting battery earth lead	16
61 35 ... Notes on ESD protection (Electro Static Discharge)	3

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13 54 030 Remove and install/seal throttle body

PRELIMINARY WORK

1 – Removing the acoustic cover

WARNING

Hot surfaces.

Risk of burning!

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

RISK OF DAMAGE

Damage to the acoustic cover.

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

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



- Release the acoustic cover (1) towards the top from the rubber mounts (marks).

2 – Partially removing charge air line

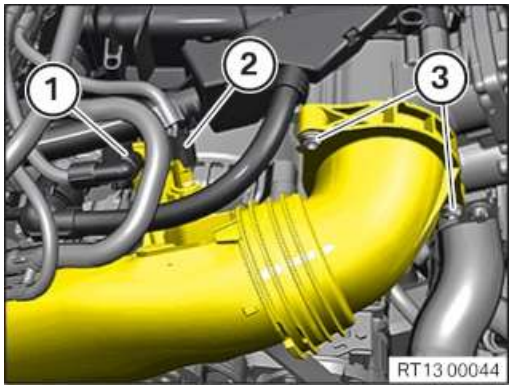
WARNING

Hot surfaces.

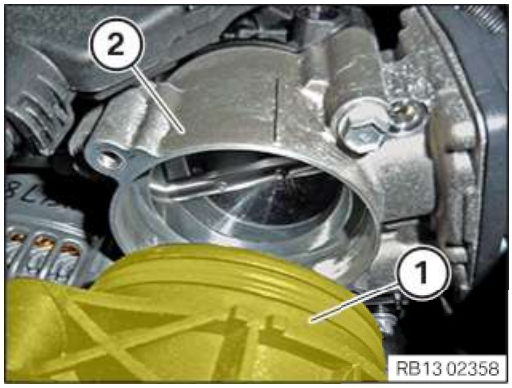
Risk of burning!

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

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- Unlock plug connection (1) and disconnect.
- Unlock plug connection (2) and disconnect.
- Loosen screws (3).



- Disconnect charge air line (1) from throttle valve (2) and set it aside.

MAIN WORK

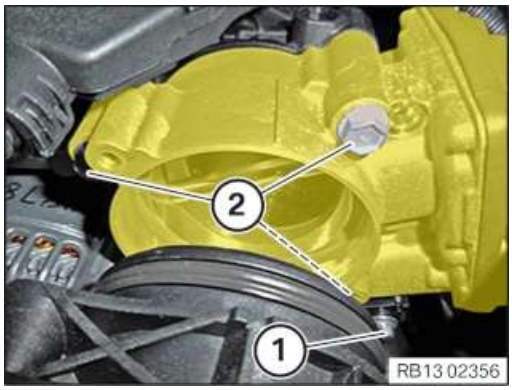
3 – Removing the throttle body

RISK OF DAMAGE

Electrostatic discharge.

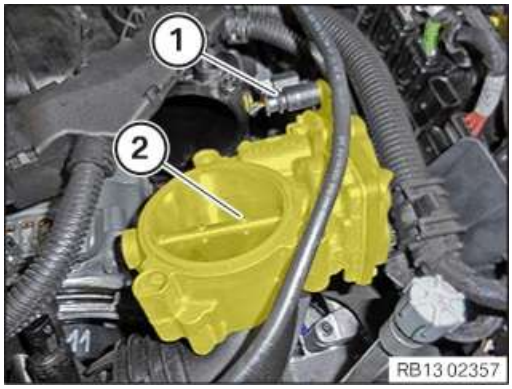
Damage to or destruction of electrical components.

- 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 Information on electrostatic discharge (ESD) protection.



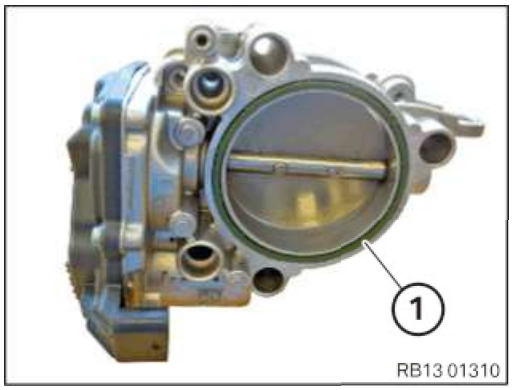
- Loosen screw (1).
- Loosen screws (2).

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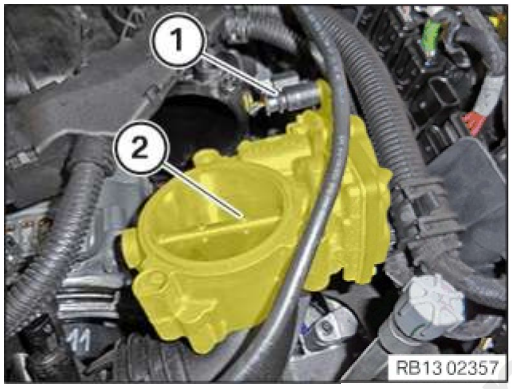
- Thread the throttle body (2) a little bit out to the front.
- Unlock plug connection (1) and disconnect.
- Remove throttle body (2).

4 – Installing the throttle body



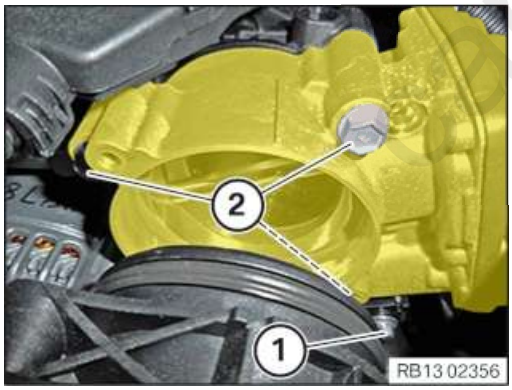
- Renew the sealing ring (1) with the special tool 0 496 714 (00 9 030).

  Parts: Sealing ring



- Position throttle body (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.
- Install throttle body (2).



- Tighten down screws (2).

Throttle body to intake plenum

6X50		Tightening torque	7 Nm

- Renew the screw (1).

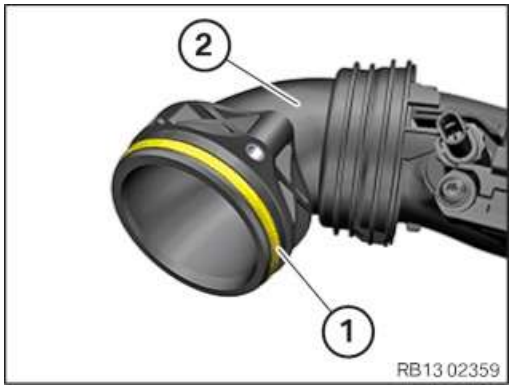
  Parts: Screw
- Tighten down screw (1).

Bracket for coolant hose to throttle body

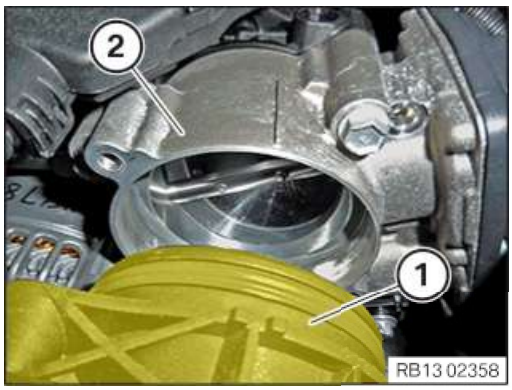
M6x16 screw	Renew screw.	Tightening torque	11,8 Nm

POSTPROCESSES

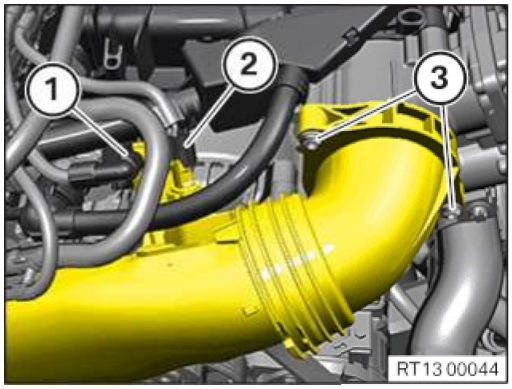
5 – Installing charge air line partially



- Check the sealing ring (1) on the charge air line (3) for damage and renew if required.



- Connect charge air line (1) with the throttle valve (2).



- Tighten down screws (3).

Charge air line to throttle valve

M6x30		Tightening torque	8 Nm

- Connect connectors (2) and lock.

  The connector (2) must engage audibly.
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

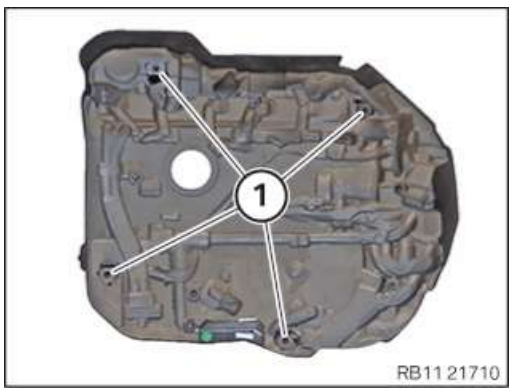
6 – Install acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover.

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

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



- Check the rubber mount (1) for correct fit in the acoustic cover.

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- Install acoustic cover (1) and fix in the rubber mounts (marks).

Additional Information

Overview of Tightening Torques

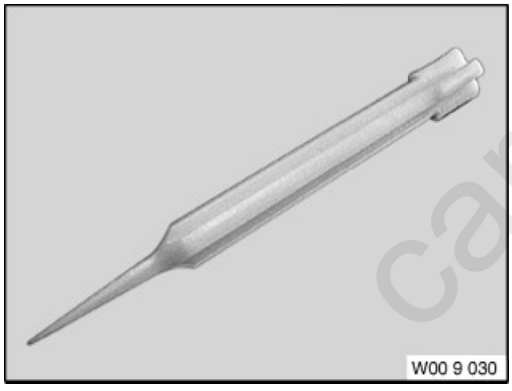
Throttle body to intake plenum			Used in step 4
6X50		Tightening torque	7 Nm

Bracket for coolant hose to throttle body			Used in step 4
M6x16 screw	Renew screw.	Tightening torque	11,8 Nm

Charge air line to throttle valve			Used in step 5
M6x30		Tightening torque	8 Nm

Overview of Special Tools

0 496 714 (00 9 030) Wedge



Common	Used in step 4
Usage	For dismantling O-rings, gaskets and trim panels. This special tool replaces special tool 00 9 316.
Included in the tool or work	
Storage location	A50
Replaced by	
In connection with	
SI-Number	01 20 09 (581)

Links

Repair instructions	Used in step
61 35 ... Notes on ESD protection (Electro Static Discharge)	3

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13 62 560 Remove and install/replace hot film air mass meter

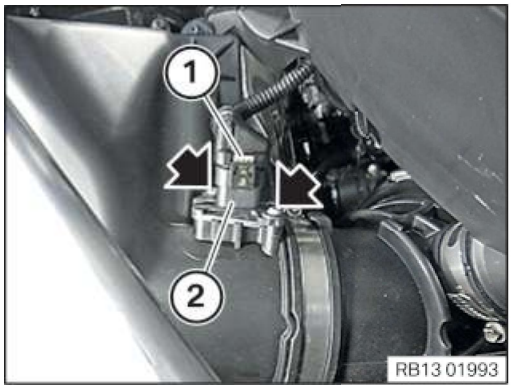
1 – Removing hot film air mass meter

RISK OF DAMAGE

Electrostatic discharge.

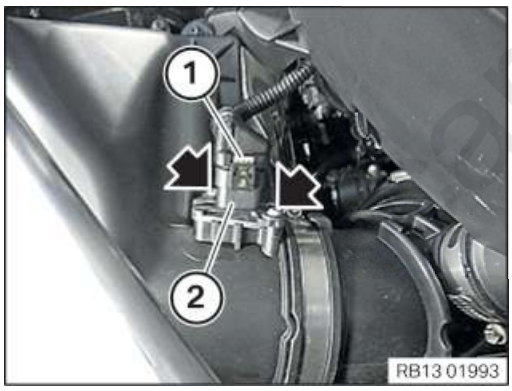
Damage to or destruction of electrical components.

- 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 Information on electrostatic discharge (ESD) protection.



- Unlock plug connection (1) and disconnect.
- Remove screws (arrows).
- Remove the hot film air mass meter (2).

2 – Installing hot film air mass meter



- Insert and install the hot film air mass meter (2).
- Tighten screws (arrows).

Hot film air mass meter to intake silencer

Screw TS 4x16		Tightening torque	1,5 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

3 – When replacing the hot film air mass metre: Reset adaptation value

- Reset the adaptation value for the air mass system with the diagnosis system.

Additional Information

Overview of Tightening Torques

Hot film air mass meter to intake silencer Used in step 2

Screw TS 4x16		Tightening torque	1,5 Nm

erdiagn.com

Links

Repair instructions	Used in step
61 35 ... Notes on ESD protection (Electro Static Discharge)	1

cardiagn.com

13 62 538 Replace charge air temperature sensor

PRELIMINARY WORK

1 – Removing the acoustic cover

WARNING

Hot surfaces.

Risk of burning!

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

RISK OF DAMAGE

Damage to the acoustic cover.

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

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



- Release the acoustic cover (1) towards the top from the rubber mounts (marks).

MAIN WORK

2 – Remove charge air temperature sensor

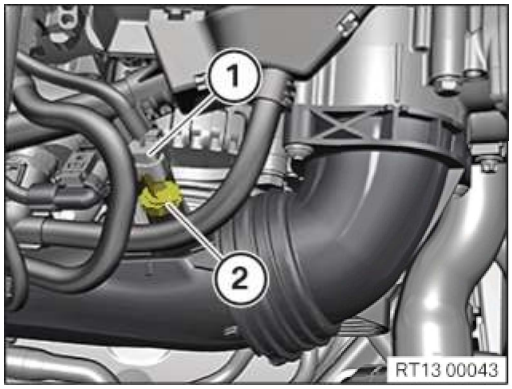
carsdiagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

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



- Unlock plug connection (1) and disconnect.
- Unscrew the charge-air temperature sensor (2) with the special tool .
- Take out and remove charge air temperature sensor (2).

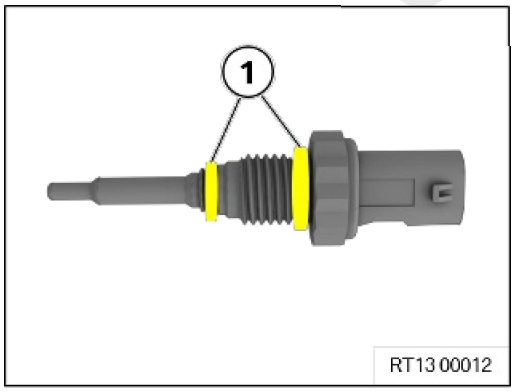
3 – Install charge air temperature sensor

RISK OF DAMAGE

Contaminant or foreign body.

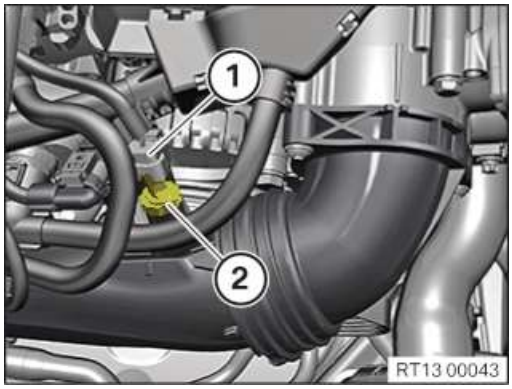
Contamination can result in malfunctions, operating failure or leaks.

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



- Check the sealing rings (1) on the charge-air temperature sensor for damage, renew if necessary.

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- Insert and install the charge air temperature sensor (2).
- Tighten the charge-air temperature sensor (2) with the special tool .

Charge air temperature sensor on charge air line

Sensor		Tightening torque	1,8 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

POSTPROCESSES

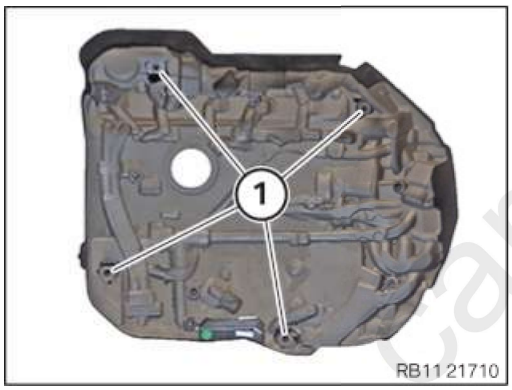
4 – Install acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover.

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

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



- Check the rubber mount (1) for correct fit in the acoustic cover.



- Install acoustic cover (1) and fix in the rubber mounts (marks).

Additional Information

Overview of Tightening Torques

Charge air temperature sensor on charge air line Used in step 3

Sensor		Tightening torque	1,8 Nm

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Overview of Special Tools

Links

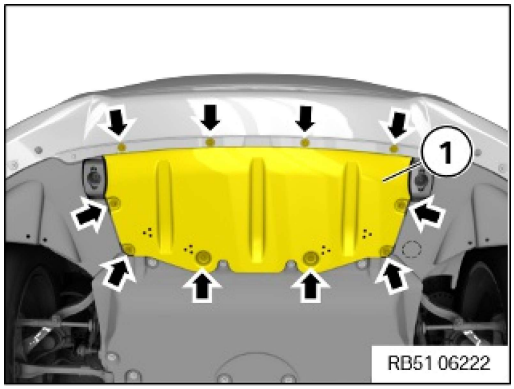
Repair instructions	Used in step
61 35 ... Notes on ESD protection (Electro Static Discharge)	2

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13 62 537 Replace coolant temperature sensor

PRELIMINARY WORK

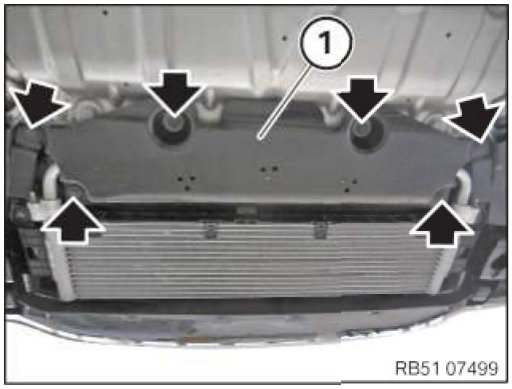
1 – Removing the front underbody protection



- **Version 1:**

  Remove screws (arrows).

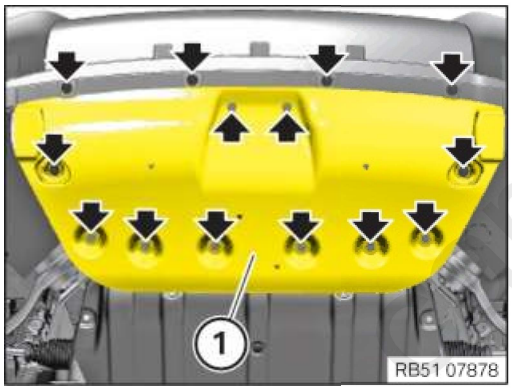
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version 2:**

  Remove screws (arrows).

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



- **Version 3:**

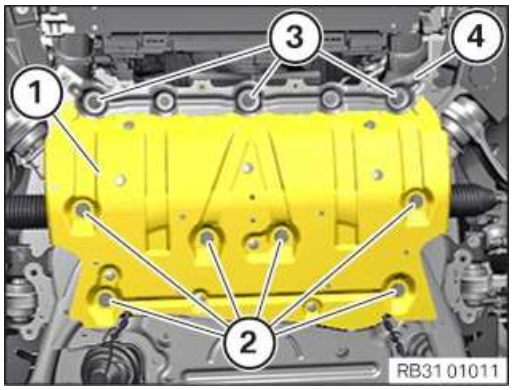
  Remove screws (arrows).

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

2 – Removing the stiffening plate

TECHNICAL INFORMATION

Driving without stiffening plate is not permissible.



- Loosen screws (3).
- Remove the holder of the underride protection (4).
- Loosen screws (2).
- Remove stiffening plate (1).

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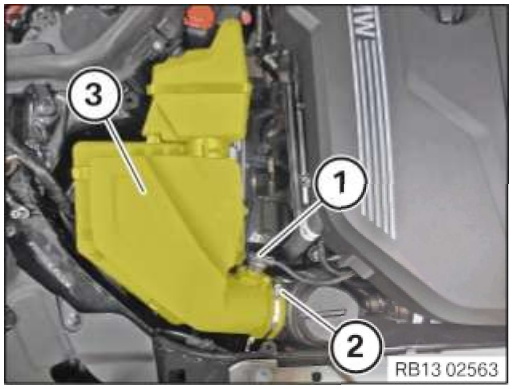
3 – Removing intake silencer housing

RISK OF DAMAGE

Damage to the clean air line. Damage to the air filter.

For changing the air filter insert, if the upper section of intake filter housing is only raised and not completely removed, the clean air line and the air filter insert may be damaged.

- Do not lift upper section of intake filter housing by force.
- Unfasten clamp.
- Remove upper section of intake filter housing completely.



- 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.

MAIN WORK

4 – Remove the coolant temperature sensor from the coolant radiator

WARNING

Hot fluids.

Risk of scalding!

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

RISK OF DAMAGE

Electrostatic discharge.

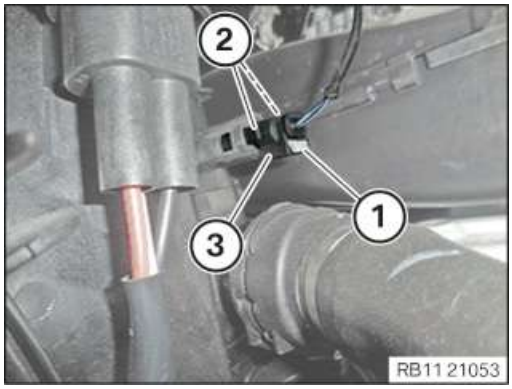
Damage to or destruction of electrical components.

- 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 Information on electrostatic discharge (ESD) protection.

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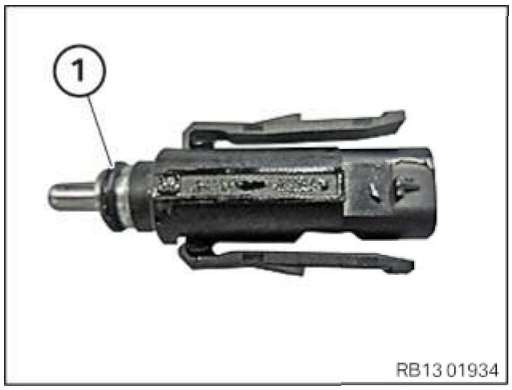
TECHNICAL INFORMATION

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

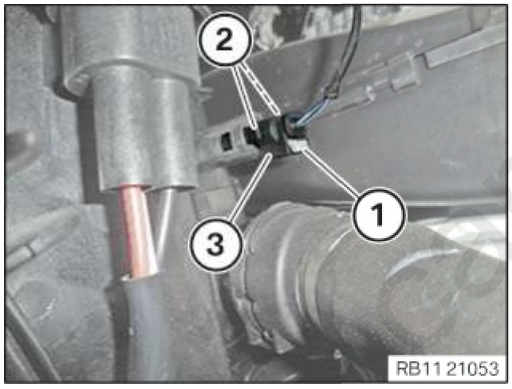


- Unlock plug connection (1) and disconnect.
- Unlock the locks (2).
- Guide out and remove the coolant temperature sensor (3).
- Catch and dispose of escaping coolant.

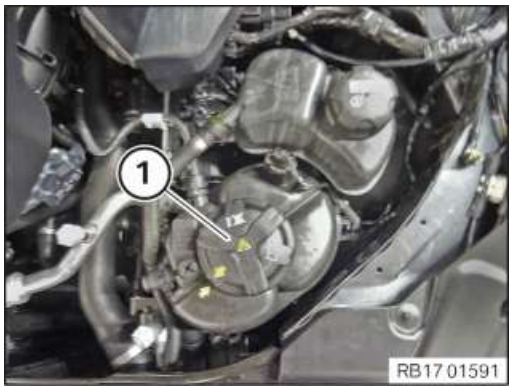
5 – Install the coolant temperature sensor on the coolant radiator



- Check sealing ring (1) for damage, renew if necessary.

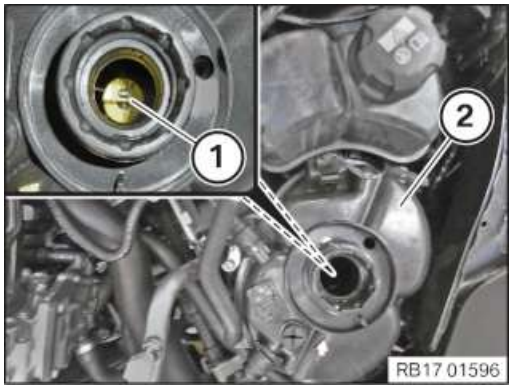


- Insert and install the coolant temperature sensor (3).
- Ensure that the locks (2) engage audibly.
- Connect connectors (1) and lock.
- Make sure the connector (1) engages audibly.



- Loosen sealing cap (1).

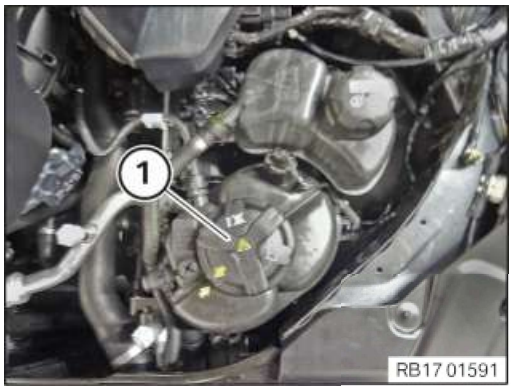
carldiagn.com



TECHNICAL INFORMATION

Follow notes for repair work on the cooling system.
For additional information see:
Main group 17
17 00 ... Notes for working on the cooling system

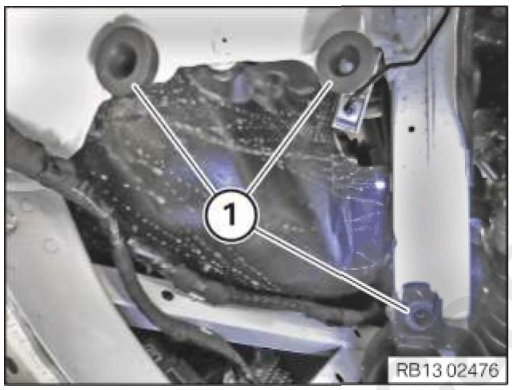
- Adjust the coolant level to the **maximum mark** (1) in the coolant expansion tank for high temperature (2).



- Shut sealing cap (1).

POSTPROCESSES

6 – 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

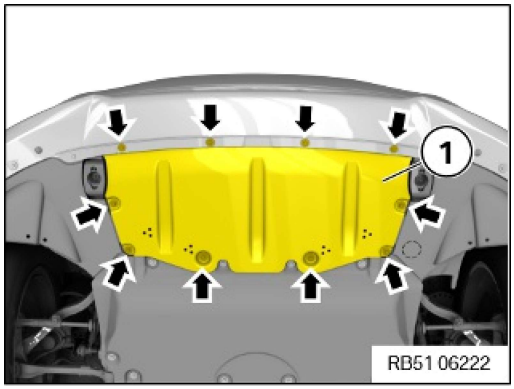
Clamp		Tightening torque	3 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

7 – Installing the front underbody protection

bmwdiagn.com



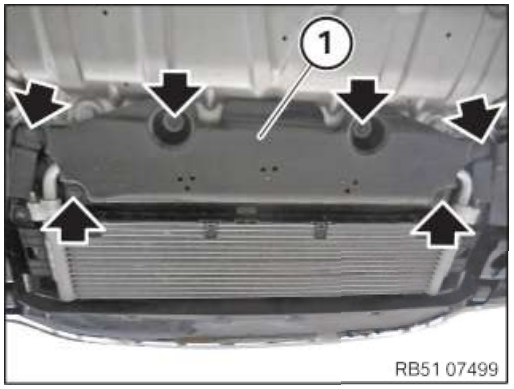
- **Version 1:**

  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



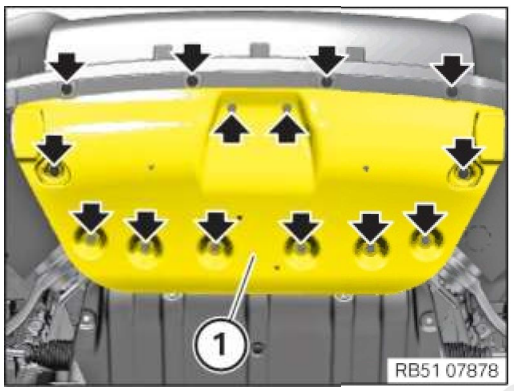
- **Version 2:**

  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 3:**

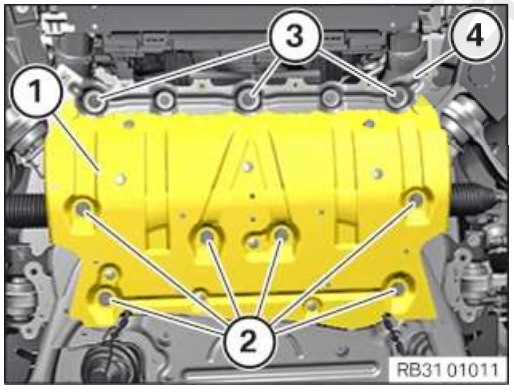
  Feed in and install front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

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

8 – Installing the stiffening plate



- Position stiffening plate (1).
- Screw screws (2) in.
- Position holder of underride protection (4).
- Screw screws (3) in.
- Tighten down screws (2) and (3).

