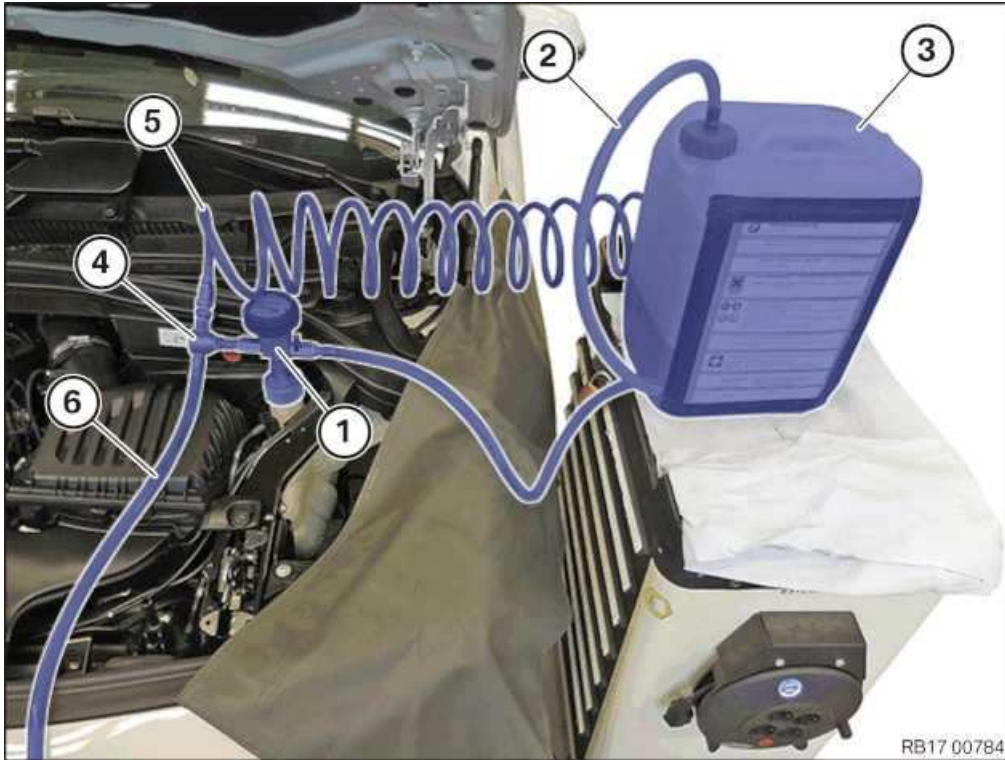


17 00 039 Bleed the cooling system and check it for watertightness with the special tool

PRELIMINARY WORK

1 – Filling the coolant circuit by means of the vacuum filler device

Vacuum filler device



Vacuum filler device - connected to the high-temperature 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 Out-going hose (lead out-going hose into 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

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

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

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

The 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.

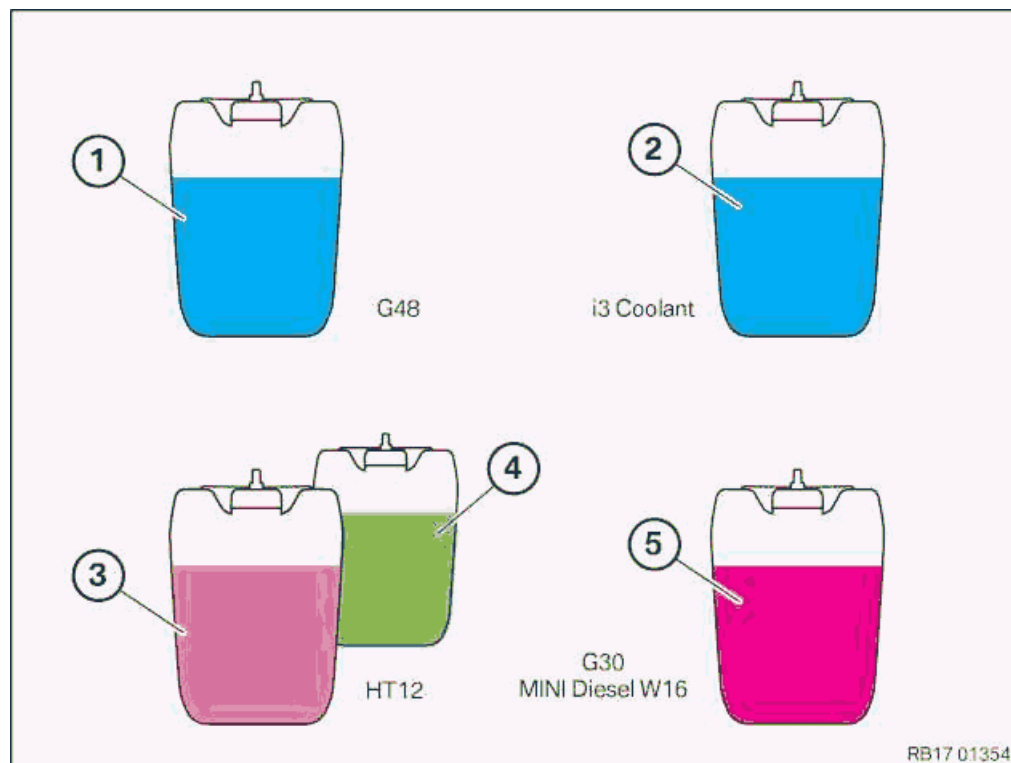


TECHNICAL INFORMATION

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 vacuum filler device container



Choose the correct coolant for filling

A vehicle must be filled with the coolant with which it is delivered ex works

1. **G48 (Blue)** G48 must not be mixed with the i3Coolant or the G30 MINI diesel fuel W16.
2. **i3 coolant (blue)** is used only for the i3 heater circuit. i3 coolant must not be filled in the other coolant circuits or mixed with the other coolants.
3. **HT12 (Pink)** HT12 must not be mixed with the i3 coolant or the G30 MINI diesel fuel W16.
4. **HT12 (Green)** HT12 must not be mixed with the i3 coolant or the G30 MINI diesel fuel W16.
5. **G30 (Pink)** must be used only for the **MINI diesel fuel W16**. G30 must not be filled in the other coolant circuits or mixed with the other coolants.



RISK OF DAMAGE

Damage to the engine.

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

- 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 :

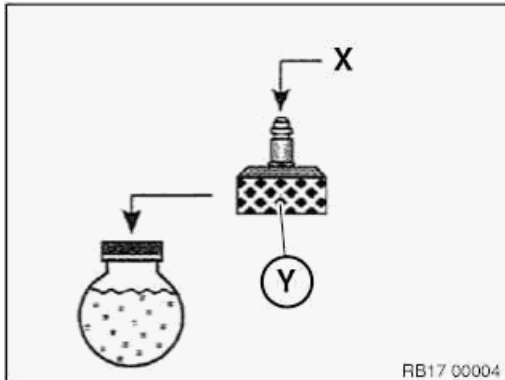
Type	Engine	Adapter (Y) from 17 0 100
F39/F45/F46/F48	B46/B48/B38/B47/B37	17 0 109

- 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.

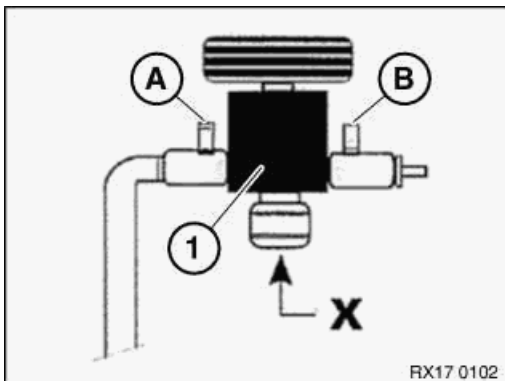
Coolant capacity

B47C20O0	7 l
B47C20T0	7,4 l
B47C20O1	7 l

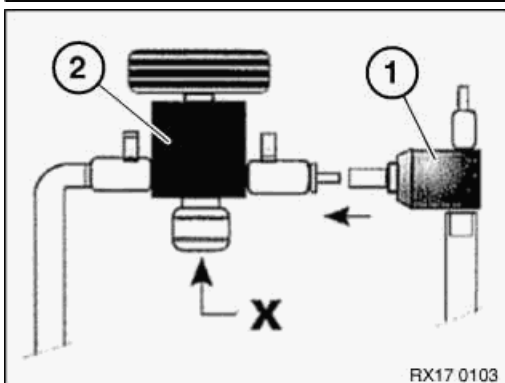
Expendable materials: Technically suitable antifreeze and corrosion inhibitor



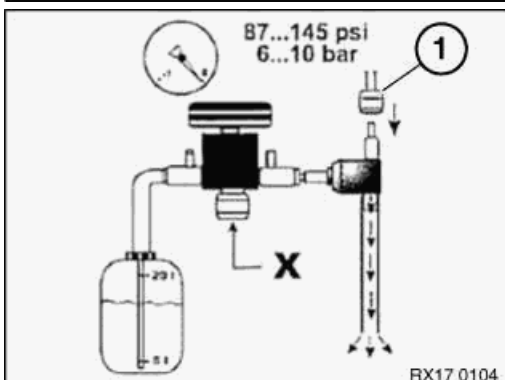
- Connect the selected adapter (Y) to the coolant expansion tank.
- Connect vacuum filler device to connection (X) of the adapter.



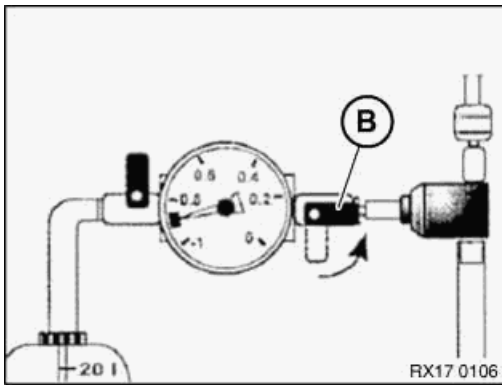
- Make sure that the shutoff valves (A) and (B) of the vacuum filler device (1) are closed.
- Connect and lock connection (X) to the coolant expansion tank.



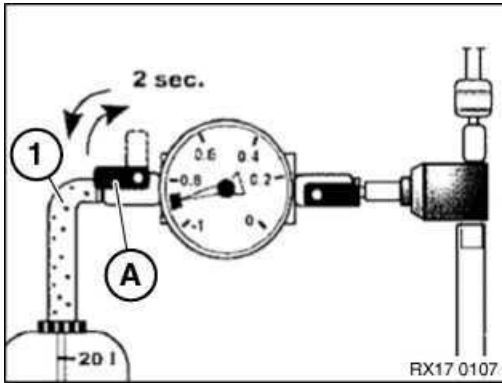
- Connect Venturi nozzle (1) to the vacuum filler device (2).
(X) is the connection on the coolant expansion tank.



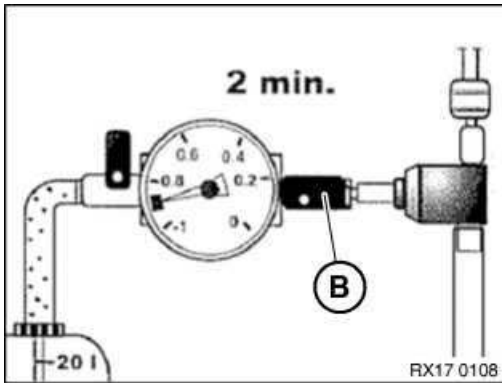
- Connect compressed air (1).
(X) is the connection to the coolant expansion tank.



- 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.



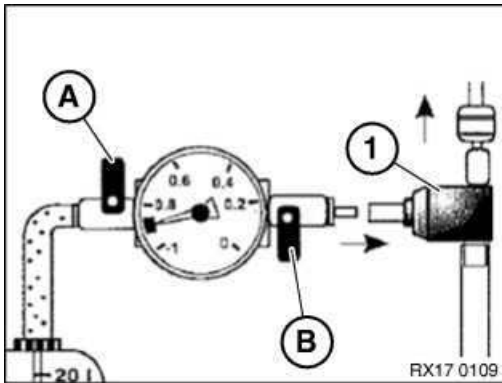
- Check the coolant hoses for porosity and renew porous coolant hoses as required.



TECHNICAL INFORMATION

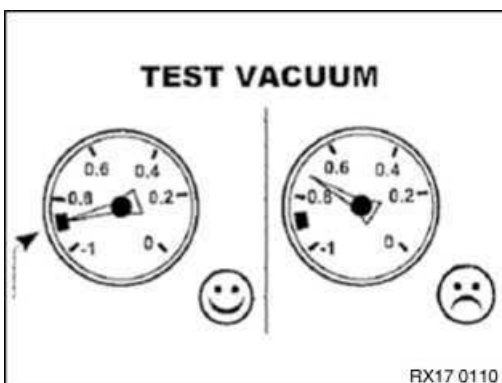
The coolant hoses contract during vacuum build-up.

- 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).
- Check whether the shut-off 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

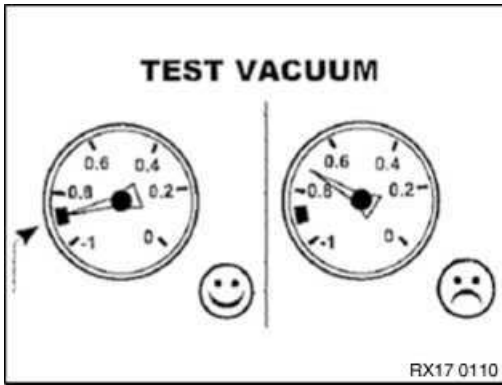
- » Vacuum drops.

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.

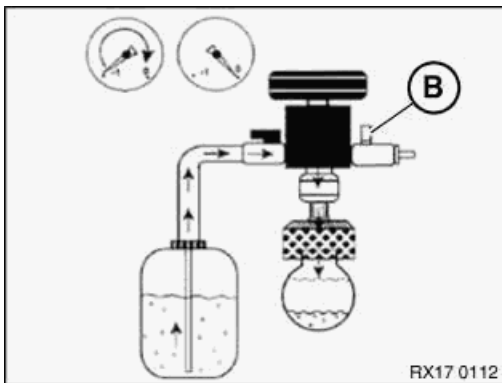
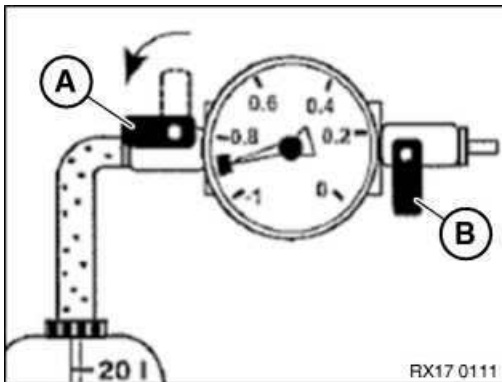


Result

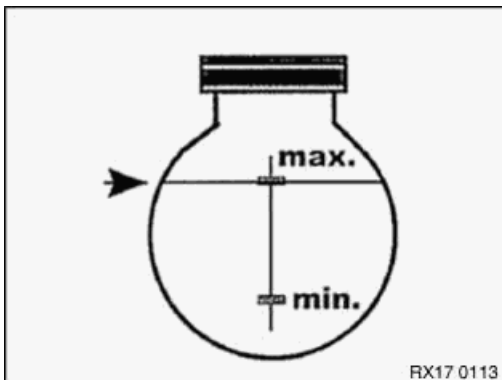
» Vacuum remains constant.

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. In order to do so, open shutoff valve (B).



- Remove the vacuum filler device with the adapter from the coolant expansion tank.
- Adjust the coolant level to 700 ml above the maximum mark.
- After filling the cooling system with the vacuum filler device perform the cooling system bleeding routine additionally.

MAIN WORK

2 – Bleed the cooling circuit



TECHNICAL INFORMATION

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

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

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

The 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 the **coolant circuit is 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.

Ensure that terminal 15 does not fail during 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

In case the cooling system bleeding routine needs to be carried out again: Pull off the ignition key until the vehicle respectively the Digital Motor Electronics (DME) has gone to sleep.



TECHNICAL INFORMATION

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



TECHNICAL INFORMATION

During the cooling system bleeding routine, the fan may sporadically activate.

- Remove the vacuum filler device from the coolant expansion tank.
- Adjust the filling level in the coolant expansion tank to maximum.
- The sealing cap on the coolant expansion tank must remain open.
- Engage the parking brake.
- Make sure that the wheels touch the ground.
- With automatic transmission: Engage selector lever position P (Park).
- For manual gearbox: Do not engage in gear (idle position).
- Switch on the ignition and make sure that the ignition remains switched on.
- Make sure the driving experience switch is **not** in the **ECO PRO** switch position.
- Set the heating to the **maximum** temperature and the blower to the **lowest** setting.
- Hold the accelerator pedal down to the floor for at least **10 s** and do **no** operate the brake pedal.
- Start engine and run at idle speed.

The electrical shift valve and the electric coolant pump are automatically switched on.

- Add coolant permanently up to maximum.
- Leave the engine running at idle for 5 minutes before you continue.
- Operate the accelerator pedal 5 times to approximately 2000 rpm.
- Hold idle speed for 10 s.
- Operate the accelerator pedal 5 times to approximately 2000 rpm.
- Hold idle speed for 10 s.
- Add coolant permanently up to maximum.
- Leave the engine running at idle for 5 minutes.
- Operate the accelerator pedal 5 times to approximately 2000 rpm.
- Hold idle speed for 10 s.
- Operate the accelerator pedal 5 times to approximately 2000 rpm.
- Hold idle speed for 10 s.
- Check 10 minutes after the engine start if the cooling system bleeding routine of the electric relay valve and the electric coolant pump is completed.
- When the cooling system bleeding routine is completed, switch off the engine.
- Allow the engine to cool down.
- Adjust the filling level in the coolant expansion tank to the **maximum mark**.
- Close the sealing cap (1) on the coolant expansion tank.



3 – Checking cooling system for watertightness

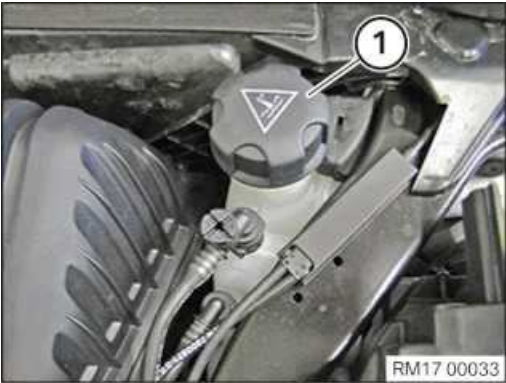


WARNING

Hot surfaces.

Risk of burning!

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



- Loosen sealing cap (1).



- Attach the special tool with 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 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 tool and from special tool set .
- Observe on the pressure measuring device when the opening pressure has been reached.

Opening pressure of sealing cap / test pressure of 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).

Additional Information

Overview of Special Tools

Overview Technical Data

Opening pressure of sealing cap / test pressure of 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

Coolant capacity

Used in step 1

B47C20O0	7 l
B47C20T0	7,4 l
B47C20O1	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](#)

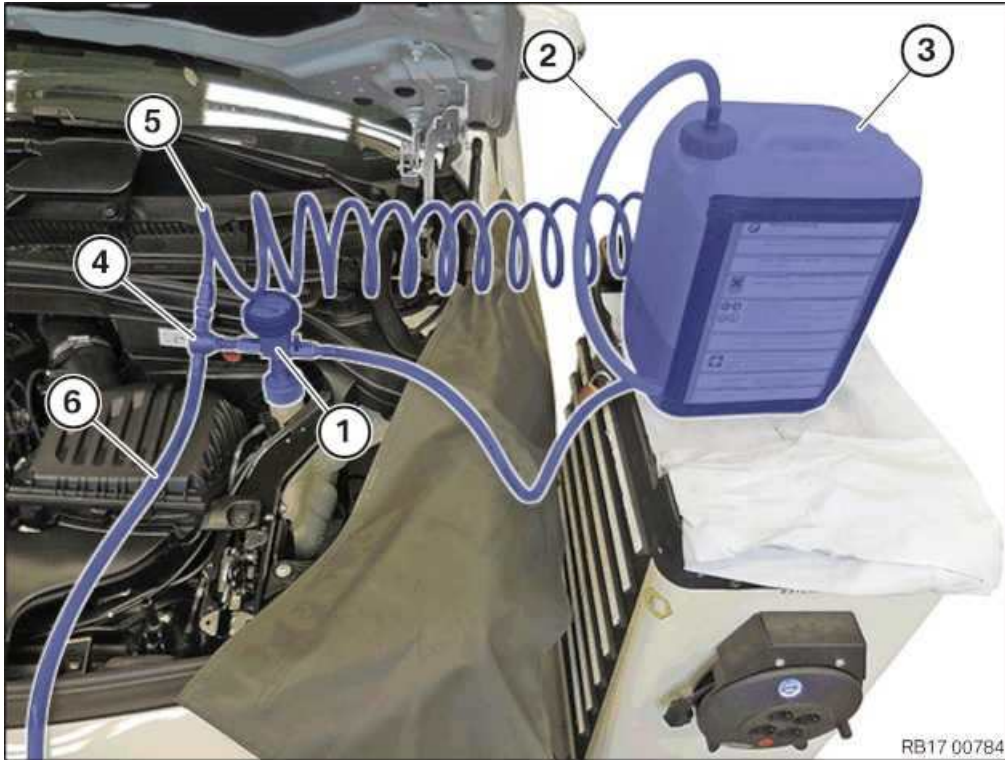
1

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

PRELIMINARY WORK

1 – Filling the coolant circuit by means of the vacuum filler device

Vacuum filler device



Vacuum filler device - connected to the high-temperature 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 Out-going hose (lead out-going hose into 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

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

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

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

The 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.

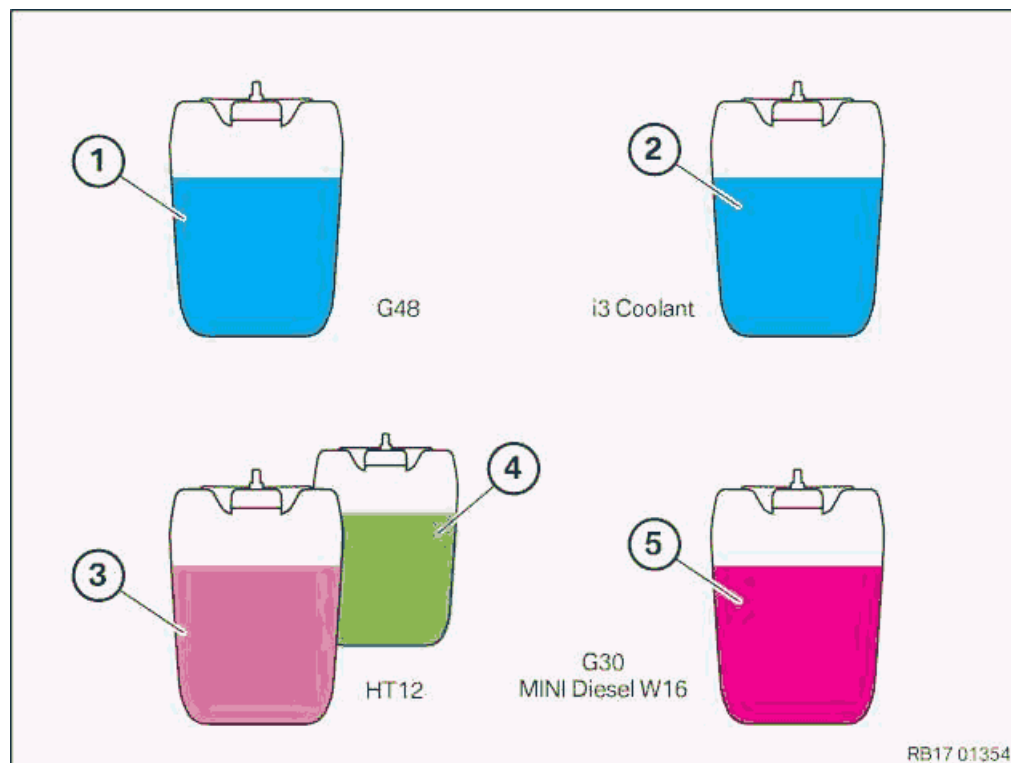


TECHNICAL INFORMATION

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 vacuum filler device container



Choose the correct coolant for filling

A vehicle must be filled with the coolant with which it is delivered ex works

1. **G48 (Blue)** G48 must not be mixed with the i3Coolant or the G30 MINI diesel fuel W16.
2. **i3 coolant (blue)** is used only for the i3 heater circuit. i3 coolant must not be filled in the other coolant circuits or mixed with the other coolants.
3. **HT12 (Pink)** HT12 must not be mixed with the i3 coolant or the G30 MINI diesel fuel W16.
4. **HT12 (Green)** HT12 must not be mixed with the i3 coolant or the G30 MINI diesel fuel W16.
5. **G30 (Pink)** must be used only for the **MINI diesel fuel W16**. G30 must not be filled in the other coolant circuits or mixed with the other coolants.



RISK OF DAMAGE

Damage to the engine.

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

- 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 :

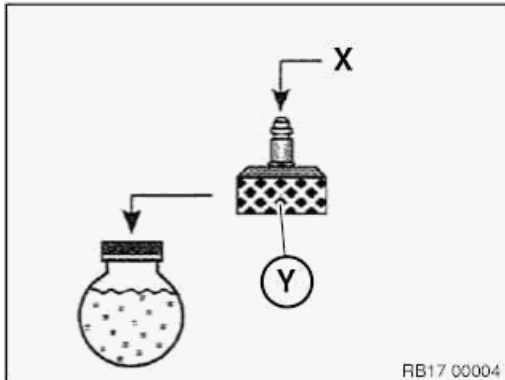
Type	Engine	Adapter (Y) from 17 0 100
F39/F45/F46/F48	B46/B48/B38/B47/B37	17 0 109

- 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.

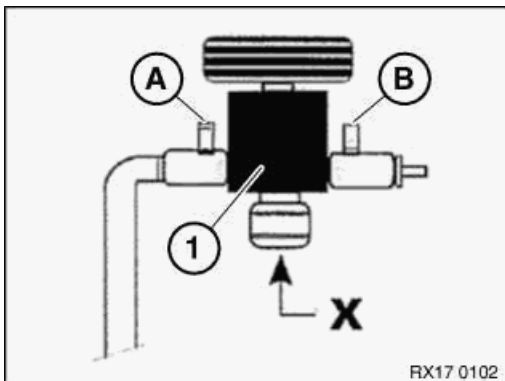
Coolant capacity

B47C20O0	7 l
B47C20T0	7,4 l
B47C20O1	7 l

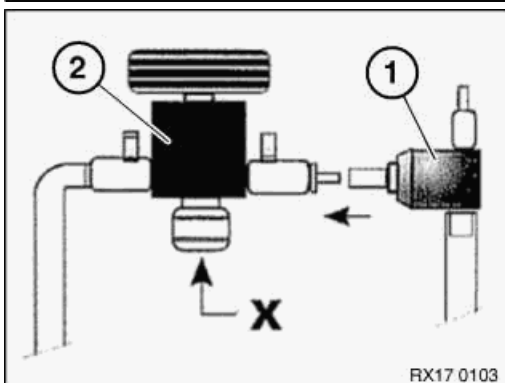
Expendable materials: Technically suitable antifreeze and corrosion inhibitor



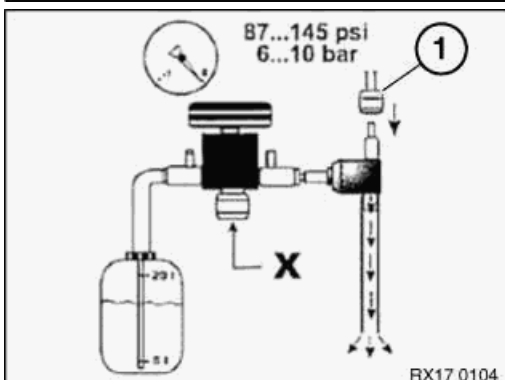
- Connect the selected adapter (Y) to the coolant expansion tank.
- Connect vacuum filler device to connection (X) of the adapter.



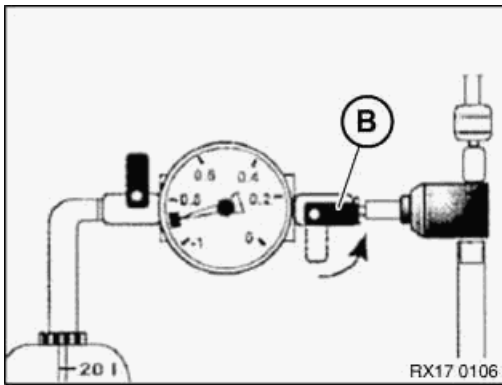
- Make sure that the shutoff valves (A) and (B) of the vacuum filler device (1) are closed.
- Connect and lock connection (X) to the coolant expansion tank.



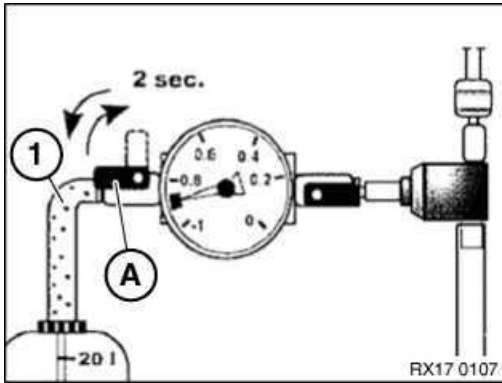
- Connect Venturi nozzle (1) to the vacuum filler device (2).
(X) is the connection on the coolant expansion tank.



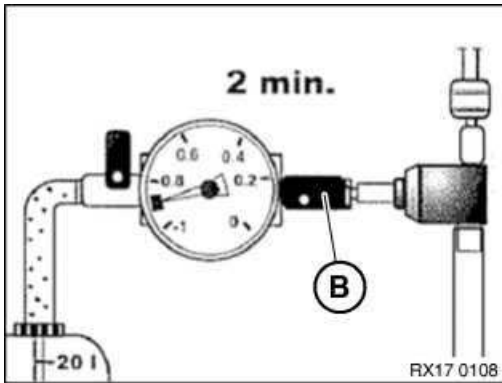
- Connect compressed air (1).
(X) is the connection to the coolant expansion tank.



- 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.



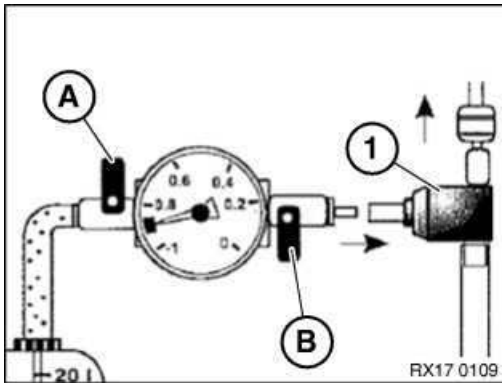
- Check the coolant hoses for porosity and renew porous coolant hoses as required.



TECHNICAL INFORMATION

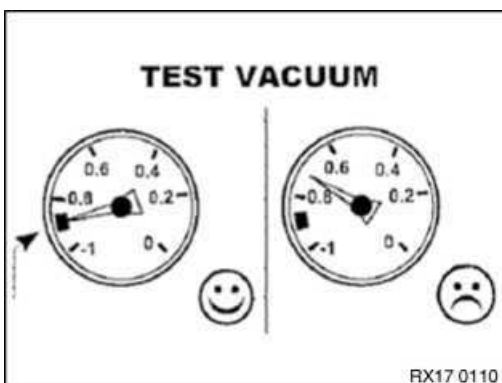
The coolant hoses contract during vacuum build-up.

- 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).
- Check whether the shut-off 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

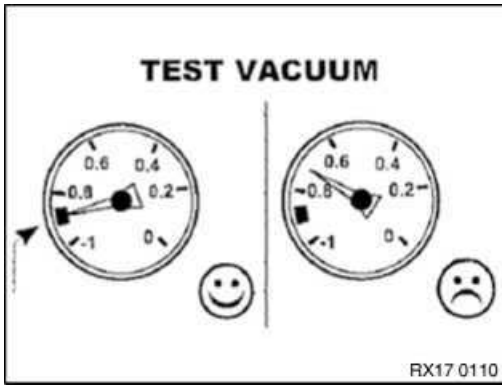
- » Vacuum drops.

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.

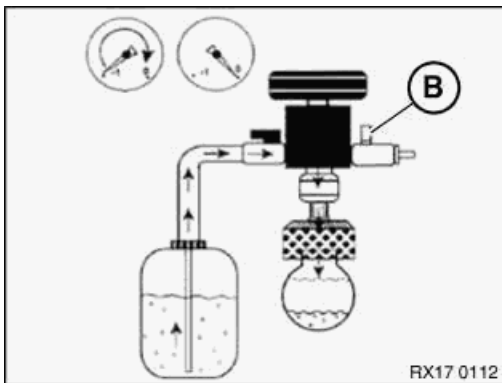
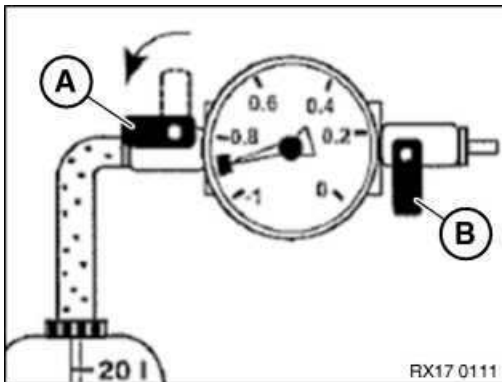


Result

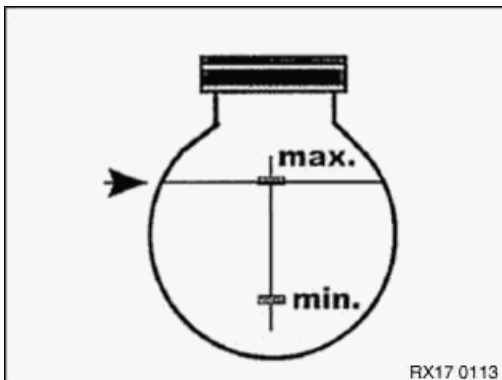
» Vacuum remains constant.

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. In order to do so, open shutoff valve (B).



- Remove the vacuum filler device with the adapter from the coolant expansion tank.
- Adjust the coolant level to 700 ml above 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



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

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

The 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.

- Fill the coolant circuit with the vacuum filler device.
- 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.
- Switch the ignition on.
- Adjust the heating to **maximum** temperature and adjust the blower to the **lowest** stage.
- Press the accelerator pedal down to the limit position for 10 seconds.
- Start engine and run at idle speed.

The electrical valve and the electric coolant pump are automatically switched on.

- 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.



Carry out the following steps "Press accelerator pedal" and "Hold idle speed" 10 times. Continue to top up the filling level in the coolant expansion tank to the maximum mark.

- 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.
- Hold idle speed for 10 s.
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- Hold idle speed for 10 s.

- 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.



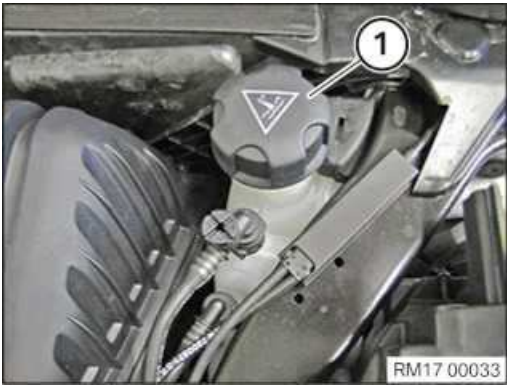
TECHNICAL INFORMATION

Carry out the following steps "Press accelerator pedal" and "Hold idle speed" 10 times. Continue to top up the filling level in the coolant expansion tank to the maximum mark.

- 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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- 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.
- Hold idle speed for 10 s.

The cooling system bleeding routine has finished approximately 10 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.



- Close the sealing cap (1) on the coolant expansion tank.

POSTPROCESSES

3 – Checking cooling system for watertightness

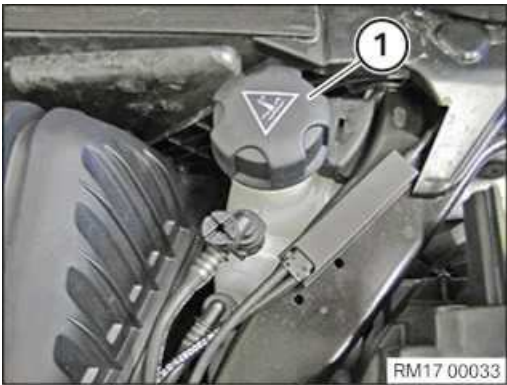


WARNING

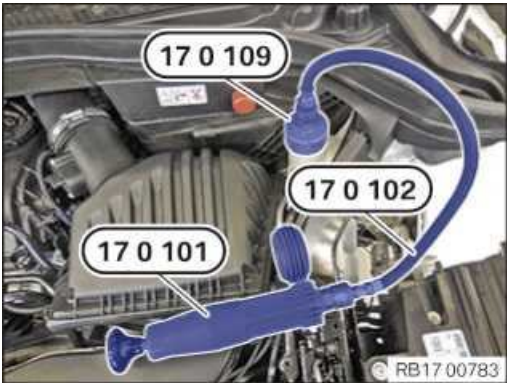
Hot surfaces.

Risk of burning!

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



- Loosen sealing cap (1).



- Attach the special tool with 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 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 tool and from special tool set .
- Observe on the pressure measuring device when the opening pressure has been reached.

Opening pressure of sealing cap / test pressure of 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).

Additional Information

Overview of Special Tools

Overview Technical Data

Opening pressure of sealing cap / test pressure of 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

Coolant capacity

Used in step 1

B47C20O0	7 l
B47C20T0	7,4 l
B47C20O1	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

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

1 – Checking cooling system for watertightness

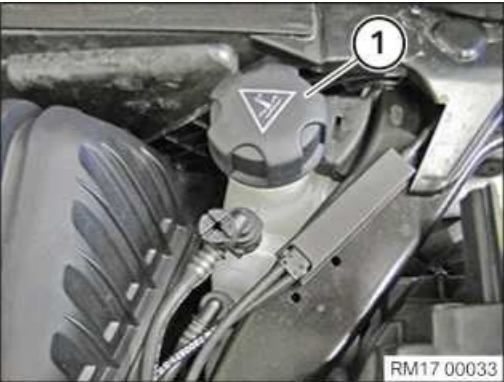


WARNING

Hot surfaces.

Risk of burning!

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



- Loosen sealing cap (1).



- Attach the special tool with 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 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 tool and from special tool set .
- Observe on the pressure measuring device when the opening pressure has been reached.

Opening pressure of sealing cap / test pressure of 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).

Additional Information

Overview of Special Tools

Overview Technical Data

Opening pressure of sealing cap / test pressure of 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

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



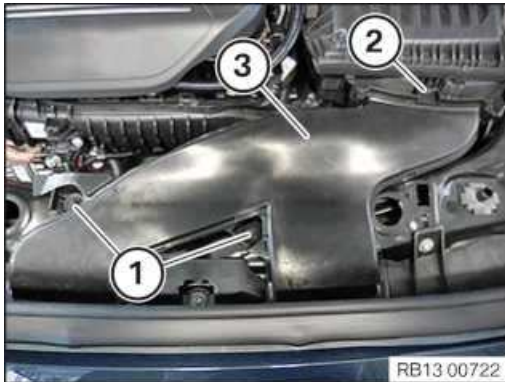
TECHNICAL INFORMATION



- 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!

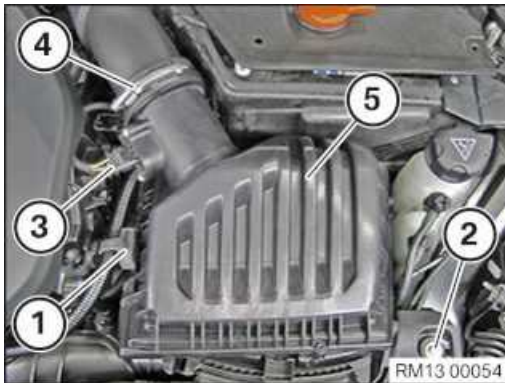
PRELIMINARY WORK

1 – Remove the intake neck for intake silencer housing



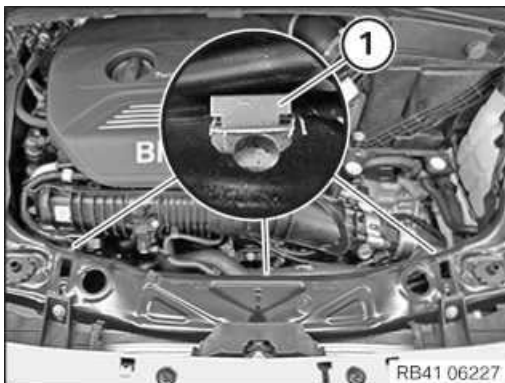
- Loosen nuts (1).
- Loosen the lock (2).
- Guide the intake neck (3) out and remove it.

2 – Removing intake silencer housing

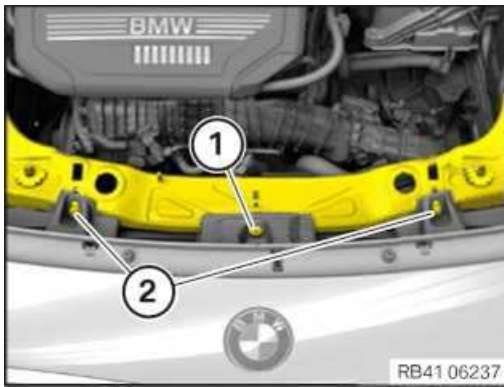


- Loosen the holder (1).
- Loosen screw (2).
- Unlock and loosen connector (3).
- Unfasten clamp (4).
- Pull out and remove the intake silencer housing (5) from the rubber mounts towards the top.

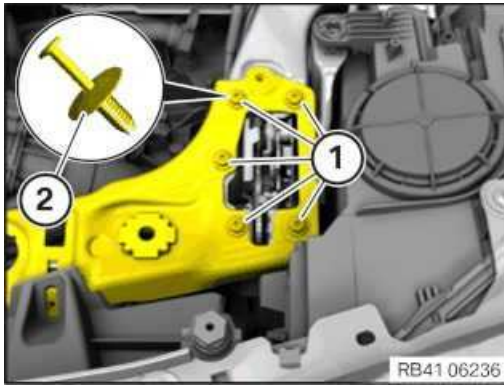
3 – Remove front cross connection



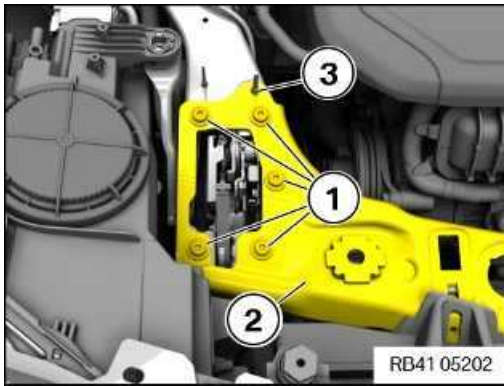
- Detach the clamps (1) for the Bowden cable of the bonnet locks from the cross connection.



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

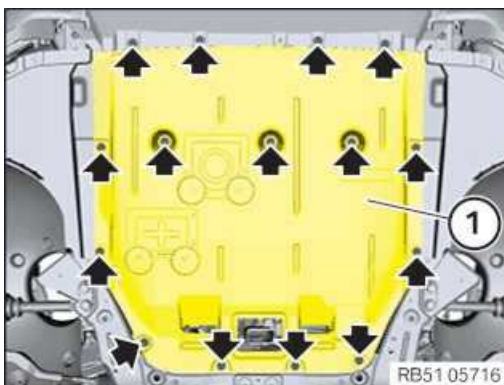


- Loosen screws (1).
- Lever out expanding rivet (2).

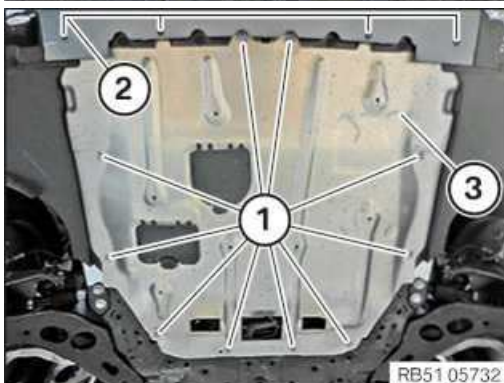


- Loosen screws (1).
- Unclip the front cross connection (2) from the rubber retainer (3) and remove it upward.

4 – Removing the front underbody protection



- Remove screws (arrows).
- Thread out and remove the front underbody protection (1) from the bumper panel.



- **Equipment specification with metal underride protection:**
- Loosen screws (1) and (2).
- Thread out and remove the underride protection (3).

5 – Draining coolant



WARNING

Hot fluids.

Risk of scalding!

- Conduct all work in the vehicle wearing 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.

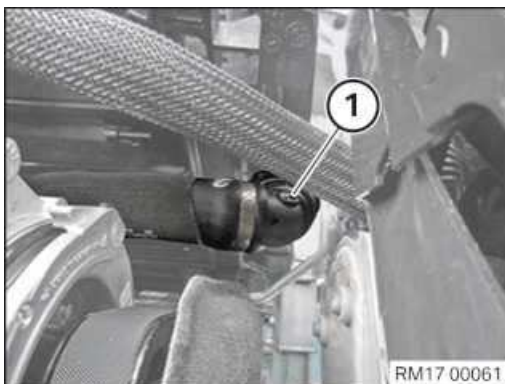


TECHNICAL INFORMATION

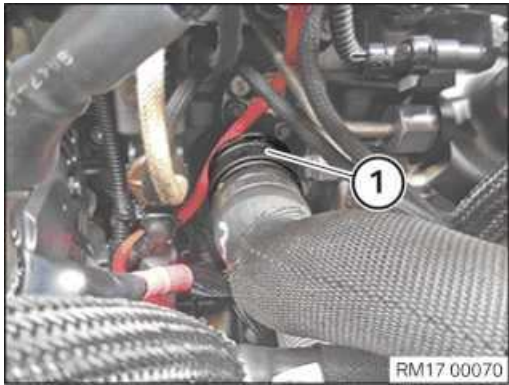
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Loosen sealing cap (1).



- Unlock and disconnect the coolant line (1) from the radiator on the right.
- Catch and dispose of escaping coolant.



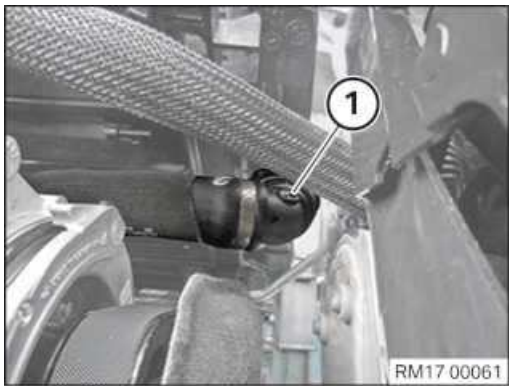
- Unlock the coolant line (1) and pull it off the connecting branch.
- Catch and dispose of escaping coolant.

6 – Connect the coolant line

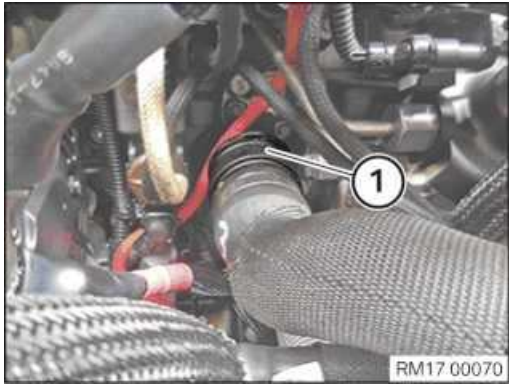


TECHNICAL INFORMATION

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



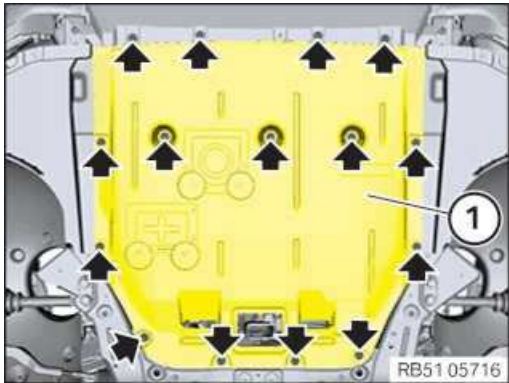
- Connect the right coolant line (1) to the radiator and lock audibly.



