Workshop Manual

Octavia III 2013 ➤
Octavia III 2014 ➤

1.4/103 kW TSI engine									
Engine ID	CHP A								

Edition 08.2013

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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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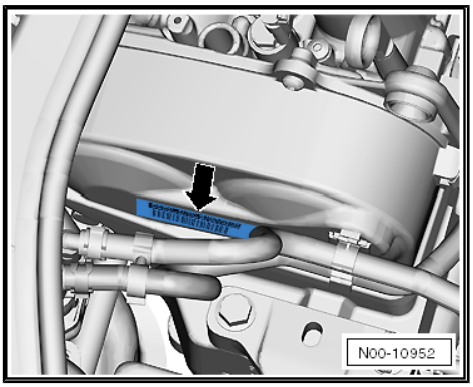
00 – Technical data

1 Technical data

(SRL000599; Edition 08.2013)

1.1 Engine number



The engine code and the engine number can be found on the sticker -arrow- on the upper toothed belt guard.

The engine code is also on the vehicle data sticker and on the crankcase above the gearbox.

The engine number consists of up to nine characters (alphanumeric). The first part (maximum 3 characters) makes up the “engine code”, and the second part (6 characters), the “serial number”. If more than 999 999 engines with the same engine code were produced then the first digit of the six part section will be replaced by a letter.

Vehicles with four-digit engine identification characters

Starting with the letter “C”, new four digit engine codes have been introduced. The first 3 digits denote the mechanical design of the engine and are stamped on the engine as before. The fourth digit denotes the performance and torque rating of the engine and depends on the engine control unit - J623- . The four digit engine code is on the identification plate, the vehicle data sticker and on the engine control unit.

1.2 Engine characteristics

Edition 08.2013; version 2.0

Engine identification characters		CHPA
Manufactured		11.2012 ►
Emission standards		EU2 DDK,EU5
Capacity	cm^3	1395
Output	kW at rpm	103/4500 - 6000
Torque	Nm at rpm	250/1500 - 3500
Bore	∅ mm	74.5
Stroke	mm	80.0
Compression ratio		10.5
Cylinder/valves per cylinder		4/4
RON	at least	95 unleaded
Ignition system/fuel injection		Motronic ME 17
Firing order		1-3-4-2
Type of fuel preparation		Direct injection homogeneous
Knock control		1 sensor
Lambda control		2 Lambda probes
Three-way catalytic converter		yes
Exhaust gas recirculation		no
Balancing shaft module		no
Intake manifold change-over		no
Camshaft adjustment		yes
Secondary air system		no
Exhaust gas turbocharger		yes

01 – Self-diagnosis

1 Self diagnosis, safety measures, cleanliness regulations, directions

1.1 Self-diagnosis

This repair group is deleted.

For this use the “Vehicle self-diagnosis”, “Measuring method” and “Fault finding” ⇒ Vehicle diagnostic tester.

1.2 Safety precautions when working on fuel supply system

When working on the fuel supply observe the following:

WARNING

Fuel under very high pressure creates a risk of injury.

- *The injection system consists of a high pressure part (max. pressure of 12 MPa = 120 bar) and a low pressure part (pressure of approx. 0.6 MPa = 6 bar).*
- *The fuel system is under pressure! Before opening the high-pressure area of the injection system, the fuel pressure must be reduced to residual pressure, see procedure ⇒ page 4 .*
- *After the pressure has been reduced the connection point must be opened »immediately«. To do this place a cleaning cloth around the connection point to reduce the residual pressure (approximately 7 bar).*
- *Wear protective gloves.*
- *Wear safety goggles.*

Leaking fuel creates a fire hazard.

- *Because the fuel pump is activated by the when the door contact switch when the driver's door is opened the voltage supply to the fuel pump must be interrupted if the battery is NOT disconnected.*
- *Take out fuse for fuel pump control unit - J538- ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.*

Caution

Risk of damage to the 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.

Even slight contamination can lead to defects. For this reason it is essential to pay careful attention to the following rules of cleanliness when working on the fuel supply and on fuel injection systems:

- ♦ 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 components: 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.

1.3 Release pressure in the high pressure area of the fuel 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 area, 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 area 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 area, 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 fault memory of the engine control unit at the end of the following work and delete all the fault entries.*
- *If the fault memory was erased, the readiness code must be generated ⇒ Vehicle diagnostic tester.*

1.4 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).*

1.5 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.*

1.6 Safety precautions when working on cooling system

WARNING

Steam may escape when expansion tank is opened.

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

Caution

When doing any repair work, especially in the engine compartment, pay attention to the following due to the cramped conditions:

- *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 clamps, assignment⇒ Electronic Catalogue of Original Parts .*
- *Hose clip pliers - VAS 6362- are recommended to install spring-type clips.*
- *Always replace seals and gasket rings.*
- *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).*

1.7 Rules of cleanliness to observe when working on the fuel supply system

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 components: 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.

1.8 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 area of the fuel system must be observed ⇒ page 4 .

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 reconnecting 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.

1.9 Safety precautions when working on ignition system

WARNING

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.

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.

1.10 General notes on the injection system

Repairing ignition ⇒ page 251 .

- The engine control unit is equipped with self-diagnosis. Before repairs and also for fault finding, first of all interrogate the fault memory. Also check the vacuum hoses and connections (unmetered air).
- Fuel hoses in the engine compartment must only be secured with spring-type clips ⇒ ETKA - Electronic catalogue of original parts . 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 fault memory after having completed all inspections and repairs, and if necessary delete ⇒ Vehicle diagnostic tester.

Safety precautions when working on the injection system
⇒ page 7 .

1.11 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 fault memory after having completed all inspections and repairs, and if necessary delete ⇒ Vehicle diagnostic tester.

Safety measures ⇒ page 7 .

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

1.12 General instructions for charge air system

WARNING

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

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

Caution

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

- *Clean all oil lines.*
- *Change 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 install approved clamps for securing the hose connections ⇒ ETKA - Electronic Catalogue of Original Parts .
- 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.

1.13 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.

2 Repair instructions

2.1 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 components: 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.

2.2 Foreign bodies in the engine

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

2.3 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 ETKA .

2.4 Cable routing and securing

- To ensure the original installation position, lines such as 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.

2.5 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.

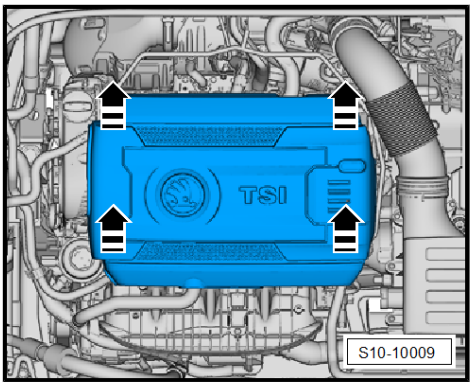
10 – Removing and installing engine

1 Engine trim panel

1.1 Removing and installing engine trim panel

Removing

– Carefully pull the engine cover off the retaining bolts one after another -arrows-. Do not pull engine cover off in jerks or on one side.



Install

– To avoid damage, do not strike the engine cover with the fist or a tool.

– Position the engine cover paying attention to the oil fill supports and dipstick.

– Press the engine trim panel into the rubber sleeves, first left, then right.

2 Removing and installing engine

2.1 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 the lifting device - MP9-201 (2024A)-
- Engine and gearbox jack - V.A.G 1383 A-
- Engine mount - T10497-
- Catch pan , e.g. -VAS 6208-
- Hose strap pliers , e.g. -VAS 6362-
- Locking pin - T10060A-
- Double ladder , e. g. -VAS 5085-
- Protective goggles
- Protective gloves

Work procedure

Note

- *The engine is removed downwards together with the gearbox.*
- *Fit all cable straps on again in the same place when installing.*

– 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 .

– Remove the cooling water tank cover ⇒ Body Work; Rep. gr. 66 .

– Remove engine cover ⇒ page 11 .

WARNING

Fuel under very high pressure creates a risk of injury.

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

– Reduce the fuel pressure in the high pressure area ⇒ page 4 .

– Draining coolant ⇒ page 141

Caution

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

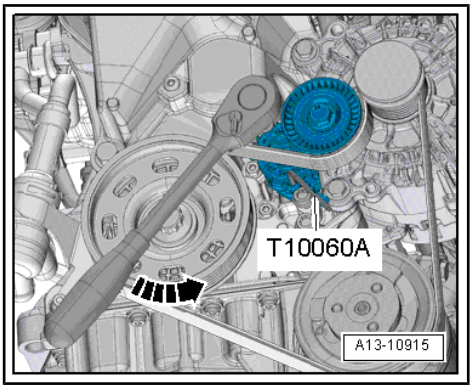
- *Mark the direction of rotation with chalk or a felt-tip pen for the re-installation before removing the V-ribbed belt.*

Vehicles with air conditioning

– To release the tension of the V-ribbed belt, swivel the tensioning device anticlockwise -direction of the arrow- and remove the V-ribbed belt from the V-ribbed belt pulley of the AC compressor .

– Lock tensioning device with locking pin - T10060A- .

– Remove poly V-belt.



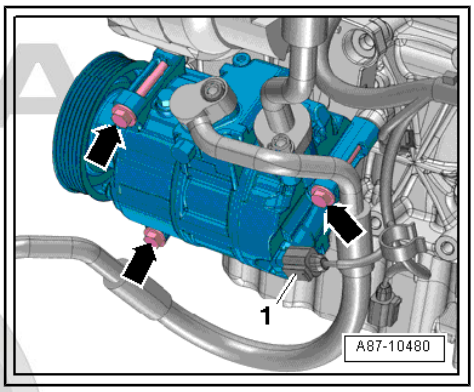
WARNING

Risk of injury through refrigerant.

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

– Remove plug -1- at the air conditioning unit compressor control valve - N280- .

– Release screws -arrows- for AC compressor.



Caution

Risk of damaging AC compressor, refrigerant lines and hoses.

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

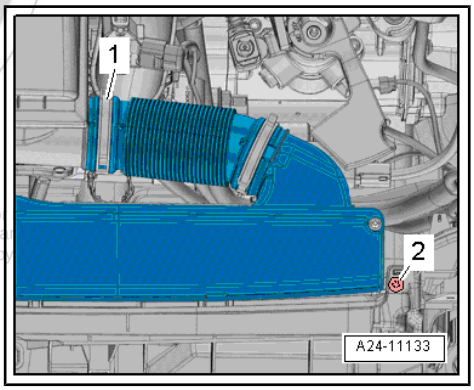
– Remove AC compressor with connected refrigerant hoses and strap up to the right side.

Continued for all vehicles

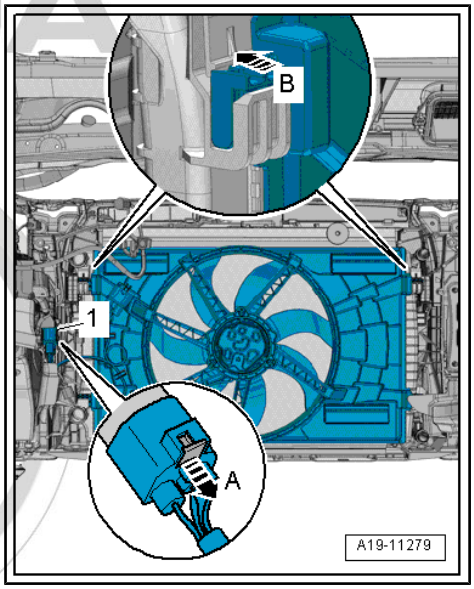
– Loosen hose clamp -1- and remove air guide hose.

– Release screw left and right arrow -2-.

– Unclip and remove the air guide on the lock carrier.

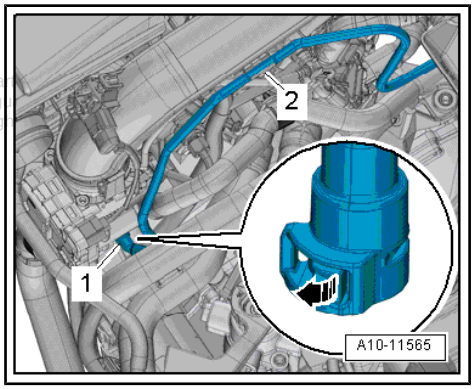


– Remove plug -1- for radiator fan, for this purpose slide screw clamp backwards -arrow A- and press release button down.
– Press locking lugs for fan shroud left and right simultaneously -arrow B- and remove fan shroud downwards from the radiator.
– Remove the battery with the battery tray ⇒ Electrical System; Rep. gr. 27 .



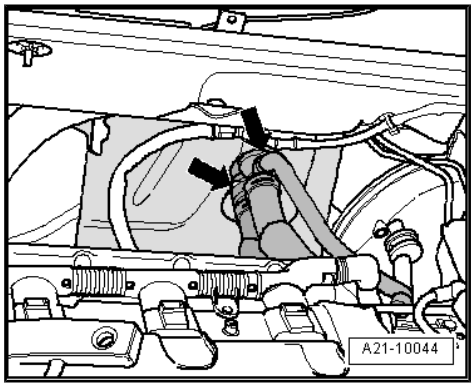
– Unlock catch -arrow- and remove vacuum hose -1-.
– Expose vacuum hose on the air guide pipe -2-.

Vehicles without auxiliary heating



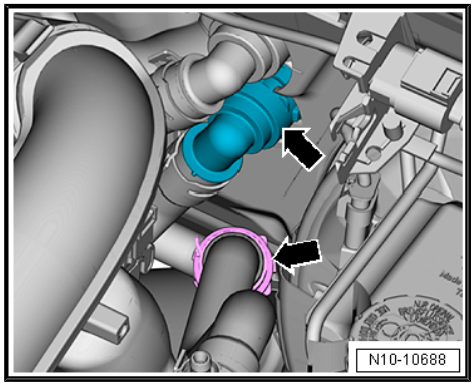
– Raise holding clamps -arrows- and remove coolant hoses from heat exchanger for heating.

Vehicles with auxiliary heating

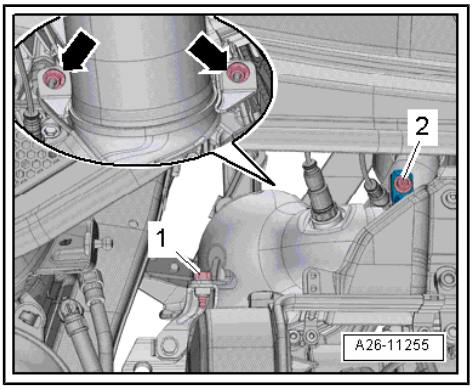


– Loosen holding clamp and holding clamps and pull off both coolant hoses -arrows-.

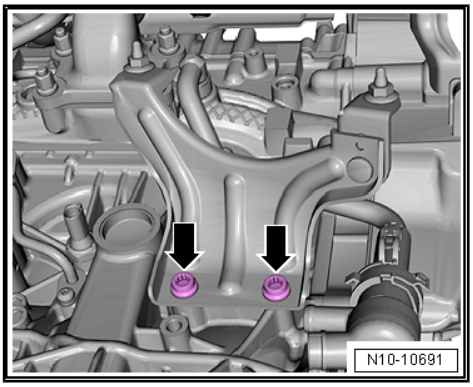
Continued for all vehicles



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

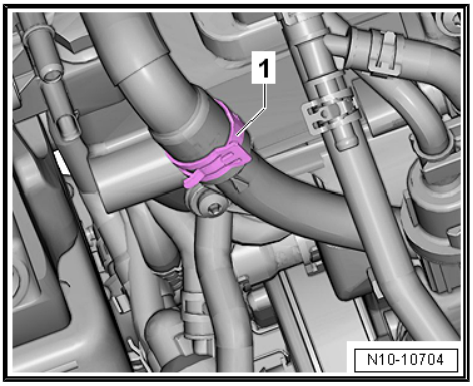


– Release screws -arrows- and remove holder.



Note

- *Place a cloth below to absorb leaking coolant.*
- *Loosen hose clamp -1- and remove coolant hose.*



WARNING

Risk of injury from fuel.

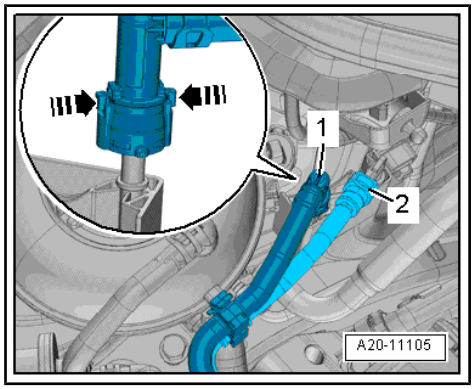
- ***To relieve the fuel pressure, place a clean cloth around the connection point and loosen the connection point carefully before opening the fuel system.***

Caution

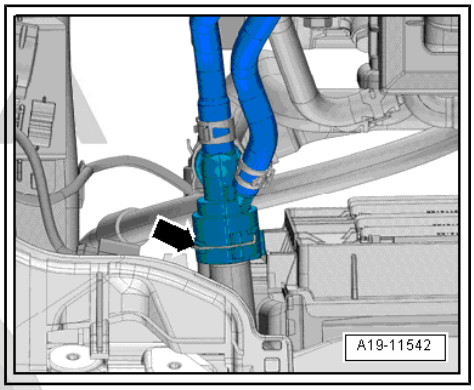
Risk of contamination.

- ***Rules of cleanliness when working on the fuel supply system*** ⇒ page 3 .

– Remove the fuel feed line -1- and the cable to the activated charcoal filter -2- ⇒ page 188 .



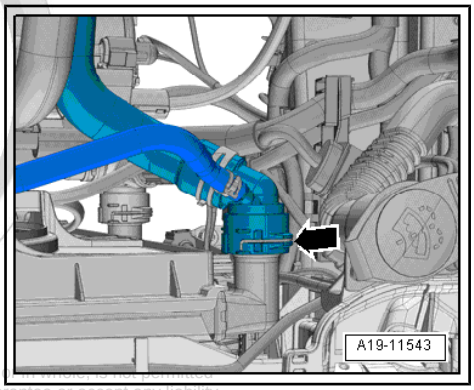
– Raise holding clamp -arrow- and disconnect coolant hose right above radiator for charge air circuit.
– Remove air filter housing ⇒ page 215 .



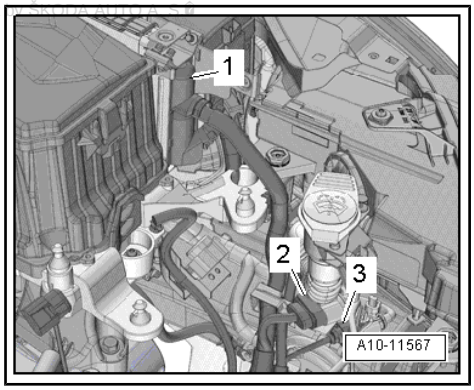
– Raise holding clamp -arrow- and remove top left coolant hose from radiator.

Note

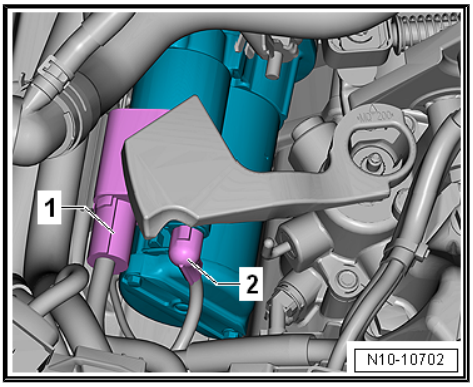
For the following clip unclipping procedure use the removal tool for inner door trim panel - MP8-602/1- .



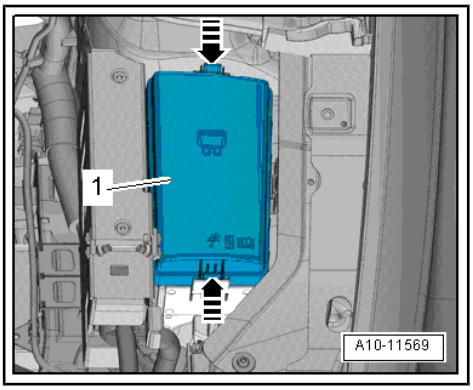
– Remove plug -1- at the engine control unit - J623- ⇒ page 238 .
– Take electrical plug connections -2 and 3- out of the holder and disconnect.
– Expose electric cables.



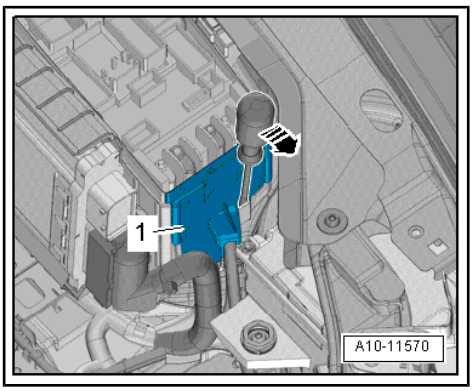
– Unplug connector -2-.
– Press back B+-pole protection -1- and unscrew B+-cable from the starter magnet switch.
– Unscrew the earth cable on the body.
– Remove upper plug from engine control unit ⇒ page 238 .



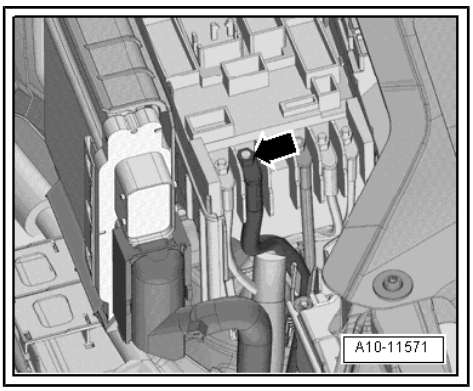
– Unlock catches -arrows-, remove cover -1- for E-box in the engine compartment.



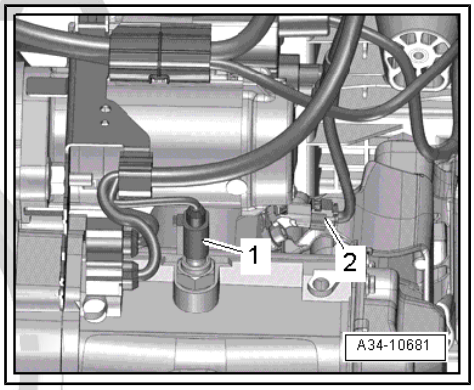
– Unlock catch with a screwdriver -arrow- and pull cover -1- for E-box in the engine compartment upwards.



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



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



Vehicles fitted with a manual gearbox

– Remove shift mechanism from gearbox ⇒ Gearbox; Rep. gr. 34 .

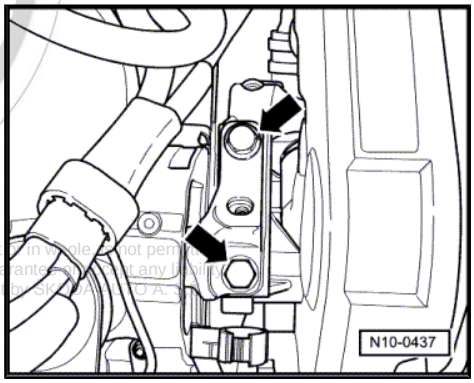
– Remove slave cylinder ⇒ Gearbox; Rep. gr. 30 .

Vehicles with automatic transmission DSG

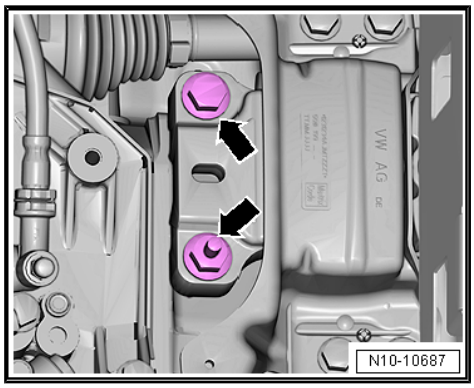
– Remove selector lever linkage, pull off mechatronics plug and remove all holders from the gearbox ⇒ Gearbox; Rep. gr. 37 .

Continued for all vehicles

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

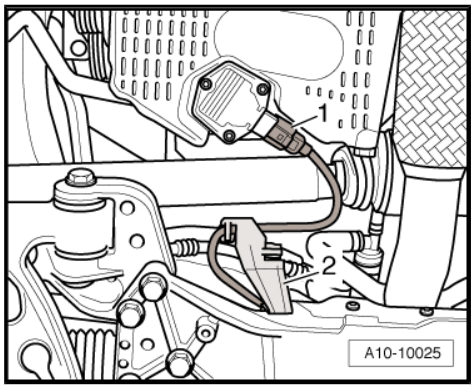


– Screw out screws -arrows- on gearbox mount by approximately 2 turns.

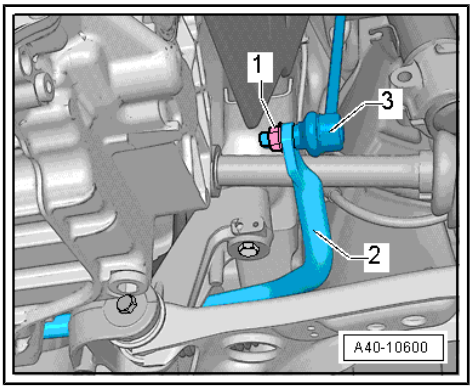


– Disconnect plug -1- at the oil level and oil temperature sender - G266- .

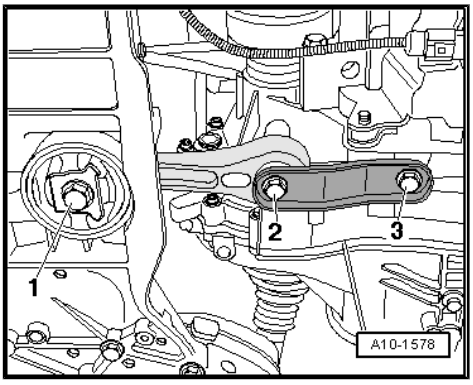
– Unhook electric cable on the holder -2-.



– Unscrew nut arrow on left and right -1- for coupling rod -3- on anti-roll bar -2-.



– Release screws -1, 2, 3- and remove pendulum support.

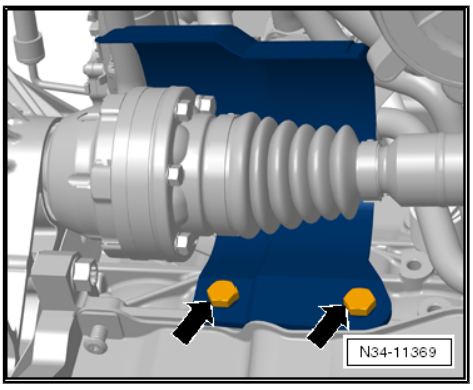


– Release screws -arrows- and remove heat shield for right drive shaft.

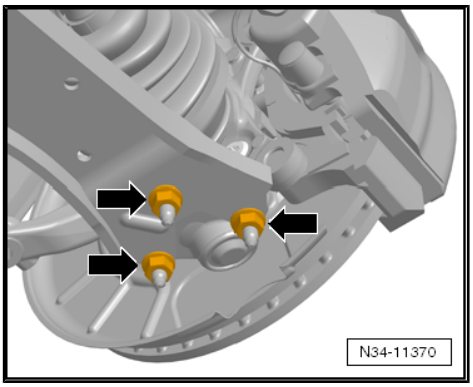
For vehicles with automatic gearbox DSG

– Remove the assembly carrier ⇒ Chassis; Rep. gr. 40 .

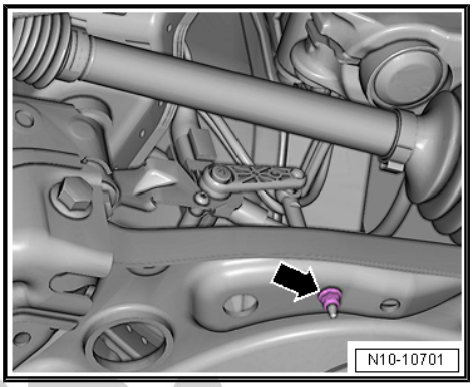
Continued for all vehicles



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



– When present, unscrew nuts -arrow- from the front left vehicle sensor - G78- .
– 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.



Note

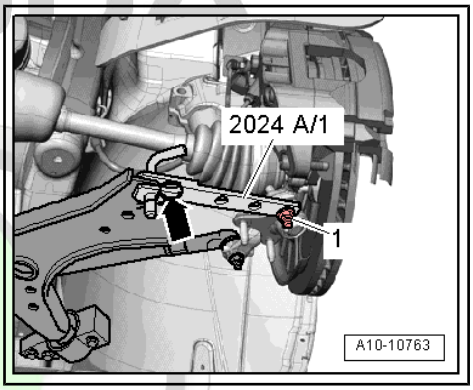
Ensure that the surface protection of the cardan shaft is not damaged.

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

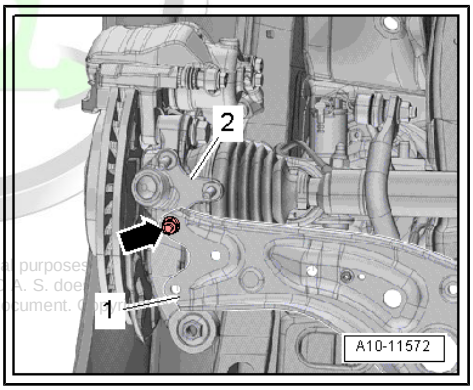
WARNING

There is a risk of accident from loose parts of the support.

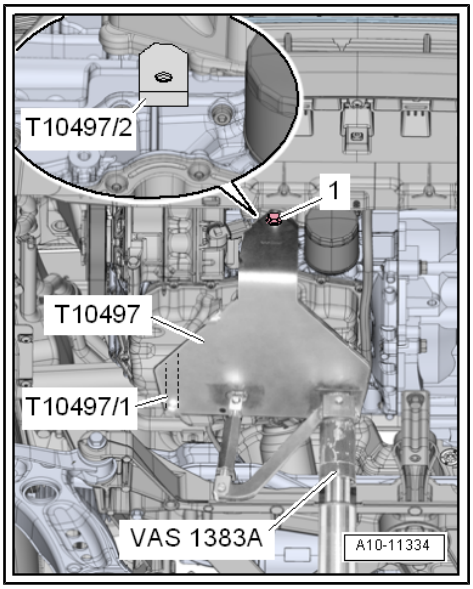
- ***Secure rig pin with plug-in lock and swivel hub-arrow- and nut-1-.***



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

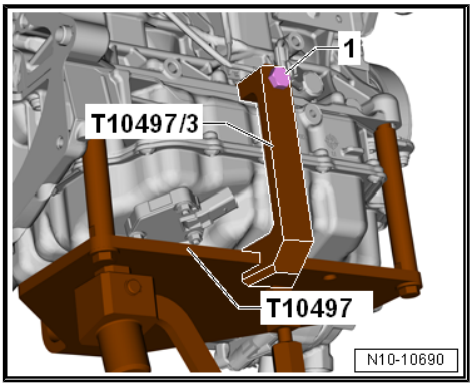


– Position clamping piece T10497/2 on the housing fin of the cylinder block, as shown in the illustration.
– Position engine mount - T10497- with bolts T10497/1 at the cylinder block.
– Screw clamping piece T10497/2 with screw -1- onto the engine mount T10497 and tighten it to 20 Nm.



– Put adapter - T10497/3- on the engine mount - T10497- and tighten screw -1- to 20 Nm.

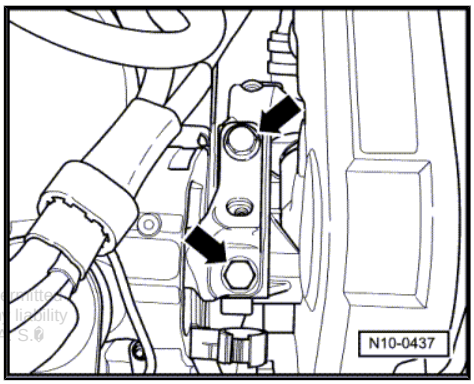
– Insert engine mount engine - T10497- onto the engine and gearbox jack - V.A.G 1383A- and lift engine/gearbox unit a little.



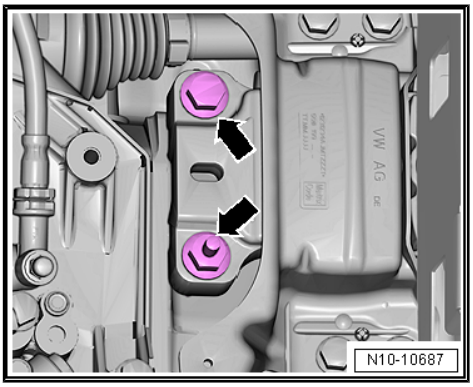
Note

To remove the screws for the assembly mountings, use a commercially available double ladder , e. g. -VAS 5085- .

– Screw out engine mount screws -arrows- fully.



– Screw out gearbox mount screws -arrows- fully.



Caution

Risk of damaging vacuum lines or electric cables and the engine compartment.

- ***Check that all vacuum lines and electric cables between engine, gearbox, assembly bracket and body have been loosened.***
- ***Guide the engine/gearbox unit with assembly carrier 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.

2.2 Separate engine and gearbox

Special tools and workshop equipment required

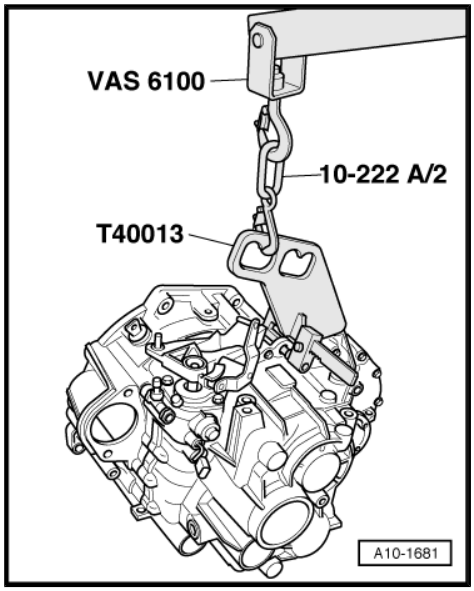
- Additional hook - MP9-200/10 (10-222A/2)-
- Workshop crane , e.g. -VAS 6100-
- Lifting device - T40013-

Work procedure

- Engine/gearbox unit removed and attached to engine mount - T10497- .

– Removing starter ⇒ Electrical System; Rep. gr. 27 .

– Attach lifting device - T40013- to gearbox and close safety mechanism.
– Attach workshop crane - VAS 6100- with additional hook - MP9-200/10 (10-222A/2)- to the lifting device - T40013- .
– Unscrew engine/gearbox connecting screws ⇒ Gearbox; Rep. gr. 34
– Remove gearbox from engine.



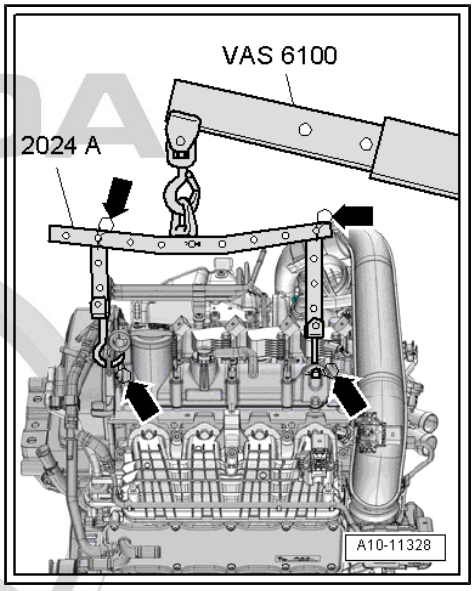
2.3 Attach engine attached to engine and gearbox mount

Special tools and workshop equipment required

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

Work procedure

- Gearbox disconnected from engine ⇒ page 21 .
– Attach lifting device - MP9-201 (2024 A)- at engine and at 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.

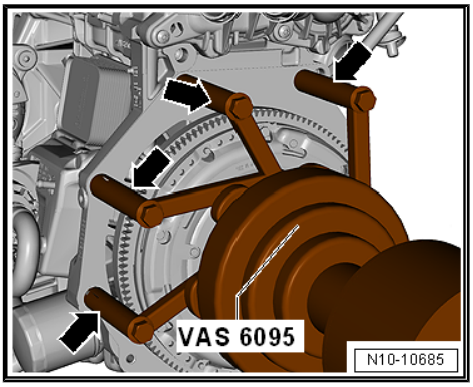
WARNING

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 engine down from engine mount - T10497- using workshop crane - VAS 6100- .

– Secure engine using bolts -arrows- to the engine and gearbox mount - VAS 6095- .



2.4 Installing engine

Work procedure

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

Note

- *Replace screws which have been tightened firmly to a torquing angle.*
- *Replace self-locking nuts, gasket rings, 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 .*
- *All cable straps should be fastened again in the same place when installing.*

– Installing intermediate plate ⇒ page 78 .

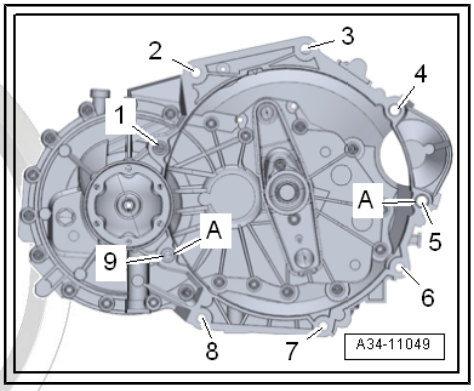
– If there are no dowel sleeves -A- are available in the cylinder block for centering the engine and gearbox, insert dowel sleeves.

– Screw gearbox onto engine at positions -1, 2, 3, 6, 7, 8, 9-.

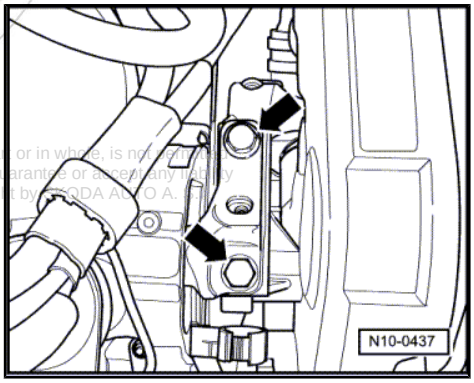
– Install gearbox support bracket.

– Attach engine/gearbox unit engine mount - T10497- .

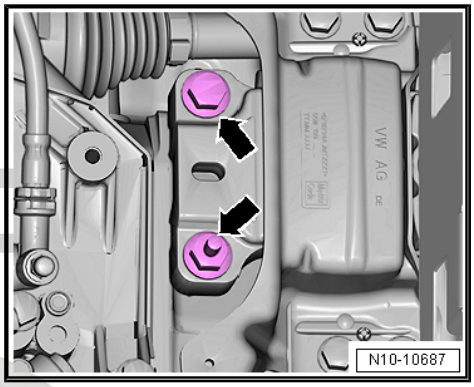
– Insert engine/gearbox unit into the body.



– 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 ⇒ page 31 .

– Remove engine mount - T10497- from engine.
– Install the starter motor ⇒ Electrical System; Rep. gr. 27 .
– Install pump for coolant recirculation - V51- ⇒ page 157 .
– Install air guide pipe ⇒ page 205 .
– Install air guides ⇒ page 206

Vehicles fitted with a manual gearbox

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

Vehicles with automatic transmission DSG

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

Continued for all vehicles

– Install exhaust pipe with catalytic converter ⇒ page 242 .
– 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 poly V-belt ⇒ page 36 .
– Electrical connections and proper routing ⇒ Electrical System; Rep. gr. 97 and ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
– Install engine control unit - J623- ⇒ page 238 .
– Connect coolant hoses with quick coupling ⇒ page 164 .
– Install pendulum support ⇒ page 30 .
– Remove the front left and right wheelhouse liner ⇒ Body Work; Rep. gr. 66 .
– Attach front wheels ⇒ Chassis; Rep. gr. 44 .
– Adjust the assembly bracket ⇒ page 31 .
– Install the battery with the battery tray ⇒ Electrical System; Rep. gr. 27 .
– Install air filter housing ⇒ page 215 .

Caution

Risk of damaging control units as a result of overvoltage.

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

– Top up and bleed cooling system ⇒ page 141 .
– Install the engine cover ⇒ page 11 .
– Install the plenum chamber cover ⇒ Body Work; Rep. gr. 66 .
– Interrogate all fault memories and delete all fault entries, which are caused by removing and installing the engine ⇒ Vehicle diagnostic tester.

  After deleting the fault 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

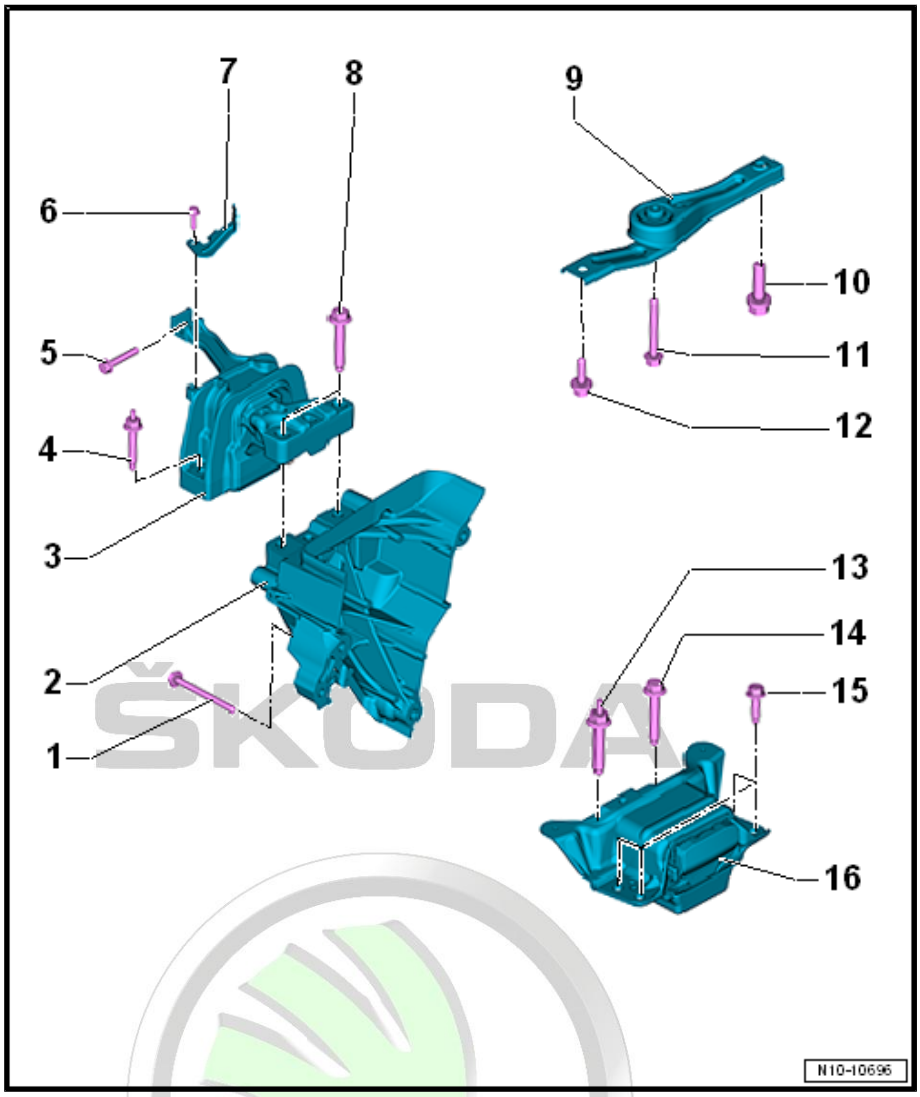
Note

- *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
	M7	15
	M8	20
	M10	40
	M12	65
deviations:		
Engine/gearbox connecting screws ⇒ Gearbox; Rep. gr. 34		
Screws for assembly bracket: ♦ Assembly bracket ⇒ page 26 .		

3 Assembly bracket

3.1 Unit mounting - summary of components



1 - 40 Nm + torque a further 90° (1/4 turn)

- ❑ replace
- ❑ order of tightening ⇒ page 27

2 - Engine support bracket

- ❑ Tightening torque and tightening order ⇒ page 27
- ❑ removing and installing ⇒ page 39

3 - Engine mounting

- ❑ with supporting arm
- ❑ removing and installing ⇒ page 27

4 - 40 Nm + torque a further 90° (1/4 turn)

- ❑ replace

5 - 20 Nm + torque a further 90° (1/4 turn)

- ❑ replace

6 - 8 Nm

7 - Support

8 - 60 Nm + torque a further 90° (1/4 turn)

- ❑ replace

9 - Pendulum support

- ❑ removing and installing ⇒ page 30

10 - Screw

- ❑ replace
- ❑ Tightening torque and tightening order ⇒ page 27

11 - Screw

- ❑ replace
- ❑ Tightening torque and tightening order ⇒ page 27

12 - Screws

- ❑ replace
- ❑ Tightening torque and tightening order ⇒ page 27

13 - 60 Nm + torque a further 90° (1/4 turn)

- ❑ replace

14 - 60 Nm + torque a further 90° (1/4 turn)

- ❑ replace

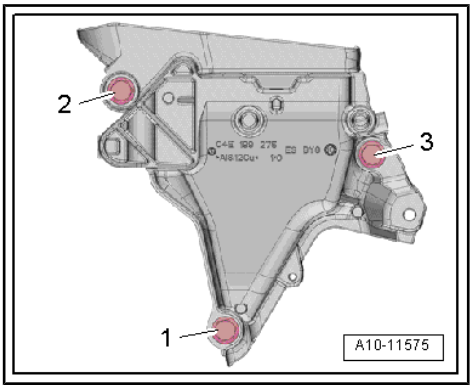
15 - 50 Nm + torque a further 90° (1/4 turn)

- ❑ replace

16 - Gearbox mount

- ❑ with supporting arm
- ❑ removing and installing ⇒ page 28

Engine support bracket - tightening torque and tightening order



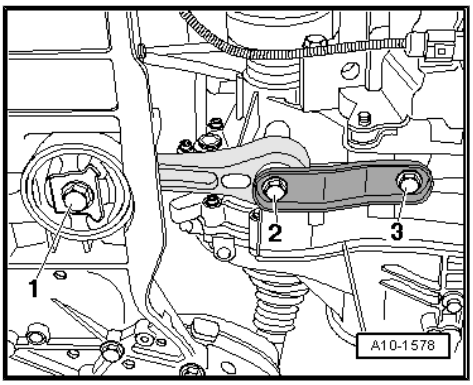
Note

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

– Tighten screws gradually in the given sequence:

Stage	Screws	Tightening torque/torquing angle
1.	-1…3-	7 Nm
2.	-1…3-	40 Nm
3.	-1…3-	90° (torque a further 90° (1/4 turn)

Install pendulum support



Note

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

– Tighten screws gradually in the given sequence:

Stage	Screws	Tightening torque/torquing angle
1.	-2, 3-	50 Nm
2.	-1-	130 Nm
3.	-1…3-	90° (torque a further 90° (1/4 turn)

3.2 Removing and installing engine mount

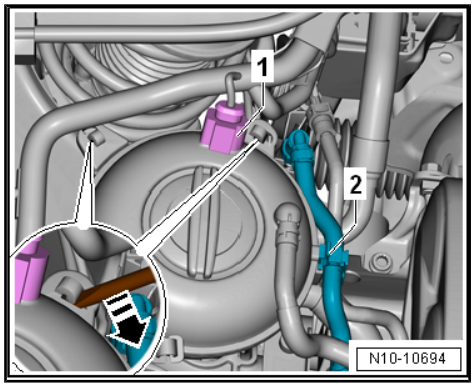
Special tools and workshop equipment required

- ♦ Supporting device - T30099-
- ♦ Adapter - T40091/3-
- ♦ Hook - MP9-200/10-
- ♦ Adapter - MP9-200/18-
- ♦ Support - 10-222A/31-
- ♦ Surface - T30119-

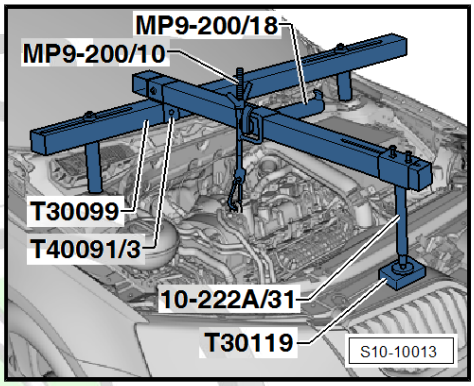
Removing

– Unplug connector -1-.

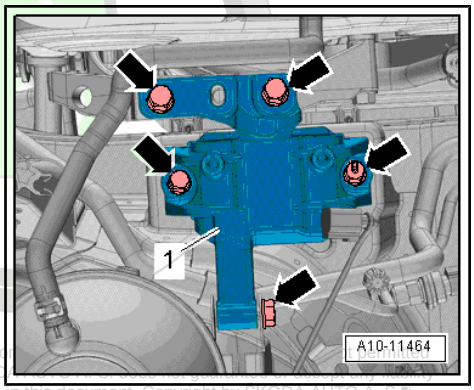
– Expose hose -2- of the activated charcoal filter.
– Unlock catches using a screwdriver -arrow- and lay coolant expansion tank to the side.
– Remove wiper arms ⇒ Electrical System; Rep. gr. 92 .
– Remove the cooling water tank cover ⇒ Body Work; Rep. gr. 50 .
– Remove caps of the screw connections of the front suspension strut dome.
– Install adapter - MP9-200/18 (10-222A/18)- with hooks for MP9-200 and T30099 - MP9-200/10 (10-222A/10)- and support - 10-222A/31-3- .



– Position the supporting device - T30099- with the support - 10-222A/31- and base - T30119- onto the screw connections of the suspension strut dome as shown.
– Slightly pre-tension engine/gearbox unit with the spindle, do not raise.



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



Install

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

– Check assembly bracket setting ⇒ page 31 .

3.3 Removing and installing gearbox mount

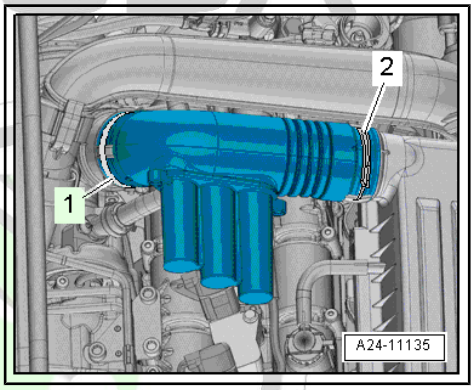
Special tools and workshop equipment required

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

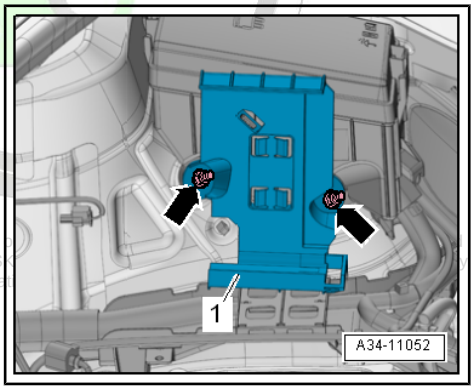
Removing

– Remove the cooling water tank cover ⇒ Body Work; Rep. gr. 66 .
– Remove engine cover ⇒ page 11

– Loosen hose clamps -1, 2- and remove air guide pipe.
– Remove air filter housing ⇒ page 215 .
– Remove the battery with the battery tray ⇒ Electrical System; Rep. gr. 27 .
– Remove engine control unit ⇒ page 238 .



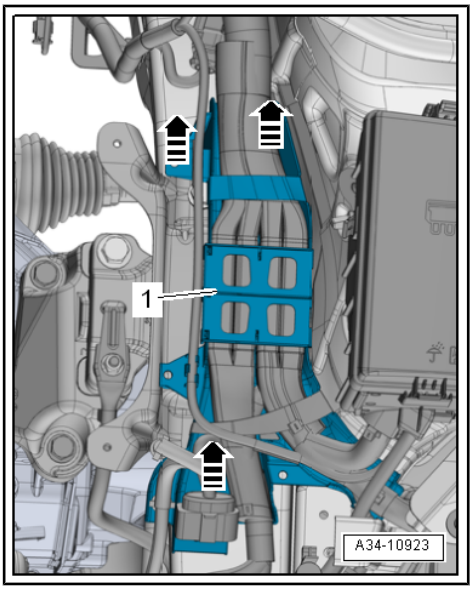
– Unscrew screws -arrows- and remove holder -1-.



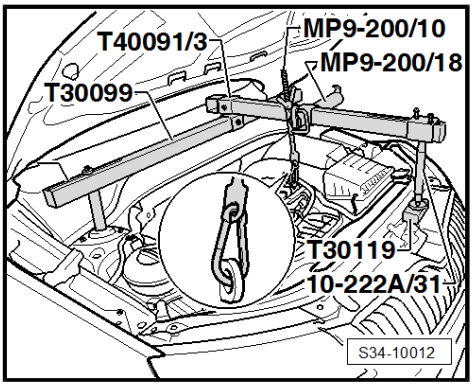
Note

Holders are installed differently according to build version.

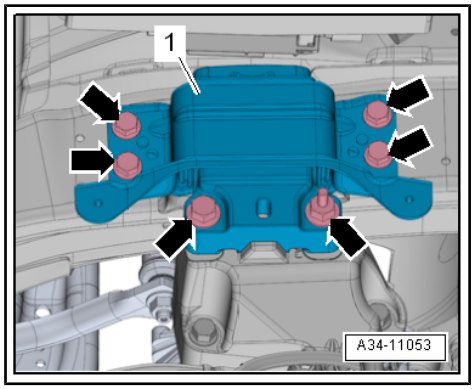
– Unscrew screw -1-, unclip upwards -arrows- and push slightly to the side.
– Remove wiper arms ⇒ Electrical System; Rep. gr. 92 .
– Remove the cooling water tank cover ⇒ Body Work; Rep. gr. 50 .
– Remove caps of the screw connections of the front suspension strut dome.
– Install adapter - MP9-200/18 (10-222A/18)- with hooks for MP9-200 and T30099 - MP9-200/10 (10-222A/10)- and support - 10-222A/31-3- .



– Position the supporting device - T30099- with the support - 10-222A/31- and base - T30119- onto the screw connections of the suspension strut dome as shown.
– 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 performed in a similar way in the reverse order. Pay attention to the following points:

Tightening torques:

- Assembly bracket ⇒ page 26
- Air filter housing ⇒ page 214
- ⇒ Electrical System; Rep. gr. 27
- Engine control unit ⇒ page 238

Note

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

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 supporting device - T30099- 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.

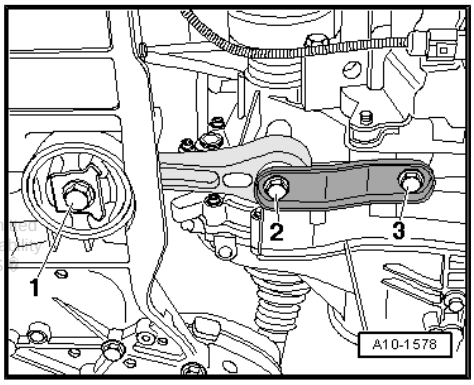
– Check assembly bracket setting ⇒ page 31 .

– Remove supporting device - T30099- .

3.4 Removing and installing pendulum support

– Remove the sound dampening system ⇒ Body Work; Rep. gr. 66 .

– Release screws -1, 2, 3- and remove pendulum support.



Install

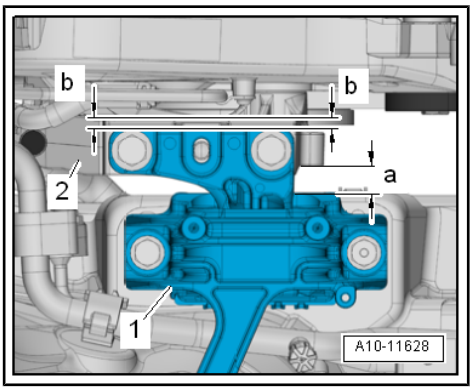
Installation is performed in a similar way in the reverse order. Pay attention to the following points:

- Tightening torques ⇒ page 27 .

3.5 Check assembly bracket setting

Work procedure

The following dimensions must be reached:



- 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.

– If the measured distance is too great or too small, adjust the assembly bracket ⇒ page 31 .

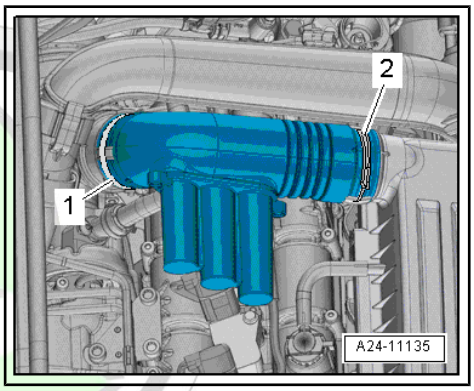
3.6 Adjusting the unit mounting

Special tools and workshop equipment required

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

Work procedure

– Remove battery tray ⇒ Electrical System; Rep. gr. 27 .

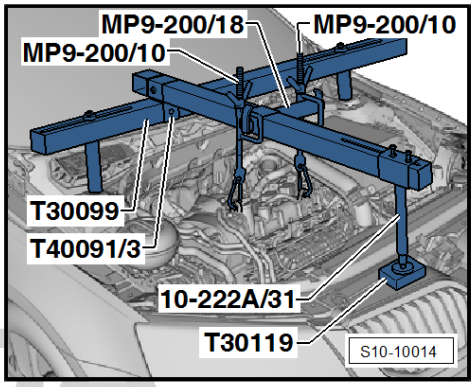


– Loosen hose clamps -1, 2- and remove air guide pipe.
– Remove air filter housing ⇒ page 215 .
– Remove wiper arms ⇒ Electrical System; Rep. gr. 92 .
– Remove the cooling water tank cover ⇒ Body Work; Rep. gr. 50 .
– Remove caps of the screw connections of the front suspension strut dome.
– Install adapter - MP9-200/18 (10-222A/18)- with hooks for MP9-200 and T30099 - MP9-200/10 (10-222A/10)- and support - 10-222A/31-3- .

– Position the supporting device - T30099- with the support - 10-222A/31- and base - T30119- onto the screw connections of the suspension strut dome as shown.

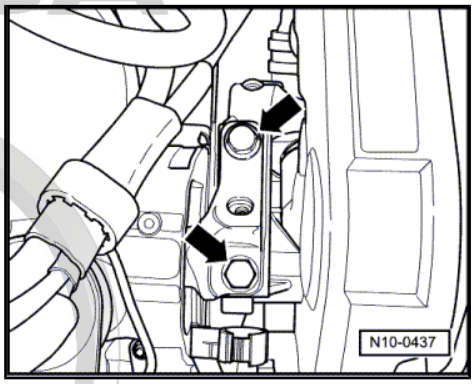
– Attach snap hook to the engine suspension eyes.

– Slightly pre-tension engine/gearbox unit with the spindles, do not raise.



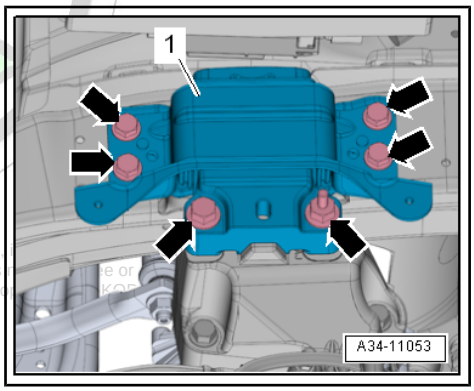
– Unscrew screws -arrows- for engine mount one after another and replace (if not already done during engine installation).

– Initially, loosely insert the screws.



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

– Initially, loosely insert the screws.

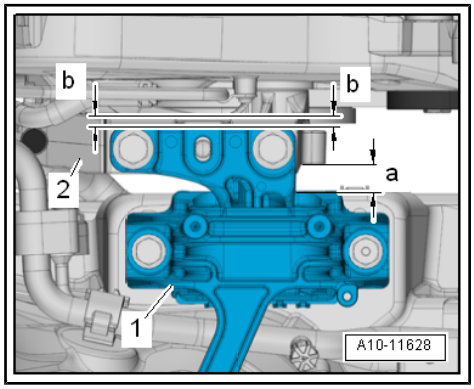


– Move engine/gearbox unit with an assembly lever until the following dimensions are set:

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.

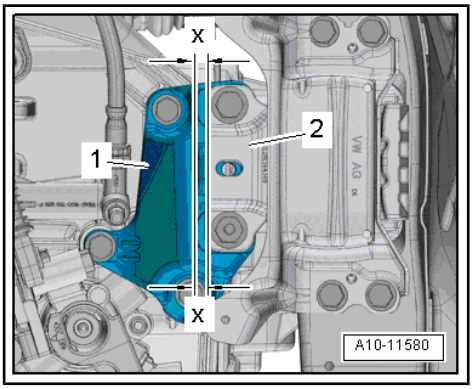
Tightening torques:

• Assembly bracket ⇒ page 26

• Charge-air system ⇒ page 205

• Battery tray ⇒ Electrical System; Rep. gr. 27

• Air filter ⇒ page 214

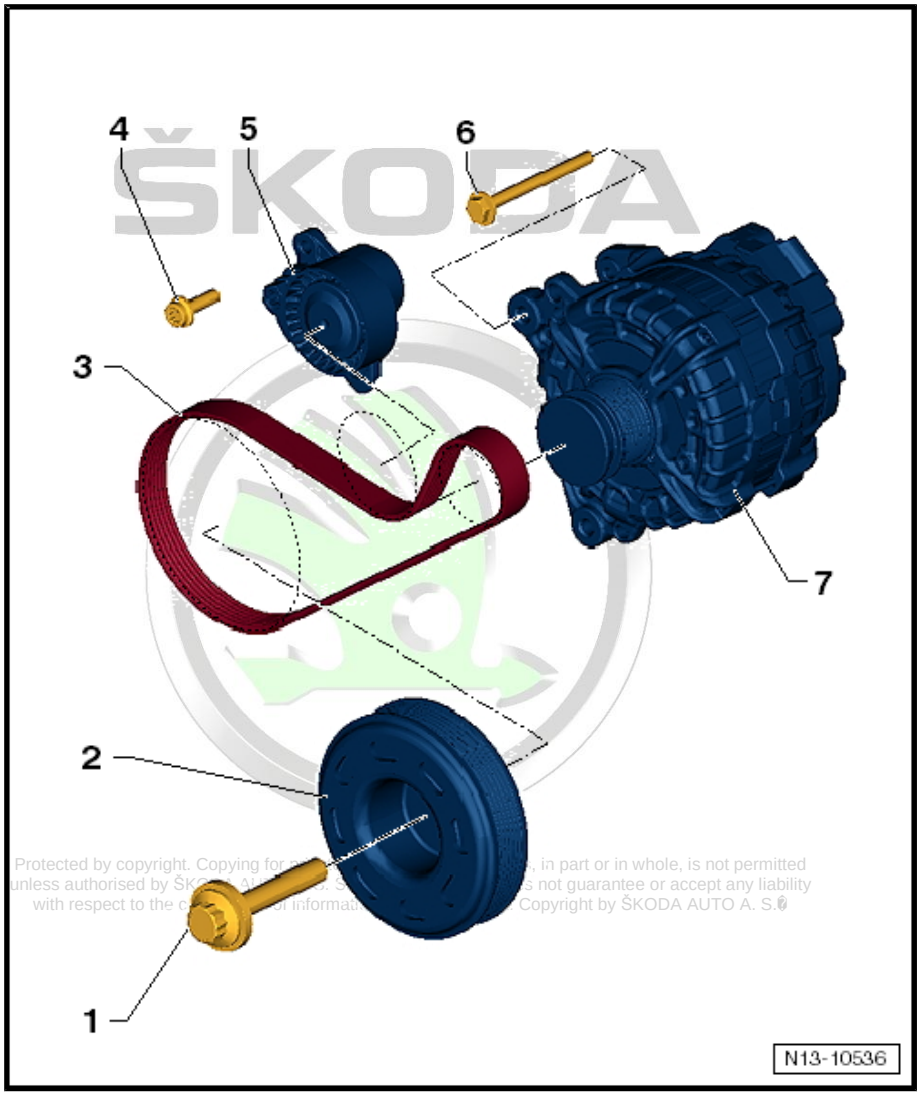


13 – Crankshaft group

1 Cylinder block on belt pulley side

1.1 V-ribbed belt drive - Summary of components

1.1.1 V-ribbed belt drive for vehicles without air conditioning system - Summary of components



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

- ❑ replace
- ❑ to release and tighten use counterholder - T10475-

> **Caution**
> *Risk of destruction of the engine.*
> *So as not to adjust the timing the crankshaft must not be turned while the screws are removed.*

2 - Crankshaft V-ribbed belt pulley

- ❑ with vibration damper
- ❑ removing and installing ⇒ page 38

> **Caution**
> *Risk of destruction of the engine.*
> *So as not to adjust the timing the crankshaft must not be turned out of the "TDC" position while the ribbed belt pulley is removed.*

3 - V-ribbed 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 37
- ❑ removing and installing ⇒ page 36
- ❑ pay attention to the correct position on the belt pulley when installing it

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

- ❑ replace

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 - T10060A-
- ❑ removing and installing ⇒ page 38

6 - 23 Nm

7 - Alternator

- ❑ removing and installing ⇒ Electrical System; Rep. gr. 27

1.1.2 V-ribbed belt drive for vehicles with air conditioning system - Summary of components

1 - V-ribbed 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
- ❑ removing and installing ⇒ page 36
- ❑ pay attention to the correct position on the belt pulley when installing it

2 - 150 Nm + torque a further 180° ($^1/_2$ turn)

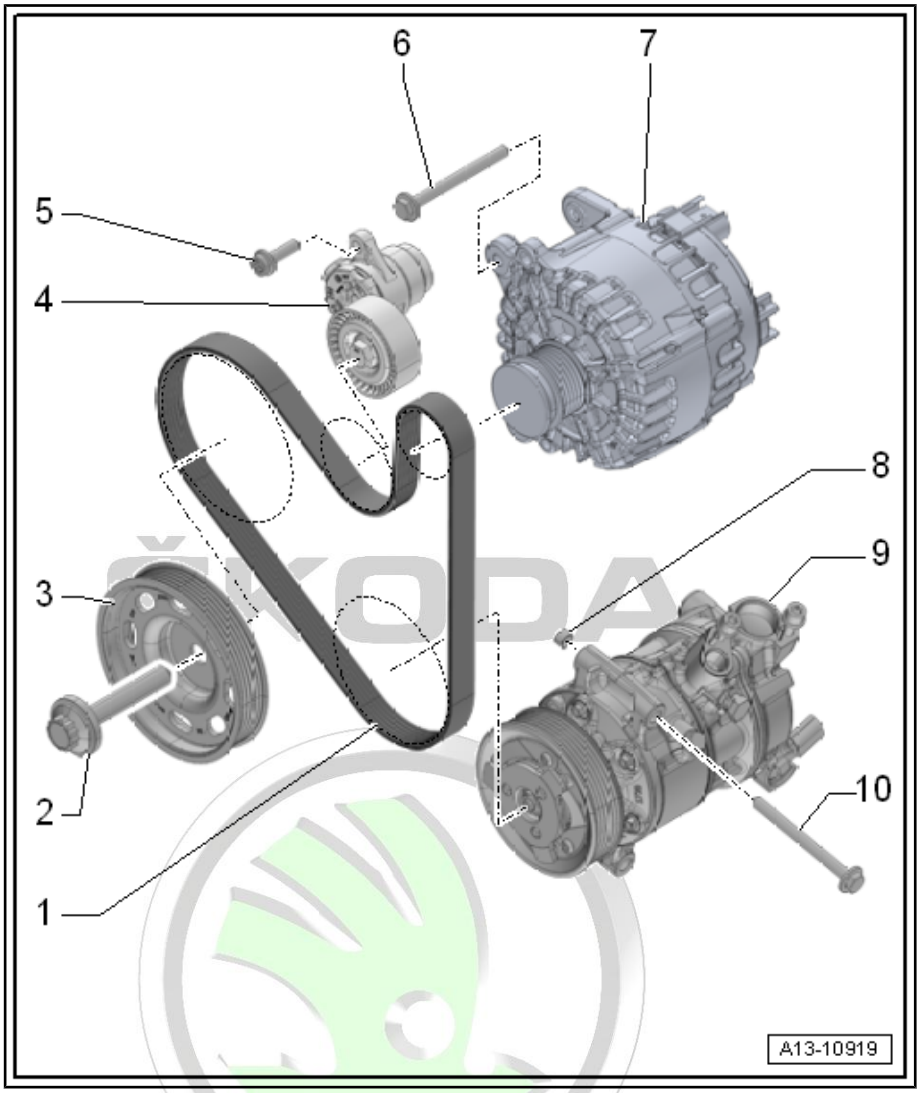
- ❑ replace
- ❑ to release and tighten use counterholder - T10475-

> **Caution**
> *Risk of destruction of the engine.*
> *So as not to adjust the timing the crankshaft must not be turned while the screws are removed.*

3 - Crankshaft V-ribbed belt pulley

- ❑ with vibration damper
- ❑ removing and installing ⇒ page 38

> **Caution**
> *Risk of destruction of the engine.*
> *So as not to adjust the timing the crankshaft must not be turned out of the "TDC" position while the ribbed belt pulley 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 - T10060A-
- ❑ removing and installing ⇒ page 38

5 - 20 Nm + torque a further 90° (1/4 turn)

- ❑ replace

6 - 23 Nm

7 - Alternator

- ❑ removing and installing ⇒ Electrical System; Rep. gr. 27

8 - Fitting sleeve

- ❑ for the AC compressor

9 - AC compressor

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

10 - 23 Nm

1.2 Removing and installing poly V-belt

1.2.1 Removing and installing V-ribbed belt on vehicles without air conditioning system

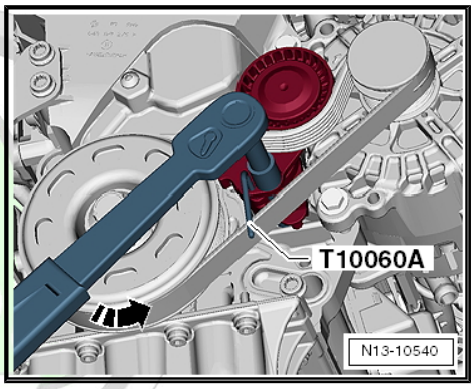
Special tools and workshop equipment required

- ♦ Locking pin - T10060A-

Removing

– To release the tension of the V-ribbed belt, turn the tensioning device in the anticlockwise -arrow direction-.

– Lock tensioning device with locking pin - T10060A- .



