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



Warning!

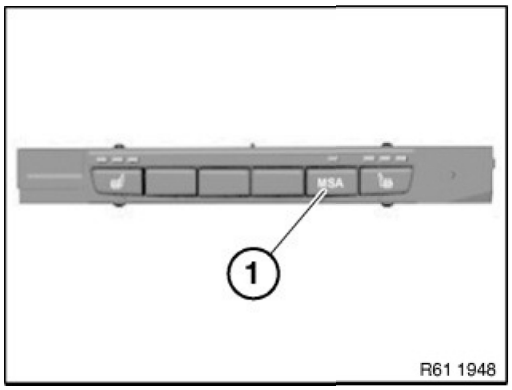
If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

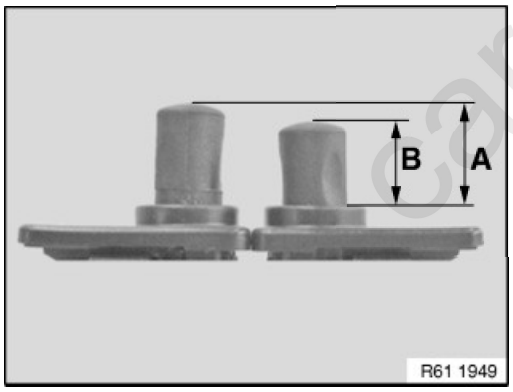
Observe safety precautions when working on MSA vehicles.

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

MSA function is deactivated by:



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



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

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

    B = 7 mm

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



When working with diagnosis tools:

- Observe instructions in diagnosis tool

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

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

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13 31 029 Check fuel delivery pressure (N20,N26 ,N55)

Special tools required:

- 13 5 270
- 11 4 310
- 11 5 360
- 13 3 060

Attention!
Lines are under pressure!

Wear safety goggles and gloves.

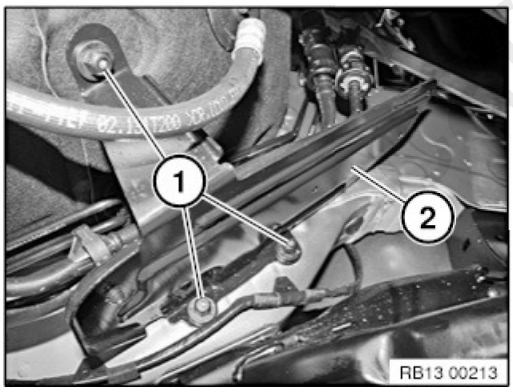
Fuel can emerge spontaneously at high velocity when the fuel line is released!

Recycling:
Catch and dispose of escaping fuel with auxiliary materials.

Observe country-specific waste disposal regulations.

Necessary preliminary work:

- Connect diagnosis system
- Remove rear underbody protection.



Unscrew nuts (1).

Remove guard plate (2).

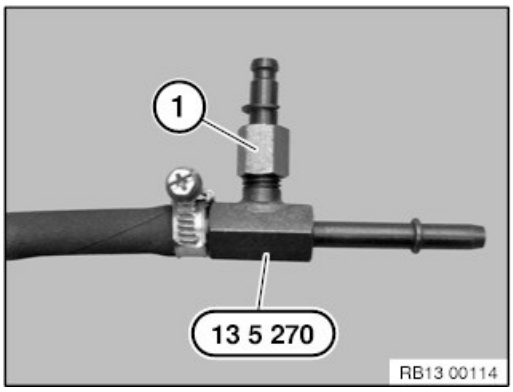
Release fuel lines from protective plate.

Disconnect fuel delivery line.

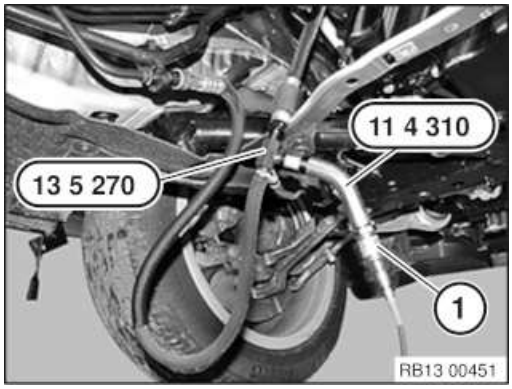
Catch and dispose of escaping fuel in a suitable container.

Installation note:
Ensure the fuel delivery line is installed correctly (no chafing points).

Make sure retaining tabs latch correctly.



Unscrew adapter (1) from special tool 13 5 270 .



Insert special tool 13 5 270 into disconnected fuel line.

Screw onto special tool 13 5 270 , the special tool 11 4 310 .

Screw IMIB 100 bar pressure sensor (1) on the special tool 11 4 310 .

Note:
As an alternative to the 100 bar IMIB pressure sensor (1), the 25 bar pressure sensor can also be used. For this, screw special tool 11 5 364 from set of special tools 11 5 360 instead of special tool 11 4 310 onto special tool 13 5 270 . Or directly screw the pressure gauge from the set of special tools 13 3 060 onto the special tool 13 5 270 .

Establish fuel delivery pressure. Read off fuel feed pressure on IMIB and compare with values in diagnosis system.

Assemble engine.

Check fuel system for leak tightness.

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13 31 032 Check fuel pressure



Special tools required:

- 13 0 290
- 13 3 060
- 11 4 310
- 13 0 291
- 13 0 292
- 13 0 293



Necessary preliminary work:

- Connect BMW diagnosis system.



Important!

Lines are under pressure!

Wear protective goggles and gloves.

Fuel can emerge spontaneously at high velocity when the fuel line is released!

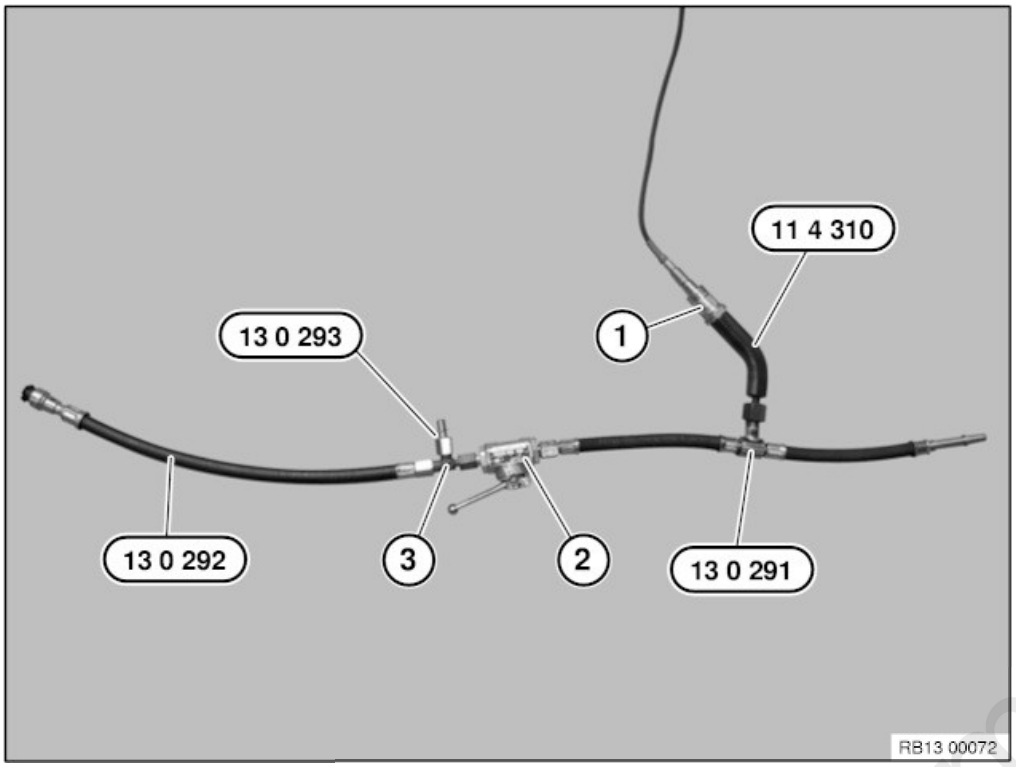


Recycling:

Catch and dispose of escaping fuel with auxiliary materials.

Observe country-specific waste disposal regulations.

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Check fuel delivery pressure:

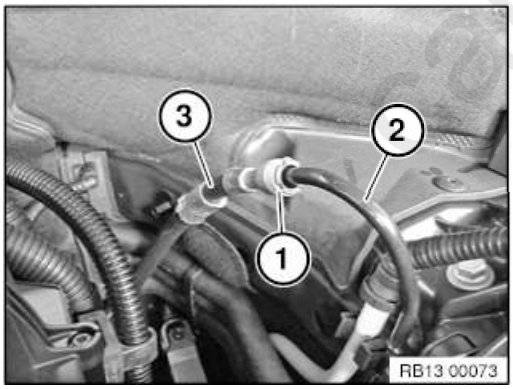
To check the fuel delivery pressure, special tool 13 0 290 must be assembled as follows.

Screw adapter 11 4 310 onto line 13 0 291 . Screw the IMIB 100 bar pressure sensor (1) onto adapter 11 4 310 .

Alternatively, the pressure gauge from the set of special tools 13 3 060 can be screwed onto line 13 0 291 .

Between lines 13 0 291 and 13 0 292 , mount a shutoff tap (2) and a T-piece (3) from the set of special tools 13 3 060 .

Close up T-piece (3) from the set of special tools with the cap 13 0 293 .

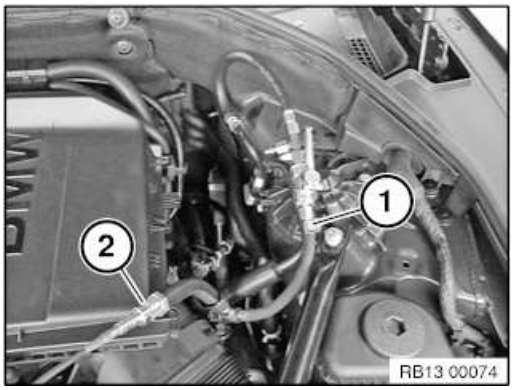


Note:
The graphic shows F07 The procedure is identical for other vehicles.

Remove circlip (1).

Unlock and detach fuel line (2) to fuel tank from fuel line (2) to high pressure pump.

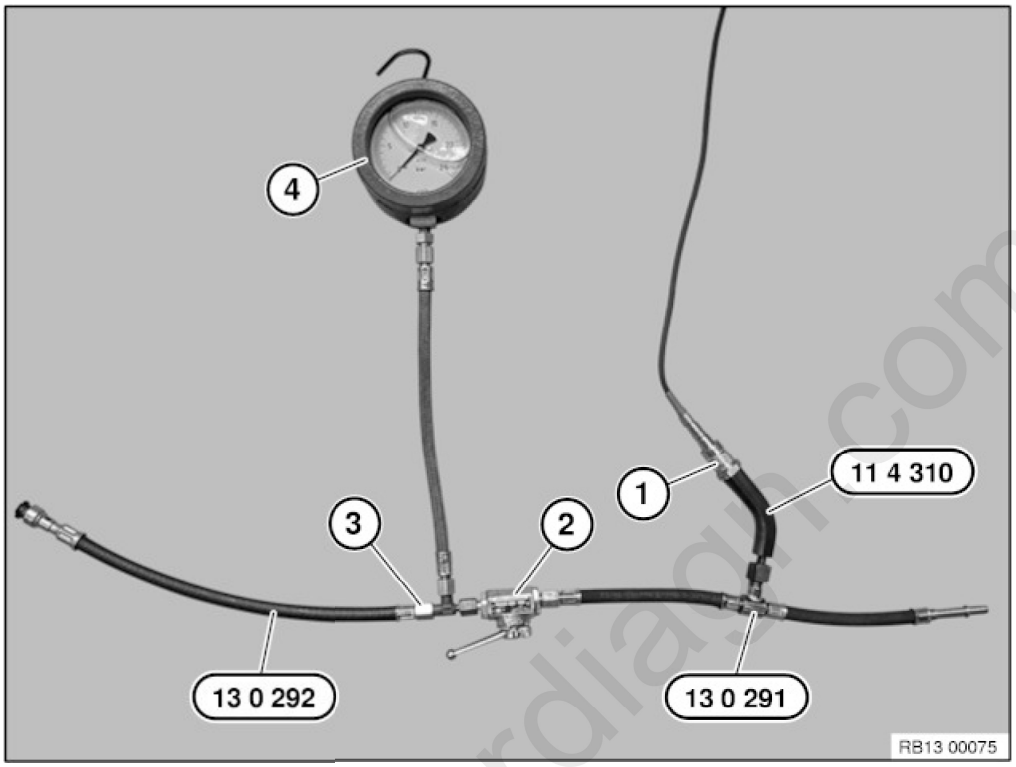
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Install special tool (1) 13 0 290 into detached fuel line with IMIB fuel pressure sensor (100 bar).

Connect IMIB with fuel pressure sensor.

Establish fuel delivery pressure. Read off fuel delivery pressure on IMIB and compare with values in diagnosis system.



Check fuel holding pressure:

To check the fuel holding pressure, special tool 13 0 290 must be assembled as follows.

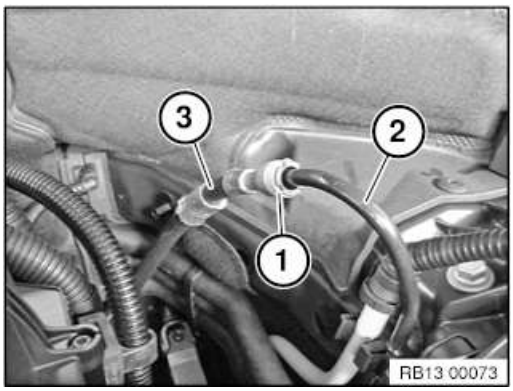
Screw adapter 11 4 310 onto line 13 0 291 . Screw the IMIB 100 bar pressure sensor (1) onto adapter 11 4 310 .

Alternatively, the pressure gauge from the set of special tools 13 3 060 can be screwed onto line 13 0 291 .

Between lines 13 0 291 and 13 0 292 , mount a shutoff tap (2) and a T-piece (3) from the set of special tools 13 3 060 .

Mount pressure gauge (4) from special tool set 13 3 060 onto T-piece (3) from special tool set 13 3 060 .

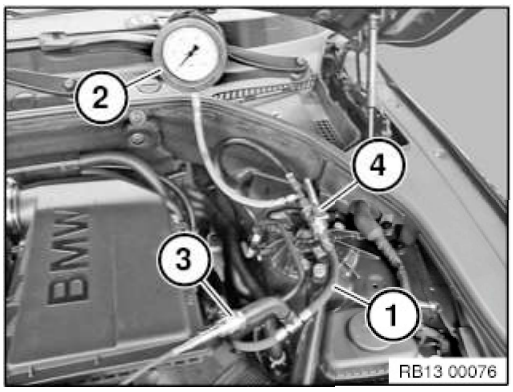
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Note:
The graphic shows F07 The procedure is identical for other vehicles.

Remove circlip (1).

Unlock and detach fuel line (2) to fuel tank from fuel line (2) to high pressure pump.



Install special tool (1) 13 0 290 with pressure gauge (2) and IMIB 100 bar fuel pressure sensor (3) into the detached fuel line.

Establish fuel delivery pressure.

Close shutoff tap (4) and switch off the engine.

Read off fuel holding pressure of high pressure pump from IMIB tester and compare with values in diagnosis system.

Read off fuel holding pressure to fuel tank on pressure gauge (2) and compare with values in diagnosis system.

Assemble engine.

Check fuel system for leak tightness.

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

The characteristic of this version with ambient pressure:

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

Test prerequisite:

The correct fuel pressure regulator has been installed.

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

  Connect test adapter.

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

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

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

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

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

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

  or

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

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

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

If no kinks are visible:

- Replace the return lines.

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

Attention:

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

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

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

If the measured value dropped by more than 0.5 bar:

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

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

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

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

Check components. Replace faulty components.

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

- Replace the pressure regulator

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

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16 12 200 Removing and installing/replacing outer fuel filter

Recycling:

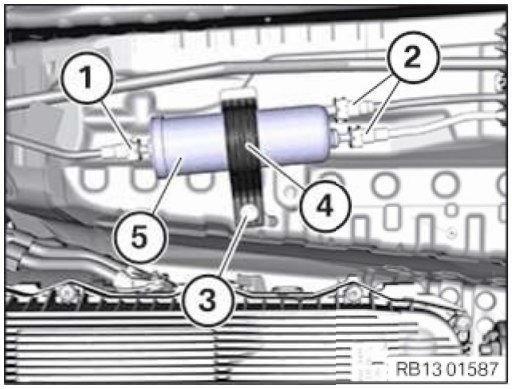
Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

Necessary preliminary tasks:

- Remove rear underbody protection.

Removal:



Unlock and detach fuel line (1).

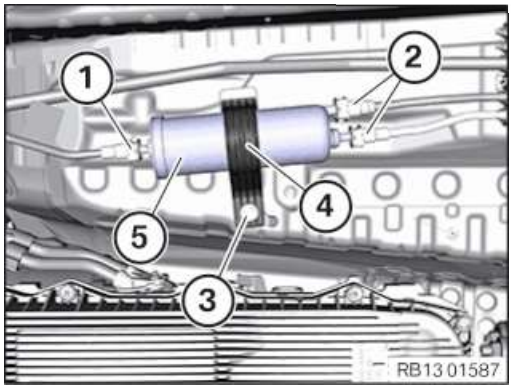
Unlock fuel line (2) and pull off.

Catch and dispose of escaping fuel.

Release screw (3) and remove holder (4).

Remove fuel filter (5).

Installation:



Install new fuel filter (5).

Connect and audibly lock fuel line (2).

Connect and audibly lock the fuel lines (1).

Install the holder (4) and tighten the screw (3).

Tightening torque 13 32 1AZ.

Required follow-up work:

- Check fuel system for leak tightness.
- Install the rear underbody protection.

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13 53 192 Removing and installing/replacing a pressure line (N55)



Special tools required:

- 32 1 270
- 13 0 160



Warning!

Observe warning on cylinder head cover.

Disconnect negative battery terminal (risk of fire due to short circuit on dismantling).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40 °C.



Warning!

Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high speed when the high pressure line is released!



Important!

Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- Do not allow any dirt particles or foreign bodies to get into the system.
- Remove all traces of dirt before removing lines or separate components.
- Use only fluff-free cloths.
- Seal all fuel system openings with protective caps or plugs.
- High pressure lines may be rescrewed a maximum of 10 times.



Necessary preliminary tasks:

- Remove ignition coil of corresponding cylinder.

Note:

- Ignition coils must not be fouled by fuel!

  The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail! It is therefore essential to protect the spark plug slot against ingress of fuel with a cloth!
- Before installing ignition coils, clean spark plug slots with compressed air.
- Make sure the spark plug slot is absolutely clean.

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Recycling:

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste disposal regulations.



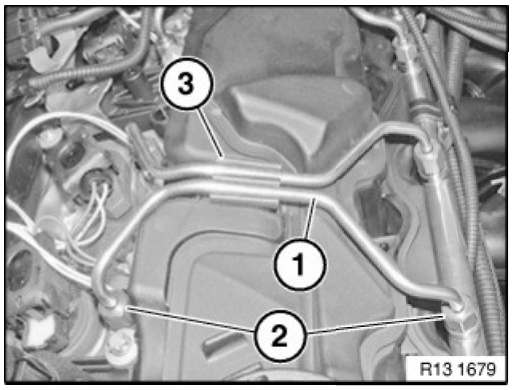
Warning!

Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high velocity from the fuel injectors!

To reduce the fuel pressure, place rag over fuel injector and carefully tap against the fuel injector with a spanner.

There is a risk of injury if the fuel pressure is not reduced!



Note:
The following description applies to all pressure lines.

Release the pressure line on the rail first. To reduce existing fuel pressure if necessary. Fuel must not get into the spark plug slot. Then disconnect the pressure line from the injector.

Unscrew nuts (2).

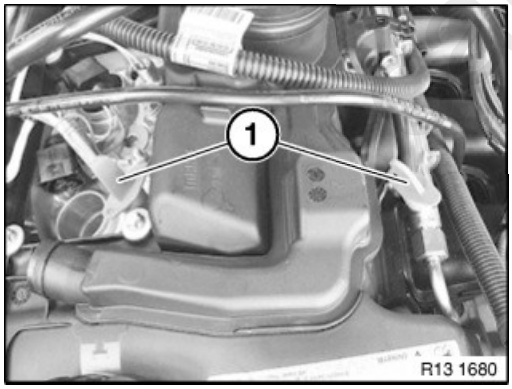
Disconnect pressure line (1).

Installation note:
Reinstall rubber mount (3).

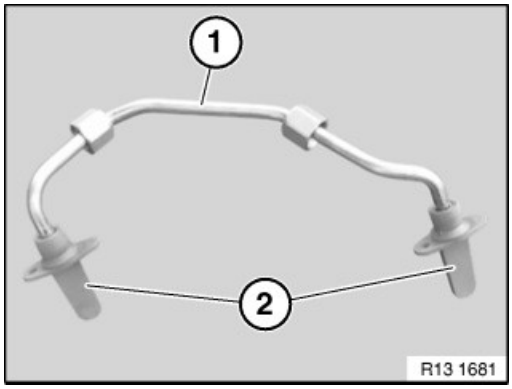
Important!

If several pressure lines are removed, ensure that each pressure line is reinstalled in its original location (cylinder).

Mark pressure lines.

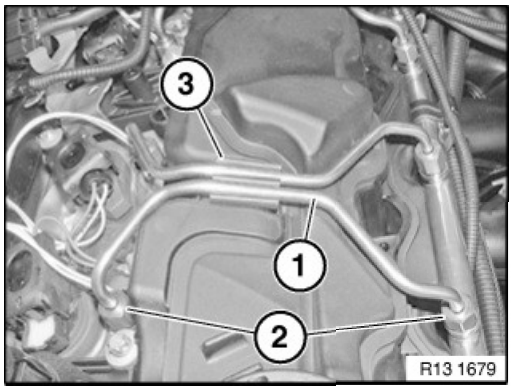


Seal rail and injector with a matching plug (1) from special tool kit 132 1 270 .



Seal pressure line (1) with a matching plug from special tool kit 232 1 270 .

When reinstalling lines, lubricate the thread and bearing face of the ball with a little transmission oil or grease! When they are installed for the first time the nuts have a coating of lubricant (only effective once). Penetration of lubricant into the fuel-conducting area should be avoided.



Important!

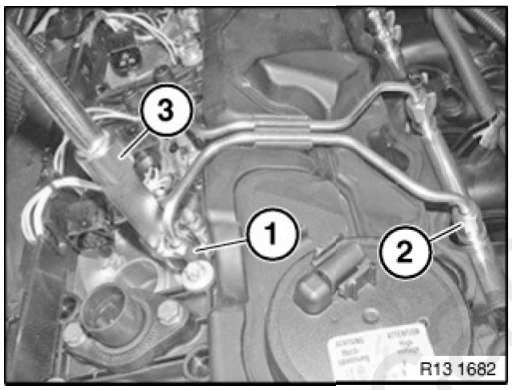
Connect pressure line (1) without tension only.

To ensure distortion-free installation of the pressure line and to avoid damaging the thread, it must be possible for both nuts to be screwed on easily by hand!

If the ball bush is not in the centre of the sealing cone of the rail and injector when the pressure line is attached, the pressure lines must be relieved of tension.

If pressure lines are tensioned, see further procedure in the section:

Relieving tension on pressure lines and fitting.



Adhere to tightening sequence:

Note:
Reset special tool in good time to prevent bending of pressure lines.

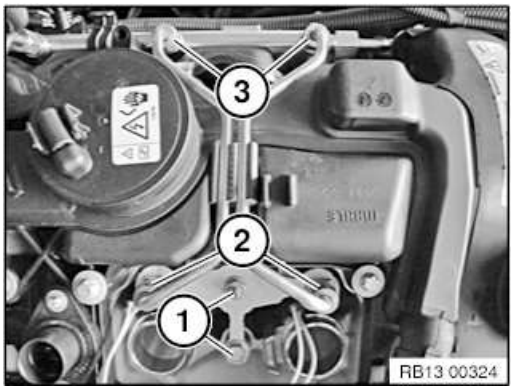
Insert pressure line (1), install together with rubber mount (3) and fit nuts (2) **hand-tight** only.

- First tighten down nut (1) on injector.
- Then tighten down nut (2) on rail.

Tighten down nuts with special tool 3 13 0 160 .

Tightening torque 13 53 9AZ.

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Relieving tension on pressure lines and fitting:

If the ball bush is not in the centre of the sealing cone of the rail and injector when the pressure line is attached, the pressure lines must be relieved of tension. To relieve tension on the pressure line, the pressure line of the adjacent injector on the same hold-down device must also be released and the hold-down device must be released.

1. Release union nuts (2) on injectors.
2. Release union nuts (3) on rail.
3. Release screws (1) on hold-down device.
4. Fit pressure lines hand-tight.
5. Tighten screws (1) on hold-down device
   Tightening torque 13 53 6AZ.
6. Tighten nuts (2) on injectors.
   Tightening torque 13 53 9AZ.
7. Tighten nuts (3) on rail.
   Tightening torque 13 53 9AZ.

Assemble engine.

Check fuel system for tightness.

Check function of DME.

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13 53 332 Removing and installing/replacing feed line (N55)



Special tools required:

- 13 5 020
- 32 1 270
- 13 5 160



Warning!

Disconnect negative battery terminal (risk of fire due to short circuit on dismantling).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40 °C.



Wear safety goggles.



Important!

Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- Do not allow any dirt particles or foreign bodies to get into the system.
- Remove all traces of dirt before removing lines or separate components.
- Use only fluff-free cloths.
- Seal all fuel system openings with protective caps or plugs.



Important!

Ignition coils must not be contaminated by fuel.

The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail!

Cover ignition coil with suitable means.



Necessary preliminary tasks:

- Remove intake plenum.

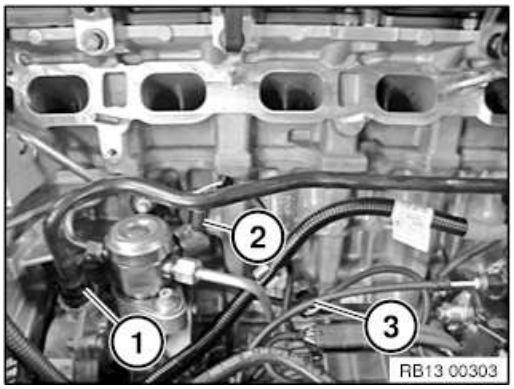
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Recycling:

Fuel escapes when fuel lines are detached.