- Connect the coolant line (1) to the connecting branch and lock audibly.

POSTPROCESSES

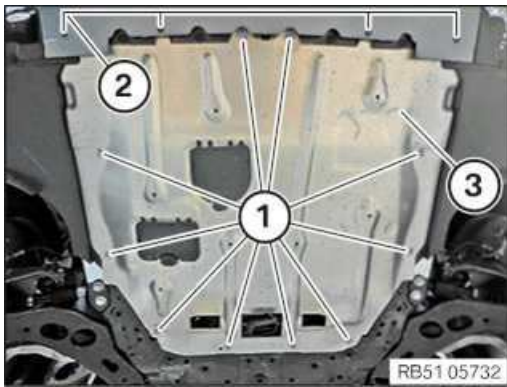
7 – Installing the front underbody protection



- Guide the front underbody protection (1) in under the bumper panel and position it at the screw points.
- Tighten screws (arrows).

Underbody protection front

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

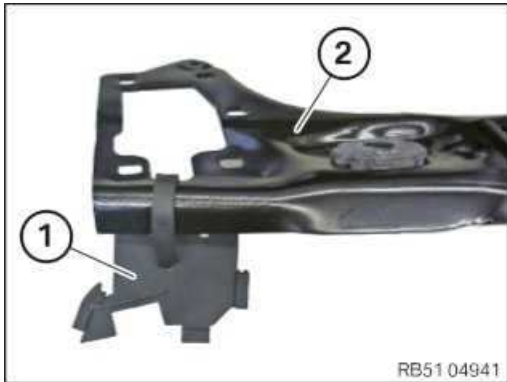


- **Equipment specification with metal underride guard:**
- Guide in and attach the underride guard (3).
- Tighten down screws (1) and (2).

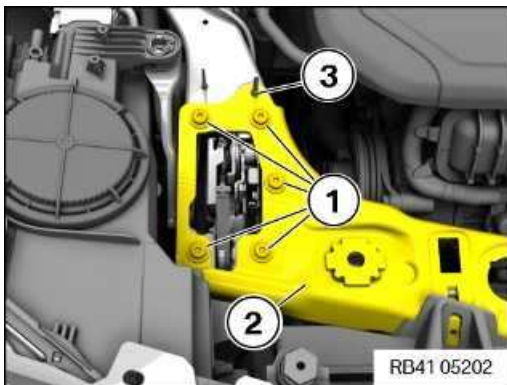
Underbody protection front

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

8 – Install front cross connection



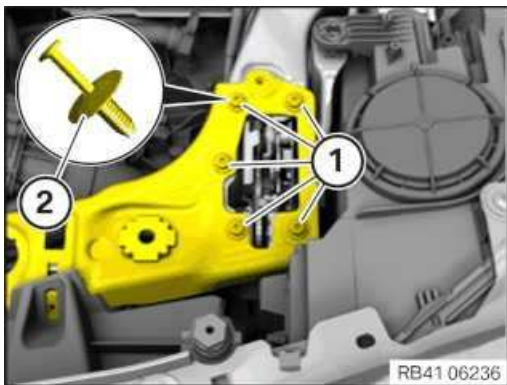
- Right side of vehicle only: Secure spray guard (1) on the cross connection (2) as pictured.



- Position front cross connection (2) and clip front cross connection (2) into the rubber retainer (3) at the same time.
- Tighten the screws (1).

Cross connection to carrier support

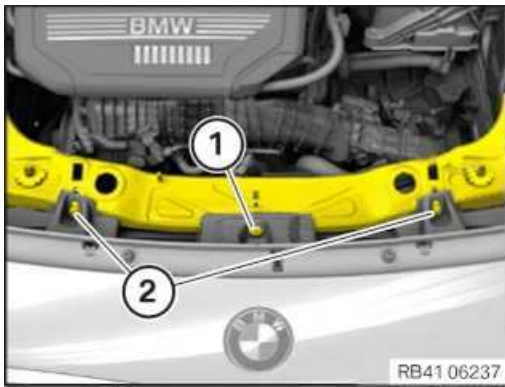
Screws M6x20		Tightening torque	11,8 Nm
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- Tighten the screws (1).

Cross connection to carrier support

Screws M6x20		Tightening torque	11,8 Nm
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- Position screws (3) on the rubber mounts for the radiator and tighten.

Screw connection for rubber mount of coolant radiator to coolant radiator

Bolt to rubber mount		Tightening torque	8 Nm
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- Tighten down screws (2).

Air duct to upper connection

M6x20 screw		Tightening torque	11,8 Nm
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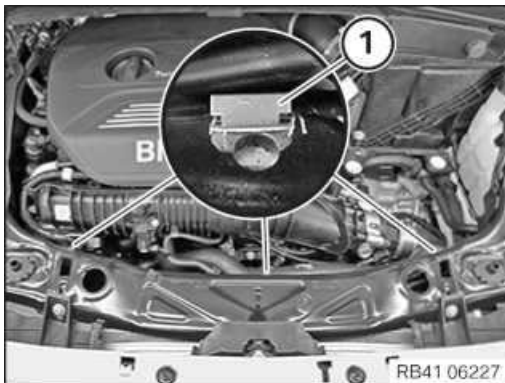
- Tighten down screw (1).

Bracing strut to upper connection

M8x20 screw		Tightening torque	28 Nm
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- Right side of vehicle only: Properly mount spray guard (1) to prevent corrosion.
- Secure spray guard (1) to the bridge with retaining tabs (2).



- Fasten the clamps (1) from the Bowden cable of the bonnet lock on the cross connection.

9 – Installing intake silencer housing



- Insert the intake silencer housing (5) into the rubber mounts and install it. Intake filter housing (5) must engage audibly.
- Tighten down screw (2).

Intake silencer housing to lock bridge

M6X30		Tightening torque	8 Nm
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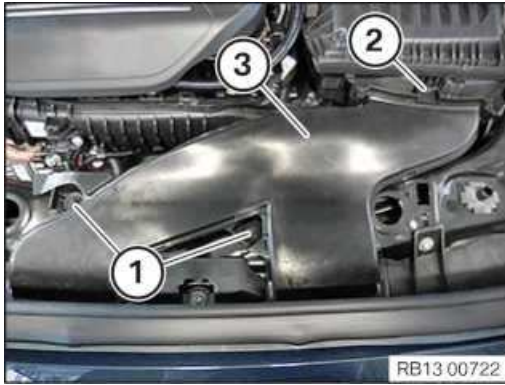
- Tighten clamp (4).

Clean air pipe to intake silencer housing

Clamp		Tightening torque	3 Nm
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- Connect and lock the connector (3). The connector (3) must engage audibly.
- Insert and install the holder (1).

10 – Install the intake neck for the intake filter housing



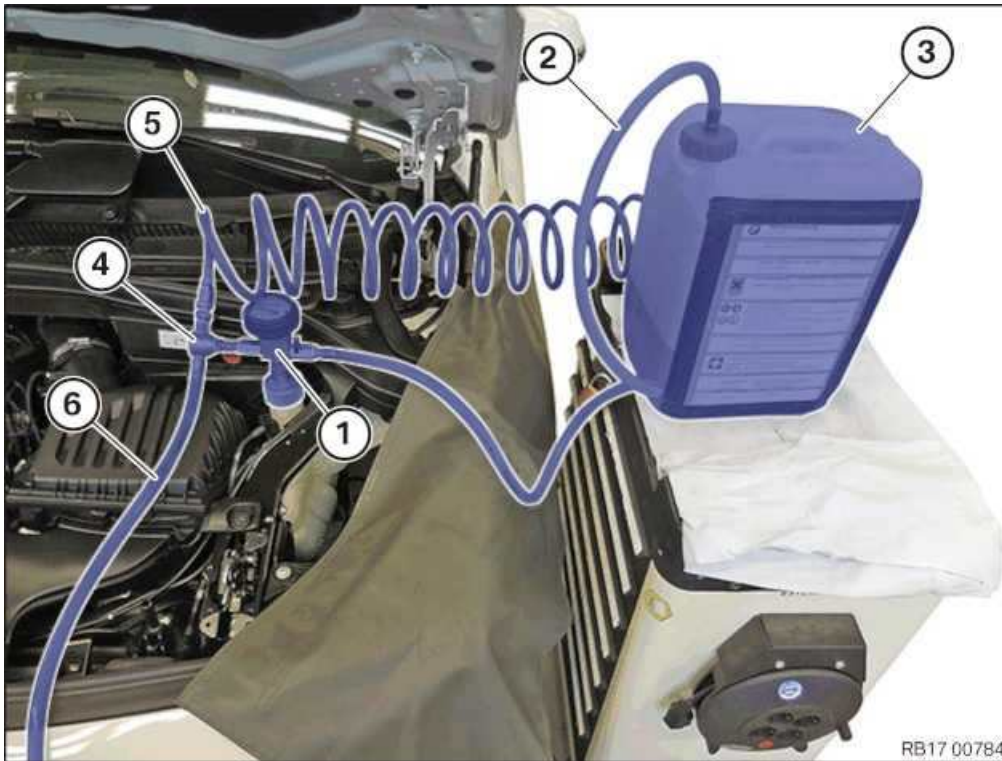
- Insert and install the intake neck (3).
The lock (2) must audibly engage.
- Tighten nuts (1).

Intake neck to cross connection

M6		Tightening torque	8 Nm
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11 – Filling the coolant circuit by means of the vacuum filler device

Vacuum filler device



Vacuum filler device - connected to the high-temperature 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 Out-going hose (lead out-going hose into 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

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

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

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

The 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.

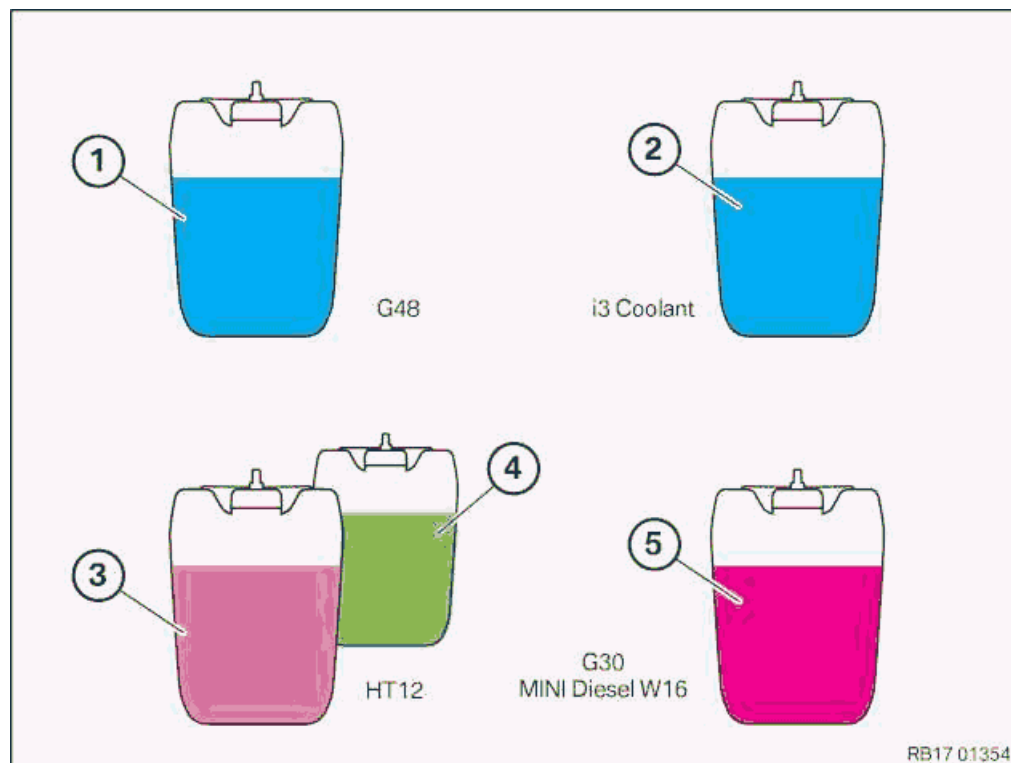


TECHNICAL INFORMATION

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 vacuum filler device container



Choose the correct coolant for filling

A vehicle must be filled with the coolant with which it is delivered ex works

1. **G48 (Blue)** G48 must not be mixed with the i3Coolant or the G30 MINI diesel fuel W16.
2. **i3 coolant (blue)** is used only for the i3 heater circuit. i3 coolant must not be filled in the other coolant circuits or mixed with the other coolants.
3. **HT12 (Pink)** HT12 must not be mixed with the i3 coolant or the G30 MINI diesel fuel W16.
4. **HT12 (Green)** HT12 must not be mixed with the i3 coolant or the G30 MINI diesel fuel W16.
5. **G30 (Pink)** must be used only for the **MINI diesel fuel W16**. G30 must not be filled in the other coolant circuits or mixed with the other coolants.



RISK OF DAMAGE

Damage to the engine.

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

- 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 :

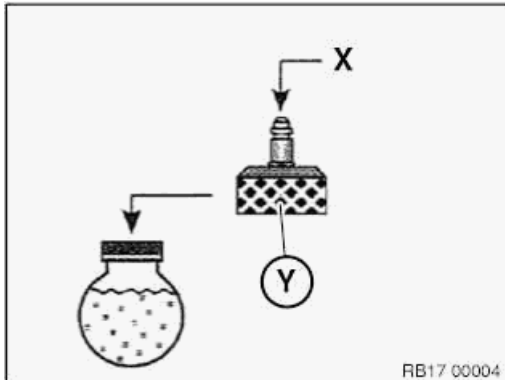
Type	Engine	Adapter (Y) from 17 0 100
F39/F45/F46/F48	B46/B48/B38/B47/B37	17 0 109

- 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.

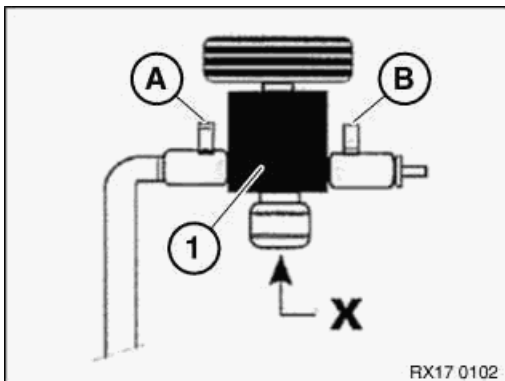
Coolant capacity

B47C20O0	7 l
B47C20T0	7,4 l
B47C20O1	7 l

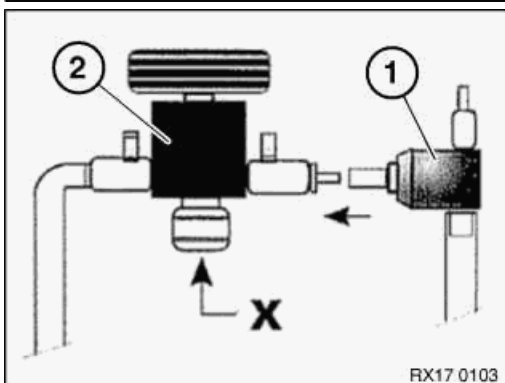
Expendable materials: Technically suitable antifreeze and corrosion inhibitor



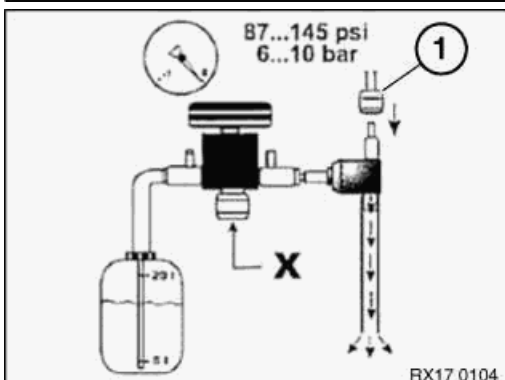
- Connect the selected adapter (Y) to the coolant expansion tank.
- Connect vacuum filler device to connection (X) of the adapter.



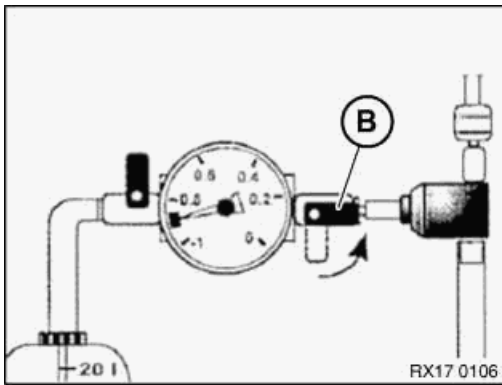
- Make sure that the shutoff valves (A) and (B) of the vacuum filler device (1) are closed.
- Connect and lock connection (X) to the coolant expansion tank.



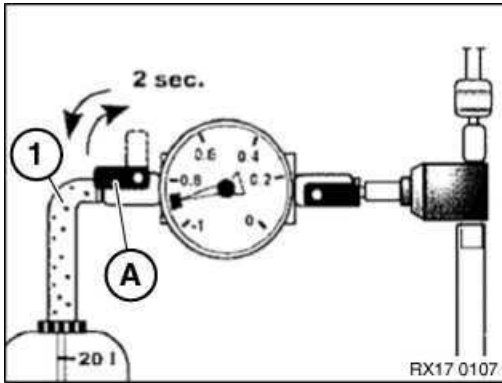
- Connect Venturi nozzle (1) to the vacuum filler device (2).
(X) is the connection on the coolant expansion tank.



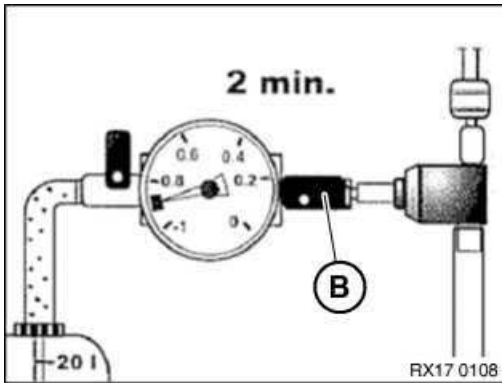
- Connect compressed air (1).
(X) is the connection to the coolant expansion tank.



- 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.



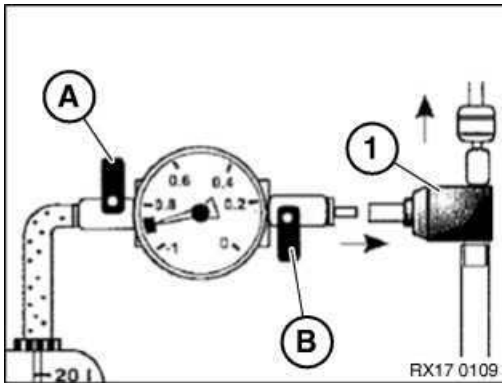
- Check the coolant hoses for porosity and renew porous coolant hoses as required.



TECHNICAL INFORMATION

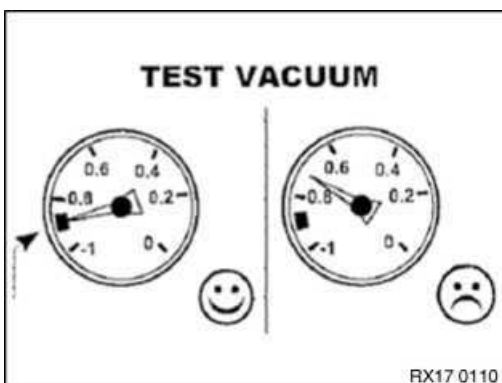
The coolant hoses contract during vacuum build-up.

- 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).
- Check whether the shut-off 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

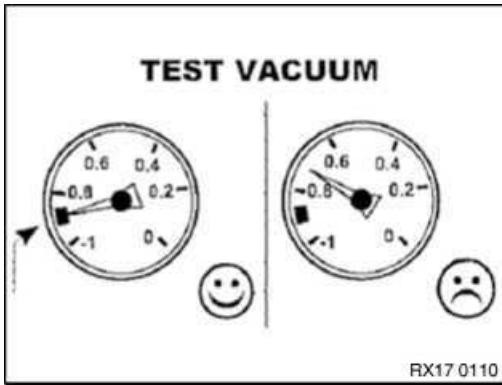
- » Vacuum drops.

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.

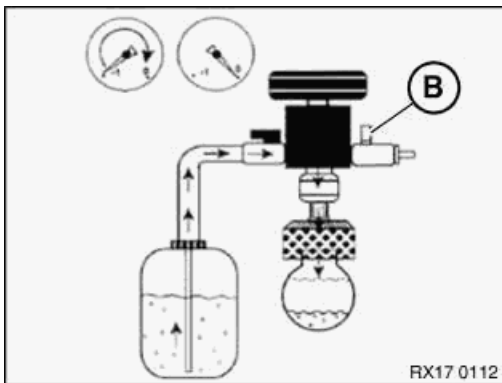
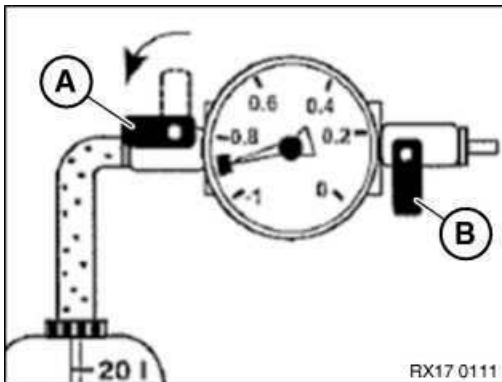


Result

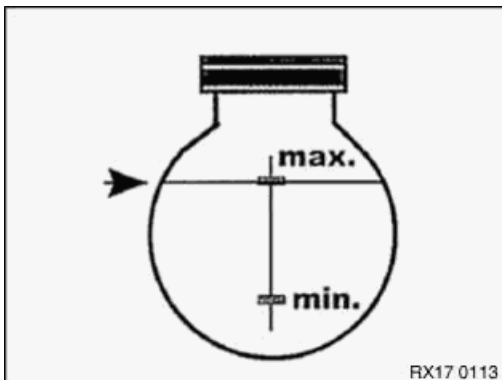
» Vacuum remains constant.

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. In order to do so, open shutoff valve (B).



- Remove the vacuum filler device with the adapter from the coolant expansion tank.
- Adjust the coolant level to 700 ml above the maximum mark.
- After filling the cooling system with the vacuum filler device perform the cooling system bleeding routine additionally.



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

The 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.

- The electrical valve and the electric coolant pump are automatically switched on.

- 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.



Carry out the following steps "Press accelerator pedal" and "Hold idle speed" 10 times. Continue to top up the filling level in the coolant expansion tank to the maximum mark.

- 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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- 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.



TECHNICAL INFORMATION

Carry out the following steps "Press accelerator pedal" and "Hold idle speed" 10 times. Continue to top up the filling level in the coolant expansion tank to the maximum mark.

- 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.
- 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.
- 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 10 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.



- Close the sealing cap (1) on the coolant expansion tank.

Additional Information

Overview of Tightening Torques

Underbody protection front				Used in step	7
Screw for thermoplastic plastic		Tightening torque	2,6 Nm		
Hexagon screw M6x20		Tightening torque	8 Nm		
Cross connection to carrier support				Used in step	8
Screws M6x20		Tightening torque	11,8 Nm		
Screw connection for rubber mount of coolant radiator to coolant radiator				Used in step	8
Bolt to rubber mount		Tightening torque	8 Nm		
Air duct to upper connection				Used in step	8
M6x20 screw		Tightening torque	11,8 Nm		
Bracing strut to upper connection				Used in step	8
M8x20 screw		Tightening torque	28 Nm		
Intake silencer housing to lock bridge				Used in step	9
M6X30		Tightening torque	8 Nm		
Clean air pipe to intake silencer housing				Used in step	9
Clamp		Tightening torque	3 Nm		
Intake neck to cross connection				Used in step	10
M6		Tightening torque	8 Nm		

Overview of Special Tools

Overview Technical Data

Coolant capacity		Used in step	11
B47C20O0	7 l		
B47C20T0	7,4 l		
B47C20O1	7 l		

Expendable materials: Technically suitable antifreeze and corrosion inhibitor

Links

Repair instructions	Used in step
17 00 ... Notes for working on cooling system.	11
Operating materials	Used in step
Main group 17	11

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



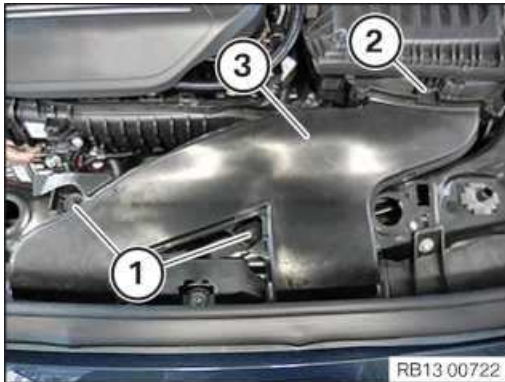
TECHNICAL INFORMATION



- 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!

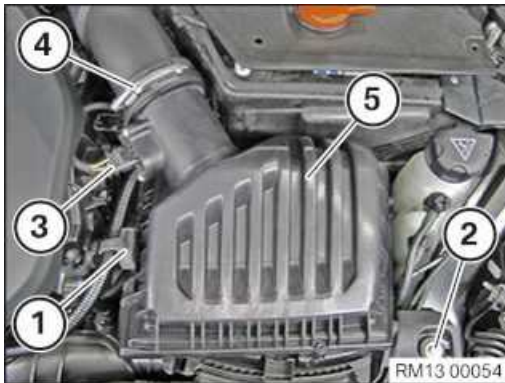
PRELIMINARY WORK

1 – Remove the intake neck for intake silencer housing



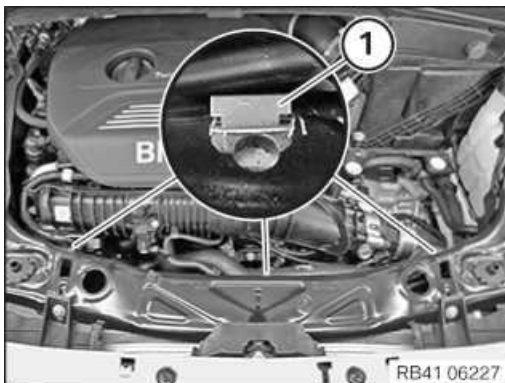
- Loosen nuts (1).
- Loosen the lock (2).
- Guide the intake neck (3) out and remove it.

2 – Removing intake silencer housing

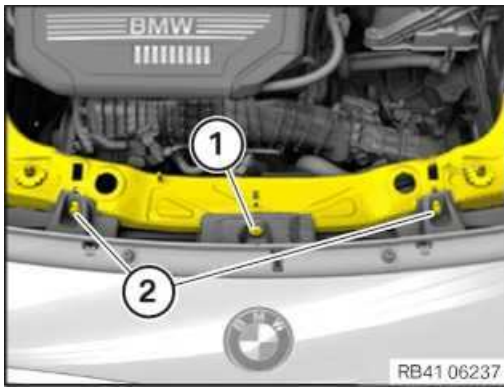


- Loosen the holder (1).
- Loosen screw (2).
- Unlock and loosen connector (3).
- Unfasten clamp (4).
- Pull out and remove the intake silencer housing (5) from the rubber mounts towards the top.

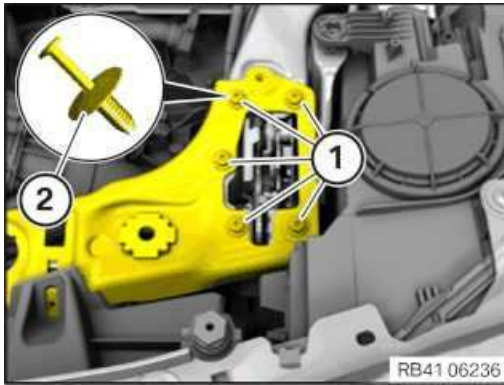
3 – Remove front cross connection



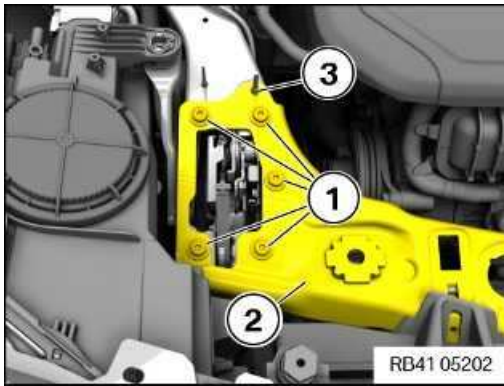
- Detach the clamps (1) for the Bowden cable of the bonnet locks from the cross connection.



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

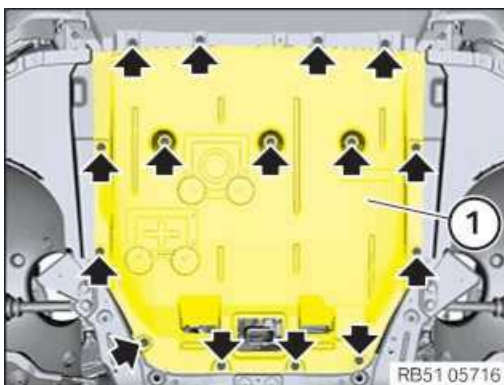


- Loosen screws (1).
- Lever out expanding rivet (2).

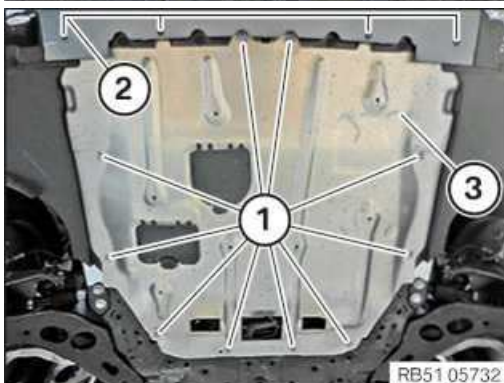


- Loosen screws (1).
- Unclip the front cross connection (2) from the rubber retainer (3) and remove it upward.

4 – Removing the front underbody protection



- Remove screws (arrows).
- Thread out and remove the front underbody protection (1) from the bumper panel.



- **Equipment specification with metal underride protection:**
- Loosen screws (1) and (2).
- Thread out and remove the underride protection (3).

5 – Drain the coolant from the coolant circuit



WARNING

Hot fluids.

Risk of scalding!

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



TECHNICAL INFORMATION

Life-long fill of coolant!

Do not reuse used coolant.

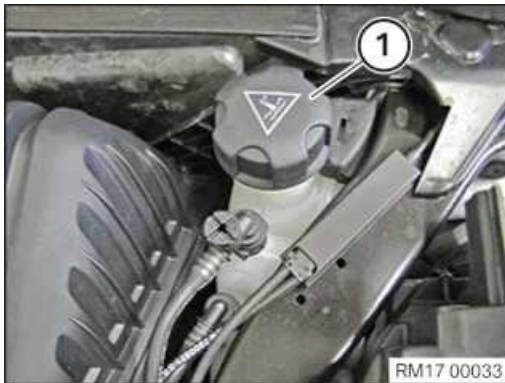
When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be emptied and refilled.

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.

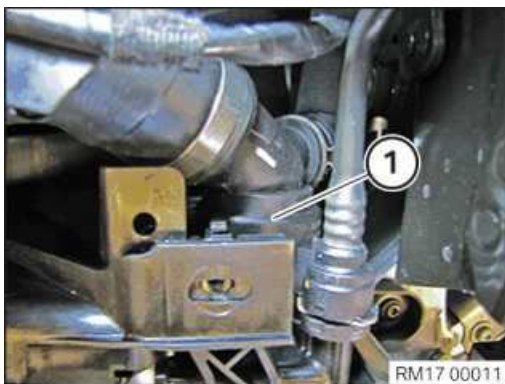


TECHNICAL INFORMATION

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



- Loosen sealing cap (1).



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



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

6 – Connecting the coolant lines

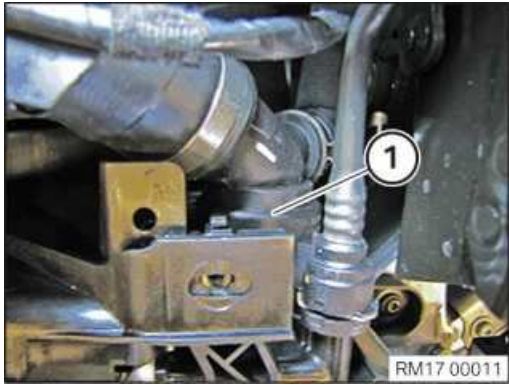


TECHNICAL INFORMATION

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



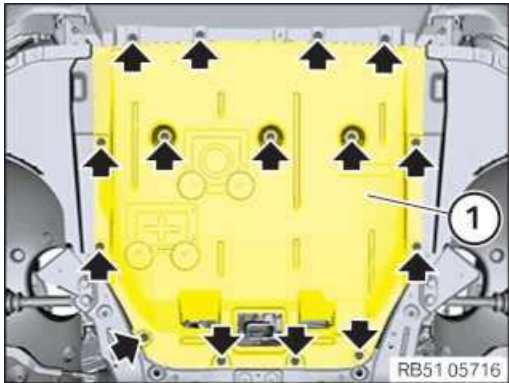
- Connect and lock coolant line (1).
- Make sure the coolant line (1) engages audibly.



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

POSTPROCESSES

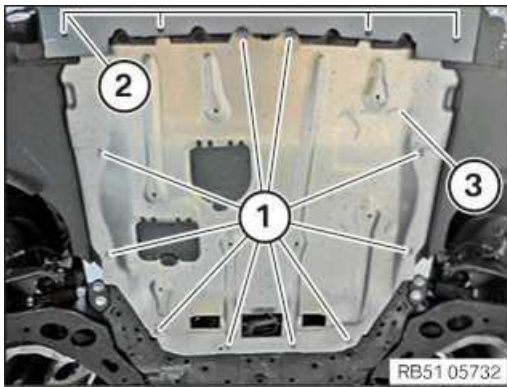
7 – Installing the front underbody protection



- Guide the front underbody protection (1) in under the bumper panel and position it at the screw points.
- Tighten screws (arrows).

Underbody protection front

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



- **Equipment specification with metal underride guard:**
- Guide in and attach the underride guard (3).
- Tighten down screws (1) and (2).

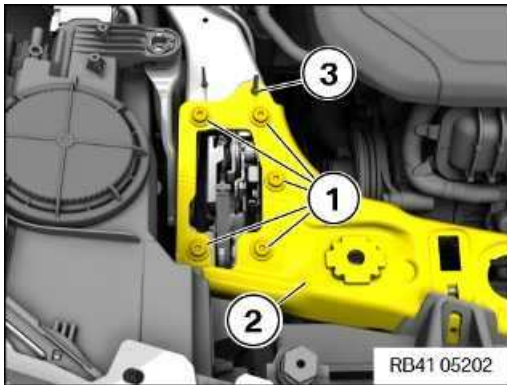
Underbody protection front

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

8 – Install front cross connection



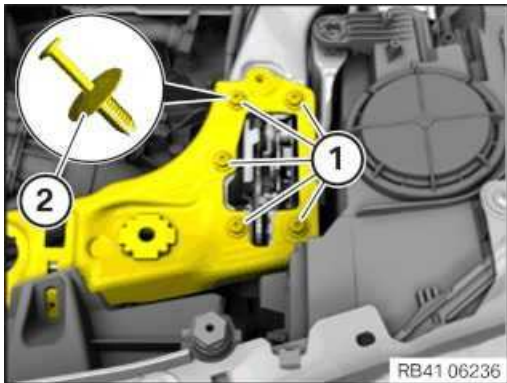
- Right side of vehicle only: Secure spray guard (1) on the cross connection (2) as pictured.



- Position front cross connection (2) and clip front cross connection (2) into the rubber retainer (3) at the same time.
- Tighten the screws (1).

Cross connection to carrier support

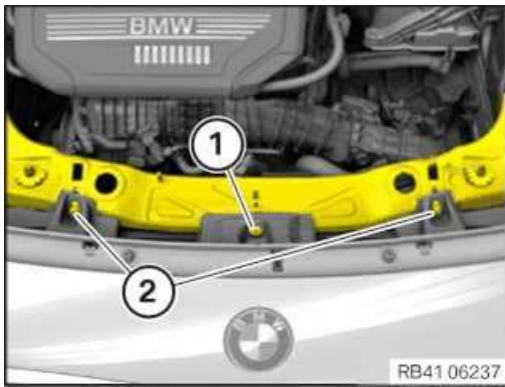
Screws M6x20		Tightening torque	11,8 Nm
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- Tighten the screws (1).

Cross connection to carrier support

Screws M6x20		Tightening torque	11,8 Nm
--------------	--	-------------------	---------



- Position screws (3) on the rubber mounts for the radiator and tighten.

Screw connection for rubber mount of coolant radiator to coolant radiator

Bolt to rubber mount		Tightening torque	8 Nm
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- Tighten down screws (2).

Air duct to upper connection

M6x20 screw		Tightening torque	11,8 Nm
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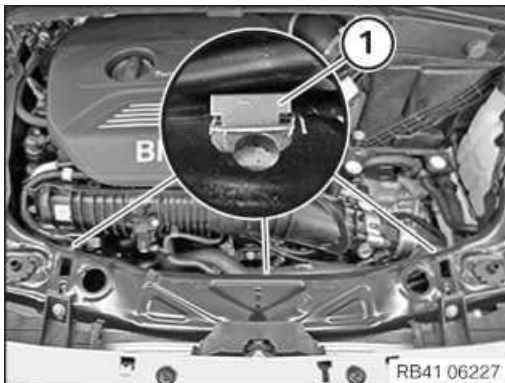
- Tighten down screw (1).

Bracing strut to upper connection

M8x20 screw		Tightening torque	28 Nm
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- Right side of vehicle only: Properly mount spray guard (1) to prevent corrosion.
- Secure spray guard (1) to the bridge with retaining tabs (2).



- Fasten the clamps (1) from the Bowden cable of the bonnet lock on the cross connection.

9 – Installing intake silencer housing



- Insert the intake silencer housing (5) into the rubber mounts and install it. Intake filter housing (5) must engage audibly.
- Tighten down screw (2).

Intake silencer housing to lock bridge

M6X30		Tightening torque	8 Nm
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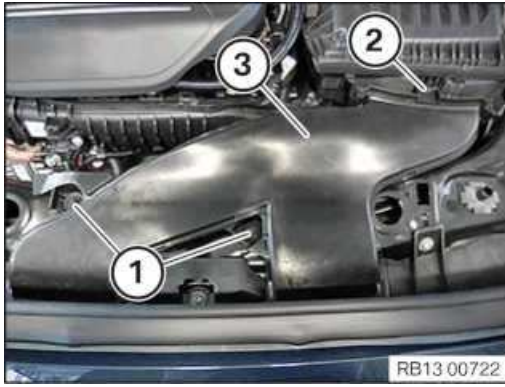
- Tighten clamp (4).

Clean air pipe to intake silencer housing

Clamp		Tightening torque	3 Nm
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- Connect and lock the connector (3). The connector (3) must engage audibly.
- Insert and install the holder (1).

10 – Install the intake neck for the intake filter housing



- Insert and install the intake neck (3).
The lock (2) must audibly engage.
- Tighten nuts (1).

Intake neck to cross connection

M6		Tightening torque	8 Nm
----	--	-------------------	------

11 – Filling the coolant circuit by means of the vacuum filler device

Vacuum filler device



Vacuum filler device - connected to the high-temperature 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 Out-going hose (lead out-going hose into 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

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

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

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

The 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.

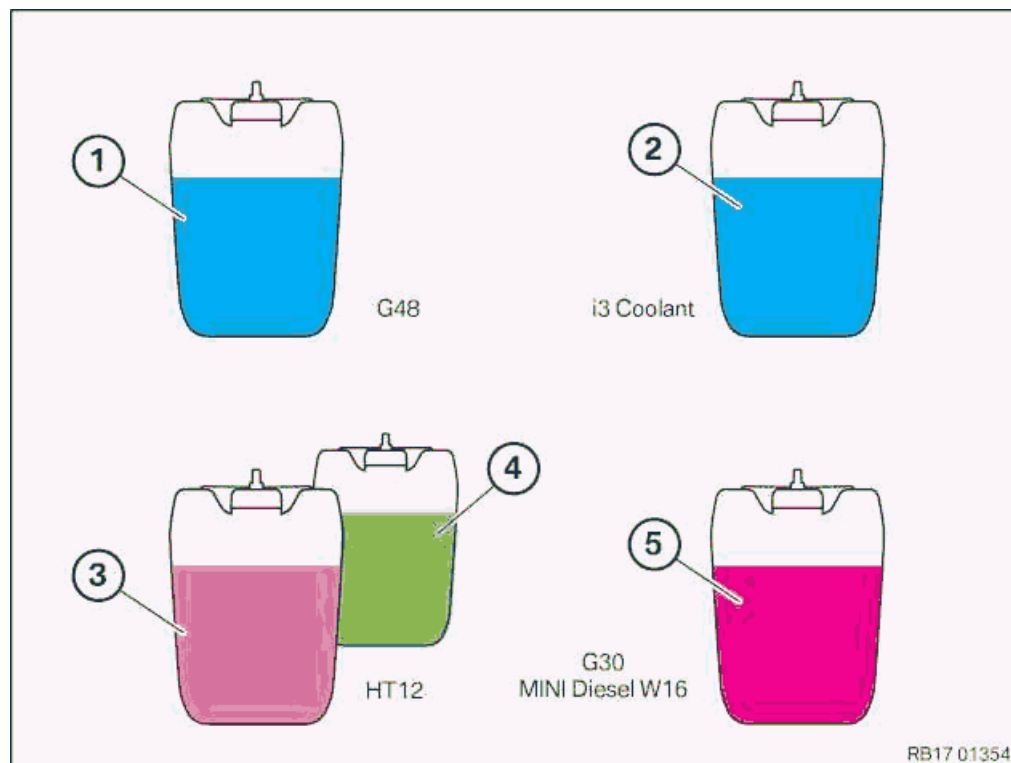


TECHNICAL INFORMATION

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 vacuum filler device container



Choose the correct coolant for filling

A vehicle must be filled with the coolant with which it is delivered ex works

1. **G48 (Blue)** G48 must not be mixed with the i3Coolant or the G30 MINI diesel fuel W16.
2. **i3 coolant (blue)** is used only for the i3 heater circuit. i3 coolant must not be filled in the other coolant circuits or mixed with the other coolants.
3. **HT12 (Pink)** HT12 must not be mixed with the i3 coolant or the G30 MINI diesel fuel W16.
4. **HT12 (Green)** HT12 must not be mixed with the i3 coolant or the G30 MINI diesel fuel W16.
5. **G30 (Pink)** must be used only for the **MINI diesel fuel W16**. G30 must not be filled in the other coolant circuits or mixed with the other coolants.



RISK OF DAMAGE

Damage to the engine.

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

- 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 :

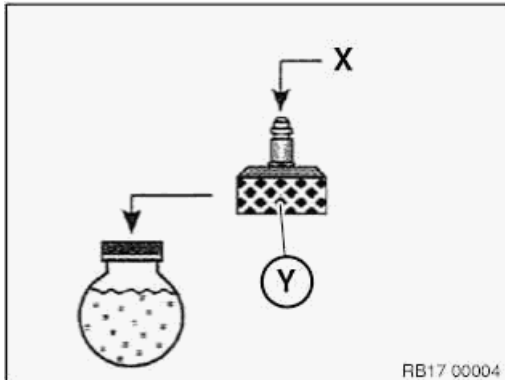
Type	Engine	Adapter (Y) from 17 0 100
F39/F45/F46/F48	B46/B48/B38/B47/B37	17 0 109

- 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.

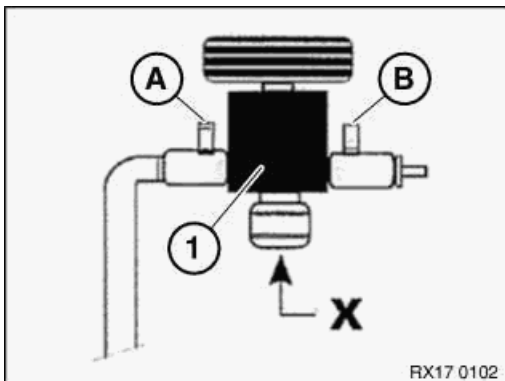
Coolant capacity

B47C20O0	7 l
B47C20T0	7,4 l
B47C20O1	7 l

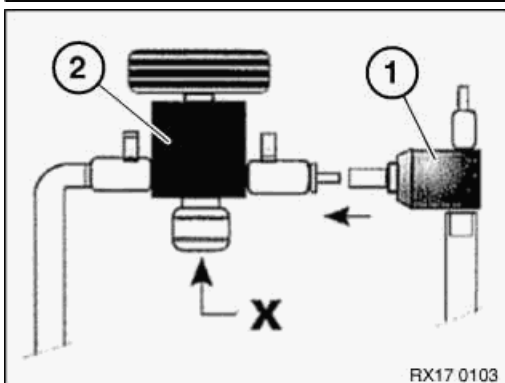
Expendable materials: Technically suitable antifreeze and corrosion inhibitor



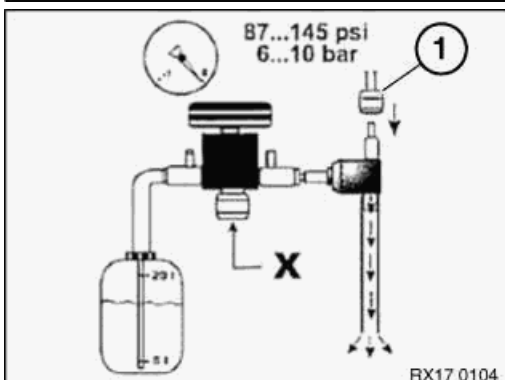
- Connect the selected adapter (Y) to the coolant expansion tank.
- Connect vacuum filler device to connection (X) of the adapter.



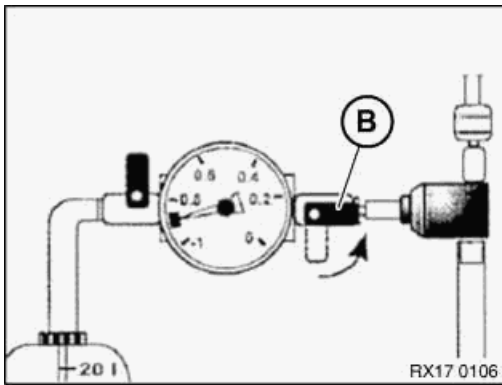
- Make sure that the shutoff valves (A) and (B) of the vacuum filler device (1) are closed.
- Connect and lock connection (X) to the coolant expansion tank.



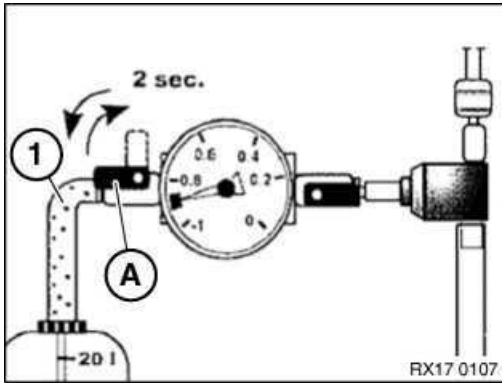
- Connect Venturi nozzle (1) to the vacuum filler device (2).
(X) is the connection on the coolant expansion tank.



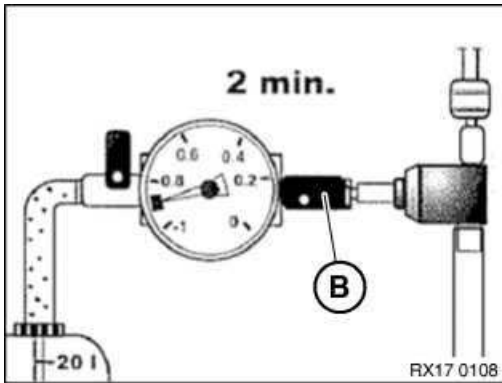
- Connect compressed air (1).
(X) is the connection to the coolant expansion tank.



- 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.



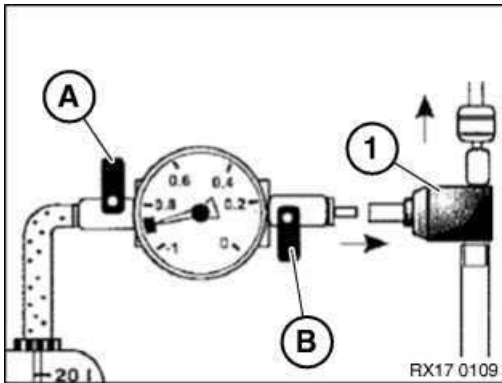
- Check the coolant hoses for porosity and renew porous coolant hoses as required.