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

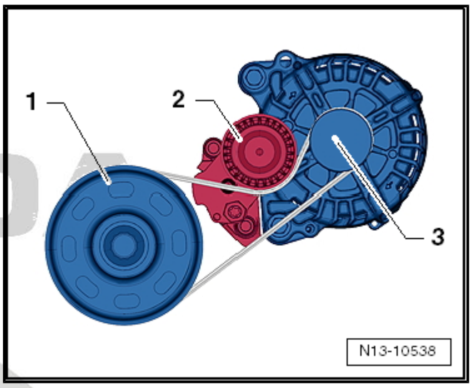
Installation is performed in a similar way in the reverse order. Pay attention to the following points:

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

1 - Poly V-belt pulley

2 - Tensioning device for V-ribbed belt

3 - Alternator

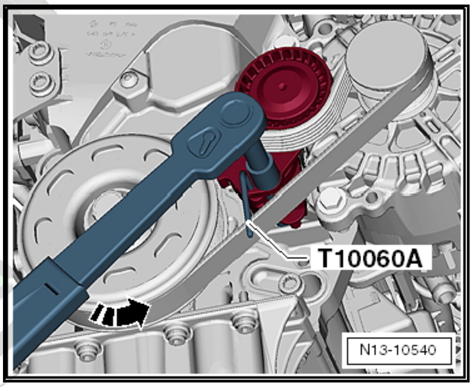


– Turn the tensioning element in the -direction of the arrow- and pull out the locking pin - T10060A- .

– 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 on vehicles with air conditioning system

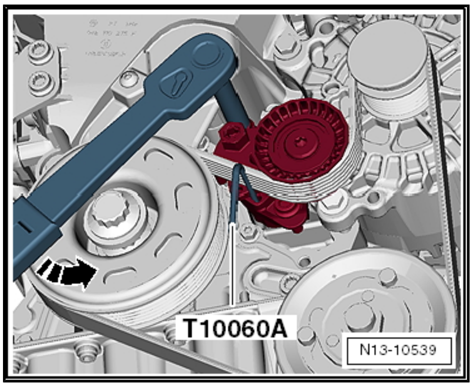
Special tools and workshop equipment required

♦ Locking pin - T10060A-

Removing

– To release the tension of the V-ribbed belt, turn the tensioning device in the anticlockwise direction -arrow-.

– Lock tensioning device with locking pin - T10060A- .



> ⚠ **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 performed in a similar way in the reverse order. Pay attention to the following points:

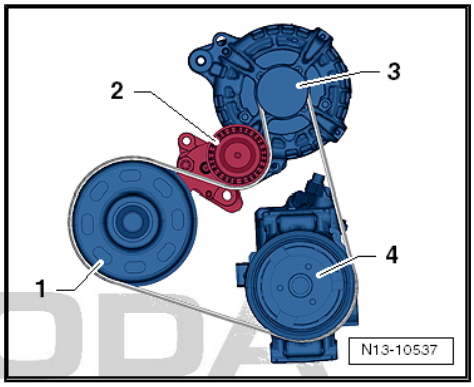
– Lay the V-ribbed belt as shown in the illustration:

1 - Poly V-belt pulley

2 - Tensioning device for V-ribbed belt

3 - Alternator

4 - AC compressor

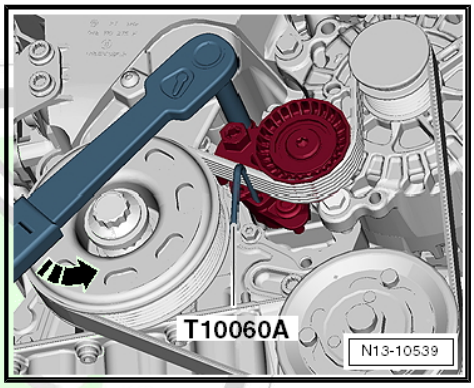


– Turn tensioning device anticlockwise -direction of the arrow- and pull out the locking pin - T10060A- .

– 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

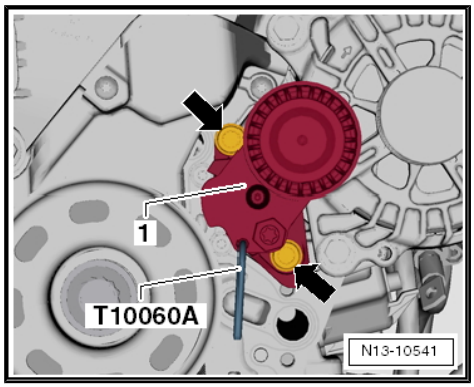
Removing

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

• vehicles without air conditioning ⇒ page 36

• Vehicles with air conditioning ⇒ page 35

– 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:

Tightening torques

• vehicles without air conditioning ⇒ page 34

• Vehicles with air conditioning ⇒ page 35

– Install the V-ribbed belt.

• vehicles without air conditioning ⇒ page 36

• Vehicles with air conditioning ⇒ page 37

1.4 Removing and installing ribbed belt pulley

Special tools and workshop equipment required

◆ Counterholder - T10475-

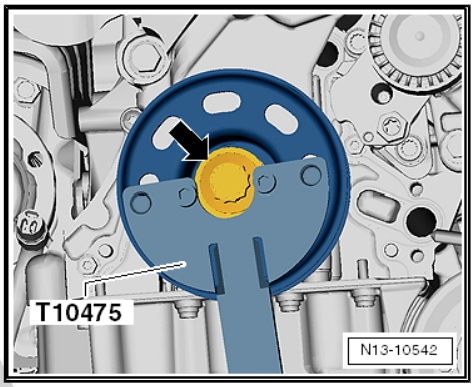
Removing

– Remove the sound dampening system ⇒ Body Work; Rep. gr. 66 .

– Remove V-ribbed belt ⇒ page 36 .

– Loosen screw -arrow- for crankshaft-belt pulley; to do so, use counterholder - T10475- .

– Unscrew screw and remove ribbed belt pulley.



Caution

Risk of destruction of the engine.

- *So as not to adjust the timing the crankshaft must not be turned while the ribbed belt pulley is removed.*

Install

- Tightening torque ⇒ page 34 .

Note

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

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

– Install poly V-belt ⇒ page 36 .

1.5 Removing and installing engine support

Special tools and workshop equipment required

- Supporting device - T30099-
- Adapter - T40091/3-
- Hook - MP9-200/10-
- Adapter - MP9-200/18-
- Support - 10-222A/31-
- Surface - T30119-

Removing

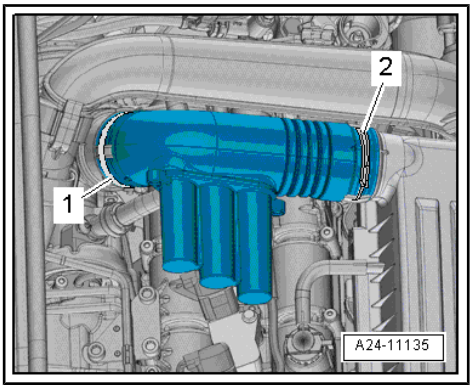
– Remove the battery with the battery tray ⇒ Electrical System; Rep. gr. 27 .

– Drain coolant ⇒ page 141 .

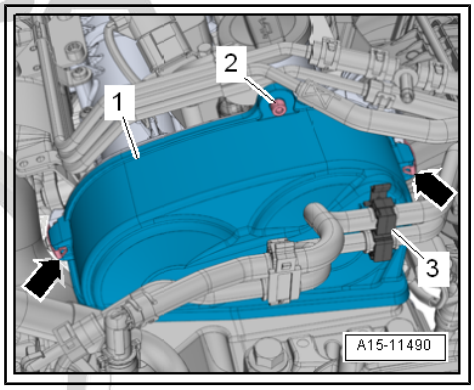
– Loosen hose clamps -1, 2- and remove air guide pipe.

– Remove air filter housing ⇒ page 215 .

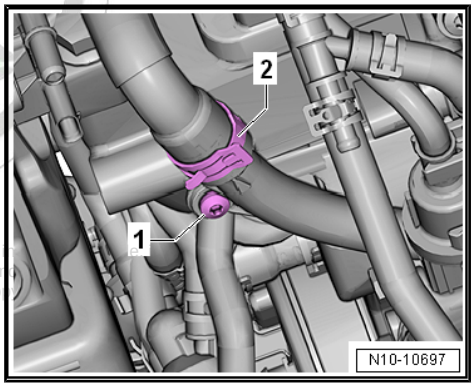
– Remove ribbed V-belt tensioning device ⇒ page 38 .



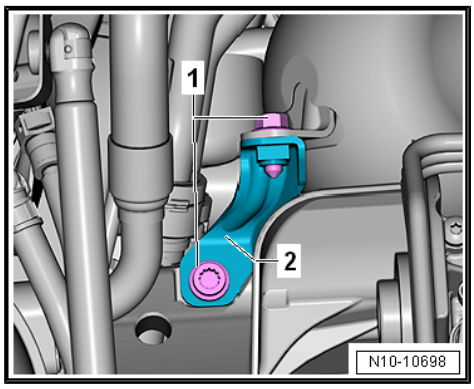
– Expose vacuum hose on the holder -3-.
– Unscrew screw -2-.
– Loosen clips -arrows- and remove toothed belt guard -1- upwards.



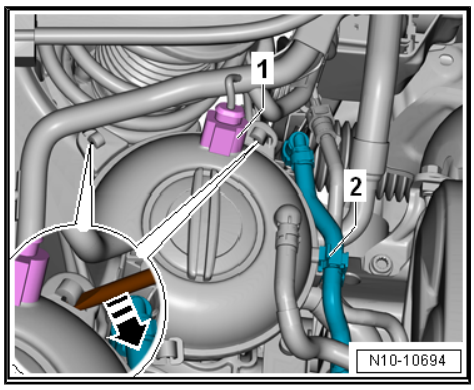
– Unscrew screw -1-.
– Loosen hose clamp -2- and remove coolant hose.



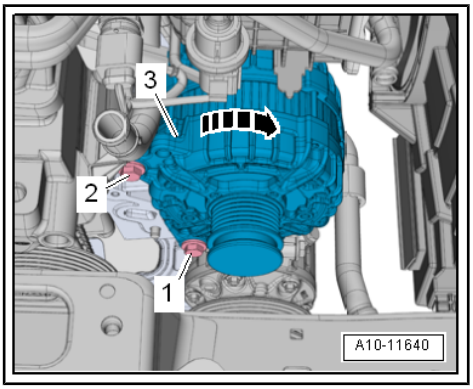
– Unscrew screws -1- and remove the catalytic converter holder -2-.



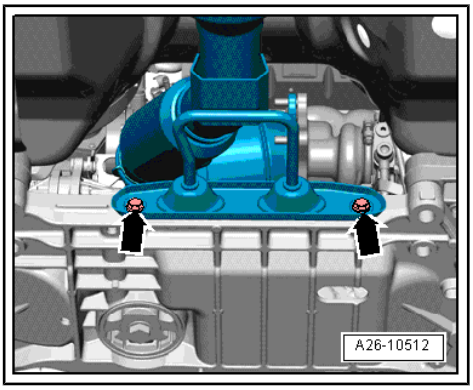
– Separate plug connection -1-.
– Expose hose -2- of the activated charcoal filter.
– Unlock catches using a screwdriver -arrow- and lay coolant expansion tank to the side.
– Open holding clamps on the air conditioning system pipes.



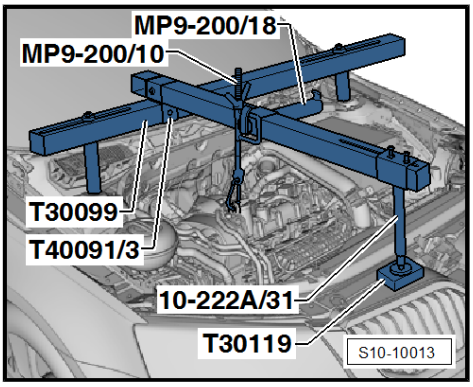
– Loosen screw -1- but do not unscrew it.
– Unscrew screw -2-.
– Swivel generator -3- forward in -direction of the arrow-.



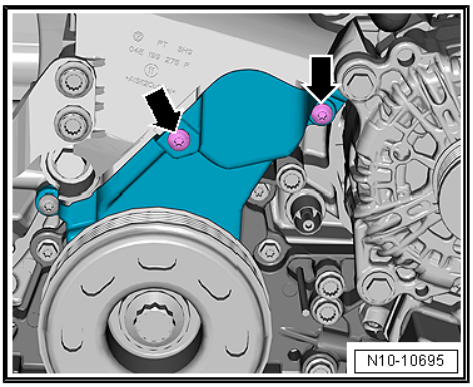
– Release screws -arrows- at holder for pre-exhaust pipe.
– Remove pendulum support ⇒ page 30 .
– Remove wiper arms ⇒ Electrical System; Rep. gr. 92 .
– Remove the cooling water tank cover ⇒ Body Work; Rep. gr. 50 .
– Remove caps of the screw connections of the front suspension strut dome.
– Install adapter - MP9-200/18 (10-222A/18)- with hooks for MP9-200 and T30099 - MP9-200/10 (10-222A/10)- and support - 10-222A/31-3- .



– Position the supporting device - T30099- with the support - 10-222A/31- and base - T30119- onto the screw connections of the suspension strut dome as shown.
– Attach snap hook to the engine suspension eye, right.
– Slightly pre-tension engine/gearbox unit with the spindle, do not raise.
– Remove engine mounts ⇒ page 27 .

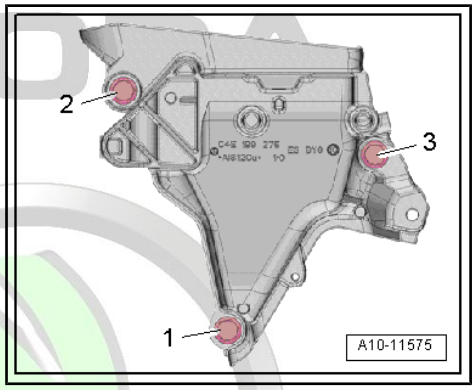


– Remove bolts -arrows-.



– Release screws -1, 2, 3-.

– Press engine/gearbox unit slightly to the left and remove engine support.



Install

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

Tightening torques:

- Assembly bracket ⇒ page 26
- Cylinder block (pulley end) ⇒ page 34
- Toothed belt drive ⇒ page 42
- Coolant pipes ⇒ page 161
- Charge-air system ⇒ page 205
- Air filter ⇒ page 214
- Removing and installing exhaust pipes/silencers ⇒ page 241
- Battery tray ⇒ Electrical System; Rep. gr. 27
- Wiper arms ⇒ Electrical System; Rep. gr. 92

– Check assembly bracket setting ⇒ page 31 .

1.6 Summary of components - toothed belt guard

1 - Bottom toothed belt guard

2 - 8 Nm

3 - Engine support bracket

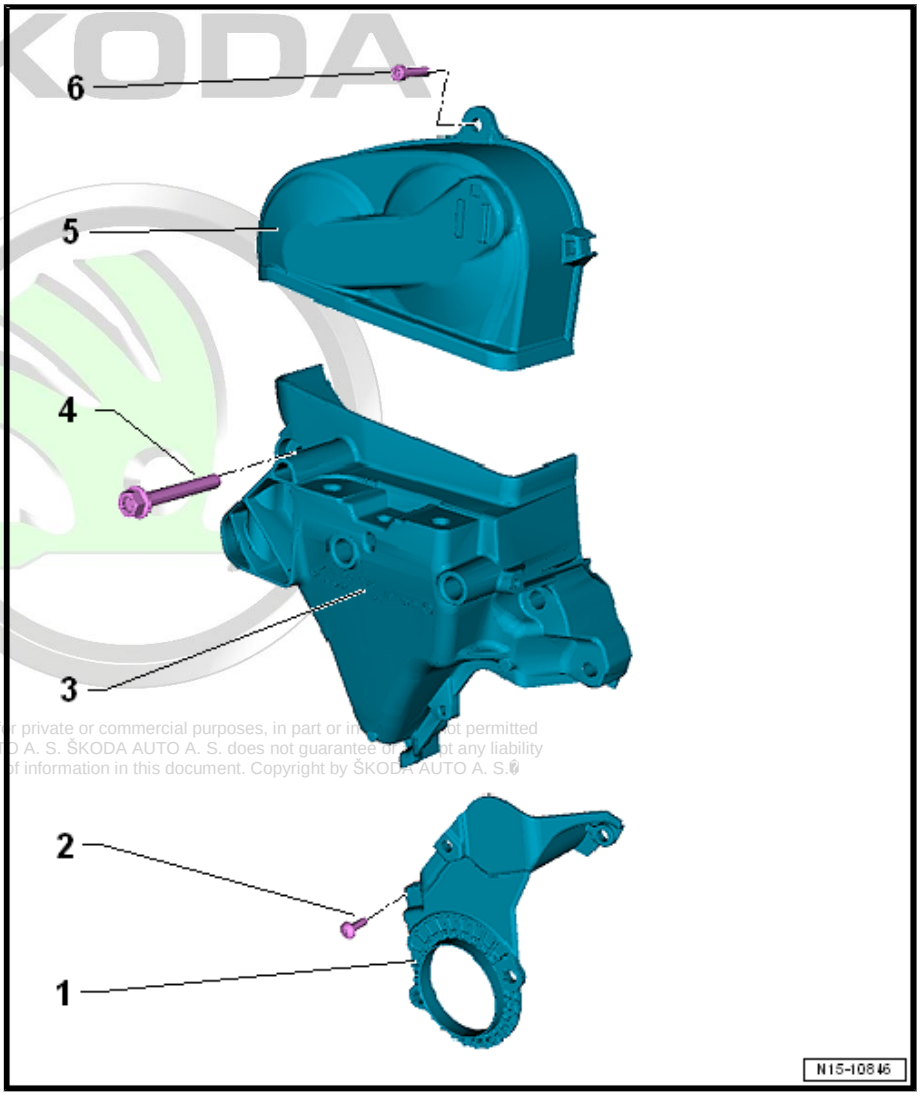
- ❑ Tightening torque and tightening order
  ⇒ page 27

4 - 40 Nm + torque a further 90° (1/4 turn)

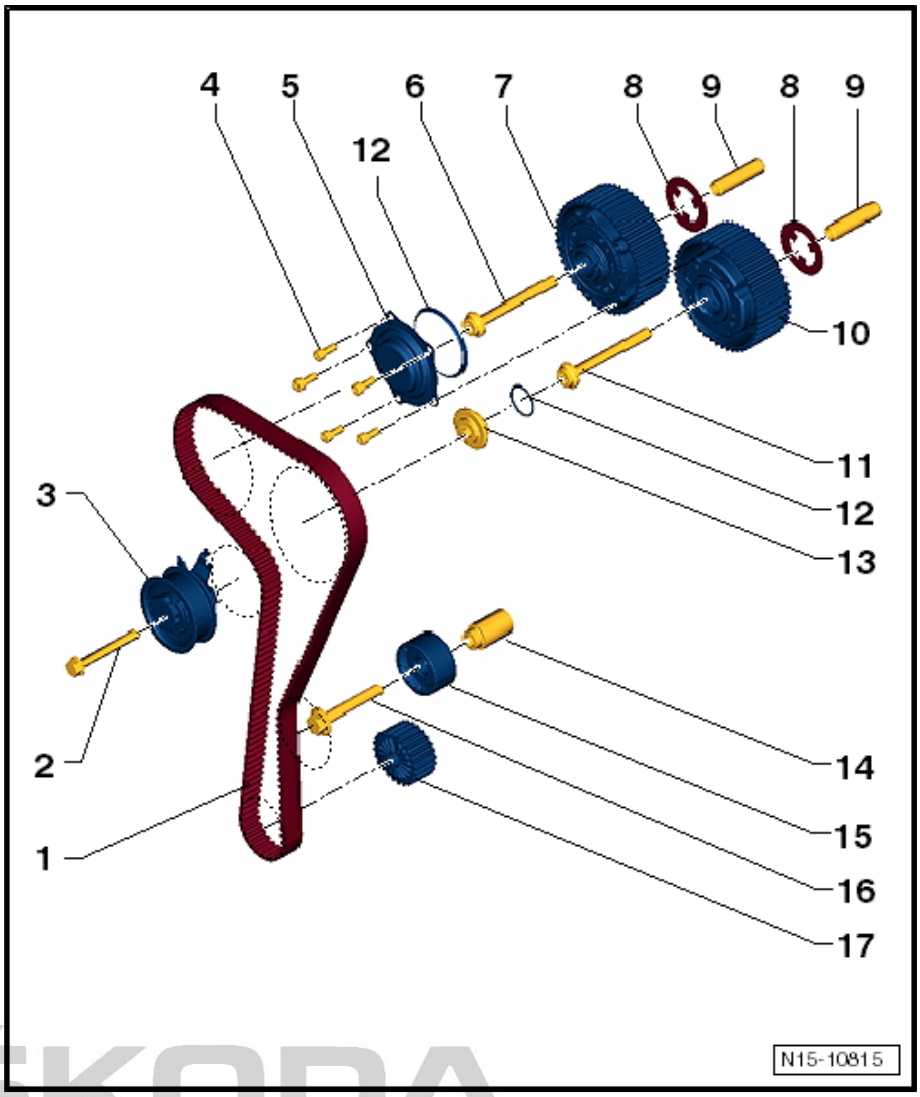
- ❑ replace
- ❑ Tightening torque and tightening order
  ⇒ page 27

5 - Top toothed belt guard

6 - 8 Nm



1.7 Assembly overview - toothed belt drive



1 - Toothed belt

- ❑ mark the direction of rotation with chalk or a felt-tip pen before removing
- ❑ check for wear
- ❑ removing ⇒ page 58
- ❑ install (set the timing) ⇒ page 64

2 - 25 Nm

3 - Tensioning roller

- ❑ for removing and installing, remove engine support ⇒ page 39

4 - 7 Nm

5 - Screw cap

6 - 50 Nm + torque a further 135° (3/8 turn)

- ❑ replace

7 - Toothed belt pulley, exhaust camshaft

- ❑ With camshaft control
- ❑ Removing and installing camshaft control ⇒ page 110

8 - Washer

9 - Guide bushing

10 - Toothed belt pulley, inlet camshaft

- ❑ With camshaft control
- ❑ Removing and installing camshaft control ⇒ page 110

11 - 50 Nm + torque a further 135° (3/8 turn)

- ❑ replace
- ❑

12 - O-ring

- ❑ replace

13 - Screw plug, 20 Nm

14 - Spacer sleeve

- ❑ with O-ring
- ❑ Renew O-ring

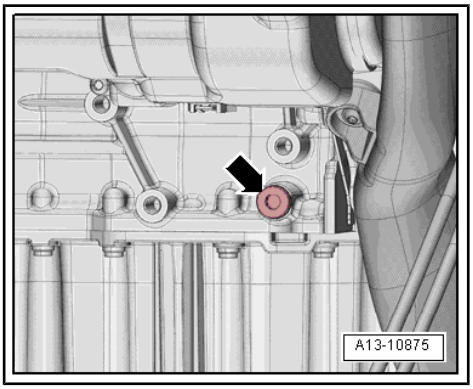
15 - Guide pulley

16 - 40 Nm

17 - 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.

1.8 Checking valve timing

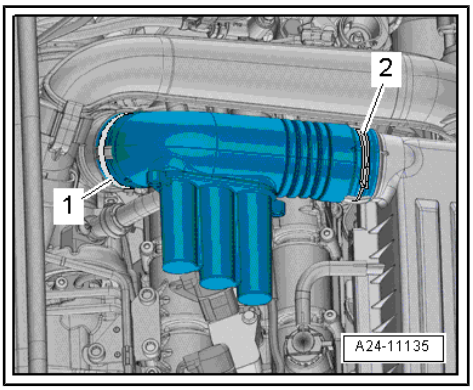
Special tools and workshop equipment required

- Fixing screw - T10340-
- Camshaft clamp - T10494-
- Release tool -T10527-
- Assembly tool - T10487-

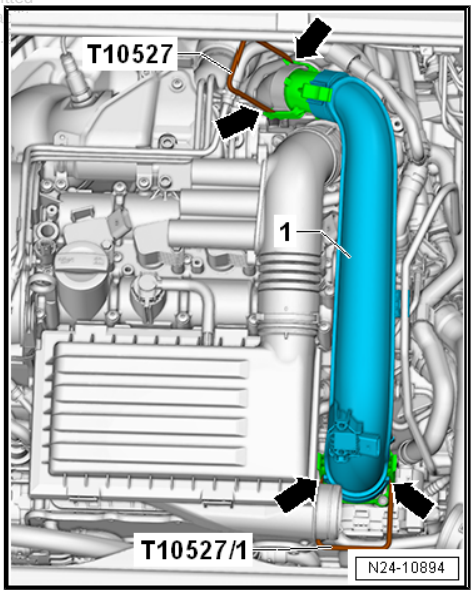
Work procedure

– Loosen hose clamps -1, 2- and remove air guide pipe.

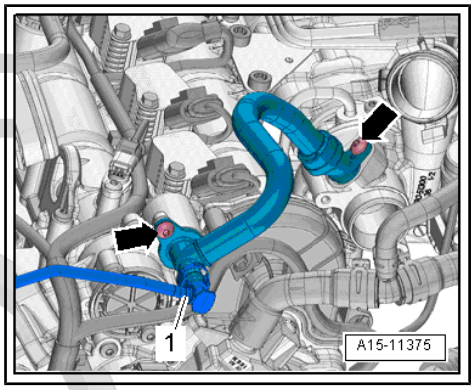
– Expose air guide hoses at the air guide pipe.



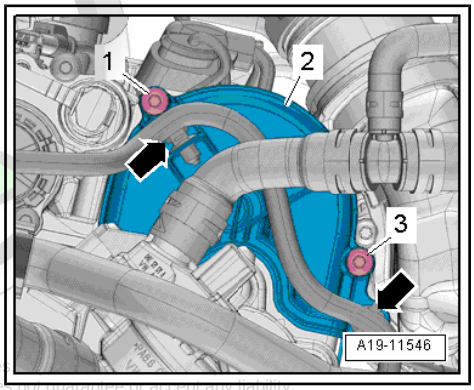
– Release latches -arrows- with release tool -T10527- and remove air guide pipe.



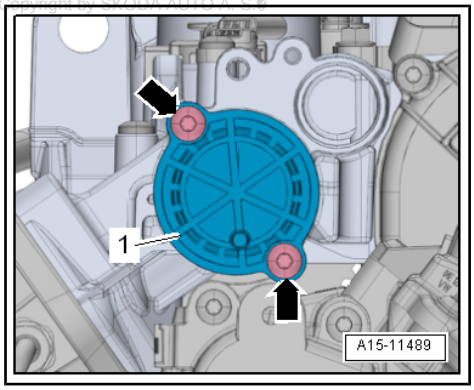
– Press release buttons and remove hose -1- to the activated charcoal filter.
– Unscrew screws -arrows- and remove hose for crankcase ventilation.



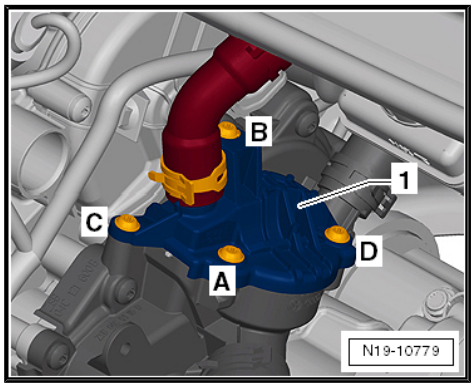
– Expose wiring loom -arrows-.
– Unscrew screws -1, 3- and remove toothed belt guard -2- for coolant pump toothed belt.



– Release screws -arrows- and remove cap -1-.
– Drain coolant ⇒ page 141 .

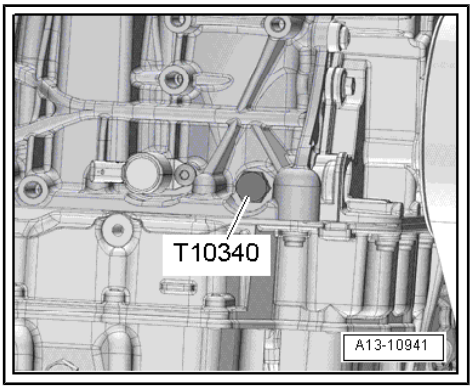


– Unscrew screws -A...D- and push thermostat cover -1- to the side.
– Remove the sound dampening system ⇒ Body Work; Rep. gr. 66 .



Turn crankshaft as follows onto “TDC”:

– Unscrew locking screw “TDC” bore at the cylinder block.
– 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 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- .

Caution

Risk of engine damage.

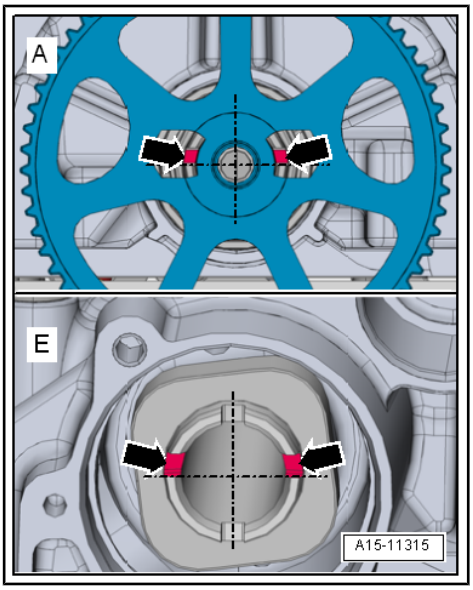
- ***If the fixing screw - T10340- cannot be screwed in up to the stop, the crankshaft is not in the correct position!***
- ***In this case, proceed as follows:***
- ***Unscrew the fixing screw.***
- ***Turn crankshaft through 90° in direction of rotation of engine.***
- ***Turn the fixing screw - T10340- up to the stop in the cylinder block and tighten to 30 Nm.***
- ***Turn crankshaft further up to the stop in direction of rotation of engine.***

• On both camshafts the asymmetrically arranged grooves -top arrows- on the gearbox side must now be at the top, as shown in the illustration.
• On the exhaust camshafts the grooves -top arrows- are accessible through the recesses in the coolant pump driving wheel.
• On the inlet camshaft the grooves -bottom arrow- are above the camshaft centre.

A - Exhaust camshaft

E - Inlet camshaft

– If the camshafts are not positioned as described, unscrew the fixing screw - T10340- and turn the camshaft by one more turn and set it to “TDC” again.



Note

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

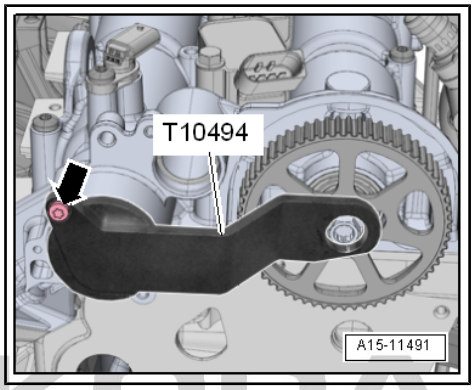
– If the camshafts are positioned as described, insert camshaft clamp - T10494- into the inlet camshaft up to the stop.
– Tighten screw -arrow- hand-tight.

If camshaft clamp cannot be fitted:

– Set timing and remove the toothed belt from the camshaft ⇒ page 48 .

If camshaft clamp can be fitted:

– Valve timing is OK.



Caution

Risk of destruction of the engine.

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

Further installation occurs in reverse order.

Tightening torques:

- Toothed belt drive ⇒ page 44
- Locking screw for bore in the cylinder block ⇒ page 45
- Camshaft housing ⇒ page 95
- Crankcase ventilation ⇒ page 132
- Coolant pump ⇒ page 147
- Charge-air system ⇒ page 205

Note

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

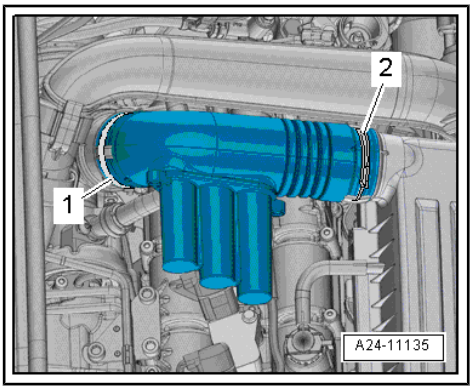
1.9 Remove the toothed belt from the camshaft

Special tools and workshop equipment required

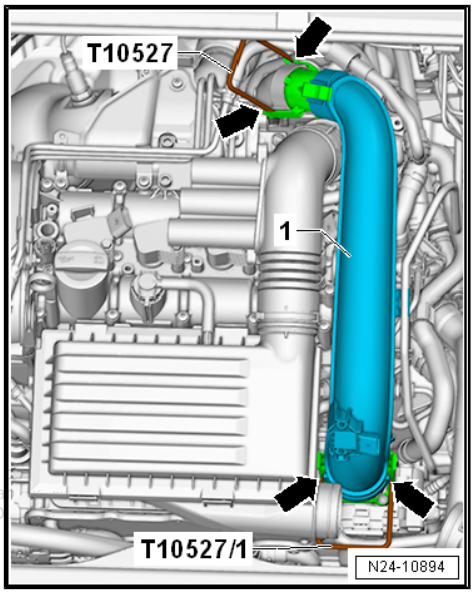
- Counterholderr - T10172- with adapters -T10172/1-
- Fixing screw - T10340-
- Counterholder - T10475-
- Key - T10499-
- Insertion tool - T10500-
- Camshaft clamp - T10494-
- Release tool -T10527-
- Assembly tool - T10487-

Work procedure

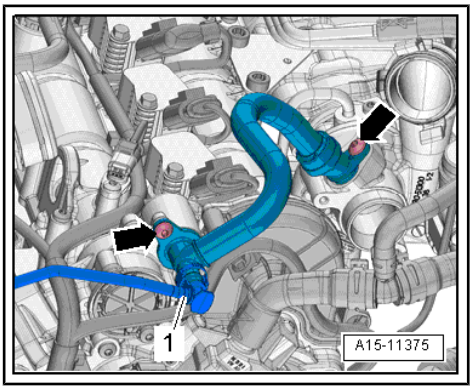
– Loosen hose clamps -1, 2- and remove air guide pipe.



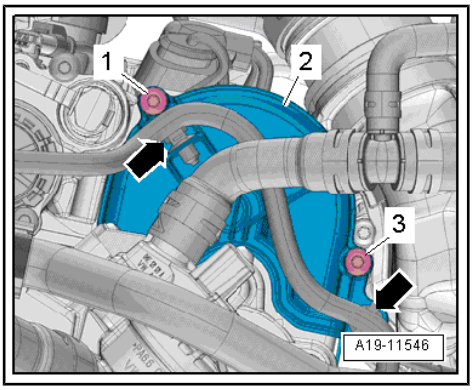
– Release latches -arrows- with release tool -T10527- and remove air guide pipe.



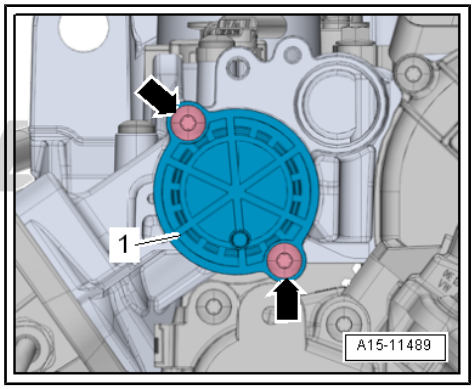
– Press release buttons and pull off hose -1-.
– Unscrew screws -arrows- and remove hose for crankcase ventilation.



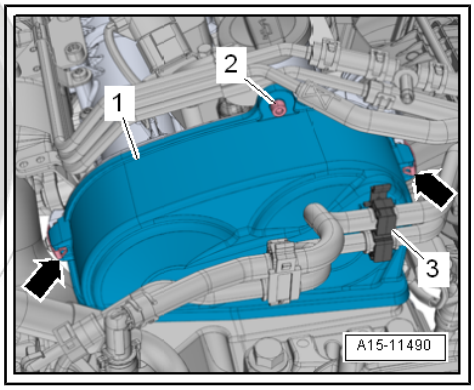
– Expose wiring loom -arrows-.
– Unscrew screws -1, 3- and remove toothed belt guard -2- for coolant pump toothed belt.



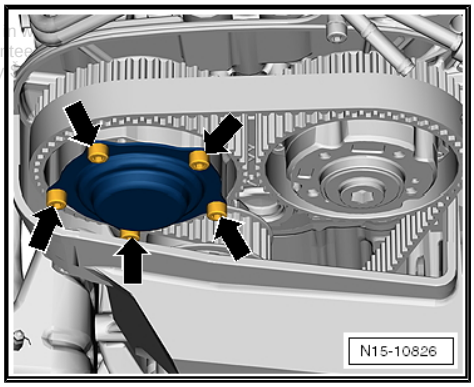
– Release screws -arrows- and remove cap -1-.
– Expose vacuum hose on the holder -3-.



– Unscrew screw -2-.
– Loosen clips -arrows- and remove toothed belt guard -1- upwards.



– Unscrew screws -arrows- and remove the cover from the camshaft control of the exhaust camshaft.



Caution

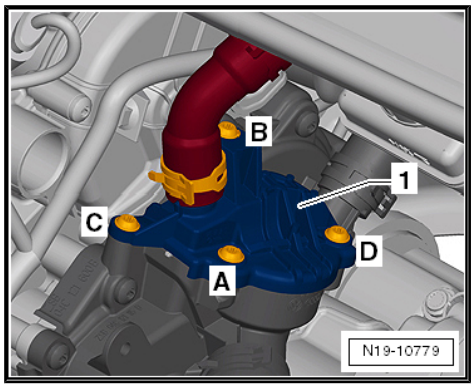
Leaking engine oil!

To protect the toothed belt, place a cleaning cloth below the camshaft control to collect any oil that is flowing out.

Contact points of the toothed belt, camshaft sprocket, crankshaft toothed belt sprocket, tensioning pulley and guide pulley are to be kept free of oil.

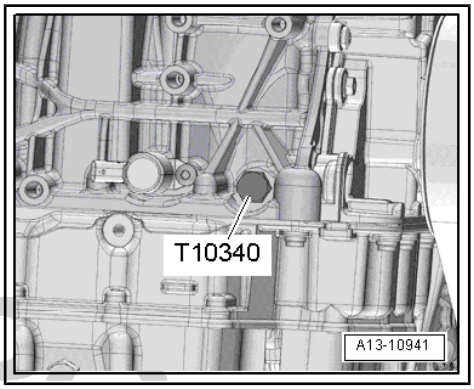
– Drain coolant ⇒ page 141 .

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



Turn crankshaft as follows onto “TDC”:

– Unscrew locking screw “TDC” bore at the cylinder block.
– 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 cheek must now be resting on the fixing screw.



Note

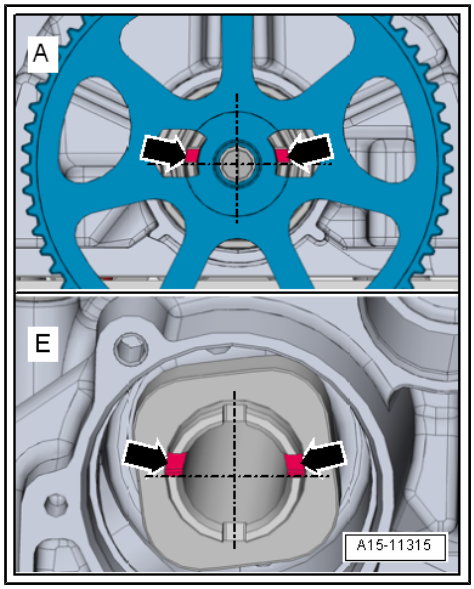
The crankshaft is only locked in direction of rotation of engine using the fixing screw - T10340- .

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.***
- ***Turn crankshaft through 90° in direction of rotation of engine.***
- ***Turn the fixing screw - T10340- up to the stop in the cylinder block and tighten to 30 Nm.***
- ***Turn crankshaft further up to the stop in direction of rotation of engine.***

- On both camshafts the asymmetrically arranged grooves -arrows- on the gearbox side must now be at the top, as shown in the illustration.
- 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 by 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".

If the camshafts are as described:

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

Note

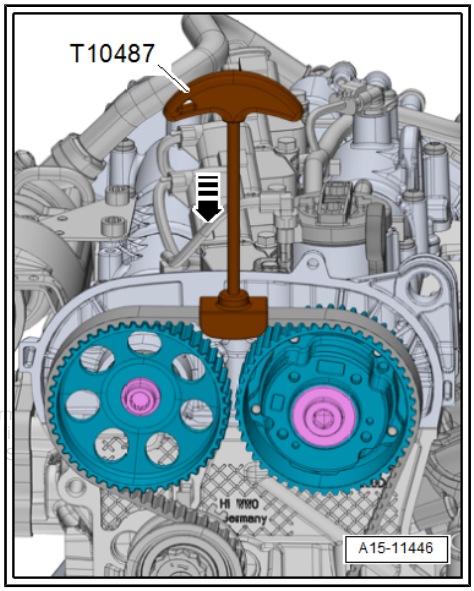
- *The camshaft clamp - T10494- must move into position easily.*
- *The camshaft clamp must not be positioned using any kind of hammer.*

If camshaft clamp - T10494- cannot be installed:

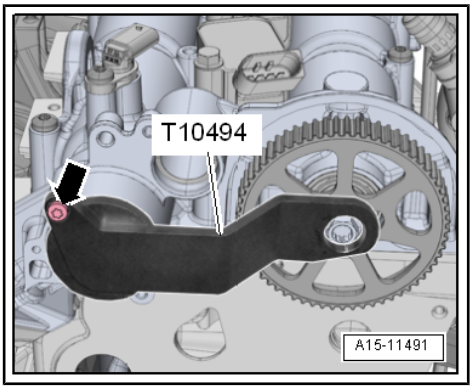
Caution

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.



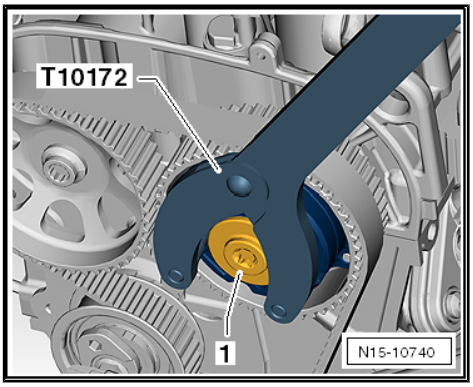
Caution

Risk of damaging the camshaft.

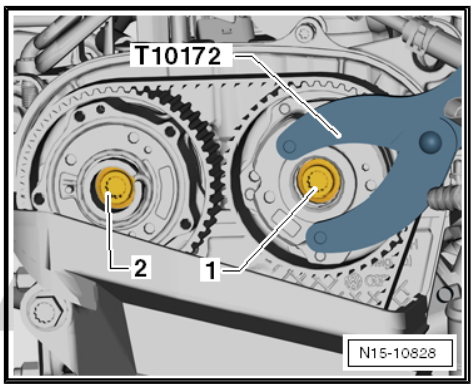
- *Do not use the camshaft fixer/locator - T10494- as a counterholder.*

– Tighten screw -arrow- hand-tight.

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



– Loosen screws -1, 2- by approximately one turn. Use counterholder - T10172- with adapters -T10172/2- and -T10172/1- to do this.



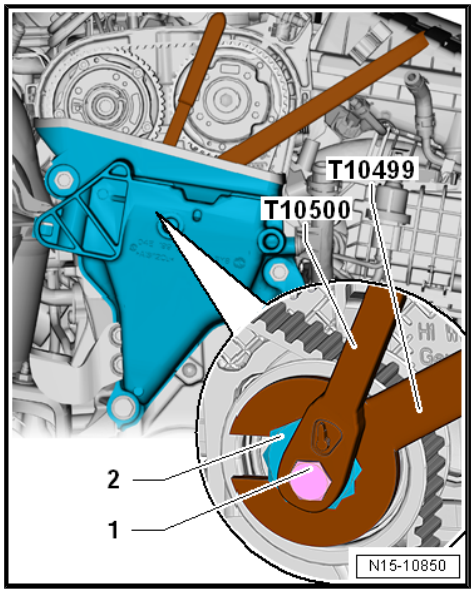
Caution

Risk of damage due to 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.*

– 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 damage to the toothed belt!

- *The toothed belt contains glass fibre cores. For this reason, the diameter of the toothed belt should never fall beneath 50 mm. Otherwise this may reduce the life time of the toothed belt.*

– Remove the toothed belt from the camshaft sprockets.

Installing (set the timing)

Tightening torques:

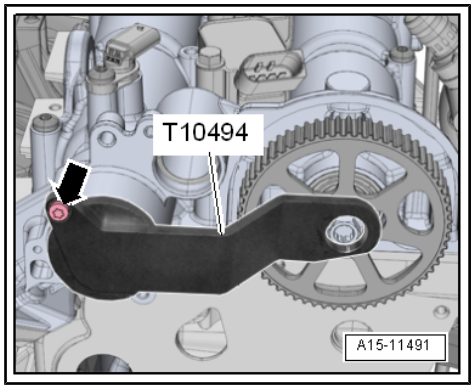
- Toothed belt drive ⇒ page 44
- Locking screw for bore in the cylinder block ⇒ page 45
- Camshaft housing ⇒ page 95
- Crankcase ventilation ⇒ page 132
- Coolant pump ⇒ page 147
- Charge-air system ⇒ page 205

Note

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

– “Check TDC” position of camshaft and crankshaft:

- Camshaft clamp -T10494- attached to camshaft housing.

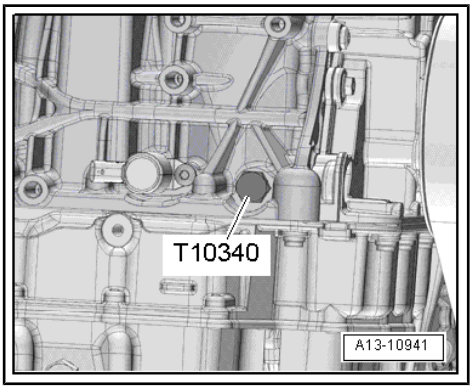


Caution

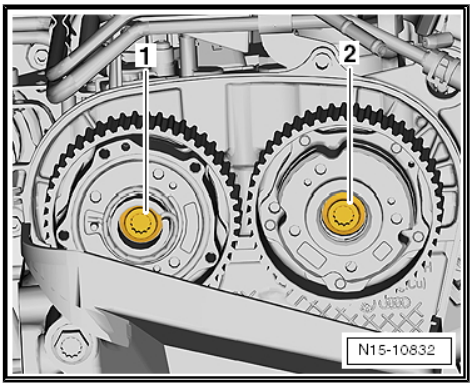
Risk of damaging the camshafts.

- *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 camshaft sprocket screws -1- and -2- and insert new screws loosely.
- It must still be possible to turn the camshaft sprockets on the camshafts, however they must not hang loose.

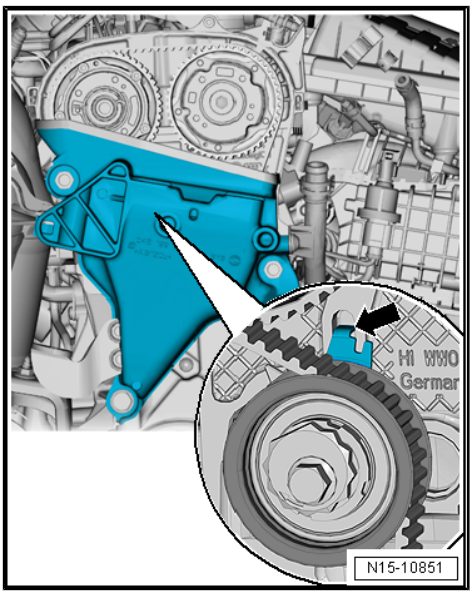


- The sheet peg -arrow- of the tensioning pulley must engage in the cast iron recess of the cylinder head.

Caution

There is a risk of damage to the toothed belt!

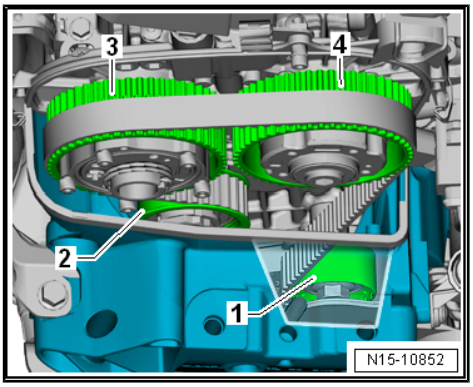
- *The toothed belt contains glass fibre cores. For this reason, the diameter of the toothed belt should never fall beneath 50 mm. Otherwise this may reduce the life time of the toothed belt.*



Note

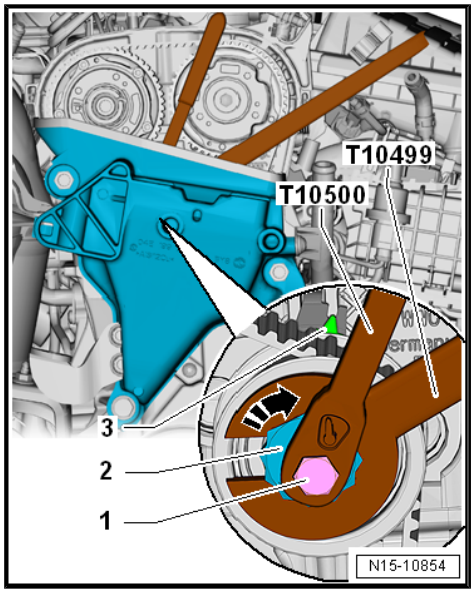
Observe sequence when fitting the toothed belt.

– Pull toothed belt upwards, then fit the tensioning pulley -2- and camshaft sprockets -3- and -4- onto the guide roller -1-.



– 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

The torque wrench - VAS 6583- must be used for tightening!

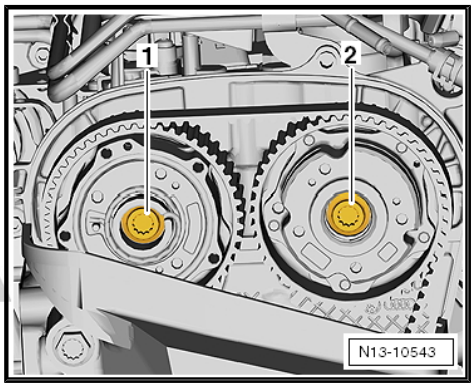
When setting the tightening torque on the torque wrench - VAS 6583- the actual dimension specified on the tool insert - T10500- must be put into the torque wrench!

– Keep eccentric in this position and tighten screw -1- to 25 Nm. Use tool insert - T10500- with torque wrench - VAS 6583- to do this.

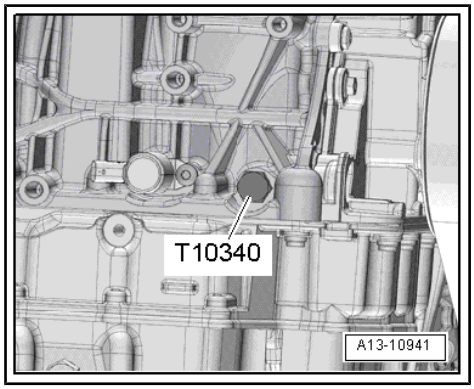
Note

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.

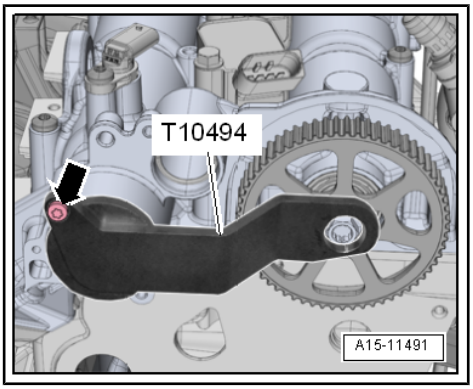
– Initially tighten screws -1, 2- to 50 Nm. To do so, use counter-holder - T10172- with adapters -T10172/1- .



– Unscrew fixing screw - T10340- .



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



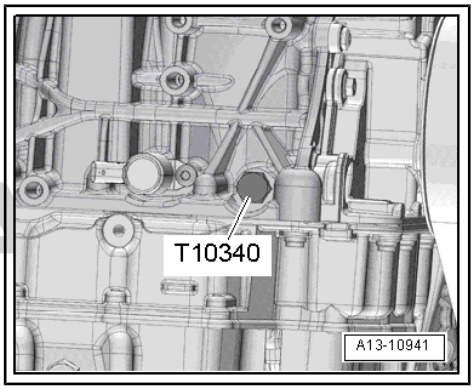
Checking valve timing

– Turn the crankshaft two turns in the running direction of the engine.

– Turn the fixing screw - T10340- up to the stop in the cylinder block and tighten to 30 Nm.

– Turn crankshaft further up to the stop in direction of rotation of engine.

• 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- .

– The camshaft clamp -T10494- must move into position easily.

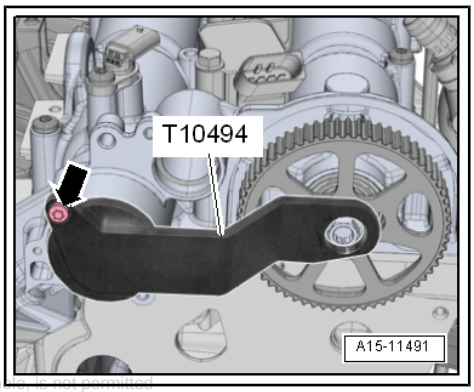
The camshaft clamp must not be positioned using any kind of hammer.

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

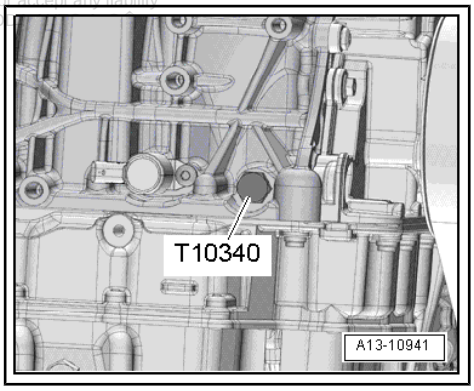
If it is not possible to insert the camshaft clamp -T10494- , the timing is NOK:

– Repeat control time settings.

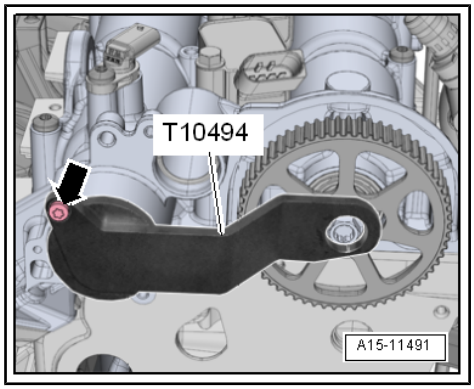
If it is possible to insert the camshaft clamp -T10494- , the timing is OK:



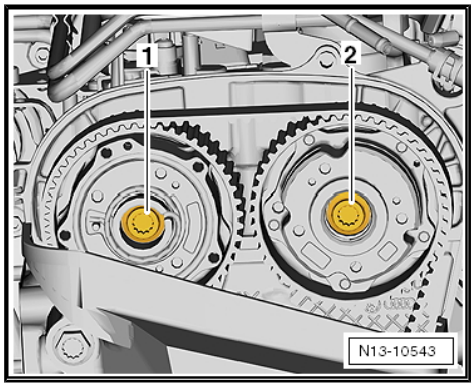
– Unscrew fixing screw - T10340- .



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



– Tighten screws -1- and -2- to end stop tightening torque ⇒ page 44 .
– Use counterholder - T10172- with adapters -T10172/1- .

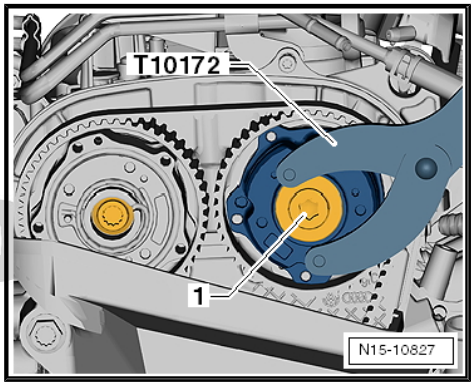


– Tighten locking screw -1-. Use counterholder - T10172- with adapters -T10172/1- to do so.

Caution

Risk of destruction of the engine.

- *To complete the work, check that the fixing screw - T10340- and camshaft clamp - T10504- have been removed from the engine.*



Further installation occurs in reverse order.

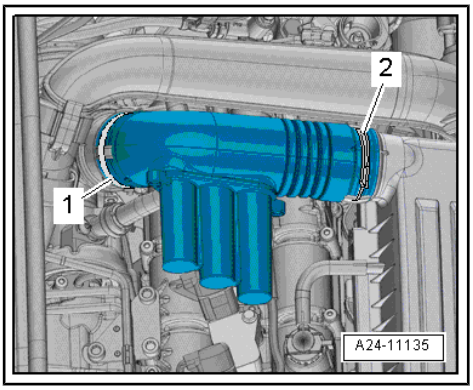
1.10 Removing and installing toothed belt

Special tools and workshop equipment required

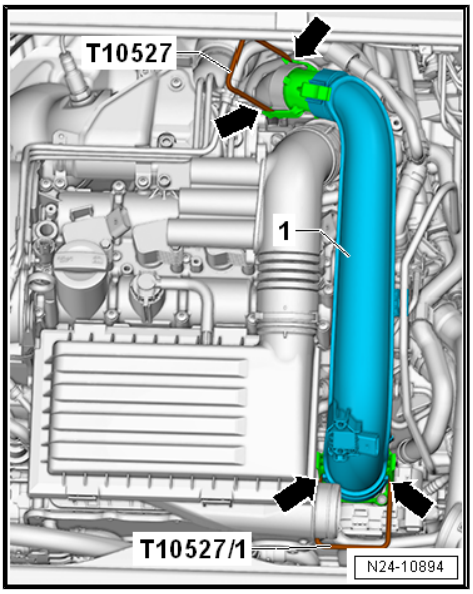
- Counterholder - T10172- with adapters -T10172/1-
- Fixing screw - T10340-
- Counterholder - T10475-
- Key - T10499-
- Insertion tool - T10500-
- Camshaft clamp - T10494-

Removing

– Loosen hose clamps -1, 2- and remove air guide pipe.

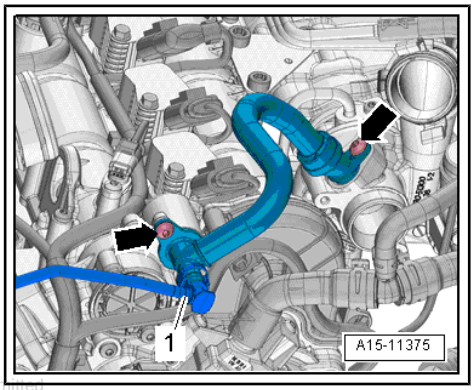


– Release latches -arrows- with release tool -T10527- and remove air guide pipe.



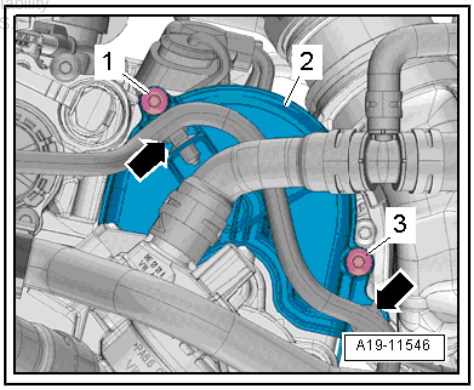
– Press release buttons and remove hose -1- to the activated charcoal filter.

– Unscrew screws -arrows- and remove hose for crankcase ventilation.



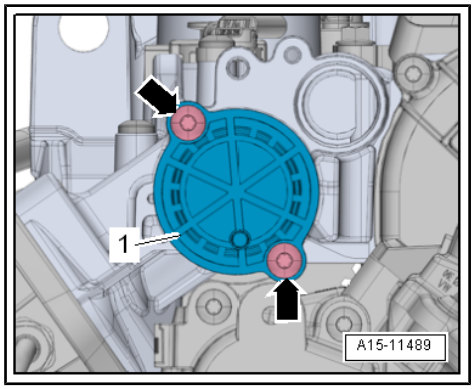
– Expose wiring loom -arrows-.

– Unscrew screws -1, 3- and remove toothed belt guard -2- for coolant pump toothed belt.



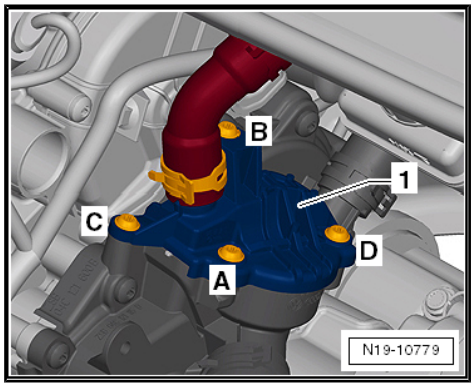
– Release screws -arrows- and remove cap -1-.

– Drain coolant ⇒ page 141 .



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

– Remove the sound dampening system ⇒ Body Work; Rep. gr. 66 .



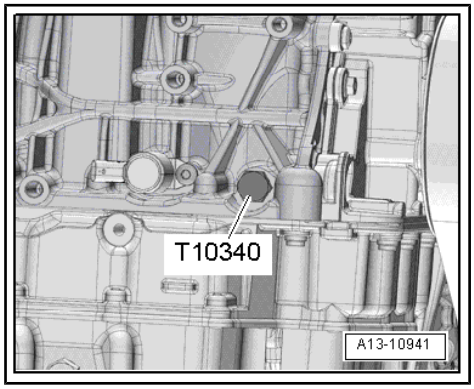
Turn crankshaft as follows onto “TDC”:

– Unscrew locking screw “TDC” bore at the cylinder block.

– 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 cheek must now be resting on the fixing screw.



Note

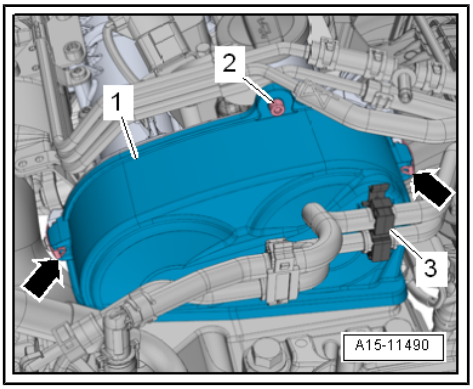
The crankshaft is only locked in direction of rotation of engine using the fixing screw - T10340- .

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.***
- ***Turn crankshaft through 90° in direction of rotation of engine.***
- ***Turn the fixing screw - T10340- up to the stop in the cylinder block and tighten to 30 Nm.***
- ***Turn crankshaft further up to the stop in direction of rotation of engine.***

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



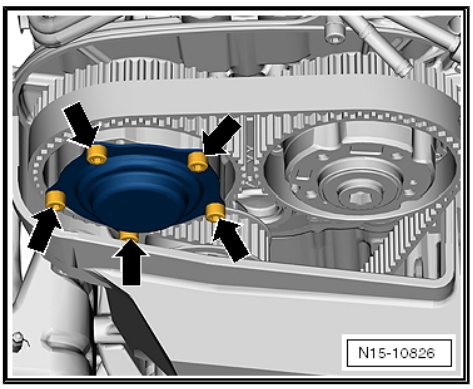
Caution

Leaking engine oil!

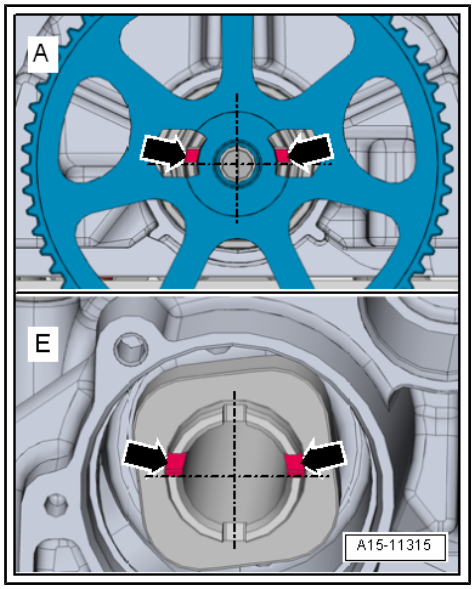
To protect the toothed belt, place a cleaning cloth below the camshaft control to collect any oil that is flowing out.

Contact points of the toothed belt, camshaft sprocket, crankshaft toothed belt sprocket, tensioning pulley and guide pulley are to be kept free of oil.

– Unscrew screws -arrows- and remove the cover from the camshaft control of the exhaust camshaft.



- On both camshafts the asymmetrically arranged grooves -arrows- on the gearbox side must now be at the top, as shown in the illustration.
- 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 by 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".

If the camshafts are as described:

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

Note

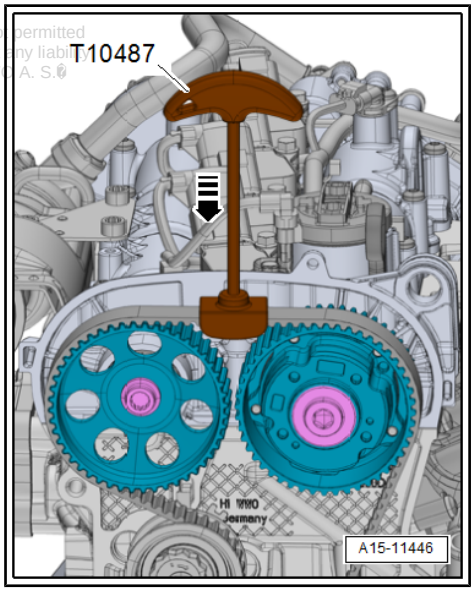
- *The camshaft clamp - T10494- must move into position easily.*
- *The camshaft clamp must not be positioned using any kind of hammer.*

If camshaft clamp - T10494- cannot be installed:

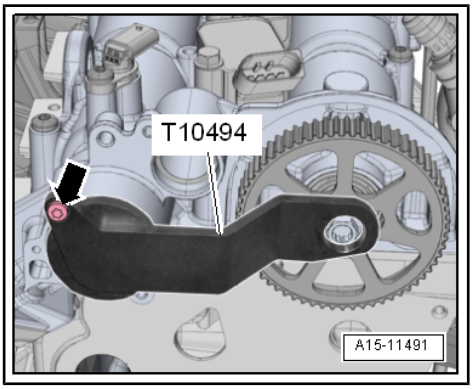
Caution

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.



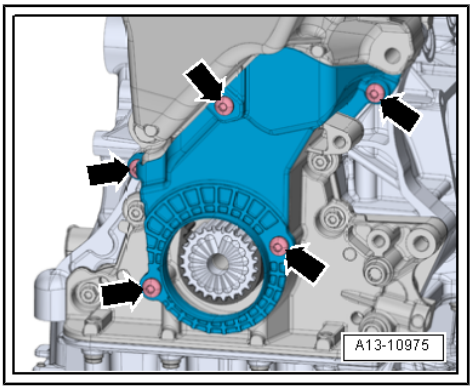
Caution

Risk of damaging the camshaft.

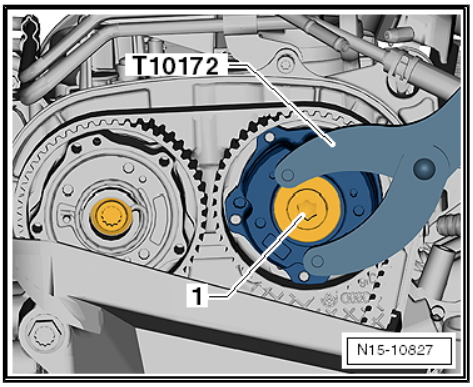
- *Do not use the camshaft fixer/locator - T10494- as a counterholder.*

– Removing the V-ribbed belt pulley ⇒ page 38 .

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



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

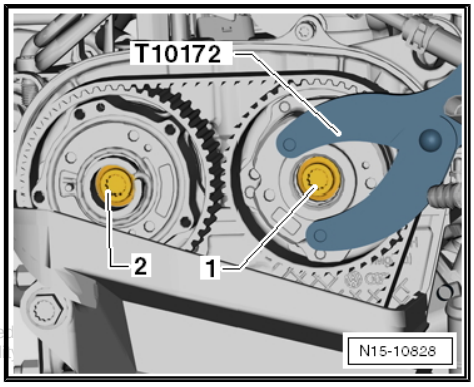


Caution

Risk of damaging the camshaft.

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

– Loosen screws -1- and -2- by approximately one turn. To do so, use counterholder - T10172- with adapters -T10172/1- .



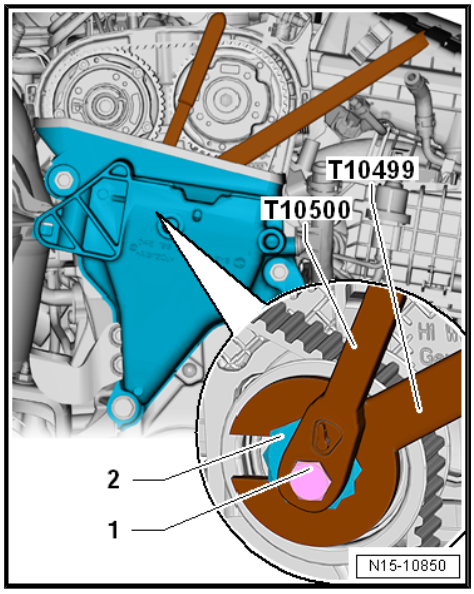
– Release screw -1- using insertion tool - T10500- .

– 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.*



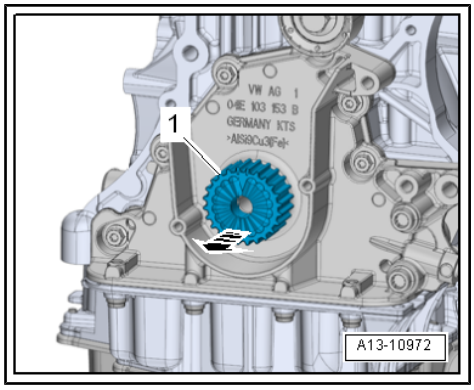
– Remove timing belt.

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

Installing (set the timing)

Note

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



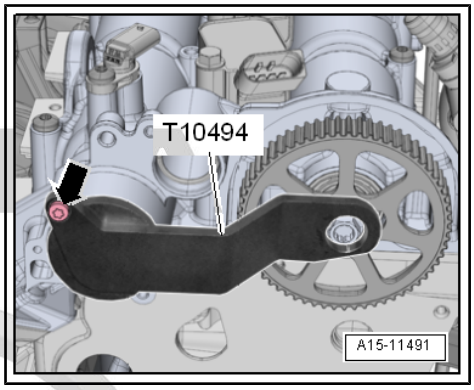
– "Check TDC" position of camshaft and crankshaft:

• Camshaft clamp - T10494- attached to camshaft housing.

Caution

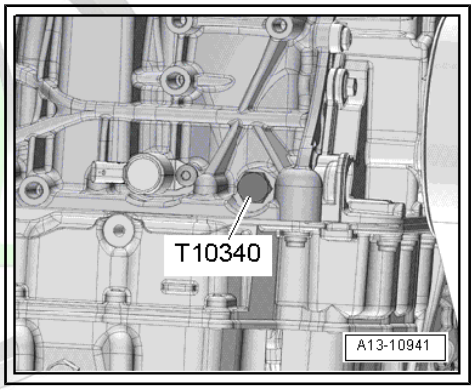
Risk of damaging the camshafts.