Stiffening plate to front axle support

M10		Tightening torque	56 Nm

Additional Information

Overview of Tightening Torques

Clean air pipe to upper section of intake filter housing Used in step 6

Clamp		Tightening torque	3 Nm

Underbody protection front			Used in step 7
Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Stiffening plate to front axle support			Used in step 8
M10		Tightening torque	56 Nm

Links

Repair instructions	Used in step
61 35 ... Notes on ESD protection (Electro Static Discharge)	4

Operating materials	Used in step
Main group 17	5

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13 62 531 Replace coolant temperature sensor

WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Detach battery earth lead from battery.
- For additional 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.

TECHNICAL INFORMATION

Additional coolant can escape. Make sure that no coolant enters the intake port of the cylinder head.

TECHNICAL INFORMATION

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

PRELIMINARY WORK

1 – Bring front compartment lid in the service position

Prerequisite

Engine compartment lid is open.

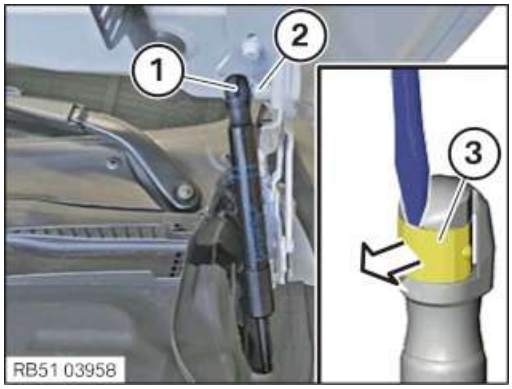
CAUTION

Shutting bonnet or tailgate.

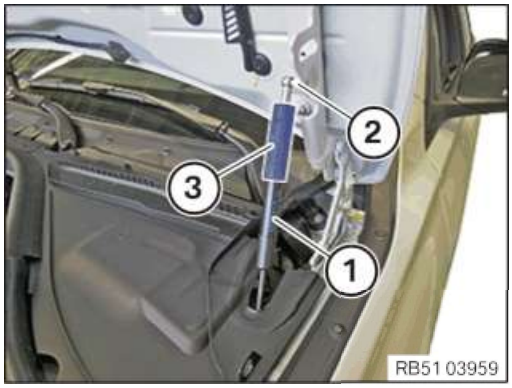
Danger of injury!

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

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- 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.
- Push special tool 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 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.

4 – Removing the acoustic cover

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WARNING

Hot surfaces.

Risk of burning!

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

RISK OF DAMAGE

Damage to the acoustic cover.

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

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



- Release the acoustic cover (1) towards the top from the rubber mounts (marks).

5 – Removing acoustic cover at rear



- Unclip the acoustic cover (1) in the marked areas and remove it to the top.

6 – Remove tank vent valve

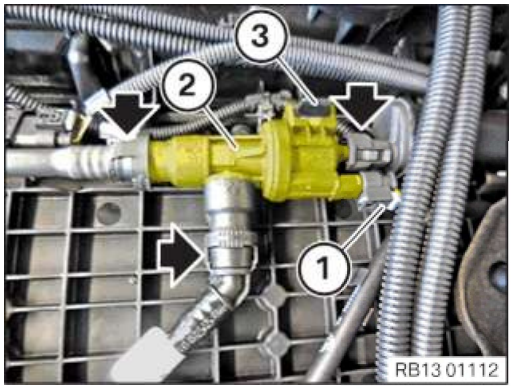
rdiagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

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



- Unlock and disconnect connector (1).
- Unlock and disconnect the tank ventilation lines (arrows).
- Detach and remove the tank vent valve (2) from the holder (3).

7 – Removing the DME control unit

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 Information on electrostatic discharge (ESD) protection.

TECHNICAL INFORMATION

Follow instructions for removing and installing control units.

For additional information see: 12 00 ... Notes on removal and installation of control units

TECHNICAL INFORMATION

In a warranty case, you must always provide a fault memory printout with the defective part, even if the fault memory does not contain an entry.

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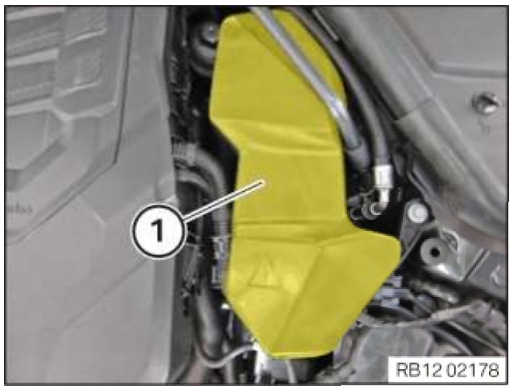
TECHNICAL INFORMATION

Control unit must be programmed after it is replaced.

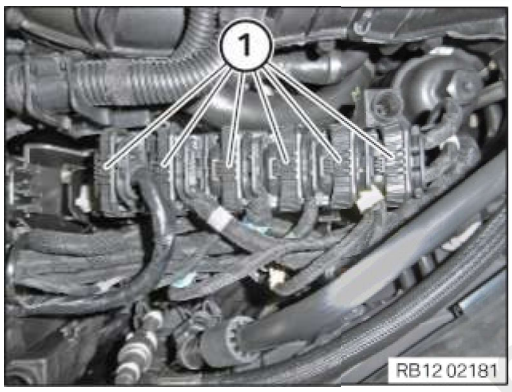
For additional information see: 61 00 ... Programming/encoding control unit(s)

TECHNICAL INFORMATION

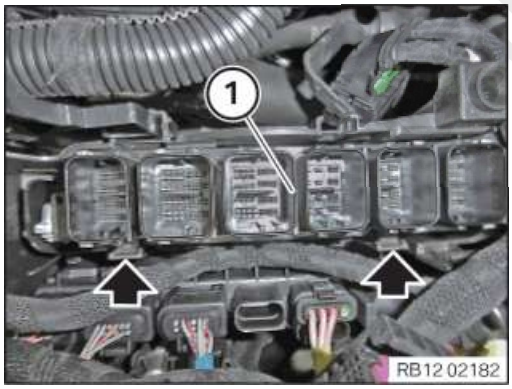
Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.



- Pull the cover (1) towards the top and feed out.



- Unlock and disconnect the plug connection (1).



- Unlock the locks (arrows).
- Guide out and remove DME control unit (1).

8 – Removing integrated supply module (PDM)

WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

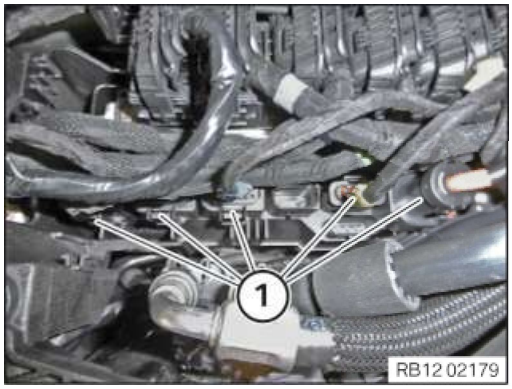
- Detach battery earth lead from battery.
- For additional batteries: Detach all battery earth leads from additional batteries.

RISK OF DAMAGE

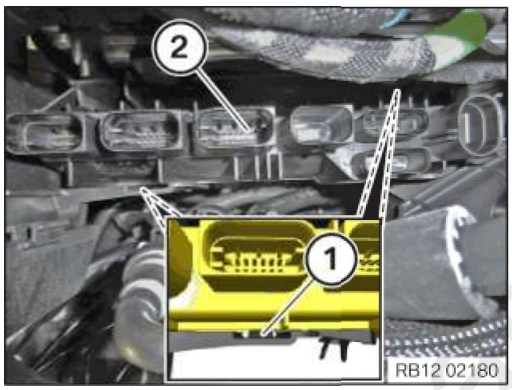
Electrostatic discharge.

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 Information on electrostatic discharge (ESD) protection.

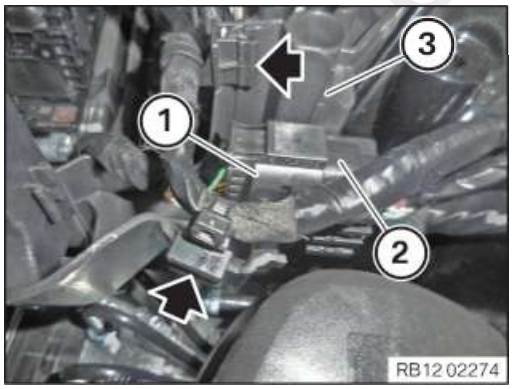


- Unlock and disconnect plug connections (1).



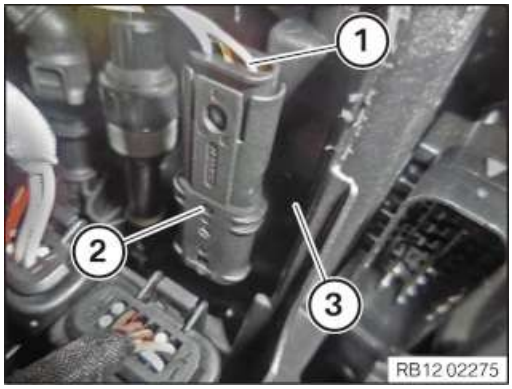
- Unlock the latch mechanisms (1).
- Guide out and remove integrated supply module (PDM) (2) upwards.

9 – Removing the control unit holder

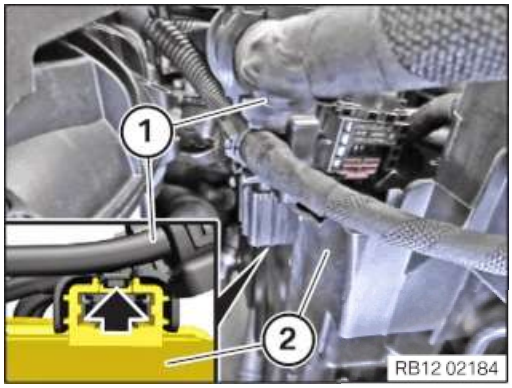


- Unlock plug connection (1) and disconnect.
- Unlock the connector (2) and disconnect from the control unit holder (3).
- Release the clamps (arrows).

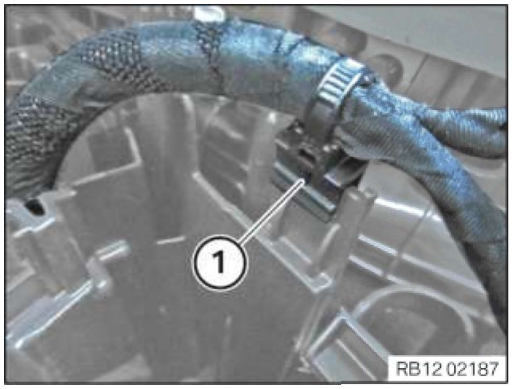
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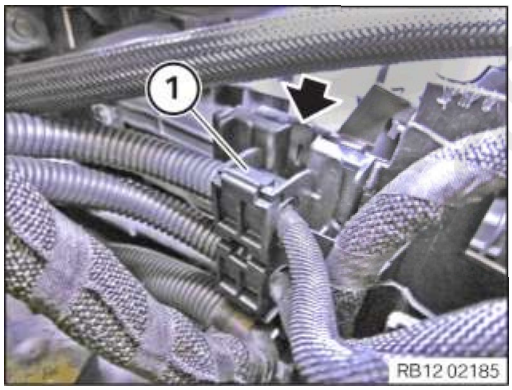
- Unlock plug connection (1) and disconnect.
- Unlock the connector and disconnect from the control unit holder (3).



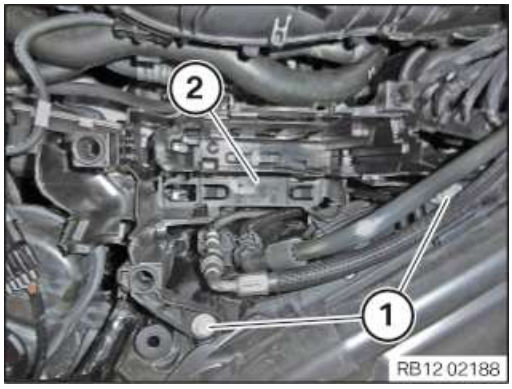
- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).



- Loosen clamp (1).

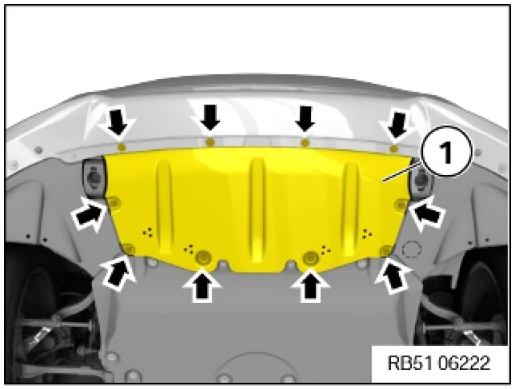


- Unlock the lock (arrow).
- Feed out the cable clip (1) upwards and set it aside.



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

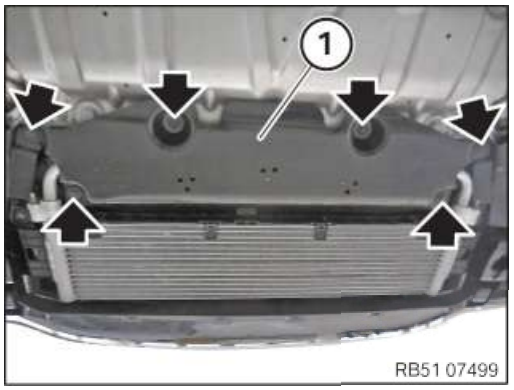
10 – Removing the front underbody protection



- **Version 1:**

  Remove screws (arrows).

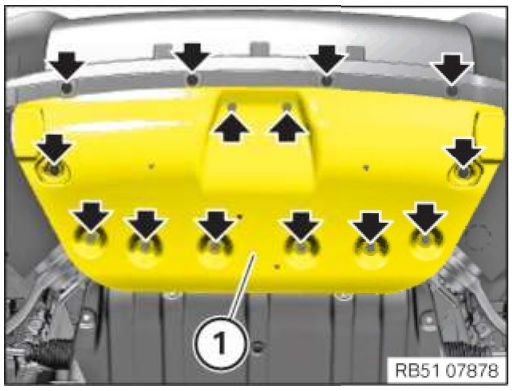
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version 2:**

  Remove screws (arrows).

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



- **Version 3:**

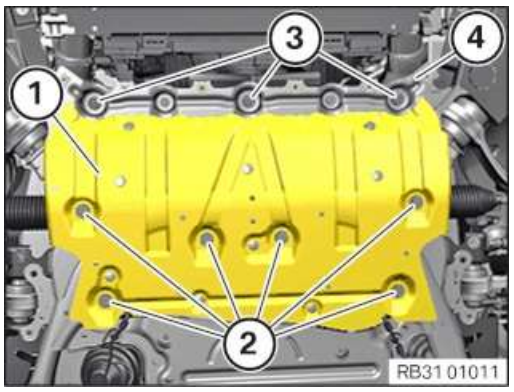
  Remove screws (arrows).

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

11 – Removing the stiffening plate

TECHNICAL INFORMATION

Driving without stiffening plate is not permissible.



- Loosen screws (3).
- Remove the holder of the underride protection (4).
- Loosen screws (2).
- Remove stiffening plate (1).

12 – If installed: Partially release the engine oil cooler

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WARNING

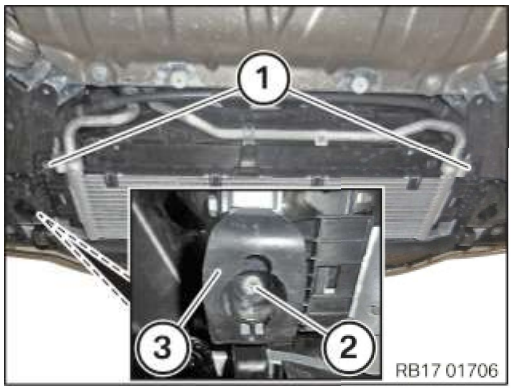
Hot surfaces.

Risk of burning!

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

TECHNICAL INFORMATION

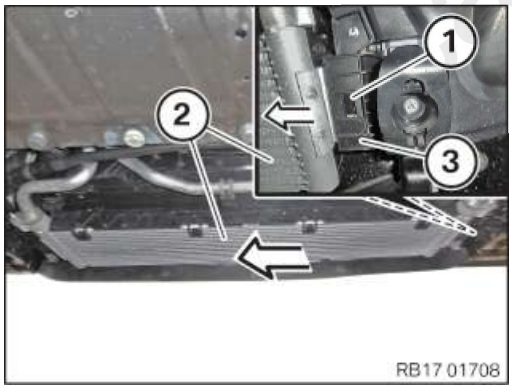
The work must be performed with care to prevent component damage.



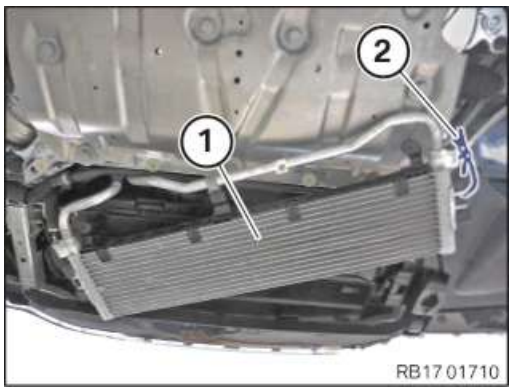
- Loosen screws (1).
- Drill out rivet on the left (2).
- Remove the left-hand damper (3).



- Loosen screw (1).



- Unlock lock (1).
- Feed out engine oil cooler (2) from the holder in the direction of arrow (3) and place to one side.



- Affix the engine oil cooler (1) with a cable strap (2) as shown.

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13 – Draining the coolant from the low-temperature cooling system

WARNING

Hot surfaces.

Risk of burning!

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

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.

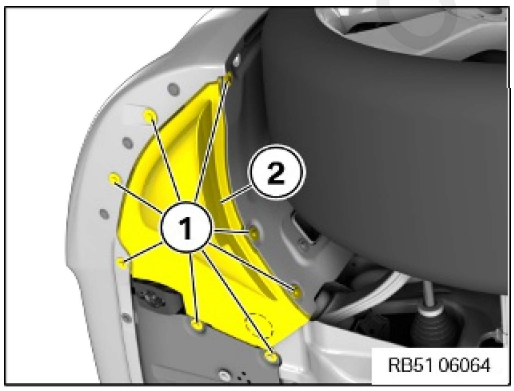
In the case of other removal work involving the draining of part quantities of coolant, the coolant level must be topped up with new coolant.

TECHNICAL INFORMATION

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

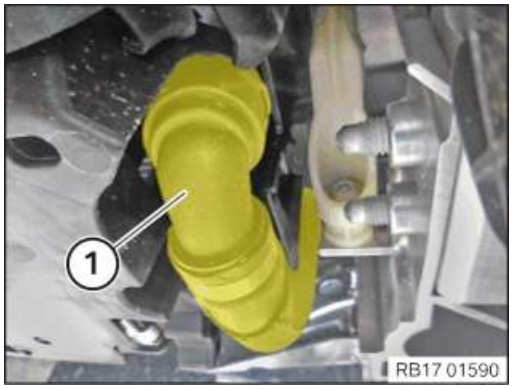


- Loosen sealing cap (1).



- Loosen screws (1).
- Guide out and remove bottom left cover (2) to the front.

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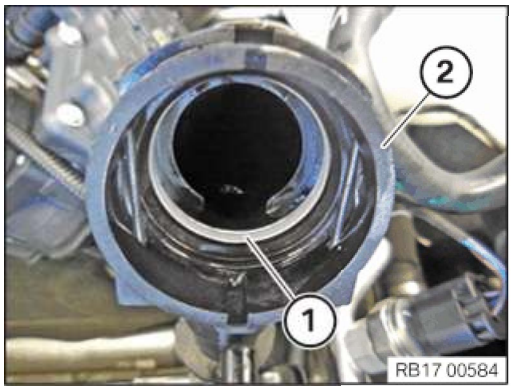


- Unlock and disconnect the coolant line (1).
- Catch and dispose of escaping coolant.

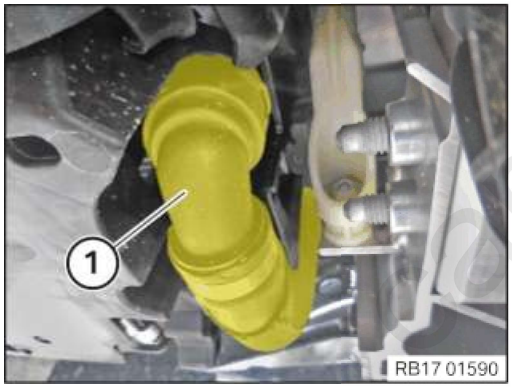
14 – Connecting the coolant lines for the low-temperature coolant circuit

TECHNICAL INFORMATION

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

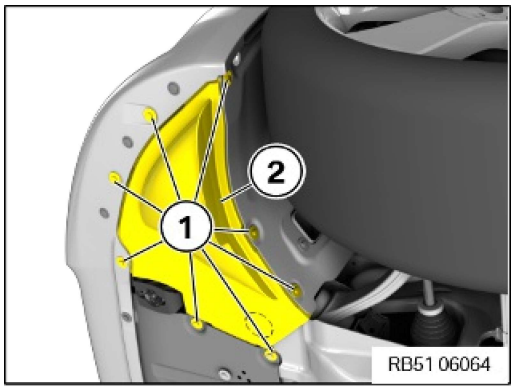


- Check the sealing rings (1) of the coolant lines (2) for damage and renew if necessary.



- Connect and lock the coolant line (1).

  The coolant line (1) must audibly engage.



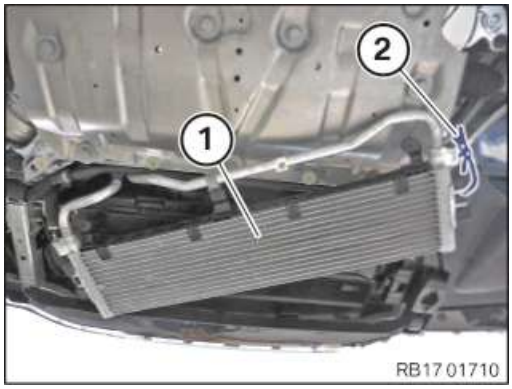
- Feed in and install cover (2) at the bottom front left.
- Tighten the screws (1).

Cover, front bottom on side

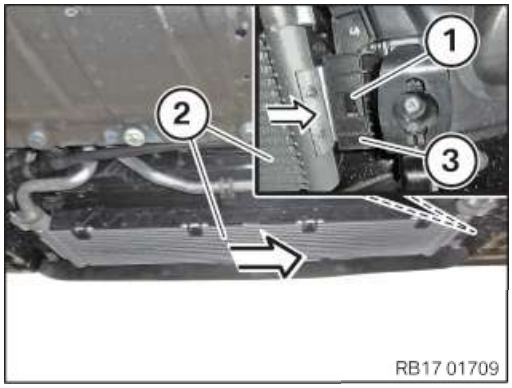
Hexagon screw for thermoplastic		Tightening torque	3 Nm

15 – If installed: Secure engine oil cooler

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- Remove the cable straps (2).
- Position engine oil cooler (1).



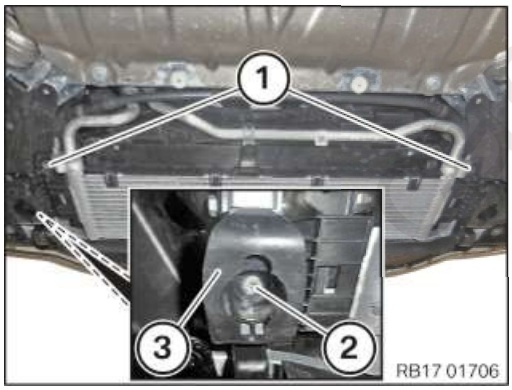
- Feed in and install the engine oil cooler (2) on the holder (3) in the direction of the arrow.
- Ensure that the lock (1)engages audibly.



- Tighten down screw (1).

Engine oil cooler to bumper support

M6X25		Tightening torque	8 Nm



- Renew rivet (2).

  Parts: Rivet
- Install and rivet damper (3).
- Tighten the screws (1).

Cover, front bottom on side

Hexagon screw for thermoplastic		Tightening torque	3 Nm

16 – Removing the intake plenum

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.

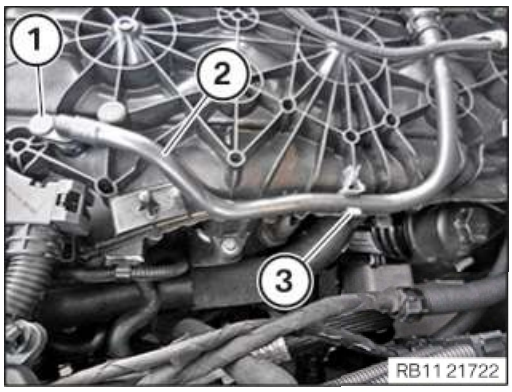
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TECHNICAL INFORMATION

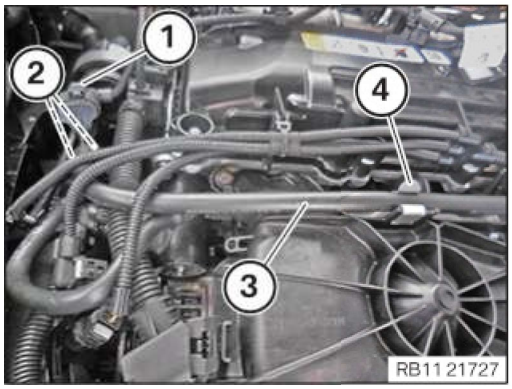
Additional coolant can escape. Make sure that no coolant enters the intake port of the cylinder head.

TECHNICAL INFORMATION

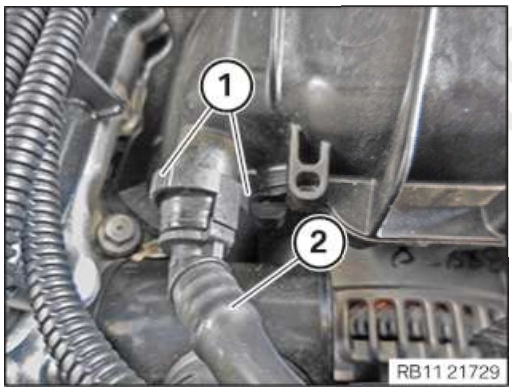
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



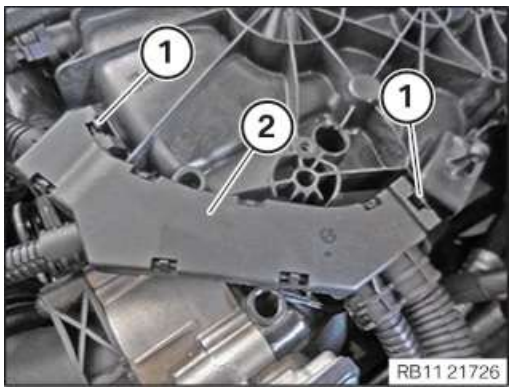
- Loosen screw (1).
- Guide tank ventilation line (2) out of clamp (3) and remove it.



- Unlock and loosen connector (1).
- Unlock the locks (2).
- Guide tank ventilation line (3) out of clamp (4) and remove it.

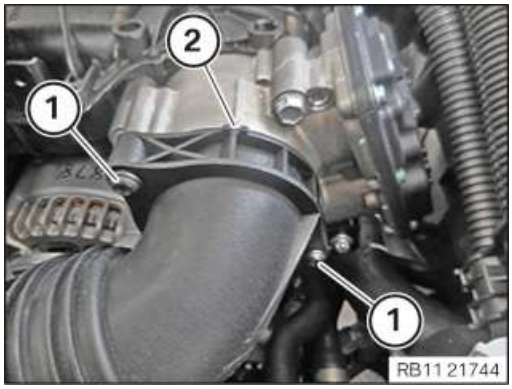


- Unlock the locks (1).
- Feed the tank ventilation line (2) out and set it aside.

