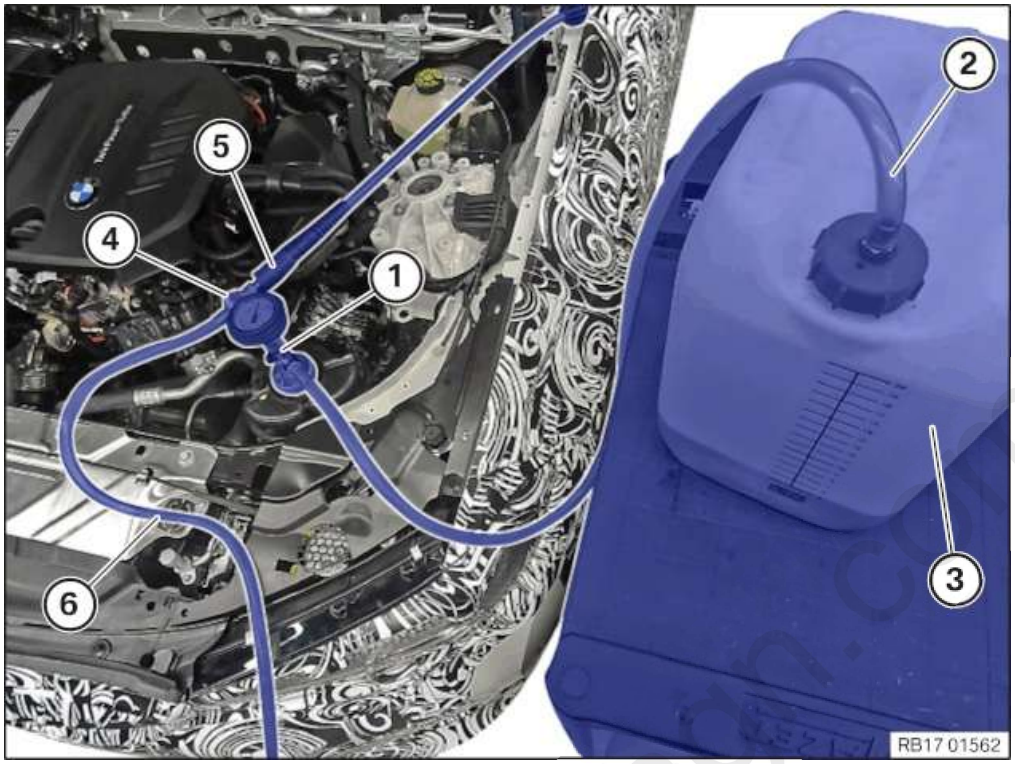
17 00 039 Bleed the cooling system and check it for watertightness with the special tool

PRELIMINARY WORK

1 – Fill the cooling system with the vacuum filling unit

Vacuum filler device



Vacuum filler device - connected to the coolant expansion tank

1 **Vacuum filler device with pressure gauge and shutoff valves**

2 **Filling hose**

3 **Fluid tank with coolant**

4 **Venturi nozzle**

5 **Compressed air connection** (maximum 6 bar)

6 **Exhaust hose** (Routing the exhaust hose to a collecting vessel)

Prerequisite

The fluid tank of the vacuum filler device must have a sufficient quantity of premixed coolant, 1 l to 2 l more than the specified capacity for the vehicle. The fluid tank of the vacuum filler device must be positioned at the same height as the coolant expansion tank.

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.

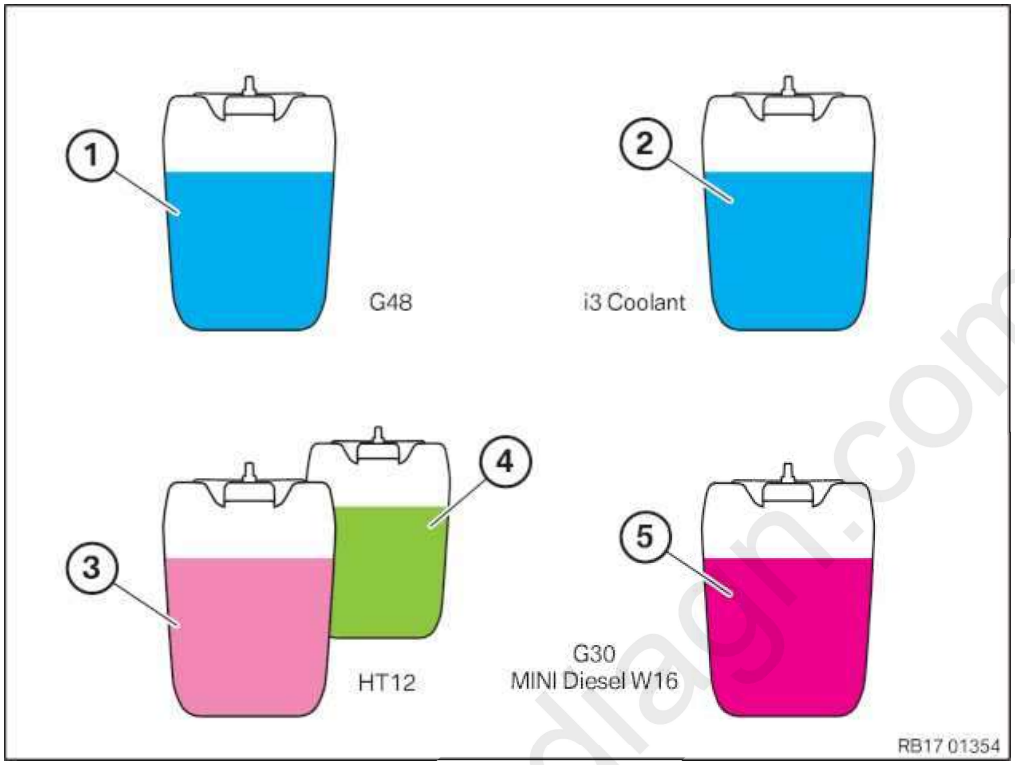
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TECHNICAL INFORMATION

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

▸ **Observe the coolant type**

Coolant in the collecting vessel of vacuum filler device



Choose the correct coolant for filling.

In general, a vehicle has to be filled with the coolant with which it is delivered from the factory.

1 G48 (Blue) (BMW LC-87) Must **not** be mixed with i3 Coolant or G30 MINI Diesel W16.

2 i3 Coolant (Blue) (BMW LC-13) Is used only for heater circuit i3. i3 Coolant must **not** be added to other coolant circuits or mixed with other coolants.

3 HT12 (Rose) (BMW LC-18) Must **not** be mixed with i3 Coolant or G30 MINI Diesel W16.

4 HT12 (Green) (BMW LC-18) Must **not** be mixed with i3 Coolant or G30 MINI Diesel W16.

5 G30 (Rose) (BMW LC-07) May be W16 used exclusively for the **MINI Diesel**. G30 must **not** be filled in the other coolant circuits or mixed with the other coolants.

RISK OF DAMAGE

Damage to the engine or components in high-voltage vehicles

The use of an incorrect coolant may lead to corrosion or gelling in the coolant circuit.

- Use only approved coolants for the specific vehicle.
- Fill the vehicle only with the coolant with which it was delivered ex works.
- Mix only compatible coolants. The colour does not allow any assessment about the compatibility of coolants.
- Selection of the correct coolant only by means of the part number.

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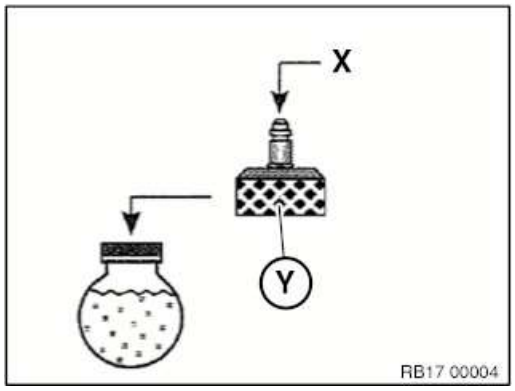
- Fill the cooling system with special tool 2 152 473.
- Select a suitable adapter (Y) from the set of special tools :

Type	Engine	Adapter (Y) from 17 0 100
G20/G21/G22/G23/G26/G28/G42	B47 / B48M1 /B57O0	17 0 113

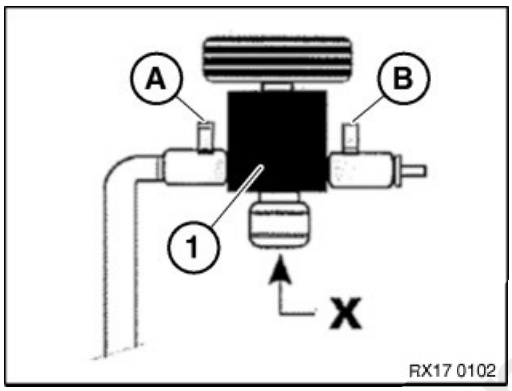
Cooling system capacity G20/G21/G22/G23/G26/G28/G42

B47D20O1	7.0 l

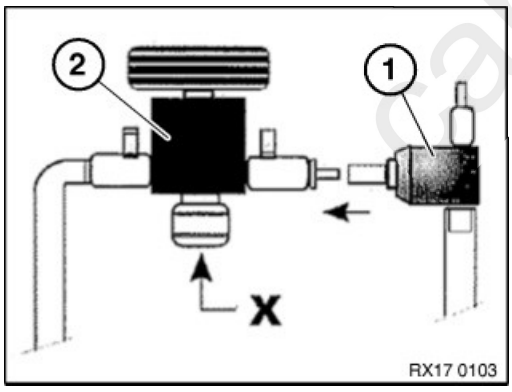
Expendable materials: Technically suitable antifreeze and corrosion inhibitor



- Connect the selected adapter (Y) to the coolant expansion tank.
- Connect vacuum filler device to connection (X) of the adapter.

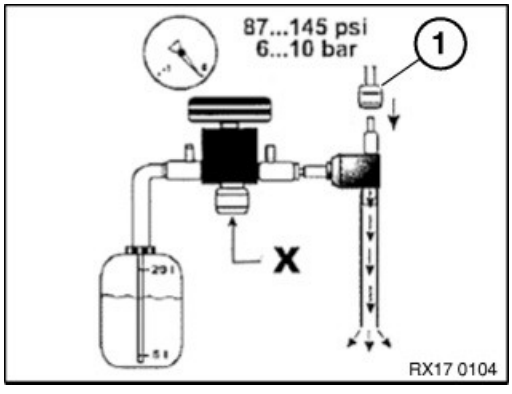


- Make sure that the shutoff valves (A) and (B) of the vacuum filler devices (1) are closed.
- Connect and lock connector (X) to the coolant expansion tank.



- Connect Venturi nozzle (1) to the vacuum filler device (2).

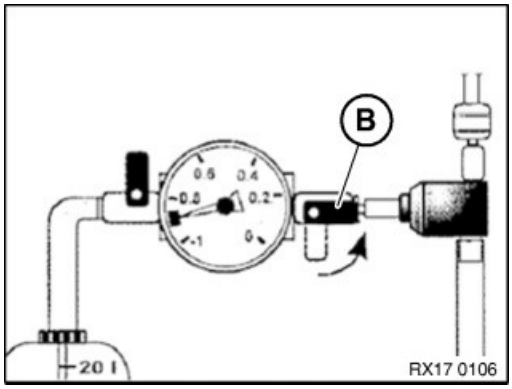
  (X)is the connection on the coolant expansion tank.



- Connect compressed air (1).

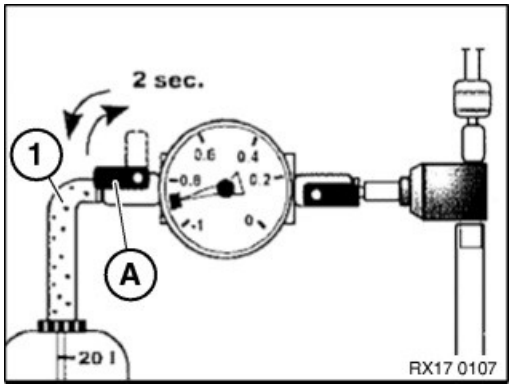
  (X)is the connection on the coolant expansion tank.

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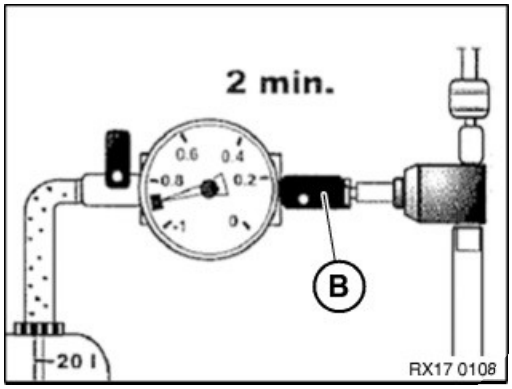
- Open shut-off valve (B).

  The Venturi nozzle produces a flow noise.



- Open shutoff valve (A) until the fuel filling hose (1) is full without bubbles.
- Close shutoff valve (A) again.

» The filling hose (1) has now been bled.

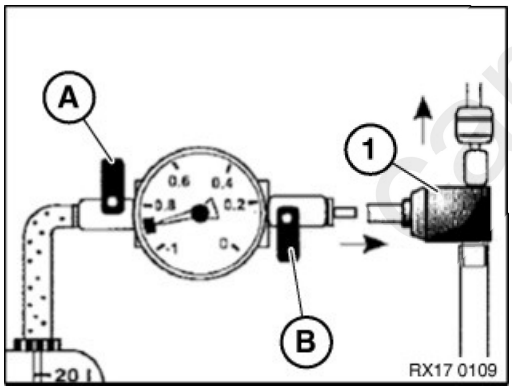


- Check the coolant hoses for porosity and renew porous coolant hoses as required.

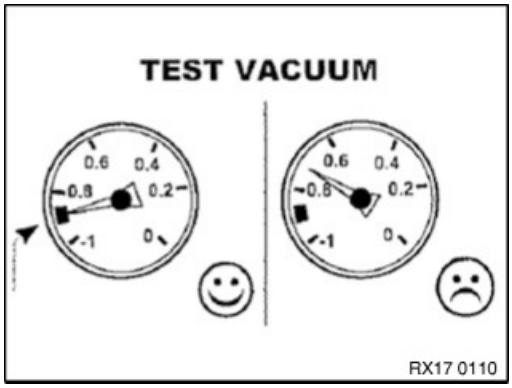
TECHNICAL INFORMATION

The coolant hoses contract during vacuum build-up.

- After a vacuum of -0.7 to -0.95 bar has been reached in the coolant circuit (duration approximately 2 minutes), close the shutoff valve (B).



- Make sure that the shutoff valves (A) and (B) are closed.
- Disconnect the Venturi nozzle (1).



Check

- The vacuum in the coolant circuit must be maintained for at least 30 seconds.

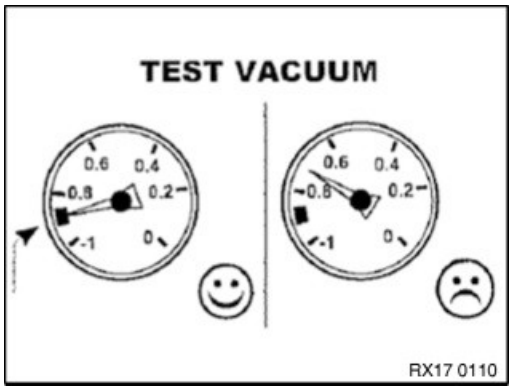
Result

» Vacuum drops.

Measure

- Look for the leak, repair it and start the filling procedure from the beginning.

Check



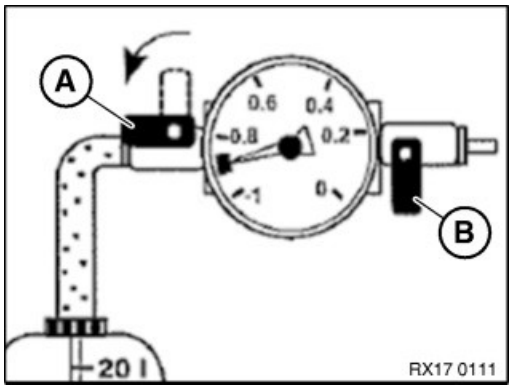
- The vacuum in the coolant circuit must be maintained for at least 30 seconds.

Result

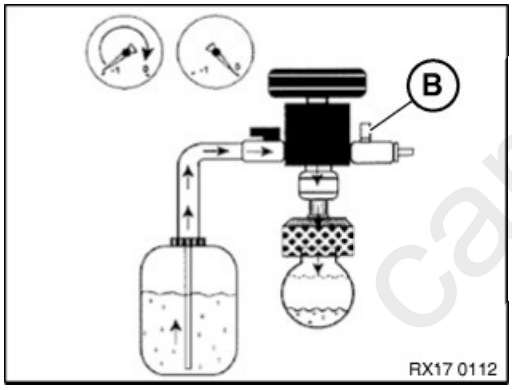
» Vacuum remains constant.

Measure

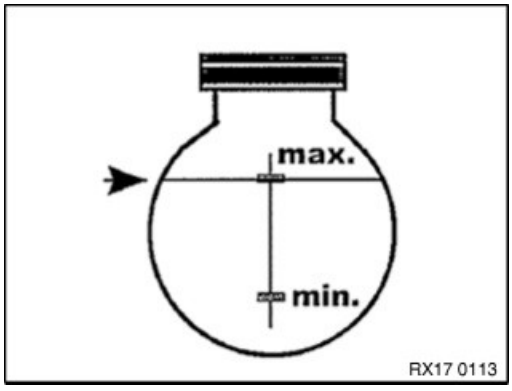
- Continue with filling.



- Keep shutoff valve (B) closed during the filling process.
- To fill the cooling system, open the shutoff valve (A) to the fluid tank of the vacuum filler device.



- Stop the filling procedure when the needle in the pressure measuring device is on 0 bar or it no longer drops.
- If necessary, reduce remaining vacuum. Open the shutoff valve (B).



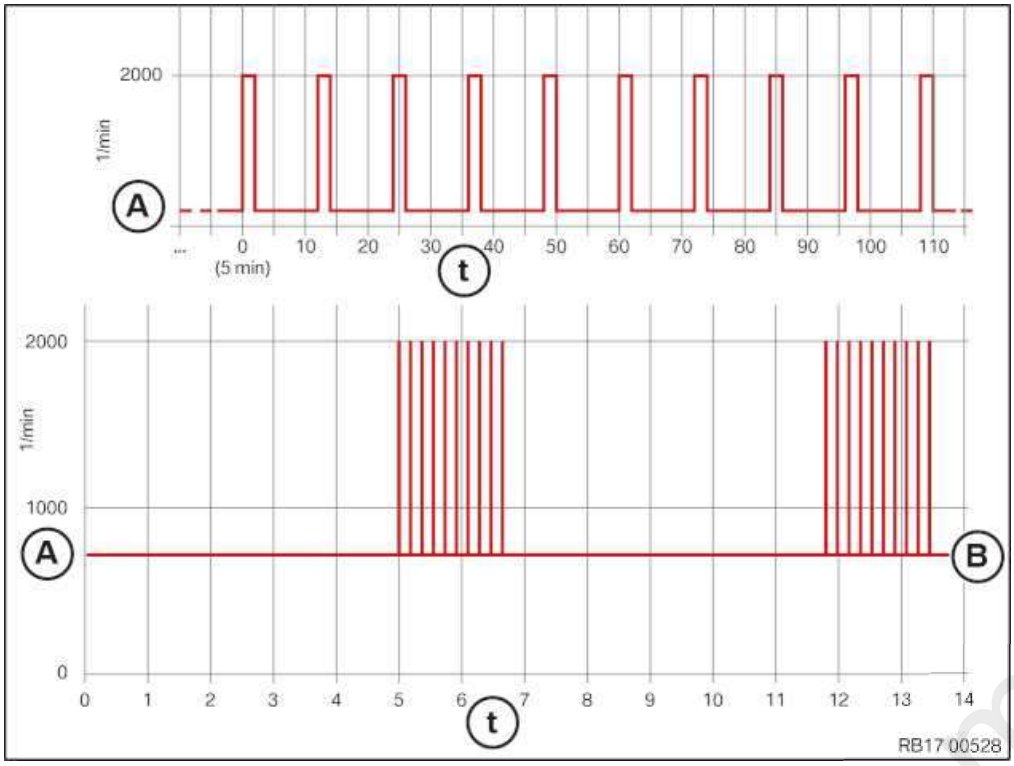
- Remove the vacuum filler device with the adapter from the coolant expansion tank.
- Adjust the coolant level to the maximum mark.
- After filling the cooling system with the vacuum filler device perform the cooling system bleeding routine additionally.

MAIN WORK

2 – Vent cooling system

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Cooling system bleeding routine



A Idle speed

B Cooling system bleeding routine finished

t Time

TECHNICAL INFORMATION

Filling **without** the vacuum filler device (watering can filling) is **not permitted**.

Non-compliance will result in danger of component and/or engine damage.

Filling specification **absolutely must** be adhered to.

Operation of the vehicle is not permitted unless the filling procedure has been completed. Otherwise, functional limitations (degradation) and/or overheating may occur.

A bleeding procedure is required after a part has been exchanged in the cooling system and/or after refilling the cooling system.

- Remove the vacuum filler device from the coolant expansion tank.
- Adjust the filling level in the coolant expansion tank to the maximum mark.
- The sealing cap on the coolant expansion tank must remain **open**.
- With automatic transmission: Select the selector lever position P (Park) and operate the parking brake.
- Set the heating to the **maximum** temperature and the blower to the **lowest** setting.
- Start engine and run at idle speed.
- Continue to top up the filling level in the coolant expansion tank to the maximum mark.
- Leave the engine running at idle for 5 minutes before you continue.
- Operate the accelerator pedal once to approximately 2000 rpm.
- Hold idle speed for 10 s.
- Operate the accelerator pedal once to approximately 2000 rpm.
- Hold idle speed for 10 s.

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- Operate the accelerator pedal once to approximately 2000 rpm.
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- Operate the accelerator pedal once to approximately 2000 rpm.
- Hold idle speed for 10 s.
- Continue to top up the filling level in the coolant expansion tank to the maximum mark.
- Leave the engine running at idle again for 5 minutes before you continue.
- Operate the accelerator pedal once to approximately 2000 rpm.
- Hold idle speed for 10 s.
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- Hold idle speed for 10 s.

  The cooling system bleeding routine has finished approximately 14 min after the engine starts.
- Switch off engine.
- Allow the engine to cool down.
- Adjust the filling level in the coolant expansion tank to the maximum mark.

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

POSTPROCESSES

3 – Checking cooling system for watertightness

WARNING

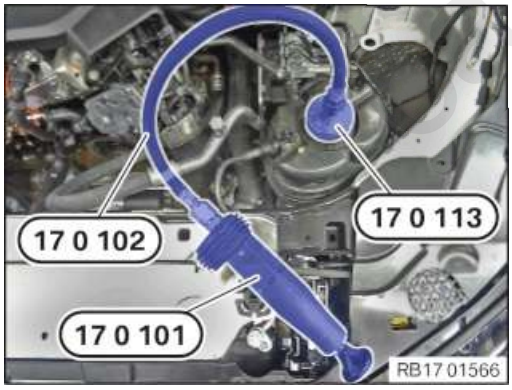
Hot surfaces.

Risk of burning!

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



- Loosen sealing cap (1).



- Set the special tool with the special tool and the special tool from the set of special tools at the coolant expansion tank.
- Build up excess pressure and wait for approximately 2 minutes.

Cooling system test pressure

Test pressure for cooling system (gauge pressure)	1,5 bar

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TECHNICAL INFORMATION

If the described test step is not completed successfully: repeat test step twice. Only replace the sealing cap after three tests with an incorrect opening pressure.

When driving at high ambient temperatures, the design may cause the pressure relief valve in the sealing cap to open slightly and air to escape together with dissolved coolant. This coolant vapour condenses on the surface of the coolant expansion tank and leaves traces of coolant when the vehicle has cooled down. These traces of coolant do not indicate whether the sealing cap is defective or not.

Escaping coolant vapours when the vehicle is at standstill may cause the pressure relief valve to stick to the sealing cap. This may cause an incorrect opening pressure.

- Screw on sealing cap on special tool from the set of special tools .
- Build up pressure using special tools and special tool from the set of special tools .
- Observe as to when opening pressure has been reached in the pressure measuring device.

Opening pressure of coolant sealing cover

Pressure relief valve opens when the pressure exceeds the ambient pressure.	min. 1,4 bar
Electric changeover valve must open at latest when the pressure is lower than the ambient pressure	max. 0,1 bar



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

Additional Information

Overview of Special Tools

2 152 473 Filler device



Common	Used in step 1
Usage	Vacuum filling device for filling the engine cooling system.
Included in the tool or work	
Storage location	
Replaced by	
In connection with	Adapter for connection to engine cooling system 17 0 100 = 0494417
SI-Number	08 15 08 (481)

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Overview Technical Data

Cooling system test pressure	Used in step 3
Test pressure for cooling system (gauge pressure)	1,5 bar

Opening pressure of coolant sealing cover	Used in step 3
Pressure relief valve opens when the pressure exceeds the ambient pressure.	min. 1,4 bar
Electric changeover valve must open at latest when the pressure is lower than the ambient pressure	max. 0,1 bar

Cooling system capacity G20/G21/G22/G23/G26/G28/G42	Used in step 1
B47D20O1	7.0 l

Expendable materials: Technically suitable antifreeze and corrosion inhibitor

Links

Repair instructions	Used in step
17 00 ... Notes for working on cooling system	1

Operating materials	Used in step
Main group 17	1

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

WARNING

Hot surfaces.

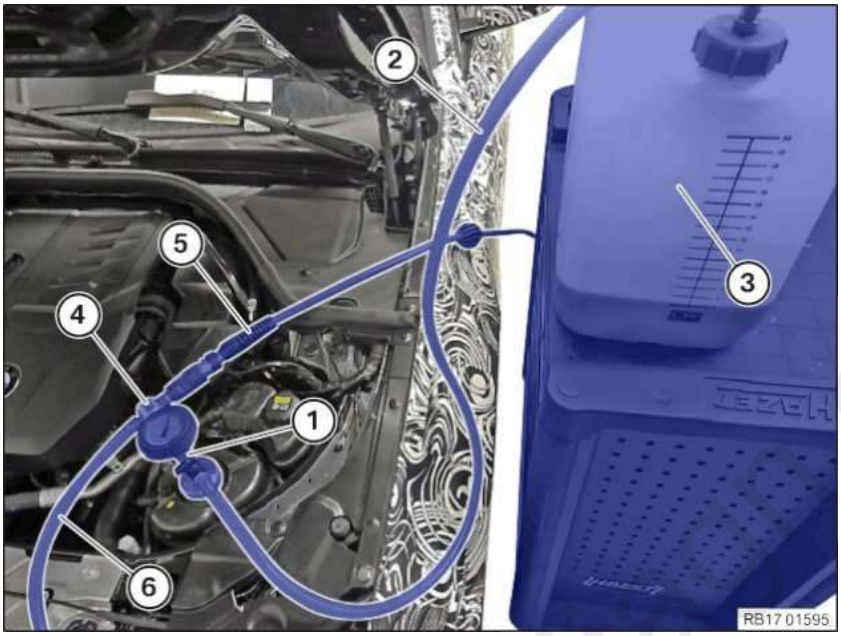
Risk of burning!

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

PRELIMINARY WORK

1 – Filling the high-temperature cooling system with the vacuum filler device

Vacuum filler device



Vacuum filler device - connected to the coolant expansion tank

1 Vacuum filler device with pressure gauge and shutoff valves

2 Filling hose

3 Fluid tank with coolant

4 Venturi nozzle

5 Compressed air connection (maximum 6 bar)

6 Exhaust hose (Routing the exhaust hose to a collecting vessel)

Prerequisite

The coolant expansion tank for the cooling system must be empty. The fluid tank of the vacuum filler device must have a sufficient quantity of premixed coolant, 1 l to 2 l more than the specified capacity for the vehicle. The fluid tank of the vacuum filler device must be positioned at the same height as the coolant expansion tank. The compressed air connection must have a pressure of 6 bar. Ignition is switched off.

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

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

Mixing different coolants is not permitted.

TECHNICAL INFORMATION

Filling **without** the vacuum filler device (watering can filling) is **not permitted**.

Non-compliance will result in danger of component and/or engine damage.

Filling specification **absolutely must** be adhered to.

Operation of the vehicle is not permitted unless the filling procedure has been completed. Otherwise, functional limitations (degradation) and/or overheating may occur.

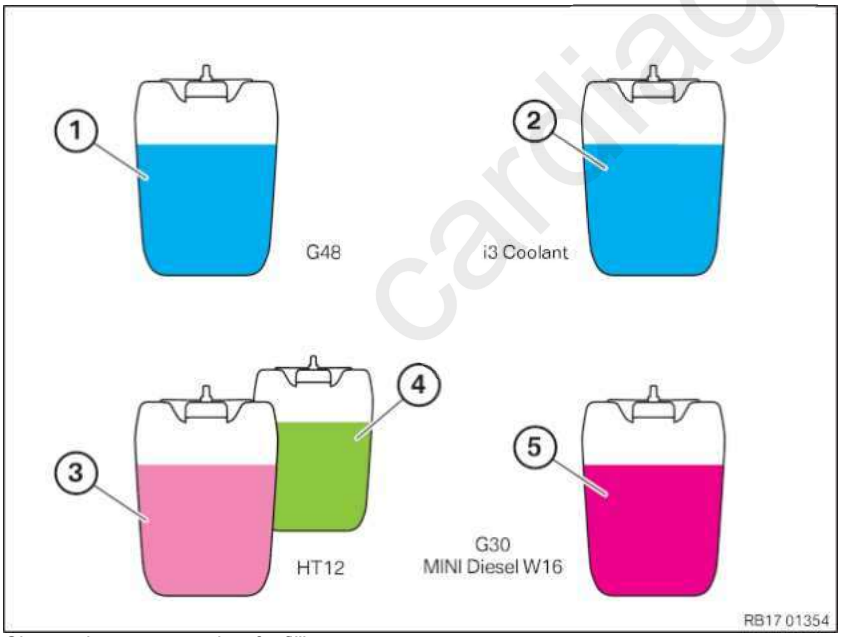
A bleeding procedure is required after a part has been exchanged in the cooling system and/or after refilling the cooling system.

TECHNICAL INFORMATION

Make sure that the ignition (terminal 15) is switched off prior to creating the vacuum with the vacuum filler device.

▸ **Observe the coolant type**

Coolant in the collecting vessel of vacuum filler device



Choose the correct coolant for filling.

In general, a vehicle has to be filled with the coolant with which it is delivered from the factory.

1 G48 (Blue) (BMW LC-87) Must **not** be mixed with i3 Coolant or G30 MINI Diesel W16.

2 i3 Coolant (Blue) (BMW LC-13) Is used only for heater circuit i3. i3 Coolant must **not** be added to other coolant circuits or mixed with other coolants.

3 HT12 (Rose) (BMW LC-18) Must **not** be mixed with i3 Coolant or G30 MINI Diesel W16.

4 HT12 (Green) (BMW LC-18) Must **not** be mixed with i3 Coolant or G30 MINI Diesel W16.

5 G30 (Rose) (BMW LC-07) May be W16 used exclusively for the **MINI Diesel**. G30 must **not** be filled in the other coolant circuits or mixed with the other coolants.

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RISK OF DAMAGE

Damage to the engine or components in high-voltage vehicles

The use of an incorrect coolant may lead to corrosion or gelling in the coolant circuit.

- Use only approved coolants for the specific vehicle.
- Fill the vehicle only with the coolant with which it was delivered ex works.
- Mix only compatible coolants. The colour does not allow any assessment about the compatibility of coolants.
- Selection of the correct coolant only by means of the part number.

- Select a suitable adapter (Y) from the set of special tools :

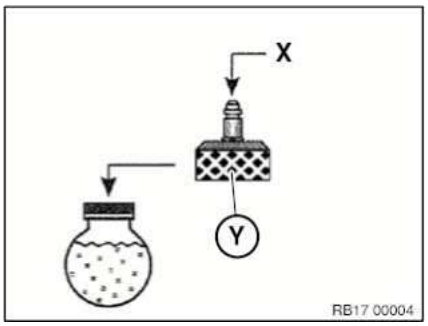
Type	Engine	Adapter (Y) from 17 0 100
G20/G21/G22/G23/G26/G28/G29	B42/B46/B48/B58	**17 0 113**
G20/21/22/23/G26/G42	B57/B47 Mild hybrid technology	**17 0 113**

- The fluid tank of the vacuum filler device must be filled with 1 l to 2 l more than the specified capacity of coolant for the vehicle.

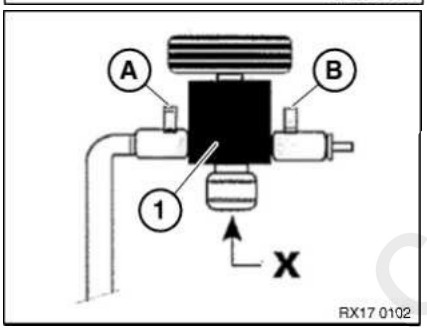
Capacity of high-temperature coolant circuit G20/G21/G22/G23/G26/G42 mild hybrid technology

B57D30T2/O2 / B47B20O1/U1	7.7 l

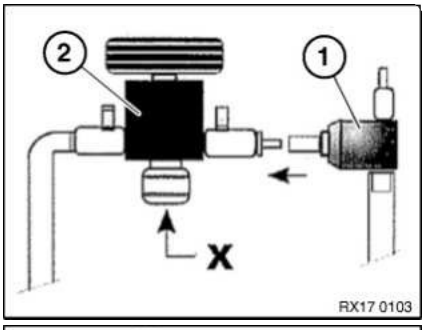
Expendable materials: Technically suitable antifreeze and corrosion inhibitor



- Connect the selected adapter (Y) to the coolant expansion tank.
- Connect vacuum filler device to connection (X) of the adapter.

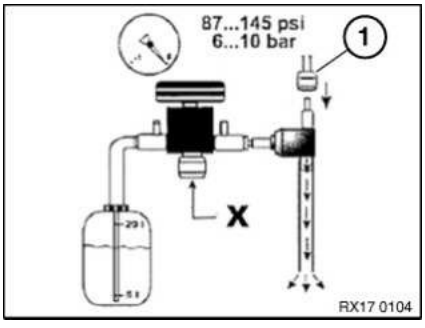


- Check whether shut-off valves (A) and (B) of the vacuum filler device (1) are closed.
- Connect and lock connection (X) to the coolant expansion tank.



- Connect Venturi nozzle (1) to the vacuum filler device (2).

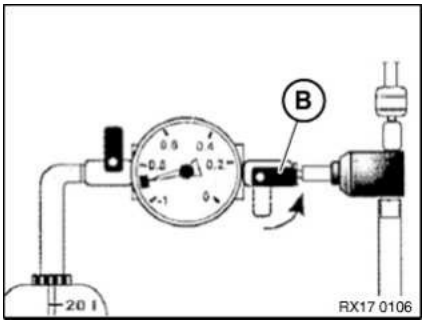
  (X)is the connection on the coolant expansion tank.



- Connect compressed air (1).

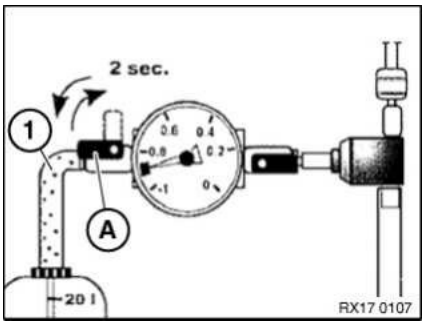
  (X)is the connection on the coolant expansion tank.

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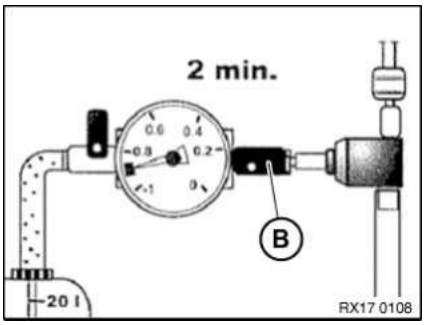
- Open shut-off valve (B).

  The Venturi nozzle produces a flow noise.



- Open shutoff valve (A) until the fuel filling hose (1) is full without bubbles.
- Close shutoff valve (A) again.

» The filling hose (1) has now been bled.

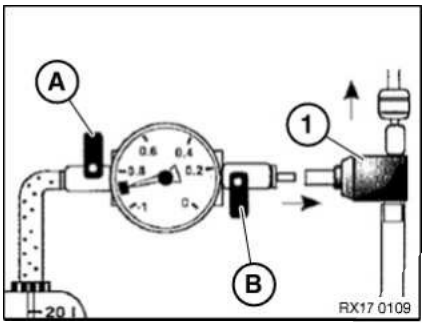


- Check the coolant hoses for porosity and renew porous coolant hoses as required.

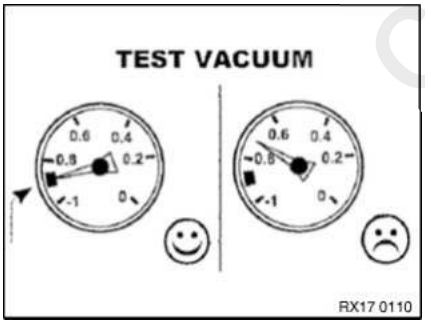
TECHNICAL INFORMATION

The coolant hoses contract during vacuum build-up.

- After having established a vacuum in the coolant circuit of between -0.7 to -0.95 bar (duration approximately 2 min), close the shut-off valve (B).



- Check whether the shutoff valves (A) and (B) are closed.
- Disconnect the Venturi nozzle (1).



Check

- Make sure the vacuum in the coolant circuit is maintained for at least 30 seconds.

Result

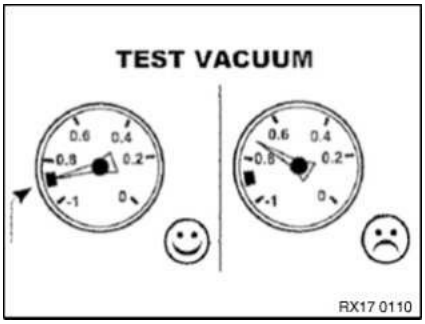
» Vacuum drops.

Measure

- Look for the leak, repair it and start the filling procedure from the beginning.

Check

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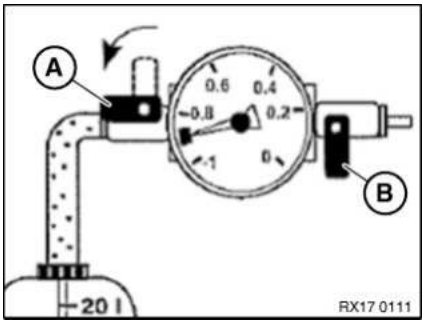
- Make sure the vacuum in the coolant circuit is maintained for at least 30 seconds.

Result

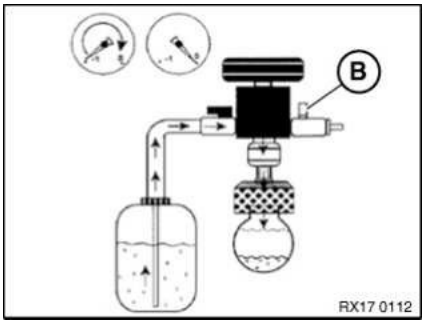
» Vacuum remains constant.

Measure

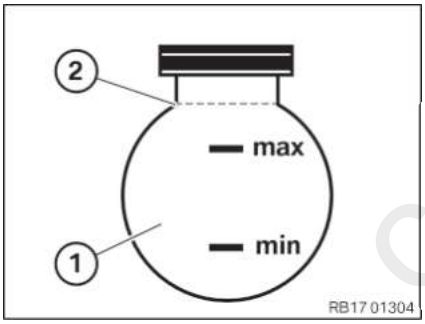
- Continue with filling.



- Keep shutoff valve (B) closed during the filling process.
- To fill the cooling system, open the shutoff valve (A) to the fluid tank of the vacuum filler device.



- Stop the filling procedure when the needle in the pressure measuring device is on 0 bar or it no longer drops.
- If necessary, reduce remaining vacuum. In order to do so, open shutoff valve (B).



- Remove the vacuum filler device with the adapter from the high temperature coolant expansion tank (1).
- Top up the coolant level in the high temperature coolant expansion tank (1) to the lower edge of the coolant filler neck (2) in the high temperature coolant expansion tank (1).
- After filling the cooling system with the vacuum filler device, **also** run the cooling system bleeding routine.

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MAIN WORK

2 – Bleed the high-temperature coolant circuit

TECHNICAL INFORMATION

Filling **without** the vacuum filler device (watering can filling) is **not permitted**.

Non-compliance will result in danger of component and/or engine damage.

Filling specification **absolutely must** be adhered to.

Operation of the vehicle is not permitted unless the filling procedure has been completed. Otherwise, functional limitations (degradation) and/or overheating may occur.

A bleeding procedure is required after a part has been exchanged in the cooling system and/or after refilling the cooling system.

TECHNICAL INFORMATION

Before starting the automatic cooling system bleeding routine, make sure that **all coolant circuits** are **filled**. If the cooling system bleeding routine is started while one of the coolant circuits is empty, there is a risk of damage to the electric coolant pump when running it dry.

Make sure that terminal 15 is not disconnected for the bleeding procedure. Switch on low-beam headlights and hazard warning lights. If the low-beam headlights and hazard warning lights are not switched on, the ignition (terminal 15) will switch off automatically after a certain period of time and interrupt the bleeding procedure.

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

After the cooling system bleeding routine, the cooling system is topped up above the maximum mark.

Overfilling the cooling system serves to balance the remaining air in the cooling system.

The normal filling level of the coolant is reached while driving.

TECHNICAL INFORMATION

The driving experience switch must not be set to the ECO PRO switch position.

TECHNICAL INFORMATION

When bleeding the high-temperature coolant circuit, the low-temperature coolant circuit is also automatically bled.

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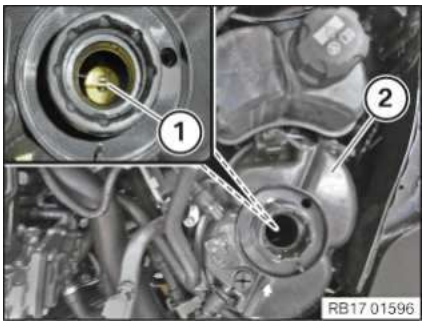
- Remove the vacuum filler device from the coolant expansion tank.
- Adjust the filling level in the coolant expansion tank to the maximum mark.
- The sealing cap on the coolant expansion tank must remain **open**.
- Ensure that the **bonnet** is **open**.
- With automatic transmission: Select the selector lever position P (Park) and operate the parking brake.
- **Activate** the testing-analysis-diagnosis (PAD) by quickly pressing the START-STOP button 3 times.
- Adjust the heating to the **maximum** temperature and adjust the blower to the **lowest** level.
- Press the accelerator pedal to the limit position for at least **10 seconds**. Do **not** press the brake pedal while doing so.
- Then start the engine **within 30 s**.

  "Service function started" is displayed in the instrument cluster.
- Leave the engine running at idle for 3 min.
- Continue to top up the filling level in the coolant expansion tank to the maximum mark.
- 1. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Hold idle speed for 10 s.
- 2. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Hold idle speed for 10 s.
- 3. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Hold idle speed for 10 s.
- 4. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Hold idle speed for 10 s.
- 5. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Hold idle speed for 10 s.
- 6. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Hold idle speed for 10 s.
- 7. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Hold idle speed for 10 s.
- 8. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Maintain the idle speed for **3 min**.
- 1. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Hold idle speed for 10 s.
- 2. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Hold idle speed for 10 s.
- 3. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Hold idle speed for 10 s.
- 4. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Hold idle speed for 10 s.
- 5. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Hold idle speed for 10 s.
- 6. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Hold idle speed for 10 s.
- 7. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Hold idle speed for 10 s.
- 8. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Maintain the idle speed until "Service function ended" is displayed in the instrument cluster.
- Switch off engine.
- Allow the engine to cool down.

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- Loosen sealing cap (1).



TECHNICAL INFORMATION

After the cooling system bleeding routine, the cooling system is topped up above the maximum mark.
Overfilling the cooling system serves to balance the remaining air in the cooling system.
The normal filling level of the coolant is reached while driving.

- Adjust the filling level in the coolant expansion tank (2) of the high-temperature coolant circuit to **300 ml** above the **maximum mark** (1).



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

POSTPROCESSES

3 – Check the high-temperature cooling system for watertightness

WARNING

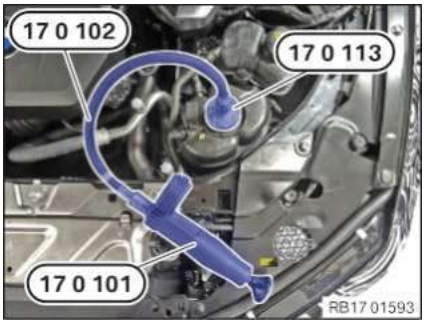
Hot surfaces.

Risk of burning!

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



- Loosen sealing cap (1).



- Attach the special tool with special tools and from the set of special tools .
- Build up excess pressure and wait for approximately 2 minutes.

Opening pressure of sealing cap / test pressure of high-temperature coolant circuit cooling system

Pressure relief valve opens when the pressure exceeds the ambient pressure.	min. 1,4 bar
Electric changeover valve must open at latest when the pressure is lower than the ambient pressure.	max. 0,1 bar
Test pressure for cooling system (gauge pressure)	1,5 bar

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TECHNICAL INFORMATION

If the described test step is not completed successfully: repeat test step twice. Only replace the sealing cap after three tests with an incorrect opening pressure.

When driving at high ambient temperatures, the design may cause the pressure relief valve in the sealing cap to open slightly and air to escape together with dissolved coolant. This coolant vapour condenses on the surface of the coolant expansion tank and leaves traces of coolant when the vehicle has cooled down. These traces of coolant do not indicate whether the sealing cap is defective or not.

Escaping coolant vapours when the vehicle is at standstill may cause the pressure relief valve to stick to the sealing cap. This may cause an incorrect opening pressure.

- Screw on sealing cap (1) on special tool from the set of special tools .
- Build up the pressure with special tools and from the set of special tools .
- Observe on the pressure measuring device when the opening pressure has been reached.

Opening pressure of sealing cap / test pressure of high-temperature coolant circuit cooling system

Pressure relief valve opens when the pressure exceeds the ambient pressure.	min. 1,4 bar
Electric changeover valve must open at latest when the pressure is lower than the ambient pressure.	max. 0,1 bar
Test pressure for cooling system (gauge pressure)	1,5 bar



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

Additional Information

Overview of Special Tools

Overview Technical Data

Opening pressure of sealing cap / test pressure of high-temperature coolant circuit cooling system	Used in step 3
Pressure relief valve opens when the pressure exceeds the ambient pressure.	min. 1,4 bar
Electric changeover valve must open at latest when the pressure is lower than the ambient pressure.	max. 0,1 bar
Test pressure for cooling system (gauge pressure)	1,5 bar

Capacity of high-temperature coolant circuit G20/G21/G22/G23/G26/G42 mild hybrid technology	Used in step 1
B57D30T2/O2 / B47B20O1/U1	7.7 l
Expendable materials: Technically suitable antifreeze and corrosion inhibitor	

Links

Repair instructions	**Used in step**
17 00 ... Notes for working on cooling system	1

Operating materials	**Used in step**
Main group 17	1

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17 00 040 Bleed the cooling system and check it for watertightness with the special tool

WARNING

Hot surfaces.

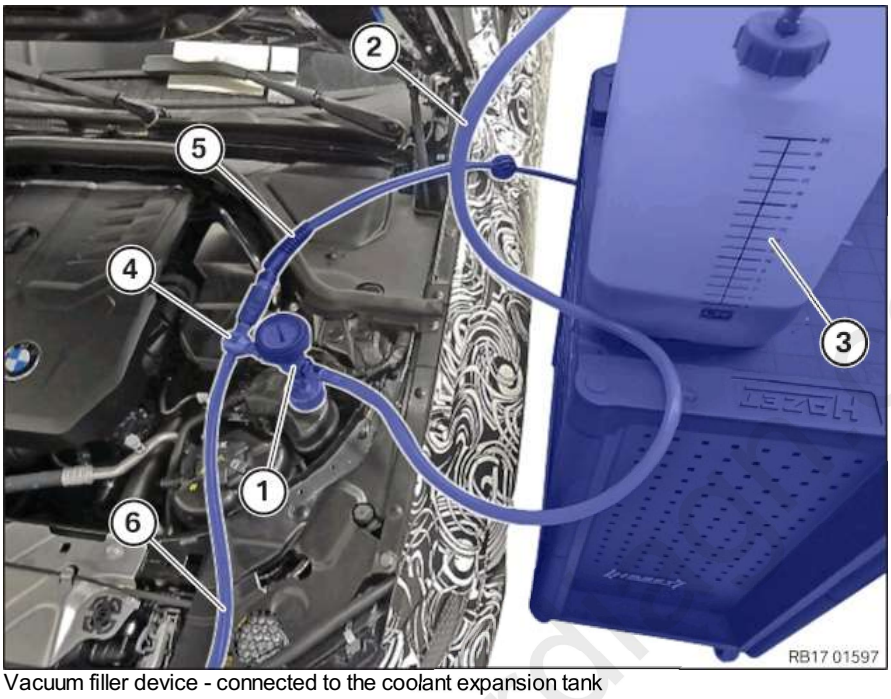
Risk of burning!

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

PRELIMINARY WORK

1 – Filling the low-temperature cooling system with the vacuum filler device

Vacuum filler device



Vacuum filler device - connected to the coolant expansion tank

1 Vacuum filler device with pressure gauge and shutoff valves

2 Filling hose

3 Fluid tank with coolant

4 Venturi nozzle

5 Compressed air connection (maximum 6 bar)

6 Exhaust hose (Routing the exhaust hose to a collecting vessel)

Prerequisite

The coolant expansion tank for the cooling system must be empty. The fluid tank of the vacuum filler device must have a sufficient quantity of premixed coolant, 1 l to 2 l more than the specified capacity for the vehicle. The fluid tank of the vacuum filler device must be positioned at the same height as the coolant expansion tank. The compressed air connection must have a pressure of 6 bar. Ignition is switched off.

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

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

Mixing different coolants is not permitted.

TECHNICAL INFORMATION

Filling **without** the vacuum filler device (watering can filling) is **not permitted**.

Non-compliance will result in danger of component and/or engine damage.

Filling specification **absolutely must** be adhered to.

Operation of the vehicle is not permitted unless the filling procedure has been completed. Otherwise, functional limitations (degradation) and/or overheating may occur.

A bleeding procedure is required after a part has been exchanged in the cooling system and/or after refilling the cooling system.

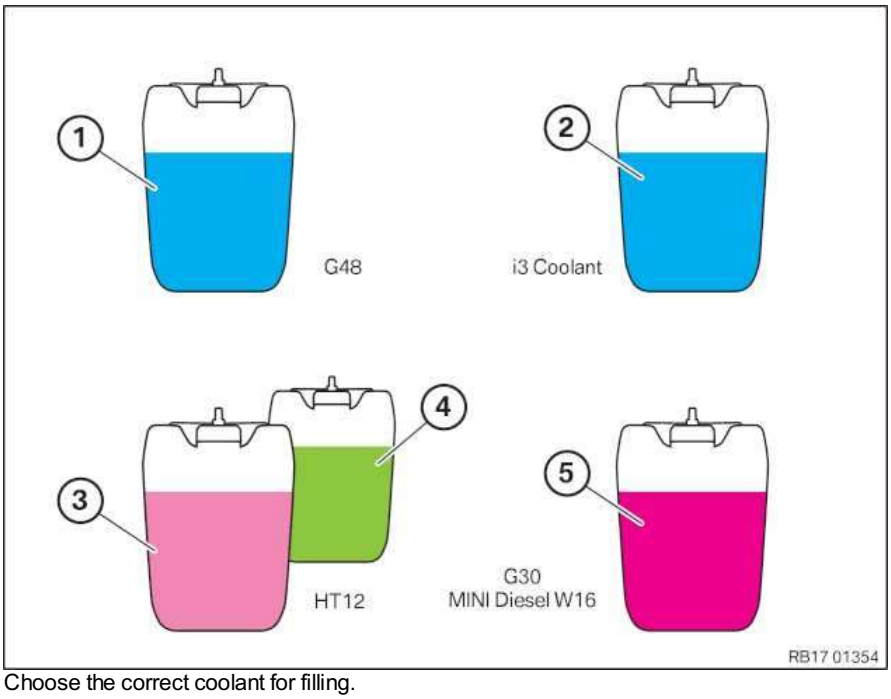
TECHNICAL INFORMATION

Make sure that the ignition (terminal 15) is switched off prior to creating the vacuum with the vacuum filler device.

▸ **Observe the coolant type**

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Coolant in the collecting vessel of vacuum filler device



Choose the correct coolant for filling.

In general, a vehicle has to be filled with the coolant with which it is delivered from the factory.

1 G48 (Blue) (BMW LC-87) Must **not** be mixed with i3 Coolant or G30 MINI Diesel W16.

2 i3 Coolant (Blue) (BMW LC-13) Is used only for heater circuit i3. i3 Coolant must **not** be added to other coolant circuits or mixed with other coolants.

3 HT12 (Rose) (BMW LC-18) Must **not** be mixed with i3 Coolant or G30 MINI Diesel W16.

4 HT12 (Green) (BMW LC-18) Must **not** be mixed with i3 Coolant or G30 MINI Diesel W16.

5 G30 (Rose) (BMW LC-07) May be W16 used exclusively for the **MINI Diesel**. G30 must **not** be filled in the other coolant circuits or mixed with the other coolants.

RISK OF DAMAGE

Damage to the engine or components in high-voltage vehicles

The use of an incorrect coolant may lead to corrosion or gelling in the coolant circuit.

- Use only approved coolants for the specific vehicle.
- Fill the vehicle only with the coolant with which it was delivered ex works.
- Mix only compatible coolants. The colour does not allow any assessment about the compatibility of coolants.
- Selection of the correct coolant only by means of the part number.

- Select a suitable adapter (Y) from the set of special tools :

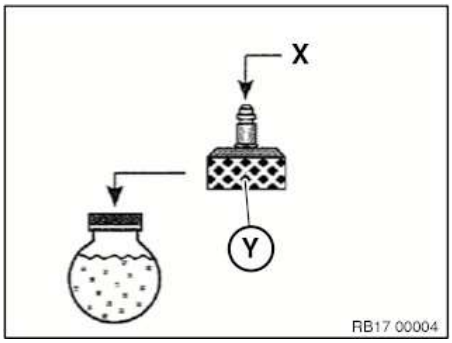
Type	Engine	Adapter (Y) from 17 0 100
G20/G21/G22/G23/G26/G28/G29	B42/B46/B48/B58	17 0 109
G20/21/22/23/G26/G42	B57/B47 Mild hybrid technology	17 0 109

- The fluid tank of the vacuum filler device must be filled with 1 l to 2 l more than the specified capacity of coolant for the vehicle.

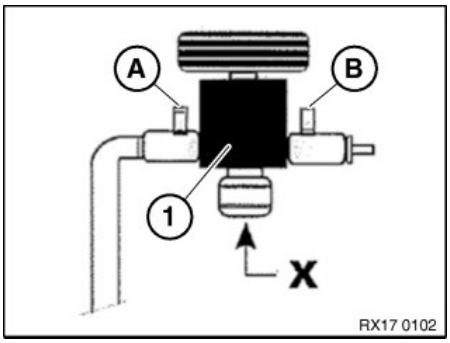
Capacity of low-temperature coolant circuit G20/G21/22/23/G26/G42 mild hybrid technology

B57D30T2/O2 / B47D20O1/U1	1.3 l
Expendable materials: Technically suitable antifreeze and corrosion inhibitor	

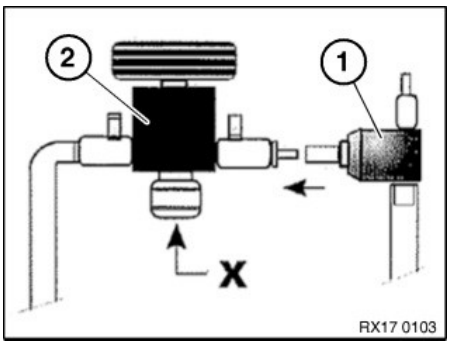
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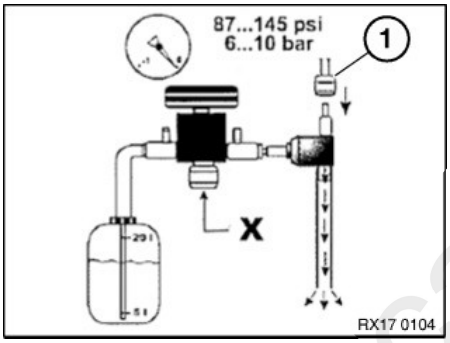
- Connect the selected adapter (Y) to the coolant expansion tank.
- Connect vacuum filler device to connection (X) of the adapter.



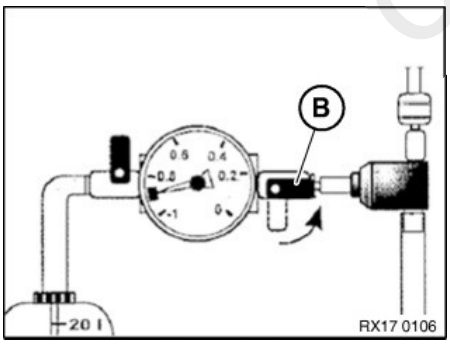
- Check that shutoff valves (A) and (B) of the vacuum filler device (1) are closed.
- Connect and lock connection (X) to the coolant expansion tank.



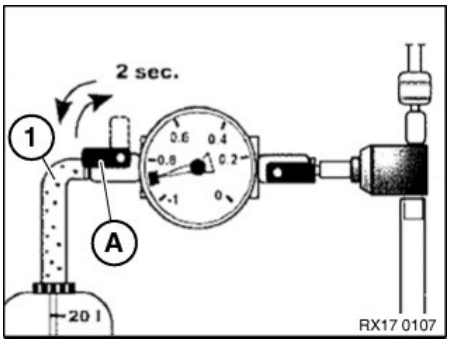
- Connect Venturi nozzle (1) to the vacuum filler device (2).
  (X)is the connection on the coolant expansion tank.



- Connect compressed air (1).
  (X)is the connection on the coolant expansion tank.



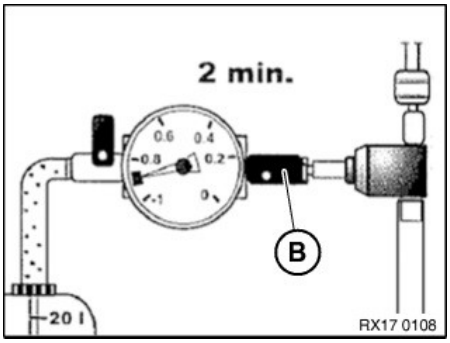
- Open shut-off valve (B).
  The Venturi nozzle produces a flow noise.



- Open shutoff valve (A) until the fuel filling hose (1) is full without bubbles.
- Close shutoff valve (A) again.

» The filling hose (1) has now been bled.

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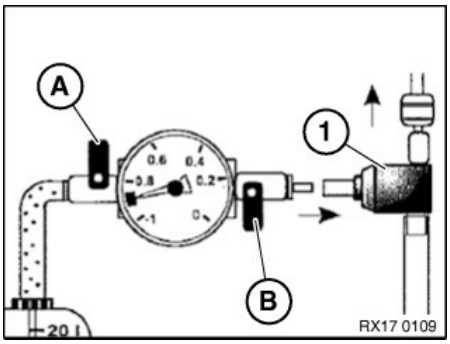


- Check the coolant hoses for porosity and renew porous coolant hoses as required.

TECHNICAL INFORMATION

The coolant hoses contract during vacuum build-up.

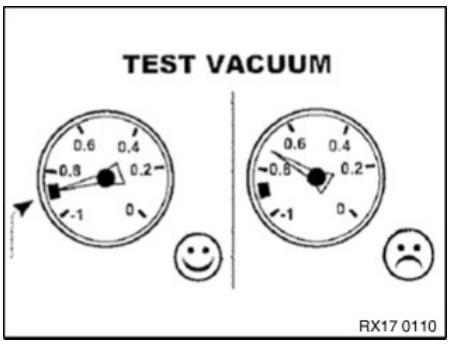
- After a vacuum of -0.7 to -0.95 bar has been created in the coolant circuit (duration approx. 2 min), shut the shutoff valve (B).



- Check whether the shutoff valves (A) and (B) are closed.
- Disconnect the Venturi nozzle (1).

Check

- Make sure the vacuum in the coolant circuit is maintained for at least 30 seconds.



Result

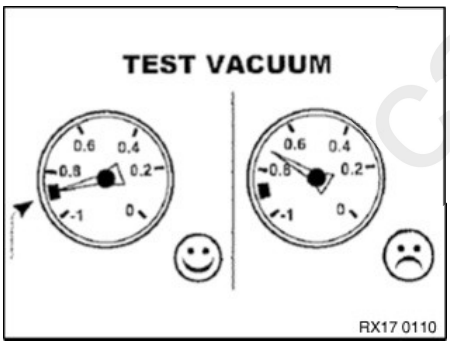
» Vacuum drops.

Measure

- Look for the leak, repair it and start the filling procedure from the beginning.

Check

- Make sure the vacuum in the coolant circuit is maintained for at least 30 seconds.

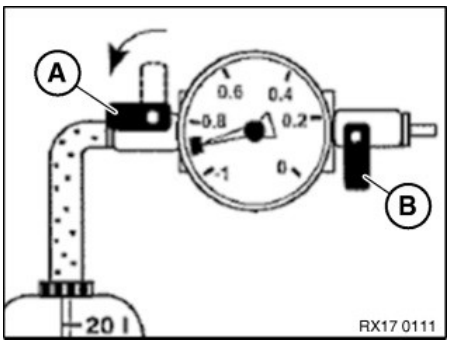


Result

» Vacuum remains constant.

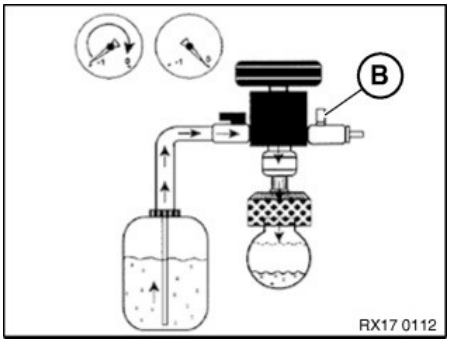
Measure

- Continue with filling.

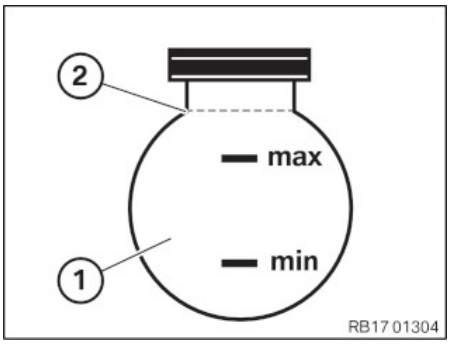


- Keep shutoff valve (B) closed during the filling process.
- To fill the cooling system, open the shutoff valve (A) to the fluid tank of the vacuum filler device.

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- Stop the filling procedure when the needle in the pressure measuring device is on 0 bar or it no longer drops.
- If necessary, reduce remaining vacuum. In order to do so, open shutoff valve (B).



- Remove the vacuum filler device with the adapter from the low-temperature coolant expansion tank (1).
- Adjust the coolant level in the low-temperature coolant expansion tank (1) to the lower edge of the coolant filler neck (2) of the low-temperature coolant expansion tank (1).
- After filling the cooling system with the vacuum filler device, **also** run the cooling system bleeding routine.

MAIN WORK

2 – Bleeding the low-temperature cooling system

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

Filling **without** the vacuum filler device (watering can filling) is **not permitted**.

Non-compliance will result in danger of component and/or engine damage.

Filling specification **absolutely must** be adhered to.

Operation of the vehicle is not permitted unless the filling procedure has been completed. Otherwise, functional limitations (degradation) and/or overheating may occur.

A bleeding procedure is required after a part has been exchanged in the cooling system and/or after refilling the cooling system.

TECHNICAL INFORMATION

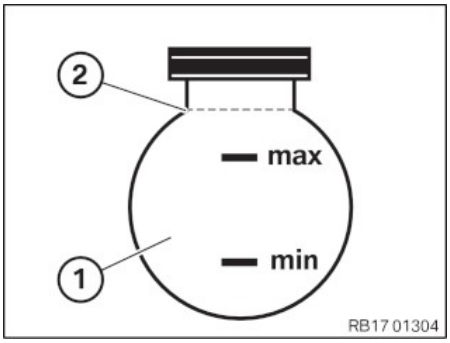
Before starting the automatic cooling system bleeding routine, make sure that **all coolant circuits** are **filled**. If the cooling system bleeding routine is started while one of the coolant circuits is empty, there is a risk of damage to the electric coolant pump when running it dry.

Make sure that terminal 15 is not disconnected for the bleeding procedure. Switch on low-beam headlights and hazard warning lights. If the low-beam headlights and hazard warning lights are not switched on, the ignition (terminal 15) will switch off automatically after a certain period of time and interrupt the bleeding procedure.

TECHNICAL INFORMATION

The driving experience switch must not be set to the ECO PRO switch position.

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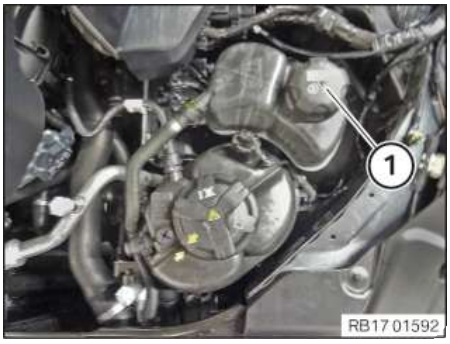
- Adjust the coolant level in the low-temperature coolant expansion tank (1) up to lower edge (2) of the coolant filler neck of low-temperature coolant expansion tank (1).
- **Close** the sealing cap on the coolant expansion tank of the low-temperature coolant circuit.
- Ensure that the bonnet is open.
- With automatic transmission: Select the selector lever position P (park) and operate the parking brake.
- **Activate** the testing-analysis-diagnosis (PAD) by quickly actuating the START-STOP button three times.
- Ensure that the Driving Experience Control is **not** in the **"ECO-PRO"** switch position.
- Adjust the heating to **maximum** temperature and adjust the blower to the **lowest** level.
- Press the accelerator pedal to the limit position for at least **10 seconds**. Do **not** press the brake pedal while doing so.
- Then start the engine within 30 s.

  "Service function started" is displayed in the instrument cluster.
- Let the engine idle during the entire bleeding procedure.

  The electric coolant pump in the low-temperature coolant circuit is activated for 10 minutes according to a cooling system bleeding routine.

  The cooling system bleeding routine is ended if "Service function ended" is displayed in the instrument cluster.

  The electric coolant pump is then activated again as required.
- If the cooling system bleeding routine is interrupted, then it must be repeated.
- Stop engine.
- Allow the coolant temperature to cool down to **< 50°C**.



- Loosen sealing cap (1).



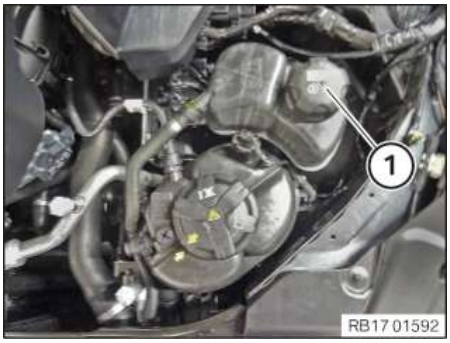
TECHNICAL INFORMATION

After the cooling system bleeding routine, the cooling system is topped up above the maximum mark.

Overfilling the cooling system serves to balance the remaining air in the cooling system.

The normal filling level of the coolant is reached while driving.

- Adjust the filling level in the coolant expansion tank (2) of the low-temperature coolant circuit to **100 ml** above the **maximum mark** (1).



- Close sealing cap (1).

POSTPROCESSES

3 – Checking low-temperature cooling system for watertightness

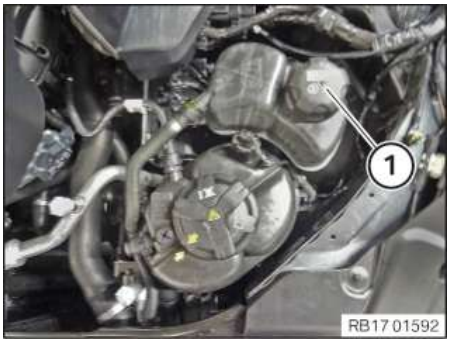
obdiagn.com

WARNING

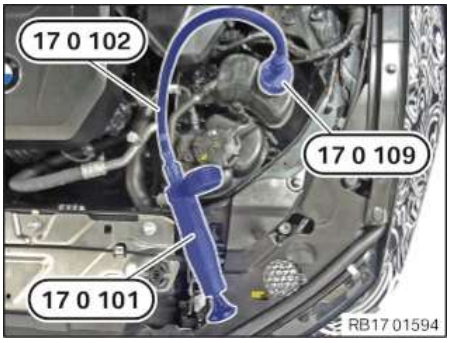
Hot surfaces.

Risk of burning!

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



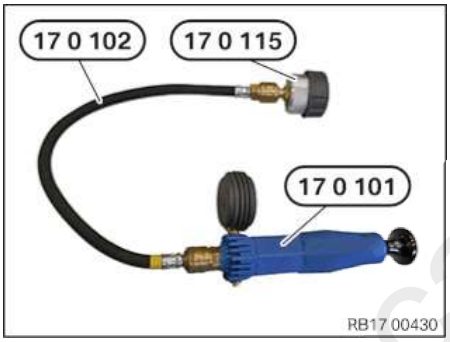
- Loosen sealing cap (1).



- Attach the special tool with special tools and from the set of special tools .
- Build up excess pressure and wait for approximately 2 minutes.

Opening pressure of sealing cap of low-temperature coolant circuit

Pressure relief valve opens when the pressure exceeds the ambient pressure.	min. 1,4 bar
Electric changeover valve must open at latest when the pressure is lower than the ambient pressure	max. 0,1 bar
Test pressure for cooling system (gauge pressure)	1,5 bar



TECHNICAL INFORMATION

If the described test step is not completed successfully: repeat test step twice. Only replace the sealing cap after three tests with an incorrect opening pressure.

When driving at high ambient temperatures, the design may cause the pressure relief valve in the sealing cap to open slightly and air to escape together with dissolved coolant. This coolant vapour condenses on the surface of the coolant expansion tank and leaves traces of coolant when the vehicle has cooled down. These traces of coolant do not indicate whether the sealing cap is defective or not.

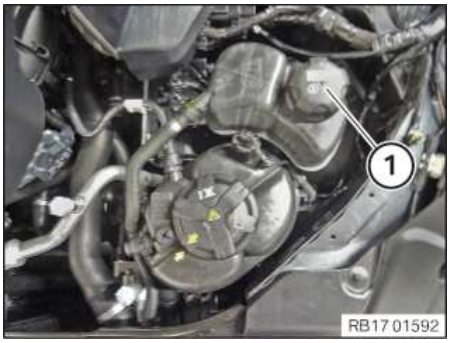
Escaping coolant vapours when the vehicle is at standstill may cause the pressure relief valve to stick to the sealing cap. This may cause an incorrect opening pressure.

- Screw on sealing cap (1) on special tool from the set of special tools .
- Build up the pressure with special tools and from the set of special tools .
- Observe on the pressure measuring device when the opening pressure has been reached.

Opening pressure of sealing cap of low-temperature coolant circuit

Pressure relief valve opens when the pressure exceeds the ambient pressure.	min. 1,4 bar
Electric changeover valve must open at latest when the pressure is lower than the ambient pressure	max. 0,1 bar
Test pressure for cooling system (gauge pressure)	1,5 bar

carsdiagn.com



- Close sealing cap (1).

Additional Information

Overview of Special Tools

Overview Technical Data

Opening pressure of sealing cap of low-temperature coolant circuit	Used in step 3
Pressure relief valve opens when the pressure exceeds the ambient pressure.	min. 1,4 bar
Electric changeover valve must open at latest when the pressure is lower than the ambient pressure	max. 0,1 bar
Test pressure for cooling system (gauge pressure)	1,5 bar

Capacity of low-temperature coolant circuit G20/G21/22/23/G26/G42 mild hybrid technology	Used in step 1
B57D30T2/O2 / B47D20O1/U1	1.3 l
Expendable materials: Technically suitable antifreeze and corrosion inhibitor	

Links

Repair instructions	Used in step
17 00 ... Notes for working on cooling system	1

Operating materials	Used in step
Main group 17	1

cardiagn.com

17 00 009 Check the cooling system for watertightness with the special tool

1 – Checking cooling system for watertightness

WARNING

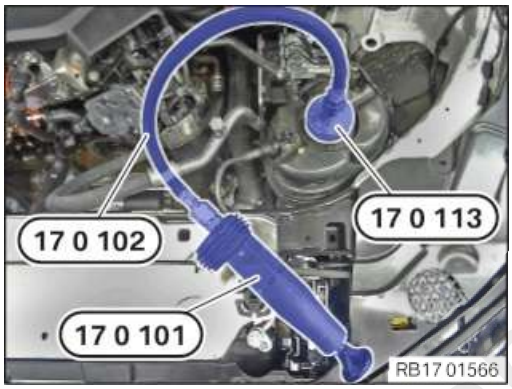
Hot surfaces.

Risk of burning!

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



- Loosen sealing cap (1).



- Set the special tool with the special tool and the special tool from the set of special tools at the coolant expansion tank.
- Build up excess pressure and wait for approximately 2 minutes.

Cooling system test pressure

Test pressure for cooling system (gauge pressure)	1,5 bar

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TECHNICAL INFORMATION

If the described test step is not completed successfully: repeat test step twice. Only replace the sealing cap after three tests with an incorrect opening pressure.

When driving at high ambient temperatures, the design may cause the pressure relief valve in the sealing cap to open slightly and air to escape together with dissolved coolant. This coolant vapour condenses on the surface of the coolant expansion tank and leaves traces of coolant when the vehicle has cooled down. These traces of coolant do not indicate whether the sealing cap is defective or not.

Escaping coolant vapours when the vehicle is at standstill may cause the pressure relief valve to stick to the sealing cap. This may cause an incorrect opening pressure.

- Screw on sealing cap on special tool from the set of special tools .
- Build up pressure using special tools and special tool from the set of special tools .
- Observe as to when opening pressure has been reached in the pressure measuring device.

Opening pressure of coolant sealing cover

Pressure relief valve opens when the pressure exceeds the ambient pressure.	min. 1,4 bar
Electric changeover valve must open at latest when the pressure is lower than the ambient pressure	max. 0,1 bar



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

Additional Information

Overview of Special Tools

Overview Technical Data

Cooling system test pressure	Used in step 1
Test pressure for cooling system (gauge pressure)	1,5 bar

Opening pressure of coolant sealing cover	Used in step 1

Pressure relief valve opens when the pressure exceeds the ambient pressure.	min. 1,4 bar
Electric changeover valve must open at latest when the pressure is lower than the ambient pressure	max. 0,1 bar

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17 00 009 Check the cooling system for watertightness with the special tool

1 – Check the high-temperature cooling system for watertightness

WARNING

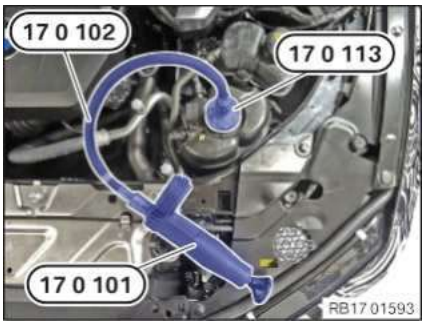
Hot surfaces.

Risk of burning!

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



- Loosen sealing cap (1).



- Attach the special tool with special tools and from the set of special tools .
- Build up excess pressure and wait for approximately 2 minutes.

Opening pressure of sealing cap / test pressure of high-temperature coolant circuit cooling system

Pressure relief valve opens when the pressure exceeds the ambient pressure.	min. 1,4 bar
Electric changeover valve must open at latest when the pressure is lower than the ambient pressure.	max. 0,1 bar
Test pressure for cooling system (gauge pressure)	1,5 bar



TECHNICAL INFORMATION

If the described test step is not completed successfully: repeat test step twice. Only replace the sealing cap after three tests with an incorrect opening pressure.

When driving at high ambient temperatures, the design may cause the pressure relief valve in the sealing cap to open slightly and air to escape together with dissolved coolant. This coolant vapour condenses on the surface of the coolant expansion tank and leaves traces of coolant when the vehicle has cooled down. These traces of coolant do not indicate whether the sealing cap is defective or not.

Escaping coolant vapours when the vehicle is at standstill may cause the pressure relief valve to stick to the sealing cap. This may cause an incorrect opening pressure.

- Screw on sealing cap (1) on special tool from the set of special tools .
- Build up the pressure with special tools and from the set of special tools .
- Observe on the pressure measuring device when the opening pressure has been reached.

Opening pressure of sealing cap / test pressure of high-temperature coolant circuit cooling system

Pressure relief valve opens when the pressure exceeds the ambient pressure.	min. 1,4 bar
Electric changeover valve must open at latest when the pressure is lower than the ambient pressure.	max. 0,1 bar
Test pressure for cooling system (gauge pressure)	1,5 bar



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

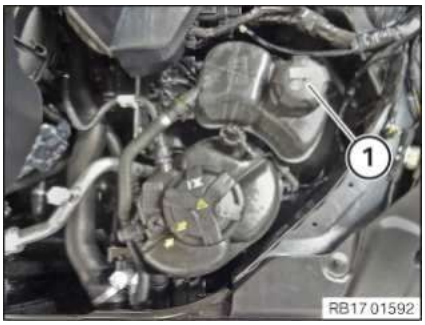
2 – Checking low-temperature cooling system for watertightness

WARNING

Hot surfaces.

Risk of burning!

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



- Loosen sealing cap (1).



- Attach the special tool with special tools and from the set of special tools .
- Build up excess pressure and wait for approximately 2 minutes.

Opening pressure of sealing cap of low-temperature coolant circuit

Pressure relief valve opens when the pressure exceeds the ambient pressure.	min. 1,4 bar
Electric changeover valve must open at latest when the pressure is lower than the ambient pressure	max. 0,1 bar
Test pressure for cooling system (gauge pressure)	1,5 bar



TECHNICAL INFORMATION

If the described test step is not completed successfully: repeat test step twice. Only replace the sealing cap after three tests with an incorrect opening pressure.

When driving at high ambient temperatures, the design may cause the pressure relief valve in the sealing cap to open slightly and air to escape together with dissolved coolant. This coolant vapour condenses on the surface of the coolant expansion tank and leaves traces of coolant when the vehicle has cooled down. These traces of coolant do not indicate whether the sealing cap is defective or not.

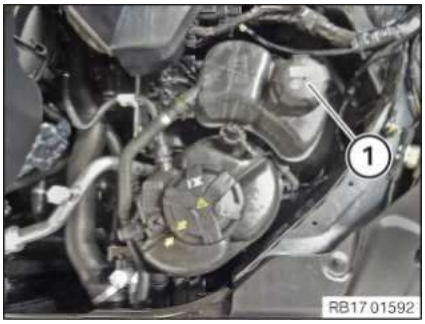
Escaping coolant vapours when the vehicle is at standstill may cause the pressure relief valve to stick to the sealing cap. This may cause an incorrect opening pressure.

- Screw on sealing cap (1) on special tool from the set of special tools .
- Build up the pressure with special tools and from the set of special tools .
- Observe on the pressure measuring device when the opening pressure has been reached.

Opening pressure of sealing cap of low-temperature coolant circuit

Pressure relief valve opens when the pressure exceeds the ambient pressure.	min. 1,4 bar
Electric changeover valve must open at latest when the pressure is lower than the ambient pressure	max. 0,1 bar
Test pressure for cooling system (gauge pressure)	1,5 bar

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- Close sealing cap (1).

