

## Workshop Manual

Octavia III 2013 ➤

Octavia III 2014 ➤

|                          |      |      |  |  |  |  |  |  |
|--------------------------|------|------|--|--|--|--|--|--|
| 1.2/63; 77 kW TSI engine |      |      |  |  |  |  |  |  |
| Engine ID                | CJZB | CJZA |  |  |  |  |  |  |

Edition 11.2014

## List of Workshop Manual Repair Groups

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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.

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## 00 – Technical data

### 1 Identification

(SRL000738; Edition 11.2014)

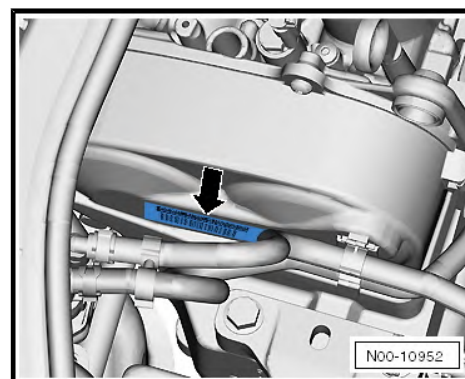
⇒ **"1.1 Engine number, engine data", page 1**

#### 1.1 Engine number, engine data

"The engine identification characters" and the "serial number" are located on the sticker -arrow- at the top timing belt guard.

The "engine identification characters" and "serial numbers" are also indicated on the engine above the engine connection with the gearbox, on the vehicle data sticker and on the engine control unit.

- ◆ Starting with the letter "C", new four digit engine codes have been introduced.
- ◆ The first 3 digits of the engine identification characters refer to the displacement and the mechanical construction of the engine. They are type-punched on the cylinder block including the serial number.
- ◆ The 4th digit refers to the output and torque of the engine and depends upon the engine - J623- control unit.



#### Note

*Fitting locations of vehicle data sticker ⇒ Maintenance ; Booklet Octavia III .*

| Engine codes                    |                 | CJZA           | CJZB           |
|---------------------------------|-----------------|----------------|----------------|
| Manufactured                    |                 | 01.2013 ►      | 11.2012 ►      |
| Emission standards              |                 | EU5            | EU5            |
| Capacity                        | cm <sup>3</sup> | 1197           | 1197           |
| Output                          | kW at rpm       | 77/4500-5500   | 63/4300-5300   |
| Torque                          | Nm at rpm       | 175/1400-4000  | 160/1400-3500  |
| Bore                            | Ø mm            | 71.0           | 71.0           |
| Stroke                          | mm              | 75.6           | 75.6           |
| Compression ratio               |                 | 10.5           | 10.5           |
| Cylinder/valves per cylinder    |                 | 4 / 4          | 4 / 4          |
| RON                             | min.            | 95 unleaded    | 95 unleaded    |
| Ignition system, fuel injection |                 | Motronic MED17 | Motronic MED17 |
| Firing order                    |                 | 1-3-4-2        | 1-3-4-2        |

Volkswagen Technical Site: <http://vwts.ru> <http://vwts.info>

огромный архив документации по автомобилям Volkswagen, Skoda, Seat, Audi



## 2 Safety instructions

⇒ [“2.1 Safety precautions when working on fuel supply system”, page 2](#)

⇒ [“2.2 Safety measures for working on vehicles with start/stop system”, page 3](#)

⇒ [“2.3 Safety precautions during road tests in which testing and measuring equipment is used”, page 4](#)

⇒ [“2.4 Safety precautions when working on cooling system”, page 4](#)

⇒ [“2.5 Safety precautions when working on the injection system”, page 5](#)

⇒ [“2.6 Safety precautions when working on ignition system”, page 6](#)

### 2.1 Safety precautions when working on fuel supply system



#### WARNING

*Fuel under high pressure creates a risk of injury.*

*Leaking fuel creates a fire hazard.*

- ◆ *The fuel system is under pressure! Before opening the high-pressure system, the fuel pressure must be reduced to residual pressure*  
⇒ [“3.10 Reduce pressure in the high-pressure system”, page 10](#).
- ◆ *The safety measures for the pressure reduction in the high pressure system must be observed.*
- ◆ *To reduce the residual pressure (about 0.7 MPa or 7 bar), the connection point must be opened »immediately« after the pressure has been reduced. Place a cleaning cloth around the connection point.*
- ◆ *Wear protective gloves.*
- ◆ *Wear safety goggles.*

- ◆ Fuel pump is activated by switching on ignition and via driver door contact switch. Before opening the fuel system and for reasons of safety, if the battery is not disconnected, the connector must be disconnected from the fuel pump.
- ◆ Take out fuse for fuel pump control unit - J538- ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.



#### Caution

*There is a risk of destruction of electronic components when disconnecting the battery.*

- ◆ *Observe notes on procedure for disconnecting the battery.*

Disconnect the battery only when the ⇒ Electrical System; Rep. gr. 27 battery is disconnected.



#### Caution

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

- ◆ *Route all the various lines (e.g. for fuel, hydraulics, activated charcoal filter system, coolant and refrigerant, brake fluid and vacuum) and electrical wiring in their original positions.*
- ◆ *Ensure that there is adequate free access to all moving or hot components.*

- ◆ Clean connection points and their environment thoroughly with engine or brake cleaner and dry the cleaned area thoroughly before loosening.
- ◆ Open closed lines and connections immediately with suitable screen caps.
- ◆ Place removed parts on a clean surface and cover. Use only lint-free cloths!
- ◆ Only install clean parts: Remove spare parts from their wrapping immediately before fitting. Do not use any parts which have been stored unwrapped (e.g. in tool boxes etc.).
- ◆ When the system is open: Do not work with compressed air. Avoid moving the vehicle.
- ◆ Protect electrical plug connections from dirt and moisture and only connect them when dry.
- ◆ 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<sup>3</sup>/h must be used.
- ◆ Prevent skin contact with fuel!
- ◆ Wear fuel-resistant gloves!

## 2.2 Safety measures for working on vehicles with start/stop system

When working on vehicles with start/stop system, please observe the following:



#### WARNING

*There is risk of injury from automatic engine starting on vehicles with start/stop system.*

- ◆ *In vehicles with an activated start-stop system (indicated by a message in the dash panel insert), the engine can start automatically if necessary.*
- ◆ *It is therefore necessary to ensure that the start-stop system is deactivated when carrying out work on the vehicle (switch ignition off, if required switch ignition on again).*



## 2.3 Safety precautions during road tests in which testing and measuring equipment is used

Note the following if testers and measuring instruments must be used during a road test:



### WARNING

*There is a risk of accident from deflection and insufficient securing of testers and measuring instruments.*

*There is also a hazard from the release of the passenger airbag in the event of an accident.*

- *Using testers and measuring instruments during driving operation creates a risk of deflection.*
- *Increased risk of injury from unsecured testers and measuring instruments must be prevented.*
- ◆ *Testers and measuring instruments must always be secured on the rear seat using a seat belt and by a 2nd person on the rear seat.*

## 2.4 Safety precautions when working on cooling system



### WARNING

*Steam may escape when expansion tank is opened.*

- ◆ *Wear eye protection and protective clothing to avoid eye injuries and scalding.*
- ◆ *Cover cap with cloth and open carefully.*



### Caution

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

- ◆ *Route all the various lines (e.g. for fuel, hydraulics, activated charcoal filter system, coolant and refrigerant, brake fluid and vacuum) and electrical wiring in their original positions.*
- ◆ *To avoid damage to lines, ensure sufficient clearance from all moving or hot components.*



#### Note

- ◆ *When the engine is warm, the cooling system is under pressure. If necessary, release pressure before beginning repair work.*
- ◆ *Secure all hose connections with hose clips, allocation ⇒ electronic parts catalogue "ETKA".*
- ◆ *Hose clip pliers - VAS 6362- are recommended to install spring-type clips.*
- ◆ *Renew gaskets and seals.*
- ◆ *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).*

## 2.5 Safety precautions when working on the injection system



### WARNING

*The fuel system is under pressure! Place a clean cleaning cloth around the connection point before detaching hose connections. Reduce pressure by carefully removing the hose.*

*The safety measures for the pressure reduction in the high pressure system must be observed  
⇒ "3.10 Reduce pressure in the high-pressure system",  
page 10 .*

To prevent injuries to persons and/or damage to the injection and ignition system, the following must be observed:

- ◆ Do not touch or disconnect ignition cables when the engine is running or being turned at starter speed.
- ◆ Ignition must be switched off before disconnecting and re-connecting the cables of the fuel injection and the ignition system as well as of the test equipment.
- ◆ If the engine must be operated at start speed without it starting, as for example, when checking the compression pressure, remove the fuse for the voltage supply of the injection valves and the ignition coils from the fuse holder ⇒ Current flow diagrams, Electrical fault finding and Fitting locations

Note the following if testers and measuring instruments have to be used during a road test:

- ◆ 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 could be injured by the release of the passenger airbag in the event of an accident.



## 2.6 Safety precautions when working on ignition system



### WARNING

*To prevent injuries to persons and/or damage to the injection and ignition system, please observe the following:*

*Do not touch or disconnect ignition cables when the engine is running or being turned at starter speed.*

*Switch off ignition before connecting or disconnecting injection and ignition system wiring as well as test instrument cables.*

*Fuel pump is activated by switching on ignition and via driver door contact switch. Therefore, if the battery power hasn't been disconnected, for safety reasons the plug of the fuel delivery unit must be disconnected, or the fuel pump fuse must be removed before opening the fuel system.*

## 3 Repair instructions

⇒ [“3.1 Rules of cleanliness”, page 7](#)

⇒ [“3.2 Foreign bodies in the engine”, page 7](#)

⇒ [“3.3 Contact corrosion”, page 7](#)

⇒ [“3.4 Cable routing and securing”, page 8](#)

⇒ [“3.5 Assembly of radiators and capacitors”, page 8](#)

⇒ [“3.6 Additional instructions when undertaking assembly work on the air-conditioning system”, page 8](#)

⇒ [“3.7 General instructions for charge air system”, page 8](#)

⇒ [“3.8 General notes on the ignition system”, page 9](#)

⇒ [“3.9 General notes on the injection system”, page 9](#)

⇒ [“3.10 Reduce pressure in the high-pressure system”, page 10](#)

### 3.1 Rules of cleanliness

Carefully observe the following “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. Use only lint-free 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 fitting. Do not use any parts which have been stored unwrapped (e.g. in tool boxes etc.).
- ◆ When the system is open: Do not work with compressed air. Do not move vehicle.
- ◆ Ensure that no fuel runs onto the fuel hoses. If happens, clean the hoses immediately.
- ◆ Protect electrical plug connections from dirt and moisture and only connect them when dry.

### 3.2 Foreign bodies in the engine

To prevent the penetration of foreign bodies, open channels of the inlet connection and exhaust tract must be sealed with suitable plugs during assembly works on the engine, for example from the screw plug set for engine - VAS 6122- .

### 3.3 Contact corrosion

The use of unsuitable connection elements causes contact corrosion (screws, nuts, washers, ...).

This is why only connection elements with a special surface coatings are fitted.

Therefore, the rubber or plastic parts and the adhesives are made from electrically non-conductive materials.

If you have any doubts about the suitability of parts, please use new parts in general ⇒ Electronic Catalogue of Original Parts “ET-KA” .



### 3.4 Cable routing and securing

- ◆ To ensure the original installation position, e.g. lines for fuel, hydraulics, vacuum, activated charcoal filter system lines or electric cables must be marked before removal. Make sketches or take photographs if necessary.
- ◆ Sufficient clearance from all moving or hot components must be ensured in the engine compartment due to its cramped construction. This prevents damage to lines.

### 3.5 Assembly of radiators and capacitors

The radiator, capacitor and charge air cooler may have minor indentations on the fins, even if assembly is correct. This is not a case of damage. Radiator, capacitors or charge air cooler must not be replaced because of these indentations.

### 3.6 Additional instructions when undertaking assembly work on the air-conditioning system



#### WARNING

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



#### Note

*To prevent damage to condenser or to refrigerant lines/hoses, ensure that the lines and hoses are not stretched, kinked or bent.*

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

- Remove the holding clamp(s) of the refrigerant lines.
- Remove AC compressor ⇒ Heating, Air Conditioning; Rep. gr. 87 .
- Mount the AC compressor in such a way that the refrigerant lines/hoses are not under tension.

### 3.7 General instructions for charge air system



#### Caution

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

- ◆ *Lay lines of all kinds (for example, 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, for example, 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 engine oil and oil filter.*
- ◆ *Inspect the air filter housing, the air filter element and the intake hoses for contaminations.*
- ◆ *Inspect the whole charge-air routing and the charge air cooler for foreign bodies.*

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

- ◆ The charge-air system must be tight.
- ◆ Renew self-locking nuts.
- ◆ Hose connections and hoses of the charge air system must be free of oil and grease before being installed.
- ◆ Only use approved clamps for securing the hose connections  
⇒ Electronic Catalogue of Original Parts "ETKA" .
- ◆ Spring-type clip pliers are recommended for installation of spring-type clips.
- ◆ Before connecting 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.

### 3.8 General notes on the ignition system

- ◆ Switch off the ignition before disconnecting and connecting the battery, as this may damage the engine control unit.
- ◆ The engine control unit and further components are equipped with self-diagnosis; inspect ⇒ Vehicle diagnostic tester
- ◆ A minimum voltage of 11.5 V is required for perfect functioning of the electrical components.
- ◆ Certain inspections may cause the control unit to detect and store a fault. It is therefore necessary to interrogate the event memory after having completed all inspections and repairs, and if necessary delete ⇒ Vehicle diagnostic tester.

Safety measures

⇒ ["2.6 Safety precautions when working on ignition system", page 6](#) .

Setting data, spark plugs ⇒ Maintenance ; Booklet Octavia III .

### 3.9 General notes on the injection system

Repairing ignition ⇒ ["1 Ignition system", page 281](#) .

- ◆ The engine control unit is equipped with self-diagnosis. Before repairs and also for fault finding, first of all interrogate the event memory. Also check the vacuum hoses and connections (unmetered air).



- ◆ Fuel hoses in the engine compartment must only be secured with spring-type clips ⇒ electronic catalogue of original parts "ETKA". The use of clamp or screw-type clips is not permissible.
- ◆ A minimum voltage of 11.5 V is required for perfect functioning of the electrical components.
- ◆ Do not use sealants containing silicone. Traces of silicone elements drawn in by the engine are not burnt in the engine and damage the lambda probe.
- ◆ Certain inspections may cause the control unit to detect and store a fault. It is therefore necessary to interrogate the event memory after having completed all inspections and repairs, and if necessary delete ⇒ Vehicle diagnostic tester.

Safety precautions when working on the injection system  
⇒ ["2.5 Safety precautions when working on the injection system", page 5](#).

### 3.10 Reduce pressure in the high-pressure system



#### Caution

*The injection system consists of a high pressure part (max. pressure of 12 MPa = 120 bar) and a low pressure part (pressure of approx. 0.7 MPa = 7 bar).*

*Before opening the high pressure system, e.g. removing the high pressure pump, the fuel distributor, the injection valves, the fuel pipes or the fuel pressure sender - G247- , the fuel pressure in the high pressure system with a remaining pressure of approx. 0.7 MPa (7 bar) must be reduced.*

- Connect the ⇒ Vehicle diagnostic tester and carry out the targeted function "remove high fuel pressure".
- The fuel pressure drops to a predetermined value.
- Switch off ignition.
- Before opening the fuel system, disconnect the plug from the fuel pump control unit.
- Before opening the high pressure system, lay cleaning cloths around the connection point.
- Open fuel system carefully to reduce the residual pressure of 0.7 MPa (7 bar) and when doing so collect fuel that is flowing out.



#### Note

- ◆ *If the high-pressure system is not opened immediately the pressure increases again as a result of the reheating effect.*
- ◆ *The ignition system must no longer be switched on, since otherwise the pressure will increase again.*
- ◆ *Interrogate the event memory of the engine control unit at the end of the following work and delete all the event memory entries.*
- ◆ *The readiness code must be generated if the event memory has been cleared ⇒ Vehicle diagnostic tester.*

## 10 – Removing and installing engine

### 1 Removing and installing engine

⇒ [“1.1 Removing engine”, page 11](#)

⇒ [“1.2 Securing the engine to the assembly stand”, page 21](#)

⇒ [“1.3 Installing engine”, page 22](#)

#### 1.1 Removing engine

##### Special tools and workshop equipment required

- ◆ Removal tool for inner lining of the door panel - MP8-602/1-
- ◆ Extension - 2024 A /1- of lifting device - MP9-201 (2024A)-
- ◆ Engine and gearbox jack - V.A.G 1383 A-
- ◆ Engine bracket - T10497-
- ◆ Catch pan for workshop crane , e.g. -VAS 6208-
- ◆ Hose clip pliers, e.g. - VAS 6362-
- ◆ Locking pin - T10060 A-
- ◆ Double ladder , e. g. -VAS 5085-
- ◆ Grease - G 000 100-
- ◆ Protective goggles
- ◆ Protective gloves

##### Work procedure



##### 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.*
- ◆ *Leave the ignition key in the ignition lock so that the steering lock does not click into place.*
- ◆ *Collect drained coolant in a clean container for reuse or proper disposal.*



##### WARNING

*There is risk of injury from high fuel pressure.*

- ◆ *Before opening the high-pressure system, the fuel pressure must be reduced to residual pressure.*

- Reduce the fuel pressure in the high pressure system  
⇒ [“3.10 Reduce pressure in the high-pressure system”, page 10](#) .



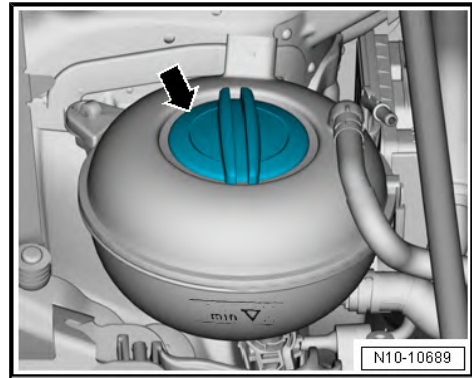
- Open cap -arrow- for coolant expansion tank.



### WARNING

*There is risk of injury due to hot steam and hot coolant.*

- ◆ *When the engine is warm, the cooling system is under overpressure.*
- ◆ *Reduce excess pressure by covering the cap of the coolant expansion tank with a cloth and opening it carefully.*



- Remove both front wheels ⇒ Chassis; Rep. gr. 44 .
- Remove the sound dampening system ⇒ Body Work; Rep. gr. 66 .
- Remove the front left and right wheelhouse liner ⇒ Body Work; Rep. gr. 66 .
- Disconnect electrical plug connection -2- at the coolant temperature sender at the radiator outlet - G83- -3-.
- Drain coolant ⇒ [“1.2 Draining and filling coolant”, page 147](#) .



### Caution

*There is a risk of destruction through reversing the rotation direction of an already used V-ribbed belt.*

- ◆ *Mark the direction of rotation with chalk or a felt-tip pen for the re-installation before removing the V-ribbed belt.*

### Vehicles with air conditioning



### WARNING

*Risk of injury through refrigerant.*

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

- Remove V-ribbed belt  
⇒ [“1.2 Removing and installing poly V-belt”, page 37](#) .
- Disconnect electric plug connection -1- on the control valve for the air conditioning system - N280- compressor.
- Release screws -arrows- for AC compressor.

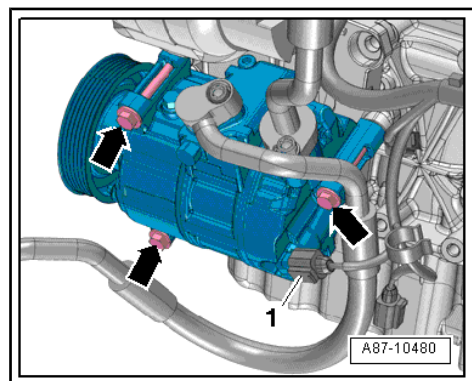


### Caution

*Risk of damaging refrigerant lines and hoses.*

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

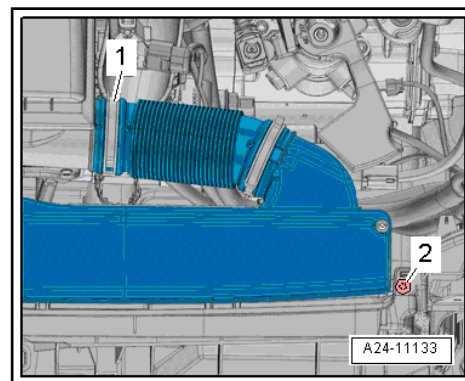
- Remove AC compressor with connected refrigerant hoses and strap up to the right side.



### Continued for all vehicles

- Loosen hose clamp -1- and remove air guide hose.

- Release screw left and right arrow -2-.
- Unclip and remove the air guide on the lock carrier.



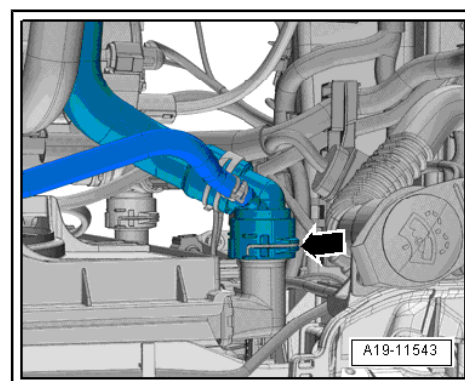
- Raise holding clamp -arrow- and remove top left coolant hose from radiator.



#### Note

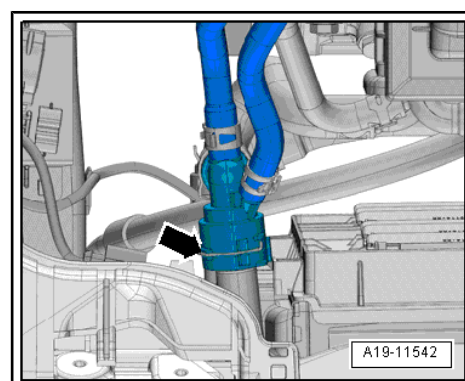
Depending on the vehicle version, 3 radiator versions are installed.

- ◆ Radiator Version 1  
⇒ ["4.1 Radiator version 1 - Summary of components", page 173](#).
- ◆ Radiator Version 2  
⇒ ["4.2 Radiator version 2 - Summary of components", page 175](#).
- ◆ Radiator Version 3  
⇒ ["4.3 Radiator version 3 - Summary of components", page 176](#).



#### Vehicles with radiator version 1

- Raise holding clamp -arrow- and disconnect coolant hose right above radiator for charge air circuit.

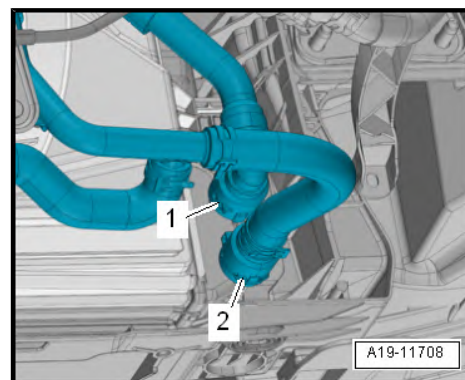


#### Vehicles with radiator versions 2 and 3:

- Raise holding clamps -1- and remove coolant hose from charge air circuit cooler.

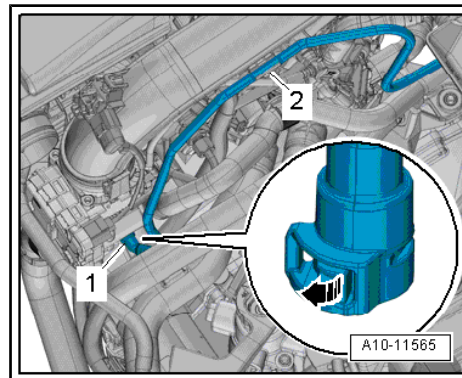
#### Continued for all vehicles

- Removing fan shroud  
⇒ ["4.7 Removing and installing fan shroud for radiator fan", page 182](#).
- Disconnect battery ⇒ Electrical System; Rep. gr. 27.
- Remove battery and battery tray ⇒ Electrical System; Rep. gr. 27.



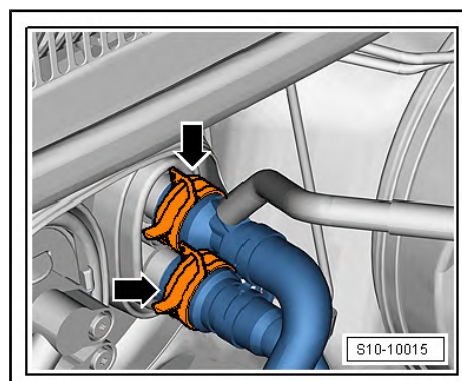


- Unlock catch -arrow- and remove vacuum hose -1-.
- Expose vacuum hose on the air guide pipe -2-.



#### Vehicles without auxiliary heating

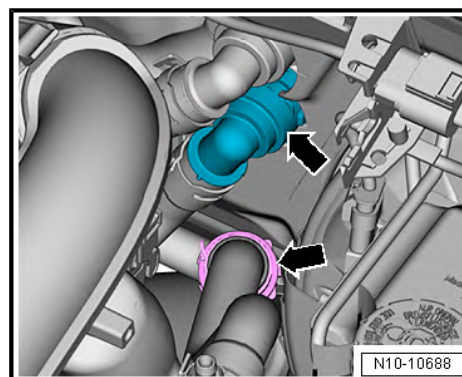
- Raise holding clamps -arrows- and remove coolant hoses from heat exchanger for heating.



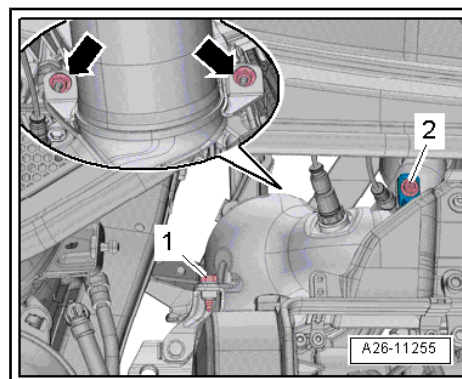
#### Vehicles with auxiliary heating

- Loosen holding clamp and holding clamps and pull off both coolant hoses -arrows-.

#### Continued for all vehicles



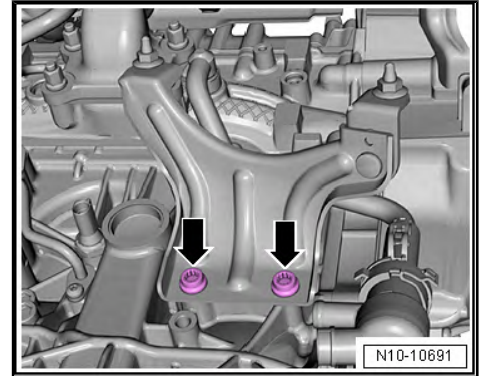
- Unscrew screw -2- and remove screw clamp.
- Unscrew screws -1- and nuts -arrows-, strap up catalytic converter.



- Release screws -arrows- and remove holder.



*Collect leaking coolant by placing a cloth under it.*



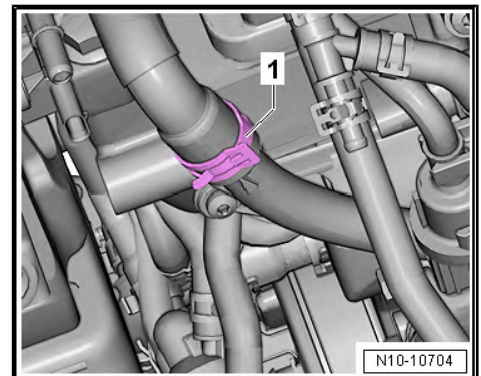
- Loosen hose clamp -1- and remove coolant hose.



#### WARNING

*There is risk of injury from fuel.*

- ◆ *To relieve the fuel pressure, place a clean cloth around the connection point and loosen the connection point carefully before opening the fuel system.*

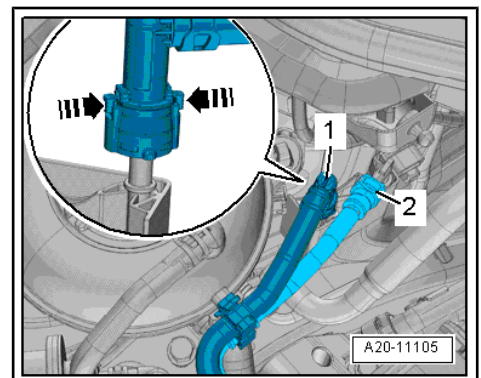


#### Caution

*Risk of contamination.*

- ◆ *Rules of cleanliness when working on the fuel supply system ⇒ "3.1 Rules of cleanliness", page 7.*

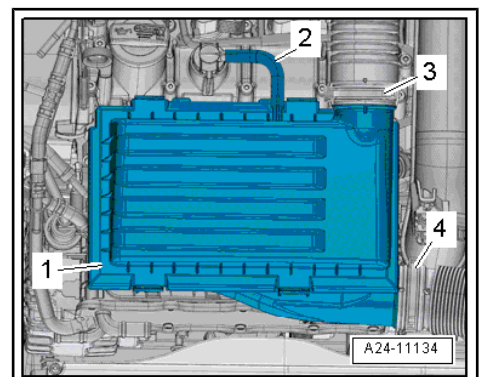
- First press the hose coupling -1- down, then press release buttons -arrows- ⇒ ["2 Separating push-on couplings", page 211](#).
- Remove hose coupling with pressed release buttons.
- Press release buttons on the hose -2- to the activated charcoal filter.
- Disconnect and expose hose.



- Pull off air guide hose -2-.
- Pull off -1- air filter housing upwards from the ball pin.
- Loosen hose clamps -3- and -4- and remove air guide pipes.



*For the following clip unclipping procedure use the removal tool for inner door trim panel - MP8-602/1-.*





- Disconnect the plug electrical plug connection -1- at the engine control unit - J623- .

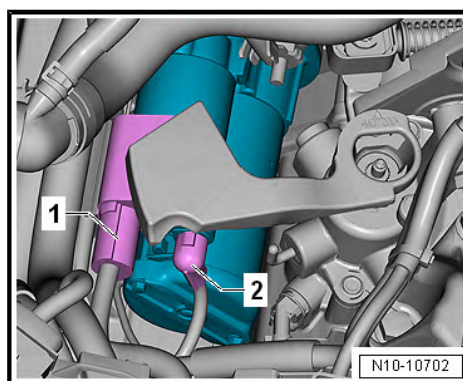
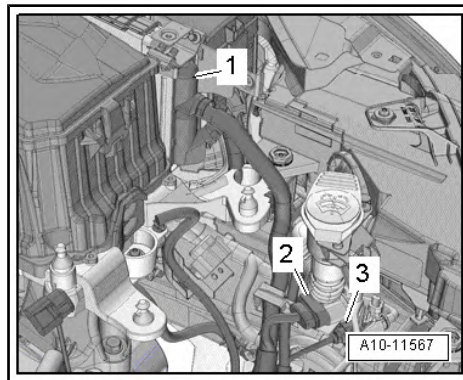


### Note

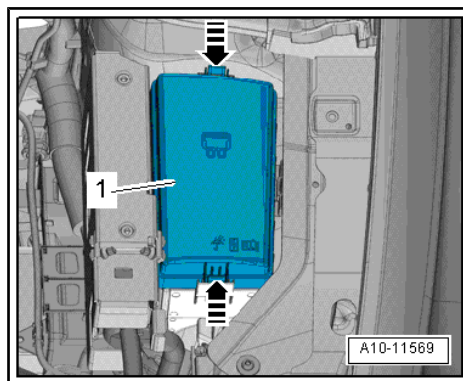
*On vehicles with an engine control unit with protective cover, first remove the protective cover*

⇒ *"8 Engine control unit", page 268* .

- Take electrical plug connections -2- and -3- out of the holder and disconnect.
- Expose electric cables.
- Separate electrical plug connection -2-.
- Press back pole protection -1- and unscrew cable from the starter magnet switch.
- Unscrew the earth cable on the body.



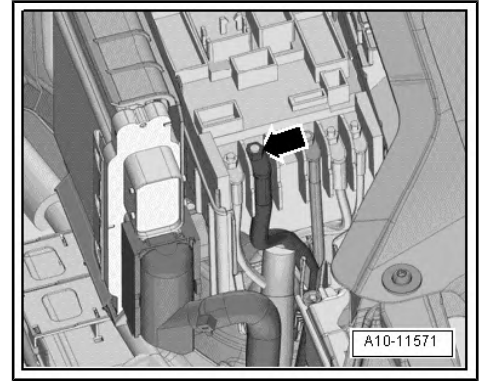
- Unlock catches -arrows-, remove cover-1- for engine compartment E-box.



- Unlock catch with a screwdriver -arrow-, pull cover -1- for E-box engine compartment upwards.



- Unscrew nut -arrow-, remove and expose electric cable.



- Disconnect plug connections -1- and -2-.

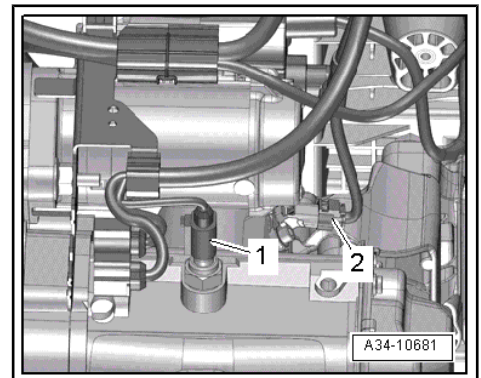
**For vehicles with manual gearbox**

- Remove shift mechanism from gearbox ⇒ Gearbox; Rep. gr. 34 .
- Remove slave cylinder ⇒ Gearbox; Rep. gr. 30 .

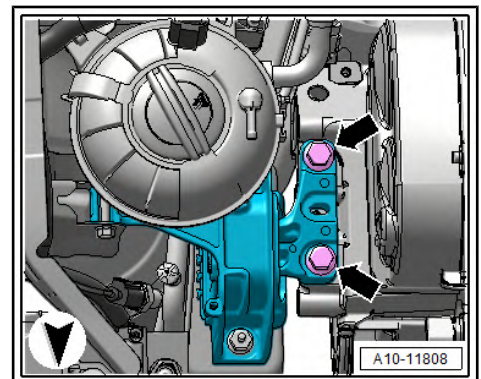
**For models with automatic gearbox**

- Remove selector lever linkage, pull off mechatronics plug and remove all holders from the gearbox ⇒ Gearbox; Rep. gr. 37 .

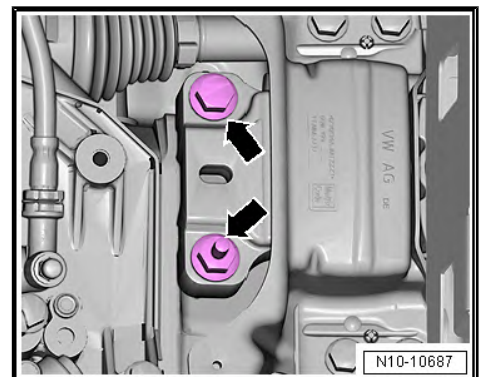
**Continued for all vehicles**



- Screw out screws -arrows- on engine mount by approximately 2 turns.

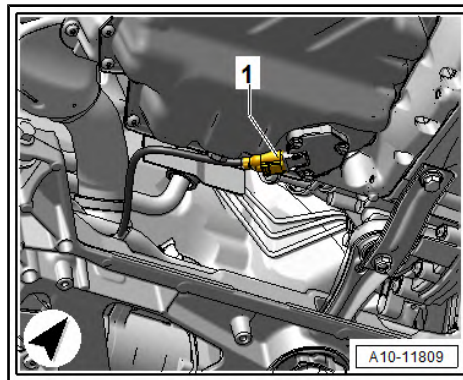


- Screw out screws -arrows- on gearbox mount by approximately 2 turns.

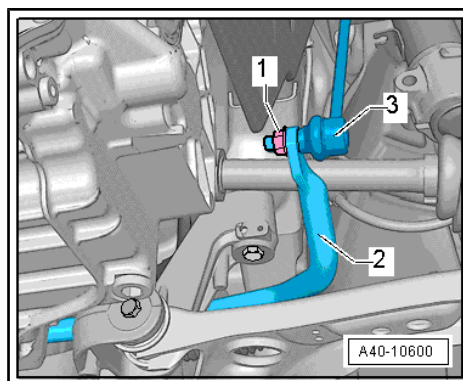




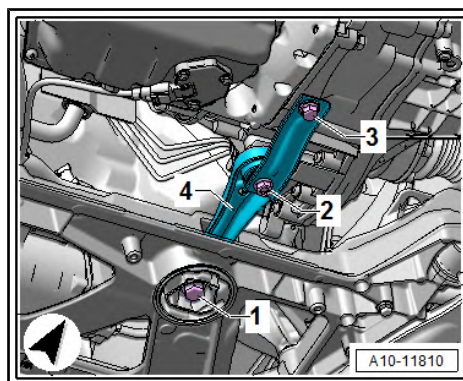
- Disconnect electrical plug connection -1- at the oil level and temperature sender - G266- .
- Unhook electric cable on the holder -2-.



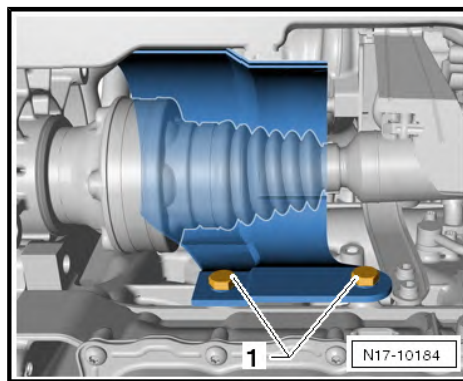
- Unscrew nuts -1- for coupling rod -3- at anti-roll bar -2- left and right.



- Undo screws -1-, -2-, -3- and remove the pendulum support -4-.



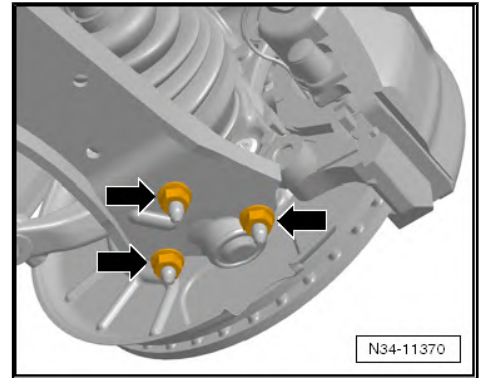
- Release screws -1- and remove heat shield for right drive shaft, if present.



Volkswagen Technical Site: <http://vwts.ru> <http://vwts.info>

огромный архив документации по автомобилям Volkswagen, Skoda, Seat, Audi

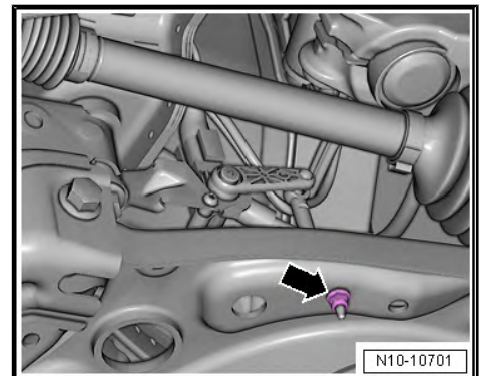
- Release nut -arrow- on left and right for swivel hub.



- Unscrew the nut -arrow- from the left track control arm - G78- if the front left vehicle level sensor is present.
- Unhook swivel hub from track control arm on left and right for swivel hub.
- Unscrew left and right cardan shaft from the gearbox ⇒ Chassis; Rep. gr. 40 and strap up.

**i Note**

*Ensure that the surface protection of the cardan shaft is not damaged.*



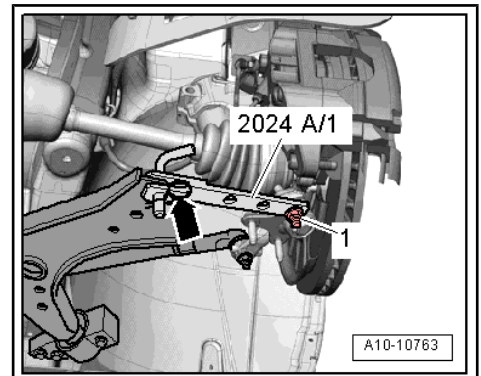
- Swivel suspension strut left towards the outside and support with extension -2024 A /1- , as shown in the illustration.



**WARNING**

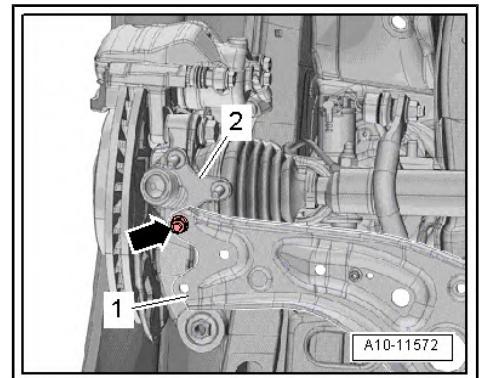
*There is a risk of accidents caused by loose parts of the support.*

- ◆ *Secure rig pin with plug-in lock and swivel hub -arrow- with nut -1-.*



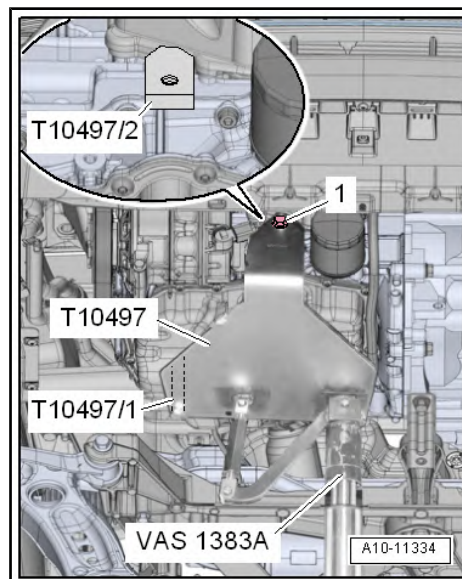
- Screw swivel hub -2- right at the track control arm -1- tight using the nut -arrow-, as shown in the illustration.

**Continued for all vehicles**





- Position adapter T10497/2 on the housing fin of the cylinder block, as shown in the illustration.
- Position engine mount T10497 with bolts T10497/1 at the cylinder block.
- Screw adapter T10497/2 with screw -1- onto the engine mount T10497 and tighten it to 20 Nm.

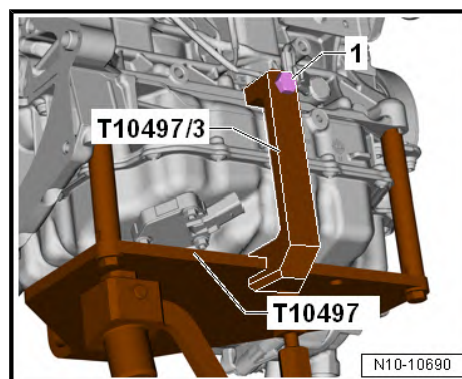


- Fit the adapter - T10497/3- to the engine mount - T10497- and tighten screw -1- to 20 Nm.
- Insert engine and gearbox jack - V.A.G 1383 A- at engine mount T10497 and raise the engine/gearbox unit somewhat.

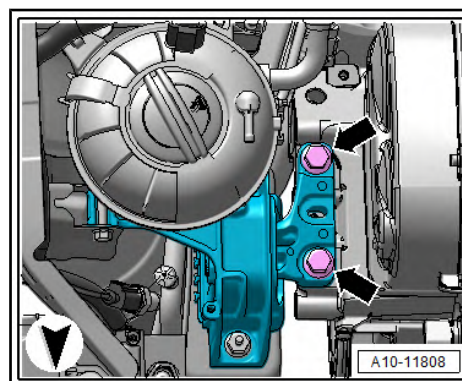


#### Note

Use double ladder , -VAS 5085- for example, to release the screws for the assembly bracket.



- Screw out engine mount screws -arrows- fully.



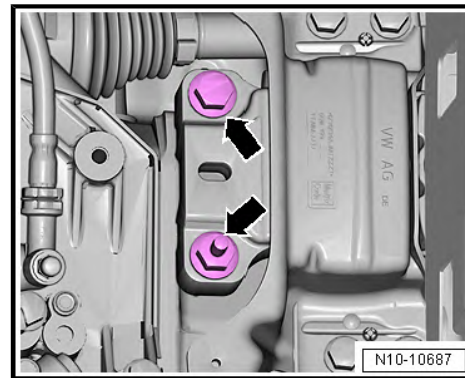
- Screw out gearbox mount screws -arrows- fully.



#### Caution

*There is a risk of damage from vacuum lines or electric cables.*

- ◆ *Check that all vacuum lines and electric cables between engine, gearbox, assembly bracket and body have been loosened.*
- ◆ *Guide the engine/gearbox unit out of the engine compartment carefully when lowering.*



- Drain engine/gearbox unit a little.
- Push the gearbox side of the engine/gearbox unit forwards and drain it slowly and carefully.
- Remove the gearbox from the engine ⇒ gearbox; Rep. gr. 34 .

## 1.2 Securing the engine to the assembly stand

### Special tools and workshop equipment required

- ◆ Lifting device - MP9-201 (2024A)-
- ◆ Engine and gearbox support - VAS 6095-
- ◆ Workshop crane, e.g. - VAS 6100-

### Work procedure

- Gearbox disconnected from engine.
- Suspend lifting device - MP9-201 (2024A)- from the engine and workshop crane - VAS 6100- as shown in the illustration.



#### Note

*For coordination with the unit centre of gravity position the perforated rails must be placed as shown in the illustration.*

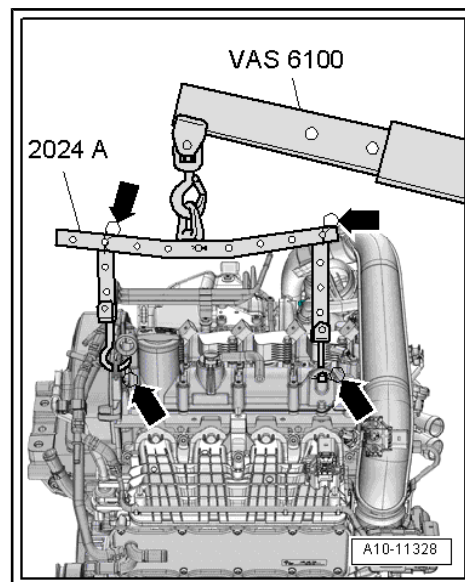


#### WARNING

*There is a risk of accident from loose parts of the lifting device.*

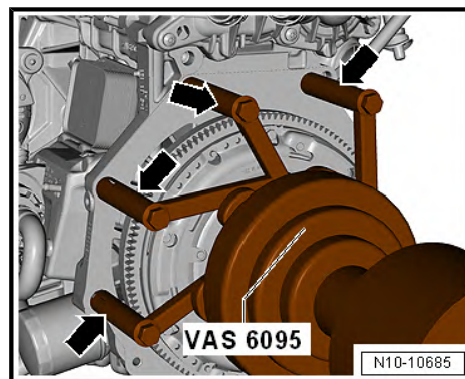
- ◆ *The suspension hooks and rig pin on the lifting must be secured using plug-in locks -arrows-.*

- Lift off engine with installed engine mount T10497 with workshop crane - VAS 6100- from engine/gearbox jack - V.A.G 1383 A- .
- Remove engine mount T10497 .





- Secure engine with bolts -arrows- at engine and gearbox mount - VAS 6095- as shown in the illustration.



## 1.3 Installing engine

### Work procedure

Installation is performed in a similar way in the reverse order. Pay attention to the following points:

- Installing intermediate plate ➔ [page 48](#) .

### For vehicles with manual gearbox

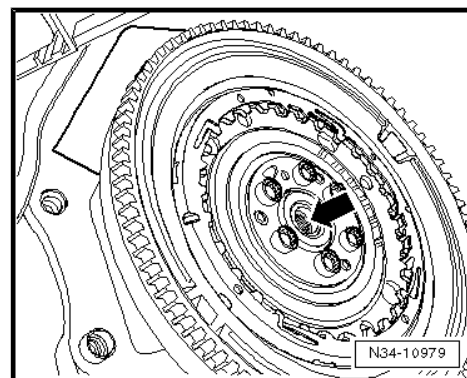
- Clean the serration of the drive shaft and if the clutch disc has been used clean the hub serration, remove any corrosion present and only apply a very thin layer of grease - G 000 100- to the serration of the drive shaft.
- Subsequently move the clutch disc up and down on the drive shaft until the hub fits smoothly on the shaft. Always remove excess grease.
- 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 .

### For models with automatic gearbox

- Replace the needle bearing -arrow- in the crankshaft  
⇒ [“3.3 Replace needle bearing for crankshaft”, page 57](#) .
- Attach the selector lever control cable at the gearbox ⇒ Gearbox; Rep. gr. 34 .

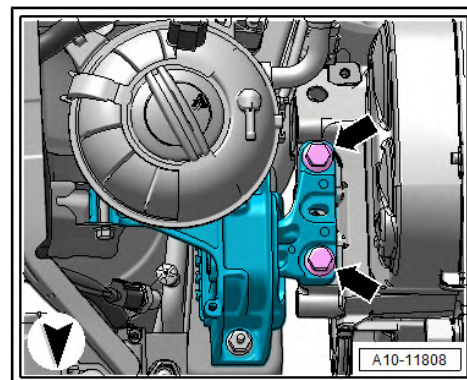
### Continued for all vehicles

- Installing the gearbox ⇒ Gearbox; Rep. gr. 34 .
- Install gearbox support bracket.
- Take up engine/gearbox unit with the engine mount T10497 .
- Position engine/gearbox unit with the engine mount - T10497- on the engine and gearbox jack - V.A.G 1383 A- .



### Note

- ◆ *Replace screws which have been tightened firmly to a torque angle.*
- ◆ *Replace self-locking nuts and screws as well as gasket rings, gaskets and O-rings.*
- ◆ *Secure all hose connections with hose clamps which comply with the series design ⇒ Electronic Catalogue of Original Parts“ETKA.”*
- ◆ *All cable straps should be fastened again in the same place when installing.*
- Insert engine/gearbox unit into the body.
- Initially insert screws -arrows- for engine mount by hand as far as the stop.





- Initially insert screws -arrows- for gearbox mount by hand as far as the stop.



### Note

*The screws must not be permanently tightened until the assembly bracket is adjusted*

⇒ [“2.5 Adjusting the assembly bracket”, page 31](#) .

- Remove engine mount T10497 from engine.
- Install the starter motor ⇒ Electrical System; Rep. gr. 27 .
- Install pump for coolant recirculation - V188-  
⇒ [“2.6 Removing and installing electric coolant pump”, page 163](#) .
- Install air guide pipe  
⇒ [“2.1 Summary of components - charge air system”, page 228](#) .
- Install air guide

### For vehicles with manual gearbox

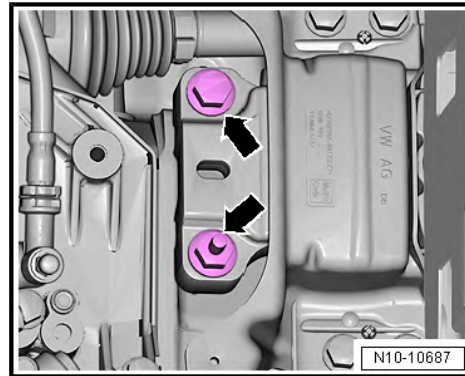
- Install slave cylinder ⇒ Gearbox; Rep. gr. 30 .
- Install linkages with linkage support ⇒ Gearbox; Rep. gr. 34 .

### For models with automatic gearbox

- Install the assembly carrier ⇒ Chassis; Rep. gr. 40 .
- Install selector lever linkage, attach mechatronics plug and all holders to the gearbox ⇒ Gearbox; Rep. gr. 37 .

### Continued for all vehicles

- Install high catalytic converter  
⇒ [“1.3 Removing and installing catalytic converter with pre-exhaust pipe”, page 275](#) .
- Install drive shafts ⇒ Chassis; Rep. gr. 40 .
- Install track control arm, swivel hub and coupling rod ⇒ Chassis; Rep. gr. 40 .
- Install AC compressor ⇒ Heating, Air Conditioning; Rep. gr. 87 .
- Install the V-ribbed belt  
⇒ [“1.2 Removing and installing poly V-belt”, page 37](#) .
- Electrical connections and proper routing ⇒ Electrical System; Rep. gr. 97 and ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Installing the engine control unit - J623-  
⇒ [“8 Engine control unit”, page 268](#) .
- Connect coolant hoses with quick coupling ⇒ [page 174](#) .
- Install pendulum support  
⇒ [“2.1 Unit mounting - summary of components”, page 26](#) .
- Install wheelhouse liners ⇒ Body Work; Rep. gr. 66 .
- Attach the right front wheel ⇒ Chassis; Rep. gr. 44 .
- Adjust the assembly bracket  
⇒ [“2.5 Adjusting the assembly bracket”, page 31](#) .
- Remove battery tray ⇒ Electrical System; Rep. gr. 27 .



- Install air filter housing  
⇒ [“2.2 Removing and installing air filter housing”, page 239](#) .



#### Caution

*There is a risk of destruction of control units as a result of over-voltage.*

- ◆ *Do not use charger for jump starting!*

- Top up and bleed cooling system ⇒ [page 148](#) .
- Interrogate all event memories and delete all event entries which are caused by removing and installing the engine ⇒ Vehicle diagnostic tester.

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



#### Note

- ◆ *Only re-use drained coolant if the cylinder head or cylinder block has not been replaced.*
- ◆ *Dirty coolant must not be used again.*

#### Tightening torques



#### Note

- ◆ *Tightening torques apply only for lightly greased, oiled, phosphatized or blackened nuts and screws.*
- ◆ *Other lubricants such as engine and gearbox oil are allowed, but no lubricants containing graphite.*
- ◆ *Do not use degreased parts.*

| Component                                                                |     | Nm    |
|--------------------------------------------------------------------------|-----|-------|
| Screws and nuts                                                          | M6  | 9 Nm  |
|                                                                          | M7  | 15 Nm |
|                                                                          | M8  | 20 Nm |
|                                                                          | M10 | 40 Nm |
|                                                                          | M12 | 65 Nm |
| deviations:                                                              |     |       |
| Engine/gearbox connecting screws ⇒ Gearbox; Rep. gr. 34                  |     |       |
| Screws for assembly bracket:                                             |     |       |
| ◆ Assembly bracket                                                       |     |       |
| ⇒ <a href="#">“2.1 Unit mounting - summary of components”, page 26</a> . |     |       |

## 2 Assembly bracket

⇒ [“2.1 Unit mounting - summary of components”, page 26](#)

⇒ [“2.2 Removing and installing engine mount”, page 28](#)

⇒ [“2.3 Removing and installing gearbox mount”, page 28](#)

⇒ [“2.4 Check assembly bracket setting”, page 31](#)

⇒ [“2.5 Adjusting the assembly bracket”, page 31](#)

### 2.1 Unit mounting - summary of components

#### 1 - Bolt

- ☐ replace after removal
- ☐ Tightening torque and tightening order  
⇒ [page 27](#)

#### 2 - Engine support bracket

- ☐ Tightening torque and tightening order  
⇒ [page 27](#)

#### 3 - Engine mounting

- ☐ with supporting arm
- ☐ installing and removing  
⇒ [“2.2 Removing and installing engine mount”, page 28](#)

#### 4 - Bolt

- ☐ replace after removal
- ☐ 40 Nm + torque a further 90° (1/4 turn)

#### 5 - Bolt

- ☐ replace after removal
- ☐ 20 Nm + torque a further 90° (1/4 turn)

#### 6 - Bolt

- ☐ 8 Nm

#### 7 - Mounting bracket

#### 8 - Bolt

- ☐ replace after removal
- ☐ 60 Nm + torque a further 90° (1/4 turn)

#### 9 - Pendulum support

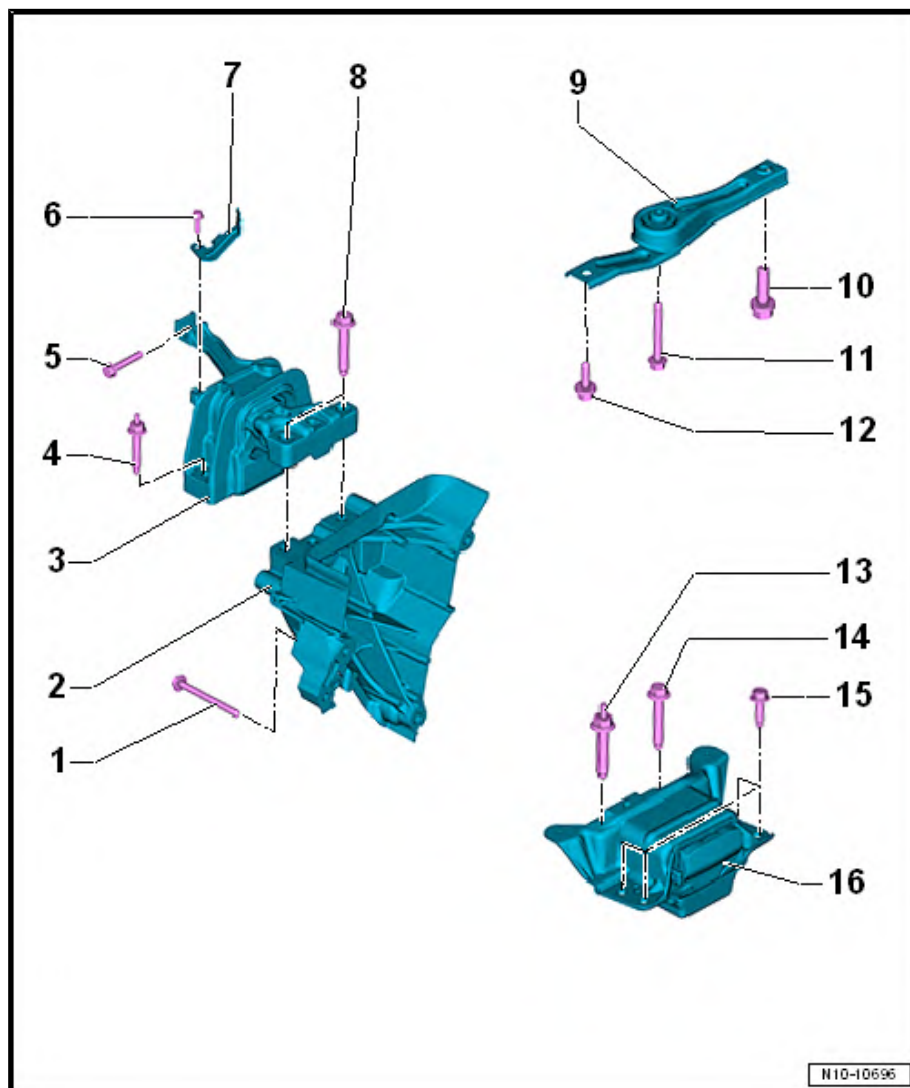
- ☐ removing and installing ⇒ [page 27](#)

#### 10 - Bolt

- ☐ replace after removal
- ☐ Tightening torque and tightening order ⇒ [page 27](#)

#### 11 - Bolt

- ☐ replace after removal
- ☐ Tightening torque and tightening order ⇒ [page 27](#)



## 12 - Bolt

- ☐ replace after removal
- ☐ Tightening torque and tightening order ➔ [page 27](#)

## 13 - Bolt

- ☐ replace after removal
- ☐ 60 Nm + torque a further 90° (1/4 turn)

## 14 - Bolt

- ☐ replace after removal
- ☐ 60 Nm + torque a further 90° (1/4 turn)

## 15 - Bolt

- ☐ replace after removal
- ☐ 50 Nm + torque a further 90° (1/4 turn)

## 16 - Gearbox mount

- ☐ with supporting arm
- ☐ installing and removing ➔ ["2.3 Removing and installing gearbox mount", page 28](#)

### Engine support bracket - tightening torque and tightening order

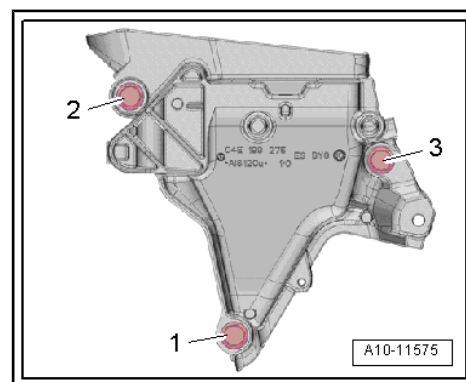


#### Note

Replace screws which have been tightened firmly to a torque angle.

- Tighten screws in steps in the given sequence:

| Stage | Screws    | Tightening torque/torque angle        |
|-------|-----------|---------------------------------------|
| 1st   | -1 ... 3- | 7 Nm                                  |
| 2nd   | -1 ... 3- | 40 Nm                                 |
| 3rd   | -1 ... 3- | 90° (torque a further 90° (1/4 turn)) |



### Removing and installing pendulum support

- Unscrew screw -1-.
- Remove screws -2- and -3- and remove support -4-.

Installation is carried out in the reverse order.

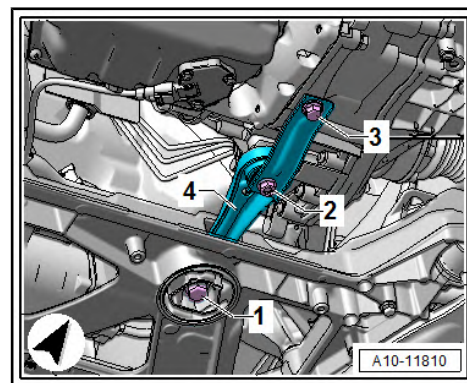


#### Note

Screws which have been tightened firmly to a torque angle must be replaced.

- Tighten screws in steps in the given sequence:

| Stage | Bolts     | Tightening torque/torque angle        |
|-------|-----------|---------------------------------------|
| 1st   | -2-, -3-  | 50 Nm                                 |
| 2nd   | -1-       | 130 Nm                                |
| 3rd   | -1 ... 3- | 90° (torque a further 90° (1/4 turn)) |



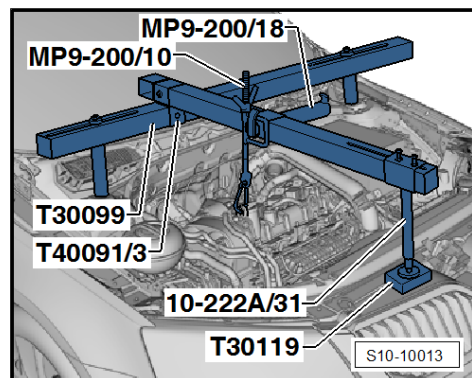
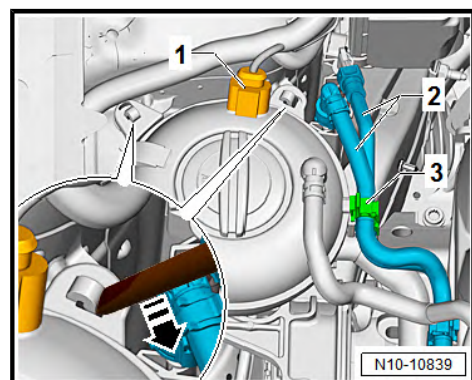
## 2.2 Removing and installing engine mount

### Special tools and workshop equipment required

- ◆ Supporting device - T30099-
- ◆ Surface - T30119-
- ◆ Hook for MP9-200 and T30099 - MP9-200/10 (10-222A/10)-
- ◆ Adapter - MP9-200/18 (10-222A/18)-
- ◆ Support - 10-222A/31-3-
- ◆ Clutch - T40091/3-

### Removing

- Remove the cooling water tank cover ⇒ Body Work; Rep. gr. 66 .
- Separate electrical plug connection -1-.
- Open locking device -3- and undo hoses -2- from the activated charcoal filter.
- Unlock catches using a screwdriver -arrow- and lay coolant expansion tank to the side.
- Connect supporting device - T30099- as shown in the illustration.
- Attach snap hook to the engine suspension eye, right.
- Slightly pre-tension engine/gearbox unit with the spindle, do not raise.



- Release screws -arrows- and remove engine mount -1-.

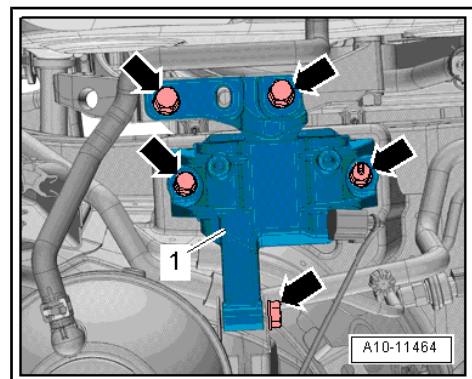
### Install

Installation is carried out in the reverse order. When installing, observe the following:

- Check assembly bracket setting  
⇒ ["2.4 Check assembly bracket setting", page 31](#) .

### Tightening torques

- ◆ ⇒ ["2.1 Unit mounting - summary of components", page 26](#)



## 2.3 Removing and installing gearbox mount

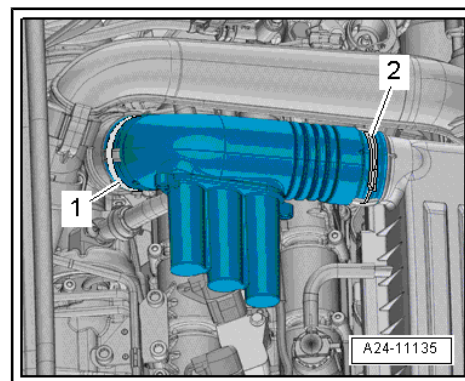
### Special tools and workshop equipment required

- ◆ Supporting device - T30099-

- ◆ Surface - T30119-
- ◆ Hook for MP9-200 and T30099 - MP9-200/10 (10-222A/10)-
- ◆ Adapter - MP9-200/18 (10-222A/18)-
- ◆ Support - 10-222A/31-3-
- ◆ Clutch - T40091/3-

### Removing

- Remove the cooling water tank cover ⇒ Body Work; Rep. gr. 66 .
- Loosen hose clamps -1- and -2- and remove air guide pipe.
- Remove air filter housing  
⇒ ["2.2 Removing and installing air filter housing", page 239](#) .
- Remove battery tray ⇒ Electrical System; Rep. gr. 27 .
- Remove engine control unit  
⇒ ["8 Engine control unit", page 268](#) .

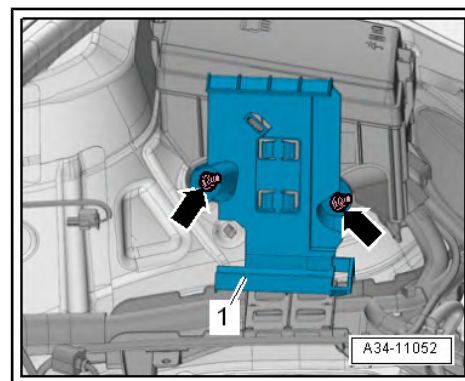


- Unscrew screws -arrows- and remove holder -1-.

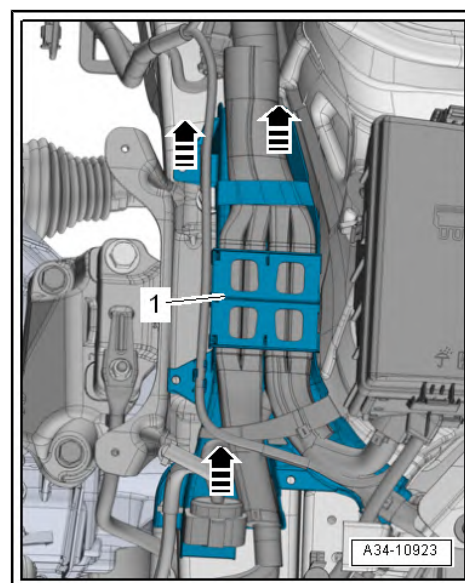


### Note

*Holders are installed differently according to build version.*

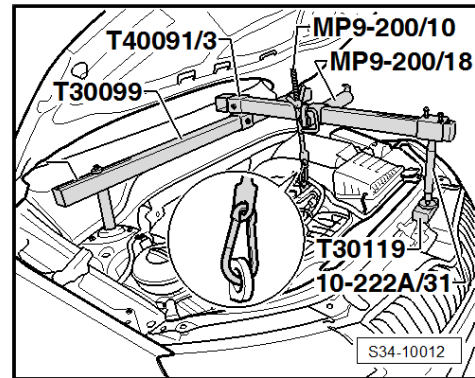


- Unscrew screw -1-, unclip upwards -arrows- and push slightly to the side.
- Remove wiper arms ⇒ Electrical System; Rep. gr. 92 .
- Remove the cooling water tank cover ⇒ Body Work; Rep. gr. 50 .
- Remove caps of screwed connections for front suspension strut domes.





- Connect support bracket - T30099- together with the other elements, as shown in the illustration.
- Attach spindle snap hook to the engine suspension eye.
- Pre-tension engine/gearbox unit with the spindle, do not raise.



- Release screws -arrows- and remove gearbox mount -1-.

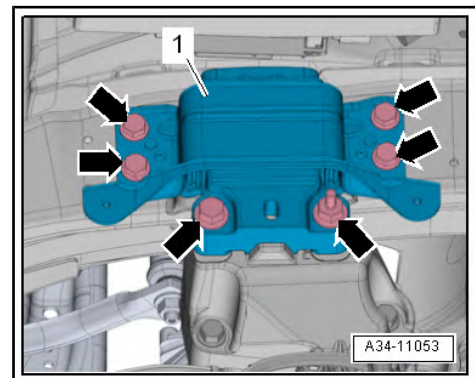
### Install

Installation is carried out in the reverse order. When installing, observe the following:



### Note

*Screws which have been tightened firmly to a torque angle must be replaced.*



### Caution

*There is a risk of damaging the thread in the gearbox support bracket by positioning the bolts obliquely.*

- ◆ *Before screwing in the screws -arrows 1- the gearbox support bracket and supporting arm of the gearbox mount must be absolutely parallel to each other. If necessary, push up gearbox at the rear using a hydraulic trolley jack.*
- ◆ *Do not remove support bracket - 10-222 A- until the bolts securing the assembly mounting have been tightened to specified torque.*

- Lift gearbox with the support bracket spindle until the gearbox support bracket is touching the supporting arm of the gearbox mount.
- Check assembly bracket setting  
⇒ [“2.4 Check assembly bracket setting”, page 31](#) .
- Disconnect support bracket - 10-222 A- from engine.

### Tightening torques

- ◆ ⇒ [“2.1 Unit mounting - summary of components”, page 26](#)
- ◆ ⇒ [“2.1 Assembly overview - air filter housing”, page 238](#)
- ◆ ⇒ [“8 Engine control unit”, page 268](#)
- ◆ Battery tray ⇒ Electrical system; Rep. gr. 27

## 2.4 Check assembly bracket setting

### Work procedure

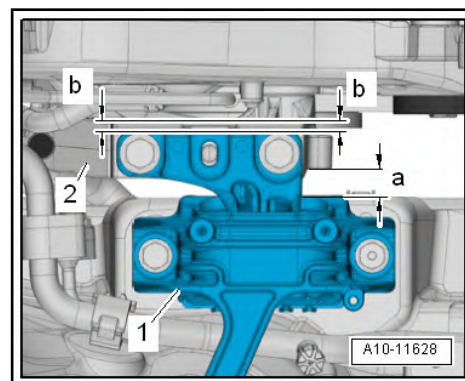
The following dimensions must be reached:

- A distance of  $-a-$  = 10 mm must be present between engine support -1- and engine mount -2-.
- The cast edge on the engine support -2- must be parallel  $-b-$  with the engine mount supporting arm -1-.
- The dimension  $-a-$  must be the same on the front and rear.



### Note

*The distance  $-a-$  = 10 mm can be checked, for example with suitable round bars.*



- If the measured distance is too great or too small, adjust the assembly bracket  
⇒ [“2.5 Adjusting the assembly bracket”, page 31](#) .

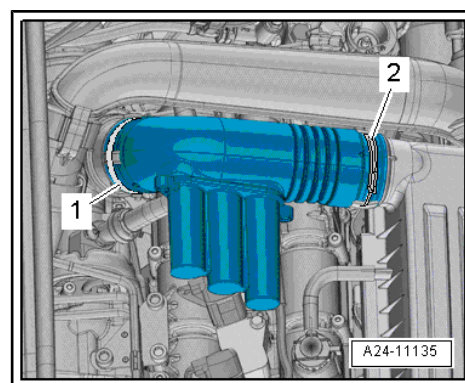
## 2.5 Adjusting the assembly bracket

### Special tools and workshop equipment required

- ◆ Supporting device - T30099-
- ◆ Surface - T30119-
- ◆ Hook for MP9-200 and T30099 - MP9-200/10 (10-222A/10)-
- ◆ Adapter - MP9-200/18 (10-222A/18)-
- ◆ Support - 10-222A/31-3-
- ◆ Clutch - T40091/3-

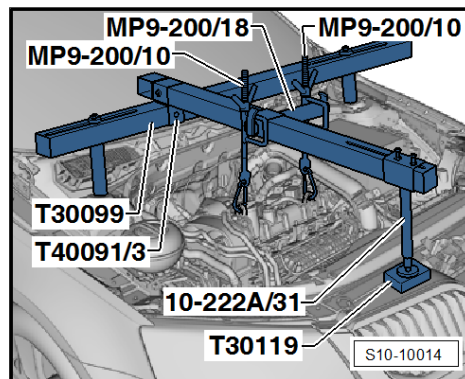
### Work procedure

- Remove battery tray ⇒ Electrical System; Rep. gr. 27 .
- Loosen hose clamps -1- and -2- and remove air guide pipe.
- Remove air filter housing  
⇒ [“2.2 Removing and installing air filter housing”, page 239](#) .
- Remove wiper arms ⇒ Electrical System; Rep. gr. 92 .
- Remove the cooling water tank cover ⇒ Body Work; Rep. gr. 50 .
- Remove caps of screwed connections for front suspension strut domes.

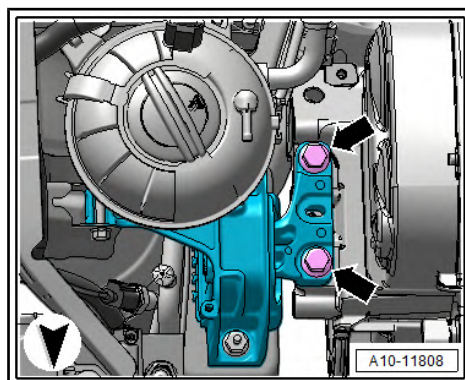




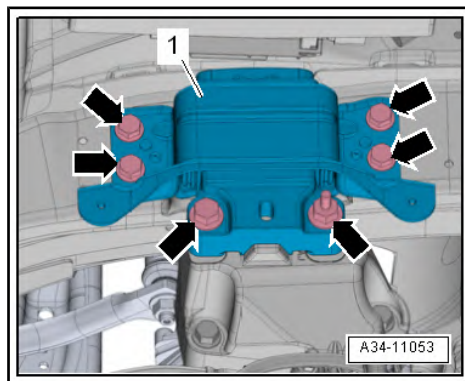
- Connect supporting device - T30099- as shown in the illustration.
- Attach snap hook to the engine suspension eyes.
- Slightly pre-tension engine/gearbox unit with the spindles, do not raise.



- Unscrew screws -arrows- for engine mount one after another and replace (if not already done during engine installation).
- Loosely insert the screws.



- Unscrew screws -arrows- for gearbox mount -1- after another and replace (if not already done during engine installation).
- Loosely insert the screws.



- Move engine/gearbox unit with an assembly lever until the following dimensions are set:

A distance of -a- = 10 mm must be present between engine support -2- and engine mount -1-.

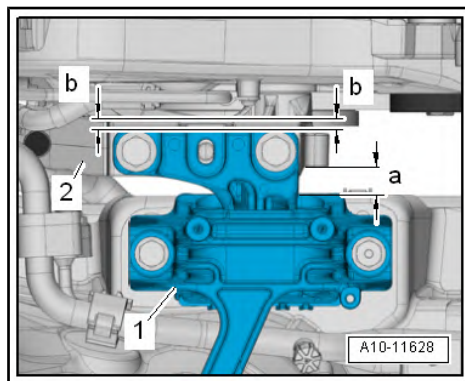
The cast edge on the engine support -2- must be parallel with the engine mount supporting arm -1-.

Dimension -b- = dimension -b-.



**Note**

*The distance -a- = 10 mm can be checked, for example with suitable round bars.*



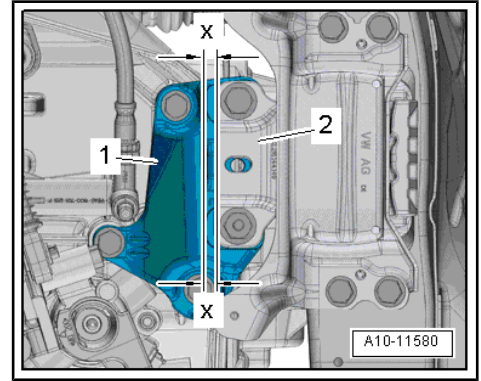
- Tighten engine mount screws.

- Make sure that on the gearbox side the edges of the supporting arm -2- and gearbox support -1- are parallel.
- Dimension -x- = dimension -x-.
- Tighten gearbox mount screws.

Installation is carried out in the reverse order.

#### Tightening torques

- ◆ ⇒ [“2.1 Unit mounting - summary of components”, page 26](#)
- ◆ ⇒ [“2.1 Summary of components - charge air system”, page 228](#)
- ◆ ⇒ [“2.1 Assembly overview - air filter housing”, page 238](#)
- ◆ Battery tray ⇒ Electrical system; Rep. gr. 27





## 13 – Crankshaft group

### 1 Cylinder block (pulley end)

⇒ [“1.1 V-ribbed belt - Summary of components”, page 34](#)

⇒ [“1.2 Removing and installing poly V-belt”, page 37](#)

⇒ [“1.3 Removing and installing tensioning device for V-ribbed belt”, page 39](#)

⇒ [“1.4 Removing and installing ribbed belt pulley”, page 40](#)

⇒ [“1.5 Removing and installing engine support”, page 41](#)

⇒ [“1.6 Renewing crankshaft oil seal - belt pulley end”, page 44](#)

### 1.1 V-ribbed belt - Summary of components

⇒ [“1.1.1 Summary of components - Vehicles without air conditioning”, page 34](#)

⇒ [“1.1.2 Summary of components - Vehicles with air conditioning”, page 36](#)

#### 1.1.1 Summary of components - Vehicles without air conditioning

##### 1 - Bolt

- ☐ replace after removal
- ☐ to release and tighten use counterholder - T10475-



##### Caution

*There is a risk of destruction of the engine.  
So as not to adjust the timing the crankshaft must not be turned while the screws are removed.*

- ☐ 150 Nm + torque a further 180° (1/2 turn)

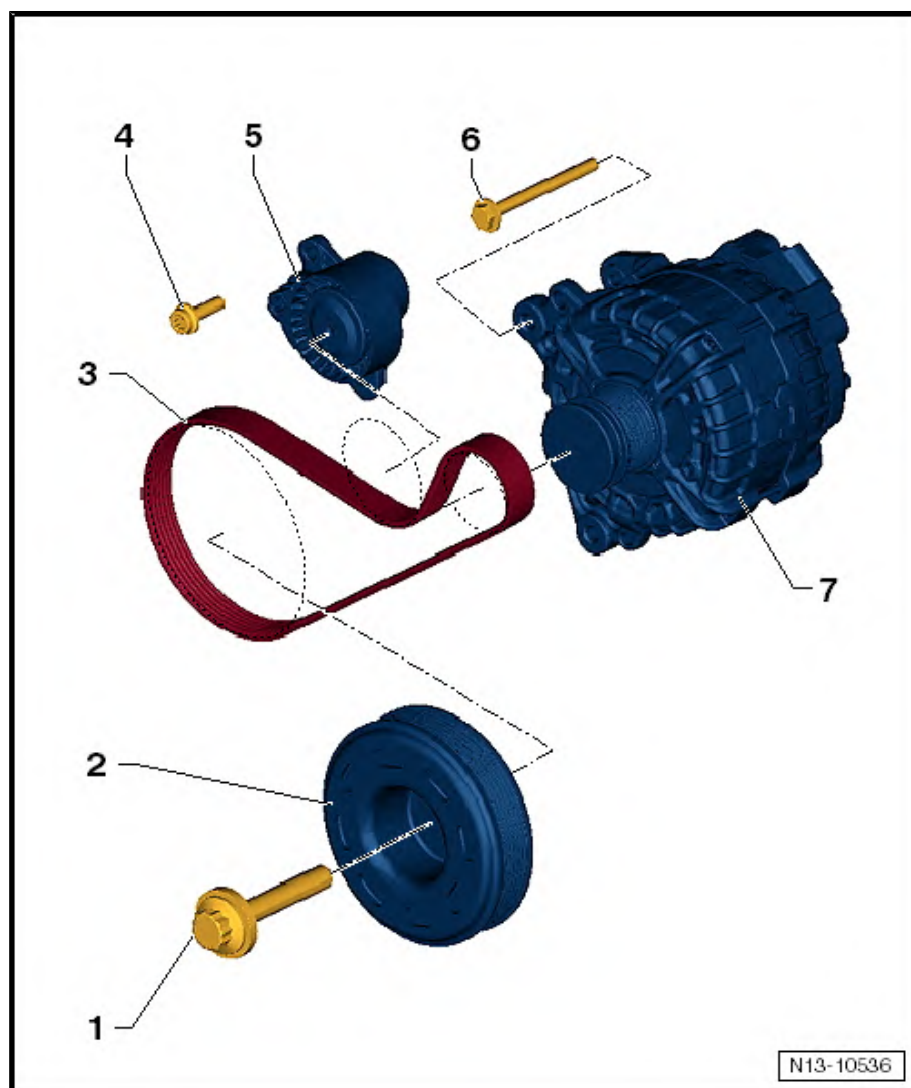
##### 2 - Crankshaft-belt pulley

- ☐ with vibration damper
- ☐ installing and removing  
⇒ [“1.4 Removing and installing ribbed belt pulley”, page 40](#)



##### Caution

*There is a risk of destruction of the engine.  
So as not to adjust the timing the crankshaft must not be turned while the vibration damper is removed.*



N13-10536

### 3 - Poly V-belt

- ☐ check for wear
- ☐ mark the direction of rotation with chalk or a felt-tip pen before removing
- ☐ do not kink
- ☐ Routing of the ribbed V-belt ⇒ [page 38](#)
- ☐ installing and removing ⇒ [“1.2 Removing and installing poly V-belt”, page 37](#)
- ☐ pay attention to the correct position on the belt pulley when installing it

### 4 - Bolt

- ☐ replace after removal
- ☐ 20 Nm + torque a further 90° (1/4 turn)

### 5 - Tensioning device for V-ribbed belt

- ☐ Swivel tensioning device for V-ribbed belt with socket insert to slacken the V-ribbed belt
- ☐ lock with locking pin - T10060 A-
- ☐ installing and removing ⇒ [“1.3 Removing and installing tensioning device for V-ribbed belt”, page 39](#)

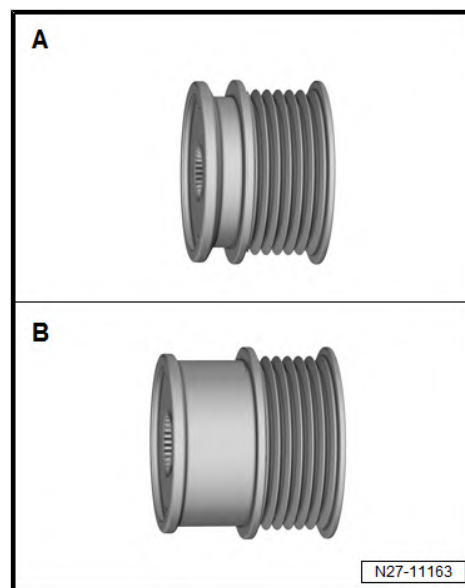
### 6 - Bolt

- ☐ 23 Nm

### 7 - AC generator

- ☐ removing and installing ⇒ Electrical System; Rep. gr. 27
- ☐ depending on the model of the alternator, different separation V-ribbed belt pulleys can be fitted with freewheel -A- and -B- ⇒ [page 35](#)
- ☐ depending on the model of the belt pulley for alternator, the correct length of the V-ribbed belt must be assigned ⇒ ETKA - Electronic Catalogue of Original Parts

#### Model of the V-ribbed belt pulley with freewheel





## 1.1.2 Summary of components - Vehicles with air conditioning

### 1 - Poly V-belt

- ☐ check for wear
- ☐ mark the direction of rotation with chalk or a felt-tip pen before removing
- ☐ do not kink
- ☐ Routing of the ribbed V-belt ⇒ [page 39](#)
- ☐ installing and removing ⇒ ["1.2.1 Removing and installing V-ribbed belt - Vehicles without air conditioning", page 37](#)
- ☐ pay attention to the correct position on the belt pulley when installing it

### 2 - Bolt

- ☐ replace after removal
- ☐ to release and tighten use counterholder - T10475-



#### Caution

*There is a risk of destruction of the engine.  
So as not to adjust the timing the crankshaft must not be turned while the screws are removed.*

- ☐ 150 Nm + torque a further 180° (1/2 turn)

### 3 - Crankshaft-belt pulley

- ☐ with vibration damper
- ☐ installing and removing ⇒ ["1.4 Removing and installing ribbed belt pulley", page 40](#)



#### Caution

*There is a risk of destruction of the engine.  
So as not to adjust the timing the crankshaft must not be turned while the vibration damper is removed.*

### 4 - Tensioning device for V-ribbed belt

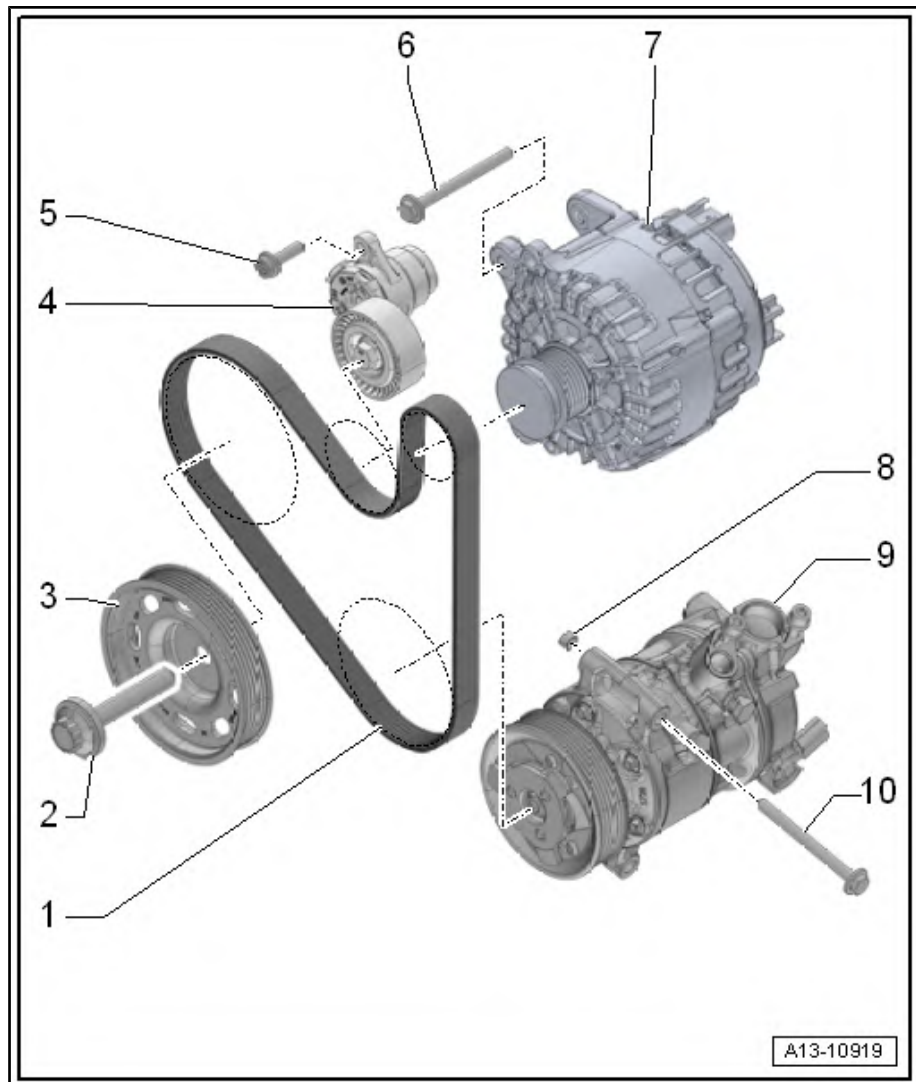
- ☐ Swivel tensioning device for V-ribbed belt with socket insert to slacken the V-ribbed belt
- ☐ lock with locking pin - T10060 A-
- ☐ installing and removing ⇒ ["1.3 Removing and installing tensioning device for V-ribbed belt", page 39](#)

### 5 - Bolt

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

### 6 - Bolt

- ☐ 23 Nm



## 7 - AC generator

- ☐ removing and installing ⇒ Electrical System; Rep. gr. 27
- ☐ depending on the model of the alternator, different separation V-ribbed belt pulleys can be fitted with freewheel -A- and -B- ⇒ [page 37](#)
- ☐ depending on the model of the belt pulley for alternator, the correct length of the V-ribbed belt must be assigned ⇒ ETKA - Electronic Catalogue of Original Parts

## 8 - Fitting sleeve

- ☐ for the AC compressor

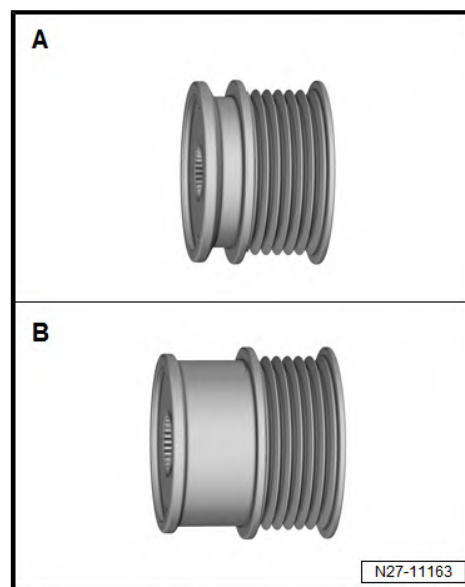
## 9 - Air conditioner compressor

- ☐ Do not unscrew or disconnect refrigerant lines
- ☐ removing and installing ⇒ Heating, Air Conditioning; Rep. gr. 87

## 10 - Screw

- ☐ Tightening torques ⇒ Heating, Air Conditioning; Rep. gr. 87

### Model of the V-ribbed belt pulley with freewheel



## 1.2 Removing and installing poly V-belt

⇒ ["1.2.1 Removing and installing V-ribbed belt - Vehicles without air conditioning", page 37](#)

⇒ ["1.2.2 Removing and installing V-ribbed belt - Vehicles with air conditioning", page 38](#)

### 1.2.1 Removing and installing V-ribbed belt - Vehicles without air conditioning

Special tools and workshop equipment required

- ◆ Locking pin - T10060 A-



## Removing

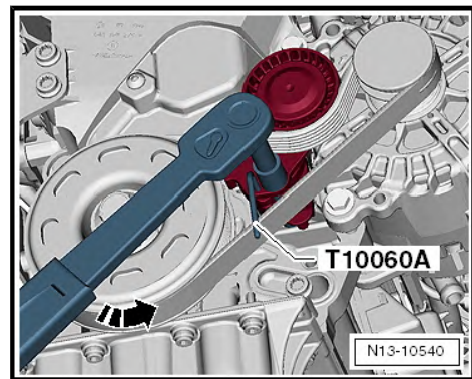
- To release the tension of the V-ribbed belt, turn the tensioning device anticlockwise -arrow-.
- Lock tensioning device with locking pin - T10060 A- .



### Caution

*There is a risk of destruction through reversing the rotation direction of an already used V-ribbed belt.*

- ◆ *Mark the direction of rotation with chalk or a felt-tip pen for the re-installation before removing the V-ribbed belt.*



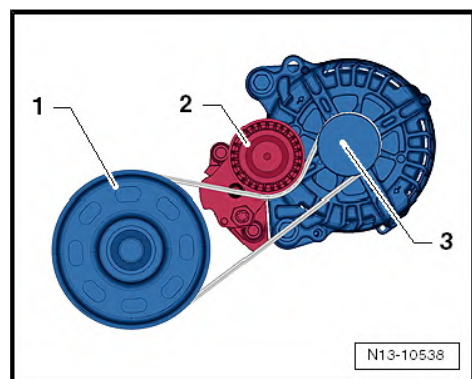
- Remove poly V-belt.

## Install

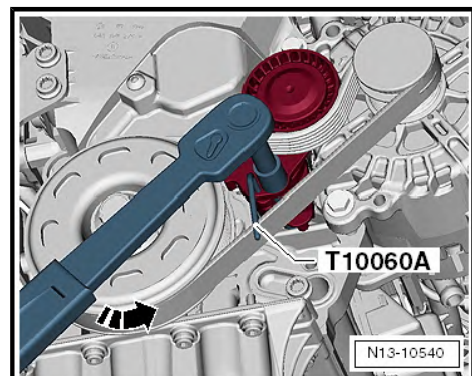
Installation is carried out in the reverse order. When installing, observe the following:

- Lay the V-ribbed belt as shown in the illustration.

- 1 - Vibration damper
- 2 - Tensioning device for V-ribbed belt
- 3 - Generator



- Turn the tensioning element in the -direction of the arrow- and pull out the locking pin - T10060 A- .
- Release pressure on tensioning device.
- Check that the V-ribbed belt is positioned correctly.
- Start end and check that the V-ribbed belt is running correctly.



## 1.2.2 Removing and installing V-ribbed belt - Vehicles with air conditioning

### Special tools and workshop equipment required

- ◆ Locking pin - T10060 A-

## Removing

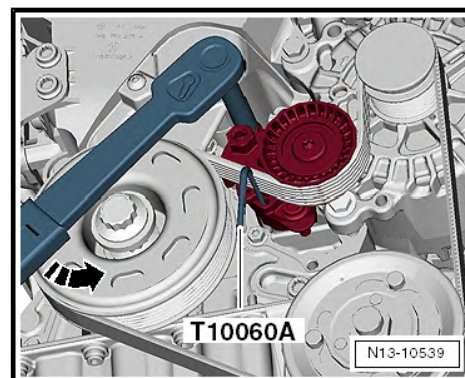
- To release the tension of the V-ribbed belt, turn the tensioning device anticlockwise -arrow-.
- Lock tensioning device with locking pin - T10060 A- .



### Caution

*There is a risk of destruction through reversing the rotation direction of an already used V-ribbed belt.*

- ◆ *Mark the direction of rotation with chalk or a felt-tip pen for the re-installation before removing the V-ribbed belt.*



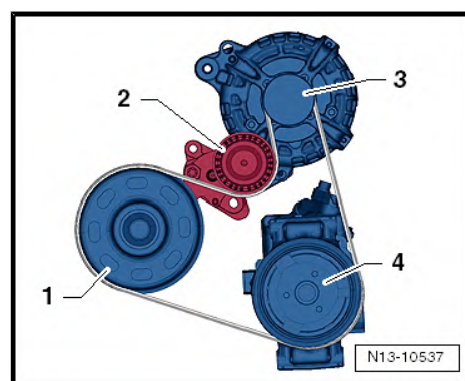
- Remove poly V-belt.

## Install

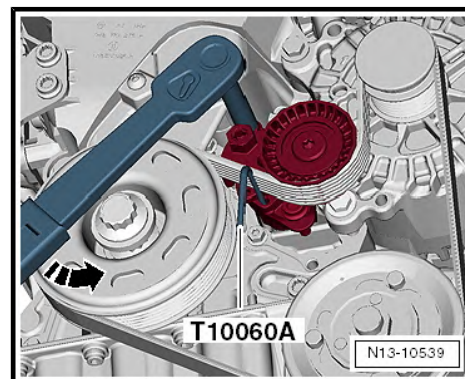
Installation is carried out in the reverse order. When installing, observe the following:

- Lay the V-ribbed belt as shown in the illustration:

- 1 - Vibration damper
- 2 - Tensioning device for V-ribbed belt
- 3 - Generator
- 4 - Air conditioner compressor



- Turn tensioning device anticlockwise -arrow-, pull out locking pin - T10060 A- .
- Release pressure on tensioning device.
- Check that the V-ribbed belt is positioned correctly.
- Start end and check that the V-ribbed belt is running correctly.



## 1.3 Removing and installing tensioning device for V-ribbed belt

### Removing

- Remove the V-ribbed belt from the tensioning device .

Vehicles without air conditioning system

⇒ ["1.2.1 Removing and installing V-ribbed belt - Vehicles without air conditioning", page 37](#) .

Vehicles with air conditioning system

⇒ ["1.2.2 Removing and installing V-ribbed belt - Vehicles with air conditioning", page 38](#) .



- Release screws -arrows- and pull off tensioning device -1- for V-ribbed belt.

### Install

Installation is performed in a similar way in the reverse order. Pay attention to the following points:

- Install the V-ribbed belt.

Vehicles without air conditioning system

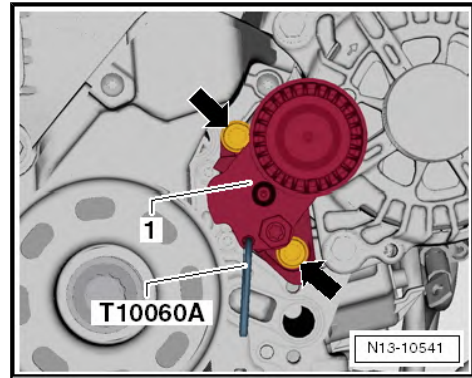
⇒ [“1.2.1 Removing and installing V-ribbed belt - Vehicles without air conditioning”, page 37](#) .