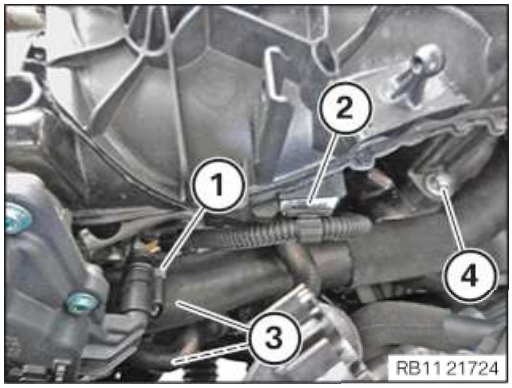


- Unlock the locks (1).
- Guide out the wiring harness section (2) for the sensor system **2** and place to one side.

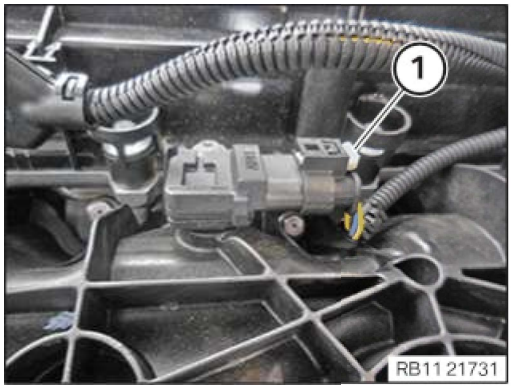
rdiagn.com



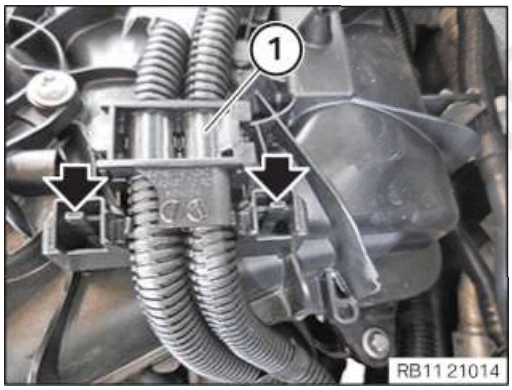
- Loosen screws (1).
- Feed out charge air line (2) and place to one side.



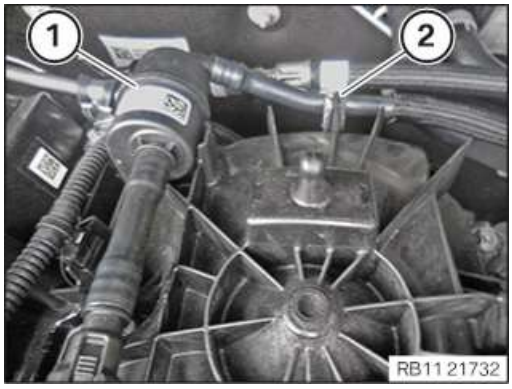
- Unlock and loosen connector (1).
- Loosen clamp (2).
- Thread off coolant line (3) and place to the side.
- Loosen screw (4).



- Unlock and loosen connector (1).

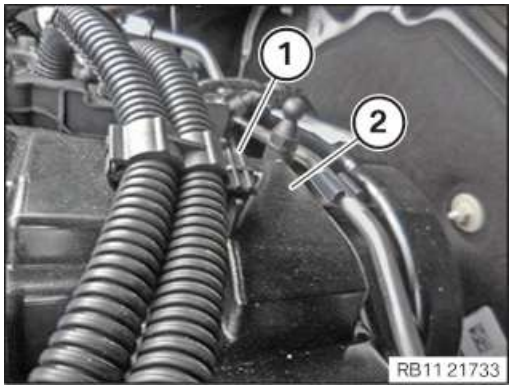


- Unlock the locks (arrows).
- Thread out the wiring harness section (1) for the injectors and ignition coils and set it aside.



- Guide tank ventilation line (1) out of clamp (2) and place it aside.

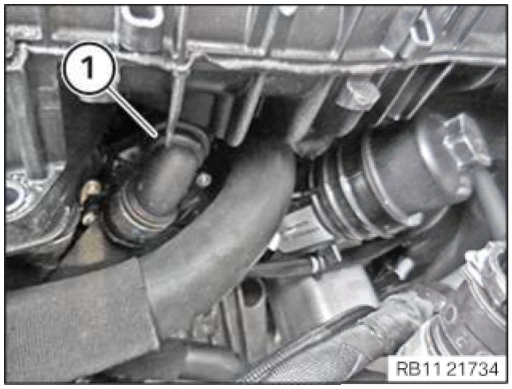
ardiagn.com



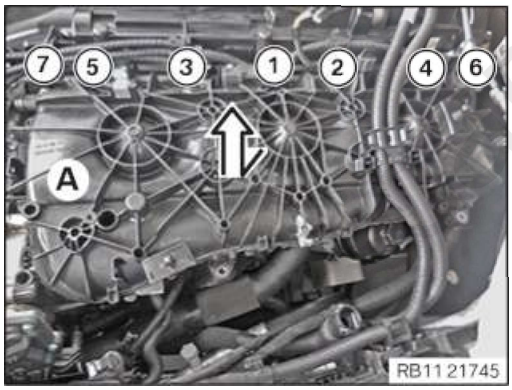
- Guide out the wiring harness section (1) for the injectors and ignition coils of the cylinder head cover (2) and set it aside.



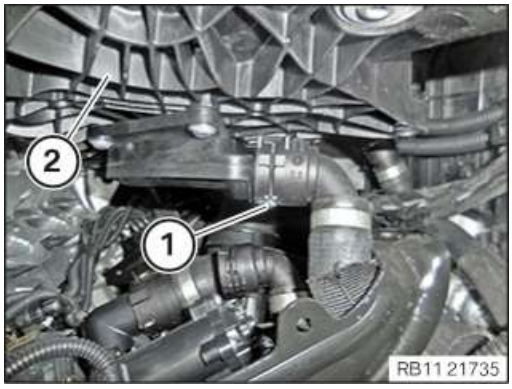
- Loosen screw (1).



- Unlock and loosen coolant line (1).
- Catch and dispose of escaping coolant.



- Loosen screws in the order (7) to (1).
- Slightly raise intake plenum (A) in direction of arrow.



TECHNICAL INFORMATION

Additional coolant can escape. Make sure that no coolant enters the intake port of the cylinder head.

- Unlock and release coolant line (1) below the intake plenum (2).
- Catch and dispose of escaping coolant.
- Thread out intake plenum (2) and remove.

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MAIN WORK

17 – Remove coolant temperature sensor

WARNING

Hot fluids.

Risk of scalding!

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

RISK OF DAMAGE

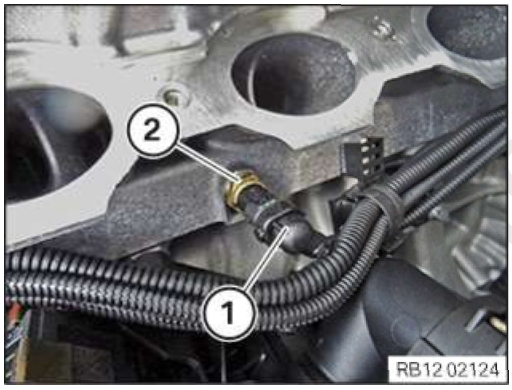
Electrostatic discharge.

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 Information on electrostatic discharge (ESD) protection.

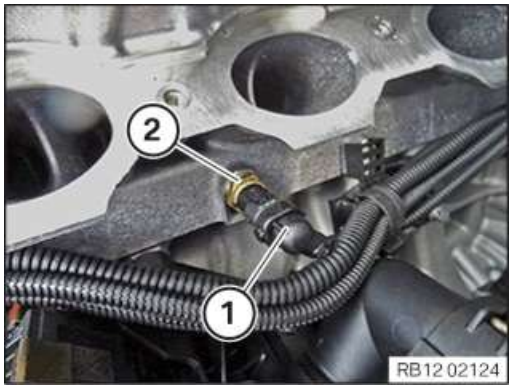
TECHNICAL INFORMATION

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



- Unlock plug connection (1) and disconnect.
- Loosen the coolant temperature sensor (2).
- Guide out and remove the coolant temperature sensor (2).
- Catch and dispose of escaping coolant.

18 – Install coolant temperature sensor



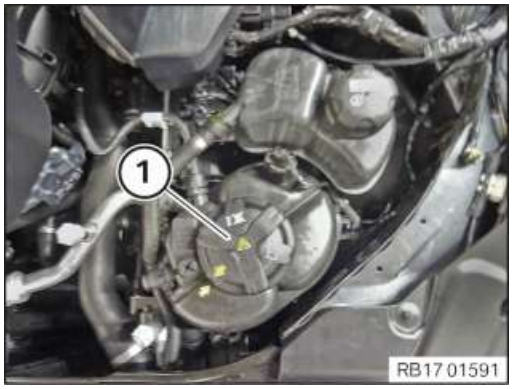
- Insert and install the coolant temperature sensor (2).
- Tighten the coolant temperature sensor (2).

Coolant temperature sensor at cylinder head

Sensor		Tightening torque	13,5 Nm

- Connect connectors (1) and lock.

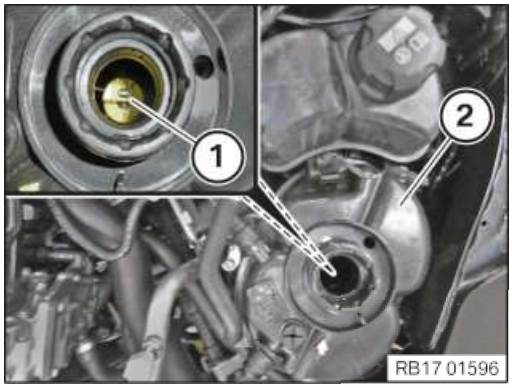
  The connector (1) must engage audibly.



TECHNICAL INFORMATION

Follow notes for repair work on the cooling system.
For additional information see:
Main group 17
17 00 ... Notes for working on the cooling system

- Loosen sealing cap (1).



- Adjust the coolant level to the **maximum mark** (1) in the coolant expansion tank for high-temperature coolant circuit(2).



- Close sealing cap (1).
- Close the sealing cap (1) until the **arrows** are flush.

POSTPROCESSES

19 – Installing the intake plenum

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

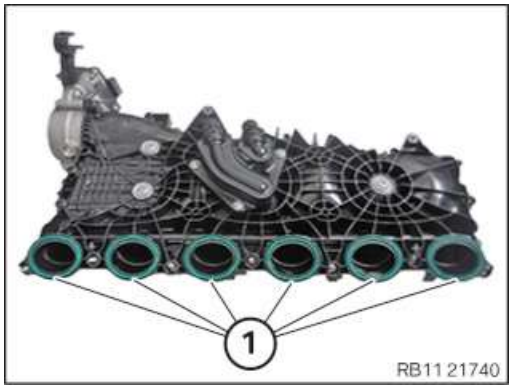
Trapped, crushed or damaged cables may cause short circuits and malfunctions.

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

TECHNICAL INFORMATION

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

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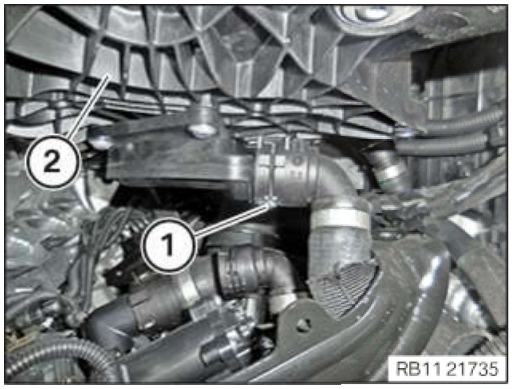


- Renew gaskets (1).

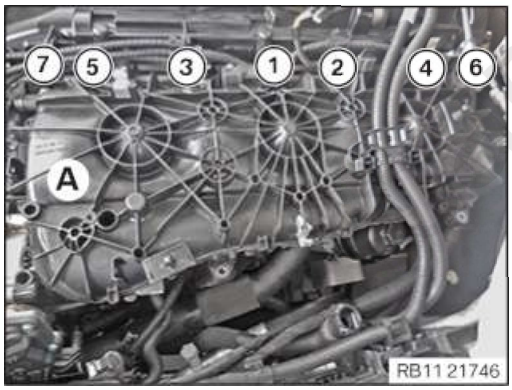
  Parts: Seals



- Clean contact surface (1).



- Feed in and position intake plenum (2).
- Connect and lock coolant line (1).
- Make sure that the cooling line (1) engages audibly.



TECHNICAL INFORMATION

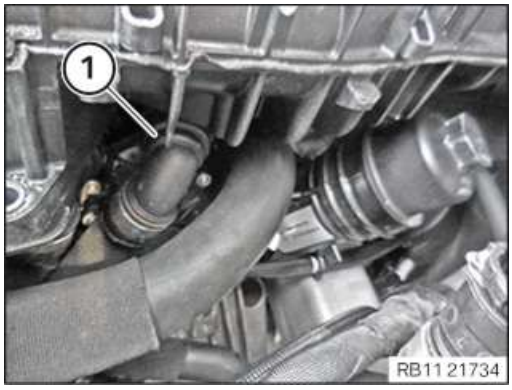
Additional coolant can escape. Make sure that no coolant enters the intake port of the cylinder head.

- Position the intake plenum (A).
- Tighten screws in the order (1) to (7).

Note: Tighten the bolts in 360 degree steps.

Intake plenum to cylinder head

M6		Tightening torque	10 Nm



- Connect and lock coolant line (1).
- Make sure that the cooling line (1) engages audibly.

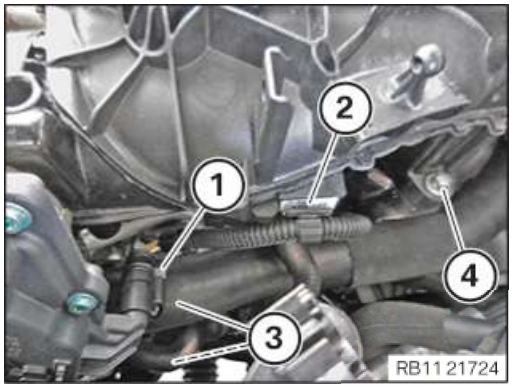
.diagn.com



- Tighten down screw 1.

Intake plenum to support

M6X25		Tightening torque	8 Nm

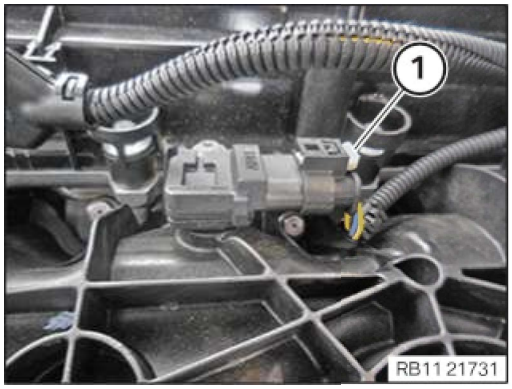


- Tighten down screw (4).

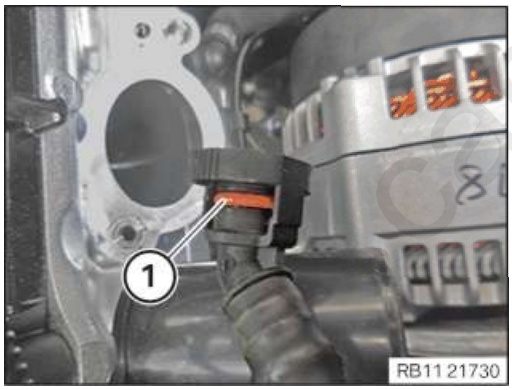
Intake plenum to support

M6X25		Tightening torque	8 Nm

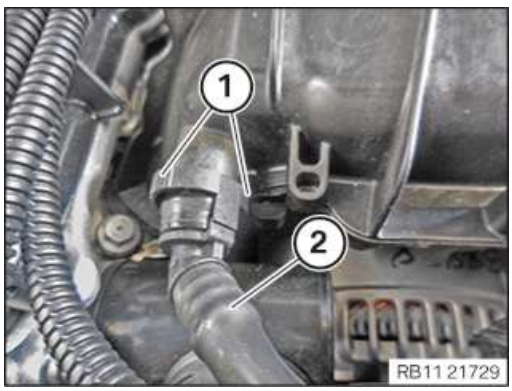
- Thread in and install coolant line (3).
- Secure clamps (2).
- Connect and lock the connector (1).
- Make sure the connector (1) engages audibly.



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

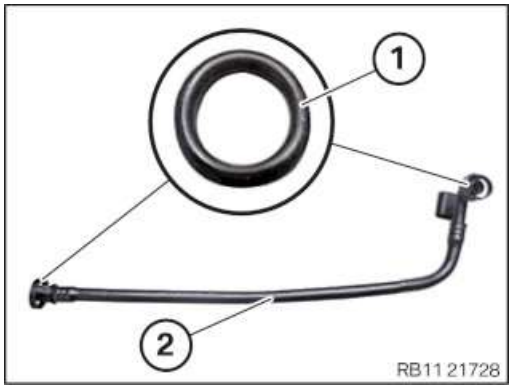


- Check sealing ring (1) for damage and renew tank ventilation line if necessary.

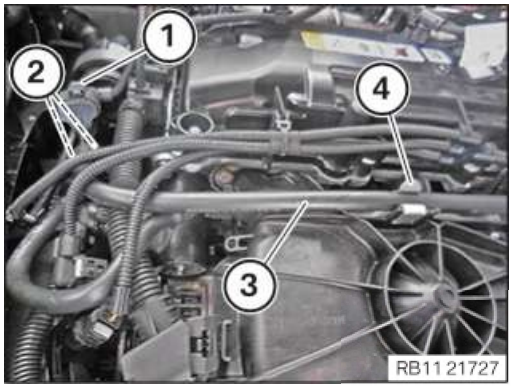


- Insert and install the tank ventilation line (2).
- Ensure that the locks (1) engage audibly.

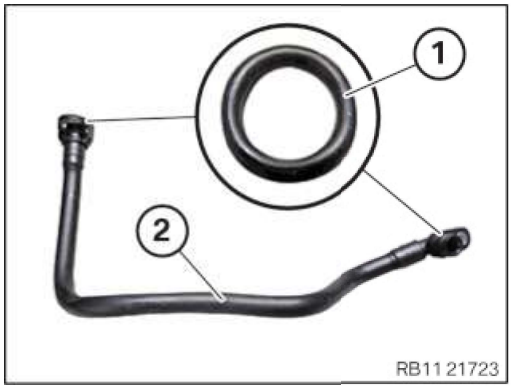
cardiagn.com



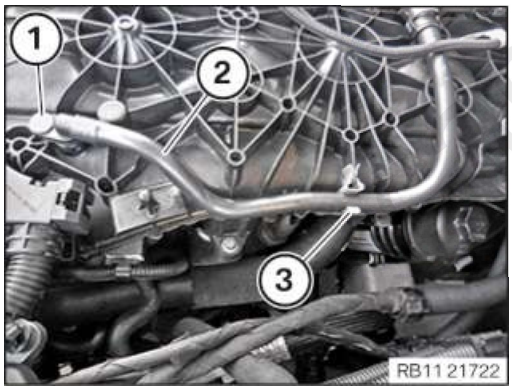
- Check sealing ring (1) for damage and renew tank ventilation line (2) if necessary.



- Insert and install the tank ventilation line (3).
- Ensure that the locks (2) engage audibly.
- Secure the tank ventilation line (3) to the clamp (4).
- Connect and lock the connector (1).
- Make sure the connector (1) engages audibly.



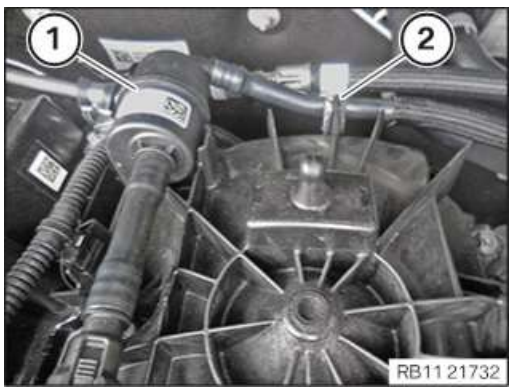
- Check sealing ring (1) for damage and renew tank ventilation line (2) if necessary.



- Insert and install the tank ventilation line (2).
- Secure the tank ventilation line (2) to the clamp (3).
- Tighten down screw (1).

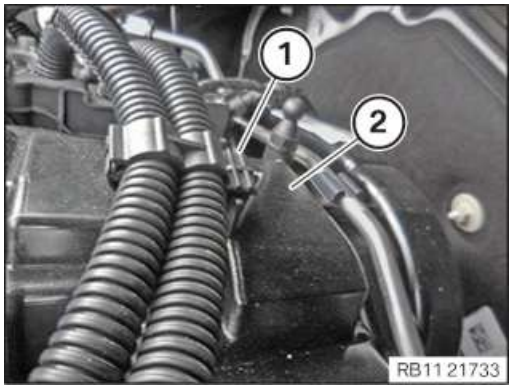
Tank ventilation line to intake plenum

Oval-head screw		Tightening torque	3 Nm

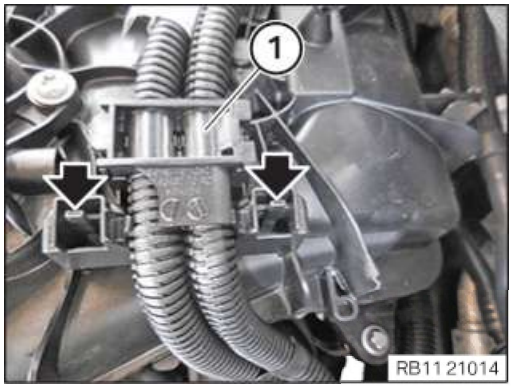


- Insert and install the tank ventilation line (1).
- Secure the tank ventilation line (1) to the clamp (2).

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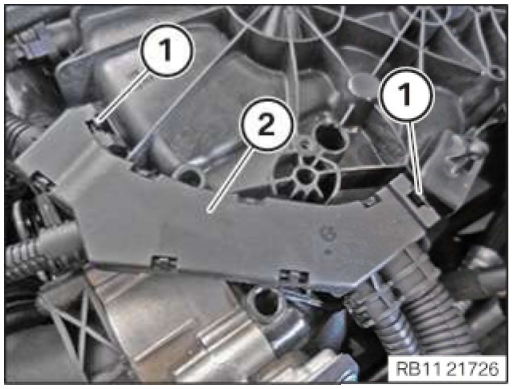


- Secure the wiring harness section(1) for the injectors and ignition coils on the cylinder head cover (2).



- Insert and install the wiring harness section (1) for the injectors and ignition coils.

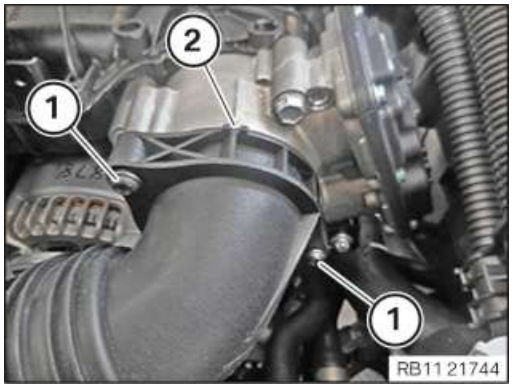
  The locks (arrows) must engage audibly.



- Feed in and install wiring harness section (2) for sensor system **2**.
- Ensure that the locks (1) engage audibly.



- Check the sealing ring (1) for damage and renew the sealing ring (1) as needed.



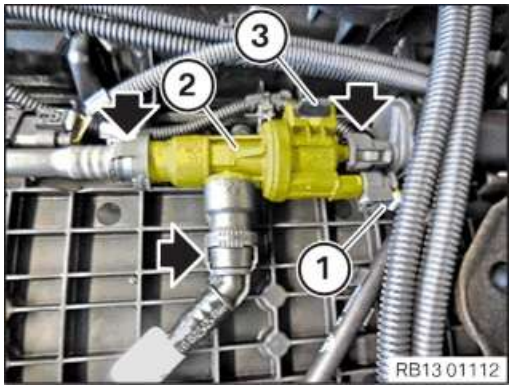
- Insert and install charge air line (2).
- Tighten the screws (1).

Charge air line to throttle valve

M6x30		Tightening torque	8 Nm

20 – Installing the tank vent valve

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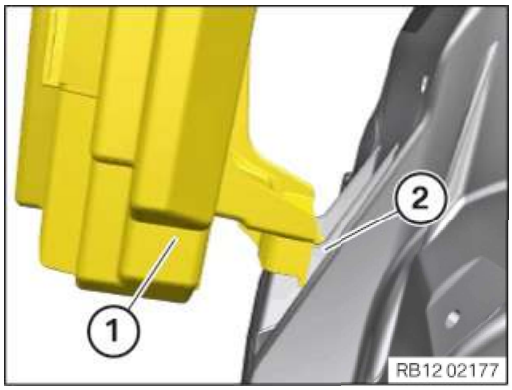


- Secure the tank vent valve (2) to the holder (3).
- Connect and lock the tank ventilation lines (arrows).

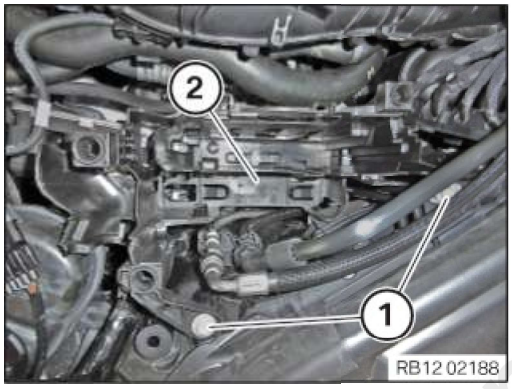
  The tank ventilation lines (arrows) must audibly engage.
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

21 – Installing the control unit holder



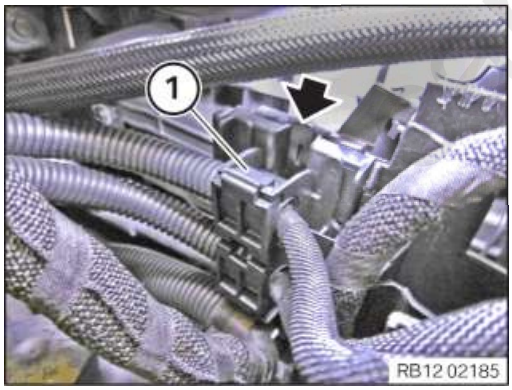
- Make sure the bottom control unit holder (1) is inserted correctly into the fixture (2).



- Guide in and install control unit holder (2).
- Tighten the screws (1).

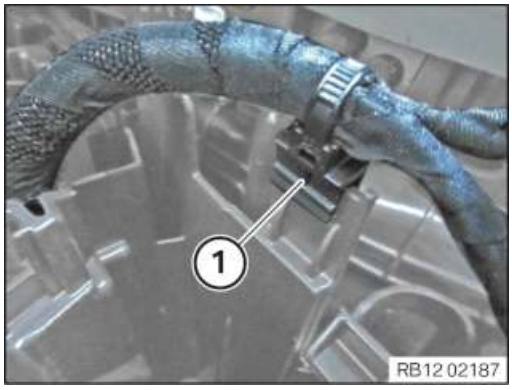
Control unit holder on spring strut dome

Hexagon screw	Tightening torque	8 Nm



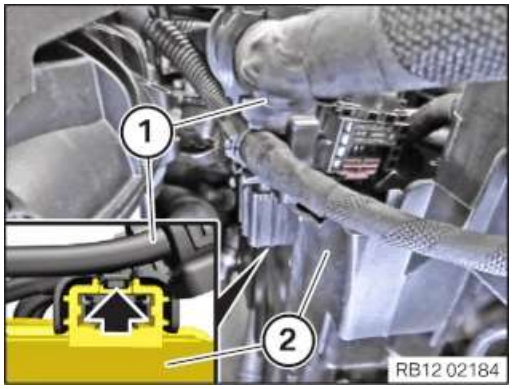
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.

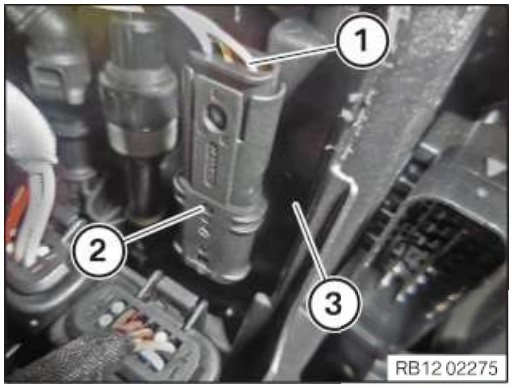


- Secure clamps (1).

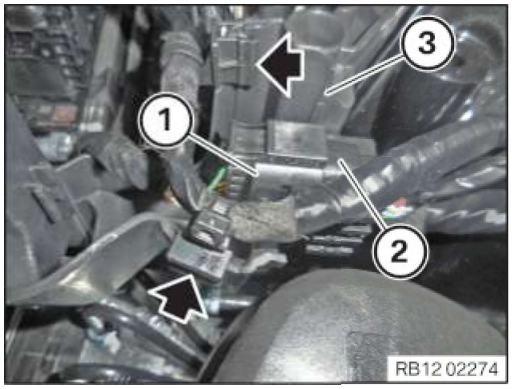
mydiagn.com



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



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



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

22 – Installing the integrated supply module (PDM)

WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Detach battery earth lead from battery.
- For additional batteries: Detach all battery earth leads from additional batteries.