TECHNICAL INFORMATION

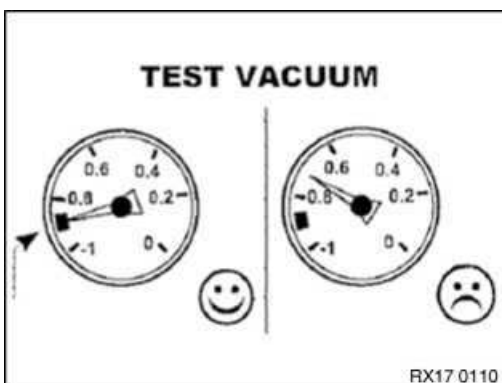
The coolant hoses contract during vacuum build-up.

- 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).
- Check whether the shut-off 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

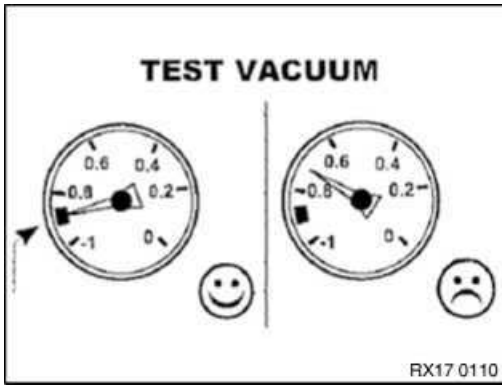
- » Vacuum drops.

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.

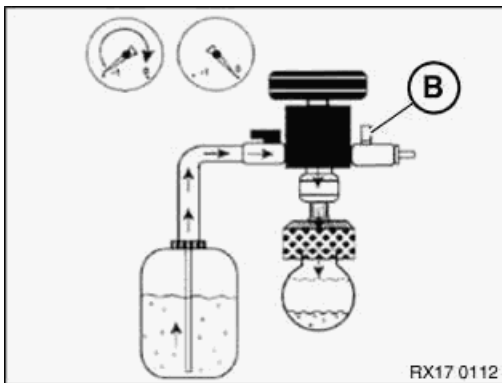
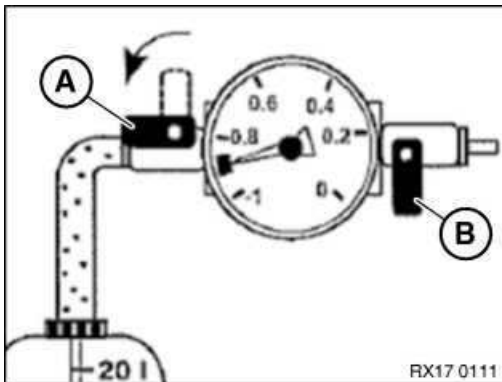


Result

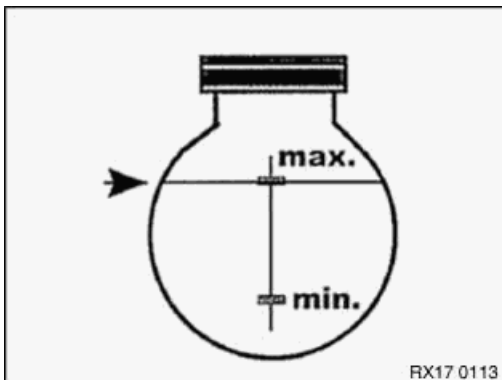
» Vacuum remains constant.

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. In order to do so, open shutoff valve (B).



- Remove the vacuum filler device with the adapter from the coolant expansion tank.
- Adjust the coolant level to 700 ml above the maximum mark.
- After filling the cooling system with the vacuum filler device perform the cooling system bleeding routine additionally.

12 – Bleed the cooling circuit



TECHNICAL INFORMATION

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

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

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

The 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 the **coolant circuit is 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.

Ensure that terminal 15 does not fail during 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

In case the cooling system bleeding routine needs to be carried out again: Pull off the ignition key until the vehicle respectively the Digital Motor Electronics (DME) has gone to sleep.



TECHNICAL INFORMATION

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



TECHNICAL INFORMATION

During the cooling system bleeding routine, the fan may sporadically activate.

- Remove the vacuum filler device from the coolant expansion tank.
- Adjust the filling level in the coolant expansion tank to maximum.
- The sealing cap on the coolant expansion tank must remain open.
- Engage the parking brake.
- Make sure that the wheels touch the ground.
- With automatic transmission: Engage selector lever position P (Park).
- For manual gearbox: Do not engage in gear (idle position).
- Switch on the ignition and make sure that the ignition remains switched on.
- Make sure the driving experience switch is **not** in the **ECO PRO** switch position.
- Set the heating to the **maximum** temperature and the blower to the **lowest** setting.
- Hold the accelerator pedal down to the floor for at least **10 s** and do **no** operate the brake pedal.
- Start engine and run at idle speed.

The electrical shift valve and the electric coolant pump are automatically switched on.

- Add coolant permanently up to maximum.
- Leave the engine running at idle for 5 minutes before you continue.
- Operate the accelerator pedal 5 times to approximately 2000 rpm.
- Hold idle speed for 10 s.
- Operate the accelerator pedal 5 times to approximately 2000 rpm.
- Hold idle speed for 10 s.
- Add coolant permanently up to maximum.
- Leave the engine running at idle for 5 minutes.
- Operate the accelerator pedal 5 times to approximately 2000 rpm.
- Hold idle speed for 10 s.
- Operate the accelerator pedal 5 times to approximately 2000 rpm.
- Hold idle speed for 10 s.
- Check 10 minutes after the engine start if the cooling system bleeding routine of the electric relay valve and the electric coolant pump is completed.
- When the cooling system bleeding routine is completed, switch off the engine.
- Allow the engine to cool down.
- Adjust the filling level in the coolant expansion tank to the **maximum mark**.
- Close the sealing cap (1) on the coolant expansion tank.



Additional Information

Overview of Tightening Torques

Underbody protection front

Used in step [7](#)

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

Cross connection to carrier support

Used in step [8](#)

Screws M6x20		Tightening torque	11,8 Nm
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Screw connection for rubber mount of coolant radiator to coolant radiator

Used in step [8](#)

Bolt to rubber mount		Tightening torque	8 Nm
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Air duct to upper connection

Used in step [8](#)

M6x20 screw		Tightening torque	11,8 Nm
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Bracing strut to upper connection

Used in step [8](#)

M8x20 screw		Tightening torque	28 Nm
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Intake silencer housing to lock bridge

Used in step [9](#)

M6X30		Tightening torque	8 Nm
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Clean air pipe to intake silencer housing

Used in step [9](#)

Clamp		Tightening torque	3 Nm
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Intake neck to cross connection

Used in step [10](#)

M6		Tightening torque	8 Nm
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Overview of Special Tools

Overview Technical Data

Coolant capacity

Used in step [11](#)

B47C20O0	7 l
B47C20T0	7,4 l
B47C20O1	7 l

Expendable materials: Technically suitable antifreeze and corrosion inhibitor

Links

Repair instructions

Used in step

[17 00 ... Notes for working on cooling system.](#)

[11](#)

Operating materials

Used in step

[Main group 17](#)

[11](#)

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!

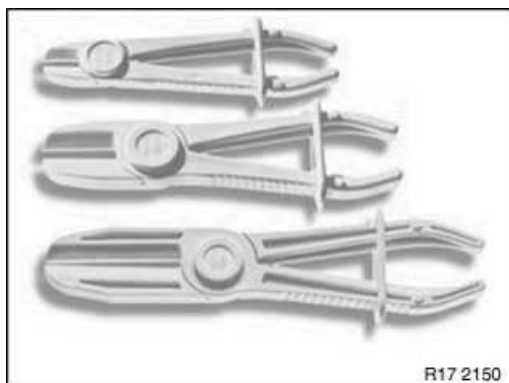
Do not fill coolant expansion tank over maximum level, as overfilling will cause the coolant to overflow. This may cause traces of coolant on the expansion tank or in the engine compartment and allow an incorrect conclusion about possible leaks.



Recycling

Catch and dispose of drained coolant.

Observe country-specific waste disposal regulations.

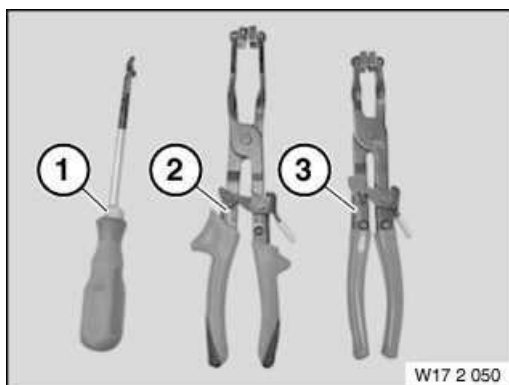


R17 2150

Note:

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

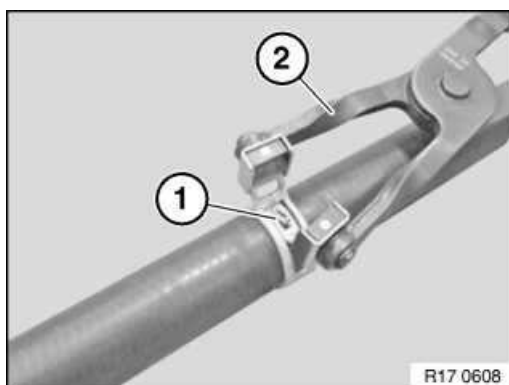
HAZET number:	Description
4590-1	Length of disconnect pliers (mm): 150
4590-2	Length of disconnect pliers (mm): 180
4590-3	Length of disconnect pliers (mm): 253
4590 / 2	Set of clamping pliers
4590 / 3	Set of clamping pliers



W17 2 050

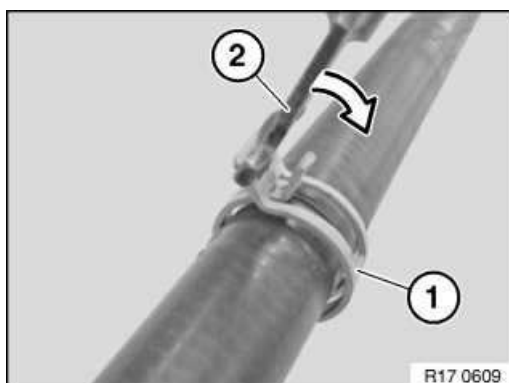
Set of special tools 17 2 050 for removing and installing the spring bracket clamps for coolant hoses.

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



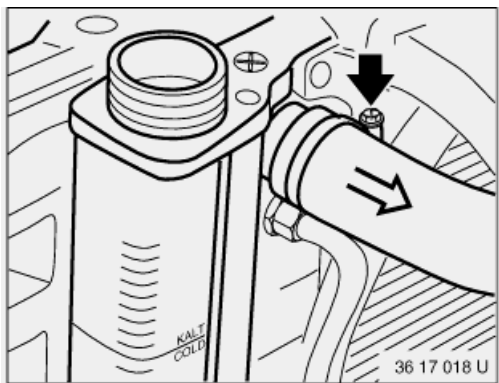
R17 0608

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



R17 0609

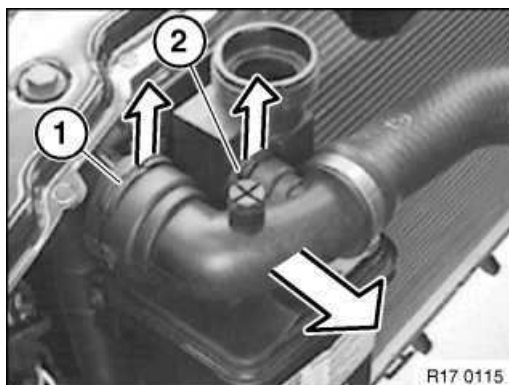
Unlock spring strap (1) with the release tool (2).



Note:

Tightening torque for hose clamps

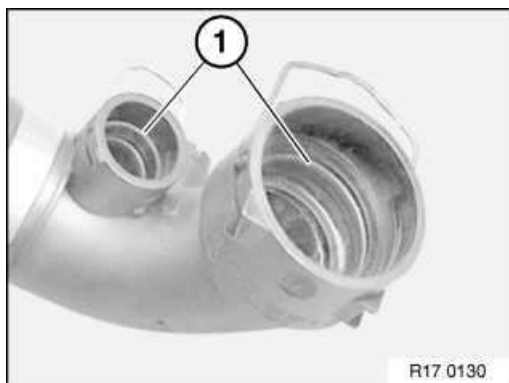
WAF 5	1.0 - 1.5 Nm
WAF 6	2.5 - 3.5 Nm



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

Dismantling of quick-release coupling

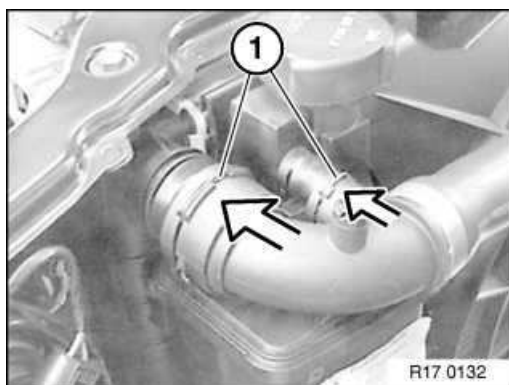
Pull out lock (1) and (2). Pull off hose.



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.

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



Warning!

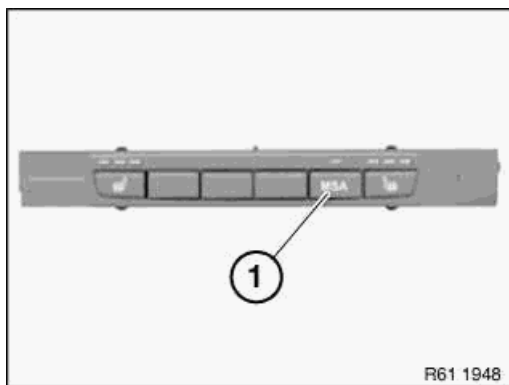
If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

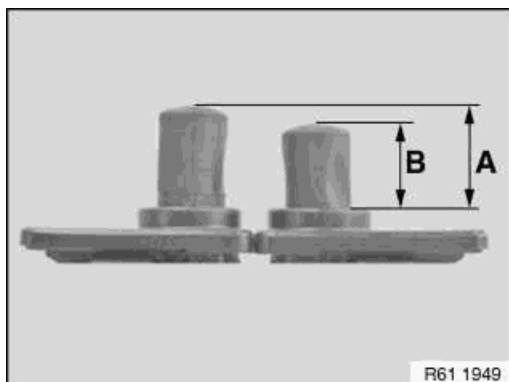
Observe safety precautions when working on MSA vehicles.

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



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](#)

64 53 ... Instructions for replacement of air conditioning capacitors 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.

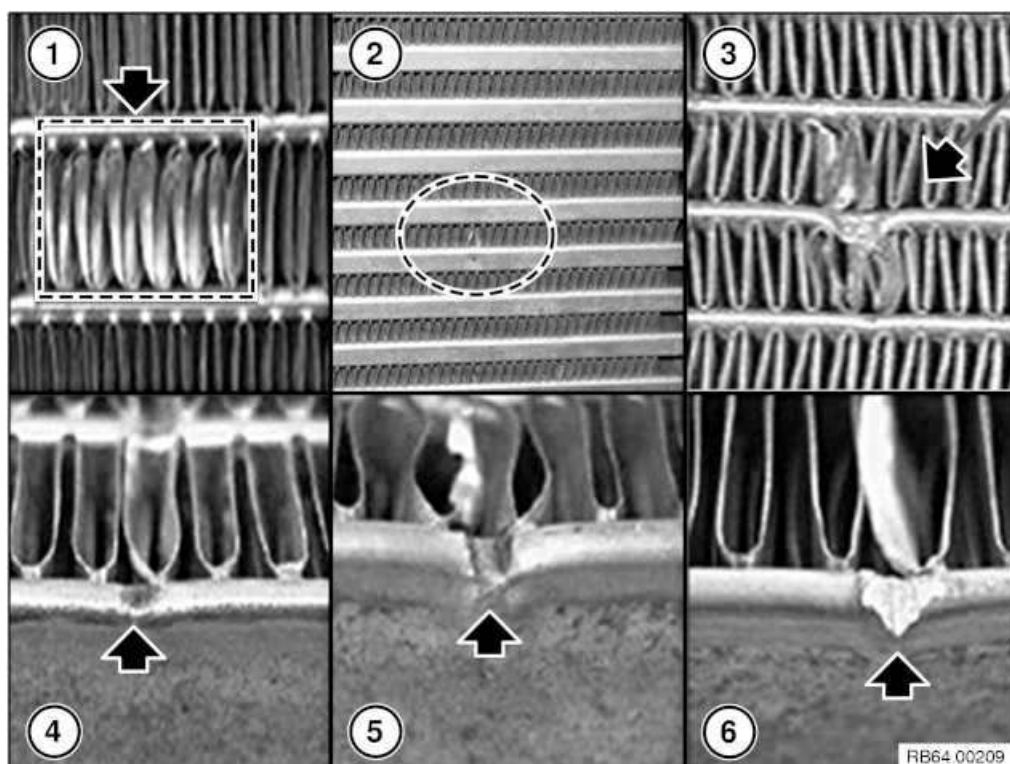
As long as tightness/function are not degraded and an adequate distance of a few mm between the radiator and air conditioning condenser remains in place, **this is not damage in either case.**

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

Note:

The deformations shown in Fig.Â (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 capacitors and radiator/coolers

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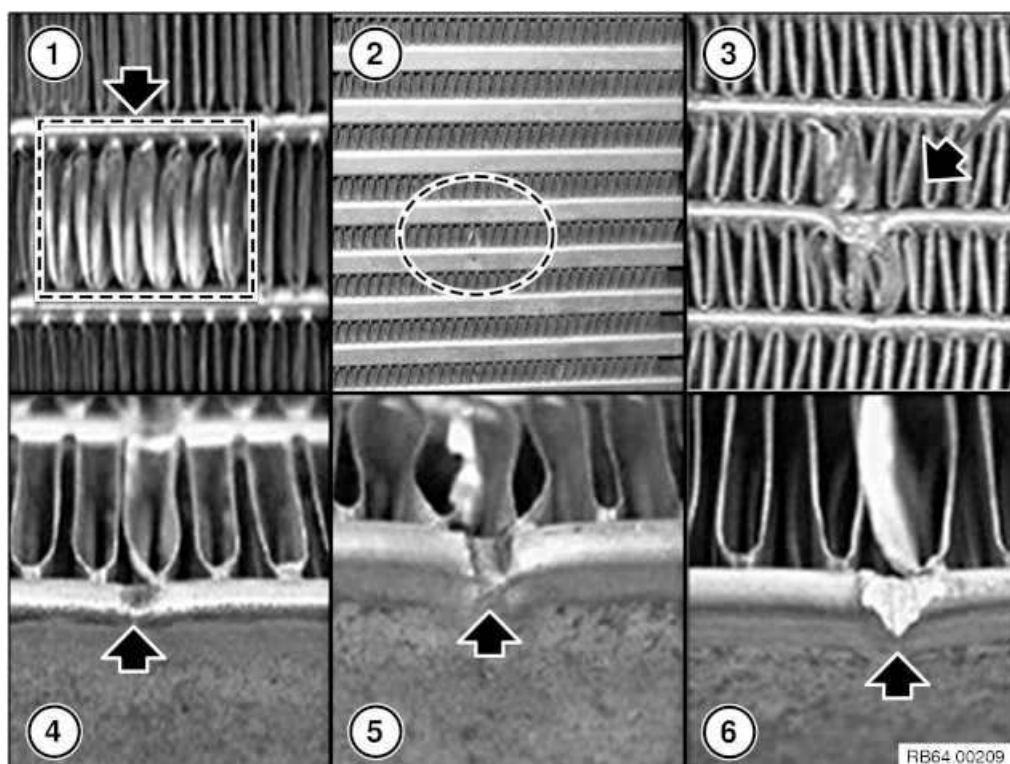
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Dryer flask (integrated in the air conditioning condenser):

Round dents/depressions are permitted.

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

17 11 000 Removing and installing coolant radiator



WARNING

Airbag unit.

Danger! Life-threatening injuries!

- Before performing any work on the airbag, always disconnect the battery earth lead from the battery.
- Airbag unit may only be set down with the cushion (airbag itself) facing upwards.
- For additional information see: 72 00 ... Safety regulations on handling airbag system components/gas generators

PRELIMINARY WORK

1 – Drawing off the air conditioning

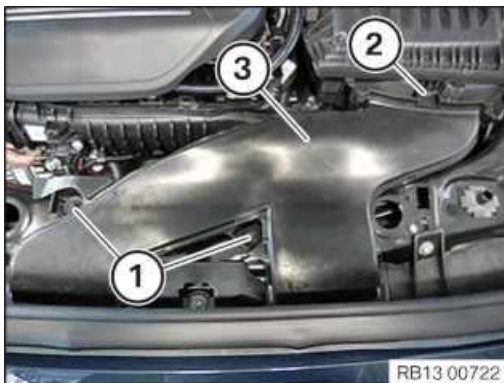
- See additional information.

2 – Disconnecting all battery earth leads



- See additional information.

3 – Remove the intake neck for intake silencer housing



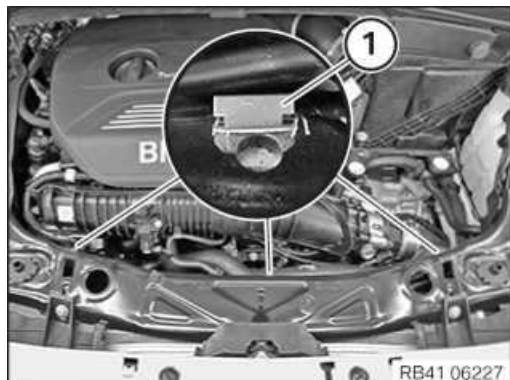
- Loosen nuts (1).
- Loosen the lock (2).
- Guide the intake neck (3) out and remove it.

4 – Removing intake silencer housing

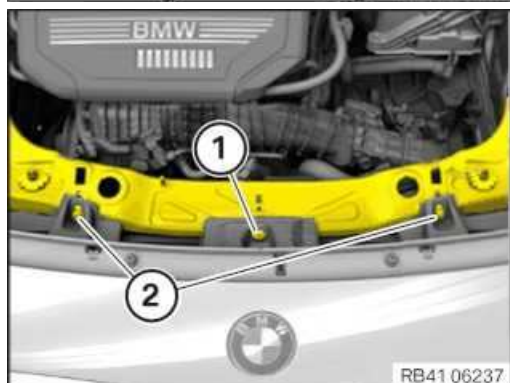


- Loosen the holder (1).
- Loosen screw (2).
- Unlock and loosen connector (3).
- Unfasten clamp (4).
- Pull out and remove the intake silencer housing (5) from the rubber mounts towards the top.

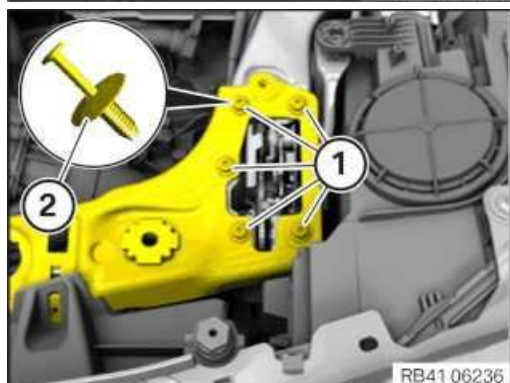
5 – Remove front cross connection



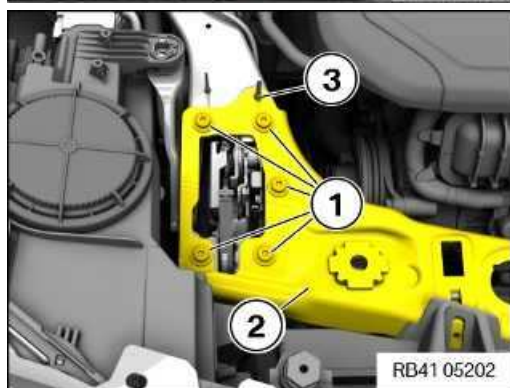
- Detach the clamps (1) for the Bowden cable of the bonnet locks from the cross connection.



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



- Loosen screws (1).
- Lever out expanding rivet (2).



- Loosen screws (1).
- Unclip the front cross connection (2) from the rubber retainer (3) and remove it upward.

6 – Removing the fan cowl with electric fan

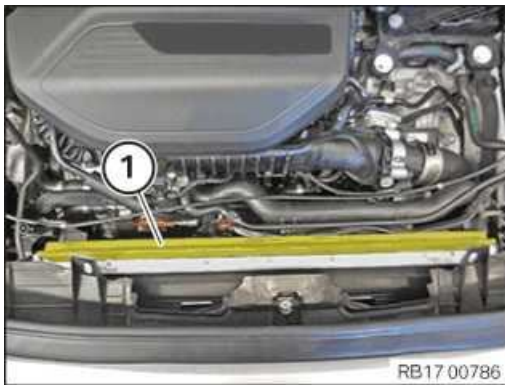


WARNING

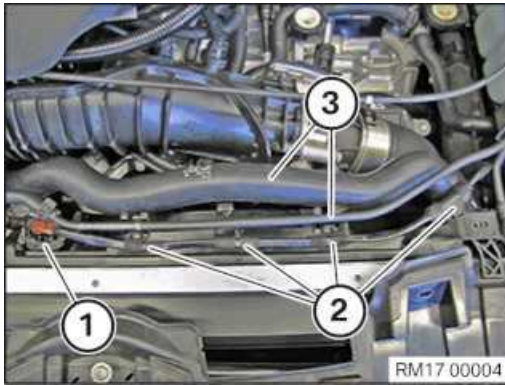
Hot surfaces.

Risk of burning!

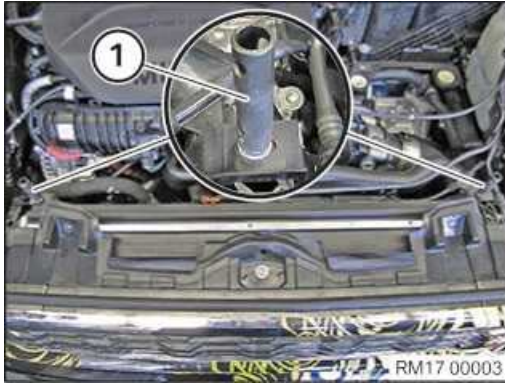
- Perform all work only on components that have cooled down.



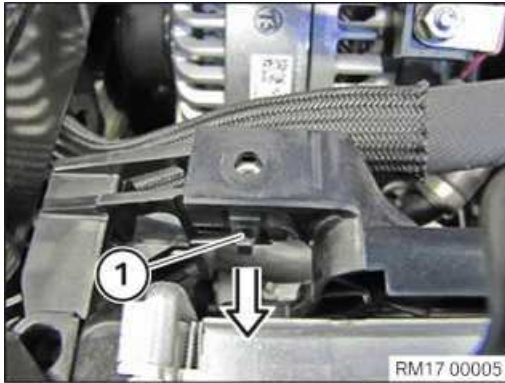
- Feed out and remove the sealing (1) from the radiator.



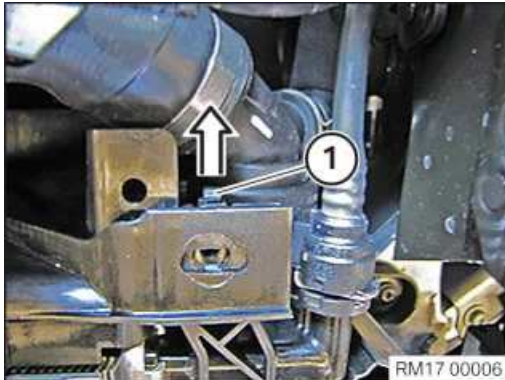
- Unlock plug connection (1) and disconnect.
- Unlock and loosen the clamps (2).
- Feed out connector (1) and place to one side.
- Thread off coolant line (3) and place to the side.



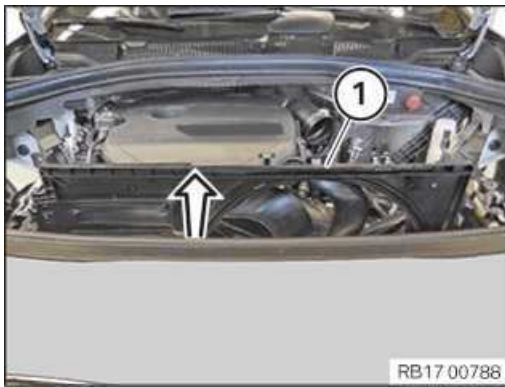
- Loosen screws (1).



- Unlock the right lock (1) on the fan cowl in the direction of the arrow.

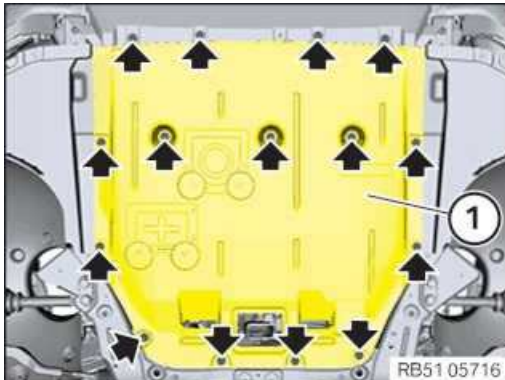


- Unlock the left lock (1) on the fan cowl in the direction of the arrow.

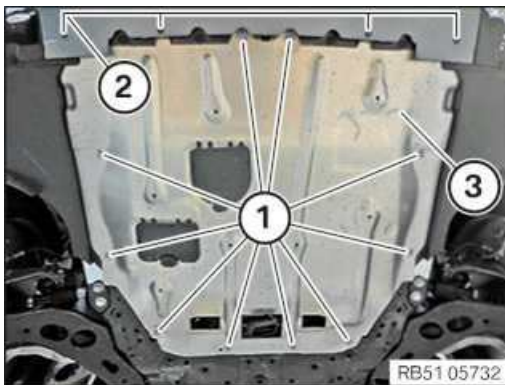


- Guide out fan cowl (1) in direction of arrow and remove.

7 – Removing the front underbody protection



- Remove screws (arrows).
- Thread out and remove the front underbody protection (1) from the bumper panel.



- **Equipment specification with metal underride protection:**
- Loosen screws (1) and (2).
- Thread out and remove the underride protection (3).

8 – Drain the coolant from the coolant circuit



WARNING

Hot fluids.

Risk of scalding!

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



TECHNICAL INFORMATION

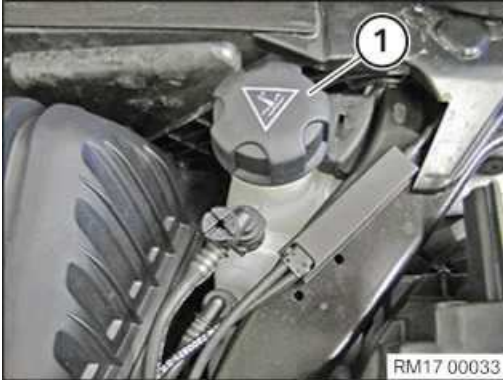
Life-long fill of coolant!

Do not reuse used coolant.

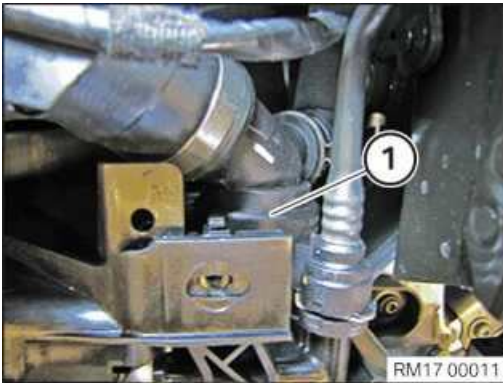
When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be emptied and refilled.

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.

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



- Loosen sealing cap (1).



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



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

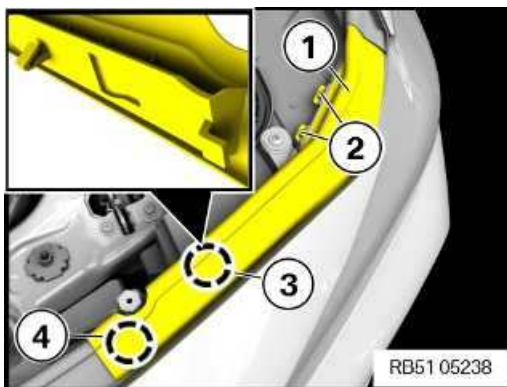
9 – Remove both bonnet seals on the side



NOTICE

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

- Remove the bonnet seal on the side



- Unclip the side bonnet seal (1) from the outer latch mechanisms (2) and the inner latch mechanism (3).
- Feed out the side bonnet seal (1) from the guide (4) and remove.

10 – Removing the seal for the front centre bonnet



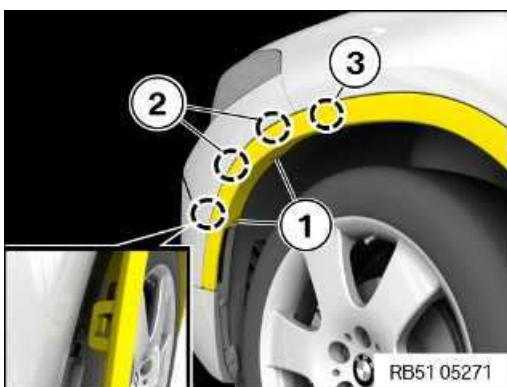
- Remove the seal for the front centre bonnet (1) towards the top.

11 – Partially remove both front wheel arch trims



NOTICE

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



► Partially removing the front wheel arch trim

- Loosen blind rivet(1).
- Release front wheel arch trim in the area of the bumper panel from the latch mechanisms (2) and from the clip (3).

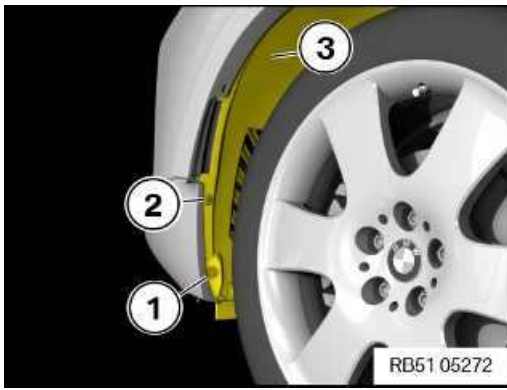
12 – Partially remove both front wheel arch covers



NOTICE

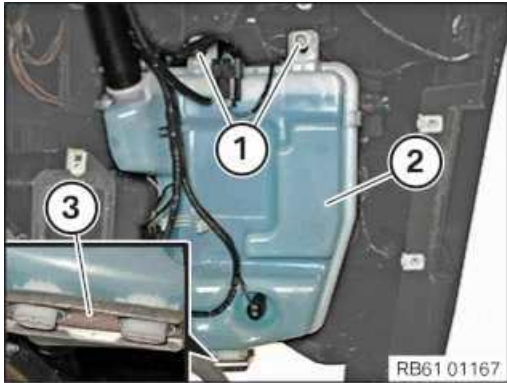
Description is for left component only. Procedure on the right side is identical.

► Partially remove the front wheel arch cover



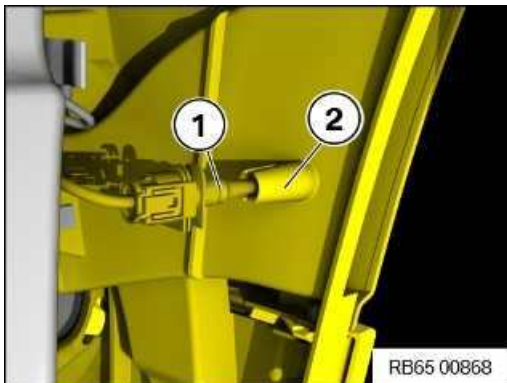
- Loosen screw (1).
- Release the blind rivet (2).
- Fold back the front wheel arch cover (3).

13 – Remove the washer fluid reservoir from the fixture



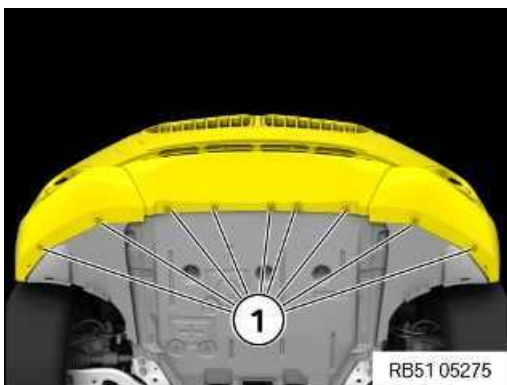
- Loosen screws (1).
- Guide the washer fluid reservoir (2) up and out of the fixture (3) and set it aside.

14 – Remove temperature sensor

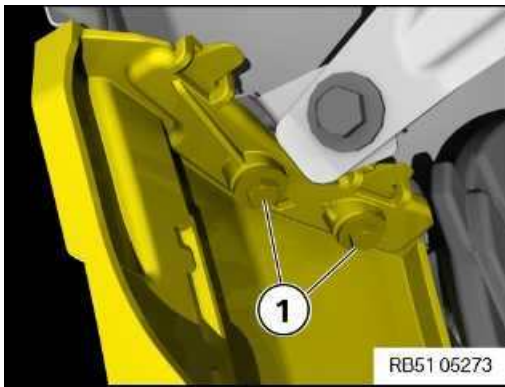


- Unclip temperature sensor (1) from front bumper panel (2).

15 – Remove front bumper panel



- Loosen screws (1).



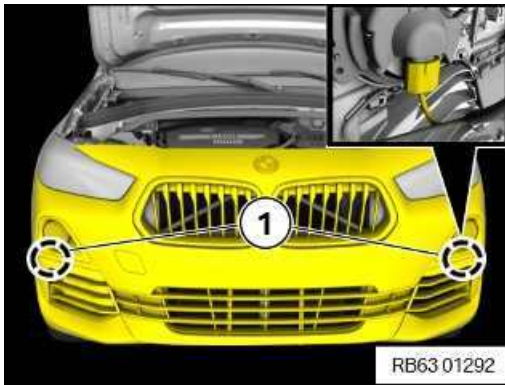
NOTICE

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

- Loosen screws (1).

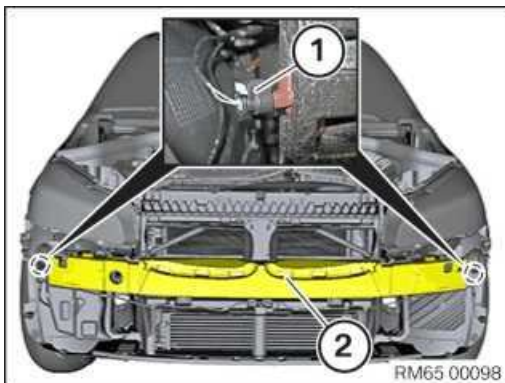


- Loosen screws (1).
- Loosen screws (2).

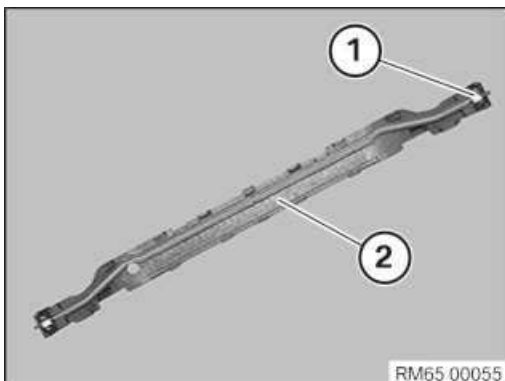


- Pull the front bumper panel slightly forward with the help of another person.
- Unlock and disconnect the plug connections (1) on the fog lights.
- Remove the front bumper panel.

16 – Remove impact absorber

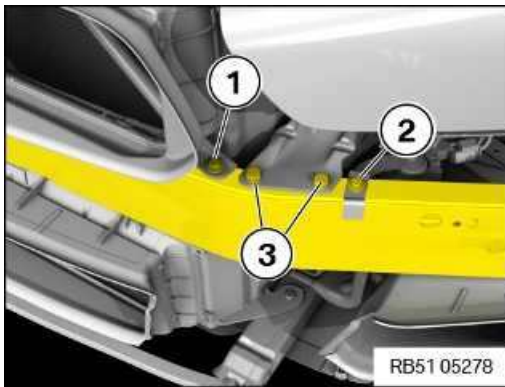


- Unlock and disconnect plug connections (1).
- Remove the impact absorber (2).

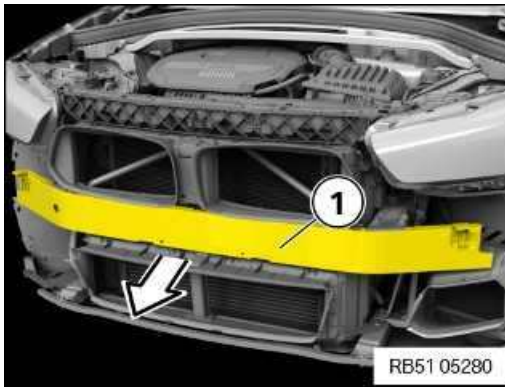


- Detach the pressure hose (1) from the impact absorber (2).

17 – Removing top front bumper support

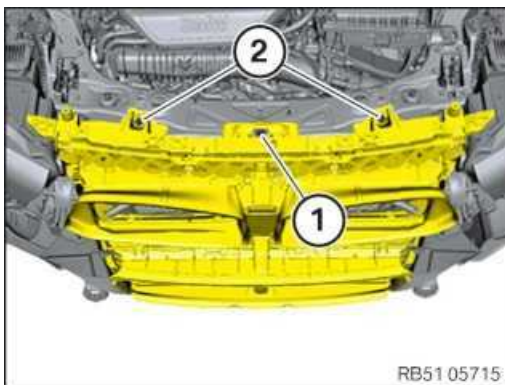


- Loosen screw (1).
- Loosen screw (2).
- Loosen screws (3).

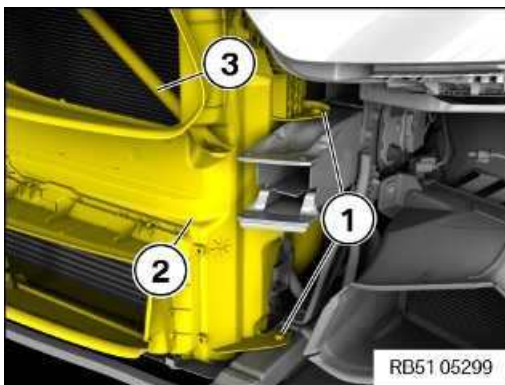


- Guide out and remove the top front bumper support (1) in direction of arrow.

18 – Remove the air duct to the radiator



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



- Loosen screws (1).
- Feed out the air duct to the radiator (2) with the bracing strut (3) toward the front and remove.



NOTICE

Perform the operations on the left and right side.

MAIN WORK

19 – Remove 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

Follow notes for repair work on the cooling system.

For additional information see:

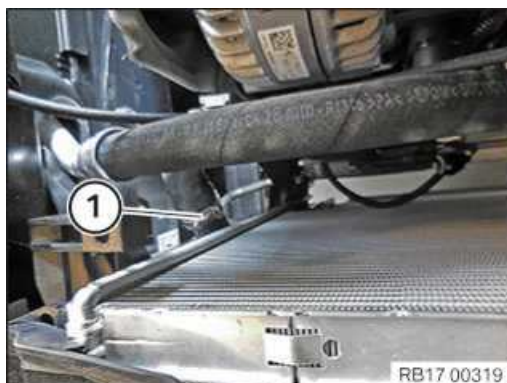
Main group 17

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

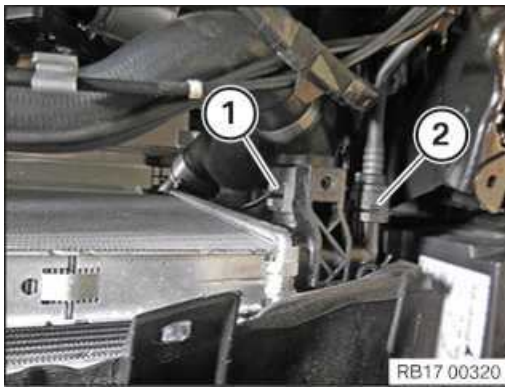


TECHNICAL INFORMATION

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



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



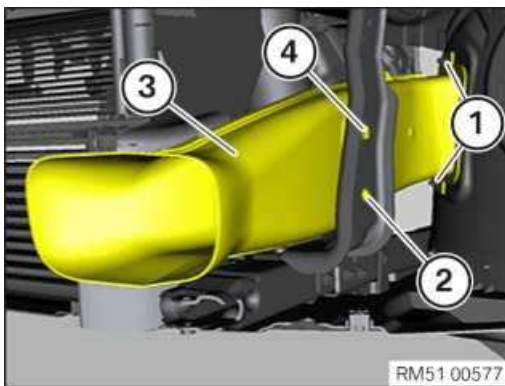
- Unlock and loosen coolant line (1).
- Catch and dispose of escaping coolant.
- Unlock and disconnect coolant ventilation line (2).

► If fitted: Removing left and right brake air duct

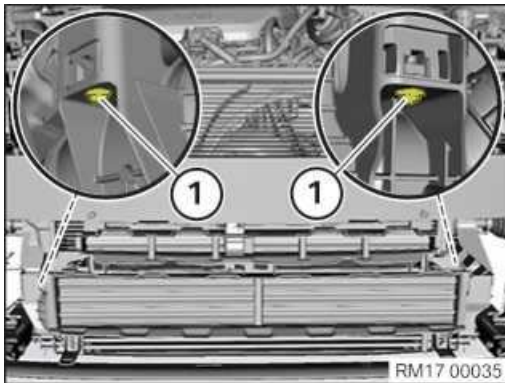


NOTICE

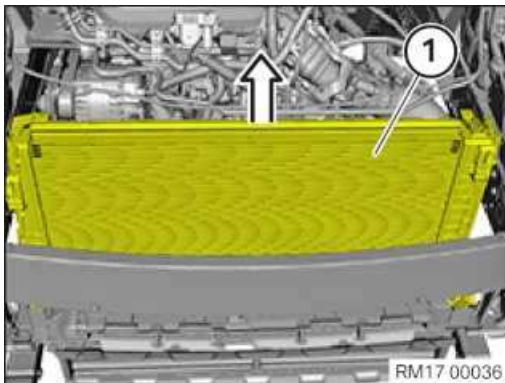
Description is for left component only. Procedure on the right side is identical.



- Loosen expanding rivet (1).
- Loosen screw (2).
- Thread out air duct (3) from guide (4) and remove.



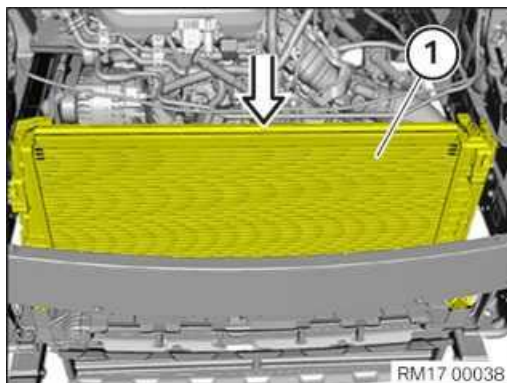
- Undo screws (1) on the charge air cooler.



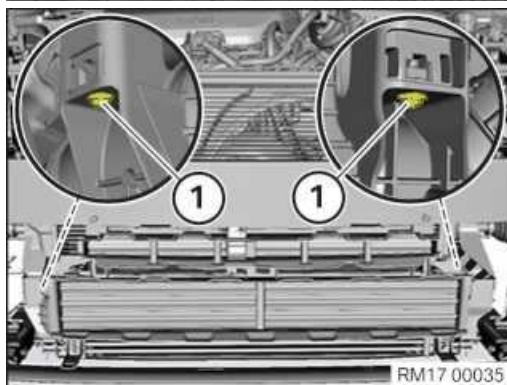
- Feed out coolant radiator (1) in direction of arrow and remove.

20 – Installing coolant radiator

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



- Feed in and install coolant radiator (1) in direction of arrow.



- Tighten screws (1) on the charge air cooler.