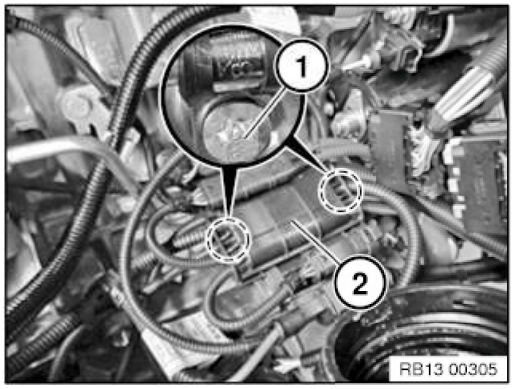
Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste disposal regulations.

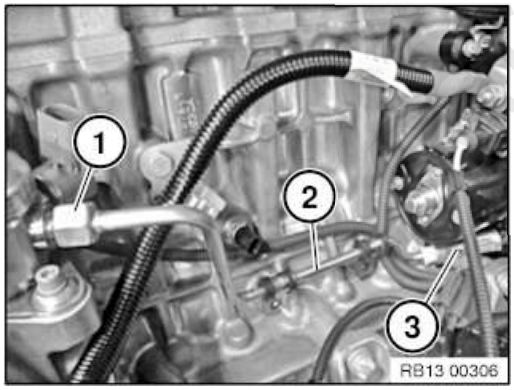


Unlock and detach vacuum line (1) from the vacuum pump.

Unlock and pull off connector (2) from the high pressure pump and connector (3) from the oil temperature sensor.



Release screws (1) below cable channel (2).*Installation note:*
Adhere to tightening/torque sequence.



Release fuel hose (3) and seal with special tool (1) 13 5 160 .

Release nut (1) on high pressure pump.

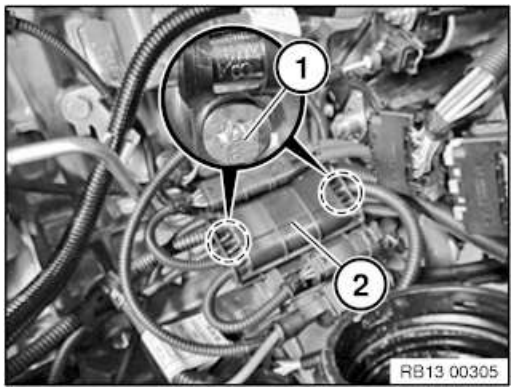
Remove feed line (2).

Close off feed line and high pressure pump with a matching plug from set of special tools 32 1 270 .

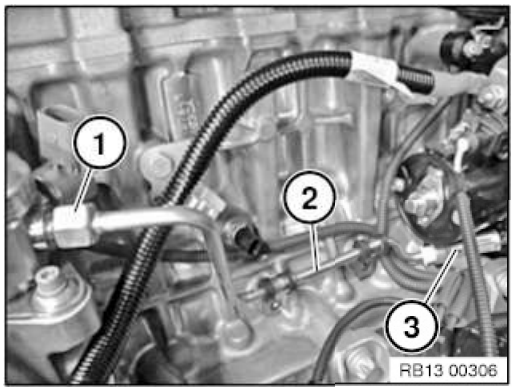
Installation note:
Adhere to tightening/torque sequence.

First, fit feed line on high pressure pump and engine block only **hand-tight**. Do **not** connect fuel hose to the feed line yet.

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Tighten screws (1) below the cable channel.
Tightening torque 13 53 10AZ.



Tighten union nut (1) with special tool 13 5 020 .
Tightening torque 13 53 7AZ.
Re-connect fuel hose (3) to feed line.

Assemble engine.
Check fuel system for tightness.
Check function of DME.

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13 51 017 Removing and installing/replacing high pressure pump (Bosch) (N55)



Warning!

Observe warning on cylinder head cover.

Disconnect negative battery terminal (risk of fire due to short-circuiting on dismantling).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40 °C.



Important!

Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high speed when the high pressure line is released!



Important!

Adhere to conditions of absolute cleanliness when carrying out repair work on the high-pressure fuel system!

Introduced contaminants can cause malfunctions in the system!

- Do not allow any dirt particles or foreign bodies to get into the system.
- Remove all traces of contamination before removing lines or separate components.
- Use only lint-free cloths.
- Seal all fuel system openings with protective caps or plugs.



Important!

Ignition coils must not be contaminated by fuel.

The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail!

Cover ignition coil with suitable means.



Necessary preliminary tasks:

- Remove feed line.
- Remove pressure line.



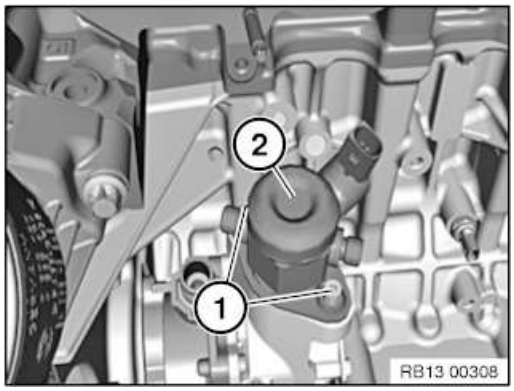
Recycling:

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

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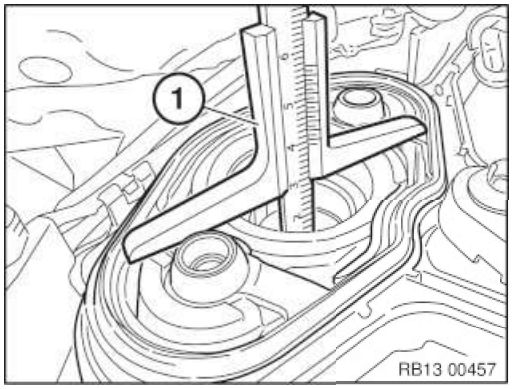
Release screws (1).

Remove high pressure pump (2).

When removing the high pressure pump, ensure that the pump tappet does not fall out.

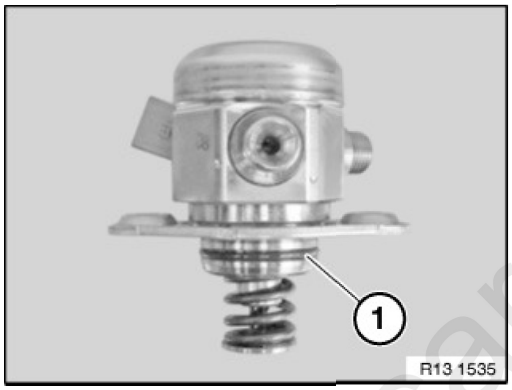
Installation note:
Before installing the high pressure pump, the cam of the high pressure pump drive must be turned to **BDC**. To do this, twist the engine if necessary in the direction of engine rotation to the central bolt of the crankshaft.

Adhere to tightening/torque sequence.



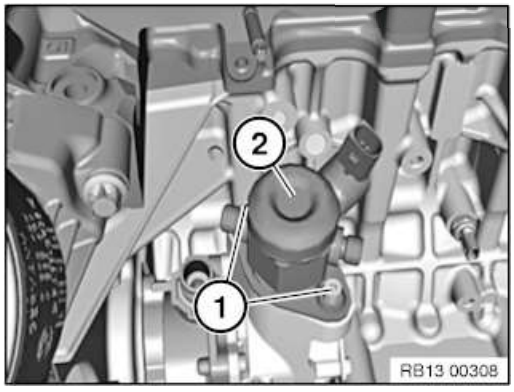
Lay depth gauge (1) flat on high pressure pump flange.

Turn engine at central bolt in direction of engine rotation until the depth gauge shows that the camshaft has reached the **BDC position**.



Installation note:
Replace O-ring (1) and coat with engine oil.

Clean contact surfaces.



Install high pressure pump (2).

Installation note:
Provisionally fasten screws (1) on high pressure pump (2) and tighten alternately in 90° increments until final tightening, otherwise the piston may break as a result of tilting!

Tightening torque 13 53 1AZ.

Attach connector.

Installation note:
An adapter must be installed for some high pressure pumps. For further information, see the Electronic Parts Catalogue (EPC).

Assemble engine.

Check fuel system for leak tightness.

Check function of DME.

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13 53 334 Removing and installing/replacing pressure line (N55)



Special tools required:

- 11 8 610
- 13 5 020
- 32 1 270



Warning!

Observe warning on cylinder head cover.

Disconnect negative battery terminal (risk of fire due to short-circuiting on removal).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40 °C.



Important!

Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high speed when the high pressure line is released!



Important!

Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- Do not allow any dirt particles or foreign bodies to get into the system.
- Remove all traces of dirt before removing lines or separate components.
- Use only fluff-free cloths.
- Seal all fuel system openings with protective caps or plugs.
- High pressure lines may be rescrewed a maximum of 10 times.



Recycling:

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel in a suitable container.

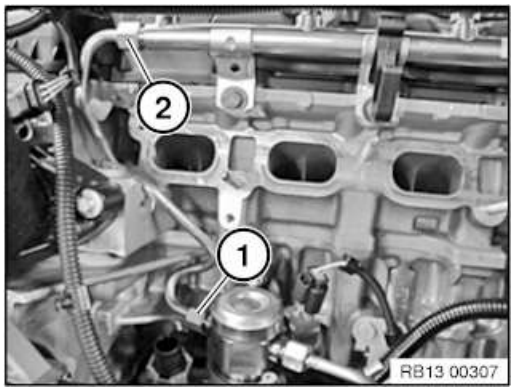
Observe country-specific waste disposal regulations.



Necessary preliminary tasks:

- Remove intake plenum.

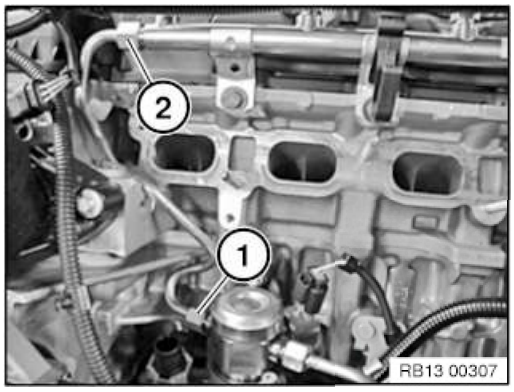
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Release nuts (1 and 2).

Remove H.P. line.

Seal connections of high pressure line and the high pressure pump with matching plugs from special tool set 32 1 270 .



Fit high pressure line.

When reinstalling lines, lubricate the thread and bearing face of the ball with a little transmission oil or grease! When they are installed for the first time the nuts have a coating of lubricant (only effective once). Penetration of lubricant into the fuel-conducting area should be avoided.

Important!

Adhere to the installation procedure!

Lay the high pressure line with the ball bush (1) to the high pressure pump. When doing so, the ball bush (2) of the high pressure line must lie in the centre of the cone on the rail. If the ball bush (2) does not lie in the centre of the cone, the installation position of the rail must be adjusted. To do this the following fuel system components must be released:

- Release pressure lines on injectors and on rail.
- Release mounting bolts on rail.

Follow sequence of screw connections:

1. Fit high pressure line on high pressure pump and on rail hand-tight.
2. Fit high pressure lines between the injectors and the rail hand-tight.
3. Fit mounting bolts on the rail and cylinder head hand-tight.
4. Tighten mounting bolts on rail and cylinder head.

   Tightening torque 13 53 2AZ.
5. Tighten high pressure line on injectors.

   Tightening torque 13 53 9AZ.
6. Tighten high pressure line (injector line) on rail.

   Tightening torque 13 53 9AZ.
7. Tighten high pressure line (high pressure line between rail and high pressure pump) on rail.

   Tightening torque 13 53 8AZ.
8. Tighten high pressure line on high pressure pump.

   Tightening torque 13 53 8AZ.

Assemble engine.

Check fuel system for tightness.

Check function of DME.

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13 53 158 Removing and installing/replacing rail (Bosch high pressure pump) (N55)



Special tools required:

- 13 0 160



Warning!

Observe warning on cylinder head cover.

Disconnect negative battery terminal (risk of fire due to short circuit on dismantling).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40 °C.



Important!

Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high speed when the high pressure line is released!



Important!

Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- Do not allow any dirt particles or foreign bodies to get into the system.
- Remove all traces of dirt before removing lines or separate components.
- Use only fluff-free cloths.
- Seal all fuel system openings with protective caps or plugs.



Important!

When working on the oil, coolant or fuel circuit, you must protect the alternator against dirt contamination.

Cover alternator with suitable materials.

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



Necessary preliminary work:

- Disconnect pressure lines.
- Remove rear ignition coil cover.

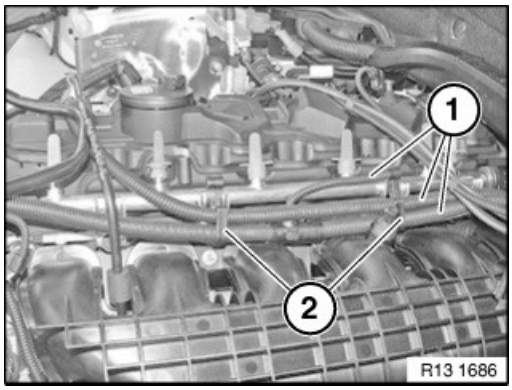
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Recycling:

Fuel escapes when fuel lines are detached.

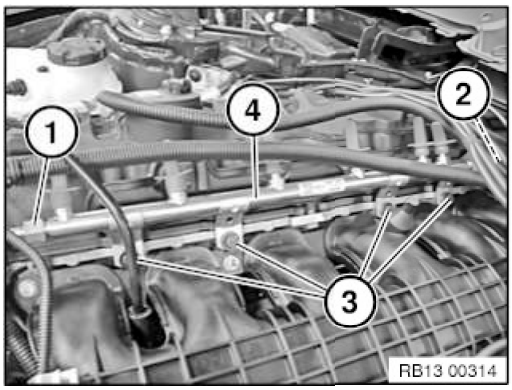
Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.



Release wiring harnesses (1) from rail and lay to one side.

Undo clamps (2) from rail.



Slacken nut (1).

Unlock and disconnect plug (2) on high-pressure sensor.

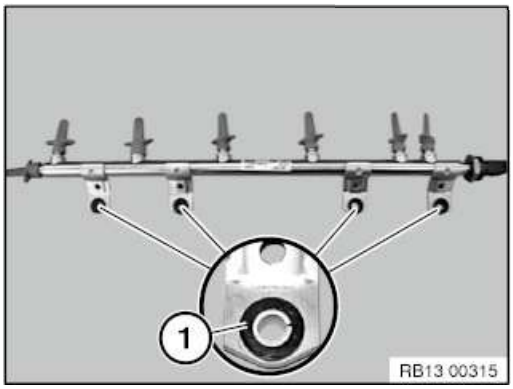
Release screws (3).

Remove rail (4).

Installing the rail:

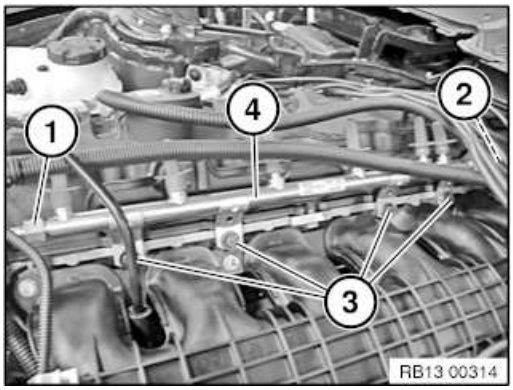
Rail installation is described separately from removal.

If an injector line is being replaced, the corresponding injector hold-down device must be released (see Removing and installing injector).



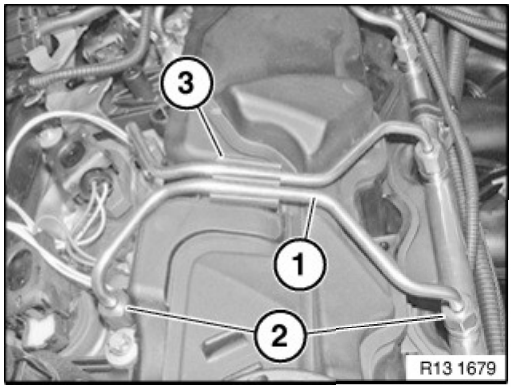
Installation note:
Before reinstalling the rail, the decoupling element and sleeves (1) must be replaced.

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Install rail (4) while tightening nuts (1) and bolts (3) hand-tight only.*Note:*

- Rail must still be displaceable on cylinder head.
- Nut (1) must be able to be screwed on easily by hand.



Important!

Connect pressure line (1) without tension only.

To ensure distortion-free installation of the pressure line and to avoid damaging the thread, it must be possible for both nuts to be screwed on easily by hand!

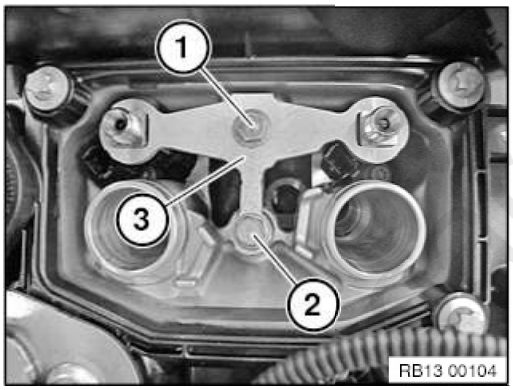
Fitting pressure lines:

(Same procedure for all pressure lines)

Install pressure line (1). Tighten nuts (2) hand-tight only.

When reinstalling lines, lubricate the thread and the nut facing of the ball! When they are installed for the first time the nuts have a coating of lubricant (only effective once). Penetration of lubricant into the fuel-conducting area should be avoided.

Reinstall rubber mount (3).



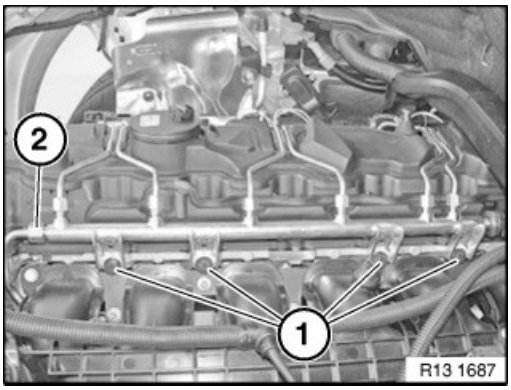
Procedure for loose injector hold-down device (this operation can be skipped if the injector hold-down device has not been loosened).

Firstly tighten screw (1).

Tightening torque 13 53 6AZ.

Then tighten down screw (2).

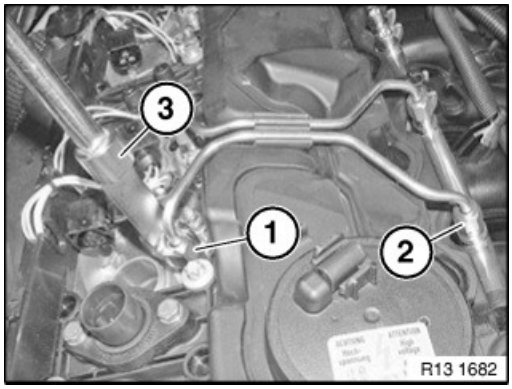
Tightening torque 13 53 6AZ.



Adhere to tightening sequence:

- **1.** Tighten screws (1).

  Tightening torque 13 53 2AZ.



Important!

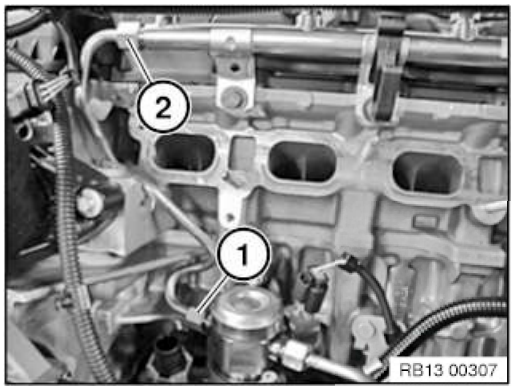
Reset special tool in early to avoid bending pressure lines.

Tighten down nuts with special tool 313 0 160 .

Adhere to tightening sequence:

- **2.** First tighten nut (1) on injector.
- **3.** Then tighten nut (2) on rail.

Tightening torque 13 53 9AZ.



- **4.** Tighten nut (2).

  5. Tighten nut (1).

  Tightening torque 13 53 8AZ.

Push connector for high pressure sensor on.

Assemble engine.

Check fuel system for tightness.

Check function of DME.

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13 53 158 Removing and installing/replacing rail (rail with pressure lines) (N55)



Special tools required:

- 13 0 160



Warning!

Observe warning on cylinder head cover.

Disconnect negative battery terminal (risk of fire due to short circuit on dismantling).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40 °C.



Attention!

Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high speed when the high pressure line is released!



Attention!

Adhere to conditions of absolute cleanliness when carrying out repair work on the high-pressure fuel system!

Introduced contaminants can cause malfunctions in the system!

- Do not allow any dirt particles or foreign bodies to get into the system.
- Remove all traces of contamination before removing lines or separate components.
- Use only lint-free cloths.
- Seal all fuel system openings with protective caps or plugs.



Attention!

When working on the oil, coolant or fuel circuit, you must protect the alternator against dirt contamination.

Cover alternator with suitable materials.

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



Necessary preliminary work:

- Remove ignition coils.
- Remove intake silencer housing
- **If fitted:** Remove rear ignition coil cover.

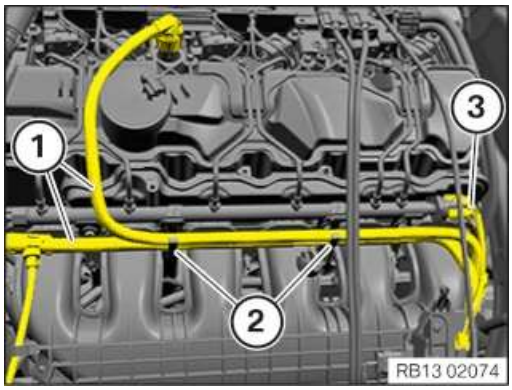
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Recycling:

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel.

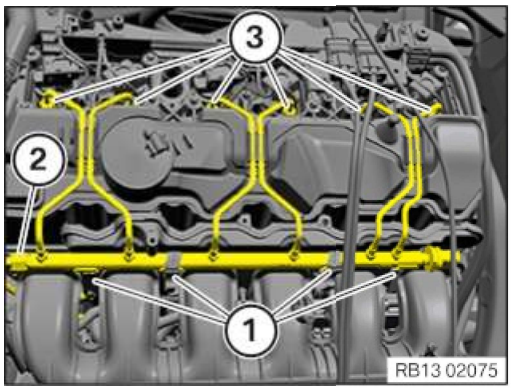
Observe country-specific waste disposal regulations.



Release wiring harnesses (1) from rail and lay to one side.

Undo clamps (2) from rail.

Unlock connector (3) from and remove from rail pressure sensor.



Release screws (1).

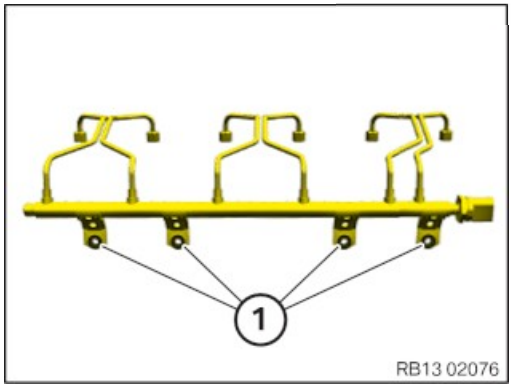
Slacken nut (2).

Loosen nuts (3) on injectors.

Feed out and remove the rail .

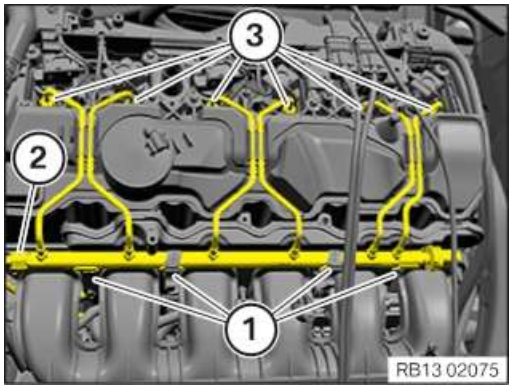
Installing the rail:

Rail installation is described separately from removal.



Installation note:
Before reinstalling the rail, the decoupling element and sleeves (1) must be replaced.

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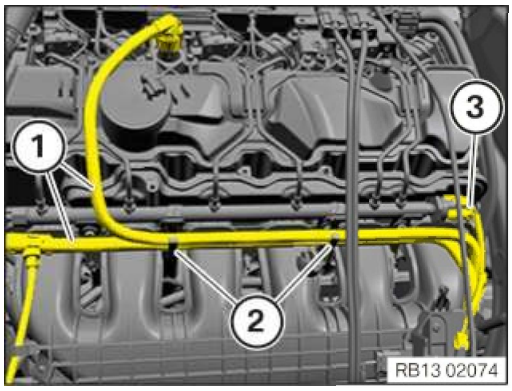
Install rail while tightening bolts (1) and nuts (2) and (3) hand-tight only.

Note:

- Rail must still be displaceable on cylinder head.
- Nuts (2) and (3) must be able to be screwed on easily by hand!

Adhere to tightening sequence:

1. Tighten down screws (1).
   Tightening torque 13 53 2AZ.
2. Tighten nuts (3) on the injectors with special tool 13 0 160 .
   Reset special tool in early to avoid bending pressure lines
   Tightening torque 13 53 9AZ.
3. Tighten nut (2).
   Tightening torque 13 53 8AZ.



Mount clamps (2) on the rail.

Lay wiring harnesses (1) and attach on the clamps (2).

Connect the connector (3) to the rail pressure sensor and lock it audibly.

Assemble engine.

Check fuel system for leak tightness.

Check function of DME.

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13 53 596 Replacing high-pressure fuel sensor (N55)



Special tools required:

- 32 1 270
- 32 2 100



Warning!

Observe warning on cylinder head cover.

Disconnect negative battery terminal (risk of fire due to short circuit on dismantling).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40 °C.