Vehicles with air conditioning system

⇒ [“1.2.2 Removing and installing V-ribbed belt - Vehicles with air conditioning”, page 38](#) .

### Tightening torque

| Component                   | Nm                                      |
|-----------------------------|-----------------------------------------|
| Screw for tensioning device | 20 Nm + torque a further 90° (1/4 turn) |



## 1.4 Removing and installing ribbed belt pulley

### Special tools and workshop equipment required

- ♦ Counterholder - T10475-

### Removing

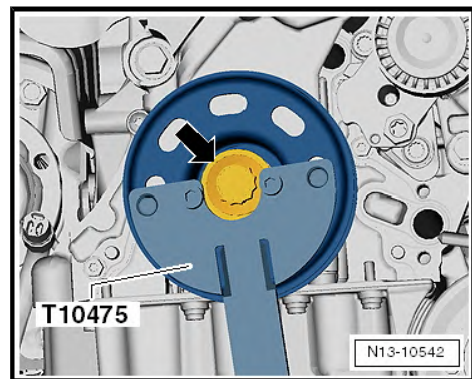
- Remove the sound dampening system ⇒ Body Work; Rep. gr. 66 .
- Remove V-ribbed belt  
⇒ [“1.2 Removing and installing poly V-belt”, page 37](#) .
- Undo the screw -arrow-; to do so, use the counterholder - T10475- .
- Unscrew bolt and remove V-ribbed belt pulley crankshaft.



### Caution

*There is a risk of destruction of the engine.*

- ♦ *So as not to adjust the timing the crankshaft must not be turned while the vibration damper is removed.*



### Install



### Note

- ♦ *Replace screws which have been tightened firmly to a torque angle.*
- ♦ *All contact surfaces between screws, V-ribbed belt pulley crankshaft and crankshaft toothed belt sprocket must be free of oil and grease.*

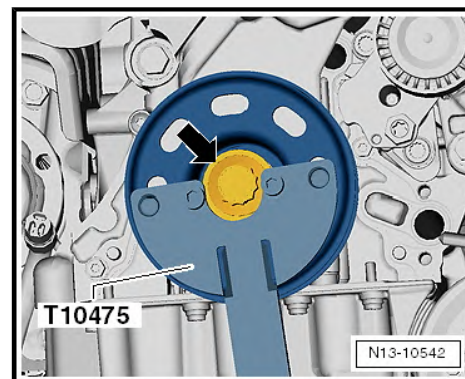
- Place V-ribbed belt pulley crankshaft, insert screw with the oiled thread manually until into the system.
- Tighten the screw -arrow-; to do so, use the counterholder - T10475- .

Continued installation is carried out in the reverse order. When installing, note the following:

- Install the V-ribbed belt  
⇒ [“1.2 Removing and installing poly V-belt”, page 37](#) .

#### Tightening torque

| Component             | Nm                                        |
|-----------------------|-------------------------------------------|
| Screw for belt pulley | 150 Nm + torque a further 180° (1/2 turn) |



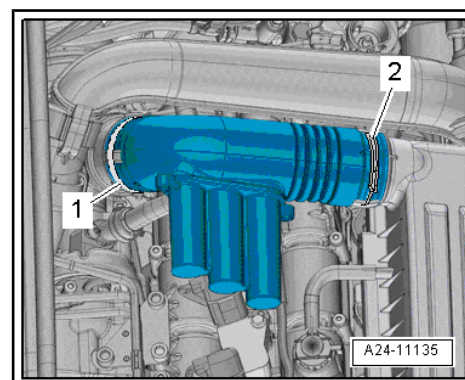
## 1.5 Removing and installing engine support

### Special tools and workshop equipment required

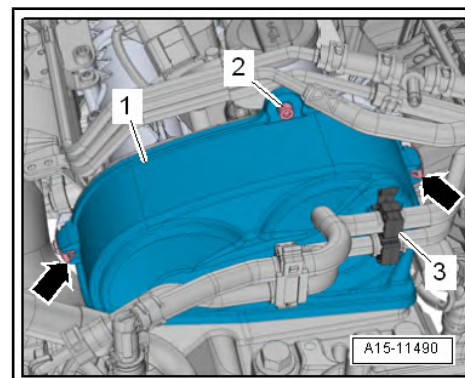
- ◆ Supporting device - T30099-
- ◆ Surface - T30119-
- ◆ Hook for MP9-200 and T30099 - MP9-200/10 (10-222A/10)-
- ◆ Adapter - MP9-200/18 (10-222A/18)-
- ◆ Support - 10-222A/31-3-
- ◆ Clutch - T40091/3-

### Removing

- Disconnect battery ⇒ Electrical System; Rep. gr. 27 .
- Remove battery tray ⇒ Electrical System; Rep. gr. 27 .
- Drain coolant ⇒ [“1.2 Draining and filling coolant”, page 147](#) .
- Loosen hose clamps -1- and -2- and remove air guide pipe.
- Remove air filter housing  
⇒ [“2.2 Removing and installing air filter housing”, page 239](#) .
- Remove ribbed V-belt tensioning device  
⇒ [“1.3 Removing and installing tensioning device for V-ribbed belt”, page 39](#) .

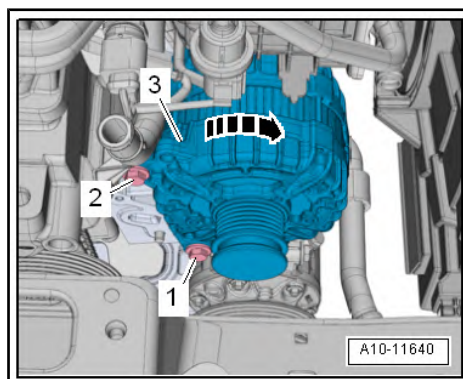
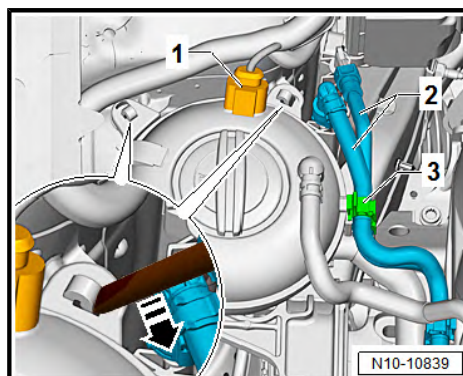
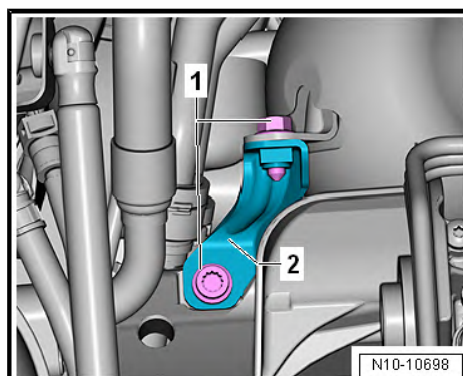
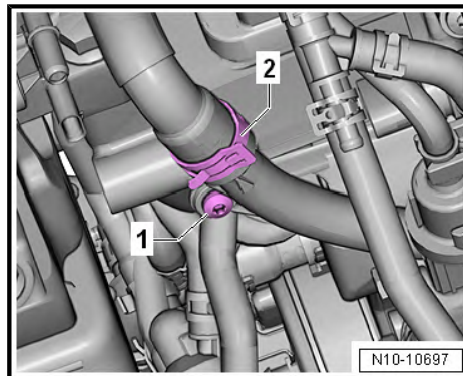


- Expose vacuum hose on the holder -3-.
- Release screw -2-.
- Loosen clips -arrows- and remove toothed belt guard -1- upwards.

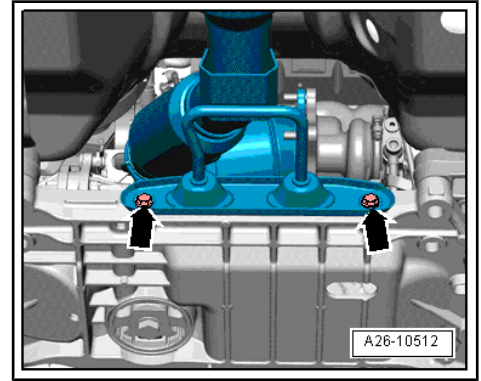




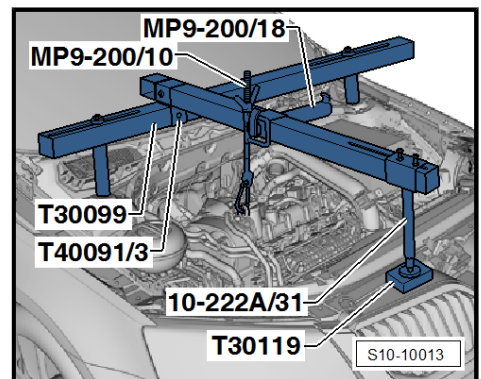
- Release screw -1-.
  - Loosen hose clamp -2- and remove coolant hose.
- 
- Unscrew screws -1- and remove the catalytic converter holder -2-.
- 
- Pull off plug connection -1-.
  - Open locking device -3- and undo hoses -2- from the activated charcoal filter.
  - Unlock catches using a screwdriver -arrow- and lay coolant expansion tank to the side.
  - Open holding clamps on the air conditioning system pipes.
- 
- Loosen screw -1- but do not unscrew it.
  - Unscrew screw -2-.
  - Swivel generator -3- forward in -direction of the arrow-.



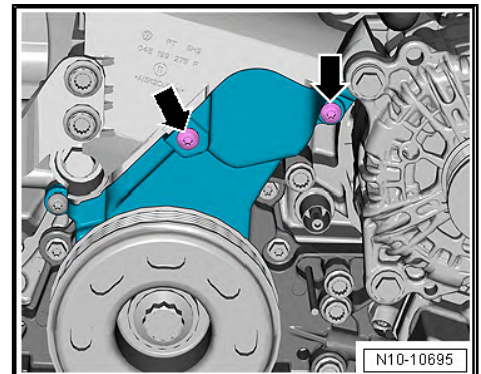
- Release screws -arrows- at holder for pre-exhaust pipe.
- Remove pendulum support  
⇒ [“2.1 Unit mounting - summary of components”, page 26](#) .
- Remove wiper arms ⇒ Electrical System; Rep. gr. 92 .
- Remove the cooling water tank cover ⇒ Body Work; Rep. gr. 50 .
- Remove caps of screwed connections for front suspension strut domes.



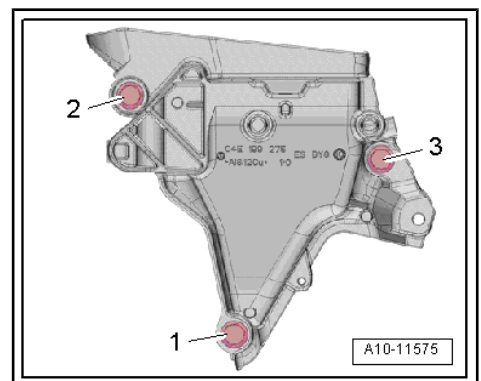
- Connect supporting device - T30099- as shown in the illustration.
- Attach snap hook to the engine suspension eye, right.
- Slightly pre-tension engine/gearbox unit with the spindle, do not raise.
- Remove engine mounts  
⇒ [“2.2 Removing and installing engine mount”, page 28](#) .



- Remove bolts -arrows-.



- Unscrew screws -1-, -2-, -3-.



- Remove bolts -arrows-.
- Press engine/gearbox unit slightly to the left and remove engine support.

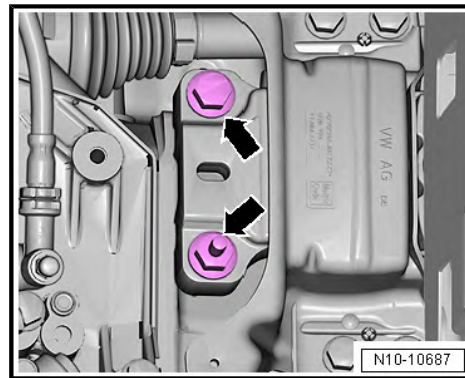
### Install

Installation is carried out in the reverse order. When installing, observe the following:

- Check assembly bracket setting  
⇒ [“2.4 Check assembly bracket setting”, page 31](#) .

### Tightening torques

- ♦ ⇒ [“2.1 Unit mounting - summary of components”, page 26](#)
- ♦ ⇒ [“1.1 V-ribbed belt - Summary of components”, page 34](#)
- ♦ Fixing screws for generator ⇒ Electrical System; Rep. gr. 27
- ♦ ⇒ [“2.1 Summary of components - toothed belt guard”, page 79](#)
- ♦ ⇒ [“3.1 Summary of components”, page 170](#)
- ♦ ⇒ [“2.1 Summary of components - charge air system”, page 228](#)
- ♦ ⇒ [“2.1 Assembly overview - air filter housing”, page 238](#)
- ♦ ⇒ [“1.1 Catalytic converter and component parts - Summary of components”, page 272](#)
- ♦ Battery tray ⇒ Electrical system; Rep. gr. 27
- ♦ Wiper arms ⇒ Electrical system; Rep. gr. 96



## 1.6 Renewing crankshaft oil seal - belt pulley end

### Special tools and workshop equipment required

- ♦ Assembly tool - T10485-
- ♦ Extractor tool - T20143-

### Work procedure

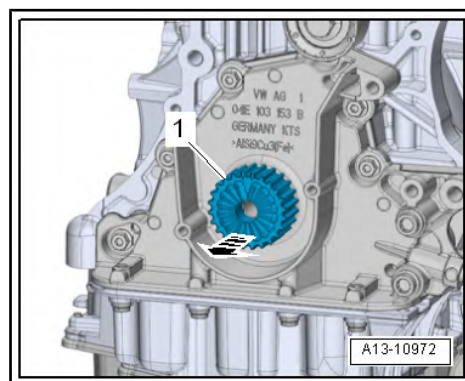
- Remove toothed belt  
⇒ [“2.5 Removing and installing toothed belt”, page 99](#) .
- Remove crankshaft toothed belt pulley -1- -arrow-.



### Caution

*There is a risk of destruction of the engine.*

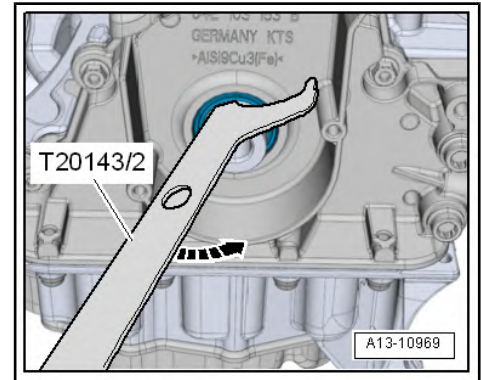
- ♦ *So as not to adjust the timing the crankshaft must not be turned while the vibration damper is removed.*



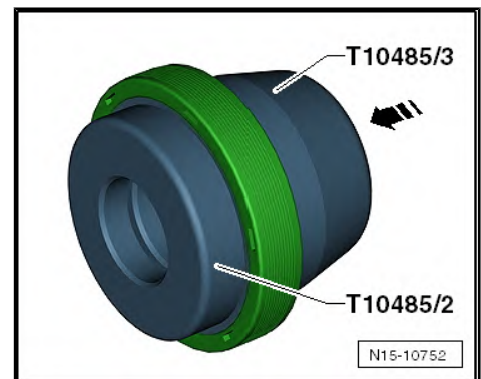
- Lift out sealing ring using the extractor hook -T20143/2- -arrow-.
- Clean the contact and sealing surfaces.

**i Note**

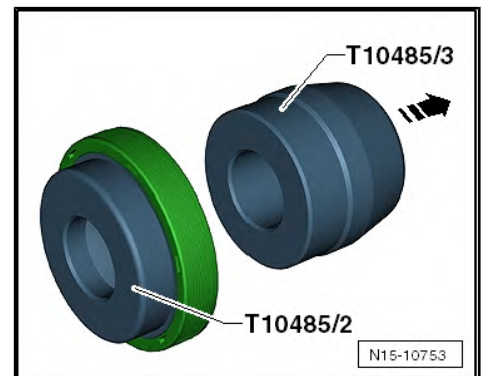
*Do not oil new sealing ring.*



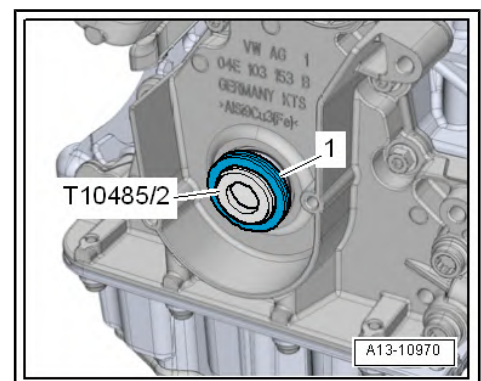
- Push new sealing ring in -direction of the arrow- over the assembly sleeve - T10485/3- onto the assembly sleeve - T10485/2- .
- Fitting position: Closed side of sealing ring points to the receiver tube.



- Pull off assembly sleeve - T10485/3- in -direction of arrow-.

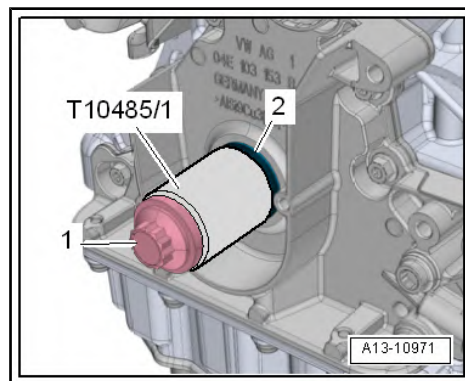


- Fit guide bushing -T10485/2- with seal -1- onto crankshaft journal.

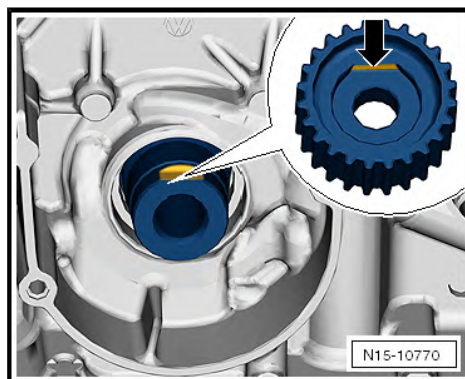




- Pull sealing ring -2- in to the stop using the thrust piece - T10485/1- and the belt pulley screw -1-.



- Fit crankshaft toothed belt pulley onto the crankshaft.
- The contact surface between the V-ribbed belt pulley crankshaft and crankshaft toothed belt sprocket must be free of oil and grease.
- Milled surface -arrow- on the crankshaft toothed belt must be positioned on the crankshaft stub.
- install (set the timing) ➤ [page 105](#) .



## 2 Cylinder block, gearbox end

⇒ [“2.1 Gearbox side cylinder block - Summary of components”, page 47](#)

⇒ [“2.2 Removing and installing flywheel”, page 48](#)

⇒ [“2.3 Removing and installing sealing flange on gearbox side”, page 49](#)

### 2.1 Gearbox side cylinder block - Summary of components



#### Note

For assembly work, secure the engine to the engine and gearbox support -VAS 6095-  
⇒ [“1.2 Securing the engine to the assembly stand”, page 21](#).

#### 1 - Bolt

- ☐ replace after removal
- ☐ 60 Nm + torque a further 90° (1/4 turn)

#### 2 - Flywheel

- ☐ installing and removing  
⇒ [“2.2 Removing and installing flywheel”, page 48](#)
- ☐ can be installed only in one position

#### 3 - Engine speed sender - G28-

- ☐ installing and removing  
⇒ [“1.5 Removing and installing engine speed sender G28”, page 284](#)

#### 4 - Bolt

- ☐ Tightening torque  
⇒ [“1.1 Assembly overview - ignition system”, page 281](#)

#### 5 - Fit pin

- ☐ 2 pieces

#### 6 - Intermediate plate

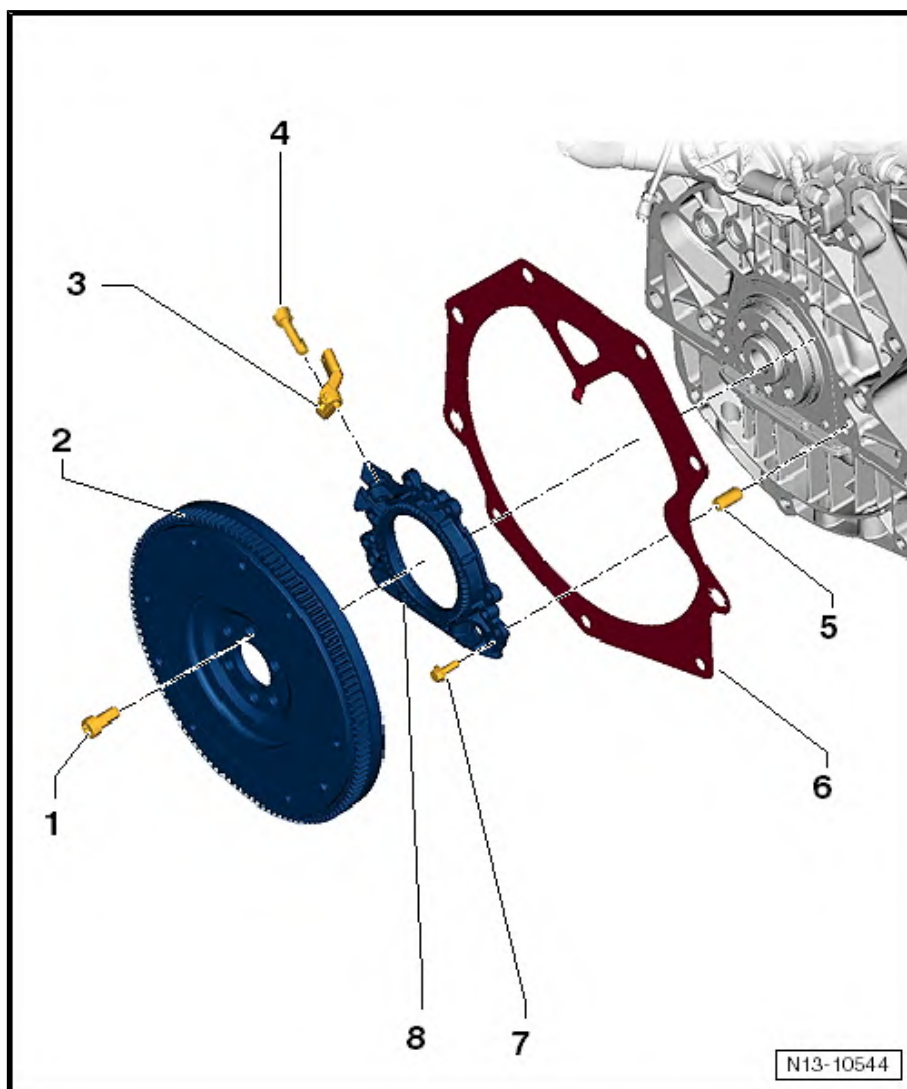
- ☐ do not damage or bend during assembly work
- ☐ installing ⇒ [page 48](#)

#### 7 - Screw

- ☐ Tightening torque and tightening order  
⇒ [page 48](#)

#### 8 - Sealing flange with sender wheel and oil seal

- ☐ Renew sealing flange complete with oil seal and sender wheel only
- ☐ installing and removing ⇒ [“2.3 Removing and installing sealing flange on gearbox side”, page 49](#)

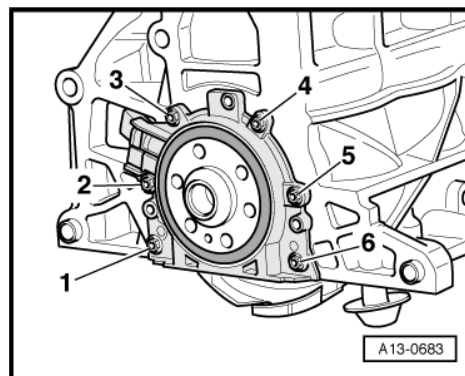




### Sealing flange on the gearbox side - tightening torque and tightening order

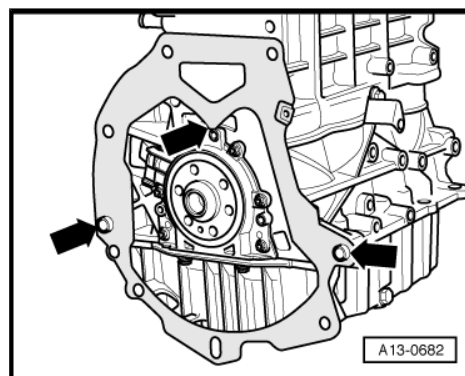
- Tighten screws in steps as follows:

| Stage | Screws    | Tightening torque                      |
|-------|-----------|----------------------------------------|
| 1st   | -1 ... 6- | by hand as far as the stop             |
| 2nd   | -1 ... 6- | tighten crosswise in steps up to 10 Nm |



### Installing intermediate plate

- Insert intermediate plate on sealing flange -top arrow- and push onto the dowel sleeves -bottom arrows-.



## 2.2 Removing and installing flywheel

### Special tools and workshop equipment required

- ♦ Counterholder - MP1-223 (3067)-

### Removing

- Gearbox removed
- Insert the counterholder - 3067- into the hole on the cylinder block -B-.
- Loosen and remove all flywheel bolts.

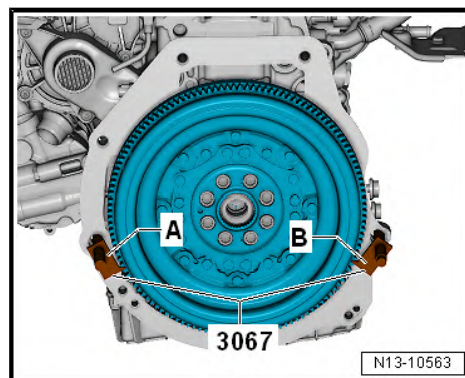
### Install

Installation is carried out in the reverse order. When installing, observe the following:



### Note

- ♦ *Replace screws which have been tightened firmly to a torque angle.*
- ♦ *Assembly of flywheel with rotor is only possible in one position.*
- Insert the counterholder - 3067- into the hole on the cylinder block -A-.



### Tightening torque

| Component          | Nm                                      |
|--------------------|-----------------------------------------|
| Screw for flywheel | 60 Nm + torque a further 90° (1/4 turn) |

## 2.3 Removing and installing sealing flange on gearbox side

### Special tools and workshop equipment required

- ◆ Depth gauges - VAS 6082-
- ◆ Assembly tool - T10134-
- ◆ Fixing screw - T10340-
- ◆ 3x screw M6x35.

### Work procedure

- Gearbox removed ⇒ Gearbox; Rep. gr. 34 .



#### Note

*For a clearer illustration, see the work sequences while the engine is removed.*

- Remove the flywheel  
⇒ [“2.2 Removing and installing flywheel”, page 48](#) .

#### Set the crankshaft to “OT”:

- Remove ignition coil with power output stage 1 ⇒ [page 282](#) .
- Remove ignition plug cylinder 1 with spark plug socket wrench , e. g. -3122 B- .

Set the correct position of the crankshaft for screwing in the fixing screw.

- Carefully insert a screwdriver into the opening of the ignition plug, minimum length of shaft 250 mm, in -direction of arrow- so that it touches the piston head.
- Rotate the crankshaft in direction of rotation of engine on “TDC” for cylinder 1.





- Turn engine shaft further in direction of arrow so that the screwdriver just out at the top by approx. 35 mm in the -direction of the arrow-.
- Unscrew locking screw for “TDC” bore at the cylinder block ➔ [page 81](#) .



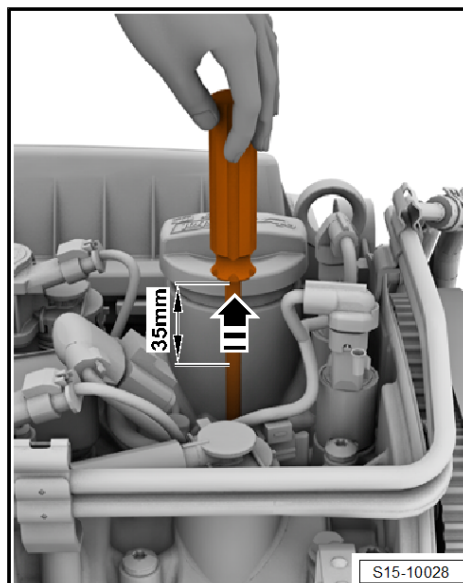
### Caution

**Risk of engine damage.**

*If the fixing screw - T10340- cannot be screwed in up to the stop, the crankshaft is not in the correct position.*

*In this case, proceed as follows:*

- ◆ Unscrew the fixing screw.
- ◆ Set the correct position of the crankshaft for screwing in the fixing screw ➔ [page 49](#) .



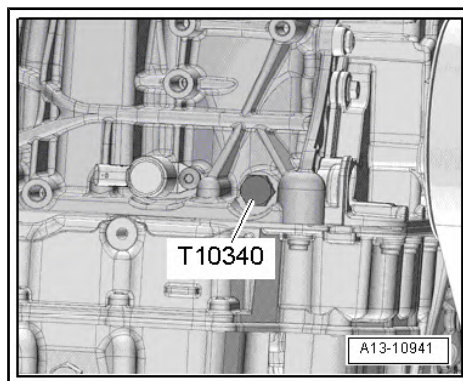
- Turn the fixing screw - T10340- up to the stop in the cylinder block and tighten to 30 Nm.
- Turn crankshaft up to the stop in direction of rotation of engine.
- The crankshaft sprocket now lies on the fixing screw and the “TCD” position is set.



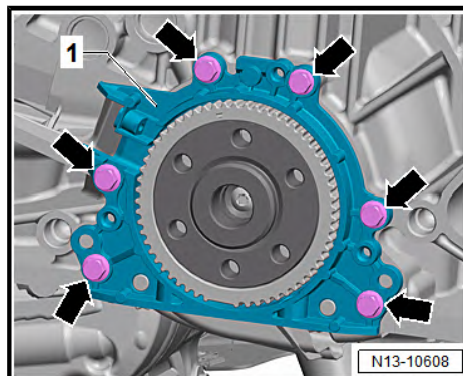
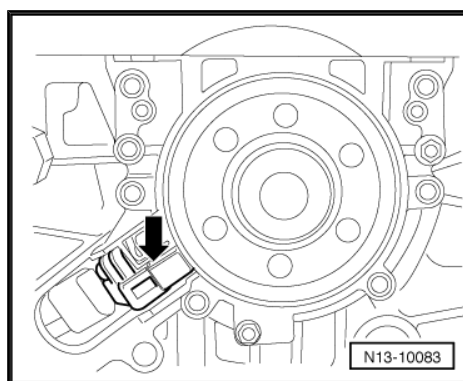
### Note

*The crankshaft is only locked in direction of rotation of engine using the fixing screw - T10340- .*

- Removing the oil pan  
➔ [“1.2 Removing and installing oil sump”, page 128](#) .
- Remove the engine speed sender - G28- -arrow-  
➔ [“1.5 Removing and installing engine speed sender G28 ”, page 284](#) .



- Unscrew screws -arrows- on sealing flange -1-.

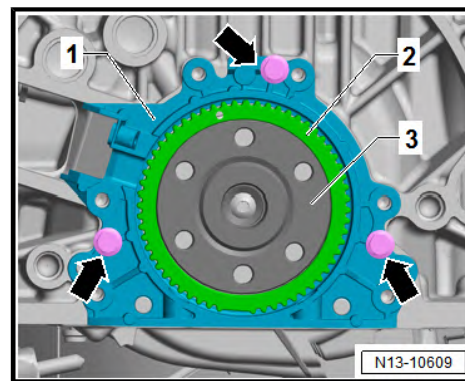


**i Note**

*The sealing flange -1- is pressed together with the sensor rotor -2- from the crankshaft -3-.*

- To press out, insert 3 screws M6x35 -arrows- into the sealing flange -1- alternately by a maximum of  $\frac{1}{2}$  turns each.
- Remove sealing flange -1- with sensor rotor -2-.

**Press in sealing flange with rotor**

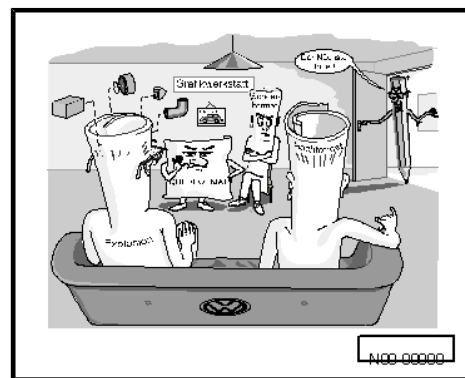


**i Note**

- ◆ *The sealing flange with a PTFE seal is equipped with a sealing lip support ring. This support ring serves as a fitting sleeve and must not be removed prior to installation.*
- ◆ *Sealing flange and sender wheel must not be separated or turned after removal from packaging.*
- ◆ *The rotor is held in its installation position on the assembly device - T10134- by a locating pin.*
- ◆ *Sealing flange and oil seal form one unit and must only be renewed together with the sender wheel.*
- ◆ *The assembly device - T10134- is held in its position relative to the crankshaft by a guide pin, which is inserted into a hole in the crankshaft.*

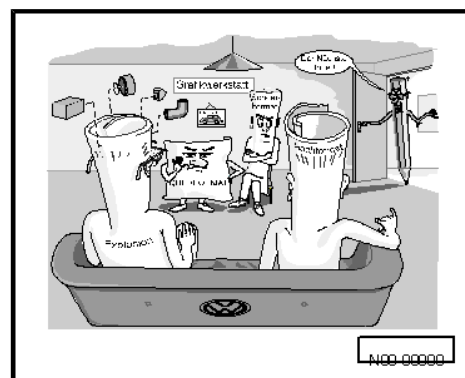
Assembly of the assembly device - T10134- :

- A - Clamping surface
- B - Nut
- C - Assembly housing
- D - Locating pin
- E - Allan screws (2 pieces)
- F - Guide bolts (for petrol engines)
- G - Guide bolts (for diesel engines)
- H - Knurled screws (3 pieces)
- I - Inner part



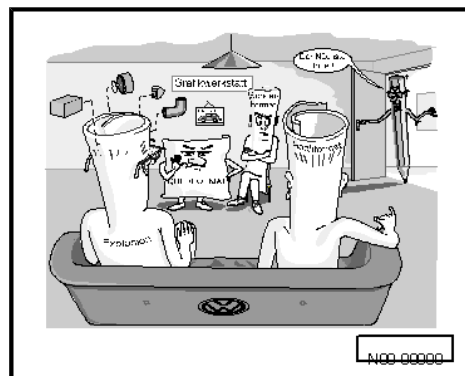
**A - Assemble sealing flange with rotor on the assembly device - T10134- :**

- Untwist nut -B- until just before it touches the clamping surface -A- of the threaded spindle.





- Grip assembly device - T10134- on clamping surface -A- of the threaded spindle in a vice -1-.
- Push assembly cup -C- down so that it rests on the nut -B- -arrow-.
- The inside of the assembly device and assembly cup must be at the same level.

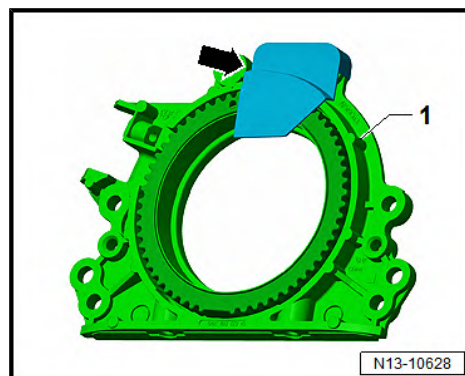


- Remove securing clip -arrow- from new sealing flange.

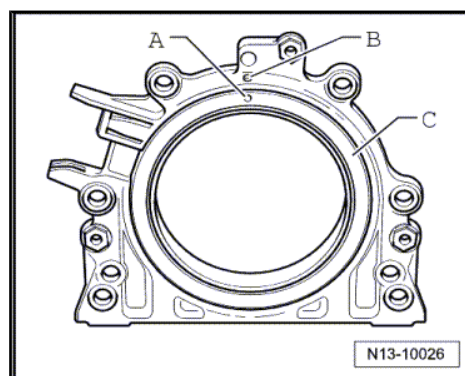


**Note**

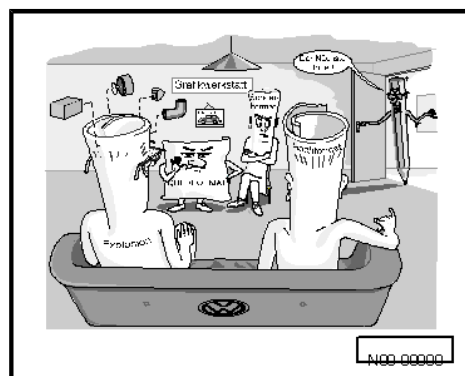
*Do not twist rotor or take it out of the sealing flange.*



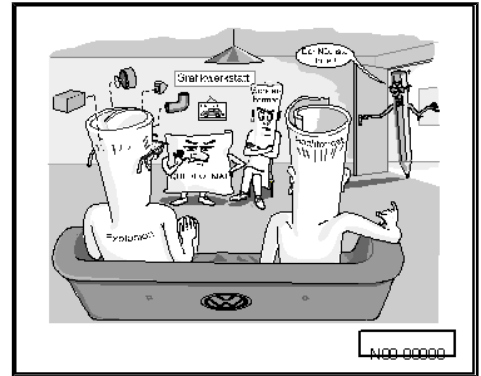
- Locating hole -A- on sender wheel -C- must align with marking -B- on sealing flange.



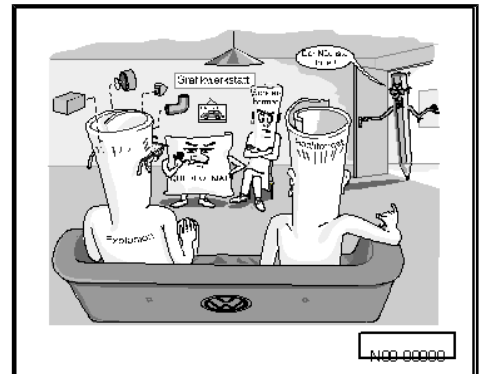
- Place sealing flange with front side facing down on a clean level surface.
- Press down sealing lips supporting ring -1- in -direction of the arrow-, until it rests on the level surface.



- Upper edge of sealing lip support ring -1- and front edge of sealing flange -2- must align -arrows-.



- Lay the sealing flange -1- with the front side on the assembly device - T10134- in such a way that the positioning pin -D- engages into the hole -3- of the sensor rotor -2-.
- The sealing flange must lie flat on the assembly device.

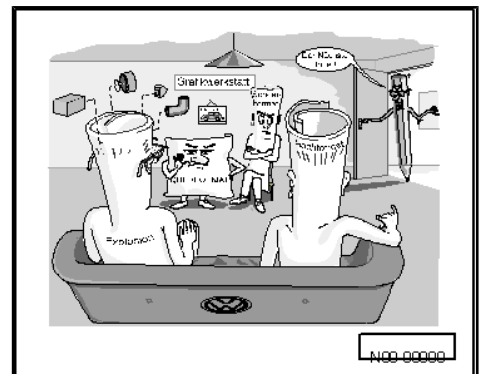


- Press the sealing flange -1- and sealing lip supporting ring -2- during tightening of 3 knurled screws -H- onto the surface of the assembly device - T10134- to ensure that the positioning pin is no longer able to slip out of the bore of the sensor rotor.



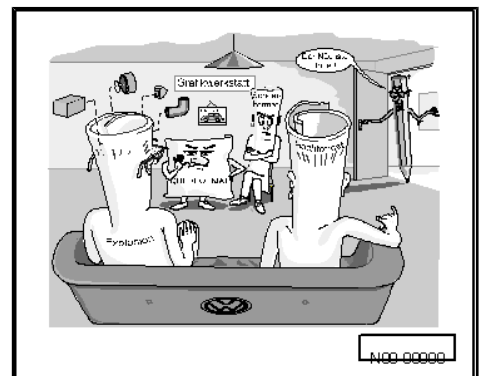
#### Note

*When installing sealing flange, ensure that sender wheel remains fixed in assembly tool.*



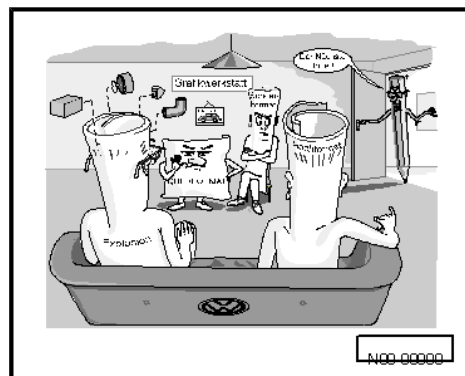
#### B - Mount assembly tool - T10134- with sealing flange on crankshaft flange:

- Crankshaft flange free from oil and grease.
- Engine on "TDC".
- Screw nut -B- on until it reaches end of threaded spindle.
- Press the threaded spindle on the assembly tool - T10134- in -direction of arrow- until the nuts -B- rest against the assembly cup -C-.
- Align flat side of assembly housing to the cylinder block sealing surface on the oil sump side.

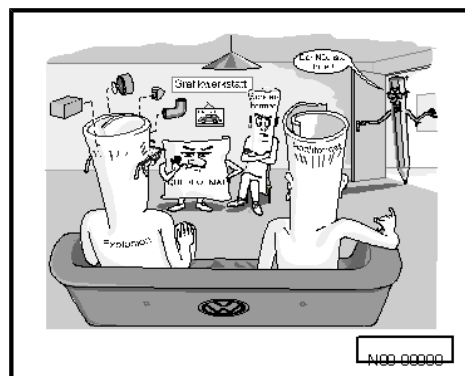




- Secure the assembly device - T10134- onto the crankshaft flange -2-. Screw in Allan screws -E- into the crankshaft flange by approx. five thread turns.

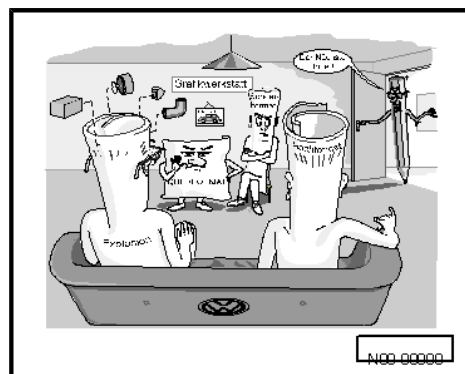


- Insert 2 screws M6x35 Pos. -2- into the cylinder block for the sealing flange guide -1-.



#### C - Bolt assembly tool - T10134- onto the crankshaft flange:

- Push the assembly cup -C- by hand in the -direction of the arrow- until the sealing lip supporting ring -1- rests on the crankshaft flange -2-.
- Push guide pin for petrol engines (red knob) -F- into hole in crankshaft. This ensures that the sender wheel reaches its final installation position.



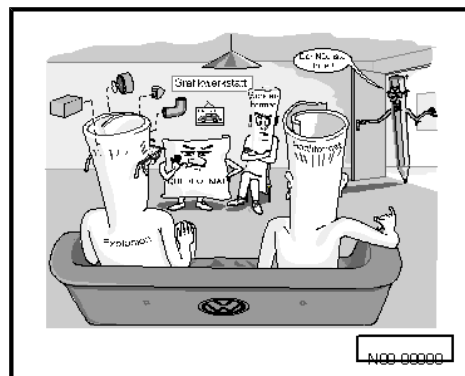
#### Note

*The guide pin for diesel engines must not be inserted in threaded hole of crankshaft.*

- Tighten both hexagon socket head bolts of the assembly device hand-tight.
- Screw nut -B- onto threaded spindle by hand until it lies against assembly housing -C-.

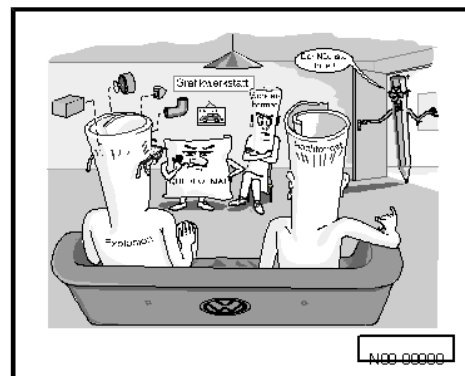
#### D - Press sender wheel onto crankshaft flange using assembly device - T10134- :

- Tighten nuts -B- on the assembly device - T10134- to 35 Nm.
- After hexagon nut is tightened to 35 Nm, a small air gap must still be present between cylinder block and sealing flange -1-.

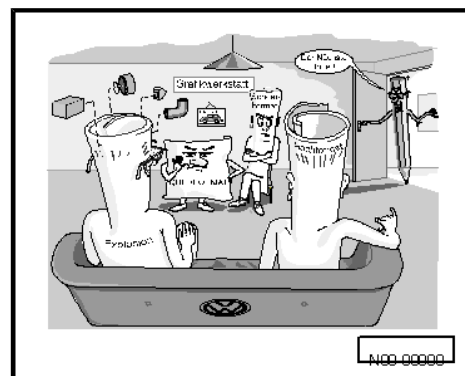


## E - Inspect the installation position of the rotor on the crankshaft

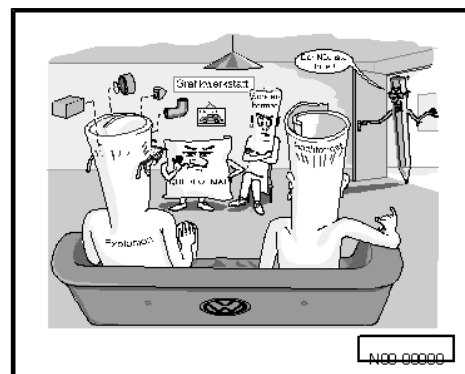
- Screw nut -B- on until it reaches end of threaded spindle.
- Unscrew both bolts-2- from the cylinder block.
- Unscrew knurled screws -H- from the sealing flange -1-.
- Unscrew assembly device - T10134- from the crankshaft flange - to do so, unscrew the hexagon socket head bolts -E- from the crankshaft flange.
- Remove sealing lip support ring.



- Mount depth gauge - VAS 6082- onto the crankshaft flange -2-.

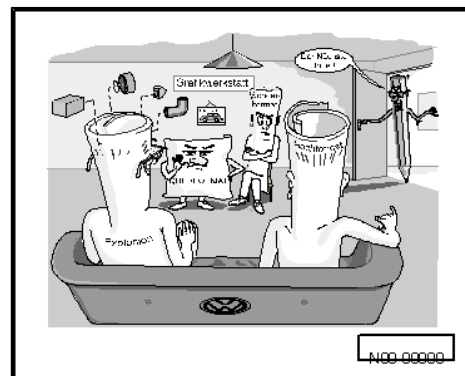


- Measure distance -a- between crankshaft flange -2- and sensor rotor -1-.
- Specified value: Dimension -a- = 0.5 mm.
- If the specified value is too small, press rotor down  
⇒ [page 55](#) .
- When the specified value has been reached, perform the remaining assembly ⇒ [page 56](#) .



## F - Pressing down the rotor:

- Screw assembly tool - T10134- with Allan screws -E- up to the stop onto the crankshaft flange.
- Screw three knurled screws -H- into the sealing flange -1-.
- Screw nuts -B- onto threaded spindle by hand until it lies against assembly device - T10134- .





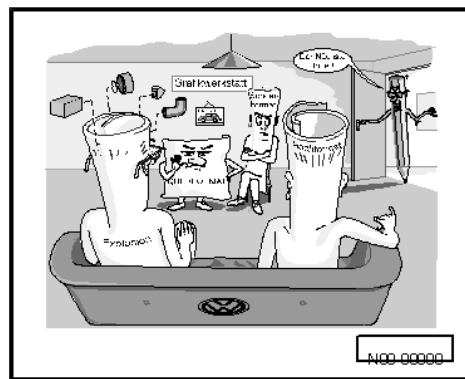
- Tighten nuts -B- on the assembly device - T10134- to 40 Nm.
- Checking sender wheel installation position on crankshaft again ⇒ [page 55](#) .
- If the specified value is too small, tighten assembly device - T10134- hexagon nut to 45 Nm.
- Checking sender wheel installation position on crankshaft again ⇒ [page 55](#) .

#### Assembling together:

- Tighten screws for sealing flange crosswise.
- Installing the oil pan  
⇒ [“1.2 Removing and installing oil sump”, page 128](#) .
- Installing intermediate plate ⇒ [page 48](#) .
- Install flywheel  
⇒ [“2.2 Removing and installing flywheel”, page 48](#) .

#### Tightening torques

- ◆ ⇒ [Fig. ““Sealing flange on the gearbox side - tightening torque and tightening order””, page 48](#)
- ◆ ⇒ [“1.1 Assembly overview - ignition system”, page 281](#)
- ◆ ⇒ [Fig. ““Unscrew locking screw TDC bore at the cylinder block - tightening torque””, page 81](#)
- ◆ ⇒ [“2.1 Gearbox side cylinder block - Summary of components”, page 47](#)



## 3 Crankshaft

⇒ [“3.1 Crankshaft mass”, page 57](#)

⇒ [“3.2 Measuring axial play of crankshaft”, page 57](#)

⇒ [“3.3 Replace needle bearing for crankshaft”, page 57](#)

### 3.1 Crankshaft mass



#### Caution

*There is a risk of bearing seat deformation.*

- ◆ *The crankshaft must not be removed. Merely releasing the crankshaft bearing cover screws will result in deformations of the bearing seats of the cylinder block.*
- ◆ *If the bearing cover screws have been released, replace the complete cylinder block together with the crankshaft.*
- ◆ *Measuring the main bearing clearance is not possible with normal workshop equipment.*

### 3.2 Measuring axial play of crankshaft



#### Caution

*There is a risk of bearing seat deformation.*

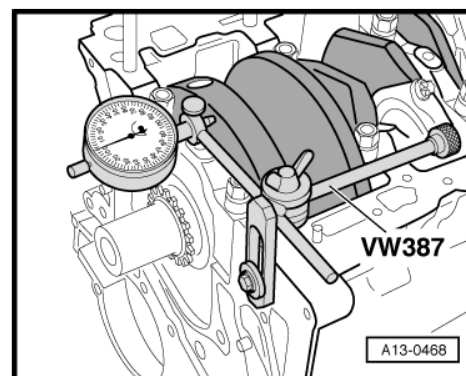
- ◆ *The crankshaft must not be removed. Merely releasing the crankshaft bearing cover screws will result in deformations of the bearing seats of the cylinder block.*
- ◆ *If the bearing cover screws have been released, replace the complete cylinder block together with the crankshaft.*
- ◆ *Measuring the main bearing clearance is not possible with normal workshop equipment.*

#### Special tools and workshop equipment required

- ◆ Universal dial gauge bracket - VW 387-
- ◆ Dial gauge , e.g. -VAS 6079-

#### Work procedure

- Secure dial gauge - VAS 6079- with the universal dial gauge bracket to the camshaft housing - VW 387- , as shown in the illustration.
- Place dial gauge against the crankshaft cheek.
- Press crankshaft against the dial gauge and set dial gauge to “0”.
- Press the crankshaft off the dial gauge and read the measured value.
- Axial clearance: 0.066...0.233 mm.



### 3.3 Replace needle bearing for crankshaft

Only for vehicles with an automatic Gearbox

Special tools and workshop equipment required



- ◆ Centering mandrel -T30029 (3176)-
- ◆ Interior extractor -Kukko 21/2-
- ◆ Countersupport -Kukko 22/1-

### Removing

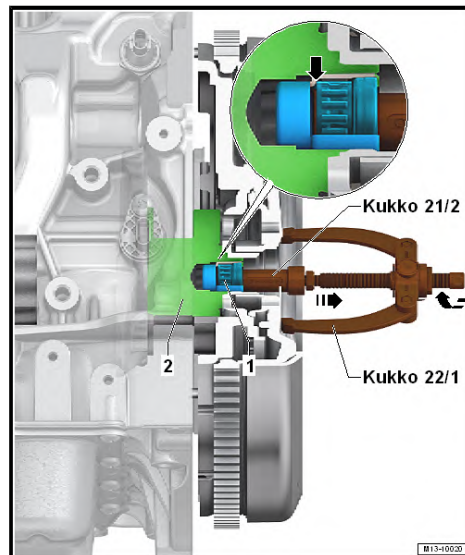
- Pull out needle bearing with interior extractor -Kukko 21/2- and countersupport -Kukko 22/1- .

### Install

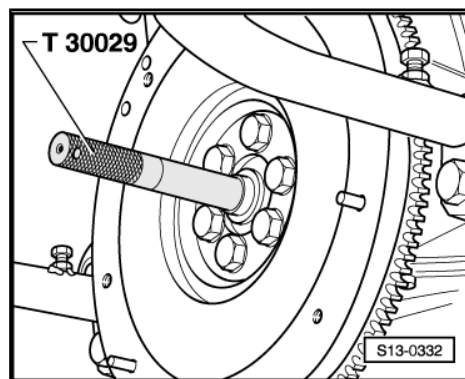


#### Note

*Labelled side of needle bearing must be legible in the installed condition.*



- Drive in needle bearing with centring mandrel -T30029 (3176)- flush with the crankshaft face.



## 4 Pistons and conrods

⇒ [“4.1 Assembly overview - piston and conrod”, page 59](#)

⇒ [“4.2 Separating new conrod”, page 61](#)

⇒ [“4.3 Removing and installing the piston”, page 61](#)

⇒ [“4.4 Checking piston and cylinder bore”, page 63](#)

⇒ [“4.5 Removing and installing oil injection nozzles”, page 64](#)

### 4.1 Assembly overview - piston and conrod

#### 1 - Bolt

- ☐ replace after removal
- ☐ Oil threads and contact surface
- ☐ 30 Nm + torque a further 90° (1/4 turn)

#### 2 - Conrod bearing cap

- ☐ as a result of the conrods separated in the cracking process, the conrod bearing cap fits only in one position and only to the relevant conrod
- ☐ Mark assignment to the cylinder and to the conrod in colour -B-
- ☐ Fitting position: Peg -A- on the conrod bearing cap points to the belt pulley side

#### 3 - Bearing shells

- ☐ Fitting position  
⇒ [page 60](#)
- ☐ replace used bearing shells
- ☐ check for firm seating

#### 4 - Conrod

- ☐ with cracked conrod bearing cap
- ☐ Renew as set only
- ☐ Mark assignment to the cylinder and to the conrod bearing cap in colour -B-

☐ separate new conrod ⇒ [“4.2 Separating new conrod”, page 61](#)

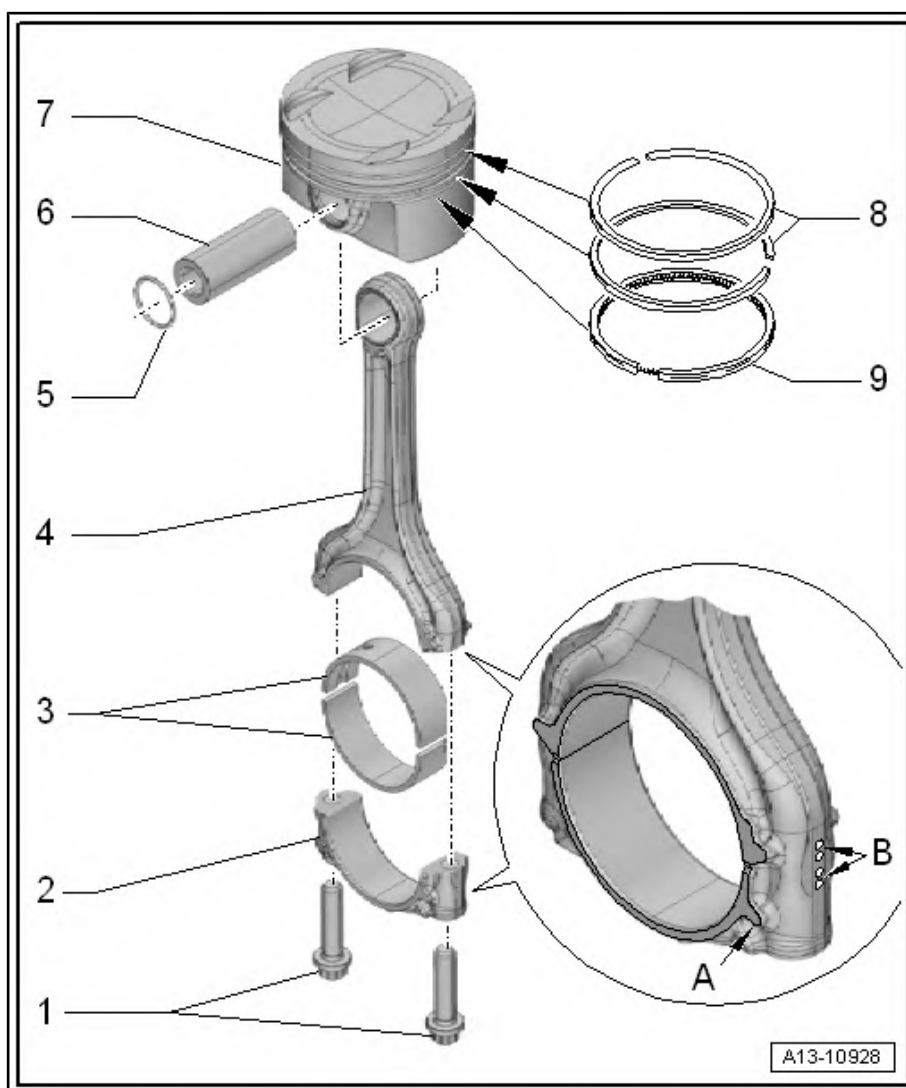
☐ Fitting position: Peg -A- on the conrod bearing cap points to the belt pulley side

#### 5 - Circlip

- ☐ 2 pieces
- ☐ replace after removal

#### 6 - Piston pin

- ☐ removing and installing ⇒ [“4.3 Removing and installing the piston”, page 61](#)





## 7 - Piston

- ☐ with combustion chamber
- ☐ Mark the installation position and the assignment to cylinder ⇒ [page 60](#)
- ☐ installing and removing ⇒ [“4.3 Removing and installing the piston”, page 61](#)
- ☐ Check piston and cylinder bore ⇒ [“4.4 Checking piston and cylinder bore”, page 63](#)

## 8 - Piston rings

- ☐ Compression rings
- ☐ Measure end gap ⇒ [page 63](#)
- ☐ Measure vertical gap ⇒ [page 63](#)
- ☐ use commercially available piston ring pliers for removing and installing
- ☐ Fitting position: Identification “TOP” or labelled side for piston crown
- ☐ Offset gaps by 120°

## 9 - Piston ring

- ☐ Oil scraper ring
- ☐ Measure end gap ⇒ [page 63](#)
- ☐ Measure vertical gap ⇒ [page 63](#)
- ☐ use piston ring pliers for removing and installing
- ☐ Fitting position: Identification “TOP” or labelled side for piston crown
- ☐ Offset joint 120° to bottom compression ring

### Fitting position of piston and assignment of piston to cylinder

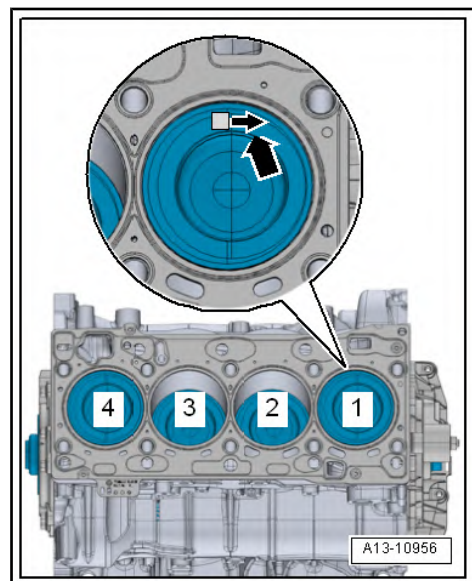


#### Caution

**Risk of damaging the piston crown.**

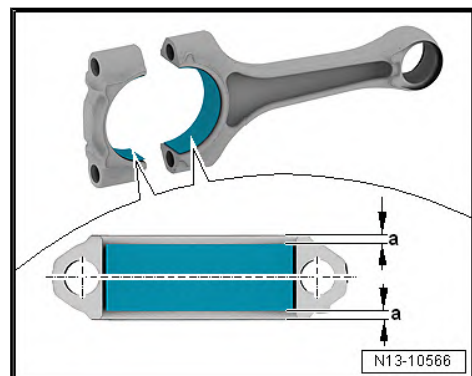
- ◆ **For re-installation: Mark the assignment in colour on the piston crown of cylinders that have already been used. Piston crown not by centre punch, scratch, nick or similar mark.**

- Arrow on the piston crown to the belt pulley side -arrow-.



### Bearing shell installation position

- Insert bearing shells centrally in the conrod and conrod bearing cap.
- Dimension -a- = 2.5 mm.



### Oil spray nozzle and pressure relief valve

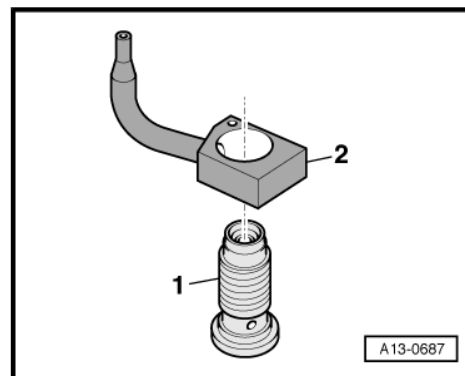
- 1 - Screw with pressure relief valve - 27 Nm
  - 2 - Oil spray nozzle (for cooling piston)
- Fitting position: Align guide edge of the oil spray nozzle -2- to the cylinder block surface.



#### Caution

*Risk of damaging the oil injection nozzles.*

- ◆ *Do not bend oil injection nozzles.*
- ◆ *Check clearance of pistons from oil injection nozzles after reinstalling the piston and nozzles.*
- ◆ *Replace the oil injection nozzles if they are bent.*



## 4.2 Separating new conrod

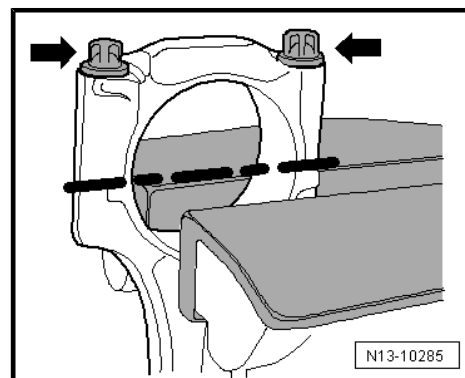
On new conrods it is possible that the breaking point is not fully separated. If the conrod bearing cap cannot be removed by hand, proceed as follows:

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

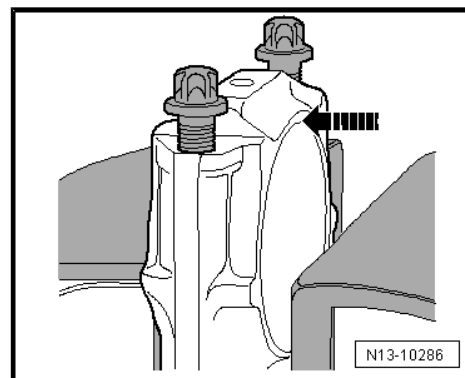


#### Note

- ◆ *Only tension the conrod slightly in order to avoid damage on the conrod.*
- ◆ *The conrod is clamped below the broken line.*
- Unscrew screws -arrows- by approx. 5 turns.



- Knock against the conrod bearing cap carefully with a plastic hammer -arrow- in order to loosen it.



## 4.3 Removing and installing the piston

### Special tools and workshop equipment required

- ◆ Drift - VW 222 A-
- ◆ Commercially available piston ring tensioning strap

### Removing

- Engine attached to engine and gearbox mount - VAS 6095-  
⇒ ["1.2 Securing the engine to the assembly stand", page 21](#) .



- Remove cylinder head  
⇒ [“1.3 Removing and installing cylinder head”, page 69](#) .
- Remove oil sump  
⇒ [“1.2 Removing and installing oil sump”, page 128](#) , remove baffle.
- Mark installation position and assignment of the piston to the cylinder.
- Mark the installation position and assignment of the conrod to the cylinder and to the conrod bearing cap Pos. -4-  
⇒ [“4.1 Assembly overview - piston and conrod”, page 59](#) .
- Remove conrod bearing cap and pull out piston with conrod upwards.



#### Note

*In case of tightness of the piston pin, heat piston to approximately 60 °C.*

- Remove securing rings from the piston pin eye.
- Drive off piston pin with a drift - VW 222 A- .

#### Install

Installation is carried out in the reverse order. When installing, observe the following:



#### Note

*Replace screws which have been tightened firmly to a torque angle.*

- Oil the contact surfaces of the bearing shells.
- Install piston with commercially available piston ring tensioning strap, check installation position ⇒ [page 60](#) .
- Install conrod bearing cap, check installation position Pos. -2- ⇒ [“4.1 Assembly overview - piston and conrod”, page 59](#) .
- Install cylinder head  
⇒ [“1.3 Removing and installing cylinder head”, page 69](#) .
- Installing the oil pan  
⇒ [“1.2 Removing and installing oil sump”, page 128](#) .

#### Tightening torques

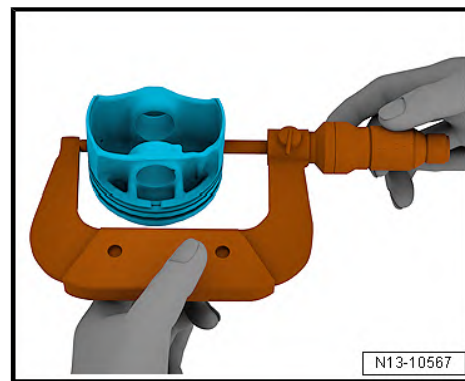
| Component                      | Nm                                      |
|--------------------------------|-----------------------------------------|
| Conrod with conrod bearing cap | 30 Nm + torque a further 90° (1/4 turn) |

## 4.4 Checking piston and cylinder bore

### Checking piston

- Using an external micrometer, measure pistons approx. 10 mm from the lower edge of skirt, at 90° to the piston pin axis.
- Maximum deviation from nominal dimension: 0.04 mm.

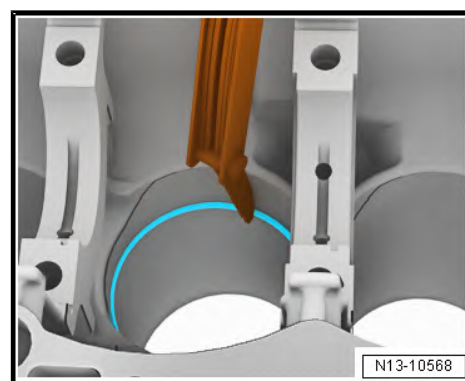
| Piston Ø mm                                                                                                                    |                     |
|--------------------------------------------------------------------------------------------------------------------------------|---------------------|
| Nominal dimension                                                                                                              | 70.92 <sup>1)</sup> |
| <ul style="list-style-type: none"> <li>• <sup>1)</sup> Dimensions without coating (thickness 0.015 mm on each side)</li> </ul> |                     |



### Measure piston ring end gap

- Insert ring at right angles from above down into lower cylinder opening, about 15 mm away from edge of cylinder.
- Push a commercially available feeler gauge into the piston ring opening to check the end gap.

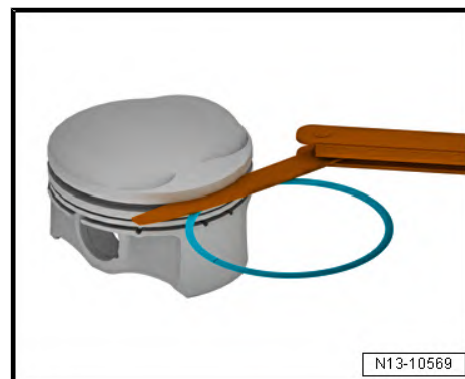
| Piston ring      | new mm      | Wear limit mm |
|------------------|-------------|---------------|
| Compression ring | 0.20 + 0.15 | 1.0           |
| Oil scraper ring | 0.20 + 0.20 | 3.0           |



### Measure piston ring vertical gap

- Clean before inspecting the annular groove of the piston.

| Piston ring                | new mm         | Wear limit mm |
|----------------------------|----------------|---------------|
| 1st Compression ring       | 0.05 ... 0.09  | 0.15          |
| 2nd Compression ring       | 0.03 ... 0.07  | 0.15          |
| Oil scraper rings (2 part) | 0.04 ... 0.08  | 0.15          |
| Oil scraper rings (3 part) | Not measurable |               |





## Measure cylinder bore



### Caution

*There is risk of damaging the cylinder bore surface.*

- ◆ *Do not use normal workshop equipment to work on cylinder bore (boring, honing, grinding).*

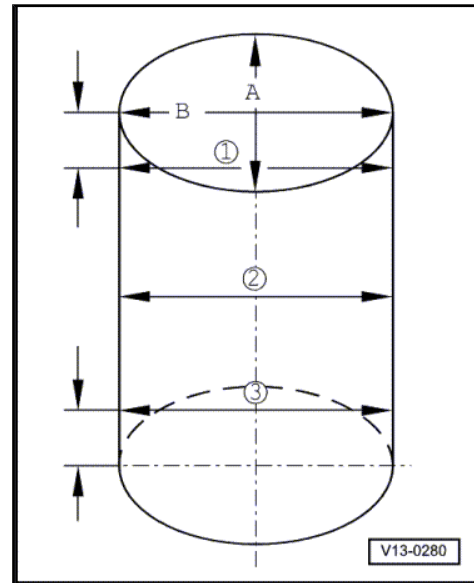
- Using the internal precision instrument - VAS 6078- , measure crosswise at 3 points in the transverse direction -A- and longitudinal direction -B-.
- Maximum deviation from nominal dimension: 0.08 mm.

| Cylinder bore Ø mm |                             |
|--------------------|-----------------------------|
| Nominal dimension  | $71.0 + 0.015^{1)} + 0.005$ |



### Note

*Cylinder bores must not be measured when cylinder block is mounted on engine and gearbox support - VAS 6095- , as measurements may be incorrect.*



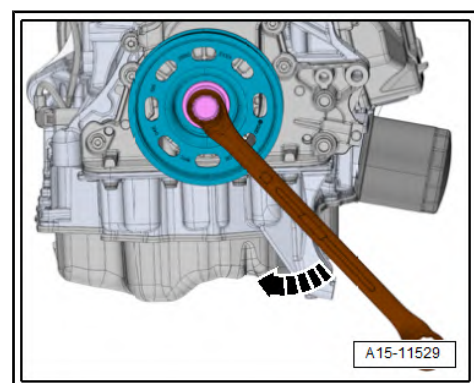
## 4.5 Removing and installing oil injection nozzles

### Special tools and workshop equipment required

- ◆ Socket - T10545-

### Removing

- Remove the noise insulation ⇒ General body repairs, exterior ; Rep. gr. 66Noise insulation .
- Removing the oil pan  
⇒ [“1.2 Removing and installing oil sump”, page 128](#) .
- Rotate crankshaft on the fixing screw of the crankshaft belt pulley in the engine's running direction -arrow- until the associated screw can be reached.



- Unscrew relief valve -1- with socket insert - T10545- .
- Remove oil spray nozzles -2-.

### Installing

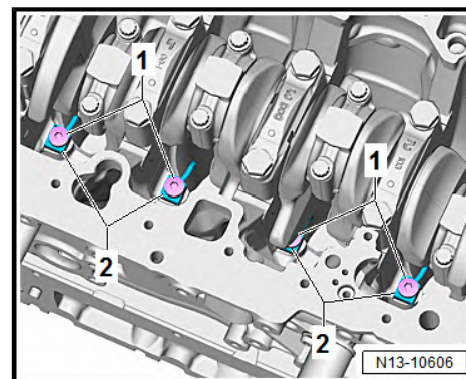
Installation is performed in a similar way in the reverse order. Pay attention to the following points:



#### Caution

*There is a risk of damage to the oil spray nozzles.*

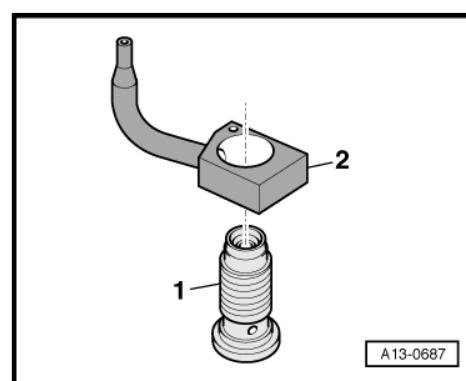
- ◆ *Do not bend oil injection nozzles.*
- ◆ *Check oil injection nozzles after reinstalling the pistons.*
- ◆ *Replace the oil injection nozzles if they are bent.*



- 1 - Pressure relief valve
- 2 - Oil spray jet
- Fitting position: Align guide edge of the oil spray nozzle -2- to the cylinder block surface.

### Tightening torques

| Component             | Nm    |
|-----------------------|-------|
| Pressure relief valve | 27 Nm |



**15 – Cylinder head, valve gear**

**1 Cylinder head**

⇒ "1.1 Summary of components - cylinder head", page 66

⇒ "1.2 Summary of components - camshaft housing", page 68

⇒ "1.3 Removing and installing cylinder head", page 69

⇒ "1.4 Removing and installing camshaft housing", page 73

⇒ "1.5 Checking compression", page 77

## 1.1 Summary of components - cylinder head



***The camshafts must not be removed individually.***

***When carrying out repairs the camshaft housing must be completely replaced.***

**1 - Cylinder head gasket**

- ❑ Renew  
⇒ “1.3 Removing and installing cylinder head”, page 69.
- ❑ check fitting position:  
Cylinder head part number

## 2 - Fitting sleeve

- 2 pieces

### 3 - Cylinder head

- ❑ installing and removing  
⇒ “1.3 Removing and installing cylinder head”, page 69
- ❑ check for distortion  
⇒ page 67

**4 - Dowel pins**

## 5 - Gasket

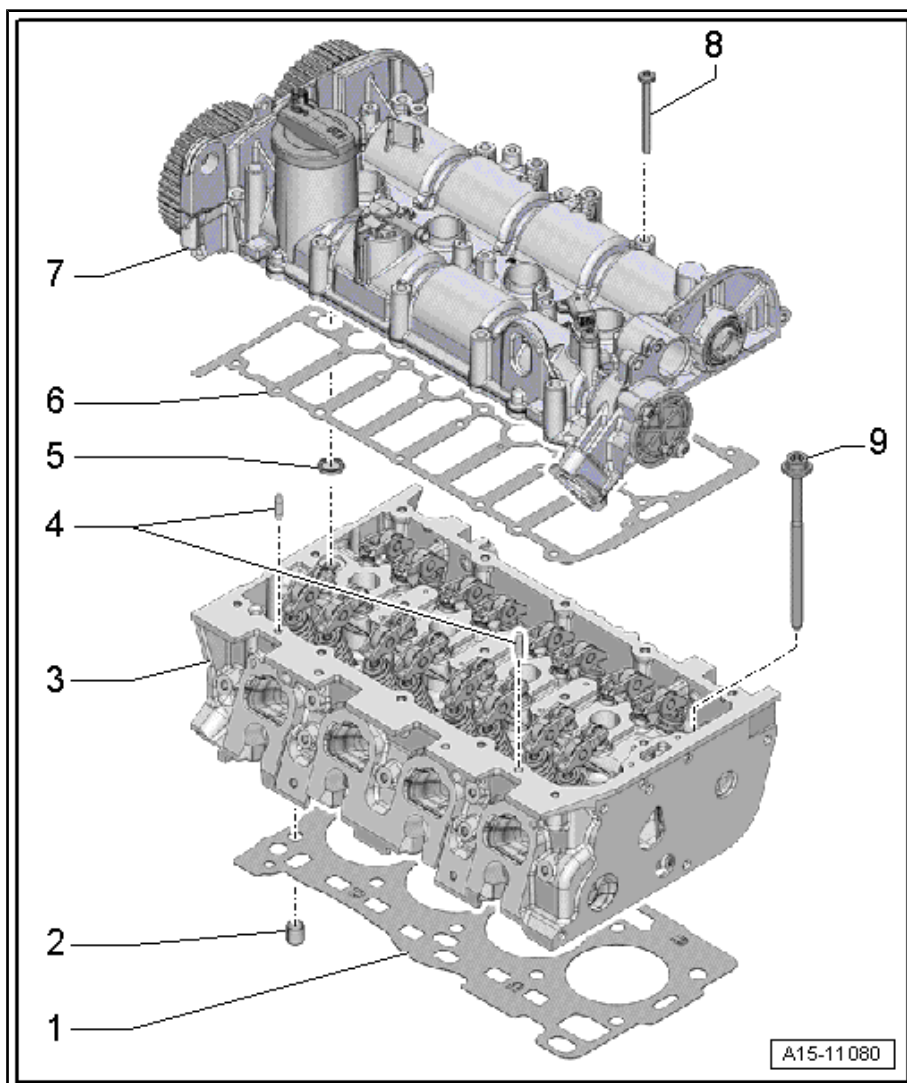
- ☐ With oil strainer
- ☐ inserted into the cylinder head
- ☐ For vehicles up to 05.2013

## 6 - Gasket

- ❑ replace after removal

## 7 - Camshaft housing

- installing and removing  
⇒ “1.4 Removing and installing camshaft housing”, page 73



## 8 - Bolt

- ☐ Tightening torque and tightening order ➔ [page 69](#)

## 9 - Bolt

- ☐ replace after removal
- ☐ Loosening order ➔ [page 72](#)
- ☐ Tightening torque and tightening order ➔ [page 67](#)

## Cylinder head - tightening torque and tightening order

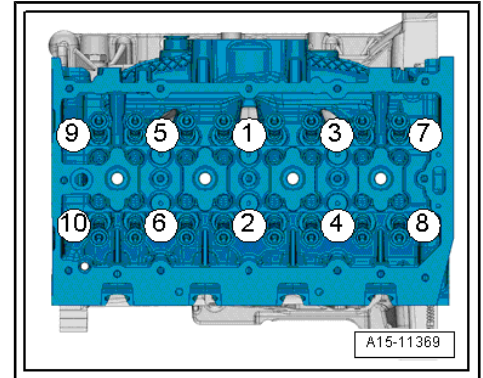


### Note

*Replace screws which have been tightened firmly to a torque angle.*

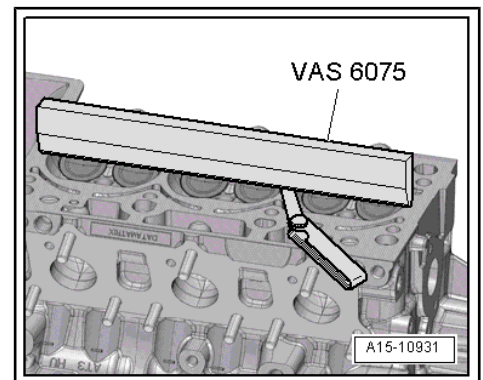
- Tighten screws in steps in the given sequence:

| Stage | Screws     | Tightening torque/torque angle        |
|-------|------------|---------------------------------------|
| 1st   | -1 ... 10- | 40 Nm                                 |
| 2nd   | -1 ... 10- | 90° (torque a further 90° (1/4 turn)) |
| 3rd   | -1 ... 10- | 90° (torque a further 90° (1/4 turn)) |
| 4th   | -1 ... 10- | 90° (torque a further 90° (1/4 turn)) |



## Checking cylinder head for distortion

- Inspect cylinder head at several points for distortion using a 500 mm knife-edge straightedge - VAS 6075- and feeler gauge.
- Maximum permitted distortion: 0.05 mm.



## 1.2 Summary of components - camshaft housing

### 1 - Fit pin

### 2 - Gasket

- ☐ With oil strainer
- ☐ inserted into the cylinder head
- ☐ For vehicles up to 05.2013

### 3 - Sealing ring

- ☐ For inlet camshaft
- ☐ Renew  
⇒ ["3.4.1 Removing and installing the camshaft sealing ring on the belt pulley side", page 115](#)

### 4 - Sealing ring

- ☐ For exhaust camshaft, belt pulley side
- ☐ Renew  
⇒ ["3.4.2 Removing and installing the camshaft sealing ring for the exhaust camshaft", page 116](#)

### 5 - Camshaft housing

- ☐ installing and removing  
⇒ ["1.4 Removing and installing camshaft housing", page 73](#)

### 6 - Bolt

- ☐ Tightening torque and tightening order  
⇒ [page 69](#)

### 7 - O-ring

- ☐ replace after removal

### 8 - Inlet camshaft control valve 1 - N205-

- ☐ installing and removing  
⇒ ["3.5 Removing and installing N205 the camshaft adjustment valve 1", page 119](#)
- ☐ with integrated seal with oil strainer

### 9 - Bolt

- ☐ 8 Nm

### 10 - Gasket

- ☐ for cap

### 11 - Screw cap

### 12 - O-ring

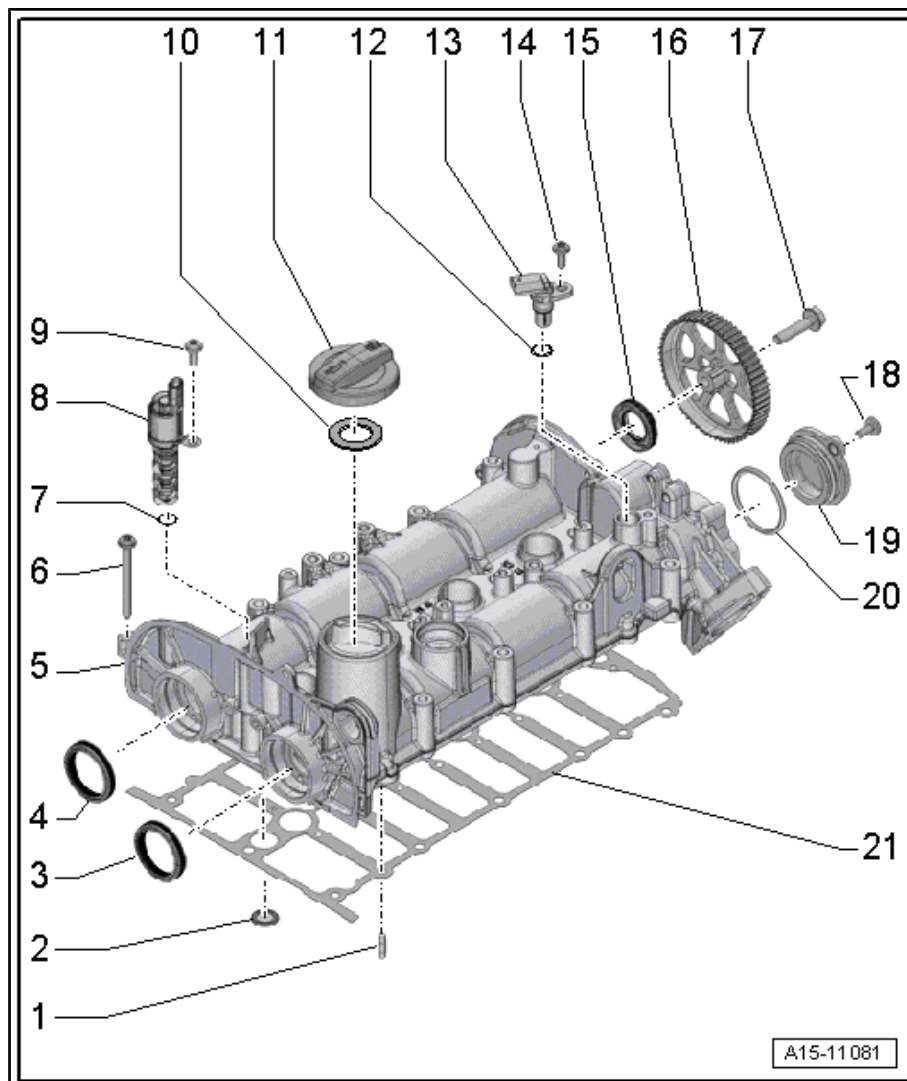
- ☐ replace after removal

### 13 - Hall sender - G40-

- ☐ installing and removing ⇒ ["1.4 Removing and installing Hall sender G40 ", page 284](#)

### 14 - Bolt

- ☐ 8 Nm



### 15 - Sealing ring

- ☐ For exhaust camshaft, gearbox side

- ☐ Renew

⇒ [“3.4.3 Removing and installing the camshaft sealing ring for exhaust camshaft on the gearbox side”](#), page 118 .

### 16 - Toothed belt pulley

- ☐ For coolant pump

- ☐ installing and removing

⇒ [“2.5 Removing and installing toothed belt pulley for coolant pump”](#), page 162

### 17 - Bolt

- ☐ Tightening torque ⇒ [“2.1 Summary of components - coolant pump/coolant thermostat”](#), page 154

### 18 - Bolt

- ☐ 8 Nm

### 19 - Screw cap

### 20 - O-ring

- ☐ replace after removal

### 21 - Gasket

- ☐ replace after removal

## Camshaft housing - tightening torque and tightening order

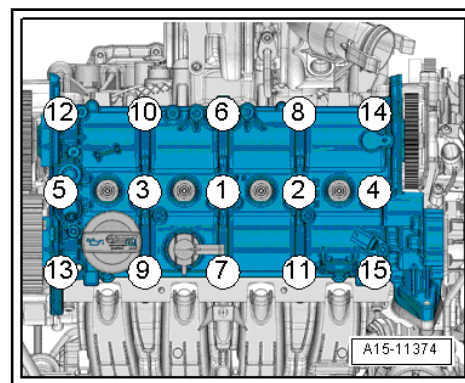


### Note

*Replace screws which have been tightened firmly to a torque angle.*

- Tighten screws in steps in the given sequence:

| Stage | Bolts      | Tightening torque/torque angle          |
|-------|------------|-----------------------------------------|
| 1st   | -1 ... 15- | 10 Nm                                   |
| 2nd   | -1 ... 15- | 180° (torque a further 180° (1/2 turn)) |



## 1.3 Removing and installing cylinder head

### Special tools and workshop equipment required

- ◆ Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- ◆ Cleaning and degreasing agent , e.g. -D 009 401 04-
- ◆ Protective goggles and gloves

### Removing

#### Requirements

- Engine temperature should not exceed 35 °C, because the cylinder head could be twisted when slackening the screws.

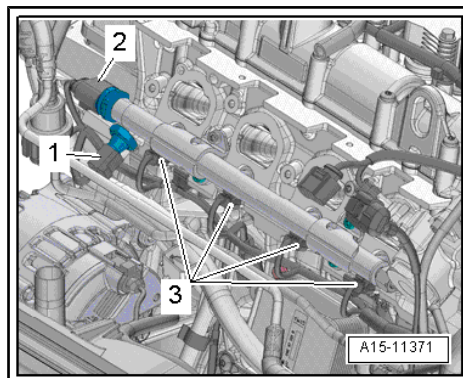


### Note

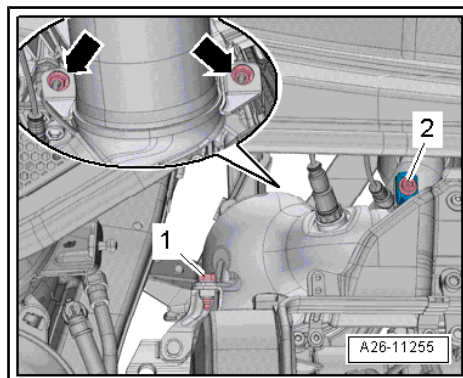
*Fit all heat protection sleeves on again in the same place when installing.*



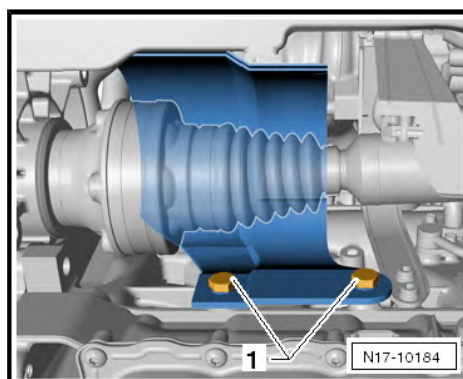
- Remove camshaft housing  
⇒ ["1.4 Removing and installing camshaft housing", page 73](#) .
- Removing the intake manifold  
⇒ ["3.2 Removing and installing intake manifold", page 241](#) .
- Disconnect electrical plug connections:
  - 1 - On the oil pressure switch for reduced oil pressure - F378-
  - 2 - On the fuel pressure sender - G247-
  - 3 - on the injection valves -N30- to -N33-



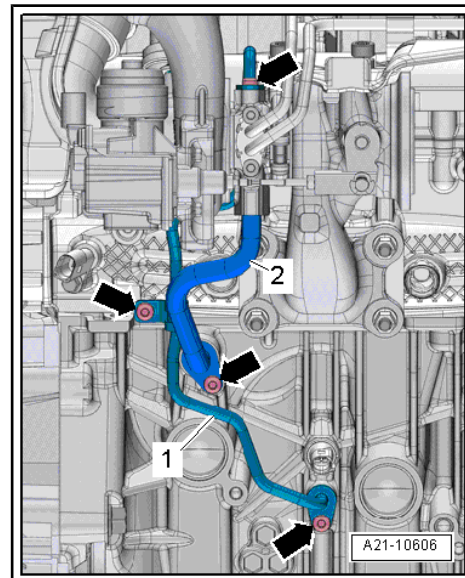
- Unscrew screw -2- and remove screw clamp.
- Unscrew screw -1- and nuts -arrows- and strap up catalytic converter.



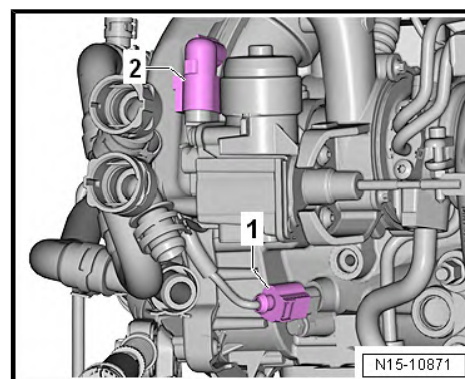
- Release screws -1- and remove heat shield for right drive shaft, if present.



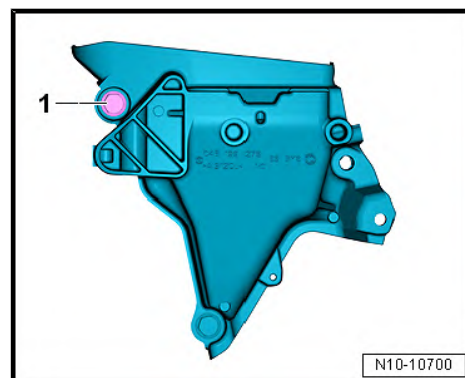
- Screw out the screws -arrows-, remove oil feed line -1- and oil return pipe -2-.



- Disconnect electrical plug connections:  
1 - for coolant temperature sender - G62-  
2 - For charge pressure regulator - V465-



- Unscrew screw -1- at the engine support.





- Slacken the screws for the cylinder head in the sequence -1...10- and release them.
- Remove cylinder head and place it on a clean base (foam).

#### Install



#### Caution

##### *Risk of damaging sealing surfaces.*

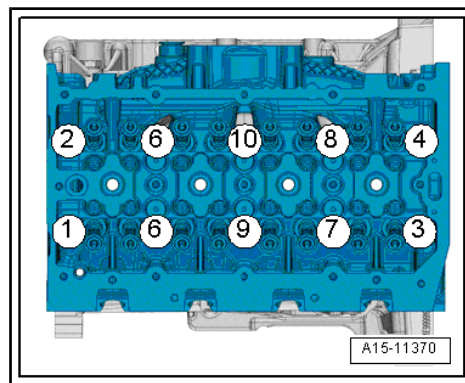
- ◆ *Carefully remove residual sealant from the cylinder head and cylinder block.*
- ◆ *Make sure this does not cause any extended scoring or scratching.*

##### *Risk of damaging the cylinder block.*

- ◆ *There must be no oil or coolant in the blind holes for the cylinder head bolts in the cylinder block.*

##### *There is a risk of leakage on the cylinder head gasket.*

- ◆ *Remove the new cylinder head gasket from its wrapping immediately before fitting.*
- ◆ *To prevent the silicon layer and the area of the bead from being damaged, handle the gasket with the utmost care.*



#### Note

- ◆ *Replace screws which have been tightened firmly to a torque angle.*
- ◆ *Replace self-locking nuts, gasket rings, gaskets and O-rings.*
- ◆ *If a replacement cylinder head must be installed, the contact surfaces between hydraulic balancing elements, roller rocker fingers and camshaft slideways must be oiled before the camshaft housing is installed.*
- ◆ *Secure all hose connections with hose clamps which comply with the series design ⇒ Electronic Catalogue of Original Parts "ETKA."*
- ◆ *When the cylinder head or the cylinder head gasket is replaced, all the coolant and engine oil must be replaced.*
- Stuff clean cloth into the cylinders to avoid any dirt getting in between cylinder wall and piston.

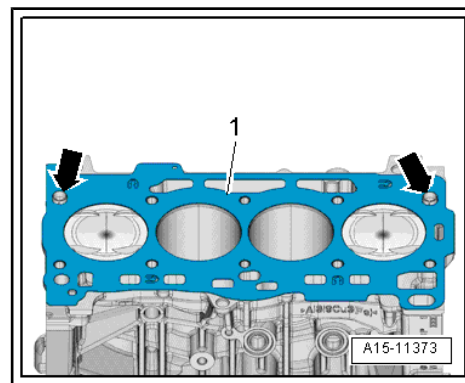


#### WARNING

***Wear protective gloves when working with sealant and grease remover!***

- Make sure that when cleaning the cylinder head and cylinder block no foreign bodies 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.

- Fit on cylinder head gasket -1-.
- ◆ Pay attention to centring pins in cylinder block -arrows-.
- ◆ Check installation position of the cylinder head gasket, identification: Part number must be legible from the inlet side.
- If the crankshaft has been turned in the meantime: Put piston of 1st. relevant cylinder at top dead centre. Turn the crankshaft back again slightly.
- Insert the cylinder head.
- Insert cylinder head bolts and tighten hand-tight.
- Tighten cylinder head bolts ⇒ [page 67](#) .



#### Note

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

Continued installation is carried out in the reverse order. When installing, note the following:

- Install camshaft housing  
⇒ [“1.4 Removing and installing camshaft housing”, page 73](#) .
- Installing the intake manifold  
⇒ [“3.2 Removing and installing intake manifold”, page 241](#) .
- Change engine oil ⇒ Maintenance ; Booklet Octavia III .
- Replace coolant  
⇒ [“1.2 Draining and filling coolant”, page 147](#) .

#### Tightening torques

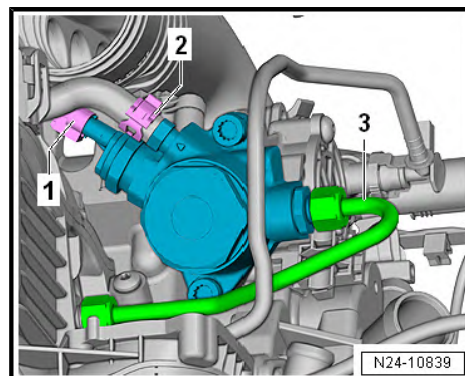
- ◆ ⇒ [Fig. ““Engine support bracket - tightening torque and tightening order””, page 27](#)
- ◆ ⇒ [“1.1 Summary of components - cylinder head”, page 66](#)
- ◆ ⇒ [“1.1 Summary of components - exhaust gas turbocharger”, page 221](#)
- ◆ ⇒ [“1 Injection system”, page 234](#)
- ◆ ⇒ [Fig. ““Installing catalytic converter - tightening torque and tightening order””, page 277](#)
- ◆ Drive shaft screening ⇒ Chassis; Rep. gr. 40

## 1.4 Removing and installing camshaft housing

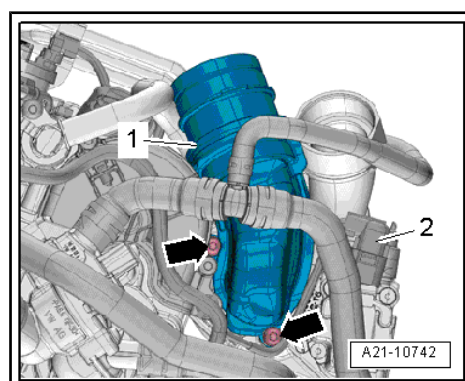
### Removing

- Remove coolant pump  
⇒ [“2.4 Removing and installing coolant pump”, page 158](#) .
- Remove air filter housing  
⇒ [“2.2 Removing and installing air filter housing”, page 239](#) .
- Removing ignition coils  
⇒ [“1.2 Removing and installing ignition coils with output stage”, page 282](#) .
- Remove the toothed belt from the camshafts  
⇒ [“2.4 Remove the toothed belt from the camshaft”, page 86](#) .

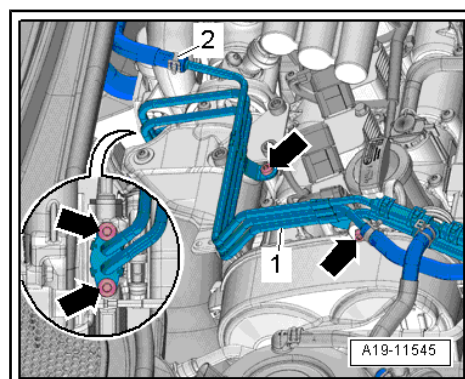
- Remove high pressure pipe -3-  
⇒ ["6.3 Removing and installing high pressure pipe", page 263](#) .
- Separate electrical plug connection -1-.
- Loosen hose clamp -2- and disconnect hose.
- Separate electrical plug connection -2-.