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



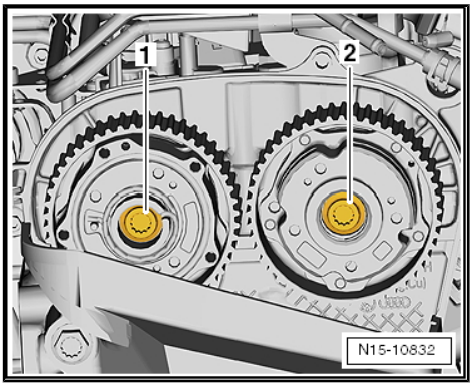
• Fixing screw - T10340- turned up to the stop in the cylinder block and tightened to 30 Nm.

• Crankshaft in engine direction of rotation applied to the fixing screw - T10340- = "TDC" position.

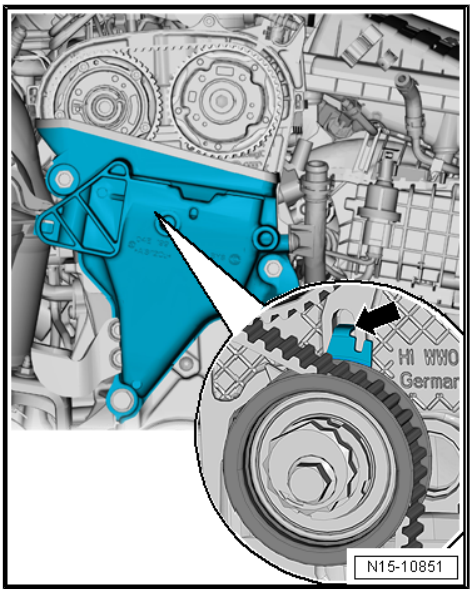


– Replace camshaft sprocket screws -1- and -2- and insert new screws loosely.

• It must still be possible to turn the camshaft sprockets on the camshafts, however they must not hang loose.



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

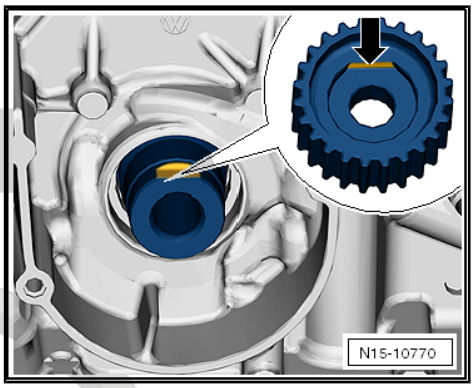


– Fit crankshaft toothed belt pulley onto the crankshaft.

• The contact surface between the V-ribbed belt pulley and the crankshaft toothed belt pulley must be free of oil and grease.

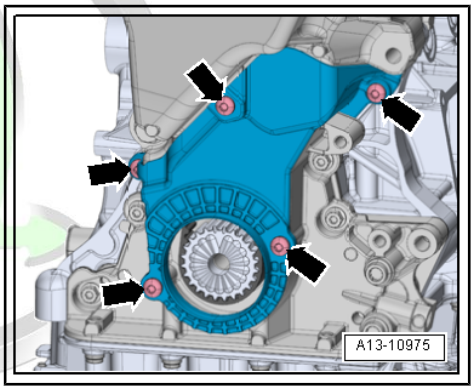
• Milled surface -arrow- on the crankshaft toothed belt must be positioned on the crankshaft stub.

– Initially fit toothed belt from below on the crankshaft toothed belt pulley.



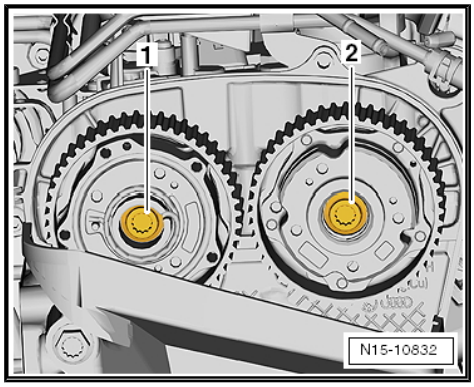
– Install the bottom toothed belt guard -arrows-.

– Installing the V-ribbed belt pulley ⇒ page 38 .

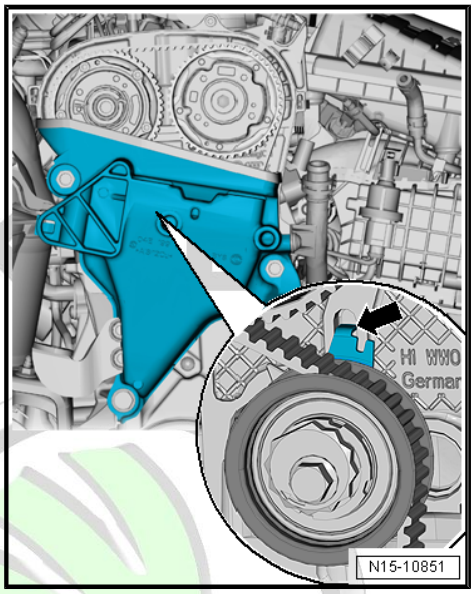


– Replace camshaft sprocket screws -1- and -2- and insert new screws loosely.

• It must still be possible to turn the camshaft sprockets on the camshafts, however they must not hang loose.



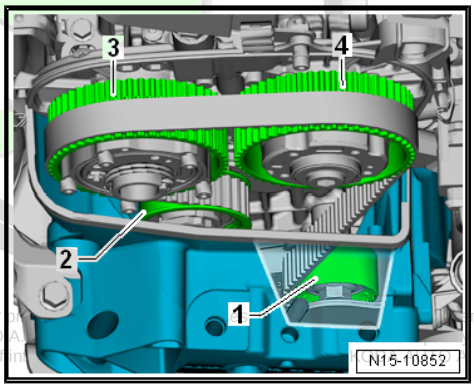
• The sheet peg -arrow- of the tensioning pulley must engage in the cast iron recess of the cylinder head.



Note

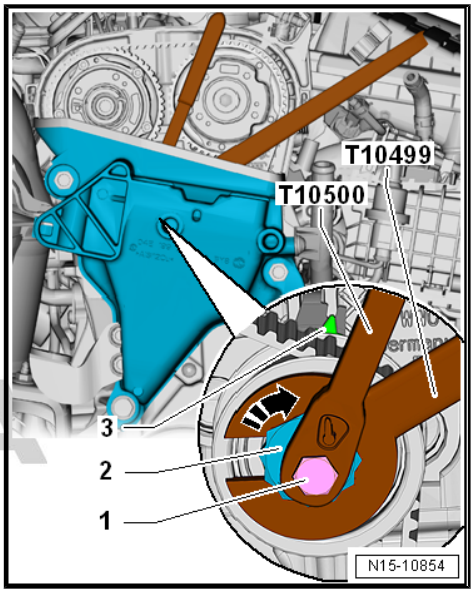
Observe sequence when fitting the toothed belt.

– Pull toothed belt upwards, then fit the tensioning pulley -2- and camshaft sprockets -3- and -4- onto the guide roller -1-.



– 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

The torque wrench - VAS 6583- must be used for tightening!

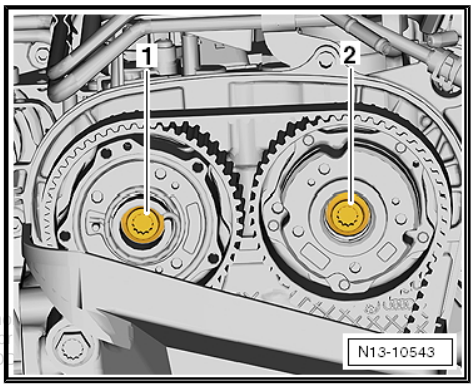
When setting the tightening torque on the torque wrench - VAS 6583- the actual dimension specified on the tool insert - T10500- must be put into the torque wrench!

– Keep eccentric in this position and tighten screw -1-. Use tool insert - T10500- with torque wrench - VAS 6583- to do this.

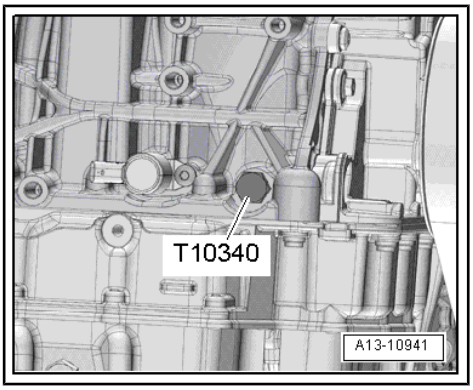
Note

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.

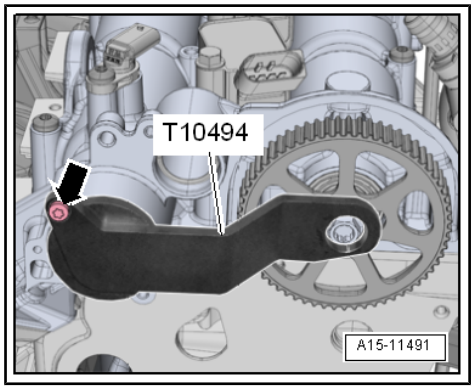
– Initially tighten screws -1, 2- to 50 Nm. To do so, use counterholder - T10172- with adapters -T10172/1- .



– Unscrew fixing screw - T10340- .



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



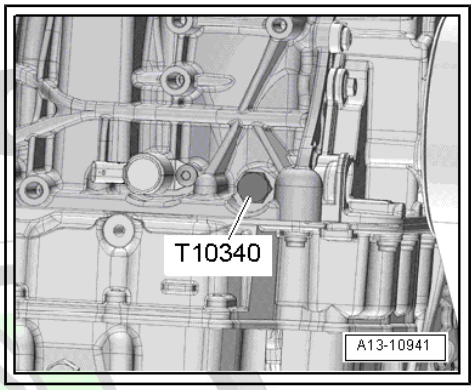
Checking valve timing

– 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 crankshaft further up to the stop in direction of rotation of engine.

• 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- .

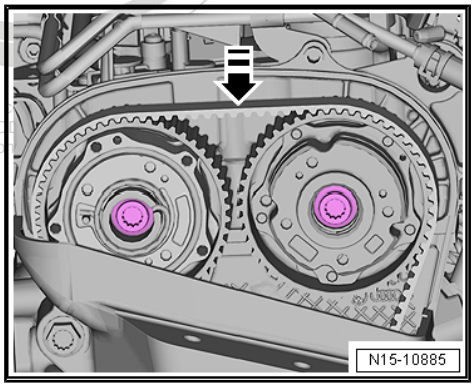
Note

♦ *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:

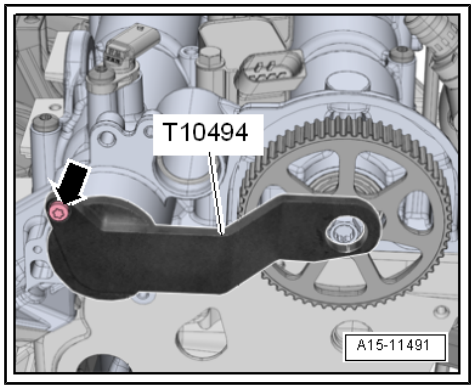
– Using the assembly tool - T10487- in -direction of arrow- press on the toothed belt.



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

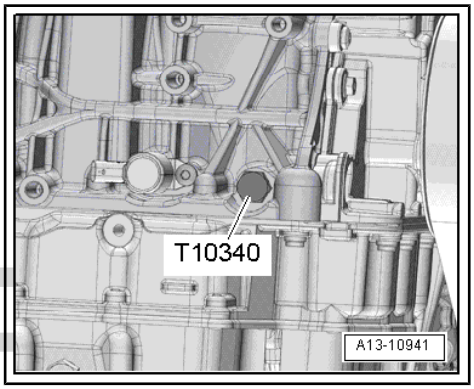
If it is not possible to insert the camshaft clamp - T10494- , the timing is NOK:

– Repeat control time settings.

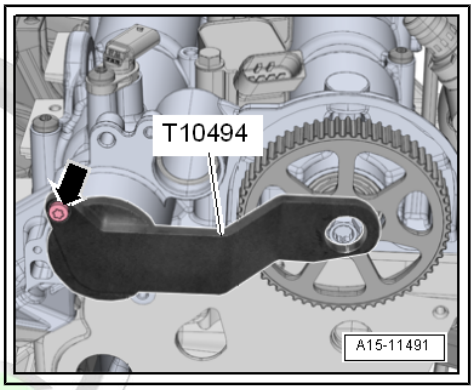


If it is possible to insert the camshaft clamp - T10494- , the timing is OK:

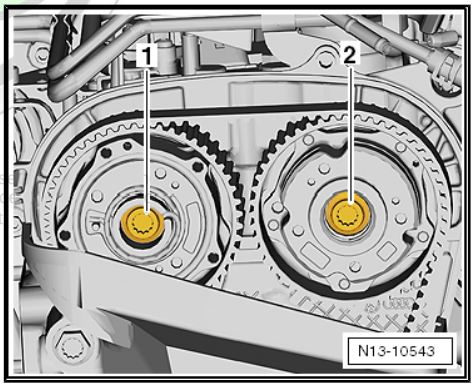
– Unscrew fixing screw - T10340- .



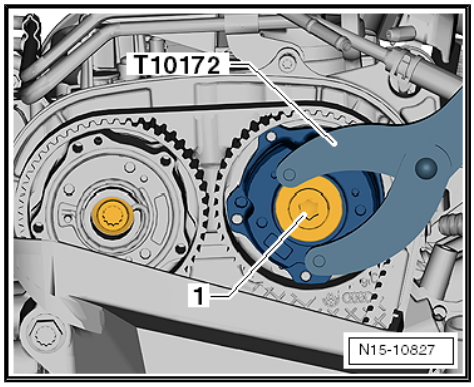
– Unscrew bolt -arrow- and remove camshaft clamp -T10494- .



– Initially tighten screws -1- and -2- to the end stop tightening torque ⇒ page 44 . To do so, use counterholder - T10172- with adapters -T10172/1- .



– Tighten locking screw -1-. Use counterholder - T10172- with adapters -T10172/1- to do so.



Caution

Risk of destruction of the engine.

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

Further installation occurs in reverse order.

Tightening torques:

- V-ribbed belt drive ⇒ page 34
- Toothed belt guard ⇒ page 42
- Toothed belt drive ⇒ page 44
- Locking screw for bore in the cylinder block ⇒ page 45
- Camshaft housing ⇒ page 95
- Crankcase ventilation ⇒ page 132
- Coolant pump ⇒ page 147
- Exhaust gas turbocharger ⇒ page 197
- Charge-air system ⇒ page 205

1.11 Sealing flange on the belt pulley side - Summary of components

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

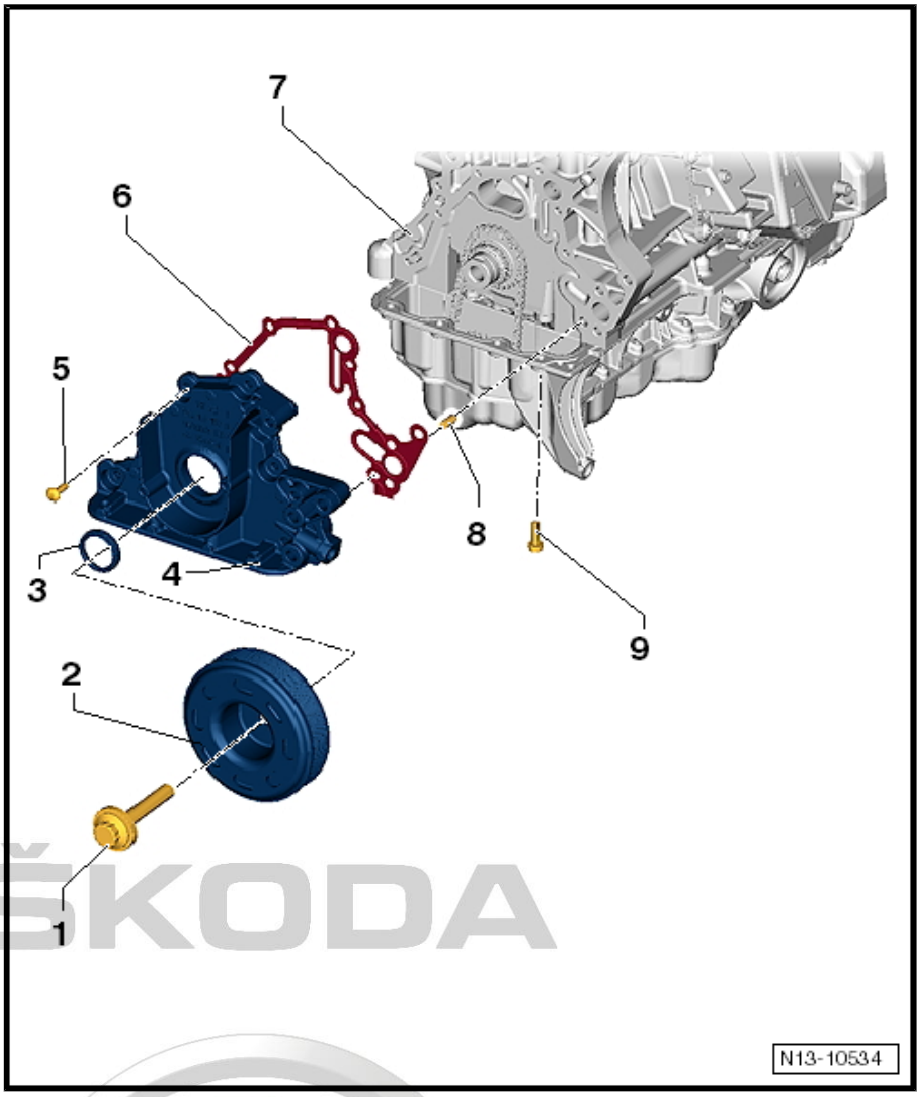
- ❑ replace
- ❑ to release and tighten use counterholder - T10475-

> **Caution**
> *Risk of destruction of the engine.*
> *So as not to adjust the timing the crankshaft must not be turned while the ribbed belt pulley is removed.*

2 - Poly V-belt pulley

- ❑ with vibration damper
- ❑ removing and installing ⇒ page 38

> **Caution**
> *Risk of destruction of the engine.*
> *So as not to adjust the timing the crankshaft must not be turned out of the "TDC" position while the ribbed belt pulley is removed.*



3 - Sealing ring

- ❑ for crankshaft on the belt pulley side
- ❑ replace ⇒ page 72
- ❑ do not oil

4 - Sealing flange on the belt pulley side

- ❑ must be positioned on dowel pins
- ❑ removing and installing ⇒ page 74

5 - Screw

- ❑ Different diameters⇒ ETKA - Electronic Catalogue of Original Parts
- ❑ replace
- ❑ Tightening torque and tightening order ⇒ page 72

6 - Gasket

- ❑ replace

7 - Cylinder block

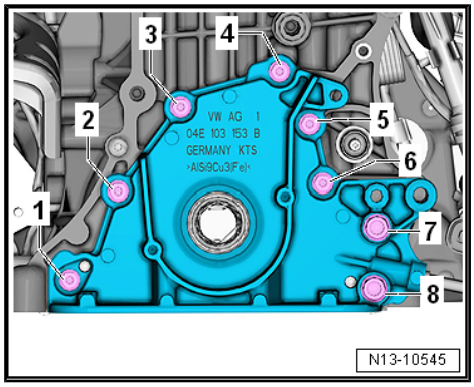
8 - Fit pin

- ❑ 2 pieces

9 - Screw

- ❑ replace
- ❑ Tightening torque and tightening order ⇒ page 72

Sealing flange on the belt pulley side - tightening torque and tightening order



Note

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

– Tighten screws gradually:

Stage	Screws	Tightening torque/torquing angle
1.	-1…8-	by hand as far as the stop
2.	-1…8-	crosswise 8 Nm
3.	-7, 8-	20 Nm
4.	-1…8-	90° (torque a further 90° ($^1/_4$ turn)

1.12 Replacing crankshaft seal on belt pulley side

Special tools and workshop equipment required

- Assembly device - T10485/1, 2 und 3-
- Extraction hook - T20143-

Work procedure

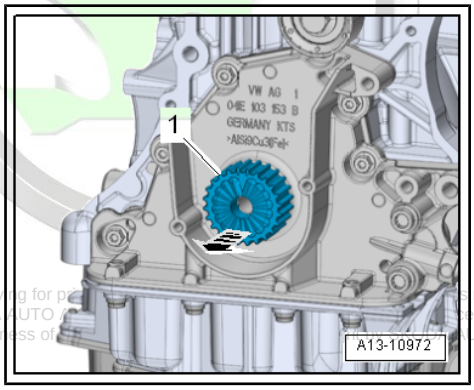
– Removing toothed belt ⇒ page 58 .

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

Caution

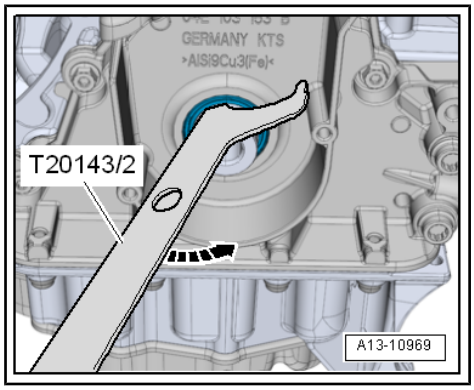
Risk of destruction of the engine.

- ***So as not to adjust the timing the crankshaft must not be turned out of the "TDC" position while the ribbed belt pulley is removed.***



– Lift out sealing ring using the extractor hook -T20143/2- -arrow-.

– Clean the contact and sealing surfaces.

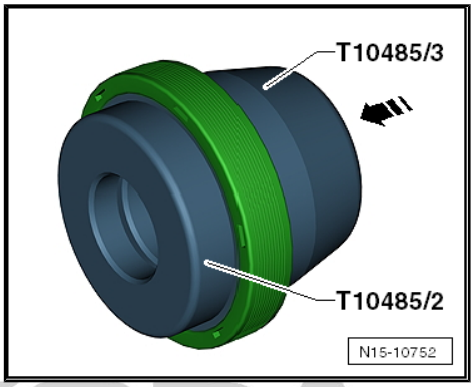


Note

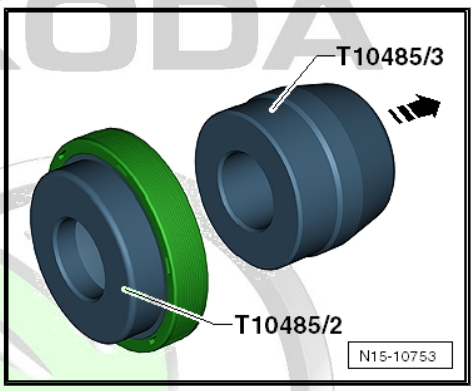
Do not oil new sealing ring.

– Push new sealing ring in -direction of the arrow- over the assembly sleeve - T10485/3- onto the guide bushing - T10485/2- .

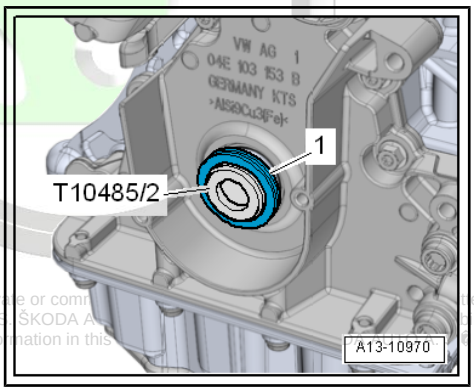
• Fitting position: Closed side of sealing ring points to the thrust piece - T10485/1- .



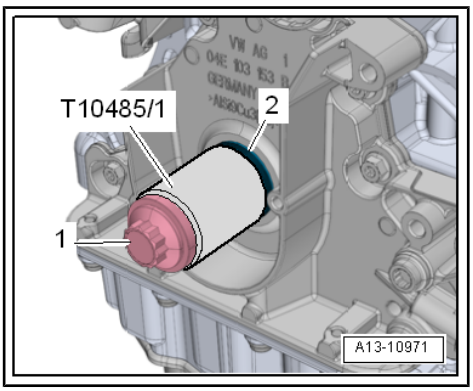
– Pull off assembly sleeve - T10485/3- in -direction of arrow-.



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



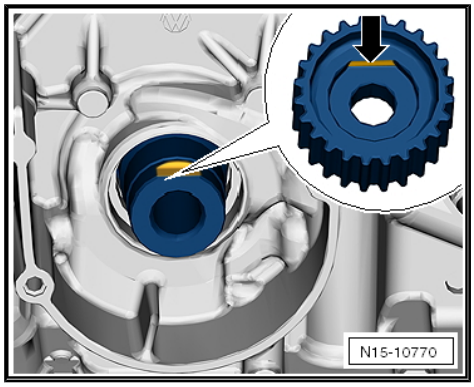
– Pull sealing ring -2- in to the stop using the thrust piece - T10485/1- and the belt pulley screw -1-.



– Fit crankshaft toothed belt pulley onto the crankshaft.

- The contact surface between the V-ribbed belt pulley 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.

– install (set the timing) ⇒ page 64 .



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

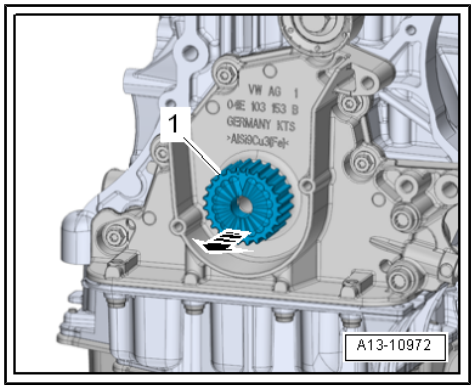
Special tools and workshop equipment required

- Flat scraper
- Cleaning and degreasing agent , e.g. -D 009 401 04-
- Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- Silicone sealant ⇒ ETKA - Electronic catalogue of original parts

Removing

– Removing toothed belt ⇒ page 58 .

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



Caution

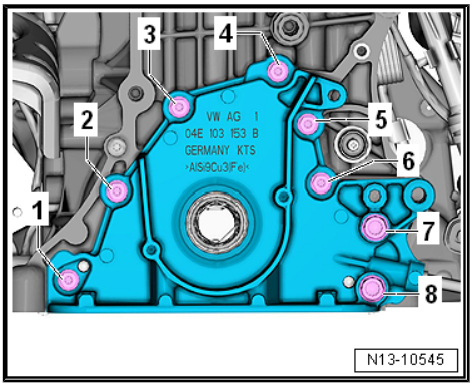
Risk of destruction of the engine.

- *So as not to adjust the timing the crankshaft must not be turned out of the "TDC" position while the ribbed belt pulley is removed.*

– Remove sump top part ⇒ page 127 .

– Unscrew the screws -1 ... 8- and carefully loosen the sealing flange from the bonding.

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



Install

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

- Tightening torques ⇒ page 72 .
- Tightening torques ⇒ page 122 .

Caution

Risk of contamination of the lubrication system by sealant residues.

- ***Place a clean cloth over the open part of the oil sump.***

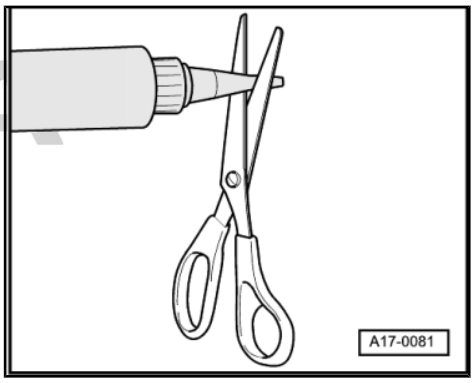
– Remove residual sealant on the sealing flange and oil sump top part.

– Clean oil and grease from sealing surfaces.

Note

Pay attention to the use by date on sealant.

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

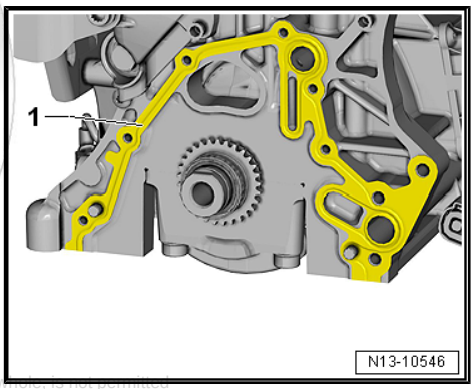


– Push gasket -1- onto the dowel pins on the cylinder block.

– Carefully push sealing flange onto the dowel pins on the cylinder block.

– Tighten sealing flange screws ⇒ page 72 .

– Install the gasket ring for the crankshaft on the belt pulley side ⇒ page 72 .



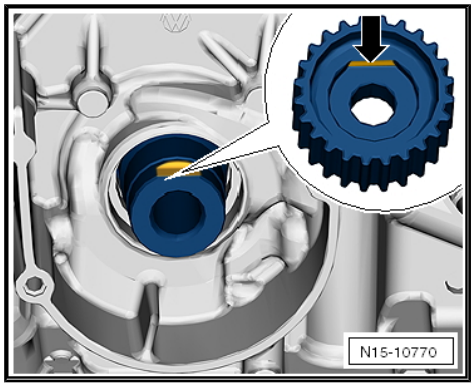
– Fit crankshaft toothed belt pulley onto the crankshaft.

• 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.

– Install sump top part ⇒ page 127

– install (set the timing) ⇒ page 58 .



2 Cylinder block on gearbox side

2.1 Cylinder block on gearbox side - Summary of components

Note

Secure engine to engine and gearbox mount for assembly work on the engine ⇒ page 22 .

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

- ❑ replace

2 - Flywheel

- ❑ on vehicles with automatic gearbox - DSG two-mass flywheel version
- ❑ removing and installing ⇒ page 78
- ❑ can be installed only in one position

3 - Engine speed sender - G28-

- ❑ removing and installing ⇒ page 254

4 - 5 Nm

5 - Fit pin

- ❑ 2 pieces

6 - Intermediate plate

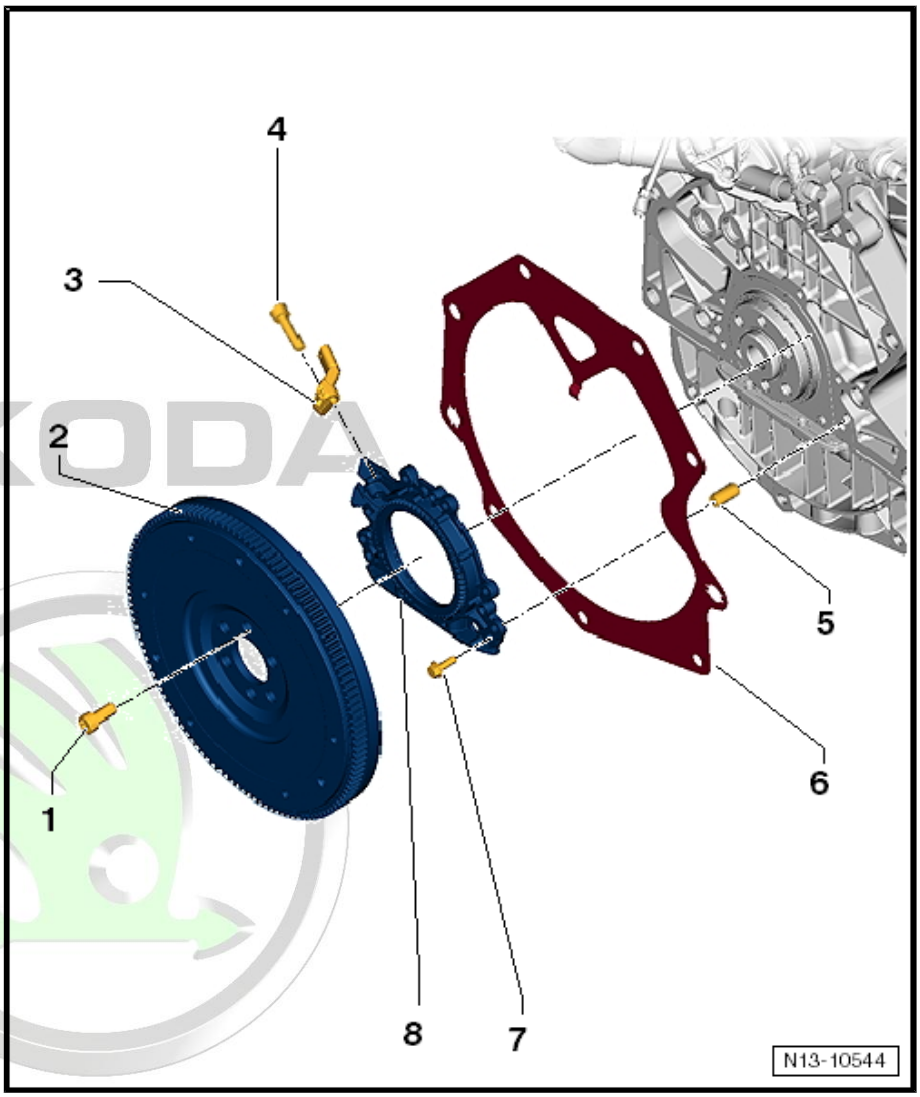
- ❑ do not damage or bend during assembly work
- ❑ installing ⇒ page 78

7 - Screw

- ❑ Tightening torque and tightening order ⇒ page 78

8 - Sealing flange with sender wheel and oil seal

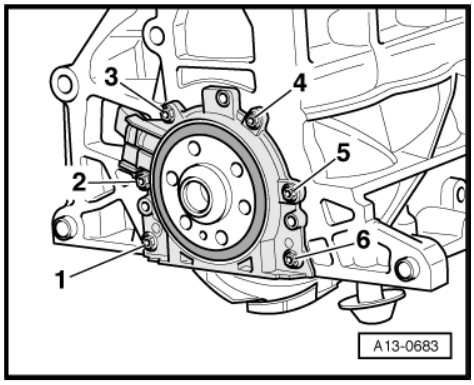
- ❑ Renew sealing flange complete with oil seal and sender wheel only
- ❑ removing and installing ⇒ page 80



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

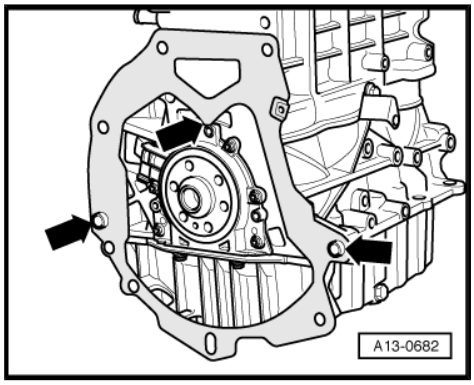
– Tighten screws gradually as follows:

Stage	Screws	Tightening torque
1.	-1…6-	by hand as far as the stop
2.	-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)-

or

♦ Engine mount - MP 1-202 (VW 540)-

♦ Bushing - T30010 (VW 540/1B)-

♦ Flywheel lock - MP 1-504-

Removing

• Gearbox is removed.

– Remove clutch on vehicles with manual gearbox ⇒ Gearbox; Rep. gr. 30 .

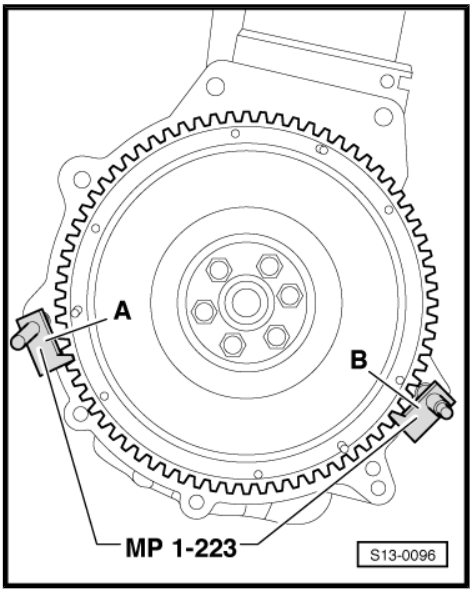
Engine installed

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

• Fitting position of the counterholder:

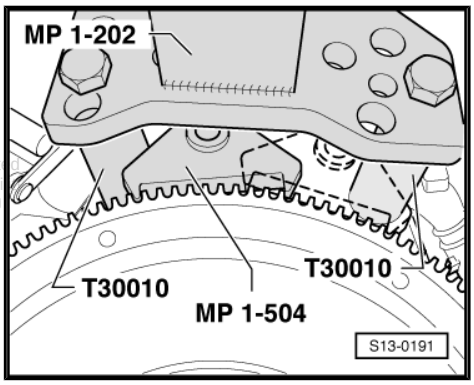
A - for tightening

B - for slackening



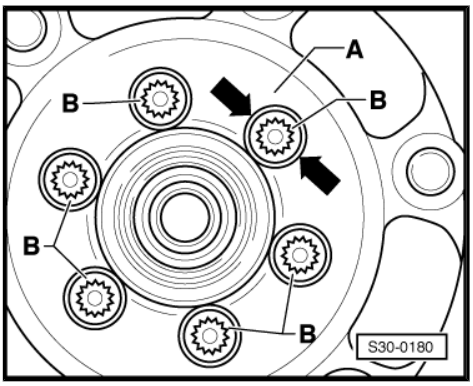
Engine removed

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



Vehicles with two-mass flywheel

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



Caution

When unscrewing the screws -B-, ensure that no screw head catches on the secondary side -A- of the two-mass flywheel, otherwise the flywheel will be damaged.

Continued for all vehicles

– Release screws and remove flywheel.

Install

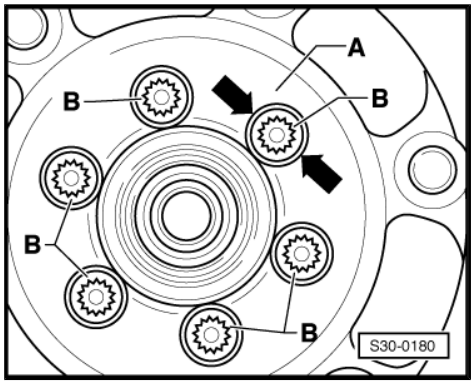
Installation is performed in the reverse order, pay attention to the following points:

Note

Use new screws for attaching.

Vehicles with two-mass flywheel

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



Continued for all vehicles

1. Screw in all the screws by hand.
2. Tighten all the screws crosswise to 60 Nm.
3. Torque all the screws crosswise a further 90° ($^1/_4$ turn).

2.3 Removing and installing the sealing flange on the gearbox side

Special tools and workshop equipment required

- Depth gauges , e.g. -VAS 6082-
- Assembly device - T10134-
- Fixing screw - T10340-
- 3x Screw M6 x 35

Work procedure

- Gearbox removed ⇒ Gearbox; Rep. gr. 34 .
- Tightening torque ⇒ page 45 .

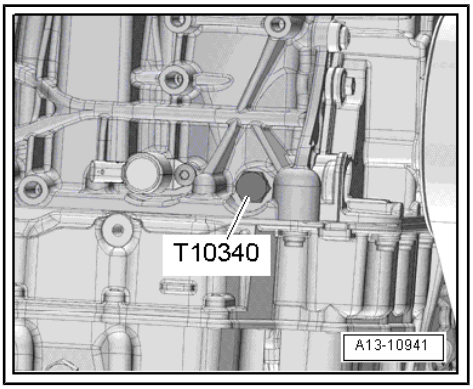
Note

For a clearer illustration, the work sequences while the engine is removed are shown.

– Remove the flywheel ⇒ page 78 .

Turn crankshaft as follows onto “TDC”:

– Unscrew locking screw “TDC” bore at the cylinder block.
– 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 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- .

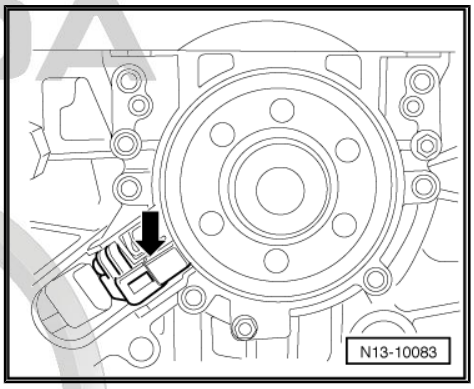
Caution

Risk of engine damage.

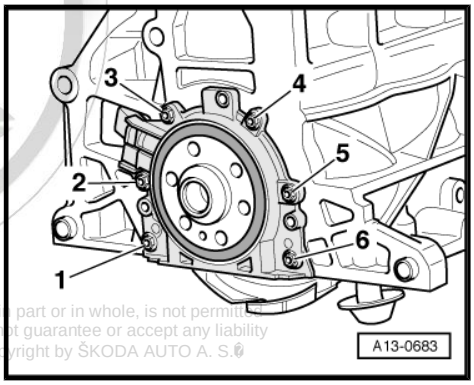
- ***If the fixing screw - T10340- cannot be screwed in up to the stop, the crankshaft is not in the correct position!***
- ***In this case, proceed as follows:***
- ***Unscrew the fixing screw.***
- ***Turn crankshaft through 90° in direction of rotation of engine.***
- ***Turn the fixing screw - T10340- up to the stop in the cylinder block and tighten to 30 Nm.***
- ***Turn crankshaft further up to the stop in direction of rotation of engine.***

– Remove sump top part ⇒ page 127 .

– Remove engine speed sender - G28- -arrow- ⇒ page 254 .



– Undo screws -1 … 6-.

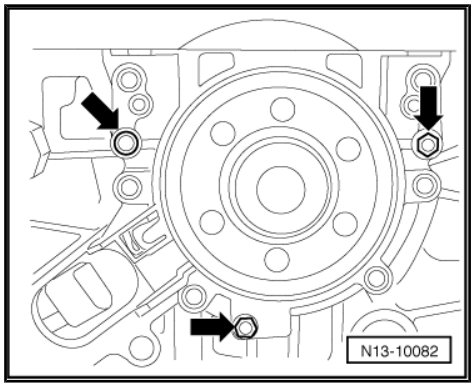


Note

The sealing flange is pressed together with the crankshaft rotor.

– To press out, insert 3 screws M6 x 35 -arrows- into the sealing flange alternately by a maximum of $^1/_2$ turns each.

– Remove sealing flange with rotor.



Press in sealing flange with rotor

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 that is inserted into a hole in the crankshaft.*

Assembly of the assembly device - T10134- :

A - Clamping surface

B - Nut

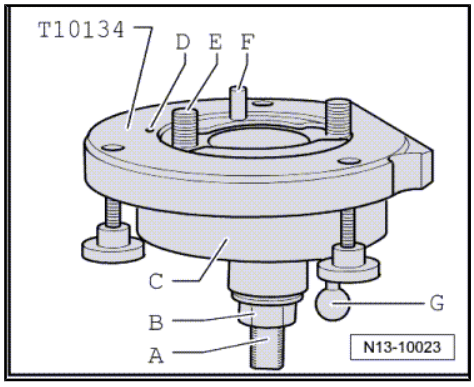
C - Assembly housing

D - Locating pin

E - Hexagon socket head bolt

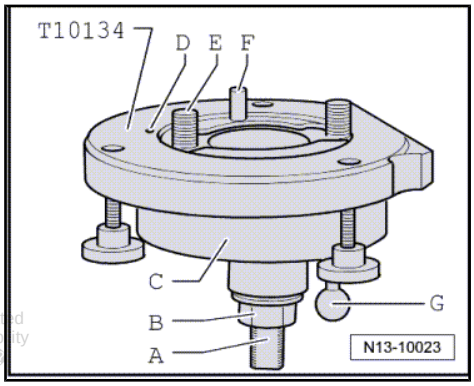
F - Guide pin for diesel engines (black knob)

G - Guide pin for petrol engines (red knob)

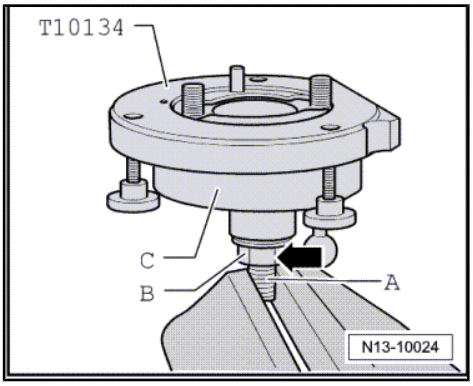


A - Attach sealing flange with rotor on the assembly device - T10134-

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



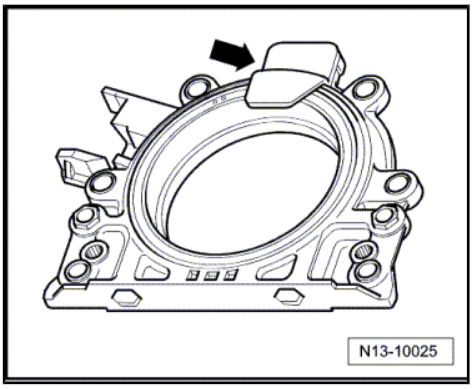
– Grip assembly device - T10134- on clamping surface -A- of the threaded spindle in a vice.
– Push assembly cup -C- down so that it rests on the nut -B- -arrow-.
• The inner part of the assembly device and the assembly cup must be flush.



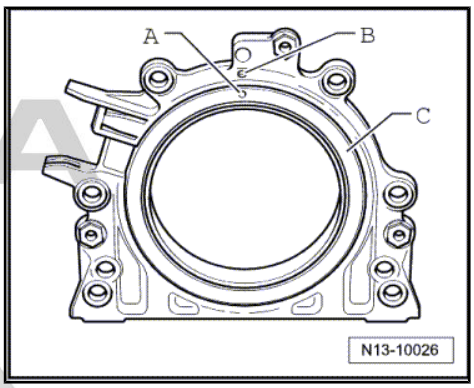
– Remove securing clip -arrow- from new sealing flange.

Note

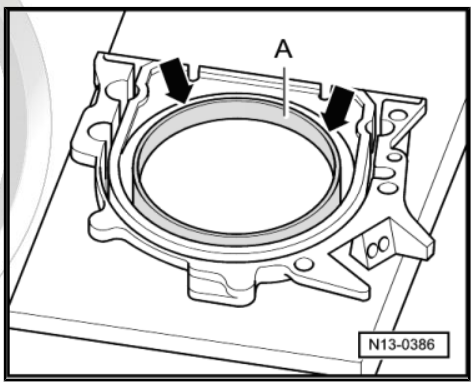
Do not twist rotor or take it out of the sealing flange.



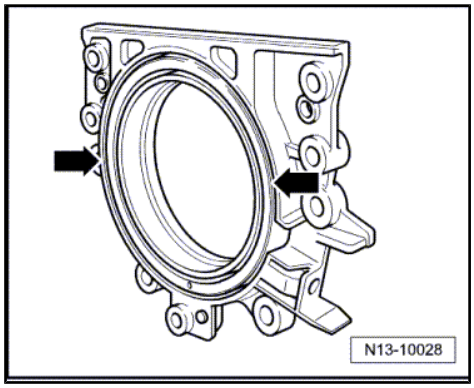
• Locating hole -A- on sender wheel -C- must align with marking -B- on sealing flange.



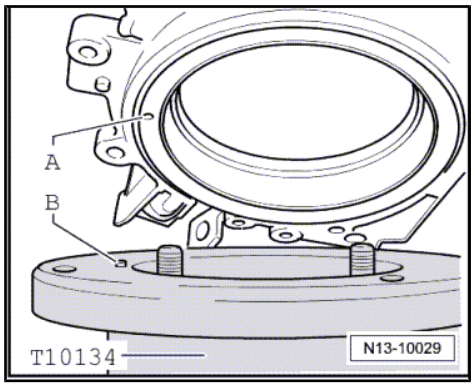
– Place sealing flange with front side facing down on a clean level surface.
– Press down sealing lips supporting ring -A- in -direction of the arrow-, until it rests on the level surface.



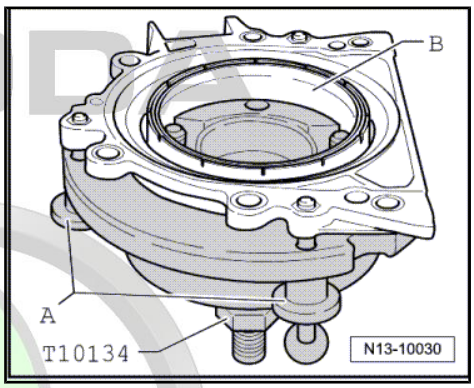
- Upper edge of sealing lip support ring and front edge of sealing flange must align -arrows-.



– Place sealing flange with front side facing downwards onto assembly tool - T10134- so that locating pin -B- can be inserted in sender wheel bore -A-.
- The sealing flange must lie flat on the assembly device.



– When tightening the 3 knurled screws -A- press the sealing flange and sealing lip supporting ring -B- on the surface of the assembly device - T10134- in such a way that the positioning pin can no longer slide out of the rotor hole.



Note

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

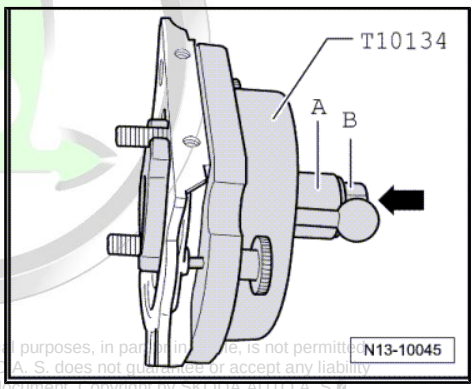
B - Mount assembly tool - T10134- with sealing flange on crankshaft flange

- Crankshaft flange free from oil and grease.
- Engine on “TDC”.

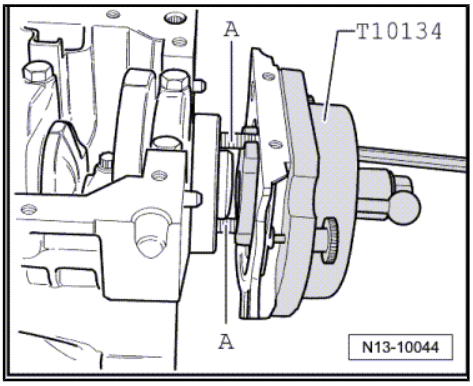
– Screw nut -B- on until it reaches end of threaded spindle.

– Press threaded spindle of assembly tool - T10134- in -direction of arrow-, until hexagon nut -B- lies against assembly housing -A-.

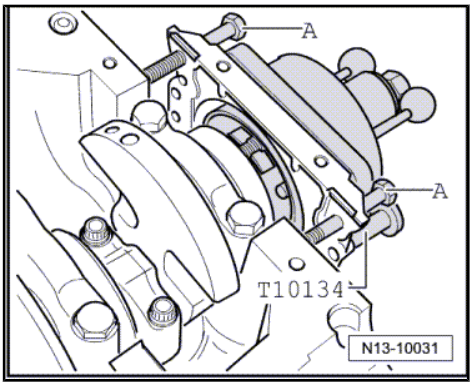
– Align flat side of assembly housing to the cylinder block sealing surface on the oil sump side.



– Secure assembly device - T10134- to crankshaft flange - to do so insert hexagon socket head bolts -A - by approximately 5 threads at the crankshaft flange.



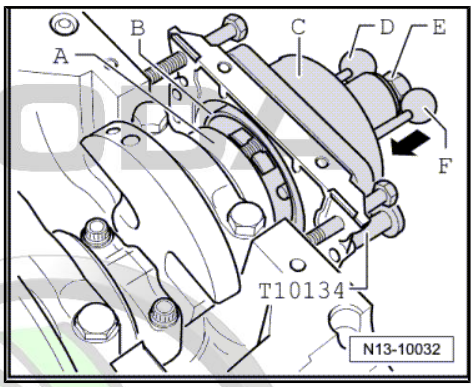
– Insert 2 screws M6x35 -A- into the cylinder block for the sealing flange guide.



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 -B- rests on the crankshaft flange -A-.

– 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 (black knob) -D- must not be inserted in threaded hole of crankshaft.

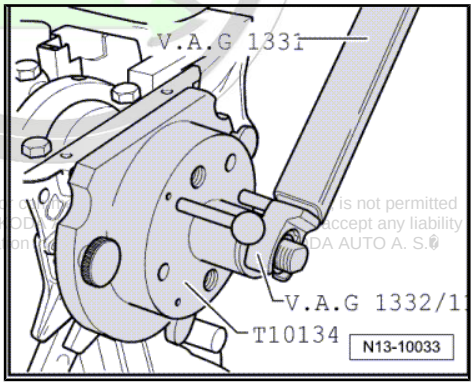
– Tighten both hexagon socket head bolts of the assembly device by hand.

– Screw nut -E- onto threaded spindle by hand until it lies against assembly housing -C-.

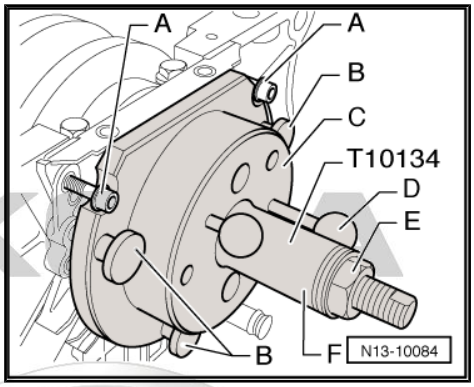
D - Press sender wheel onto crankshaft flange using assembly device - T10134-

– Tighten nut for the assembly device - T10134- to 35 Nm.

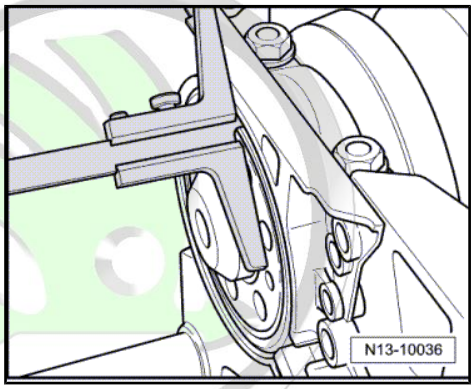
• After tightening the nut to 35 mm there must still be a narrow air gap between the cylinder block and the sealing flange.



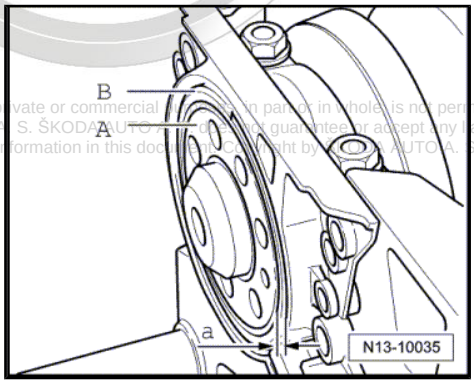
E - Inspect the installation position of the rotor on the crankshaft



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

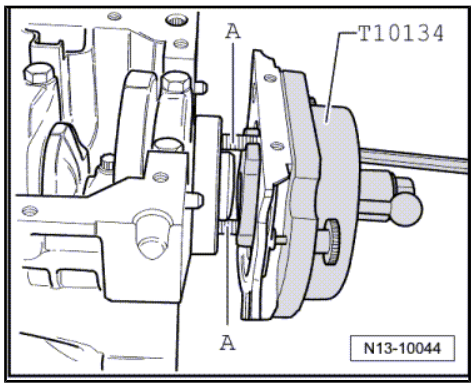


– Position depth gauges - VAS 6082- at the crankshaft flange.



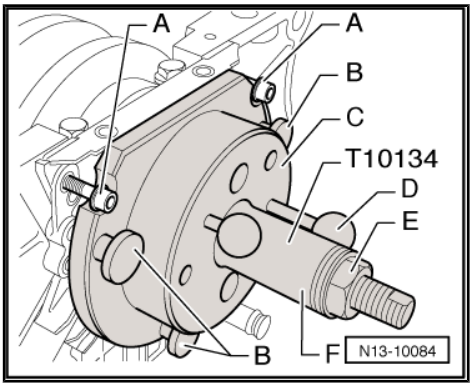
– Measure distance -a- between crankshaft flange -A- and rotor -B-.
• Specified value: Dimension -a- = 0.5 mm.
– If the specified value is too small, press rotor down ⇒ page 86 .
– When the specified value has been reached, perform the remaining assembly ⇒ page 87 .

F - Pressing down the rotor

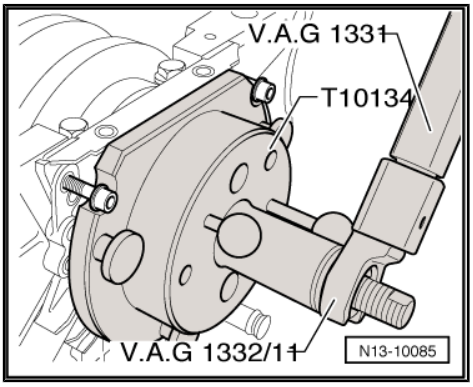


– Secure assembly device - T10134- to crankshaft flange - to do so tighten hexagon socket head bolts -A- hand-tight.
– Push the assembly tool - T10134- against the sealing flange by hand.

– Screw nut -E- onto threaded spindle by hand until it lies against assembly housing -C-.



– Tighten nut for the assembly device - T10134- to 40 Nm.
– Checking sender wheel installation position on crankshaft again ⇒ page 86 .
– 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 86 .



Assembling

Tightening torques:

- Sealing flange on the gearbox side ⇒ page 78
- Cylinder block, gearbox end ⇒ page 77
- Ignition system ⇒ page 251

– Tighten screws for sealing flange crosswise.
– Install sump ⇒ page 123 .
– Installing intermediate plate ⇒ page 78 .
– Install flywheel ⇒ page 78 .

3 Crankshaft

3.1 Measuring axial play of crankshaft

Caution

There is a risk of bearing pedestal deformation.

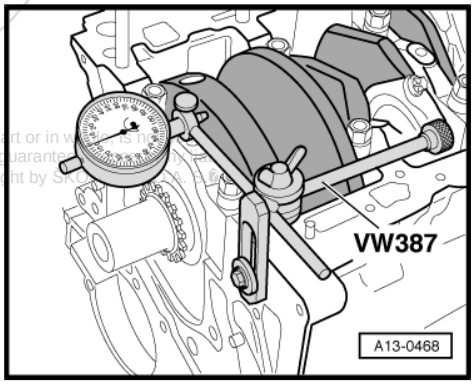
- *The crankshaft must not be removed. Merely releasing the screws of the crankshaft bearing cover will result in deformations of the bearing seats of the cylinder block. This deformation will change the bearing clearance. Even if the bearing shells were not replaced, the changed bearing clearance may cause damage to the bearing.*
- *If the bearing cap bolts are loosened, the cylinder block must be renewed complete with the crankshaft.*
- *Measuring the main bearing clearance is not possible with normal workshop equipment.*

Special tools and workshop equipment required

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

Work procedure

– Secure dial gauge - VAS 6079- with the universal dial gauge bracket - VW 387- to the cylinder block, as shown in the illustration.



– Place dial gauge against the crankshaft cheek.

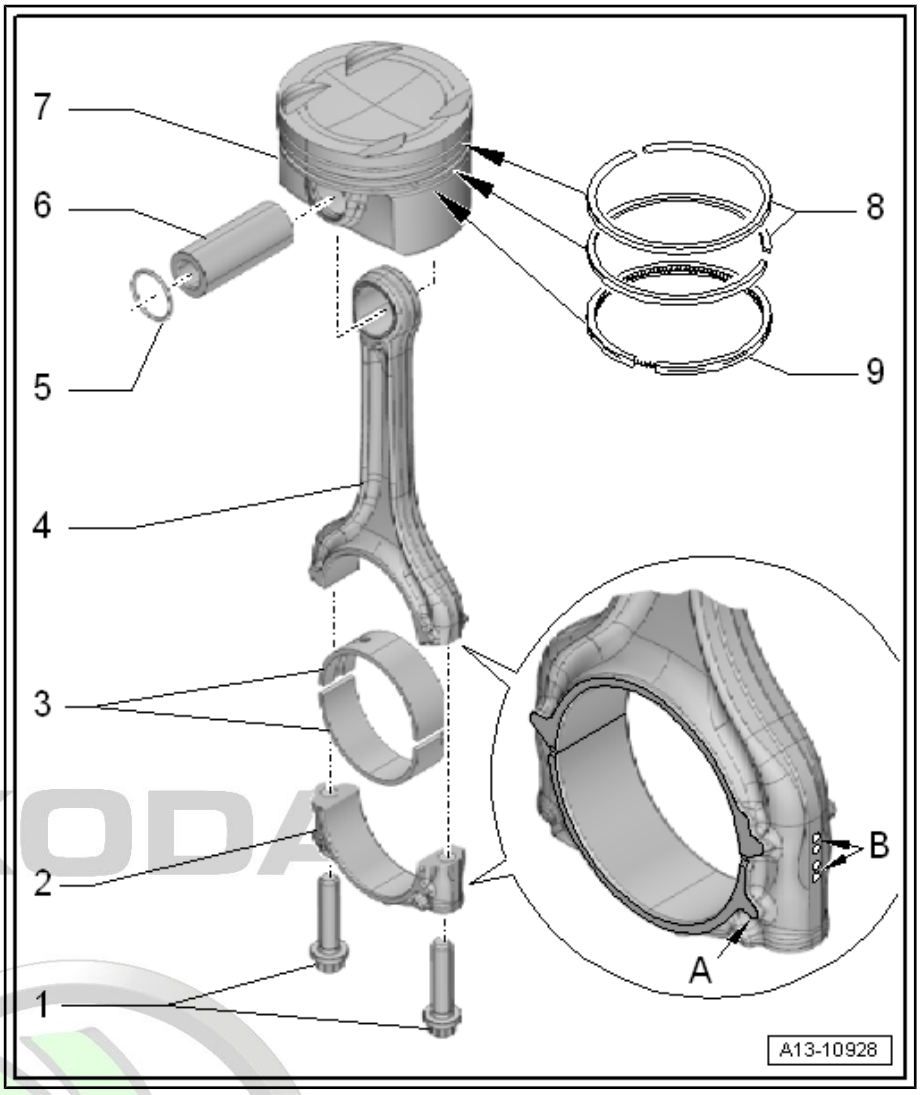
– Press crankshaft against the dial gauge and set dial gauge to “0”.

– Press the crankshaft off the dial gauge and read the measured value.

• Axial clearance: 0.066 … 0.233 mm

4 Pistons and conrods

4.1 Piston and conrod - Summary of components



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

- ❑ replace
- ❑ Oil threads and contact surface

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 90
- ❑ 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 ⇒ page 90
- ❑ Fitting position: Peg -A- on the conrod bearing cap points to the belt pulley side

5 - Circlip

- ❑ 2 pieces
- ❑ replace

6 - Piston pin

- ❑ removing and installing ⇒ page 91

7 - Piston

- ❑ Mark the installation position and the assignment to cylinder ⇒ page 90
- ❑ removing and installing ⇒ page 91
- ❑ Checking piston and cylinder bore ⇒ page 92

8 - Piston rings

- ❑ Compression rings
- ❑ Measure end gap ⇒ page 92

- ❑ Measure vertical gap ⇒ page 93
- ❑ 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

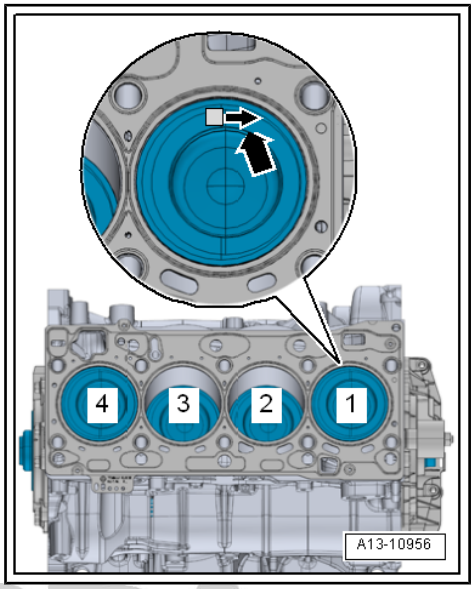
- ❑ Oil scraper ring
- ❑ Measure end gap ⇒ page 92
- ❑ Measure vertical gap ⇒ page 93
- ❑ use piston ring pliers for removing and installing
- ❑ Fitting position: Identification “TOP” or labelled side for piston crown
- ❑ Offset joint 120° to bottom compression ring

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. Do not mark piston crown not using centre punch, scratch, nick or similar.*

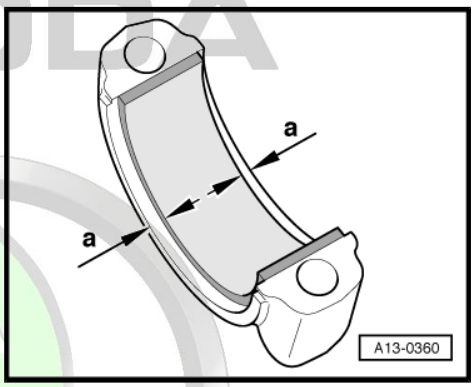


- Arrow on the piston crown to the belt pulley side -arrow-.

Bearing shell installation position

– Insert bearing shells centrally in the conrod and conrod bearing cap.

- Dimension -a- = 2.5 mm



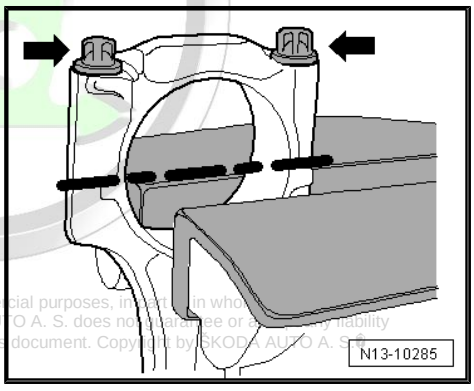
Separating new conrod bearing cap

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:

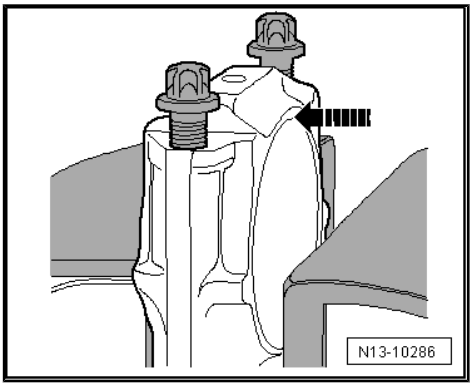
– To prevent damage, tension the conrod only slightly in a vice with protective jaws as shown.

- Tension the conrod below the dotted 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.

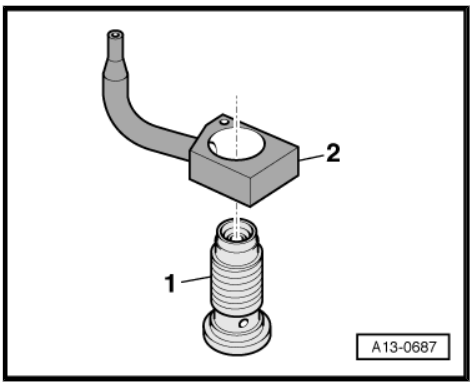


Oil spray nozzle and pressure relief valve

1 - Screw with pressure relief valve, 27 Nm

2 - Oil spray nozzle (for cooling piston)

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



Caution

Risk of damaging the oil injection nozzles.

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

4.2 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- ⇒ page 22

– Remove cylinder head ⇒ page 97 .

– Remove oil sump top part ⇒ page 127 and remove baffle.

– Mark installation position and assignment of the piston to the cylinder ⇒ page 89 .

– Mark the installation position and assignment of the conrod to the cylinder and to the conrod bearing cap ⇒ page 89 .

– 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 - VW222A- .

Install

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

- Tightening torques ⇒ page 89 .

Note

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

– Oil the contact surfaces of the bearing shells.

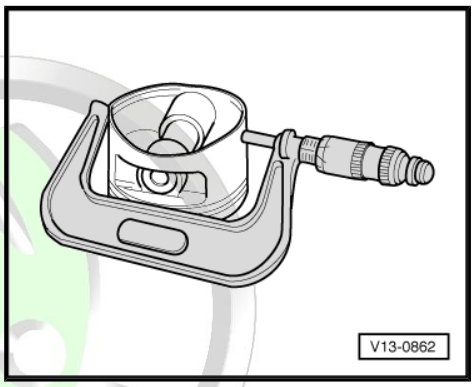
– Install piston with commercially available piston ring tensioning strap, check installation position ⇒ page 90 .

– Install conrod bearing cap, check installation position ⇒ page 89 .

– Install cylinder head ⇒ page 97 .

– Install sump top part ⇒ page 127

4.3 Checking piston and cylinder bore



Checking piston

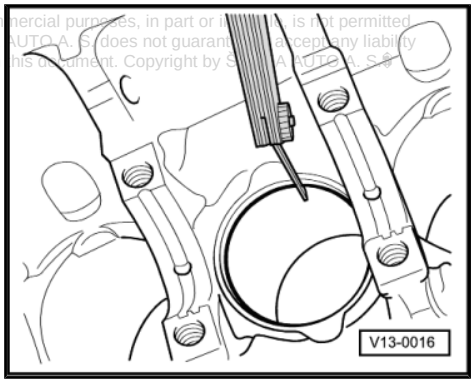
– Using an external micrometer, measure pistons approx. 10 mm from the lower edge of skirt, at 90° to the piston pin axis.

- Maximum deviation from nominal dimension: 0.04 mm

Piston Ø mm	
Nominal dimension	74.42 [1]

- [1] dimensions without coating
- Manufacturer of the piston Federal Mogul (thickness 0.018 mm per side)
- Manufacturer of the piston Mahle (thickness 0.015 mm per side)

Measure piston ring end gap

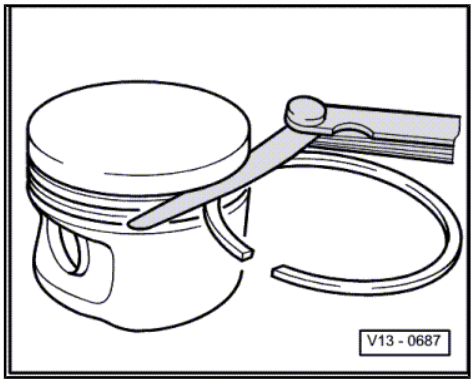


– Push the piston ring into the bottom cylinder opening at right angles to the cylinder wall from above to about 15 mm from the cylinder edge.

– To insert, use a piston without piston ring.

