Workshop Manual

Fabia II 2007 ➤

1.6/55 kW; 1.6/66 kW; 1.6/77 kW TDI CR Engine									
Engine ID	CAY A	CAY B	CAY C						

Edition 02.10

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Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.

Contents

00 – Technical data

1 Technical data

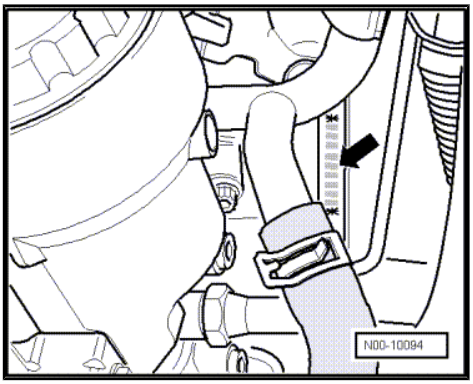
1.1 Engine number

The engine number (“engine identification characters” and “serial number”) is located at the engine/gearbox joint -arrow-.

In addition, a sticker with the “engine identification character” and “serial number” is affixed to the toothed belt guard.

The engine code is also indicated on the vehicle data sticker.

- The engine identification characters have 4 digits starting with the letter “C”.
- The first 3 digits of the engine identification characters refer to the displacement and the mechanical construction of the engine. They are type-punched in the cylinder block including the serial number.
- The fourth digit indicates the output and the torque of the engine and depends upon the engine control unit.



1.2 Engine characteristics

Engine identification character	CAYA	CAYB	CAYC
Manufactured	03.10 ?	03.10 ?	03.10 ?
Exhaust limit values conforming to	EU5	EU5	EU5
Displacement l	1598	1598	1598
Power output kW at rpm	55/4000	66/4200	77/4400
Torque Nm at rpm	195/1500...2000	230/1500...2500	250/1500...2500
Bore ∅ mm	79,5	79,5	79,5
Stroke mm	80,5	80,5	80,5
Number of valves per cylinder	4	4	4
Compression ratio	16,5	16,5	16,5
Firing order	1-3-4-2	1-3-4-2	1-3-4-2
Catalytic converter	yes	yes	yes
Exhaust gas recirculation with radiator	yes	yes	yes
Turbocharging	yes	yes	yes
Charge air cooler	yes	yes	yes
Diesel particle filter	yes	yes	yes

01 – Self-diagnosis

1 Self diagnosis, safety measures, cleanliness regulations and directions

1.1 Self-diagnosis

This repair group is no longer applicable.

For this use “Vehicle self-diagnosis”, “Measuring method” and “Targeted fault finding” ⇒ Vehicle diagnosis, testing and information system VAS 5051.

1.2 Supplementary instructions and assembly work on vehicles with an air conditioning system

WARNING

Refrigerant circuit of the air conditioning system must not be opened.

Caution

Risk of damaging the condenser and the refrigerant lines as well as the refrigerant hoses.

- *Do not over-tension, buckle or bend refrigerant lines and refrigerant hoses.*

Steps which should be taken in order to remove and install the engine without opening the refrigerant circuit:

– Unscrew the holding clamp(s) on the refrigerent lines

– Remove V-ribbed belt ⇒ page 31 .

– Remove AC compressor from the bracket for auxiliary units ⇒ page 24 .

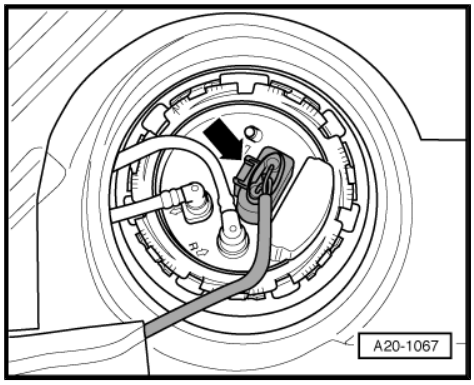
– Mount the air conditioning compressor and the condenser in such a way that the refrigerent lines/hoses are not under tension.

1.3 Safety precautions when working on the fuel supply system

WARNING

- *The fuel or the fuel lines in the fuel system can become very hot (risk of scalding)!*
- *The fuel system is under pressure!*
- *Wear safety goggles and safety clothing, in order to avoid injuries and skin contact with fuel.*
- *Place cleaning cloths around the connection point before detaching cable connections. Reduce pressure by carefully removing the wiring.*

- The fuel pump is activated when the ignition is switched on and by the door contact switch of the driver door. Before opening the fuel system and for reasons of safety, if the battery is not disconnected, the connector -arrow- must be disconnected from the fuel delivery unit.



WARNING

When undertaking all installation work, particularly in the engine compartment due to its cramped construction, please observe the following:

- *Lay lines of all kinds (e.g. for fuel, hydraulic fluid, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.*
- *Ensure that there is adequate free access to all moving or hot components.*

Caution

In order to avoid the fuel high pressure pump to run dry and to achieve a quick engine start after parts are replaced, the following must absolutely be observed:

- *If parts of the fuel system were removed or replaced, it is necessary to initiate the basic setting "check fuel pump" in order to vent the fuel system ⇒ Vehicle diagnosis, testing and information system VAS 5051.*
- *If the fuel pump, fuel line or fuel filter were removed or replaced, the basic setting "check fuel pump" must be initiated "once" before the first engine start.*
- *If the fuel high pressure pump is removed, the basic setting "test of fuel pump for predelivery" must be carried out "3 times" before the first engine start.*
- *If the fuel high pressure pump is replaced, the initial fuel filling of the fuel high pressure pump must be carried out before the first engine start ⇒ page 179 .*

When removing and installing the fuel gauge sender or the fuel delivery unit from a full or partly filled fuel tank, pay attention to the following points:

- The extraction hose of an exhaust extraction system which is switched on, must be positioned close to the assembly opening of the fuel tank in order to extract the released fuel vapours, even before the work is commenced. If no exhaust extraction system is available, a radial fan (motor not in air flow of fan) with a delivery volume of more than 15 m^3/h must be used.
- Avoid skin contact with fuel! Wear fuel-resistant gloves!

1.4 Safety precautions when working on the fuel supply of the diesel direct injection system

WARNING

When undertaking all installation work, particularly in the engine compartment due to its cramped construction, please observe the following:

- *Lay lines of all kinds (e.g. for fuel, hydraulic fluid, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.*
- *Ensure that there is adequate free access to all moving or hot components.*
- *The fuel or the fuel lines in the fuel system can become very hot (risk of scalding)!*
- *The fuel system is under pressure!*
- *Wear safety goggles and safety clothing, in order to avoid injuries and skin contact with fuel.*
- *Place cleaning cloths around the connection point before detaching cable connections. Reduce pressure by carefully removing the wiring.*

Caution

In order to avoid the fuel high pressure pump to run dry and to achieve a quick engine start after parts are replaced, the following points must be observed:

- *If parts of the fuel system were removed or replaced, it is necessary to initiate the basic setting "check fuel pump" in order to vent the fuel system ⇒ Vehicle diagnosis, testing and information system VAS 5051.*
- *If the fuel pump, fuel line or fuel filter were removed or replaced, the basic setting "check fuel pump" must be initiated "once" before the first engine start.*
- *If the fuel high pressure pump is removed, the basic setting "test of fuel pump for predelivery" must be carried out "3 times" before the first engine start.*
- *If the fuel high pressure pump is replaced, the initial fuel filling of the fuel high pressure pump must be carried out before the first engine start* *⇒ page 179* *.*

If test and measuring devices are required during test drives observe the following:

- Always secure the test and measuring devices on the rear seat and have a second person operate them there.

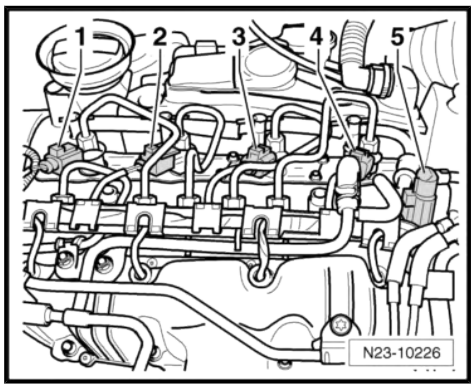
If the test and measuring devices are operated from the passenger seat, the passenger can be injured by the release of the passenger airbag in the event of an accident.

WARNING

Secure the diagnostic device to the rear seat and operate from that position.

Observe the following points to prevent injury to persons and/or damage to the injection and preheating system:

- Disconnect and connect wires of the preheating and injection system as well as measuring device wires when the ignition is switched off.
- If the engine must be operated, without it starting, unplug the connector -5- at the fuel pressure regulating valve -N276- .
- Before disconnecting the battery determine the code of the radio fitted with anti-theft coding.
- Always switch off the ignition before disconnecting and re-connecting the battery. Otherwise the engine control unit may be damaged.
- If the battery is connected, carry out certain additional operations ⇒ Electrical System ⇒ Rep. Gr. 27 .



1.5 Regulations concerning cleanliness when working on the fuel supply/fuel injection system

Carefully observe the following “6 rules” for cleanliness when working on the fuel supply/injection system:

- Thoroughly clean the connection points and their surroundings before releasing.
- Place removed parts on a clean surface and cover. Do not use fuzzy cloths!
- Carefully cover or close opened components if the repair is not completed immediately.
- Only install clean parts: Remove spare parts from their wrapping immediately before installing. Do not use any parts which have been stored unwrapped (e.g. on a shelf or in a tool box).
- When the system is opened: do no use compressed air. Do not use the vehicle.
- Also make sure no diesel fuel runs onto the coolant hoses. If this is the case clean the hoses immediately. Replace immediately any hoses which have suffered damage.

1.6 Regulations concerning cleanliness when working on the exhaust gas turbocharger

Carefully observe the following “5 rules” for cleanliness when working on the exhaust gas turbocharger:

- Thoroughly clean the connection points and their surroundings before releasing.
- Place removed parts on a clean surface and cover. Do not use fuzzy cloths!
- Carefully cover or close opened components if the repair is not completed immediately.

- Only install clean parts: Remove spare parts from their wrapping immediately before installing. Do not use any parts which have been stored unwrapped (e.g. on a shelf or in a tool box).
- When the system is opened: do no use compressed air. Do not use the vehicle.

1.7 General instructions for charge air system

WARNING

When undertaking all installation work, particularly in the engine compartment due to its cramped construction, please observe the following:

- *Lay lines of all kinds (e.g. for fuel, hydraulic fluid, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.*
- *Ensure that there is adequate free access to all moving or hot components.*

Caution

In case a mechanical damage to the exhaust gas turbocharger is found, e.g. damage to the compressor wheel, it is not sufficient to only replace the turbocharger. In order to avoid consequential damage, perform the following tasks:

- *Clean all oil lines.*
- *Change the engine oil and replace the oil filter*
- *Check air filter housing, air filter element and charge air pipes as well as charge air hoses for soiling.*
- *Check all air guides and charge air cooler for foreign bodies.*

If foreign bodies are detected in the charge air system, the charge-air routing must be cleaned and the charge air cooler must be replaced.

- The charge-air system must be tight, check ⇒ page 157 .
- Replace the gaskets, the sealing rings and the self-locking nuts.
- Hose connections and hoses for the charge air system must be free of oil and grease before being installed.
- Observe markings on the hoses and components.
- All hose connections of the charge air system are secured with spring strap clips.
- Only install approved clamps for securing the hose connections ⇒ Electronic Catalogue of Original Parts .
- Use pliers for spring strap clamps to fit the spring strap clips.
- Before screwing down the oil feed line, fill the exhaust turbocharger via the connection fitting with engine oil.
- After installing the turbocharger, run engine at idling speed for about 1 minute to ensure that oil is supplied to the turbocharger.

10 – Removing and installing engine

1 Removing and installing engine

1.1 Removing engine

Special tools and workshop equipment required

- Engine mount -T10012-
- Engine and gearbox jack , e.g. -V.A.G 1383 A-
- Catch pan for workshop crane , e.g. -VAS 6208-
- Double ladder , e. g. -VAS 5085-
- Pliers for spring strap clamps

Note

- *The engine is removed downwards together with the gearbox.*
- *All cable straps that have been loosened or cut open when the engine was removed must be attached again in the same location when the engine is installed again.*
- *Collect drained coolant in a clean container for proper disposal or reuse.*

Caution

When undertaking all installation work, particularly in the engine compartment due to its cramped construction, please observe the following:

- ***Lay lines of all kinds (e.g. for fuel, hydraulic fluid, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.***
- ***In order to avoid damage to the cables, ensure that there is adequate free access to all moving or hot components.***

Observe all safety measures and notes for assembly work on the fuel and injection system, the charge air system as well as the rules for cleanliness ⇒ page 2 .

– If present, remove the adapter for the safety wheel bolts from the luggage compartment.

– Remove front wheels ⇒ Chassis ⇒ Rep. Gr. 44 .

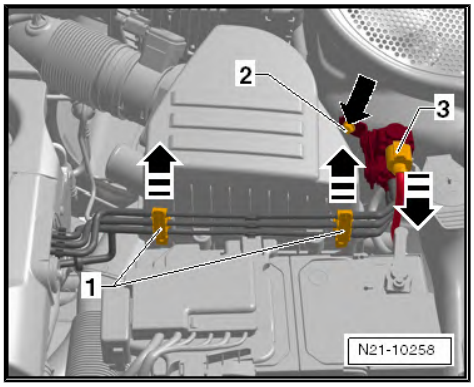
– Disconnect the battery-earth strap with the ignition off ⇒ Electrical System ⇒ Rep. Gr. 27 .

– Remove top engine cover ⇒ page 15 .

– Remove air filter housing with air mass meter -G70- and suction hose ⇒ page 187 .

– Remove battery and battery tray ⇒ Electrical System ⇒ Rep. Gr. 27 .

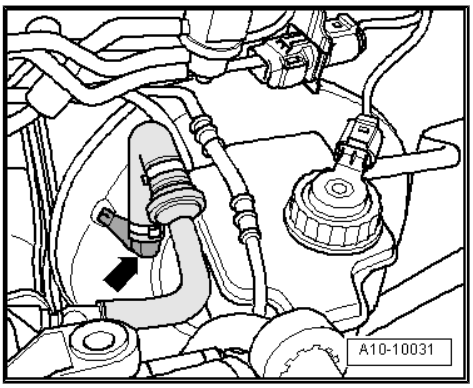
– Release plug -3- from charge pressure control solenoid valve -N75 - .
– Unscrew charge pressure control solenoid valve -N75- with fixture -2- and place it on the engine.
– Remove the gearshift mechanism from the gearbox ⇒ Gearbox ⇒ Rep. Gr. 34 .
– Remove clutch slave cylinder from gearbox ⇒ Gearbox ⇒ Rep. Gr. 30 .



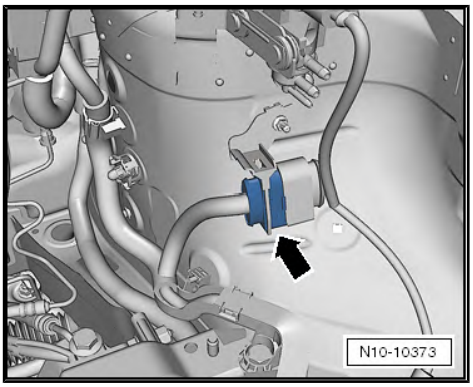
WARNING

After removing the slave cylinder, do not depress the clutch pedal.

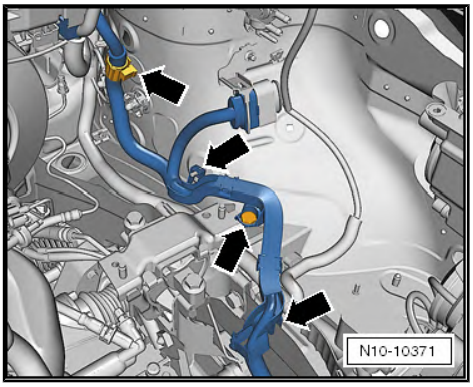
– Remove the vacuum hose -arrow- from the brake servo unit.
– Unlatch the fuse and disconnect the front plug from the engine control unit ⇒ page 189 .



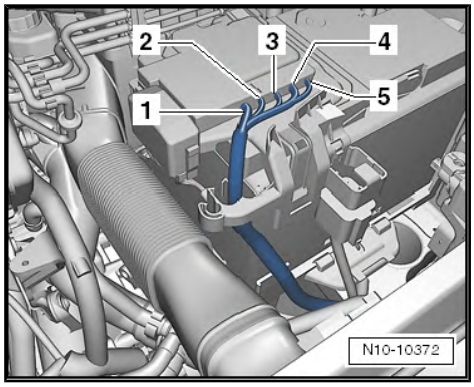
– Disconnect plug connection -arrow-.



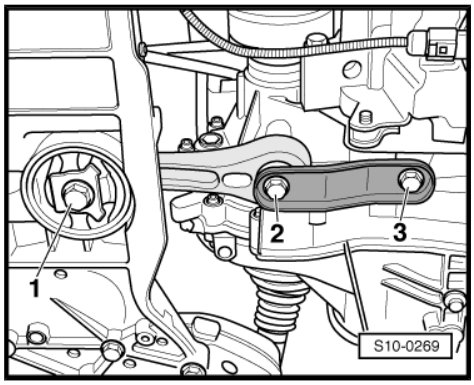
– Carefully slacken the engine wiring harness on its fixing points -arrows-.
– Place the engine wiring harness on the engine.



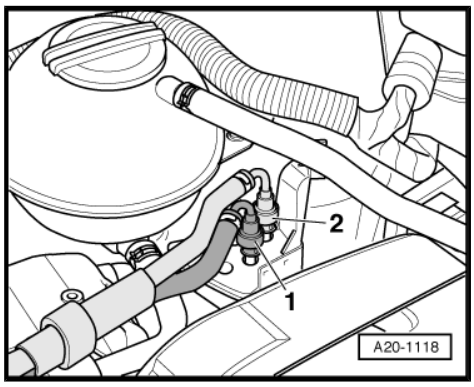
– Unscrew the positive cable to the generator -1-, unclip and place on the gearbox.
– Unscrew the cable from the starter and the gearbox and remove it.



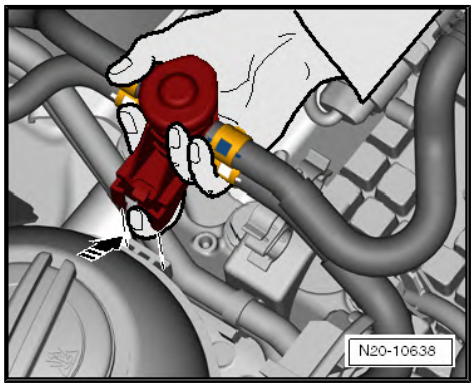
– Release screws -1 ... 3- and remove pendulum support.
– Remove pre-exhaust pipe with diesel particle filter ⇒ page 194 .



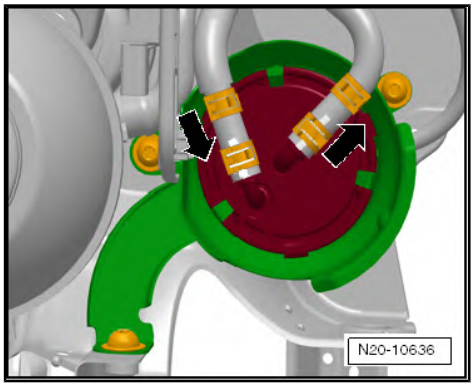
– Separate fuel feed line -2- and fuel return-flow line -1-, to do so press the release buttons.



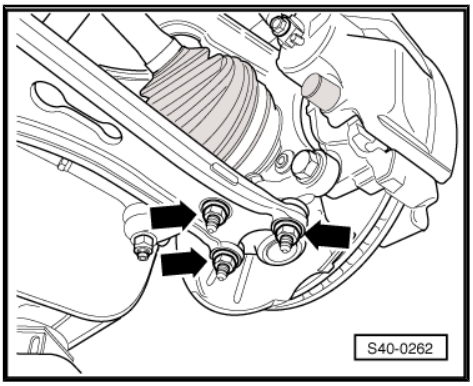
– Unlock the catch peg with a finger and pull the fuel preheating valve upwards out of the guide of the coolant expansion bottle.



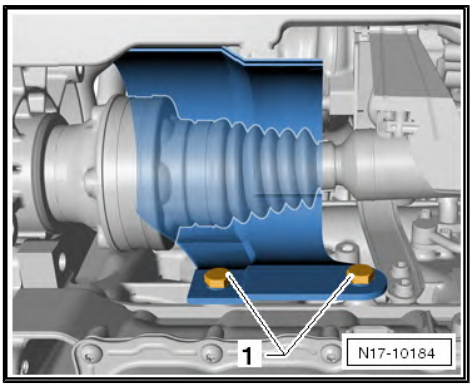
– Push the catch pegs up and remove the fuel filter towards the top.
– Place the fuel filter and the fuel hoses together with the fuel preheating valve on the engine.
– Remove fuel filter bracket.
– Remove the right and left wheelhouse liner ⇒ Body Work ⇒ Rep. Gr. 66 .



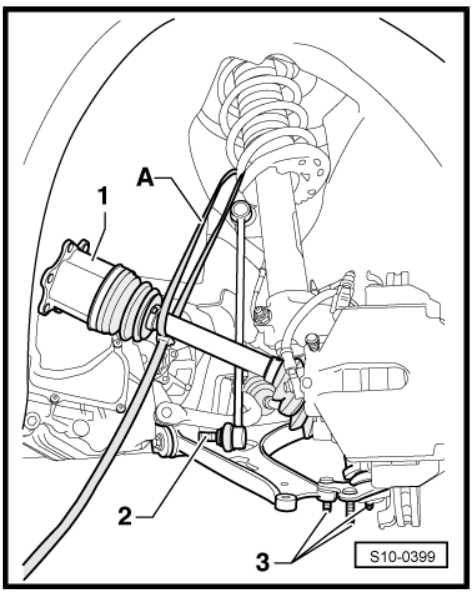
– Unscrew the nuts from the right steering joint -arrows- and press the steering joint out of the suspension arm.



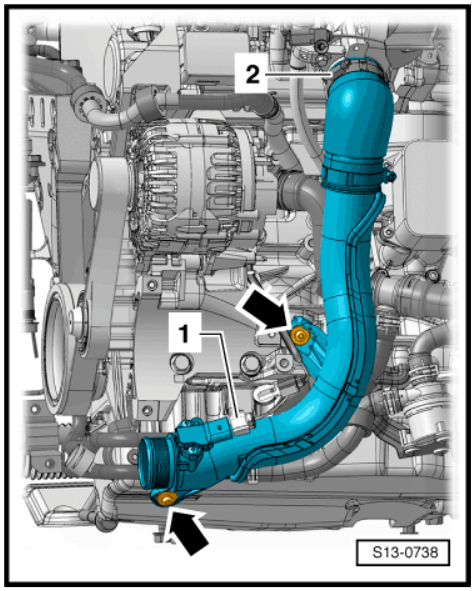
– Remove drive shaft cover.
– Remove right drive shaft from gearbox and secure with wire ⇒ Chassis ⇒ Rep. Gr. 40 .
– Disconnect left drive shaft from gearbox ⇒ Chassis ⇒ Rep. Gr. 40 .



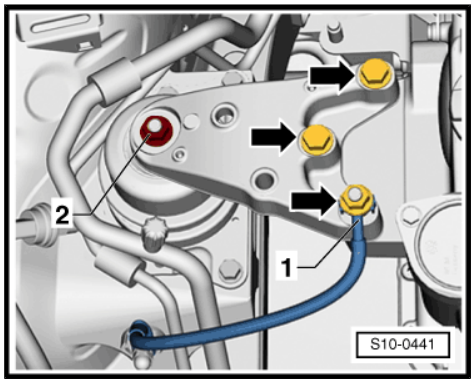
– Unscrew the nut from the left coupling rod -2- of the anti-roll bar and press the coupling rod off the anti-roll bar.
– Unscrew the nuts from the left steering joint -3- and press the steering joint out of the suspension arm.
– If present, remove the front left vehicle level sensor -G78- ⇒ Chassis ⇒ Rep. Gr. 40 .
– Turn the wheel bearing housing to the left up to the stop.
– Swivel the steering joint outwards and secure the drive shaft -1- with a band -A- in the wheelhouse.
– Remove right charge air hose.



– Release screws -arrows-.
– Loosen hose clamp -2-.
– Disconnect the plug -1- at the charge pressure sender -G31- with intake air temperature sender -G42- and remove the right charge air pipe.
– Drain coolant ⇒ page 117 .
– Remove the remaining coolant hoses from the radiator.



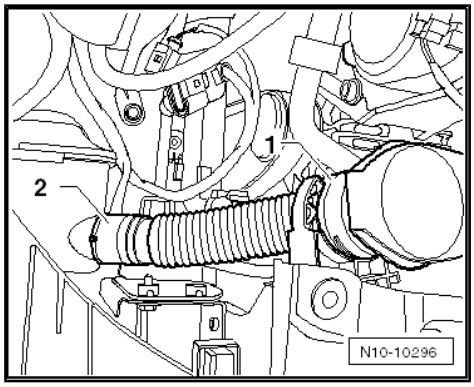
– Remove the earth connection -1- from the assembly bearing.
– Remove coolant expansion bottle and place on the engine.



– Unclip the filler neck of the windshield washer reservoir -1- and lay to the side.

On vehicles with air conditioning

– Remove alternator ⇒ Electrical System ⇒ Rep. Gr. 27 .



WARNING

Risk of injury through refrigerant.

- *Do not open the refrigerant circuit of the air conditioning system.*

Caution

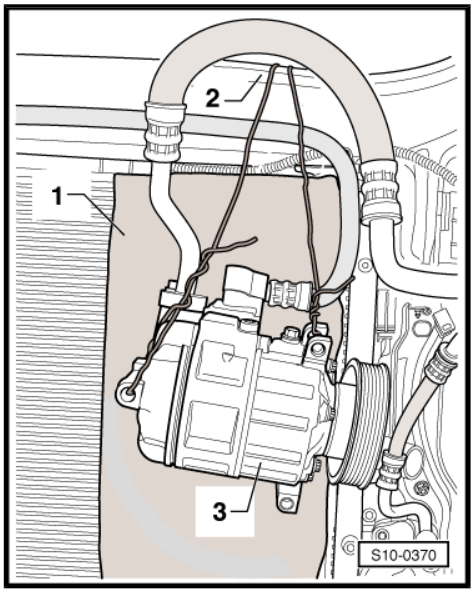
Risk of damaging the condenser and the refrigerant lines as well as the refrigerant hoses.

- *Do not over-tension, buckle or bend refrigerant lines and refrigerant hoses.*

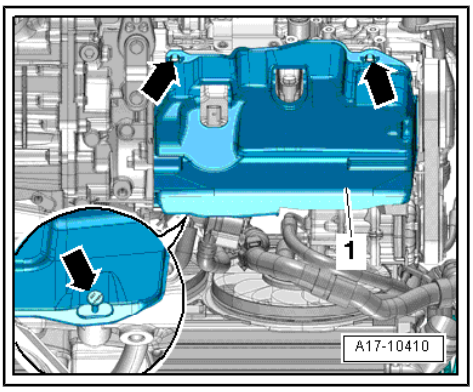
– Remove the AC compressor from the bracket for auxiliary units ⇒ Heating, Air Conditioning ⇒ Rep. Gr. 87 .

– Attach the AC compressor -3- e.g. behind the lock carrier as shown in the figure. As protection put a sheet of cardbord -1- on the radiator wall.

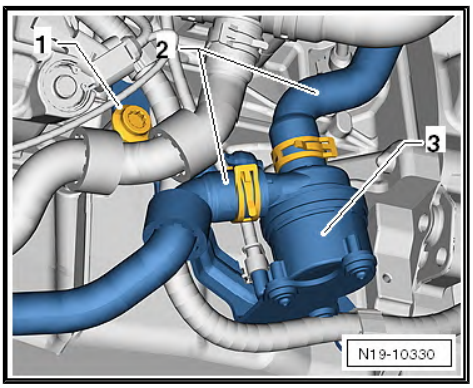
Continued for all vehicles



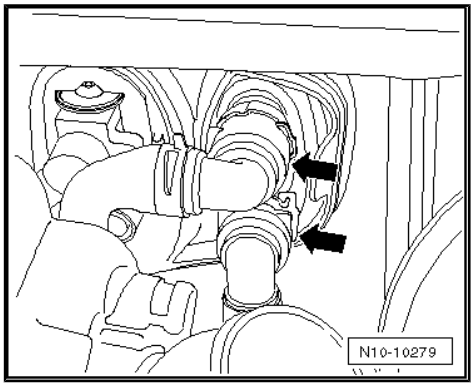
– Remove noise insulation of oil pan -1-, to do so slacken the fixing parts -arrows-.



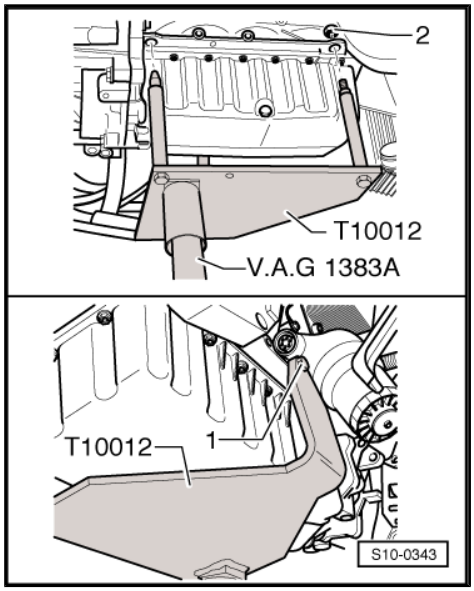
– Unscrew screw -1- and push the coolant recirculation pump 2 -V178- -3- to the side.
– Disconnect all further necessary plugs at the engine and gearbox or separate the lines to the engine and gearbox.



– Separate the quick couplings -arrows- at the heat exchanger.
– Unclamp all remaining connecting, coolant, vacuum and suction hoses from the engine.
– Release all remaining plugs at engine and gearbox and lay aside the relevant lines.



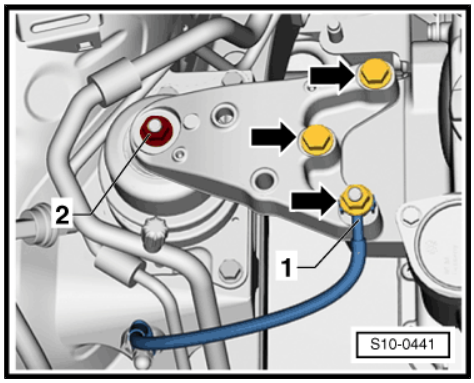
– Screw engine mount -T10012- to the cylinder block with nut -2- and screw -1- to 20 Nm.
– Insert engine/gearbox jack -V.A.G 1383 A- in the engine mount and slightly raise.



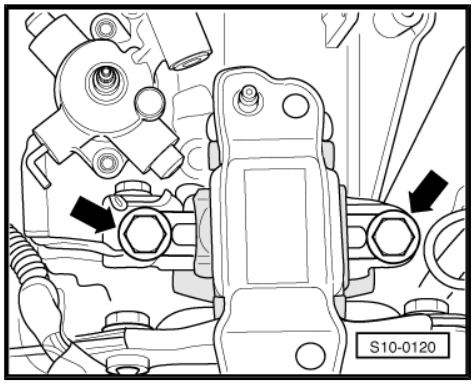
Note

Use double ladder to release the screws for the engine/gearbox mounting.

– Release the screws which connect the engine mount with the engine support -arrows-.



– Remove the assembly bracket at the gearbox. Release screws -arrows-.



Note

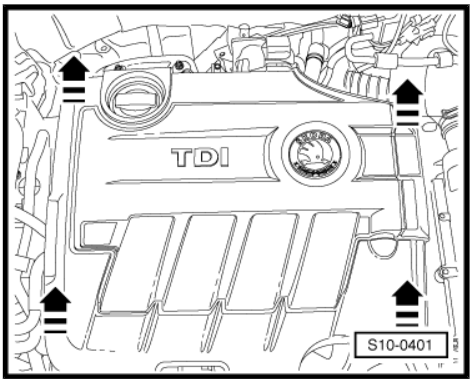
- *Check whether all hose and line connections between engine, gearbox and body are released.*
- *When lowering carefully guide the engine with the gearbox, in order to avoid damage.*
- *Ensure the necessary space for lowering the assembly by pressing off the assembly carrier.*

– Carefully lower engine with gearbox. During this procedure, turn or move the engine with the gearbox depending upon the constriction.
– Remove the gearbox from the engine.

1.1.1 Removing and installing engine trim panel

Removing

– Pull the engine cover at the corners -arrows- upwards with a sudden motion and through this slacken it.



Install

> **Caution**
>
> *Before installing the engine cover, check the correct position of the 4 fixing elements (ball sockets). If necessary they must be put back into their position. Otherwise this can lead to damage to the engine cover.*

– Position the engine cover onto the fixing points and press it in at the corners until it clicks into place.

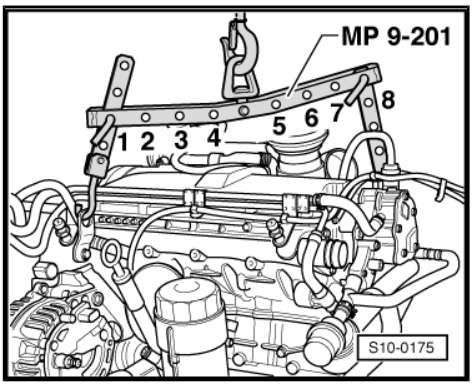
1.2 Securing the engine to the assembly stand

Special tools and workshop equipment required

- Engine mount -MP 1-202- or -VAS 6095-
- Hook -MP 1-202/10-
- Assembly stand -MP 9-101-
- Lifting device -MP 9-201 (2024A)-
- Bushing -T30010 (VW 540/1B)-
- Workshop crane , e.g. -VAS 6100-
- Separate engine from gearbox.

> **WARNING**
>
> *Use securing pins on the hooks and rig pins to prevent release.*

– Attach lifting device -MP 9-201- at engine and at workshop crane e.g. -VAS 6100- .



On the belt pulley side:

- 2. Hole of the attachment in Position 1

On the flywheel side:

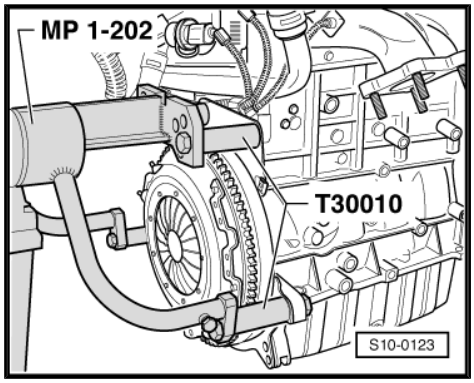
- 4. Hole of the attachment in Position 8

> **Note**
>
> *The illustration shows the pump injector engine. The attachment for the Common Rail engine occurs in the same way.*

– Lift off engine with installed engine mount -T10012- with workshop crane from engine/gearbox jack.

– Remove engine mount -T10012 - .

– For carrying out assembly work, attach the engine with engine mount -MP 1-202- , hooks -MP 1-202/10- and sleeves -T30010- or engine mount -VAS 6095- to the assembly stand -MP 9-101- . The figure shows the 1.9 ltr./47 kW SDI Engine. The fixing system is identical.



1.3 Installing the engine

Special tools and workshop equipment required

- Grease -G 000 100- for manual gearbox
- Mount engine and gearbox using engine mount onto engine/ gearbox jack .

Installation is performed in the reverse order, pay attention to the following points:

Note

- *Observe all safety measures and notes for assembly work on the fuel and injection system, the charge air system as well as the rules for cleanliness* *⇒ page 2* *.*
- *When undertaking assembly replace self-locking nuts and screws which have been tightened to a torquing angle.*
- *Always replace gasket rings and seals.*
- *All cable straps should be fastened again in the same place when installing.*
- *Secure all hose connections with corresponding hose clamps ⇒ Electronic Catalogue of Original Parts .*

Caution

When undertaking all installation work, particularly in the engine compartment due to its cramped construction, please observe the following:

- ***Lay lines of all kinds (e.g. for fuel, hydraulic fluid, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.***
- ***In order to avoid damage to the cables, ensure that there is adequate free access to all moving or hot components.***

Note

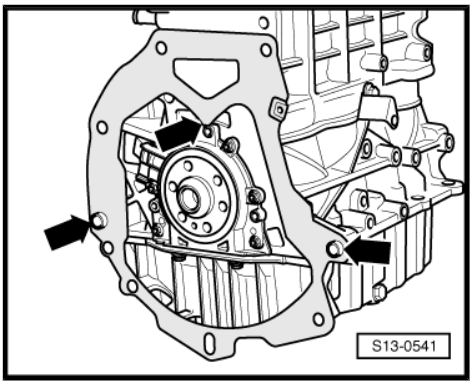
- *Clean the serration of the drive shaft and if the clutch disc has been used clean the hub serration, remove corrosion and only apply a very thin layer of grease -G 000 100- on the serration. Subsequently move the clutch disc up and down on the drive shaft until the hub fits smoothly on the shaft. Always remove excess grease.*
- *After installing the coupling, check the centering of the clutch disc ⇒ gearbox ⇒ Rep. Gr. 30 .*
- *Check the clutch release bearing for wear. Replace release bearing if worn ⇒ gearbox ⇒ Rep. Gr. 30 .*

– Check whether the dowel sleeves for centering the engine/ gearbox are present in the cylinder block; insert if necessary.

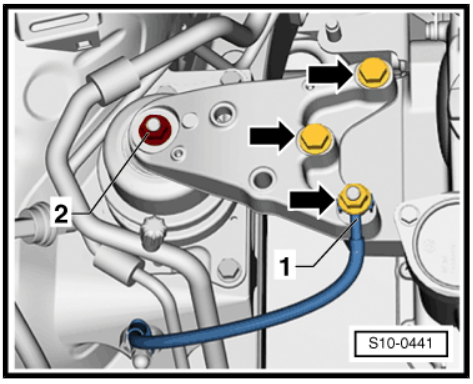
– Ensure that the intermediate plate has been inserted on the sealing flange and is pushed onto the dowel sleeves -arrows-.

– Screw on gearbox to engine ⇒ gearbox ⇒ Rep. Gr. 34 .

– Insert engine with gearbox into the body.



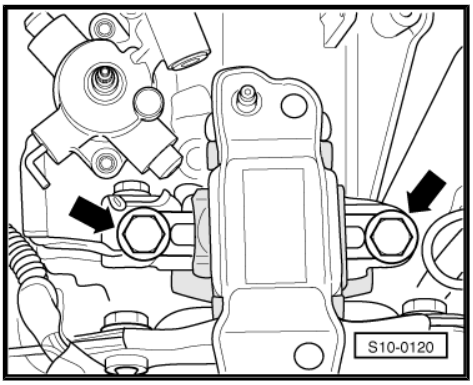
– Successively screw in by hand the screws for engine mounting -arrows-.

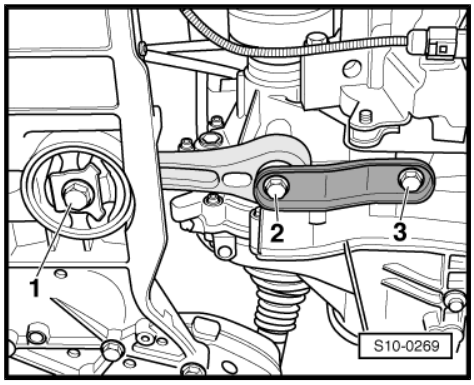


– Successively screw in by hand the screws for gearbox mounting -arrows-.

– Remove engine mount -T10012- from engine.

– Install pre-exhaust pipe with diesel particle filter ⇒ page 194 .





- Screw down pendulum support with new screws -2- and -3- at gearbox and then screw down with new screw -1- at assembly carrier.
- Install the left and right drive shaft ⇒ Chassis ⇒ Rep. Gr. 40 .
- Install the slave cylinder, if necessary bleed the clutch control ⇒ Gearbox ⇒ Rep. Gr. 30 .
- Attach the shift mechanism to the gearbox and adjust ⇒ Gearbox ⇒ Rep. Gr. 34 .
- Attach AC compressor to holder for auxiliary units ⇒ page 24 .
- Install alternator ⇒ Electrical System ⇒ Rep. Gr. 27 .
- Install the V-ribbed belt ⇒ page 31 .
- Connect all hoses to the engine.
- Connect electrical connections and attach cables ⇒ Current flow diagrams and Fitting locations.
- Carry out cohesive work when reconnecting the battery ⇒ Electrical System ⇒ Rep. Gr. 27 .
- Top up coolant ⇒ page 117 .
- Checking the oil level ⇒ Maintenance ; Fabia II .
- Install the left and right wheelhouse liner ⇒ Body Work ⇒ Rep. Gr. 66 .
- Install the noise insulation ⇒ Body Work ⇒ Rep. Gr. 50 .

Caution

- ***If parts of the fuel system were removed or replaced, it is necessary to initiate the basic setting "check fuel pump" in order to vent the fuel system ⇒ Vehicle diagnosis, testing and information system VAS 5051.***

- Perform a test drive.
- Interrogate all fault memories, rectify any faults existing and erase fault memory ⇒ Vehicle diagnosis, testing and information system VAS 5051.

Note

After deleting the fault memory of the engine control unit the readiness code must be re-generated.

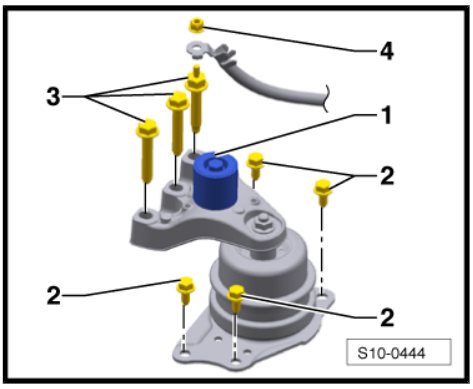
Tightening torques

Component		Nm
Screws or nuts	M6	10
	M7	15
	M8	20
	M10	40
	M12	70
Engine/gearbox connecting screws ⇒ gearbox ⇒ Rep. Gr. 34		

1.4 Assembly bracket

Tightening torques

Engine mount



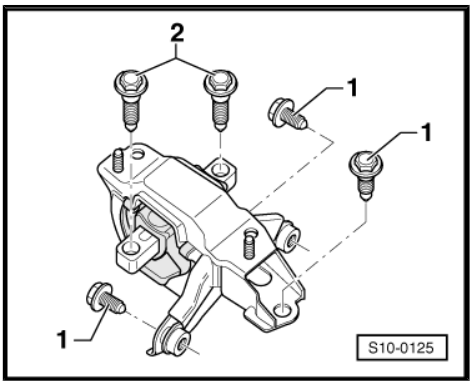
1 - not fitted on this type of engine

2 - 20 Nm + 90° ($^1/_4$ turn) - replace

3 - 30 Nm + 90° ($^1/_4$ turn) - replace

4 - 16 Nm

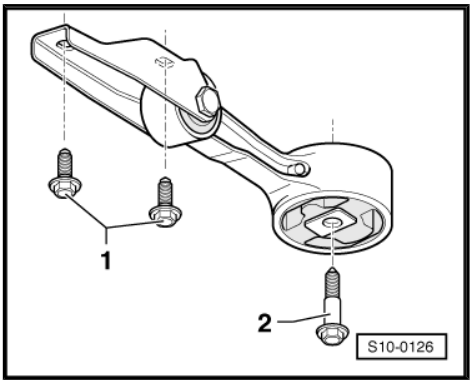
Gearbox mount



1 - 50 Nm + 90° ($^1/_4$ turn) - replace

2 - 40 Nm + 90° ($^1/_4$ turn) - replace

Pendulum support



Note

Position the screws -1- in the elongated holes of the pendulum support in such a way that there is maximum distance between the gearbox and the assembly carrier.

1 - 30 Nm + 90° ($^1/_4$ turn) - replace

2 - 40 Nm + 90° ($^1/_4$ turn) - replace

1.5 Removing and installing engine support

Special tools and workshop equipment required

- Supporting device -MP9-200 (10-222A)-

Removing

Caution

When undertaking all installation work, particularly in the engine compartment due to its cramped construction, please observe the following:

- *Lay lines of all kinds (e.g. for fuel, hydraulic fluid, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.*
- *In order to avoid damage to the cables, ensure that there is adequate free access to all moving or hot components.*

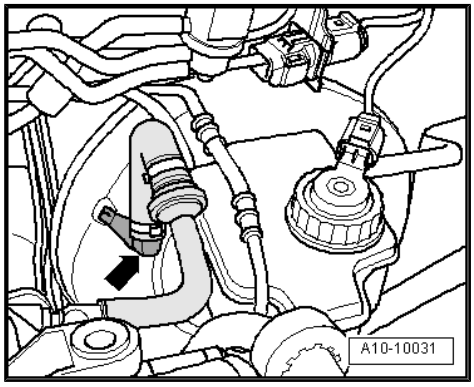
Note

- *Safety precautions when working on the fuel supply system* ⇒ page 3 .
- *Observe rules for cleanliness* ⇒ page 6 .

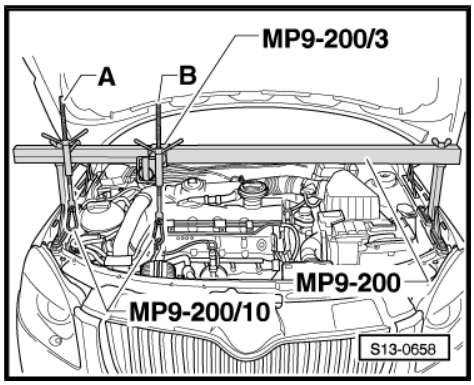
– Switch off ignition and withdraw ignition key.

– Remove top engine cover ⇒ page 15 .

– Remove vacuum line from brake servo unit -arrow-.



– Install supporting device -MP9-200 (10-222A)- and support the engine with spindle -B- in fitting position. Allow spindle -A- to hang loosely.

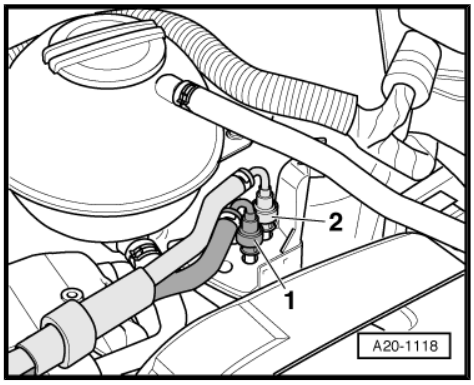


Note

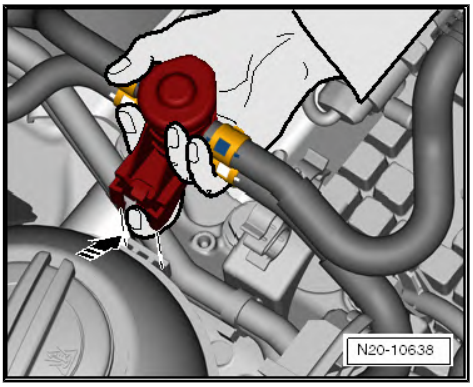
- *The assembly bearing must only be removed if the engine is supported with the supporting device -MP9-200 (10-222A)- !*
- *Only release the engine support if the assembly bearing is removed.*

– Remove the front right wheelhouse liner ⇒ Body Work ⇒ Rep. Gr. 66 .

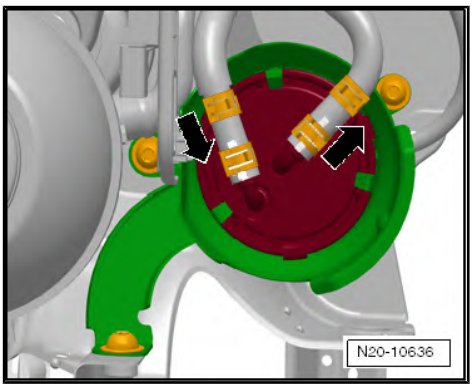
– Separate fuel feed line -2- and fuel return-flow line -1-, to do so press the release buttons.
– Collect the fuel which flows out.



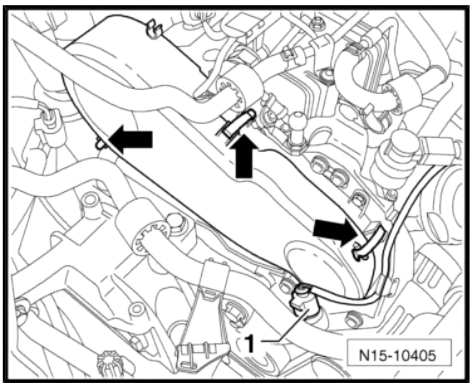
– Unlock the catch peg with a finger and pull the fuel preheating valve upwards out of the guide of the coolant expansion bottle.
– Unclip the fuel line from the plastic holders.



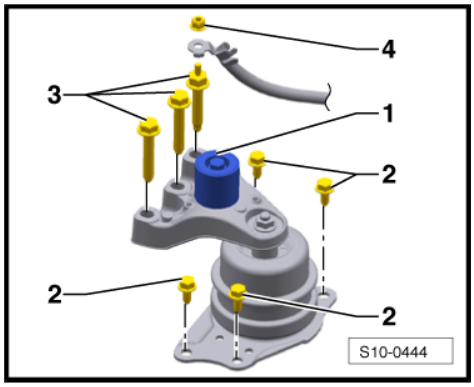
– Push the catch pegs up and remove the fuel filter towards the top.
– Place the fuel filter and the fuel hoses together with the fuel preheating valve on the engine.
– Remove fuel filter bracket.
– Slacken the coolant expansion bottle in such a way that there is sufficient space for the removal of the engine support.



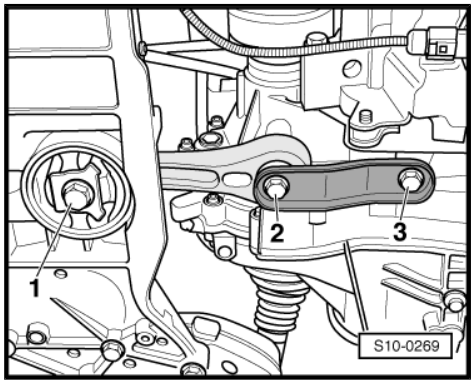
– Remove top part of toothed belt guard; to do so release retaining clips -arrows-.
– Remove the earth connection from the assembly bracket.



– Release the fixing screws of the assembly/engine support bracket -3-, assembly/body bracket -2- and remove the entire assembly bracket.



– Release screws -1 ... 3- and remove pendulum support.



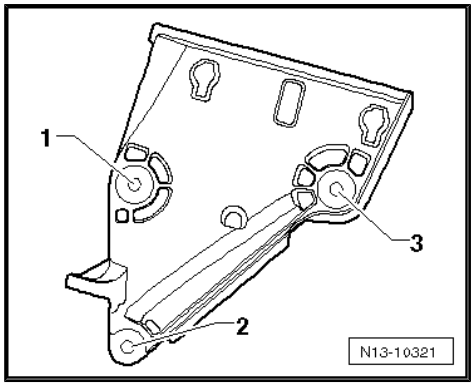
WARNING

Make sure that no components as well as hoses are damaged, overstretched or torn off when lifting and lowering the engine with the supporting device -MP9-200 (10-222A)- .

– Pull the engine as far as possible towards the radiator.

Note

Remove the fixing screw -1- together with the engine support. Raise the engine and lower it via the spindle of the supporting device -MP9-200 (10-222A)- so that the screws -2- and -3- can be removed or inserted.



– Unscrew the fixing screws for the engine support in the sequence -3 - 2 - 1-.

– Remove the engine support upwards.

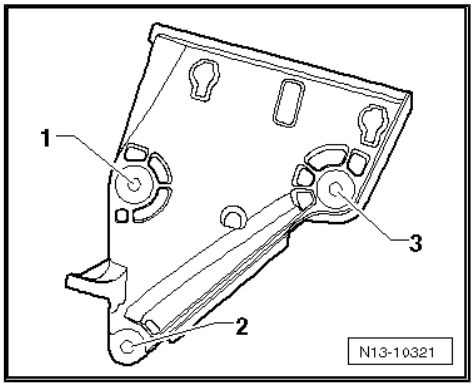
Install

Caution

The tightening sequence and the tightening torque of the fixing screws for the engine support must definitely be respected. Otherwise stress of the engine support occurs, which results in the breaking of the engine support.

Installation occurs in reverse order. However, pay attention to the following:

– Place the engine support from the top.



Note

Install the fixing screw -1- together with the engine support. Raise the engine and lower it via the spindle of the supporting device - MP9-200 (10-222A)- so that the screws -2- and -3- can be removed or inserted.

– Tighten the fixing screws in the tightening sequence -1 - 2 - 3-: 7 Nm
– Tighten the fixing screws in the tightening sequence -1 - 2 - 3-: 40 Nm + torque a further 180° ($^1/_2$ turn).
– Install engine mounting with new screws.
– Tighten screws for engine mount ⇒ page 19 .

Further installation occurs in reverse order. However, pay attention to the following:

♦ Make sure the fuel lines fit tightly.
♦ Do not mix-up the feed line and the return-flow line (the return-flow line is blue or has a blue marking, the feed line is black).

13 – Crankgear

1 Removing and installing a V-ribbed belt and a toothed belt

1.1 Removing and installing V-ribbed belt

1.1.1 Summary of components - Vehicles without air conditioning

1 - Belt pulley/vibration damper

- ❑ pay attention to correct installation position ⇒ page 25
- ❑ removing and installing ⇒ page 32

2 - 25 Nm

3 - AC generator

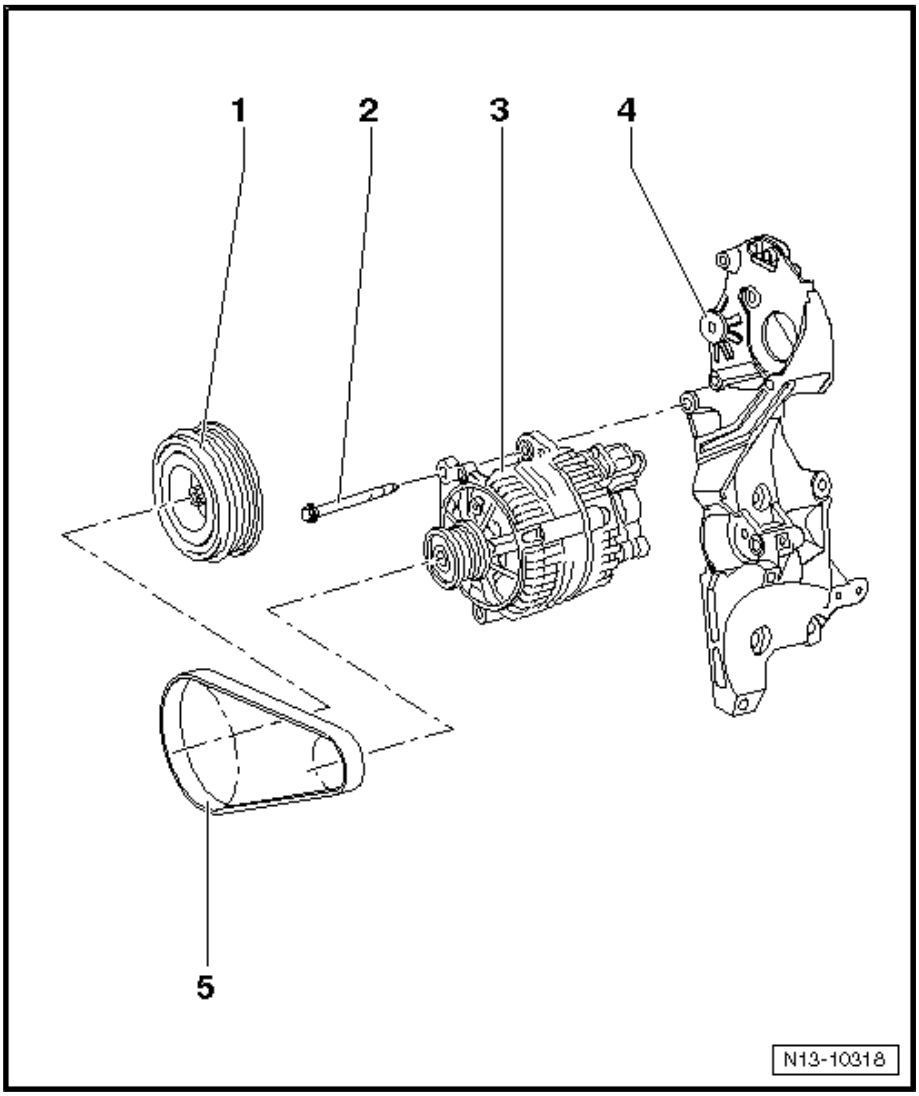
- ❑ removing and installing ⇒ Electrical System ⇒ Rep. Gr. 27

4 - Bracket for auxiliary units

- ❑ removing and installing ⇒ page 35

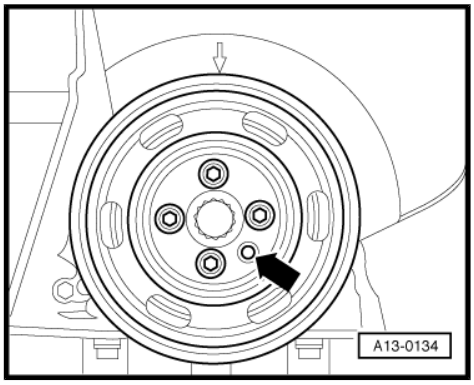
5 - V-ribbed belt

- ❑ removing and installing ⇒ page 29
- ❑ replace
- ❑ pay attention to the correct position on the belt pulley when installing it.



Fitting position of the V-ribbed belt on the crankshaft

- The hole -arrow- in the V-ribbed belt on the crankshaft must be positioned above the peg on the toothed belt sprocket of the crankshaft.



Bracket for auxiliary units - tightening order and tightening torques

- A dowel sleeve must be located between the bracket for auxiliary units and the cylinder block in the area of the screw hole -6-.

– Insert new fixing screws for the bracket for auxiliary units as follows:

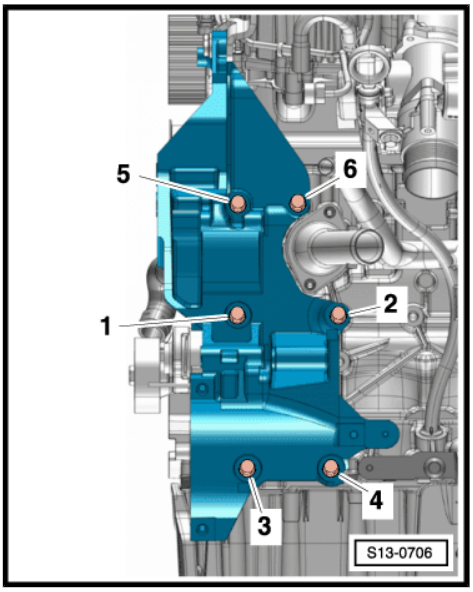
♦ Screws -1- and -2- M10 x 52

♦ Screws -3- and -4- M10 x 30

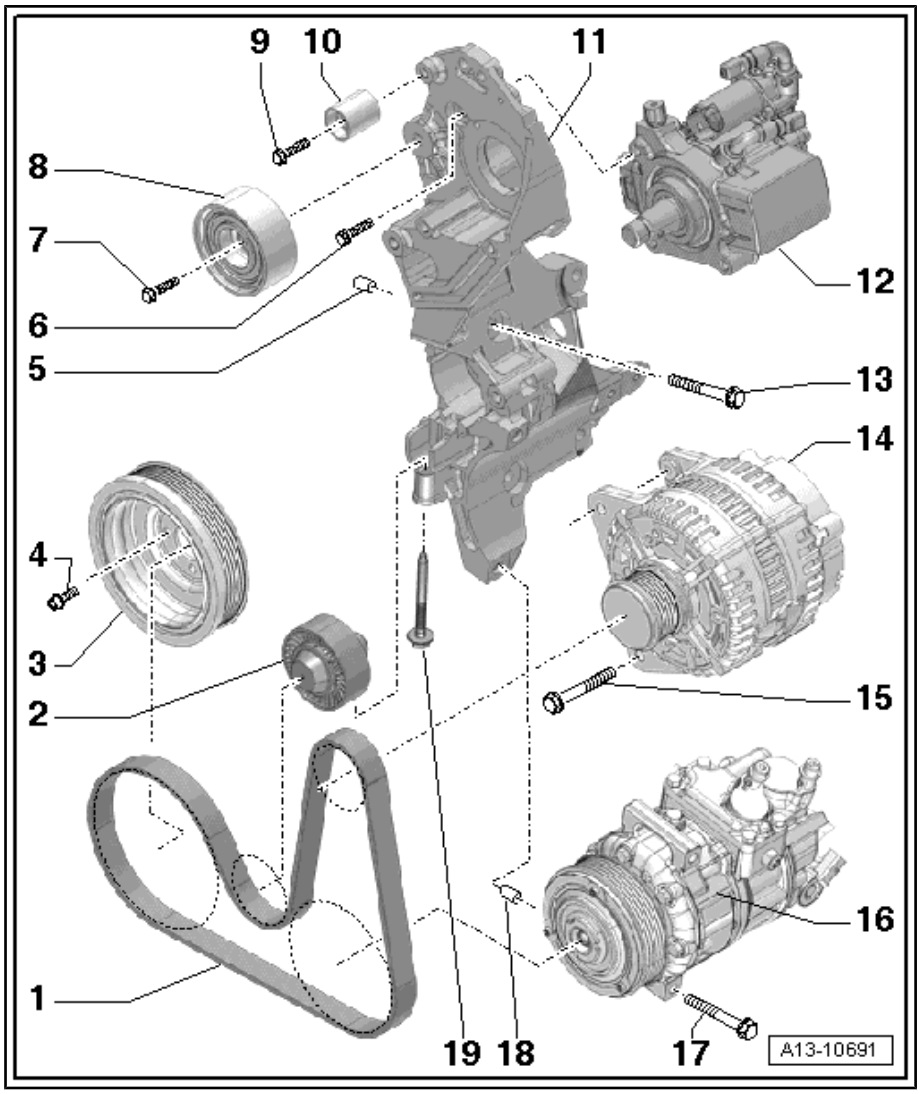
♦ Screws -5- and -6- M10 x 60

– Gradually tighten the fixing screws for the bracket for auxiliary units in the sequence -1…6-:

1. Screw in all the screws by hand.
2. Tighten all screws to 40 Nm.
3. Turn the screws -3- and -4- a further 45°.
4. Turn the screws -1, 2, 5, 6- a further 90°.



1.1.2 Summary of components - Vehicles with air conditioning and guide pulley



1 - V-ribbed belt

- ❑ removing and installing ⇒ page 30
- ❑ check for wear
- ❑ mark the direction of rotation with chalk or a felt-tip pen before removing
- ❑ do not kink
- ❑ pay attention to the correct position on the belt pulley when installing it.

2 - Guide pulley for V-ribbed belt

- ❑ removing and installing ⇒ page 30

3 - Belt pulley for crankshaft

- ❑ with vibration damper
- ❑ pay attention to correct installation position ⇒ page 27
- ❑ removing and installing ⇒ page 32

4 - 10 Nm + torque a further 90° (1/4 turn)

- ❑ replace

5 - Fitting sleeve

- ❑ pay attention to correct fit in the bracket for auxiliary units
- ❑ the dowel sleeve is located in the top right screw hole ⇒ page 27

6 - 20 Nm + torque a further 45° (1/8 turn)

7 - 50 Nm + torque a further 90° (1/4 turn)

8 - Guide pulley

- ❑ for toothed belt

9 - 15 Nm

10 - Guide pulley

- ❑ for toothed belt

11 - Bracket for auxiliary units

- ❑ removing and installing ⇒ page 35

12 - High pressure pump

- ❑ removing and installing ⇒ page 176

13 - Screw

- ❑ order of tightening ⇒ page 27

14 - AC generator

- ❑ removing and installing ⇒ Electrical System ⇒ Rep. Gr. 27

15 - Screw

- ❑ removing and installing ⇒ Electrical System ⇒ Rep. Gr. 27

16 - AC compressor

- ❑ removing and installing ⇒ Heating, Air Conditioning ⇒ Rep. Gr. 87

17 - Screw

- ❑ removing and installing ⇒ Heating, Air Conditioning ⇒ Rep. Gr. 87

18 - Fitting sleeve

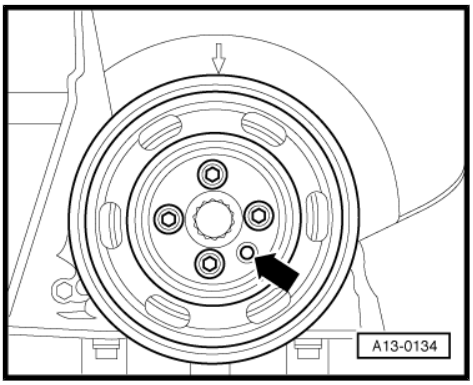
- ❑ pay attention to correct fit in the bracket for auxiliary units
- ❑ The dowel sleeve is located in the bottom right screw hole ⇒ page 27

19 - Screw

- ❑ Tightening torque ⇒ page 30

Fitting position of the V-ribbed belt on the crankshaft

- The hole -arrow- in the V-ribbed belt on the crankshaft must be positioned above the peg on the toothed belt sprocket of the crankshaft.



Bracket for auxiliary units - tightening order and tightening torques

- A dowel sleeve must be located between the bracket for auxiliary units and the cylinder block in the area of the screw hole -6-.

– Insert new fixing screws for the bracket for auxiliary units as follows:

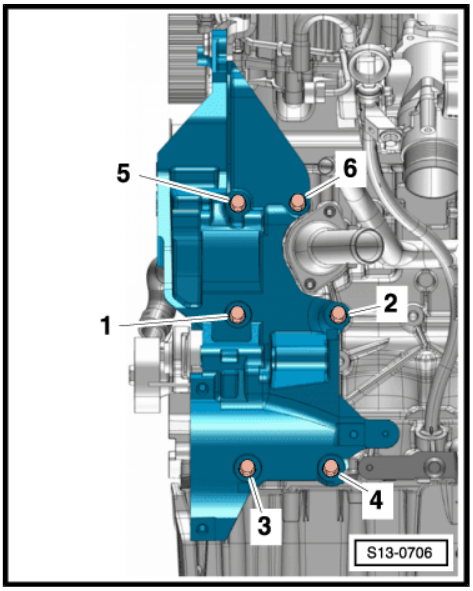
♦ Screws -1- and -2- M10 x 52

♦ Screws -3- and -4- M10 x 30

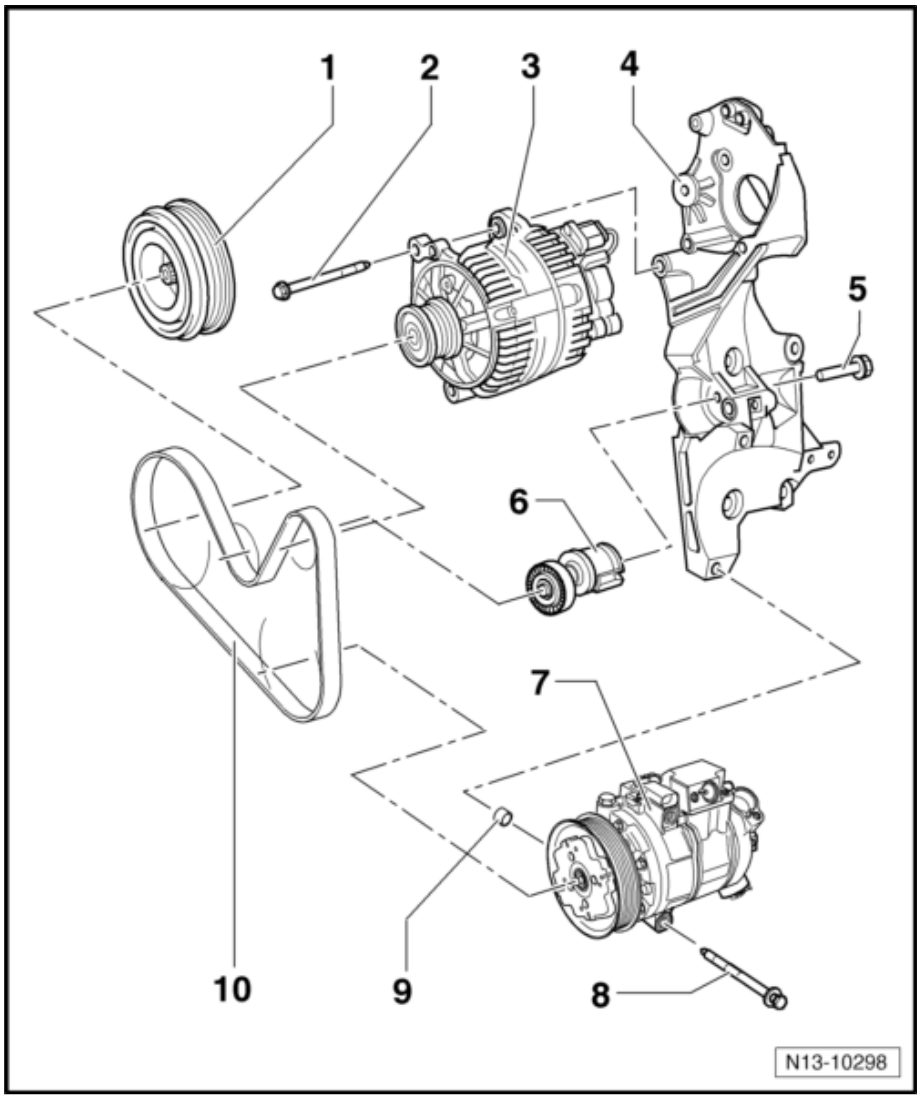
♦ Screws -5- and -6- M10 x 60

– Gradually tighten the fixing screws for the bracket for auxiliary units in the sequence -1…6-:

1. Screw in all the screws by hand.
2. Tighten all screws to 40 Nm.
3. Turn the screws -3- and -4- a further 45°.
4. Turn the screws -1, 2, 5, 6- a further 90°.