Charge air cooler to coolant radiator

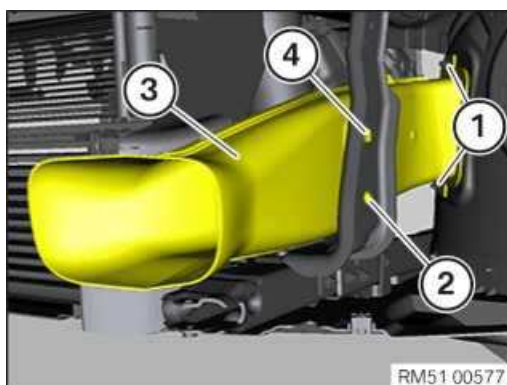
M6x12		Tightening torque	6 Nm
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► If fitted: Installing left and right brake air duct



NOTICE

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

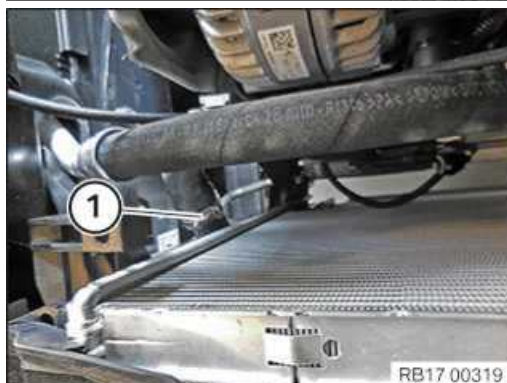


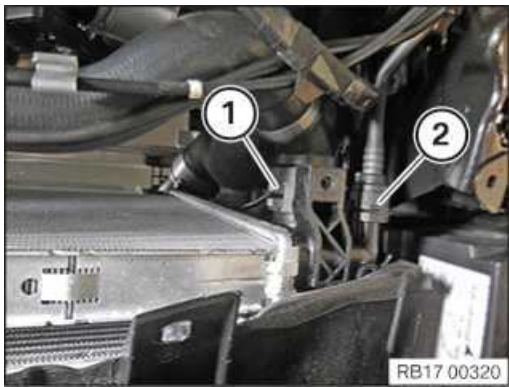
- Feed air duct (3) into the holder with guide (4).
- Secure air duct (3) with screw (2).
- Tighten down screw (2).

Brake air duct to bracket

Screw		Tightening torque	4 Nm
-------	--	-------------------	------

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





- Connect and lock coolant line (1).
- Make sure that the cooling line (1) engages audibly.
- Connect and lock the coolant ventilation line (2).
- Make sure that the coolant ventilation line (2) engages audibly.

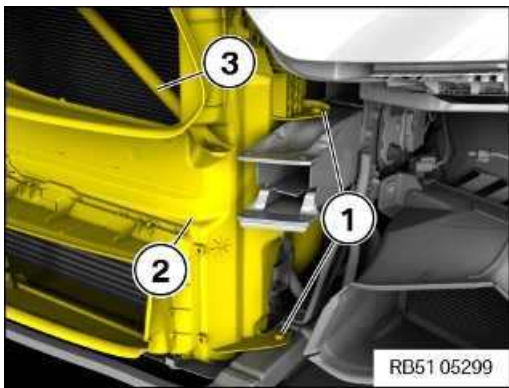
POSTPROCESSES

21 – Installing air duct to radiator



NOTICE

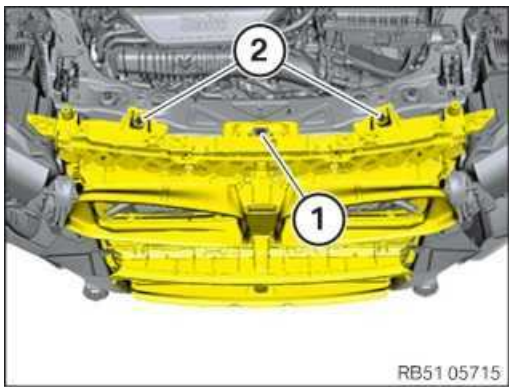
Perform the operations on the left and right side.



- Feed in air duct to radiator (2) with bracing strut (3).
- Tighten the screws (1).

Air duct to deformation element

M6x20 screw		Tightening torque	4,6 Nm
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- Tighten down screw (1).

Bracing strut to top front bumper support or to top connection

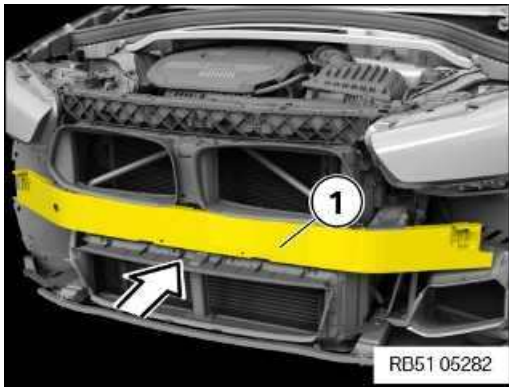
M6x20 screw		Tightening torque	11,8 Nm
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- Tighten down screws (2).

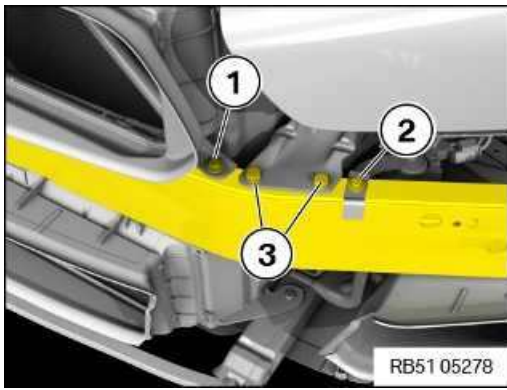
Air duct to upper connection

M6x20 screw		Tightening torque	11,8 Nm
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22 – Installing top front bumper support



- Position top front bumper support (1).



- Tighten down screws (3).

Front top bumper support to top deformation element

Hexagon screw M8x95		Tightening torque	28 Nm
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- Tighten down screw (2).

Fanfare to front top bumper support

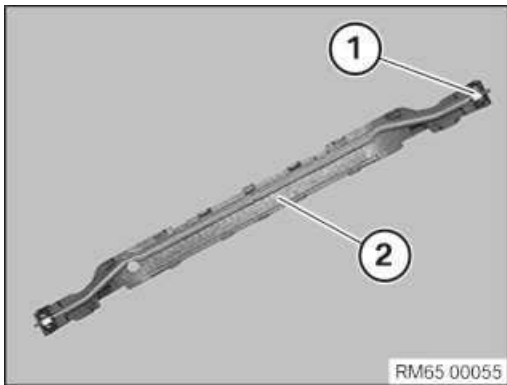
Hexagon screw		Tightening torque	11,8 Nm
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- Tighten down screw (1).

Bracing strut to top front bumper support or to top connection

M6x20 screw		Tightening torque	11,8 Nm
-------------	--	-------------------	---------

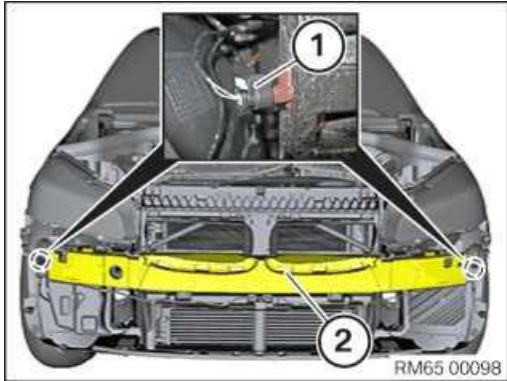
23 – Installing impact absorber



- Renew the impact absorber (2).

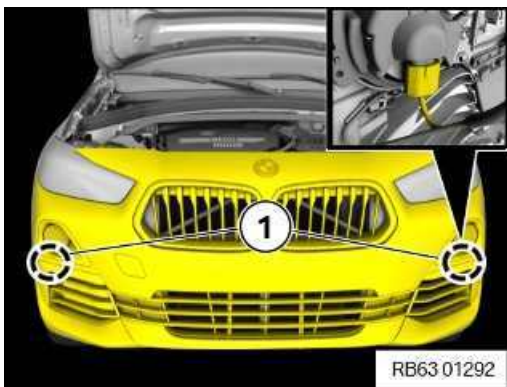
Parts: Impact absorber

- Insert and engage pressure hose (1) in impact absorber (2).



- Attach bottom impact absorber (2) and press upwards.
- Connect connectors (1) and lock.

24 – Install bumper panel, front



- Connect the connectors (1) on the fog lights and lock.
- Join the front bumper panel and position.



- Tighten the screws (1).

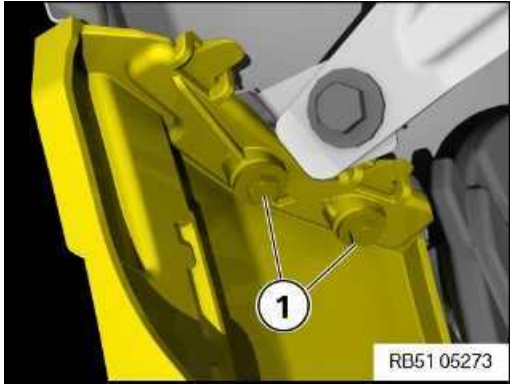
Bumper panel to headlight

Thermoplastic multi-purpose bolt		Tightening torque	2,5 Nm
----------------------------------	--	-------------------	--------

- Tighten down screws (2).

Bumper panel to air duct

Screw M6		Tightening torque	4,6 Nm
----------	--	-------------------	--------



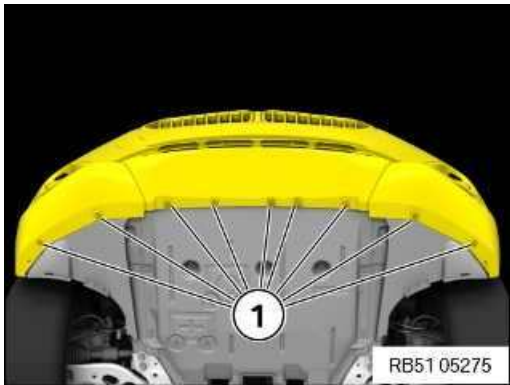
NOTICE

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

- Tighten the screws (1).

Front bumper panel to front side panel

Screw TS5X35		Tightening torque	3 Nm
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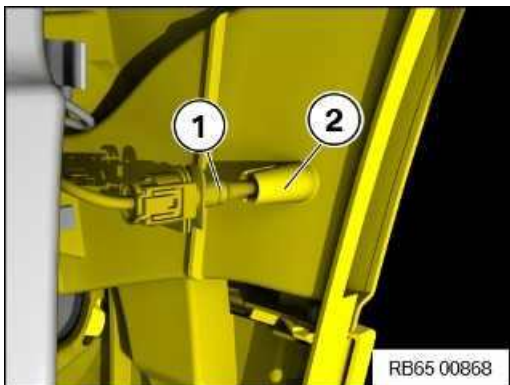


- Tighten the screws (1).

Front bumper panel to underbody panelling

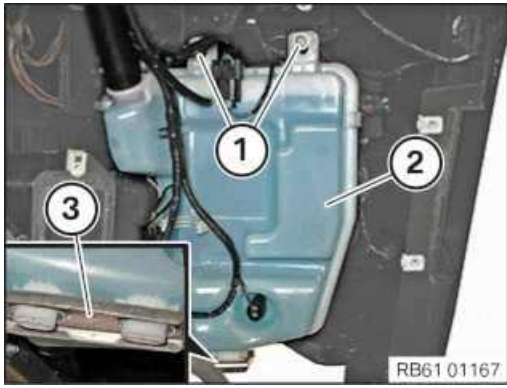
Thermoplastic hexagon screw		Tightening torque	2,5 Nm
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25 – Install temperature sensor



- Clip temperature sensor (1) into the front bumper panel (2).

26 – Install the washer fluid reservoir in the fixture



- Feed washer fluid reservoir (2) into the mounting (3) and install.
- Tighten the screws (1).

Washer fluid reservoir to body

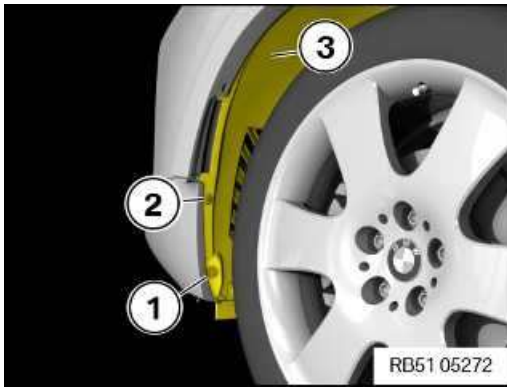
M6x20		Tightening torque	8 Nm
-------	--	-------------------	------

27 – Partially install both front wheel arch covers



NOTICE

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



► Partially install the front wheel arch cover

- Fold the front wheel arch cover (3) forward.
- Mount the blind rivet (2) with the special tool **0 496 521 (00 2 230)**.
- Tighten down screw (1).

Front wheel arch cover to front bumper panel

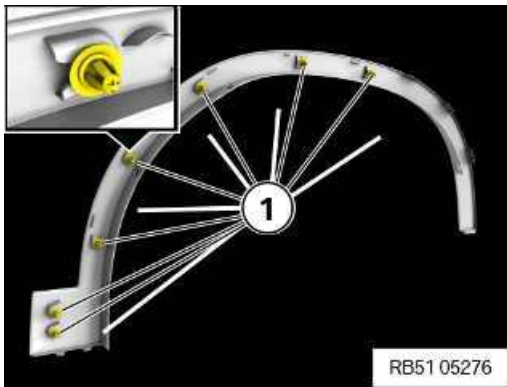
Hexagon screw for thermoplastic plastic		Tightening torque	2,6 Nm
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28 – Partially install both front wheel arch trims



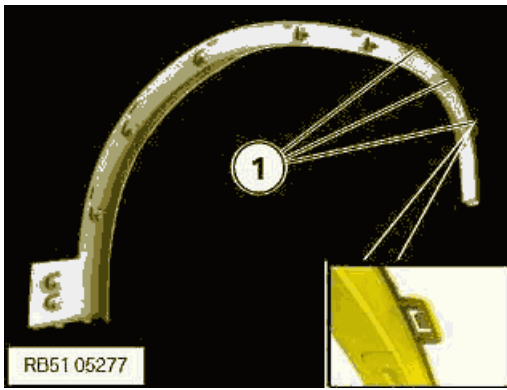
NOTICE

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

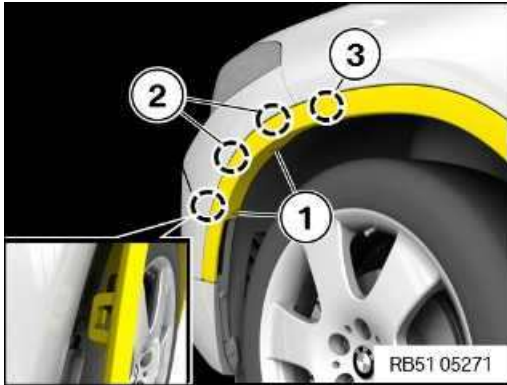


► Partly install the front wheel arch trim

- Check clips (1) for damage, and replace if necessary.

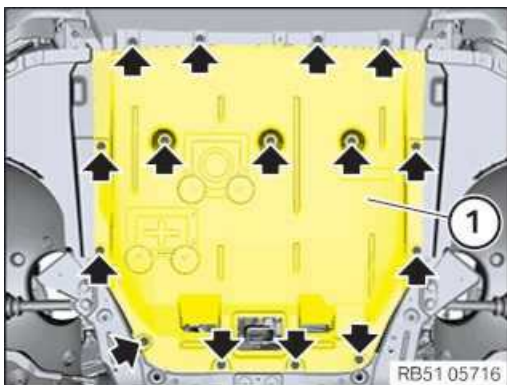


- Check the retaining lugs (1) for damage and replace the front wheel arch trim where required.



- Clip the front wheel arch trim into the clip (3) in the area of the bumper panel and into the latch mechanisms (2).
- Mount blind rivet (1) using the special tool **0 496 521 (00 2 230)**.

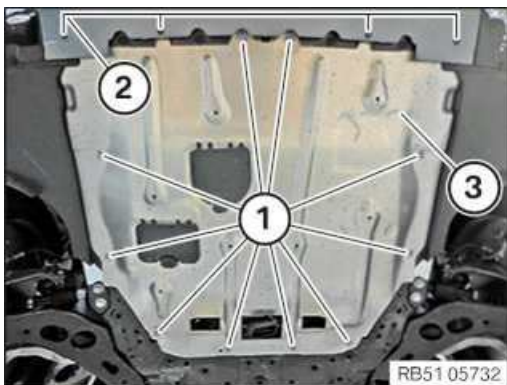
29 – Installing the front underbody protection



- Guide the front underbody protection (1) in under the bumper panel and position it at the screw points.
- Tighten screws (arrows).

Underbody protection front

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



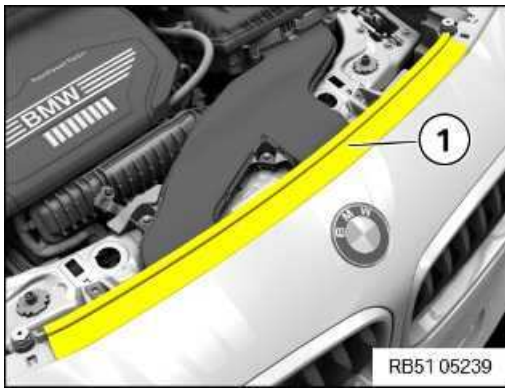
Equipment specification with metal underride guard:

- Guide in and attach the underride guard (3).
- Tighten down screws (1) and (2).

Underbody protection front

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

30 – Install the center front bonnet seal



- Press the centre front bonnet seal (1) down into the guide.
- Make sure the centre front bonnet seal (1) is fitted correctly.

31 – Install both bonnet seals on the side



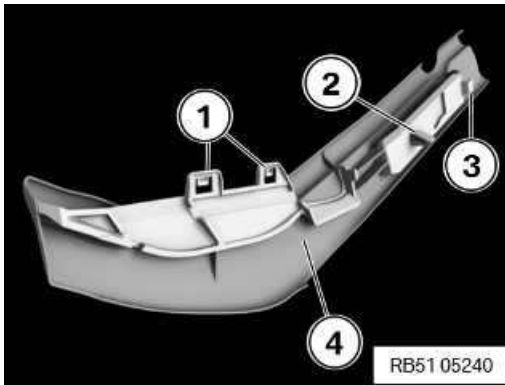
NOTICE

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

► Installing seal for side bonnet

Check

- Check latch mechanisms (1) and (2) and also the guide (3) on the bonnet seal on the side (4) for damage.

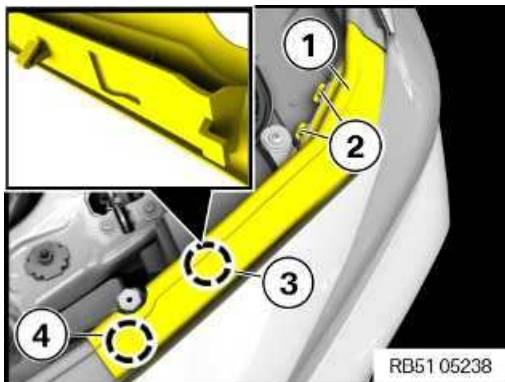


Result

» Latch mechanisms (1), (2) or the guide (3) are damaged.

Measure

- Renew the bonnet seal on the side (4).
- Insert the bonnet seal on the side (1) in the guide (4).
- Clip in the bonnet seal on the side (1) in the inner latch mechanism (3) and the outer latch mechanisms (2).



32 – Connecting the coolant lines

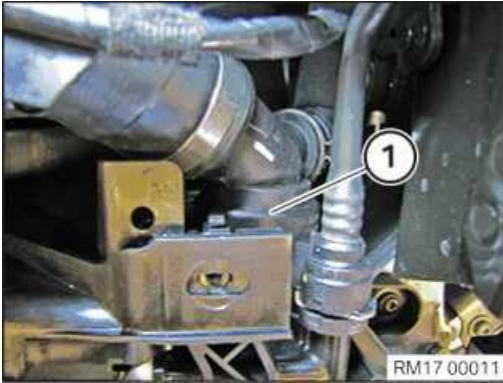


TECHNICAL INFORMATION

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



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



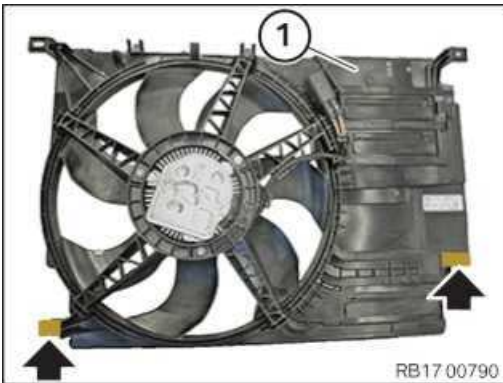
- Connect and lock coolant line (1).
- Make sure that the cooling line (1) engages audibly.

33 – Installing fan cowl with electric fan

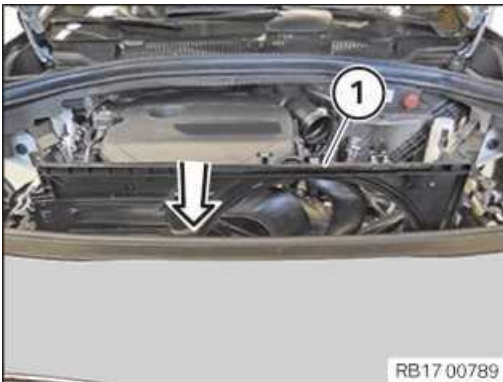


TECHNICAL INFORMATION

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



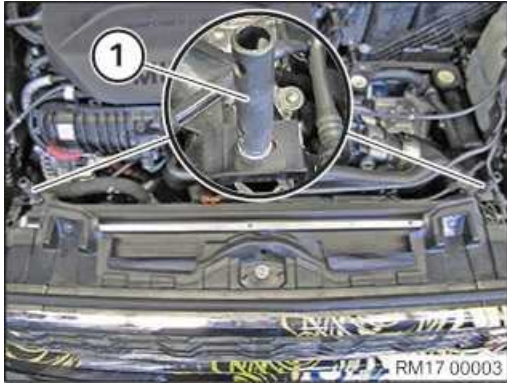
- Feed the guides (arrows) of the fan cowl (1) into the charge air cooler.



- Feed in and install the fan cowl (1) in the direction of the arrow.



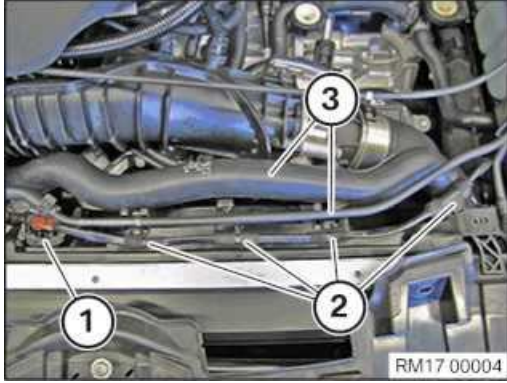
- Lock the left and right locks (arrows).



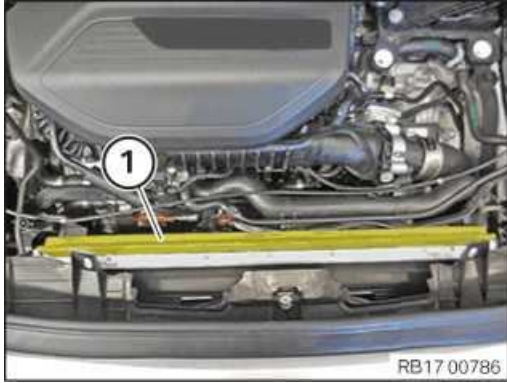
- Tighten the screws (1).

Fan cowl on radiator

M6X12		Tightening torque	6 Nm
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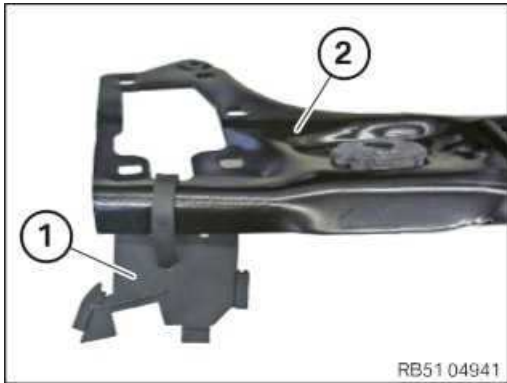


- Connect connectors (1) and lock.
The connector (1) must engage audibly.
- Secure clamps (2).
- Thread in and install coolant line (3).

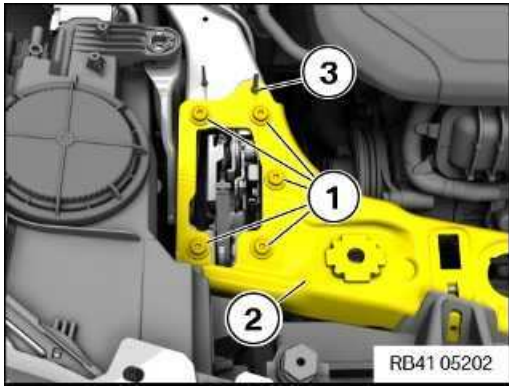


- Guide the sealing (1) on the radiator in and install it.

34 – Install front cross connection



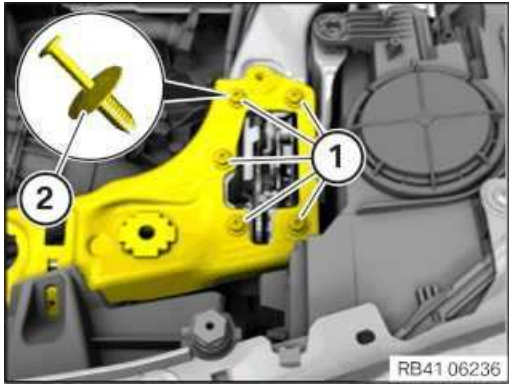
- Right side of vehicle only: Secure spray guard (1) on the cross connection (2) as pictured.



- Position front cross connection (2) and clip front cross connection (2) into the rubber retainer (3) at the same time.
- Tighten the screws (1).

Cross connection to carrier support

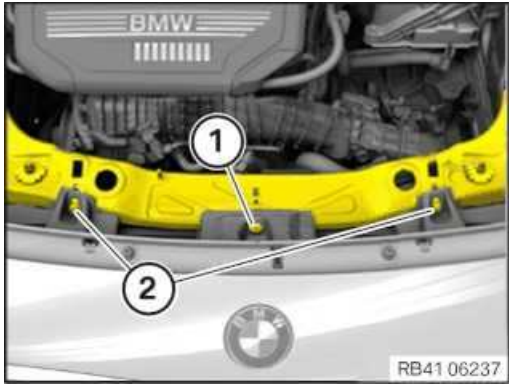
Screws M6x20		Tightening torque	11,8 Nm
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- Tighten the screws (1).

Cross connection to carrier support

Screws M6x20		Tightening torque	11,8 Nm
--------------	--	-------------------	---------



- Position screws (3) on the rubber mounts for the radiator and tighten.
- Screw connection for rubber mount of coolant radiator to coolant radiator**

Bolt to rubber mount		Tightening torque	8 Nm
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- Tighten down screws (2).

Air duct to upper connection

M6x20 screw		Tightening torque	11,8 Nm
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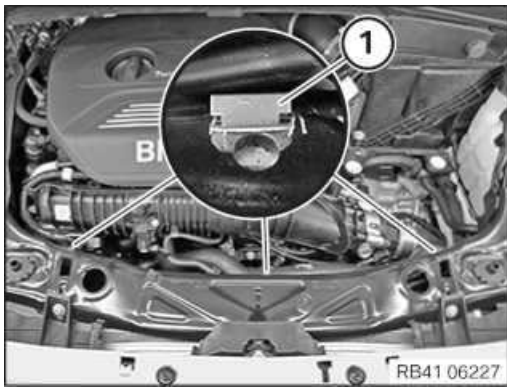
- Tighten down screw (1).

Bracing strut to upper connection

M8x20 screw		Tightening torque	28 Nm
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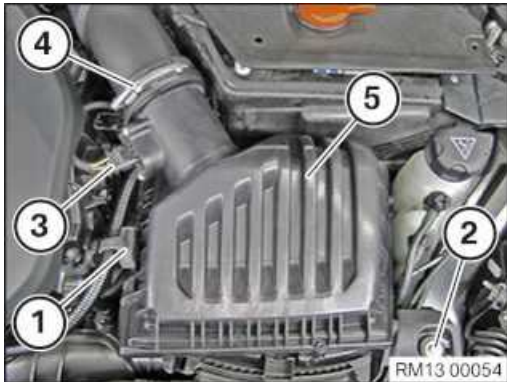


- Right side of vehicle only: Properly mount spray guard (1) to prevent corrosion.
- Secure spray guard (1) to the bridge with retaining tabs (2).



- Fasten the clamps (1) from the Bowden cable of the bonnet lock on the cross connection.

35 – Installing intake silencer housing



- Insert the intake silencer housing (5) into the rubber mounts and install it. Intake filter housing (5) must engage audibly.
- Tighten down screw (2).

Intake silencer housing to lock bridge

M6X30		Tightening torque	8 Nm
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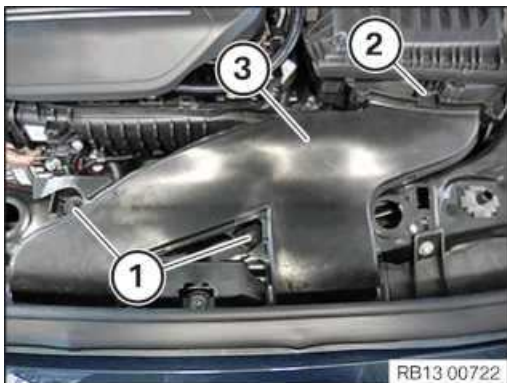
- Tighten clamp (4).

Clean air pipe to intake silencer housing

Clamp		Tightening torque	3 Nm
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- Connect and lock the connector (3). The connector (3) must engage audibly.
- Insert and install the holder (1).

36 – Install the intake neck for the intake filter housing



- Insert and install the intake neck (3). The lock (2) must audibly engage.
- Tighten nuts (1).

Intake neck to cross connection

M6		Tightening torque	8 Nm
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37 – Disconnecting all battery earth leads



- See additional information.

38 – Evacuate and fill air conditioning

- See additional information.

39 – Fill and bleed the coolant circuit



► Filling and bleed the high-temperature coolant circuit

- See additional information.

Additional Information

Overview of Tightening Torques

Charge air cooler to coolant radiator			Used in step
M6x12		Tightening torque	20 6 Nm
Brake air duct to bracket			Used in step
Screw		Tightening torque	20 4 Nm
Air duct to deformation element			Used in step
M6x20 screw		Tightening torque	21 4,6 Nm
Bracing strut to top front bumper support or to top connection			Used in step
M6x20 screw		Tightening torque	21 22 11,8 Nm
Air duct to upper connection			Used in step
M6x20 screw		Tightening torque	21 34 11,8 Nm
Front top bumper support to top deformation element			Used in step
Hexagon screw M8x95		Tightening torque	22 28 Nm
Fanfare to front top bumper support			Used in step
Hexagon screw		Tightening torque	22 11,8 Nm
Bumper panel to headlight			Used in step
Thermoplastic multi-purpose bolt		Tightening torque	24 2,5 Nm
Bumper panel to air duct			Used in step
Screw M6		Tightening torque	24 4,6 Nm
Front bumper panel to front side panel			Used in step
Screw TS5X35		Tightening torque	24 3 Nm

Front bumper panel to underbody panellingUsed in step [24](#)

Thermoplastic hexagon screw		Tightening torque	2,5 Nm
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Washer fluid reservoir to bodyUsed in step [26](#)

M6x20		Tightening torque	8 Nm
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Front wheel arch cover to front bumper panelUsed in step [27](#)

Hexagon screw for thermoplastic plastic		Tightening torque	2,6 Nm
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Underbody protection frontUsed in step [29](#)

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

Fan cowl on radiatorUsed in step [33](#)

M6X12		Tightening torque	6 Nm
-------	--	-------------------	------

Cross connection to carrier supportUsed in step [34](#)

Screws M6x20		Tightening torque	11,8 Nm
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Screw connection for rubber mount of coolant radiator to coolant radiatorUsed in step [34](#)

Bolt to rubber mount		Tightening torque	8 Nm
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Bracing strut to upper connectionUsed in step [34](#)

M8x20 screw		Tightening torque	28 Nm
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Intake silencer housing to lock bridgeUsed in step [35](#)

M6X30		Tightening torque	8 Nm
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Clean air pipe to intake silencer housingUsed in step [35](#)

Clamp		Tightening torque	3 Nm
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Intake neck to cross connectionUsed in step [36](#)

M6		Tightening torque	8 Nm
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Overview of Special Tools**0 496 521 (00 2 230) Pliers****Common**Used in step [27](#) [28](#)

Usage	(Blind rivet pliers for plastic rivets) For shaft diameters of 3.5 mm, 3.9 mm and 4.5 mm
Included in the tool or work	
Storage location	C25
Replaced by	
In connection with	
SI-Number	01 17 08 (478)

Links

[64 50 ... Note for handling R134a refrigerant](#)

[64 53 ... Instructions for replacement of air conditioning capacitors and radiator/coolers](#)

[64 52 ... Instructions for opening and part exchange in refrigerant circuit](#)

Repair instructions

Used in step

[64 50 010 Extract, evacuate and fill air conditioning system](#)

1 38

[64 50 010 Drawing off, evacuating and filling air conditioning \(R134a\)](#)

1 38

[64 50 010 Drawing off, evacuating and filling air conditioning \(R134a\)](#)

1 38

[64 50 ... Notes on repairs to air conditioning](#)

1 38

[64 50 010 Drawing off, evacuating and filling air conditioning \(R1234yf\)](#)

1 38

[64 50 ... Safety information for handling refrigerant R1234yf](#)

1 38

[64 50 ... Safety information for handling tetrafluorethane refrigerant R134a](#)

1 38

[64 50 ... Safety informations for handling refrigerant oil](#)

1 38

[61 20 900 Disconnecting and connecting battery earth lead](#)

2 37

[61 20 900 Disconnecting and connecting battery earth lead](#)

2 37

[61 20 900 Disconnecting and connecting battery earth lead](#)

2 37

[61 20 900 Disconnecting and connecting battery earth lead](#)

2 37

[61 20 900 Disconnecting and connecting battery earth lead](#)

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[61 20 900 Disconnecting and connecting battery earth lead](#)

2 37

[61 20 900 Disconnecting and connecting the battery earth lead \(all battery earth leads\)](#)

2 37

[61 20 900 Disconnecting and connecting the battery earth lead \(all battery earth leads\)](#)

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[61 20 900 Disconnecting and connecting battery earth lead](#)

2 37

[61 20 900 Disconnecting and connecting the battery earth lead \(all battery earth leads\)](#)

2 37

[61 20 900 Disconnect and connect battery earth lead \(Plug-in Hybrid Electric Vehicle\)](#)

2 37

[61 20 900 Disconnecting and connecting battery earth lead](#)

2 37

[61 20 900 Disconnecting and connecting battery earth lead](#)

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[61 20 900 Disconnecting and connecting battery earth lead](#)

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[61 20 900 Disconnecting and connecting battery earth lead](#)

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[61 20 900 Disconnecting and connecting battery earth lead](#)

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[61 20 900 Disconnecting and connecting the battery earth lead \(all battery earth leads\)](#)

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[61 20 900 Disconnecting and connecting battery earth lead](#)

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[61 20 900 Disconnecting and connecting battery earth lead](#)

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[61 20 900 Disconnecting and connecting battery earth lead](#)

2 37

[61 20 900 Disconnecting and connecting battery earth lead](#)

2 37

[17 00 ... Notes for working on cooling system](#)

19

[17 00 008 Draining and topping up coolant for high-temperature circuit](#)

39

[illegible]

[64 50 ... Safety information for handling refrigerant R1234yf](#)

Operating materials	Used in step
Main group 17	19

17 11 000 Removing and installing coolant radiator



WARNING

Airbag unit.

Danger! Life-threatening injuries!

- Before performing any work on the airbag, always disconnect the battery earth lead from the battery.
- Airbag unit may only be set down with the cushion (airbag itself) facing upwards.
- For additional information see: 72 00 ... Safety regulations on handling airbag system components/gas generators

PRELIMINARY WORK

1 – Drawing off the air conditioning

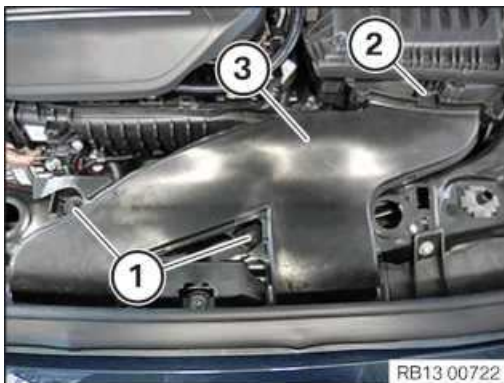
- See additional information.

2 – Disconnecting all battery earth leads



- See additional information.

3 – Remove the intake neck for intake silencer housing



- Loosen nuts (1).
- Loosen the lock (2).
- Guide the intake neck (3) out and remove it.

4 – Removing intake silencer housing



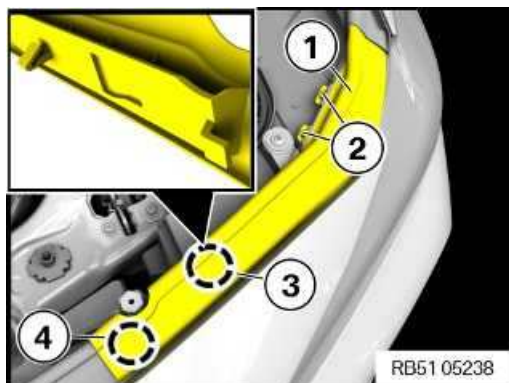
- Loosen the holder (1).
- Loosen screw (2).
- Unlock and loosen connector (3).
- Unfasten clamp (4).
- Pull out and remove the intake silencer housing (5) from the rubber mounts towards the top.

5 – Remove both bonnet seals on the side



NOTICE

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



► Remove the bonnet seal on the side

- Unclip the side bonnet seal (1) from the outer latch mechanisms (2) and the inner latch mechanism (3).
- Feed out the side bonnet seal (1) from the guide (4) and remove.

6 – Removing the seal for the front centre bonnet



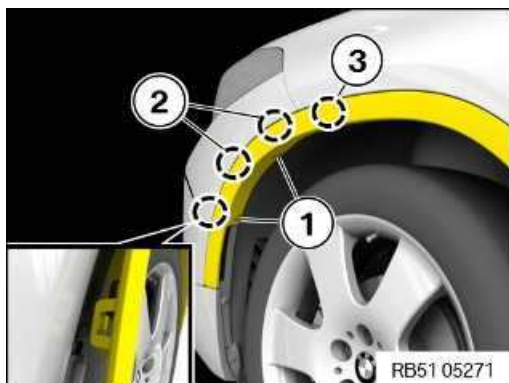
- Remove the seal for the front centre bonnet (1) towards the top.

7 – Partially remove both front wheel arch trims



NOTICE

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



► Partially removing the front wheel arch trim

- Loosen blind rivet (1).
- Release front wheel arch trim in the area of the bumper panel from the latch mechanisms (2) and from the clip (3).

8 – Partially remove both front wheel arch covers

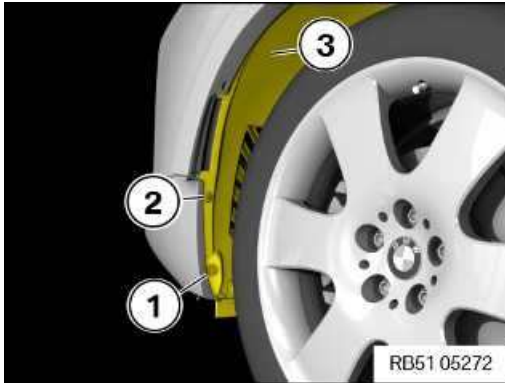


NOTICE

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

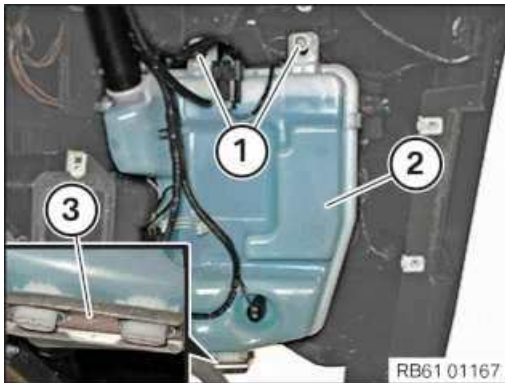
► Partially remove the front wheel arch cover

- Loosen screw (1).
- Release the blind rivet (2).
- Fold back the front wheel arch cover (3).



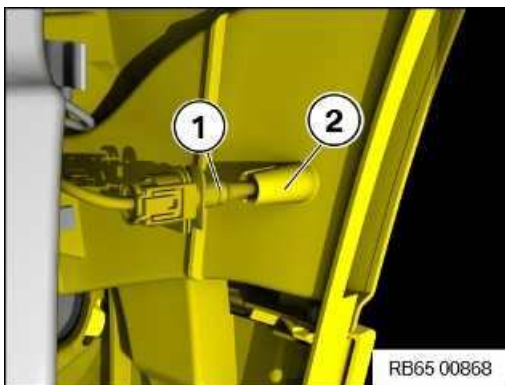
9 – Remove the washer fluid reservoir from the fixture

- Loosen screws (1).
- Guide the washer fluid reservoir (2) up and out of the fixture (3) and set it aside.



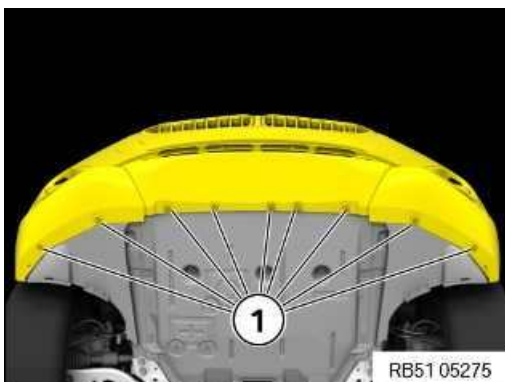
10 – Remove temperature sensor

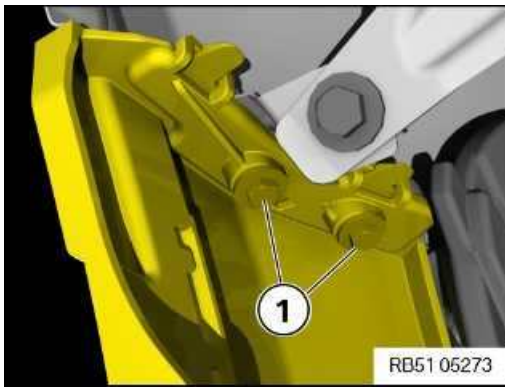
- Unclip temperature sensor (1) from front bumper panel (2).



11 – Remove front bumper panel

- Loosen screws (1).





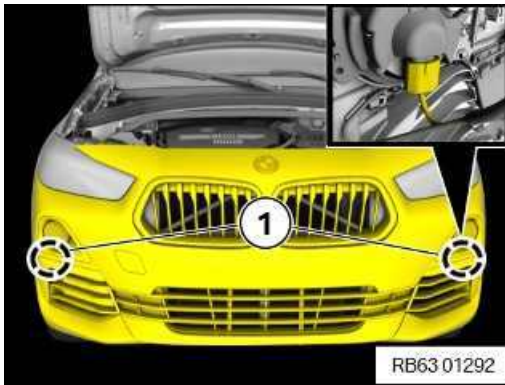
NOTICE

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

- Loosen screws (1).

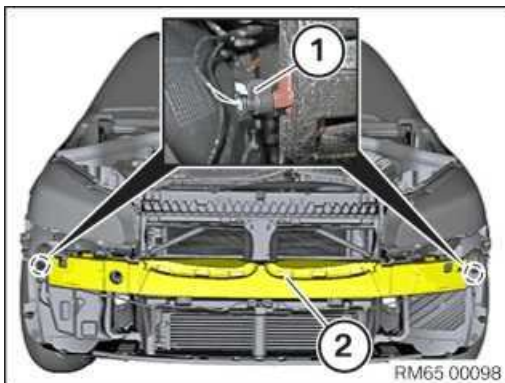


- Loosen screws (1).
- Loosen screws (2).

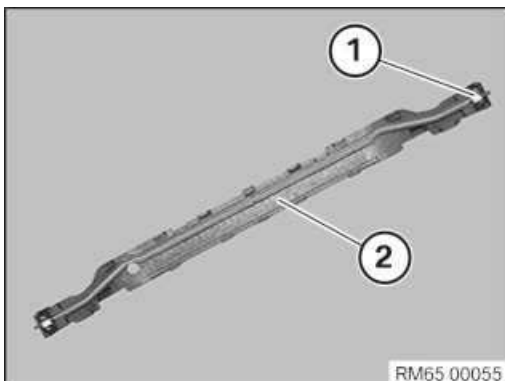


- Pull the front bumper panel slightly forward with the help of another person.
- Unlock and disconnect the plug connections (1) on the fog lights.
- Remove the front bumper panel.

12 – Remove impact absorber

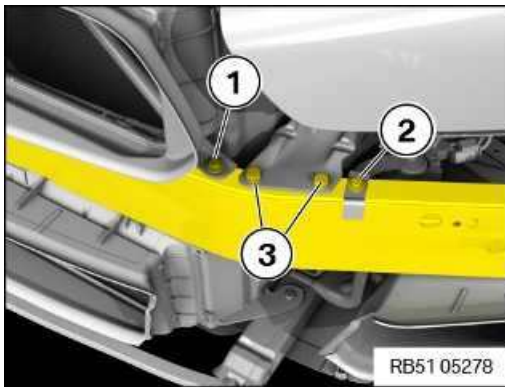


- Unlock and disconnect plug connections (1).
- Remove the impact absorber (2).

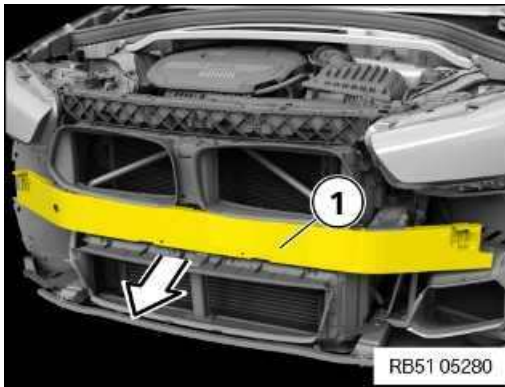


- Detach the pressure hose (1) from the impact absorber (2).

13 – Removing top front bumper support

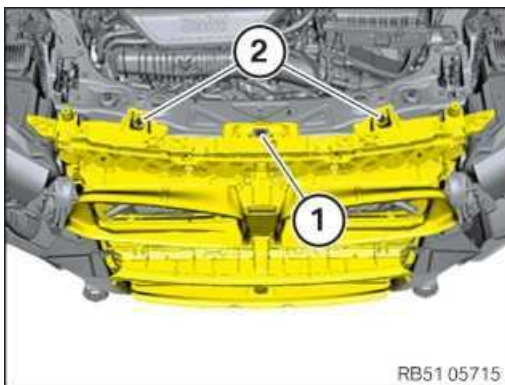


- Loosen screw (1).
- Loosen screw (2).
- Loosen screws (3).

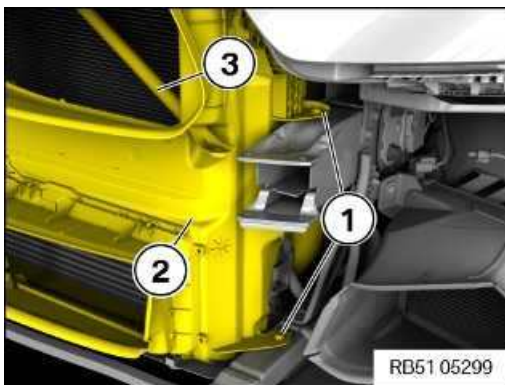


- Guide out and remove the top front bumper support (1) in direction of arrow.

14 – Remove the air duct to the radiator



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



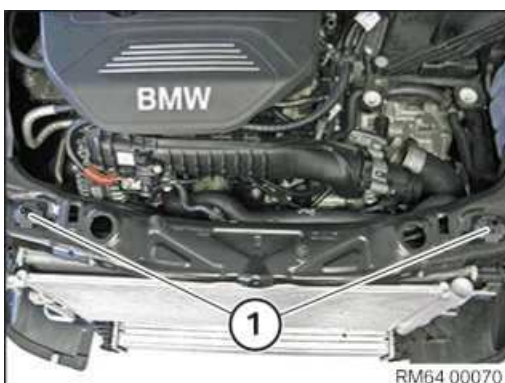
- Loosen screws (1).
- Feed out the air duct to the radiator (2) with the bracing strut (3) toward the front and remove.