Piston ring	New mm	Wear limit mm
Compression ring	0.20 + 0.15	1.0
2-part oil scraper ring	0.20 + 0.20	3.0
3-part oil scraper ring	0.50 + 0.20	3.0

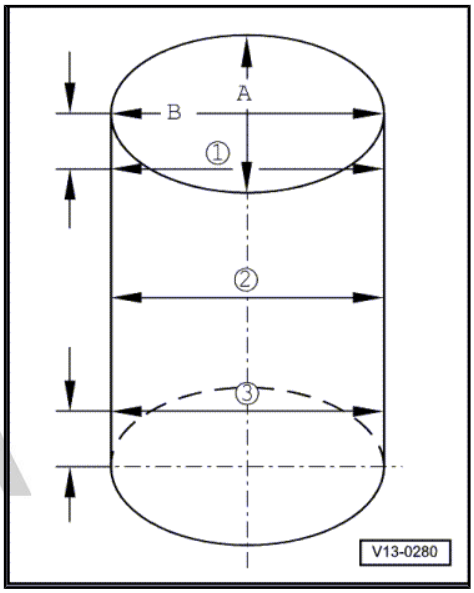
Measure piston ring vertical gap



– Clean before inspecting the annular groove of the piston.

Piston ring	New mm	Wear limit mm
1. Compressor ring (manufacturer of piston rings is Federal Mogul)	0.05 … 0.09	0.15
1. Compressor ring (manufacturer of piston rings is Mahle)	0.035 … 0.085	0.15
2. Compression ring	0.030 ...0.070	0.15
3-part oil scraper rings	Not measurable	
2-part oil scraper rings	0.04 ...0.08	

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	74.5 + 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.

15 – Cylinder head, valve gear

1 Cylinder head

1.1 Cylinder head - summary of components

Caution

The camshafts must not be removed individually.

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

1 - Cylinder head gasket
- ❑ replace ⇒ page 97
- ❑ check fitting position: Cylinder head part number

2 - Fitting sleeve
- ❑ 2 pieces

3 - Cylinder head
- ❑ removing and installing ⇒ page 97
- ❑ check for distortion ⇒ page 95

4 - Dowel pins

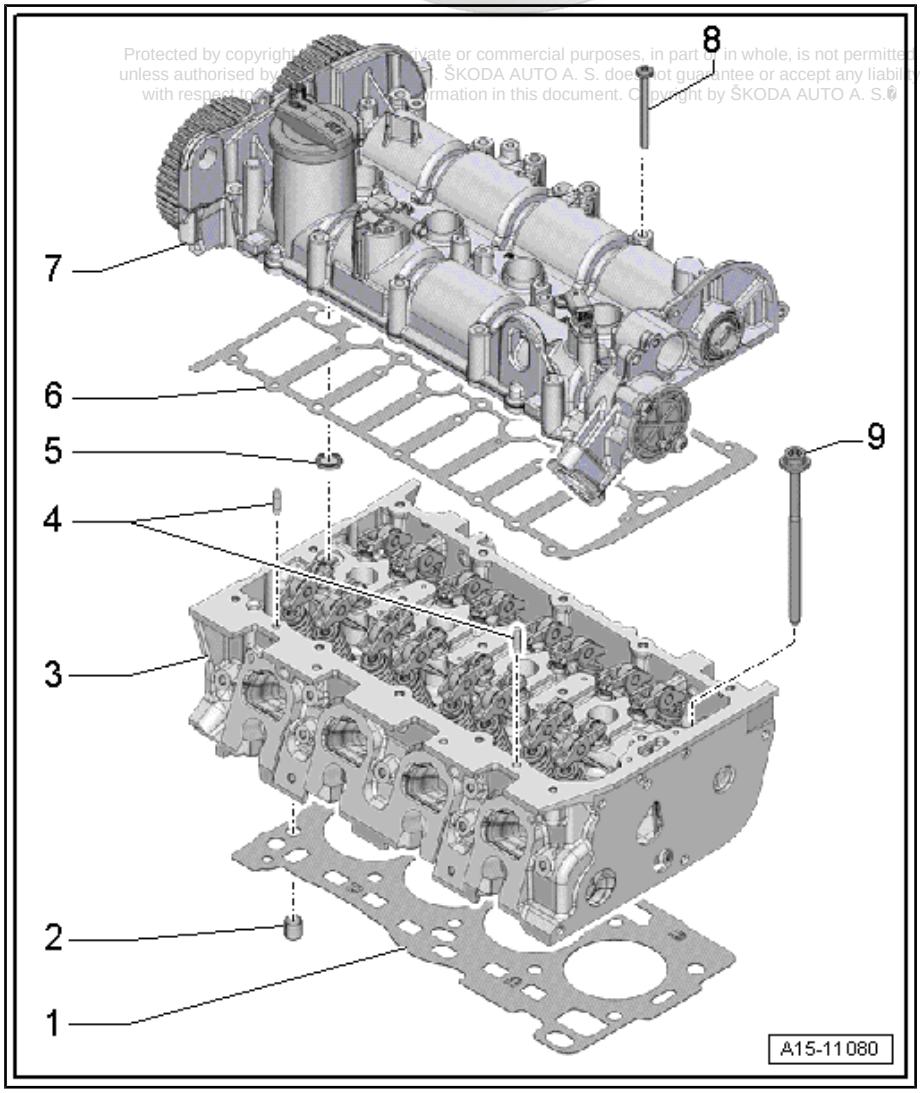
5 - Gasket
- ❑ With oil strainer
- ❑ inserted into the cylinder head

6 - Gasket
- ❑ replace

7 - Camshaft housing
- ❑ removing and installing ⇒ page 101

8 - 10 Nm + torque a further 180° (1/2 turn)
- ❑ replace
- ❑ Tightening torque and tightening order ⇒ page 106

9 - 40 Nm + torque a further 3x 90° (3x 1/4 turn)
- ❑ replace



Note

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

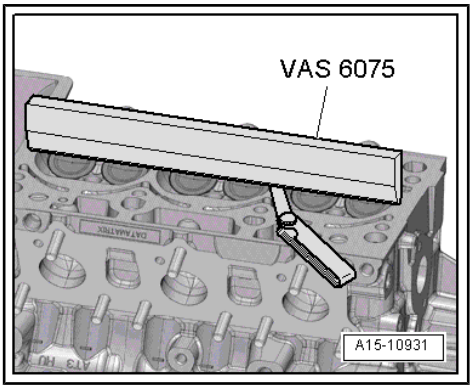
– Tighten screws gradually in the given sequence:

Stage	Screws	Tightening torque/torquing angle
1.	-1…10-	40 Nm
2.	-1…10-	90° (torque a further 90° ($^1/_4$ turn)
3.	-1…10-	90° (torque a further 90° ($^1/_4$ turn)
4.	-1…10-	90° (torque a further 90° ($^1/_4$ turn)

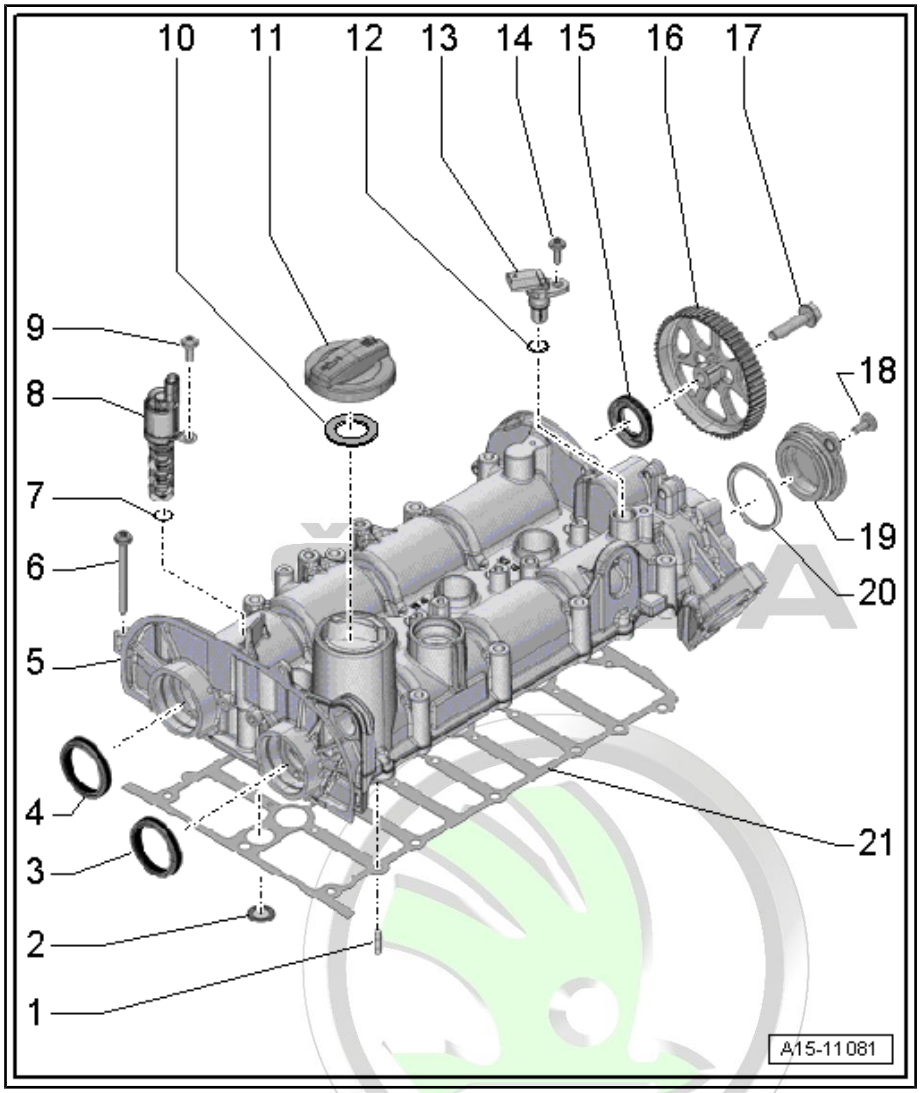
Checking cylinder head for distortion

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

• Max. permissible distortion: 0.05 mm.



1.2 Camshaft housing - Summary of components



1 - Fit pin

2 - Gasket

- ❑ With oil strainer
- ❑ inserted into the cylinder head

3 - Sealing ring

- ❑ For inlet camshaft
- ❑ replace ⇒ page 111

4 - Sealing ring

- ❑ for exhaust camshaft on the belt pulley side
- ❑ replace ⇒ page 113

5 - Camshaft housing

- ❑ removing and installing ⇒ page 101

6 - 10 Nm + torque a further 180° (1/2 turn)

- ❑ replace
- ❑ Tightening torque and tightening order ⇒ page 106

7 - O-ring

- ❑ replace

8 - Inlet camshaft control valve 1 - N205-

- ❑ removing and installing ⇒ page 110

9 - 8 Nm

10 - Gasket

- ❑ for cap

11 - Screw cap

12 - O-ring

- ❑ replace

13 - Hall sender - G40-

- ❑ removing and installing ⇒ page 253

14 - 8 Nm

15 - Sealing ring

- ❑ for exhaust camshaft on the gearbox side
- ❑ removing and installing ⇒ page 114

16 - Toothed belt pulley

- ❑ For coolant pump
- ❑ removing and installing ⇒ page 153

17 - 20 Nm + torque a further 90° (1/4 turn)

- ❑ replace

18 - 8 Nm

19 - Screw cap

20 - O-ring

❑ replace

21 - Gasket

❑ replace

1.3 Removing and installing cylinder head

Removing

Note

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

– Remove the camshaft housing ⇒ page 101 .

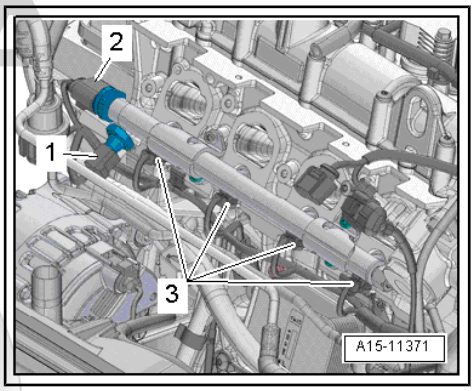
– Removing the intake manifold ⇒ page 217 .

– Disconnect the plug connections:

1 - On the oil pressure switch for reduced oil pressure - F378-

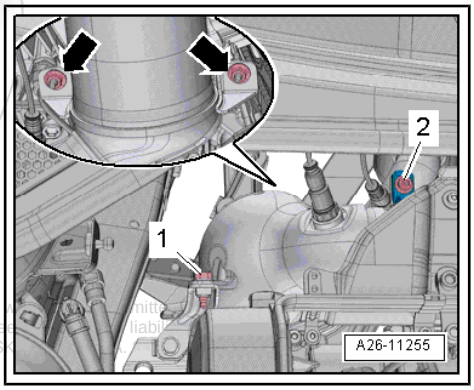
2 - On the fuel pressure sender - G247-

3 - On the injectors



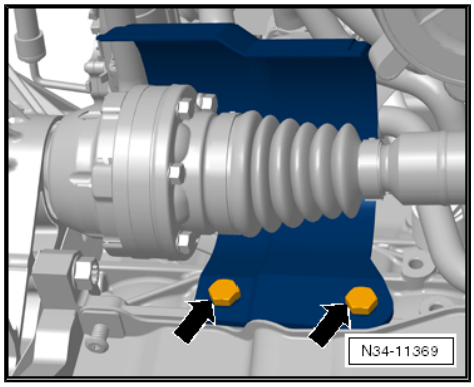
– Unscrew screw -2- and remove screw clamp.

– Unscrew screws -1- and nuts -arrows-, strap up catalytic converter.

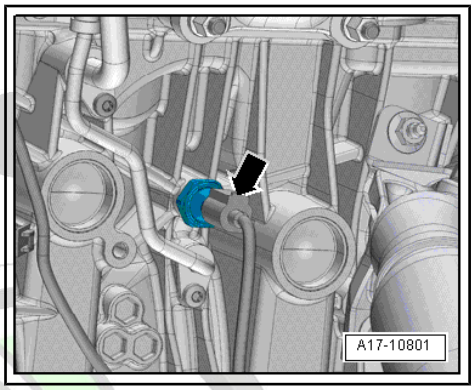


– Release screws -arrows- and remove heat shield for right drive shaft.

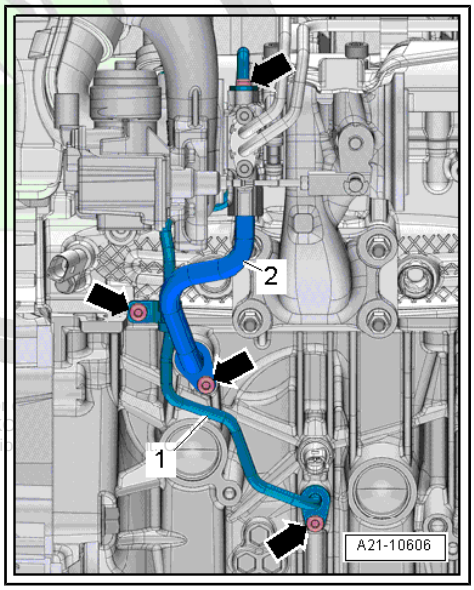
– Remove heat protection sleeve.



– Disconnect electrical plug connection -arrow- at the oil pressure switch - F22- .



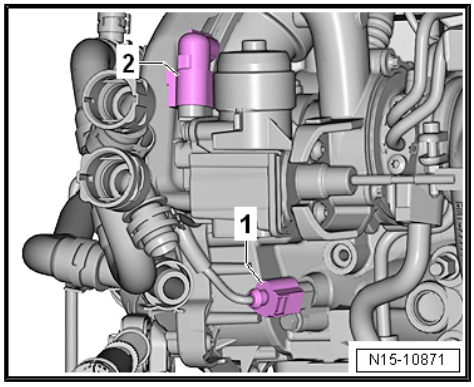
– Screw out the screws -arrows-, remove oil feed line -1- and oil return pipe -2-.



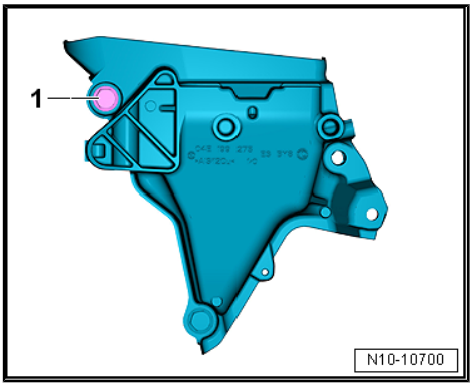
– Disconnect the plug connections:

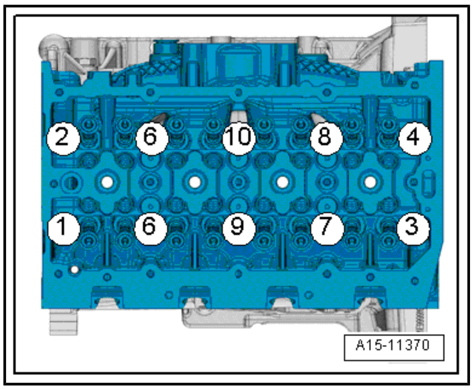
1 - for coolant temperature sender - G62-

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

Tightening torques:

- Engine support bracket ⇒ page 27
- Cylinder head ⇒ page 94
- Exhaust gas turbocharger ⇒ page 197
- Injection system ⇒ page 211
- Install catalytic converter ⇒ page 245
- Drive shaft protection ⇒ Suspension; Rep. gr. 40

Caution

Risk of damaging sealing surfaces.

- ♦ *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 torquing 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 connection ends with spring-type clips that comply with the series design ⇒ ETKA - Electronic Catalogue of Original Parts .*
- ♦ *When the cylinder head or the cylinder head gasket is replaced, all the coolant and engine oil must be replaced.*

– Fit on cylinder head gasket -1-.

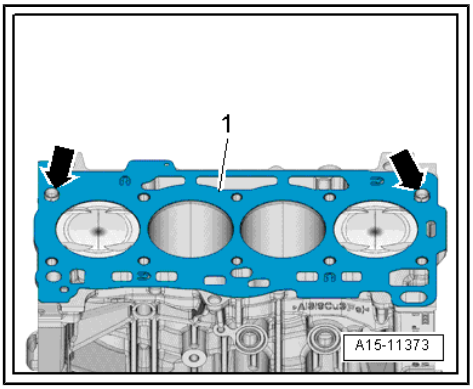
♦ Pay attention to centring pins in cylinder block -arrows-.

♦ 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: Set No. 1 cylinder piston to top dead centre and then turn crankshaft back slightly.

– Insert the cylinder head.

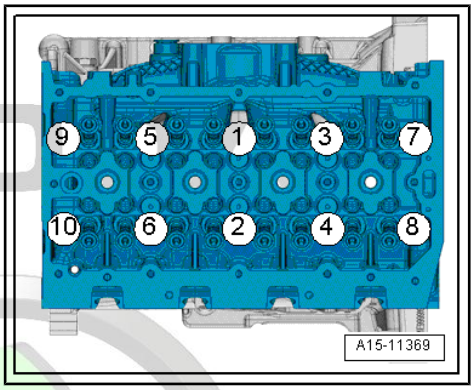
– Insert cylinder head bolts and tighten hand-tight.



Cylinder head - tightening torque and tightening order

Note

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



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

– Install camshaft housing ⇒ page 101 .

– Installing the intake manifold ⇒ page 217 .

– Change engine oil ⇒ Maintenance ; Booklet Octavia III

– Replace coolant ⇒ page 141 .

1.4 Removing and installing camshaft housing

Removing

– Remove coolant pump ⇒ page 150 .

– Remove air filter housing ⇒ page 215 .

– Removing ignition coils ⇒ page 252 .

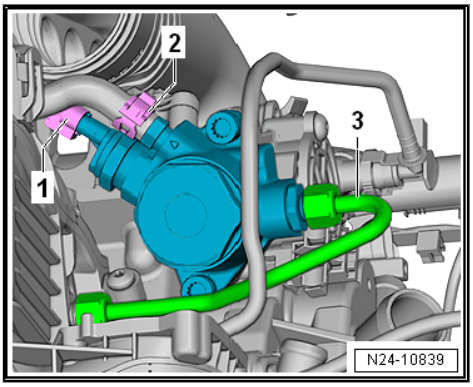
– Remove the toothed belt from the camshafts ⇒ page 48 .

– Unplug connector -1-.

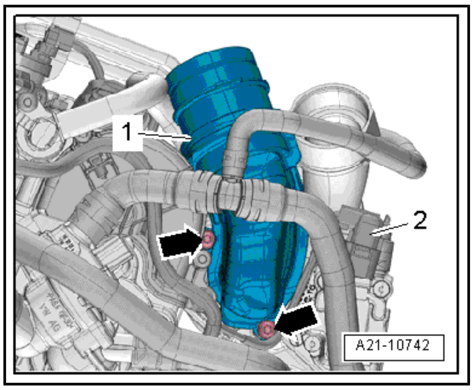
– Loosen hose clamp -2- and disconnect hose.

– Remove high pressure pipe -3- ⇒ page 235 .

– Unplug connector -2-.

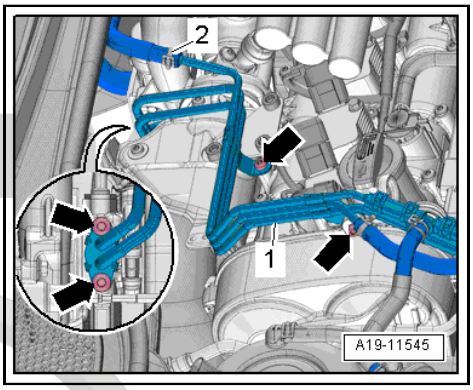


– Release screws -arrows- and remove connection piece -1-.

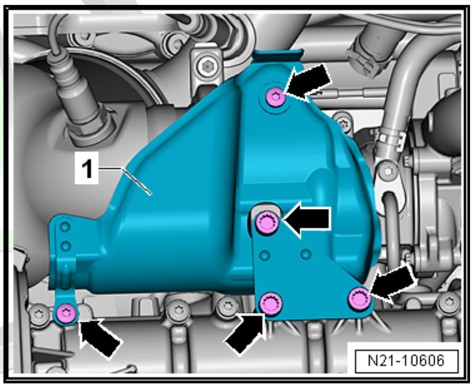


– Loosen hose clamp -2- and remove coolant hose.

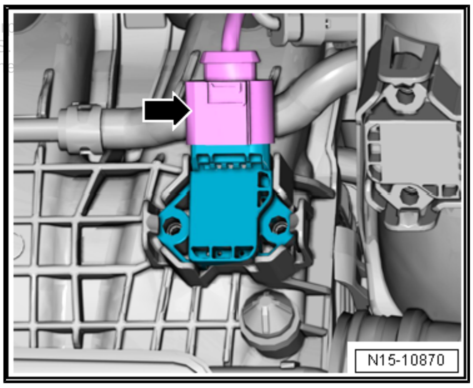
– Unscrew -arrows- screws and swivel coolant lines -1- to the right side.



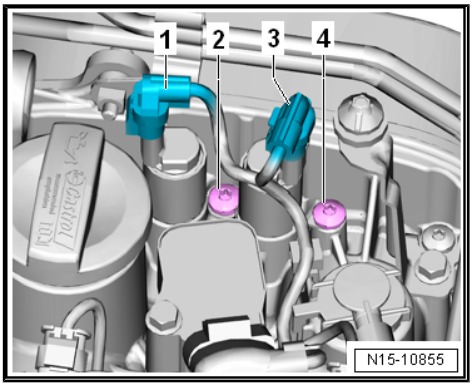
– Release screws -arrows- and remove heat shield -1-.



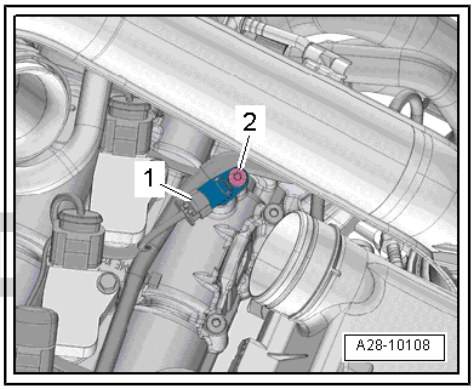
– Pull of plug -arrow- at the intake air temperature sender - G42- with intake air temperature sender - G71- .



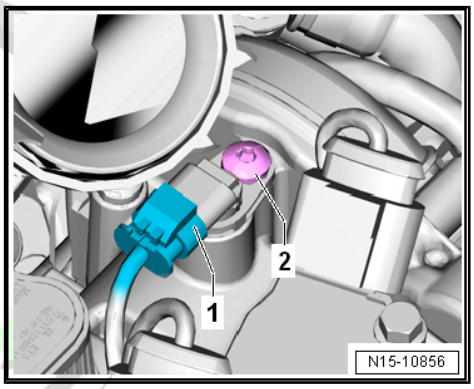
– Pull off plug -1- for valve 1 for camshaft adjustment - N205- and -3- valve 1 for camshaft adjustment in the exhaust - N318- .



– Remove plug -1- for Hall sender - G40- .

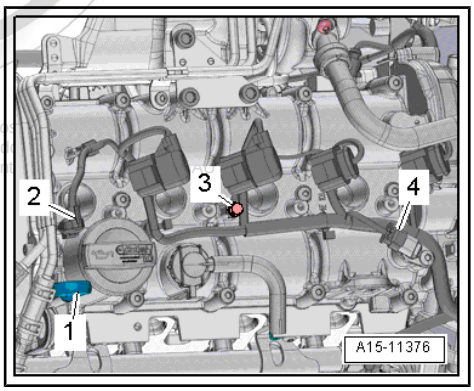


– Remove plug -1- for Hall sender - G300- .



– Unscrew screw -3- and expose the wiring loom and lay it to the side.

– Pull out oil dipstick -1-.

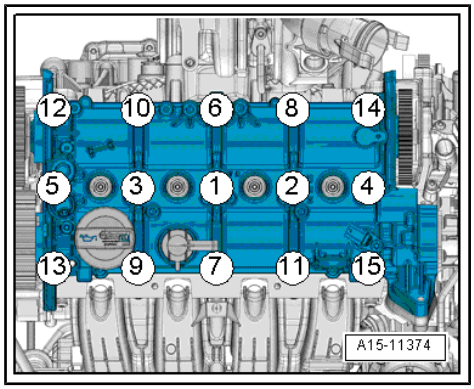


– Loosen the screws for the camshaft housing in the sequence -15 … 1- and unscrew them.

– 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

Tightening torques:

- Valve gear ⇒ page 109
- Exhaust gas turbocharger ⇒ page 197
- Air filter ⇒ page 214

Note

- *Replace screws which have been tightened firmly to a torquing angle.*
- *Replace gasket with oil strainer.*

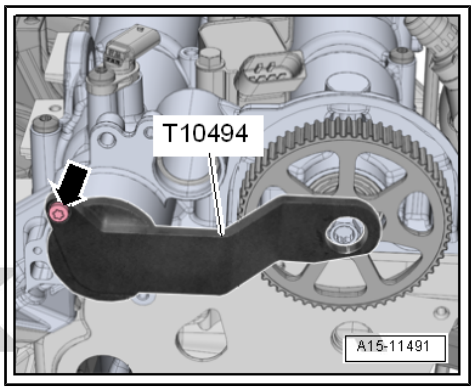
– “Check TDC” position of camshaft and crankshaft:

- Camshaft clamp -T10494- attached to camshaft housing.

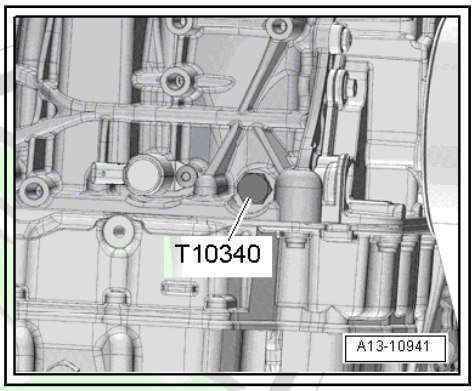
Caution

Risk of damaging the valve gear.

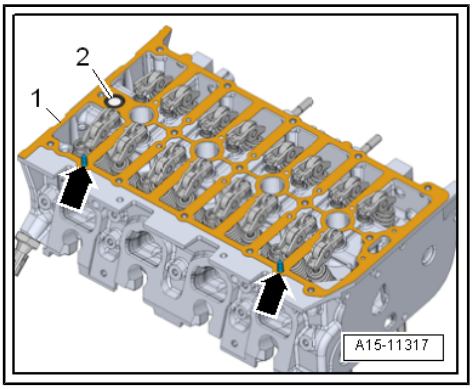
- ***When turning, the camshafts must not be moved axially.***



- 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.
– Insert gasket with oil strainer -2- into the cylinder head -1-.
– Fit gasket onto dowel pins -arrows-.

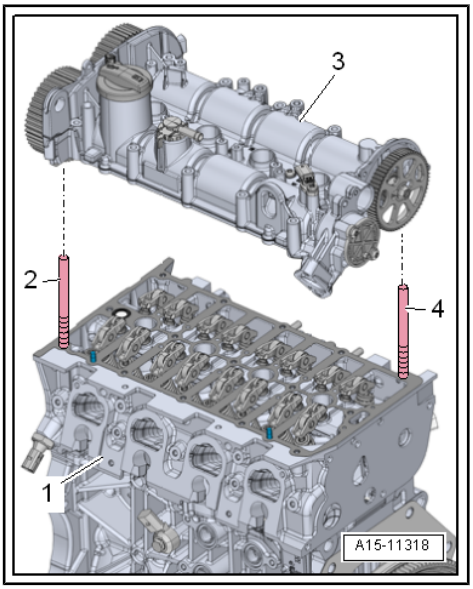


– Screw 2 threaded bolts -2, 4-, e.g. centering tool - T10288/4- , into the cylinder head.
– Carefully place camshaft housing -3- vertically from above onto the threaded bolts in the cylinder head.

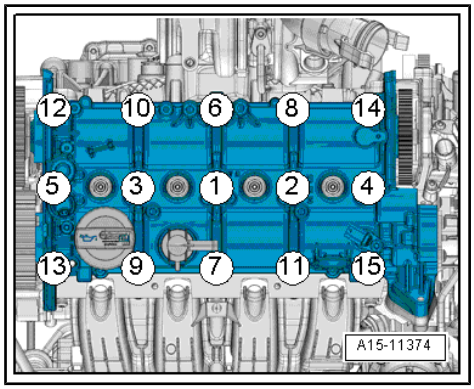
Note

Make sure that the camshaft housing does not tilt.

– Tighten camshaft housing screws.



Camshaft housing - tightening torque and tightening order



Note

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

– Tighten screws gradually in the given sequence:

Stage	Screws	Tightening torque/torquing angle
1.	-1…15-	10 Nm
2.	-1…15-	180° (torque a further 90° ($^1/_2$ turn)

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

– Install high pressure pipe ⇒ page 235 .

– install (set the timing) ⇒ page 48 .

– Install ignition coils ⇒ page 252 .

– Install coolant pump ⇒ page 150 .

– 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.***

1.5 Checking compression

Special tools and workshop equipment required

- Spark plug socket and extension - 3122B-
- 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

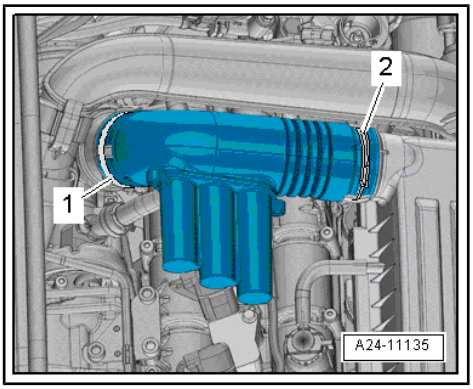
Note

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

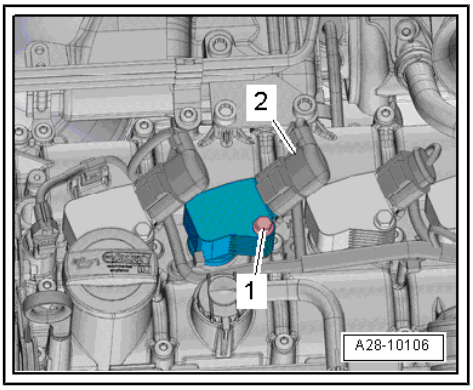
– Start engine and allow to run until it has cut out.

– Switch off ignition.

– Loosen hose clamps -1, 2- and remove air guide pipe.



– Disconnect plug -2- and remove screw -1-.
– Pull out ignition coils at power output stage.
– Remove the spark plugs with spark plug wrench - 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 work procedure for each cylinder.



New engine	Wear limit	Maximum difference between cylinders
1.0…1.5 MPa (10…15 bar)	0.7 MPa (7 bar)	0.3 MPa (3 bar)

If the specified values are not reached, test the combustion chamber for tightness ⇒ page 107 .

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

– Install spark plugs, tightening torque ⇒ page 251 .
– Install ignition coils at power output stage ⇒ page 252 .

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

– Delete the contents of the fault memory for the engine control unit at the end of the work as error messages were stored due to disconnecting the plugs ⇒ Vehicle diagnostic tester.

1.6 Testinf the combustion chamber for tightness

Special tools and workshop equipment required

♦ Pressure hose - MP1-210 (VW 653/3)- (replace gasket ring with a spark plug gasket ring)
♦ Spark plug socket and extension

Test procedure

– Unscrew the spark plugs.
– Position piston of the relevant cylinder to dead centre.

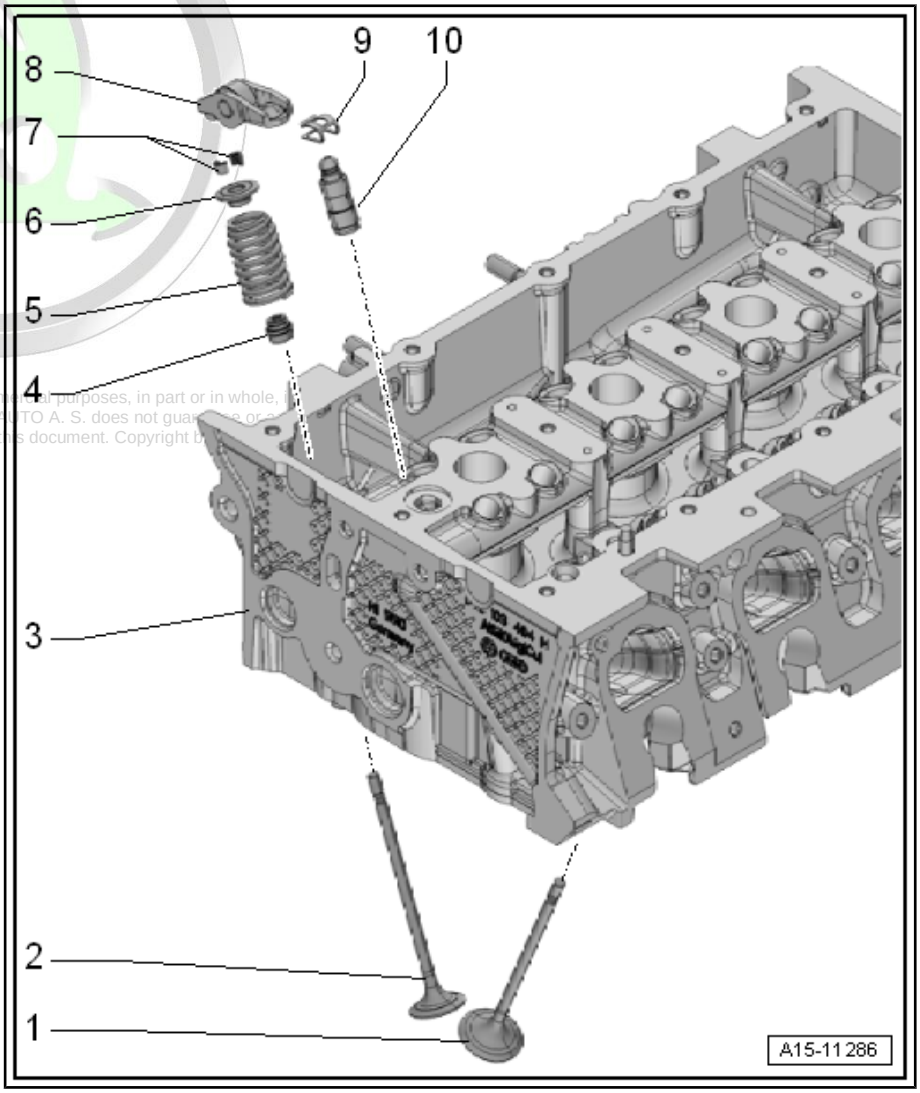
– Screw the pressure hose MP 1-210 into the spark plug thread.
– Connect pressure hose to compressed air.
– With the assistance of a second mechanic, lock the screw at the crankshaft on TDC position in order to avoid the displacement of the piston after pressure build-up.
– Build up a pressure of approx. 0.3 MPa (3 bar) in the combustion chamber.
– Determine how the pressure escapes:

1 - Via the inlet valve(s) - the pressure enters the throttle valve.
2 - Via the outlet valve(s) - the pressure enters the exhaust system.
3 - Via the piston rings - the pressure enters the cylinder block.

2 Valve gear

2.1 Valve gear - Summary of components

2.1.1 Valves - Summary of components



1 - Inlet valve

- ❑ do not rework, only grinding in is permissible
- ❑ Valve dimensions ⇒ page 121
- ❑ inspecting valve guides ⇒ page 120

2 - Exhaust valve

- ❑ do not rework, only grinding in is permissible
- ❑ Valve dimensions ⇒ page 121
- ❑ inspecting valve guides ⇒ page 120

3 - Cylinder head

4 - Valve stem seal

- ❑ replace ⇒ page 115

5 - Valve spring

- ❑ Fitting position ⇒ page 110

6 - Valve spring retainer

7 - Valve collets

8 - Roller rocker finger

- ❑ removing and installing ⇒ page 101
- ❑ mark the fitting position for re-installation
- ❑ inspect roller bearings for smooth operation
- ❑ oil the contact surfaces before installing

9 - Locking clip

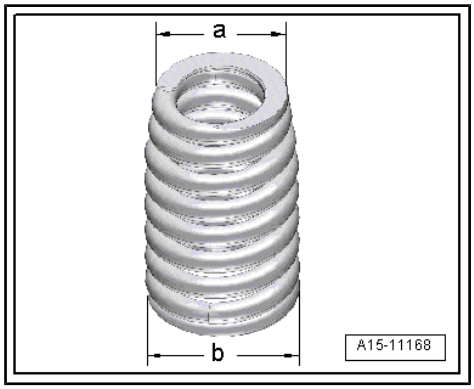
- ❑ for hydraulic balancing element

10 - Hydraulic balancing element

- ❑ Do not interchange
- ❑ Oil contact surface

Fitting position of the valve spring

- The small ∅ -a- points to the valve spring plate.
- The small ∅ -b- points to the cylinder head.



2.2 Removing and installing the camshaft adjustment valves

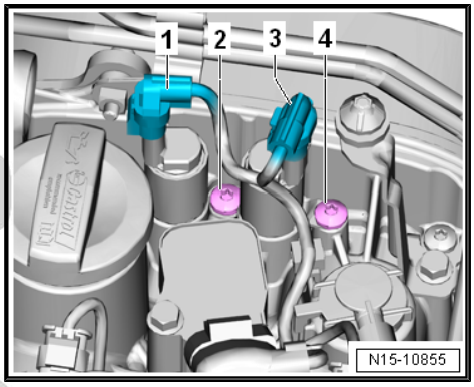
2.2.1 Removing and installing valve 1 for camshaft adjustment - N205- and valve 1 for camshaft adjustment in the exhaust - N318-

Removing

Inlet camshaft control valve 1 - N205-

– Unplug connector -1-.

– Unscrew screw -2- and remove camshaft control valve 1 - N205- .



Camshaft control valve 1 in the exhaust - N318-

– Unplug connector -3-.

– Unscrew screw -4- and remove camshaft control valve 1 in the exhaust - N318- .

Install

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

Note

Renew O-ring.

- Tightening torque ⇒ page 95 .

2.3 Removing and installing camshaft control

Removing

Camshaft control for exhaust camshaft

– Remove engine support ⇒ page 39 .

Camshaft control for inlet/exhaust camshaft

– Remove the toothed belt from the camshafts ⇒ page 48 .

Install

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

Tightening torques:

- Assembly bracket ⇒ page 26
- V-ribbed belt drive ⇒ page 34
- Toothed belt guard ⇒ page 42
- Coolant pipes ⇒ page 161
- Battery tray ⇒ Electrical System; Rep. gr. 27
- Check assembly bracket setting ⇒ page 31 .

2.4 Measuring axial play of camshaft

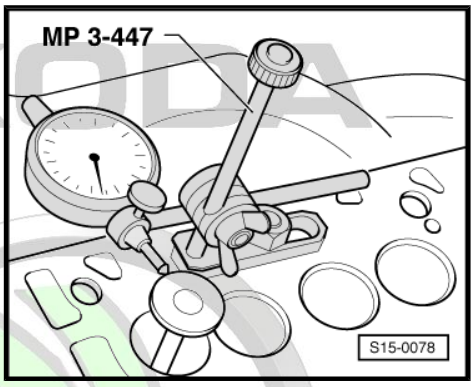
Special tools and workshop equipment required

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

Work procedure

– Remove the camshaft housing ⇒ page 101 .

– Secure dial gauge with the universal dial gauge bracket 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.

2.5 Removing and installing gasket ring for camshaft

2.5.1 Removing and installing the inlet camshaft on the belt pulley side

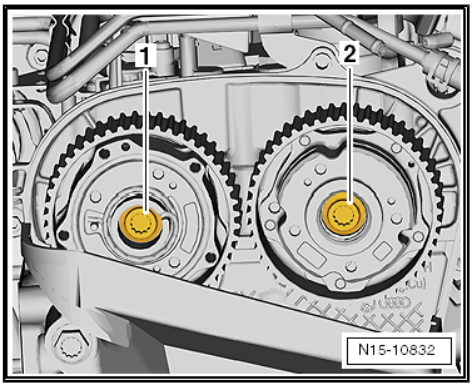
Special tools and workshop equipment required

- ♦ Assembly device - T10478-
- ♦ Extraction hook - T20143/1-

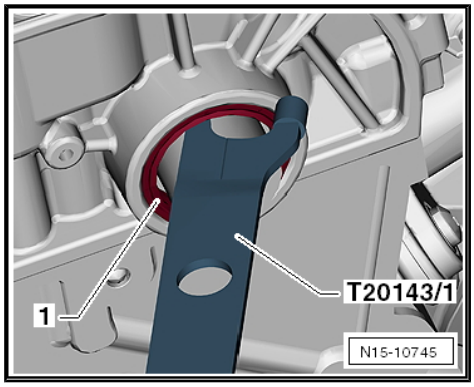
Removing

– Remove the toothed belt from the camshafts ⇒ page 48 .

– Unscrew screw -2- and remove camshaft sprocket.



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



Install

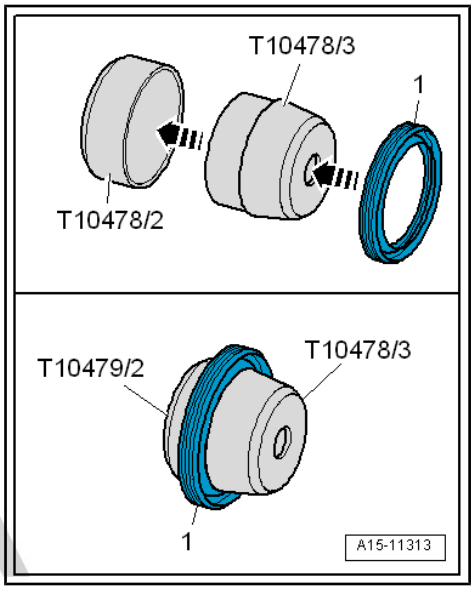
Note

Do not oil new sealing ring.

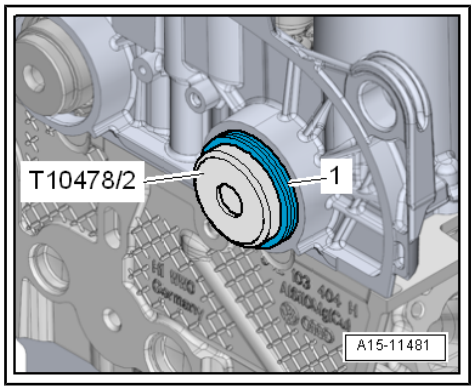
– Push sealing ring -1- over the receiver tube -T10478/3- onto the guide bushing -T10478/2- .

• Fitting position: Closed side of sealing ring points to the receiver tube.

– Disconnect receiver tube and guide bushing.

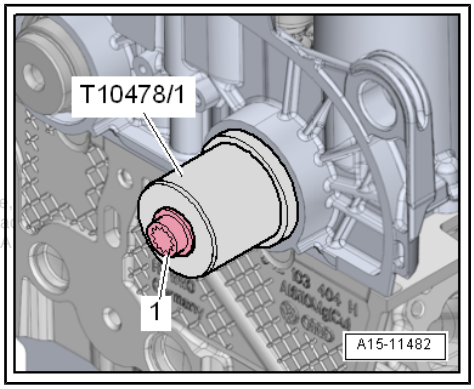


– Position guide bushing -T10478/2- with seal -1- on camshaft.



– Pull sealing ring in to the stop using the thrust piece -T10478/1- and the camshaft sprocket screw -1-.

– install (set the timing) ⇒ page 48 .



2.5.2 Removing and installing the exhaust camshaft on the belt pulley side

Special tools and workshop equipment required

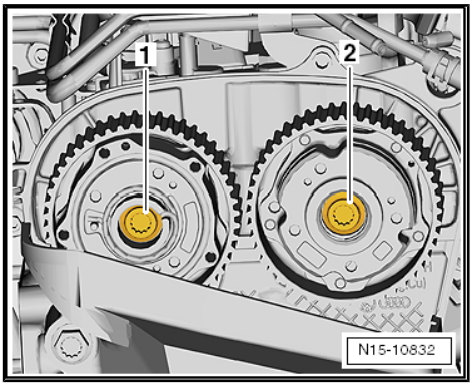
- Assembly device - T10478- with screw -T10478/5-
- Extraction hook - T20143/1-

Removing

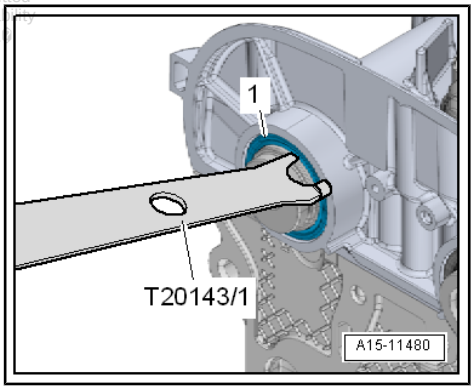
– Remove the toothed belt from the camshafts ⇒ page 48 .

– Remove engine support ⇒ page 39 .

– Unscrew screw -1- and remove camshaft sprocket.



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



Install

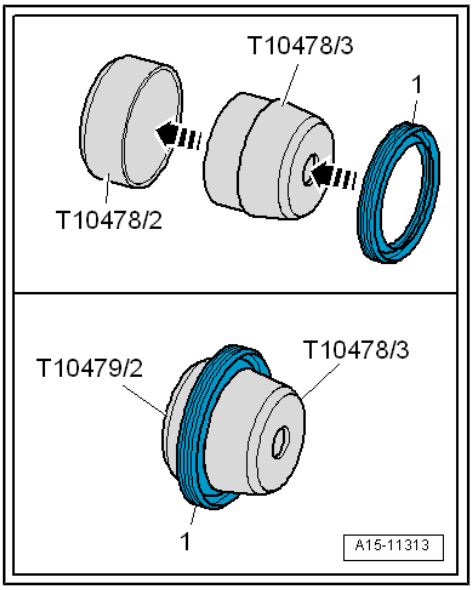
Note

Do not oil new sealing ring.

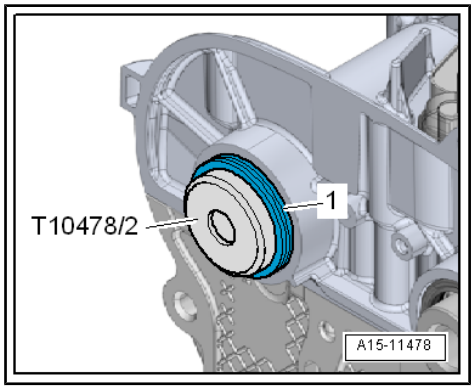
– Push sealing ring -1- over the receiver tube -T10478/3- onto the guide bushing -T10478/2- .

• Fitting position: Closed side of sealing ring points to the receiver tube.

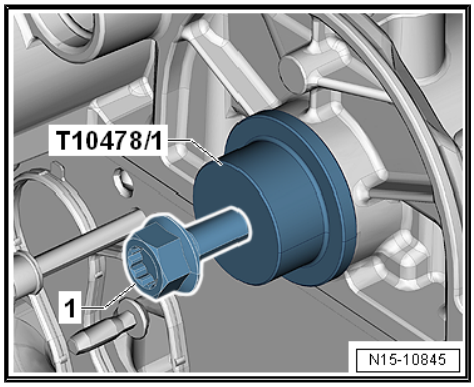
– Disconnect receiver tube and guide bushing.



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



– Pull in to the stop using screw for camshaft sprocket -1- and thrust piece -T10478/1- .
– install (set the timing) ⇒ page 48 .
– Install engine support ⇒ page 39 .



2.5.3 Removing and installing the exhaust camshaft on the gearbox side

Special tools and workshop equipment required

- Assembly device - T10479-
- Extraction hook - T20143/1-

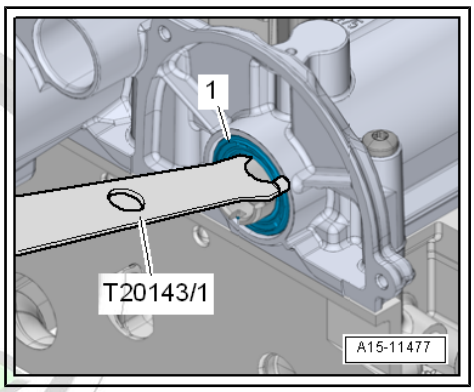
Removing

– Remove toothed belt pulley for coolant pump ⇒ page 153 .
– Carefully fit extractor hook - T20143/1- between camshaft and seal -1-.
– Lever out sealing ring.

Install

Note

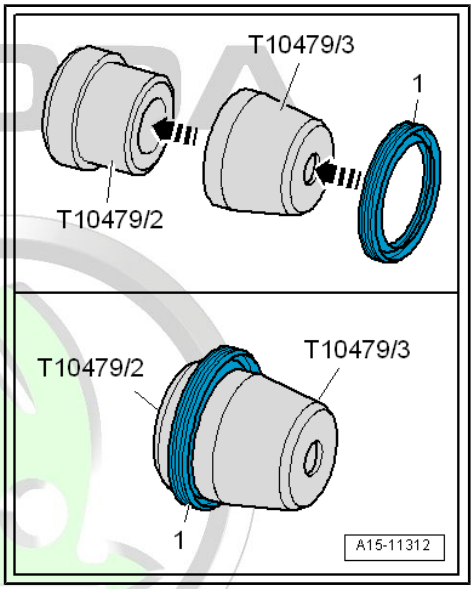
Do not oil new sealing ring.



– 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.

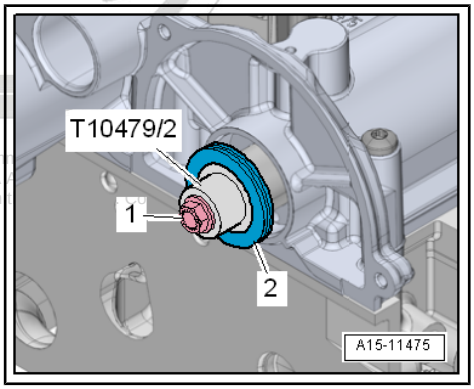
– Disconnect receiver tube and guide bushing.



– Fit guide bushing -T10479/2- with sealing ring -2- centrally onto the camshaft.

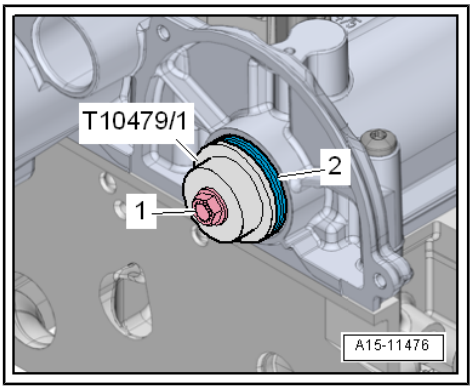
– Fix guide bushing with screw -1- for coolant pump driving wheel onto the camshaft.

– Push sealing ring onto camshaft and 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 ⇒ page 153 .



2.6 Removing and installing valve stem seal

2.6.1 Removing and installing valve stem seal with cylinder head installed

Special tools and workshop equipment required

♦ Spark plug socket and extension - 3122 B-

♦ Disassembly and assembly device for valve collets - VAS 5161- with set - VAS 5161/32-32-

♦ Adapter - T40012-

♦ Valve stem seal insertion tool - MP1-233 (3365)-

♦ Valve shaft pliers , e.g. -VAS 6770-

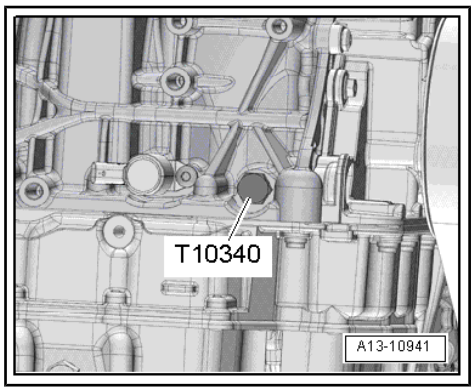
Work procedure

– Remove the camshaft housing ⇒ page 101 .

– Unscrew the spark plugs with spark plug wrench - 3122 B- .

– Unscrew fixing screw - T10340- .

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



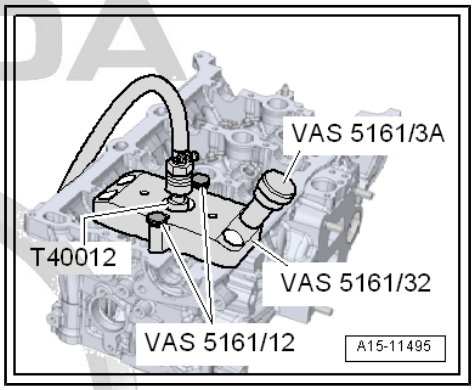
– Place guide plate -VAS 5161/32-1- on the cylinder head and screw on using the knurled screws -VAS 5161/12- .

– Screw the adapter - T40012- with sealing ring into the relevant spark plug thread by hand.

– 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.



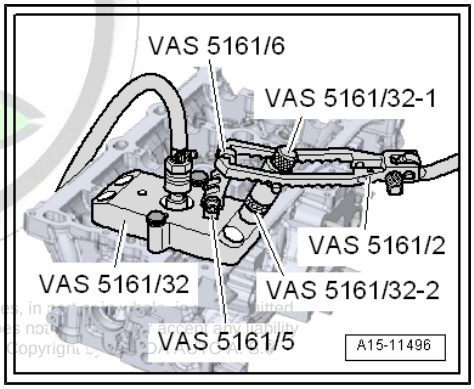
– Screw the detent part -VAS 5161/6- with the interlocking fork -VAS 5161/5- into the guide plate.

– Insert assembly cartridge -VAS 5161/32-2- with sleeve mounted -VAS 5161/32-3- 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.

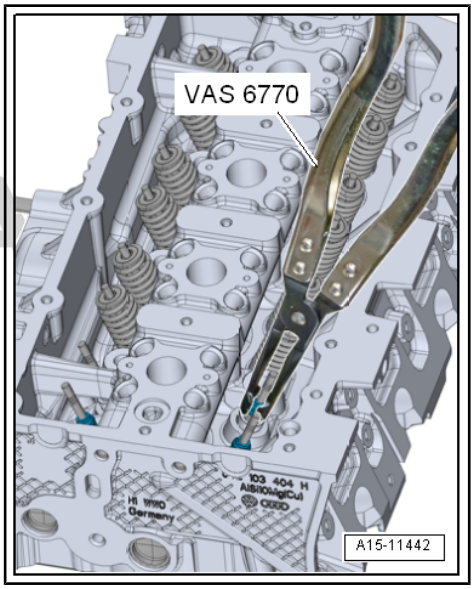
– Remove assembly cartridge.

– Unscrew guide plate and turn it to the side.

• T compressed air hose remains connected.

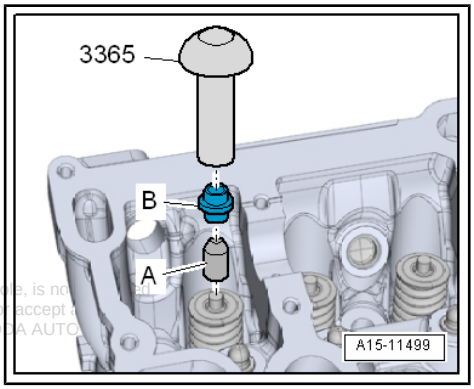
– Remove the valve spring with the valve spring retainer.

– Use valve shaft pliers - VAS 6770- to pull off valve stem seal.



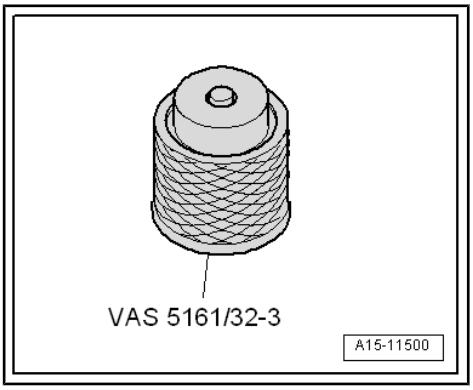
> **Caution**
>
> ***Risk of damage when installing the valve stem seals.***

– 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 - 3365- onto the valve guide.
– Remove plastic sleeve.

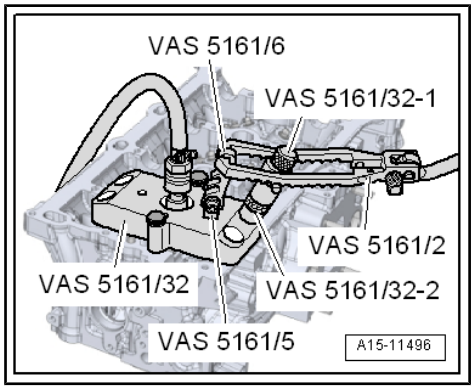


If the valve collets were removed from the assembly cartridge, first of all they must be inserted into the insertion device.

• The large diameter of the valve collets points to the top.
– Press the assembly cartridge from the top onto the insertion device and lift up the valve collets.
– Insert the valve spring and the valve spring retainer, installation position of valve spring ⇒ page 110 .



– Screw the guide plate -VAS 5161/32-1- back onto the cylinder head.
– Insert assembly cartridge -VAS 5161/32-2- with sleeve -VAS 5161/32-3- mounted 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 work procedure for each cylinder.



Assembling

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

– Install spark plugs ⇒ Maintenance ; Booklet Octavia III .
– Install camshaft housing ⇒ page 101 .

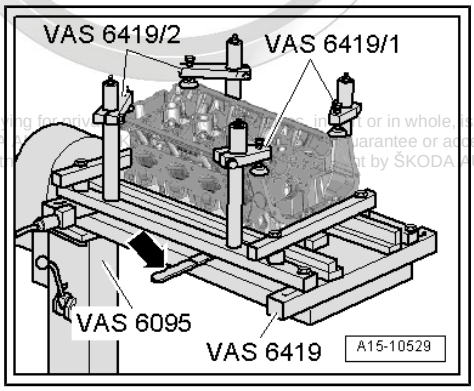
2.6.2 Removing and installing valve stem seal with cylinder head removed

Special tools and workshop equipment required

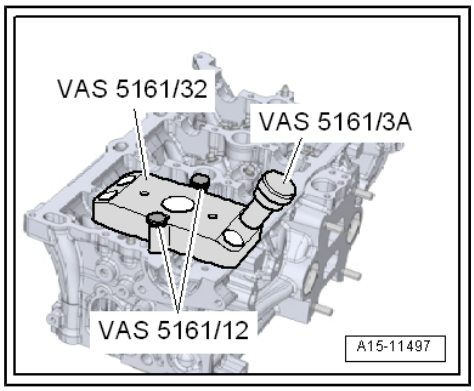
- Disassembly and assembly device for valve collets - VAS 5161- with set - VAS 5161/32-32-
- Engine and gearbox support - VAS 6095-
- Cylinder head tensioning device - VAS 6419-
- Valve shaft pliers - VAS 6770-
- Valve stem seal insertion tool - 3365-

Work procedure

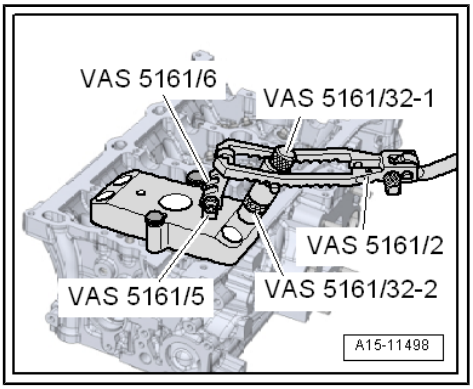
– Remove cylinder head ⇒ page 97 .
– Insert the cylinder head tensioning device - VAS 6419- into the engine and gearbox jack - VAS 6095- .
– Tension the cylinder head in the cylinder head tensioning device, as shown in the illustration.
– Connect cylinder head tensioning device to compressed air.
– Adjust 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 5161/32-1- 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.



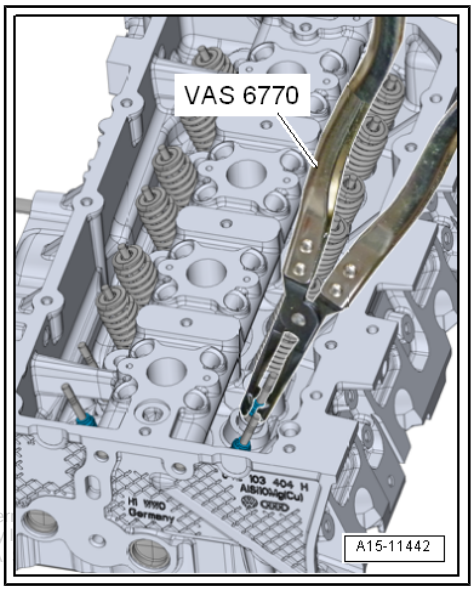
– Screw the detent part -VAS 5161/6- with the interlocking fork -VAS 5161/5- into the guide plate.
– Insert assembly cartridge -VAS 5161/32-2- with sleeve mounted -VAS 5161/32-3- into the guide plate.
– Hook the pressure fork -VAS 5161/2- onto the detent part and push the assembly cartridge downwards.
– 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.



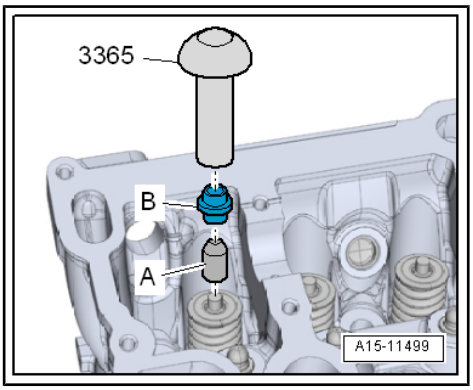
– Use valve shaft pliers - VAS 6770- to pull off valve stem seal.

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 - 3365- onto the valve guide.
– Remove plastic sleeve.

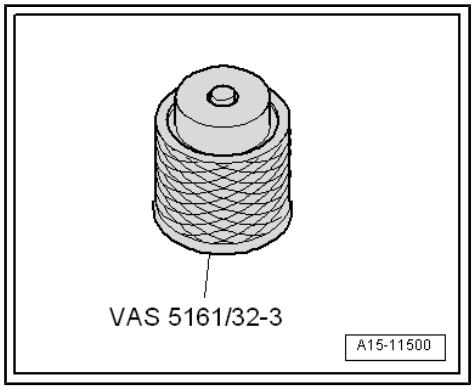


If the valve collets were removed from the assembly cartridge, first of all they must be inserted into the insertion device.

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

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

– Insert the valve spring and the valve spring retainer, installation position of valve spring ⇒ page 110 .



– Screw the guide plate -VAS 5161/32-1- back onto the cylinder head.

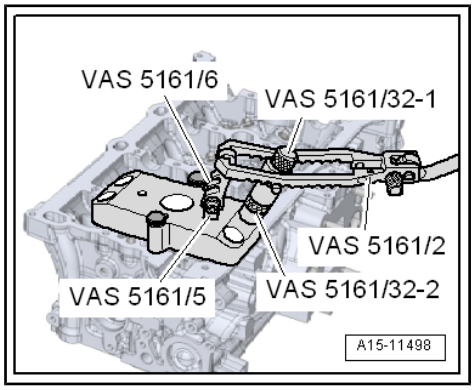
– Insert assembly cartridge -VAS 5161/32-2- with sleeve -VAS 5161/32-3- mounted into the guide plate.

– 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 ⇒ page 97 .



2.6.3 Checking valve guides

Special tools and workshop equipment required

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

Test procedure

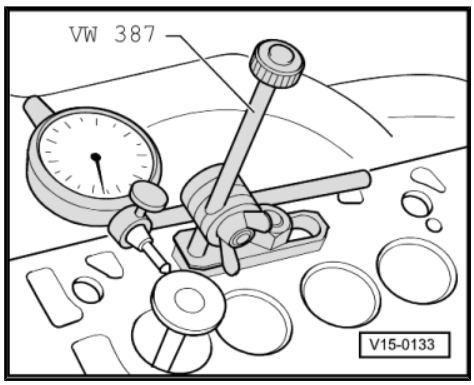
– Insert valve into guide. The end of the valve stem must be flush with the guide. On account of differing stem diameters, only use inlet valve in inlet valve guide and exhaust valve in exhaust valve guide.

– 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.



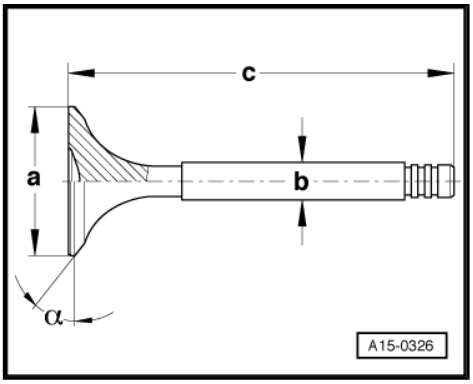
Note

The valve guides cannot be replaced.

2.6.4 Valve dimensions

Note

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



Dimension		Inlet valve	Exhaust valve
∅ a	mm	28.5	25.0
∅ b	mm	4.973	4.963
c	mm	110.25	110.09
α	∠°	45	30

17 – Lubrication

1 Oil sump and oil pump

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 91* *.*

1 - 8 Nm + torque a further 90° (1/4 turn)

2 - Oil level and oil temperature sender - G266-
- ❑ removing and installing ⇒ page 123

3 - Sealing ring
- ❑ replace

4 - Oil drain plug, 30 Nm
- ❑ replace

5 - Sealing ring
- ❑ replace

6 - Sump bottom part
- ❑ removing and installing ⇒ page 123

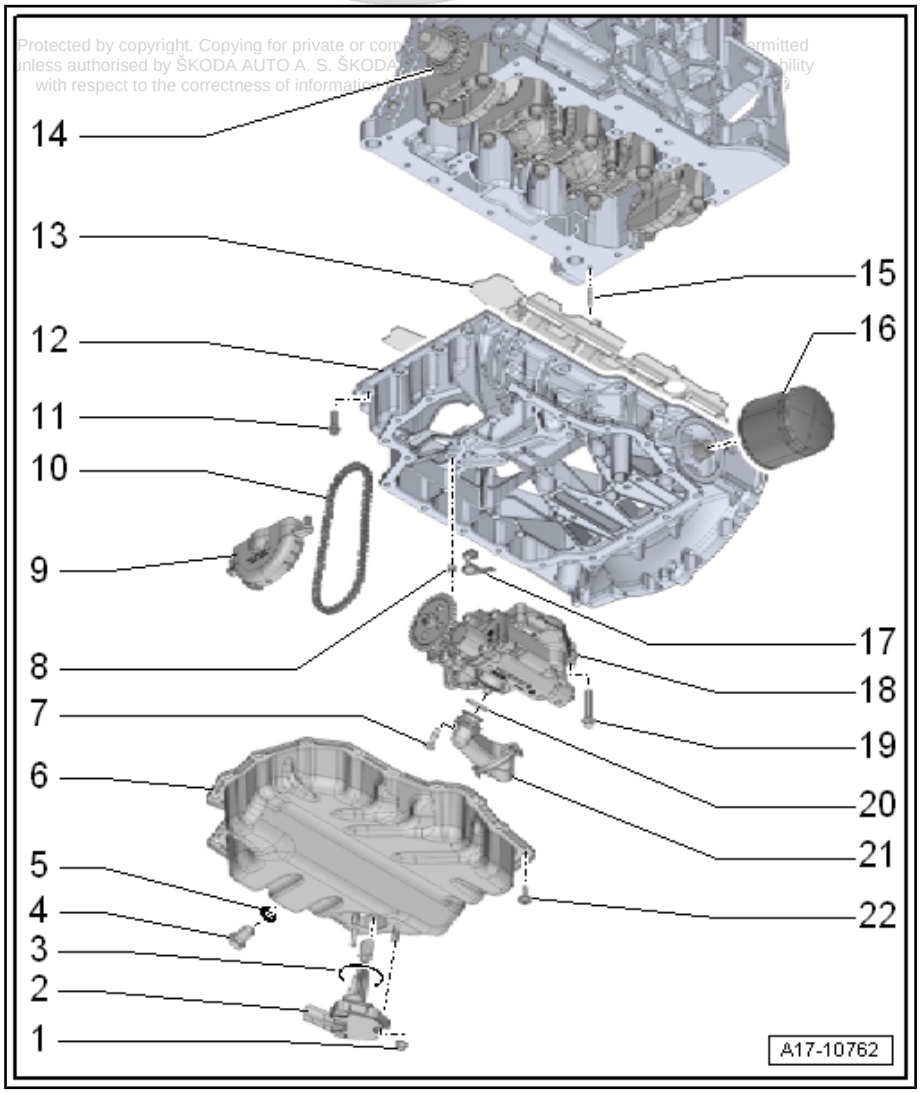
7 - 8 Nm + torque a further 90° (1/4 turn)
- ❑ replace

8 - Fitting sleeve
- ❑ 2 pieces

9 - Cover
- ❑ for drive chain of the oil pump

10 - Drive chain
- ❑ for oil pump
- ❑ mark the direction of rotation in colour before removing

11 - 8 Nm + torque a further 90° (1/4 turn)
- ❑ replace
- ❑ Tightening order



12 - Sump top part

- ❑ removing and installing ⇒ page 127

13 - Baffle

14 - Sprocket

- ❑ for oil pump drive

15 - Fit pin

16 - Oil filter, 20 Nm

- ❑ Remove and install with oil filter tool - 3417- .
- ❑ Before installing, lightly coat sealing ring with clean engine oil

17 - Gasket

- ❑ With oil strainer

18 - Oil pump

- ❑ removing and installing ⇒ page 126

19 - 10 Nm

20 - O-ring

- ❑ replace

21 - Oil suction pipe

- ❑ Clean strainer if dirty

22 - 12 Nm

- ❑ replace
- ❑ Order of tightening ⇒ page 126

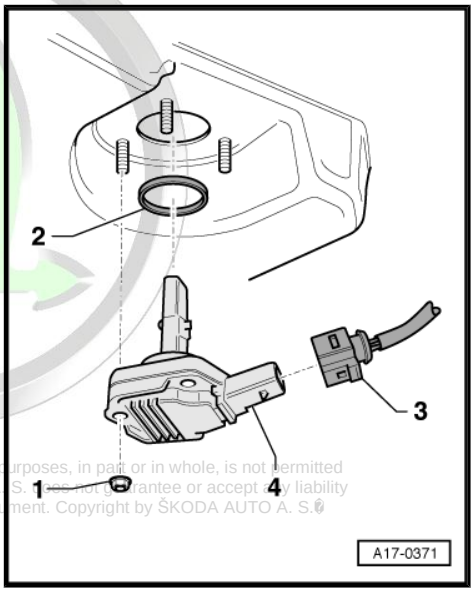
1.2 Removing and installing oil level and oil temperature sender - G266-

Removing

– Drain engine oil ⇒ Maintenance ; Booklet Octavia III .