Additional Information

Overview of Special Tools

Overview Technical Data

Opening pressure of sealing cap / test pressure of high-temperature coolant circuit cooling system	Used in step 1
Pressure relief valve opens when the pressure exceeds the ambient pressure.	min. 1,4 bar
Electric changeover valve must open at latest when the pressure is lower than the ambient pressure.	max. 0,1 bar
Test pressure for cooling system (gauge pressure)	1,5 bar

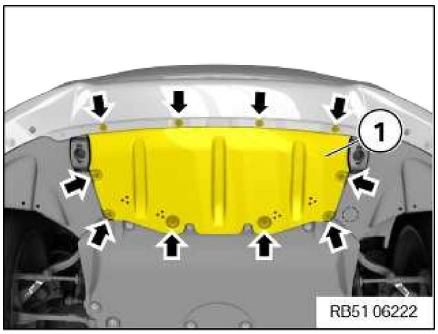
Opening pressure of sealing cap of low-temperature coolant circuit	Used in step 2
Pressure relief valve opens when the pressure exceeds the ambient pressure.	min. 1,4 bar
Electric changeover valve must open at latest when the pressure is lower than the ambient pressure	max. 0,1 bar
Test pressure for cooling system (gauge pressure)	1,5 bar

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17 00 008 Draining and topping up coolant for high-temperature circuit

PRELIMINARY WORK

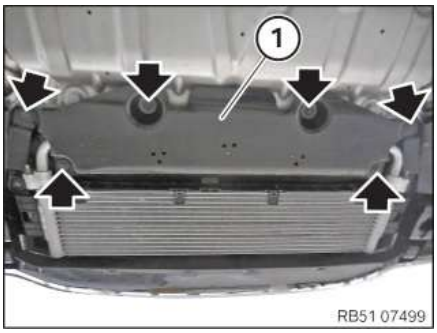
1 – Removing the front underbody protection



- **Version A:**

  Remove screws (arrows).

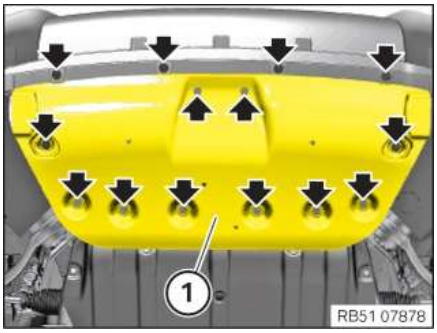
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version B:**

  Remove screws (arrows).

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

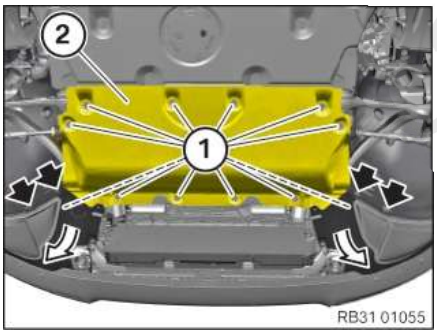


- **Version C:**

  Remove screws (arrows).

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

2 – Remove the underbody protection of the steering gear



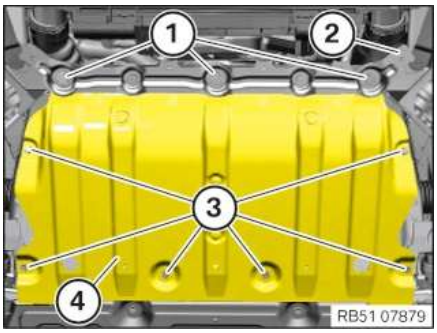
- **Version A:**

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

  Fold the bottom wheel arch cover to the side.

  Loosen screws (1).

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



- **Version B:**

  Loosen screws (1).

  Remove the holder (2) for the underride protection.

  Loosen screws (3).

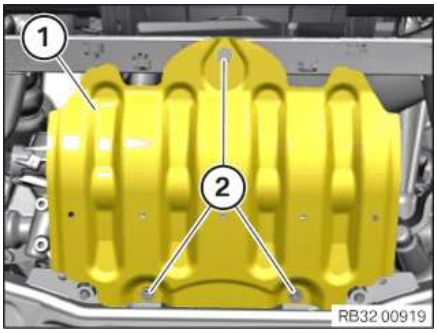
  Feed out and remove the underbody protection (4) of the steering gear.

3 – If installed: Removing the steering underbody protection

Prerequisite

Front underbody protection has been removed.

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

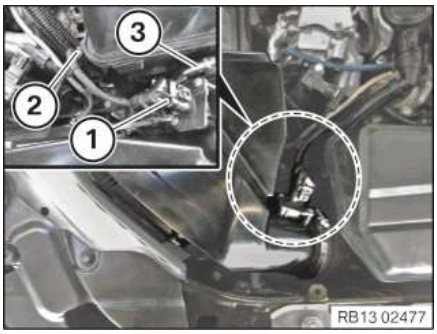
4 – Removing the clean air pipe with the resonator

WARNING

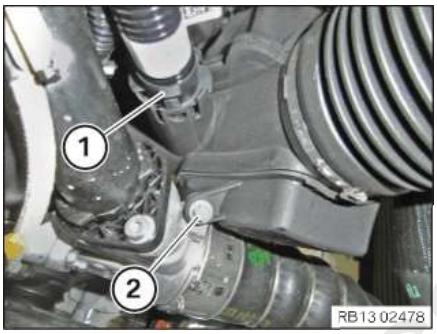
Hot surfaces.

Risk of burning!

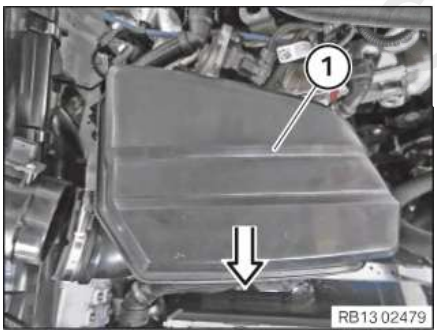
- Perform all work only on components that have cooled down.



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



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



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



- Unlock and loosen clamp (1).

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

MAIN WORK

5 – Draining the coolant from the high-temperature cooling system

WARNING

Hot fluids.

Risk of scalding!

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

CAUTION

Materials harmful to health.

Contact with fluids harmful to health!

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

TECHNICAL INFORMATION

Life-long fill of coolant!

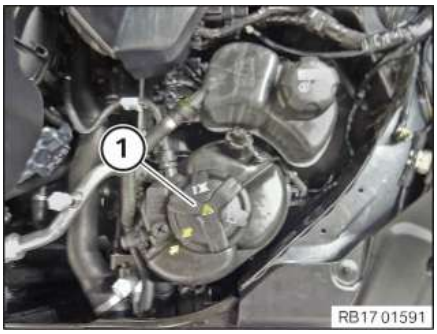
Do not reuse used coolant.

When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be emptied and refilled.

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

TECHNICAL INFORMATION

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



- Loosen sealing cap (1).

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

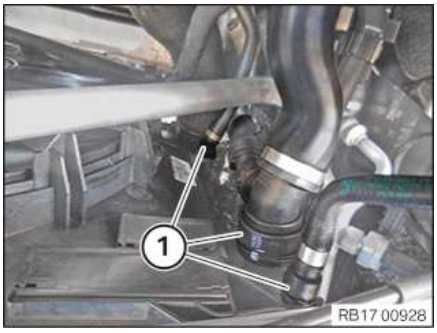
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RISK OF DAMAGE

Escaping coolant on the starter generator.

Damage and operating failure of the starter generator.

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



NOTICE

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

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

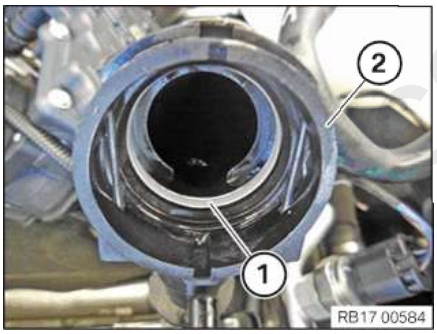


- Unlock and loosen coolant line (1).
- Catch and dispose of escaping coolant.

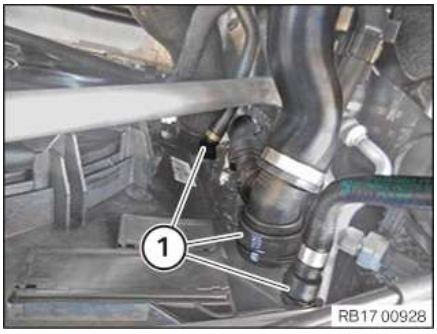
6 – Connecting the coolant lines

TECHNICAL INFORMATION

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



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



NOTICE

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

- Connect and lock the coolant lines (1).

  The coolant lines (1) must engage audibly.

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- Connect and lock coolant line (1).

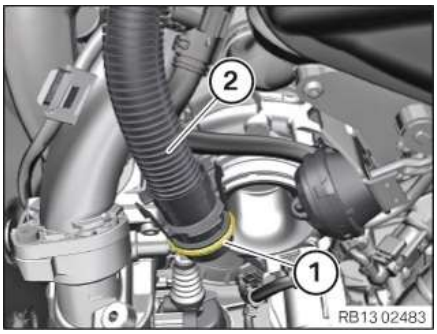
  The coolant line (1) must audibly engage.

POSTPROCESSES

7 – Installing the clean air pipe with resonator



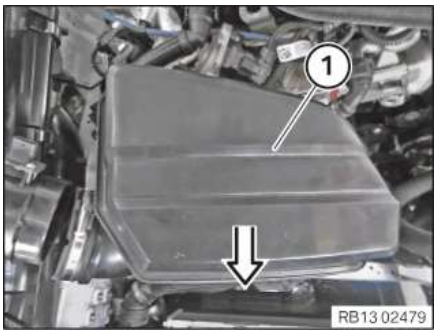
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



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



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



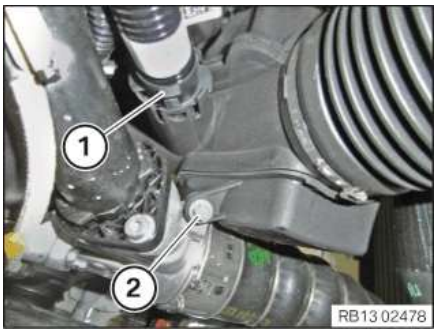
- Press and hold clean air pipe with resonator (1) in the direction of the arrow.

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- Attach and lock the clamp (1).

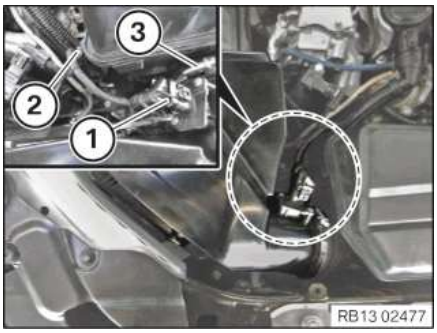
  The clamp (1) must engage audibly.



- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm



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

Clean air pipe to upper section of intake filter housing

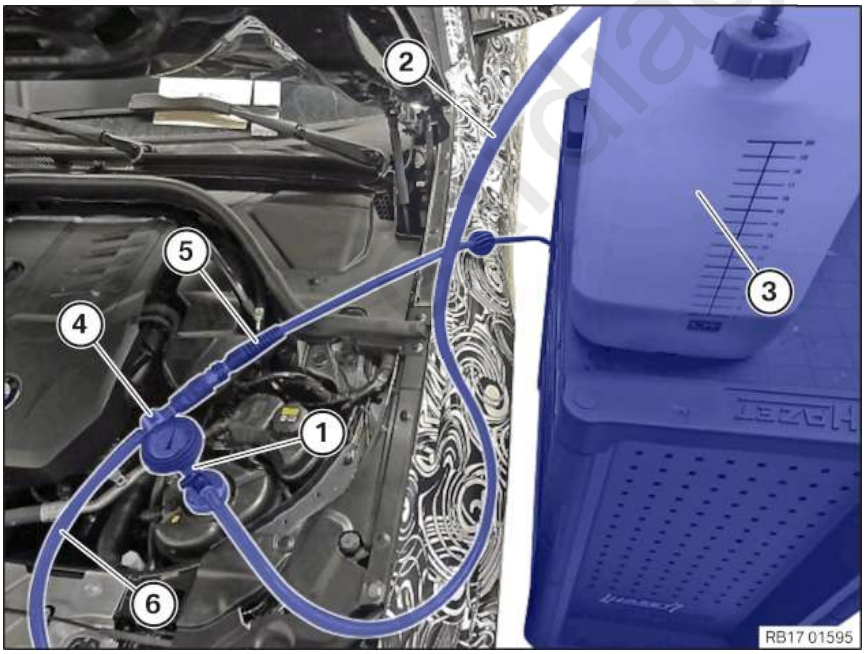
Clamp		Tightening torque	3 Nm

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

  The connector (1) must engage audibly.

8 – Filling the high-temperature cooling system with the vacuum filler device

Vacuum filler device



Vacuum filler device - connected to the coolant expansion tank

1 Vacuum filler device with pressure gauge and shutoff valves

2 Filling hose

3 Fluid tank with coolant

4 Venturi nozzle

5 Compressed air connection (maximum 6 bar)

6 Exhaust hose (Routing the exhaust hose to a collecting vessel)

Prerequisite

The coolant expansion tank for the cooling system must be empty. The fluid tank of the vacuum filler device must have a sufficient quantity of premixed coolant, 1 l to 2 l more than the specified capacity for the vehicle. The fluid tank of the vacuum filler device must be positioned at the same height as the coolant expansion tank. The compressed air connection must have a pressure of 6 bar. Ignition is switched off.

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

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

Mixing different coolants is not permitted.

TECHNICAL INFORMATION

Filling **without** the vacuum filler device (watering can filling) is **not permitted**.

Non-compliance will result in danger of component and/or engine damage.

Filling specification **absolutely must** be adhered to.

Operation of the vehicle is not permitted unless the filling procedure has been completed. Otherwise, functional limitations (degradation) and/or overheating may occur.

A bleeding procedure is required after a part has been exchanged in the cooling system and/or after refilling the cooling system.

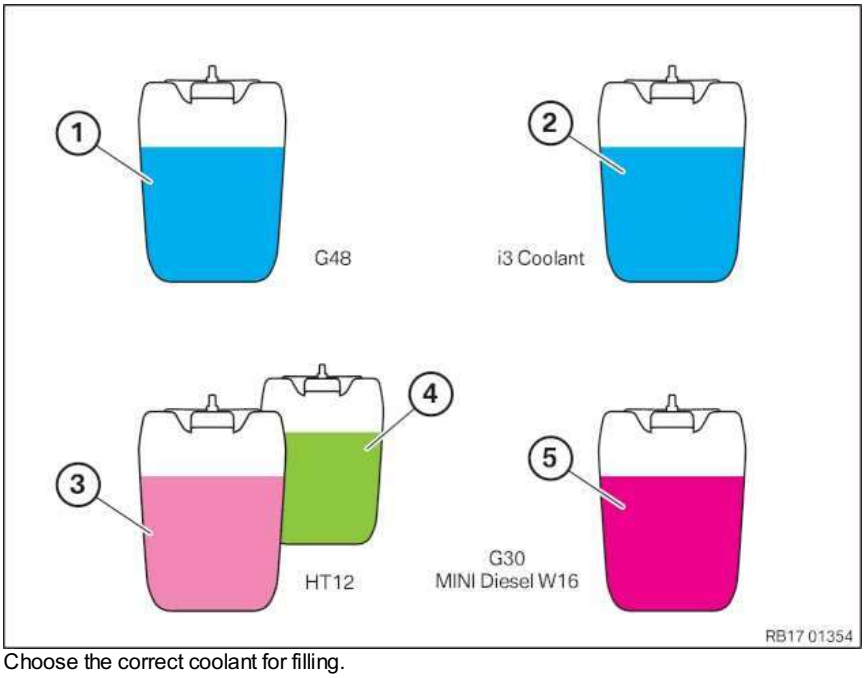
TECHNICAL INFORMATION

Make sure that the ignition (terminal 15) is switched off prior to creating the vacuum with the vacuum filler device.

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▸ **Observe the coolant type**

Coolant in the collecting vessel of vacuum filler device



Choose the correct coolant for filling.

In general, a vehicle has to be filled with the coolant with which it is delivered from the factory.

1 G48 (Blue) (BMW LC-87) Must **not** be mixed with i3 Coolant or G30 MINI Diesel W16.

2 i3 Coolant (Blue) (BMW LC-13) Is used only for heater circuit i3. i3 Coolant must **not** be added to other coolant circuits or mixed with other coolants.

3 HT12 (Rose) (BMW LC-18) Must **not** be mixed with i3 Coolant or G30 MINI Diesel W16.

4 HT12 (Green) (BMW LC-18) Must **not** be mixed with i3 Coolant or G30 MINI Diesel W16.

5 G30 (Rose) (BMW LC-07) May be W16 used exclusively for the **MINI Diesel**. G30 must **not** be filled in the other coolant circuits or mixed with the other coolants.

RISK OF DAMAGE

Damage to the engine or components in high-voltage vehicles

The use of an incorrect coolant may lead to corrosion or gelling in the coolant circuit.

- Use only approved coolants for the specific vehicle.
- Fill the vehicle only with the coolant with which it was delivered ex works.
- Mix only compatible coolants. The colour does not allow any assessment about the compatibility of coolants.
- Selection of the correct coolant only by means of the part number.

- Select a suitable adapter (Y) from the set of special tools :

Type	Engine	Adapter (Y) from 17 0 100
G20/G21/G22/G23/G26/G28/G29	B42/B46/B48/B58	**17 0 113**
G20/21/22/23/G26/G42	B57/B47 Mild hybrid technology	**17 0 113**

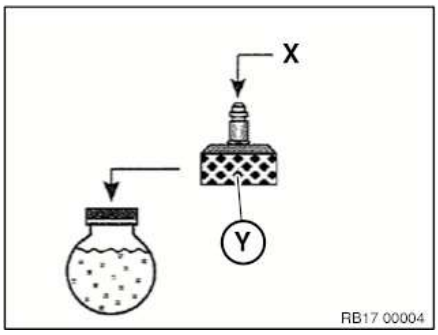
- The fluid tank of the vacuum filler device must be filled with 1 l to 2 l more than the specified capacity of coolant for the vehicle.

Capacity of high-temperature coolant circuit G20/G21/G22/G23/G26/G42 mild hybrid technology

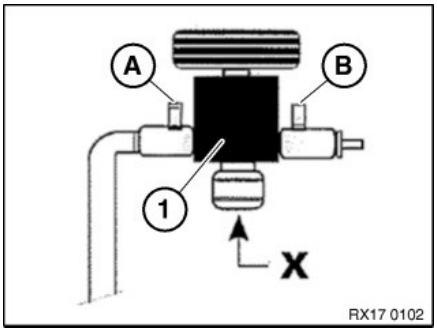
B57D30T2/O2 / B47B20O1/U1	7.7 l

Expendable materials: Technically suitable antifreeze and corrosion inhibitor

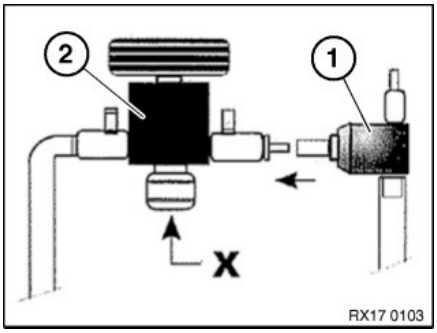
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- Connect the selected adapter (Y) to the coolant expansion tank.
- Connect vacuum filler device to connection (X) of the adapter.

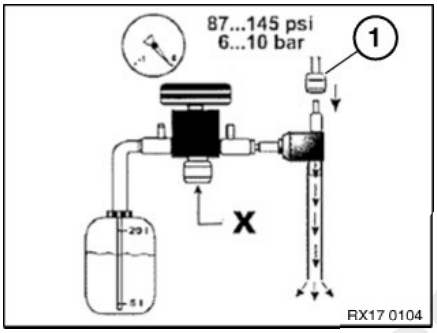


- Check whether shut-off valves (A) and (B) of the vacuum filler device (1) are closed.
- Connect and lock connection (X) to the coolant expansion tank.



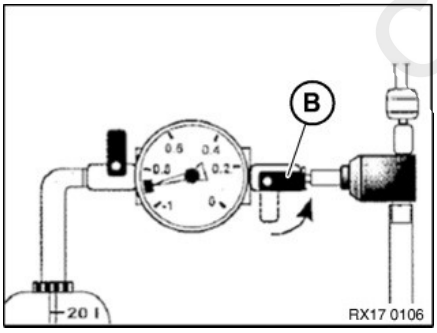
- Connect Venturi nozzle (1) to the vacuum filler device (2).

  (X)is the connection on the coolant expansion tank.



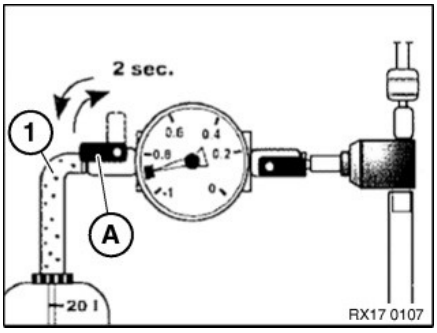
- Connect compressed air (1).

  (X)is the connection on the coolant expansion tank.



- Open shut-off valve (B).

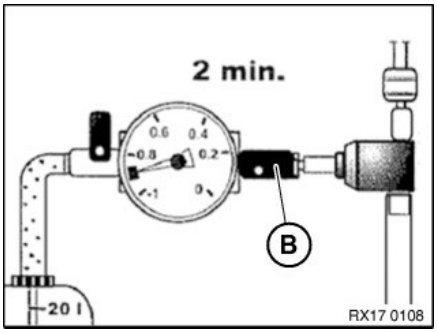
  The Venturi nozzle produces a flow noise.



- Open shutoff valve (A) until the fuel filling hose (1) is full without bubbles.
- Close shutoff valve (A) again.

» The filling hose (1) has now been bled.

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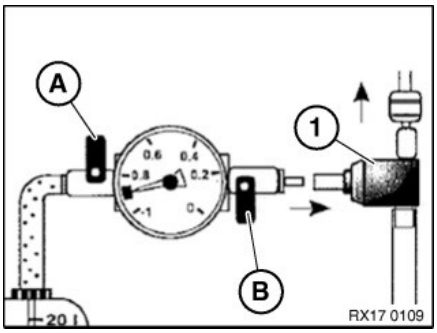


- Check the coolant hoses for porosity and renew porous coolant hoses as required.

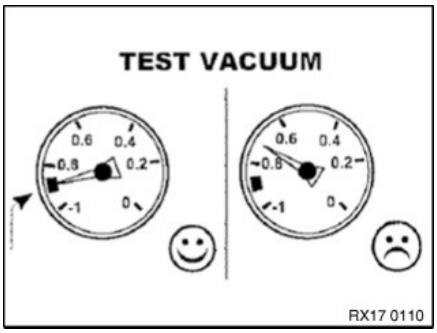
TECHNICAL INFORMATION

The coolant hoses contract during vacuum build-up.

- After having established a vacuum in the coolant circuit of between -0.7 to -0.95 bar (duration approximately 2 min), close the shut-off valve (B).



- Check whether the shutoff valves (A) and (B) are closed.
- Disconnect the Venturi nozzle (1).



Check

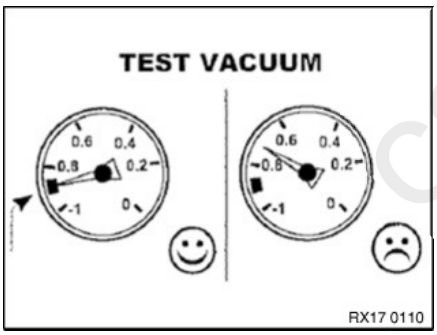
- Make sure the vacuum in the coolant circuit is maintained for at least 30 seconds.

Result

» Vacuum drops.

Measure

- Look for the leak, repair it and start the filling procedure from the beginning.



Check

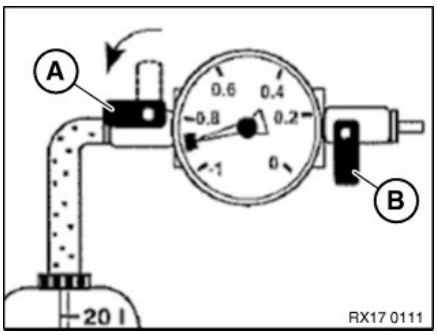
- Make sure the vacuum in the coolant circuit is maintained for at least 30 seconds.

Result

» Vacuum remains constant.

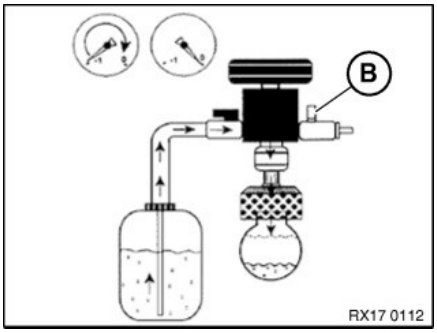
Measure

- Continue with filling.

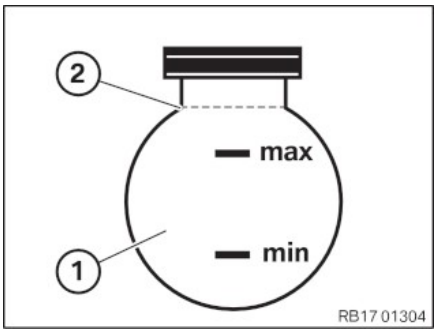


- Keep shutoff valve (B) closed during the filling process.
- To fill the cooling system, open the shutoff valve (A) to the fluid tank of the vacuum filler device.

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- Stop the filling procedure when the needle in the pressure measuring device is on 0 bar or it no longer drops.
- If necessary, reduce remaining vacuum. In order to do so, open shutoff valve (B).



- Remove the vacuum filler device with the adapter from the high temperature coolant expansion tank (1).
- Top up the coolant level in the high temperature coolant expansion tank (1) to the lower edge of the coolant filler neck (2) in the high temperature coolant expansion tank (1).
- After filling the cooling system with the vacuum filler device, **also** run the cooling system bleeding routine.

9 – Bleed the high-temperature coolant circuit

TECHNICAL INFORMATION

Filling **without** the vacuum filler device (watering can filling) is **not permitted**.

Non-compliance will result in danger of component and/or engine damage.

Filling specification **absolutely must** be adhered to.

Operation of the vehicle is not permitted unless the filling procedure has been completed. Otherwise, functional limitations (degradation) and/or overheating may occur.

A bleeding procedure is required after a part has been exchanged in the cooling system and/or after refilling the cooling system.

TECHNICAL INFORMATION

Before starting the automatic cooling system bleeding routine, make sure that **all coolant circuits** are **filled**. If the cooling system bleeding routine is started while one of the coolant circuits is empty, there is a risk of damage to the electric coolant pump when running it dry.

Make sure that terminal 15 is not disconnected for the bleeding procedure. Switch on low-beam headlights and hazard warning lights. If the low-beam headlights and hazard warning lights are not switched on, the ignition (terminal 15) will switch off automatically after a certain period of time and interrupt the bleeding procedure.

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

After the cooling system bleeding routine, the cooling system is topped up above the maximum mark.

Overfilling the cooling system serves to balance the remaining air in the cooling system.

The normal filling level of the coolant is reached while driving.

TECHNICAL INFORMATION

The driving experience switch must not be set to the ECO PRO switch position.

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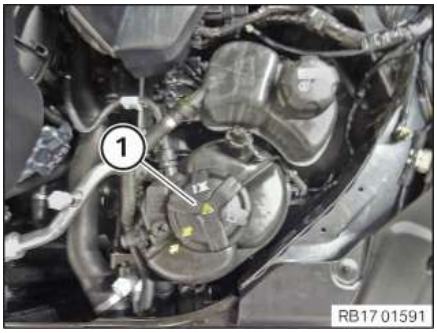
TECHNICAL INFORMATION

When bleeding the high-temperature coolant circuit, the low-temperature coolant circuit is also automatically bled.

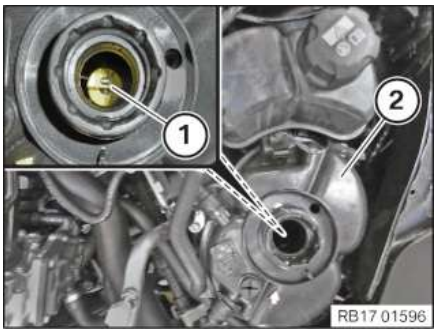
- Remove the vacuum filler device from the coolant expansion tank.
- Adjust the filling level in the coolant expansion tank to the maximum mark.
- The sealing cap on the coolant expansion tank must remain **open**.
- Ensure that the **bonnet** is **open**.
- With automatic transmission: Select the selector lever position P (Park) and operate the parking brake.
- **Activate** the testing-analysis-diagnosis (PAD) by quickly pressing the START-STOP button 3 times.
- Adjust the heating to the **maximum** temperature and adjust the blower to the **lowest** level.
- Press the accelerator pedal to the limit position for at least **10 seconds**. Do **not** press the brake pedal while doing so.
- Then start the engine **within 30 s**.

  "Service function started" is displayed in the instrument cluster.
- Leave the engine running at idle for 3 min.
- Continue to top up the filling level in the coolant expansion tank to the maximum mark.
- 1. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Hold idle speed for 10 s.
- 2. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Hold idle speed for 10 s.
- 3. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Hold idle speed for 10 s.
- 4. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Hold idle speed for 10 s.
- 5. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Hold idle speed for 10 s.
- 6. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Hold idle speed for 10 s.
- 7. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Hold idle speed for 10 s.
- 8. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Maintain the idle speed for **3 min**.
- 1. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Hold idle speed for 10 s.
- 2. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Hold idle speed for 10 s.
- 3. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Hold idle speed for 10 s.
- 4. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Hold idle speed for 10 s.
- 5. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Hold idle speed for 10 s.
- 6. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Hold idle speed for 10 s.
- 7. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Hold idle speed for 10 s.
- 8. Press the accelerator pedal up to approx. 2500 rpm for 5 s.
- Maintain the idle speed until "Service function ended" is displayed in the instrument cluster.
- Switch off engine.
- Allow the engine to cool down.

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- Loosen sealing cap (1).



TECHNICAL INFORMATION

After the cooling system bleeding routine, the cooling system is topped up above the maximum mark.

Overfilling the cooling system serves to balance the remaining air in the cooling system.

The normal filling level of the coolant is reached while driving.

- Adjust the filling level in the coolant expansion tank (2) of the high-temperature coolant circuit to **300 ml** above the **maximum mark** (1).

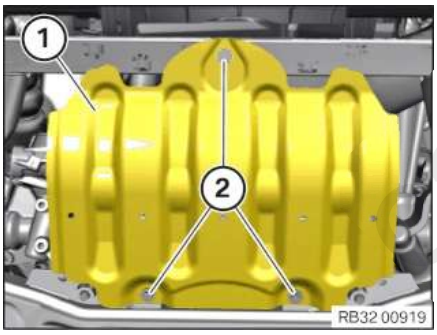


- Close sealing cap (1).
- Close the sealing cap (1) until the **arrows** are flush.

10 – If installed: Install underbody protection of the steering

Prerequisite

Front underbody protection has been removed.



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

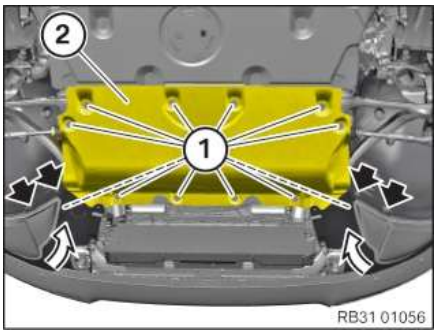
Underbody protection, steering, to front axle support

Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

11 – Install the underbody protection of the steering gear



- **Version A:**

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

  Tighten the screws (1).

Underbody protection of the steering gear

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

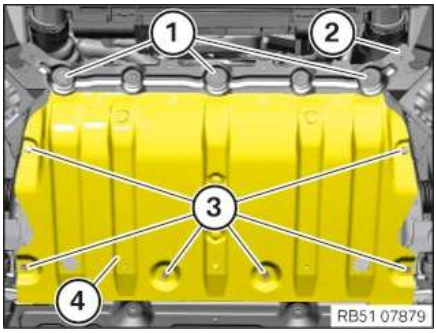
- Position the bottom wheel arch cover.

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

Wheel arch trim panel, front

Thermoplastic hexagon screw		Tightening torque	2.6 Nm

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- **Version B:**

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

  Tighten the screws (3).

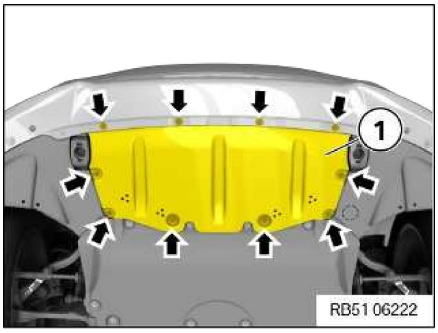
Underbody protection of the steering gear

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

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

  Tighten the screws (1).

12 – Installing the front underbody protection



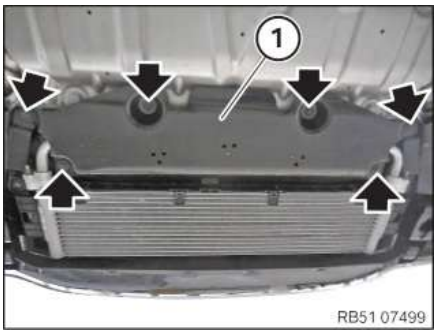
- **Version A:**

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

  Tighten screws (arrows).

Underbody protection front

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



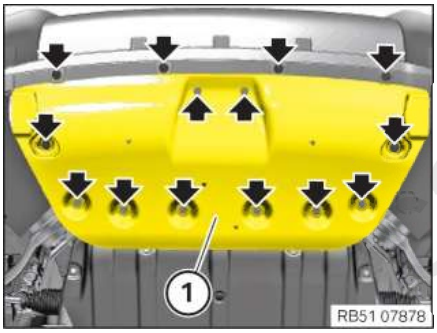
- **Version B:**

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

  Tighten screws (arrows).

Underbody protection front

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



- **Version C:**

  Feed in and install front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

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

Additional Information

Overview of Tightening Torques

Clean air pipe to exhaust turbocharger — Used in step 7

M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing — Used in step 7

Clamp		Tightening torque	3 Nm

Underbody protection, steering, to front axle support — Used in step 10

Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support — Used in step 10

Hexagon bolt M6		Tightening torque	8 Nm

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Underbody protection of the steering gear			Used in step 11
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

Wheel arch trim panel, front			Used in step 11
Thermoplastic hexagon screw		Tightening torque	2,6 Nm

Underbody protection front			Used in step 12
Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Overview of Special Tools

Overview Technical Data

Capacity of high-temperature coolant circuit G20/G21/G22/G23/G26/G42 mild hybrid technology	Used in step 8
B57D30T2/O2 / B47B20O1/U1	7.7 l
Expendable materials: Technically suitable antifreeze and corrosion inhibitor	

Links

Repair instructions	Used in step
17 00 ... Notes for working on cooling system	8

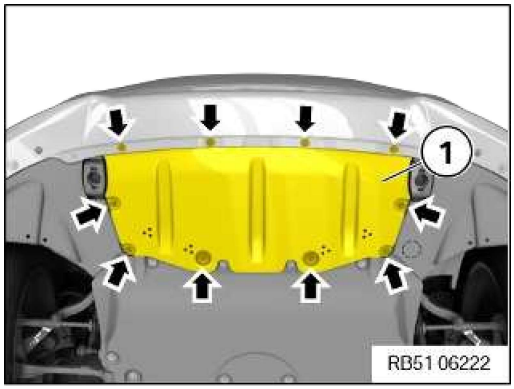
Operating materials	Used in step
Main group 17	8

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17 00 008 Draining and topping up coolant for high-temperature circuit

PRELIMINARY WORK

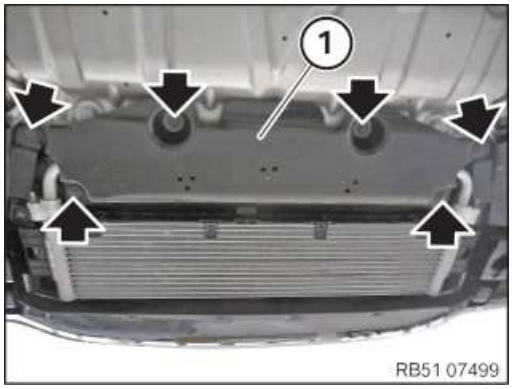
1 – Removing the front underbody protection



- **Version A:**

  Remove screws (arrows).

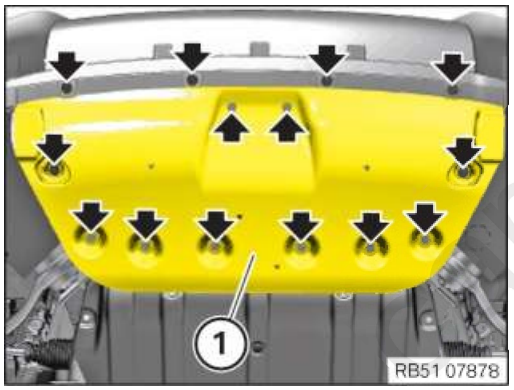
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version B:**

  Remove screws (arrows).

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

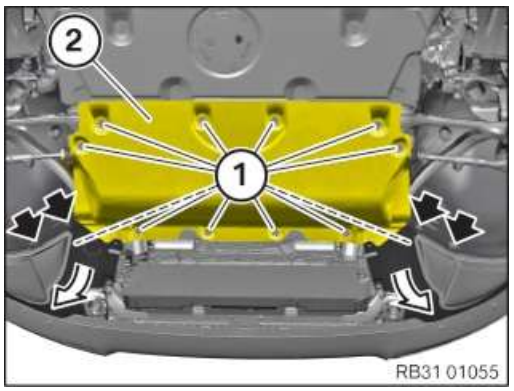


- **Version C:**

  Remove screws (arrows).

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

2 – Remove the underbody protection of the steering gear



- **Version A:**

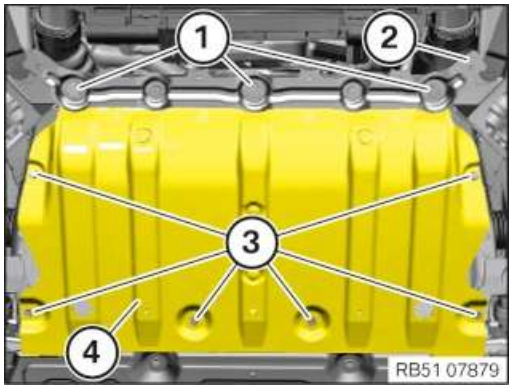
  Unscrew the screws (arrows) of the wheel arch cover on the wheel arch cover.

  Fold the bottom wheel arch cover to the side.

  Loosen screws (1).

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

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- **Version B:**

  Loosen screws (1).

  Remove the holder (2) for the underride protection.

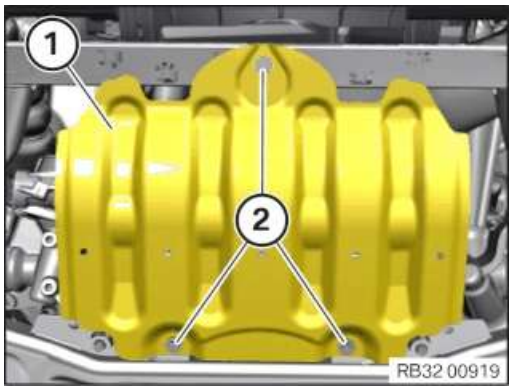
  Loosen screws (3).

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

3 – If installed: Removing the steering underbody protection

Prerequisite

Front underbody protection has been removed.



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

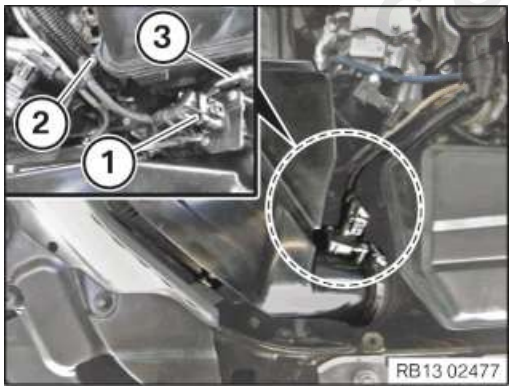
4 – Removing the clean air pipe with the resonator

WARNING

Hot surfaces.

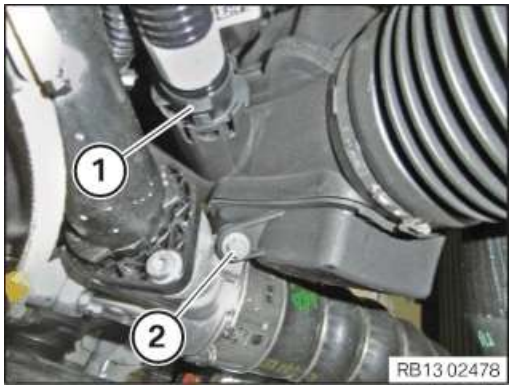
Risk of burning!

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

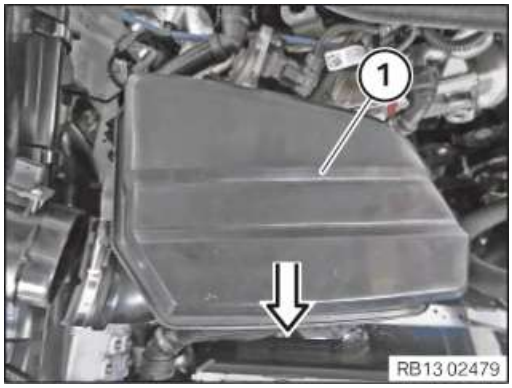


- Unlock plug connection (1) and disconnect.
- Loosen clamp (2).
- Unfasten clamp (3).
- Separate the clean air pipe with resonator from the intake filter housing.

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



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



- Unlock and loosen clamp (1).



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

MAIN WORK

5 – Draining coolant

WARNING

Hot fluids.

Risk of scalding!

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

.com

CAUTION

Materials harmful to health.

Contact with fluids harmful to health!

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

TECHNICAL INFORMATION

Life-long fill of coolant!

Do not reuse used coolant.

When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be emptied and refilled.

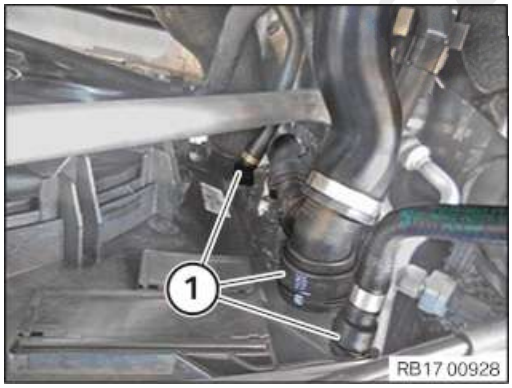
In the case of other removal work involving the draining of part quantities of coolant, the coolant level must be topped up with new coolant.

TECHNICAL INFORMATION

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



- Loosen sealing cap (1) from the coolant expansion tank.



NOTICE

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

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

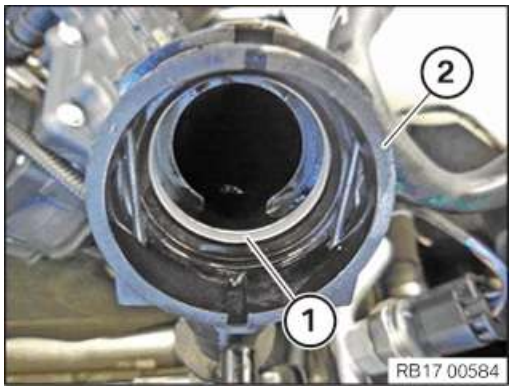


- Unlock and loosen coolant line (1).
- Catch and dispose of escaping coolant.

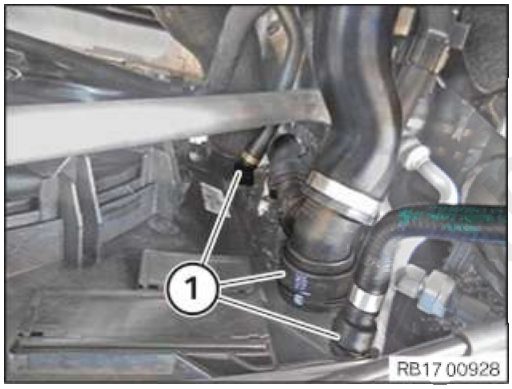
6 – Connecting the coolant lines

TECHNICAL INFORMATION

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



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



NOTICE

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

- Connect and lock the coolant lines (1).

  The coolant lines (1) must engage audibly.



- Connect and lock coolant line (1).

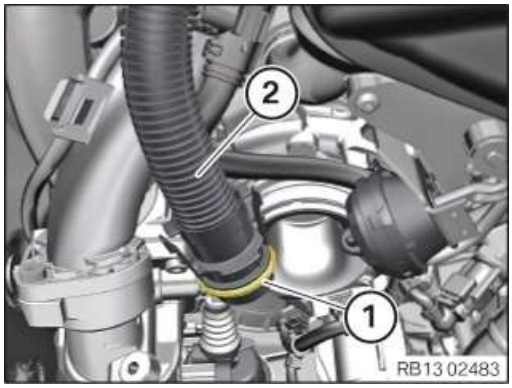
  The coolant line (1) must audibly engage.

POSTPROCESSES

7 – Installing the clean air pipe with resonator



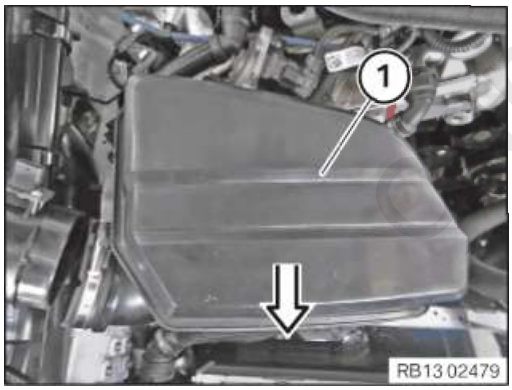
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



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



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



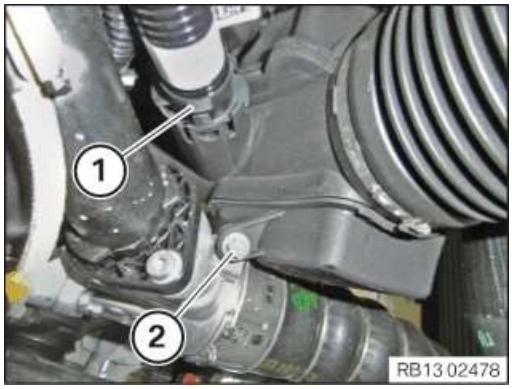
- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

  The clamp (1) must engage audibly.

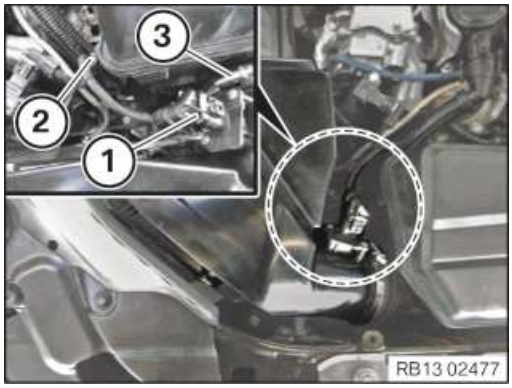
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- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm



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

Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

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

  The connector (1) must engage audibly.

8 – Fill the cooling system with the vacuum filling unit

Vacuum filler device



Vacuum filler device - connected to the coolant expansion tank

1 Vacuum filler device with pressure gauge and shutoff valves

2 Filling hose

3 Fluid tank with coolant

4 Venturi nozzle

5 Compressed air connection (maximum 6 bar)

6 Exhaust hose (Routing the exhaust hose to a collecting vessel)

Prerequisite

The fluid tank of the vacuum filler device must have a sufficient quantity of premixed coolant, 1 l to 2 l more than the specified capacity for the vehicle. The fluid tank of the vacuum filler device must be positioned at the same height as the coolant expansion tank.

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

Follow notes for repair work on the cooling system.

For additional information see:

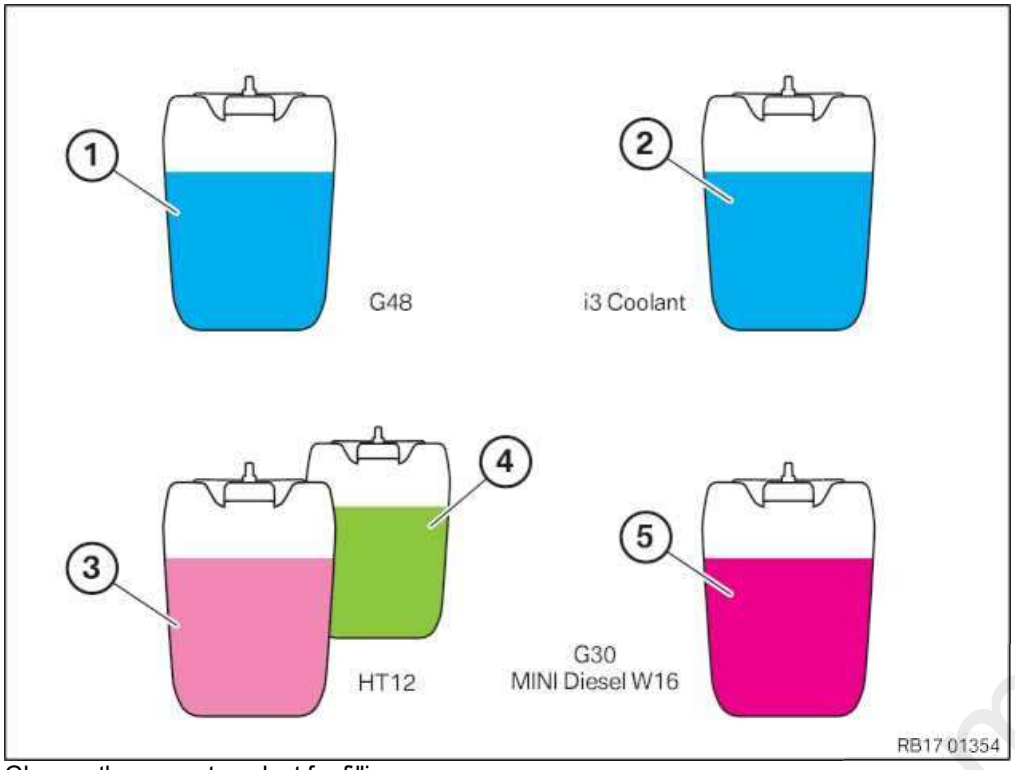
Main group 17

17 00 ... Notes for working on the cooling system

▸ **Observe the coolant type**

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Coolant in the collecting vessel of vacuum filler device



Choose the correct coolant for filling.

In general, a vehicle has to be filled with the coolant with which it is delivered from the factory.

1 G48 (Blue) (BMW LC-87) Must **not** be mixed with i3 Coolant or G30 MINI Diesel W16.

2 i3 Coolant (Blue) (BMW LC-13) Is used only for heater circuit i3. i3 Coolant must **not** be added to other coolant circuits or mixed with other coolants.

3 HT12 (Rose) (BMW LC-18) Must **not** be mixed with i3 Coolant or G30 MINI Diesel W16.

4 HT12 (Green) (BMW LC-18) Must **not** be mixed with i3 Coolant or G30 MINI Diesel W16.

5 G30 (Rose) (BMW LC-07) May be W16 used exclusively for the **MINI Diesel**. G30 must **not** be filled in the other coolant circuits or mixed with the other coolants.

RISK OF DAMAGE

Damage to the engine or components in high-voltage vehicles

The use of an incorrect coolant may lead to corrosion or gelling in the coolant circuit.

- Use only approved coolants for the specific vehicle.
- Fill the vehicle only with the coolant with which it was delivered ex works.
- Mix only compatible coolants. The colour does not allow any assessment about the compatibility of coolants.
- Selection of the correct coolant only by means of the part number.

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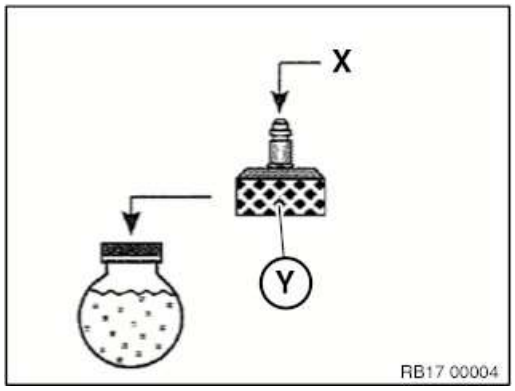
- Fill the cooling system with special tool 2 152 473.
- Select a suitable adapter (Y) from the set of special tools :

Type	Engine	Adapter (Y) from 17 0 100
G20/G21/G22/G23/G26/G28/G42	B47 / B48M1 /B57O0	17 0 113

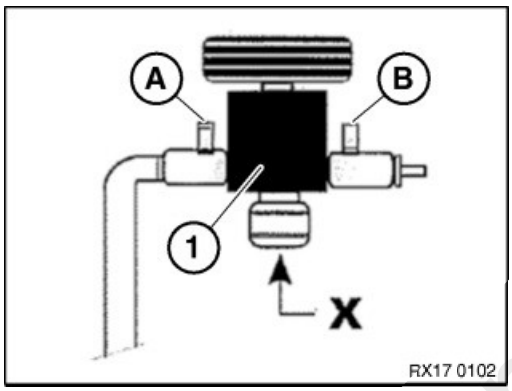
Cooling system capacity G20/G21/G22/G23/G26/G28/G42

B47D20O1	7.0 l

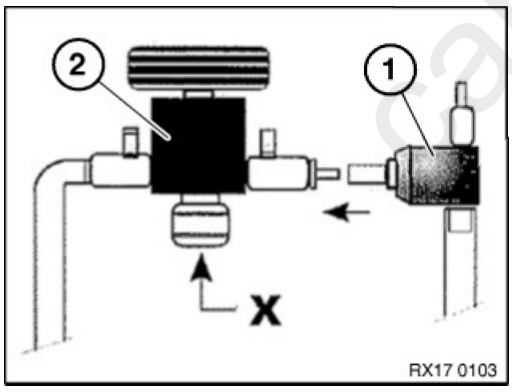
Expendable materials: Technically suitable antifreeze and corrosion inhibitor



- Connect the selected adapter (Y) to the coolant expansion tank.
- Connect vacuum filler device to connection (X) of the adapter.

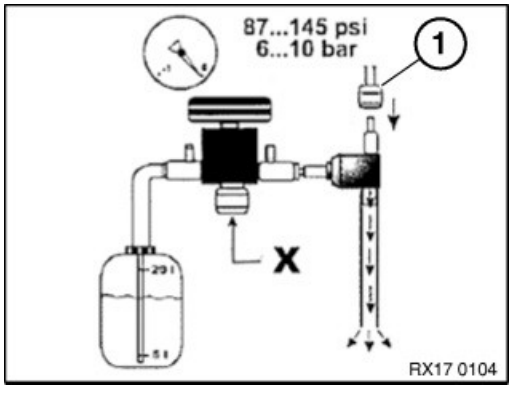


- Make sure that the shutoff valves (A) and (B) of the vacuum filler devices (1) are closed.
- Connect and lock connector (X) to the coolant expansion tank.



- Connect Venturi nozzle (1) to the vacuum filler device (2).

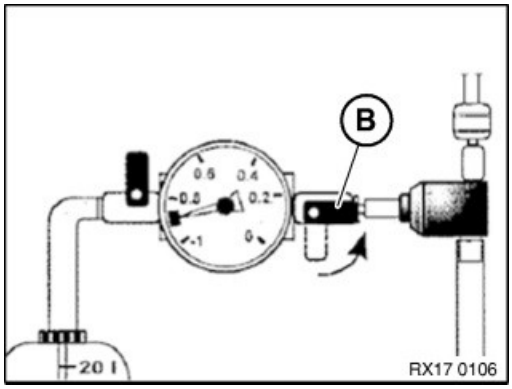
  (X)is the connection on the coolant expansion tank.



- Connect compressed air (1).

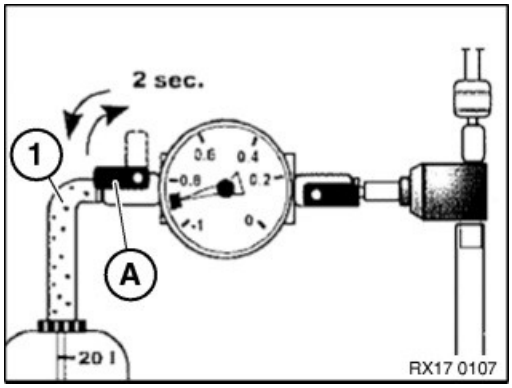
  (X)is the connection on the coolant expansion tank.

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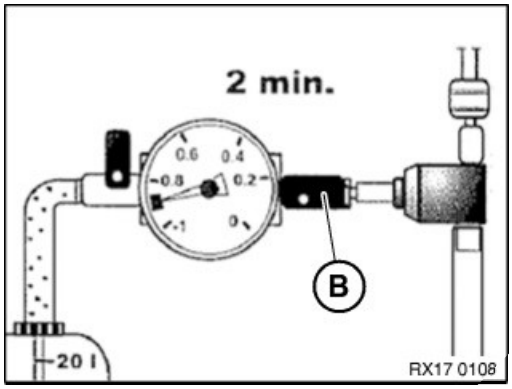
- Open shut-off valve (B).

  The Venturi nozzle produces a flow noise.



- Open shutoff valve (A) until the fuel filling hose (1) is full without bubbles.
- Close shutoff valve (A) again.

» The filling hose (1) has now been bled.

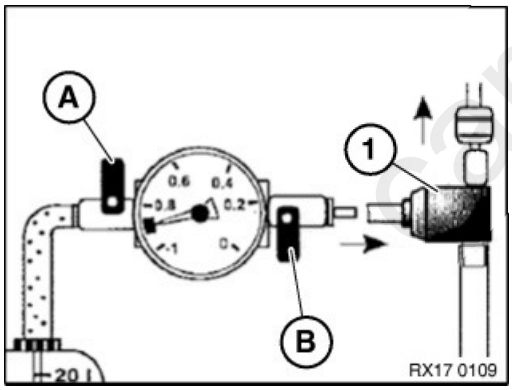


- Check the coolant hoses for porosity and renew porous coolant hoses as required.

TECHNICAL INFORMATION

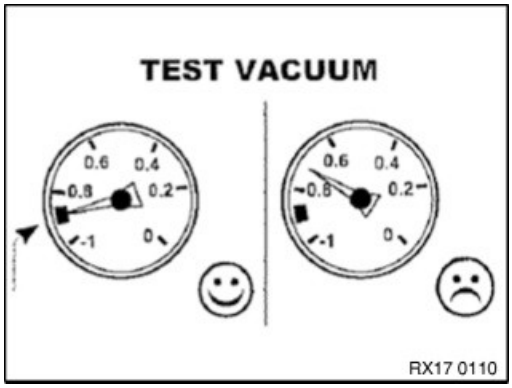
The coolant hoses contract during vacuum build-up.

- After a vacuum of -0.7 to -0.95 bar has been reached in the coolant circuit (duration approximately 2 minutes), close the shutoff valve (B).



- Make sure that the shutoff valves (A) and (B) are closed.
- Disconnect the Venturi nozzle (1).

Check



- The vacuum in the coolant circuit must be maintained for at least 30 seconds.

Result

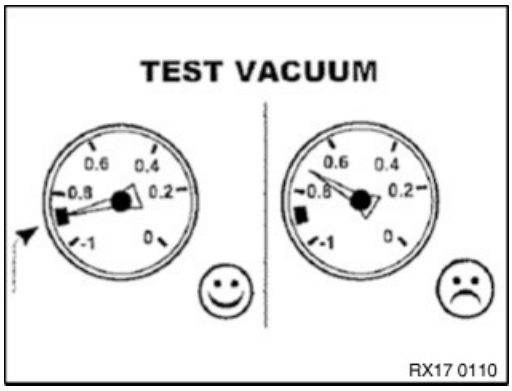
» Vacuum drops.

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Measure

- Look for the leak, repair it and start the filling procedure from the beginning.

Check



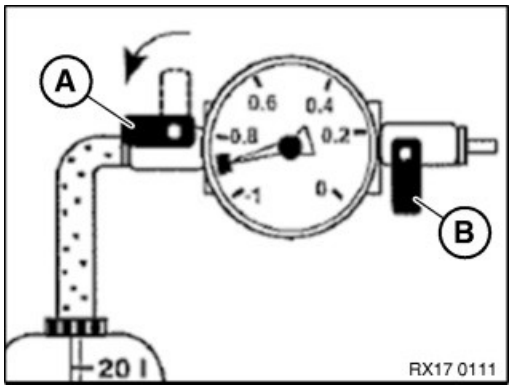
- The vacuum in the coolant circuit must be maintained for at least 30 seconds.

Result

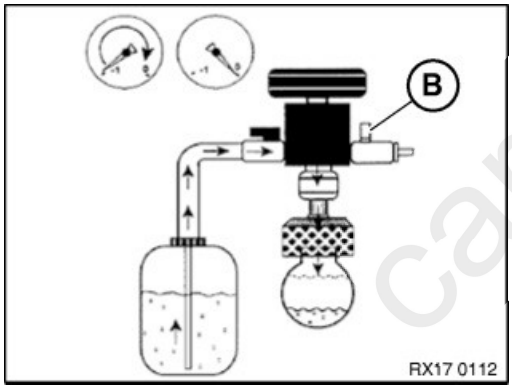
» Vacuum remains constant.

Measure

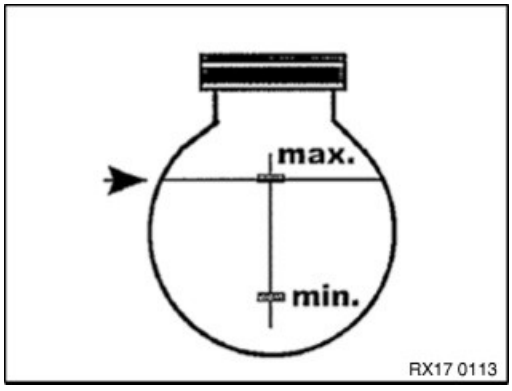
- Continue with filling.



- Keep shutoff valve (B) closed during the filling process.
- To fill the cooling system, open the shutoff valve (A) to the fluid tank of the vacuum filler device.



- Stop the filling procedure when the needle in the pressure measuring device is on 0 bar or it no longer drops.
- If necessary, reduce remaining vacuum. Open the shutoff valve (B).

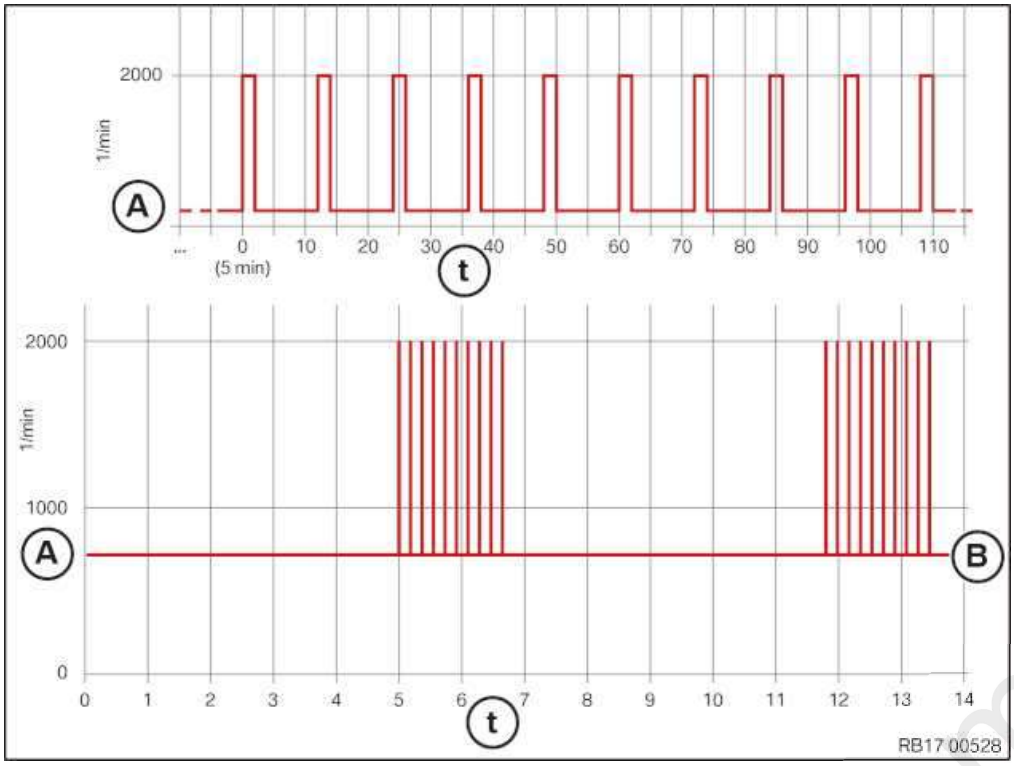


- Remove the vacuum filler device with the adapter from the coolant expansion tank.
- Adjust the coolant level to the maximum mark.
- After filling the cooling system with the vacuum filler device perform the cooling system bleeding routine additionally.

9 – Vent cooling system

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Cooling system bleeding routine



A Idle speed

B Cooling system bleeding routine finished

t Time

TECHNICAL INFORMATION

Filling **without** the vacuum filler device (watering can filling) is **not permitted**.

Non-compliance will result in danger of component and/or engine damage.

Filling specification **absolutely must** be adhered to.

Operation of the vehicle is not permitted unless the filling procedure has been completed. Otherwise, functional limitations (degradation) and/or overheating may occur.

A bleeding procedure is required after a part has been exchanged in the cooling system and/or after refilling the cooling system.

- Remove the vacuum filler device from the coolant expansion tank.
- Adjust the filling level in the coolant expansion tank to the maximum mark.
- The sealing cap on the coolant expansion tank must remain **open**.
- With automatic transmission: Select the selector lever position P (Park) and operate the parking brake.
- Set the heating to the **maximum** temperature and the blower to the **lowest** setting.
- Start engine and run at idle speed.
- Continue to top up the filling level in the coolant expansion tank to the maximum mark.
- Leave the engine running at idle for 5 minutes before you continue.
- Operate the accelerator pedal once to approximately 2000 rpm.
- Hold idle speed for 10 s.
- Operate the accelerator pedal once to approximately 2000 rpm.
- Hold idle speed for 10 s.

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- Operate the accelerator pedal once to approximately 2000 rpm.
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- Hold idle speed for 10 s.
- Operate the accelerator pedal once to approximately 2000 rpm.
- Hold idle speed for 10 s.
- Operate the accelerator pedal once to approximately 2000 rpm.
- Hold idle speed for 10 s.
- Continue to top up the filling level in the coolant expansion tank to the maximum mark.
- Leave the engine running at idle again for 5 minutes before you continue.
- Operate the accelerator pedal once to approximately 2000 rpm.
- Hold idle speed for 10 s.
- Operate the accelerator pedal once to approximately 2000 rpm.
- Hold idle speed for 10 s.
- Operate the accelerator pedal once to approximately 2000 rpm.
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- Hold idle speed for 10 s.
- Operate the accelerator pedal once to approximately 2000 rpm.
- Hold idle speed for 10 s.
- Operate the accelerator pedal once to approximately 2000 rpm.
- Hold idle speed for 10 s.

  The cooling system bleeding routine has finished approximately 14 min after the engine starts.
- Switch off engine.
- Allow the engine to cool down.
- Adjust the filling level in the coolant expansion tank to the maximum mark.

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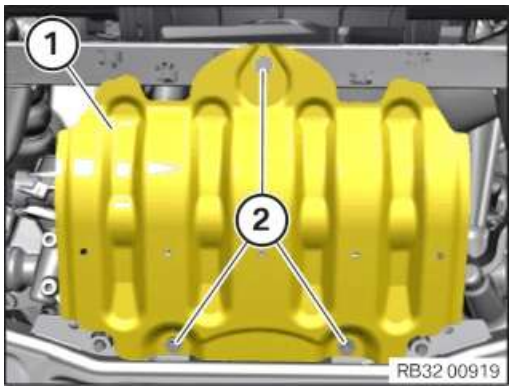


- Close the sealing cap (1) until the arrows are flush.

10 – If installed: Install underbody protection of the steering

Prerequisite

Front underbody protection has been removed.



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

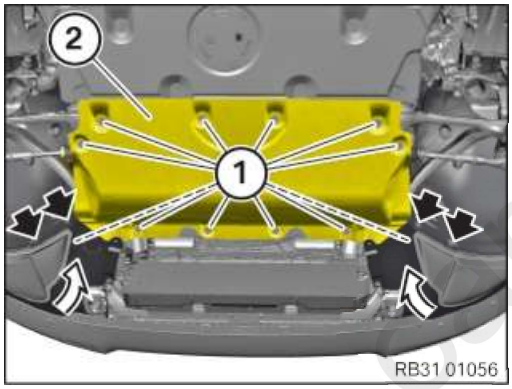
Underbody protection, steering, to front axle support

Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

11 – Install the underbody protection of the steering gear



- **Version A:**

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

  Tighten the screws (1).

Underbody protection of the steering gear

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

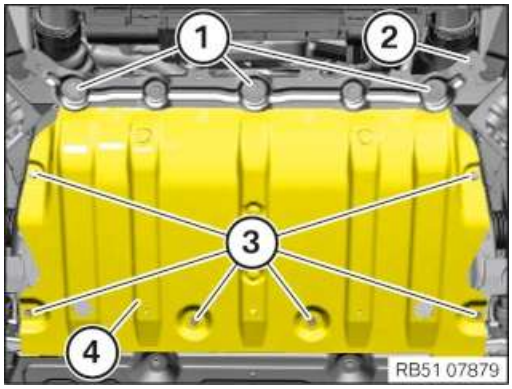
- Position the bottom wheel arch cover.

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

Wheel arch trim panel, front

Thermoplastic hexagon screw		Tightening torque	2,6 Nm

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- **Version B:**

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

  Tighten the screws (3).

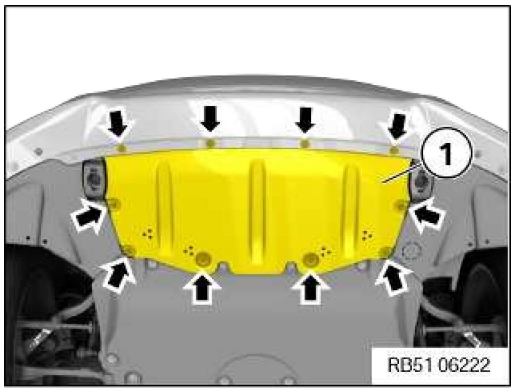
Underbody protection of the steering gear

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

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

  Tighten the screws (1).

12 – Installing the front underbody protection



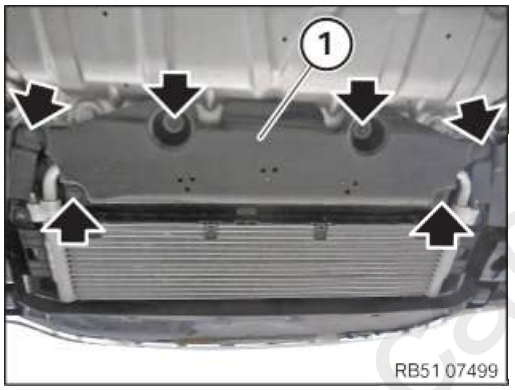
- **Version A:**

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

  Tighten screws (arrows).

Underbody protection front

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



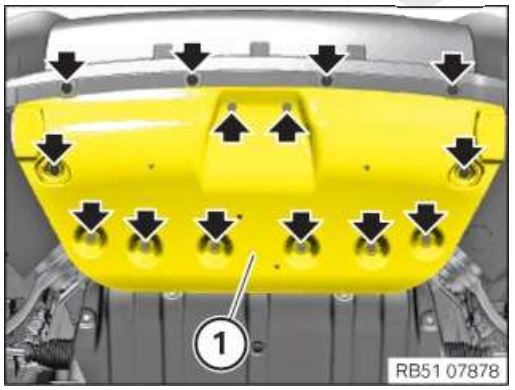
- **Version B:**

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

  Tighten screws (arrows).

Underbody protection front

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



- **Version C:**

  Feed in and install front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

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

Additional Information

Overview of Tightening Torques

Clean air pipe to exhaust turbocharger Used in step 7

M6X20		Tightening torque	8 Nm

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Clean air pipe to upper section of intake filter housing			Used in step 7
Clamp		Tightening torque	3 Nm

Underbody protection, steering, to front axle support			Used in step 10
Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support			Used in step 10
Hexagon bolt M6		Tightening torque	8 Nm

Underbody protection of the steering gear			Used in step 11
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

Wheel arch trim panel, front			Used in step 11
Thermoplastic hexagon screw		Tightening torque	2,6 Nm

Underbody protection front			Used in step 12
Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Overview of Special Tools

2 152 473 Filler device



Common	Used in step 8
Usage	Vacuum filling device for filling the engine cooling system.
Included in the tool or work	
Storage location	
Replaced by	
In connection with	Adapter for connection to engine cooling system 17 0 100 = 0494417
SI-Number	08 15 08 (481)

Overview Technical Data

Cooling system capacity G20/G21/G22/G23/G26/G28/G42	Used in step 8
B47D20O1	7.0 l

Expendable materials: Technically suitable antifreeze and corrosion inhibitor

Links

Repair instructions	Used in step
17 00 ... Notes for working on cooling system	8

Operating materials	Used in step
Main group 17	8

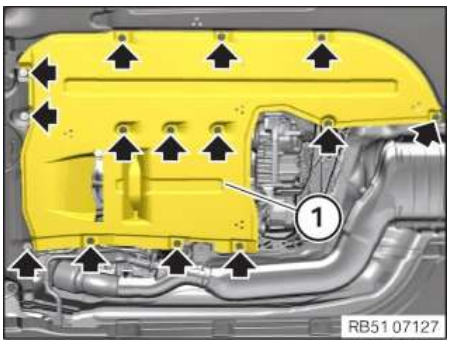
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17 00 011 Draining and topping up the coolant for the low-temperature circuit

Prerequisite
- Switch off ignition.

PRELIMINARY WORK

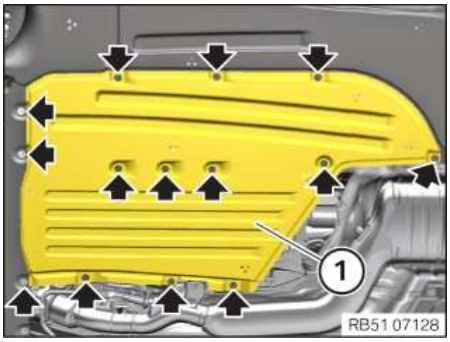
1 – Remove rear underbody protection



- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).



- **Version B:**

  Remove screws (arrows).

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

MAIN WORK

2 – 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.

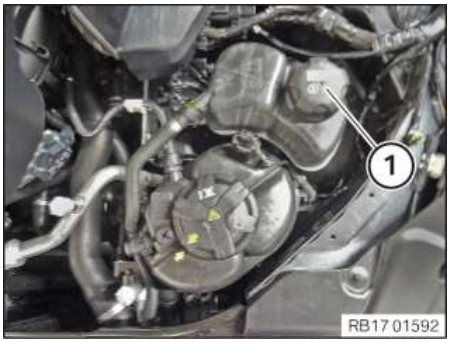
When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be emptied and refilled.

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.

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- Loosen sealing cap (1).

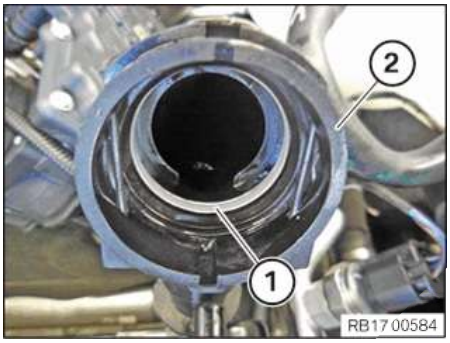


- Unlock coolant lines (1) and pull off.
- Catch and dispose of escaping coolant.

3 – 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 lines (1).

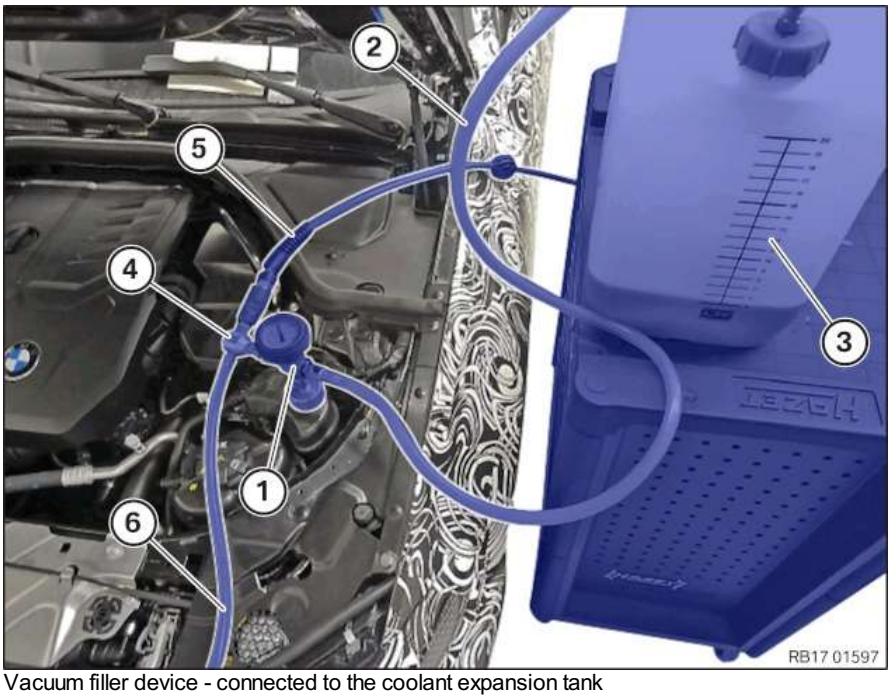
  The coolant lines (1) must engage audibly.

POSTPROCESSES

4 – Filling the low-temperature cooling system with the vacuum filler device

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Vacuum filler device



Vacuum filler device - connected to the coolant expansion tank

1 **Vacuum filler device with pressure gauge and shutoff valves**

2 **Filling hose**

3 **Fluid tank with coolant**

4 **Venturi nozzle**

5 **Compressed air connection** (maximum 6 bar)

6 **Exhaust hose** (Routing the exhaust hose to a collecting vessel)

Prerequisite

The coolant expansion tank for the cooling system must be empty. The fluid tank of the vacuum filler device must have a sufficient quantity of premixed coolant, 1 l to 2 l more than the specified capacity for the vehicle. The fluid tank of the vacuum filler device must be positioned at the same height as the coolant expansion tank. The compressed air connection must have a pressure of 6 bar. Ignition is switched off.

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

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

Mixing different coolants is not permitted.

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TECHNICAL INFORMATION

Filling **without** the vacuum filler device (watering can filling) is **not permitted**.

Non-compliance will result in danger of component and/or engine damage.

Filling specification **absolutely must** be adhered to.

Operation of the vehicle is not permitted unless the filling procedure has been completed. Otherwise, functional limitations (degradation) and/or overheating may occur.