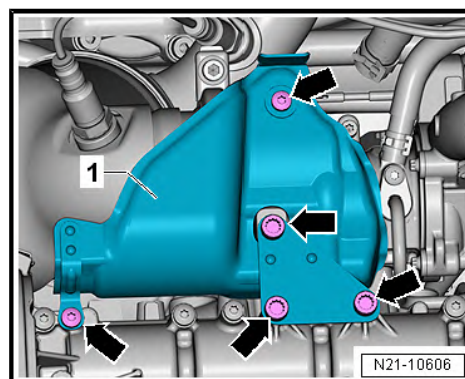
- Release screws -arrows- and remove connection piece -1-.



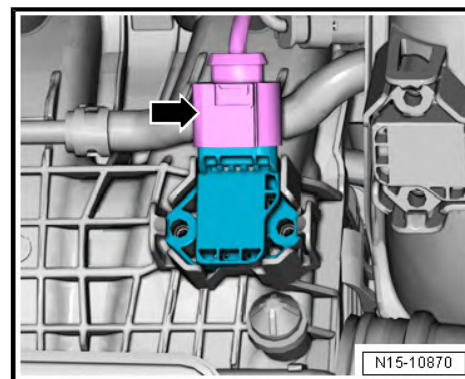
- Loosen hose clamp -2- and remove coolant hose.
- Unscrew -arrows- screws and swivel coolant lines -1- to the right side.



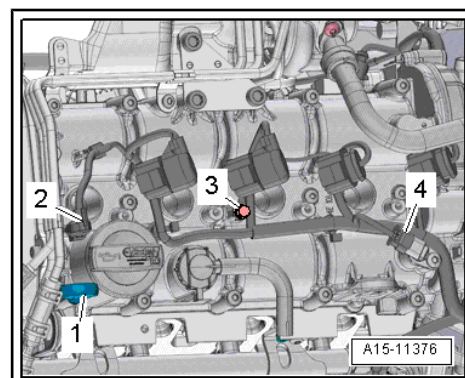
- Release screws -arrows- and remove mount with heat shield -1-.



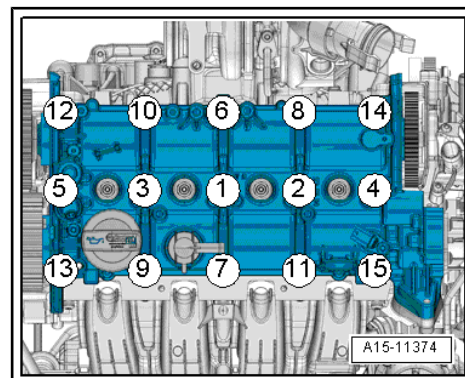
- Remove connector -arrow- from manifold pressure sender - GX9- .



- Disconnect electrical plug connections:  
2 - For valve 1 for camshaft control - N205- .  
4 - For Hall sender - G40- .
- Unscrew screw -3- and expose the wiring loom and lay it to the left-hand side.
- Pull out oil dipstick -1-.



- Loosen the screws for the camshaft housing in the sequence -15...1- and unscrew them.
- Carefully unscrew the camshaft housing and remove from the bonding.
- When installing again, mark the assignment of the roller rocker finger and the balancing elements.
- Remove the roller rocker finger together with the balancing elements and lay aside on a clean surface.



## Install



### Note

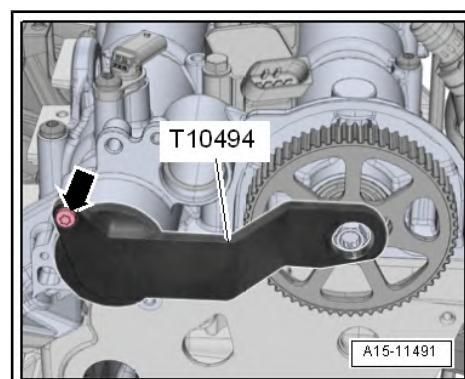
- ◆ *Replace screws which have been tightened firmly to a torque angle.*
- ◆ *Replace gasket with oil strainer.*
- “Check TDC” position of camshaft and crankshaft:
- Attach camshaft clamp -T10494- to camshaft housing using screw -arrow-.



### Caution

*Risk of damaging the valve gear.*

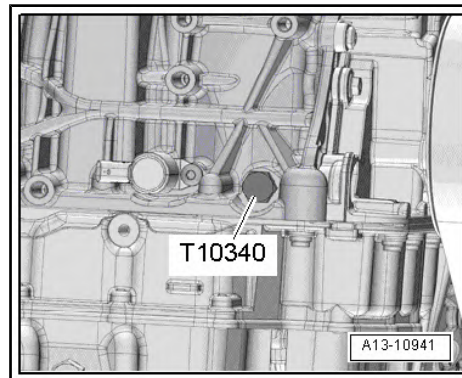
- ◆ *When turning, the camshafts must not be moved axially.*





- Fixing screw - T10340- turned up to the stop in the cylinder block and tightened to 30 Nm.
- Crankshaft in engine direction of rotation applied to the fixing screw - T10340- = "TDC" position.
- Check that all roller rocker fingers are lying flat correctly on the end of the valve stem and are clipped into the respective balancing element.

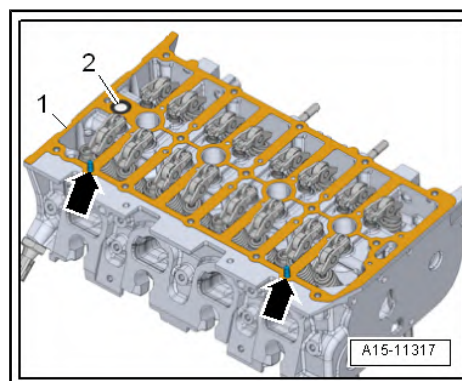
**For vehicles up to 05.2013**



- Insert gasket with oil strainer -2- into the cylinder head -1-.

**Continued for all vehicles**

- Fit gasket onto dowel pins -arrows-.



- Screw 2 threaded bolts Pos. -2- and -4-, for example , - T10288/4- into the cylinder head.
- Carefully place camshaft housing -3- vertically from above on- to the threaded bolts in the cylinder head.



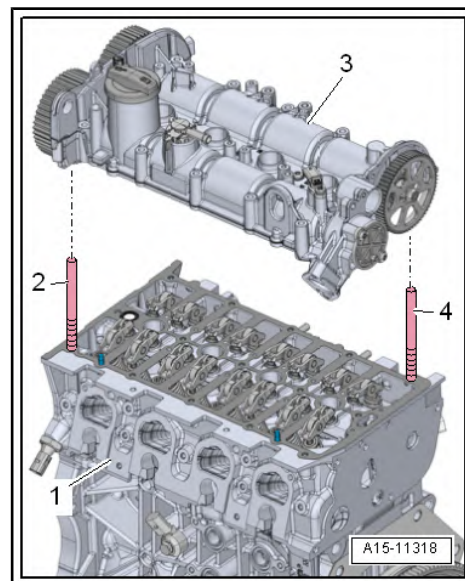
#### Note

*Make sure that the camshaft housing does not tilt.*

- Tighten camshaft housing screws ⇒ [page 69](#) .

Installation is carried out in the reverse order. When installing, note the following:

- Install high pressure pipe  
⇒ [“6.3 Removing and installing high pressure pipe”, page 263](#) .
- install (set the timing)  
⇒ [“2.4 Remove the toothed belt from the camshaft”, page 86](#) .
- Install ignition coils  
⇒ [“1.2 Removing and installing ignition coils with output stage”, page 282](#) .
- Install coolant pump  
⇒ [“2.4 Removing and installing coolant pump”, page 158](#) .
- Electrical connections and proper routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.



#### Caution

*Risk of damaging valves and piston crowns after work on the valve gear.*

- ◆ *To ensure that no valve is set during starting, turn the engine carefully by at least 2 turns.*

#### Tightening torques

- ◆ ⇒ [“1.1 Summary of components - exhaust gas turbocharger”, page 221](#)
- ◆ ⇒ [“2.1 Assembly overview - air filter housing”, page 238](#)

## 1.5 Checking compression

#### Special tools and workshop equipment required

- ◆ Spark plug wrench , e.g. -3122 B-
- ◆ Compression tester - V.A.G 1763-

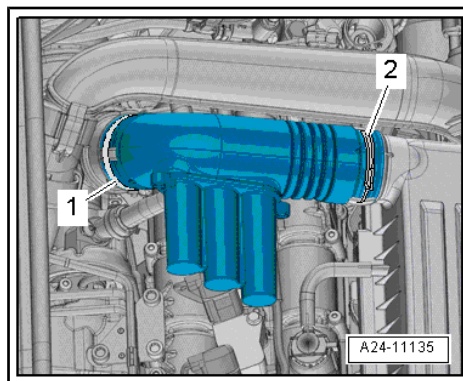
#### Work procedure

- Engine oil temperature at least 30 °C.
- Battery voltage at least 12.5 V.
- Remove fuse for fuel pump control unit from the fuse holder.  
Fuse assignment ⇒ Current flow diagrams, Electrical fault finding and Fitting locations

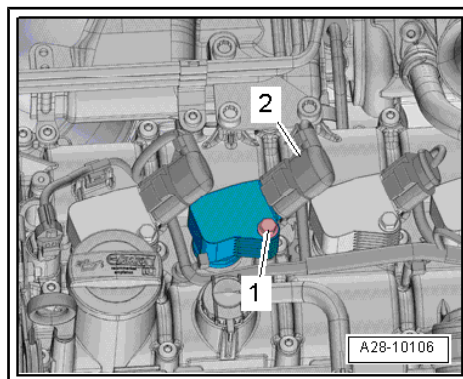
**Note**

*Removing fuse interrupts the voltage supply of the fuel pump control unit.*

- Start engine and allow to run until the engine has cut out.
- Switch off ignition.
- Loosen hose clamps -1- and -2- and remove air guide pipes.



- Disconnect plug -2- and remove screw -1-.
- Pull out ignition coils at power output stage  
 ⇒ [“1.2 Removing and installing ignition coils with output stage”, page 282](#) .
- Unscrew spark plugs with spark plug wrench , e. g. -3122 B- .
- Check the compression pressure using the compression tester - V.A.G 1763- ; handling, ⇒ Operating Manual .
- A 2nd. mechanic depresses the accelerator pedal fully and at the same time actuates the starter until the tester shows no further pressure rise.
- Repeat the procedure for each cylinder.



| Compression readings                 |                                      |
|--------------------------------------|--------------------------------------|
| New part                             | 1.0 ... 1.5 MPa<br>(10.0...15.0 bar) |
| Wear limit                           | 0.7 MPa<br>(7.0 bar)                 |
| Maximum difference between cylinders | 0.3 MPa<br>(3.0 bar)                 |

**Assembling**

Assembling is performed in the reverse order, while paying attention to the following:

- Install spark plugs, tightening torque 22 Nm.
- Install ignition coils at power output stage  
 ⇒ [“1.2 Removing and installing ignition coils with output stage”, page 282](#) .

Because the electrical plug connections were disconnected and the engine started, faults are stored in the event memory of the engine control unit.

- Clear event memory and re-generate the readiness code ⇒ Vehicle diagnostic tester.

## 2 Toothed belt drive

⇒ [“2.1 Summary of components - toothed belt guard”, page 79](#)

⇒ [“2.2 Summary of components - toothed belt”, page 80](#)

⇒ [“2.3 Checking valve timing”, page 81](#)

⇒ [“2.4 Remove the toothed belt from the camshaft”, page 86](#)

⇒ [“2.5 Removing and installing toothed belt”, page 99](#)

### 2.1 Summary of components - toothed belt guard

1 - Bottom toothed belt guard

2 - Bolt

□ 8 Nm

3 - Engine support bracket

□ Tightening torque and  
tightening order

⇒ [page 27](#)

4 - Screw

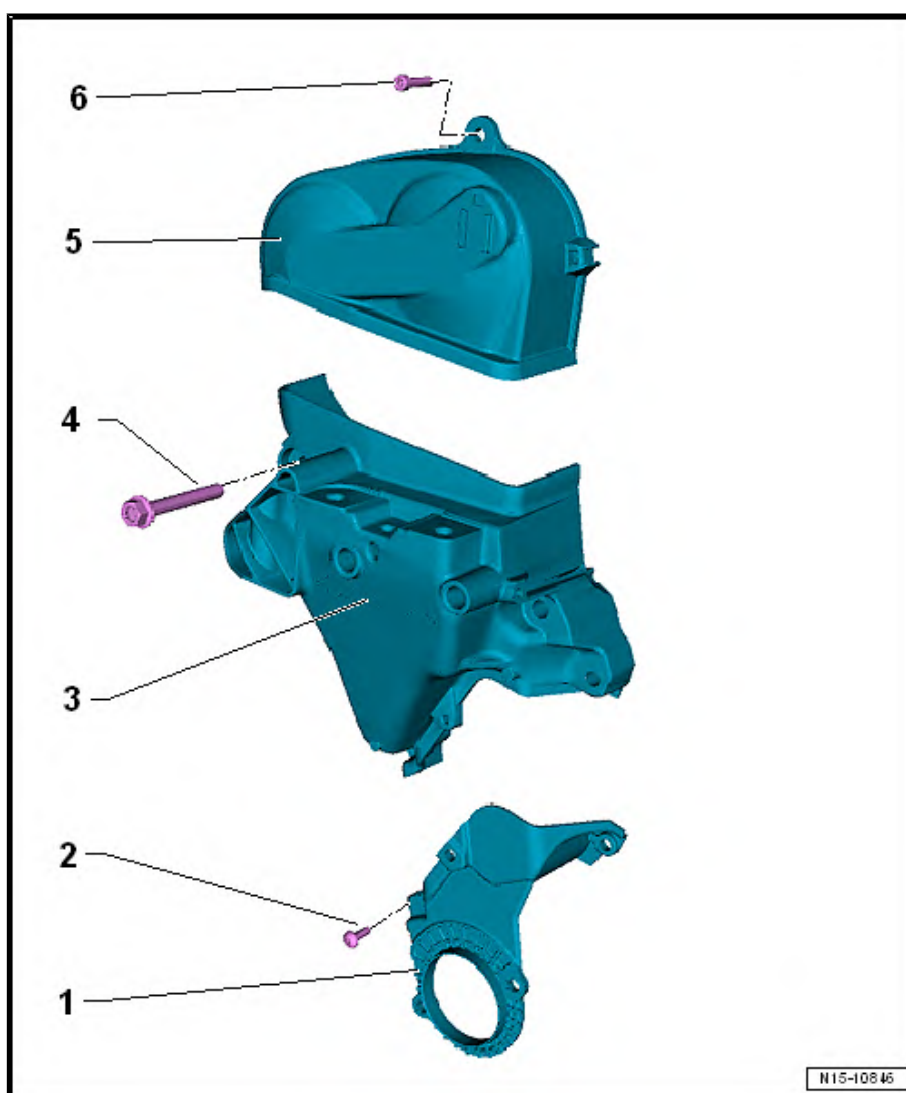
□ Tightening torque and  
tightening order

⇒ [page 27](#)

5 - Top toothed belt guard

6 - Bolt

□ 8 Nm





## 2.2 Summary of components - toothed belt

### 1 - Toothed belt

- ☐ mark the direction of rotation with chalk or a felt-tip pen before removing
- ☐ check for wear



#### Caution

**Risk of damage to the toothed belt!**

*The bending radius of the toothed belt must not fall below 50 mm (approximate Ø of the crankshaft sprocket).*

*A larger bending radius has a negative effect on the life of the toothed belt.*

- ☐ removing  
⇒ ["2.5 Removing and installing toothed belt", page 99](#)
- ☐ install (set the timing)  
⇒ [page 93](#)

### 2 - Bolt

- ☐ When setting the tightening torque on the torque wrench - VAS 6583- the actual dimension specified on the tool insert - T10500- must be put into the torque wrench!
- ☐ 25 Nm

### 3 - Tensioning roller

- ☐ for removing and installing, remove engine support  
⇒ ["1.5 Removing and installing engine support", page 41](#)

### 4 - Bolt

- ☐ replace after removal
- ☐ 50 Nm + torque a further 90° (1/4 turn)

### 5 - Toothed belt pulley, exhaust camshaft

- ☐ installing and removing ⇒ ["2.4 Remove the toothed belt from the camshaft", page 86](#)

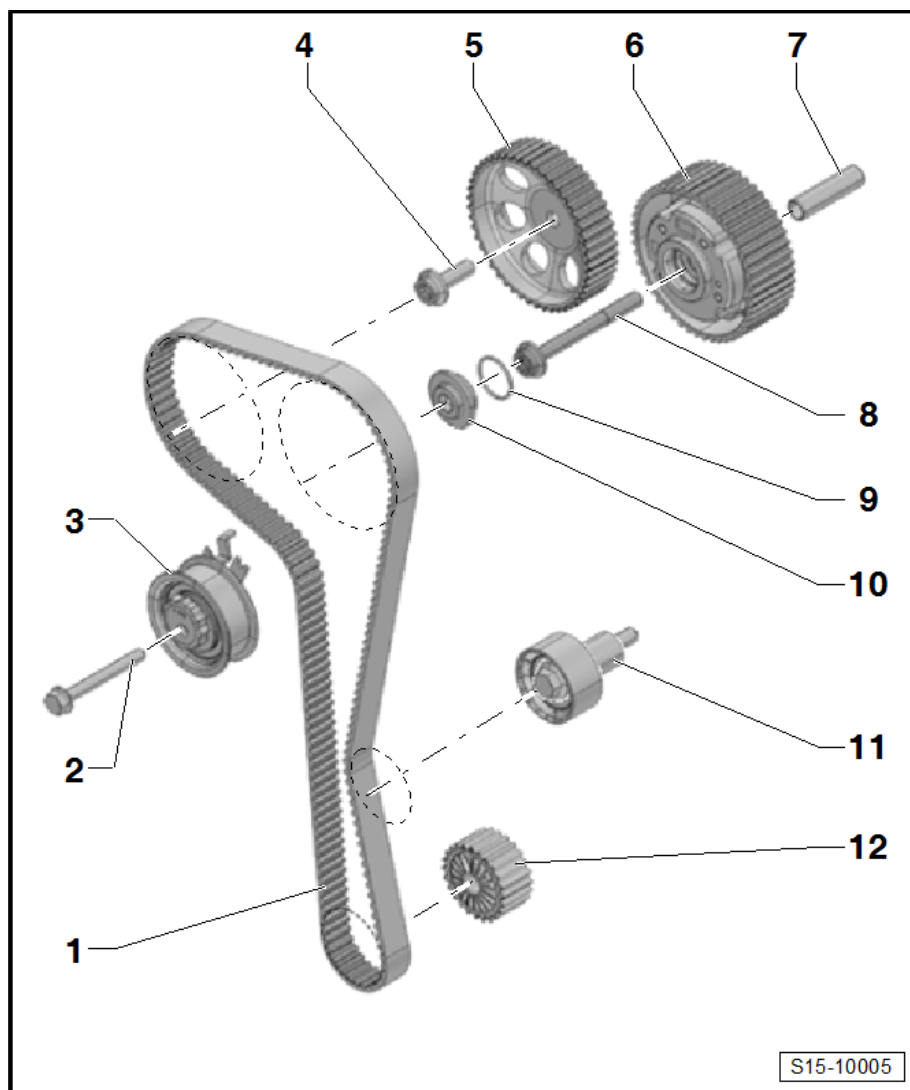
### 6 - Toothed belt pulley, inlet camshaft

- ☐ With camshaft control
- ☐ Removing and installing camshaft control ⇒ ["3.3 Removing and installing camshaft control", page 114](#)

### 7 - Guide sleeve

### 8 - Bolt

- ☐ replace after removal
- ☐ 50 Nm + torque a further 135° (3/8 turn)



### 9 - O-ring

- ☐ replace after removal

### 10 - Plug

- ☐ 20 Nm

### 11 - Idler roller

- ☐ 45 Nm

### 12 - Crankshaft - toothed belt sprocket

- ☐ there must not be any oil present on the contact surface between the toothed belt sprocket and the crankshaft
- ☐ can be installed only in one position

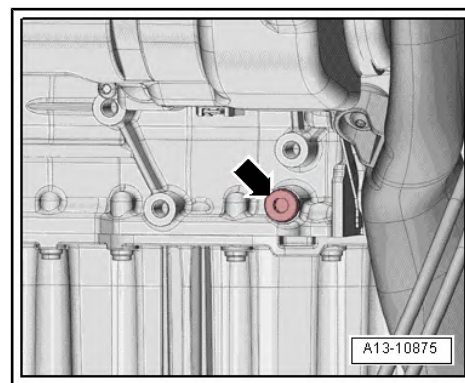
Unscrew locking screw "TDC" bore at the cylinder block - tightening torque



#### Note

*Replace the O-ring if it is damaged.*

- Tighten bolts -arrows- to 30 Nm.



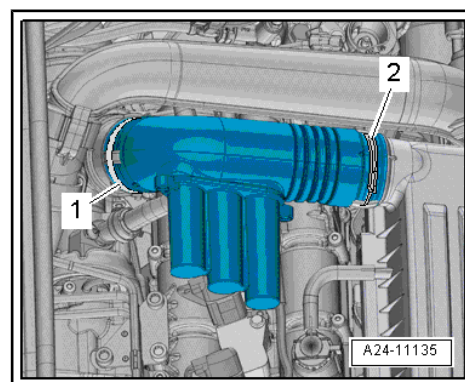
## 2.3 Checking valve timing

### Special tools and workshop equipment required

- ◆ Fixing screw - T10340-
- ◆ Camshaft clamp - T10494-
- ◆ Assembly tool - T10487-
- ◆ Spark plug wrench , e.g. -3122 B-
- ◆ Release tool - T10527-
- ◆ Release tool - T10527/1-

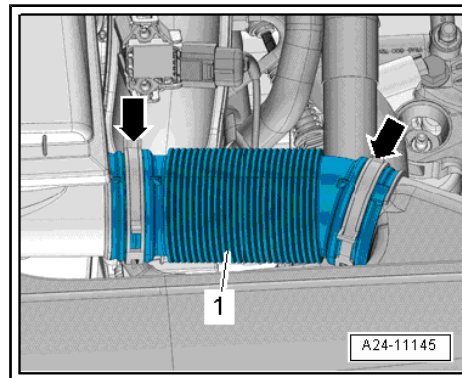
### Work procedure

- Loosen hose clamps -1-, -2- and remove air guide pipes.
- Expose air guide hoses at the air guide pipe.

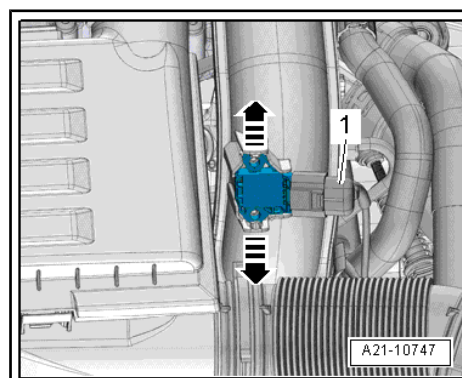




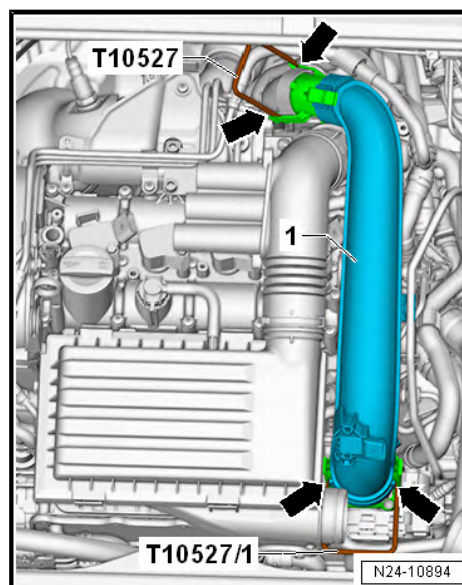
- Undo hose clamps -arrows-, remove air guide hose -1-.



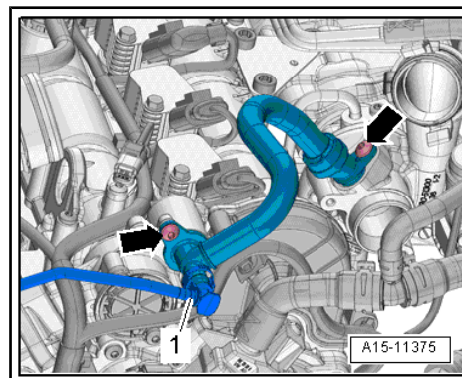
- Disconnect plug -1- at charge pressure sender - GX26- .



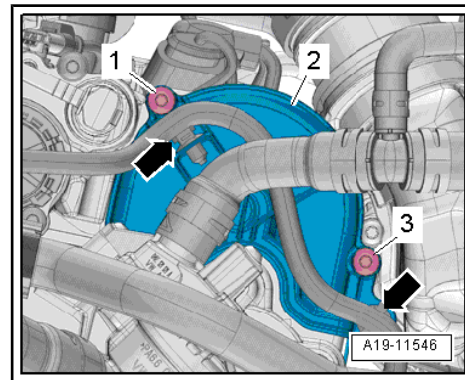
- Unlock catch pegs -arrows- with unlocking tool - T10527- and release unlocking tool - T10527/1- , remove the air guide pipe -1-.



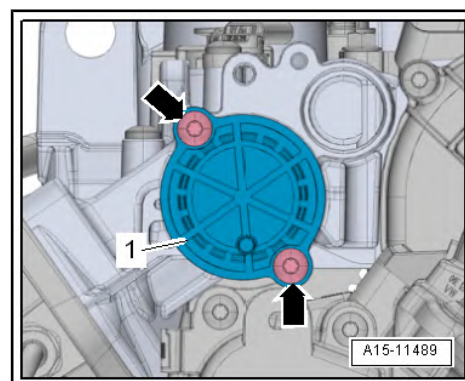
- Press release buttons and remove hose -1- to the activated charcoal filter.
- Unscrew screws -arrows- and remove hose for crankcase ventilation.



- Expose wiring loom -arrows-.
- Unscrew screws -1-, -3- and remove toothed belt guard -2- for coolant pump toothed belt.



- Release screws -arrows- and remove cap -1-.
- Drain coolant ➔ [“1.2 Draining and filling coolant”, page 147](#) .

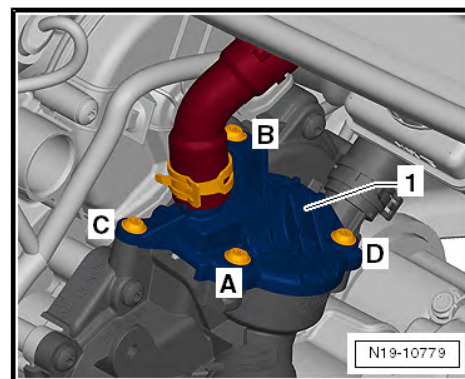


- Unscrew screws -A...D- and push thermostat cover -1- to the side.
- Remove the sound dampening system ➔ Body Work; Rep. gr. 66 .

#### Position crankshaft to “TDC”

- Remove ignition coil with power output stage 1 ➔ [page 282](#) .
- Remove ignition plug cylinder 1 with spark plug socket wrench , e. g. -3122 B- .

Set the correct position of the crankshaft for screwing in the fixing screw.



- Carefully insert a screwdriver into the opening of the ignition plug, minimum length of shaft 250 mm, in -direction of arrow- so that it touches the piston head.
- Rotate the crankshaft in direction of rotation of engine on “TDC” for cylinder 1.





- Turn engine shaft further in direction of arrow so that the screwdriver just out at the top by approx. 35 mm in the -direction of the arrow-.
- Unscrew locking screw for “TDC” bore at the cylinder block ➔ [page 81](#) .



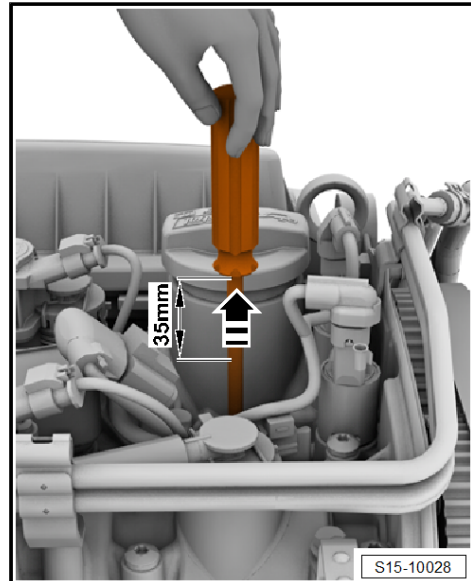
### Caution

**Risk of engine damage.**

*If the fixing screw - T10340- cannot be screwed in up to the stop, the crankshaft is not in the correct position.*

*In this case, proceed as follows:*

- ◆ *Unscrew the fixing screw.*
- ◆ *Set the correct position of the crankshaft for screwing in the fixing screw ➔ [page 83](#) .*

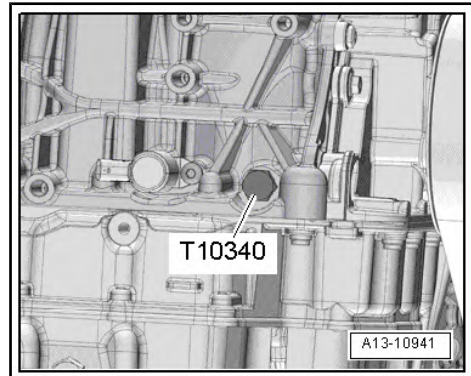


- Turn the fixing screw - T10340- up to the stop in the cylinder block and tighten to 30 Nm.
- Turn crankshaft up to the stop in direction of rotation of engine.



### Note

*The crankshaft is only locked in direction of rotation of engine using the fixing screw - T10340- .*



- The crankshaft sprocket now lies on the fixing screw and the “TCD” position is set.
- On both camshafts the asymmetrically arranged grooves -arrows- on the gearbox side must be above the middle of the camshaft.
- On the exhaust camshaft -A-, the grooves -top arrows- are accessible through the recesses in the coolant pump driving wheel.
- On the inlet camshaft -E- the grooves -bottom arrow- are above the camshaft centre.

If the camshafts are not as described:

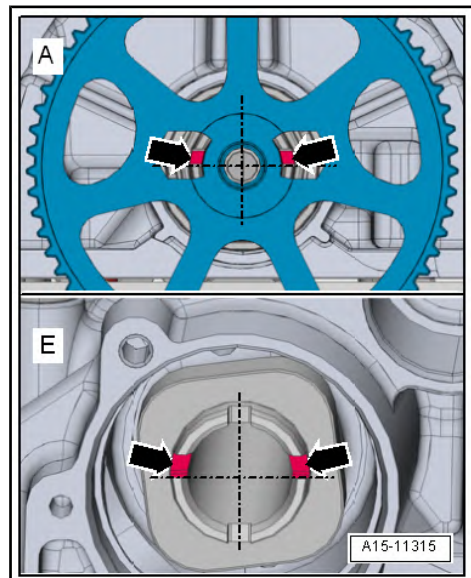
- Remove fixing screw - T10340- and turn crankshaft another turn, set back to “TDC” ➔ [page 83](#) .

If the camshafts are as described:



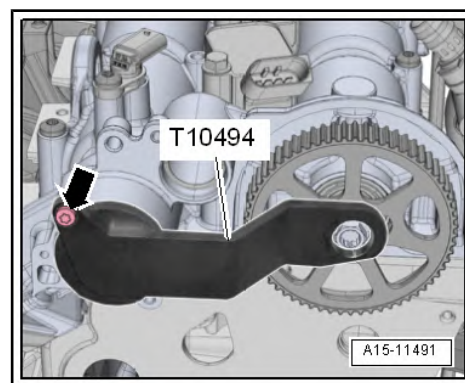
### Note

- ◆ *The camshaft clamp - T10494- must slide into position easily.*
- ◆ *The camshaft clamp must not be positioned using any kind of hammer.*



- Insert camshaft clamp -T10494- to stop into camshafts and tighten bolt -arrow- by hand.

**If camshaft clamp - T10494- cannot be installed:**





- Using the assembly tool - T10487- in -direction of arrow- press on the toothed belt.
- At the same time, insert the camshaft clamp -T10494- up to stop into the camshafts and fix with the screw.

If it is not possible to insert the camshaft clamp -T10494- , the timing is NOK:

- Set timing, remove the toothed belt from the camshaft  
⇒ [“2.4 Remove the toothed belt from the camshaft”](#),  
[page 86](#) .

If it is possible to insert the camshaft clamp -T10494- , the timing is OK:

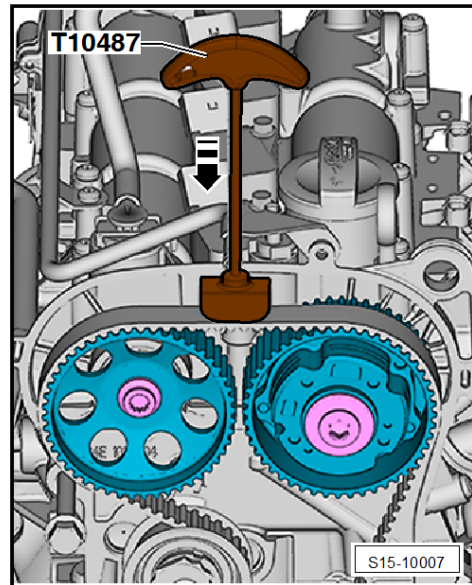
- Valve timing is OK.



#### Caution

*There is a risk of destruction of the engine.*

- ◆ *To complete the work, check to ensure that the fixing screw - T10340- and camshaft clamp -T10494- have been removed.*



Installation is performed in a similar way in the reverse order. Pay attention to the following points:



#### Note

- ◆ *Replace screws which have been tightened firmly to a torque angle.*
- ◆ *Renew O-ring of locking screw if damaged.*

#### Tightening torques

- ◆ ⇒ [“2.1 Summary of components - toothed belt guard”](#),  
[page 79](#)
- ◆ ⇒ [“2.2 Summary of components - toothed belt”](#), [page 80](#)
- ◆ ⇒ [Fig. ““Unscrew locking screw TDC bore at the cylinder block - tightening torque””](#), [page 81](#)
- ◆ ⇒ [“1.2 Summary of components - camshaft housing”](#),  
[page 68](#)
- ◆ ⇒ [“1.1 Summary of components - exhaust gas turbocharger”](#),  
[page 221](#)
- ◆ ⇒ [“2.1 Summary of components - coolant pump/coolant thermostat”](#), [page 154](#)
- ◆ ⇒ [“2.1 Summary of components - charge air system”](#),  
[page 228](#)
- ◆ Remove the sound dampening system ⇒ Body Work; Rep. gr. 66 .

## 2.4 Remove the toothed belt from the camshaft

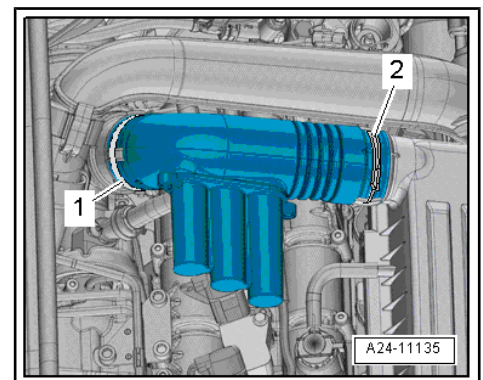
#### Special tools and workshop equipment required

- ◆ Counterholder - T10172- with adapters -T10172/1- and -T10172/2-

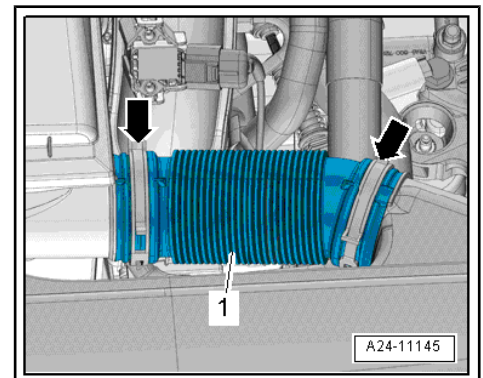
- ◆ Fixing screw - T10340-
- ◆ Counterholder - T10475-
- ◆ Key - T10499-
- ◆ Insertion tool - T10500-
- ◆ Camshaft clamp - T10494-
- ◆ Assembly tool - T10487-
- ◆ Spark plug wrench , e.g. -3122 B-
- ◆ Torque wrench -VAS 6583- or -V.A.G 1410-
- ◆ Release tool - T10527-
- ◆ Release tool - T10527/1-

#### Work procedure

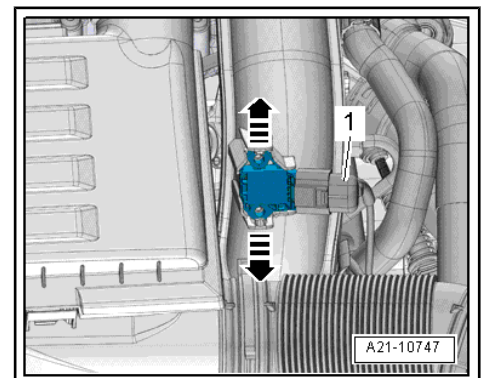
- Loosen hose clamps -1-, -2- and remove air guide pipes.
- Expose air guide hoses at the air guide pipe.



- Undo hose clamps -arrows-, remove air guide hose -1-.

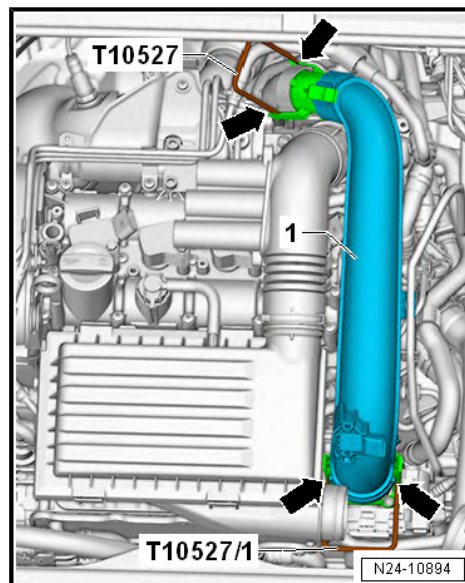


- Disconnect plug -1- at charge pressure sender - GX26- .

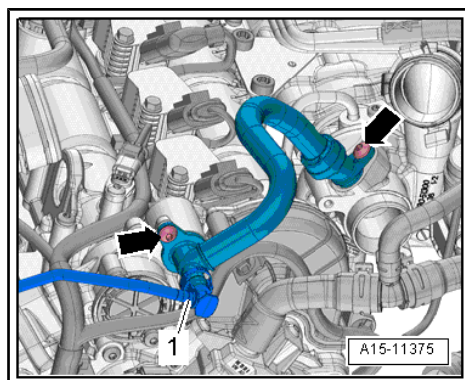




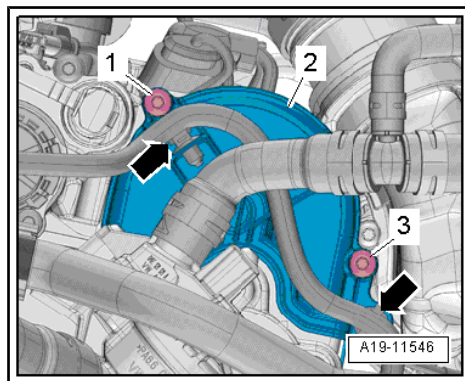
- Unlock catch pegs -arrows- with unlocking tool - T10527- and release unlocking tool - T10527/1- , remove the air guide pipe -1-.



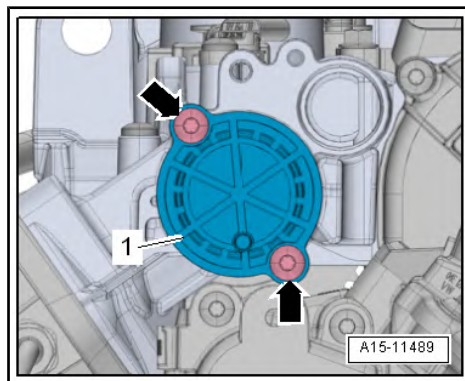
- Press release buttons, pull off hose -1-.
- Unscrew screws -arrows- and remove hose for crankcase ventilation.



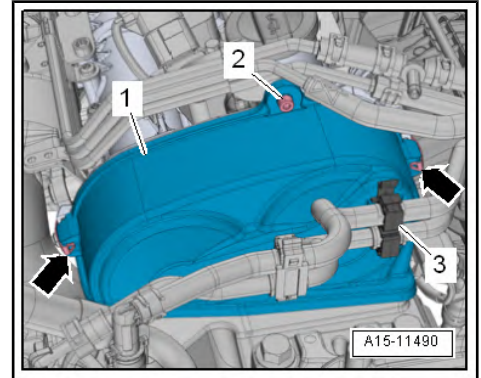
- Expose wiring loom -arrows-.
- Unscrew screws -1-, -3- and remove toothed belt guard -2- for coolant pump toothed belt.



- Release screws -arrows- and remove cap -1-.



- Expose vacuum hose on the holder -3-.
- Unscrew screw -2-.
- Loosen clips -arrows- and remove toothed belt guard -1- upwards.
- Drain coolant ➔ ["1.2 Draining and filling coolant", page 147](#) .

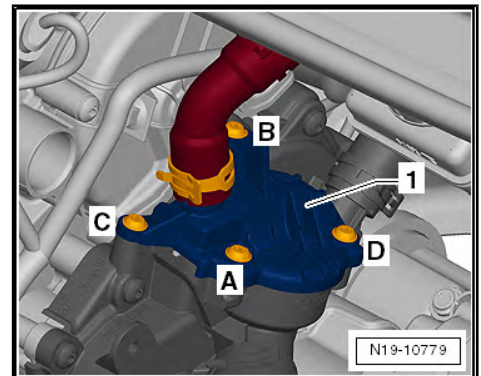


- Unscrew screws -A...D- and push thermostat cover -1- to the side.
- Remove the sound dampening system ➔ Body Work; Rep. gr. 66 .

#### Position crankshaft to "TDC"

- Remove ignition coil with power output stage 1 ➔ [page 282](#) .
- Remove ignition plug cylinder 1 with spark plug socket wrench , e. g. -3122 B- .

Set the correct position of the crankshaft for screwing in the fixing screw.



- Carefully insert a screwdriver into the opening of the ignition plug, minimum length of shaft 250 mm, in -direction of arrow- so that it touches the piston head.
- Rotate the crankshaft in direction of rotation of engine on "TDC" for cylinder 1.





- Turn engine shaft further in direction of arrow so that the screwdriver just out at the top by approx. 35 mm in the -direction of the arrow-.
- Unscrew locking screw for “TDC” bore at the cylinder block  
⇒ [page 81](#) .



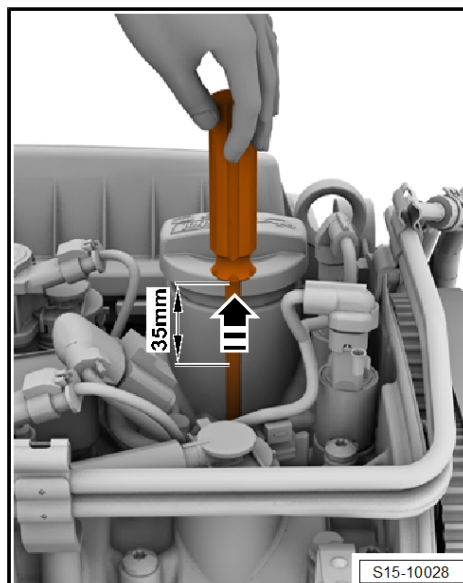
### Caution

**Risk of engine damage.**

*If the fixing screw - T10340- cannot be screwed in up to the stop, the crankshaft is not in the correct position.*

*In this case, proceed as follows:*

- ◆ *Unscrew the fixing screw.*
- ◆ *Set the correct position of the crankshaft for screwing in the fixing screw ⇒ [page 89](#) .*

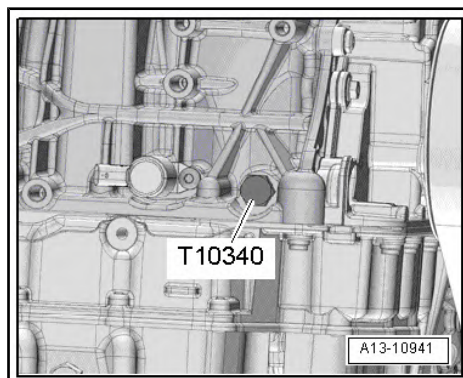


- Turn the fixing screw - T10340- up to the stop in the cylinder block and tighten to 30 Nm.
- Turn crankshaft up to the stop in direction of rotation of engine.



### Note

*The crankshaft is only locked in direction of rotation of engine using the fixing screw - T10340- .*



- The crankshaft sprocket now lies on the fixing screw and the "TCD" position is set.
- On both camshafts the asymmetrically arranged grooves -arrows- on the gearbox side must be above the middle of the camshaft.
- On the exhaust camshaft -A-, the grooves -top arrows- are accessible through the recesses in the coolant pump driving wheel.
- On the inlet camshaft -E- the grooves -bottom arrow- are above the camshaft centre.



#### Note

*The camshafts have one symmetrically and one asymmetrically arranged pair of grooves. In the "TDC" position the asymmetrically arranged pair of grooves must be above the imaginary horizontal centre line.*

If the camshafts are not as described:

- Remove fixing screw - T10340- and turn crankshaft another turn, set back to "TDC" ➔ [page 89](#) .

If the camshafts are as described:



#### Note

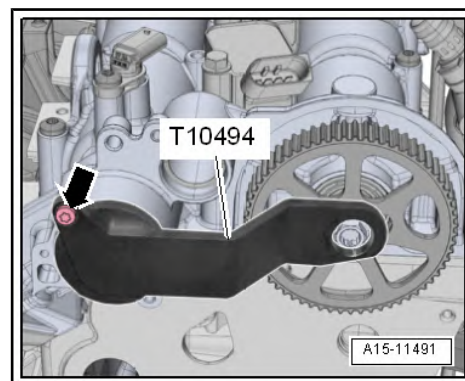
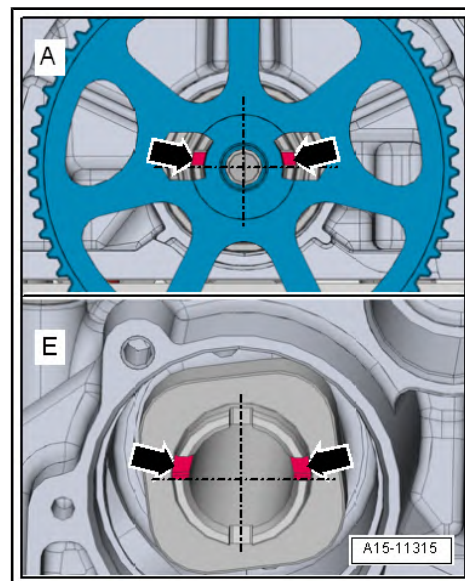
- ◆ *The camshaft clamp -T10494- must move into position easily.*
- ◆ *The camshaft clamp must not be positioned using any kind of hammer.*
- Insert camshaft clamp -T10494- to stop into camshafts and tighten bolt -arrow- by hand.

If camshaft clamp - T10494- cannot be installed:



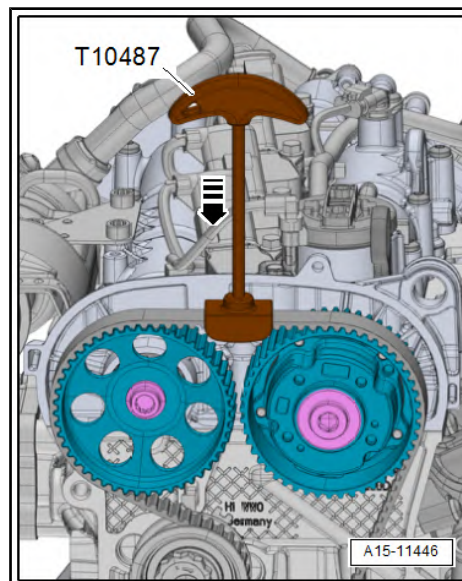
#### Caution

***To prevent damage to the belt, do not use sharp-edged tools!***





- Using the assembly tool - T10487- in -direction of arrow- press on the toothed belt.



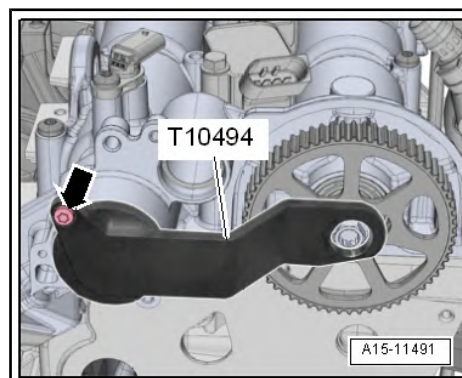
- While doing so, insert camshaft control -T10494- to stop into camshafts and tighten screw -arrow- hand-tight.



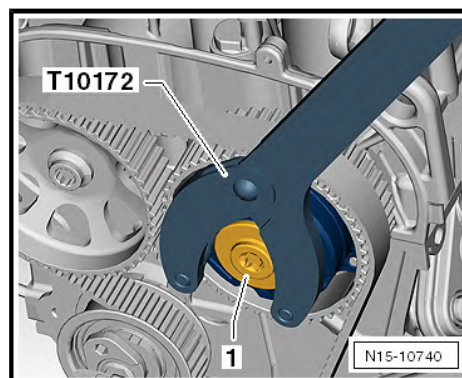
**Caution**

*Risk of damaging the camshaft.*

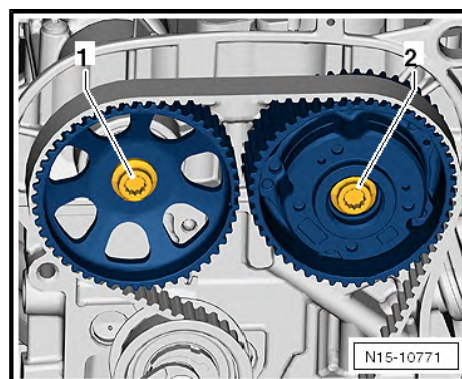
- ◆ *Do not use the camshaft fixer/locator - T10494- as a counterholder.*



- Unscrew locking screw -1- on the camshaft sprocket fitting position. Use counterholder - T10172- with adapter - T10172/1- to do this.



- Undo screws -1-, -2- by around one turn. Use counterholder - T10172- with adapters -T10172/2- and -T10172/1- to do this.



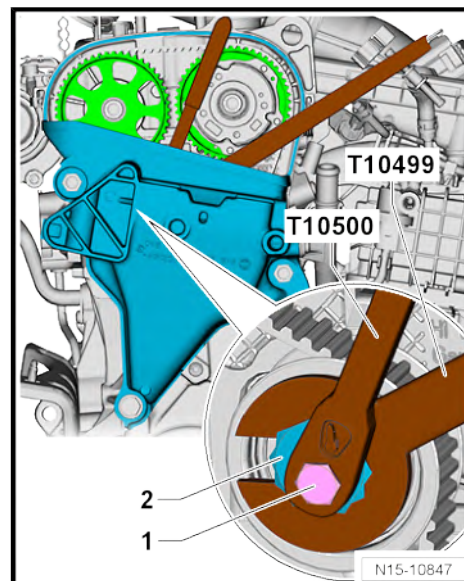
- Release screw -1- using insertion tool - T10500- .
- Slacken the tensioning pulley at the eccentric -2- using the wrench - T10499- .
- Remove the toothed belt from the camshaft sprockets.

#### Installing (set the timing)



#### Note

- ◆ *Replace screws which have been tightened firmly to a torque angle.*
- ◆ *Renew O-ring of locking screw if damaged.*
- “Check TDC” position of camshaft and crankshaft:



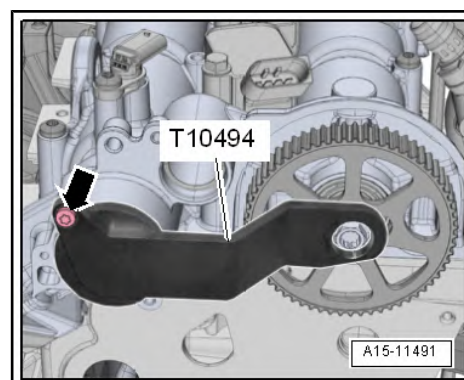
- Attach camshaft clamp -T10494- to camshaft housing.



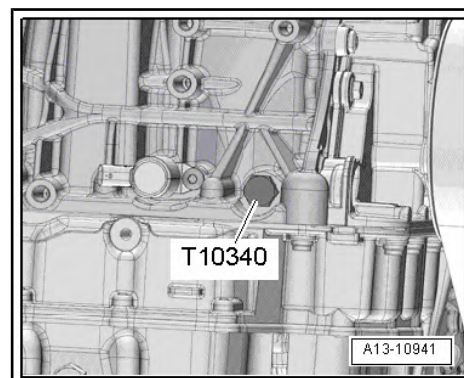
#### Caution

*Risk of damaging the camshafts.*

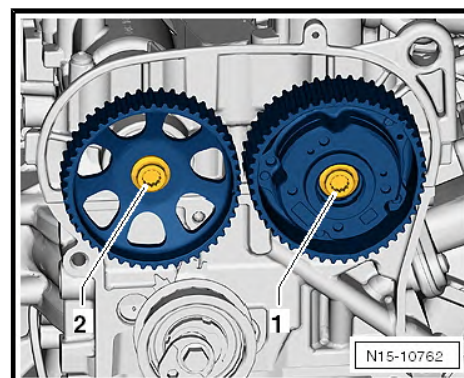
- ◆ *Do not use the camshaft clamp -T10494- as a counter-holder.*



- Fixing screw - T10340- turned up to the stop in the cylinder block and tightened to 30 Nm.
- Crankshaft in engine direction of rotation applied to the fixing screw - T10340- = “TDC” position.

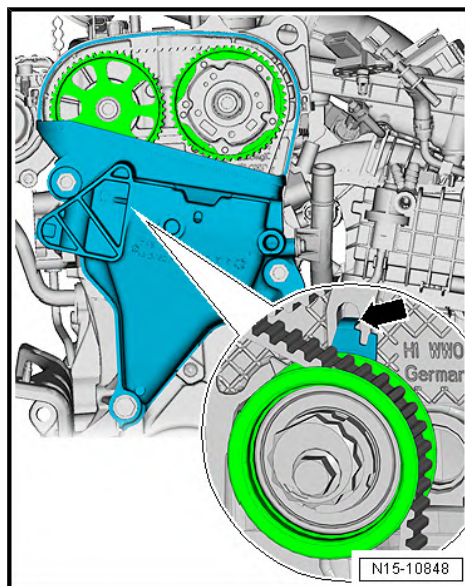


- Replace screws -1-, -2- for camshaft sprocket and insert them loosely.
- It must still be possible to turn the camshaft sprockets on the camshafts, however they must not tilt.



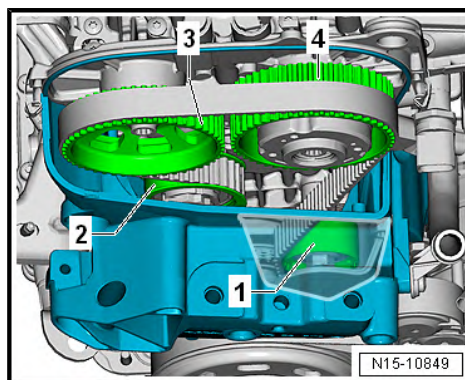


- Sheet peg -arrow- of the tensioning pulley must engage in the cast iron recess of the cylinder head.



**Observe sequence when fitting the toothed belt.**

- Pull toothed belt upwards, place onto the guide pulley -1- and the tensioning pulley -2- and the camshaft sprockets -3- and -4-.



- Rotate the eccentric -2- of the tensioning pulley with the wrench - T10499- in -direction of arrow- until the adjustment pointer -3- is located approx. 10 mm to the right from the adjustment window.
- Push eccentric so far back that the adjustment pointer is positioned exactly in the adjustment window.



#### Caution

*Risk of engine damage.*

*To tighten, the torque wrench - VAS 6583- or torque wrench - V.A.G 1410- must be used!*

*To tighten, no other torque wrench may be used!*

Tighten with torque wrench VAS 6583



#### Caution

*Only use the torque wrench together with insertion tool - T10500- !*

*When setting the tightening torque on the torque wrench - VAS 6583- the actual dimension specified on the tool insert - T10500- must be put into the torque wrench!*

- Keep eccentric in this position and tighten screw -1- to 25 Nm. To do so, use the insertion tool - T10500- with torque wrench - VAS 6583- .

Tighten with torque wrench VAG 1410



#### Caution

*Only use the torque wrench together with insertion tool - T10500- !*

*Set the reduced tightening torque of 12 Nm on the torque wrench - V.A.G 1410-*

*The required tightening torque of 25 Nm is achieved by the extending the torque wrench - V.A.G 1410- around the tool insert - T10500- !*

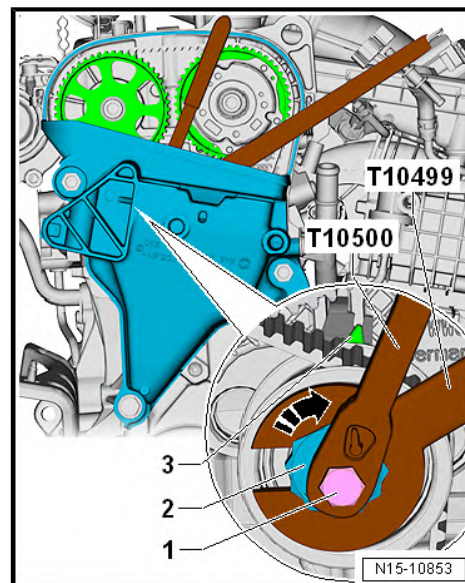
- Keep eccentric in this position and tighten screw -1- to the reduced tightening torque 12 Nm. To do so, use the insertion tool - T10500- with torque wrench - V.A.G 1410- .

Continued



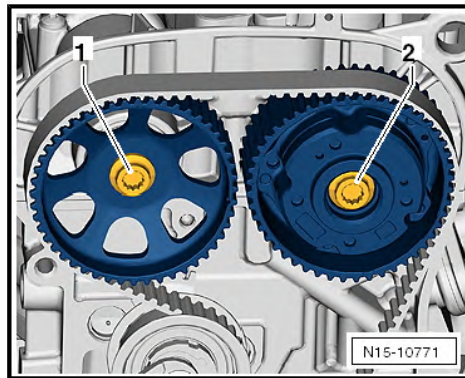
#### Note

*If the engine continued to turn or has run, there may be slight deviations of the adjustment pointer -3- setting in the adjustment window. This has no influence on the toothed belt tensioning.*

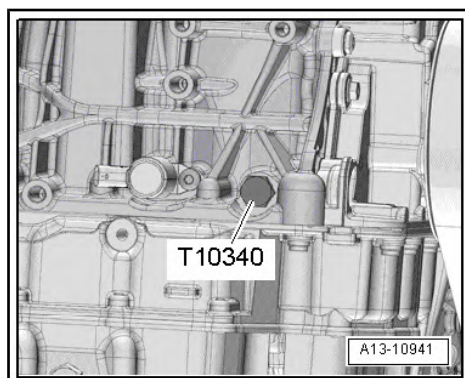




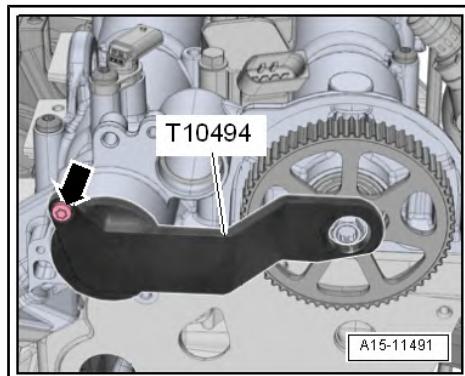
- Pre-tighten screws -1-, -2- to 50 Nm, to do so, use the counterholder - T10172- with adapters -T10172/1- and -T10172/2- .



- Unscrew positioning screw - T10340- .



- Unscrew bolt -arrow- and remove camshaft clamp -T10494- .



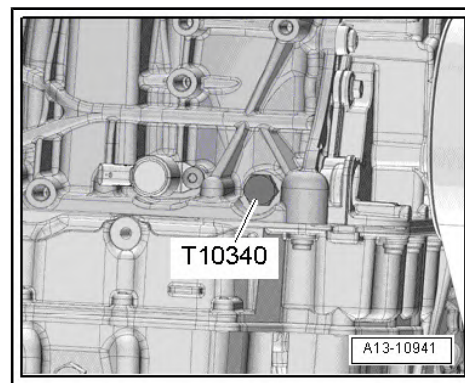
### Test timing:

- Turn the crankshaft in direction of rotation of engine by 2 turns.
- Turn the fixing screw - T10340- up to the stop in the cylinder block and tighten to 30 Nm.
- Turn the crankshaft further in direction of rotation of engine to the stop.
- The crankshaft sprocket now lies on the fixing screw and the “TCD” position is set.



#### Note

*The crankshaft is only locked in direction of rotation of engine using the fixing screw - T10340- .*

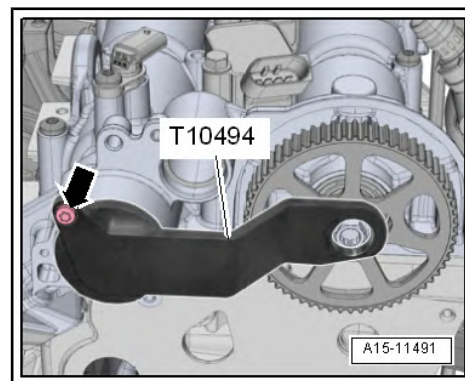


#### Note

- ◆ *The camshaft clamp -T10494- must move into position easily.*
- ◆ *The camshaft clamp must not be positioned using any kind of hammer.*

- Insert camshaft control -T10494- to stop into camshafts and tighten screw -arrow- hand-tight.

If camshaft clamp - T10494- cannot be installed:

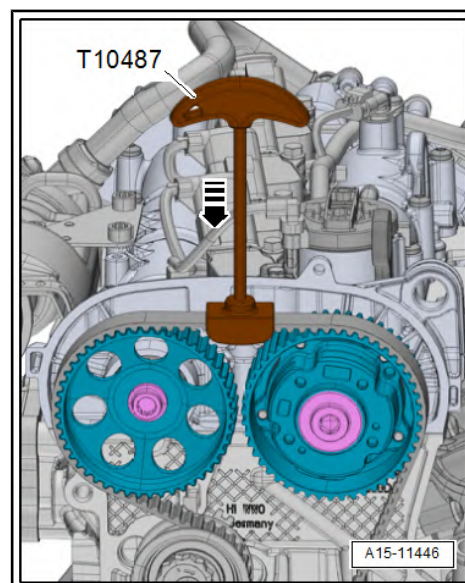


- Using the assembly tool - T10487- in -direction of arrow- press on the toothed belt.
- While doing so, insert camshaft control -T10494- to stop into camshafts and tighten screw hand-tight.

If it is not possible to insert the camshaft clamp -T10494- , the timing is NOK:

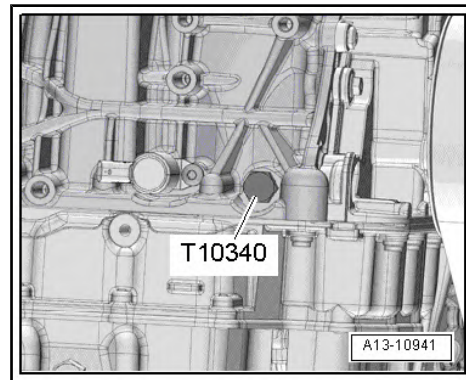
- Repeat control time settings.

If it is possible to insert the camshaft clamp -T10494- , the timing is OK:

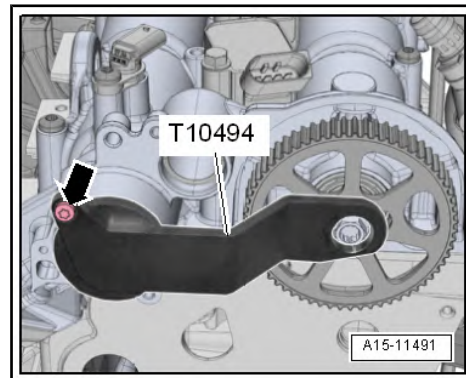




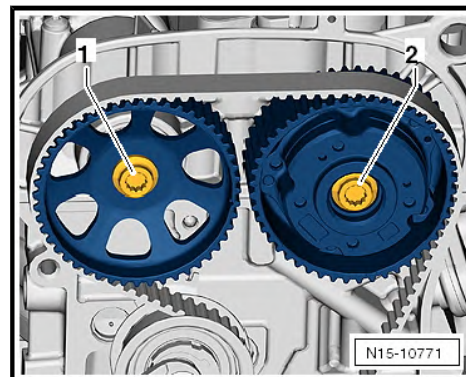
- Unscrew positioning screw - T10340- .



- Unscrew bolt -arrow- and remove camshaft clamp -T10494- .



- Pre-tighten screws -1-, -2- to final tightening torque  
⇒ [“2.2 Summary of components - toothed belt”, page 80](#) , to  
do so use counterholder - T10172- with adapters -T10172/1-  
and -T10172/2- .



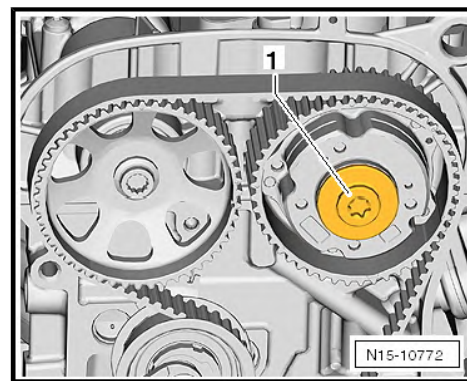
- Tighten locking screw -1- to 20 Nm, to do so, use the counterholder - T10172- with the adapter -T10172/1- .



#### Caution

*Risk of destruction of the engine.*

- ◆ *After completing the work, check whether the positioning screw - T10340- and camshaft clamp -T10494- are removed.*



Further installation occurs in reverse order.

#### Tightening torques

- ◆ ⇒ [“2.1 Summary of components - toothed belt guard”, page 79](#)
- ◆ ⇒ [“2.2 Summary of components - toothed belt”, page 80](#)
- ◆ ⇒ [Fig. ““Unscrew locking screw TDC bore at the cylinder block - tightening torque””, page 81](#)
- ◆ ⇒ [“1.2 Summary of components - camshaft housing”, page 68](#)
- ◆ ⇒ [“1.1 Summary of components - exhaust gas turbocharger”, page 221](#)
- ◆ ⇒ [“2.1 Summary of components - coolant pump/coolant thermostat”, page 154](#)
- ◆ ⇒ [“2.1 Summary of components - charge air system”, page 228](#)
- ◆ Noise insulation ⇒ Body Work- Assembly; Rep. gr. 66

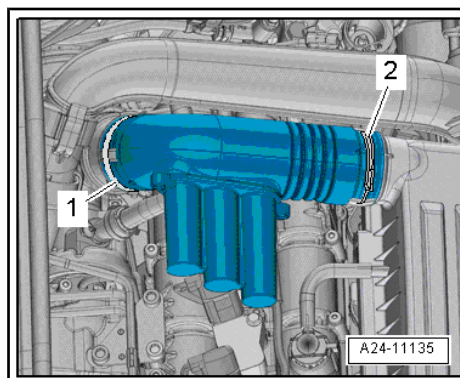
## 2.5 Removing and installing toothed belt

### Special tools and workshop equipment required

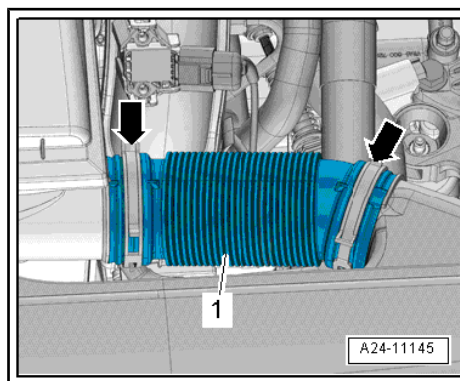
- ◆ Counterholder - T10172- with adapters -T10172/1- and - T10172/2-
- ◆ Fixing screw - T10340-
- ◆ Counterholder - T10475-
- ◆ Key - T10499-
- ◆ Insertion tool - T10500-
- ◆ Camshaft clamp - T10494-
- ◆ Assembly tool - T10487-
- ◆ Spark plug wrench , e.g. -3122 B-
- ◆ Torque wrench -VAS 6583- or -V.A.G 1410-
- ◆ Release tool - T10527-
- ◆ Release tool - T10527/1-

## Removing

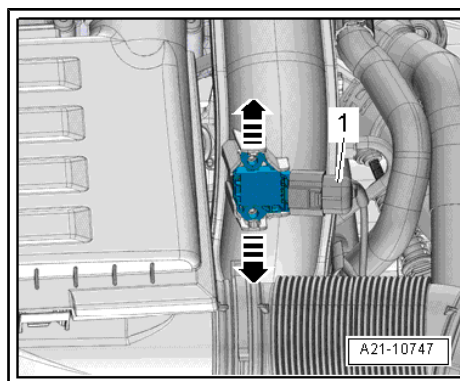
- Loosen hose clamps -1-, -2- and remove air guide pipes.
- Expose air guide hoses at the air guide pipe.



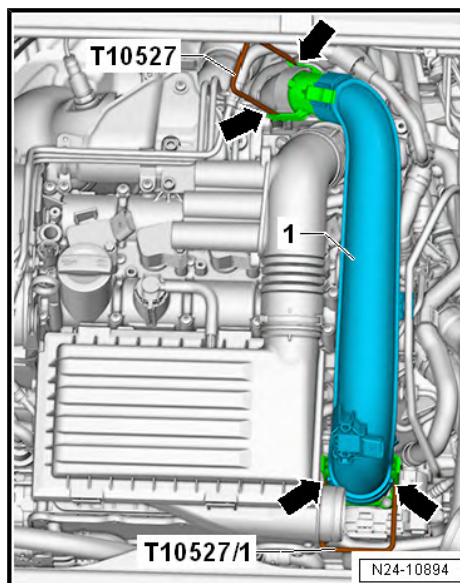
- Undo hose clamps -arrows-, remove air guide hose -1-.



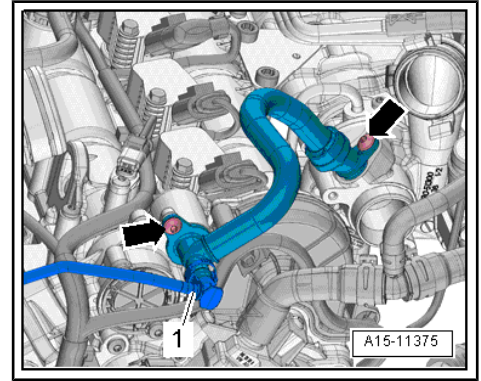
- Disconnect plug -1- at charge pressure sender - GX26- .



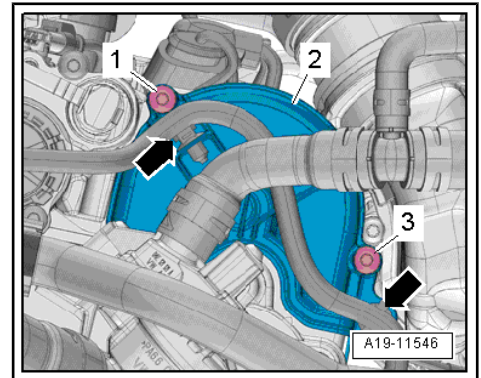
- Unlock catch pegs -arrows- with unlocking tool - T10527- and release unlocking tool - T10527/1- , remove the air guide pipe -1-.



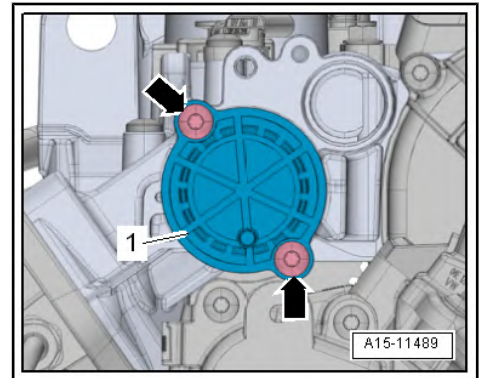
- Press release buttons and remove hose -1- to the activated charcoal filter.
- Unscrew screws -arrows- and remove hose for crankcase ventilation.



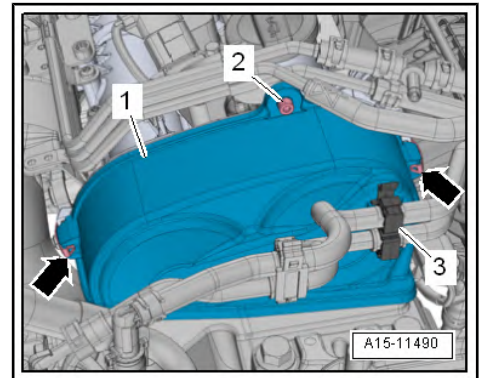
- Expose wiring loom -arrows-.
- Unscrew screws -1-, -3- and remove toothed belt guard -2- for coolant pump toothed belt.



- Release screws -arrows- and remove cap -1-.



- Expose vacuum hose on the holder -3-.
- Unscrew screw -2-.
- Loosen clips -arrows- and remove toothed belt guard -1- upwards.
- Drain coolant ➔ [“1.2 Draining and filling coolant”, page 147](#) .



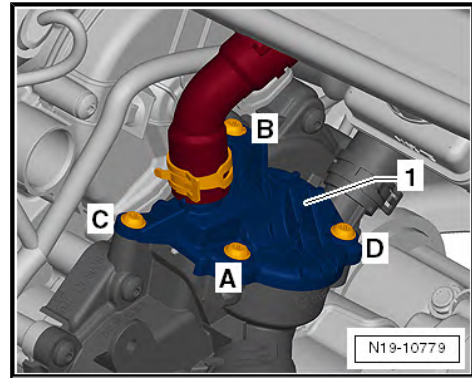


- Unscrew screws -A...D- and push thermostat cover -1- to the side.

#### Position crankshaft to "TDC"

- Remove ignition coil with power output stage 1 ➔ [page 282](#) .
- Remove ignition plug cylinder 1 with spark plug socket wrench , e. g. -3122 B- .

Set the correct position of the crankshaft for screwing in the fixing screw.



- Carefully insert a screwdriver into the opening of the ignition plug, minimum length of shaft 250 mm, in -direction of arrow- so that it touches the piston head.
- Rotate the crankshaft in direction of rotation of engine on "TDC" for cylinder 1.



- Turn engine shaft further in direction of arrow so that the screwdriver just out at the top by approx. 35 mm in the -direction of the arrow-.
- Unscrew locking screw for "TDC" bore at the cylinder block ➔ [page 81](#) .



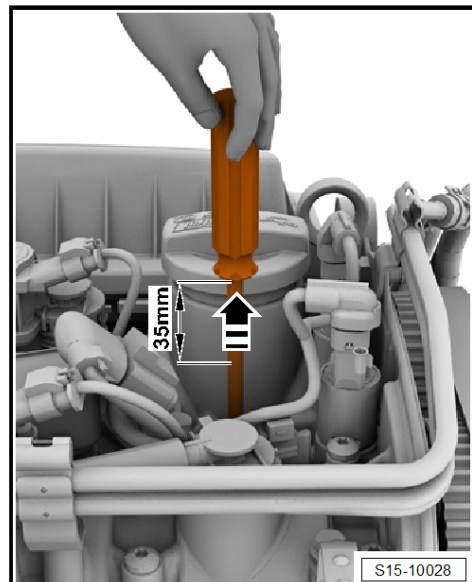
#### Caution

**Risk of engine damage.**

**If the fixing screw - T10340- cannot be screwed in up to the stop, the crankshaft is not in the correct position.**

**In this case, proceed as follows:**

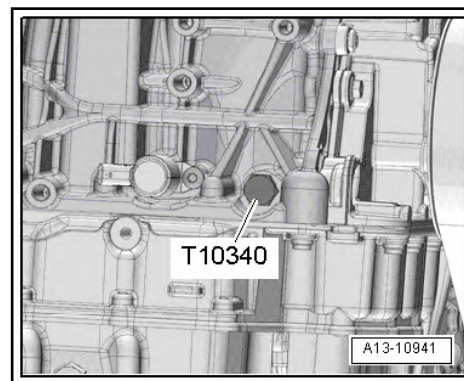
- ◆ **Unscrew the fixing screw.**
- ◆ **Set the correct position of the crankshaft for screwing in the fixing screw ➔ [page 102](#) .**



- Turn the fixing screw - T10340- up to the stop in the cylinder block and tighten to 30 Nm.
- Turn crankshaft up to the stop in direction of rotation of engine.

**i Note**

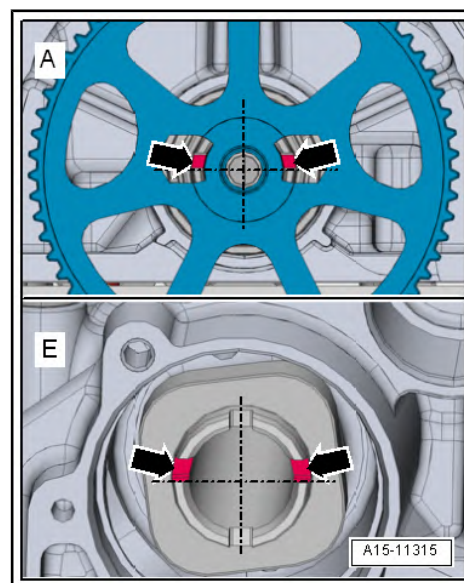
*The crankshaft is only locked in direction of rotation of engine using the fixing screw - T10340- .*



- The crankshaft sprocket now lies on the fixing screw and the "TCD" position is set.
- On both camshafts the asymmetrically arranged grooves -arrows- on the gearbox side must be above the middle of the camshaft.
- On the exhaust camshaft -A-, the grooves -top arrows- are accessible through the recesses in the coolant pump driving wheel.
- On the inlet camshaft -E- the grooves -bottom arrow- are above the camshaft centre.

**i Note**

*The camshafts have one symmetrically and one asymmetrically arranged pair of grooves. In the "TDC" position the asymmetrically arranged pair of grooves must be above the imaginary horizontal centre line.*



If the camshafts are not as described:

- Remove fixing screw - T10340- and turn crankshaft another turn, set back to "TDC" ➔ [page 102](#) .

If the camshafts are as described:

**i Note**

- ♦ *The camshaft clamp -T10494- must move into position easily.*
- ♦ *The camshaft clamp must not be positioned using any kind of hammer.*

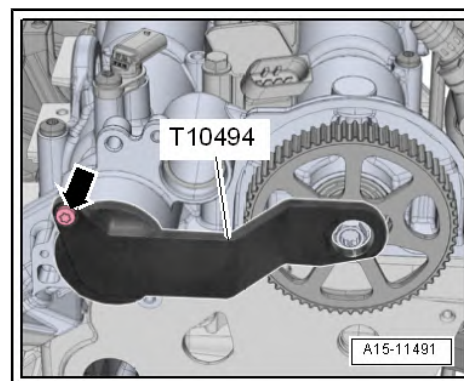
- Insert camshaft clamp -T10494- to stop into camshafts and tighten bolt -arrow- by hand.

If camshaft clamp - T10494- cannot be installed:



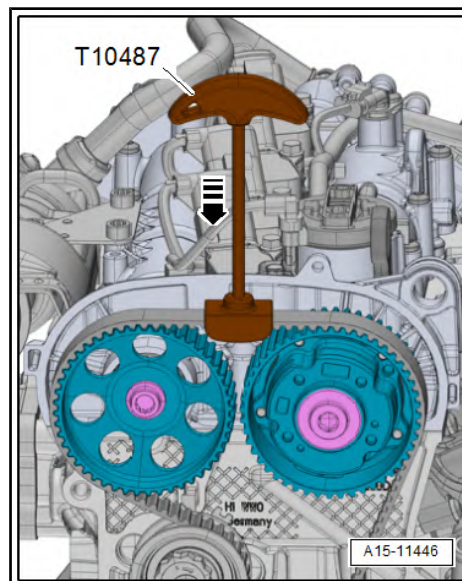
**Caution**

*To prevent damage to the belt, do not use sharp-edged tools!*

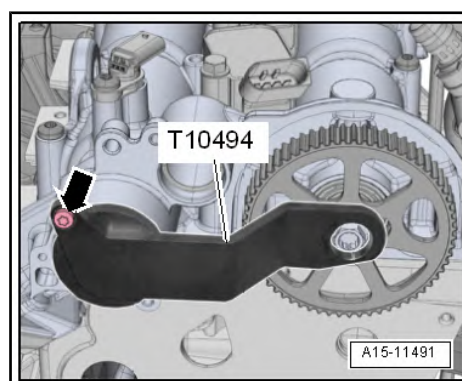




- Using the assembly tool - T10487- in -direction of arrow- press on the toothed belt.



- While doing so, insert camshaft control -T10494- to stop into camshafts and tighten screw -arrow- hand-tight.
- Remove vibration damper  
⇒ ["1.4 Removing and installing ribbed belt pulley", page 40](#) .



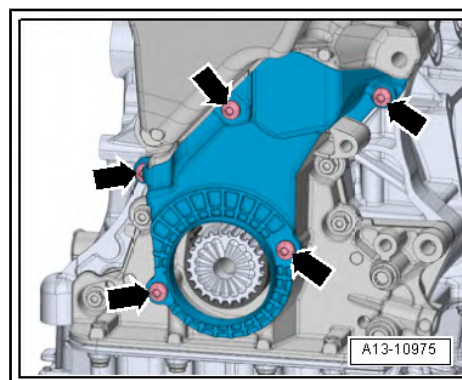
- Release screws -arrows- and remove bottom toothed belt guard.



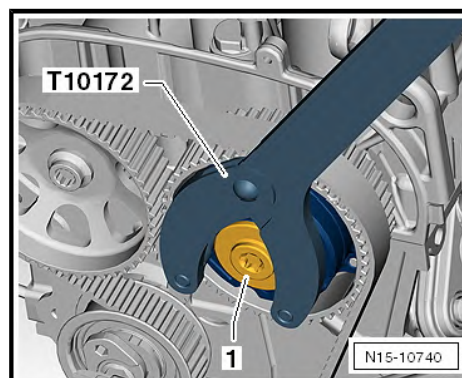
**Caution**

*There is a risk of damage to the camshaft.*

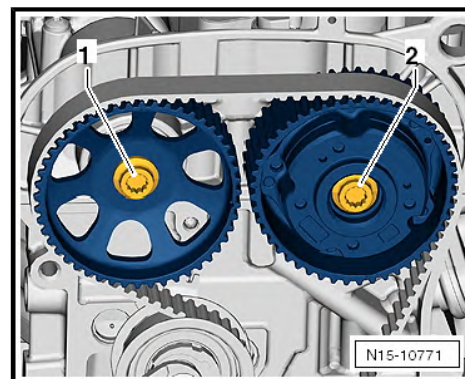
- ◆ *Do not use the camshaft fixer/locator - T10494- as a counterholder.*



- Unscrew locking screw -1- on the camshaft sprocket fitting position. Use counterholder - T10172- with adapters - T10172/1- to do so.



- Undo screws -1-, -2- by around one turn, to do so use the counterholder - T10172- with adapters -T10172/2- and - T10172/1- .



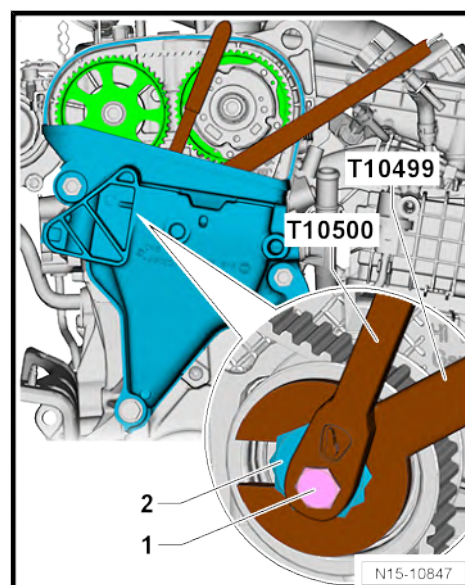
- Release screw -1- using insertion tool - T10500- .
- Slacken the tensioning pulley at the eccentric -2- using the wrench - T10499- .



#### Caution

*There is a risk of destruction through reversing the rotation direction of an already used toothed belt.*

- ◆ *Mark the direction of rotation with chalk or a felt-tip pen for the re-installation before removing the toothed belt pulley.*



- Remove timing belt.

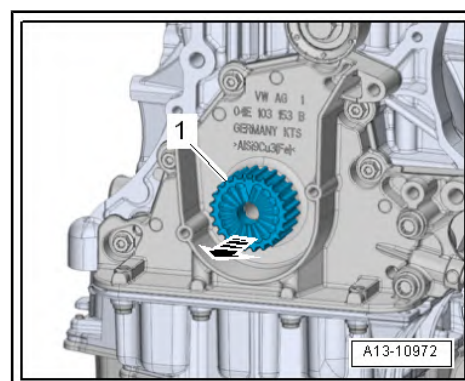
- Remove crankshaft toothed belt pulley -1- -arrow-.

#### Installing (set the timing)



#### Note

- ◆ *Replace screws which have been tightened firmly to a torque angle.*
- ◆ *Renew O-ring of locking screw if damaged.*
- “Check TDC” position of camshaft and crankshaft:



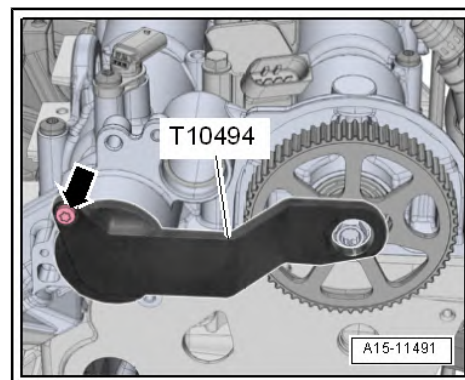
- Camshaft clamp - T10494- attached to camshaft housing.



#### Caution

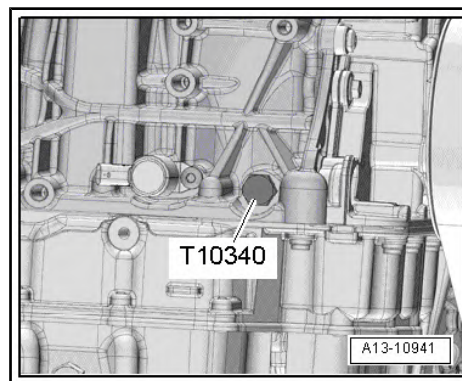
*Risk of damaging the camshafts.*

- ◆ *Do not use the camshaft clamp -T10494- as a counter-holder.*

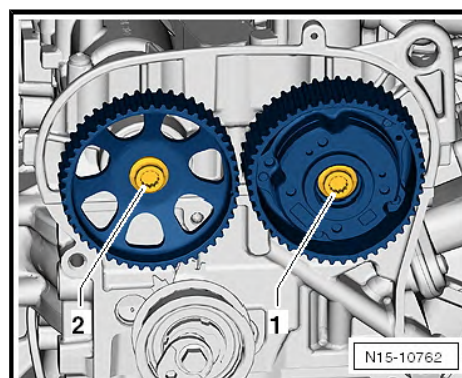




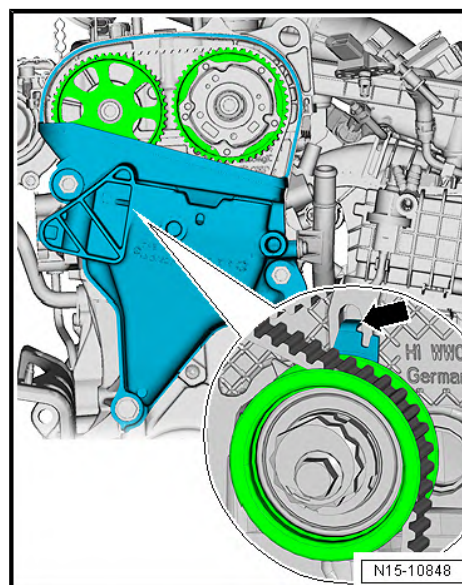
- Fixing screw - T10340- turned up to the stop in the cylinder block and tightened to 30 Nm.
- Crankshaft in engine direction of rotation applied to the fixing screw - T10340- = "TDC" position.



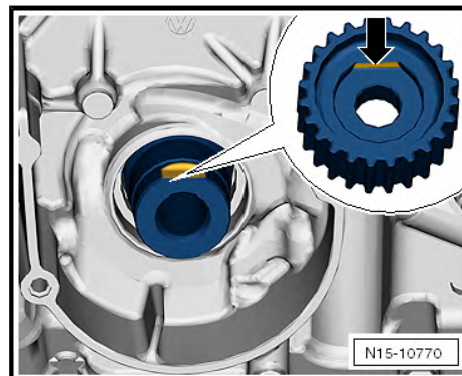
- Replace screws -1-, -2- for camshaft sprocket and insert them loosely.
- It must still be possible to turn the camshaft sprockets on the camshafts, however they must not tilt.



- The sheet peg -arrow- of the tensioning pulley must engage in the cast iron recess of the cylinder head.

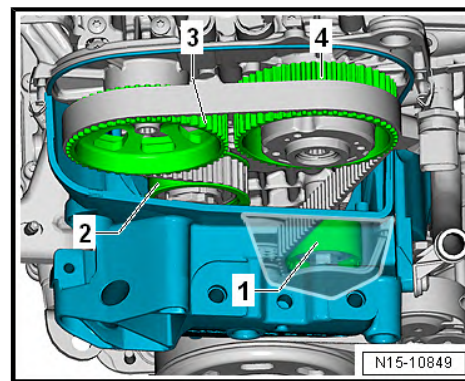


- Fit crankshaft toothed belt pulley onto the crankshaft.
- The contact surface between the V-ribbed belt pulley and the crankshaft toothed belt pulley must be free of oil and grease.
- Milled surface -arrow- on the crankshaft toothed belt must be positioned on the crankshaft stub.



**Observe sequence when fitting the toothed belt.**

- Pull toothed belt upwards, place onto the guide pulley -1- and the tensioning pulley -2- and the camshaft sprockets -3- and -4-.





- Turn the eccentric -2- of the tensioning pulley with the wrench -T10499- in the -direction of arrow- until the setting pointer -3- is approx. 10 mm to the right of the setting window.
- Push eccentric so far back that the adjustment pointer is positioned exactly in the adjustment window.



### Caution

**Risk of engine damage.**

**To tighten, the torque wrench - VAS 6583- or torque wrench - V.A.G 1410- must be used!**

**To tighten, no other torque wrench may be used!**

Tighten with torque wrench VAS 6583



### Caution

**Only use the torque wrench together with insertion tool - T10500- !**

**When setting the tightening torque on the torque wrench - VAS 6583- the actual dimension specified on the tool insert - T10500- must be put into the torque wrench!**

- Keep eccentric in this position and tighten screw -1- to 25 Nm. To do so, use the insertion tool - T10500- with torque wrench - VAS 6583- .

Tighten with torque wrench VAG 1410



### Caution

**Only use the torque wrench together with insertion tool - T10500- !**

**Set the reduced tightening torque of 12 Nm on the torque wrench - V.A.G 1410-**

**The required tightening torque of 25 Nm is achieved by the extending the torque wrench - V.A.G 1410- around the tool insert - T10500- !**

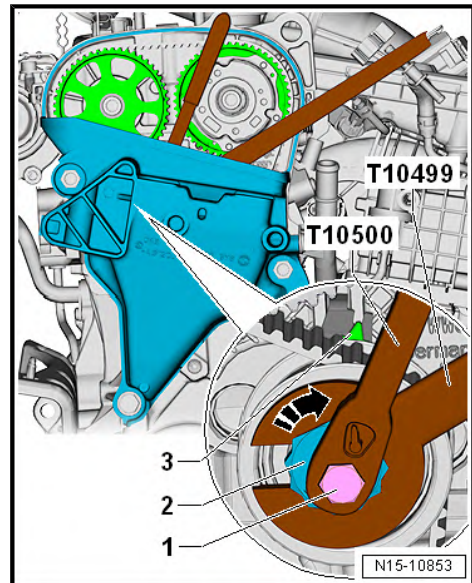
- Keep eccentric in this position and tighten screw -1- to the reduced tightening torque 12 Nm. To do so, use the insertion tool - T10500- with torque wrench - V.A.G 1410- .

Continued

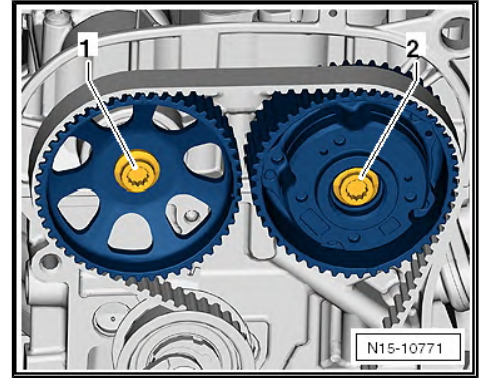


### Note

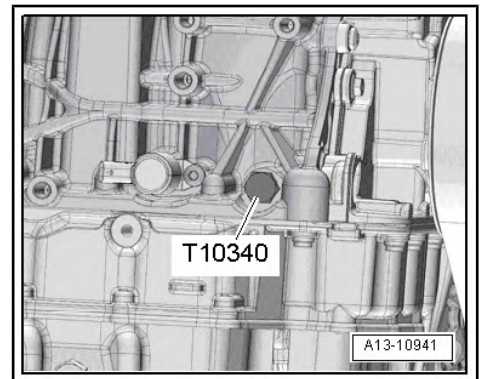
*If the engine continued to turn or has run, there may be slight deviations of the adjustment pointer -3- setting in the adjustment window. This has no influence on the toothed belt tensioning.*



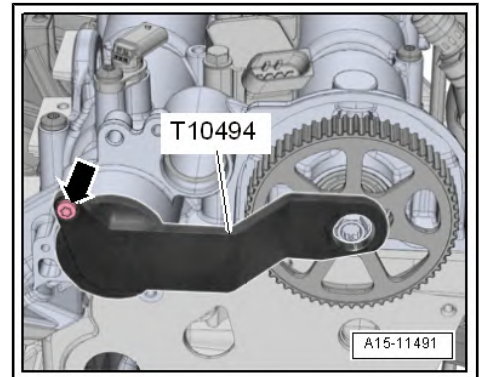
- Pre-tighten screws -1-, -2- to 50 Nm, to do so, use the counterholder - T10172- with adapters -T10172/2- and -T10172/1-.



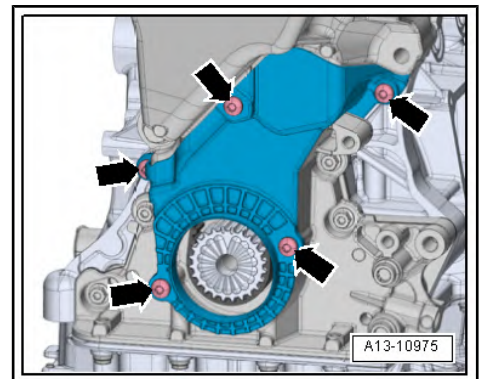
- Unscrew positioning screw - T10340- .



- Unscrew bolt -arrow- and remove camshaft clamp -T10494- .



- Install the bottom toothed belt guard -arrows-.
- Install the oscillation damper  
⇒ ["1.4 Removing and installing ribbed belt pulley", page 40](#) .





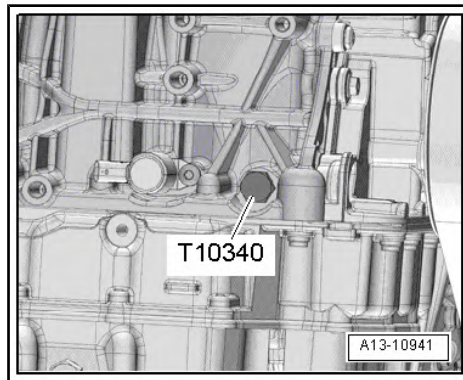
### Test timing:

- Turn the crankshaft in direction of rotation of engine by 2 turns.
- Turn the fixing screw - T10340- up to the stop in the cylinder block and tighten to 30 Nm.
- Turn the crankshaft further in direction of rotation of engine to the stop.
- The crankshaft cheek must now be resting on the fixing screw.



### Note

*The crankshaft is only locked in direction of rotation of engine using the fixing screw - T10340- .*



### Note

- ◆ *The camshaft clamp -T10494- must move into position easily.*
- ◆ *The camshaft clamp must not be positioned using any kind of hammer.*

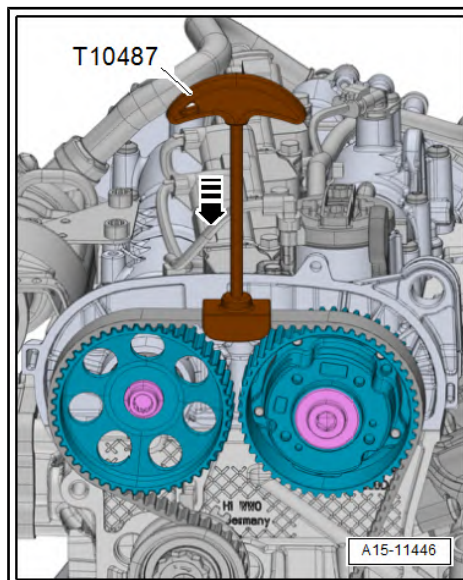
If camshaft clamp - T10494- cannot be installed:



### Caution

***To prevent damage to the belt, do not use sharp-edged tools!***

- Using the assembly tool - T10487- in -direction of arrow- press on the toothed belt.