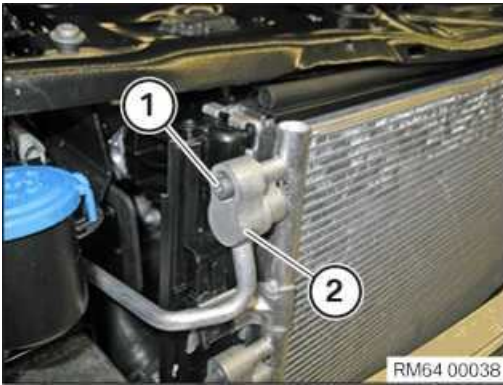
NOTICE

Perform the operations on the left and right side.

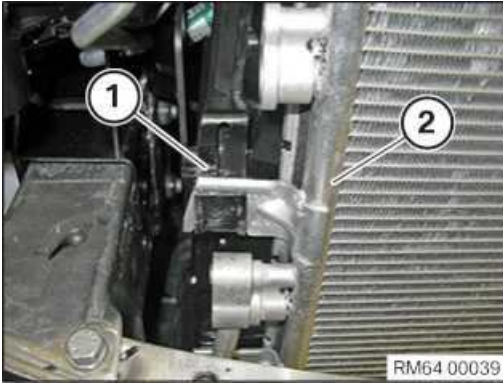
15 – Remove A/C condenser



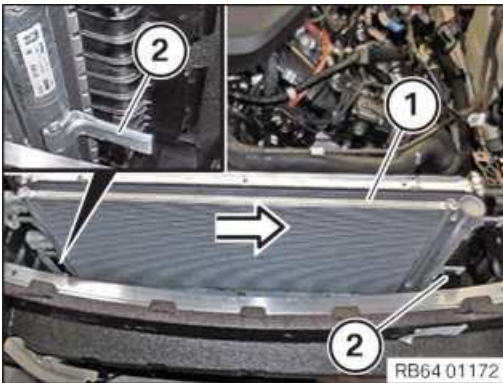
- Loosen screws (1).



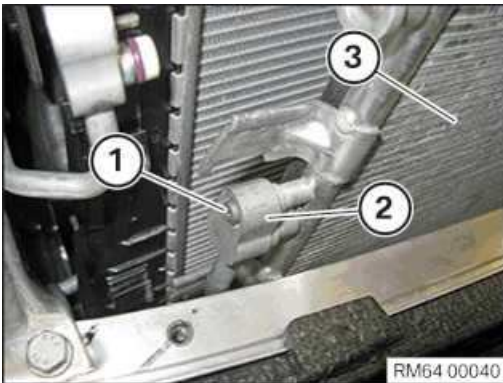
- Loosen screw (1).
- Remove the refrigerant line (2).



- Unlock the latch mechanism (1) on the left and right and slide the air conditioning condenser (2) slightly upward.

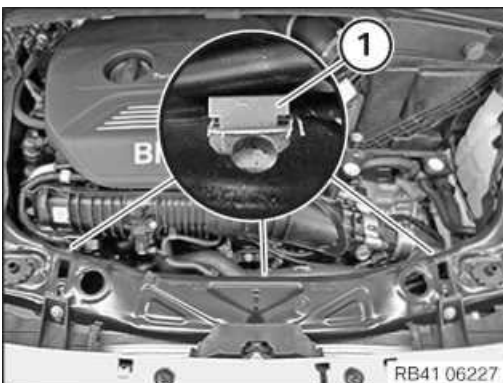


- Push condenser (1) in direction of arrow and feed out on the guides (2).

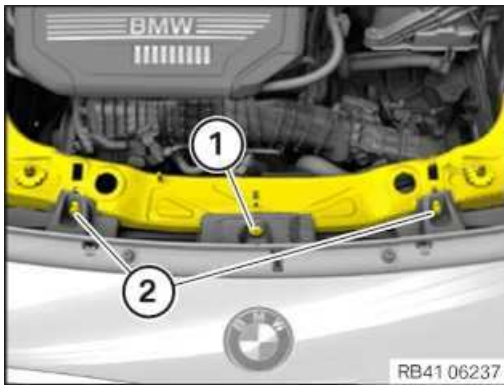


- Loosen screw (1).
- Remove the refrigerant line (2).
- Guide out the condenser (3) toward the top and remove it.

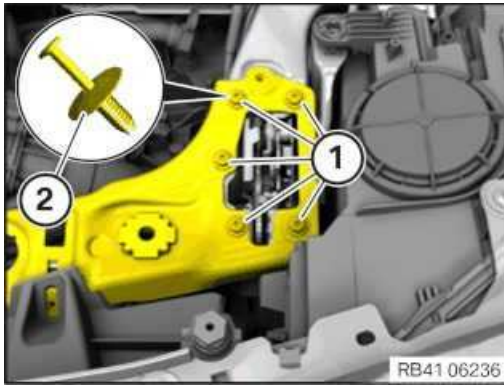
16 – Remove front cross connection



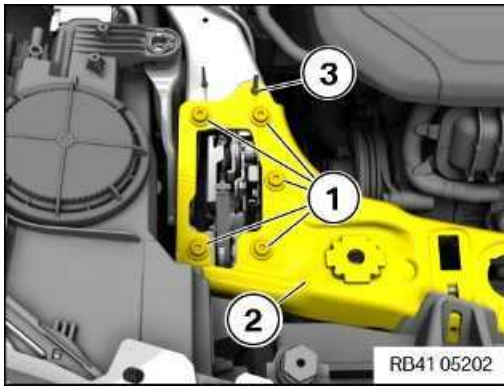
- Detach the clamps (1) for the Bowden cable of the bonnet locks from the cross connection.



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



- Loosen screws (1).
- Lever out expanding rivet (2).



- Loosen screws (1).
- Unclip the front cross connection (2) from the rubber retainer (3) and remove it upward.

17 – Removing the fan cowl with electric fan

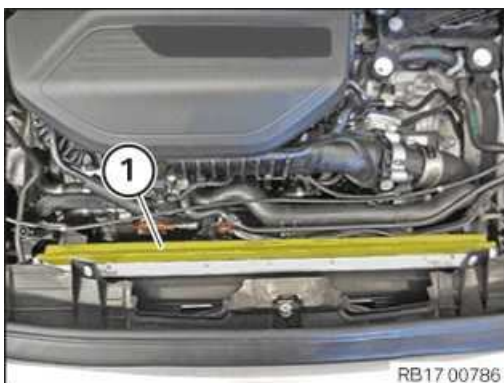


WARNING

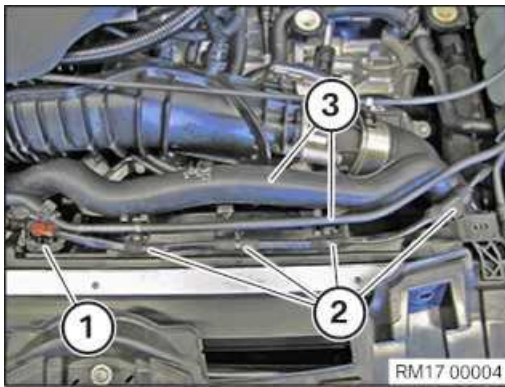
Hot surfaces.

Risk of burning!

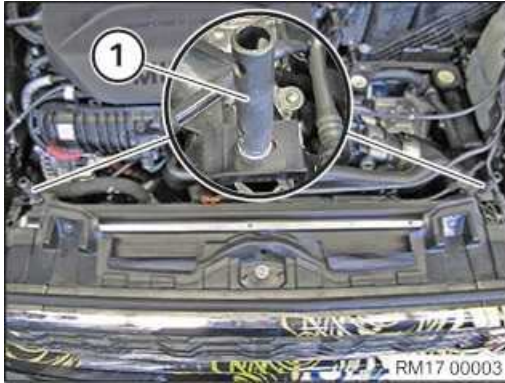
- Perform all work only on components that have cooled down.



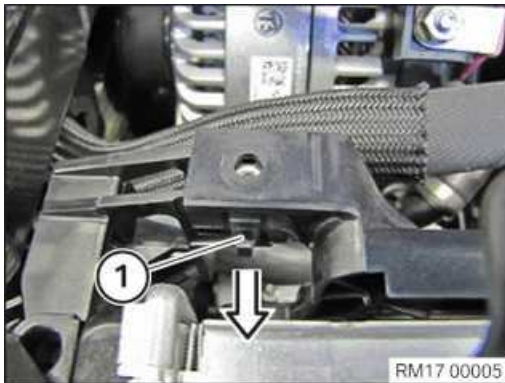
- Feed out and remove the sealing (1) from the radiator.



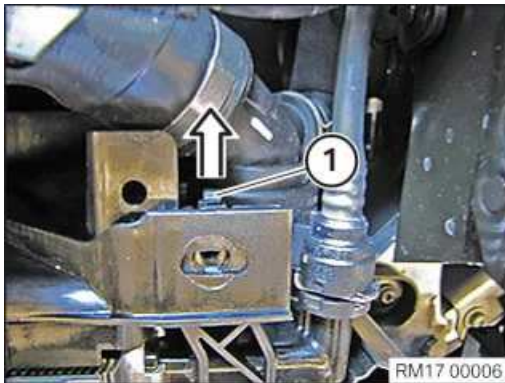
- Unlock plug connection (1) and disconnect.
- Unlock and loosen the clamps (2).
- Feed out connector (1) and place to one side.
- Thread off coolant line (3) and place to the side.



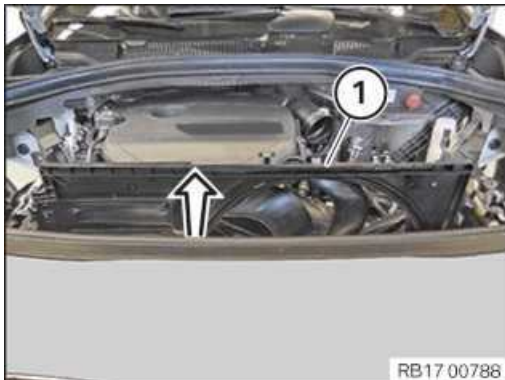
- Loosen screws (1).



- Unlock the right lock (1) on the fan cowl in the direction of the arrow.

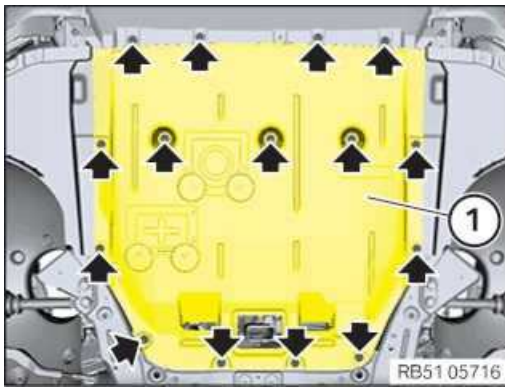


- Unlock the left lock (1) on the fan cowl in the direction of the arrow.

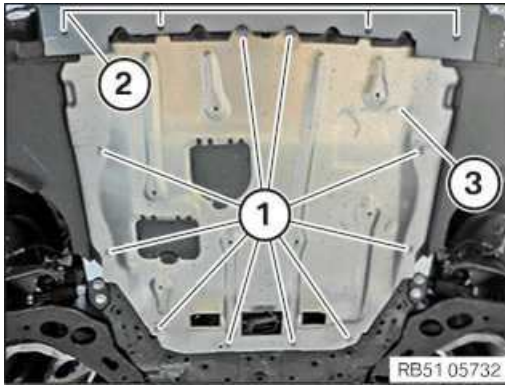


- Guide out fan cowl (1) in direction of arrow and remove.

18 – Removing the front underbody protection



- Remove screws (arrows).
- Thread out and remove the front underbody protection (1) from the bumper panel.



- **Equipment specification with metal underride protection:**
- Loosen screws (1) and (2).
- Thread out and remove the underride protection (3).

19 – Draining coolant



WARNING

Hot fluids.

Risk of scalding!

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



TECHNICAL INFORMATION

Life-long fill of coolant!

Do not reuse used coolant.

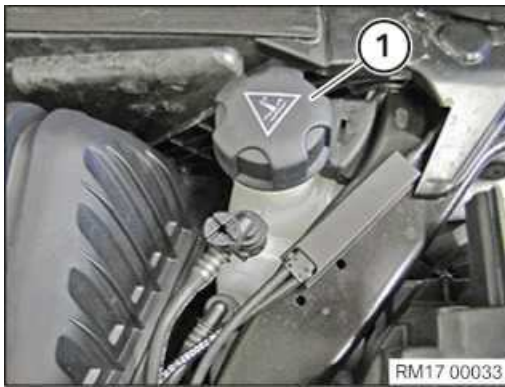
When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be emptied and refilled.

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.

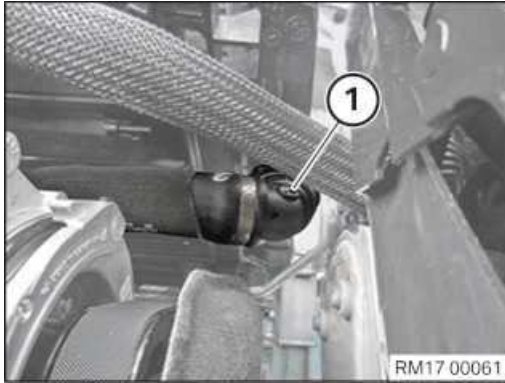


TECHNICAL INFORMATION

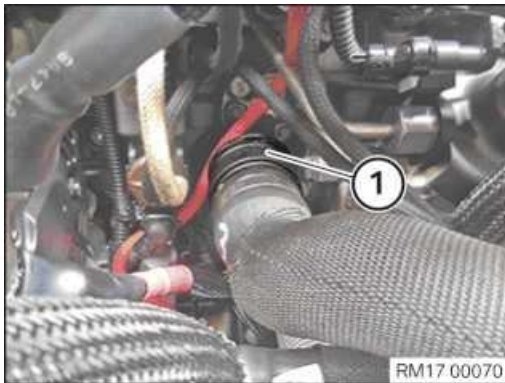
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Loosen sealing cap (1).



- Unlock and disconnect the coolant line (1) from the radiator on the right.
- Catch and dispose of escaping coolant.



- Unlock the coolant line (1) and pull it off the connecting branch.
- Catch and dispose of escaping coolant.

MAIN WORK

20 – Remove 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

Follow notes for repair work on the cooling system.

For additional information see:

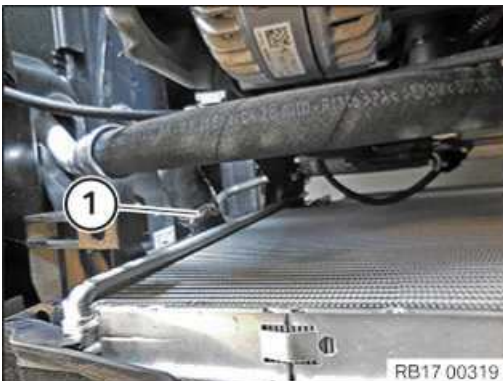
Main group 17

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

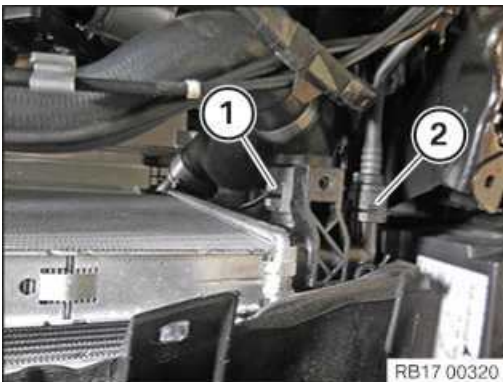


TECHNICAL INFORMATION

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



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



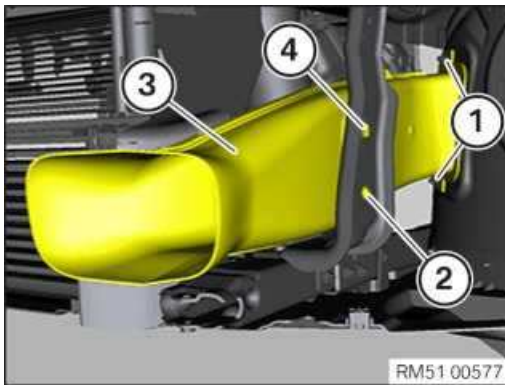
- Unlock and loosen coolant line (1).
- Catch and dispose of escaping coolant.
- Unlock and disconnect coolant ventilation line (2).

► If fitted: Removing left and right brake air duct

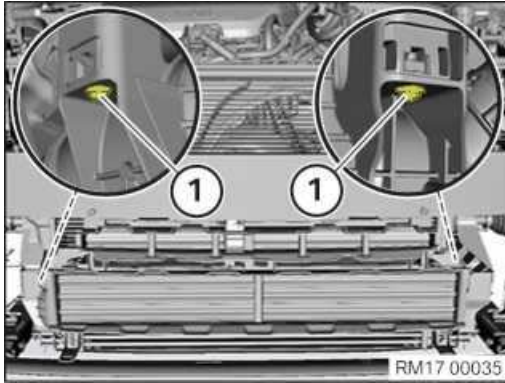


NOTICE

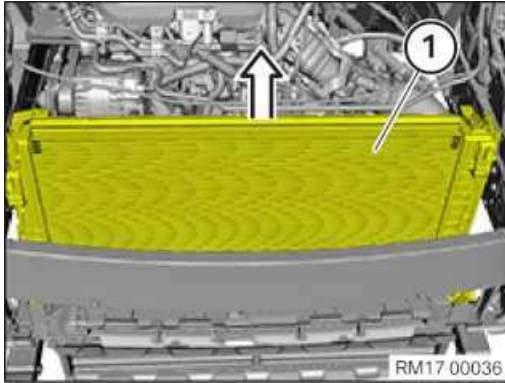
Description is for left component only. Procedure on the right side is identical.



- Loosen expanding rivet (1).
- Loosen screw (2).
- Thread out air duct (3) from guide (4) and remove.



- Undo screws (1) on the charge air cooler.



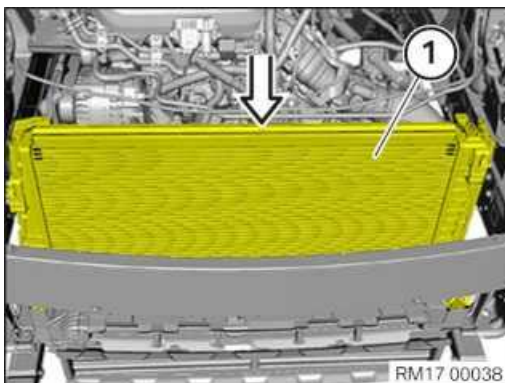
- Feed out coolant radiator (1) in direction of arrow and remove.

21 – Installing coolant radiator

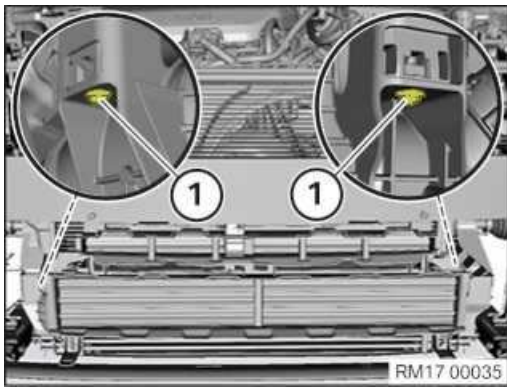


TECHNICAL INFORMATION

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



- Feed in and install coolant radiator (1) in direction of arrow.



- Tighten screws (1) on the charge air cooler.

Charge air cooler to coolant radiator

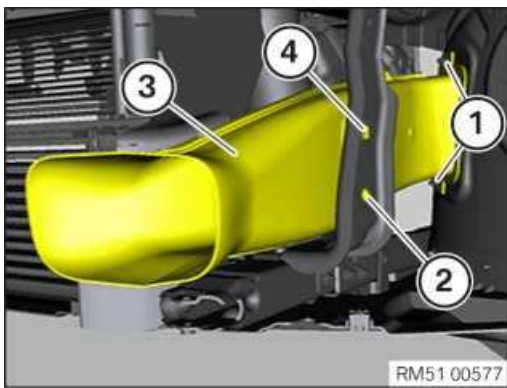
M6x12		Tightening torque	6 Nm
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► If fitted: Installing left and right brake air duct



NOTICE

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

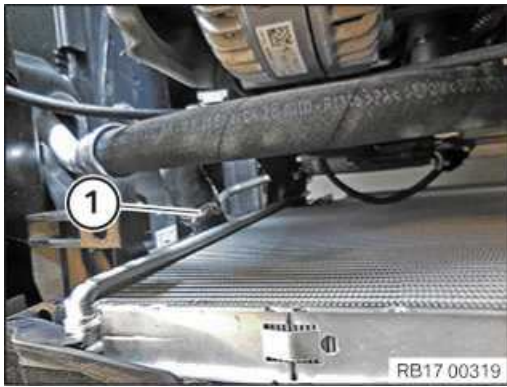


- Feed air duct (3) into the holder with guide (4).
- Secure air duct (3) with screw (2).
- Tighten down screw (2).

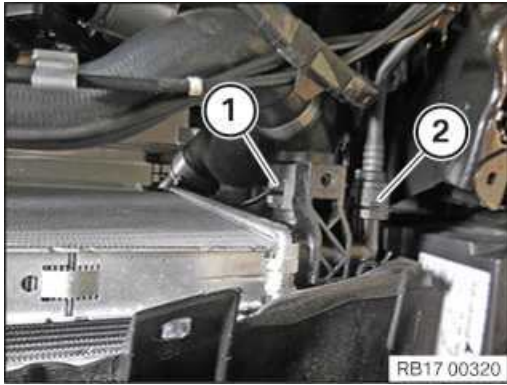
Brake air duct to bracket

Screw		Tightening torque	4 Nm
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- Mount the expanding rivets (1).



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



- Connect and lock coolant line (1).
- Make sure that the cooling line (1) engages audibly.
- Connect and lock the coolant ventilation line (2).
- Make sure that the coolant ventilation line (2) engages audibly.

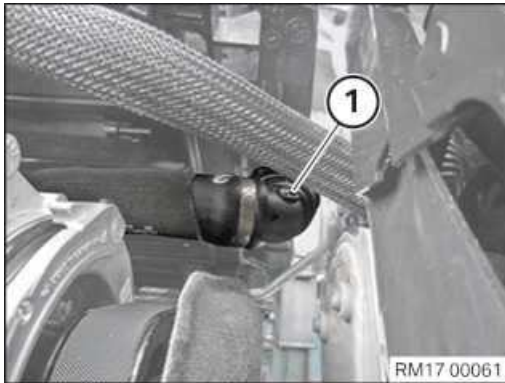
POSTPROCESSES

22 – Connect the coolant line

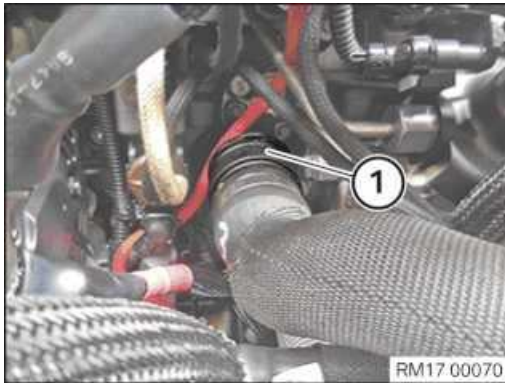


TECHNICAL INFORMATION

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



- Connect the right coolant line (1) to the radiator and lock audibly.



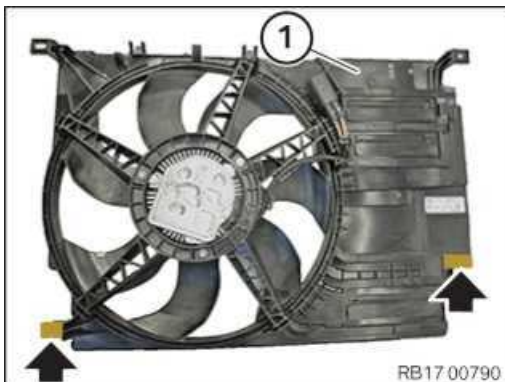
- Connect the coolant line (1) to the connecting branch and lock audibly.

23 – Installing fan cowl with electric fan

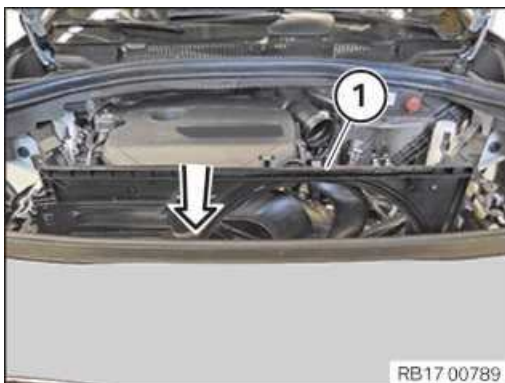


TECHNICAL INFORMATION

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



- Feed the guides (arrows) of the fan cowl (1) into the charge air cooler.



- Feed in and install the fan cowl (1) in the direction of the arrow.



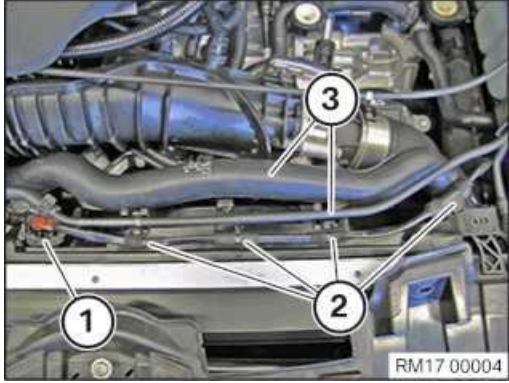
- Lock the left and right locks (arrows).



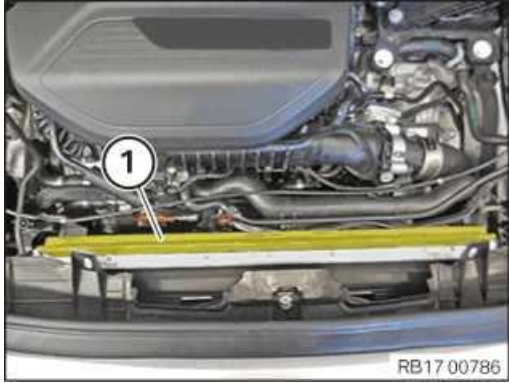
- Tighten the screws (1).

Fan cowl on radiator

M6X12		Tightening torque	6 Nm
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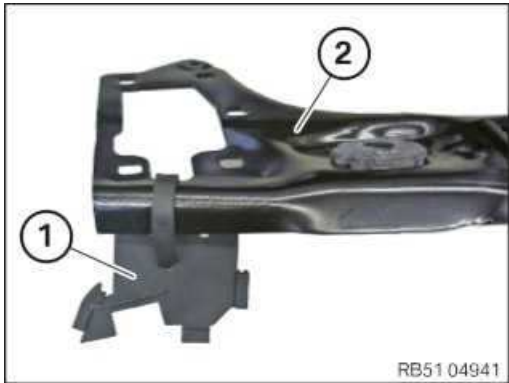


- Connect connectors (1) and lock.
The connector (1) must engage audibly.
- Secure clamps (2).
- Thread in and install coolant line (3).

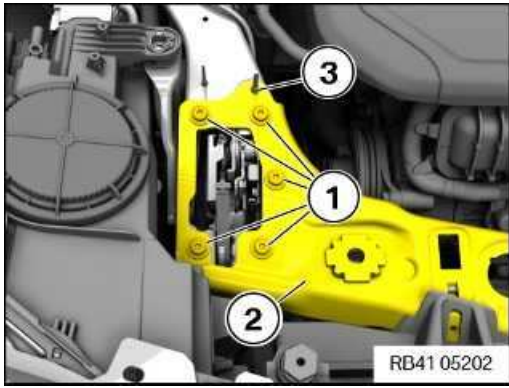


- Guide the sealing (1) on the radiator in and install it.

24 – Install front cross connection



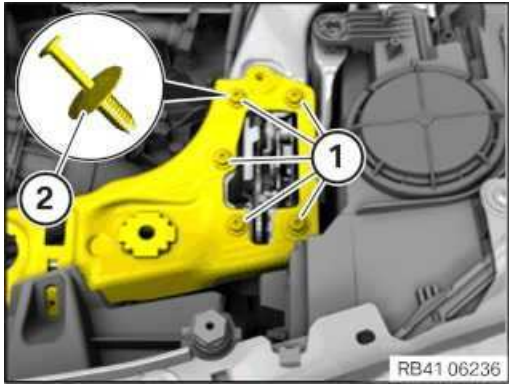
- Right side of vehicle only: Secure spray guard (1) on the cross connection (2) as pictured.



- Position front cross connection (2) and clip front cross connection (2) into the rubber retainer (3) at the same time.
- Tighten the screws (1).

Cross connection to carrier support

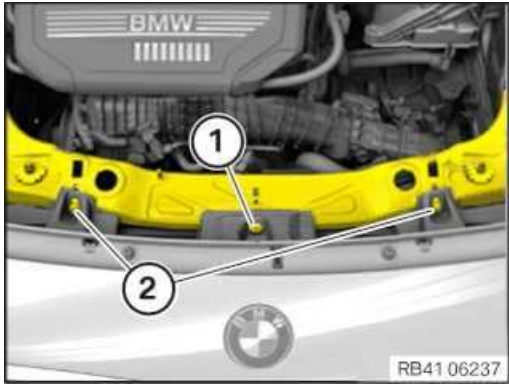
Screws M6x20		Tightening torque	11,8 Nm
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- Tighten the screws (1).

Cross connection to carrier support

Screws M6x20		Tightening torque	11,8 Nm
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- Position screws (3) on the rubber mounts for the radiator and tighten.
- Screw connection for rubber mount of coolant radiator to coolant radiator**

Bolt to rubber mount		Tightening torque	8 Nm
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- Tighten down screws (2).

Air duct to upper connection

M6x20 screw		Tightening torque	11,8 Nm
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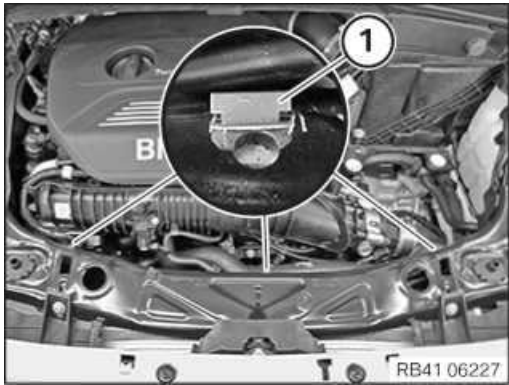
- Tighten down screw (1).

Bracing strut to upper connection

M8x20 screw		Tightening torque	28 Nm
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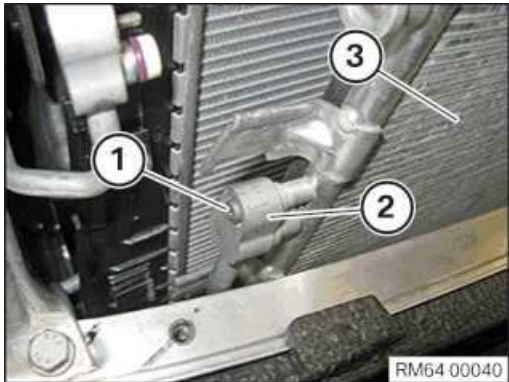


- Right side of vehicle only: Properly mount spray guard (1) to prevent corrosion.
- Secure spray guard (1) to the bridge with retaining tabs (2).



- Fasten the clamps (1) from the Bowden cable of the bonnet lock on the cross connection.

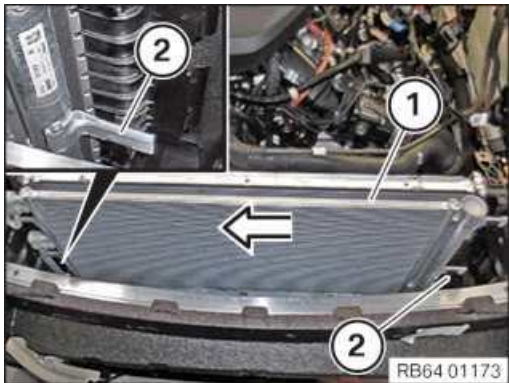
25 – Install air conditioning condenser



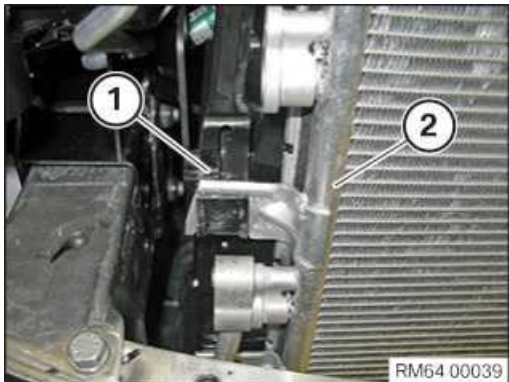
- Insert the condenser (3) from the top.
- Place refrigerant line (2) on the condenser (3).
- Tighten down screw (1).

Refrigerant line on the air conditioning condenser/bracket

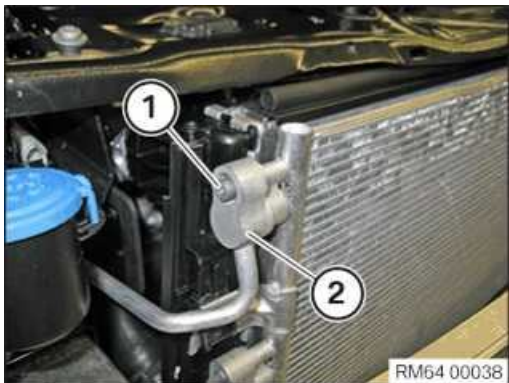
M6		Tightening torque	8 Nm
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- Push the condenser (1) in direction of arrow and insert with guides (2).



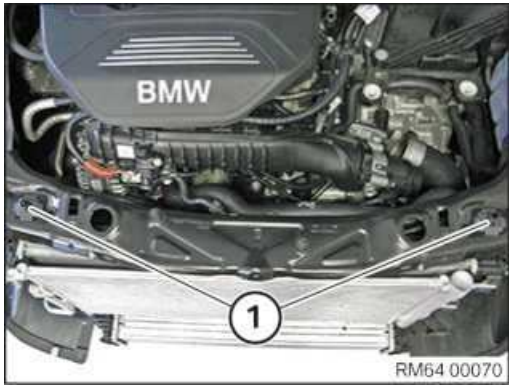
- Push the condenser (2) from top to bottom and engage latch mechanisms (1) on the left and right.



- Position refrigerant line (2).
- Tighten down screw (1).

Refrigerant line on the air conditioning condenser/bracket

M6		Tightening torque	8 Nm
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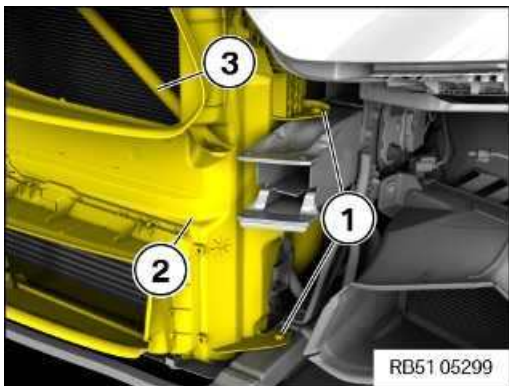
- Tighten the screws (1).

26 – Installing air duct to radiator



NOTICE

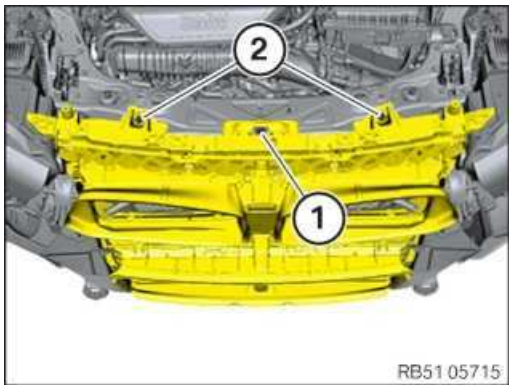
Perform the operations on the left and right side.



- Feed in air duct to radiator (2) with bracing strut (3).
- Tighten the screws (1).

Air duct to deformation element

M6x20 screw		Tightening torque	4,6 Nm
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- Tighten down screw (1).

Bracing strut to top front bumper support or to top connection

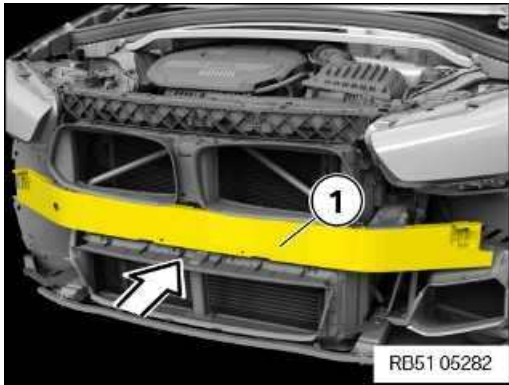
M6x20 screw		Tightening torque	11,8 Nm
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- Tighten down screws (2).

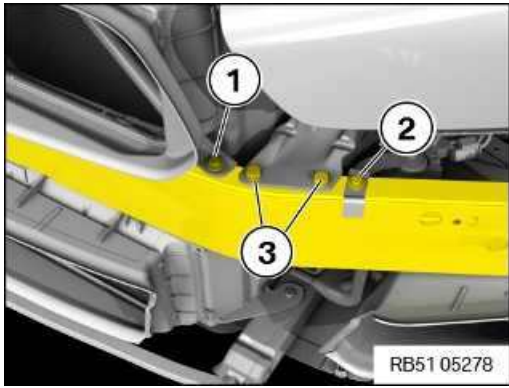
Air duct to upper connection

M6x20 screw		Tightening torque	11,8 Nm
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27 – Installing top front bumper support



- Position top front bumper support (1).



- Tighten down screws (3).

Front top bumper support to top deformation element

Hexagon screw M8x95		Tightening torque	28 Nm
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- Tighten down screw (2).

Fanfare to front top bumper support

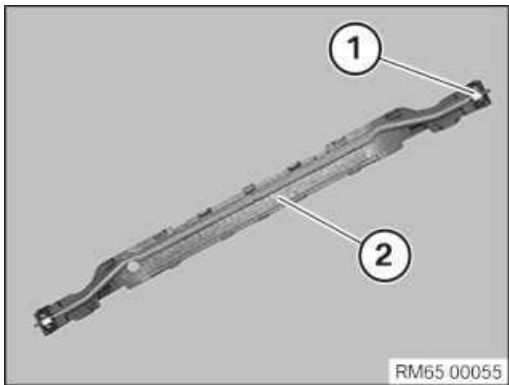
Hexagon screw		Tightening torque	11,8 Nm
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- Tighten down screw (1).

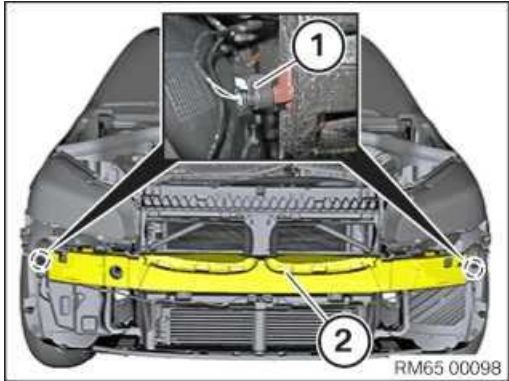
Bracing strut to top front bumper support or to top connection

M6x20 screw		Tightening torque	11,8 Nm
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28 – Installing impact absorber

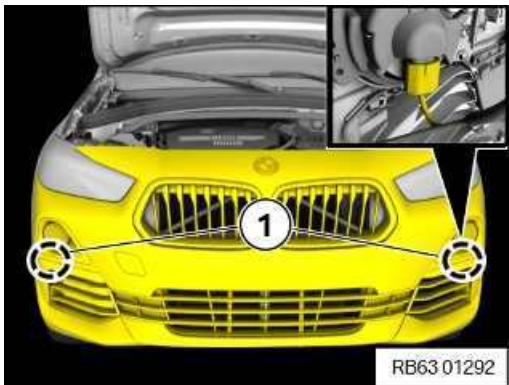


- Renew the impact absorber (2).
- Parts:** Impact absorber
- Insert and engage pressure hose (1) in impact absorber (2).



- Attach bottom impact absorber (2) and press upwards.
- Connect connectors (1) and lock.

29 – Install bumper panel, front



- Connect the connectors (1) on the fog lights and lock.
- Join the front bumper panel and position.



- Tighten the screws (1).

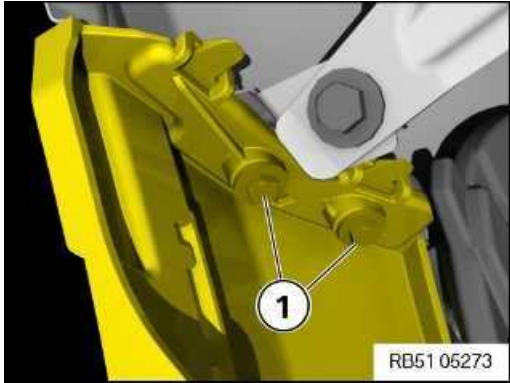
Bumper panel to headlight

Thermoplastic multi-purpose bolt		Tightening torque	2,5 Nm
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- Tighten down screws (2).

Bumper panel to air duct

Screw M6		Tightening torque	4,6 Nm
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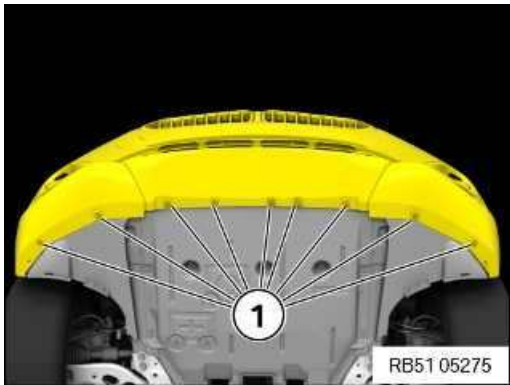
NOTICE

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

- Tighten the screws (1).

Front bumper panel to front side panel

Screw TS5X35		Tightening torque	3 Nm
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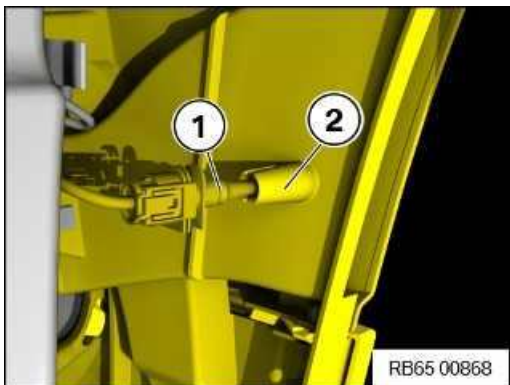


- Tighten the screws (1).

Front bumper panel to underbody panelling

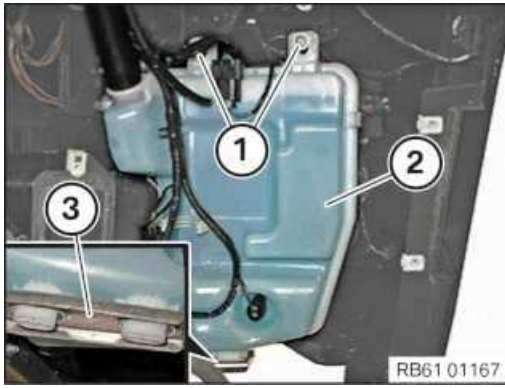
Thermoplastic hexagon screw		Tightening torque	2,5 Nm
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30 – Install temperature sensor



- Clip temperature sensor (1) into the front bumper panel (2).

31 – Install the washer fluid reservoir in the fixture



- Feed washer fluid reservoir (2) into the mounting (3) and install.
- Tighten the screws (1).

Washer fluid reservoir to body

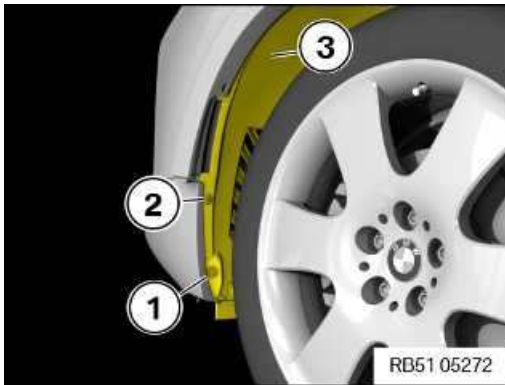
M6x20		Tightening torque	8 Nm
-------	--	-------------------	------

32 – Partially install both front wheel arch covers



NOTICE

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



► Partially install the front wheel arch cover

- Fold the front wheel arch cover (3) forward.
- Mount the blind rivet (2) with the special tool **0 496 521 (00 2 230)**.
- Tighten down screw (1).

Front wheel arch cover to front bumper panel

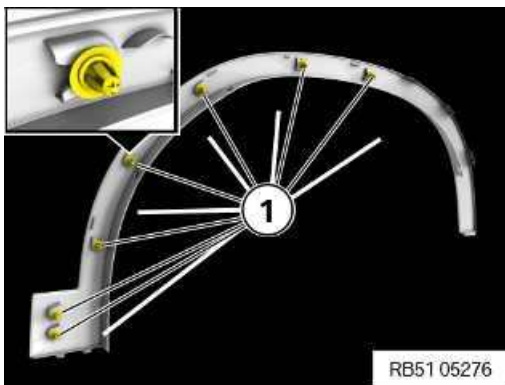
Hexagon screw for thermoplastic plastic		Tightening torque	2,6 Nm
---	--	-------------------	--------

33 – Partially install both front wheel arch trims



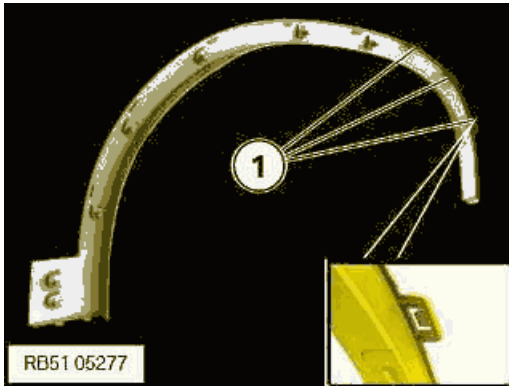
NOTICE

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

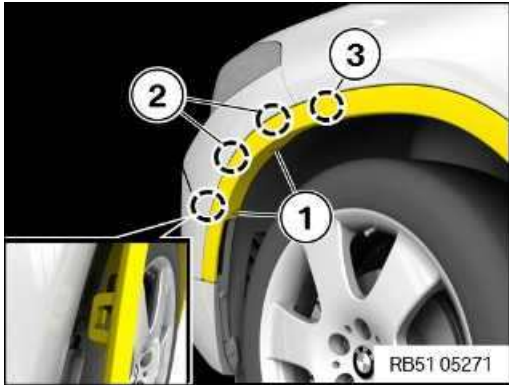


► Partly install the front wheel arch trim

- Check clips (1) for damage, and replace if necessary.

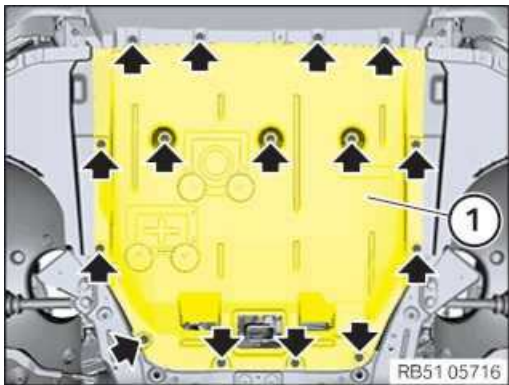


- Check the retaining lugs (1) for damage and replace the front wheel arch trim where required.



- Clip the front wheel arch trim into the clip (3) in the area of the bumper panel and into the latch mechanisms (2).
- Mount blind rivet (1) using the special tool **0 496 521 (00 2 230)**.