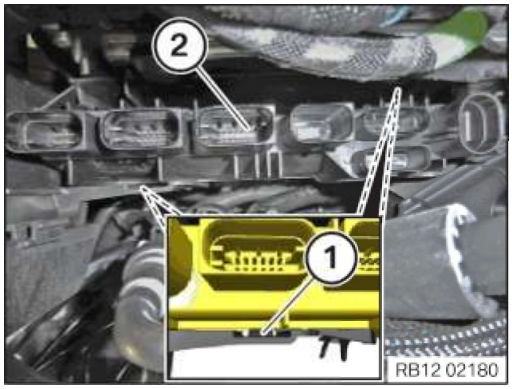
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RISK OF DAMAGE

Electrostatic discharge.

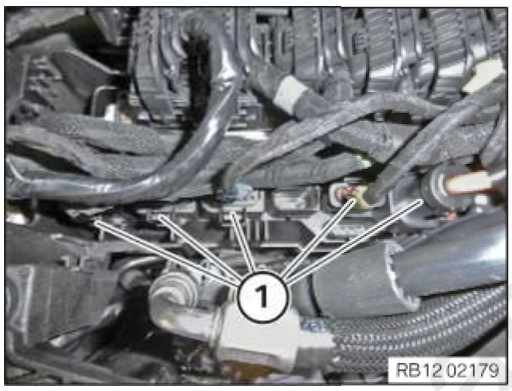
Damage to or destruction of electrical components.

- 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 Information on electrostatic discharge (ESD) protection.



- Insert and install the integrated supply module (PDM) (2).

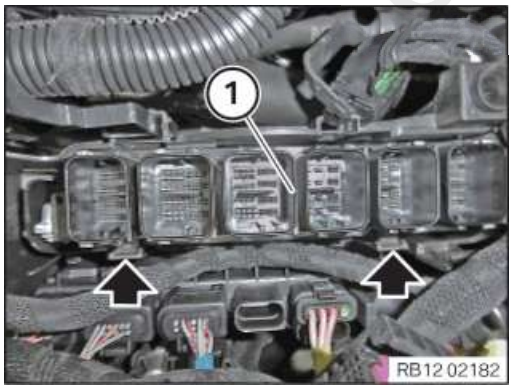
  The latch mechanisms (1) must engage audibly.
- Unlock the latch mechanisms (1).



- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.

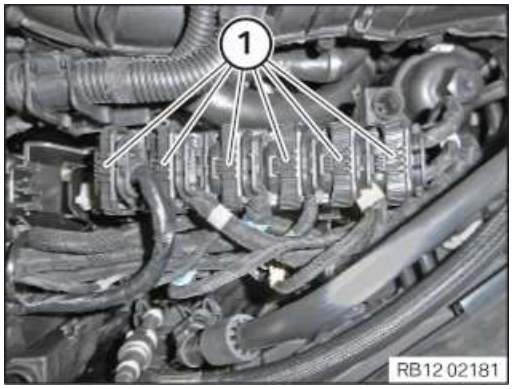
23 – Installing the DME control unit



- Feed in and install DME control unit (1).

  The locks (arrows) must engage audibly.

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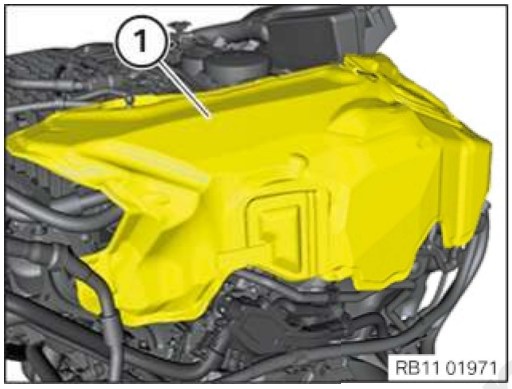
- Connect connectors (1) and lock.

  All connectors (1) must engage audibly.



- Insert and install cover (1) into guides.

24 – Installing acoustic cover at rear



- Make sure the acoustic cover (1) is correctly positioned on the rear side of the engine.



- Install the acoustic cover (1) from the top and clip it in into the marked areas.

25 – 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.

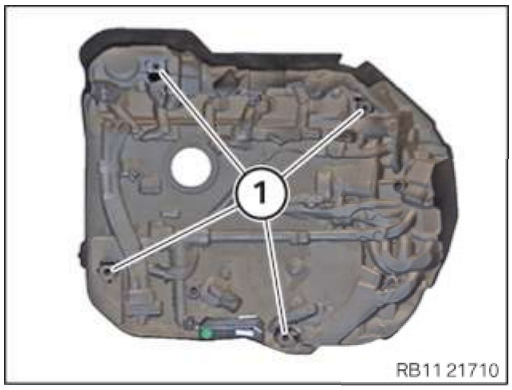
26 – Install acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover.

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

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



- Check the rubber mount (1) for correct fit in the acoustic cover.



- Install acoustic cover (1) and fix in the rubber mounts (marks).

27 – Disconnecting all battery earth leads



- See additional information.

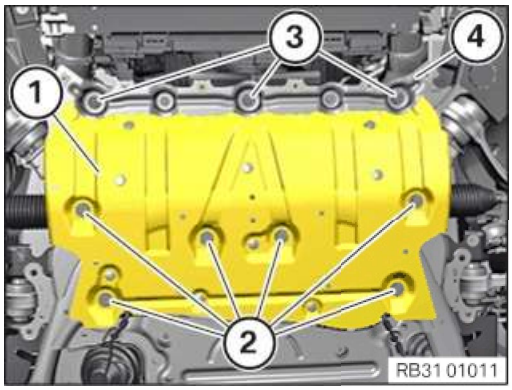
28 – Filling and bleed the low-temperature coolant circuit

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- See additional information.

29 – Installing the stiffening plate

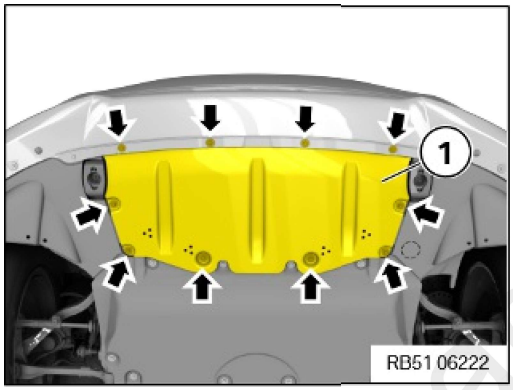


- Position stiffening plate (1).
- Screw screws (2) in.
- Position holder of underride protection (4).
- Screw screws (3) in.
- Tighten down screws (2) and (3).

Stiffening plate to front axle support

M10		Tightening torque	56 Nm

30 – Installing the front underbody protection



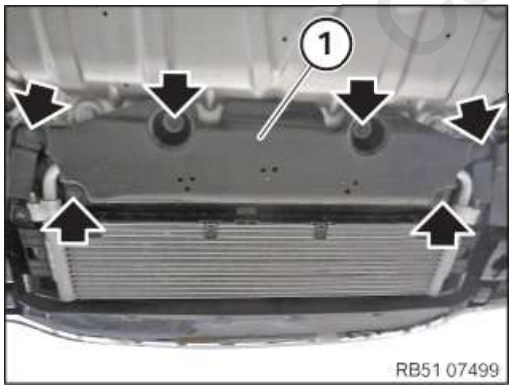
- **Version 1:**

  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 2:**

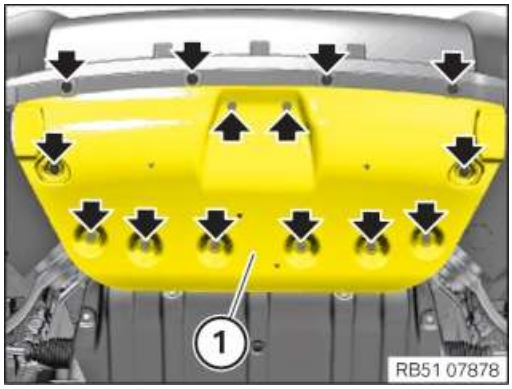
  Feed in and position the front underbody protection (1).

  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 3:**

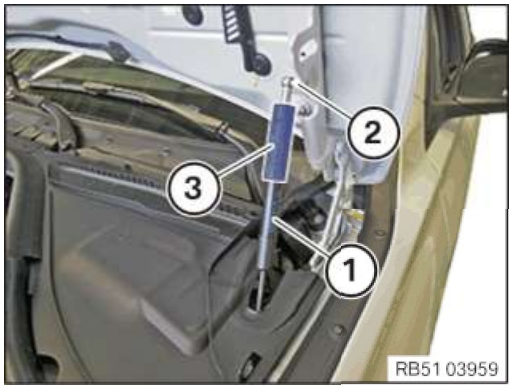
  Feed in and install front underbody protection (1).

  Tighten screws (arrows).

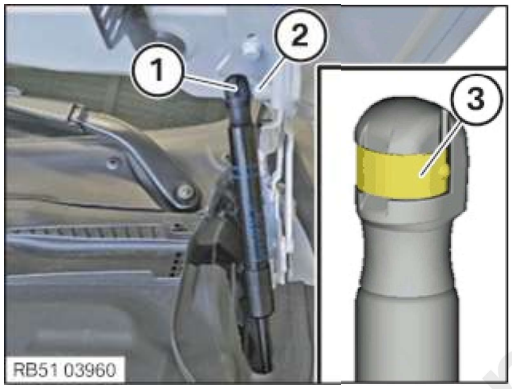
Underbody protection front

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

31 – Take bonnet out of the service position



- 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.



CAUTION

Shutting bonnet or tailgate.

Danger of injury!

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

- 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.

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Additional Information

Overview of Tightening Torques

Cover, front bottom on side — Used in step 1415

Hexagon screw for thermoplastic		Tightening torque	3 Nm

Engine oil cooler to bumper support — Used in step 15

M6X25		Tightening torque	8 Nm

Coolant temperature sensor at cylinder head — Used in step 18

Sensor		Tightening torque	13,5 Nm

Intake plenum to cylinder head — Used in step 19

M6		Tightening torque	10 Nm

Intake plenum to support			Used in step 19
M6X25		Tightening torque	8 Nm

Tank ventilation line to intake plenum			Used in step 19
Oval-head screw		Tightening torque	3 Nm

Charge air line to throttle valve			Used in step 19
M6x30		Tightening torque	8 Nm

Control unit holder on spring strut dome			Used in step 21
Hexagon screw		Tightening torque	8 Nm

Stiffening plate to front axle support			Used in step 29
M10		Tightening torque	56 Nm

Underbody protection front			Used in step 30
Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Overview of Special Tools

Links

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12 00 ... Instructions for removal and replacement of control units	723

Repair instructions	Used in step
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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17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	28
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17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	28
17 00 011 Draining and topping up coolant circuit for low temperature	28
17 00 040 Bleed the low-temperature cooling system and check for watertightness (coolant circuit for low temperature)	28
17 00 040 Bleeding and filling low temperature cooling system using vacuum filler device (B48)	28
17 00 011 Draining and topping up low-temperature coolant circuit	28
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17 00 040 Bleeding the low-temperature coolant circuit and checking it for watertightness	28
17 00 015 Draining and topping up the coolant circuit for the drive \PREMIUM	28
17 00 011 Draining and topping up low-temperature coolant circuit	28
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17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	28

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17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	28

Operating materials	Used in step
Main group 17	18

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13 62 679 Replacing the coolant/oil temperature sensor

WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Detach battery earth lead from battery.
- For additional 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.

TECHNICAL INFORMATION

Additional coolant can escape. Make sure that no coolant enters the intake port of the cylinder head.

TECHNICAL INFORMATION

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

PRELIMINARY WORK

1 – Bring front compartment lid in the service position

Prerequisite

Engine compartment lid is open.

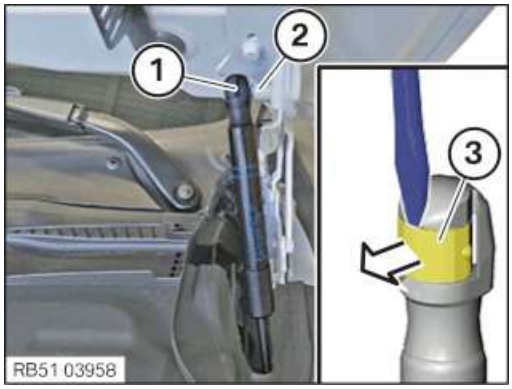
CAUTION

Shutting bonnet or tailgate.

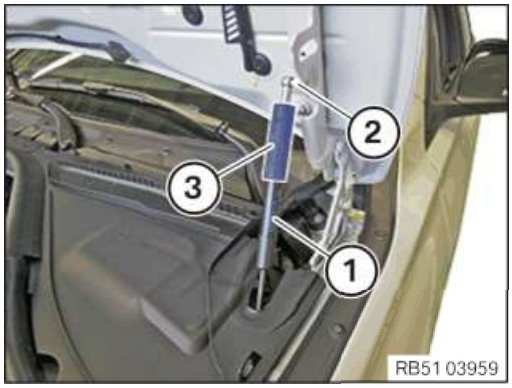
Danger of injury!

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

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- 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.
- Push special tool 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 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.

4 – Removing the acoustic cover

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WARNING

Hot surfaces.

Risk of burning!

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

RISK OF DAMAGE

Damage to the acoustic cover.

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

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



- Release the acoustic cover (1) towards the top from the rubber mounts (marks).

5 – Removing acoustic cover at rear



- Unclip the acoustic cover (1) in the marked areas and remove it to the top.

6 – Remove tank vent valve

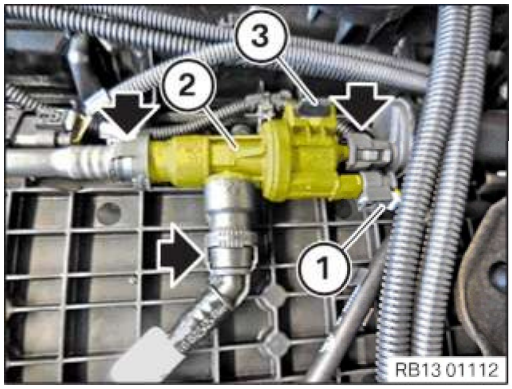
rdiagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

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



- Unlock and disconnect connector (1).
- Unlock and disconnect the tank ventilation lines (arrows).
- Detach and remove the tank vent valve (2) from the holder (3).

7 – Removing the DME control unit

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 Information on electrostatic discharge (ESD) protection.

TECHNICAL INFORMATION

Follow instructions for removing and installing control units.

For additional information see: 12 00 ... Notes on removal and installation of control units

TECHNICAL INFORMATION

In a warranty case, you must always provide a fault memory printout with the defective part, even if the fault memory does not contain an entry.

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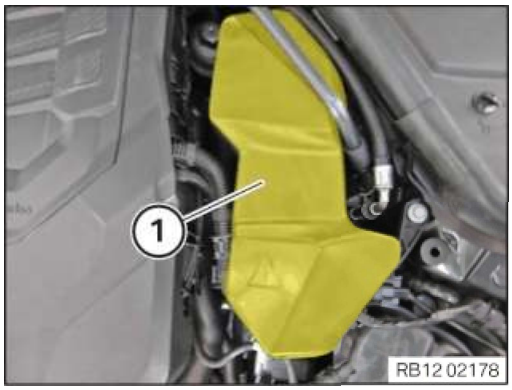
TECHNICAL INFORMATION

Control unit must be programmed after it is replaced.

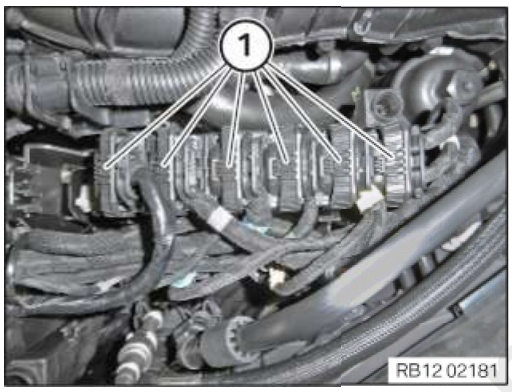
For additional information see: 61 00 ... Programming/encoding control unit(s)

TECHNICAL INFORMATION

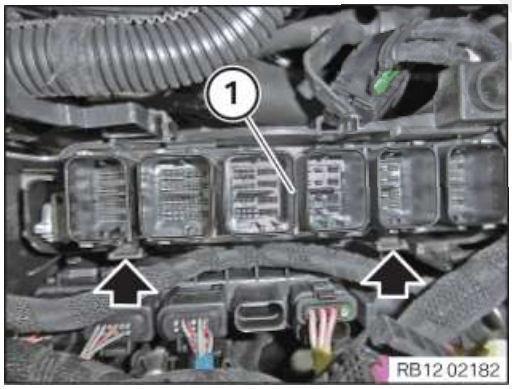
Disconnecting control units may cause fault code entries and functional limitations. Fault code entries must be read out and deleted if necessary.



- Pull the cover (1) towards the top and feed out.



- Unlock and disconnect the plug connection (1).



- Unlock the locks (arrows).
- Guide out and remove DME control unit (1).

8 – Removing integrated supply module (PDM)

WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

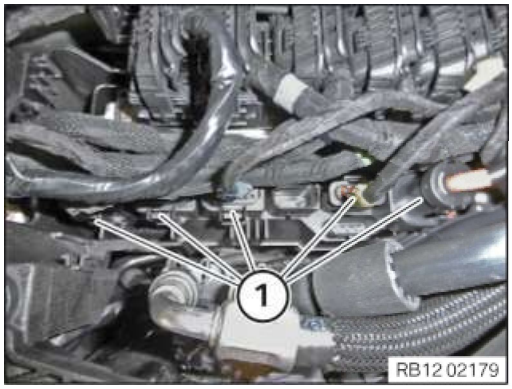
- Detach battery earth lead from battery.
- For additional batteries: Detach all battery earth leads from additional batteries.

RISK OF DAMAGE

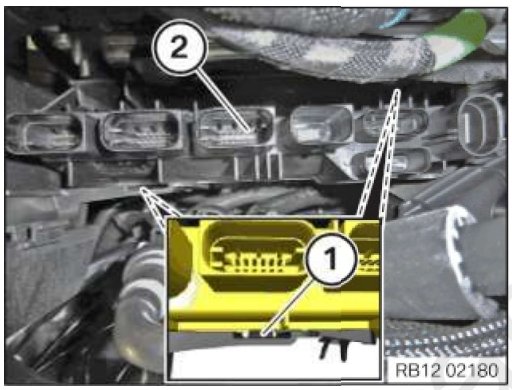
Electrostatic discharge.

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 Information on electrostatic discharge (ESD) protection.

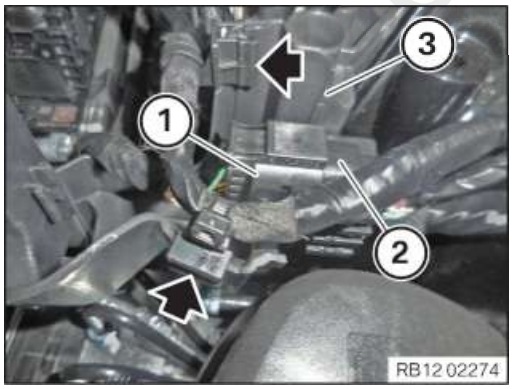


- Unlock and disconnect plug connections (1).



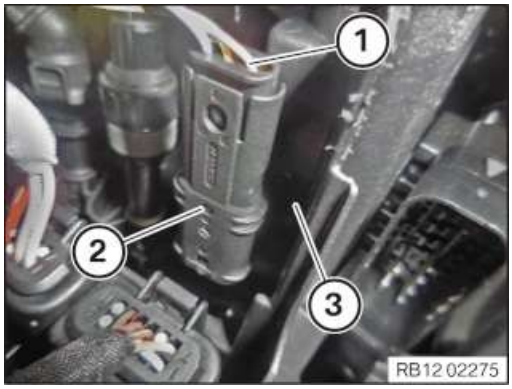
- Unlock the latch mechanisms (1).
- Guide out and remove integrated supply module (PDM) (2) upwards.

9 – Removing the control unit holder

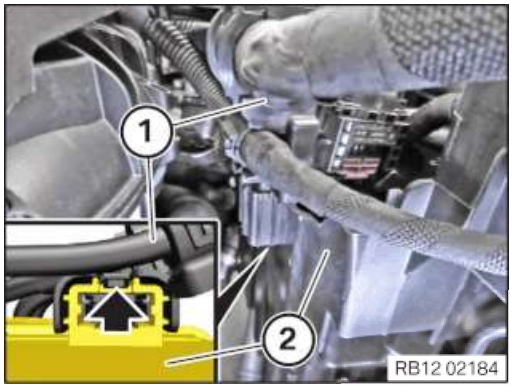


- Unlock plug connection (1) and disconnect.
- Unlock the connector (2) and disconnect from the control unit holder (3).
- Release the clamps (arrows).

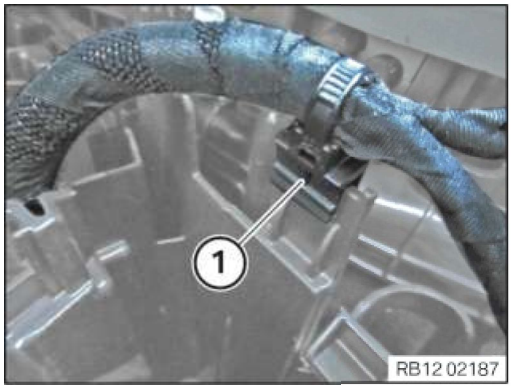
cardiagn.com



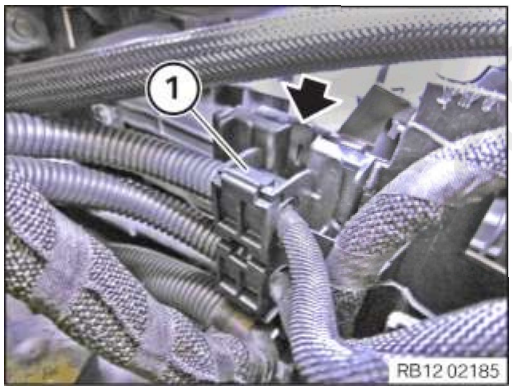
- Unlock plug connection (1) and disconnect.
- Unlock the connector and disconnect from the control unit holder (3).



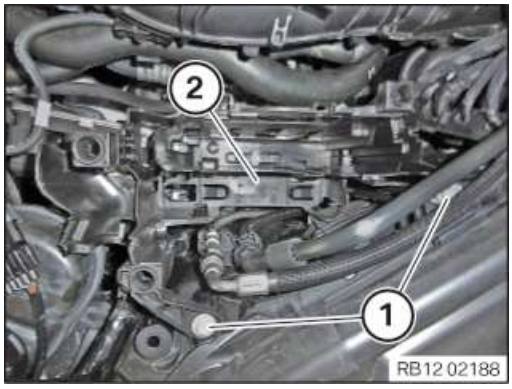
- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).



- Loosen clamp (1).

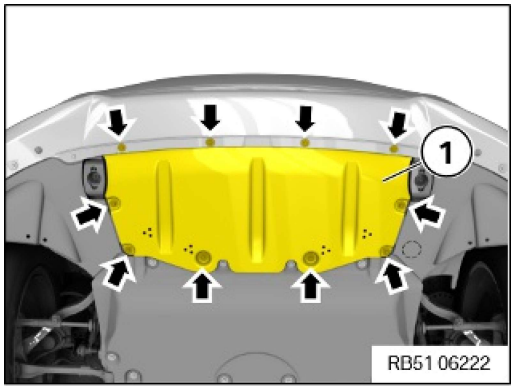


- Unlock the lock (arrow).
- Feed out the cable clip (1) upwards and set it aside.



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

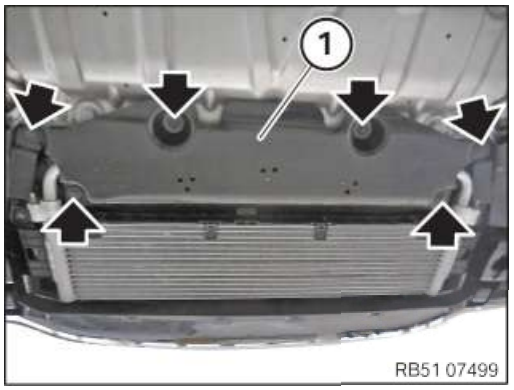
10 – Removing the front underbody protection



- **Version 1:**

  Remove screws (arrows).

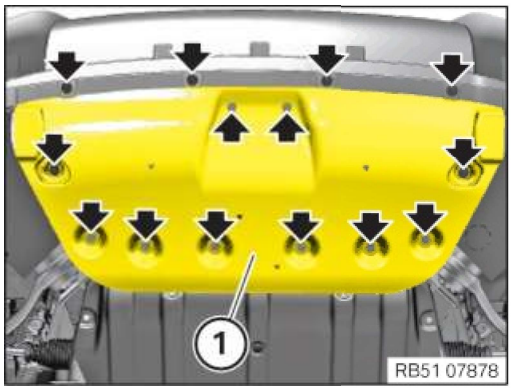
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version 2:**

  Remove screws (arrows).

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



- **Version 3:**

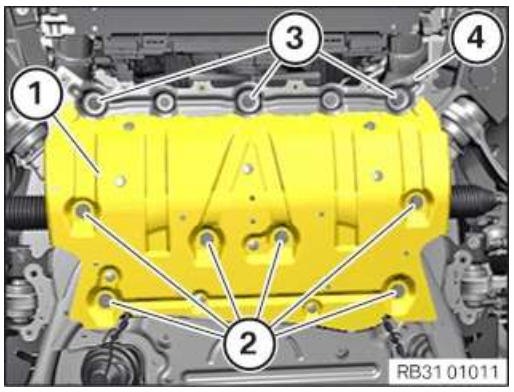
  Remove screws (arrows).

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

11 – Removing the stiffening plate

TECHNICAL INFORMATION

Driving without stiffening plate is not permissible.



- Loosen screws (3).
- Remove the holder of the underride protection (4).
- Loosen screws (2).
- Remove stiffening plate (1).

12 – If installed: Partially release the engine oil cooler

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WARNING

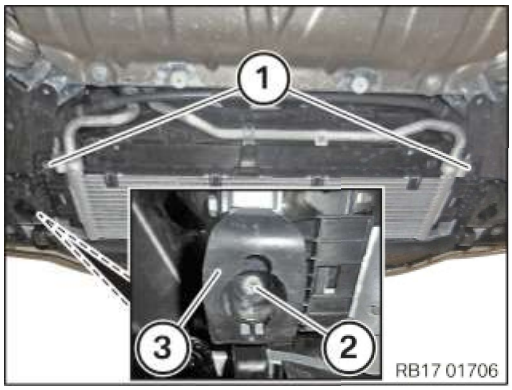
Hot surfaces.

Risk of burning!

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

TECHNICAL INFORMATION

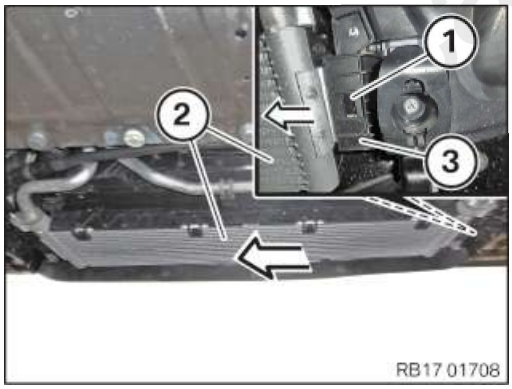
The work must be performed with care to prevent component damage.



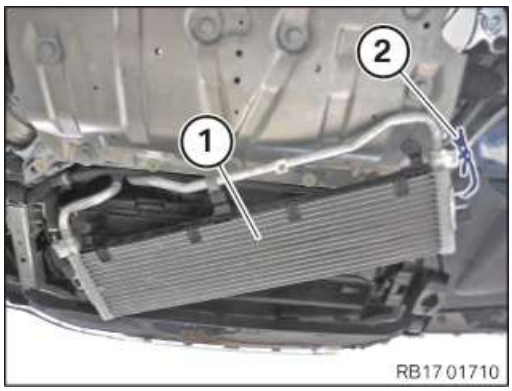
- Loosen screws (1).
- Drill out rivet on the left (2).
- Remove the left-hand damper (3).



- Loosen screw (1).



- Unlock lock (1).
- Feed out engine oil cooler (2) from the holder in the direction of arrow (3) and place to one side.



- Affix the engine oil cooler (1) with a cable strap (2) as shown.

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13 – Draining the coolant from the low-temperature cooling system

WARNING

Hot surfaces.

Risk of burning!

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

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.