Important!

Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high speed when the high pressure line is released!



Important!

Read and comply with notes on protection against electrostatic discharge (ESD protection).



Important!

Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- Do not allow any dirt particles or foreign bodies to get into the system.
- Remove all traces of dirt before removing lines or separate components.
- Use only fluff-free cloths.
- Seal all fuel system openings with protective caps or plugs.



Necessary preliminary tasks:

- Remove ignition coil cover
- Remove rear ignition coil cover.

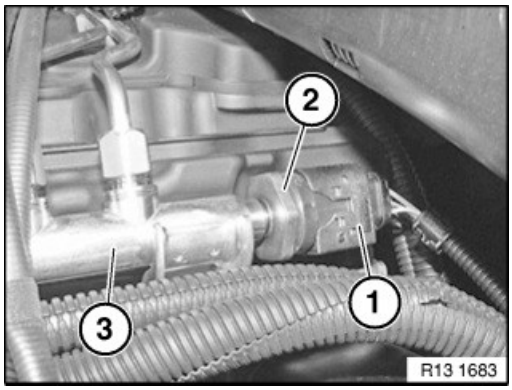
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Recycling:

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste disposal regulations.



Unlock connector (1) and remove.

Release high pressure sensor (2) and remove.

Tightening torque 13 53 4AZ with special tool 32 2 100 .

Seal rail (3) 32 1 270 if necessary with a matching plug from set of special tools .

Assemble engine.

Check fuel system for tightness.

Check function of DME.

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13 53 192 Removing and installing/replacing a pressure line (N55)



Special tools required:

- 32 1 270
- 13 0 160



Warning!

Observe warning on cylinder head cover.

Disconnect negative battery terminal (risk of fire due to short circuit on dismantling).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40 °C.



Warning!

Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high speed when the high pressure line is released!



Important!

Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- Do not allow any dirt particles or foreign bodies to get into the system.
- Remove all traces of dirt before removing lines or separate components.
- Use only fluff-free cloths.
- Seal all fuel system openings with protective caps or plugs.
- High pressure lines may be rescrewed a maximum of 10 times.



Necessary preliminary tasks:

- Remove ignition coil of corresponding cylinder.

Note:

- Ignition coils must not be fouled by fuel!

  The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail! It is therefore essential to protect the spark plug slot against ingress of fuel with a cloth!
- Before installing ignition coils, clean spark plug slots with compressed air.
- Make sure the spark plug slot is absolutely clean.

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Recycling:

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste disposal regulations.



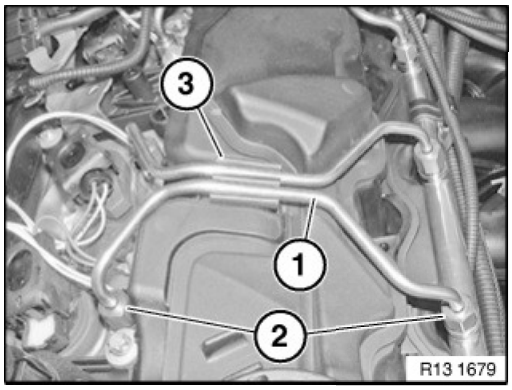
Warning!

Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high velocity from the fuel injectors!

To reduce the fuel pressure, place rag over fuel injector and carefully tap against the fuel injector with a spanner.

There is a risk of injury if the fuel pressure is not reduced!



Note:
The following description applies to all pressure lines.

Release the pressure line on the rail first. To reduce existing fuel pressure if necessary. Fuel must not get into the spark plug slot. Then disconnect the pressure line from the injector.

Unscrew nuts (2).

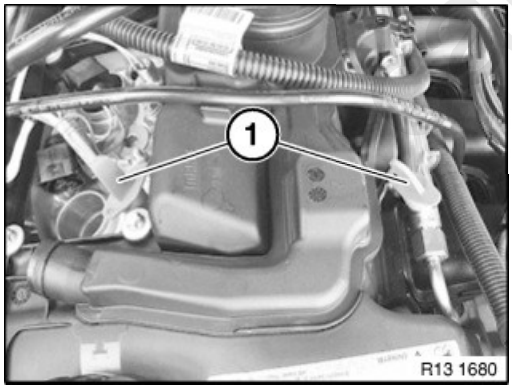
Disconnect pressure line (1).

Installation note:
Reinstall rubber mount (3).

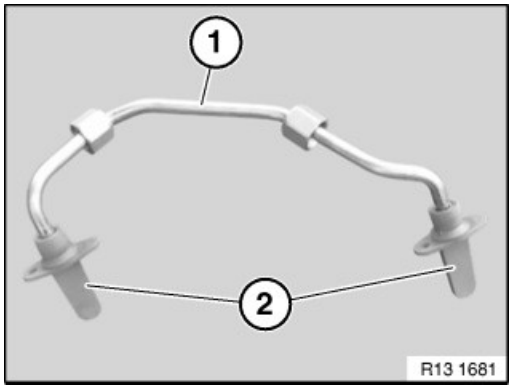
Important!

If several pressure lines are removed, ensure that each pressure line is reinstalled in its original location (cylinder).

Mark pressure lines.

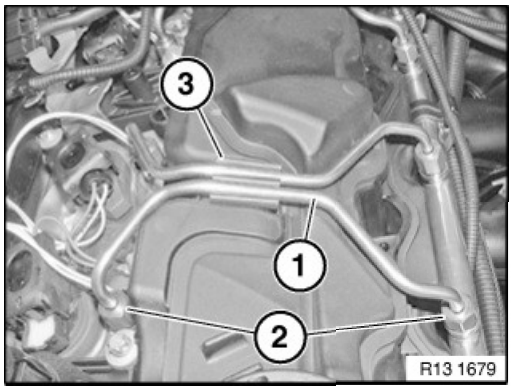


Seal rail and injector with a matching plug (1) from special tool kit 132 1 270 .



Seal pressure line (1) with a matching plug from special tool kit 232 1 270 .

When reinstalling lines, lubricate the thread and bearing face of the ball with a little transmission oil or grease! When they are installed for the first time the nuts have a coating of lubricant (only effective once). Penetration of lubricant into the fuel-conducting area should be avoided.



Important!

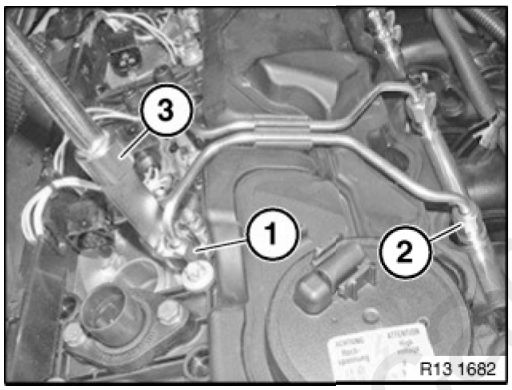
Connect pressure line (1) without tension only.

To ensure distortion-free installation of the pressure line and to avoid damaging the thread, it must be possible for both nuts to be screwed on easily by hand!

If the ball bush is not in the centre of the sealing cone of the rail and injector when the pressure line is attached, the pressure lines must be relieved of tension.

If pressure lines are tensioned, see further procedure in the section:

Relieving tension on pressure lines and fitting.



Adhere to tightening sequence:

Note:
Reset special tool in good time to prevent bending of pressure lines.

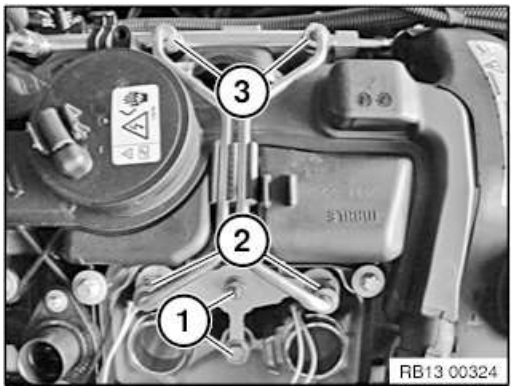
Insert pressure line (1), install together with rubber mount (3) and fit nuts (2) **hand-tight** only.

- First tighten down nut (1) on injector.
- Then tighten down nut (2) on rail.

Tighten down nuts with special tool 3 13 0 160 .

Tightening torque 13 53 9AZ.

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Relieving tension on pressure lines and fitting:

If the ball bush is not in the centre of the sealing cone of the rail and injector when the pressure line is attached, the pressure lines must be relieved of tension. To relieve tension on the pressure line, the pressure line of the adjacent injector on the same hold-down device must also be released and the hold-down device must be released.

1. Release union nuts (2) on injectors.
2. Release union nuts (3) on rail.
3. Release screws (1) on hold-down device.
4. Fit pressure lines hand-tight.
5. Tighten screws (1) on hold-down device
   Tightening torque 13 53 6AZ.
6. Tighten nuts (2) on injectors.
   Tightening torque 13 53 9AZ.
7. Tighten nuts (3) on rail.
   Tightening torque 13 53 9AZ.

Assemble engine.

Check fuel system for tightness.

Check function of DME.

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13 53 310 Removing and installing/replacing an injector (N55)

Special tools required:

- 13 0 320
- 00 9 170
- 13 0 190
- 13 0 280

Observe warnings on removal of the injectors without fail!

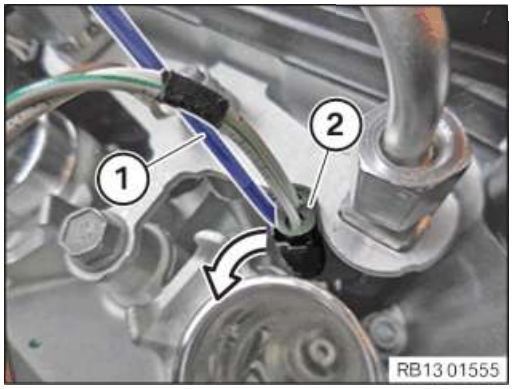
Note:
Caution! Injector conversion from EU5 to EU6.

For vehicles produced up until 01 July 2013.

If you can choose between several injectors, the service function "injector determination" must first be called up and the designated injector must be ordered before replacing the injector.

Necessary preliminary work:

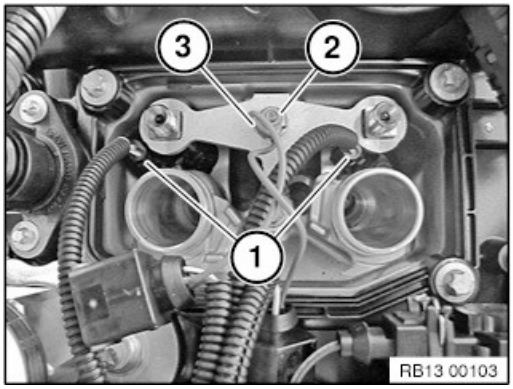
- Disconnect negative battery terminal (risk of fire due to short-circuiting on dismantling).
- Remove ignition coil of corresponding cylinder.
- Remove pressure lines of the corresponding cylinder **(only on vehicles with individual pressure lines).**
- Remove rail **(only on vehicles using the rail with fixed pressure lines).**



Unlock and disconnect the connectors (2) from the injectors with a small slotted screwdriver (1).

Unlock the lock in the direction of the arrow with a small slotted screwdriver (1). Disconnect the connector (2) on the connector housing from the injector.

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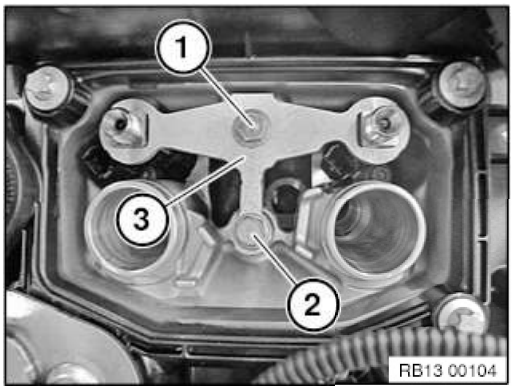
Note:
The following description applies to all injectors in cylinders 1-6.

Unlock connector (1) from injectors and detach.

Slacken nut (2).

Tightening torque 12 90 5AZ.

Remove ground cable (3).



Caution!

First, release screw (2). The, release screw (1).

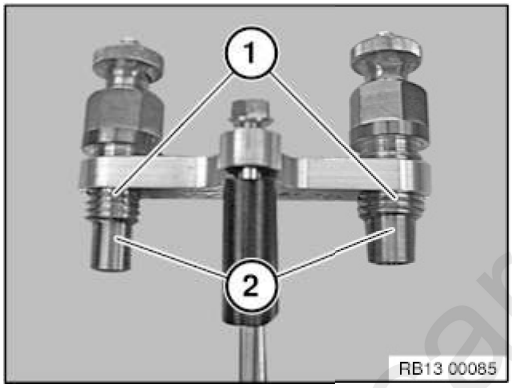
Otherwise, the hold-down device may tilt.

Remove holding-down element (3).

Pull injectors upward out of cylinder head and remove.

Note:
If several injectors are removed, ensure that each injector is reinstalled in its original location (cylinder).

Mark injectors.



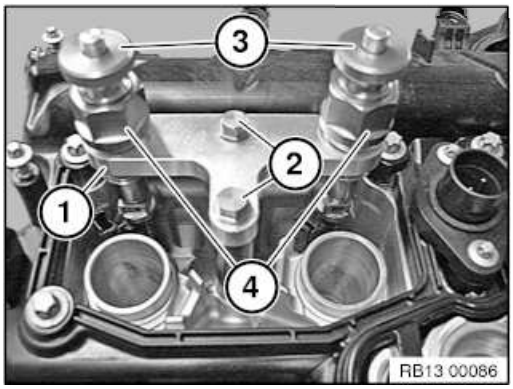
Procedure in event of stuck injector:

Use special tool 13 0 320 to remove injectors that are stuck.

Lightly oil pull-out thread (1) and unscrew completely (see graphic) before using the special tool.

Caution!

Pull-out thread (1) is a left-hand thread!

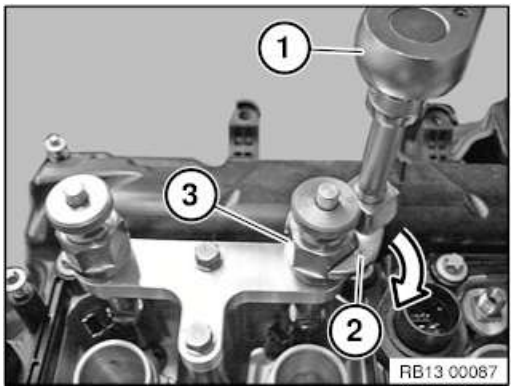


Fit special tool (1) 13 0 320 on injector slot. Join screws (2) to injector slot by a few threads. Screw in pull-out thread (4) until it is possible to screw the threaded sleeves (3) onto the injectors. Screw threaded sleeves (3) onto injectors and tighten down.

Tighten screws (2).

Tightening torque 13 53 13AZ.

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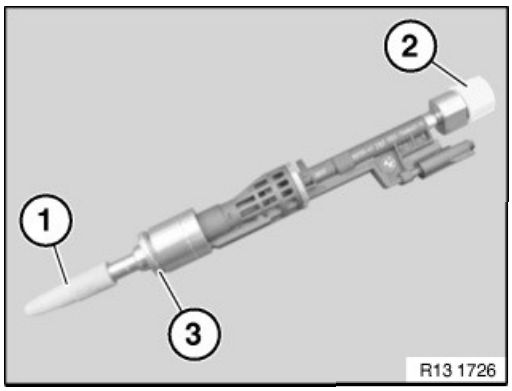


Caution!

Set torque wrench (1) to **5 Nm** clockwise rotation. Together with the special tool 13 0 320 , this corresponds to a tensile force of 2000 N. The injector must be **renewed** if the torque wrench disengages when the injector is pulled out.

Fit torque wrench (1) and special tool (2) 00 9 170 on hexagon head (3) of special tool 13 0 320 .

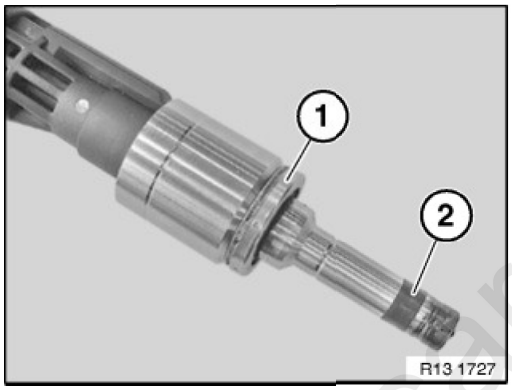
Turn torque wrench (1) in clockwise direction until the injector is pulled out.



After removing, fit protective caps (1 and 2) to injector tip and fuel line connection. *Installation note:*
When installing a new injector:

- Install decoupling element (3) **without fail!**

Failure to comply with this requirement may result in line breaks and fuel discharge!

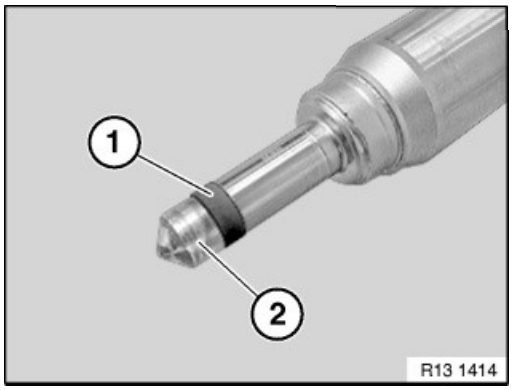


Installation note:
When reusing a running injector:

- Replace decoupling element (1) **without fail!**
- Replace Teflon ring (2) **without fail!**

  A Teflon ring that has already been installed once in the cylinder head must be replaced before the injector is reinstalled.

Failure to comply with this requirement may result in line breaks and fuel discharge!

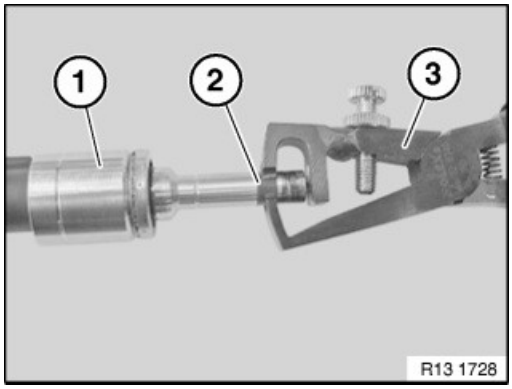


Replace Teflon ring:

Before replacing the Teflon ring (1), make sure your hands and the support areas are clean and free of oil.

Avoid mechanical contact with injector tip (2).

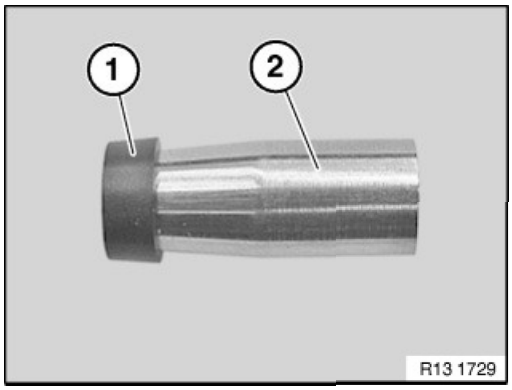
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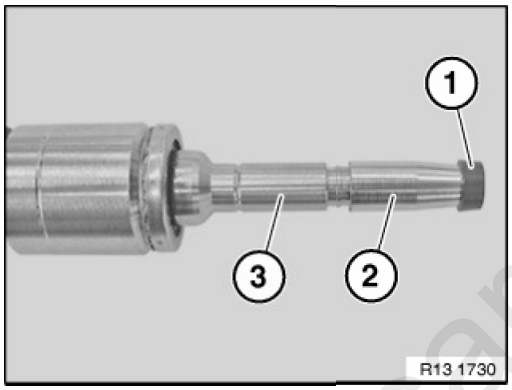
Remove Teflon ring (2) using special tool (3) 13 0 191 from the set of special tools 13 0 190 from the injector (1).

Use a fluff-free cloth only to remove combustion residues from cylindrical part of injector tip (do not use ultrasound or other tools/agents).

Do not clean injector tip.

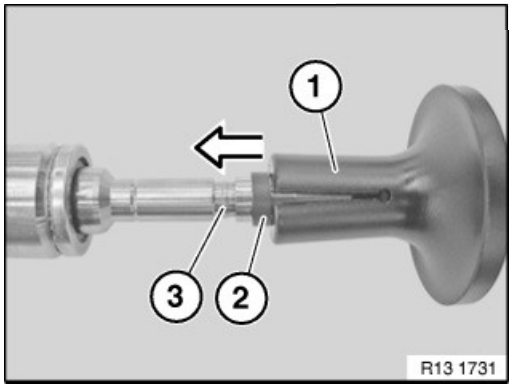


Push new Teflon ring (1) onto installation cone (2) 13 0 283 from the set of special tools 13 0 280 .



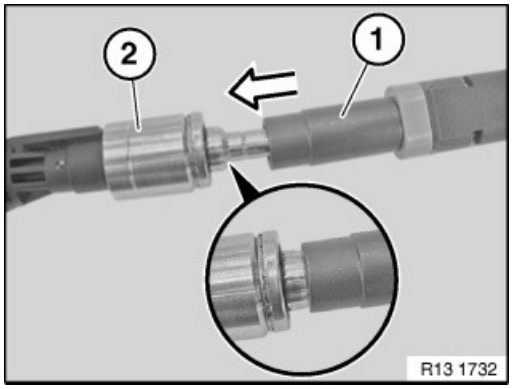
Mount Teflon ring (1) with installation cone (2) 13 0 283 onto injector tip (3).*Note:*

- Do not use fingernails to slide Teflon ring on.
- Do not use any lubricating agents.
- The sealing ring is expanded when slid on.



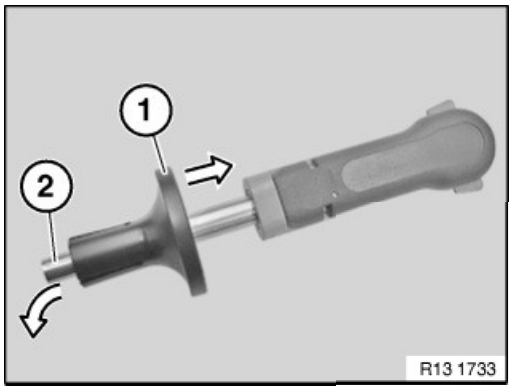
Use special tool (1) 13 0 281 from set of special tools 13 0 280 to slide Teflon ring into groove (3) on injector.

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To adjust the widened Teflon ring to the installation dimension, special tool (1) 13 0 282 from set of special tools 13 0 280 must be slid up to limit position on injector (2).

Do not use any lubricating agents.



Note:
Pull mounting tip (1) of special tool 13 0 282 towards rear to release installation cone (2) 13 0 281.

Installing injector:



Caution!
Injection quantity compensation!

An injection quantity compensation must be carried out if an injector is replaced or changed on the cylinder side.

Injection quantity compensation is carried out with the aid of a so-called adjustment value.

The adjustment value is printed in three digits on the injector body.

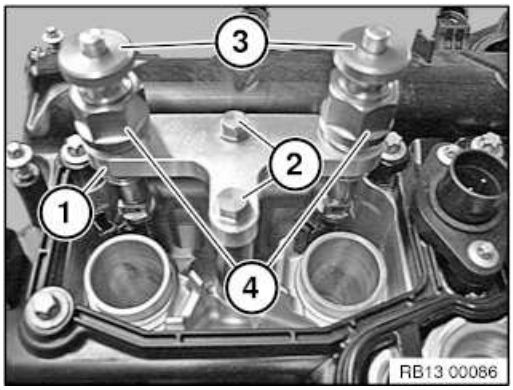
The adjustment value must be read off **before** installation!

Enter the adjustment value according to the installation location (cylinder) of the injector.

If injector quantity compensation is not carried out, the engine may run roughly or fail to start.

Injection quantity compensation is described at the end of these instructions.

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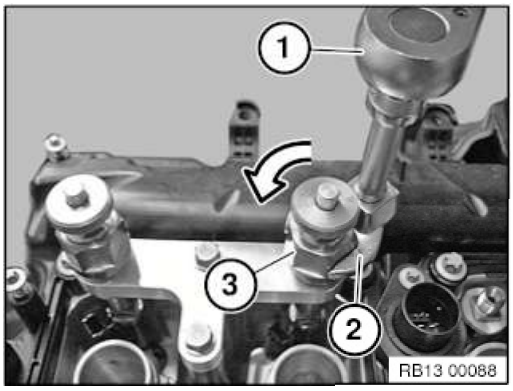


Insert injectors in injector bores.

Fit special tool (1) 13 0 320 on injector slot. Join screws (2) to injector slot by a few threads. Screw in the pull-out thread (4) until the threaded sleeves (3) can be screwed onto the injectors. Screw threaded sleeves (3) onto injectors and tighten down.

Tighten screws (2).

Tightening torque 13 53 13AZ.

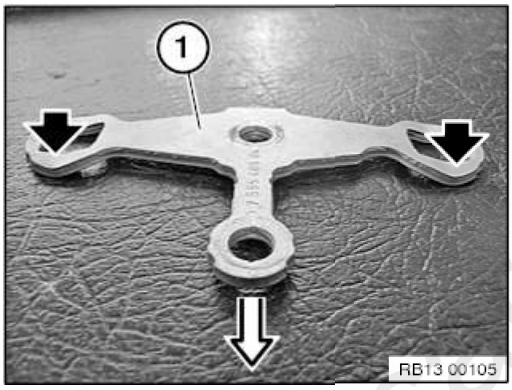


Caution!

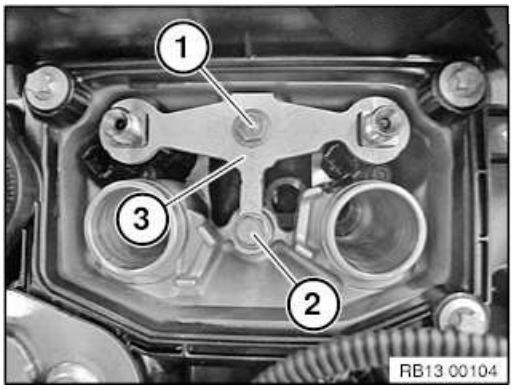
Set torque wrench (1) to **2 Nm** counter-clockwise rotation.

Fit torque wrench (1) and special tool (2) 00 9 170 on hexagon head (3) of special tool 13 0 320 .