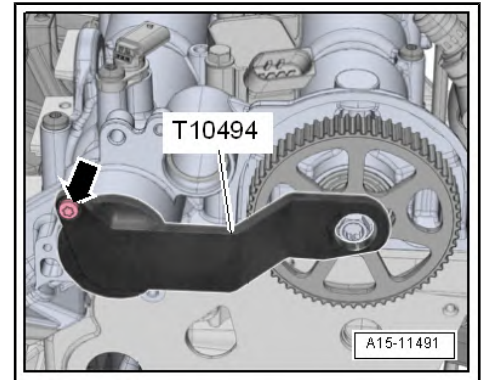


- While doing so, insert camshaft control -T10494- to stop into camshafts and tighten screw -arrow- hand-tight.

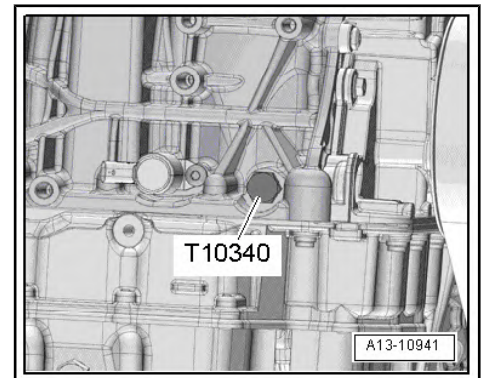
If it is not possible to insert the camshaft clamp -T10494- , the timing is NOK:

- Repeat control time settings.

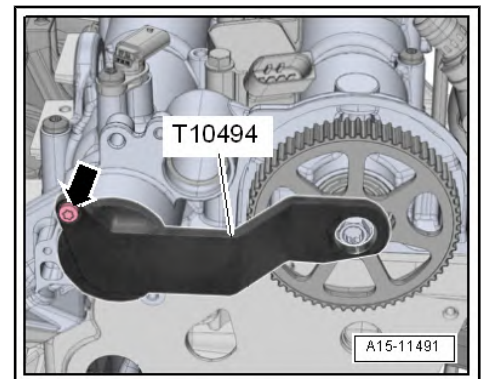
If it is possible to insert the camshaft clamp -T10494- , the timing is OK:



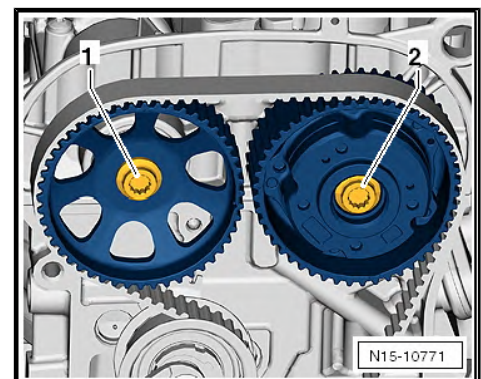
- Unscrew positioning screw - T10340- .



- Unscrew bolt -arrow- and remove camshaft clamp -T10494- .



- Pre-tighten screws -1-, -2- to final tightening torque  
⇒ [“2.2 Summary of components - toothed belt”, page 80](#) , to do so use counterholder - T10172- with adapters -T10172/2- and -T10172/1- .





- Tighten locking screw -1- to 20 Nm, to do so, use the counterholder - T10172- with the adapter -T10172/1- .



### Caution

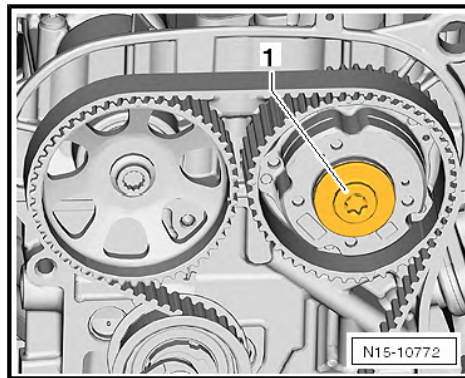
*Risk of destruction of the engine.*

- ◆ *After completing the work, check whether the positioning screw - T10340- and camshaft clamp -T10494- are removed.*

Further installation occurs in reverse order.

### Tightening torques

- ◆ ⇒ [“1.1 V-ribbed belt - Summary of components”, page 34](#)
- ◆ ⇒ [“2.1 Summary of components - toothed belt guard”, page 79](#)
- ◆ ⇒ [“2.2 Summary of components - toothed belt”, page 80](#)
- ◆ ⇒ [Fig. ““Unscrew locking screw TDC bore at the cylinder block - tightening torque””, page 81](#)
- ◆ ⇒ [“1.2 Summary of components - camshaft housing”, page 68](#)
- ◆ ⇒ [“1.1 Summary of components - exhaust gas turbocharger”, page 221](#)
- ◆ ⇒ [“2.1 Summary of components - coolant pump/coolant thermostat”, page 154](#)
- ◆ ⇒ [“2.1 Summary of components - charge air system”, page 228](#)
- ◆ Remove the sound dampening system ⇒ Body Work; Rep. gr. 66 .



### 3 Valve gear

⇒ [“3.1 Assembly overview - valve gear”, page 113](#)

⇒ [“3.2 Measuring axial play of camshaft”, page 114](#)

⇒ [“3.3 Removing and installing camshaft control”, page 114](#)

⇒ [“3.4 Removing and installing camshaft oil seal”, page 115](#)

⇒ [“3.5 Removing and installing N205 the camshaft adjustment valve 1”, page 119](#)

⇒ [“3.6 Removing and installing valve stem seal”, page 119](#)

#### 3.1 Assembly overview - valve gear

##### 1 - Inlet valve

- ☐ do not rework, only grinding in is permissible
- ☐ valve dimensions  
⇒ [“4.3 Valve dimensions”, page 125](#)
- ☐ inspecting valve guides  
⇒ [“4.1 Checking valve guides”, page 125](#)

##### 2 - Exhaust valve

- ☐ do not rework, only grinding in is permissible
- ☐ valve dimensions  
⇒ [“4.3 Valve dimensions”, page 125](#)
- ☐ inspecting valve guides  
⇒ [“4.1 Checking valve guides”, page 125](#)

##### 3 - Cylinder head

##### 4 - Valve stem seal

- ☐ Renew  
⇒ [“3.6 Removing and installing valve stem seal”, page 119](#) .

##### 5 - Valve spring

- ☐ Fitting position  
⇒ [page 114](#)

##### 6 - Valve spring plate

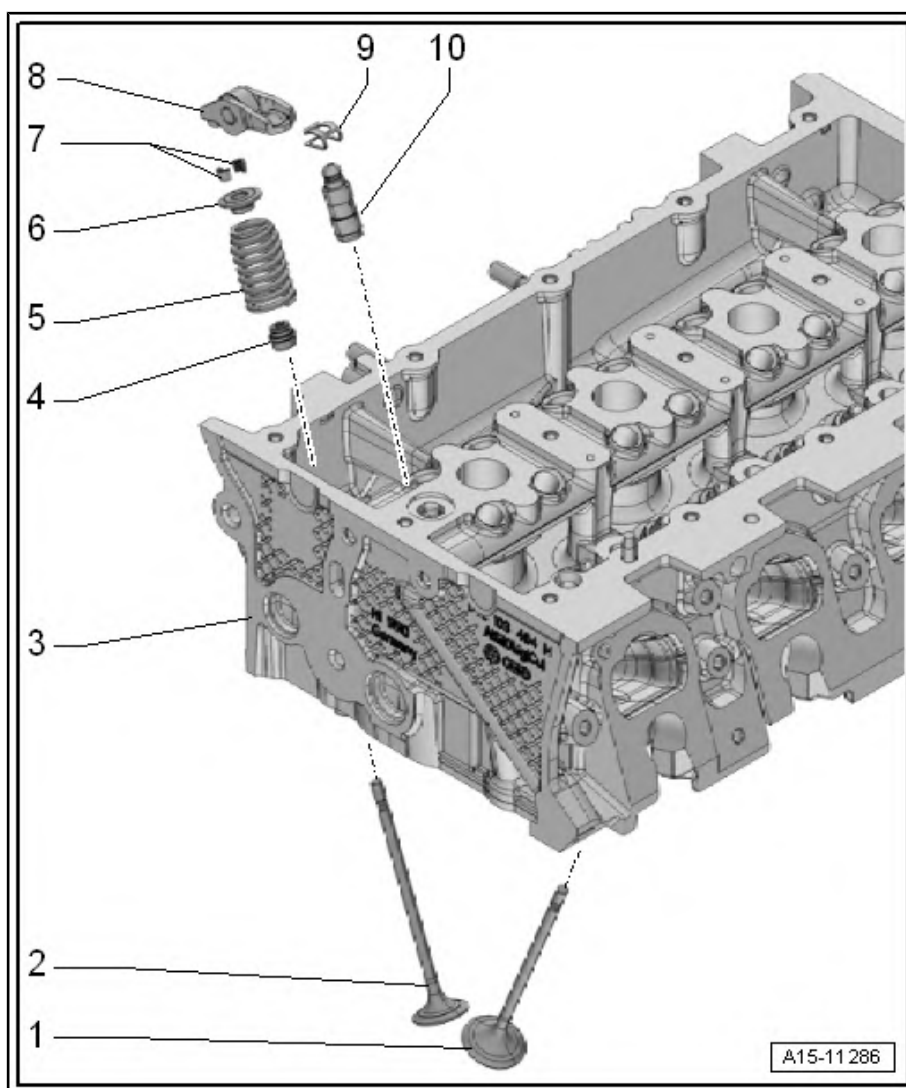
##### 7 - Valve collets

##### 8 - Roller rocker finger

- ☐ installing and removing  
⇒ [“1.4 Removing and installing camshaft housing”, page 73](#)
- ☐ mark the fitting position for re-installation
- ☐ inspect roller bearings for smooth operation
- ☐ oil the contact surfaces before installing

##### 9 - Locking clip

- ☐ for hydraulic balancing element



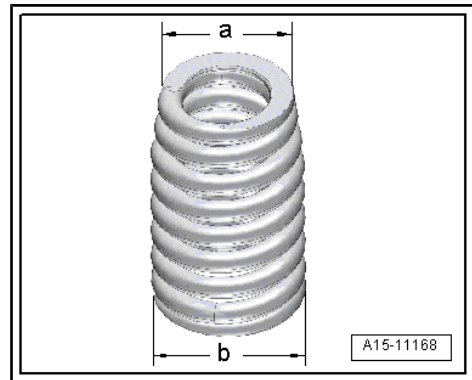


## 10 - Hydraulic balancing element

- ☐ Do not interchange
- ☐ Oil contact surface

### Fitting position of the valve spring

- The small  $\varnothing$  -a- points to the valve spring plate.
- The small  $\varnothing$  -b- points to the cylinder head.



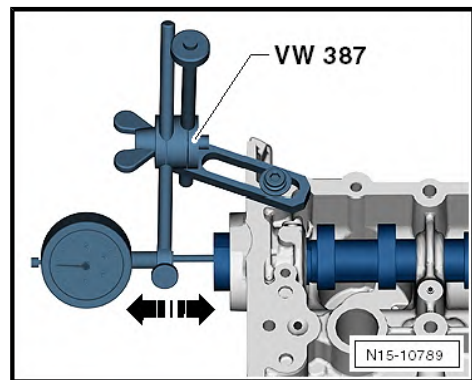
## 3.2 Measuring axial play of camshaft

### Special tools and workshop equipment required

- ◆ Universal dial gauge bracket - MP3-447 (VW 387)-
- ◆ Dial gauge , e.g. -VAS 6079-

### Checking camshaft axial clearance

- Remove camshaft housing  
⇒ ["1.4 Removing and installing camshaft housing", page 73](#) .
- Secure dial gauge - VAS 6079- with the universal dial gauge bracket - VW 387- to the camshaft housing, as shown in the illustration.
- Press the camshaft by hand against the dial gauge.
- Position dial gauge to "0".
- Press the camshaft off the dial gauge and read the value:



Axial clearance:

- Wear limit: 0.25 mm.

## 3.3 Removing and installing camshaft control

### Removing

- Remove the toothed belt from the camshafts  
⇒ ["2.4 Remove the toothed belt from the camshaft", page 86](#) .

### Install

Installation is carried out in the reverse order.

### Tightening torques

- ◆ ⇒ ["1.1 V-ribbed belt - Summary of components", page 34](#)
- ◆ ⇒ ["2.1 Summary of components - toothed belt guard", page 79](#)
- ◆ ⇒ ["3.1 Summary of components", page 170](#)
- ◆ ⇒ ["2.4 Check assembly bracket setting", page 31](#)

## 3.4 Removing and installing camshaft oil seal

⇒ [“3.4.1 Removing and installing the camshaft sealing ring on the belt pulley side”, page 115](#)

⇒ [“3.4.2 Removing and installing the camshaft sealing ring for the exhaust camshaft”, page 116](#)

⇒ [“3.4.3 Removing and installing the camshaft sealing ring for exhaust camshaft on the gearbox side”, page 118](#)

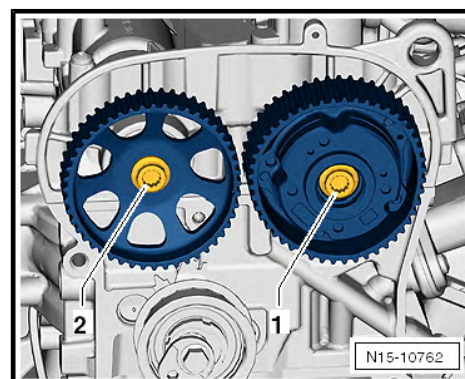
### 3.4.1 Removing and installing the camshaft sealing ring on the belt pulley side

Special tools and workshop equipment required

- ◆ Assembly tool - T10478 B- with screw -T10478/5-
- ◆ Extraction hook - T20143/1-

#### Removing

- Remove the toothed belt from the camshaft sprockets  
⇒ [“2.4 Remove the toothed belt from the camshaft”, page 86](#) .
- Unscrew screw -1- and remove camshaft sprocket.



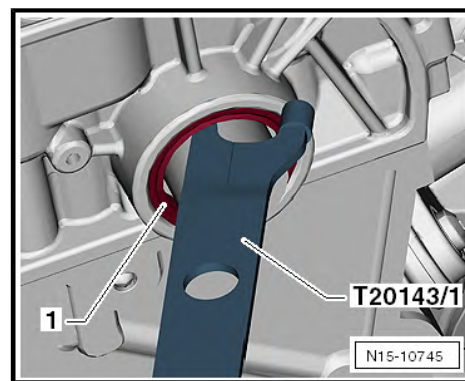
- Remove seal -1- using extractor hook -T20143/1- .

#### Install

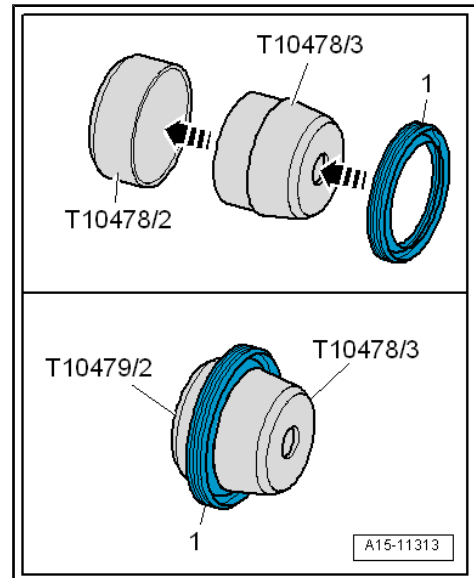


Note

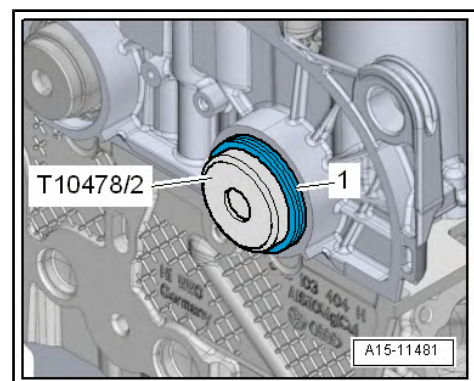
*Do not oil new sealing ring.*



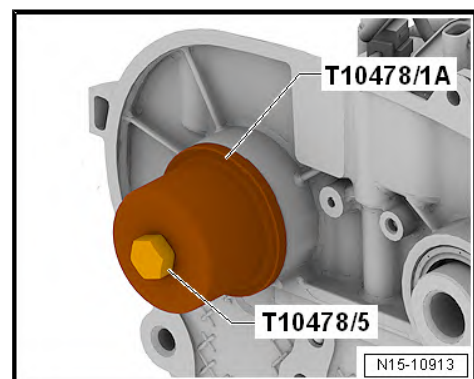
- Push sealing ring -1- over the receiver tube -T10478/3- onto the guide bushing -T10478/2- .
- Fitting position: Closed side of sealing ring points to the receiver tube.
- Disconnect receiver tube and guide bushing.



- Place guide bushing -T10478/2- with sealing ring -1- onto the camshaft.



- Pull sealing ring with thrust piece -T10478/1A- and screw -T10478/5- for camshaft sprocket as far as it can go.
- install (set the timing)  
⇒ ["2.4 Remove the toothed belt from the camshaft", page 86](#) .



### 3.4.2 Removing and installing the camshaft sealing ring for the exhaust camshaft

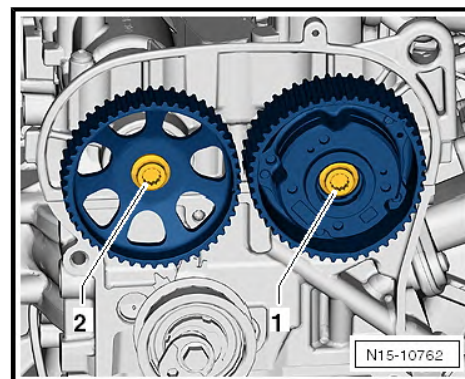
#### Special tools and workshop equipment required

- ◆ Assembly tool - T10478 B- with screw -T10478/5-
- ◆ Extraction hook - T20143/1-

#### Removing

- Remove the toothed belt from the camshafts  
⇒ ["2.4 Remove the toothed belt from the camshaft", page 86](#) .

- Unscrew screw -2- and remove camshaft sprocket.



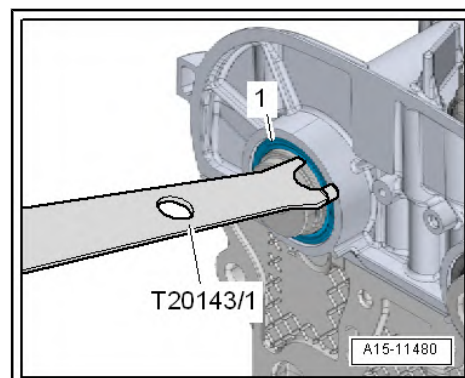
- Remove seal -1- using extractor hook -T20143/1- .

#### Install

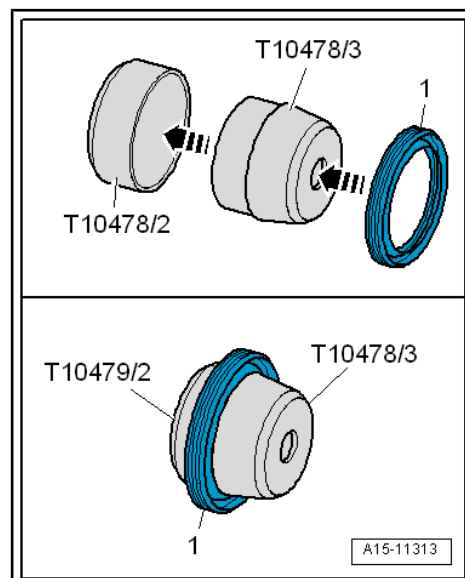


#### Note

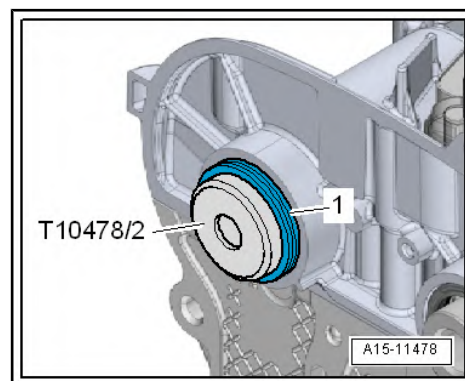
*Do not oil new sealing ring.*



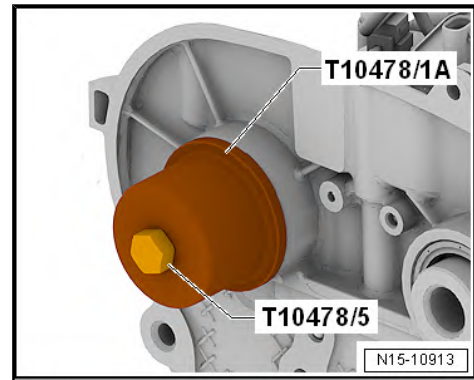
- Push sealing ring -1- over the receiver tube -T10478/3- onto the guide bushing -T10478/2- .
- Fitting position: Closed side of sealing ring points to the receiver tube.
- Disconnect receiver tube and guide bushing.



- Position guide bushing -T10478/2- with seal -1- on camshaft.



- Pull in -T10478/1A- with the screw -T10478/5- to the stop.
- install (set the timing)  
⇒ [“2.4 Remove the toothed belt from the camshaft”, page 86](#) .



### 3.4.3 Removing and installing the camshaft sealing ring for exhaust camshaft on the gearbox side

#### Special tools and workshop equipment required

- ◆ Assembly tool - T10479 A-
- ◆ Extraction hook - T20143/1-

#### Removing

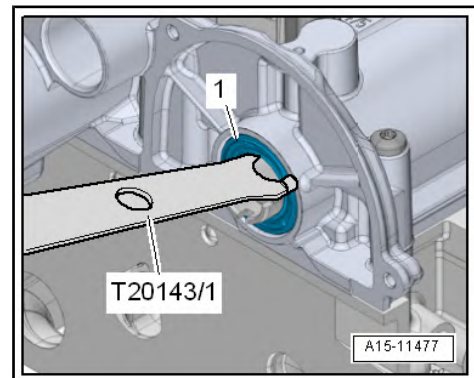
- Remove toothed belt pulley for coolant pump  
⇒ [“2.5 Removing and installing toothed belt pulley for coolant pump”, page 162](#) .
- Carefully fit extractor hook -T20143/1- between camshaft and seal -1-.
- Lever out sealing ring.

#### Install

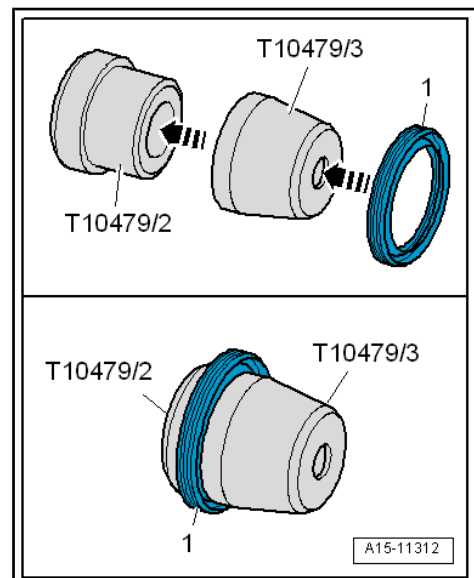


#### Note

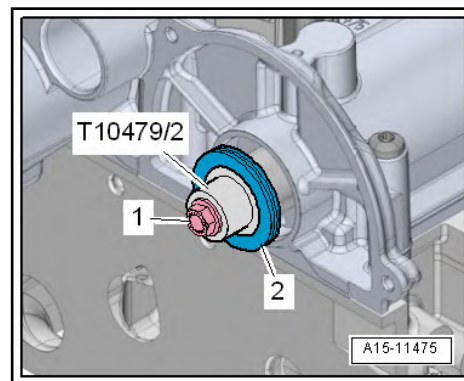
*Do not oil new sealing ring.*



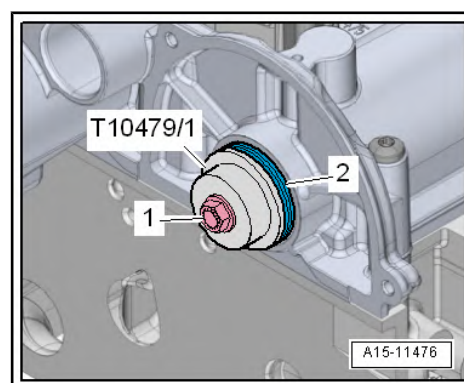
- Push sealing ring -1- over the receiver tube -T10479/3- onto the guide bushing -T10479/2- .
- Fitting position: Closed side of sealing ring points to the receiver tube.
- Disconnect receiver tube and guide bushing.



- Fit guide bushing -T10479/2- with sealing ring -2- centrally on to the camshaft.
- Fix guide bushing with screw -1- for coolant pump driving wheel onto the camshaft.
- Push sealing ring onto camshaft, unscrew guide bushing.



- Pull sealing ring -2- into the stop using the thrust piece - T10479/1- and the screw -1- for coolant pump driving wheel.
- Install toothed belt pulley for coolant pump  
⇒ [“2.5 Removing and installing toothed belt pulley for coolant pump”, page 162](#) .



### 3.5 Removing and installing - N205- the camshaft adjustment valve 1

#### Removing

- Disconnect plug connection -1-.
- Unscrew screw -2- and remove camshaft control valve 1 - N205- .

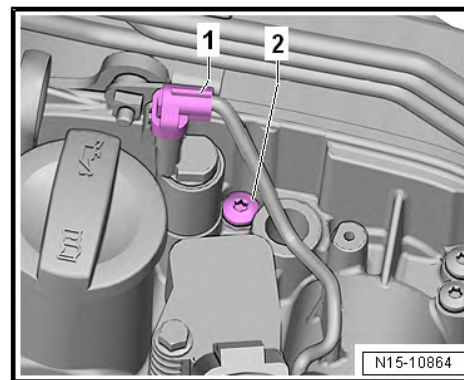
#### Install

Installation is carried out in the reverse order. When installing, observe the following:



Note

*Renew O-ring.*



#### Tightening torques

| Component                          | Nm   |
|------------------------------------|------|
| Screw for camshaft control valve 1 | 8 Nm |

### 3.6 Removing and installing valve stem seal

⇒ [“3.6.1 Removing and installing valve stem seal with cylinder head installed”, page 119](#)

⇒ [“3.6.2 Removing and installing valve stem seal with cylinder head removed”, page 122](#)

#### 3.6.1 Removing and installing valve stem seal with cylinder head installed

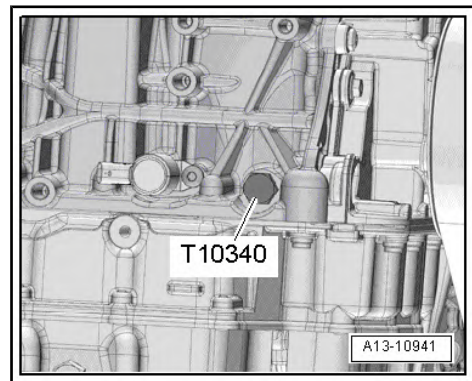
Special tools and workshop equipment required



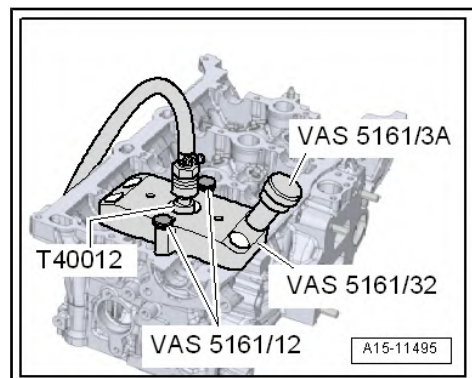
- ◆ Spark plug wrench , e.g. -3122 B-
- ◆ Disassembly and assembly device for valve collets - VAS 5161A- with set - VAS 5161A/32-
- ◆ Adapter - T40012-
- ◆ Valve stem seal fitting tool - MP1-233 (3365)-
- ◆ Valve stem e. g. -VAS 6770-

### Work procedure

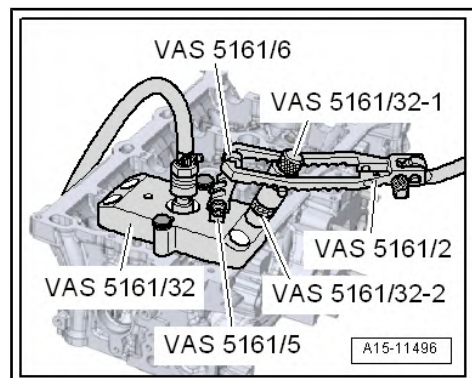
- Remove camshaft housing  
⇒ ["1.4 Removing and installing camshaft housing", page 73](#) .
- Release spark plugs with spark plug wrench , e.g. -3122 B- .
- Unscrew positioning screw - T10340- .
- Put the piston of the relevant cylinder at "bottom dead centre".



- Place guide plate -VAS 5161A/32- on the cylinder head and screw on using the knurled screws -VAS 5161/12- .
- Screw in adapter - T40012- with seal ring hand-tight into the corresponding plug connector thread.
- Connect the adapter to the compressed air with a commercially available intermediate piece and apply constant pressure.
- Minimum pressure: 0.6 MPa (6 bar)
- Insert the impact drift -VAS 5161/3A- 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.
- Insert assembly cartridge -VAS 5161A/32-1- with sleeve mounted -VAS 5161A/32-2- into the guide plate.
- 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 assembly cartridge.
- Unscrew guide plate and turn it to the side.
- T compressed air hose remains connected.
- Remove the valve spring with the valve spring retainer.

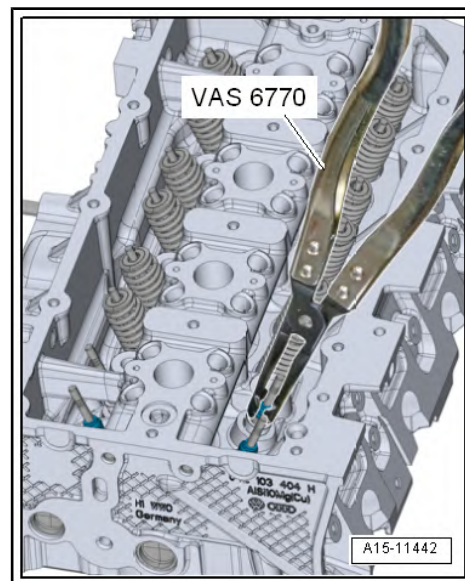


- Pull off valve stem seal with valve shaft pliers , for example - VAS 6770- .

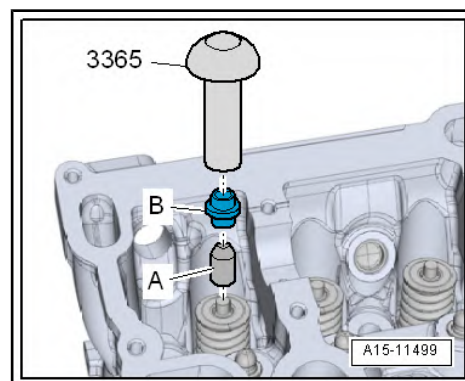


**Caution**

*There is a risk of damage when installing the valve stem seals.*

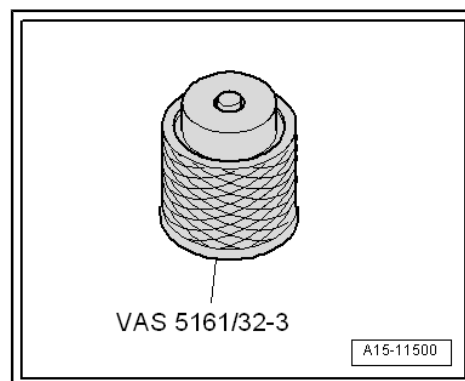


- Fit the plastic bushing -A-, which is attached to the new valve stem seals -B-, onto the valve stem.
- Lightly oil sealing lip of the valve stem seal.
- Slide the valve stem seal onto the plastic bushing.
- Carefully press the valve stem seal with the valve stem seal insertion tool - 3365- onto the valve guide.
- Remove plastic sleeve.



If the valve collets were removed from the assembly cartridge, first of all they must be inserted into the device - VAS 5161A/32-3- .

- The large diameter of the valve collets points to the top.
- Press the assembly cartridge from the top onto the device - VAS 5161A/32-3- and lift up the valve collets.
- Insert the valve spring and the valve spring retainer, installation position of valve spring ⇒ [page 114](#) .

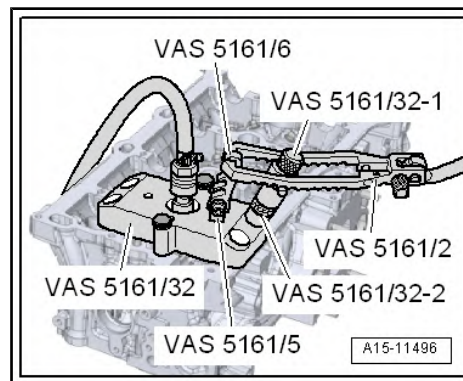


- Screw the guide plate -VAS 5161A/32- back onto the cylinder head.
- Insert assembly cartridge -VAS 5161A/32-1- with sleeve -VAS 5161A/32-2- into the guide plate.
- Press down the pressure fork and turn the knurled screw to the left and to the right while pulling it upwards, by doing so the valve collets are inserted.
- Release the pressure fork on tightened knurled screw.
- Repeat the procedure for each valve.

#### Assembling

Assembly is carried out in the reverse order. When installing, observe the following.

- Install spark plugs ➔ Maintenance ; Booklet Octavia III .
- Install camshaft housing  
⇒ [“1.4 Removing and installing camshaft housing”, page 73](#) .



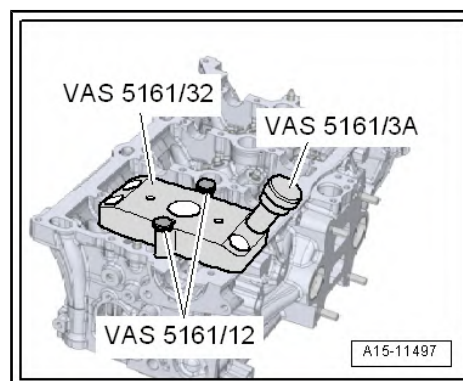
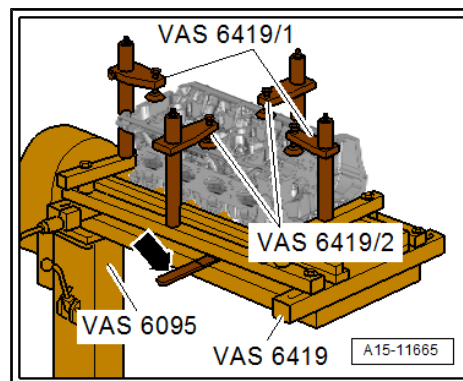
### 3.6.2 Removing and installing valve stem seal with cylinder head removed

#### Special tools and workshop equipment required

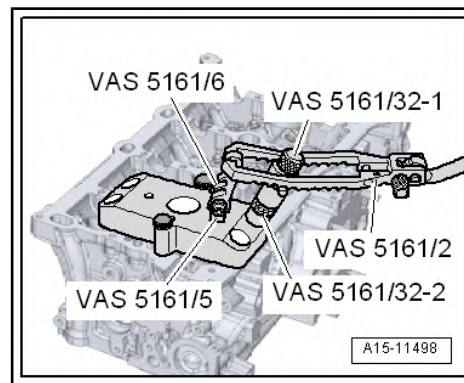
- ♦ Disassembly and assembly device for valve collets - VAS 5161A- with set - VAS 5161A/32-
- ♦ Engine and gearbox support - VAS 6095-
- ♦ Cylinder head tensioning device - VAS 6419-
- ♦ Valve stem e. g. -VAS 6770-
- ♦ Valve stem seal fitting tool - MP1-233 (3365)-

#### Work procedure

- Remove cylinder head  
⇒ [“1.3 Removing and installing cylinder head”, page 69](#) .
- Insert the cylinder head tensioning device - VAS 6419- into the engine and gearbox jack - VAS 6095- .
- Tension the cylinder head in the cylinder head tensioning device, as shown in the illustration.
- Connect cylinder head tensioning device to compressed air.
- Adjust the air bellows with the lever -arrow- below the combustion chamber on which the valve stem seals should be removed.
- Allow just enough air to flow into the air bag so that it applied to the valve disc.
- Place guide plate -VAS 5161A/32- on the cylinder head and screw on using the knurled screws -VAS 5161/12- .
- Insert the impact drift -VAS 5161/3A- into the guide plate and knock off the tightly fitted valve collets using a plastic hammer.

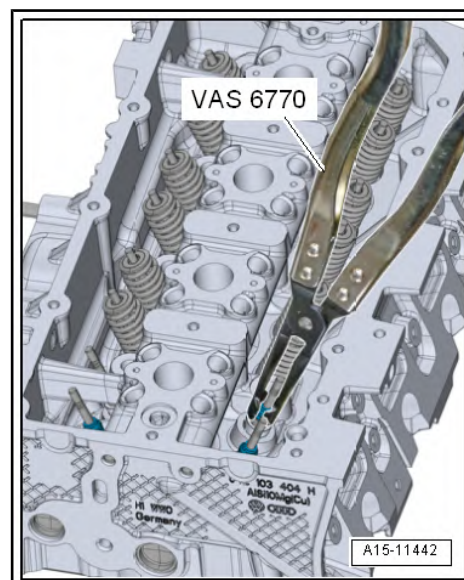


- Screw the detent part -VAS 5161/6- with the interlocking fork -VAS 5161/5- into the guide plate.
- Insert assembly cartridge -VAS 5161A/32-1- with sleeve mounted -VAS 5161/32-2- into the guide plate.
- Hook the pressure fork -VAS 5161/2- onto the detent part and push the assembly cartridge downwards.
- 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 assembly cartridge.
- Unscrew guide plate and turn it to the side.
- Remove the valve spring with the valve spring retainer.
- Pull off valve stem seal with valve shaft pliers , for example -VAS 6770- .

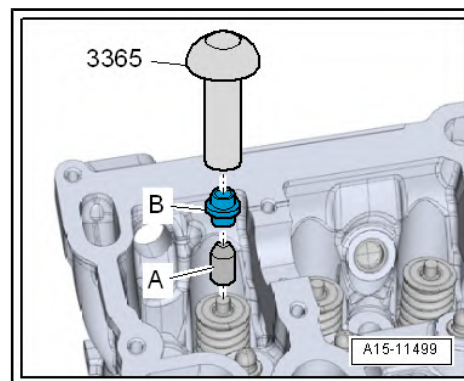


**Caution**

*Risk of damage when installing the valve stem seals.*



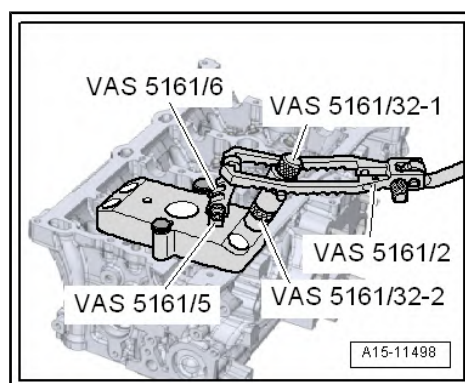
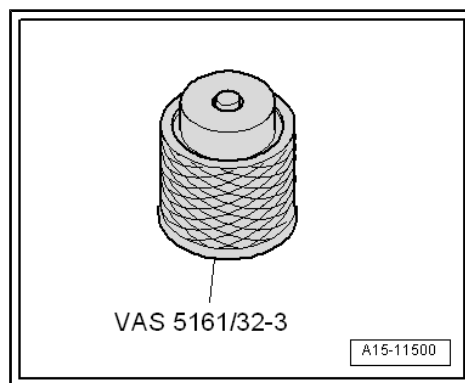
- Fit the plastic bushing -A-, which is attached to the new valve stem seals -B-, onto the valve stem.
- Lightly oil sealing lip of the valve stem seal.
- Slide the valve stem seal onto the plastic bushing.
- Carefully press the valve stem seal with the valve stem seal insertion tool - MP1-233 (3365)- 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 device - VAS 5161A/32-3- .

- The large diameter of the valve collets points to the top.
- Press the assembly cartridge from the top onto the device - VAS 5161A/32-3- and lift up the valve collets.
- Insert the valve spring and the valve spring retainer, installation position of valve spring ⇒ [page 114](#) .
- Screw the guide plate -VAS 5161A/32- back onto the cylinder head.
- Insert assembly cartridge -VAS 5161A/32-1- with sleeve -VAS 5161A/32-2- into the guide plate.
- 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.
- Install cylinder head  
⇒ [“1.3 Removing and installing cylinder head”, page 69](#) .



## 4 Inlet and exhaust valves

⇒ [“4.1 Checking valve guides”, page 125](#)

⇒ [“4.2 Testing valves”, page 125](#)

⇒ [“4.3 Valve dimensions”, page 125](#)

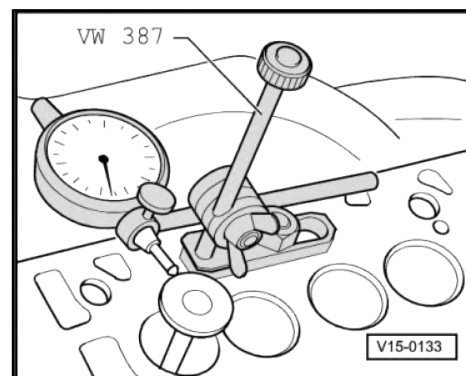
### 4.1 Checking valve guides

**Special tools and workshop equipment required**

- ◆ Universal dial gauge bracket - MP3-447 (VW 387)-
- ◆ Dial gauge , e.g. -VAS 6079-

**Test procedure**

- Insert valve into guide. The end of the valve stem must be flush with the guide. On account of differing stem diameters, only use inlet valve in inlet guide and exhaust valve in exhaust guide.
- Determine valve rock.
- Wear limit: 0.5 mm.
- If the wear limit is exceeded, repeat measurement with new valves.
- If the wear limit is again exceeded, replace cylinder head.



**Note**

*The valve guides cannot be changed.*

### 4.2 Testing valves

- Check valves on the shank and seat surface for scoring.
- If scoring is clearly visible, change valve.

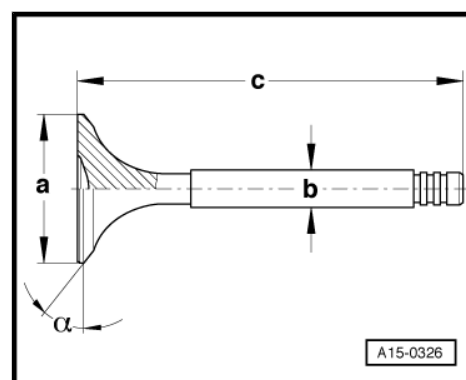
### 4.3 Valve dimensions



**Note**

*Inlet and exhaust valves must not be reworked. Only lapping-in is permitted.*

| Dimension |    | Inlet valve | Exhaust valve |
|-----------|----|-------------|---------------|
| Ø a       | mm | 26.5        | 23.5          |
| Ø b       | mm | 4.973       | 4.963         |
| c         | mm | 110.25      | 110.09        |
| α         | °  | 45          | 30            |





## 17 – Lubrication

### 1 Lubrication system

⇒ [“1.1 Oil sump and oil pump - Summary of components”, page 126](#)

⇒ [“1.2 Removing and installing oil sump”, page 128](#)

⇒ [“1.3 Removing and installing oil pump”, page 131](#)

⇒ [“1.4 Removing and installing oil level and oil temperature sender G266”, page 134](#)

#### 1.1 Oil sump and oil pump - Summary of components



#### Note

- ♦ If considerable quantities of metal swarf or abrasion is found when carrying out an engine repair, this can be subject to damage to the crankshaft and conrod bearings. In order to prevent consequential damage, the following tasks must be performed after the repair: Clean oil channels carefully; change oil injection nozzles, engine oil cooler and oil filter.
- ♦ Oil spray nozzle and pressure relief valve ⇒ [page 61](#) .

#### 1 - Dipstick

- ☐ Oil capacities ⇒ Maintenance ; Booklet Octavia III

#### 2 - Screw cap

#### 3 - Vent valve

- ☐ Check fitting position

#### 4 - O-ring

- ☐ replace after removal
- ☐ Moisten with oil before installing

#### 5 - Screening

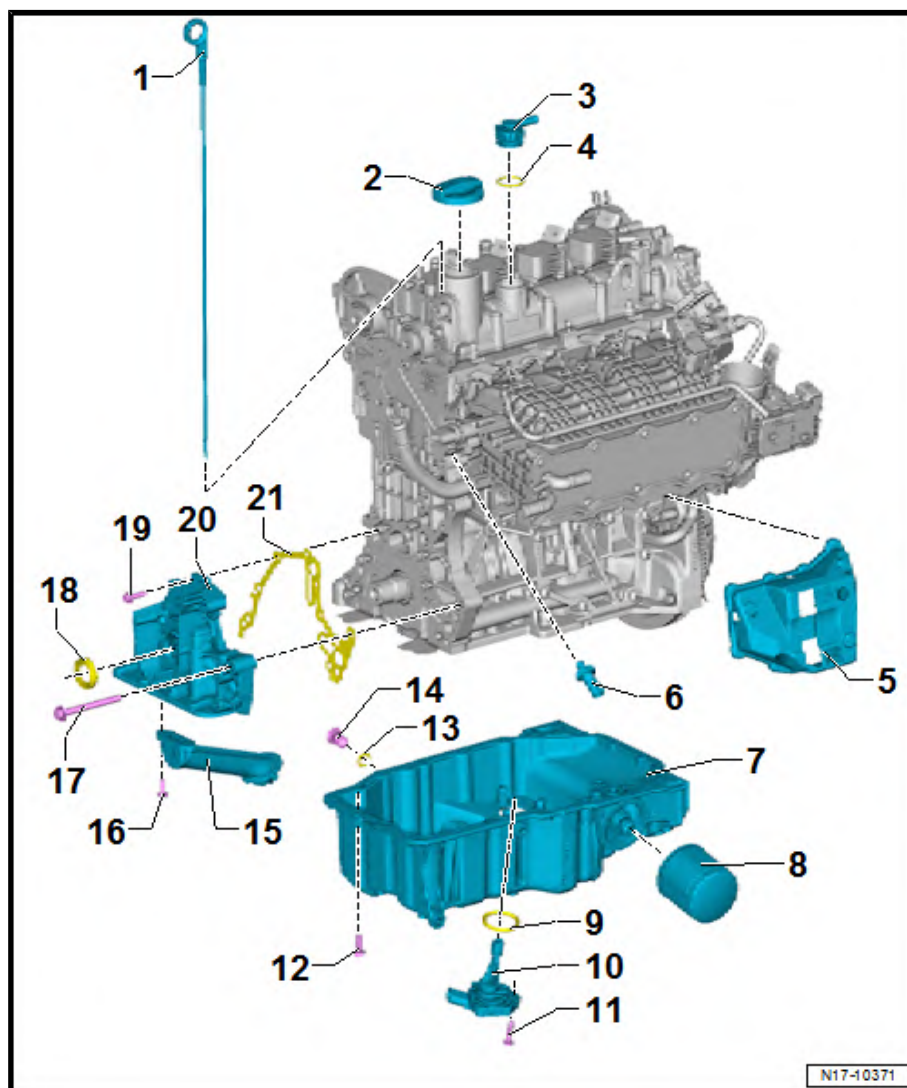
- ☐ For oil separator

#### 6 - Oil pressure switch for reduced oil pressure F378

- ☐ Screw in 3 threads by hand
- ☐ check  
⇒ [“4.3 Checking oil pressure and oil pressure switch”, page 142](#)
- ☐ installing and removing  
⇒ [“4.2 Removing and installing oil pressure switch for reduced oil pressure F378”, page 141](#)
- ☐ 20 Nm

#### 7 - Oil sump

- ☐ installing and removing  
⇒ [“1.2 Removing and installing oil sump”,](#)



[page 128](#)

#### 8 - Oil filter

- ☐ Moisten gasket with oil before installing
- ☐ In case of damage to the outer skin, the oil filter must be replaced
- ☐ 20 Nm

#### 9 - Sealing ring

- ☐ replace after removal

#### 10 - Oil level and oil temperature sender - G266-

- ☐ installing and removing  
⇒ ["1.4 Removing and installing oil level and oil temperature sender G266 ", page 134](#)

#### 11 - Bolt

- ☐ 8 Nm

#### 12 - Bolt

- ☐ Tightening torque and tightening order ⇒ [page 128](#)

#### 13 - Sealing ring

- ☐ replace after removal

#### 14 - Oil drain plug



##### Note

- ◆ *Replace the oil drain plug when it has an integrated sealing ring.*
- ◆ *Always replace the gasket ring.*

- ☐ 30 Nm

#### 15 - Suction line

#### 16 - Bolt

- ☐ 8 Nm

#### 17 - Bolt

- ☐ for the tensioning device
- ☐ Tightening torques ⇒ ["1.1 V-ribbed belt - Summary of components", page 34](#)

#### 18 - Sealing ring

- ☐ Renew ⇒ ["1.6 Renewing crankshaft oil seal - belt pulley end", page 44](#) .
- ☐ for oil pump drive

#### 19 - Screw

- ☐ replace after removal
- ☐ Tightening torques ⇒ [page 133](#)

#### 20 - Oil pump

- ☐ installing and removing ⇒ ["1.3 Removing and installing oil pump", page 131](#)

#### 21 - Gasket

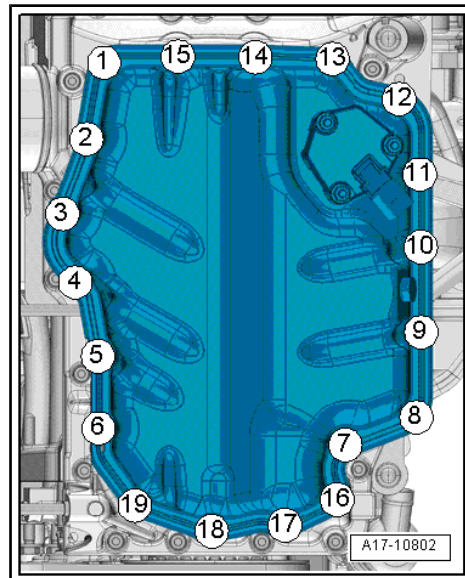
- ☐ replace after removal
- ☐ Observe positioning of runners



### Oil sump - tightening torque and tightening order

- Tighten screws in steps in the given sequence:

| Stage | Screws     | Tightening torque                      |
|-------|------------|----------------------------------------|
| 1st   | -1 ... 19- | by hand as far as the stop             |
| 2nd   | -1 ... 19- | 8 Nm + torque a further 90° (1/4 turn) |



## 1.2 Removing and installing oil sump

### Special tools and workshop equipment required

- ♦ Oil filter tool - 3417-
- ♦ Socket - T10058-
- ♦ Cleaning and degreasing agent , e.g. -D 009 401 04-
- ♦ Protective goggles and gloves
- ♦ Silicone sealant ⇒ Electronic Catalogue of Original Parts“ET-KA”
- ♦ Catch pan , e.g. -VAS 6208-

### Removing

- Drain engine oil ⇒ Maintenance ; Booklet Octavia III .
- Remove oil filter with oil filter tool - 3417- .
- Remove V-ribbed belt  
⇒ [“1.2 Removing and installing poly V-belt”, page 37](#) .

### Only vehicles with air conditioner



#### Note

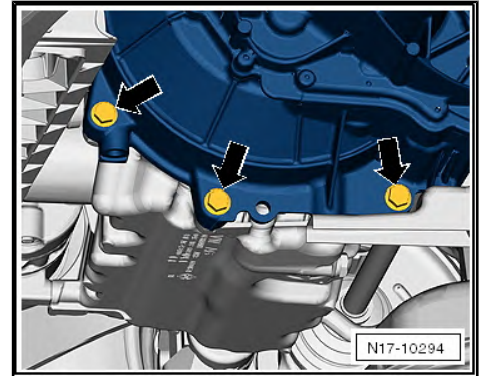
- ♦ *The air conditioning system lines must not be opened.*
- ♦ *Prevent damage to condenser and refrigerant lines and hoses.*
- ♦ *Do NOT stretch, kink or bend lines and hoses.*
- Remove AC compressor ⇒ Heating, Air Conditioning; Rep. gr. 87 .
- Secure AC compressor to lock carrier.

Volkswagen Technical Site: <http://vwts.ru> <http://vwts.info>

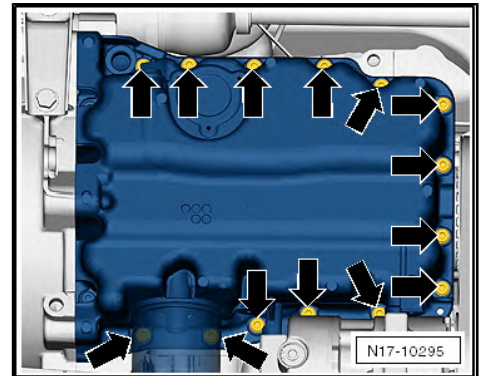
огромный архив документации по автомобилям Volkswagen, Skoda, Seat, Audi

**Continued for all vehicles**

- Remove securing bolt -arrows- for gearbox.
- Disconnect connect for oil level and oil temperature sender - G266-  
⇒ ["1.4 Removing and installing oil level and oil temperature sender G266", page 134](#) .



- Unscrew all sump securing bolts -arrows-.

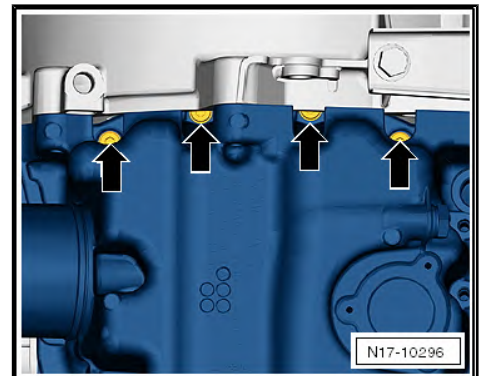


- Unscrew sump securing bolts on gearbox side -arrows- using Allen key, long reach - T10058- .



**Note**

*When hardened, the sealant has a high adhesive strength.*





- Carefully lever off sump from cylinder block at recess -arrow- using assembly lever.
- Remove sump. Loosen sump with light blows of a rubber headed hammer if necessary.

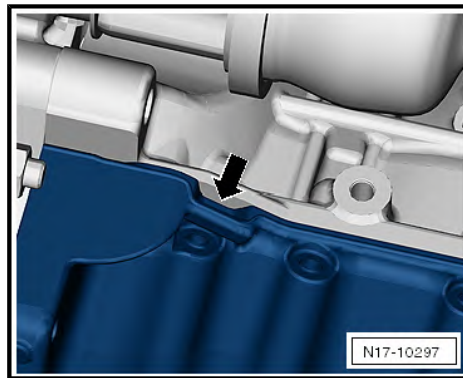
**WARNING**

***Wear protective gloves when working with sealant and grease remover!***

- Remove the remaining sealant on the cylinder block and on the oil pan with chemical sealant remover.
- Degrease the sealing surfaces.

**Install****Note**

- ◆ *Pay attention to the use by date on sealant.*
- ◆ *The oil pan must be installed within 5 minutes after applying the sealant.*
- ◆ *The sump can be positioned more easily and with greater security if M6 studs are inserted into the cylinder block flange at two positions as guides.*



- Cut off nozzle on tube at front marking ( $\varnothing$  of nozzle approx. 3 mm).

- Apply sealant to clean sealing surface of sump as shown.

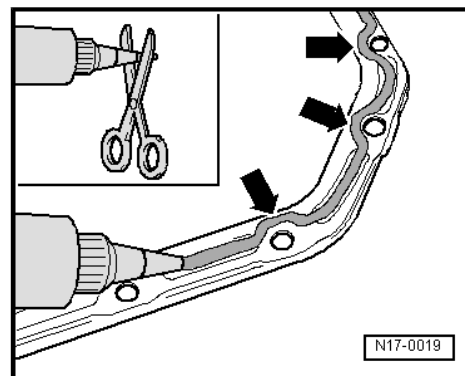
Sealant bead must be:

- ◆ 2...3 mm thick
- ◆ Run bead along inner side of bolt holes -arrows-



#### Note

*The sealing compound bead must not be thicker, otherwise excessive sealing compound will enter the sump and may block the oil suction pipe strainer.*



- Fit sump immediately and lightly tighten all sump securing bolts ➔ [page 128](#) .

- Tighten the sump securing bolts to the prescribed torque.

Tightening torque of gearbox screws: ➔ Gearbox; Rep. gr. 34 .



#### Note

*Let sealing compound dry for approx. 30 minutes after installing oil sump. Only then fill with engine oil.*

- Install oil filter and tighten it with the oil filter wrench - 3417- .
- Fill engine oil ➔ Maintenance ; Booklet Octavia III .
- Install AC compressor ➔ Heating, Air Conditioning; Rep. gr. 87 .

Install the V-ribbed belt

➔ [“1.2 Removing and installing poly V-belt”, page 37](#) .

Further installation occurs in a similar way in reverse order to removal.

#### Tightening torques

| Component       | Nm                         |
|-----------------|----------------------------|
| Oil filter      | 20 Nm                      |
| Oil sump screws | ➔ <a href="#">page 128</a> |

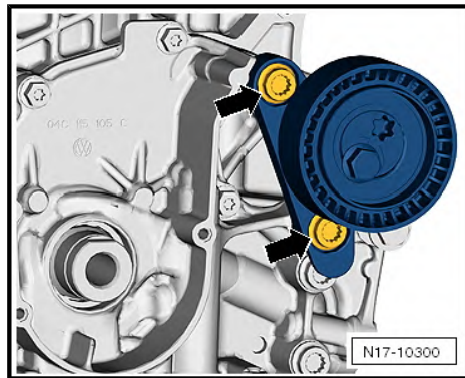
## 1.3 Removing and installing oil pump

### Removing

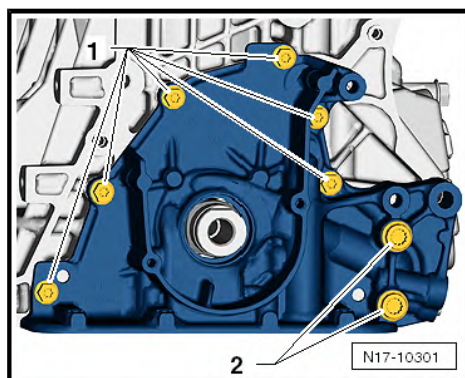
- Disconnect battery ➔ Electrical System; Rep. gr. 27 .
- Remove toothed belt  
➔ [“2.5 Removing and installing toothed belt”, page 99](#) .
- Removing the oil pan  
➔ [“1.2 Removing and installing oil sump”, page 128](#) .



- Unscrew securing bolts -arrows- and remove tensioning element.
- Remove the generator ⇒ Electrical System; Rep. gr. 27 .
- Removing gasket ring for crankshaft on belt pulley side  
⇒ ["1.6 Renewing crankshaft oil seal - belt pulley end", page 44](#) .

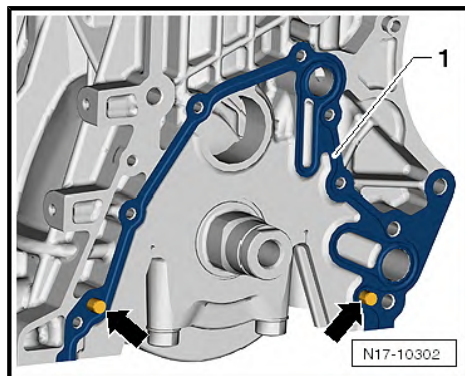


- Unscrew oil pump securing bolts -1- and -2-.
- Pull oil pump off dowel pins on cylinder block in a straight line.

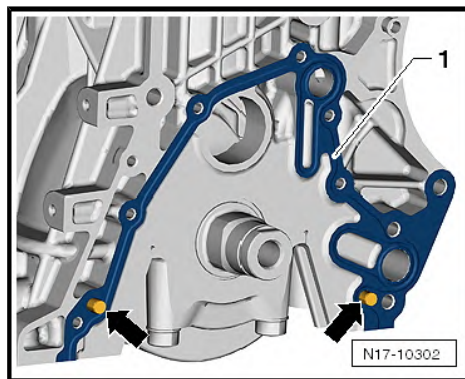


- Remove gasket -1- from dowel pins -arrows-.

#### Install



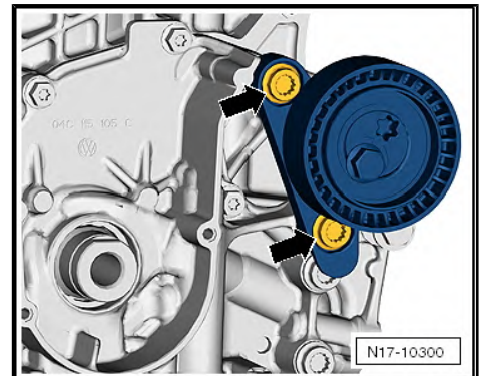
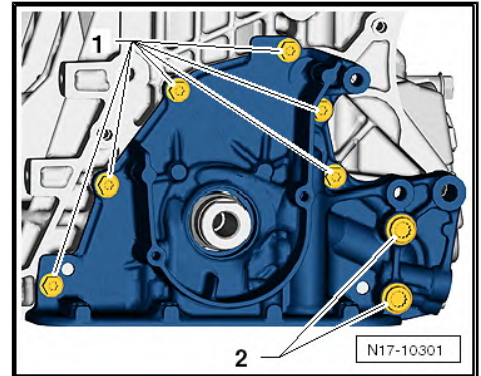
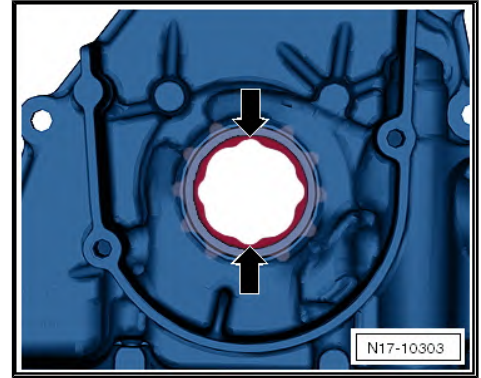
- Fit new gasket -1- onto dowel pins -arrows-.



- Rotate oil pump gear to a position where 2 opposing notches -arrows- are aligned vertically, as shown in the illustration.
- Fit oil pump onto dowel pins.

#### Tightening torques

- Tighten the new fixing screws -1- to 8 Nm + torque a further 90° (1/4 turn).
- Tighten securing bolts -2- to 20 Nm.
- Install the new gasket ring for the crankshaft on the belt pulley side  
⇒ [“1.6 Renewing crankshaft oil seal - belt pulley end”, page 44](#) .
- Installing the oil pan  
⇒ [“1.2 Removing and installing oil sump”, page 128](#) .
- Install generator ⇒ Electrical System; Rep. gr. 27 .
- Mount tensioning element using new securing bolts -arrows- and tighten to 20 Nm + 90° (1/4 turn).
- Install toothed belt  
⇒ [“2.5 Removing and installing toothed belt”, page 99](#) .



## 1.4 Removing and installing oil level and oil temperature sender - G266-

### Removing

- Drain engine oil ⇒ Maintenance ; Booklet Octavia III .
- Separate electrical plug connection -3-.
- Release screws -1- and remove oil level and oil temperature sender - G266- Pos. -4-.

### Install

Installation is performed in a similar way in the reverse order. Pay attention to the following points:



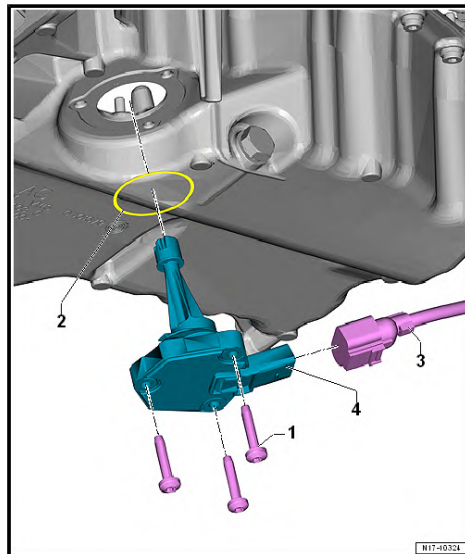
#### Note

*Replace gasket ring -2- and oil before installing.*

- Fill with engine oil and check the oil level ⇒ Maintenance ; Booklet Octavia III .

### Tightening torques

| Component              | Nm   |
|------------------------|------|
| Oil level sender screw | 8 Nm |



## 2 Engine oil cooler

⇒ [“2.1 Summary of components - engine oil cooler”, page 135](#)

⇒ [“2.2 Removing and installing engine oil cooler”, page 135](#)

### 2.1 Summary of components - engine oil cooler

#### 1 - Engine oil cooler

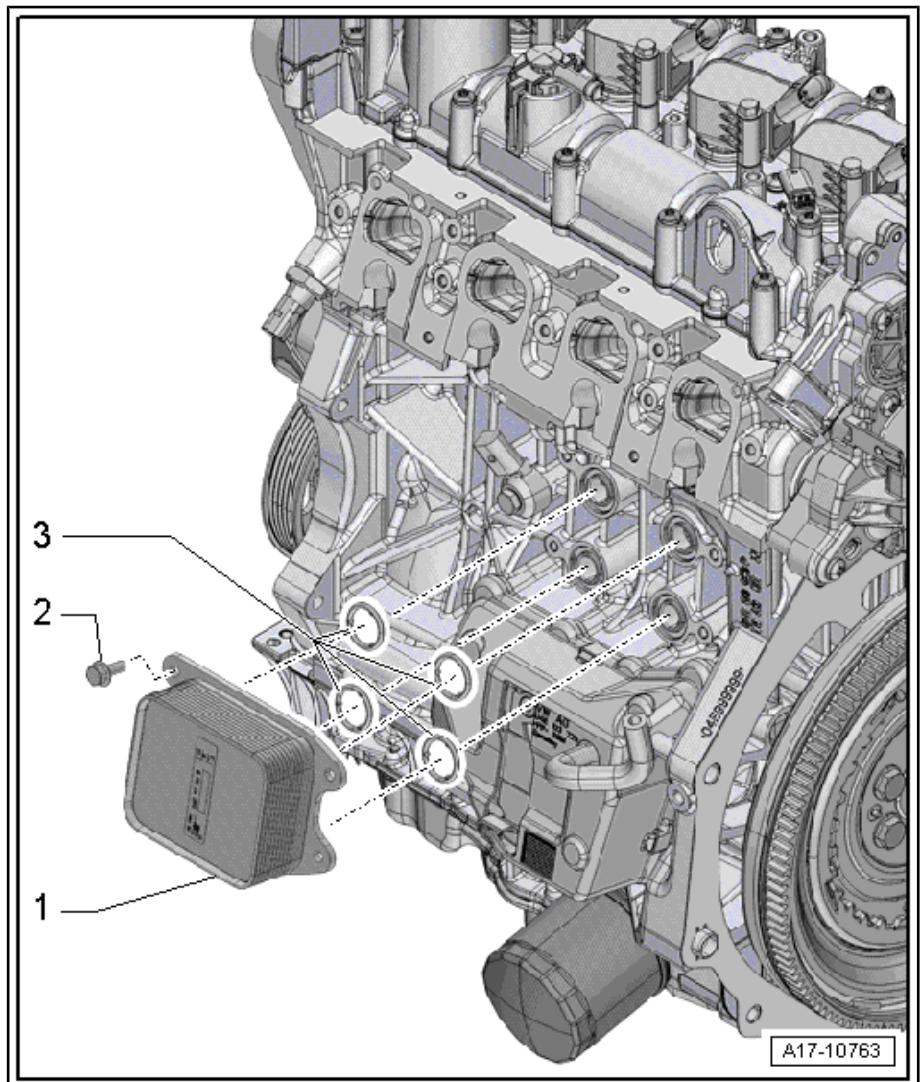
- ☐ installing and removing  
⇒ [“2.2 Removing and installing engine oil cooler”, page 135](#)
- ☐ fill with fresh coolant after replacing

#### 2 - Bolt

- ☐ replace after removal
- ☐ 8 Nm + torque a further 90° (1/4 turn)

#### 3 - Gasket rings

- ☐ replace after removal



### 2.2 Removing and installing engine oil cooler

#### Removing

- Drain coolant ⇒ [“1.2 Draining and filling coolant”, page 147](#) .
- Removing the intake manifold  
⇒ [“3.2 Removing and installing intake manifold”, page 241](#) .



- Release screws -arrows- and remove engine oil cooler -1-.

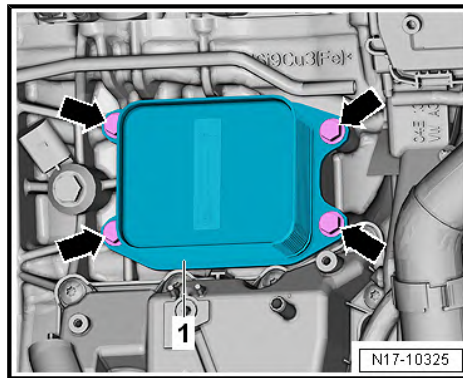
### Install

Installation is carried out in the reverse order. When installing, observe the following:

- Insert new O-rings.
- Installing the intake manifold  
⇒ [“3.2 Removing and installing intake manifold”, page 241](#) .
- Replenish coolant ⇒ [page 151](#) .

### Tightening torques

| Component                   | Nm                                                                    |
|-----------------------------|-----------------------------------------------------------------------|
| Screw for engine oil cooler | 8 Nm + torque<br>a further 90°<br>( <sup>1</sup> / <sub>4</sub> turn) |



## 3 Crankcase ventilation

⇒ [“3.1 Summary of components - crankcase ventilation”, page 137](#)

⇒ [“3.2 Removing and installing oil separator”, page 137](#)

### 3.1 Summary of components - crankcase ventilation

#### 1 - Hose

- ☐ for crankcase ventilation

#### 2 - Cover

- ☐ For oil separator

#### 3 - Oil separator

- ☐ installing and removing  
⇒ [“3.2 Removing and installing oil separator”, page 137](#)
- ☐ replace if damaged

#### 4 - O-ring

- ☐ replace after removal
- ☐ Moisten with oil before installing

#### 5 - Inlet connections

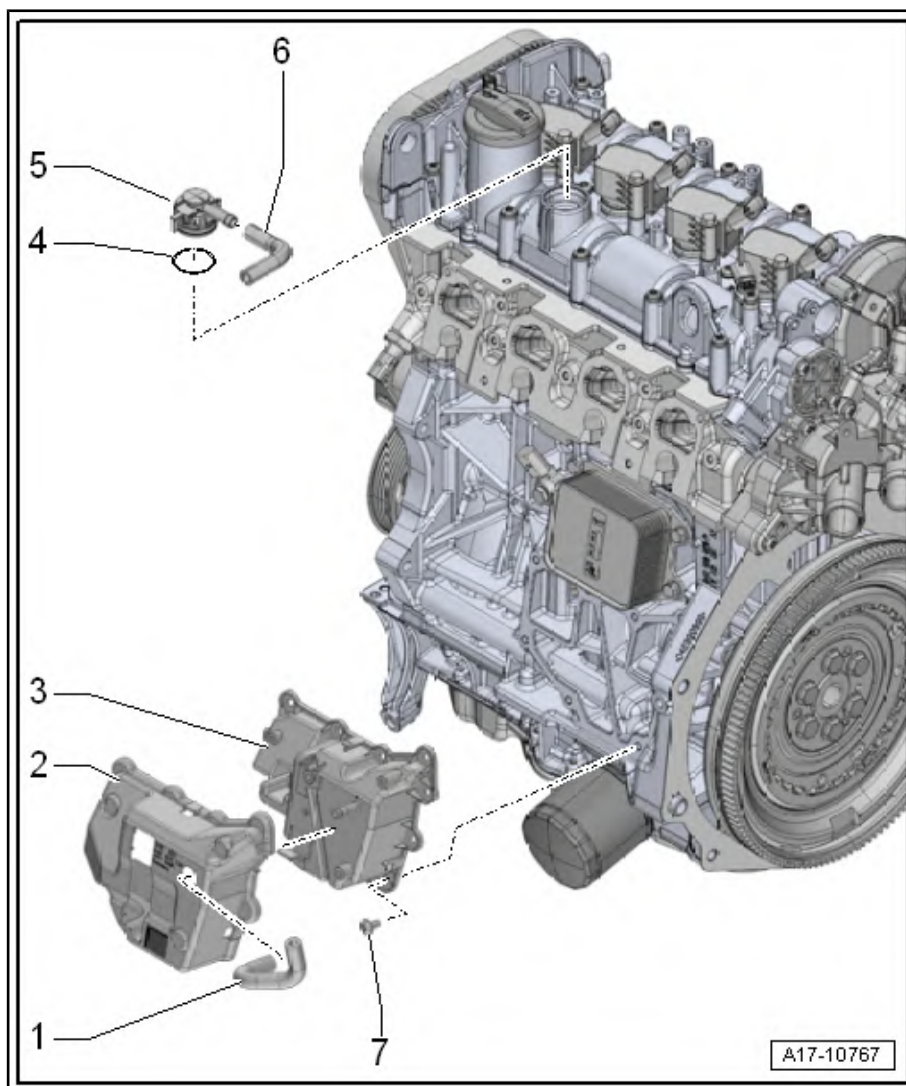
- ☐ Ensure proper positioning

#### 6 - Hose

- ☐ for crankcase ventilation

#### 7 - Bolt

- ☐ self-locking
- ☐ replace after removal
- ☐ 9 Nm



### 3.2 Removing and installing oil separator

#### Special tools and workshop equipment required

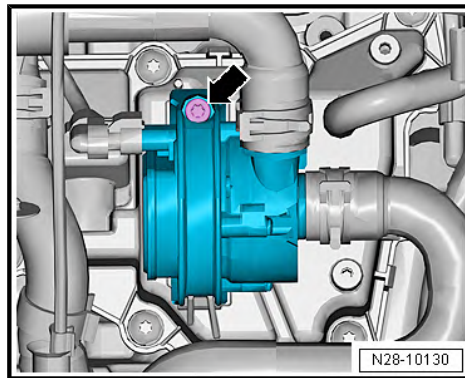
- ◆ Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- ◆ Cleaning and degreasing agent , e.g. -D 009 401 04-
- ◆ Protective goggles and gloves
- ◆ Silicone sealant ⇒ Electronic Catalogue of Original Parts“ET-KA”

#### Removing

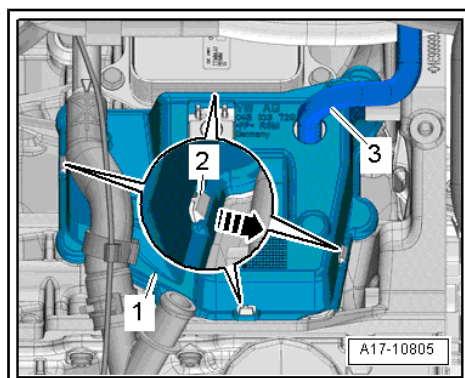
- Remove the sound dampening system ⇒ Body Work; Rep. gr. 66 .



- Undo screw -arrow- and place charge air cooler pump - V188- to one side.



- Pull off hose -3- for crankcase ventilation.
- Unlock -1- oil separator cover at catches -2- -arrow- and remove.



- Loosen the screws in the sequence -9...1- and unscrew them.
- Loosen oil separator carefully from the bonding.

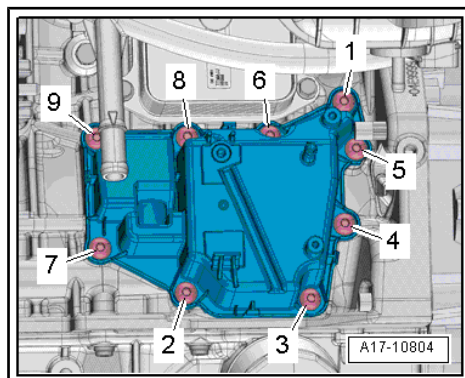
#### Install

Installation is carried out in the reverse order. When installing, observe the following:



#### WARNING

***Wear protective gloves when working with sealant and grease remover!***



- Remove the remaining sealant on the cylinder block and on the oil pan with chemical sealant remover.
- Degrease the sealing surfaces.

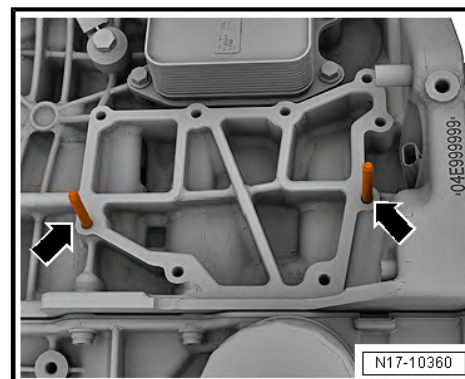


#### Caution

***There is a risk of contamination of the lubrication system.***

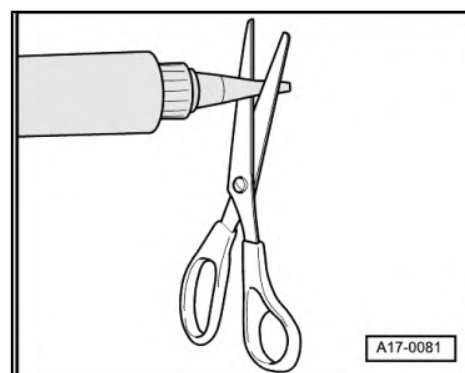
- ◆ ***Cover open parts of the engine.***

- Insert 2 commercially available pin bolts a few revolutions into the holes -arrows-.



#### Note

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



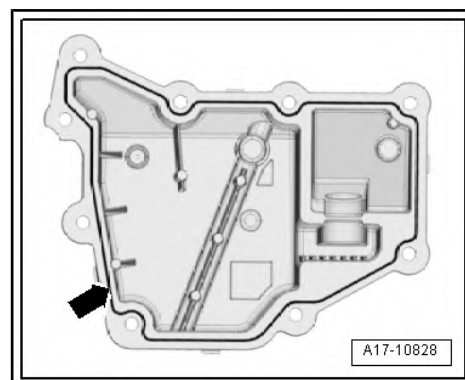
- Cut off nozzle on tube at front marking (Ø of nozzle approx. 1.5 mm).



#### Caution

*There is risk of blockage of the lubrication system through excess sealant.*

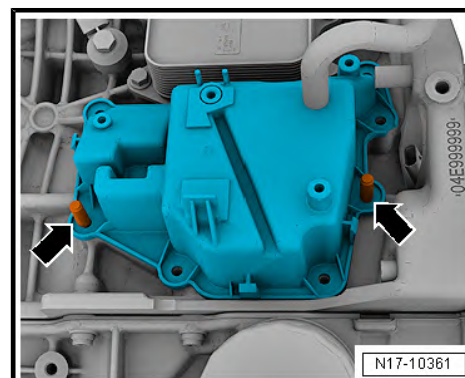
◆ *Do not apply a thicker sealant bead than indicated.*



- Apply sealant bead -arrow- onto the clean sealing surface of the oil separator, as shown in the illustration.
- Thickness of sealant bead: 1.5 mm.

After applying the sealant, you must install the oil separator within 5 minutes.

- Insert oil trap onto the pin bolts -arrows- and insert onto the cylinder block.
- Remove the pin bolts again.





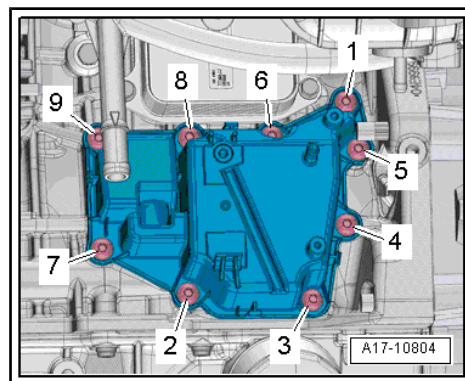
- Release the screws in the order -1...9-.

Continued installation is carried out in the reverse order. When installing, note the following:

- Install the noise insulation ⇒ Body Work; Rep. gr. 66 .

#### Tightening torques

| Component               | Nm   |
|-------------------------|------|
| Screw for coolant pump  | 8 Nm |
| Screw for oil separator | 9 Nm |



## 4 Oil filter, oil pressure switch

⇒ [“4.1 Summary of components - oil filter/oil pressure switch”, page 141](#)

⇒ [“4.2 Removing and installing oil pressure switch for reduced oil pressure F378”, page 141](#)

⇒ [“4.3 Checking oil pressure and oil pressure switch”, page 142](#)

⇒ [“4.4 Removing and installing oil filter housing”, page 143](#)

### 4.1 Summary of components - oil filter/oil pressure switch

#### 1 - Oil filter

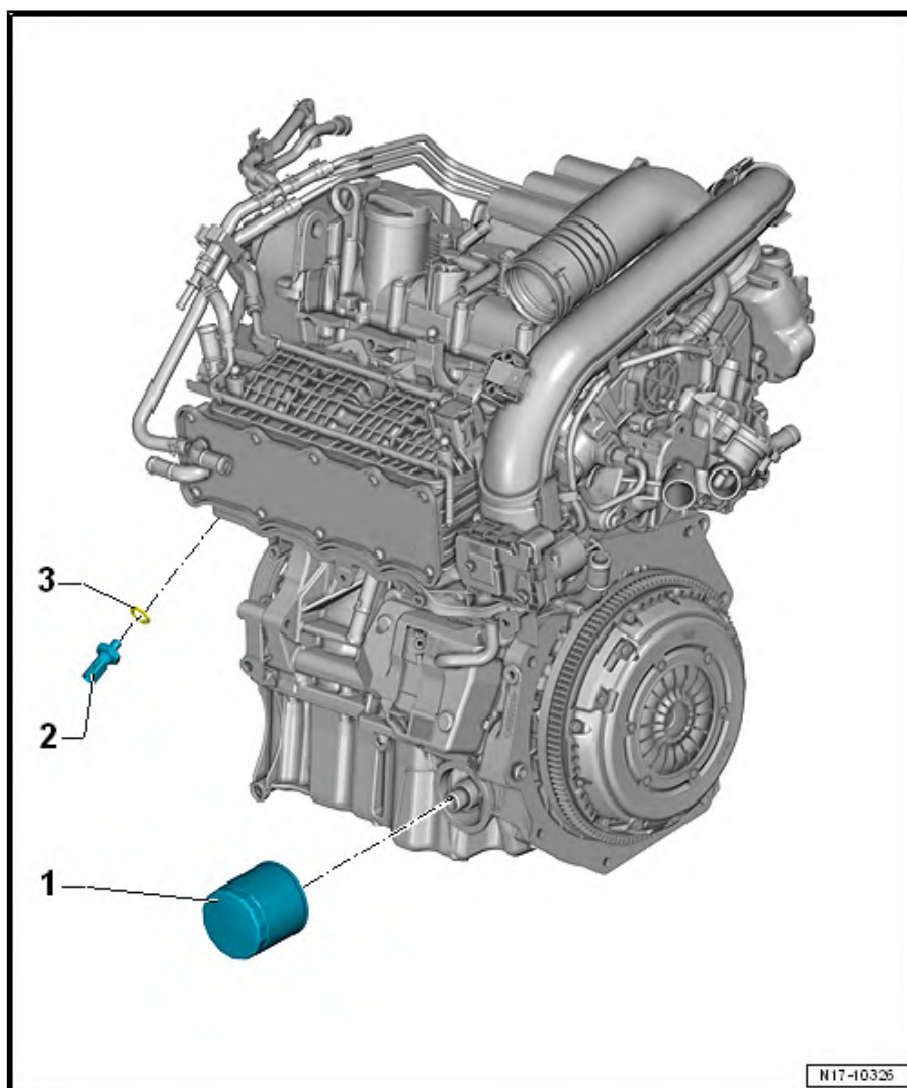
- ☐ pay attention to note  
⇒ [page 126](#)
- ☐ removing and installing  
⇒ Maintenance ; Book-  
let Octavia III
- ☐ 20 Nm

#### 2 - Oil pressure switch for reduced oil pressure - F378-

- ☐ replace after removal
- ☐ Switching pressure  
0.03 ... 0.06 MPa (0.3...  
0.6 bar)
- ☐ Insulation green
- ☐ check  
⇒ [“4.3 Checking oil  
pressure and oil pres-  
sure switch”, page 142](#)
- ☐ installing and removing  
⇒ [“4.2 Removing and  
installing oil pressure  
switch for reduced oil  
pressure F378”,  
page 141](#)
- ☐ 20 Nm

#### 3 - Sealing ring

- ☐ not available separately



### 4.2 Removing and installing oil pressure switch for reduced oil pressure - F378-

Special tools and workshop equipment required

- ◆ Flexible-head wrench SW 24 - T40175-



## Removing

- Pull solenoid valve 1 for activated charcoal filter - N80- -3- off the intake manifold and press downwards slightly.
- Separate electrical plug connection -2-.



### Note

*Place a cloth below to absorb leaking engine oil.*

- Unscrew the oil pressure switch for reduced oil pressure - F378- -1-.

## Install

Installation is carried out in the reverse order. When installing, observe the following:

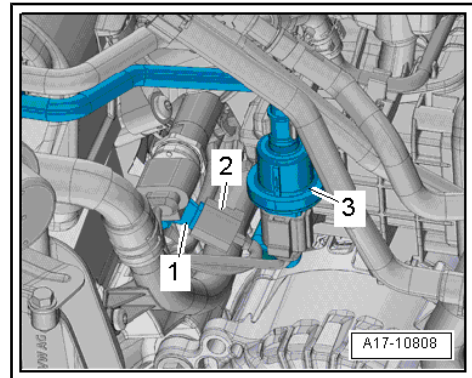


### Note

- ♦ *Renew seal.*
- ♦ *To prevent larger quantities of oil from flowing out the new oil pressure switch for reduced oil pressure - F378- must be inserted into the bore immediately.*
- Checking the oil level ⇒ Maintenance ; Booklet Octavia III .

## Tightening torque

| Component                                    | Nm    |
|----------------------------------------------|-------|
| Oil pressure switch for reduced oil pressure | 20 Nm |



## 4.3 Checking oil pressure and oil pressure switch

### Special tools and workshop equipment required

- ♦ Oil pressure tester - V.A.G 1342-
- ♦ Measuring tool set , e. g. -V.A.G 1594 C-
- ♦ Voltage tester , e. g. -V.A.G 1527 B-

### Work procedure

- Oil level OK, test ⇒ Maintenance ; Booklet Octavia III .
- Engine oil temperature at least 80 °C (radiator fan must have run once).
- Remove oil pressure switch for reduced oil pressure - F378- ⇒ ["4.2 Removing and installing oil pressure switch for reduced oil pressure F378", page 141](#) .
- Screw oil pressure switch tester - V.A.G 1342- onto the oil pressure switch bore.
- Screw oil pressure switch for reduced oil pressure - F378- into the oil pressure tester - V.A.G 1342- bore to close it.
- Start the engine.
- Oil pressure in idle: at least 0.06 MPa (0.6 bar)
- Oil pressure at 2000 rpm: at least 0.15 MPa (1.5 bar)
- Oil pressure at 4500 rpm: at least 0.28 MPa (2.8 bar)

**i Note**

*Mechanical damage such as bearing damage may also be the cause of oil pressure that is too low.*

If no fault is found:

- Replace oil pump  
⇒ [“1.3 Removing and installing oil pump”, page 131](#) .

**Check oil pressure switch for reduced oil pressure - F378- :**

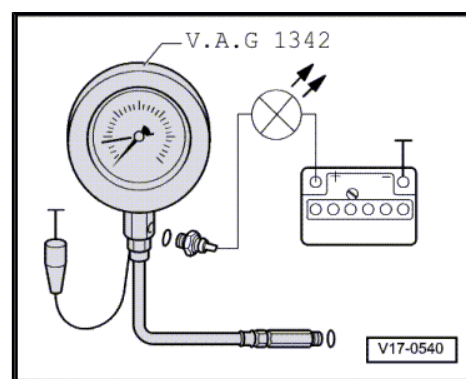
- Switch off engine.
- Connect brown wire of oil testing device - V.A.G 1342- to earth (-).
- Connect the voltage tester - V.A.G 1527 B- with adapter set from measuring tool set - V.A.G 1594 C- to the battery positive pole (+) and connect oil pressure switch for reduced oil pressure - F378- (brown).

- The LED must not light up.

- If the LED is illuminated the oil pressure switch for reduced oil pressure - F378- must be replaced.

If the LED does not light up:

- Start engine, at an overpressure of 0.03 .... 0.06 MPa (0.3...0.6 bar) the LED must light up, otherwise renew oil pressure switch  
⇒ [“4.2 Removing and installing oil pressure switch for reduced oil pressure F378 ”, page 141](#) .



## 4.4 Removing and installing oil filter housing

### Special tools and workshop equipment required

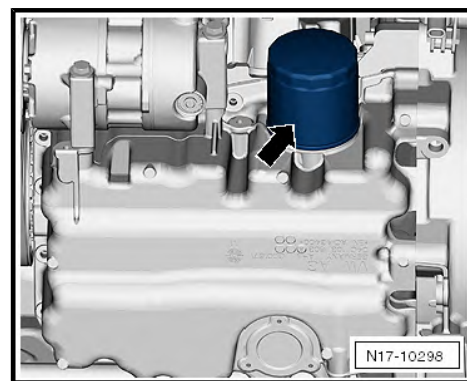
- ◆ Oil filter tool - 3417-

#### Removing

- Drain engine oil ⇒ Maintenance ; Booklet Octavia III .
- Remove oil filter -arrow- with oil filter tool - 3417- .

#### Install

- Fill oil filter with engine oil and moisten the gasket with oil.
- Tighten the oil filter using the oil filter tool - 3417- , tightening torque 20 Nm.
- Fill engine oil ⇒ Maintenance ; Booklet Octavia III .





## 19 – Cooling

### 1 Cooling system, coolant

⇒ [“1.1 Coolant hose schematic diagram”, page 144](#)

⇒ [“1.2 Draining and filling coolant”, page 147](#)

⇒ [“1.3 Checking cooling system for leaks”, page 151](#)

#### 1.1 Coolant hose schematic diagram

⇒ [“1.1.1 For vehicles up to 05.2013”, page 144](#)

⇒ [“1.1.2 For vehicles as of 06.2013”, page 146](#)

##### 1.1.1 For vehicles up to 05.2013



#### Note

- ◆ *Red = small coolant circuit.*
- ◆ *Blue = large coolant circuit.*
- ◆ *Green = charge-air coolant circuit*
- ◆ *brown= auxiliary heating coolant circuit (vehicles with auxiliary heating only)*
- ◆ *The arrows point in the coolant flow direction.*

**1 - Coolant expansion tank**

**2 - Screw cap**

- ☐ for coolant expansion tank
- ☐ Check pressure relief valve ⇒ [page 153](#)

**3 - Cylinder head and cylinder block**

- ☐ fill with fresh coolant after replacing

**4 - Exhaust gas turbocharger**

**5 - Integrated exhaust manifold**

**6 - Heat exchanger of heating system**

- ☐ fill with fresh coolant after replacing

**7 - Coolant temperature sender - G62-**

**8 - Coolant pump**

- ☐ with thermostat housing

**9 - Engine oil cooler**

**10 - Coolant temperature sender at radiator outlet - G83-**

**11 - Coolant radiator**

- ☐ fill with fresh coolant after replacing

**12 - Choke**

- ☐ integrated into the coolant hose, not visible from the outside

- ☐ The fitting position is not defined, therefore the coolant hose must not be unclipped with the hose clamp (Risk of damage!)

**13 - Non-return valve**

**14 - Charge air cooler pump - V188-**

**15 - Cooler for charge air circuit**

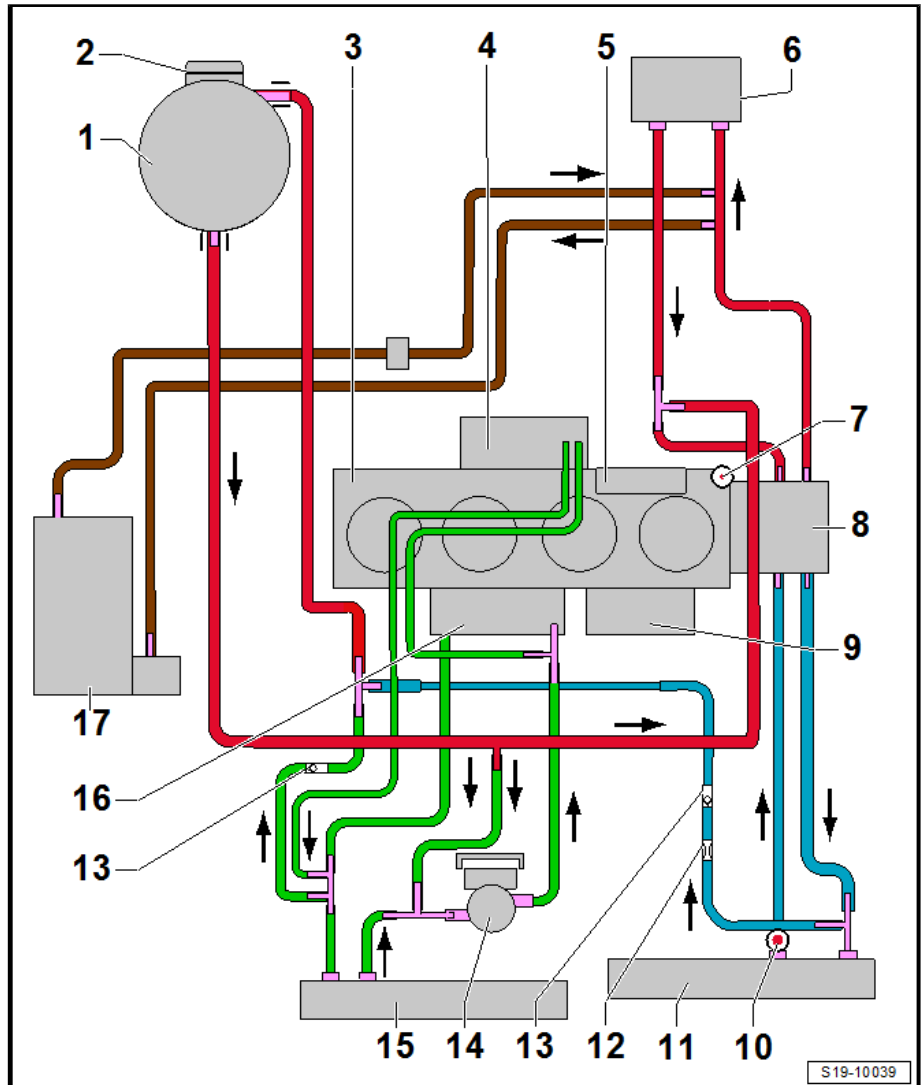
- ☐ fill with fresh coolant after replacing

**16 - Charge-air cooler in intake manifold**

- ☐ fill with fresh coolant after replacing

**17 - Auxiliary heating**

- ☐ for vehicles with auxiliary heating only





### 1.1.2 For vehicles as of 06.2013



### Note

- ◆ *Red = small coolant circuit.*
- ◆ *Blue = large coolant circuit.*
- ◆ *Green = charge-air coolant circuit*
- ◆ *brown= auxiliary heating coolant circuit (vehicles with auxiliary heating only)*
- ◆ *The arrows point in the coolant flow direction.*

### 1 - Coolant expansion tank

**2 - Screw cap**

- ❑ for coolant expansion tank
- ❑ Check pressure relief valve ⇒ **page 153**

### 3 - Cylinder head and cylinder block

- ❑ fill with fresh coolant after replacing

#### 4 - Exhaust gas turbocharger

## 5 - Integrated exhaust manifold

## 6 - Heat exchanger of heating system

- ❑ fill with fresh coolant after replacing

**7 - Coolant temperature sender - G62-**

## 8 - Coolant pump

- with thermostat housing

**9 - Engine oil cooler**

**10 - Coolant temperature sender at radiator outlet - G83-**

## 11 - Coolant radiator

- ❑ fill with fresh coolant after replacing

## 12 - Choke

- integrated into the coolant hose, not visible from the outside

- ☐ The fitting position is not defined, therefore the coolant hose must not be unclipped with the hose clamp (Risk of damage!)