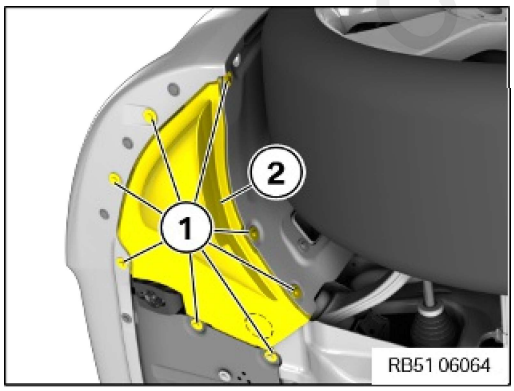
In the case of other removal work involving the draining of part quantities of coolant, the coolant level must be topped up with new coolant.

TECHNICAL INFORMATION

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

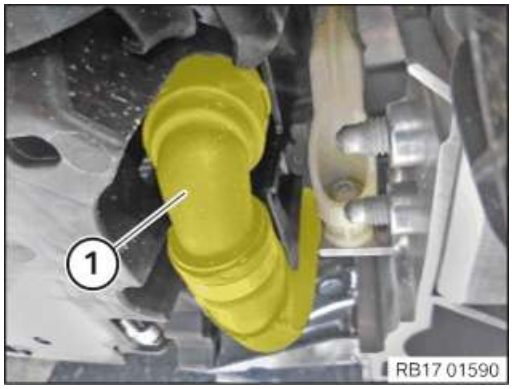


- Loosen sealing cap (1).



- Loosen screws (1).
- Guide out and remove bottom left cover (2) to the front.

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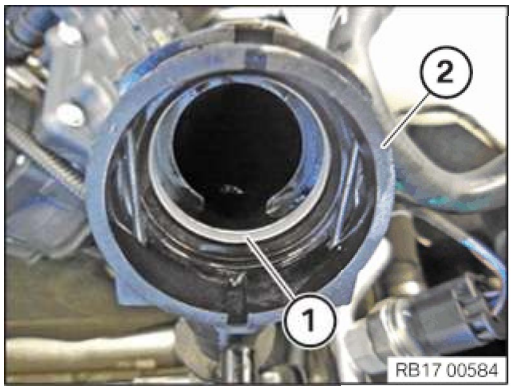


- Unlock and disconnect the coolant line (1).
- Catch and dispose of escaping coolant.

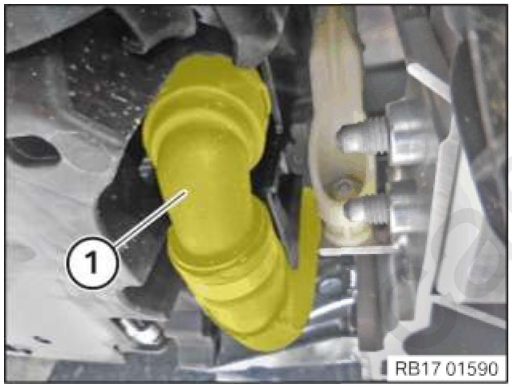
14 – Connecting the coolant lines for the low-temperature coolant circuit

TECHNICAL INFORMATION

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

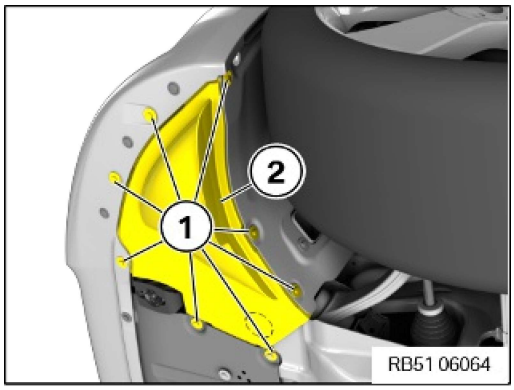


- Check the sealing rings (1) of the coolant lines (2) for damage and renew if necessary.



- Connect and lock the coolant line (1).

  The coolant line (1) must audibly engage.



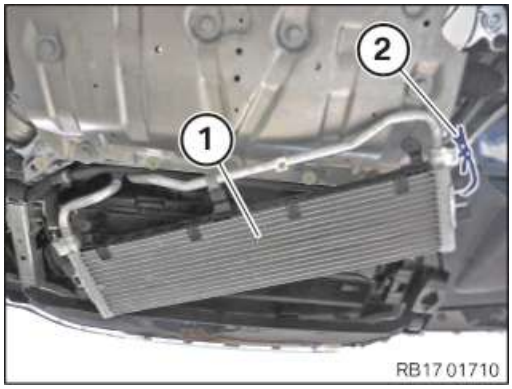
- Feed in and install cover (2) at the bottom front left.
- Tighten the screws (1).

Cover, front bottom on side

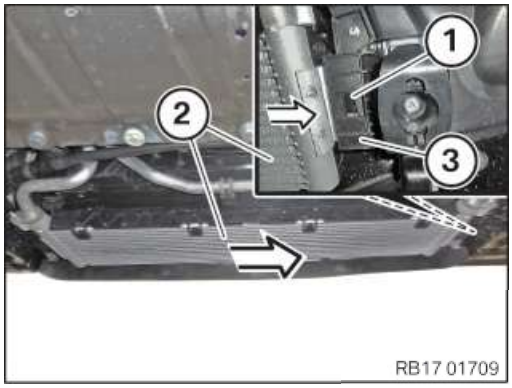
Hexagon screw for thermoplastic		Tightening torque	3 Nm

15 – If installed: Secure engine oil cooler

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- Remove the cable straps (2).
- Position engine oil cooler (1).



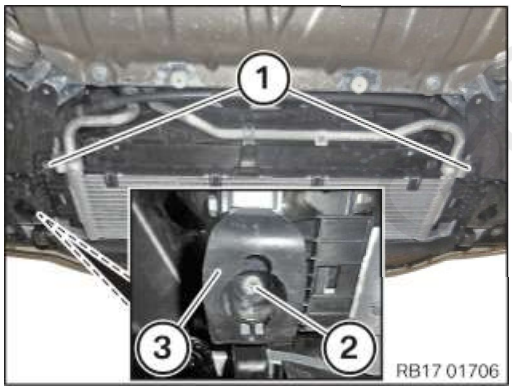
- Feed in and install the engine oil cooler (2) on the holder (3) in the direction of the arrow.
- Ensure that the lock (1)engages audibly.



- Tighten down screw (1).

Engine oil cooler to bumper support

M6X25		Tightening torque	8 Nm



- Renew rivet (2).

  Parts: Rivet
- Install and rivet damper (3).
- Tighten the screws (1).

Cover, front bottom on side

Hexagon screw for thermoplastic		Tightening torque	3 Nm

16 – Removing the intake plenum

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.

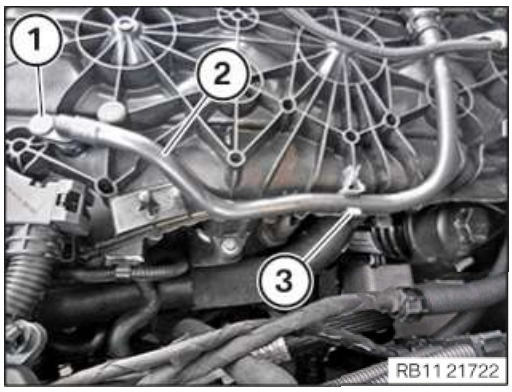
rdiagn.com

TECHNICAL INFORMATION

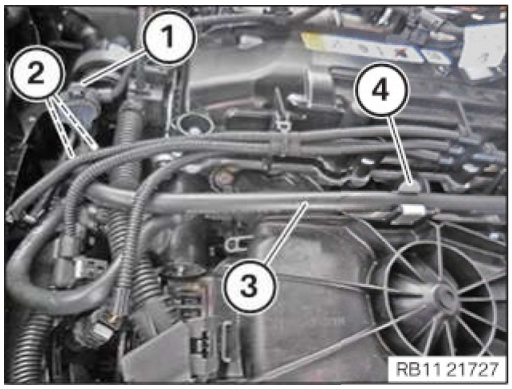
Additional coolant can escape. Make sure that no coolant enters the intake port of the cylinder head.

TECHNICAL INFORMATION

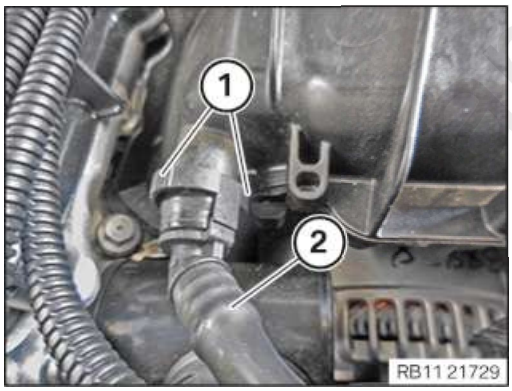
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



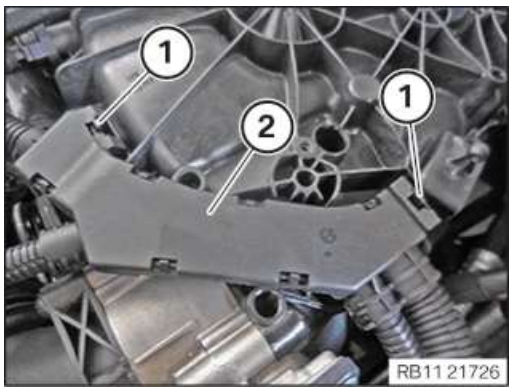
- Loosen screw (1).
- Guide tank ventilation line (2) out of clamp (3) and remove it.



- Unlock and loosen connector (1).
- Unlock the locks (2).
- Guide tank ventilation line (3) out of clamp (4) and remove it.

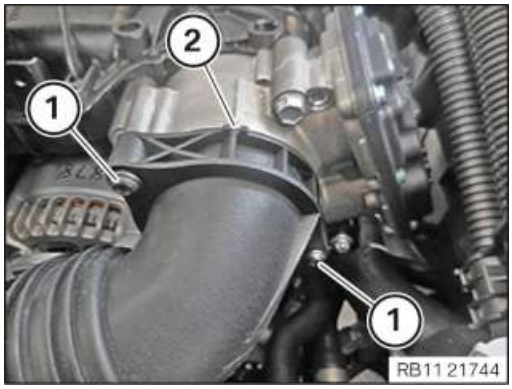


- Unlock the locks (1).
- Feed the tank ventilation line (2) out and set it aside.

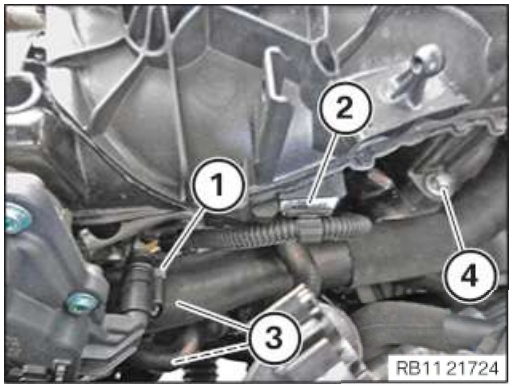


- Unlock the locks (1).
- Guide out the wiring harness section (2) for the sensor system **2** and place to one side.

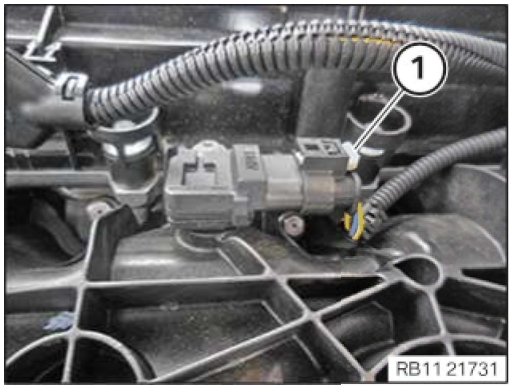
rdiagn.com



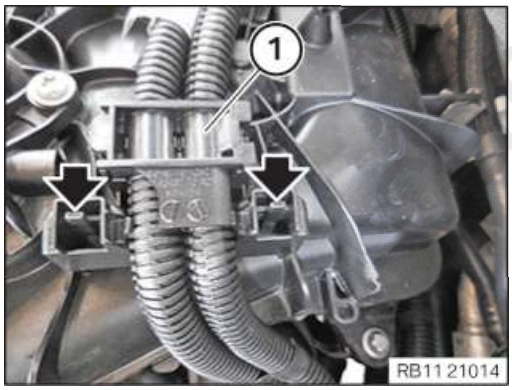
- Loosen screws (1).
- Feed out charge air line (2) and place to one side.



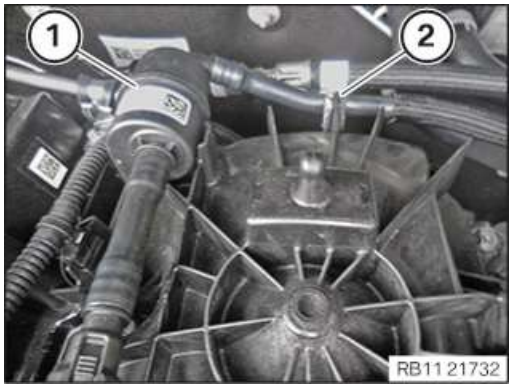
- Unlock and loosen connector (1).
- Loosen clamp (2).
- Thread off coolant line (3) and place to the side.
- Loosen screw (4).



- Unlock and loosen connector (1).

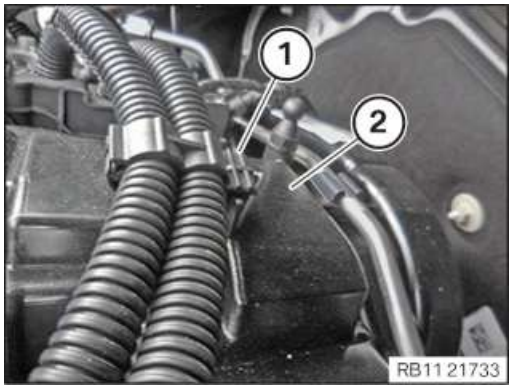


- Unlock the locks (arrows).
- Thread out the wiring harness section (1) for the injectors and ignition coils and set it aside.



- Guide tank ventilation line (1) out of clamp (2) and place it aside.

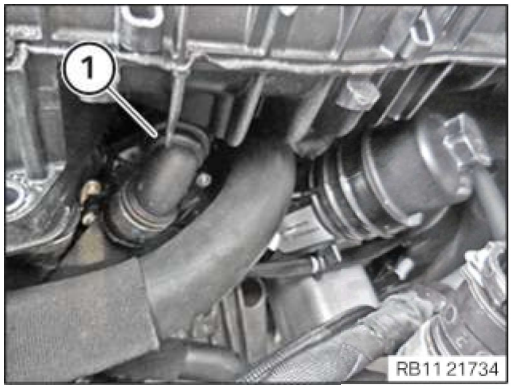
ardiagn.com



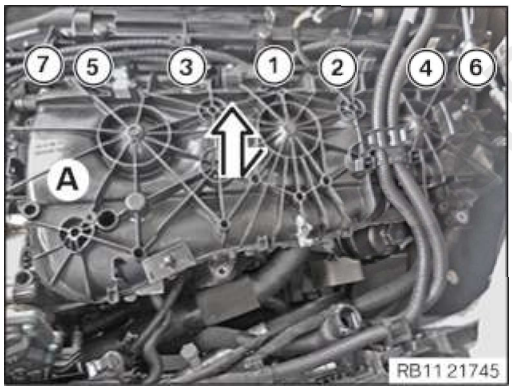
- Guide out the wiring harness section (1) for the injectors and ignition coils of the cylinder head cover (2) and set it aside.



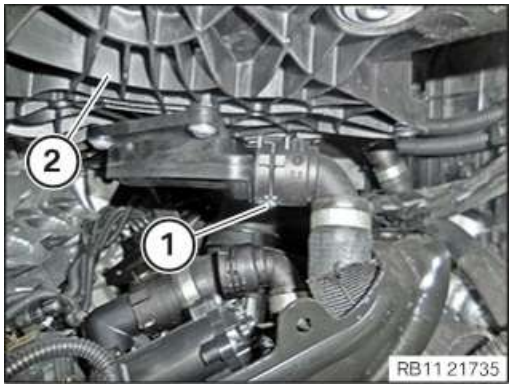
- Loosen screw (1).



- Unlock and loosen coolant line (1).
- Catch and dispose of escaping coolant.



- Loosen screws in the order (7) to (1).
- Slightly raise intake plenum (A) in direction of arrow.



TECHNICAL INFORMATION

Additional coolant can escape. Make sure that no coolant enters the intake port of the cylinder head.

- Unlock and release coolant line (1) below the intake plenum (2).
- Catch and dispose of escaping coolant.
- Thread out intake plenum (2) and remove.

mdiagn.com

MAIN WORK

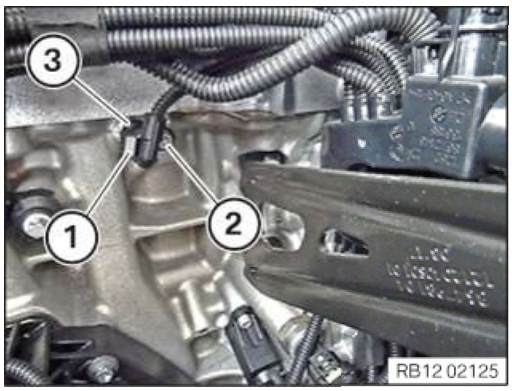
17 – Remove the temperature sensor on the crankcase

RISK OF DAMAGE

Electrostatic discharge.

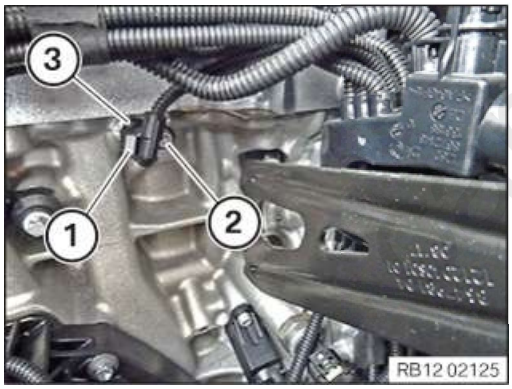
Damage to or destruction of electrical components.

- 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 Information on electrostatic discharge (ESD) protection.



- Unlock plug connection (1) and disconnect.
- Loosen screw (2).
- Feed out the temperature sensor (3) on the crankcase and remove it.

18 – Install the temperature sensor on the crankcase



- Insert and install the temperature sensor (3) on the crankcase.
- Tighten down screw (2).

Temperature sensor on crankcase

M6x18		Tightening torque	8 Nm

- Connect and lock connector (1) .

  The connector (1) must engage audibly.

POSTPROCESSES

19 – Installing the intake plenum

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

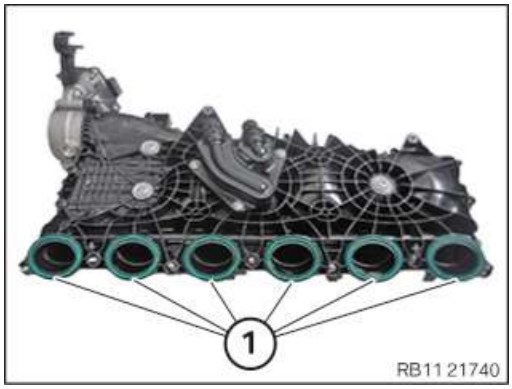
Trapped, crushed or damaged cables may cause short circuits and malfunctions.

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

.com

TECHNICAL INFORMATION

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

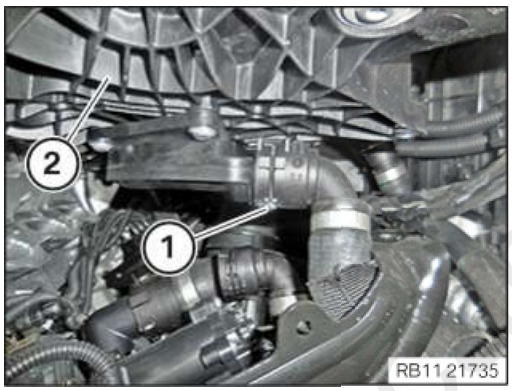


- Renew gaskets (1).

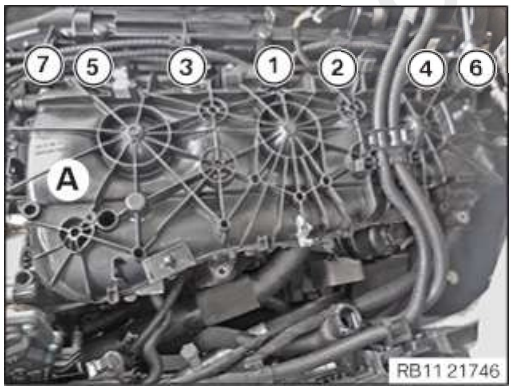
  Parts: Seals



- Clean contact surface (1).



- Feed in and position intake plenum (2).
- Connect and lock coolant line (1).
- Make sure that the cooling line (1) engages audibly.



TECHNICAL INFORMATION

Additional coolant can escape. Make sure that no coolant enters the intake port of the cylinder head.

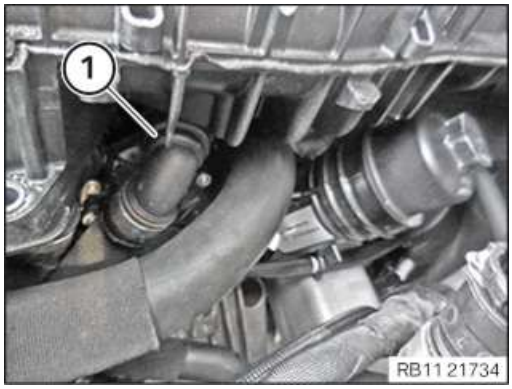
- Position the intake plenum (A).
- Tighten screws in the order (1) to (7).

Note: Tighten the bolts in 360 degree steps.

Intake plenum to cylinder head

M6		Tightening torque	10 Nm

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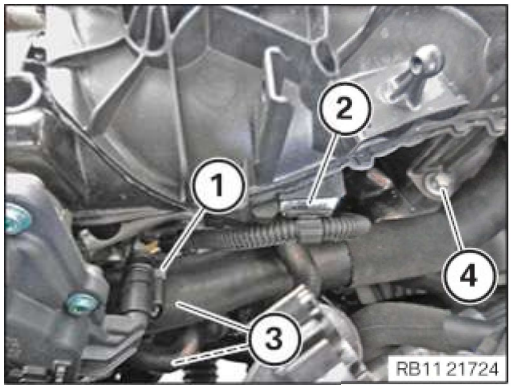
- Connect and lock coolant line (1).
- Make sure that the cooling line (1) engages audibly.



- Tighten down screw 1.

Intake plenum to support

M6X25		Tightening torque	8 Nm

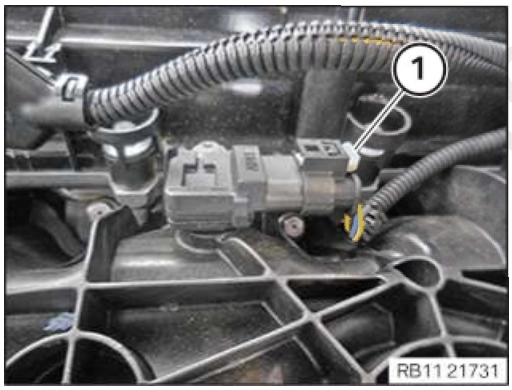


- Tighten down screw (4).

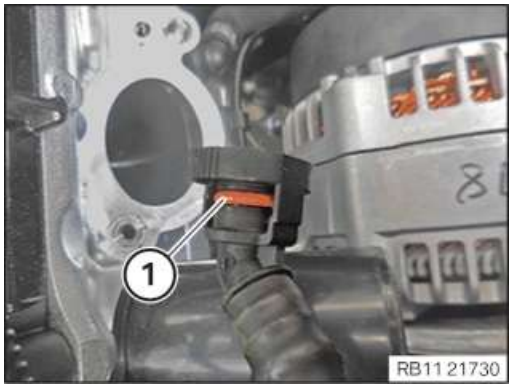
Intake plenum to support

M6X25		Tightening torque	8 Nm

- Thread in and install coolant line (3).
- Secure clamps (2).
- Connect and lock the connector (1).
- Make sure the connector (1) engages audibly.

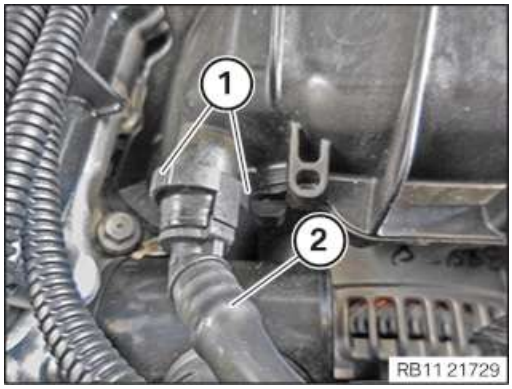


- Connect and lock the connector (1).
- Make sure the connector (1) engages audibly.

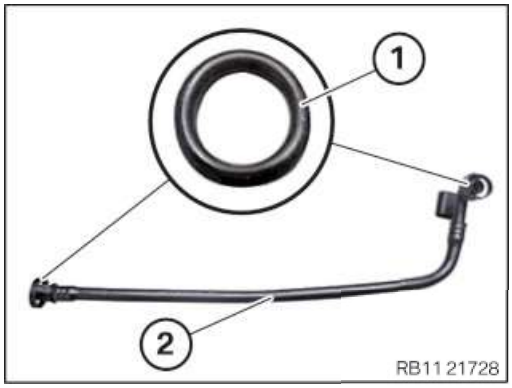


- Check sealing ring (1) for damage and renew tank ventilation line if necessary.

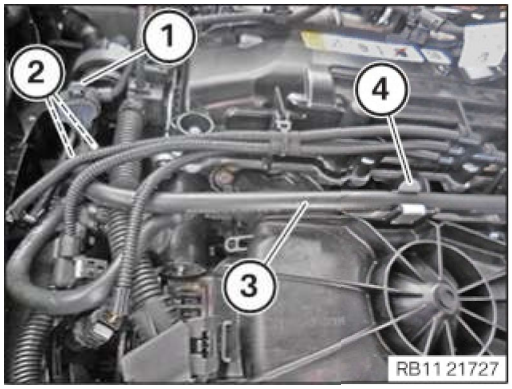
ardiag.com



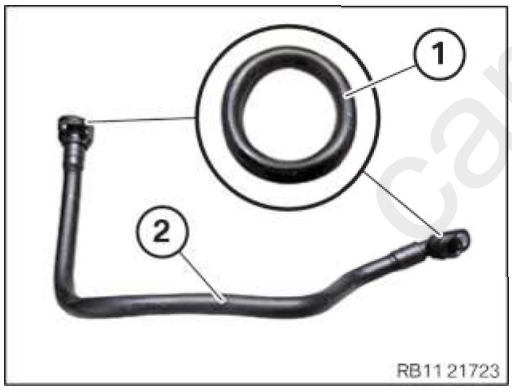
- Insert and install the tank ventilation line (2).
- Ensure that the locks (1) engage audibly.



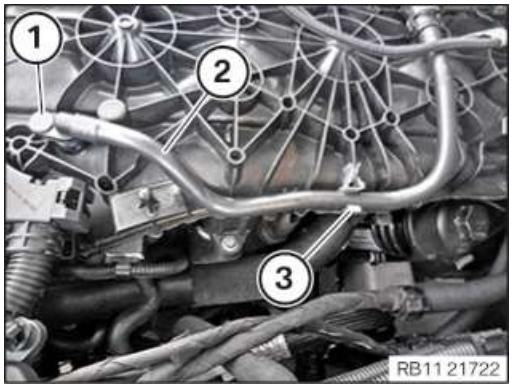
- Check sealing ring (1) for damage and renew tank ventilation line (2) if necessary.



- Insert and install the tank ventilation line (3).
- Ensure that the locks (2) engage audibly.
- Secure the tank ventilation line (3) to the clamp (4).
- Connect and lock the connector (1).
- Make sure the connector (1) engages audibly.



- Check sealing ring (1) for damage and renew tank ventilation line (2) if necessary.

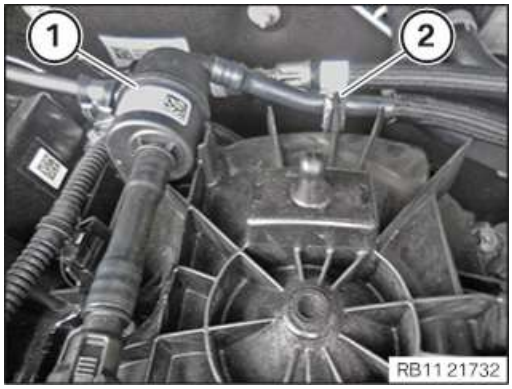


- Insert and install the tank ventilation line (2).
- Secure the tank ventilation line (2) to the clamp (3).
- Tighten down screw (1).