– Unplug connector -3-.

– Unscrew nuts -1- and remove oil level and oil temperature sender - G266- -4-.



Install

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

- Tightening torques ⇒ page 122 .

Note

Replace gasket ring -2-.

– Fill with engine oil and check the oil level ⇒ Maintenance ; Booklet Octavia III .

1.3 Removing and installing oil sump bottom part

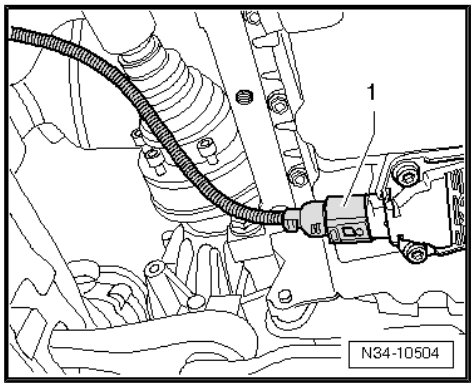
Special tools and workshop equipment required

- Socket insert - T10058-
- Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.
- Silicone sealant ⇒ ETKA - Electronic catalogue of original parts
- Cleaning and degreasing agent , e.g. -D 009 401 04-

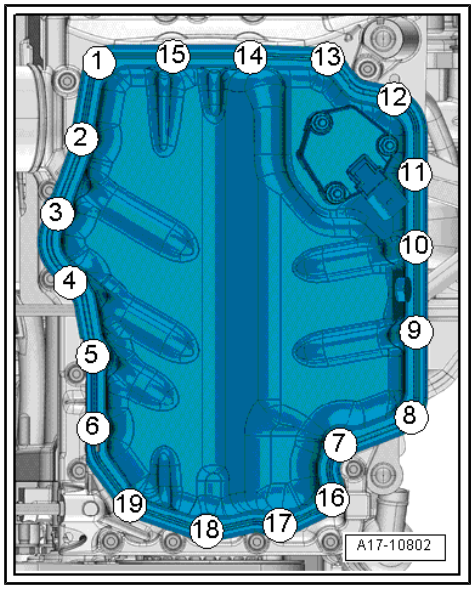
Removing

– Drain engine oil ⇒ Maintenance ; Booklet Octavia III .

– Disconnect plug -1- at the oil level and oil temperature sender - G266- .



– Loosen the screws in the sequence -19…1- and unscrew them.



– At the point identified by an -arrow-, carefully lever out the oil sump bottom part using a screwdriver.

– Remove lower part of oil sump. If necessary, undo the oil pan by applying slight blows with a rubber-headed hammer.

Install

Caution

Risk of contamination of the lubrication system.

- ***Cover opened engine parts.***

– Spray sealant remover onto sealing flange and allow it to take effect.

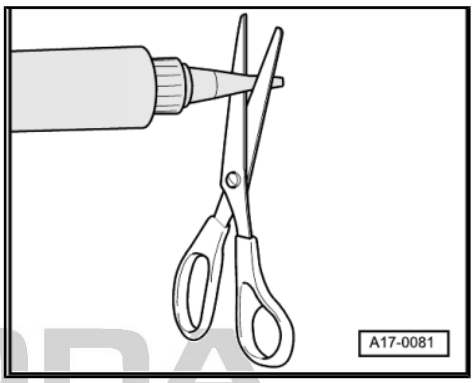
– Remove sealant residues from the upper part of the oil sump.

– Clean oil and grease from sealing surfaces.

Note

Pay attention to the use by date on sealant.

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



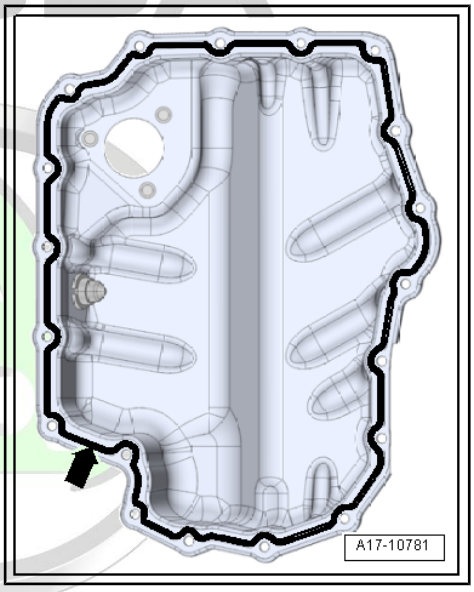
Caution

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 sump bottom part, as shown in the illustration.

• Thickness of sealant bead: 2…3 mm.



Note

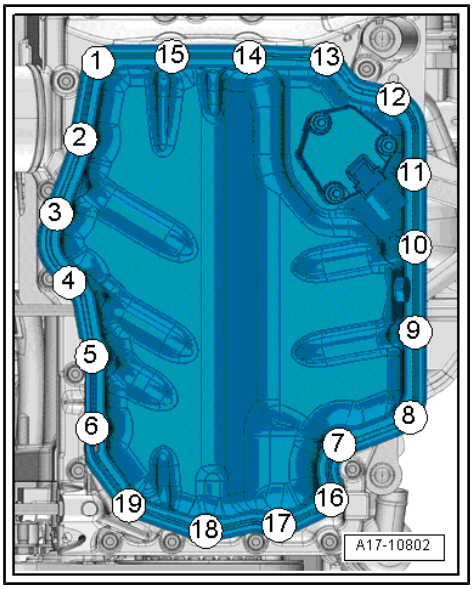
- *Take particular care when applying sealant bead in the area of the sealing flange.*
- *After applying the sealant, the oil sump bottom part must be installed within 5 minutes.*

– Position oil sump bottom part and tighten screws.

Oil sump bottom part - tightening torque and tightening order

– Tighten screws gradually in the given sequence:

Stage	Screws	Tightening torque
1.	-1…19-	by hand as far as the stop
2.	-1…19-	12 Nm



Note

After installing the lower part of the oil pan, allow the sealant to dry for about 30 minutes. Only then fill with engine oil.

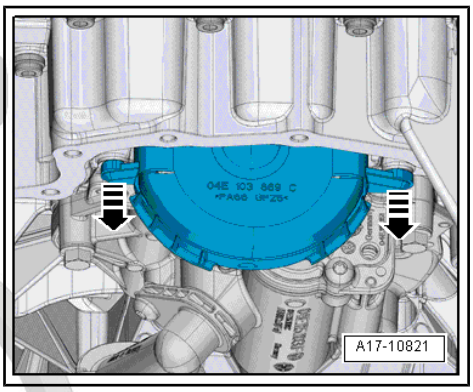
– Fill with engine oil and check the oil level ⇒ Maintenance ; Booklet Octavia III .

1.4 Removing and installing oil pump

Removing

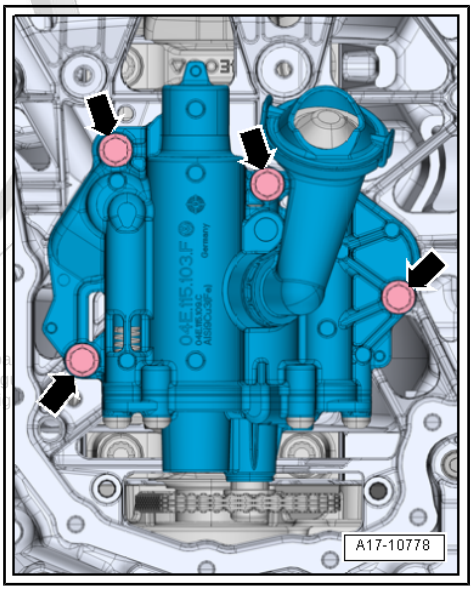
– Remove oil sump bottom part ⇒ page 123 .

– Unclip cover for oil pump drive chain sprocket -arrows-.



– Remove bolts -arrows-.

– Guide oil pump out with drive chain sprocket below the drive chain.



Install

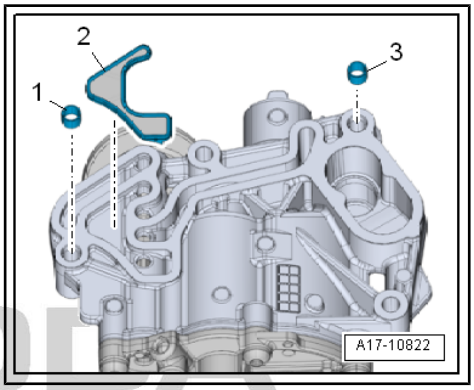
– Check that the dowel sleeves -1, 3- are inserted into the oil pump.

– Insert gasket with strainer -2- into the oil pump.

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

• Tightening torques ⇒ page 122 .

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



Note

A sluggish oil pump must be replaced.

– Insert drive chain sprocket into drive chain and screw tight.

– Install oil sump bottom part ⇒ page 123 .

– Fill with engine oil and check the oil level ⇒ Maintenance ; Booklet Octavia III .

1.5 Removing and installing oil sump top part

Special tools and workshop equipment required

♦ Cleaning and degreasing agent , e.g. -D 009 401 04-

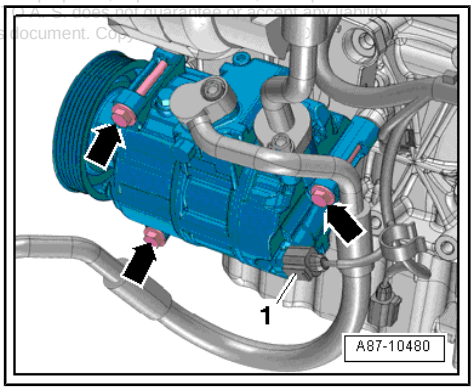
♦ Sealant remover gasket stripper (bearing code GST, bearing article no. R 34402), manufacturer Retech s.r.o.

♦ Silicone sealant ⇒ ETKA - Electronic catalogue of original parts

Removing

– Remove AC compressor from holder and strap up ⇒ Heating, Air Conditioning; Rep. gr. 87 .

– Remove oil pump ⇒ page 126 .



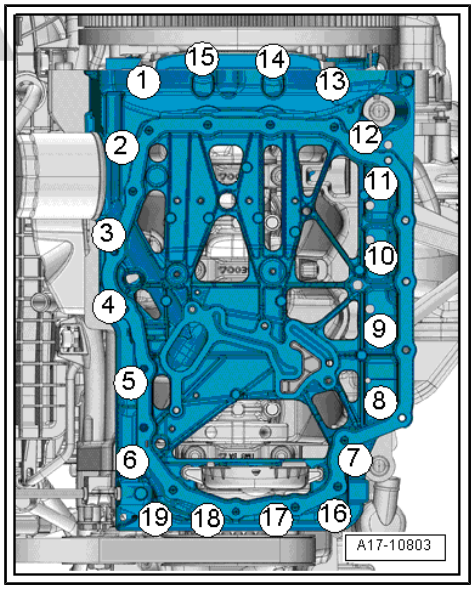
– Loosen the screws in the sequence -19…1- and unscrew them.
– Loosing oil sump top part carefully from the bonding.
– Remove baffle.

Install

Note

♦ *Replace screws which have been tightened firmly to a torquing angle.*
♦ *Replace the gaskets, sealing rings and self-locking nuts.*

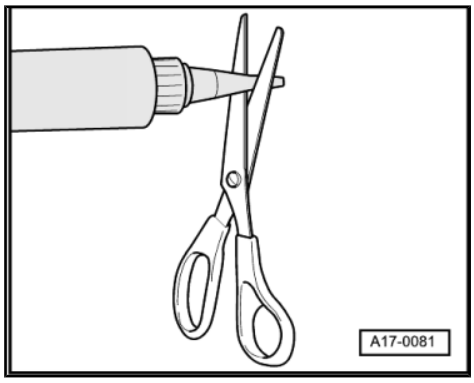
– Check oil channels in the oil sump top part and in the cylinder block for contamination.
– Clean oil and grease from sealing surfaces.



Note

Pay attention to the use by date on sealant.

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



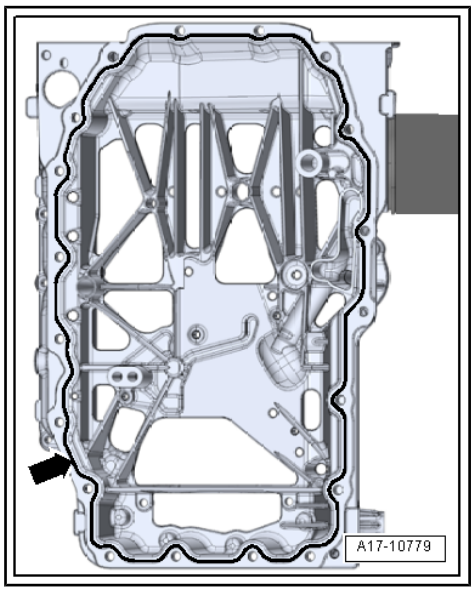
Caution

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 sump top part, as shown in the illustration.

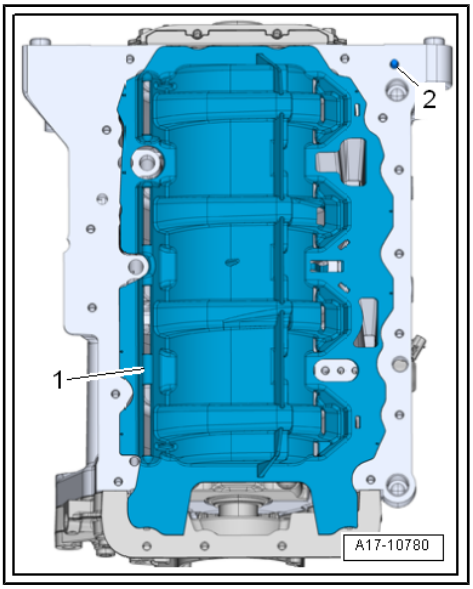
• Thickness of sealant bead: 2…3 mm.



Note

After applying the sealant, the oil sump top part must be installed within 5 minutes.

– Check firm seating of the fit pin -2- in the cylinder block.
– Position the gasket -1- at the cylinder block.
– Position oil sump top part and tighten screws.



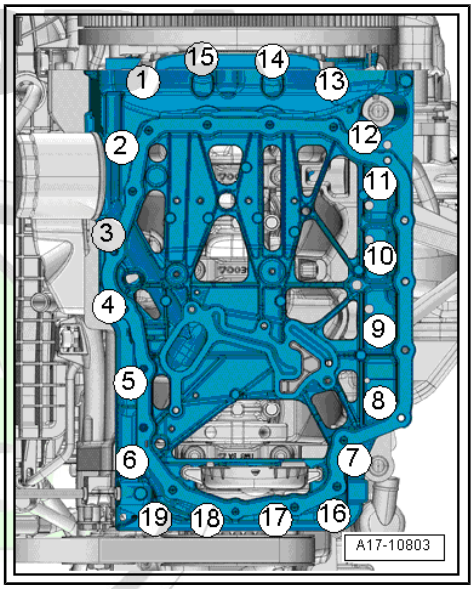
Oil sump top part - tightening torque and tightening order

Note

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

– Tighten screws gradually in the given sequence:

Stage	Screws	Tightening torque/torquing angle
1.	-1...19-	by hand as far as the stop
1.	-1…19-	8 Nm
2.	-1…19-	90° (torque a further 90° ($^1/_4$ turn)



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

– Install oil pump ⇒ page 126 .
– Install AC compressor ⇒ Heating, Air Conditioning; Rep. gr. 87 .
– Fill with engine oil and check the oil level ⇒ Maintenance ; Booklet Octavia III .

2 Engine oil cooler

2.1 Engine oil cooler - Summary of components

1 - Engine oil cooler

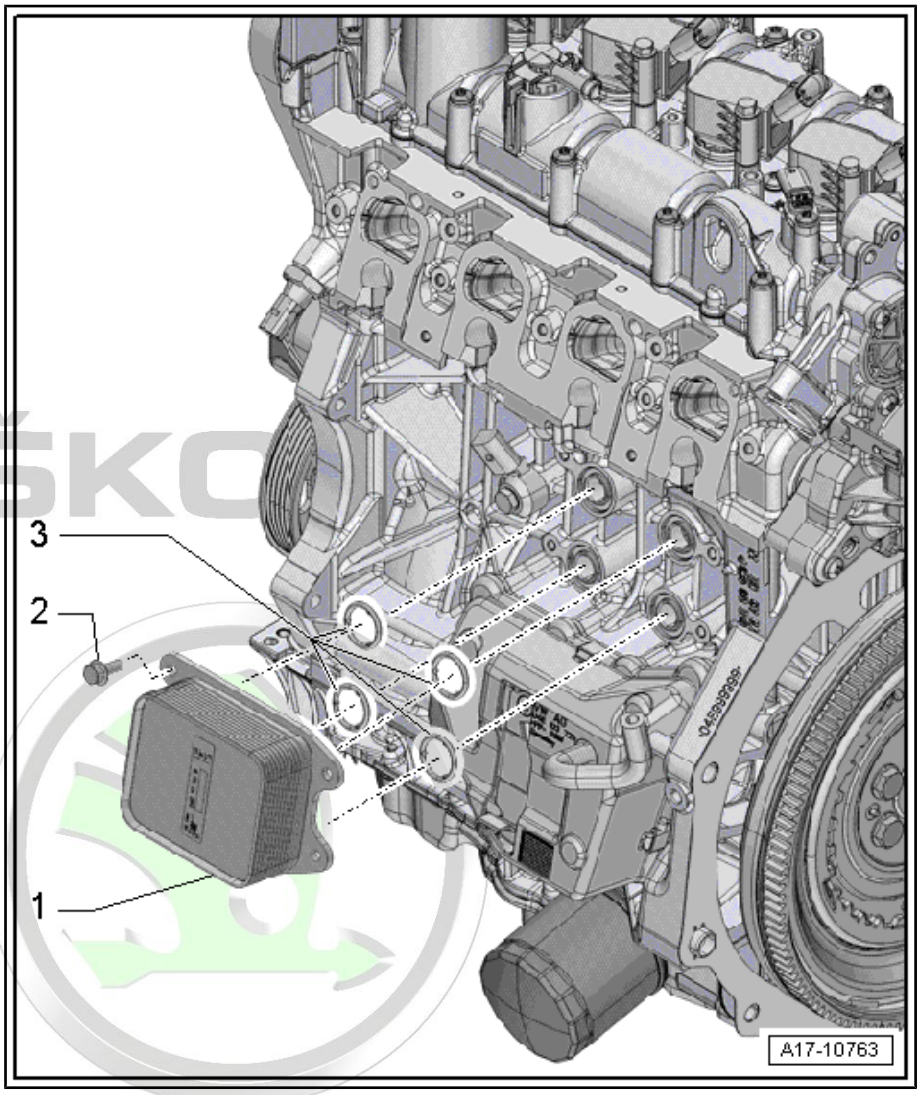
- ❑ pay attention to the notes ⇒ page 122
- ❑ removing and installing ⇒ page 130
- ❑ fill with fresh coolant after replacing

2 - 8 Nm + torque a further 90° (1/4 turn)

- ❑ replace

3 - Gasket rings

- ❑ replace



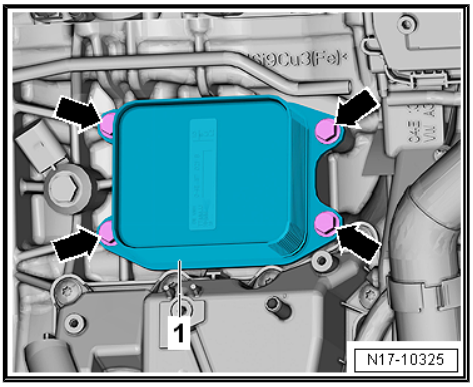
2.2 Removing and installing engine oil cooler

Removing

– Drain coolant ⇒ page 141 .

– Removing the intake manifold ⇒ page 217 .

– Release screws -arrows- and remove engine oil cooler -1-.



Install

– Insert new O-rings.

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

Tightening torques:

- Engine oil cooler ⇒ page 130 .
- Ignition system ⇒ page 251 .

– Installing the intake manifold ⇒ page 217 .

– Top up coolant ⇒ page 144 .

3 Crankcase ventilation

3.1 Crankcase ventilation - Summary of components

1 - Hose
- ❑ for crankcase ventilation

2 - Cover
- ❑ For oil separator

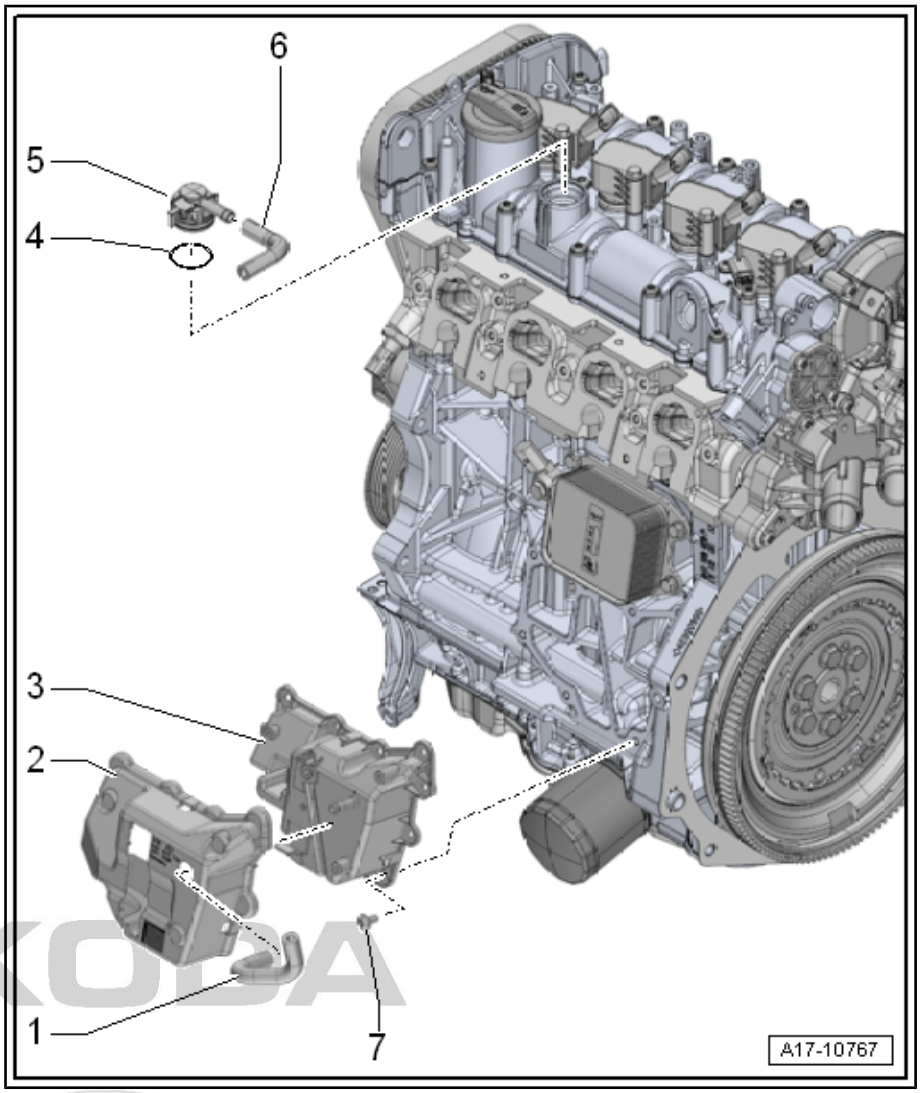
3 - Oil separator
- ❑ removing and installing ⇒ page 132
- ❑ replace if damaged

4 - O-ring
- ❑ replace

5 - Inlet connections

6 - Hose
- ❑ for crankcase ventilation

7 - 9 Nm
- ❑ replace
- ❑ order of tightening ⇒ page 134



3.2 Removing and installing oil separator

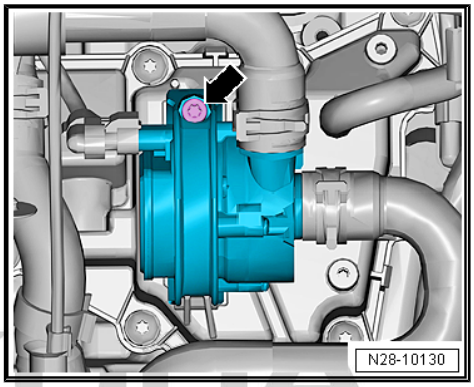
Special tools and workshop equipment required

- 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-
- Silicone sealant ⇒ ETKA - Electronic catalogue of original parts

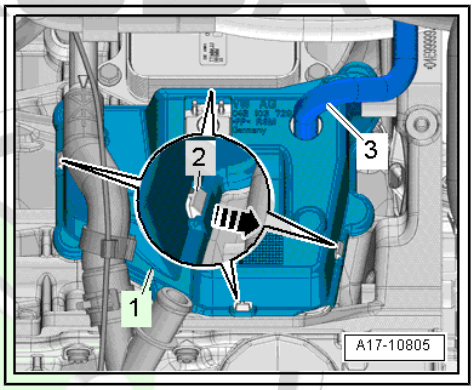
Removing

– Remove the sound dampening system ⇒ Body Work; Rep. gr. 66 .

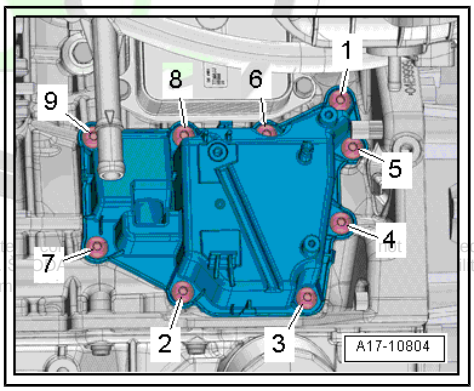
– Unscrew screw -arrow- and push coolant recirculation pump -V51- to the side.



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

Tightening torques:

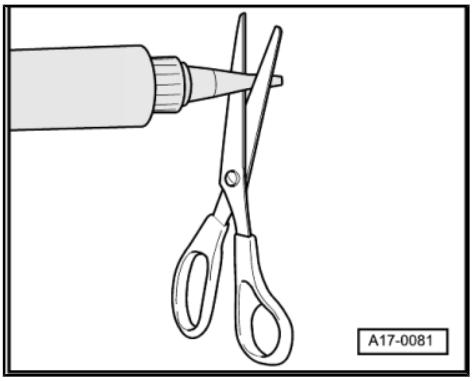
- Electric coolant pump ⇒ page 149

– Clean oil and grease from sealing surfaces.

Note

Pay attention to the use by date on sealant.

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

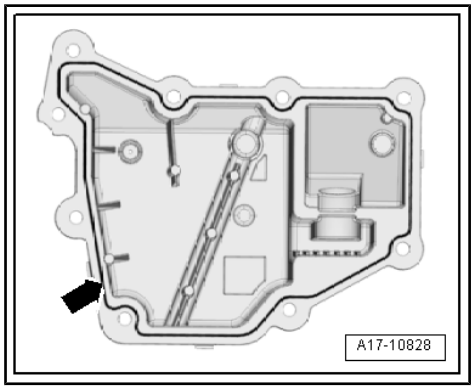


Caution

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.

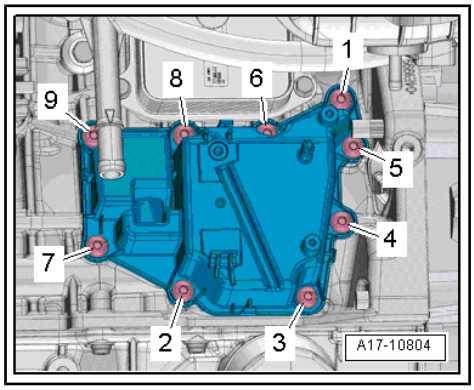


• Thickness of sealant bead: 2 mm.

After applying the sealant, the oil separator must be installed within 5 minutes.

– Position oil separator and tighten screws.

Oil separator - tightening torque and tightening order



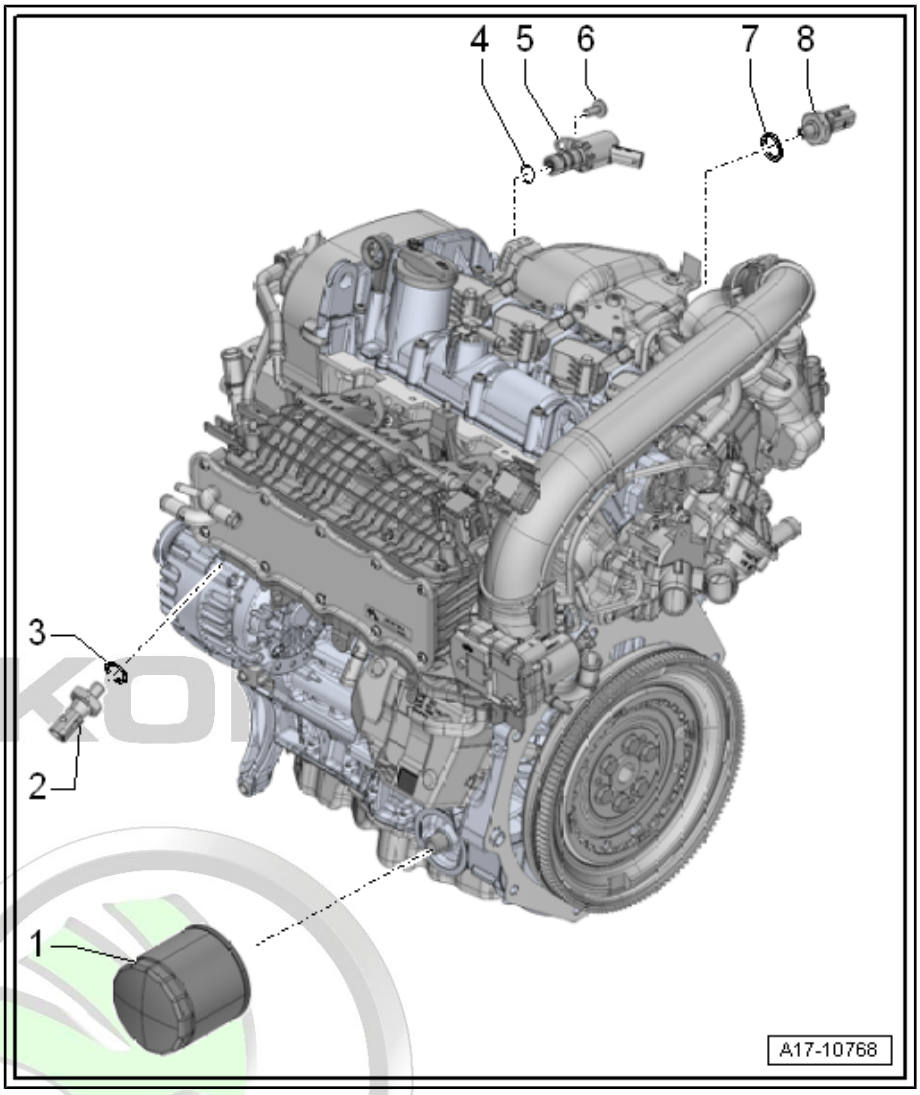
– Tighten the bolts in the sequence -1…9- to 9 Nm.

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

– Install the noise insulation ⇒ Body Work; Rep. gr. 66 .

4 Oil filter and oil pressure switch

4.1 Oil filter and oil pressure switch - Summary of components



1 - Oil filter, 20 Nm

- ❑ Remove and install with oil filter tool - 3417- .
- ❑ Before installing, lightly coat sealing ring with clean engine oil
- ❑ pay attention to the notes ⇒ page 122

2 - Oil pressure switch for reduced oil pressure - F378- , 20 Nm

- ❑ Check switching pressure 0.3 ... 0.6 MPa (3 ... 6 bar)
- ❑ (black) ⇒ page 138
- ❑ removing and installing ⇒ page 136
- ❑ Black

3 - Sealing ring

- ❑ replace

4 - O-ring

- ❑ replace

5 - Oil pressure control valve - N428-

- ❑ removing and installing ⇒ page 137

6 - 8 Nm

7 - Sealing ring

- ❑ replace

8 - Oil pressure switch - F22- , 20 Nm

- ❑ Switching pressure 0.215 ... 0.295 MPa (2.15 ... 2.95 bar)
- ❑ (brown) to be checked ⇒ page 138
- ❑ removing and installing ⇒ page 135

4.2 Removing and installing oil pressure switch - F22-

Special tools and workshop equipment required

- ♦ Flexible-head wrench SW 24 - T40175-

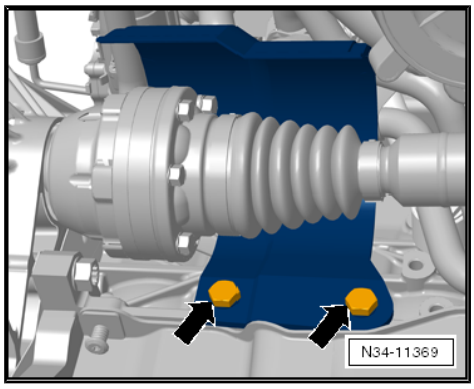
Removing

Note

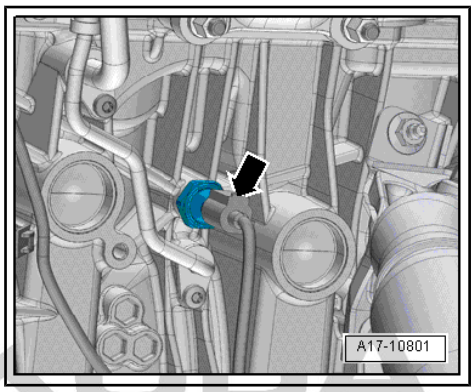
Fit all heat protection sleeves on again in the same place when installing.

– Remove the sound dampening system ⇒ Body Work; Rep. gr. 66 .

– Release screws -arrows- and remove heat shield for right drive shaft.



– Disconnect plug connection -arrow-.



Note

Place a cloth below to absorb leaking engine oil.

– Screw out oil pressure switch - F22- .

Install

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

Tightening torques:

- Oil filter ⇒ page 135
- ⇒ Chassis; Rep. gr. 40

Note

- *Replace gasket ring.*
- *Insert new oil pressure switch - F22- immediately into connection piece in order to avoid loss of oil.*

– Checking the oil level ⇒ Maintenance ; Booklet Octavia III .

4.3 Removing and installing oil pressure switch for reduced oil pressure - F378-

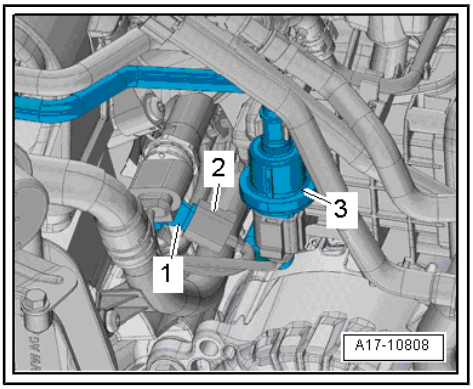
Special tools and workshop equipment required

- 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.

– Unplug connector -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 performed in a similar way in the reverse order. Pay attention to the following points:

- Tightening torque ⇒ page 135 .

Note

- *Replace gasket ring.*
- *Insert new oil pressure switch for reduced oil pressure - F378- immediately into the bore in order to avoid loss of oil.*

– Checking the oil level ⇒ Maintenance ; Booklet Octavia III .

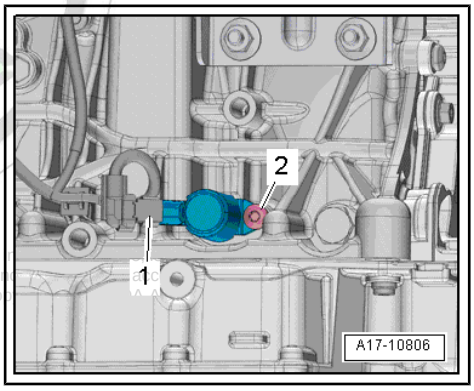
4.4 Removing and installing valve for oil pressure control - N428-

Removing

Note

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

– Remove the sound dampening system ⇒ Body Work; Rep. gr. 66 .
– Remove heat protection sleeves.
– Unplug connector -1-.



Note

Place a cloth below to absorb leaking engine oil.

– Remove screw -2- and remove oil pressure control valve - N428- .

Install

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

- Tightening torque ⇒ page 135 .

Note

Renew O-ring.

– Install the noise insulation ⇒ Body Work; Rep. gr. 66 .

4.5 Testing oil pressure

Special tools and workshop equipment required

- Oil pressure tester - V.A.G 1342-

Work procedure

- Engine oil level o.k., 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- ⇒ page 135 .

– 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 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)

If the specification is not attained:

– Check oil pressure control valve - N428- Vehicle diagnosis tester ⇒ Vehicle diagnostic tester.

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 ⇒ page 126 .

Check oil pressure switch for reduced oil pressure - F378- (black)

– Switch off engine.

– Connect brown wire of tester to earth (-).

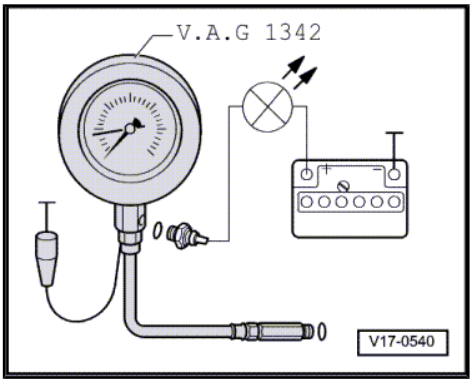
– Connect the voltage tester - V.A.G 1527 B- with adapter cables from measuring tool set - V.A.G 1594 C- to the plus pole on the battery (+) and oil pressure switch for reduced oil pressure - F378- (brown).

• 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 the engine: At a pressure of 0.3…0.6 MPa (3…6 bar) the LED must light up, otherwise replace the oil pressure switch.



Check oil pressure switch - F22- (brown)

– Switch off engine.

– Connect voltage tester - V.A.G 1527B- with auxiliary cables from auxiliary measuring set - V.A.G 1594 C- to battery positive (+) and oil pressure switch - F22- (blue).

• The LED must not light up.

– If the LED lights up, replace the oil pressure switch - F22- .

If the LED does not light up:

– Start engine and increase engine speed: At a pressure of 0.215…0.295 MPa (2.15…2.95 bar) the LED must light up, otherwise replace the oil pressure switch.

• Tightening torques ⇒ page 135 .

– Install oil pressure switch for reduced oil pressure - F378- ⇒ page 136 .

19 – Cooling

1 Cooling system

1.1 Coolant hose schematic diagram

Note

- *Blue = small coolant circuit.*
- *Green = large coolant circuit.*
- *Red = charge air coolant circuit.*
- *Grey = auxiliary heating coolant circuit (vehicles with auxiliary heating only)*
- *The arrows point in the coolant flow direction.*
- *The arrows which are on the coolant pipes and the coolant hose ends must stand opposite to each other.*

1 - Coolant expansion tank

2 - Screw cap

- ❑ for coolant expansion tank
- ❑ Check pressure relief valve ⇒ page 146

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

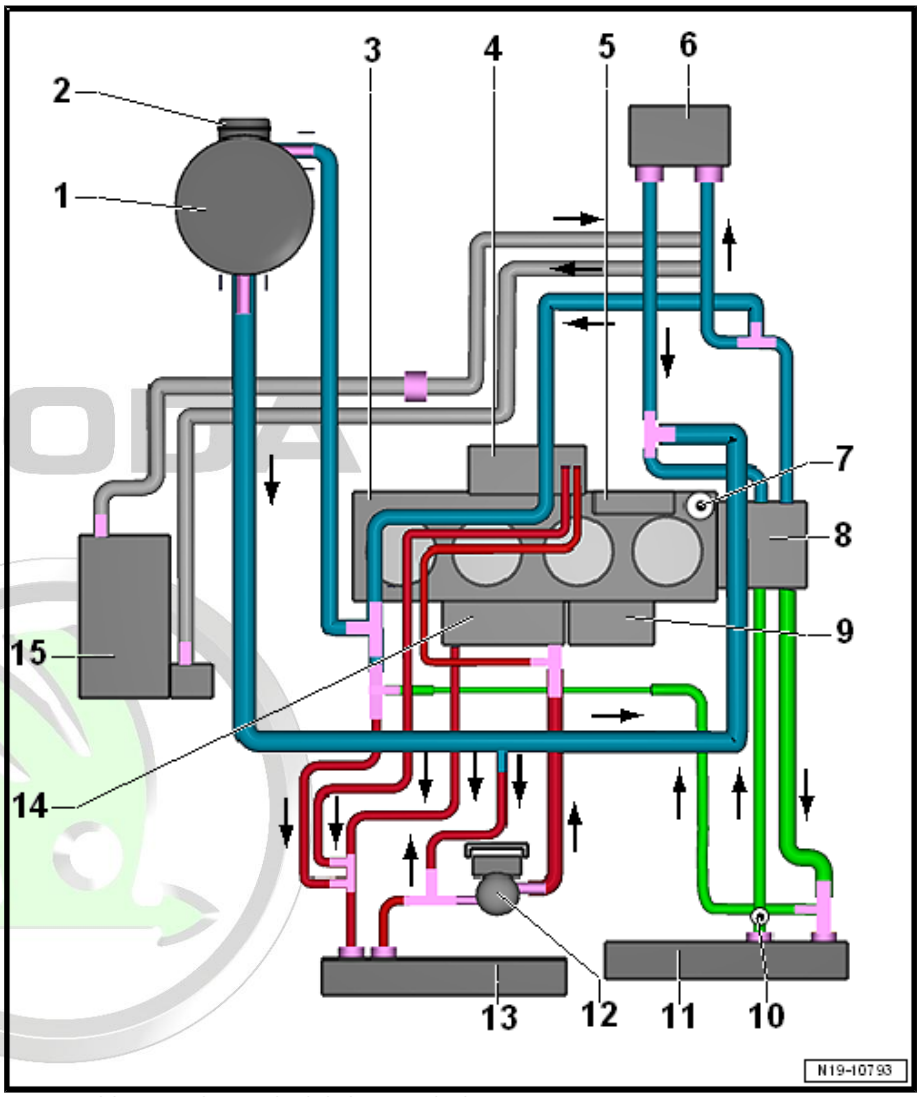
- ❑ with thermostat housing

9 - Engine oil cooler

10 - Coolant temperature sender at radiator outlet - G83-

11 - Coolant radiator

- ❑ fill with fresh coolant after replacing



12 - Coolant recirculation pump - V51-

13 - Cooler for charge air circuit

- ❑ fill with fresh coolant after replacing

14 - Charge-air cooler in intake manifold

- ❑ fill with fresh coolant after replacing

15 - Auxiliary heating

- ❑ Optional equipement

1.2 Draining and filling coolant

Special tools and workshop equipment required

- ♦ Catch pan , e.g. -VAS 6208-
- ♦ Pliers for spring strap clamps
- ♦ Cooling system charge unit - VAS 6096-
- ♦ Adapter for cooling system tester - V.A.G 1274/8-
- ♦ Refractometer
- ♦ Protective goggles
- ♦ Protective gloves

Draining

Note

- ♦ *Collect drained coolant in a clean container for reuse or proper disposal.*
- ♦ *Observe the disposal instructions.*

WARNING

Steam may escape when expansion tank is opened.

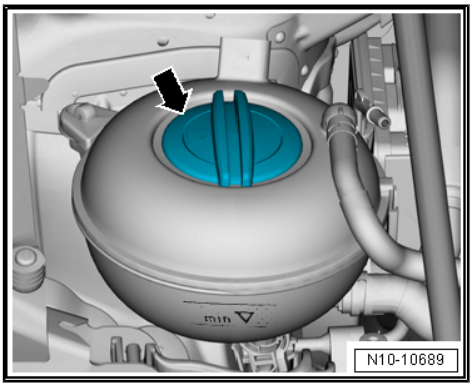
- ♦ ***When the engine is warm, the cooling system is under pressure.***
- ♦ ***Wear safety goggles and safety clothing, in order to avoid eye injuries and scalding.***
- ♦ ***Cover the cap with a cloth and open carefully.***

– Open cap -arrow- for coolant expansion tank.

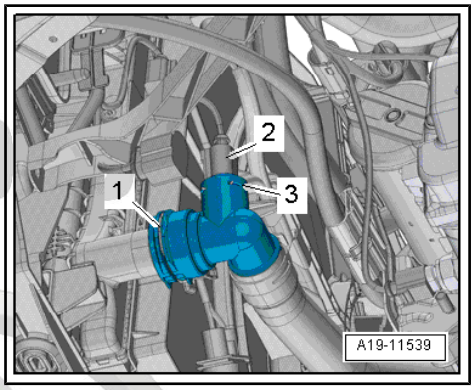
– Remove the sound dampening system ⇒ Body Work; Rep. gr. 66 .

– Position catch pan underneath.

– Remove plug -2- at the coolant temperature sender - G83- -3-.



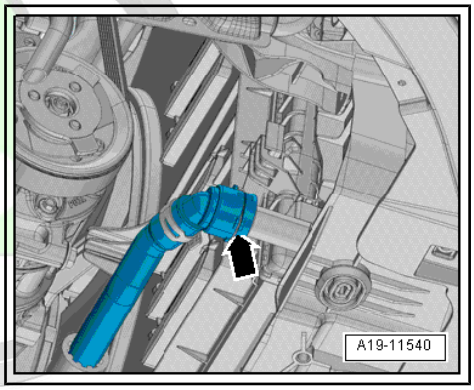
– Raise holding clamp -1-, remove bottom left coolant hose from radiator, allow coolant to drain.



Note

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

– Raise holding clamp -arrow-, remove bottom right coolant hose from radiator, allow coolant to drain.



Filling up

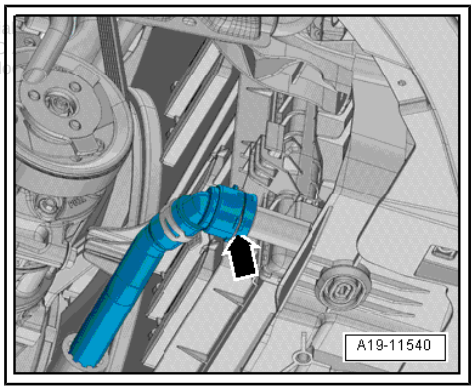
Select the appropriate coolant additive from the ⇒ ETKA - Electronic catalogue of original parts .

– In a clean reservoir mix water and coolant additive in the specified mixing ratio:

♦ ⇒ Maintenance ; Booklet Octavia III .

– Connect coolant hose with quick coupling to radiator bottom left ⇒ page 164 .

– Connect coolant hose bottom right to radiator -arrow-.

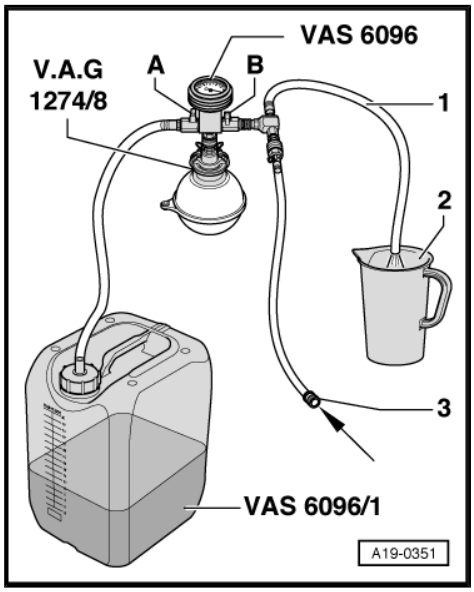


– Fill up the coolant reservoir -VAS 6096- with at least 10 litres of pre-mixed coolant mixed to the correct ratio:

– Screw the adapter for cooling system testing device - V.A.G 1274/8- to the coolant expansion tank.

– Mount cooling system charge unit - VAS 6096- onto 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)

– Open the valve -B-, while doing so turn the lever in the direction of flow.

• A vacuum pump is created in the cooling system by the vacuum pump; the display instrument pointer must move into the green area.

– In addition, briefly open the valve -A- by turning the lever in the direction of flow, so that the hose of the coolant expansion bottle is -VAS 6096- filled with coolant.

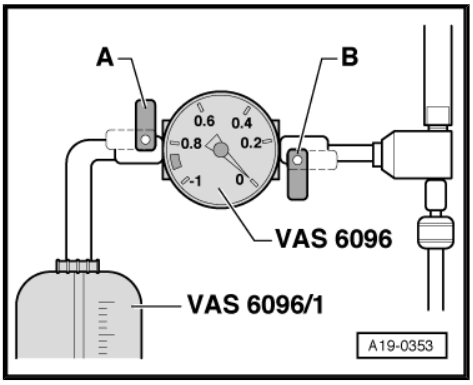
– Close the valve -A- again.

– 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-.

• If the display instrument pointer remains in the green area the vacuum in the cooling system is 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 cooling system charge unit - VAS 6096- from 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 it on for approximately 30 seconds.

– Set temperature to “HI”.

– Switch off AC compressor. Press AC button to do so.

• The LED in the button must not illuminate.

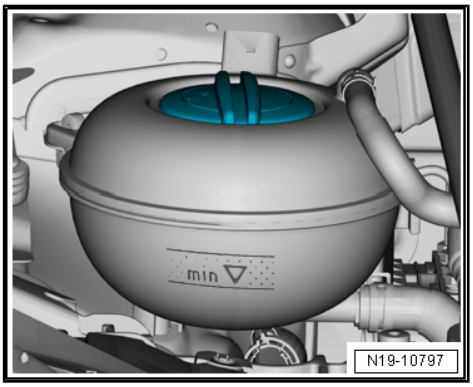
– Start engine and run for not more than 2 minutes at 1500 rpm.

– 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.

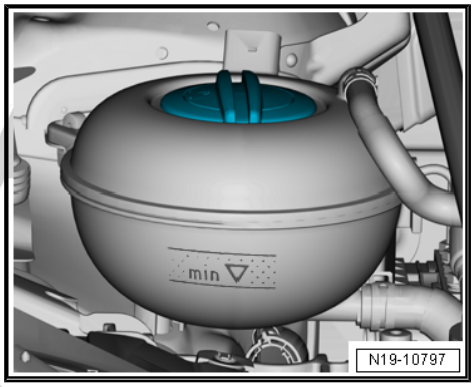
– Switch off engine and allow it to cool down.



– 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-

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

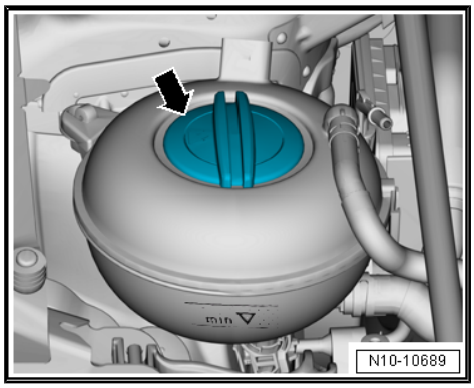
- Engine is at operating temperature.

Test procedure

WARNING

Hot steam may escape when the coolant expansion reservoir is opened. Wear safety goggles and safety clothing, in order to avoid eye injuries and scalding. Cover the cap with a cloth and open carefully.

– Open cap -arrow- for coolant expansion tank.

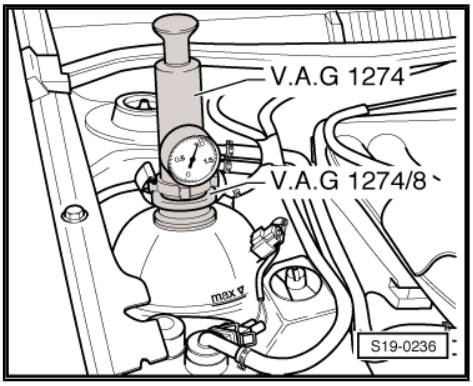


– Position the cooling system testing device - V.A.G 1274- with adapter - V.A.G 1274/8 - on the coolant expansion reservoir.
– Using the hand pump of the testing device generate an over-pressure of approx. 0.1 MPa (1.0 bar).

If pressure drops:

– Search position of the leak and repair fault.

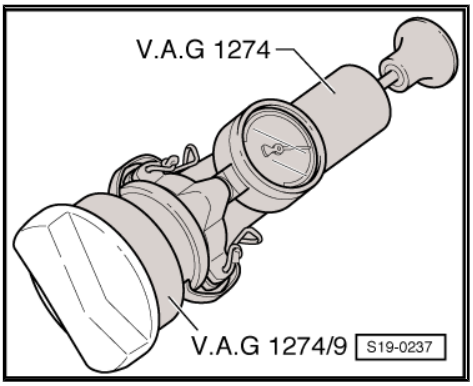
Testing the pressure relief valve in the cap



– Position the cooling system testing device - V.A.G 1274- with adapter - V.A.G 1274/9 - on 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-

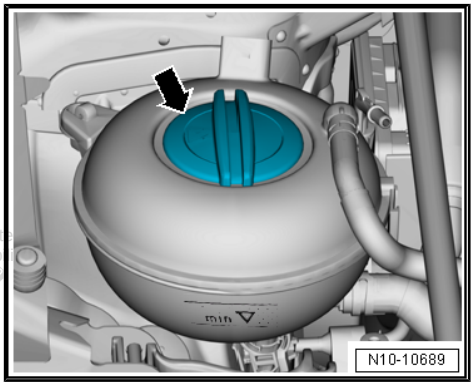
Work procedure

• Engine must be warm.
– Open cap -arrow- for coolant expansion tank.

WARNING

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.***



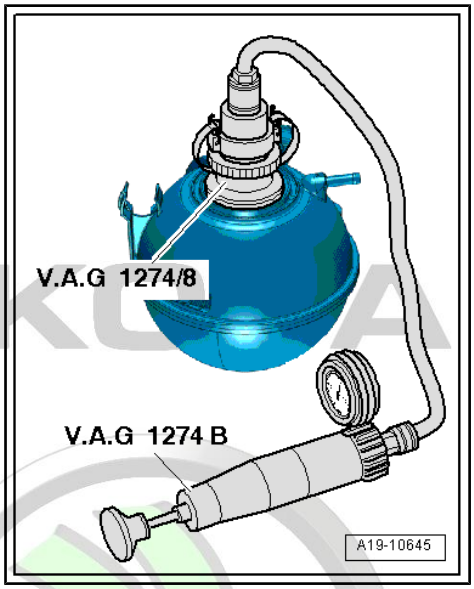
– Position the cooling system testing device - V.A.G 1274 B- with adapter -V.A.G 1274/8- onto the coolant expansion tank.

– Using the hand pump of the testing device generate an overpressure 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«.*



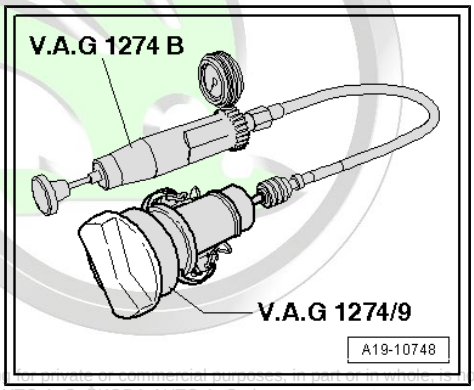
– If the pressure drops determine leak positions and repair.

Check pressure relief valve in cap.

– Position the cooling system testing device - V.A.G 1274 B- with adapter -V.A.G 1274/9- on the cap.

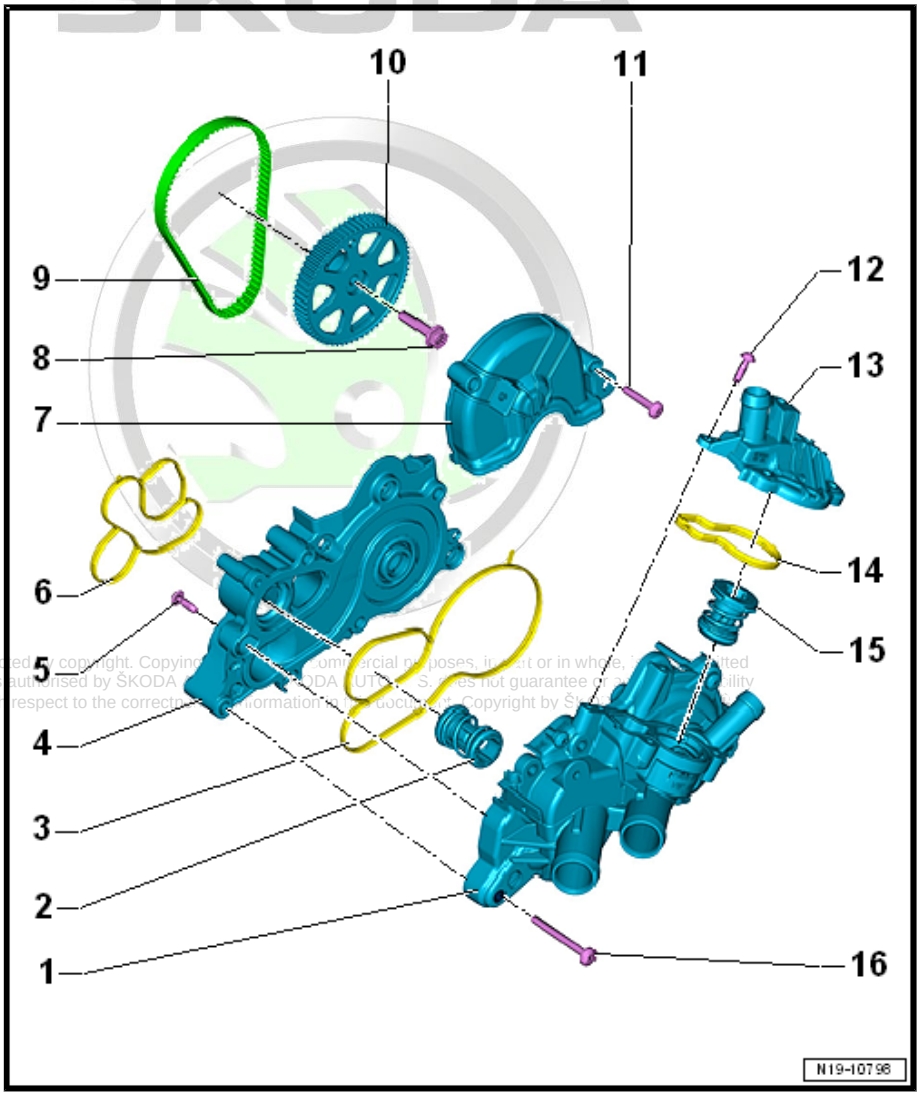
– Build up overpressure using hand pump on cooling system tester.

♦ The pressure relief valve should open at a pressure of 0.14...0.16 MPa (1.4...1.6 bar).



2 Coolant pump and map-controlled engine cooling

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



1 - Thermostat housing

- ❑ removing and installing ⇒ page 154

2 - Coolant regulator

- ❑ for small coolant circuits ⇒ ETKA - Electronic Catalogue of Original Parts
- ❑ Start of opening approx. 105 °C
- ❑ removing and installing ⇒ page 154

3 - Gasket

- ❑ replace

4 - Coolant pump

- ❑ removing and installing ⇒ page 150
- ❑ Also replace toothed belt when changing coolant pump

5 - Screw

- ❑ thread forming
- ❑ position and screw in by to allow the screw to find the old thread, then tighten the screw to the torque
- ❑ Tightening torque and tightening order ⇒ page 157

6 - Gasket

- ❑ replace
- ❑ Observe proper seating of gasket
- ❑ before installing, slightly moisten with coolant

7 - Toothed belt guard

- ❑ For coolant pump toothed belt

8 - 20 Nm + torque a further 90° (1/4 turn)

- ❑ replace

9 - Toothed belt

- ❑ For coolant pump
- ❑ Also replace toothed belt when changing coolant pump

10 - Toothed belt pulley

- ❑ on the coolant pump
- ❑ removing and installing ⇒ page 153

11 - 8 Nm

12 - Screw

- ❑ thread forming
- ❑ position and screw in by to allow the screw to find the old thread, then tighten the screw to the torque
- ❑ Tightening torque and tightening order ⇒ page 148

13 - Cover

- ❑ for coolant regulator

14 - Gasket

- ❑ replace

15 - Coolant regulator

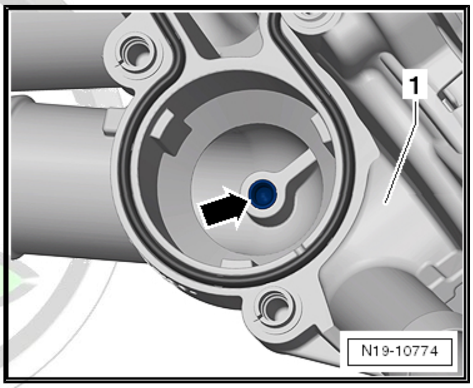
- ❑ for large coolant circuits ⇒ ETKA - Electronic Catalogue of Original Parts
- ❑ Start of opening approx. 87 °C
- ❑ removing and installing ⇒ page 154
- ❑ Fitting position ⇒ page 148

16 - 12 Nm

- ❑ Tightening torque and tightening order ⇒ page 153

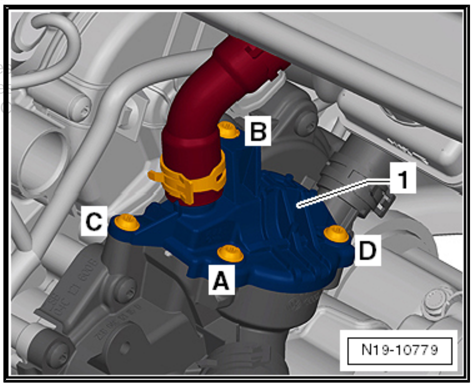
Installation position of thermostat for large coolant circuit

- Must be fitted with the centring pin into guide -arrow- on coolant pump housing.



Cover for coolant thermostat in the coolant thermostat housing - Tightening torque

– Tighten cover screws -1- in the sequence -A...D- to 8 Nm.



2.2 Electric coolant pump - Summary of components

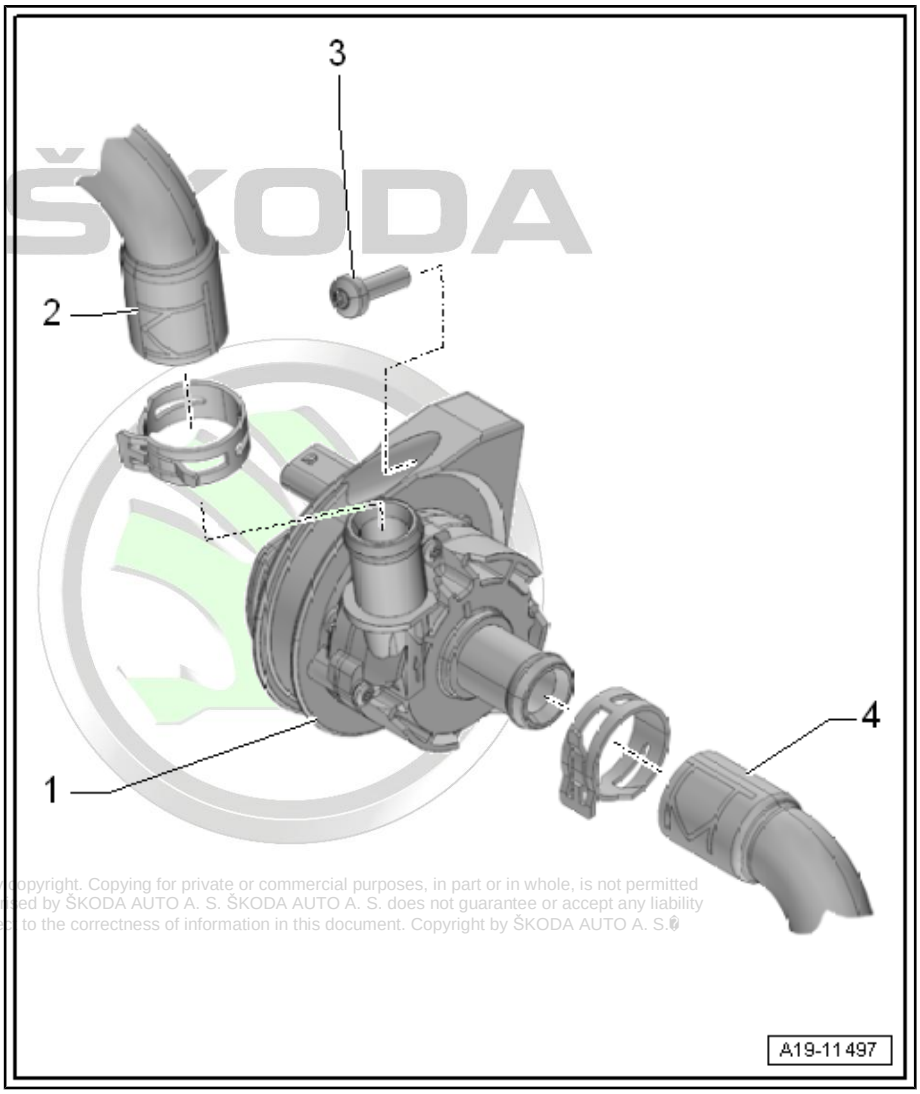
1 - Coolant recirculation pump - V51-

- ❑ With holder
- ❑ removing and installing ⇒ page 252

2 - Coolant hose

3 - 8 Nm

4 - Coolant hose



2.3 Coolant temperature sender - Summary of components

1 - O-ring

- ❑ replace

2 - Coolant temperature sender at radiator outlet - G83-

- ❑ removing and installing ⇒ page 159

3 - Support ring

4 - O-ring

- ❑ replace

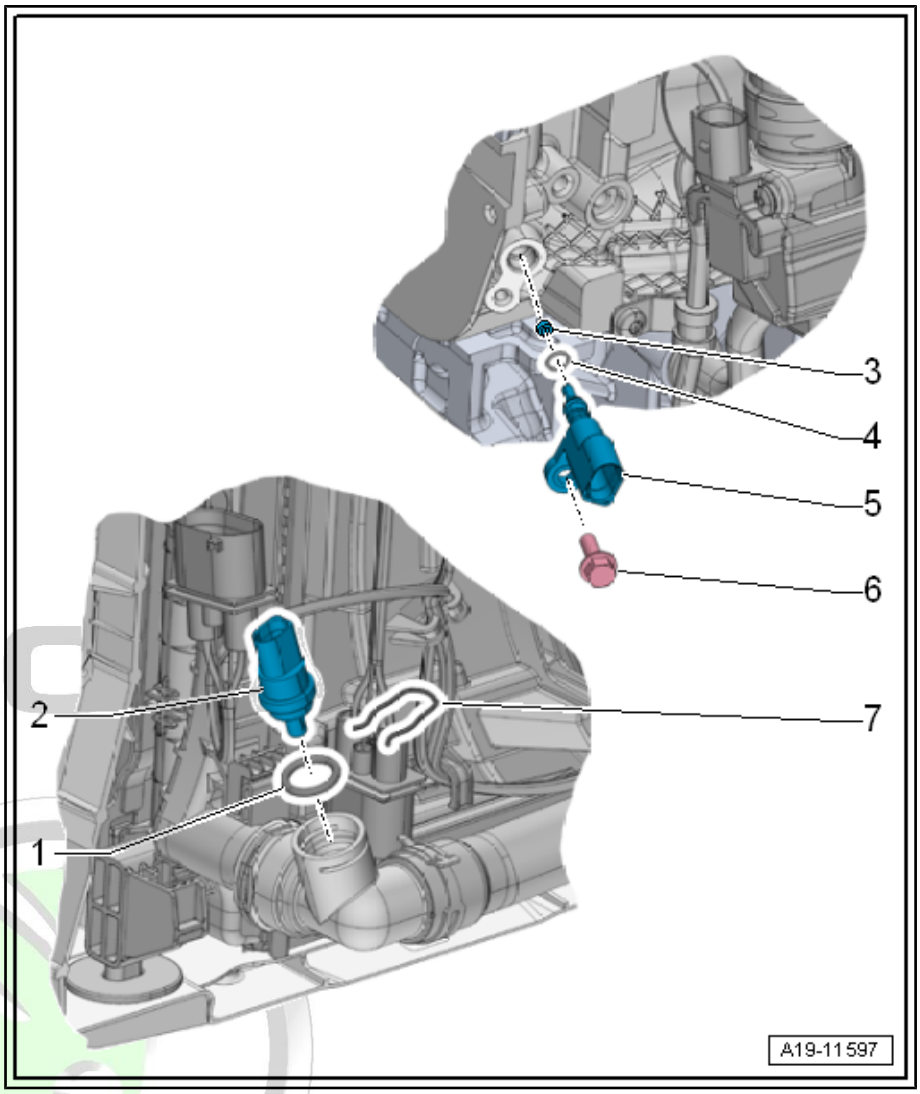
5 - Coolant temperature sender - G62-

- ❑ removing and installing ⇒ page 158

6 - 8 Nm

7 - Retaining clip

- ❑ Check for secure seating



2.4 Removing and installing coolant pump

Special tools and workshop equipment required

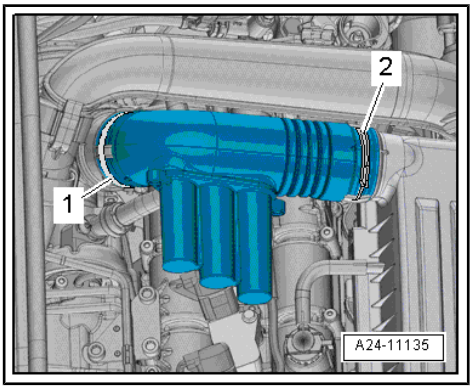
- ♦ Catch pan , e.g. -VAS 6208-
- ♦ Pliers for spring strap clamps
- ♦ Cooling system charge unit - VAS 6096-
- ♦ Adapter for cooling system tester - V.A.G 1274/8-
- ♦ Release tool -T10527-
- ♦ Refractometer

Removing

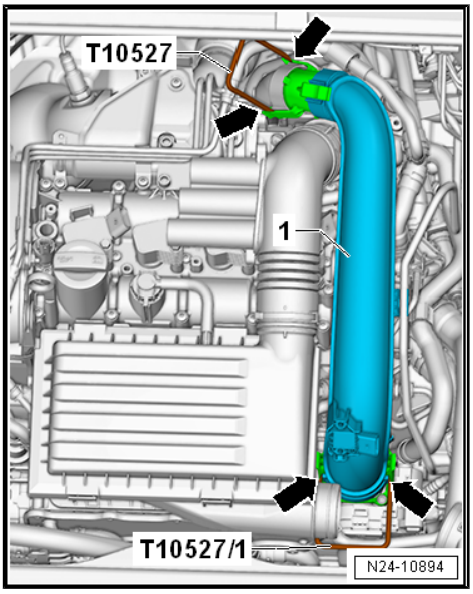
– Drain coolant ⇒ page 141 .