### 13 - Non-return valve

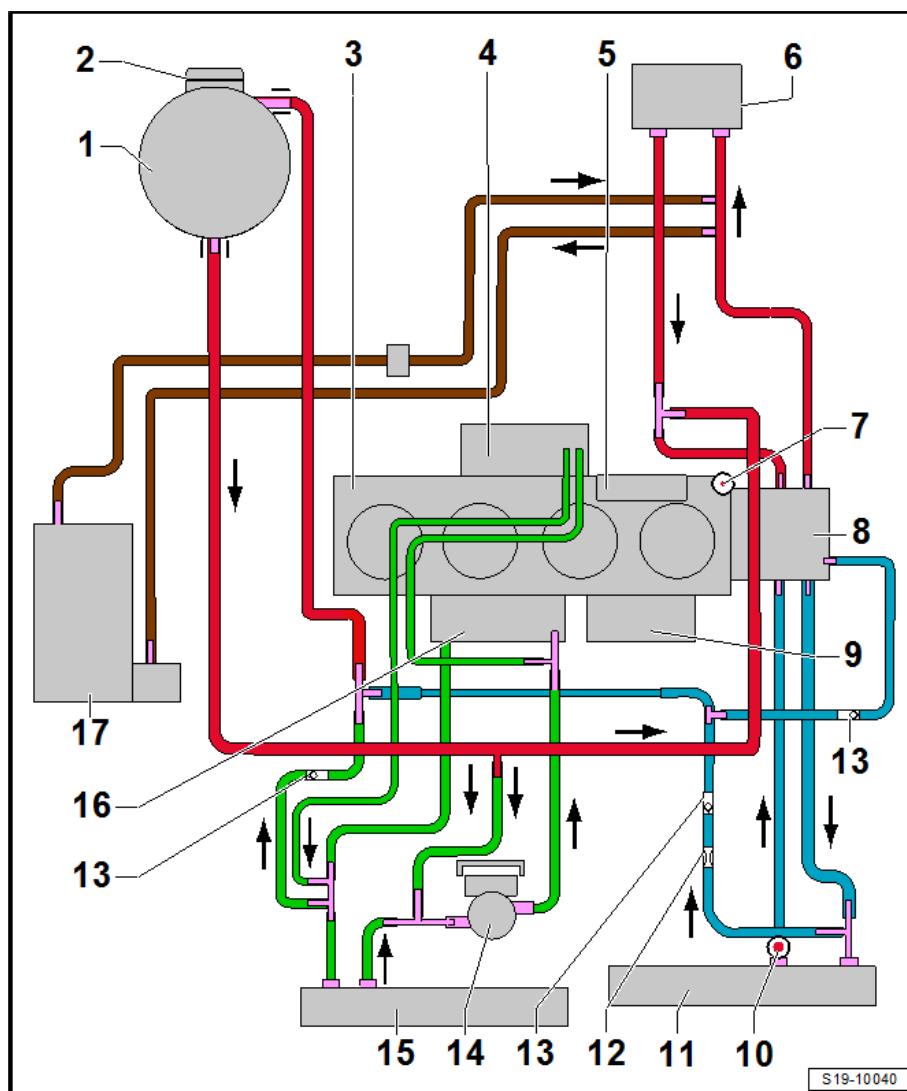
**14 - Charge air cooler pump - V188-**

**15 - Cooler for charge air circuit**

- ❑ fill with fresh coolant after replacing

**16 - Charge-air cooler in intake manifold**

- ❑ fill with fresh coolant after replacing



## 17 - Auxiliary heating

- ☐ for vehicles with auxiliary heating only

## 1.2 Draining and filling coolant

### Special tools and workshop equipment required

- ◆ Refractometer
- ◆ Catch pan for workshop crane , e.g. -VAS 6208-
- ◆ Pliers for spring strap clamps
- ◆ Cooling system charge unit e.g. -VAS 6096-
- ◆ Adapter for cooling system testing device, e.g. - V.A.G 1274/8-
- ◆ Protective goggles and gloves



### Note

*Depending on the vehicle version, 3 radiator versions are installed.*

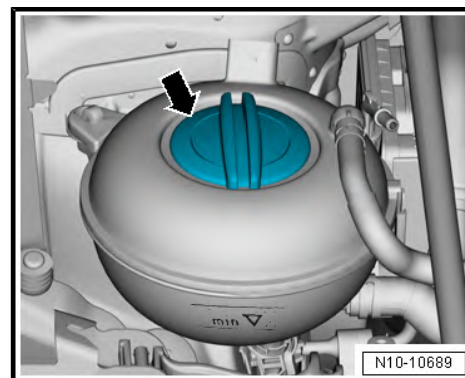
- ◆ Radiator Version 1  
⇒ ["4.1 Radiator version 1 - Summary of components", page 173](#) .
- ◆ Radiator Version 2  
⇒ ["4.2 Radiator version 2 - Summary of components", page 175](#) .
- ◆ Radiator Version 3  
⇒ ["4.3 Radiator version 3 - Summary of components", page 176](#) .

### Draining



### Note

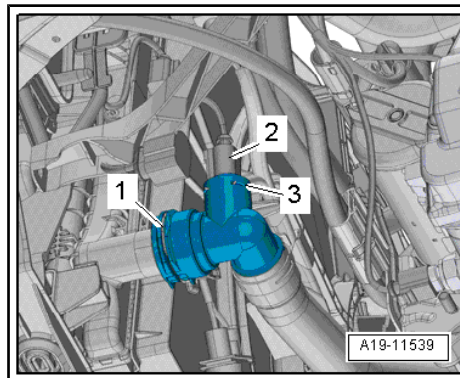
- ◆ *Collect drained coolant in a clean container for reuse or proper disposal.*
- ◆ *Observe the disposal instructions.*
- Open cap -arrow- for coolant expansion tank.
- Remove the sound dampening system ⇒ Body Work; Rep. gr. 66 .
- Place a catch pan for workshop crane - VAS 6208- underneath.





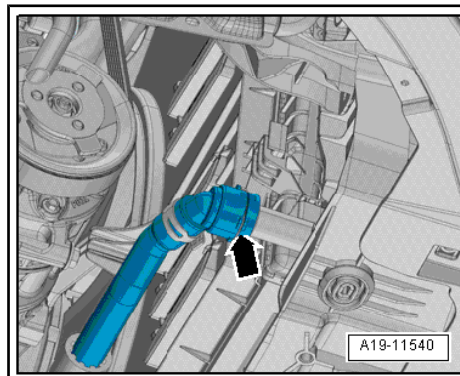
- Disconnect electrical plug connection -2- at the coolant temperature sender at the radiator outlet - G83- -3-.
- Raise holding clamp -1-, remove bottom left coolant hose from radiator fan for coolant, allow coolant to drain.

#### Vehicles with radiator version 1



- Loosen holding clamp -arrow-, remove bottom right coolant hose from charge air circuit cooler, allow remaining coolant to drain.

#### Vehicles with radiator versions 2 and 3:



- Raise holding clamp -2-, remove coolant hose from charge air circuit cooler, allow remaining coolant to drain.

#### Filling up

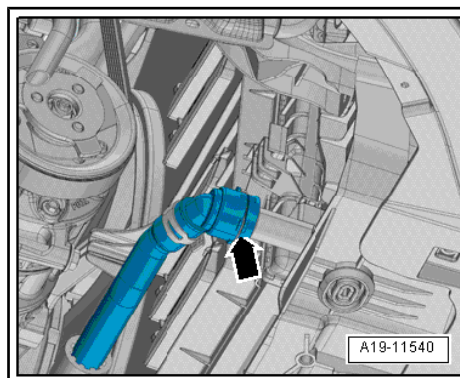
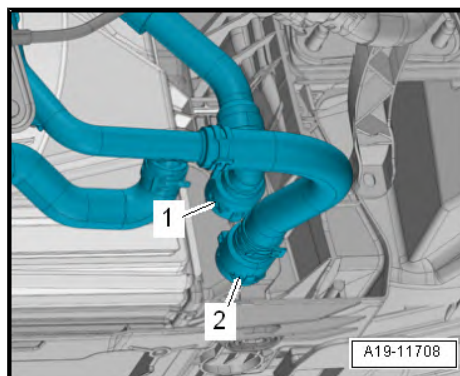
Select the appropriate coolant additive from the ➔ Electronic catalogue of original parts“ETKA” .

- In a clean reservoir mix drinking water and coolant additive in the specified mixing ratio ➔ Maintenance ; Booklet Octavia III .
- Connect coolant hose with quick coupling to radiator bottom left ➔ [page 174](#) .

#### Vehicles with radiator version 1

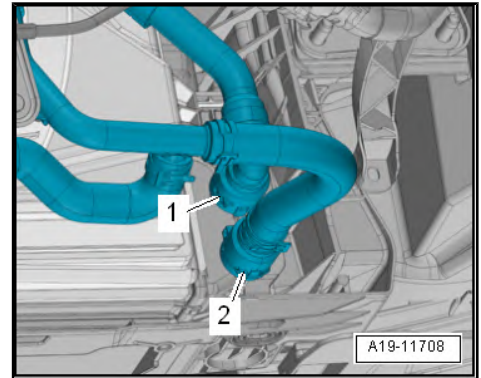
- Connect coolant hose bottom right to radiator -arrow-.

#### Vehicles with radiator versions 2 and 3:



- Connect coolant hose bottom right to charge air circuit cooler -2-.

**Continued for all vehicles**



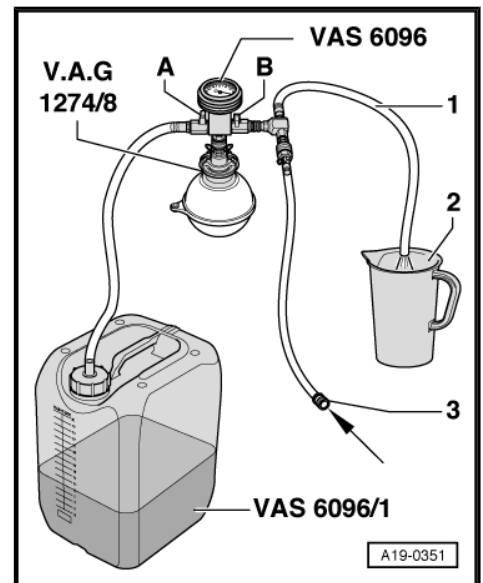
- Fill up the coolant -VAS 6096- with at least 10 litres of pre-mixed coolant mixed to the correct ratio ⇒ Maintenance ; Booklet Octavia III .
- For example, screw the adapter for cooling system testing device - V.A.G 1274/8- to the coolant expansion tank.
- Connect the cooling system charge unit - VAS 6096- with the adapter -V.A.G 1274/8- .
- Lead the air hose -1- into a small container -2-.



**Note**

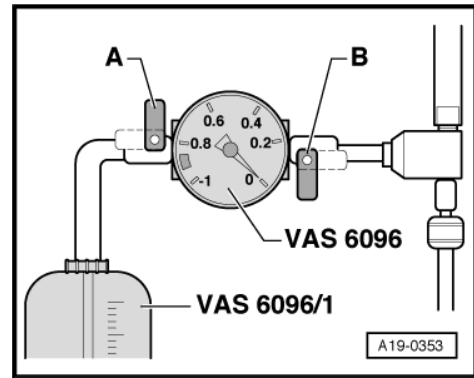
*A small amount of coolant, which is entrained with the exhaust air, must be collected.*

- Close the valves -A- and -B-, while doing so turn the lever at right angles to the direction of flow.
- Connect hose -3- to compressed air.
- Pressure: 0.6 -1 MPa (6...10 bar) overpressure.





- Open the valve -B-, while doing so turn the lever in the direction of flow.
- Vacuum is generated in the cooling system by the suction jet pump. The display instrument pointer must be in the green area.
- In addition, briefly open the valve -A- and turn the lever in the direction of flow, so that the hose of the coolant expansion bottle is filled -VAS 6096- with coolant.
- Close the valve -A- again.
- Leave the valve -B- open a further 2 minutes.
- A vacuum pump is created in the cooling system by the vacuum pump; the display instrument pointer must remain in the green area.
- Close the valve -B-.
- The display instrument pointer must remain unaffected in the green area. The vacuum in the cooling system is now sufficient for subsequent filling.



#### Note

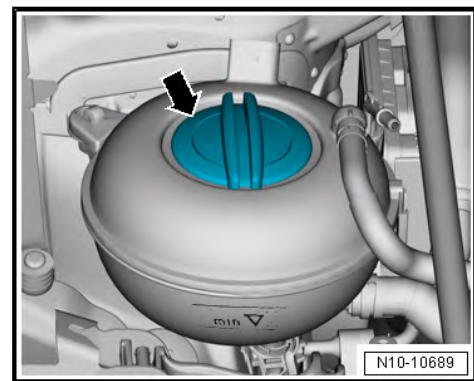
- ◆ If the pointer is below the green area, repeat the process.
- ◆ If the vacuum drops, check the cooling system for leak points.
- Disconnect pneumatic hose.
- Open valve -A-.
- The vacuum pump in the cooling system draws the coolant out of the coolant reservoir -VAS 6096- and fills the cooling system.
- Remove the cooling system charge unit - VAS 6096- from the coolant expansion tank.
- Fill up coolant up to “Max” marking.
- Install the noise insulation ⇒ Body Work; Rep. gr. 66 .

#### For vehicles with auxiliary heating

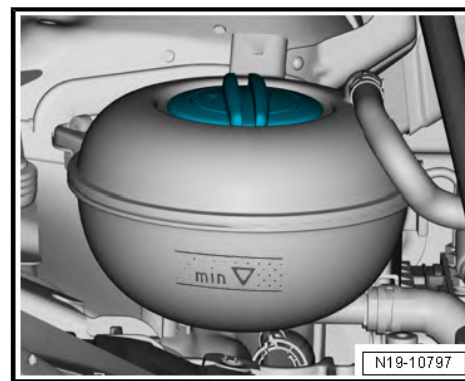
- Switch on auxiliary heating for approximately 30 seconds.

#### Continued for all vehicles

- Set temperature to “HI”.
- Switch off AC compressor. Press **AC** button to do so.
- The LED in the button must not illuminate.
- Start engine and run for not more than 2 minutes at 1500 rpm.
- With the engine running, fill coolant up to the overflow hole on the coolant expansion tank.
- Tighten cap for coolant expansion tank tighten until it clicks into place.
- Run engine at idling speed until the two large coolant hoses at the radiator are hot.
- Switch off engine and allow it to cool down.



- Check coolant level.
- If the engine is cold the coolant level must be between the “Min” and “Max” marking.
- When the engine is at operating temperature the coolant level may be at the “Max” marking.
- If necessary, top up with coolant.



## 1.3 Checking cooling system for leaks

⇒ “1.3.1 Checking with the cooling system testing device V.A.G 1274”, page 151

⇒ “1.3.2 Checking with the cooling system testing device V.A.G 1274 B”, page 152

### 1.3.1 Checking with the cooling system testing device - V.A.G 1274-

Special tools and workshop equipment required

- ◆ Cooling system testing device , e.g. -V.A.G 1274-
- ◆ Adapter for cooling system testing device , e.g. -V.A.G 1274/8-
- ◆ Adapter for cooling system testing device , e.g. -V.A.G 1274/9-

Test prerequisite

- Engine is at operating temperature.

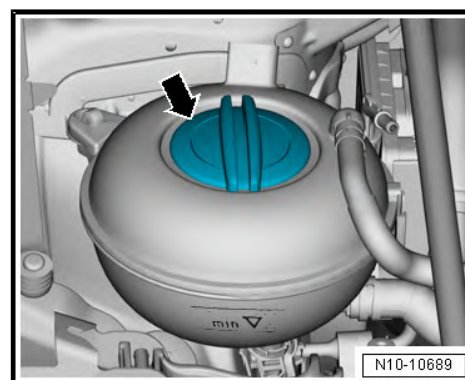
Test procedure



#### WARNING

*Hot steam may escape when the coolant expansion reservoir is opened. Wear eye protection and protective clothing to avoid eye injuries and scalding. Cover the cap with a cloth and open carefully.*

- Open cap -arrow- for coolant expansion tank.





- Position the cooling system testing device - V.A.G 1274- with adapter - V.A.G 1274/8 - on the coolant expansion reservoir.
- Using the hand pump of the testing device generate an over-pressure of approx. 0.1 MPa (1.0 bar).

If pressure drops:

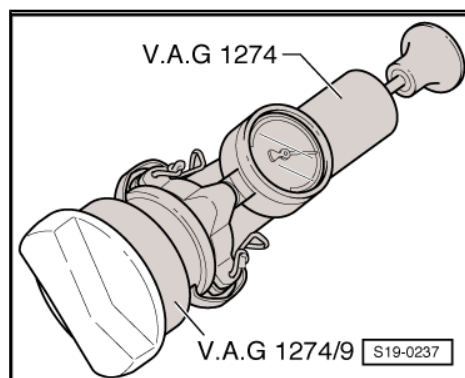
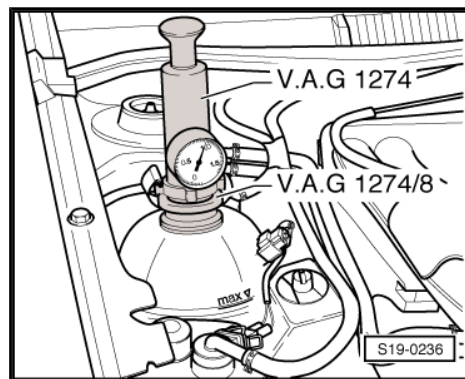
- Search position of the leak and repair fault.

#### Testing the pressure relief valve in the cap

- Fit the cooling system testing device - V.A.G 1274- with adapter - V.A.G 1274/9- onto the cap.
- 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 does not open:

- Renew cap.



### 1.3.2 Checking with the cooling system testing device - V.A.G 1274 B-

#### Special tools and workshop equipment required

- ♦ Cooling system testing device , e.g. -V.A.G 1274 B-
- ♦ Adapter for cooling system testing device , e.g. -V.A.G 1274/8-
- ♦ Adapter for cooling system testing device , e.g. -V.A.G 1274/9-

#### Work procedure

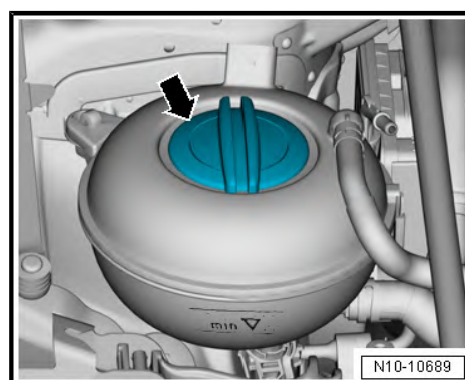
- Engine must be warm.
- Open cap -arrow- for coolant expansion tank.



#### WARNING

*There is risk of injury due to hot steam and hot coolant.*

- ♦ *When the engine is warm, the cooling system is under overpressure.*
- ♦ *Reduce excess pressure by covering the cap of the coolant expansion tank with a cloth and opening it carefully.*



- Fit the cooling system testing device - V.A.G 1274 B- with adapter -V.A.G 1274/8- onto the coolant expansion tank.
- Using the hand pump of the testing device generate an over-pressure of approx. 0.1 MPa (1.0 bar).



# **WARNING**

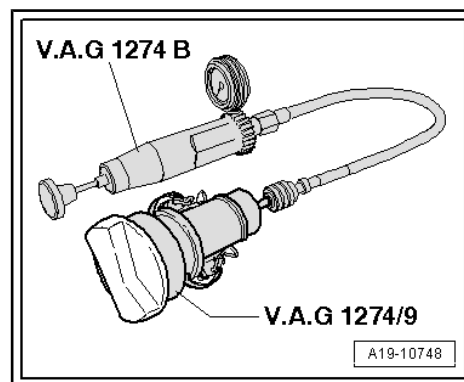
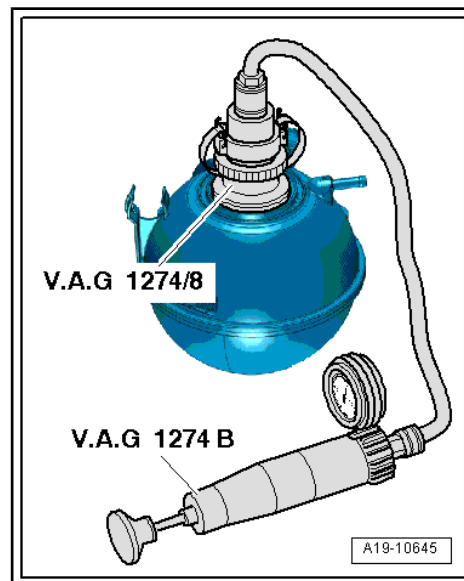
## ***Risk of scalding!***

- ◆ ***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- and hold it pressed until the pressure gauge indicates the value »0«.***

- If the pressure drops determine leak positions and repair.

## **Check pressure relief valve in cap.**

- Fit the cooling system testing device - V.A.G 1274 B- with adapter -V.A.G 1274/9- onto the cap.
- Build up overpressure using hand pump on cooling system tester.
- ◆ The pressure relief valve should open at a pressure of 0.14...0.16 MPa (1.4...1.6 bar).





## 2 Coolant pump, regulation of cooling system

⇒ "2.1 Summary of components - coolant pump/coolant thermostat", page 154

⇒ "2.2 Summary of components - electric coolant pump", page 157

⇒ "2.3 Summary of components - coolant temperature sender", page 158

⇒ "2.4 Removing and installing coolant pump", page 158

⇒ "2.5 Removing and installing toothed belt pulley for coolant pump", page 162

⇒ "2.6 Removing and installing electric coolant pump", page 163

⇒ "2.7 Removing and installing thermostat", page 164

⇒ "2.8 Removing and installing coolant temperature sender G62", page 167

⇒ "2.9 Removing and installing coolant temperature sender at radiator outlet G83", page 168

### 2.1 Summary of components - coolant pump/coolant thermostat

## 1 - Thermostat housing

- ☐ installing and removing  
⇒ [“2.7.2 Removing and installing thermostat for large coolant circuit”, page 167](#)
- ☐ Observe tightening sequence when tightening to coolant pump  
⇒ [“2.4 Removing and installing coolant pump”, page 158](#).

## 2 - Thermostat

- ☐ For large coolant circuit
- ☐ Start of opening approx. 105 °C
- ☐ different versions ⇒ Electronic Catalogue of Original Parts“ETKA”
- ☐ installing and removing  
⇒ [“2.7.2 Removing and installing thermostat for large coolant circuit”, page 167](#)

## 3 - Gasket

- ☐ replace after removal
- ☐ Observe proper seating of gasket
- ☐ before installing, slightly moisten with coolant

## 4 - Coolant pump

- ☐ installing and removing  
⇒ [“2.4 Removing and installing coolant pump”, page 158](#)

- ☐ Replace toothed belt when changing coolant pump

## 5 - Bolt

- ☐ order of tightening ⇒ [page 156](#)
- ☐ 8 Nm

## 6 - Gasket

- ☐ replace after removal
- ☐ Observe proper seating of gasket
- ☐ before installing, slightly moisten with coolant

## 7 - Toothed belt guard

- ☐ For coolant pump toothed belt

## 8 - Bolt

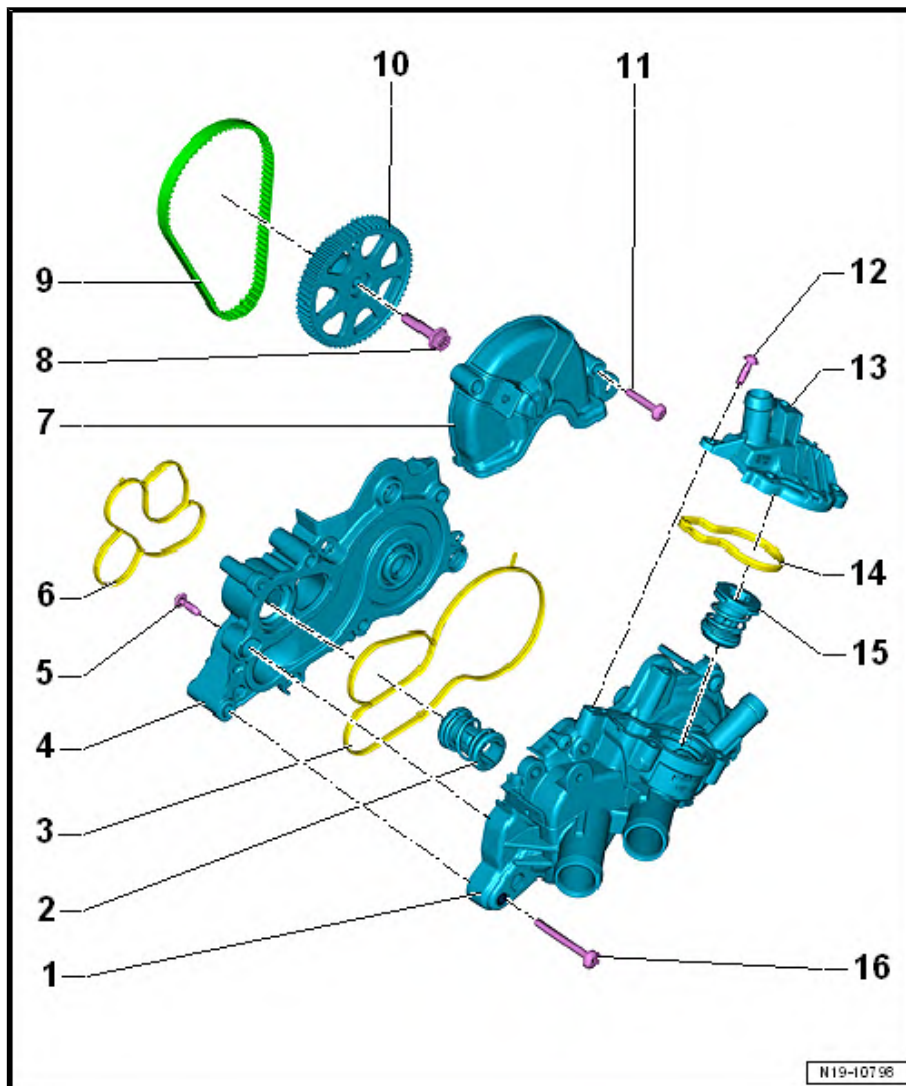
- ☐ replace after removal
- ☐ 20 Nm + torque a further 90° (1/4 turn)

## 9 - Toothed belt

- ☐ Replace when changing coolant pump
- ☐ For coolant pump drive
- ☐ installing and removing ⇒ [“2.4 Removing and installing coolant pump”, page 158](#)

## 10 - Toothed belt pulley

- ☐ For coolant pump drive



N19-107 98



- ❑ installing and removing  
⇒ [“2.5 Removing and installing toothed belt pulley for coolant pump”, page 162](#)

#### 11 - Bolt

- ❑ 8 Nm

#### 12 - Bolt

- ❑ order of tightening ⇒ [page 157](#)
- ❑ 7 Nm

#### 13 - Cover

- ❑ for coolant regulator

#### 14 - Gasket

- ❑ replace after removal
- ❑ before installing, slightly moisten with coolant

#### 15 - Thermostat

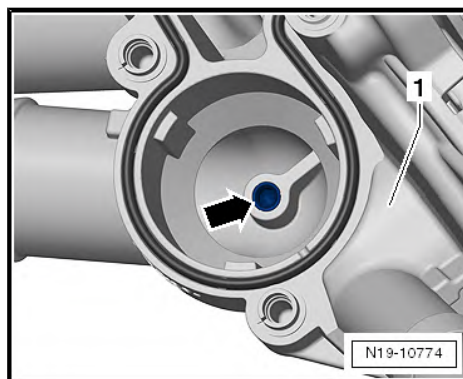
- ❑ For small coolant circuit
- ❑ Start of opening approx. 87 °C
- ❑ installing and removing  
⇒ [“2.7.1 Removing and installing thermostat for small coolant circuit”, page 164](#)
- ❑ Fitting position ⇒ [page 156](#)

#### 16 - Screw

- ❑ Tightening torque and tightening order ⇒ [page 161](#)

#### Installation position of thermostat for large coolant circuit

- Must be fitted with the centring pin into guide -arrow- on coolant pump housing.



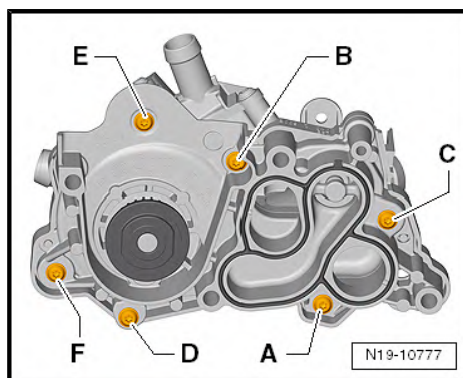
#### Tightening sequence thermostat housing at coolant pump - tightening torque and tightening sequence



#### Note

*Self-cutting screws must be positioned by hand in such a way that they find the old thread turn. Then tighten the screw to torque.*

- Tighten screws in the sequence -A...F- to 8 Nm.

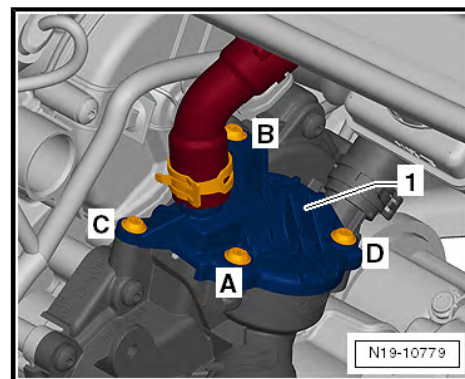


## Tightening sequence cover for coolant thermostat at the coolant thermostat housing - Tightening torque



*Self-cutting screws must be positioned by hand in such a way that they find the old thread turn. Then tighten the screw to torque.*

- Tighten cover screws -1- in the sequence -A...D- to 7 Nm.



## 2.2 Summary of components - electric coolant pump

### 1 - Charge air cooler pump - V188-

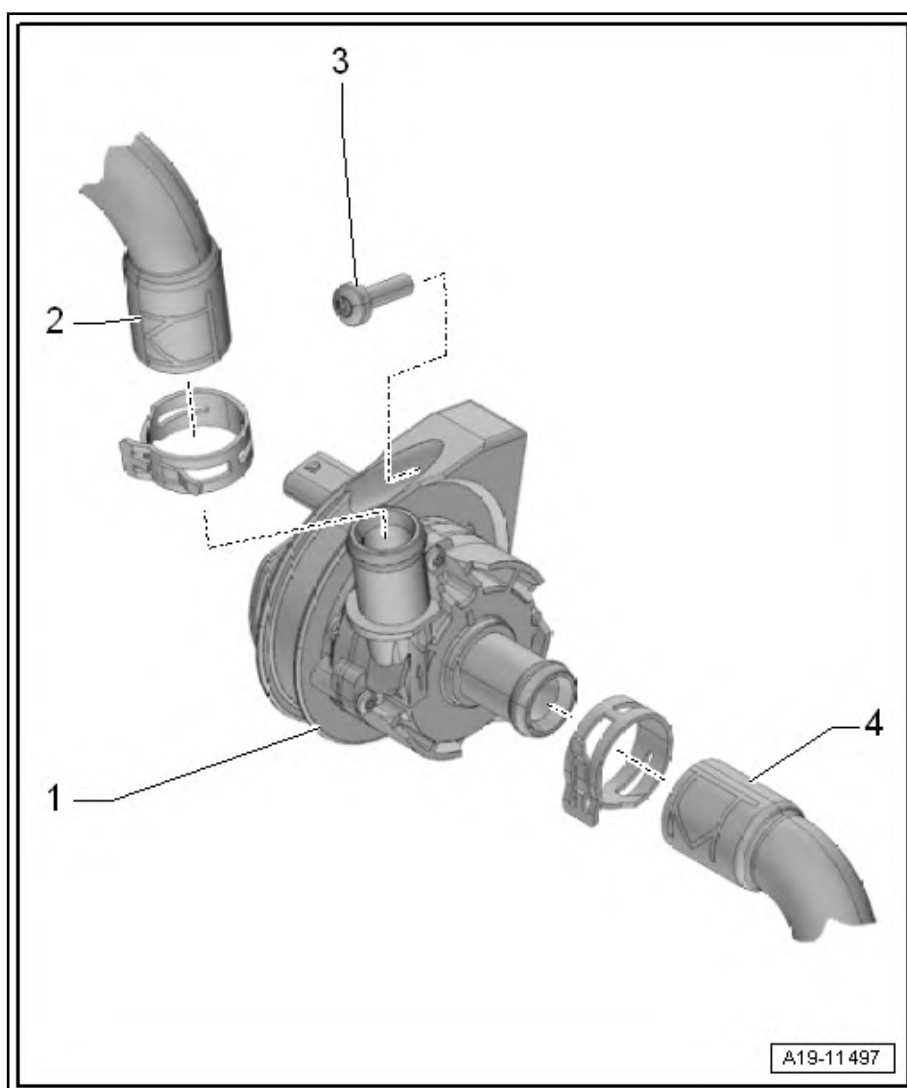
- ☐ With holder
- ☐ installing and removing  
⇒ ["2.6 Removing and installing electric coolant pump", page 163](#)

### 2 - Coolant hose

### 3 - Bolt

- ☐ 8 Nm

### 4 - Coolant hose





## 2.3 Summary of components - coolant temperature sender

### 1 - O-ring

- ☐ replace after removal

### 2 - Coolant temperature sender at radiator outlet - G83-

- ☐ installing and removing  
⇒ ["2.9 Removing and installing coolant temperature sender at radiator outlet G83"](#),  
[page 168](#)

### 3 - Support ring

### 4 - O-ring

- ☐ replace after removal

### 5 - Coolant temperature sender - G62-

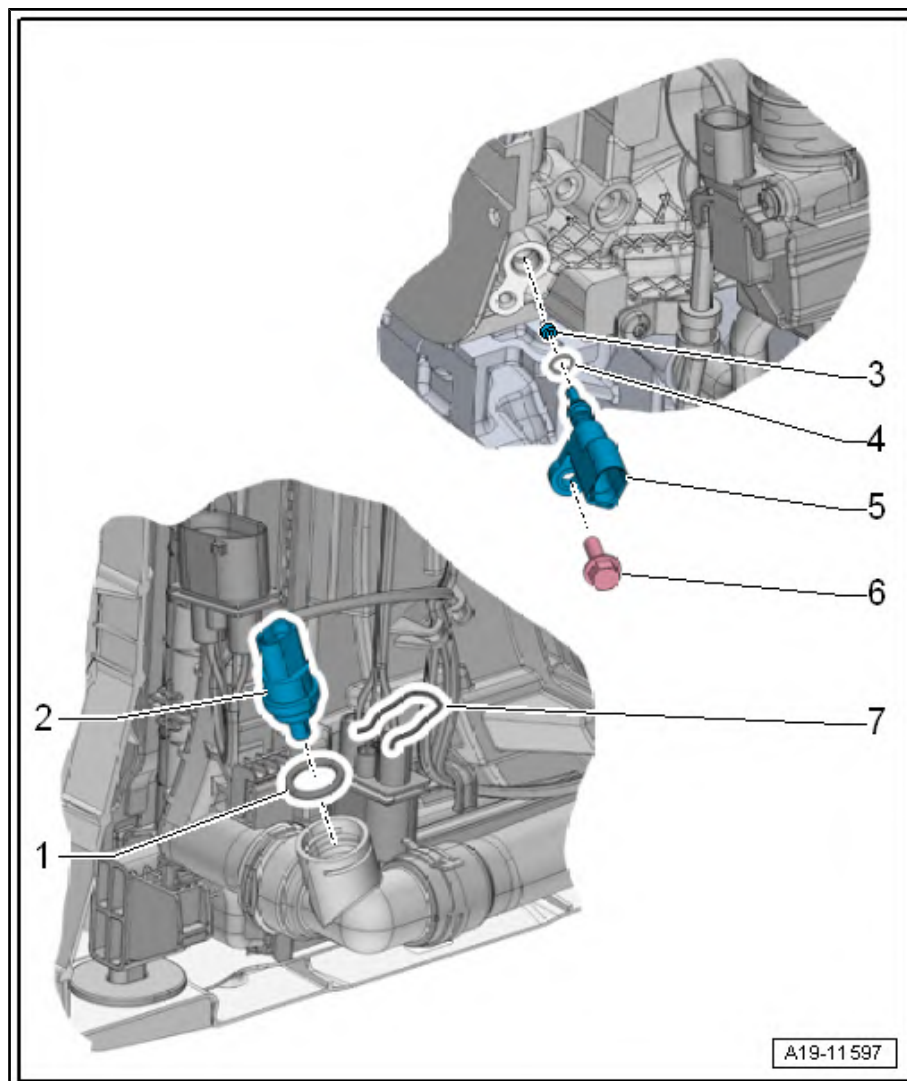
- ☐ installing and removing  
⇒ ["2.8 Removing and installing coolant temperature sender G62"](#),  
[page 167](#)

### 6 - Bolt

- ☐ 8 Nm

### 7 - Retaining clip

- ☐ Check for secure seating



## 2.4 Removing and installing coolant pump

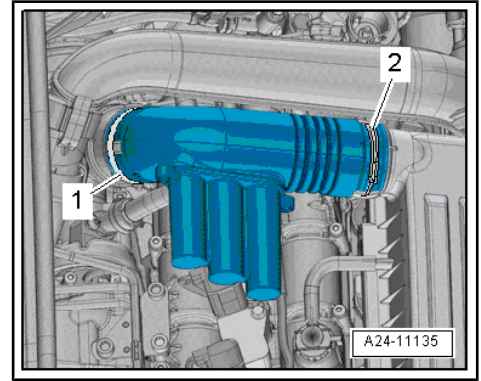
### Special tools and workshop equipment required

- ◆ Catch pan for workshop crane , e.g. -VAS 6208-
- ◆ Pliers for spring strap clamps
- ◆ Adapter for cooling system testing device , e.g. -V.A.G 1274/8-
- ◆ Release tool - T10527-
- ◆ Release tool - T10527/1-

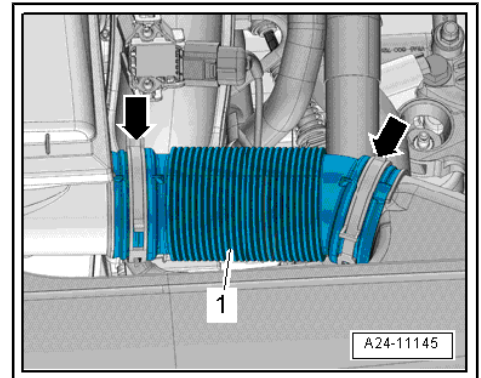
### Removing

- Drain coolant ⇒ ["1.2 Draining and filling coolant"](#), [page 147](#) .
- Remove battery tray ⇒ Electrical System; Rep. gr. 27 .

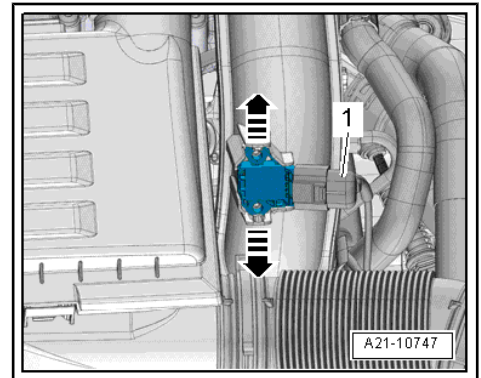
- Loosen hose clamps -1-, -2- and remove air guide pipes.
- Expose air guide hoses at the air guide pipe.



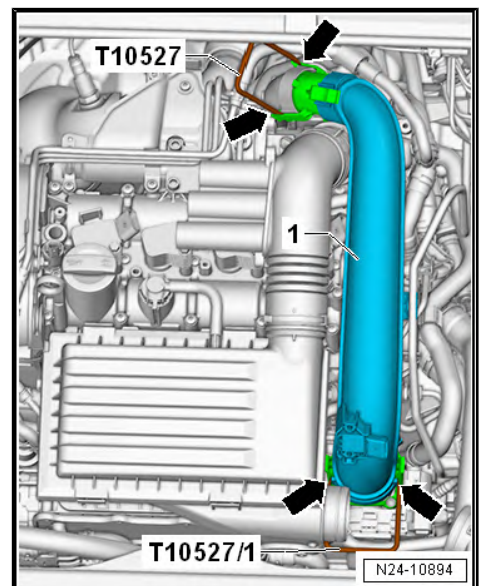
- Undo hose clamps -arrows-, remove air guide hose -1-.



- Disconnect plug -1- at charge pressure sender - GX26- .

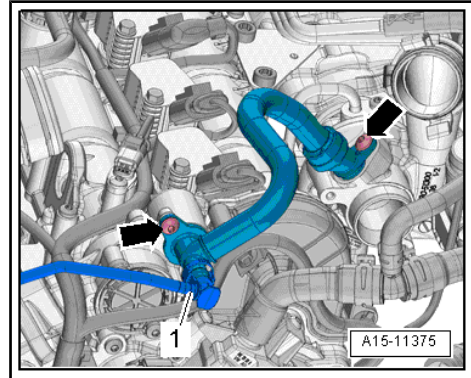


- Unlock catch pegs -arrows- with unlocking tool - T10527- and release unlocking tool - T10527/1- , remove the air guide pipe -1-.

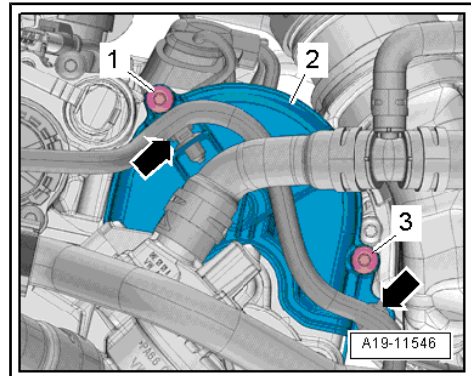




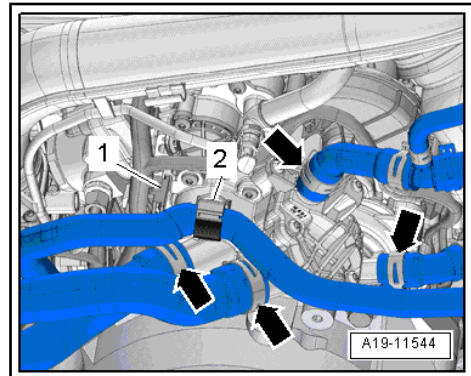
- Press release buttons on the hose -1- to pull off the activated charcoal filter.
- Unscrew screws -arrows- and remove hose for crankcase ventilation.



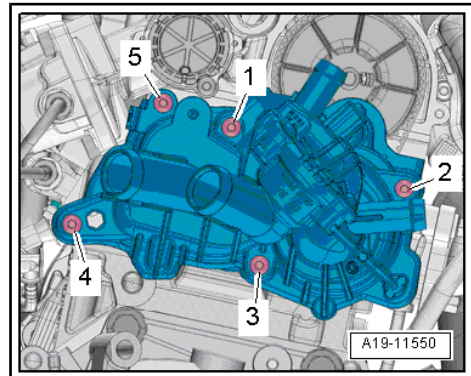
- Expose wiring loom -arrows-.
- Unscrew screws -1-, -3- and remove toothed belt guard -2- for coolant pump toothed belt.



- Expose electric wiring loom -1- and coolant hose -2-.
- Loosen hose clamps -arrows- and remove coolant hoses.



- Loosen the screws in the sequence -5- to -1- and unscrew them.
- Remove coolant pump with toothed belt.
- Remove thermostat housing when coolant pump is being replaced  
⇒ ["2.7.1 Removing and installing thermostat for small coolant circuit", page 164](#) .



## Install



### Note

- ◆ Replace gaskets -arrows-.
- ◆ Remove toothed belt when coolant pump is being replaced.
- ◆ Secure hose connections with hose clamps which comply with the series design ⇒ *Electronic Catalogue of Original Parts "ET-KA"* .

- Ensure proper seating of gaskets -arrows-.
- Moisten gasket for coolant pump with coolant.

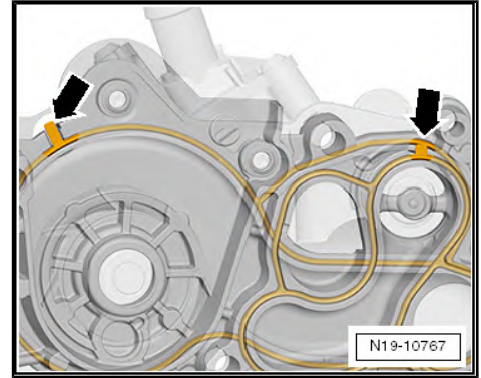


#### Caution

*Always adhere to the sequence of work steps given below when installing the coolant pump.*

*This ensures that the toothed belt is correctly tensioned.*

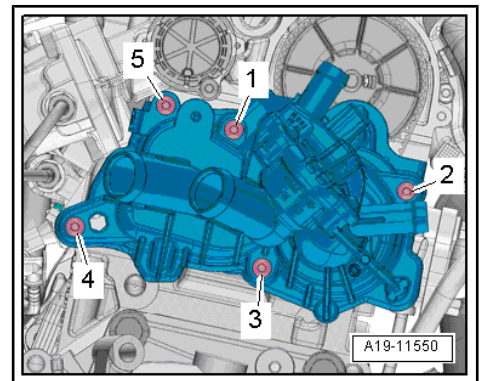
*The following work steps must be carried out with the aid of a 2nd mechanic.*



- Used toothed belts must always be replaced with new ones when the coolant pump is being replaced.
- Place cylinder 1 to TDC  
⇒ [“2.3 Checking valve timing”, page 81](#)
- Fit toothed belt centrally, move coolant pump to installation position.
- Mount coolant pump on cylinder head with securing bolts.
- Initially tighten screws in the specified order:

| Stage | Screws    | Tightening torque          |
|-------|-----------|----------------------------|
| 1st   | -1 ... 5- | by hand as far as the stop |
| 2nd   | -1 ... 5- | 10 Nm                      |

- Loosen all screws by 1 turn.





- Fit torque wrench, e. g. - VAS 6583- with hexagon socket SW10 insert -Pos. 6- to the coolant pump.
- Preload coolant pump with a 10 mm hexagon socket insert -6- with extension and torque wrench e.g. - VAS 6583- to 30 Nm clockwise.
- Position the torque wrench - VAS 6583- vertically for better handling.



#### Note

- ◆ *Do not support torque wrench with the other hand.*
- ◆ *In order to avoid the belt tension being too high the torque wrench must not be »put under excessive pressure«.*
- Keep coolant pump pretensioned.
- At the same time, have a second mechanic pre-tighten the fixing screws on the coolant pump clockwise in sequence from right to left, beginning with screw -2-, -1- and -5- »3. Pretighten stage« to 10 Nm.
- Then tighten the fixing screws to the »4th. stage«.

| Stage | Bolts                   | Tightening torque |
|-------|-------------------------|-------------------|
| 3rd   | -2-, -1-, -5-           | 10 Nm             |
| 4th   | -3-, -4-, -5-, -1-, -2- | 12 Nm             |

Continued installation is carried out in the reverse order. When installing, note the following:

- Replenish coolant ➔ [page 151](#) .

#### Tightening torques

- ◆ ➔ ["1.1.2 Summary of components 2- exhaust gas turbocharger", page 222](#)
- ◆ ➔ ["2.1 Summary of components - coolant pump/coolant thermostat", page 154](#)
- ◆ Battery tray ➔ Electrical system; Rep. gr. 27

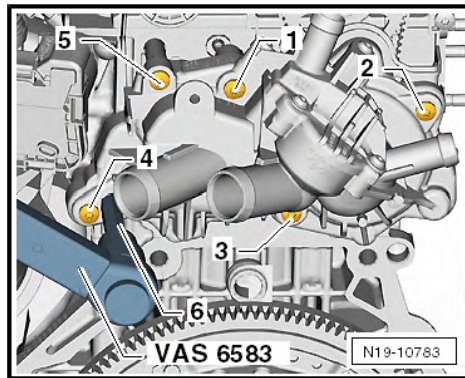
## 2.5 Removing and installing toothed belt pulley for coolant pump

#### Special tools and workshop equipment required

- ◆ Counterholder - T10172- with adapters -T10172/2-

#### Removing

- Remove coolant pump  
➔ ["2.4 Removing and installing coolant pump", page 158](#) .



- Loosen screw -1-. Use counterholder - T10172- with adapter -T10172/2- to do so.
- Unscrew screw, remove toothed belt pulley-2-.

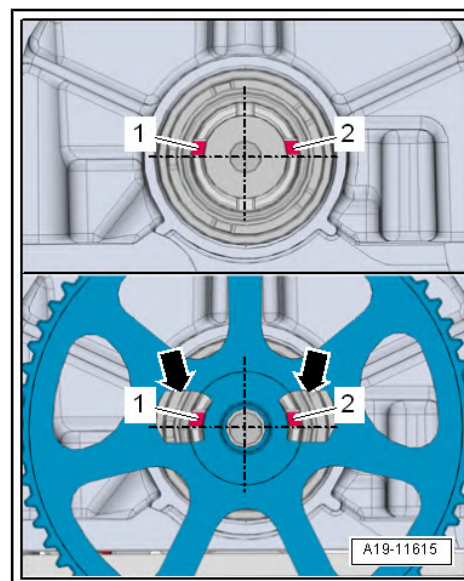
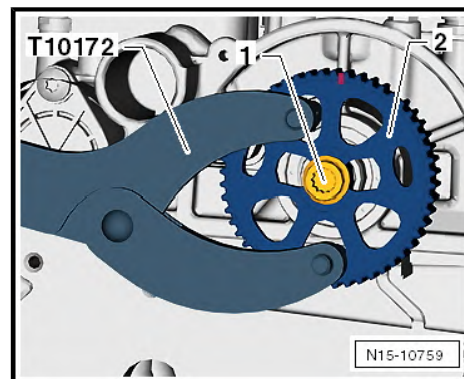
### Install

Installation is carried out in the reverse order. When installing, observe the following:

- Position toothed belt pulley:
  - Grooves -1- and -2- in the camshaft are arranged asymmetrically.
  - The recesses-arrows- in the toothed belt pulley are also arranged asymmetrically.
- Place the toothed belt pulley on the camshaft so that the asymmetrical grooves are exactly in the centre of the recesses.
- Install coolant pump  
⇒ [“2.4 Removing and installing coolant pump”, page 158](#) .

### Tightening torque

| Component             | Nm                                      |
|-----------------------|-----------------------------------------|
| Screw for belt pulley | 20 Nm + torque a further 90° (1/4 turn) |



## 2.6 Removing and installing electric coolant pump

⇒ [“2.6.1 Removing and installing charge air cooler pump V188”, page 163](#)

### 2.6.1 Removing and installing charge air cooler pump - V188-

#### Special tools and workshop equipment required

- ◆ Hose clamps up to Ø 25 mm - MP7-602 (3094)-
- ◆ Catch pan for workshop crane , e.g. -VAS 6208-
- ◆ Pliers for spring strap clamps



## Removing

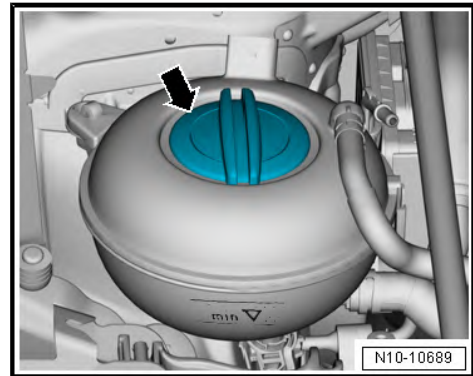
- Open cap -arrow- for coolant expansion tank.



### WARNING

*There is risk of injury due to hot steam and hot coolant.*

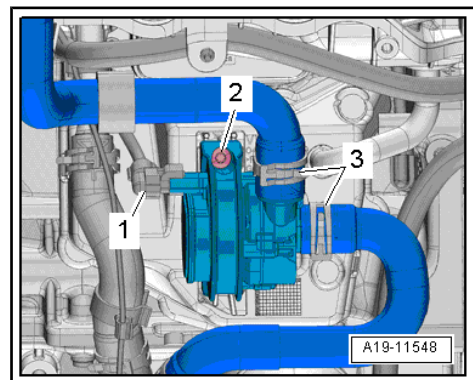
- ◆ *When the engine is warm, the cooling system is under overpressure.*
- ◆ *Reduce excess pressure by covering the cap of the coolant expansion tank with a cloth and opening it carefully.*



- Remove the sound dampening system ⇒ Body Work; Rep. gr. 66 .
- Separate electrical plug connection -1-.
- Place a catch pan for workshop crane - VAS 6208- underneath.
- At the charge air cooler pump - V188- disconnect coolant hoses with hose clamps -3094- .
- Loosen hose clamps -3- and remove coolant hoses.
- Undo screw -2- and remove charge air cooler pump - V188- .

## Installing

Installation is performed in a similar way in the reverse order. Pay attention to the following points:



### Note

*Secure all hose connections with hose clamps which comply with the series design ⇒ Electronic Catalogue of Original Parts "ET-KA."*

- Install the noise insulation ⇒ Body Work; Rep. gr. 66 .
- Check coolant level ⇒ [page 151](#) .

## Tightening torque

| Component      | Nm   |
|----------------|------|
| Screw for pump | 8 Nm |

## 2.7 Removing and installing thermostat

⇒ ["2.7.1 Removing and installing thermostat for small coolant circuit", page 164](#)

⇒ ["2.7.2 Removing and installing thermostat for large coolant circuit", page 167](#)

### 2.7.1 Removing and installing thermostat for small coolant circuit

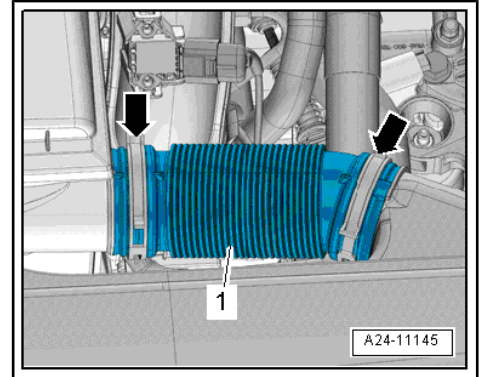
#### Special tools and workshop equipment required

- ◆ Pliers for spring strap clamps
- ◆ Key - T10508-
- ◆ Release tool - T10527-

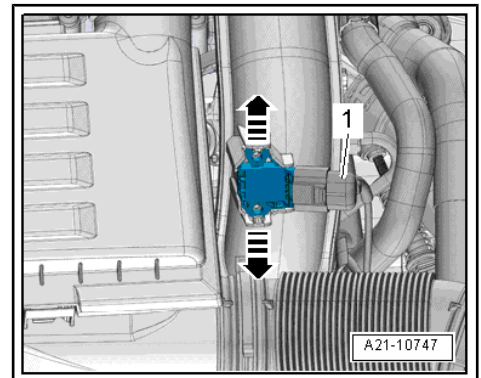
- ◆ Release tool - T10527/1-

### Removing

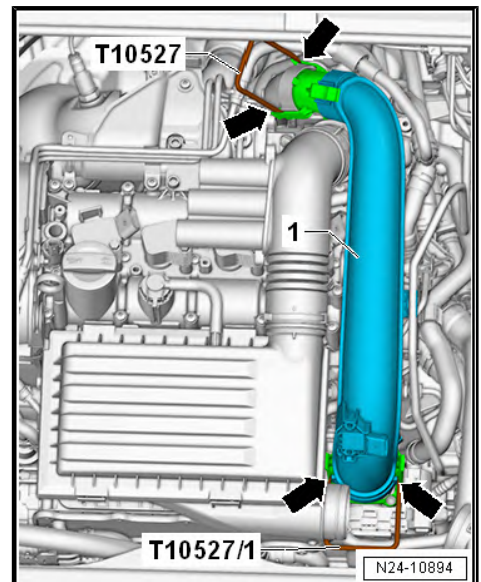
- Drain coolant ➔ [“1.2 Draining and filling coolant”, page 147](#) .
- Expose air guide hoses at the air guide pipe.
- Undo hose clamps -arrows-, remove air guide hose -1-.



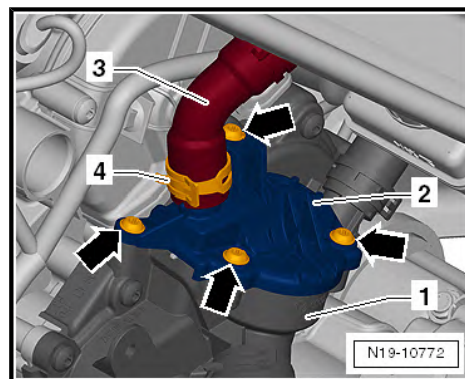
- Disconnect plug -1- at charge pressure sender - GX26- .



- Unlock catch pegs -arrows- with unlocking tool - T10527- and release unlocking tool - T10527/1- , remove the air guide pipe -1-.

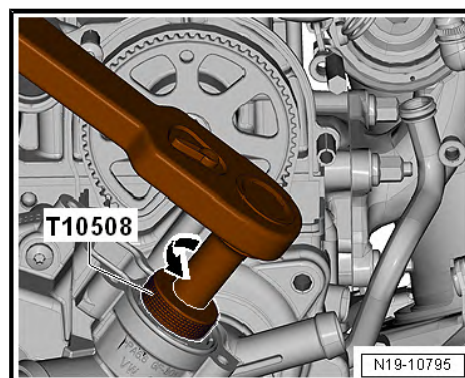


- Loosen hose clamp -4- and remove coolant hose -3-.
- Screw out screws -arrows- and remove cover -2- from thermostat housing -1-.

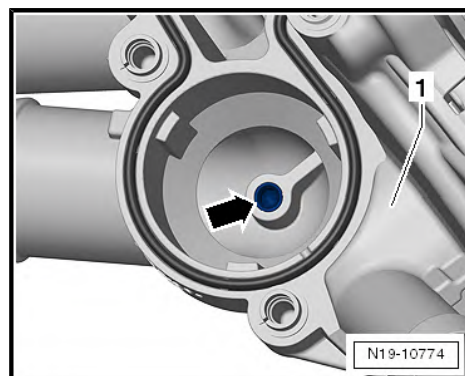


- Remove thermostat with spanner - T10508- .
- Light press the wrench - T10508- down, while doing so, turn in the -direction of the arrow-.

#### Install



- Insert thermostat. Fit the centring pin in into the guide-arrow-.



- Install thermostat with spanner - T10508- .
- Light press the wrench - T10508- down, while doing so, turn in the -direction of the arrow- as far as it can go.

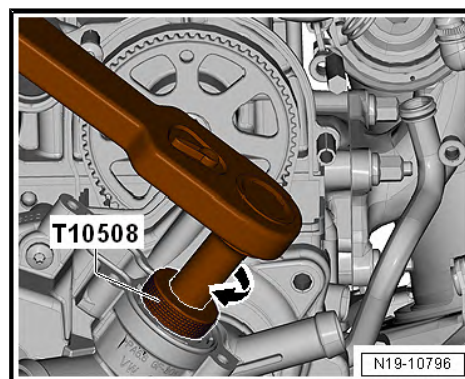
Installation is carried out in the reverse order. When installing, observe the following:



#### Note

*Replace gasket.*

- Moisten gasket with coolant.
- Replenish coolant  
⇒ [“1.2 Draining and filling coolant”, page 147](#) .



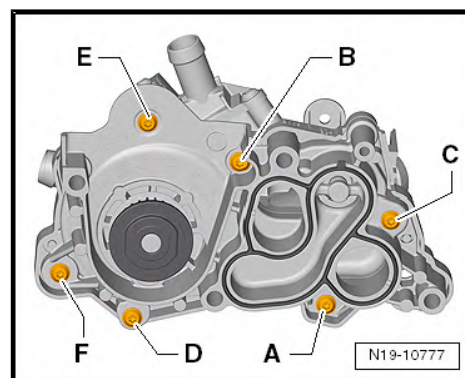
#### Tightening torques

| Component                                     | Nm   |
|-----------------------------------------------|------|
| Thermostat cover screws on thermostat housing | 7 Nm |

## 2.7.2 Removing and installing thermostat for large coolant circuit

### Removing

- Remove coolant pump  
⇒ [“2.4 Removing and installing coolant pump”, page 158](#) .
- Release the screws in the order -F...A-.
- Remove coolant pump from coolant pump housing.



- Remove thermostat -2- from coolant pump -1-.

### Install

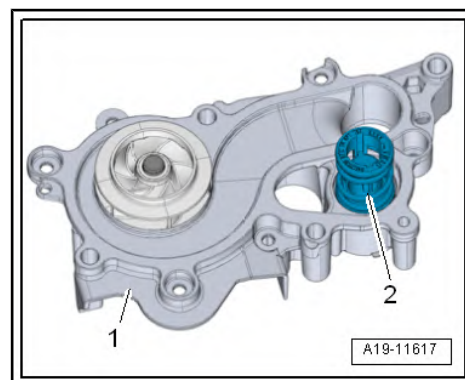
Installation is carried out in the reverse order. When installing, observe the following:



#### Note

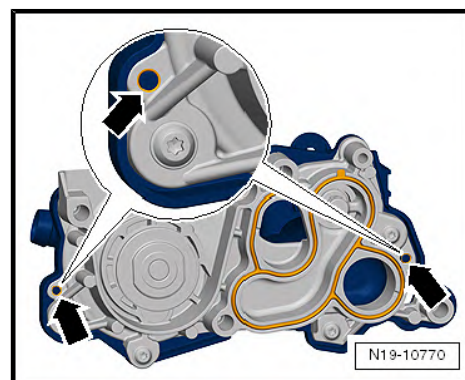
*Replace gasket.*

- Moisten gasket with coolant.
- Position thermostat housing on coolant pump.
- The centring bolts on the thermostat must be inserted into the guides -arrows- on the coolant pump.
- Tighten screws for thermostat housing ⇒ [page 156](#) .
- Install coolant pump  
⇒ [“2.4 Removing and installing coolant pump”, page 158](#) .
- Replenish coolant  
⇒ [“1.2 Draining and filling coolant”, page 147](#) .



### Tightening torque

- ◆ ⇒ Fig. [“Tightening sequence thermostat housing at coolant pump - tightening torque and tightening sequence”](#), [page 156](#)



## 2.8 Removing and installing coolant temperature sender - G62-

### Removing

- Engine cold.



- Briefly open the cap -arrow- for the coolant expansion reservoir in order to remove the remaining pressure in the coolant system, then close until it clicks into place.
- Disconnect plug connection from the coolant temperature sender - G62- .



#### Note

Place a cloth below to catch any leaking coolant.

- Undo screw -1- and remove coolant temperature sender - G62- Pos. -2-.



#### Note

- ♦ If the O-ring -3- with support ring -4- remains in the cylinder head, lift out the O-ring with support ring using a wire.
- ♦ Insert new coolant temperature sender - G62- immediately into cylinder head in order to avoid loss of coolant.

#### Install

Installation is carried out in the reverse order. When installing, observe the following:



#### Note

Renew O-ring.

- Check coolant level ➔ [page 151](#) .

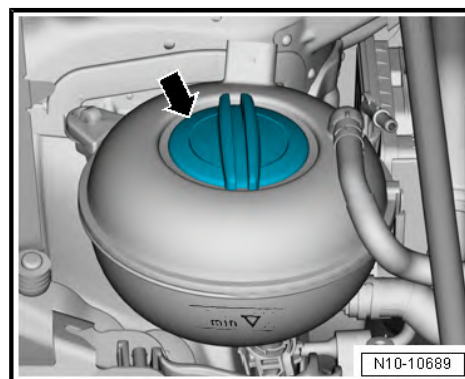
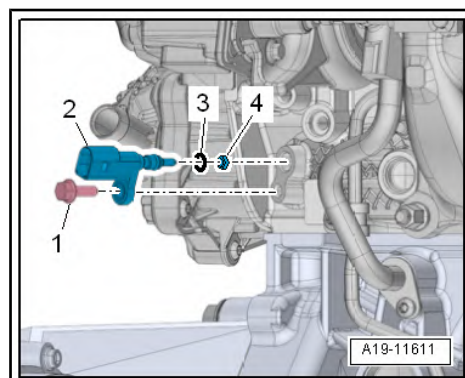
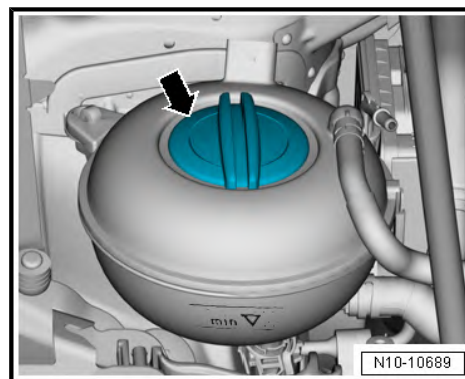
#### Tightening torque

| Component       | Nm   |
|-----------------|------|
| Screw of sender | 8 Nm |

## 2.9 Removing and installing coolant temperature sender at radiator outlet - G83-

#### Removing

- Engine cold.
- Briefly open the cap -arrow- for the coolant expansion reservoir in order to remove the remaining pressure in the coolant system, then close until it clicks into place.
- Remove the sound dampening system ➔ Body Work; Rep. gr. 66 .



- Separate electrical plug connection -2-.



**Note**

*Place a cloth below to catch any leaking coolant.*

- Pull off holding clamp -3- and take coolant temperature sender on radiator outlet - G83- out of connection piece.

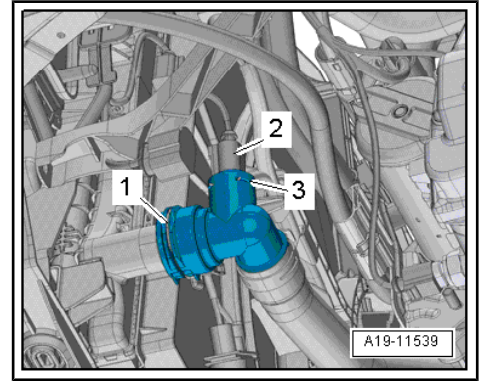
**Install**

Installation is carried out in the reverse order. When installing, observe the following:



**Note**

- ◆ *Renew O-ring.*
- ◆ *Insert new coolant temperature sender - G83- into the connection piece immediately in order to avoid loss of coolant.*
- Remove front noise insulation ⇒ Body Work; Rep. gr. 66 .
- Check coolant level ⇒ [page 151](#) .



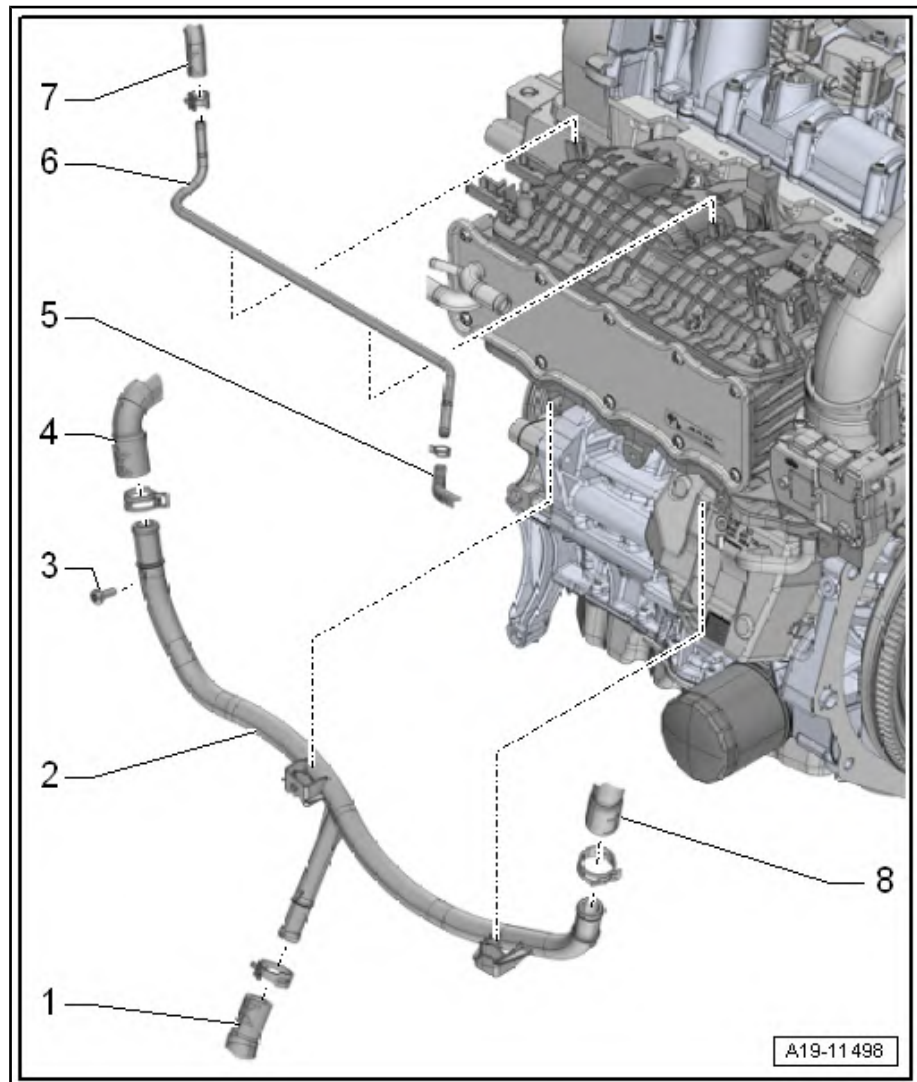
### 3 Parts of cooling system engine side

⇒ "3.1 Summary of components", page 170

⇒ "3.2 Removing and installing coolant pipe", page 170

#### 3.1 Summary of components

- 1 - Coolant hose
  - ❑ to cooler for charge air circuit
- 2 - Coolant pipe
  - ❑ When removing using a screwdriver, carefully lever out of the catch
- 3 - Bolt
  - ❑ 8 Nm
- 4 - Coolant hose
  - ❑ from the expansion reservoir
- 5 - Coolant hose
  - ❑ from coolant radiator
- 6 - Coolant line
- 7 - Coolant hose
- 8 - Coolant hose



#### Note

*The arrows which are on the coolant pipes and the coolant hose ends must stand opposite to each other.*

#### 3.2 Removing and installing coolant pipe

##### Special tools and workshop equipment required

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

## Removing

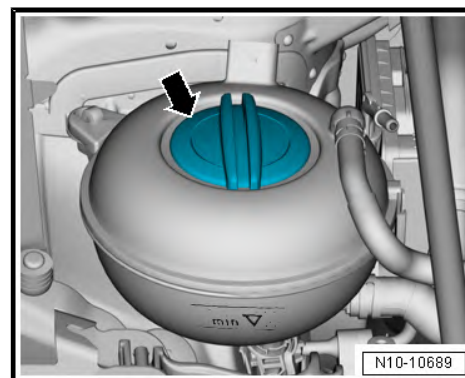


### WARNING

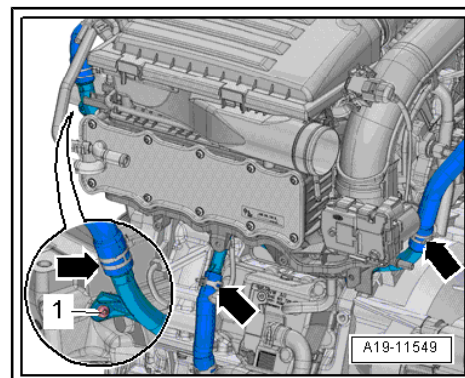
*Danger of scalding due to hot steam and hot coolant.*

- ◆ *When the engine is warm, the cooling system is under overpressure.*
- ◆ *Reduce excess pressure by covering the cap of the coolant expansion tank with a cloth and opening it carefully.*

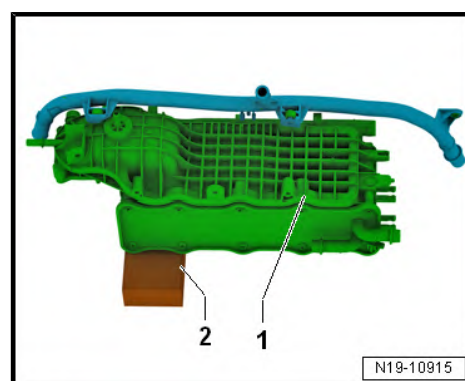
- Open cap -arrow- for coolant expansion tank.



- Disconnect coolant hoses at coolant pipe with hose clamps - MP7-602 (3094)- .
- Loosen hose clamps -arrows- and remove coolant hoses.
- Removing the intake manifold  
⇒ [“3.2 Removing and installing intake manifold”, page 241](#) .



- Place the intake manifold -1- on the work bench as shown.
- Use a wooden wedge -2- as a support for example.

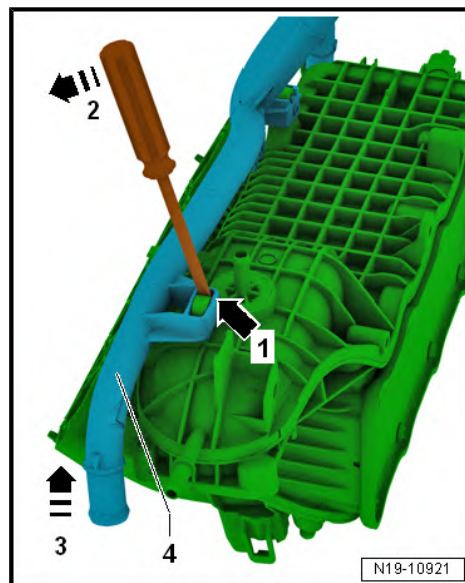


Volkswagen Technical Site: <http://vwts.ru> <http://vwts.info>

огромный архив документации по автомобилям Volkswagen, Skoda, Seat, Audi

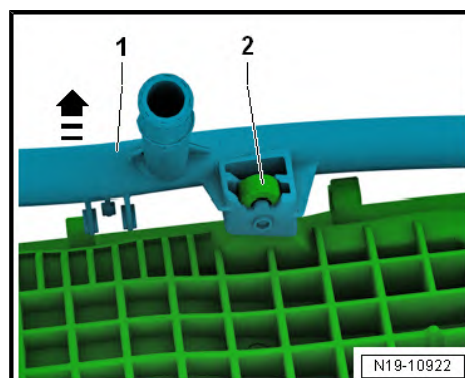


- Using the screwdriver in the direction of arrow -2- carefully press and at the same time raise the coolant pipe -4- in direction of arrow -3- until it is released from the locking mechanism.



- Remove the coolant pipe -1- in -direction of arrow- upwards, and release it from the locking mechanism -2-.

#### Installing

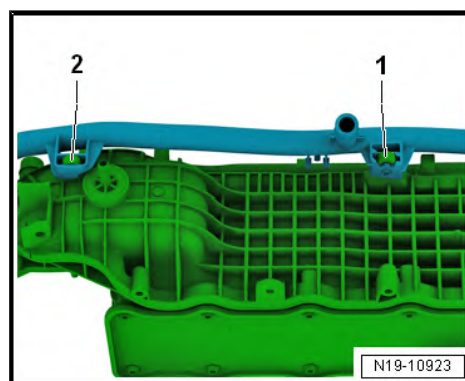


- Press the coolant pipe onto the bearings -1- and -2- until it latches.
- By pulling in the opposite direction, check that both bearings are locked.



#### Note

- ◆ Replace gaskets and O-rings.
- ◆ Secure all hose connection ends with spring-type clips that comply with the series design ⇒ ETKA - Electronic Catalogue of Original Parts .



Installation is carried out in the reverse order. When installing, note the following:

- Check coolant level ⇒ [page 151](#) .

#### Tightening torques

- ◆ ⇒ [“3.1 Assembly overview - intake manifold”, page 240](#)

## 4 Radiator and radiator fan

⇒ [“4.1 Radiator version 1 - Summary of components”, page 173](#)

⇒ [“4.2 Radiator version 2 - Summary of components”, page 175](#)

⇒ [“4.3 Radiator version 3 - Summary of components”, page 176](#)

⇒ [“4.4 Fan shroud with a radiator fan - Summary of components”, page 178](#)

⇒ [“4.5 Fan shroud with two radiator fans - Summary of components”, page 179](#)

⇒ [“4.6 Removing and installing radiator”, page 179](#)

⇒ [“4.7 Removing and installing fan shroud for radiator fan”, page 182](#)

⇒ [“4.8 Removing and installing radiator fan V7 ”, page 184](#)

⇒ [“4.9 Removing and installing radiator fan 2 V177 ”, page 185](#)

### 4.1 Radiator version 1 - Summary of components

#### 1 - Coolant radiator

- ☐ installing and removing  
⇒ [“4.6 Removing and installing radiator”, page 179](#)
- ☐ fill with fresh coolant after replacing

#### 2 - Coolant hose

- ☐ to remove, raise the holding clamps
- ☐ connect ⇒ [page 174](#)

#### 3 - Retaining clip

#### 4 - O-ring

- ☐ replace after removal

#### 5 - Coolant temperature sender at radiator outlet - G83-

- ☐ installing and removing  
⇒ [“2.9 Removing and installing coolant temperature sender at radiator outlet G83 ”, page 168](#)

#### 6 - O-ring

- ☐ replace after removal

#### 7 - Coolant hose

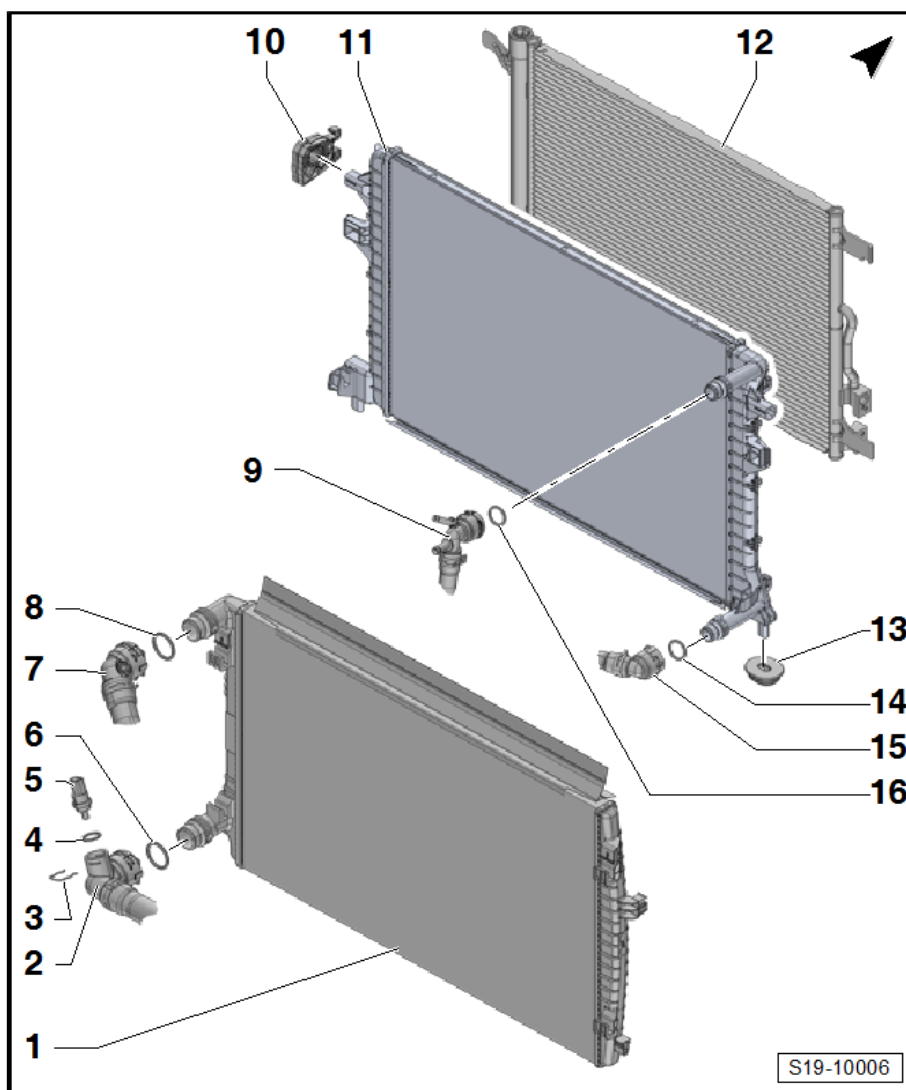
- ☐ to remove, raise the holding clamps
- ☐ connect ⇒ [page 174](#)

#### 8 - O-ring

- ☐ replace after removal

#### 9 - Coolant hose

- ☐ to remove, raise the holding clamps





- ☐ connect ➔ [page 174](#)

#### 10 - Top radiator bearing

- ☐ If the fuse latches break, you will not need to replace the top radiator bearing.
- ☐ The fuse is replaced by a special screw ➔ Electronic Catalogue of Original Parts“ETKA.”

#### 11 - Cooler for charge air circuit

- ☐ installing and removing ➔ [“4.6 Removing and installing radiator”, page 179](#)

#### 12 - Condenser

- ☐ removing and installing ➔ Heating, Air Conditioning; Rep. gr. 87

#### 13 - Bottom radiator bearing

#### 14 - O-ring

- ☐ replace after removal

#### 15 - Coolant hose

- ☐ to remove, raise the holding clamps
- ☐ connect ➔ [page 174](#)

#### 16 - O-ring

- ☐ replace after removal

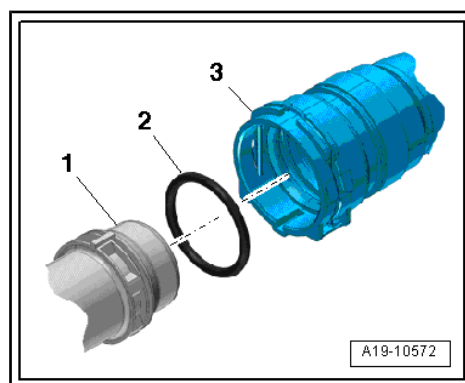


#### Note

*The arrows which are on the coolant pipes and the coolant hose ends must stand opposite to each other.*

#### Connect coolant hose with quick coupling

- Remove old O-ring -2- in coolant hose -3-.
- Moisten new O-ring with coolant and insert into coolant hose.
- Press coolant hose onto connection -1- until there is an audible click.
- Press coolant hose down again and check by pulling that the plug-in connector is fully engaged.



## 4.2 Radiator version 2 - Summary of components

### 1 - Coolant hose

- ☐ to remove, raise the holding clamps
- ☐ connect ⇒ [page 176](#)

### 2 - O-ring

- ☐ replace after removal

### 3 - Radiator fan for coolant and for charge air circuit

- ☐ removing and installing  
⇒ [“4.6 Removing and installing radiator”, page 179](#)
- ☐ fill with fresh coolant after replacing

### 4 - Coolant hose

- ☐ to remove, raise the holding clamps
- ☐ connect ⇒ [page 176](#)

### 5 - O-ring

- ☐ replace after removal

### 6 - Coolant hose

- ☐ to remove, raise the holding clamps
- ☐ connect ⇒ [page 176](#)

### 7 - O-ring

- ☐ replace after removal

### 8 - Condenser

- ☐ removing and installing  
⇒ Heating, Air Conditioning; Rep. gr. 87

### 9 - Top radiator bearing

- ☐ If the fuse latches break, you will not need to replace the top radiator bearing.
- ☐ The fuse is replaced by a special screw ⇒ Electronic Catalogue of Original Parts“ETKA.”

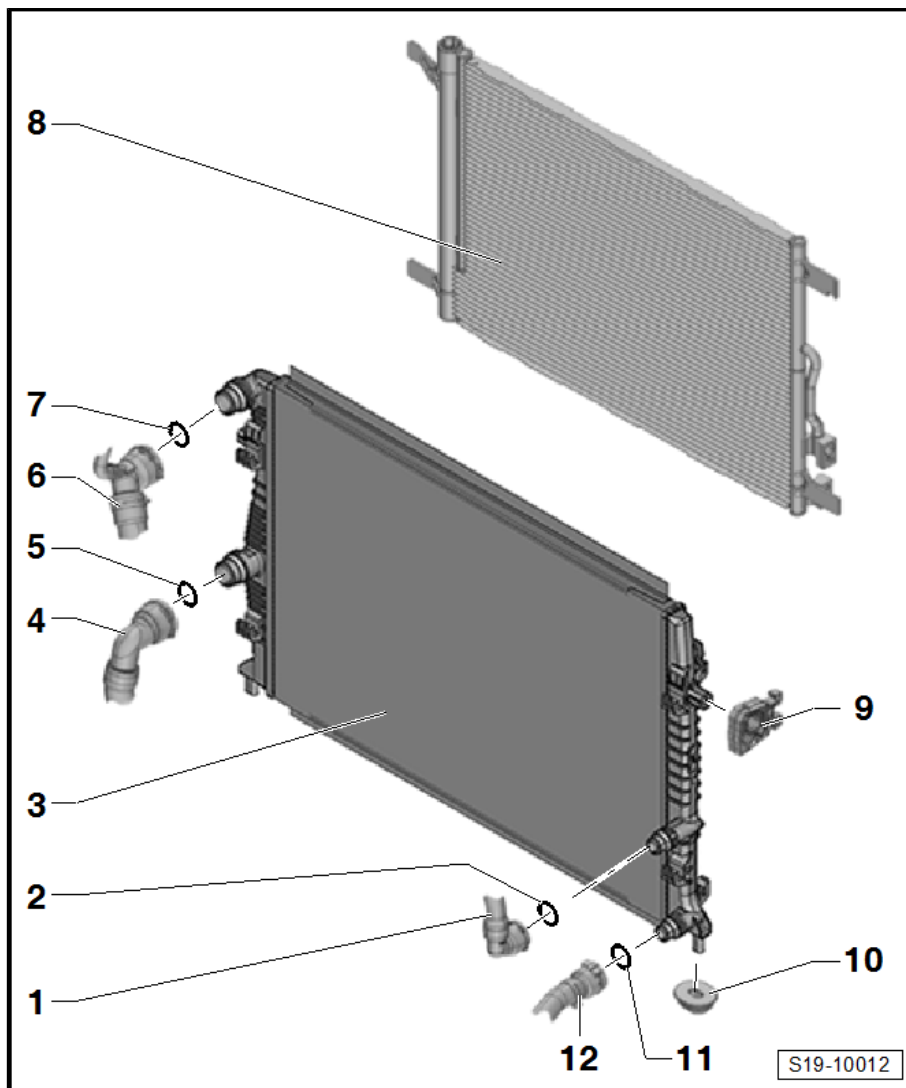
### 10 - Bottom radiator bearing

### 11 - O-ring

- ☐ replace after removal

### 12 - Coolant hose

- ☐ to remove, raise holding clamps
- ☐ connect ⇒ [page 176](#)



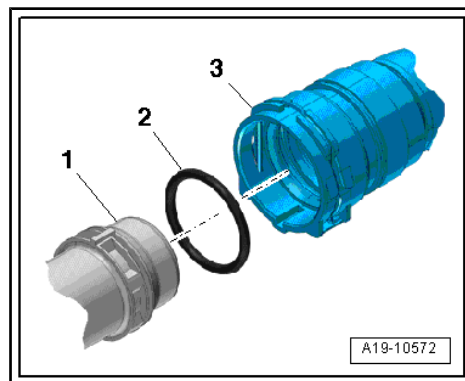


## Note

The arrows which are on the coolant pipes and the coolant hose ends must stand opposite to each other.

### Connect coolant hose with quick coupling

- Remove old O-ring -2- in coolant hose -3-.
- Moisten new O-ring with coolant and insert into coolant hose.
- Press coolant hose onto connection -1- until there is an audible click.
- Press coolant hose down again and check by pulling that the plug-in connector is fully engaged.



## 4.3 Radiator version 3 - Summary of components

### 1 - Coolant hose

- ☐ to remove, raise the holding clamps
- ☐ connect ➔ [page 177](#)

### 2 - O-ring

- ☐ replace after removal

### 3 - Cooler for charge air circuit

- ☐ installing and removing  
➔ ["4.6 Removing and installing radiator",  
page 179](#)

### 4 - Coolant hose

- ☐ to remove, raise the holding clamps
- ☐ connect ➔ [page 177](#)

### 5 - O-ring

- ☐ replace after removal

### 6 - Coolant hose

- ☐ to remove, raise the holding clamps
- ☐ connect ➔ [page 177](#)

### 7 - O-ring

- ☐ replace after removal

### 8 - Coolant radiator

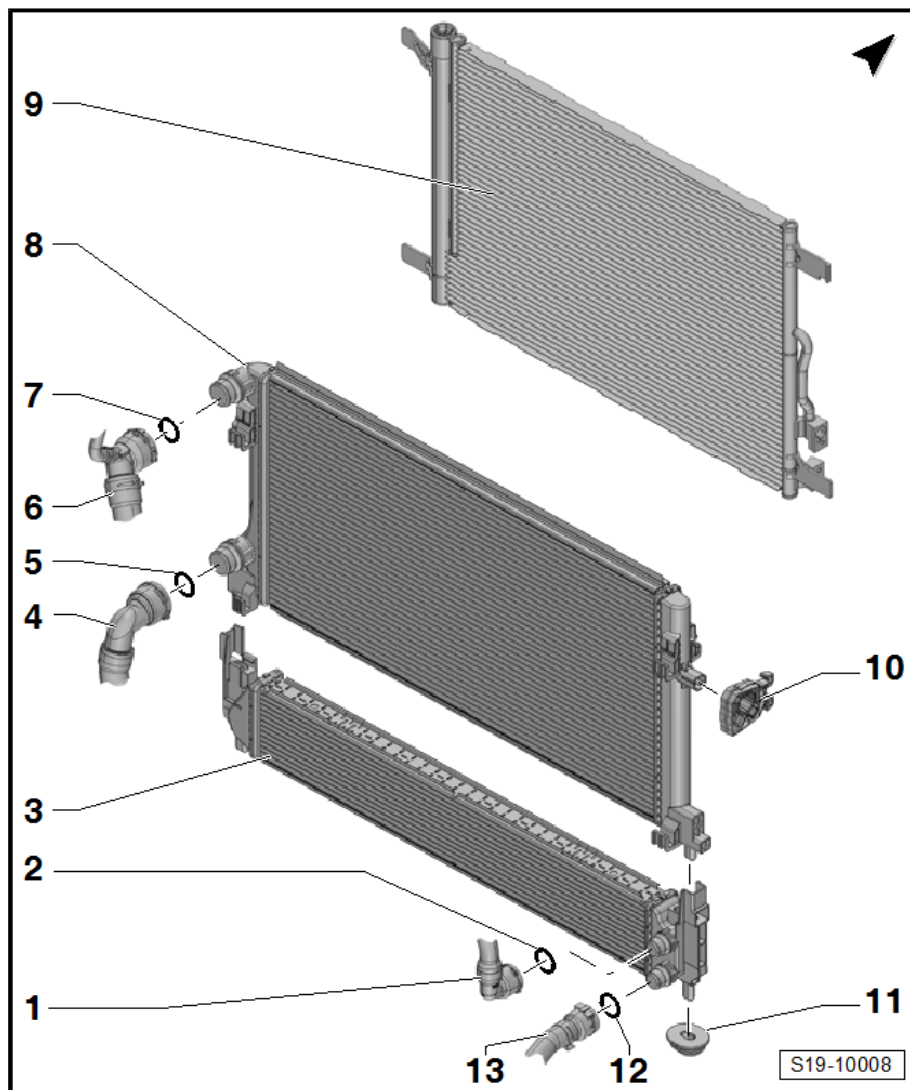
- ☐ installing and removing  
➔ ["4.6 Removing and installing radiator",  
page 179](#)
- ☐ fill with fresh coolant after replacing

### 9 - Condenser

- ☐ removing and installing ➔ Heating, Air Conditioning; Rep. gr. 87

### 10 - Top radiator bearing

- ☐ If the fuse latches break, you will not need to replace the top radiator bearing.
- ☐ The fuse is replaced by a special screw ➔ Electronic Catalogue of Original Parts "ETKA."



**11 - Bottom radiator bearing**

**12 - O-ring**

- ☐ replace after removal

**13 - Coolant hose**

- ☐ to remove, raise holding clamps
- ☐ connect ⇒ [page 177](#)

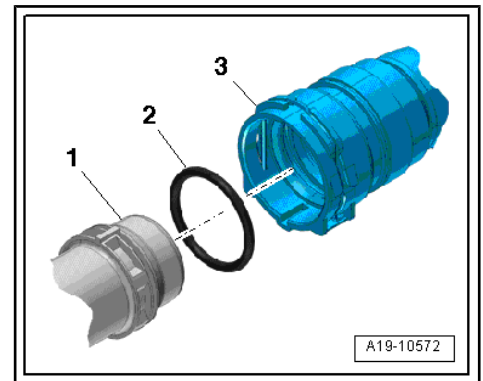


**Note**

*The arrows which are on the coolant pipes and the coolant hose ends must stand opposite to each other.*

**Connect coolant hose with quick coupling**

- Remove old O-ring -2- in coolant hose -3-.
- Moisten new O-ring with coolant and insert into coolant hose.
- Press coolant hose onto connection -1- until there is an audible click.
- Press coolant hose down again and check by pulling that the plug-in connector is fully engaged.





## 4.4 Fan shroud with a radiator fan - Summary of components

### 1 - Bolt

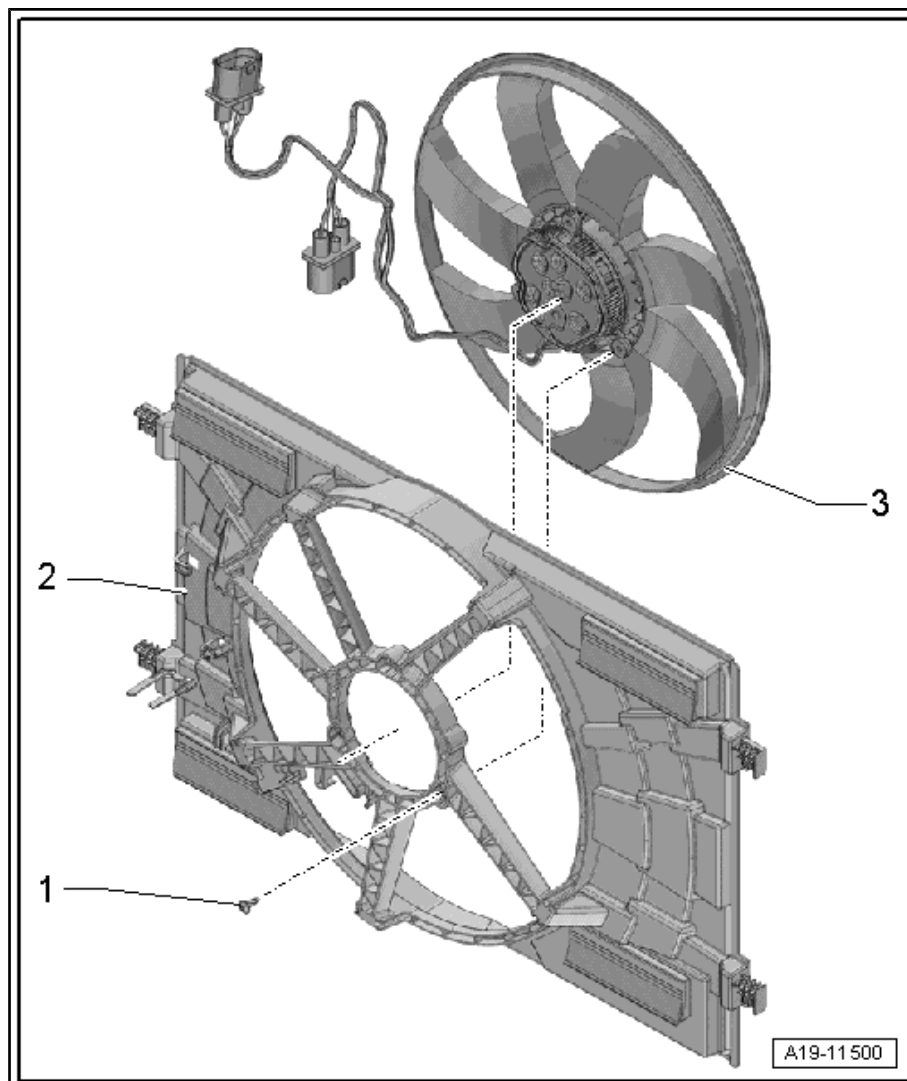
- 5 Nm

### 2 - Fan shroud

- installing and removing  
⇒ ["4.7 Removing and installing fan shroud for radiator fan", page 182](#)

### 3 - Radiator fan - V7-

- installing and removing  
⇒ ["4.8 Removing and installing radiator fan V7", page 184](#)



## 4.5 Fan shroud with two radiator fans - Summary of components

### 1 - Bolt

- 5 Nm

### 2 - Fan shroud

- installing and removing  
⇒ [“4.7 Removing and installing fan shroud for radiator fan”, page 182](#)

### 3 - Bolt

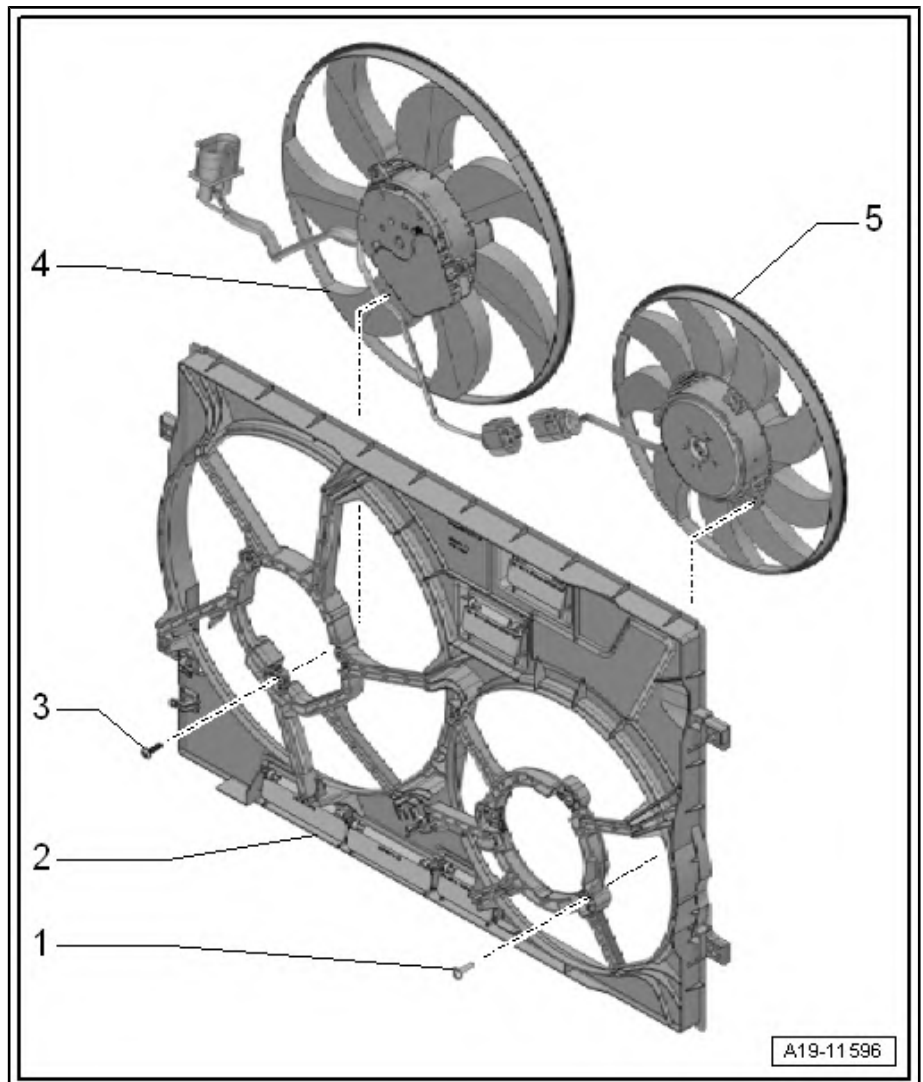
- 5 Nm

### 4 - Radiator fan - V7-

- installing and removing  
⇒ [“4.8 Removing and installing radiator fan V7”, page 184](#)

### 5 - Radiator fan 2 - V177-

- installing and removing  
⇒ [“4.9 Removing and installing radiator fan 2 V177”, page 185](#)



## 4.6 Removing and installing radiator

### Special tools and workshop equipment required

- ◆ Catch pan for workshop crane , e.g. -VAS 6208-
- ◆ Pliers for spring strap clamps



### WARNING

*There is risk of injury from radiator fans starting up automatically.*

- ◆ *Before carrying out work in the fan shroud area, disconnect the electrical plug connections.*



## Note

- ◆ Depending on the vehicle version, 3 radiator versions are installed.
- ◆ Coolant radiator and charge air circulation cooler are removed together.
- ◆ Radiator Version 1  
⇒ [“4.1 Radiator version 1 - Summary of components”, page 173](#).
- ◆ Radiator Version 2  
⇒ [“4.2 Radiator version 2 - Summary of components”, page 175](#).
- ◆ Radiator Version 3  
⇒ [“4.3 Radiator version 3 - Summary of components”, page 176](#).