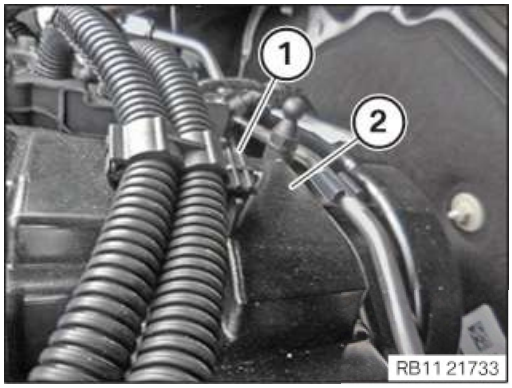
Tank ventilation line to intake plenum

Oval-head screw		Tightening torque	3 Nm

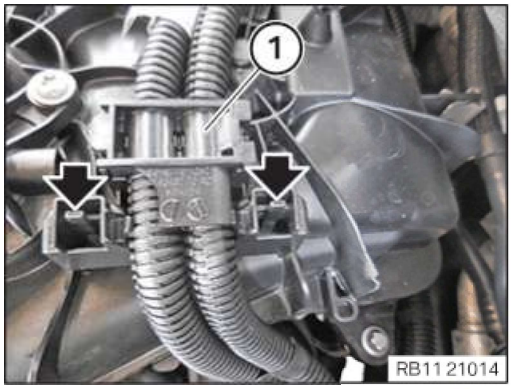
cardiagn.com



- Insert and install the tank ventilation line (1).
- Secure the tank ventilation line (1) to the clamp (2).

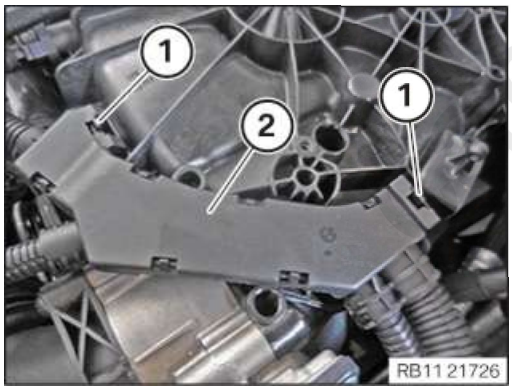


- Secure the wiring harness section(1) for the injectors and ignition coils on the cylinder head cover (2).



- Insert and install the wiring harness section (1) for the injectors and ignition coils.

  The locks (arrows) must engage audibly.

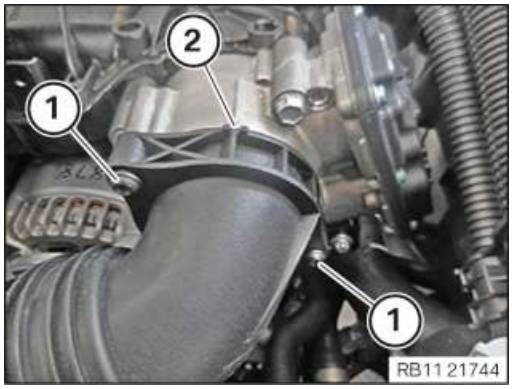


- Feed in and install wiring harness section (2) for sensor system **2**.
- Ensure that the locks (1) engage audibly.



- Check the sealing ring (1) for damage and renew the sealing ring (1) as needed.

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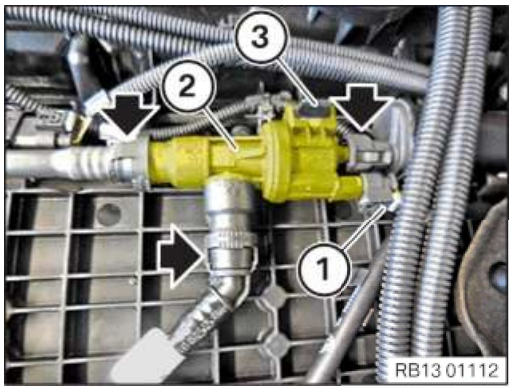


- Insert and install charge air line (2).
- Tighten the screws (1).

Charge air line to throttle valve

M6x30		Tightening torque	8 Nm

20 – Installing the tank vent valve

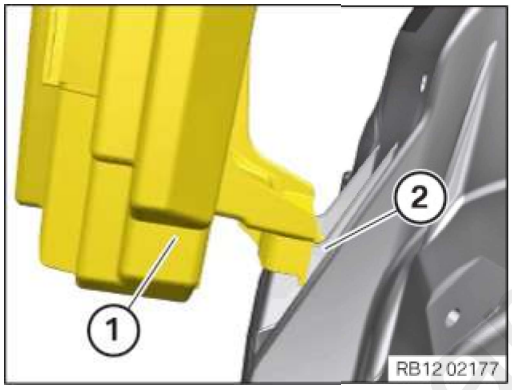


- Secure the tank vent valve (2) to the holder (3).
- Connect and lock the tank ventilation lines (arrows).

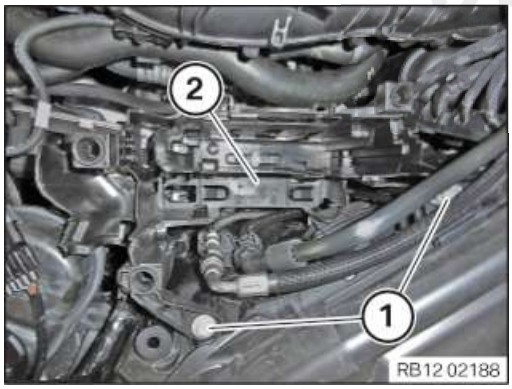
  The tank ventilation lines (arrows) must audibly engage.
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

21 – Installing the control unit holder



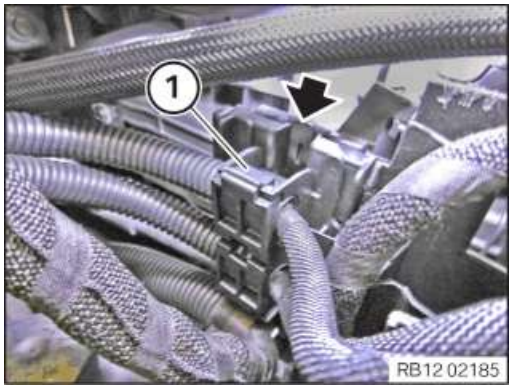
- Make sure the bottom control unit holder (1) is inserted correctly into the fixture (2).



- Guide in and install control unit holder (2).
- Tighten the screws (1).

Control unit holder on spring strut dome

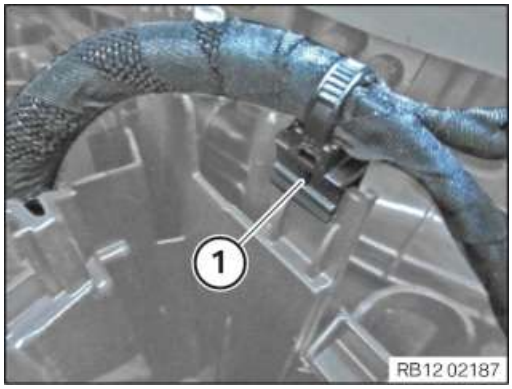
Hexagon screw		Tightening torque	8 Nm



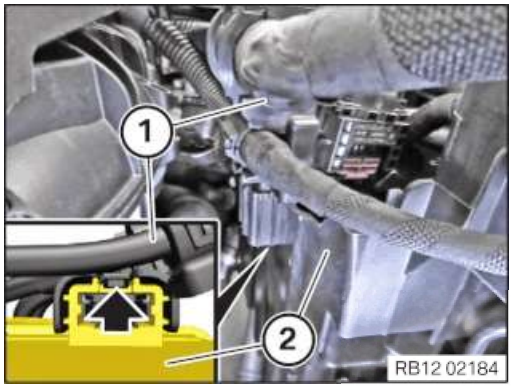
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.

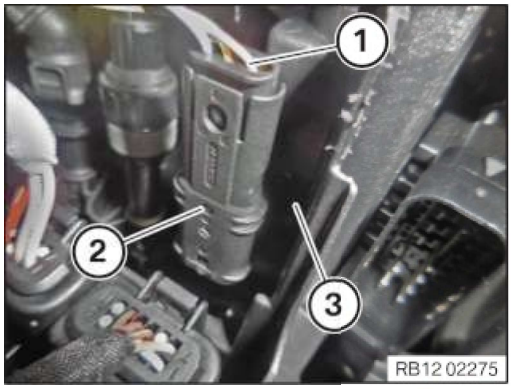
-diagn.com



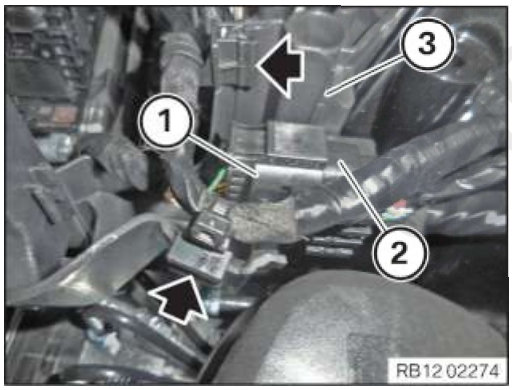
- Secure clamps (1).



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



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



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

22 – Installing the integrated supply module (PDM)

WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Detach battery earth lead from battery.
- For additional batteries: Detach all battery earth leads from additional batteries.

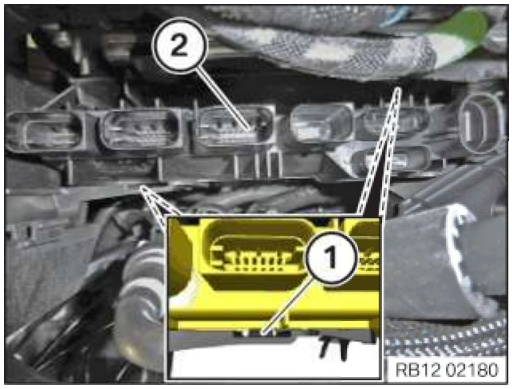
rdiagn.com

RISK OF DAMAGE

Electrostatic discharge.

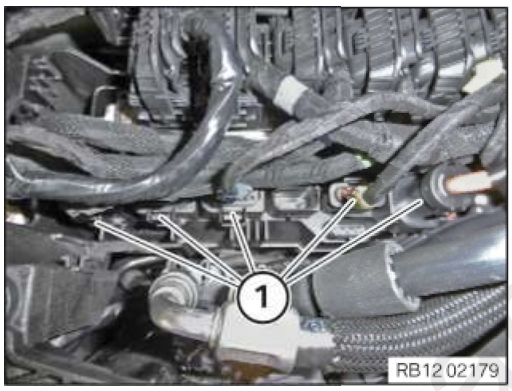
Damage to or destruction of electrical components.

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



- Insert and install the integrated supply module (PDM) (2).

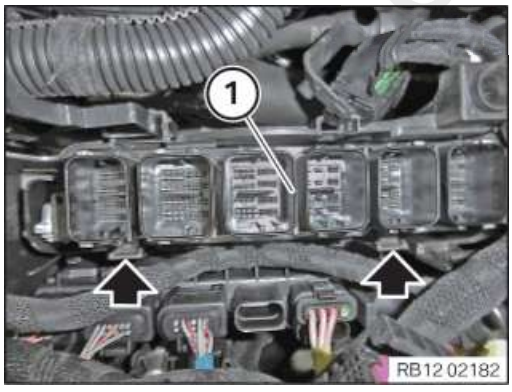
  The latch mechanisms (1) must engage audibly.
- Unlock the latch mechanisms (1).



- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.

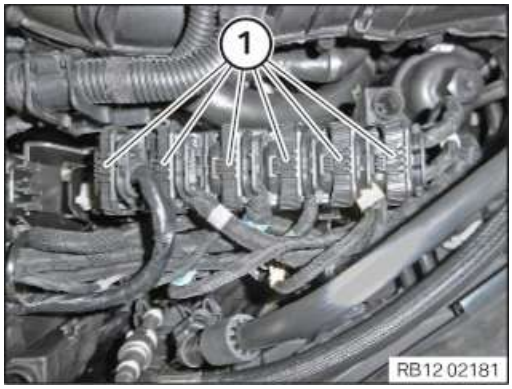
23 – Installing the DME control unit



- Feed in and install DME control unit (1).

  The locks (arrows) must engage audibly.

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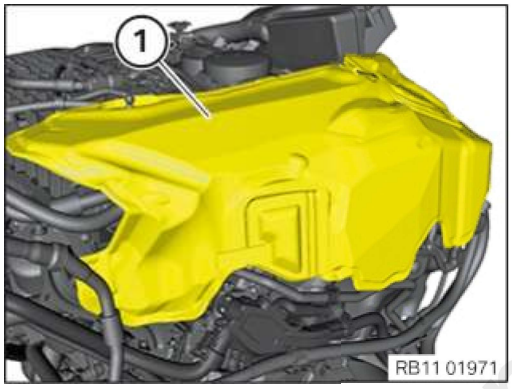
- Connect connectors (1) and lock.

  All connectors (1) must engage audibly.



- Insert and install cover (1) into guides.

24 – Installing acoustic cover at rear



- Make sure the acoustic cover (1) is correctly positioned on the rear side of the engine.



- Install the acoustic cover (1) from the top and clip it in into the marked areas.

25 – 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.

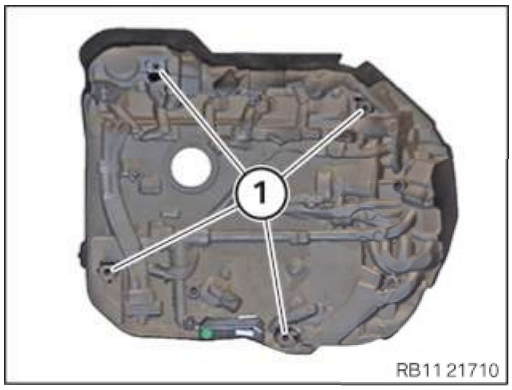
26 – Install acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover.

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

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



- Check the rubber mount (1) for correct fit in the acoustic cover.



- Install acoustic cover (1) and fix in the rubber mounts (marks).

27 – Disconnecting all battery earth leads



- See additional information.

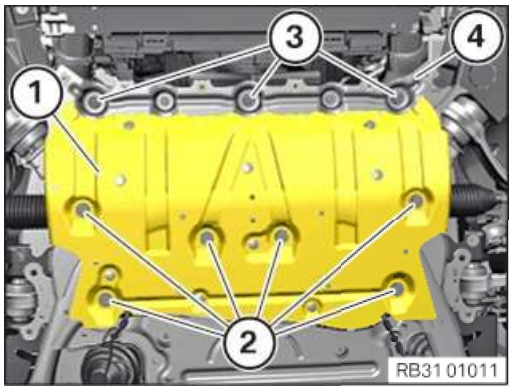
28 – Filling and bleed the low-temperature coolant circuit

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- See additional information.

29 – Installing the stiffening plate

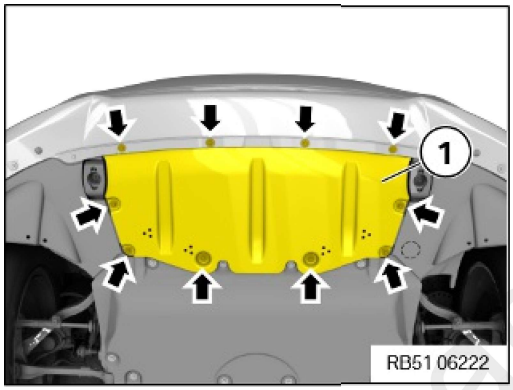


- Position stiffening plate (1).
- Screw screws (2) in.
- Position holder of underride protection (4).
- Screw screws (3) in.
- Tighten down screws (2) and (3).

Stiffening plate to front axle support

M10		Tightening torque	56 Nm

30 – Installing the front underbody protection



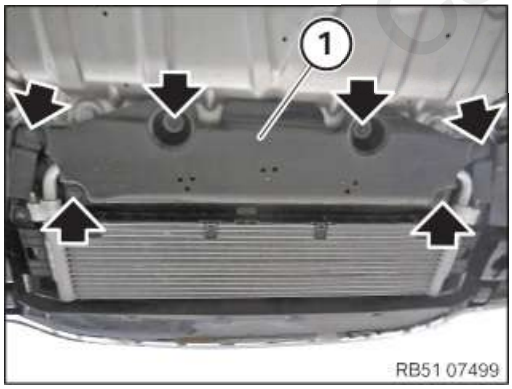
- **Version 1:**

  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 2:**

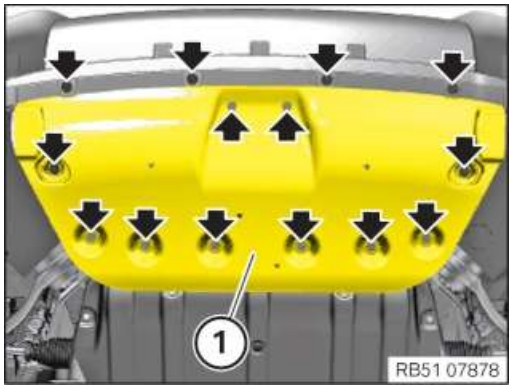
  Feed in and position the front underbody protection (1).

  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 3:**

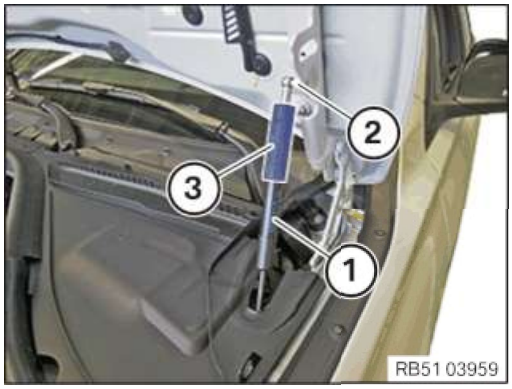
  Feed in and install front underbody protection (1).

  Tighten screws (arrows).

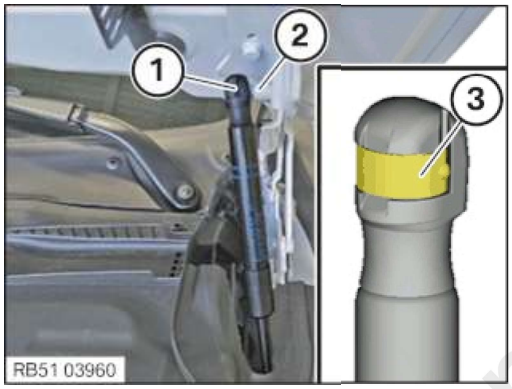
Underbody protection front

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

31 – Take bonnet out of the service position



- 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.



CAUTION

Shutting bonnet or tailgate.

Danger of injury!

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

- 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.

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Additional Information

Overview of Tightening Torques

Cover, front bottom on side — Used in step 1415

Hexagon screw for thermoplastic		Tightening torque	3 Nm

Engine oil cooler to bumper support — Used in step 15

M6X25		Tightening torque	8 Nm

Temperature sensor on crankcase — Used in step 18

M6x18		Tightening torque	8 Nm

Intake plenum to cylinder head — Used in step 19

M6		Tightening torque	10 Nm

Intake plenum to support			Used in step 19
M6X25		Tightening torque	8 Nm

Tank ventilation line to intake plenum			Used in step 19
Oval-head screw		Tightening torque	3 Nm

Charge air line to throttle valve			Used in step 19
M6x30		Tightening torque	8 Nm

Control unit holder on spring strut dome			Used in step 21
Hexagon screw		Tightening torque	8 Nm

Stiffening plate to front axle support			Used in step 29
M10		Tightening torque	56 Nm

Underbody protection front			Used in step 30
Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Overview of Special Tools

Links

General repair instructions	Used in step
12 00 ... Instructions for removal and replacement of control units	723

Repair instructions	Used in step
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 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 the battery earth lead (all battery earth leads)	227
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61 20 900 Disconnect and connect battery earth lead (Plug-in Hybrid Electric Vehicle)	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 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 battery earth lead	227
61 20 900 Disconnecting and connecting battery earth lead	227
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61 35 ... Notes on ESD protection (Electro Static Discharge)	6781722
61 00 730 Encode/program control unit(s) (after vehicle test)	23
17 11 103 Removing and installing/replacing coolant expansion tank for the low-temperature coolant circuit	28
17 11 103 Removing and installing/replacing coolant expansion tank for the low-temperature coolant circuit	28
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	28
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17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	28
17 00 040 Venting cooling system and checking on watertightness	28
17 00 040 Venting high temperature - cooling system and checking for water leaks (N20 hybrid drive)	28
17 00 040 Venting high temperature - cooling system and checking for water leaks (N20 hybrid drive)	28
17 00 040 Bleeding lower-temperature cooling system (B48)	28
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	28
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	28
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	28
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	28
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	28
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	28
17 00 011 Draining and topping up coolant circuit for low temperature	28
17 00 040 Bleed the low-temperature cooling system and check for watertightness (coolant circuit for low temperature)	28
17 00 040 Bleeding and filling low temperature cooling system using vacuum filler device (B48)	28
17 00 011 Draining and topping up low-temperature coolant circuit	28
17 00 011 Draining and topping up low-temperature coolant circuit	28
17 00 040 Bleeding the low-temperature coolant circuit and checking it for watertightness	28
17 00 040 Bleeding the low-temperature coolant circuit and checking it for watertightness	28
17 00 015 Draining and topping up the coolant circuit for the drive \PREMIUM	28
17 00 011 Draining and topping up low-temperature coolant circuit	28
17 00 040 Bleed the cooling system and check for watertightness with the special tool (low-temperature coolant circuit)	28
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	28

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17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature) 28

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13 62 596 Replacing the differential pressure sensor for the petrol particulate filter

PRELIMINARY WORK

1 – Removing the acoustic cover

WARNING

Hot surfaces.

Risk of burning!

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

RISK OF DAMAGE

Damage to the acoustic cover.

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

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



- Release the acoustic cover (1) towards the top from the rubber mounts (marks).

MAIN WORK

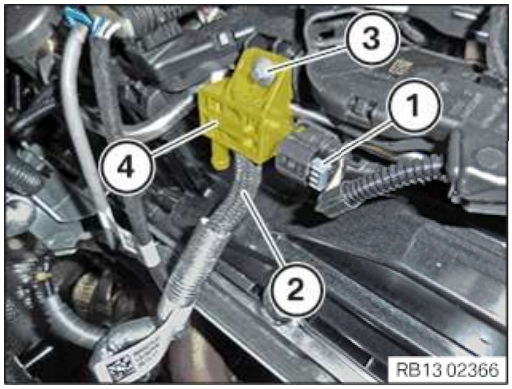
2 – Remove differential pressure sensor

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 Information on electrostatic discharge (ESD) protection.

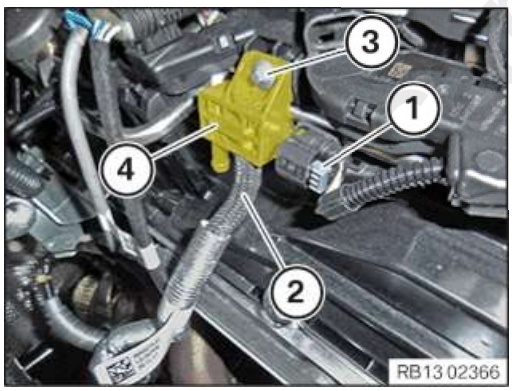


- Unlock plug connection (1) and disconnect.
- Pull off the pressure hose (2) from the differential pressure sensor (4) set aside.
- Loosen screw (3).
- Feed out and remove the differential pressure sensor (4).

3 – Install differential pressure sensor

TECHNICAL INFORMATION

Check the pressure hose on the pressure sensor and/or the differential pressure sensor. Replace hardened pressure hose. Check connection on pressure pipe and pressure sensor for leaks.



- Feed in and install the differential pressure sensor (4).
- Tighten down screw (3).

Differential pressure sensor to holder

TS6X18		Tightening torque	3,5 Nm

- Renew pressure hose (2).

  Parts: Pressure hose
- Connect the pressure hose (2) to the differential pressure sensor (4) until the limit position.
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

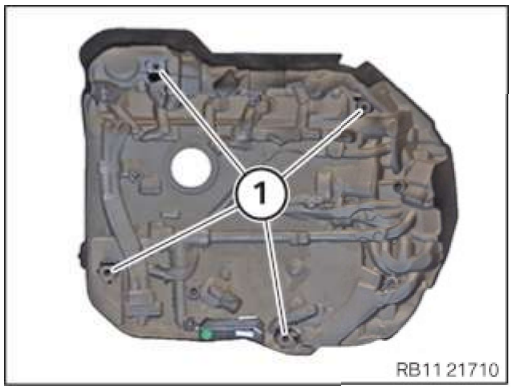
4 – Install acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover.

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

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



- Check the rubber mount (1) for correct fit in the acoustic cover.



- Install acoustic cover (1) and fix in the rubber mounts (marks).

5 – Replacement: Reset adaptation values

- Reset the adaptation values with the diagnosis system:
  - Power train
  - DDE / DME
  - Reset adaptations
  - Delete adaptations

Additional Information

Overview of Tightening Torques

carsdiagn.com

Differential pressure sensor to holder			Used in step 3
TS6X18		Tightening torque	3,5 Nm

Links

Repair instructions	Used in step
61 35 ... Notes on ESD protection (Electro Static Discharge)	2

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13 62 590 Replacing the pressure sensor

PRELIMINARY WORK

1 – Removing the acoustic cover

WARNING

Hot surfaces.

Risk of burning!

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

RISK OF DAMAGE

Damage to the acoustic cover.

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

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



- Release the acoustic cover (1) towards the top from the rubber mounts (marks).

MAIN WORK

2 – Remove the charging pressure sensor on the charge air line

WARNING

Hot surfaces.

Risk of burning!

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

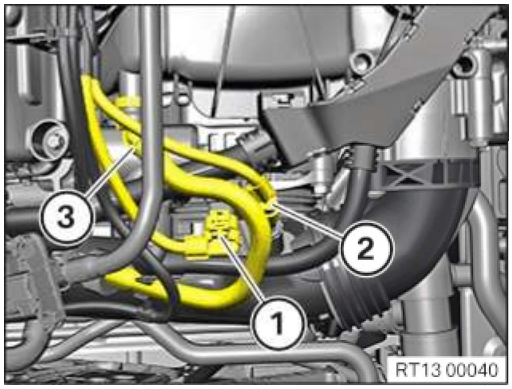
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RISK OF DAMAGE

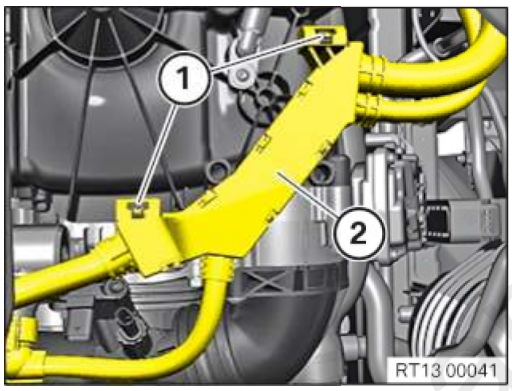
Electrostatic discharge.

Damage to or destruction of electrical components.

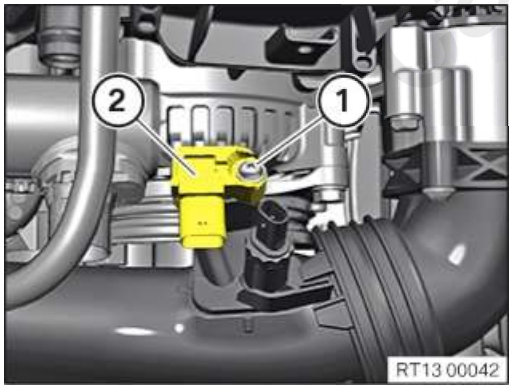
- Leave electrical components in original packaging until just before they are installed. Use the original packaging only for any return shipments. Always package removed components straight away.
- Read and comply with user information on using the associated special tool 12 7 060.
- Only touch the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



- Unlock plug connection (1) and disconnect.
- Unlock plug connection (2) and disconnect.
- Unlock the engine ventilation line (3) and set it aside.



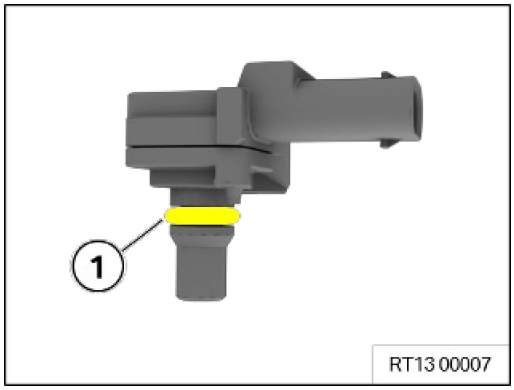
- Unlock the locks (1).
- Feed out wiring harness section for the engine (2) slightly and set it aside.



- Loosen screw (1).
- Remove the charging pressure sensor (2).

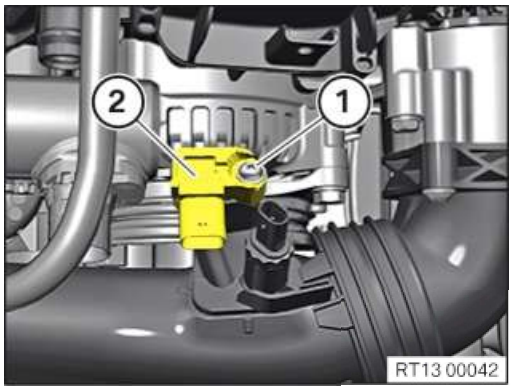
3 – Install the charging pressure sensor on the charge air line

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- Renew sealing ring (1) of the charging pressure sensor.