Turn torque wrench (1) in counterclockwise direction until 2 Nm are reached.



Installation note:
Install hold-down device (1) with curvatures (black arrows) downward.

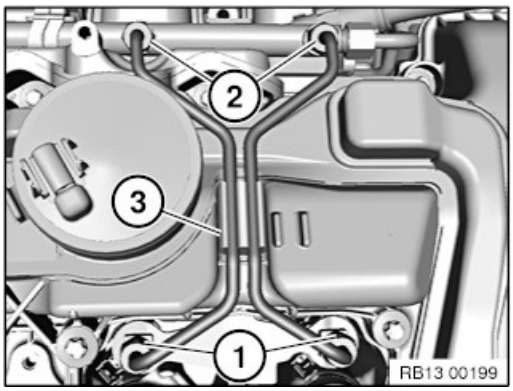


Fit hold-down device (3) on injectors.

Fit screws (1) hand-tight.

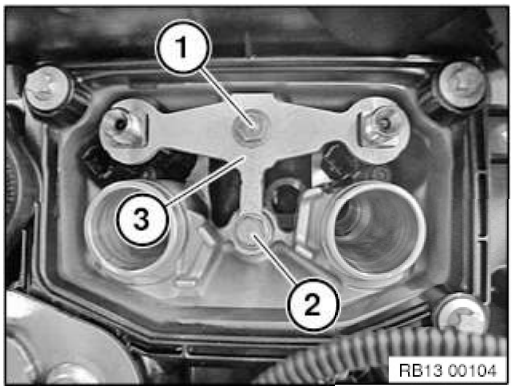
Only fit the screw (2) loosely to prevent the hold-down device from tilting.

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Only on vehicles with individual pressure lines.

Fit pressure lines with rubber mounts (3) on injectors and rail. Tighten nuts (1) and (2) manually only.

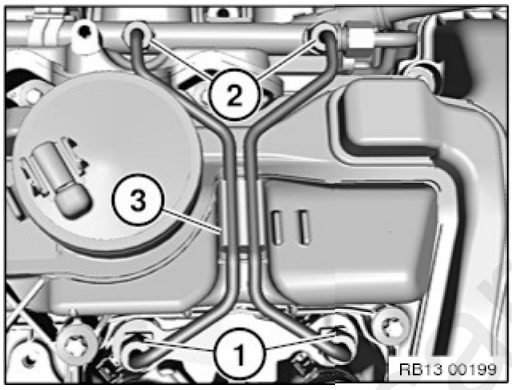


First tighten screw (1).

Tightening torque 13 53 6AZ.

Then tighten screw (2).

Tightening torque 13 53 6AZ.



Only on vehicles with individual pressure lines.

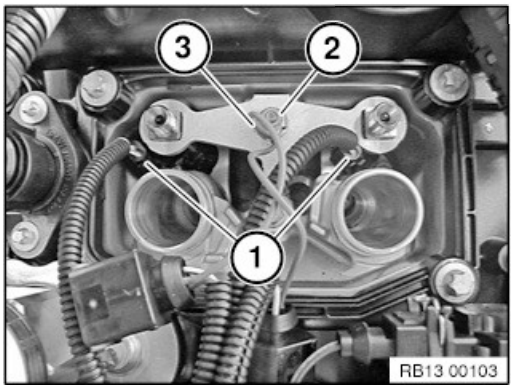
Tighten down pressure lines on injectors (1).

Tightening torque 13 53 9AZ .

Then tighten pressure lines (2) on rail.

Tightening torque 13 53 9AZ .

Installation note:
Reinstall line damper (3).



Note:
The following description applies to all injectors.

Noticeably connect connector (1) to the injectors.

Mount the ground cable (3).

Tighten nut (2).

Tightening torque 12 90 5AZ.

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Check all connectors (1) on the injectors again for correct fit and make sure that all connectors have noticeably engaged.



Perform an injection quantity compensation:

The adjustment value is printed with three digits - depending on the version - on the injector body.

- Connect diagnosis system.
- Identify vehicle.
- Select "Function selection."
- Select "Service functions."
- Select "Engine electronics."
- Select "Adjustment functions."
- Select "Adjust injectors."
- Select "Test plan"
- For each replaced injector, the adjustment value must be entered according to the installation location (cylinder).

Clean spark plug slot.

Assemble engine.

Check fuel system for leak tightness.

Check function of DME.

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13 53 332 Removing and installing/replacing feed line (N55)



Special tools required:

- 13 5 020
- 32 1 270
- 13 5 160



Warning!

Disconnect negative battery terminal (risk of fire due to short circuit on dismantling).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40 °C.



Wear safety goggles.



Important!

Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- Do not allow any dirt particles or foreign bodies to get into the system.
- Remove all traces of dirt before removing lines or separate components.
- Use only fluff-free cloths.
- Seal all fuel system openings with protective caps or plugs.



Important!

Ignition coils must not be contaminated by fuel.

The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail!

Cover ignition coil with suitable means.



Necessary preliminary tasks:

- Remove intake plenum.

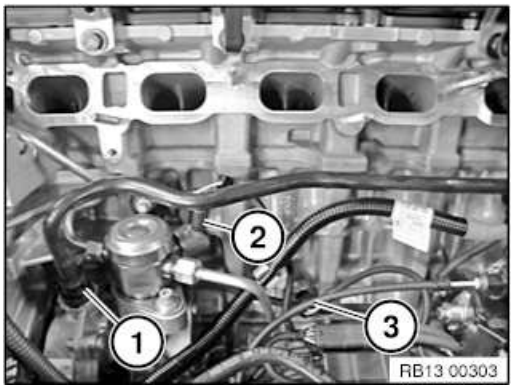
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Recycling:

Fuel escapes when fuel lines are detached.

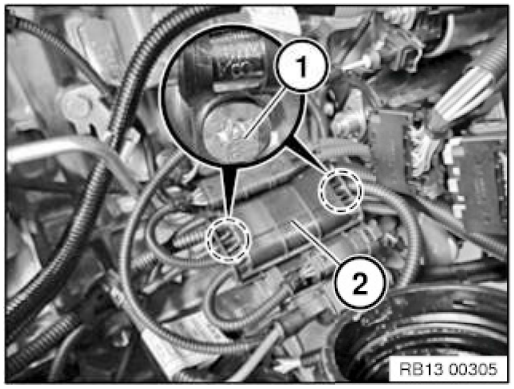
Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste disposal regulations.

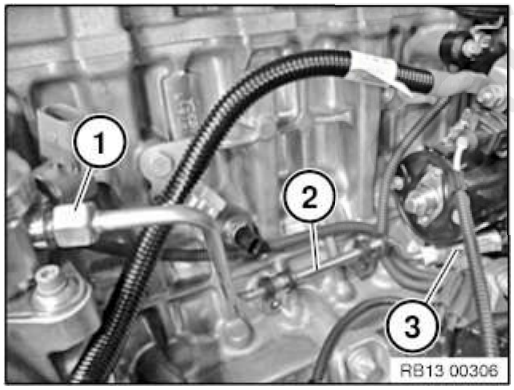


Unlock and detach vacuum line (1) from the vacuum pump.

Unlock and pull off connector (2) from the high pressure pump and connector (3) from the oil temperature sensor.



Release screws (1) below cable channel (2).*Installation note:*
Adhere to tightening/torque sequence.



Release fuel hose (3) and seal with special tool (1) 13 5 160 .

Release nut (1) on high pressure pump.

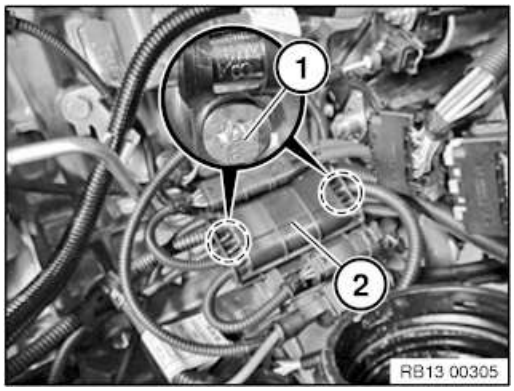
Remove feed line (2).

Close off feed line and high pressure pump with a matching plug from set of special tools 32 1 270 .

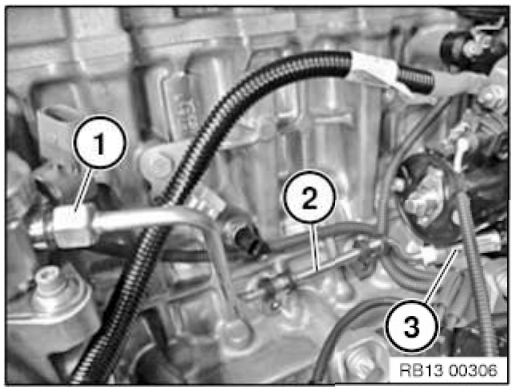
Installation note:
Adhere to tightening/torque sequence.

First, fit feed line on high pressure pump and engine block only **hand-tight**. Do **not** connect fuel hose to the feed line yet.

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Tighten screws (1) below the cable channel.
Tightening torque 13 53 10AZ.



Tighten union nut (1) with special tool 13 5 020 .
Tightening torque 13 53 7AZ.
Re-connect fuel hose (3) to feed line.

Assemble engine.
Check fuel system for tightness.
Check function of DME.

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13 53 334 Removing and installing/replacing pressure line (N55)



Special tools required:

- 11 8 610
- 13 5 020
- 32 1 270



Warning!

Observe warning on cylinder head cover.

Disconnect negative battery terminal (risk of fire due to short-circuiting on removal).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40 °C.



Important!

Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high speed when the high pressure line is released!



Important!

Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- Do not allow any dirt particles or foreign bodies to get into the system.
- Remove all traces of dirt before removing lines or separate components.
- Use only fluff-free cloths.
- Seal all fuel system openings with protective caps or plugs.
- High pressure lines may be rescrewed a maximum of 10 times.



Recycling:

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel in a suitable container.

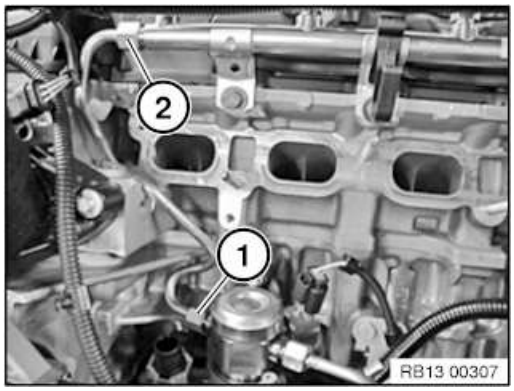
Observe country-specific waste disposal regulations.



Necessary preliminary tasks:

- Remove intake plenum.

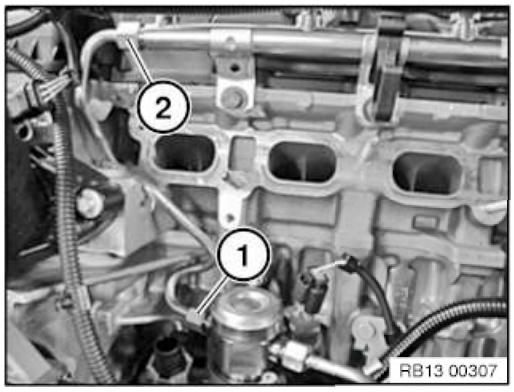
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Release nuts (1 and 2).

Remove H.P. line.

Seal connections of high pressure line and the high pressure pump with matching plugs from special tool set 32 1 270 .



Fit high pressure line.

When reinstalling lines, lubricate the thread and bearing face of the ball with a little transmission oil or grease! When they are installed for the first time the nuts have a coating of lubricant (only effective once). Penetration of lubricant into the fuel-conducting area should be avoided.

Important!

Adhere to the installation procedure!

Lay the high pressure line with the ball bush (1) to the high pressure pump. When doing so, the ball bush (2) of the high pressure line must lie in the centre of the cone on the rail. If the ball bush (2) does not lie in the centre of the cone, the installation position of the rail must be adjusted. To do this the following fuel system components must be released:

- Release pressure lines on injectors and on rail.
- Release mounting bolts on rail.

Follow sequence of screw connections:

1. Fit high pressure line on high pressure pump and on rail hand-tight.
2. Fit high pressure lines between the injectors and the rail hand-tight.
3. Fit mounting bolts on the rail and cylinder head hand-tight.
4. Tighten mounting bolts on rail and cylinder head.

   Tightening torque 13 53 2AZ.
5. Tighten high pressure line on injectors.

   Tightening torque 13 53 9AZ.
6. Tighten high pressure line (injector line) on rail.

   Tightening torque 13 53 9AZ.
7. Tighten high pressure line (high pressure line between rail and high pressure pump) on rail.

   Tightening torque 13 53 8AZ.
8. Tighten high pressure line on high pressure pump.

   Tightening torque 13 53 8AZ.

Assemble engine.

Check fuel system for tightness.

Check function of DME.

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13 53 158 Removing and installing/replacing rail (Bosch high pressure pump) (N55)



Special tools required:

- 13 0 160



Warning!

Observe warning on cylinder head cover.

Disconnect negative battery terminal (risk of fire due to short circuit on dismantling).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40 °C.



Important!

Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high speed when the high pressure line is released!



Important!

Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- Do not allow any dirt particles or foreign bodies to get into the system.
- Remove all traces of dirt before removing lines or separate components.
- Use only fluff-free cloths.
- Seal all fuel system openings with protective caps or plugs.



Important!

When working on the oil, coolant or fuel circuit, you must protect the alternator against dirt contamination.

Cover alternator with suitable materials.

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



Necessary preliminary work:

- Disconnect pressure lines.
- Remove rear ignition coil cover.

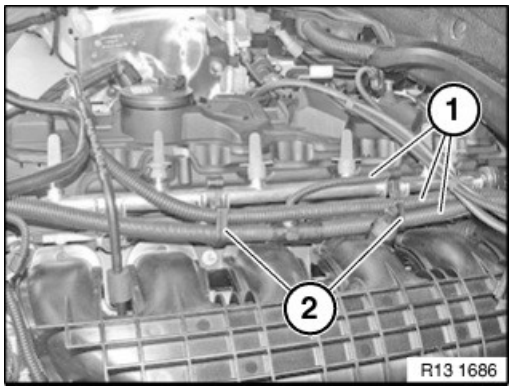
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Recycling:

Fuel escapes when fuel lines are detached.

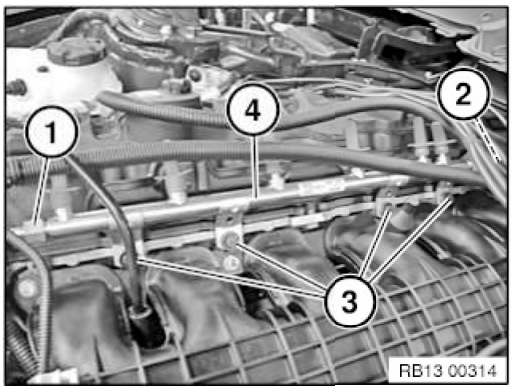
Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.



Release wiring harnesses (1) from rail and lay to one side.

Undo clamps (2) from rail.



Slacken nut (1).

Unlock and disconnect plug (2) on high-pressure sensor.

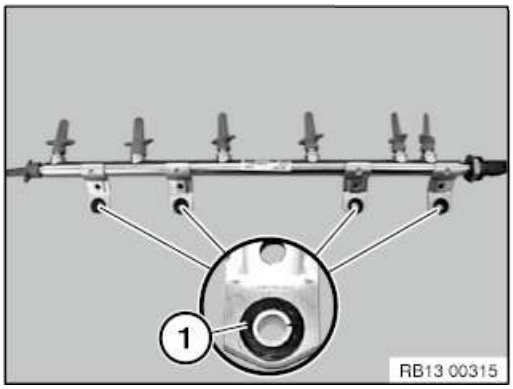
Release screws (3).

Remove rail (4).

Installing the rail:

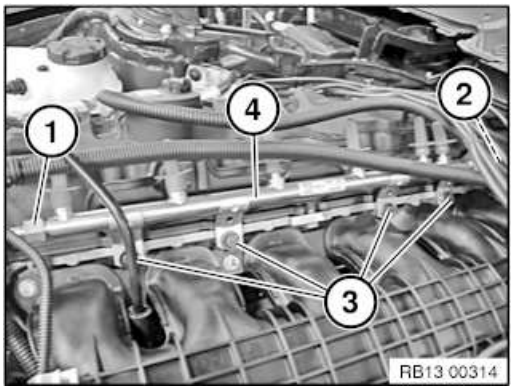
Rail installation is described separately from removal.

If an injector line is being replaced, the corresponding injector hold-down device must be released (see Removing and installing injector).



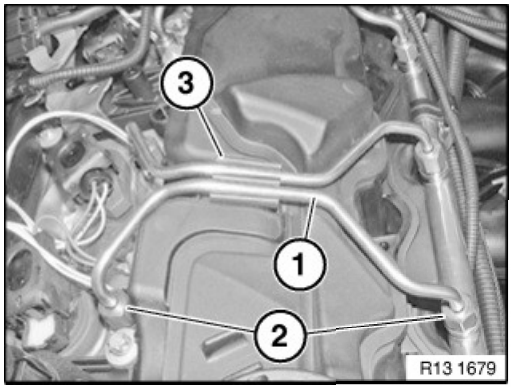
Installation note:
Before reinstalling the rail, the decoupling element and sleeves (1) must be replaced.

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Install rail (4) while tightening nuts (1) and bolts (3) hand-tight only.*Note:*

- Rail must still be displaceable on cylinder head.
- Nut (1) must be able to be screwed on easily by hand.



Important!

Connect pressure line (1) without tension only.

To ensure distortion-free installation of the pressure line and to avoid damaging the thread, it must be possible for both nuts to be screwed on easily by hand!

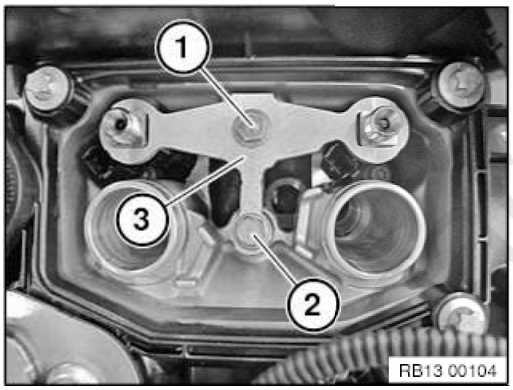
Fitting pressure lines:

(Same procedure for all pressure lines)

Install pressure line (1). Tighten nuts (2) hand-tight only.

When reinstalling lines, lubricate the thread and the nut facing of the ball! When they are installed for the first time the nuts have a coating of lubricant (only effective once). Penetration of lubricant into the fuel-conducting area should be avoided.

Reinstall rubber mount (3).



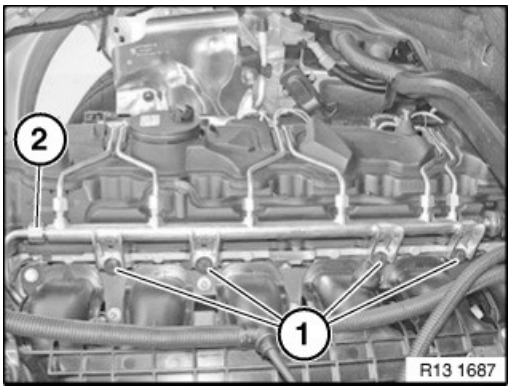
Procedure for loose injector hold-down device (this operation can be skipped if the injector hold-down device has not been loosened).

Firstly tighten screw (1).

Tightening torque 13 53 6AZ.

Then tighten down screw (2).

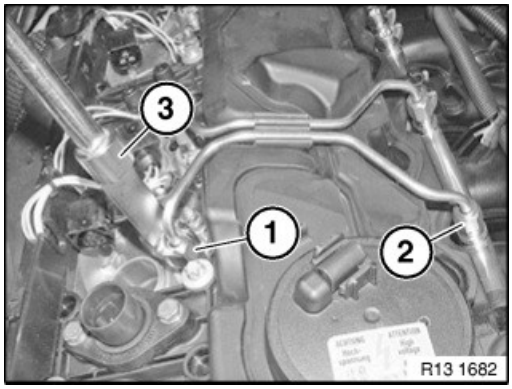
Tightening torque 13 53 6AZ.



Adhere to tightening sequence:

- **1.** Tighten screws (1).

  Tightening torque 13 53 2AZ.



Important!

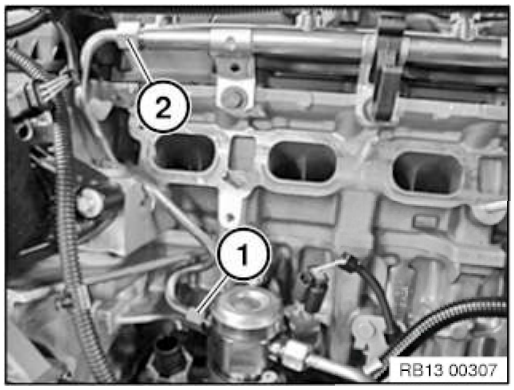
Reset special tool in early to avoid bending pressure lines.

Tighten down nuts with special tool 313 0 160 .

Adhere to tightening sequence:

- **2.** First tighten nut (1) on injector.
- **3.** Then tighten nut (2) on rail.

Tightening torque 13 53 9AZ.



- **4.** Tighten nut (2).

  5. Tighten nut (1).

  Tightening torque 13 53 8AZ.

Push connector for high pressure sensor on.

Assemble engine.

Check fuel system for tightness.

Check function of DME.

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13 53 158 Removing and installing/replacing rail (rail with pressure lines) (N55)



Special tools required:

- 13 0 160



Warning!

Observe warning on cylinder head cover.

Disconnect negative battery terminal (risk of fire due to short circuit on dismantling).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40 °C.



Attention!

Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high speed when the high pressure line is released!



Attention!

Adhere to conditions of absolute cleanliness when carrying out repair work on the high-pressure fuel system!

Introduced contaminants can cause malfunctions in the system!

- Do not allow any dirt particles or foreign bodies to get into the system.
- Remove all traces of contamination before removing lines or separate components.
- Use only lint-free cloths.
- Seal all fuel system openings with protective caps or plugs.



Attention!

When working on the oil, coolant or fuel circuit, you must protect the alternator against dirt contamination.

Cover alternator with suitable materials.

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



Necessary preliminary work:

- Remove ignition coils.
- Remove intake silencer housing
- **If fitted:** Remove rear ignition coil cover.

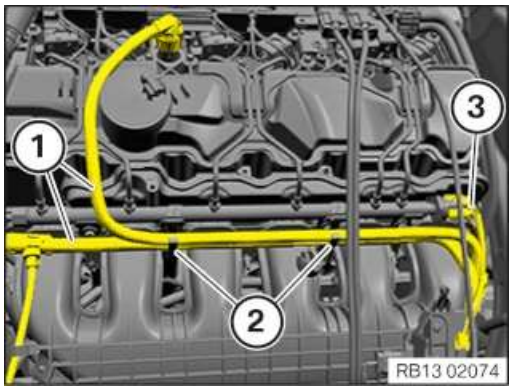
cardiagn.com

Recycling:

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel.

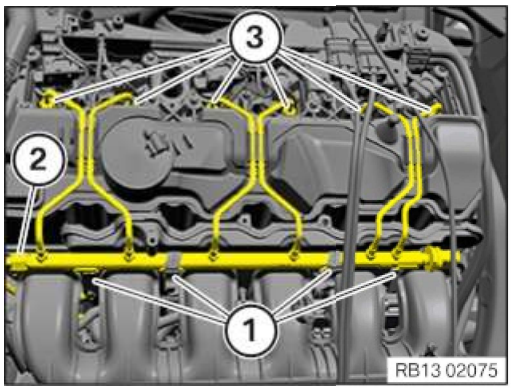
Observe country-specific waste disposal regulations.



Release wiring harnesses (1) from rail and lay to one side.

Undo clamps (2) from rail.

Unlock connector (3) from and remove from rail pressure sensor.



Release screws (1).

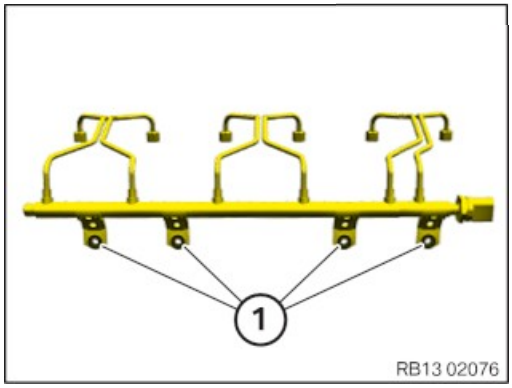
Slacken nut (2).

Loosen nuts (3) on injectors.

Feed out and remove the rail .

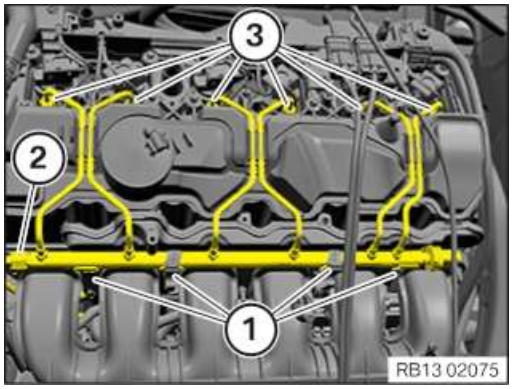
Installing the rail:

Rail installation is described separately from removal.



Installation note:
Before reinstalling the rail, the decoupling element and sleeves (1) must be replaced.

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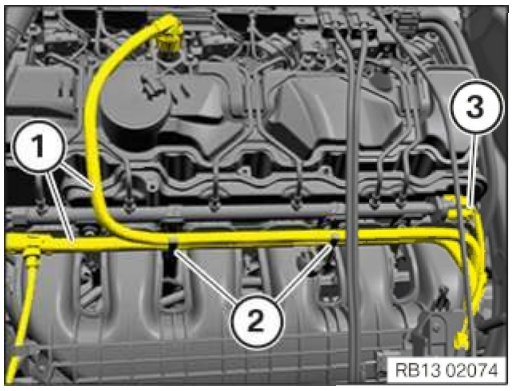
Install rail while tightening bolts (1) and nuts (2) and (3) hand-tight only.

Note:

- Rail must still be displaceable on cylinder head.
- Nuts (2) and (3) must be able to be screwed on easily by hand!