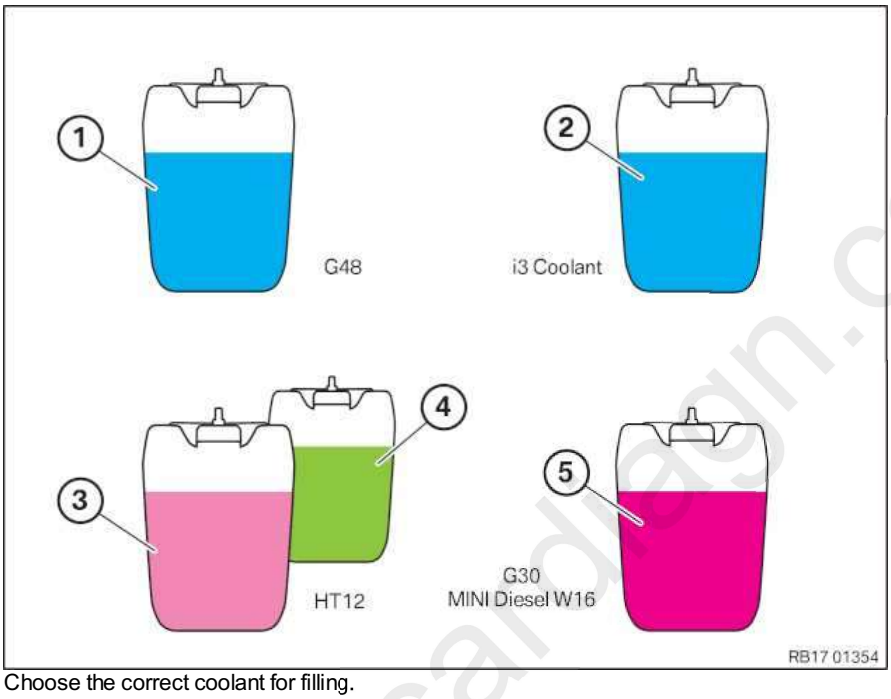
A bleeding procedure is required after a part has been exchanged in the cooling system and/or after refilling the cooling system.

TECHNICAL INFORMATION

Make sure that the ignition (terminal 15) is switched off prior to creating the vacuum with the vacuum filler device.

▸ **Observe the coolant type**

Coolant in the collecting vessel of vacuum filler device



Choose the correct coolant for filling.

In general, a vehicle has to be filled with the coolant with which it is delivered from the factory.

1 G48 (Blue) (BMW LC-87) Must **not** be mixed with i3 Coolant or G30 MINI Diesel W16.

2 i3 Coolant (Blue) (BMW LC-13) Is used only for heater circuit i3. i3 Coolant must **not** be added to other coolant circuits or mixed with other coolants.

3 HT12 (Rose) (BMW LC-18) Must **not** be mixed with i3 Coolant or G30 MINI Diesel W16.

4 HT12 (Green) (BMW LC-18) Must **not** be mixed with i3 Coolant or G30 MINI Diesel W16.

5 G30 (Rose) (BMW LC-07) May be W16 used exclusively for the **MINI Diesel**. G30 must **not** be filled in the other coolant circuits or mixed with the other coolants.

RISK OF DAMAGE

Damage to the engine or components in high-voltage vehicles

The use of an incorrect coolant may lead to corrosion or gelling in the coolant circuit.

- Use only approved coolants for the specific vehicle.
- Fill the vehicle only with the coolant with which it was delivered ex works.
- Mix only compatible coolants. The colour does not allow any assessment about the compatibility of coolants.
- Selection of the correct coolant only by means of the part number.

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- Select a suitable adapter (Y) from the set of special tools :

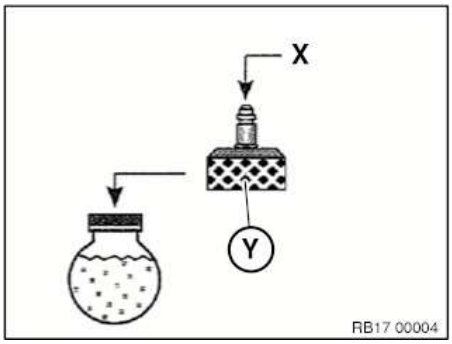
Type	Engine	Adapter (Y) from 17 0 100
G20/G21/G22/G23/G26/G28/G29	B42/B46/B48/B58	17 0 109
G20/21/22/23/G26/G42	B57/B47 Mild hybrid technology	17 0 109

- The fluid tank of the vacuum filler device must be filled with 1 l to 2 l more than the specified capacity of coolant for the vehicle.

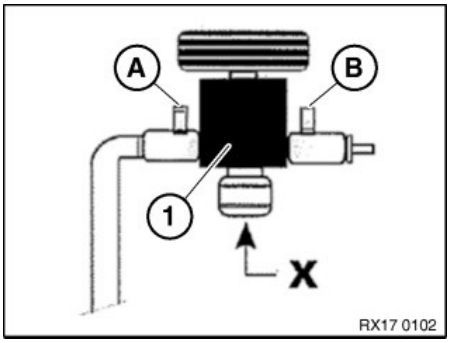
Capacity of low-temperature coolant circuit G20/G21/22/23/G26/G42 mild hybrid technology

B57D30T2/O2 / B47D20O1/U1	1.3 l

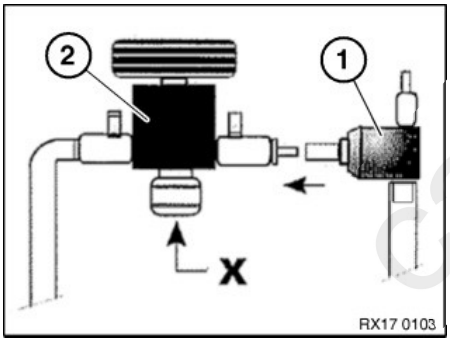
Expendable materials: Technically suitable antifreeze and corrosion inhibitor



- Connect the selected adapter (Y) to the coolant expansion tank.
- Connect vacuum filler device to connection (X) of the adapter.

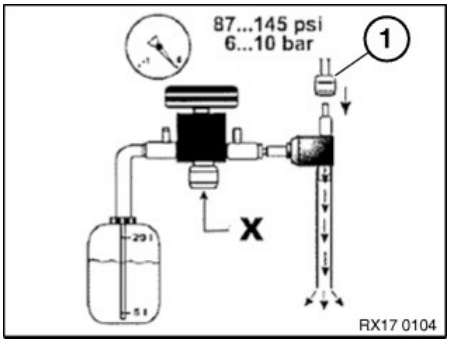


- Check that shutoff valves (A) and (B) of the vacuum filler device (1) are closed.
- Connect and lock connection (X) to the coolant expansion tank.



- Connect Venturi nozzle (1) to the vacuum filler device (2).

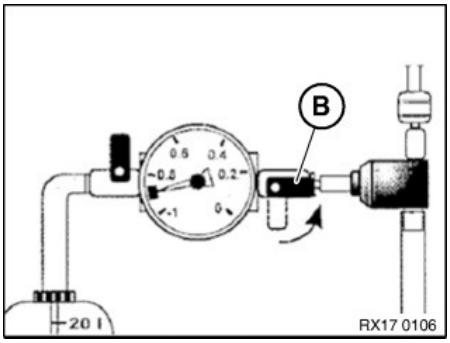
  (X)is the connection on the coolant expansion tank.



- Connect compressed air (1).

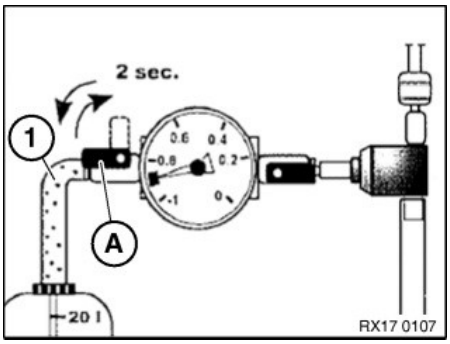
  (X)is the connection on the coolant expansion tank.

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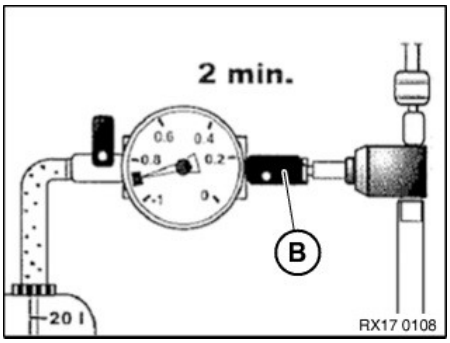
- Open shut-off valve (B).

  The Venturi nozzle produces a flow noise.



- Open shutoff valve (A) until the fuel filling hose (1) is full without bubbles.
- Close shutoff valve (A) again.

» The filling hose (1) has now been bled.

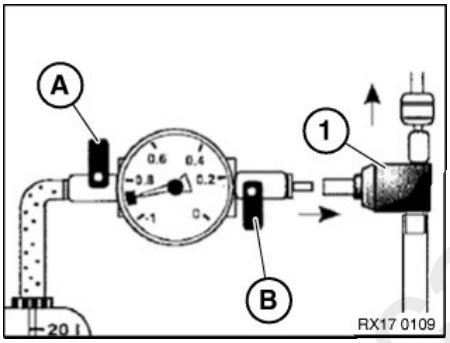


- Check the coolant hoses for porosity and renew porous coolant hoses as required.

TECHNICAL INFORMATION

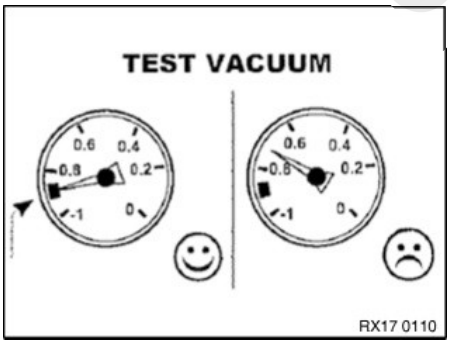
The coolant hoses contract during vacuum build-up.

- After a vacuum of -0.7 to -0.95 bar has been created in the coolant circuit (duration approx. 2 min), shut the shutoff valve (B).



- Check whether the shutoff valves (A) and (B) are closed.
- Disconnect the Venturi nozzle (1).

Check



- Make sure the vacuum in the coolant circuit is maintained for at least 30 seconds.

Result

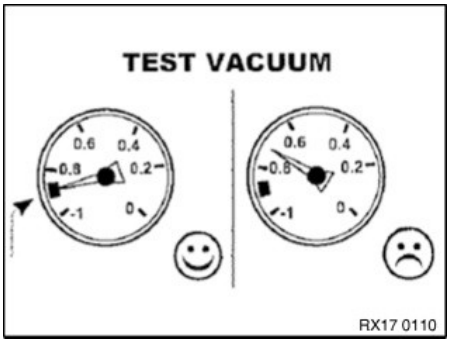
» Vacuum drops.

Measure

- Look for the leak, repair it and start the filling procedure from the beginning.

Check

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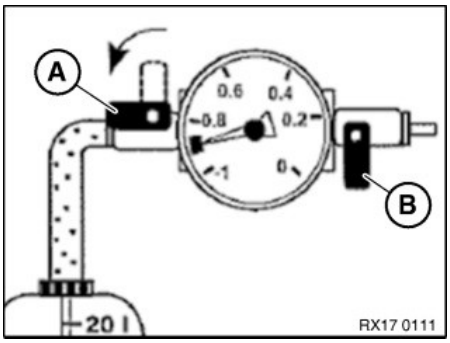
- Make sure the vacuum in the coolant circuit is maintained for at least 30 seconds.

Result

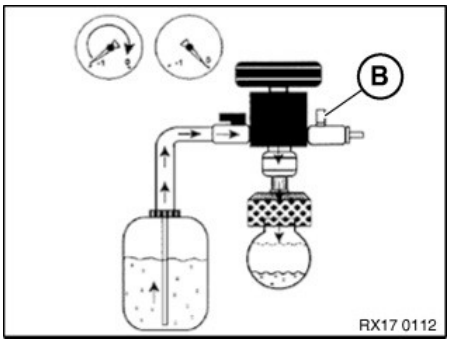
» Vacuum remains constant.

Measure

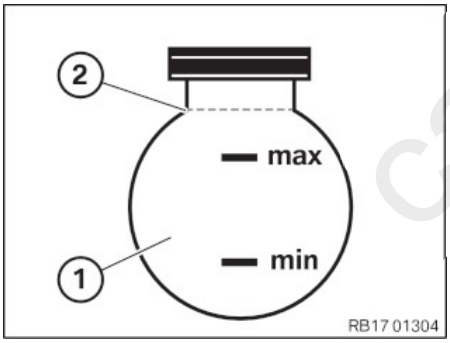
- Continue with filling.



- Keep shutoff valve (B) closed during the filling process.
- To fill the cooling system, open the shutoff valve (A) to the fluid tank of the vacuum filler device.



- Stop the filling procedure when the needle in the pressure measuring device is on 0 bar or it no longer drops.
- If necessary, reduce remaining vacuum. In order to do so, open shutoff valve (B).



- Remove the vacuum filler device with the adapter from the low-temperature coolant expansion tank (1).
- Adjust the coolant level in the low-temperature coolant expansion tank (1) to the lower edge of the coolant filler neck (2) of the low-temperature coolant expansion tank (1).
- After filling the cooling system with the vacuum filler device, **also** run the cooling system bleeding routine.

5 – Bleeding the low-temperature cooling system

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.

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TECHNICAL INFORMATION

Filling **without** the vacuum filler device (watering can filling) is **not permitted**.

Non-compliance will result in danger of component and/or engine damage.

Filling specification **absolutely must** be adhered to.

Operation of the vehicle is not permitted unless the filling procedure has been completed. Otherwise, functional limitations (degradation) and/or overheating may occur.

A bleeding procedure is required after a part has been exchanged in the cooling system and/or after refilling the cooling system.

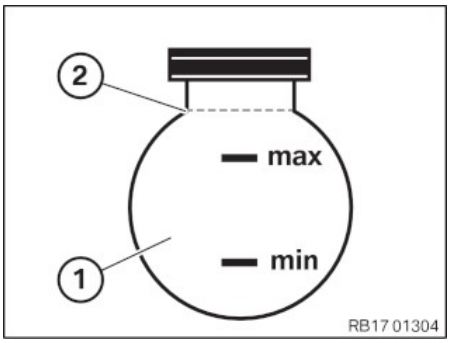
TECHNICAL INFORMATION

Before starting the automatic cooling system bleeding routine, make sure that **all coolant circuits** are **filled**. If the cooling system bleeding routine is started while one of the coolant circuits is empty, there is a risk of damage to the electric coolant pump when running it dry.

Make sure that terminal 15 is not disconnected for the bleeding procedure. Switch on low-beam headlights and hazard warning lights. If the low-beam headlights and hazard warning lights are not switched on, the ignition (terminal 15) will switch off automatically after a certain period of time and interrupt the bleeding procedure.

TECHNICAL INFORMATION

The driving experience switch must not be set to the ECO PRO switch position.



- Adjust the coolant level in the low-temperature coolant expansion tank (1) up to lower edge (2) of the coolant filler neck of low-temperature coolant expansion tank (1).
- **Close** the sealing cap on the coolant expansion tank of the low-temperature coolant circuit.
- Ensure that the bonnet is open.
- With automatic transmission: Select the selector lever position P (park) and operate the parking brake.
- **Activate** the testing-analysis-diagnosis (PAD) by quickly actuating the START-STOP button three times.
- Ensure that the Driving Experience Control is **not** in the **"ECO-PRO"** switch position.
- Adjust the heating to **maximum** temperature and adjust the blower to the **lowest** level.
- Press the accelerator pedal to the limit position for at least **10 seconds**. Do **not** press the brake pedal while doing so.
- Then start the engine within 30 s.

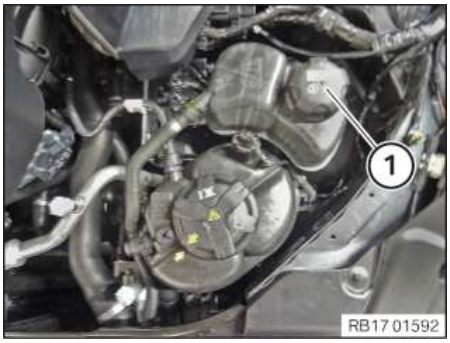
"Service function started" is displayed in the instrument cluster.

- Let the engine idle during the entire bleeding procedure.

  The electric coolant pump in the low-temperature coolant circuit is activated for 10 minutes according to a cooling system bleeding routine.

  The cooling system bleeding routine is ended if "Service function ended" is displayed in the instrument cluster.

  The electric coolant pump is then activated again as required.
- If the cooling system bleeding routine is interrupted, then it must be repeated.
- Stop engine.
- Allow the coolant temperature to cool down to **< 50°C**.



- Loosen sealing cap (1).

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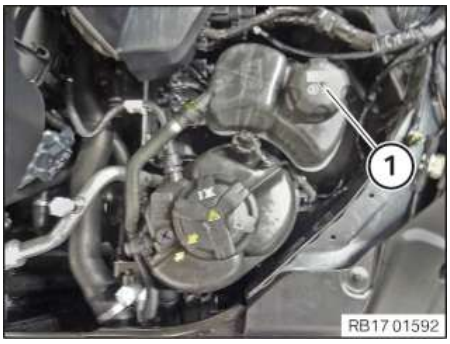
TECHNICAL INFORMATION

After the cooling system bleeding routine, the cooling system is topped up above the maximum mark.

Overfilling the cooling system serves to balance the remaining air in the cooling system.

The normal filling level of the coolant is reached while driving.

- Adjust the filling level in the coolant expansion tank (2) of the low-temperature coolant circuit to **100 ml** above the **maximum mark** (1).



- Close sealing cap (1).

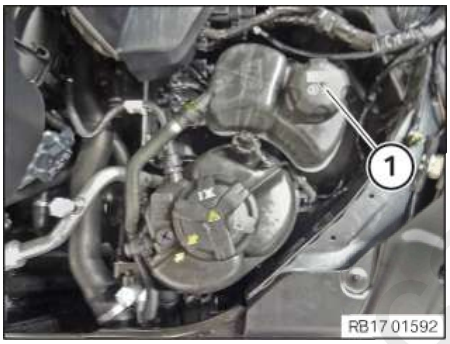
6 – Checking low-temperature cooling system for watertightness

WARNING

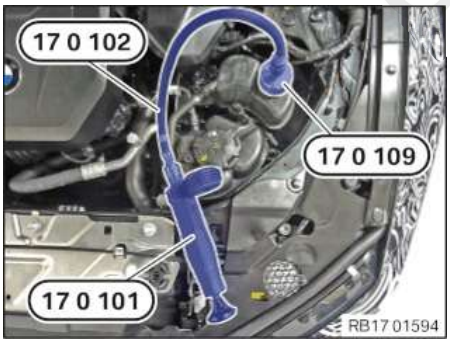
Hot surfaces.

Risk of burning!

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



- Loosen sealing cap (1).

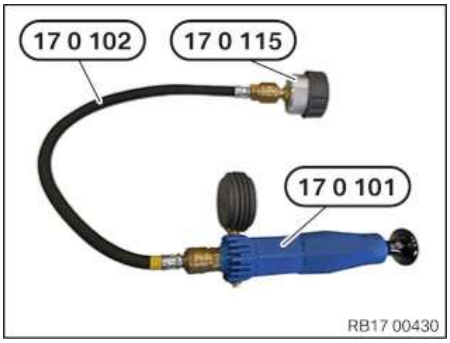


- Attach the special tool with special tools and from the set of special tools .
- Build up excess pressure and wait for approximately 2 minutes.

Opening pressure of sealing cap of low-temperature coolant circuit

Pressure relief valve opens when the pressure exceeds the ambient pressure.	min. 1,4 bar
Electric changeover valve must open at latest when the pressure is lower than the ambient pressure	max. 0,1 bar
Test pressure for cooling system (gauge pressure)	1,5 bar

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TECHNICAL INFORMATION

If the described test step is not completed successfully: repeat test step twice. Only replace the sealing cap after three tests with an incorrect opening pressure.

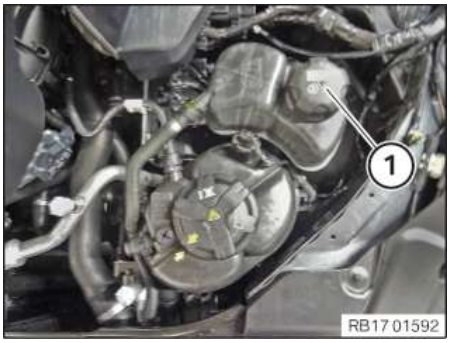
When driving at high ambient temperatures, the design may cause the pressure relief valve in the sealing cap to open slightly and air to escape together with dissolved coolant. This coolant vapour condenses on the surface of the coolant expansion tank and leaves traces of coolant when the vehicle has cooled down. These traces of coolant do not indicate whether the sealing cap is defective or not.

Escaping coolant vapours when the vehicle is at standstill may cause the pressure relief valve to stick to the sealing cap. This may cause an incorrect opening pressure.

- Screw on sealing cap (1) on special tool from the set of special tools .
- Build up the pressure with special tools and from the set of special tools .
- Observe on the pressure measuring device when the opening pressure has been reached.

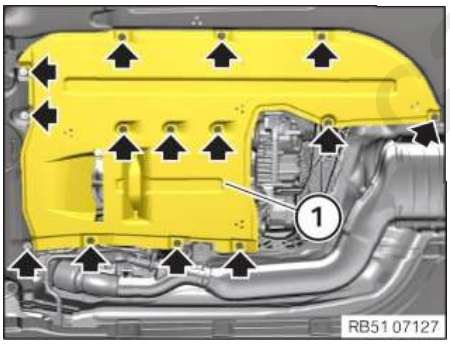
Opening pressure of sealing cap of low-temperature coolant circuit

Pressure relief valve opens when the pressure exceeds the ambient pressure.	min. 1,4 bar
Electric changeover valve must open at latest when the pressure is lower than the ambient pressure	max. 0,1 bar
Test pressure for cooling system (gauge pressure)	1,5 bar



- Close sealing cap (1).

7 – Installing underbody protection at rear



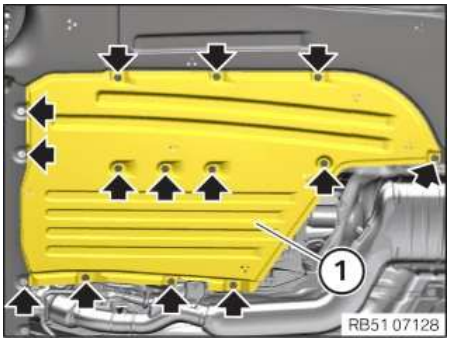
- **Version A:**

  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version B:**

  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm

Additional Information

Overview of Tightening Torques

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Underbody protection			Used in step 7
Hexagon screw		Tightening torque	3 Nm

Overview of Special Tools

Overview Technical Data

Opening pressure of sealing cap of low-temperature coolant circuit	Used in step 6
Pressure relief valve opens when the pressure exceeds the ambient pressure.	min. 1,4 bar
Electric changeover valve must open at latest when the pressure is lower than the ambient pressure	max. 0,1 bar
Test pressure for cooling system (gauge pressure)	1,5 bar

Capacity of low-temperature coolant circuit G20/G21/22/23/G26/G42 mild hybrid technology	Used in step 4
B57D30T2/O2 / B47D20O1/U1	1.3 l

Expendable materials: Technically suitable antifreeze and corrosion inhibitor

Links

Repair instructions	Used in step
17 00 ... Notes for working on cooling system	4

Operating materials	Used in step
Main group 17	4

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17 00 ... Instructions for working on cooling system



Warning!

Risk of scalding, carry out repairs on the cooling system only when the engine has cooled down.



Attention!

Wear protective gloves and safety goggles.



Attention!

Life-time coolant filling:

Never 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 drained and refilled.

In the case of other removal work involving the draining of part quantities of coolant, replace these quantities which have been drained with new coolant.

Installation note:
Use only recommended coolant.

Observe mixture ratio.



Attention!

Open cooling system only when it has cooled down.

Opening the cooling system while hot can result in air entering the system.

This can cause overheating with permanent damage to the engine.



Attention!

Protect the alternator from contamination when carrying out any repairs on the coolant circuit.

Cover alternator with suitable materials.

Failure to comply with this procedure may result in an alternator malfunction.



Attention!

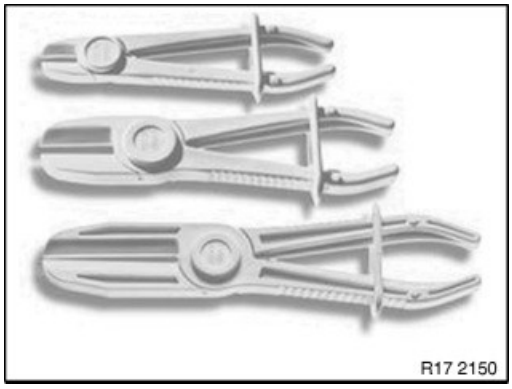
Do not fill coolant expansion tank over maximum level, as overfilling will cause the coolant to overflow. This may cause traces of coolant on the expansion tank or in the engine compartment and allow an incorrect conclusion about possible leaks.

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Recycling

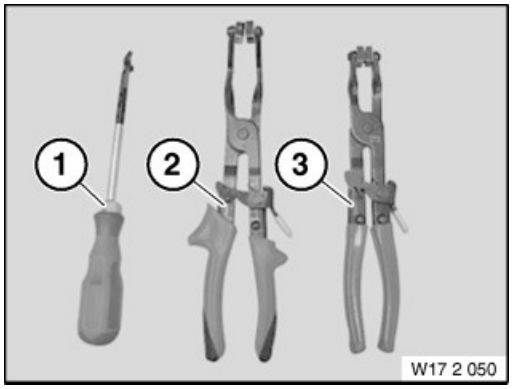
Catch and dispose of drained coolant.

Observe country-specific waste disposal regulations.



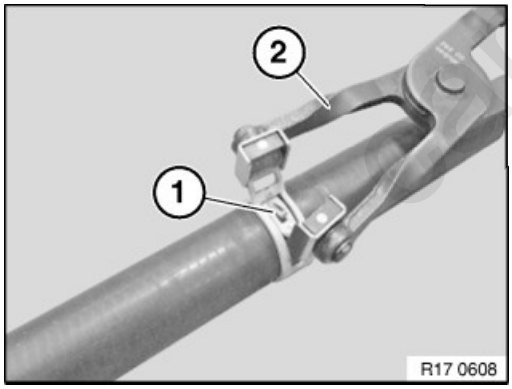
Note:
To disconnect the coolant hoses, use a commercially available disconnection tool such as HAZET (see table).

HAZET number:	Description
4590-1	Length of disconnect pliers (mm): 150
4590-2	Length of disconnect pliers (mm): 180
4590-3	Length of disconnect pliers (mm): 253
4590 / 2	Set of clamping pliers
4590 / 3	Set of clamping pliers

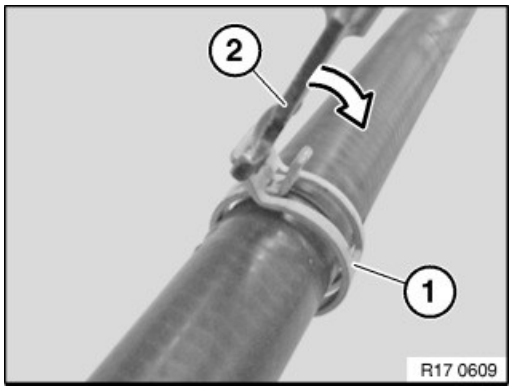


Set of special tools 17 2 050 for removing and installing the spring bracket clamps for coolant hoses.

- (1) Release tool.
- (2) Pliers (bent version).
- (3) Pliers (straight version).

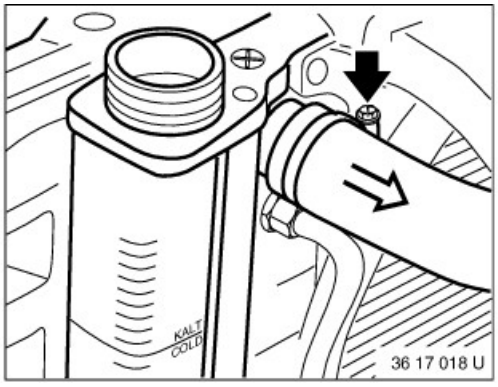


Loosen spring strap (1) with the pliers (2).



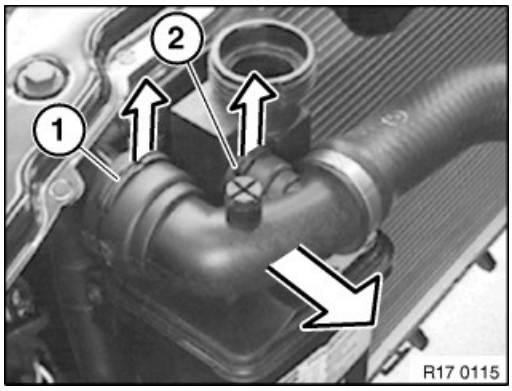
Unlock spring strap (1) with the release tool (2).

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Note:
Tightening torque for hose clamps

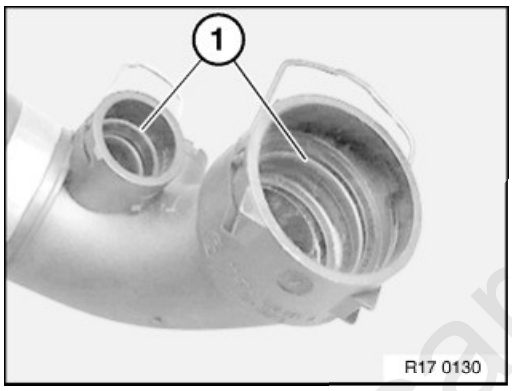
WAF 5	1.0 - 1.5 Nm
WAF 6	2.5 - 3.5 Nm



Notes on disassembly/installation of the quick-release couplings of the coolant hoses

Dismantling of quick-release coupling

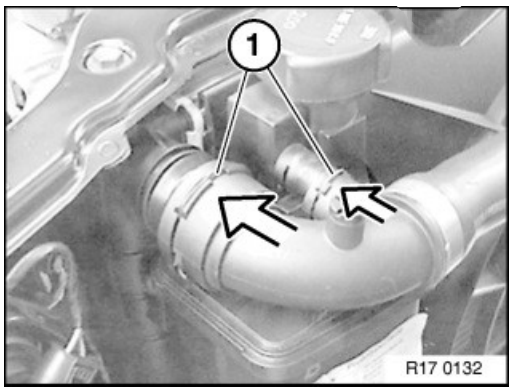
Pull out lock (1) and (2). Pull off hose.



Installation note:

Check O-rings (1).

Do not coat O-rings (1) with lubricant.



Assembly of quick-release coupling

Press in lock (1) before installing quick-release coupling.

Push on hose.

Quick-release couplings must clearly snap audibly into place.

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

Warning!

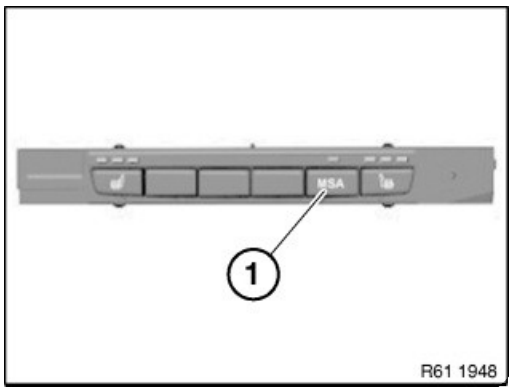
If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

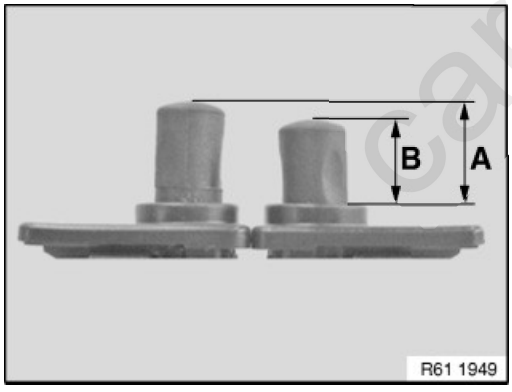
Observe safety precautions when working on MSA vehicles.

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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64 53 ... Instructions for replacement of air conditioning condensers and radiator/coolers

Attention!

Even when they are correctly installed or due to normal driving, radiators (oil cooler, radiator, charge air cooler) or air conditioning condensers may show slight impressions or deformations on their discs (1).

A slight sag with a large radius for the air conditioning condenser is also permissible.

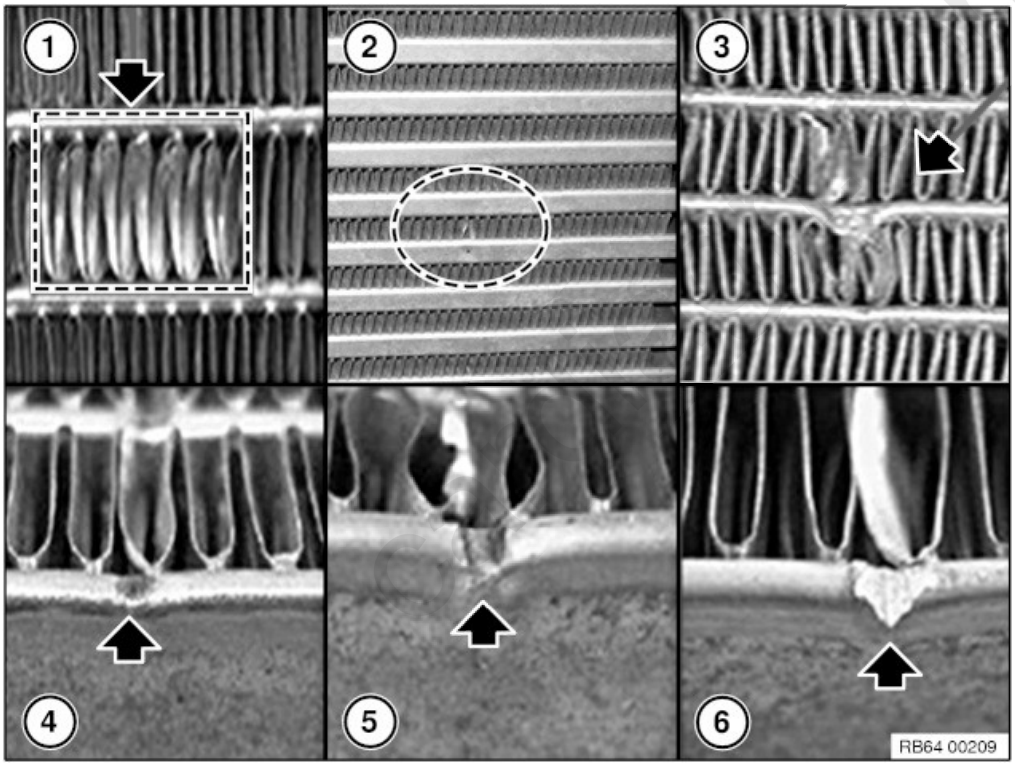
As long as tightness/function are not degraded and an adequate distance of a few mm between the radiator and air conditioning condenser remains in place, **this is not damage in either case.**

Radiators or air conditioning condensers are not to be replaced in these cases!

Note:

The deformations shown in Fig. (1) can be bent back with a standard fin comb..

Damage to lines carrying media or on the flat pipe require exchange of the radiator or air conditioning condenser (2-6).



Dryer flask (integrated in the air conditioning condenser):

Round dents/depressions are permitted.

The air conditioning condenser is not to be replaced in this case.

64 53 ... Instructions for replacement of air conditioning condensers and radiator/coolers

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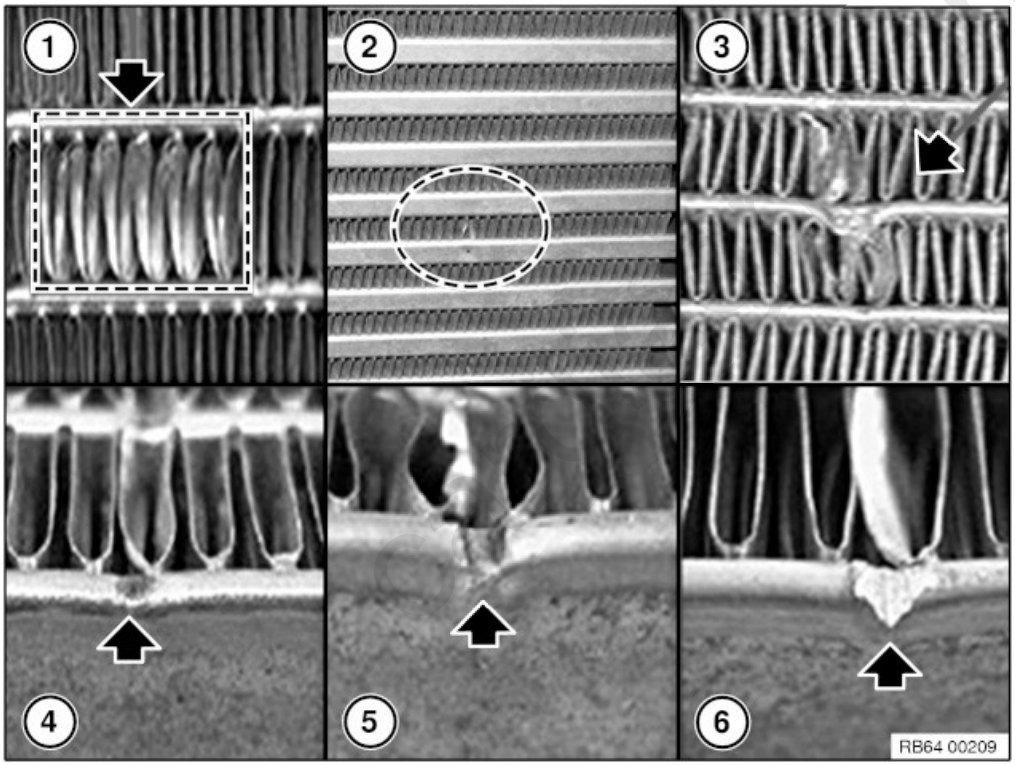
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Dryer flask (integrated in the air conditioning condenser):

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The air conditioning condenser is not to be replaced in this case.

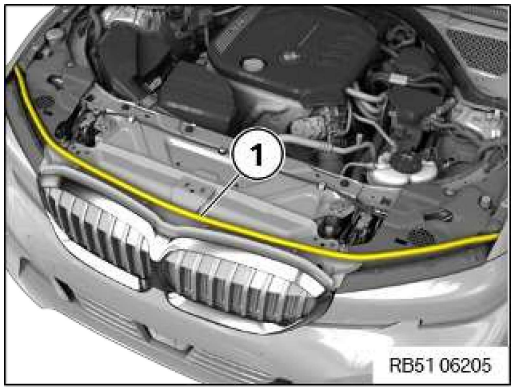
17 11 000 Removing and installing coolant radiator

PRELIMINARY WORK

1 – Remove the seal for the bonnet in front

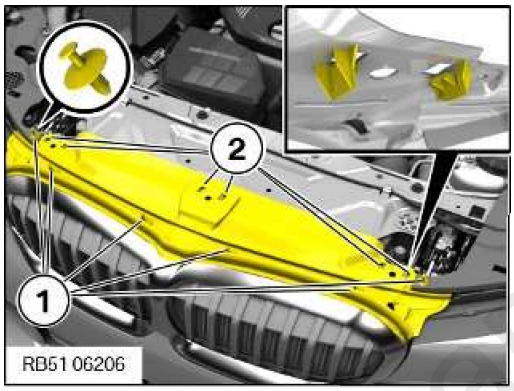
NOTICE

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



- Pull offfront bonnet seal (1) upwards.

2 – Removing the centre engine compartment cover



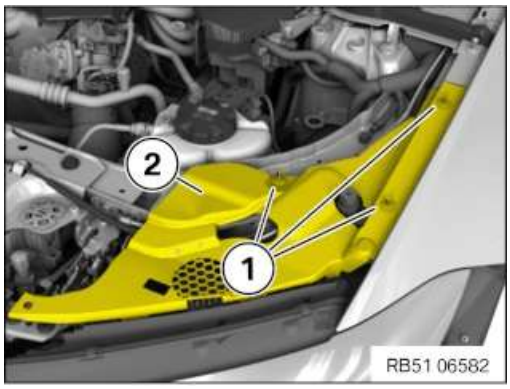
- Detach all expanding rivets (1).
- Release the cover at the latch mechanisms (2) and feed it out to the rear.

3 – If installed: 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 cover (2) at the top of the engine compartment.

4 – Removing left and right front-end strut

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4 – Removing left and right front-end strut

NOTICE

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

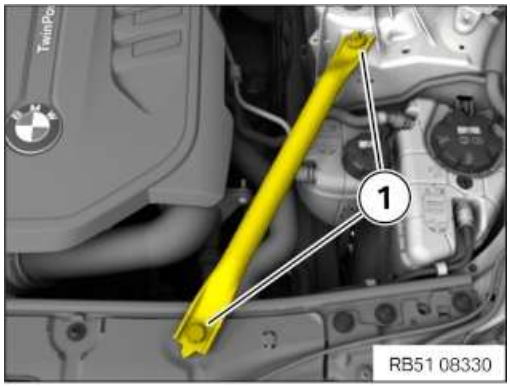
▸ **Removing the front-end strut**

TECHNICAL INFORMATION

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

NOTICE

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

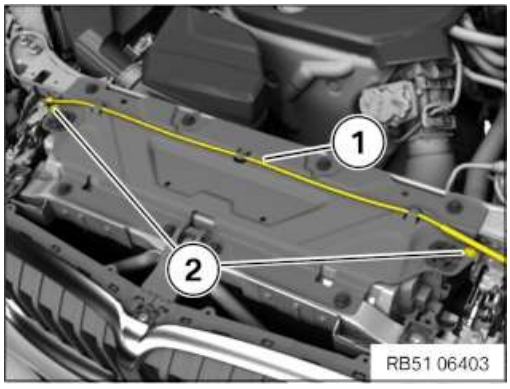


- Loosen screws (1).
- Remove the front-end strut.

5 – Removing the top cross connection

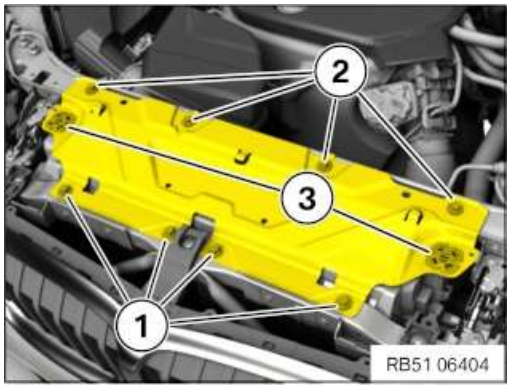


- Release housing (1) for the coupling of the Bowden cables from the body.



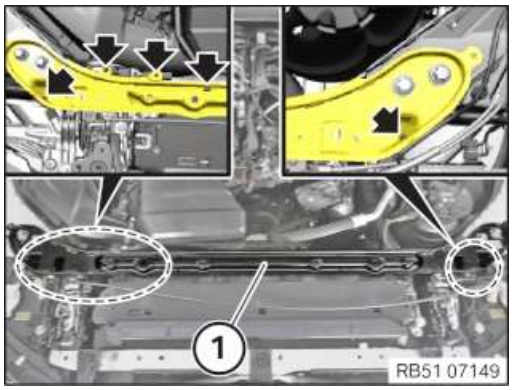
- Detach Bowden cable (1) at the top cross connection.
- Loosen screws (2).

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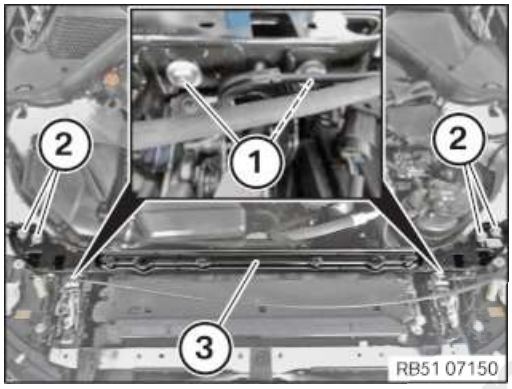


- Loosen screws (1) and (2).
- Remove the top cross connection with holders (3) to the top.

6 – Remove the rear top cross connection



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

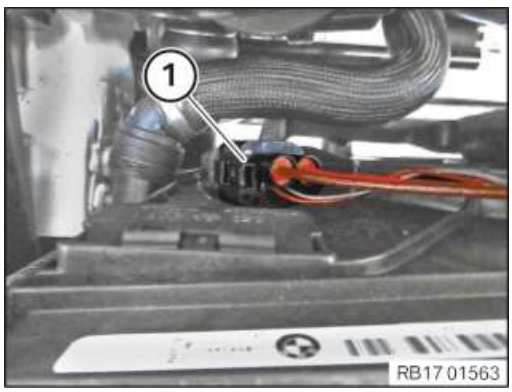


- Loosen screws (1).
- Loosen screws (2).
- Guide out and remove top rear cross connection (3).

7 – Removing the fan cowl

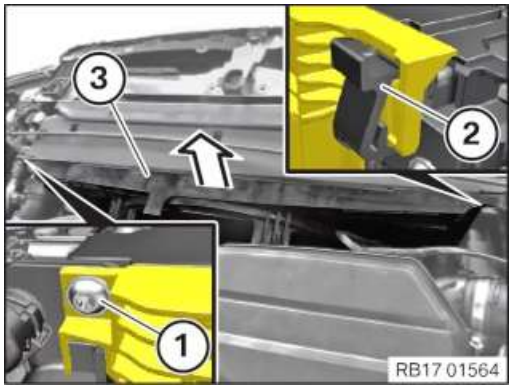
TECHNICAL INFORMATION

- 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!



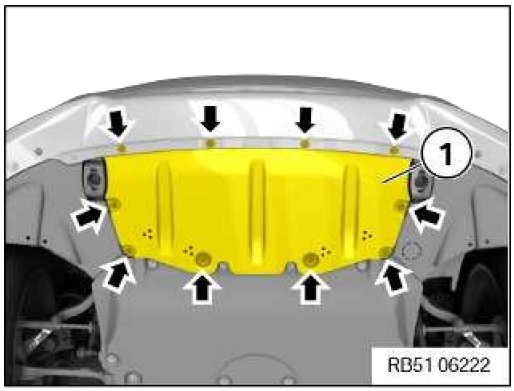
- Unlock plug connection (1) and disconnect.

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

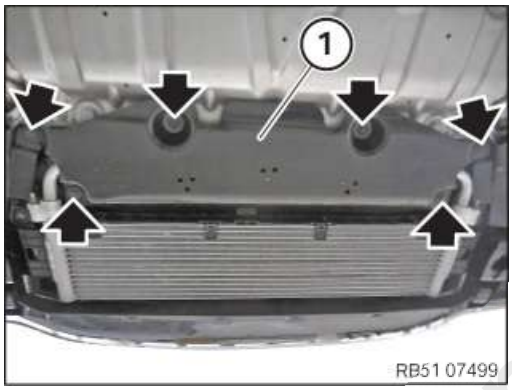
8 – Removing the front underbody protection



- **Version A:**

  Remove screws (arrows).

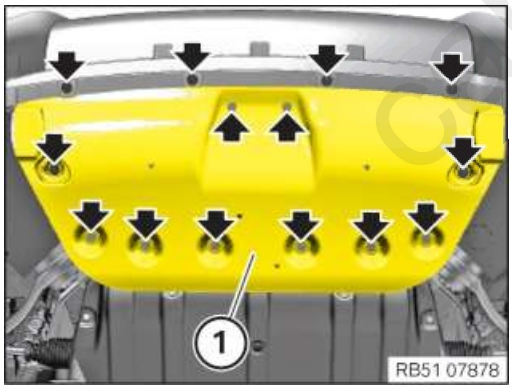
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version B:**

  Remove screws (arrows).

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

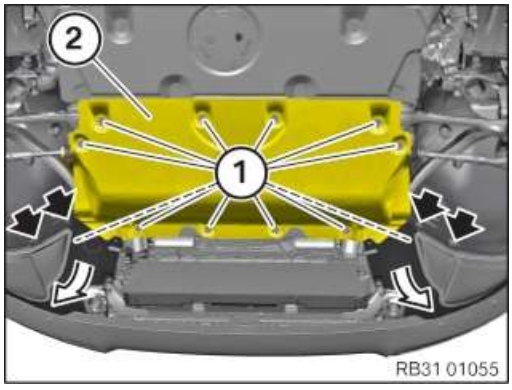


- **Version C:**

  Remove screws (arrows).

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

9 – Remove the underbody protection of the steering gear



- **Version A:**

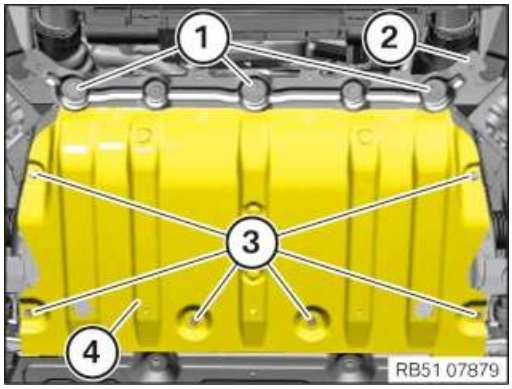
  Unscrew the screws (arrows) of the wheel arch cover on the wheel arch cover.

  Fold the bottom wheel arch cover to the side.

  Loosen screws (1).

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

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- **Version B:**

  Loosen screws (1).

  Remove the holder (2) for the underride protection.

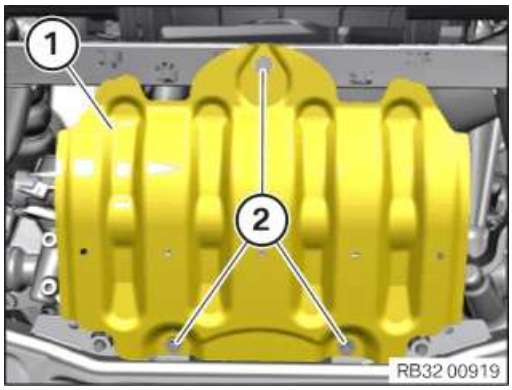
  Loosen screws (3).

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

10 – If installed: Removing the steering underbody protection

Prerequisite

Front underbody protection has been removed.



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

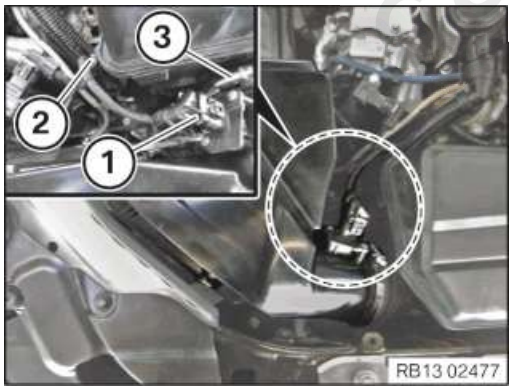
11 – Removing the clean air pipe with the resonator

WARNING

Hot surfaces.

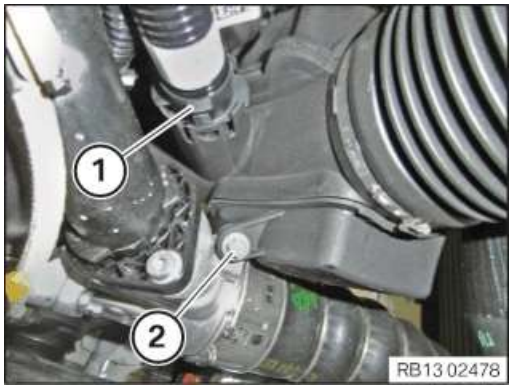
Risk of burning!

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

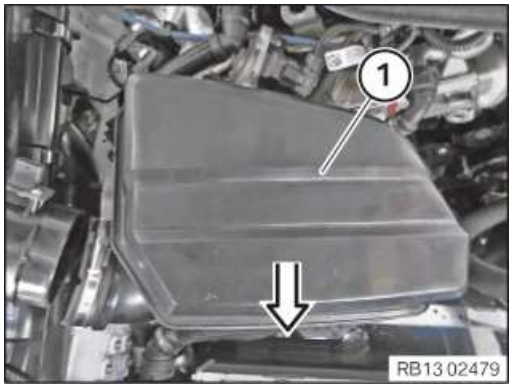


- Unlock plug connection (1) and disconnect.
- Loosen clamp (2).
- Unfasten clamp (3).
- Separate the clean air pipe with resonator from the intake filter housing.

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



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



- Unlock and loosen clamp (1).



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

12 – Draining the coolant from the high-temperature cooling system

WARNING

Hot fluids.

Risk of scalding!

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

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CAUTION

Materials harmful to health.

Contact with fluids harmful to health!

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

TECHNICAL INFORMATION

Life-long fill of coolant!

Do not reuse used coolant.

When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be emptied and refilled.

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

TECHNICAL INFORMATION

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



- Loosen sealing cap (1).

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

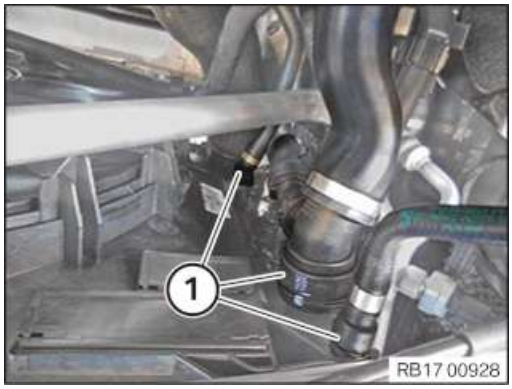
RISK OF DAMAGE

Escaping coolant on the starter generator.

Damage and operating failure of the starter generator.

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

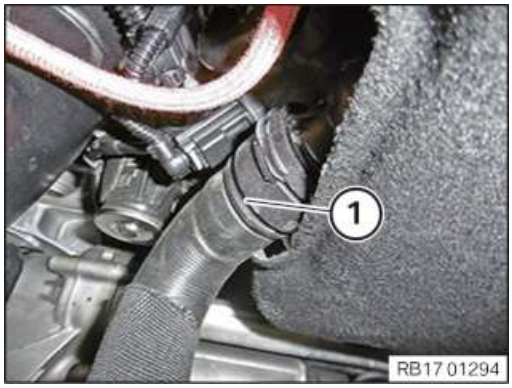
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NOTICE

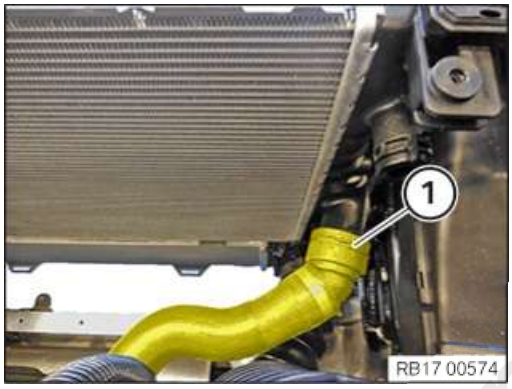
Schematic diagram is for example purposes. Some parts may differ in certain details.

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



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

13 – Releasing the coolant line at the radiator, right



- Unlock and disconnect coolant line (1) and place it aside.
- Catch and dispose of escaping coolant.

MAIN WORK

14 – Removing the radiator

WARNING

Hot surfaces.

Risk of burning!

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

CAUTION

Materials harmful to health.

Contact with fluids harmful to health!

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

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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

Follow notes for repair work on the cooling system.

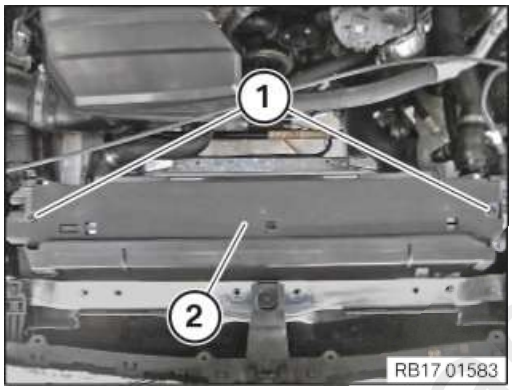
For additional information see:

Main group 17

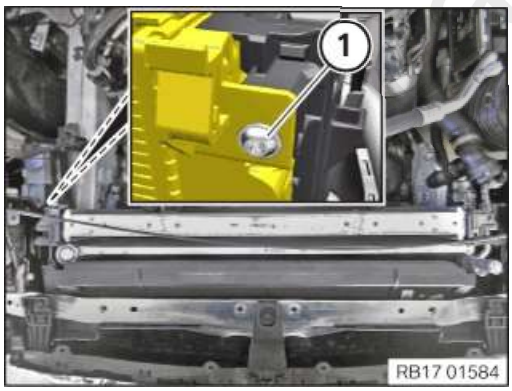
17 00 ... Notes for working on the cooling system

TECHNICAL INFORMATION

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



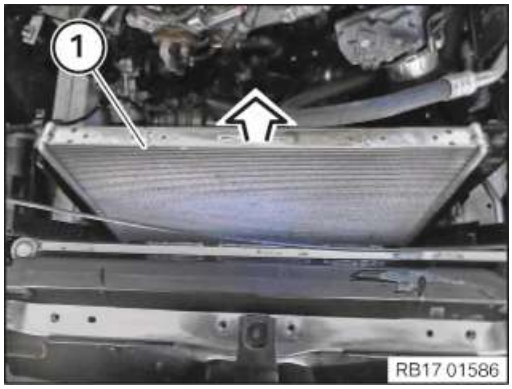
- Loosen screws (1).
- Guide out and remove top cover (2).



- Loosen screw (1).

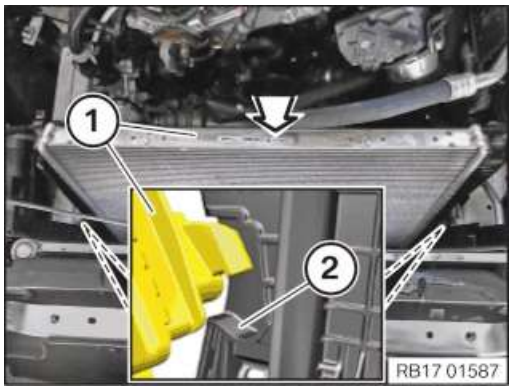


- Tilt radiator (1) towards the rear in the direction of the arrow.

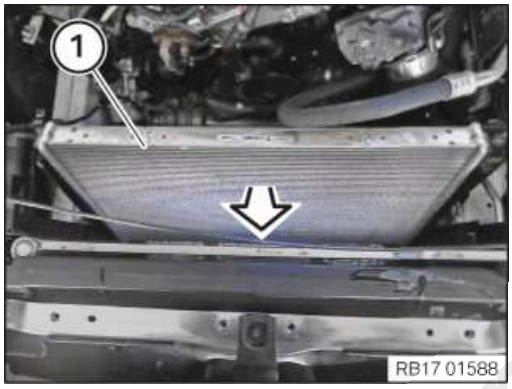


- Guide out and remove radiator (1) upwards in the direction of the arrow.

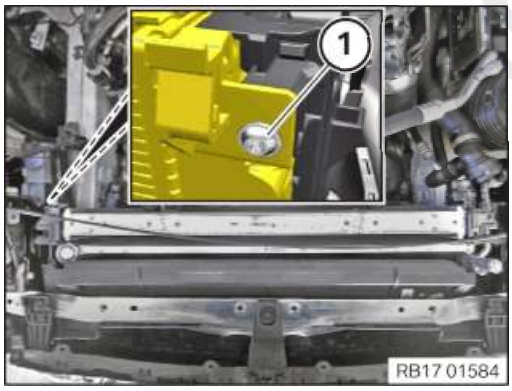
15 – Install radiator



- Feed in radiator (1) downwards in direction of arrow.
- Make sure the radiator (1) is fed in the mountings (2).



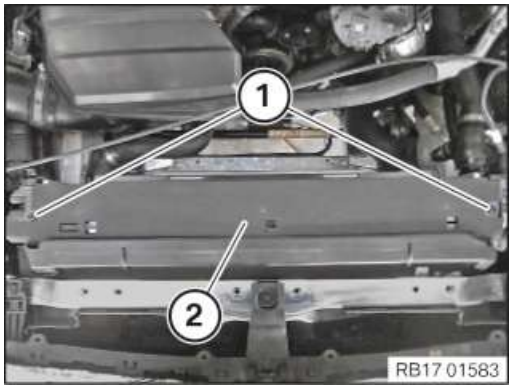
- Bring the radiator (1) in the front to the system in direction of arrow.



- Tighten down screw (1).

Radiator on holder

D6x20 screw		Tightening torque	6 Nm



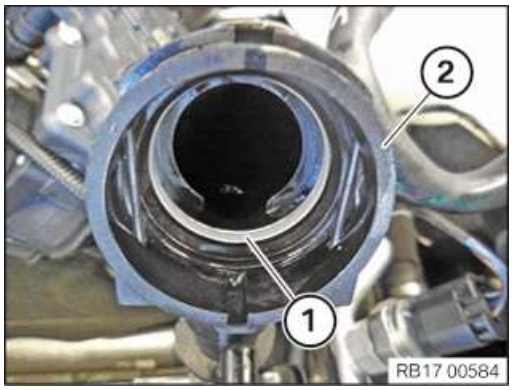
- Feed in and install the cover (2) on the top.
- Tighten the screws (1).

Cooling module cover on holder

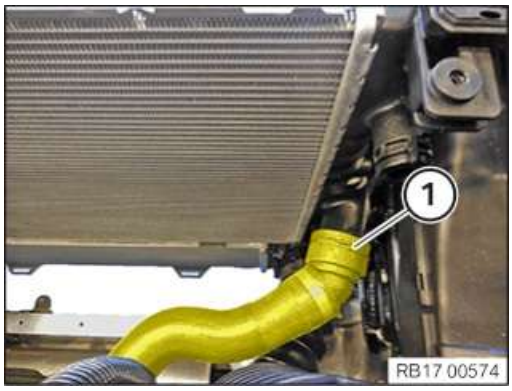
D6X20		Tightening torque	7 Nm

POSTPROCESSES

16 – Securing the coolant line to the right radiator



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



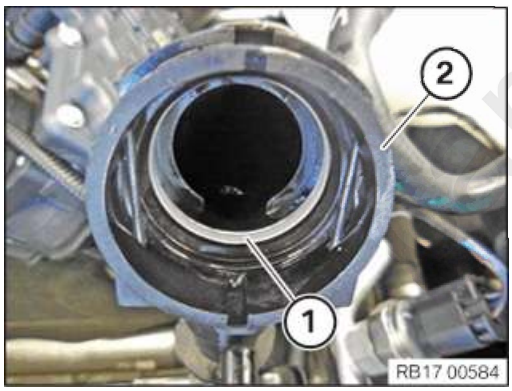
- Connect and lock the coolant line (1).

  The coolant line (1) must audibly engage.

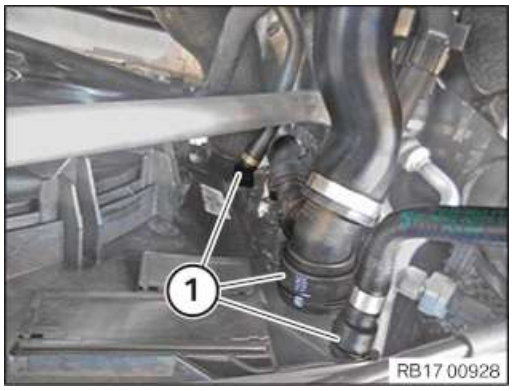
17 – Connecting the coolant lines

TECHNICAL INFORMATION

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



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



NOTICE

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

- Connect and lock the coolant lines (1).

  The coolant lines (1) must engage audibly.



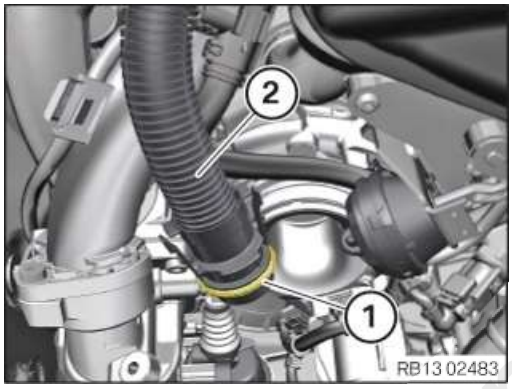
- Connect and lock coolant line (1).

  The coolant line (1) must audibly engage.

18 – Installing the clean air pipe with resonator



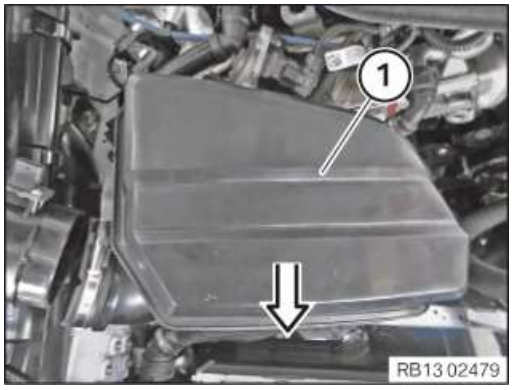
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



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



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



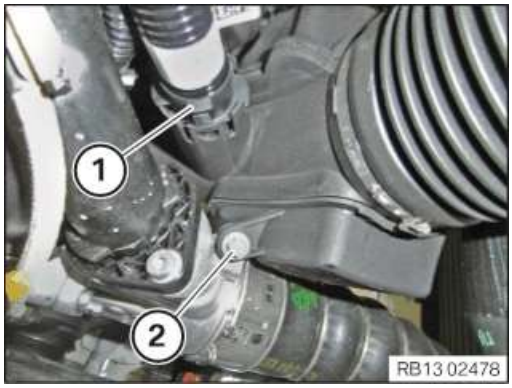
- Press and hold clean air pipe with resonator (1) in the direction of the arrow.

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- Attach and lock the clamp (1).

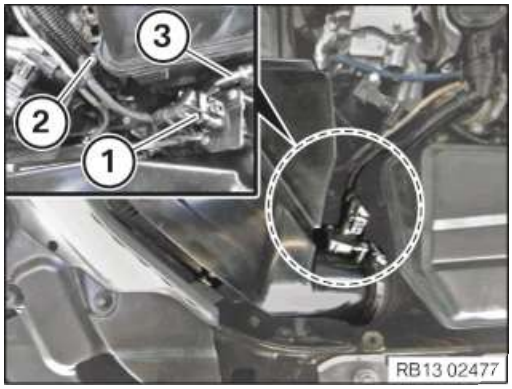
  The clamp (1) must engage audibly.



- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm



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

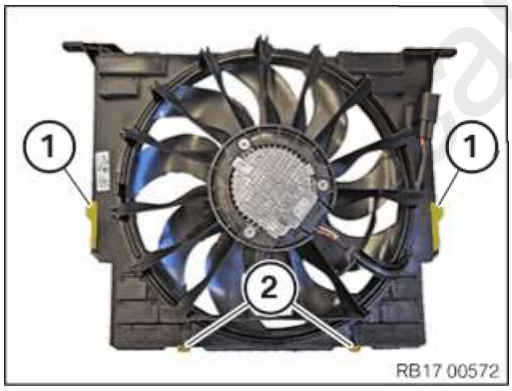
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

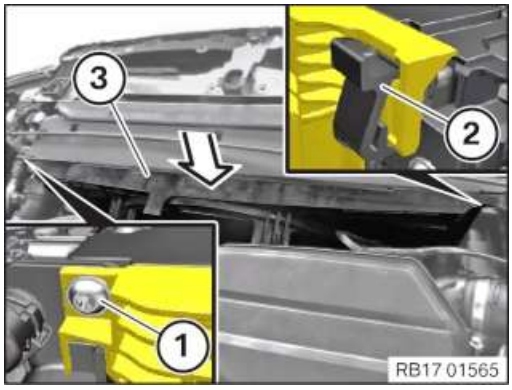
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

19 – Install fan cowl



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

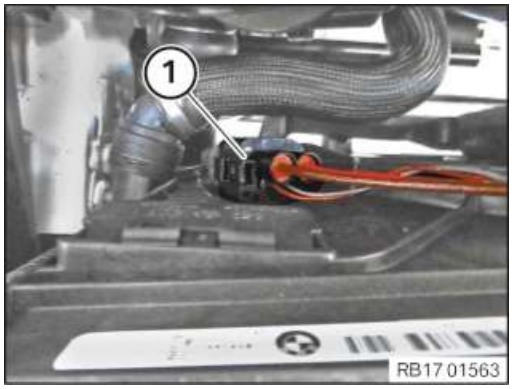


- Guide the fan cowl (3) in **carefully** in the direction of the arrow and install.
- Make sure that the lock (2) engages audibly.
- Tighten down screw (1).

Fan cowl with electric fan on radiator

TS6x20		Tightening torque	6,5 Nm

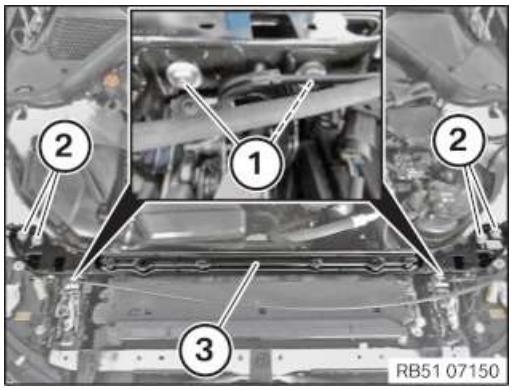
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- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

20 – 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

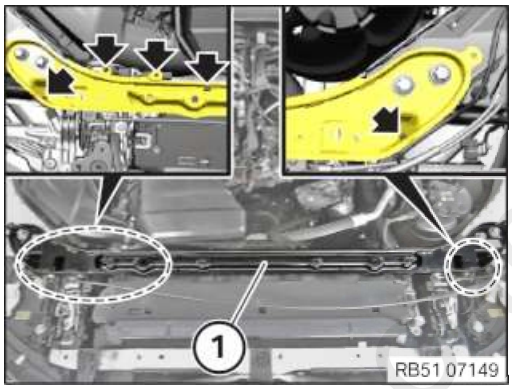
Flat-head screw M6x20		Tightening torque	11,8 Nm

- Renew screws (2).

  Parts: Bolts
- Tighten the screws (2).

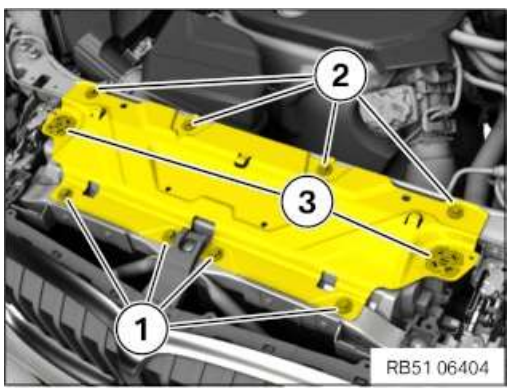
Rear top cross connection to wheel arch carrier support

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).

21 – Installing the top cross connection

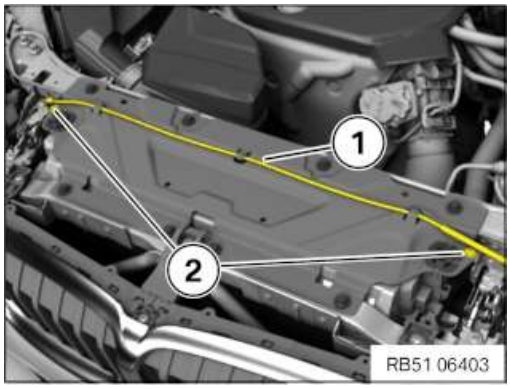


- Set and position the upper cross connection with holders (3) from above.
- Tighten screws (1) and (2).

Cross connection, top

M8x20		Tightening torque	28 Nm

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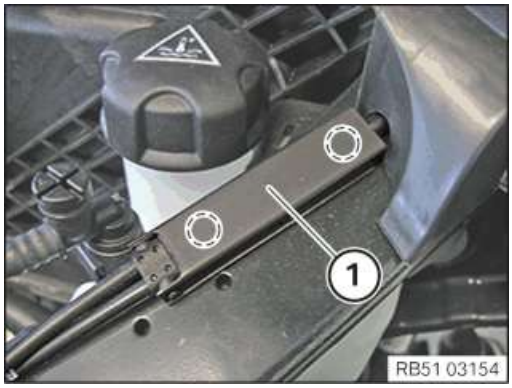


- Tighten the screws (2).

Cross connection, top

M6x20		Tightening torque	11,8 Nm

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



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

22 – Installing front-end strut on left and right

TECHNICAL INFORMATION

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

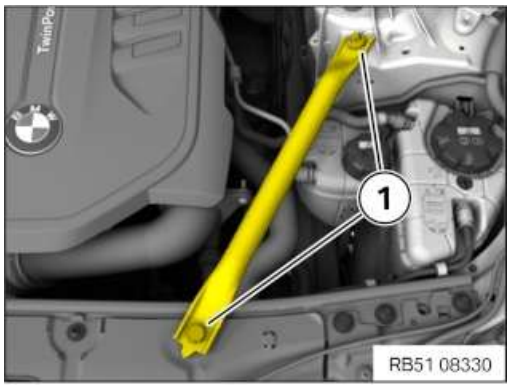
NOTICE

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

▸ **Installing the front-end strut**

NOTICE

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



- Position the front-end strut.
- Tighten the screws (1).

Front end strut

Screw		Tightening torque	56 Nm

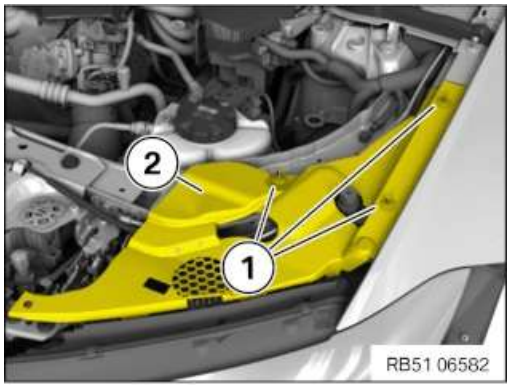
23 – If installed: Install the cover in the engine compartment at top left and right (partially removed)

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NOTICE

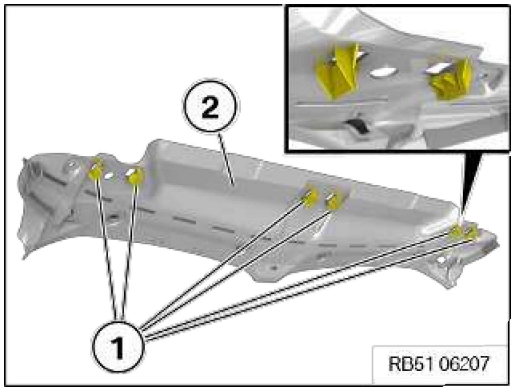
Description is for left component only. Procedure on the right side is identical.

▸ Installing the cover in the top engine compartment (partially removed)



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

24 – Installing the cover for the centre engine compartment



Check

- Check the latch mechanisms (1) of the cover (2) for damage.

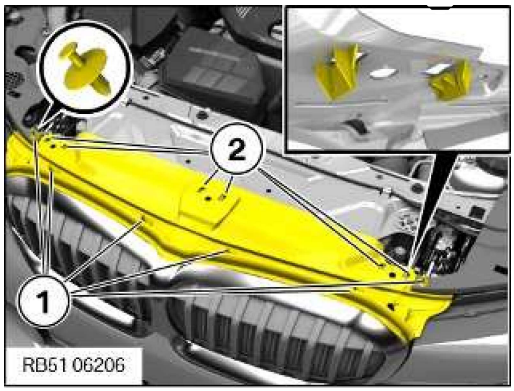
Result

» Latch mechanisms (1) are damaged.

Measure

- Replace the cover (2).

  Parts: Cover



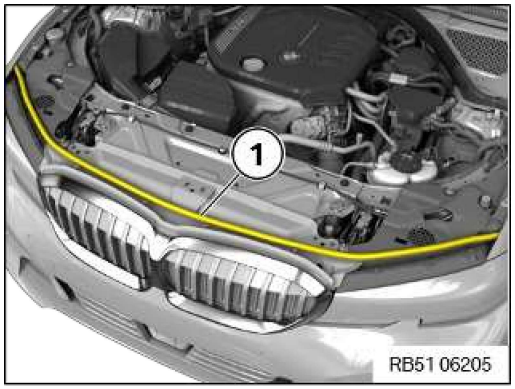
- Insert the cover from the rear and position it.
- Clip in the latch mechanisms (2).
- Mount all expanding rivets (1).

25 – Install the seal for the front bonnet

NOTICE

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

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

26 – Filling and bleed the high-temperature coolant circuit



TECHNICAL INFORMATION

It is **mandatory** to fill the cooling system before bleeding.

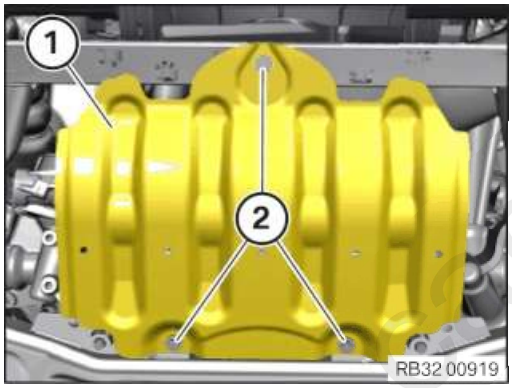
Fill **both** the circuits for high and low-temperature coolant circuits.

- See additional information.

27 – If installed: Install underbody protection of the steering

Prerequisite

Front underbody protection has been removed.



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

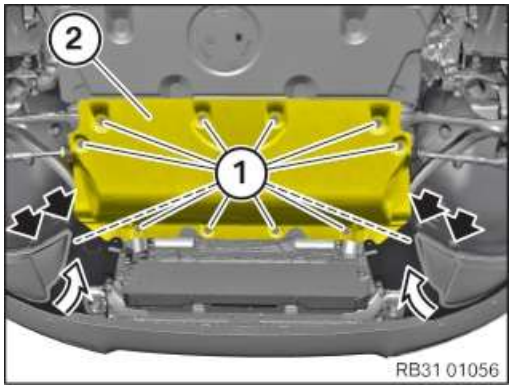
Underbody protection, steering, to front axle support

Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

28 – Install the underbody protection of the steering gear



- **Version A:**

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

  Tighten the screws (1).

Underbody protection of the steering gear

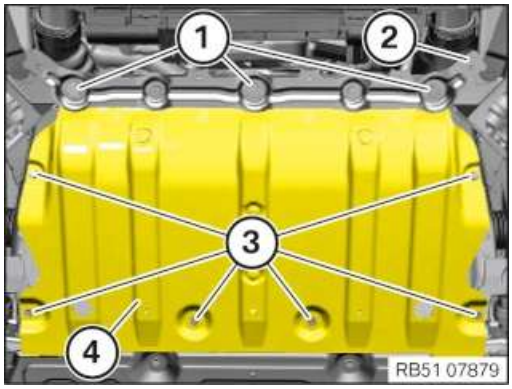
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the bottom wheel arch cover.

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

Wheel arch trim panel, front

Thermoplastic hexagon screw		Tightening torque	2,6 Nm



- **Version B:**

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

  Tighten the screws (3).

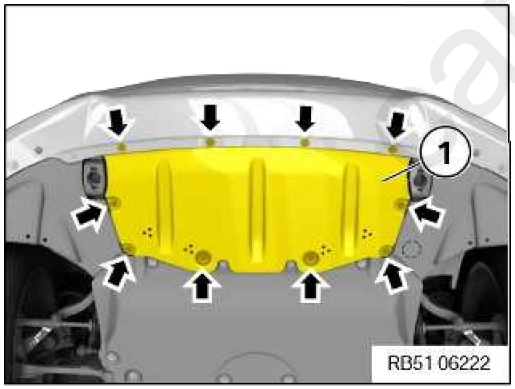
Underbody protection of the steering gear

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

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

  Tighten the screws (1).