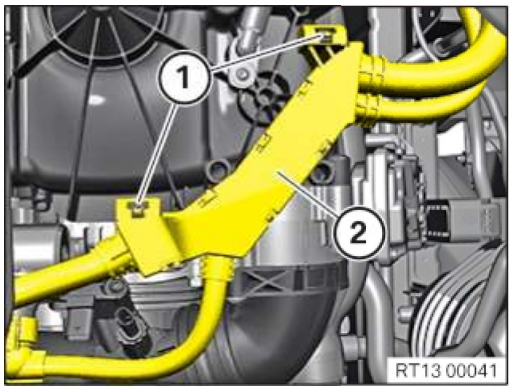
  Parts: Sealing ring



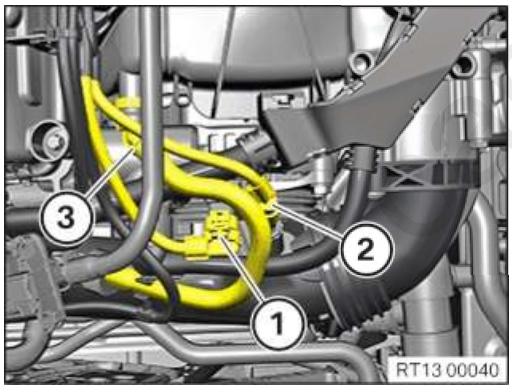
- Insert and install the charging pressure sensor (2).
- Tighten down screw (1).

Charging pressure sensor to charge air line

TS5x20		Tightening torque	4 Nm



- Insert the wiring harness section for the engine (2) and install.
- Ensure that the locks (1) engage audibly.



- Insert and connect the engine ventilation line (3).

  The engine ventilation line (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.

rdiagn.com

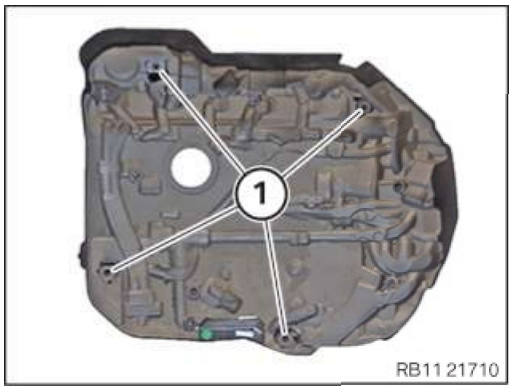
4 – Install acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover.

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

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



- Check the rubber mount (1) for correct fit in the acoustic cover.



- Install acoustic cover (1) and fix in the rubber mounts (marks).

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Additional Information

Overview of Tightening Torques

Charging pressure sensor to charge air line Used in step 3

TS5x20		Tightening torque	4 Nm

Links

Repair instructions	Used in step
61 35 ... Notes on ESD protection (Electro Static Discharge)	2

cardiagn.com

13 62 592 Replacing the pressure sensor

PRELIMINARY WORK

1 – Removing the acoustic cover

WARNING

Hot surfaces.

Risk of burning!

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

RISK OF DAMAGE

Damage to the acoustic cover.

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

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



- Release the acoustic cover (1) towards the top from the rubber mounts (marks).

MAIN WORK

2 – Removing the charging pressure sensor from the intake plenum

WARNING

Hot surfaces.

Risk of burning!

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

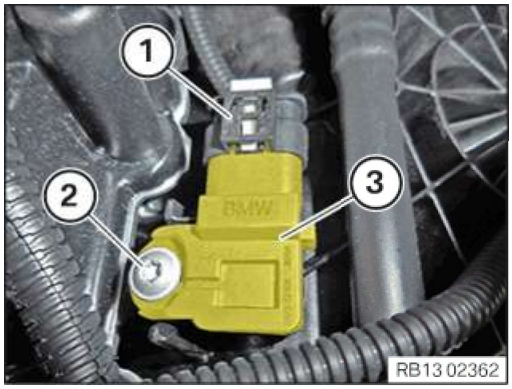
carsdiagn.com

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

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

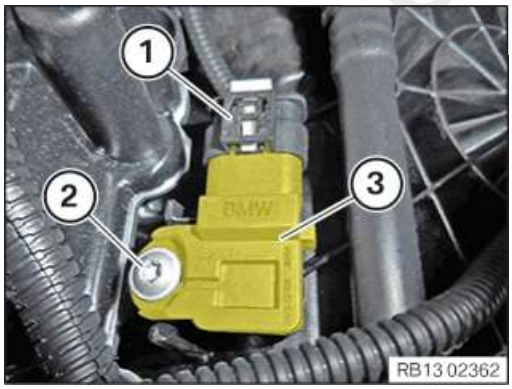


- Unlock and disconnect connector (1).
- Loosen screw (2).
- Remove the charging pressure sensor (3).

3 – Installing the charging pressure sensor on the intake plenum



- Check sealing ring (1) for damage, renew if necessary.
- Apply a thin coat of lubricant to the sealing ring (1) of the charging pressure sensor.



- Insert and install the charging pressure sensor (3).
- Tighten down screw (2).

Charging pressure sensor to intake plenum

TS6X20		Tightening torque	4 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

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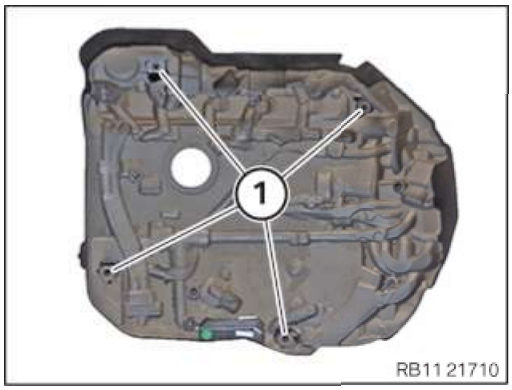
4 – Install acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover.

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

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



- Check the rubber mount (1) for correct fit in the acoustic cover.



- Install acoustic cover (1) and fix in the rubber mounts (marks).

Additional Information

Overview of Tightening Torques

Charging pressure sensor to intake plenum			Used in step 3
TS6X20		Tightening torque	4 Nm

Links

Repair instructions	Used in step
61 35 ... Notes on ESD protection (Electro Static Discharge)	2

carldiagn.com

13 71 000 Remove and install intake silencer housing

WARNING

Hot surfaces.

Risk of burning!

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

cardiagn.com

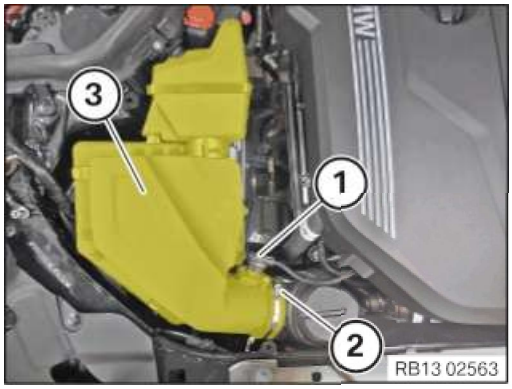
1 – Removing intake silencer housing

RISK OF DAMAGE

Damage to the clean air line. Damage to the air filter.

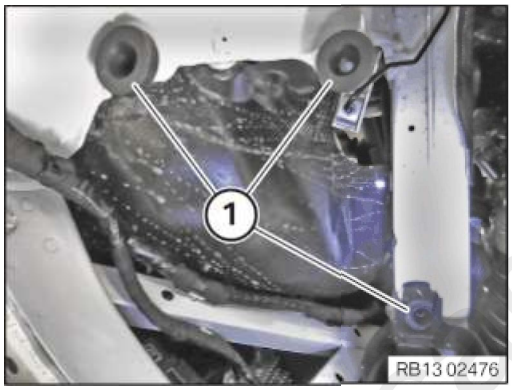
For changing the air filter insert, if the upper section of intake filter housing is only raised and not completely removed, the clean air line and the air filter insert may be damaged.

- Do not lift upper section of intake filter housing by force.
- Unfasten clamp.
- Remove upper section of intake filter housing completely.



- 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.

2 – 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.

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Additional Information

Overview of Tightening Torques

Clean air pipe to upper section of intake filter housing Used in step 2

Clamp		Tightening torque	3 Nm

cardiagn.com

13 71 044 Removing and installing/replacing charge air line

TECHNICAL INFORMATION

- When the engine is stopped after the end of the journey, it may be necessary to run the electric fan. In rare cases, operation of the electric fan can last up to 11 min. This protects the components. In this case, replacing the electric fan will not remedy the problem!

PRELIMINARY WORK

1 – Removing the acoustic cover

WARNING

Hot surfaces.

Risk of burning!

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

RISK OF DAMAGE

Damage to the acoustic cover.

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

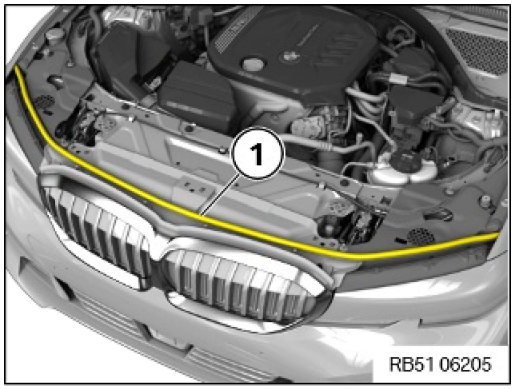
- Disassemble or mount the acoustic cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation, no lubricants.



- Release the acoustic cover (1) towards the top from the rubber mounts (marks).

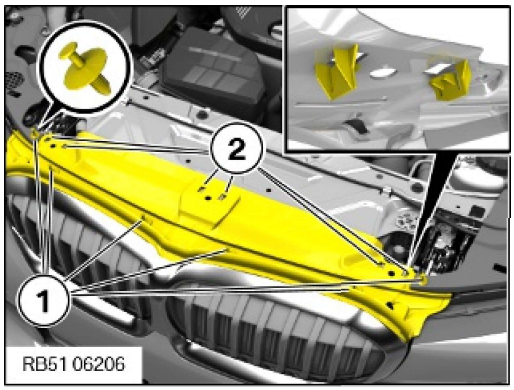
2 – Remove the seal for the bonnet in front

cardiagn.com



- Pull off front bonnet seal (1) upwards.

3 – Removing the centre engine compartment cover



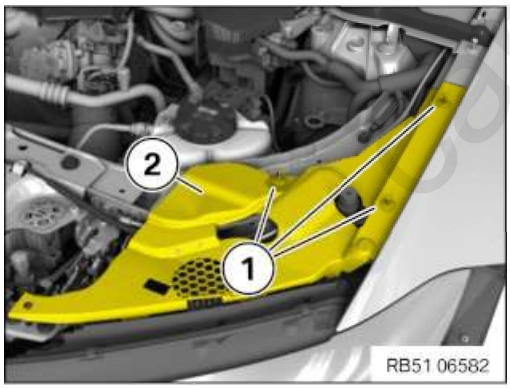
- Detach all expanding rivets (1).
- Release the cover of the centre engine compartment with the latch mechanisms (2) .
- Feed the cover for the centre engine compartment out to the rear.

4 – Partially remove the top left and right cover in the engine compartment

NOTICE

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

▸ **Removing the cover in the engine compartment on top partially**



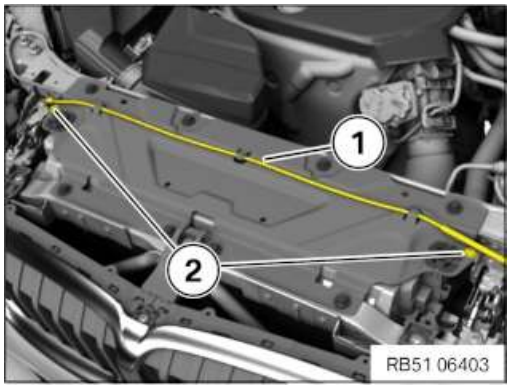
- Loosen the expanding rivet (1).
- Remove the cover in the engine compartment on top (2) partially.

5 – Removing the top cross connection

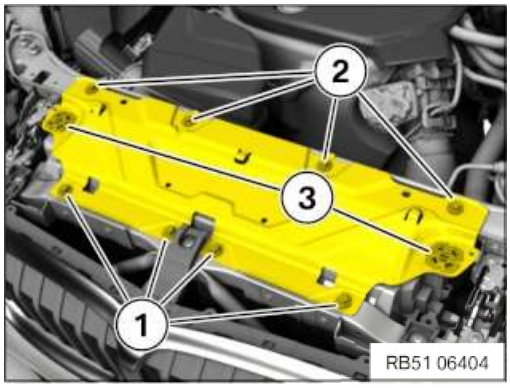


- Release the housing for the coupling of the Bowden cables (1) from the body.

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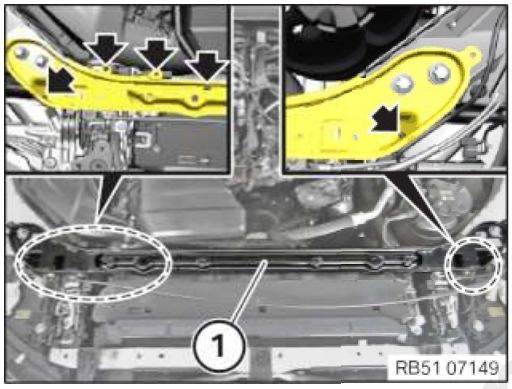


- Detach Bowden cable (1) at the top cross connection.
- Loosen screws (2).

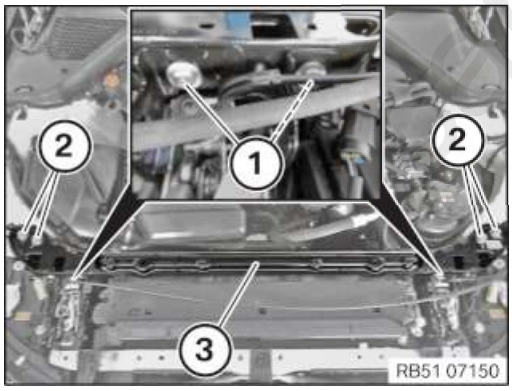


- Loosen screws (1) and (2).
- Remove the top cross connection with the holders(3) towards the top.

6 – Remove the rear top cross connection



- Release the clips (arrows) in the marked areas from the top rear cross connection (1).



- Loosen screws (1).
- Loosen screws (2).
- Guide out and remove top rear cross connection (3).

7 – Removing intake silencer housing

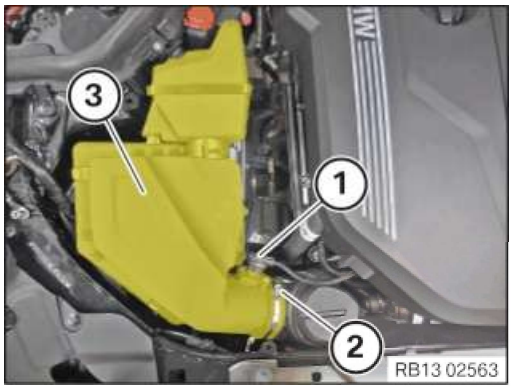
.diagn.com

RISK OF DAMAGE

Damage to the clean air line. Damage to the air filter.

For changing the air filter insert, if the upper section of intake filter housing is only raised and not completely removed, the clean air line and the air filter insert may be damaged.

- Do not lift upper section of intake filter housing by force.
- Unfasten clamp.
- Remove upper section of intake filter housing completely.



- 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.

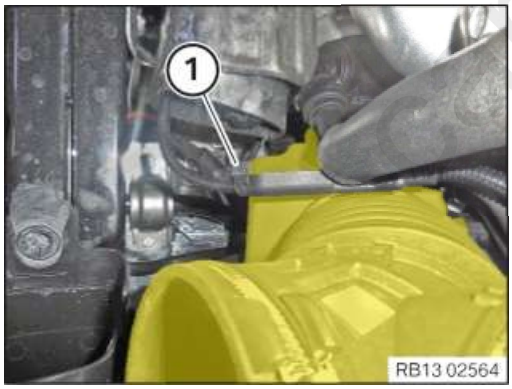
8 – Removing clean air pipe

WARNING

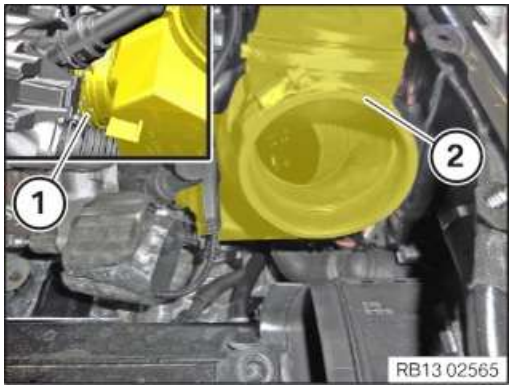
Hot surfaces.

Risk of burning!

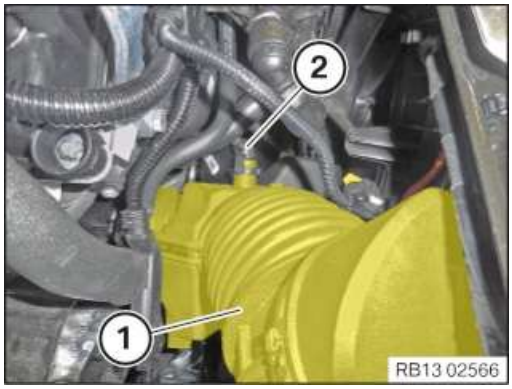
- Perform all work only on components that have cooled down.



- Loosen clamp (1).



- Unlock the clamp (1).
- Thread out clean air pipe (2) and set it aside.

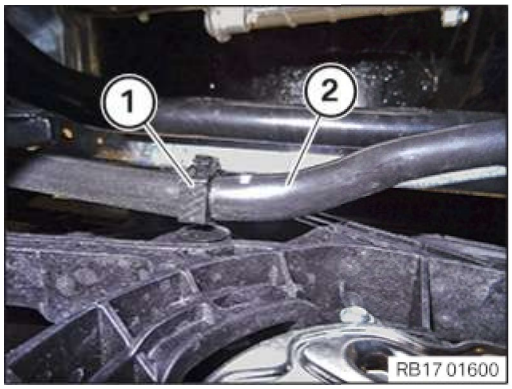


- Position clean air pipe (1).
- Unlock and loosen engine ventilation line (2).
- Feed out clean air pipe and remove (1).

9 – Remove fan cowl.

TECHNICAL INFORMATION

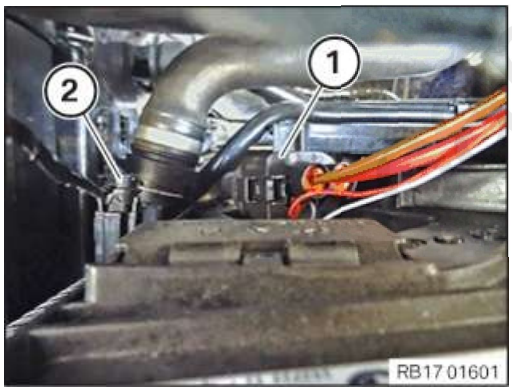
- When the engine is stopped after the end of the journey, it may be necessary to run the electric fan. In rare cases, operation of the electric fan can last up to 11 min. This protects the components. In this case, replacing the electric fan will not remedy the problem!



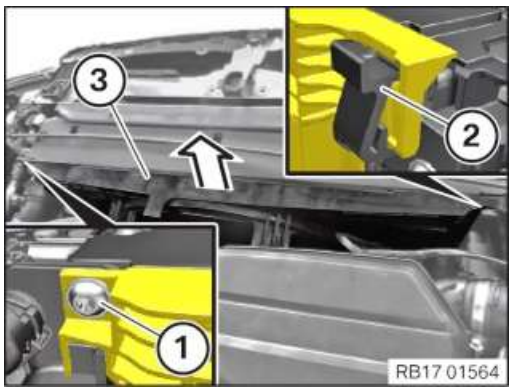
- **If installed:** Release transmission oil line (2).

  Unlock the holder (1).

  Thread out transmission oil line (2) and set aside.



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



- Loosen screw (1).
- Unlock lock (2).
- Guide out and remove fan cowl (3) **carefully** in the direction of the arrow.

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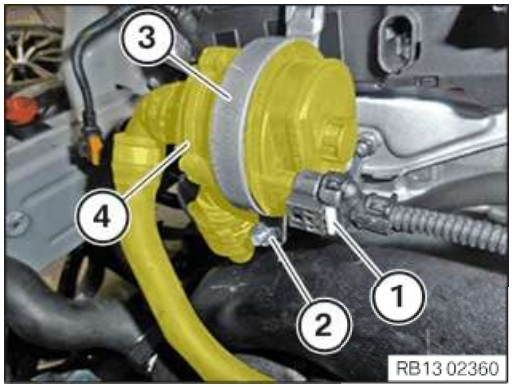
10 – Remove charge air line

WARNING

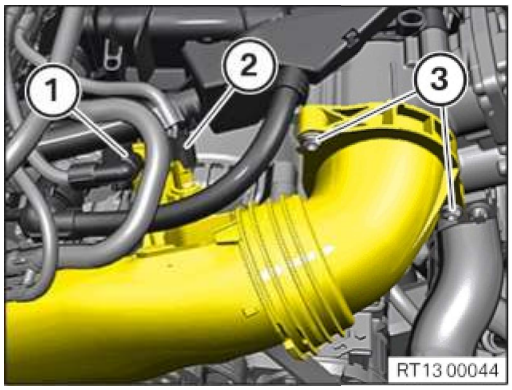
Hot surfaces.

Risk of burning!

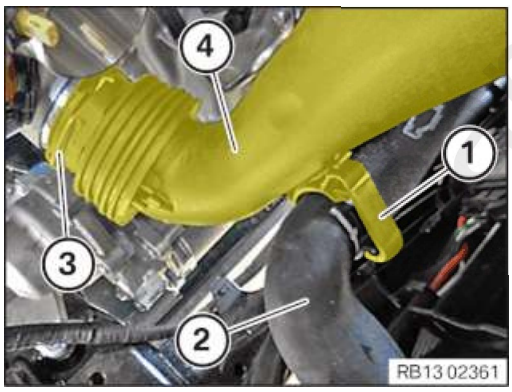
- Perform all work only on components that have cooled down.



- Unlock plug connection (1) and disconnect.
- Loosen nut (2).
- Guide the retaining bracket (3)out and remove.
- Guide out auxiliary coolant pump (4) and place it aside.

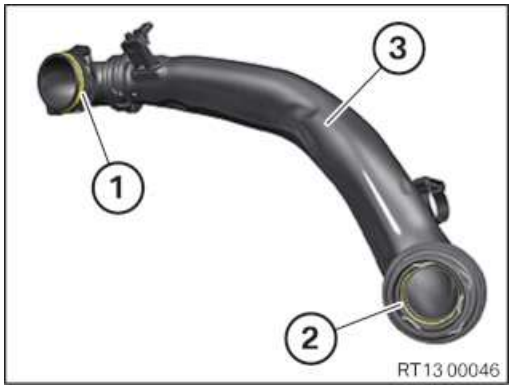


- Unlock plug connection (1) and disconnect.
- Unlock plug connection (2) and disconnect.
- Loosen screws (3).



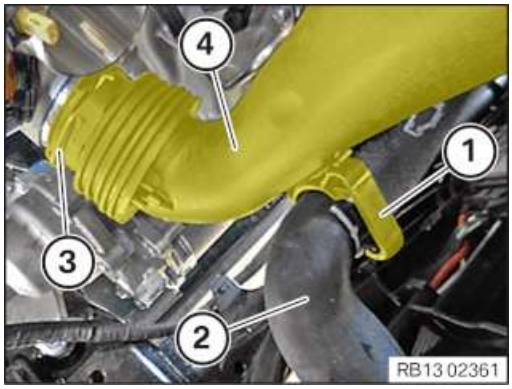
- Unlock the clamp (1).
- Feed out the coolant hose (2) and set it aside.
- Unlock the clamp (3).
- Feed the charge air line (4) out upwards and remove it.

11 – Install charge air line



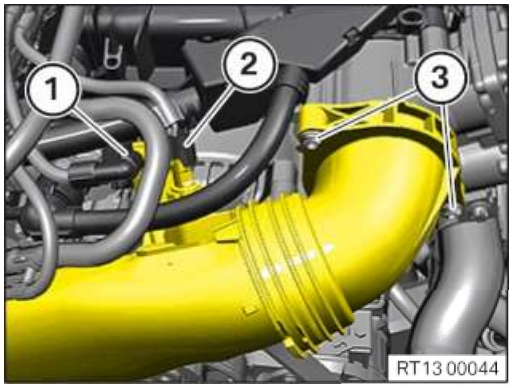
- Check the sealing ring (1) on the charge air line (3) for damage and renew it with the special tool 0 496 714 (00 9 030), if necessary.
- Check the sealing ring (2) on the charge air line (3) for damage and renew it with the special tool 0 496 714 (00 9 030), if necessary.

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- Insert and install charge air line (4).
- Lock clamp (3).

  The clamp (3) must engage audibly.
- Insert and install the coolant hose (2).
- Lock clamp (1).



- Tighten the screws (3).

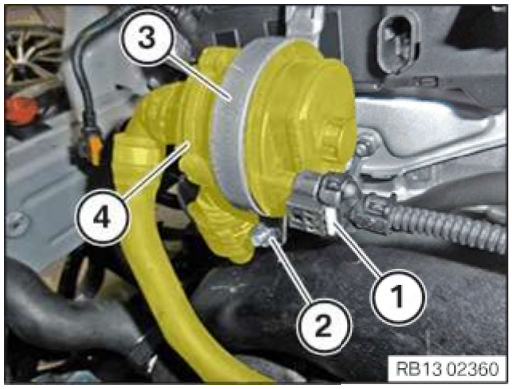
Charge air line to throttle valve

M6x30		Tightening torque	8 Nm

- Connect connectors (2) and lock.

  The connector (2) must engage audibly.
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



- Insert and position the additional coolant pump (4).
- Insert and position the retaining bracket (3).
- Tighten nut (2).

Electric coolant pump to holder

M6		Tightening torque	8 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

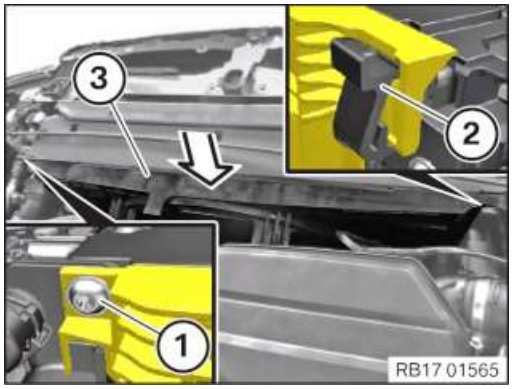
POSTPROCESSES

12 – Install fan cowl



- Feed guides (1) into the radiator.
- Feed guides (2) into the charge air cooler.

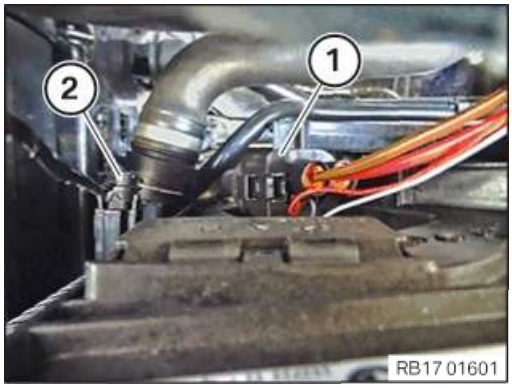
cardiagn.com



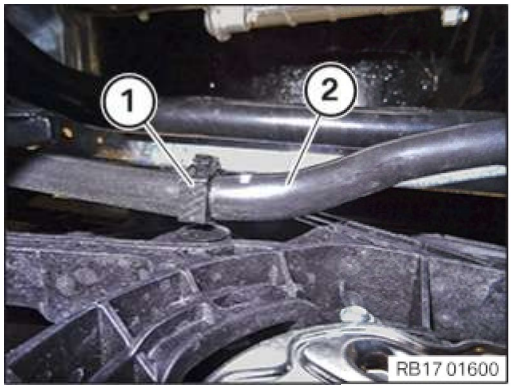
- Guide in and install fan cowl (3) **carefully** in the direction of the arrow.
- Ensure that the lock (2)engages audibly.
- Tighten down screw (1).

Fan cowl with electric fan on radiator

TS6x20		Tightening torque	6,5 Nm



- Connect connectors (2) and lock.
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.
  The connector (1) must engage audibly.



- **If installed:** Secure the transmission oil line (2).
  Insert and install the transmission oil line (2).
  Lock holder (1).