1.1.3 Summary of components - Vehicles with air conditioning system and tensioning element



1 - Belt pulley for crankshaft

- ❑ with vibration damper
- ❑ pay attention to correct installation position ⇒ page 29
- ❑ removing and installing ⇒ page 32

2 - 25 Nm

3 - AC generator

- ❑ removing and installing ⇒ Electrical System ⇒ Rep. Gr. 27

4 - Bracket for auxiliary units

- ❑ removing and installing ⇒ page 35
- ❑ order of tightening ⇒ page 29

5 - 20 Nm + torque a further 180° (1/2 turn)

- ❑ replace

6 - Tensioner for V-ribbed belt

7 - AC compressor

- ❑ removing and installing ⇒ Heating, Air Conditioning ⇒ Rep. Gr. 87

8 - 45 Nm

9 - Dowel sleeves

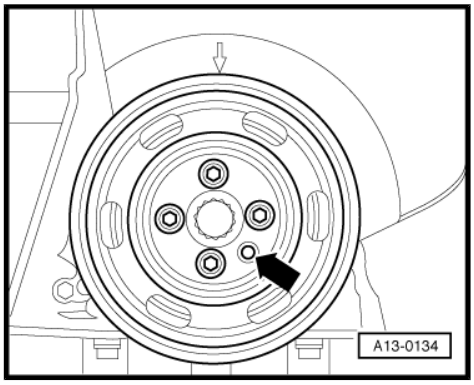
- ❑ pay attention to correct fit in the holder

10 - V-ribbed belt

- ❑ removing and installing ⇒ page 31
- ❑ check for wear
- ❑ mark the direction of rotation with chalk or a felt-tip pen before removing
- ❑ do not kink
- ❑ pay attention to the correct position on the belt pulley when installing it.

Fitting position of the V-ribbed belt on the crankshaft

- The hole -arrow- in the V-ribbed belt on the crankshaft must be positioned above the peg on the toothed belt sprocket of the crankshaft.



Bracket for auxiliary units - tightening order and tightening torques

- A dowel sleeve must be located between the bracket for auxiliary units and the cylinder block in the area of the screw hole -6-.

– Insert new fixing screws for the bracket for auxiliary units as follows:

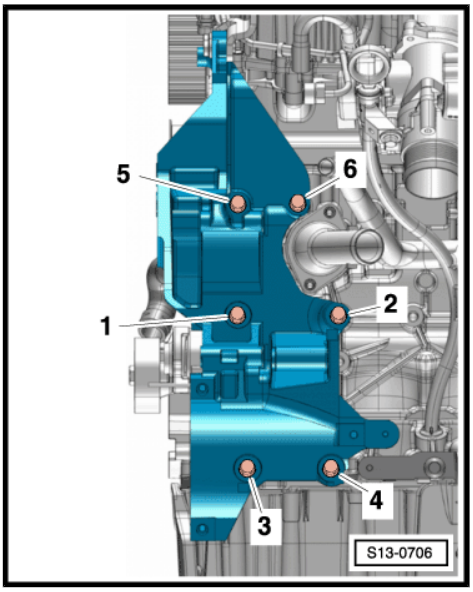
♦ Screws -1- and -2- M10 x 52

♦ Screws -3- and -4- M10 x 30

♦ Screws -5- and -6- M10 x 60

– Gradually tighten the fixing screws for the bracket for auxiliary units in the sequence -1…6-:

1. Screw in all the screws by hand.
2. Tighten all screws to 40 Nm.
3. Turn the screws -3- and -4- a further 45°.
4. Turn the screws -1, 2, 5, 6- a further 90°.



1.2 Removing and installing V-ribbed belt for vehicles without air conditioning system

Note

The assembly device -T10367- and an illustrated work instruction can be found in the repair kit of the V-ribbed belt.

Removing

– Remove noise insulation ⇒ Body Work ⇒ Rep. Gr. 50 .

– Remove the right wheelhouse liner ⇒ Body Work ⇒ Rep. Gr. 66 .

– Cut through V-ribbed belt.

Install

Installation is performed in the reverse order, pay attention to the following points:

– The following work procedure is given in the illustrated work instruction.

– Start engine and check V-ribbed belt run.

1.3 Removing and installing V-ribbed belt for vehicles with air conditioning system and guide pulley

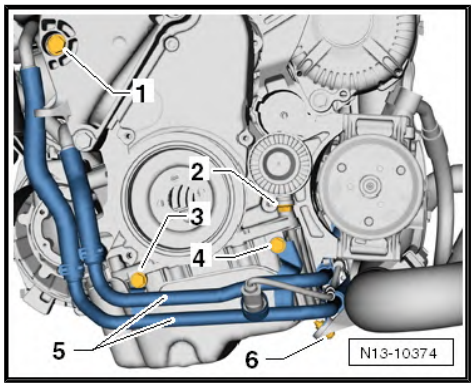
Removing

– Remove noise insulation ⇒ Body Work ⇒ Rep. Gr. 50 .

– Remove the right wheelhouse liner ⇒ Body Work ⇒ Rep. Gr. 66 .

– Release screws -3, 4, 6-.

– Carefully push the coolant line -5- to the side so that there is adequate space for loosening the screw -2- for the guide pulley of the V-ribbed belt.

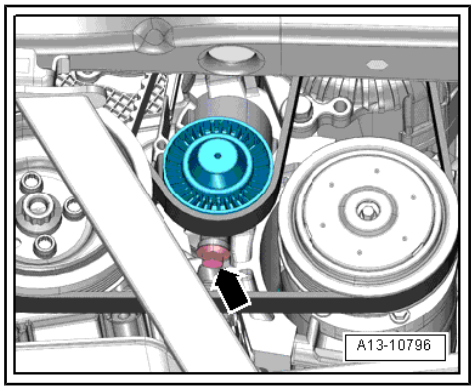


Caution

Risk of damage through reversing the rotation direction of an already used V-ribbed belt.

- ***If it is intended to re-install the V-ribbed belt, mark the direction of rotation with chalk or a felt-tip pen before removing it.***

– Slacken the screw for the guide pulley/V-ribbed belt -arrow- until the V-ribbed belt can be easily removed.



– Remove the V-ribbed belt.

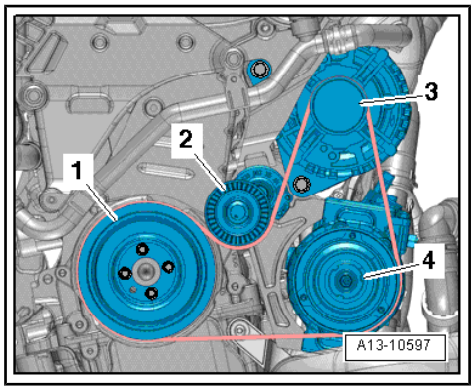
Install

Installation is performed in the reverse order, pay attention to the following points:

Note

Before fitting the V-ribbed belt make sure that all assemblies (generator and AC compressor) are securely mounted.

– First position the V-ribbed belt on the belt pulleys of the crankshaft and AC compressor and last on the belt pulley of the generator.



1 - Belt pulley for crankshaft

2 - Guide pulley

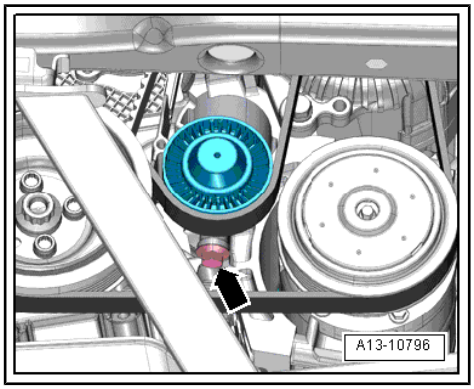
3 - AC generator

4 - AC compressor

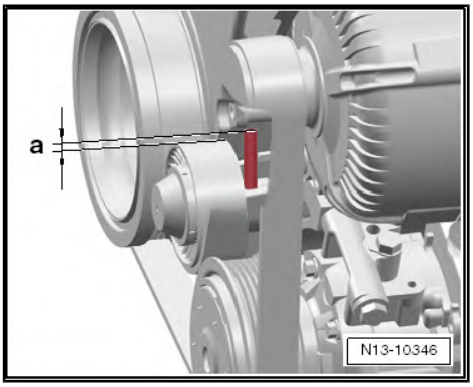
– Coat the guide surfaces for the guide pulley with the grease G 052 751 A1 .

– Guide the guide pulley with the bolt into the guide in the bracket for auxiliary units.

– Screw in the screw for the guide pulley -arrow- until the bolt of the guide pulley is located at the stop (this tensions the V-ribbed belt).
– Subsequently slacken the screw -arrow- again by 1/4 turn, tighten again to 30 Nm + torque a further 90° (1/4 turn).



– Check whether the end of the screw for the guide pulley/V-ribbed belt protrudes beyond the contact surface of the guide pulley. Dimension -a- = approx. + 2.5 mm.
– Check correct positioning of the V-ribbed belt.
– Start engine and check V-ribbed belt run.



1.4 Removing and installing V-ribbed belt for vehicles with air conditioning system and tensioning element

Special tools and workshop equipment required

♦ Locking pin -T10060 A-

Removing

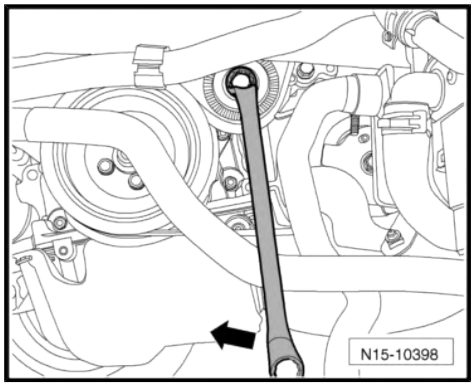
– Remove noise insulation ⇒ Body Work ⇒ Rep. Gr. 50 .
– Remove the right wheelhouse liner ⇒ Body Work ⇒ Rep. Gr. 66 .

Caution

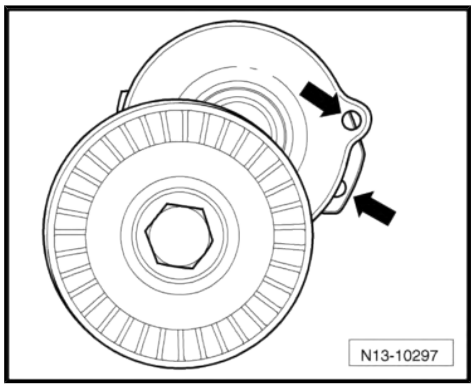
Risk of damage through reversing the rotation direction of an already used V-ribbed belt.

♦ *If it is intended to re-install the V-ribbed belt, mark the direction of rotation with chalk or a felt-tip pen before removing it.*

– Swing the tensioning element in -the direction of the arrow- detension the V-ribbed belt.



– Align the holes -arrows- and lock the tensioning element using the locking pin -T10060 A- .
– Remove the V-ribbed belt.



Install

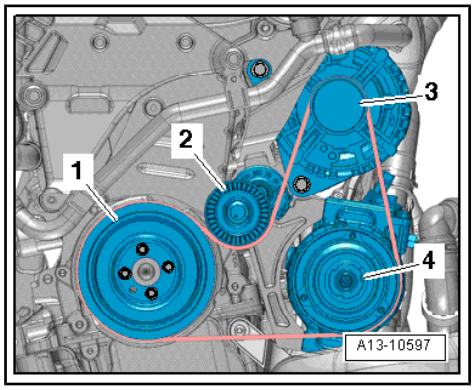
Installation is performed in the reverse order, pay attention to the following points:

Note

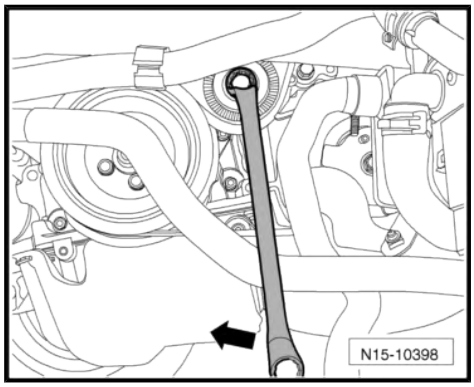
Before fitting the V-ribbed belt make sure that all assemblies (generator and AC compressor) are securely mounted.

– Lay the V-ribbed belt onto the V-ribbed belt pulleys.

1 - Belt pulley for crankshaft
2 - Tensioning element
3 - AC generator
4 - AC compressor



– Hold the tensioning element with the ring spanner and pull out the locking pin -T10060 A- .
– Release the tensioning element.
– Check correct positioning of the V-ribbed belt.
– Start engine and check V-ribbed belt run.

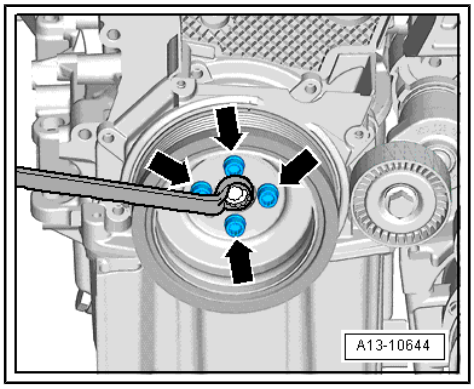


1.5 Removing and installing the belt pulley of the crankshaft

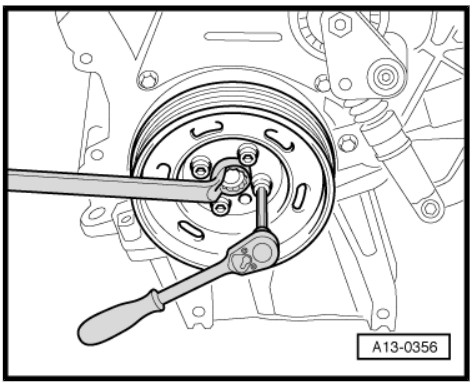
Removing

– Remove V-ribbed belt ⇒ page 24 .

– Loosen the screws -arrows- for the belt pulley of the crankshaft. To do so, counterhold with a ring spanner at the screw for the timing belt sprocket of the crankshaft.



– Release screws and remove the belt pulley of the crankshaft.



Install

Installation is performed in the reverse order, pay attention to the following points:

Note

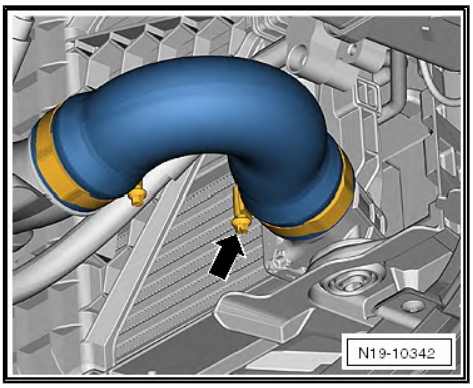
- *Pay attention to the fitting position of the V-ribbed belt on the crankshaft ⇒ page 29 or ⇒ page 25 .*
- *The screws for the belt pulley of the crankshaft must be replaced.*
- *Tightening torques: ⇒ page 37 .*

1.6 Removing and installing tensioning element for V-ribbed belt

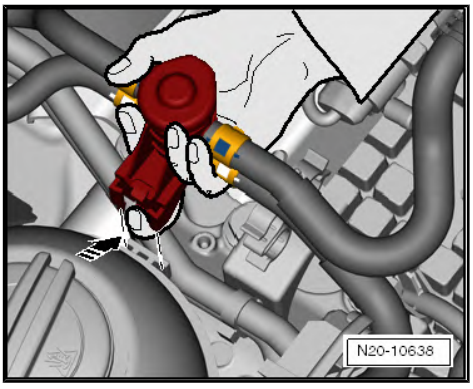
Removing

– Remove V-ribbed belt ⇒ page 31 .

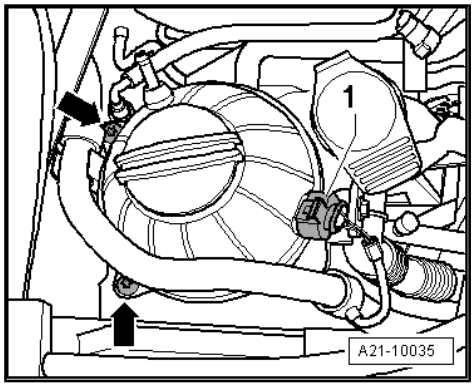
– Remove right charge air hose.



– Unlock the catch peg with a finger and pull the fuel preheating valve upwards out of the guide of the coolant expansion bottle.



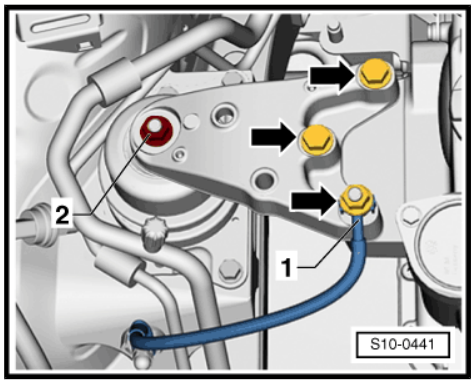
– Unscrew the screws of the coolant expansion bottle -arrows-.
– Disconnect the plug -1- from the expansion bottle and remove the coolant expansion bottle and place it on the engine.



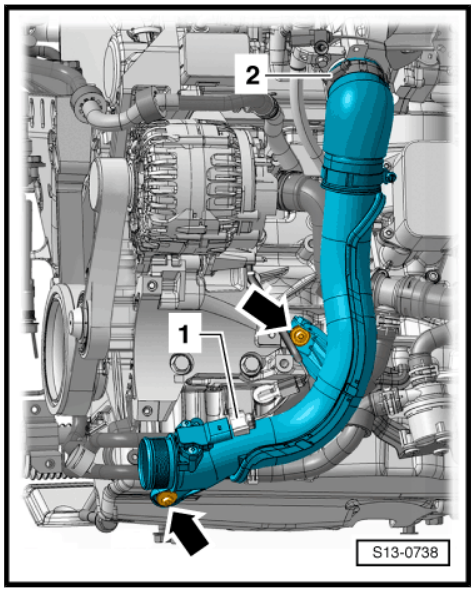
Note

The assembly bearing must only be removed if the engine is supported with the supporting device -MP9-200 (10-222A)- !

– Remove the earth connection -1- from the assembly bearing.
– Remove the screws -arrows- of the assembly bracket ⇒ page 19 .
– Carefully lower the engine sufficiently so that the tensioning element can be taken out.



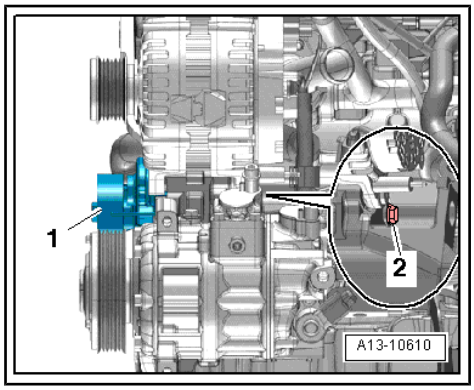
– Release screws -arrows-.
– Loosen hose clamp -2-.
– Disconnect the plug -1- at the charge pressure sender -G31- with intake air temperature sender -G42- and remove the right charge air pipe.



– Release screws -2- and remove tensioning element -1- for V-ribbed belt.

Install

Installation is performed in the reverse order, pay attention to the following points:

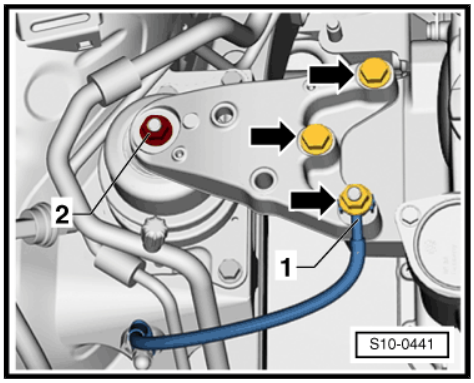


– Install the screws -arrows- of the assembly bracket ⇒ page 19 .

♦ Tightening torques: ⇒ page 28 .

– Replace the screw of the tensioning element for the V-ribbed belt.

– Install the V-ribbed belt ⇒ page 31 .



1.7 Removing and installing bracket for auxiliary units

Removing

– Remove alternator ⇒ Electrical System ⇒ Rep. Gr. 27 .

– Remove the high pressure pump ⇒ page 176 .

On vehicles with air conditioning

WARNING

Risk of injury through refrigerant.

♦ *Do not open the refrigerant circuit of the air conditioning system.*

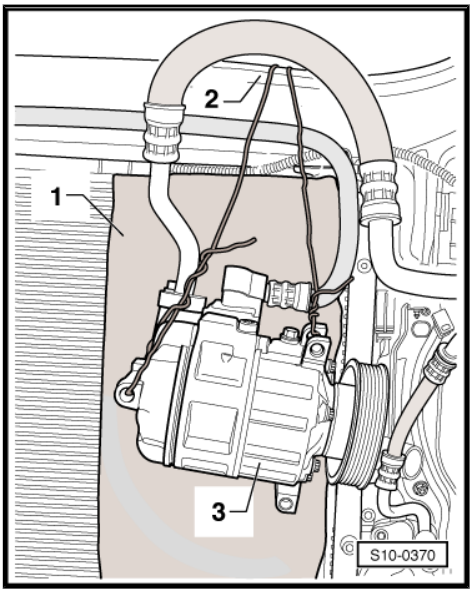
Caution

Risk of damaging the condenser and the refrigerant lines as well as the refrigerant hoses.

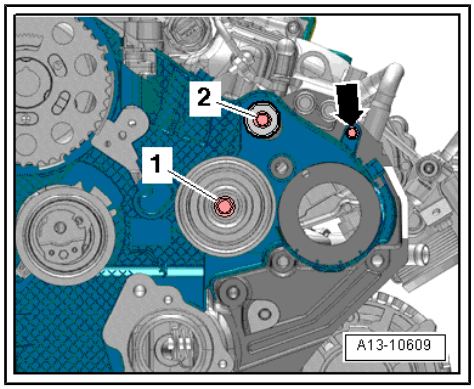
♦ *Do not over-tension, buckle or bend refrigerant lines and refrigerant hoses.*

– Remove the AC compressor from the bracket for auxiliary units ⇒ Heating, Air Conditioning ⇒ Rep. Gr. 87 .

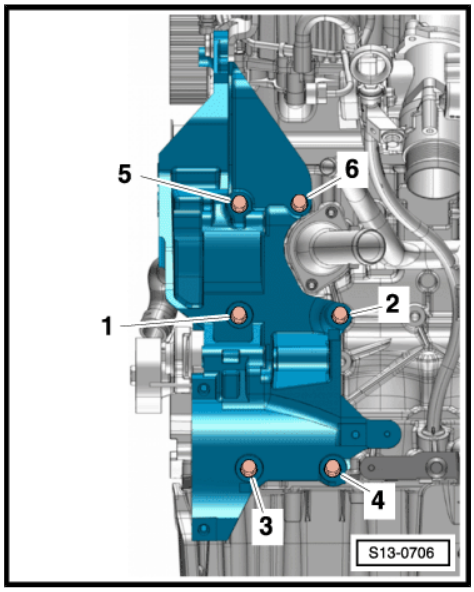
– Attach the AC compressor -3- e.g. behind the lock carrier as shown in the figure. As protection put a sheet of cardbord -1- on the radiator wall.



– Release screw -arrow-.
– Release screws -1- and -2- and remove toothed belt camshaft drives.



– Release screws -1 ... 6- and remove bracket for auxiliary units.



Install

Installation is performed in the reverse order, pay attention to the following points:

Note

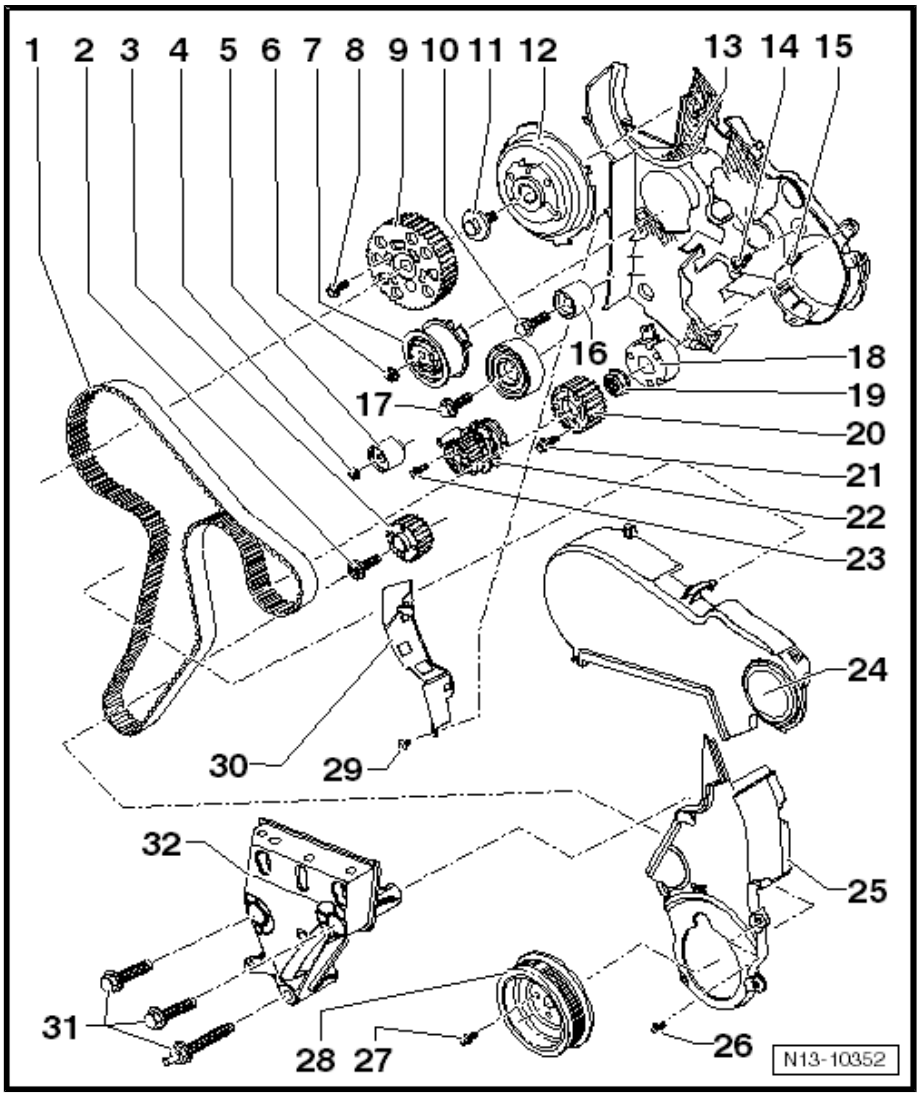
Replace screws which have been tightened to a torquing angle.

– If no dowel sleeves are present on the top right between the bracket for auxiliary units and the cylinder block, insert dowel sleeves.
– Tighten the fixing screws for the bracket for auxiliary units.
♦ On vehicles without air conditioning system ⇒ page 25
♦ On vehicles with air conditioning system ⇒ page 29
– Install high pressure pump ⇒ page 176 .
– Installing the timing belt ⇒ page 44 .
– Install engine support and engine mount ⇒ page 19 and ⇒ page 19 .
– Install alternator ⇒ Electrical System ⇒ Rep. Gr. 27 .

On vehicles with air conditioning

– Attach AC compressor to holder for auxiliary units ⇒ page 24 .

1.8 Timing belt - Summary of components



1 - Toothed belt

- ❑ before removing mark running direction
- ❑ check for wear
- ❑ do not kink
- ❑ removing and installing ⇒ page 39

Note

2 - 120 Nm + torque a further 90° (1/4 turn)

- ❑ replace
- ❑ to release and tighten use counterholder -3415-
- ❑ do not apply additional oil or grease to the thread and collar
- ❑ tightening may occur in successive stages

3 - Toothed belt sprocket of crankshaft

4 - 20 Nm

5 - Guide pulley

6 - 20 Nm + torque a further 45° (1/8 turn)

7 - Tensioning pulley

- ❑ remove engine support for removing and installing ⇒ page 19

8 - 20 Nm + torque a further 45° (1/8 turn)

9 - Toothed belt sprocket of camshaft

10 - 15 Nm

11 - 100 Nm

- ❑ to release and tighten use counterholder -T10051-

12 - Hub

- ❑ for camshaft
- ❑ to release and tighten use counterholder -T10051-
- ❑ to remove use extractor -T10052-
- ❑ removing and installing ⇒ page 92

13 - Rear toothed belt guard

14 - 20 Nm + torque a further 45° (1/8 turn)

- ❑ replace
- ❑ Attachment of high pressure pump

15 - 10 Nm

- ❑ replace

16 - Guide pulley

17 - 50 Nm + torque a further 90° (1/4 turn)

- ❑ replace

18 - Hub

- ❑ for high pressure pump
- ❑ to release and tighten use counterholder -T10051-
- ❑ to remove use extractor -T40064-
- ❑ removing and installing ⇒ page 176

19 - 95 Nm

20 - Timing belt gear of the high pressure pump

21 - 20 Nm + torque a further 90° (1/4 turn)

- ❑ replace

22 - Coolant pump

- ❑ removing and installing ⇒ page 123

23 - 15 Nm

24 - Timing belt guard - top part

25 - Timing belt guard - bottom part

- ❑ removing and installing ⇒ page 39

26 - 9 Nm

- ❑ insert using locking agent -D 000 600 A2-

27 - 10 Nm + torque a further 90° (1/4 turn)

- ❑ replace

28 - Belt pulley for crankshaft

- ❑ with vibration damper
- ❑ Assembly only possible in one position, holes offset
- ❑ removing and installing ⇒ page 32

29 - 5 Nm

30 - Protection plate

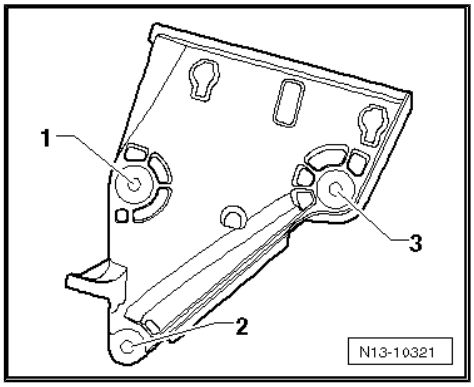
31 - 40 Nm + torque a further 180° (1/2 turn)

- ❑ replace
- ❑ removing and installing ⇒ page 39

32 - Engine support bracket

- ❑ removing and installing ⇒ page 19

Engine strut attachment



Note

Replace screws for engine support.

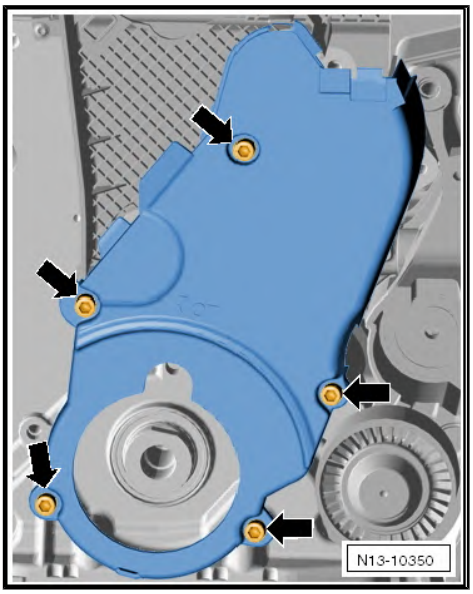
– Tighten the screws in 3 stages in the following sequence:

Stage	Screws	Torque/torquing angle
1.	-1…3-	7 Nm
2.	-1…3-	40 Nm
3.	-1…3-	180° ($^1/_2$ turn)

Attach toothed belt guard - bottom part

– Insert screws with locking agent -D 000 600 A2- .

– Tighten screws -arrows-: 9 Nm



1.9 Removing and installing toothed belt

Special tools and workshop equipment required

- Rig pin -3359- (2x)
- Camshaft lock -T10050-
- Locking pin -T10060 A-
- Counterholder -T10172-
- Offset screwdriver -T10264-
- Rig tool -T10265-
- Pliers for spring strap clamps
- Wrench socket -T10385-

1.9.1 Removing

Caution

When undertaking all installation work, particularly in the engine compartment due to its cramped construction, please observe the following:

- *If the toothed belt is replaced when carrying out engine repair (apart from regular change interval), it should be entered in the Service Schedule!*
- *Lay lines of all kinds (e.g. for fuel, hydraulic fluid, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.*
- *In order to avoid damage to the cables, ensure that there is adequate free access to all moving or hot components.*

Note

- *Safety precautions when working on the fuel supply system* ⇒ page 3 .
- *Observe rules for cleanliness* ⇒ page 6 .

– In order to turn the crankshaft, the shift lever must be in Neutral.

– Switch off ignition and withdraw ignition key.

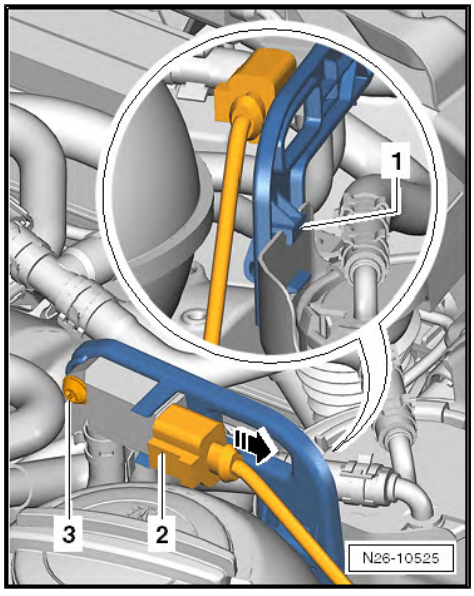
– Remove top engine cover ⇒ page 15 .

– Remove V-ribbed belt ⇒ page 24 .

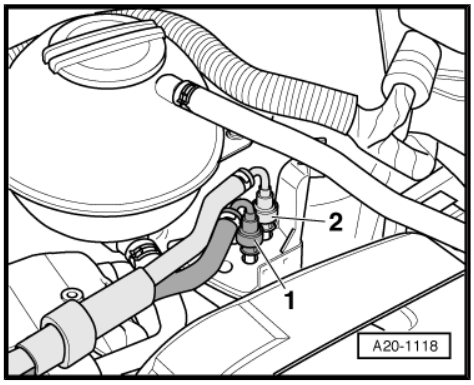
– Disconnect the plug connection -2- at the differential pressure sender -G505- .

– Release screw -3- and remove differential pressure sender -G505- from bracket.

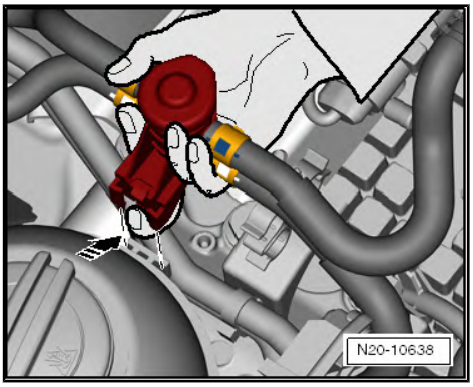
– Place the differential pressure sender -G505- with line to the rear.



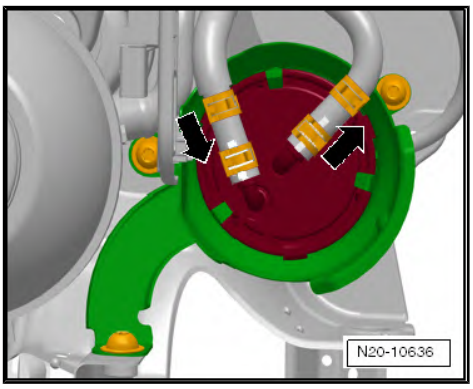
– Separate fuel feed line -2- and fuel return-flow line -1-, to do so press the release buttons.



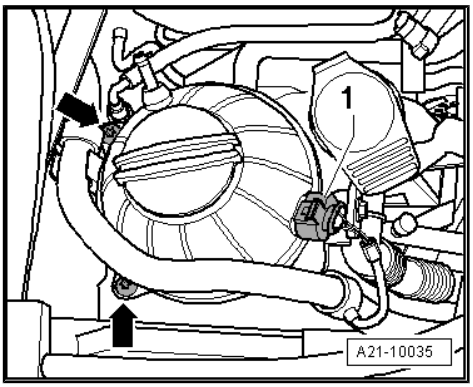
– Unlock the catch peg with a finger and pull the fuel preheating valve upwards out of the guide of the coolant expansion bottle.
– Unclip the fuel line from the plastic holders.



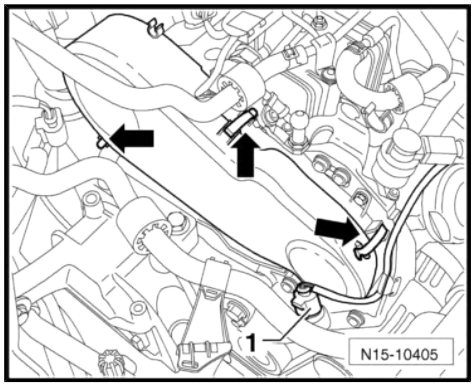
– Push the catch pegs up and remove the fuel filter towards the top.
– Place the fuel filter and the fuel hoses together with the fuel preheating valve on the engine.
– Remove fuel filter bracket.



– Unscrew the screws of the coolant expansion bottle -arrows-.
– Remove the plug -1- from the expansion bottle and push the expansion bottle to the side.



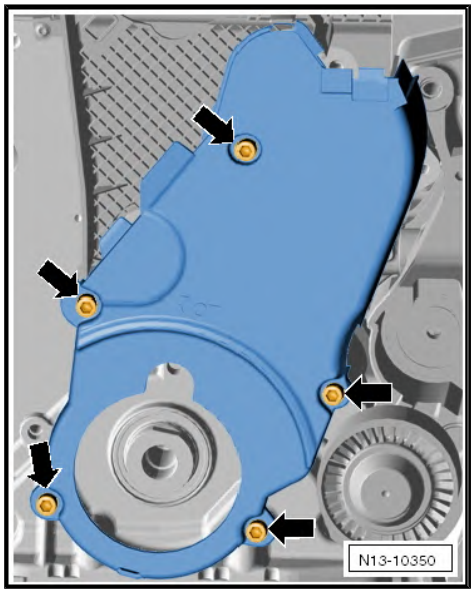
– Remove top part of toothed belt guard; to do so release retaining clips -arrows-.
– Remove the belt pulley of the crankshaft ⇒ page 32 .



Note

Do not lock tensioning element for V-ribbed belt.

– Release screws -arrows-.
– Remove bottom toothed belt guard.
• Remove the engine support before exchanging the tensioning pulley and removing and installing the toothed belt.

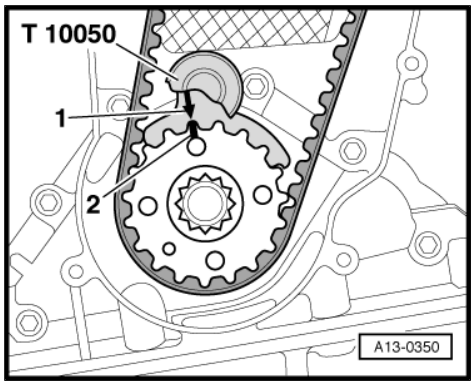


Note

♦ *The assembly bearing must only be removed if the engine is supported with the supporting device -MP9-200 (10-222A)- !*
♦ *Only release the engine support if the assembly bracket is removed.*

– Remove engine support ⇒ page 19 .

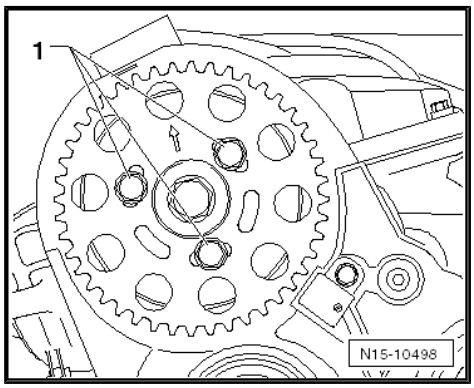
– Rotate the crankshaft in direction of rotation of engine at top dead centre and remove the toothed belt sprocket of the crankshaft with the crankshaft arrester -T10050- . Slide the crankshaft arrester from the front side of the toothed belt sprocket into its teeth.



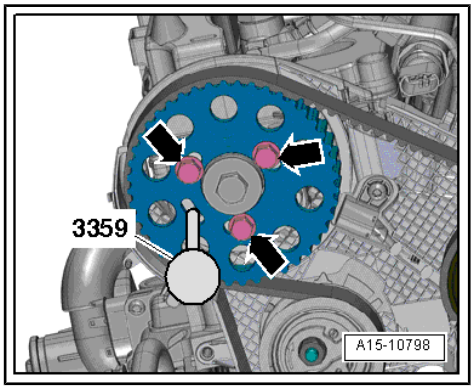
Note

The markings on the toothed belt sprocket of the crankshaft -2- and the crankshaft arrester -T10050- -1- must be aligned. While doing so, the stud of the crankshaft arrester -T10050- must engage in the hole of the sealing flange.

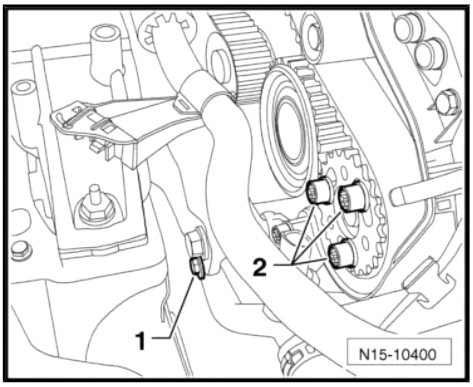
The arrow on the toothed belt sprocket of the camshaft must be close to the “12 o'clock” position.



– Slacken the screws -arrows- of the toothed belt sprocket on the camshaft by approx. 90°.

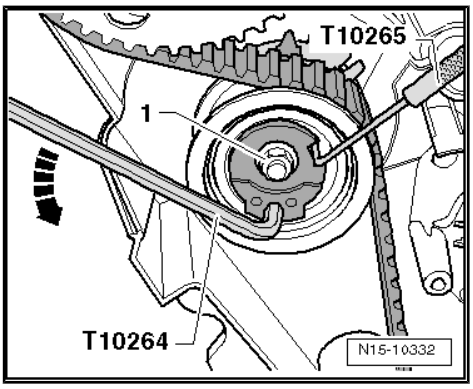


– Slacken the screws -2- for the timing belt gear on the high pressure pump by approx 90° using the socket wrench -T10385- .



– Loosen nut -1- for tensioning pulley.

– Turn the eccentric of the tensioning pulley with the offset screwdriver -T10264- in -direction of arrow- (anti-clockwise), until the tensioning pulley can be interlocked with the rig tool -T10265- .

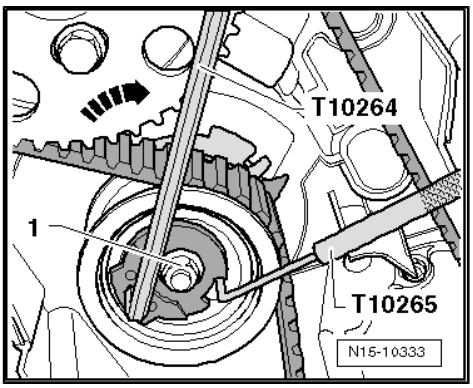


– Then turn the eccentric of the tensioning pulley with the offset screwdriver -T10264- in the -direction of arrow- up to the stop and tighten the nut -1- by hand.

Caution

Risk of damage through reversing the rotation direction of an already used toothed belt.

- ***If it is intended to re-install the toothed belt, mark the direction of rotation with chalk or a felt-tip pen before removing it.***



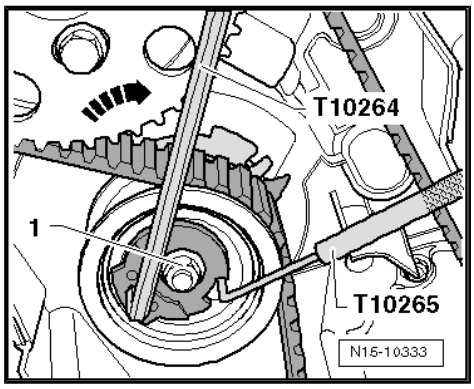
– First of all remove the toothed belt from the large guide pulley and then from the remaining toothed belt gears.

1.9.2 Installing (set the timing)

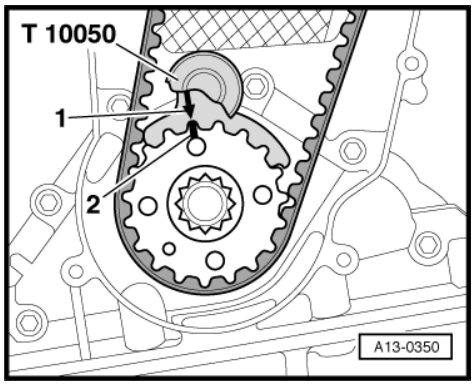
Note

- *Adjusting work on the toothed belt must only be performed on a cold engine, as the position of the pointer of the tensioning element changes depending on the engine temperature.*
- *If it is intended to replace the tensioning pulley, the engine support must be removed* *⇒ page 19* *.*

Conditions



- Tensioning pulley locked with rig tool -T10265- and fixed with nut up to right stop.
- Lock the crankshaft with the crankshaft arrester -T10050- .
- Replace and loosely screw in the screws for timing belt gear - camshaft and timing belt gear - high pressure pump. It must still be possible to just turn the timing belt gears however they must not tilt.

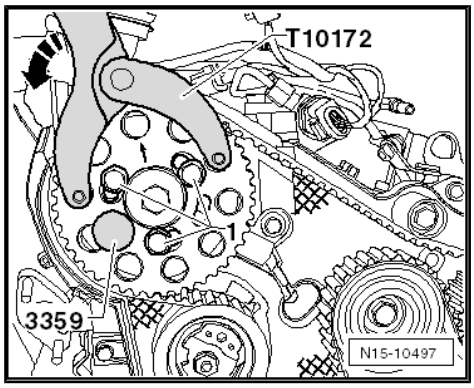


Note

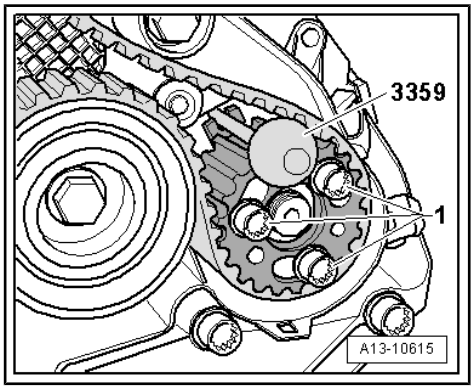
If necessary, turn the hub of the camshaft using the counterholder -T10172- and the adapters -T10172/4 - until it can be arrested. To do so tighten at least one fixing screw -1- by hand.

– Lock the hub of the camshaft with the rig pin for diesel injection pump -3359- . To do so, slide the rig pin through the open elongated hole on the outside of the cylinder head.

– Loosen again the screws which were tightened by hand.

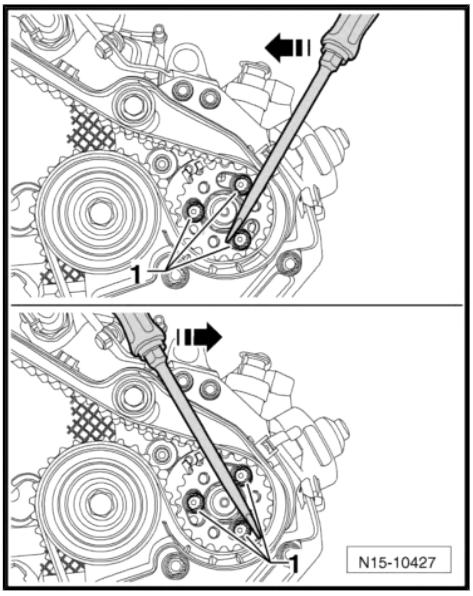


– Lock the hub of the high pressure pump with the rig pin for diesel injection pump -3359- . To do so slide the rig pin into the fit outside the toothed belt sprocket.



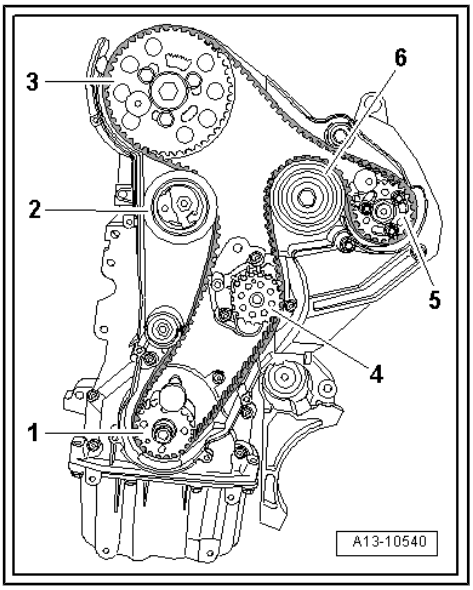
Note

If necessary, use a screwdriver to turn the hub of the high pressure pump at the screw heads -1- until the hub can be locked with the rig pin.

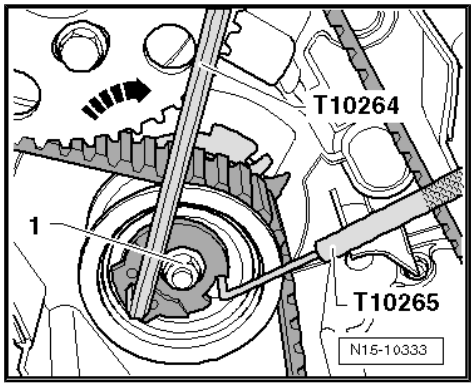


– Turn the toothed belt sprocket of the camshaft -3- and the toothed belt sprocket of the high pressure pump -5- clockwise in their elongated holes as far as the stop.
– Fit the timing belt in the following order.

1 - Toothed belt sprocket of crankshaft
2 - Tensioning pulley
3 - Toothed belt sprocket of camshaft
4 - Toothed belt sprocket of coolant pump
5 - Timing belt gear of the high pressure pump
6 - Guide pulley

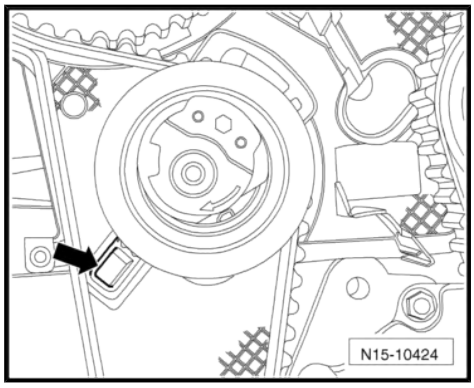


– Loosen nut -1- for tensioning pulley and remove rig tool - T10265- .



Note

Pay attention to correct fitting of the tensioning pulley in the rear toothed belt guard -arrow-.

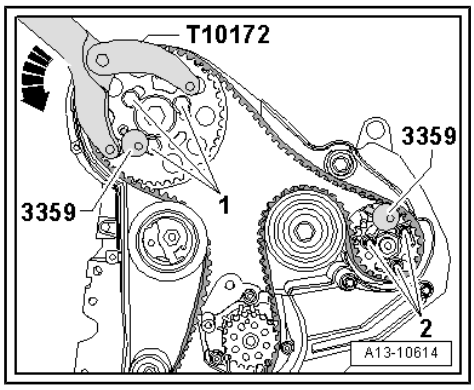


– Position the counterholder -T10172- with the adapters - T10172/4 - onto the toothed belt sprocket of the camshaft.

– Push the counterholder in -direction of arrow- and keep it pre-tensioned.

– In this position, first of all tighten the screws -1- for the toothed belt sprocket of the camshaft and the screws -2- for the toothed belt sprocket of the high pressure pump to 20 Nm.

The screws must be further turned according to the setting of the timing ⇒ page 48 .



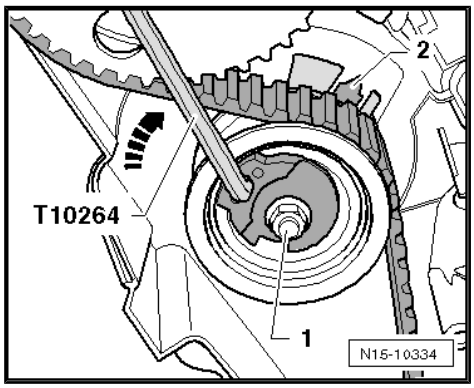
– Turn the eccentric of the tensioning pulley with the offset screwdriver -T10264- clockwise -arrow- until the pointer -2- stands in the centre of the base plate in the gap.

• The nut -1- must not turn along.

– Hold tensioning pulley in this position and tighten nut.

Tightening torque: 20 Nm + torque a further 45° ($^1/_8$ turn)

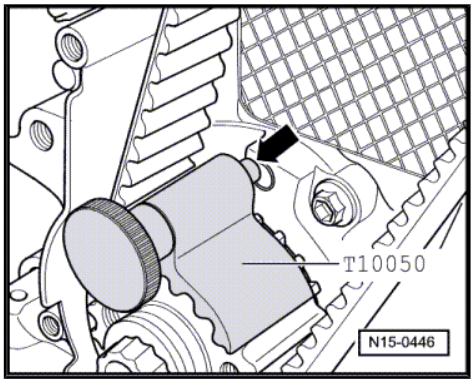
– Remove locking pins -3359- and crankshaft arrester - T10050- .



Test timing:

– Turn the crankshaft at the screw for timing belt gear 2 turns in the direction of rotation of the engine until the crankshaft is positioned shortly before top dead centre for cylinder 1.

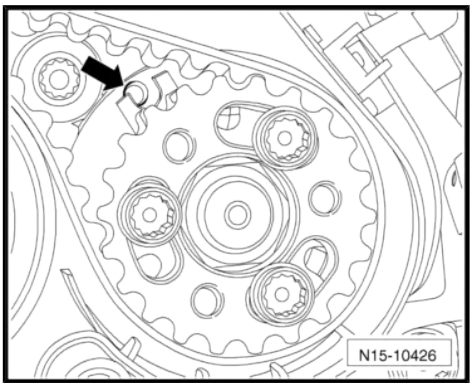
– Position again the crankshaft arrester -T10050- on the toothed belt sprocket of the crankshaft.
– Turn the crankshaft in the direction of running of the engine until the stud -arrow- of the crankshaft arrester engages during this rotary movement in the sealing flange.



Note

The removal of the crankshaft and camshaft is limited in the following test. The removal point of the hub of the high pressure pump is always difficult to find again. A slight difference -arrow- does not influence the engine running.

Conditions:



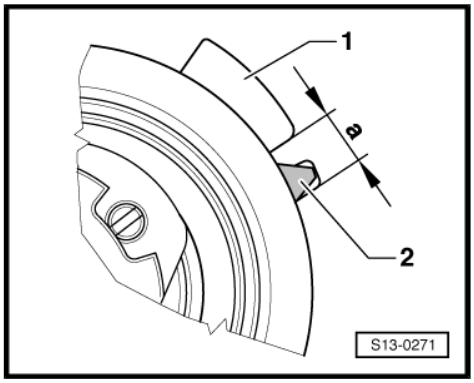
- The hub of the camshaft must be locked with the rig pin for diesel injection pump -3359- .
- The pointer of the tensioning pulley -2- must be in the area -a- of the base plate -1-.

If the conditions are not fulfilled:

– Correct timing ⇒ page 47 .

If the conditions are fulfilled:

– Continued if the timing is correctly set ⇒ page 48 .



Correct timing:

– If the hub of the camshaft cannot be locked, pull back the crankshaft arrester -T10050- until the hole of the stud is uncovered.
– Turn the crankshaft against the direction of rotation of the engine slightly past the top dead centre.
– Now turn the crankshaft slowly in the running direction of the engine until the hub of the camshaft can be locked.
– After locking, loosen the screws for the toothed belt sprocket of the camshaft.

If the stud of the crankshaft arrester -T10050- is positioned to the left of the hole:

– Turn the crankshaft in the direction of running of the engine until the stud of the crankshaft arrester engages during this rotary movement in the sealing flange.

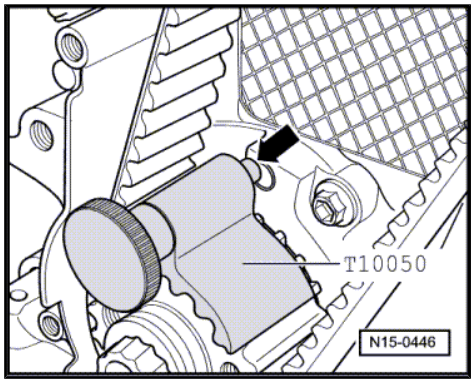
– Tighten the screws for the toothed belt sprocket of the camshaft to 20 Nm.

If the stud of the crankshaft arrester -T10050- is positioned to the left of the hole:

– First of all turn the crankshaft slightly against the running direction of the engine.

– Turn the crankshaft again in the direction of running of the engine until the stud of the crankshaft arrester engages during this rotary movement in the sealing flange.

– Tighten the screws for the toothed belt sprocket of the camshaft to 20 Nm.



Continued if the timing is correctly set:

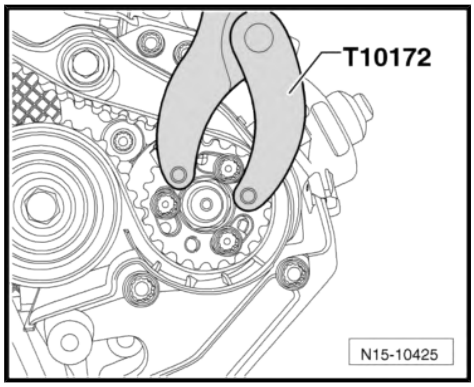
– Remove rig pin -3359- and crankshaft arrester -T10050- .

– Once again test timing ⇒ page 46 .

– If the hub of the camshaft can now be removed, tighten the fixing screws as follows:

♦ Timing belt gear - camshaft: Torque screws a further 45° ($^1/_8$ turn). Counterhold with counterholder -T10172- and adapters -T10172/4- .

♦ Toothed belt sprocket of high pressure pump: Torque screws a further 90° ($^1/_4$ turn). Counterhold with counterholder -T10172- and adapters -T10172/8- .



Further installation:

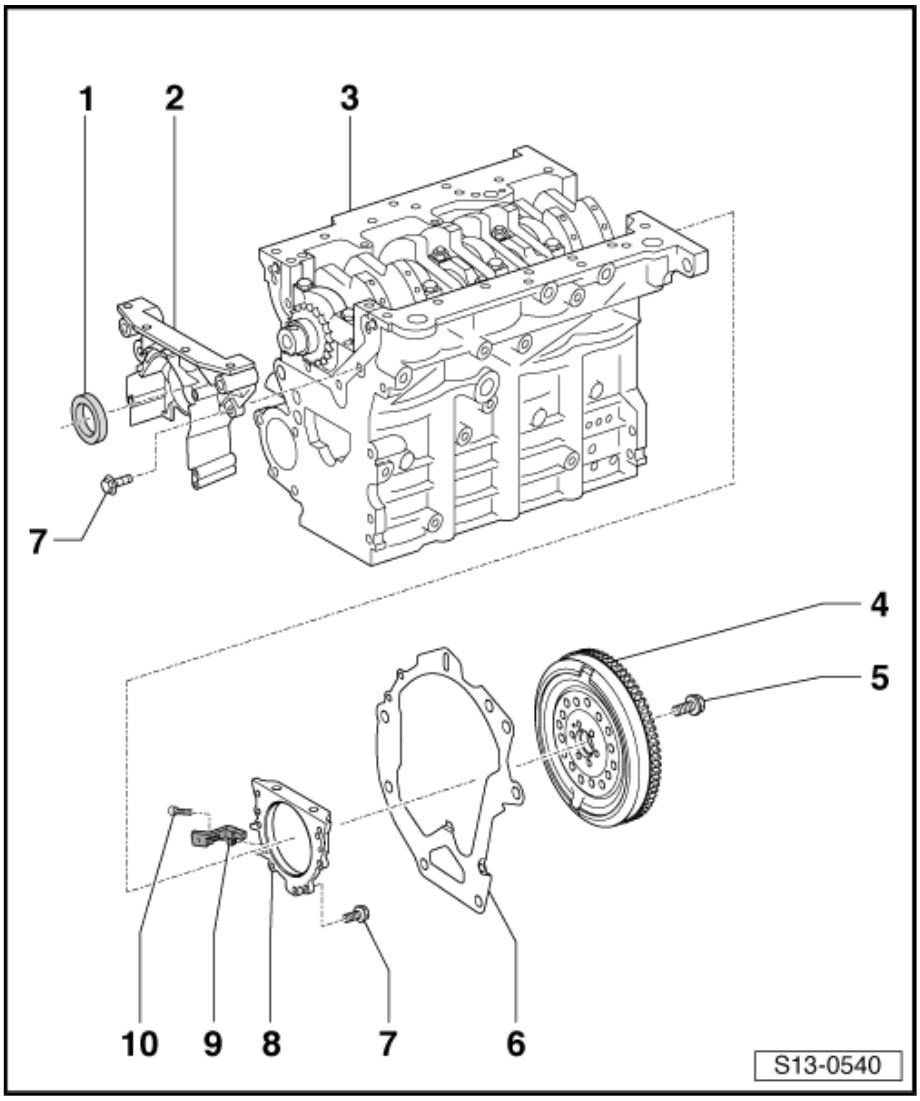
Further installation occurs in reverse order to removal.

♦ Tightening torques: ⇒ page 37

2 Removing and installing sealing flange and flywheel

Note

Repairs to the clutch ⇒ gearbox ⇒ Rep. Gr. 30 .



1 - Sealing ring

- ❑ replace ⇒ page 50
- ❑ do not oil or grease

2 - Sealing flange on the belt pulley side

- ❑ must be positioned on dowel sleeves
- ❑ removing and installing ⇒ page 52

3 - Cylinder block

- ❑ removing and installing crankshaft ⇒ page 62
- ❑ Disassembling and assembling pistons and conrods ⇒ page 63

4 - The two-mass flywheel

- ❑ removing and installing ⇒ page 59
- ❑ Assembly is only possible in one position through offset holes.

5 - 60 Nm + torque a further 90° (1/4 turn)

- ❑ replace

6 - Intermediate plate

- ❑ must be positioned on dowel sleeves
- ❑ do not damage/bend during assembly work
- ❑ hang on the sealing flange ⇒ page 50

7 - 15 Nm

8 - Sealing flange on the gearbox side

- ❑ Always replace complete with sealing ring and if possible with rotor of engine speed sender -G28-
- ❑ replace ⇒ page 54

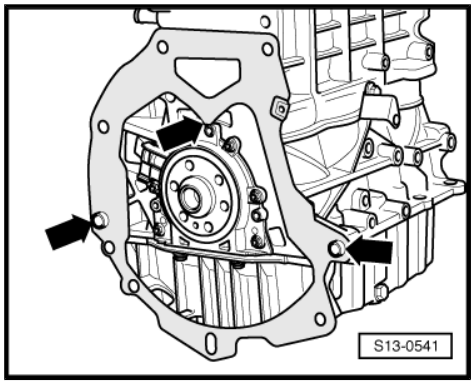
9 - Engine speed sender -G28-

- ❑ removing and installing ⇒ page 163

10 - 5 Nm

Installing intermediate plate

– Insert intermediate plate on sealing flange and push onto the dowel sleeves -arrows-.



2.1 Replacing gasket ring for crankshaft - on the belt pulley side

Special tools and workshop equipment required

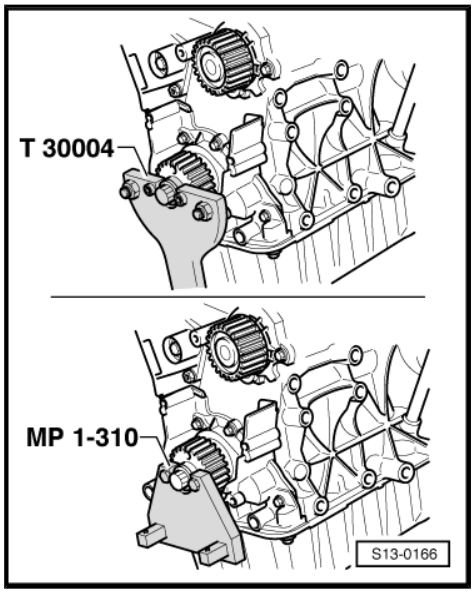
- Counterholder -T30004 (3415)- or counterholder for toothed belt sprocket -MP 1-310 (3099)-
- Gasket ring extractor -MP 1-226 (3203)-
- Assembly device -T10053-
- Torque wrench

Removing

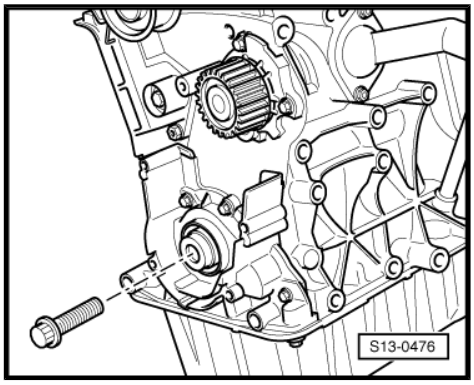
- Engine installed.

– Removing toothed belt ⇒ page 39 .

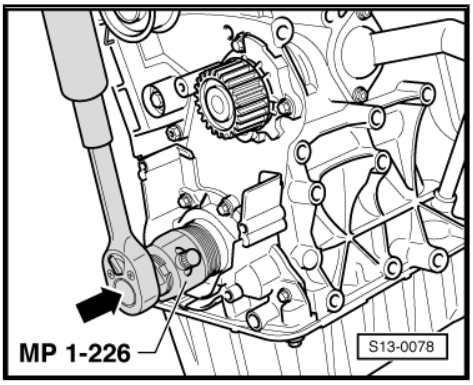
– Remove toothed belt sprocket - crankshaft, to this end lock toothed belt sprocket with counterholder -T30004- or counterholder for toothed belt sprocket -MP 1-310- .



– To guide the gasket ring extractor screw in central screw for toothed belt sprocket - crankshaft in the crankshaft up to the stop.



– Turn inner part of gasket ring extractor -MP 1-226- 2 turns (approx. 3 mm) out of the outer part and lock with knurled screw.
– Oil the thread head of the gasket ring extractor, position and forcely screw into the gasket ring as far as possible.
– Release knurled screw and turn the inner side against the crankshaft until the gasket ring is pulled out.
– Clamp gasket ring extractor into the vice and remove gasket ring with pliers.
– Clean the contact and sealing surfaces.

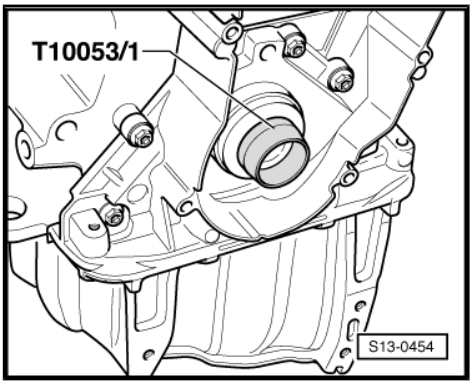


Install

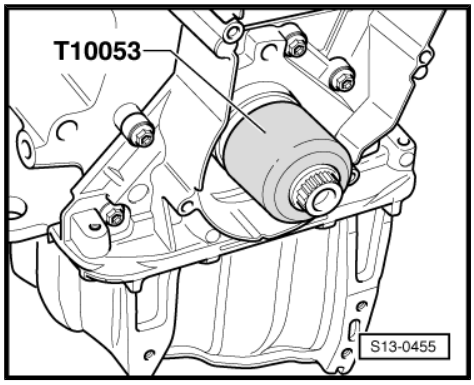
Note

Do not oil the sealing lip and the outer surface of the gasket ring before the pressing in procedure.

– Remove oil residue on the crankshaft stub with a clean cloth.
– Insert guide bushing -T10053/1- on the crankshaft stub.
– Slide gasket ring over the guide bushing.



– Press in the gasket ring flush with the central screw for the toothed belt sprocket of crankshaft and with the pressure bushing of the assembly device -T10053- .



Note

- *There must not be any oil present on contact surface between toothed belt sprocket and crankshaft.*
- *Replace central screw for toothed belt sprocket of crankshaft.*
- *Do not oil central screw for toothed belt sprocket of crankshaft.*

– Install the toothed belt sprocket of the crankshaft, to do so lock the toothed belt sprocket with the counterholder .

– Installing the timing belt ⇒ page 44 .

2.2 Removing and installing the sealing flange on the belt pulley side

Special tools and workshop equipment required

- Counterholder -T30004 (3415)- or counterholder for toothed belt sprocket -MP 1-310 (3099)-
- Assembly device -T10053-
- Torque wrench
- Protective goggles and gloves
- Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- Cleaning agent and grease remover e.g. -D 000 401 04-
- Silicone sealant -D 176 404 A2-

Removing

- Engine installed.