## Removing

- Drain coolant ⇒ [“1.2 Draining and filling coolant”, page 147](#).
- Removing fan shroud  
⇒ [“4.7 Removing and installing fan shroud for radiator fan”, page 182](#).
- Remove front bumper ⇒ Body Work; Rep. gr. 63.

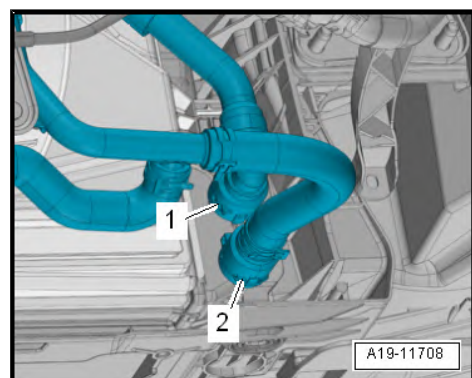
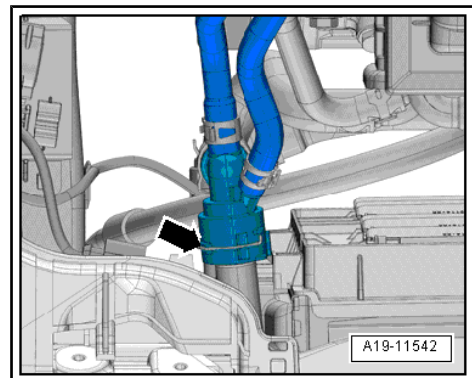
### Vehicles with radiator version 1

- Raise holding clamp -arrow- and disconnect coolant hose right above radiator for charge air circuit.

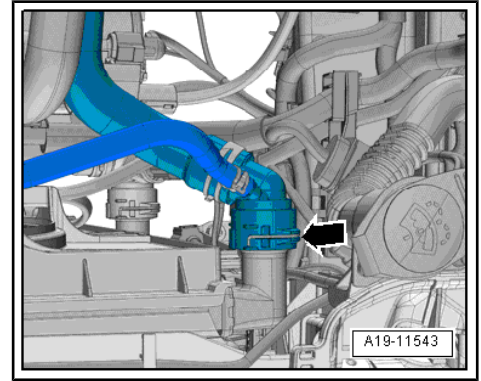
### Vehicles with radiator versions 2 and 3:

- Raise holding clamp -1- and remove top right coolant hose from charge air circuit cooler (bottom right coolant hose already removed).

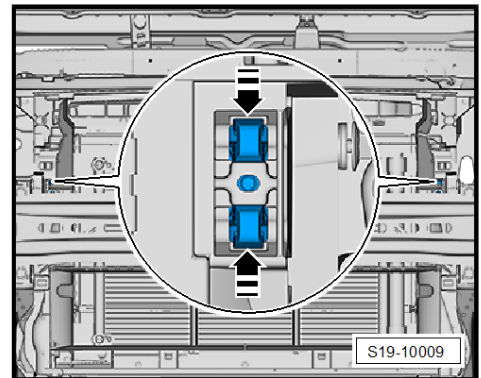
### Continued for all vehicles



- Raise holding clamp -arrow- and remove top left coolant hose from radiator.

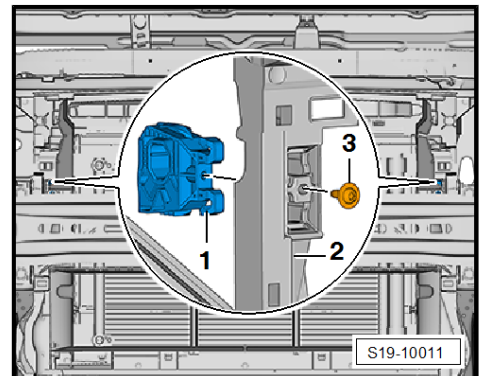


- Press the catches for the top radiator bearing -arrows- at the same time, e.g. with screwdrivers, and unclip the bearing on both sides.
- Partially tilt cooler into the engine compartment.



#### Note

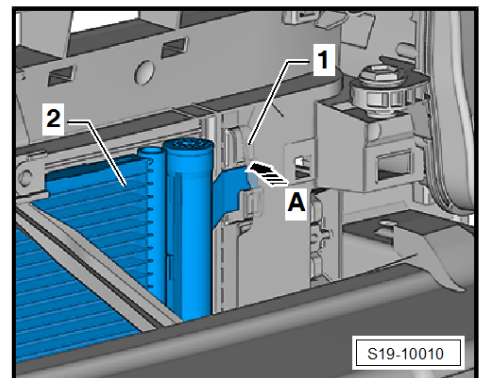
*If the fuse latches break, you will not need to replace the top radiator bearing -1-. The fuse is replaced by a special screw -3- ➔ Electronic Catalogue of Original Parts "ETKA".*



- Unlock the left and right catches from the cooler -1- arrow -A- and raise the condenser.
- Press the radiator downwards until the radiator bearing deflects at the bottom, to do so, unhook the condenser -2- from the radiator -1-.
- Strap capacitor to the lock support.

#### Vehicles with radiator version 1

- Remove the cooler for the charge air circuit from the vehicle together with the cooler for coolant.





- Press left and right radiator locking lugs simultaneously -arrow- and remove coolant radiator from the charge air circuit radiator.

#### Vehicles with radiator versions 2 and 3:

- Remove the cooler for the charge air circuit from the vehicle together with the charge air circuit cooler.

#### Vehicles with radiator version 3

- Unlock catches for charge air circuit -1- -arrows A- from the radiator fan for coolant -2-.
- Tilt the charge air circuit cooler -1- in direction of arrow -B- and suspend in the direction of arrow -C-.

#### Installing

Installation is performed in a similar way in the reverse order. Pay attention to the following points:



#### Note

- ◆ *When there is light pressure on the fins*  
⇒ ["3.5 Assembly of radiators and capacitors", page 8](#).
- ◆ *Replace O-rings.*
- Install front bumper ⇒ Body Work; Rep. gr. 63 .
- Install fan shroud  
⇒ ["4.7 Removing and installing fan shroud for radiator fan", page 182](#) .
- Connect coolant hoses with quick coupling ⇒ [page 174](#) .
- Replenish coolant ⇒ [page 148](#) .



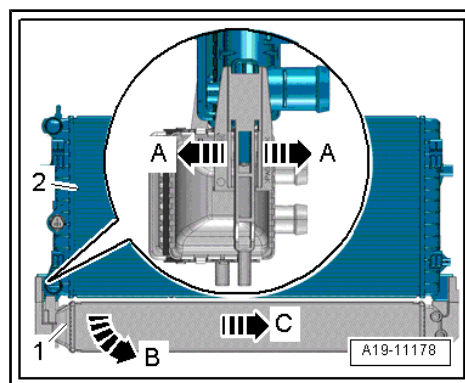
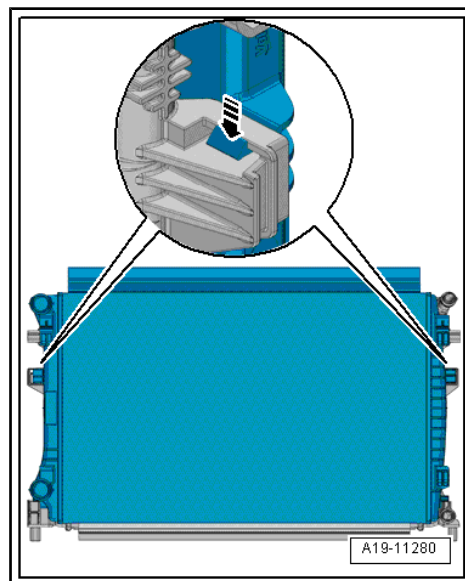
#### Note

*If the radiator has been replaced, all the coolant must be changed.*

## 4.7 Removing and installing fan shroud for radiator fan

#### Special tools and workshop equipment required

- ◆ Catch pan for workshop crane , e.g. -VAS 6208-





## WARNING

*There is risk of injury from radiator fans starting up automatically.*

- ◆ *Before carrying out work in the fan shroud area, disconnect the electrical plug connections.*
- ◆ *When the engine is warm, the cooling system is under overpressure.*
- ◆ *Reduce excess pressure by covering the cap of the coolant expansion tank with a cloth and opening it carefully.*



## Note

*Depending on the vehicle version, 3 radiator versions are installed.*

- ◆ Radiator Version 1  
⇒ [“4.1 Radiator version 1 - Summary of components”, page 173](#).
- ◆ Radiator Version 2  
⇒ [“4.2 Radiator version 2 - Summary of components”, page 175](#).
- ◆ Radiator Version 3  
⇒ [“4.3 Radiator version 3 - Summary of components”, page 176](#).

## Removing

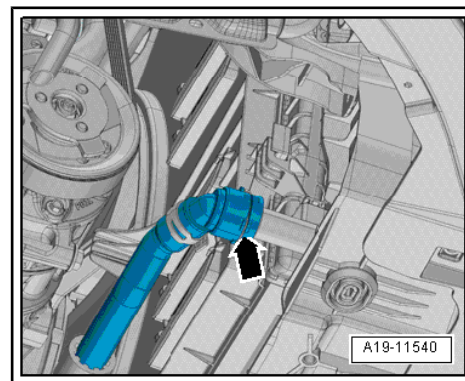
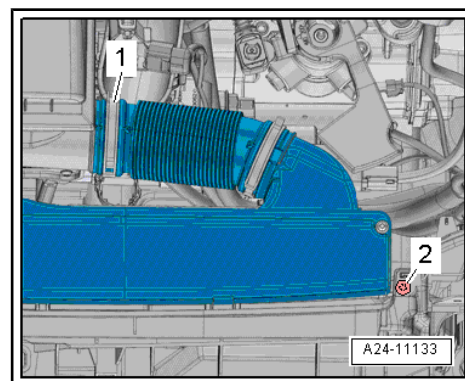
- Loosen hose clamp -1- and remove air guide hose.
- Release screw left and right arrow -2-.
- Unclip and remove the air guide on the lock carrier.

### Vehicles with radiator versions 1 and 2

- Place a catch pan for workshop crane - VAS 6208- underneath.

- Loosen holding clamp -arrow- and remove bottom right coolant hose from charge air circuit cooler, allowing coolant to drain.

### Continued for all vehicles





- Remove plug -1- for radiator fan, for this purpose slide screw clamp backwards arrow -A- and press release button down.
- Press locking lugs for fan shroud left and right simultaneously -arrow B- and remove fan shroud upwards from the radiator.

#### Vehicles with radiator version 3

- Partially move the fan shroud to the right and remove upwards out of the vehicle.

#### Vehicles with radiator versions 1 and 2

- Remove the fan shroud downwards out of the vehicle.

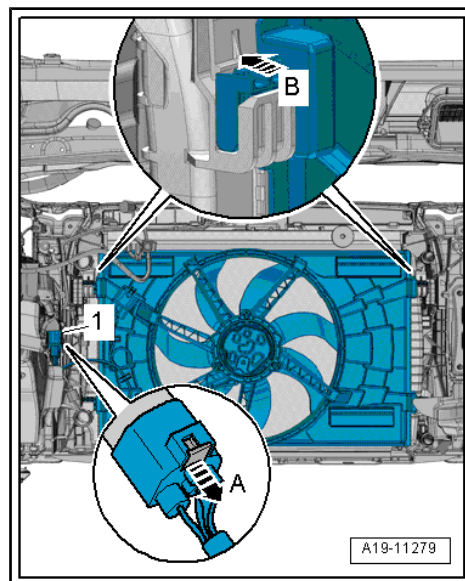
#### Install

Installation is carried out in the reverse order. When installing, observe the following:

- Electrical connections and proper routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Replenish coolant ⇒ [page 151](#) .

#### Tightening torque

| Component                    | Nm   |
|------------------------------|------|
| Screw for cover on air guide | 2 Nm |



## 4.8 Removing and installing radiator fan - V7-



#### WARNING

*Risk of injury due to radiator fans starting up automatically.*

- ◆ *Before carrying out work in the fan shroud area, disconnect the electrical plug connections.*

#### Removing



#### Note

*All cable straps should be fastened again in the same place when installing.*

- Removing fan shroud  
⇒ [“4.7 Removing and installing fan shroud for radiator fan”, page 182](#) .

- Disconnect electrical plug connections.
- Release screws -arrows- and remove radiator fan - V7- .

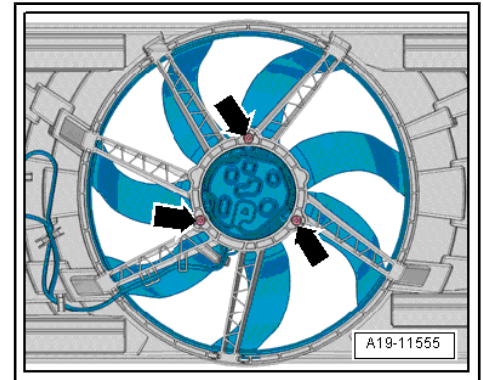
#### Install

Installation is performed in a similar way in the reverse order. Pay attention to the following points:

- Install fan shroud  
⇒ [“4.7 Removing and installing fan shroud for radiator fan”, page 182](#) .

#### Tightening torque

| Component | Nm   |
|-----------|------|
| Fan screw | 5 Nm |



## 4.9 Removing and installing radiator fan 2 - V177-



#### WARNING

*Risk of injury due to radiator fans starting up automatically.*

- ◆ *Before carrying out work in the fan shroud area, disconnect the electrical plug connections.*

#### Removing



#### Note

*All cable straps should be fastened again in the same place when installing.*

- Removing fan shroud  
⇒ [“4.7 Removing and installing fan shroud for radiator fan”, page 182](#) .
- Disconnect plug connection -arrow-.
- Remove screws -2- and remove the radiator fan - V177- .

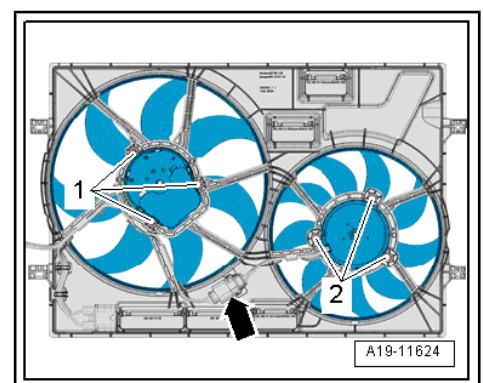
#### Installing

Installation is performed in a similar way in the reverse order. Pay attention to the following points:

- Install fan shroud  
⇒ [“4.7 Removing and installing fan shroud for radiator fan”, page 182](#) .

#### Tightening torque

| Component | Nm   |
|-----------|------|
| Fan screw | 5 Nm |





## 20 – Fuel supply system

### 1 Fuel tank and fuel delivery unit

- ⇒ [“1.1 Fuel tank - Summary of components”, page 186](#)
- ⇒ [“1.2 Extract fuel from the fuel tank”, page 189](#)
- ⇒ [“1.3 Removing and installing the fuel tank”, page 195](#)
- ⇒ [“1.4 Summary of components - fuel delivery unit and sender for fuel gauge display”, page 200](#)
- ⇒ [“1.5 Fuel delivery unit with sender for fuel gauge display”, page 201](#)
- ⇒ [“1.6 Removing and installing the sender for fuel gauge display G”, page 204](#)
- ⇒ [“1.7 Checking fuel pump”, page 205](#)
- ⇒ [“1.8 Removing and installing fuel pump control unit J538”, page 210](#)



#### Note

- ◆ *Fuel hoses at the engine must only be secured with spring-type clips ⇒ [Electronic catalogue of original parts“ETKA”](#).*
- ◆ *Spring-type clip pliers are recommended for installation of spring-type clips.*
- ◆ *Fuel hoses can be connected further with push-fit couplings ⇒ [“2 Separating push-on couplings”, page 211](#).*

### 1.1 Fuel tank - Summary of components

## 1 - Screw cap

- ☐ screw in until there is an audible click
- ☐ with securing suspended to prevent any loss at tank fuel filler flap

## 2 - Earth connection

- ☐ for fuel filler neck
- ☐ for discharging the electrostatic charge  
⇒ [page 188](#)

## 3 - Bolt

- ☐ replace after removal
- ☐ 8 Nm

## 4 - Lock ring

- ☐ loosen and tighten up with spanner -T30101 (3087)-
- ☐ 110 Nm

## 5 - Sealing ring

- ☐ replace after removal
- ☐ install when dry

## 6 - Fuel delivery unit

- ☐ with integrated fuel filter, the fuel filter cannot be replaced individually
- ☐ with sender for fuel gauge display - G-
- ☐ Summary of components  
⇒ ["1.4 Summary of components - fuel delivery unit and sender for fuel gauge display", page 200](#)

- ☐ installing and removing ⇒ ["1.5 Fuel delivery unit with sender for fuel gauge display", page 201](#)
- ☐ Checking electric fuel pump ⇒ Vehicle diagnostic tester
- ☐ Fitting position ⇒ [page 189](#)
- ☐ Connect fuel lines ⇒ [page 189](#)
- ☐ Removing and installing fuel gauge sender - G-  
⇒ ["1.6 Removing and installing the sender for fuel gauge display G", page 204](#)

## 7 - Fuel tank

- ☐ installing and removing ⇒ ["1.3 Removing and installing the fuel tank", page 195](#)

## 8 - Heat shield

- ☐ for fuel tank

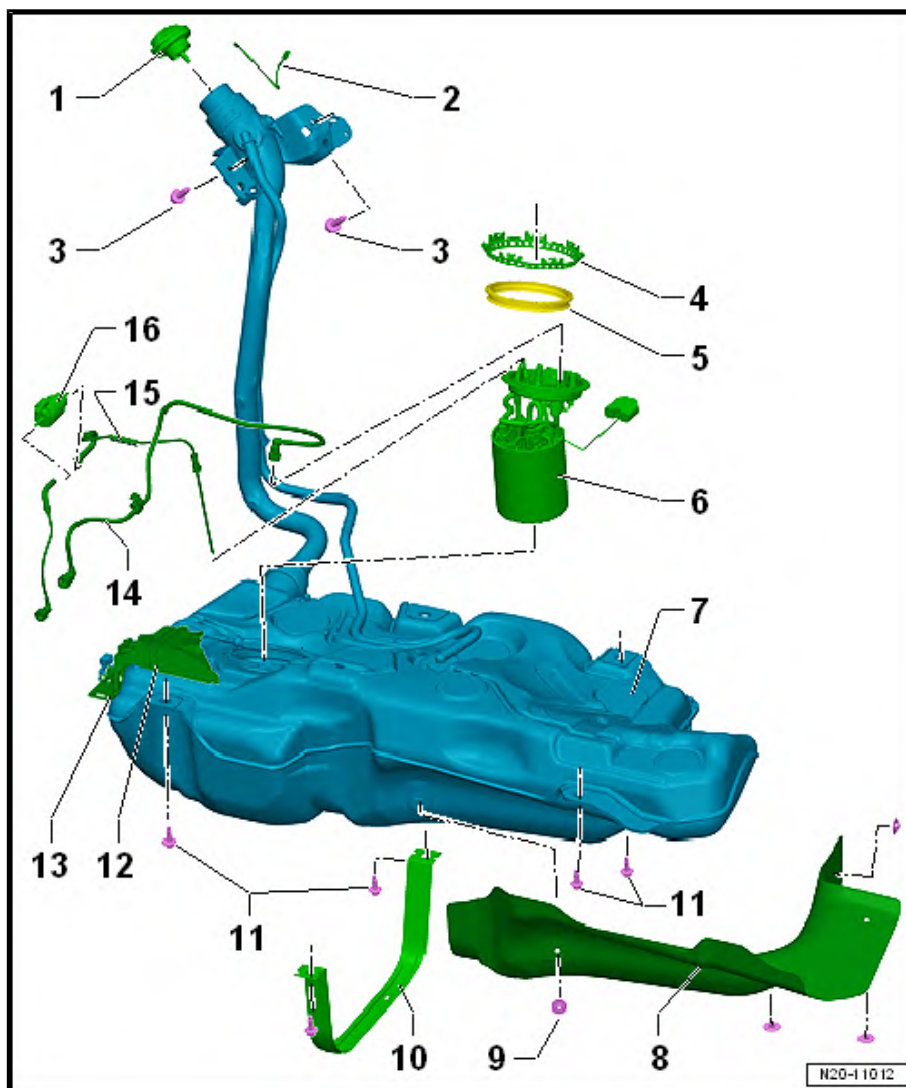
## 9 - Circlip

## 10 - Tensioning strap

- ☐ Mark installation position before installation
- ☐ Ensure proper seating

## 11 - Bolt

- ☐ replace after removal
- ☐ 20 Nm + torque a further 90° (1/4 turn)





## 12 - Mounting bracket

- ☐ For fuel pump control unit -J538-
- ☐ Removing and installing fuel pump control unit -J538-  
⇒ [“1.8 Removing and installing fuel pump control unit J538”, page 210](#)

## 13 - Support

- ☐ for vehicles with auxiliary heating
- ☐ for dosing pump -V54-
- ☐ pay attention to correct fit of the dosing pump in the holder

## 14 - Fuel feed line

- ☐ to the engine
- ☐ pushed into the fuel tank
- ☐ do not kink
- ☐ Fit so that it can be heard clicking into place
- ☐ Unlock the quick couplings and fit together ⇒ [“2 Separating push-on couplings”, page 211](#)

## 15 - Fuel line

- ☐ for vehicles with auxiliary heating
- ☐ to the dosing pump -V54-
- ☐ do not kink
- ☐ Fitting position ⇒ Heating, Air Conditioning; Rep. gr. 82
- ☐ Check the quick coupling for firm seating by pulling in the opposite direction!
- ☐ Unlock the quick couplings and fit together ⇒ [“2 Separating push-on couplings”, page 211](#)

## 16 - Dosing pump -V54-

- ☐ for vehicles with auxiliary heating

## Earth connection for fuel filler neck

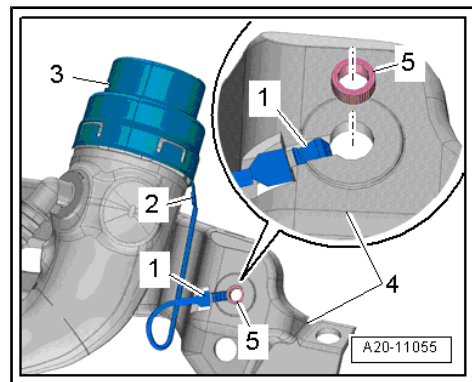
- Connect earth connection as shown in the illustration.
- Ensure proper seating of plug connection.
- ◆ Plug -2- of the earth connection on the threaded ring -3- of the fuel filler neck.
- Unhook contact peg -1- of the earth connection in the securing bore on the fuel tank -4- and press in the distance sleeve -5-.



### WARNING

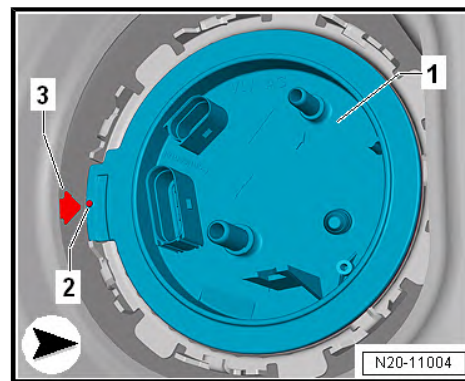
***Risk of explosion from electrostatic charge.***

- ◆ ***After installing, use an ohmmeter to test the electrical connection of the plate ring on the fuel filler neck at a bare point on the body.***
- ◆ ***Specified value approximately 0 Ω.***



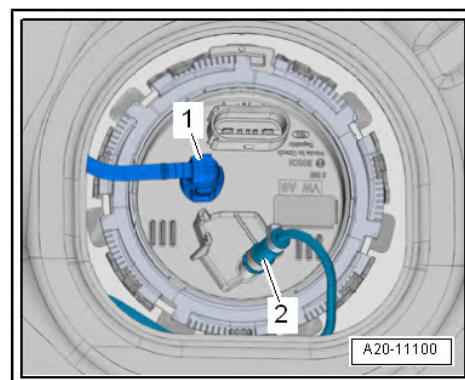
### Fitting location of the fuel delivery unit

- The marking -2- at the fuel delivery unit closing flange -1- must be located against arrow -3- at the fuel tank.



### Connect the fuel lines to the fuel delivery unit.

- 1 - Fuel feed line to the engine
- 2 - Fuel line to the dosing pump -V54-



## 1.2 Extract fuel from the fuel tank

⇒ "1.2.1 Emptying fuel tank when fuel pump is intact", page 189

⇒ "1.2.2 Emptying fuel tank when the fuel pump is damaged when more than 3/4 full", page 192

⇒ "1.2.3 Emptying fuel tank when the fuel pump is damaged when less than 3/4 full", page 193

### 1.2.1 Emptying fuel tank when fuel pump is intact

#### Special tools and workshop equipment required

- ◆ Fuel extraction device , e. g. -VAS 5190-
- ◆ Adapter for fuel extraction - VAS 5190 /3-
- ◆ Removal wedge - 3409-
- ◆ Remote control - V.A.G 1348/3A-
- ◆ Measuring tool set , e.g. -V.A.G 1594 C-
- ◆ Adapter - VAS 5565-



#### Note

*If the fuel extraction device - VAS 5190- is still fitted with an extraction hose with a fixed tip, replace it by the version with a screw-type tip.*

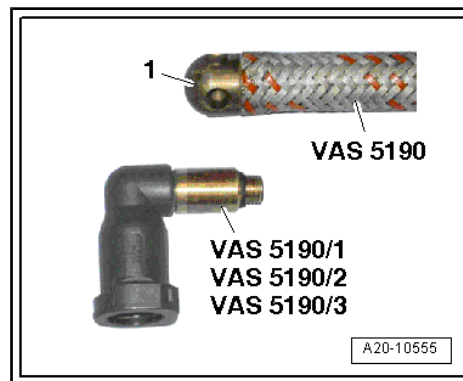


- Unscrew tip -1- from extraction hose of fuel extraction unit - VAS 5190- .
- Screw fuel extraction adapter - VAS 5190 /2- from fuel extraction adapter set - VAS 5190 /10- onto extraction hose.



#### Note

- ♦ *Safety precautions when working on the fuel supply system*  
⇒ *"2.1 Safety precautions when working on fuel supply system", page 2* .
- ♦ *Observe rules for cleanliness*  
⇒ *"3.1 Rules of cleanliness", page 7* .
- Switch off ignition.
- Pull out the supply line -1- and catch the fuel that flows out with a cleaning cloth. Unlock the quick coupling and disconnect  
⇒ *"2 Separating push-on couplings", page 211* .



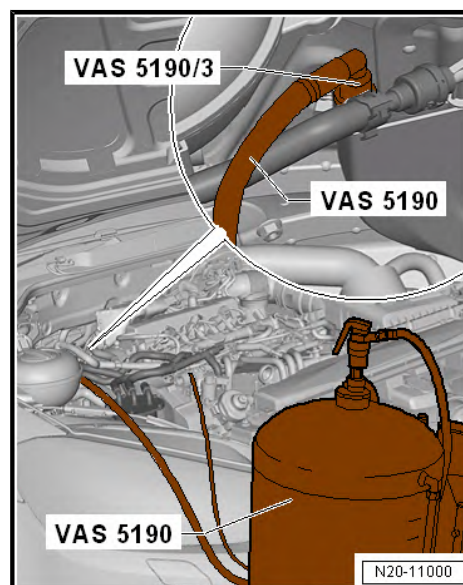
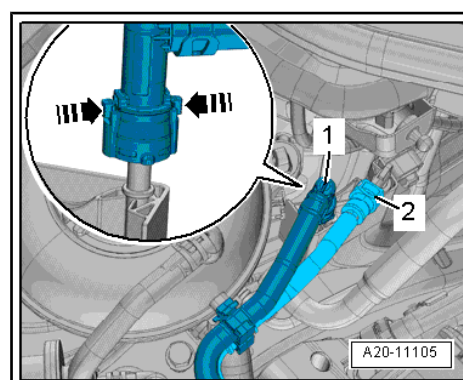
- Connect the fuel extraction device - VAS 5190- with the adapter for the fuel extraction - VAS 5190 /3- to the fuel feed line.



#### Caution

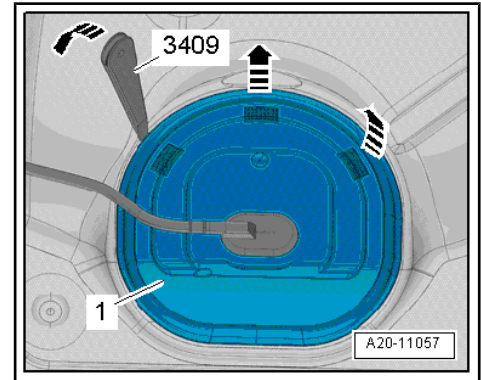
**Secure the earth cable of the fuel extraction device to a bare metal part of the body.**

- Removing rear seat bench ⇒ Body Work; Rep. gr. 72 .



- Unclip the cover -1- using the removal wedge - 3409- .

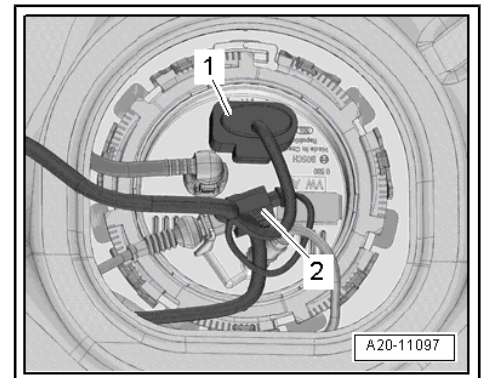
#### Vehicles with auxiliary heating



- Disconnect the plug connection of the dosing pump - V54- -2-.

#### Continued for all vehicles

- Disconnect plug connection -1-.
- Open shut-off valve at the fuel extraction device - VAS 5190- until the fuel tank is empty.

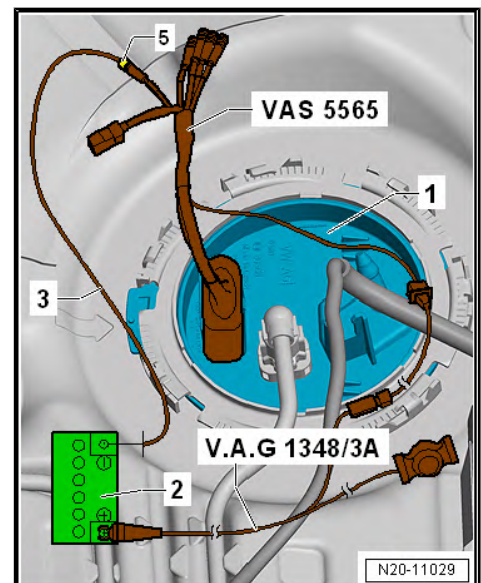


- Connect adapter - VAS 5565- to fuel delivery unit -1-.
- Connect remote control - V.A.G 1348/3A- to adapter - VAS 5565- and to battery positive terminal in engine compartment.
- Connect connection -5- (yellow) from the adapter - VAS 5565- with auxiliary line -3- from the measuring tool set - V.A.G 1594/ C- to the negative pole on the battery.



#### Note

*This step is only intended to ensure that the fuel pump runs when the engine is switched off.*

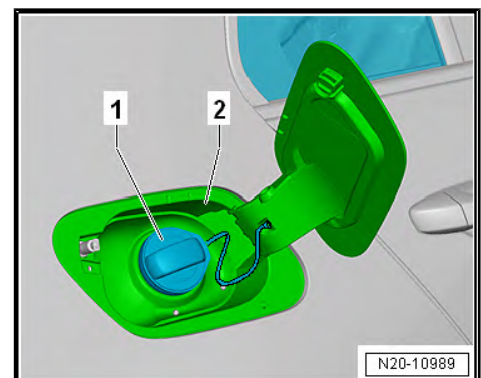


- Open tank flap unit -2-.
- Clean the area around the fuel filler neck.
- Unscrew the cap -1- for the fuel filler neck.
- Operate the remote control - V.A.G 1348/3A- and the shut-off cock on the fuel extraction device - VAS 5190- until the fuel tank is emptied.



#### Caution

**The fuel pump must not run »dry«.**





## 1.2.2 Emptying fuel tank when the fuel pump is damaged when more than $\frac{3}{4}$ full

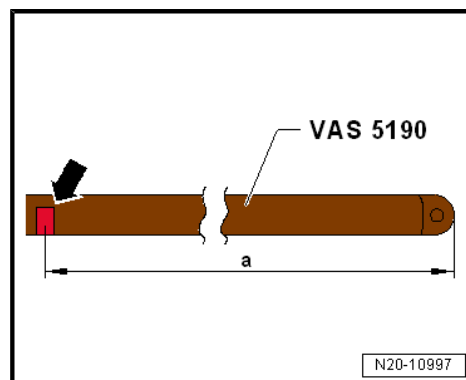
### Special tools and workshop equipment required

- ♦ Fuel extraction device , e. g. -VAS 5190-



#### Note

- ♦ *Safety precautions when working on the fuel supply system*  
⇒ *"2.1 Safety precautions when working on fuel supply system", page 2*.
- ♦ *Observe rules for cleanliness*  
⇒ *"3.1 Rules of cleanliness", page 7*.
- In distance -a- from the end of the extraction hose make a marking -arrow- on the hose.
- Use insulating tape for this purpose.



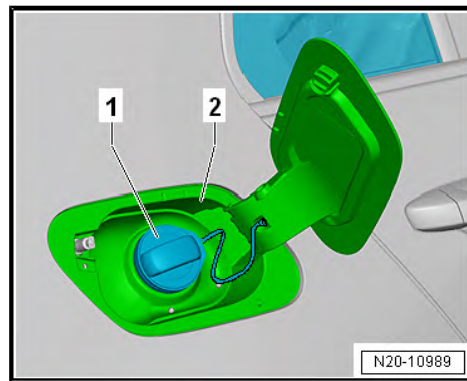
| Rear axle                            | Distance a in mm |
|--------------------------------------|------------------|
| Vehicles with torsion beam rear axle | 1,010 mm         |

- Open tank flap unit -2-.
- Clean the area around the fuel filler neck.
- Unscrew the cap -1- for the fuel filler neck.



#### Caution

**Secure the earth cable of the fuel extraction device to a bare metal part of the body.**

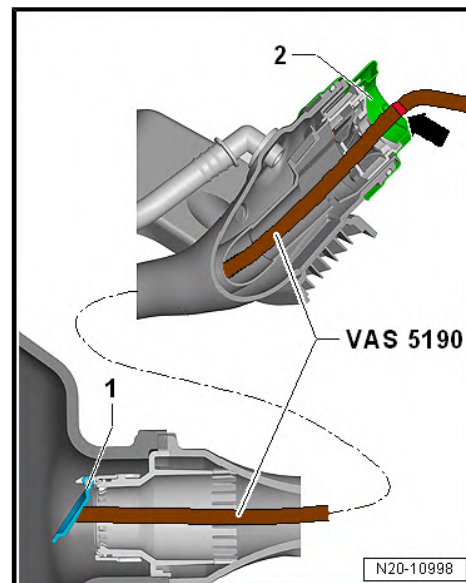


- Push the extraction hose of the fuel extraction device as far into the fuel tank holder as necessary until the previously applied marking -arrow- terminates with the filler neck -2-.
- Drain the fuel tank through the filler neck as much as possible.



#### Note

- ◆ *In the fuel tank there is a flap -1- on the lower end of the filler neck, which must not be damaged by the extraction hose of the fuel extraction device . Therefore, the hose must only be pushed in up to the previously made marking -arrow-.*
  - ◆ *If the extraction hose becomes stuck to the check valve while being pulled out, do not pull the extraction hose violently.*
  - ◆ *If this is the case, remove the fuel delivery unit and hold the check valve open by hand. Make sure that your arm does not come in contact with fuel.*
- Carefully pull out the extraction hose.



#### Note

*When no more fuel is extracted, the tank is emptied just enough for the sender flange to be opened without danger.*

### 1.2.3 Emptying fuel tank when the fuel pump is damaged when less than $\frac{3}{4}$ full

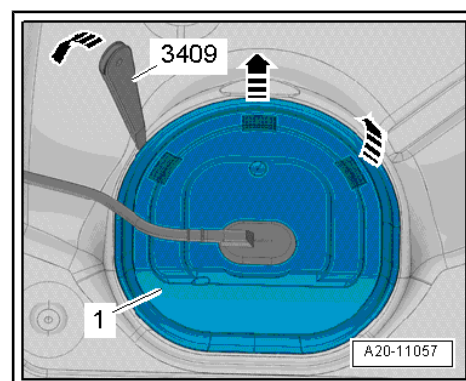
#### Special tools and workshop equipment required

- ◆ Fuel extraction device , e. g. -VAS 5190-
- ◆ Wrench for union nut - T30101 (3087)-
- ◆ Removal wedge - 3409-

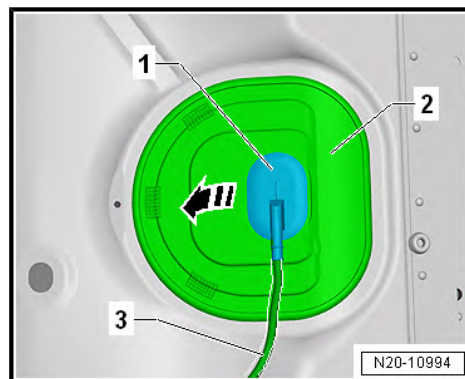


#### Note

- ◆ *Safety precautions when working on the fuel supply system*  
⇒ *"2.1 Safety precautions when working on fuel supply system", page 2* .
  - ◆ *Observe rules for cleanliness*  
⇒ *"3.1 Rules of cleanliness", page 7* .
- Removing rear seat bench ⇒ Body Work; Rep. gr. 72 .
  - Unclip cover -1- for the right closing flange with the removal wedge - 3409- on the retaining tabs -arrows-.



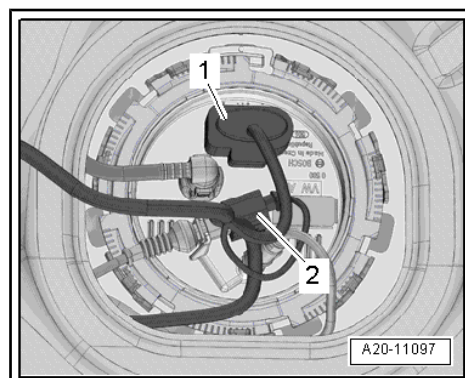
- Unclip sealing grommet -1- downwards from the cover -2-.
- Guide the cover -2- backward at the electric wiring loom -3-.



- Unlock electrical plug connection -1- from closing flange, and remove.

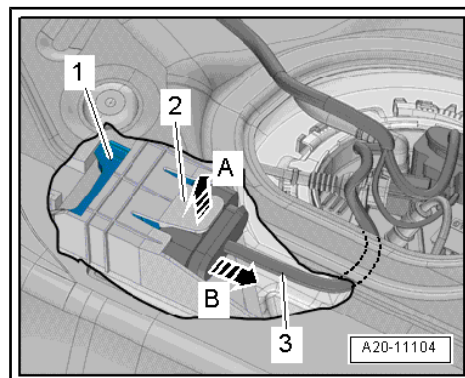
#### Vehicles with auxiliary heating

- Unlock plug connection -2- for the dosing pump - V54- and remove it.



#### Continued for all vehicles

- Push up catch -2- in arrow direction -A-.
- To do so, reach between bottom plate and fuel tank with a finger.
- At the same time, carefully pull the fuel pump control unit - J538- -1- carefully at the electrical wiring loom -3- out of the uptake in arrow direction -B-.
- Take out fuel pump control unit - J538- inwards between fuel tank and bottom plate.
- Put fuel pump control unit - J538- to one side together with the electrical wiring harness.

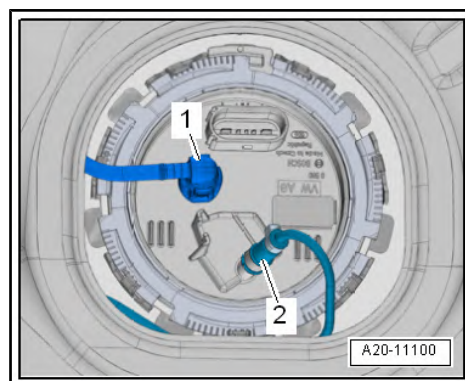


- Disconnect fuel line -1- at the closing flange. Unlock the quick coupling and disconnect  
⇒ ["2 Separating push-on couplings", page 211](#) .

#### Vehicles with auxiliary heating

- Remove fuel line -2- to the dosing pump - V54- for the auxiliary heating at the closing flange.
- To do so, open the bottom clamp.
- Carefully pull out fuel line -2-.

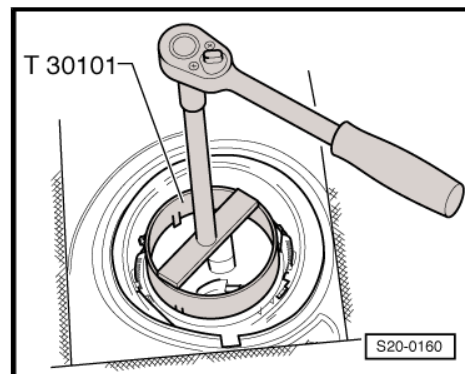
#### Continued for all vehicles



#### Note

*Ensure that the fuel delivery unit is not damaged when loosening the lock ring of the holder on the flange.*

- Open locking ring using union nut wrench - T30101 (3087)- .



- Carefully lift out fuel delivery unit flange -3-.
- Remove gasket -1- and raise the fuel delivery unit flange slightly higher.



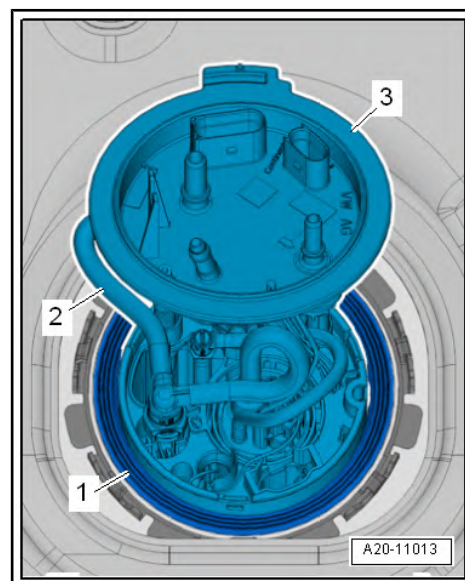
#### Caution

***Secure the earth cable of the fuel extraction device to a bare metal part of the body.***

- Insert suction hose of fuel extractor - VAS 5190- as far as possible into fuel tank.
- Extract fuel using the fuel extraction device - VAS 5190- .

If fuel tank needs only to be emptied, re-install the fuel delivery unit

⇒ [“1.5 Fuel delivery unit with sender for fuel gauge display”, page 201](#) .



#### Tightening torques

- ◆ ⇒ [“1.4 Summary of components - fuel delivery unit and sender for fuel gauge display”, page 200](#)
- ◆ ⇒ Heating, Air conditioning; Rep. gr. 82

## 1.3 Removing and installing the fuel tank

#### Special tools and workshop equipment required

- ◆ Engine and gearbox jack , e.g. -V.A.G 1383A-
- ◆ Removal wedge - 3409-
- ◆ Body saw , e. g. -V.A.G 1523 A - or grinder
- ◆ Protective goggles



#### Caution

***The fuel tank must be empty for weight reasons when removing it, if necessary suction the fuel out of the fuel tank***  
⇒ [“1.2 Extract fuel from the fuel tank”, page 189](#) .



## Removing



### Note

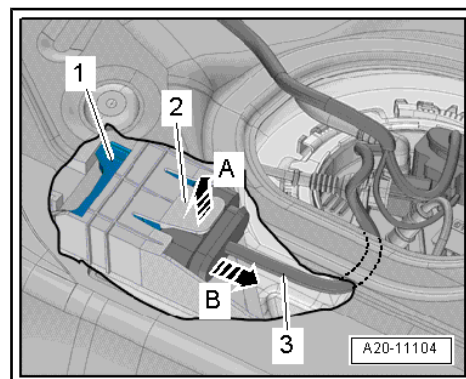
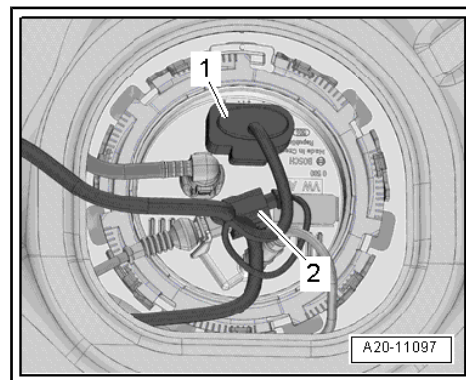
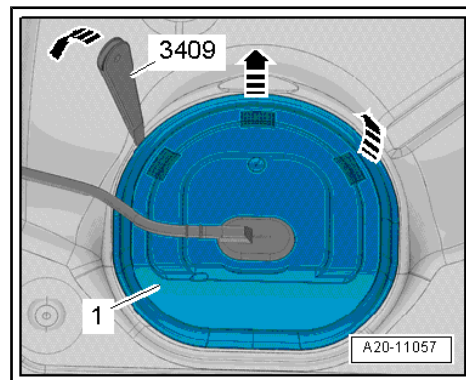
- ◆ *Safety precautions when working on the fuel supply system*  
⇒ *"2.1 Safety precautions when working on fuel supply system", page 2*.
- ◆ *Rules of cleanliness when working on the fuel supply system*  
⇒ *"3.1 Rules of cleanliness", page 7*.
- Switch off ignition and all electrical loads, and pull out ignition key.
- Removing rear seat bench ⇒ Body Work; Rep. gr. 72.
- Unclip cover -1- for closing flange from holder catches -arrows- using the removal wedge - 3409-.
- Disconnect plug connection -1- from fuel pump.

### Vehicles with auxiliary heating

- Disconnect plug connection -2- from auxiliary heating dosing pump.

### Continued for all vehicles

- Push up pick-up coupling -2- -arrow A-. To do so, reach between bottom plate and fuel tank with a finger.
- Simultaneously pull the fuel pump control unit - J538- -1- at the electric wiring loom -3- carefully out of the uptake -arrow B-.
- Take out fuel pump control unit - J538- inwards between fuel tank and bottom plate.
- Open tank flap.
- Clean the area around the fuel filler neck.



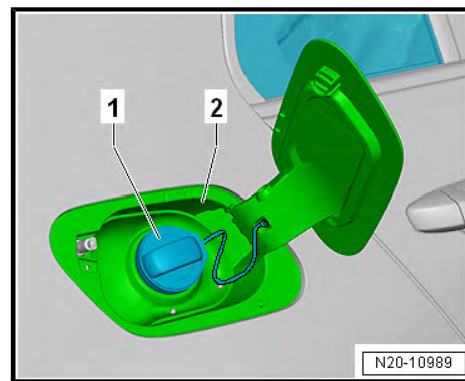
- Unscrew the cap -1- for the fuel filler neck.



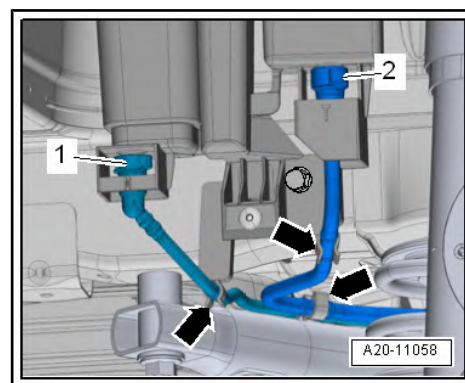
#### Note

*Close the opening of the fuel filler neck with a clean cloth so that no dirt can penetrate.*

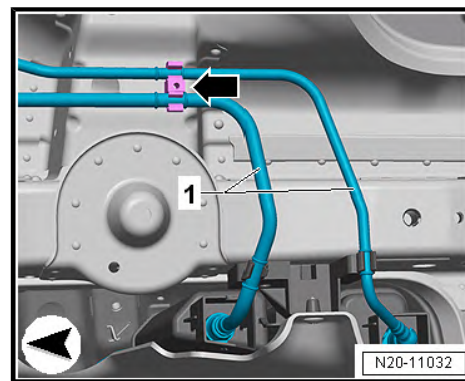
- Removing the rear right wheel.
- Remove the rear right wheelhouse liner ⇒ Body Work; Rep. gr. 66 .
- Remove the rear wheel brake calliper and store to on side ⇒ Suspension; Rep. gr. 46 .
- Disconnect the plug connection from the ABS speed sensor, right rear wheel, and undo the line from the mounting brackets at the rear axle ⇒ Suspension; Rep. gr. 45 .



- Remove the vent lines -1- and -2- from the activated charcoal filter, do so by disconnecting the push-fit couplings ⇒ [“2 Separating push-on couplings”, page 211](#) .
- Loosen ventilation lines from fasteners on the holder -arrows-.



- Loosen ventilation line -1- from fastener on the holder -arrow-.
- Disconnect the exhaust pipe with body saw , e. g. -V.A.G 1523 A - or grinder, and remove the middle- and rear part of the exhaust system separately ⇒ [“1.4 Removing and installing or replacing the middle and rear silencer”, page 277](#) .



- Unscrew screws -1- -2- for fuel filler neck.

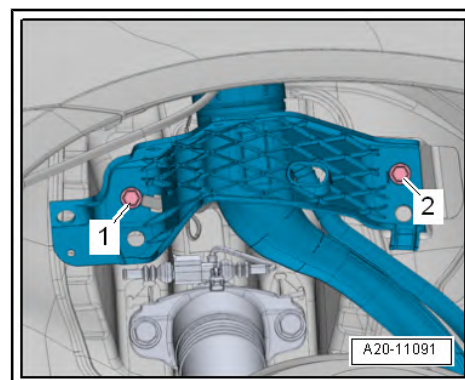


#### WARNING

*Risk of injury caused by fuel which is under high pressure.*

*To relieve the pressure in the fuel system, place a clean cloth around the connection point and carefully loosen the connection point.*

- Unclip hand-brake cables from the holders.





- Disconnect vent line -3- and fuel line -2-  
⇒ ["2 Separating push-on couplings", page 211](#) .



**Note**

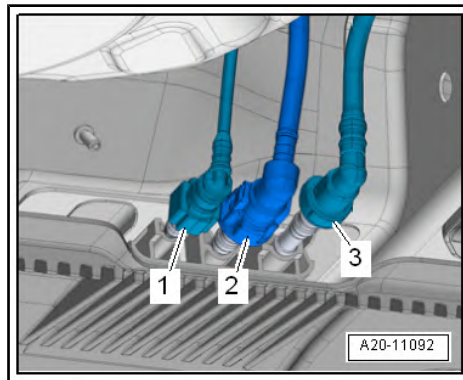
*For vehicles with auxiliary heating, the fuel line -1- for the dosing pump - V54- must also be disconnected  
⇒ ["2 Separating push-on couplings", page 211](#) .*



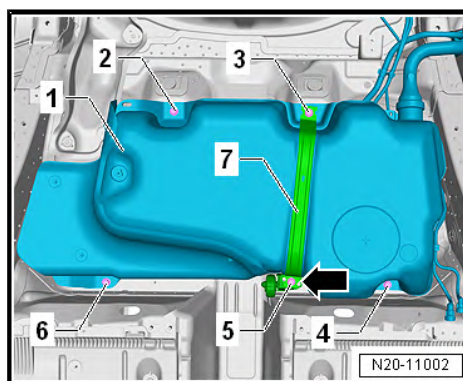
**WARNING**

*Risk of accident from fuel tank weight.*

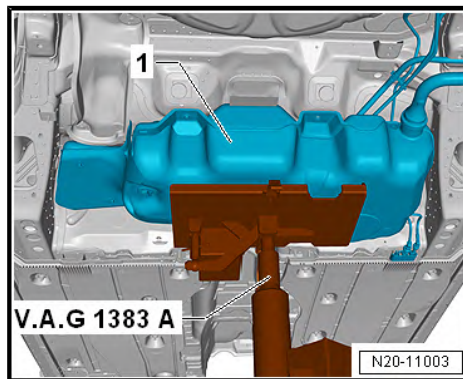
*The fuel tank must be empty for removal.*



- Unscrew screw -5-.
- Remove holder for exhaust system retaining strap -arrow-.
- Unscrew fixing screws -3- and remove tensioning strap -7-.



- Support the fuel tank using the engine and gearbox jack - V.A.G 1383A- .



- Release fixing screws -2-, -4- and -6-.
- Remove securing nuts for heat shield of fuel tank and remove protection plate.
- Slightly lower the fuel tank using the engine and gearbox jack - V.A.G 1383A- .



#### Note

- ◆ *The aid of a 2nd mechanic is required to remove the fuel tank.*
- ◆ *Make sure that the individual cables are not damaged.*
- With the aid of a second mechanic, turn the fuel tank to one side, and lower.
- Pull the filler tube through between the rear axle and body-shell.

#### Install



#### Note

*For vehicles with auxiliary heating and additional heating the dosing pump - V54- must also be tested for firm seating on the holder.*

- Check both earth connections for corrosion, if necessary remove corrosion.
- Check the fitting position of the earth lead ➔ [page 188](#) .



#### Note

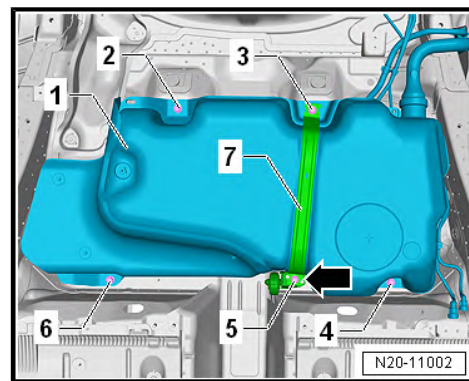
- ◆ *The aid of a 2nd mechanic is required to install the fuel tank. .*
- ◆ *Make sure that the individual cables are not damaged.*
- With the aid of a second mechanic, pull the filler tube between the rear axle and body and support the fuel tank with engine and gearbox jack - V.A.G 1383A- .

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

- ◆ Vent and fuel lines must be laid without any kinks.
- ◆ Do not mix-up the feed line and the air bleed valve (the air bleed valve is white, the feed line is black).
- ◆ Make sure the line connections fit tightly.
- ◆ After installing the fuel tank, check whether the lines are also clipped in place on the fuel tank.

#### Tightening torques

- ◆ ➔ [“1.1 Fuel tank - Summary of components”, page 186](#)
- ◆ ➔ [“1.2 Middle and rear silencer - Summary of components”, page 274](#)
- ◆ ➔ Chassis; Rep. gr. 44 .
- ◆ ➔ Chassis; Rep. gr. 46 .
- ◆ ➔ Body Work; Rep. gr. 66



#### 1.4 Summary of components - fuel delivery unit and sender for fuel gauge display

**1 - Fuel delivery unit**

- ❑ with integrated fuel filter, the fuel filter cannot be replaced individually
- ❑ Checking electric fuel pump ⇒ Vehicle diagnostic tester
- ❑ installing and removing  
⇒ “1.5 Fuel delivery unit with sender for fuel gauge display”,  
page 201
- ❑ Fill the vehicle with at least 5 litres of fuel after installing

## 2 - Sealing ring

- ❑ replace after removal
- ❑ install when dry

### 3 - Lock ring

- ☐ loosen and/or tighten using wrench - T30101 (3087)-
- ☐ 110 Nm

**4 - Fuel pump control unit - J538-**

- ❑ Checking ⇒ Vehicle diagnostic tester
- ❑ installing and removing ⇒ “1.8 Removing and installing fuel pump control unit J538”, page 210

## 5 - Plug connection

- ☐ For fuel pump control unit - J538-
- ☐ Ensure safe locking by pulling

## 6 - Plug connection

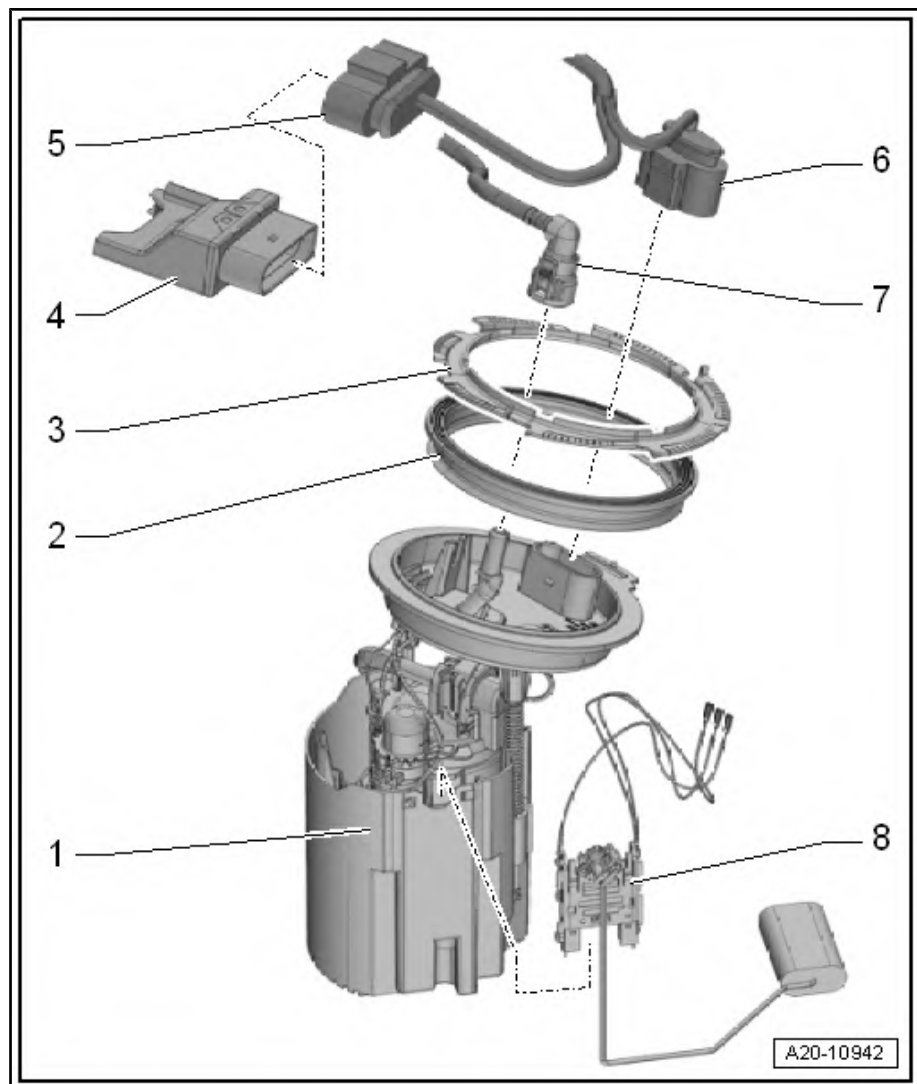
- ☐ for Fuel pump for predelivery system - G6- and fuel gauge sender - G-
- ☐ Ensure safe locking by pulling

**7 - Fuel feed line**

- ☐ to the engine
- ☐ do not kink
- ☐ Fit so that it can be heard clicking into place
- ☐ Unlock the quick couplings and fit together ⇒ “2 Separating push-on couplings”, page 211

**8 - Fuel gauge sender - G-**

- ❑ Check with the fuel pump control unit - J538- ⇒ Vehicle diagnostic tester
- ❑ installing and removing  
⇒ "1.6 Removing and installing the sender for fuel gauge display G ", page 204



## 1.5 Fuel delivery unit with sender for fuel gauge display

Special tools and workshop equipment required

- ◆ Removal wedge - 3409-
- ◆ Key - T30101 (3087)-

### Removing

- The fuel tank must not be more than  $\frac{3}{4}$  full.



### Note

- ◆ If necessary, extract fuel from the fuel tank  
⇒ ["1.2 Extract fuel from the fuel tank", page 189](#).
- ◆ Observe the safety instructions before starting fitting work  
⇒ ["2.1 Safety precautions when working on fuel supply system", page 2](#).
- ◆ Observe rules for cleanliness  
⇒ ["3.1 Rules of cleanliness", page 7](#).
- Switch off ignition and all electrical loads, and pull out ignition key.
- Removing rear seat bench ⇒ Body Work; Rep. gr. 72.
- Unclip cover -1- for closing flange from holder catches -arrows- using the removal wedge - 3409-.
- Disconnect plug connection -1- from fuel pump.

### Vehicles with auxiliary heating

- Disconnect plug connection -2- from auxiliary heating dosing pump.

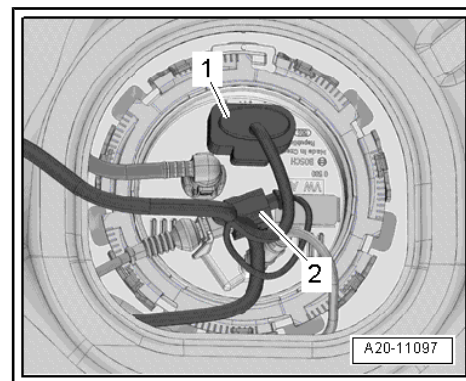
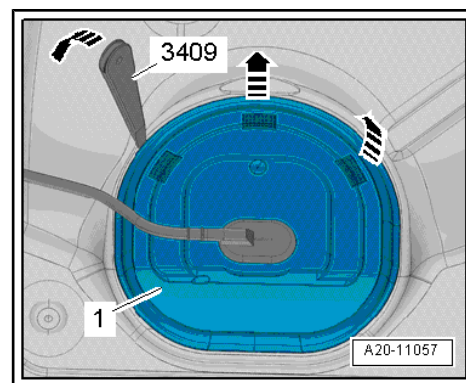
### Continued for all vehicles



### WARNING

*Risk of injury caused by fuel which is under high pressure.*

*To relieve the pressure in the fuel system, place a clean cloth around the connection point and carefully loosen the connection point.*





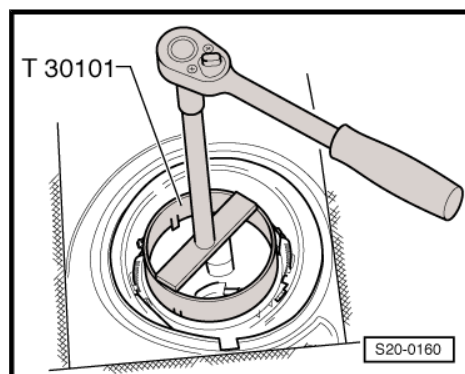
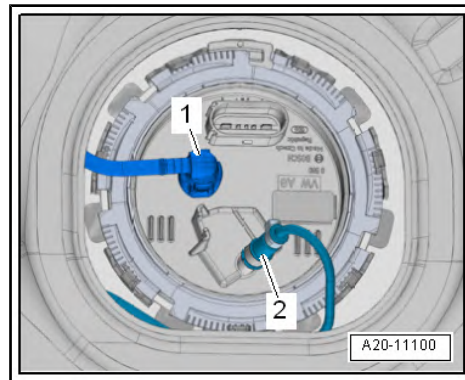
- Remove fuel line -1- from closing flange  
⇒ [“2 Separating push-on couplings”, page 211](#) .

#### Vehicles with auxiliary heating

- Loosen hose clamp, fuel line -2- to the dosing pump for the auxiliary heating from the closing flange.

#### Continued for all vehicles

- Open lock ring with the wrench - T30101 (3087)- .
- Pull sealing flange -2- carefully out of the fuel tank opening.



- Remove sealing ring -1- from fuel tank opening.



### WARNING

**Beware of fuel flowing out of the fuel pump that is still full - accident hazard.**

**Put cleaning cloth underneath to collect fuel.**



### Note

- ◆ Remove fuel delivery unit from the fuel tank so that the electric lines and fuel hoses are not damaged and the float arm of the sender for fuel gauge display - G- is not bent.
- ◆ You must empty the old fuel delivery unit before disposing of it if you wish to replace it.

- Pull the fuel delivery unit out of the opening of the fuel tank.

### Install

- Insert the new dry gasket ring into the opening of the fuel tank and moisten only from the inside with fuel for installing the closing flange.
- Insert the fuel delivery unit into the fuel tank in such a way that the float arm of the sender for the fuel gauge display - G- is not bent.

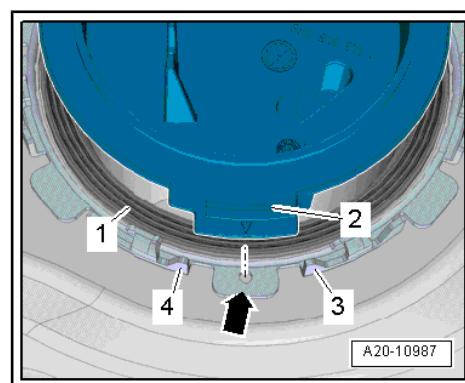
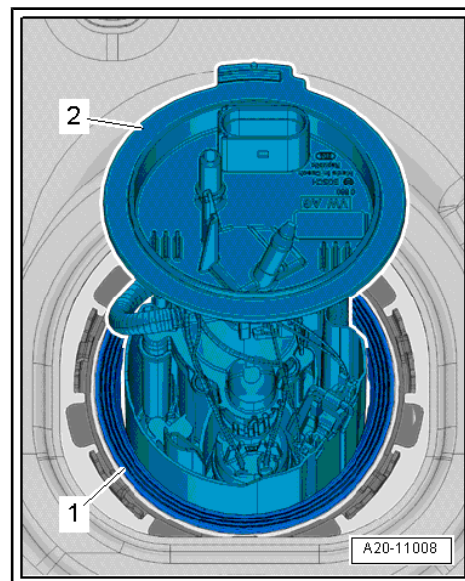


### Caution

**Risk of leakage.**

**The gasket ring must not get damaged or squashed when inserting the sealing flange.**

- Press down the closing flange against the spring force and bring it into the installation position.
- Clutch -2- on closing flange must point to opening -arrow- on the lock ring and be located between tabs -3- and -4- on the fuel tank.





- Insert lock ring and tighten using the wrench - T30101 (3087)- .
- Connect fuel line  
⇒ [“2 Separating push-on couplings”, page 211](#) .

#### Vehicles with auxiliary heating

- Attach fuel line to the dosing pump of the auxiliary heating and additional heating at the closing flange.

#### Continued for all vehicles

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

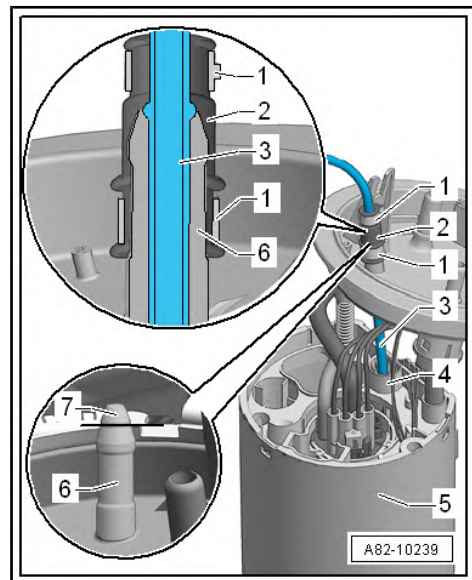
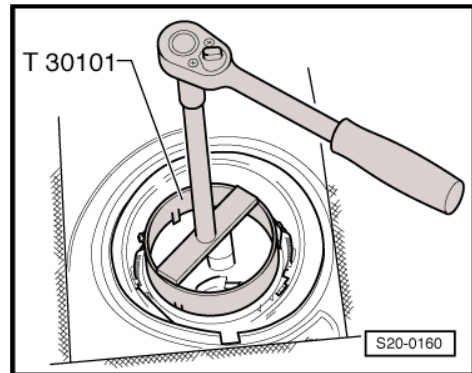
- After installing the fuel delivery unit, refuel with at least 5 litres of fuel.



#### WARNING

##### *Risk of explosion to fuel tank!*

*After installing a new fuel tank or completely emptying the fuel tank, you must replenish with a minimum of 5 litres of fuel right away. The fuel pump must not be allowed to start when the fuel tank is completely empty.*



#### Tightening torques

- ♦ ⇒ [“1.4 Summary of components - fuel delivery unit and sender for fuel gauge display”, page 200](#)

## 1.6 Removing and installing the sender for fuel gauge display - G-

#### Removing



#### Note

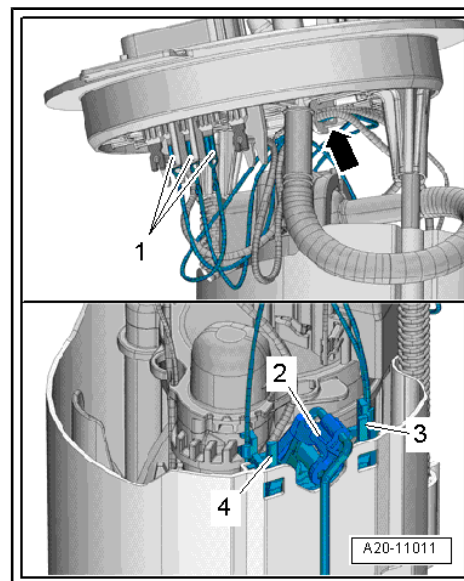
- ♦ *Observe safety instructions*  
⇒ [“2.1 Safety precautions when working on fuel supply system”, page 2](#) .
- ♦ *Observe rules for cleanliness*  
⇒ [“3.1 Rules of cleanliness”, page 7](#) .
- Remove fuel delivery unit  
⇒ [“1.5 Fuel delivery unit with sender for fuel gauge display”, page 201](#) .
- Disconnect electrical plug connection -1- on the closing flange, thereby unlocking the plug lock.
- Unhook the electric cable from the holder -arrow- and expose it.

- Unlock the catch on the uptake clamps -3- and -4-; at the same time, pull the sender for fuel gauge display -G- -2- upwards.

### Install

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

- 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 all electric cables to fuel delivery unit.



## 1.7 Checking fuel pump

⇒ [“1.7.1 Checking fuel pressure”, page 205](#)

⇒ [“1.7.2 Testing holding pressure”, page 206](#)

⇒ [“1.7.3 Checking fuel delivery rate”, page 207](#)

### 1.7.1 Checking fuel pressure

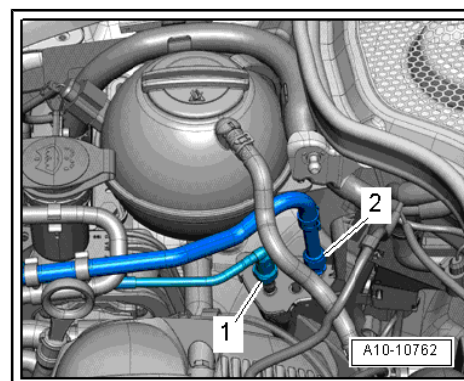
Special tools and workshop equipment required

- ◆ Pressure gauge , e.g. -VAS 6550-
- ◆ Measuring vessel



#### Note

- ◆ *Safety precautions when working on the fuel supply system*  
⇒ [“2.1 Safety precautions when working on fuel supply system”, page 2](#) .
- ◆ *Rules of cleanliness when working on the fuel supply system*  
⇒ [“3.1 Rules of cleanliness”, page 7](#) .
- ◆ *Test conditions when working on the fuel supply system*  
⇒ [“2.3 Safety precautions during road tests in which testing and measuring equipment is used”, page 4](#) .
- Remove the fuel feed line -2-  
⇒ [“2 Separating push-on couplings”, page 211](#) and catch the fuel which flows out with a cleaning cloth.
- Connect pressure tester - VAS 6550- to fuel supply line with adapter - VAS 6550/2- .





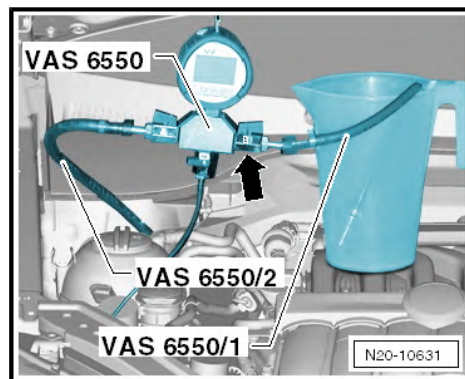
- Insert hose line - VAS 6550/1- and keep in the fuel-resistant measuring vessel.



### Caution

*Risk of fuel dripping out.*

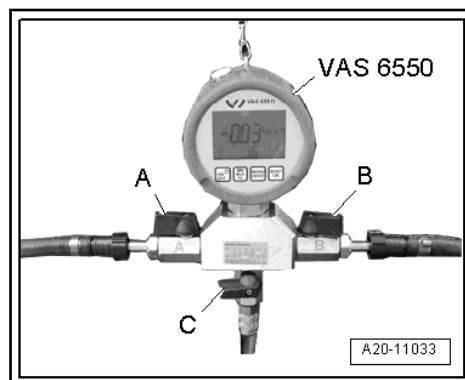
- ◆ *Make sure that the shut-off tap -C- is closed.*
- ◆ *Lever points in the direction of flow.*



- Open shut-off taps -A- and -B- .
- Switch on ignition until bubble-free fuel flows out.
- Close shut-off tap -B- to will build fuel pressure.
- Read off fuel pressure on pressure gauge.
- Specified value: 0.4...0.70 MPa (4...7.0 bar)

If the specification is not attained:

- Perform fuel delivery quantity check  
⇒ ["1.7.3 Checking fuel delivery rate", page 207](#) .



## 1.7.2 Testing holding pressure

### Special tools and workshop equipment required

- ◆ Pressure gauge , e.g. -VAS 6550-
- ◆ Measuring vessel



### Note

- ◆ *Safety precautions when working on the fuel supply system*  
⇒ ["2.1 Safety precautions when working on fuel supply system", page 2](#) .
- ◆ *Rules of cleanliness when working on the fuel supply system*  
⇒ ["3.1 Rules of cleanliness", page 7](#) .
- ◆ *Test conditions when working on the fuel supply system*  
⇒ ["2.3 Safety precautions during road tests in which testing and measuring equipment is used", page 4](#) .
- Check leak tightness and while doing so observe pressure drop at pressure gauge - VAS 6550- .
- The pressure must not drop below 0.3 MPa (3.0 bar) after 10 minutes.

### If the pressure again falls below 0.3 MPa (3.0 bar)

- Check line connections between pressure gauge - VAS 6550- and fuel feed line for leak tightness.
- Inspect pressure measuring device - VAS 6550- for leaks.
- Check fuel lines and its connections for tightness.

If no fault is found:

- ◆ Non-return valve in the fuel delivery unit is leaking:

- Renew fuel delivery unit  
⇒ "1.5 Fuel delivery unit with sender for fuel gauge display", page 201.

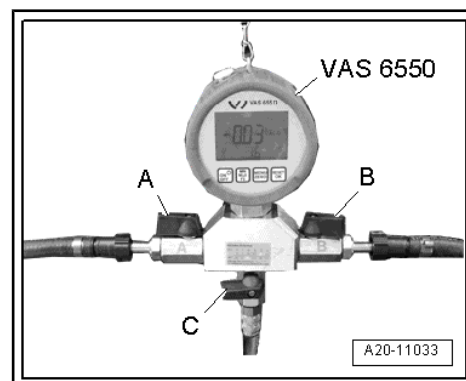
Assembly is carried out in the reverse order. When installing, observe the following:

- Ignition must be switched off.



#### Note

*Reduce fuel pressure before removing the pressure gauge, while doing so open the shut-off tap -C- and let the fuel drain into the measuring vessel.*



### 1.7.3 Checking fuel delivery rate

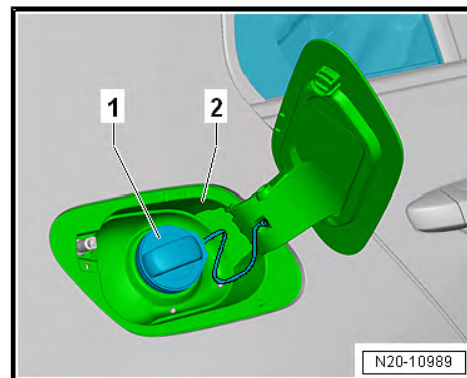
#### Special tools and workshop equipment required

- ◆ Pressure gauge , e.g. -VAS 6550-
- ◆ Remote control , e.g. -V.A.G 1348/3A- with adapter cable , e.g. -V.A.G 1348/3-3-
- ◆ Auxiliary measuring set - V.A.G 1594 C-
- ◆ Handheld multimeter - V.A.G 1526B-
- ◆ Removal wedge - 3409-
- ◆ Measuring vessel



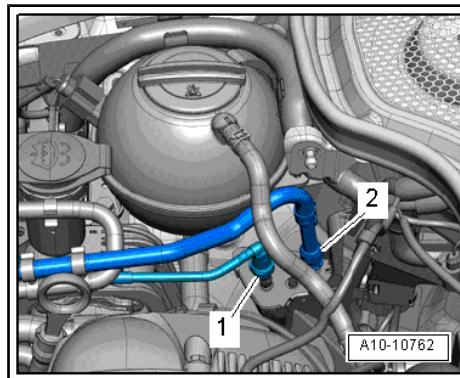
#### Note

- ◆ *Safety precautions when working on the fuel supply system*  
⇒ "2.1 Safety precautions when working on fuel supply system", page 2.
  - ◆ *Rules of cleanliness when working on the fuel supply system*  
⇒ "3.1 Rules of cleanliness", page 7.
  - ◆ *Test conditions when working on the fuel supply system*  
⇒ "2.3 Safety precautions during road tests in which testing and measuring equipment is used", page 4.
- Unscrew the cap -1- for the fuel filler neck.





- Remove the fuel feed line -2-  
⇒ [“2 Separating push-on couplings”, page 211](#) and catch the fuel which flows out with a cleaning cloth.
- Connect pressure tester - VAS 6550- to fuel supply line with adapter - VAS 6550/2- .



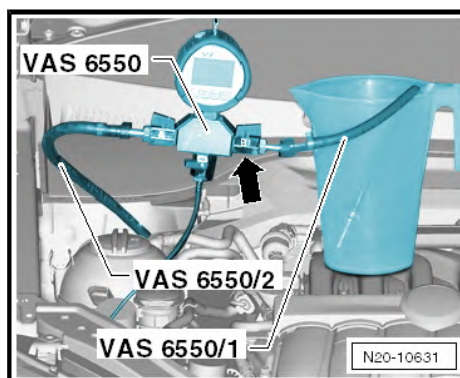
- Insert hose line - VAS 6550/1- and keep in the fuel-resistant measuring vessel.



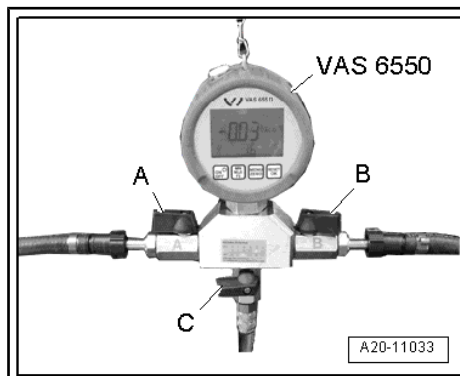
**Caution**

*Risk of fuel dripping out.*

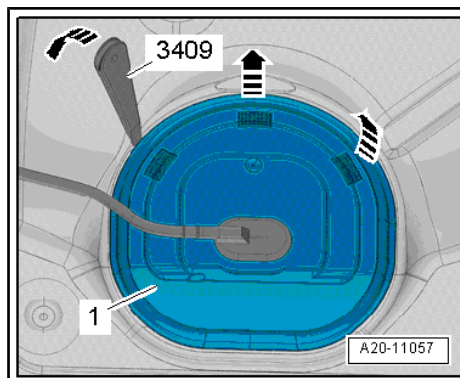
- ◆ *Make sure that the shut-off tap -C- is closed.*
- ◆ *Lever points in the direction of flow.*



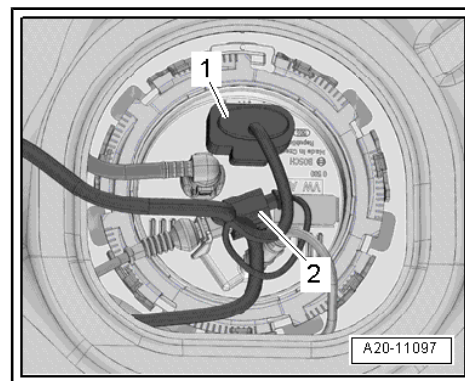
- Open shut-off taps -A- and -B- .
- The levers are housed in the flow direction.
- Removing rear seat bench ⇒ Body Work; Rep. gr. 72 .



- Loosen catch pegs -arrows- of the cover -1- with removal wedge - 3409- and remove the cover.



- Disconnect plug connection -1- at the closing flange.

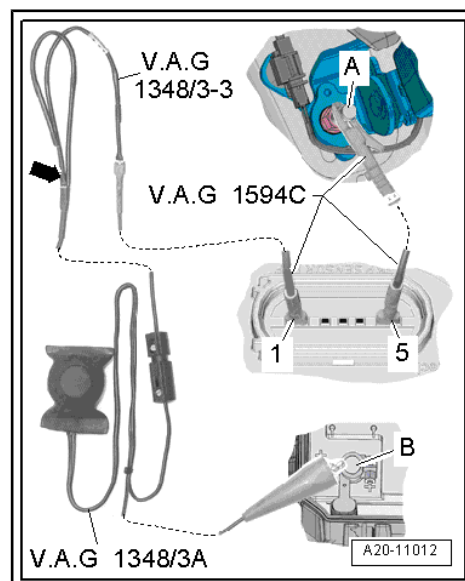


- Connect remote control - V.A.G 1348/3A- with adapter line - V.A.G 1348/3-3- and with the line from the measuring tool set - V.A.G 1594/C- to contact -1-.
- Mask second plug contact of the adapter - V.A.G 1348/3-3- with short-circuit proof tape -arrow-.
- Connect contact -5- with line of auxiliary measuring set - V.A.G 1594/C- to body mass -A-.
- Connect alligator clip to the positive terminal "+" -B-.

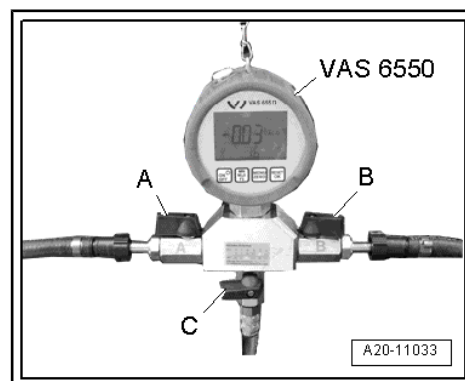


#### Note

*Primary pressure must be built up against which the fuel pump must work when the fuel delivery flow in the fuel line is being measured. This primary pressure is set as follows using pressure gauge VAS 6550:*



- Operate remote control - V.A.G 1348/3A- . While doing this, slowly close the shut-off tap -B- until the pressure gauge displays a pressure of 0.4 MPa (4 bar). From this point on do not move position of shut-off tap.
- Empty measuring glass.
- Activate remote control for 15 seconds.





- Compare fuel quantity delivered with minimum flow quantity in the diagram cm<sup>3</sup>/15s.



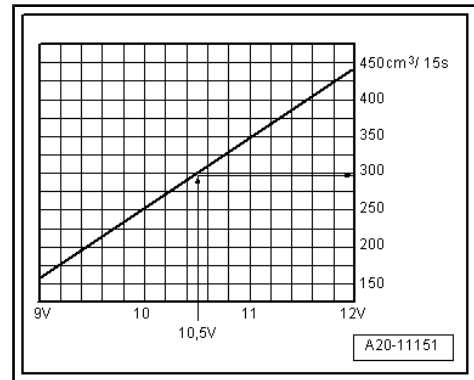
### Note

*Voltage at the fuel pump when engine is not running and pump is approximately 2 volts less than battery voltage.*

If the minimum delivery volume is not reached, it can be caused by the following faults:

- ◆ Fuel lines squashed.
- ◆ The fuel filter is clogged.
- ◆ The fuel pressure sender is defective.
- ◆ Fuel delivery unit defective.

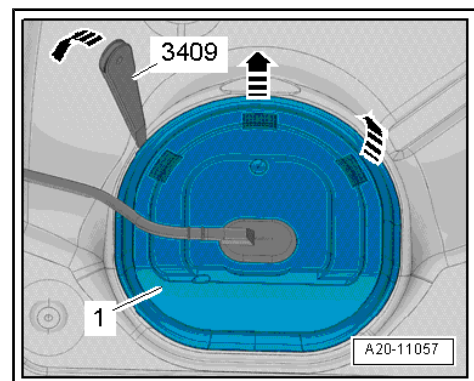
Installation is carried out in the reverse order.



## 1.8 Removing and installing fuel pump control unit -J538-

### Special tools and workshop equipment required

- ◆ Removal wedge - 3409-
- Switch off ignition and all electrical loads, and pull out ignition key.
- Removing rear seat bench ➔ Body Work; Rep. gr. 72 .
- Loosen catch pegs -arrows- of the cover -1- with removal wedge - 3409- and remove the cover.

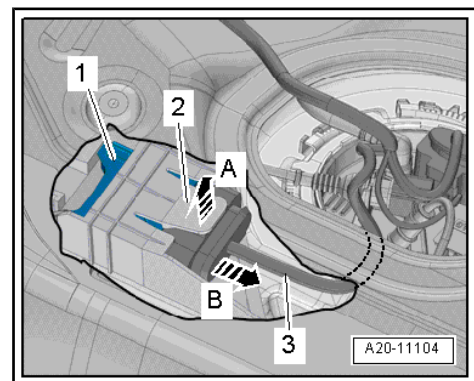


- Push up pick-up coupling -2- -arrow A-. To do so, reach between bottom plate and fuel tank with a finger.
- Simultaneously pull the fuel pump control unit - J538- -1- at the electric wiring loom -3- carefully out of the uptake -arrow B-.
- Take out fuel pump control unit - J538- inwards between fuel tank and bottom plate.
- Disconnect electrical plug connections.

### Install

- Push fuel pump control unit - J538- into the uptake and push in until there is an audible click.

Further installation occurs in reverse order.



## 2 Separating push-on couplings

### Special tools and workshop equipment required

- ◆ Lever - T10468-



#### Note

- ◆ *The quick couplings of fuel, vacuum and ventilation lines are colour marked. Either the colour point at the quick coupling or the release button has the corresponding colour.*
- ◆ *Observe safety measures  
⇒ "2.1 Safety precautions when working on fuel supply system", page 2 .*

| Push-on coupling | Colour code on connector |
|------------------|--------------------------|
| Fuel feed line   | Black                    |
| Vent line        | White, beige             |
| Vacuum line      | green                    |

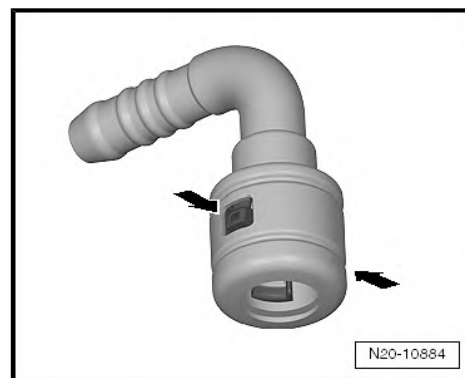


#### WARNING

*Fuel supply line is pressurised! 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 hose connections. Reduce pressure by carefully removing the hose.*

#### Variant 1

Quick coupling with release buttons -arrows- on right and left.





The coupling point -1- in the engine compartment must be held.

- Insert the lever - T10468- between the heat shield and the stop -arrow- of the fuel line -2- and hold it.

Continued for all socket boxes



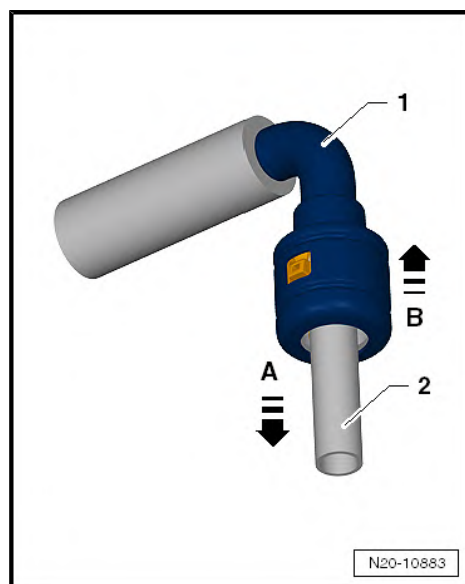
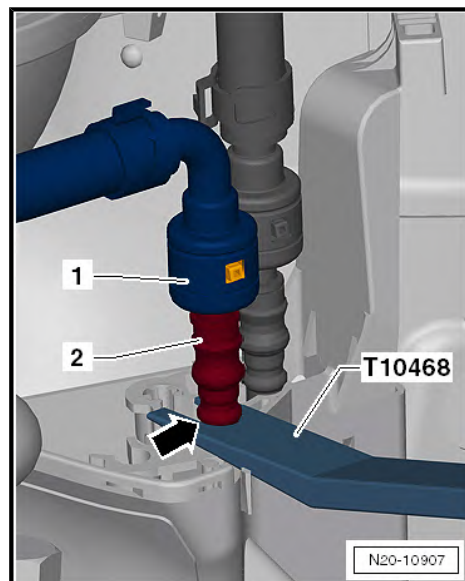
#### Note

*When the push-fit coupling is fitted with a plastic circlip, leave it inserted when removing and installing the quick release.*

- Press the push-fit coupling -1- in direction of arrow -A-.
- Press the release buttons and remove the push-fit coupling -1- from the fuel line -2- in direction of the arrow -B-.

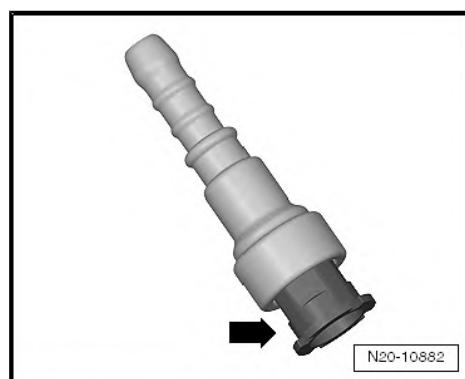
Pay attention to the colour assignment when installing  
⇒ [page 211](#) .

- Check the quick coupling for firm seating by pulling in the opposite direction!



#### Variant 2

Quick coupling with pull release -arrow-.

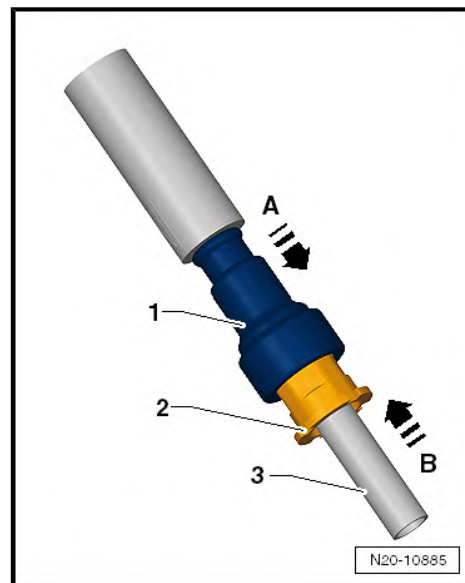


- Press the push-fit coupling -1- in direction of arrow -A-.
- Pull pull-release mechanism -2- in direction of arrow -B-.
- Remove the push-fit coupling -1- from the fuel line -3- in direction of the arrow -B-.

Pay attention to the colour assignment when installing

⇒ [page 211](#) .

- Check the quick coupling for firm seating by pulling in the opposite direction!



### Variant 3

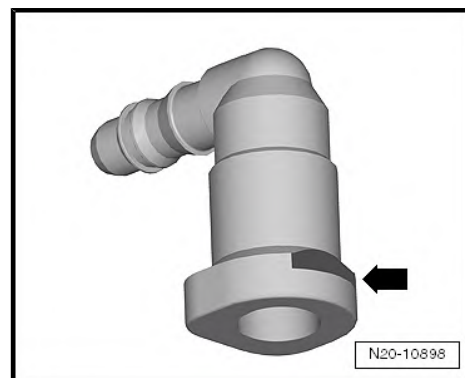
Quick coupling with front release button -arrow-.

- Press the release button -arrow- and detach the quick coupling.

Pay attention to the colour assignment when installing

⇒ [page 211](#) .

- Check the quick coupling for firm seating by pulling in the opposite direction!



### Variant 4

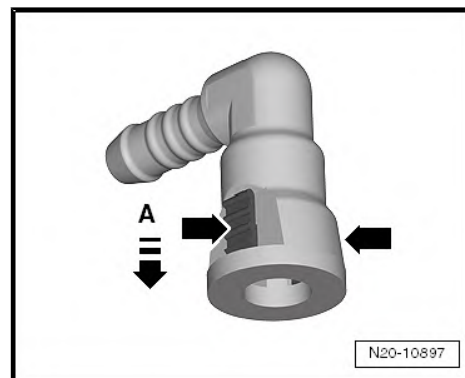
Quick coupling with release buttons -arrows- on right and left.

- Press the push-fit coupling in direction of arrow -A-.
- Press release buttons -arrows- and pull push-on coupling off.

Pay attention to the colour assignment when installing

⇒ [page 211](#) .

- Check the quick coupling for firm seating by pulling in the opposite direction!



### Variant 5

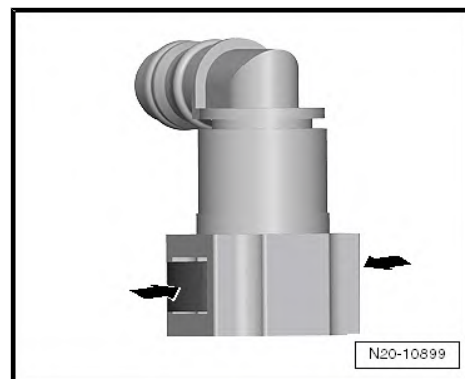
Quick coupling with release buttons -arrows- on right and left.

- Press release buttons -arrows- and pull push-on coupling off.

Pay attention to the colour assignment when installing

⇒ [page 211](#) .

- Check the quick coupling for firm seating by pulling in the opposite direction!





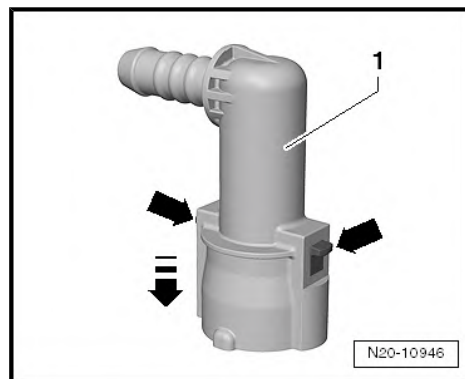
### Variant 6

Quick coupling with release buttons -arrows- on right and left.

- Press push-on coupling -1- in -direction of arrow- and hold pressed.
- Press release buttons -arrows- and pull push-on coupling off.

Pay attention to the colour assignment when installing  
⇒ [page 211](#) .

- Check the quick couplings for firm seating by pulling in the opposite direction!



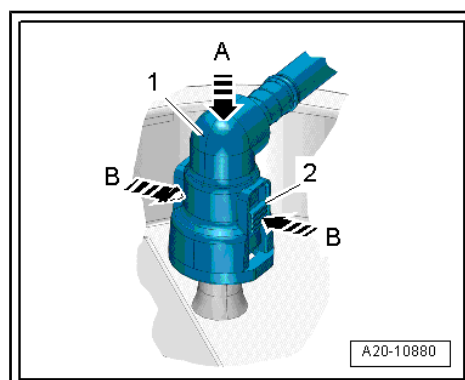
### Variant 7

Quick coupling -1- with release buttons -arrows- right and left.

- Press push-on coupling -1- in direction of arrow -A- and hold pressed.
- Press the release buttons -2- in direction of arrow -B- and remove the push-fit coupling -1-.

Pay attention to the colour assignment when installing  
⇒ [page 211](#) .

- Check the quick couplings for firm seating by pulling in the opposite direction!