29 – Installing the front underbody protection



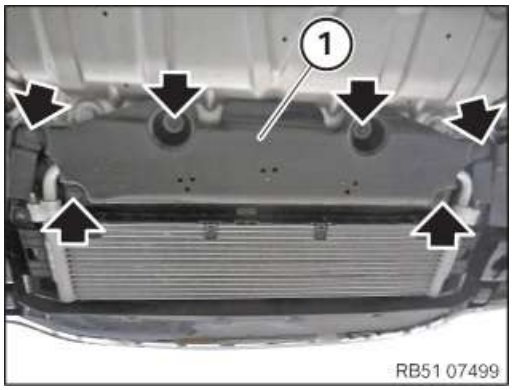
- **Version A:**

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

  Tighten screws (arrows).

Underbody protection front

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



- **Version B:**

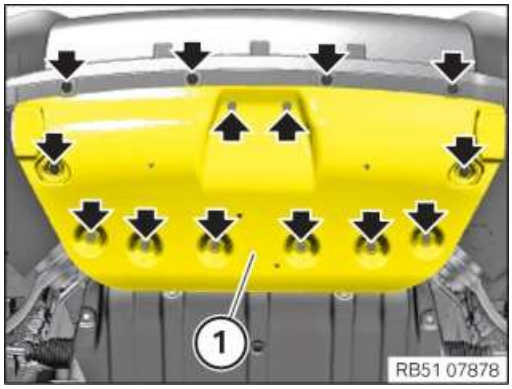
  Feed in and position the front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

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

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- **Version C:**

  Feed in and install front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

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

Additional Information

Overview of Tightening Torques

Radiator on holder — Used in step 15

D6x20 screw		Tightening torque	6 Nm

Cooling module cover on holder — Used in step 15

D6X20		Tightening torque	7 Nm

Clean air pipe to exhaust turbocharger — Used in step 18

M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing — Used in step 18

Clamp		Tightening torque	3 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

Front end strut — Used in step 22

Screw		Tightening torque	56 Nm

Underbody protection, steering, to front axle support — Used in step 27

Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support — Used in step 27

Hexagon bolt M6		Tightening torque	8 Nm

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Underbody protection of the steering gear Used in step 28

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

Wheel arch trim panel, front Used in step 28

Thermoplastic hexagon screw		Tightening torque	2,6 Nm

Underbody protection front Used in step 29

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

Links

Repair instructions	Used in step
17 00 ... Notes for working on cooling system.	14
17 00 008 Draining and topping up coolant for high-temperature circuit	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
17 00 008 Draining and topping up coolant for high-temperature circuit	26
17 00 008 Draining and topping up coolant for high-temperature circuit	26
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
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17 00 039 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
17 00 039 Bleeding the cooling system (B36, B38, B46, B48)	26
17 00 039 Bleeding cooling system (B37, B47)	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
17 00 039 Filling and bleeding the high-temperature cooling system vacuum filler device (B48)	26
17 00 008 Draining and topping up the high-temperature coolant circuit	26
17 00 008 Draining and topping up the high-temperature coolant circuit	26
17 00 016 Draining and topping up coolant circuit for Range Extender \PREMIUM	26
17 00 008 Draining and topping up the high-temperature coolant circuit	26
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	26
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
17 00 009 Check the cooling system for watertightness with a special tool (with a tester)	26
17 00 009 Check the cooling system for watertightness with a special tool (with a tester)	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
17 00 008 Draining and topping up coolant for high-temperature circuit	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
17 00 008 Draining and topping up coolant for high-temperature circuit	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26

Operating materials	**Used in step**

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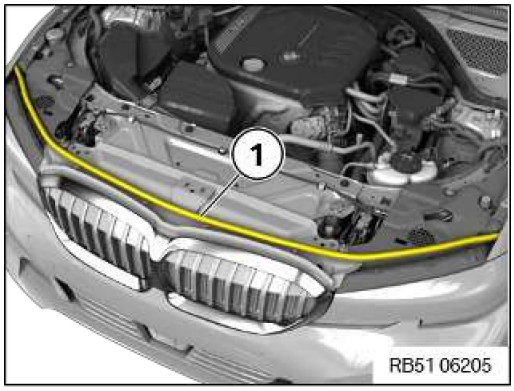
17 11 000 Removing and installing coolant radiator

PRELIMINARY WORK

1 – Remove the seal for the bonnet in front

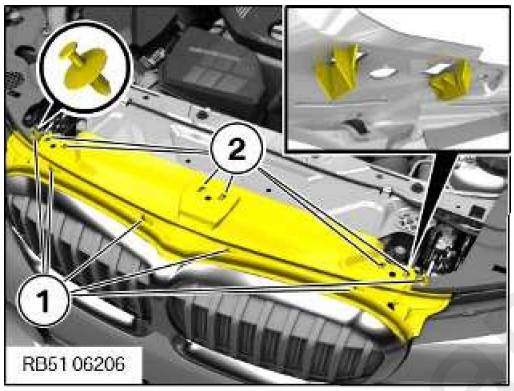
NOTICE

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



- Pull offfront bonnet seal (1) upwards.

2 – Removing the centre engine compartment cover



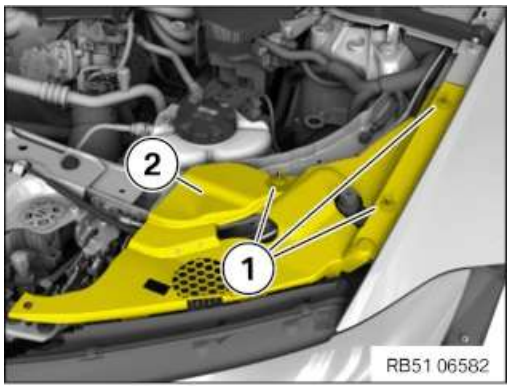
- Detach all expanding rivets (1).
- Release the cover at the latch mechanisms (2) and feed it out to the rear.

3 – If installed: 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 cover (2) at the top of the engine compartment.

4 – Removing left and right front-end strut

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4 – Removing left and right front-end strut

NOTICE

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

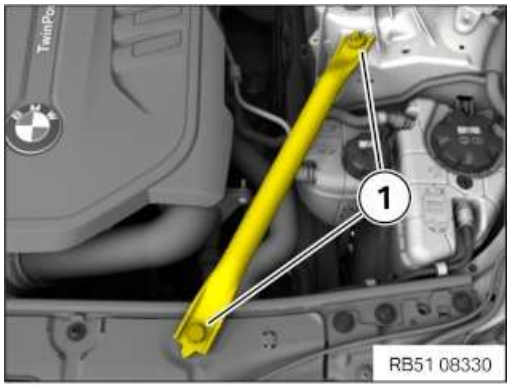
▸ **Removing the front-end strut**

TECHNICAL INFORMATION

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

NOTICE

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

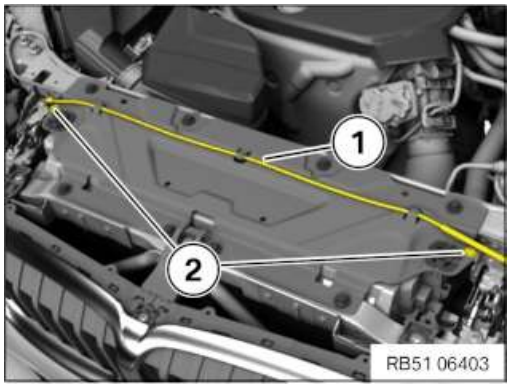


- Loosen screws (1).
- Remove the front-end strut.

5 – Removing the top cross connection

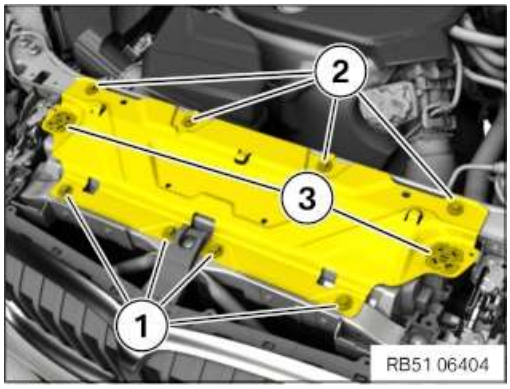


- Release housing (1) for the coupling of the Bowden cables from the body.



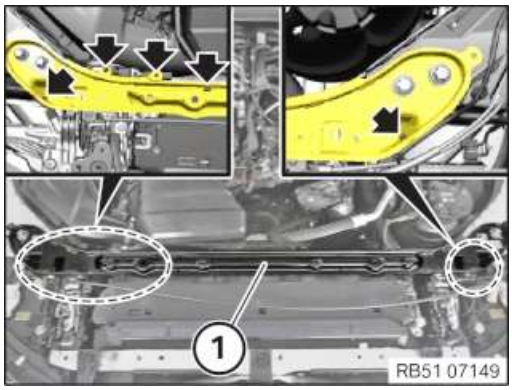
- Detach Bowden cable (1) at the top cross connection.
- Loosen screws (2).

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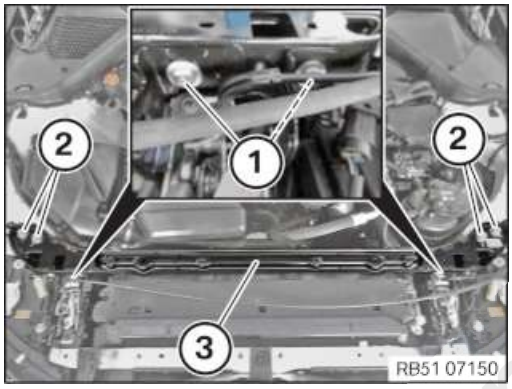


- Loosen screws (1) and (2).
- Remove the top cross connection with holders (3) to the top.

6 – Remove the rear top cross connection



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

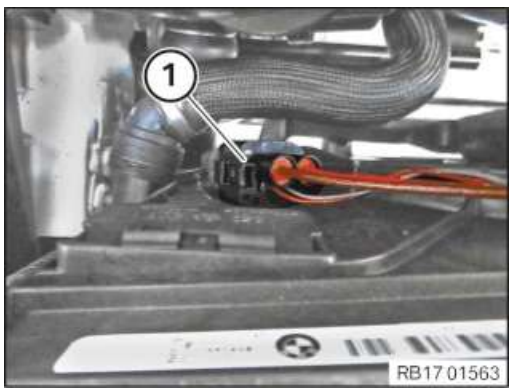


- Loosen screws (1).
- Loosen screws (2).
- Guide out and remove top rear cross connection (3).

7 – Removing the fan cowl

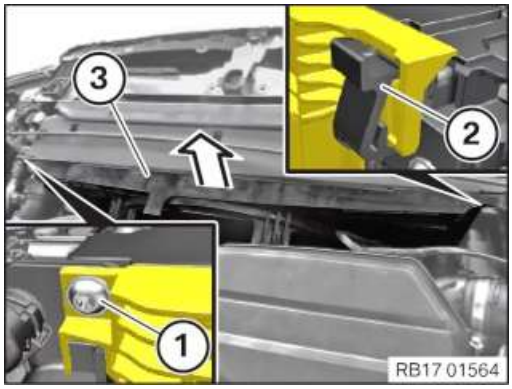
TECHNICAL INFORMATION

- 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!



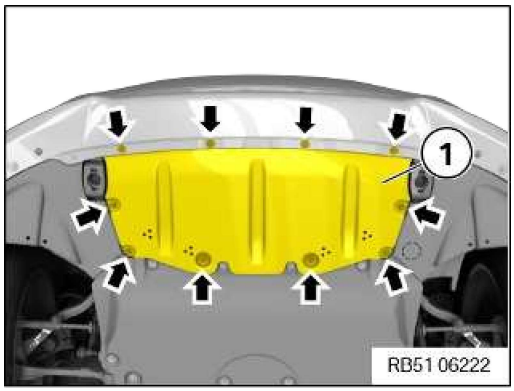
- Unlock plug connection (1) and disconnect.

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

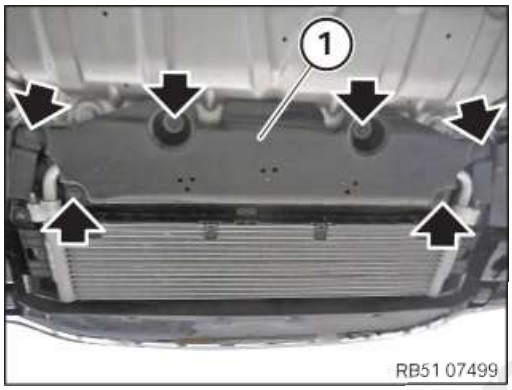
8 – Removing the front underbody protection



- **Version A:**

  Remove screws (arrows).

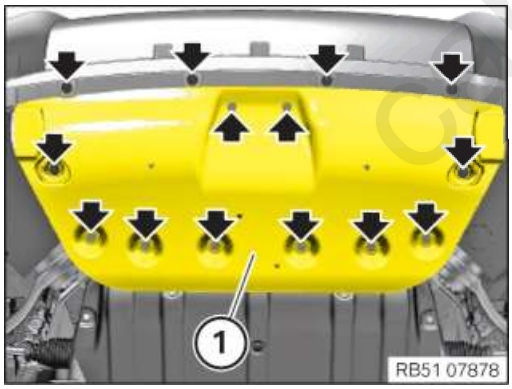
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version B:**

  Remove screws (arrows).

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

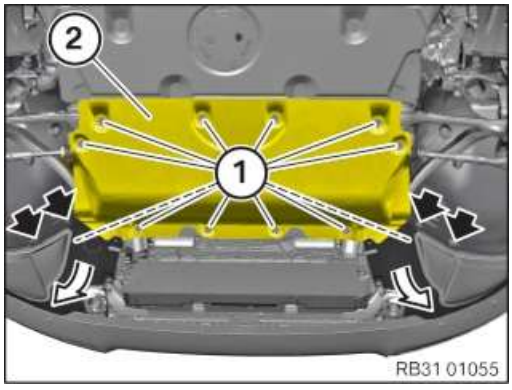


- **Version C:**

  Remove screws (arrows).

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

9 – Remove the underbody protection of the steering gear



- **Version A:**

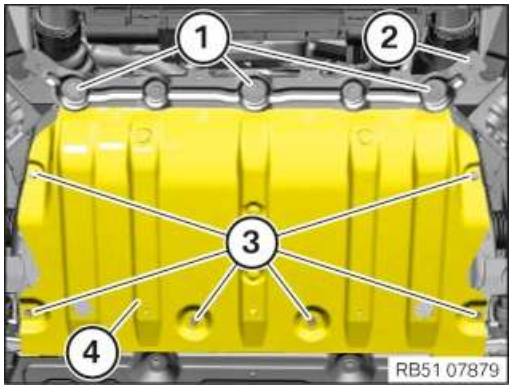
  Unscrew the screws (arrows) of the wheel arch cover on the wheel arch cover.

  Fold the bottom wheel arch cover to the side.

  Loosen screws (1).

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

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- **Version B:**

  Loosen screws (1).

  Remove the holder (2) for the underride protection.

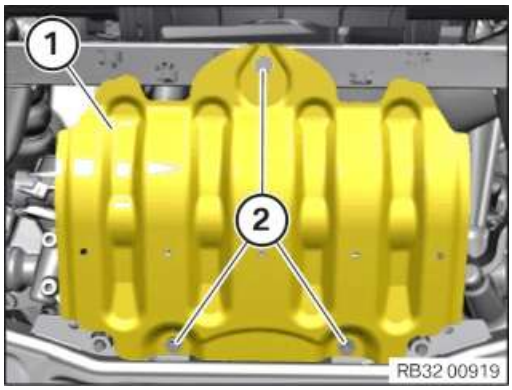
  Loosen screws (3).

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

10 – If installed: Removing the steering underbody protection

Prerequisite

Front underbody protection has been removed.



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

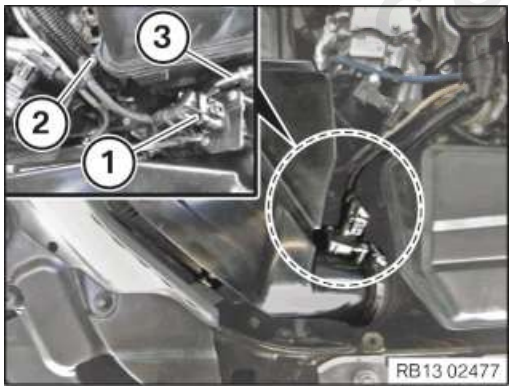
11 – Removing the clean air pipe with the resonator

WARNING

Hot surfaces.

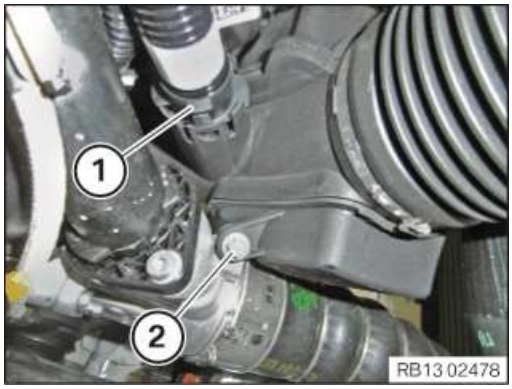
Risk of burning!

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

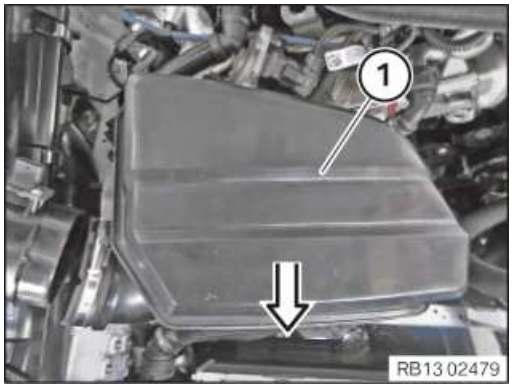


- Unlock plug connection (1) and disconnect.
- Loosen clamp (2).
- Unfasten clamp (3).
- Separate the clean air pipe with resonator from the intake filter housing.

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



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



- Unlock and loosen clamp (1).



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

12 – Draining coolant

WARNING

Hot fluids.

Risk of scalding!

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

.com

CAUTION

Materials harmful to health.

Contact with fluids harmful to health!

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

TECHNICAL INFORMATION

Life-long fill of coolant!

Do not reuse used coolant.

When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be emptied and refilled.

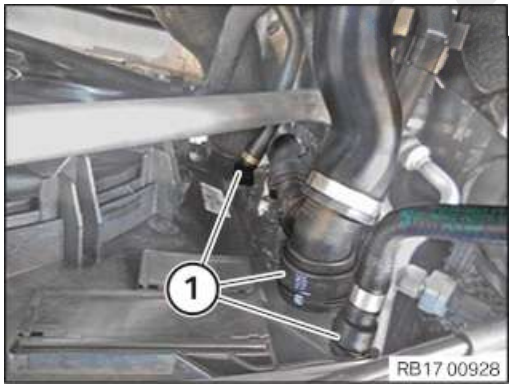
In the case of other removal work involving the draining of part quantities of coolant, the coolant level must be topped up with new coolant.

TECHNICAL INFORMATION

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



- Loosen sealing cap (1) from the coolant expansion tank.



NOTICE

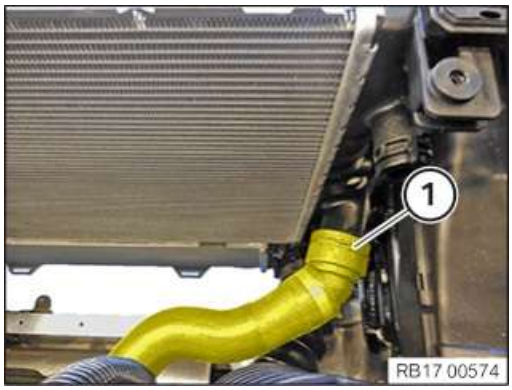
Schematic diagram is for example purposes. Some parts may differ in certain details.

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



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

13 – Releasing the coolant line at the radiator, right



- Unlock and disconnect coolant line (1) and place it aside.
- Catch and dispose of escaping coolant.

MAIN WORK

14 – Removing the radiator

WARNING

Hot surfaces.

Risk of burning!

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

CAUTION

Materials harmful to health.

Contact with fluids harmful to health!

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

TECHNICAL INFORMATION

Life-long fill of coolant!

Do not reuse used coolant.

When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be emptied and refilled.

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

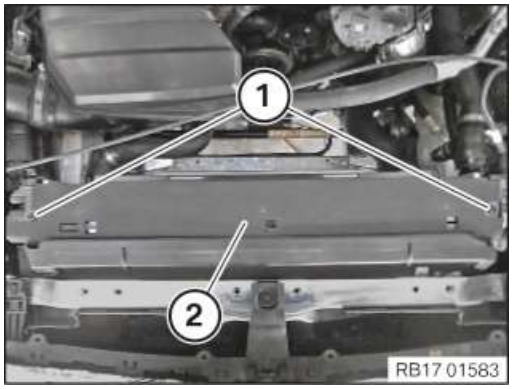
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TECHNICAL INFORMATION

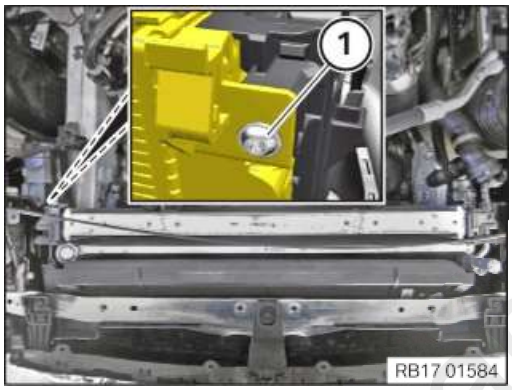
Follow notes for repair work on the cooling system.
For additional information see:
Main group 17
17 00 ... Notes for working on the cooling system

TECHNICAL INFORMATION

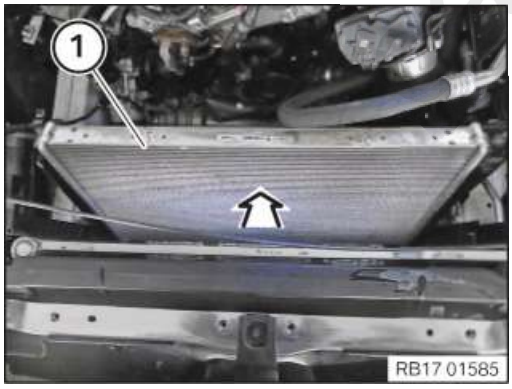
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



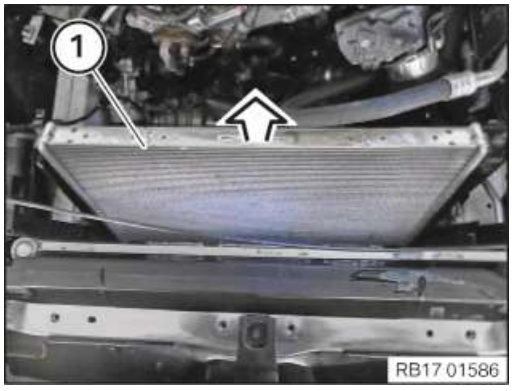
- Loosen screws (1).
- Guide out and remove top cover (2).



- Loosen screw (1).



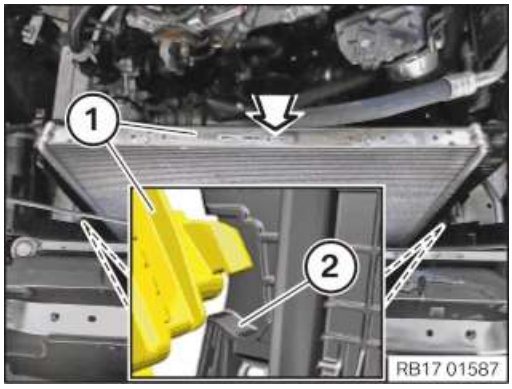
- Tilt radiator (1) towards the rear in the direction of the arrow.



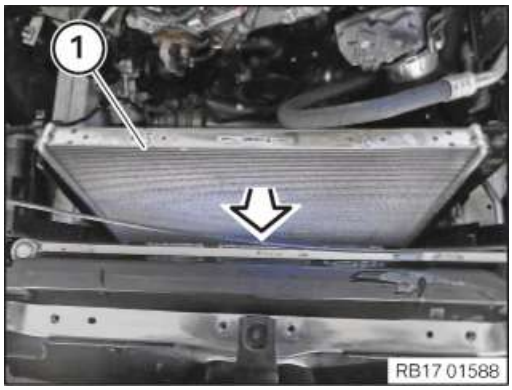
- Guide out and remove radiator (1) upwards in the direction of the arrow.

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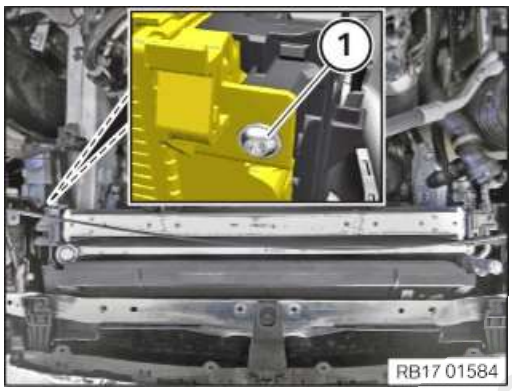
15 – Install radiator



- Feed in radiator (1) downwards in direction of arrow.
- Make sure the radiator (1) is fed in the mountings (2).



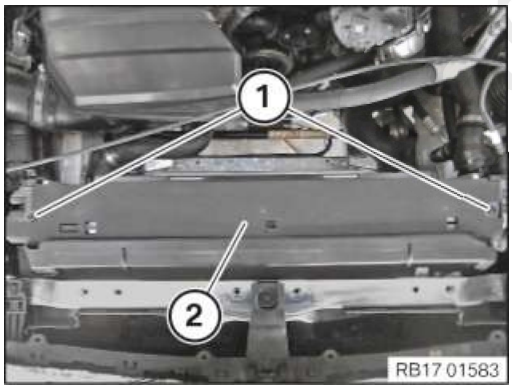
- Bring the radiator (1) in the front to the system in direction of arrow.



- Tighten down screw (1).

Radiator on holder

D6x20 screw		Tightening torque	6 Nm



- Feed in and install the cover (2) on the top.
- Tighten the screws (1).

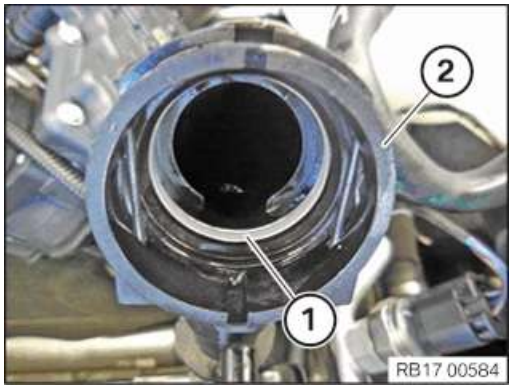
Cooling module cover on holder

D6X20		Tightening torque	7 Nm

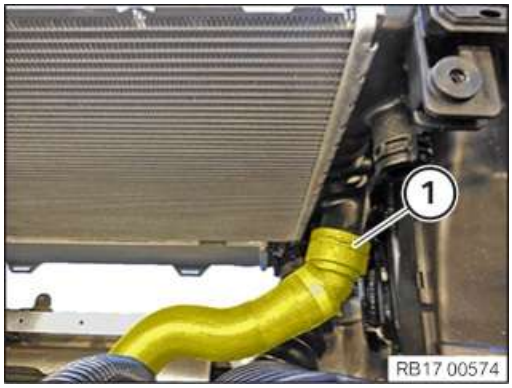
POSTPROCESSES

16 – Securing the coolant line to the right radiator

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



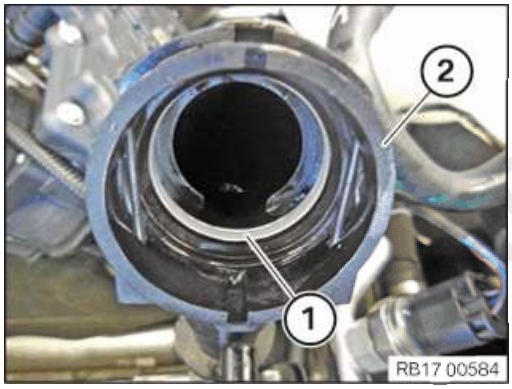
- Connect and lock the coolant line (1).

  The coolant line (1) must audibly engage.

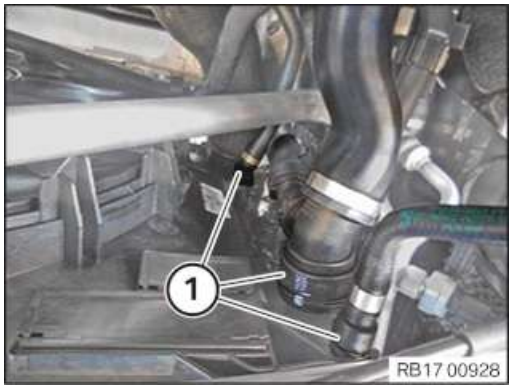
17 – Connecting the coolant lines

TECHNICAL INFORMATION

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



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



NOTICE

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

- Connect and lock the coolant lines (1).

  The coolant lines (1) must engage audibly.



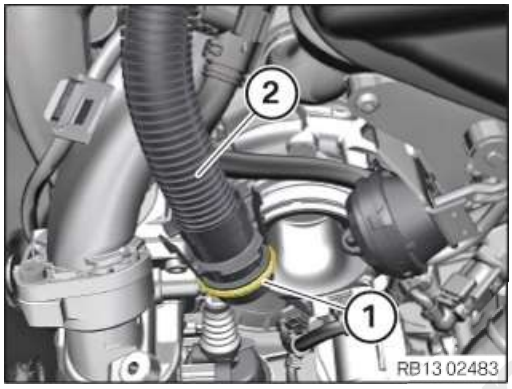
- Connect and lock coolant line (1).

  The coolant line (1) must audibly engage.

18 – Installing the clean air pipe with resonator



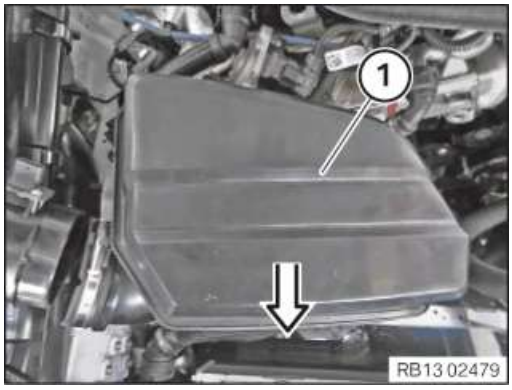
- Check the sealing ring (1) on the exhaust turbocharger for damage and renew if necessary.



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



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



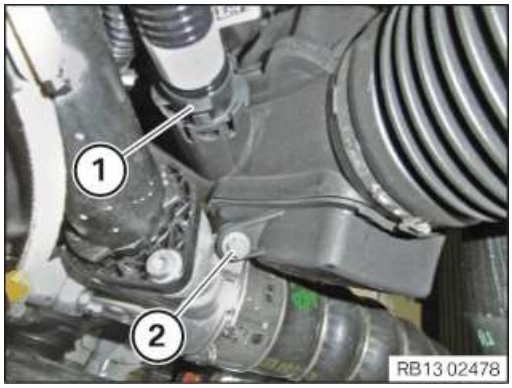
- Press and hold clean air pipe with resonator (1) in the direction of the arrow.

.diagn.com



- Attach and lock the clamp (1).

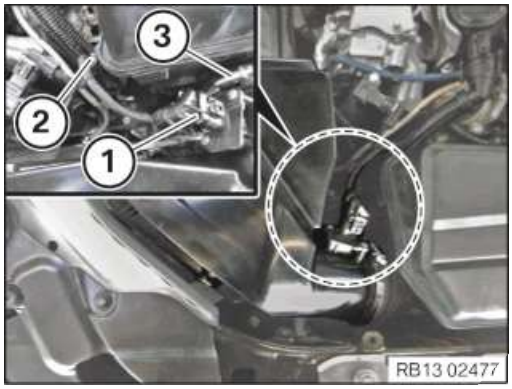
  The clamp (1) must engage audibly.



- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm



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

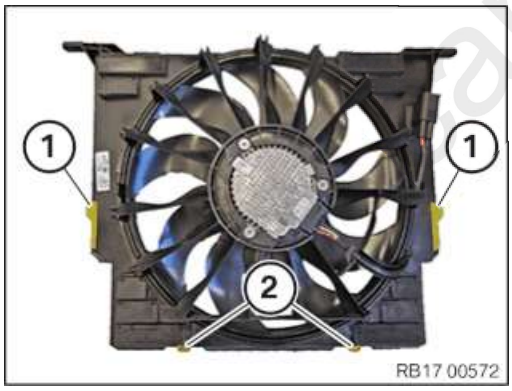
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

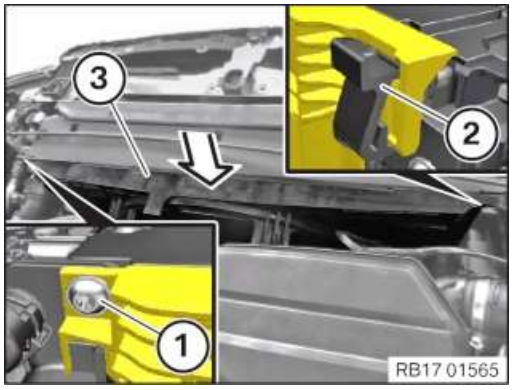
- Secure clamps (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

19 – Install fan cowl



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

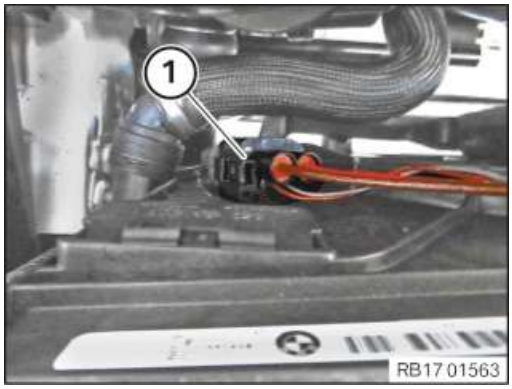


- Guide the fan cowl (3) in **carefully** in the direction of the arrow and install.
- Make sure that the lock (2) engages audibly.
- Tighten down screw (1).

Fan cowl with electric fan on radiator

TS6x20		Tightening torque	6,5 Nm

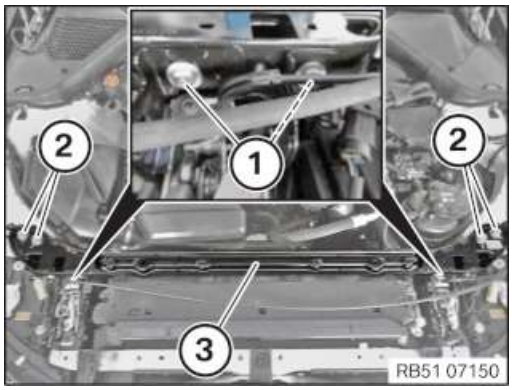
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- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

20 – 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

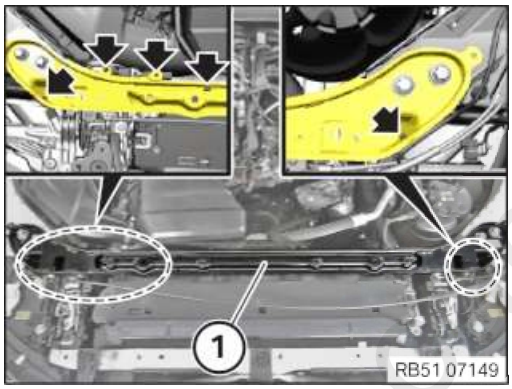
Flat-head screw M6x20		Tightening torque	11,8 Nm

- Renew screws (2).

  Parts: Bolts
- Tighten the screws (2).

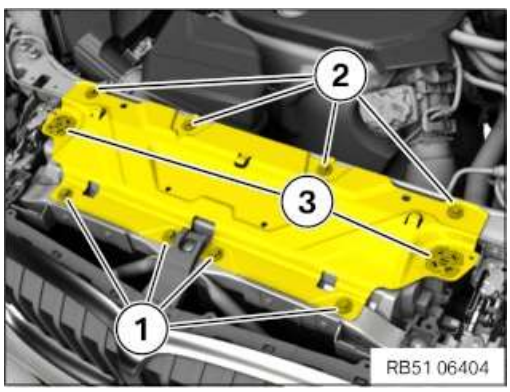
Rear top cross connection to wheel arch carrier support

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).

21 – Installing the top cross connection

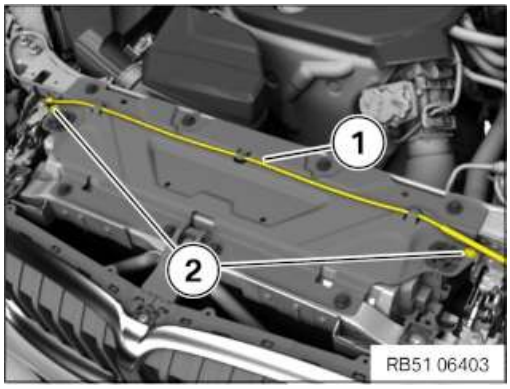


- Set and position the upper cross connection with holders (3) from above.
- Tighten screws (1) and (2).

Cross connection, top

M8x20		Tightening torque	28 Nm

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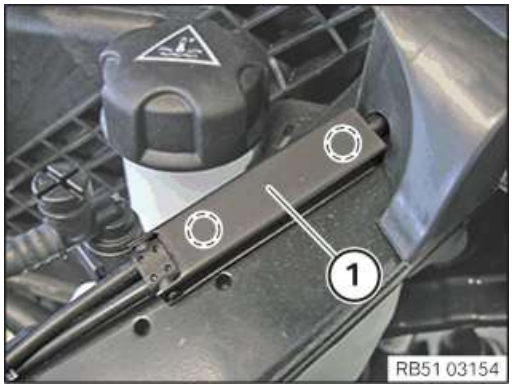


- Tighten the screws (2).

Cross connection, top

M6x20		Tightening torque	11,8 Nm

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



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

22 – Installing front-end strut on left and right

TECHNICAL INFORMATION

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

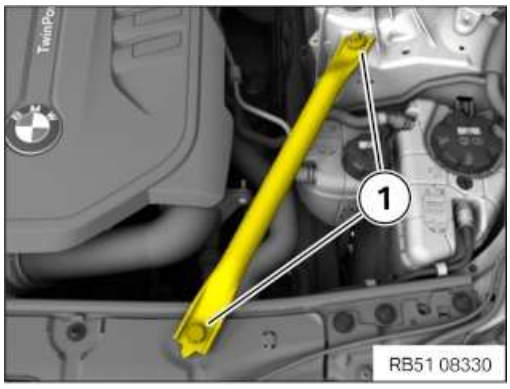
NOTICE

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

▸ **Installing the front-end strut**

NOTICE

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



- Position the front-end strut.
- Tighten the screws (1).

Front end strut

Screw		Tightening torque	56 Nm

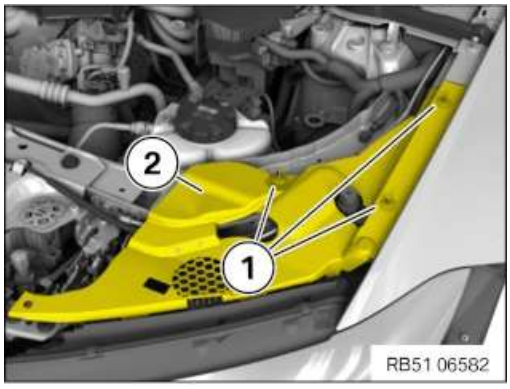
23 – If installed: Install the cover in the engine compartment at top left and right (partially removed)

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NOTICE

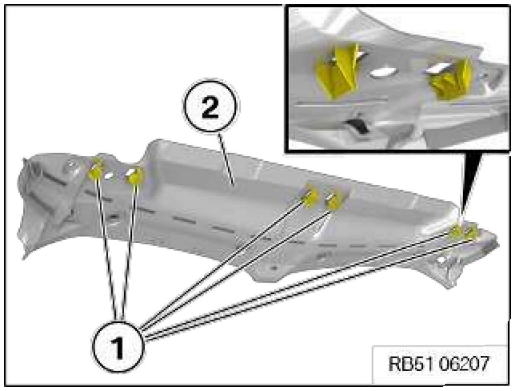
Description is for left component only. Procedure on the right side is identical.

▸ Installing the cover in the top engine compartment (partially removed)



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

24 – Installing the cover for the centre engine compartment



Check

- Check the latch mechanisms (1) of the cover (2) for damage.

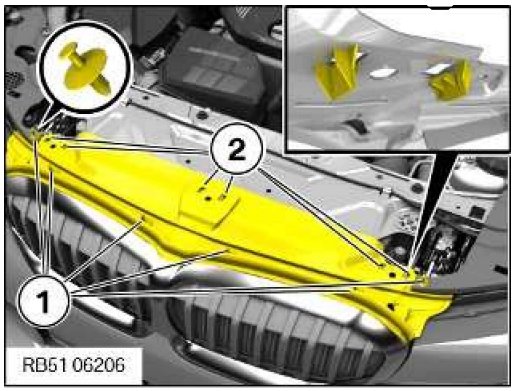
Result

» Latch mechanisms (1) are damaged.

Measure

- Replace the cover (2).

  Parts: Cover



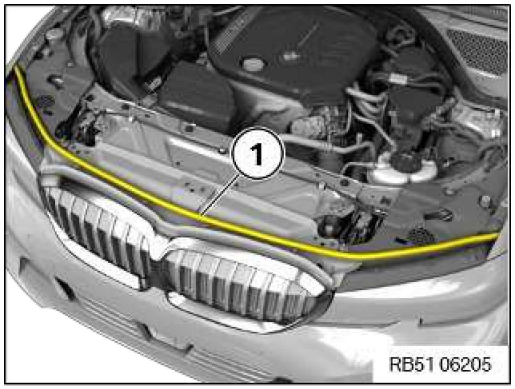
- Insert the cover from the rear and position it.
- Clip in the latch mechanisms (2).
- Mount all expanding rivets (1).

25 – Install the seal for the front bonnet

NOTICE

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

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

26 – Filling and bleed the high-temperature coolant circuit



TECHNICAL INFORMATION

It is **mandatory** to fill the cooling system before bleeding.

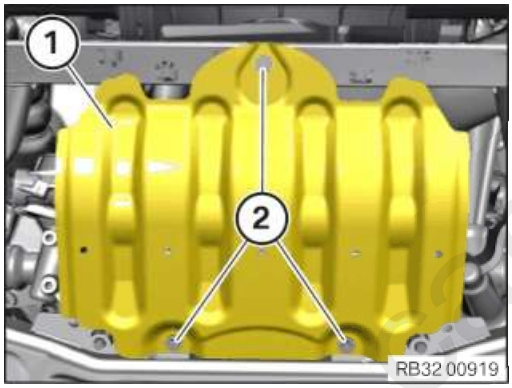
Fill **both** the circuits for high and low-temperature coolant circuits.

- See additional information.

27 – If installed: Install underbody protection of the steering

Prerequisite

Front underbody protection has been removed.



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

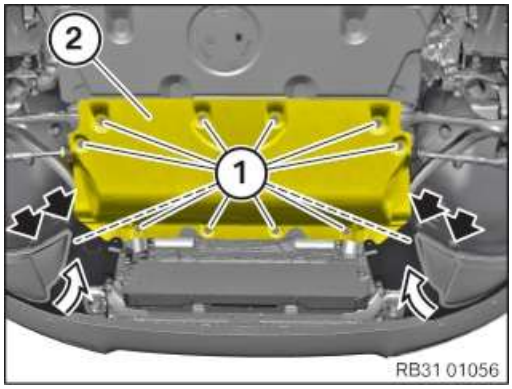
Underbody protection, steering, to front axle support

Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

28 – Install the underbody protection of the steering gear



- **Version A:**

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

  Tighten the screws (1).

Underbody protection of the steering gear

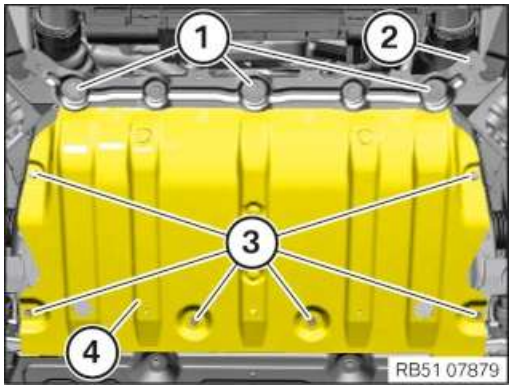
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the bottom wheel arch cover.

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

Wheel arch trim panel, front

Thermoplastic hexagon screw		Tightening torque	2,6 Nm



- **Version B:**

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

  Tighten the screws (3).

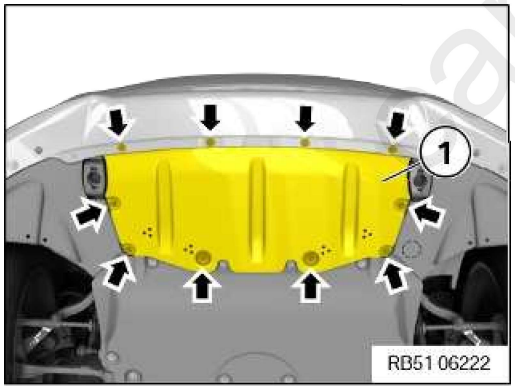
Underbody protection of the steering gear

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

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

  Tighten the screws (1).

29 – Installing the front underbody protection



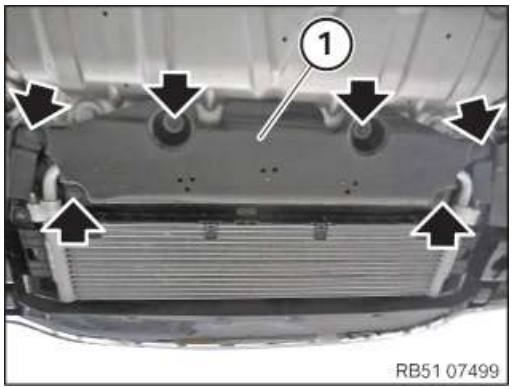
- **Version A:**

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

  Tighten screws (arrows).

Underbody protection front

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



- **Version B:**

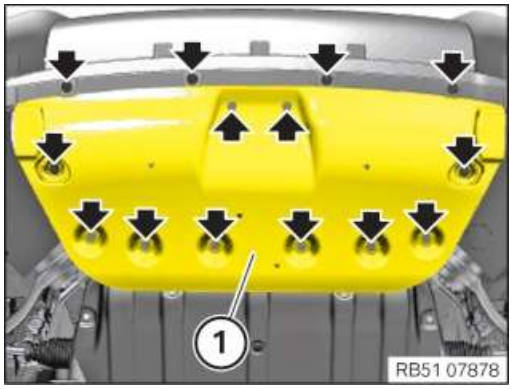
  Feed in and position the front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

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

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- **Version C:**

  Feed in and install front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

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

Additional Information

Overview of Tightening Torques

Radiator on holder — Used in step 15

D6x20 screw		Tightening torque	6 Nm

Cooling module cover on holder — Used in step 15

D6X20		Tightening torque	7 Nm

Clean air pipe to exhaust turbocharger — Used in step 18

M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing — Used in step 18

Clamp		Tightening torque	3 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

Front end strut — Used in step 22

Screw		Tightening torque	56 Nm

Underbody protection, steering, to front axle support — Used in step 27

Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support — Used in step 27

Hexagon bolt M6		Tightening torque	8 Nm

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Underbody protection of the steering gear Used in step 28

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

Wheel arch trim panel, front Used in step 28

Thermoplastic hexagon screw		Tightening torque	2,6 Nm

Underbody protection front Used in step 29

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

Links

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17 00 ... Notes for working on cooling system.	14
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
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17 00 039 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
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17 00 009 Check the cooling system for watertightness with a special tool (with a tester)	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
17 00 008 Draining and topping up coolant for high-temperature circuit	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
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17 00 008 Draining and topping up coolant for high-temperature circuit	26
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	26

Operating materials	**Used in step**

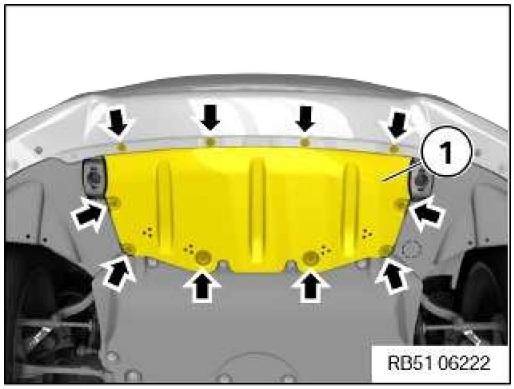
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17 11 100 Removing and installing/replacing coolant expansion tank

PRELIMINARY WORK

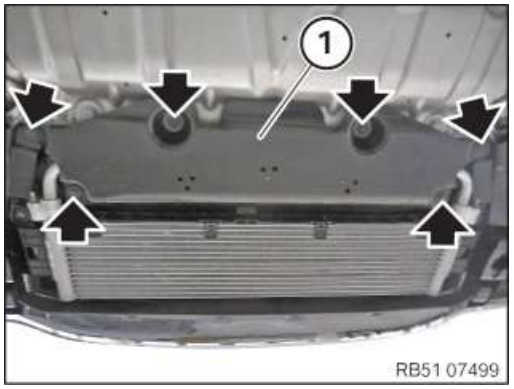
1 – Removing the front underbody protection



- **Version A:**

  Remove screws (arrows).

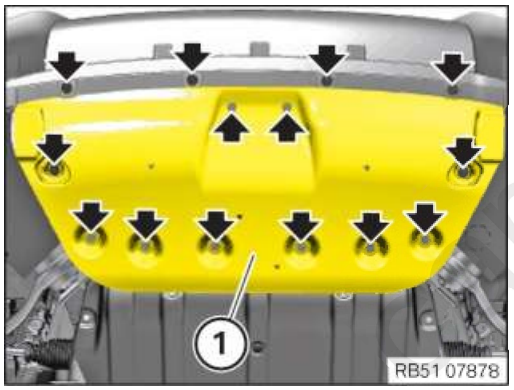
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version B:**

  Remove screws (arrows).

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

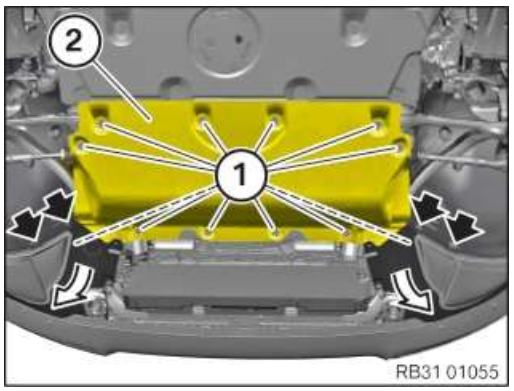


- **Version C:**

  Remove screws (arrows).

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

2 – Remove the underbody protection of the steering gear



- **Version A:**

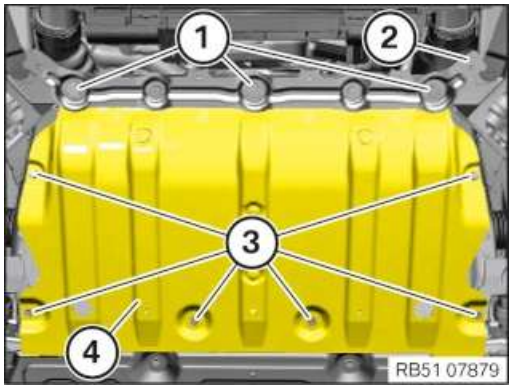
  Unscrew the screws (arrows) of the wheel arch cover on the wheel arch cover.

  Fold the bottom wheel arch cover to the side.

  Loosen screws (1).

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

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- **Version B:**

  Loosen screws (1).

  Remove the holder (2) for the underride protection.

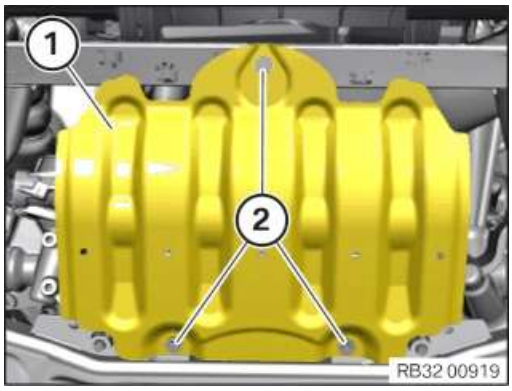
  Loosen screws (3).

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

3 – If installed: Removing the steering underbody protection

Prerequisite

Front underbody protection has been removed.



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

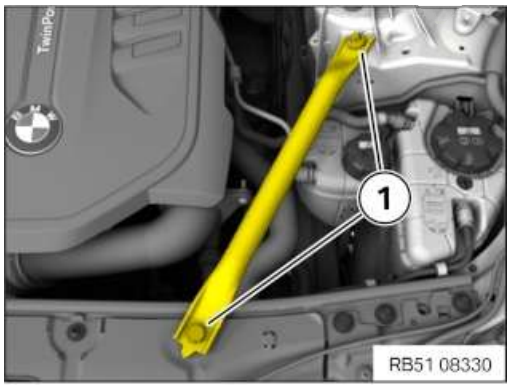
4 – Removing the front-end strut

TECHNICAL INFORMATION

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

NOTICE

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



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

MAIN WORK

5 – Remove coolant expansion tank

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CAUTION

Materials harmful to health.

Contact with fluids harmful to health!

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

TECHNICAL INFORMATION

Life-long fill of coolant!

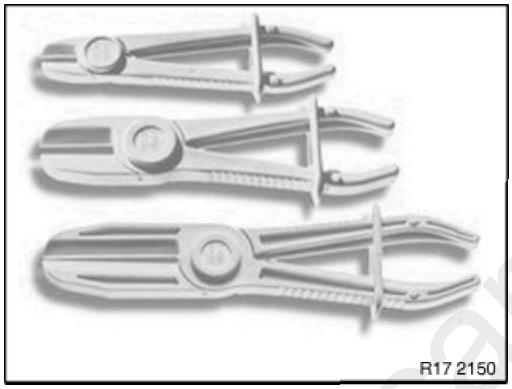
Do not reuse used coolant.

When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be emptied and refilled.

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

TECHNICAL INFORMATION

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



- Use commercially available disconnection tools to pinch off the coolant lines.

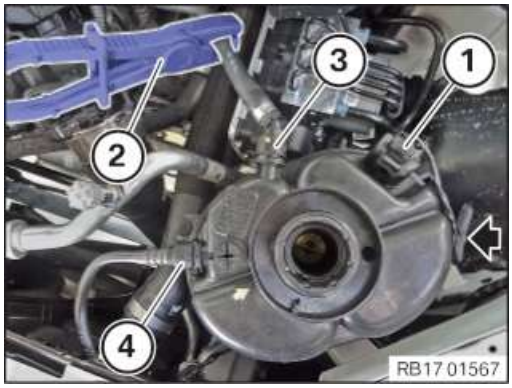


- Use commercially available syringe (1) or suitable tool to draw off coolant expansion tank.

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- Open the lid (1) on the coolant expansion tank.
- Draw off coolant using **standard pump** from the coolant expansion tank and dispose of it.



- Unlock plug connection (1) and disconnect.

TECHNICAL INFORMATION

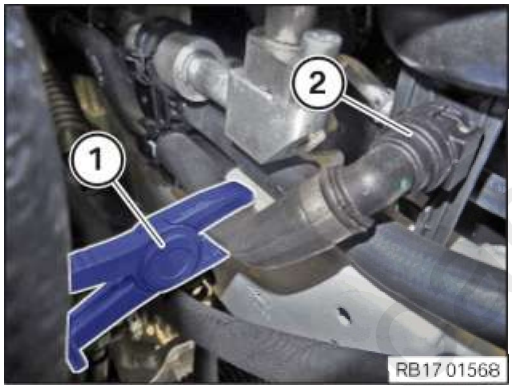
Only flexible hose pipes may be disconnected.

- Disconnect the coolant line (3) using standard disconnection tool (2).
- Unlock and disconnect the coolant line (3).

NOTICE

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

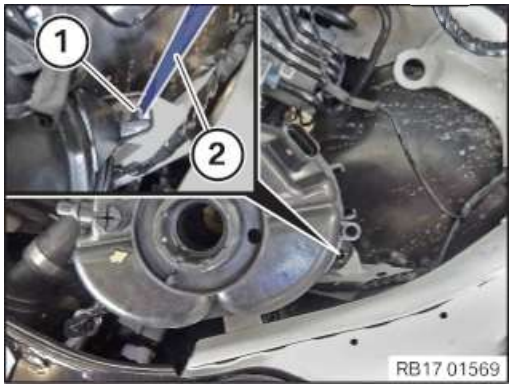
- Unlock and disconnect the coolant line (4).



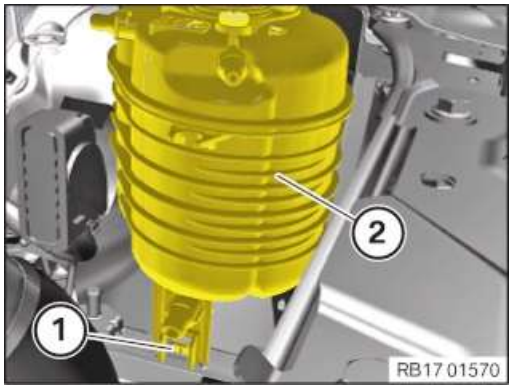
TECHNICAL INFORMATION

Only flexible hose pipes may be disconnected.

- Disconnect the coolant line (2) using standard disconnection tool (1).
- Unlock and disconnect the coolant line (2).



- Unlock the lock (1) with a suitable screwdriver (2).



- Unlock lock (1).
- Thread out coolant expansion tank (2) and remove.

6 – Installing coolant expansion tank

CAUTION

Materials harmful to health.

Contact with fluids harmful to health!

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

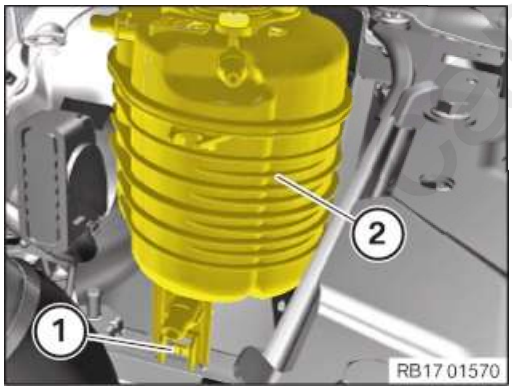
TECHNICAL INFORMATION

Life-long fill of coolant!

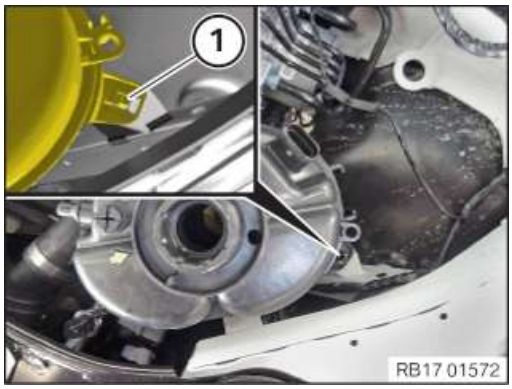
Do not reuse used coolant.

When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be emptied and refilled.

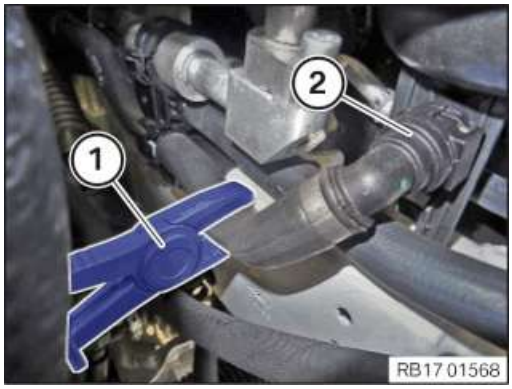
In the case of other removal work involving the draining of part quantities of coolant, the coolant level must be topped up with new coolant.



- Feed in and install coolant expansion tank (2).
- Ensure that the lock (1)engages audibly.

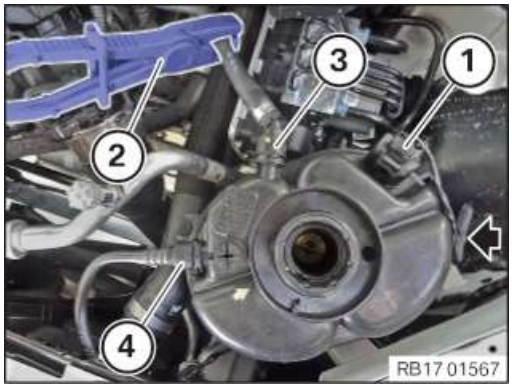


- Ensure that the lock (1)engages audibly.



- Connect and lock the coolant line (2).

  The coolant line (2) must audibly engage.
- Remove conventional disconnection tool(1).



NOTICE

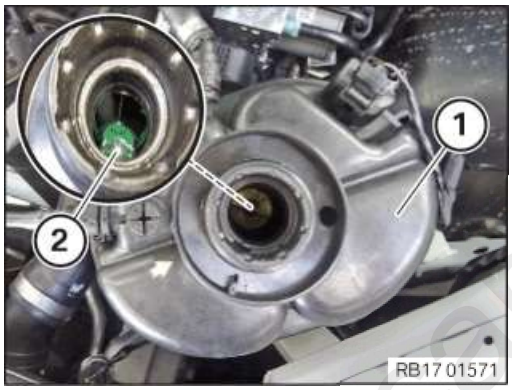
The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

- Connect and lock the coolant line (4).

  The coolant line (4) must audibly engage.
- Connect and lock the coolant line (3).

  The coolant line (3) must audibly engage.
- Remove conventional disconnection tool(2).
- 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

- Fill up coolant expansion tank (1) with coolant upto **max. mark** (2).



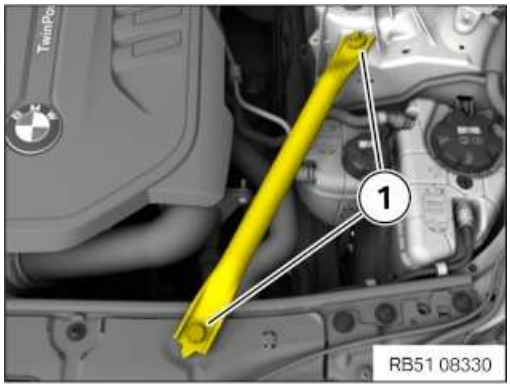
- Close the sealing cap (1) until the **arrows** are flush.

POSTPROCESSES

7 – Installing the front-end strut

NOTICE

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



- Position the front-end strut.
- Tighten the screws (1).

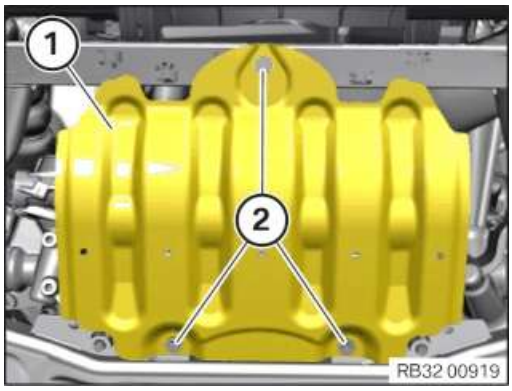
Front end strut

Screw		Tightening torque	56 Nm

8 – If installed: Install underbody protection of the steering

Prerequisite

Front underbody protection has been removed.



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

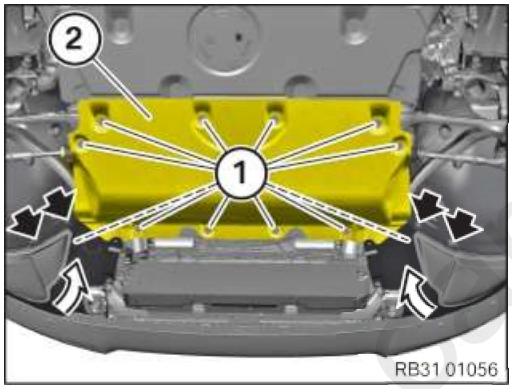
Underbody protection, steering, to front axle support

Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

9 – Install the underbody protection of the steering gear



- **Version A:**

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

  Tighten the screws (1).

Underbody protection of the steering gear

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

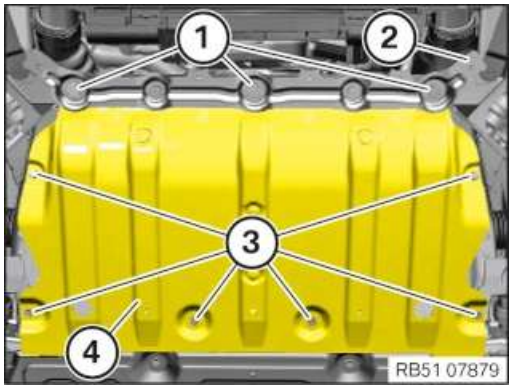
- Position the bottom wheel arch cover.

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

Wheel arch trim panel, front

Thermoplastic hexagon screw		Tightening torque	2,6 Nm

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- **Version B:**

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

  Tighten the screws (3).

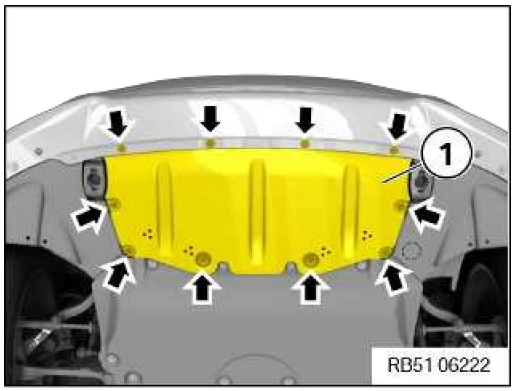
Underbody protection of the steering gear

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

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

  Tighten the screws (1).

10 – Installing the front underbody protection



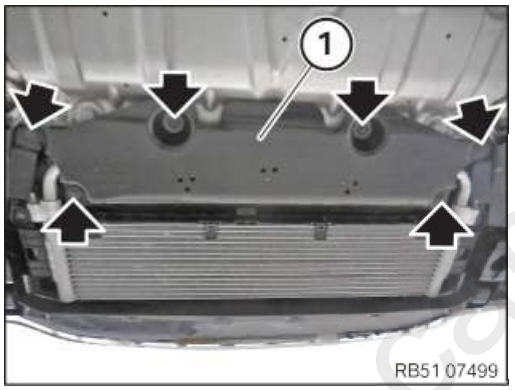
- **Version A:**

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

  Tighten screws (arrows).

Underbody protection front

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



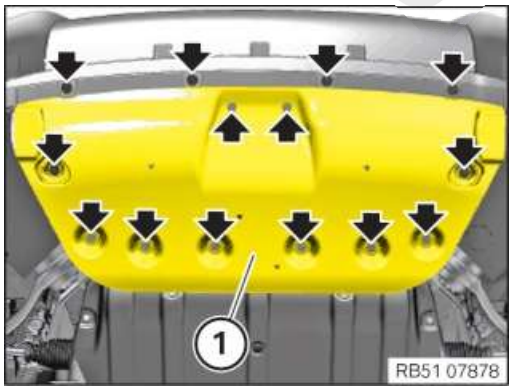
- **Version B:**

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

  Tighten screws (arrows).

Underbody protection front

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



- **Version C:**

  Feed in and install front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

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

Additional Information

Overview of Tightening Torques

Front end strut Used in step 7

Screw		Tightening torque	56 Nm

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Underbody protection, steering, to front axle support			Used in step 8
Multi-purpose boltM10		Tightening torque	56 Nm

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

Underbody protection of the steering gear			Used in step 9
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

Wheel arch trim panel, front			Used in step 9
Thermoplastic hexagon screw		Tightening torque	2,6 Nm

Underbody protection front			Used in step 10
Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Links

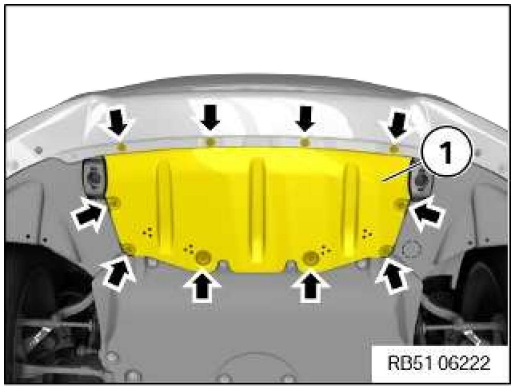
Operating materials	Used in step
Main group 17	6

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17 11 100 Removing and installing/replacing coolant expansion tank

PRELIMINARY WORK

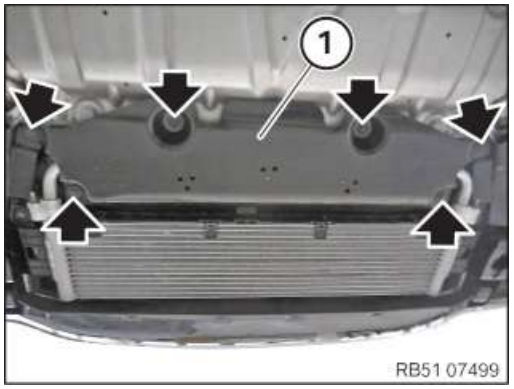
1 – Removing the front underbody protection



- **Version A:**

  Remove screws (arrows).

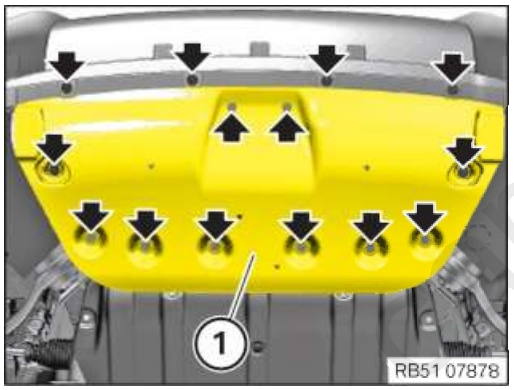
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version B:**

  Remove screws (arrows).

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

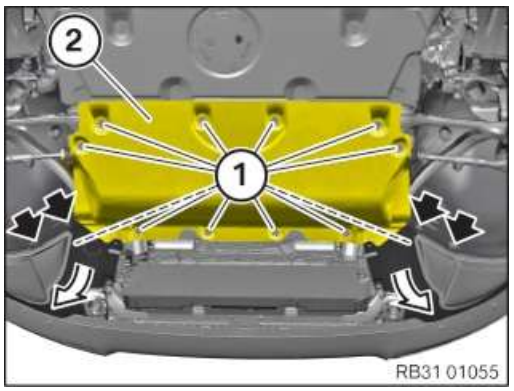


- **Version C:**

  Remove screws (arrows).

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

2 – Remove the underbody protection of the steering gear



- **Version A:**

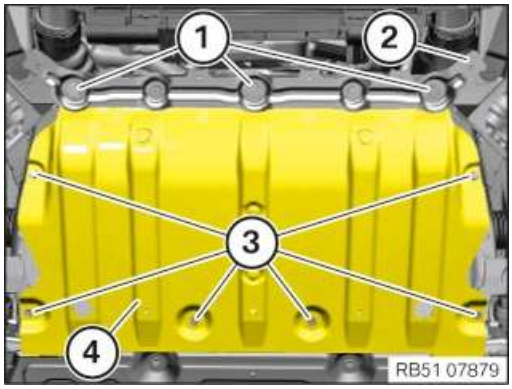
  Unscrew the screws (arrows) of the wheel arch cover on the wheel arch cover.

  Fold the bottom wheel arch cover to the side.

  Loosen screws (1).

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

mdiagn.com



- **Version B:**

  Loosen screws (1).

  Remove the holder (2) for the underride protection.

  Loosen screws (3).

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

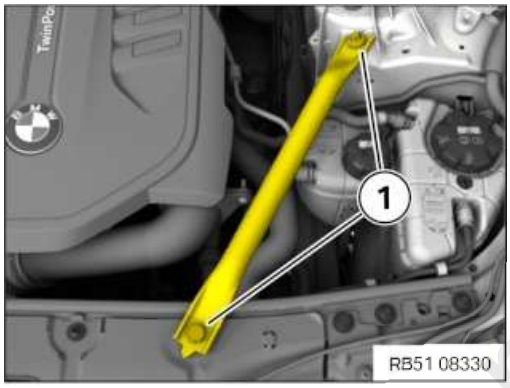
3 – Removing the front-end strut

TECHNICAL INFORMATION

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

NOTICE

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



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

MAIN WORK

4 – Removing coolant expansion tank of high-temperature coolant circuit

CAUTION

Materials harmful to health.

Contact with fluids harmful to health!

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

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TECHNICAL INFORMATION

Life-long fill of coolant!

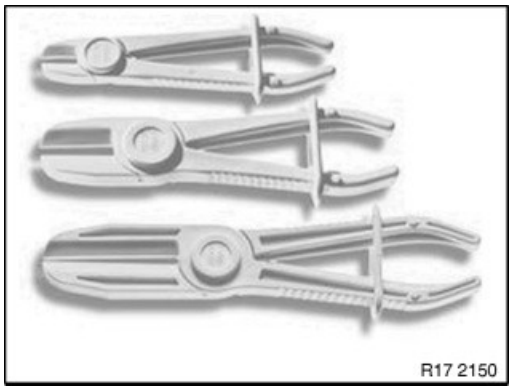
Do not reuse used coolant.

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

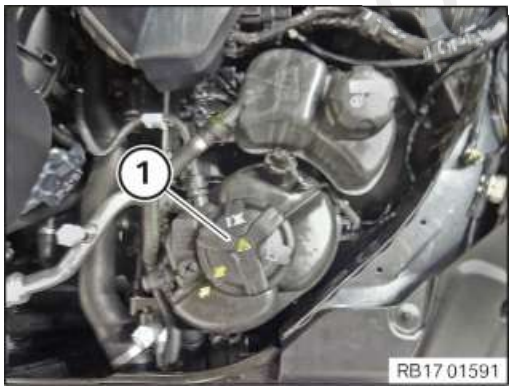
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Use commercially available disconnection tools to pinch off the coolant lines.

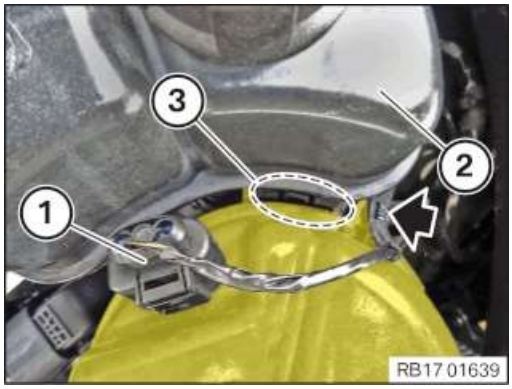


- Use commercially available syringe (1) or suitable tool to draw off coolant expansion tank.



- Open the lid (1) on the coolant expansion tank for the high-temperature coolant circuit.
- Draw off coolant using **standard pump** from the coolant expansion tank for high-temperature coolant circuit and dispose of it.

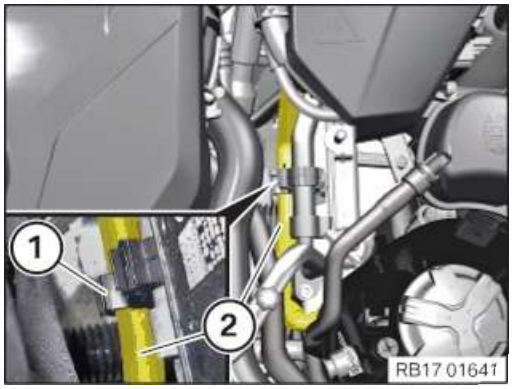
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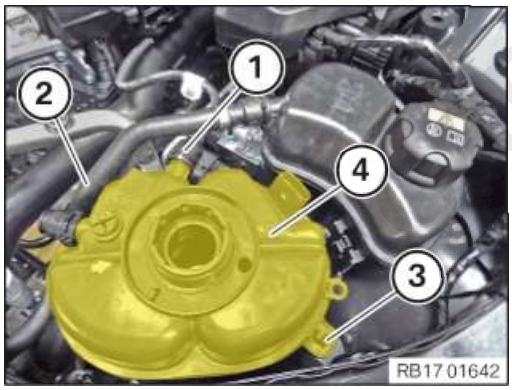
- Unlock plug connection (1) and disconnect.
- Loosen the clamp (arrow).
- Unlock coolant expansion tank (2) for the low-temperature coolant circuit in marked area.



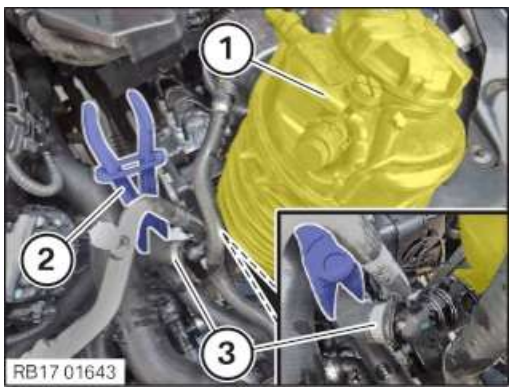
- Feed out and position the coolant expansion tank (1)for the low-temperature coolant circuit from the holders.



- Unlock the holder (1).
- Feed out coolant line (2) and place to one side.



- Unlock the coolant line (1) and pull off from the coolant expansion tank (4) for the high-temperature coolant circuit.
- Unlock the coolant line (2) and pull off the coolant expansion tank (4) for the high-temperature coolant circuit.
- Unlock lock (3).



TECHNICAL INFORMATION

Only flexible hose pipes may be disconnected.

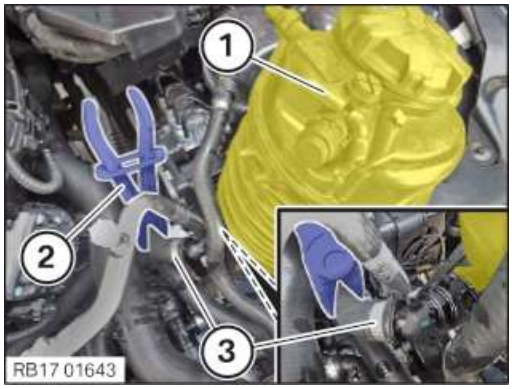
- Feed out and position the coolant expansion tank (1)for the high-temperature coolant circuit from the holders, upwards.
- Disconnect the coolant line (3) using standard disconnection tool (2).
- Unlock and disconnect the coolant line (3).
- Removing coolant expansion tank (1) for the high-temperature coolant circuit.

5 – Removing coolant expansion tank of high-temperature coolant circuit

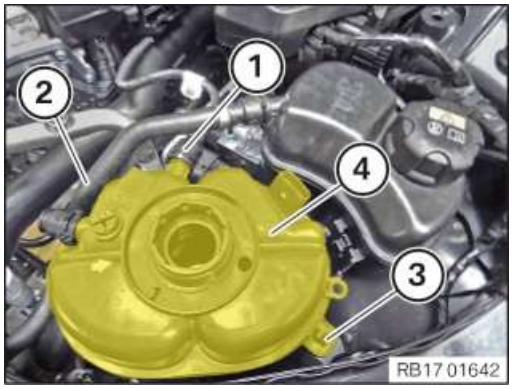
rdiagn.com

TECHNICAL INFORMATION

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



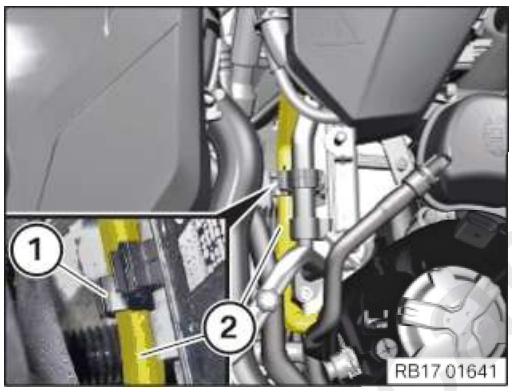
- Feed in and position the coolant expansion tank (1) for the high-temperature coolant circuit.
- Connect and lock the coolant line (3).
- Remove conventional disconnection tool(2).
- Feed in and install the coolant expansion tank (1) for the high-temperature coolant circuit in the holders.