Adhere to tightening sequence:

1. Tighten down screws (1).
   Tightening torque 13 53 2AZ.
2. Tighten nuts (3) on the injectors with special tool 13 0 160 .
   Reset special tool in early to avoid bending pressure lines
   Tightening torque 13 53 9AZ.
3. Tighten nut (2).
   Tightening torque 13 53 8AZ.



Mount clamps (2) on the rail.

Lay wiring harnesses (1) and attach on the clamps (2).

Connect the connector (3) to the rail pressure sensor and lock it audibly.

Assemble engine.

Check fuel system for leak tightness.

Check function of DME.

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13 53 596 Replacing high-pressure fuel sensor (N55)



Special tools required:

- 32 1 270
- 32 2 100



Warning!

Observe warning on cylinder head cover.

Disconnect negative battery terminal (risk of fire due to short circuit on dismantling).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40 °C.



Important!

Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high speed when the high pressure line is released!



Important!

Read and comply with notes on protection against electrostatic discharge (ESD protection).



Important!

Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- Do not allow any dirt particles or foreign bodies to get into the system.
- Remove all traces of dirt before removing lines or separate components.
- Use only fluff-free cloths.
- Seal all fuel system openings with protective caps or plugs.



Necessary preliminary tasks:

- Remove ignition coil cover
- Remove rear ignition coil cover.

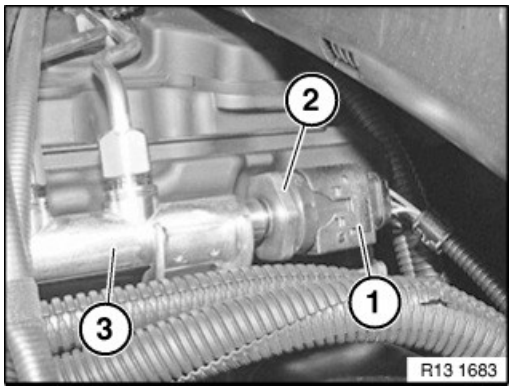
cardiagn.com

Recycling:

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste disposal regulations.



Unlock connector (1) and remove.

Release high pressure sensor (2) and remove.

Tightening torque 13 53 4AZ with special tool 32 2 100 .

Seal rail (3) 32 1 270 if necessary with a matching plug from set of special tools .

Assemble engine.

Check fuel system for tightness.

Check function of DME.

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13 53 ... Warnings for the removal of injectors (N55)



Warning!
Fuel, oil and dirt particles may get into your eyes!

Wear full face guard and protective gloves.

Observe warning on cylinder head cover.

Disconnect negative battery terminal (risk of fire due to short circuit on removal).

Carry out installation work on fuel system only with coolant temperature below 40 °C.

Electric fuel pump starts up automatically when door is opened!

Fuel can emerge spontaneously at high velocity from the fuel injectors!

To reduce the fuel pressure, place rag over fuel injector and carefully tap against the fuel injector with a spanner.

There is a danger of injury if the fuel pressure is not reduced!

Before removing the injectors, clean or vacuum off injector slots.



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Important!
There are two different injector versions for the N55 engine.

A mixed installation of the components (hold-down device, spark plug shafts, injectors, cylinder heads, and screws) between the two hold-down device versions is not possible/permitted!

Compliance with the following notes regarding the removal of the injectors is absolutely mandatory:

- Injectors may be pulled out with a maximum tensile force of **2000 N** and twisted only to **6 Nm** (torsion movement). If these values are exceeded, the injectors must be **replaced**!
- When assembling, it is essential to adhere to screwing sequences and tightening torques!

  Failure to comply with this regulation may result in leaks!
- Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

  Introduced dirt contamination can cause malfunctions in the system!
  - Do not allow any dirt particles or foreign bodies to get into the system.
  - Remove all traces of dirt before removing lines or separate components.
  - Use only fluff-free cloths.
  - Seal all fuel system openings with protective caps or plugs.
  - High pressure lines may be rescrewed a maximum of 10 times.
- Carry out engine washing only with ignition coil cover fitted.

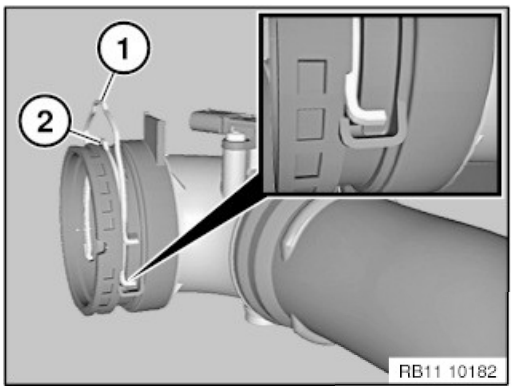
  No water may penetrate into injector slots and corrosion between injectors and cylinder head must be prevented.
- Prior to removing injectors, remove the ignition coil of the corresponding cylinder.
  - Ignition coils must not become coated with fuel!
  - The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail! It is therefore essential to protect the spark plug slot against ingress of fuel with a cloth!
  - Clean spark plug slots before installing ignition coils.
  - Make sure the spark plug slot is absolutely clean.

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11 61 365 Removing and installing/replacing left-hand charge air duct (N55)

Necessary preliminary tasks:

- Remove front underbody protection.
- Release air conditioning compressor (do not draw off and remove).

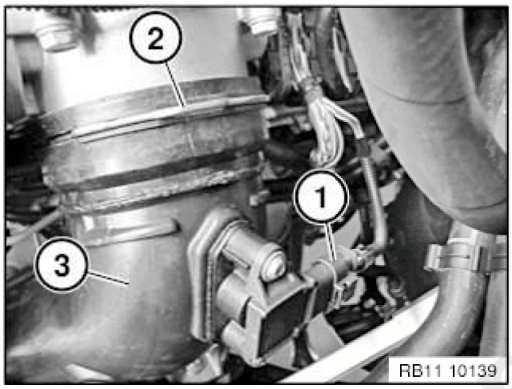


(1) Unlocked

(2) Locked

Installation note:
Ensure locking clamps are correctly fitted.

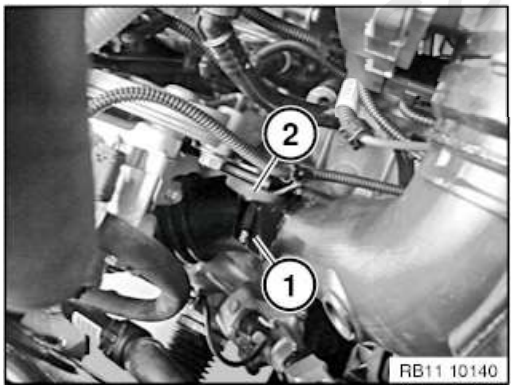
Lock must engage.



Unlock and pull off cable connector (1).

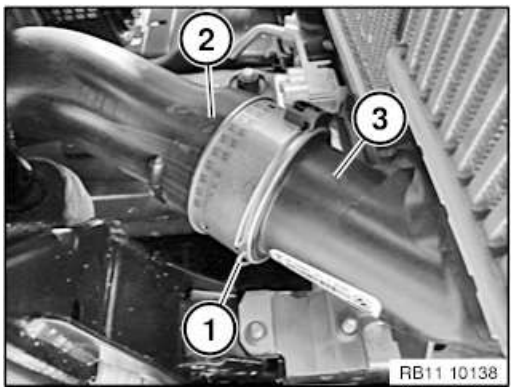
Unlock snap fastener (2).

Pull off charge air duct (3) from throttle body.



Unclip charge air duct (1) from rubber grommet (2).

manualdiagram.com



Unlock snap fastener (1).

Pull off charge air duct (2) from charge air cooler (3).

Installation note:

The seal inside the snap fastener must be coated with anti-friction agent.

Charge air duct (2) must snap audibly into place!

Assemble engine.

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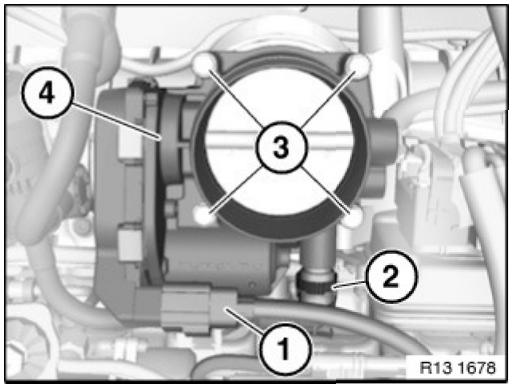
13 54 030 Removing and installing/sealing throttle body (N55)

Important!

Read and comply with notes on protection against electrostatic discharge (ESD protection).

Necessary preliminary tasks:

- Switch off ignition.
- Remove charge air duct.



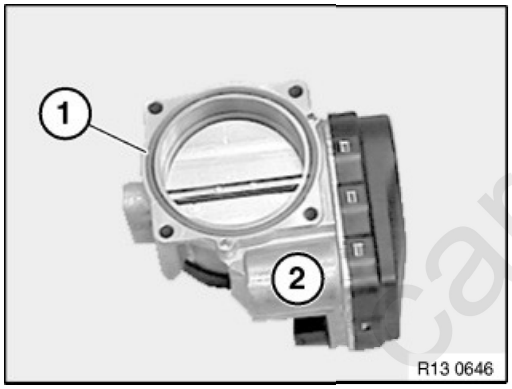
Unlock connector (1) and remove.

Release screws (3).

Tightening torque 13 54 1AZ.

Partially remove throttle body (4) and unlock tank ventilation line (2) and remove.

Remove throttle body (4).



Installation note:

Replace sealing ring (1) of throttle body (2).

Installation note:

Check stored fault message.

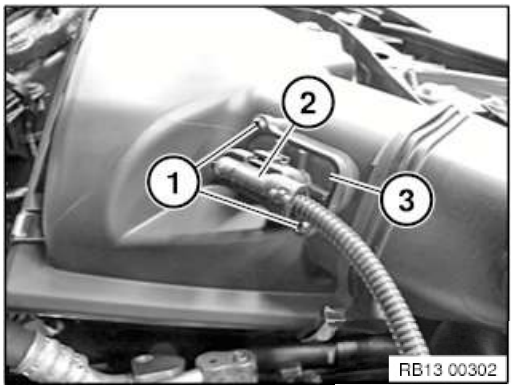
Delete fault memory.

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13 62 560 Removing and installing/replacing hot film air mass meter (N55)

Necessary preliminary tasks:

- Read out the fault memory of the DME control unit.
- Switch off ignition.



Release screws (1).

Tightening torque 13 71 4AZ.

Pull hot film air mass meter (2) out of upper section of intake silencer housing.

Note:
Check stored fault message.

Delete fault memory.

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13 62 582 Removing and installing/replacing oil temperature sensor (N55)

Warning!

Risk of burning!

Only perform this repair work on an engine that has cooled down.

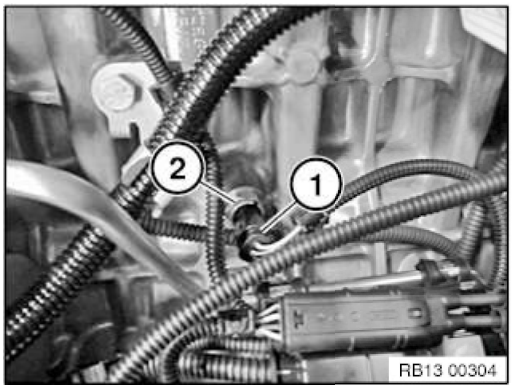
Necessary preliminary tasks:

- Switch off ignition.
- Remove throttle valve assembly.

Recycling:

Catch and dispose of emerging engine oil.

Observe country-specific waste disposal regulations.



Unlock connector (1) and remove.

Release oil temperature sensor (2).

Tightening torque 13 62 8AZ.

Note:

Add final details to vehicle

Check engine oil level. Top up engine oil if necessary.

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13 62 531 Replacing coolant temperature sensor (N55)

Warning!

Risk of scalding!

Only perform this repair work on an engine that has cooled down.

Recycling

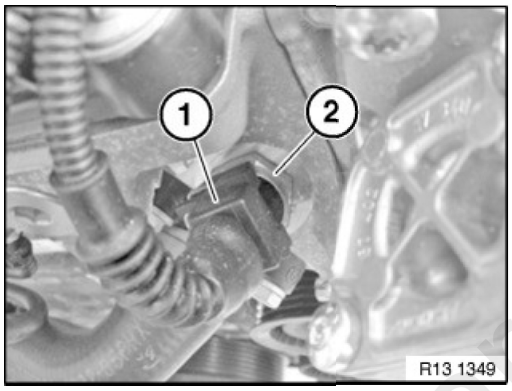
Catch and dispose of escaping coolant.

Observe country-specific waste disposal regulations.

Necessary preliminary work:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Remove ignition coil cover.

Note:
Coolant temperature sensor is mounted on cylinder head at front.



Unlock connector (1) and remove.

Unfasten coolant temperature sensor (2).

Installation note:
Tightening torque 13 62 5AZ.

If necessary, top up coolant.

Note:

Check stored fault messages.

Clear diagnostic fault entries from fault memory.

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13 53 310 Removing and installing/replacing an injector (N55)

Special tools required:

- 13 0 320
- 00 9 170
- 13 0 190
- 13 0 280

Observe warnings on removal of the injectors without fail!

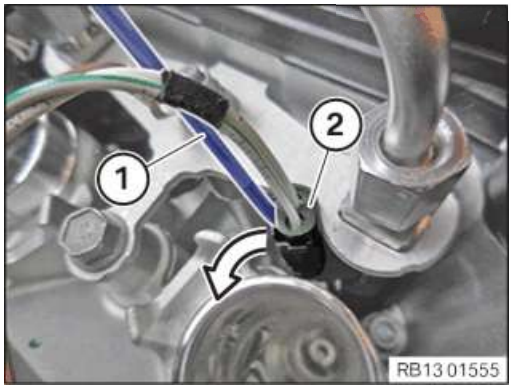
Note:
Caution! Injector conversion from EU5 to EU6.

For vehicles produced up until 01 July 2013.

If you can choose between several injectors, the service function "injector determination" must first be called up and the designated injector must be ordered before replacing the injector.

Necessary preliminary work:

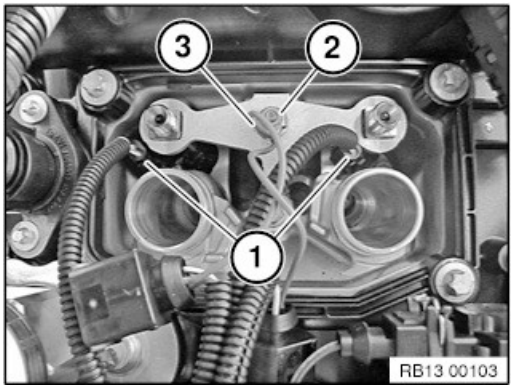
- Disconnect negative battery terminal (risk of fire due to short-circuiting on dismantling).
- Remove ignition coil of corresponding cylinder.
- Remove pressure lines of the corresponding cylinder **(only on vehicles with individual pressure lines).**
- Remove rail **(only on vehicles using the rail with fixed pressure lines).**



Unlock and disconnect the connectors (2) from the injectors with a small slotted screwdriver (1).

Unlock the lock in the direction of the arrow with a small slotted screwdriver (1). Disconnect the connector (2) on the connector housing from the injector.

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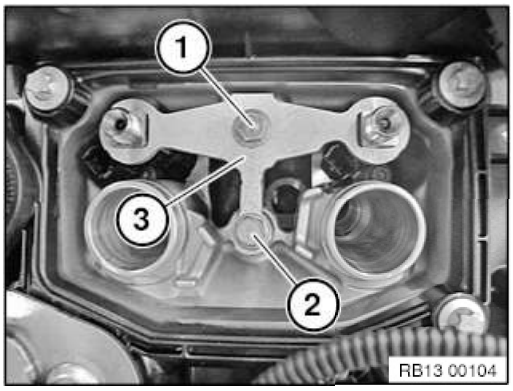
Note:
The following description applies to all injectors in cylinders 1-6.

Unlock connector (1) from injectors and detach.

Slacken nut (2).

Tightening torque 12 90 5AZ.

Remove ground cable (3).



Caution!

First, release screw (2). The, release screw (1).

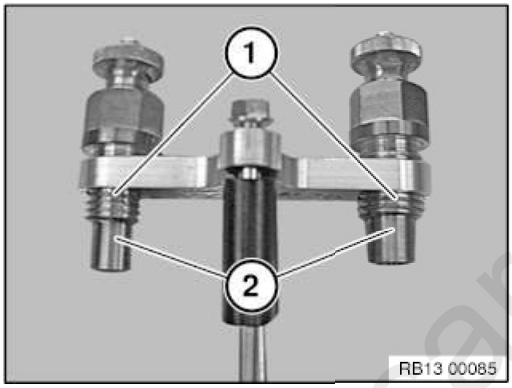
Otherwise, the hold-down device may tilt.

Remove holding-down element (3).

Pull injectors upward out of cylinder head and remove.

Note:
If several injectors are removed, ensure that each injector is reinstalled in its original location (cylinder).

Mark injectors.



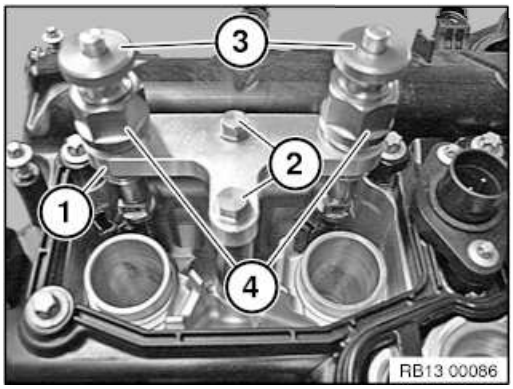
Procedure in event of stuck injector:

Use special tool 13 0 320 to remove injectors that are stuck.

Lightly oil pull-out thread (1) and unscrew completely (see graphic) before using the special tool.

Caution!

Pull-out thread (1) is a left-hand thread!

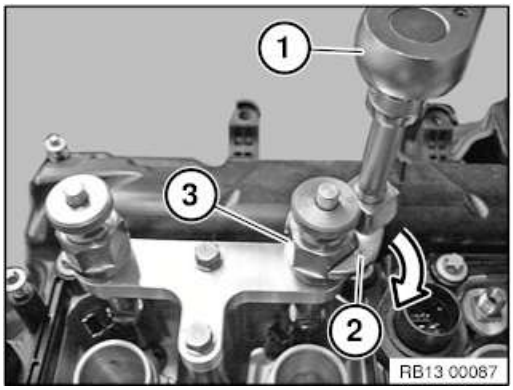


Fit special tool (1) 13 0 320 on injector slot. Join screws (2) to injector slot by a few threads. Screw in pull-out thread (4) until it is possible to screw the threaded sleeves (3) onto the injectors. Screw threaded sleeves (3) onto injectors and tighten down.

Tighten screws (2).

Tightening torque 13 53 13AZ.

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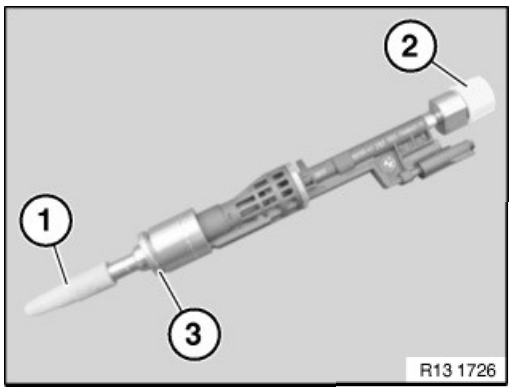


Caution!

Set torque wrench (1) to **5 Nm** clockwise rotation. Together with the special tool 13 0 320 , this corresponds to a tensile force of 2000 N. The injector must be **renewed** if the torque wrench disengages when the injector is pulled out.

Fit torque wrench (1) and special tool (2) 00 9 170 on hexagon head (3) of special tool 13 0 320 .

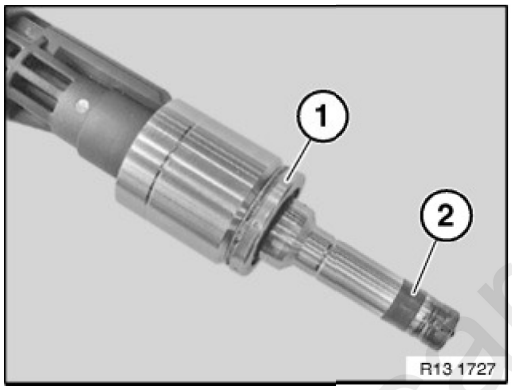
Turn torque wrench (1) in clockwise direction until the injector is pulled out.



After removing, fit protective caps (1 and 2) to injector tip and fuel line connection. *Installation note:*
When installing a new injector:

- Install decoupling element (3) **without fail!**

Failure to comply with this requirement may result in line breaks and fuel discharge!

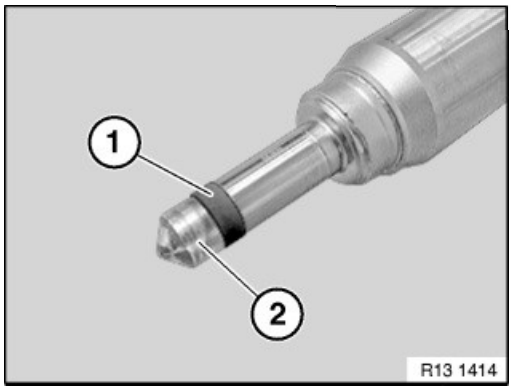


Installation note:
When reusing a running injector:

- Replace decoupling element (1) **without fail!**
- Replace Teflon ring (2) **without fail!**

  A Teflon ring that has already been installed once in the cylinder head must be replaced before the injector is reinstalled.

Failure to comply with this requirement may result in line breaks and fuel discharge!

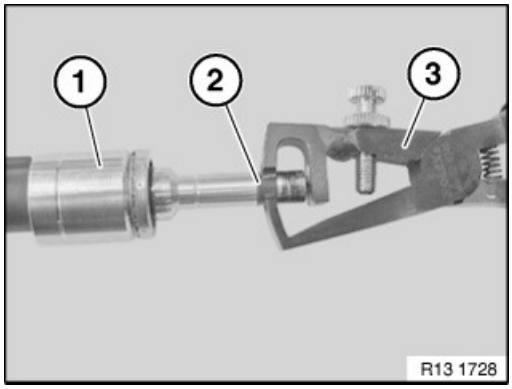


Replace Teflon ring:

Before replacing the Teflon ring (1), make sure your hands and the support areas are clean and free of oil.

Avoid mechanical contact with injector tip (2).

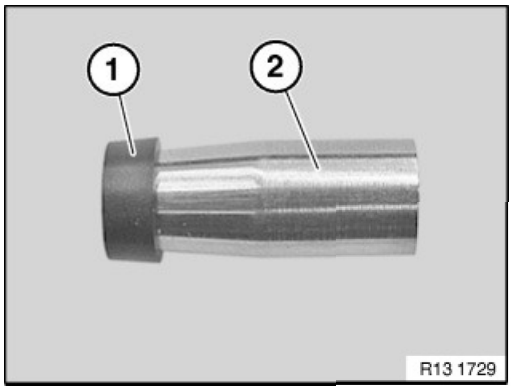
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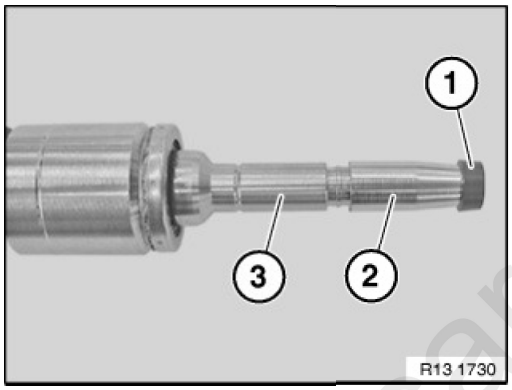
Remove Teflon ring (2) using special tool (3) 13 0 191 from the set of special tools 13 0 190 from the injector (1).

Use a fluff-free cloth only to remove combustion residues from cylindrical part of injector tip (do not use ultrasound or other tools/agents).

Do not clean injector tip.

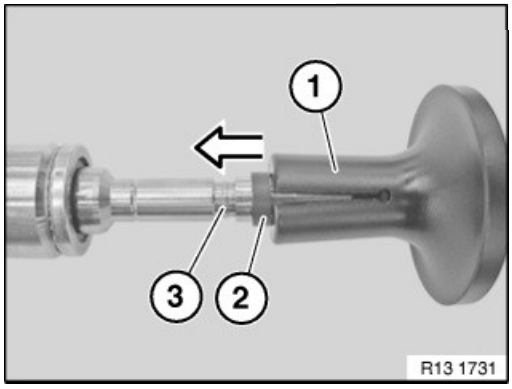


Push new Teflon ring (1) onto installation cone (2) 13 0 283 from the set of special tools 13 0 280 .



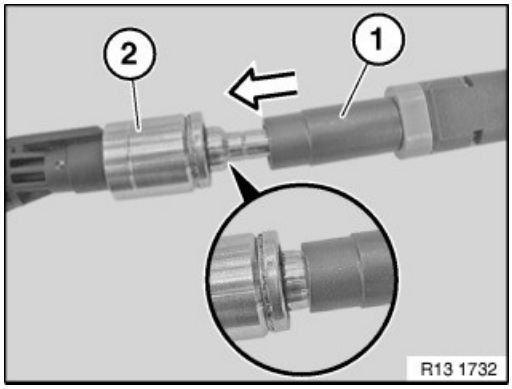
Mount Teflon ring (1) with installation cone (2) 13 0 283 onto injector tip (3).*Note:*

- Do not use fingernails to slide Teflon ring on.
- Do not use any lubricating agents.
- The sealing ring is expanded when slid on.



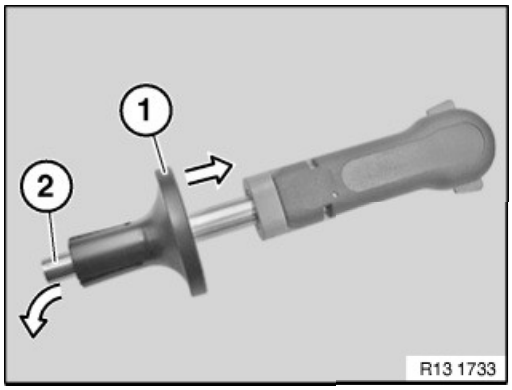
Use special tool (1) 13 0 281 from set of special tools 13 0 280 to slide Teflon ring into groove (3) on injector.