13 – Installing clean air pipe



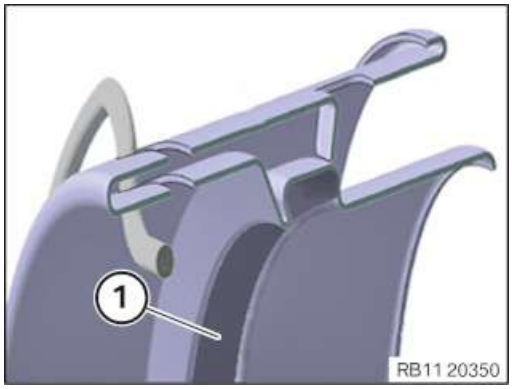
- Check the seal (1) for damage and renew if necessary.

▸ **Replace damaged gasket**

TECHNICAL INFORMATION

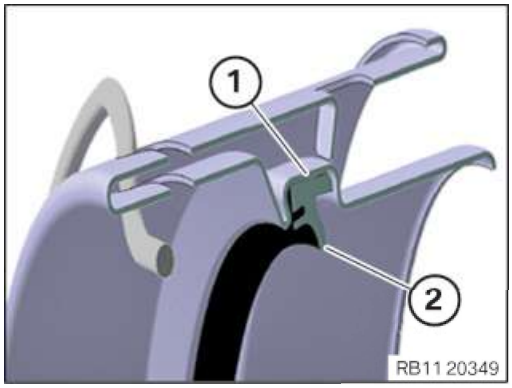
Do not use pointed or sharp-edged tools for the installation and/or removal.

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

  The gasket groove (1) must be clean.



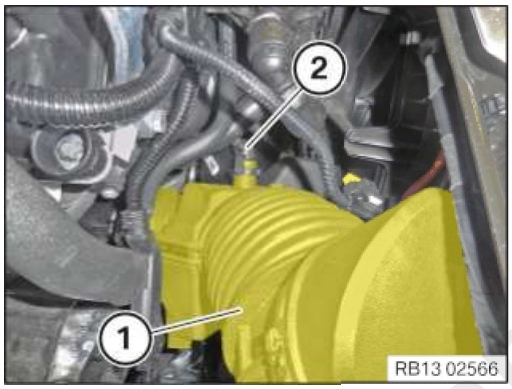
- Renew gasket.

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

TECHNICAL INFORMATION

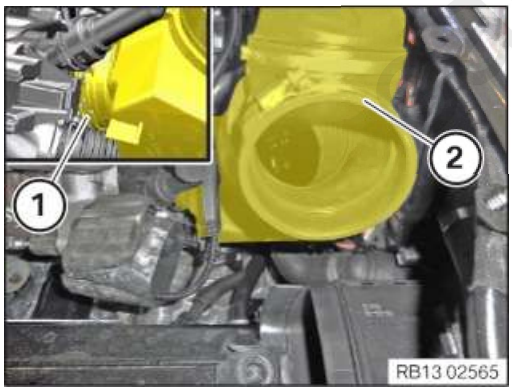
Incorrect assembly is possible. Ensure correct installation position.

- 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 pointing downwards (see figure).



- Guide in and position clean air pipe (1).
- Connect engine ventilation line (2) and lock.

  The engine ventilation line (2) must engage audibly.



- Install the clean air pipe (2).
- Lock clamp (1).

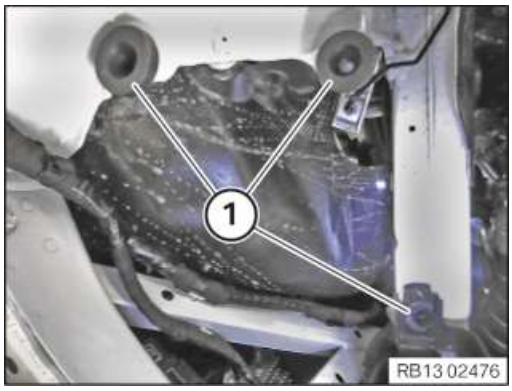
  The clamp (1) must engage audibly.



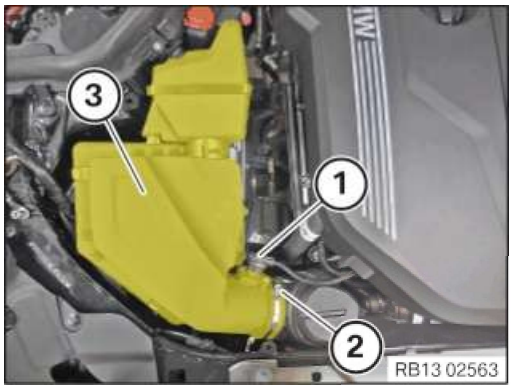
- Secure clamps (1).

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14 – 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).

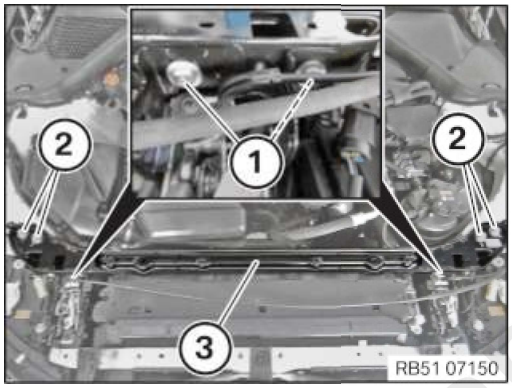
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

15 – Install the rear top cross connection



- Guide in and position the top rear cross connection (3).
- Tighten the screws (1).

Top rear cross connection to bonnet catch support

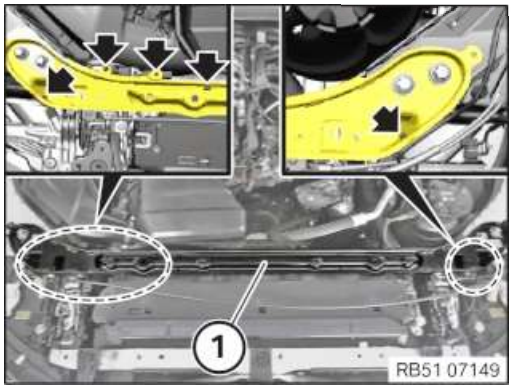
Flat-head screw M6x20	Tightening torque	11,8 Nm

- Renew screws (2).

  Parts: Bolts
- Tighten the screws (2).

Rear top cross connection to wheel arch carrier support

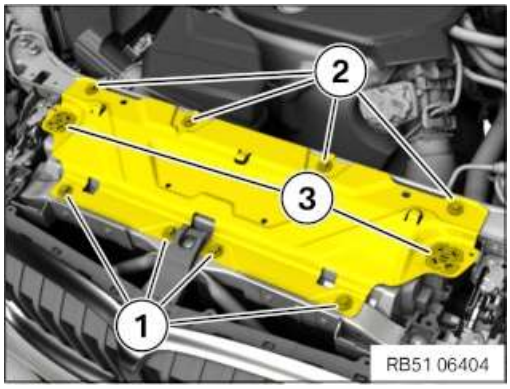
M10x20 screw	Renew screw.	Jointing torque	56 Nm
		Angle of rotation	90 °



- Secure the clips (arrows) in the marked areas to the top rear cross connection (1).

16 – Installing the top cross connection

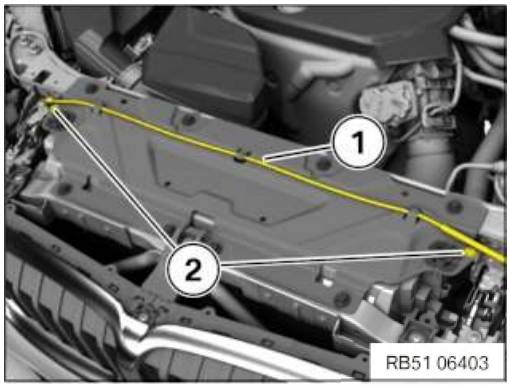
cardiagn.com



- Set and position upper cross connection with holders (3) from above.
- Tighten down screws (1) and (2).

Cross connection, top

M8x20		Tightening torque	28 Nm

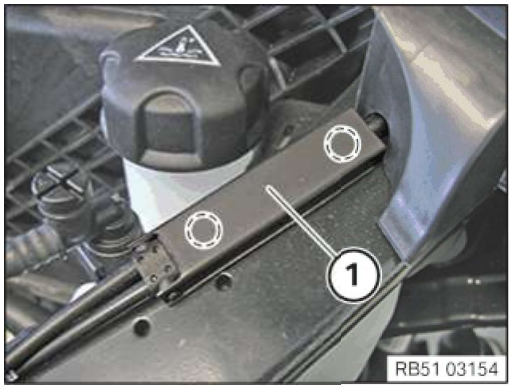


- Tighten down screws (2).

Cross connection, top

M6x20		Tightening torque	11,8 Nm

- Attach Bowden cable (1) on the upper cross connection.



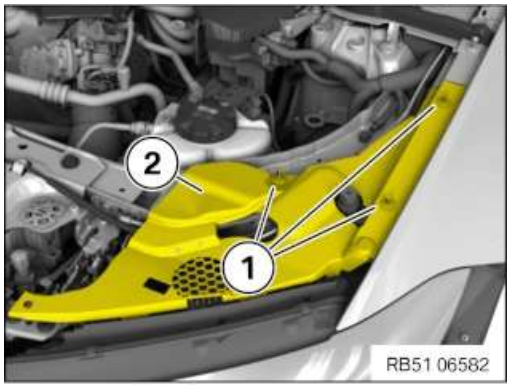
- Clip in the housing for the coupling of the Bowden cables (1).

17 – Install the cover in the engine compartment at top left and right partially

NOTICE

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

▸ **Installing the cover in the engine compartment on top partially**

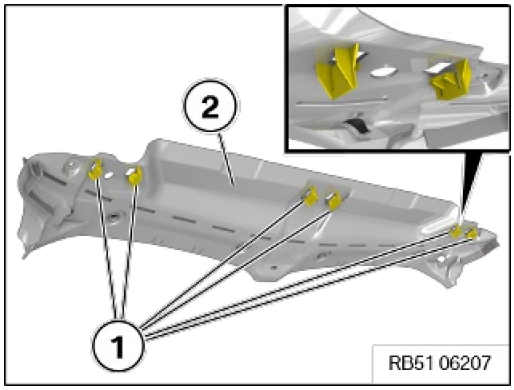


- Install the cover in the engine compartment on top (2).
- Secure expanding rivet (1).

18 – Installing cover for engine compartment centre

Check

cardiagn.com



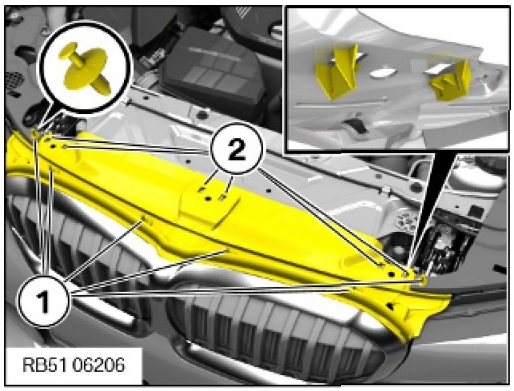
- Check latch mechanisms (1) of cover for engine compartment centre (2) for damage.

Result

» The latch mechanism (1) is damaged.

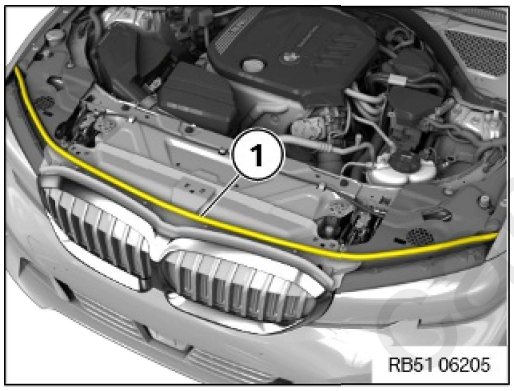
Measure

- Renew cover for engine compartment centre (2).



- Guide in the cover for the engine compartment centre from the rear and position it.
- Clip in the cover for the engine compartment centre with latch mechanisms (2).
- Mount all expanding rivets (1).

19 – Install the seal for the front bonnet



- Position the bonnet seal(1) and connect it on the mounting on the bumper and on the headlights.

20 – Install acoustic cover

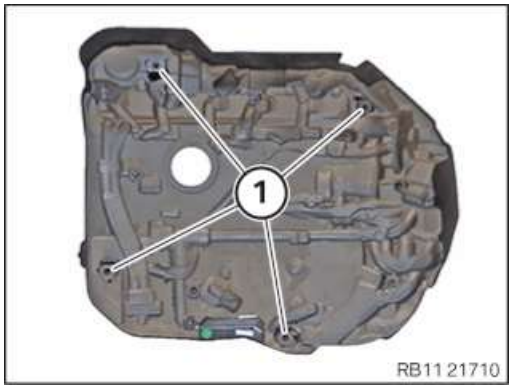
RISK OF DAMAGE

Damage to the acoustic cover.

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

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

partdiagn.com



- Check the rubber mount (1) for correct fit in the acoustic cover.



- Install acoustic cover (1) and fix in the rubber mounts (marks).

Additional Information

Overview of Tightening Torques

Charge air line to throttle valve — Used in step 11

M6x30		Tightening torque	8 Nm

Electric coolant pump to holder — Used in step 11

M6		Tightening torque	8 Nm

Fan cowl with electric fan on radiator — Used in step 12

TS6x20		Tightening torque	6,5 Nm

Clean air pipe to upper section of intake filter housing — Used in step 14

Clamp		Tightening torque	3 Nm

Top rear cross connection to bonnet catch support — Used in step 15

Flat-head screw M6x20		Tightening torque	11,8 Nm

Rear top cross connection to wheel arch carrier support — Used in step 15

M10x20 screw	Renew screw.	Jointing torque	56 Nm
		Angle of rotation	90 °

Cross connection, top — Used in step 16

M8x20		Tightening torque	28 Nm

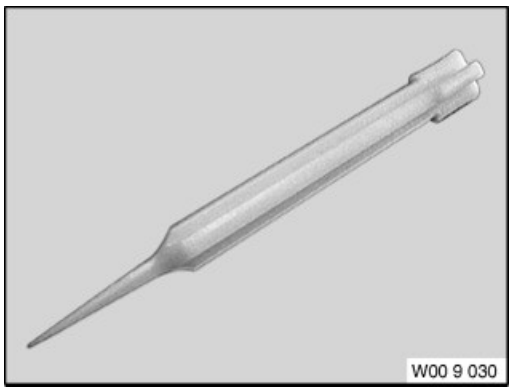
Cross connection, top — Used in step 16

M6x20		Tightening torque	11,8 Nm

Overview of Special Tools

cardiagn.com

0 496 714 (00 9 030) Wedge



Common	Used in step 11
Usage	For dismantling O-rings, gaskets and trim panels. This special tool replaces special tool 00 9 316.
Included in the tool or work	
Storage location	A50
Replaced by	
In connection with	
SI-Number	01 20 09 (581)

cardiagn.com

13 71 035 Removing and installing/replacing clean air pipe

WARNING

Hot surfaces.

Risk of burning!

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

PRELIMINARY WORK

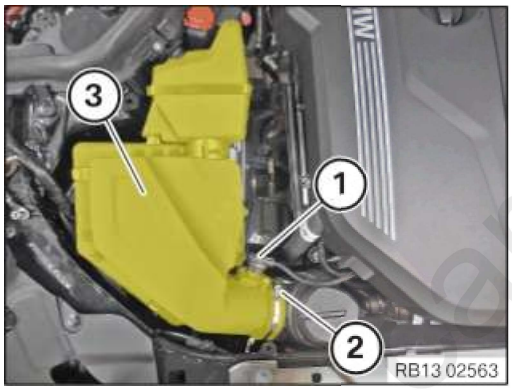
1 – Removing intake silencer housing

RISK OF DAMAGE

Damage to the clean air line. Damage to the air filter.

For changing the air filter insert, if the upper section of intake filter housing is only raised and not completely removed, the clean air line and the air filter insert may be damaged.

- Do not lift upper section of intake filter housing by force.
- Unfasten clamp.
- Remove upper section of intake filter housing completely.



- 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.

MAIN WORK

2 – Removing clean air pipe

WARNING

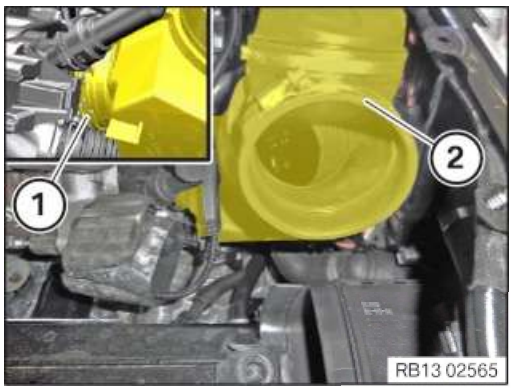
Hot surfaces.

Risk of burning!

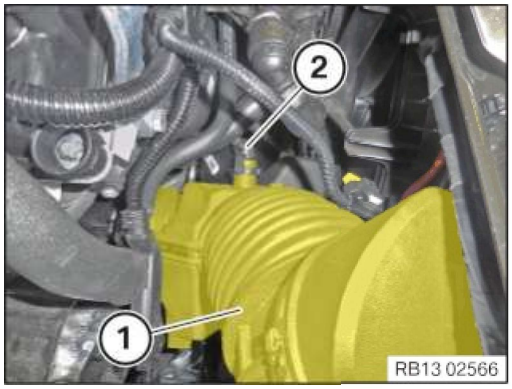
- Perform all work only on components that have cooled down.



- Loosen clamp (1).



- Unlock the clamp (1).
- Thread out clean air pipe (2) and set it aside.



- Position clean air pipe (1).
- Unlock and loosen engine ventilation line (2).
- Feed out clean air pipe and remove (1).

3 – Installing clean air pipe



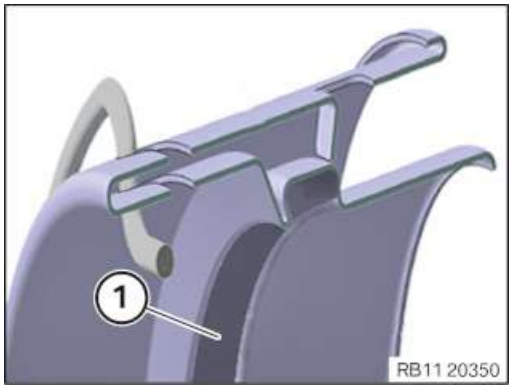
- Check the seal (1) for damage and renew if necessary.

▸ **Replace damaged gasket**

TECHNICAL INFORMATION

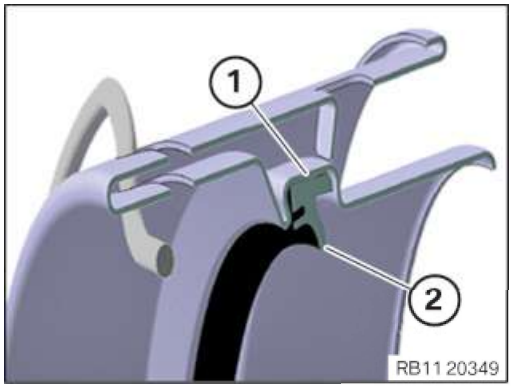
Do not use pointed or sharp-edged tools for the installation and/or removal.

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

  The gasket groove (1) must be clean.



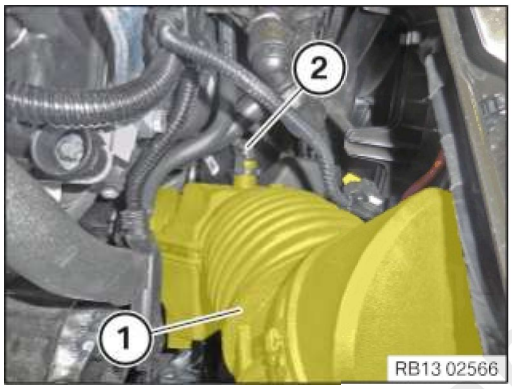
- Renew gasket.

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

TECHNICAL INFORMATION

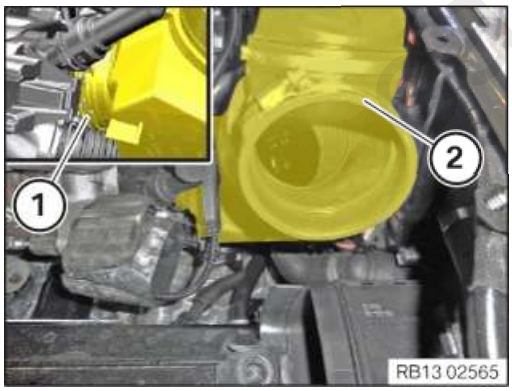
Incorrect assembly is possible. Ensure correct installation position.

- 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 pointing downwards (see figure).



- Guide in and position clean air pipe (1).
- Connect engine ventilation line (2) and lock.

  The engine ventilation line (2) must engage audibly.



- Install the clean air pipe (2).
- Lock clamp (1).

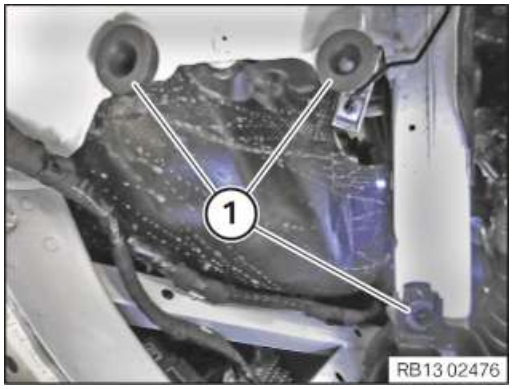
  The clamp (1) must engage audibly.



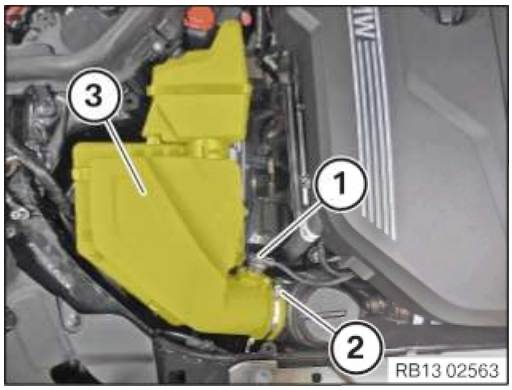
- Secure clamps (1).

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4 – 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.

Additional Information

Overview of Tightening Torques

Clean air pipe to upper section of intake filter housing Used in step 4

Clamp		Tightening torque	3 Nm

cardiagn.com

13 72 001 Replacing air filter element

WARNING

Hot surfaces.

Risk of burning!

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

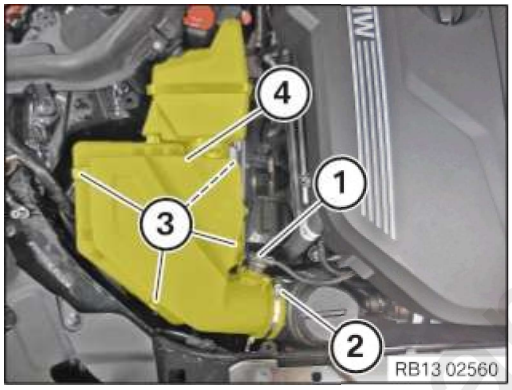
1 – Removing air filter element

RISK OF DAMAGE

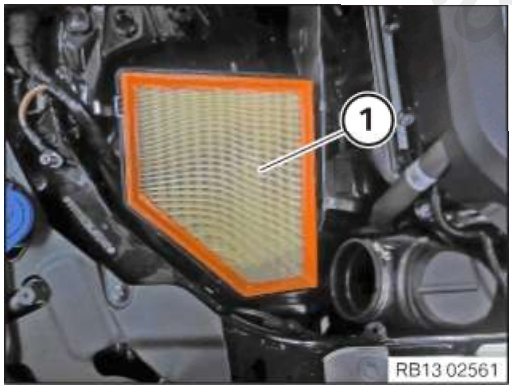
Damage to the clean air line. Damage to the air filter.

For changing the air filter insert, if the upper section of intake filter housing is only raised and not completely removed, the clean air line and the air filter insert may be damaged.

- Do not lift upper section of intake filter housing by force.
- Unfasten clamp.
- Remove upper section of intake filter housing completely.



- Unlock plug connection (1) and disconnect.
- Unfasten clamp (2).
- Loosen clamps (3).
- Feed out the upper section of intake filter housing with resonator (1) and remove.



- Remove the air filter element (1).

2 – Installing the air filter element

cardiagn.com

CAUTION

Swirling dirt particles caused by compressed air.

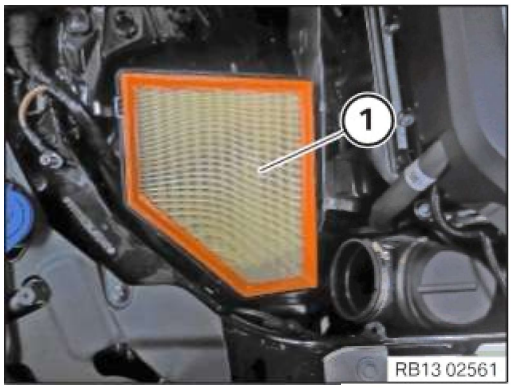
Danger of injury!

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

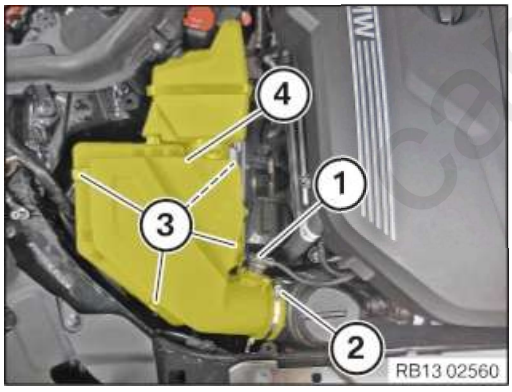
- Wear safety goggles.



- Clean the lower section of the intake filter housing (1).



- Install the air filter element (1).



- Feed in the upper section of intake filter housing with resonator (4) and install.
- Lock clamps (3).

  The clamps (3) must engage audibly.
- 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.

Additional Information

Overview of Tightening Torques

Clean air pipe to upper section of intake filter housing Used in step 2

Clamp		Tightening torque	3 Nm

carldiagn.com

13 90 500 Replace the tank vent valve

WARNING

Hot surfaces.

Risk of burning!

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

PRELIMINARY WORK

1 – Removing the acoustic cover

WARNING

Hot surfaces.

Risk of burning!

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

RISK OF DAMAGE

Damage to the acoustic cover.

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

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



- Release the acoustic cover (1) towards the top from the rubber mounts (marks).

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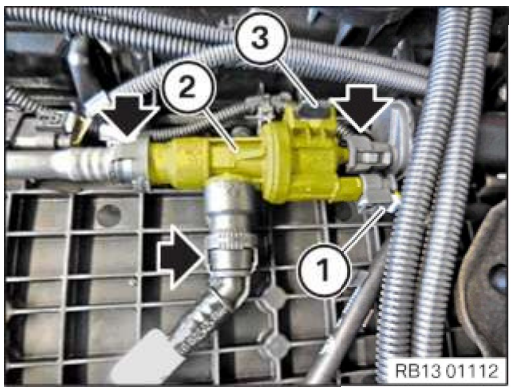
2 – Remove tank vent valve

RISK OF DAMAGE

Electrostatic discharge.

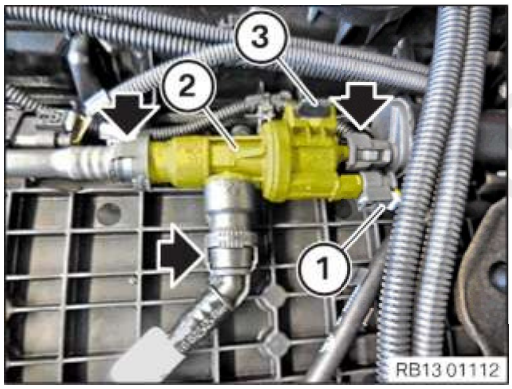
Damage to or destruction of electrical components.

- 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 Information on electrostatic discharge (ESD) protection.



- Unlock and disconnect connector (1).
- Unlock and disconnect the tank ventilation lines (arrows).
- Detach and remove the tank vent valve (2) from the holder (3).

3 – Installing the tank vent valve



- Secure the tank vent valve (2) to the holder (3).
- Connect and lock the tank ventilation lines (arrows).

  The tank ventilation lines (arrows) must audibly engage.
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

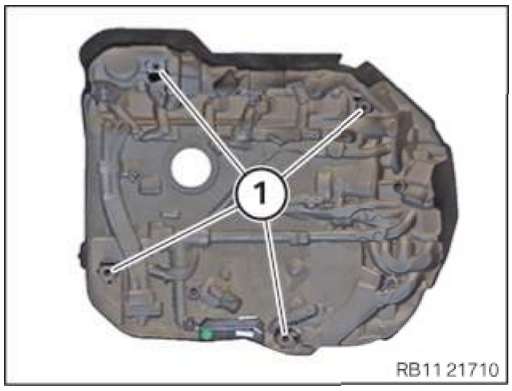
4 – Install acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover.

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

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



- Check the rubber mount (1) for correct fit in the acoustic cover.



- Install acoustic cover (1) and fix in the rubber mounts (marks).

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Additional Information

Links

Repair instructions	Used in step
61 35 ... Notes on ESD protection (Electro Static Discharge)	2