- Ensure that the lock (3)engages audibly.
- Connect and lock the coolant line (2) at the coolant expansion tank (4) for the high-temperature coolant circuit.

  The coolant line (1) must audibly engage.
- Connect and lock the coolant line (1) at the coolant expansion tank (4) for the high-temperature coolant circuit.

  The coolant line (1) must audibly engage.

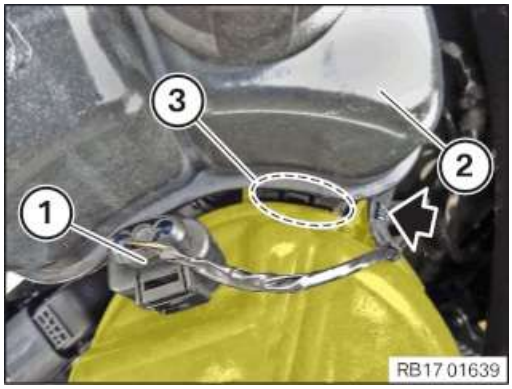


- Feed in the coolant line to the holder (1) and position.
- Lock holder (1).



- Feed in and position the coolant expansion tank (1) for the low-temperature coolant circuit.

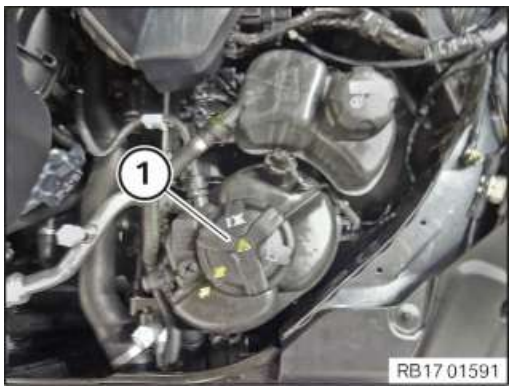
vwdiag.com



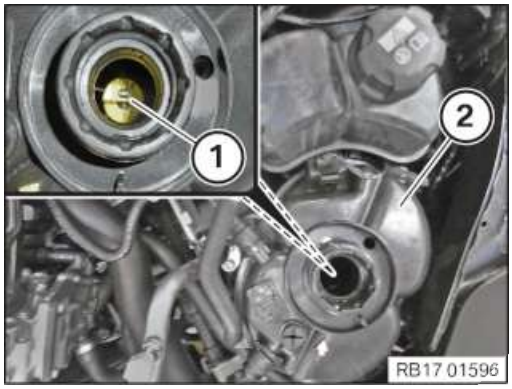
- Feed in and install the coolant expansion tank (2) for the low-temperature coolant circuit to the holders.

  The lock (3) must audibly engage.
- Secure clamp (arrow).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



- Loosen sealing cap (1).



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



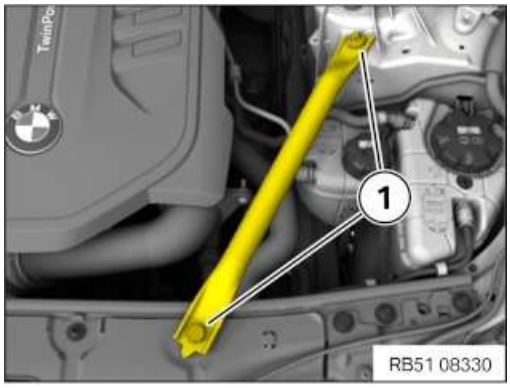
- Close sealing cap (1).
- Close the sealing cap (1) until the **arrows** are flush.

POSTPROCESSES

6 – Installing the front-end strut

NOTICE

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

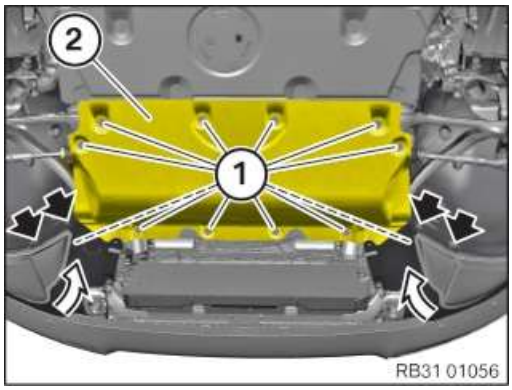


- Position the front-end strut.
- Tighten the screws (1).

Front end strut

Screw		Tightening torque	56 Nm

7 – Install the underbody protection of the steering gear



- **Version A:**

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

  Tighten the screws (1).

Underbody protection of the steering gear

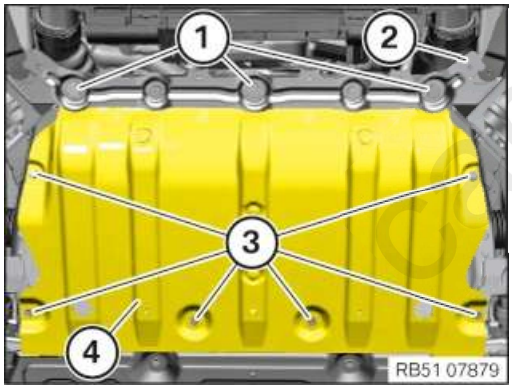
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the bottom wheel arch cover.

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

Wheel arch trim panel, front

Thermoplastic hexagon screw	Tightening torque	2,6 Nm



- **Version B:**

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

  Tighten the screws (3).

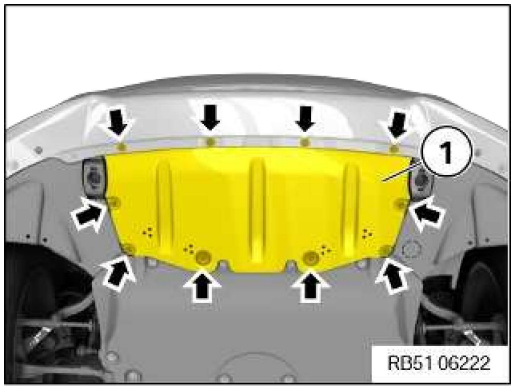
Underbody protection of the steering gear

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

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

  Tighten the screws (1).

8 – Installing the front underbody protection



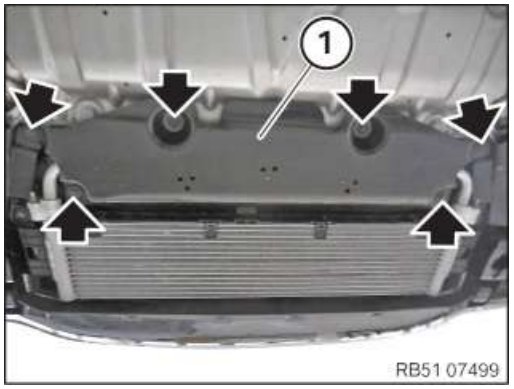
- **Version A:**

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

  Tighten screws (arrows).

Underbody protection front

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



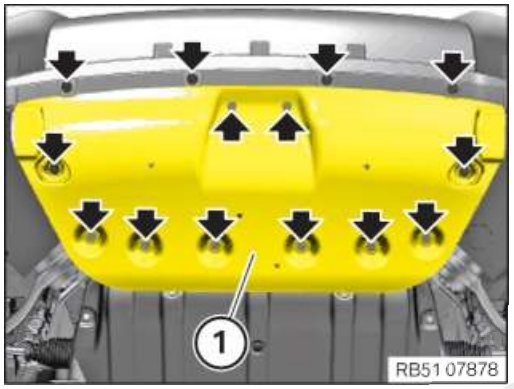
- **Version B:**

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

  Tighten screws (arrows).

Underbody protection front

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



- **Version C:**

  Feed in and install front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

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

Additional Information

Overview of Tightening Torques

Front end strut — Used in step 6

Screw		Tightening torque	56 Nm

Underbody protection of the steering gear — Used in step 7

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

Wheel arch trim panel, front — Used in step 7

Thermoplastic hexagon screw		Tightening torque	2,6 Nm

Underbody protection front — Used in step 8

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

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Links

Operating materials	Used in step
Main group 17	5

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17 11 103 Removing and installing/replacing coolant expansion tank for the low-temperature coolant circuit

PRELIMINARY WORK

1 – Removing the wheel



TECHNICAL INFORMATION

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

- **In vehicles with M Carbon ceramic brake: The wheel lift must be used to remove the wheel.**

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



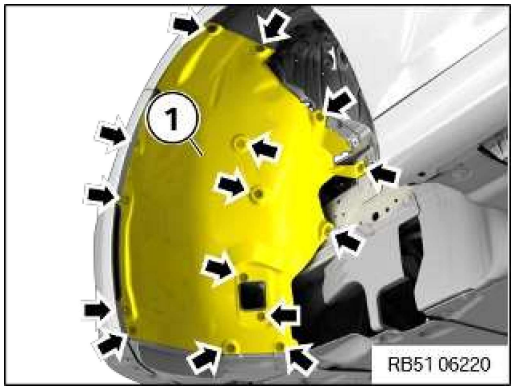
- If several wheels are removed at the same time: Use a piece of chalk to mark on each tyre the axle and side on which the corresponding wheel is fitted.
- Release the wheel bolts (arrows) crosswise and remove the wheel.
- To release and tighten wheel bolts with a security code: Use the correct adapter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

2 – Removing the front section of the front wheel arch cover

NOTICE

To provide a better overview: Schematic diagram with partially hidden components.

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- Remove screws (arrows).
- Remove front section of the front wheel arch cover (1).

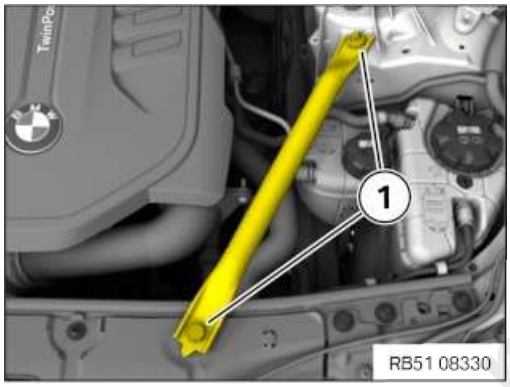
3 – Removing the front-end strut

TECHNICAL INFORMATION

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

NOTICE

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



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

MAIN WORK

4 – Removing the coolant expansion tank for the low-temperature coolant circuit

WARNING

Hot surfaces.

Risk of burning!

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

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CAUTION

Materials harmful to health.

Contact with fluids harmful to health!

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

TECHNICAL INFORMATION

Use commercially available pinch-off tools to pinch off the coolant hoses.

TECHNICAL INFORMATION

Life-long fill of coolant!

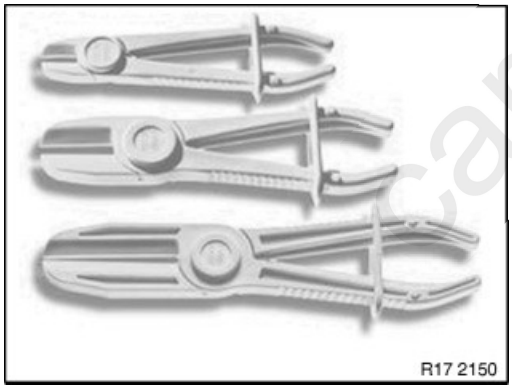
Do not reuse used coolant.

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.

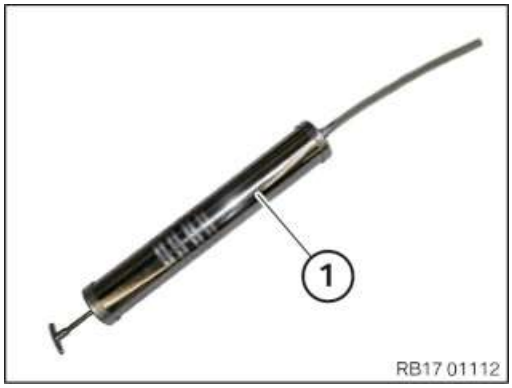
In the case of other removal work involving the draining of part quantities of coolant, the coolant level must be topped up with new coolant.

TECHNICAL INFORMATION

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

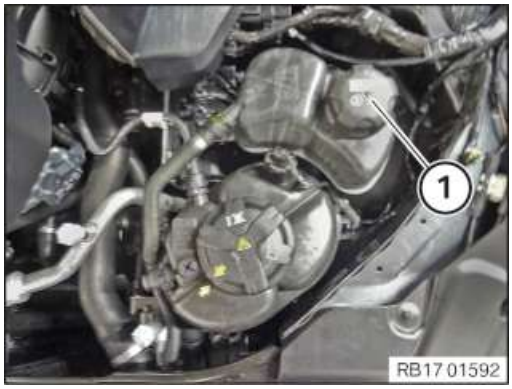


- Use commercially available disconnection tools to pinch off the coolant lines.

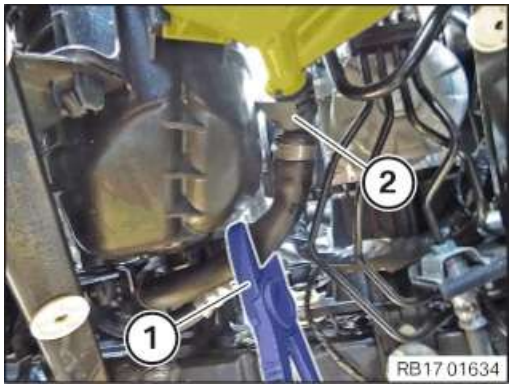


- Use commercially available syringe (1) or suitable tool to draw off coolant expansion tank.

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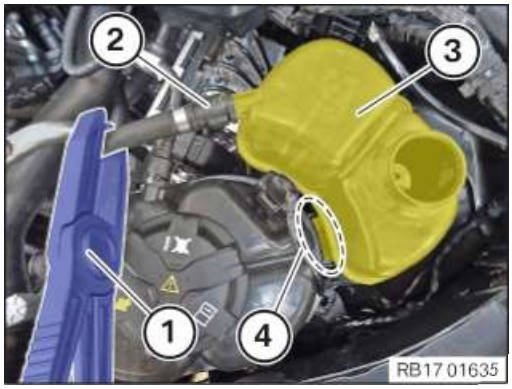
- Open the lid (1) on the coolant expansion tank.
- Draw off coolant using **standard pump** from the coolant expansion tank for low-temperature coolant circuit and dispose it.



TECHNICAL INFORMATION

Only flexible hose pipes may be disconnected.

- Disconnect the coolant line (2) using standard disconnection tool (1).
- Unlock and disconnect the coolant line (2).



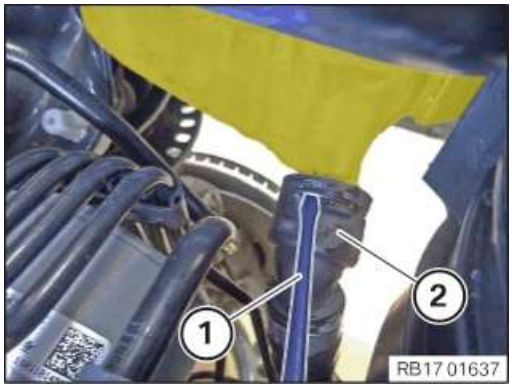
TECHNICAL INFORMATION

Only flexible hose pipes may be disconnected.

- Disconnect the coolant line (2) using standard disconnection tool (1).
- Unlock and disconnect the coolant line (2).
- Unlock coolant expansion tank (3) for low-temperature coolant circuit in marked area (4).



- Pull coolant expansion tank (1) for low-temperature coolant circuit upwards from the holders and position.



- Unlock the coolant lines (2) with a conventional screwdriver (1) and disconnect.



- Guide out and remove the coolant expansion tank (1) for low-temperature coolant circuit toward the top.

5 – Installing the coolant expansion tank for the low-temperature coolant circuit

CAUTION

Materials harmful to health.

Contact with fluids harmful to health!

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

TECHNICAL INFORMATION

Life-long fill of coolant!

Do not reuse used coolant.

When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be emptied and refilled.

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

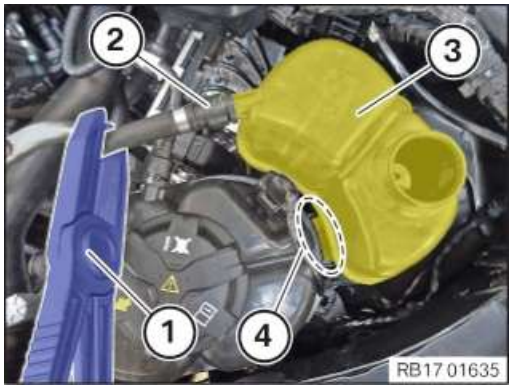


- Feed in and position the coolant expansion tank (1) for the low-temperature coolant circuit.



- Connect and lock the coolant line (1).

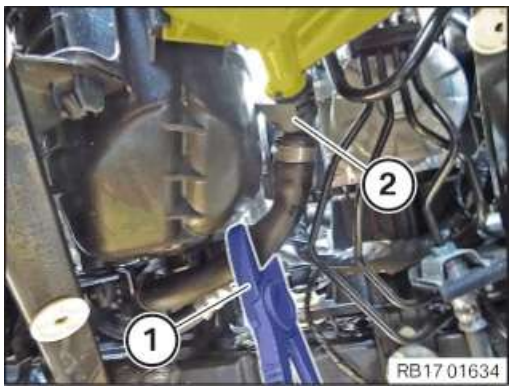
  The coolant line (1) must audibly engage.



- Guide in and install coolant expansion tank (3) for the low-temperature coolant circuit in the holders.

  The lock must engage audibly in the marked area (4).
- Connect and lock the coolant line (2).

  The coolant line (2) must audibly engage.
- Remove conventional disconnection tool(1).



- Connect and lock the coolant line (2).

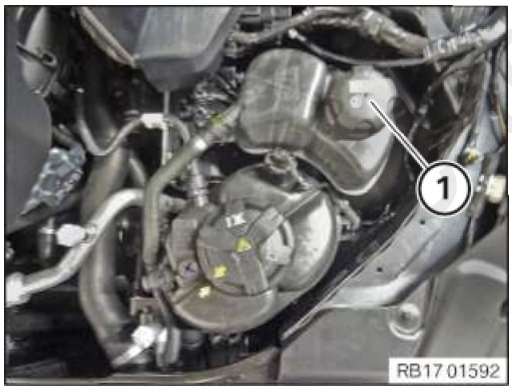
  The coolant line (2) must audibly engage.
- Remove conventional disconnection tool(1).



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

- Fill up coolant expansion tank (2) for the low-temperature coolant circuit with coolant up to the **maximum mark** (1).



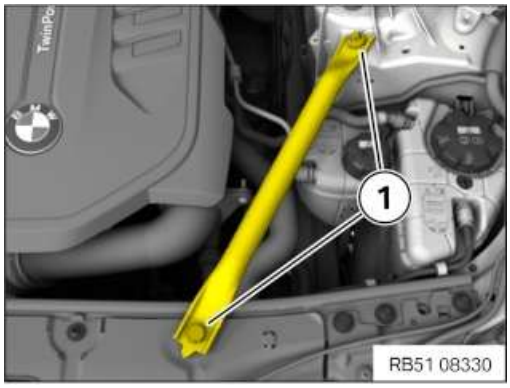
- Close sealing cap (1).

POSTPROCESSES

6 – Installing the front-end strut

NOTICE

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



- Position the front-end strut.
- Tighten the screws (1).

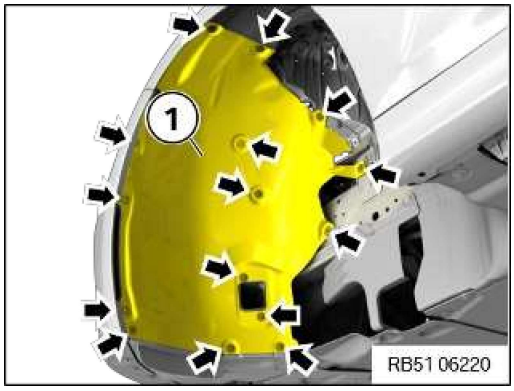
Front end strut

Screw		Tightening torque	56 Nm

7 – Install the front section of the front wheel arch cover

NOTICE

To provide a better overview: Schematic diagram with partially hidden components.



- Install the front section of the front wheel arch cover (1).
- Tighten screws (arrows).

Wheel arch trim panel, front

Thermoplastic hexagon screw		Tightening torque	2,6 Nm

8 – Mounting the wheel



TECHNICAL INFORMATION

The contact surface between the brake disc and the wheel rim must be clean and free from oil and grease. There is otherwise a risk of the wheel becoming loose at a later time.

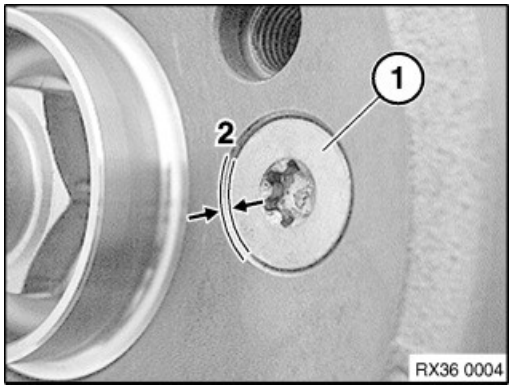
- Remove dirt, grease residues and corrosion from the contact surface with a drill and the special tool 2 344 011.

  Do not operate special tool 2 344 011 with an impact screwdriver.
- Degrease the contact surfaces with the universal cleaner (see BMW Group Parts).
- In the event of grease residue in the area of the wheel bolt holes, remove and clean the brake disc.



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

  Do not operate special tool 2 344 011 with an impact screwdriver.
- Degrease the contact surfaces with the universal cleaner (see BMW Group Parts).



- Check that the mounting bolt (1) for the brake disc is securely seated.

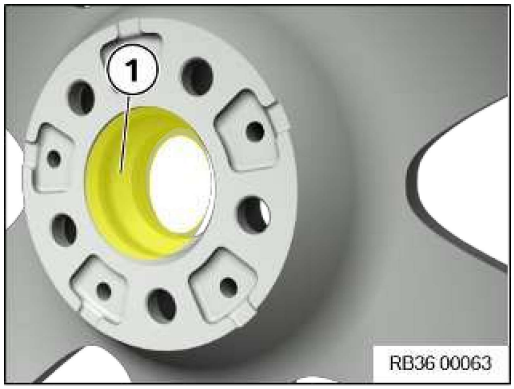
  The mounting bolt (1) for the brake disc **may not** protrude on the contact surface (2) between the brake disc and the wheel rim.

Brake disc to front wheel hub

M8	Renew screw.	Tightening torque	16 Nm

Brake disc to rear wheel hub

M8	Renew screw.	Tightening torque	16 Nm



TECHNICAL INFORMATION

Wheel hubs and wheel centering on the models G80, G82 and G83 **must not** be greased.

- Thinly grease the wheel centring (1) in the wheel rim.

Expendable materials

Brake block paste * TU = Trade Unit. TU numbers cannot be ordered! For invoicing purposes only.	3 g, Bag	83192158851
	100 g, Tube	83192158852
	5 g, TU*	83230140233



TECHNICAL INFORMATION

Wheel hubs and wheel centering on the models G80, G82 and G83 **must not** be greased.

- Apply a thin layer of grease to the front and rear wheel hubs (1) to protect against corrosion.

Expendable materials

Brake block paste * TU = Trade Unit. TU numbers cannot be ordered! For invoicing purposes only.	3 g, Bag	83192158851
	100 g, Tube	83192158852
	5 g, TU*	83230140233

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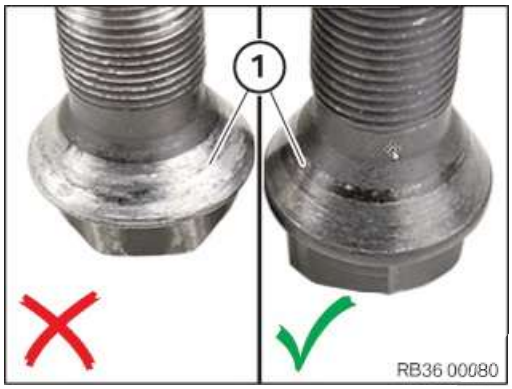


TECHNICAL INFORMATION

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

- **In vehicles with M Carbon ceramic brake: The wheel lift must be used to install the wheel.**

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



Check

- **Check wheel bolts for wear.**

Result

» Places (> 30%) of the bearing surfaces (1) of the taper on the screw head show a silver wear.

Measure

- Replace wheel bolts.

  Parts: Wheel bolts

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TECHNICAL INFORMATION

Never use impact screwdrivers or electric screwdrivers to screw in and tighten the wheel bolts.

The wheel rim must rest uniformly against the brake disc.

In the case of non-original BMW wheel bolts/wheel rims, it may be necessary to retighten the wheel bolts on account of setting properties (refer to the documentation from the manufacturer).

Do not apply oil to new wheel bolts.

- Renew the corroded wheel bolts (arrows).

  Parts: Wheel bolts
- Clean the wheel bolts (arrows).
- Check the wheel bolts (arrows) and threads for damage, renew the wheel bolts (arrows) if necessary.
- Join and tighten the wheel bolts (arrows).

Wheel bolts

M14 / SW17	Screw in wheel bolts and evenly tighten crosswise by hand in order to centre the wheel rim.	Tightening torque	140 Nm
	Tighten wheel bolts to the prescribed tightening torque with a calibrated torque wrench in a crosswise sequence.	Check	140 Nm
	Check all the wheel bolts in the same order or retighten to the prescribed tightening torque again.		

Additional Information

Overview of Tightening Torques

Front end strut — Used in step 6

Screw		Tightening torque	56 Nm

Wheel arch trim panel, front — Used in step 7

Thermoplastic hexagon screw		Tightening torque	2,6 Nm

Brake disc to front wheel hub — Used in step 8

M8	Renew screw.	Tightening torque	16 Nm

Brake disc to rear wheel hub — Used in step 8

M8	Renew screw.	Tightening torque	16 Nm

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Wheel bolts			Used in step 8
M14 / SW17	Screw in wheel bolts and evenly tighten crosswise by hand in order to centre the wheel rim. Tighten wheel bolts to the prescribed tightening torque with a calibrated torque wrench in a crosswise sequence. Check all the wheel bolts in the same order or retighten to the prescribed tightening torque again.	Tightening torque Check	140 Nm 140 Nm

Overview of Special Tools

2 344 011 Tool



Common	Used in step 8
Usage	Tool (wheel hub grinder) for cleaning the connection of the wheel rim (wheel contact face) to the wheel hub.
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	08 08 12 (872)

Replacement tools:

0 495 221 (36 1 323) Wheel stud



Common	Used in step 1
Usage	(Code 30) Code 39 available separately, (see EPC) under 36 13 1 181 259
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 224 (36 1 326) Wheel stud



Common	Used in step 1
Usage	(Code 33) With centring bore available separately, (see EPC) under 36 13 6 765 546
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

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0 495 225 (36 1 327) Wheel stud



Common	Used in step 1
Usage	(Code 34) With centring bore available separately (see EPC) under 36 13 6 765 547
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 226 (36 1 328) Wheel stud



Common	Used in step 1
Usage	(Code 35) With centring bore available separately, (see EPC) under 36 13 6 762 340
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 227 (36 1 329) Wheel stud



Common	Used in step 1
Usage	(Code 36) With centring bore available separately (see EPC) under 36 13 6 762 341
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 228 (36 1 331) Wheel stud



Common	Used in step 1
Usage	(Code 37) With centring bore available separately (see EPC) under 36 13 6 762 342
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

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0 495 229 (36 1 332) Wheel stud



Common	Used in step 1
Usage	(Code 38) With centring bore available separately (see EPC) under 36 13 6 762 343
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 230 (36 1 333) Wheel stud



Common	Used in step 1
Usage	(Code 40) With centring bore available separately (see EPC) under 36 13 6 762 344
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

Links

Repair instructions	Used in step
00 02 001 Raising the vehicle using a vehicle lift	18

Operating materials	Used in step
Main group 17	5

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17 11 035 Removing and installing/replacing fan cowl with electric fan

TECHNICAL INFORMATION

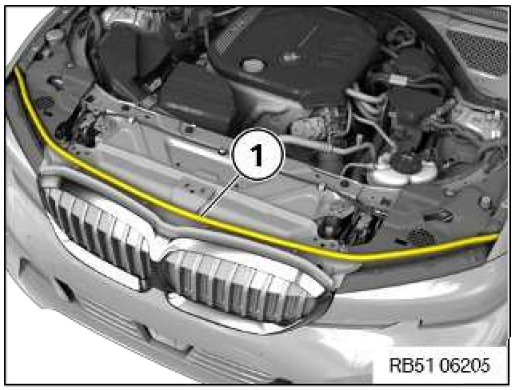
- When the engine is stopped after the end of the journey, it may be necessary to run the electric fan. In rare cases, operation of the electric fan can last up to 11 min. This protects the components. In this case, replacing the electric fan will not remedy the problem!

PRELIMINARY WORK

1 – Remove the seal for the bonnet in front

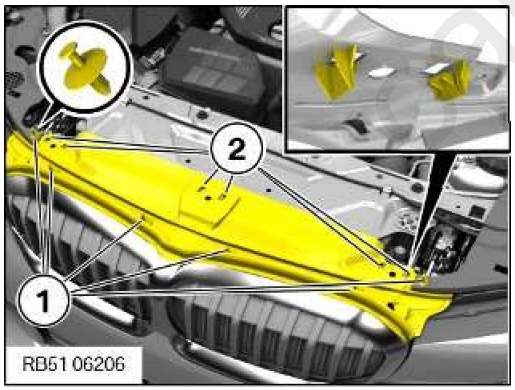
NOTICE

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



- Pull offfront bonnet seal (1) upwards.

2 – Removing the centre engine compartment cover



- Detach all expanding rivets (1).
- Release the cover at the latch mechanisms (2) and feed it out to the rear.

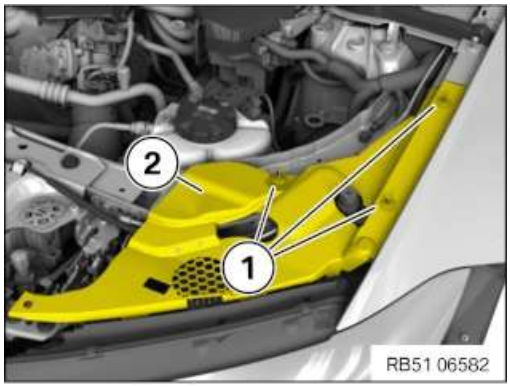
3 – If installed: Partially remove the top left and right cover in the engine compartment

NOTICE

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

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

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- Loosen the expanding rivet (1).
- Remove cover (2) at the top of the engine compartment.

4 – Removing left and right front-end strut

NOTICE

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

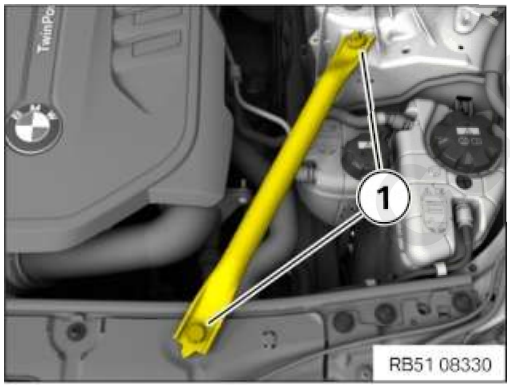
▸ **Removing the front-end strut**

TECHNICAL INFORMATION

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

NOTICE

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

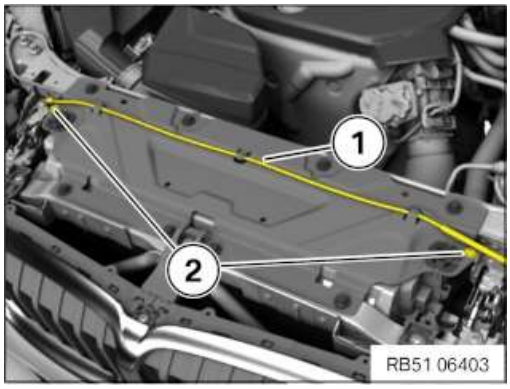


- Loosen screws (1).
- Remove the front-end strut.

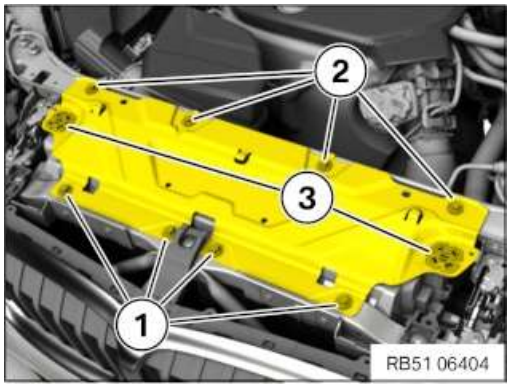
5 – Removing the top cross connection



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

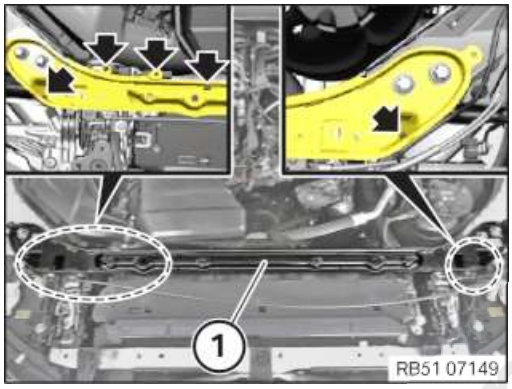


- Detach Bowden cable (1) at the top cross connection.
- Loosen screws (2).

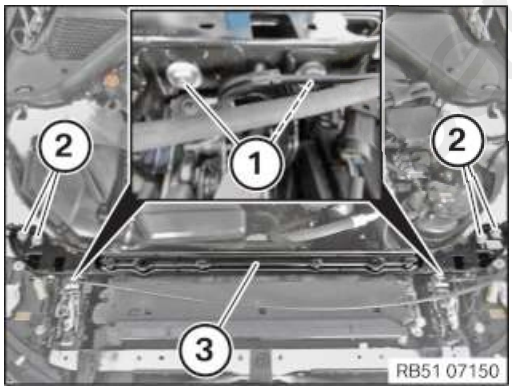


- Loosen screws (1) and (2).
- Remove the top cross connection with holders (3) to the top.

6 – Remove the rear top cross connection



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



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

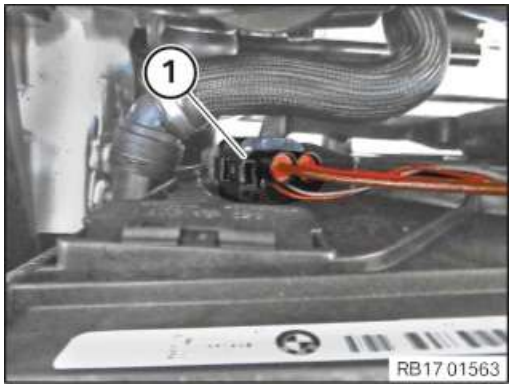
MAIN WORK

7 – Removing the fan cowl

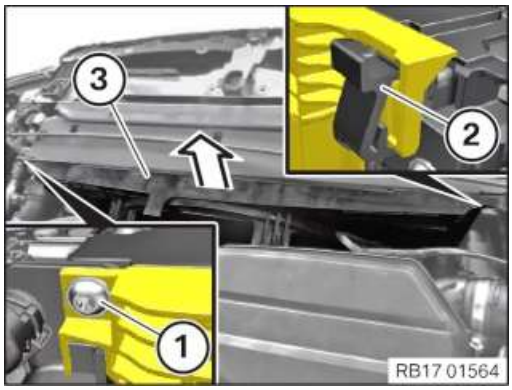
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TECHNICAL INFORMATION

- 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!

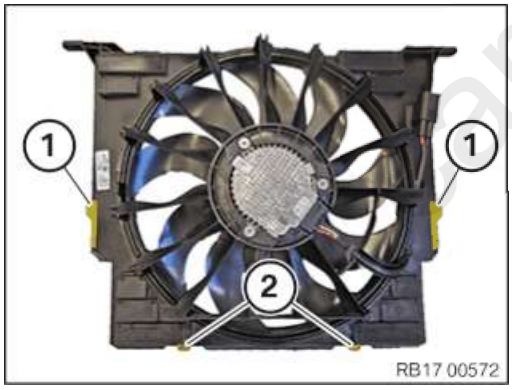


- Unlock plug connection (1) and disconnect.

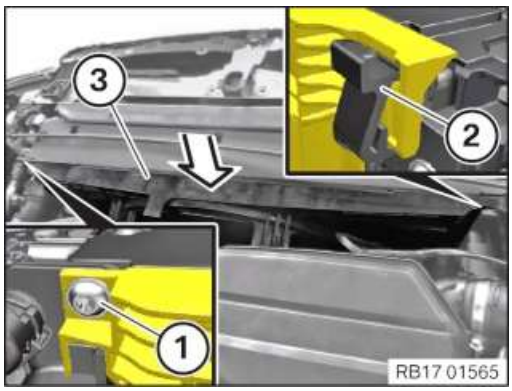


- Loosen screw (1).
- Unlock lock (2).
- **Carefully** guide out the fan cowl (3) in direction of arrow and remove.

8 – Install fan cowl



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

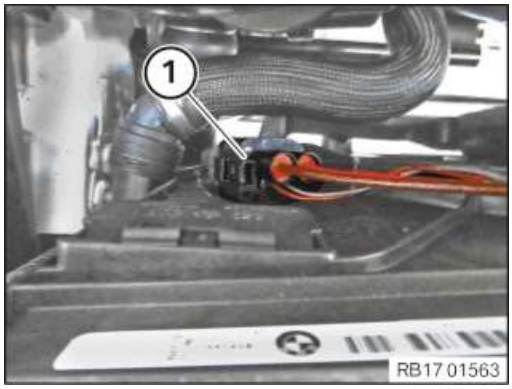


- Guide the fan cowl (3) in **carefully** in the direction of the arrow and install.
- Make sure that the lock (2) engages audibly.
- Tighten down screw (1).

Fan cowl with electric fan on radiator

TS6x20		Tightening torque	6,5 Nm

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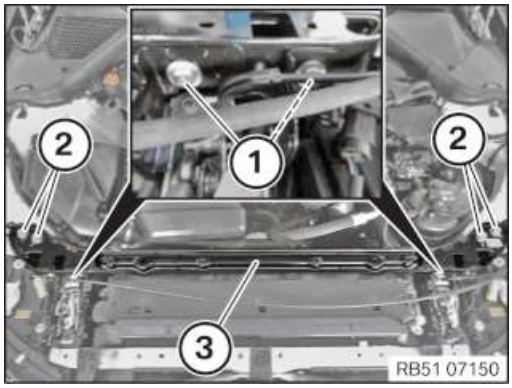


- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

POSTPROCESSES

9 – 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

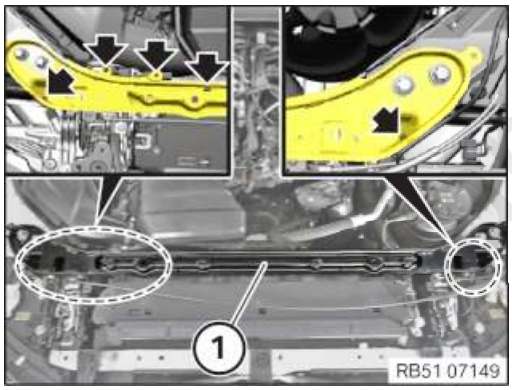
Flat-head screw M6x20		Tightening torque	11,8 Nm

- Renew screws (2).

  Parts: Bolts
- Tighten the screws (2).

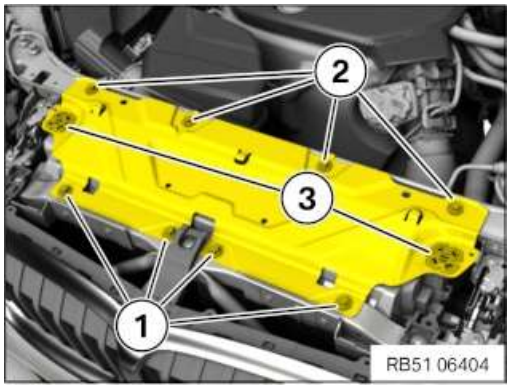
Rear top cross connection to wheel arch carrier support

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).

10 – Installing the top cross connection

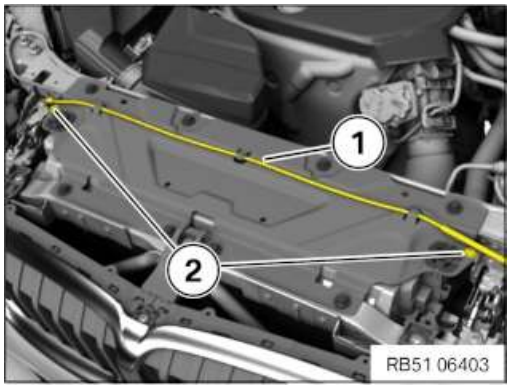


- Set and position the upper cross connection with holders (3) from above.
- Tighten screws (1) and (2).

Cross connection, top

M8x20		Tightening torque	28 Nm

carmanualsdiagram.com

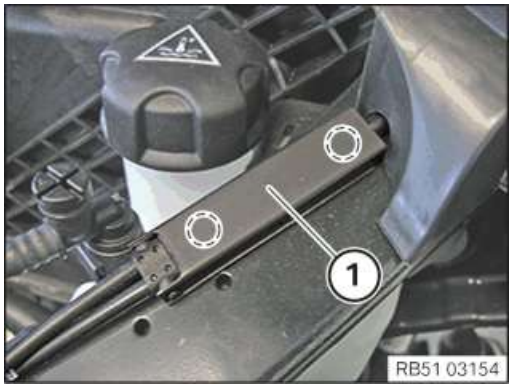


- Tighten the screws (2).

Cross connection, top

M6x20		Tightening torque	11,8 Nm

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



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

11 – Installing front-end strut on left and right

TECHNICAL INFORMATION

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

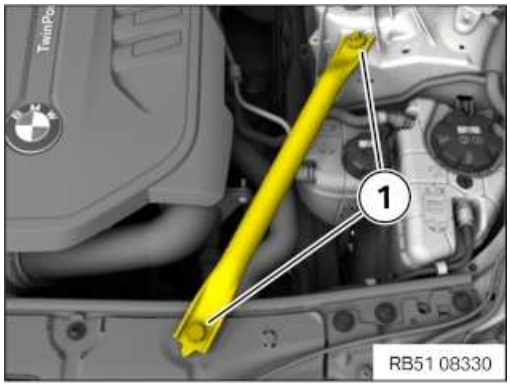
NOTICE

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

▸ **Installing the front-end strut**

NOTICE

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



- Position the front-end strut.
- Tighten the screws (1).

Front end strut

Screw		Tightening torque	56 Nm

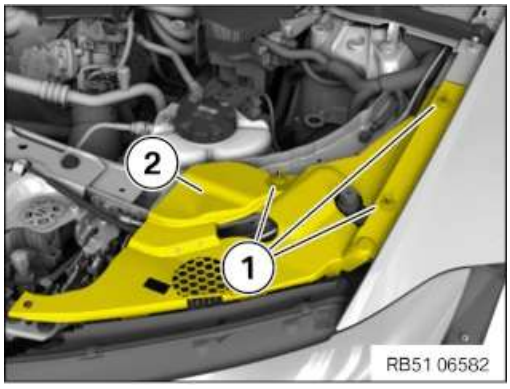
12 – If installed: Install the cover in the engine compartment at top left and right (partially removed)

cardiagn.com

NOTICE

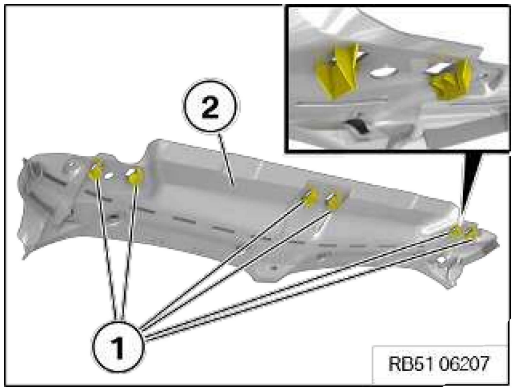
Description is for left component only. Procedure on the right side is identical.

▸ **Installing the cover in the top engine compartment (partially removed)**



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

13 – Installing the cover for the centre engine compartment



Check

- Check the latch mechanisms (1) of the cover (2) for damage.

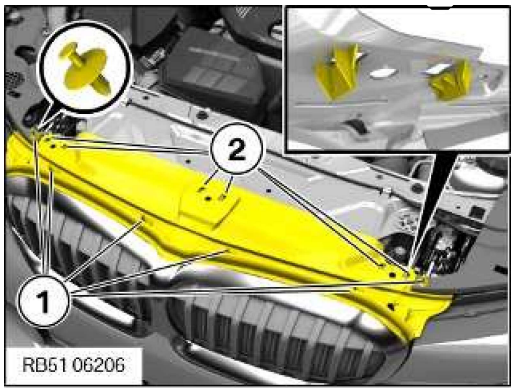
Result

» Latch mechanisms (1) are damaged.

Measure

- Replace the cover (2).

  Parts: Cover



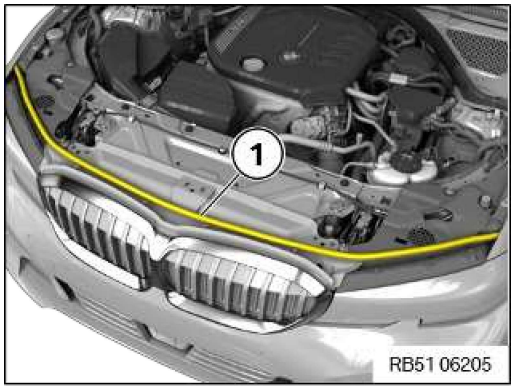
- Insert the cover from the rear and position it.
- Clip in the latch mechanisms (2).
- Mount all expanding rivets (1).

14 – Install the seal for the front bonnet

NOTICE

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

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

Additional Information

Overview of Tightening Torques

Fan cowl with electric fan on radiator			Used in step 8
TS6x20		Tightening torque	6,5 Nm

Top rear cross connection to bonnet catch support			Used in step 9
Flat-head screw M6x20		Tightening torque	11,8 Nm

Rear top cross connection to wheel arch carrier support			Used in step 9
M10x20 screw	Renew screw.	Jointing torque	56 Nm
		Angle of rotation	90 °

Cross connection, top			Used in step 10
M8x20		Tightening torque	28 Nm

Cross connection, top			Used in step 10
M6x20		Tightening torque	11,8 Nm

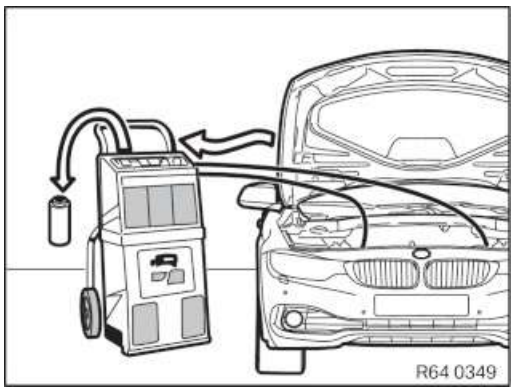
Front end strut			Used in step 11
Screw		Tightening torque	56 Nm

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17 11 006 Removing and installing/replacing low-temperature coolant radiator

PRELIMINARY WORK

1 – Drawing off the air conditioning

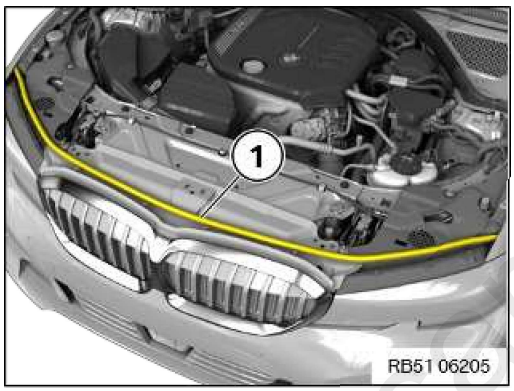


- See additional information.

2 – Remove the seal for the bonnet in front

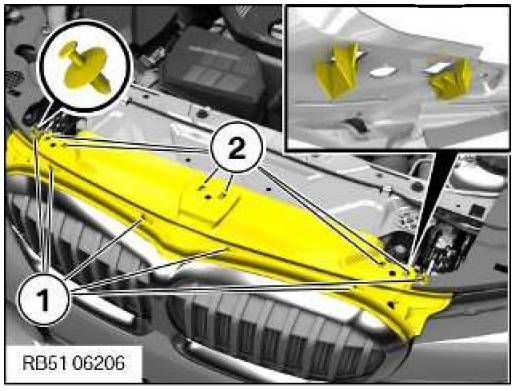
NOTICE

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



- Pull offfront bonnet seal (1) upwards.

3 – Removing the centre engine compartment cover



- Detach all expanding rivets (1).
- Release the cover at the latch mechanisms (2) and feed it out to the rear.

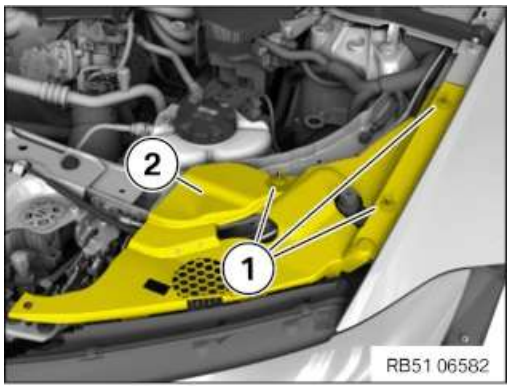
4 – If installed: Partially remove the top left and right cover in the engine compartment

NOTICE

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

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



- Loosen the expanding rivet (1).
- Remove cover (2) at the top of the engine compartment.

5 – Removing left and right front-end strut

NOTICE

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

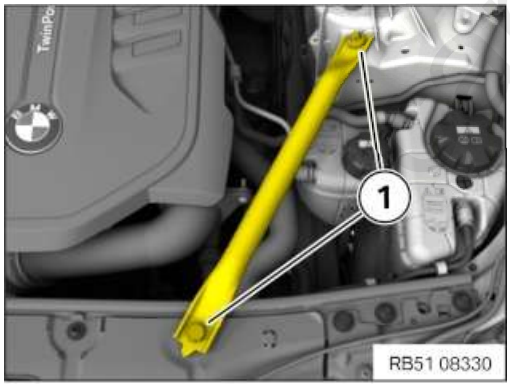
▸ **Removing the front-end strut**

TECHNICAL INFORMATION

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

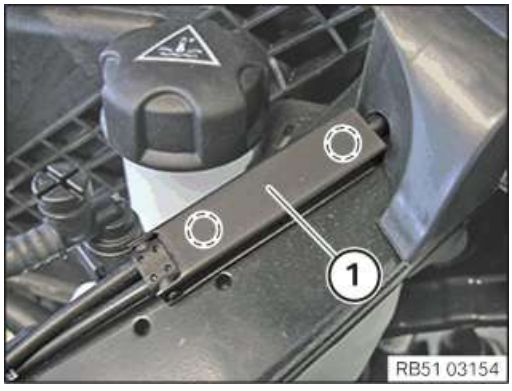
NOTICE

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

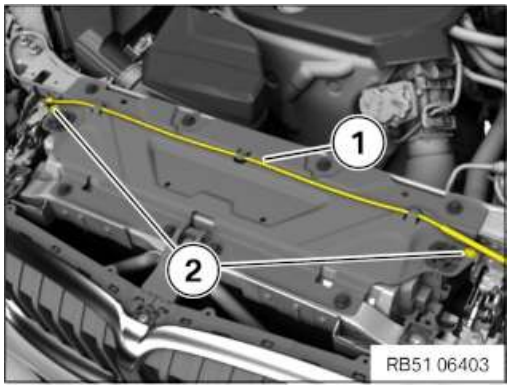


- Loosen screws (1).
- Remove the front-end strut.

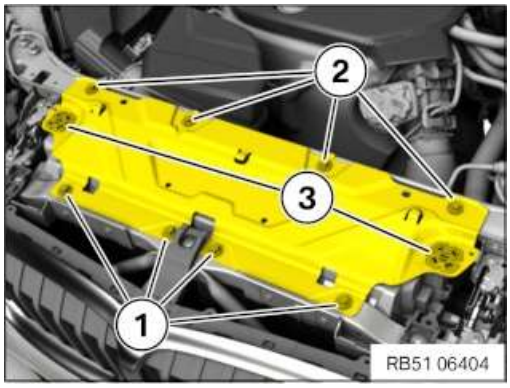
6 – Removing the top cross connection



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

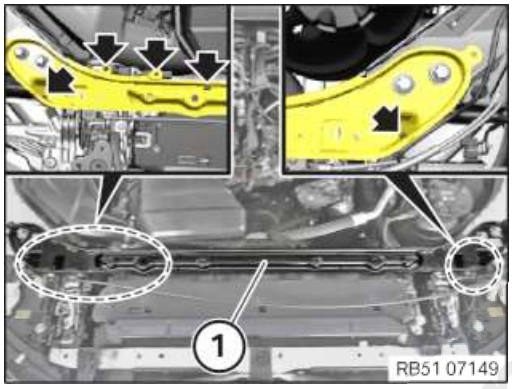


- Detach Bowden cable (1) at the top cross connection.
- Loosen screws (2).

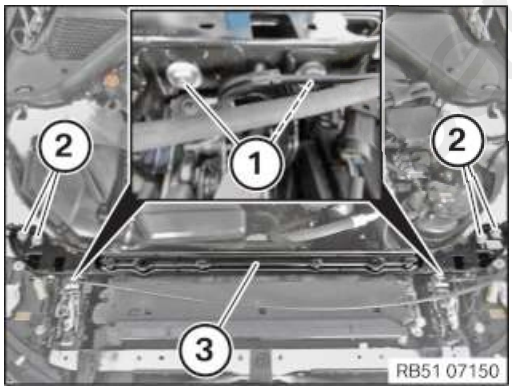


- Loosen screws (1) and (2).
- Remove the top cross connection with holders (3) to the top.

7 – Remove the rear top cross connection



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



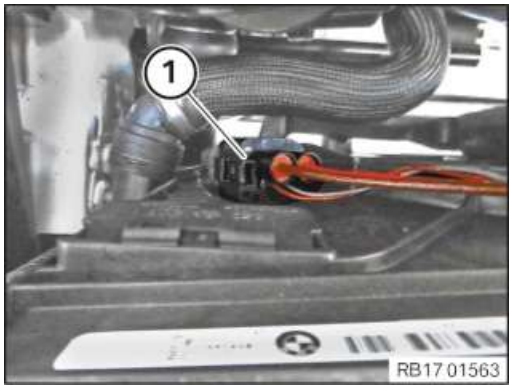
- Loosen screws (1).
- Loosen screws (2).
- Guide out and remove top rear cross connection (3).

8 – Removing the fan cowl

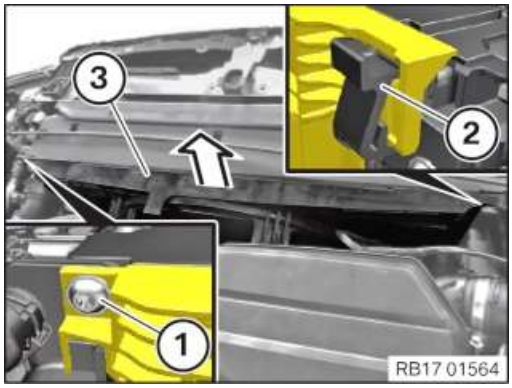
TECHNICAL INFORMATION

- 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!

.diagn.com

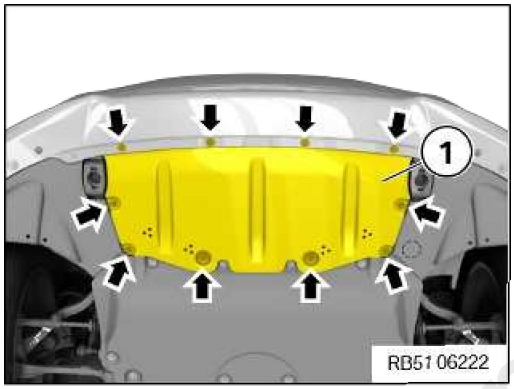


- Unlock plug connection (1) and disconnect.



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

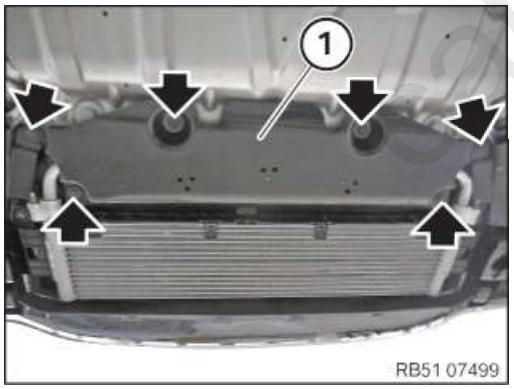
9 – Removing the front underbody protection



- **Version A:**

  Remove screws (arrows).

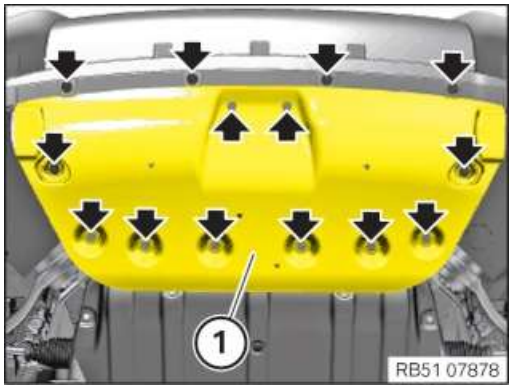
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version B:**

  Remove screws (arrows).

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

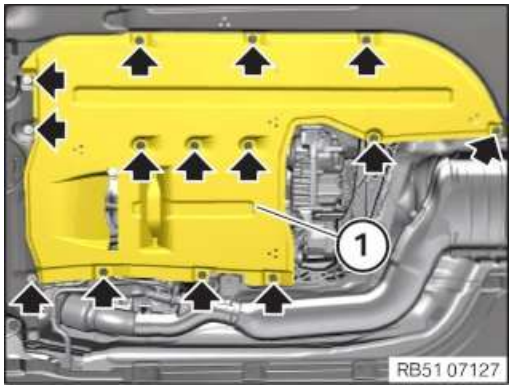


- **Version C:**

  Remove screws (arrows).

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

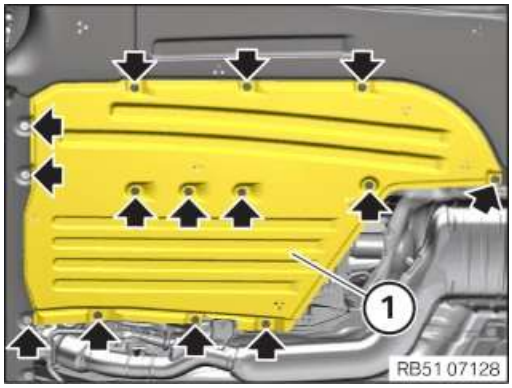
10 – Remove rear underbody protection



- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).



- **Version B:**

  Remove screws (arrows).

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

11 – 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.

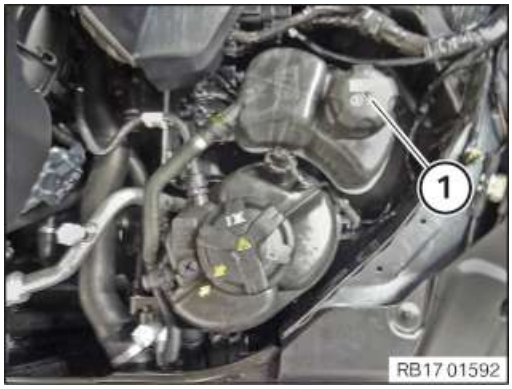
When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be emptied and refilled.

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.

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- Loosen sealing cap (1).



- Unlock coolant lines (1) and pull off.
- Catch and dispose of escaping coolant.

MAIN WORK

12 – Removing the low-temperature coolant radiator

WARNING

Hot surfaces.

Risk of burning!

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

CAUTION

Materials harmful to health.

Contact with fluids harmful to health!

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

TECHNICAL INFORMATION

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

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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

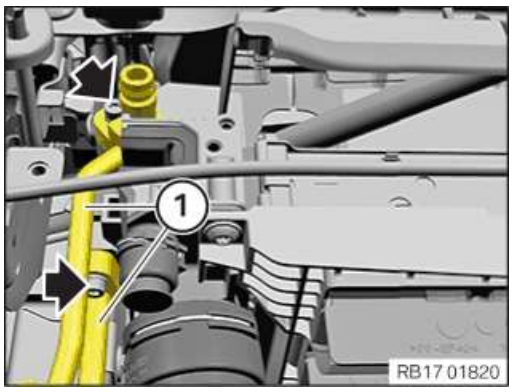
TECHNICAL INFORMATION

Life-long fill of coolant!

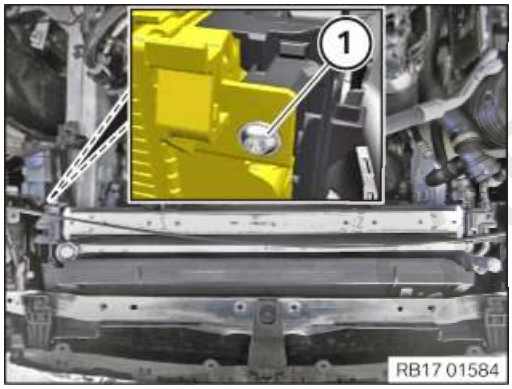
Do not reuse used coolant.

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.

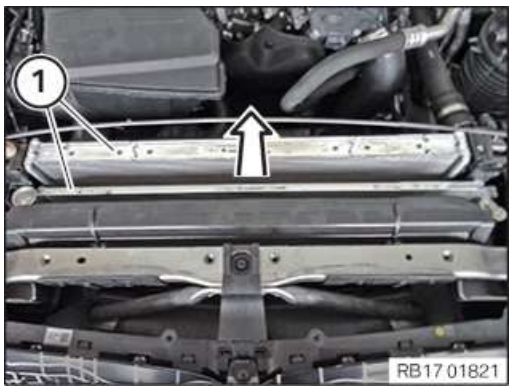
In the case of other removal work involving the draining of part quantities of coolant, the coolant level must be topped up with new coolant.



- Remove screws (arrows).
- Feed out the refrigerant lines (1) and set them aside.

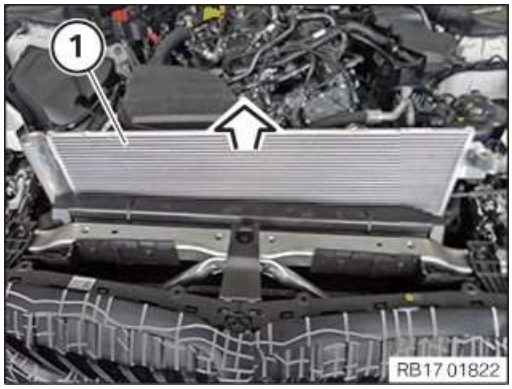


- Loosen screw (1).

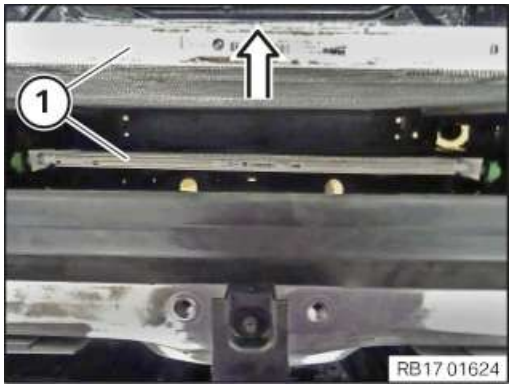


- For better accessibility:

  Tilt and hold cooling module (1) carefully in the direction of the arrow.

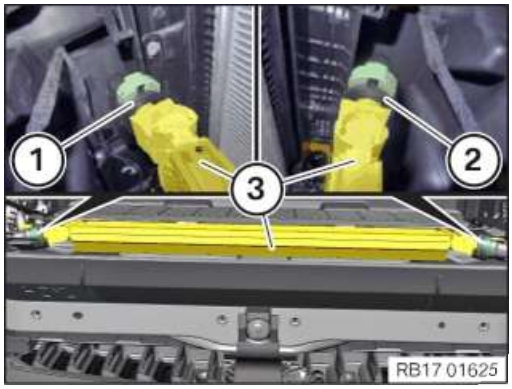


- Feed out the air conditioning condenser (1) in the direction of arrow **carefully** and remove it.

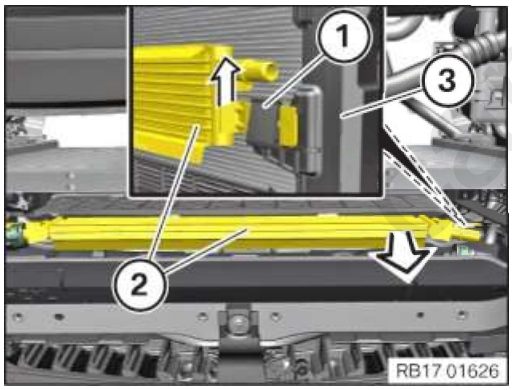


- For better accessibility:

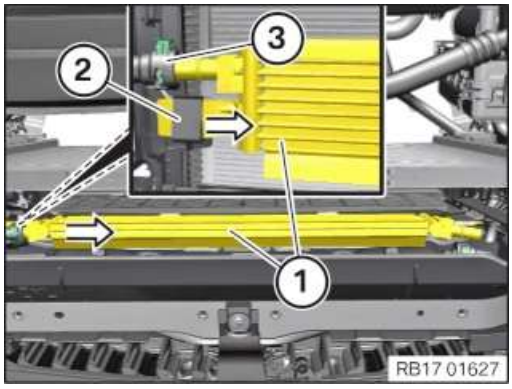
  Tilt and hold cooling module (1) carefully in the direction of the arrow.



- Unlock coolant line (1) on the right and disconnect from low-temperature coolant radiator (3).
- Collect and dispose of escaping coolant.
- Unlock coolant line (2) on the left and disconnect from low-temperature coolant radiator (3).
- Collect and dispose of escaping coolant.

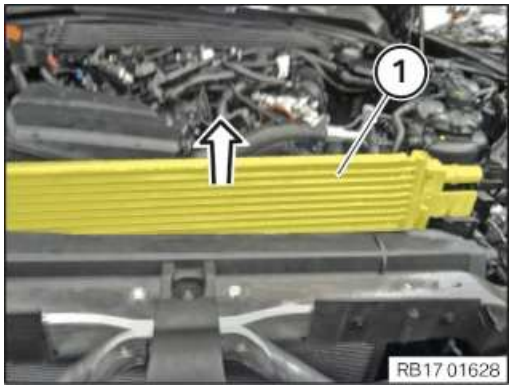


- Unlock lock (1).
- Feed out low-temperature coolant radiator (2) in direction of arrow from holder (3) and place to one side.



- Feed out low-temperature coolant radiator (1) in direction of arrow from holder (2) and coolant line (3).

.com



- Guide out and remove low-temperature coolant radiator (1) in the direction of the arrow.

13 – Installing the low-temperature coolant radiator

WARNING

Hot surfaces.

Risk of burning!

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

CAUTION

Materials harmful to health.

Contact with fluids harmful to health!

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

TECHNICAL INFORMATION

Life-long fill of coolant!

Do not reuse used coolant.

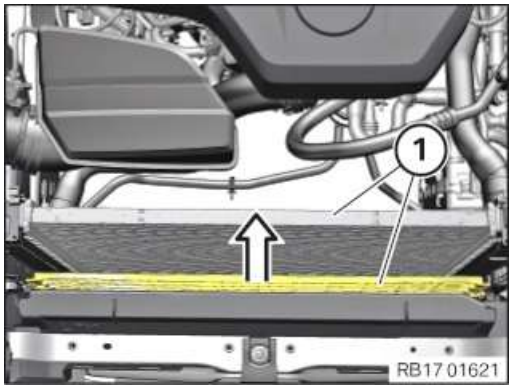
When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be emptied and refilled.

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

TECHNICAL INFORMATION

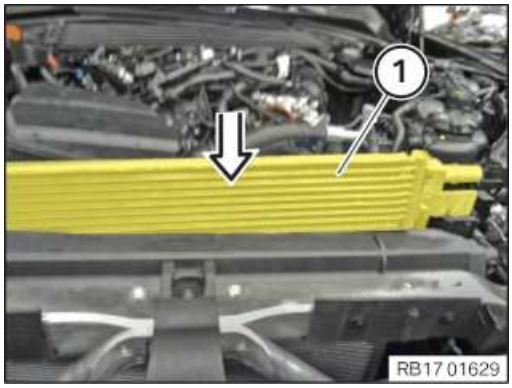
Make sure that the connections are locked correctly. The locks must engage audibly.

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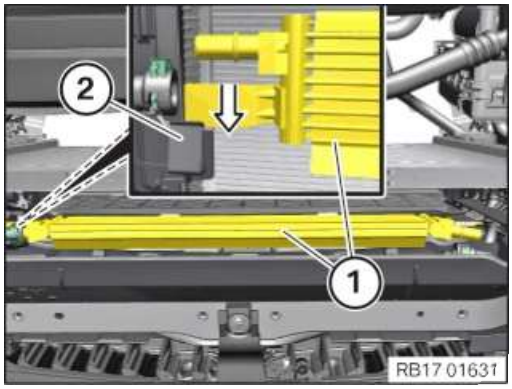


- For better accessibility:

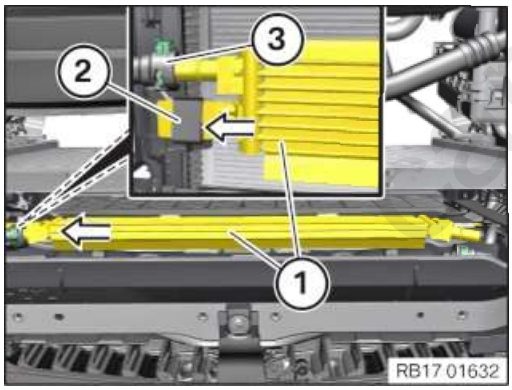
  Tilt and hold cooling module (1) carefully in the direction of the arrow.



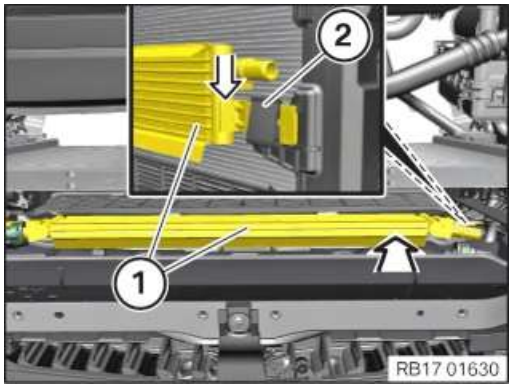
- Guide in low-temperature coolant radiator (1) in the direction of the arrow.



- Feed in the low-temperature coolant radiator (1) in the direction of arrow at the holder (2).

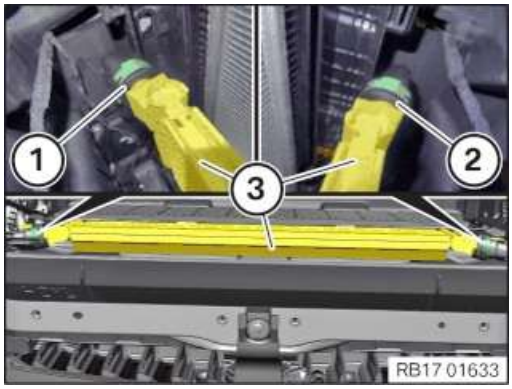


- Feed in the low-temperature coolant radiator (1) in the direction of arrow at the holder (2) and the coolant line (3).

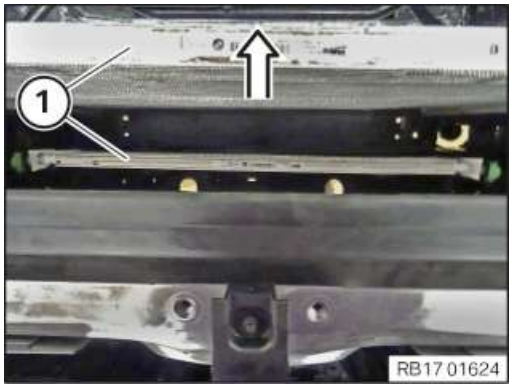


- Feed in and install the low-temperature coolant radiator (1) in the direction of arrow at the holder (2).

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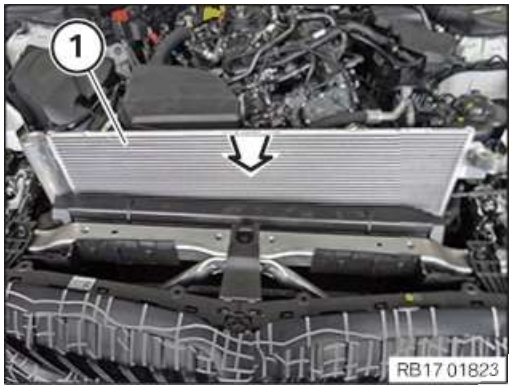


- Connect and lock the coolant line (2) with the low-temperature coolant radiator (3).
- Connect and lock the coolant line (1) with the low-temperature coolant radiator (3).

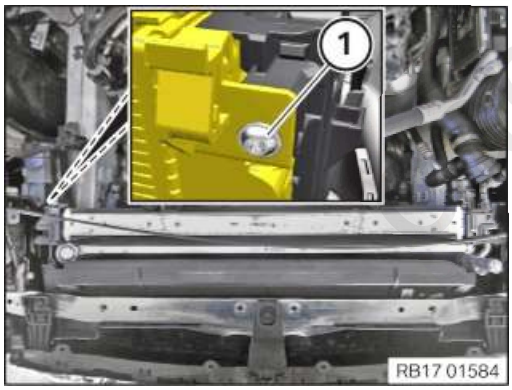


- For better accessibility:

  Tilt and hold cooling module (1) carefully in the direction of the arrow.



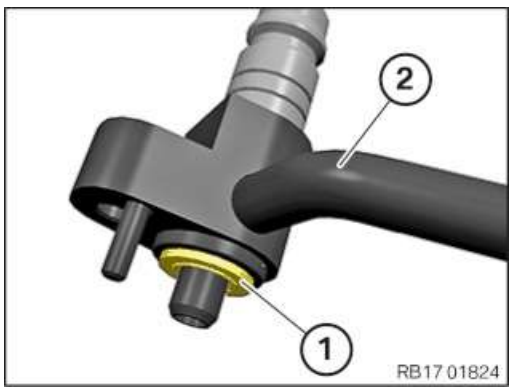
- Guide in and install the air conditioning condenser (1) **carefully** in the direction of the arrow.



- Tighten down screw (1).

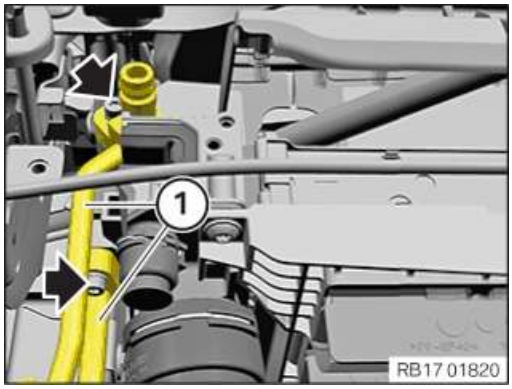
Radiator on holder

D6x20 screw		Tightening torque	6 Nm



- Renew the sealing ring (1) of the refrigerant line (2).

mdiagn.com



- Feed in and install the refrigerant lines (1).
- Tighten screws (arrows).

Refrigerant lines to air conditioning condenser/connecting piece

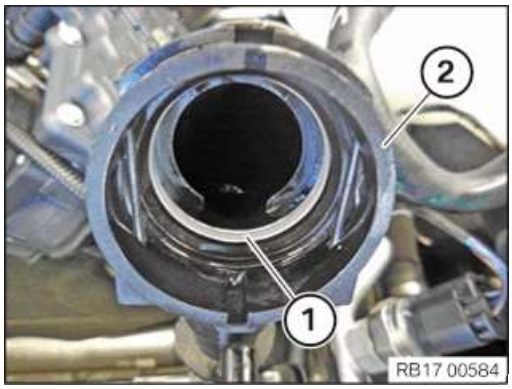
M6		Tightening torque	13 Nm

POSTPROCESSES

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.



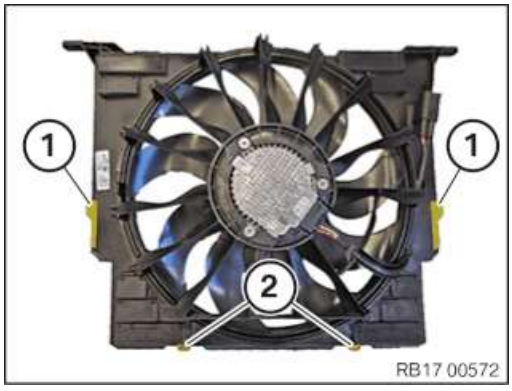
- Check the sealing rings (1) of the coolant lines (2) for damage and renew if necessary.



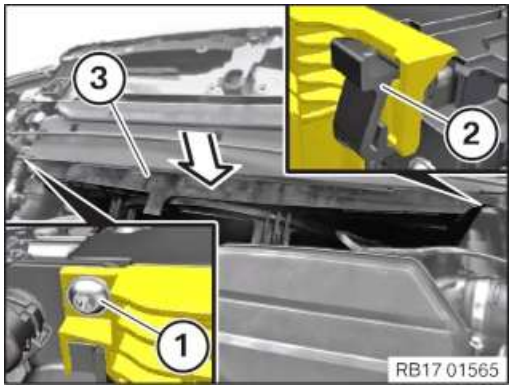
- Connect and lock the coolant lines (1).

  The coolant lines (1) must engage audibly.

15 – Install fan cowl



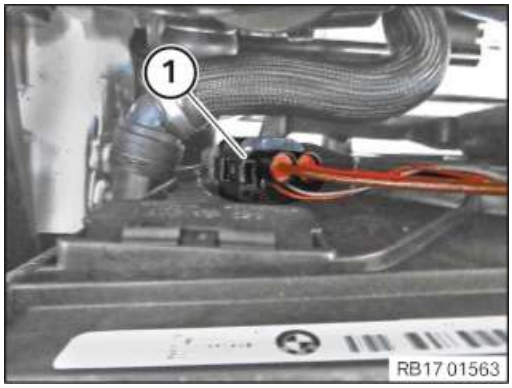
- Feed guides (1) into the radiator.
- Feed guides (2) into the charge air cooler.



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

Fan cowl with electric fan on radiator

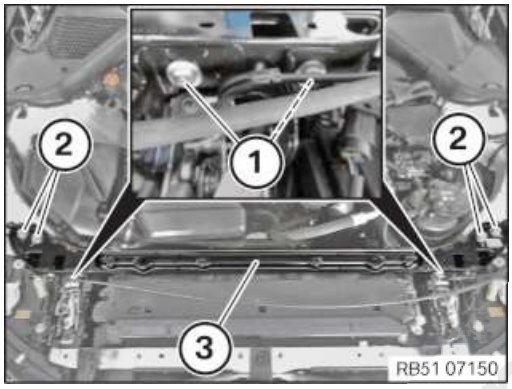
TS6x20		Tightening torque	6,5 Nm



- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

16 – 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

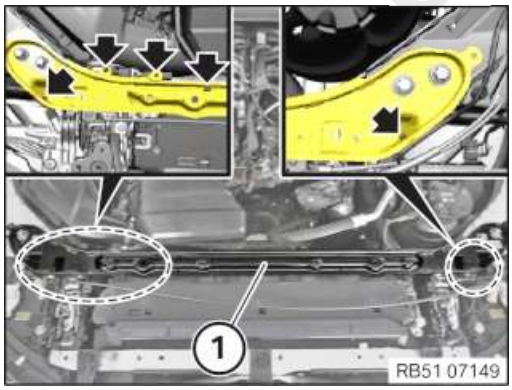
Flat-head screw M6x20		Tightening torque	11,8 Nm

- Renew screws (2).