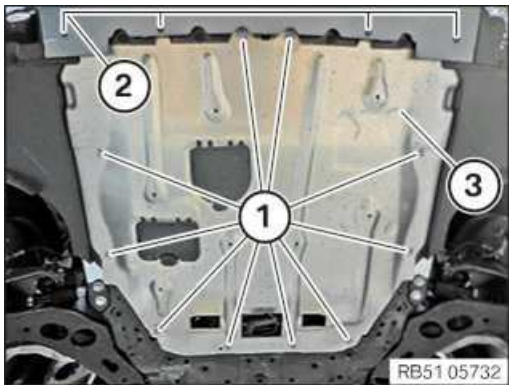
34 – Installing the front underbody protection



- Guide the front underbody protection (1) in under the bumper panel and position it at the screw points.
- Tighten screws (arrows).

Underbody protection front

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



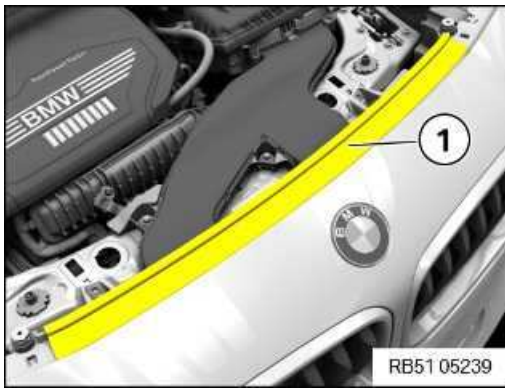
Equipment specification with metal underride guard:

- Guide in and attach the underride guard (3).
- Tighten down screws (1) and (2).

Underbody protection front

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

35 – Install the center front bonnet seal



- Press the centre front bonnet seal (1) down into the guide.
- Make sure the centre front bonnet seal (1) is fitted correctly.

36 – Install both bonnet seals on the side



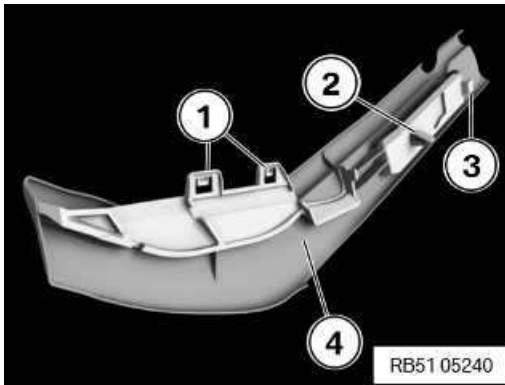
NOTICE

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

► Installing seal for side bonnet

Check

- Check latch mechanisms (1) and (2) and also the guide (3) on the bonnet seal on the side (4) for damage.

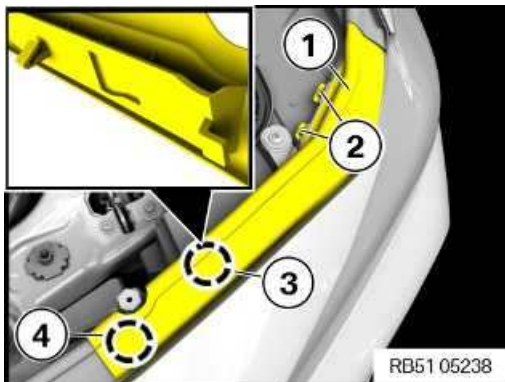


Result

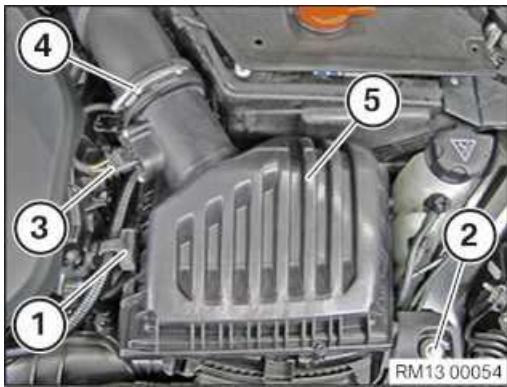
» Latch mechanisms (1), (2) or the guide (3) are damaged.

Measure

- Renew the bonnet seal on the side (4).
- Insert the bonnet seal on the side (1) in the guide (4).
- Clip in the bonnet seal on the side (1) in the inner latch mechanism (3) and the outer latch mechanisms (2).



37 – Installing intake silencer housing



- Insert the intake silencer housing (5) into the rubber mounts and install it. Intake filter housing (5) must engage audibly.
- Tighten down screw (2).

Intake silencer housing to lock bridge

M6X30		Tightening torque	8 Nm
-------	--	-------------------	------

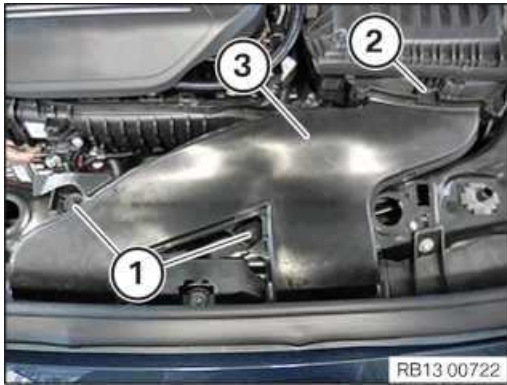
- Tighten clamp (4).

Clean air pipe to intake silencer housing

Clamp		Tightening torque	3 Nm
-------	--	-------------------	------

- Connect and lock the connector (3). The connector (3) must engage audibly.
- Insert and install the holder (1).

38 – Install the intake neck for the intake filter housing



- Insert and install the intake neck (3). The lock (2) must engage audibly.
- Tighten nuts (1).

Intake neck to cross connection

M6		Tightening torque	8 Nm
----	--	-------------------	------

39 – Disconnecting all battery earth leads



- See additional information.

40 – Evacuate and fill air conditioning

- See additional information.

41 – Fill and bleed the coolant circuit

- Filling and bleed the high-temperature coolant circuit



- See additional information.

Additional Information

Overview of Tightening Torques

Charge air cooler to coolant radiator

Used in step [21](#)

M6x12		Tightening torque	6 Nm
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Brake air duct to bracket

Used in step [21](#)

Screw		Tightening torque	4 Nm
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Fan cowl on radiator

Used in step [23](#)

M6X12		Tightening torque	6 Nm
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Cross connection to carrier support

Used in step [24](#)

Screws M6x20		Tightening torque	11,8 Nm
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Screw connection for rubber mount of coolant radiator to coolant radiator

Used in step [24](#)

Bolt to rubber mount		Tightening torque	8 Nm
----------------------	--	-------------------	------

Air duct to upper connection

Used in step [24](#) [26](#)

M6x20 screw		Tightening torque	11,8 Nm
-------------	--	-------------------	---------

Bracing strut to upper connection

Used in step [24](#)

M8x20 screw		Tightening torque	28 Nm
-------------	--	-------------------	-------

Refrigerant line on the air conditioning condenser/bracket

Used in step [25](#)

M6		Tightening torque	8 Nm
----	--	-------------------	------

Air duct to deformation element

Used in step [26](#)

M6x20 screw		Tightening torque	4,6 Nm
-------------	--	-------------------	--------

Bracing strut to top front bumper support or to top connection

Used in step [26](#) [27](#)

M6x20 screw		Tightening torque	11,8 Nm
-------------	--	-------------------	---------

Front top bumper support to top deformation element

Used in step [27](#)

Hexagon screw M8x95		Tightening torque	28 Nm
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Fanfare to front top bumper support

Used in step [27](#)

Hexagon screw		Tightening torque	11,8 Nm
---------------	--	-------------------	---------

Bumper panel to headlight

Used in step [29](#)

Thermoplastic multi-purpose bolt		Tightening torque	2,5 Nm
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Bumper panel to air duct

Used in step [29](#)

Screw M6		Tightening torque	4,6 Nm
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Front bumper panel to front side panel

Used in step [29](#)

Screw TS5X35		Tightening torque	3 Nm
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Front bumper panel to underbody panelling

Used in step [29](#)

Thermoplastic hexagon screw		Tightening torque	2,5 Nm
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Washer fluid reservoir to body

Used in step [31](#)

M6x20		Tightening torque	8 Nm
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Front wheel arch cover to front bumper panel

Used in step [32](#)

Hexagon screw for thermoplastic plastic		Tightening torque	2,6 Nm
---	--	-------------------	--------

Underbody protection front

Used in step [34](#)

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

Intake silencer housing to lock bridge

Used in step [37](#)

M6X30		Tightening torque	8 Nm
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Clean air pipe to intake silencer housing

Used in step [37](#)

Clamp		Tightening torque	3 Nm
-------	--	-------------------	------

Intake neck to cross connection

Used in step [38](#)

M6		Tightening torque	8 Nm
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Overview of Special Tools

0 496 521 (00 2 230) Pliers



Common

Used in step [32](#) [33](#)

Usage (Blind rivet pliers for plastic rivets) For shaft diameters of 3.5 mm, 3.9 mm and 4.5 mm

Included in the tool or work

Storage location C25

Replaced by

In connection with

SI-Number 01 17 08 (478)

Links

General repair instructions

Used in step

[64 50 ... Note for handling R134a refrigerant](#)

[64 53 ... Instructions for replacement of air conditioning capacitors and radiator/coolers](#)

[64 52 ... Instructions for opening and part exchange in refrigerant circuit](#)

Repair instructions

Used in step

[64 50 010 Extract, evacuate and fill air conditioning system](#)

1 40

[64 50 010 Drawing off, evacuating and filling air conditioning \(R134a\)](#)

1 40

[64 50 010 Drawing off, evacuating and filling air conditioning \(R134a\)](#)

1 40

[64 50 ... Notes on repairs to air conditioning](#)

1 40

[64 50 010 Drawing off, evacuating and filling air conditioning \(R1234yf\)](#)

1 40

[64 50 ... Safety information for handling refrigerant R1234yf](#)

1 40

[64 50 ... Safety information for handling tetrafluorethane refrigerant R134a](#)

1 40

[64 50 ... Safety informations for handling refrigerant oil](#)

1 40

[61 20 900 Disconnecting and connecting battery earth lead](#)

2 39

[61 20 900 Disconnecting and connecting battery earth lead](#)

2 39

[61 20 900 Disconnecting and connecting battery earth lead](#)

2 39

[61 20 900 Disconnecting and connecting battery earth lead](#)

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[61 20 900 Disconnecting and connecting battery earth lead](#)

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[61 20 900 Disconnecting and connecting battery earth lead](#)

2 39

[61 20 900 Disconnecting and connecting the battery earth lead \(all battery earth leads\)](#)

2 39

[61 20 900 Disconnecting and connecting the battery earth lead \(all battery earth leads\)](#)

2 39

[61 20 900 Disconnecting and connecting battery earth lead](#)

2 39

[61 20 900 Disconnecting and connecting the battery earth lead \(all battery earth leads\)](#)

2 39

[61 20 900 Disconnect and connect battery earth lead \(Plug-in Hybrid Electric Vehicle\)](#)

2 39

[61 20 900 Disconnecting and connecting battery earth lead](#)

2 39

[61 20 900 Disconnecting and connecting battery earth lead](#)

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[61 20 900 Disconnecting and connecting battery earth lead](#)

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[61 20 900 Disconnecting and connecting battery earth lead](#)

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[61 20 900 Disconnecting and connecting battery earth lead](#)

2 39

[61 20 900 Disconnecting and connecting the battery earth lead \(all battery earth leads\)](#)

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[61 20 900 Disconnecting and connecting battery earth lead](#)

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[61 20 900 Disconnecting and connecting battery earth lead](#)

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[61 20 900 Disconnecting and connecting battery earth lead](#)

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[61 20 900 Disconnecting and connecting battery earth lead](#)

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[61 20 900 Disconnecting and connecting battery earth lead](#)

2 39

[61 20 900 Disconnecting and connecting battery earth lead](#)

2 39

[17 00 ... Notes for working on cooling system](#)

20

[17 00 008 Draining and topping up coolant for high-temperature circuit](#)

41

[17 00 008 Draining and topping up coolant for high-temperature circuit](#)

41

[illegible]

17 00 039 Bleeding the cooling system and checking watertightness using a special tool (coolant circuit for high temperatures)	41
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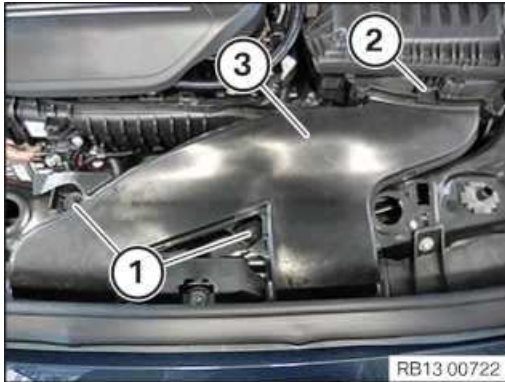
[64 50 ... Safety information for handling refrigerant R1234yf](#)

Operating materials	Used in step
Main group 17	20

17 11 100 Removing and installing/replacing coolant expansion tank

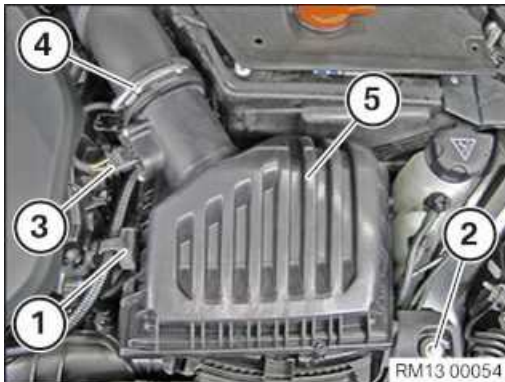
PRELIMINARY WORK

1 – Remove the intake neck for intake silencer housing



- Loosen nuts (1).
- Loosen the lock (2).
- Guide the intake neck (3) out and remove it.

2 – Removing intake silencer housing



- Loosen the holder (1).
- Loosen screw (2).
- Unlock and loosen connector (3).
- Unfasten clamp (4).
- Pull out and remove the intake silencer housing (5) from the rubber mounts towards the top.

MAIN WORK

3 – Remove coolant expansion tank



WARNING

Hot surfaces.

Risk of burning!

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

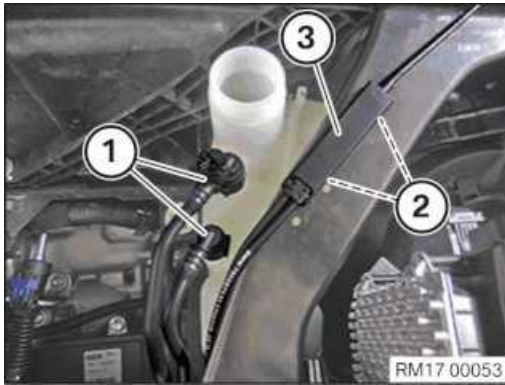


TECHNICAL INFORMATION

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



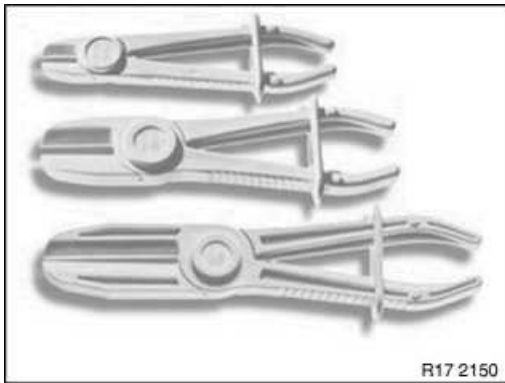
- Loosen sealing cap (1).
- Draw off the coolant **with a standard pump**.



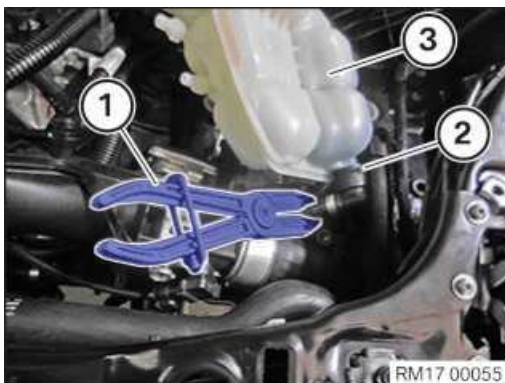
- Unlock and release coolant line (1).
- Catch and dispose of escaping coolant.
- Unlock the locks (2).
- Feed out clutch with Bowden cable (3) and set aside.



- Loosen screw (1).
- Carefully guide out coolant expansion tank (2) and place to one side.



- Use commercially available pinch-off tools to pinch off the coolant hoses.



- Fasten clamping pliers (1) to coolant line (2).
- Unlock and loosen coolant line (2).
- Catch and dispose of escaping coolant.
- Thread out coolant expansion tank (3) and remove.

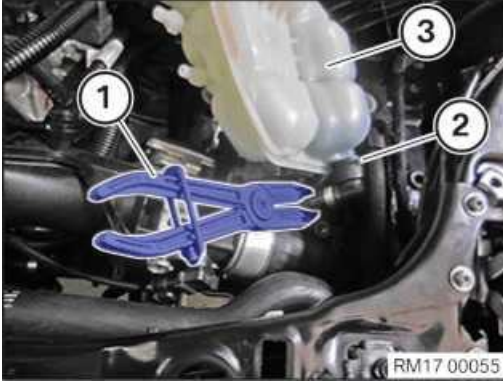
4 – Installing coolant expansion tank

Follow notes for repair work on the cooling system.

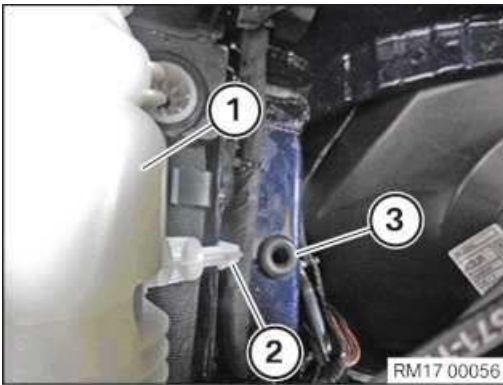
For additional information see:

Main group 17

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



- Connect the coolant line (2) to the coolant expansion tank (3) and lock it in position.
- Make sure that the cooling line (2) engages audibly.
- Release clamping pliers (1) from the coolant line (2).



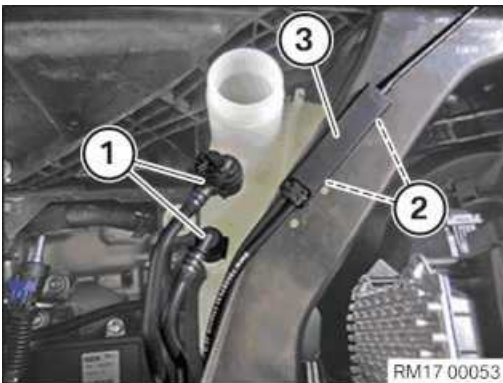
- Feed in the coolant expansion tank (1) at the side.
- Feed coolant expansion tank (1) with guide pin (2) into the guide (3).



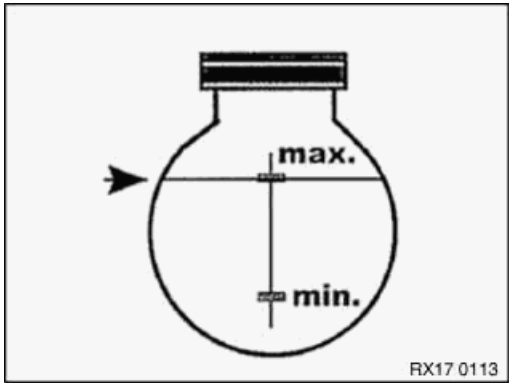
- Position the coolant expansion tank (2).
- Tighten down screw (1).

Coolant expansion tank to body

M6x20		Tightening torque	9 Nm
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- Connect and lock the coolant lines (1).
- Make sure that you can hear the coolant lines (1) engage.
- Feed in and install the clutch with the Bowden cable (3).
- Locks (2) must engage audibly.



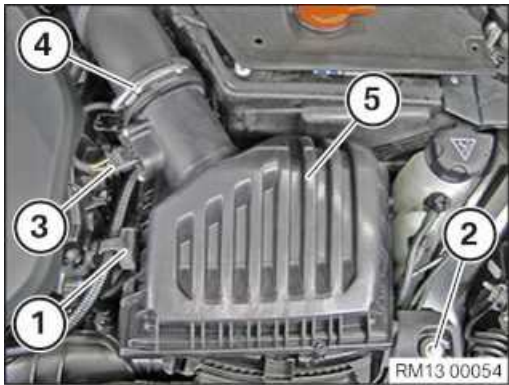
- Adjust the coolant level to the **maximum mark**.



- Shut sealing cap (1).

POSTPROCESSES

5 – Installing intake silencer housing



- Insert the intake silencer housing (5) into the rubber mounts and install it. Intake filter housing (5) must engage audibly.
- Tighten down screw (2).

Intake silencer housing to lock bridge

M6X30		Tightening torque	8 Nm
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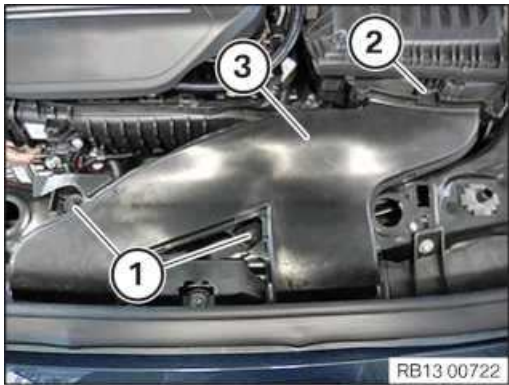
- Tighten clamp (4).

Clean air pipe to intake silencer housing

Clamp		Tightening torque	3 Nm
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- Connect and lock the connector (3). The connector (3) must engage audibly.
- Insert and install the holder (1).

6 – Install the intake neck for the intake filter housing



- Insert and install the intake neck (3). The lock (2) must audibly engage.
- Tighten nuts (1).

Intake neck to cross connection

M6		Tightening torque	8 Nm
----	--	-------------------	------

Additional Information

Overview of Tightening Torques

Coolant expansion tank to body

Used in step [4](#)

M6x20		Tightening torque	9 Nm
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Intake silencer housing to lock bridge

Used in step [5](#)

M6X30		Tightening torque	8 Nm
-------	--	-------------------	------

Clean air pipe to intake silencer housing

Used in step [5](#)

Clamp		Tightening torque	3 Nm
-------	--	-------------------	------

Intake neck to cross connection

Used in step [6](#)

M6		Tightening torque	8 Nm
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Links

Repair instructions

Used in step

[17 00 ... Instructions for working on cooling system](#)

[4](#)

Operating materials

Used in step

[Main group 17](#)

[4](#)

17 11 035 Removing and installing/replacing fan cowl with electric fan



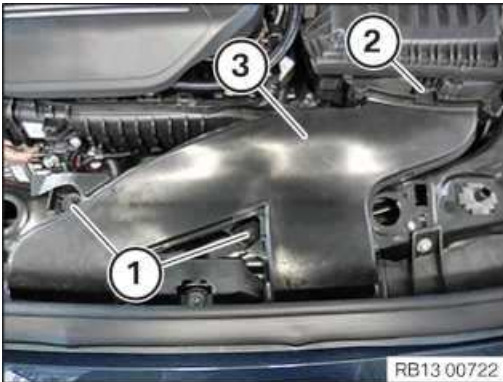
TECHNICAL INFORMATION



- 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!

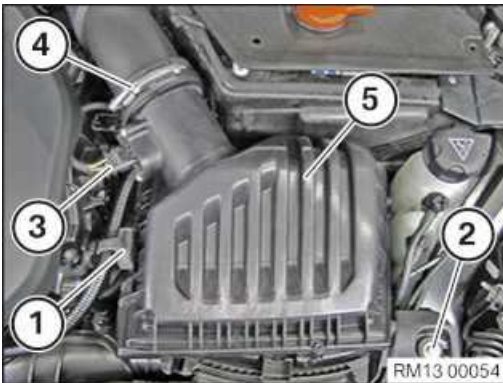
PRELIMINARY WORK

1 – Remove the intake neck for intake silencer housing



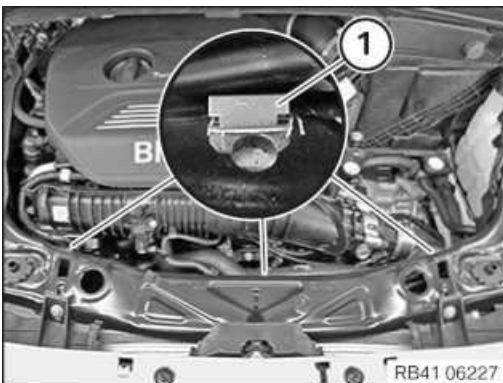
- Loosen nuts (1).
- Loosen the lock (2).
- Guide the intake neck (3) out and remove it.

2 – Removing intake silencer housing

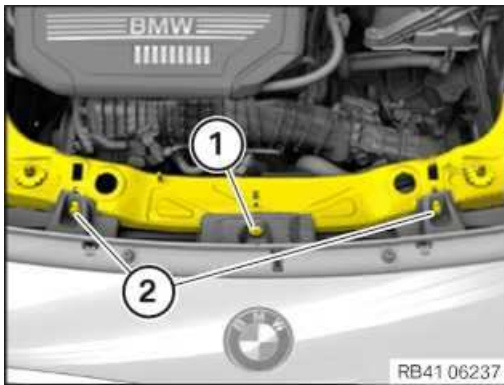


- Loosen the holder (1).
- Loosen screw (2).
- Unlock and loosen connector (3).
- Unfasten clamp (4).
- Pull out and remove the intake silencer housing (5) from the rubber mounts towards the top.

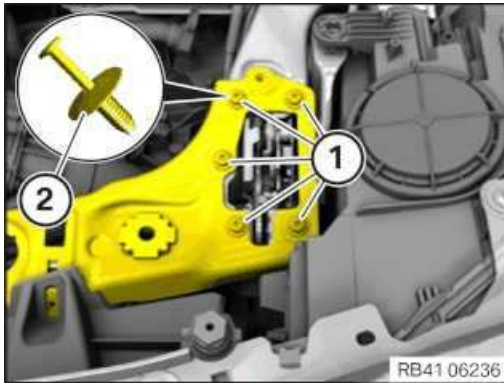
3 – Remove front cross connection



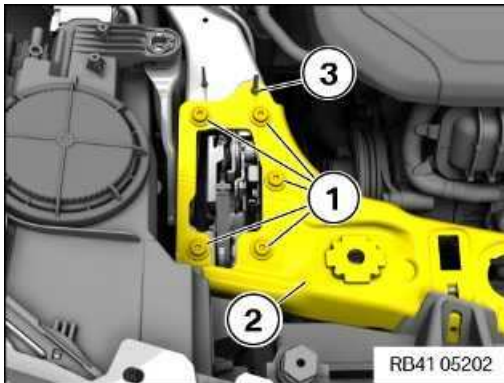
- Detach the clamps (1) for the Bowden cable of the bonnet locks from the cross connection.



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



- Loosen screws (1).
- Lever out expanding rivet (2).



- Loosen screws (1).
- Unclip the front cross connection (2) from the rubber retainer (3) and remove it upward.

MAIN WORK

4 – Removing the fan cowl with electric fan



WARNING

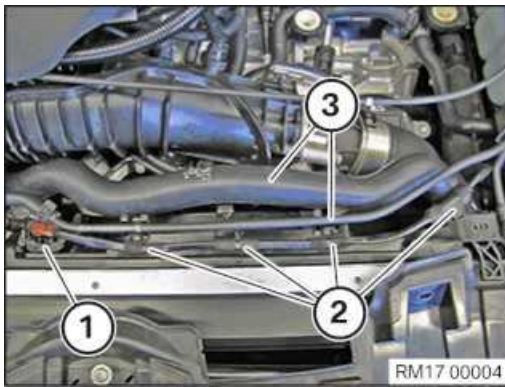
Hot surfaces.

Risk of burning!

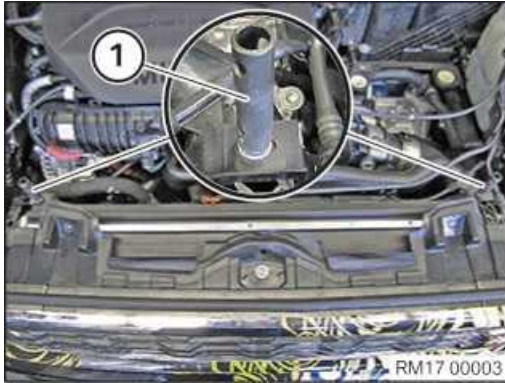
- Perform all work only on components that have cooled down.



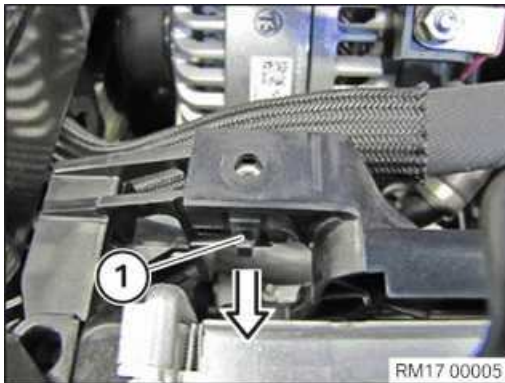
- Feed out and remove the sealing (1) from the radiator.



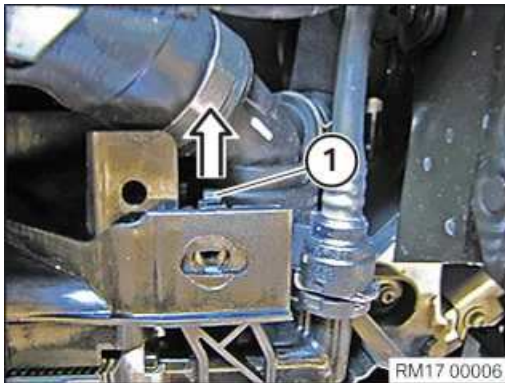
- Unlock plug connection (1) and disconnect.
- Unlock and loosen the clamps (2).
- Feed out connector (1) and place to one side.
- Thread off coolant line (3) and place to the side.



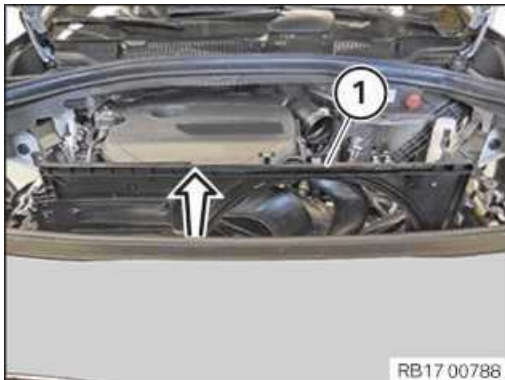
- Loosen screws (1).



- Unlock the right lock (1) on the fan cowl in the direction of the arrow.



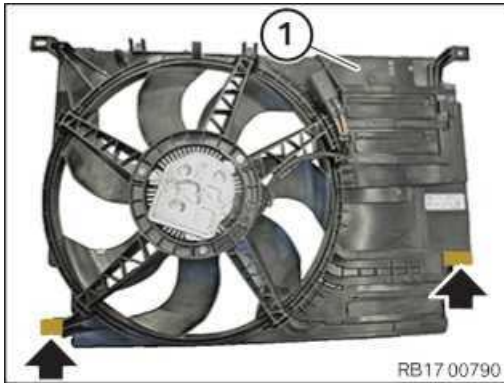
- Unlock the left lock (1) on the fan cowl in the direction of the arrow.



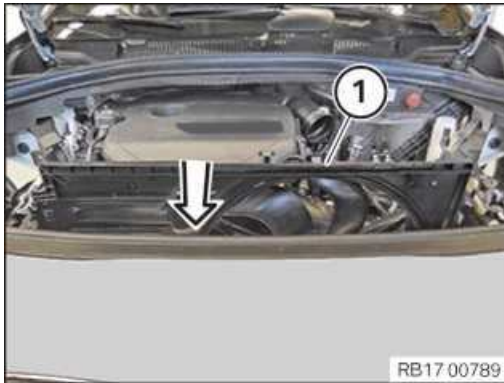
- Guide out fan cowl (1) in direction of arrow and remove.

5 – Installing fan cowl with electric fan

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



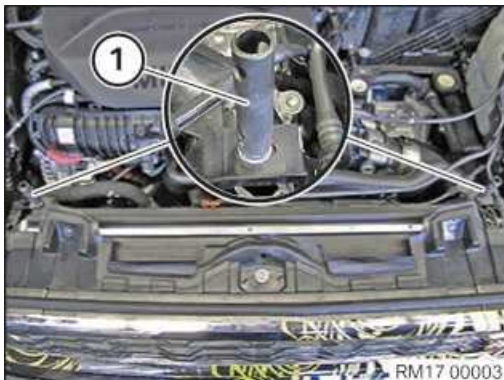
- Feed the guides (arrows) of the fan cowl (1) into the charge air cooler.



- Feed in and install the fan cowl (1) in the direction of the arrow.



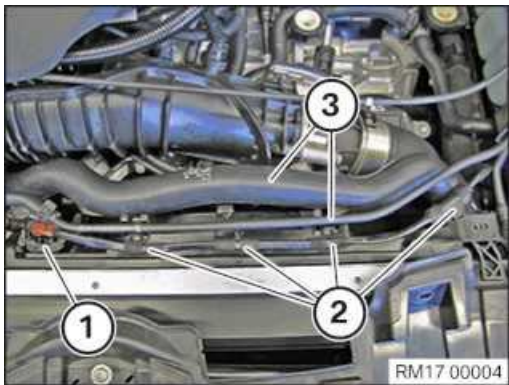
- Lock the left and right locks (arrows).



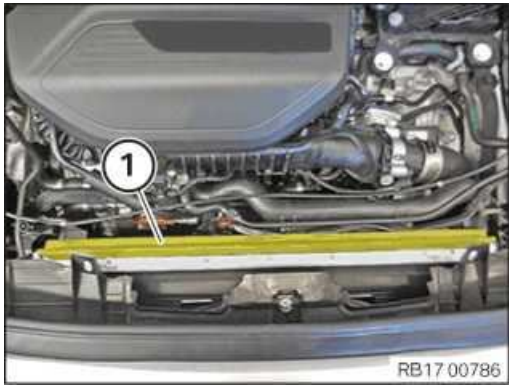
- Tighten the screws (1).

Fan cowl on radiator

M6X12		Tightening torque	6 Nm
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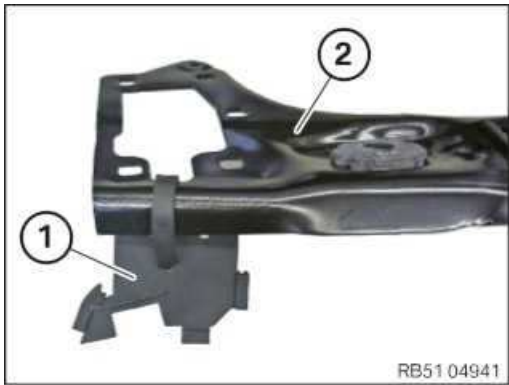
- Connect connectors (1) and lock.
The connector (1) must engage audibly.
- Secure clamps (2).
- Thread in and install coolant line (3).



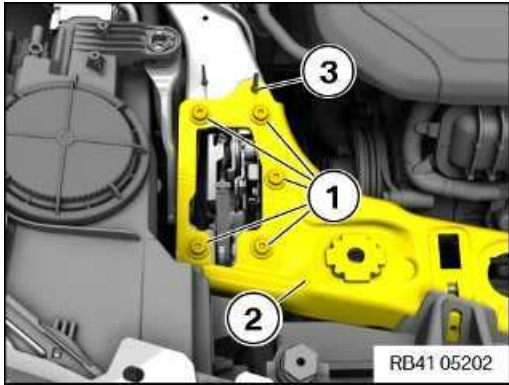
- Guide the sealing (1) on the radiator in and install it.

POSTPROCESSES

6 – Install front cross connection



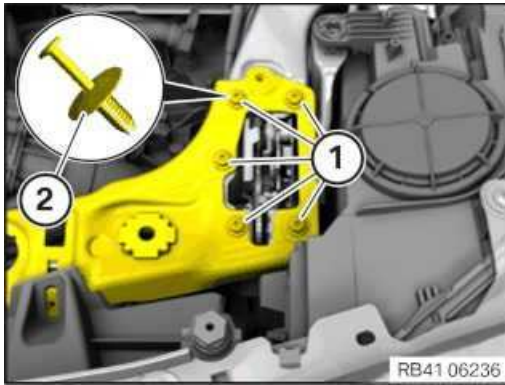
- Right side of vehicle only: Secure spray guard (1) on the cross connection (2) as pictured.



- Position front cross connection (2) and clip front cross connection (2) into the rubber retainer (3) at the same time.
- Tighten the screws (1).

Cross connection to carrier support

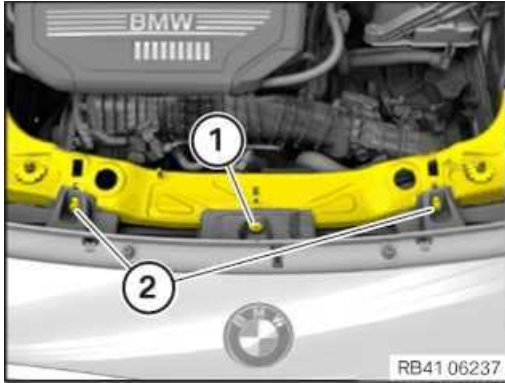
Screws M6x20		Tightening torque	11,8 Nm
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- Tighten the screws (1).

Cross connection to carrier support

Screws M6x20		Tightening torque	11,8 Nm
--------------	--	-------------------	---------



- Position screws (3) on the rubber mounts for the radiator and tighten.

Screw connection for rubber mount of coolant radiator to coolant radiator

Bolt to rubber mount		Tightening torque	8 Nm
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- Tighten down screws (2).

Air duct to upper connection

M6x20 screw		Tightening torque	11,8 Nm
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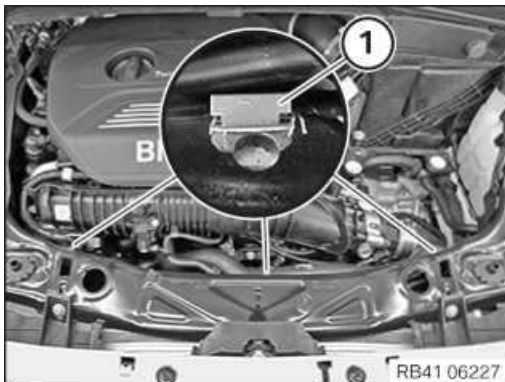
- Tighten down screw (1).

Bracing strut to upper connection

M8x20 screw		Tightening torque	28 Nm
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- Right side of vehicle only: Properly mount spray guard (1) to prevent corrosion.
- Secure spray guard (1) to the bridge with retaining tabs (2).



- Fasten the clamps (1) from the Bowden cable of the bonnet lock on the cross connection.

7 – Installing intake silencer housing



- Insert the intake silencer housing (5) into the rubber mounts and install it. Intake filter housing (5) must engage audibly.
- Tighten down screw (2).

Intake silencer housing to lock bridge

M6X30		Tightening torque	8 Nm
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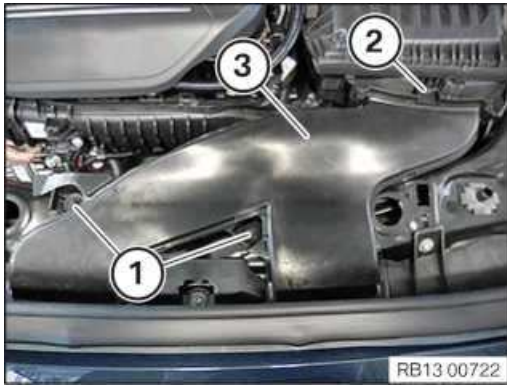
- Tighten clamp (4).

Clean air pipe to intake silencer housing

Clamp		Tightening torque	3 Nm
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- Connect and lock the connector (3). The connector (3) must engage audibly.
- Insert and install the holder (1).

8 – Install the intake neck for the intake filter housing



- Insert and install the intake neck (3). The lock (2) must audibly engage.
- Tighten nuts (1).

Intake neck to cross connection

M6		Tightening torque	8 Nm
----	--	-------------------	------

Additional Information

Overview of Tightening Torques

Fan cowl on radiator			Used in step 5
M6X12		Tightening torque	6 Nm
Cross connection to carrier support			Used in step 6
Screws M6x20		Tightening torque	11,8 Nm
Screw connection for rubber mount of coolant radiator to coolant radiator			Used in step 6
Bolt to rubber mount		Tightening torque	8 Nm
Air duct to upper connection			Used in step 6
M6x20 screw		Tightening torque	11,8 Nm
Bracing strut to upper connection			Used in step 6
M8x20 screw		Tightening torque	28 Nm
Intake silencer housing to lock bridge			Used in step 7
M6X30		Tightening torque	8 Nm
Clean air pipe to intake silencer housing			Used in step 7
Clamp		Tightening torque	3 Nm

M6		Tightening torque	8 Nm
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64 53 ... Instructions for replacement of air conditioning capacitors 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.

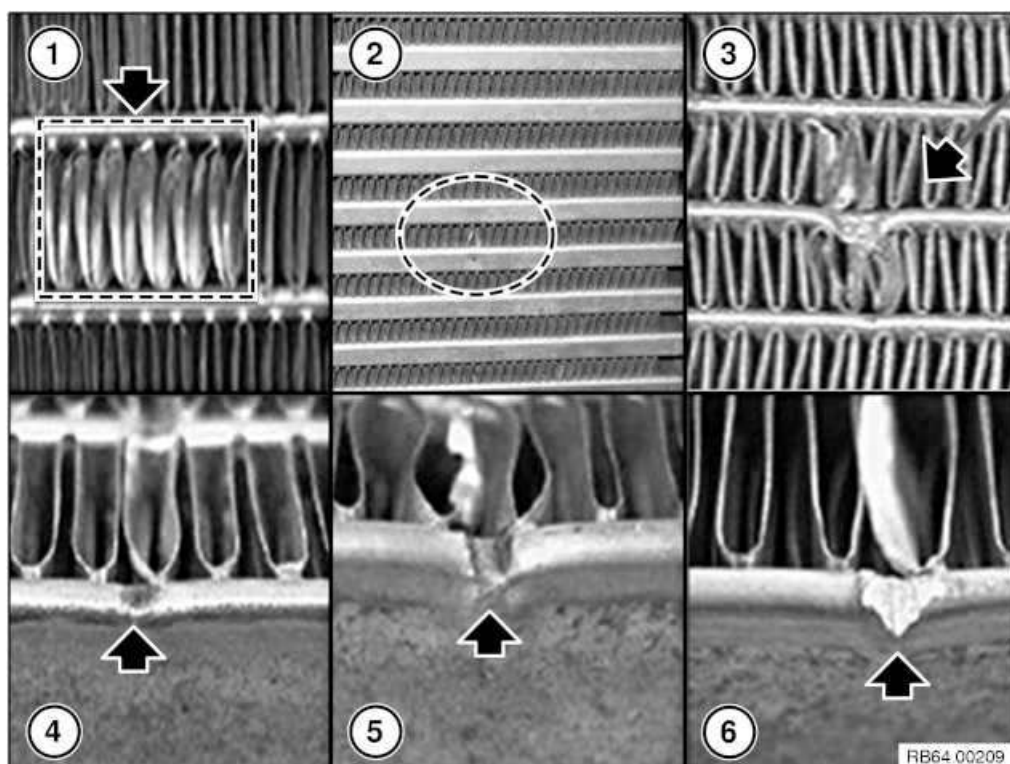
As long as tightness/function are not degraded and an adequate distance of a few mm between the radiator and air conditioning condenser remains in place, **this is not damage in either case.**

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

Note:

The deformations shown in Fig.Â (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.

17 22 010 Removing and installing/replacing heat exchanger for automatic transmission



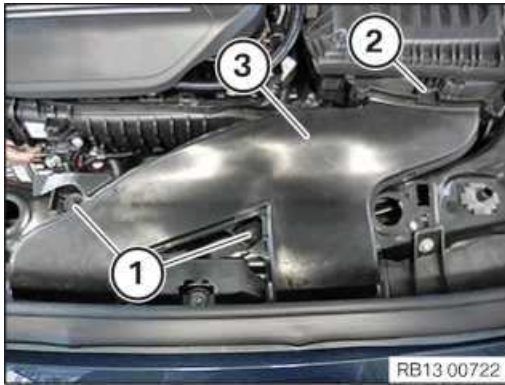
TECHNICAL INFORMATION



- 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!

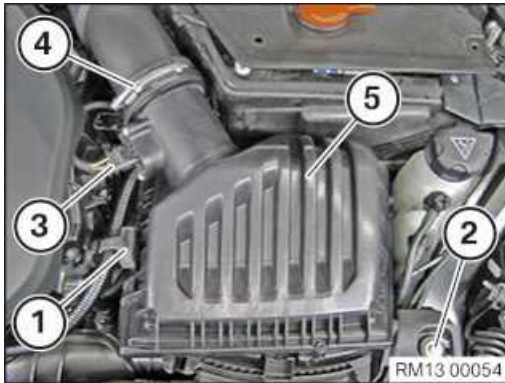
PRELIMINARY WORK

1 – Remove the intake neck for intake silencer housing



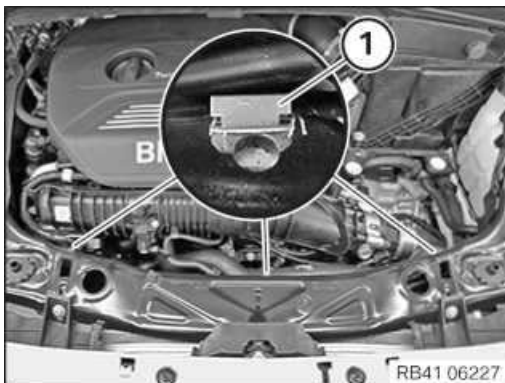
- Loosen nuts (1).
- Loosen the lock (2).
- Guide the intake neck (3) out and remove it.

2 – Removing intake silencer housing

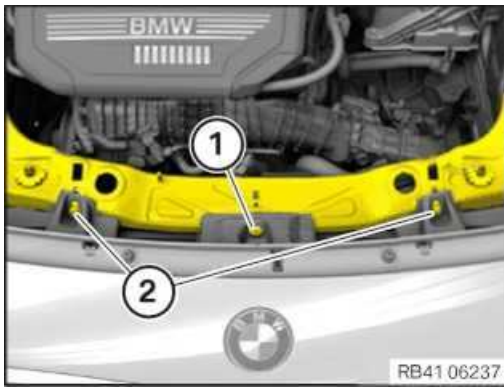


- Loosen the holder (1).
- Loosen screw (2).
- Unlock and loosen connector (3).
- Unfasten clamp (4).
- Pull out and remove the intake silencer housing (5) from the rubber mounts towards the top.

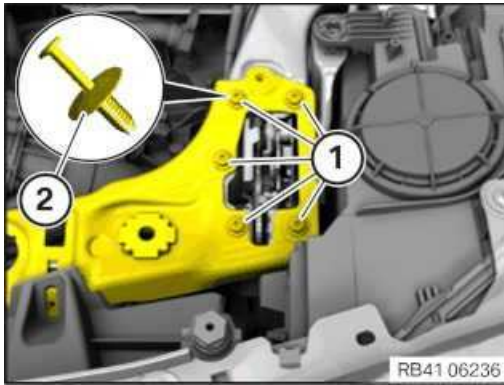
3 – Remove front cross connection



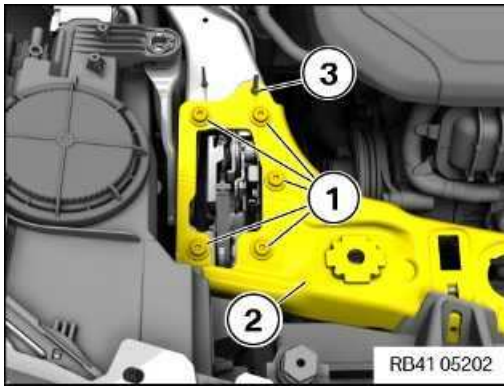
- Detach the clamps (1) for the Bowden cable of the bonnet locks from the cross connection.



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

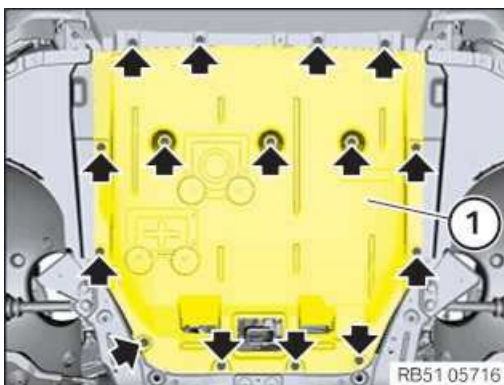


- Loosen screws (1).
- Lever out expanding rivet (2).