– Remove battery tray ⇒ Electrical System; Rep. gr. 27 .

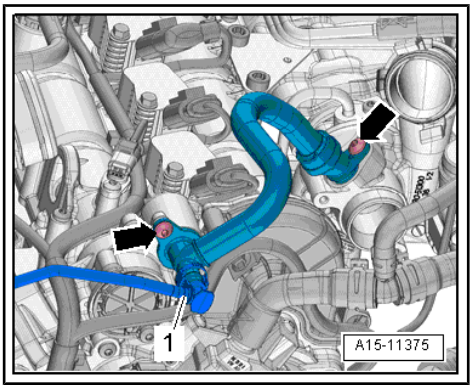
– Loosen hose clamps -1, 2- and remove air guide pipe.



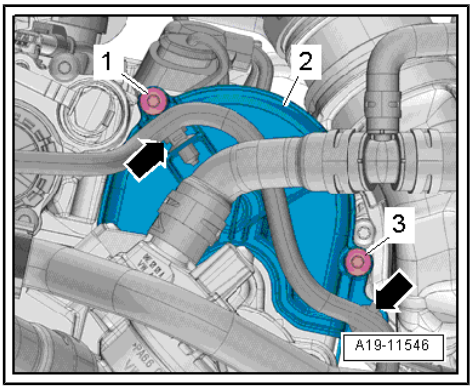
– Release latches -arrows- with release tool -T10527- and remove air guide pipe.



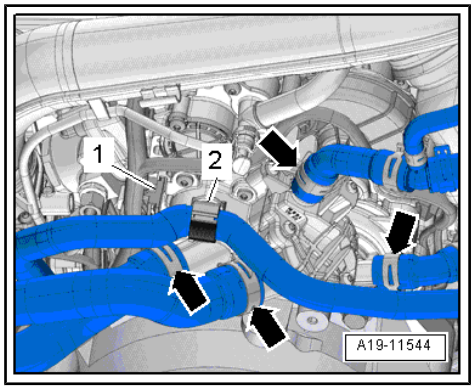
– Press release buttons and remove hose -1- to the activated charcoal filter.
– Unscrew screws -arrows- and remove hose for crankcase ventilation.



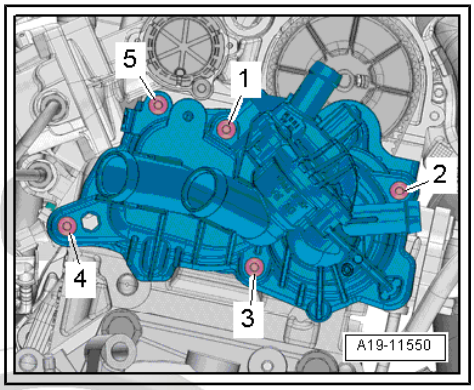
– Expose wiring loom -arrows-.
– Unscrew screws -1, 3- and remove toothed belt guard -2- for coolant pump toothed belt.



– Expose electric wiring loom -1- and coolant hose -2-.
– Loosen hose clamps -arrows- and remove coolant hoses.



– Loosen the screws in the sequence -5…1- and unscrew them.
– Remove coolant pump with toothed belt.
– Remove thermostat housing when coolant pump is being replaced ⇒ page 154 .



Install

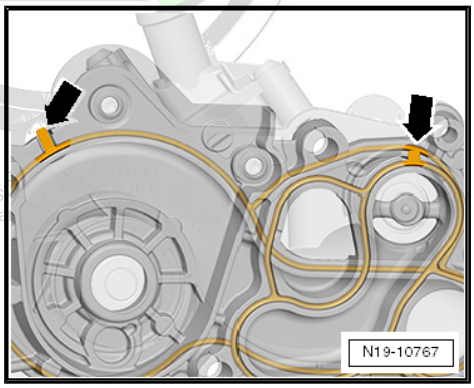
Tightening torques:

- Fit screws in the specified order. ⇒ page 153
- Charge-air system ⇒ page 205
- Battery tray ⇒ Electrical System; Rep. gr. 27 .

Note

- *Replace the housing gasket -arrows-.*
- *Remove toothed belt when coolant pump is being replaced.*
- *Secure hose connection ends with spring-type clips that comply with the series design ⇒ ETKA - Electronic Catalogue of Original Parts .*

– 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.

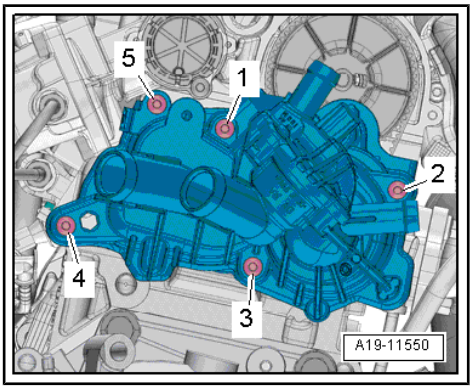
This ensures that the toothed belt is correctly tensioned.

The following work steps must be carried out with the aid of a 2nd mechanic.

– Set cylinder 1 to TDC ⇒ page 45 .
– Fit toothed belt centrally and 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
1.	-1…5-	by hand as far as the stop
2.	-1…5-	10 Nm

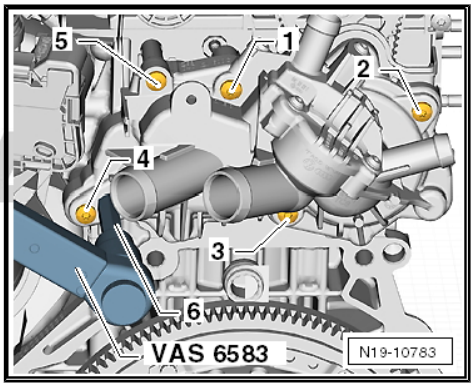


– Loosen all screws by 1 turn.

– Position torque wrench -VAS 6583- with hexagon socket SW10 insert -Pos. 6- on the coolant pump.

– Pre-load coolant pump with a 10 mm hexagon socket insert -6- with extension and torque wrench - 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.*
- *Do not exert »excessive pressure« on the torque wrench.*

– Keep coolant pump pretensioned.

– While the coolant pump is kept pre-tensioned, tighten coolant pump screws in the specified sequence:

Stage	Screws	Tightening torque
3.	-2, 1, 5-	10 Nm
4.	-3, 4, 5, 1, 2-	12 Nm

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

– Top up coolant ⇒ page 141 .

2.5 Removing and installing toothed belt pulley for coolant pump

Special tools and workshop equipment required

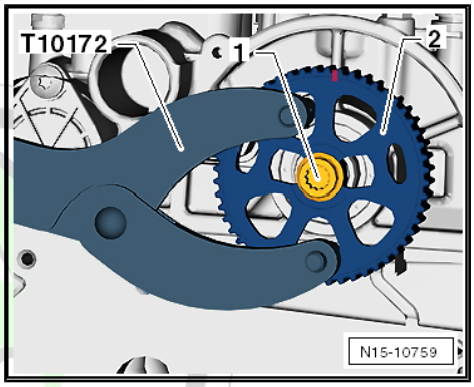
- Counterholder - T10172- with adapters -T10172/2-

Removing

– Remove coolant pump ⇒ page 150 .

– Loosen screw -1-. Use counterholder - T10172- with adapters -T10172/2- to do so.

– Unscrew screw and remove toothed belt pulley -2-.



Install

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

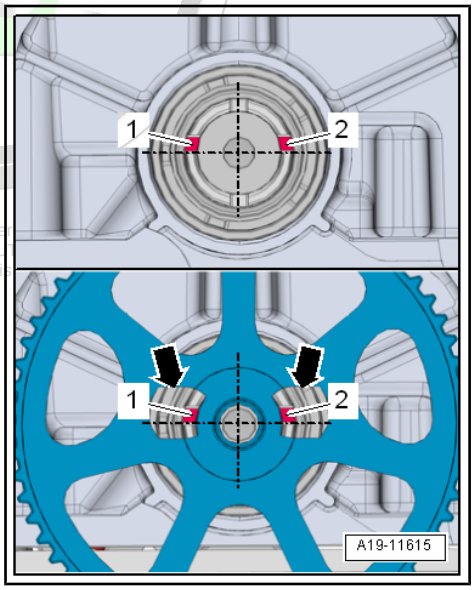
- Tightening torque ⇒ page 147 .

– 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 ⇒ page 150 .



2.6 Removing and installing thermostat

2.6.1 Removing and installing thermostat for large coolant circuit

Special tools and workshop equipment required

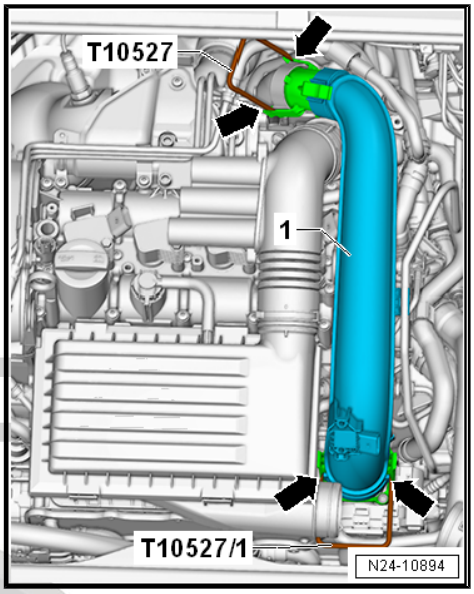
- ♦ Pliers for spring strap clamps
- ♦ Key - T10508-
- ♦ Release tool -T10527-

Removing

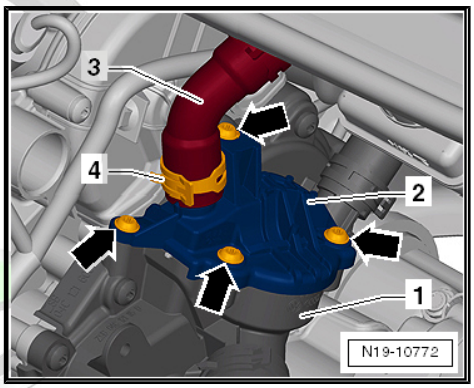
– Drain coolant ⇒ page 141 .

– Expose air guide hoses at the air guide pipe.

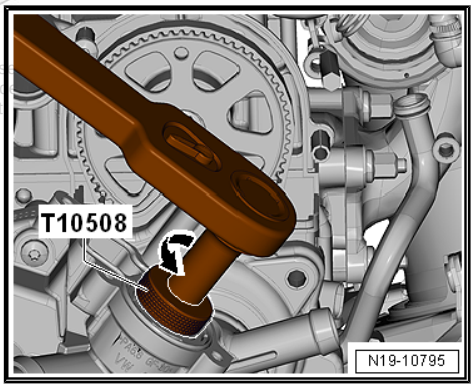
– Release latches -arrows- with release tool -T10527- and remove air guide pipe.



– Loosen hose clamp -4- and remove coolant hose -3-.
– Screw out screws -arrows- and remove cover -2- from thermostat housing.

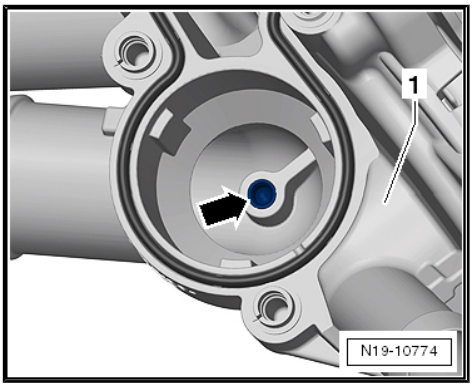


– Remove thermostat with spanner - T10508- .
– Push spanner - T10508- down slightly and turn in -direction of the arrow-.



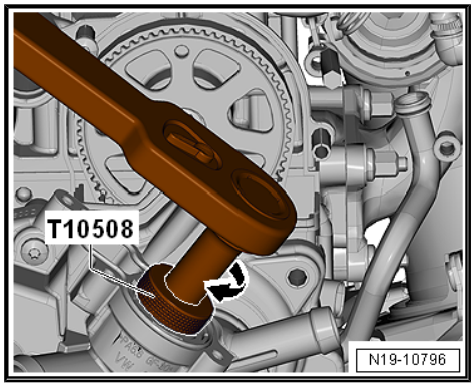
Install

– Insert thermostat. Fit the centring pin in into the guide-arrow-.



– Install thermostat with spanner - T10508- .

– Push spanner down - T10508- slightly and turn in -direction of the arrow- to the stop.



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

- Tightening torque ⇒ page 148 .

Note

Replace gasket.

– Moisten gasket with coolant.

– Top up coolant ⇒ page 141 .

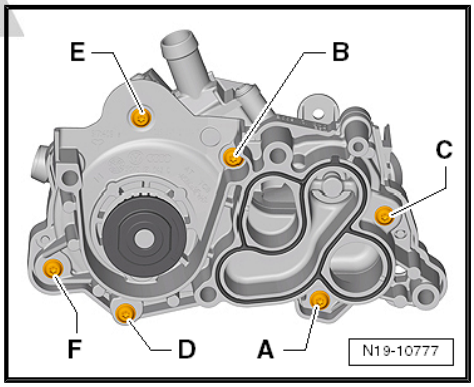
2.6.2 Removing and installing thermostat for small coolant circuit

Removing

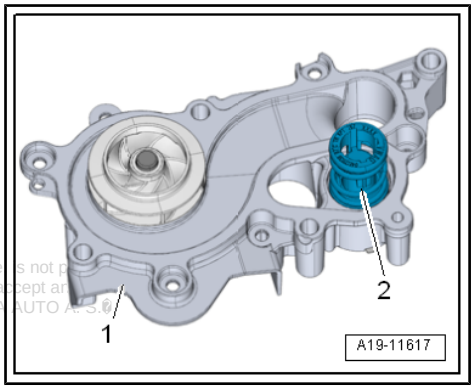
– Remove coolant pump ⇒ page 150 .

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

- Tightening torque ⇒ page 157 .

Note

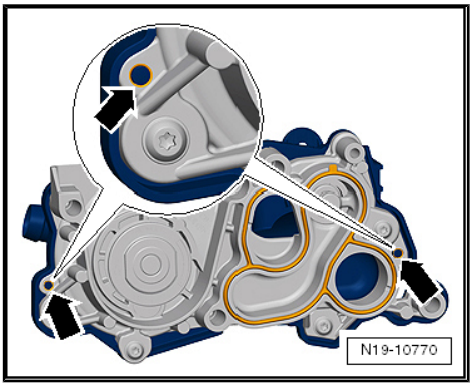
Replace gasket.

– Moisten gasket with coolant.

– Fit thermostat housing to coolant pump.

• The centring bolts on the thermostat must be inserted into the guides -arrows- on the coolant pump.

– Tighten screws for thermostat housing.

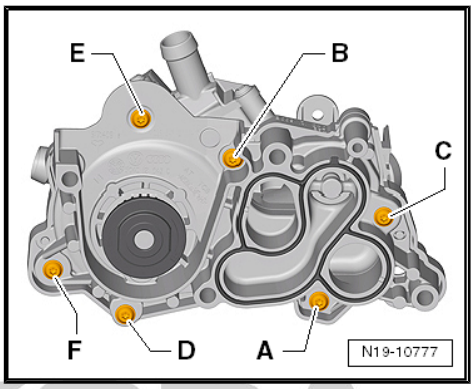


Thermostat housing and coolant pump - tightening torque and tightening order

– Tighten screws in the sequence -A…F- to 8 Nm.

– Install coolant pump ⇒ page 150 .

– Top up coolant ⇒ page 141 .



2.7 Removing and installing coolant recirculation pump - V51-

Special tools and workshop equipment required

♦ Hose clamps up to 25 mm - MP7-602 (3094)-

♦ Catch pan , e.g. -VAS 6208-

♦ Pliers for spring strap clamps

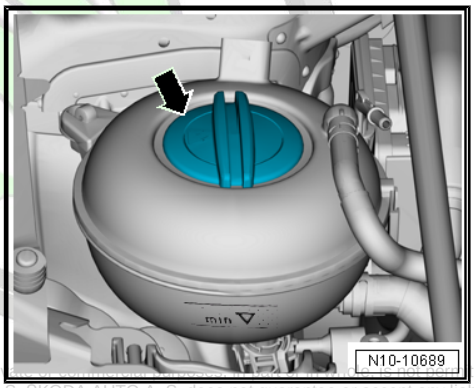
Removing

– Open cap -arrow- for coolant expansion tank.

WARNING

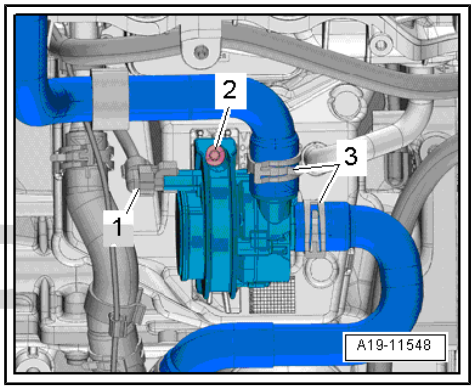
Danger of scalding due to hot steam and hot coolant.

- *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.*



– Remove the sound dampening system ⇒ Body Work; Rep. gr. 66 .

– Unplug connector -1-.
– Place catch pan underneath.
– At the coolant hoses pump - V51- , disconnect coolant hoses with hose clamps -MP7-602 (3094)- .
– Loosen hose clamps -3- and remove coolant hoses.
– Unscrew screw -2- and remove coolant recirculation pump - V51- .



Install

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

- Tightening torques ⇒ page 149 .

Note

Secure all hose connection ends with spring-type clips that comply with the series design ⇒ ETKA - Electronic Catalogue of Original Parts .

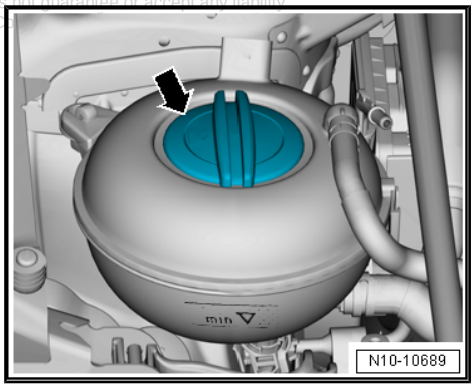
– Install the noise insulation ⇒ Body Work; Rep. gr. 66 .
– Check coolant level ⇒ page 144 .

2.8 Removing and installing coolant temperature sender - G62-

Removing

- Engine cold.

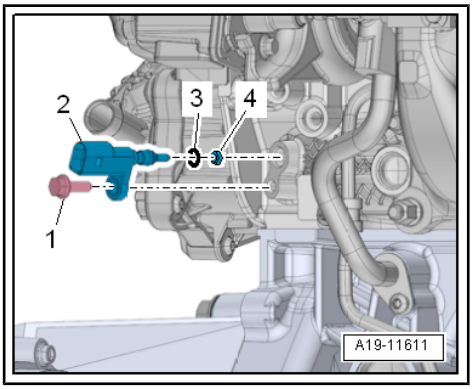
– Briefly open the cap -arrow- for the coolant expansion reservoir in order to remove the remaining pressure in the coolant system, then close until it clicks into place.
– Disconnect the plug connection.



Note

Place a cloth below to absorb leaking coolant.

– Unscrew screw -1- and pull out coolant temperature sender - G62- -2-.



Install

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

- Tightening torque ⇒ page 150 .

Note

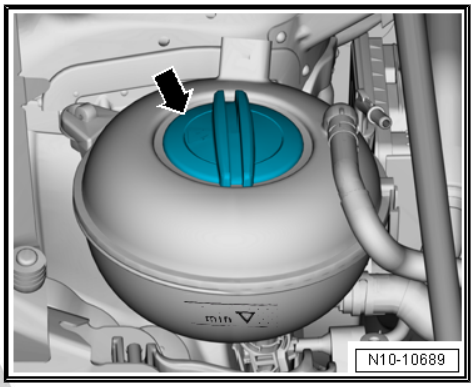
- *Renew O-ring.*
- *If the O-ring -3- with support ring -4- remains in the cylinder head, lift out the O-ring with support ring using a wire.*
- *Insert new coolant temperature sender - G62- immediately into cylinder head in order to avoid loss of coolant.*

– Check coolant level ⇒ page 144 .

2.9 Remove and install the coolant temperature sender at the cooler outlet - G83-

Removing

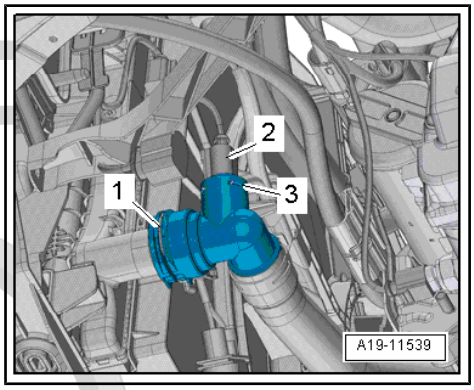
- Engine cold.



– 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 .

– Unplug connector -2-.



Note

Place a cloth below to absorb leaking coolant.

– Pull out holding clamp -1- and pull coolant temperature sender at radiator outlet - G83- out of the connection piece -3-.

Install

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

Note

- *Renew O-ring.*
- *Insert new coolant temperature sender - G62- immediately into connection piece in order to avoid loss of coolant.*

– Remove front noise insulation ⇒ Body Work; Rep. gr. 66 .

– Check coolant level ⇒ page 144 .

3 Coolant pipes

3.1 Coolant pipe - Summary of components

1 - Coolant hose

2 - Coolant pipe

- ❑ below clipped onto the intake manifold
- ❑ When removing using a screwdriver, carefully lever out of the catch

3 - 8 Nm

4 - Coolant hose

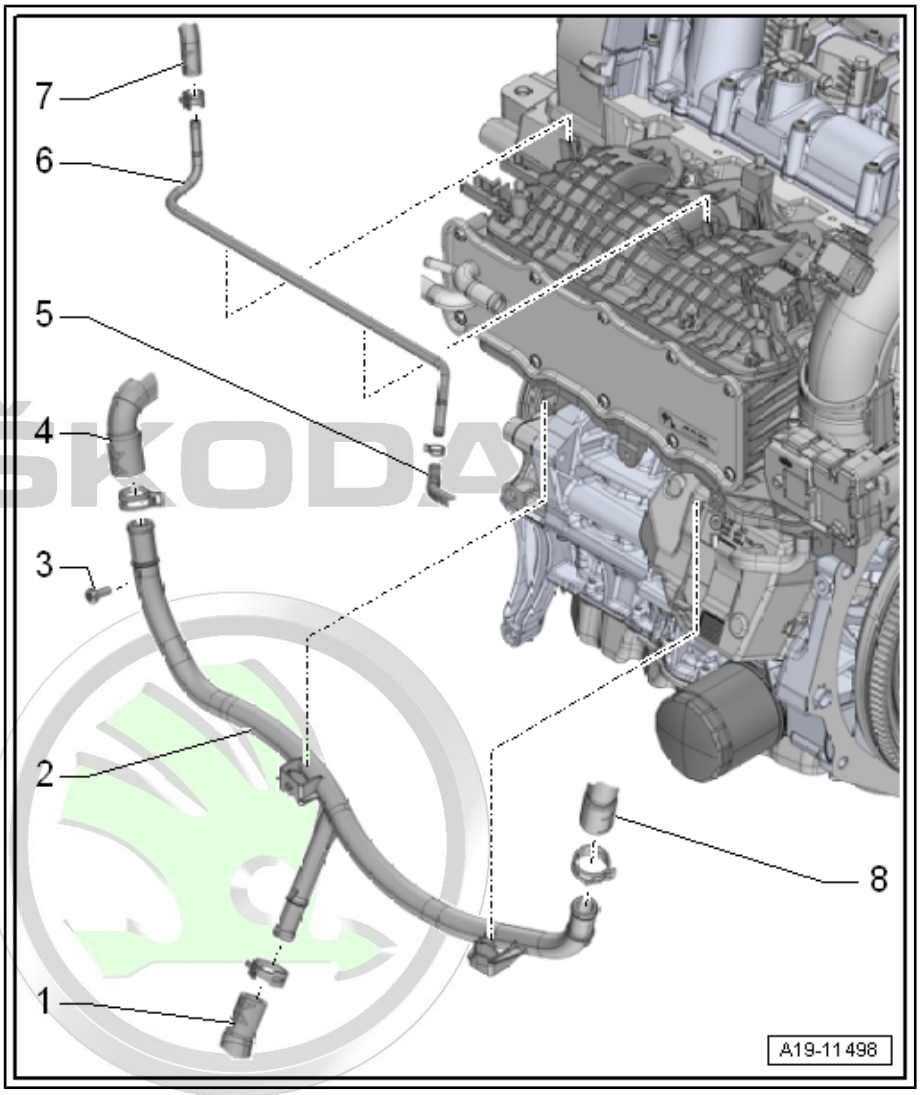
5 - Coolant hose

6 - Coolant line

- ❑ above clipped onto the intake manifold

7 - Coolant hose

8 - Coolant hose



3.2 Removing and installing coolant pipes

Special tools and workshop equipment required

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

Removing

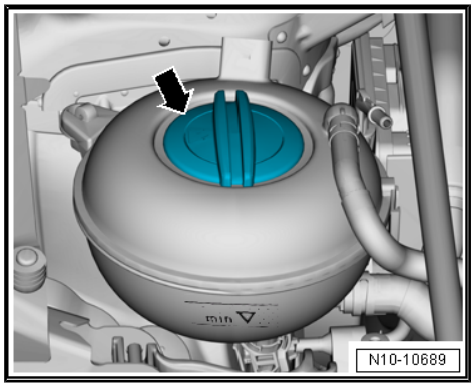
WARNING

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.

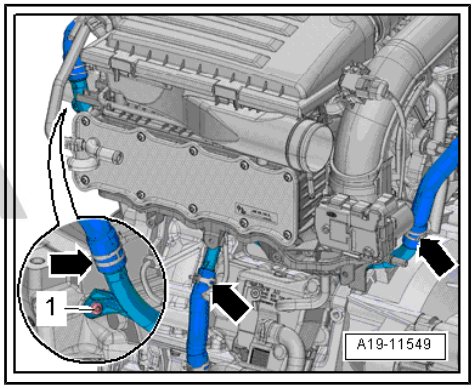
– Removing the intake manifold ⇒ page 217 .



– Disconnect coolant hoses at coolant pipe with hose clamps - MP7-602 (3094)- .

– Loosen hose clamps -arrows- and remove coolant hoses.

– Remove coolant pipe.



Install

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

- Tightening torque ⇒ page 216 .

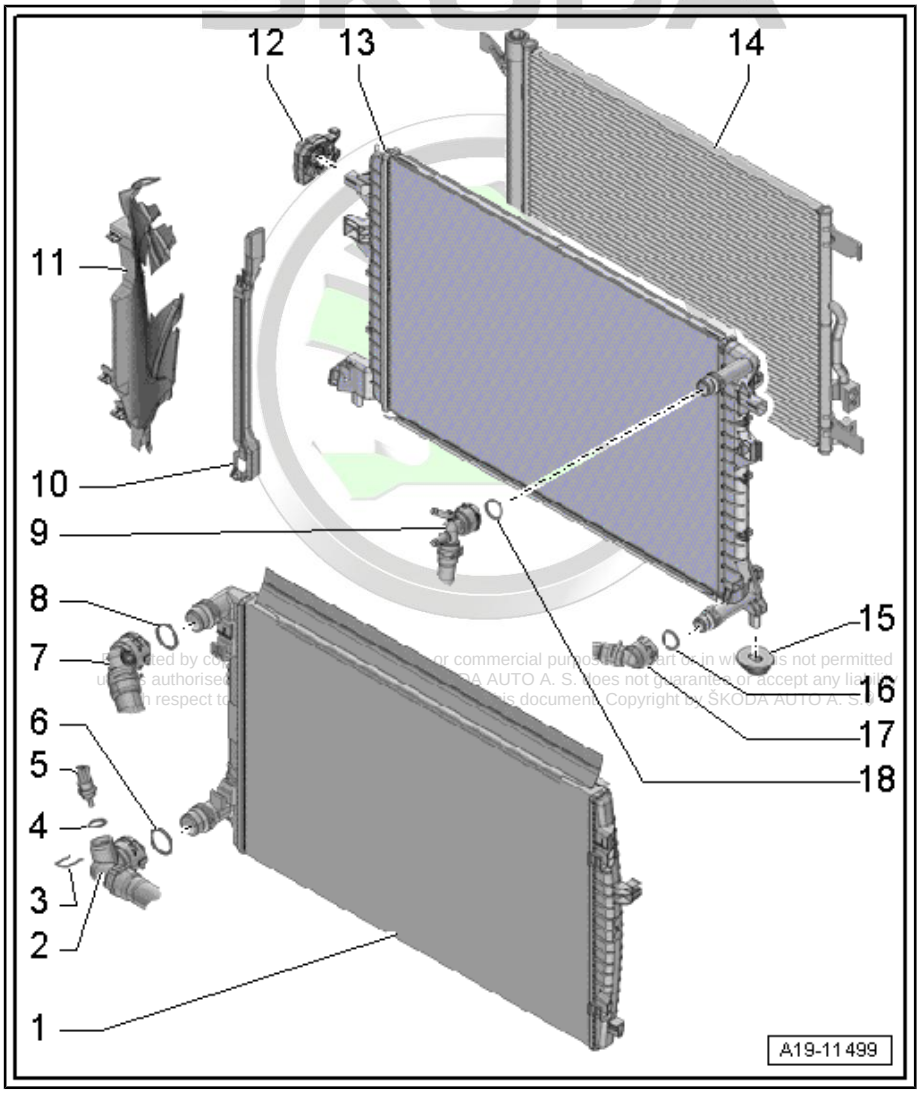
Note

- *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 .*

– Check coolant level ⇒ page 144 .

4 Radiator and radiator fan

4.1 Radiator and radiator fan - Summary of components



1 - Coolant radiator
- ❑ removing and installing ⇒ page 165
- ❑ fill with fresh coolant after replacing

2 - Coolant hose
- ❑ to remove, raise holding clamps
- ❑ connect ⇒ page 164

3 - Retaining clip

4 - O-ring
- ❑ replace

5 - Coolant temperature sender at radiator outlet - G83-
- ❑ removing and installing ⇒ page 159

6 - O-ring
- ❑ replace

7 - Coolant hose
- ❑ to remove, raise holding clamps
- ❑ connect ⇒ page 164

8 - O-ring
- ❑ replace

9 - Coolant hose
- ❑ to remove, raise holding clamps
- ❑ connect ⇒ page 164

10 - Air deflector

11 - Air deflector

12 - Rubber bush
- ❑ for radiator

13 - Cooler for charge air circuit
- ❑ removing and installing ⇒ page 165

14 - Condenser
- ❑ removing and installing ⇒ Heating, Air Conditioning; Rep. gr. 87

15 - Rubber bush
- ❑ for radiator

16 - O-ring
- ❑ replace

17 - Coolant hose
- ❑ to remove, raise holding clamps
- ❑ connect ⇒ page 164

18 - O-ring

- ❑ replace

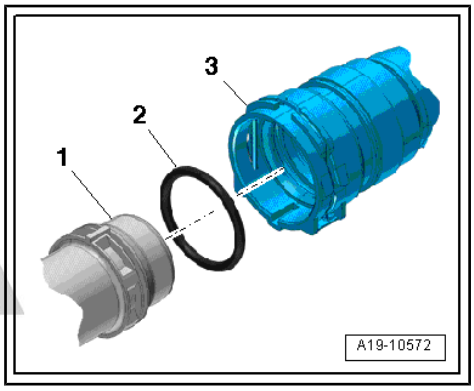
Connect coolant hose with quick coupling

– 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 Fan shroud and radiator fan - Summary of components

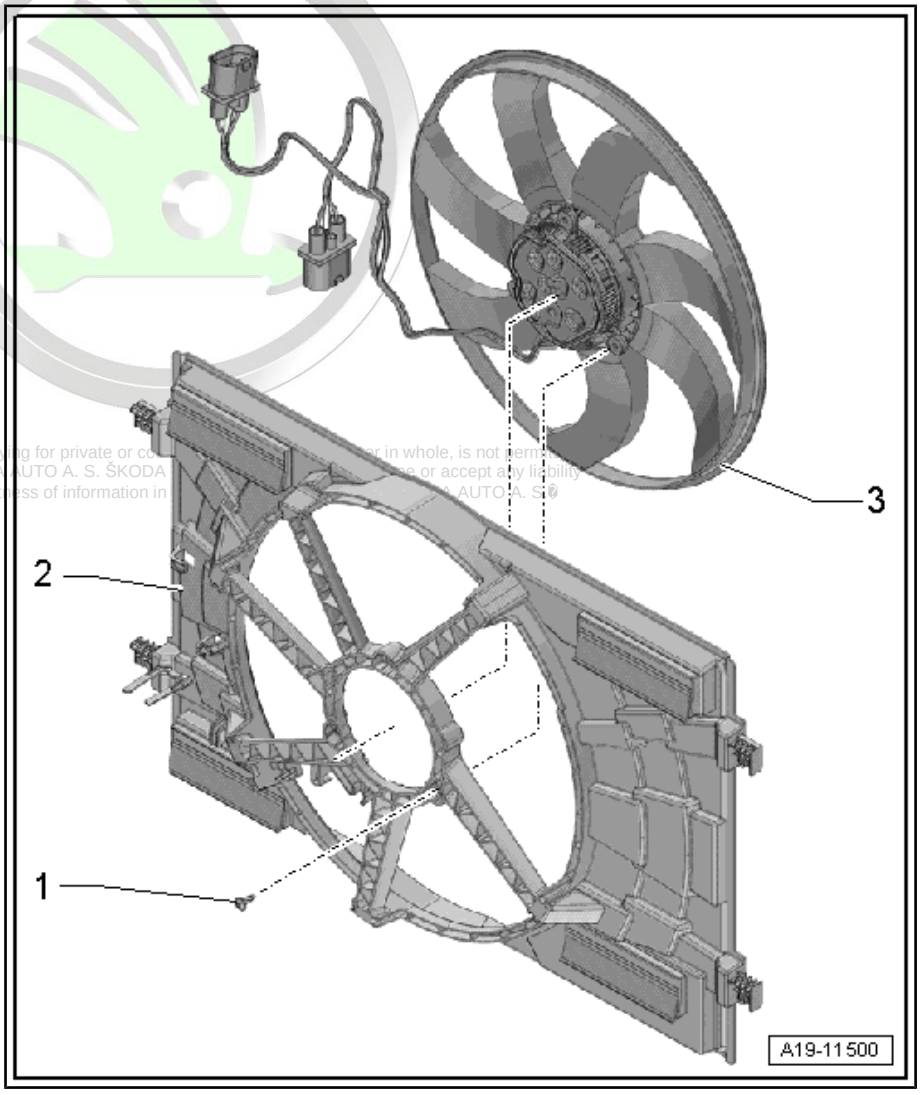
1 - 5 Nm

2 - Fan shroud

- ❑ removing and installing ⇒ page 167

3 - Radiator fan - V7-

- ❑ removing and installing ⇒ page 168



4.3 Removing and installing radiator fan for coolant

Special tools and workshop equipment required

- Catch pan , 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

Coolant radiator and charge air circulation cooler are removed together.

♦

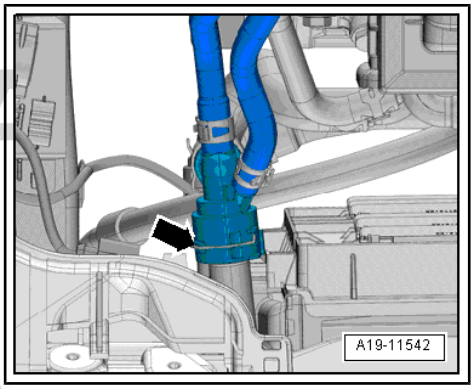
Removing

– Drain coolant ⇒ page 141 .

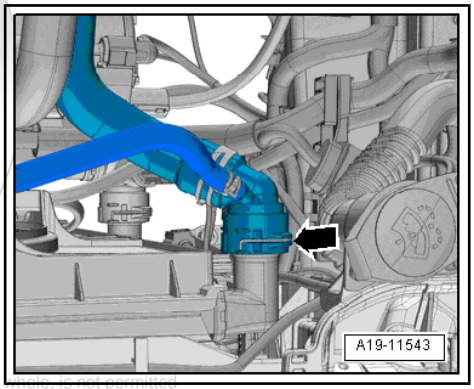
– Removing fan shroud ⇒ page 167 .

– Remove front bumper ⇒ Body Work; Rep. gr. 63 .

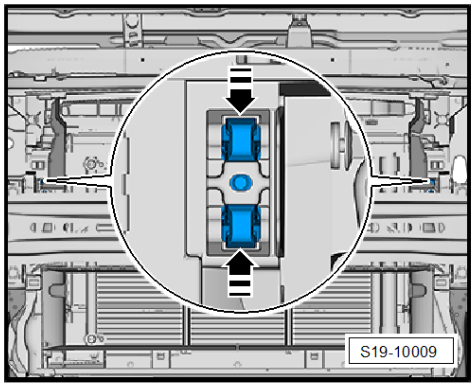
– Raise holding clamp -arrow- and disconnect coolant hose right above radiator for charge air circuit.



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

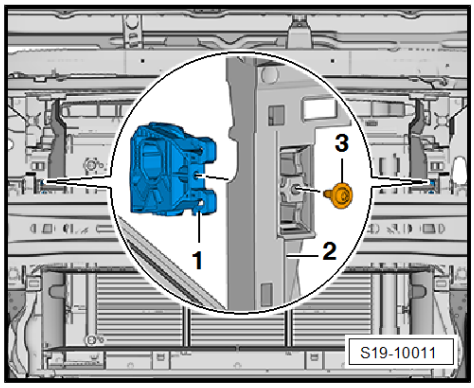


– Press the catches for the top radiator bearing -arrows- at the same time, e..g with screwdrivers, and unclip the bearing on both sides.
– Partially tilt cooler into the engine compartment.

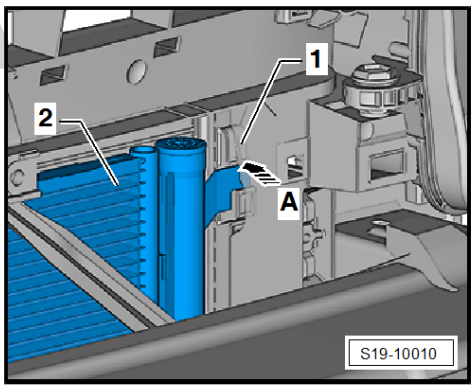


Note

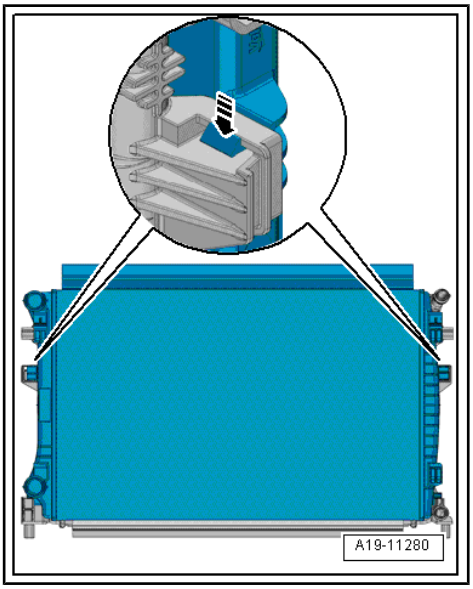
If the fuse latches break, you will not need to replace the top radiator bearing -1- . The fuse is replaced by a special screw -3- ⇒ Electronic Catalogue of Original Parts ETKA .



– 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.
– Remove the cooler for the charge air circuit from the vehicle together with the charge air circuit cooler.



– Press left and right radiator locking lugs simultaneously -arrow- and remove coolant radiator from the charge air circuit radiator.



Install

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 ⇒ page 10 .*
- *Replace O-rings.*

– Install front bumper ⇒ Body Work; Rep. gr. 63 .
– Install fan shroud ⇒ page 167 .
– Connect coolant hoses with quick coupling ⇒ page 164 .
– Top up coolant ⇒ page 141 .

Note

If the radiator has been replaced, all the coolant must be changed.

4.4 Removing and installing fan shroud

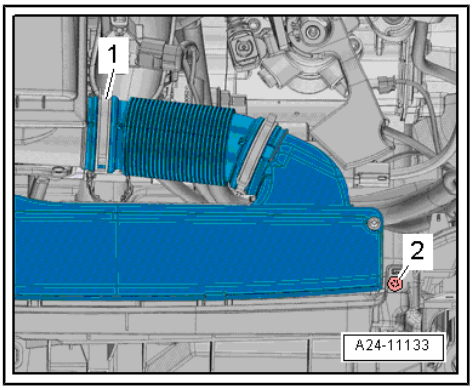
WARNING

There is risk of injury from radiator fans starting up automatically.

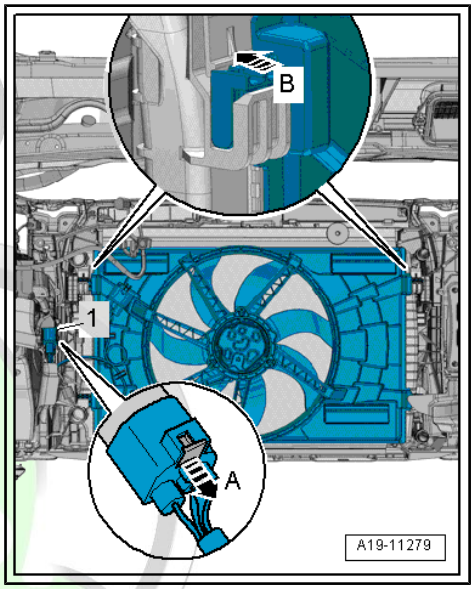
- ***Before carrying out work in the fan shroud area, disconnect the electrical plug connections.***

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.



– 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 downwards from the radiator.



Install

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

• Tightening torque ⇒ page 214 .
– Electrical connections and proper routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

4.5 Removing and installing radiator fan - V7-

WARNING

There is risk of injury from radiator fans starting up automatically.

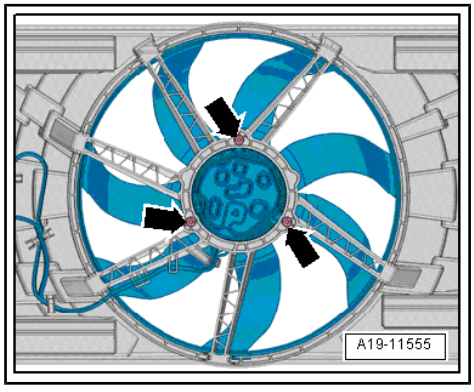
- ***Before carrying out work in the fan shroud area, disconnect the electrical plug connections.***

Removing

Note

All cable straps should be fastened again in the same place when installing.

– Removing fan shroud ⇒ page 167 .
– Disconnect the plug connection.
– 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:

• Tightening torques ⇒ page 164 .
– Install fan shroud ⇒ page 167 .

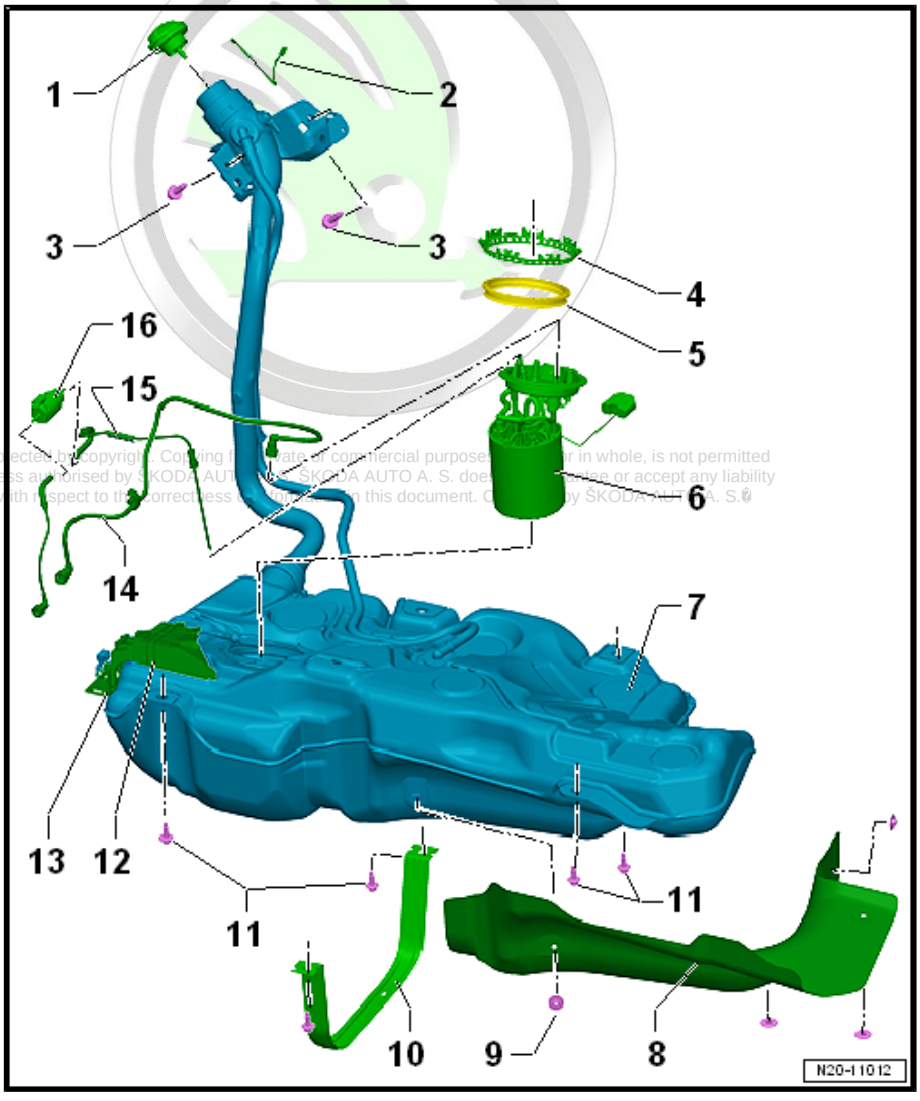
20 – Fuel supply system

1 Fuel tank

Note

- *Fuel hoses at the engine must only be secured with spring-type clamps ⇒ ETKA - Electronic catalogue of original parts .*
- *Spring-type clip pliers are recommended for installation of spring-type clips.*
- *Separate push-on couplings ⇒ page 188 .*

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 177

3 - 8 Nm

- ❑ replace

4 - Lock ring, 110 Nm

- ❑ loosen and tighten up with spanner -T30101 (3087)-

5 - Sealing ring

- ❑ replace
- ❑ install when dry

6 - Fuel delivery unit

- ❑ with fuel system pressurisation pump -G6-
- ❑ with integrated fuel filter, the fuel filter cannot be replaced individually
- ❑ Checking electric fuel pump ⇒ Vehicle diagnostic tester
- ❑ Fitting position ⇒ page 171
- ❑ Connect fuel lines ⇒ page 171
- ❑ removing and installing ⇒ page 178
- ❑ Fill the vehicle with at least 5 litres of fuel after installing

7 - Fuel tank

- ❑ removing and installing ⇒ page 172

8 - Heat shield

- ❑ for fuel tank

9 - Shield locking mechanism

- ❑ for heat shield
- ❑ 4 pieces

10 - Tensioning strap

- ❑ Mark installation position before installation
- ❑ Ensure proper seating

11 - 20 Nm + torque a further 90° (1/4 turn)

- ❑ replace

12 - Support

- ❑ For fuel pump control unit -J538-

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
- ❑ disconnect and connect ⇒ page 188

15 - Fuel line

- ❑ for vehicles with auxiliary heating
- ❑ to the dosing pump -V54-
- ❑ do not kink
- ❑ disconnect and connect ⇒ page 188

16 - Dosing pump -V54-

- ❑ for vehicles with auxiliary heating

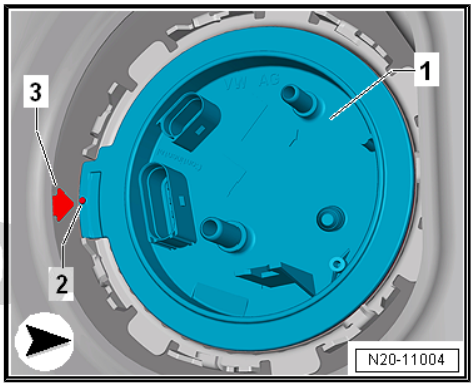
WARNING

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

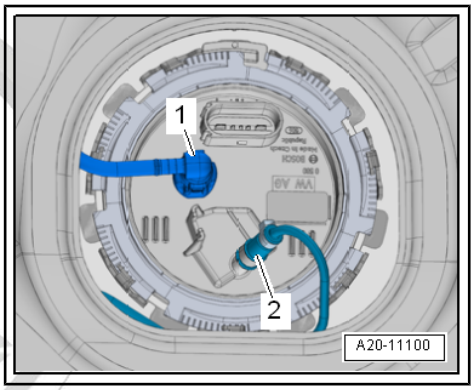
- The marking -2- at the fuel delivery unit closing flange -1- must be located against -arrow 3- at the fuel tank.



Connect fuel feed lines to 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

Special tools and workshop equipment required

- Hose adapter , e.g. -V.A.G 1318/16-
- Adapter , e.g. -V.A.G 1318/17-
- Measuring tool set , e.g. -V.A.G 1594 C-
- Battery
- Catch pan for fuel

Note

If there are functional problems of the fuel delivery unit suction off fuel with fuel extraction device, e.g. -VAS 5190- .

Work procedure

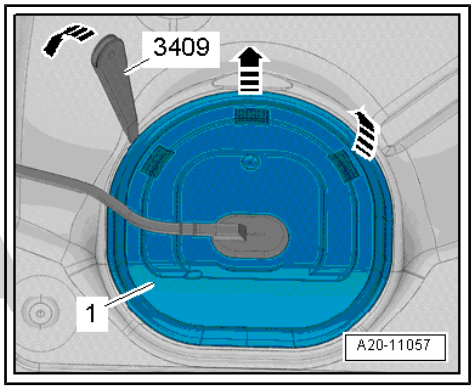
Note

- *Safety precautions when working on the fuel supply system* *⇒ page 3* .
- *Rules of cleanliness when working on the fuel supply system* *⇒ page 3* .

– Switch off ignition and all electrical loads, and pull out ignition key.

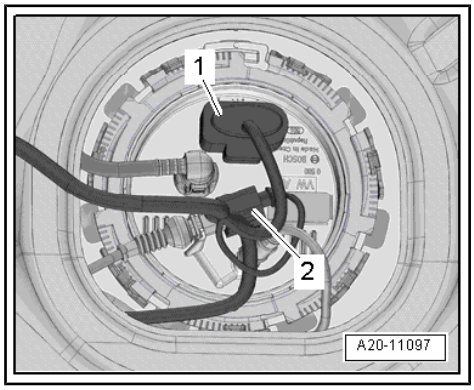
– Removing rear seat bench ⇒ Body Work; Rep. gr. 72 .

– Unclip the cover -1- using the disassembly wedge - 3409- .



Vehicles with auxiliary heating

– Disconnect the dosing pump - V54- -2- 2-pin plug connection.



Continued for all vehicles

– Disconnect the 5-pin plug connection -1- and the black feed line ⇒ page 188 .

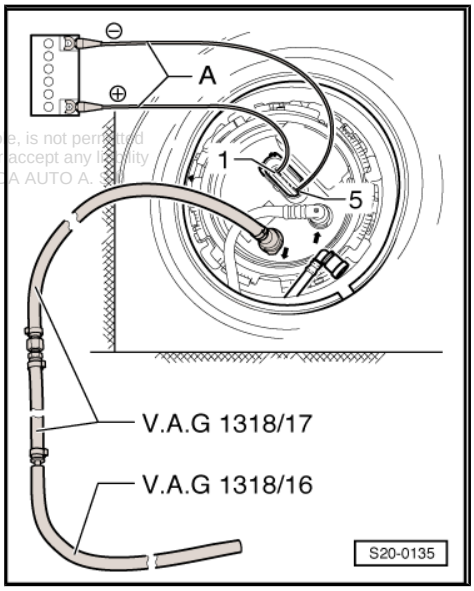
– Connect the adapter -V.A.G 1318/16- with the adapter -V.A.G 1318/17- and fit this “drain pipe” thus prepared onto the feed support of the fuel delivery unit.

– Hold the “drain pipe” in a suitable fuel tank.

– Connect the battery and the contacts of the fuel pump with adapter cables -A- from the adapter cable set - V.A.G 1594/C- as follows:

Battery positive terminal (+) to contact -1- of the fuel pump

Battery negative terminal (-) to contact -5- of fuel pump



The fuel pump runs and suctions off fuel.

WARNING

In order to prevent an overflow of fuel in case of a too small fuel tank, the fuel pump must not run unattended.

1.3 Removing and installing the fuel tank

Special tools and workshop equipment required

- Engine and gearbox jack , e.g. -V.A.G 1383A-
- Disassembly wedge - 3409-

• The fuel tank must be empty for weight reasons when removing it, if necessary suction the fuel out of the fuel tank ⇒ page 171 .

Removing

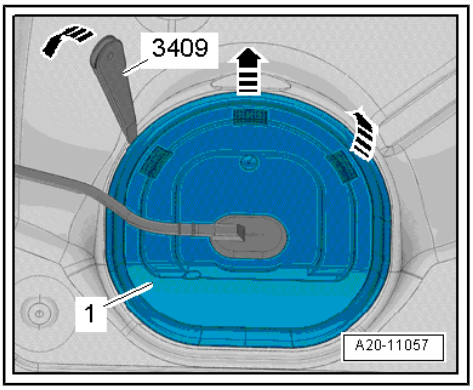
Note

- *Safety precautions when working on the fuel supply system* ⇒ page 3 .
- *Rules of cleanliness when working on the fuel supply system* ⇒ page 3 .

– Switch off ignition and all electrical loads, and pull out ignition key.

– Removing rear seat bench ⇒ Body Work; Rep. gr. 72 .

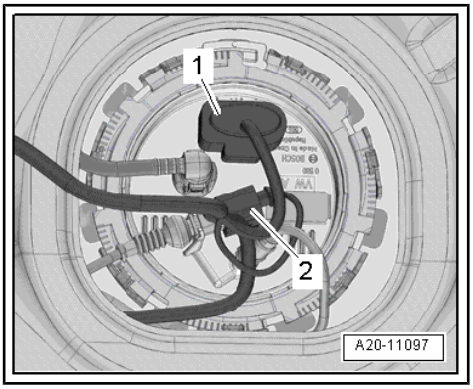
– Unclip cover -1- for closing flange from holder catches -arrows- using the disassembly wedge - 3409- .



– Disconnect plug connection -1- at fuel pump.

Vehicles with auxiliary heating

– Disconnect plug connection -2- from auxiliary heating dosing pump.

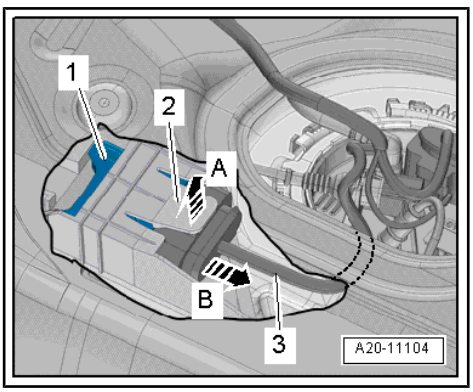


Continued for all vehicles

– 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-.

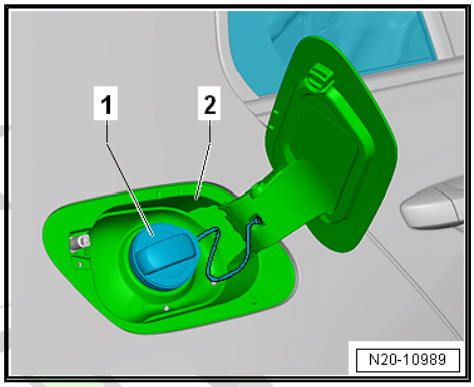
– Take out fuel pump control unit inwards - J538- between fuel tank and bottom plate.



– Open tank flap.

– Clean the area around the fuel filler neck.

– Unscrew the cap -1- for the fuel filler neck.

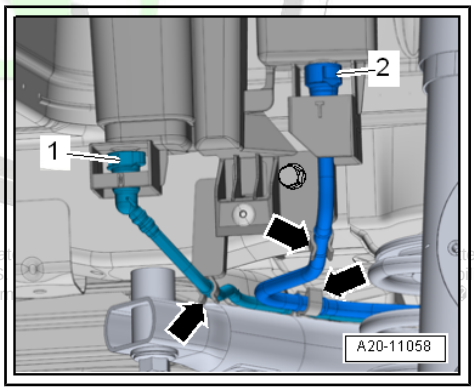


Note

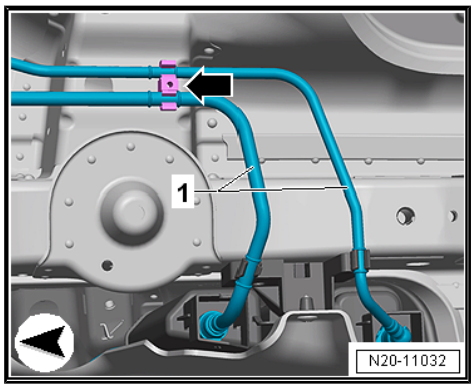
Close the opening of the fuel filler neck with a clean cloth so that no dirt can penetrate.

– Remove tank flap unit -2- ⇒ Body Work; Rep. gr. 55 .
– 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 .

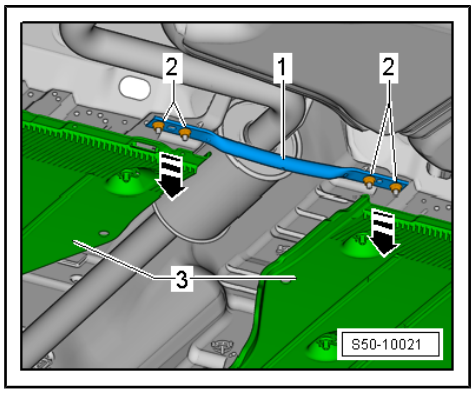
– Pull off ventilation lines -1 and 2- at the activated charcoal filter. Disconnect quick couplings to do so ⇒ page 188 .
– Loosen ventilation lines from fasteners on the holder -arrows-.



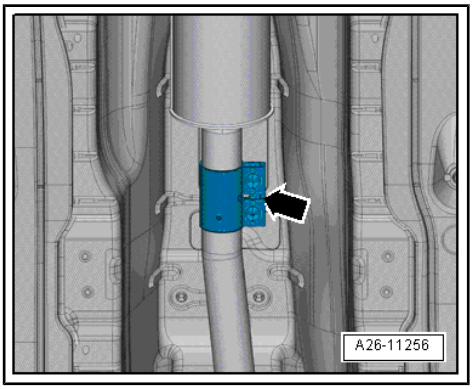
– Loosen ventilation line -1- from fastener on the holder -arrow-.
– Remove cover for rear left underbody and plastic cover behind the rear axle ⇒ Body Work; Rep. gr. 66



– Remove screws -2- and remove tunnel bridge -1- in -direction of arrow-.



– Loosen the clamping sleeve -arrow- and slide it forwards.

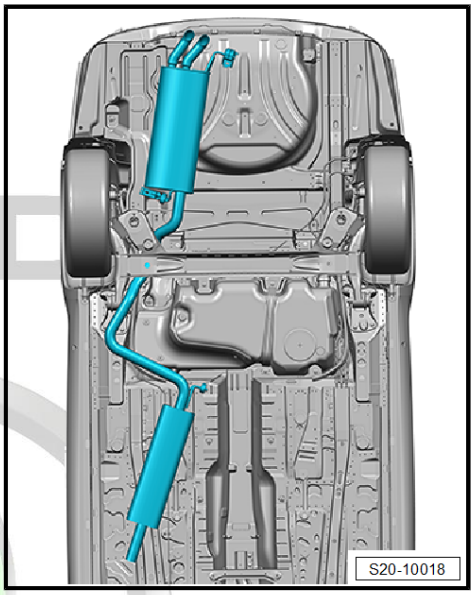


Note

A second person is required for the further work.

– Unscrew screws of the suspension for middle and rear silencer -positions 2,3,4- ⇒ page 247 .

– Unscrew middle silencer outwards and carefully place it on the rear axle as shown in the figure.



Note

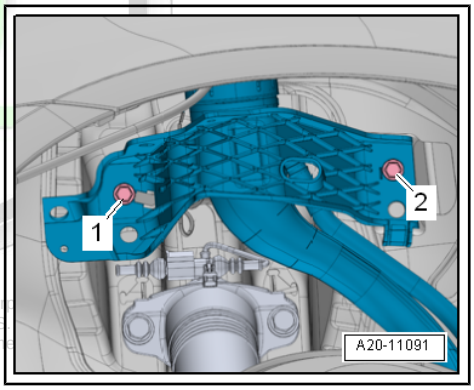
- *Make sure that the rear axle is not damaged.*
- *To protect the rear axle, place a cloth underneath the middle and rear silencer.*

– Unscrew screws -1- -2- for fuel filler neck.

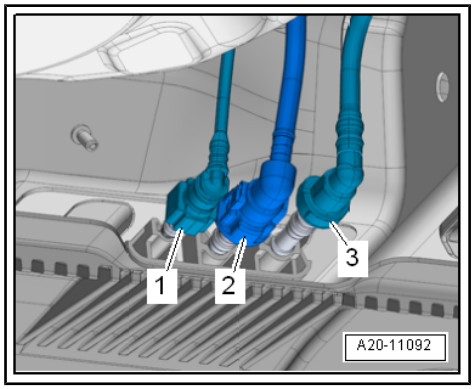
WARNING

Risk of injury caused by fuel which is under high pressure.

Lay a clean cloth around the connection point and carefully slacken the connection point in order to relieve the pressure in the fuel system.



– Disconnect vent line -3- and fuel line -2- ⇒ page 188 .



Note

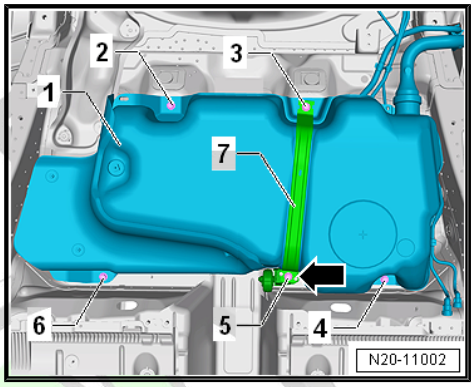
For vehicles with auxiliary heating, the fuel line -1- for the dosing pump - V54- must also be disconnected ⇒ page 188 .

WARNING

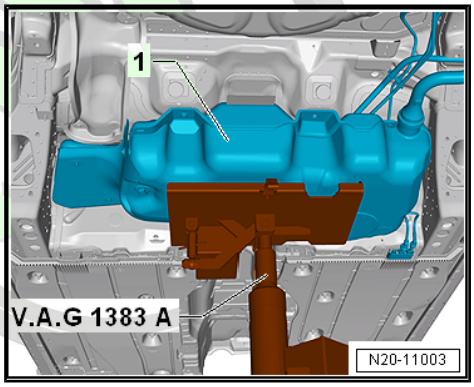
Risk of accident from fuel tank weight.

The fuel tank must be empty for removal.

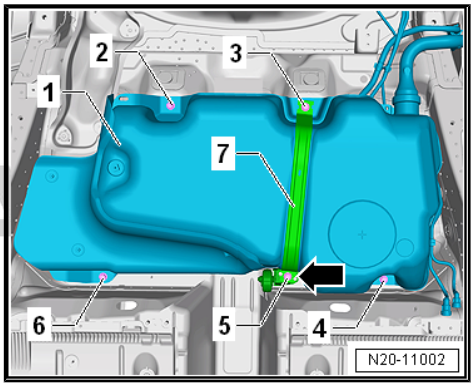
– Unscrew screw -5-.
– Remove holder for exhaust system retaining strap -arrow-.
– Unscrew fixing screws -3- and remove tensioning strap -7-.



– Support the fuel tank using the engine and gearbox jack - V.A.G 1383A- .



– Release fixing screws -2, 4 and 6-.



Note

The filler neck must be "extracted" between body and rear axle. Lift fuel tank down from the engine and gearbox jack - V.A.G 1383A- with a 2nd mechanic.

– Lower the fuel tank a little and carefully unscrew it outwards and downwards.

Note

Make sure you do not kink the vent and fuel lines.

Install

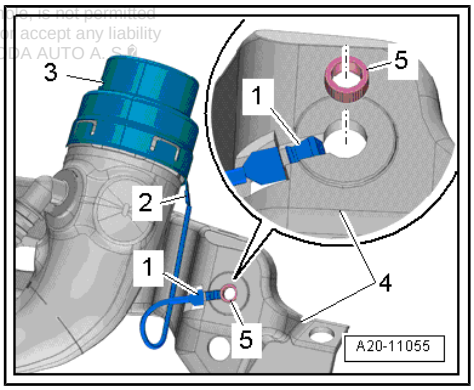
Note

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.

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-.

– Guide the filler neck between body and rear axle with the assistance of a 2nd mechanic. Then position the fuel tank onto the engine/gearbox jack - V.A.G 1383A- .

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

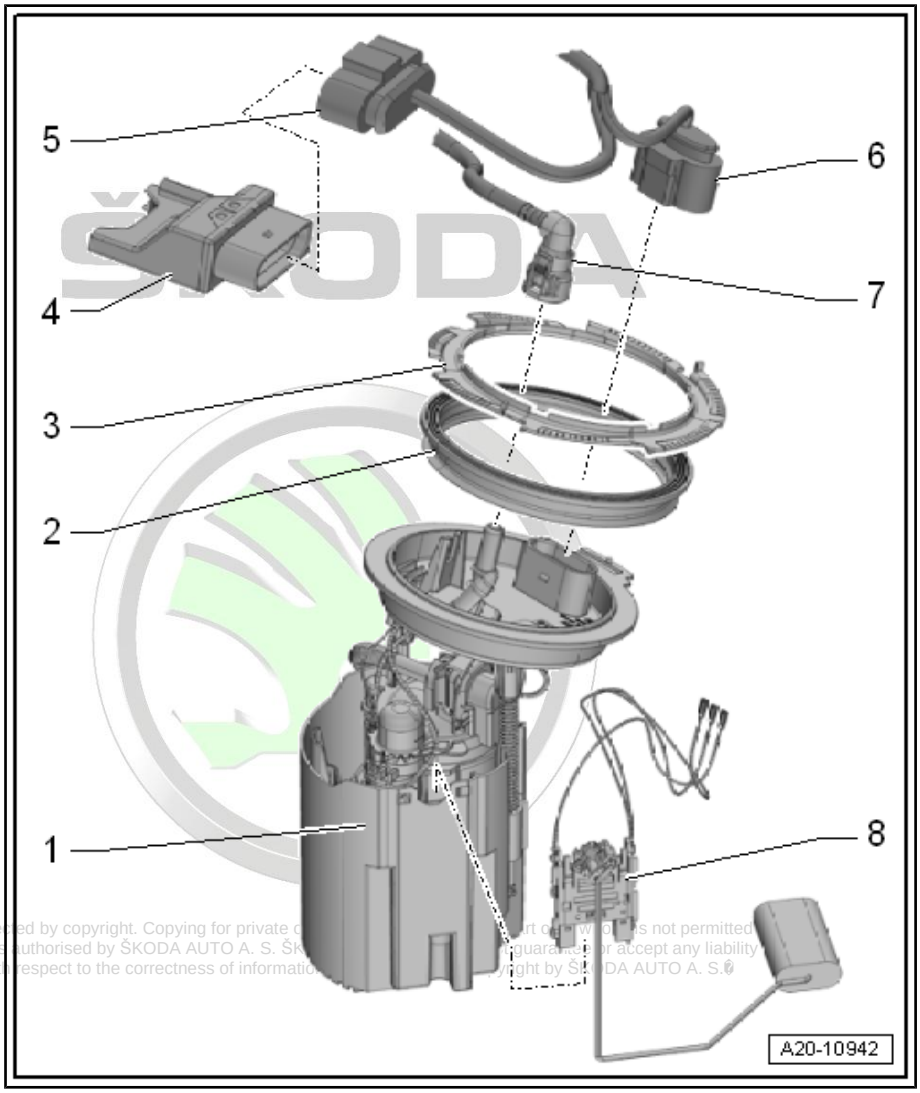
♦ Vent and fuel lines must be laid without any kinks.

♦ Do not mix-up the feed line and the return-flow line (the return-flow line is blue, 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.

1.4 Fuel delivery unit and sender for fuel gauge display - Summary of components



1 - Fuel delivery unit

- ❑ with fuel system pressurisation pump -G6-
- ❑ with integrated fuel filter, the fuel filter cannot be replaced individually
- ❑ Checking electric fuel pump ⇒ Vehicle diagnostic tester
- ❑ removing and installing ⇒ page 178
- ❑ Fill the vehicle with at least 5 litres of fuel after installing

2 - Sealing ring

- ❑ replace
- ❑ install when dry

3 - Lock ring, 110 Nm

- ❑ loosen and/or tighten using wrench - T30101-

4 - Fuel pump control unit - J538-

- ❑ removing and installing ⇒ page 186

5 - Connector

- ❑ For fuel pump control unit - J538-
- ❑ Ensure safe locking by pulling

6 - Connector

- ❑ for fuel pump for predelivery system - G6- and sender for fuel gauge display - G-
- ❑ Ensure safe locking by pulling

7 - Fuel feed line

- ❑ to the engine
- ❑ do not kink
- ❑ disconnect and connect ⇒ page 188

8 - Fuel gauge sender - G-

- ❑ removing and installing ⇒ page 181

1.5 Removing and installing fuel delivery unit with sender for fuel gauge display

Special tools and workshop equipment required

- ◆ Disassembly wedge - 3409-
- ◆ Key - T30101-

Removing

- The fuel tank must not be more than $^{3}/_{4}$ full.