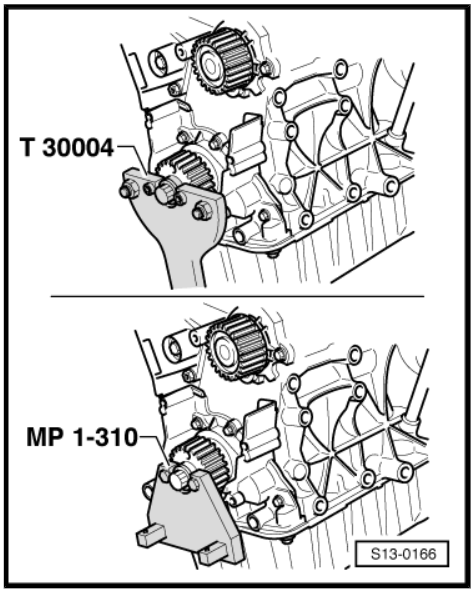
– Removing toothed belt ⇒ page 39 .

– Remove toothed belt sprocket - crankshaft, to this end lock toothed belt sprocket with counterholder -T30004- or counterholder for toothed belt sprocket -MP 1-310- .

– Removing the oil pan ⇒ page 110 .

– Unscrew the fixing screws of the front sealing flange and remove sealing flange, if necessary release by applying slight blows with a rubber-headed hammer.

– Drive out the gasket ring from the removed sealing flange.



Install

Installation is performed in the reverse order, pay attention to the following points:

WARNING

Wear protective gloves when working with sealant and grease remover!

– Remove residual sealant from the sealing surfaces on sealing flange, cylinder block and on the oil pan with chemical sealant remover.

– Degrease the sealing surfaces.

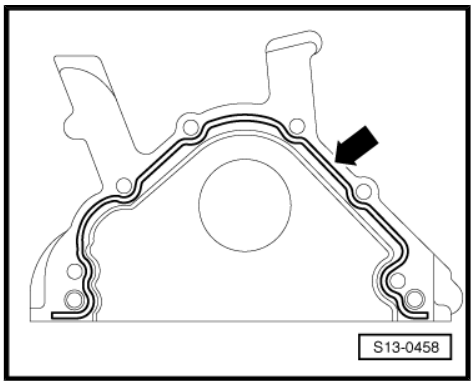
Note

Pay attention to the use by date on the silicone sealant.

– Cut off nozzle tube at the front marking (∅ of nozzle approx. 3 mm).

– Apply silicone sealant bead -arrow- to the clean sealing surface of the upper part of the sealing flange, as shown.

• Thickness of sealant bead -arrow-: 2...3 mm.



Note

- *The sealant bead must not be thicker than 3 mm. Otherwise, excess sealant may get into the oil pan and clogg the strainer in the oil suction pipe.*
- *The sealing flange must be installed within 5 minutes after applying the silicone sealant.*
- *When installing the sealing flange with the gasket ring fitted place a guide sleeve -T10053/1- on the crankshaft journal.*

– Carefully push the sealing flange onto the dowel sleeves at the cylinder block and tighten new fixing bolts by hand.

– Tighten the screws of the sealing flange alternately and crosswise to 15 Nm.

– Installing the oil pan ⇒ page 110 .

– Install the new gasket ring for the crankshaft on the belt pulley side ⇒ page 50 .

– Installing the timing belt ⇒ page 44 .

– Top up with engine oil and check the oil level ⇒ Maintenance ; Fabia II .

2.3 Replace sealing flange on the gearbox side

Special tools and workshop equipment required

- Assembly tool -T10134-
- Torque wrench
- Feeler gauges
- Steel straightedge
- Screw M6 x 35 (3x)
- Screw M7 x 35 (2x)

2.3.1 Removing

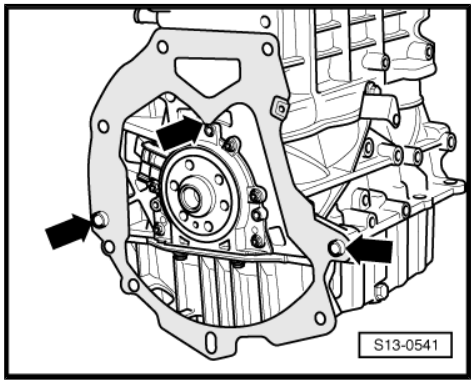
- Gearbox is removed.

– Remove the two-mass flywheel ⇒ page 59 .

– Remove the intermediate plate from the dowel sleeves and unhook from sealing flange -arrows-.

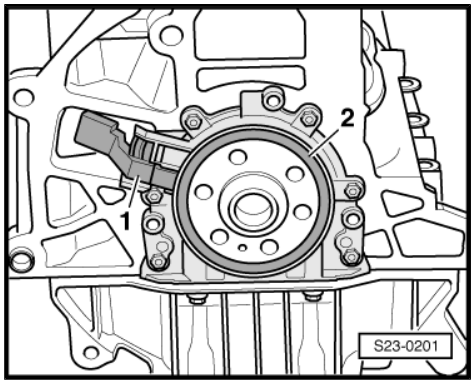
– Position crankshaft at top dead centre of cylinder 1 ⇒ page 39 .

– Removing the oil pan ⇒ page 110 .



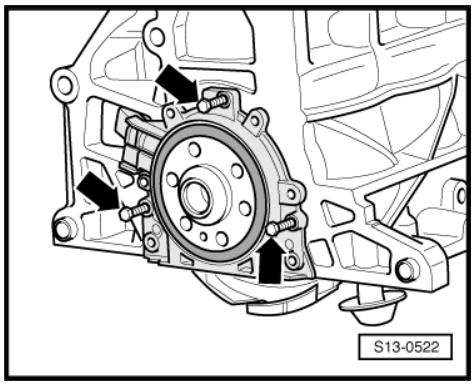
– Remove engine speed sender -G28- -Pos. 1-.

– Unscrew the fixing screws of the sealing flange.



– Screw 3 screws M6 x 35 mm into the threaded bores of the sealing flange -arrows-.

– Press sealing flange together with rotor from the crankshaft To do so, turn the screws alternatively into the sealing flange.



2.3.2 Install

Note

- *The sealing flange with PTFE gasket ring is provided with sealing lip supporting ring. This supporting ring is intended as an assembly sleeve. It must not be removed before installing.*
- *Do not separate or turn the sealing flange and rotor after removing them from the spare part package.*
- *The rotor is given its fitting location by fixing the assembly device -T10134- to the positioning pin.*
- *The sealing flange and sealing ring form one unit. It must only be replaced together with the rotor.*
- *The rotor has an elastomer layer on its sealing surface with the crankshaft. This layer must not be brought into contact with dirt or grease.*
- *The assembly device -T10134- is given its fitting location to the crankshaft by means of a guide bolt, which is guided into the threaded bore of the crankshaft.*

A - Mounting sealing flange with rotor on the assembly device -T10134-

A - Hexagon nut

B - Clamping surface

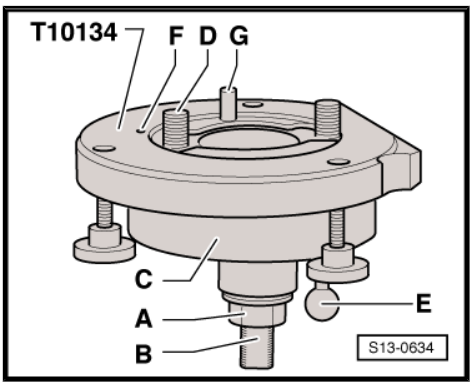
C - Assembly cup

D - Allan screw

E - Guide bolts (with red handle - for fuel engine)

F - Positioning pin

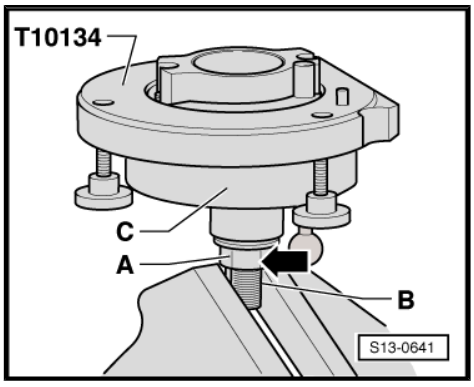
G - Guide bolts (with black handle - for diesel engine)



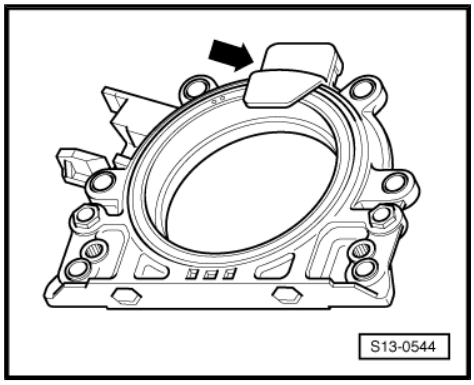
– Grip assembly device assembly device -T10134- on clamping surface -B- of the threaded spindle in a vice.

– Push assembly cup -C- down until it rests on the hexagon nut -A-, -arrow-.

• The inner part of the assembly device and assembly cup must be at the same level.



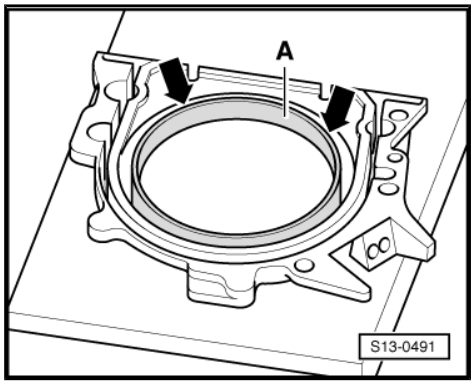
– Remove the securing clip -arrow- from the new sealing flange.



Note

Do not remove or turn the rotor from the sealing flange.

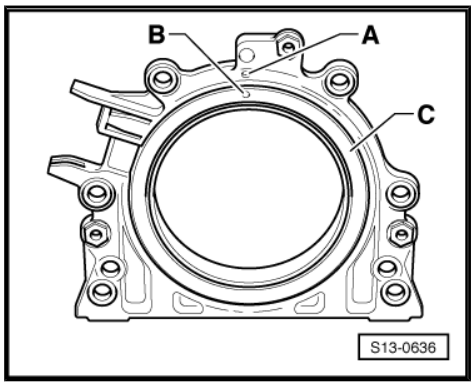
– Lay the front side of the sealing flange on a clean and level surface.
– Press down sealing lips supporting ring -A- in -direction of the arrow-, until it rests on the level surface.



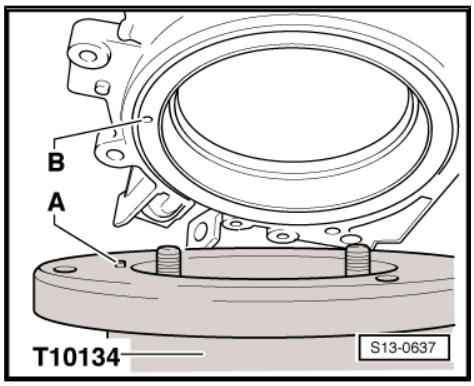
Note

The top edge of the rotor and the front edge of the sealing flange must be flush.

The locating hole -B- on the rotor -C- must be flush with the marking -A- on the sealing flange.



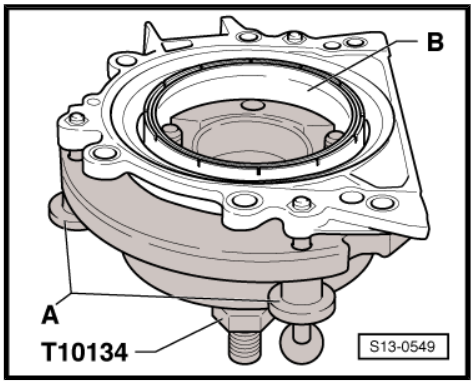
– Lay the sealing flange with the front side on the assembly device -T10134- in such a way that the positioning pin -A- engages into the hole -B- of the rotor.



Note

Make sure the sealing flange lies flat on the assembly device.

– When tightening the knurled screws -A- press the sealing lip supporting ring -B- on the surface of the assembly device -T10134- in such a way that the positioning pin can no longer slide out of the rotor hole.

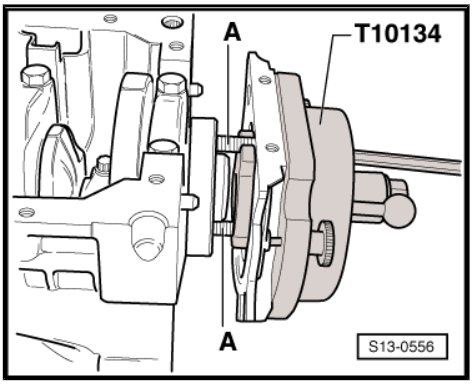


B - Mounting the assembly device -T10134- with sealing flange on the crankshaft flange

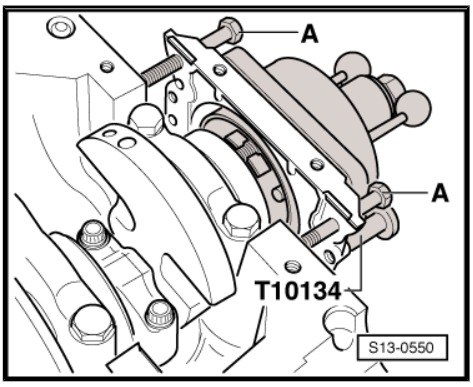
- The crankshaft flange must be free of grease and oil
- The crankshaft is at top dead centre of cylinder 1

– Unscrew hexagon nut up to the end of the threaded spindle.

– Screw assembly device -T10134- with Allan screws -A- up to the stop onto the crankshaft flange.

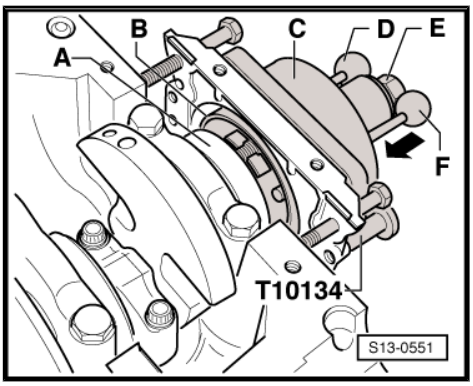


– Screw in 2 screws M7 x 35 mm -A- by about 3 thread turns for the sealing flange guide into the cylinder block.



– Move the assembly cup -C- by hand in the -direction of the arrow- until the rotor -B- rests on the crankshaft flange -A-. Subsequently insert the guide bolt with black handle -D- fully into the threaded bore of the crankshaft. If the guide bolt is correctly positioned, then the handle has a distance of approx. 10 mm from the assembly cup -C-. This gives the rotor its final fitting location.

– Screw in hexagon nut -E- by hand onto the threaded spindle until it rests against the assembly cup -C-.

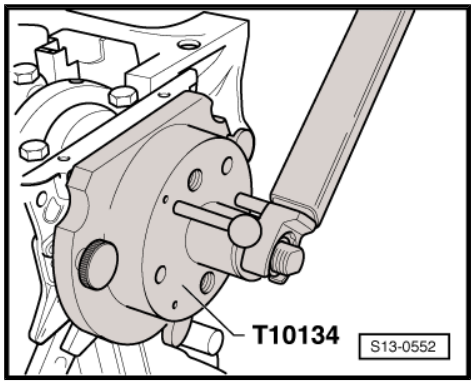


Note

The guide bolt for petrol engines (red handle) -F- must not be fitted into the threaded hole of the crankshaft.

C - Pressing the rotor onto the crankshaft flange

– Tighten the hexagon nut of the assembly device -T10134- using a torque wrench with adapter. Tightening torque: 35 Nm.

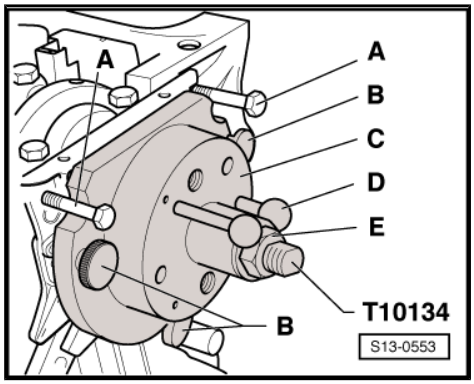


Note

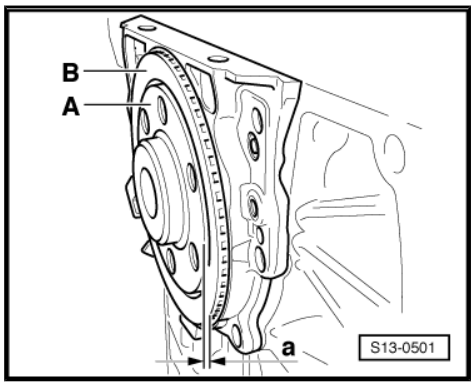
After tightening the nut to 35 mm there must still be a narrow air gap between the cylinder block and the sealing flange.

D - Inspecting the fitting position of the rotor on the crankshaft

– Unscrew hexagon nut -E- up to the end of the threaded spindle.
– Release 2 screws -A- to the guide from the cylinder block.
– Release 3 knurled screws -B- from the sealing flange.
– Unscrew 2 Allan screws and remove assembly device.
– Remove sealing lips supporting ring.



The fitting position of the rotor on the crankshaft is accurate if there is a distance -a- of 0.5 mm between the crankshaft flange -A- and the rotor -B-.



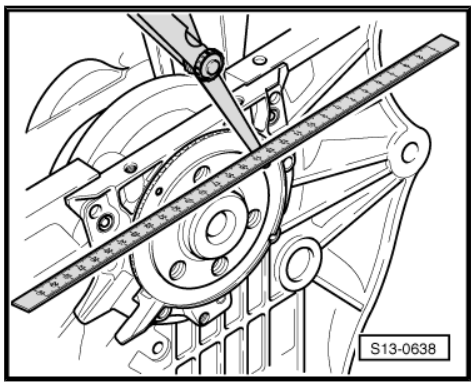
– Position the steel striaghtedge onto the crankshaft flange.
– Measure the distance between the steel straightedge and the rotor with a feeler gauge.

If the measured distance is less than 0.5 mm:

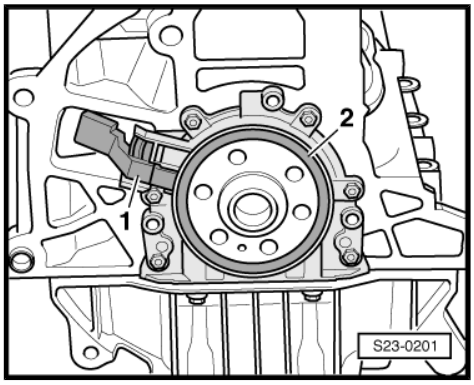
– Press down rotor ⇒ page 59 .

If the dimension is correct:

– Tighten the new fixing screws of the sealing flange crosswise. Tightening torque: 15 Nm.

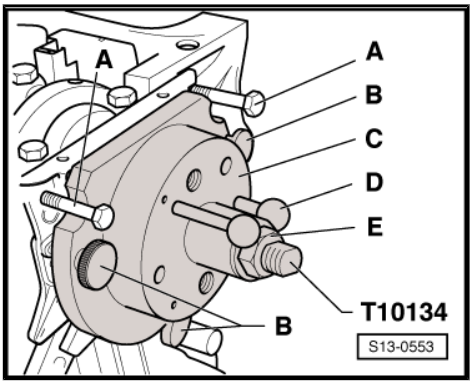


– Install engine speed sender -G28- -Pos. 1-. Tightening torque: 5 Nm.
– Installing the oil pan ⇒ page 110 .
– Installing intermediate plate.
– Install flywheel with new screws. Tighten fixing bolts to 60 Nm and torque a further $^{1}/_{4}$ turn (90°).



E - Pressing down the rotor

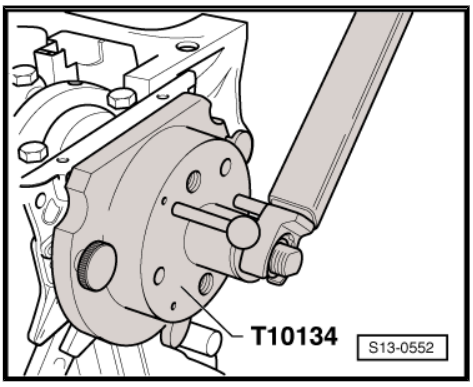
– Screw assembly device -T10134- with Allan screws up to the stop onto the crankshaft flange.
– Screw in 3 knurled screws -B- into the flange.
– Subsequently insert the guide bolt with black handle -D- fully into the threaded bore of the crankshaft. If the guide bolt is correctly positioned, then the handle has a distance of approx. 10 mm from the assembly cup -C-.
– Screw in hexagon nut -E- by hand onto the threaded spindle until it rests against the assembly cup.



– Tighten the hexagon nut of the assembly device using a torque wrench with adapter. Tightening torque: 40 Nm.
– Again inspect the fitting position of the rotor on the crankshaft ⇒ page 58 .

If the dimension -a- is again too small:

– Tighten the hexagon nut of the assembly device to 45 Nm.
– Again inspect the fitting position of the rotor on the crankshaft ⇒ page 58 .



2.4 Removing and installing the two-mass flywheel

Special tools and workshop equipment required

♦ Counterholder -MP1-223 (3067)-

or

♦ Engine mount -MP 1-202 (VW 540)-
♦ Bushing -T30010 (VW 540/1B)-
♦ Flywheel lock -MP 1-504-

Removing

• Gearbox is removed.

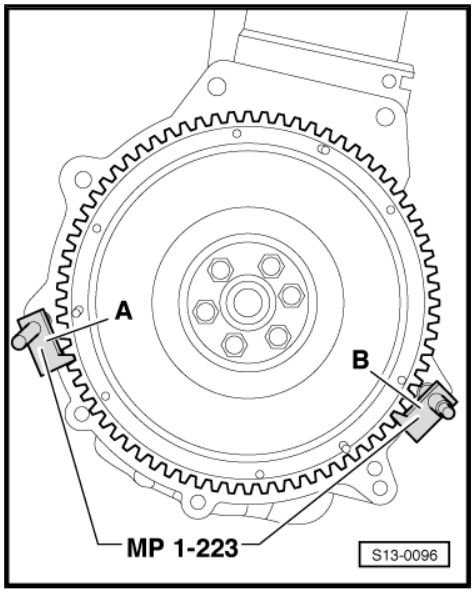
Engine installed

– Insert the counterholder -MP1-223 (3067)- into the bore hole on the cylinder block.

• Fitting position of the counterholder:

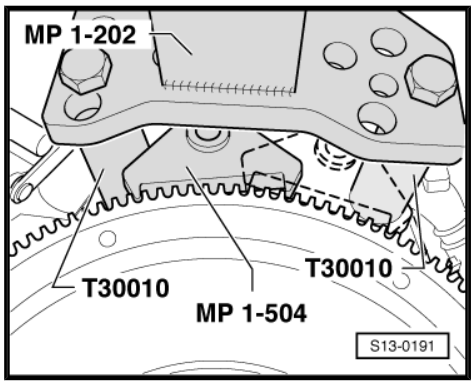
A - for tightening

B - for slackening



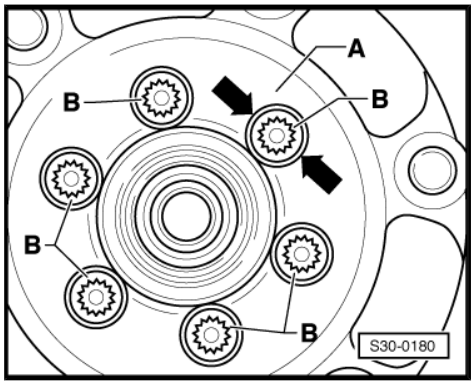
Engine removed

– Position the flywheel lock -MP 1-504- on the starter ring gear and turn crankshaft until it rests against the sleeve -T30010- .



Continued for all engines

– Rotate the secondary side -A- of the two-mass flywheel in such a way that the screws -B- are positioned in the middle of the holes -arrows-.



Caution

Risk of damage to the two-mass flywheel.

- *Do not release the screws -B- using a compressed air or an impact screwdriver, instead release them by hand.*
- *Pay attention when releasing the screws -B- that the screw head does not touch the two-mass flywheel.*

– Release screws -B- and remove two-mass flywheel.

Install

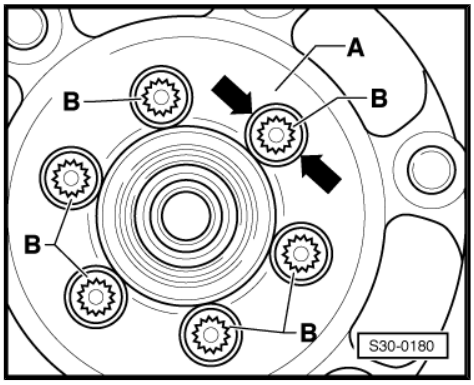
Installation occurs in reverse order to removal. Pay attention to the following:

Note

Use new screws for attaching.

– Rotate the secondary side -A- of the two-mass flywheel in such a way that the screws -B- are positioned in the middle of the holes -arrows-.

1. Screw in all the screws -B- by hand.
2. First of all tighten all the screws -B- crosswise to 60 Nm.
3. Then torque all the screws -B- crosswise a further 90° ($^1/_4$ turn.)

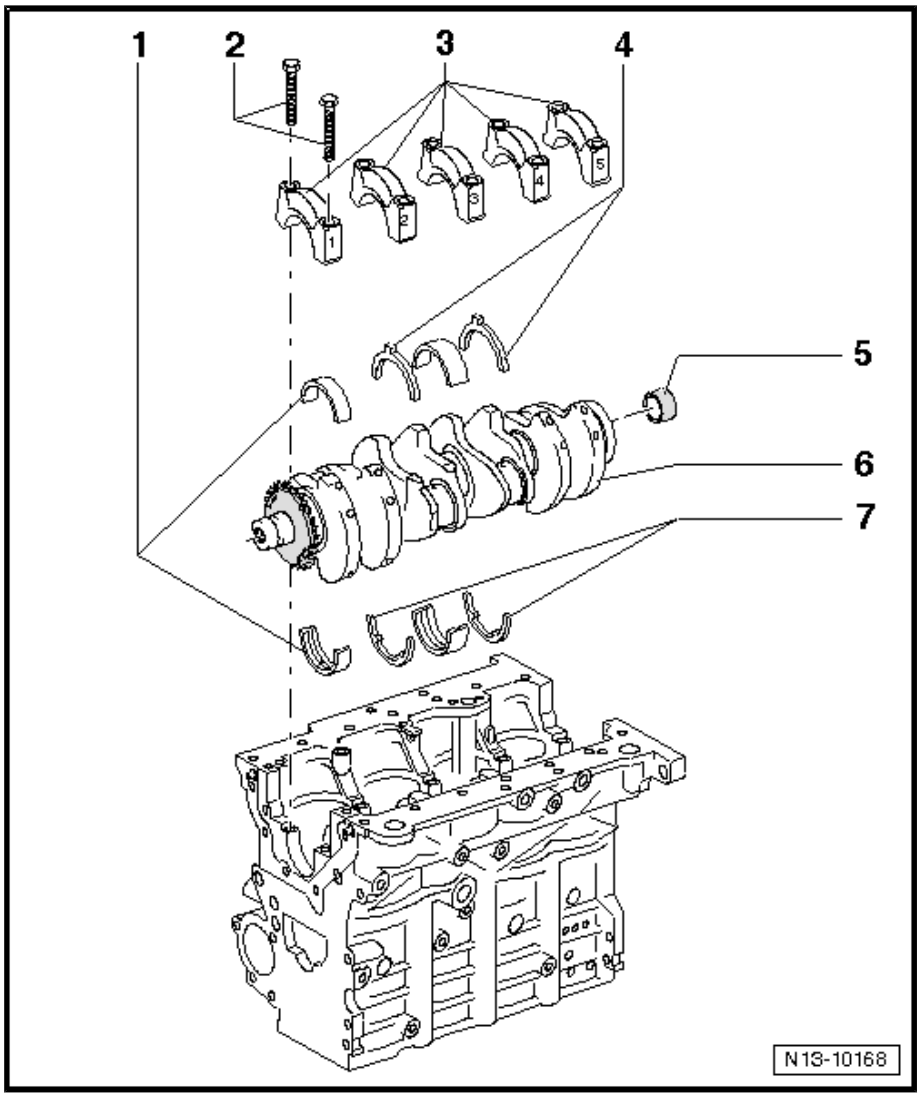


3 Crankshaft, Piston and Conrod

3.1 Removing and installing crankshaft

Note

The engine should be attached to the engine repair stand with the engine holder -MP 1-202- for carrying out removal and installation work.



1 - Bearing shell

- for cylinder block with lubricating groove
- for bearing cap without lubricating groove
- do not mix up already used bearing shells (mark)

2 - 65 Nm + torque a further 90° (1/4 turn)

- replace

3 - Bearing caps

- Bearing cap 1: belt pulley side
- Bearing cap 3: with recesses for thrust washers
- retaining lugs of the bearing shells of the cylinder block/bearing cap must be on top of one another

4 - Thrust washers

- for bearing cap 3
- pay attention to locating element

5 - Needle bearing

- not used (only on vehicles with automatic gearbox)

6 - Crankshaft

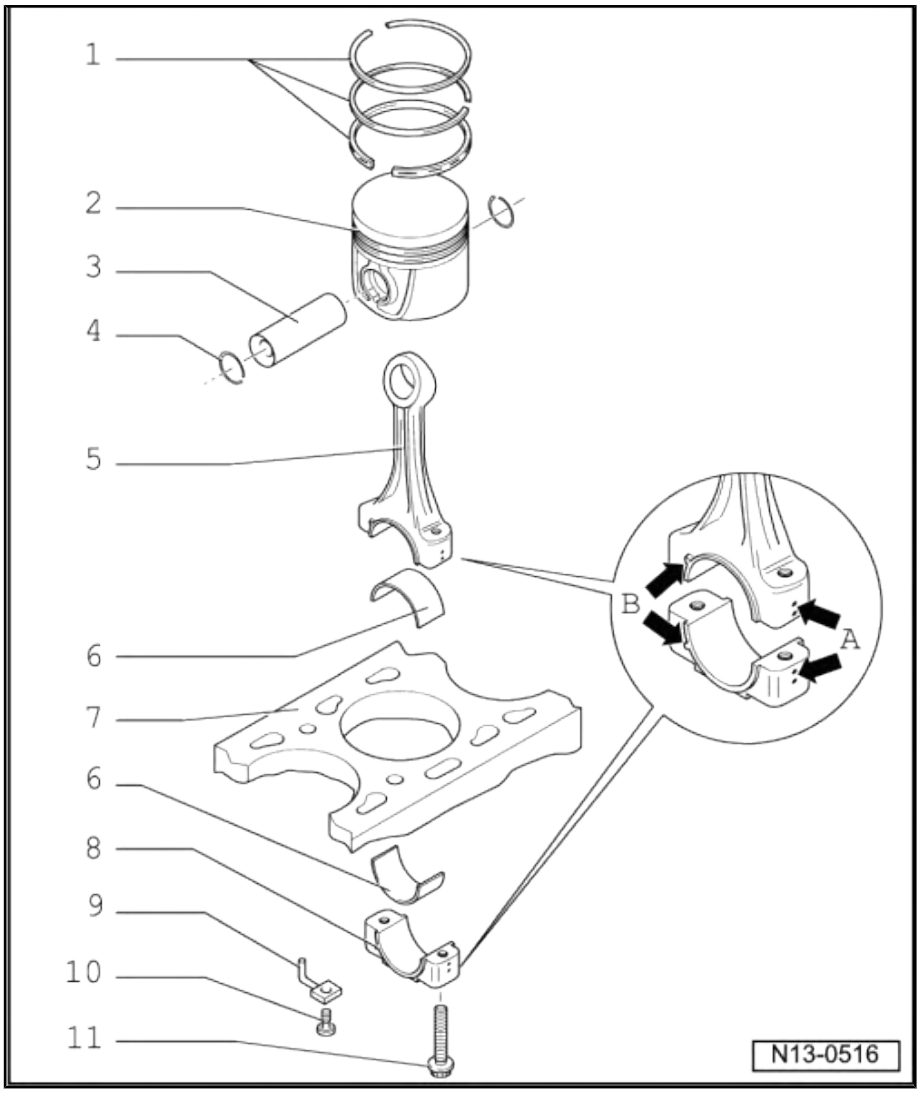
- with chain sprocket for oil pump drive
- Axial play when new: 0.07…0.17 mm

  Wear limit: 0.37 mm
- Crankshaft bearing: ∅ 54.00 mm
- Conrod bearing: ∅ 47.80 mm

7 - Thrust washers

- for cylinder block, bearing 3

3.2 Disassembling and assembling pistons and conrods



1 - Piston rings

- ❑ Offset joint 120°
- ❑ use piston ring pliers for removing and installing
- ❑ marking “TOP” faces piston crown
- ❑ Inspect gap clearance ⇒ page 64
- ❑ Inspect end clearance ⇒ page 64

2 - Piston

- ❑ with combustion chamber
- ❑ mark installation position and matching cylinder
- ❑ Installation position and assignment of piston and cylinder ⇒ page 65
- ❑ arrow on piston crown faces towards the belt pulley
- ❑ replace piston if there is any sign of crack formation on the piston body
- ❑ Inspecting piston ⇒ page 65
- ❑ Piston dimension: ∅ 79.45 mm
- ❑ use piston ring tensioning strap for installing
- ❑ Check piston projection at top dead centre ⇒ page 66

3 - Piston pin

- ❑ if stiff, heat piston to 60°C
- ❑ use drift -VW 222A- for removing and installing

4 - Circlip

- ❑ replace

5 - Conrod

- ❑ always replace as a set only
- ❑ mark matching cylinder -A-
- ❑ Fitting position: Markings -B- point towards the belt pulley side
- ❑ with a split bearing cap
- ❑ separate new conrod ⇒ page 67

6 - Bearing shell

- ❑ Fitting position ⇒ page 66
- ❑ do not mix up already used bearing shells (mark)
- ❑ Observe version: top bearing shell (towards the piston) must be made from a long lasting material, recognition feature for new bearing shells: black marking on the contact surface near the separation point
- ❑ insert in middle ⇒ page 66

- ❑ pay attention to correct position
- ❑ Axial play wear limit: 0.37 mm

7 - Cylinder block

- ❑ Inspect cylinder ⇒ page 65
- ❑ Cylinder dimension: ∅ 79.50 mm

8 - Conrod bearing cap

- ❑ Check fitting position
- ❑ cracked cover fits only in one position at the relevant conrod

9 - Oil injection nozzle

- ❑ for piston cooling
- ❑ removing and installing ⇒ page 66

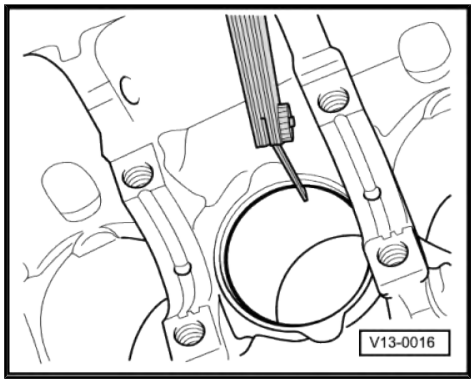
10 - Pressure relief valve, 27 Nm

- ❑ replace without sealant
- ❑ removing and installing ⇒ page 66

11 - 30 Nm + torque a further 90° (1/4 turn)

- ❑ replace
- ❑ Oil thread and contact surface

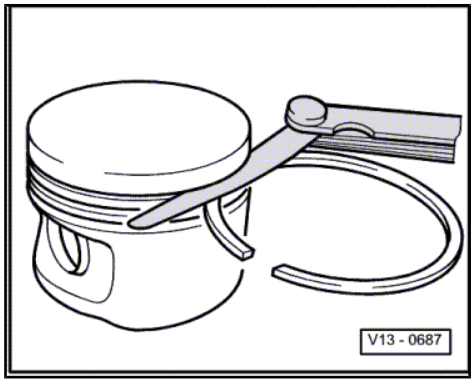
Inspecting piston ring gap clearance



Special tools and workshop equipment required

- ♦ Feeler gauges

– Insert ring at right angles from above down into lower cylinder opening, about 15 mm away from edge of cylinder. To insert use piston without rings.



Piston ring (dimensions in mm)	new	Wear limit
1. Compression ring	0,20 … 0,40	1,00
2. Compression ring	0,20 … 0,40	1,00
Oil scraper ring	0,25 … 0,50	1,00

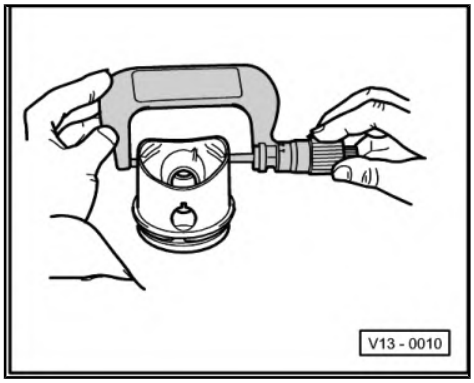
Inspect piston ring end clearance

Special tools and workshop equipment required

- ♦ Feeler gauges

– Clean before inspecting the annular grooves of the piston.

Piston ring (dimensions in mm)	new	Wear limit
1. Compression ring	0,06 … 0,09	0,25
2. Compression ring	0,05 … 0,08	0,25
Oil scraper ring	0,03 … 0,06	0,15



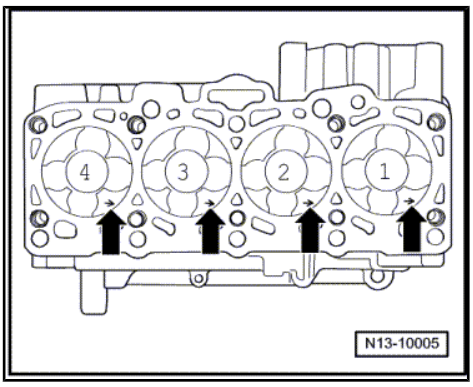
Inspecting pistons

Special tools and workshop equipment required

♦ External micrometer

– Measure about 10 mm from the lower edge, offset at right angles to the piston pin shaft.

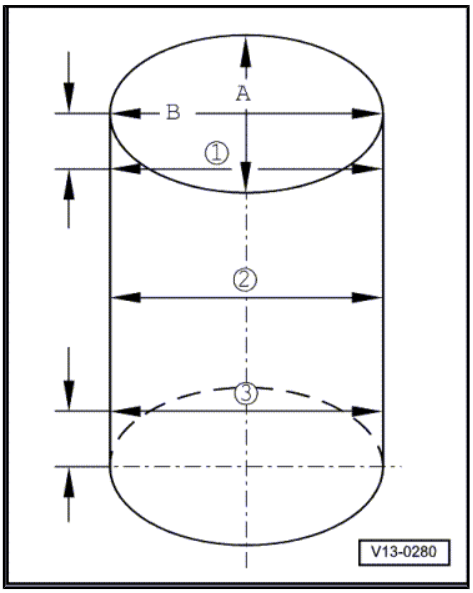
• Max. deviation from specified dimension: 0.04 mm.



Installation position and assignment of piston/cylinder

• The arrow on the piston crown -arrows- faces towards the belt pulley side.

Inspecting cylinder bore



Special tools and workshop equipment required

♦ Internal precision measuring instrument

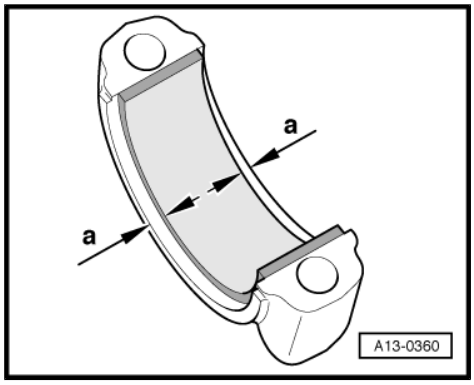
– Measure cylinder at 3 points crosswise in transverse direction -A- and lengthwise -B-.

- Max. deviation from specified dimension: 0.10 mm.

Fitting position of the bearing shells in the conrods

– Insert bearing shell in the conrod or in the conrod bearing cap centred.

- Dimension -a- = 2.5 mm

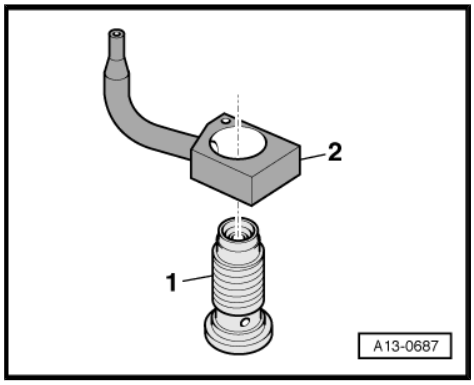


Oil spray nozzle and pressure relief valve

1 - Screw with pressure relief valve

2 - Oil spray nozzle (for cooling piston)

- Fitting position: Align the guide edge of the oil injection nozzle to the area of the cylinder block being worked on.



Note

- *The oil injection nozzles must not be bent.*
- *Replace the oil injection nozzles if they are bent.*

3.3 Checking piston projection in top dead centre

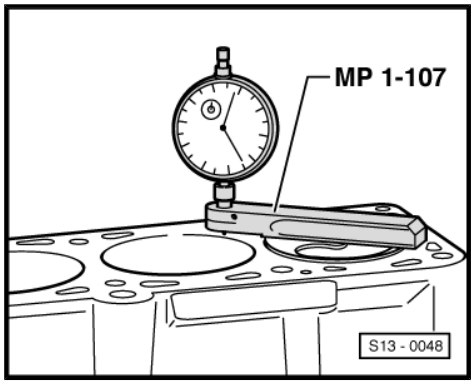
Special tools and workshop equipment required

- Measuring tool for liner pretension -MP 1-107-

Test sequence

– Attach the measuring tool for piston projection -MP 1-107- to the cylinder block as shown in the illustration.

– Measure the projection for each piston at 2 points.



When fitting new pistons or a partial engine, check the piston projection at top dead centre on all pistons.

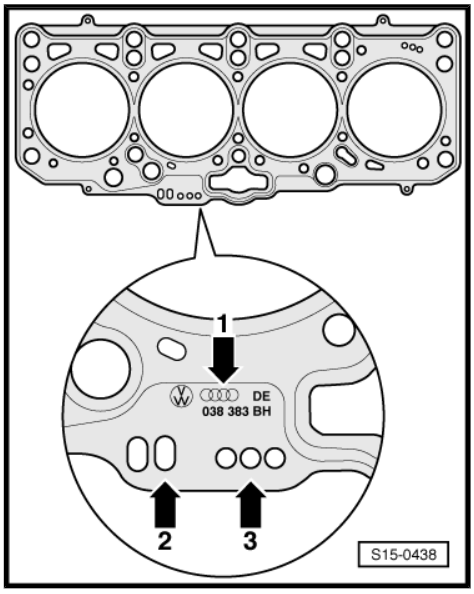
If different values are measured during the projection measurement of the piston, the highest value applies for the seal assignment.

Depending on the piston projection fit the relevant cylinder head seal in accordance with the table below.

Piston projection over cylinder block - top side mm	Bore marking
0,91 … 1,00	1
1,01 … 1,10	2
1,11 … 1,20	3

Identification of the cylinder head gasket

- Part number = -arrow 1-
- Holes -arrow 2- (ignore)
- Bores -arrow 3-



Note

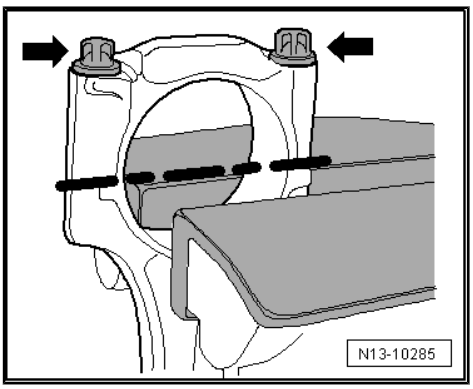
If different values are measured during the projection measurement of the piston, the greatest dimension applies for the seal assignment.

3.4 Separating new conrod

It can happen that the predetermined breaking point on the new conrod is not completely pierced. If the conrod bearing cap cannot be lifted by hand, proceed in the following manner:

– Mark the assignment of the conrod to the cylinder.

– Slightly clamp the conrod in a vice provided with aluminium protective jaws, as shown in the illustration.

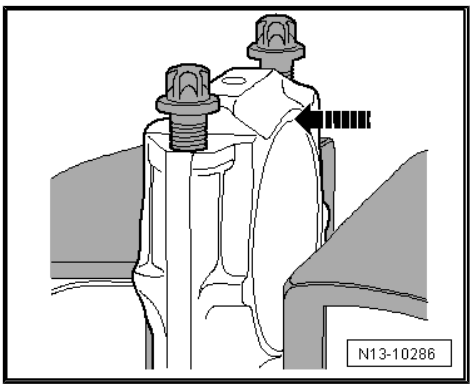


Note

- *Only tension the conrod slightly in order to avoid damage on the conrod.*
- *The conrod is clamped below the broken line.*

– Release both screws -arrows- by approx. 5 turns.

– Carefully knock against the conrod bearing cap with a plastic hammer in -direction of arrow- in order to loosen it.



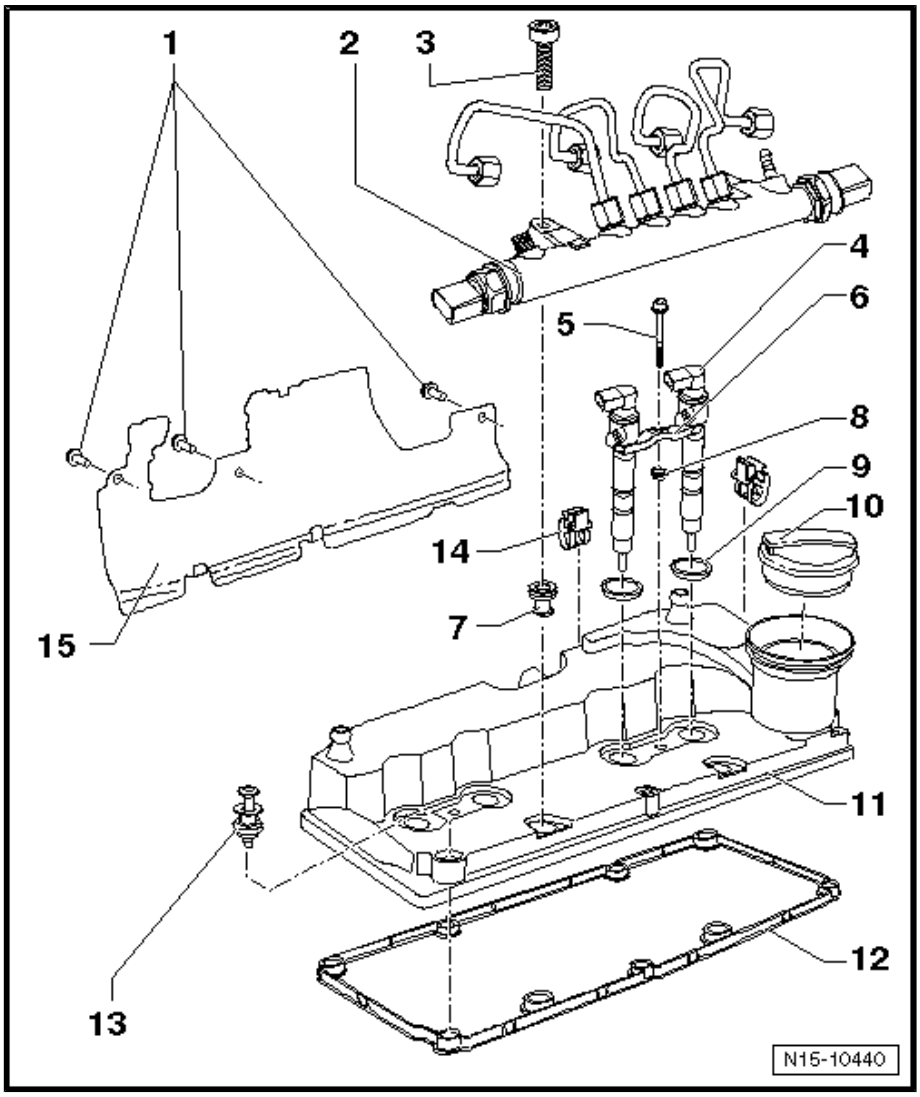
15 – Cylinder Head, Valve Gear

1 Removing and installing cylinder head

Note

- *Cylinder heads with cracks between the valve seats may continue to be used without any reduction in the life time provided the cracks are slight and max. 0.5 mm wide.*
- *It is not permissible to rework the cylinder heads of diesel engines.*
- *Replace O-rings and gaskets.*
- *Replace cylinder head bolts and screws which have been tightened to a torquing angle.*
- *When installing an exchange cylinder head with the camshafts installed, it is necessary to oil the contact surfaces between the roller rocker arms and the cams after installing the head.*
- *Do not remove the plastic bases supplied as a protection for the open valves until just before fitting on the cylinder head.*
- *When replacing the cylinder head, replace all the coolant* *⇒ page 117* *.*
- *Change contaminated engine oil ⇒ Maintenance ; Fabia II .*

1.1 Cylinder head cover - Summary of components



1 - 5 Nm

2 - High pressure reservoir (rail)

- ❑ with injection lines
- ❑ Do not change the bending form of the injection lines ⇒ page 164

3 - 22 Nm

4 - Injection unit (Piezo injector)

- ❑ removing and installing ⇒ page 167

5 - 8 Nm + torque a further 180°

- ❑ replace

6 - Clamping claw

- ❑ one clamping claw for 2 injection units

7 - Bushing

- ❑ for attaching the high pressure reservoir
- ❑ replace if damaged

8 - Sealing ring

- ❑ replace

9 - Sealing ring

- ❑ replace

10 - Screw cap

- ❑ Replace seal if damaged

11 - Cylinder head cover

- ❑ removing and installing ⇒ page 70

12 - Gasket

- ❑ replace if damaged or leaking

13 - 10 Nm

- ❑ observe tightening torque and tightening sequence ⇒ page 70
- ❑ Screw with bush and elastomer damping element pressed captively into the cylinder head cover

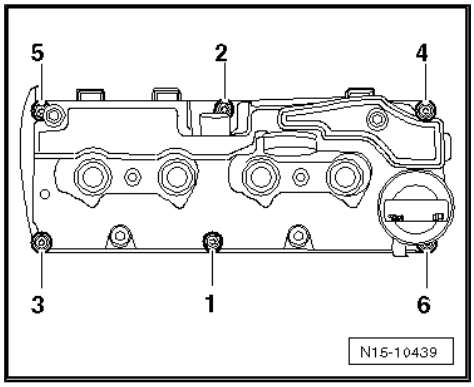
14 - Support

- ❑ for wiring loom

15 - Heat shield

Cylinder head cover - tightening sequence and tightening torque

– Tighten the screws for the cylinder head cover in the sequence -1…6- to 10 Nm.



1.2 Removing and installing cylinder head cover

Note

Observe safety precautions when working on the diesel direct injection system ⇒ page 5 .

Removing

Observe all safety measures and notes for assembly work on the fuel and injection system as well as the rules for cleanliness ⇒ page 2 .

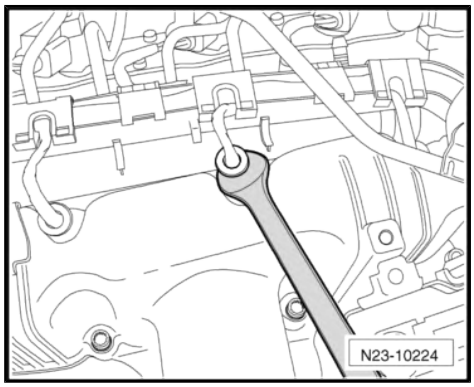
– Remove top engine cover ⇒ page 15 .

– If present, remove the noise insulation at the injection units.

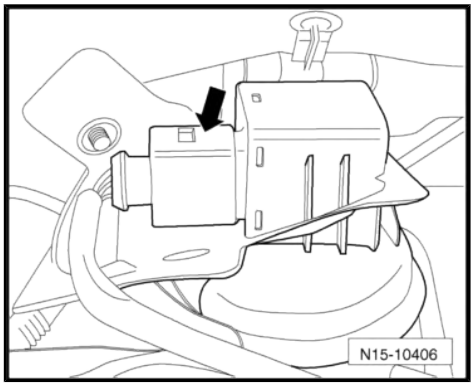
Caution

- *Carefully disconnect the plug from the pencil type glow plugs.*
- *If the plug is damaged when disconnecting it, the wiring loom including the plugs must be replaced (plugs cannot be replaced separately).*

– Carefully disconnect the plug from the pencil type glow plugs. To do so use an open-end wrench, wrench size 12, for help.

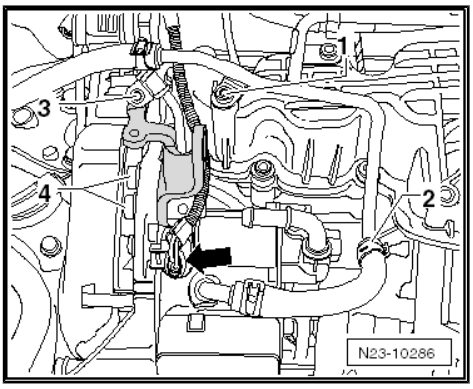


– Disconnect the plug from the position sender for charge pressure regulator -G581- -arrow- at the vacuum reservoir of the exhaust turbocharger and unhook the cable.



– Release screw -3-.

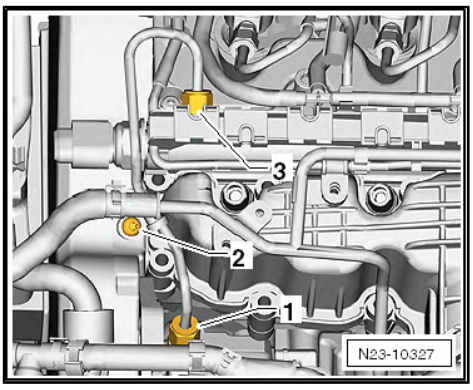
– Remove engine mount -grey-.



– Remove the fuel high pressure line between the high pressure pump -1- and the high pressure reservoir (rail) -3-.

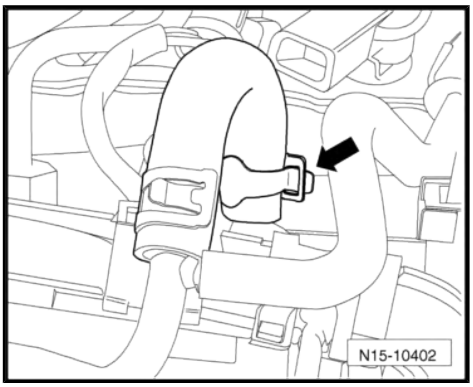
Note

- *Preferred loosening sequence of the high pressure lines cylinders 4-3-2-1.*
- *Counterhold at the injection units when loosening the high pressure connection piece.*

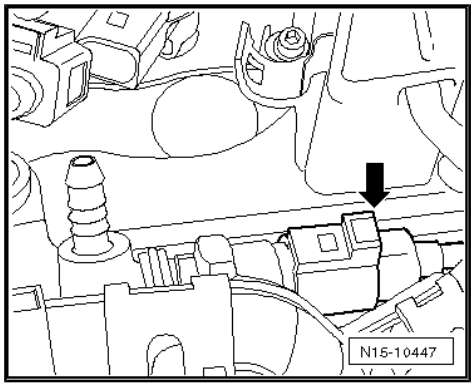


– Remove the high pressure lines between the high pressure reservoir (rail) and the injection units.

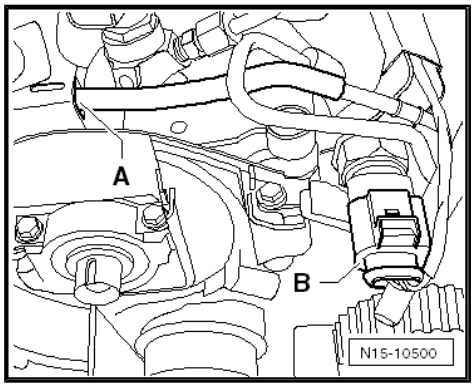
– Release spring strap clamp -arrow- and separate cable from high pressure reservoir (rail).



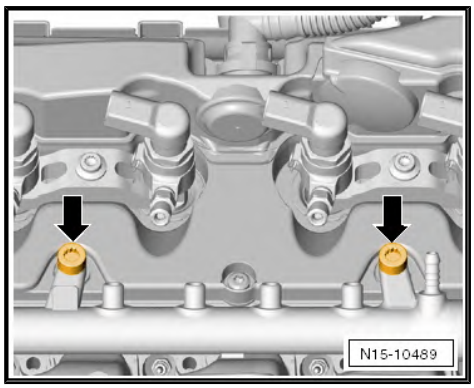
– Disconnect the plug at the fuel pressure regulating valve -N276- -arrow-.
– Remove the cable guide from the rail and lay it to the side.



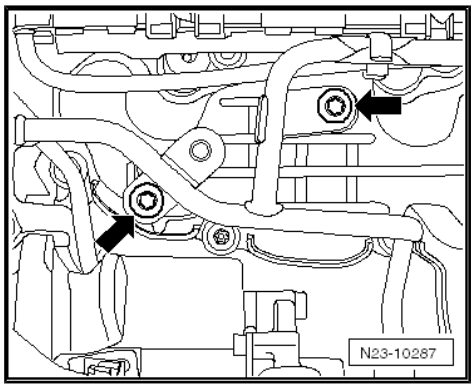
– Disconnect plug at fuel pressure sender -G247- -B-.
– Detach the vacuum line at the cylinder head cover -A-.



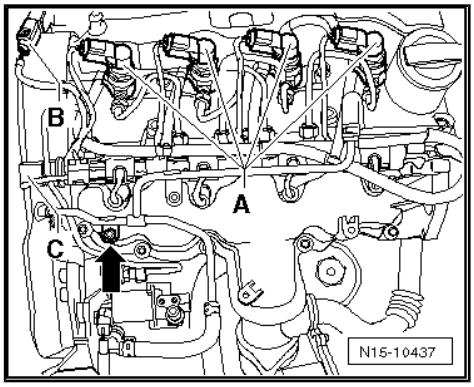
– Screw out screws -arrows- and remove high pressure reservoir (rail).



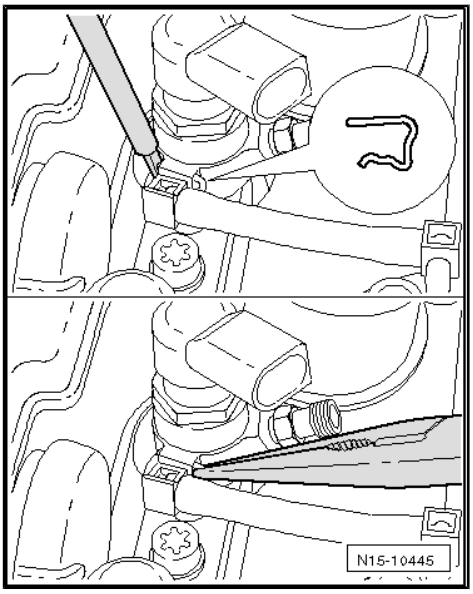
– Unscrew the fixing screws at the intake manifold -arrows- and lay the fuel return-flow line to the side.



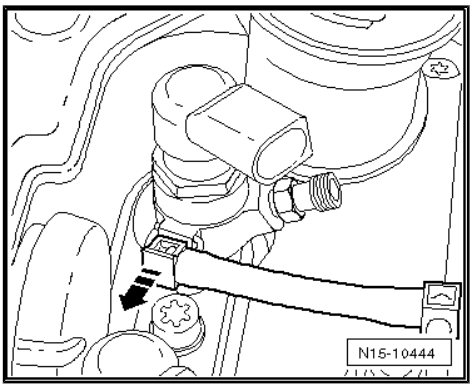
– Disconnect the plug from the injection units -A-.



– Unlock the connections of the fuel return-flow line using a screwdriver and a set of pointed pliers.

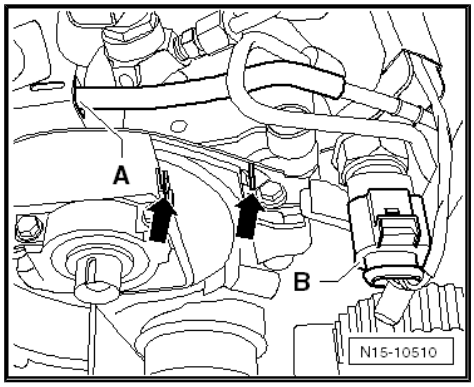


– Disconnect the connections of the fuel return-flow line at the injectors in -direction of arrow-.



– Remove the complete return-flow line and place it down at the intake manifold.
– Remove the remaining vacuum lines from the bracket at the cylinder head cover.
– Remove top toothed belt guard.
– Remove the vent line between the cylinder head cover and the intake hose. To do so, press together the quick-release fittings.
– Remove the injection units ⇒ page 167 .
– Unscrew the fixing screws of the cylinder head cover.
– Remove cylinder head cover.

– To do so, unclip the cylinder head cover at the catch pegs -arrows- of the rear toothed belt guard.



Install

Installation is performed in the reverse order, pay attention to the following points:

Tightening torques

- Cylinder head cover - Summary of components: ⇒ page 69
- Fuel system - Summary of components: ⇒ page 164

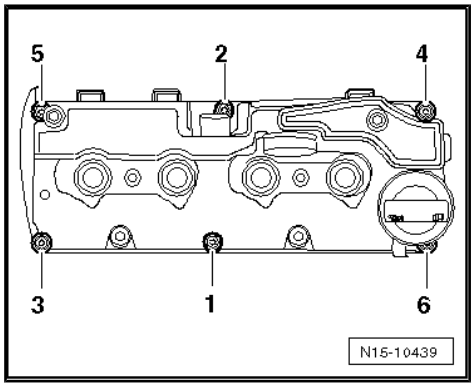
Note

Replace gasket for cylinder head cover if damaged or leaking.

– Screw on the cylinder head cover by hand in the sequence -1 ... 6-.

– Tighten the bolts in the sequence -1…6- with torque wrench to 10 Nm.

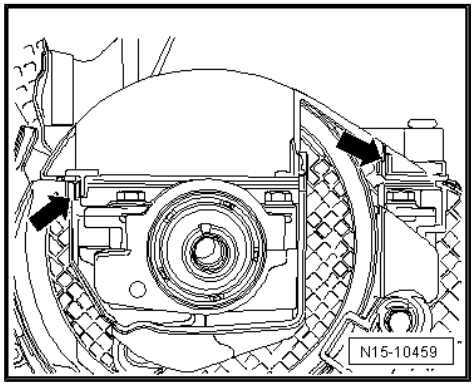
– Make sure that the cylinder head cover is correctly clipped with the toothed belt guard.



Note

To provide a clearer illustration, the camshaft sprocket is removed.

– To do so, if necessary use a screwdriver to press the toothed belt guard in the area of the clips -arrows- against the cylinder head cover until they lock audibly into each other.



– Check the clearance between the hub and the toothed belt guard.

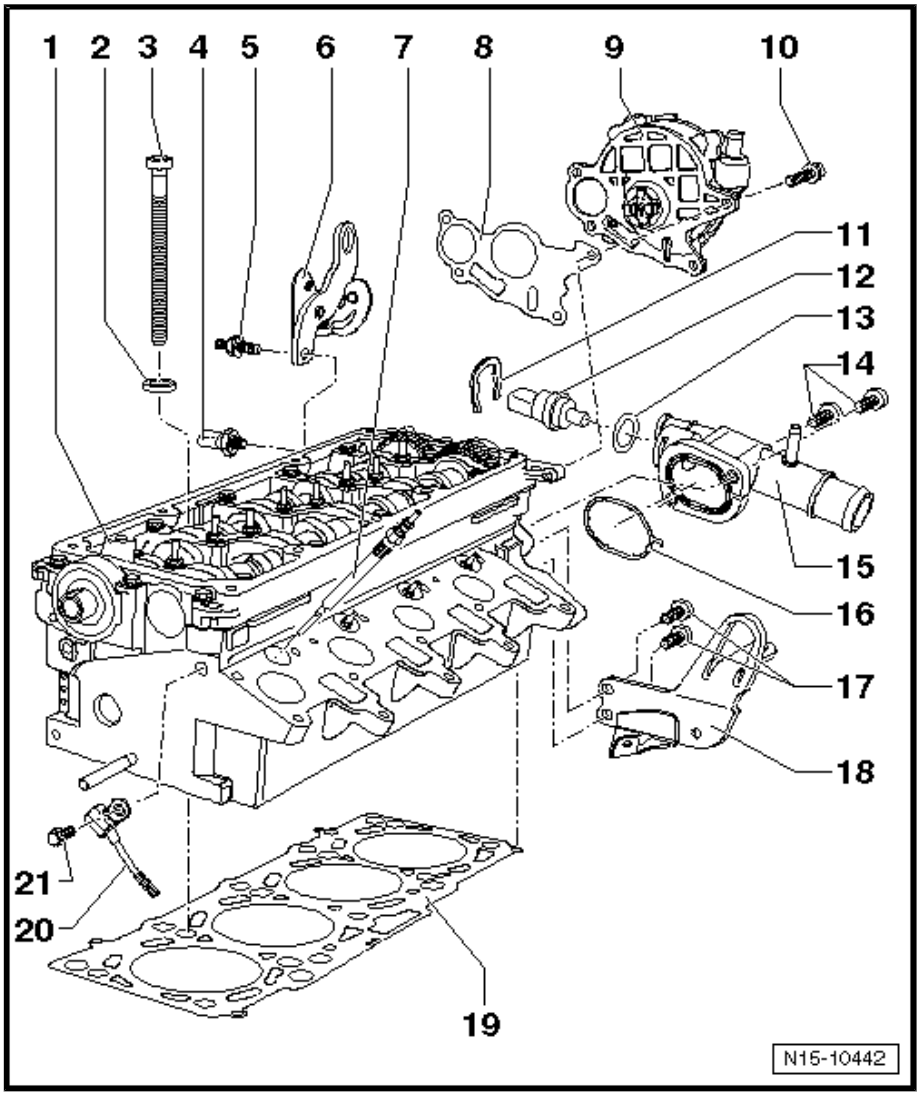
– Install the injection units ⇒ page 167 .

Connect the ⇒ Vehicle diagnosis, testing and information system VAS 5051 and carry out the function “vent air from fuel system” in the “guided functions” ⇒ page 179 .

1.3 Cylinder head - summary of components

Note

- *Do not remove the plastic bases supplied as a protection for the open valves until just before fitting on the cylinder head.*
- *If the cylinder head is replaced, the system must also be completely filled with fresh coolant.*



1 - Cylinder head

- ❑ removing and installing ⇒ page 76
- ❑ check for distortion ⇒ page 76
- ❑ after replacing fill entire system with fresh coolant

2 - Washer

- ❑ for cylinder head screw

3 - Cylinder head bolt

- ❑ pay attention to sequence for loosening and tightening ⇒ page 76
- ❑ before fitting insert washers in the cylinder head

4 - Oil pressure switch -F1- - 22 Nm

- ❑ Marking: green
- ❑ 0.05 MPa (0.5 bar)
- ❑ Cut open gasket ring if leaking and replace

5 - 20 Nm

6 - Rear left lifting eye on cylinder head?

7 - Glow plug - 18 Nm

8 - Gasket

- ❑ replace

9 - Vacuum pump

> **WARNING**
> *Under no circumstances must the vacuum pump be disassembled, otherwise it can lead to malfunction of the vacuum part. This will result in a failure of the brake booster.*

- ❑ removing and installing ⇒ page 87

10 - 10 Nm

11 - Clamp

12 - Coolant temperature sender -G62-

- ❑ replace ⇒ page 121

13 - O-ring

- ❑ replace

14 - 10 Nm

15 - Coolant connection fittings

16 - Gasket

- ❑ replace

17 - 25 Nm

18 - Front left lifting eye on cylinder head?

- ❑ the front right lifting eye is attached at the bracket for auxiliary units in the same way ⇒ page 24

19 - Cylinder head gasket

- ❑ replace
- ❑ Pay attention to the marking ⇒ page 76
- ❑ after replacing fill entire system with fresh coolant

20 - Hall sender -G40-

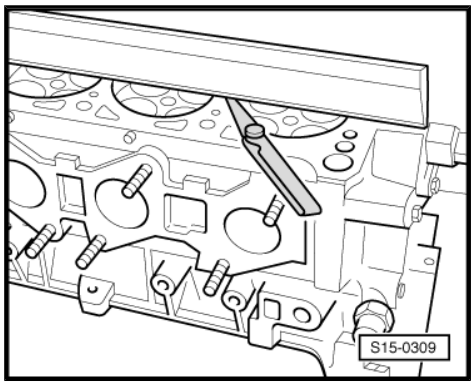
- ❑ for camshaft position
- ❑ removing and installing ⇒ page 86

21 - 10 Nm

Inspecting the cylinder head for distortion

– Inspect cylinder head at several points for distortion using a knife-edge straightedge and feeler gauge.

• Max. permissible distortion: 0.1 mm

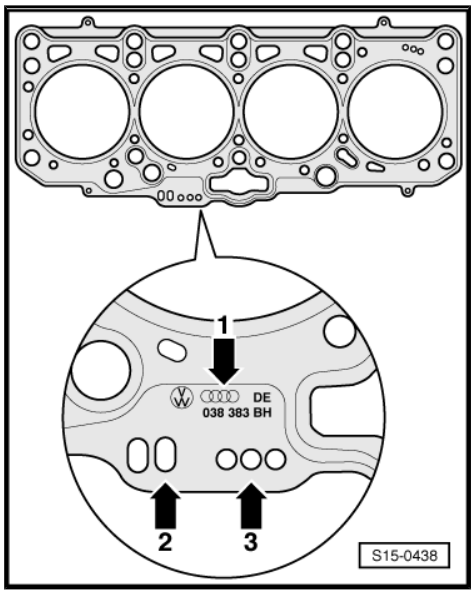


Note

It is not permissible to rework the cylinder heads of diesel engines.