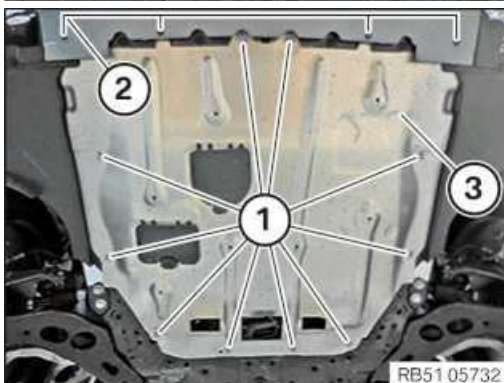


- Loosen screws (1).
- Unclip the front cross connection (2) from the rubber retainer (3) and remove it upward.

4 – Removing the front underbody protection



- Remove screws (arrows).
- Thread out and remove the front underbody protection (1) from the bumper panel.



- **Equipment specification with metal underride protection:**
- Loosen screws (1) and (2).
- Thread out and remove the underride protection (3).

5 – Draining coolant



WARNING

Hot fluids.

Risk of scalding!

- Conduct all work in the vehicle wearing 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.

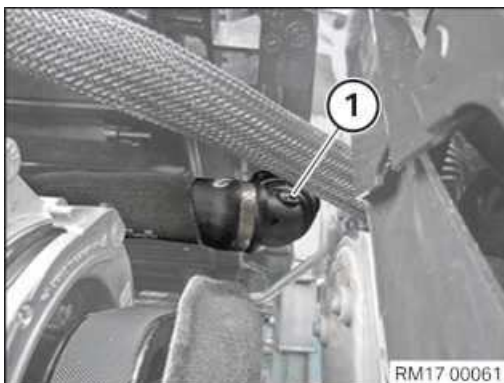


TECHNICAL INFORMATION

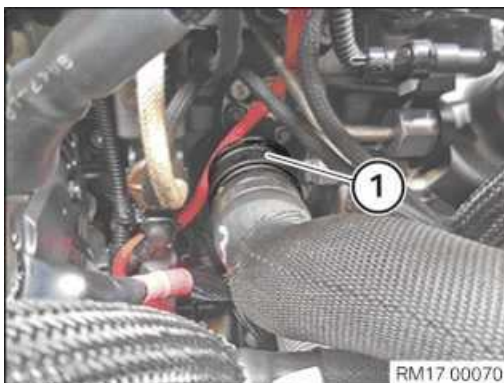
Collect and dispose of emerging fluids. Observe country-specific waste disposal regulations.



- Loosen sealing cap (1).



- Unlock and disconnect the coolant line (1) from the radiator on the right.
- Catch and dispose of escaping coolant.



- Unlock the coolant line (1) and pull it off the connecting branch.
- Catch and dispose of escaping coolant.

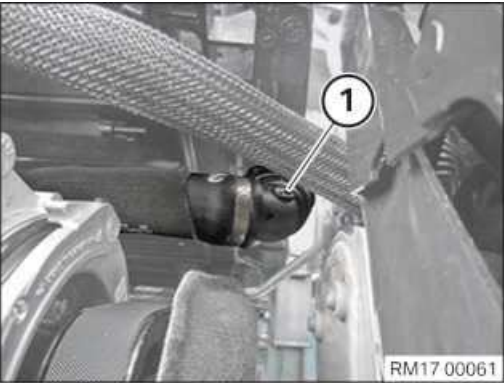
POSTPROCESSES

6 – Connect the coolant line

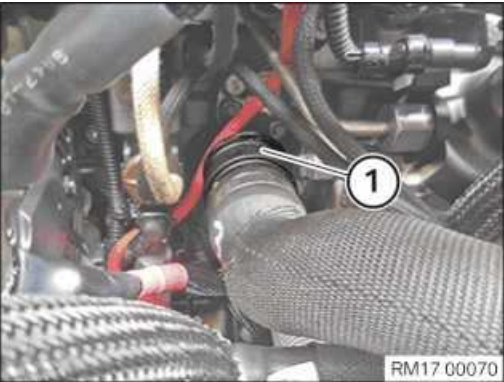
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TECHNICAL INFORMATION

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



- Connect the right coolant line (1) to the radiator and lock audibly.

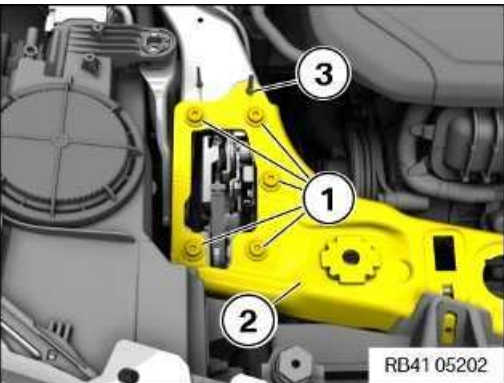


- Connect the coolant line (1) to the connecting branch and lock audibly.

7 – Install front cross connection



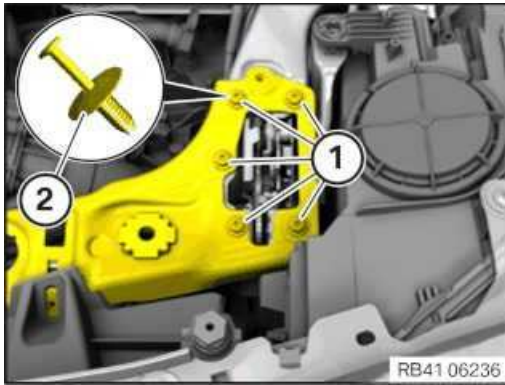
- Right side of vehicle only: Secure spray guard (1) on the cross connection (2) as pictured.



- Position front cross connection (2) and clip front cross connection (2) into the rubber retainer (3) at the same time.
- Tighten the screws (1).

Cross connection to carrier support

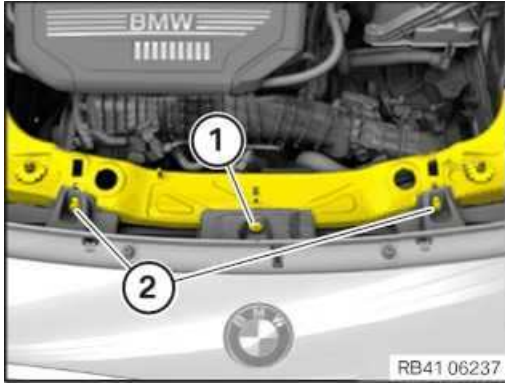
Screws M6x20		Tightening torque	11,8 Nm
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- Tighten the screws (1).

Cross connection to carrier support

Screws M6x20		Tightening torque	11,8 Nm
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- Position screws (3) on the rubber mounts for the radiator and tighten.

Screw connection for rubber mount of coolant radiator to coolant radiator

Bolt to rubber mount		Tightening torque	8 Nm
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- Tighten down screws (2).

Air duct to upper connection

M6x20 screw		Tightening torque	11,8 Nm
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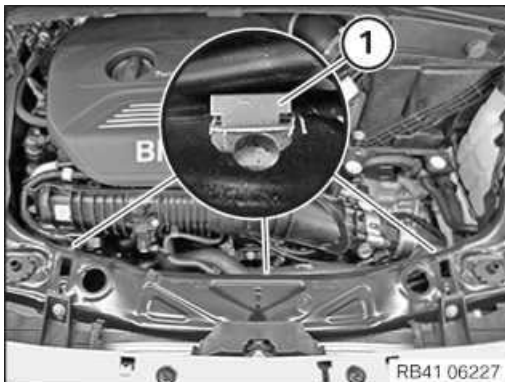
- Tighten down screw (1).

Bracing strut to upper connection

M8x20 screw		Tightening torque	28 Nm
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- Right side of vehicle only: Properly mount spray guard (1) to prevent corrosion.
- Secure spray guard (1) to the bridge with retaining tabs (2).



- Fasten the clamps (1) from the Bowden cable of the bonnet lock on the cross connection.

8 – Installing intake silencer housing



- Insert the intake silencer housing (5) into the rubber mounts and install it.
Intake filter housing (5) must engage audibly.
- Tighten down screw (2).

Intake silencer housing to lock bridge

M6X30		Tightening torque	8 Nm
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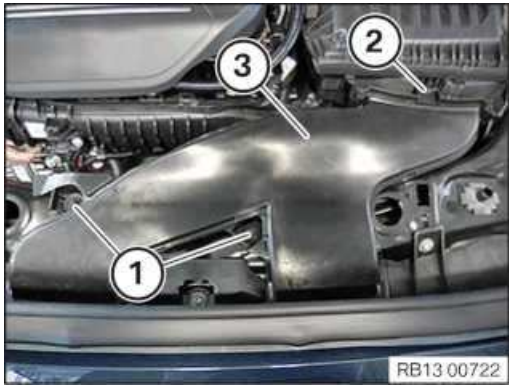
- Tighten clamp (4).

Clean air pipe to intake silencer housing

Clamp		Tightening torque	3 Nm
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- Connect and lock the connector (3).
The connector (3) must engage audibly.
- Insert and install the holder (1).

9 – Install the intake neck for the intake filter housing



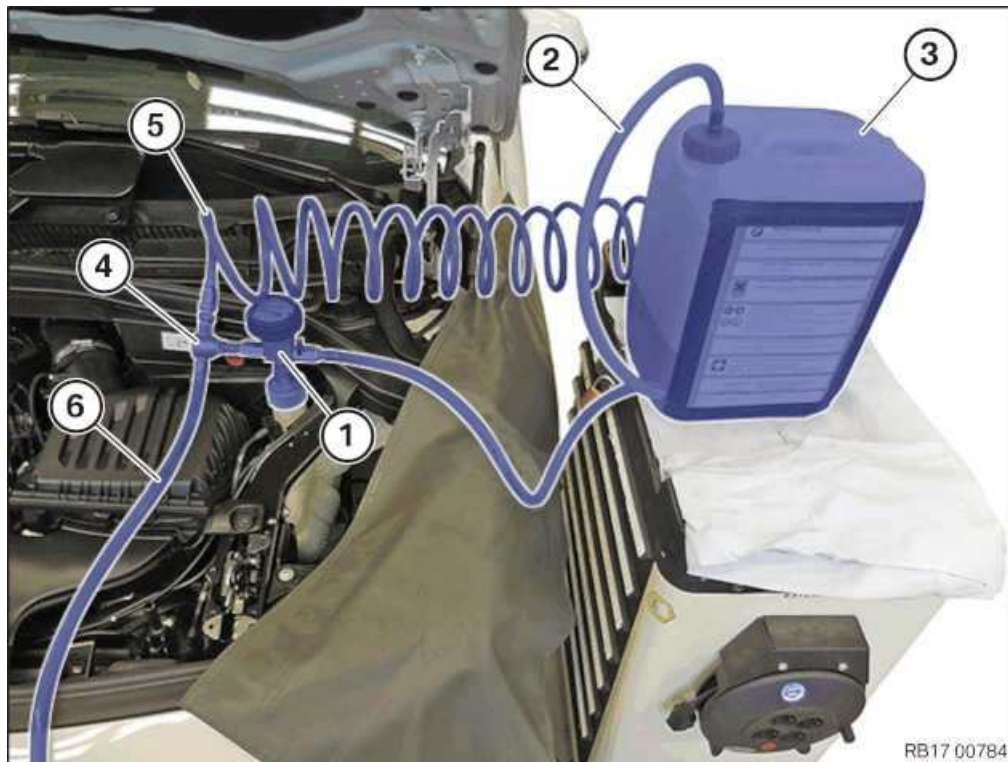
- Insert and install the intake neck (3).
The lock (2) must engage audibly.
- Tighten nuts (1).

Intake neck to cross connection

M6		Tightening torque	8 Nm
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10 – Filling the coolant circuit by means of the vacuum filler device

Vacuum filler device



Vacuum filler device - connected to the high-temperature 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 Out-going hose (lead out-going hose into 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

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

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

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

The 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.

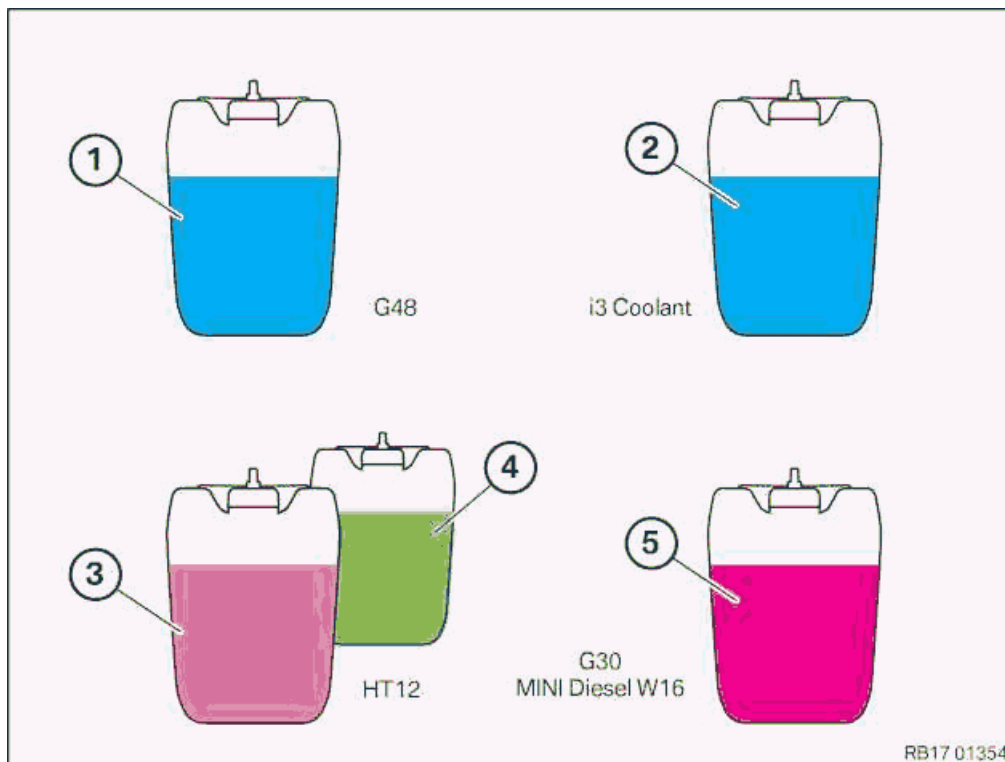


TECHNICAL INFORMATION

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 vacuum filler device container



Choose the correct coolant for filling

A vehicle must be filled with the coolant with which it is delivered ex works

- 1. G48 (Blue)** G48 must not be mixed with the i3Coolant or the G30 MINI diesel fuel W16.
- 2. i3 coolant (blue)** is used only for the i3 heater circuit. i3 coolant must not be filled in the other coolant circuits or mixed with the other coolants.
- 3. HT12 (Pink)** HT12 must not be mixed with the i3 coolant or the G30 MINI diesel fuel W16.
- 4. HT12 (Green)** HT12 must not be mixed with the i3 coolant or the G30 MINI diesel fuel W16.
- 5. G30 (Pink)** must be used only for the **MINI diesel fuel W16**. G30 must not be filled in the other coolant circuits or mixed with the other coolants.



RISK OF DAMAGE

Damage to the engine.

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

- 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 :

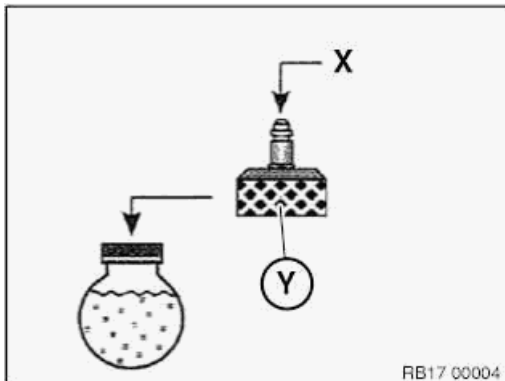
Type	Engine	Adapter (Y) from 17 0 100
F39/F45/F46/F48	B46/B48/B38/B47/B37	17 0 109

- 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.

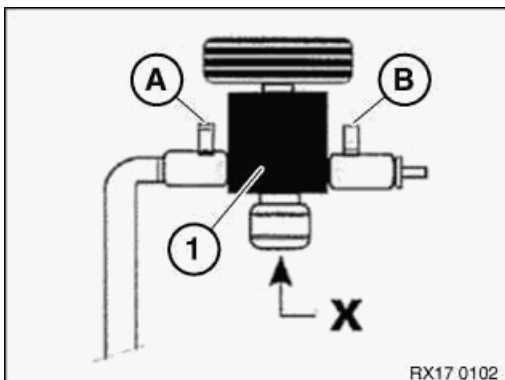
Coolant capacity

B47C20O0	7 l
B47C20T0	7,4 l
B47C20O1	7 l

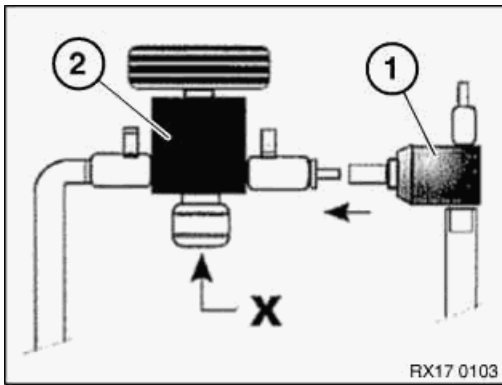
Expendable materials: Technically suitable antifreeze and corrosion inhibitor



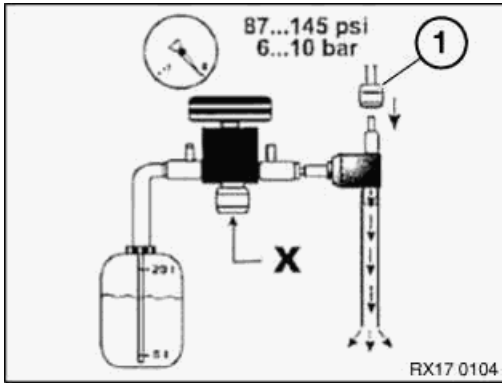
- Connect the selected adapter (Y) to the coolant expansion tank.
- Connect vacuum filler device to connection (X) of the adapter.



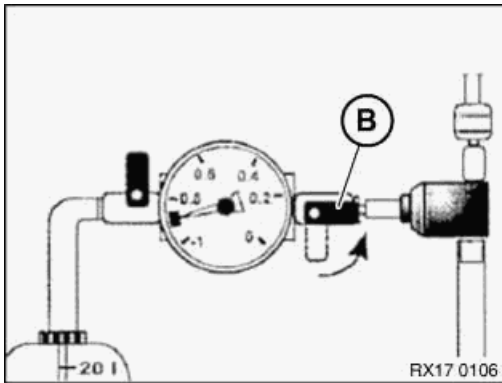
- Make sure that the shutoff valves (A) and (B) of the vacuum filler device (1) are closed.
- Connect and lock connection (X) to the coolant expansion tank.



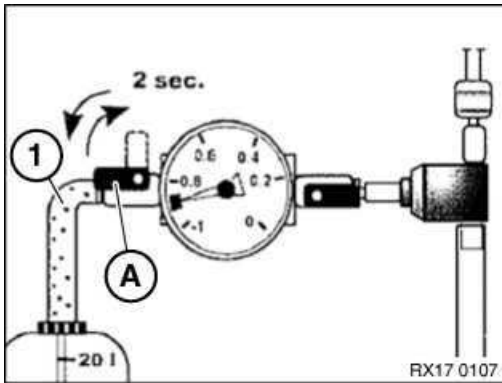
- Connect Venturi nozzle (1) to the vacuum filler device (2).
(X) is the connection on the coolant expansion tank.



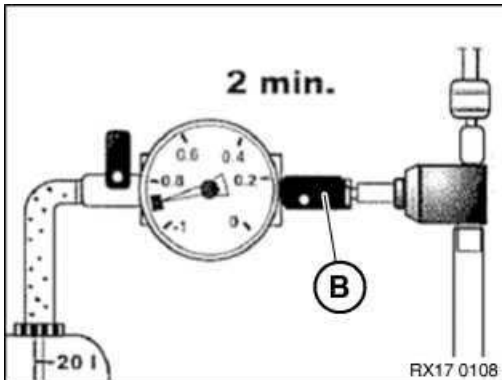
- Connect compressed air (1).
(X) is the connection to the coolant expansion tank.



- 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.



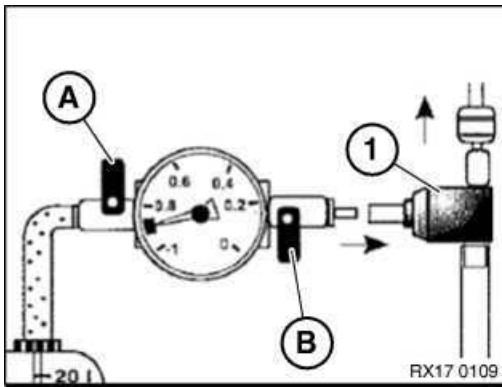
- Check the coolant hoses for porosity and renew porous coolant hoses as required.



TECHNICAL INFORMATION

The coolant hoses contract during vacuum build-up.

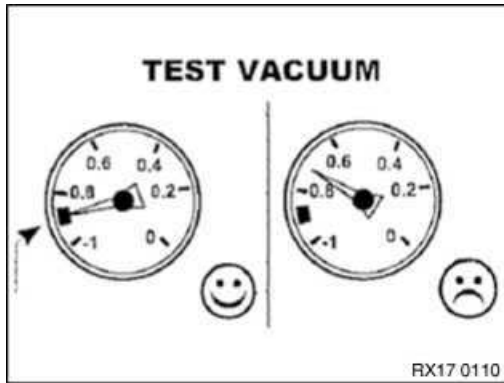
- After a vacuum of -0.7 to -0.95 bar has been reached in the coolant circuit (duration approximately 2 minutes), close the shutoff valve (B).



- Check whether the shut-off 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

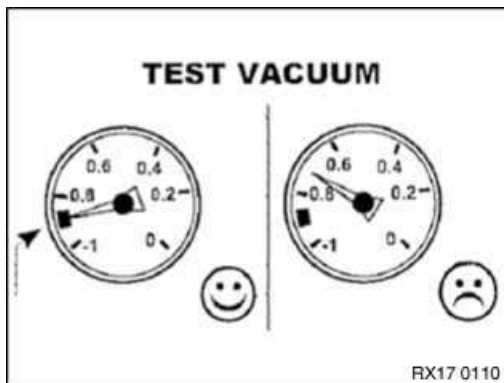
» Vacuum drops.

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.

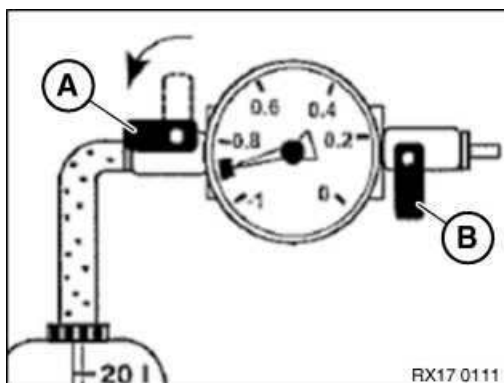


Result

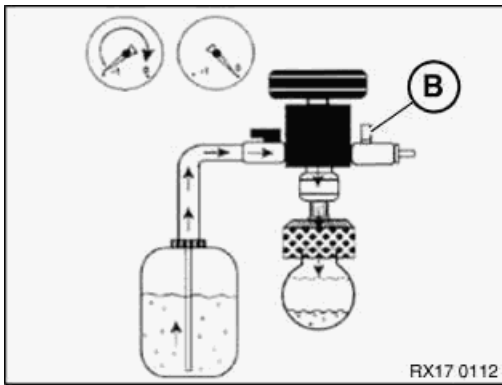
» Vacuum remains constant.

Measure

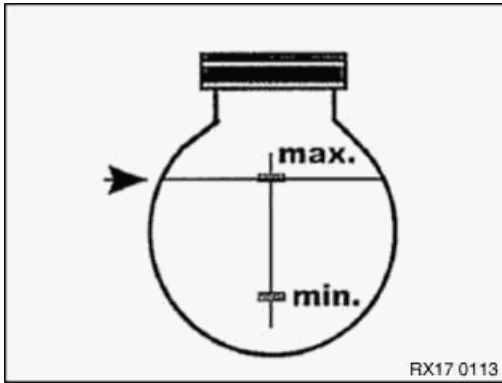
- Continue with filling.



- 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. In order to do so, open shutoff valve (B).



- Remove the vacuum filler device with the adapter from the coolant expansion tank.
- Adjust the coolant level to 700 ml above the maximum mark.
- After filling the cooling system with the vacuum filler device perform the cooling system bleeding routine additionally.

11 – Vent cooling system

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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 damage and/or engine damage.

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

The 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.

- Fill the coolant circuit with the vacuum filler device.
- 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.
- Switch the ignition on.
- Adjust the heating to **maximum** temperature and adjust the blower to the **lowest** stage.
- Press the accelerator pedal down to the limit position for 10 seconds.
- Start engine and run at idle speed.
The electrical valve and the electric coolant pump are automatically switched on.
- 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.



TECHNICAL INFORMATION

Carry out the following steps "Press accelerator pedal" and "Hold idle speed" 10 times. Continue to top up the filling level in the coolant expansion tank to the maximum mark.

- 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.
- 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.
- 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.



TECHNICAL INFORMATION

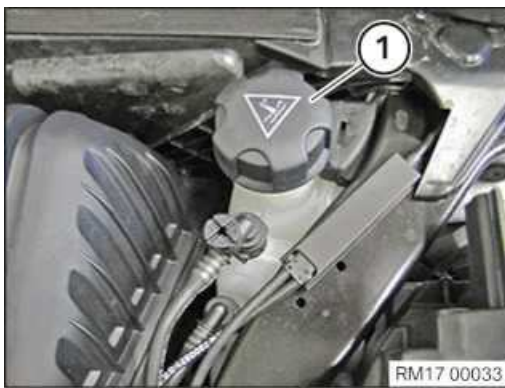
Carry out the following steps "Press accelerator pedal" and "Hold idle speed" 10 times. Continue to top up the filling level in the coolant expansion tank to the maximum mark.

- 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.
- 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.
- 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.
- 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 10 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.



- Close the sealing cap (1) on the coolant expansion tank.

12 – Checking/topping up oil level in automatic gearbox (AISIN GA8G45)

Prerequisite

Vehicle in horizontal position.

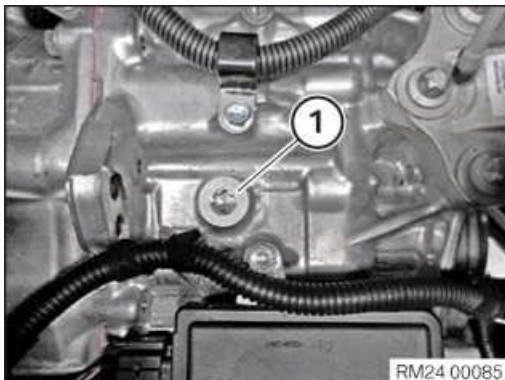


CAUTION

Materials harmful to health.

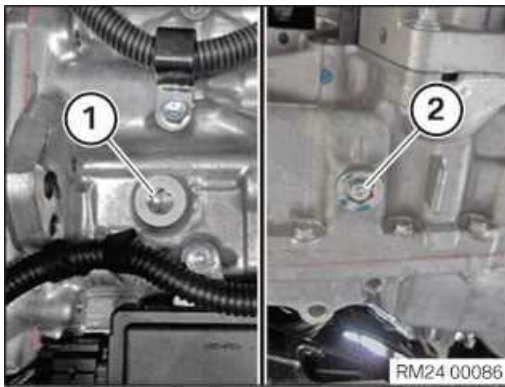
Contact with fluids harmful to health!

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



- Move the selector lever to the "P" position.
- Secure vehicle to prevent it rolling.
- Connect diagnosis system.
- Release the oil filler plug (1) using the Torx T55 .

- **Topping up the automatic transmission fluid (the automatic transmission fluid was drained):**



- Release oil filler plug (1) from engine compartment.
- Loosen the overflow plug (2) below at the transmission.
- Top up automatic transmission fluid at oil filler plug (1) until oil emerges at overflow plug (2).
- Start engine and run at idle speed.
- Check whether the automatic transmission fluid is leaking at the overflow plug (2) .
- If there is no automatic transmission fluid leaking at the overflow plug (2) , fill in the automatic transmission fluid to the oil filler plug (1) .
- Press the footbrake and, when idle, shift through all the gears from "P" to "D" 2 times for more than 2 seconds .
- Move the selector lever to the "P" position.
- Check again whether the automatic transmission fluid is leaking at the overflow plug(2) .
- Read the temperature of the automatic transmission fluid with the diagnosis system.
- Increase temperature of automatic transmission fluid to 35 °C to 45 °C.
- Top up automatic transmission fluid until it flows over.
- Renew sealing rings.

Parts: Sealing ring

- Screw in and fasten oil filler plug (1) and overflow plug (2).

Oil filler plug to transmission housing

M14	Renew the sealing ring.	Tightening torque	45 Nm
-----	-------------------------	-------------------	-------

Overflow screw in oil drain plug

M6	Renew the sealing ring.		8 Nm
----	-------------------------	--	------

- **Check oil level (transmission oil temperature must be between 35 °C and 45 °C):**
- Open the oil filler plug (1).
- Slacken overflow plug (2).
- Start engine and run at idle speed.
- Unscrew and remove overflow plug (2).
- Check whether the automatic transmission fluid is leaking at the overflow plug (2) .
- If there is no automatic transmission fluid leaking at the overflow plug (2) , fill in the automatic transmission fluid to the oil filler plug (1) .
- Top up the automatic transmission fluid until it overflows at the overflow plug (2) .
- Press the footbrake and, when idle, shift through all the gears from "P" to "D" 2 times for more than 2 seconds .
- Move the selector lever to the "P" position.
- Check the oil level again.
- Renew sealing rings.

Parts: Sealing ring

- If the oil escapes slightly from the overflow plug (2) , tighten the overflow plug (2) and the oil filler plug (1) .

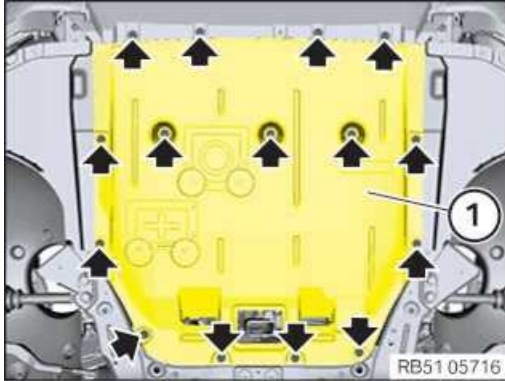
Overflow screw in oil drain plug

M6	Renew the sealing ring.		8 Nm
----	-------------------------	--	------

Oil filler plug to transmission housing

M14	Renew the sealing ring.	Tightening torque	45 Nm
-----	-------------------------	-------------------	-------

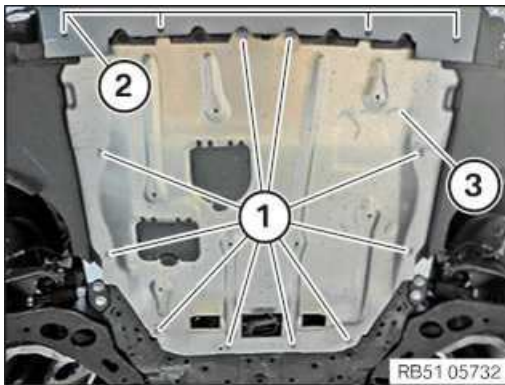
13 – Installing the front underbody protection



- Guide the front underbody protection (1) in under the bumper panel and position it at the screw points.
- Tighten screws (arrows).

Underbody protection front

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



- **Equipment specification with metal underride guard:**
- Guide in and attach the underride guard (3).
- Tighten down screws (1) and (2).

Underbody protection front

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

Additional Information

Overview of Tightening Torques

Cross connection to carrier support

Used in step 7

Screws M6x20		Tightening torque	11,8 Nm
--------------	--	-------------------	---------

Screw connection for rubber mount of coolant radiator to coolant radiator

Used in step 7

Bolt to rubber mount		Tightening torque	8 Nm
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Air duct to upper connection

Used in step 7

M6x20 screw		Tightening torque	11,8 Nm
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Bracing strut to upper connection

Used in step 7

M8x20 screw		Tightening torque	28 Nm
-------------	--	-------------------	-------

Intake silencer housing to lock bridge

Used in step 8

M6X30		Tightening torque	8 Nm
-------	--	-------------------	------

Clean air pipe to intake silencer housing

Used in step 8

Clamp		Tightening torque	3 Nm
-------	--	-------------------	------

Intake neck to cross connection

Used in step 9

M6		Tightening torque	8 Nm
----	--	-------------------	------

Oil filler plug to transmission housing

Used in step 12

M14	Renew the sealing ring.	Tightening torque	45 Nm
-----	-------------------------	-------------------	-------

Overflow screw in oil drain plug

Used in step 12

M6	Renew the sealing ring.		8 Nm
----	-------------------------	--	------

Underbody protection front

Used in step 13

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

Overview of Special Tools

Overview Technical Data

Coolant capacity

Used in step 10

B47C20O0	7 l
B47C20T0	7,4 l
B47C20O1	7 l

Expendable materials: Technically suitable antifreeze and corrosion inhibitor

Links

Repair instructions

Used in step

[17 00 ... Notes for working on cooling system.](#)

10

Operating materials

Used in step

[14.0 Automatic transmission fluid for ZF-transmission GA8HP45Z / GA8HP50Z / GA8HP70Z / GA8HP90Z / GA8P70H / GA8P75H / GA8HP75Z](#)

12

Operating materials

Used in step

[Main group 17](#)

10

64 53 ... Instructions for replacement of air conditioning capacitors 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.

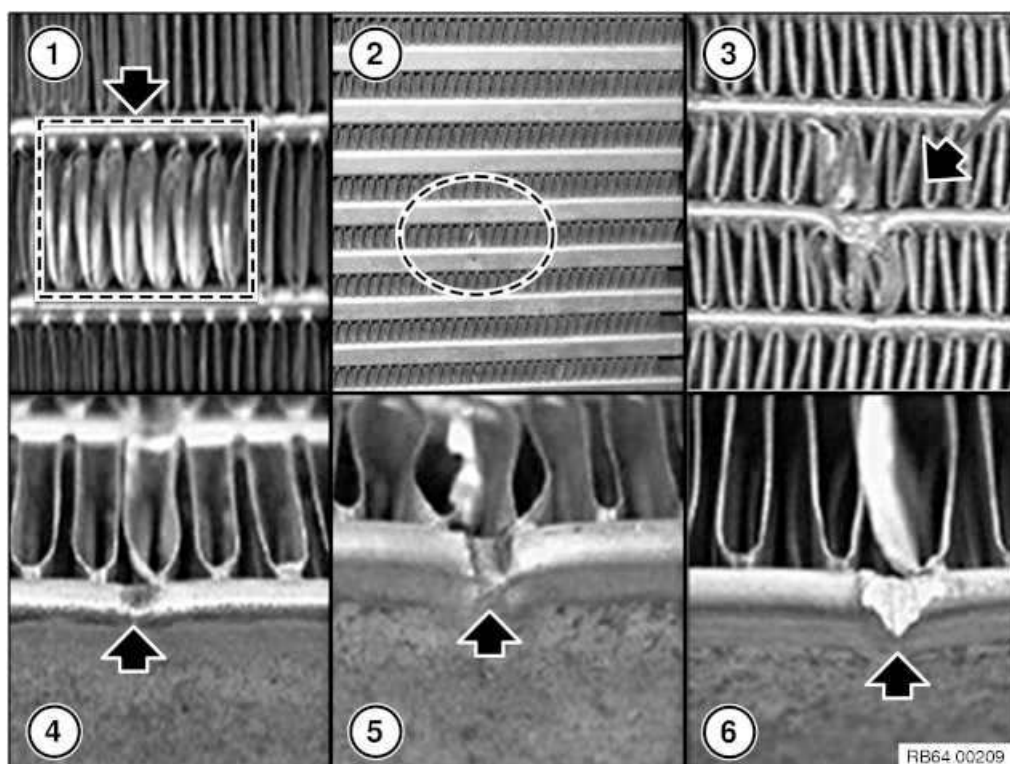
As long as tightness/function are not degraded and an adequate distance of a few mm between the radiator and air conditioning condenser remains in place, **this is not damage in either case.**

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

Note:

The deformations shown in Fig.Â (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.

17 51 000 Remove and install/replace charge air cooler



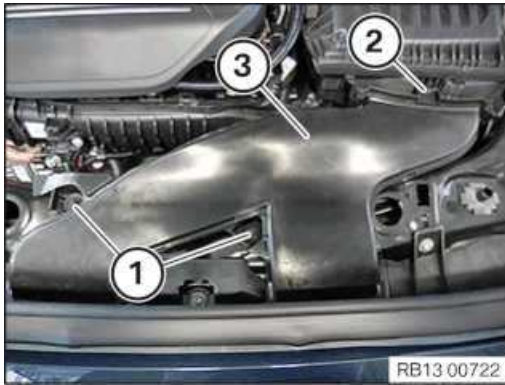
TECHNICAL INFORMATION



- 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!

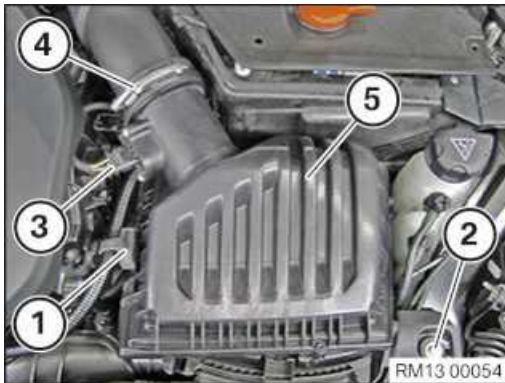
PRELIMINARY WORK

1 – Remove the intake neck for intake silencer housing



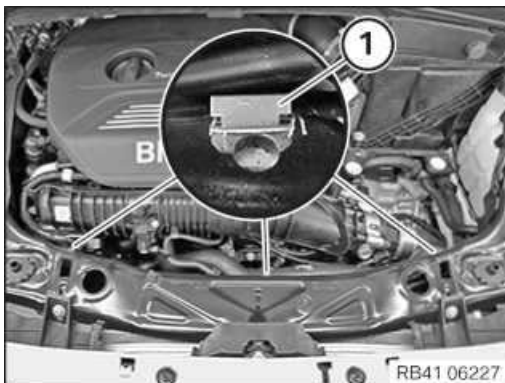
- Loosen nuts (1).
- Loosen the lock (2).
- Guide the intake neck (3) out and remove it.

2 – Removing intake silencer housing

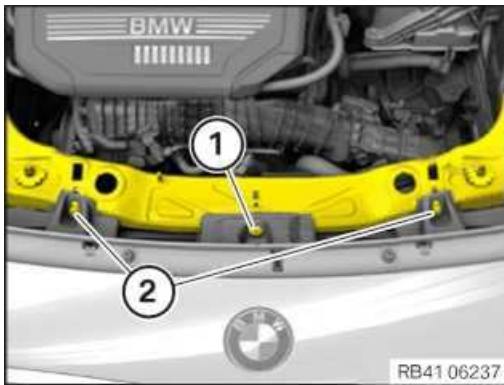


- Loosen the holder (1).
- Loosen screw (2).
- Unlock and loosen connector (3).
- Unfasten clamp (4).
- Pull out and remove the intake silencer housing (5) from the rubber mounts towards the top.

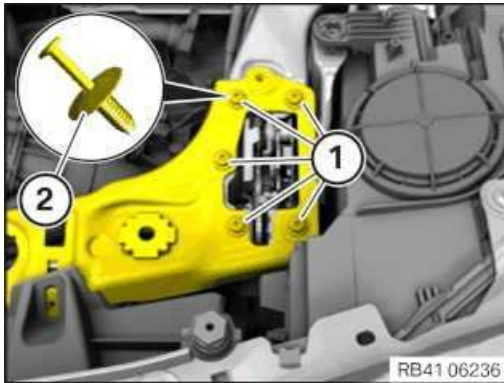
3 – Remove front cross connection



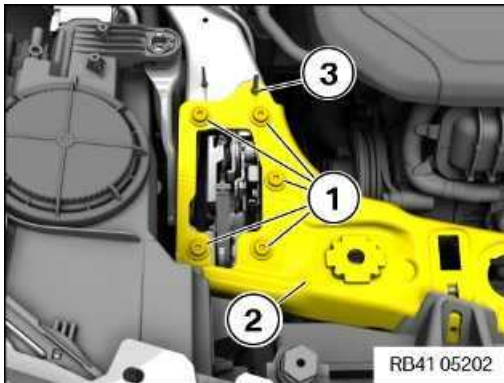
- Detach the clamps (1) for the Bowden cable of the bonnet locks from the cross connection.



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



- Loosen screws (1).
- Lever out expanding rivet (2).



- Loosen screws (1).
- Unclip the front cross connection (2) from the rubber retainer (3) and remove it upward.

4 – Removing the fan cowl with electric fan

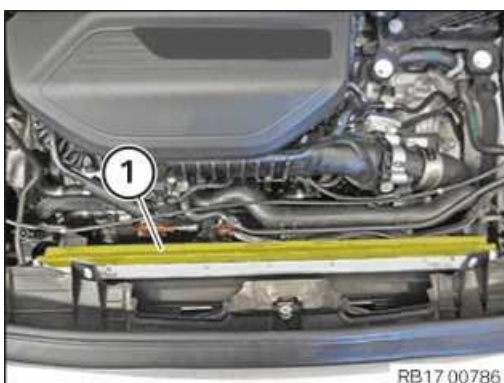


WARNING

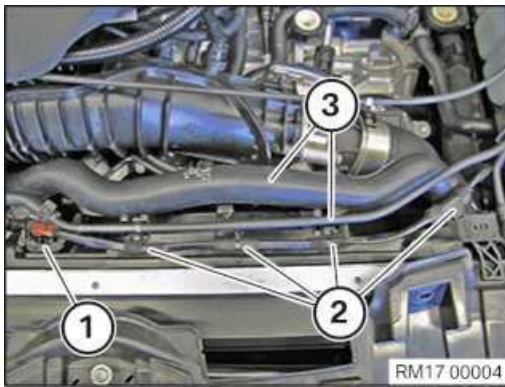
Hot surfaces.

Risk of burning!

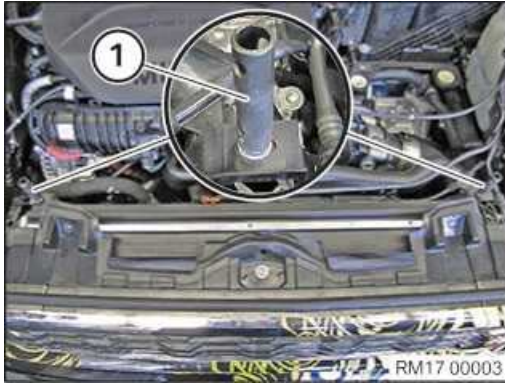
- Perform all work only on components that have cooled down.



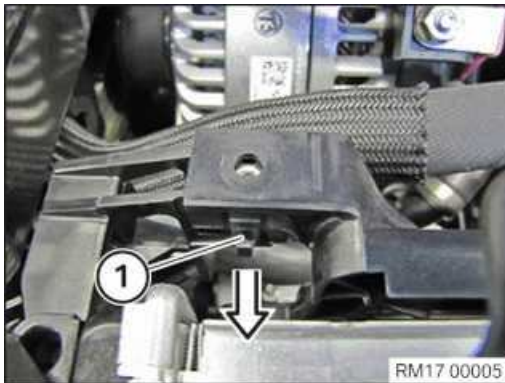
- Feed out and remove the sealing (1) from the radiator.



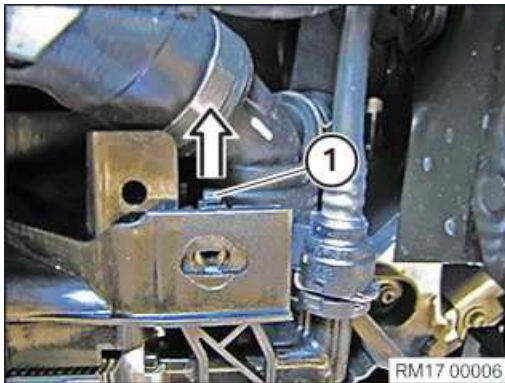
- Unlock plug connection (1) and disconnect.
- Unlock and loosen the clamps (2).
- Feed out connector (1) and place to one side.
- Thread off coolant line (3) and place to the side.



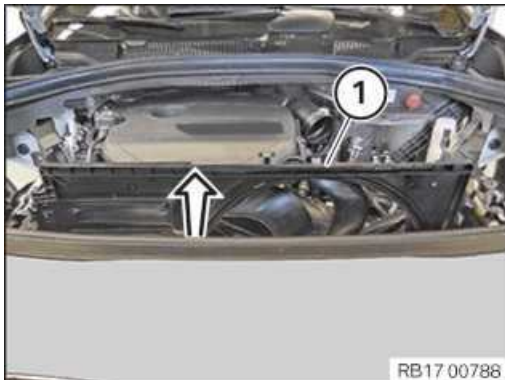
- Loosen screws (1).



- Unlock the right lock (1) on the fan cowl in the direction of the arrow.

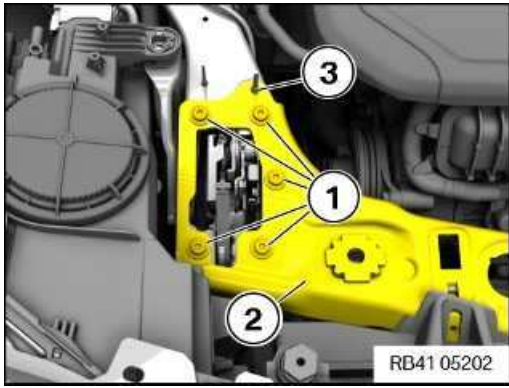


- Unlock the left lock (1) on the fan cowl in the direction of the arrow.



- Guide out fan cowl (1) in direction of arrow and remove.

5 – Install front cross connection (air duct removed)



- Correctly position front cross connection (2) and clip front cross connection (2) into the rubber retainer (3) at the same time.
- Tighten the screws (1).

Cross connection to carrier support

Screws M6x20		Tightening torque	11,8 Nm
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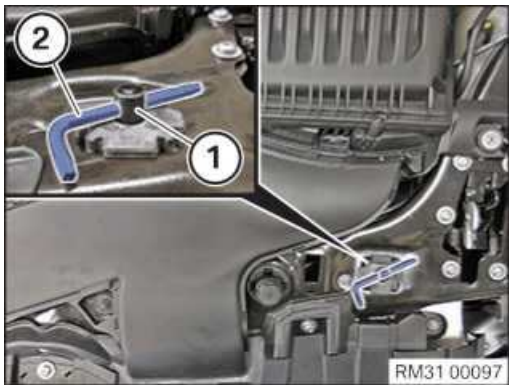


- Tighten the screws (1).

Cross connection to carrier support

Screws M6x20		Tightening torque	11,8 Nm
--------------	--	-------------------	---------

6 – Securing radiator on left and right

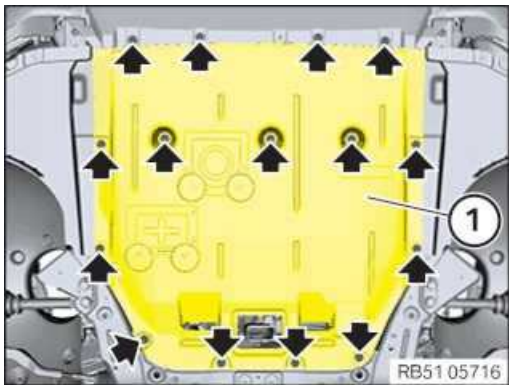


NOTICE

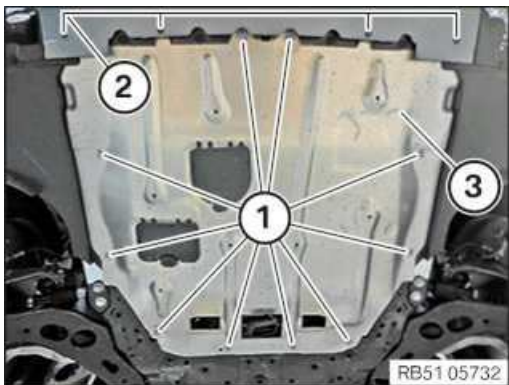
Perform the operations on the left and right side.