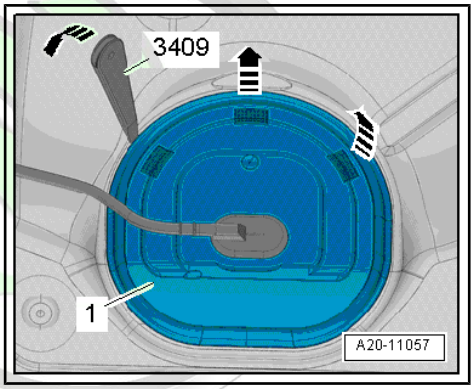
Note

- *If necessary, extract fuel from the fuel tank ⇒ page 171 .*
- *Observe the safety instructions before starting fitting work ⇒ page 3 .*
- *Observe rules for cleanliness ⇒ page 3 .*

– Switch off ignition and all electrical loads, and pull out ignition key.

– Removing rear seat bench ⇒ Body Work; Rep. gr. 72 .

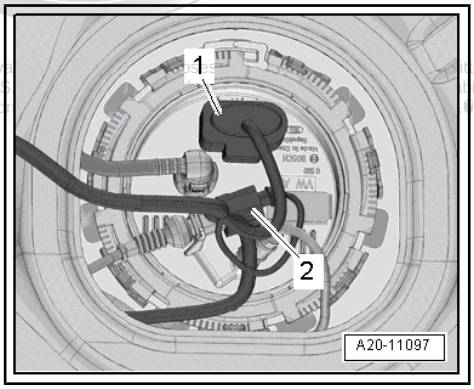
– Unclip cover -1- for closing flange from holder catches -arrows- using the disassembly wedge - 3409- .



– Disconnect plug connection -1- at fuel pump.

Vehicles with auxiliary heating

– Disconnect plug connection -2- from auxiliary heating dosing pump.



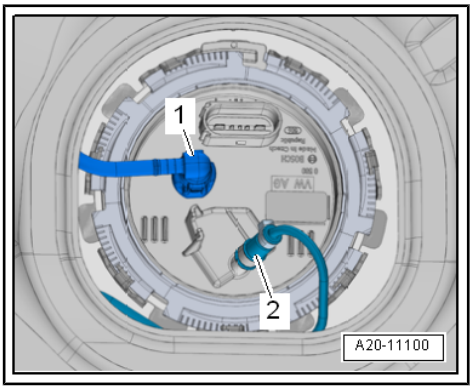
Continued for all vehicles

WARNING

Risk of injury caused by fuel which is under high pressure.

Lay a clean cloth around the connection point and carefully slacken the connection point in order to relieve the pressure in the fuel system.

– Remove fuel line -1- from closing flange ⇒ page 188 .

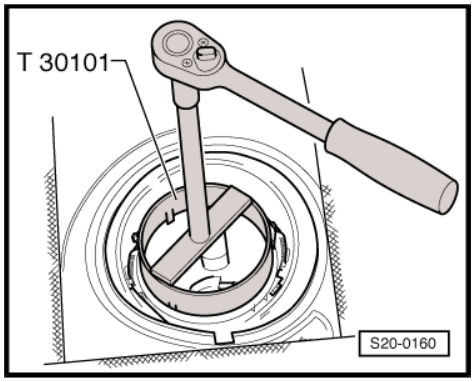


Vehicles with auxiliary heating

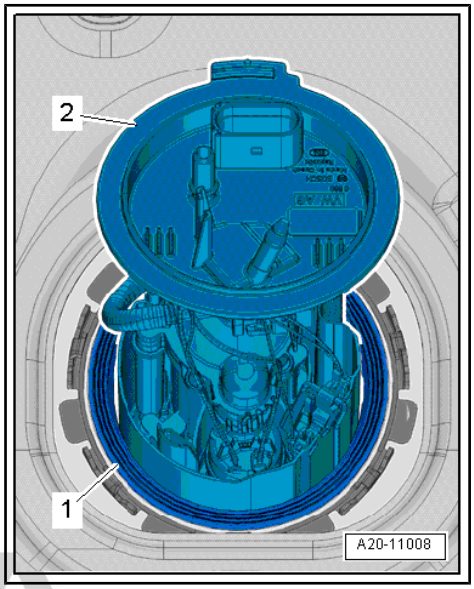
– Loosen hose clamp, fuel line -2- to the dosing pump for the auxiliary heating from the closing flange.

Continued for all vehicles

– Open lock ring with the wrench - T30101- .



– 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 delivery unit before disposing of it if you wish to replace the fuel delivery unit.*

– 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.

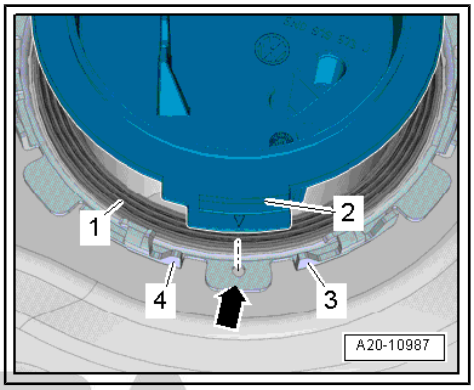
Caution

Risk of leakage.

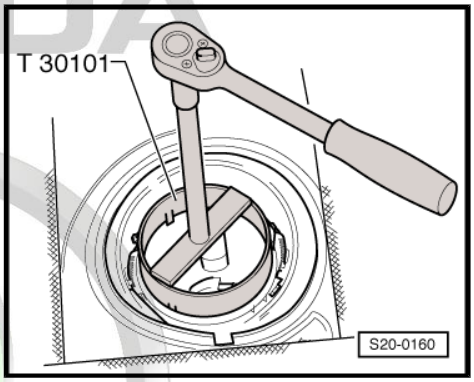
The gasket ring must not get damaged or squashed when inserting the sealing flange.

– 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.



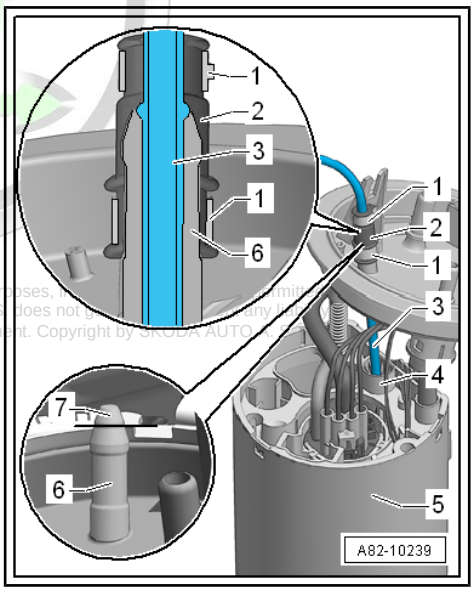
– Insert lock ring and tighten using the wrench - T30101- .



– Connect fuel line ⇒ page 188 .

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.

1.6 Removing and installing the sender for fuel gauge display - G-

Removing

Note

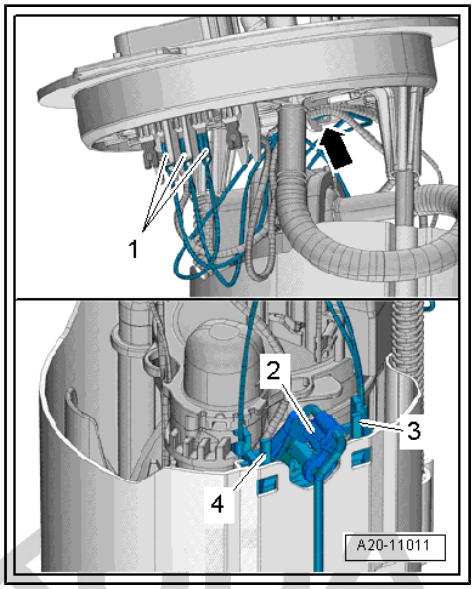
- *Observe safety instructions ⇒ page 3 .*
- *Observe rules for cleanliness ⇒ page 6 .*

– Remove fuel delivery unit ⇒ page 178 .

– 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 catches on uptake clamps -3 and 4- and 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

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 1526C-
- Disassembly wedge - 3409-
- Measuring vessel

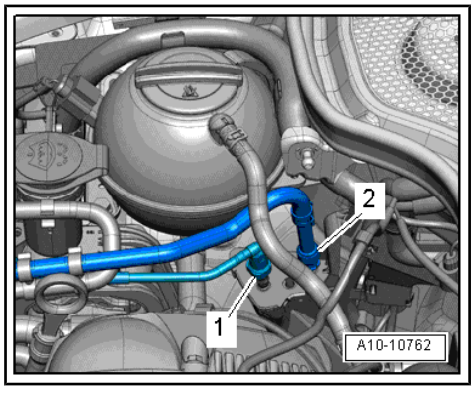
1.7.1 Checking fuel pressure

Note

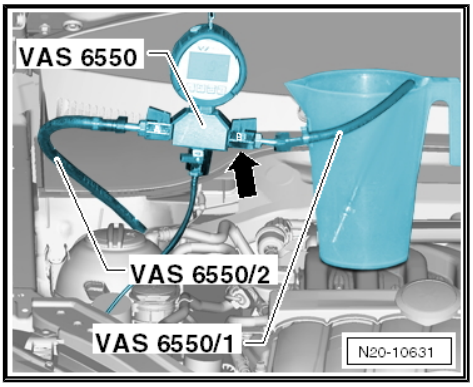
- *Safety precautions when working on the fuel supply system* ⇒ page 3 .
- *Rules of cleanliness when working on the fuel supply system* ⇒ page 3 .
- *Test conditions when working on the fuel supply system* ⇒ page 5 .

– Remove high pressure pipe -2- ⇒ page 188 .

– Connect pressure tester - VAS 6550- to fuel supply line with adapter - VAS 6550/2- .



– Fit hose line - VAS 6550/1- and keep in a 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.*

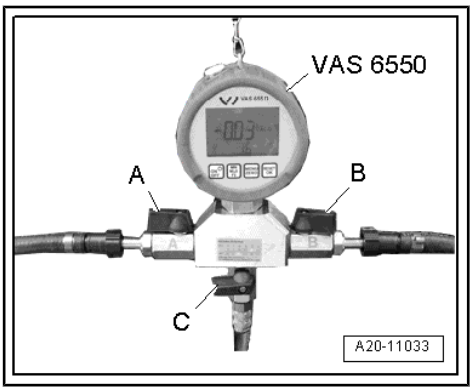
– Open shut-off taps -A and B-.

– 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: 0.35…0.7 MPa (3.5 … 7 bar)



If the specification is not attained:

– Perform fuel delivery quantity check ⇒ page 184 .

1.7.2 Testing holding pressure

Note

- *Safety precautions when working on the fuel supply system* ⇒ page 3 .
- *Rules of cleanliness when working on the fuel supply system* ⇒ page 3 .
- *Test conditions when working on the fuel supply system* ⇒ page 5 .

– Check leaktightness and while doing so observe pressure drop at pressure gauge - VAS 6550- .

• The pressure must not drop below 0.3 MPa (3 bar) after 10 minutes.

If the pressure again falls below 0.3 MPa (3 bar):

• Check line connections between pressure gauge - VAS 6550- and fuel feed line for leaktightness.

• Check pressure gauge - 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:

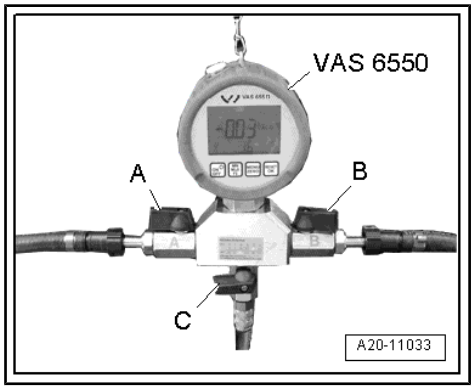
– Replace fuel delivery unit ⇒ page 178 .

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.



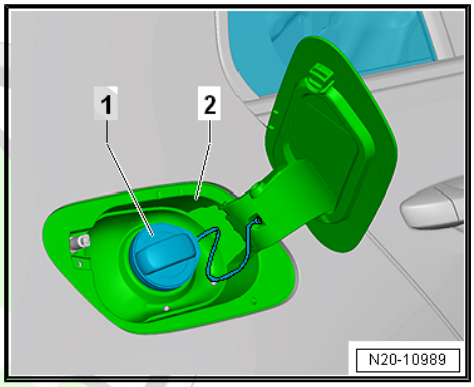
1.7.3 Checking fuel delivery rate

Note

- *Safety precautions when working on the fuel supply system* ⇒ page 3 .
- *Rules of cleanliness when working on the fuel supply system* ⇒ page 3 .
- *Test conditions when working on the fuel supply system* ⇒ page 5 .

– Open tank flap.

– Unscrew the cap -1- for the fuel filler neck.

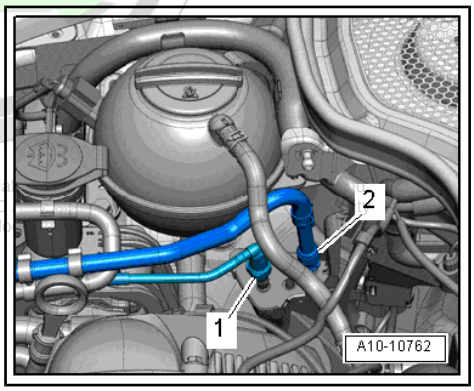


Note

Do not pay attention to the position -2-.

– Remove high pressure pipe -2- ⇒ page 188 .

– Connect pressure tester - VAS 6550- to fuel supply line with adapter - VAS 6550/2- .

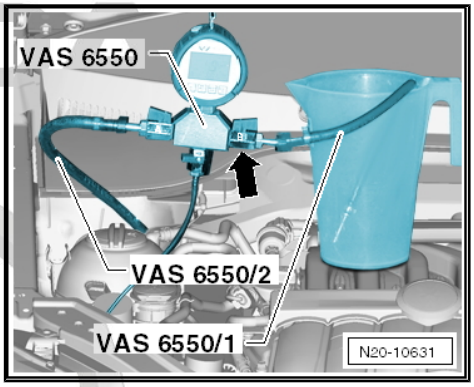


– Fit hose line - VAS 6550/1- and keep in a fuel-resistant measuring vessel.

Caution

Risk of fuel dripping out.

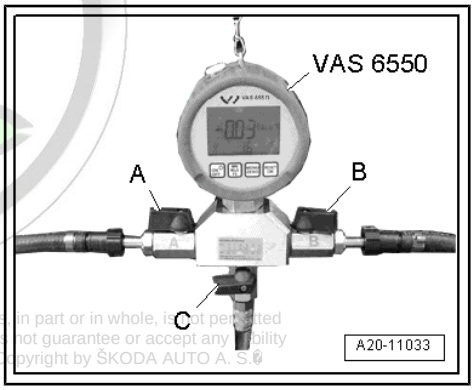
- *Make sure that the shut-off tap -C- is closed.*
- *Lever points in the direction of flow.*



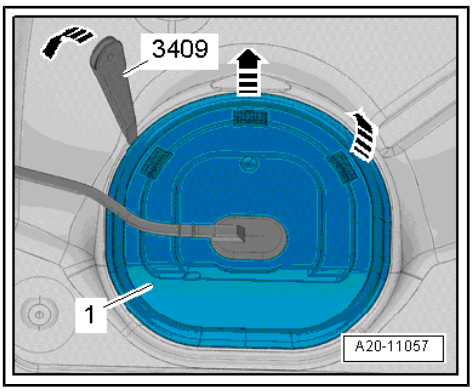
– Open shut-off taps -A and B-.

• The levers are housed in the flow direction.

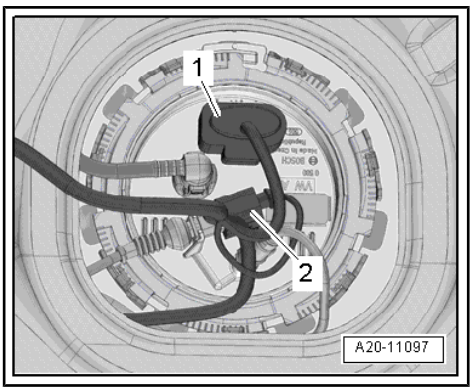
– Removing rear seat bench ⇒ Body Work; Rep. gr. 72 .



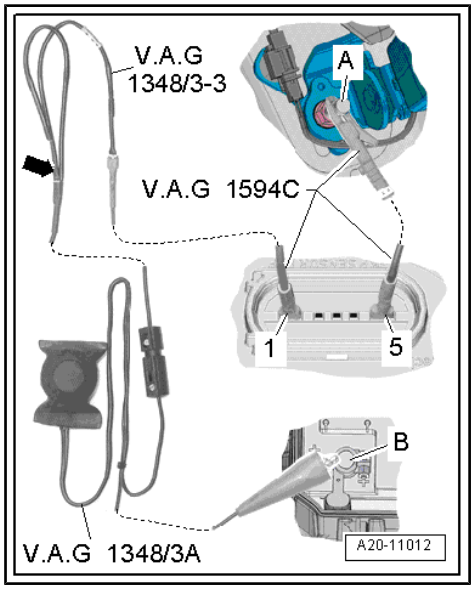
– Loosen catch pegs -arrows- of the cover -1- with disassembly wedge - 3409- and remove the cover.



– Disconnect plug connection -1- at the closing flange.



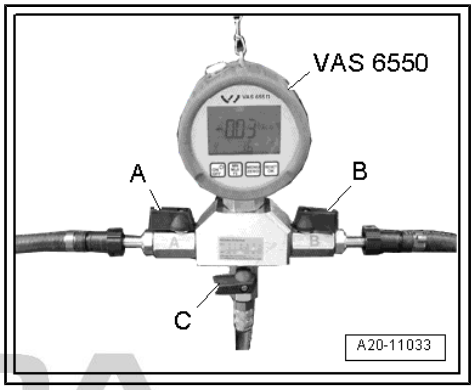
– Connect remote control - V.A.G 1348/3A- with adapter line - V.A.G 1348/3-3- and connect with the line from the adapter set - V.A.G 1594/C- to contact -1-.
– Mask second plug contact of the adapter - V.A.G 1348/3-3- with short-circuit proof tape -arrow-.
– Connect contact -5- with line of auxiliary measuring set - V.A.G 1594 C- to body mass -A-.
– Connect alligator clips to the positive terminal “+” -B- of the battery.



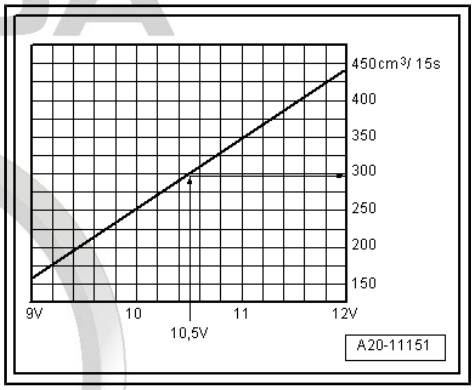
Note

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 fuel minimum flow quantity in the diagram cm ^{3}/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-

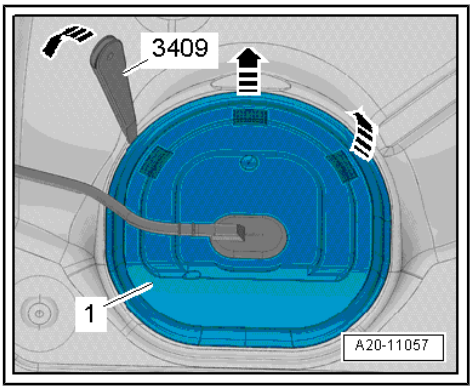
Special tools and workshop equipment required

- Disassembly 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 disassembly wedge - 3409- and remove the cover.

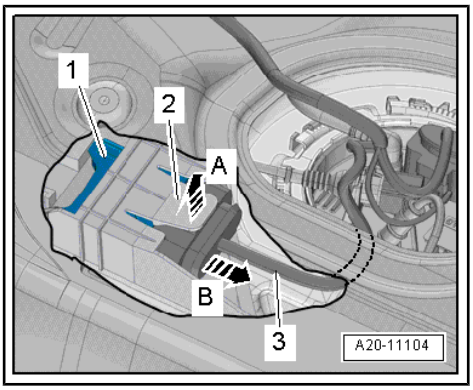


– Push up pick-up coupling -2- -arrow A-. To do so, reach between bottom plate and fuel tank with a finger.

– 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 inwards - J538- between fuel tank and bottom plate.

– Disconnect the plug connection.



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 precautions* *⇒ page 3* *.*

Push-on coupling	Colour code on connector
Fuel feed line	Black
Fuel return-flow line	Blue
Vent line	White, beige
Vacuum line	green

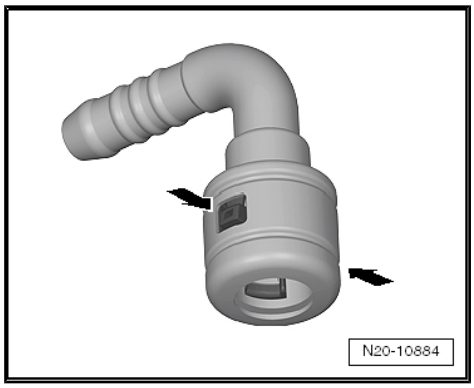
WARNING

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.

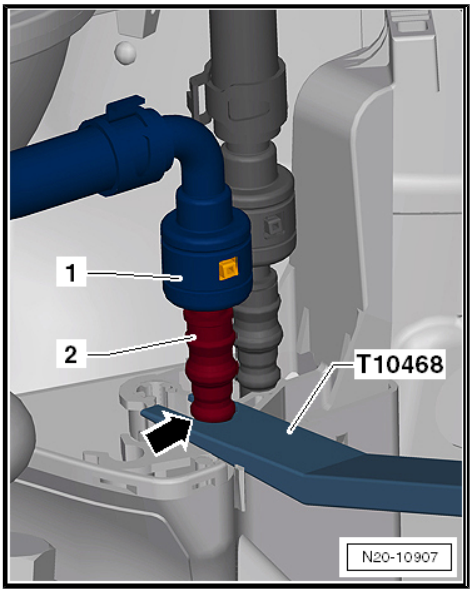
Opening



The separation point -1- in the engine compartment must be held.

– Insert the lever - T10468- between the heat shield and the stop -arrow- of the fuel feed line -2- and hold it.

Continued for all separation points

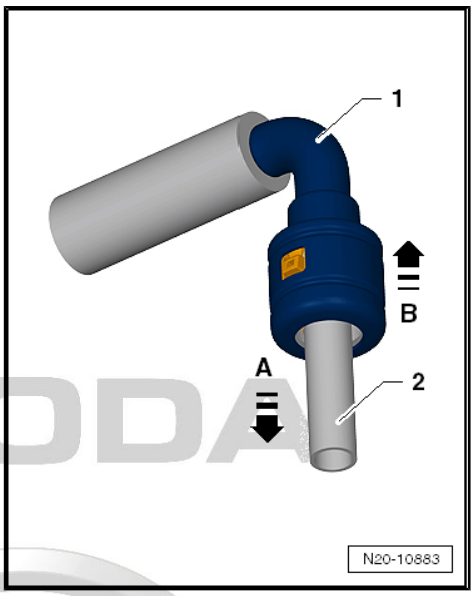


– Push push-on coupling -1- in -direction of arrow A-.

– Press release buttons and pull push-on coupling -1- off fuel line -2- in -direction of arrow B-.

Pay attention to the colour assignment when installing ⇒ page 188 .

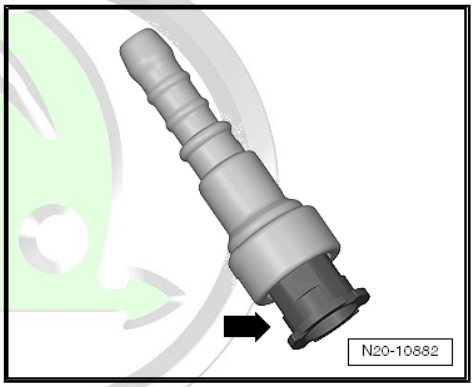
– Check the quick coupling for firm seating by pulling in the opposite direction!



Variant 2

Quick coupling with pull release -arrow-.

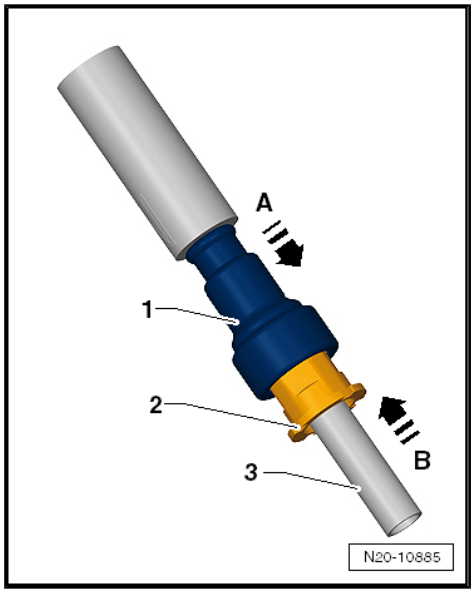
Opening



– Push push-on coupling -1- in -direction of arrow A-.
– Pull pull-release mechanism -2- in -direction of arrow B-.
– Pull push-on coupling -1- off fuel line -3- in -direction of arrow B-.

Pay attention to the colour assignment when installing ⇒ page 188 .

– Check the quick coupling for firm seating by pulling in the opposite direction!



Variant 3

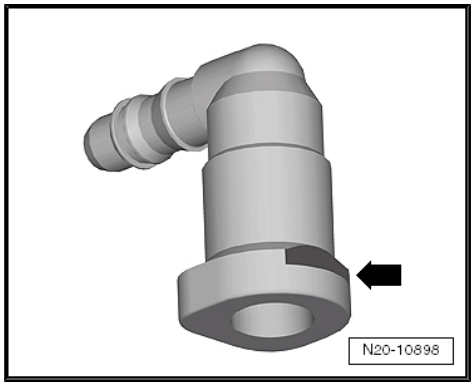
Quick coupling with front release button -arrow-.

Opening

– Press the release button -arrow- and detach the quick coupling.

Pay attention to the colour assignment when installing ⇒ page 188 .

– Check the quick coupling for firm seating by pulling in the opposite direction!



Variant 4

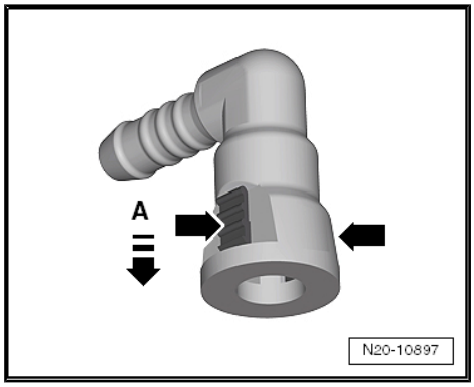
Quick coupling with release buttons -arrows- on right and left.

Opening

– Press push-on 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 188 .

– Check the quick coupling for firm seating by pulling in the opposite direction!



Variant 5

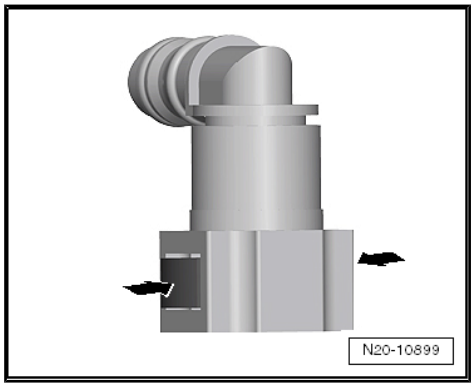
Quick coupling with release buttons -arrows- on right and left.

Opening

– Press release buttons -arrows- and pull push-on coupling off.

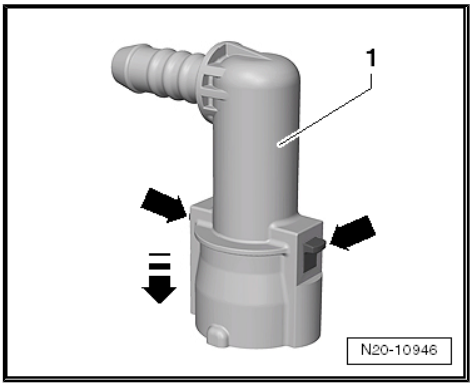
Pay attention to the colour assignment when installing ⇒ page 188 .

– 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.



Opening

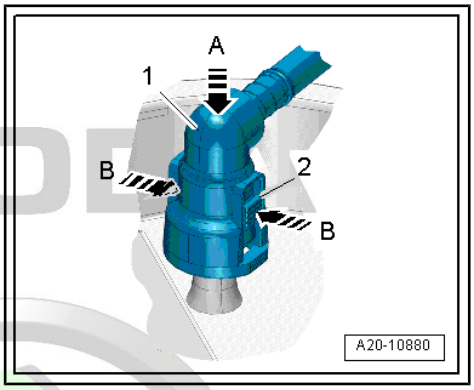
– Press push-on coupling -1- in -direction of arrow- and hold pressed.
– Press release buttons -arrows- and pull push-on coupling off.

Pay attention to the colour assignment when installing
⇒ page 188 .

– 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.



Opening

– Press push-on coupling -1- in -arrow direction A- and hold pressed.
– Press release buttons -2- in -arrow direction B- and remove quick coupling- 1-.

Pay attention to the colour assignment when installing
⇒ page 188 .

– Check the quick couplings for firm seating by pulling in the opposite direction!

3 Accelerator pedal

3.1 Accelerator pedal module - Summary of components

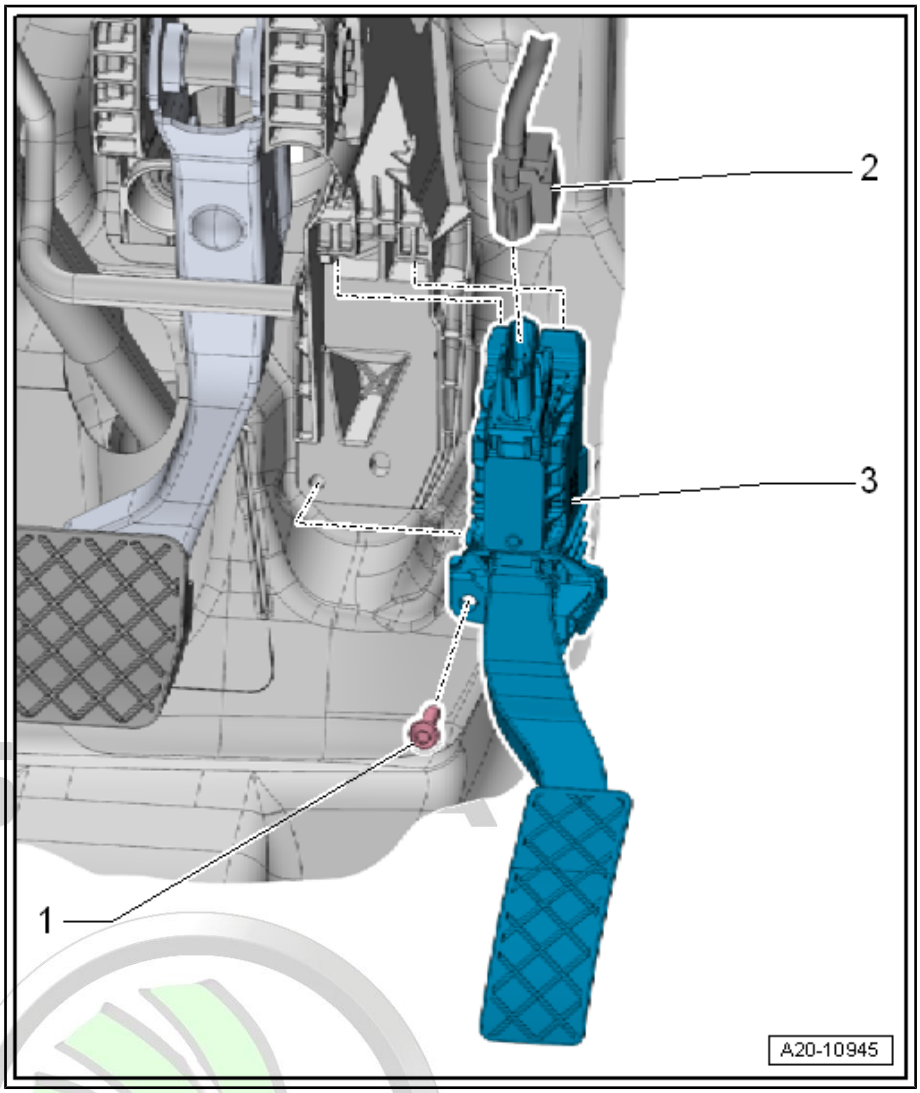
1 - 9 Nm

2 - Connector

- ❑ Ensure safe locking by pulling

3 - Accelerator pedal module

- ❑ with accelerator pedal position sender - G79- and accelerator pedal position sender 2 - G185-



3.2 Removing and installing accelerator module

Removing

– Remove trim panel from steering column ⇒ Chassis; Rep. gr. 40 .

– Disconnect plug connection -2- at the accelerator pedal module ⇒ page 193 .

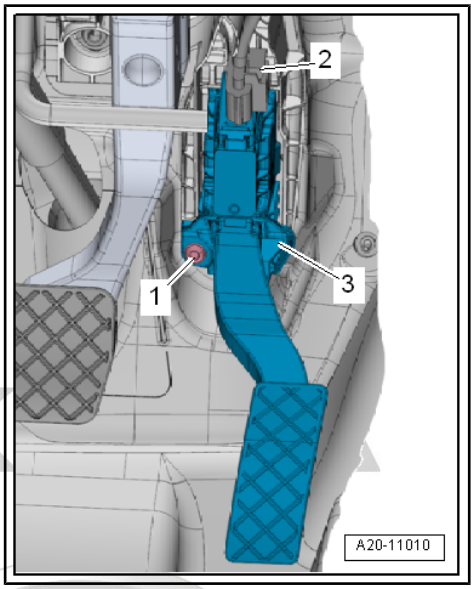
– Unscrew screw -1-.

– Remove accelerator module -3- from the uptake.

Install

Installation is carried out in the reverse order.

> **Caution**
>
> ***Risk of damage to knee airbag surface by mechanical stress.***
>
> ***After completion of the visual inspection, check that the knee airbag surface is not damaged.***



3.2.1 Disconnect connector for accelerator pedal module and fit on

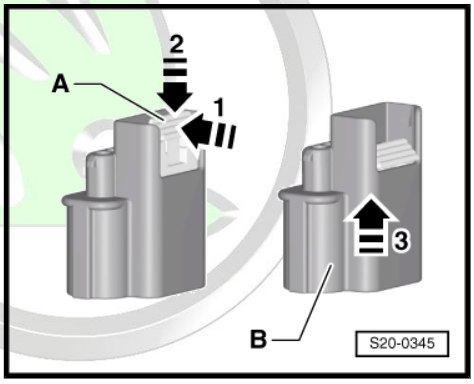
> **Note**
>
> *The plugs for the accelerator pedal module which are inserted, must be disconnected and fit on in a different manner.*

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.

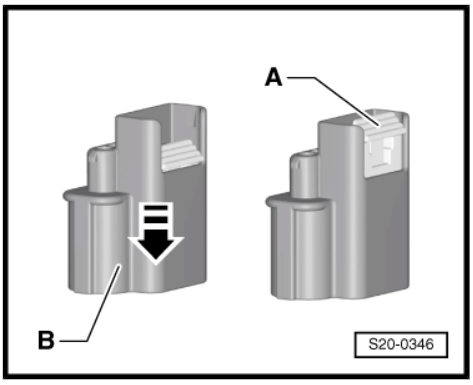


Fit on connector 1K0 973 706

– 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.

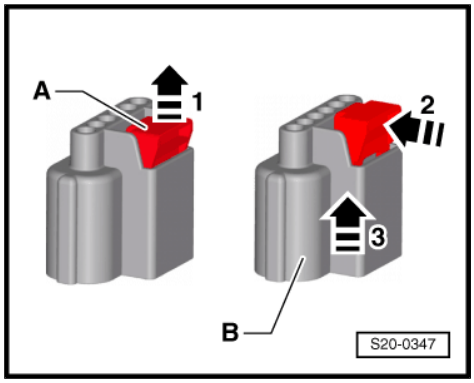


Disconnect connector 8K0 973 706

– Pull the 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- upwards in -direction of arrow 3-.

  The piston slide valve -A- remains in the top position.



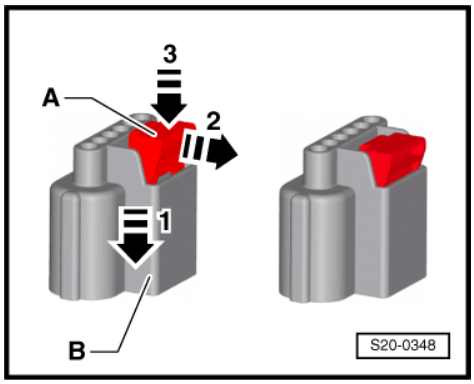
Fit on connector 8K0 973 706

– Push the socket housing -B- downwards up to the stop in -direction of arrow 1-.

– Slightly press the piston slide valve in -direction of arrow 2- and push it downwards in -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 Activated charcoal container system - Summary of components

1 - Vent line

- ❑ to activated charcoal filter solenoid valve 1 - N80-
- ❑ pushed into the fuel tank
- ❑ disconnect and connect ⇒ page 188

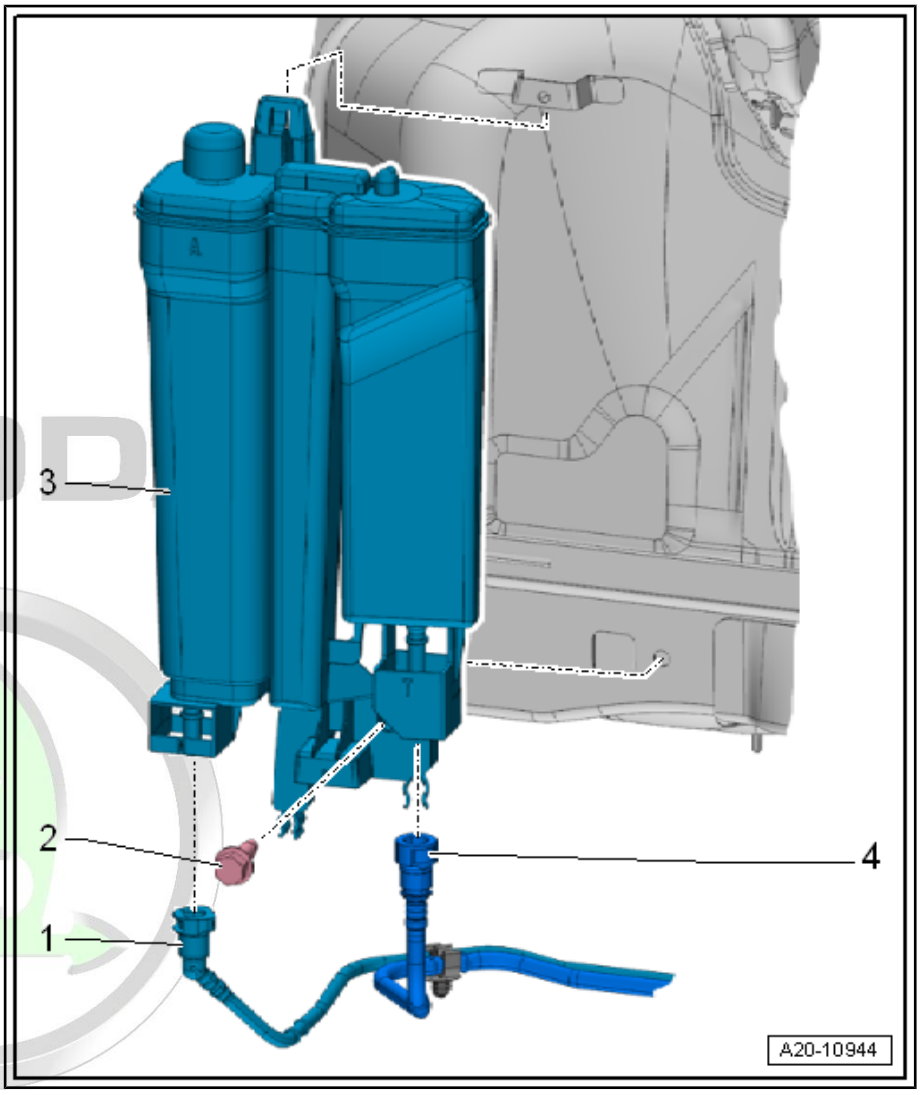
2 - 20 Nm

3 - Activated charcoal filter

- ❑ Installation location in wheelhouse under the wheelhouse liner
- ❑ removing and installing ⇒ page 195

4 - Vent line

- ❑ to fuel tank
- ❑ disconnect and connect ⇒ page 188



4.2 Removing and installing activated charcoal filter

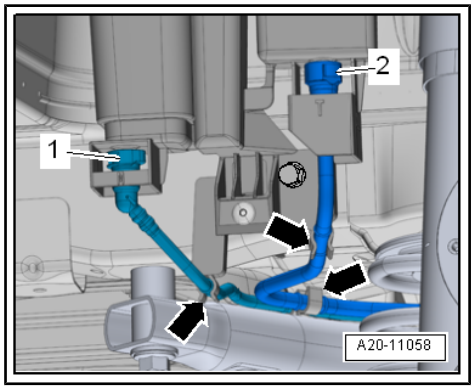
– Observe safety instructions ⇒ page 3 .

– Observe rules for cleanliness ⇒ page 3 .

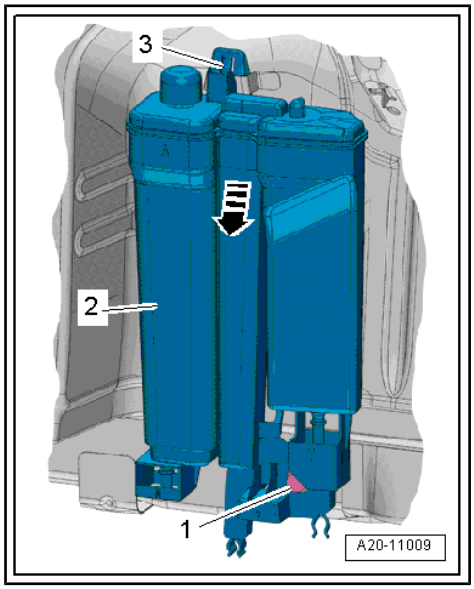
– Remove right rear wheel ⇒ Chassis; Rep. gr. 44 .

– Remove the rear right wheelhouse liner ⇒ Body Work; Rep. gr. 66 .

– Disconnect ventilation lines -1 and 2- at activated charcoal filter ⇒ page 188 .
– 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.

21 – Turbocharging/supercharging

1 Exhaust gas turbocharger

1.1 Exhaust turbocharger - Summary of components

Part I

Part II ⇒ page 197

1 - Exhaust gas turbocharger

- ❑ removing and installing ⇒ page 198

2 - 8 Nm

3 - Supports

4 - O-ring

- ❑ replace

5 - Gasket

- ❑ replace

6 - Heat shield

7 - 25 Nm

8 - 8 Nm

9 - 14 Nm

- ❑ replace ⇒ ETKA - Electronic Catalogue of Original Parts

10 - 9 Nm

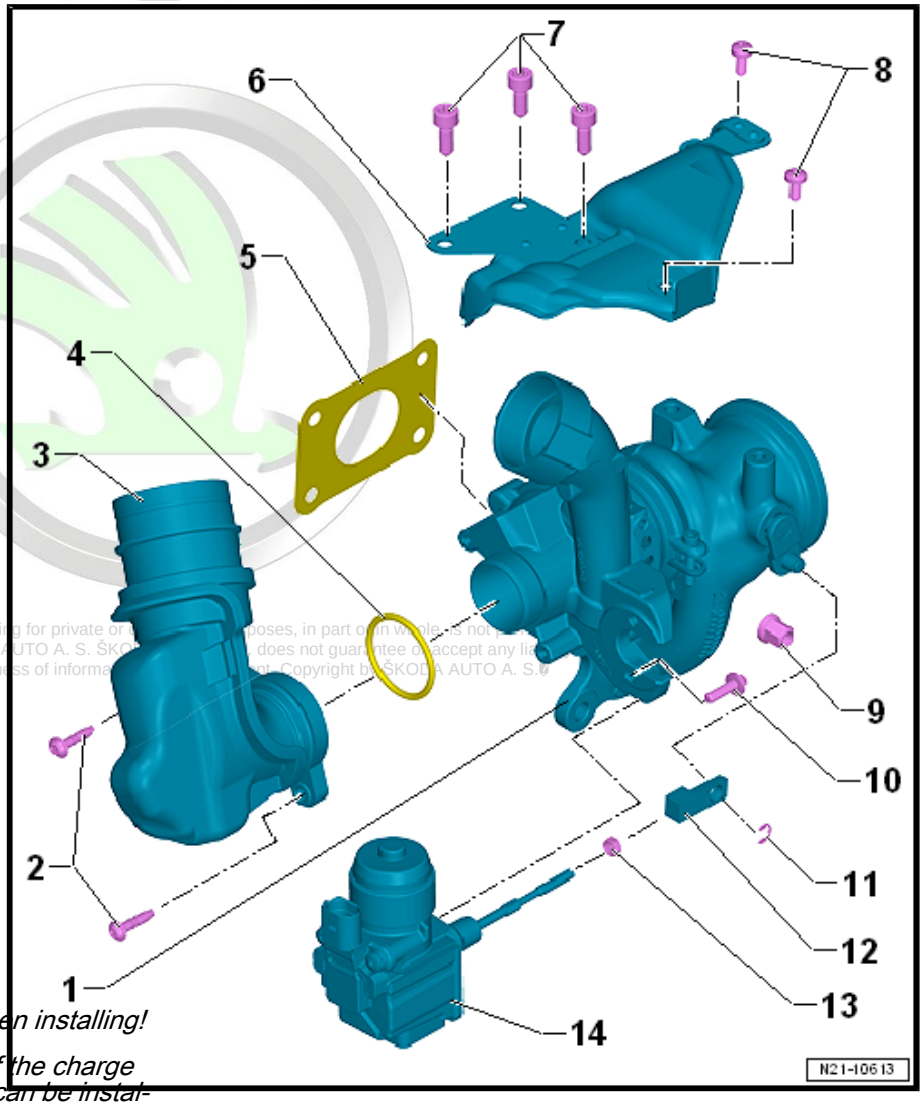
11 - Locking clip

12 - Release handle

13 - Counternut, 10 Nm

- ❑ Secure with sealant

14 - Charge pressure regulator - V465-



Note

- ♦ *Always observe when installing!*
- ♦ *Different variants of the charge pressure regulator can be installed.*

- ❑ removing and installing ⇒ page 204

Part II

Part I ⇒ page 197

1 - Oil return-flow line

2 - O-ring

- ❑ replace

3 - 9 Nm

4 - O-ring

- ❑ replace

5 - 9 Nm

6 - Oil feed line

7 - O-ring

- ❑ replace

8 - 9 Nm

9 - 8 Nm

10 - O-ring

- ❑ Replace crankcase ventilation hose (-Pos. 9-) if it is damaged or leaking

11 - Hose

- ❑ for crankcase ventilation

12 - 8 Nm

13 - O-ring

- ❑ Replace crankcase ventilation hose (-Pos. 9-) if it is damaged or leaking

14 - Exhaust gas turbocharger

- ❑ removing and installing ⇒ page 198

15 - Gasket

- ❑ replace

16 - Coolant line

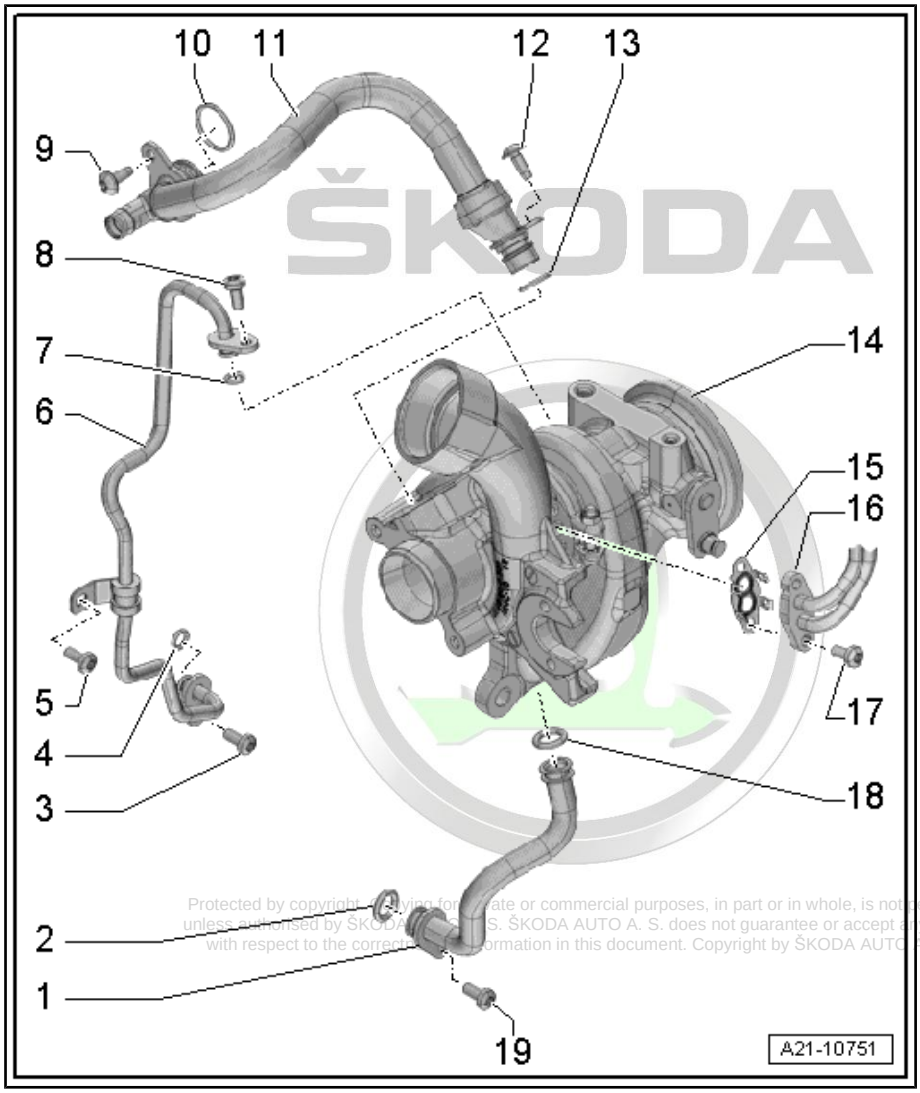
- ❑ Forward and reverse

17 - 8 Nm

18 - O-ring

- ❑ replace

19 - 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-
- Hose clamps up to 25 mm - MP7-602 (3094)-
- Pliers for spring strap clamps -VAS 6362-

Removing

Note

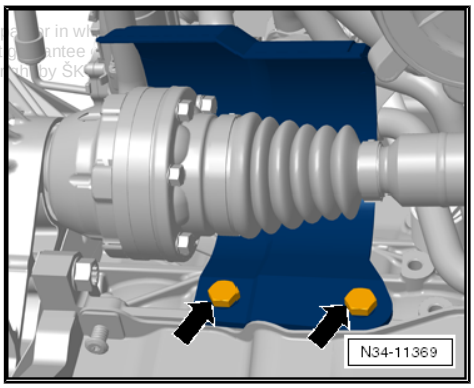
- *Observe rules for cleanliness ⇒ page 3 .*
- *Fit all heat protection sleeves on again in the same place when installing.*

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:

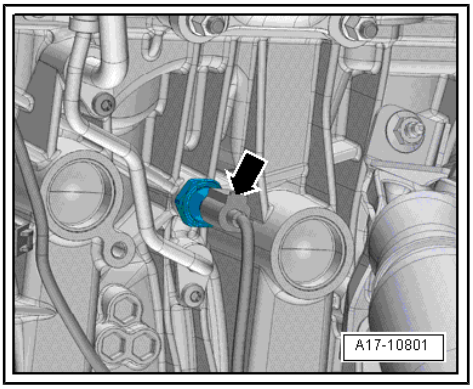
- ***Inspect the air filter housing, the air filter element and air guide hoses for contamination.***
- ***Inspect the whole charge-air routing and the charge air cooler for foreign bodies.***
- ***If foreign bodies are found in the charge air system, clean charge air duct and replace charge air cooler if necessary.***

– Release screws -arrows- and remove heat shield for right drive shaft.

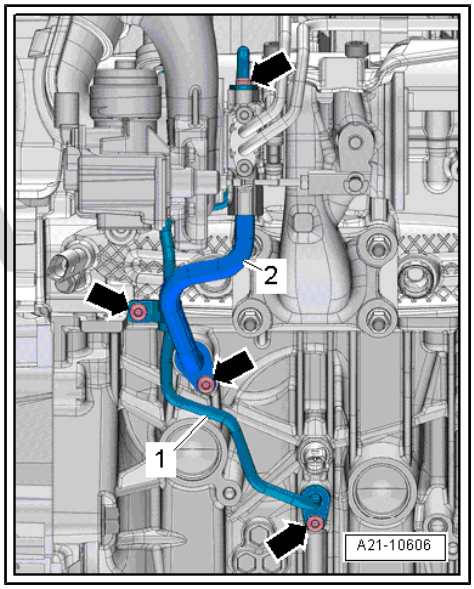


– Remove heat protection sleeve.

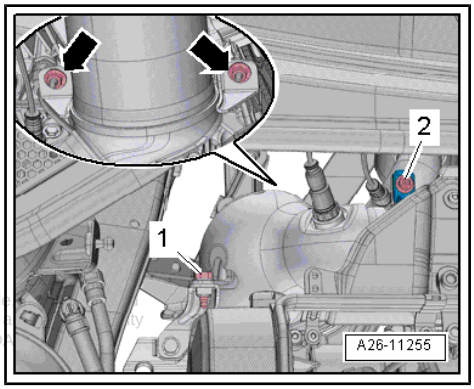
– Remove plug -arrow- at the oil pressure switch for reduced oil pressure - F378- .



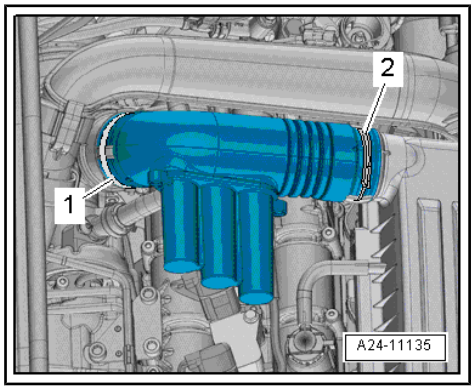
– Screw out the screws -arrows-, remove oil feed line -1- and oil return flow-line -2-.



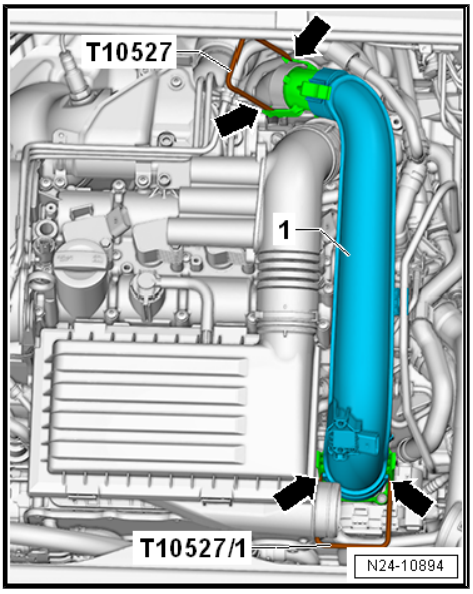
– Unscrew screw -2- and remove screw clamp.
– Unscrew screws -1- and nuts -arrows-, strap up catalytic converter.



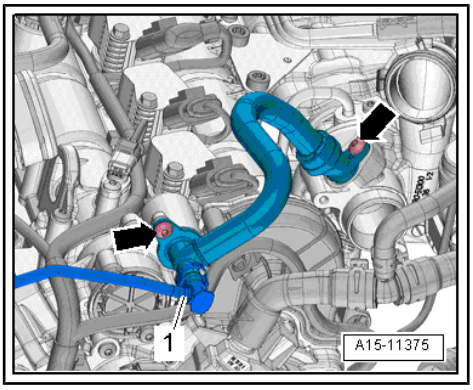
– Loosen hose clamps -1, 2- and remove air guide pipe.



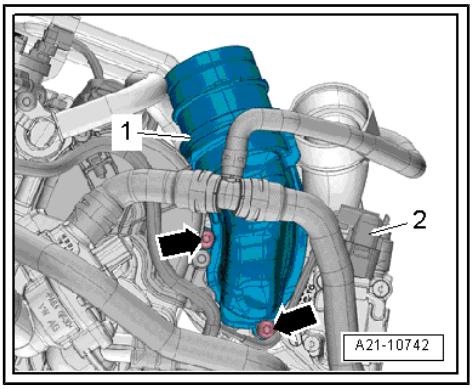
– Release latches -arrows- with release tool -T10527- and remove air guide pipe.
– Press release buttons and remove hose -1- to the activated charcoal filter.



– Unscrew screws -arrows- and remove hose for crankcase ventilation.
– Unplug connector -2-.



– Release screws -arrows- and remove connection piece -1-.
– Disconnect coolant hoses with hose clamps up to 25 mm - MP7-602 (3094)- -1- and -2-.

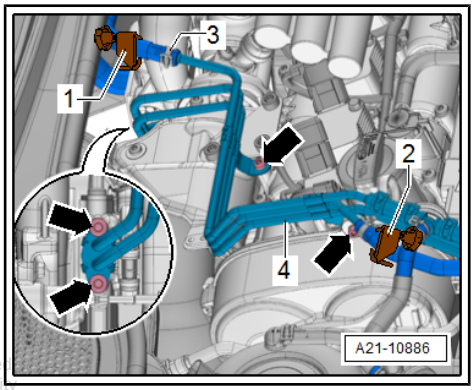


– Loosen hose clamp -3- and remove coolant hose.

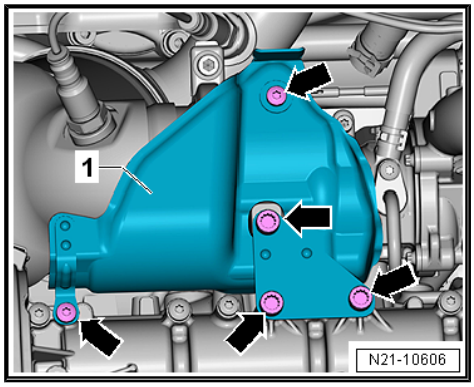
Note

Place a cloth below to absorb leaking coolant.

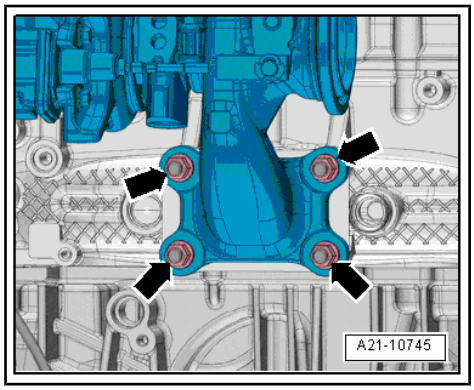
– Unscrew -arrows- screws and swivel coolant lines -4- to the right side.



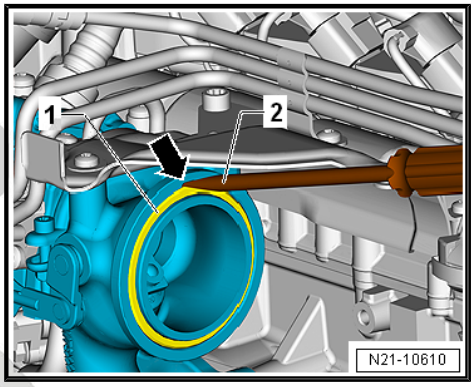
– Release screws -arrows- and remove heat shield -1-.



– Unscrew nuts -arrows- and remove cylinder head cover.



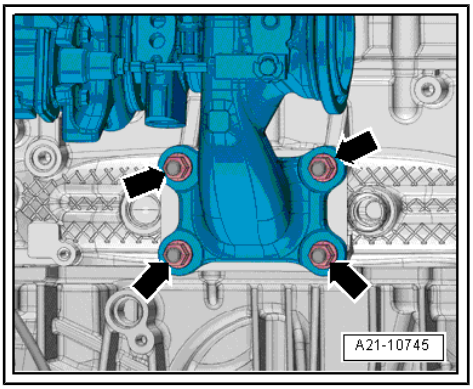
– Push screwdriver -2- into the recess -arrow- of the exhaust gas turbocharger and lever out the sealing ring -1-.



Install

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

Torquing procedure of nuts for exhaust gas turbocharger



Tighten nuts -arrows- in succession in the clockwise direction in several stages:

Stage	Nut	Tightening torque
1.	-1…4-	tighten to 7 Nm
2.	-1…4-	tighten to 10 Nm
3.	-1…4-	tighten again to 10 Nm
4.	-1...4-	tighten to 14 Nm

Tightening torques:

- Exhaust gas turbocharger ⇒ page 197
- Install air guides ⇒ page 206
- Install catalytic converter ⇒ page 245
- ⇒ Chassis; Rep. gr. 40

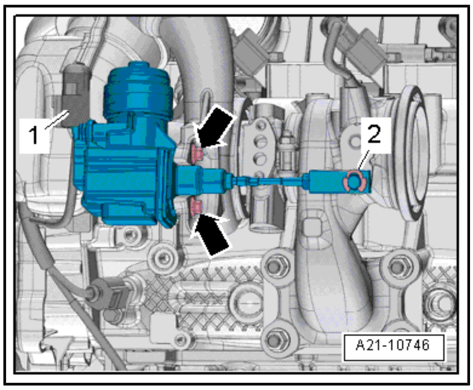
Note

- *Replace gaskets and O-rings.*
- *Fill the exhaust turbocharger with engine oil at the connection fitting for the oil feed line.*
- *Secure all hose connection ends with spring-type clips that comply with the series design ⇒ ETKA - Electronic Catalogue of Original Parts .*
- *To ensure the oil supply to the exhaust gas turbocharger, leave the engine running for about 1 minute after installing the exhaust gas turbocharger; do not rev up immediately.*

– Electrical connections and proper routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

– Top up coolant ⇒ page 144 .

1.3 Removing and installing charge pressure regulator - V465-



Removing

– Switch off ignition.

– Unplug connector -1-.

– Remove lock washer -2-.

– Release screws -arrows- and remove charge pressure regulator - V465- .

Install

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

• Tightening torques ⇒ page 197 .

Note

Different variants of the charge pressure regulator can be installed.

Charge pressure regulator without adjustable linkage

– Adapting the engine control unit - J623- to the charge pressure regulator - V465- ⇒ Vehicle diagnostic tester.

Charge pressure regulator with adjustable linkage

– Screw threads of charge pressure regulator - V465- into the driver at the centre position.

– Adjust the charge pressure regulator - V465- : ⇒ Vehicle diagnostic tester `01 - Select setting charge pressure regulator V465` in `Targeted functions`.

– Set specified value by turning the linkage, specified value ⇒ Vehicle diagnostic tester.

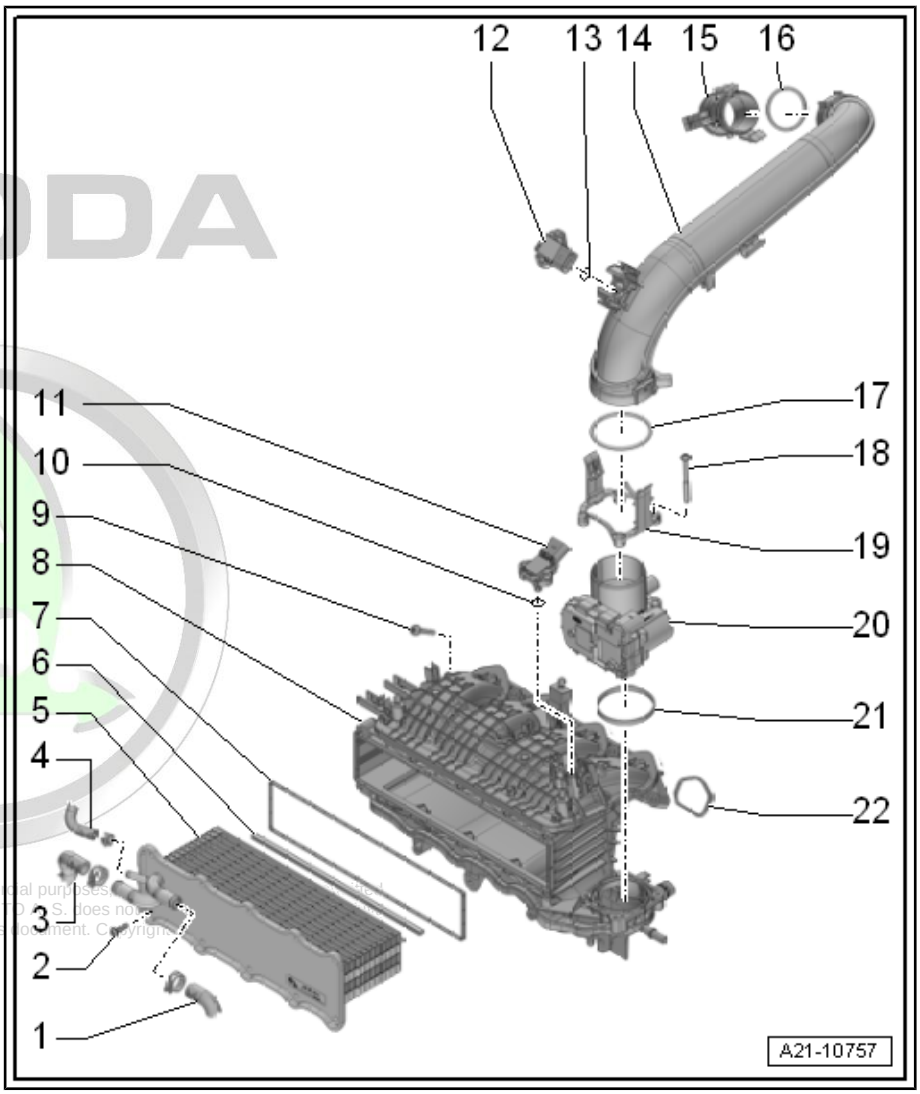
– Tighten counter nut to 10 Nm an secure using sealant.

2 Charge-air system

2.1 Charge air system - Summary of components

Note

- *Before a test or repair, check all charge air pipes, charge air hoses and vacuum lines for tight connection and leaktightness.*
- *Observe rules for cleanliness ⇒ page 10 .*



1 - Coolant hose

2 - Screw

- ❑ thread forming
- ❑ position and screw in by to allow the screw to find the old thread, then tighten the screw to 15 Nm

3 - Coolant hose

4 - Coolant hose

5 - Charge air cooler

- ❑ removing and installing ⇒ page 207
- ❑ fill with fresh coolant after replacing

6 - Sealing section

7 - Gasket

- ❑ replace

8 - Intake manifold

removing and installing ⇒ page 217

9 - 10 Nm

- ❑ Tightening torque and tightening order ⇒ page 220

10 - O-ring

- ❑ replace

11 - Intake air temperature sender - G42- with manifold pressure sender - G71-

- ❑ removing and installing ⇒ page 230

12 - Charge pressure sender - G31- with intake air temperature sender 2 - G299-

- ❑ removing and installing ⇒ page 207

13 - O-ring

- ❑ replace

14 - Air guide pipe

15 - Inlet connections

16 - O-ring

- ❑ replace

17 - O-ring

- ❑ replace

18 - Screw

- ❑ thread forming
- ❑ position and screw in by to allow the screw to find the old thread, then tighten the screw to 7 Nm

19 - Retaining clip

- ❑ For air guide pipe

20 - Throttle valve module - J338-

- ❑ removing and installing ⇒ page 220

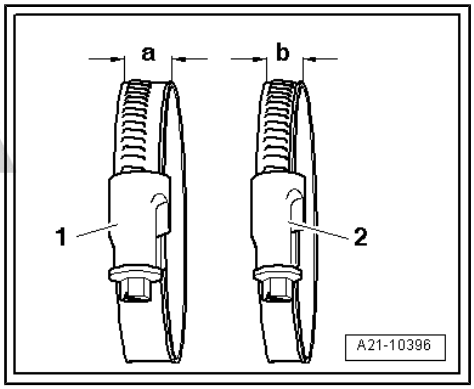
21 - Sealing ring

- ❑ replace

22 - Gasket

- ❑ 4 pieces
- ❑ replace

Install air guide pipes with screw clamps



Note

- *Hose connections and air guide pipes and hoses must be free of oil and grease before being installed.*
- *Secure all hose connection ends with spring-type clips that comply with the series design ⇒ ETKA - Electronic Catalogue of Original Parts .*
- *In order to secure the air guide hoses securely on their connection fittings, the screw threads must be sprayed with rust solvent before installing if the screw clamps have been used beforehand.*

Tightening torque for

1 - Hose clamp -a- = 13 mm wide: 5.5 Nm

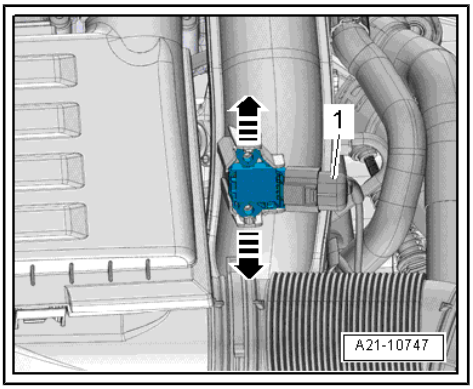
2 - Screw clamp -b- = 9 mm wide: 3 Nm

2.2 Removing and installing charge pressure sender - G31- with intake air temperature sender 2 - G299-

Removing

– Separate plug connection -1-.

– Unlock catches -arrows- and remove charge pressure sender - G31- with intake air temperature sender 2 - G299- .



Install

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

Note

Renew O-ring.

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 , e.g. -VAS 6208-
- Pliers for spring strap clamps

Removing

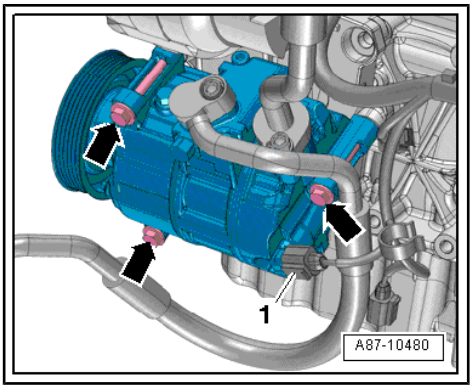
– Removing fan shroud ⇒ page 167 .