### 3 Accelerator pedal

⇒ [“3.1 Assembly overview - accelerator module”, page 215](#)

⇒ [“3.2 Removing and installing accelerator module”, page 216](#)

⇒ [“3.3 Disconnect connector for accelerator pedal module and fit on”, page 216](#)

#### 3.1 Assembly overview - accelerator module

##### 1 - Bolt

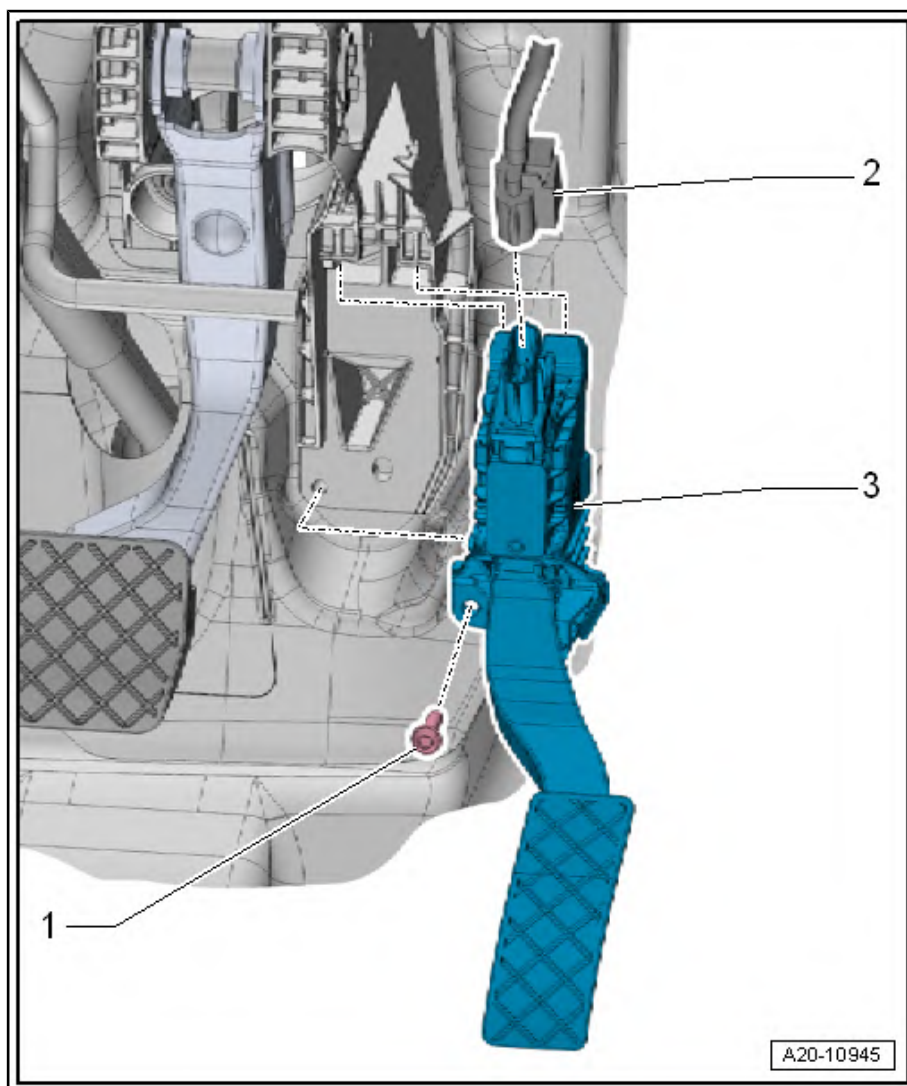
- ❑ 6 Nm

##### 2 - Connector

- ❑ Ensure safe locking by pulling.

##### 3 - Accelerator pedal module

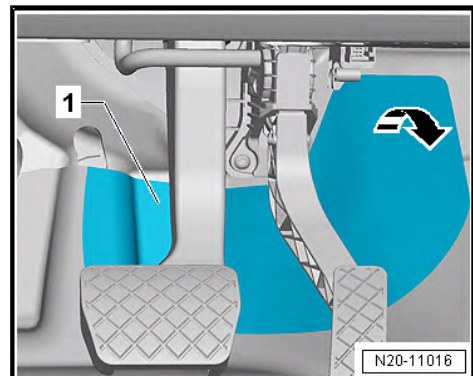
- ❑ with accelerator pedal position sender - G79- and accelerator pedal position sender 2 - G185-
- ❑ installing and removing  
⇒ [page 216](#)



## 3.2 Removing and installing accelerator module

### Removing

- Tilt the cover for underbody -1- towards the front in -direction of arrow-.



- Disconnect plug connection -2- at the accelerator pedal module ➔ [page 216](#) .
- Unscrew screw -1-.
- Remove accelerator module -3- from the uptake.

### Install

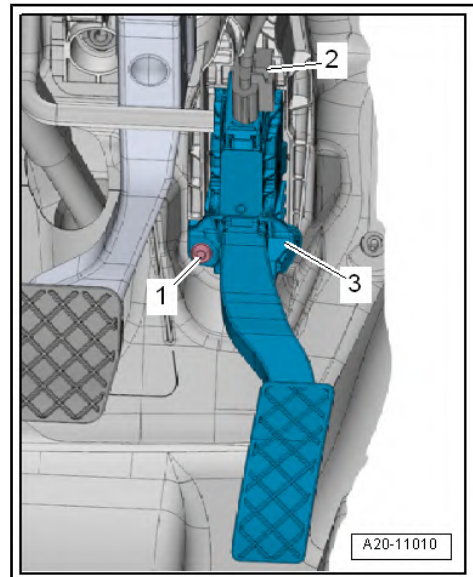
Installation is carried out in the reverse order.



#### Caution

*There is risk of damaging the surface of the knee airbag.*

*After completion of assembly work with visual inspection, check that the knee airbag surface is not damaged.*



## 3.3 Disconnect connector for accelerator pedal module and fit on



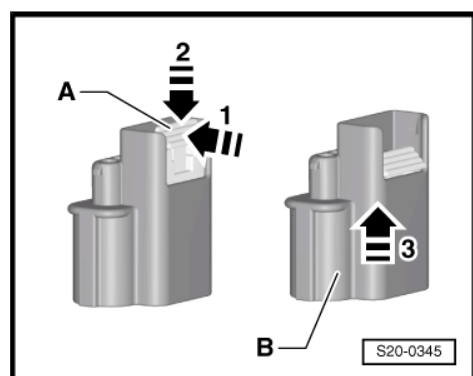
#### Note

*The plugs for the accelerator pedal module which are inserted, must be disconnected and fit on in a different manner.*

### Disconnect connector 1K0 973 706

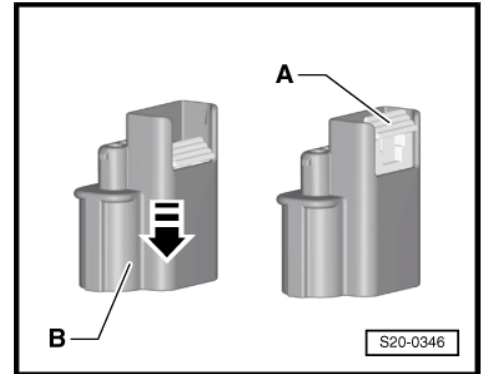
- Slightly press the piston slide valve -A- (grey) in direction of arrow -1- and push it up to the stop in direction of arrow -2-.
- Hold the piston slide valve in this position and disconnect the socket housing -B- towards the top in direction of arrow -3-.

The piston slide valve -A- remains in the bottom position.



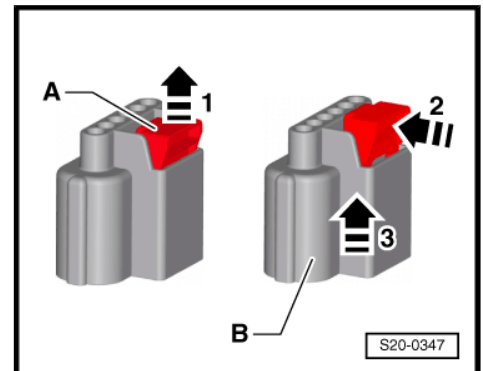
#### Fit on connector 1K0 973 706

- Push the socket housing -B- down in -direction of arrow- until the housing can be heard to lock in place.  
The piston slide valve -A- moves automatically upwards.
- For safety reasons, check the connector for secure catch by tightening it in the opposite direction.



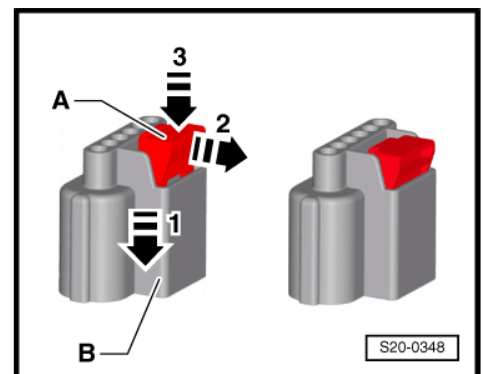
#### Disconnect connector 8K0 973 706

- Pull piston slide valve -A- (red) upwards in direction of arrow -1- up to the stop.
  - Press the piston slide valve in direction of arrow -2- and disconnect the socket housing -B- in direction of arrow -3-.
- The piston slide valve -A- remains in the top position.



#### Fit on connector 8K0 973 706

- Push the socket housing -B- down in direction of arrow -1- up to the stop.
  - Lightly press the piston slide valve in direction of arrow -2- and slide in the direction of arrow -3-.
- The piston slide valve -A- can only be pushed downwards if the socket housing was pushed downwards »up to the stop«.
- For safety reasons, check the connector for secure catch by tightening it in the opposite direction.



## 4 Activated charcoal filter system

⇒ [“4.1 Assembly overview - activated charcoal filter system”, page 218](#)

⇒ [“4.2 Removing and installing activated charcoal filter”, page 218](#)

⇒ [“4.3 Checking the fuel tank venting”, page 219](#)

### 4.1 Assembly overview - activated charcoal filter system

#### 1 - Vent line

- ☐ For solenoid valve 1 for activated charcoal filter - N80-
- ☐ pushed into the fuel tank
- ☐ Unlock the quick couplings and fit together  
⇒ [“2 Separating push-on couplings”, page 211](#)

#### 2 - Bolt

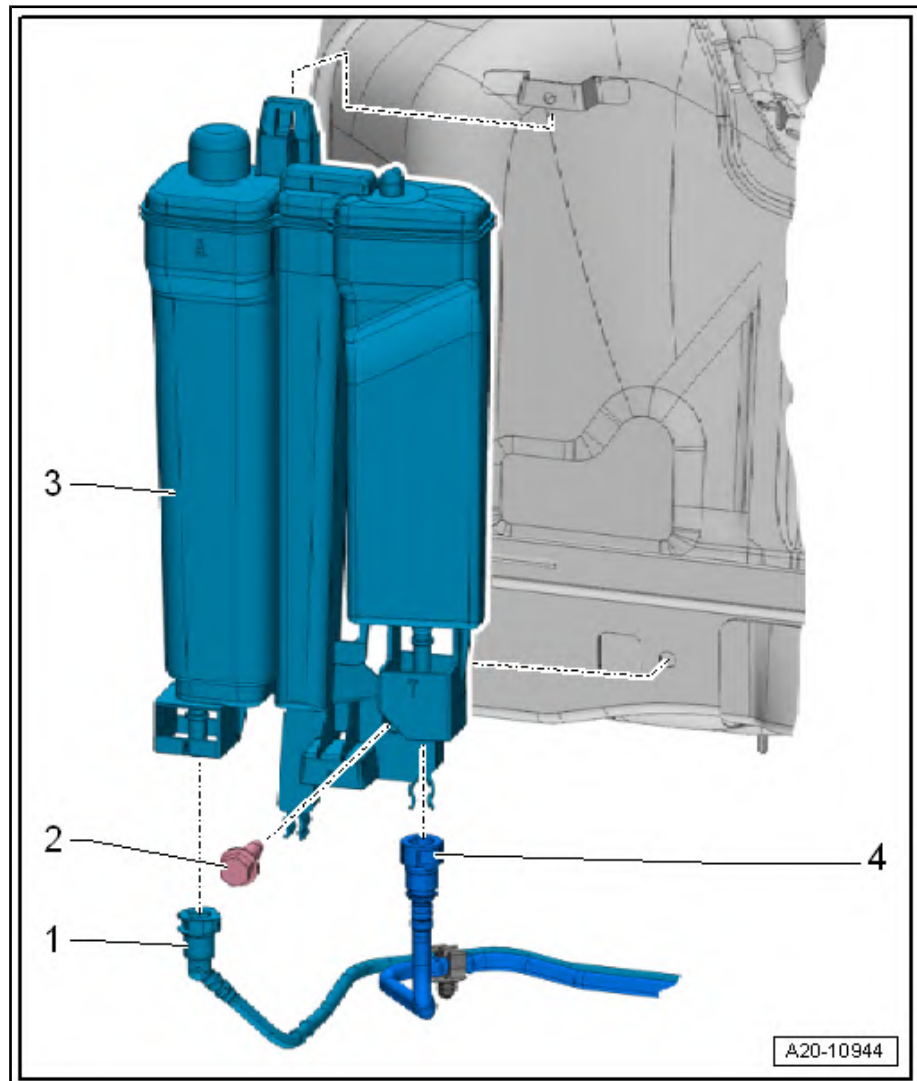
- ☐ 20 Nm

#### 3 - Activated charcoal filter

- ☐ Installation location in wheelhouse under the wheelhouse liner
- ☐ installing and removing  
⇒ [“4.2 Removing and installing activated charcoal filter”, page 218](#)

#### 4 - Vent line

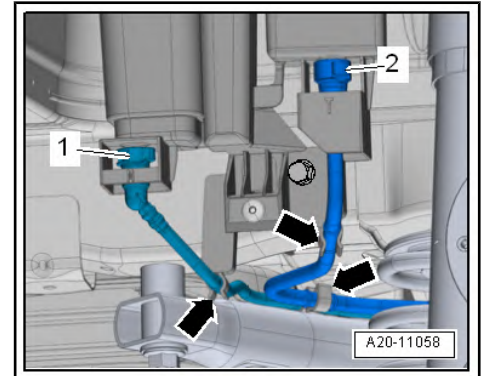
- ☐ to fuel tank
- ☐ Unlock the quick couplings and fit together  
⇒ [“2 Separating push-on couplings”, page 211](#)
- ☐ disconnect and connect  
⇒ [“2 Separating push-on couplings”, page 211](#)



### 4.2 Removing and installing activated charcoal filter

- Observe safety instructions  
⇒ [“2.1 Safety precautions when working on fuel supply system”, page 2](#) .
- Observe rules for cleanliness  
⇒ [“3.1 Rules of cleanliness”, page 7](#) .
- Remove right rear wheel ⇒ Chassis; Rep. gr. 44 .

- Remove the rear right wheelhouse liner ⇒ Body Work; Rep. gr. 66 .
- Disconnect the vent lines -1- and -2- on the activated charcoal filter ⇒ [“2 Separating push-on couplings”, page 211](#) .
- Loosen ventilation lines from fasteners on the holder -arrows-.



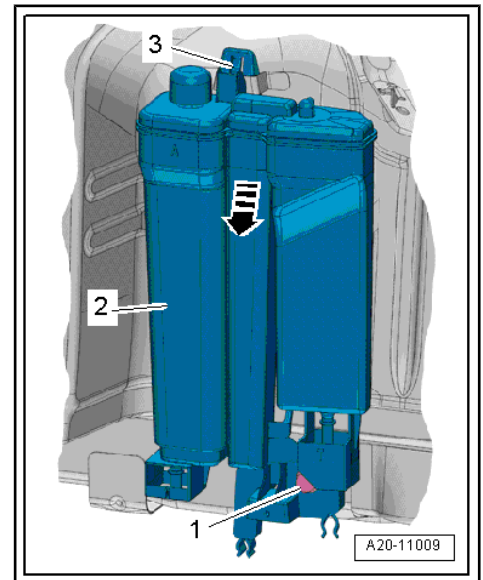
- Unscrew screw -1-.
- Pull out catch -3- using a screwdriver and pull the activated charcoal filter -2- down out of the lock -arrow-.

#### Install

Installation is carried out in the reverse order.

#### Tightening torques

- ◆ ⇒ Body Work; Rep. gr. 66
- ◆ ⇒ Chassis; Rep. gr. 44



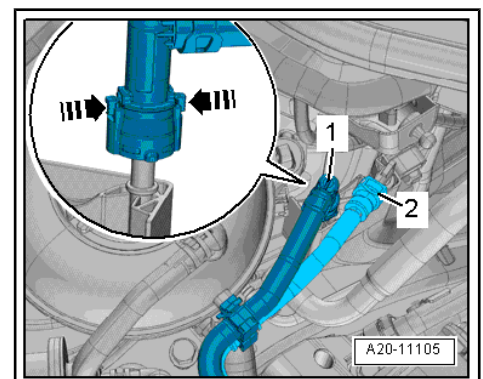
### 4.3 Checking the fuel tank venting

#### Special tools and workshop equipment required

- ◆ Hand vacuum pump , e.g. -V.A.S 6213-
- ◆ Pressure gauge - VAS 6550 -
- ◆ Adapter - VAS 6550/3-1 -
- ◆ Screw plug set for engine , e.g. -VAS 6122-

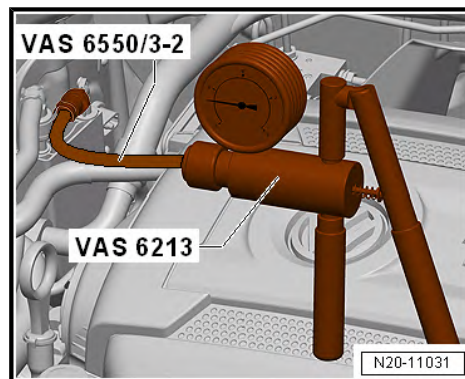
#### Test procedure

- Remove the ventilation line -2- from the activated charcoal filter to the activated charcoal filter system solenoid valve 1 - N80- . Unlock the quick coupling and disconnect ⇒ [page 211](#) .





- Connect the hand vacuum pump -V.A.S 6213- with adapter -VAS 6550/3-2 - to the vent line as shown.

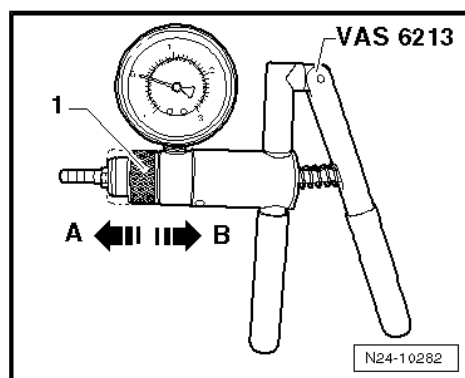


- Put the change-over ring -1- of the hand vacuum pump -V.A.S 6213- in position -A- for vacuum

- Operate the hand vacuum pump several times.

No vacuum should build up.

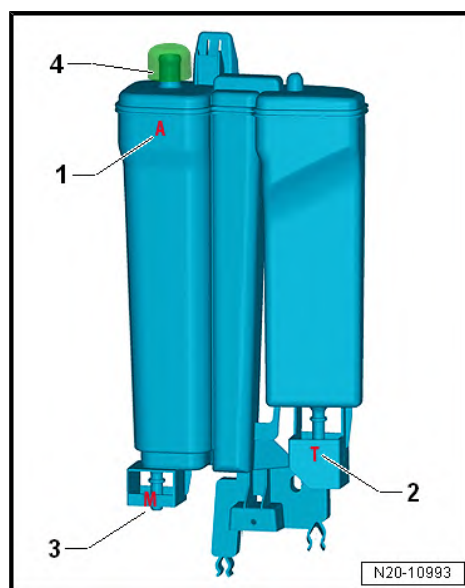
**If a vacuum builds up.**



- Check the ventilation opening -4- on the activated charcoal filter -1- for dirt and clean as required.

- Check vent line from activated charcoal filter to engine for clearance.

**If no vacuum builds up:**

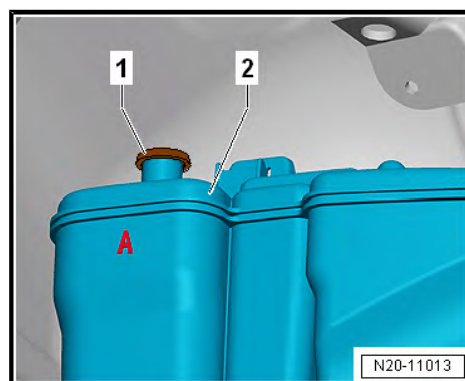


- Seal connection of the activated charcoal filter -2- with a suitable plug -1- from screw plug set for engine , e. g. -VAS 6122- .

- Operate the hand vacuum pump several times. A vacuum should build up.

**If no vacuum builds up:**

- Renew activated charcoal filter  
⇒ [“4.2 Removing and installing activated charcoal filter”, page 218](#) .



## 21 – Turbocharging/supercharging

### 1 Exhaust gas turbocharger

⇒ [“1.1 Summary of components - exhaust gas turbocharger”, page 221](#)

⇒ [“1.2 Removing and installing exhaust gas turbocharger”, page 223](#)

⇒ [“1.3 Removing and installing charge pressure regulator V465”, page 227](#)

#### 1.1 Summary of components - exhaust gas turbocharger

⇒ [“1.1.1 Summary of components 1- exhaust gas turbocharger”, page 221](#)

⇒ [“1.1.2 Summary of components 2- exhaust gas turbocharger”, page 222](#)

##### 1.1.1 Summary of components 1- exhaust gas turbocharger

###### 1 - Exhaust gas turbocharger

- ☐ installing and removing  
⇒ [“1.2 Removing and installing exhaust gas turbocharger”, page 223](#)

###### 2 - Bolt

- ☐ 8 Nm

###### 3 - Supports

###### 4 - O-ring

- ☐ replace after removal

###### 5 - Gasket

- ☐ replace after removal

###### 6 - Heat shield

###### 7 - Bolt

- ☐ 25 Nm

###### 8 - Bolt

- ☐ 8 Nm

###### 9 - Bolt

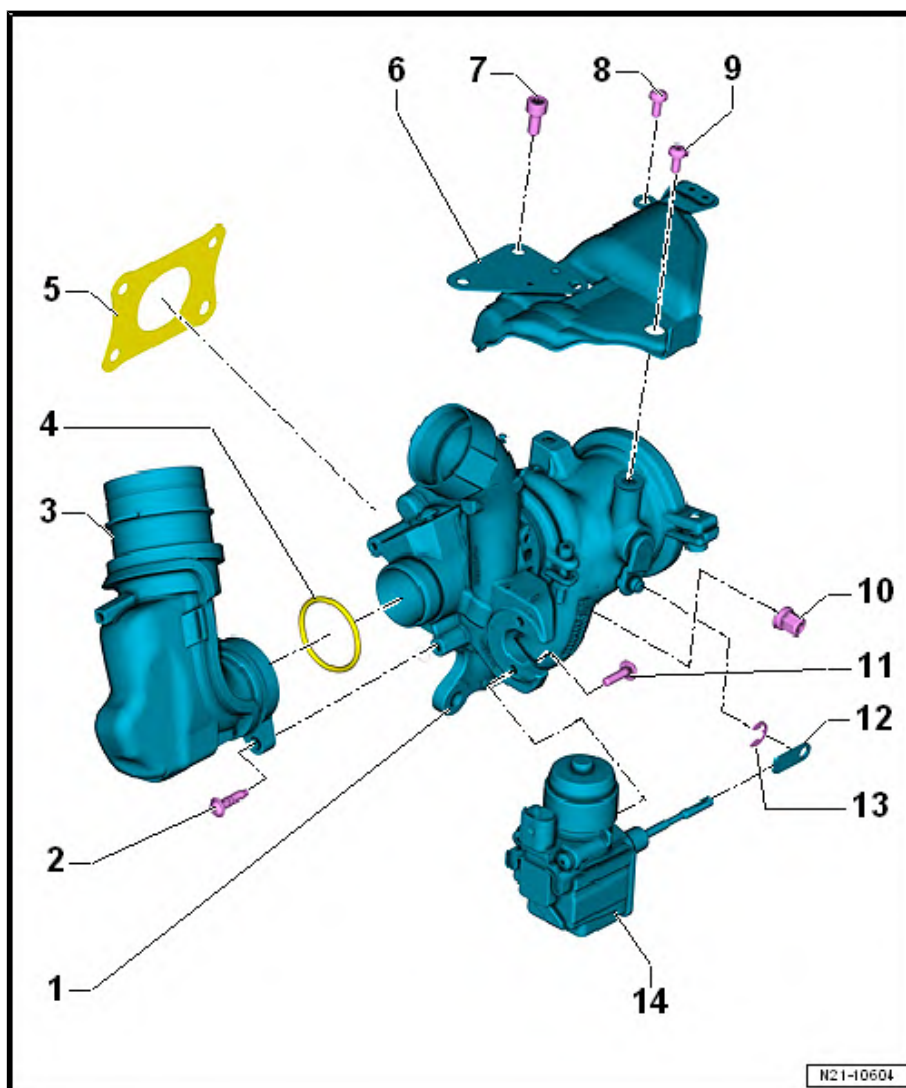
- ☐ 8 Nm

###### 10 - Nut

- ☐ replace after removal
- ☐ tighten step by step:  
1st stage 7 Nm  
2nd stage 10 Nm  
3rd stage 14 Nm

###### 11 - Bolt

- ☐ 9 Nm





## 12 - Release handle

## 13 - Locking clip

## 14 - Charge pressure regulator - V465-

- ☐ installing and removing ⇒ ["1.3 Removing and installing charge pressure regulator V465", page 227](#)

## 1.1.2 Summary of components 2- exhaust gas turbocharger

### 1 - Oil return-flow line

### 2 - O-ring

- ☐ replace after removal  
☐ wet with engine oil

### 3 - Bolt

- ☐ 9 Nm

### 4 - O-ring

- ☐ replace after removal

### 5 - Bolt

- ☐ 9 Nm

### 6 - Oil feed line

### 7 - O-ring

- ☐ replace after removal  
☐ wet with engine oil

### 8 - Bolt

- ☐ 9 Nm

### 9 - Bolt

- ☐ replace after removal  
☐ 5 Nm

### 10 - O-ring

- ☐ Replace crankcase ventilation hose Pos. -11- if it is damaged or leaking  
☐ wet with engine oil

### 11 - Hose

- ☐ for crankcase ventilation

### 12 - Bolt

- ☐ replace after removal  
☐ 5 Nm

### 13 - O-ring

- ☐ Replace crankcase ventilation hose Pos. -11- if it is damaged or leaking  
☐ wet with engine oil

### 14 - Exhaust gas turbocharger

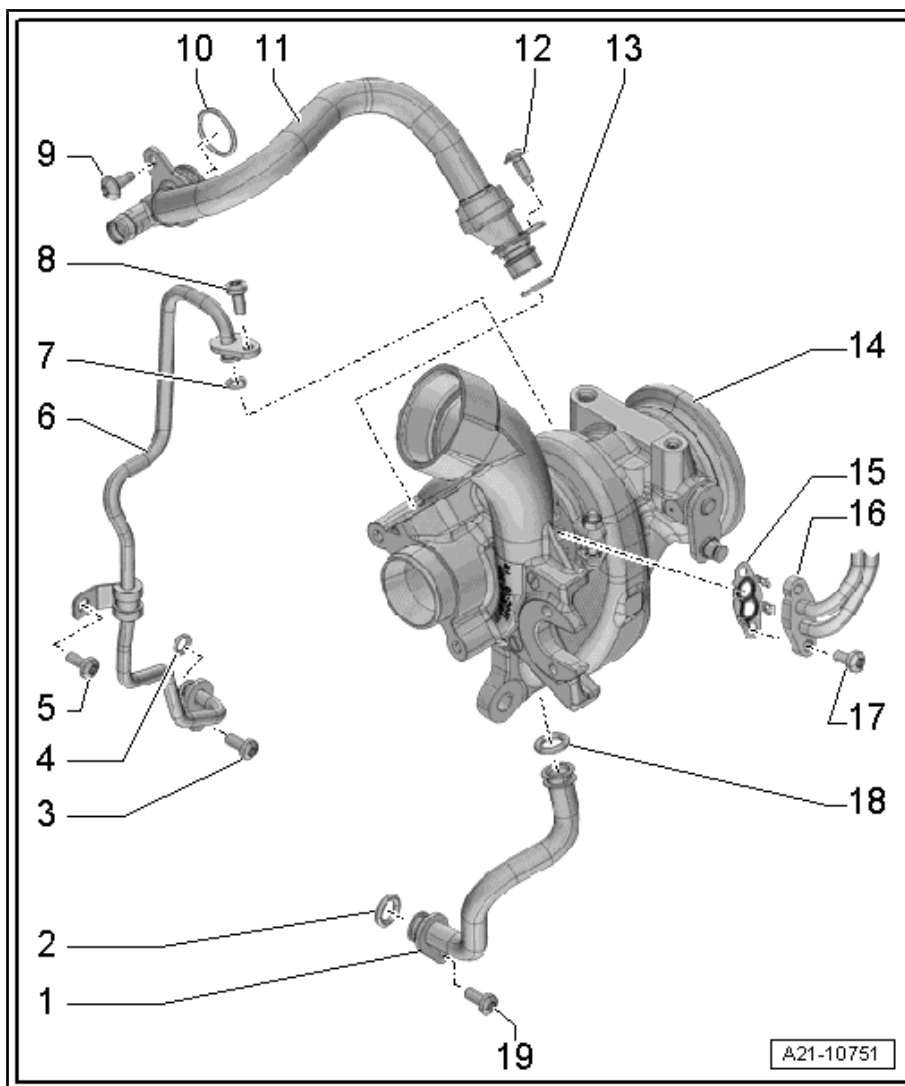
- ☐ installing and removing ⇒ ["1.2 Removing and installing exhaust gas turbocharger", page 223](#)

### 15 - Gasket

- ☐ replace after removal

### 16 - Coolant lines

- ☐ Forward and reverse



**17 - Bolt**

- ☐ 8 Nm

**18 - O-ring**

- ☐ replace after removal
- ☐ wet with engine oil

**19 - Bolt**

- ☐ 9 Nm

## 1.2 Removing and installing exhaust gas turbocharger

### Special tools and workshop equipment required

- ◆ Screw plug set for engine, e.g. - VAS 6122-
- ◆ Pliers for spring strap clamps
- ◆ Release tool - T10527-
- ◆ Release tool - T10527/1-

### Removing



#### Note

- ◆ *Observe rules for cleanliness  
⇒ ["3.1 Rules of cleanliness", page 7](#) .*
- ◆ *Fit all heat protection sleeves on again in the same place when installing.*



#### Caution

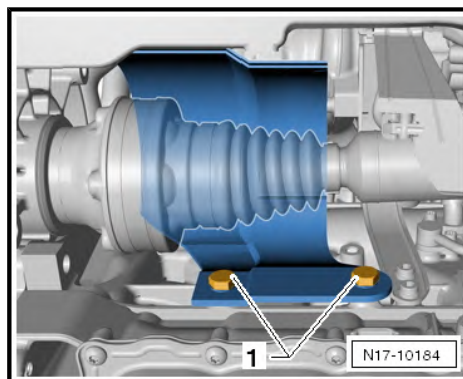
*In case a mechanical damage to the exhaust gas turbocharger is found, (e.g. damage to the compressor wheel), it is not sufficient to only replace the turbocharger. In order to avoid consequential damage, the following tasks must be performed:*

- ◆ *Inspect the air filter housing, the air filter element and air guide hoses for contamination.*
- ◆ *Inspect the whole charge-air routing and charge air cooler for foreign bodies.*
- ◆ *If foreign bodies are found in the charge air system, clean the charge air duct and replace the charge air cooler if necessary.*

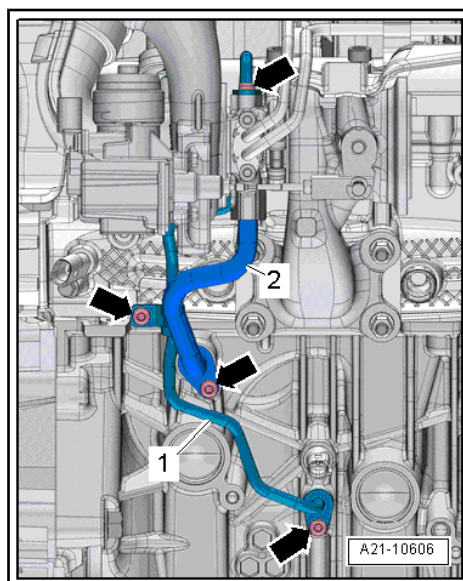
- Drain coolant ⇒ ["1.2 Draining and filling coolant", page 147](#) .



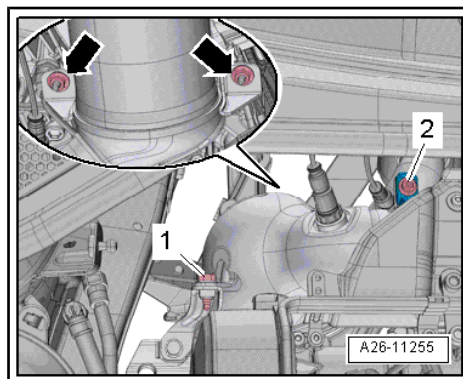
- Release screws -1- and remove heat shield for right drive shaft, if present.



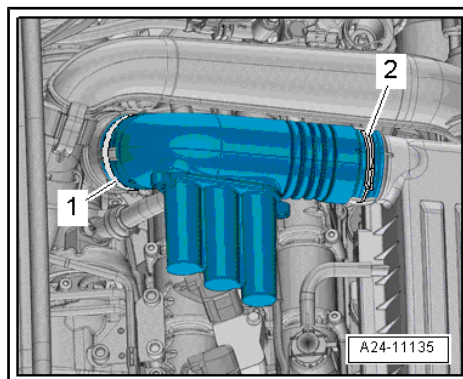
- Screw out the screws -arrows-, remove oil feed line -1- and oil return pipe -2-.



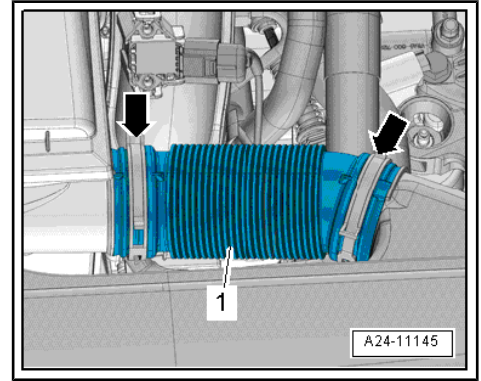
- Unscrew screw -2- and remove screw clamp.
- Unscrew screw -1- and nuts -arrows- and strap up catalytic converter.



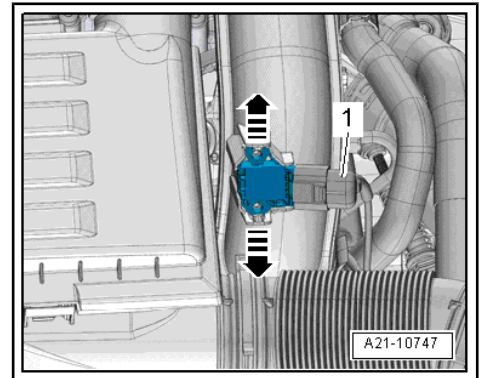
- Loosen hose clamps -1- and -2- and remove air guide pipes.
- Expose air guide hoses at the air guide pipe.



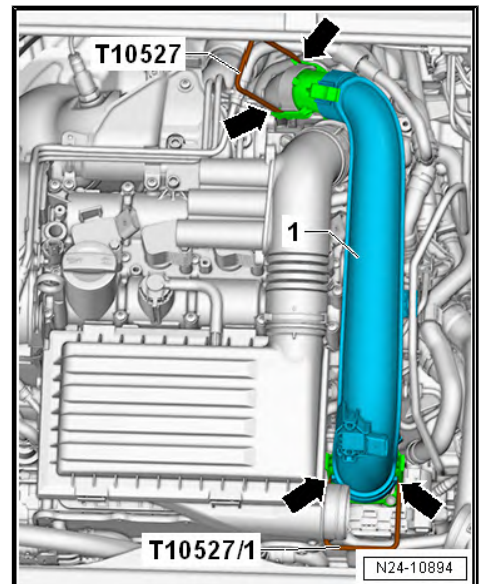
- Undo hose clamps -arrows-, remove air guide hose -1-.



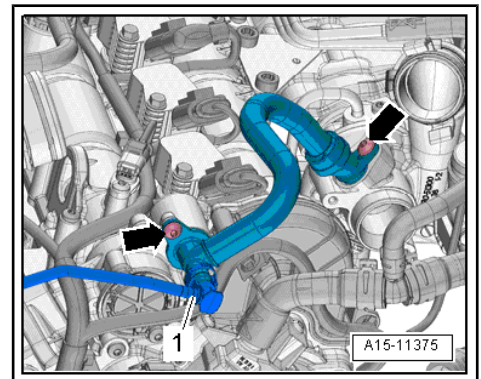
- Disconnect plug -1- at charge pressure sender - GX26- .



- Unlock catch pegs -arrows- with unlocking tool - T10527- and release unlocking tool - T10527/1- , remove the air guide pipe -1-.

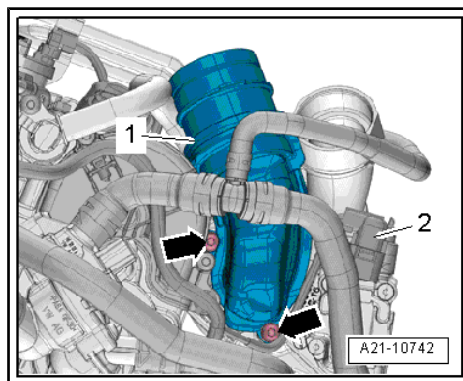


- Press release buttons and remove hose -1- to the activated charcoal filter.
- Unscrew screws -arrows- and remove hose for crankcase ventilation.

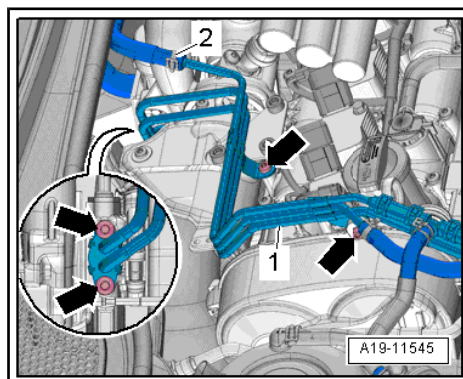




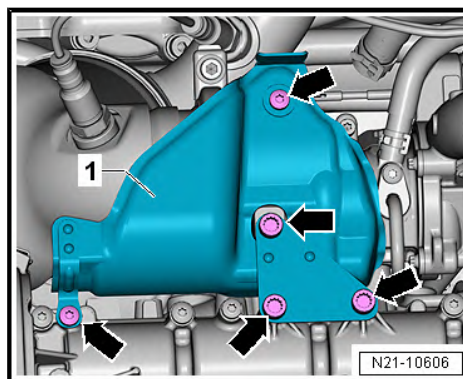
- Disconnect plug connection -2-.
- Release screws -arrows- and remove connection piece -1-.



- Loosen hose clamp -2- and remove coolant hose.
- Unscrew -arrows- screws and swivel coolant lines -1- to the right side.



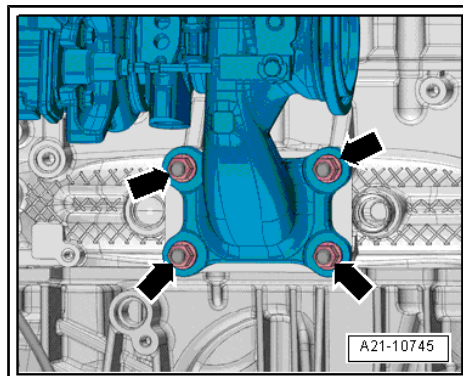
- Release screws -arrows- and remove mount with heat shield -1-.



- Unscrew nuts -arrows- and remove exhaust gas turbocharger.

### Install

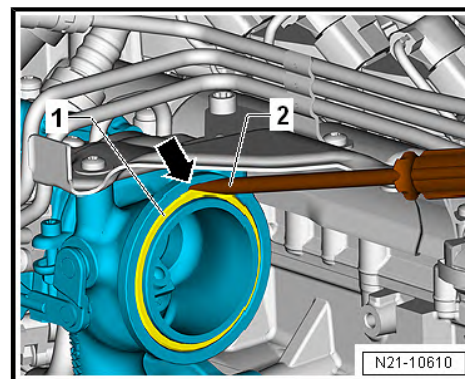
Installation is carried out in the reverse order. When installing, observe the following:



- Push screwdriver -2- into the recess -arrow- of the exhaust gas turbocharger and lever out the sealing ring -1-.

**i Note**

- ◆ Replace gaskets, O-rings and securing nuts for cylinder head.
- ◆ Fill the exhaust turbocharger with engine oil at the connection fitting for the oil feed line.
- ◆ Secure all hose connections with hose clamps which comply with the series design ⇒ *Electronic Catalogue of Original Parts "ETKA."*
- ◆ To ensure the oil supply to the exhaust gas turbocharger, leave the engine running for about 1 minute after installing the exhaust gas turbocharger. It is essential to avoid revving up early.



- Electrical connections and proper routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Replenish coolant ⇒ [page 148](#) .

**Tightening torques**

- ◆ ⇒ ["1.1 Summary of components - exhaust gas turbocharger", page 221](#)
- ◆ ⇒ Chassis, axles, steering; Rep. gr. 40

## 1.3 Removing and installing charge pressure regulator - V465-

**Special tools and workshop equipment required**

- ◆ Rig tool - T40265-

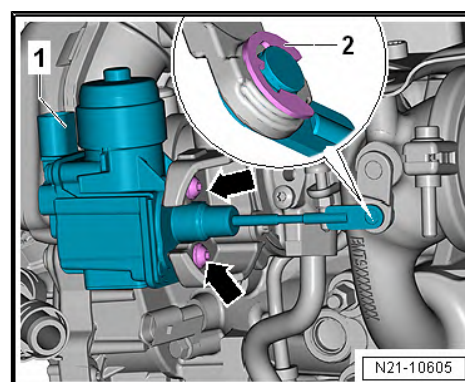
**Removing**

- Switch off ignition.
- Separate electrical plug connection -1-.
- Pull off lock washer -2- using extractor - T40265- .
- Release screws -arrows- and remove charge pressure regulator - V465- .

**Install**

Installation is carried out in the reverse order. When installing, observe the following:

- Adapting the engine control unit - J623- to the charge pressure regulator - V465- ⇒ Vehicle diagnostic tester.



**Tightening torque**

| Component                           | Nm   |
|-------------------------------------|------|
| Screw for charge pressure regulator | 9 Nm |

Volkswagen Technical Site: <http://vwts.ru> <http://vwts.info>

огромный архив документации по автомобилям Volkswagen, Skoda, Seat, Audi

## 2 Charge-air system

⇒ [“2.1 Summary of components - charge air system”, page 228](#)

⇒ [“2.2 Removing and installing charge pressure sender GX26”, page 229](#)

⇒ [“2.3 Removing and installing charge air cooler”, page 230](#)

⇒ [“2.4 Checking the charge-air system for leak tightness”, page 232](#)

### 2.1 Summary of components - charge air system



#### Note

- ◆ Before a test or repair, inspect all charge air pipes, charge air hoses and vacuum lines for tight connection and leak tightness.
- ◆ Observe rules for cleanliness ⇒ [“3.1 Rules of cleanliness”, page 7](#).

1 - Coolant hose

2 - Bolt

- ☐ thread forming
- ☐ position and screw in by to allow the screw to find the old thread. Next, tighten screw to the given tightening torque.
- ☐ 15 Nm

3 - Coolant hose

4 - Coolant hose

5 - Charge air cooler

- ☐ installing and removing  
⇒ [“2.3 Removing and installing charge air cooler”, page 230](#)
- ☐ fill with fresh coolant after replacing

6 - Sealing lip

7 - Gasket

- ☐ replace after removal

8 - Intake manifold

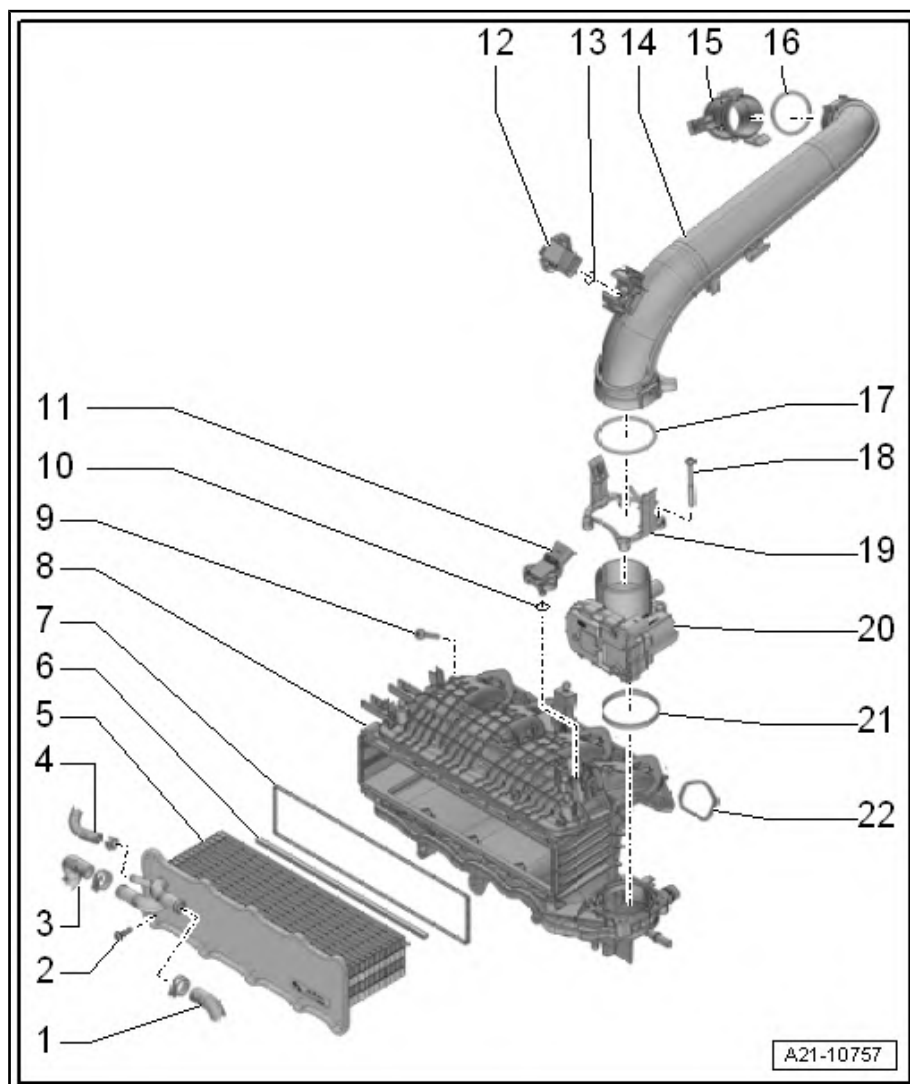
installing and removing  
⇒ [“3.2 Removing and installing intake manifold”, page 241](#)

9 - Screw

- ☐ Tightening torque and tightening order  
⇒ [“3.1 Assembly overview - intake manifold”, page 240](#)

10 - O-ring

- ☐ replace after removal





#### 11 - Intake manifold pressure sender - GX9-

- ☐ comprises:

Intake air temperature sender 2 - G299-

Intake manifold pressure sender - G71-

- ☐ installing and removing

⇒ ["5.1 Removing and installing intake manifold pressure sender GX9 ", page 257](#)

#### 12 - Charge pressure sender - GX26-

- ☐ comprises:

Charge pressure sender - G31-

Intake air temperature transmitter - G42-

- ☐ installing and removing ⇒ ["2.2 Removing and installing charge pressure sender GX26 ", page 229](#)

#### 13 - O-ring

- ☐ replace after removal

#### 14 - Air guide pipe

#### 15 - Inlet connections

#### 16 - O-ring

- ☐ replace after removal

#### 17 - O-ring

- ☐ replace after removal

#### 18 - Bolt

- ☐ thread forming
- ☐ position and screw in by to allow the screw to find the old thread. Next, tighten screw to the given tightening torque.
- ☐ 7 Nm

#### 19 - Retaining clip

- ☐ For air guide pipe

#### 20 - Throttle valve module - GX3-

- ☐ comprises:

Throttle valve module - J338-

Throttle valve drive - G186-

Throttle valve drive angle sender 1 - G187-

Throttle valve drive angle sender 2 - G188-

- ☐ installing and removing ⇒ ["3.3 Removing and installing the throttle valve control unit GX3 ", page 244](#)

#### 21 - Sealing ring

- ☐ replace after removal

#### 22 - Gasket

- ☐ 4 pieces
- ☐ replace after removal

## 2.2 Removing and installing charge pressure sender - GX26-

The charge pressure sender - GX26- consists:

- ◆ Charge pressure sender - G31-



- ◆ Intake air temperature transmitter - G42-

### Removing

- Separate electrical plug connection -1-.
- Release catches -arrows- and remove the charge pressure sender - GX26- .

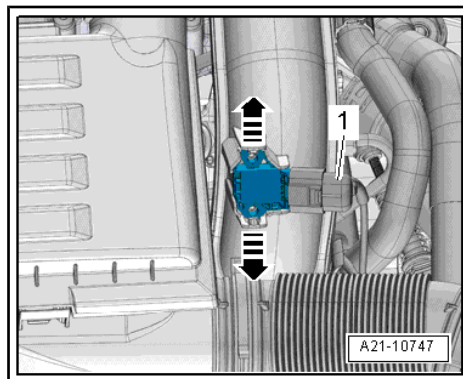
### Install

Installation is carried out in the reverse order. When installing, observe the following:



### Note

- ◆ Renew O-ring.
- ◆ If retaining tabs break during removal, fixing screws can be attached to the sender as a replacement ⇒ *Electronic Catalogue of Original Parts "ETKA"*. Tightening torque:  
⇒ [page 230](#)



### Tightening torque

| Component                      | Nm   |
|--------------------------------|------|
| Charge pressure sender - GX26- | 3 Nm |

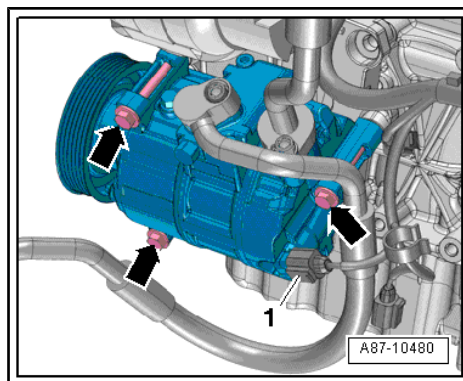
## 2.3 Removing and installing charge air cooler

### Special tools and workshop equipment required

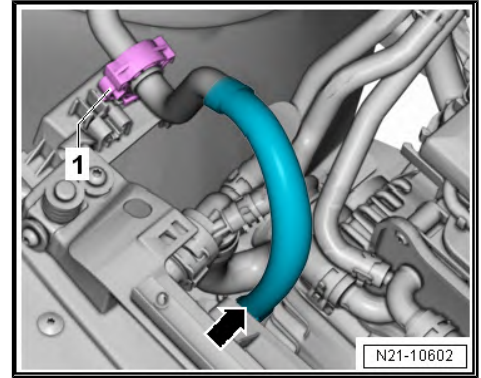
- ◆ Hose clamps up to 25 mm - MP7-602 (3094)-
- ◆ Catch pan for workshop crane , e.g. -VAS 6208-
- ◆ Pliers for spring strap clamps

### Removing

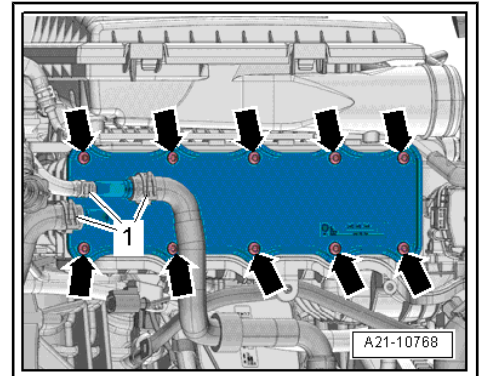
- Disconnect plug connection -1-.
- Remove AC compressor from holder -arrows- and strap up ⇒ Heating, Air Conditioning; Rep. gr. 87 .
- Place a catch pan for workshop crane - VAS 6208- underneath.
- Removing fan shroud  
⇒ ["4.7 Removing and installing fan shroud for radiator fan"](#), [page 182](#) .



- Open the clamp -1- and push hose -arrow- to the side.



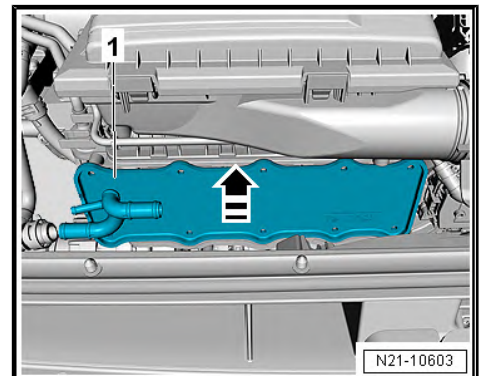
- Loosen hose clamps -1- and remove coolant hoses.
- Release screws -arrows- and remove charge air cooler.



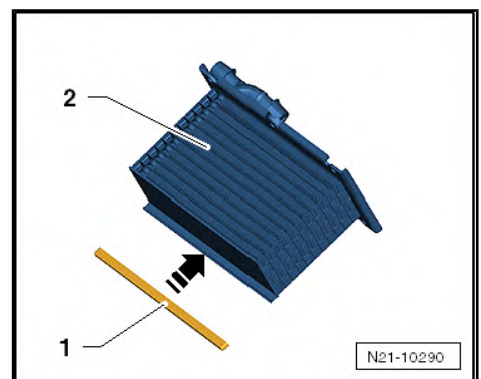
- Pull charge air cooler -1- backwards and forwards simultaneously in -direction of the arrow- out of the intake manifold.

#### Install

Installation is carried out in the reverse order. When installing, observe the following:



- Fit sealing strip -1- in -direction of the arrow- to the charge air cooler -2-.
- Insert new gasket into the groove at the intake manifold.





- Tighten screws -arrows- from centre to outside crosswise.
- Attach hose clamps -1-.



#### Note

When there is light pressure on the fins  
⇒ [“3.5 Assembly of radiators and capacitors”, page 8](#) .

- Install fan shroud  
⇒ [“4.7 Removing and installing fan shroud for radiator fan”, page 182](#) .
- Check coolant level ⇒ [page 151](#) .

#### Tightening torques

- ♦ ⇒ [“2.1 Summary of components - charge air system”, page 228](#)
- ♦ ⇒ Heating, Air conditioning; Rep. gr. 87 .

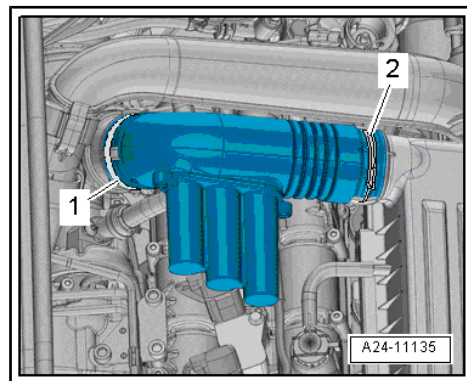
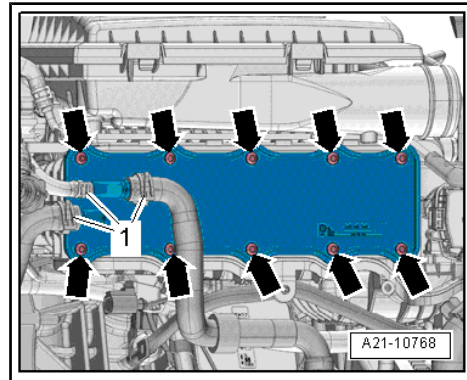
## 2.4 Checking the charge-air system for leak tightness

#### Special tools and workshop equipment required

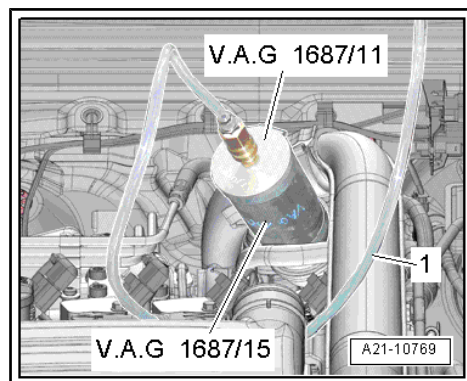
- ♦ Charge-air system testing device , e. g. -V.A.G 1687-

#### Work procedure

- Loosen hose clamps -1- and -2- and remove air guide pipes.



- Connect adapter - V.A.G 1687/15- with -V.A.G 1687/11- to the exhaust gas turbocharger.
- Connect hose -1- of charge air system tester -V.A.G 1687- to adapter.



Prepare tester for charge air system - V.A.G 1687- as follows:

- Unscrew pressure control valve -2- fully and close the valves -3- and -4-.
- The rotary knob must be pulled to the top in order to rotate the pressure control valve -2-.
- Connect tester for charge air systems - V.A.G 1687- to compressed air using a commercially available intermediate piece -1-.



**Note**

*If there is water in the inspection glass, drain water via the drain plug -6-.*

- Open valve -3-.



**Caution**

***Risk of damage owing to pressure being set too high.***

♦ ***The pressure must not be greater than 0.05 MPa (0.5 bar)!***

- Set the pressure to 0.05 MPa (0.5 bar) with the pressure control valve -2-.
- Open valve -4- and wait until the test circuit is filled. If necessary regulate the pressure to 0.05 MPa (0.5 bar).
- To check the charge air system for leak points, listen, touch or use commercially available leak search spray or the ultrasonic measuring device - V.A.G 1842- .



**Note**

- ♦ *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 .*
- ♦ *Before removing the adapter, depressurize the test circuit by detaching the hose coupling.*

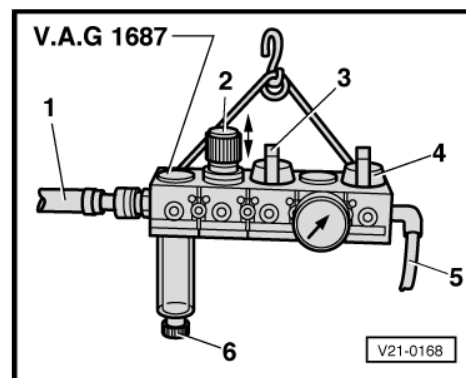
**Assembling**

Assembly is carried out in the reverse order. When installing, observe the following:



**Note**

*Replace gaskets and O-rings.*





## 24 – Mixture preparation - injection

### 1 Injection system

⇒ [“1.1 Injection system - Fitting location of the injection system”, page 234](#)

#### 1.1 Injection system - Fitting location of the injection system

⇒ [“1.1.1 Installation location overview - engine compartment”, page 234](#)

⇒ [“1.1.2 Installation overview - engine from front”, page 236](#)

⇒ [“1.1.3 Installation overview - engine from rear”, page 237](#)

##### 1.1.1 Installation location overview - engine compartment

Installation location overview - engine compartment

##### 1 - Inlet camshaft control valve 1 - N205-

- ❑ Summary of components  
⇒ [“1.2 Summary of components - camshaft housing”, page 68](#)
- ❑ with integrated seal with oil strainer

##### 2 - Lambda probe 1 in front of the catalytic converter - GX10-

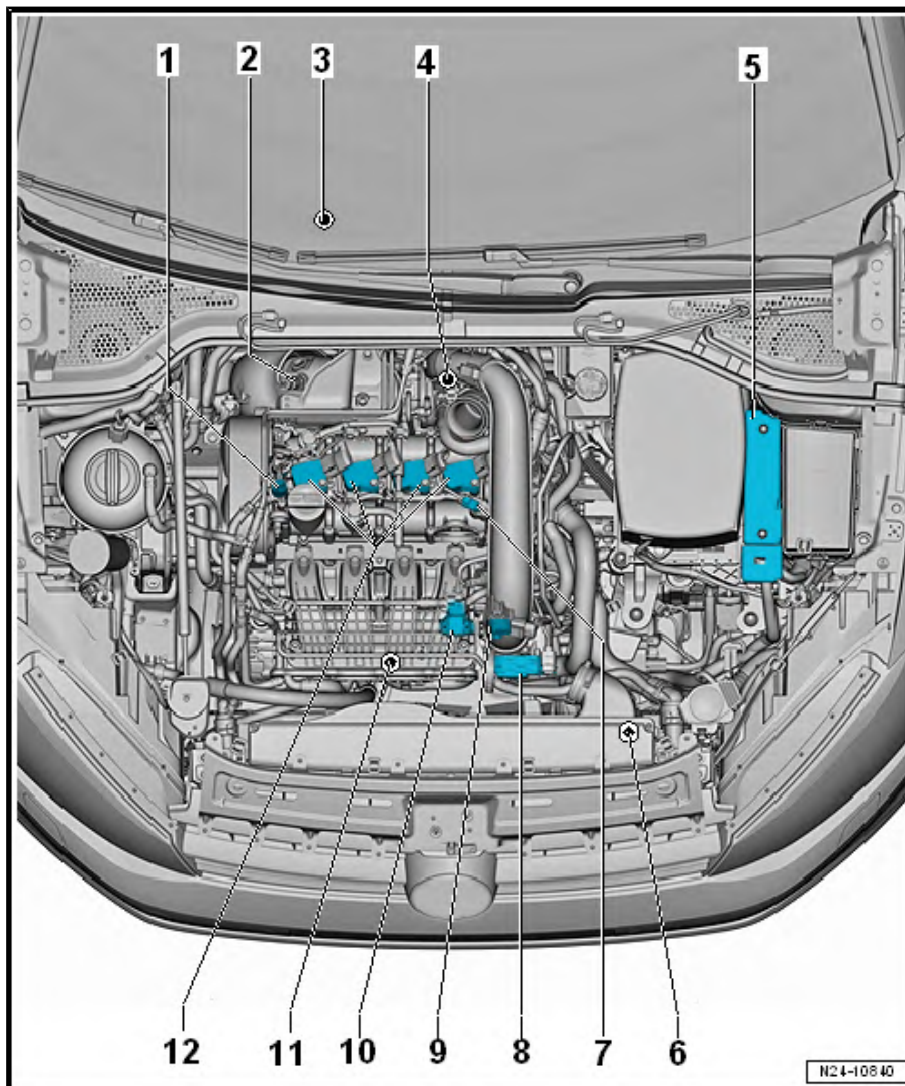
- ❑ comprises:
  - Lambda probe - G39-
  - Lambda probe heater - Z19-
- ❑ Summary of components  
⇒ [“7.1 Summary of components - lambda probe”, page 265](#)

##### 3 - Lambda probe 1 after catalytic converter - GX7-

- ❑ comprises:
  - Lambda probe after catalytic converter - G130-
  - Lambda probe heater 1 after catalytic converter - Z29-
- ❑ Summary of components  
⇒ [“7.1 Summary of components - lambda probe”, page 265](#)

##### 4 - Charge pressure regulator - V465-

- ❑ installing and removing ⇒ [“1.3 Removing and installing charge pressure regulator V465”, page 227](#)



#### 5 - Engine control unit - J623-

- ❑ installing and removing ⇒ [“8 Engine control unit”, page 268](#)

#### 6 - Coolant temperature sender at radiator outlet - G83-

- ❑ installing and removing  
⇒ [“2.9 Removing and installing coolant temperature sender at radiator outlet G83”, page 168](#)

#### 7 - Hall sender - G40-

- ❑ Camshaft position sensor
- ❑ Summary of components ⇒ [“1.1 Assembly overview - ignition system”, page 281](#)

#### 8 - Throttle valve module - GX3-

- ❑ comprises:
  - Throttle valve module - J338-
  - Throttle valve drive - G186-
  - Throttle valve drive angle sender 1 - G187-
  - Throttle valve drive angle sender 2 - G188-
- ❑ Summary of components ⇒ [“3.1 Assembly overview - intake manifold”, page 240](#)

#### 9 - Charge pressure sender - GX26-

- ❑ comprises:
  - Charge pressure sender - G31-
  - Intake air temperature transmitter - G42-
- ❑ Summary of components ⇒ [“2.1 Summary of components - charge air system”, page 228](#)

#### 10 - Intake manifold pressure sender - GX9-

- ❑ comprises:
  - Intake air temperature sender 2 - G299-
  - Intake manifold pressure sender - G71-
- ❑ Summary of components ⇒ [“3.1 Assembly overview - intake manifold”, page 240](#)

#### 11 - Charge air cooler pump - V188-

- ❑ Summary of components ⇒ [“2.2 Summary of components - electric coolant pump”, page 157](#)

#### 12 - Ignition coils with a power output stage

- ◆ Ignition coil 1 with output stage - N70-
- ◆ Ignition coil 2 with output stage - N127-
- ◆ Ignition coil 3 with output stage - N291-
- ◆ Ignition coil 4 with output stage - N292-
- ❑ installing and removing ⇒ [“1.2 Removing and installing ignition coils with output stage”, page 282](#)



## 1.1.2 Installation overview - engine from front

### 1 - Knock sensor 1 - G61-

- ❑ Summary of components  
⇒ [“1.1 Assembly overview - ignition system”, page 281](#)

### 2 - Oil pressure switch for reduced oil pressure - F378-

- ❑ Summary of components  
⇒ [“4.2 Removing and installing oil pressure switch for reduced oil pressure F378”, page 141](#)

### 3 - Fuel pressure sender - G247-

- ❑ Summary of components  
⇒ [“4.1 Assembly overview - fuel rail with injectors”, page 248](#)

### 4 - Activated charcoal filter solenoid valve 1 - N80-

### 5 - Injectors

- ◆ Injector, cylinder 1 - N30-
- ◆ Injector, cylinder 2 - N31-
- ◆ Injector, cylinder 3 - N32-
- ◆ Injector, cylinder 4 - N33-

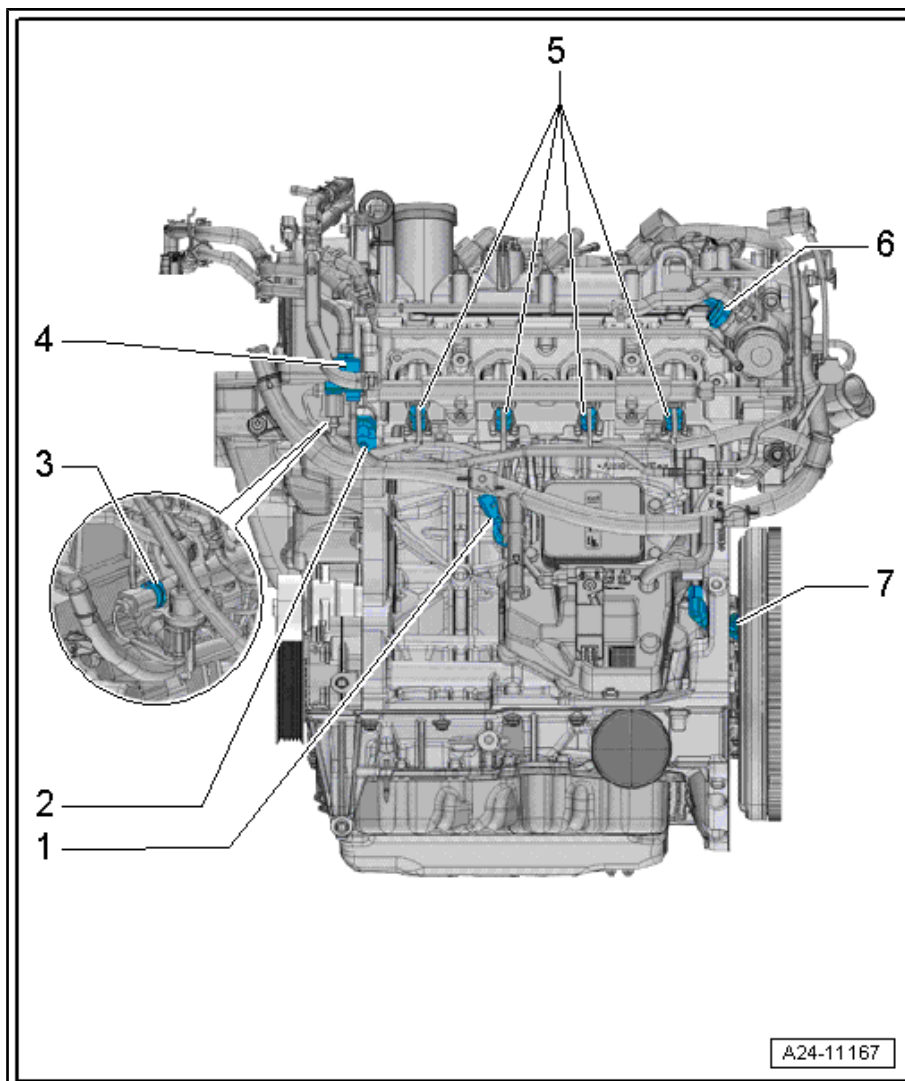
- ❑ Summary of components  
⇒ [“4.1 Assembly overview - fuel rail with injectors”, page 248](#)

### 6 - Control valve for fuel pressure - N276-

- ❑ on the high pressure pump
- ❑ Summary of components ⇒ [“6.1 Summary of components - high pressure pump”, page 261](#)

### 7 - Engine speed transmitter - G28-

- ❑ Summary of components ⇒ [“1.1 Assembly overview - ignition system”, page 281](#)



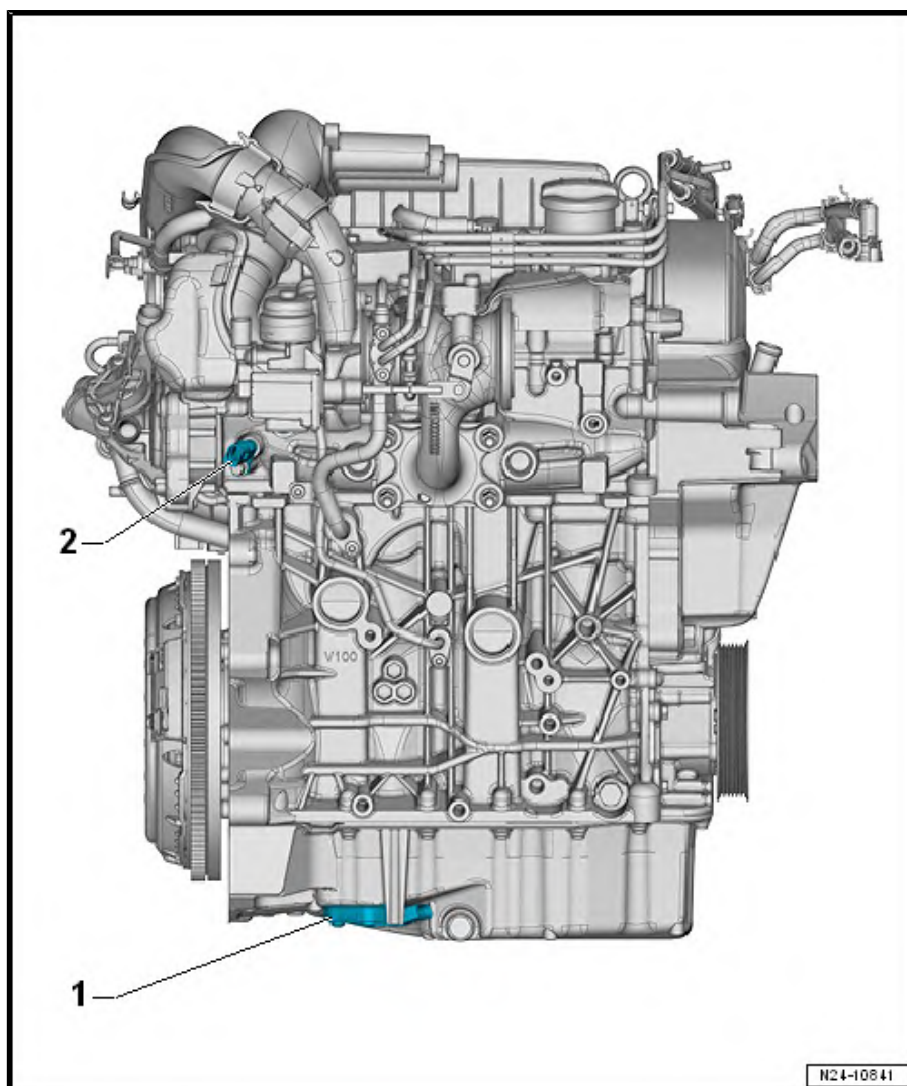
### 1.1.3 Installation overview - engine from rear

#### 1 - Oil level and oil temperature sender - G266-

- installing and removing  
⇒ [“1.4 Removing and installing oil level and oil temperature sender G266”, page 134](#)

#### 2 - Coolant temperature sender - G62-

- installing and removing  
⇒ [“2.8 Removing and installing coolant temperature sender G62”, page 167](#)





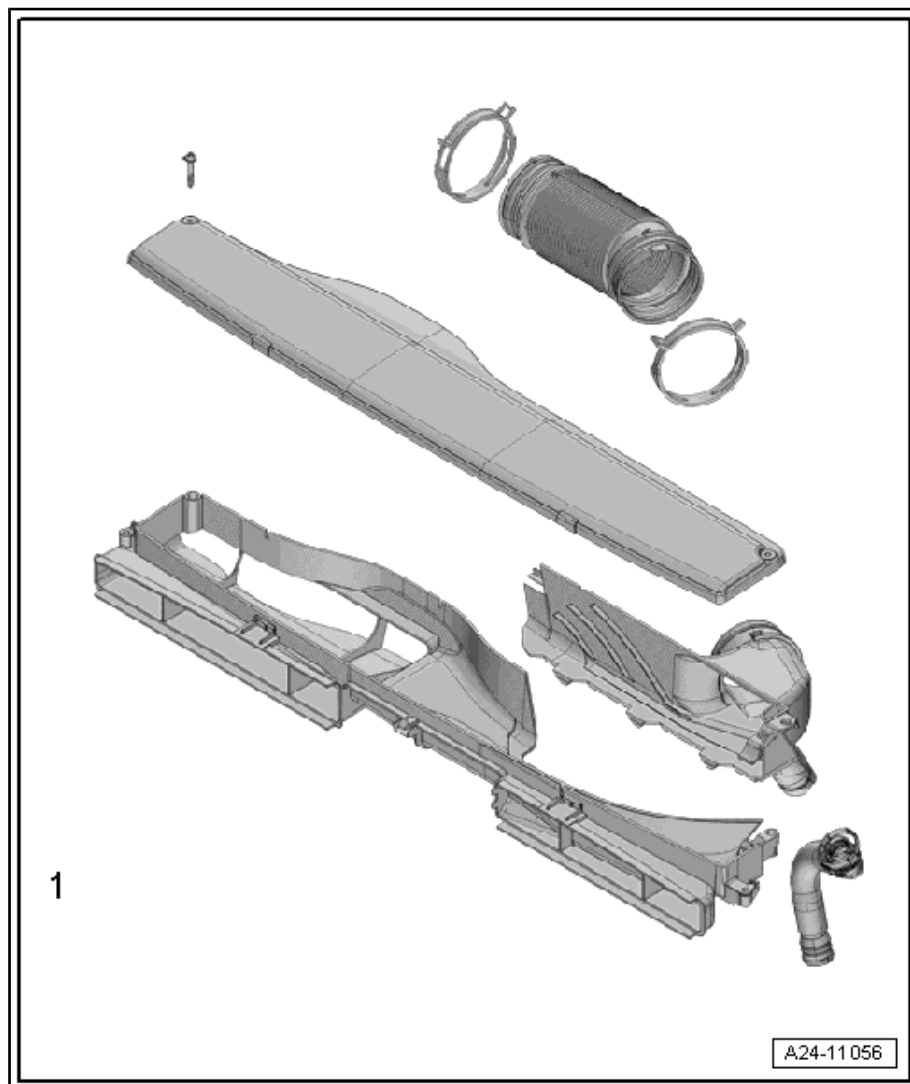
## 2 Air filter

⇒ "2.1 Assembly overview - air filter housing", page 238

⇒ "2.2 Removing and installing air filter housing", page 239

### 2.1 Assembly overview - air filter housing

- 1 - Air guide lower part
  - ☐ on the lock support
- 2 - air guide pipe top
  - ☐ on the lock support
- 3 - Cover
  - ☐ for air guide
- 4 - Bolt
  - ☐ 2 Nm
- 5 - Air filter lower part
  - ☐ remove mechanical foreign particles
- 6 - Air filter element
  - ☐ Change intervals  
⇒ Maintenance ; Booklet Octavia III
- 7 - Air filter upper part
- 8 - Hose
  - ☐ for crankcase ventilation
- 9 - Air guide hose
- 10 - Rubber bearing
- 11 - Bolt
  - ☐ 2 Nm
- 12 - Air guide hose
- 13 - O-ring
  - ☐ replace if damaged
- 14 - Water drain hose
  - ☐ clean
- 15 - Bolt
  - ☐ 2 Nm



## 2.2 Removing and installing air filter housing

### Removing

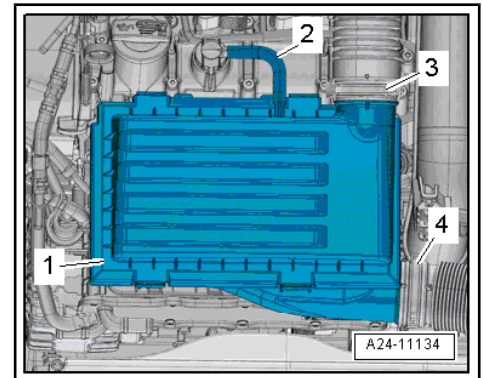
- Pull off air guide hose -2-.
- Pull off -1- air filter housing upwards from the ball pin.
- Loosen hose clamps -3- and -4- and remove air guide pipes.
- Grab air filter housing and remove by pulling it upwards.

### Install



#### Note

- ◆ *If the air filter is heavily soiled or wet, dirt particles or moisture can enter components and distort the measured values. This leads to loss of power as a smaller injection quantity is calculated.*
- ◆ *It is imperative for the air filter housing to be clean.*
- ◆ *Hose connections and air guide pipes and hoses must be free of oil and grease before being installed.*
- ◆ *Use a silicone-free lubricant to assemble the air guide hoses.*
- ◆ *Secure all hose connections with hose clamps which comply with the series design ⇒ Electronic Catalogue of Original Parts "ETKA."*
- ◆ *When blowing out the air filter housing using compressed air, cover critical air-carrying components such as air ducts etc, with a clean cloth. This will prevent any malfunctions.*
- ◆ *Observe disposal regulations!*
- Remove mechanical foreign particles from the top and bottom parts of the air filter housing.
- Clean the water drain with compressed air.



### 3 Intake manifold

⇒ ["3.1 Assembly overview - intake manifold", page 240](#)

⇒ ["3.2 Removing and installing intake manifold", page 241](#)

⇒ ["3.3 Removing and installing the throttle valve control unit GX3", page 244](#)

⇒ ["3.4 Clean throttle valve control unit GX3", page 246](#)

#### 3.1 Assembly overview - intake manifold

##### 1 - Coolant pipe

- ☐ clipped onto the intake manifold

##### 2 - Intake manifold

- ☐ Building unit with charge air cooler
- ☐ installing and removing  
⇒ ["3.2 Removing and installing intake manifold", page 241](#)

##### 3 - Coolant pipe

- ☐ clipped onto the intake manifold

##### 4 - Screw

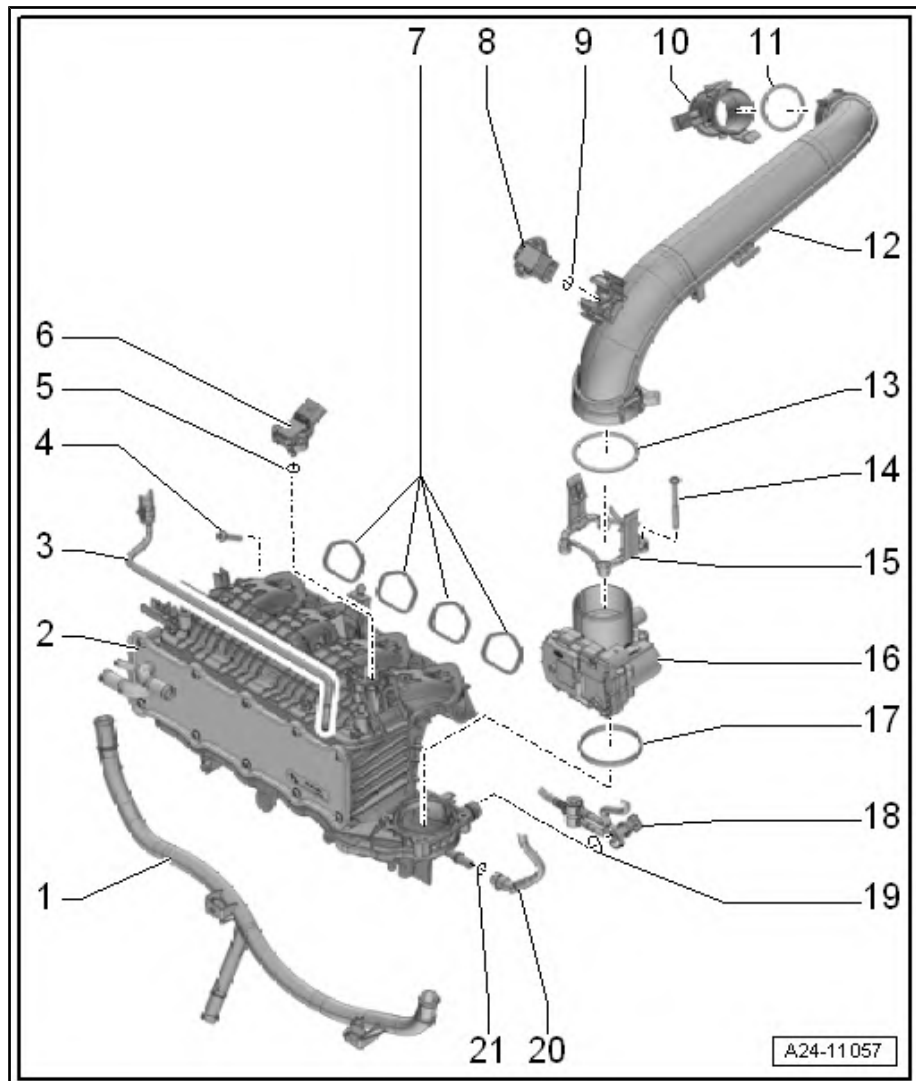
- ☐ Tightening torque and tightening order  
⇒ [page 241](#)

##### 5 - O-ring

- ☐ replace after removal

##### 6 - Charge pressure sender - GX9-

- ☐ comprises:  
Intake air temperature sender 2 - G299-  
Intake manifold pressure sender - G71-
- ☐ installing and removing  
⇒ ["5.1 Removing and installing intake manifold pressure sender GX9", page 257](#)



##### 7 - Gasket

- ☐ replace after removal

##### 8 - Charge pressure sender - GX26-

- ☐ comprises:  
Charge pressure sender - G31-  
Intake air temperature transmitter - G42-

☐ installing and removing ⇒ ["2.2 Removing and installing charge pressure sender GX26", page 229](#)

##### 9 - O-ring

- ☐ replace after removal

## 10 - Inlet connections

### 11 - O-ring

- ☐ replace after removal

### 12 - Air guide pipe

### 13 - O-ring

- ☐ replace after removal

### 14 - Bolt

- ☐ thread forming
- ☐ position and screw in by to allow the screw to find the old thread. Next, tighten screw to the given tightening torque.
- ☐ 7 Nm

### 15 - Retaining clip

- ☐ For air guide pipe

### 16 - Throttle valve module - GX3-

- ☐ comprises:

Throttle valve module - J338-

Throttle valve drive - G186-

Throttle valve drive angle sender 1 - G187-

Throttle valve drive angle sender 2 - G188-

- ☐ installing and removing ⇒ [“3.3 Removing and installing the throttle valve control unit GX3”, page 244](#)
- ☐ cleaning ⇒ [“3.4 Clean throttle valve control unit GX3”, page 246](#)
- ☐ After replacing the throttle flap control unit - GX3- this must be readjusted to the engine control unit - J623- Vehicle diagnosis tester ⇒ Vehicle diagnostic tester

### 17 - Sealing ring

- ☐ replace after removal

### 18 - Vacuum line

### 19 - O-ring

- ☐ replace after removal

### 20 - Vacuum line

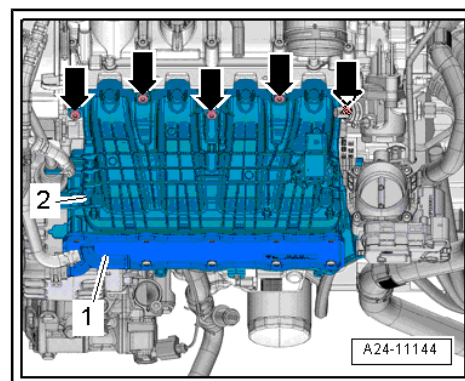
### 21 - O-ring

- ☐ replace after removal

## Intake manifold - tightening torque and tightening order

– Tighten screws in steps as follows:

| Stage | Screws   | Tightening torque                                                      |
|-------|----------|------------------------------------------------------------------------|
| 1st   | -Arrows- | Insert in the centre, starting alternately, by hand as far as the stop |
| 2nd   | -Arrows- | In the centre, starting alternately, 8 Nm                              |



## 3.2 Removing and installing intake manifold

Special tools and workshop equipment required



- ◆ Release tool - T10527-
- ◆ Release tool - T10527/1-

### Removing

- Remove air filter housing  
⇒ ["2.2 Removing and installing air filter housing", page 239](#) .
- Remove the sound dampening system ⇒ Body Work; Rep. gr. 66 .
- Drain coolant ⇒ ["1.2 Draining and filling coolant", page 147](#) .



### WARNING

*Risk of injury from fuel.*

- ◆ *To relieve the fuel pressure, place a clean cloth around the connection point and loosen the connection point carefully before opening the fuel system.*

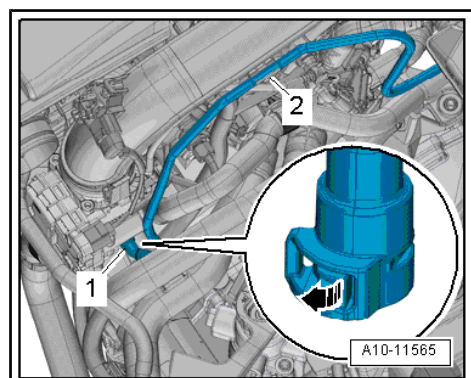
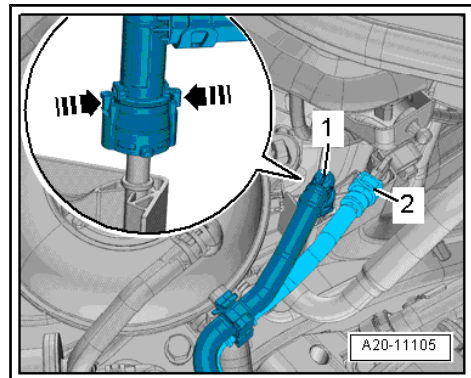


### Caution

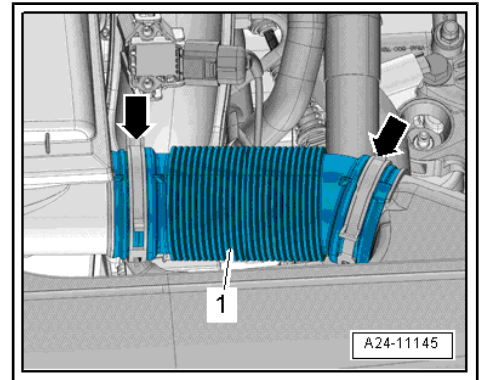
*Risk of malfunctions caused by soiling.*

- ◆ ⇒ ["2.1 Safety precautions when working on fuel supply system", page 2](#)

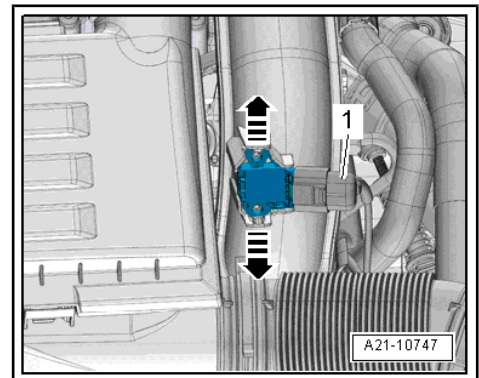
- First press the hose coupling -1- down, then press release buttons -arrows-  
⇒ ["2 Separating push-on couplings", page 211](#) .
- Remove hose coupling with pressed release buttons.
- Press release buttons on the hose -2- for the activated charcoal filter.
- Disconnect and expose hose.
- Unlock catch -arrow- and remove vacuum hose -1-.
- Expose vacuum hose on the air guide pipe -2-.
- Expose air guide hoses at the charge air pipe.



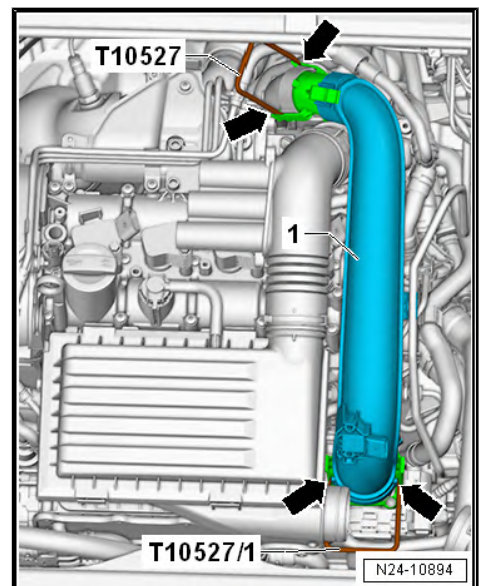
- Undo hose clamps -arrows-, remove air guide hose -1-.



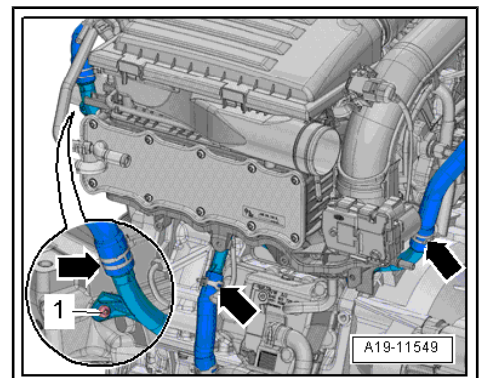
- Disconnect plug -1- at charge pressure sender - GX26- .



- Unlock catch pegs -arrows- with unlocking tool - T10527- and release unlocking tool - T10527/1- , remove the air guide pipe -1-.



- Release screw -1- and remove clamps -arrows-.
- Disconnect coolant hoses.





- Disconnect electrical plug connections:
  - 1 - For solenoid valve 1 for activated charcoal filter - N80-
  - 3 - for throttle valve control unit - GX3-
  - 4 - Intake manifold pressure sender - GX9-
- Release screw -arrow-.
- Press release buttons and remove hose -2- for activated charcoal filter.
- Unclip fuel feed line -5- and coolant line -6- at the intake manifold and push to the side.
- Disconnect the plug connection -1- from the fuel pressure sender - G247- .
- Disconnect the electrical plug connections from the oil pressure switch sender.
- Loosen hose clamps -2- and remove coolant hoses.
- Remove bolts -arrows-.
- Remove intake manifold -1-.

### Install

Installation is carried out in the reverse order. When installing, observe the following:



### Note

*Replace gaskets and O-rings.*

- Install the noise insulation ⇒ Body Work; Rep. gr. 66 .
- Install air filter housing  
⇒ [“2.2 Removing and installing air filter housing”, page 239](#) .
- Replenish coolant  
⇒ [“1.2 Draining and filling coolant”, page 147](#) .

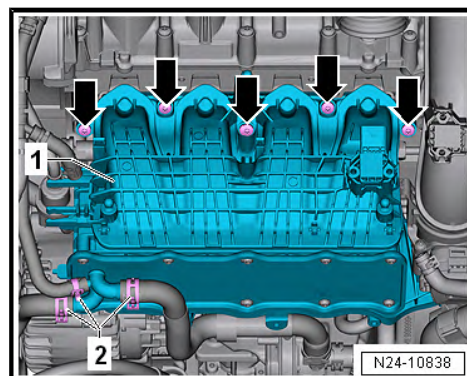
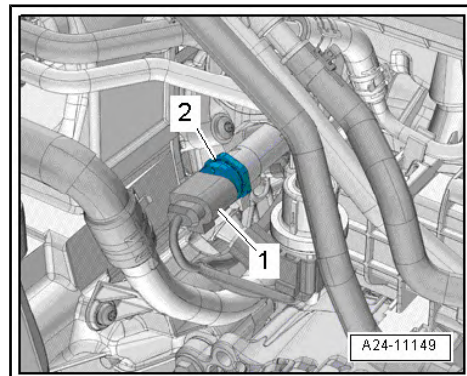
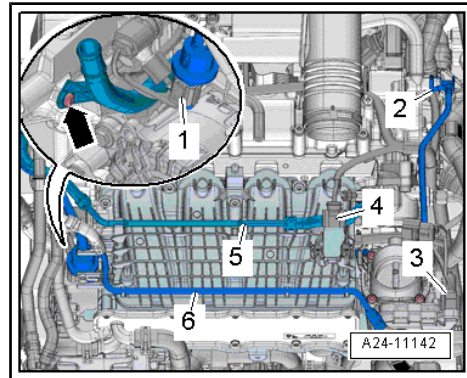
### Tightening torques

- ◆ ⇒ [“3.1 Assembly overview - intake manifold”, page 240](#)

## 3.3 Removing and installing the throttle valve control unit - GX3-

The throttle flap control unit - GX3- comprises:

- ◆ Throttle valve module - J338-
- ◆ Throttle valve drive - G186-
- ◆ Throttle valve drive angle sender 1 - G187-
- ◆ Throttle valve drive angle sender 2 - G188-

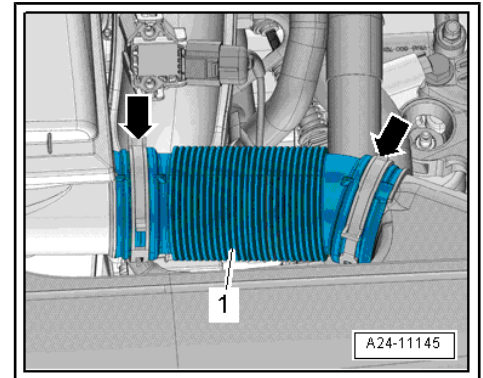


### Special tools and workshop equipment required

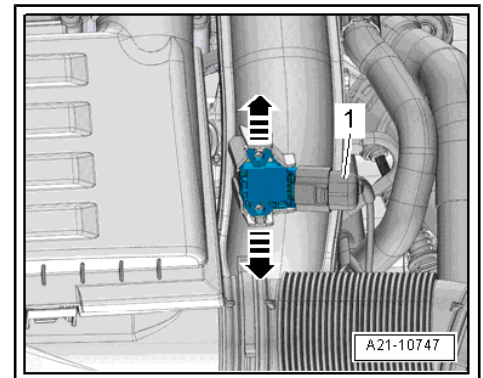
- ◆ Release tool - T10527-
- ◆ Release tool - T10527/1-

### Removing

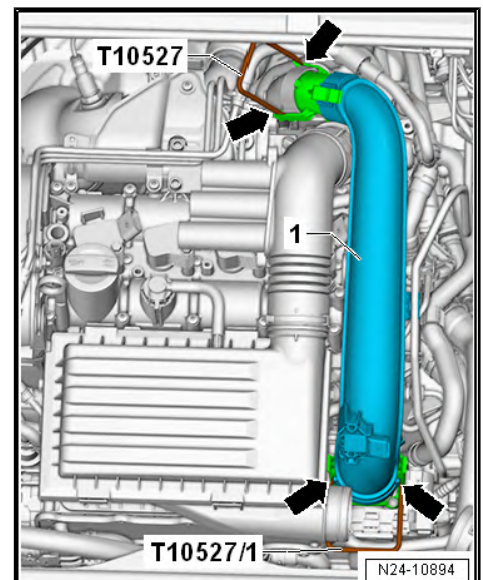
- Expose air guide hoses at the charge air pipe.
- Undo hose clamps -arrows-, remove air guide hose -1-.



- Disconnect plug -1- at charge pressure sender - GX26- .



- Unlock catch pegs -arrows- with unlocking tool - T10527- and release unlocking tool - T10527/1- , remove the air guide pipe -1-.





- Separate electrical plug connection -3-.
- Unscrew the screws -arrows- and remove throttle valve control unit - GX3- -1- with adapter -2-.

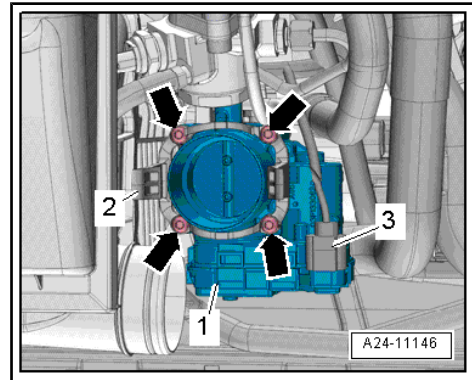
### Installing

Installation is performed in a similar way in the reverse order. Pay attention to the following points:

- After replacing the throttle flap control unit - GX3- this must be readjusted to the engine control unit - J623- → Vehicle diagnostic tester.

### Tightening torque

| Component                            | Nm   |
|--------------------------------------|------|
| Screw for throttle flap control unit | 7 Nm |



## 3.4 Clean throttle valve control unit - GX3-



### Note

- ◆ If a new engine control unit - J623- is fitted, the throttle valve control unit must be adapted.
- ◆ Soiling and carbonisation in the limit stop can lead to incorrect adjustment values.
- ◆ When cleaning the throttle valve housing it must not be scratched.

### Special tools and workshop equipment required

- ◆ Commercially available Acetone
- ◆ Paint brush

### Work procedure

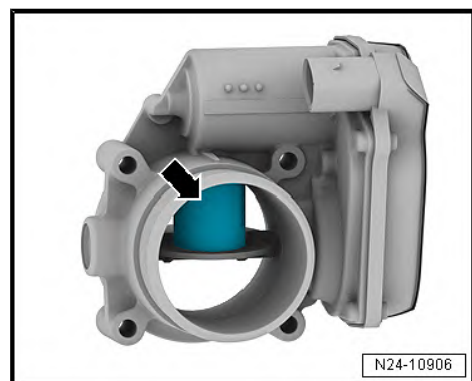
- Remove throttle valve module - GX3-  
⇒ ["3.3 Removing and installing the throttle valve control unit GX3", page 244](#).
- Open throttle valve by hand and lock in open position using wood or a plastic wedge -arrow-.