- Fasten radiator at centring pin (1) with suitable tool (2).

7 – Removing the front underbody protection



- Remove screws (arrows).
- Thread out and remove the front underbody protection (1) from the bumper panel.



- **Equipment specification with metal underride protection:**
- Loosen screws (1) and (2).
- Thread out and remove the underride protection (3).

8 – Removing both front wheels

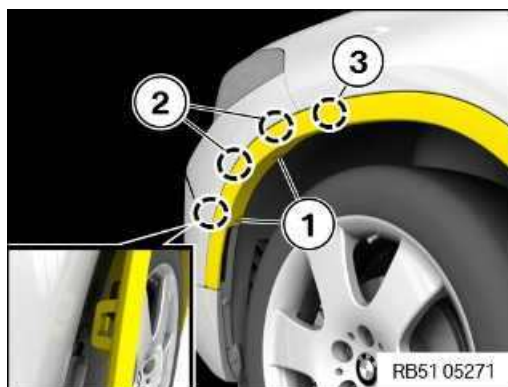


► Removing the wheel

- If several wheels are removed simultaneously: Use a piece of chalk to mark on each tyre the axle and side on which the corresponding wheel is fitted.
- Unscrew the wheel bolts (arrows) and remove the wheel.

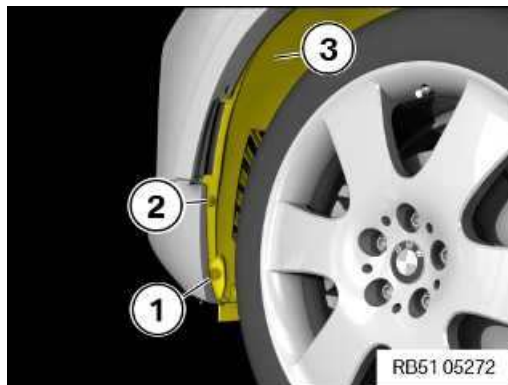
Use the matching adapter from tool set (wheel bolt adapter set) to loosen and tighten down the wheel bolt with security code.

9 – Partially removing the front wheel arch trim



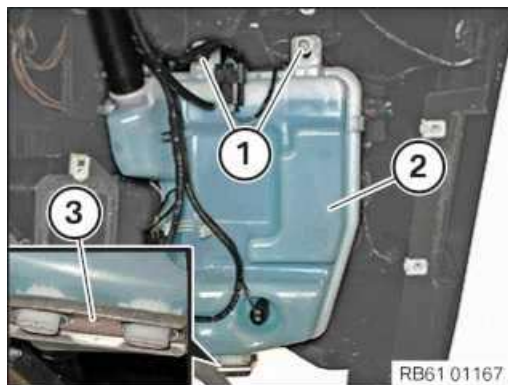
- Loosen blind rivet(1).
- Release front wheel arch trim in the area of the bumper panel from the latch mechanisms (2) and from the clip (3).

10 – Partially remove the front wheel arch cover



- Loosen screw (1).
- Release the blind rivet (2).
- Fold back the front wheel arch cover (3).

11 – Remove the washer fluid reservoir from the fixture



- Loosen screws (1).
- Guide the washer fluid reservoir (2) up and out of the fixture (3) and set it aside.

MAIN WORK

12 – Remove charge air cooler



WARNING

Hot surfaces.

Risk of burning!

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

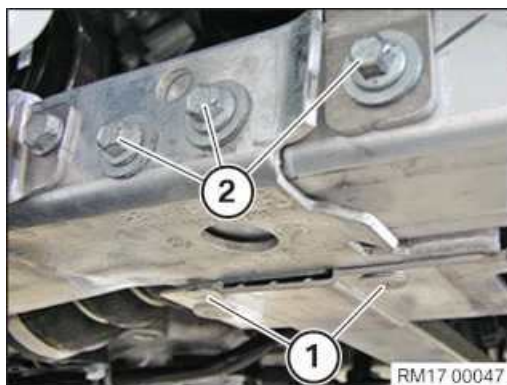


RISK OF DAMAGE

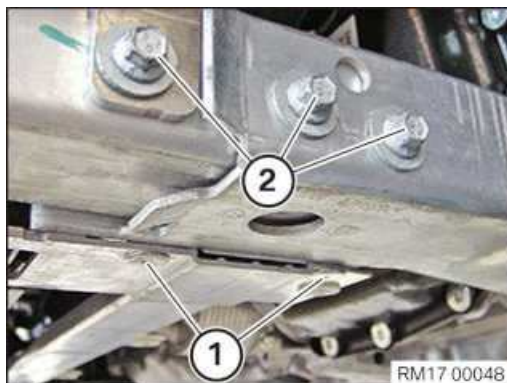
Damage to the exhaust turbocharger.

A leak at the pressure pipe can damage the exhaust turbocharger.

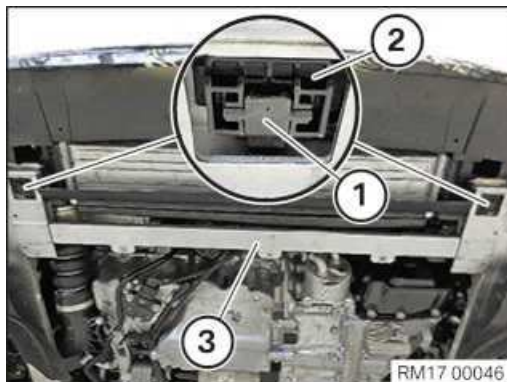
- Replace the gaskets and pressure pipe if necessary.



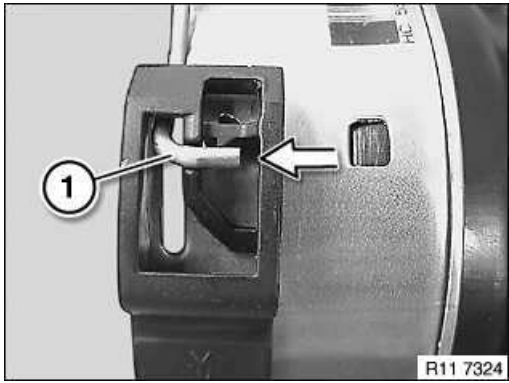
- Undo screws (2) at front left.
- Drill out blind rivets (1) at front left.



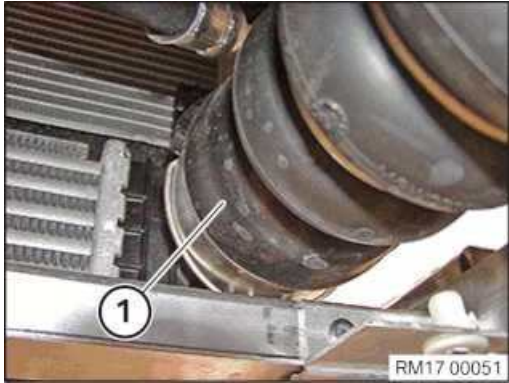
- Undo screws (2) at front right.
- Drill out blind rivets (1) at front right.



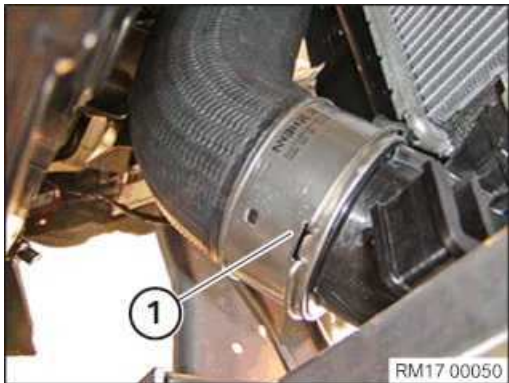
- Unlock locking pins (1).
- Thread out and remove locks (2).
- Thread out and remove cross connection (3).



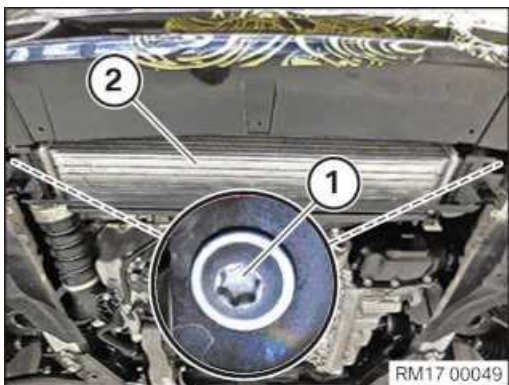
- Engage the locks (1) in the bracket in the direction of the arrow.



- Unlock and detach pressure pipe (1).

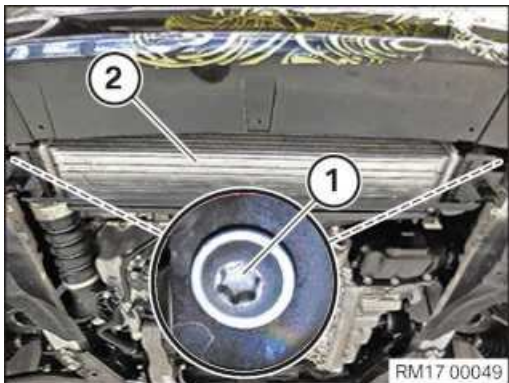


- Unlock and detach pressure pipe (1) at front left.



- Loosen screws (1).
- Feed out charge air cooler (2) downwards and remove.

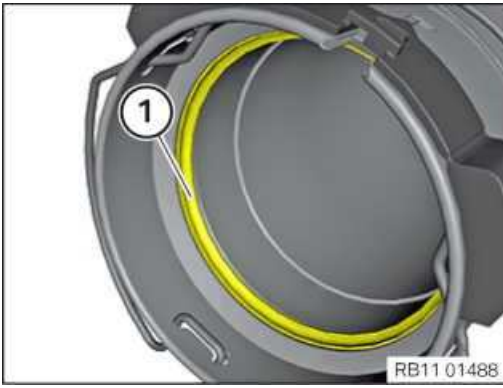
13 – Install charge air cooler



- Guide in charge air cooler (2) and install.
- Tighten the screws (1).

Charge air cooler to coolant radiator

M6x12		Tightening torque	6 Nm
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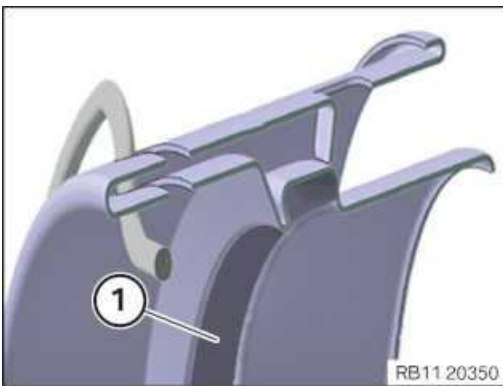
- Check sealing ring (1) for damage, renew if necessary.

► **Replace damaged gasket**

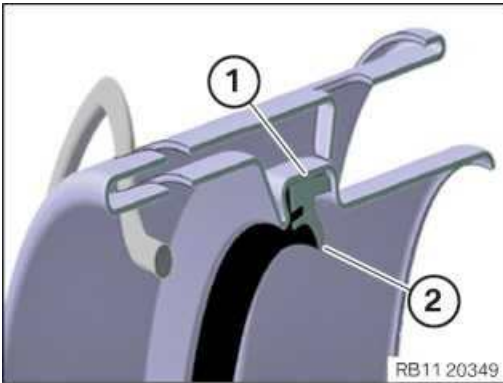


TECHNICAL INFORMATION

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.



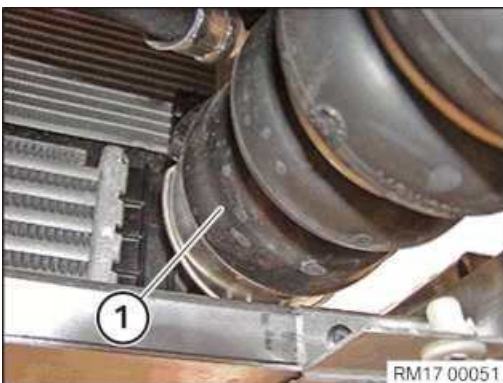
- Renew gasket.
- Parts:** Gasket
- Install seal dry without lubricant or mounting agent.

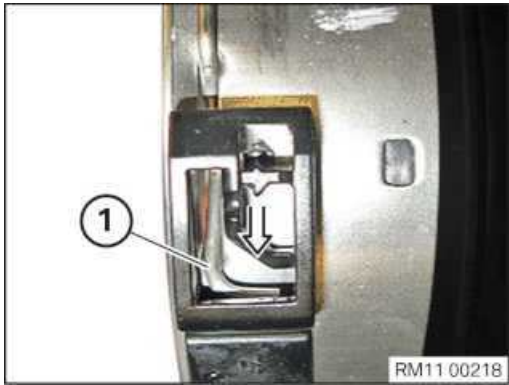


TECHNICAL INFORMATION

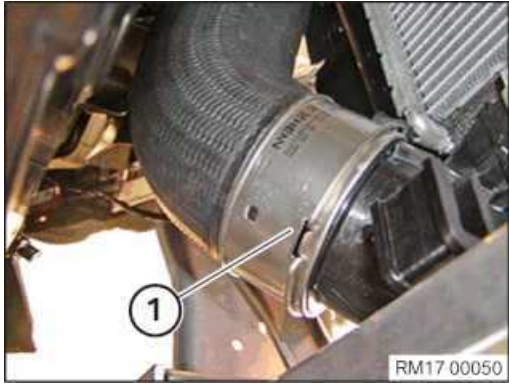
Incorrect assembly is possible. Ensure correct installation position.

- 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 pointing downwards (see figure).
- Guide in front right pressure pipe (1) and install.
- Make sure the pressure pipe (1) engages audibly.

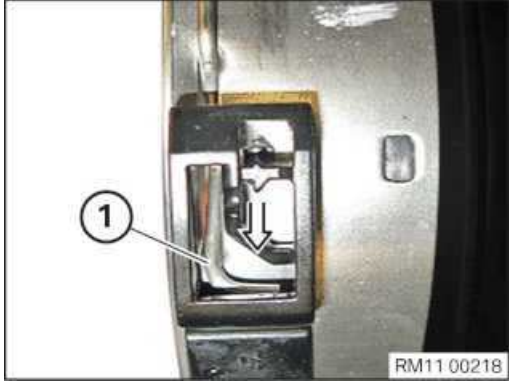




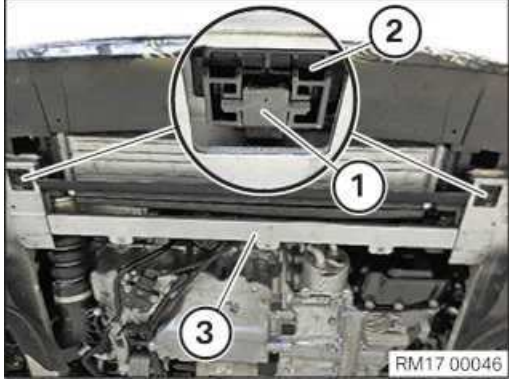
- Detach the locks (1) in the direction of the arrow from the brackets.
- Ensure that the locks (1) engage audibly.



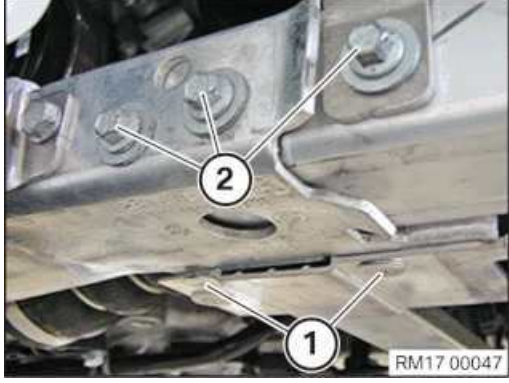
- Guide in front left pressure pipe (1) and install.
- Make sure the pressure pipe (1) engages audibly.



- Detach the locks (1) in the direction of the arrow from the brackets.
- Ensure that the locks (1) engage audibly.



- Guide in cross connection (3) and install.
- Guide in locks (2) and install.
- Lock the locking pins (1).
- Ensure that the locking pins (1) audibly engage.



- Renew screws (2).
- Tighten the bolts (2) at the front left.

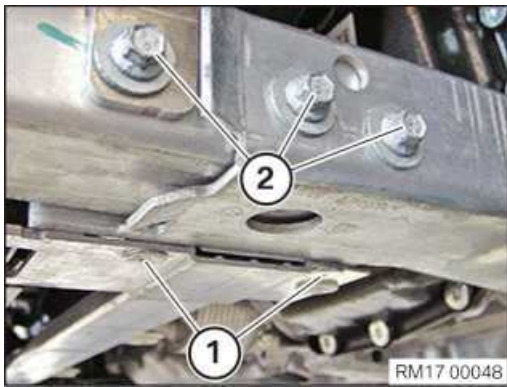
Parts: Bolts

Cross connection to front axle support

M6		Tightening torque	12 Nm
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- Renew the blind rivet (1).
- Rivet the blind rivets (1) at the front left.

Parts: Blind rivet



- Renew screws (2).

Parts: Bolts

- Tighten the bolts (2) at the front right.

Cross connection to front axle support

M6		Tightening torque	12 Nm
----	--	-------------------	-------

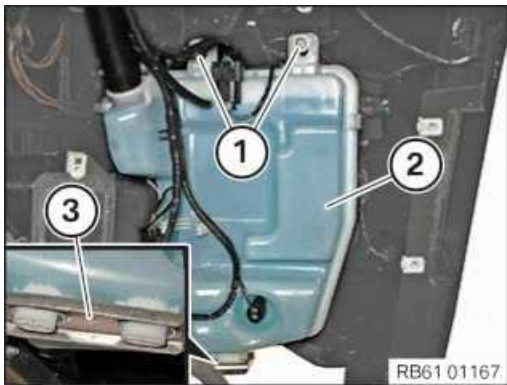
- Renew the blind rivet (1).

Parts: Blind rivet

- Rivet the blind rivets (1) at the front right.

POSTPROCESSES

14 – Install the washer fluid reservoir in the fixture

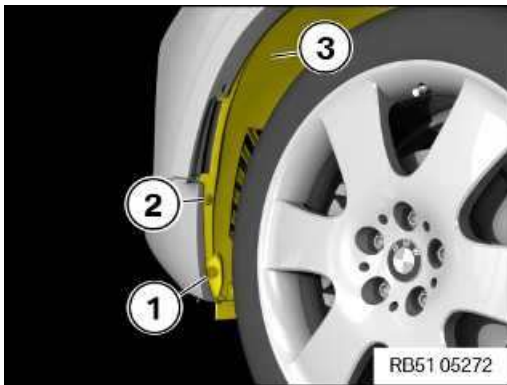


- Feed washer fluid reservoir (2) into the mounting (3) and install.
- Tighten the screws (1).

Washer fluid reservoir to body

M6x20		Tightening torque	8 Nm
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15 – Partially install the front wheel arch cover

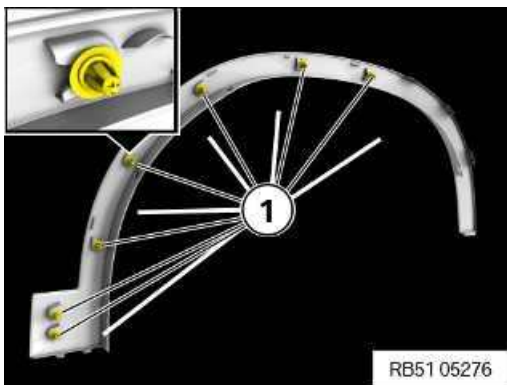


- Fold the front wheel arch cover (3) forward.
- Mount the blind rivet (2) with the special tool **0 496 521 (00 2 230)**.
- Tighten down screw (1).

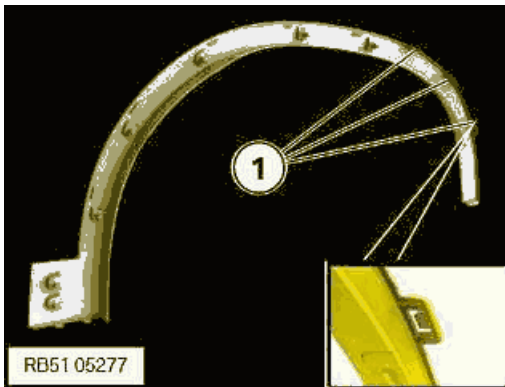
Front wheel arch cover to front bumper panel

Hexagon screw for thermoplastic plastic		Tightening torque	2,6 Nm
---	--	-------------------	--------

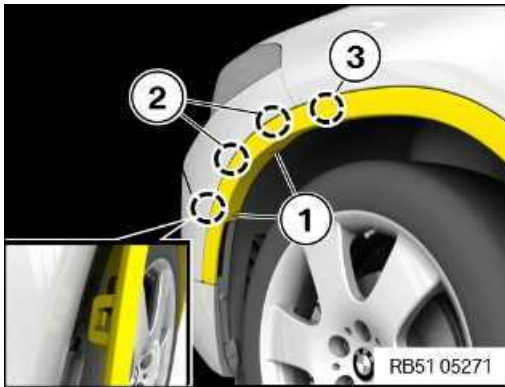
16 – Partly install the front wheel arch trim



- Check clips (1) for damage, and replace if necessary.



- Check the retaining lugs (1) for damage and replace the front wheel arch trim where required.



- Clip the front wheel arch trim into the clip (3) in the area of the bumper panel and into the latch mechanisms (2).
- Mount blind rivet (1) using the special tool **0 496 521 (00 2 230)**.

17 – Installing both front wheels

► Mounting the wheel

► Clean the contact surfaces between the brake disc and the wheel rim



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.

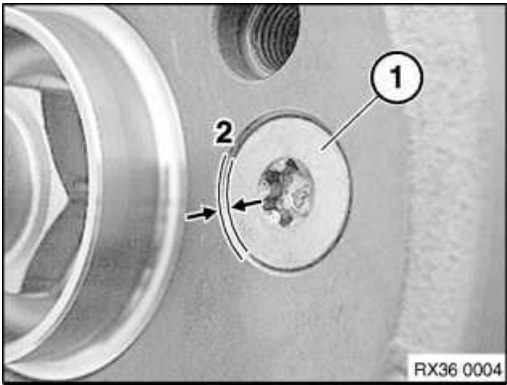
- Degrease the contact surfaces with the universal cleaner (see BMW Group Parts).
- In the event of grease residue in the area of the wheel bolt holes, remove and clean the brake disc.



- 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).



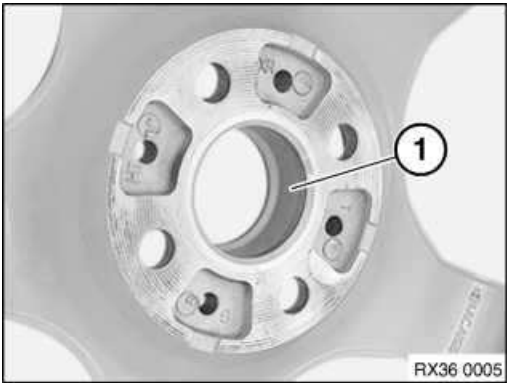
- Renew mounting bolt (1).
- Parts:** Mounting bolt
- Check that the mounting bolt (1) for the brake disc is securely seated.
- The mounting bolt (1) for the brake disc may not protrude under any circumstances on the contact surface (2) between the brake disc and the wheel rim.

Brake disc to rear wheel hub

M8	Renew screw.	Tightening torque	16 Nm
----	--------------	-------------------	-------

Brake disc to front wheel hub

M8	Renew screw.	Tightening torque	16 Nm
----	--------------	-------------------	-------



- Lightly grease the wheel centring (1) in the wheel rim; refer to additional information for grease for the wheel centring (1).



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 corroded wheel bolts.

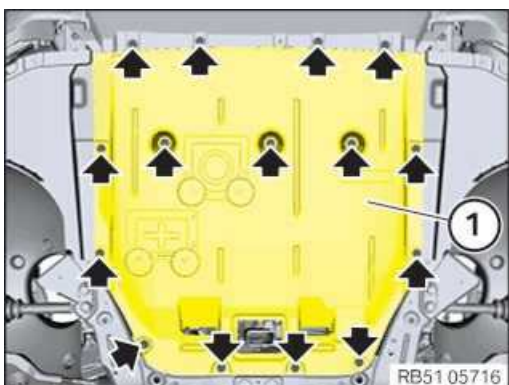
Parts: Wheel bolts

- Clean the wheel bolts.
- Check the wheel bolts and threads for damage, renew the wheel bolts if necessary.
- Join and tighten the wheel bolts (arrows).

Wheel bolts

M 14/AF 17	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 all the wheel bolts in the same order or retighten to the prescribed tightening torque again.	Check	140 Nm

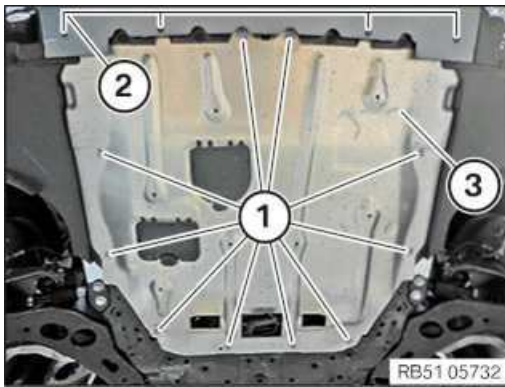
18 – Installing the front underbody protection



- Guide the front underbody protection (1) in under the bumper panel and position it at the screw points.
- Tighten screws (arrows).

Underbody protection front

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

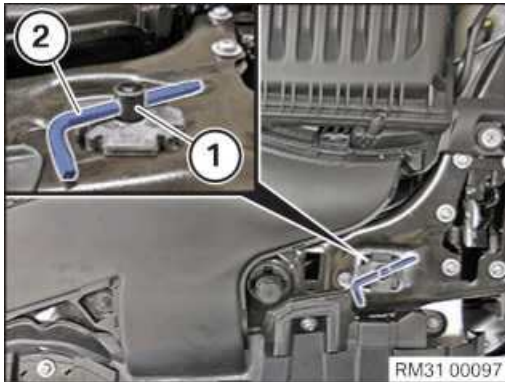


- **Equipment specification with metal underride guard:**
- Guide in and attach the underride guard (3).
- Tighten down screws (1) and (2).

Underbody protection front

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

19 – Removing fastener for left and right radiator

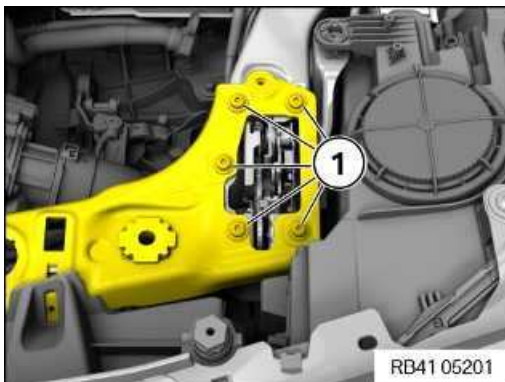


NOTICE

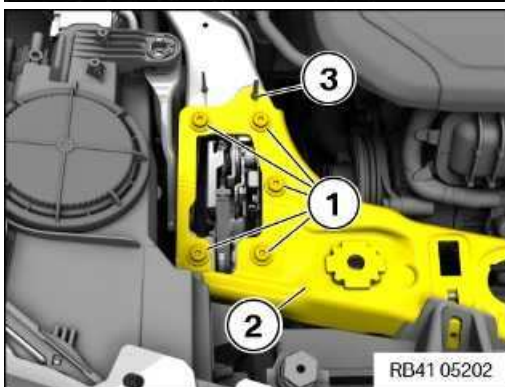
Perform the operations on the left and right side.

- Remove suitable tool (2) from the centering pin (1).

20 – Remove front cross connection (air duct removed)



- Loosen screws (1).



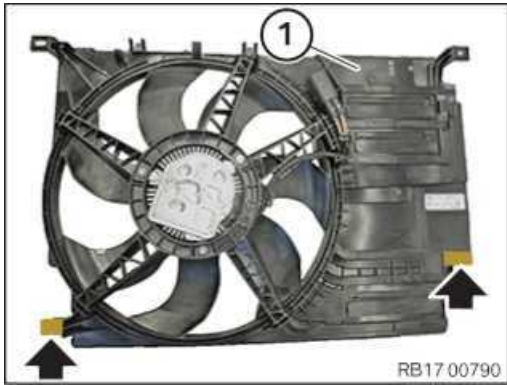
- Loosen screws (1).
- Unclip the front cross connection (2) from the rubber retainer (3) and remove it upward.

21 – Installing fan cowl with electric fan

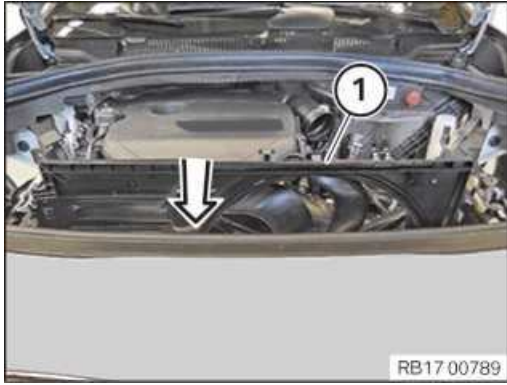


TECHNICAL INFORMATION

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



- Feed the guides (arrows) of the fan cowl (1) into the charge air cooler.



- Feed in and install the fan cowl (1) in the direction of the arrow.



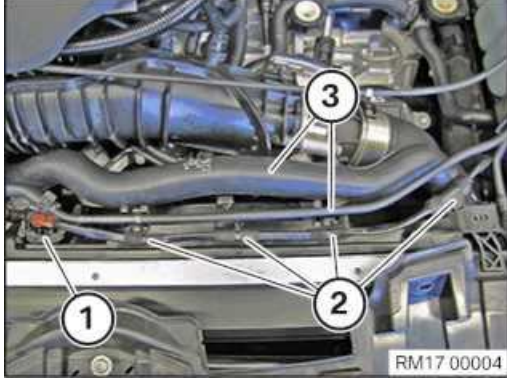
- Lock the left and right locks (arrows).



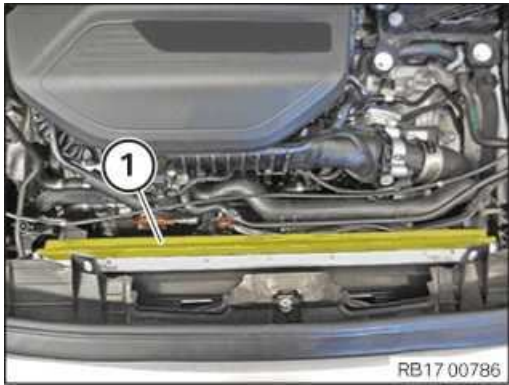
- Tighten the screws (1).

Fan cowl on radiator

M6X12		Tightening torque	6 Nm
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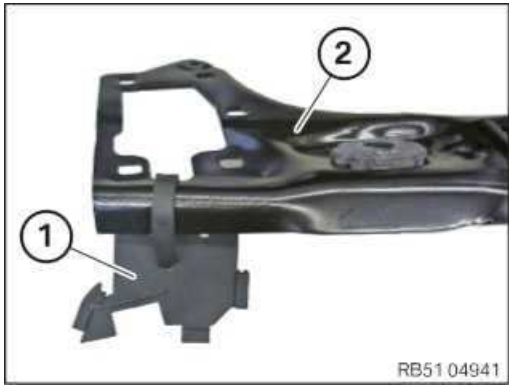


- Connect connectors (1) and lock.
The connector (1) must engage audibly.
- Secure clamps (2).
- Thread in and install coolant line (3).

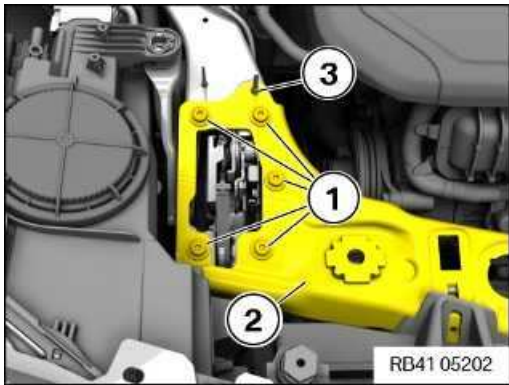


- Guide the sealing (1) on the radiator in and install it.

22 – Install front cross connection



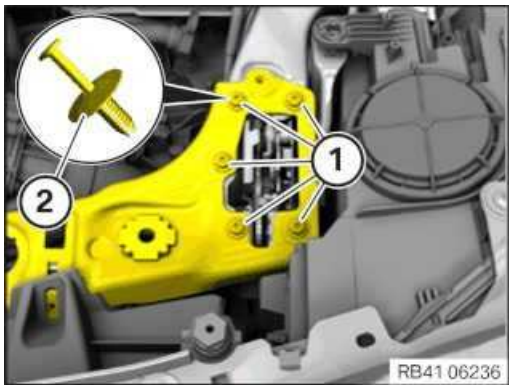
- Right side of vehicle only: Secure spray guard (1) on the cross connection (2) as pictured.



- Position front cross connection (2) and clip front cross connection (2) into the rubber retainer (3) at the same time.
- Tighten the screws (1).

Cross connection to carrier support

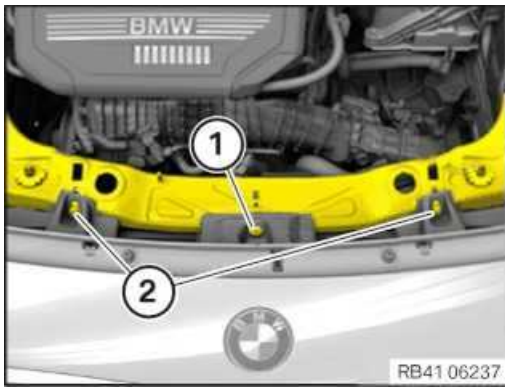
Screws M6x20		Tightening torque	11,8 Nm
--------------	--	-------------------	---------



- Tighten the screws (1).

Cross connection to carrier support

Screws M6x20		Tightening torque	11,8 Nm
--------------	--	-------------------	---------



- Position screws (3) on the rubber mounts for the radiator and tighten.

Screw connection for rubber mount of coolant radiator to coolant radiator

Bolt to rubber mount		Tightening torque	8 Nm
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- Tighten down screws (2).

Air duct to upper connection

M6x20 screw		Tightening torque	11,8 Nm
-------------	--	-------------------	---------

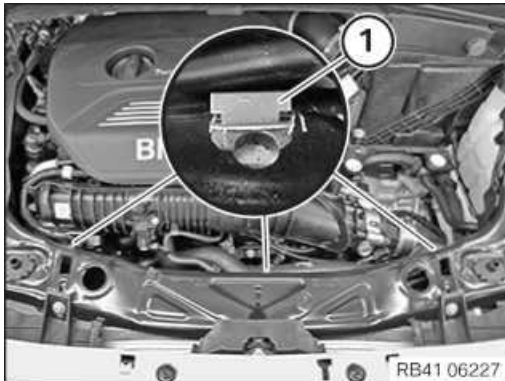
- Tighten down screw (1).

Bracing strut to upper connection

M8x20 screw		Tightening torque	28 Nm
-------------	--	-------------------	-------



- Right side of vehicle only: Properly mount spray guard (1) to prevent corrosion.
- Secure spray guard (1) to the bridge with retaining tabs (2).



- Fasten the clamps (1) from the Bowden cable of the bonnet lock on the cross connection.

23 – Installing intake silencer housing



- Insert the intake silencer housing (5) into the rubber mounts and install it. Intake filter housing (5) must engage audibly.
- Tighten down screw (2).

Intake silencer housing to lock bridge

M6X30		Tightening torque	8 Nm
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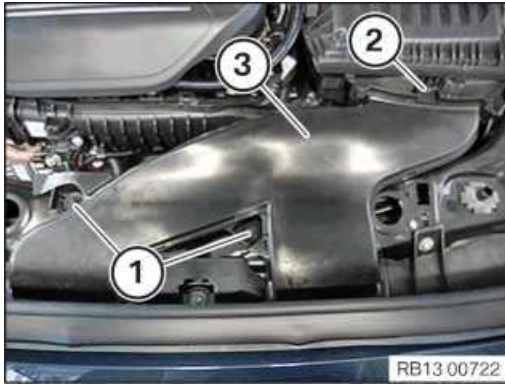
- Tighten clamp (4).

Clean air pipe to intake silencer housing

Clamp		Tightening torque	3 Nm
-------	--	-------------------	------

- Connect and lock the connector (3). The connector (3) must engage audibly.
- Insert and install the holder (1).

24 – Install the intake neck for the intake filter housing



- Insert and install the intake neck (3).
The lock (2) must audibly engage.
- Tighten nuts (1).

Intake neck to cross connection

M6		Tightening torque	8 Nm
----	--	-------------------	------

Additional Information

Overview of Tightening Torques

Cross connection to carrier support

Used in step [5](#) [22](#)

Screws M6x20		Tightening torque	11,8 Nm
--------------	--	-------------------	---------

Charge air cooler to coolant radiator

Used in step [13](#)

M6x12		Tightening torque	6 Nm
-------	--	-------------------	------

Cross connection to front axle support

Used in step [13](#)

M6		Tightening torque	12 Nm
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Washer fluid reservoir to body

Used in step [14](#)

M6x20		Tightening torque	8 Nm
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Front wheel arch cover to front bumper panel

Used in step [15](#)

Hexagon screw for thermoplastic plastic		Tightening torque	2,6 Nm
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Brake disc to rear wheel hub

Used in step [17](#)

M8	Renew screw.	Tightening torque	16 Nm
----	--------------	-------------------	-------

Brake disc to front wheel hub

Used in step [17](#)

M8	Renew screw.	Tightening torque	16 Nm
----	--------------	-------------------	-------

Wheel bolts

Used in step [17](#)

M 14/AF 17	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.		

Underbody protection front

Used in step [18](#)

Screw for thermoplastic plastic		Tightening torque	2,6 Nm
---------------------------------	--	-------------------	--------

Hexagon screw M6x20		Tightening torque	8 Nm
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Fan cowl on radiator

Used in step 21

M6X12		Tightening torque	6 Nm
-------	--	-------------------	------

Screw connection for rubber mount of coolant radiator to coolant radiator

Used in step 22

Bolt to rubber mount		Tightening torque	8 Nm
----------------------	--	-------------------	------

Air duct to upper connection

Used in step 22

M6x20 screw		Tightening torque	11,8 Nm
-------------	--	-------------------	---------

Bracing strut to upper connection

Used in step 22

M8x20 screw		Tightening torque	28 Nm
-------------	--	-------------------	-------

Intake silencer housing to lock bridge

Used in step 23

M6X30		Tightening torque	8 Nm
-------	--	-------------------	------

Clean air pipe to intake silencer housing

Used in step 23

Clamp		Tightening torque	3 Nm
-------	--	-------------------	------

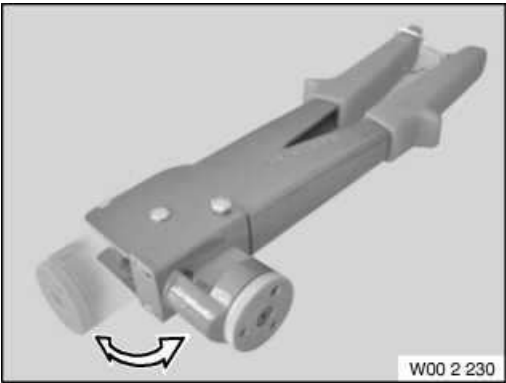
Intake neck to cross connection

Used in step 24

M6		Tightening torque	8 Nm
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Overview of Special Tools

0 496 521 (00 2 230) Pliers



Common

Used in step 15 16

Usage	(Blind rivet pliers for plastic rivets) For shaft diameters of 3.5 mm, 3.9 mm and 4.5 mm
Included in the tool or work	
Storage location	C25
Replaced by	
In connection with	
SI-Number	01 17 08 (478)

2 344 011 Tool



Common

Used in step 17

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 8
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 8
Usage	(Code 33) With centring bore available separately, (see EPC) under 36 13 6 765 546	
Included in the tool or work	0 492 518	
Storage location		
Replaced by		
In connection with		
SI-Number		

0 495 225 (36 1 327) Wheel stud



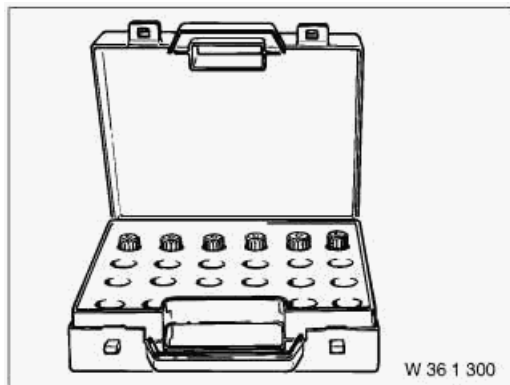
Common		Used in step 8
Usage	(Code 34) With centring bore available separately (see EPC) under 36 13 6 765 547	
Included in the tool or work	0 492 518	
Storage location		
Replaced by		
In connection with		
SI-Number		

0 495 226 (36 1 328) Wheel stud



Common		Used in step 8
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 8

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 8

Usage (Code 37) With centring bore available separately (see EPC) under 36 13 6 762 342

Included in the tool or work 0 492 518

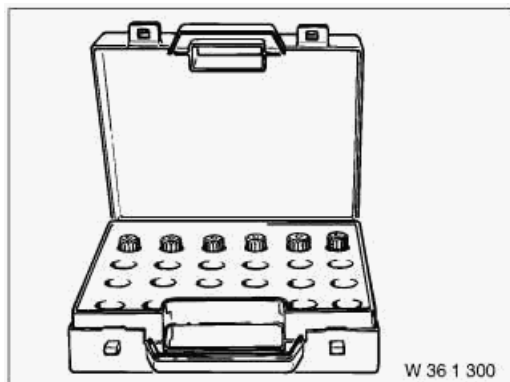
Storage location

Replaced by

In connection with

SI-Number

0 495 229 (36 1 332) Wheel stud



Common

Used in step 8

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 8

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

Operating materials

Used in step

[2.0 Grease for wheel centring](#)

17

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!

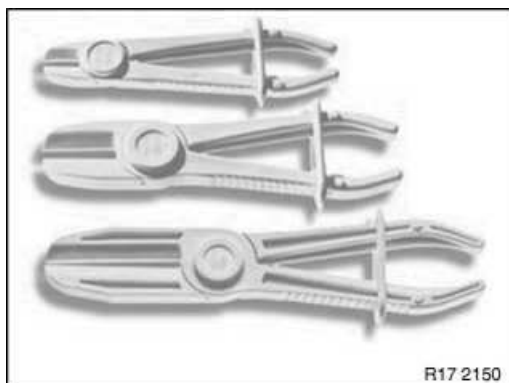
Do not fill coolant expansion tank over maximum level, as overfilling will cause the coolant to overflow. This may cause traces of coolant on the expansion tank or in the engine compartment and allow an incorrect conclusion about possible leaks.



Recycling

Catch and dispose of drained coolant.

Observe country-specific waste disposal regulations.

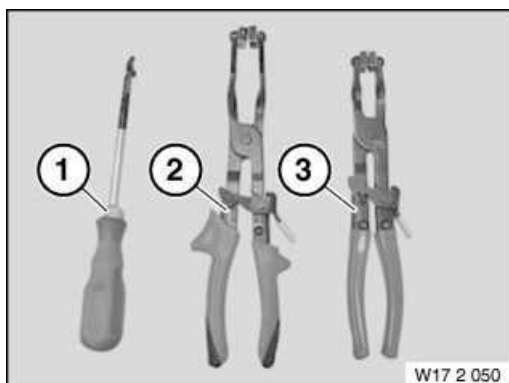


R17 2150

Note:

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

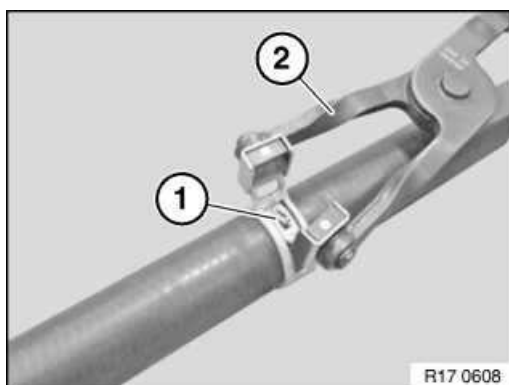
HAZET number:	Description
4590-1	Length of disconnect pliers (mm): 150
4590-2	Length of disconnect pliers (mm): 180
4590-3	Length of disconnect pliers (mm): 253
4590 / 2	Set of clamping pliers
4590 / 3	Set of clamping pliers



W17 2 050

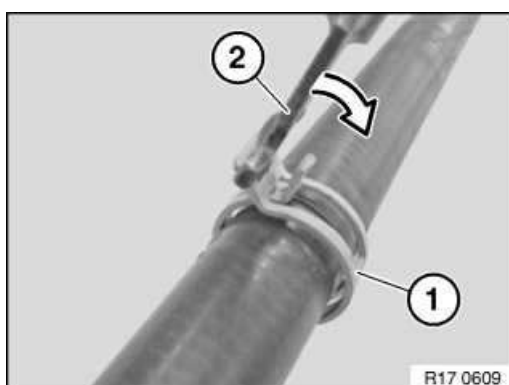
Set of special tools 17 2 050 for removing and installing the spring bracket clamps for coolant hoses.

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



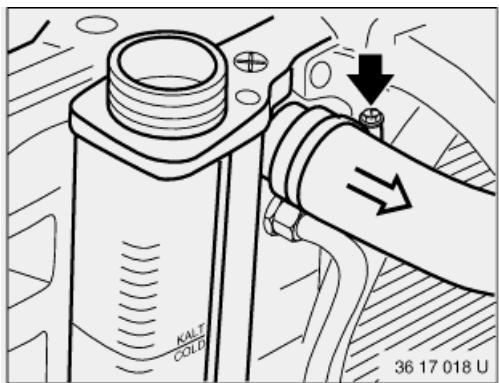
R17 0608

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



R17 0609

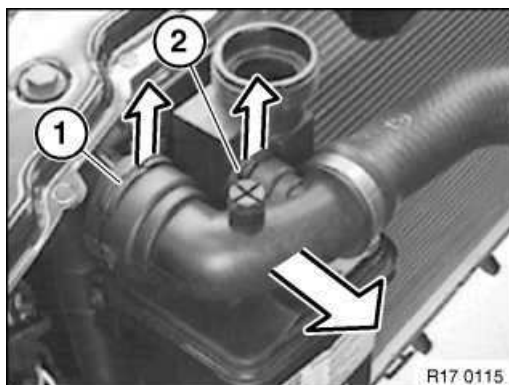
Unlock spring strap (1) with the release tool (2).



Note:

Tightening torque for hose clamps

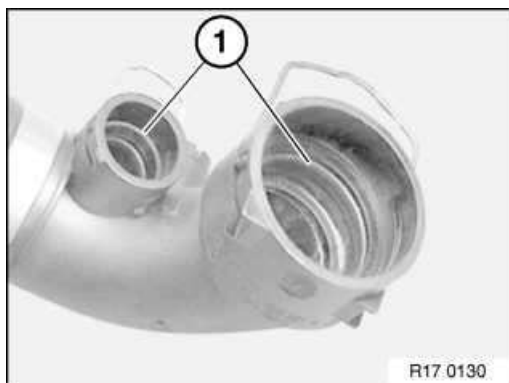
WAF 5	1.0 - 1.5 Nm
WAF 6	2.5 - 3.5 Nm



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

Dismantling of quick-release coupling

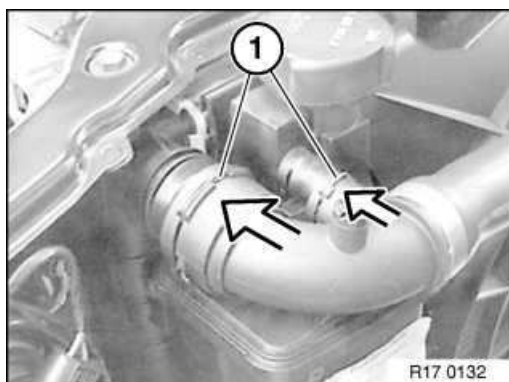
Pull out lock (1) and (2). Pull off hose.



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.