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To adjust the widened Teflon ring to the installation dimension, special tool (1) 13 0 282 from set of special tools 13 0 280 must be slid up to limit position on injector (2).

Do not use any lubricating agents.



Note:
Pull mounting tip (1) of special tool 13 0 282 towards rear to release installation cone (2) 13 0 281.

Installing injector:



Caution!
Injection quantity compensation!

An injection quantity compensation must be carried out if an injector is replaced or changed on the cylinder side.

Injection quantity compensation is carried out with the aid of a so-called adjustment value.

The adjustment value is printed in three digits on the injector body.

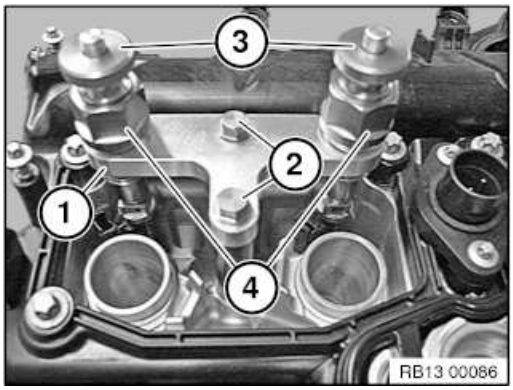
The adjustment value must be read off **before** installation!

Enter the adjustment value according to the installation location (cylinder) of the injector.

If injector quantity compensation is not carried out, the engine may run roughly or fail to start.

Injection quantity compensation is described at the end of these instructions.

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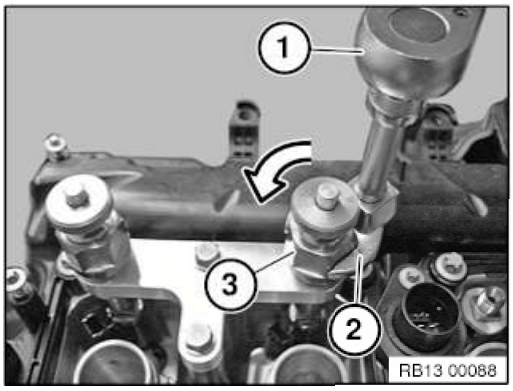


Insert injectors in injector bores.

Fit special tool (1) 13 0 320 on injector slot. Join screws (2) to injector slot by a few threads. Screw in the pull-out thread (4) until the threaded sleeves (3) can be screwed onto the injectors. Screw threaded sleeves (3) onto injectors and tighten down.

Tighten screws (2).

Tightening torque 13 53 13AZ.

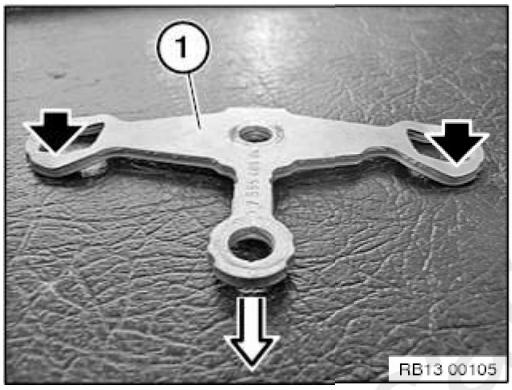


Caution!

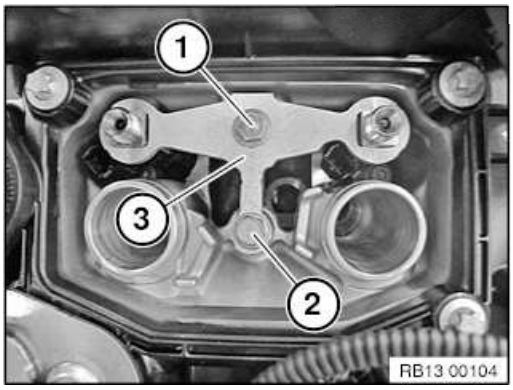
Set torque wrench (1) to **2 Nm** counter-clockwise rotation.

Fit torque wrench (1) and special tool (2) 00 9 170 on hexagon head (3) of special tool 13 0 320 .

Turn torque wrench (1) in counterclockwise direction until 2 Nm are reached.



Installation note:
Install hold-down device (1) with curvatures (black arrows) downward.

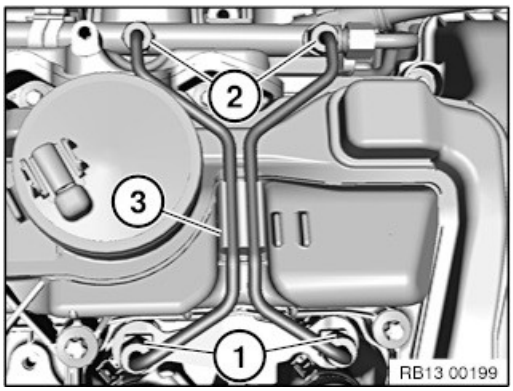


Fit hold-down device (3) on injectors.

Fit screws (1) hand-tight.

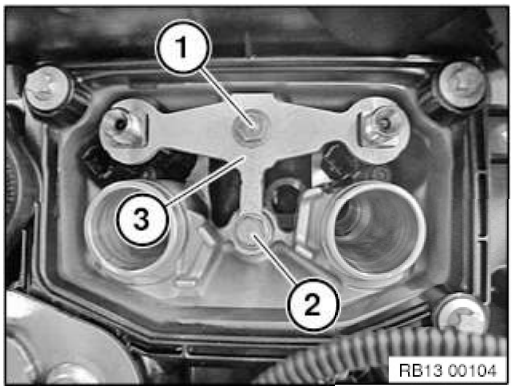
Only fit the screw (2) loosely to prevent the hold-down device from tilting.

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Only on vehicles with individual pressure lines.

Fit pressure lines with rubber mounts (3) on injectors and rail. Tighten nuts (1) and (2) manually only.

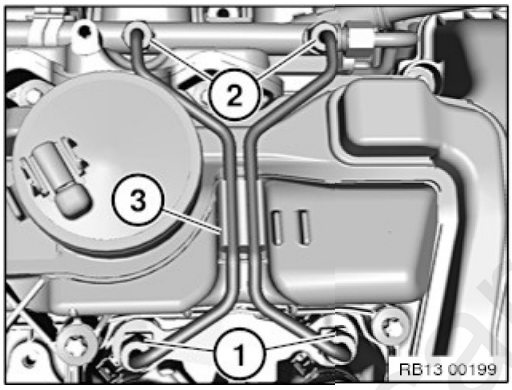


First tighten screw (1).

Tightening torque 13 53 6AZ.

Then tighten screw (2).

Tightening torque 13 53 6AZ.



Only on vehicles with individual pressure lines.

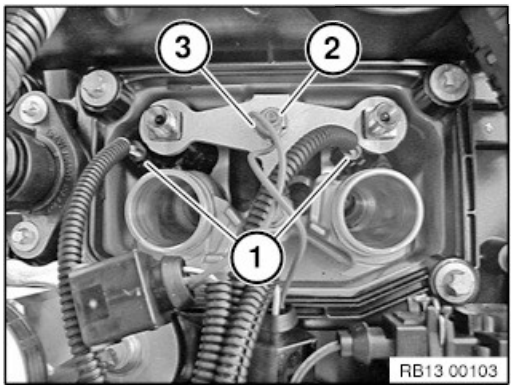
Tighten down pressure lines on injectors (1).

Tightening torque 13 53 9AZ .

Then tighten pressure lines (2) on rail.

Tightening torque 13 53 9AZ .

Installation note:
Reinstall line damper (3).



Note:
The following description applies to all injectors.

Noticeably connect connector (1) to the injectors.

Mount the ground cable (3).

Tighten nut (2).

Tightening torque 12 90 5AZ.

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Check all connectors (1) on the injectors again for correct fit and make sure that all connectors have noticeably engaged.



Perform an injection quantity compensation:

The adjustment value is printed with three digits - depending on the version - on the injector body.

- Connect diagnosis system.
- Identify vehicle.
- Select "Function selection."
- Select "Service functions."
- Select "Engine electronics."
- Select "Adjustment functions."
- Select "Adjust injectors."
- Select "Test plan"
- For each replaced injector, the adjustment value must be entered according to the installation location (cylinder).

Clean spark plug slot.

Assemble engine.

Check fuel system for leak tightness.

Check function of DME.

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13 53 ... Warnings for the removal of injectors (N55)



Warning!
Fuel, oil and dirt particles may get into your eyes!

Wear full face guard and protective gloves.

Observe warning on cylinder head cover.

Disconnect negative battery terminal (risk of fire due to short circuit on removal).

Carry out installation work on fuel system only with coolant temperature below 40 °C.

Electric fuel pump starts up automatically when door is opened!

Fuel can emerge spontaneously at high velocity from the fuel injectors!

To reduce the fuel pressure, place rag over fuel injector and carefully tap against the fuel injector with a spanner.

There is a danger of injury if the fuel pressure is not reduced!

Before removing the injectors, clean or vacuum off injector slots.



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Important!
There are two different injector versions for the N55 engine.

A mixed installation of the components (hold-down device, spark plug shafts, injectors, cylinder heads, and screws) between the two hold-down device versions is not possible/permitted!

Compliance with the following notes regarding the removal of the injectors is absolutely mandatory:

- Injectors may be pulled out with a maximum tensile force of **2000 N** and twisted only to **6 Nm** (torsion movement). If these values are exceeded, the injectors must be **replaced**!
- When assembling, it is essential to adhere to screwing sequences and tightening torques!

  Failure to comply with this regulation may result in leaks!
- Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

  Introduced dirt contamination can cause malfunctions in the system!
  - Do not allow any dirt particles or foreign bodies to get into the system.
  - Remove all traces of dirt before removing lines or separate components.
  - Use only fluff-free cloths.
  - Seal all fuel system openings with protective caps or plugs.
  - High pressure lines may be rescrewed a maximum of 10 times.
- Carry out engine washing only with ignition coil cover fitted.

  No water may penetrate into injector slots and corrosion between injectors and cylinder head must be prevented.
- Prior to removing injectors, remove the ignition coil of the corresponding cylinder.
  - Ignition coils must not become coated with fuel!
  - The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail! It is therefore essential to protect the spark plug slot against ingress of fuel with a cloth!
  - Clean spark plug slots before installing ignition coils.
  - Make sure the spark plug slot is absolutely clean.

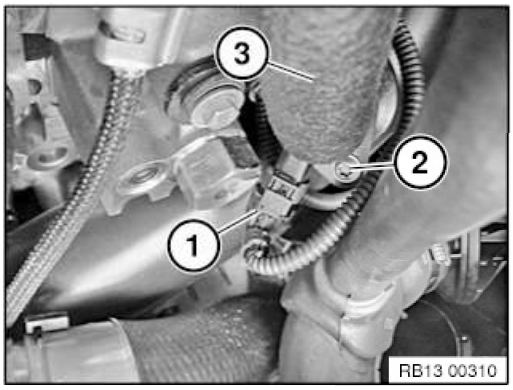
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13 71 170 Removing air duct (N55)

Necessary preliminary tasks:

- Remove intake silencer housing.
- Remove fan cowl.
- Remove front underbody protection.
- Detach the coolant expansion tank and set it on its side but do not drain the coolant.
- **Do the following only F87:**

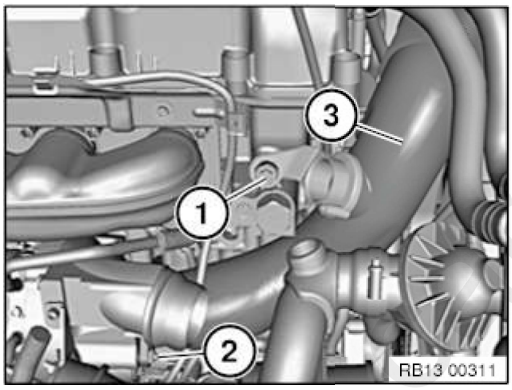
  Remove stiffening plate



Unlock connector (1) and pull off.

Release screw (2).

Pull off engine vent line (3) from air duct.



Release screw (1).

Tightening torque 13 71 2AZ.

Slacken nut (2).

Tightening torque 13 71 3AZ.

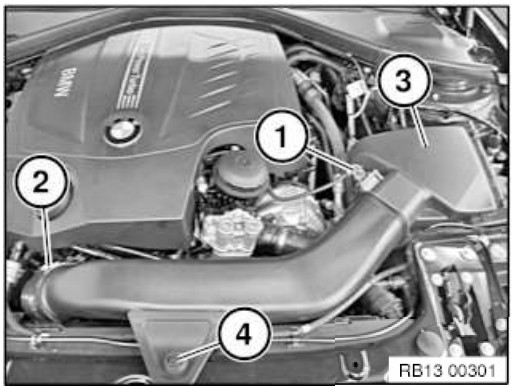
Pull off air duct (3) from exhaust turbocharger, feed out and remove.

Assemble engine.

13 71 000 Removing and installing/replacing intake silencer housing (N55)

Necessary preliminary tasks:

- **F23,F33,F87 only:**
  Remove left front strut.



Release connector (1) on hot film air mass meter and disconnect.

Release clamp (2).

Tightening torque 13 71 1AZ.

Detach intake silencer housing (3) from rubber mount in upward direction.

Detach intake silencer housing from front rubber mount (4) and remove toward the top.

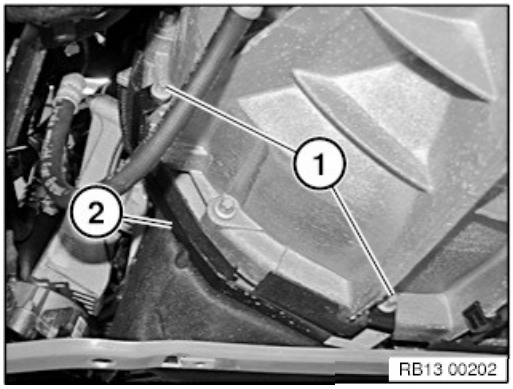
Reassemble the vehicle.

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13 71 ... Removing bottom sound insulation (N47 D16/20 K/U/O/T 1)

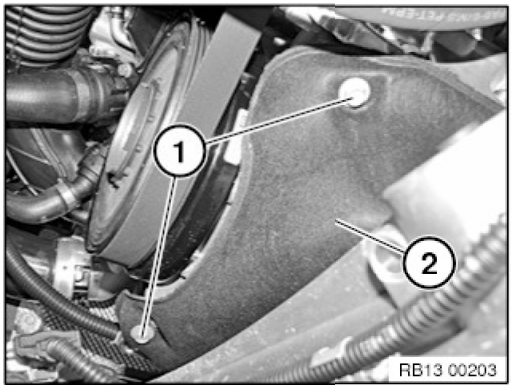
Necessary preliminary tasks:

- Lower front axle support.



Release screws (1).

Remove holder (2).



Release screws (1).

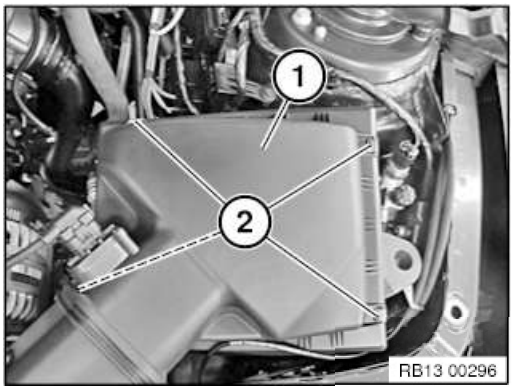
Feed out and remove sound insulation (2).

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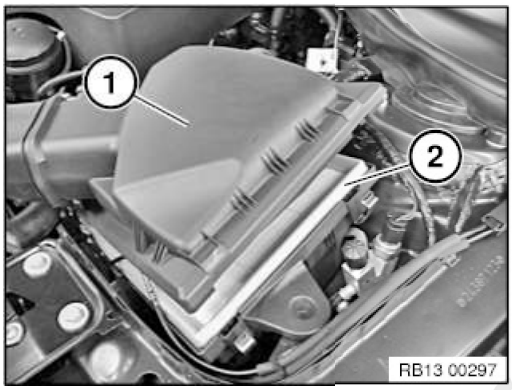
13 72 001 Replacing air filter element (N55)

Necessary preliminary tasks:

- **F33, F87 only:**
  Remove front end strut.



Release clamps (2) from upper section of intake filter housing (1).



Pull upper section of intake filter housing (1) slightly towards top until air filter element (2) is accessible.

Remove air filter element (2).

Installation note:

Clean upper part and lower section of intake silencer housing from inside.

Install new air filter element.

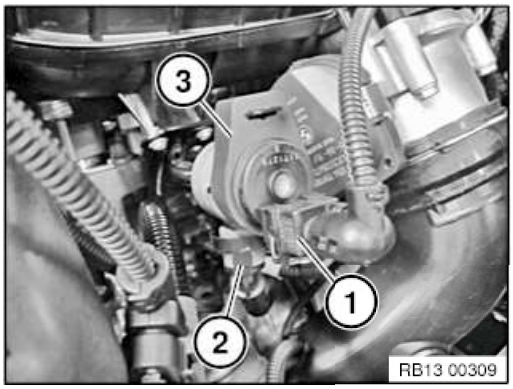
Assemble engine.

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13 90 500 Replacing tank vent valve (N55)

Necessary preliminary tasks:

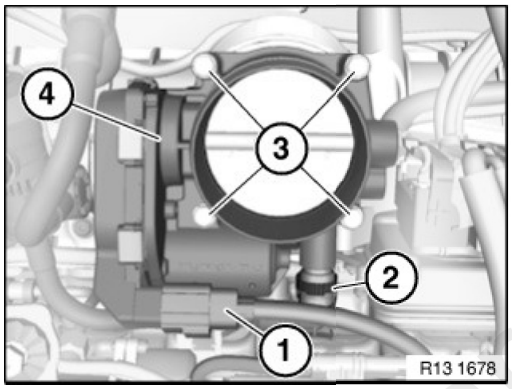
- Check stored fault message.
- Switch off ignition.
- Remove left charge air duct.



Unlock connector (1) and remove.

Unlock the hose (2) and detach it.

Pull off the tank vent valve (3) from holder in the direction of the arrow.



Unlock connector (1) and remove.

Release screws (3).

Tightening torque 13 54 1AZ.

Remove throttle body part way and then unlock tank ventilation line and pull off.

Remove throttle body (4).

Installation note:
Replace gasket on throttle body.

Feed out and remove tank vent valve.

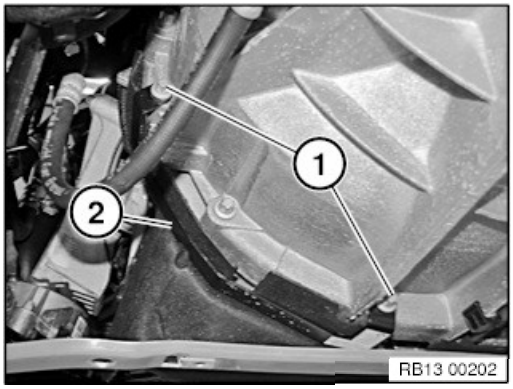
Note:
Read out the fault memory of the DME control unit.

Delete fault memory.

13 71 ... Removing bottom sound insulation (N47 D16/20 K/U/O/T 1)

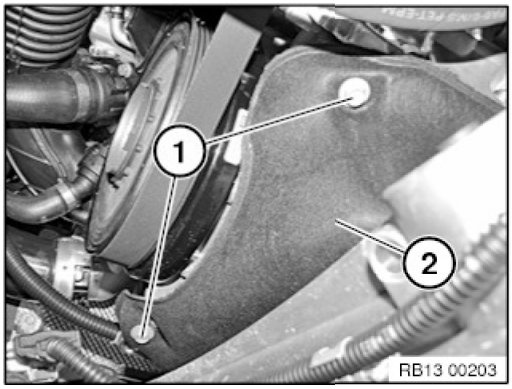
Necessary preliminary tasks:

- Lower front axle support.



Release screws (1).

Remove holder (2).



Release screws (1).

Feed out and remove sound insulation (2).

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16 00 005 Draining and filling fuel tank

Special tools required:

- 16 1 080

Important!

Observe country-specific safety regulations.

Ensure adequate ventilation in the workbay!

Connect the exhaust extraction unit to the exhaust tailpipe.

The electric fuel pump must not operate without fuel! After completing repairs but before starting the engine for the first time, fill the fuel tank with min. 5 l fuel through the fuel filler pipe.

Do not damage non-return valve when pulling out suction hose.

Diesel vehicles:

Before starting the engine for the first time, if the fuel tank has been run dry or emptied, fill with diesel fuel and turn on ignition for approx. 1 minute. The fuel circuit is thus filled and vented, which results in the engine firing more quickly.

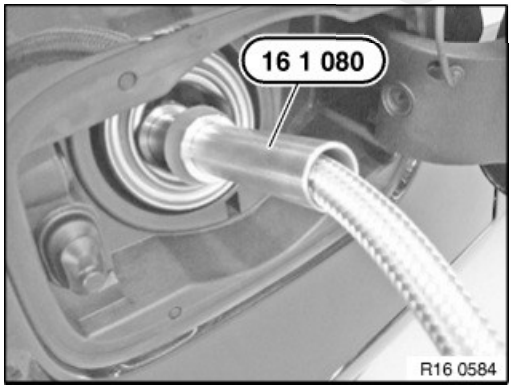
Drawing off fuel:

Start engine and allow to run.

The electric fuel pump runs.

In this way, the fuel is re-pumped through the suction jet pump from the left to the right side of the fuel tank.

Note:
Fuel can be drawn out of left and right sides of tank through fuel filler neck, leaving only a small residue. The residual amount is drawn off via the sensor opening.



Insert special tool 16 1 080 into fuel filler neck.

Special tool 16 1 080 has two different diameters for petrol/gasoline and diesel-engine cars!

Slide suction hose of extractor unit, refer to BMW Service Workshop Equipment - Planning Documentation, through special tool 16 1 080 into the fuel filler pipe, turning in the process if necessary.

Insertion length approx. 125 cm.

Draw off fuel with extractor unit (refer to BMW Service Workshop Equipment) as far as possible.

Follow drawing off of fuel on fuel gauge in instrument cluster.

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Drawing off residual fuel quantity:

Drawing off residual fuel amount is not included in the time value of this operation.

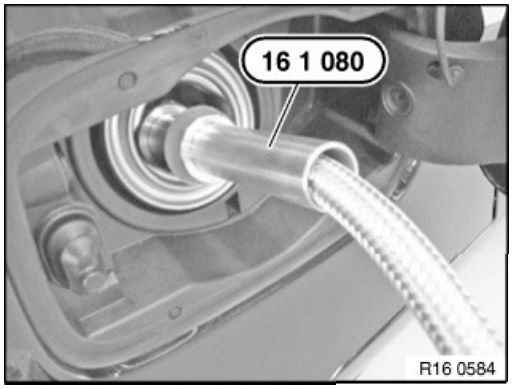
Important!

Ensure passenger compartment is adequately ventilated.

Catch dripping fuel in a suitable container.

Remove flange cover.

Draw off residual fuel quantity through sensor openings.



Fuel filling:

Insert special tool 16 1 080 into fuel filler neck.

Special tool 16 1 080 has two different diameters for petrol/gasoline and diesel-engine cars!

Slide suction hose of extractor unit, refer to BMW Service Workshop Equipment - Planning Documentation, approx. 40 cm into fuel filler pipe.

Fill fuel from suction extractor unit.

Extracting fuel after a defect in the suction jet pump or fuel pump:

Draw off right half of tank completely through fuel filler pipe.

Remove flange cover.

Insert extraction hose through service opening in tank, fuel (also residual quantity) can be drawn off.

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16 11 030 Remove and install/replace the fuel tank (petrol)

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting vessel ready.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

Caution!

Ensure adequate ventilation in the workbay!

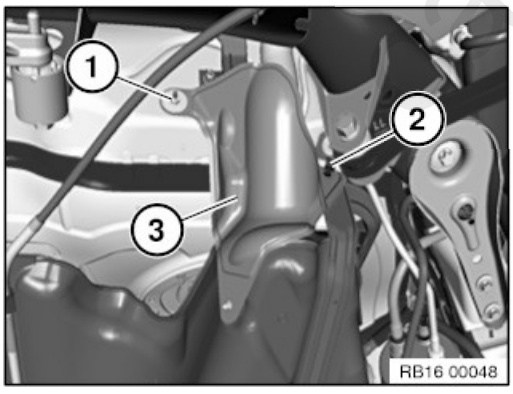
Avoid skin contact (wear gloves)!

After installation of fuel tank/prior to first engine start-up:

- Fill fuel tank with at least 5 litres of fuel.
- Check ground connection at fuel filler neck to body for continuity. If necessary, clean contact surface between body and fuel filler pipe screw connection.
- Check transfer function of suction jet pump.

Necessary preliminary work:

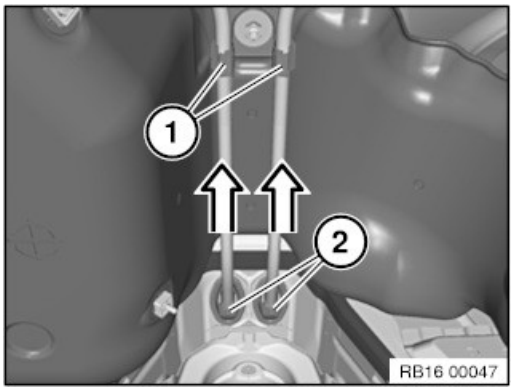
- Extract fuel from fuel tank.
- Remove the left tank cover.
- Remove the right tank cover.
- Remove propeller shaft.
- Remove carbon canister.
- Detach parking brake Bowden cables from the brake shoe expander, left and right.



Undo sheet metal nut (1).

Remove the clip (2) from the tensioning strap and remove the heat shield (3).

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Detach the guide tubes from the clip (1).

Installation note:
It is absolutely necessary to replace damaged clips (1).