Identification of the cylinder head gasket

- ♦ Part number = -arrow 1-
- ♦ Holes -arrow 2- (ignore)
- ♦ Bores = -arrow 3-



Note

- ♦ *Differing thicknesses of cylinder head gaskets are inserted according to the piston projection. If only the gasket is replaced, it must be replaced with a new gasket with the same marking.*
- ♦ *When installing new pistons or a partial engine, determine the piston projection at top dead centre ⇒ page 66 .*

1.4 Removing and installing cylinder head

Special tools and workshop equipment required

- ♦ Guide bolt -MP1-208 (3070)-
- ♦ Counterholder -T10051 -

- Extractor -T10052-
- Socket insert XZN 10 -T10385-
- Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- Locking agent -D 000 600 A2-
- Protective goggles and gloves

1.4.1 Removing

Requirements

- Engine temperature should not exceed 35°, because the cylinder head could be twisted when slackening the screws.
- The pistons must not be positioned at top dead centre.

Caution

When undertaking all installation work, particularly in the engine compartment due to its cramped construction, please observe the following:

- *Lay lines of all kinds (e.g. for fuel, hydraulic fluid, cooling fluid and refrigerant, brake fluid, vacuum) and electrical lines in such a way that the original line guide is re-established.*
- *In order to avoid damage to the cables, ensure that there is adequate free access to all moving or hot components.*

Observe all safety measures and notes for assembly work on the fuel and injection system, the charge air system as well as the rules for cleanliness ⇒ page 2 .

– Disconnect the battery-earth strap with the ignition off ⇒ Electrical System ⇒ Rep. Gr. 27 .

– Remove top engine cover ⇒ page 15 .

– Remove air filter housing with air mass meter -G70- and suction hose ⇒ page 187 .

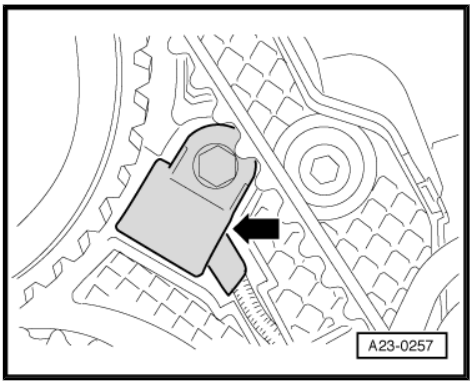
– Remove battery and battery tray ⇒ Electrical System ⇒ Rep. Gr. 27 .

– Remove cylinder head cover ⇒ page 70 .

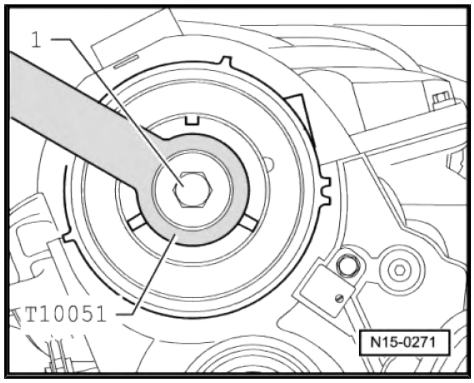
– Removing toothed belt ⇒ page 39 .

– Unscrew Hall sender -G40- -arrow- and place down.

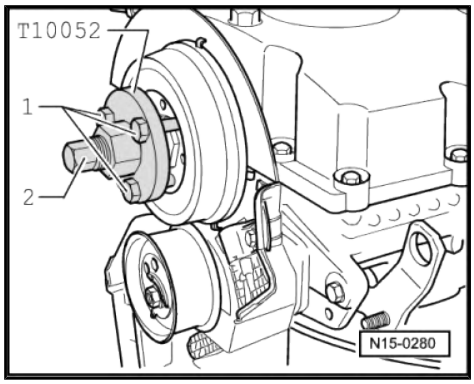
– Remove camshaft sprocket.



– Counterhold the hub with the counterholder -T10051- and slacken the fixing screw -1- of the hub.
– Unscrew the fixing screw of the hub by approx. 2 turns.



– Position the extractor -T10052- and align it with the hub bores.
– Tighten fixing screws -1-.
– Put the hub under tension by uniformly tightening the extractor -2- until the hub is released from the camshaft cone.

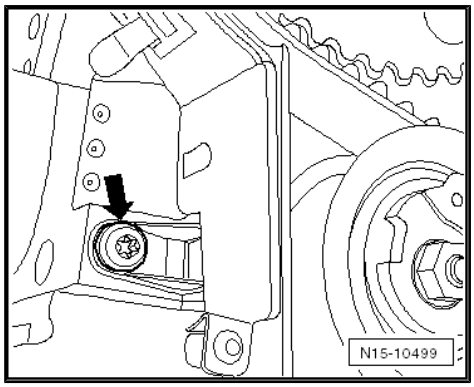


Note

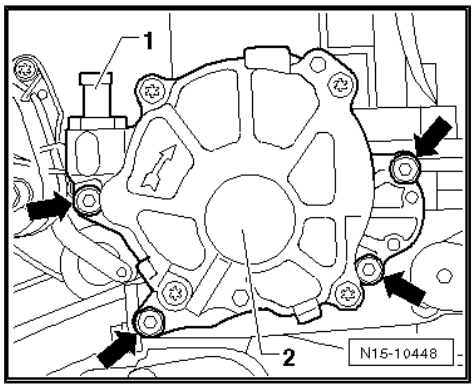
While doing so, hold the extractor firmly using a wrench SW 30.

– Remove hub from cone of camshaft.

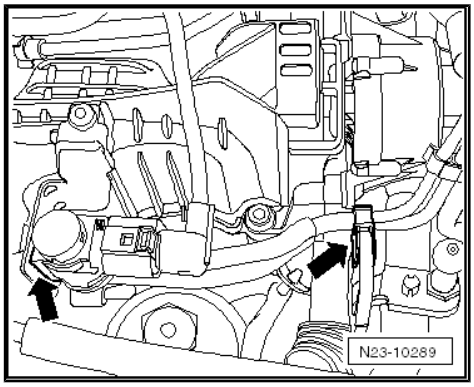
– Unscrew the fixing screw -arrow- of the toothed belt guard.



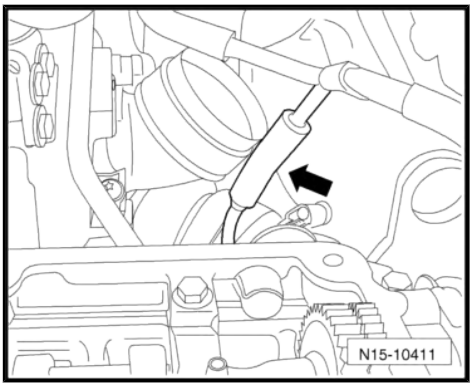
– Detach the vacuum line -1- from the vacuum pump -2-.



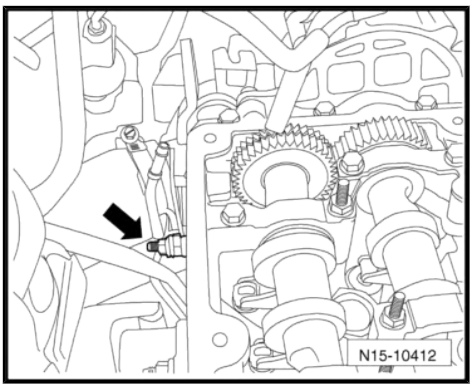
– Unclip the vacuum lines, -arrows- and lay them to the side.



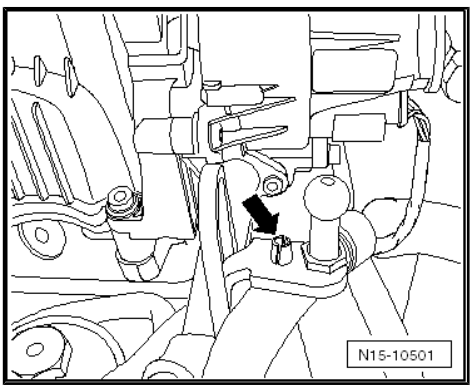
– Detach vacuum line -arrow-.
– Lay vacuum lines to the side.



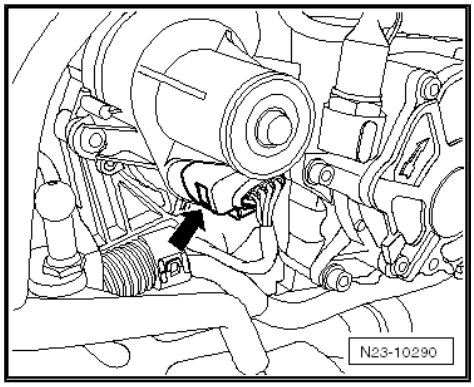
– Unscrew the connection -arrow- of the vacuum line.



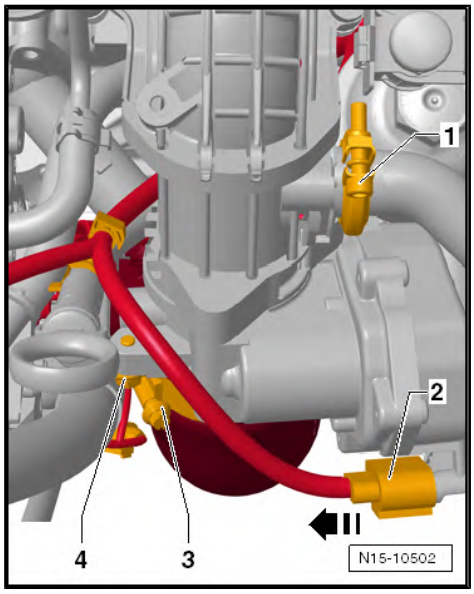
– Unclip the engine pre-wiring from the holder -arrow-.



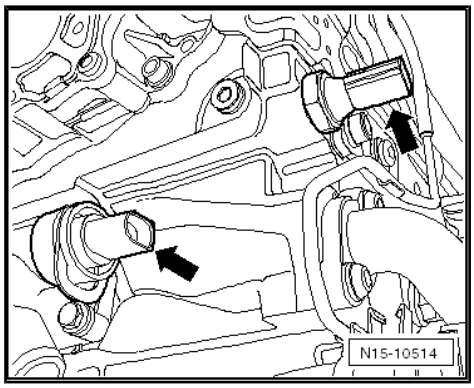
– Unplug plug -arrow- from intake manifold flap motor -V157- .
– Lay the engine pre-wiring to the side.



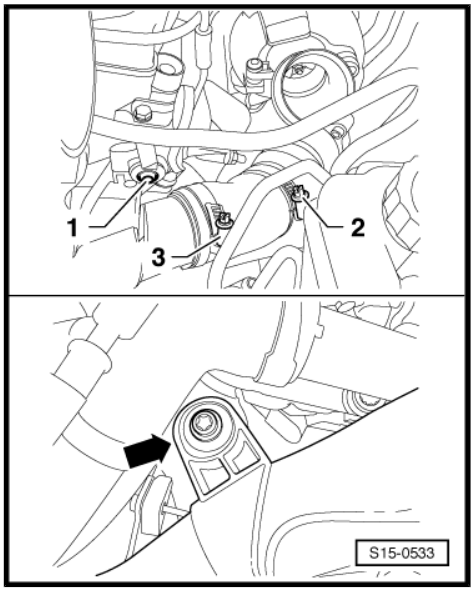
– Disconnect the plug from the throttle valve control unit -J338- -2-.
– Open clamp -3- and detach charge air hose -dark red-.
– Release the screw from the oil measuring connection -4-.



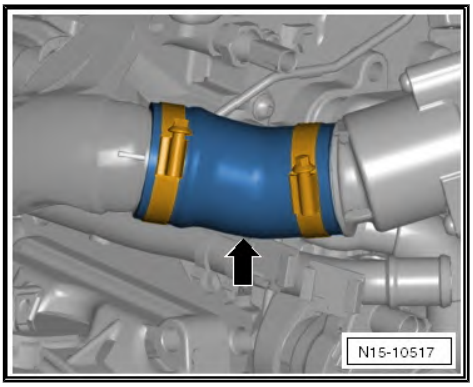
– Disconnect plug at oil pressure switch -arrow- and guide out the cable Pos. 4 ⇒ page 74 .



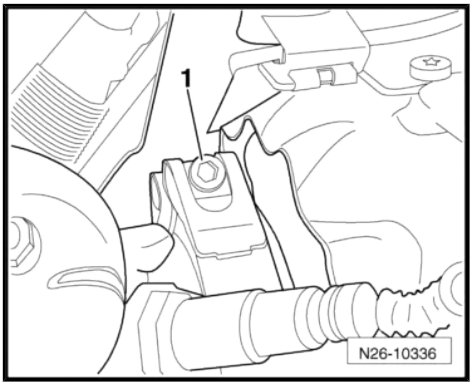
– Release the fixing screw -1- from the charge air pipe, slacken the clamp -2 or 3-.
– Release fixing screw -arrow- from charge air pipe.



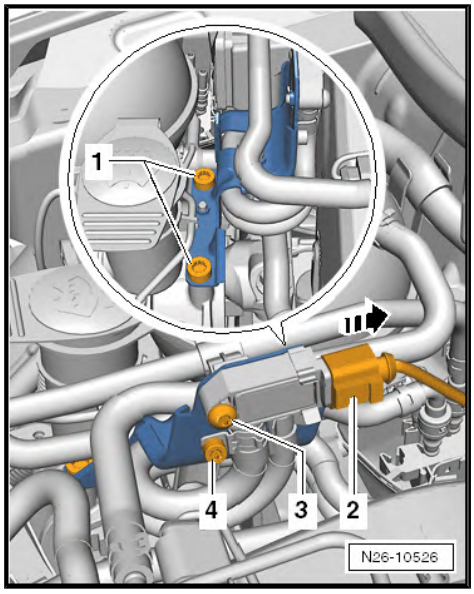
– Detach the connecting hose -arrow- as far as possible from the vibration damper.
– Push the charge air pipe as far as possible to the side.
– Remove pulsation dampener, Pos. 21 ⇒ page 147 .



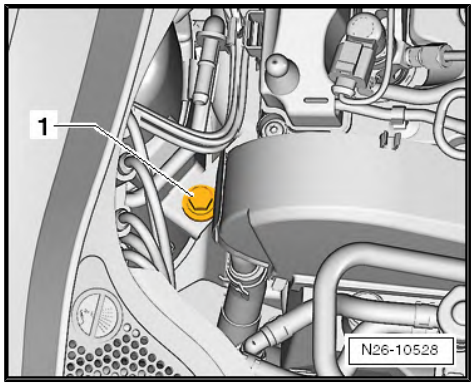
– Unscrew the screw -1- and open the clamp at the diesel particle filter.



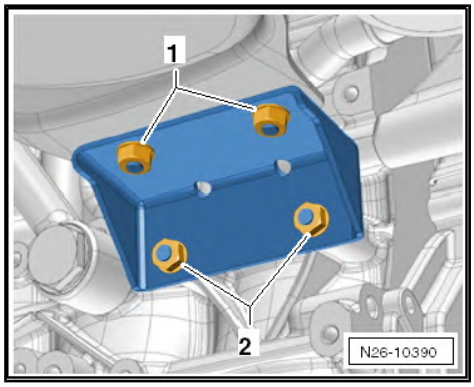
– Disconnect the plug from the exhaust gas pressure sensor 1 -G450- and unscrew the fixing screws -1-.
– Release screws -3 and 4-.
– Remove the bracket with the exhaust gas pressure sensor 1 -G450- and place it to the rear.



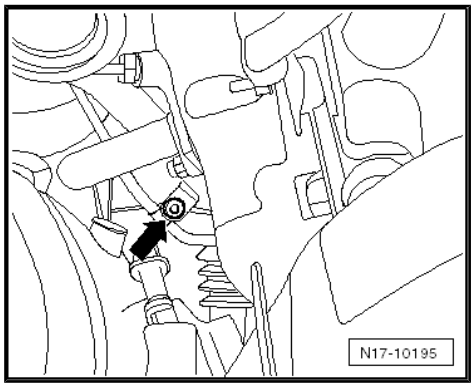
– Release the top screw -1- for attaching the diesel particle filter.



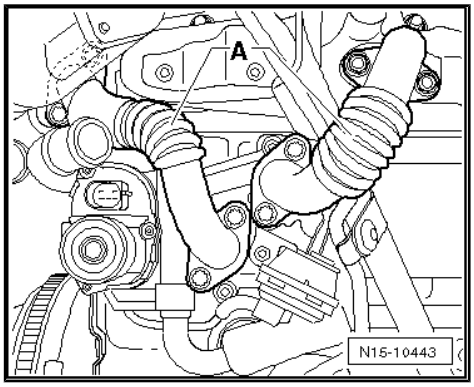
– Unscrew the nuts -2-.



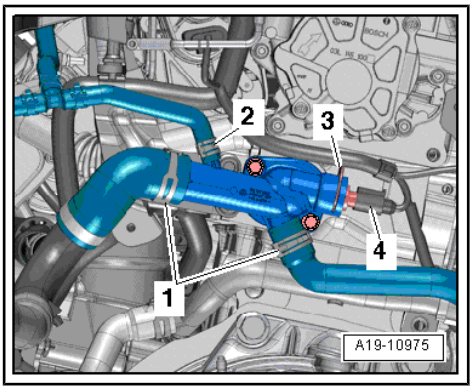
– Now the fixing screw of the retaining clip -arrow- for the oil feed line at the support of the exhaust turbocharger is accessible. Release screw -arrow-.



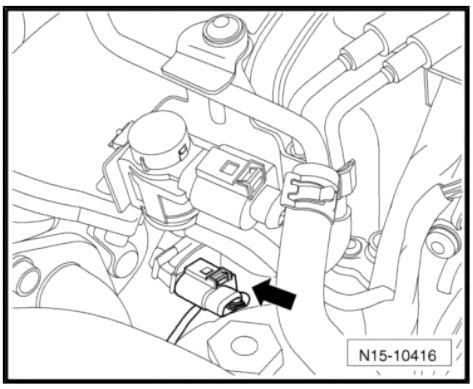
– Remove connection pipes -A- to exhaust gas recirculation radiator.
– Remove the oil feed line and the support for the exhaust turbocharger ⇒ page 109 .
– Drain coolant ⇒ page 117 .



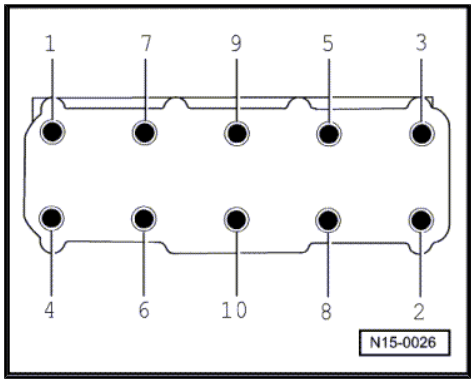
– Disconnect plug -4- from coolant temperature sender -G62- .
– Slacken the hose clamps -1 and 2- and detach the coolant hoses from the connection fittings.
– Unscrew the fixing nut of the timing belt tensioning pulley.



– Disconnect plug from Hall sender -G40- -arrow-.



– Follow the specified order for loosening cylinder head bolts.



Note

- *The assistance of a second mechanic is required for removing the cylinder head.*
- *The timing belt tensioning pulley is removed from the pin screw when lifting out the cylinder head.*

– First of all raise the cylinder head at the gearbox side and then thread it out of the toothed belt guard. Make sure that the timing belt tensioning pulley does not fall down.

Caution

Risk of damage to the pencil type glow plugs when placing down the cylinder head.

- ***If the cylinder head is removed with installed glow plugs, do not place it down on the sealing surface since the glow plugs protrude slightly beyond the sealing surface.***

1.4.2 Install

Note

- *There must not be any oil or coolant present in the blind holes for the cylinder head bolts.*
- *Replace cylinder head bolts.*
- *When undertaking assembly replace self-locking nuts and screws as well as gasket rings and gaskets which have been tightened to a torquing angle.*
- *Remove the new cylinder head gasket from its wrapping immediately before fitting.*
- *Treat the seal with the utmost care. Damage to the silicone layer and in the area of the bead results in leakages.*
- *When installing an exchange cylinder head with the camshafts installed, it is necessary to oil the contact surfaces between the roller rocker arms and the cams after installing the cylinder head.*
- *Secure all hose connections with corresponding hose clips.*

WARNING

Wear protective gloves when working with sealant and grease remover!

– Make sure that when cleaning the cylinder head and cylinder block no impurities can get into the cylinder or into the oil and coolant galleries.

– Carefully remove old sealant residue from the cylinder head and cylinder block using a chemical sealant remover.

– Remove the crankshaft arrester -T10050- before fitting on the cylinder head and turn back the crankshaft in the opposite di-

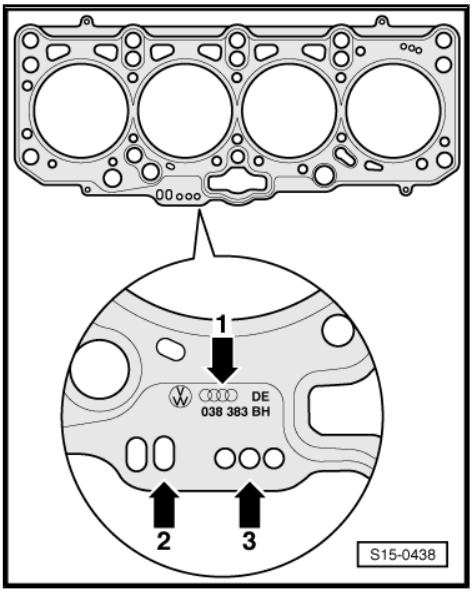
rection of rotation of the engine until all the pistons are almost evenly positioned before top dead centre.

– Pay attention to the identification of the cylinder head seal.

♦ Part number = -arrow 1-

♦ Holes -arrow 2- (ignore)

♦ Bores = -arrow 3-



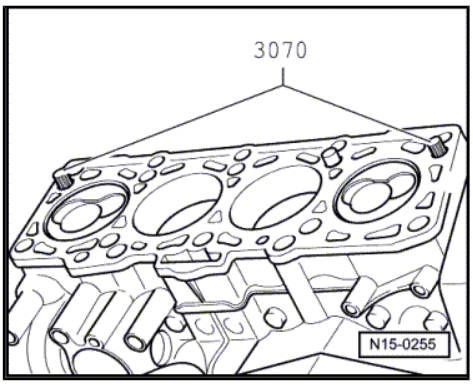
Note

♦ *Install a new cylinder head gasket with the same marking; whether or not the cylinder head was replaced.*

♦ *If parts of the crankshaft drive were replaced, then the new cylinder head gasket must be defined by measuring the protrusion of the piston at top dead centre.*

– Position the cylinder head gasket with the marking to the top.

– For centering, screw in guide bolts -3070- into the outer holes on the suction side.



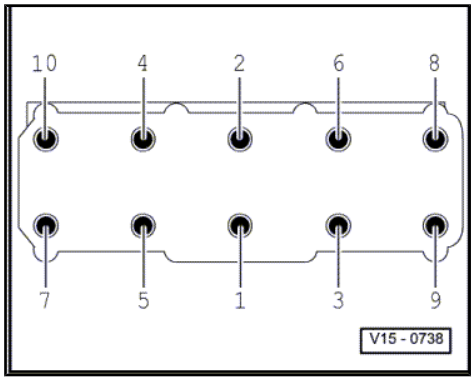
Note

The tensioning pulley must be fitted onto the pin screw when placing on the cylinder head.

– Fit on cylinder head, insert all 8 cylinder head bolts and tighten by hand.

– Remove the guide bolts by screwing out with a bolt tightener from 3070 through the bolt holes and insert the cylinder head screws.

– Tighten the cylinder head in four stages in the indicated tightening sequence:



Stage	Tighten
I	– Pre-tighten with the torque wrench to 35 Nm.
II	– Pre-tighten with the torque wrench to 60 Nm.
III	– Using a rigid wrench torque a further 90° (1/4 turn).
IV	– Using a rigid wrench torque a further 90° (1/4 turn).

Note

Tightening up the cylinder head bolts after doing repair work is not necessary.

Further installation occurs in reverse order, while paying attention to the following:

– The tightening torques which are missing can be found in the corresponding explosion view drawing.

– Perform a test drive, interrogate fault memory and erase ⇒ Vehicle diagnosis, testing and information system VAS 5051.

Note

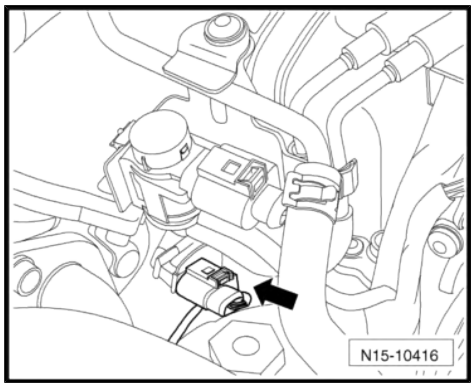
After deleting the fault memory of the engine control unit the readiness code must be re-generated.

1.5 Removing and installing Hall sender - G40-

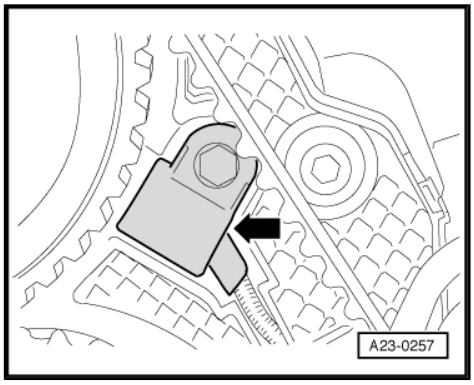
– Removing toothed belt ⇒ page 39 .

– Disconnect plug from Hall sender -G40- -arrow-.

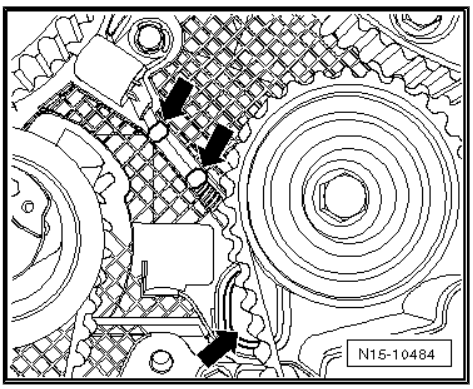
– Slacken the plug from its holder.



– Unscrew Hall sender -G40- -arrow-.



– Remove the pegs and the cover of the repair hole -arrows- with a screwdriver.
– Unscrew the Hall sender -G40- from the cylinder head and guide its plug through the repair hole in the toothed belt guard.



Install

Installation is carried out in the reverse order. Pay attention to the following:

♦ Close the repair opening in the toothed belt guard with a rubber plug according to the ⇒ Electronic Catalogue of Original Parts .

– install toothed belt and set the timing ⇒ page 44 .

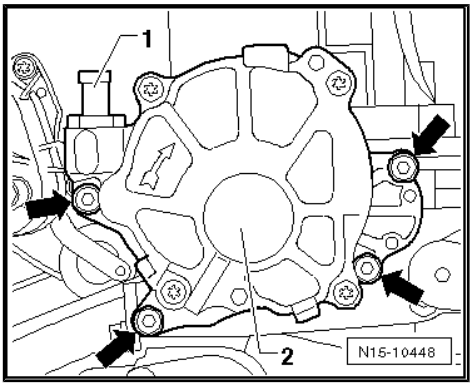
1.6 Removing and installing the vacuum pump

WARNING

Under no circumstances must the vacuum pump be disassembled, otherwise it can lead to malfunction of the vacuum part. This will result in a failure of the brake booster.

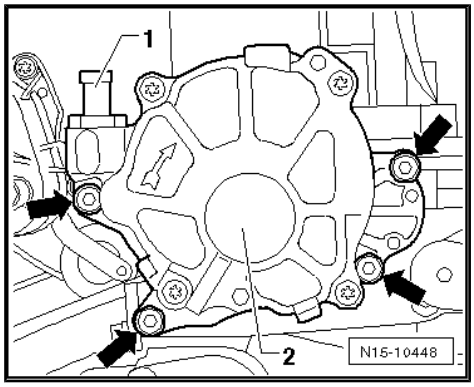
Removing

– Remove the air filter housing ⇒ page 187 .
– Detach the vacuum line -1- from the vacuum pump -2-.



– Unscrew securing bolts -arrows-.

– Remove vacuum pump -2- from cylinder head.



Install

Installation is performed in the reverse order, pay attention to the following points:

Note

- *Ensure that the coupling of the vacuum pump is correctly seated in the camshaft.*
- *Replace the gasket of the vacuum pump.*

– Install the vacuum pump and tighten the fixing screws to 10 Nm.

– Connect the vacuum line -1- of the brake servo unit to the vacuum pump.

1.7 Testing the compression

Note

- *A rough test of the compression pressure can be carried out in the targeted fault finding ⇒ Vehicle diagnosis, testing and information system VAS 5051.*
- *The work sequence with the compression tester , as described in the following, gives more precise values.*

Special tools and workshop equipment required

- Compression tester , e.g. -V.A.G 1763 -
- Adapter , e.g. -V.A.G 1381/12-
- Hinged wrench -3220-

Test condition

- Engine oil temperature at least 30 °C

Test sequence

– Remove the pencil type glow plug of the relevant cylinder using the hinged wrench -3220 - ⇒ page 205 .

– Screw in the adapter -V.A.G 1381/12 - instead of the pencil type glow plug.

– Check compression pressure using the compression tester -V.A.G 1763- .

Note

Use of tester ⇒ Operating Instructions .

– Leave engine running until the tester no longer indicates a pressure rise.

Compression readings

new	Wear limit	permissible difference between cylinders
Overpressure	**Overpressure**	**Overpressure**
2.5…3.1 MPa	1.9 MPa	max. 0.5 MPa
25…31 bar	19 bar	max. 5 bar

Perform after the compression pressure test:

– Install the pencil type glow plug of the relevant cylinder ⇒ page 205 .

– Interrogating and erasing fault memory of engine control unit ⇒ Vehicle diagnosis, testing and information system VAS 5051.

Note

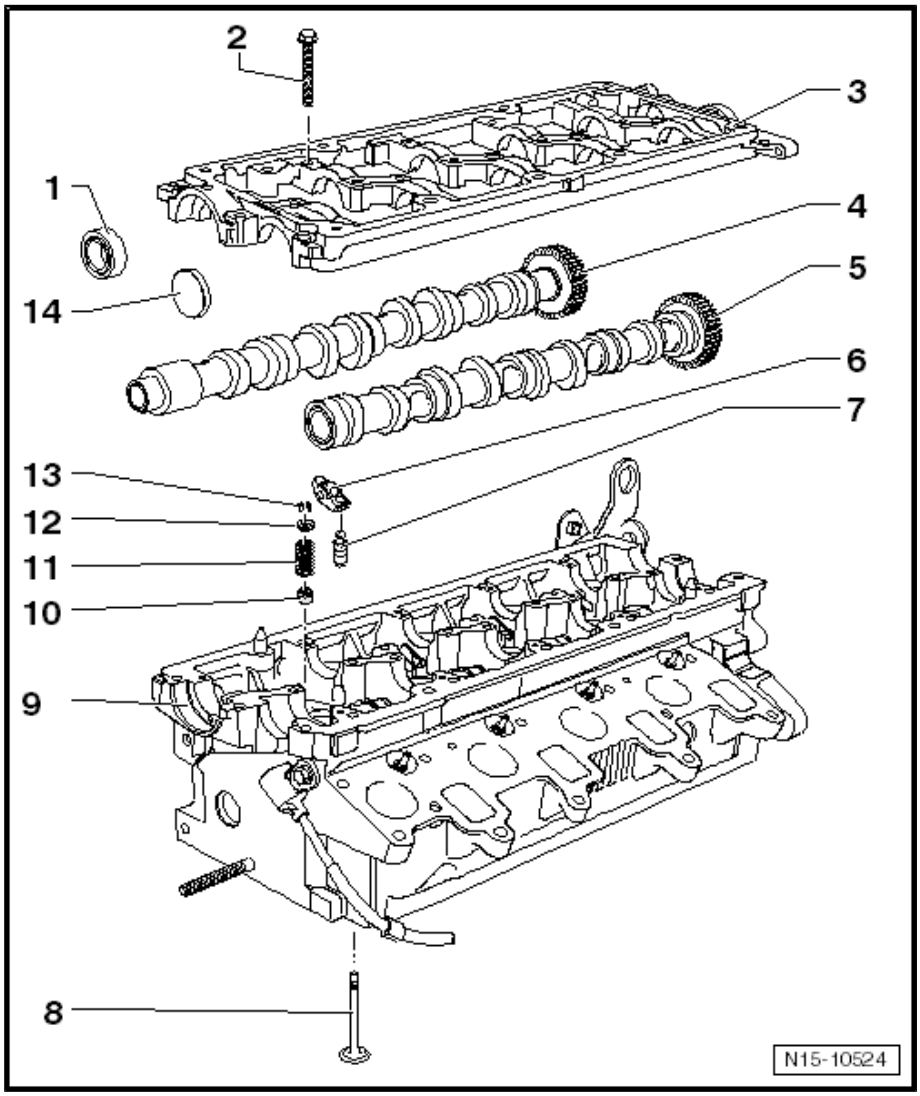
After deleting the fault memory of the engine control unit the readiness code must be re-generated.

2 Valve gear

2.1 Summary of components

Note

- *After installing the camshafts, the engine must not be cranked or started for about 30 minutes. The hydraulic clearance compensation elements must settle (otherwise the valves would strike the pistons).*
- *After carrying out work on the valve gear, carefully crank engine at least 2 revolutions to ensure that no valve touches the piston when the engine is started.*
- *Always replace gasket rings and seals.*



1 - Sealing ring

- ❑ do not additionally lubricate or grease sealing lips of the sealing ring
- ❑ before fitting remove oil residues on the camshaft studs with a clean cloth
- ❑ before fitting cover slot on the camshaft cone with adhesive tape (e.g. Scotch tape).
- ❑ removing and installing ⇒ page 91

2 - 10 Nm

- ❑ order of tightening ⇒ page 92

3 - Bearing frame

- ❑ pay attention to sequence for loosening and tightening ⇒ page 92
- ❑ seal with silicone sealant -D 176 501 A1-

4 - Exhaust camshaft

- ❑ removing and installing ⇒ page 92

5 - Inlet camshaft

- ❑ removing and installing ⇒ page 92

6 - Roller rocker arm

- ❑ Mark installation position
- ❑ do not interchange
- ❑ Check smooth operation of cylindrical-roller bearings
- ❑ oil contact surfaces

7 - hydraulic balancing element

- ❑ Mark installation position
- ❑ oil the contact surfaces before installing

8 - Valve

- ❑ do not rework, only grinding in is permissible
- ❑ mark the fitting position for re-installation
- ❑ Valve dimensions ⇒ page 99
- ❑ inspecting valve guides ⇒ page 99

9 - Cylinder head

- ❑ pay attention to the notes ⇒ page 74
- ❑ check for distortion ⇒ page 76
- ❑ removing and installing ⇒ page 76
- ❑ after replacing fill entire system with fresh coolant

10 - Valve stem seal

- ❑ replace ⇒ page 96

11 - Valve spring

12 - Valve spring retainer

13 - Collets

14 - Screw cap

- ❑ replace
- ❑ removing: Plunge into the installed bearing frame using a screwdriver and lever out.
- ❑ installing: Drive in without sealant using a suitable thrust piece until flush.

2.2 Replacing camshaft gasket ring

Special tools and workshop equipment required

- ♦ Insertion tool -MP 1-214 (10-203)-
- ♦ Gasket ring extractor -T30003 (3240)-
- ♦ Screw M12 x 1.5 x 75 from the insertion tool -MP 1-214 (10-203)-

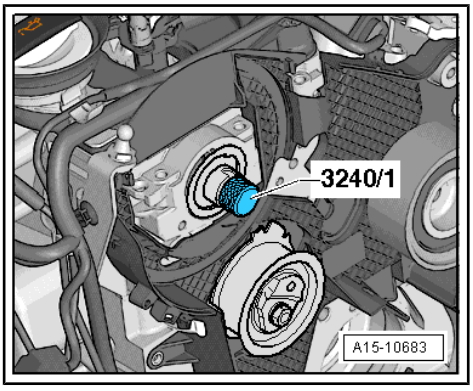
Removing

– Take toothed belt off toothed belt sprocket of camshaft and toothed belt sprocket of high pressure pump ⇒ page 39 .

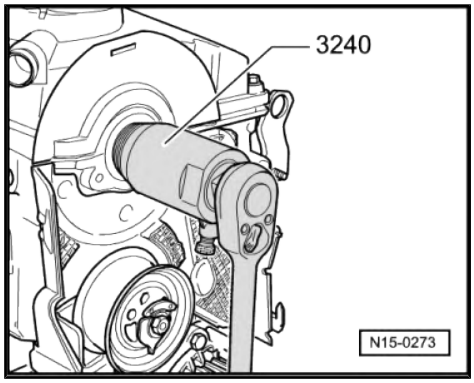
– Remove timing belt gear - camshaft and hub ⇒ page 92 .

– Insert thrust piece -3240/1- into the camshaft.

– Unscrew inner part of the gasket ring extractor -3240- 2 turns (approx. 3 mm) out of the outer part and lock with knurled screw.



– Oil the thread head of the gasket ring extractor, position and forcely screw into the gasket ring as far as possible.
– Release knurled screw and turn the inner side against the camshaft until the gasket ring is pulled out.

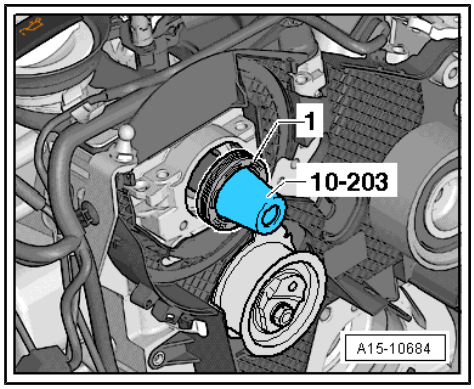


Install

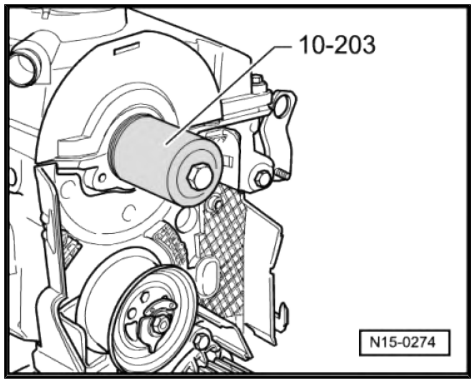
Note

The sealing lip of the gasket ring must neither be oiled nor greased additionally.

– Fit the guide bushing from -MP 1-214 (10-203)- onto the camshaft as shown in the illustration.
– Carefully slide the gasket ring -1- over the guide bushing onto the camshaft.



– Press in the gasket ring with the thrust piece of the inserting device -MP 1-214 (10-203)- and the screw M12 x 1.5 x 75 up to the stop.
– Install hub and toothed belt sprocket of camshaft ⇒ page 92 .
– Installing the timing belt ⇒ page 44 .



2.3 Removing and installing camshafts

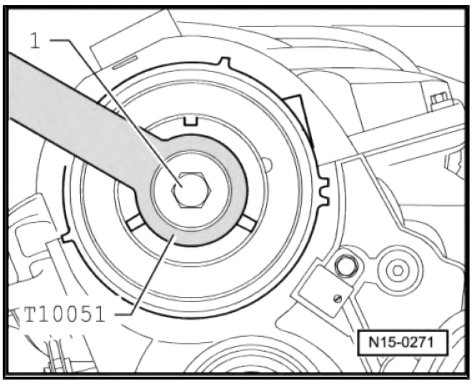
Special tools and workshop equipment required

- Counterholder -T10051 -
- Extractor -T10052-
- Camshaft-insertion tool -T40094-
- Camshaft-insertion tool -T40095-
- Tensioning tool -T40096/1-
- Silicone sealant -D 176 501 A1-
- Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- Cleaning agent and grease remover e.g. -D 000 401 04-
- Protective goggles and gloves

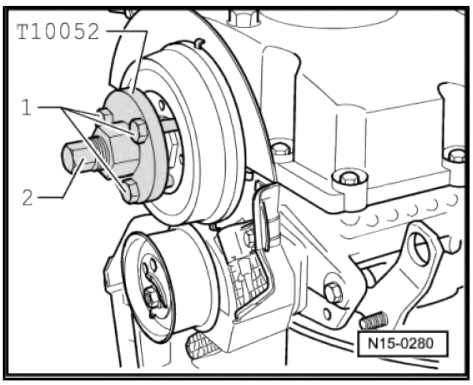
Removing

- Cylinder head fitted.

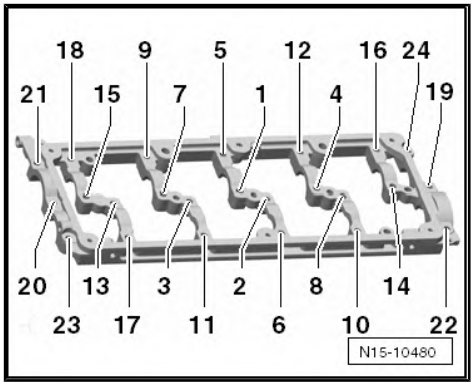
– Take toothed belt off toothed belt sprocket of camshaft and toothed belt sprocket of high pressure pump ⇒ page 39 .
– Remove cylinder head cover ⇒ page 70 .
– Remove camshaft sprocket.
– Slacken screw -1- for the hub of the camshaft, to do so counterhold with counterholder -T10051- .
– Unscrew screw by approx. 2 turns.



– Position the extractor -T10052- at the hub of the camshaft and screw the screws -1- into the hub.
– Screw in the screw -2- for removing the hub of the camshaft and counterhold on the hexagon (with open-end wrench SW 30) of the extractor.
– Remove hub from cone of camshaft.
– Remove vacuum pump ⇒ page 87 .



– Release the screws for the bearing frame in the sequence -24...1-.
– Unscrew the screws and carefully loosen the bearing frame from the bonding.
– Mark the camshafts for reinstalling and remove.



Install

WARNING

Wear protective gloves when working with sealant and grease remover!

– Remove residual sealant on the bearing frame and cylinder head using a chemical sealant remover.
– Clean sealing surfaces, they must be free of oil and grease.
– Oil contact surfaces of camshafts.

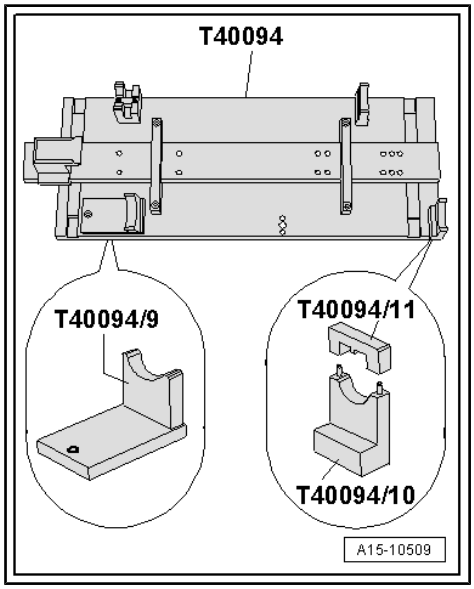
Caution

The camshafts must only be installed using the camshaft-insertion tool -T40094- as described below.

- *Otherwise the axial bearings in the bearing frame can be destroyed and the cylinder head must be replaced.*

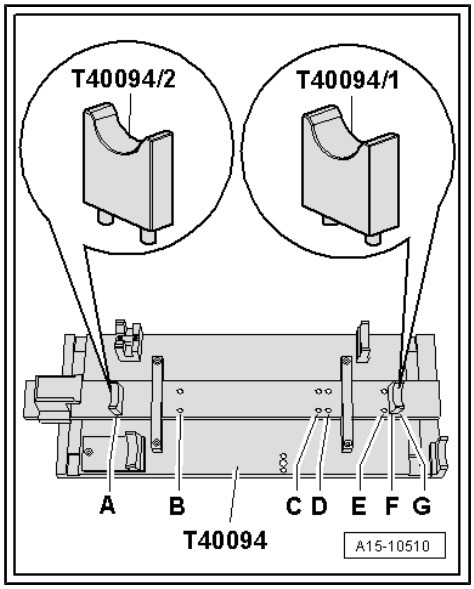
Set up the camshaft-insertion tool -T40094- as follows:

– Tighten the supports -T40094/9- and -T40094/10- (with -T40094/11-) to the base plate as shown in the illustration. It may be necessary to remove the bolted supports in this location.



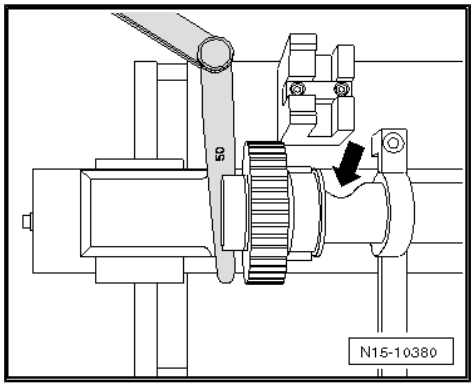
– Position the support -T40094/1- onto the plug location -F- and the support -T40094/2- onto the plug location -A-.

– Insert the inlet camshaft in the supports -T40094/1 - and -T40094/2- .



– The protrusion -arrow- of the cylinder head bolt must point to the outside.

– Fit on a feeler gauge of 0.50 mm in order to balance out any play and slide the support -T40094/8- into the groove of the inlet camshaft.



– Insert the outlet camshaft in the supports -T40094/9- and -T40094/11- .

– Interlock the outlet camshaft with the cover -T40094/11- .

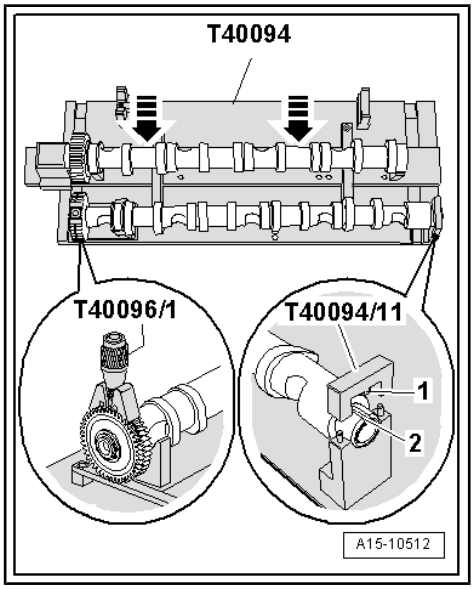
• The peg -1- of the cover must engage in the groove -2- in the camshaft.

– Position the tensioning tool -T40096/1- on the serration of the outlet camshaft in such a way that each leg of the tensioning tool engages into each one half-pinion.

• The wider leg must engage in the wider half-pinion.

– Tension the tensioning tool with the knurled wheel until the tooth flanks are flush with each other.

– Slide the inlet camshaft to the outlet camshaft until the serrations -arrows- engage.

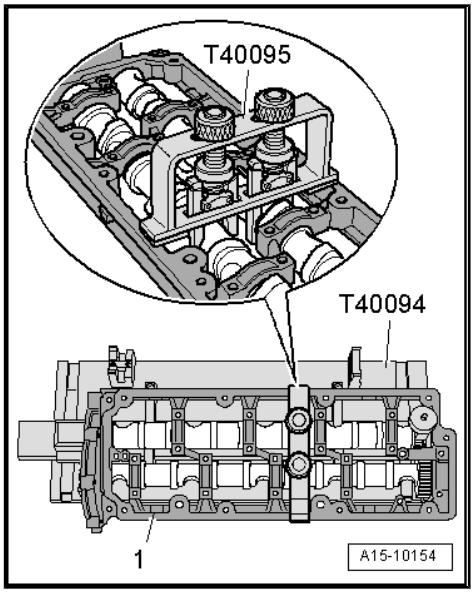


– Position the bearing frame onto the camshafts.

• All of the camshaft bearings must rest on the camshafts.

– Position the camshaft-insertion tool -T40095- and fix the camshafts in the bearing frame as shown in the illustration.

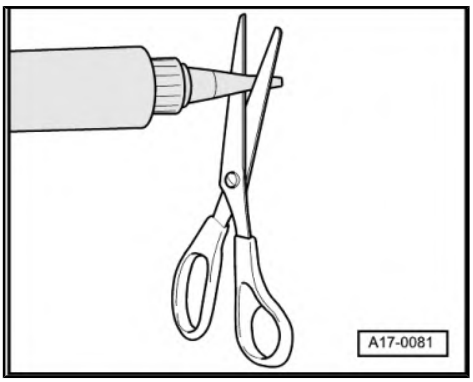
– Remove the cover -T40094/11- and slide the support -T40094/8- out of the groove of the inlet camshaft.



Note

Pay attention to the use by date on sealant.

– Cut off nozzle tube at the front marking (∅ of nozzle approx. 2 mm).



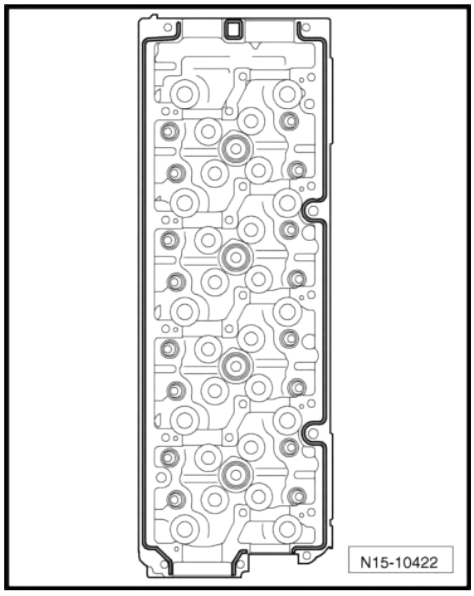
Caution

Risk of contamination of the camshaft bearings through excess sealant.

♦ *Do not apply thicker sealant beads than indicated.*

– Apply sealant beads onto the clean sealing surfaces of the cylinder head as shown in the illustration.

• Thickness of sealant beads: 2…3 mm.



Note

The bearing frame must be installed within 5 minutes after applying the silicone sealant.

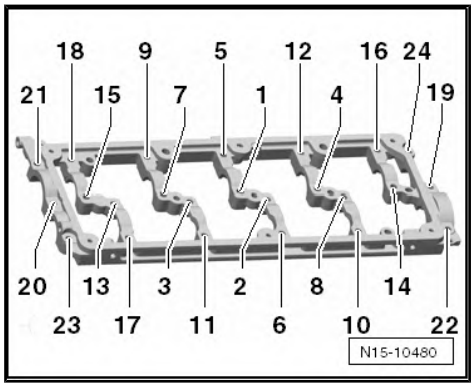
– Remove the camshafts together with the bearing frame, the camshaft-insertion tool -T40095- and the tensioning tool -T40096/1- from the camshaft-insertion tool -T40094- and carefully fit into the cylinder head.

– First of all tighten the screws and the nuts for the bearing frame in the sequence -1°...°24- by hand.

• The bearing frame must rest on the cylinder head with its complete contact surface.

– First of all tighten the screws and the nuts for the bearing frame in the sequence -1°...°24- by hand.

Tightening torque: 10 Nm



– Remove the camshaft-insertion tool -T40095- and the tensioning tool -T40096/1- .

Further installation occurs in reverse order, while paying attention to the following:

– Install camshaft seal ⇒ page 91 .

– Drive in new screw cap ⇒ page 90 .

– Install vacuum pump ⇒ page 87 .

– Install cylinder head cover ⇒ page 70 .

Note

♦ *After installing the camshafts, the engine must not be cranked or started for about 30 minutes. The hydraulic clearance compensation elements must settle (otherwise the valves would strike the pistons).*

♦ *After carrying out work on the valve gear, carefully crank engine at least 2 revolutions to ensure that no valve touches the piston when the engine is started.*

2.4 Replacing valve stem seals

Special tools and workshop equipment required

♦ Valve stem seal extractor -MP 1-230 (3364)-

♦ Insertion tool -MP 1-233 (3365)-

♦ Disassembly and assembly device for valve collets -VAS 5161- with knurled spacer ring -VAS 5161/23-1- and guide plate -VAS 5161/23-

Work procedure

– Remove all glow plugs ⇒ page 205 .

– Remove the camshafts ⇒ page 92 .

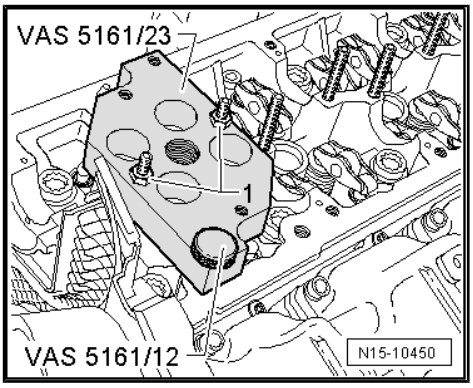
– When installing again, mark the assignment of the roller rocker arms and the hydraulic clearance compensation elements.

– Remove the roller rocker arms together with the hydraulic balancing elements and lay aside on a clean surface.

– Put the piston of the relevant cylinder at “bottom dead centre”.

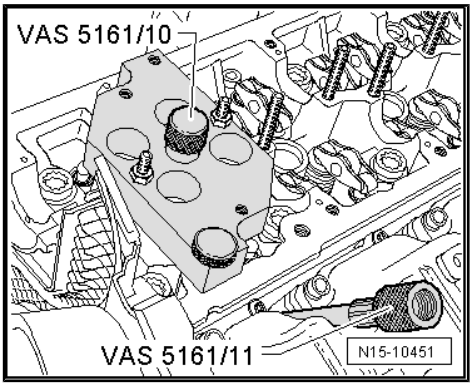
– Position the guide plate -VAS 5161/23- onto the cylinder head.

– Screw the guide plate to the side of the intake manifold with the knurled screw -VAS 5161/12- and to the pin screws with 2 nuts M6 without collar -1- by hand until it fits on.

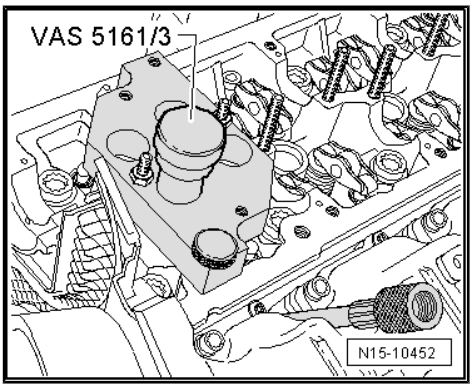


– Screw the sealing bolt -VAS 5161/10- into the guide plate.

– Screw the adapter -VAS 5161/11 - into the relevant pencil type glow plug thread by hand.



– Insert the impact drift -VAS 5161/3- into the guide plate and knock off the tightly fitted valve collets using a plastic hammer.



– Screw the detent part -VAS 5161/6- with the interlocking fork -VAS 5161/5- into the guide plate.

– Slide the knurled spacer ring -VAS 5161/23-1- onto the assembly cartridge -VAS 5161/8- .

– Connect the adapter to the compressed air with a commercially available intermediate piece and apply constant pressure.

• Minimum pressure: 0.6 MPa (6 bar) overpressure.

– Hook the pressure fork -VAS 5161/2- onto the detent part and push the assembly cartridge downwards.

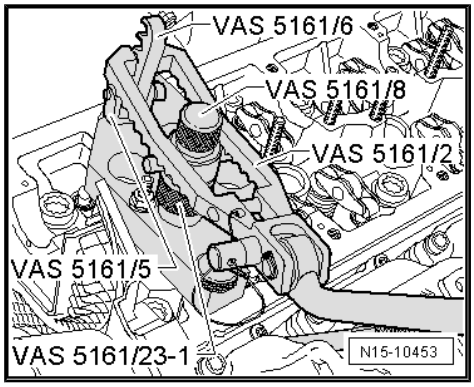
– Turn simultaneously the knurled screw of the assembly cartridge to the right, until the tips click into the valve collets.

– Rotate the knurled screw to the left and to the right, by doing so the valve collets are pressed apart and are installed in the assembly cartridge.

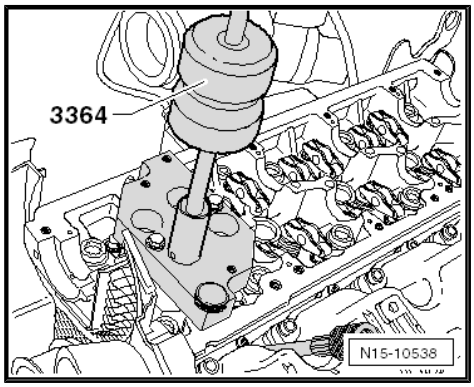
– Release the pressure fork.

– Remove the assembly cartridge with the knurled spacer ring.

– Remove the valve spring with the valve spring retainer.



– Pull off valve stem seal with extractor for valve stem seal -3364- .



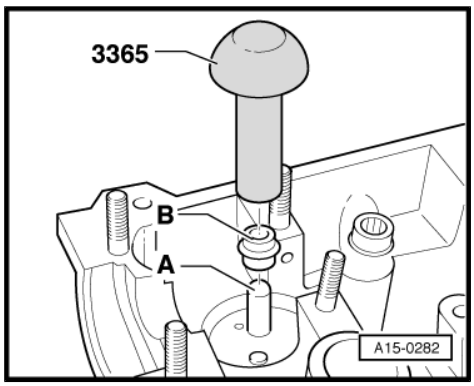
– Fit the plastic bushing -A-, which is attached to the new valve stem seals -B-, onto the valve stem.

– Lightly oil sealing lip of the new valve stem seal.

– Slide the valve stem seal onto the plastic bushing.

– Carefully press the valve stem seal with the valve stem seal insertion tool -3365- onto the valve guide.

– Remove plastic sleeve.

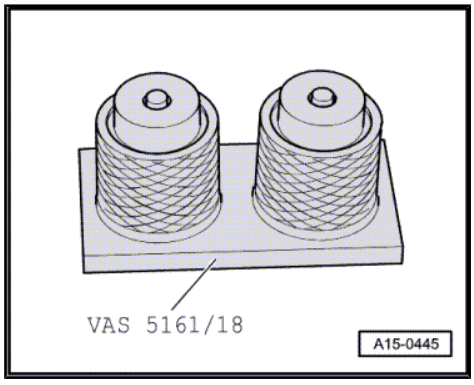


If the valve collets were removed from the assembly cartridge, first of all they must be inserted into the insertion device for valve collets -VAS 5161/18- .

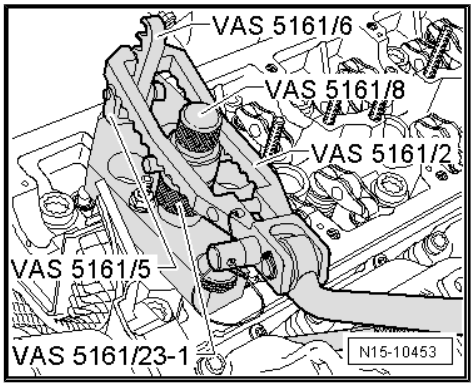
• The large diameter of the valve collets points to the top.

– Insert the valve spring and the valve spring retainer.

– Press the assembly cartridge from the top onto the insertion device for valve collets and lift up the valve collets.



– Re-insert the assembly cartridge into the guide plate - VAS 5161/23- .
– Press down the pressure fork and turn the knurled screw to the left and to the right while pulling it upwards, by doing so the valve collets are inserted.
– Release the pressure fork on tightened knurled screw.
– Repeat the procedure for each valve.



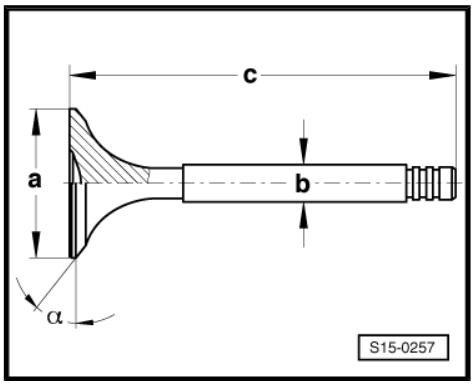
Assembling together

Installation is performed in the reverse order, pay attention to the following points:

– Ensure that all the roller arms are correctly positioned on the valve stem ends and are clipped in place on the relevant hydraulic balancing elements.
– Install camshafts ⇒ page 92 .
– Install pencil type glow plugs ⇒ page 205 .

2.5 Valve dimensions

Dimension		Inlet valve	Exhaust valve
∅ a	mm	26,50 ... 26,70	24,40 ... 24,60
∅ b	mm	5,968 ... 5,982	5,958 ... 5,972
c	mm	99,30	99,10
α	∠°	45	45



Note

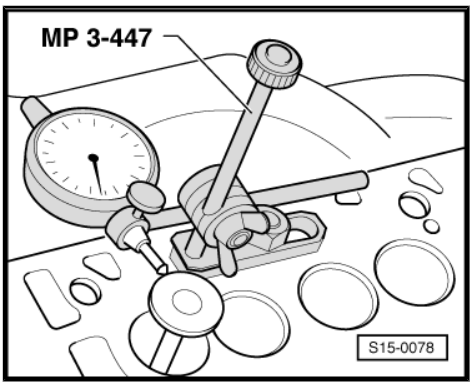
Valves must not be reworked. Only grinding in is permissible.

2.6 Inspect valve guides

Special tools and workshop equipment required

♦ Universal dial gauge holder -MP 3-447 (VW 387)-
♦ Dial gauge

Test sequence



Note

If the valves are replaced when carrying out repair work, use new valves for the measurement.

– Insert valve into valve guide. End of valve stem must be flush with guide.
• Valve rock: max. 1.3 mm.

Note

If the wear limit is exceeded, repeat measurement with new valves. If the wear limit is again exceeded, replace cylinder head. The valve guides cannot be replaced.

17 – Lubrication

1 Removing and installing parts of the lubrication system

Note

- *The oil level must not be above the max. marking - risk of damage to catalytic converter!*
- *If considerable quantities of metal swarf or abrasion is found when carrying out engine repairs, this can be subject to damage to the crankshaft and conrod bearings. In order to avoid consequential damage, after the repair perform the following tasks:*

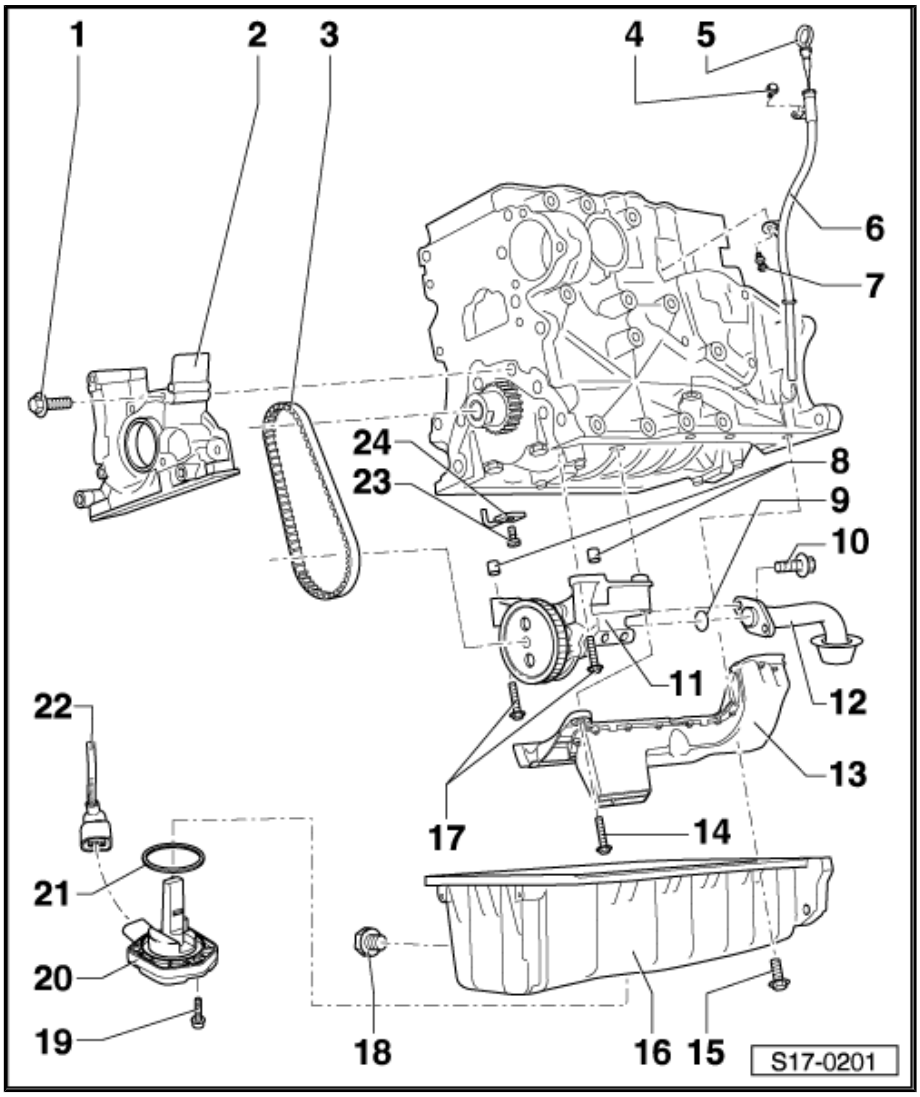
– Carefully clean the oil galleries.

– Replace engine oil cooler.

– Replace oil filter element.

Check the engine oil, amount of oil and oil specification ⇒ Maintenance ; Fabia II .

1.1 Removing and installing parts of the lubrication system - Summary of components



1 - 15 Nm

2 - Sealing flange on the belt pulley side

- ❑ must be positioned on dowel sleeves
- ❑ removing and installing ⇒ page 52
- ❑ Replace crankshaft seal on belt pulley side ⇒ page 50

3 - Toothed belt for oil pump

- ❑ check for wear and damage, replace if necessary.

4 - 10 Nm

5 - Dipstick

- ❑ The oil level must not exceed the MAX. marking

6 - Guide tube

7 - Clip

8 - Dowel sleeves

9 - O-ring

- ❑ replace

10 - 10 Nm

11 - Oil pump

- ❑ removing and installing ⇒ page 113
- ❑ with pressure relief valve 1.2 MPa (12 bar)
- ❑ before installing, check whether both dowel sleeves are present
- ❑ if there is any scoring on the contact surfaces of the gears, replace the oil pump
- ❑ Tighening torque of oil pump cover at oil pump housing: 10 Nm

12 - Intake manifold

- ❑ Clean strainer if dirty

13 - Baffle

14 - 15 Nm

15 - 15 Nm

16 - Oil pan

- ❑ removing and installing ⇒ page 110
- ❑ install with silicone sealant -D 176 404 A2-

17 - 15 Nm

18 - Drain plug, 30 Nm

- ❑ with integrated gasket ring
- ❑ replace

19 - 10 Nm

20 - Oil level and oil temperature sender -G266-

- ❑ removing and installing ⇒ page 102
- ❑ check ⇒ Vehicle diagnosis, testing and information system VAS 5051

21 - O-ring

- ❑ replace

22 - Wiring loom to oil level and oil temperature sender

23 - Pressure relief valve, 27 Nm

- ❑ opens at 0.25..0.32 MPa (2.5..3.2 bar) overpressure
- ❑ replace without sealant
- ❑ removing and installing ⇒ page 66

24 - Oil injection nozzle

- ❑ for piston cooling
- ❑ removing and installing ⇒ page 66

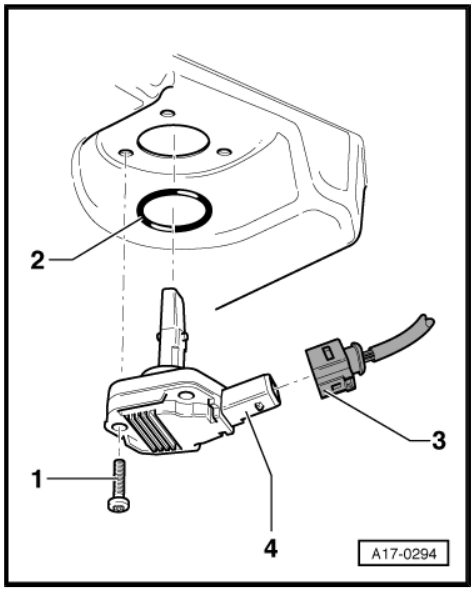
1.2 Removing and installing oil level and oil temperature sender -G266-

Removing

– Drain engine oil ⇒ Maintenance ; Fabia II .

– Disconnect plug connection -3-.

– Release screws -1- and remove oil level and oil temperature sender -G266 - -4-.