  Parts: Bolts
- Tighten the screws (2).

Rear top cross connection to wheel arch carrier support

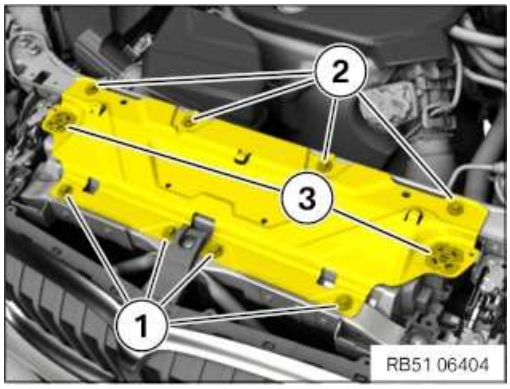
M10x20 screw	Renew screw.	Jointing torque	56 Nm
		Angle of rotation	90 °



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

17 – Installing the top cross connection

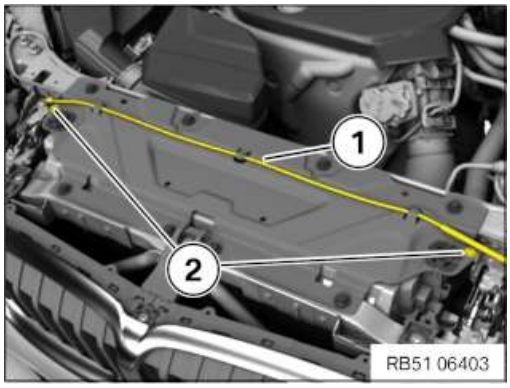
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- Set and position the upper cross connection with holders (3) from above.
- Tighten screws (1) and (2).

Cross connection, top

M8x20		Tightening torque	28 Nm



- Tighten the screws (2).

Cross connection, top

M6x20		Tightening torque	11,8 Nm

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



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

18 – Installing front-end strut on left and right

TECHNICAL INFORMATION

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

NOTICE

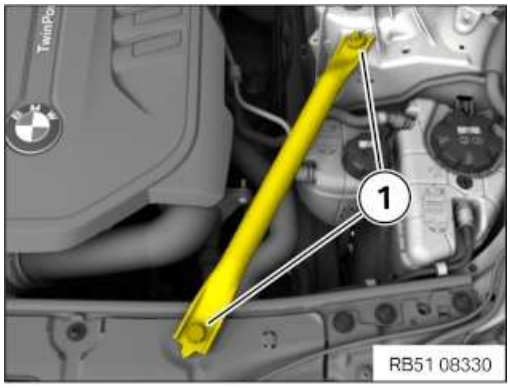
Description is for left component only. Procedure on the right side is identical.

▸ **Installing the front-end strut**

NOTICE

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

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- Position the front-end strut.
- Tighten the screws (1).

Front end strut

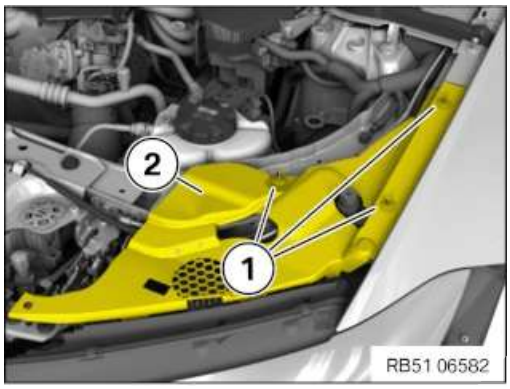
Screw		Tightening torque	56 Nm

19 – If installed: Install the cover in the engine compartment at top left and right (partially removed)

NOTICE

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

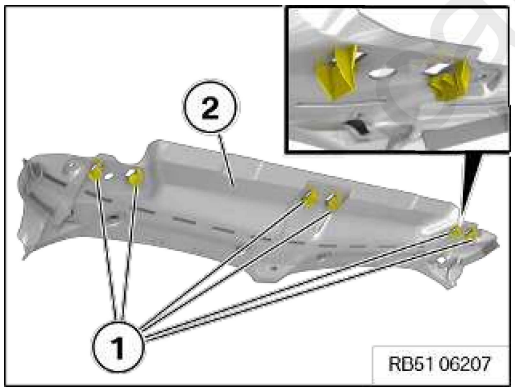
▸ Installing the cover in the top engine compartment (partially removed)



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

20 – Installing the cover for the centre engine compartment

Check



- Check the latch mechanisms (1) of the cover (2) for damage.

Result

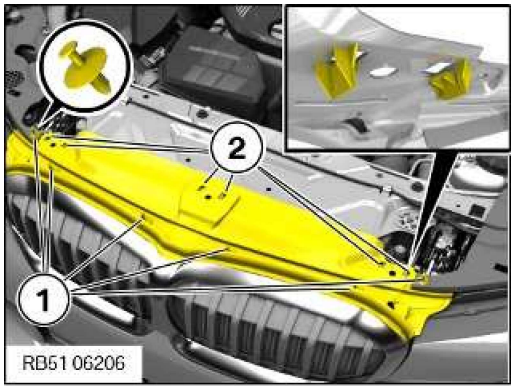
» Latch mechanisms (1) are damaged.

Measure

- Replace the cover (2).

  Parts: Cover

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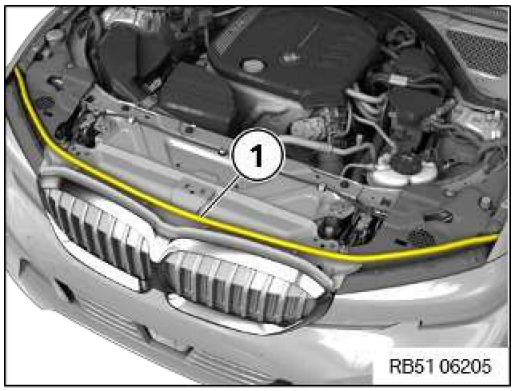


- Insert the cover from the rear and position it.
- Clip in the latch mechanisms (2).
- Mount all expanding rivets (1).

21 – Install the seal for the front bonnet

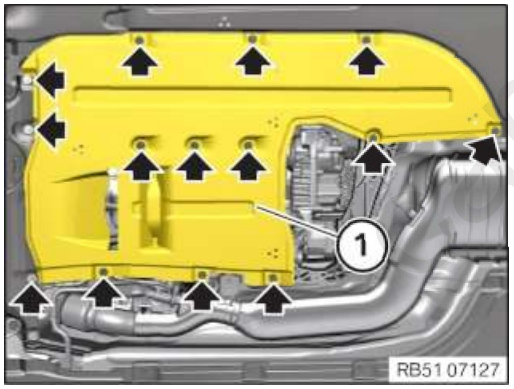
NOTICE

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



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

22 – Installing underbody protection at rear



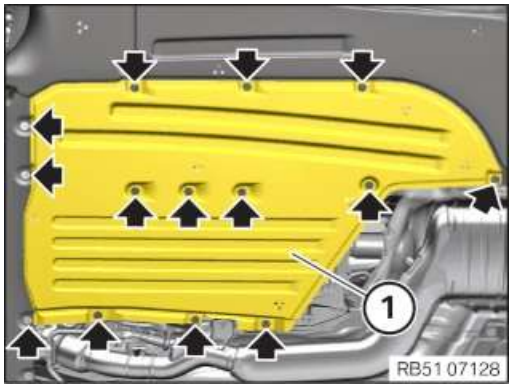
- **Version A:**

  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version B:**

  Insert and install the rear underbody protection (1).

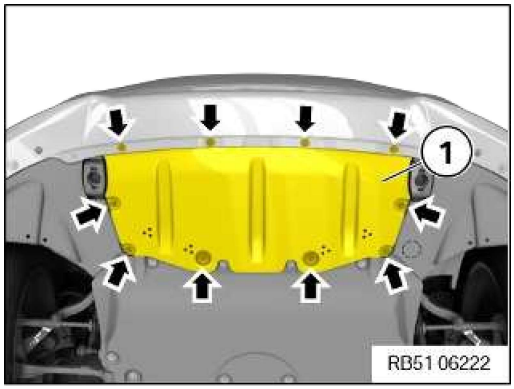
  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm

23 – Installing the front underbody protection

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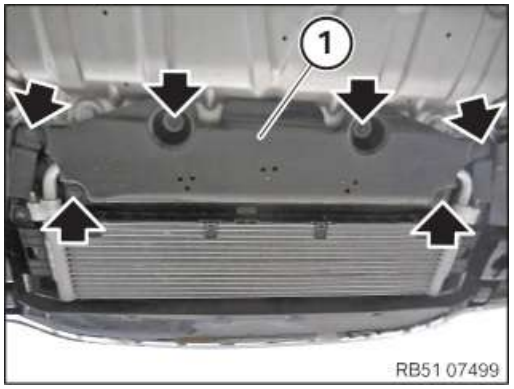
- **Version A:**

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

  Tighten screws (arrows).

Underbody protection front

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



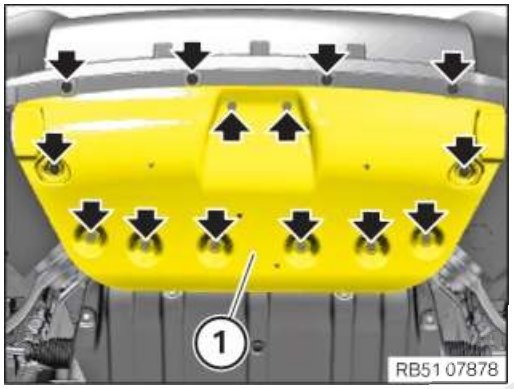
- **Version B:**

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

  Tighten screws (arrows).

Underbody protection front

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



- **Version C:**

  Feed in and install front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

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

24 – Filling and bleed the low-temperature coolant circuit



TECHNICAL INFORMATION

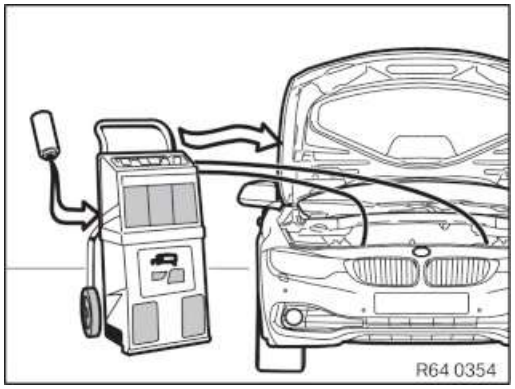
It is **mandatory** to fill the cooling system before bleeding.

Fill **both** the circuits for high and low-temperature coolant circuits.

- See additional information.

25 – Evacuate and fill air conditioning

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- See additional information.

Additional Information

Overview of Tightening Torques

Radiator on holder			Used in step 13
D6x20 screw		Tightening torque	6 Nm

Refrigerant lines to air conditioning condenser/connecting piece			Used in step 13
M6		Tightening torque	13 Nm

Fan cowl with electric fan on radiator			Used in step 15
TS6x20		Tightening torque	6,5 Nm

Top rear cross connection to bonnet catch support			Used in step 16
Flat-head screw M6x20		Tightening torque	11,8 Nm

Rear top cross connection to wheel arch carrier support			Used in step 16
M10x20 screw	Renew screw.	Jointing torque	56 Nm
		Angle of rotation	90 °

Cross connection, top			Used in step 17
M8x20		Tightening torque	28 Nm

Cross connection, top			Used in step 17
M6x20		Tightening torque	11,8 Nm

Front end strut			Used in step 18
Screw		Tightening torque	56 Nm

Underbody protection			Used in step 22
Hexagon screw		Tightening torque	3 Nm

Underbody protection front			Used in step 23
Hexagon screw for thermoplastic		Tightening torque	2,6 Nm
Hexagon screw M6x20		Tightening torque	8 Nm

Links

General repair instructions	**Used in step**
64 52 ... Instructions for opening and part exchange in refrigerant circuit	125

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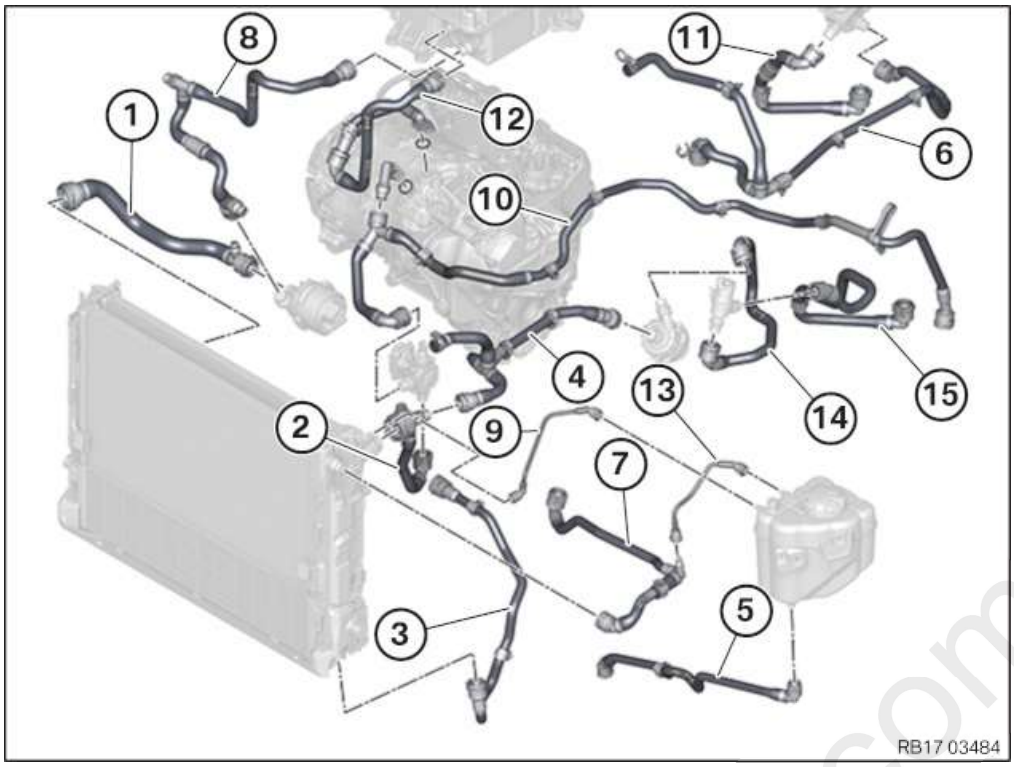
Repair instructions	Used in step
64 50 010 Extract, evacuate and fill air conditioning system	125
64 50 010 Drawing off, evacuating and filling air conditioning (R134a)	125
64 50 010 Drawing off, evacuating and filling air conditioning (R134a)	125
64 50 ... Notes on repairs to air conditioning	125
64 50 010 Drawing off, evacuating and filling air conditioning (R1234yf)	125
64 50 ... Safety information for handling refrigerant R1234yf	125
64 50 ... Safety information for handling tetrafluorethane refrigerant R134a	125
64 50 ... Safety informations for handling refrigerant oil	125
17 00 011 Draining and topping up the coolant for the low-temperature circuit	24
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	24
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	24
17 11 103 Removing and installing/replacing coolant expansion tank for the low-temperature coolant circuit	24
17 11 103 Removing and installing/replacing coolant expansion tank for the low-temperature coolant circuit	24
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	24
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	24
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	24
17 00 040 Venting cooling system and checking on watertightness	24
17 00 040 Venting high temperature - cooling system and checking for water leaks (N20 hybrid drive)	24
17 00 040 Venting high temperature - cooling system and checking for water leaks (N20 hybrid drive)	24
17 00 040 Bleeding lower-temperature cooling system (B48)	24
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	24
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	24
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17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	24
17 00 011 Draining and topping up coolant circuit for low temperature	24
17 00 040 Bleed the low-temperature cooling system and check for watertightness (coolant circuit for low temperature)	24
17 00 040 Bleeding and filling low temperature cooling system using vacuum filler device (B48)	24
17 00 011 Draining and topping up low-temperature coolant circuit	24
17 00 011 Draining and topping up low-temperature coolant circuit	24
17 00 040 Bleeding the low-temperature coolant circuit and checking it for watertightness	24
17 00 040 Bleeding the low-temperature coolant circuit and checking it for watertightness	24
17 00 015 Draining and topping up the coolant circuit for the drive \PREMIUM	24
17 00 011 Draining and topping up low-temperature coolant circuit	24
17 00 040 Bleed the cooling system and check for watertightness with the special tool (low-temperature coolant circuit)	24

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17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	24
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	24
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17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	24

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17 12 xxx Overview of the coolant lines on the front electric drive unit

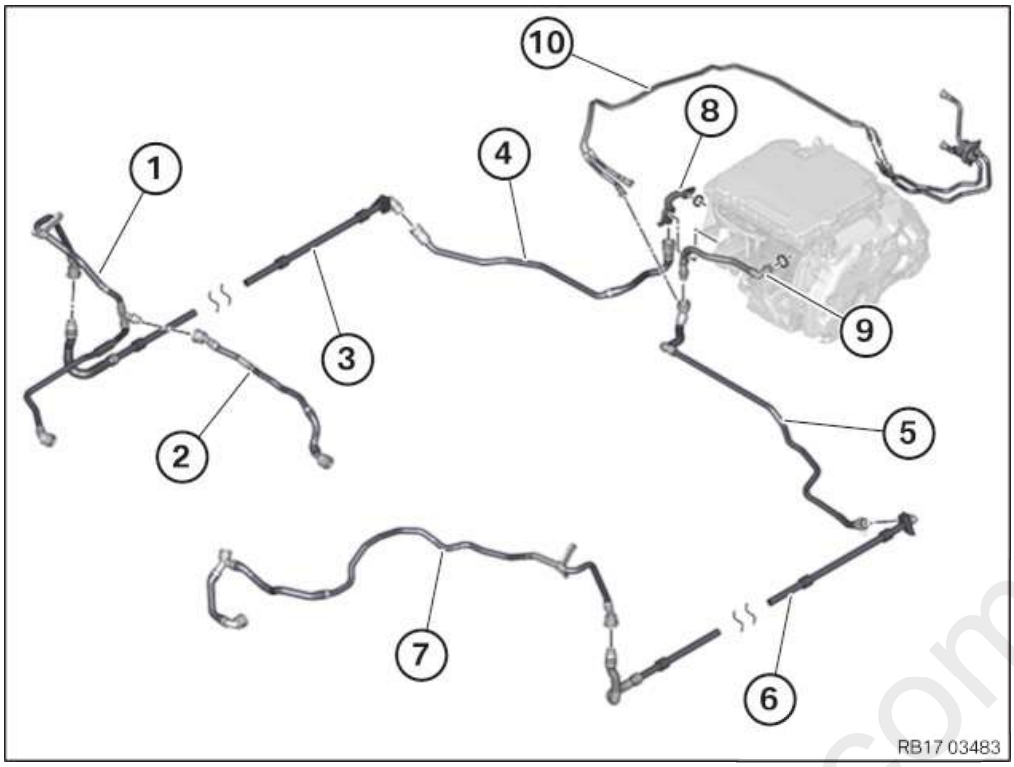


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Item	Job number	Title	Spare part number
1.	17 12 680	Removing and installing / replacing coolant hose, high-temperature coolant radiator - electric coolant pump	8 475 126
2.	17 12 681	Removing and installing / replacing coolant hose, heating - high-temperature coolant radiator	8 475 148
3.	17 12 682	Removing and installing / replacing coolant hose, electric coolant pump - low-temperature coolant radiator	8 475 131
4.	17 12 683	Removing and installing / replacing coolant hose, cooling unit - electric coolant pump - high-temperature coolant radiator	8 479 142
5.	17 12 684	Removing and installing / replacing coolant hose, expansion tank - electric coolant pump	8 479 127
6.	17 12 685	Removing and installing / replacing coolant hose, cooling unit - changeover valves	8 475 145
7.	17 12 686	Removing and installing / replacing coolant hose, low-temperature coolant radiator - shutoff valve	8 475 132
8.	17 12 687	Removing and installing / replacing coolant hose, electric coolant pump - Combined Charging Unit	8 475 128
9.	17 12 688	Removing and installing / replacing coolant line, high-temperature coolant radiator - expansion tank	8 475 149
10.	17 12 576	Removing and installing / replacing electric drive unit - changeover valve part 3	8 475 140
11.	17 12 689	Removing and installing / replacing coolant hose, high-voltage battery - changeover valve	8 475 144
12.	17 12 ...		8 475 129
13.	17 12 691	Removing and installing / replacing coolant line, low-temperature coolant radiator - expansion tank	8 475 133
14.	17 12 962	Removing and installing / replacing coolant hose, electric coolant pump - shutoff valve	8 475 141
15.	17 12 963	Removing and installing / replacing coolant hose, shutoff valve - high-voltage battery	8 475 143

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17 12 XXX Overview of the coolant lines on the rear electric drive unit



Item	Job number	Title	Spare part number
1.	17 12 570	Removing and installing / replacing coolant line, electric coolant pump - electric drive unit part 1	8 475 134
2.	17 12 571	Removing and installing / replacing coolant line, electric coolant pump - electric drive unit part 2	8 475 135
3.	17 12 572	Removing and installing / replacing coolant line, electric coolant pump - electric drive unit part 3	8 475 136
4.	17 12 573	Removing and installing / replacing coolant line, electric coolant pump - electric drive unit part 4	8 479 137
5.	17 12 574	Removing and installing / replacing electric drive unit - changeover valve part 1	8 479 138
6.	17 12 575	Removing and installing / replacing electric drive unit - changeover valve part 2	8 475 139
7.	17 12 576	Removing and installing / replacing electric drive unit - changeover valve part 3	8 475 140
8.	17 12 577	Removing and installing / replacing coolant feed line for electric drive unit	8 743 378
9.	17 12 578	Removing and installing / replacing coolant return line for electric drive unit	8 743 379
10.	Not yet fitted		

17 12 565 Replacing the coolant hose between coolant radiator and coolant expansion tank

WARNING

Hot fluids.

Risk of scalding!

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

CAUTION

Materials harmful to health.

Contact with fluids harmful to health!

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

TECHNICAL INFORMATION

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

1 – Removing the coolant line from coolant radiator to expansion tank

WARNING

Hot fluids.

Risk of scalding!

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

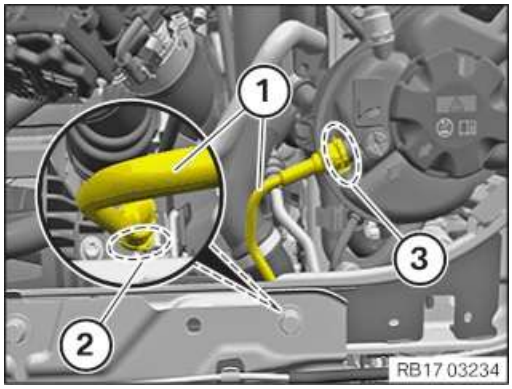
TECHNICAL INFORMATION

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

TECHNICAL INFORMATION

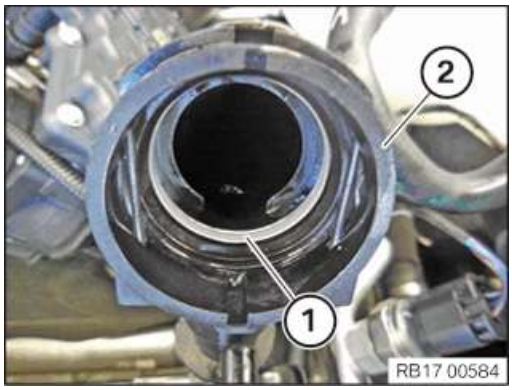
Notes on work at the cooling system form the basis of these repair instructions and must be complied with at all times.
For additional information see: 17 00 ... Instructions for repair work on cooling system

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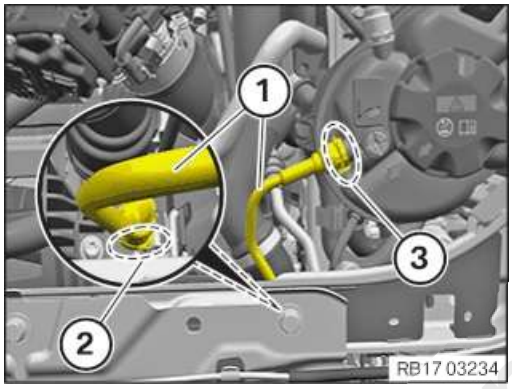


- Unlock and pull off the coolant line (1) in the marked area (2).
- Catch and dispose of escaping coolant.
- Unlock and pull off the coolant line (1) in the marked area (3).
- Catch and dispose of escaping coolant.
- Feed out coolant line (1) and remove.

2 – Installing the coolant line of the coolant radiator for the expansion tank



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



- Guide in the coolant line (1) and install it.
- Connect the coolant line (1) in the marked areas (3) and (2) and lock it.

  The coolant line (1) must audibly engage.

Additional Information

Links

Repair instructions	Used in step
17 00 ... Instructions for repair work on cooling system	1

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17 12 555 Replacing the coolant hose from the coolant radiator to the transmission oil cooler

WARNING

Hot fluids.

Risk of scalding!

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

CAUTION

Materials harmful to health.

Contact with fluids harmful to health!

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

TECHNICAL INFORMATION

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

PRELIMINARY WORK

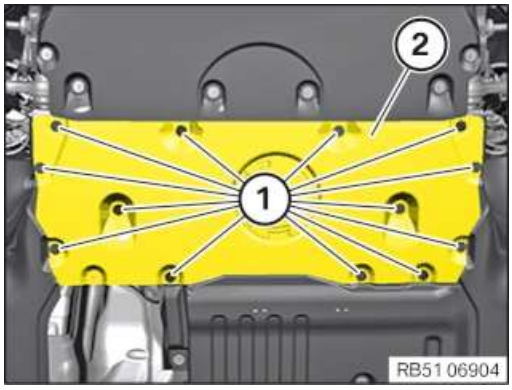
1 – Draining coolant

TECHNICAL INFORMATION

The additional information must be observed without fail!
Proceeding further without working through the additional information is not allowed!

- See additional information.

2 – Removing the centre underbody protection

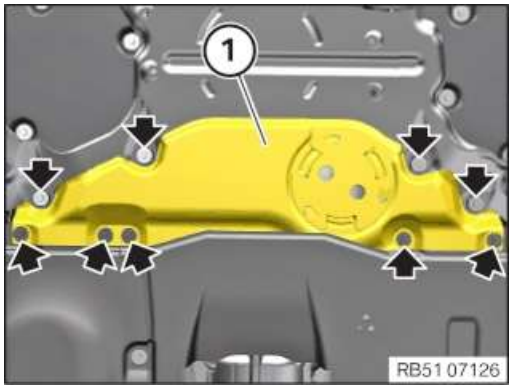


- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .

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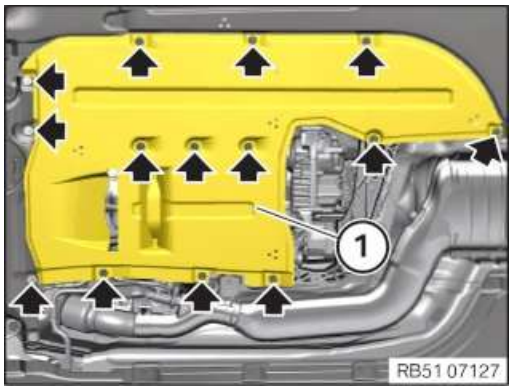


- **Version with all-wheel drive:**

  Remove screws (arrows).

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

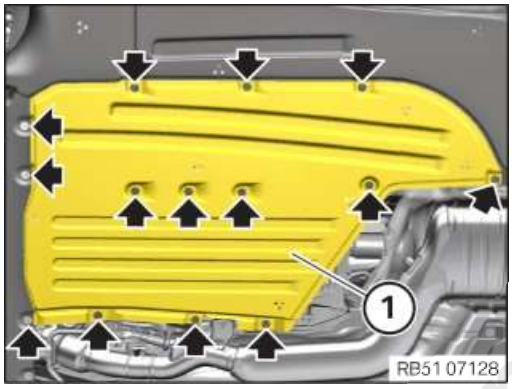
3 – Remove rear underbody protection



- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).



- **Version B:**

  Remove screws (arrows).

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

MAIN WORK

4 – Removing the coolant line from the coolant radiator to the transmission oil cooler

Prerequisite

Coolant drained.

WARNING

Hot fluids.

Risk of scalding!

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

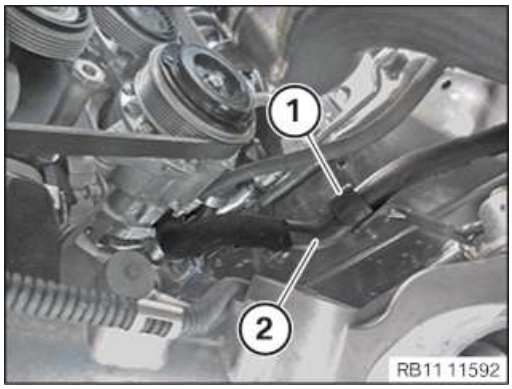
TECHNICAL INFORMATION

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

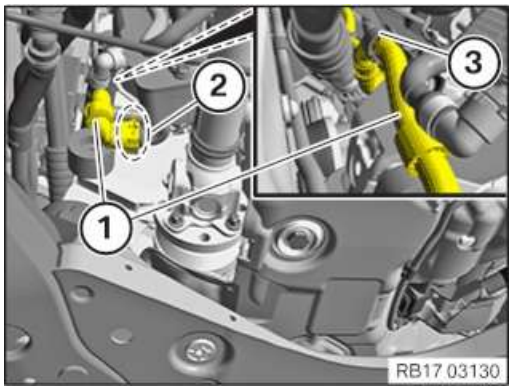
cardiagn.com

TECHNICAL INFORMATION

Notes on work at the cooling system form the basis of these repair instructions and must be complied with at all times.
For additional information see: 17 00 ... Instructions for repair work on cooling system

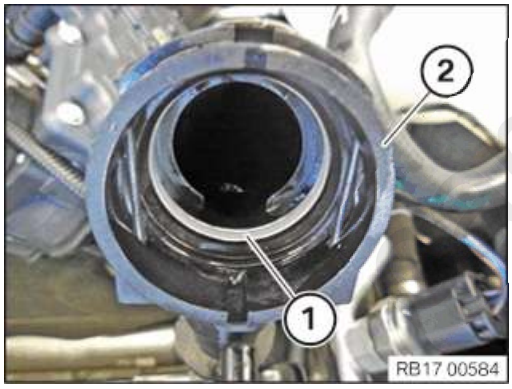


- Unlock and open the holder (1).
- Feed out the coolant line (2) from the holder (1).

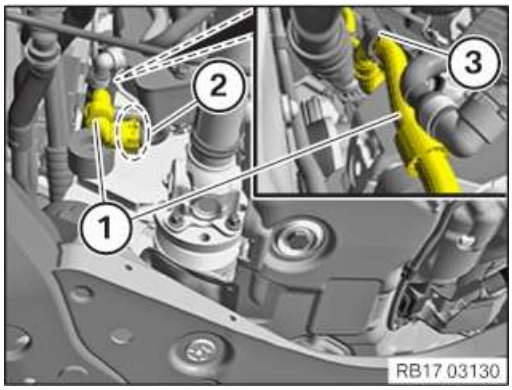


- Unlock and pull off of the coolant line (1) in the marked area (2).
- Catch and dispose of escaping coolant.
- Unlock and open the holder (3).
- Feed out the coolant line (1) from the holder (3).
- Feed out and remove the coolant line (1) **carefully**.

5 – Installing coolant line from coolant radiator to transmission oil cooler



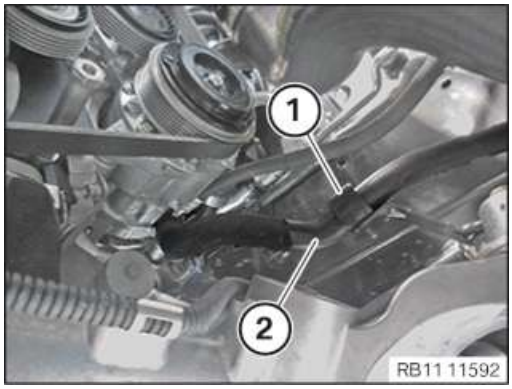
- Check the sealing ring (1) of the coolant line (2) for damage and renew where required.



- **Carefully** feed in the coolant line (1) and install it.
- Connect and lock the coolant line (1) in the marked area (2).

  The coolant line (1) must audibly engage.
- Fasten coolant line (1) in holder (3).
- Lock holder (3).

  The holder (3) must engage audibly.

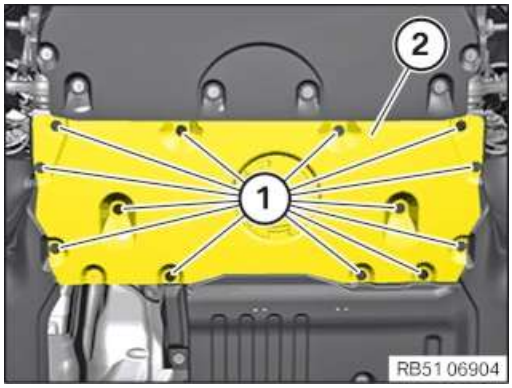


- Fasten coolant line (2) in holder (1).
- Lock holder (1).

  The holder (1) must engage audibly.

POSTPROCESSES

6 – Installing the centre underbody protection



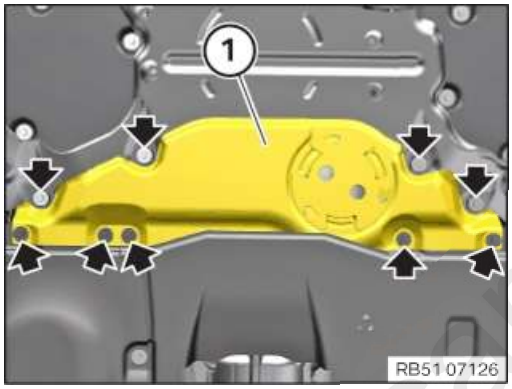
- **Variant with rear wheel drive:**

  Position central underbody protection (2).

  Tighten the screws (1).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



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

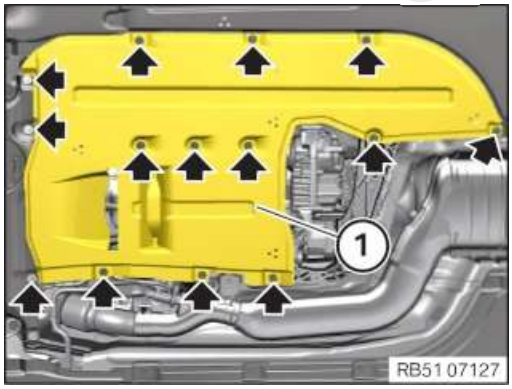
  Guide in centre underbody protection (1) and install.

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm

7 – Installing underbody protection at rear



- **Version A:**

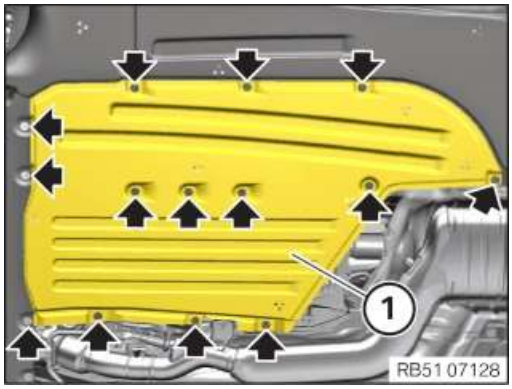
  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm

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- **Version B:**

  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm

8 – Connecting the coolant lines

TECHNICAL INFORMATION

The additional information must be observed without fail!
Proceeding further without working through the additional information is not allowed!

- See additional information.

9 – Filling and bleed the high-temperature coolant circuit



TECHNICAL INFORMATION

It is **mandatory** to fill the cooling system before bleeding.
Fill **both** the circuits for high and low-temperature coolant circuits.

- See additional information.

Additional Information

Overview of Tightening Torques

Underbody protection Used in step 67

Hexagon screw		Tightening torque	3 Nm

Links

Repair instructions	Used in step
17 00 ... Instructions for repair work on cooling system	4
17 00 008 Draining and topping up coolant for high-temperature circuit	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 008 Draining and topping up coolant for high-temperature circuit	9
17 00 008 Draining and topping up coolant for high-temperature circuit	9
17 00 008 Draining and topping up coolant for high-temperature circuit	9
17 00 008 Draining and topping up coolant for high-temperature circuit	9

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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 039 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 039 Bleeding the cooling system (B36, B38, B46, B48)	9
17 00 039 Bleeding cooling system (B37, B47)	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 039 Filling and bleeding the high-temperature cooling system vacuum filler device (B48)	9
17 00 008 Draining and topping up the high-temperature coolant circuit	9
17 00 008 Draining and topping up the high-temperature coolant circuit	9
17 00 016 Draining and topping up coolant circuit for Range Extender \PREMIUM	9
17 00 008 Draining and topping up the high-temperature coolant circuit	9
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	9
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	9
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9

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17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 009 Check the cooling system for watertightness with a special tool (with a tester)	9
17 00 009 Check the cooling system for watertightness with a special tool (with a tester)	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 008 Draining and topping up coolant for high-temperature circuit	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 008 Draining and topping up coolant for high-temperature circuit	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	9
17 00 008 Draining and topping up coolant for high-temperature circuit	
17 00 008 Draining and topping up coolant for high-temperature circuit	
17 00 008 Draining and topping up coolant for high-temperature circuit	
17 00 008 Draining and topping up coolant for high-temperature circuit	
17 00 008 Draining and topping up coolant for high-temperature circuit	
17 00 008 Draining and topping up coolant for high-temperature circuit	

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17 12 521 Replacing the coolant hose of coolant radiator at the top/coolant line

WARNING

Hot fluids.

Risk of scalding!

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

CAUTION

Materials harmful to health.

Contact with fluids harmful to health!

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

TECHNICAL INFORMATION

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

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PRELIMINARY WORK

1 – Removing the acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

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

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



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

2 – Draining coolant

TECHNICAL INFORMATION

The additional information must be observed without fail!
Proceeding further without working through the additional information is not allowed!

- See additional information.

MAIN WORK

3 – Removing the coolant line at the top of the coolant radiator

Prerequisite

Coolant has been drained.

WARNING

Hot fluids.

Risk of scalding!

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

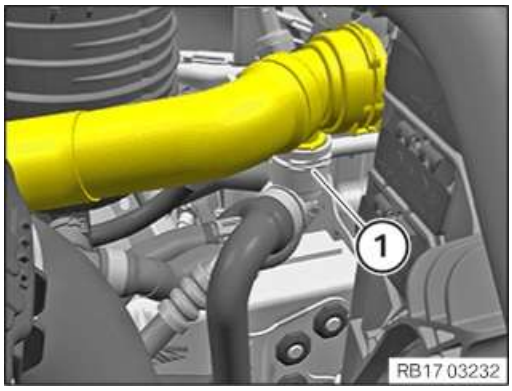
carflagn.com

TECHNICAL INFORMATION

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

TECHNICAL INFORMATION

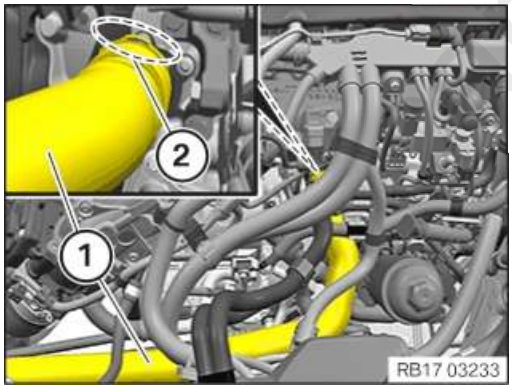
Notes on work at the cooling system form the basis of these repair instructions and must be complied with at all times.
For additional information see: 17 00 ... Instructions for repair work on cooling system



- Unlock the coolant line (1) and pull it off.
- Catch and dispose of escaping coolant.

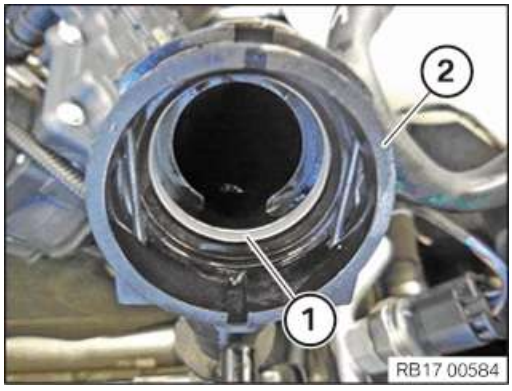


- Unlock the holder (1) and feed the coolant line (2) out and set it aside.



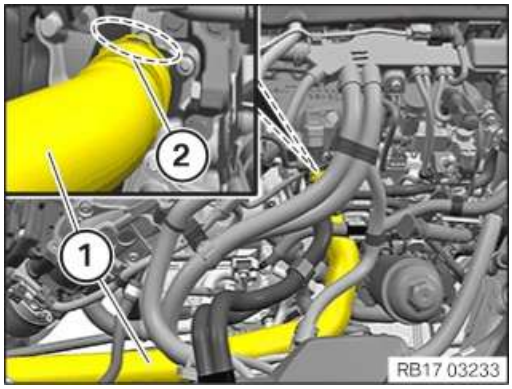
- Unlock and pull off the coolant line (1) in the marked area (2).
- Catch and dispose of escaping coolant.
- Feed out coolant line (1) and remove.

4 – Installing the coolant line on top of coolant radiator



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

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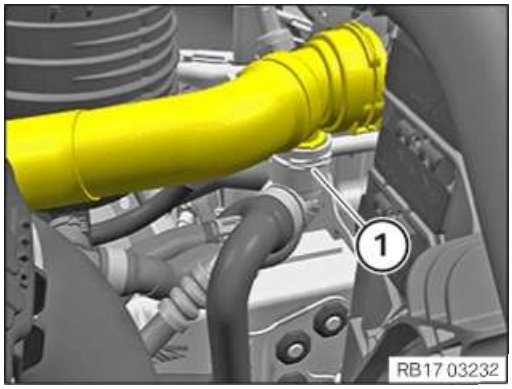
- Guide in the coolant line (1) and install it.
- Connect and lock coolant line (1) in the marked area (2).

  The coolant line (1) must audibly engage.



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

  The holder (1) must engage audibly.



- Connect and lock coolant line (1).

  The coolant line (1) must audibly engage.

POSTPROCESSES

5 – Install acoustic cover

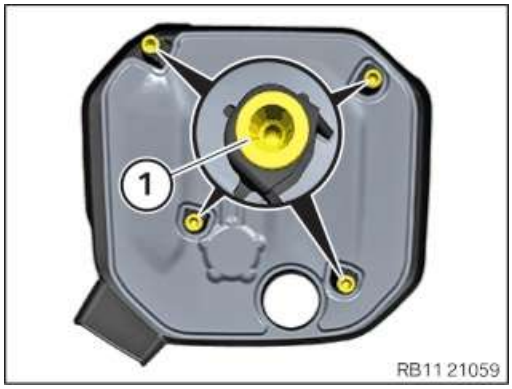
RISK OF DAMAGE

Damage to the acoustic cover/design cover.

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

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

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



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

6 – Connecting the coolant lines

TECHNICAL INFORMATION

The additional information must be observed without fail!
Proceeding further without working through the additional information is not allowed!

- See additional information.

7 – Filling and bleed the high-temperature coolant circuit



TECHNICAL INFORMATION

It is **mandatory** to fill the cooling system before bleeding.
Fill **both** the circuits for high and low-temperature coolant circuits.

- See additional information.

Additional Information

Links

Repair instructions	Used in step
17 00 ... Instructions for repair work on cooling system	3
17 00 008 Draining and topping up coolant for high-temperature circuit	7
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	7
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	7
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	7

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17 00 008 Draining and topping up coolant for high-temperature circuit	7
17 00 008 Draining and topping up coolant for high-temperature circuit	7
17 00 008 Draining and topping up coolant for high-temperature circuit	7
17 00 008 Draining and topping up coolant for high-temperature circuit	7
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	7
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	7
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	7
17 00 039 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	7
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	7
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	7
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	7
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	7
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	7
17 00 039 Bleeding the cooling system (B36, B38, B46, B48)	7
17 00 039 Bleeding cooling system (B37, B47)	7
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	7
17 00 039 Filling and bleeding the high-temperature cooling system vacuum filler device (B48)	7
17 00 008 Draining and topping up the high-temperature coolant circuit	7
17 00 008 Draining and topping up the high-temperature coolant circuit	7
17 00 016 Draining and topping up coolant circuit for Range Extender \PREMIUM	7
17 00 008 Draining and topping up the high-temperature coolant circuit	7
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	7
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	7
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	7

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17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	7
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	7
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	7
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	7
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	7
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	7
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	7
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	7
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	7
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	7
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	7
17 00 009 Check the cooling system for watertightness with a special tool (with a tester)	7
17 00 009 Check the cooling system for watertightness with a special tool (with a tester)	7
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	7
17 00 008 Draining and topping up coolant for high-temperature circuit	7
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	7
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	7
17 00 008 Draining and topping up coolant for high-temperature circuit	7
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	7
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	7
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17 00 008 Draining and topping up coolant for high-temperature circuit	
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17 12 542 Replacing the coolant hose of thermostat radiator

WARNING

Hot fluids.

Risk of scalding!

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

CAUTION

Materials harmful to health.

Contact with fluids harmful to health!

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

TECHNICAL INFORMATION

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

PRELIMINARY WORK

1 – Draining coolant

TECHNICAL INFORMATION

The additional information must be observed without fail!
Proceeding further without working through the additional information is not allowed!

- See additional information.

MAIN WORK

2 – Removing the coolant line from the thermostat to the coolant radiator

Prerequisite

Coolant drained.

WARNING

Hot fluids.

Risk of scalding!

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

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TECHNICAL INFORMATION

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

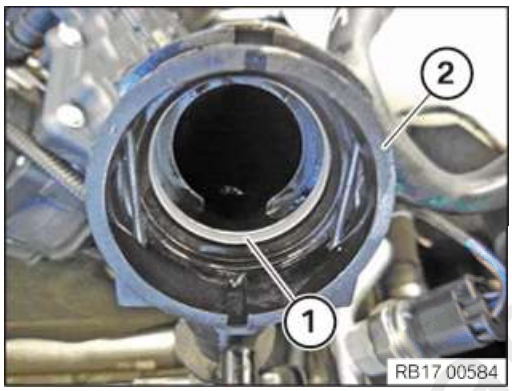
TECHNICAL INFORMATION

Notes on work at the cooling system form the basis of these repair instructions and must be complied with at all times.
For additional information see: 17 00 ... Instructions for repair work on cooling system

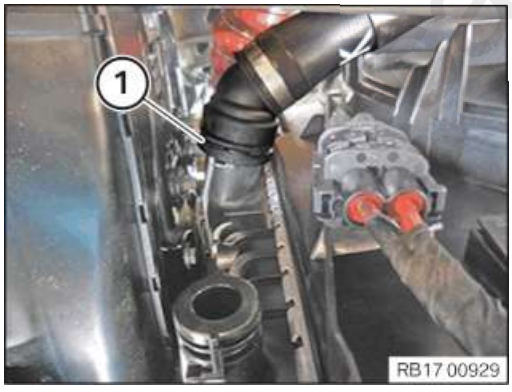


- Unlock the coolant line (1) and pull it off.
- Catch and dispose of escaping coolant.
- Feed out coolant line (1) and remove.

3 – Installing the coolant line from the thermostat to the coolant radiator



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



- Guide in the coolant line (1) and install it.
- Connect and lock coolant line (1).

  The coolant line (1) must audibly engage.

4 – Connecting the coolant lines

TECHNICAL INFORMATION

The additional information must be observed without fail!
Proceeding further without working through the additional information is not allowed!

- See additional information.

5 – Filling and bleed the high-temperature coolant circuit



TECHNICAL INFORMATION

It is **mandatory** to fill the cooling system before bleeding.
Fill **both** the circuits for high and low-temperature coolant circuits.

- See additional information.

Additional Information

Links

Repair instructions	Used in step
17 00 ... Instructions for repair work on cooling system	2
17 00 008 Draining and topping up coolant for high-temperature circuit	5
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	5
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	5
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	5
17 00 008 Draining and topping up coolant for high-temperature circuit	5
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	5
17 00 039 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	5
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	5
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	5
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	5
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	5
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	5
17 00 039 Bleeding the cooling system (B36, B38, B46, B48)	5
17 00 039 Bleeding cooling system (B37, B47)	5
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	5
17 00 039 Filling and bleeding the high-temperature cooling system vacuum filler device (B48)	5
17 00 008 Draining and topping up the high-temperature coolant circuit	5
17 00 008 Draining and topping up the high-temperature coolant circuit	5
17 00 016 Draining and topping up coolant circuit for Range Extender \PREMIUM	5
17 00 008 Draining and topping up the high-temperature coolant circuit	5
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	5
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	5
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	5
17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	5
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	5
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	5
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17 00 008 Draining and topping up coolant for high-temperature circuit	
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17 00 008 Draining and topping up coolant for high-temperature circuit	
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17 12 564 Replacing the coolant line in cylinder head expansion tank

WARNING

Hot fluids.

Risk of scalding!

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

CAUTION

Materials harmful to health.

Contact with fluids harmful to health!

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

TECHNICAL INFORMATION

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

PRELIMINARY WORK

1 – Bring front compartment lid in the service position

Prerequisite

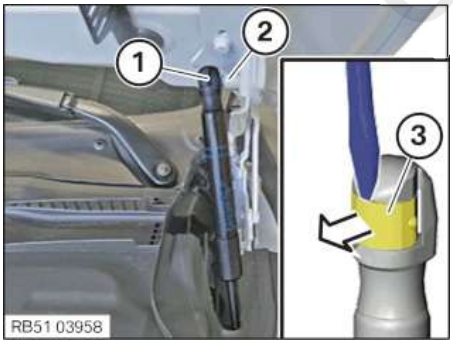
Engine compartment lid is open.

CAUTION

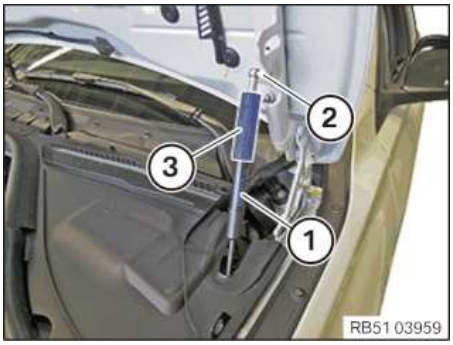
Shutting bonnet or tailgate.

Danger of injury!

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



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



TECHNICAL INFORMATION

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

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

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2 – Deactivating the 48 V electrical system

Prerequisite

Ignition is switched off.

WARNING

Deactivation of the 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

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

WARNING

Deactivation of the 48 V electrical system.

Risk of short circuits! Risk of fire!

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

RISK OF DAMAGE

Damage to 48-V battery

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

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

TECHNICAL INFORMATION

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



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

  The deactivation takes place automatically.

Check

TECHNICAL INFORMATION

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



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

desired state

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

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Result

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

Measure

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

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

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

Result

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

Measure

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

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



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



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



WARNING

Unprotected battery terminals.

Risk of short circuits! Risk of fire!

- Cover the vehicle battery.

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

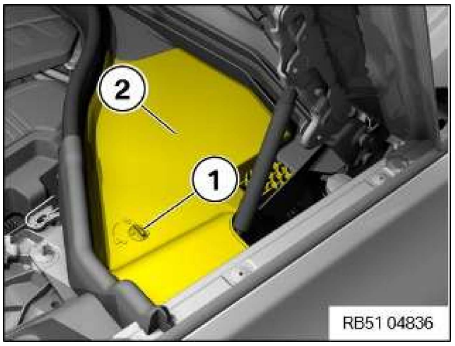
3 – Disconnecting all battery earth leads



- See additional information.

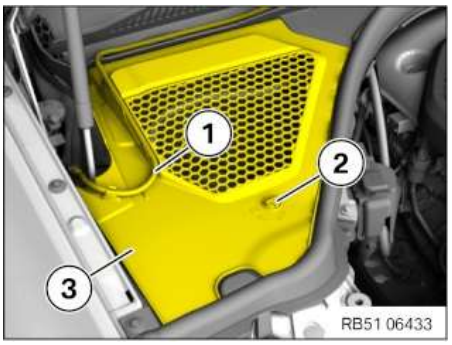
4 – Remove the cover of the engine compartment at the rear left

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

5 – Remove the cover of the rear right engine compartment



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

6 – Removing the wiper arm on the left and right

NOTICE

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

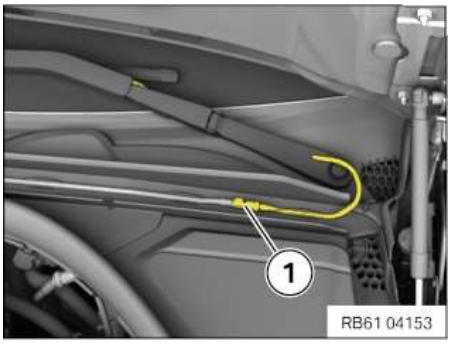
▸ **Remove the wiper arm**

RISK OF DAMAGE

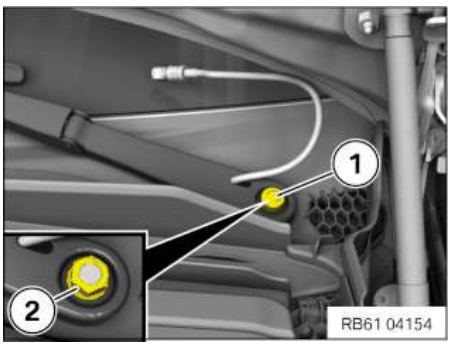
Damage to wiper console.

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

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

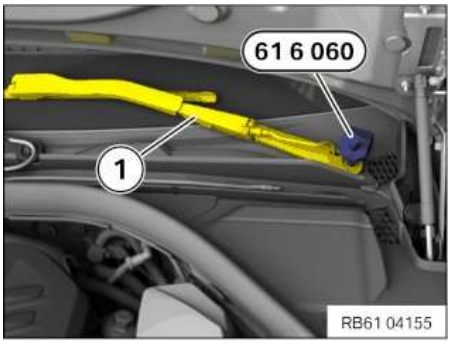


- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.



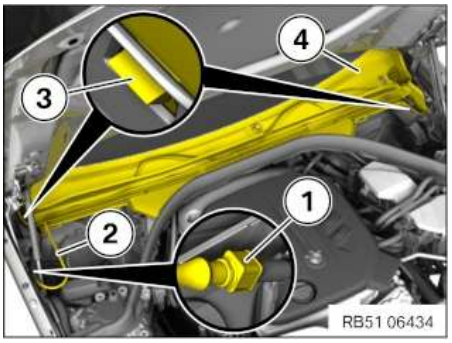
- Remove the protective cap (1).
- Loosen nut (2).

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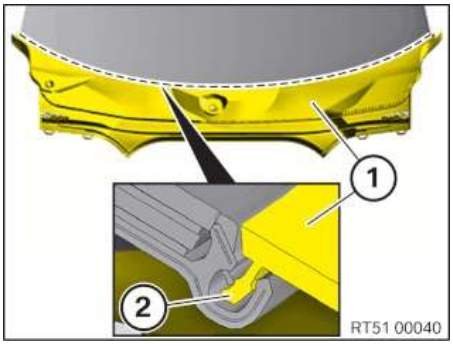


- Pull off the wiper arm (1) using special tool .

7 – Remove cowl panel cover



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



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

8 – Remove the seal for the rear bonnet

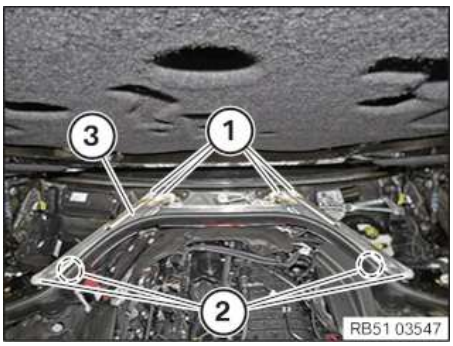


- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

9 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

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

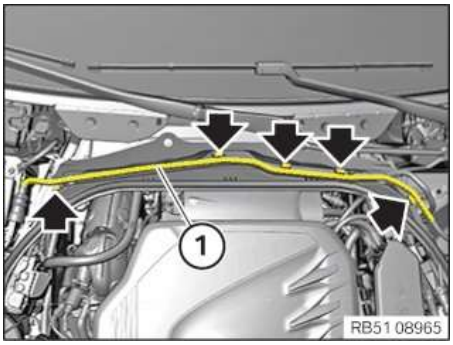


NOTICE

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

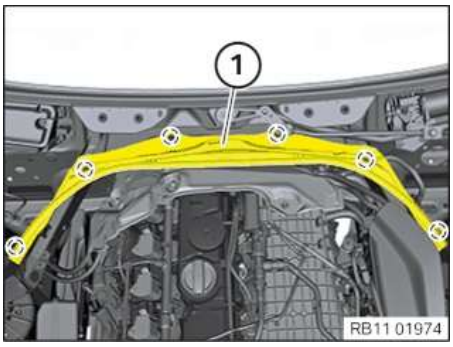
- Loosen screws (1) and (2).
- Remove tension strut (3) in the spring strut dome upwards.

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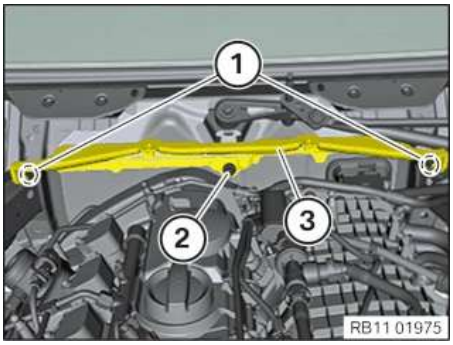
- **Version with mild hybrid technology:**

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



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

10 – Removing the centre bulkhead lower section



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

11 – Removing the acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

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

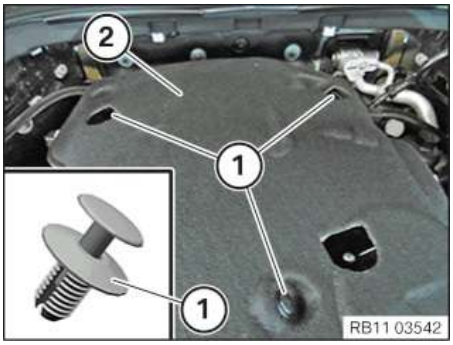
- Disassemble or mount the acoustic cover/design cover carefully.
- Disassemble or mount snap-lock couplings of the ball pivots one after the other.
- Disassemble or mount acoustic cover/design cover only at temperatures >20 °C.
- Use only distilled water as an auxiliary material during installation,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



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

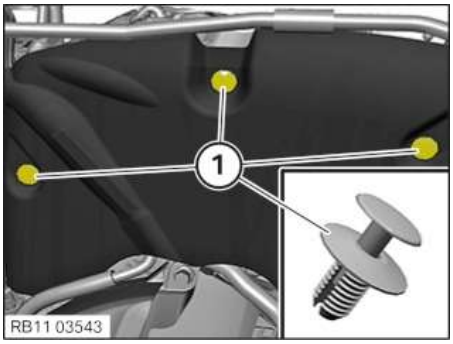
12 – Remove the acoustic cover for the injectors

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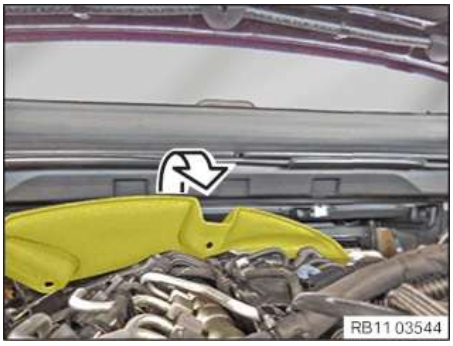


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

13 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).



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

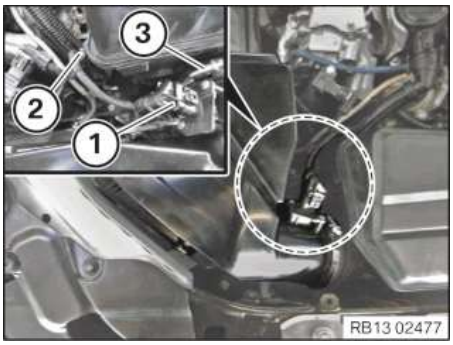
14 – Removing the clean air pipe with the resonator

WARNING

Hot surfaces.

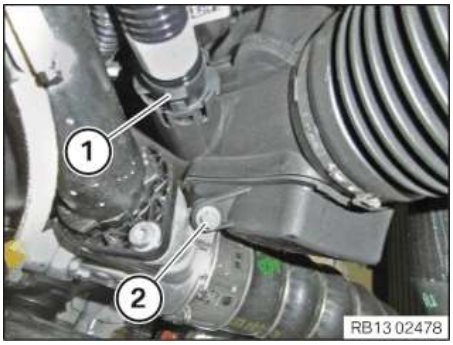
Risk of burning!

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

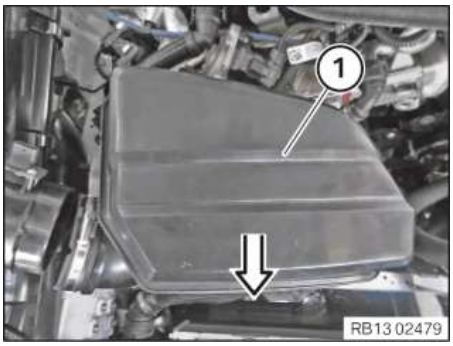


- Unlock plug connection (1) and disconnect.
- Loosen clamp (2).
- Unfasten clamp (3).
- Separate the clean air pipe with resonator from the intake filter housing.

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



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



- Unlock and loosen clamp (1).



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

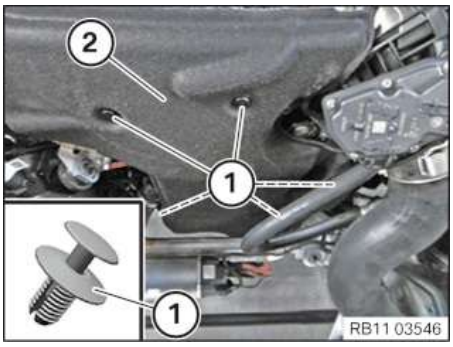
15 – Remove acoustic cover of the front engine

WARNING

Hot surfaces.

Risk of burning!

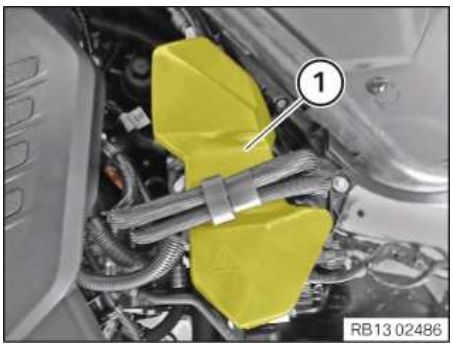
- Perform all work only on components that have cooled down.



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

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16 – Remove the cover for the DDE control unit



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

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

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

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

RISK OF DAMAGE

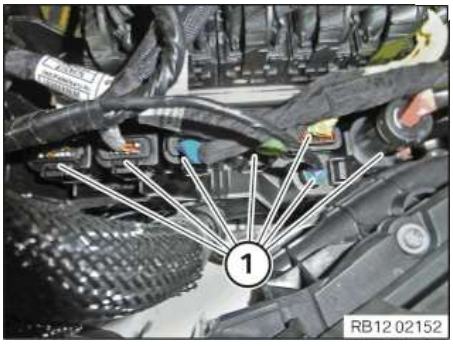
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

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

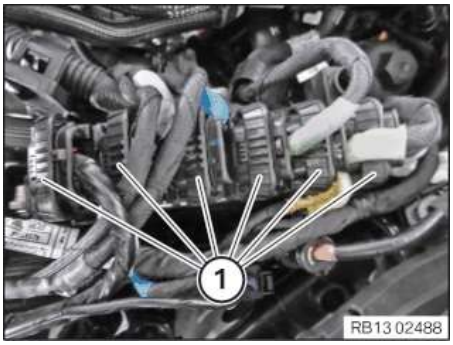
TECHNICAL INFORMATION

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

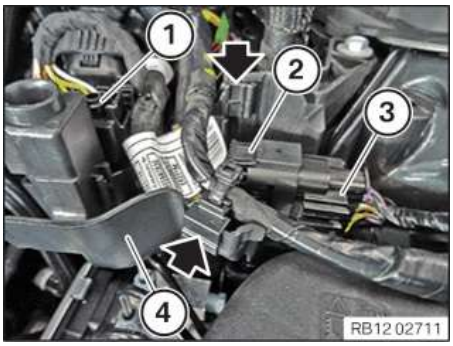


- Unlock and disconnect plug connections (1).

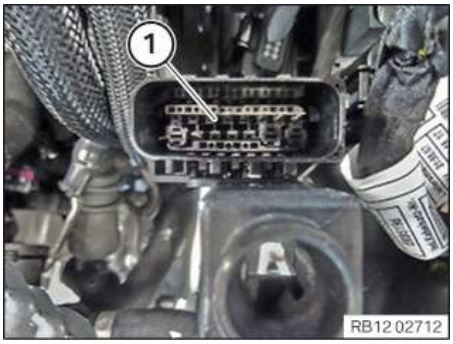
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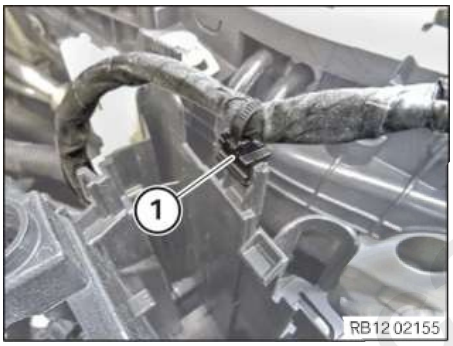
- Unlock and disconnect plug connections (1).



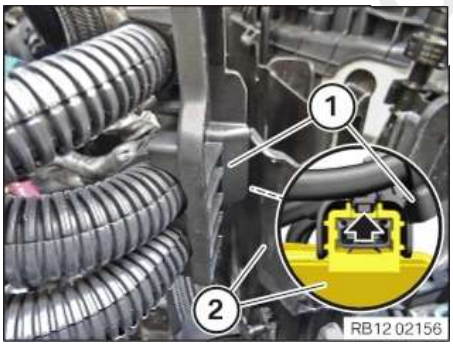
- Unlock plug connection (1) and disconnect.
- Unlock plug connection (2) and disconnect.
- Release the connector (3) and disconnect from the control unit holder (4).
- Release the clamps (arrows).



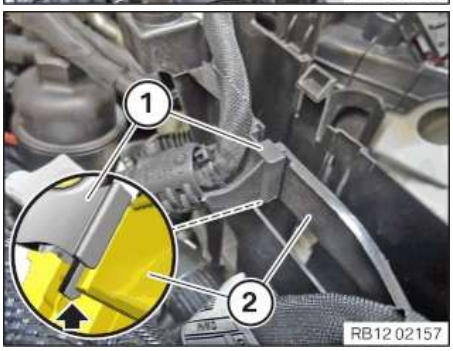
- Unlock plug connection (1) and disconnect.



- Loosen clamp (1).



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

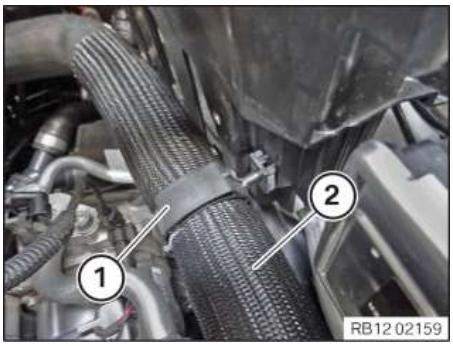


- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).

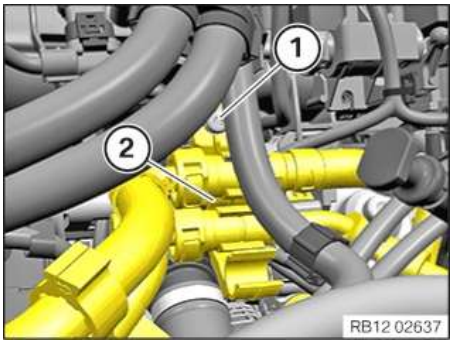
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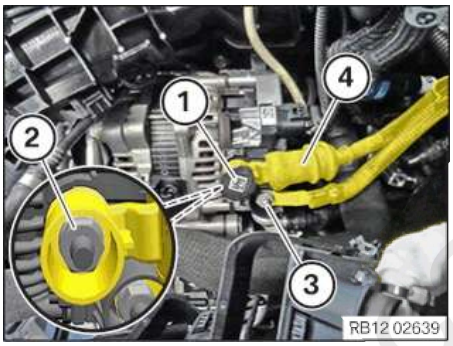
- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.



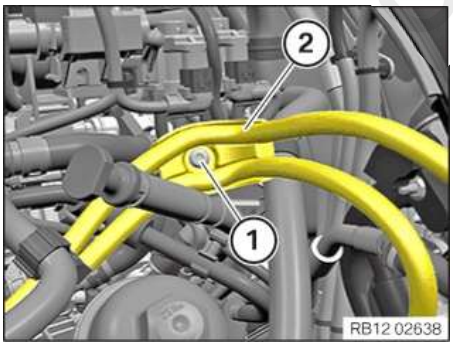
- Unlock holder (1) and feed out coolant line (2) and place it aside.



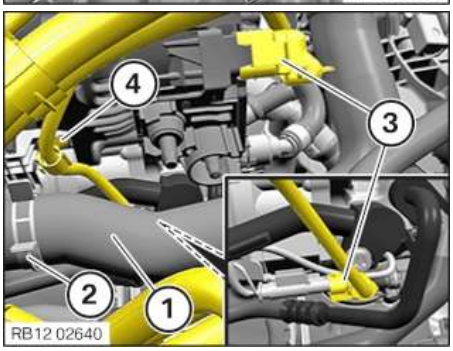
- Release the screw (1).
- Guide out fuel lines (2) and set them aside.



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

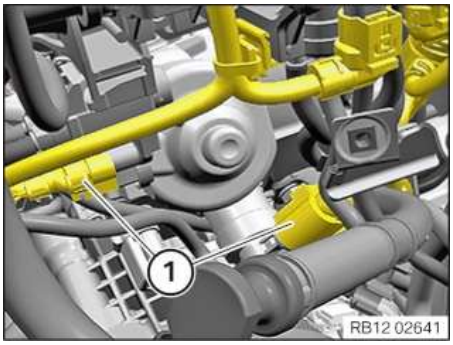


- Release the screw (1).
- Guide out the positive battery cables (2) and set them aside.

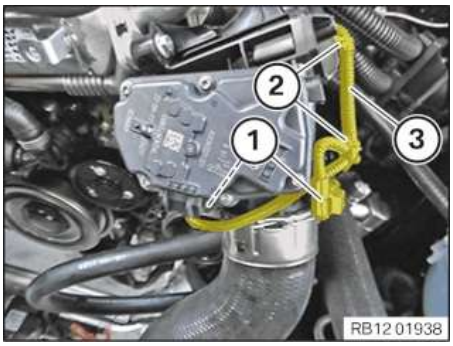


- Release the coolant line (1) from the holder (2) .
- Unlock plug connections (3) and disconnect.
- Loosen clamp (4).

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- Unlock and disconnect plug connections (1).



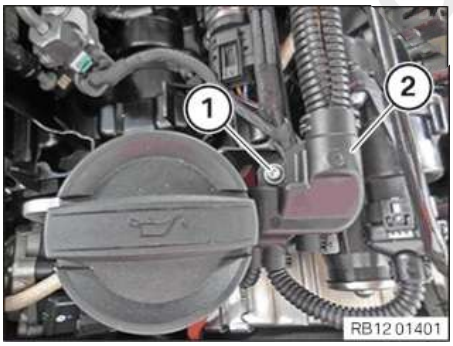
- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.



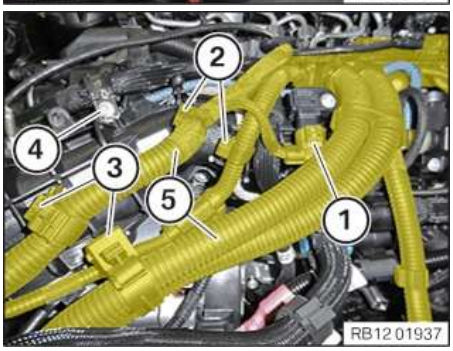
- Unlock and loosen connector (1).



- Unlock plug connection (1) and disconnect.

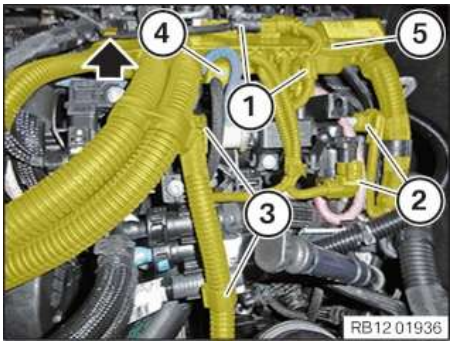


- Loosen screw (1).
- Remove the wiring harness section (2) and put to one side.



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

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

18 – Removing the intake plenum

TECHNICAL INFORMATION

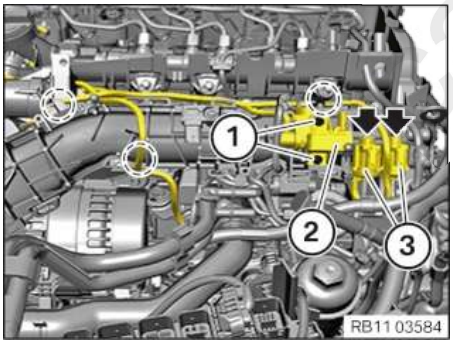
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



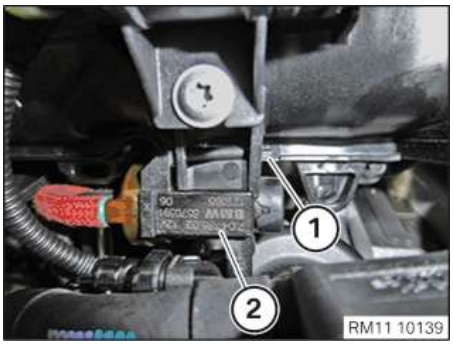
- Unlock clamp (1) and engage in this position.



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

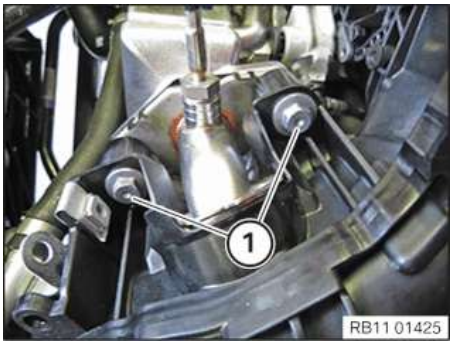


- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.

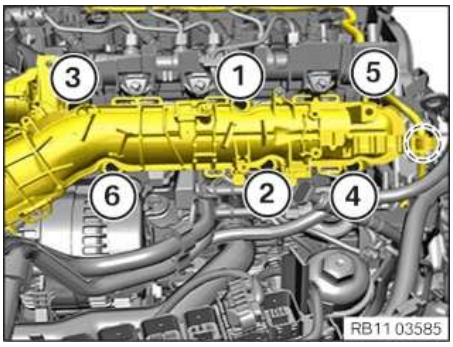


- Unlock the lock (1) upward.
- Guide out the electric changeover valve (2) to the left and set it aside.

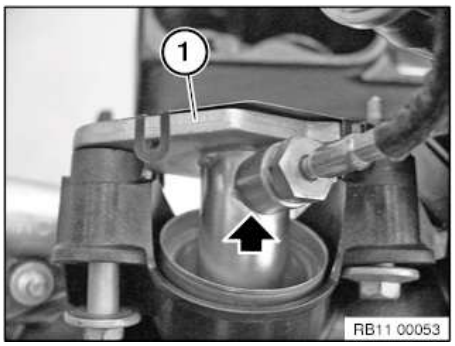
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- Loosen screws (1).



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



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

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MAIN WORK

19 – Removing the coolant line from cylinder head to expansion tank

WARNING

Hot fluids.

Risk of scalding!

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

TECHNICAL INFORMATION

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

TECHNICAL INFORMATION

Notes on work at the cooling system form the basis of these repair instructions and must be complied with at all times.
For additional information see: 17 00 ... Instructions for repair work on cooling system

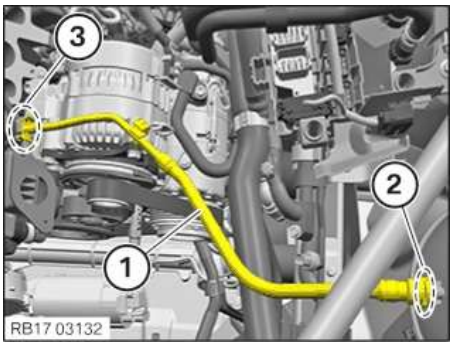
▸ **Avoiding damage to the starter generator due to escaping coolant**

RISK OF DAMAGE

Escaping coolant on the starter generator.

Damage and operating failure of the starter generator.

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

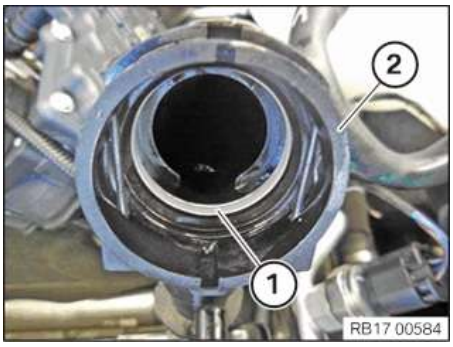


NOTICE

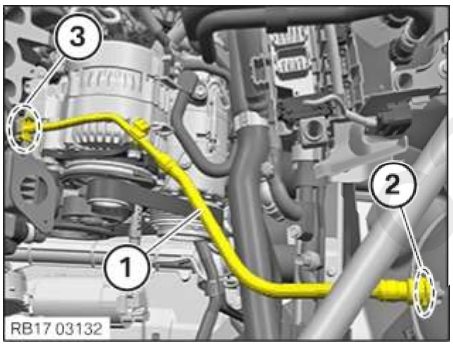
Schematic diagram is for example purposes. Some parts may differ in certain details.

- Unlock and pull off the coolant line (1) in the marked area (2).
- Catch and dispose of escaping coolant.
- Unlock and pull off the coolant line (1) in the marked area (3).
- Catch and dispose of escaping coolant.
- Feed out coolant line (1) and remove.

20 – Installing the coolant line from cylinder head to expansion tank



- Check the sealing ring (1) of the coolant line (2) for damages, and replace if necessary.



NOTICE

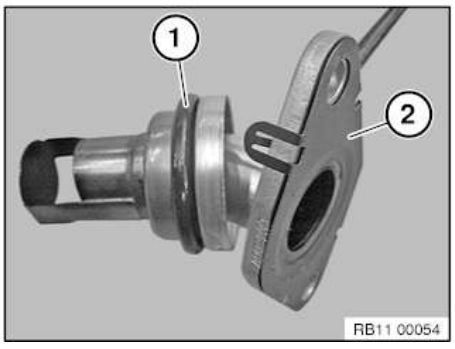
Schematic diagram is for example purposes. Some parts may differ in certain details.

- Guide in the coolant line (1) and install it.
- Connect the coolant line (1) in the marked areas (3) and (2) and lock it.