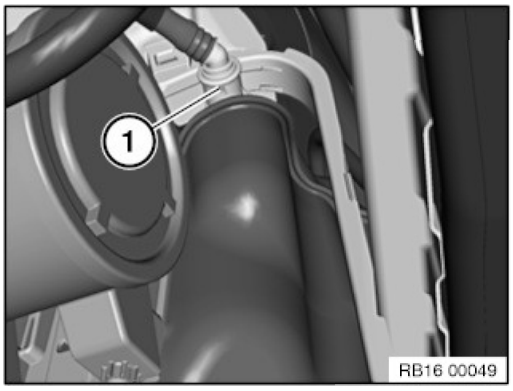
Pull both guide tubes back in the direction of the arrow until the guide tubes can be moved freely.

Caution!

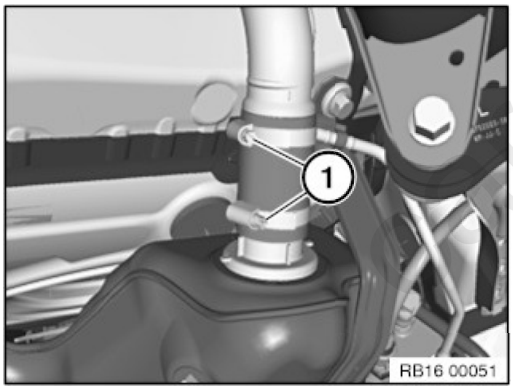
Parking brake bowden cables remain attached to parking brake lever!

Installation note:
The two guide tubes must be inserted into the holder under the centre console by touch!

Both rubber grommets (2) must be correctly pressed into the body after securing the guide tubes in the clips (1).



Unlock the snap fastener (1) and pull off the tank ventilation line.*Installation note:*
Make sure quick-release fasteners engage correctly.



Caution!

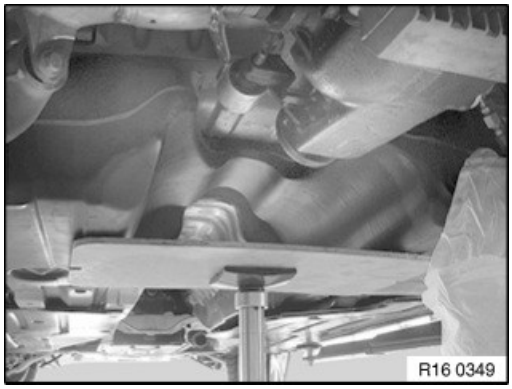
There may still be residual amounts of fuel in the fuel tank.

Catch and dispose of escaping fuel.

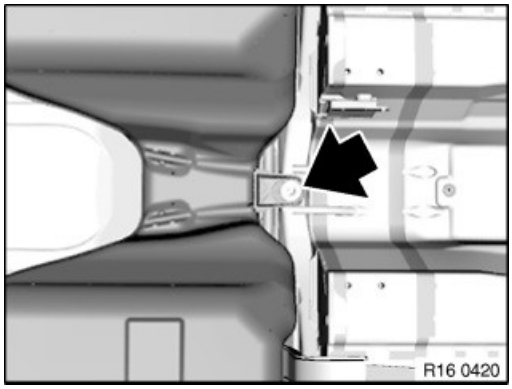
Release hose clamps (1) and loosen the fuel filling hose from fuel filler pipe.

The fuel filling hose cannot be pulled off until the fuel tank has been lowered.

Installation note:
Tightening torque 16 12 1AZ.

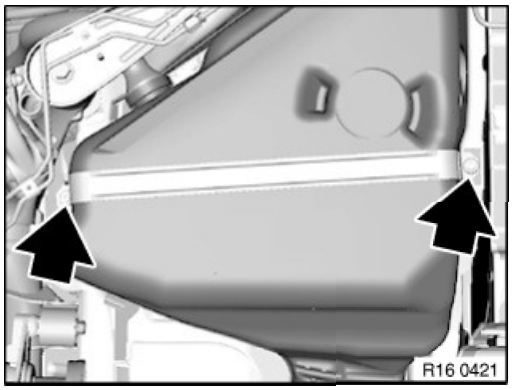


Heavily support the fuel tank.



Unfasten nut.*Installation note:*
Replace self-locking nut.

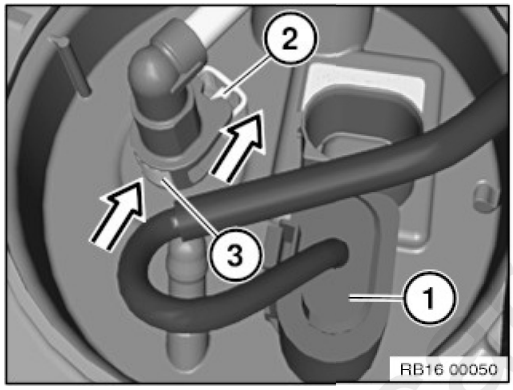
Tightening torque 16 11 1AZ.



Release screws for tightening straps on left and right and remove tightening straps.

Carefully lower the fuel tank until the plug connection and fuel delivery line are accessible at the flange cover.

Installation note:
Tightening torque 16 11 2AZ.



Disconnect plug connection (1).

Open the lock (2) in the direction of the arrow (graphic already opened).

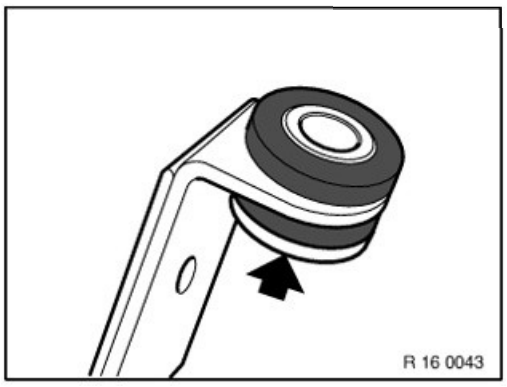
Press the release button (3) and pull off the fuel delivery line. If applicable, slightly push the connector out to make pulling the part off easier.

Caution!

Fuel delivery line must be felt and heard to snap into place.

Damaged lock parts must be replaced without fail!

Completely lower the fuel tank.

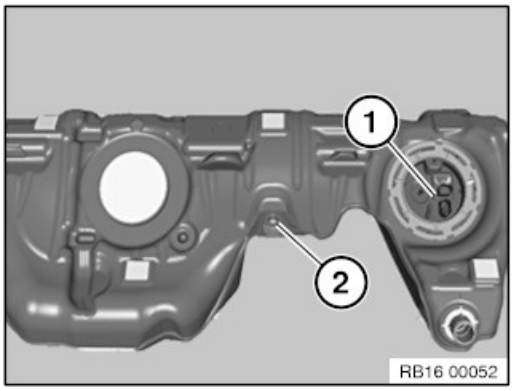


Installation note:

Note rubber mount with spacer bush.

Wide collar on spacer bush points to screw head.

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The following components must be remounted when the fuel tank is replaced:

- Delivery unit
- Holder for parking brake Bowden cable guide tubes

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16 11 060 Removing and installing or replacing fuel filler pipe

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting vessel ready.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

Caution!

Ensure adequate ventilation in the workbay!

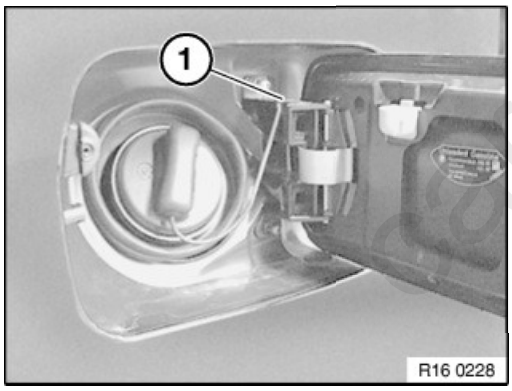
Avoid skin contact (wear gloves)!

After installation of fuel tank/prior to first engine start-up:

- Fill fuel tank with at least 5 litres of fuel.
- Check ground connection at fuel filler neck to body for continuity. If necessary, clean contact surface between body and fuel filler pipe screw connection.

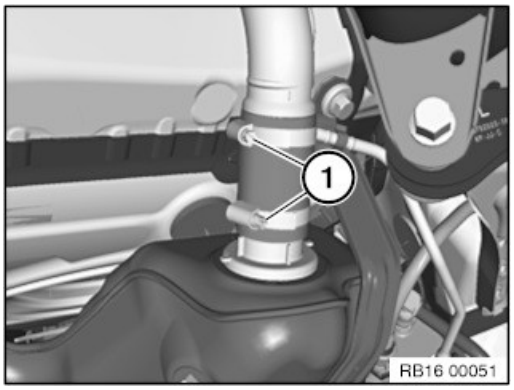
Necessary preliminary work:

- Extract fuel from fuel tank.
- Remove rear right wheel arch trim
- Lower rear axle.



Unhook retaining strap (1) from tank flap.

Open cap and set to one side.



Caution!

There may still be residual amounts of fuel in the fuel tank.

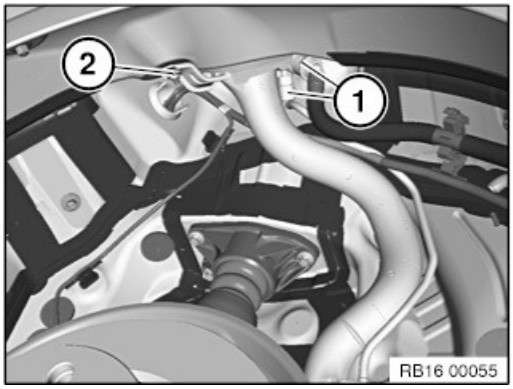
Catch and dispose of escaping fuel.

Loosen hose clamps (1).

Detach fuel filler hose from fuel filler pipe.

Installation note:
Replace hose clamps.

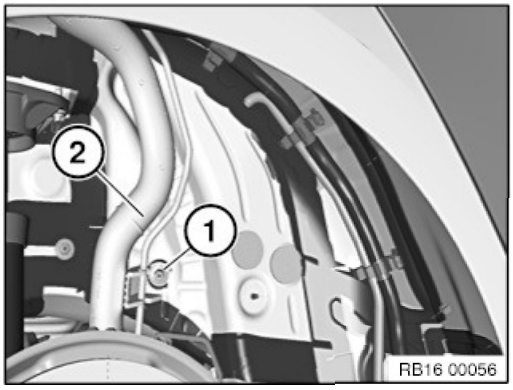
Tightening torque 16 12 1AZ.



Unlock quick-release fasteners (1) and disconnect vent hoses.

Slacken nut (2).

Installation note:
Tightening torque: 16 12 2AZ.



Detach the tank ventilation line from the holder.

Slacken nut (1).

Installation note:
Renew plastic nut.

Tightening torque 16 12 2AZ.

Withdraw fuel filler pipe (2) completely out of rubber cup at wheel arch and feed out.

Installation note:
Make sure rubber cup fits correctly.

Installation note:
Clean **contact surface** on body and earth cable on fuel filler pipe.

Ground connection must be guaranteed.

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16 14 090 Removing and installing/replacing delivery unit (petrol)

Special tools required:

- 16 1 190
- 33 5 070

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting vessel ready.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

Important!

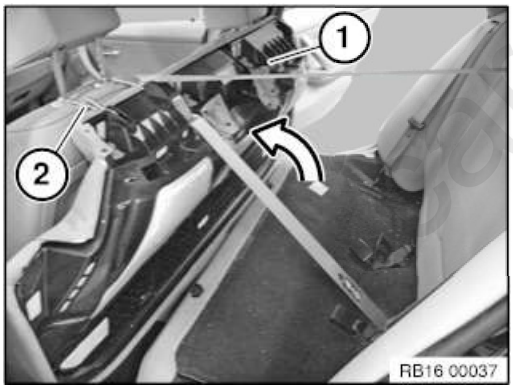
Ensure adequate ventilation in the workbay!

Avoid skin contact (wear gloves)!

Ensure absolute cleanliness when performing repair work on the open fuel system. Dirt contamination in the fuel tank may impair driving or may even result in vehicle breakdown.

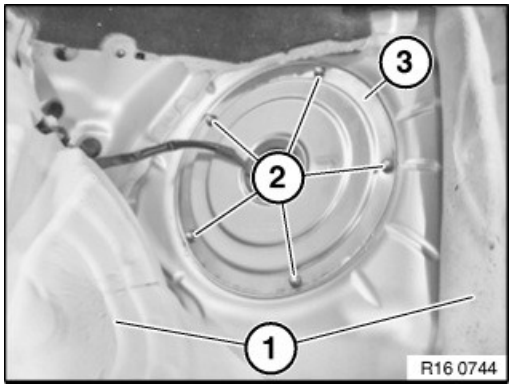
Necessary preliminary work:

- Draw off fuel



Only unclip seat bench (1) as shown on the left and right and fold up in direction of arrow.

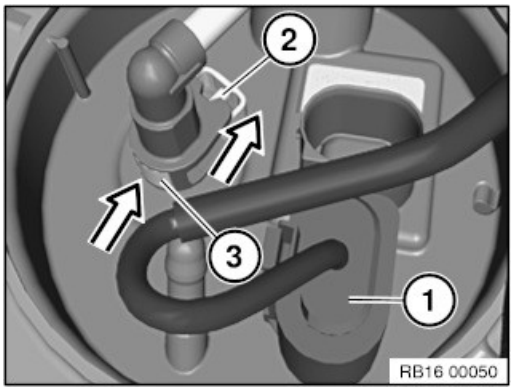
Secure seat bench on front seat (2).



Fold both floor trim panels (1) to the side.

Unscrew nuts (2).

Remove cover for service opening (3).



Disconnect plug connection (1).

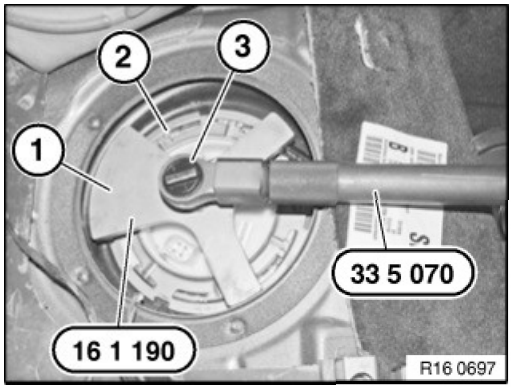
Open the lock (2) in the direction of the arrow (graphic already opened).

Press the release button (3) and pull off the fuel delivery line. If applicable, slightly push the connector out to make pulling the part off easier.

Important!

Fuel delivery line must be felt and heard to snap into place.

Damaged lock parts must be replaced without fail!

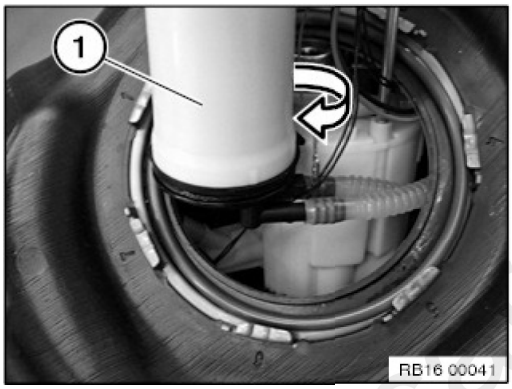


Fit special tool 16 1 190 with wide crank web (1) towards rear onto locking ring (2).

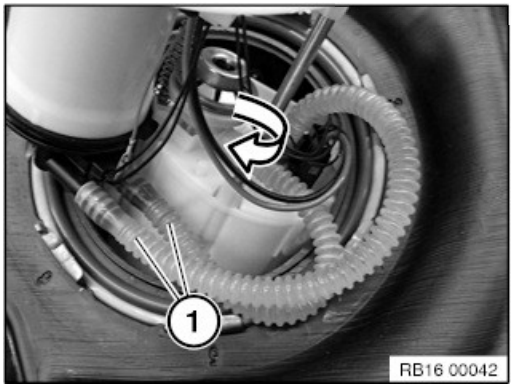
Connect special tool 33 5 070 with reversible ratchet head 1/2 " (3) and position on special tool 16 1 190 .

Release locking ring (2) in counterclockwise direction.

Installation note:
Replace the sealing ring between the flange head and fuel tank.



First, unscrew the flange cover with container (1) from the fuel tank.*Note:*
Graphic shows fuel tank removed.

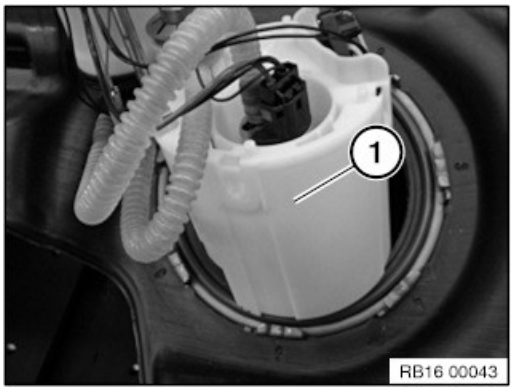


Feed both hoses (1) out of the fuel tank.

Raise the fuel pump by continuing to turn the delivery unit.

Note:
Graphic shows fuel tank removed.

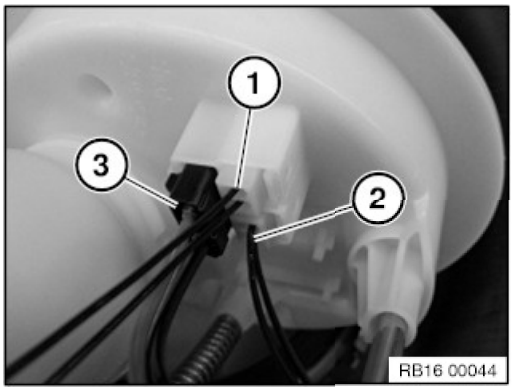
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Carefully remove the delivery unit (1) from the fuel tank.

Make sure that the fuel level sensor is not damaged or bent during the removal.

Note:
Graphic shows fuel tank removed.



Disconnect the plug connection (1) from the left fuel level sensor.

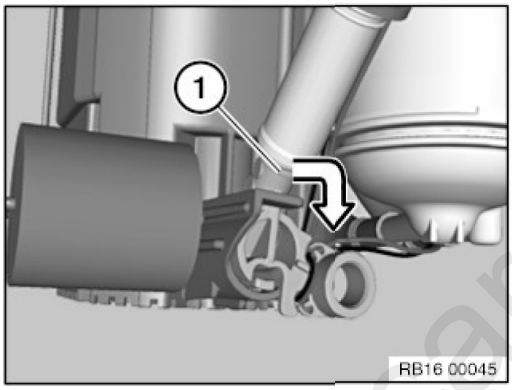
The plug connections (2 and 3) will remain connected.

Important!

Connector housings (1 and 2) are not encoded and accidental switching is possible!

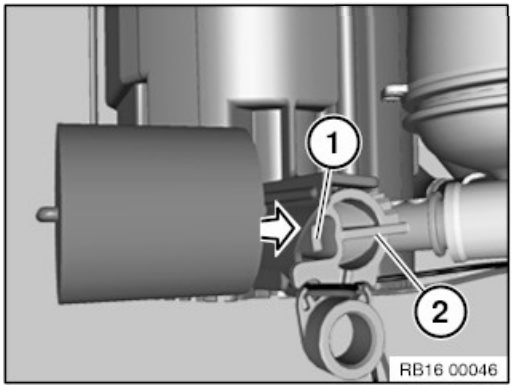
Plug assignment:

- (1) Fuel level sensor, left (cannot be mistakenly switched).
- (2) Fuel level sensor, right
- (3) Fuel pump



Disconnect the hose connection to the left tank half.

Turn the fuel hose (1) by 90° in direction of arrow.

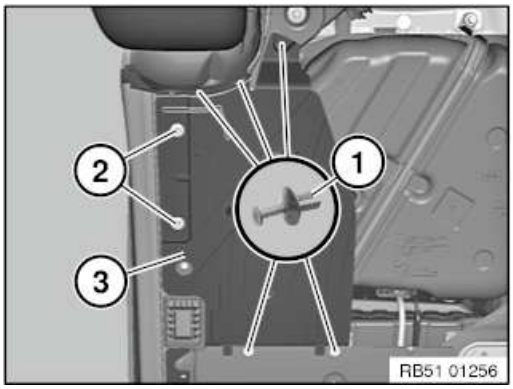


Press the unlocking tab (1) and pull the connector out of the delivery unit in the direction of the arrow.*Installation note:*
Replace sealing ring on the connector (2).

Make sure the connector latches correctly.

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51 75 ... Removing and installing/replacing left or right tank cover



Release expanding rivets (1).

Unfasten screws (2).

Tightening torque 51 75 1AZ.

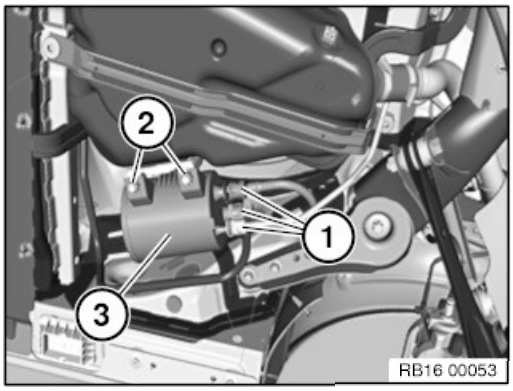
Remove tank (3).

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16 12 010 Removing and installing or replacing carbon canister

Necessary preliminary work:

- Remove the tank cover on the right.



Unlock snap fastener (1) and pull off tank ventilation line.

Release screws (2) and remove carbon canister (3).

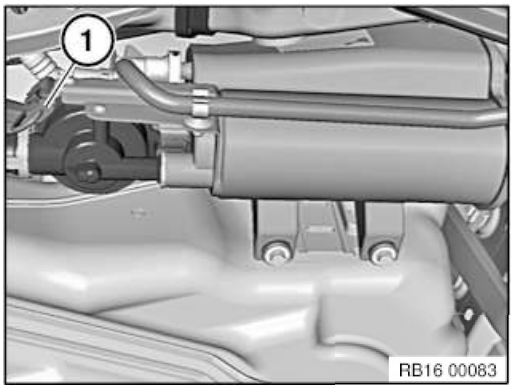
Installation note:
Tightening torque 16 13 1AZ.

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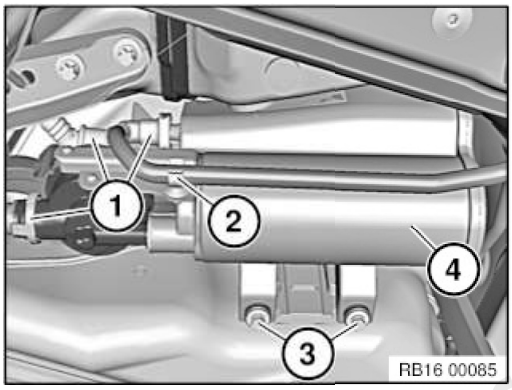
16 12 060 Removing and installing/replacing carbon canister (US version NVLD)

Necessary preliminary work:

- Remove right tank cover.



Disconnect plug connection (1).*Installation note:*
Make sure plug connection latch mechanism is correct.



Unlock snap fasteners (1) and remove tank ventilation lines.

Detach tank ventilation line from holder (2).

Release screws (3) and remove carbon canister (4).

Installation note:
Tightening torque 16 13 1AZ.

The following components must be modified when the carbon canister is replaced:

- Pressure switch NVLD

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16 12 200 Removing and installing/replacing outer fuel filter

Recycling:

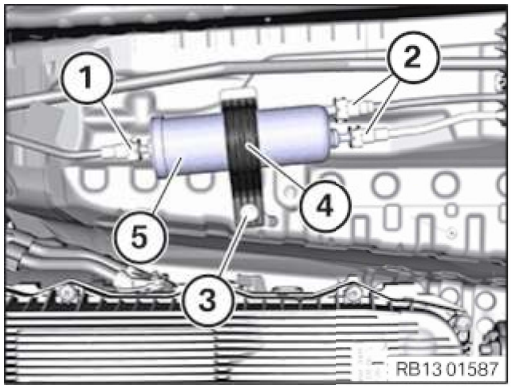
Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

Necessary preliminary tasks:

- Remove rear underbody protection.

Removal:



Unlock and detach fuel line (1).

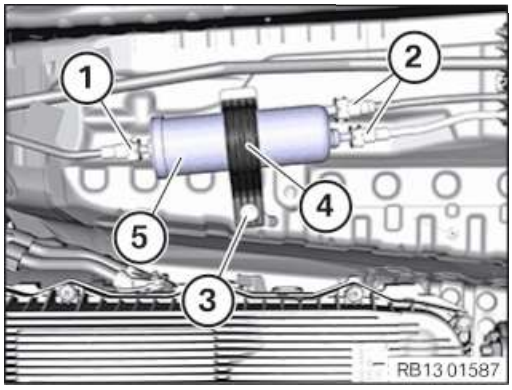
Unlock fuel line (2) and pull off.

Catch and dispose of escaping fuel.

Release screw (3) and remove holder (4).

Remove fuel filter (5).

Installation:



Install new fuel filter (5).

Connect and audibly lock fuel line (2).

Connect and audibly lock the fuel lines (1).

Install the holder (4) and tighten the screw (3).

Tightening torque 13 32 1AZ.

Required follow-up work:

- Check fuel system for leak tightness.
- Install the rear underbody protection.

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16 12 001 Removing and installing/replacing sensor for fuel gauge (left)

Note:
Left fuel level sensor cannot be replaced separately.

The entire fuel tank must be replaced.

This operation is described in: Removing and installing the fuel tank.

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16 12 000 Removing and installing/replacing sensor for fuel gauge (right).

Note:
The fuel level sensor, right, cannot be replaced separately.

The entire delivery unit must be replaced.

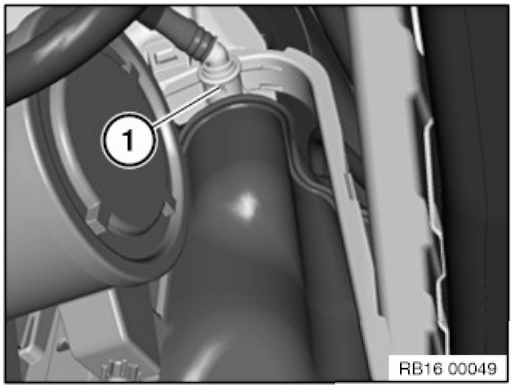
This operation is described in: Remove and install the delivery unit

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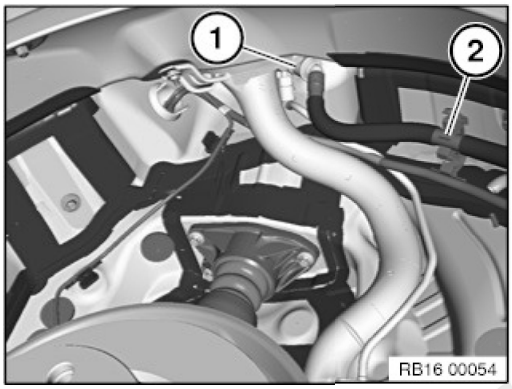
16 12 440 Replace the fuel filler neck breather pipe (petrol)

Necessary preliminary work:

- Remove right tank cover.
- Remove right wheel arch panel.