Install

Installation is performed in the reverse order, pay attention to the following points:

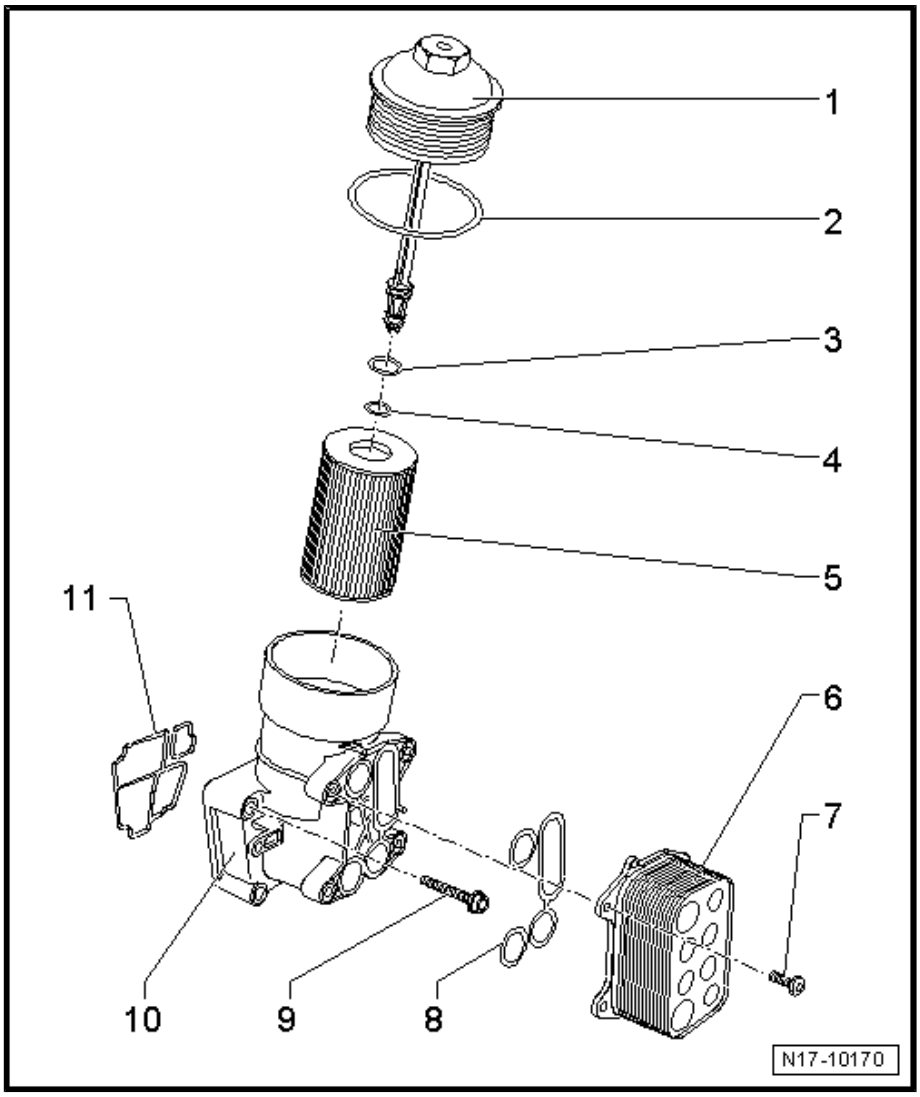
- Tightening torque Pos. 19 ⇒ page 101

Note

Replace gasket ring -2- and screw -1-.

– Top up with engine oil and check the oil level ⇒ Maintenance ; Fabia II .

1.3 Oil filter holder - Summary of components



1 - Screw cap - 25 Nm
- ❑ slacken and tighten with oil filter wrench -3417-

2 - O-ring
- ❑ replace

3 - O-ring
- ❑ replace

4 - O-ring
- ❑ replace

5 - Oil filter element
- ❑ pull off cap (Pos. 1)
- ❑ when replacing the oil filter element, replace O-rings (Pos. 2, 3 and 4)
- ❑ Check fitting position
- ❑ pay attention to change intervals ⇒ Maintenance ; Fabia II

6 - Engine oil cooler
- ❑ removing and installing ⇒ page 106
- ❑ connection diagram for coolant hoses ⇒ page 117

7 - 11 Nm

8 - Gasket
- ❑ replace

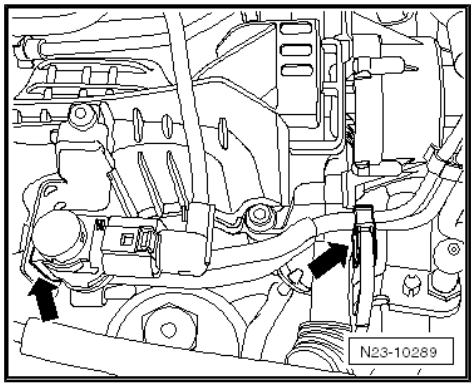
9 - 15 Nm + torque a further 90° (1/4 turn)
- ❑ replace
- ❑ tighten crosswise

10 - Oil filter holder
- ❑ removing and installing ⇒ page 104
- ❑ Tightening sequence ⇒ page 104

11 - Gasket
- ❑ replace

Note

- *To oil filter change*
- *Unclip the vacuum lines, -arrows- and lay them to the side.*



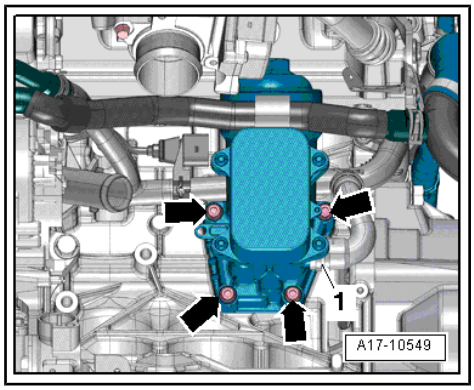
Oil filter holder, tightening torques and tightening sequence

Note

Replace screws for oil filter holder.

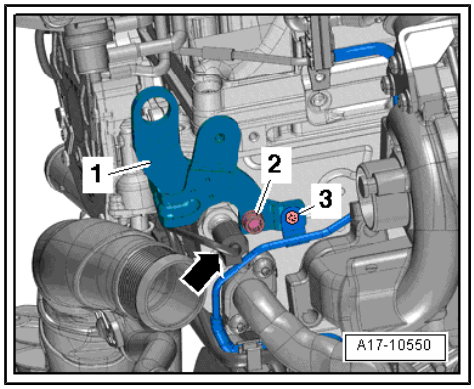
– First of all insert the screw at the top left and at the bottom right.
– Tighten the screws in 2 stages:

Stage	Screws	Torque/torquing angle
1.	-Arrows-	14 Nm
2.	-Arrows-	180° ($^1/_2$ turn)



Oil pressure switch -F1-

- with gasket
- Replace gasket rings
- Switching pressure 0.03 ... 0.06 MPa (0.3 ... 0.6 bar)
- removing and installing ⇒ page 108
- check ⇒ page 113
- 20 Nm



1.4 Removing and installing the oil filter holder with the engine oil cooler

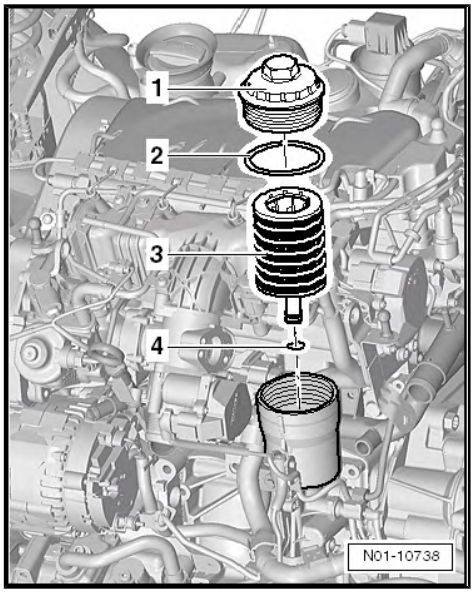
Special tools and workshop equipment required

- Assembly tool -T10118-
- Catch pan , e.g. -VAS 6208-
- Removal tool for inner lining of the door panel -MP8-602/1-
- Old oil collecting and suction equipment , e.g. -V.A.G 1782-
- Pliers for spring strap clamps

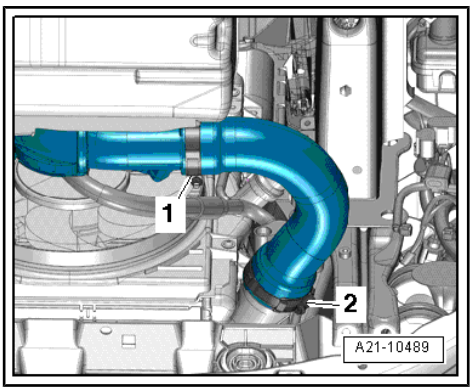
Removing

– Remove top engine cover ⇒ page 15 .
– Drain coolant ⇒ page 117 .

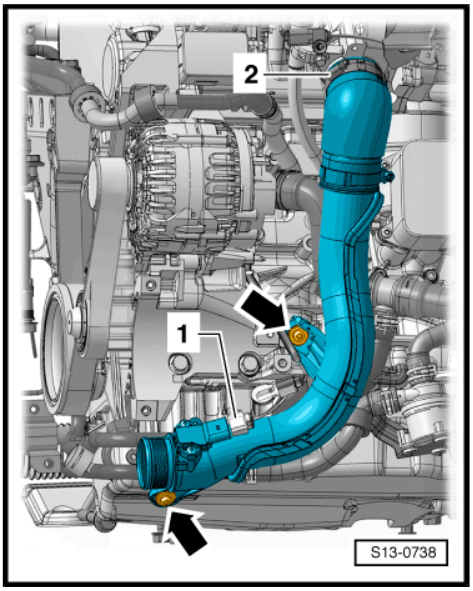
– Remove oil filter insert.



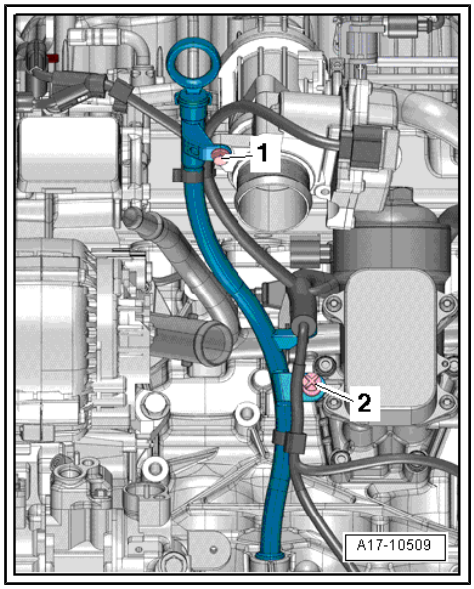
– Remove the charge air hose, to do so slacken the hose clamps -1- and -2-.



– Release screws -arrows-.
– Loosen hose clamp -2-.
– Disconnect the plug -1- at the charge pressure sender -G31- with intake air temperature sender -G42- and remove the right charge air pipe.



– Slightly pull out oil dipstick, unscrew screw -1-.
– Press off clip -2- with removal tool for inner lining of the door panel -MP8-602/1- .
– Pull out the oil dipstick guide pipe upwards out of the cylinder block and push it to the side.
– Position the catch pan , e.g. -VAS 6208- , under the engine.
– Place an old oil collecting and suction equipment -V.A.G 1782- under the engine.
– Screw out screws -arrows- and remove oil filter holder with engine oil cooler.



Install

• Tightening torques: ⇒ page 103

Installation is performed in the reverse order, pay attention to the following points:

Note

♦ *Replace gaskets, gasket rings and O-rings.*
♦ *Hose connections as well as charge air pipes/hoses must be free of oil and grease before being installed.*
♦ *The hose connections are secured with spring-type clips. In the event of repairs only use spring-type clips.*

– Install oil filter insert, fill with engine oil and check the oil level ⇒ Maintenance ; Fabia II .
– Top up or replace coolant if the engine oil cooler was replaced ⇒ page 117 .

1.5 Removing and installing engine oil cooler

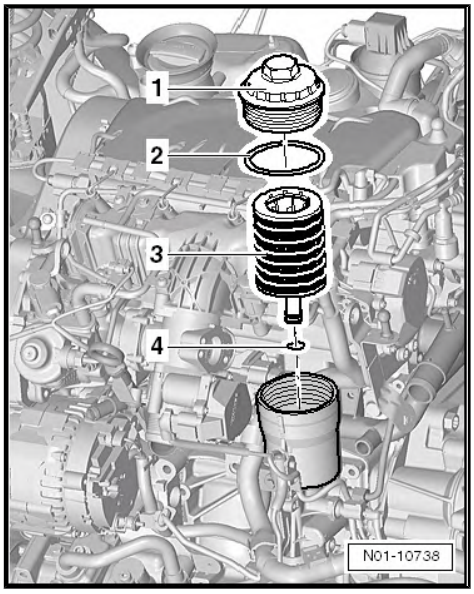
Special tools and workshop equipment required

♦ Catch pan , e.g. -VAS 6208-
♦ Old oil collecting and suction equipment , e.g. -V.A.G 1782-
♦ Pliers for spring strap clamps

Removing

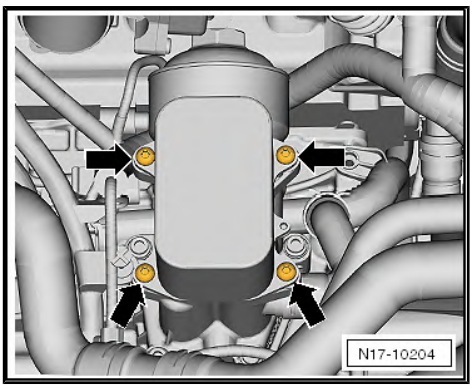
– Remove top engine cover ⇒ page 15 .
– Drain coolant ⇒ page 117 .

– Remove oil filter insert.



– Release screws -arrows-.

– Take the engine oil cooler out of the housing.



Install

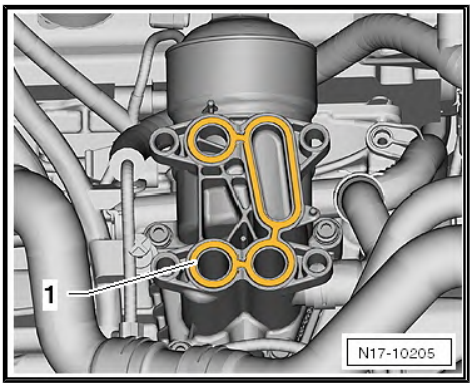
Installation is performed in the reverse order, pay attention to the following points:

Note

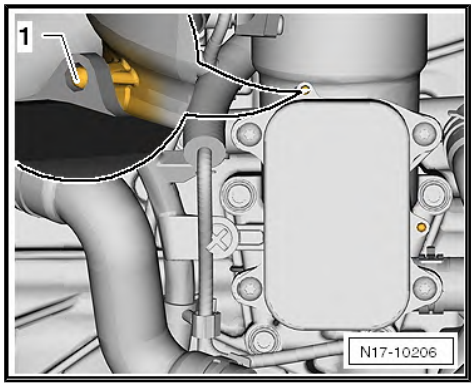
- *Replace gaskets, gasket rings and O-rings.*
- *Hose connections as well as charge air pipes/hoses must be free of oil and grease before being installed.*
- *The hose connections are secured with spring-type clips. In the event of repairs only use spring-type clips.*

– Insert new gaskets Pos. 8 ⇒ page 103 -1- in the supports of the oil filter holder.

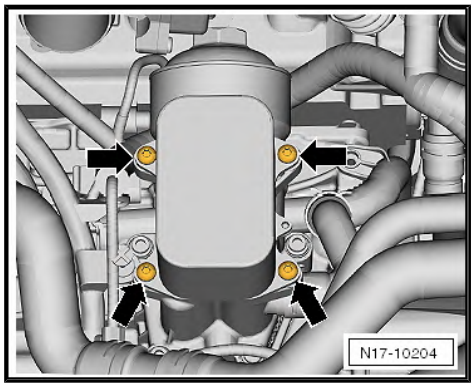
– Carefully slide the engine oil cooler onto the centering pins.



– Carefully push the engine oil cooler until it rests against the centering pins -1-.
– Position new screws and screw in up to the bearing face until flush.



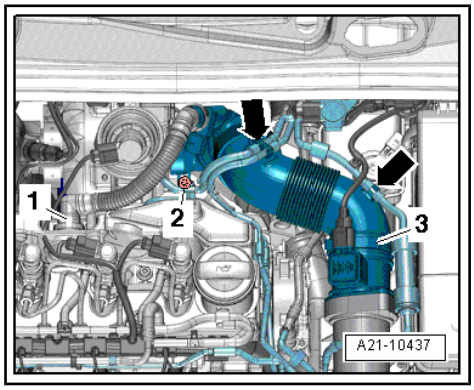
– Tighten the screws -arrows- crosswise in 3 stages:
♦ Stage 1: only tighten by hand
♦ Stage 2: 5 Nm
♦ Stage 3: 11 Nm
– Install oil filter insert, fill with engine oil and check the oil level ⇒ Maintenance ; Fabia II .
– Top up or replace coolant if the engine oil cooler was replaced ⇒ page 117 .



1.6 Removing and installing oil pressure switch -F1-

Removing

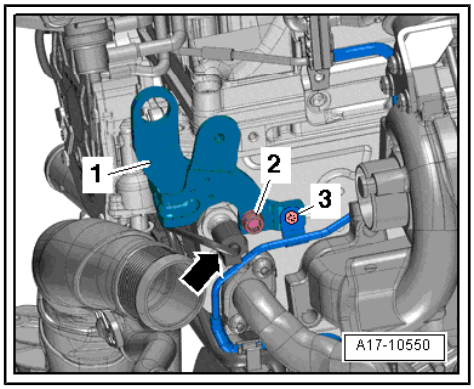
– Remove top engine cover ⇒ page 15 .
– Remove the hose for the crankcase ventilation -1-, to do so press the release buttons.
– Slacken hose clamp -3- and remove air guide pipe from air filter housing.
– Release vacuum hoses.
– Release screw -2-, swivel intake hose with connection fitting towards the rear and detach from exhaust gas turbocharger.



– Release screws -2- and -3- and remove engine lifting eye -1-.

– Disconnect plug connection -arrow-.

– Screw out oil pressure switch -F1- .



Install

- Tightening torques: ⇒ page 103

Installation is performed in the reverse order, pay attention to the following points:

Note

Replace gasket ring.

– Install inlet connection.

– Install vacuum line.

1.7 Parts of the oil feed line as well as the oil return-flow line and the support for the exhaust gas turbocharger - Summary of components

1 - 20 Nm

2 - 22 Nm

❑ Union nut for oil feed line at exhaust gas turbo-charger

3 - Oil feed line

4 - Oil return-flow line

❑ Replace gasket

5 - 20 Nm

6 - 25 Nm

❑ replace

7 - Connection pipe to exhaust gas recirculation radiator

❑ Replace gasket

8 - 10 Nm

9 - Support

❑ for exhaust gas turbo-charger

10 - Hollow screw - 60 Nm

❑ replace

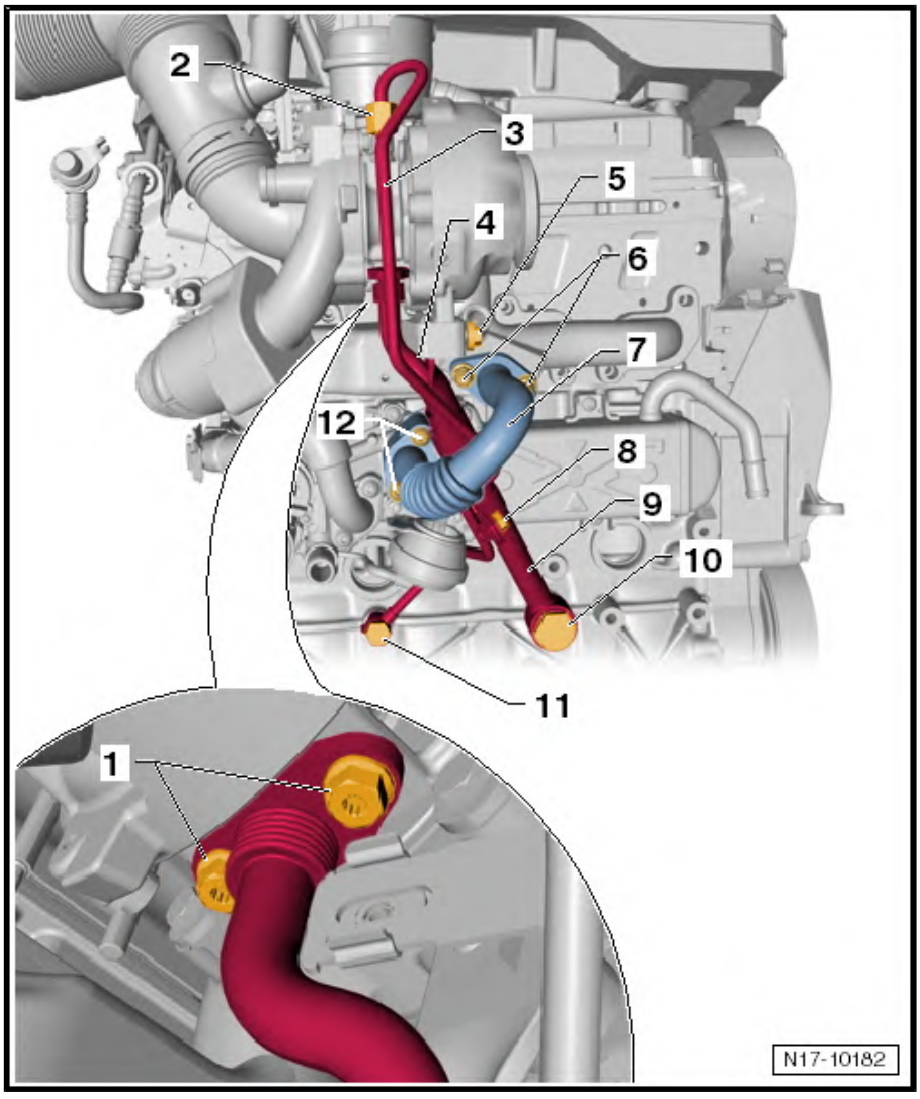
11 - Hollow screw - 30 Nm

❑ replace

❑ Replace gasket rings

12 - 25 Nm

❑ replace



1.8 Removing and installing oil pan

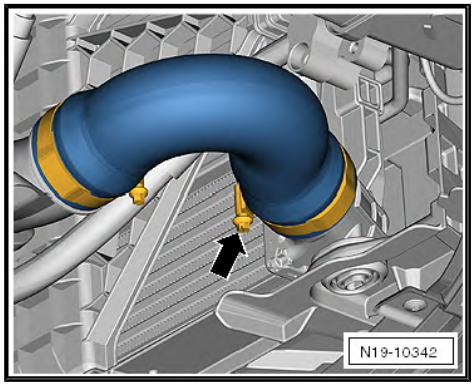
Special tools and workshop equipment required

- Wrench socket -T10058-
- Old oil collecting and suction equipment , e.g. -V.A.G 1782-
- Silicone sealant -D 176 404 A2-
- Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- Cleaning agent and grease remover e.g. -D 000 401 04-
- Protective goggles and gloves

Removing

– Remove noise insulation ⇒ Body Work ⇒ Rep. Gr. 50 .

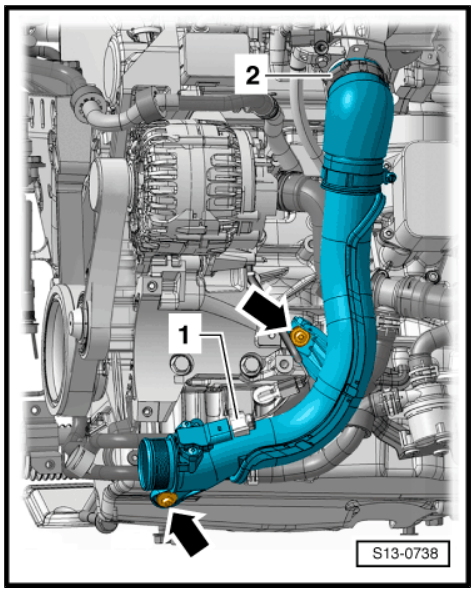
– Remove right charge air hose.



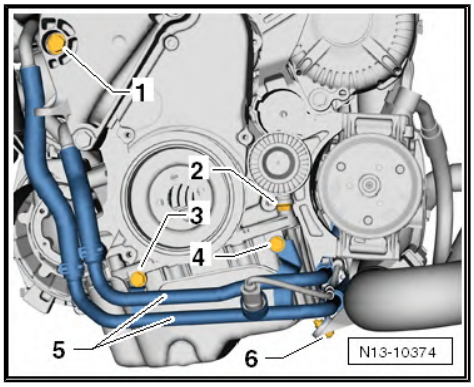
– Release screws -arrows-, push the right charge air pipe slightly to the side.

– Loosen hose clamp -2-.

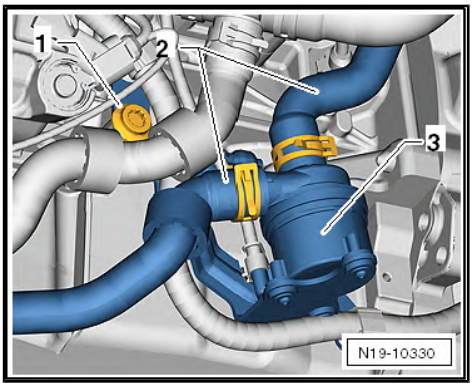
– Disconnect the plug -1- at the charge pressure sender -G31- / intake air temperature sender -G42- and remove the right charge air pipe.



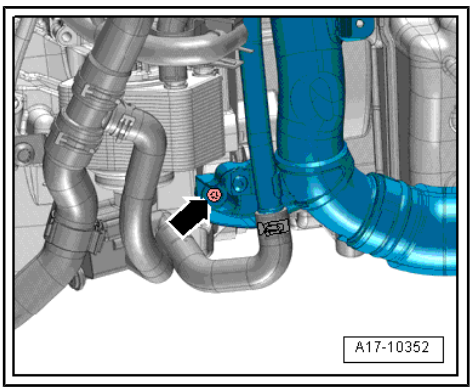
– Release screws -3, 4-.



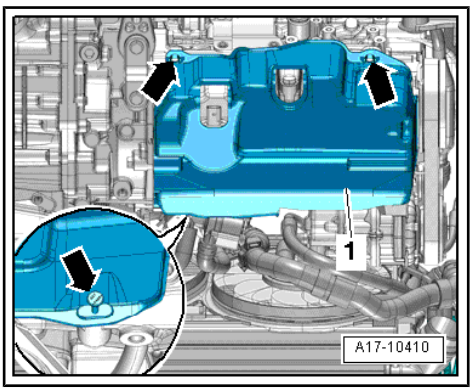
– Unscrew screw -1- and push the coolant recirculation pump 2 -V178- -3- to the side.



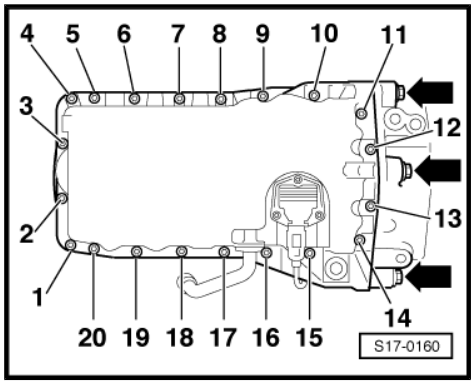
– Unscrew screw -arrow- on the left charge air pipe.
– Disconnect plug at oil level and oil temperature sender - G266- .



– Remove noise insulation of oil pan -1-, to do so slacken the fixing parts -arrows-.
– Suction off engine oil -V.A.G 1782- with old oil collecting and suction equipment ⇒ Maintenance ; Fabia II .



– Release screws of oil pan/gearbox -arrows-.
– Loosen bolts -1...20- crosswise and release.
– Remove oil pan, if necessary release by applying slight blows with a rubber-headed hammer.



Install

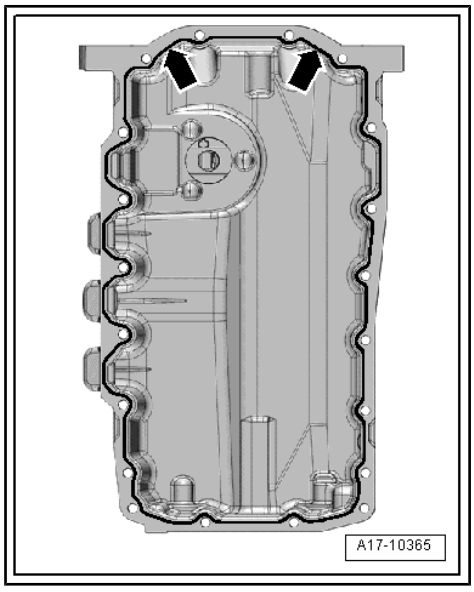
Installation is performed in the reverse order, pay attention to the following points:

WARNING

Wear protective gloves when working with sealant and grease remover!

– Remove residual sealant from the sealing surfaces on the cylinder block and on the oil pan with chemical sealant remover.
– Degrease the sealing surfaces.
– Cut off nozzle tube at the front marking (∅ of nozzle approx. 3 mm).

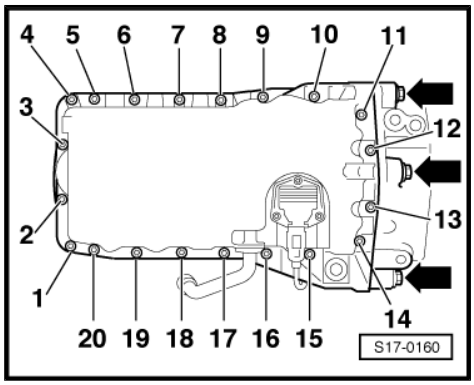
– Apply silicone sealant bead -D 176 404 A2- -arrow- to the clean sealing surface of the oil pan, as shown.
• Thickness of sealant bead: 2…3 mm.



Note

- *The sealant bead must not be thicker than 3 mm. Otherwise, excess sealant may get into the oil pan and clogg the strainer in the oil suction pipe.*
- *Take particular care when applying the sealant bead in the area of the sealing flange on the gearbox side -arrows-.*
- *The oil pan must be installed within 5 minutes after applying the silicone sealant -D 176 404 A2- .*

– Fit on oil pan immediately and tighten the bolts as follows:
– First of all pre-tighten bolts -1...20- crosswise to 5 Nm.
– Tighten the bolts of the oil pan/gearbox -arrows- to a torque of 40 Nm.
– Tighten screws -1...20- crosswise to 15 Nm.



Note

- *When installing the oil pan with the engine removed, ensure that the oil pan is flush with the cylinder block at the flywheel side.*
- *After installing the oil pan, allow the sealant to dry for about 30 minutes. Only then may engine oil be filled in.*

– Fill with engine oil and check the oil level ⇒ Maintenance ; Fabia II .

1.9 Removing and installing oil pump

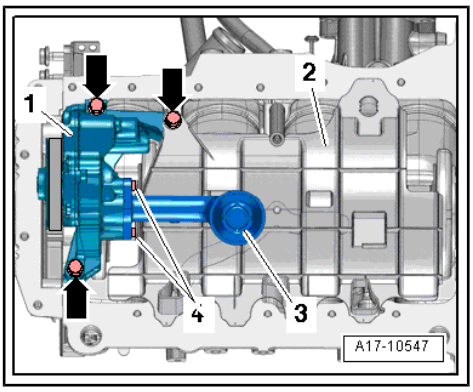
Removing

– Removing the oil pan ⇒ page 110 .

– If the oil pump must be replaced, release the screws -4- and remove the oil suction pipe -3-.

– Release screws -arrows- and remove baffle -2-.

– Unhook the oil pump -1- from the toothed belt and remove it.



Install

• Tightening torques: ⇒ page 101

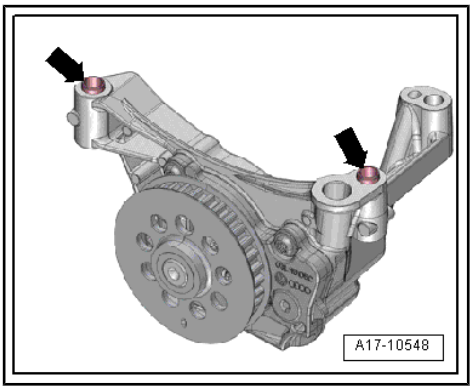
Installation is performed in the reverse order, pay attention to the following points:

Note

Replace O-ring.

– Insert top dowel sleeves into the oil pump.

– Check smooth operation of oil pump, to do so turn the toothed belt sprocket with a finger.



Note

If the oil pump is sluggish, it must be replaced.

– Check toothed belt for oil pump.

Note

♦ *Replace the toothed belt if damaged.*

♦ *After long duration the toothed belt can sag. This is not a fault and there is no reason to replace the toothed belt.*

– Installing the oil pan ⇒ page 110 .

1.10 Testing oil pressure and oil pressure switch

Special tools and workshop equipment required

♦ Oil pressure tester , e.g. -V.A.G 1342-

♦ Voltage tester , e. g. -V.A.G 1527 B-

♦ Measuring tool set , e.g. -V.A.G 1594 C-

Test conditions

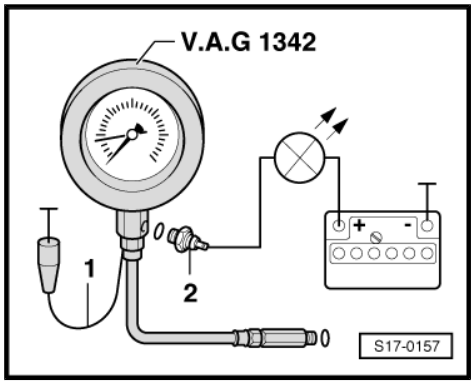
• Oil level o.k.

• Coolant temperature approx. 80°C.

Test preparations

– Remove oil pressure switch -F1- , Pos. 4 ⇒ page 74 .

– Screw the connection of the oil pressure tester -V.A.G 1342- into the hole for the oil pressure switch.
– Screw the oil pressure switch -2- into the oil pressure tester.



Testing oil pressure switch

– Connect brown cable -1- of oil pressure tester to earth (-).
– Unclamp the voltage tester with its auxiliary cables out of the measuring tool set on the oil pressure switch and plus (+) terminal on the battery.
• The LED should not light up.

If the LED lights up:

– Replace oil pressure switch.

If the LED does not light up:

– Start engine.

Note

Observe the testing equipment and the LED while actuating the starter since the switching point of the oil pressure switch can already be exceeded when starting up.

• At 0.03...0.06 MPa (0.3...0.6 bar) the LED should light up.

If the LED does not light up:

– Replace oil pressure switch.

Testing oil pressure

– Start engine.
• Oil pressure when engine idling: at least 0.05 MPa (0.5 bar).
• Oil pressure at a speed of 2000 rpm: at least 0.2 MPa (2.0 bar).

If the specified values are not reached: Oil pump defective.

– Replace oil pump.
• Oil pressure at a higher engine speed: max. 0.7 MPa (7.0 bar).

If the specified value is exceeded: Pressure relief valve defective.

– Replace oil filter holder.

19 – Cooling

1 Cooling system

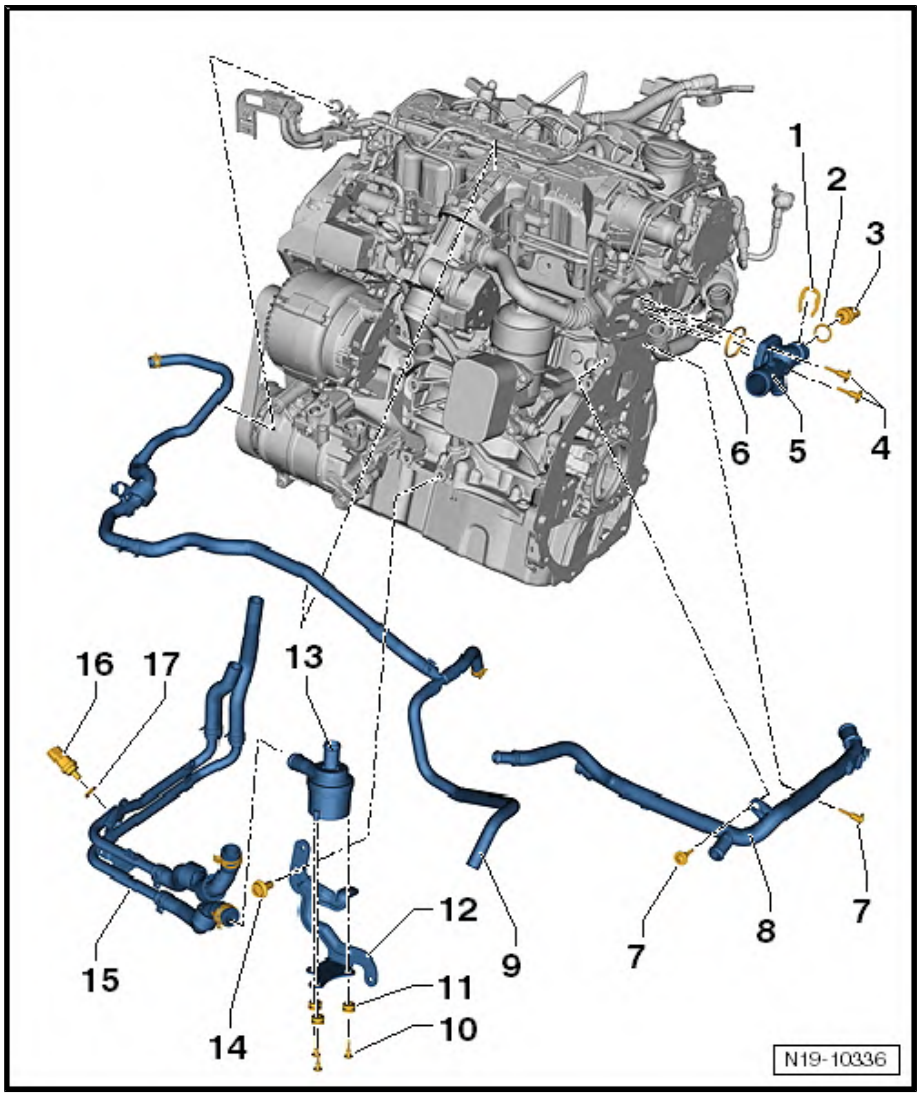
WARNING

Hot steam or hot coolant may escape when the compensation bottle is opened. Cover the cap with a cloth and open carefully.

Note

- *When the engine is warm the cooling system is under pressure. If necessary reduce pressure before repairs.*
- *Secure all hose connections with corresponding hose clips.*
- *Use pliers for spring strap clamps to fit the spring strap clips.*
- *Always replace seals and gasket rings.*
- *The arrows affixed to the coolant pipes and the coolant hoses must stand opposite to each other.*

1.1 Parts of cooling system, engine side



1 - Retaining clip
- ❑ check tightness

2 - O-ring
- ❑ replace

3 - Coolant temperature sender -G62-
- ❑ replace ⇒ page 121

4 - 9 Nm

5 - Connection fittings
- ❑ for cylinder head

6 - Gasket
- ❑ replace

7 - 5 Nm

8 - Coolant pipe - front

9 - Coolant hose

10 - 5 Nm

11 - Grommet
- ❑ not available separately

12 - Support
- ❑ for coolant recirculation pump 2 -V178-

13 - Coolant recirculation pump 2 -V178-
- ❑ removing and installing ⇒ page 120

14 - 40 Nm

15 - Coolant line
- ❑ to radiator for exhaust gas recirculation

16 - Coolant temperature sender at radiator outlet -G83-

17 - O-ring
- ❑ replace

1.2 Connection diagram for coolant hoses

1 - Expansion reservoir
- ❑ with cap
- ❑ Testing the pressure relief valve in the cap ⇒ page 132

2 - Radiator for exhaust gas recirculation
- ❑ after replacing fill entire system with fresh coolant ⇒ page 117
- ❑ removing and installing ⇒ page 201

3 - Heat exchanger for heating
- ❑ with quick coupling

4 - Cylinder head/cylinder block

5 - Engine oil cooler
- ❑ removing and installing ⇒ page 103

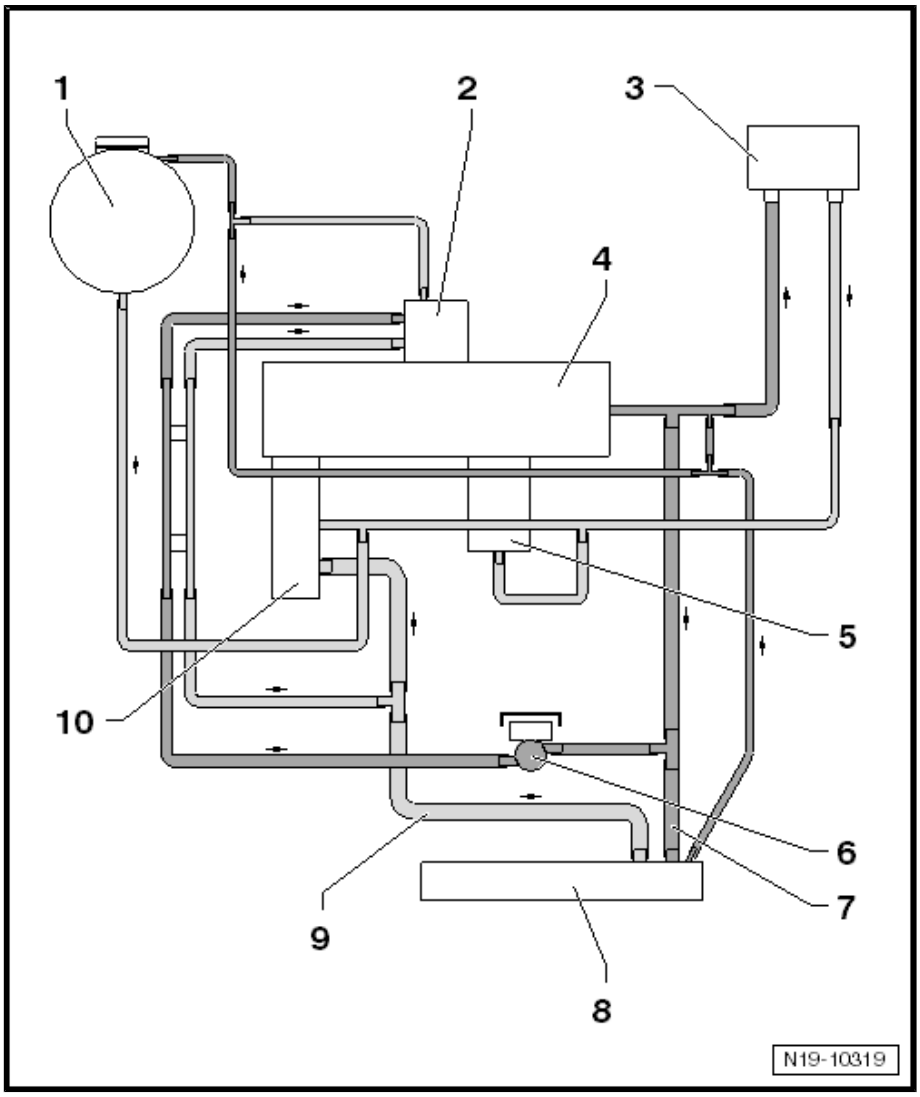
6 - Coolant recirculation pump 2 -V178-
- ❑ removing and installing ⇒ page 120

7 - Top coolant hose
- ❑ with quick coupling

8 - Radiator
- ❑ removing and installing ⇒ page 129
- ❑ after replacing fill entire system with fresh coolant ⇒ page 117

9 - Bottom coolant hose
- ❑ with quick coupling

10 - Coolant pump/coolant regulator
- ❑ removing and installing ⇒ page 123



1.3 Draining and filling up coolant

Special tools and workshop equipment required

- ♦ Catch pan for workshop crane e.g. -VAS 6208-
- ♦ Pliers for spring strap clamps
- ♦ antifreeze tester

Draining

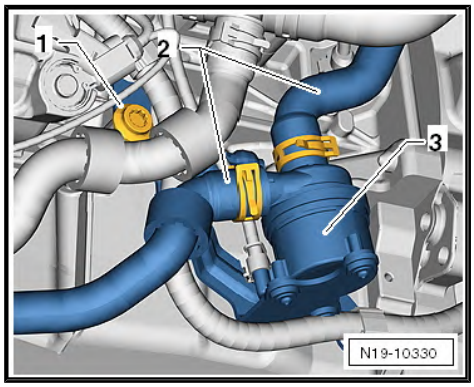
Note

Collect drained coolant in a clean container for proper disposal or reuse.

WARNING

Hot steam or hot coolant may escape when the compensation bottle is opened. Cover the cap with a cloth and open carefully.

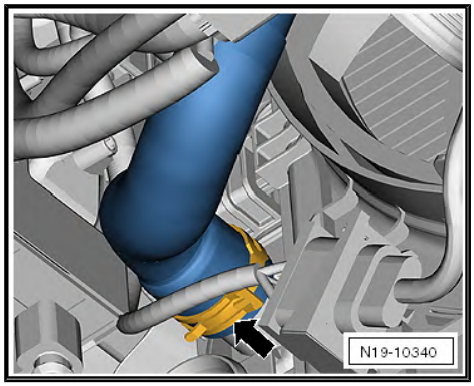
– Open the cap of the coolant expansion reservoir.
– Remove noise insulation ⇒ Body Work ⇒ Rep. Gr. 50 .
– Place a catch pan under the engine.
– Remove the coolant hoses -2- at the coolant recirculation pump 2 -V178- -3-.
– Remove the left charge air hose.



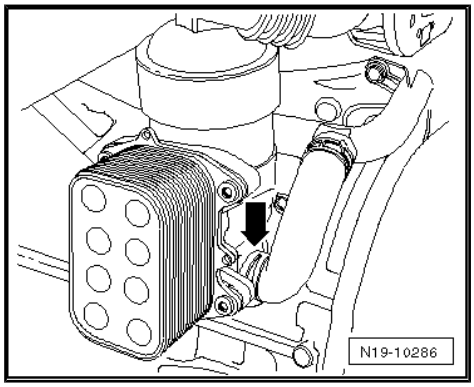
WARNING

Shut off the opening of the charge air cooler, e.g. with a clean foam piece, so that no coolant can penetrate.

– Remove the coolant hose from the radiator; to do so loosen the retaining clip -arrow-.



– Remove the coolant hose on the engine oil cooler -arrow- and drain residual coolant.

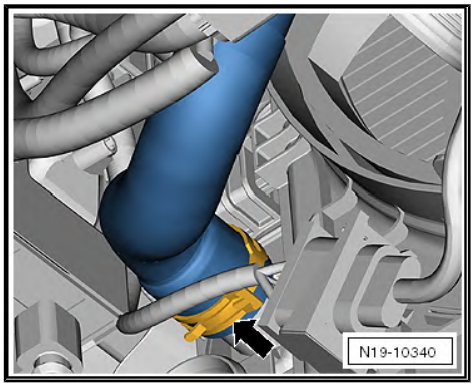


Filling up

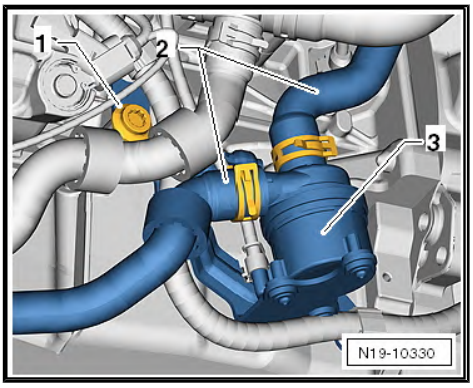
Note

Replace O-rings.

– Connect coolant hose at bottom of radiator -arrow-.
– Install left charge air hose.



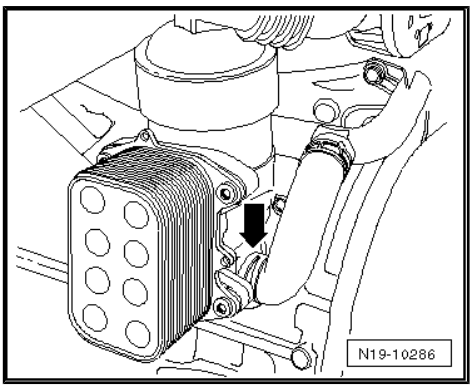
– Connect the coolant hoses -2- at the coolant recirculation pump 2 -V178- .



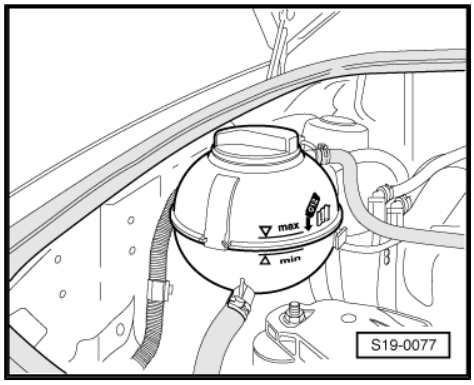
– Connect the coolant hose on the engine oil cooler -arrow-.

Select the appropriate coolant additive from the Electronic Catalogue of Original Parts Škoda or from the list of allowed coolant additives ⇒ Maintenance ; Fabia II .

– In a clean reservoir mix water and coolant additive in the correct mixing ratio ⇒ Maintenance ; Fabia II .



– Top up coolant in the expansion reservoir, until the “max. marking” of the coolant level is reached.
– Switch off the heating, and if present, the air conditioning system.
– Start engine, run for not more than 3 minutes at approx. 2000 rpm and while doing so top up coolant in the expansion reservoir.
– Tighten cap at expansion reservoir.
– Run engine until radiator fan starts.



WARNING

Hot steam may escape when the compensation bottle is opened.

- *Wear safety goggles and safety clothing, in order to avoid eye injuries and scalding.*
- *Cover the cap with cloths and open carefully.*

– Check the level of coolant when the expansion reservoir is closed and top up if necessary when the engine is cooled down.

• When engine is at operating temperature the coolant level must be at the “max. marking”, when engine is cold between the “min. marking” and the “max. marking”.

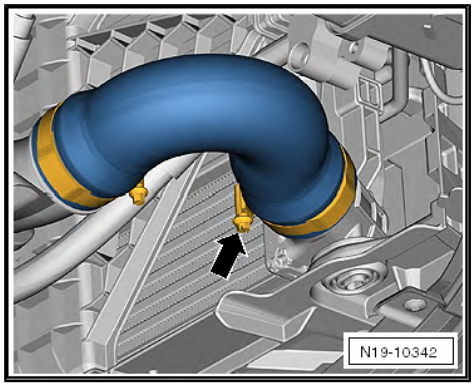
1.4 Remove and install coolant recirculation pump 2 -V178-

Special tools and workshop equipment required

- Hose clamps up to 25 mm -MP7-602 (3094)-
- Pliers for spring strap clamps

Removing

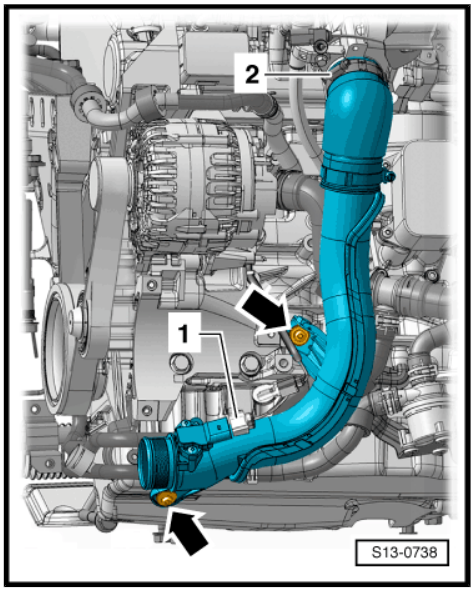
– Remove noise insulation ⇒ Body Work ⇒ Rep. Gr. 50 .
– Remove right charge air hose.



– Release screws -arrows-.

– Disconnect plug -1- at charge pressure sender -G31- with intake air temperature sender -G42- .

– Slacken the hose clamp -2- and push the right charge air pipe to the right.



Note

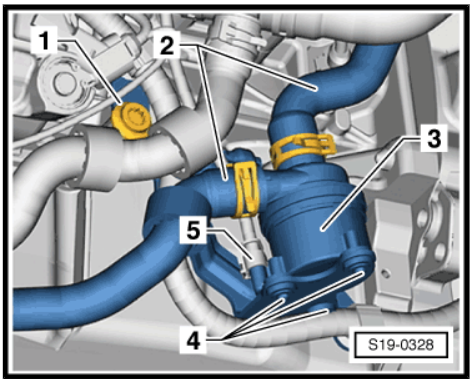
In order to collect flowing out coolant, place a cloth below the coolant recirculation pump 2 -V178- -3-.

– Pinch off coolant hoses -2- with hose clamps up to 25 mm - MP7-602- and remove.

– Unplug connector -5-.

– If necessary, loosen the cable guide at the pump holder.

– Release screws -4- and remove coolant recirculation pump 2 -V178- -3-.



Install

Installation is performed in the reverse order, pay attention to the following points:

Note

- *Hose connections as well as charge air pipes/hoses must be free of oil and grease before being installed.*
- *Secure all hose connections with corresponding hose clips.*

– Inspect coolant level, top up with coolant if necessary ⇒ page 117 .

1.5 Replace coolant temperature sender - G62-

Replace

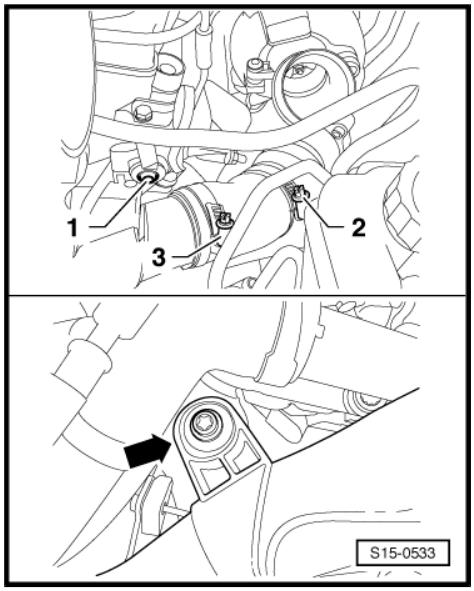
• Engine cold.

– Briefly open the cap for the coolant expansion reservoir in order to remove the remaining pressure in the coolant system.

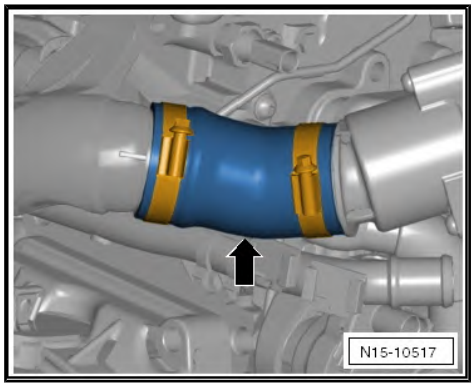
– Remove air filter ⇒ page 187 .

– Remove noise insulation ⇒ Body Work ⇒ Rep. Gr. 50 .

– Release the fixing screw -1- from the charge air pipe, slacken the clamp -2 or 3-.
– Release fixing screw -arrow- from charge air pipe.



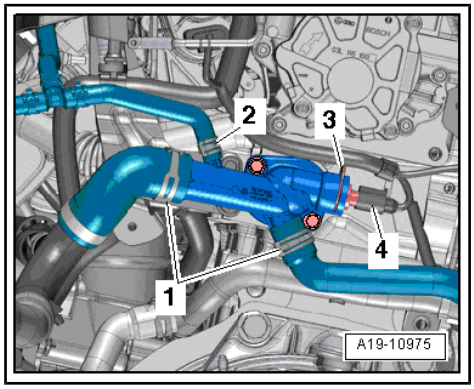
– Detach the connecting hose -arrow- as far as possible from the vibration damper.
– Push the left charge air hose to the left.



– Disconnect plug -4- at the coolant temperature sender -G62- .

Note

- *In order to collect flowing out coolant, place a cloth below the connection fitting.*
- *Have a new coolant temperature sender -G62- with a new gasket ring ready.*



– Remove the retaining clip -3-, pull the coolant temperature sender -G62- out of the connection fitting and install a new coolant temperature sender -G62- .
– Inspect coolant level, top up with coolant if necessary ⇒ page 117 .

Further installation occurs in reverse order.

2 Coolant pump and coolant regulator

2.1 The coolant pump and coolant regulator - List of assembly parts

1 - Coolant pump
- ❑ removing and installing ⇒ page 123

2 - 15 Nm

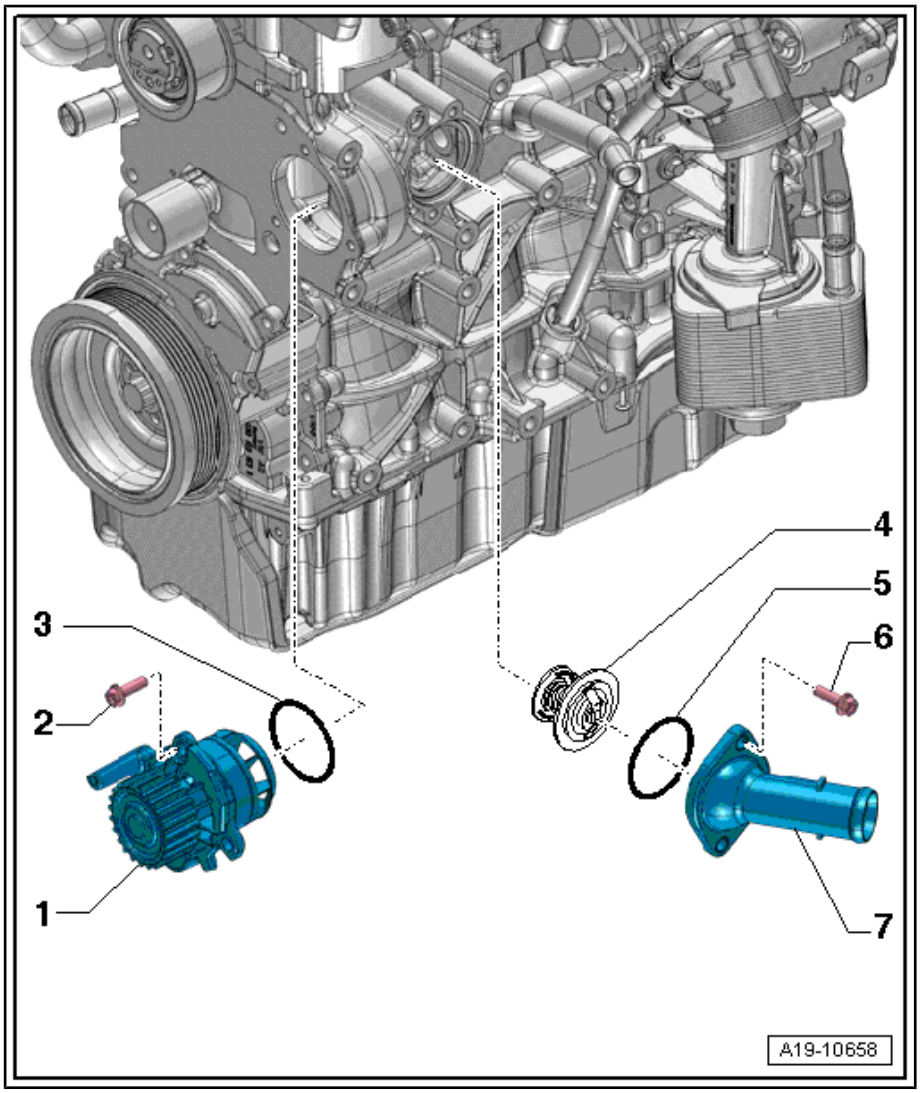
3 - O-ring
- ❑ replace

4 - Coolant regulator
- ❑ removing and installing ⇒ page 124
- ❑ check ⇒ page 126

5 - O-ring
- ❑ replace

6 - 15 Nm

7 - Connection fittings



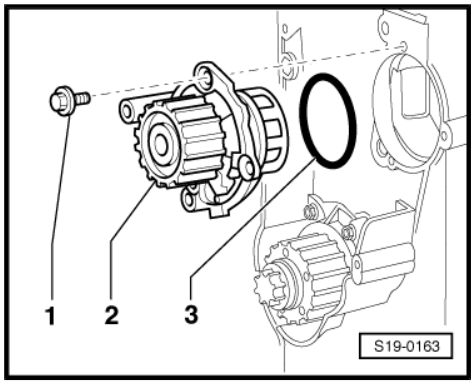
2.2 Removing and installing coolant pump

Removing

– Drain coolant ⇒ page 117 .

– Removing toothed belt ⇒ page 39 .

– Release screws -1- and remove coolant pump -2-.
– Remove O-ring -3-.



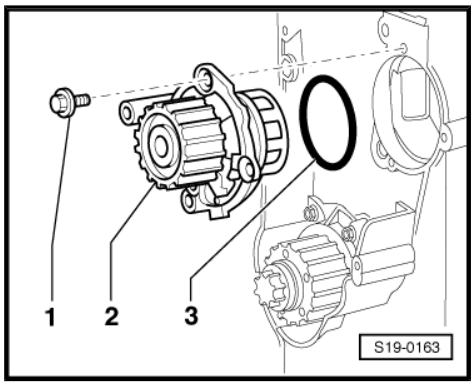
Install

Installation is performed in the reverse order, pay attention to the following points:

Note

Replace O-ring.

– Clean sealing surface for O-ring or smoothen.
– Moisten new O-ring -3- with coolant.
– Attach the coolant pump -2-.
• Fitting position: Plug in housing points down.
– Tighten screws -1- of coolant pump to 15 Nm.
– Installing the timing belt ⇒ page 44 .
– Top up coolant ⇒ page 117 .



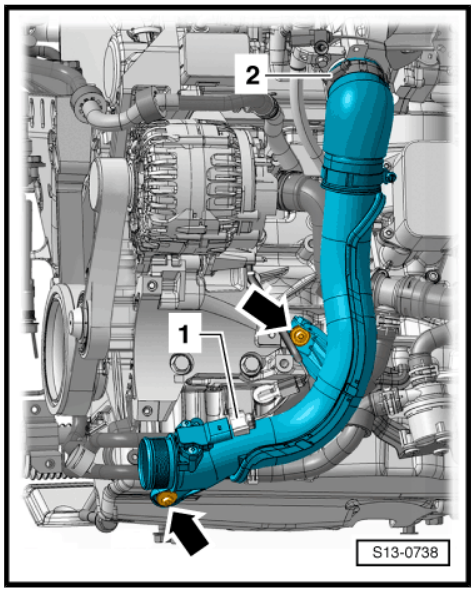
2.3 Removing and installing coolant regulator

Special tools and workshop equipment required

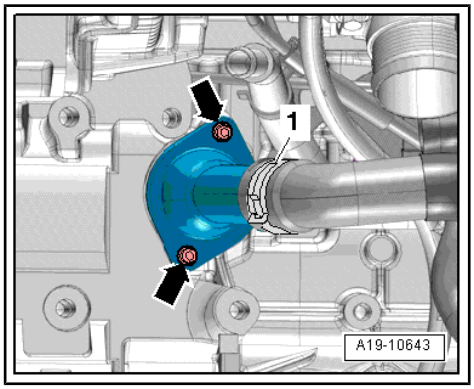
♦ Flexible-head wrench SW 10 -3185-
♦ Wrench socket -T10058-
♦ Catch pan for workshop crane e.g. -VAS 6208-
♦ Pliers for spring strap clamps

Removing

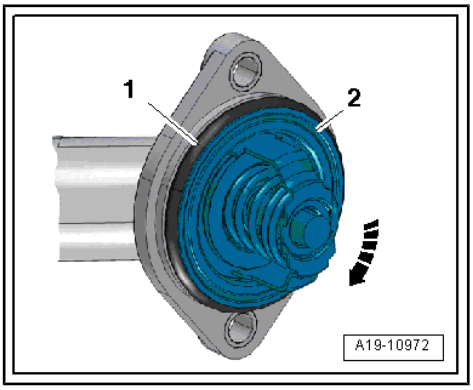
– Drain coolant ⇒ page 117 .
– Release screws -arrows-.
– Loosen hose clamp -2-.
– Disconnect the plug -1- at the charge pressure sender -G31- / intake air temperature sender -G42- and remove the right charge air pipe.



– Remove the coolant hose from the connection fitting, to do so slacken the hose clamp -1-.
– Slacken the screws -arrows- using the flexible-head wrench -3185- , screw out with socket insert -T10058 - and remove the connection fitting.



– Turn the coolant thermostat -2- approx. 15° clockwise -arrow- and remove it from the connection fitting.
– Remove O-ring -1-.



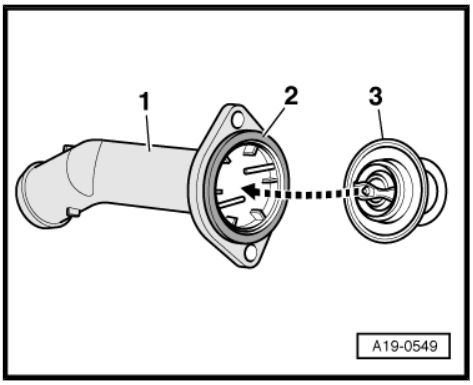
Install

Installation is performed in the reverse order, pay attention to the following points:

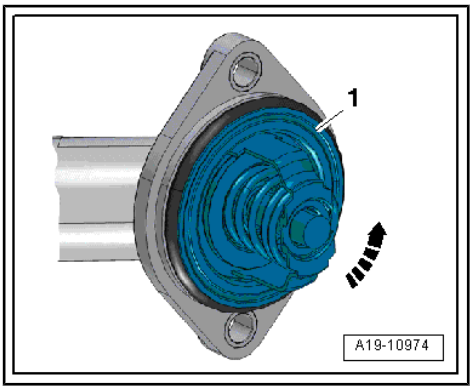
Note

- *Replace O-ring.*
- *Hose connections as well as charge air pipes/hoses must be free of oil and grease before being installed.*
- *The hose connections are secured with spring-type clips. In the event of repairs only use spring-type clips.*

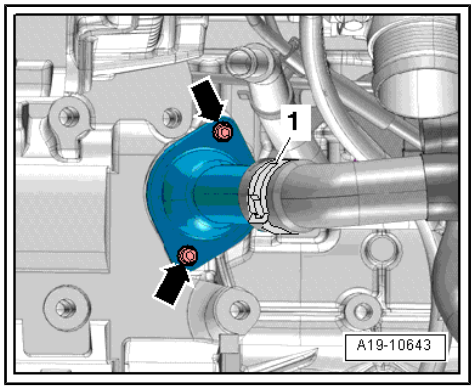
– Clean sealing surface for O-ring or smoothen.
– Moisten O-ring -2- with coolant.
– Insert the coolant regulator -3- with the O-ring -2-.



– Screw in coolant thermostat -1- anti-clockwise as far as the stop -arrow-.



– Position the connection fitting onto cylinder block and tighten the screws -arrows- to 15 Nm.
– Top up coolant ⇒ page 117 .



2.4 Testing coolant thermostat

– Heat up the removed coolant regulator in a water bath.

Start of opening	End of opening	Opening stroke
approx. 87 °C	approx. 102 °C [1)]	min. 7 mm

◆ [1)] Cannot be tested.

3 Parts of cooling system - Summary of components

WARNING

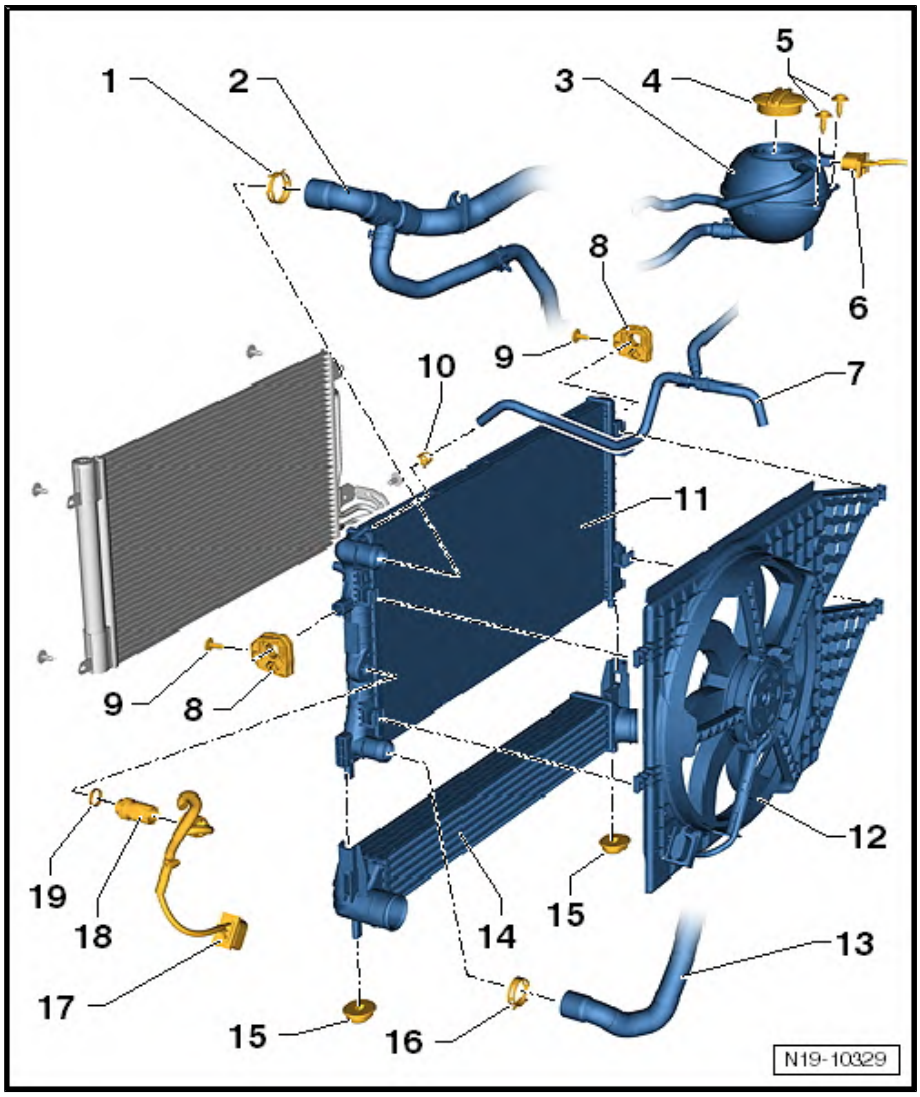
Hot steam or hot coolant may escape when the compensation bottle is opened. Cover the cap with a cloth and open carefully.