  The coolant line (1) must audibly engage.

POSTPROCESSES

21 – Installing the intake plenum

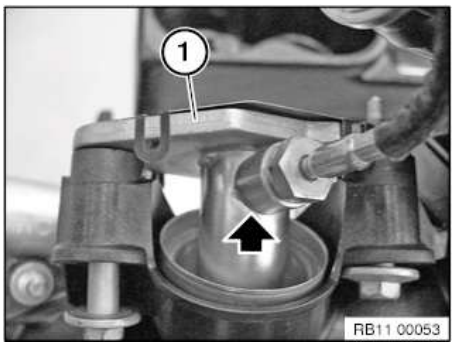


- Renew O-ring (1).

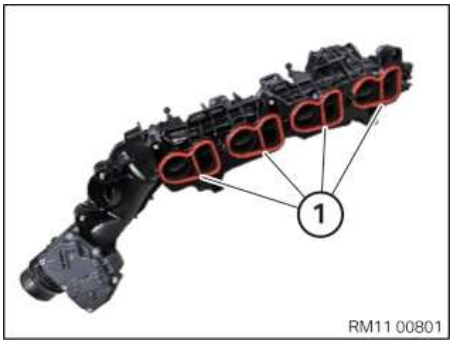
  Parts: O-ring
- Unclip the seal (2).
- Renew the seal (2).

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

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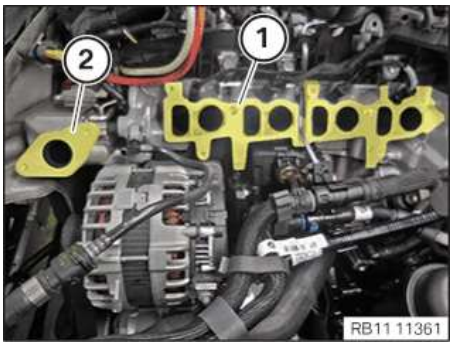


- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).

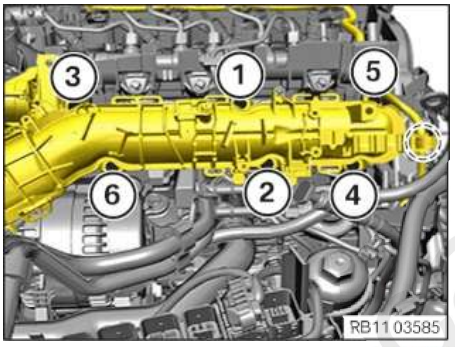


- Renew seals (1).

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



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

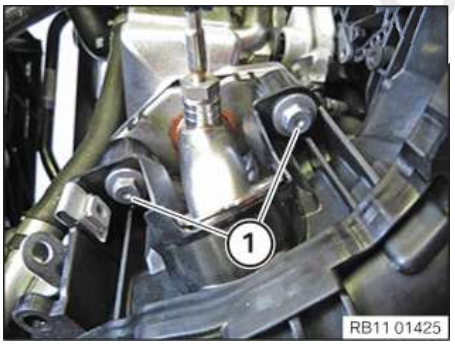


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

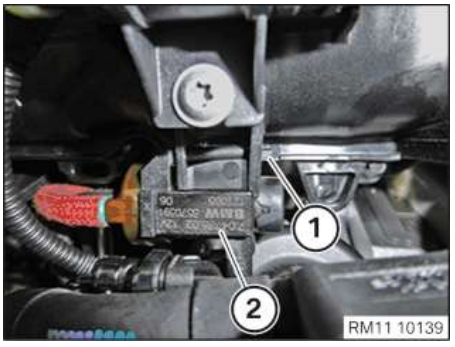
- Attach the wiring harness and fuel lines in the marked area on the intake plenum.



- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

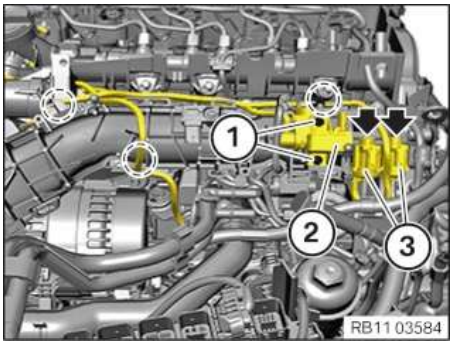
		Tightening torque	10 Nm



- Install electric changeover valve (2) from the left to the right in the holder on the intake plenum.

  The lock (1) must audibly engage.

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

Electric changeover valve to intake plenum

TS6x20		Tightening torque	5 Nm

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

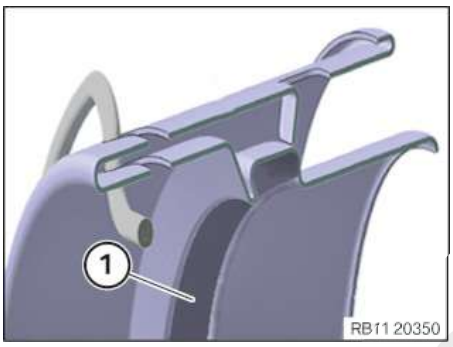


- Check the seal (1) for damage, and renew if necessary.

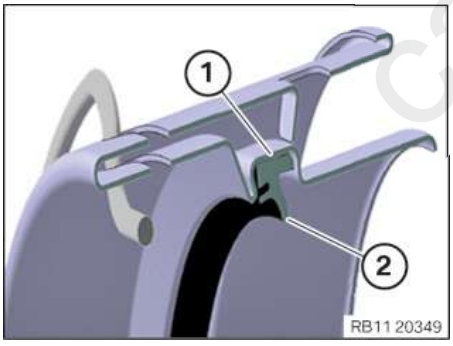
▸ **Replacing damaged seal**

TECHNICAL INFORMATION

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



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



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

TECHNICAL INFORMATION

Incorrect assembly is possible. Ensure correct installation position.

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



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

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

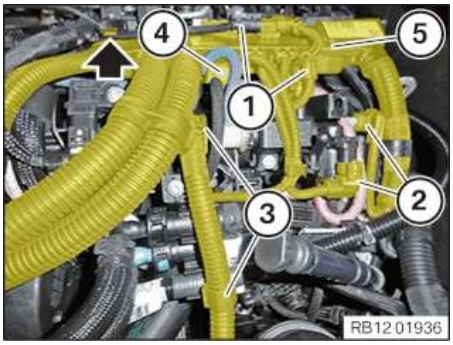
22 – Partially securing the wiring harness section on the intake plenum

RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

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

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



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

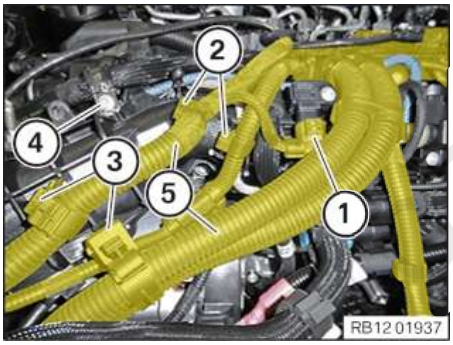
Wiring harness section to manifold

TS5x20		Tightening torque	3,6 Nm

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

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

  The connectors (1) must engage audibly.



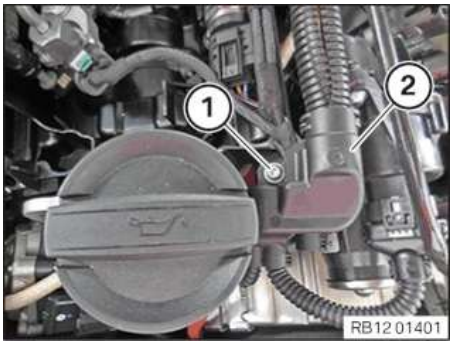
- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

Standard screw connection 4 Nm

Oval-head screw		Tightening torque	4 Nm

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

  The connector (1) must engage audibly.



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

Wiring harness section to cylinder head cover

TS5x20		Tightening torque	3,6 Nm

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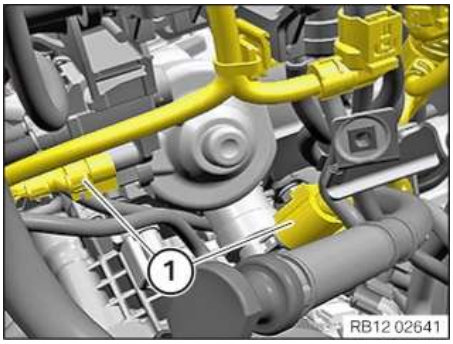
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.



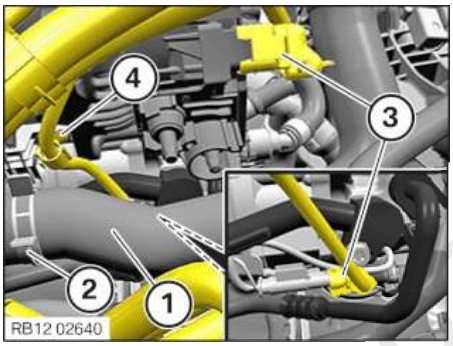
- Connect the connector (1) and lock it.

  The connector (1) must engage audibly.



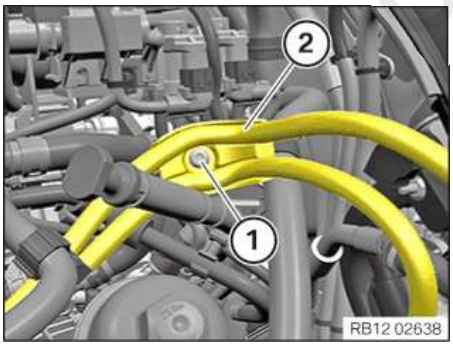
- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.



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

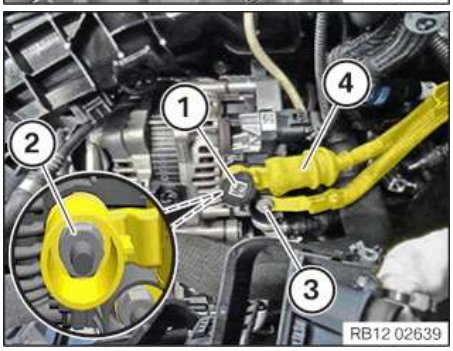
  The connectors (3) must engage audibly.
- Feed the coolant line (1) into the holder (2) and install it.



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

Standard screw connection M6

M6		Tightening torque	8 Nm



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

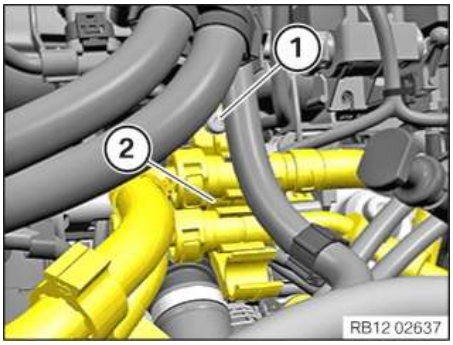
  Parts: Nuts
- Tighten nuts (3) and (2).

Battery positive lead on the starter motor generator

M8		Tightening torque	19 Nm

- Guide in and install the lid (1).

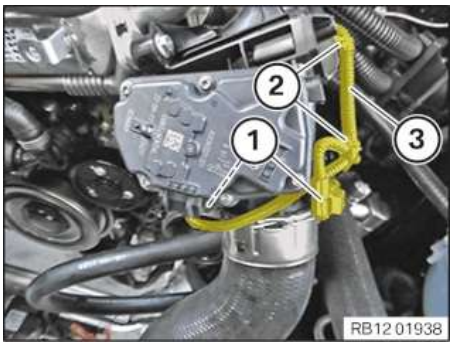
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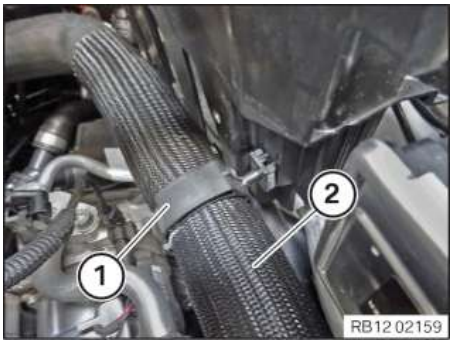
- Insert and install the holder (2).
- Tighten down screw (1).

Holder on intake plenum

TS6X20		Tightening torque	5 Nm



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



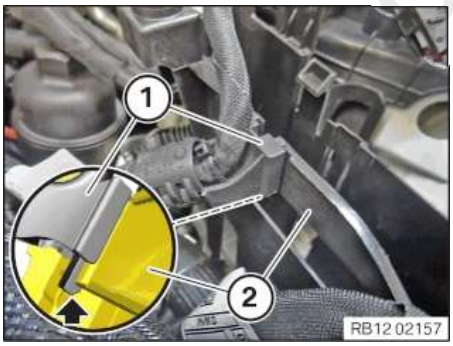
- Feed in and install coolant line (2).
- Lock holder (1).

  The holder (1) must engage audibly.



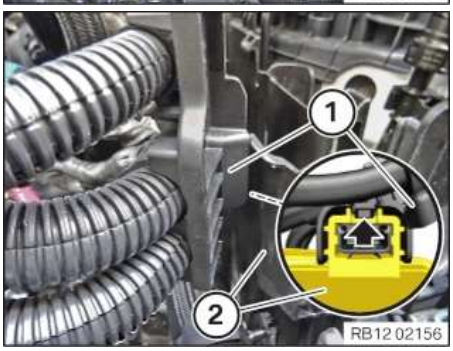
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.



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

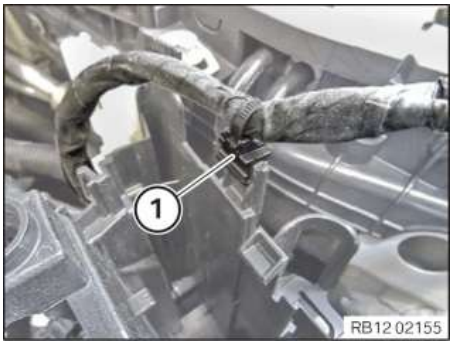
  Lock (arrow) must audibly engage.



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

  Lock (arrow) must audibly engage.

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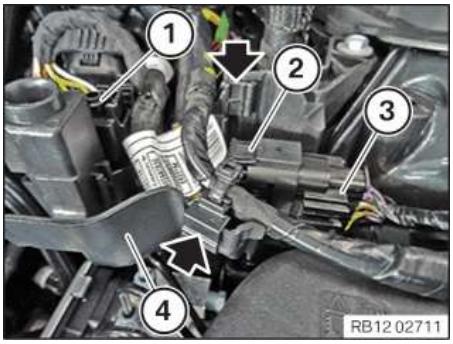


- Secure clamps (1).



- Feed in and install the connector (1).

  The connector (1) must engage audibly.

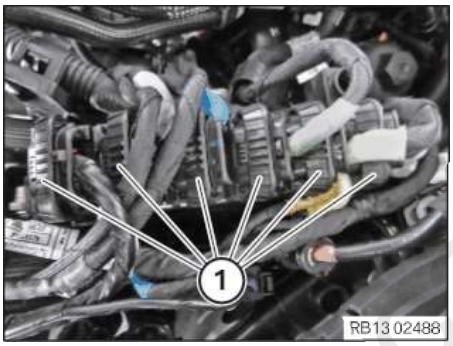


- Connect connector (3) to control unit holder (4) and lock it.

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

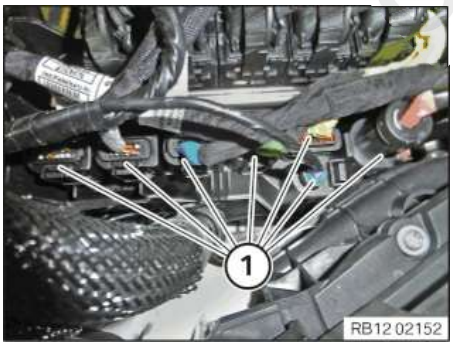
  The connector (2) must engage audibly.
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.
- Secure the clamps (arrows).



- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.

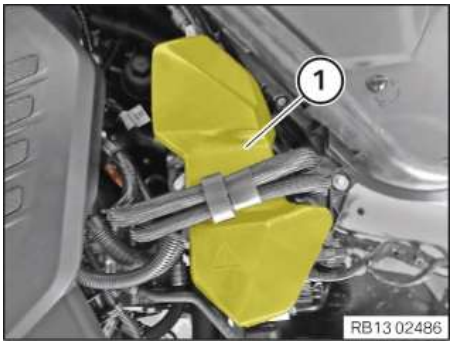


- Connect connectors (1) and lock.

  The connectors (1) must engage audibly.

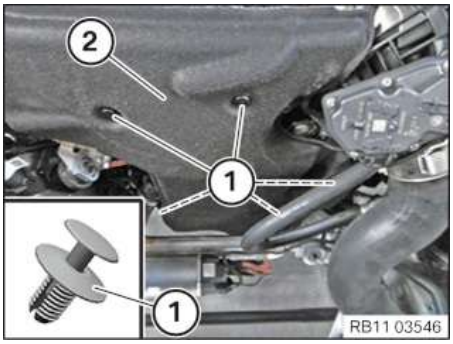
23 – Install the cover for the DDE control unit

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- Insert and install cover (1) into guides.

24 – Install acoustic cover for the engine, front

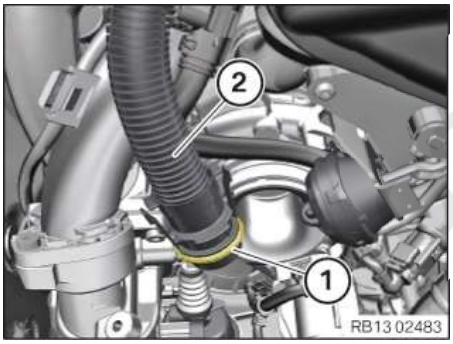


- Feed the acoustic cover (2) in and install.
- Secure the acoustic cover (2) with the expanding rivets (1).

25 – Installing the clean air pipe with resonator



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

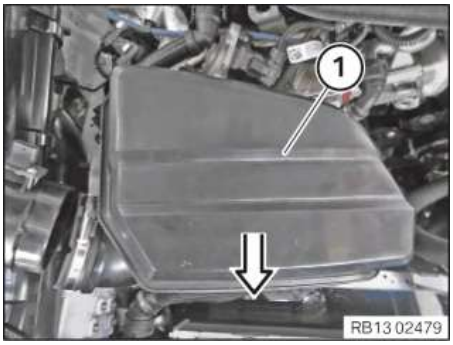


- Check the sealing ring (1) for the engine ventilation line (2) for damage and renew where required.



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

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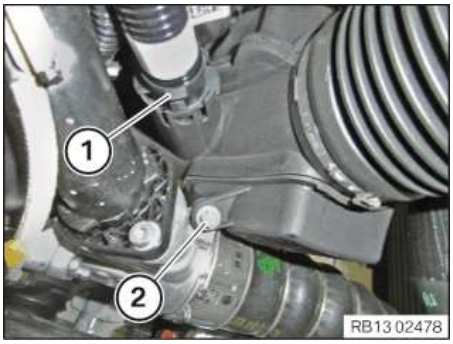


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

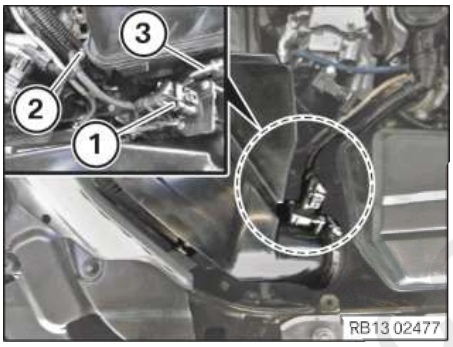
  The clamp (1) must engage audibly.



- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm



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

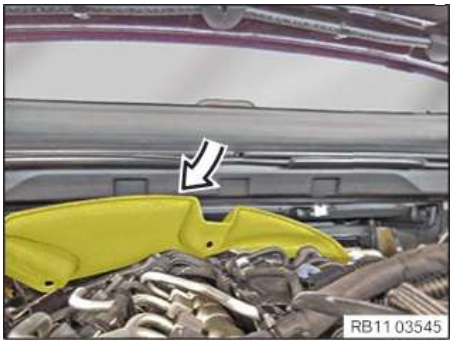
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

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

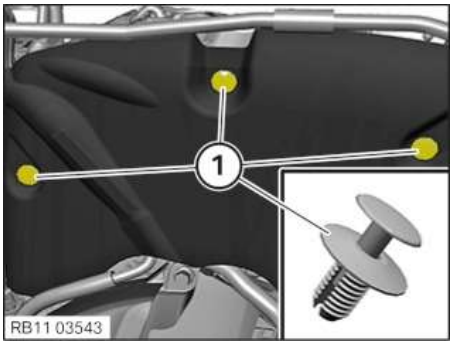
  The connector (1) must engage audibly.

26 – Installing acoustic cover at rear



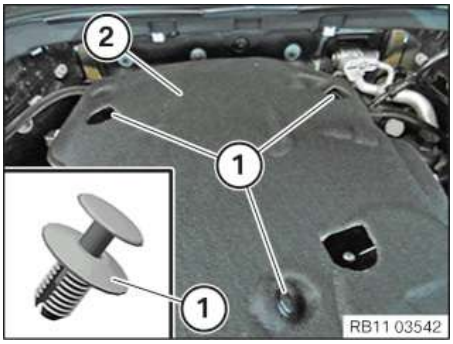
- Guide in the acoustic cover in the direction of the arrow and install it.

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

27 – Install the acoustic cover for the injectors



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

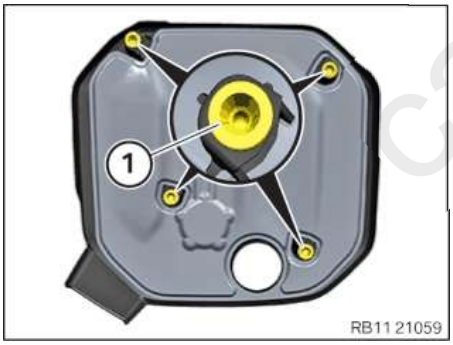
28 – Install acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

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

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



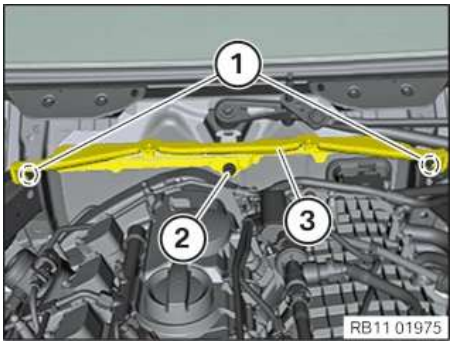
- Check the acoustic cover for correct fit of the rubber mounts (1).



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

29 – Installing centre bulkhead lower section

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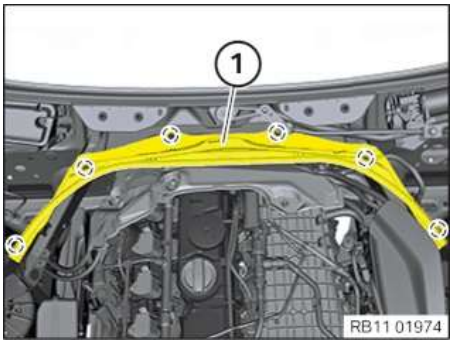


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

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

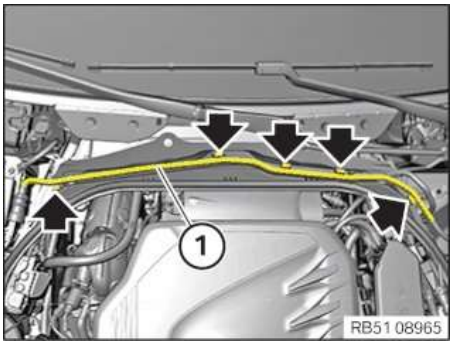
30 – Installing the centre bulkhead upper part



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

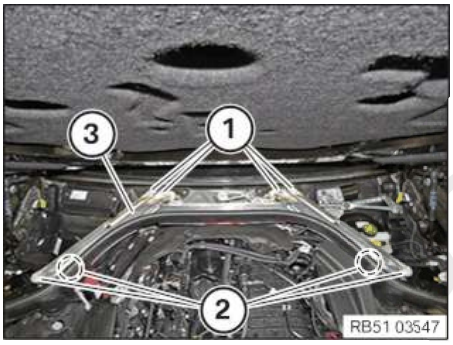
Bulkhead upper part to bottom bulkhead

		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

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



NOTICE

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

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

Tension strut on bulkhead

M10x25 screw		Tightening torque	56 Nm

- Renew screws (2).

  Parts: Screws

- Tighten the screws (2).

Tension strut to spring strut dome

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

31 – Install the seal for the bonnet

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- 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.

32 – Installing cowl panel cover

RISK OF DAMAGE

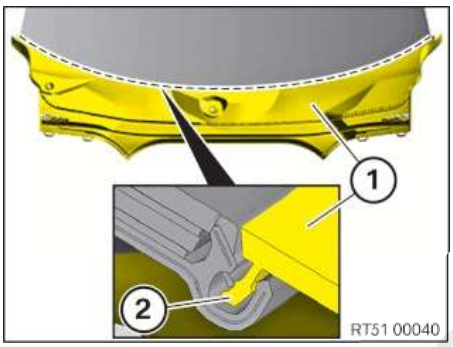
Damage caused by water ingress into the vehicle.

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

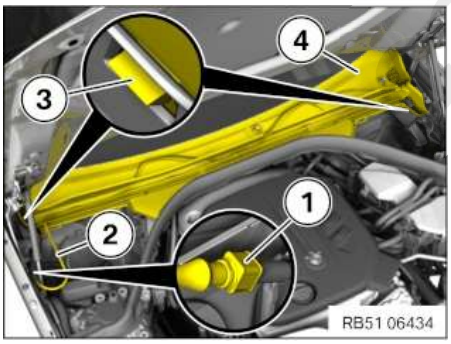
- Ensure correct installation of the components.
- Only use undamaged components.

TECHNICAL INFORMATION

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



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



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

33 – Install left and right wiper arm

NOTICE

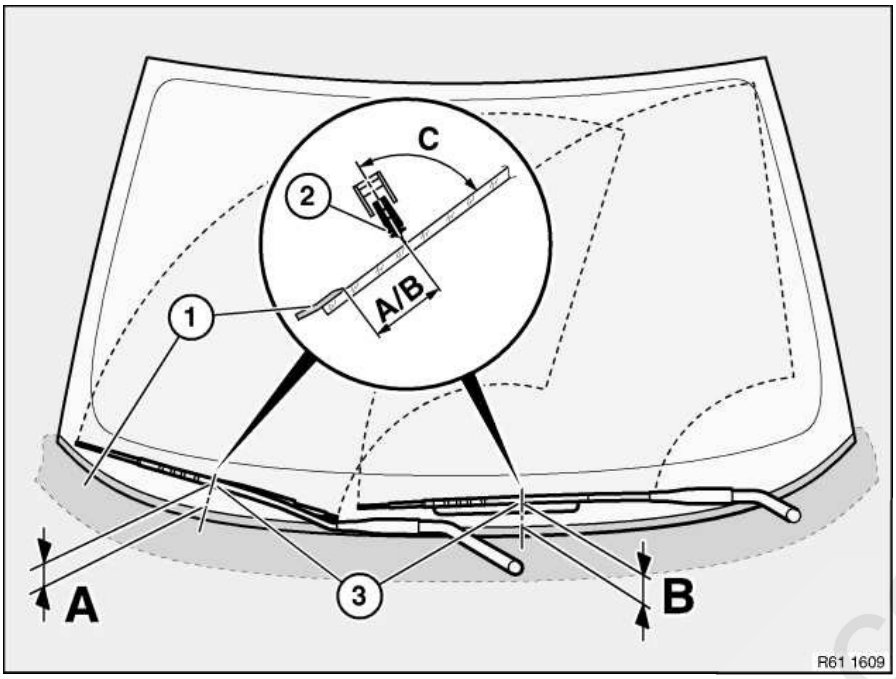
Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

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TECHNICAL INFORMATION

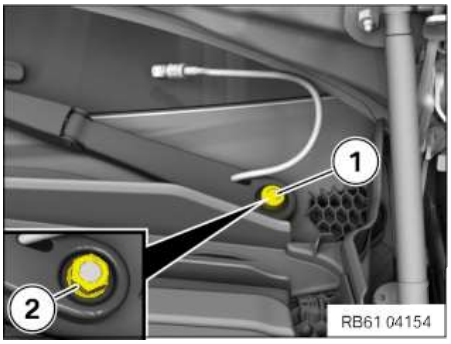
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



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

Distance from window pane edge to wiper blade

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

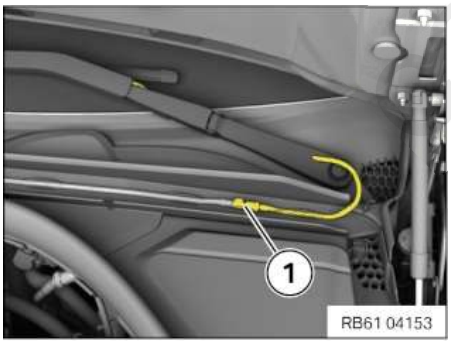


- Tighten nut (2).

Windscreen wiper arm

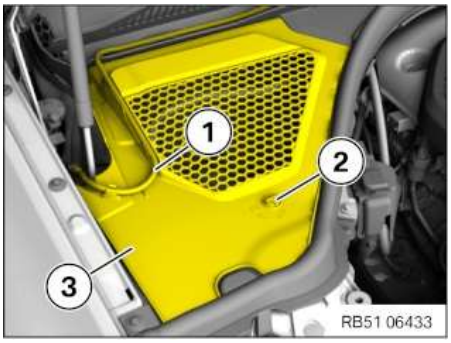
Combination hexagon nut		Tightening torque	35 Nm

- Connect the protective cap (1).



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

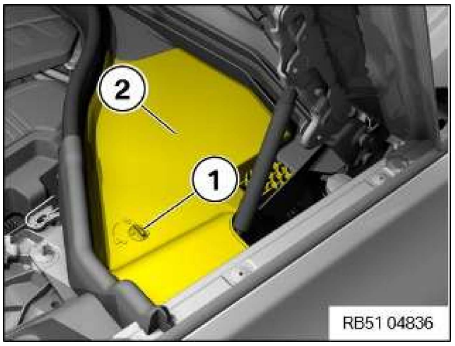
34 – Install the rear right engine compartment cover



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

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

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

36 – Connecting all battery earth leads



- See additional information.

37 – Activating the 48 V electrical system

Prerequisite

Ignition is switched off.

RISK OF DAMAGE

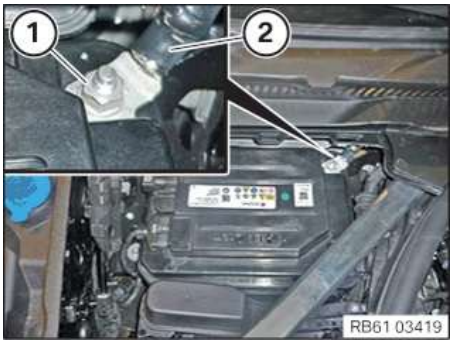
Damage to 48-V battery

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

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



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



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

Negative battery cable to 48-V battery

Nut M8		Tightening torque	19 Nm



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



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

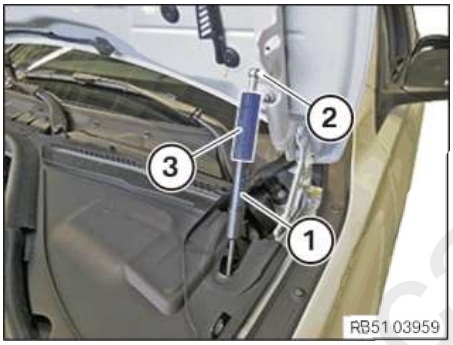
38 – Take bonnet out of the service position

CAUTION

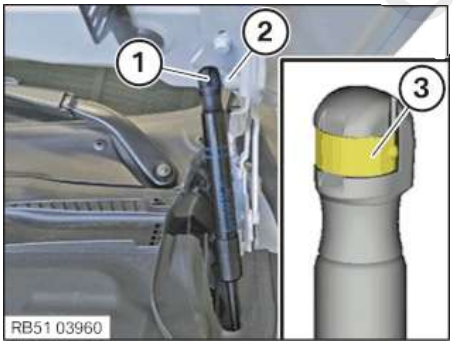
Shutting bonnet or tailgate.

Danger of injury!

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



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



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

Additional Information

Overview of Tightening Torques

Intake plenum to cylinder head			Used in step 21
M6		Tightening torque	11 Nm

Exhaust-gas recirculation cooler to intake plenum			Used in step 21
		Tightening torque	10 Nm

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Electric changeover valve to intake plenum			Used in step 21
TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold			Used in step 22
TS5x20		Tightening torque	3,6 Nm

Standard screw connection 4 Nm			Used in step 22
Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover			Used in step 22
TS5x20		Tightening torque	3,6 Nm

Standard screw connection M6			Used in step 22
M6		Tightening torque	8 Nm

Battery positive lead on the starter motor generator			Used in step 22
M8		Tightening torque	19 Nm

Holder on intake plenum			Used in step 22
TS6X20		Tightening torque	5 Nm

Clean air pipe to exhaust turbocharger			Used in step 25
M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing			Used in step 25
Clamp		Tightening torque	3 Nm

Bulkhead lower part to body			Used in step 29
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead			Used in step 30
		Tightening torque	3 Nm

Tension strut on bulkhead			Used in step 30
M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome			Used in step 30
Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm			Used in step 33
Combination hexagon nut		Tightening torque	35 Nm

Negative battery cable to 48-V battery			Used in step 37
Nut M8		Tightening torque	19 Nm

Overview of Special Tools

Overview Technical Data

Distance from window pane edge to wiper blade	Used in step 33
Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

Links

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Repair instructions (PRE)	Used in step
Notes on 48-V battery	237

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	336
61 20 900 Disconnecting and connecting battery earth lead	336
61 20 900 Disconnecting and connecting battery earth lead	336
61 20 900 Disconnecting and connecting battery earth lead	336
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61 20 900 Disconnecting and connecting battery earth lead	336
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61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	336
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17 12 564 Replacing the coolant line in cylinder head expansion tank

WARNING

Hot fluids.

Risk of scalding!

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

CAUTION

Materials harmful to health.

Contact with fluids harmful to health!

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

TECHNICAL INFORMATION

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

PRELIMINARY WORK

1 – Bring front compartment lid in the service position

Prerequisite

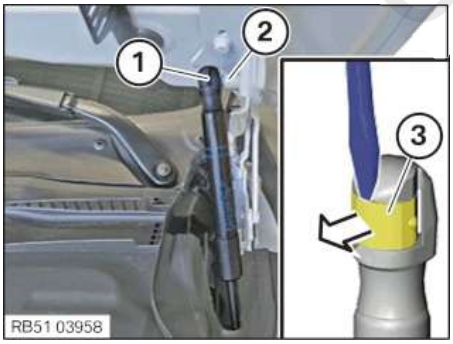
Engine compartment lid is open.

CAUTION

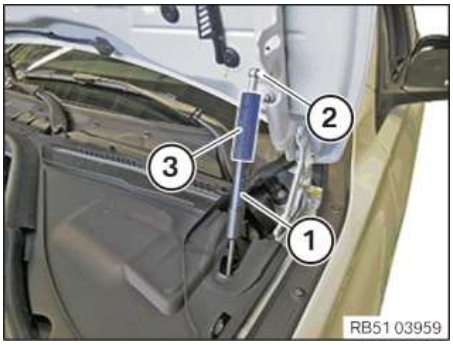
Shutting bonnet or tailgate.

Danger of injury!

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



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



TECHNICAL INFORMATION

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

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

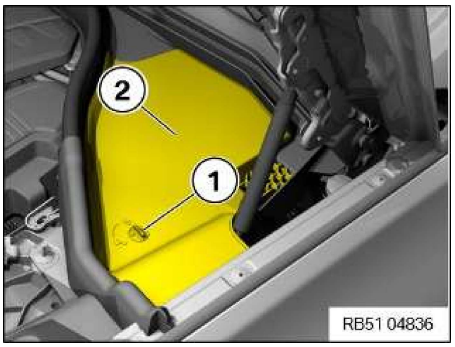
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2 – Disconnecting all battery earth leads



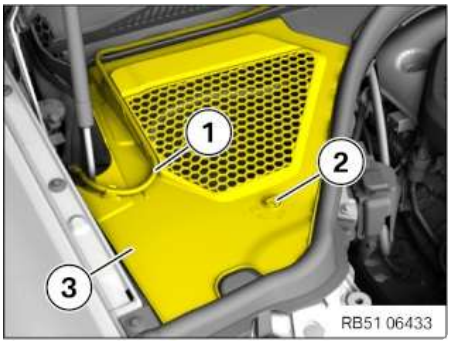
- See additional information.

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



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

4 – Remove the cover of the rear right engine compartment



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

5 – Removing the wiper arm on the left and right

NOTICE

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

▸ **Remove the wiper arm**

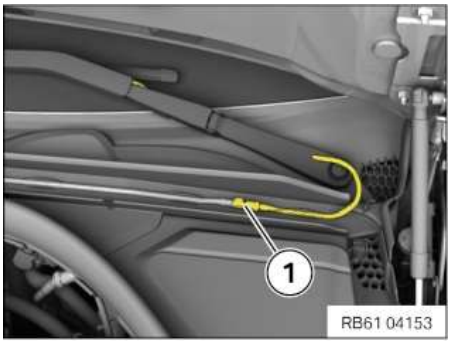
RISK OF DAMAGE

Damage to wiper console.

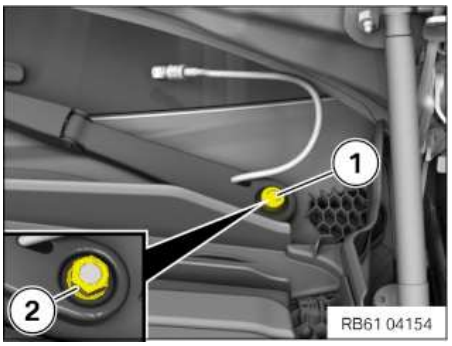
While removing the wiper arms without using special tool, the wiper console can break.

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

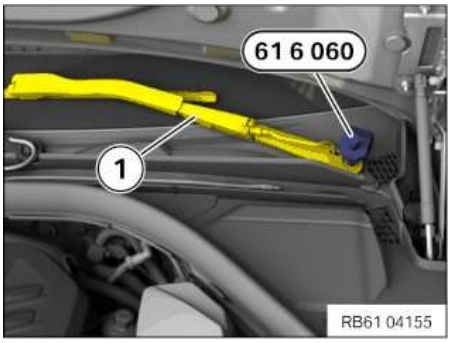
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- Disconnect the washer fluid hose (1) at the separation point and feed out from the cowl panel guide.

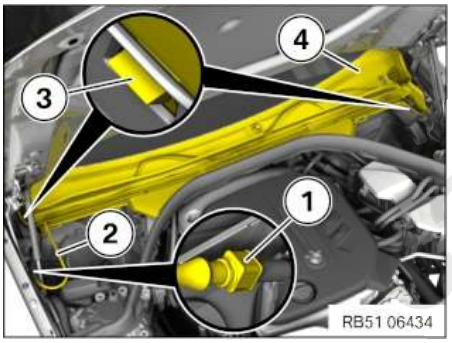


- Remove the protective cap (1).
- Loosen nut (2).

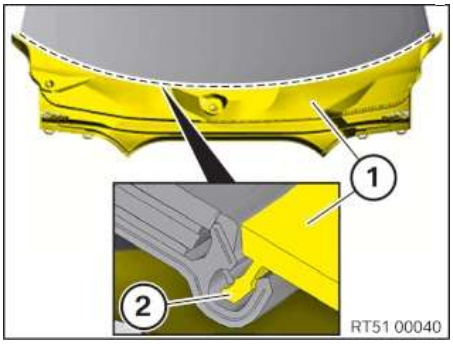


- Pull off the wiper arm (1) using special tool .

6 – Remove cowl panel cover



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



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

7 – Remove the seal for the rear bonnet

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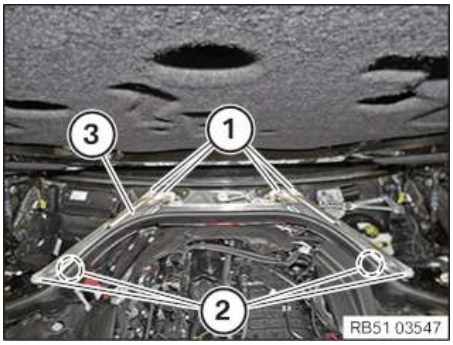


- Feed the cable (1) out of the brackets toward the front.
- Remove the rear bonnet seal (2) from the guide toward the inside.

8 – Removing the centre bulkhead upper part

TECHNICAL INFORMATION

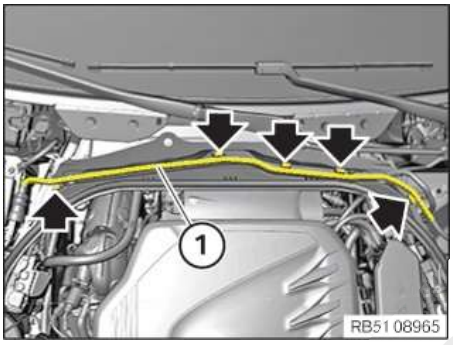
Driving without the strut brace/front-end strut or tension strut is not permitted.



NOTICE

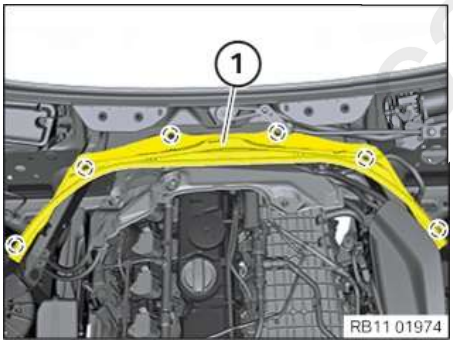
The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

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



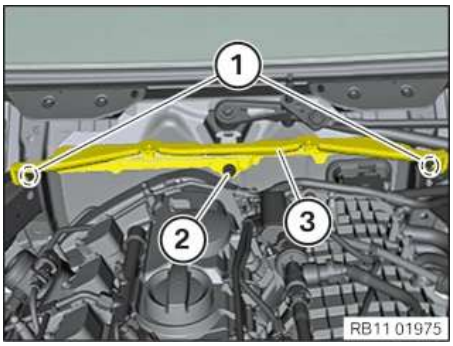
- **Version with mild hybrid technology:**

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



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

9 – Removing the centre bulkhead lower section



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

10 – Removing the acoustic cover

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RISK OF DAMAGE

Damage to the acoustic cover/design cover.

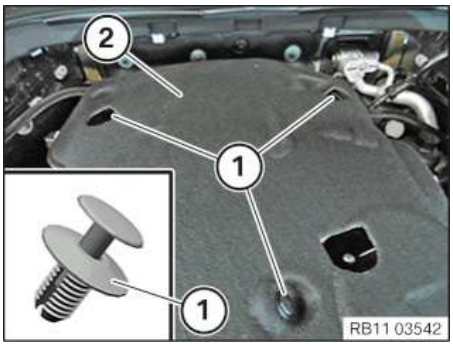
Jerky movements during disassembly and excessive application of force during installation may result in breakage of the acoustic cover/design cover.

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



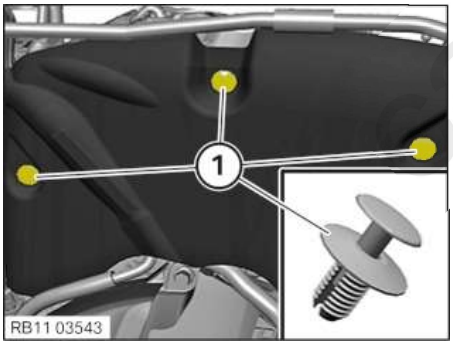
- Unclip the acoustic cover (1) from the holders in the indicated area towards the top.

11 – Remove the acoustic cover for the injectors

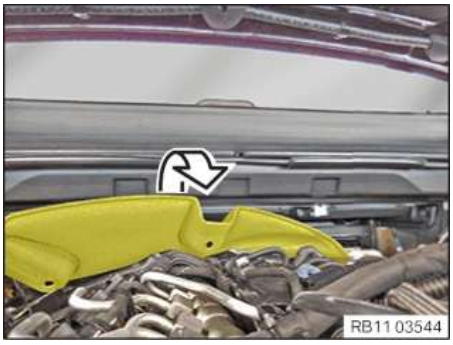


- **If installed:** Release the expanding rivet (1).
- Guide the acoustic cover (2) out and remove.

12 – Removing acoustic cover at rear



- Loosen the expanding rivet (1).



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

13 – Removing the clean air pipe with the resonator

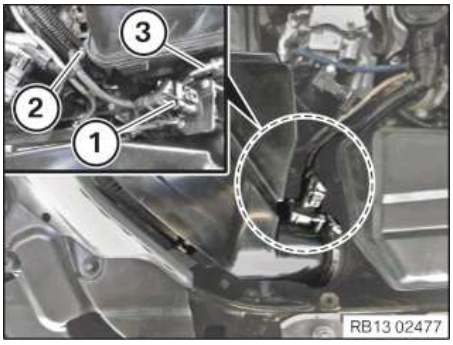
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WARNING

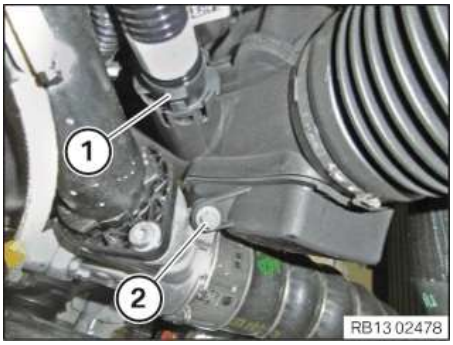
Hot surfaces.

Risk of burning!

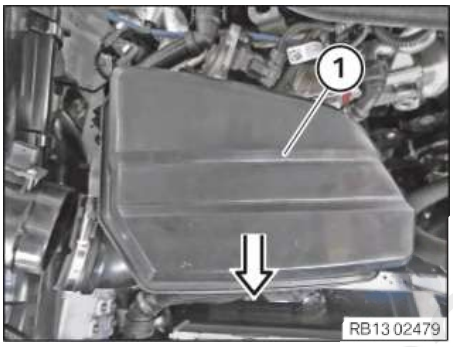
- Perform all work only on components that have cooled down.



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



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



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



- Unlock and loosen clamp (1).



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

14 – Remove acoustic cover of the front engine

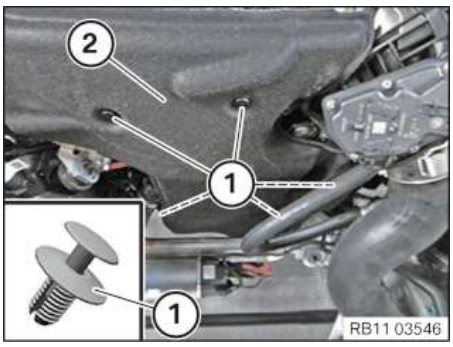
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WARNING

Hot surfaces.

Risk of burning!

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



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

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

RISK OF DAMAGE

Electrostatic discharge.

Damage to or destruction of electrical components.

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

RISK OF DAMAGE

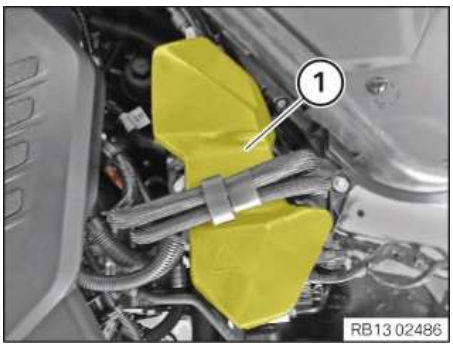
Damage to wires when disconnecting connectors and plug connections.

Sheared wires can cause a short circuit.

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

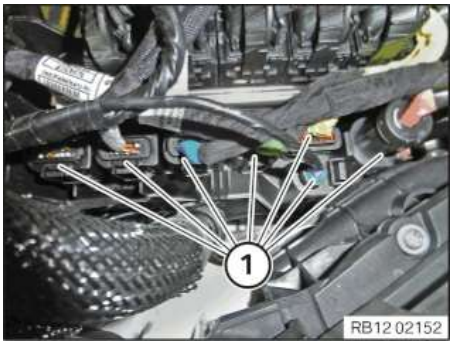
TECHNICAL INFORMATION

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

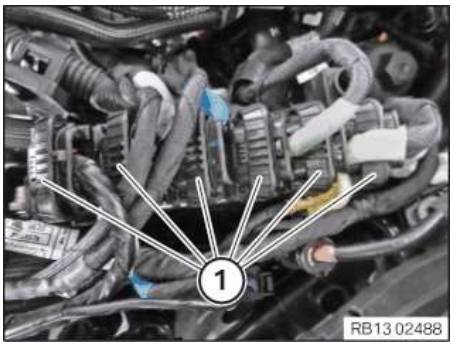


- Pull off cover (1) upwards, feed out and remove.

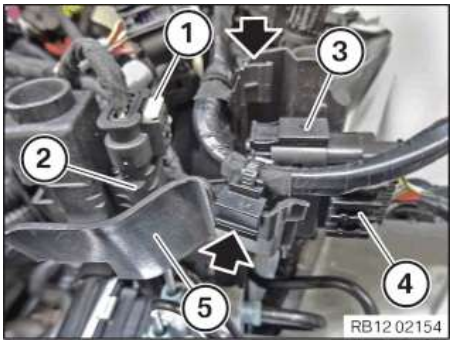
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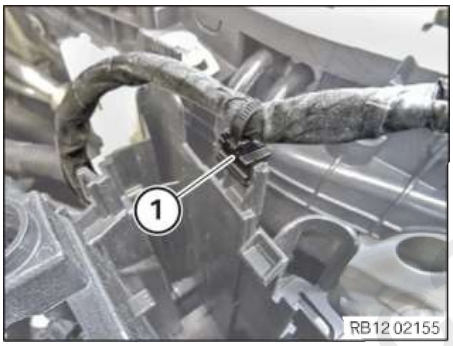
- Unlock and disconnect plug connections (1).



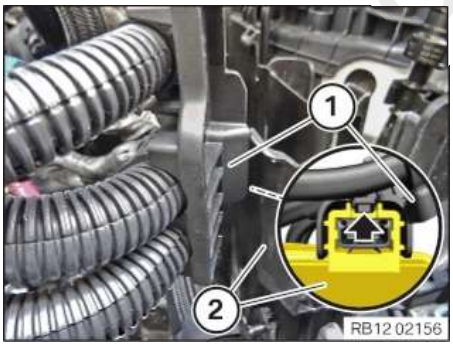
- Unlock and disconnect plug connections (1).



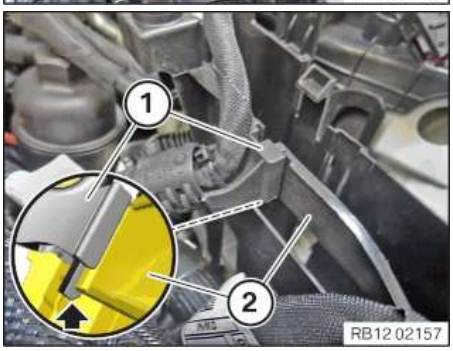
- Unlock plug connection (1) and disconnect.
- Unlock the plug (2) and disconnect from the control unit holder (5).
- Unlock plug connection (3) and disconnect.
- Unlock the plug (4) and disconnect from the control unit holder (5).
- Release the clamps (arrows).



- Loosen clamp (1).



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

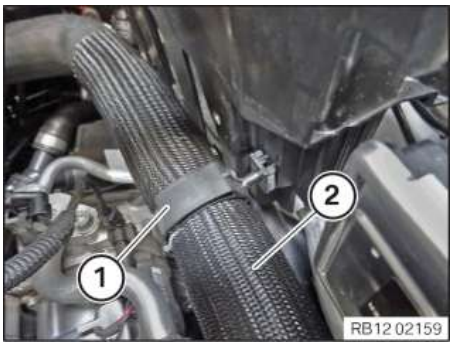


- Unlock the lock (arrow).
- Disconnect the cable holder (1) upwards from the control unit holder (2).

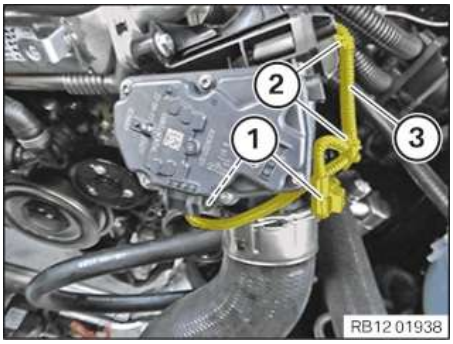
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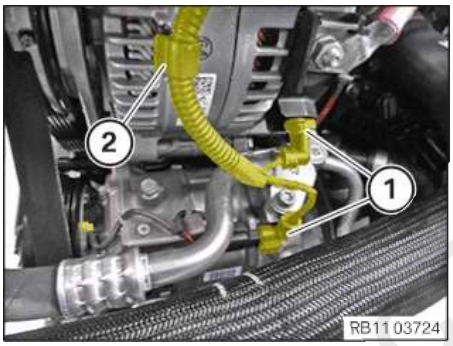
- Unlock the lock (arrow).
- Feed out cable holder (1) towards top and remove.



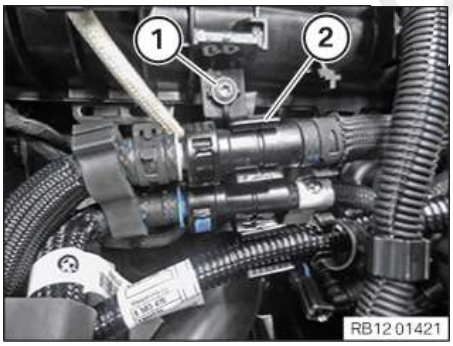
- Unlock holder (1) and feed out coolant line (2) and place it aside.



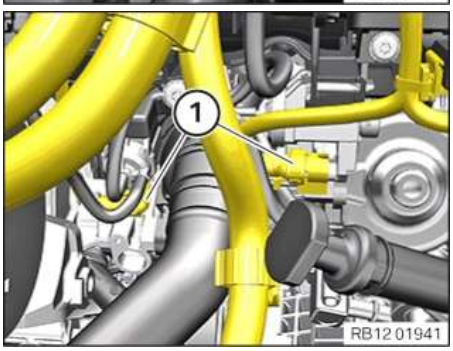
- Unlock and disconnect plug connections (1).
- Loosen clamps (2).
- Remove the wiring harness section (3) and put to one side.



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



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



- Unlock and disconnect plug connections (1).

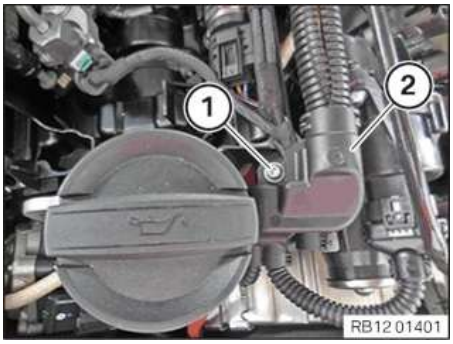
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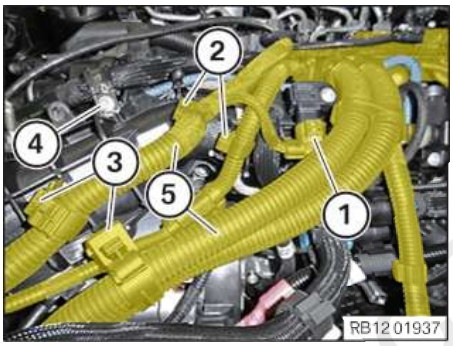
- Unlock and loosen connector (1).



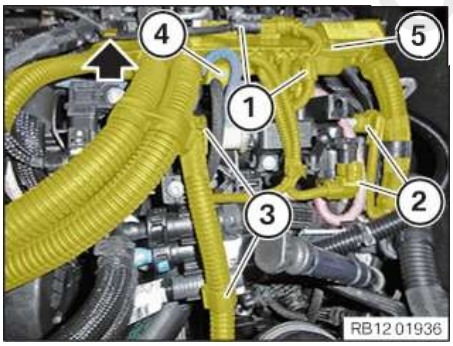
- Unlock plug connection (1) and disconnect.



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



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



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

16 – Removing the intake plenum

TECHNICAL INFORMATION

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

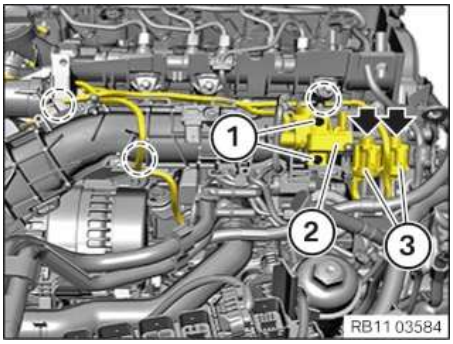
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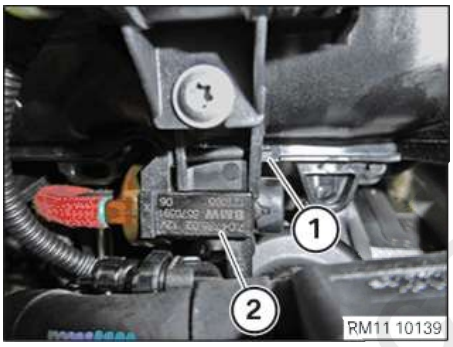
- Unlock clamp (1) and engage in this position.



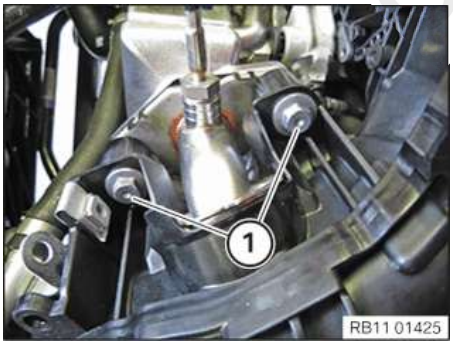
- Unlock the lock (1) and engage.
- Disconnect pressure pipe from throttle valve.



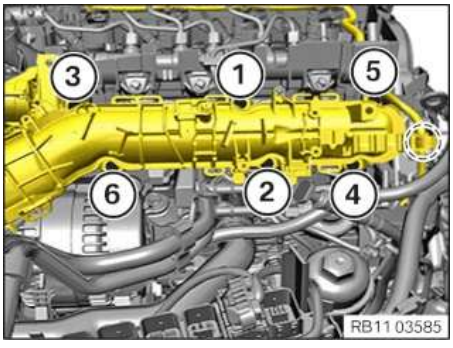
- Release the vacuum hose in the marked areas of the intake plenum.
- Release screws (1) and set aside electric changeover valve (2).
- Unlock electric changeover valves (3) at the top (arrows) and remove them downwards.



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

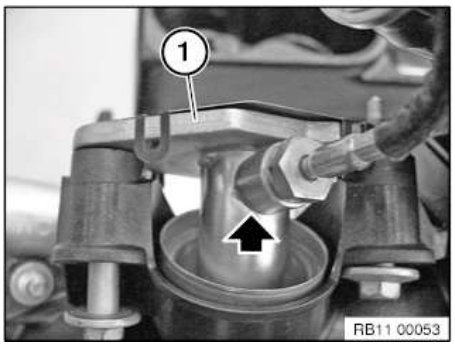


- Loosen screws (1).



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

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

MAIN WORK

17 – Removing the coolant line from cylinder head to expansion tank

WARNING

Hot fluids.

Risk of scalding!

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

TECHNICAL INFORMATION

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

TECHNICAL INFORMATION

Notes on work at the cooling system form the basis of these repair instructions and must be complied with at all times.
For additional information see: 17 00 ... Instructions for repair work on cooling system

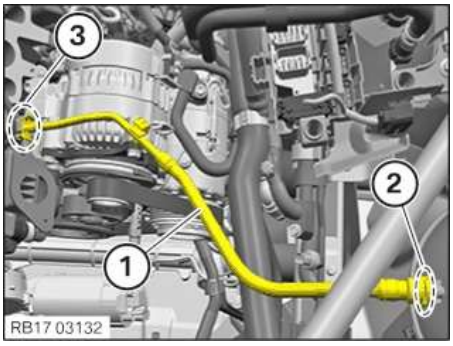
▸ **Avoiding damage to the starter generator due to escaping coolant**

RISK OF DAMAGE

Escaping coolant on the starter generator.

Damage and operating failure of the starter generator.

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



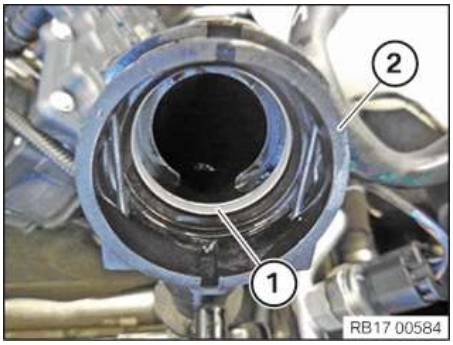
NOTICE

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

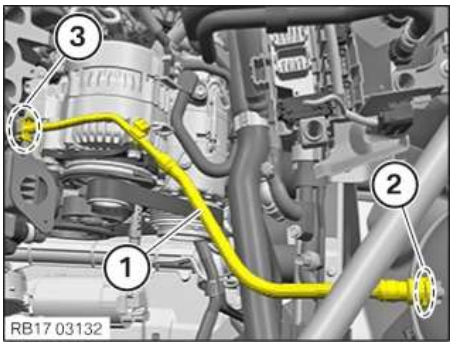
- Unlock and pull off the coolant line (1) in the marked area (2).
- Catch and dispose of escaping coolant.
- Unlock and pull off the coolant line (1) in the marked area (3).
- Catch and dispose of escaping coolant.
- Feed out coolant line (1) and remove.

18 – Installing the coolant line from cylinder head to expansion tank

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- Check the sealing ring (1) of the coolant line (2) for damages, and replace if necessary.



NOTICE

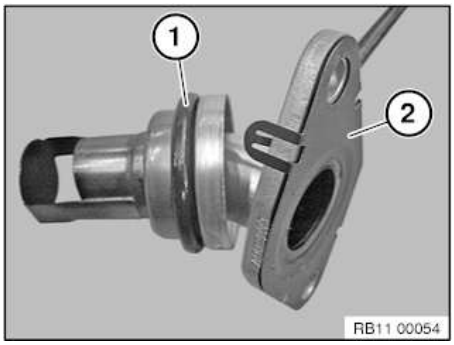
Schematic diagram is for example purposes. Some parts may differ in certain details.

- Guide in the coolant line (1) and install it.
- Connect the coolant line (1) in the marked areas (3) and (2) and lock it.

  The coolant line (1) must audibly engage.

POSTPROCESSES

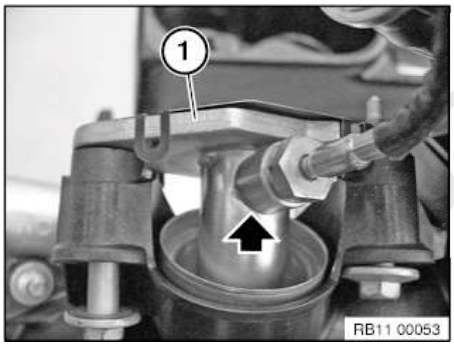
19 – Installing the intake plenum



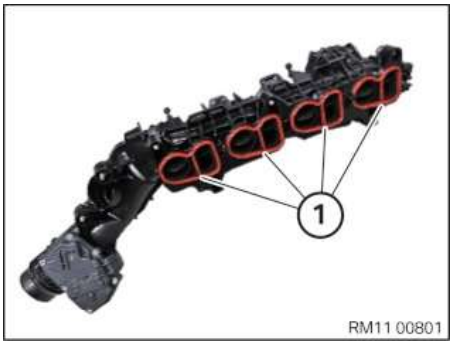
- Renew O-ring (1).

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

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



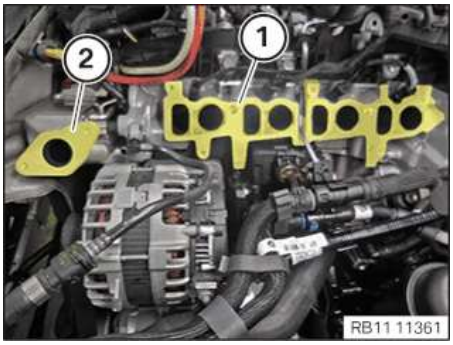
- Install exhaust-gas recirculation pipe (1) in the intake plenum (arrow).



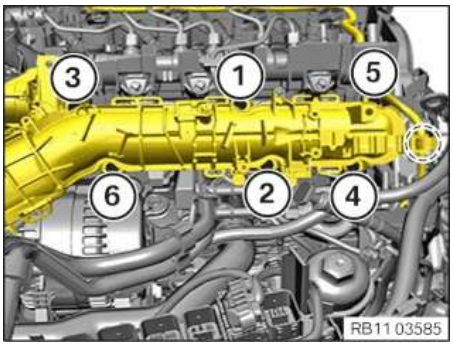
- Renew seals (1).

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

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

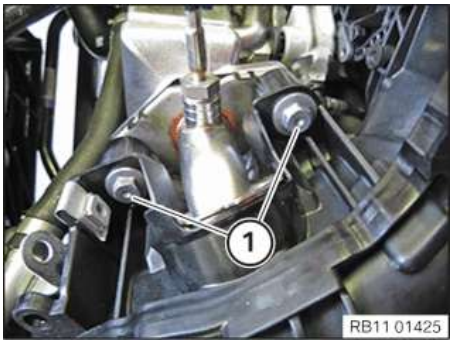


- Guide in and install intake plenum .
- Tighten the screws in the order (1) to (6).

Intake plenum to cylinder head

M6		Tightening torque	11 Nm

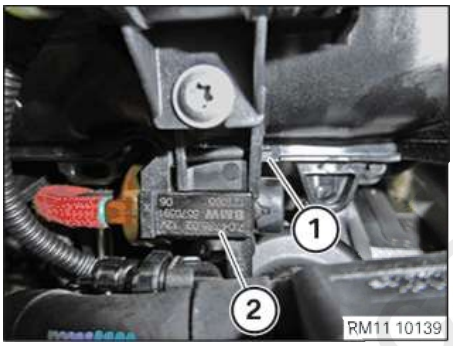
- Attach the wiring harness and fuel lines in the marked area on the intake plenum.



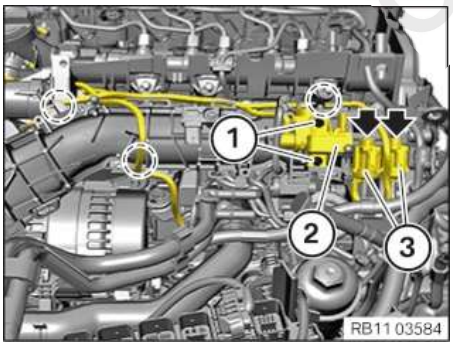
- Tighten the screws (1).

Exhaust-gas recirculation cooler to intake plenum

		Tightening torque	10 Nm



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



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

Electric changeover valve to intake plenum

TS6x20		Tightening torque	5 Nm

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



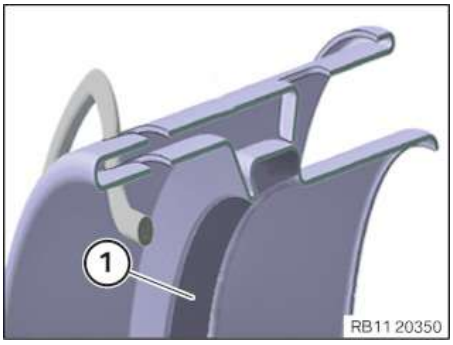
- Check the seal (1) for damage, and renew if necessary.

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▸ **Replacing damaged seal**

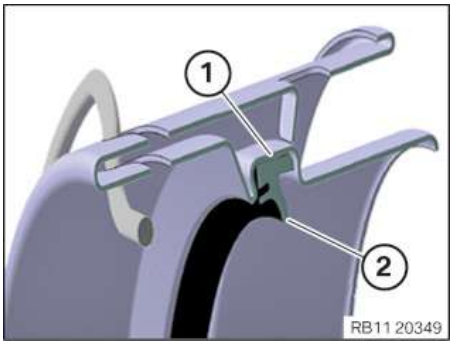
TECHNICAL INFORMATION

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



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

  The gasket groove (1) must be clean.



- Renew gasket.

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

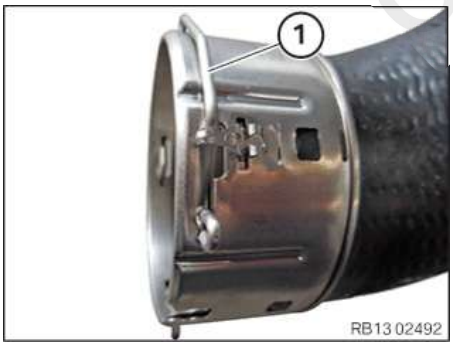
TECHNICAL INFORMATION

Incorrect assembly is possible. Ensure correct installation position.

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



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



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

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

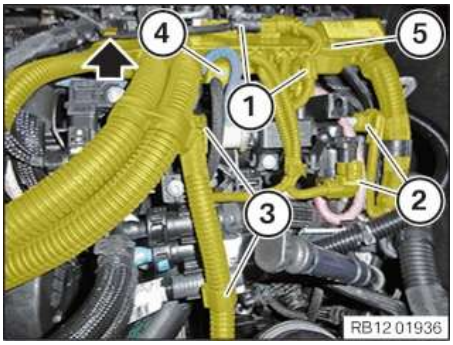
RISK OF DAMAGE

Improper routing of cables and wiring harnesses.

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

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

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

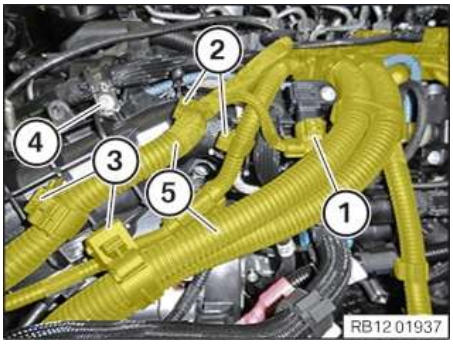
Wiring harness section to manifold

TS5x20		Tightening torque	3,6 Nm

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

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

  The connectors (1) must engage audibly.



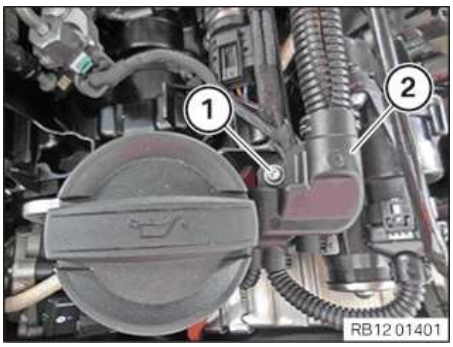
- Guide in the wiring harness section (5) and install.
- Tighten down screw (4).

Standard screw connection 4 Nm

Oval-head screw		Tightening torque	4 Nm

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

  The connector (1) must engage audibly.



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

Wiring harness section to cylinder head cover

TS5x20		Tightening torque	3,6 Nm



- Connect connectors (1) and lock.

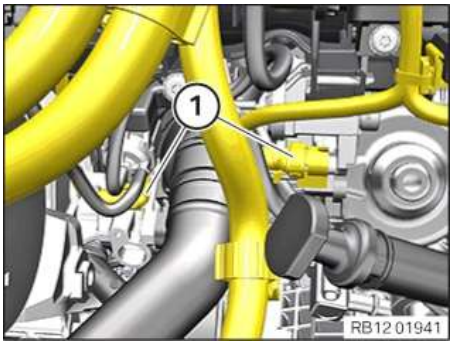
  The connector (1) must engage audibly.



- Connect the connector (1) and lock it.

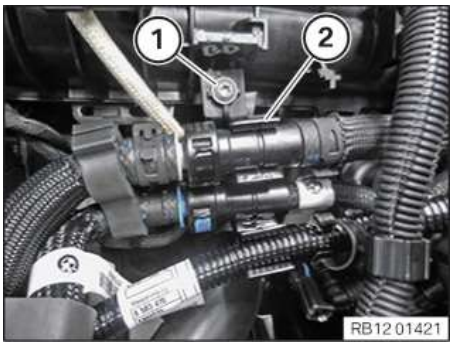
  The connector (1) must engage audibly.

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- Connect connectors (1) and lock.

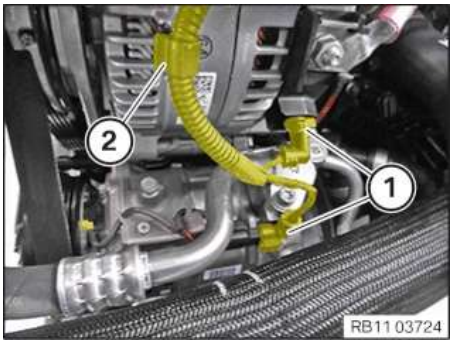
  The connectors (1) must engage audibly.



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

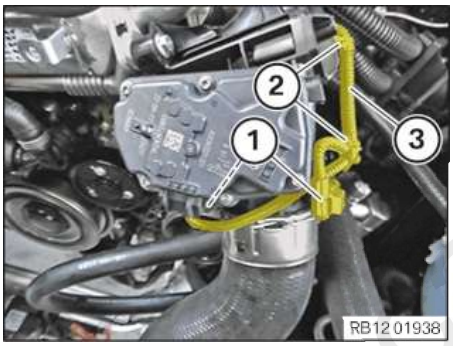
Holder on intake plenum

TS6X20		Tightening torque	5 Nm

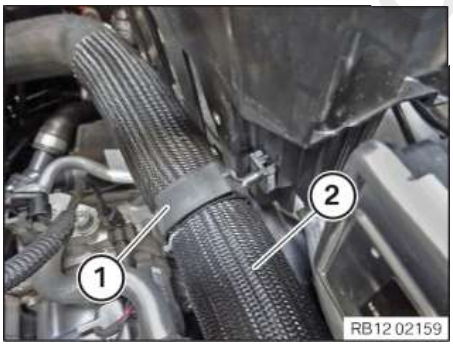


- Connect the connector (1) and lock it.

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



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



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

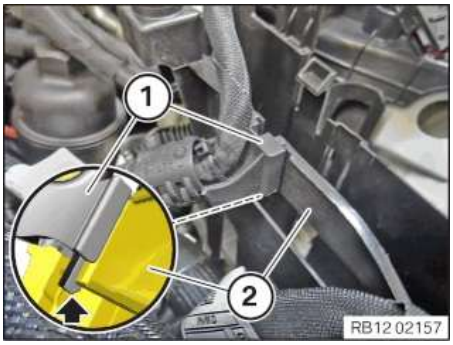
  The holder (1) must engage audibly.



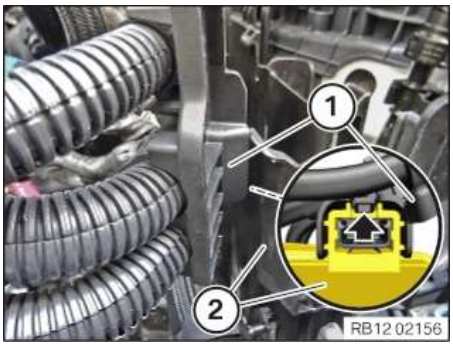
- Feed in and install the cable clip (1).

  Lock (arrow) must audibly engage.

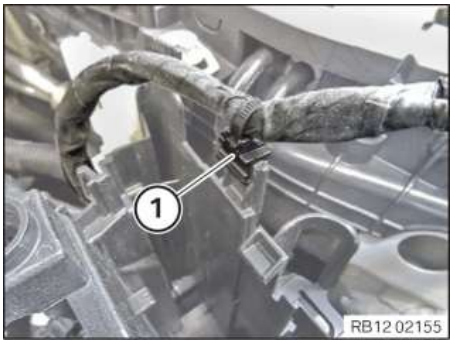
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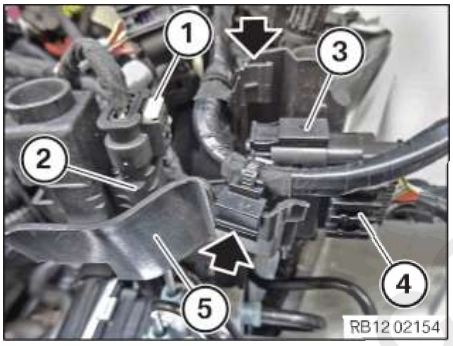
- Connect the cable clip (1) with the control unit holder (2) and lock it.
  Lock (arrow) must audibly engage.



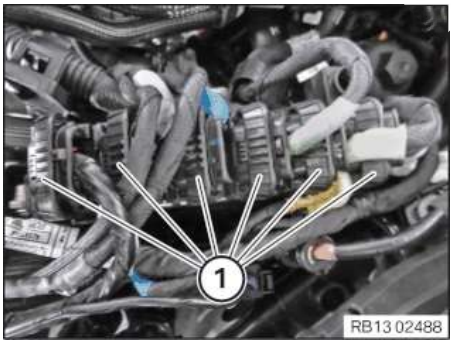
- Connect the cable clip (1) with the control unit holder (2) and lock it.
  Lock (arrow) must audibly engage.



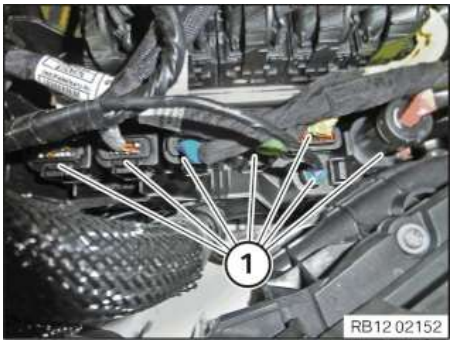
- Secure clamps (1).



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

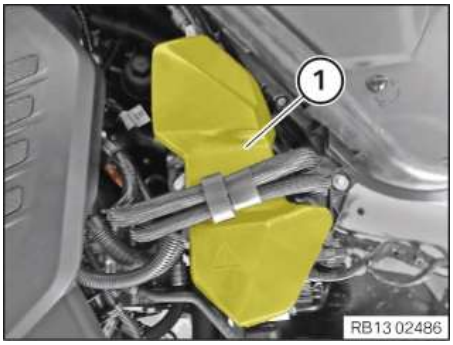


- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.



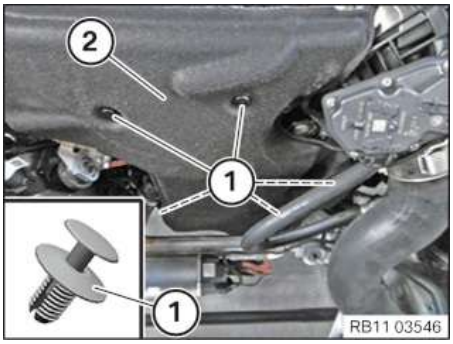
- Connect connectors (1) and lock.
  The connectors (1) must engage audibly.

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- Insert and install cover (1) into guides.

21 – Install acoustic cover for the engine, front

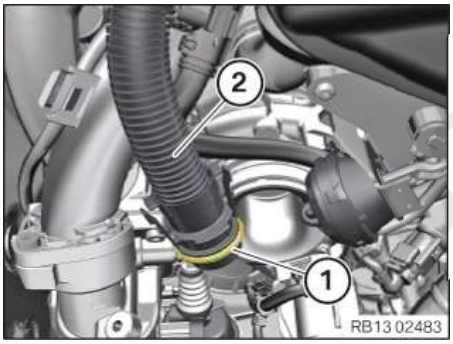


- Feed the acoustic cover (2) in and install.
- Secure the acoustic cover (2) with the expanding rivets (1).