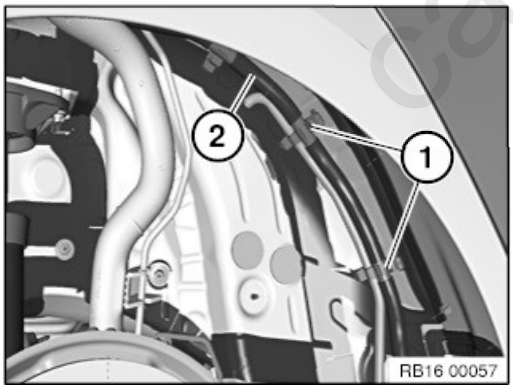
Unlock and disconnect snap fastener (1).*Installation note:*
Make sure the quick-release fastener snaps in correctly.



Unlock and disconnect snap fastener (1).

Disengage fuel filler neck breather pipe from holder (2).

Installation note:
Make sure the quick-release fastener snaps in correctly.



Detach the fuel filler neck breather pipe (2) from the holders (1) and feed through body.

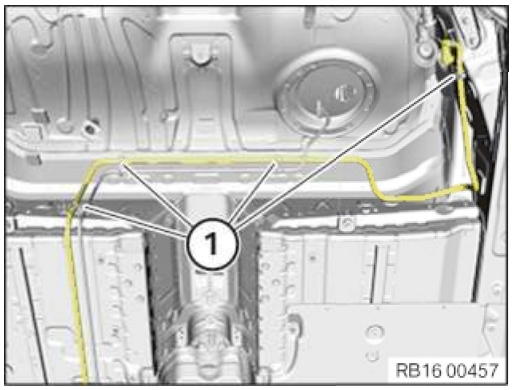
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16 13 xxx Removing and installing / replacing purge air line (US version)

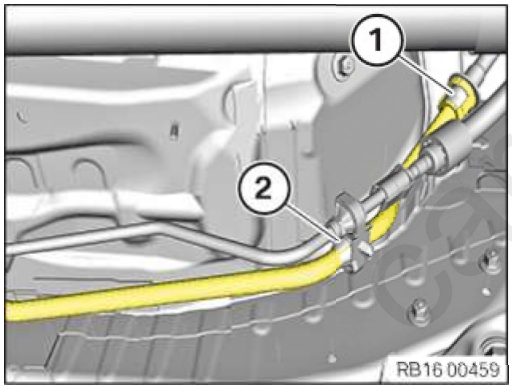
Necessary preliminary tasks:

- Remove fuel tank.
- Remove carbon canister.
- Remove left underbody panelling.

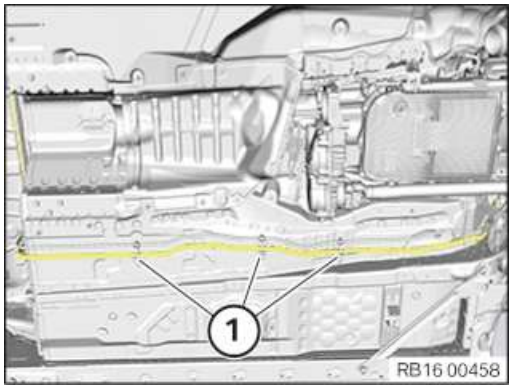
Removal:



Detach purge air line from brackets (1).



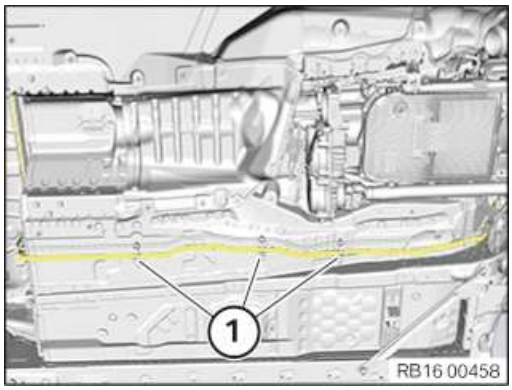
Unlock and disconnect snap fastener (1).
Detach purge air line from bracket (2).



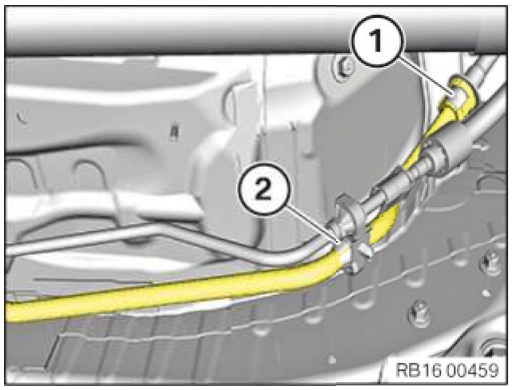
Detach purge air line from brackets (1).
Remove purge air line.

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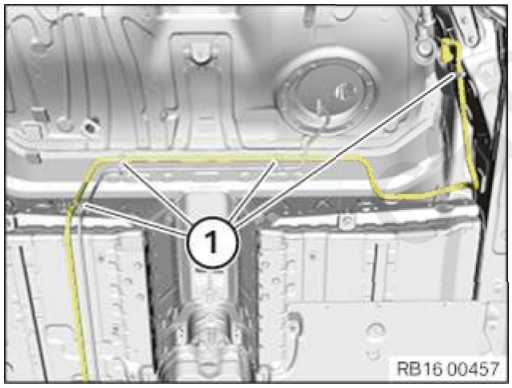
Installation:



Position purge air line in the vehicle.
Attach purge air line in brackets (1).



Position snap fastener (1) and lock.
Attach purge air line in bracket (2).



Attach purge air line in brackets (1).

Required follow-up work:

- Install fuel tank.
- Install carbon canister.
- Install left underbody panelling.

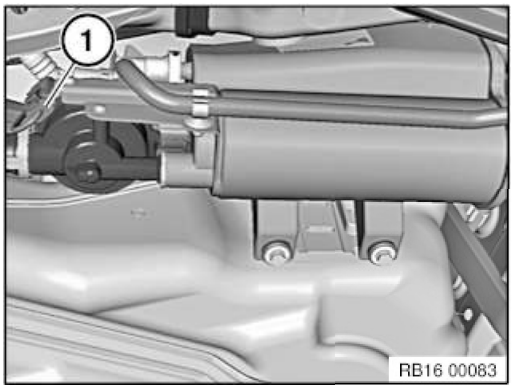
16 13 521 Removing and installing/replacing pressure switch for Natural Vacuum Leak Detection (NVLD)

Necessary preliminary tasks:

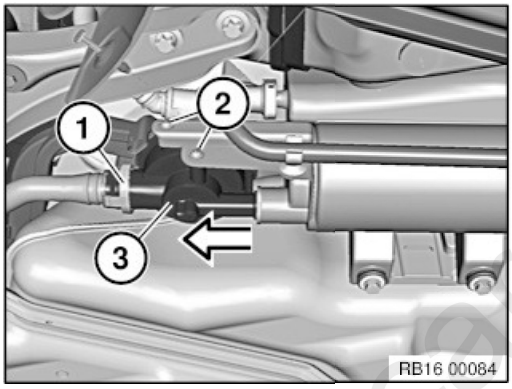
- Remove the tank cover on the right.

Important!

When replacing the pressure switch, the dust filter must also always be replaced.



Disconnect plug connection (1).*Installation note:*
Make sure plug connection latch mechanism is correct.



Unlock and disconnect snap fastener (1).

Unfasten screws (2).

Pull off pressure switch (3) in direction of arrow.

Installation note:
Check gaskets and replace if necessary.

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16 13 522 Removing and installing/replacing temperature sensor for Natural Vacuum Leak Detection (NVLD)



Note:
On this system the temperature sensor is integrated in the pressure switch.

The procedure for removing and installing the pressure switch is described in: Removing and installing pressure switch for Natural Vacuum Leak Detection (NVLD).

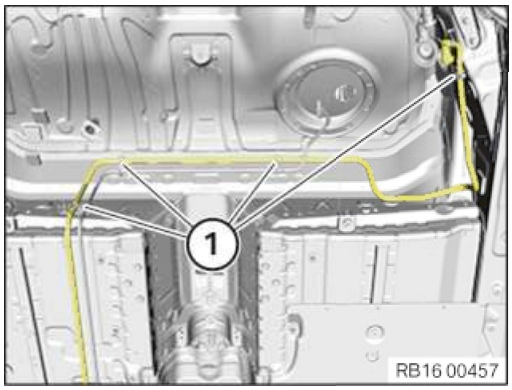
cardiagn.com

16 13 xxx Removing and installing / replacing purge air line (US version)

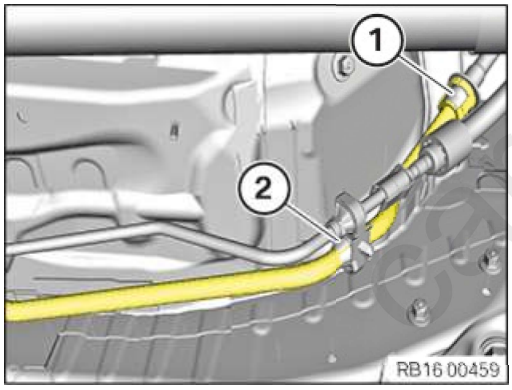
Necessary preliminary tasks:

- Remove fuel tank.
- Remove carbon canister.
- Remove left underbody panelling.

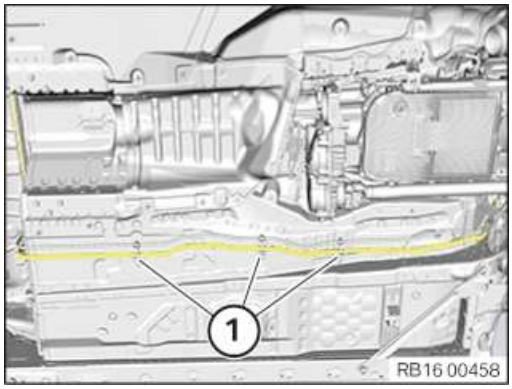
Removal:



Detach purge air line from brackets (1).



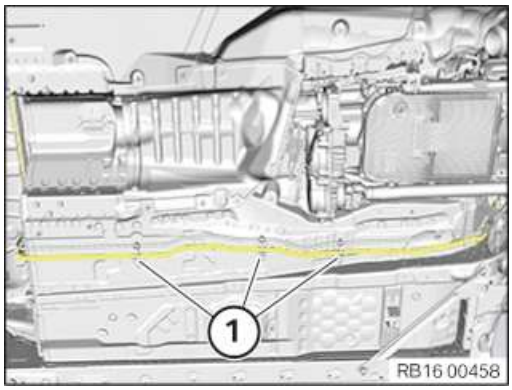
Unlock and disconnect snap fastener (1).
Detach purge air line from bracket (2).



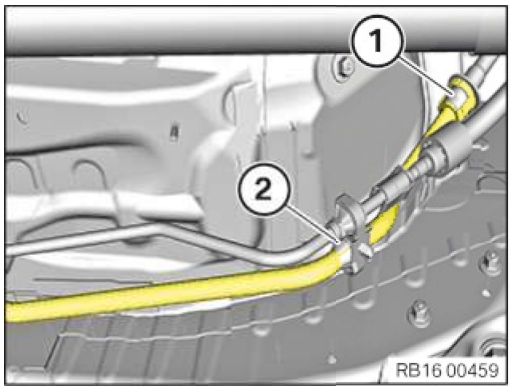
Detach purge air line from brackets (1).
Remove purge air line.

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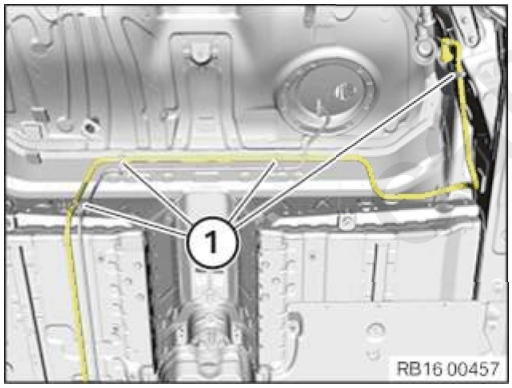
Installation:



Position purge air line in the vehicle.
Attach purge air line in brackets (1).



Position snap fastener (1) and lock.
Attach purge air line in bracket (2).



Attach purge air line in brackets (1).

Required follow-up work:

- Install fuel tank.
- Install carbon canister.
- Install left underbody panelling.

16 14 010 Removing and installing or replacing fuel pump (petrol/gasoline)

Note:
The fuel pump can not be replaced separately.

The entire delivery unit must be replaced.

This operation is described in: Remove and install the delivery unit

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16 14 500 Removing and installing/replacing control unit for electric fuel pump

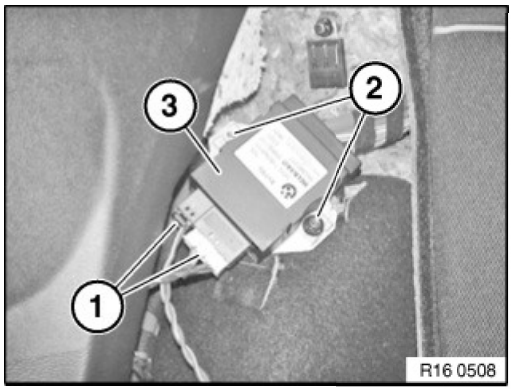
Attention!

Read and comply with notes on protection against electrostatic discharge (ESD protection).

Necessary preliminary work:

- Remove backrest side section, right rear seat.

Note:
On motor vehicles with N13 engine, the control unit for the electric fuel pump is integrated into the DME control unit.



Disconnect plug connection (1).

Release nuts (2) and remove control unit (3).

Installation note:
Tightening torque 16 14 1AZ.

Replacement:

- Replacement only: Perform initial operation of electric fuel pumps-control electronics.

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16 14 090 Removing and installing/replacing delivery unit (petrol)

Special tools required:

- 16 1 190
- 33 5 070

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting vessel ready.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

Important!

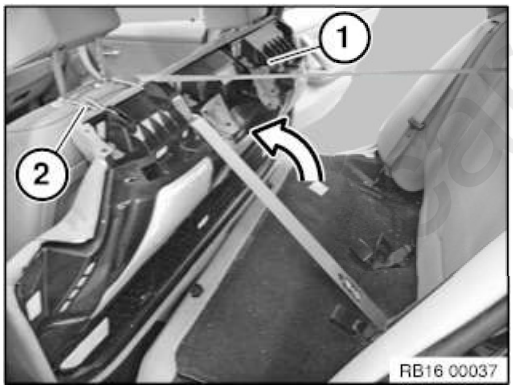
Ensure adequate ventilation in the workbay!

Avoid skin contact (wear gloves)!

Ensure absolute cleanliness when performing repair work on the open fuel system. Dirt contamination in the fuel tank may impair driving or may even result in vehicle breakdown.

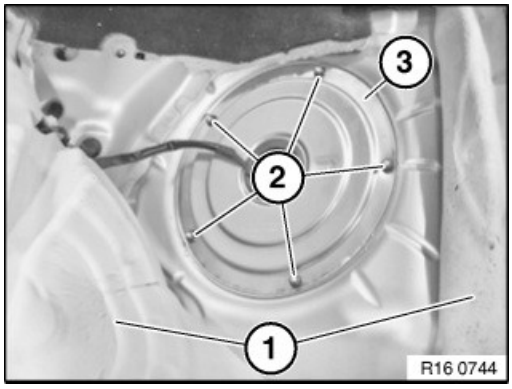
Necessary preliminary work:

- Draw off fuel



Only unclip seat bench (1) as shown on the left and right and fold up in direction of arrow.

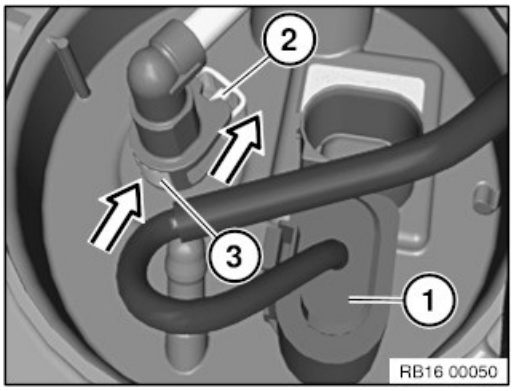
Secure seat bench on front seat (2).



Fold both floor trim panels (1) to the side.

Unscrew nuts (2).

Remove cover for service opening (3).



Disconnect plug connection (1).

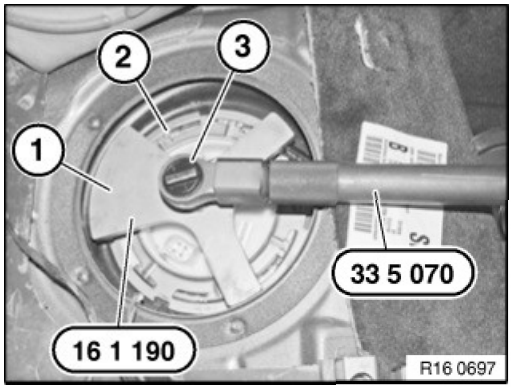
Open the lock (2) in the direction of the arrow (graphic already opened).

Press the release button (3) and pull off the fuel delivery line. If applicable, slightly push the connector out to make pulling the part off easier.

Important!

Fuel delivery line must be felt and heard to snap into place.

Damaged lock parts must be replaced without fail!

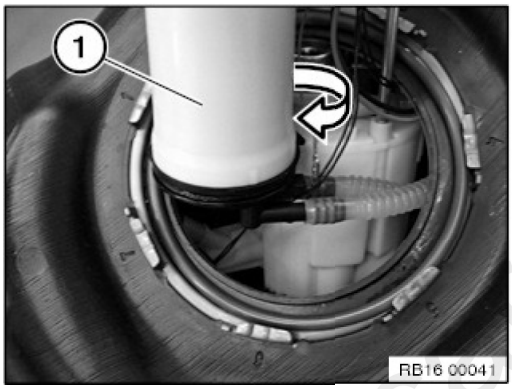


Fit special tool 16 1 190 with wide crank web (1) towards rear onto locking ring (2).

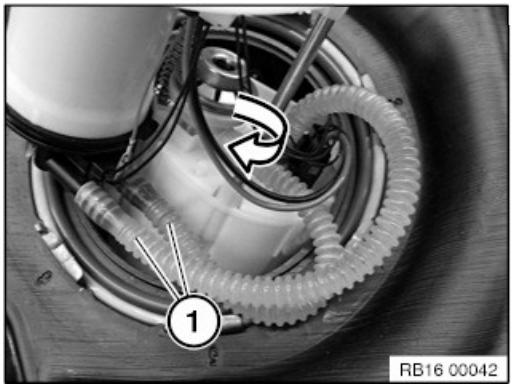
Connect special tool 33 5 070 with reversible ratchet head 1/2 " (3) and position on special tool 16 1 190 .

Release locking ring (2) in counterclockwise direction.

Installation note:
Replace the sealing ring between the flange head and fuel tank.



First, unscrew the flange cover with container (1) from the fuel tank.*Note:*
Graphic shows fuel tank removed.

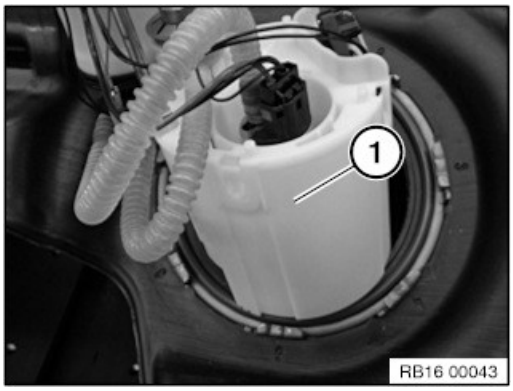


Feed both hoses (1) out of the fuel tank.

Raise the fuel pump by continuing to turn the delivery unit.

Note:
Graphic shows fuel tank removed.

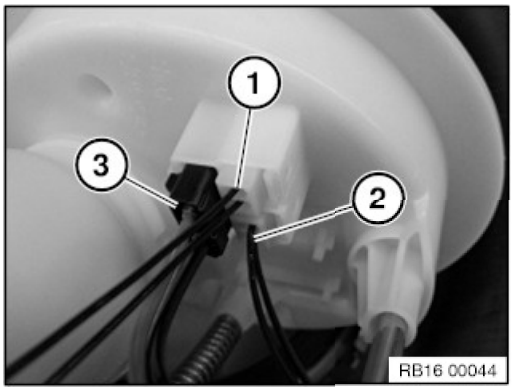
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Carefully remove the delivery unit (1) from the fuel tank.

Make sure that the fuel level sensor is not damaged or bent during the removal.

Note:
Graphic shows fuel tank removed.



Disconnect the plug connection (1) from the left fuel level sensor.

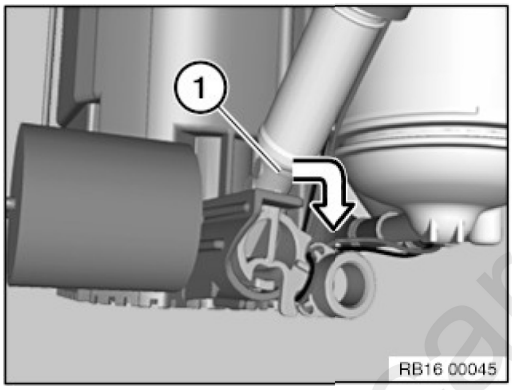
The plug connections (2 and 3) will remain connected.

Important!

Connector housings (1 and 2) are not encoded and accidental switching is possible!

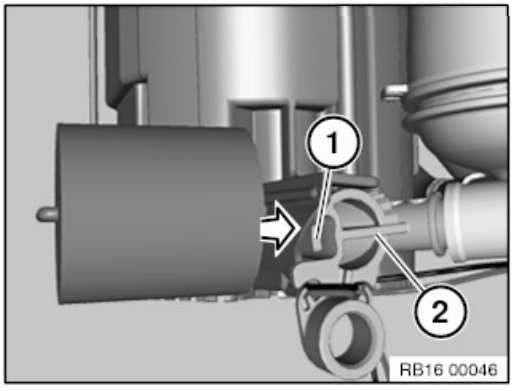
Plug assignment:

- (1) Fuel level sensor, left (cannot be mistakenly switched).
- (2) Fuel level sensor, right
- (3) Fuel pump



Disconnect the hose connection to the left tank half.

Turn the fuel hose (1) by 90° in direction of arrow.



Press the unlocking tab (1) and pull the connector out of the delivery unit in the direction of the arrow.*Installation note:*
Replace sealing ring on the connector (2).

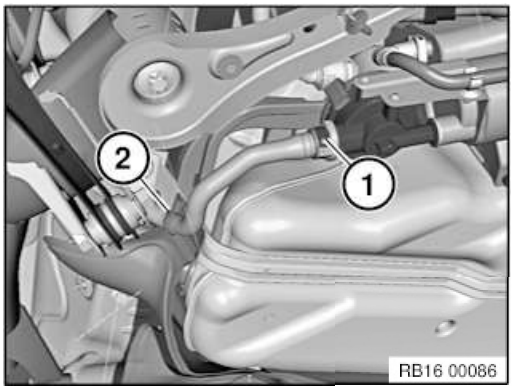
Make sure the connector latches correctly.

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16 14 065 Removing and installing/replacing dust filter for Natural Vacuum Leak Detection (NVLD)

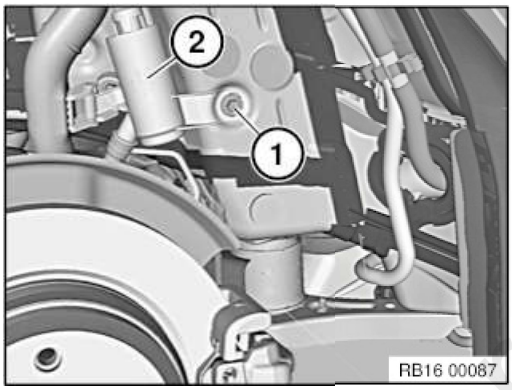
Necessary preliminary tasks:

- Remove right tank cover.
- Remove right wheel arch panel.



Unlock and disconnect snap fastener (1).

Detach tank ventilation line from bracket (2).



Release nut (1) and feed out dust filter (2) with tank ventilation line.

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64 00 ... Information on using cleaning agent/paints (personal protection equipment)



Warning!

Use of cleaning agents/paints not compliant with instructions can cause serious injuries or burns!

Handling cleaning agents/paints can trigger allergic skin and respiratory reactions!



Important!

Observe following instructions:

- Store cleaning agents/paints only in a secure cabinet.
- Keep cleaning agents/paints away from naked flames and other sources of ignition.
- Protect cleaning agents/paints from high temperatures and direct sunlight.
- Always keep an eye douche on hand, change the water regularly (once a month).



Important!

Observe following instructions before use:

- Manufacturer's instructions (on container/packaging)
- Hazard warnings (on container/packaging)
- Manufacturer's instructions on package insert
- Material safety data sheet of manufacturer
- Product information in EPC
- National market regulations



Important!

Observe following instructions during use:

- Do not eat, drink or smoke while working with these products.
- Avoid direct contact with skin and eyes.
- Wear personal protective clothing/equipment.
- Ensure that all enclosed areas are well ventilated or extract fumes directly.
- Immediately change working clothes soiled with cleaning agent/paint.
- After finishing work, wash your hands and apply protective skin cream.



Important!

Follow hazard warnings and wear personal protection equipment!

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First Aid:

- If product comes in contact with eyes, immediately flush with running water for about 10 - 15 minutes. Seek the advice of eye specialist.
- In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. Seek advice of physician.
- If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.
- After inhaling vapours ensure ample supply of fresh air. Keep calm, keep respiratory tracks clear and call doctor.



Recycling:

Dispose of cleaning agents/paints in a professional manner!

Observe national/country-specific disposal regulations.

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