Note

- *When the engine is warm the cooling system is under pressure. If necessary reduce pressure before repairs.*
- *The hose connections are secured with spring-type clips. In the event of repairs only use spring-type clips.*
- *Use pliers for spring strap clips to remove and fit the spring strap clips.*
- *Gaskets and gasket rings must be replaced.*
- *When installing fit the coolant hoses free of stress, without them touching any other components (pay attention to the marking on the coolant connection and hose).*

Coolant mixing ratios ⇒ Maintenance ; Fabia II .

3.1 Parts of the cooling system, fitted to body



1 - Clamp
- ❑ replace if damaged

2 - Top coolant hose
- ❑ connection diagram for coolant hoses ⇒ page 117

3 - Expansion reservoir
- ❑ Check the cooling system for tightness ⇒ page 132

4 - Screw cap
- ❑ Test pressure 0.14...0.16 MPa (1.4...1.6 bar)
- ❑ check ⇒ page 132

5 - 5 Nm

6 - Connector

7 - Coolant hose

8 - Radiator bearing

9 - 5 Nm

10 - Clamp
- ❑ replace if damaged

11 - Radiator
- ❑ removing and installing ⇒ page 129
- ❑ after replacing fill entire system with fresh coolant ⇒ page 117

12 - Fan shroud with radiator fan -V7-
- ❑ removing and installing ⇒ page 129

13 - Bottom coolant hose
- ❑ connection diagram for coolant hoses ⇒ page 117

14 - Charge air cooler
- ❑ remove and install together with radiator ⇒ page 129

15 - Bottom radiator bearing
- ❑ black

16 - Clamp
- ❑ replace if damaged

17 - Connector

18 - Thermo-switch for radiator fan -F18- , 35 Nm
- ❑ for fan
- ❑ switching temperatures:

1. Stage
- ♦ on: 91...97°C
- ♦ off: 84...91°C

2. Stage

- on: 99...105°C
- off: 91...98°C

19 - Sealing ring

❑ replace

3.2 Fan shroud with radiator fan -V7-

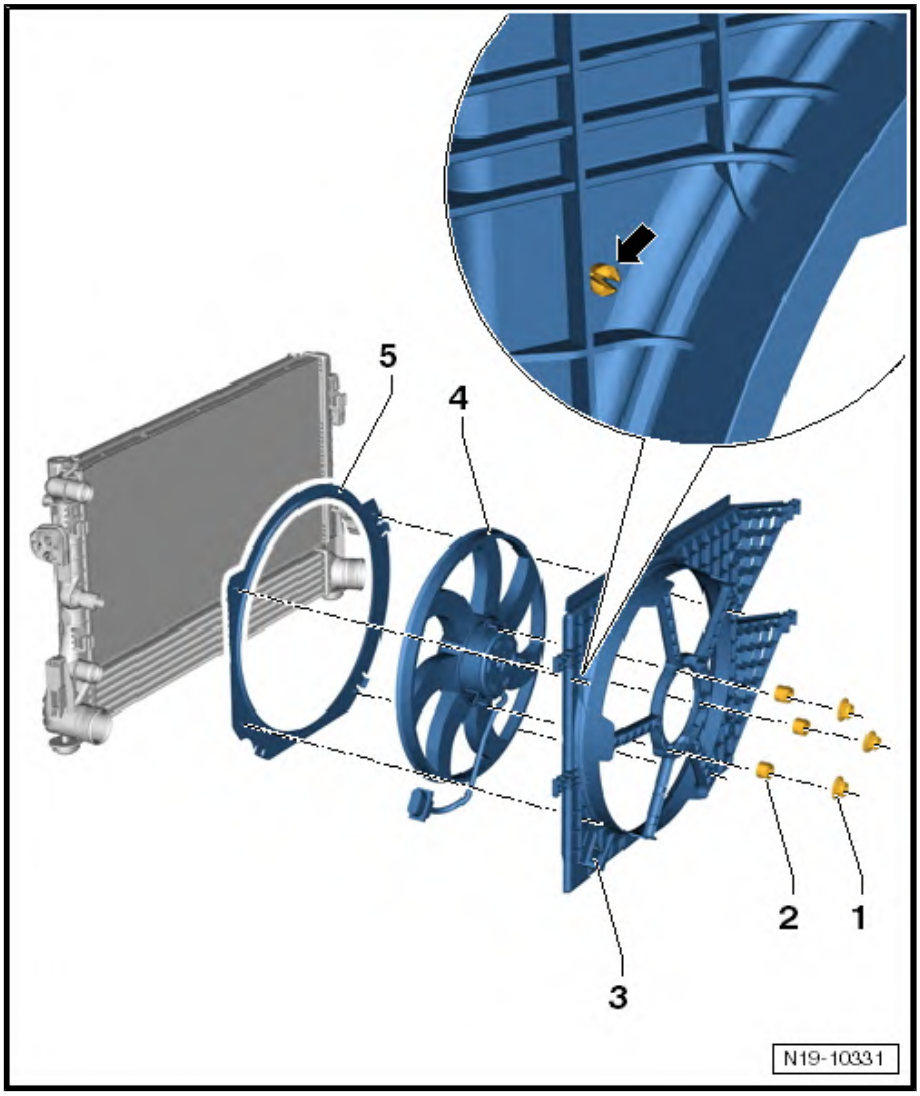
1 - 5 Nm

2 - Bushing

3 - Fan shroud

4 - Radiator fan -V7-

5 - The fan ring



3.3 Removing and installing radiator

Special tools and workshop equipment required

- Catch pan (e.g. -VAS 6208-)
- broad cross-head screwdriver
- Pliers for spring strap clamps

Removing

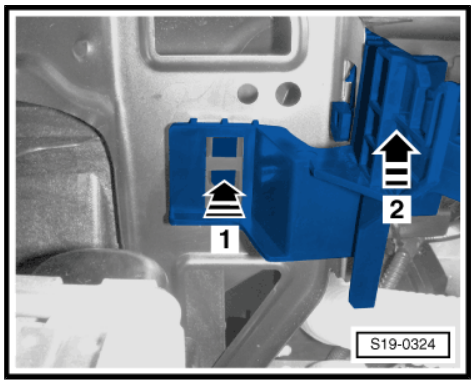
– Remove front bumper ⇒ Body Work ⇒ Rep. Gr. 63 .

– Drain coolant ⇒ page 117 .

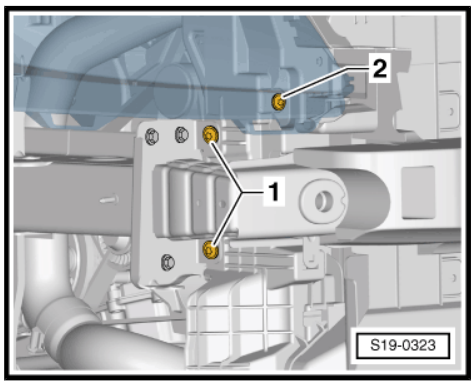
– Remove fan shroud with radiator fan -V7- ⇒ page 129 .

– Disconnect plug from thermo-switch for radiator fan -F18- .
– Detach top coolant hose from connection fitting of radiator.
– Remove the holder for the windscreen washer fluid reservoir.

  To do so, press in the catch -direction of arrow 1- and at the same time push the bracket upwards -direction of arrow 2-.



– Release right and left screw -2- for radiator bearing.
– Push the radiator to the rear and remove the right and left radiator bearing (⇒ page 128 , position 8).



Vehicles without air conditioning

– Push the radiator together with the charge air cooler upwards out of the lower rubber bearings and remove it laterally down.

Vehicles with air conditioning

– Remove V-ribbed belt ⇒ page 24 .

WARNING

Risk of injury through refrigerant.

- *Do not open the refrigerant circuit of the air conditioning system.*

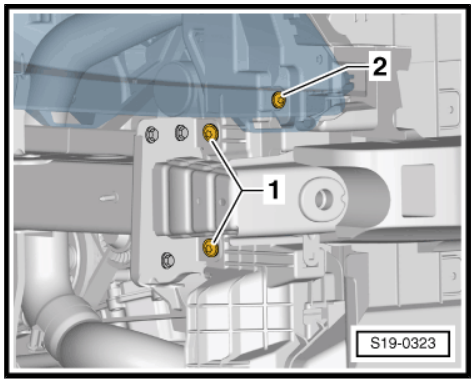
Caution

Risk of damaging the condenser and the refrigerant lines as well as the refrigerant hoses.

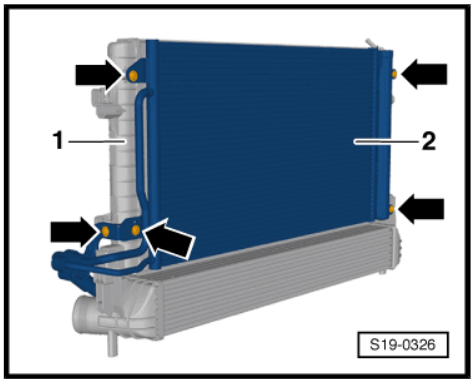
- *Do not over-tension, buckle or bend refrigerant lines and hoses.*

– Remove the AC compressor from the bracket for auxiliary units and secure it with connected refrigerant hoses to the body.
– Mark the installation position of the screws -1- on the right and left and only slacken.
– Push the radiator together with the charge air cooler and the condensor upwards out of the lower rubber bearings.

  To do so, pull the plastic housing of the lock carrier downwards. There is little space on the right between the refrigerant line and the body.
– Place the radiator with the condensor to the rear.



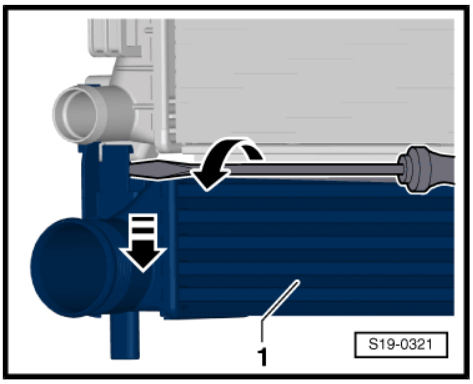
– Release the screws -arrows- of the condensor -2- from the radiator -1-.
– Draw the condensor forwards and attach to the lock carrier.
– Remove the radiator together with the charge air cooler laterally down.



Separate the charge air cooler from the radiator.

> **Caution**
>
> ***To prevent damage to the charge air cooler, the separation of the charge air cooler from the radiator must be carried out by 2 mechanics.***

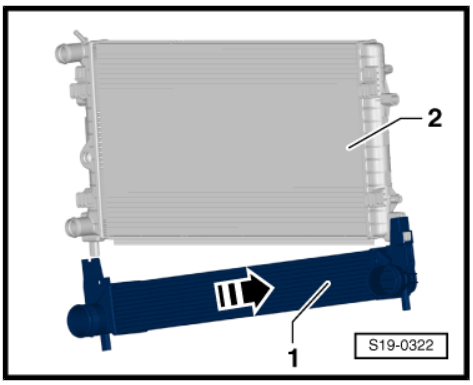
– Slide a broad cross-head screwdriver into the left catch from the front and the rear. Carefully open the catch of the charge air cooler -1- at the radiator by turning the screwdriver.
– Pull the left charge air cooler slightly down in this position.



– Push the charge air cooler -1- to the right out of the catch of the radiator -2-.

Install

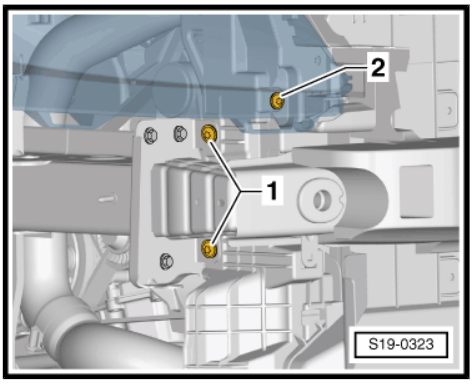
Installation is performed in the reverse order, pay attention to the following points:



– On vehicles with air conditioning system, push the plastic housing of the lock carrier upwards into the initial position and tighten the screws -1- on the right and left.

  Tightening torque: 8 Nm

– Top up coolant ⇒ page 117 .



3.4 Checking the coolant system for leak-tightness

3.4.1 Inspecting coolant system with cooling system testing device -V.A.G 1274- for tightness

Special tools and workshop equipment required

- Cooling system testing device (e.g. -V.A.G 1274-)
- Adapter (e.g. -V.A.G 1274/8-)
- Adapter (e.g. -V.A.G 1274/9-)

Test condition

- The engine is at operating temperature.

Test sequence

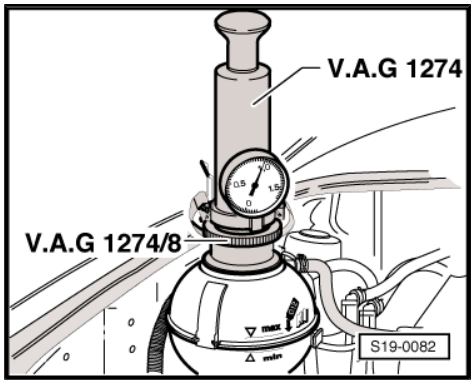
> **WARNING**
>
> *Hot steam may escape when the compensation bottle is opened. Cover the cap with a cloth and open carefully.*

– Open the cap of the coolant expansion reservoir.

– Position Cooling system testing device (e.g. -V.A.G 1274-) with adapter (e.g. -V.A.G 1274/8-) on the compensation bottle.

– Using the hand pump of the testing device generate an overpressure of approx. 0.1 MPa (1 bar).

– If the pressure drops determine positions of the leak and repair.



Testing the pressure relief valve in the cap

– Screw cap onto tester with adapter (e.g. -V.A.G 1274/9-).

– Using the hand pump of the testing device generate an overpressure of approx. 0.16 MPa (1.6 bar).

– The pressure relief valve should open at a pressure of 0.14...0.16 MPa (1.4...1.6 bar).

3.4.2 Inspecting coolant system with cooling system testing device -V.A.G 1274 B- for tightness

Special tools and workshop equipment required

- Cooling system testing device -V.A.G 1274B-
- Adapter -V.A.G 1274/8-
- Adapter -V.A.G 1274/9-

Test condition

- The engine is at operating temperature.

Test sequence

WARNING

Hot steam may escape when the compensation bottle is opened. Cover the cap with a cloth and open carefully.

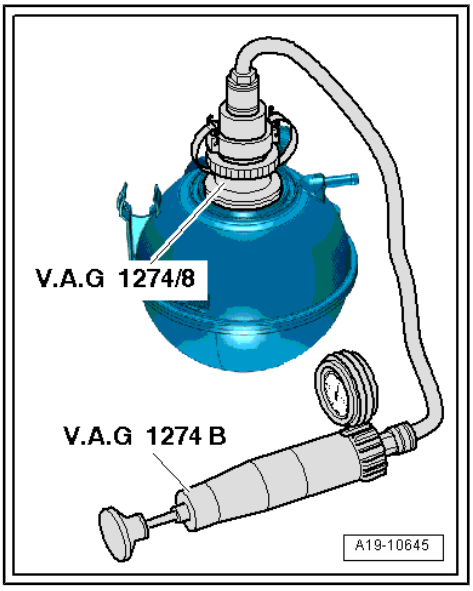
– Open the cap of the coolant expansion reservoir.

– Screw the adapter for the cooling system testing device -V.A.G 1274/8- into the coolant expansion bottle.

– Connect the connecting piece of the -V.A.G 1274 B/1- to the adapter for the cooling system testing device -V.A.G 1274/8- .

– Connect the connecting piece of the -V.A.G 1274 B/1- via the delivered connecting hose to the cooling system testing device -V.A.G 1274 B- .

– Using the hand pump of the testing device generate an over-pressure of approx. 0.1 MPa (1.0 bar).



WARNING

Risk of burning!

- *Before the cooling system testing device -V.A.G 1274 B- is separated from the connecting hose or the connecting piece -V.A.G 1274 B/1- , the existing pressure must absolutely be released.*
- *For this step, press the pressure relief valve on the cooling system testing device -V.A.G 1274 B- until the pressure gauge indicates the value "0".*

If the pressure drops:

– Determine position of the leak and repair fault.

Testing the pressure relief valve in the cap

– Screw the screw cap into the adapter for the cooling system testing device -V.A.G 1274/9- .

– Connect the connecting piece of the -V.A.G 1274 B/1- to the adapter for the cooling system testing device -V.A.G 1274/9- .

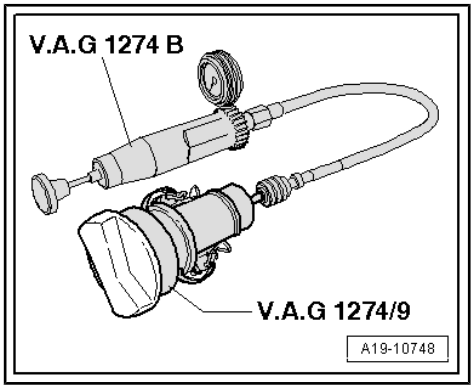
– Connect the connecting piece of the -V.A.G 1274 B/1- via the delivered connecting hose to the cooling system testing device -V.A.G 1274 B- .

– Operate the handpump.

- The pressure relief valve should open at a pressure of 0.14...0.16 MPa (1.4...1.6 bar).

If the pressure relief valve opens too early or too late:

– Replace cap.



20 – Fuel Supply

1 Removing and installing parts of the fuel supply system

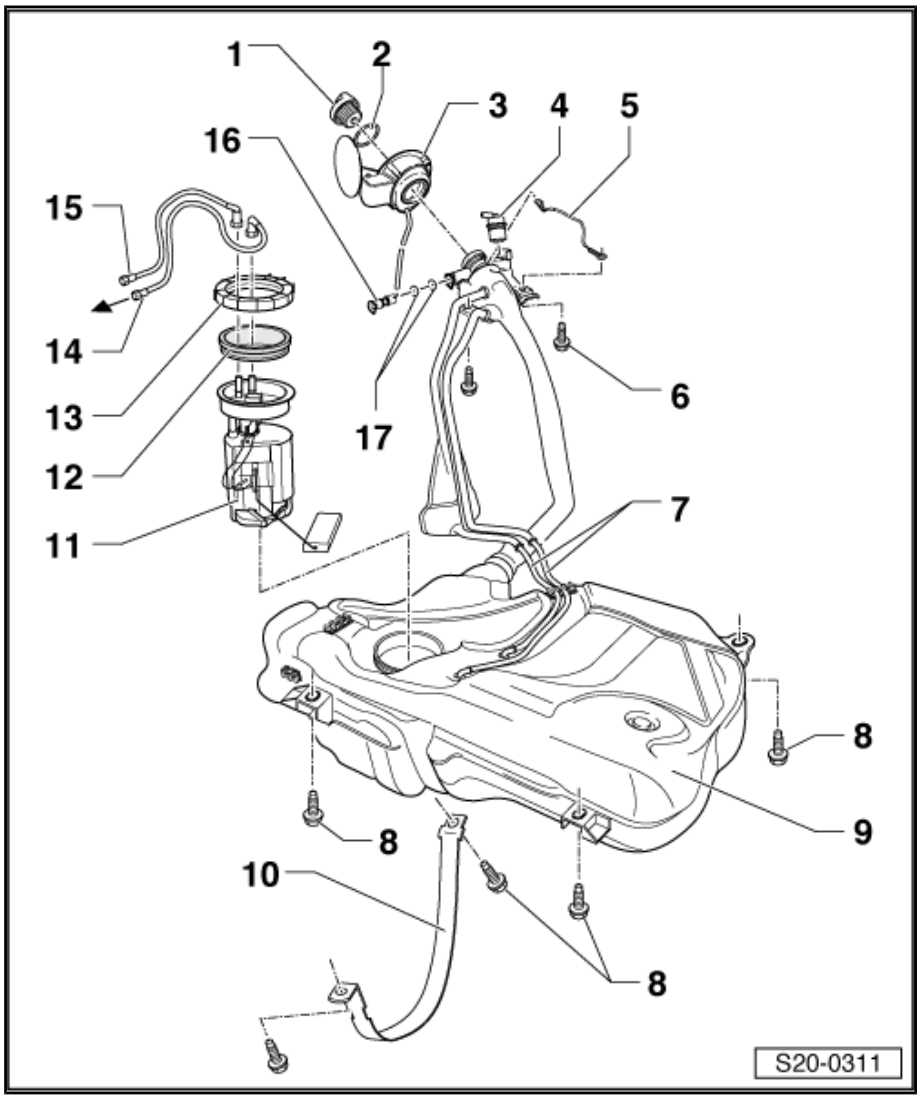
Note

- *Fuel lines are secured with quick-release couplings.*
- *Fuel hoses must be secured only with spring strap clips. The use of clamp-type or screw-type clips is not allowed.*
- *Use pliers for spring strap clips to fit the spring strap clips.*

Observe safety measures ⇒ page 3 .

Observe rules for cleanliness ⇒ page 6 .

1.1 Fuel tank with attached parts



1 - Screw cap

2 - Gasket

3 - Fuel tank lid unit

- ❑ with rubber bowl

4 - Gravity valve

- ❑ to remove, unclip valve at top and lift out of filler neck.
- ❑ inspect valve for blockage:

- ♦ Valve in a vertical position: valve open
- ♦ Valve tilted 45°: valve closed

5 - Earth connection

6 - 10 Nm

7 - Vent lines

- ❑ clipped in place on fuel tank

8 - 25 Nm

9 - Fuel tank

- ❑ when removing support, for example with the engine/gearbox jack e.g. -V.A.G 1383 A-
- ❑ removing and installing ⇒ page 138

10 - Tensioning strap

11 - Fuel delivery unit

- ❑ removing and installing ⇒ page 143
- ❑ with sender for fuel gauge display -G-

- ❑ removing and installing the sender for fuel gauge display ⇒ page 145
- ❑ Check fuel delivery unit ⇒ page 140
- ❑ note the installed position of the fuel tank ⇒ page 135
- ❑ Clean strainer if dirty

12 - Sealing ring

- ❑ replace
- ❑ only moisten from the inside the flange of the fuel delivery unit with fuel for installation purposes

13 - Union nut

- ❑ use wrench for union nut -MP 1-227 (3217)- for removing and installing

14 - Feed line

- ❑ to fuel filter
- ❑ Connection to the delivery unit ⇒ page 135
- ❑ check for firm seating
- ❑ black

15 - Return-flow line

- ❑ check for firm seating
- ❑ Connection to the delivery unit ⇒ page 135
- ❑ blue

16 - Vent valve

- ❑ to remove, unclip valve at side and take out of filler neck.
- ❑ before installing, unscrew fuel tank cap (Pos. 1)
- ❑ check ⇒ page 135

17 - O-ring

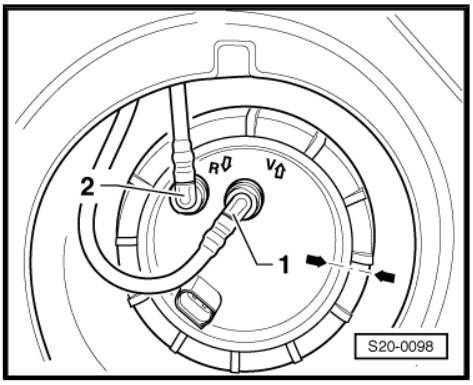
- ❑ replace

Fitting position of the flange of the fuel delivery unit/fuel gauge sender unit

The marking on the flange must be aligned with marking on the fuel tank -arrows-.

(Black) feed line -1- to connection marked -V-.

(Blue) return-flow line -2- to connection marked -R-.



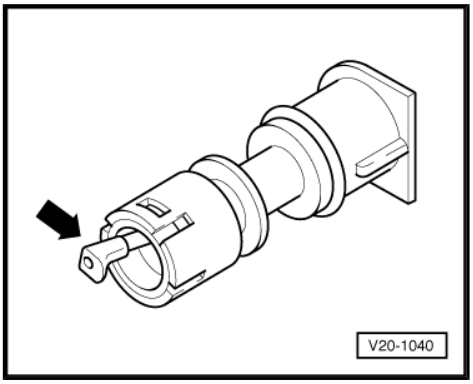
Note

After installing the fuel delivery unit/fuel gauge sender unit check whether the feed and return-flow lines are secured to the fuel tank with retaining clips.

Inspect vent valve

Lever in off position: valve closed

Lever pushed in direction of arrow: valve open



Note

Unscrew cap of fuel tank before installing the vent valve.

1.2 Fuel filter - Summary of components

The fuel flow direction is indicated with arrows on the hoses and on the fuel filter.

1 - Support

2 - Fuel filter

- ❑ do not interchange connections
- ❑ when removing, disconnect the fuel feed line, push the retaining lugs outwards and remove the fuel filter towards the top.

3 - Intake hose

- ❑ from fuel preheating valve
- ❑ check for firm seating
- ❑ white marking

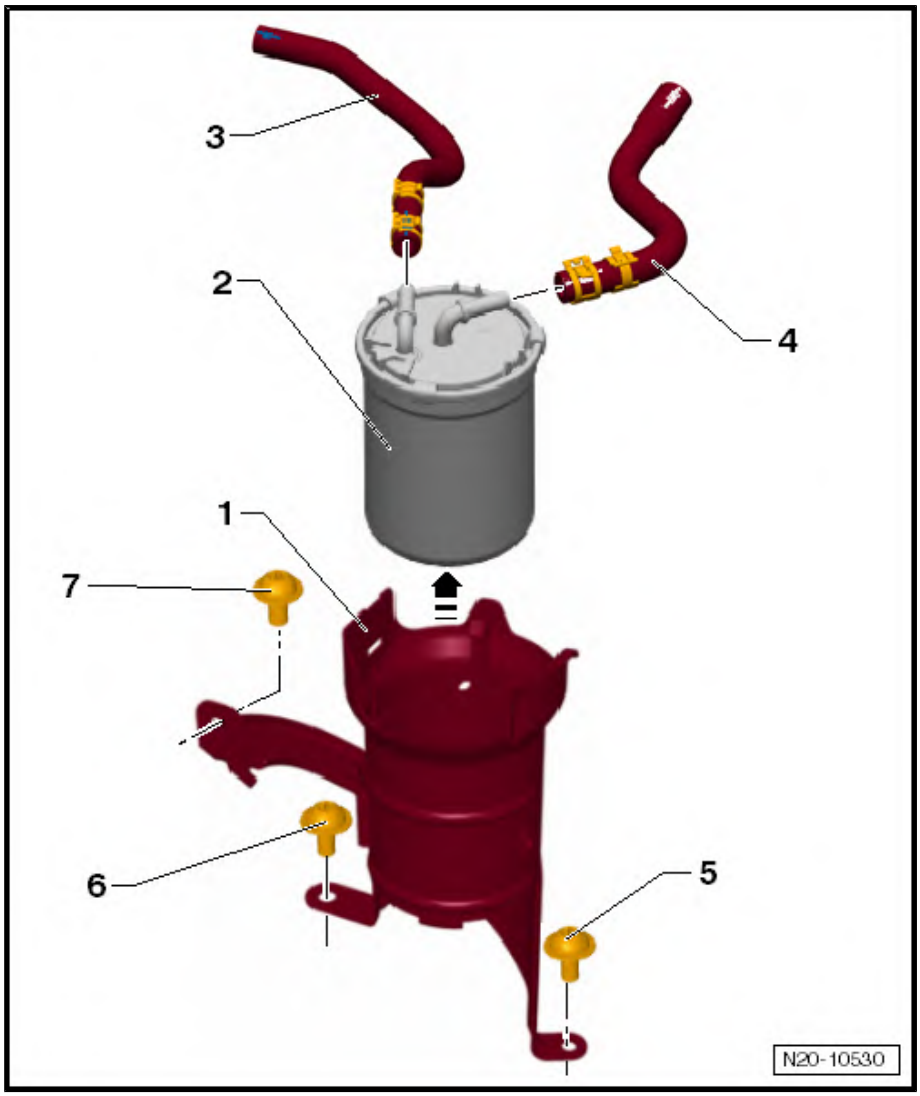
4 - Intake hose

- ❑ to high pressure pump
- ❑ check for firm seating
- ❑ white marking

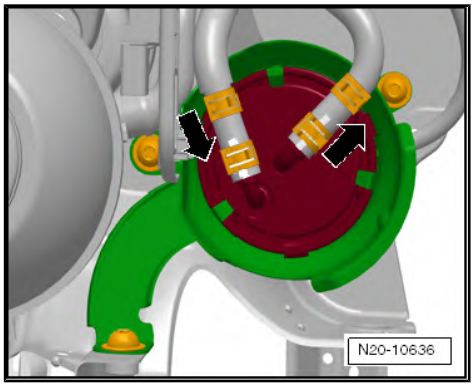
5 - 20 Nm

6 - 20 Nm

7 - 20 Nm



Removing and installing fuel filter



– Release spring strap clips and disconnect fuel hoses from fuel filter.

– Push the catch pegs up and remove the fuel filter towards the top.

Install

Installation is carried out in the reverse order. Pay attention to the following:

- Lay the fuel hoses without any kinks.
- Make sure the fuel hoses fit tightly.
- Do not mix-up the feed line and the return-flow line (the return-flow line is blue or has a blue marking, the feed line is white or has a white marking).
- Clip the fuel and coolant hoses into the holders again.

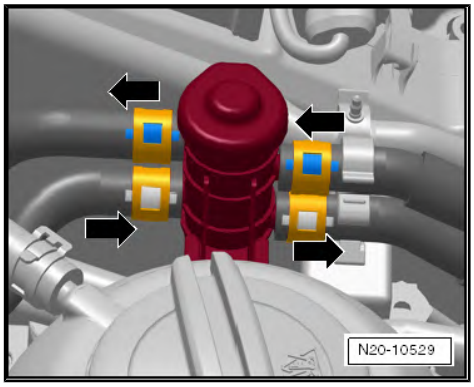
– Carry out work procedure for filling up the fuel system ⇒ page 179 .

Connecting the fuel preheating valve

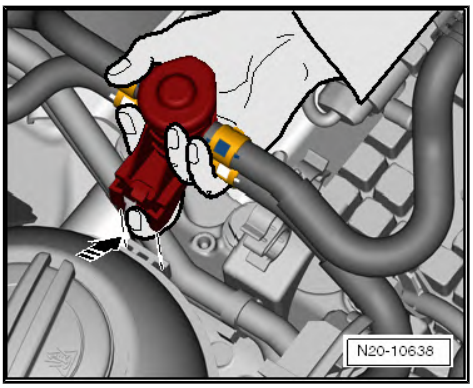
Fuel return-flow line blue or with blue marking

Fuel feed line white or with white marking

Removing the fuel preheating valve



– Unlock the catch peg -movement arrow- with a finger and pull the fuel preheating valve upwards out of the guide of the coolant expansion bottle.



Install

– Push the fuel preheating valve from above into the coolant expansion bottle.

The catch peg must lock in place on the coolant expansion bottle.

1.3 Extract fuel from the fuel tank

Special tools and workshop equipment required

- Hose adapter , e.g. -V.A.G 1318-16-
- Adapter set e.g. -V.A.G 1318/17-
- Measuring tool set , e.g. -V.A.G 1594 C-
- 12 V battery
- Fuel tank

Note

If the fuel pump is defective, suction off fuel using a fuel suction device, e.g. -VAS 5190- .

Work procedure

Note

Observe the regulations concerning cleanliness when working on the fuel supply/injection system *⇒ page 6* *.*

– Fold back right rear seat vertically ⇒ Body Work ⇒ Rep. Gr. 72 .
– Lift cover of fuel delivery unit.
– Unplug the 5-pin plug from the fuel delivery unit.

WARNING

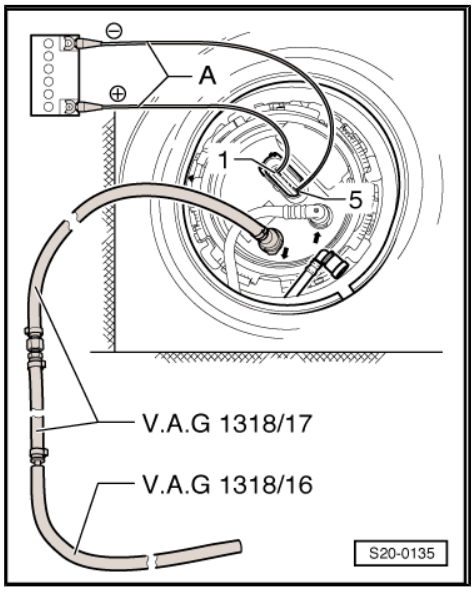
The fuel feed line is pressurized! Place a clean cleaning cloth around the connection point before detaching hose connections. Reduce pressure by carefully releasing the connection point.

– Pull off the fuel feed line and gather residual fuel in a cloth.
– Connect the adapter -V.A.G 1318/16- and -V.A.G 1318/17- and fit this “drain pipe” onto the feed support of the fuel delivery unit.
– Hold the “drain pipe” in a suitable fuel tank.
– Using auxiliary cables -A- from the measuring tool set -V.A.G 1594/C- connect up the battery through contacts of the fuel delivery unit as follows:

  Battery positive (+) to contact -1- of the fuel delivery unit

  Battery minus (-) to contact -5- of the fuel delivery unit

The fuel delivery unit runs and suctions off fuel.



WARNING

In order to avoid fuel overflow due to the fuel tank not being sufficiently large enough, the fuel pump must not run unattended.

1.4 Removing and installing the fuel tank

Special tools and workshop equipment required

♦ Engine/gearbox jack , e.g. -V.A.G 1383 A-

Conditions

- Ignition is switched off and ignition key is withdrawn.
- The fuel tank must not be more than $^1/_4$ full.

Removing

Note

- *Observe the safety instructions before starting fitting work* ⇒ page 3 .
- *Observe rules for cleanliness* ⇒ page 6 .

– Unscrew the fuel tank cap from the filler neck.

– Fold back right rear seat vertically ⇒ Body Work ⇒ Rep. Gr. 72 .

– Lift cover of fuel delivery unit.

– Unplug the 5-pin plug from the fuel delivery unit.

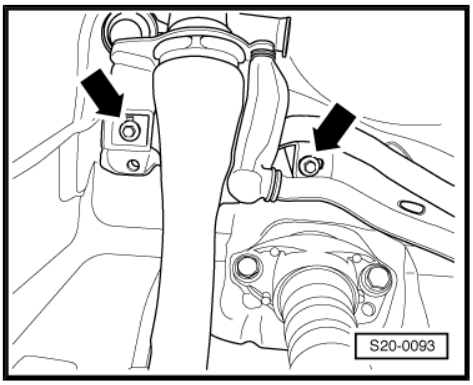
– If necessary drain the fuel tank ⇒ page 137 .

– Remove rear axle ⇒ Chassis ⇒ Rep. Gr. 42 .

– Remove the rear silencer ⇒ page 194 .

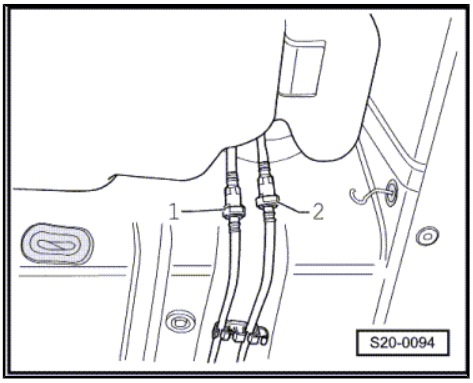
– Remove the rear right wheelhouse liner ⇒ Body Work ⇒ Rep. Gr. 66 .

– Unscrew bolts on filler neck -arrows-.



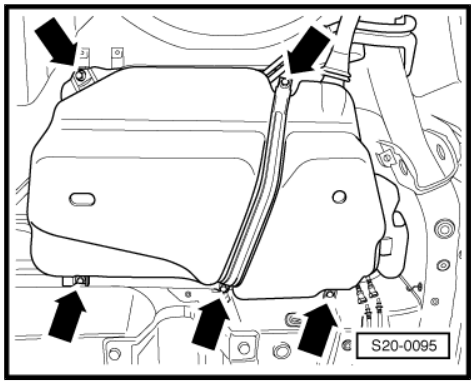
– Disconnect feed line (black) -1- and return-flow line (blue) -2- from the fuel tank. To do so press the release buttons.

– Support fuel tank using the engine/gearbox jack - V.A.G 1383 A- .



– Unscrew tensioning strap and fixing screws -arrows-.

– Pull the filler neck out of the rubber bowl and swivel the fuel tank downwards.

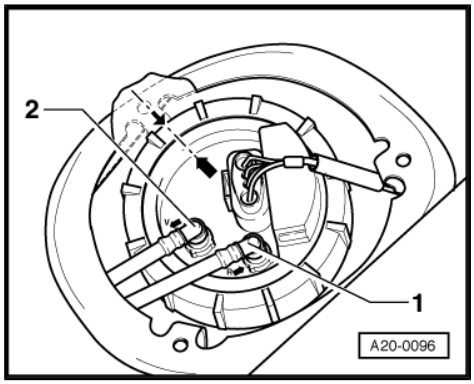


Install

Installation is carried out in the reverse order. Pay attention to the following:

– Connect the fuel lines to the flange of the fuel delivery unit:

- (Black) feed line -2- to connection marked -V-.
- (Blue) return-flow line -1- to connection marked -R-.
- Make sure the fuel line connections fit tightly.
- Check feed, return and ventilation line at fuel tank for firm seating.
- Check earth connection of fuel tank/body at filler neck.



1.5 Checking fuel delivery unit

1.5.1 Checking the function and supply voltage

Test conditions

- Battery voltage at least 11.5 V.
- Fuses are O.K. ⇒ Current flow diagrams and Fitting locations.
- All electrical consumers such as the lights and rear window heater must be switched off.

Test sequence

– Fold back right rear seat vertically ⇒ Body Work ⇒ Rep. Gr. 72 .

– Lift cover of fuel delivery unit.

– Switch on ignition. The fuel delivery unit must be heard to start.

– Switch off ignition.

If the fuel delivery unit does not run:

– Continuing searching for faults using a multimeter (e.g. -V.A.G 1715-) ⇒ Current flow diagrams and Fitting locations.

1.5.2 Check fuel flow rate

Special tools and workshop equipment required

- Hose adapter , e.g. -V.A.G 1318/16-
- Adapter set , e.g. -V.A.G 1318/17-
- Remote control , e.g. -V.A.G 1348/3A-
- Measuring vessel

Note

- *Observe the safety instructions before starting fitting work ⇒ page 3 .*
- *Observe rules for cleanliness ⇒ page 6 .*

Test conditions

- Supply voltage o.k.
- Battery voltage at least 11.5 V.
- Fuel temperature 15…30 °C.
- Fuel tank at least 1/4 full.

Test sequence

– Unscrew the fuel tank cap from the filler neck.

– Fold back right rear seat vertically ⇒ Body Work ⇒ Rep. Gr. 72 .

– Lift cover of fuel delivery unit.

– Unplug the 5-pin plug from the fuel delivery unit.

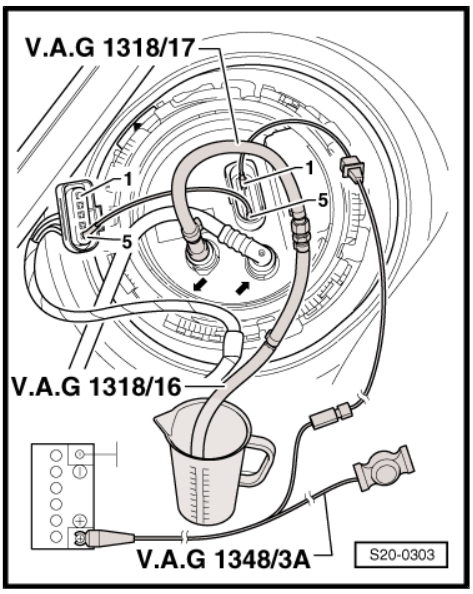
– Connect remote control -V.A.G 1348/3A- with connection lines from the measuring tool set to contact -1- of the fuel delivery unit and to battery +.

– Use the connection lines from the measuring tool set to connect the contacts -5- to the plug and to the fuel delivery unit.

– Pull off the fuel feed line and gather residual fuel in a cloth.

WARNING

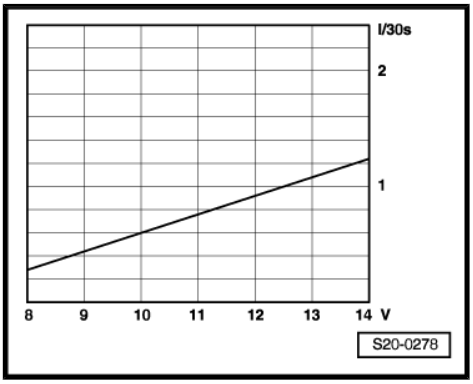
The fuel feed line is pressurized! Place a clean cleaning cloth around the connection point before detaching hose connections. Reduce pressure by carefully releasing the connection point.



– Connect adapter -V.A.G 1318/17- and -V.A.G 1318/16- to the fuel delivery unit and hold in the measuring vessel.

– Activate remote control -V.A.G 1348/3A- for 30 seconds.

– Compare the amount of the fuel pumped to the specified value (the amount of the fuel pumped is dependent on the voltage at the fuel delivery unit).



If the minimum flow rate is not reached:

– Remove the fuel delivery unit and check whether the pump strainer is not clogged up.

If no fault was detected until now:

– Replace fuel delivery unit.

1.5.3 Checking the power consumption of the fuel pump

Special tools and workshop equipment required

- Vehicle diagnosis system, measurement and information system -VAS 505X-
- Hand multimeter , e.g. -V.A.G 1526D-
- Amps clamp , e.g. -V.A.G 1526B/2-
- Adapter for measuring method/DSO (5-pin) , e.g. -VAS 5565-

Note

- *The battery voltage as well as the temperature of the diesel fuel have a major influence on the power consumption of the fuel pump. For this reason it is necessary to ensure that the battery voltage is at least 12.5 V when testing.*
- *Depending on the season, it is necessary to ensure that the vehicle is fueled with "winter diesel".*

Test conditions

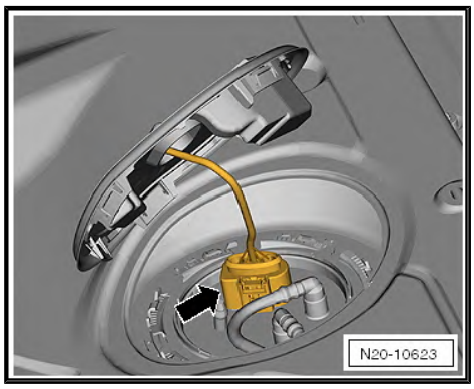
- Battery voltage at least 12.5 volts
- Fuel temperature above 10 °C

– Fold back right rear seat vertically ⇒ Body Work ⇒ Rep. Gr. 72 .

– Lift cover of fuel delivery unit.

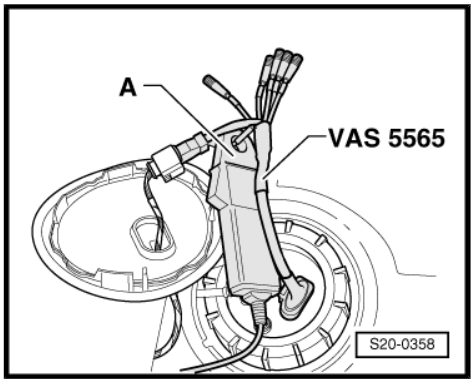
– First of all check the plug -arrow- for firm seating. Pull on the plug without pressing the locking mechanism. If the plug was not correctly plugged in, it may have caused a fault.

– Unplug connector -arrow-.



– Connect the adapter for measuring method/DSO (5-pin) -VAS 5565- to the plug and to the fuel delivery unit.

– Connect the current probe -A- on the red cable - with the inscription “current probe” - of the adapter for measuring method/DSO (5-pin) -VAS 5565- .



Note

The current probe of the multimeter -V.A.G 1715- can also be used.

– Connect vehicle diagnosis system, measurement and information system -VAS 505X- , carry out the targeted function “test electric fuel pump”.

Note

The fuel pump is actuated for 30 seconds.

– Read off power consumption at handheld multimeter -V.A.G 1526D- .

• Specified value: 8.0 ... 14.0 amps

– If the measured value is outside the range of the nominal value:

– Remove fuel delivery unit ⇒ page 143 .

– Check whether the electric wiring between the flange and fuel pump is connected and test for continuity.

If there is no open circuit in the wiring:

– Replace fuel delivery unit ⇒ page 143 .

1.6 Removing and installing fuel delivery unit

Special tools and workshop equipment required

♦ Wrench for union nut -MP 1-227 (3217)-

♦ Fuel extraction device e.g. -VAS 5190-

Conditions

• The fuel tank must not be more than 3/4 full.

• Ignition is switched off and ignition key is withdrawn.

Removing

Note

♦ *Empty the fuel tank if necessary ⇒ page 137 .*

♦ *Observe the safety instructions before starting fitting work ⇒ page 3 .*

♦ *Observe rules for cleanliness ⇒ page 6 .*

– Fold back right rear seat vertically ⇒ Body Work ⇒ Rep. Gr. 72 .

– Lift cover of fuel delivery unit.

– Unplug the 5-pin plug from the fuel delivery unit.

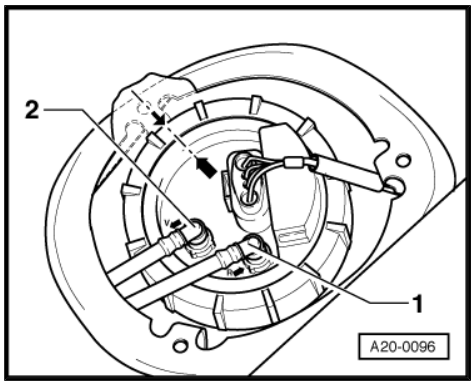
WARNING

The fuel system is under pressure! Place a clean cleaning cloth around the connection point before detaching hose connections. Then reduce the pressure by carefully removing the hose.

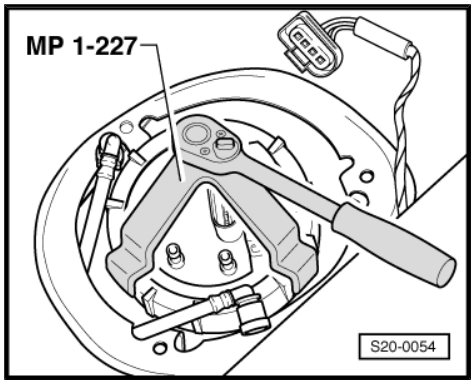
Note

Press together the securing ring on the rear side of the angular connection in order to unlock the fuel lines.

– Remove feed line (black) -2- and return-flow line (blue) -1- from the flange of the delivery unit. To do so press the release buttons.



– Unscrew union nut with wrench for union nut -MP 1-227 (3217)- .
– Pull the fuel delivery unit and the gasket ring out of the opening of the fuel tank.



Note

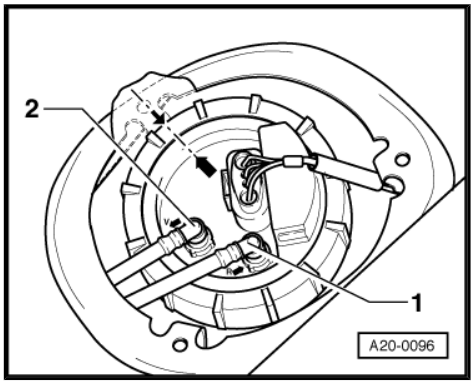
You must empty the old delivery unit before disposing of it if you wish to replace it.

Install

– The fuel delivery unit is installed in the reverse order. Pay attention to the following:

Note

- *Do not bend the sender for fuel gauge display when installing it.*
- *Only moisten from the inside the seal of the flange with fuel for fitting purposes.*
- *Pay attention to installed position of flange of fuel delivery unit: The marking on the flange must be aligned with the marking on the fuel tank -arrows-.*
- *Do not interchange feed line and return-flow line.*
- *Make sure the fuel lines fit tightly.*
- *After installing the fuel delivery unit, check whether the feed, return-flow and vent lines are clipped in place on the fuel tank.*



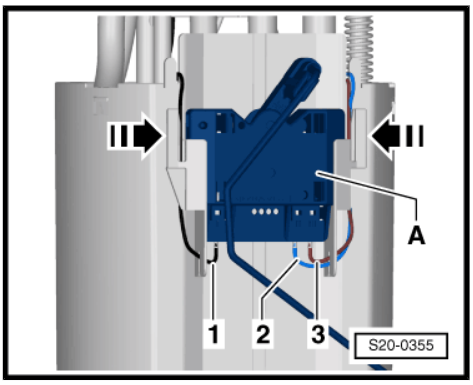
1.7 Removing and installing the sender for fuel gauge display -G-

Removing

– Remove fuel delivery unit ⇒ page 143 .

– Unlatch and disconnect the plug of the lines -1- (black), -2- (blue) and -3- (brown).

– Press together the holding tabs -arrows- and remove the sender for fuel gauge display -G- upwards.



Install

– Insert the sender for fuel gauge display -G- in the guides at the fuel delivery unit and press downwards until it latches into position.

– Connect the lines -1, 2 and 3- and fix in the holding slots of the fuel delivery unit.

– Install fuel delivery unit ⇒ page 143 .

2 Accelerator control

2.1 Accelerator pedal module - Summary of components

1 - Bracket

- ❑ removing and installing ⇒ Chassis ⇒ Rep. Gr. 46

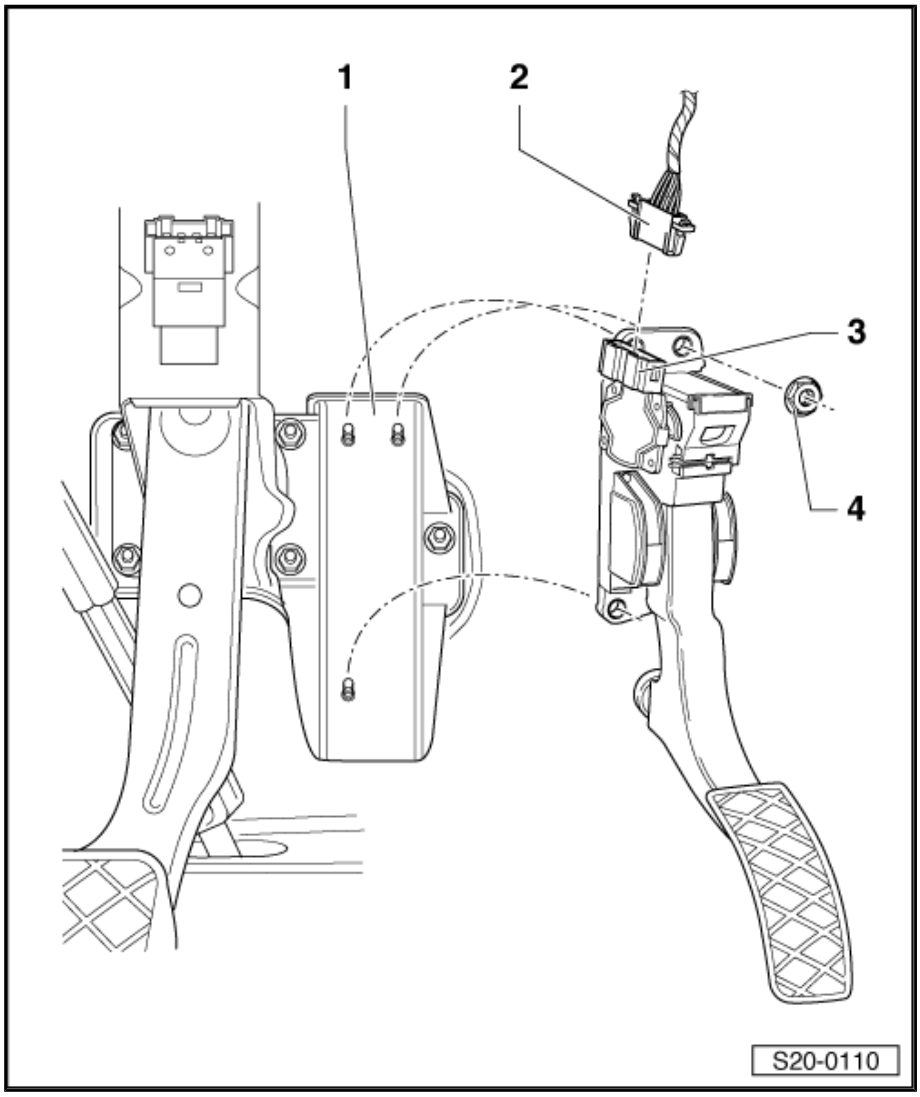
2 - Connector

- ❑ 6-pin, black

3 - Accelerator pedal module

- ❑ with accelerator pedal position sender -G79- and accelerator pedal position sender 2 -G185-
- ❑ to remove the sender remove the bottom part of the dash panel insert on the driver's side
- ❑ not adjustable
- ❑ check ⇒ Vehicle diagnosis, testing and information system VAS 5051

4 - 9 Nm



21 – Turbocharging

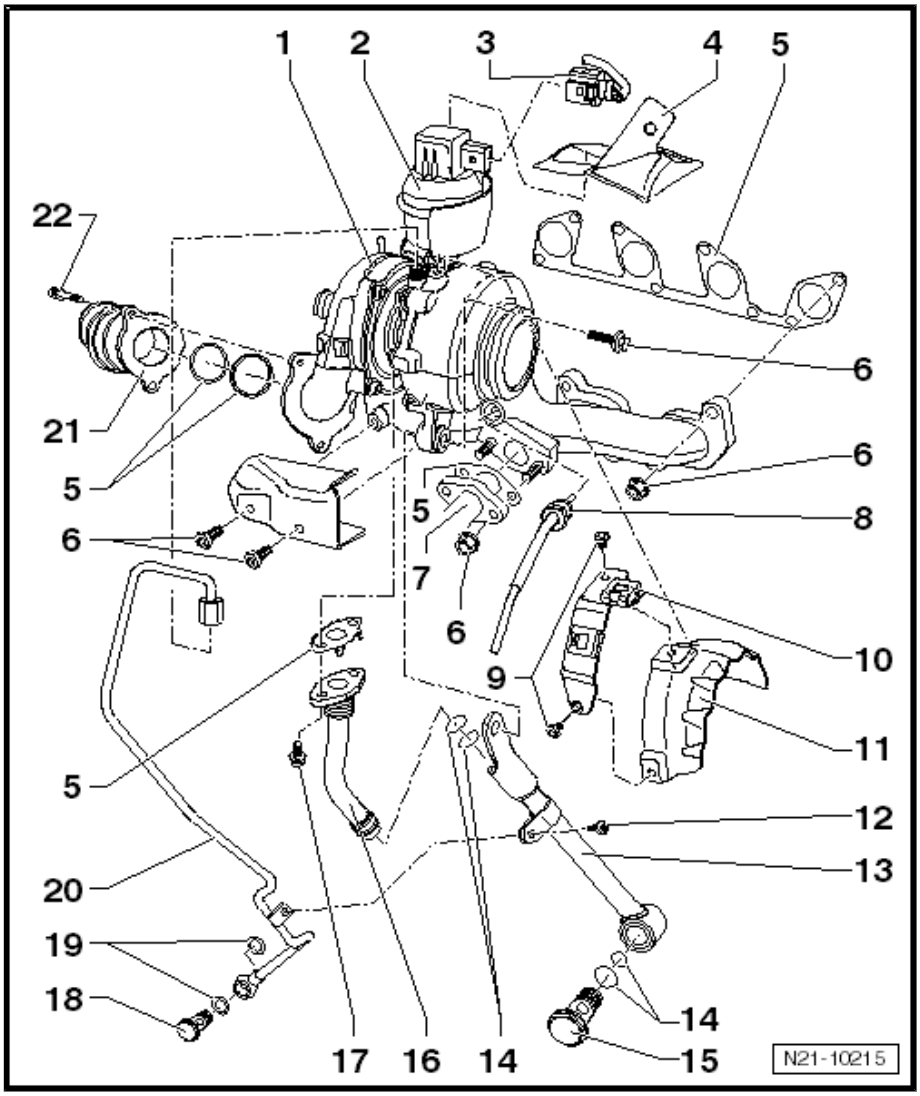
1 Charge-air system - exhaust gas turbocharger

Note

- *Observe rules for cleanliness* ⇒ page 6 .
- *Observe general instructions for charge-air system* ⇒ page 7 .

1.1 Exhaust gas turbocharger with component parts - Summary of components

The exhaust turbocharger and the exhaust manifold are one component part.



1 - Exhaust gas turbocharger
- ❑ only complete with exhaust manifold
- ❑ removing and installing ⇒ page 148
- ❑ Remove and install the connection pipe for the suction hose ⇒ page 187

2 - Vacuum setting element
- ❑ with position sender for charge pressure regulator -G581-

3 - Plug connection
- ❑ to position sender for charge pressure regulator -G581-

4 - Heat shield
- ❑ replace if damaged

5 - Gasket
- ❑ replace

6 - 20 Nm

7 - Connecting pipe
- ❑ to radiator for exhaust gas recirculation

8 - Exhaust gas temperature sender 1 -G235-
- ❑ Tightening torque: 45 Nm
- ❑ coat thread with hot screw paste -G 052 112 A3- before installing

9 - 10 Nm

10 - Support
- ❑ for oil feed line

11 - Heat shield

12 - 10 Nm

13 - Support for exhaust gas turbocharger

- ❑ removing and installing ⇒ page 109

14 - Sealing ring

- ❑ replace

15 - Hollow screw, 60 Nm

- ❑ replace

16 - Oil return-flow line

17 - 20 Nm

18 - Hollow screw, 30 Nm

- ❑ replace

19 - Sealing ring

- ❑ replace

20 - Oil feed line

- ❑ removing and installing ⇒ page 109
- ❑ check continuity
- ❑ before installing, fill the exhaust turbocharger on the connection fitting for the oil feed line with engine oil

21 - Pulsation dampener

22 - 10 Nm

1.2 Removing and installing exhaust gas turbocharger

Special tools and workshop equipment required

- ♦ Pliers for spring strap clamps

Removing

Caution

In case a mechanical damage to the exhaust turbocharger is found, e.g. damage to the compressor wheel, it is not sufficient to only replace the turbocharger. In order to prevent consequential damage to the engine, perform the following tasks:

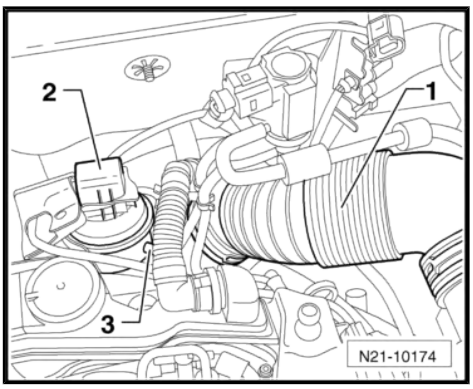
- ♦ *Clean all oil lines.*
- ♦ *Change the engine oil and replace the oil filter*
- ♦ *Check air filter housing, air filter element and charge air pipes as well as charge air hoses for soiling.*
- ♦ *Check all air guides and charge air cooler for foreign bodies.*

If foreign bodies are detected in the charge air system, the charge-air routing must be cleaned and the charge air cooler must be replaced.

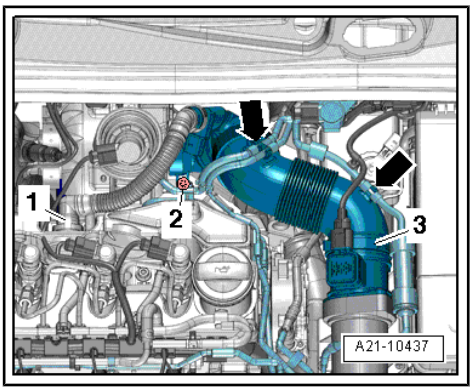
Note

- *Observe rules for cleanliness ⇒ page 6 .*
- *Observe general instructions for charge-air system ⇒ page 7 .*

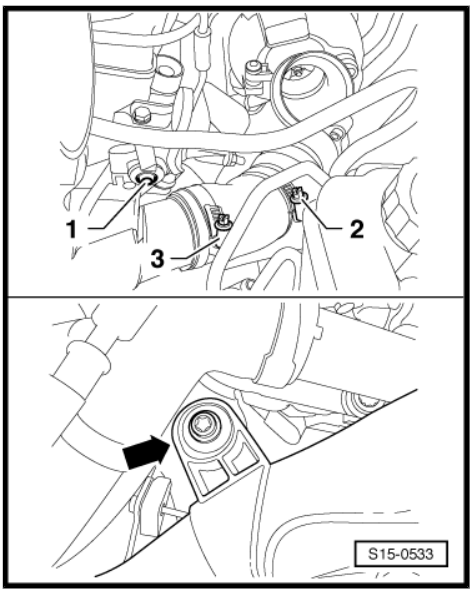
– Remove pre-exhaust pipe with diesel particle filter ⇒ page 194 .
– Remove air filter housing with air mass meter -G70- ⇒ page 187 .
– Remove battery and battery tray ⇒ Electrical System ⇒ Rep. Gr. 27 .
– Disconnect plug from position sender for charge pressure regulator -G581- -2- at exhaust gas turbocharger.
– Detach vacuum line -3- at exhaust gas turbocharger.



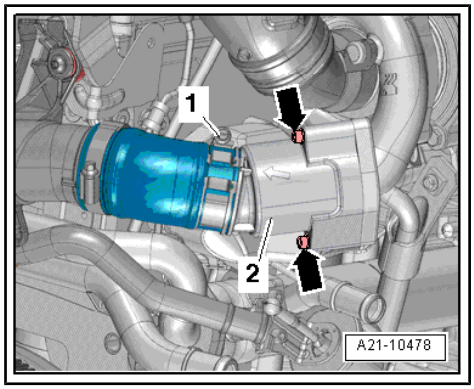
– Remove the hose for the crankcase ventilation -1-, to do so press the release buttons.
– Slacken vacuum hose to intake hose.
– Release screw -2- (captive), swivel intake hose with connection fitting towards the rear and detach from exhaust gas turbocharger.
– Remove intake hose.



– Release the fixing screw -1- from the charge air pipe, slacken the clamp -2-.
– Release fixing screw -arrow- from charge air pipe.



– Release the screws -arrows- and detach the connecting hose as far as possible from the pulsation dampener.
– Push the left charge air pipe as far as possible to the left.
– Remove the pulsation dampener.

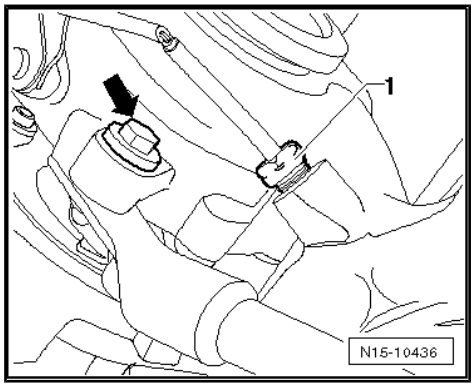


Caution

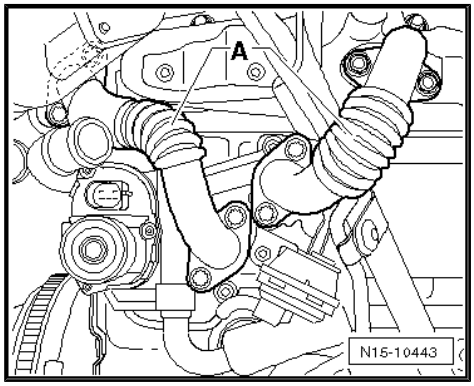
The exhaust gas temperature sender 1 -G235- covers the top bolted connection of the support for exhaust turbocharger.

- *The exhaust gas temperature sender 1 -G235- must not be bent.*
- *For this reason it must be removed.*

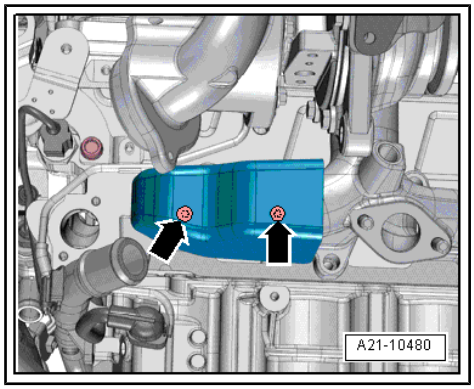
– Remove exhaust gas temperature sender 1 -G235- -1- ⇒ page 151 .
– Remove the oil feed line together with the oil return-flow line, Pos. 3 and 4, as well as the support for exhaust gas turbocharger, Pos. 9 ⇒ page 109 .



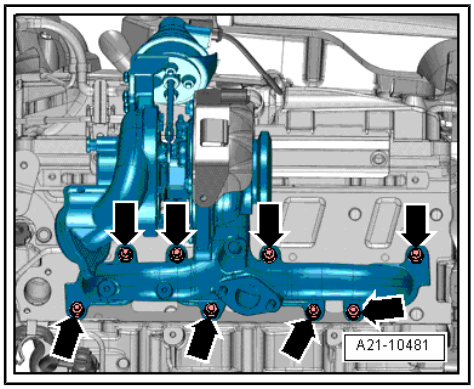
– Remove connection pipes -A- to exhaust gas recirculation radiator.



– Remove heat shield at exhaust manifold.



– Unscrew the nuts -arrows- and remove the exhaust gas turbocharger with exhaust manifold from the cylinder head.



Install

Installation is performed in the reverse order, pay attention to the following points:

Caution

Before installing, check if the decoupling element of the oil return-flow line is not bent and therefore is not overstretched. If this is the case, microcracks might have occured which can result in leaks. If necessary, replace the oil return-flow line before installing the exhaust gas turbocharger.

Note

- *Replace the gaskets, the sealing rings and the self-locking nuts.*
- *Fill exhaust turbocharger with engine oil through the connection fitting of the oil feed line.*
- *Remove oil and grease from the charge air pipes and hoses and from their connections before installing.*
- *Secure all hose connections with corresponding hose clips.*
- *Tightening torques:* *⇒ page 147*

– Checking the oil level ⇒ Maintenance ; Fabia II .

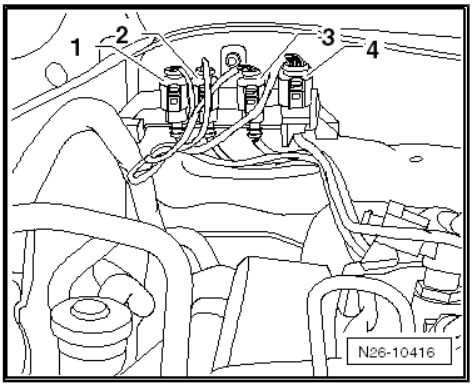
Note

After installing the turbocharger, run engine at idling speed for about 1 minute to ensure that oil is supplied to the turbocharger.

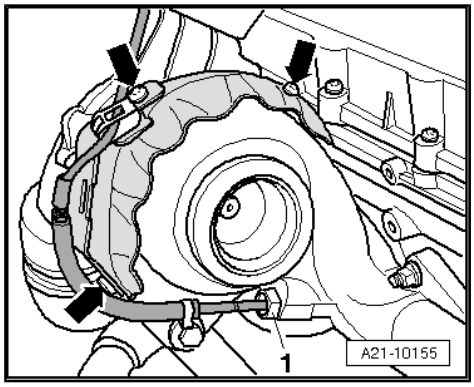
1.3 Removing and installing the exhaust gas temperature sender 1 -G235-

Removing

- -1-: Disconnect plug connection for exhaust gas temperature sender 1 -G235- and expose electrical cables.



– Unscrew the exhaust gas temperature sender 1 -G235- -1- from the exhaust manifold.