22 – Installing the clean air pipe with resonator



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

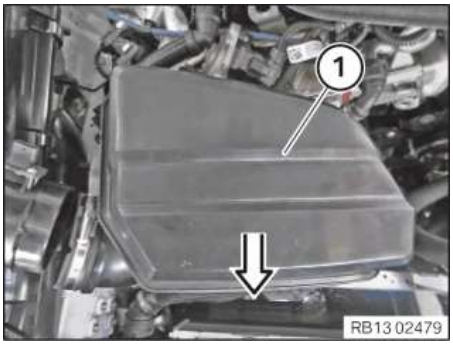


- Check the sealing ring (1) for the engine ventilation line (2) for damage and renew where required.



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

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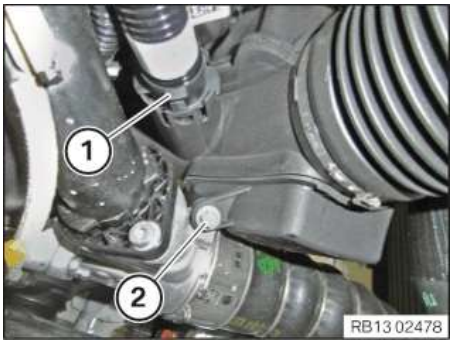


- Press and hold clean air pipe with resonator (1) in the direction of the arrow.



- Attach and lock the clamp (1).

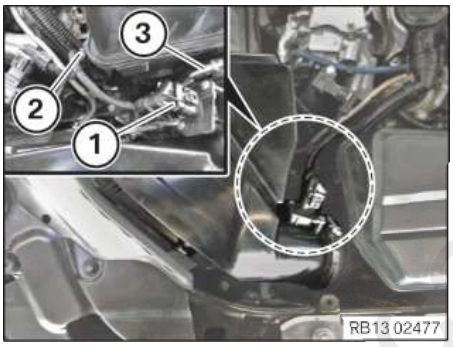
  The clamp (1) must engage audibly.



- Tighten down screw (2).

Clean air pipe to exhaust turbocharger

M6X20		Tightening torque	8 Nm



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

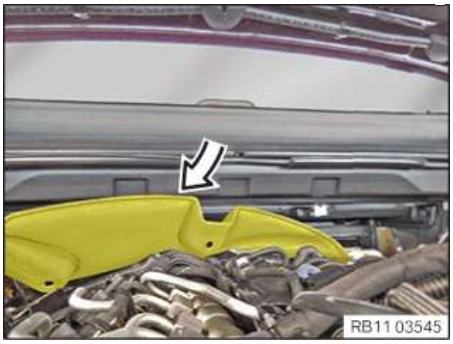
Clean air pipe to upper section of intake filter housing

Clamp		Tightening torque	3 Nm

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

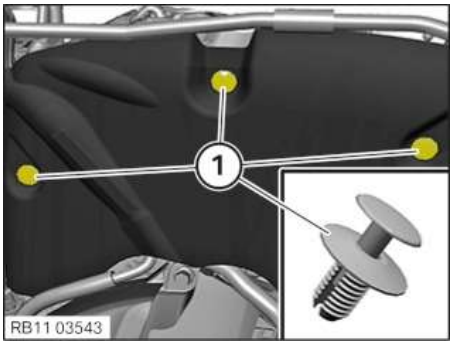
  The connector (1) must engage audibly.

23 – Installing acoustic cover at rear



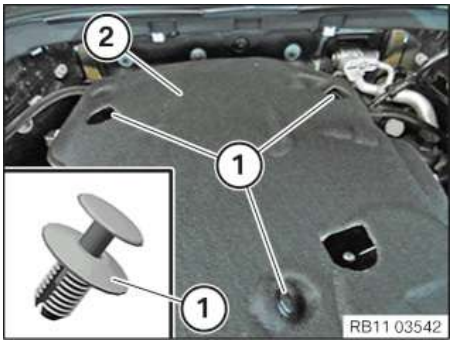
- Guide in the acoustic cover in the direction of the arrow and install it.

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

24 – Install the acoustic cover for the injectors



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

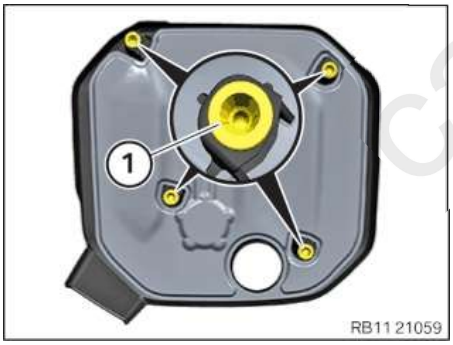
25 – Install acoustic cover

RISK OF DAMAGE

Damage to the acoustic cover/design cover.

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

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

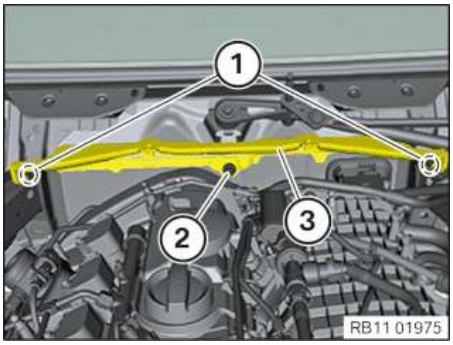


- Check the acoustic cover for correct fit of the rubber mounts (1).



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

26 – Installing centre bulkhead lower section

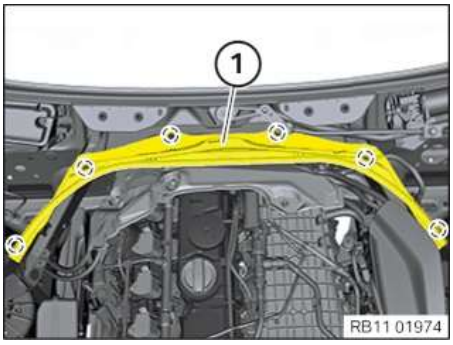


- Position the centre bulkhead lower part (3).
- Tighten nut (2) and screws (1).

Bulkhead lower part to body

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

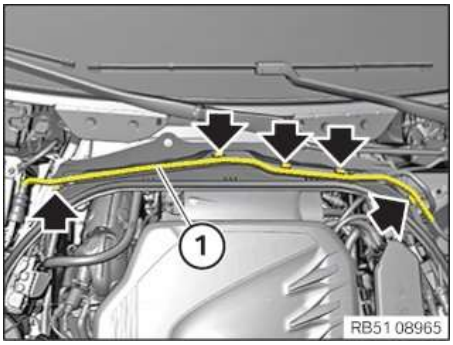
27 – Installing the centre bulkhead upper part



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

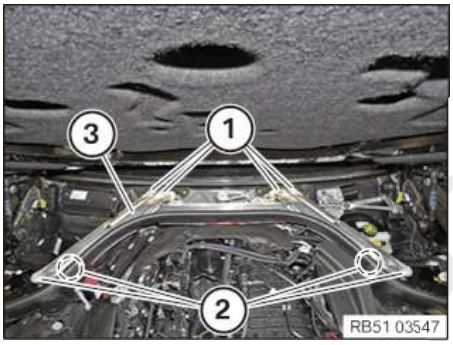
Bulkhead upper part to bottom bulkhead

		Tightening torque	3 Nm



- **Version with mild hybrid technology:**

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



NOTICE

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

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

Tension strut on bulkhead

M10x25 screw		Tightening torque	56 Nm

- Renew screws (2).

  Parts: Screws
- Tighten the screws (2).

Tension strut to spring strut dome

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

28 – Install the seal for the bonnet

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- 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.

29 – Installing cowl panel cover

RISK OF DAMAGE

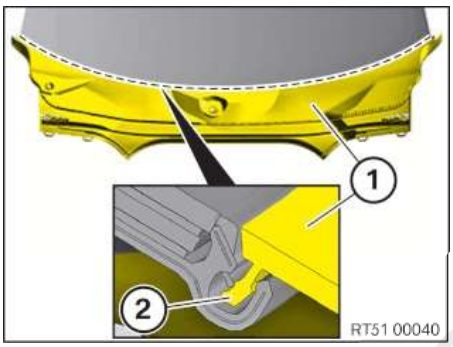
Damage caused by water ingress into the vehicle.

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

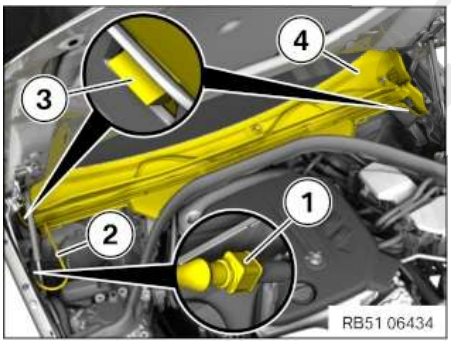
- Ensure correct installation of the components.
- Only use undamaged components.

TECHNICAL INFORMATION

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



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



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

30 – Install left and right wiper arm

NOTICE

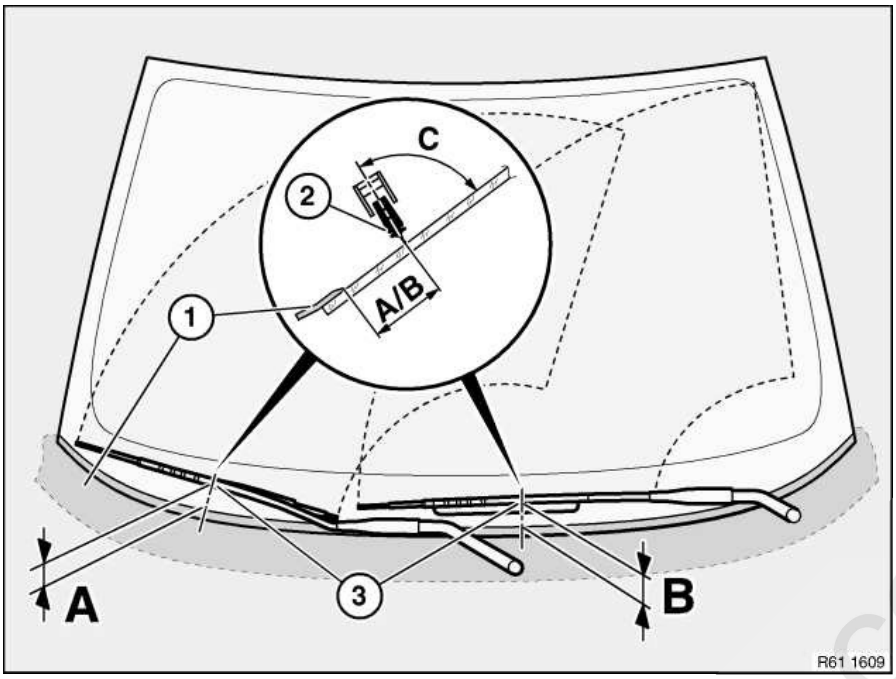
Description is for left component only. Procedure on the right side is identical.

▸ **Installing left and right wiper arm**

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TECHNICAL INFORMATION

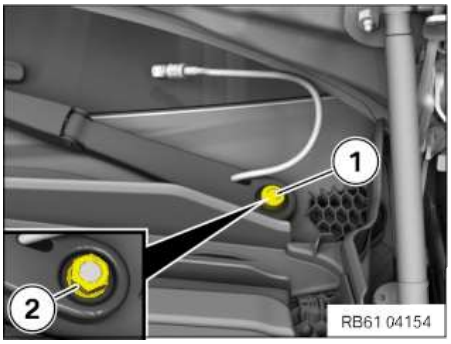
The wiper system must be in zero position.
After installing the cowl panel cover and before fitting the wiper arm:
Activate the wiper system once to ensure that it has the correct installation position.



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

Distance from window pane edge to wiper blade

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

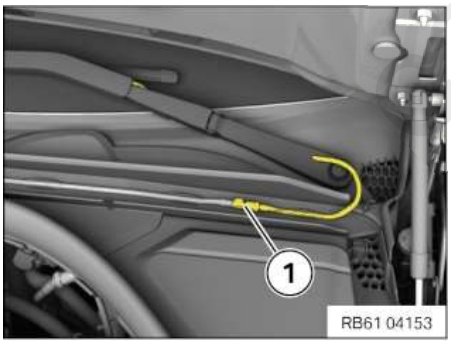


- Tighten nut (2).

Windscreen wiper arm

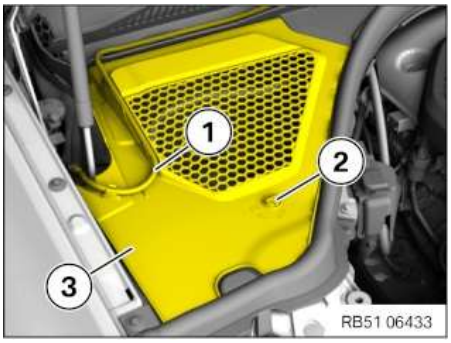
Combination hexagon nut		Tightening torque	35 Nm

- Connect the protective cap (1).



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

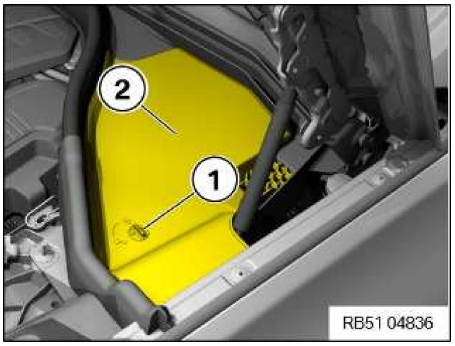
31 – Install the rear right engine compartment cover



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

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

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

33 – Connecting all battery earth leads



- See additional information.

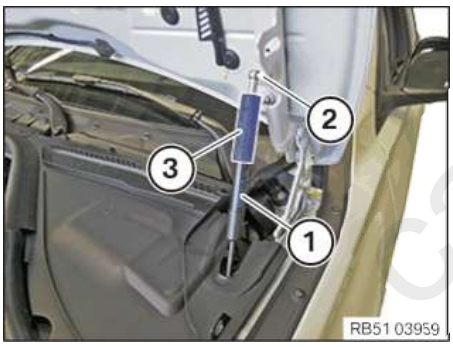
34 – Take bonnet out of the service position

CAUTION

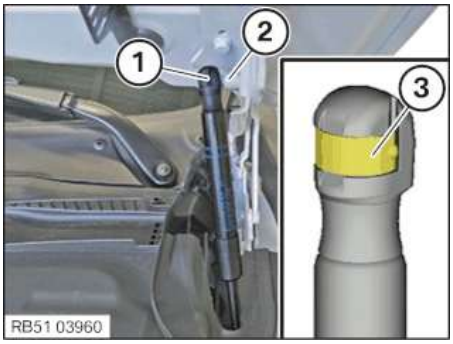
Shutting bonnet or tailgate.

Danger of injury!

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



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



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

Additional Information

Overview of Tightening Torques

Intake plenum to cylinder head Used in step 19

M6		Tightening torque	11 Nm

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Exhaust-gas recirculation cooler to intake plenum			Used in step 19
		Tightening torque	10 Nm

Electric changeover valve to intake plenum			Used in step 19
TS6x20		Tightening torque	5 Nm

Wiring harness section to manifold			Used in step 20
TS5x20		Tightening torque	3,6 Nm

Standard screw connection 4 Nm			Used in step 20
Oval-head screw		Tightening torque	4 Nm

Wiring harness section to cylinder head cover			Used in step 20
TS5x20		Tightening torque	3,6 Nm

Holder on intake plenum			Used in step 20
TS6X20		Tightening torque	5 Nm

Clean air pipe to exhaust turbocharger			Used in step 22
M6X20		Tightening torque	8 Nm

Clean air pipe to upper section of intake filter housing			Used in step 22
Clamp		Tightening torque	3 Nm

Bulkhead lower part to body			Used in step 26
Screw		Tightening torque	2,6 Nm
Plastic nut		Tightening torque	2,6 Nm

Bulkhead upper part to bottom bulkhead			Used in step 27
		Tightening torque	3 Nm

Tension strut on bulkhead			Used in step 27
M10x25 screw		Tightening torque	56 Nm

Tension strut to spring strut dome			Used in step 27
Screw	Renew screws.	Jointing torque	56 Nm
		Angle of rotation	90 °

Windscreen wiper arm			Used in step 30
Combination hexagon nut		Tightening torque	35 Nm

Overview of Special Tools

Overview Technical Data

Distance from window pane edge to wiper blade	Used in step 30
Wiper arm right (A)	57,5 ± 5 mm
Wiper arm left (B)	63,3 ± 4 mm

Links

Repair instructions	Used in step
61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads)	233
61 20 900 Disconnecting and connecting battery earth lead	233
61 20 900 Disconnecting and connecting battery earth lead	233
61 20 900 Disconnecting and connecting battery earth lead	233

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61 20 900 Disconnecting and connecting battery earth lead 233
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61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads) 233
61 20 900 Disconnecting and connecting battery earth lead (Plug-in Hybrid Electric Vehicle) 233
61 20 900 Disconnecting and connecting battery earth lead 233
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61 20 900 Disconnecting and connecting the battery earth lead (all battery earth leads) 233
61 20 900 Disconnecting and connecting battery earth lead 233
61 20 900 Disconnecting and connecting battery earth lead 233
61 20 900 Disconnecting and connecting battery earth lead 233
61 35 ... Notes on ESD protection (Electro Static Discharge) 15
61 35 ... Notes on ESD protection (Electro Static Discharge) 15
17 00 ... Instructions for repair work on cooling system 17

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17 12 630 Replacing the hose of SCR metering module

WARNING

Hot fluids.

Risk of scalding!

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

CAUTION

Materials harmful to health.

Contact with fluids harmful to health!

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

TECHNICAL INFORMATION

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

PRELIMINARY WORK

1 – Draining coolant

TECHNICAL INFORMATION

The additional information must be observed without fail!
Proceeding further without working through the additional information is not allowed!

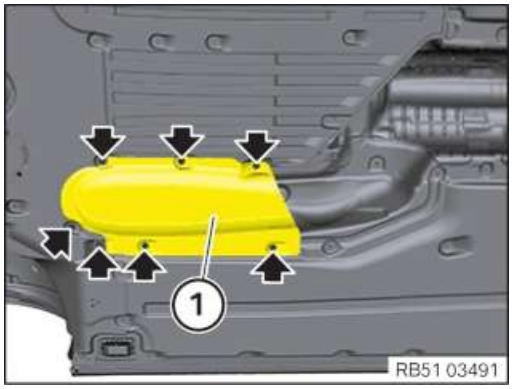
- See additional information.

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

NOTICE

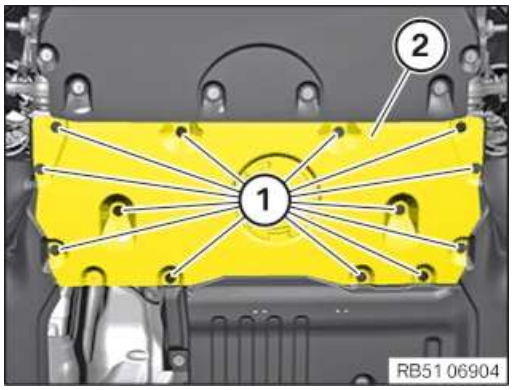
The following work step(s) is / are to be carried out if the specified component(s) is/are fitted.

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

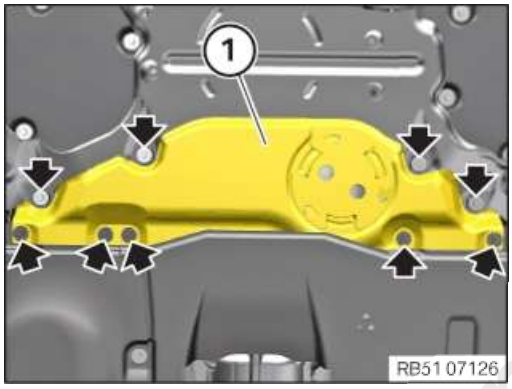
3 – Removing the centre underbody protection



- **Variant with rear wheel drive:**

  Loosen screws (1).

  Remove centre underbody protection (2) .

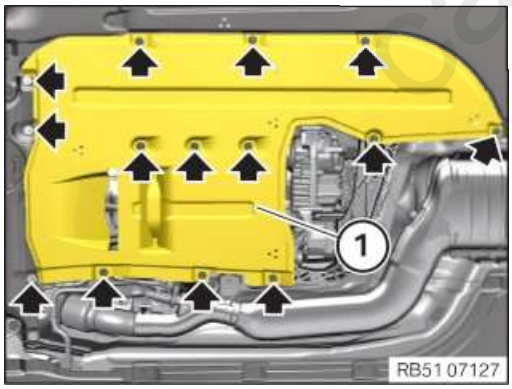


- **Version with all-wheel drive:**

  Remove screws (arrows).

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

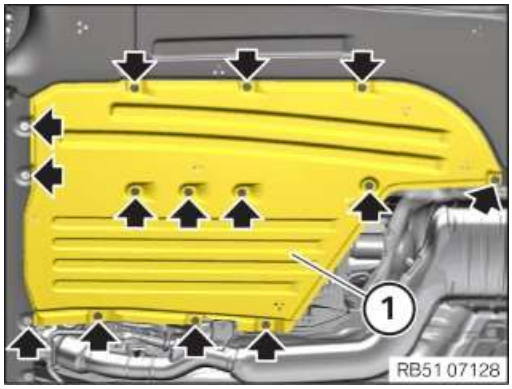
4 – Remove rear underbody protection



- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).



- **Version B:**

  Remove screws (arrows).

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

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5 – Removing the coolant line from the SCR metering module

Prerequisite

Coolant drained.

WARNING

Hot fluids.

Risk of scalding!

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

CAUTION

Materials harmful to health.

Contact with fluids harmful to health!

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

TECHNICAL INFORMATION

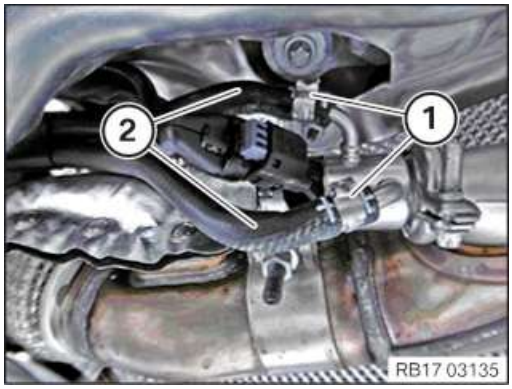
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.

TECHNICAL INFORMATION

Do not unintentionally swap the coolant hoses and coolant lines. If necessary, mark before removal.

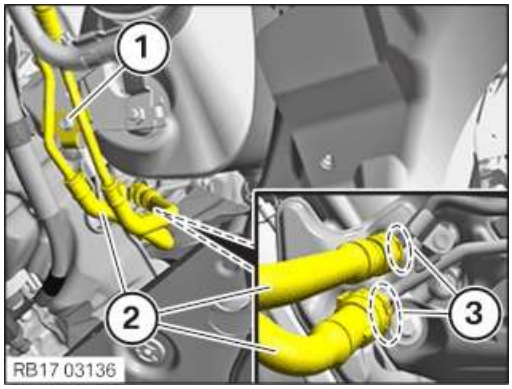
TECHNICAL INFORMATION

Notes on work at the cooling system form the basis of these repair instructions and must be complied with at all times.
For additional information see: 17 00 ... Instructions for repair work on cooling system



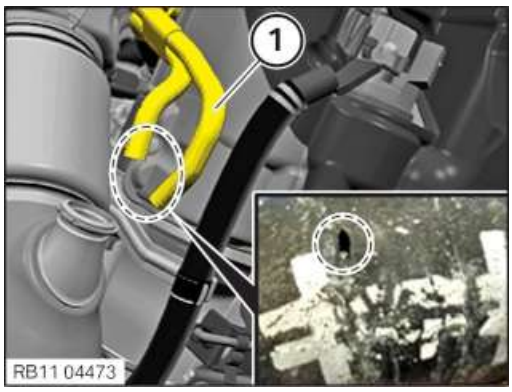
- Release clamps (1) .
- Pull off the coolant hoses (2).
- Catch and dispose of escaping coolant.

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- Release the screw (1).
- Unlock and pull off coolant line (2) in the marked areas (2).
- Catch and dispose of escaping coolant.
- Feed out coolant line (2) and remove.

6 – Installing the coolant line from the SCR metering module



Check

- Check coolant line (1) in the marked area for damage caused by the clamp.

Note: Bend the coolant line back and forth slightly to see the damage better.

Result

» Coolant line (1) is damaged.

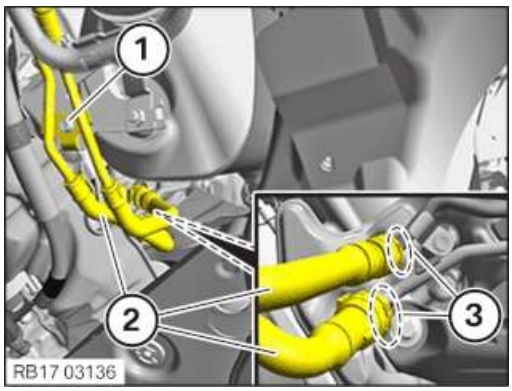
Measure

- Renew coolant line (1) for the SCR metering module.



- In order to mount the clamps onto the SCR metering module, use only the special tool 0 494 152 (32 1 260).
- Crimp the clamps on the marked, slightly open side (arrows).

  The clamp is crimped correctly when the gap is **less than** 1 mm.



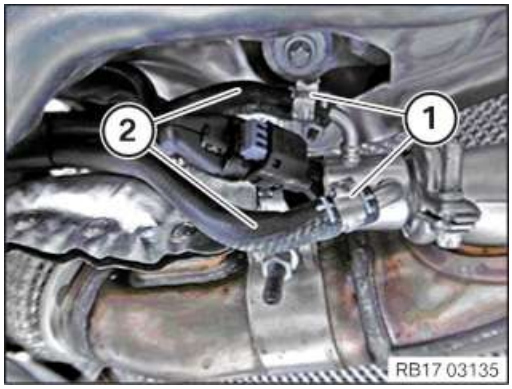
- Insert the coolant line (2) and install it.
- Connect and lock coolant line (2) in the marked areas (3).

  The coolant line (2) must engage audibly.
- Tighten down screw (1).

Coolant lines for SCR metering module

M6X16		Tightening torque	8 Nm

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- Renew the clamps (1).

  Parts: Clamp
- Connect coolant hoses (2) and secure clamps (1).

POSTPROCESSES

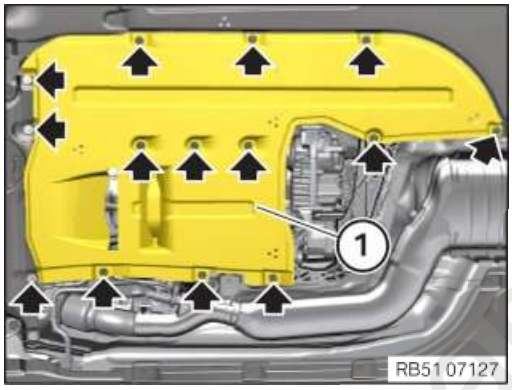
7 – Connecting the coolant lines

TECHNICAL INFORMATION

The additional information must be observed without fail!
Proceeding further without working through the additional information is not allowed!

- See additional information.

8 – Installing underbody protection at rear



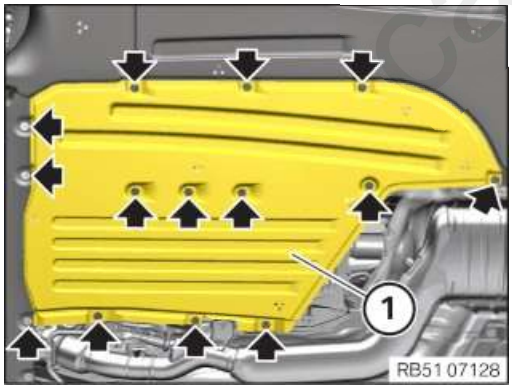
- **Version A:**

  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version B:**

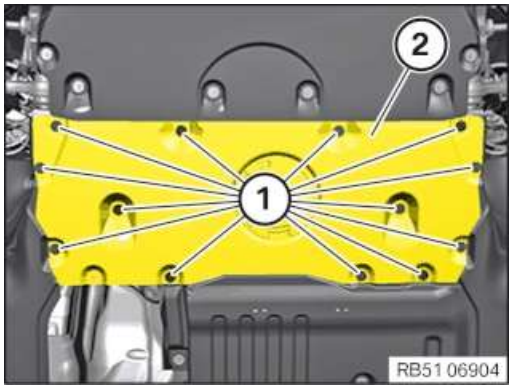
  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm

9 – Installing the centre underbody protection



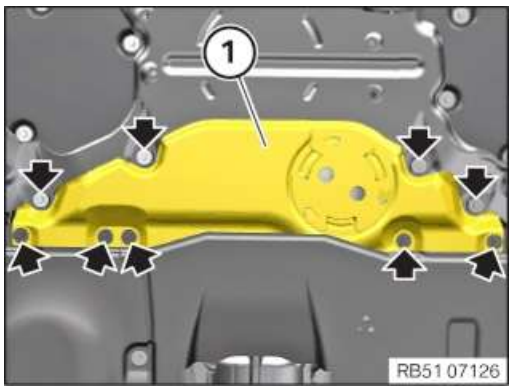
- **Variant with rear wheel drive:**

  Position central underbody protection (2).

  Tighten the screws (1).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



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

  Guide in centre underbody protection (1) and install.

  Tighten screws (arrows).

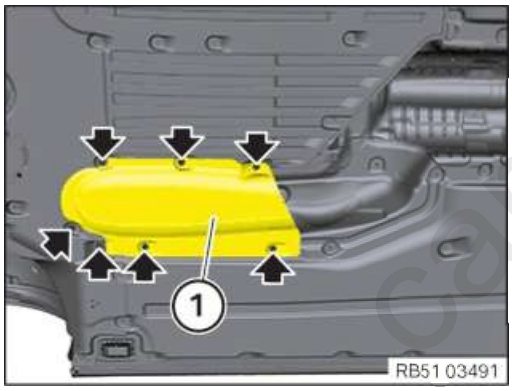
Underbody protection

Hexagon screw		Tightening torque	3 Nm

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

NOTICE

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



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

Underbody panelling

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

11 – Filling and bleed the high-temperature coolant circuit



TECHNICAL INFORMATION

It is **mandatory** to fill the cooling system before bleeding.

Fill **both** the circuits for high and low-temperature coolant circuits.

- See additional information.

Additional Information

Overview of Tightening Torques

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Coolant lines for SCR metering module — Used in step 6

M6X16		Tightening torque	8 Nm

Underbody protection — Used in step 89

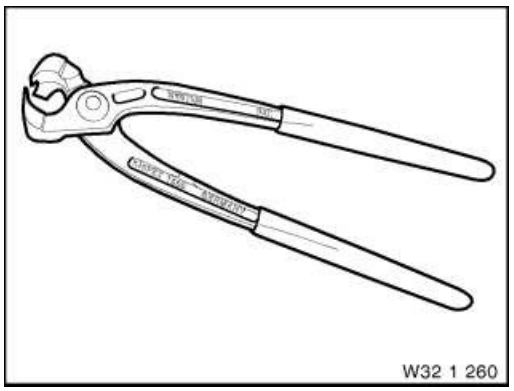
Hexagon screw		Tightening torque	3 Nm

Underbody panelling — Used in step 10

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

Overview of Special Tools

0 494 152 (32 1 260) Pliers



Common — Used in step 6

Usage	For opening and fastening hose clamps
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 02 01 (667)

Links

Repair instructions	Used in step
17 00 ... Instructions for repair work on cooling system	5
17 00 008 Draining and topping up coolant for high-temperature circuit	11
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	11
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	11
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	11
17 00 008 Draining and topping up coolant for high-temperature circuit	11
17 00 008 Draining and topping up coolant for high-temperature circuit	11
17 00 008 Draining and topping up coolant for high-temperature circuit	11
17 00 008 Draining and topping up coolant for high-temperature circuit	11
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	11
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	11
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	11
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	11
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	11
17 00 039 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	11
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	11
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	11
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	11
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	11
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	11
17 00 039 Bleeding the cooling system (B36, B38, B46, B48)	11
17 00 039 Bleeding cooling system (B37, B47)	11
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	11
17 00 039 Filling and bleeding the high-temperature cooling system vacuum filler device (B48)	11
17 00 008 Draining and topping up the high-temperature coolant circuit	11
17 00 008 Draining and topping up the high-temperature coolant circuit	11
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	11
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	11
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17 00 039 Bleed the cooling system and check it for watertightness with the special tool	11
17 00 008 Draining and topping up coolant for high-temperature circuit	11
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	11
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	11
17 00 008 Draining and topping up coolant for high-temperature circuit	11
17 00 039 Bleed the cooling system and check it for watertightness with the special tool	11
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17 00 008 Draining and topping up coolant for high-temperature circuit	
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64 53 ... Instructions for replacement of air conditioning condensers and radiator/coolers

Attention!

Even when they are correctly installed or due to normal driving, radiators (oil cooler, radiator, charge air cooler) or air conditioning condensers may show slight impressions or deformations on their discs (1).

A slight sag with a large radius for the air conditioning condenser is also permissible.

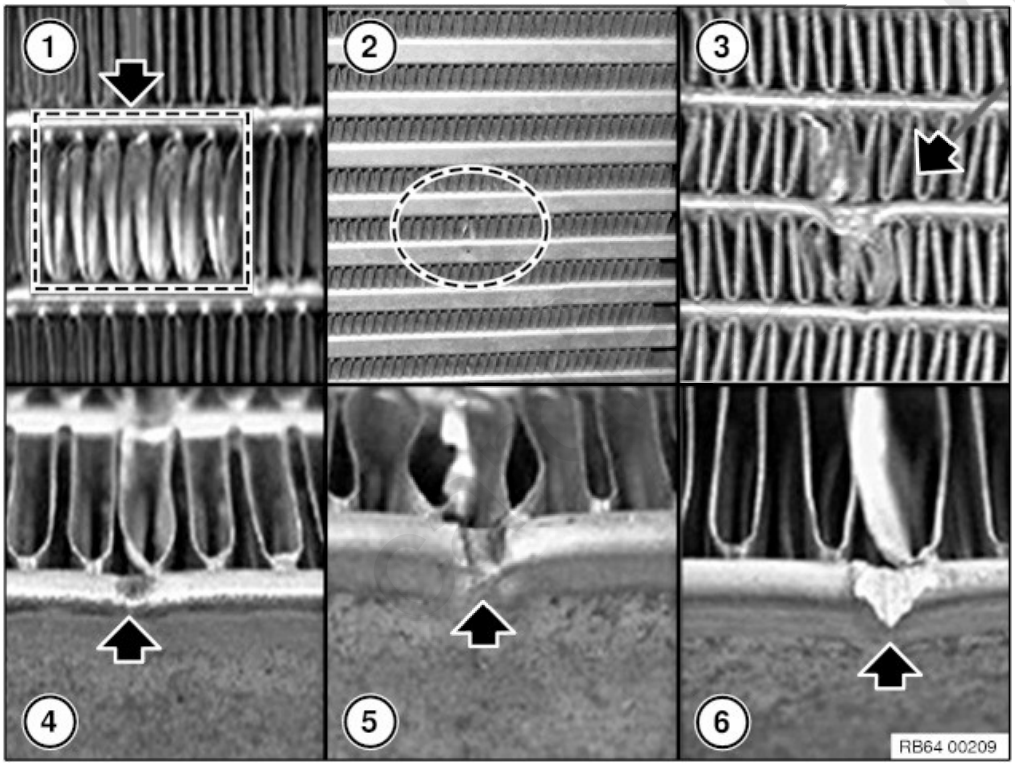
As long as tightness/function are not degraded and an adequate distance of a few mm between the radiator and air conditioning condenser remains in place, **this is not damage in either case.**

Radiators or air conditioning condensers are not to be replaced in these cases!

Note:

The deformations shown in Fig. (1) can be bent back with a standard fin comb..

Damage to lines carrying media or on the flat pipe require exchange of the radiator or air conditioning condenser (2-6).



Dryer flask (integrated in the air conditioning condenser):

Round dents/depressions are permitted.

The air conditioning condenser is not to be replaced in this case.

64 53 ... Instructions for replacement of air conditioning condensers and radiator/coolers

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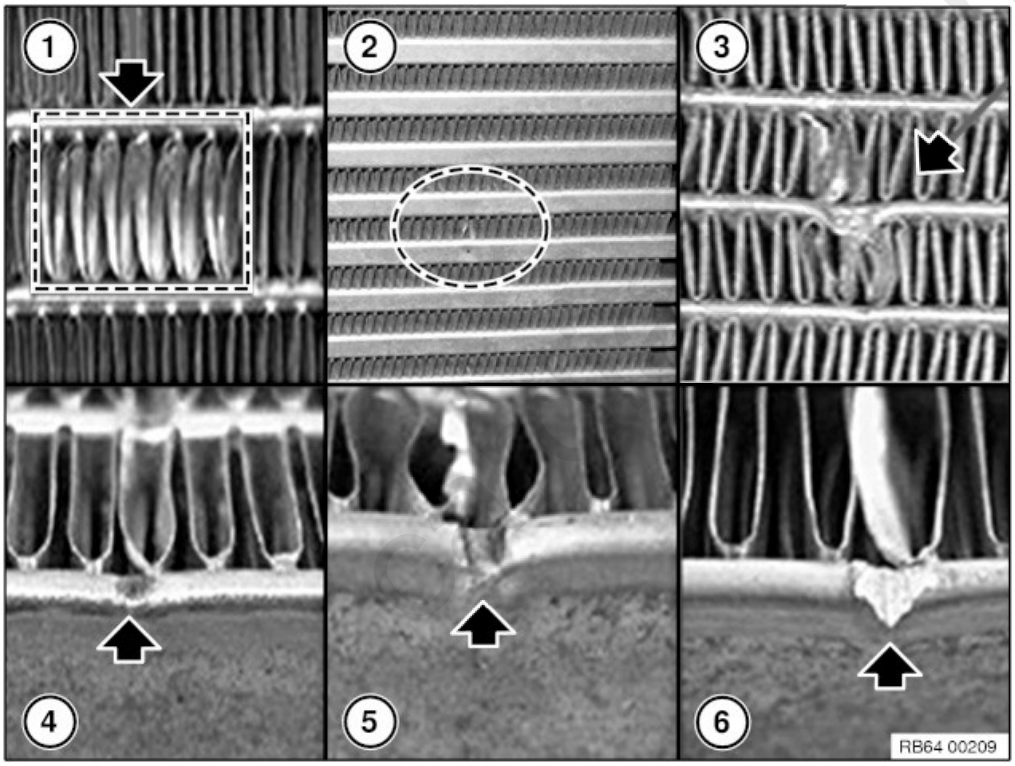
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Dryer flask (integrated in the air conditioning condenser):

Round dents/depressions are permitted.

The air conditioning condenser is not to be replaced in this case.

17 51 000 Remove and install/replace charge air cooler

WARNING

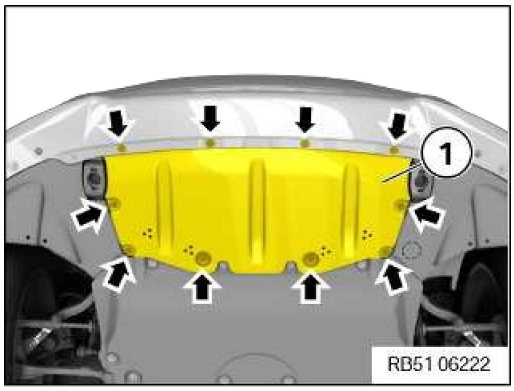
Hot surfaces.

Risk of burning!

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

PRELIMINARY WORK

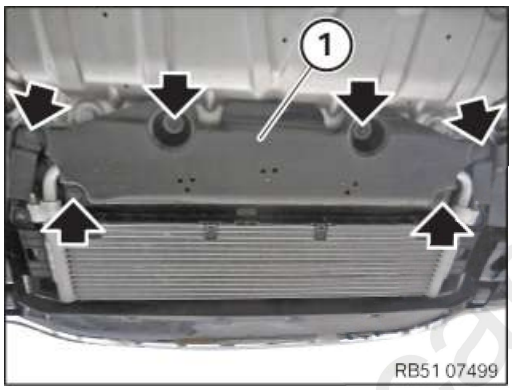
1 – Removing the front underbody protection



- **Version A:**

  Remove screws (arrows).

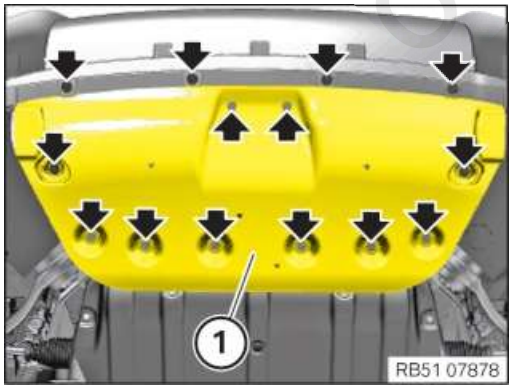
  Feed front underbody protection (1) backwards out of the bumper panel.



- **Version B:**

  Remove screws (arrows).

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



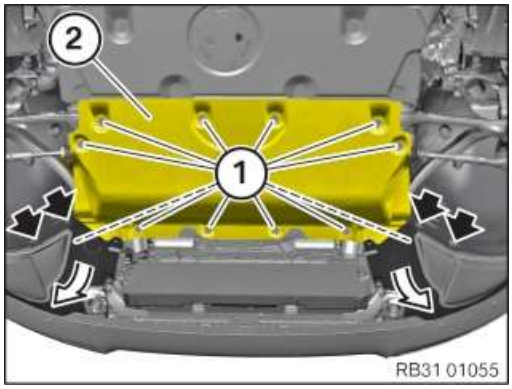
- **Version C:**

  Remove screws (arrows).

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

2 – Remove the underbody protection of the steering gear

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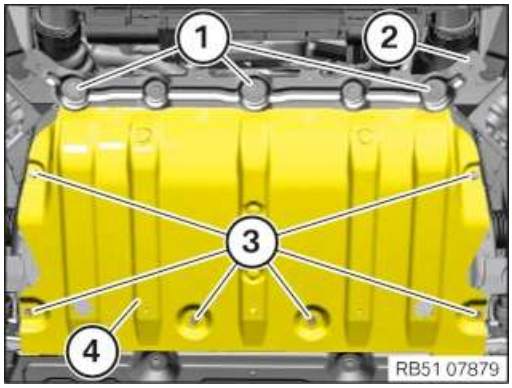
- **Version A:**

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

  Fold the bottom wheel arch cover to the side.

  Loosen screws (1).

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



- **Version B:**

  Loosen screws (1).

  Remove the holder (2) for the underride protection.

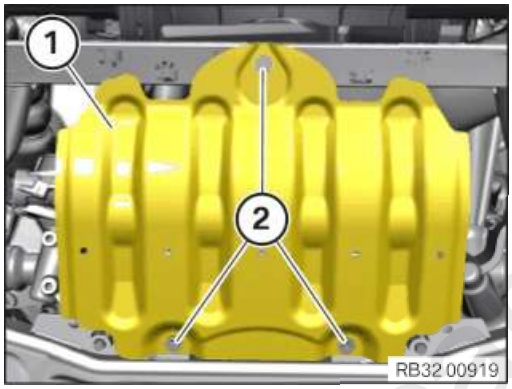
  Loosen screws (3).

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

3 – If installed: Removing the steering underbody protection

Prerequisite

Front underbody protection has been removed.



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

MAIN WORK

4 – Remove charge air cooler

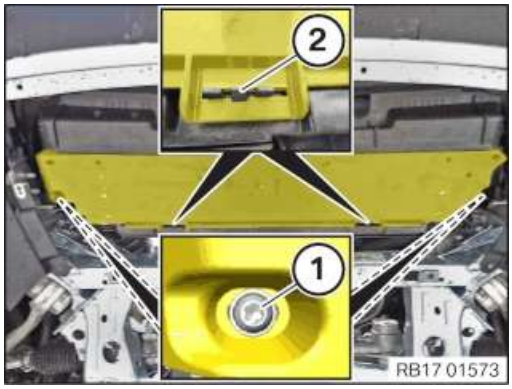
WARNING

Hot surfaces.

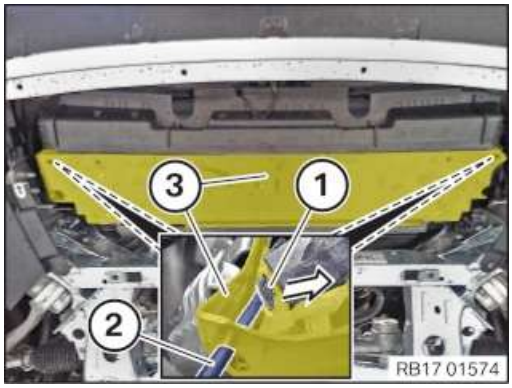
Risk of burning!

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

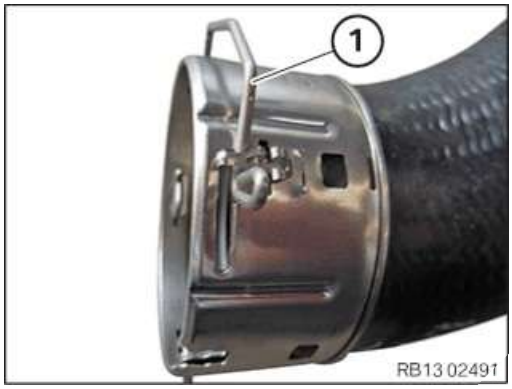
cardiagn.com



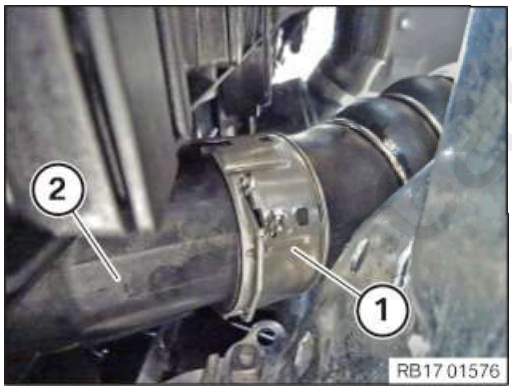
- Loosen screws (1).
- Unlock lock (2).



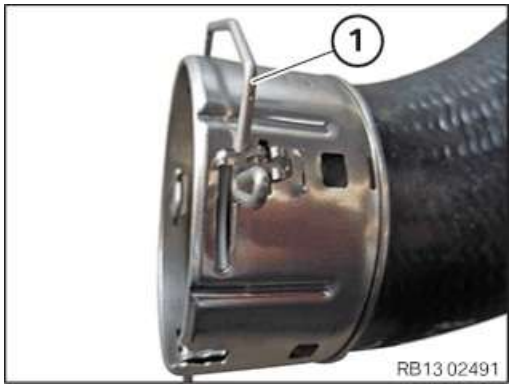
- Unlock lock (1) in the direction of the arrow using standard screwdriver (2).
- Guide out and remove cover (3) downwards.



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



- Unlock pressure pipe (1) and disconnect it from charge air cooler (2).

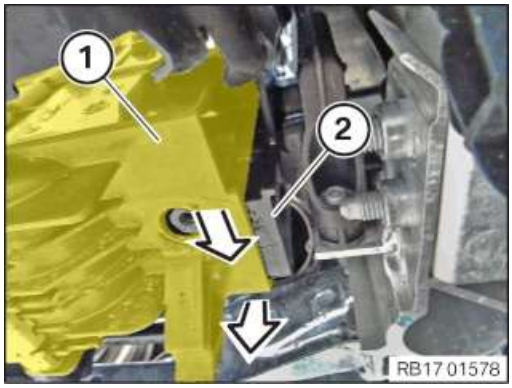


- Unlock clamp (1) and engage it in this position.

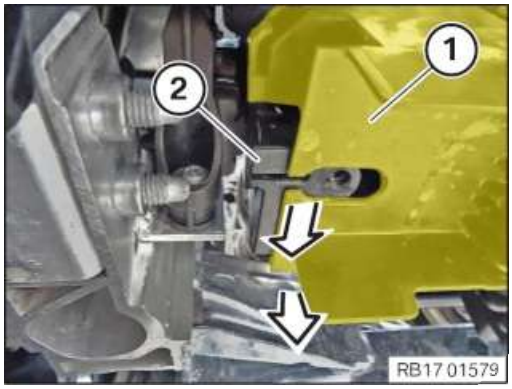
carsdiagn.com



- Unlock pressure pipe (1) and disconnect it from charge air cooler (2).



- Press charge air cooler (1) towards the rear and downwards in the direction of the arrow, counter-holding holder (2).
- Disconnect charge air cooler (1) from holder (2).



- Press charge air cooler (1) towards the rear and downwards in the direction of the arrow, counter-holding holder (2).
- Disconnect charge air cooler (1) from holder (2).



- Feed out charge air cooler (1) downwards and remove.

5 – Install charge air cooler



- Check the sealing ring (1) for damage and renew where required.

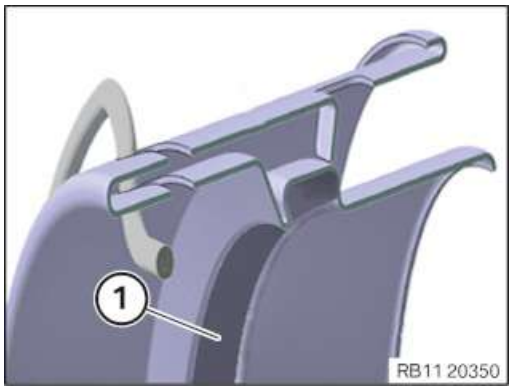
  Parts: Sealing ring

► **Replacing damaged seal**

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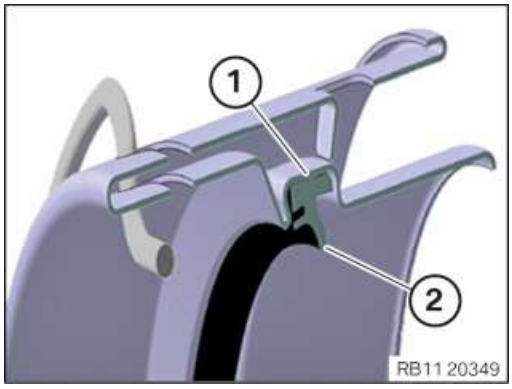
TECHNICAL INFORMATION

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



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

  The gasket groove (1) must be clean.



- Renew gasket.

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

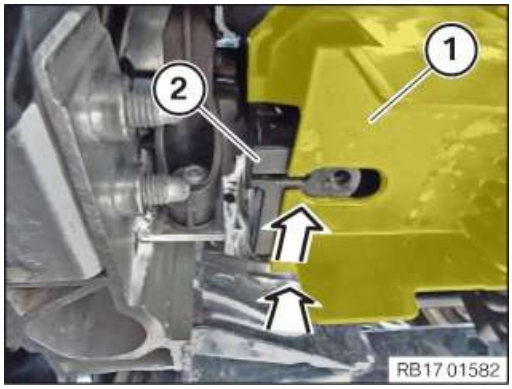
TECHNICAL INFORMATION

Incorrect assembly is possible. Ensure correct installation position.

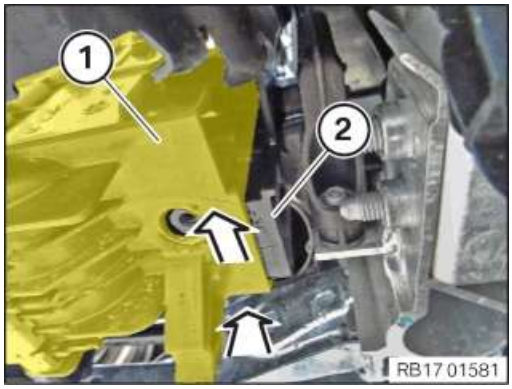
- Feed in and install the seal.
- Make sure the seal is correctly installed in the gasket groove (1).
- Make sure that the sealing lip (2) is directed inwards as shown.



- Guide the charge air cooler (1) in towards the top.



- Press the charge air cooler (1) in the direction of arrow upwards and forward and feed in and install in the holder (2).



- Press the charge air cooler (1) in the direction of arrow upwards and forward and feed in and install in the holder (2).

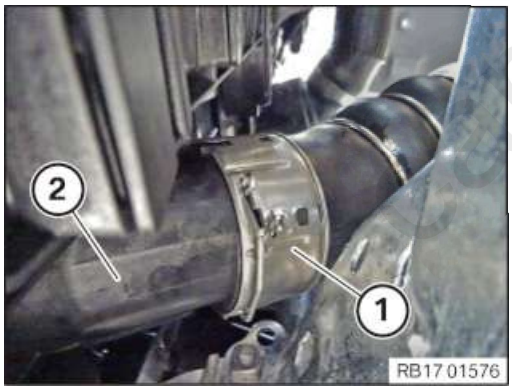


- Connect and lock the pressure pipe (1) to the charge air cooler (2).

  The pressure pipe (1) must engage audibly.

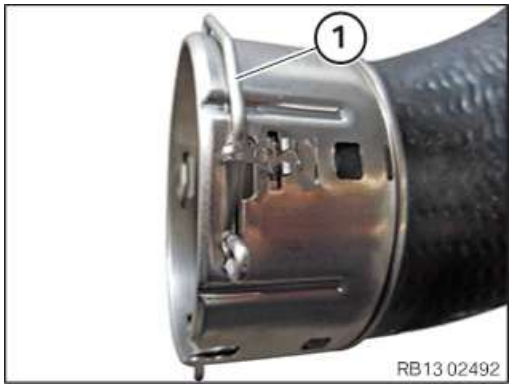


- Lock clamp (1).



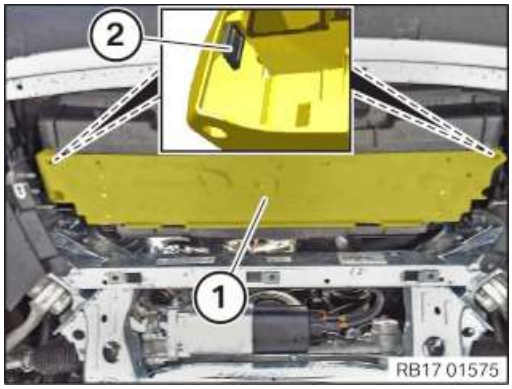
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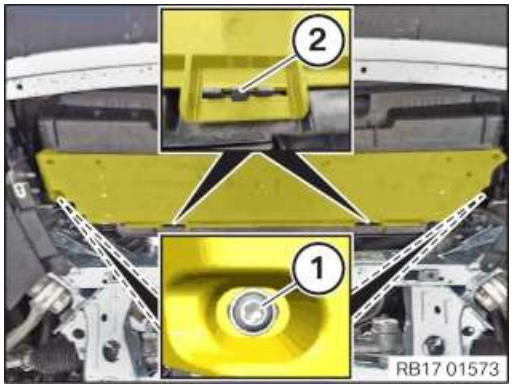


- Lock clamp (1).

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- Guide in and install cover (1).
- Ensure that locks (2) engage correctly.



- Ensure that locks (2) engage correctly.
- Tighten the screws (1).

Cooling module cover on holder

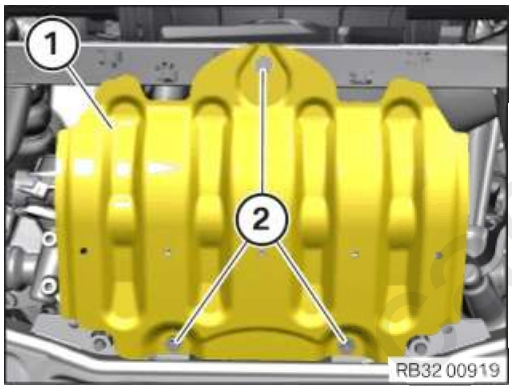
D6X20		Tightening torque	7 Nm

POSTPROCESSES

6 – If installed: Install underbody protection of the steering

Prerequisite

Front underbody protection has been removed.



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

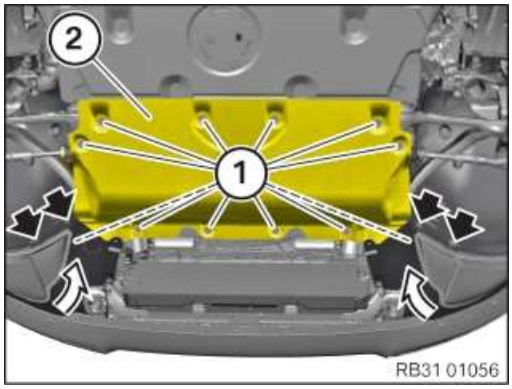
Underbody protection, steering, to front axle support

Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support

Hexagon bolt M6		Tightening torque	8 Nm

7 – Install the underbody protection of the steering gear



- **Version A:**

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

  Tighten the screws (1).

Underbody protection of the steering gear

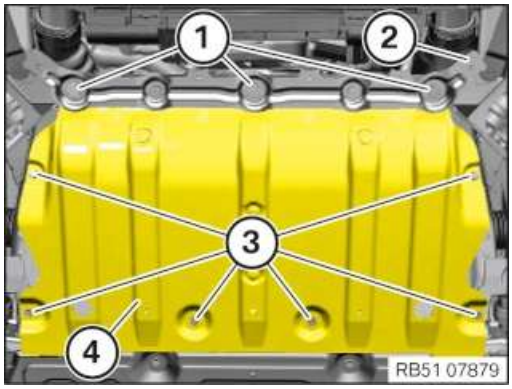
Hexagon screw for thermoplastic		Tightening torque	2.6 Nm
Hexagon bolt M6x20		Tightening torque	8 Nm

- Position the bottom wheel arch cover.

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

Wheel arch trim panel, front

Thermoplastic hexagon screw		Tightening torque	2,6 Nm



- **Version B:**

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

  Tighten the screws (3).

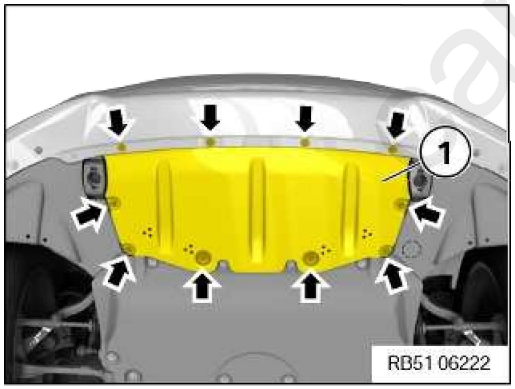
Underbody protection of the steering gear

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

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

  Tighten the screws (1).

8 – Installing the front underbody protection



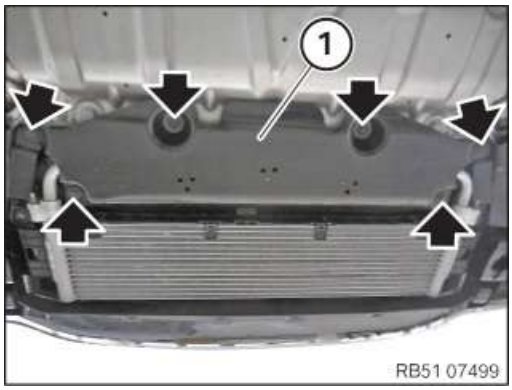
- **Version A:**

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

  Tighten screws (arrows).

Underbody protection front

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



- **Version B:**

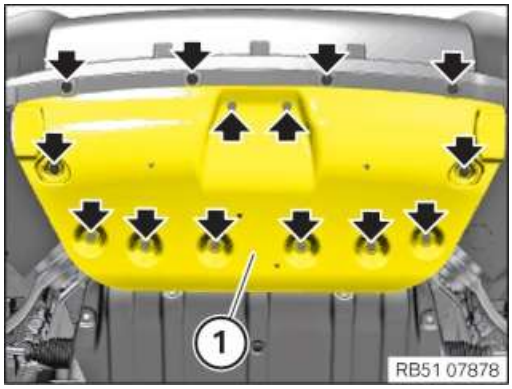
  Feed in and position the front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

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

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- **Version C:**

  Feed in and install front underbody protection (1).

  Tighten screws (arrows).

Underbody protection front

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

Additional Information

Overview of Tightening Torques

Cooling module cover on holder — Used in step 5

D6X20		Tightening torque	7 Nm

Underbody protection, steering, to front axle support — Used in step 6

Multi-purpose boltM10		Tightening torque	56 Nm

Underbody protection, steering, to front axle support — Used in step 6

Hexagon bolt M6		Tightening torque	8 Nm

Underbody protection of the steering gear — Used in step 7

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

Wheel arch trim panel, front — Used in step 7

Thermoplastic hexagon screw		Tightening torque	2,6 Nm

Underbody protection front — Used in step 8

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

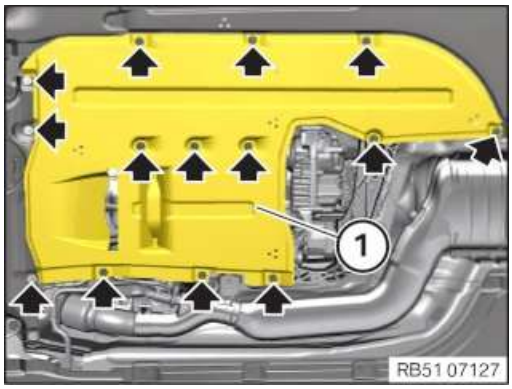
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17 61 008 Removing and installing/replacing the electric coolant pump for the low-temperature coolant circuit

Prerequisite
- Switch off ignition.

PRELIMINARY WORK

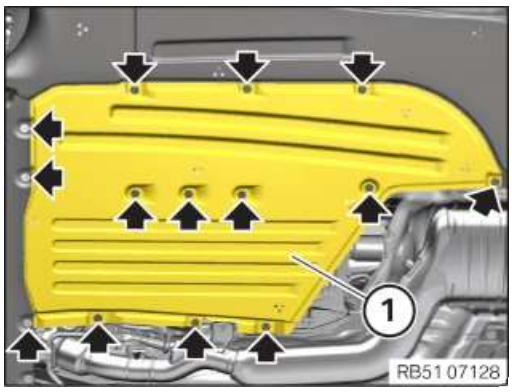
1 – Remove rear underbody protection



- **Version A:**

  Remove screws (arrows).

  Feed out the rear underbody protection (1).



- **Version B:**

  Remove screws (arrows).

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

2 – 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.

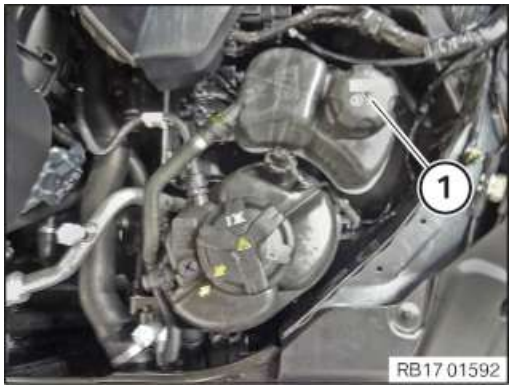
When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be emptied and refilled.

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.

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TECHNICAL INFORMATION

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



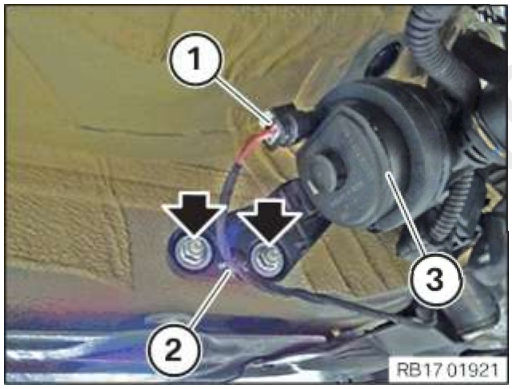
- Loosen sealing cap (1).



- Unlock coolant lines (1) and pull off.
- Catch and dispose of escaping coolant.

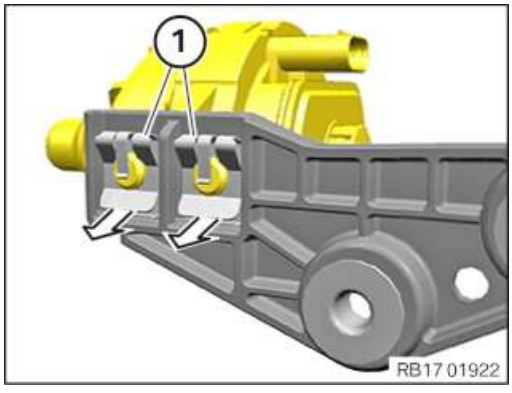
MAIN WORK

3 – Remove the electric coolant pump for the low-temperature coolant circuit

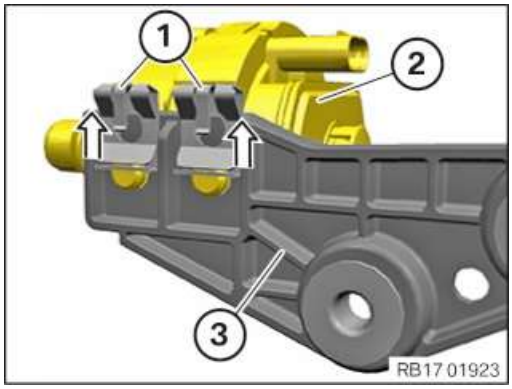


- Unlock plug connection (1) and disconnect.
- Loosen clamp (2).
- Unscrew the nuts (arrows).
- Feed out and remove the electric coolant pump (3) for the low-temperature coolant circuit.

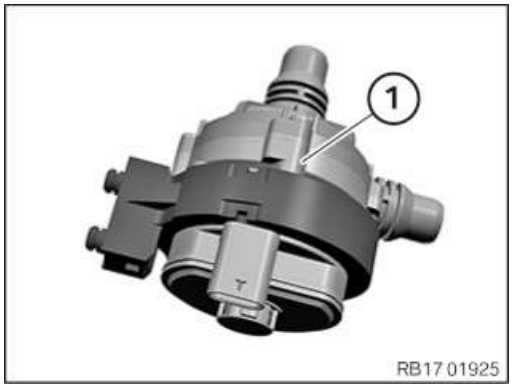
4 – Replacing the electric coolant pump for the low-temperature coolant circuit



- Unlock the retaining clips (1) in the direction of arrow.

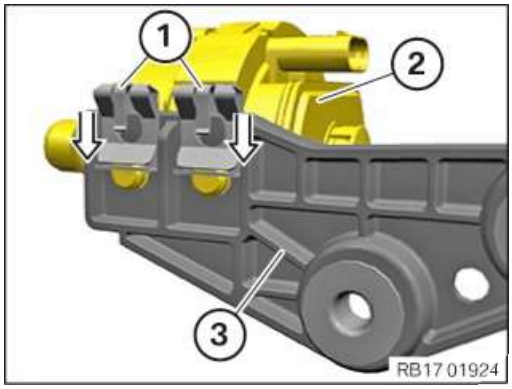


- Feed out and remove the retaining clips (1) in the direction of arrow.
- Remove the electric coolant pump (2) for the low-temperature coolant circuit from the holder (3).



- Renew the electric coolant pump (1) for the low-temperature coolant circuit.

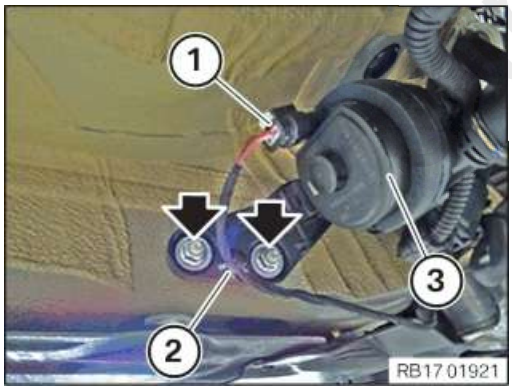
  Parts: Electric coolant pump



- Fit the electric coolant pump (2) for the low-temperature coolant circuit on the holder (3) and position it.
- insert and install the retaining clips (1) in the direction of arrow.

  The retaining clips (1) must engage audibly.

5 – Install the electric coolant pump for the low-temperature coolant circuit



- Feed in and install the electric coolant pump (3) for the low-temperature coolant circuit.
- Tighten the nuts (arrows).

Electric coolant pump for mild hybrid technology to the body

Nut M6		Tightening torque	8 Nm

- Secure the clamp (2).
- Connect connectors (1) and lock.

  The connector (1) must engage audibly.

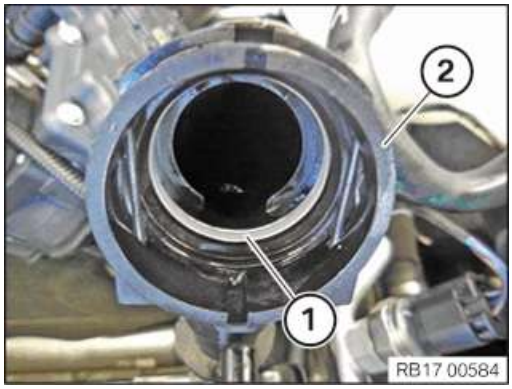
POSTPROCESSES

6 – 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.

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



- Connect and lock the coolant lines (1).

  The coolant lines (1) must engage audibly.

7 – Filling and bleed the low-temperature coolant circuit



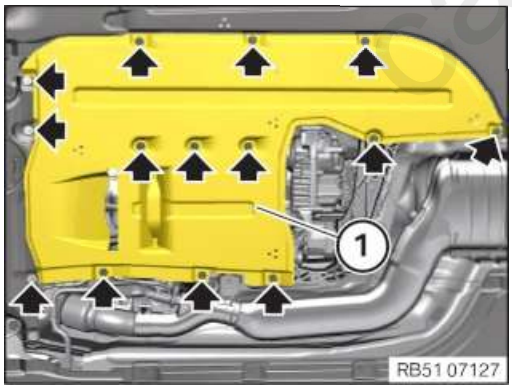
TECHNICAL INFORMATION

It is **mandatory** to fill the cooling system before bleeding.

Fill **both** the circuits for high and low-temperature coolant circuits.

- See additional information.

8 – Installing underbody protection at rear



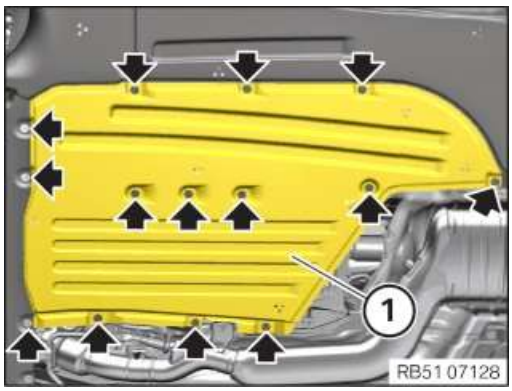
- **Version A:**

  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm



- **Version B:**

  Insert and install the rear underbody protection (1).

  Tighten screws (arrows).

Underbody protection

Hexagon screw		Tightening torque	3 Nm

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Additional Information

Overview of Tightening Torques

Electric coolant pump for mild hybrid technology to the body			Used in step 5
Nut M6		Tightening torque	8 Nm

Underbody protection			Used in step 8
Hexagon screw		Tightening torque	3 Nm

Links

Repair instructions	Used in step
17 00 011 Draining and topping up the coolant for the low-temperature circuit	7
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	7
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	7
17 11 103 Removing and installing/replacing coolant expansion tank for the low-temperature coolant circuit	7
17 11 103 Removing and installing/replacing coolant expansion tank for the low-temperature coolant circuit	7
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	7
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	7
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	7
17 00 040 Venting cooling system and checking on watertightness	7
17 00 040 Venting high temperature - cooling system and checking for water leaks (N20 hybrid drive)	7
17 00 040 Venting high temperature - cooling system and checking for water leaks (N20 hybrid drive)	7
17 00 040 Bleeding lower-temperature cooling system (B48)	7
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	7
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	7
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17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	7
17 00 011 Draining and topping up coolant circuit for low temperature	7
17 00 040 Bleed the low-temperature cooling system and check for watertightness (coolant circuit for low temperature)	7
17 00 040 Bleeding and filling low temperature cooling system using vacuum filler device (B48)	7
17 00 011 Draining and topping up low-temperature coolant circuit	7
17 00 011 Draining and topping up low-temperature coolant circuit	7
17 00 040 Bleeding the low-temperature coolant circuit and checking it for watertightness	7
17 00 040 Bleeding the low-temperature coolant circuit and checking it for watertightness	7
17 00 015 Draining and topping up the coolant circuit for the drive \PREMIUM	7
17 00 011 Draining and topping up low-temperature coolant circuit	7
17 00 040 Bleed the cooling system and check for watertightness with the special tool (low-temperature coolant circuit)	7
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	7
17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	7
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17 00 040 Bleed the cooling system and check for watertightness with the special tool (coolant circuit for low temperature)	7
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17 00 ... Instructions for working on cooling system



Warning!

Risk of scalding, carry out repairs on the cooling system only when the engine has cooled down.



Attention!

Wear protective gloves and safety goggles.



Attention!

Life-time coolant filling:

Never 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 drained and refilled.

In the case of other removal work involving the draining of part quantities of coolant, replace these quantities which have been drained with new coolant.

Installation note:
Use only recommended coolant.

Observe mixture ratio.



Attention!

Open cooling system only when it has cooled down.

Opening the cooling system while hot can result in air entering the system.

This can cause overheating with permanent damage to the engine.



Attention!

Protect the alternator from contamination when carrying out any repairs on the coolant circuit.

Cover alternator with suitable materials.

Failure to comply with this procedure may result in an alternator malfunction.



Attention!

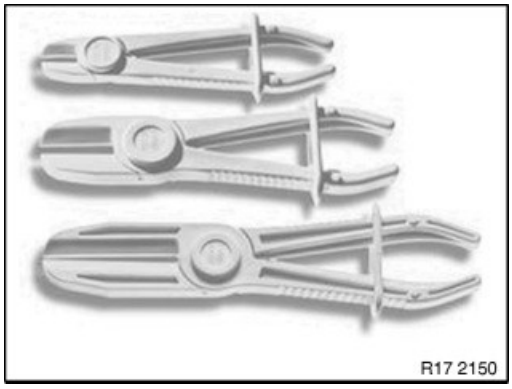
Do not fill coolant expansion tank over maximum level, as overfilling will cause the coolant to overflow. This may cause traces of coolant on the expansion tank or in the engine compartment and allow an incorrect conclusion about possible leaks.

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Recycling

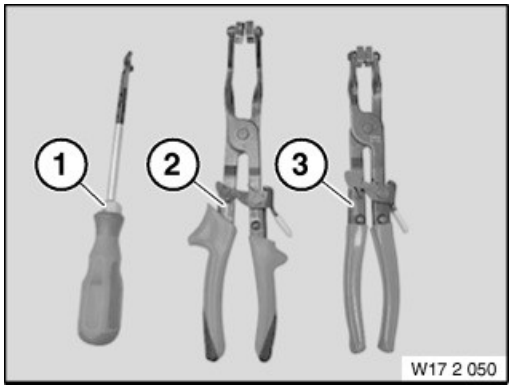
Catch and dispose of drained coolant.

Observe country-specific waste disposal regulations.



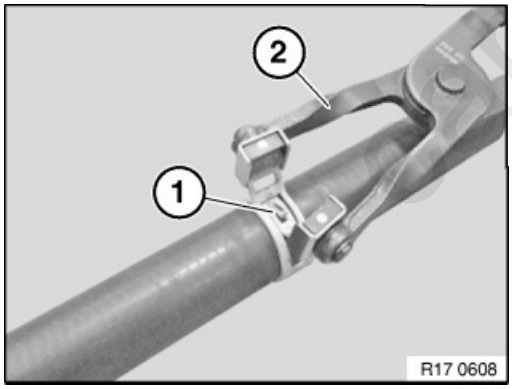
Note:
To disconnect the coolant hoses, use a commercially available disconnection tool such as HAZET (see table).

HAZET number:	Description
4590-1	Length of disconnect pliers (mm): 150
4590-2	Length of disconnect pliers (mm): 180
4590-3	Length of disconnect pliers (mm): 253
4590 / 2	Set of clamping pliers
4590 / 3	Set of clamping pliers

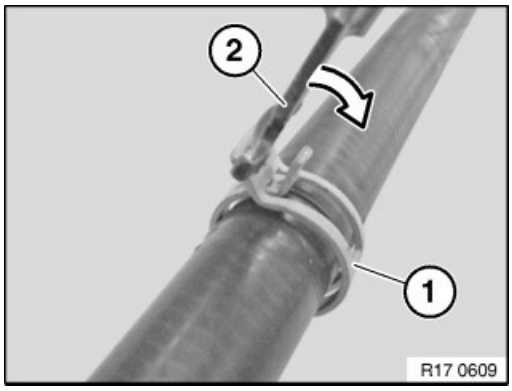


Set of special tools 17 2 050 for removing and installing the spring bracket clamps for coolant hoses.

- (1) Release tool.
- (2) Pliers (bent version).
- (3) Pliers (straight version).

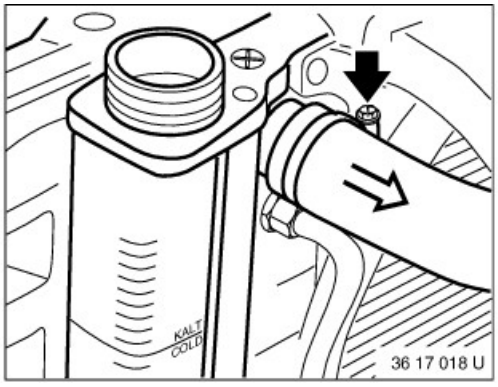


Loosen spring strap (1) with the pliers (2).



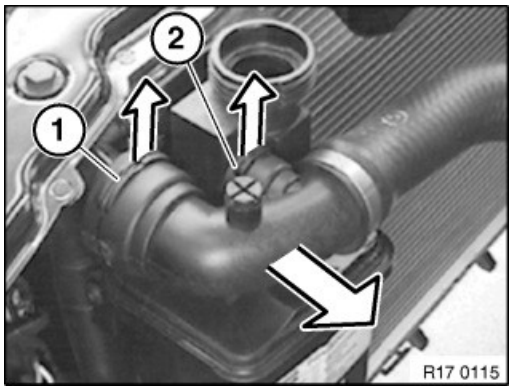
Unlock spring strap (1) with the release tool (2).

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Note:
Tightening torque for hose clamps

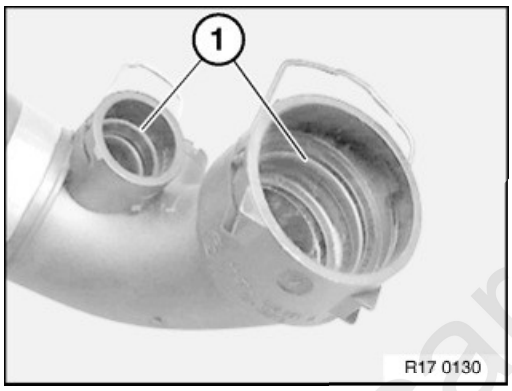
WAF 5	1.0 - 1.5 Nm
WAF 6	2.5 - 3.5 Nm



Notes on disassembly/installation of the quick-release couplings of the coolant hoses

Dismantling of quick-release coupling

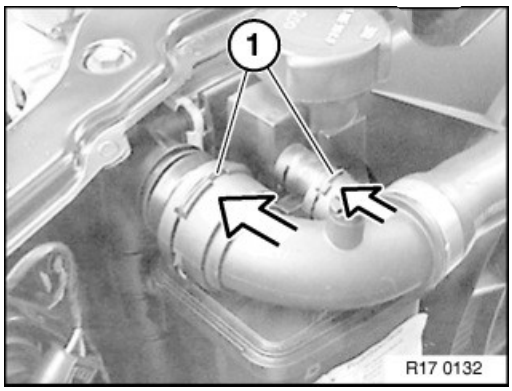
Pull out lock (1) and (2). Pull off hose.



Installation note:

Check O-rings (1).

Do not coat O-rings (1) with lubricant.



Assembly of quick-release coupling

Press in lock (1) before installing quick-release coupling.

Push on hose.

Quick-release couplings must clearly snap audibly into place.

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