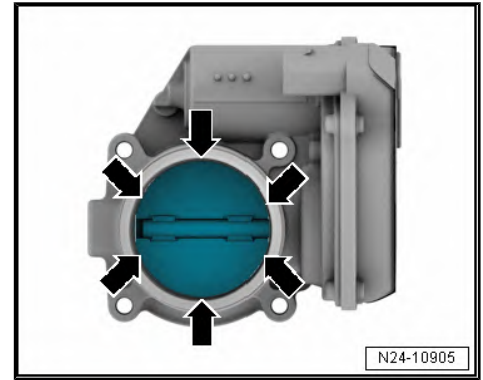
### WARNING

*Acetone is highly inflammable.*

- ◆ *Accident prevention regulations and the safety instructions must be observed when handling easily inflammable fluids.*
- ◆ *Compressed air must not be used for cleaning throttle valve.*
- ◆ *To avoid injury from metal shavings and to avoid skin contact, wear eye protection and protective clothing.*



- Thoroughly clean the throttle valve housing using commercially available Acetone and a paint brush, particularly in the area -arrows- of the closed throttle valve.
- Wipe out throttle valve housing with a lint-free cloth.
- Allow Acetone to dry off completely.
- Install throttle valve module - GX3-  
⇒ ["3.3 Removing and installing the throttle valve control unit GX3", page 244](#) .
- Erase adapted values and adjust the engine control unit - J623- to the throttle flap control unit - GX3- ⇒ Vehicle diagnostic tester.





## 4 Injectors

⇒ [“4.1 Assembly overview - fuel rail with injectors”, page 248](#)

⇒ [“4.2 Removing and installing the fuel distributor”, page 249](#)

⇒ [“4.3 Removing and installing injectors”, page 250](#)

⇒ [“4.4 Clean injection valves”, page 255](#)

### 4.1 Assembly overview - fuel rail with injectors

#### 1 - Fuel pressure sender - G247-

- ☐ check  
⇒ [“5.3 Check fuel pressure sender G247”, page 258](#)
- ☐ installing and removing  
⇒ [“5.2 Removing and installing fuel pressure sender G247”, page 257](#)
- ☐ Moisten the cone with clean engine oil; the thread must not be oiled
- ☐ 22 Nm

#### 2 - Fuel distributor

- ☐ installing and removing  
⇒ [“4.2 Removing and installing the fuel distributor”, page 249](#)

#### 3 - High pressure tube



#### WARNING

*Risk of injury caused by fuel which is under high pressure.*

*Before opening the high-pressure system, the fuel pressure must be reduced to residual pressure*

⇒ [“3.10 Reduce pressure in the high-pressure system”, page 10](#).

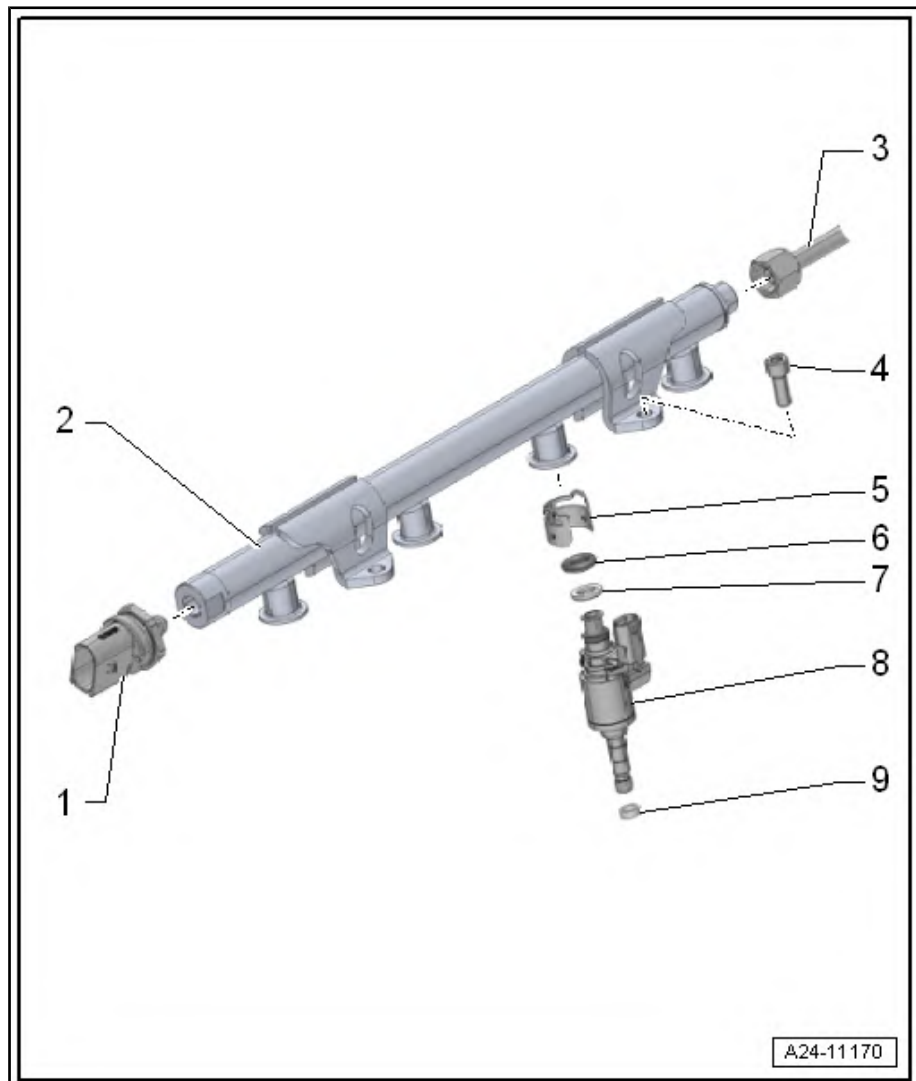
- ☐ replace if damaged
- ☐ do not change bending form
- ☐ installing and removing ⇒ [“6.3 Removing and installing high pressure pipe”, page 263](#)
- ☐ 25 Nm

#### 4 - Bolt

- ☐ installing and removing ⇒ [“4.2 Removing and installing the fuel distributor”, page 249](#)
- ☐ 9 Nm

#### 5 - Support ring

- ☐ replace after removal
- ☐ the fuel distributor exerts force via the support ring that holds the injector in the cylinder head
- ☐ connected with valve Pos. -8-



#### 6 - O-ring

- ☐ replace after removal
- ☐ Moisten with engine oil

#### 7 - Distance ring

- ☐ replace if damaged

#### 8 - Injector

- ☐ installing and removing ⇒ [“4.3 Removing and installing injectors”, page 250](#)

#### 9 - Combustion chamber sealing ring

- ☐ Do not grease or treat using any other lubricant
- ☐ Renew ⇒ [“4.3 Removing and installing injectors”, page 250](#) .

## 4.2 Removing and installing the fuel distributor

### Removing



#### WARNING

*Risk of injury caused by fuel which is under high pressure.*

- ◆ *Before opening the high-pressure system, the fuel pressure must be reduced to residual pressure  
⇒ [“3.10 Reduce pressure in the high-pressure system”, page 10](#) .*



#### Caution

*Risk of malfunctions caused by soiling.*

- ◆ *⇒ [“2.1 Safety precautions when working on fuel supply system”, page 2](#)*

- Removing the intake manifold  
⇒ [“3.2 Removing and installing intake manifold”, page 241](#) .
- Remove high pressure pipe  
⇒ [“6.3 Removing and installing high pressure pipe”, page 263](#) .



- Separate electrical plug connection -1-.



#### Note

*Place a cloth below to absorb leaking fuel.*

- Release the screws -arrows- and disconnect the fuel distributor from the injection valves.

#### Install

Installation is carried out in the reverse order. When installing, observe the following:



#### Note

*Renew O-ring.*

- Position fuel distributor on the injectors.
- Press fuel distributor first to the right, then to the left onto the injectors up to the stop.
- Press fuel distributor down firmly in the holder area and tighten screws by 2 turns.
- Tighten screws crosswise uniformly.
- Install high pressure pipe  
⇒ [“6.3 Removing and installing high pressure pipe”, page 263](#) .
- Installing the intake manifold  
⇒ [“3.2 Removing and installing intake manifold”, page 241](#) .

#### Tightening torques

| Component              | Nm   |
|------------------------|------|
| Fuel distributor screw | 9 Nm |

- ♦ ⇒ [“4.1 Assembly overview - fuel rail with injectors”, page 248](#)

## 4.3 Removing and installing injectors

#### Special tools and workshop equipment required

- ♦ Pulling device - T10133- with removal tool - T10133/16A- and extractor - T10133/19-

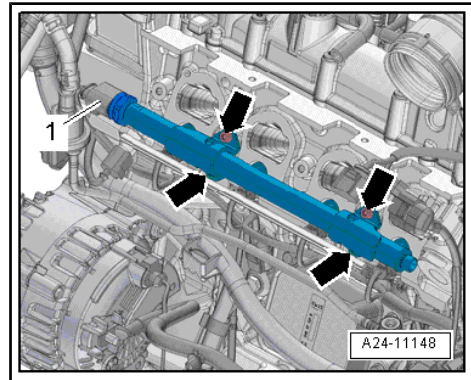
#### Removing



#### Caution

*There is a risk of malfunctions caused by soiling.*

- ♦ ⇒ [“3.1 Rules of cleanliness”, page 7](#)

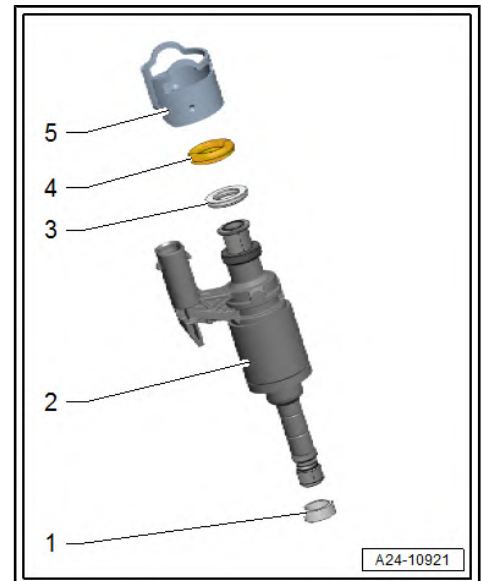


#### Note

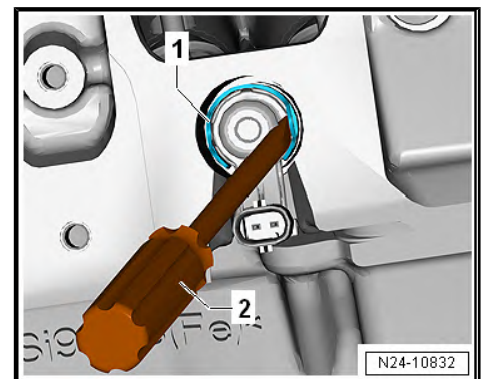
*Injectors must not be removed while the engine is cold.*

- Removing the intake manifold  
⇒ [“3.2 Removing and installing intake manifold”, page 241](#) .

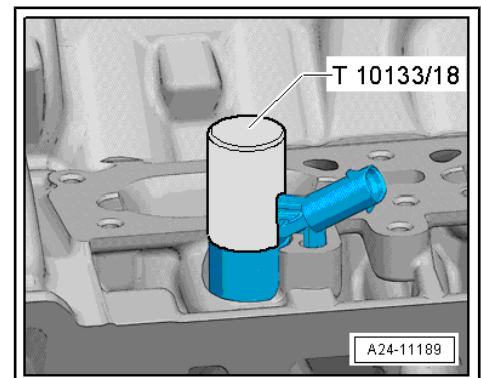
- Remove fuel distributor  
⇒ [“4.2 Removing and installing the fuel distributor”, page 249](#) .
- Remove O-ring -4- from injector -2-.
- Disconnect the electrical plug connections from affected injector.



- Lever off caps -1- from injector using a screwdriver -2-.



- Push impact sleeve -T10133/18- over the injector.



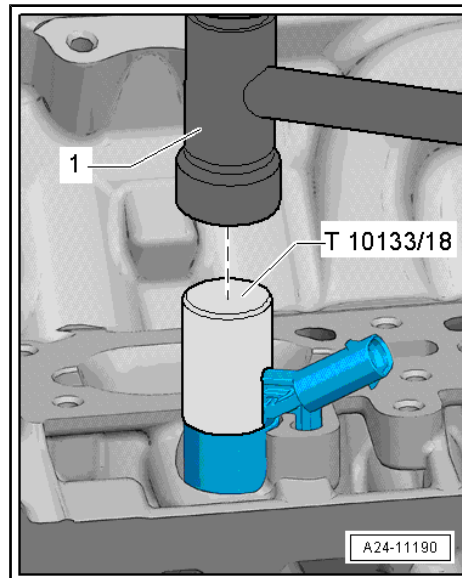


- Gently apply a few knocks to the impact sleeve to loosen the injector.



**Note**

- ◆ Use a torque wrench to pull out the injector.
- ◆ Set 5 Nm on the torque wrench.

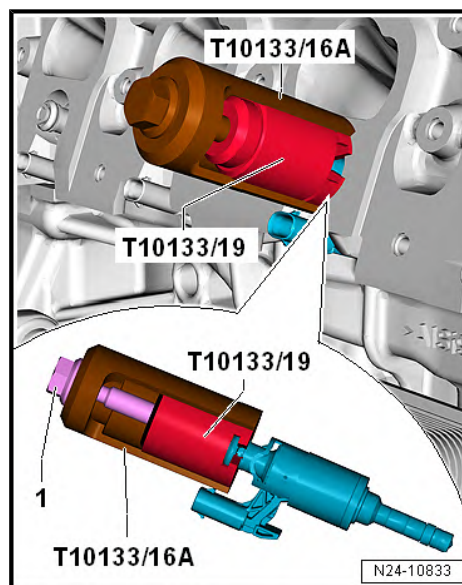


- Position extractor -T10133/19- at the groove on the injector.
- Position removal tool -T10133/16 A- on extractor.
- Pull the injector out by screwing in the screw -1-.
- If the limit torque of »5 Nm« has been reached without the injector becoming loose, the extraction tool must be removed again. Work on injector again using impact sleeve -T10133/18-.
- Repeat the procedure for each injector.



**Note**

- ◆ Failure to observe the torque threatens the destruction of the injector.
- ◆ The combustion chamber sealing ring must always be replaced before the injection valve is pre-installed.
- Remove gasket for intake manifold.



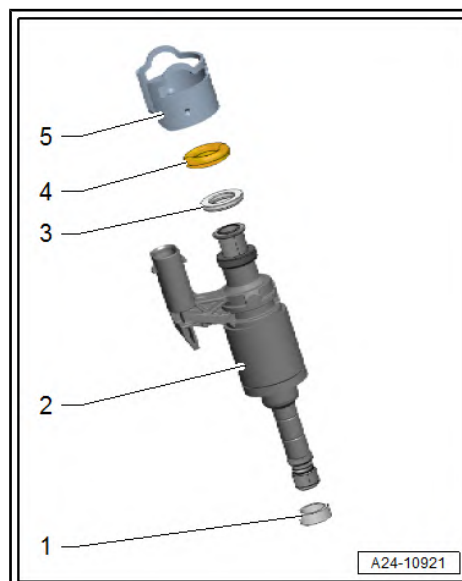
**Disassemble injector:**

- Pull support ring -5- and distance ring -3- off the injector -2-.
- Carefully remove old combustion chamber sealing ring -1-, to do so, cut open to the ring using a knife and remove.



**Note**

Ensure that the injector groove is not damaged. If the groove is damaged the injector must be replaced.



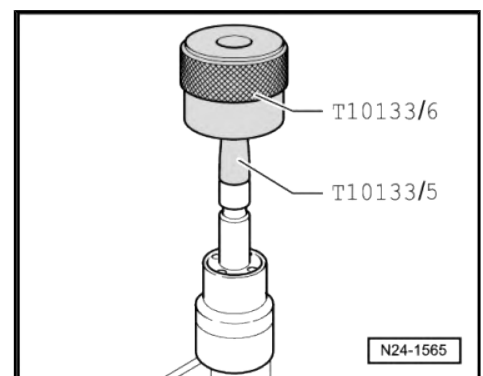
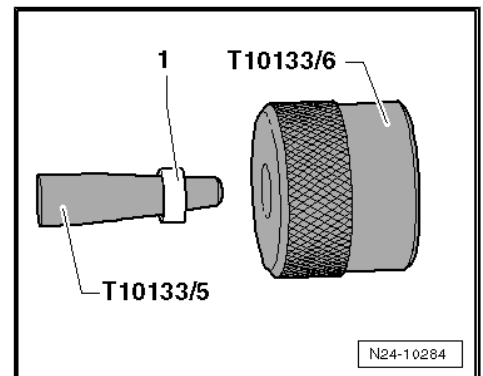
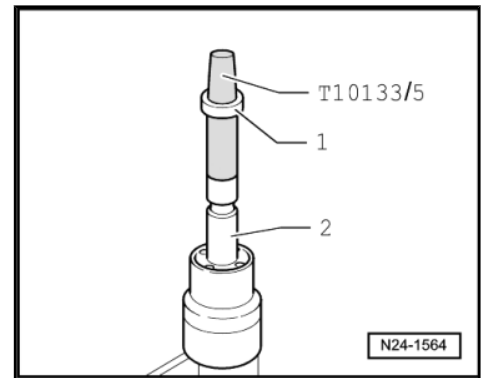
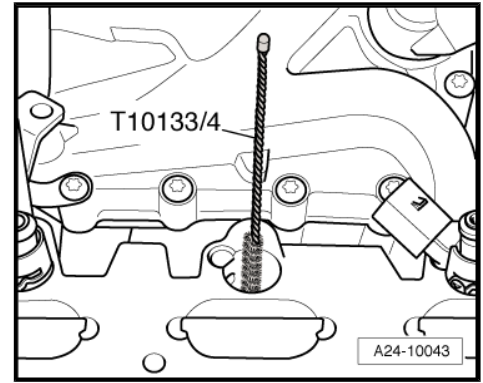
## Install

- Clean hole in the cylinder head using a nylon cylinder brush - T10133/4- .



### Note

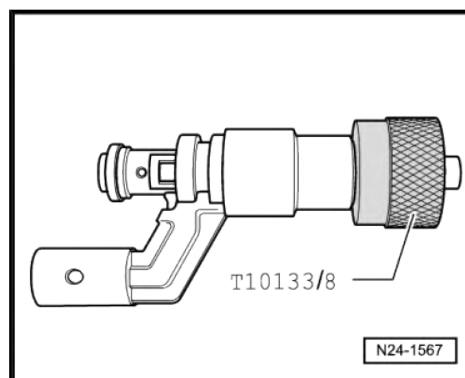
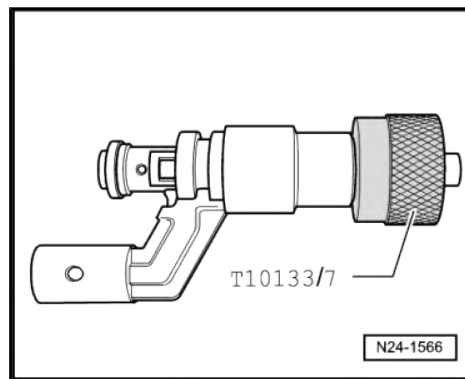
- ◆ *Replace combustion chamber sealing ring and O-ring.*
- ◆ *Replace distance ring if it is damaged.*
- When reinstalling an injector, clean combustion residues from groove for the combustion chamber sealing ring and injector shaft using a clean cloth clean.
- Fit assembly cone -T10133/5- with the new combustion chamber sealing ring -1- onto the injector -2-.
- Push combustion chamber sealing ring with assembly sleeve -T10133/6- as far as possible onto the assembly cone -T10133/5- .
- Turn assembly sleeve -T10133/6- , push combustion chamber sealing ring into the sealing ring groove.



**Note**

*When sliding on the injector the combustion chamber sealing ring is widened. It must therefore be reduced in width again in two steps, as described below.*

- Press calibrating sleeve -T10133/7- with a gentle rotary movement (approximately 180°) up to the stop on the injector.
- Turn calibrating sleeve -T10133/7- off again in the opposite direction.
- Press calibrating sleeve -T10133/8- with a gentle rotary movement (approximately 180°) up to the stop on the injector.
- Turn calibrating sleeve -T10133/8- off again in the opposite direction.



- Pull support ring -5- and distance ring -3- onto the injector -2-.
- Before installing injector -2-, moisten new O-ring -4- with clean engine oil.



#### Note

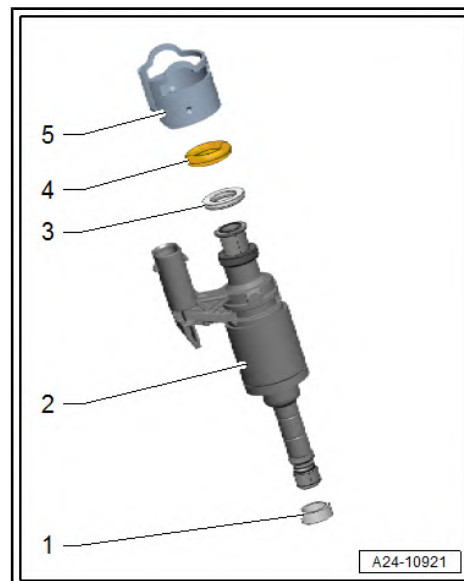
*The combustion chamber sealing ring -1- must not be oiled.*

- Press the injection valves by hand up to the stop into the hole of the cylinder head (free of oil and grease). Pay attention to the correct position of the injection valves in the cylinder head.



#### Note

- ◆ *The injectors must fit easily. If necessary, wait until the width of the combustion chamber sealing ring has reduced sufficiently.*
- ◆ *Pay attention to the correct seating and fitting position of the injection valves in the cylinder head.*
- The electrical connection of the injector must reach into the recess provided in the cylinder head.
- Install fuel distributor  
⇒ [“4.2 Removing and installing the fuel distributor”, page 249](#) .
- Installing the intake manifold  
⇒ [“3.2 Removing and installing intake manifold”, page 241](#) .
- Connect vehicle diagnosis tester and perform Targeted Function “delete injector adaption values” ⇒ Vehicle diagnostic tester.
- Switch off ignition.



## 4.4 Clean injection valves

### Special tools and workshop equipment required

- ◆ Ultrasonic cleaning device - VAS 6418-
- ◆ Feeder plate for injection units - VAS 6418/1-
- ◆ Cleaning fluid ⇒ Electronic Catalogue of Original Parts“ETKA”



#### Note

- ◆ *The ultrasound device must be filled with cleaning agent up to the top edge of the holes.*
- ◆ *Observe the safety and operating instructions of the ultrasound device.*



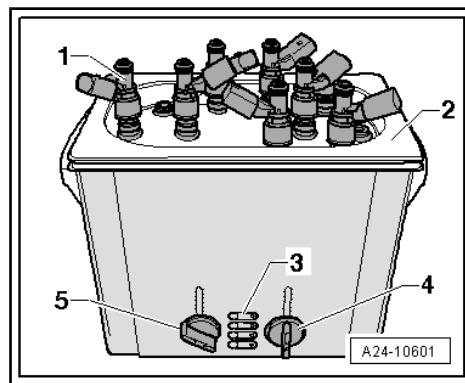
- Remove injection valves  
⇒ ["4.3 Removing and installing injectors", page 250](#) .
- Insert injectors -1- into the feeder plate for injection units - VAS 6418/1- Pos. -2-.
- Immerse injectors with the feeder plate for injection units - VAS 6418/1- into the cleaning fluid - VAS 6418/2- .
- On the rotating head -4-, set a temperature of 50 °C.
- On the rotating head -5-, set a cleaning time of 30 minutes.
- Switch on ultrasound device using the button -3-.



#### Note

*Once the cleaning temperature has reached 50 °C the set time begins to elapse.*

- Replace the combustion chamber sealing ring at each injector after cleaning  
⇒ ["4.3 Removing and installing injectors", page 250](#) .



## 5 Senders and sensors

⇒ [“5.1 Removing and installing intake manifold pressure sender GX9”, page 257](#)

⇒ [“5.2 Removing and installing fuel pressure sender G247”, page 257](#)

⇒ [“5.3 Check fuel pressure sender G247”, page 258](#)

### 5.1 Removing and installing intake manifold pressure sender - GX9-

The charge pressure sender - GX9- consists:

- ◆ Intake air temperature sender 2 - G299-
- ◆ Intake manifold pressure sender - G71-

#### Removing

- Remove air filter housing  
⇒ [“2.2 Removing and installing air filter housing”, page 239](#) .
- Disconnect plug connection -arrow-.
- Unlock locking tabs, remove the manifold pressure sender - GX9- .

#### Install

Installation is carried out in the reverse order. When installing, observe the following:

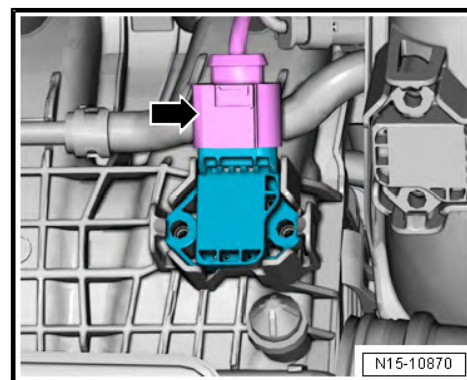


#### Note

- ◆ *Renew O-ring.*
- ◆ *If retaining tabs break during removal, fixing screws can be attached to the sender as a replacement ⇒ Electronic Catalogue of Original Parts “ETKA” .*
- Install air filter housing  
⇒ [“2.2 Removing and installing air filter housing”, page 239](#) .

#### Tightening torque

| Component                              | Nm   |
|----------------------------------------|------|
| Intake manifold pressure sender - GX9- | 3 Nm |



### 5.2 Removing and installing fuel pressure sender - G247-

#### Special tools and workshop equipment required

- ◆ Assembly tool - T10118-
- ◆ Socket insert size 27 - T40218- or commercially available 27 mm socket insert



## Removing

- Separate electrical plug connection -1-.



### Note

*Place a cloth below to absorb leaking fuel.*

- Undo the fuel pressure sender - G247- -2- with the Polydrive socket width across flats 27 - T40218- .

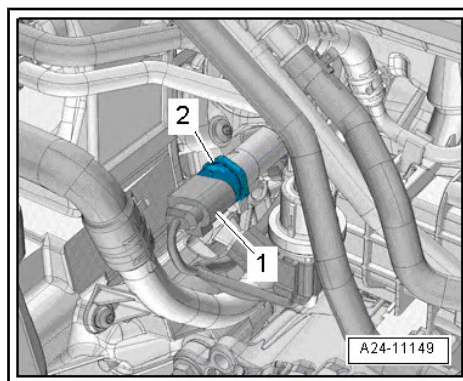
## Install

Installation is carried out in the reverse order. When installing, observe the following:



### Note

*The thread of the fuel pressure sender must not be moistened.*



## Tightening torque

| Component                    | Nm    |
|------------------------------|-------|
| Fuel pressure sender - G247- | 22 Nm |

## 5.3 Check fuel pressure sender - G247-

### Special tools and workshop equipment required

- ♦ Adapter for measuring method/DSO (3-pin) , e.g. -VAS 5570-
- ♦ Testing device for pressure sensor e. g. -VAS 6394-
- ♦ Socket, 27 mm long, commercially available

### Work procedure



### WARNING

*Risk of injury caused by fuel which is under high pressure.*

- ♦ *Before opening the high-pressure system, the fuel pressure must be reduced to residual pressure  
⇒ **"3.10 Reduce pressure in the high-pressure system", page 10**.*



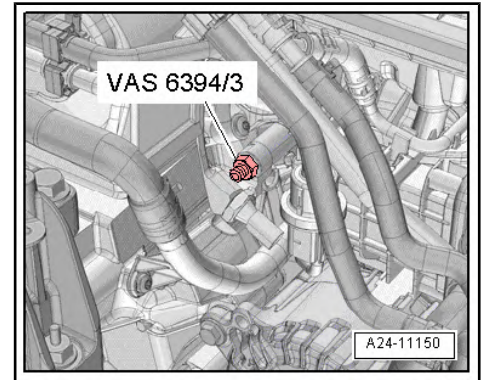
### Caution

*Risk of malfunctions caused by soiling.*

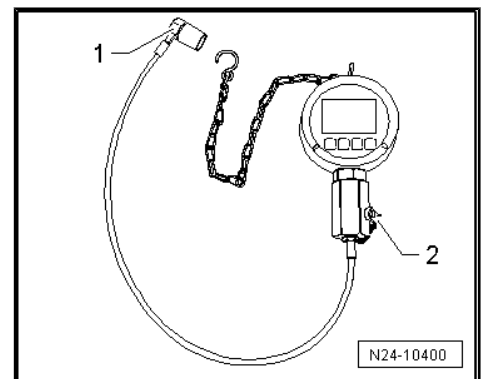
- ♦ *⇒ **"3.1 Rules of cleanliness", page 7***

- Remove fuel pressure sender - G247-  
⇒ **"5.2 Removing and installing fuel pressure sender G247 ", page 257** .

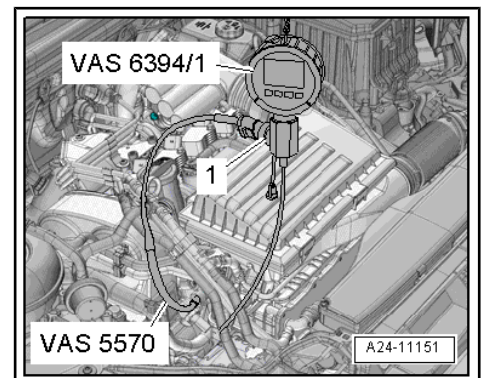
- Moisten the sealing cone of the adapter -VAS 6394/3- with clean engine oil and screw it into the fuel distributor with 22 Nm.



- Release the screw plug -2- and screw the fuel pressure sender - G247- into the tester -VAS 6394/1- .
- Connect the pressure line -1- of the tester onto the adapter - VAS 6394/3- .



- Use the adapter for measuring method/DSO (3-pin) - VAS 5570- to produce the electrical connection between vehicle and fuel pressure sender - G247- .



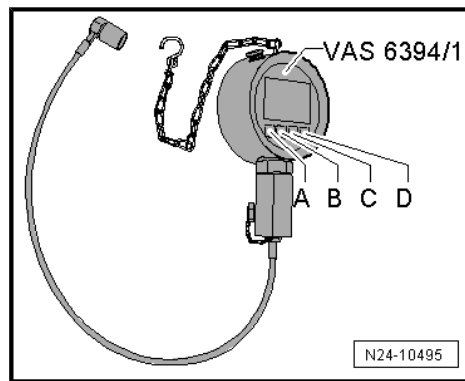


- Switch on the tester -VAS 6394/1- , for this step, briefly press the button -A-.



#### Note

- ◆ *If the button -A- is pressed for 2 seconds, the illumination is switched on for 20 seconds.*
- ◆ *If the tester -VAS 6394/1- does not indicate 0 MPa (0 bar), carry out a zero point of the balance ⇒ operating instructions .*
- Connect vehicle diagnosis tester ⇒ Vehicle diagnostic tester.
- Start engine and run at idling speed.
- Select the “Engine electronics” in the self-diagnosis.
- Then select “measured values”.
- Select “fuel pressure” in the selection list.
- Compare the displayed tester fuel pressure tester -VAS 6394/1- with the actual value displayed at the vehicle diagnosis tester .
- Read fuel pressure on vehicle diagnosis tester.
- The pressures may deviate maximum 0.5 MPa (5 bar) from one another.
- If the deviation is greater than 0.5 MPa (5 bar), replace the fuel pressure sender - G247- .
- Repeat the test with the new fuel pressure sender - G247- and compare both measured values.
- If the measurements now match, install new fuel pressure sender - G247- .
- If the measured values still do not match, test electrical line connection between fuel pressure sender - G247- and engine control unit - J623- ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.



#### Tightening torque

| Component            | Nm    |
|----------------------|-------|
| Fuel pressure sender | 22 Nm |

## 6 High pressure pump

⇒ [“6.1 Summary of components - high pressure pump”, page 261](#)

⇒ [“6.2 Removing and installing the high pressure pump”, page 262](#)

⇒ [“6.3 Removing and installing high pressure pipe”, page 263](#)

### 6.1 Summary of components - high pressure pump

#### 1 - Roller tappet

- ☐ Moisten with engine oil during installation

#### 2 - O-ring

- ☐ replace after removal
- ☐ Moisten with engine oil during installation

#### 3 - High pressure pump

- ☐ with fuel dosage valve - N290-
- ☐ do not disassemble
- ☐ installing and removing  
⇒ [“6.2 Removing and installing the high pressure pump”, page 262](#)

#### 4 - High pressure tube



#### WARNING

*Risk of injury caused by fuel which is under high pressure.  
Before opening the high-pressure system, the fuel pressure must be reduced to residual pressure  
⇒ [“3.10 Reduce pressure in the high-pressure system”, page 10](#).*

- ☐ installing and removing  
⇒ [“6.3 Removing and installing high pressure pipe”, page 263](#)
- ☐ replace if damaged
- ☐ Connections must not be damaged
- ☐ Moisten thread of the union nuts with clean engine oil
- ☐ 25 Nm

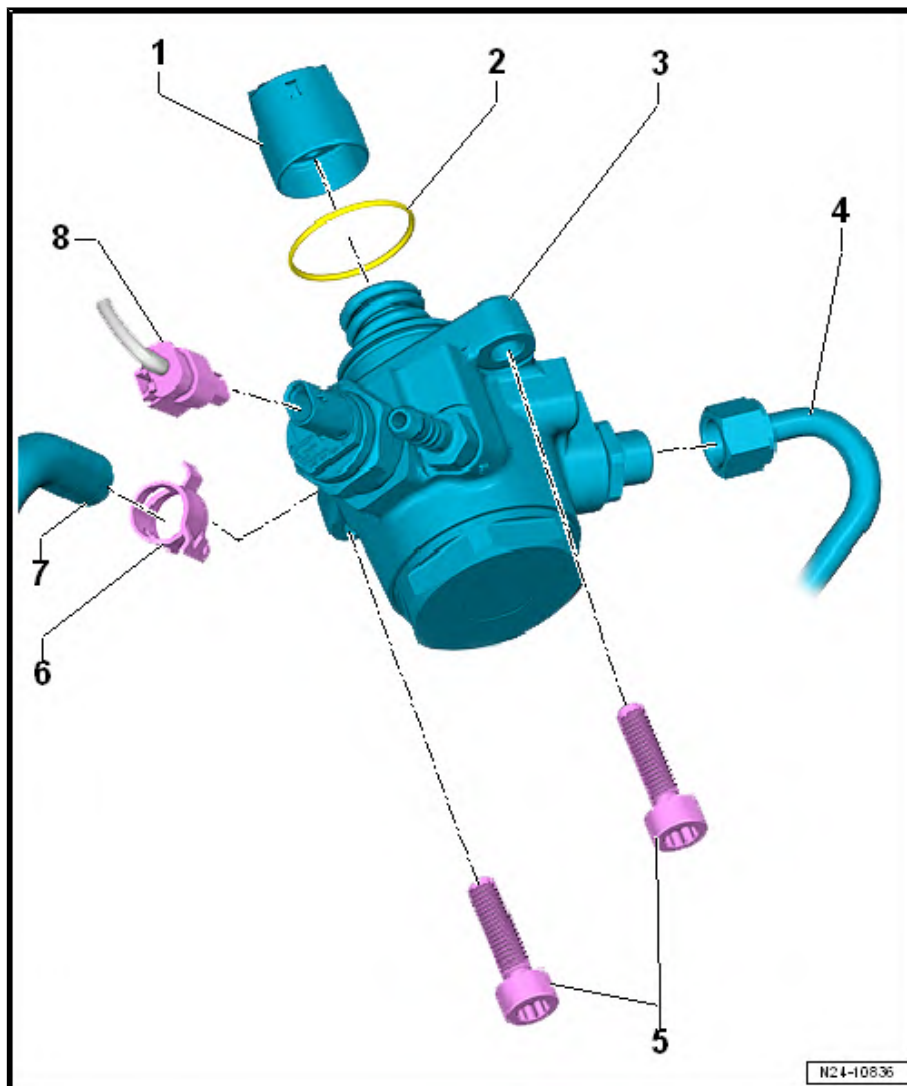
#### 5 - Bolt

- ☐ replace after removal
- ☐ Tightening torque and tightening order ⇒ [page 263](#)

#### 6 - Hose clamp

#### 7 - Fuel feed line

#### 8 - Electrical plug connection





## 6.2 Removing and installing the high pressure pump

### Removing

- Engine cold.



#### WARNING

*Risk of injury caused by fuel which is under high pressure.*

- ◆ *Before opening the high-pressure system, the fuel pressure must be reduced to residual pressure  
⇒ **"3.10 Reduce pressure in the high-pressure system", page 10.***



#### Caution

*Risk of malfunctions caused by soiling.*

- ◆ ⇒ **"3.1 Rules of cleanliness", page 7**

- Remove high pressure pipe  
⇒ **"6.3 Removing and installing high pressure pipe", page 263.**
- Separate electrical plug connection -1-.



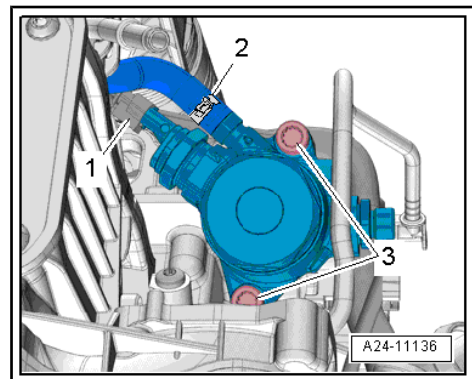
#### Note

*Place a cloth below to absorb leaking fuel.*

- Loosen hose clamp -2- and remove fuel intake hose.
- Unscrew screws -3- and remove high pressure pump with roller tappet.

### Install

- Inspect roller tappet for damage, if necessary replace.
- Moisten roller tappet -1- with clean engine oil.



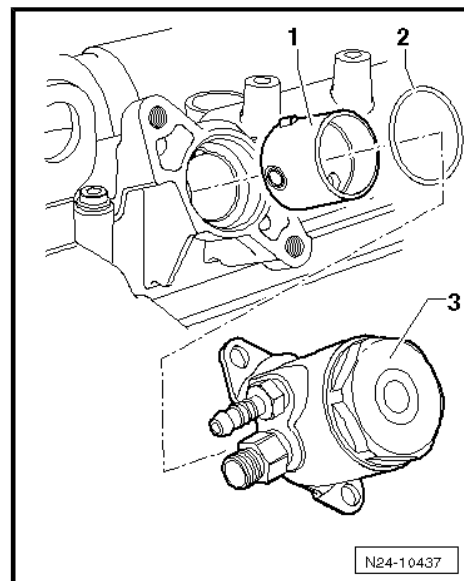
- Insert the oiled roller tappet -1- into the camshaft housing.



#### Note

*Renew O-ring.*

- Turn crankshaft in direction of engine rotation until the roller tappet is at the lowest point.
- Insert a new, oiled O-ring -2- into the slot of the high pressure pump -3-.

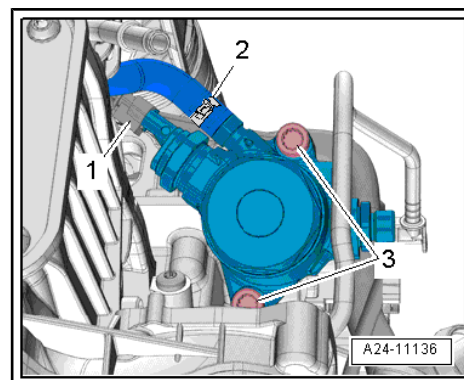


#### High pressure pump - tightening torque and tightening order

To prevent the flange of the high pressure pump from becoming deformed during installation, attach high pressure pump as follows:

- Tighten screws in steps as follows:

| Stage | Bolts | Tightening torque/torque angle                                                                      |
|-------|-------|-----------------------------------------------------------------------------------------------------|
| 1st   | -3-   | by hand as far as the stop                                                                          |
| 2nd   | -3-   | Tighten by 1 turn alternately until the flange of the high pressure pump is at the camshaft housing |
| 3rd   | -3-   | 20 Nm                                                                                               |
| 4th   | -3-   | 90° (torque a further 90° (1/4 turn))                                                               |



- Check fuel system for leak tightness.

## 6.3 Removing and installing high pressure pipe

### Removing

- Remove throttle valve module - GX3-  
⇒ [“3.3 Removing and installing the throttle valve control unit GX3”, page 244](#).



#### WARNING

*Risk of injury caused by fuel which is under high pressure.*

- ◆ *Before opening the high-pressure system, the fuel pressure must be reduced to residual pressure*  
⇒ [“3.10 Reduce pressure in the high-pressure system”, page 10](#).



### Caution

*Risk of malfunctions caused by soiling.*

◆ ⇒ **"3.1 Rules of cleanliness", page 7**



### Note

*Place a cloth below to absorb leaking fuel.*

- Unscrew union nuts -arrows- and remove high pressure line.

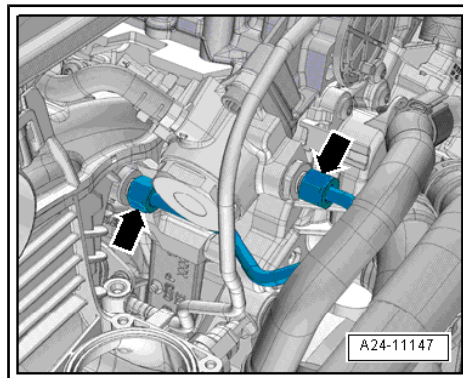
### Install

Installation is carried out in the reverse order. When installing, observe the following:

- Moisten thread of union nuts with clean engine oil.
- Hand-tighten union nuts for high pressure pipe, ensure that the fit is tension-free.
- Tighten union nuts.
- Install throttle valve module - GX3-  
⇒ **"3.3 Removing and installing the throttle valve control unit GX3", page 244** .

### Tightening torques

| Component | Nm    |
|-----------|-------|
| Union nut | 25 Nm |



## 7 Lambda probe

⇒ [“7.1 Summary of components - lambda probe”, page 265](#)

⇒ [“7.2 Removing and installing lambda probe GX10 / GX7”, page 266](#)

### 7.1 Summary of components - lambda probe



#### Note

- ◆ *New lambda probes are coated with assembly paste. This paste must not come into contact with the slots of the lambda probe body.*
- ◆ *For a re-used lambda probe, only coat the thread with hot bolt paste. This paste must not come into contact with the slots of the lambda probe body. Hot bolt paste ⇒ Electronic Catalogue of Original Parts“ETKA”*
- ◆ *The electrical cable wire connection of the lambda probe must be secured again at the same points during installation. Contact between the electrical cable connection and the exhaust pipe must be prevented.*

#### 1 - Lambda probe 1 after catalytic converter - GX7-

- ☐ comprises:

Lambda probe after catalytic converter - G130-

Lambda probe heater 1 after catalytic converter - Z29-

- ☐ installing and removing  
⇒ [“7.2 Removing and installing lambda probe GX10 / GX7”, page 266](#)

- ☐ 55 Nm

#### 2 - Connector

- ☐ for lambda probe 1 downstream of catalytic converter - GX7-

#### 3 - Connector

- ☐ for lambda probe 1 upstream of catalytic converter - GX10-

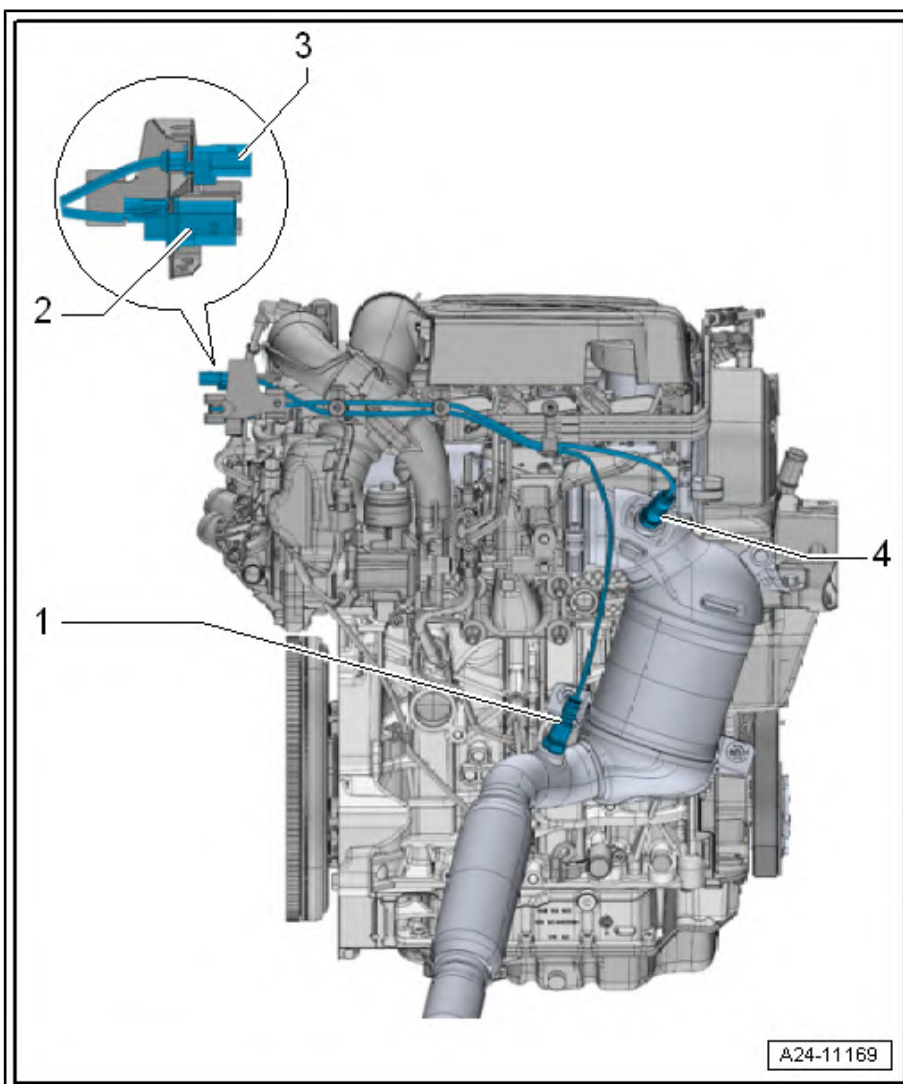
#### 4 - Lambda probe 1 in front of the catalytic converter - GX10-

- ☐ comprises:

Lambda probe - G39-

Lambda probe heater - Z19-

- ☐ installing and removing  
⇒ [“7.2 Removing and installing lambda probe](#)



A24-11169



GX10 / GX7 ", page 266

□ 55 Nm

## 7.2 Removing and installing lambda probe - GX10- / -GX7-

The Lambda probe 1 in front of catalytic converter - GX10- comprises:

- ◆ Lambda probe - G39-
- ◆ Lambda probe heater - Z19-

The Lambda probe 1 downstream of catalytic converter - GX7- comprises:

- ◆ Lambda probe after catalytic converter - G130-
- ◆ Lambda probe heater 1 after catalytic converter - Z29-

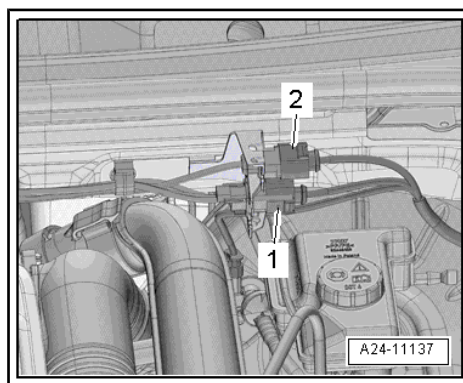
### Special tools and workshop equipment required

- ◆ Lambda probe open ring spanner set - 3337-

### Removing

– Disconnect electrical plug connections:

- 1 - for lambda probe 1 upstream of catalytic converter - GX10-
- 2 - for lambda probe 1 downstream of catalytic converter - GX7-



- Unscrew respective lambda probe using a spanner from the lambda probe ring spanner set - 3337- .

1 - Lambda probe 1 after catalytic converter - GX7-

2 - Lambda probe 1 in front of the catalytic converter - GX10-

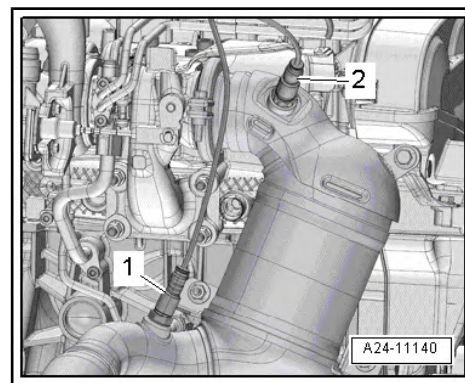
#### Install

Installation is carried out in the reverse order. When installing, observe the following:



#### Note

- ◆ *New lambda probes are coated with assembly paste. This paste must not come into contact with the slots of the lambda probe body.*
- ◆ *For a re-used lambda probe, only coat the thread with hot bolt paste. This paste must not come into contact with the slots of the lambda probe body. Hot bolt paste ⇒ Electronic Catalogue of Original Parts "ETKA"*
- ◆ *The electrical cable wire connection of the lambda probe must be secured again at the same points during installation. Contact between the electrical cable connection and the exhaust pipe must be prevented.*



#### Tightening torque

| Component                                                  | Nm    |
|------------------------------------------------------------|-------|
| Lambda probe 1 after catalytic converter - GX7-            | 55 Nm |
| Lambda probe 1 in front of the catalytic converter - GX10- | 55 Nm |



## 8 Engine control unit

⇒ **"8.1 Removing and installing engine control unit J623 without protective housing", page 268**

⇒ **"8.2 Removing and installing engine control unit J623 , engine control unit with protective housing", page 268**

### 8.1 Removing and installing engine control unit - J623- without protective housing

#### Removing



#### Note

*If the engine control unit is replaced, the vehicle diagnosis tester must be connected ⇒ Vehicle diagnostic tester and the function "replace engine control unit" must be carried out.*



#### Caution

***If the engine control unit touches the plus pole of the battery, this will destroy it.***

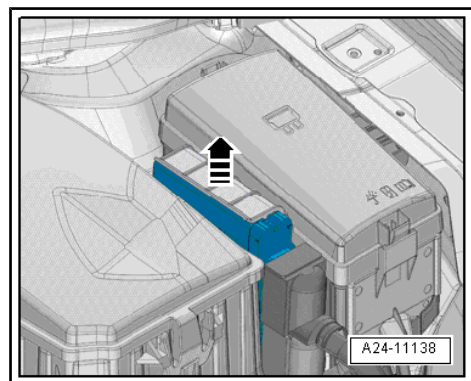
- Unlock the catch in -direction of the arrow- and remove the engine control unit -1-.
- Unlock plug connections for engine control unit - J623- and pull off.

#### Install

Installation is performed in a similar way in the reverse order. Pay attention to the following points:

**After installing a new engine control unit, the following work step must be performed:**

- Connect vehicle diagnosis tester ⇒ Vehicle diagnostic tester.
- Activate the engine control unit in operating mode "Software version management" or "Targeted functions" under [Replace engine control unit].



### 8.2 Removing and installing engine control unit - J623- , engine control unit with protective housing

#### Removing

#### Special tools and workshop equipment required

- ♦ Hot air blowers - VAS 1978/14A- with push-on nozzle from the wiring harness repair set - VAS 1978 B-
- ♦ commercially available miniature grinder

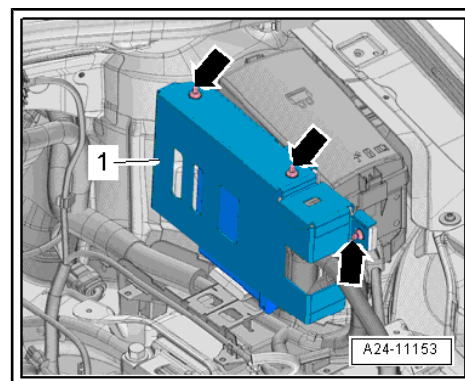
## Removing



### Note

*If the engine control unit is replaced, the vehicle diagnosis tester must be connected ➔ Vehicle diagnostic tester and the function "replace engine control unit" must be carried out.*

Unscrew shear bolts -arrows- to remove the protective housing -1- as follows:

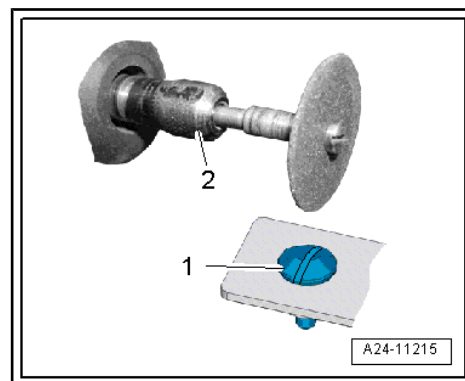


- In the shear bolt head -1-, using a miniature grinder -2-, make a slot for a screwdriver.



### Note

- ◆ *The threads of the pull-off screws are equipped with safety agent. Warming the pull-off screw when grinding a slot for a screwdriver makes it easier to undo it afterwards.*
- ◆ *If the pull-off screws still cannot be undone, warm the, up with a hot air blower.*



Undoing pull-off screws with a hot air blower:

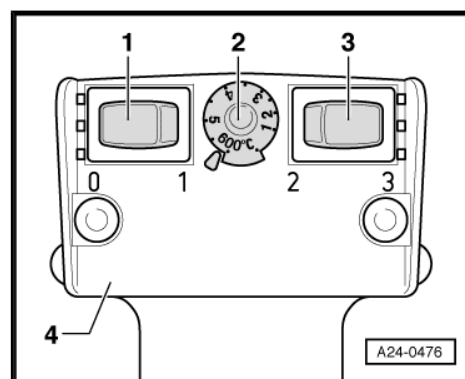
- Set the temperature adjustment potentiometer -2- to maximum heating performance and set the air flow two stage switch -3- to position 3.



### WARNING

*Risk of burns from hot air blower.*

- ◆ *Only warm up the pull-off screws with a hot air blower.*
- ◆ *By warming the pull-off screws, the cover plate and parts in its vicinity are heated up strongly too. Where necessary, protect these parts by a piece of sheet covering.*





- Heat the shear bolt head -1- for approximately 20 to 30 seconds.

Continued for slackened screws:

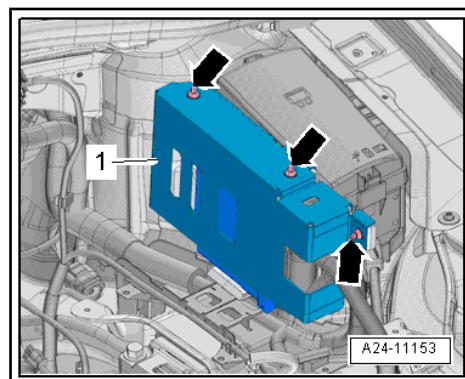
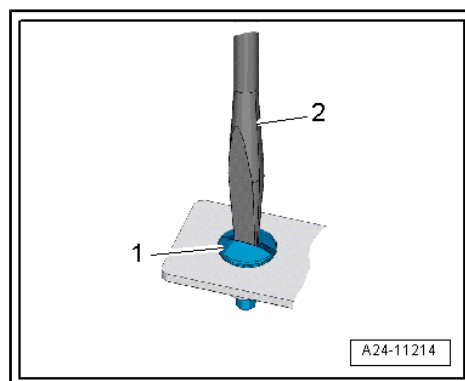
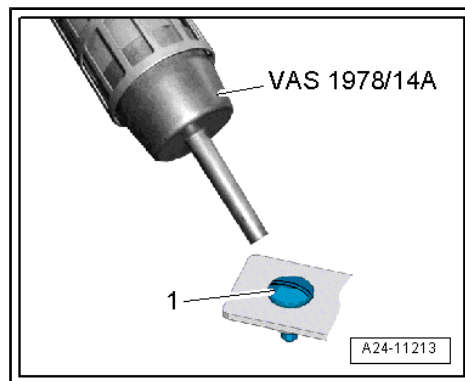
- Release shear bolt -1- using the screwdriver -2-.

- Remove protective housing -1-.



#### Caution

*If the engine control unit touches the plus pole of the battery, this will destroy it.*



- Unlock the catch in -direction of the arrow- and remove the engine control unit -1-.
- Unlock plug connections for engine control unit - J623- and pull off.

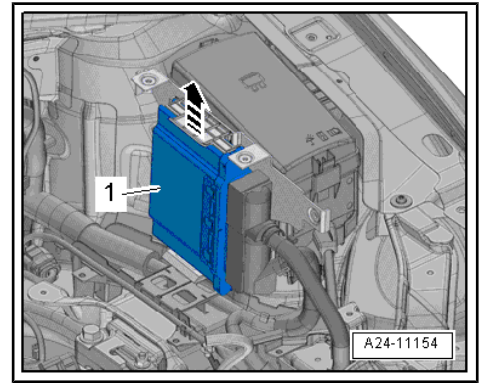
#### Install

Installation is carried out in the reverse order. When installing, observe the following:

- It is imperative for the protective housing to be put back in place on the engine control unit - J623- .
- Clean the threaded holes for the shear bolts to remove safety agent residues. Cleaning can be done using a taper.
- Use new shear bolts.

**After installing a new engine control unit, the following work step must be performed:**

- Connect vehicle diagnosis tester ⇒ Vehicle diagnostic tester.
- Activate the engine control unit in operating mode “Software version management” or “Targeted functions” under Replace engine control unit.





## 26 – Exhaust system

### 1 Removing and installing exhaust system

⇒ [“1.1 Catalytic converter and component parts - Summary of components”, page 272](#)

⇒ [“1.2 Middle and rear silencer - Summary of components”, page 274](#)

⇒ [“1.3 Removing and installing catalytic converter with pre-exhaust pipe”, page 275](#)

⇒ [“1.4 Removing and installing or replacing the middle and rear silencer”, page 277](#)

⇒ [“1.5 Aligning exhaust system free of stress”, page 279](#)

⇒ [“1.6 Align exhaust tailpipe”, page 279](#)

⇒ [“1.7 Inspecting the exhaust system for leak tightness”, page 280](#)

#### 1.1 Catalytic converter and component parts - Summary of components

##### 1 - Bolt

- ☐ 20 Nm

##### 2 - Support

- ☐ replace if damaged

##### 3 - Nut

- ☐ Tightening torque and tightening order  
⇒ [page 277](#)

##### 4 - Bolt

- ☐ 20 Nm

##### 5 - Nut

- ☐ Tightening torque and tightening order  
⇒ [page 277](#)

##### 6 - Support

##### 7 - Support

##### 8 - Screw

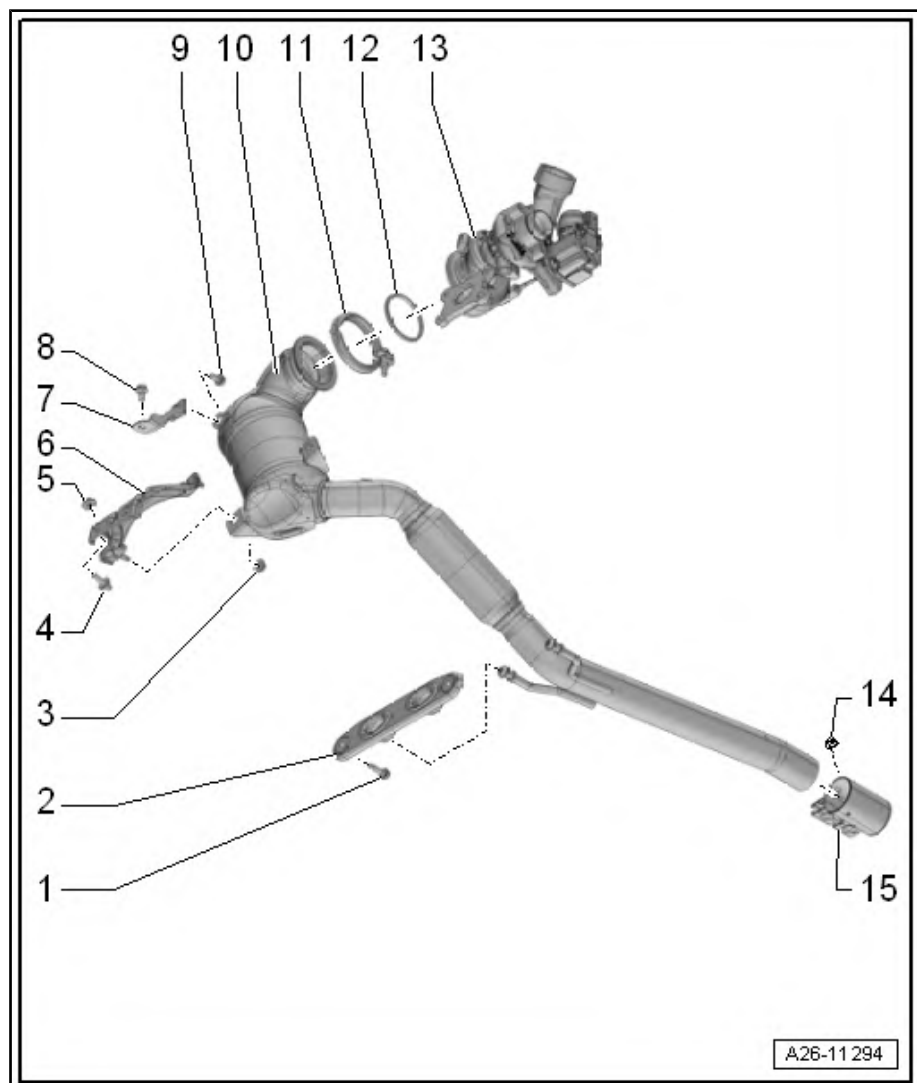
- ☐ Tightening torque and tightening order  
⇒ [page 277](#)

##### 9 - Screw

- ☐ Tightening torque and tightening order  
⇒ [page 277](#)

##### 10 - Exhaust pipe with catalytic converter

- ☐ do not twist decoupling element more than 10° - risk of damage
- ☐ Do not load decoupler with tensile stress



- ☐ Do not damage wire mesh on decoupling element
- ☐ protect catalytic converter against shocks and blows
- ☐ installing and removing  
⇒ [“1.3 Removing and installing catalytic converter with pre-exhaust pipe”, page 275](#)
- ☐ Remove the protection for the decoupling element on the spare part as late as possible
- ☐ Align exhaust system free of stress ⇒ [“1.5 Aligning exhaust system free of stress”, page 279](#)

#### 11 - Screw clamp

- ☐ Tightening torque and tightening order ⇒ [page 277](#)

#### 12 - Gasket

- ☐ replace after removal

#### 13 - Exhaust gas turbocharger

- ☐ installing and removing ⇒ [“1.2 Removing and installing exhaust gas turbocharger”, page 223](#)
- ☐ Tightening torque and tightening order  
⇒ [“1.1 Summary of components - exhaust gas turbocharger ”, page 221](#)

#### 14 - Nut

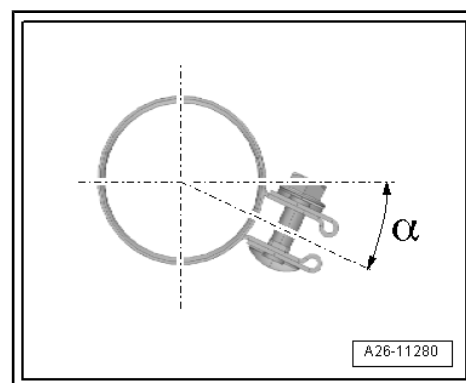
- ☐ 30 Nm

#### 15 - Clamping sleeve

- ☐ before tightening, align exhaust system free of stress  
⇒ [“1.5 Aligning exhaust system free of stress”, page 279](#)
- ☐ Fitting position ⇒ [page 273](#)
- ☐ Tighten screwed connections uniformly

#### Installation position of front clamp

- Install clamping sleeve in the position shown.
- Angle  $\alpha$  = approximately  $20^\circ$ .
- Bolted connection to the right.
- Nuts upwards.





## 1.2 Middle and rear silencer - Summary of components

### 1 - Retaining strap

- ☐ replace if damaged

### 2 - Hanger

- ☐ replace if damaged

### 3 - Rear silencer

- ☐ for first equipment building unit with middle silencer
- ☐ Replace individually when carrying out repairs
- ☐ installing and removing  
⇒ ["1.4 Removing and installing or replacing the middle and rear silencer", page 277](#)
- ☐ Separating exhaust pipes, silencers  
⇒ ["1.4 Removing and installing or replacing the middle and rear silencer", page 277](#)
- ☐ Align exhaust system free of stress  
⇒ ["1.5 Aligning exhaust system free of stress", page 279](#)

### 4 - Bolt

- ☐ 20 Nm

### 5 - Hanger

- ☐ replace if damaged

### 6 - Retaining strap

- ☐ replace if damaged

### 7 - The middle silencer

- ☐ for first equipment building unit with rear silencer
- ☐ Replace individually when carrying out repairs
- ☐ installing and removing  
⇒ ["1.4 Removing and installing or replacing the middle and rear silencer", page 277](#)
- ☐ Separating exhaust pipes, silencers  
⇒ ["1.4 Removing and installing or replacing the middle and rear silencer", page 277](#)
- ☐ Align exhaust system free of stress ⇒ ["1.5 Aligning exhaust system free of stress", page 279](#)

### 8 - Clamping sleeve

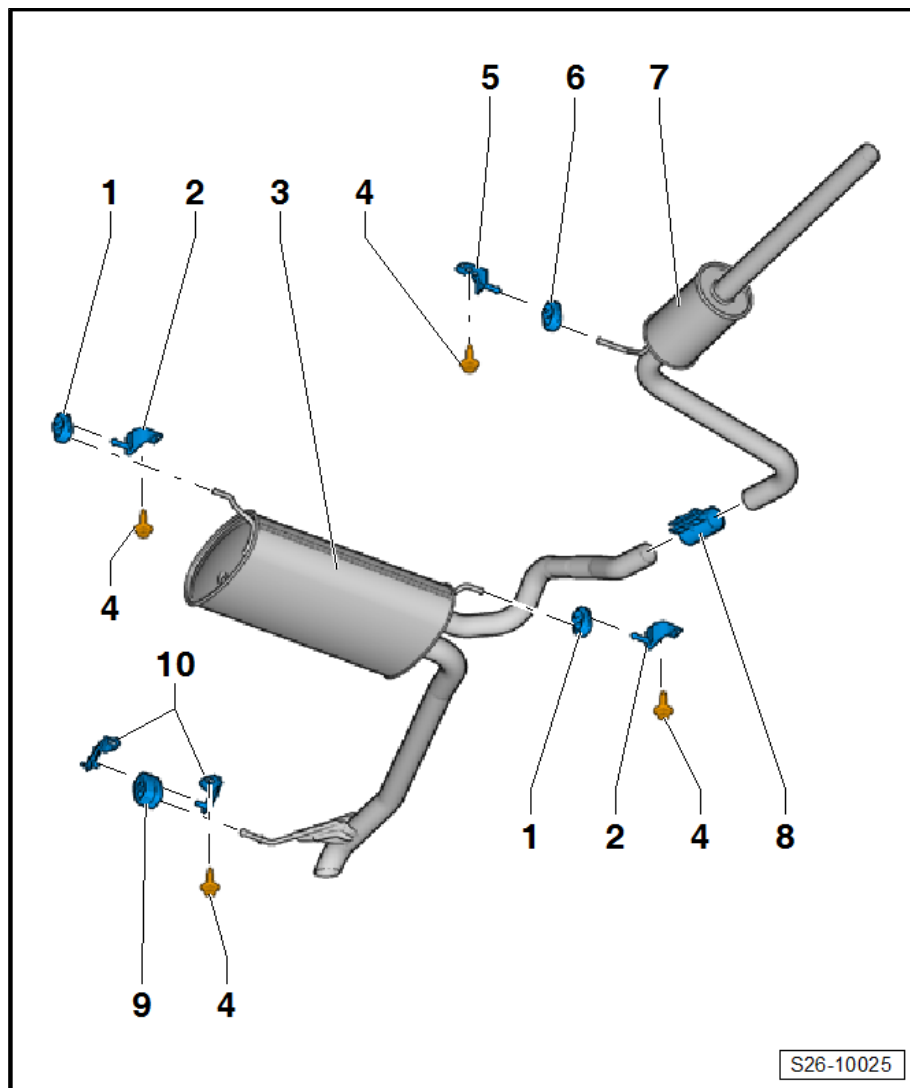
- ☐ before tightening, align exhaust system free of stress  
⇒ ["1.5 Aligning exhaust system free of stress", page 279](#)
- ☐ Fitting position ⇒ [page 275](#)
- ☐ Tighten screwed connections uniformly

### 9 - Retaining strap

- ☐ replace if damaged

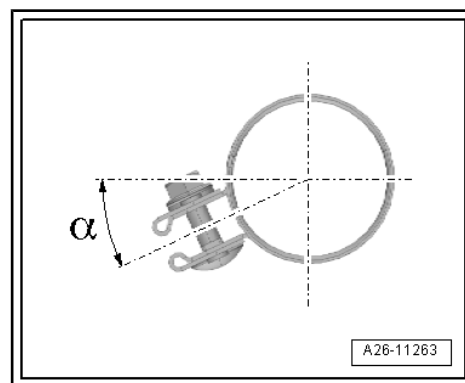
### 10 - Hanger

- ☐ replace if damaged



### Installation position of rear clamp

- Install clamping sleeve in the position shown.
- Angle  $\alpha$  = approximately  $20^\circ$ .
- Nuts upwards.
- 30 Nm



## 1.3 Removing and installing catalytic converter with pre-exhaust pipe

### Special tools and workshop equipment required

- ◆ Transport security - T10403-
- ◆ Hot bolt paste ⇒ Electronic Catalogue of Original Parts“ETKA”



#### Note

*The catalytic converter is removed with the pre-exhaust pipe.*

### Removing



#### Note

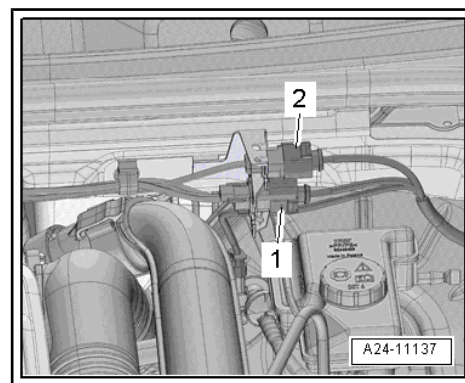
*All cable straps should be fastened again in the same place when installing.*

- Take electrical plug connections -1- and -2- out of the holder, disconnect and expose electric cables.

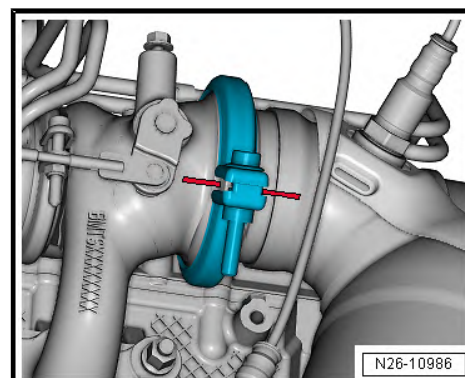


#### Note

- ◆ *Before undoing the coupling point between catalytic converter and turbocharger, make the position of the clamp ⇒ [page 275](#) !*
- ◆ *Mark the part opposite the part to be replaced.*
- ◆ *Re-establish the position of the clamp when assembling.*

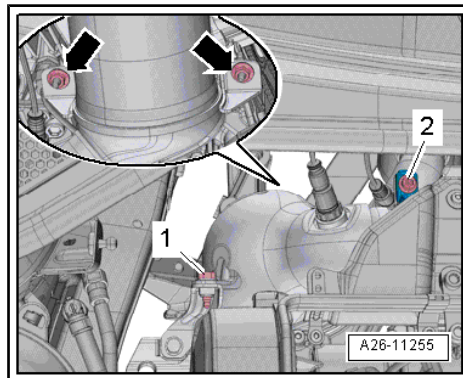


### Position of the clamp

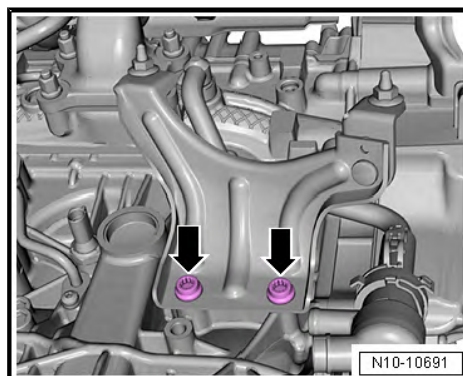




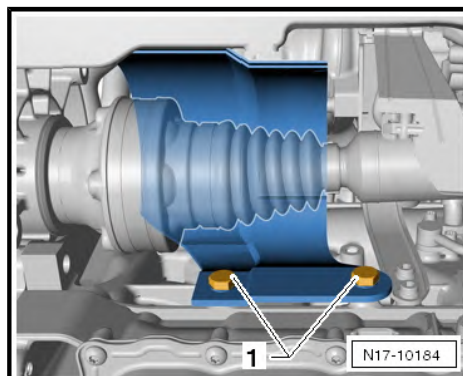
- Unscrew screw -2- and remove screw clamp.
- Unscrew screws -1- and nuts -arrows-.



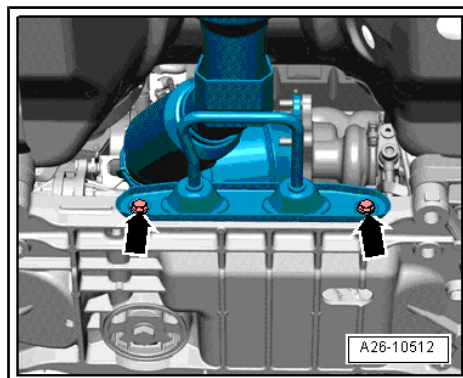
- Release screws -arrows- of the holder.
- Remove the tunnel bridge ⇒ Body Work - Assembly work; Rep. gr. 50 .



- Release screws -1- and remove heat shield for right drive shaft, if present.
- Remove plastic cover for floor tunnel ⇒ Body Work; Rep. gr. 50 .



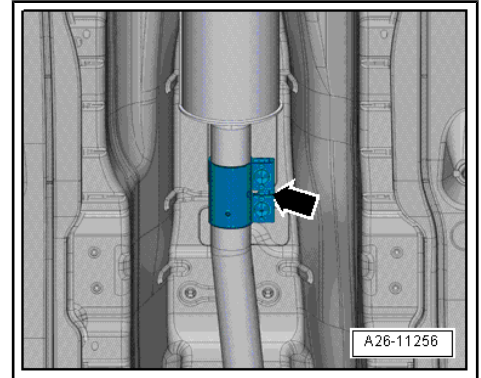
- Remove bolts -arrows-.
- Remove electrical plug connection from holder, disconnect and expose lambda probe electric cable.



- Loosen the clamping sleeve -arrow- and slide it backwards.
- Remove catalytic converter backwards.

**Note**

- ◆ *The decoupling element in the pre-exhaust pipe should not be bent by more than 10° - risk of damage.*
- ◆ *Do not bend the decoupling element by pulling it.*
- ◆ *Do not damage the wire mesh of the decoupling element.*
- ◆ *Secure the decoupling element with the transport security - T10403- against over-tensioning.*



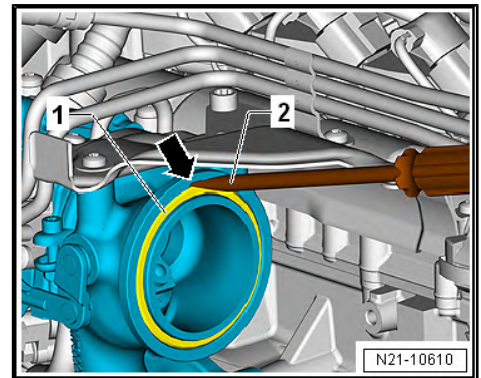
- Push screwdriver -2- into the recess -arrow- of the exhaust gas turbocharger and lever out the sealing ring -1-.

**Install**

Installation is carried out in the reverse order. When installing, observe the following:

**Note**

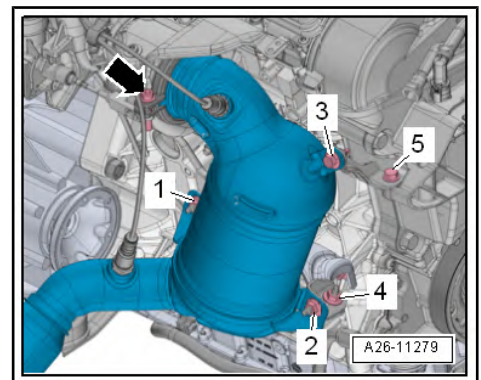
- ◆ *Replace the gasket and the self-locking nuts.*
- ◆ *Coat pin bolts and screws of the catalytic converter with hot bolt paste ⇒ Electronic Catalogue of Original Parts "ETKA".*



- Align exhaust system free of stress  
⇒ ["1.5 Aligning exhaust system free of stress", page 279](#) .

**Installing catalytic converter - tightening torque and tightening order**

|     |                                                                                           |                                                                             |
|-----|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1st | – Position catalytic converter on exhaust gas turbocharger, loosely tighten clamp -arrow- |                                                                             |
| 2nd | – Loosely screw in screws -3-, -5- and nuts -1-, -2-, -4- by hand                         | • It must still be possible to move the catalytic converter and the bracket |
| 3rd | – Tighten screw clamp -arrow-                                                             | 15 Nm                                                                       |
| 4th | – Tighten screws and nuts in the order -1...5-                                            | 20 Nm                                                                       |



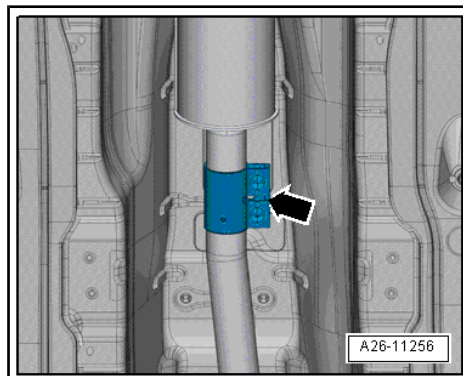
## 1.4 Removing and installing or replacing the middle and rear silencer

**Special tools and workshop equipment required**

- ◆ Body saw e.g. -V.A.G 1523 A-
- ◆ Protective goggles
- The rear axle is not removed when replacing the middle or rear silencer.
- For individually replacing the middle silencer, a coupling point is provided in the connecting pipe.
- The coupling point is marked by indentation on the circumference of the exhaust pipe.



- When present, remove the underbody rear left trim panel ⇒ Body Work- Assembly work; Rep. gr. 66 .
- Remove the rear tunnel bridge ⇒ Body Work - Assembly work; Rep. gr. 66 .
- Loosen the clamping sleeve -arrow- and slide it forwards.



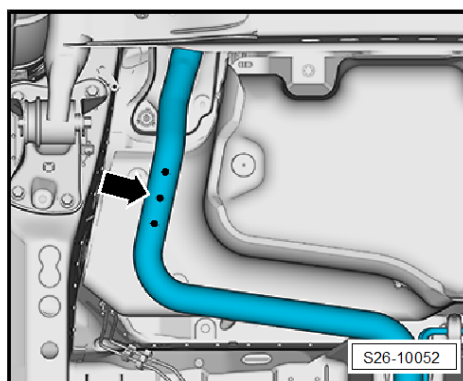
- Separate exhaust pipe at the separation point-arrow- with body saw (right-angled).



### WARNING

*Risk of accident from silencer weight.*

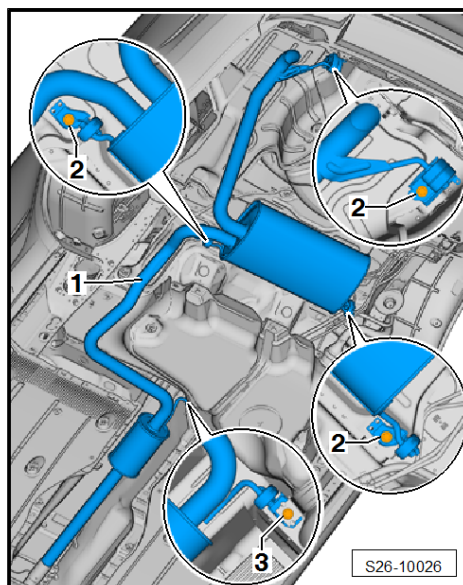
♦ *A second mechanic is required for removing the silencer.*



- Remove screws -2- and take out rear silencer -1-.
- Remove screw -3- and remove the middle silencer -1-.

### Install

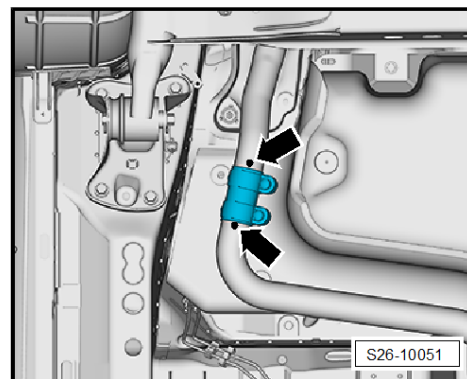
Installation is performed in a similar way in the reverse order. Pay attention to the following points:



- Position clamping sleeve centrally to the side markers during installation -arrows-.
- Install rear clamping sleeve ⇒ [page 275](#)
- Installing front clamping sleeve ⇒ [page 273](#)
- Align exhaust system in cold condition free of stress  
⇒ [“1.5 Aligning exhaust system free of stress”, page 279](#) .

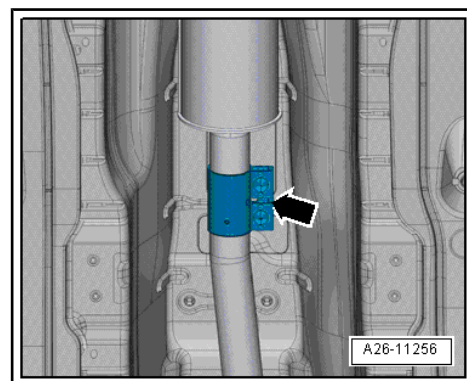
#### Tightening torques

- ◆ ⇒ [“1.2 Middle and rear silencer - Summary of components”, page 274](#)
- ◆ ⇒ [“1.1 Catalytic converter and component parts - Summary of components”, page 272](#)
- ◆ Remove the tunnel bridge and underbody cover ⇒ Body Work; Rep. gr. 66



## 1.5 Aligning exhaust system free of stress

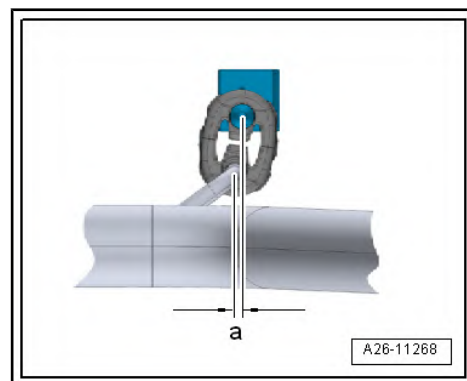
- The exhaust system is aligned when cold.
- Loosen bolted connections of clamping sleeve -arrow-.



- Push the rear silencer so far forward until the pre-tensioning on the retaining strap on the exhaust pipe is -a- = 5 mm.
- Installing the clamping sleeve ⇒ [page 273](#) .

#### Tightening torques

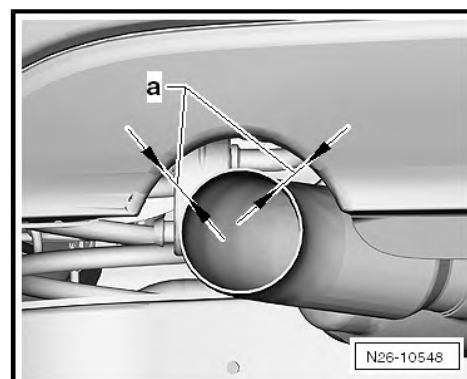
- ◆ ⇒ [“1.1 Catalytic converter and component parts - Summary of components”, page 272](#)



## 1.6 Align exhaust tailpipe

#### Work procedure

- Align rear silencer in such a way that there is an equal distance -a- between bumper opening and exhaust tailpipe.
- For centring the exhaust tailpipes, loosen the suspension of the rear silencer.





## 1.7 Inspecting the exhaust system for leak tightness

### Work procedure

- Start engine and run at idling speed.
- Close off exhaust tailpipes for the duration of the leak test, using cloths or plugs.
- Check connection points for leak tightness by listening: exhaust manifold at cylinder head, exhaust gas turbocharger at pre-exhaust pipe, etc.
- Eliminate any leak found.

## 28 – Ignition system

### 1 Ignition system

⇒ [“1.1 Assembly overview - ignition system”, page 281](#)

⇒ [“1.2 Removing and installing ignition coils with output stage”, page 282](#)

⇒ [“1.3 Removing and installing knock sensor 1 G61”, page 283](#)

⇒ [“1.4 Removing and installing Hall sender G40”, page 284](#)

⇒ [“1.5 Removing and installing engine speed sender G28”, page 284](#)

#### 1.1 Assembly overview - ignition system

##### 1 - Bolt

- ☐ the tightening torque influences the knock sensor function
- ☐ 20 Nm

##### 2 - Knock sensor 1 - G61-

- ☐ installing and removing  
⇒ [“1.3 Removing and installing knock sensor 1 G61”, page 283](#)

##### 3 - Spark plug

- ☐ use spark plug wrench e.g. -3122 B- for removing and installing
- ☐ Change interval ⇒ Maintenance ; Booklet Octavia III
- ☐ Observe part number ⇒ Electronic Catalogue of Original Parts “ETKA”
- ☐ 22 Nm

##### 4 - Ignition coil with a power output stage

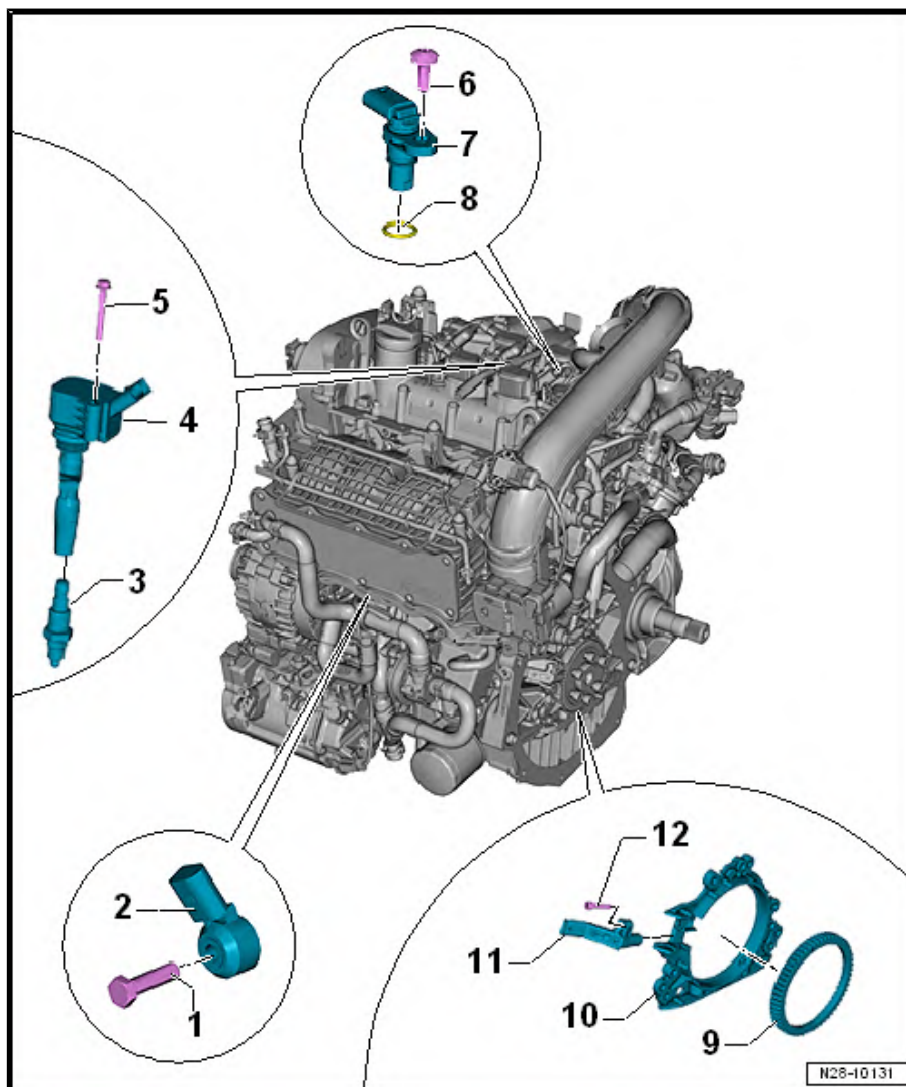
- ◆ Ignition coil 1 with output stage - N70-
- ◆ Ignition coil 2 with output stage - N127-
- ◆ Ignition coil 3 with output stage - N291-
- ◆ Ignition coil 4 with output stage - N292-
- ☐ installing and removing  
⇒ [“1.2 Removing and installing ignition coils with output stage”, page 282](#)

##### 5 - Bolt

- ☐ 8 Nm

##### 6 - Bolt

- ☐ 8 Nm





## 7 - Hall sender - G40-

- ☐ installing and removing ⇒ [“1.4 Removing and installing Hall sender G40 ”, page 284](#)

## 8 - O-ring

## 9 - Rotor

- ☐ for engine speed sender - G28-
- ☐ cannot be removed separately, only with sealing flange Pos. -10-

## 10 - Sealing flange on the gearbox side

- ☐ installing and removing ⇒ [“2.3 Removing and installing sealing flange on gearbox side”, page 49](#)

## 11 - Engine speed transmitter - G28-

- ☐ installing and removing ⇒ [“1.5 Removing and installing engine speed sender G28 ”, page 284](#)

## 12 - Bolt

- ☐ 5 Nm

# 1.2 Removing and installing ignition coils with output stage

Special tools and workshop equipment required

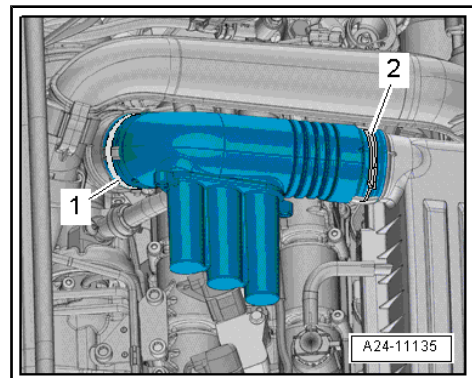
- ◆ Extractor -T10530-

## Removing

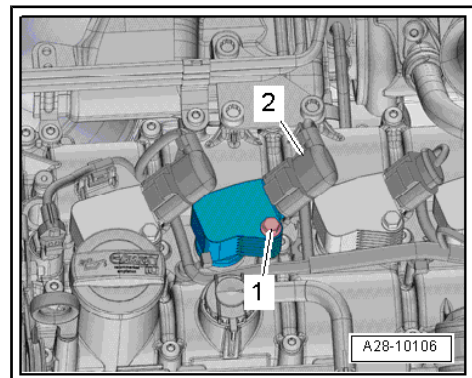
Ignition coils “cyl. 2, 3, 4”

- Loosen hose clamps -1- and -2- and remove air guide pipes.

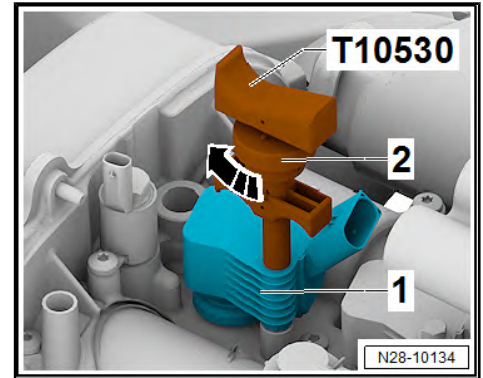
Continued for all ignition coils



- Disconnect plug connection -2-.
- Unscrew screw -1-.



- Press extractor -T10530- into the bore of the ignition coil -1- as far as the stop.
- Tighten nuts -2- in -direction of arrow-.



- Remove ignition coil with extractor -T10530- in -direction of arrow- out of the camshaft housing.

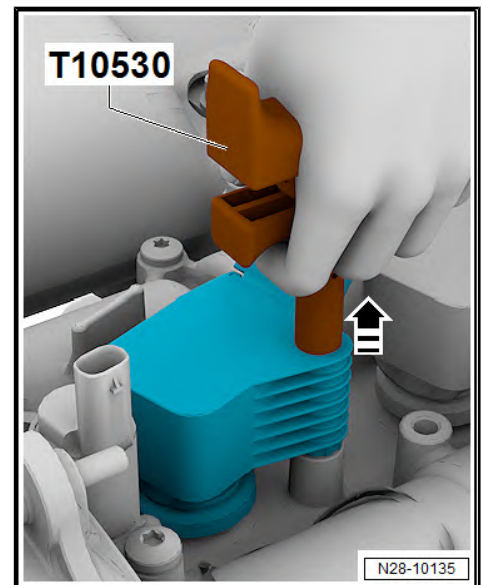
#### Install

Installation is carried out in the reverse order. When installing, observe the following:

- Insert all ignition coils loosely into the spark plug shaft.
- Align ignition coils to the connectors and simultaneously attach all connections to the ignition coils.
- Press ignition coils onto the spark plugs evenly by hand (do not use an impact tool).

#### Tightening torque

| Component               | Nm   |
|-------------------------|------|
| Screw for ignition coil | 8 Nm |



## 1.3 Removing and installing knock sensor 1 - G61-

#### Removing

- Remove AC compressor from holder and strap up ⇒ Heating, Air Conditioning; Rep. gr. 87 .
- Separate electrical plug connection -1-.
- Release screw -2- and remove knock sensor 1 - G61- .

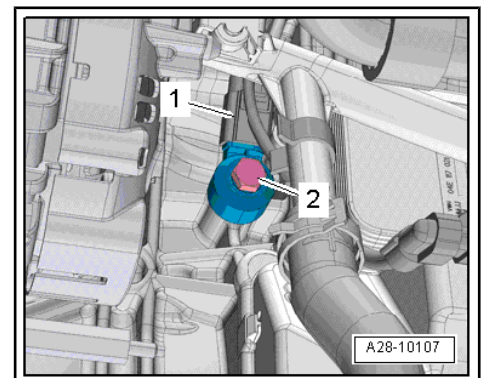
#### Install

Installation is carried out in the reverse order. When installing, observe the following:

- Install AC compressor ⇒ Heating, Air Conditioning; Rep. gr. 87 .

#### Tightening torque

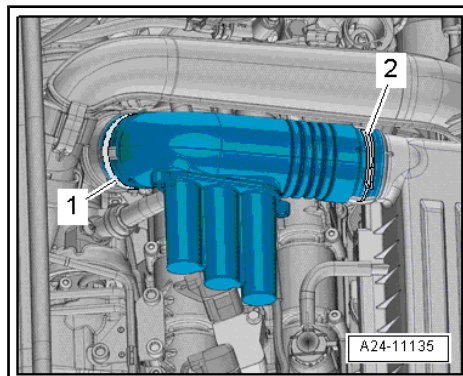
| Component              | Nm    |
|------------------------|-------|
| Screw for knock sensor | 20 Nm |



## 1.4 Removing and installing Hall sender - G40-

### Removing

- Loosen hose clamps -1- and -2- and remove air guide pipes.



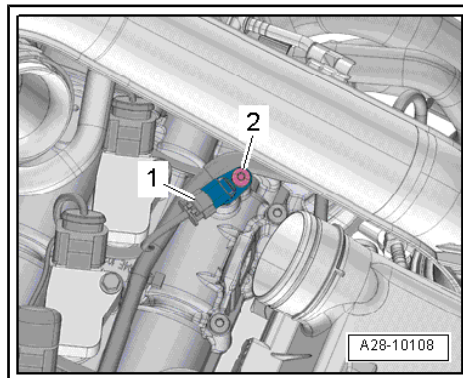
- Separate electrical plug connection -1-.
- Unscrew screw -2- and remove Hall sender - G40- .

### Install

- Installation is carried out in the reverse order.

### Tightening torque

| Component             | Nm   |
|-----------------------|------|
| Screw for hall sender | 8 Nm |



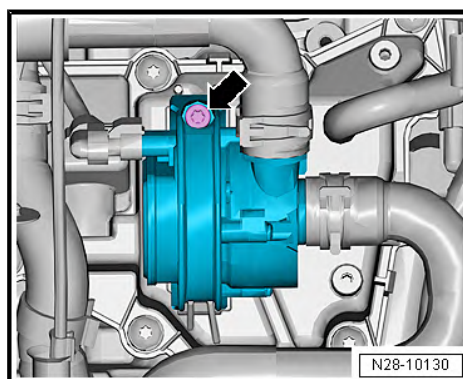
## 1.5 Removing and installing engine speed sender - G28-

### Special tools and workshop equipment required

- ♦ Socket insert 4 mm - T10370-

### Removing

- Remove the sound dampening system -1- ⇒ Body Work; Rep. gr. 66 .
- Undo screw -arrow- and place charge air cooler pump - V188- to one side.



- Separate electrical plug connection -1-.
- Unscrew screw -2- and pull out engine speed sender - G28- .

#### Install



#### Caution

*Carefully insert engine speed sender - G28- into the bore.*

*This prevents the engine speed sensor - G28- from falling between the engine and gearbox.*

Installation is performed in a similar way in the reverse order. Pay attention to the following points:

- Install the noise insulation ⇒ Body Work; Rep. gr. 66 .

#### Tightening torque

| Component                     | Nm   |
|-------------------------------|------|
| Screw for coolant pump        | 8 Nm |
| Screw for engine speed sender | 5 Nm |