Install

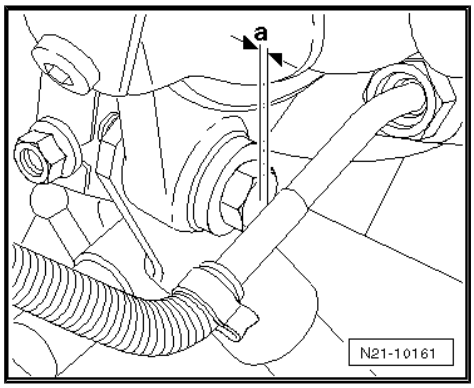
Installation is performed in the reverse order, pay attention to the following points:

Note

- *The thread of new temperature senders must be coated with assembly paste.*
- *Grease only the thread with hot bolt paste -G 052 112 A3- for re-used temperature sender.*
- *All cable straps should be fastened again in the same place when installing.*

Fitting position exhaust gas temperature sender 1 -G235- :

- The dimension -a- should not be less than 0.5 mm.
- Tightening torque: ⇒ page 191



1.4 Connection diagram for vacuum hoses

1 - Vacuum setting element

- ❑ for changeover of radiator for exhaust gas recirculation

2 - Non-return valve

- ❑ Check fitting position

3 - Changeover valve for radiator of exhaust gas recirculation -N345-

- ❑ Check change-over ⇒ page 203

4 - Cylinder head cover

- ❑ with integrated vacuum reservoir

5 - Vacuum setting element

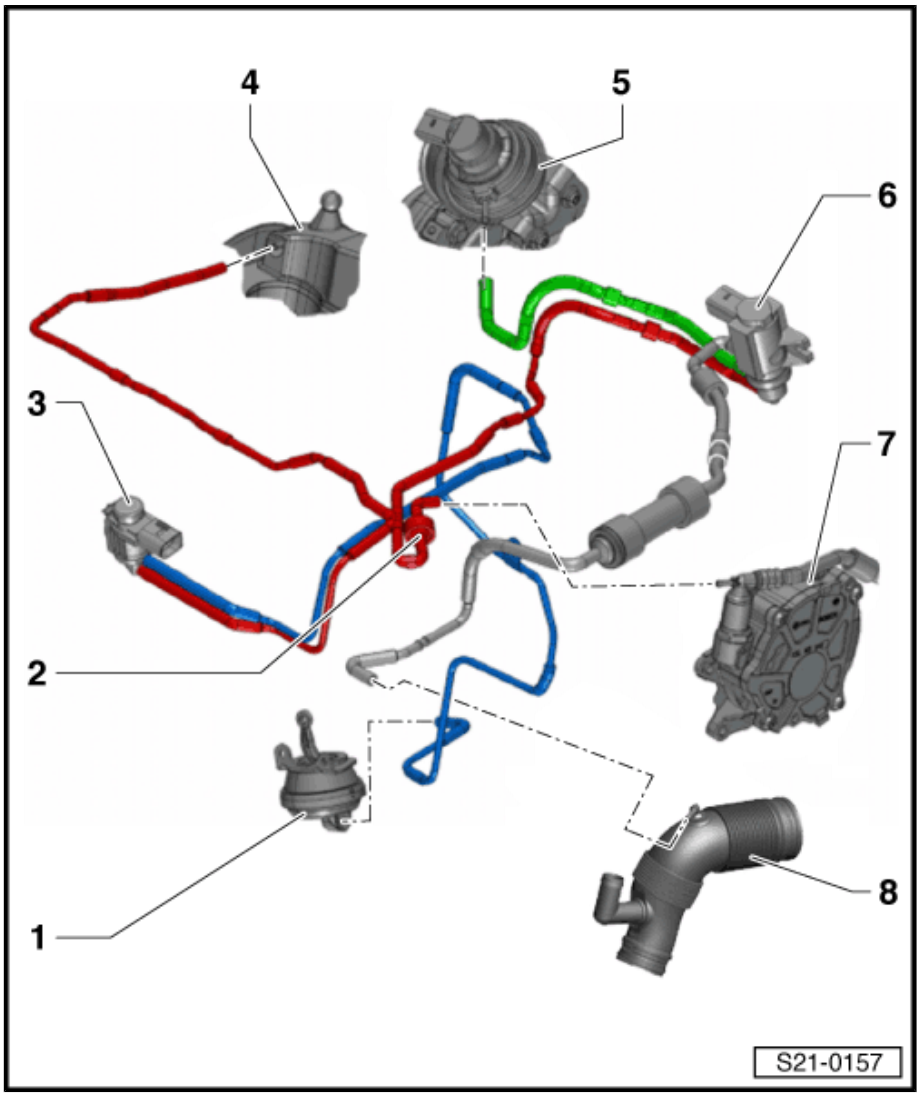
- ❑ at exhaust gas turbocharger
- ❑ with position sender for charge pressure regulator -G581-

6 - Solenoid valve for charge pressure control -N75-

7 - Vacuum pump

8 - Air intake hose

- ❑ with connecting piece for vent line



1.5 Inspect the vacuum system

Caution

When routing the vacuum lines, make sure that the lines are not kinked, twisted or crimped. Otherwise this can lead to breakdown.

Special tools and workshop equipment required

♦ Hand vacuum pump , e.g. -VAS 6213-

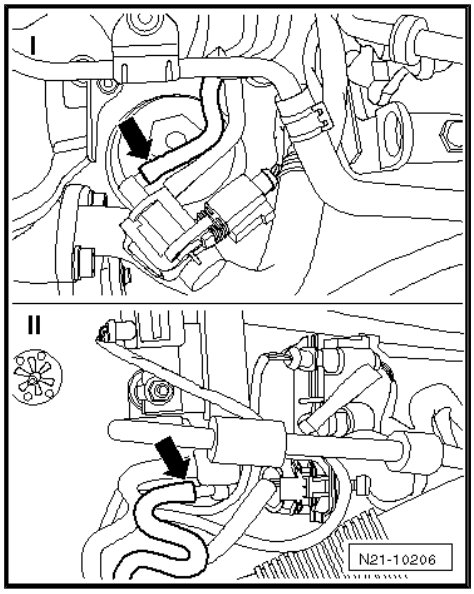
– Remove engine cover ⇒ page 15 .

Check supply line, vacuum reservoir and non-return valve:

– Unclip the changeover valve for radiator of exhaust gas recirculation -N345- from the front bracket at the intake manifold.

– Detach the vaccum hose on the bottom connection -arrow in I- from the changeover valve for radiator of exhaust gas recirculation -N345- and from the charge pressure control solenoid valve -N75- -arrow in II-.

– Close off the open hose ends with suitable dummy plugs.



Note

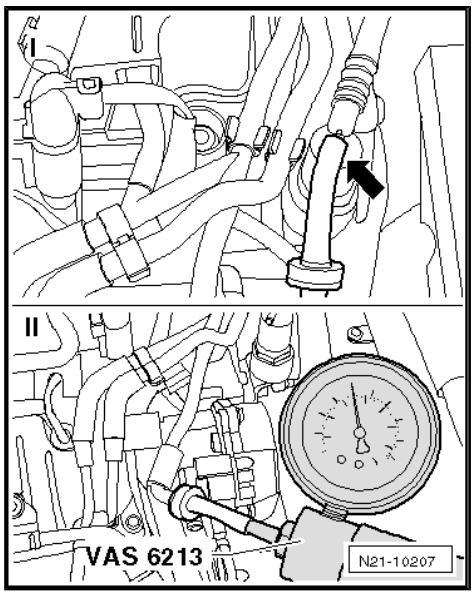
Do not use any thread screws or thread bolts.

– Detach the vacuum hose -arrow- on the connecting piece of the vaccum pump.

– Attach the hand vacuum pump -VAS 6213- to the detached hose and generate a vacuum of 0.06 MPa (0.6 bar).

– Observe the pressure gauge of the hand vacuum pump for approx. 30 seconds.

• The vacuum must not drop.



If the vacuum drops:

– Search for the damage or a leaky connection in the hose line and replace the piece of the hose.

If the vacuum does not drop:

– First of all, detach the hose at the hand vacuum pump -VAS 6213- .

– Remove one of the plugs from the hose ends.

If the non-return valve is functional, a significant spluttering can now be heard when the vacuum is suctioned off in the vacuum reservoir.

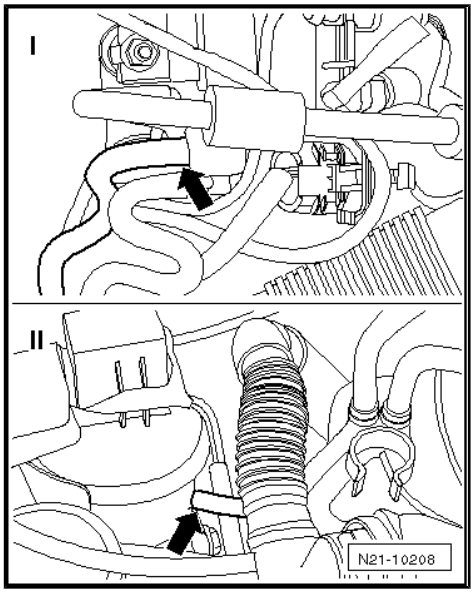
If no spluttering can be heard:

– Replace non-return valve.

– Re-connect all vacuum hoses.

Check the control line to the exhaust turbocharger

– Detach the hose on the middle connection -arrow in I- of the charge pressure control solenoid valve -N75 - and on the vacuum setting element of the exhaust turbocharger -arrow in II-.
– Close one opening of the hose with a suitable dummy plug.



Note

Do not use any thread screws or thread bolts.

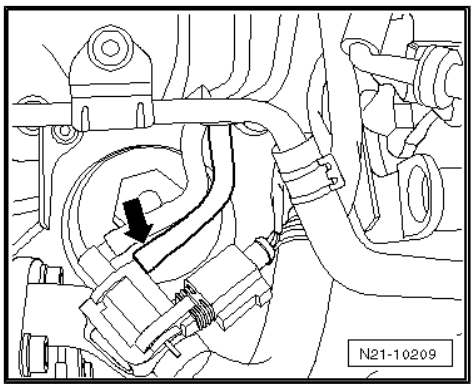
– Attach the hand vacuum pump -VAS 6213- to the other end of the hose and generate a vacuum of 0.06 MPa (0.6 bar).
– Observe the pressure gauge of the hand vacuum pump for approx. 30 seconds.

• The vacuum must not drop.

If the vacuum drops:

– Replace vacuum hose.

Check the control line to the vacuum setting element for switching over the radiator for the exhaust gas recirculation:



– Detach the hose on the middle connection of the exhaust gas recirculation radiator change-over valve -N345- -arrow-.
– Attach the hand vacuum pump -VAS 6213- to the detached hose and generate a vacuum of 0.06 MPa (0.6 bar).
– Observe the pressure gauge of the hand vacuum pump for approx. 30 seconds.

• The vacuum must not drop.

If the pressure drops:

– Detach the vacuum hose on the vacuum setting element for switching over the radiator for exhaust gas recirculation.
– Attach the hand vacuum pump -VAS 6213- with the factory-delivered test hose to the vacuum setting element and generate a vacuum of 0.06 MPa (0.6 bar).

Note

♦ *The adjustment on the vacuum setting element must be recognizable and the vacuum must not drop. If this is not the case, replace the radiator for exhaust gas recirculation* *⇒ page 201* *.*

♦ *If no defect can be found on the vacuum setting element, replace the vacuum line of the changeover valve for radiator of exhaust gas recirculation -N345- .*

2 Charge-air system - radiator, leak-tightness

2.1 Charge air cooling - Summary of components

Note

Observe general instructions for charge-air system ⇒ page 7 .

1 - Charge air cooler
- ❑ only remove together with radiator ⇒ page 129

2 - Right charge air hose

3 - Screw clamp, 8 Nm

4 - to throttle valve control unit -J338-

5 - Connecting hose

6 - 5 Nm

7 - Charge pressure sender -G31- with intake air temperature sender -G42-

8 - Rubber grommet
- ❑ replace if damaged

9 - 10 Nm

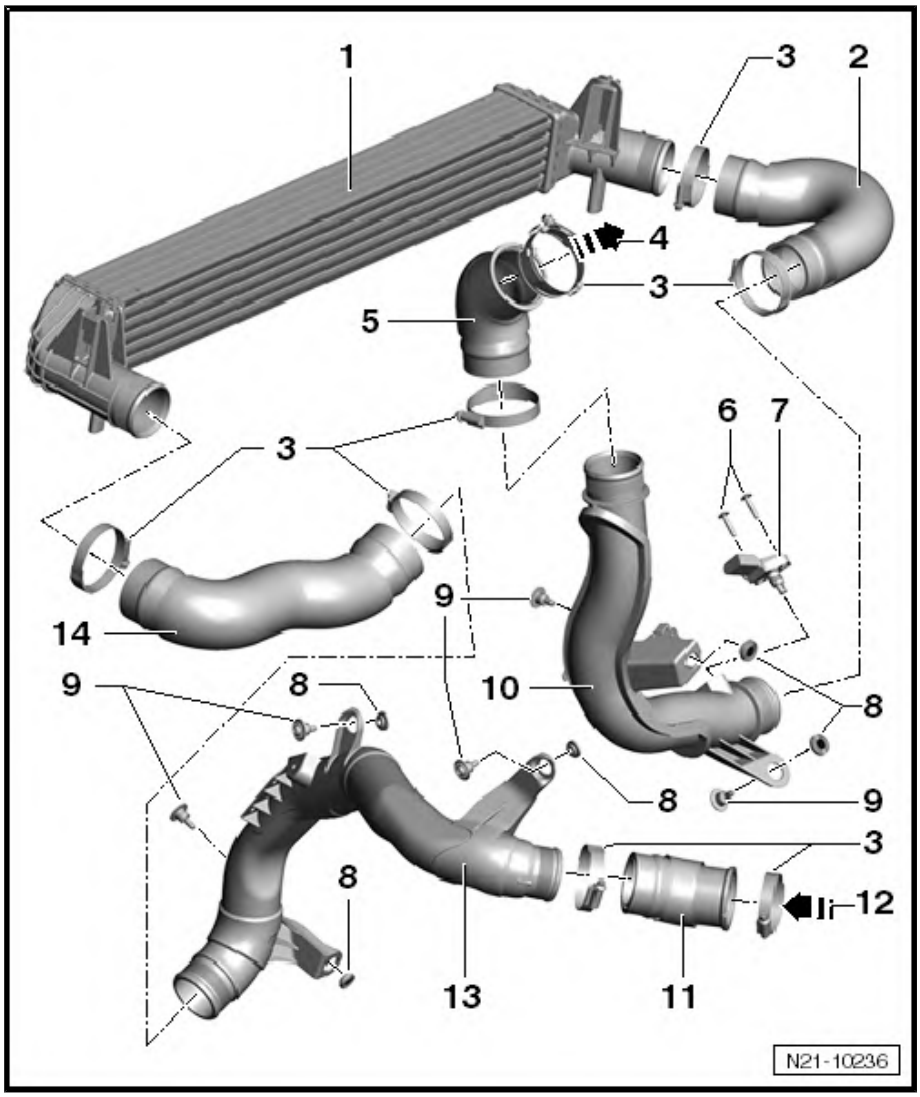
10 - Right charge air pipe

11 - Connecting hose

12 - from exhaust turbocharger

13 - Left charge air pipe

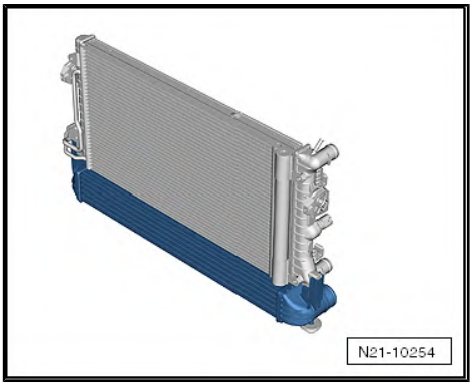
14 - Left charge air hose



2.2 Removing and installing charge air cooler

The charge-air cooler is located below the radiator.

Only remove charge-air cooler together with radiator ⇒ page 129 .



2.3 Checking the charge-air system for leaktightness

Special tools and workshop equipment required

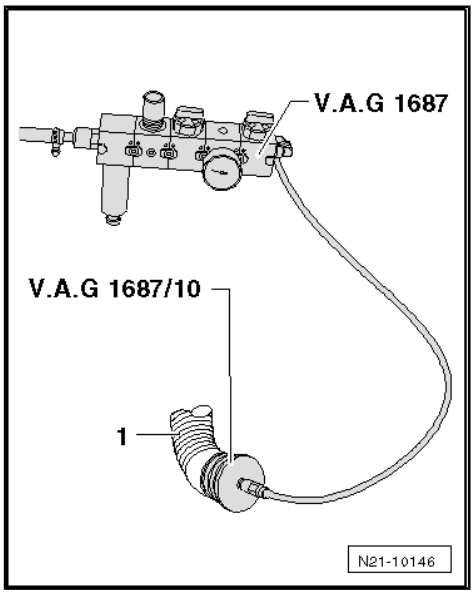
- Charge-air system testing device , e. g. -V.A.G 1687-
- Adapter , e.g. -V.A.G 1687/10-

Test sequence

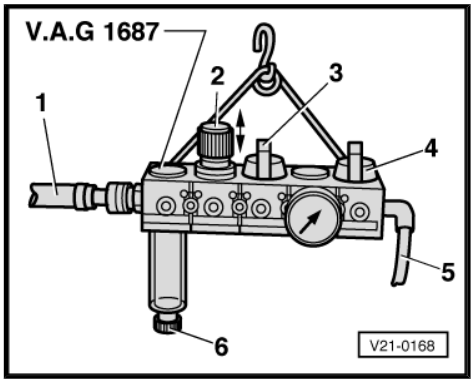
– Remove the suction hose -1- from the air filter housing.

– Fit adapter -1687/10- into the intake hose -1- and secure with a clamp.

Prepare tester -V.A.G 1687- as follows:



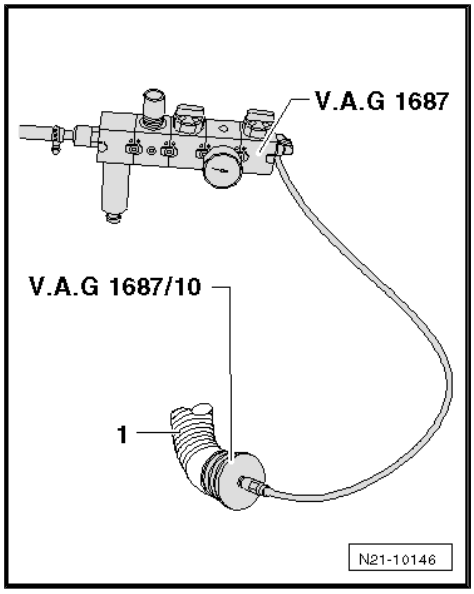
– Unscrew pressure control valve -2- fully and close the valves -3- and -4-.

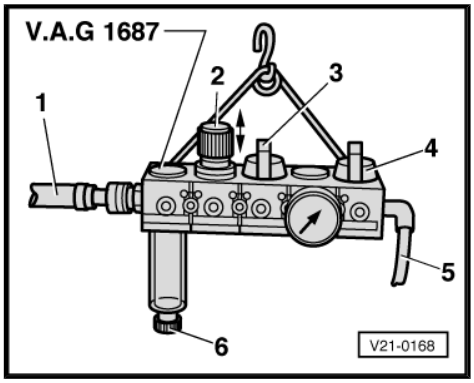


Note

The rotary knob must be pulled to the top in order to rotate the pressure control valve -2-.

– Connect tester for charge air system -V.A.G 1687- as shown to adapter -1687/10- .
– Connect the pneumatic hose -1- (pneumatic support) at tester.





Note

If there is water in the transparent water drain reservoir, drain water via the drain plug -6-.

– Open valve -3-.
– Set the pressure to 0.05 MPa (0.5 bar) with the pressure control valve -2-.

Caution

The pressure must not be greater than 0.05 MPa (0.5 bar)! A too high pressure can damage the engine.

– Open valve -4- and wait until the test circuit is filled. If necessary regulate the pressure to 0.05 MPa (0.5 bar).
– Check the charge-air system for leak points:

- by listening
- by touching
- with a commercially available leak search spray
- with the ultrasonic measuring device -V.A.G 1842-

Note

- *Minor leaks are permissible on the suction side of the turbocharger, because the intake hoses are not designed for overpressure.*
- *A small amount of air escapes via the valves into the engine. For this reason no pressure test is possible.*
- *Use of ultrasonic measuring device -V.A.G 1842- ⇒ operating instructions .*
- *In case of a leak point, observe the instructions for the charge air system during the installation ⇒ page 7 .*
- *Before removing the adapter, depressurize the test circuit by detaching the coupling from the adapter -1687/10- .*

23 – Fuel Formation, Injection

1 Diesel direct injection system - fitting location, system overview

The control unit is equipped with a fault memory. Before repairs, setting operations and fault finding, interrogate the fault memory and execute a self-diagnosis ⇒ Vehicle diagnosis, testing and information system VAS 5051.

Note

- *Faults can be detected by the control unit as checking and adjustment work is being undertaken and then saved. It is therefore absolutely necessary to delete the fault memory after completing all checking and adjustment work ⇒ Vehicle diagnosis, testing and information system VAS 5051*
- *Observe safety precautions when working on the diesel direct injection system* *⇒ page 5* *.*

1.1 Overview of fitting locations

1 - Pressure sensor 1 for exhaust gas -G450-

2 - Fuel pressure sender -G247-

3 - Hall sender -G40- (camshaft position sensor)

4 - Connector

- ❑ for exhaust gas temperature sender 4 -G648-
- ❑ for exhaust gas temperature sender 1 -G235- (Temperature sender upstream turbocharger -G507-)
- ❑ for lambda probe -G39-

5 - Injection units (Piezo injectors)

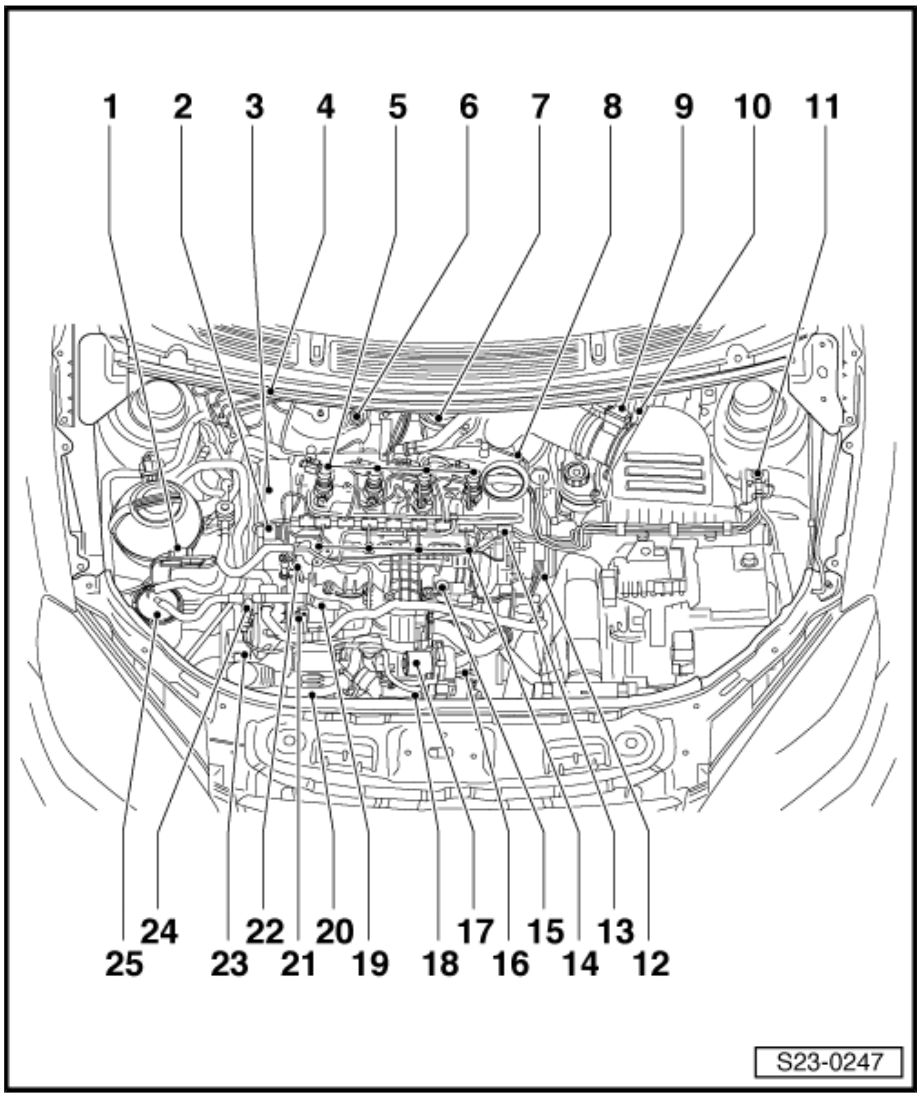
6 - lambda probe -G39- with heating for lambda probe -Z19-

7 - Position sender for charge pressure regulator -G581-

8 - Exhaust gas return valve -N18-

- ❑ consists of:

- ♦ mechanical valve (electrically operated)
- ♦ EGR control motor -V338-
- ♦ EGR potentiometer -G212-



9 - Air mass meter -G70-

10 - Engine control unit

11 - Solenoid valve for charge pressure control -N75-

12 - Intake manifold flap motor -V157-

13 - Control valve for fuel pressure -N276-

14 - Glow plugs

- ❑ Glow plug 1 -Q10-
- ❑ Glow plug 2 -Q11-
- ❑ Glow plug 3 -Q12-
- ❑ Glow plug 4 -Q13-

15 - Changeover valve for radiator of exhaust gas recirculation -N345-

16 - Engine speed sender -G28-

- ❑ removing and installing ⇒ page 163

17 - Throttle valve control unit -J338-

18 - Coolant recirculation pump 2 -V178-

19 - Connection of fuel feed line from fuel filter

20 - Charge pressure sender -G31-

21 - Fuel high pressure pump with fuel dosage valve -N290-

22 - Connection of fuel feed line (high pressure line)

23 - Coolant temperature sender at radiator outlet -G83-

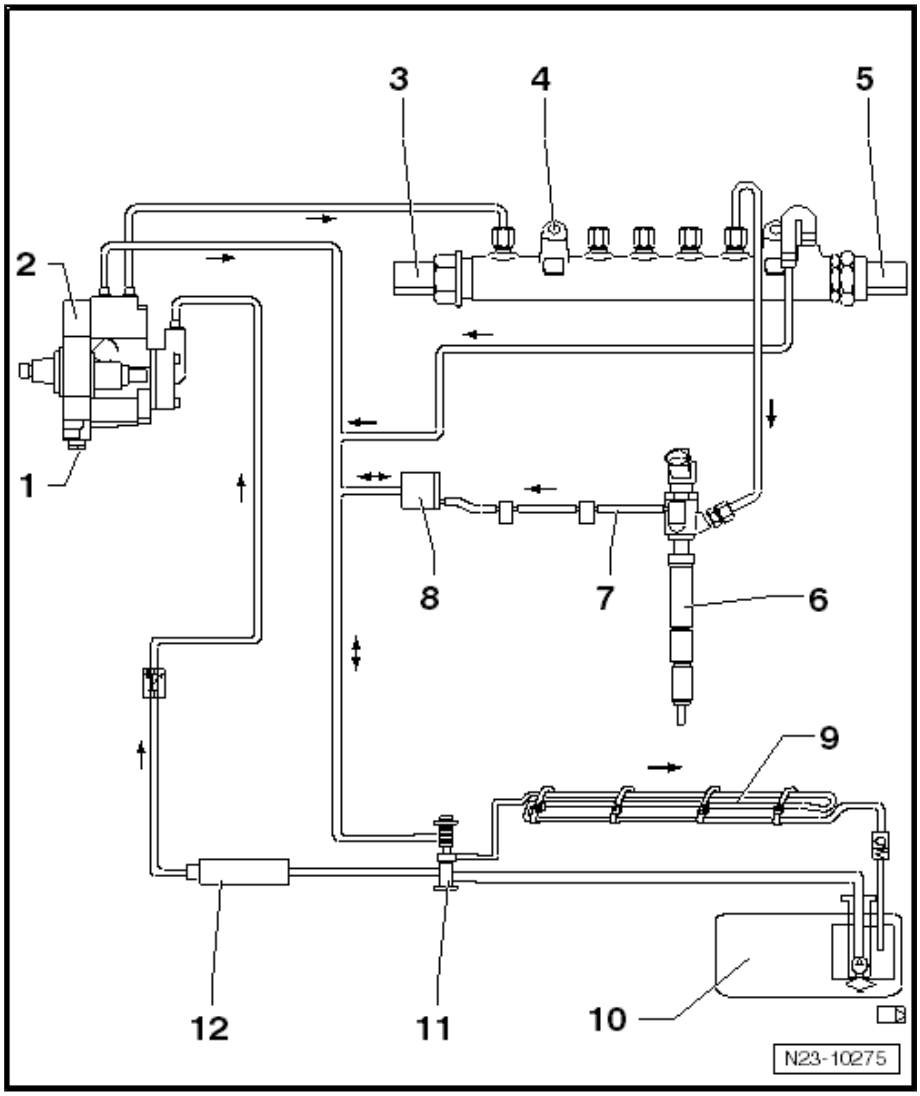
24 - Fuel temperature sender -G81-

25 - Fuel filter

1.2 System - Overview

WARNING

It is essential to pay attention to the safety precautions when working on the diesel direct injection system ⇒ page 5 .



1 - Fuel dosage valve -N290-

- ❑ do not open

2 - Fuel high pressure pump

- ❑ removing and installing ⇒ page 176

3 - Fuel pressure sender - G247-

- ❑ removing and installing ⇒ page 174

4 - High pressure reservoir (rail)

5 - Control valve for fuel pressure -N276-

- ❑ replace after each removal
- ❑ check ⇒ page 172
- ❑ removing and installing ⇒ page 172

6 - Injection unit (Piezo injector)

- ❑ removing and installing ⇒ page 167

7 - Fuel return-flow line

8 - Pressure holding valve

- ❑ The pressure holding valve has the function to always hold a remaining pressure (control quantity) of approx. 0.1 MPa (1 bar) in the fuel return-flow line. The injection units (piezo injectors) require this control quantity for their function.
- ❑ check ⇒ page 181

9 - Fuel cooler

- ❑ not fitted

10 - Fuel tank

- ❑ removing and installing ⇒ page 138

11 - Preheating valve

- ❑ Connect ⇒ page 134

12 - Fuel filter

- ❑ removing and installing ⇒ page 136

1.3 Removing and installing engine speed sender -G28-

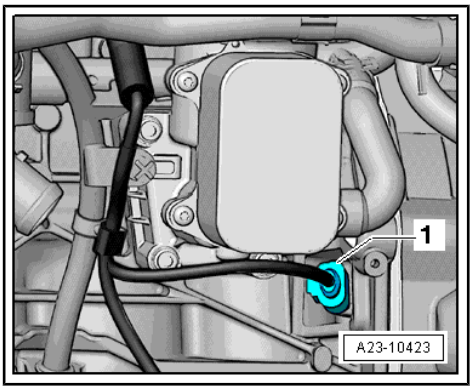
Special tools and workshop equipment required

- Socket insert -T10370-
- Assembly tool -T10118-

Removing

– Remove noise insulation ⇒ Body Work ⇒ Rep. Gr. 50 .

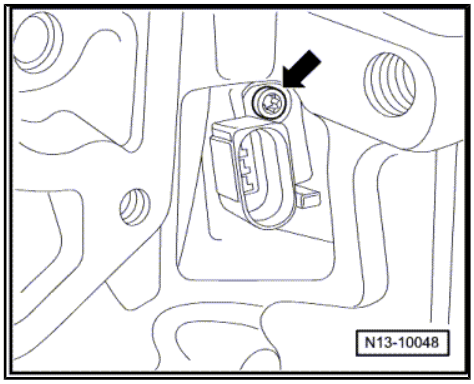
– Disconnect the plug -1- on the engine speed sender -G28- with the assembly device -T10118 - and lay the electrical cable to the side.



Note

To unlock the plug without the assembly device -T10118- , press the unlock button at the plug using a screwdriver. At the same time raise the unlock button with a thin wire hook.

– Unscrew the fixing screw -arrow- of the engine speed sender -G28- and pull out the sender.



Install

Installation is performed in the reverse order, pay attention to the following points:

Tightening torque

Component	Nm
Engine speed sender -G28- on the flange	5

2 Fuel system, engine side

2.1 Fuel system - Summary of components

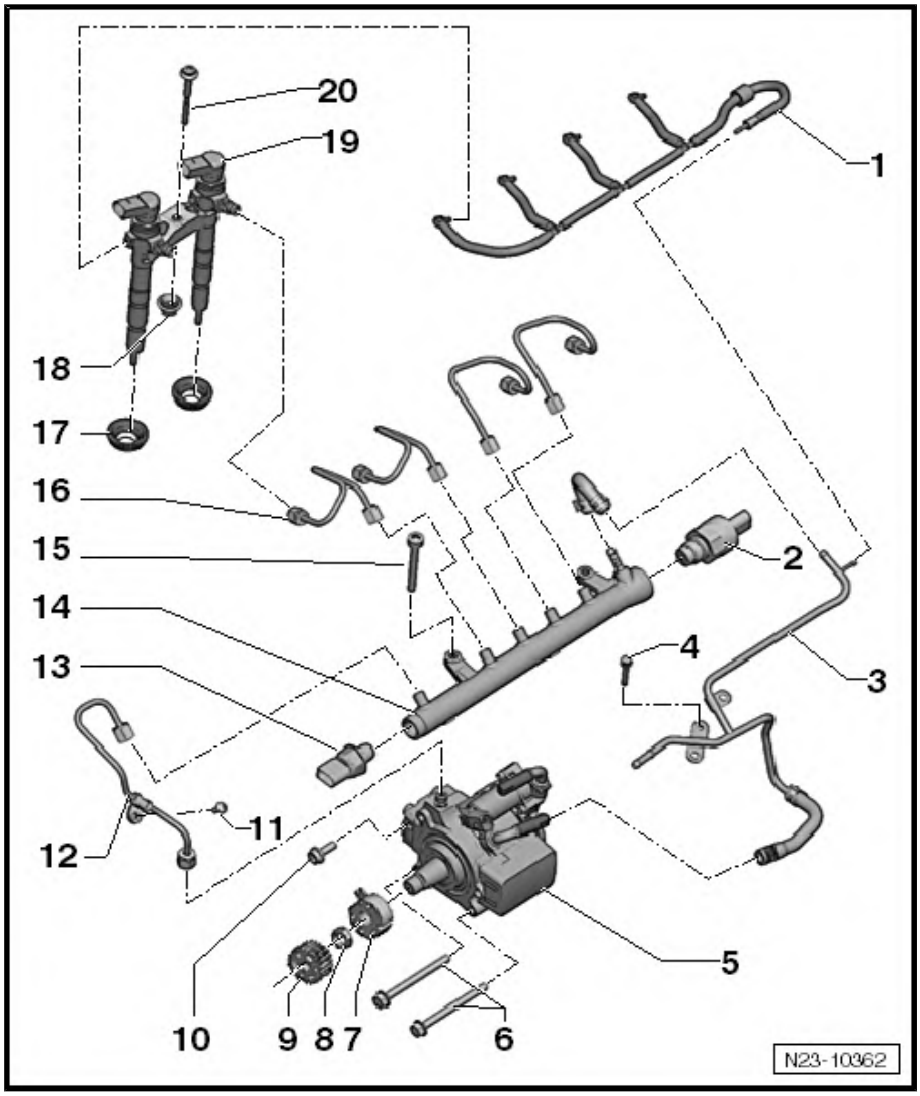
Special tools and workshop equipment required

- Counterholder -T10051-
- Extractor -T40064-

Caution

In order to avoid the fuel high pressure pump to run dry and to achieve a quick engine start after parts are replaced, the following must absolutely be observed:

- *If the fuel high pressure pump is removed, the basic setting "test of fuel pump for predelivery" must be carried out "3 times" before the first engine start.*
- *If the fuel high pressure pump is replaced, the initial fuel filling of the fuel high pressure pump must be carried out before the first engine start* ⇒ page 179 .



1 - Fuel return-flow lines

- ❑ to fuel tank
- ❑ Fuel return-flow lines must not be kinked, damaged or blocked
- ❑ Fuel return-flow lines must not be disassembled
- ❑ The pressure holding valve in the fuel return-flow line has the function to always hold a remaining pressure (control quantity)
- ❑ The piezo injectors require this control quantity for their function
- ❑ Check the pressure holding valve ⇒ page 181 .

2 - Fuel pressure regulating valve -N276- , 80 Nm

- ❑ not reusable
- ❑ removing and installing ⇒ page 172

3 - Fuel return-flow lines

4 - 10 Nm

5 - Fuel high pressure pump

- ❑ removing and installing ⇒ page 176
- ❑ with fuel dosage valve -N290- (do not open)
- ❑ an initial fuel filling must

be carried out after the
replacement (absolutely avoid it to run dry)

6 - 20 Nm + torque a further 180° (1/2 turn)

7 - Hub

- ❑ with transmitter ring
- ❑ to release and tighten use counterholder -T10051-
- ❑ to remove use extractor -T40064-

8 - 95 Nm

9 - Timing belt gear - high pressure pump

- ❑ Torque screws to 20 Nm + a further 90° (1/2 turn)

10 - 20 Nm + torque a further 45° (1/8 turn)

11 - 10 Nm

12 - High pressure line, 28 Nm

- ❑ between high pressure pump and high pressure reservoir (rail)
- ❑ install not under tension

Note

13 - Fuel pressure sender -G247- , 100 Nm

- ❑ removing and installing ⇒ page 174

14 - High pressure reservoir (rail)

- ❑ removing and installing

15 - 22 Nm

16 - High pressure lines, 28 Nm

- ❑ between the high pressure reservoir (rail) and the injection units
- ❑ do not interchange
- ❑ install free of stress

Note

17 - Gasket

- ❑ replace in case the cylinder head cover is damaged

18 - Gasket

19 - Injection units (Piezo injectors)

- ❑ removing and installing ⇒ page 167
- ❑ The following component parts and gaskets or O-rings must be replaced each time when removing and installing: “copper disc”, “O-ring of injection channel”, “O-ring of injector return flow”.
- ❑ The following components and gaskets or O-rings must be replaced when replacing an injector: clamping claw, copper disc, O-ring of injection channel, O-ring of injector return flow, screw for clamping claw
- ❑ Before re-using the “high pressure line”, carry out a visual inspection of the sealing cones for damage e.g. cross chamfers and corrosion. In the event of damage, always replace the line.
- ❑ Removed injection units (piezo injectors), high pressure lines and clamping claws, which are re-installed, may only be mounted again at the same point (cylinder).
- ❑ Perform adaptation for injector quantity adjustment ⇒ page 166 .

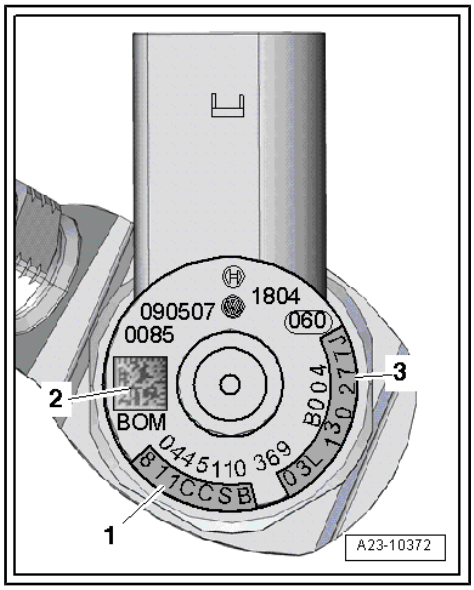
20 - 8 Nm + torque a further 180° (1/2 turn)

- ❑ replace

2.2 Perform adaptation for injector quantity adjustment

The functionality “injector quantity adjustment (IQA)” is used to correct the injection rate for each cylinder of a Common Rail system individually in the complete characteristic diagram area.

The adaptation values -1- are imprinted on each injection unit (injector). The imprinted values can be letters and/or numbers. The specifications provided in the figure are only one example.



View from the top of the injection unit

1 - Checksum (IQA)

2 - Data Matrix code

3 - Part number

After replacing an injection unit, the adaptation value must be written into the engine control unit.

After replacing the engine control unit, the “adaptation values for the injection units” must be transferred into the new engine control unit.

The work procedure for the adaptation is described in the “Targeted fault finding” ⇒ Vehicle diagnosis, testing and information system VAS 5051.

In addition, check whether all the values of the other injection units related to the “injector quantity adjustment (IQA)” are entered correctly.

2.3 Injection units (piezo injectors) - Summary of components and fitting position of the clamping claw

1 - Injection unit (Piezo injector)

- ❑ Perform adaptation for injector quantity adjustment ⇒ page 166

2 - Screw for clamping claw

- ❑ 8 Nm + torque a further 180° ($^1/_2$ turn)

3 - High pressure connection piece at the injector

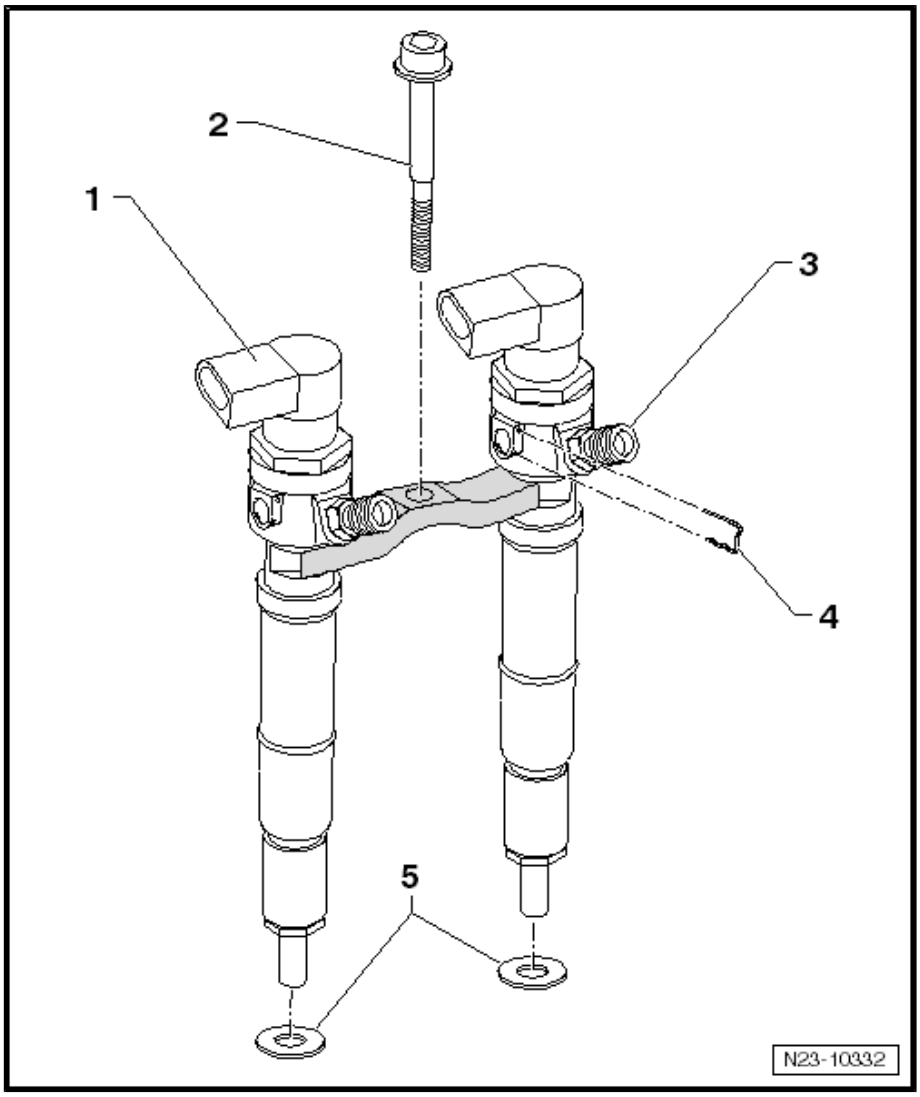
- ❑ 40 Nm
- ❑ counterhold when loosening the high pressure lines

4 - Retaining clip for return-flow lines

- ❑ replace
- ❑ Lightly grease the retaining clip before installing the injector

5 - Copper disc

- ❑ replace



2.4 Remove and install injection unit (Piezo injector)

Special tools and workshop equipment required

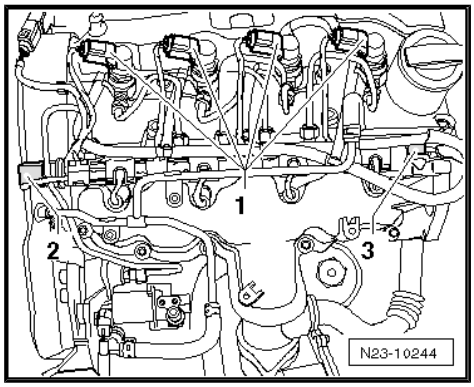
- ♦ Extractor -T10055-
- ♦ Assembly sleeve -T10377-
- ♦ Socket wrench insert -T40055-
- ♦ Extractor -T10402-
- ♦ Supporting sleeve -T10411-

2.4.1 Removing

Note

- *Safety precautions when working on the fuel supply system ⇒ page 3 .*
- *Observe rules for cleanliness ⇒ page 6 .*

– Remove top engine cover ⇒ page 15 .
– If present, remove the noise insulation at the injection units.
– Disconnect the plug -1- at the injection units to be removed.

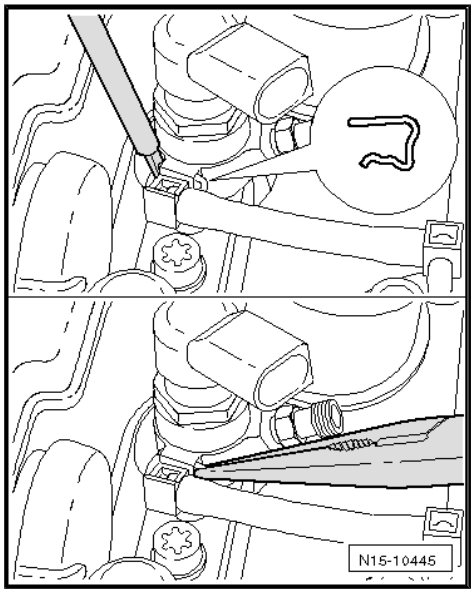


Note

- *Preferred loosening sequence of the high pressure lines cylinders 4-3-2-1.*
- *Counterhold at the injection units when loosening the high pressure connection piece.*

– Remove the high pressure lines between the high pressure reservoir (rail) and the injection units.
– Remove the high pressure line between the high pressure pump and the high pressure reservoir (rail).

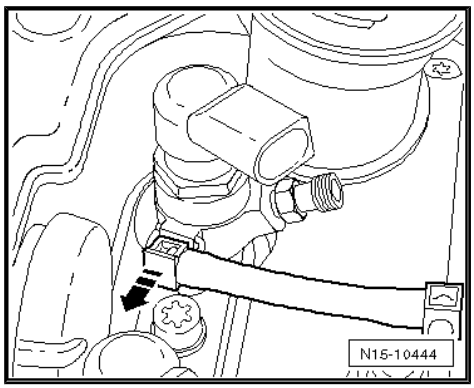
– Unlock the connections of the fuel return-flow line using a screwdriver and a set of pointed pliers.



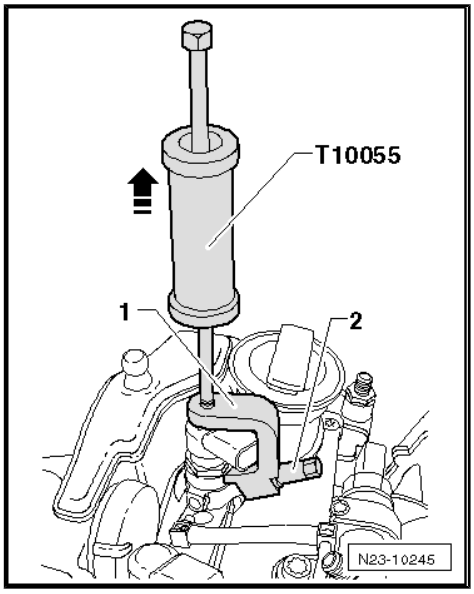
– Disconnect the connections of the fuel return-flow line at the injectors in -direction of arrow-.
– Unscrew the fixing screw, Pos. 20 ⇒ page 164 of the clamping claw for the injection units (piezo injectors).

Caution

Pay particular attention in order to avoid unnecessary installation work or consequential damage.



– Position the extractor -T10055- with the extractor -T10402- -1- and -2- as shown and pull out the injection unit towards the top by tapping it.



2.4.2 Install

Important instructions for installing the injection units:

- List of parts and seals or O-rings to be replaced:
– Clamping claw
– Copper seal
– O-ring for channel in cylinder head
– O-ring for fuel return-flow line
– Only for new injection unit: injection line.
- When reinstalling, only insert injection units and injection lines for the same cylinder in the cylinder head.
- Check the injection units and the installation area for cleanliness before installing.
- The injection units must not show any sign of damage.
- All the O-rings must be coated with engine oil before installing.

If a used injection unit is refitted:

– Spray the tip of the injection unit with a rust solvent spray. Remove the soot particles or the oil particles with a cloth after approx. 5 minutes.

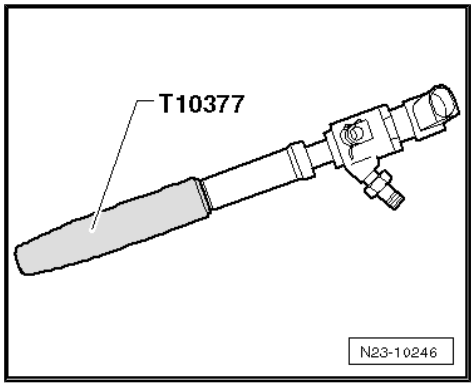
– For disassembling the old copper gasket ring from the injection unit, carefully tighten the gasket ring in a vice. Turn the chuck jaws together until the copper gasket ring is prevented from spinning. Pull the injection unit out of the copper gasket ring with slight turning and pulling movements of the hand.

Continued for all injection units

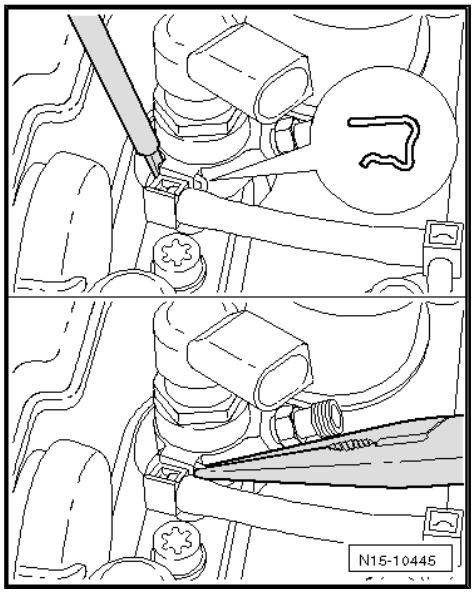
– Install the new copper gasket ring with the aid of a plastic bush.

– Use a cloth soaked in engine oil or rust solvent in order to remove the soot particles on the contact surface of the injection unit in the cylinder head and the channel. Make sure the sealing surfaces are not damaged in the process.

– Replace the O-ring for the channel in the cylinder head, to do so use the assembly sleeve -T10377- .



– Position the clips before installing the injector. Lightly grease them.

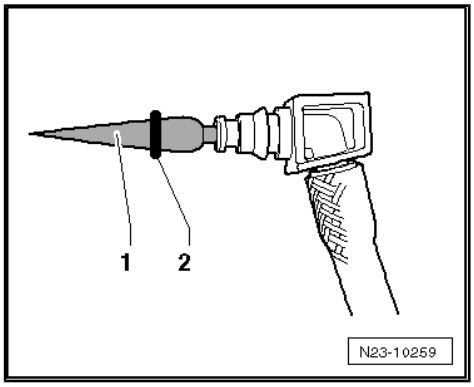


– In order to avoid damaging the O-ring, slide the new O-ring -2- for the fuel return-flow line over the drift pin -1-.

• Ensure that the injection channel is clean before the installation.

– Slide the clamping claw onto the injection units, observe the fitting position of the clamping claw.

– Always insert 2 injectors with clamping claw carefully into the injection channels of the cylinder head.



Caution

Pay particular attention in order to avoid unnecessary installation work or consequential damage.

Avoid damage and contact of the injectors with the cylinder head.

– First of all tighten the fixing screws only to MAX: 1 - 2 Nm.

It must be possible to align the injectors when installing the high pressure lines by hand.

Note

After replacing one or several injection units, the "injector quantity adjustment (IQA)" and the "injector voltage adjustment (IVA)" ⇒ Vehicle diagnosis, testing and information system VAS 5051 must be carried out for the new injection units.

– Fill up the fuel system ⇒ page 179 .

– Let the engine run at idling speed for a few minutes and then switch off again.

– Switch off ignition.

– Check the complete fuel system and the connections of the fuel return-flow line for tightness.

If there is leakage despite the correct tightening torque, replace the related component part.

Note

If air is still in the fuel system, the engine can go into emergency running mode during the test drive. Switch off engine, interrogate and erase fault memory of engine control unit ⇒ Vehicle diagnosis, testing and information system VAS 5051. Then proceed with the test drive.

– Interrogate the fault memory of the engine control unit again.

Note

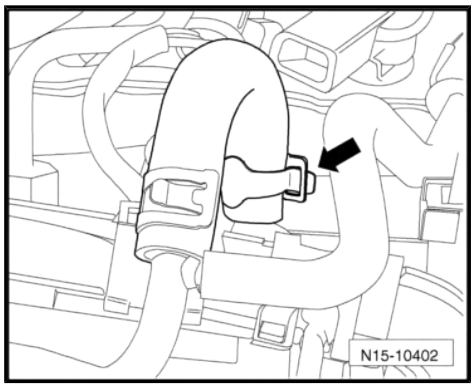
After deleting the fault memory of the engine control unit the readiness code must be re-generated.

2.5 Check fuel pressure regulating valve - N276-

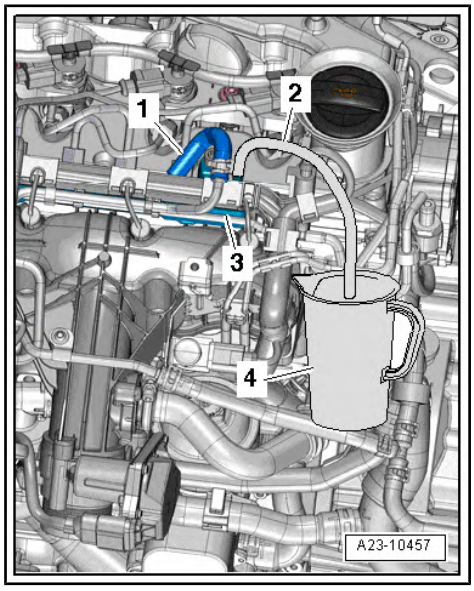
Note

Observe rules for cleanliness ⇒ page 6 .

– Remove engine cover ⇒ page 15 .
– Remove the fuel return hose from the fuel distributor, to do so slacken the hose clamp -arrow-.
– Close the open fuel return flow hose with a suitable plug.



– Connect the auxiliary hose -2- to the return-flow connection of the fuel distributor -3-.
– Hold the auxiliary hose in the measuring vessel -4- in order to measure the return flow quantity.
– Start engine and run for 30 seconds at idling speed.
• Specified value: in 30 seconds 90 … 110 ml
– If the specified value is not reached, the fuel pressure regulating valve -N276- is defective.
– Replace fuel pressure regulating valve -N276- ⇒ page 172 .



2.6 Replace fuel pressure regulating valve - N276-

The fuel pressure regulating valve -N276- is located in the high pressure reservoir (rail). It provides a constant pressure in the high pressure reservoir (rail) and in the injection lines (high-pressure fuel circuit).

The regulating valve opens if there is too high a pressure in the high-pressure fuel circuit. One part of the fuel from the high pressure reservoir flows back into the fuel tank via a return-flow line.

The regulating valve closes if there is too low a pressure in the high-pressure fuel circuit. Thus, it seals the high-pressure side from the low-pressure side.

Note

The fuel pressure regulating valve -N276- is not reusable.

Special tools and workshop equipment required

- Cleaning agent and grease remover e.g. -D 000 401 04-
- Protective goggles and gloves

Removing

Note

- *Safety precautions when working on the fuel supply system* ⇒ page 3 .
- *Observe rules for cleanliness* ⇒ page 6 .

– Remove engine cover ⇒ page 15 .

WARNING

Wear protective gloves and protective googles when working with grease remover!

– Before removing the fuel pressure regulating valve -N276 - , clean the thread area with a grease remover.

• No dirt must get into the hole of the high pressure reservoir (rail).

• No cleaning agent must get into the plug connector housing of the fuel pressure regulating valve -N276- .

– Dry fuel pressure regulating valve -N276-

– Disconnect the plug at the fuel pressure regulating valve -N276- .

– Counterhold on the case hexagon and slacken the union nut. Afterwards release by hand.

– Suction the dirt out of the high pressure reservoir hole (thread and contact surface). To do so do not use any mechanical tools.

Note

Close the high pressure reservoir hole immediately with a suitable screw plug in order to prevent dirt from penetrating.

Install

Note

- *The fuel pressure regulating valve -N276- does not have a gasket ring but a biting edge.*
- *The fuel pressure regulating valve -N276- is not reusable.*
- *The O-ring seals the high pressure area from the low pressure area in the high pressure reservoir (rail). It must be replaced.*
- *Before installing, moisten the O-ring and the hole in the high pressure reservoir (rail) with diesel fuel.*
- *Pay attention to damage of the sealing surfaces (biting edge seal) and the thread of the new fuel pressure regulating valve -N276- .*
- *Also check the sealing surface on the high pressure reservoir hole (rail).*

– Tighten the union nut by hand.

– Align the fuel pressure regulating valve -N276- in such a way that the connecting line is routed draught-free after fitting on the plug.

– Counterhold on the case hexagon and tighten the union nut.

Tightening torque: ⇒ page 164

– After installing the engine, let the engine run at an average speed for a few minutes and then switch it off again.

– Check fuel system for tightness.

– Interrogating and erasing fault memory of engine control unit ⇒ Vehicle diagnosis, testing and information system VAS 5051.

– Afterwards, carry out a test drive with at least one full load acceleration, then once again check the fuel high pressure area for tightness.

– Interrogate and erase once again the fault memory of the engine control unit ⇒ Vehicle diagnosis, testing and information system VAS 5051.

Note

After deleting the fault memory of the engine control unit the readiness code must be re-generated.

2.7 Removing and installing fuel pressure sender -G247-

The fuel pressure sender -G247- (rail pressure sensor) is located in the high pressure reservoir, it measures the current fuel pressure in the high pressure system and delivers a voltage signal to the engine control unit -J623- .

If the sender fails, the pressure regulation is controlled by the engine control unit via a characteristic diagram. In the emergency running mode, the maximum engine speed is limited to approx. 3000 rpm.

Special tools and workshop equipment required

- Cleaning agent and grease remover e.g. -D 000 401 04-

♦ Protective goggles and gloves

Removing

Note

♦ *Safety precautions when working on the fuel supply system ⇒ page 3 .*

♦ *Observe rules for cleanliness ⇒ page 6 .*

– Remove engine cover ⇒ page 15 .

WARNING

Wear protective gloves and protective googles when working with grease remover!

– Before removing the fuel pressure sender -G247- , clean the thread area with a grease remover.

• No dirt must get into the hole of the fuel distributor.

• No cleaning agent must get into the plug connector housing of the fuel pressure sender -G247- .

– Dry the fuel pressure sender -G247- .

– Disconnect plug at fuel pressure sender -G247- .

Caution

Do not slacken the fuel pressure sender using the open-end wrench or the open ring spanner - Risk of damage!

Use lengthened socket insert.

– Unscrew the fuel pressure sender -G247- .

– Suction the dirt out of the high pressure reservoir hole (thread and contact surface). To do so do not use any mechanical tools.

Note

Close the high pressure reservoir hole immediately with a suitable screw plug in order to prevent dirt from penetrating.

Install

Note

♦ *The fuel pressure sender -G247- has no gasket ring but a biting edge for sealing.*

♦ *Pay attention to damage of the sealing surfaces (biting edge seal) and the thread of the fuel pressure sender -G247- . It is possible to use the fuel pressure sender -G247- again.*

♦ *Also check the sealing surface on the high pressure reservoir hole (rail).*

Caution

Do not tighten the fuel pressure sender using the open-end wrench or the open ring spanner - Risk of damage!

Use lengthened socket insert.

– Tighten the fuel pressure sender -G247- by hand.

– Tighten the sender.

Tightening torque: ⇒ page 164

– After installing the engine, let the engine run at an average speed for a few minutes and then switch it off again.

– Check fuel system for tightness.

– Interrogating and erasing fault memory of engine control unit ⇒ Vehicle diagnosis, testing and information system VAS 5051.

– Afterwards, carry out a test drive with at least one full load acceleration, then once again check the fuel high pressure area for tightness.

– Interrogate and erase once again the fault memory of the engine control unit ⇒ Vehicle diagnosis, testing and information system VAS 5051.

Note

After deleting the fault memory of the engine control unit the readiness code must be re-generated.

2.8 Removing and installing the high pressure pump

Special tools and workshop equipment required

- Counterholder -T10051 -
- Extractor -T40064-
- Pressure plate -T40064/1-
- Bolt -T40064/2-

Removing

Note

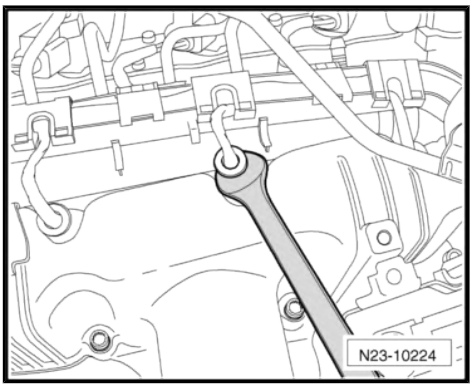
- *Safety precautions when working on the fuel supply system* *⇒ page 3* *.*
- *Observe rules for cleanliness* *⇒ page 6* *.*

– Remove the toothed belt from the camshaft and the high pressure pump ⇒ page 39 .

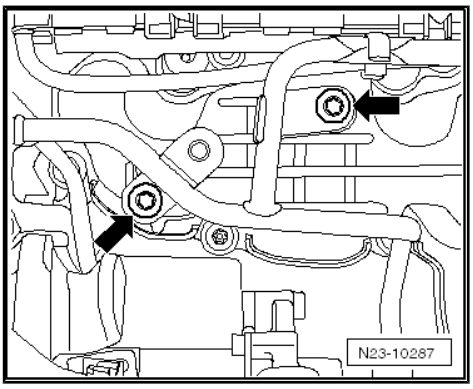
Caution

- *Carefully disconnect the plug from the pencil type glow plugs.*
- *If the plug is damaged when disconnecting it, the wiring loom including the plugs must be replaced (plugs cannot be replaced separately).*

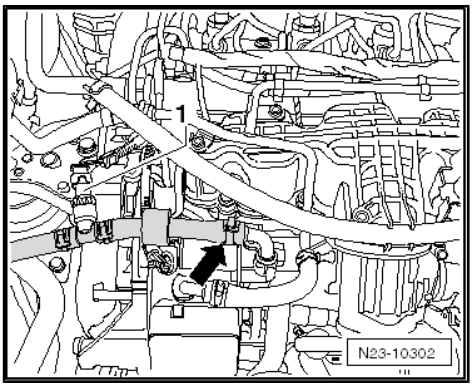
– Carefully disconnect the plug from the pencil type glow plugs. To do so use an open-end wrench, wrench size 12, for help.



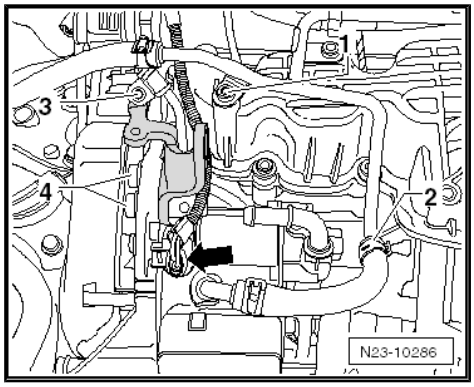
– Unscrew securing bolts -arrows-.



– Disconnect the fuel feed line -arrow- on the high pressure pump and disconnect the plug -1- at the fuel temperature sender -G81- .



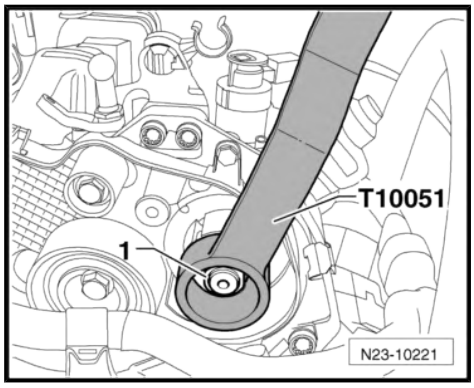
– Release screws -1, 3, 4- and remove engine mount -grey-.
– Detach fuel return-flow line -2-.
– Remove the fuel high pressure line between the high pressure pump and the high pressure reservoir (rail).
– Remove the toothed belt gear from the high pressure pump.



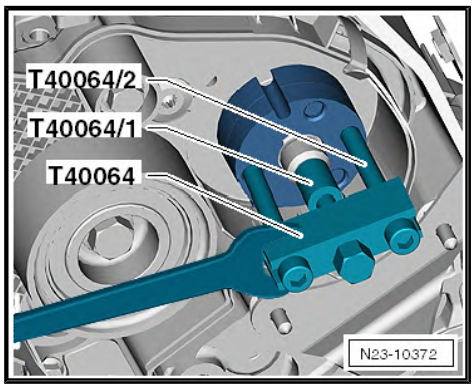
– Hold the hub of the high pressure pump with the counterholder -T10051- and unscrew the fixing nut -1-.

Note

Replace the basic pressure plate with the pressure plate -T40064/1- on the extractor -T40064- .

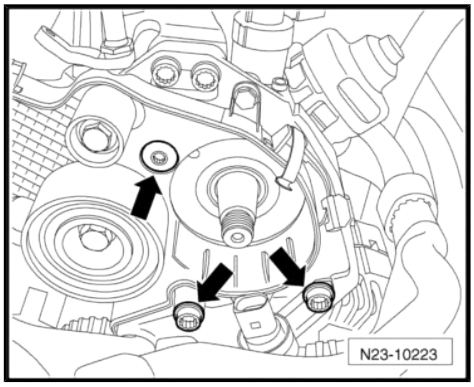


– Position the extractor -T40064- with thrust piece -T40064/1- and bolt -T40064/2- as shown and pull out the hub from the high pressure pump. If necessary, counterhold with an open-end wrench SW 24.



– Unscrew fixing screws -arrows- of high pressure pump.

– Remove the high pressure pump.



Install

Caution

Risk of damage to the high pressure pump through running dry.

- ***After reinstalling the high pressure pump: carry out the basic setting "test of fuel pump for predelivery" "3 times" before the first engine start ⇒ Vehicle diagnosis, testing and information system VAS 5051.***
- ***After installing a new high pressure pump: fill up the high pressure pump with fuel before the first engine start*** ***⇒ page 179*** ***.***

Installation is performed in the reverse order, pay attention to the following points:

Note

The screws for the high pressure pump must be replaced.

Tightening torques: ⇒ page 164

2.9 Filling/bleeding the high pressure pump and the fuel system

Special tools and workshop equipment required

- Cleaning agent and grease remover e.g. -D 000 401 04-
- Vehicle diagnosis, measurement and information system -VAS 505X-

Caution

Risk of damage to the high pressure pump through running dry.

- ***After installing a new high pressure pump, the high pressure pump must be filled up with fuel before the first engine start. Avoid the high pressure pump to run dry.***

Note

- *When installing the high pressure pump, ensure that no dirt penetrates the fuel system.*
- *Only remove the screw plug immediately before installing the fuel lines.*

- The vehicle must be filled up.
- Temperature of the fuel system ≥ 15 °C

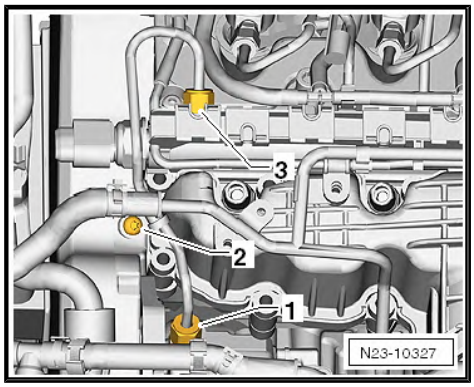
In order to fill up the high pressure pump with fuel, proceed as follows:

– Connect vehicle diagnosis system, measurement and information system -VAS 505X- .

– Switch on ignition.
– Select the “Engine electronics” in the self-diagnosis.
– Then select “006 - Basic setting”.
– Then select “Test of fuel pump for predelivery”.
– Subsequently press on “Start”.
♦ The fuel pumps start running for approx. 60 seconds.
– Repeat this work procedure 3x.

  This ensures that the high pressure pump is adequately filled up with fuel.

– Degrease the union nut of the high pressure pipe -1- and -3- and its surrounding area at the pump as well as at the fuel distributor.
– Start the engine and let it run at an average speed for a few minutes.
– Carry out a visual inspection of the fuel system for leaks after switching off the engine.



If there is leakage despite the correct tightening torque:

– Replace the related component part and repeat the filling/ bleeding procedure.
– Afterwards, carry out a test drive with at least one full load acceleration.
– Afterwards, once again carry out a visual inspection of the fuel system for leaks.

If there is leakage despite the correct tightening torque:

– Replace the related component part and repeat the filling/ bleeding procedure.
– Interrogate and if necessary erase fault memory of engine control unit ⇒ Vehicle diagnosis, testing and information system VAS 5051.

Note

After deleting the fault memory of the engine control unit the readiness code ⇒ Vehicle diagnosis, testing and information system VAS 5051 must be re-generated.

2.10 Check the fuel system for tightness

– Let the engine run at idling speed for a few minutes, do not accelerate and then switch off the engine again. (The fuel system vents itself.)
– Check the complete fuel system for tightness.

If there is leakage despite the correct tightening torque, replace the related component part.

– Afterwards, carry out a test drive with at least one full load acceleration, then once again check the high pressure area for tightness.

Note

If air is still in the fuel system, the engine can go into emergency running mode during the test drive. Switch off engine, interrogate and erase fault memory of engine control unit ⇒ Vehicle diagnosis, testing and information system VAS 5051. Then proceed with the test drive.

– Interrogate the fault memory of the engine control unit again.

Note

After deleting the fault memory of the engine control unit the readiness code must be re-generated.

2.11 Check the pressure holding valve in the fuel return-flow line

The pressure holding valve in the fuel return-flow line has the function to always hold a remaining pressure (control quantity) of approx. 0.1 MPa (1 bar).

The injection units (piezo injectors) require this control quantity for their function.

Special tools and workshop equipment required

- Pressure gauge , e.g. -VAS 6330-
- Adapter , e.g. -VAS 6330/3-1-
- Adapter , e.g. -VAS 6330/3-2-
- Cleaning agent and grease remover e.g. -D 000 401 04-
- Protective goggles and gloves

Test sequence

Note

- *Safety precautions when working on the fuel supply system ⇒ page 3 .*
- *Observe rules for cleanliness ⇒ page 6 .*

– Remove top engine cover ⇒ page 15 .

WARNING

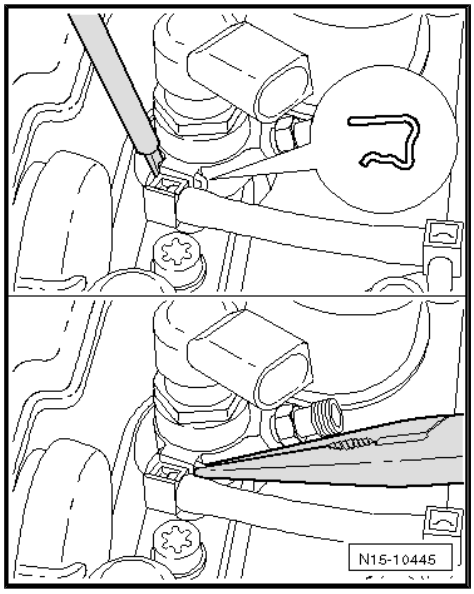
Wear protective gloves and protective googles when working with grease remover!

– Before removing, clean the return line connection at the injection unit of cylinder 1 with a grease remover.

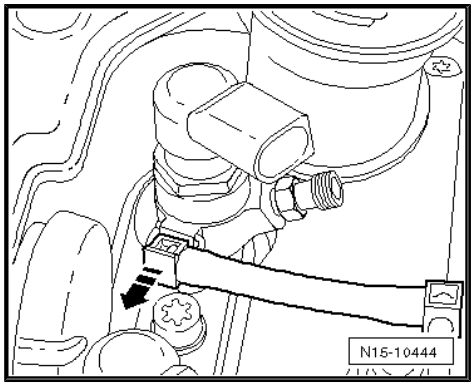
– Dry the return line connection of cylinder 1.

– Cover the return line connection of cylinder 1 with a cloth.

– Unlock the return line connection of cylinder 1 using a screwdriver and a set of pointed pliers.

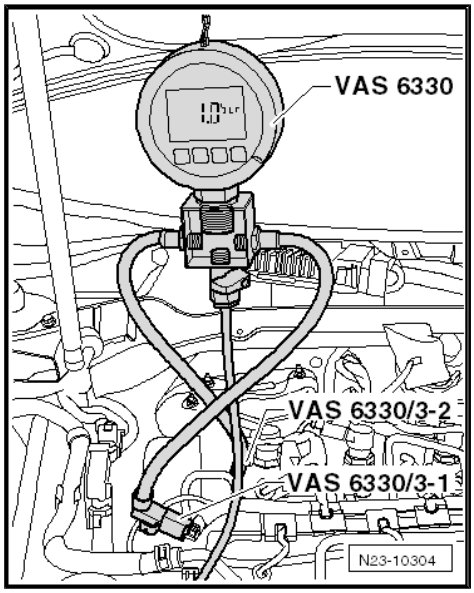


– Disconnect the connections of the fuel return-flow line at the injectors in -direction of arrow-.



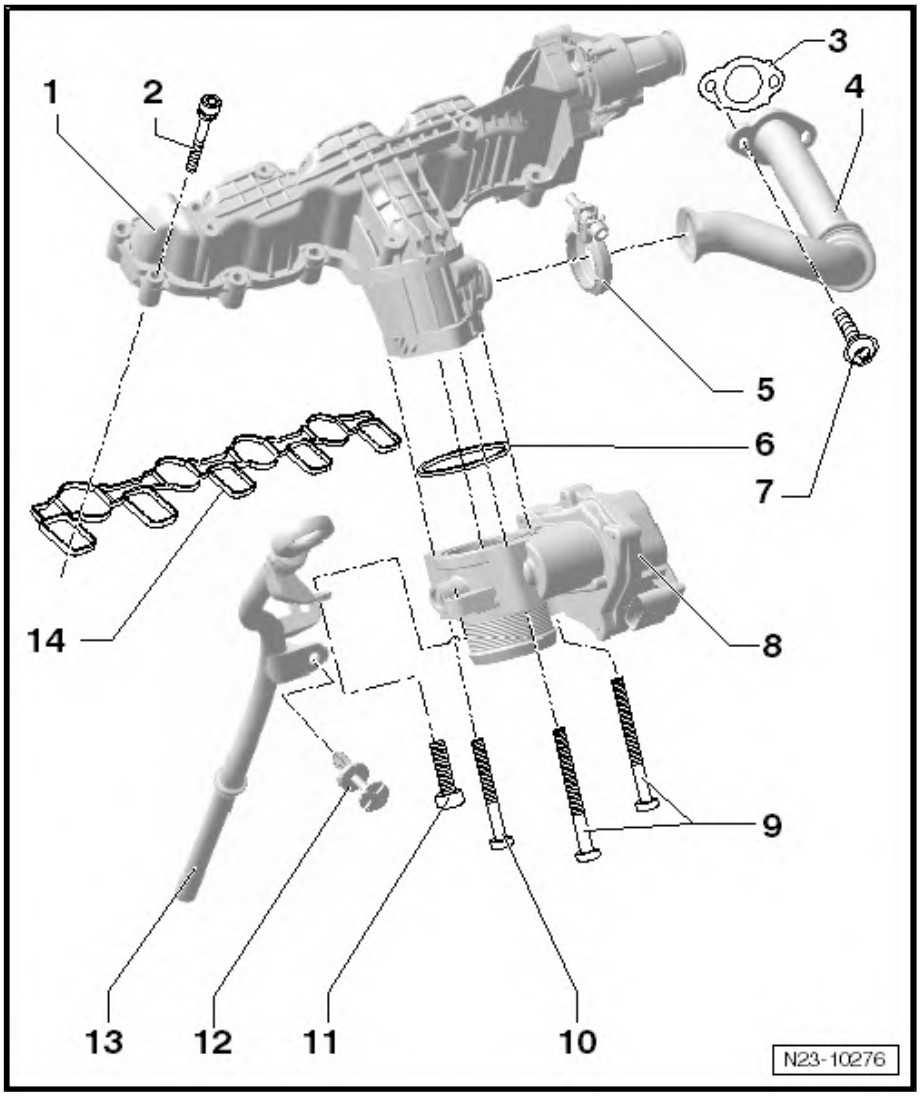
– Connect the pressure gauge -6330- with the adapters -VAS 6330/3-1- and -VAS 6330/3-2- between the return line connection at the injection unit and the return-flow line.
– Open shut-off cock of the pressure gauge.
– Start engine and run in idle.
– Read the pressure on the pressure gauge -VAS 6330- .
• Specified value: approx. 0.1 MPa (1 bar)

If the specified value is not reached, replace the pressure holding valve.



3 Intake manifold, air filter

3.1 Intake manifold with component parts - Summary of components



1 - Intake manifold

- ❑ with intake manifold flap motor -V157-
- ❑ with intake air-intrinsic optimisation
- ❑ must not be disassembled
- ❑ removing and installing ⇒ page 183

2 - 20 Nm

3 - Gasket

- ❑ replace

4 - Connecting pipe

- ❑ to radiator for exhaust gas recirculation

> **Caution**
> *Pay attention that the decoupling element of the connection pipe is not bent and therefore is not overstretched. There is a risk of crack formation.*

5 - Warm-type clamp, 5 Nm

- ❑ replace

6 - Sealing ring

- ❑ replace

7 - 20 Nm

8 - Throttle valve control unit - J338-

9 - 10 Nm

10 - 10 Nm

11 - 10 Nm

12 - Clip

- ❑ for oil dipstick guide pipe

13 - Dipstick

14 - Gasket

- ❑ replace

3.2 Removing and installing intake manifold

Special tools and workshop equipment required

- ♦ Socket insert Torx T 30 -T10405-

Removing

Note

- *Safety precautions when working on the fuel supply system ⇒ page 3 .*
- *Observe rules for cleanliness ⇒ page 6 .*

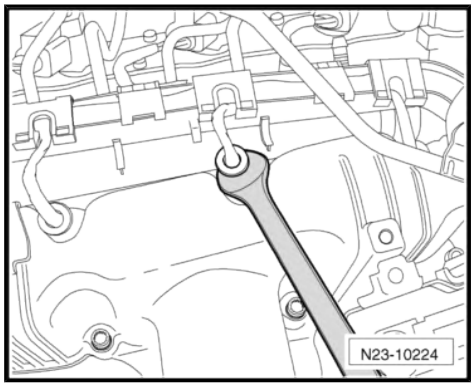
– Remove top engine cover ⇒ page 15 .

– Unclip the wiring loom from the cable guide of the glow plugs.

Caution

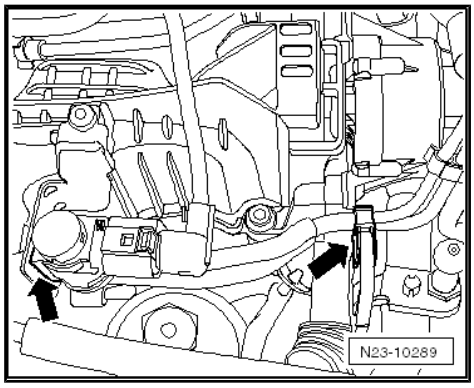
- ***Carefully disconnect the plug from the pencil type glow plugs.***
- ***If the plug is damaged when disconnecting it, the wiring loom including the plugs must be replaced (plugs cannot be replaced separately).***

– Carefully disconnect the plug from the pencil type glow plugs. To do so use an open-end wrench, wrench size 12, for help.

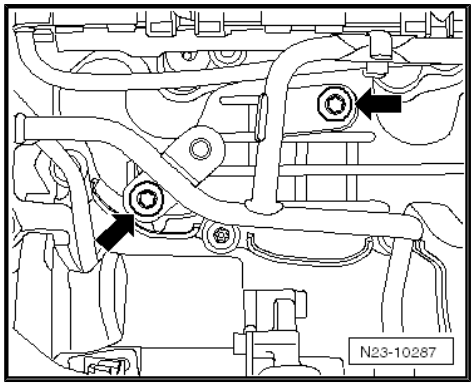


– Unclip the vacuum lines, -arrows- and lay them to the side.

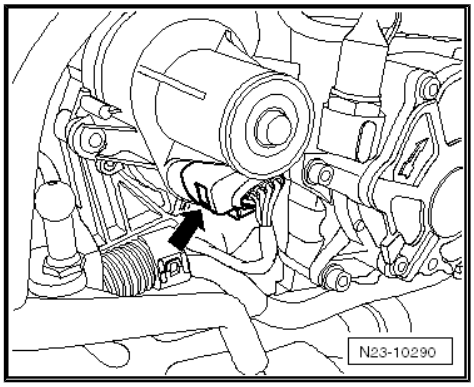
– Unclip the coolant return-flow line from the intake manifold and lay to the side.



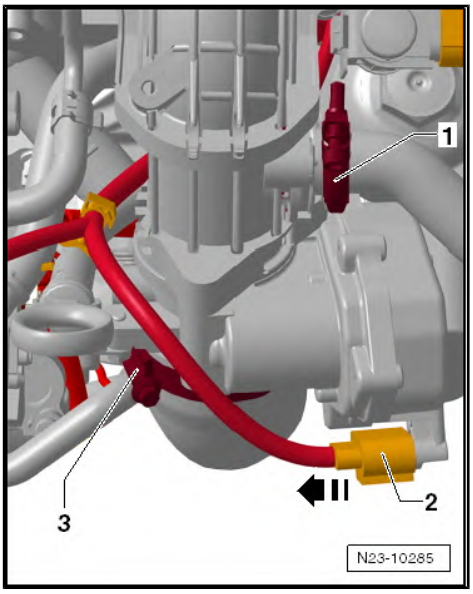
– Unscrew the fixing screws -arrows- and lay the fuel return-flow line to the side.



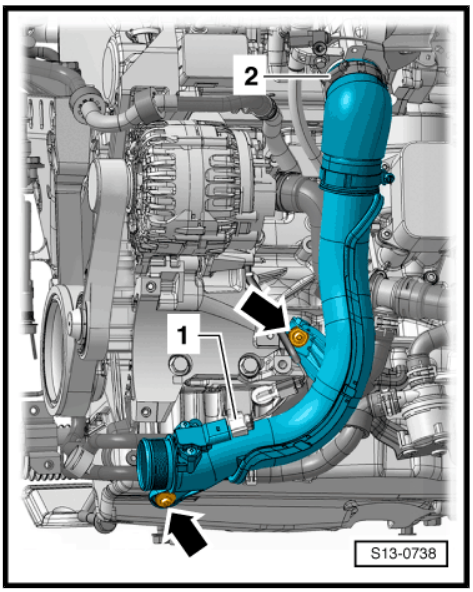
– Unplug plug -arrow- from intake manifold flap motor -V157- .
– Disconnect the plug from the throttle valve control unit -J338- -2-.



– Loosen clamp -3- at charge air hose.
– Unscrew the top screw from the oil measuring connection.



– Loosen clamp -2- at charge air pipe.
– Remove charge air hose between throttle valve control unit -J338 - and charge air pipe.



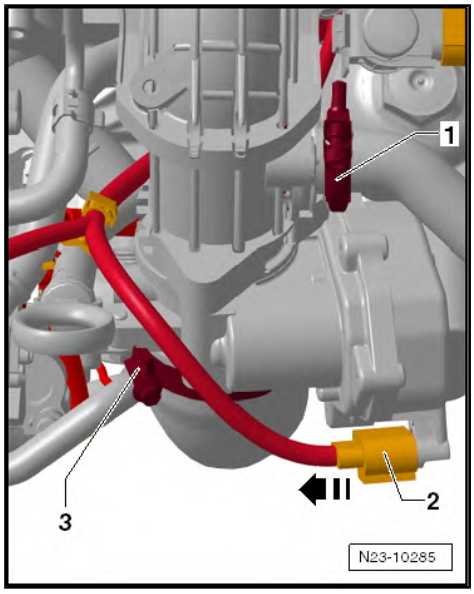
– Remove the warm-type clamp -1- from the connection pipe for the exhaust gas recirculation and remove the connection pipe.
– Release the fixing screws of the intake manifold crosswise from the outside to the inside. To do so, use socket insert T30 with spherical head -T10405- .
– Carefully remove intake manifold.

Install

Installation is performed in the reverse order, pay attention to the following points:

– Replace gasket.
– Tighten fixing screws for intake manifold crosswise from the inside to the outside.

  Tightening torque: ⇒ page 183



3.3 Air filter - Summary of components

Removing and installing air filter ⇒ page 187 .

1 - Spring strap clamp

2 - Connecting pipe
- ❑ from cylinder head cover
- ❑ for crankcase ventilation

3 - Air intake hose
- ❑ to exhaust gas turbocharger

4 - 2 Nm

5 - Spring strap clamp

6 - Air mass meter -G70-

7 - O-ring
- ❑ replace if damaged

8 - 8 Nm

9 - Air filter top part

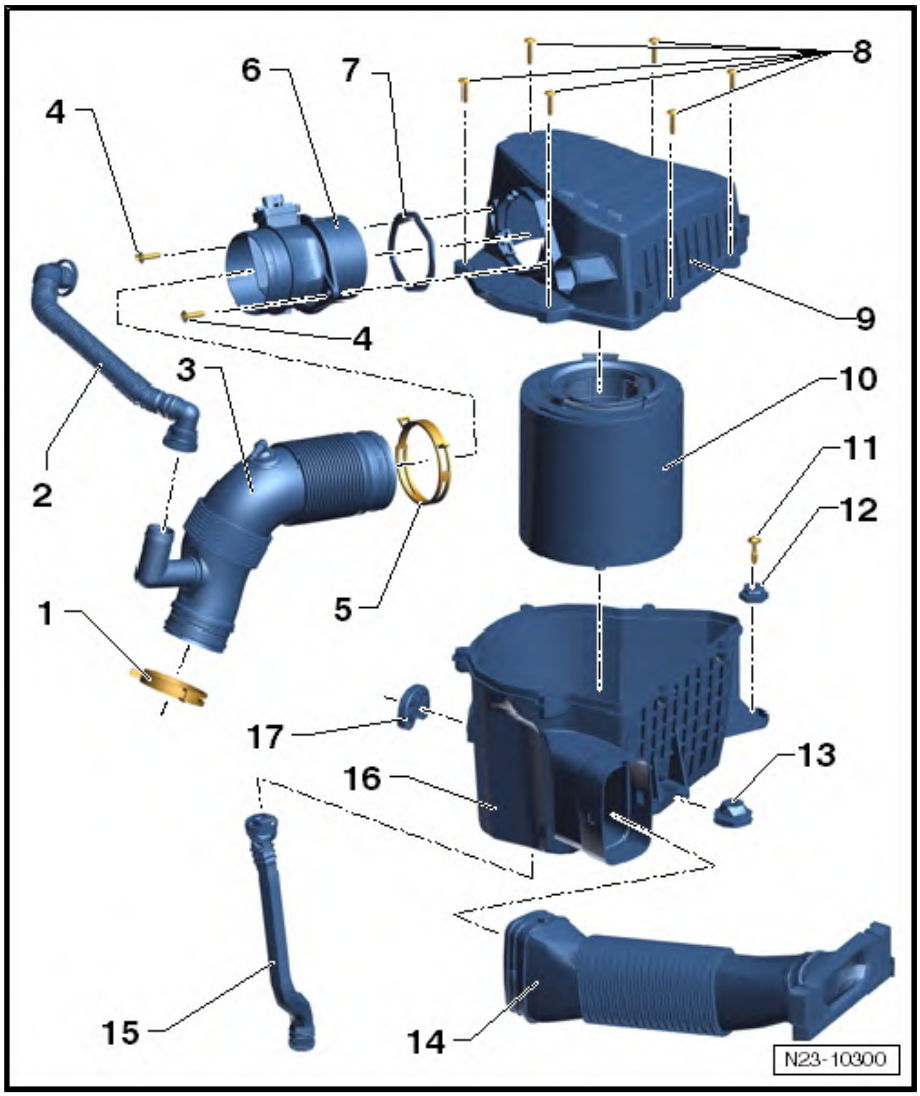
10 - Air filter element
- ❑ to remove, turn 1/4 turn (90°) to the left

11 - 10 Nm

12 - Rubber bearing
- ❑ replace if damaged

13 - Rubber bearing
- ❑ replace if damaged

14 - Intake hose with connection fitting
- ❑ Intake hose attached to lock carrier



15 - Drain pipe

- ❑ Check fitting position

16 - Air filter bottom part

- ❑ with supports for drain pipe

17 - Rubber bearing

- ❑ replace if damaged

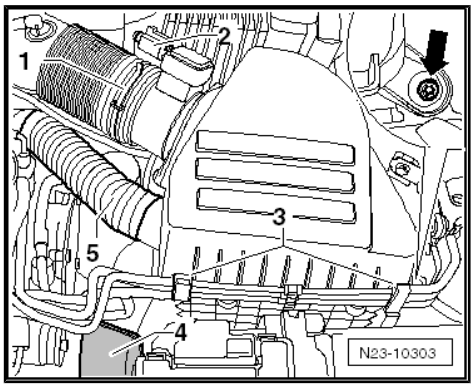
3.4 Removing and installing air filter

Removing

– Unplug connector -2- from air mass meter -G70- .

– Loosen the spring strap clip -1- and remove the hose from the air filter.

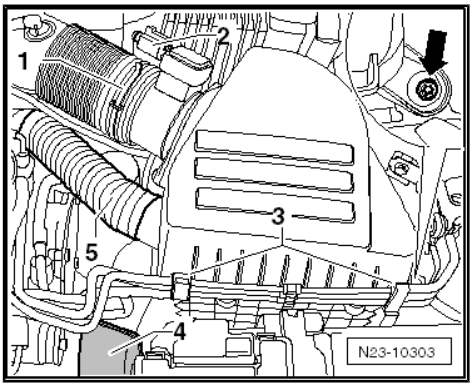
– Open the retaining clamps -3-, remove the vacuum lines laterally.



– Slacken the screwed connection at the air filter housing -arrow-.

– Remove intake hose -4-.

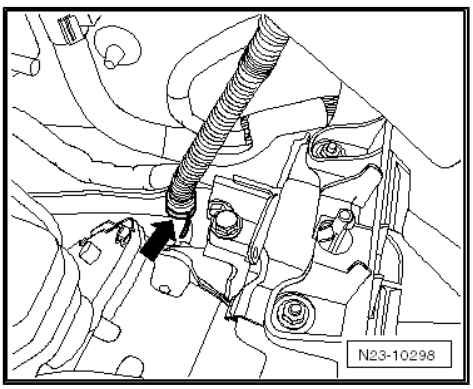
– Carefully remove air filter from the top.



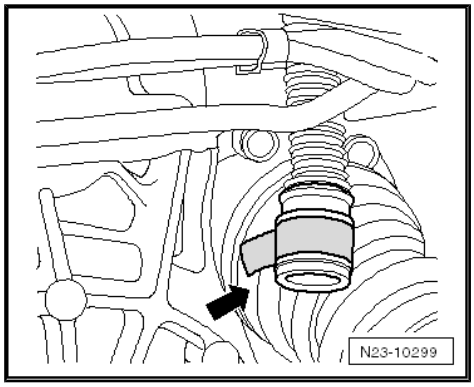
Install

Installation is performed in the reverse order, pay attention to the following points:

– Pull through the drain pipe -arrow- between the gearbox and the body.



– Check if the drain pipe is correctly installed by looking under the wing.



4 Engine control unit

4.1 Removing and installing engine control unit -J623-

Note

If the engine control unit must be replaced, connect ⇒ Vehicle diagnosis, testing and information system VAS 5051 and perform the function "replace engine control unit".

Special tools and workshop equipment required

- Body saw e.g. body saw -V.A.G 1523/A-

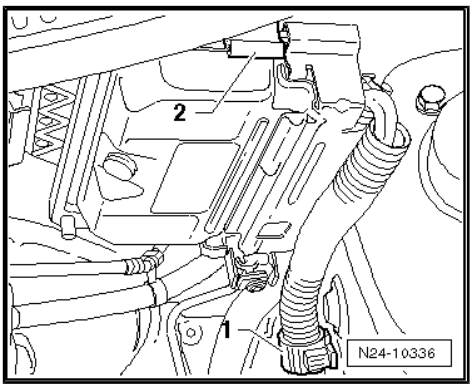
Removing

– Switch off ignition.

– Remove air filter ⇒ page 187 .

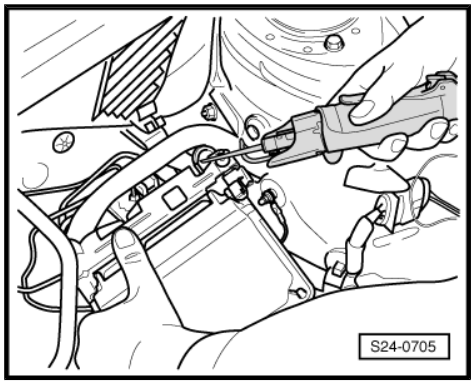
– Raise the cable guide -1- and the locking mechanism -2-.

– Take the engine control unit out of the mount.



For vehicles with protective cover

– Cut with body saw a slot for the cross-head screwdriver in the heads of the pull-off screws.



Note

- *It must be sawed 2x with the body saw, so that the slot is wide enough, in order to be able to unscrew the screws with a suitable screwdriver.*
- *The pull-off screws until are inserted with locking agent.*

– Screw out the screws.

– Remove protective cover of control unit.

For all vehicles

– Release plug locks and unplug plug connector from engine control unit -J623- .

Install

Installation occurs in reverse order.

– Connect both plugs and lock.

For vehicles with protective cover

– Insert protective cover and fix with new pull-off screws at engine control unit.

– Tighten pull-off screws evenly until the screw heads are pulled off.

For all vehicles

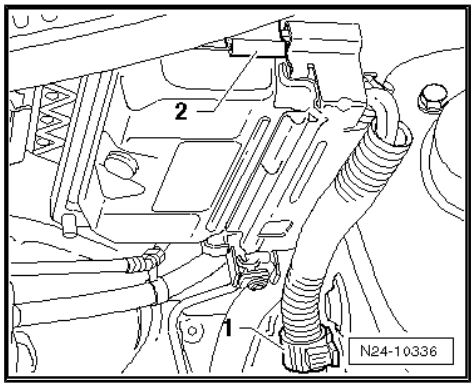
– Insert the control unit into the holder on the body until the locking mechanism -2- clicks audibly into place.

– Press the cable into the cable guide -1-.

– After installation of the new control unit, activate the engine control unit in the “Targeted fault finding” in the diagnostic field “replace engine control unit” ⇒ Vehicle diagnosis, testing and information system VAS 5051.

– When replacing the control unit, adapt the engine control unit ⇒ Vehicle diagnosis, testing and information system VAS 5051.

– Interrogate the fault memory again ⇒ Vehicle diagnosis, testing and information system VAS 5051.



Note

After deleting the fault memory of the engine control unit the readiness code must be re-generated.

26 – Exhaust System

1 Removing and installing parts of the exhaust system

Note

- *The decoupling element in the pre-exhaust pipe should not be bent by more than 10° - risk of damage.*
- *Replace the gaskets and the self-locking nuts.*
- *When performing installation work on the exhaust system, make sure the exhaust system is not mounted under tension and has adequate clearance from the vehicle body. If necessary slacken the double clamp and align the exhaust system so as to create adequate clearance between these components and the vehicle body, and that the weight of the exhaust system is evenly distributed over the hangers.*

1.1 Pre-exhaust pipe with diesel particle filter - Summary of components

1 - Differential pressure sender -G505-

2 - 3 Nm

3 - Control line

4 - Clamps

5 - Exhaust gas temperature sender 4 -G648- , 45 Nm

- ❑ the thread of new temperature senders must be coated with assembly paste
- ❑ grease only the thread with hot bolt paste -G 052 112 A3- for re-used temperature sender.

6 - Lambda probe -G39- , 50 Nm

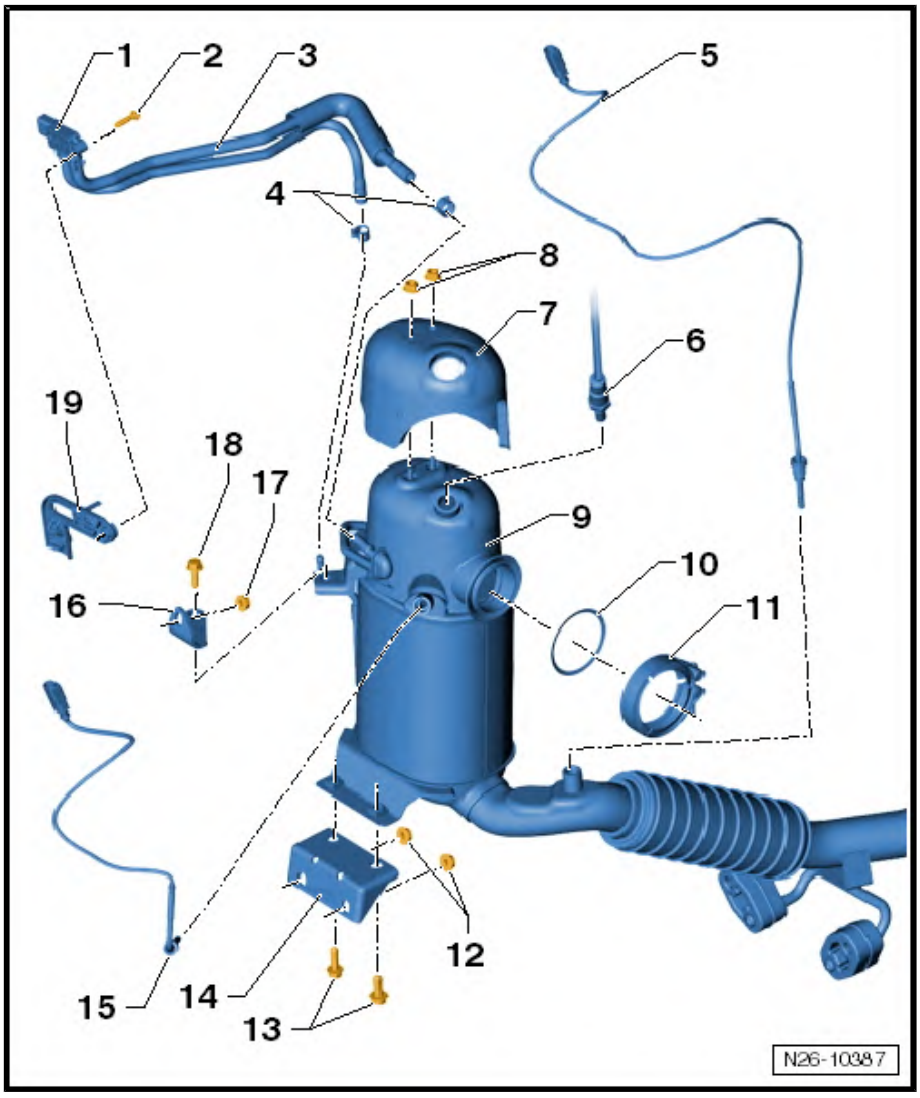
- ❑ the thread of new lambda probes must be coated with assembly paste
- ❑ for re-used lambda probe, only coat the thread with hot bolt paste -G 052 112 A3-
- ❑ the hot bolt paste -G 052 112 A3- must not come into contact with the slots of the probe body

7 - Heat shield

8 - 9 Nm

9 - Diesel particle filter

- ❑ removing and installing ⇒ page 194



10 - Gasket

- ❑ replace
- ❑ Check fitting position

11 - Warm-type clamp, 7 Nm

- ❑ replace

12 - 25 Nm

13 - 25 Nm

14 - Support

- ❑ screwed onto the cylinder block

15 - Exhaust gas temperature sender 3 -G495- , 45 Nm

- ❑ the thread of new temperature senders must be coated with assembly paste
- ❑ grease only the thread with hot bolt paste -G 052 112 A3- for re-used temperature sender.
- ❑ tighten ⇒ page 192

16 - Support

17 - 25 Nm

18 - 45 Nm

- ❑ for control line

19 - Support

- ❑ for differential pressure indicator -G505-

1.2 Tightening the exhaust gas temperature sender 3 -G495-

WARNING

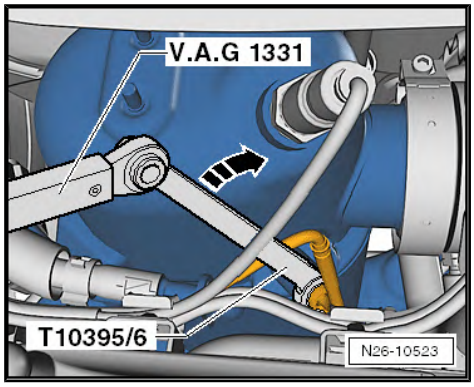
In this case, the setting of the torque wrench -V.A.G 1331- must be 29 Nm.

The correct torque of 45 Nm is achieved by the extension of the torque wrench -V.A.G 1331- using the wrench from the set of tools -T10395/6- .

Only coat the thread with hot bolt paste -G 052 112 A3- .

– Screw in exhaust gas temperature sender 1 -G495- by hand.

– Then set the tightening torque with the torque wrench -V.A.G 1331- together with the wrench from the set of tools -T10395/6- .



1.3 Removing and installing differential pressure sender -G505-

The differential pressure sender -G505- is connected to the measuring points upstream and downstream particle filter via 2 pipes.

The differential pressure sender -G505- determines the load condition of the particle filter.

Removing

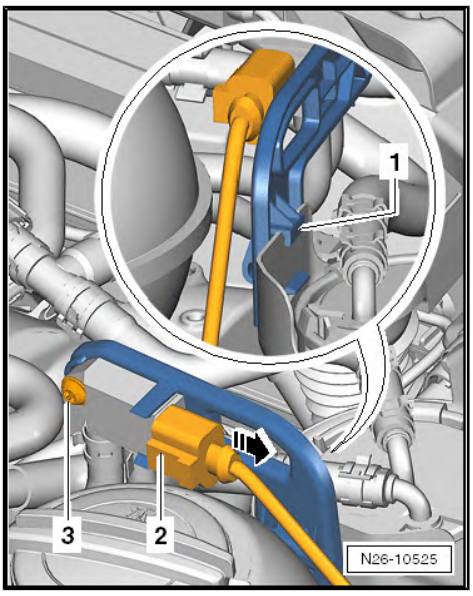
– Remove engine cover ⇒ page 15 .

– Before detaching, spray the hoses of the differential pressure sender -G505- with solvent.

– Disconnect plug connection -2- at differential pressure sender -G505- .

– Pull off the hoses carefully and straight from the connection fittings (the connection fittings break off slightly from the differential pressure sender -G505-).

– Release screw -3- and remove the differential pressure sender -G505- .



Install

– When installing, pay attention to the following points:

• Tightening torque for the screw of the differential pressure sender -G505- see summary of components ⇒ page 191 .

Note

♦ *Before installing, blow out the hoses from the differential pressure sender -G505- to the particle filter with compressed air in the direction of the particle filter (blocked or iced up by condensation water).*

♦ *Pay attention to the tight connection and leaktightness of the hoses.*

– After replacing the differential pressure sender -G505- , an adaption must be performed in the function “Targeted functions” ⇒ Vehicle diagnosis, testing and information system VAS 5051.

1.4 Rear silencer

Rear silencer

1 - from diesel particle filter

2 - Double clamp, 23 Nm

3 - Retaining strap

- ❑ replace if damaged

4 - 25 Nm

5 - Separation point

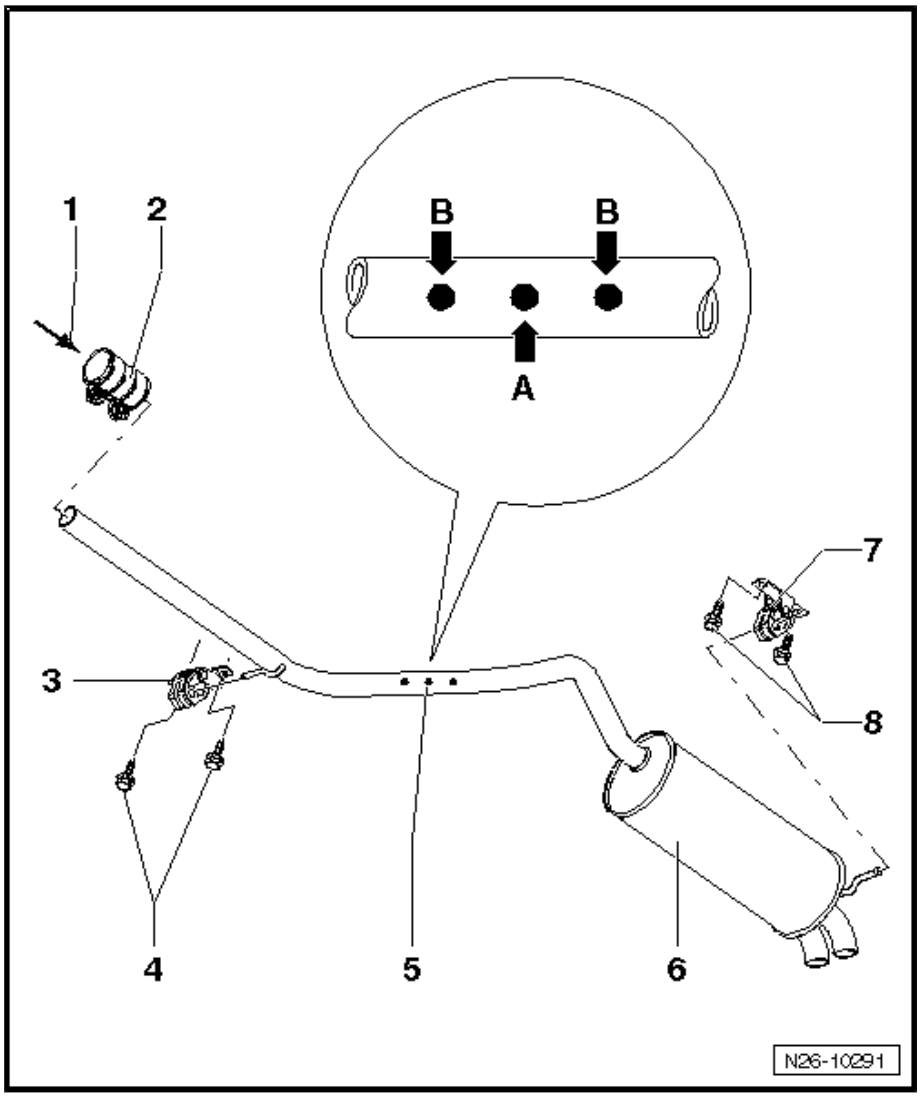
- ❑ the rear silencer is a building unit for first version with middle silencer
- ❑ Replace individually when carrying out repairs
- ❑ Position double clamp on the marking -arrows B- when installing
- ❑ Align exhaust system free of stress ⇒ page 199

6 - Rear silencer

7 - Retaining strap

- ❑ replace if damaged

8 - 25 Nm



1.5 Removing and installing pre-exhaust pipe with diesel particle filter

Special tools and workshop equipment required

- ♦ Torque wrench
- ♦ Ring spanner set for lambda probe
- ♦ Tensioning strap -T10038-
- ♦ Engine/gearbox jack -V.A.G 1383/A-
- ♦ Set of tools SW 17 -T10395-
- ♦ Hot screw paste -G 052 112 A3-
- ♦ Pliers for spring strap clamps
- ♦ Transport security -T10403-

Removing

– Release assembly carrier in the service position and align ⇒ Chassis ⇒ Rep. Gr. 40 .

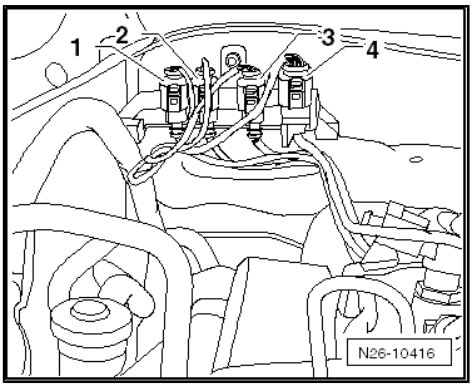
– Remove engine cover ⇒ page 15 .

♦ -1-: Disconnect plug connection for exhaust gas temperature sender 1 -G235-

♦ -2-: Disconnect plug connection for exhaust gas temperature sender 3 -G495-

♦ -3-: Disconnect plug connection for exhaust gas temperature sender 4 -G648-

♦ -4-: Unplug the plug connection at the lambda probe -G39- .



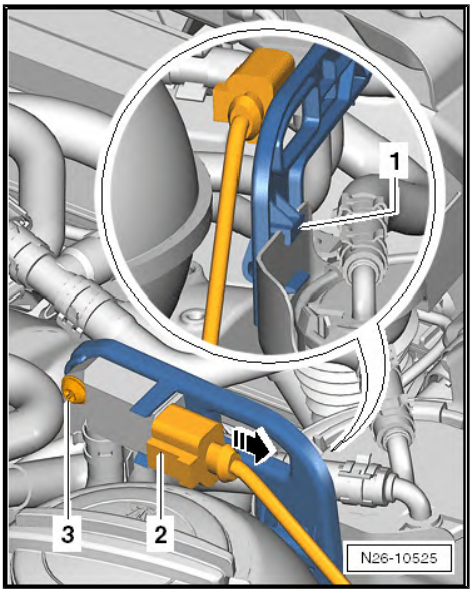
– Disconnect plug connection at differential pressure sender -G505- -2-.

– Release screw -3- and remove the differential pressure sender -G505- .

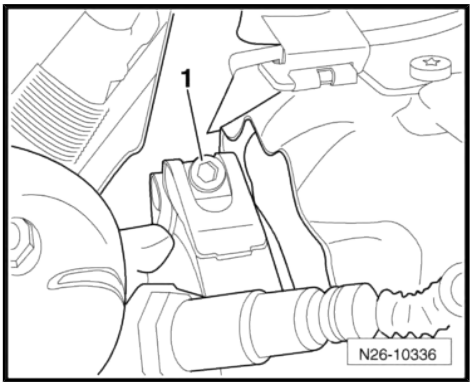
– Detach the lines from the brackets at the engine and the heat shield from the particle filter, if necessary remove installed cable straps.

– Remove the lambda probe -G39- using the ring spanner for lambda probe.

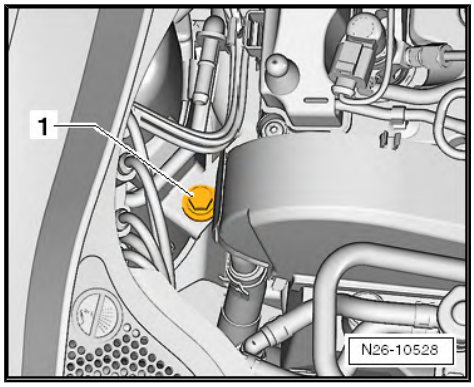
– Remove the exhaust gas temperature sender 3 -G495- (temperature sender downstream particle filter -G527-) using the key set -T10395- .



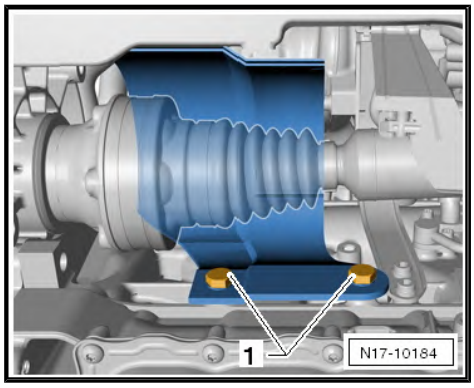
– Remove the fixing clamp -1- between diesel particle filter and exhaust gas turbocharger.



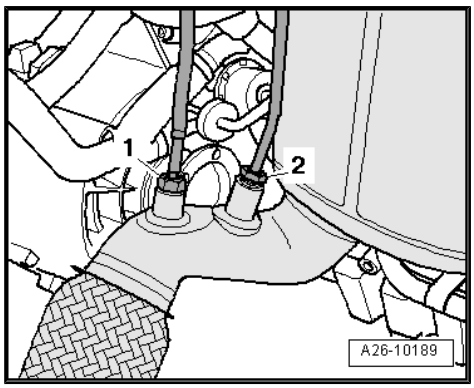
– Release screw -1-.



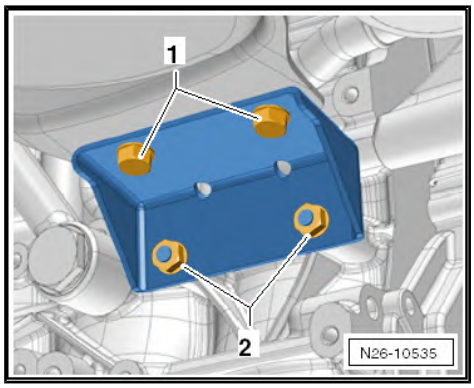
– Release fixing screws -1- and remove heat shield for right drive shaft from cylinder block.



– Unscrew exhaust gas temperature sender 4 -G648- -position 1- from exhaust pipe downstream diesel particle filter.
– Do not pay attention to the position -2-.

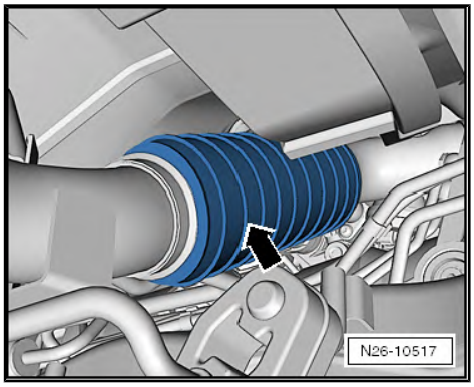


– Release the screws -1- and then the nuts -2-.
– Remove bracket for diesel particle filter.



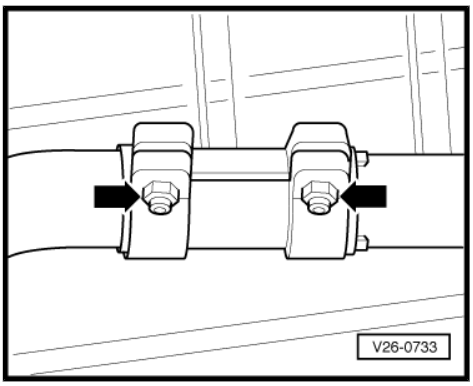
Note

- *The assistance of a 2nd mechanic is required for guiding out the diesel particle filter.*
- *The decoupling element in the pre-exhaust pipe should not be bent by more than 10° - risk of damage.*
- *Secure the decoupling element with the transport security -T10403- against overtensioning -arrow-.*



– Slacken the fixing nuts -arrows- of the double clamp and slightly push it back from the pre-exhaust pipe.

– Carefully remove the pre-exhaust pipe with particle filter above the lowered assembly carrier together with the differential pressure sender -G505- .



– Turn the particle filter by 180° and remove.

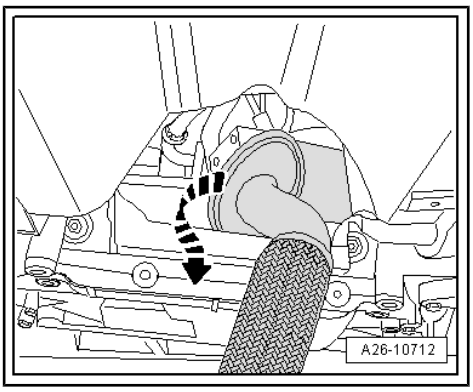
Install

Tightening torques ⇒ page 191 .

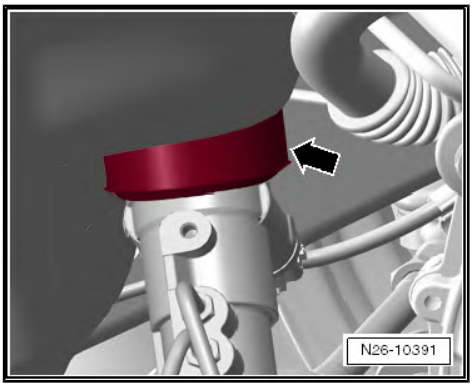
Installation is performed in the reverse order, pay attention to the following points:

Note

- *Before installing the assembly carrier with steering gear, make sure the seal on the steering gear is not bent on the assembly plate. In this way the footwell opening is correctly sealed, otherwise water could penetrate or noise could occur.*
- *Replace seals, self-locking nuts and the clamp for particle filter.*
- *All cable straps which are detached when removing, should be attached again in the same place when installing.*

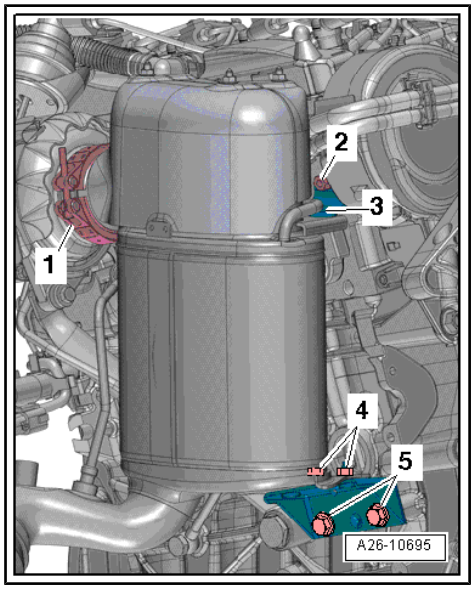


Pay attention to the fitting position of the seal -arrow- (steering donut)



Observe the sequence when installing the particle filter:

1.	Position particle filter on exhaust gas turbocharger, loosely tighten clamp -1-
2.	Loosely screw in screws and nuts -3 … 5- by hand
3.	Tighten clamp -1-.
4.	Tighten nuts -5-.
5.	Tighten screws and nuts -3- and -4-



– Align exhaust system free of stress ⇒ page 199 .

– After replacing the diesel particle filter, an adaption must be performed in the function “Targeted functions” ⇒ Vehicle diagnosis, testing and information system VAS 5051.

1.6 Replace middle and rear silencer

Special tools and workshop equipment required

- Body saw e.g. -V.A.G 1523 A-
- Protective goggles

Work procedure

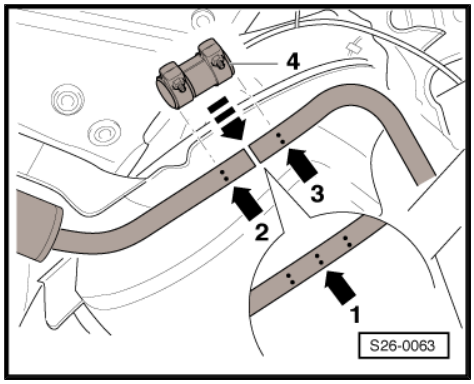
For separating the middle or rear silencer, a separation point is provided in the connecting pipe, which is marked with a recess.

WARNING

Wear safety goggles.

– Use body saw (e.g. -V.A.G 1523 A-) to separate exhaust pipe at right angles at separation point -arrow 1-.

– When installing, position double clamp -4- at the side markings -arrow 2- and -arrow 3-.

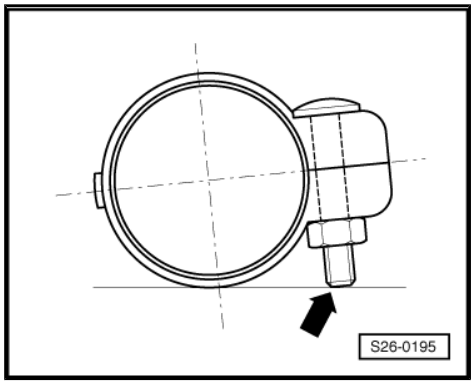


– Install double clamps in such a way that the ends of the screws do not protrude beyond the bottom edge of the double clamp.

– Align exhaust system free of stress ⇒ page 199 .

– Tighten bolted connections of the double clamp evenly to 23 Nm.

• bolted connection points to the right.



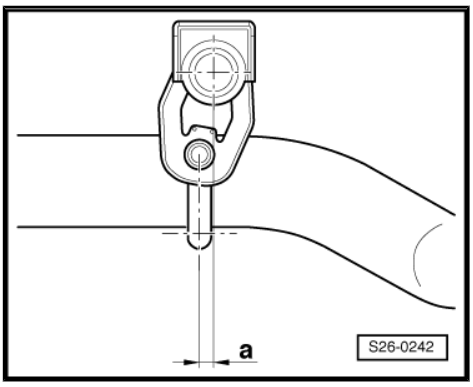
1.7 Aligning exhaust system free of stress

Condition

- The exhaust system is aligned when cold.

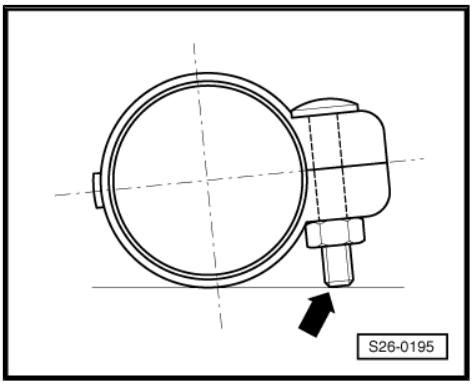
– Slacken bolted connections of double clamp Pos. 2 ⇒ page 194 between front and middle silencer.

– Push the rear silencer so far forward until the initial load -a- = 2 ...°5 mm is achieved between hanger/middle silencer and hanger/rear silencer.

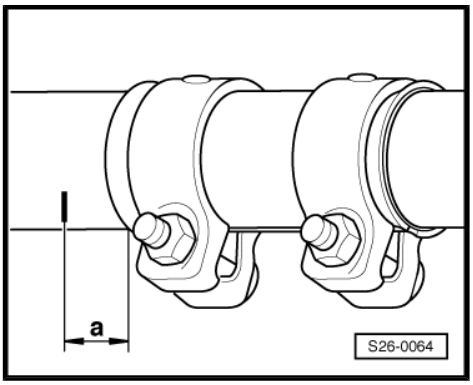


– Install double clamps in such a way that the ends of the screws do not protrude beyond the bottom edge of the double clamp.

- bolted connection points to the right.



– Align the double clamp by referring to the dimension -a- = 5 mm from the marking at the pre-exhaust pipe and tighten the bolted connections evenly to 23 Nm.



1.8 Inspecting the exhaust system for leak-tightness

– Start engine and run in idle.

– Seal off tail pipes of rear silencer for the duration of the leak check (e.g. with cloth or plug).

– Inspect connection points of cylinder head/exhaust manifold, exhaust gas turbocharger/pre-exhaust pipe etc. for leaktightness by listening.

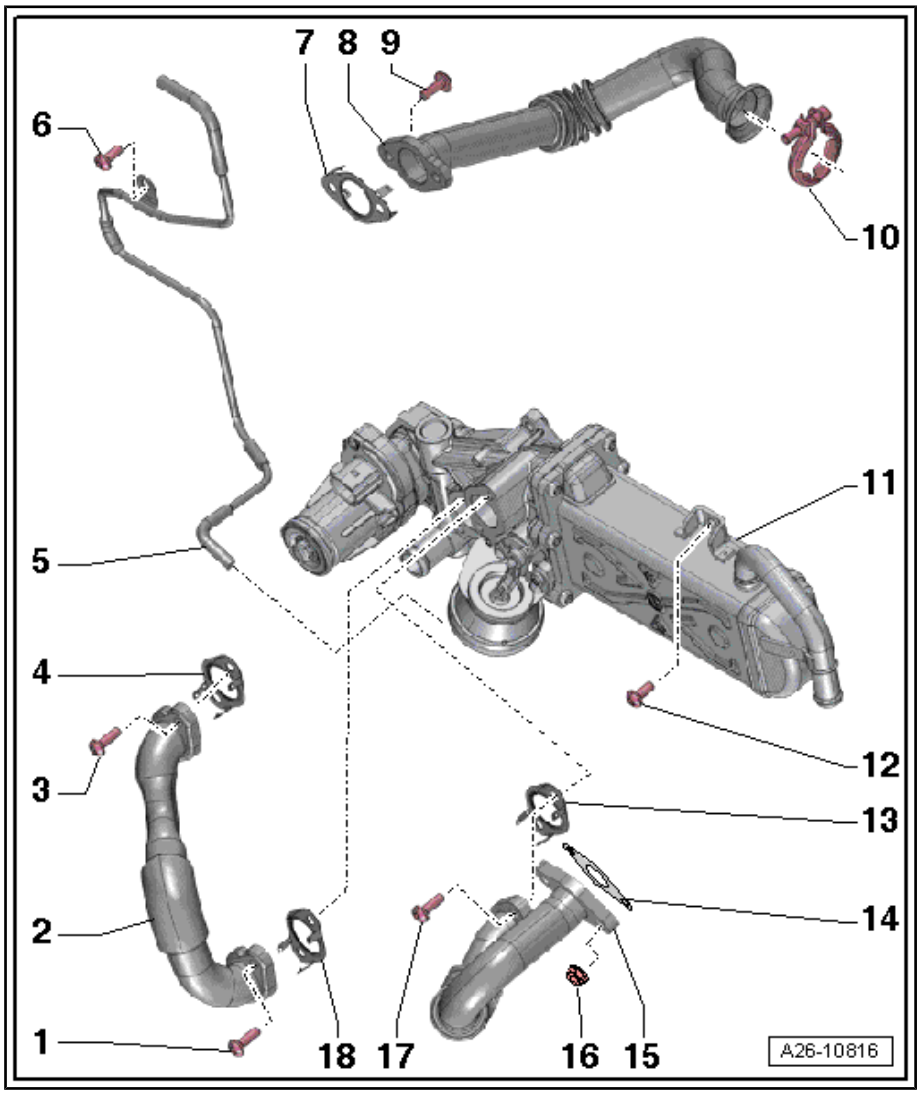
– Eliminate any leak found.

2 Exhaust gas recirculation system

Note

- *The exhaust gas recirculation system is operated by the engine control unit -J623- for EGR valve -N18- .*
- *The EGR valve -N18- consists of the mechanical valve, the EGR control motor -V338- and the EGR potentiometer -G212- .*
- *The electrically operated valve with cone-shaped valve plunger makes it possible to achieve different opening cross-sections at different opening strokes.*
- *Replace self-locking nuts.*

2.1 Exhaust gas recirculation with radiator for exhaust gas recirculation - Summary of components



1 - 9 Nm

2 - Exhaust return pipe
- ❑ with decoupling element; do not bend the decoupling element - Risk of crack formation

3 - 9 Nm

4 - Gasket
- ❑ replace

5 - Vacuum line
- ❑ do not change bending form
- ❑ Connection diagram for vacuum hoses ⇒ page 153

6 - 9 Nm

7 - Gasket
- ❑ replace

8 - Exhaust return pipe
- ❑ with decoupling element; do not bend the decoupling element - Risk of crack formation

9 - 9 Nm

10 - Clamp
- ❑ 4 Nm

11 - Radiator for exhaust gas recirculation
- ❑ with integrated exhaust gas recirculation valve -N18- with exhaust gas recirculation potentiometer -G212-
- ❑ Check change-over ⇒ page 203
- ❑ removing and installing ⇒ page 201

12 - 9 Nm

13 - Gasket

- ❑ replace

14 - Gasket

- ❑ replace

15 - Exhaust return pipe

- ❑ with decoupling element; do not bend the decoupling element - Risk of crack formation

16 - 22 Nm

17 - 9 Nm

18 - Gasket

- ❑ replace

2.2 Removing and installing radiator for exhaust gas recirculation

Special tools and workshop equipment required

- ♦ Hose clamps up to ∅ 25 mm -MP7-602 (3094)-
- ♦ Catch pan , e.g. -VAS 6208-
- ♦ Pliers for spring strap clamps
- ♦ Old oil collecting and suction equipment , e.g. -V.A.G 1782-

Removing

– Remove engine cover ⇒ page 15 .

– Remove air filter housing with air mass meter -G70- ⇒ page 187 .

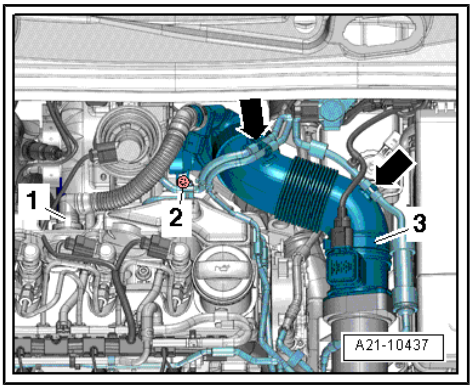
– Remove battery and battery tray ⇒ Electrical System ⇒ Rep. Gr. 27 .

– Remove the hose for the crankcase ventilation -1-, to do so press the release buttons.

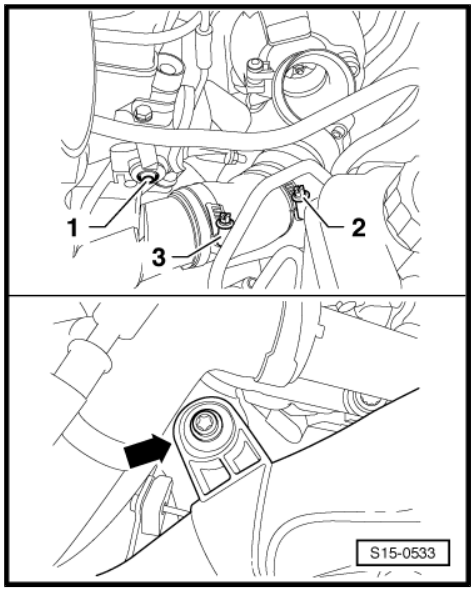
– Slacken vacuum hose to intake hose.

– Release screw -2- (captive), swivel intake hose with connection fitting towards the rear and detach from exhaust gas turbocharger.

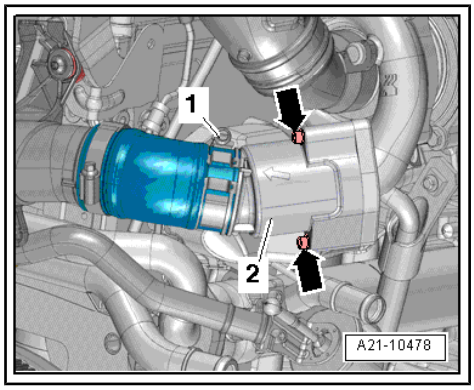
– Remove intake hose.

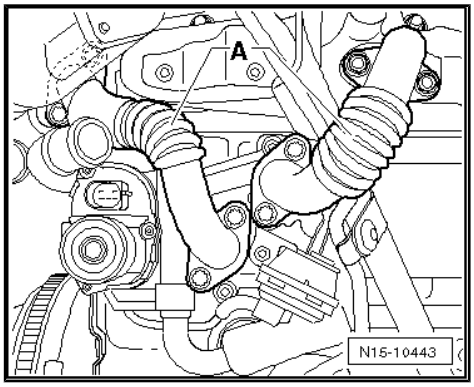


– Release the fixing screw -1- from the charge air pipe, slacken the clamp -2-.
– Release fixing screw -arrow- from charge air pipe.



– Release the screws -arrows- and detach the connecting hose as far as possible from the pulsation dampener.
– Push the left charge air pipe as far as possible to the left.
– Remove the pulsation dampener.
– Remove pre-exhaust pipe with diesel particle filter ⇒ page 194 .





– Remove the connection pipes -A- to the cylinder head.
– Remove oil feed and oil return-flow line with support for exhaust turbocharger ⇒ page 109 .
– Collect escaping engine oil with the old oil collecting and suction equipment -V.A.G 1782- .
– Detach the vacuum line at the vacuum unit, Pos. 5 ⇒ page 200 .
– Disconnect the plug connection at the electrical actuator of the exhaust gas recirculation valve -N18- for the radiator for exhaust gas recirculation.
– Unclamp the coolant feed line and the return-flow line with the hose clamps up to Ø 25 mm -MP7-602 (3094)- on the radiator for exhaust gas recirculation.
– Separate the coolant feed line and the return-flow line from the exhaust gas recirculation system.
– Collect escaping coolant with the catch pan -VAS 6208- .
– Release screws Pos. 12 ⇒ page 200 and remove radiator for exhaust gas recirculation.

Install

Installation is performed in the reverse order, pay attention to the following points:

♦ Replace the gaskets, the sealing rings and the self-locking nuts.
♦ Secure all hose connections with corresponding hose clips.
♦ Tightening torques ⇒ page 200 .
– Inspecting engine oil level ⇒ Maintenance ; Roomster .
– Inspect coolant level and top up if necessary ⇒ page 117 .

2.3 Check change-over for radiator for exhaust gas recirculation

Special tools and workshop equipment required

♦ Hand vacuum pump , e.g. -VAS 6213-

Work procedure

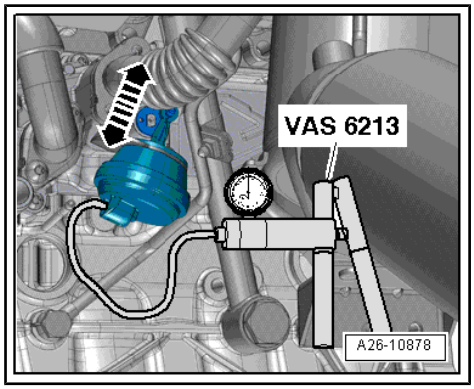
Note

The vacuum setting element for change-over flap is accessible from below.

– Remove noise insulation ⇒ Body Work ⇒ Rep. Gr. 50 .
– Unbolt heat shield for right drive shaft.

– Detach vacuum hose from vacuum setting element.
– Connect hand vacuum pump to the vacuum setting element.
– Actuate the hand vacuum pump in order to generate negative pressure.

• The vacuum setting element must open the change-over flap up to the stop at maximum 0.08 MPa (0.8 bar) negative pressure and in case of ventilation close it up to the stop -arrows-.



Note

◆ *For this test the opening of the change-over flap can be performed in jolts. In driving mode the change-over flap opens suddenly due to the large negative pressure volume.*

◆ *The closing of the change-over flap must be carried out suddenly when ventilating (e.g. detach vacuum hose).*

If the vacuum setting element does not open or close the change-over flap up to the stop:

– Replace radiator for exhaust gas recirculation with vacuum setting element ⇒ page 201 .

28 – Glow Plug System

1 Glow Plug System

1.1 Remove and install pencil type glow plugs

Note

Metal pencil type glow plugs are installed in this engine.

Special tools and workshop equipment required

- Flexible-head wrench SW 10 , e.g. -3220-
- Cleaning agent and grease remover e.g. -D 000 401 04-
- Protective goggles and gloves

Removing

Observe all safety measures and notes for assembly work on the fuel and injection system as well as the rules for cleanliness ⇒ page 2 .

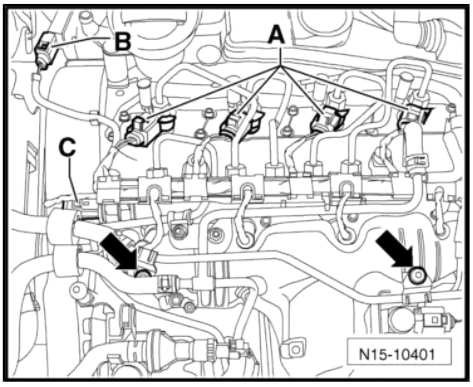
– Switch off ignition and withdraw ignition key.

– Remove top engine cover ⇒ page 15 .

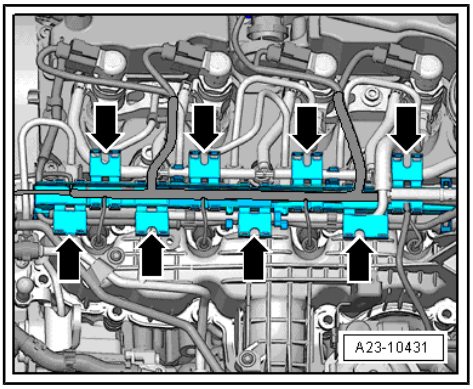
– If present, remove the noise insulation at the injection units.

– Disconnect the plug connection -B- at the differential pressure sender -G505- and the fuel pressure sender -G247- -C-.

– Unscrew the fixing screws -arrows- of the coolant line from the intake manifold and lay the line in front of the intake manifold.



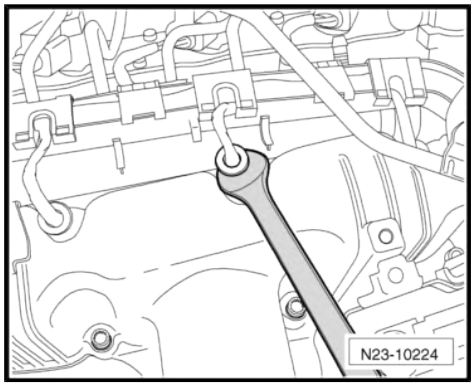
– Open the catch pegs of the wiring in order to expose the wiring loom -arrows-.



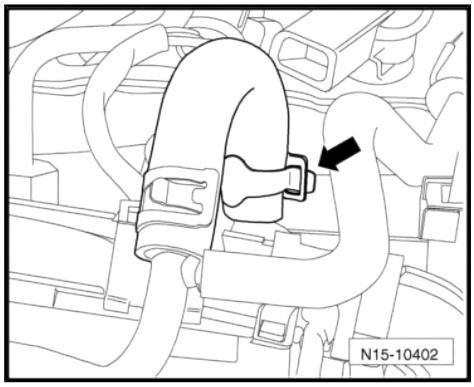
Caution

- *Carefully disconnect the plug from the pencil type glow plugs.*
- *If the plug is damaged when disconnecting it, the wiring loom including the plugs must be replaced (plugs cannot be replaced separately).*

– Carefully disconnect the plug from the pencil type glow plugs. To do so use an open-end wrench, wrench size 12, for help.



– Unscrew the fixing nut of the fuel return-flow line on the intake manifold, open the spring strap clamp -arrow- and remove the cable from the high pressure reservoir (rail).
– Remove the complete fuel return-flow line and place it down in front of the intake manifold.
– Clean the pencil type glow plug channel in the cylinder head. No dirt must get into the cylinder.



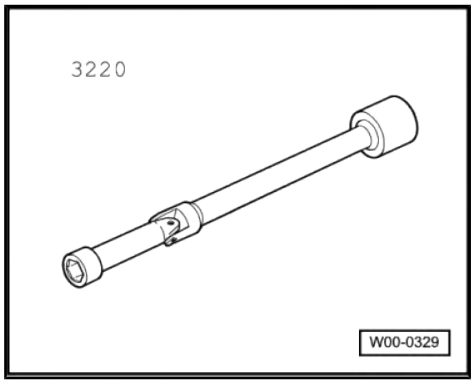
When cleaning, for example:

WARNING

Wear protective gloves and protective googles when working with grease remover!

1. Suction off heavy dirt using a vacuum cleaner.
2. Spray the pencil type glow plug channel using a brake cleaner or a suitable cleaner, let it take effect for a short period of time and blow out with compressed air.
3. Then clean the pencil type glow plug channel with a cloth which is wetted with oil.

– To release the pencil type glow plugs, use the socket wrench SW 10 -3220- .



Install

– To tighten the pencil type glow plugs, use the socket wrench SW 10 -3220- .
– Tighten pencil type glow plugs.
♦ Tightening torque: 18 Nm
– Fit the plug again onto the relevant glow plug and check for firm seating.
– Further installation occurs in reverse order.
– Interrogating and erasing fault memory of engine control unit ⇒ Vehicle diagnosis, testing and information system VAS 5051.

Note

After deleting the fault memory of the engine control unit the readiness code must be re-generated.