– Separate plug connection -1-.

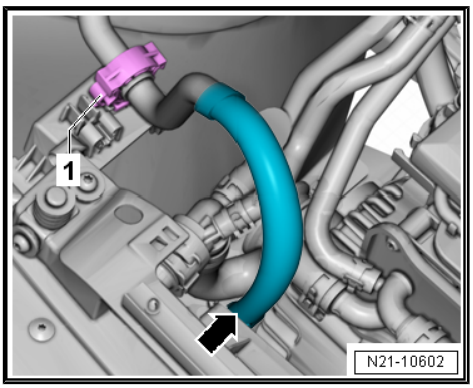
– Remove AC compressor from holder -arrows- and strap up ⇒ Heating, Air Conditioning; Rep. gr. 87 .

– Place catch pan - VAS 6208- underneath.

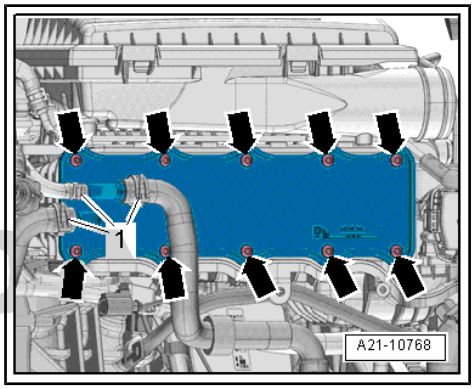
– Disconnect coolant hoses at coolant pipe with hose clamps - MP7-602 (3094)- .



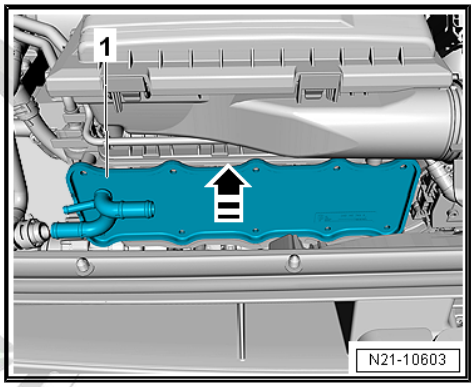
– Open the clamp -1- and push hose -arrow- to the side.



– Loosen hose clamps -1- and remove coolant hoses.
– Remove bolts -arrows-.



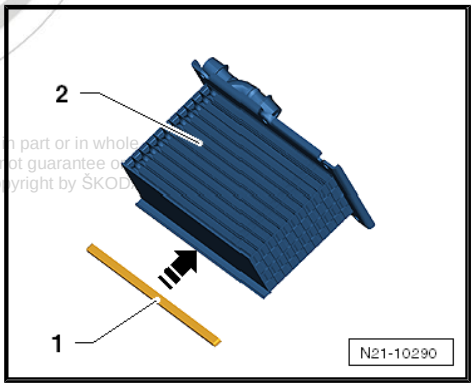
– Pull charge air cooler -1- backwards and forwards simultaneously in -direction of the arrow- out of the intake manifold.



Install

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

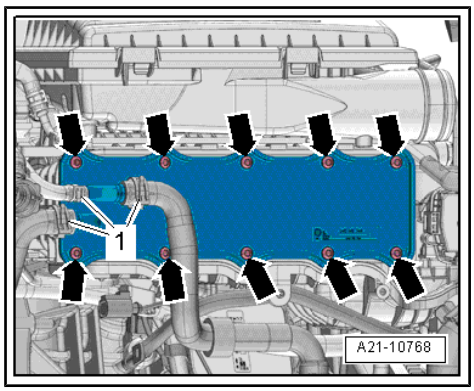
– Fit sealing strip -1- in -direction of the arrow- to the charge air cooler -2-.
– Insert new gasket into the groove at the intake manifold.



– Tighten screws -arrows- from centre to outside crosswise.
– Attach hose clamps -1-.

Tightening torques:

- Charge-air system ⇒ page 205
- ⇒ Heating, Air conditioning; Rep. gr. 87



Note

If the fins have only minor indentations this does not indicate damage and the radiator, capacitor and charge air cooler must not be replaced.

– Install fan shroud ⇒ page 167 .
– Check coolant level ⇒ page 144 .

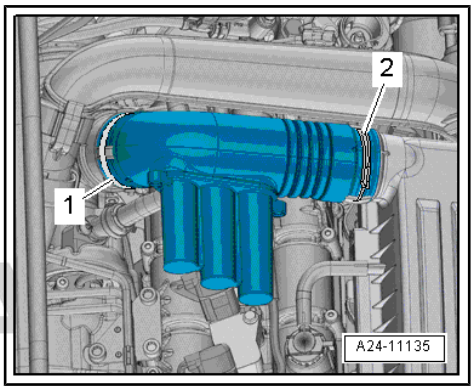
2.4 Checking the charge-air system for leaktightness

Special tools and workshop equipment required

- Tester for charge air systems - V.A.G 1687-

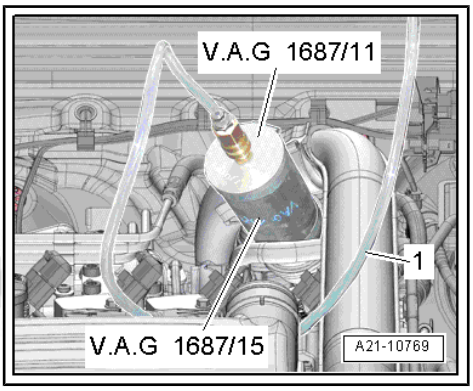
Work procedure

– Loosen hose clamps -1, 2- and remove air guide pipe.



– Connect adapter with - 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.

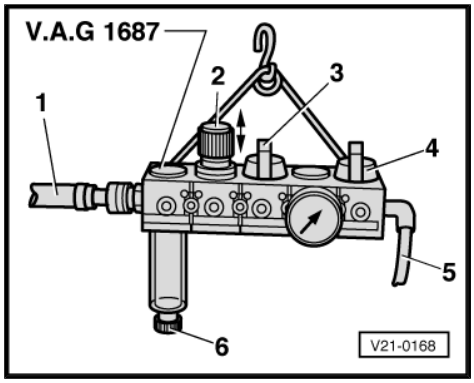


Prepare tester for charge air system - V.A.G 1687- as follows:

– 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 up. If necessary readjust pressure to 0.05 MPa (0.5 bar).

– Listen to, touch or use commercially available leak search spray or the ultrasonic measuring device - V.A.G 1842- to check the charge-air system for leak points.

Note

- *A small amount of air escapes via the valves into the engine. For this reason no holding 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.*

Install

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

• Install air guides ⇒ page 206

Note

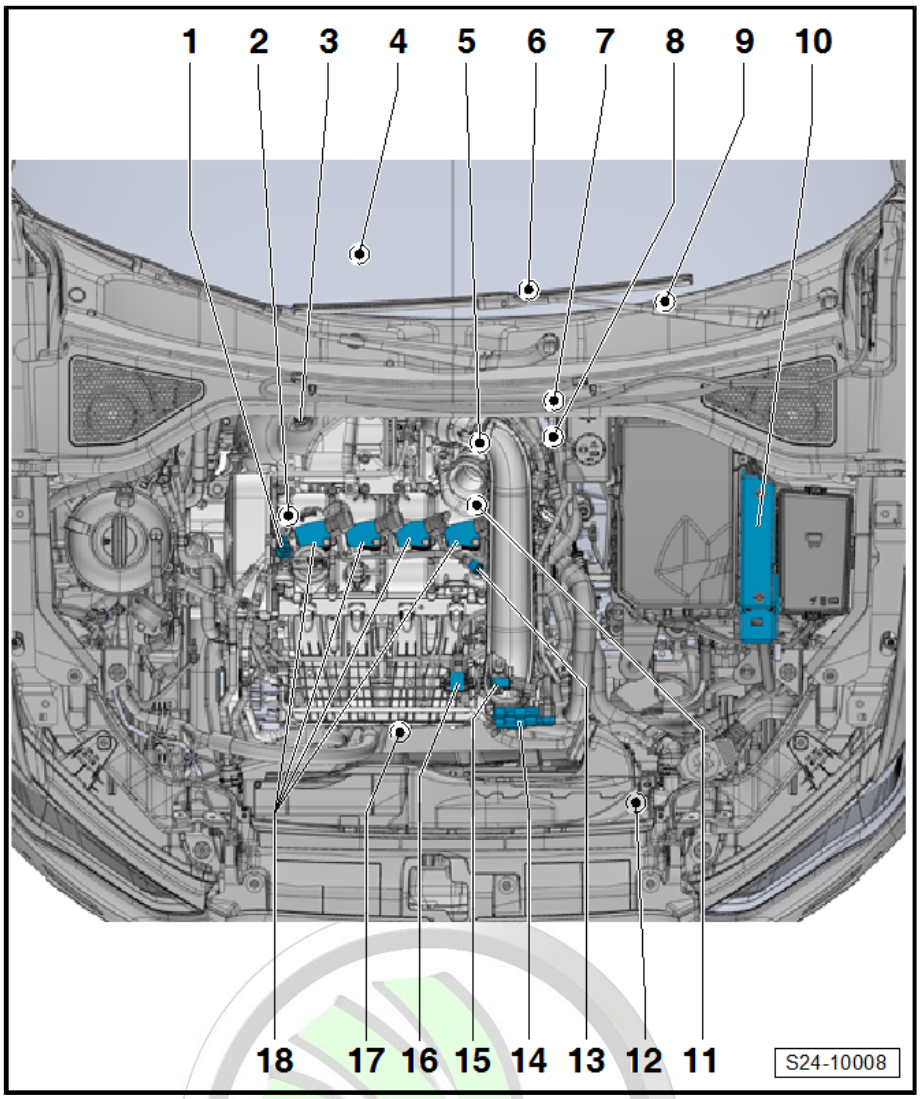
Replace gaskets and O-rings.

24 – Mixture preparation - injection

1 Injection system

1.1 Injection system - Installation location overview

Engine compartment - Installation location overview



1 - Inlet camshaft control valve 1 - N205-

- ❑ removing and installing ⇒ page 110

2 - Camshaft control valve 1 in the exhaust - N318-

- ❑ removing and installing ⇒ page 110

3 - Lambda probe after catalytic converter - G130-

- ❑ removing and installing ⇒ page 237

4 - Lambda probe - G39-

- ❑ removing and installing ⇒ page 237

5 - Charge pressure regulator - V465-

- ❑ removing and installing ⇒ page 204

6 - Accelerator pedal position sender - G79- with accelerator pedal position sender 2 - G185-

- ❑ removing and installing ⇒ page 192

7 - Pressure sensor for the brake servo unit - G608-

8 - Brake light switch - F- with Brake pedal switch - F63-

9 - Clutch position sender - G476-

- ❑ for vehicles with manual gearbox

10 - Engine control unit - J623-

- ❑ removing and installing ⇒ page 238

11 - Hall sender 3 - G300-

- ❑ removing and installing ⇒ page 254

12 - Coolant temperature sender at radiator outlet - G83-

- ❑ removing and installing ⇒ page 159

13 - Hall sender - G40-

- ❑ removing and installing ⇒ page 253

14 - Throttle valve module - J338-

- ❑ with throttle valve drive - G186- , throttle valve drive angle sender 1 - G187- and throttle valve drive angle sender 2 - G188- .
- ❑ removing and installing ⇒ page 220

15 - Charge pressure sender - G31- with intake air temperature sender 2 - G299-

- ❑ removing and installing ⇒ page 207

16 - Intake air temperature sender - G42- with manifold pressure sender - G71-

- ❑ removing and installing ⇒ page 230

17 - Coolant recirculation pump - V51-

- ❑ removing and installing ⇒ page 157

18 - 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-
  - ❑ removing and installing ⇒ page 252

Engine from left - Installation location overview

1 - Knock sensor 1 - G61-

- ❑ Summary of components ⇒ page 251

2 - Oil pressure switch for reduced oil pressure - F378-

- ❑ Summary of components ⇒ page 136

3 - Fuel pressure sender - G247-

- ❑ Summary of components ⇒ page 223

4 - Activated charcoal filter solenoid valve 1 - N80-

5 - Injectors

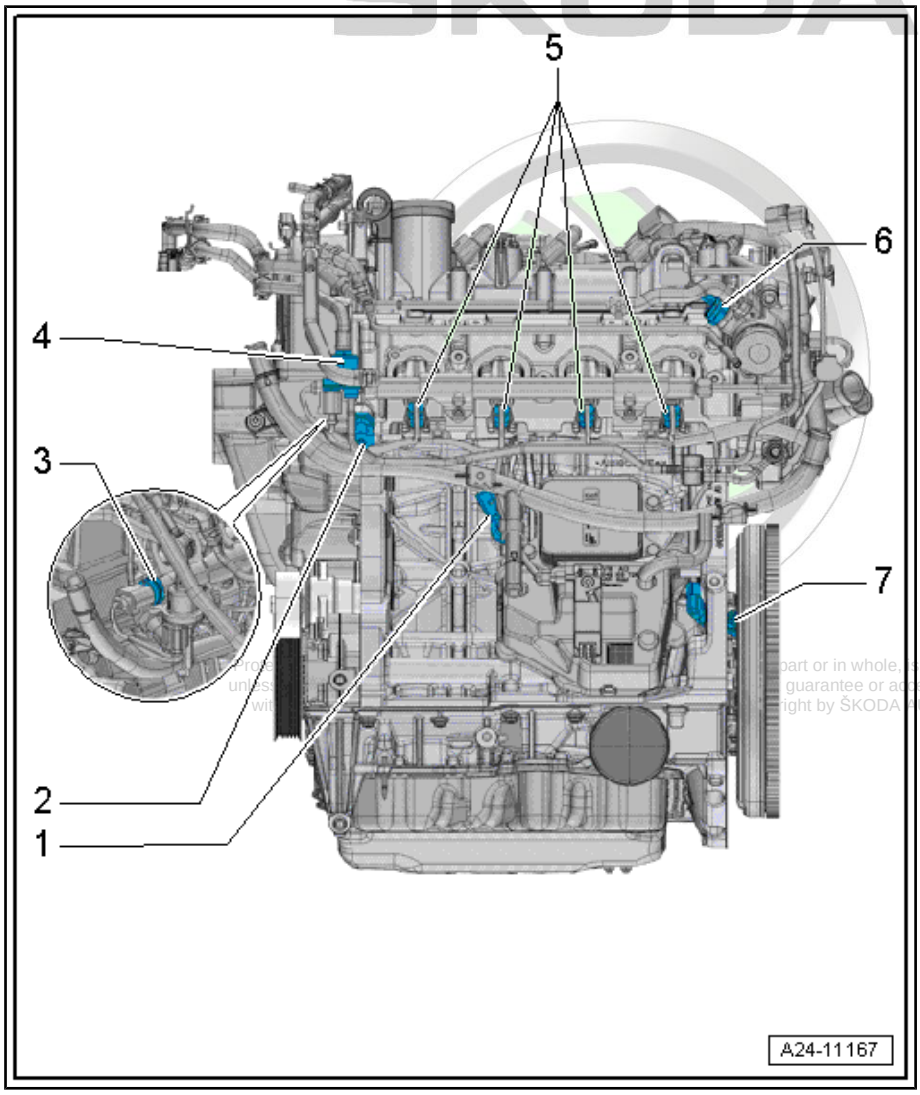
- ♦ Injector, cylinder 1 - N30-
- ♦ Injector, cylinder 2 - N31-
- ♦ Injector, cylinder 3 - N32-
- ♦ Injector, cylinder 4 - N33-
  - ❑ Summary of components ⇒ page 223

6 - Control valve for fuel pressure - N276-

- ❑ on the high pressure pump
- ❑ Summary of components ⇒ page 233

7 - Engine speed sender - G28-

- ❑ Summary of compo-



nents ⇒ page 251

Engine from right - Installation location overview

1 - Oil level and oil temperature sender - G266-

- ❑ removing and installing ⇒ page 123

2 - Coolant temperature sender - G62-

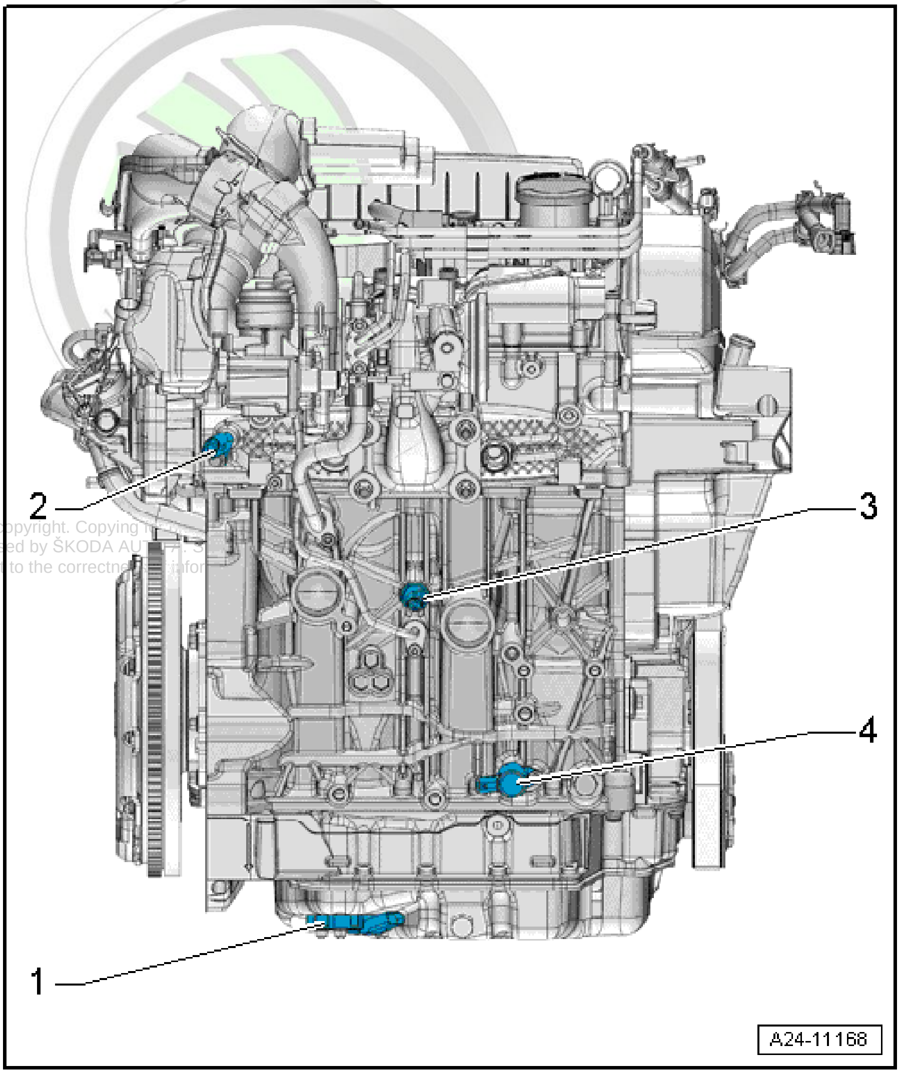
- ❑ removing and installing ⇒ page 158

3 - Oil pressure switch - F22-

- ❑ removing and installing ⇒ page 135

4 - Oil pressure control valve - N428-

- ❑ removing and installing ⇒ page 137



2 Air filter

2.1 Air filter housing - Summary of components

1 - Air guide lower part
- ❑ on the lock support

2 - air guide pipe top
- ❑ on the lock support

3 - Cover
- ❑ for air guide

4 - 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 bush

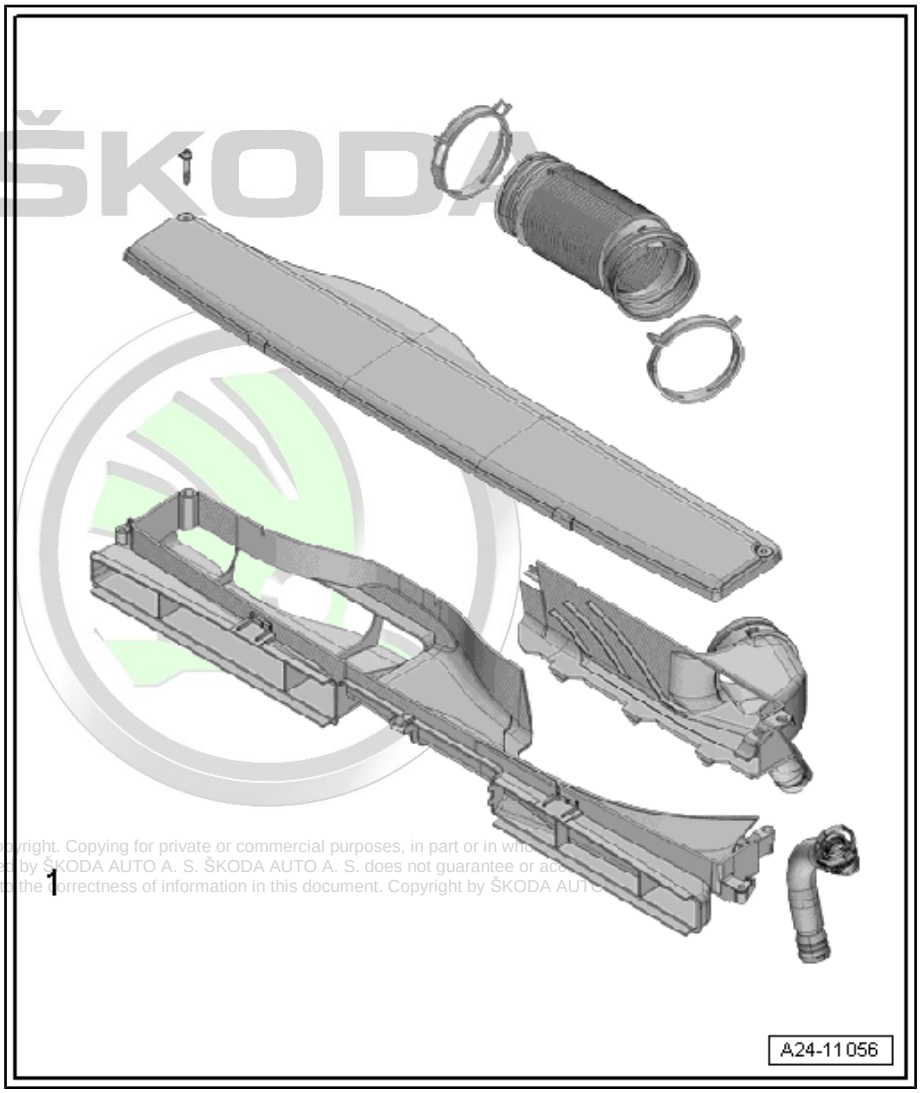
11 - 2 Nm

12 - Air guide hose

13 - O-ring
- ❑ replace if damaged

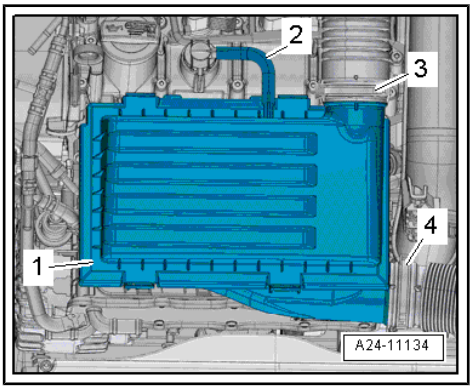
14 - Water drain hose
- ❑ clean

15 - 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, 4- and remove air guides.

Install

• Tightening torque ⇒ page 214 .

Note

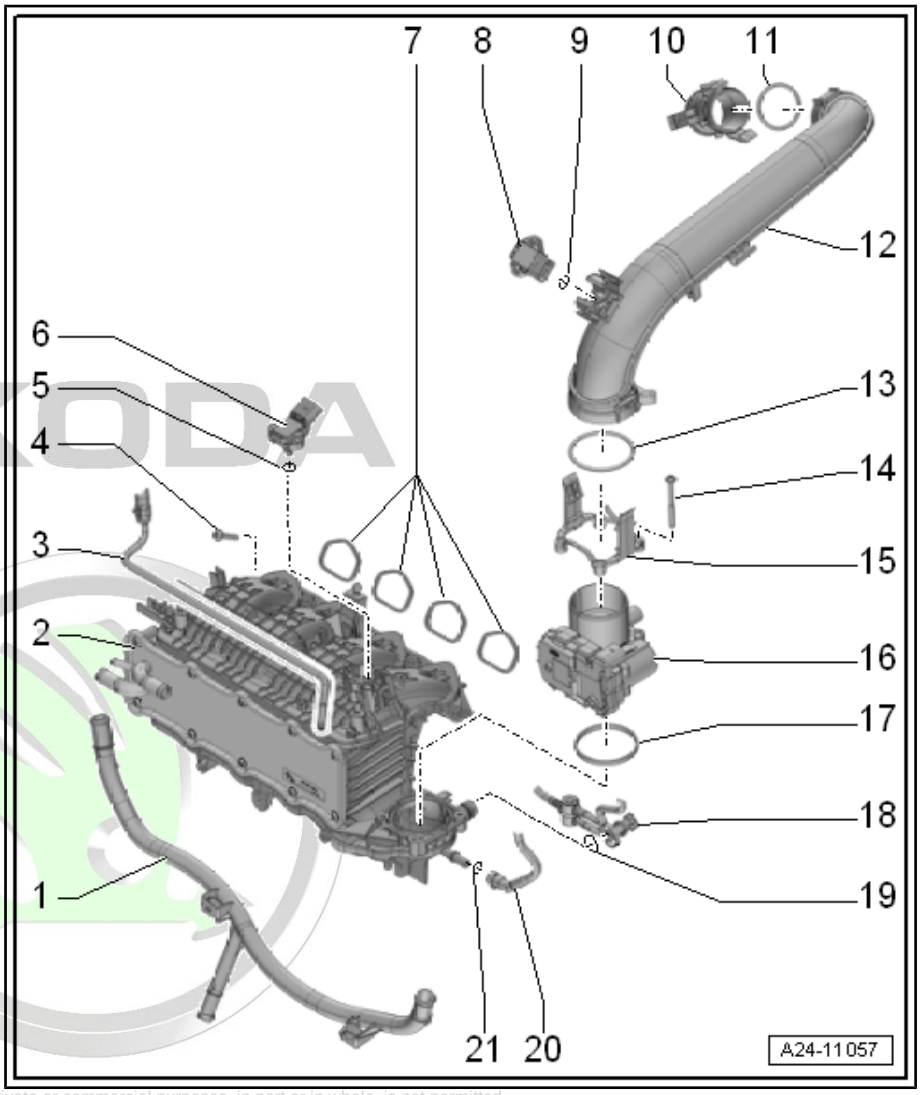
- *If the air filter is heavily soiled or wet, dirt particles or moisture can enter components and distort the measured values. This leads to loss of power as a smaller injection quantity is calculated.*
- *It is imperative for the air filter housing to be clean.*
- *Hose connections and air guide pipes 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 connection ends with spring-type clips that comply with the series design ⇒ ETKA - Electronic Catalogue of Original Parts .*
- *When blowing out the air filter housing using compressed, cover critical air-carrying components such as air ducts, etc. with a clean cloth. This will prevent any malfunctions.*
- *Observe the disposal instructions!*

– 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 Intake manifold - Summary of components



1 - Coolant pipe
- ❑ clipped onto the intake manifold

2 - Intake manifold
- ❑ Building unit with charge air cooler
- ❑ removing and installing ⇒ page 217

3 - Coolant pipe
- ❑ clipped onto the intake manifold

4 - 8 Nm
- ❑ Tightening torque and tightening order ⇒ page 220

5 - O-ring
- ❑ replace

6 - Intake air temperature sender - G42- with manifold pressure sender - G71-
- ❑ removing and installing ⇒ page 230

7 - Gasket
- ❑ replace

8 - Charge pressure sender - G31- with intake air temperature sender 2 - G299-
- ❑ removing and installing ⇒ page 207

9 - O-ring
- ❑ replace

10 - Inlet connections

11 - O-ring
- ❑ replace

12 - Air guide pipe

13 - O-ring
- ❑ replace

14 - 7 Nm
- ❑ thread forming
- ❑ position and screw in by to allow the screw to find the old thread, then tighten the screw to the torque

15 - Retaining clip
- ❑ For air guide pipe

16 - Throttle valve module - J338-
- ❑ removing and installing ⇒ page 220

❑ Clean ⇒ page 221

❑ After replacing the throttle valve control unit - J338- , this part must be re-adapted to the engine control unit - J623- . ⇒ Vehicle diagnostic tester

17 - Sealing ring

❑ replace

18 - Vacuum line

19 - O-ring

❑ replace

20 - Vacuum line

21 - O-ring

❑ replace

3.2 Removing and installing intake manifold

Removing

Special tools and workshop equipment required

- Hose clamps up to 25 mm - MP7-602 (3094)-
- Pliers for spring strap clamps -VAS 6362-
- Release tool -T10527-

– Remove air filter housing ⇒ page 215 .

– Remove the sound dampening system ⇒ Body Work; Rep. gr. 66 .

WARNING

Risk of injury from fuel.

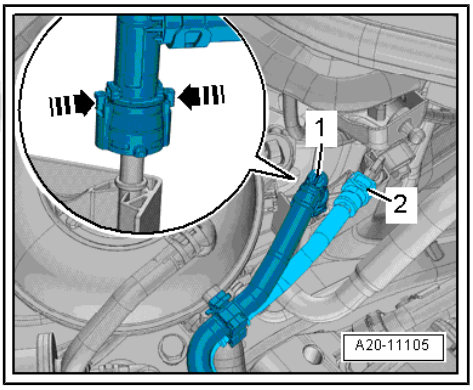
- *To relieve the fuel pressure, place a clean cloth around the connection point and loosen the connection point carefully before opening the fuel system.*

Caution

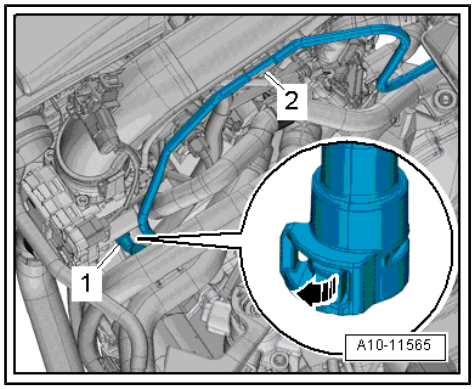
Risk of malfunctions caused by soiling.

- *Safety precautions when working on fuel supply system ⇒ page 3*

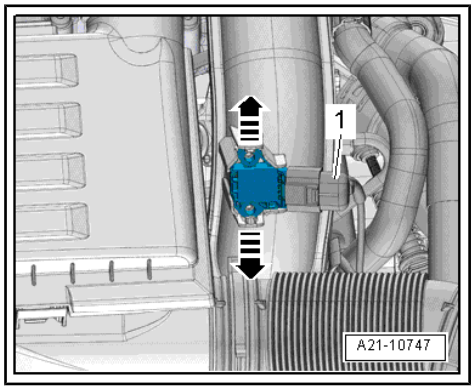
– Remove the fuel feed line -1- and the cable to the activated charcoal filter -2- ⇒ page 188 .



– 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.



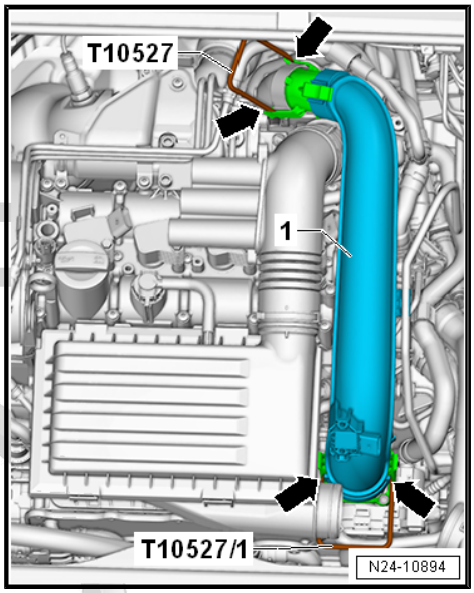
– Unplug connector -1-.



Note

-Ignore arrows-.

– Release latches -arrows- with release tool -T10527- and remove air guide pipe.



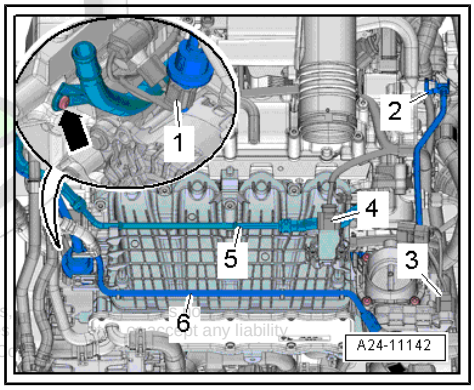
– Disconnect the plug connections:

1 - For solenoid valve 1 for activated charcoal filter - N80-

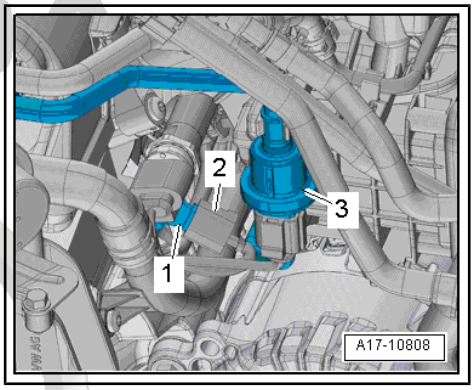
3 - for throttle valve control unit - J338-

4 - For intake manifold pressure sender - G71-

– Unscrew plug -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.



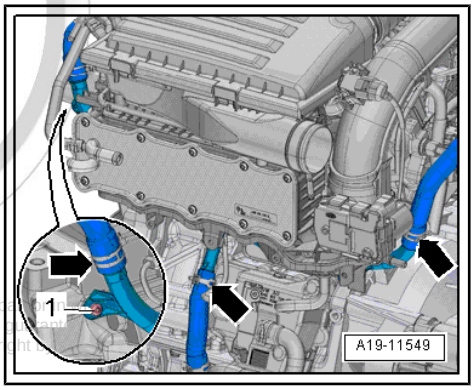
– Remove connector -2- from the oil pressure switch for reduced oil pressure - F378- -1-.



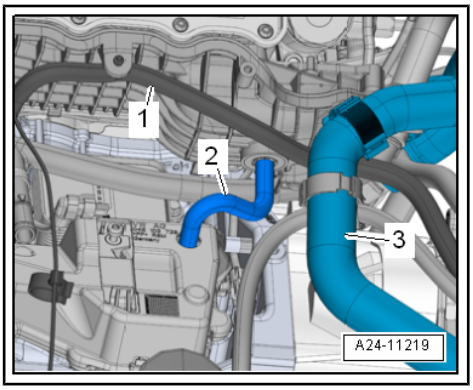
– Unscrew screw -1- and disconnect coolant hose with hose clamps up to 25 mm - MP7-602 (3094)- .
– Loosen hose clamps -arrows- and remove coolant hoses.

Note

Place a cloth below to absorb leaking coolant.

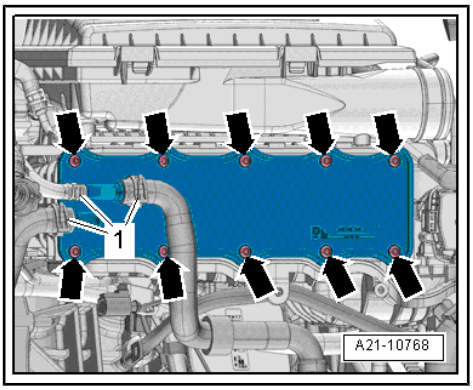


– Remove wire harness -1-, coolant hose -3- crankcase ventilation hose -2- from intake manifold.
– Remove bolts -arrows-.

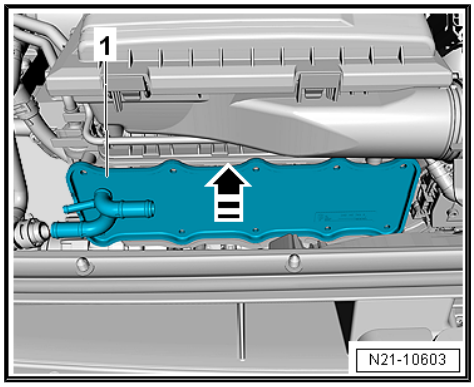


Note

Do not pay attention to the position -1-.



– Pull charge air cooler -1- backwards and forwards simultaneously in -direction of the arrow- out of the intake manifold.
– Swivel charge air cooler to one side.
– Remove bolts -arrows-.



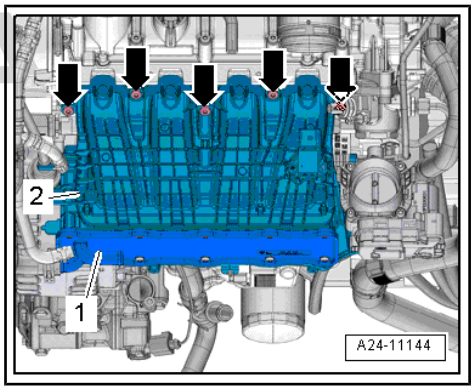
Note

Do not pay attention to the position -1-.

– Remove intake manifold -2-.

Install

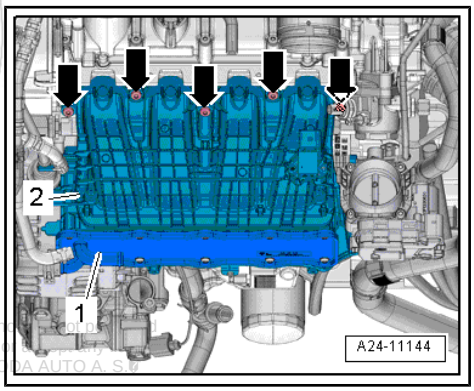
Installation is performed in a similar way in the reverse order. Pay attention to the following points:



Intake manifold - tightening torque and tightening order

– Tighten screws gradually as follows:

Stage	Screws	Tightening torque
1.	-Arrows-	Insert in the centre, starting alternately, by hand as far as the stop
2.	-Arrows-	In the centre, starting alternately, 8 Nm



Note

Replace gaskets and O-rings.

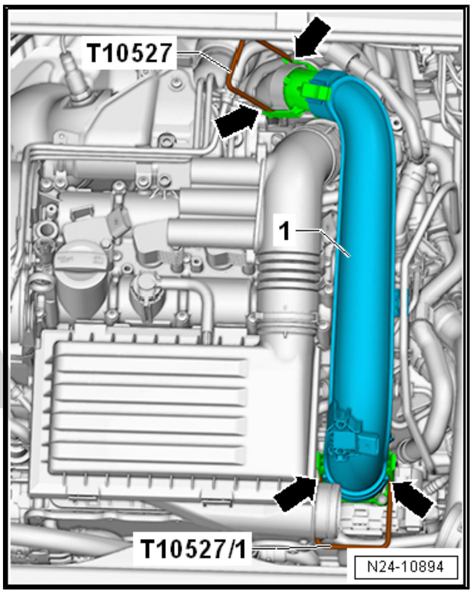
– Install the noise insulation ⇒ Body Work; Rep. gr. 66 .
– Install air filter housing ⇒ page 215 .

3.3 Removing and installing the throttle valve control unit - J338-

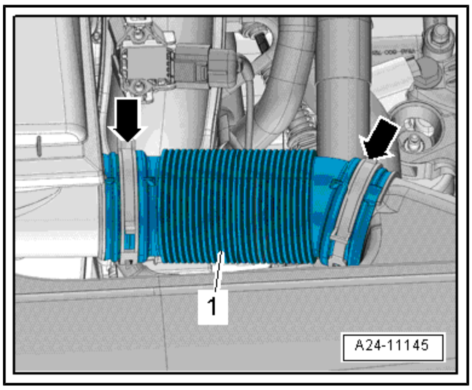
Removing

– Expose air guide hoses at the charge air pipe.

– Release latches -arrows- with release tool -T10527- and remove air guide pipe.

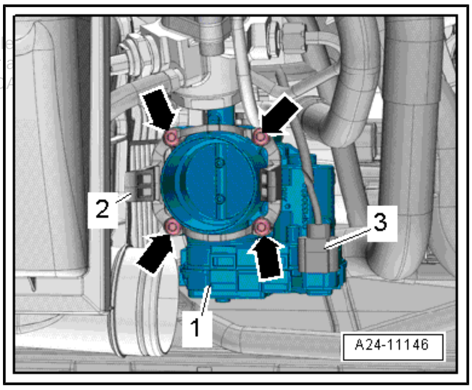


– Loosen hose clamps -arrows- and remove air guide -1-.



– Unplug connector -3-.

– Unscrew the screws -arrows- and remove throttle valve control unit - J338- -1- with adapter -2-.



Install

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

– Clean the original throttle valve control unit - J338- before re-installation ⇒ page 221 .

• Tightening torques ⇒ page 216 .

– After replacing the throttle valve control unit - J338- , this part must be re-adapted to the engine control unit - J623- ⇒ Vehicle diagnostic tester.

3.4 Clean throttle valve control unit - J338-

Note

♦ *If a new engine control unit - J623- is installed the throttle valve module must be adjusted.*

♦ *Soiling and carbonisation in the limit stop can lead to incorrect adjustment values.*

♦ *When cleaning the throttle valve housing it must not be scratched.*

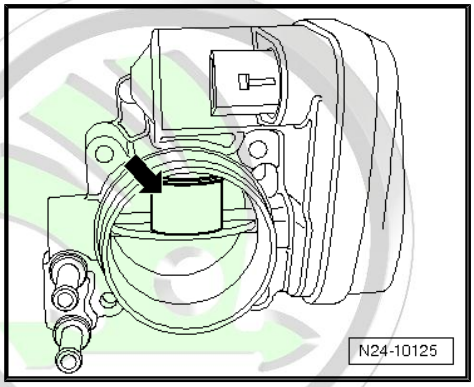
Special tools and workshop equipment required

- Commercially available Acetone
- Paint brush

Work procedure

– Remove throttle valve module - J338- ⇒ page 220 .

– Open throttle valve by hand and lock in open position using wood or a plastic wedge -arrow-.

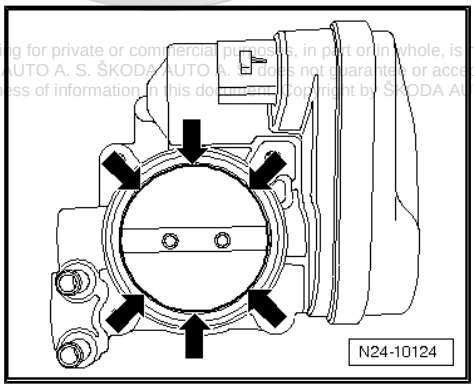


WARNING

Acetone is highly inflammable.

- *Accident prevention regulations and the safety instructions must be observed when handling easily inflammable fluids.*
- *Do not use compressed air when 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.

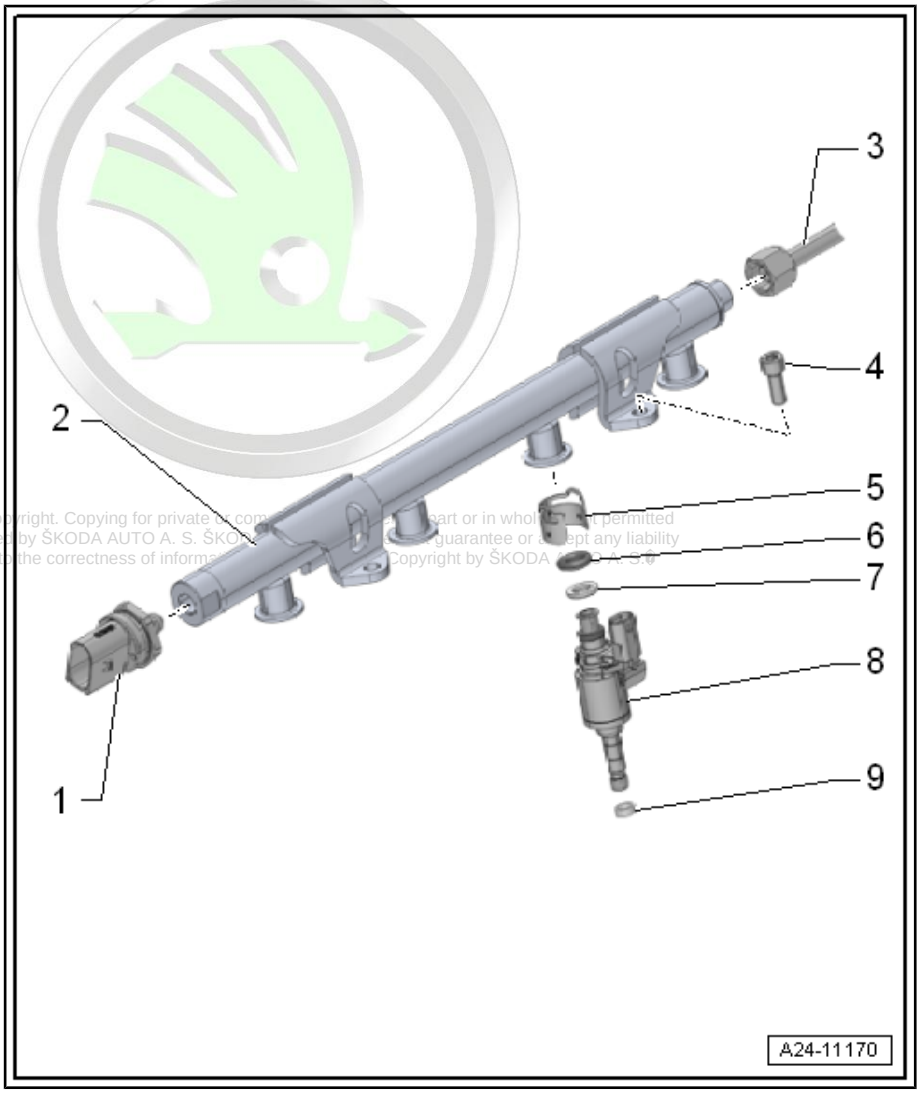
– Allow Acetone to dry off completely.

– Install throttle valve module - J338- ⇒ page 220 .

– Erase initialisation values and adapt the engine control unit - J623- to the throttle valve control unit - J338- ⇒ Vehicle diagnostic tester.

4 Injectors

4.1 Fuel rail with injection valves - Summary of components



1 - Fuel pressure sender - G247- , 22 Nm

- ❑ check ⇒ page 230
- ❑ removing and installing ⇒ page 230
- ❑ Moisten the cone with clean engine oil; the thread must not be oiled

2 - Fuel distributor

- ❑ removing and installing ⇒ page 224

3 - High pressure pipe, 25 Nm

> **WARNING**
> *Fuel under very high pressure creates a risk of injury.*
> *Before opening the high-pressure area of the injection system, the fuel pressure must be reduced to residual pressure ⇒ page 4 .*

- ❑ Connections must not be damaged
- ❑ do not change bending form
- ❑ removing and installing ⇒ page 235

4 - 9 Nm

- ❑ removing and installing ⇒ page 224

5 - Support ring

- ❑ replace
- ❑ the fuel distributor exerts force via the support ring that holds the injector in the cylinder head
- ❑ Connected to valve -Pos. 8-

6 - O-ring

- ❑ replace
- ❑ Moisten with engine oil

7 - Distance ring

- ❑ replace if damaged

8 - Injector

- ❑ removing and installing ⇒ page 224

9 - Combustion chamber sealing ring

- ❑ Do not grease or treat using any other lubricant
- ❑ replace ⇒ page 224

4.2 Removing and installing the fuel distributor

Removing

WARNING

Fuel under very high pressure creates a risk of injury.

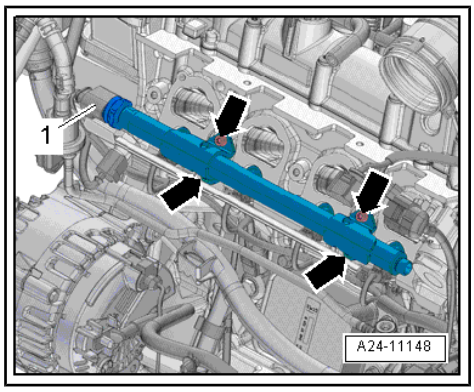
- *Before opening the high-pressure area of the injection system, the fuel pressure must be reduced to residual pressure ⇒ page 4 .*

Caution

Risk of malfunctions caused by soiling.

- *⇒ page 3*

– Removing the intake manifold ⇒ page 217 .
– Remove high pressure pipe ⇒ page 235 .
– Unplug connector -1-.



Note

Place a cloth below to absorb leaking fuel.

– Release the screws -arrows-, disconnect fuel distributor from the injection valves.

Install

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

- Tightening torques ⇒ page 223 .

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 two turns.
– Tighten screws crosswise uniformly.
– Install high pressure pipe ⇒ page 235 .
– Installing the intake manifold ⇒ page 217 .

4.3 Removing and installing injectors

Special tools and workshop equipment required

- Pulling device - T10133- with removal tool - T10133/16A- and with extractor - T10133/19-

Removing

Caution

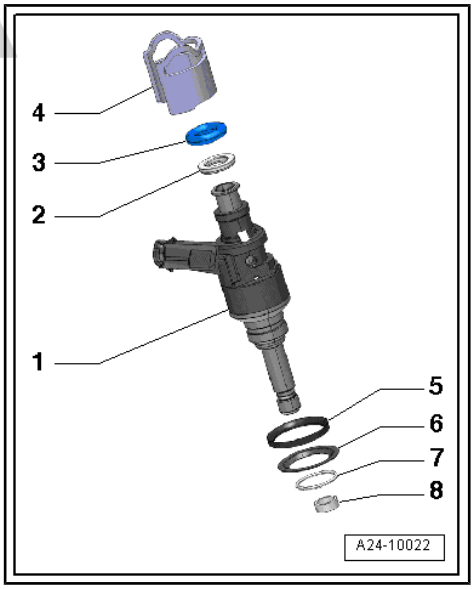
Risk of malfunctions caused by soiling.

- *⇒ page 3*

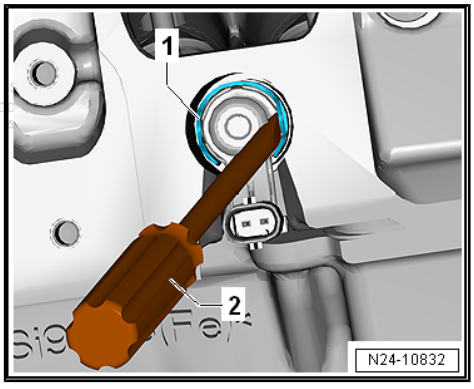
Note

Injectors must not be removed while the engine is cold.

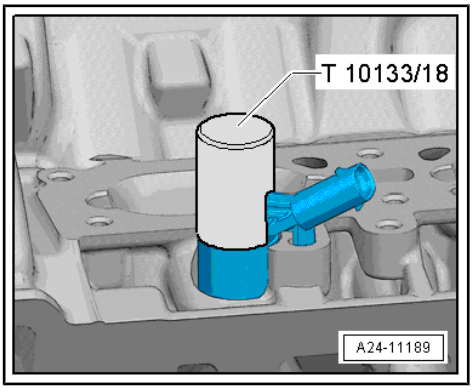
– Removing the intake manifold ⇒ page 217 .
– Remove fuel distributor ⇒ page 224 .
– Remove O-ring -3- from injector -1-.
– Disconnect the plug connections from affected injector.



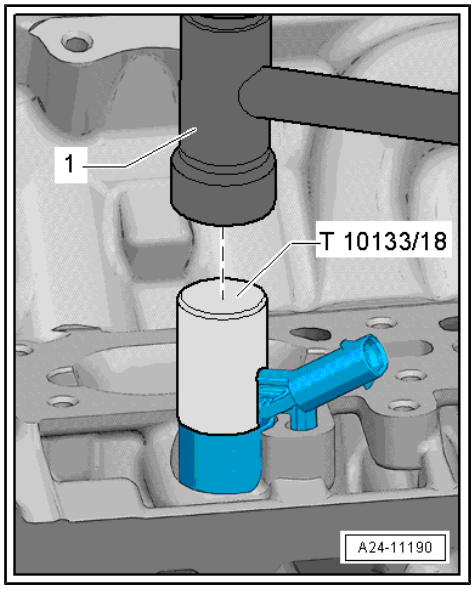
– Lever off caps -1- from injector using a screwdriver -2-.



– Push impact sleeve -T10133/18- over the injector.



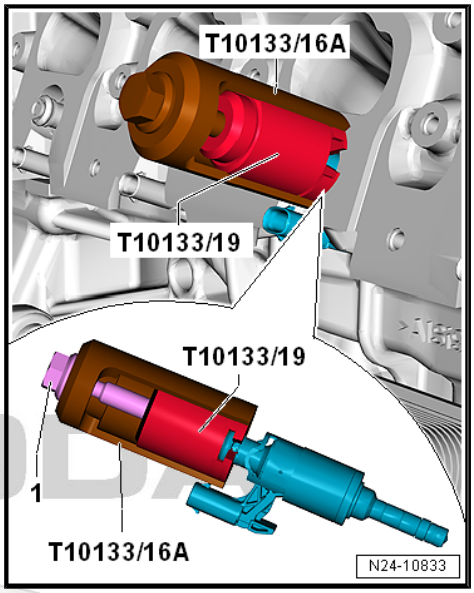
– Gently apply a few knocks to the impact sleeve to loosen the injector.



Note

- *Use a torque wrench to pull out the injector.*
- *Set 5 Nm on the torque wrench.*

– Insert extractor -T10133/19- into the groove at 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« is reached without the injector loosening, remove the extractor and begin to loosen the injector again using the impact sleeve.
– Repeat the procedure for each injector.



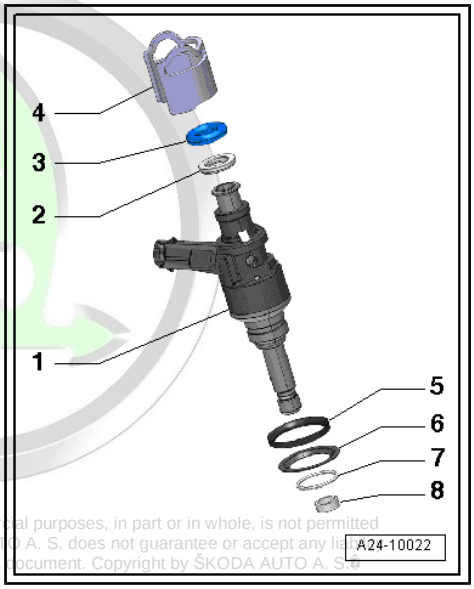
Note

- *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 -4- and distance ring -2- off the injector -1-.
– Remove circlip -7-, top sealing disc -5- and bottom sealing disc -6-.
– Carefully remove old combustion chamber sealing ring -8-. To do so, cut off the ring using a knife or enlarge the ring using a small screwdriver and pull it off forwards.

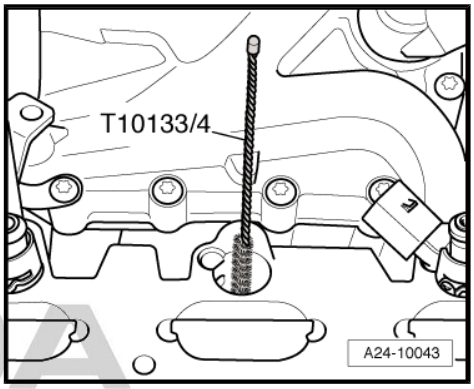


Note

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- .

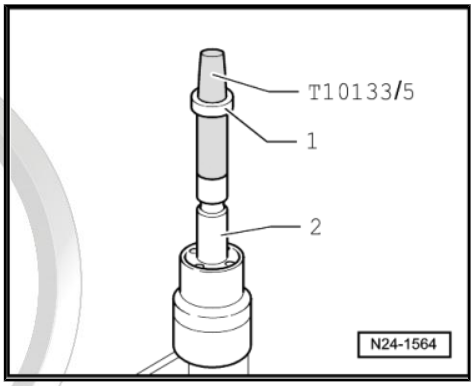


Note

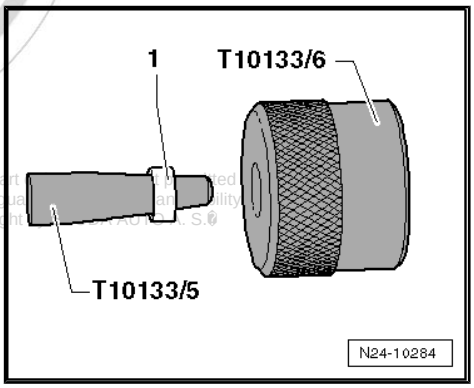
- *Replace combustion chamber sealing ring and O-ring.*
- *Replace distance ring if it is damaged.*

– When reinstalling an injector, clean combustion residues from the groove for the combustion chamber sealing ring and injector shaft using a clean cloth clean.

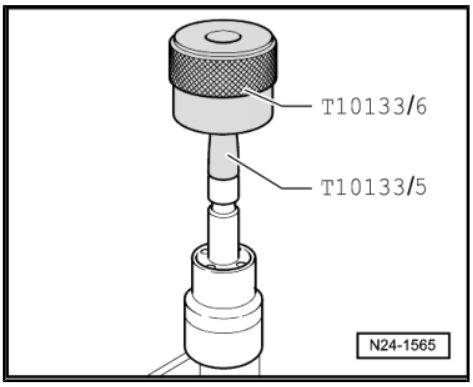
– Fit assembly cone -T10133/5- with the new combustion chamber sealing ring -1- onto the injector -2-.



– Push combustion chamber sealing ring with assembly sleeve -T10133/6- as far as possible onto the assembly cone - T10133/5- .

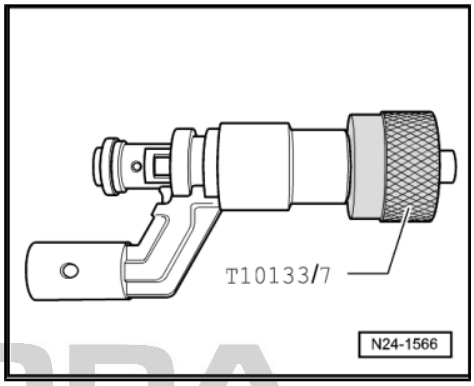


– Turn assembly sleeve -T10133/6- , push combustion chamber sealing ring into the sealing ring groove.

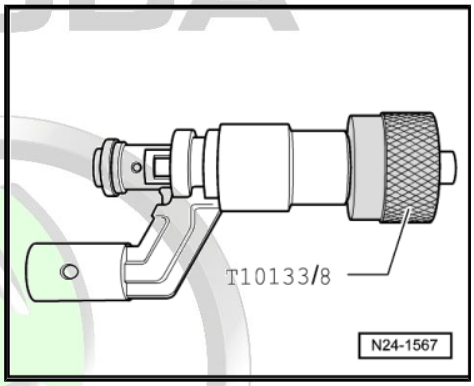


Note

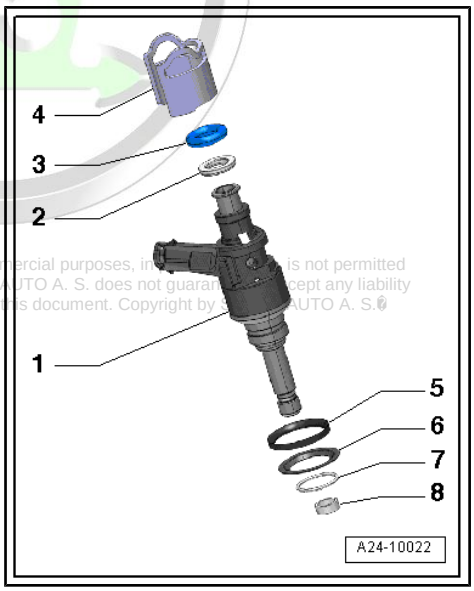
When sliding on the injector the combustion chamber sealing ring is widened. It must therefore be reduced in width again in two steps, as described below.



– 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 -4- and distance ring -2- onto the injector -1-.



– Before installing injector -1-, moisten new O-ring -3- with clean engine oil.

Note

The combustion chamber sealing ring -8- must not be oiled.

– Press the injectors into the cylinder head bore (free of oil and grease) by hand up to the stop. 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.

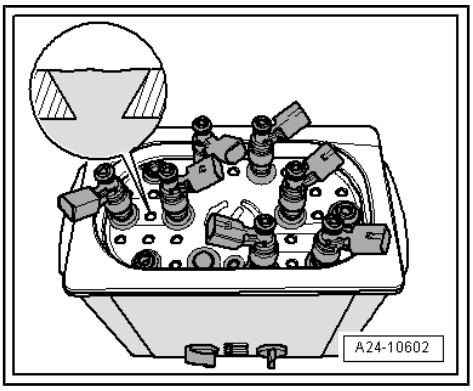
– Install fuel distributor ⇒ page 224 .
– Installing the intake manifold ⇒ page 217 .
– Connect vehicle diagnosis tester and perform Targeted Function “delete injector adaption values”.
– Switch off ignition.

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 ⇒ ETKA - Electronic Catalogue of Original Parts



Note

- *The ultrasound device must be filled with cleaning agent up to the top of the holes (see inset).*
- *Observe the safety and operating instructions of the ultrasound device.*

Clean

– Remove injection valves ⇒ page 224 .

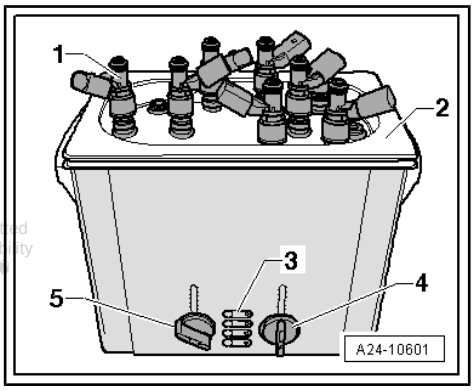
– Push injectors -1- into the feeder plate for injection units - VAS 6418/1- -2-.

– 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 ⇒ page 224 .

5 Senders and sensors

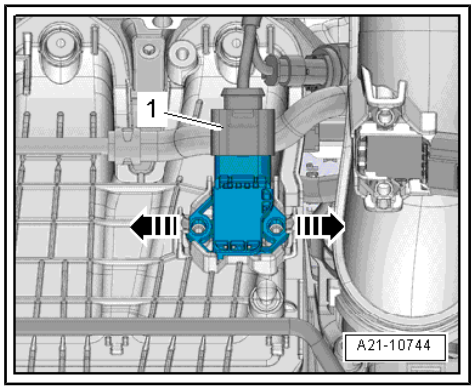
5.1 Removing and installing intake air temperature sender - G42- with intake air temperature sender - G71-

Removing

– Remove air filter housing ⇒ page 215 .

– Unplug connector -1-.

– Release catches -arrows - and charge pressure sender - G31- with intake air temperature sender - G42- .



Install

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

Note

Renew O-ring.

– Install air filter housing ⇒ page 215 .

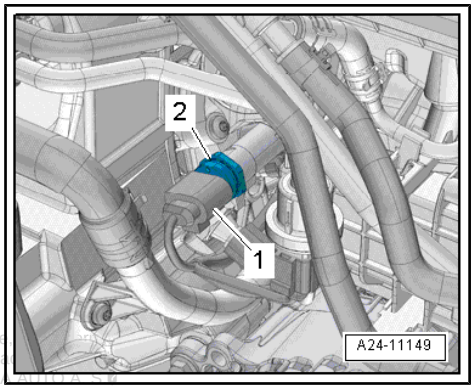
5.2 Removing and installing fuel pressure sender - G247-

Special tools and workshop equipment required

- Assembly tool - T10118-
- Socket insert SW 27 - T40218- or commercially available socket insert

Removing

– Unplug connector -1-.



Note

Place a cloth below to absorb leaking fuel.

– Unscrew the fuel pressure sender - G247- -2- with the socket insert SW 27 - T40218- .

Install

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

- Tightening torque ⇒ page 223 .

Note

The thread of the fuel pressure sender must not be moistened.

5.3 Check fuel pressure sender - G247-

Special tools and workshop equipment required

- Adapter for measuring method / DSO (3-pin) - VAS 5570-
- Tester for pressure sensor - VAS 6394-
- Socket insert, elongated, SW 27 mm, commercially available

Work procedure

WARNING

Fuel under very high pressure creates a risk of injury.

- ***Before opening the high-pressure area of the injection system, the fuel pressure must be reduced to residual pressure ⇒ page 4 .***

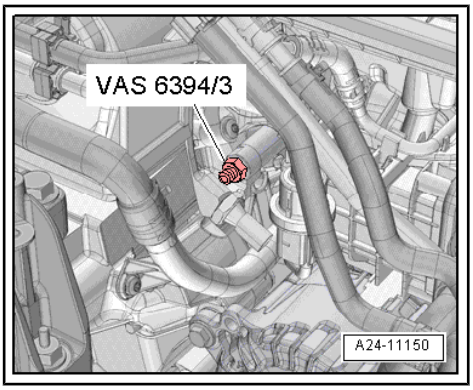
Caution

Risk of malfunctions caused by soiling.

- ***⇒ page 3***

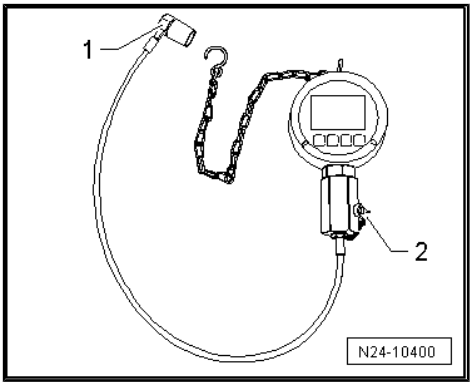
– Remove fuel pressure sender\ - G247- ⇒ page 230 .

– Moisten the sealing cone of the adapter -VAS 6394/3- with clean engine oil and screw it into the fuel distributor with 22 Nm.

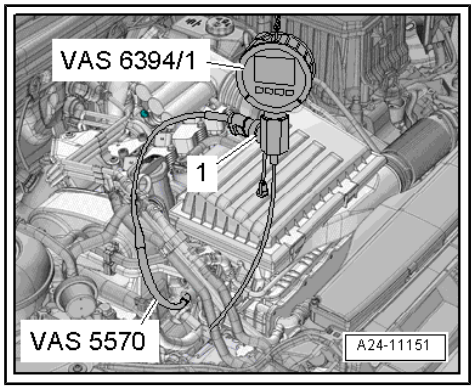


– Release the screw plug -2- and screw the fuel pressure sender - G247- into the tester -VAS 6394/1- .

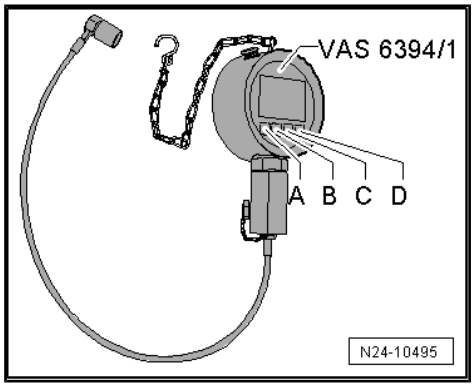
– Connect the pressure line -1- of the tester onto the adapter - VAS 6394/3- .



– 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- is not displaying 0 bar, perform zero point adjustment ⇒ Operating Manual .*

– 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.

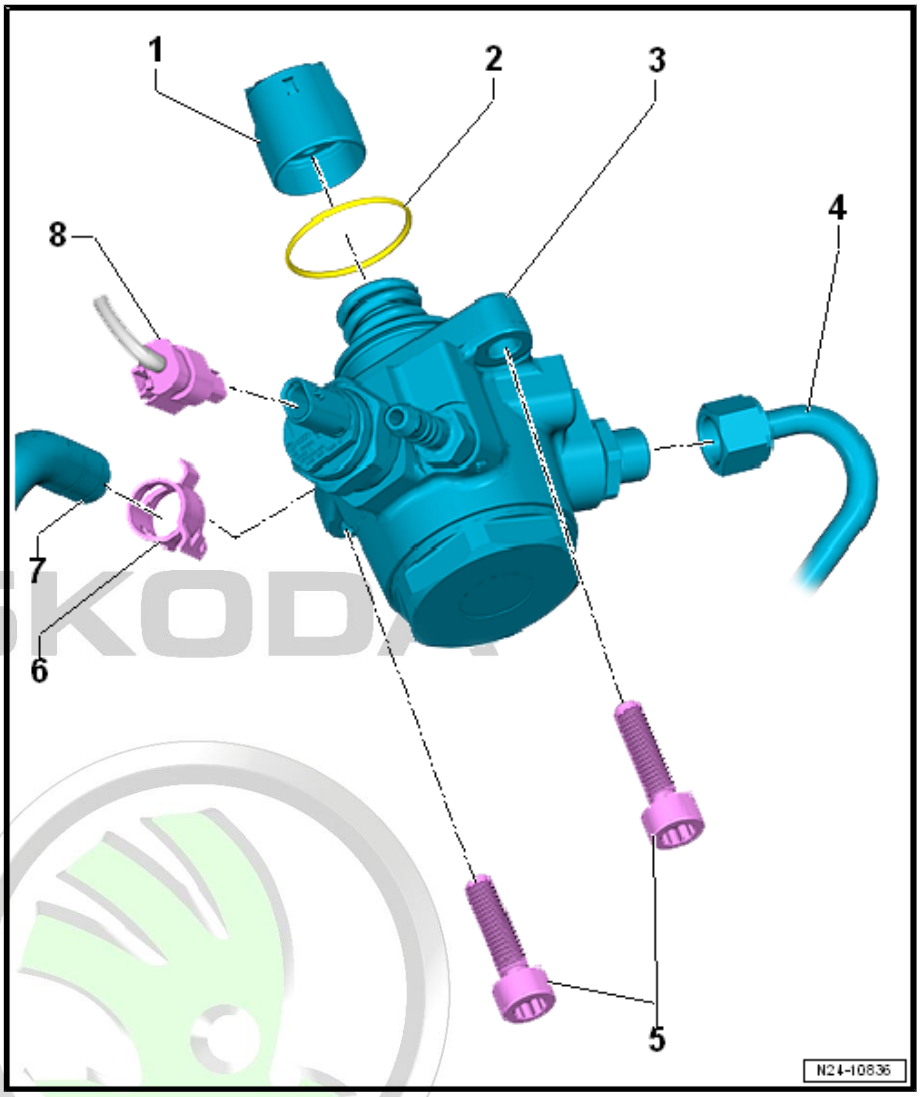
– If the measurements now match, install new fuel pressure sender - G247- .

Tightening torque ⇒ page 223 .

– 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.

6 High pressure pump

6.1 High pressure pump - Summary of components



1 - Roller tappet

- ❑ Moisten with engine oil during installation

2 - O-ring

- ❑ replace
- ❑ Moisten with engine oil during installation

3 - High pressure pump

- ❑ with fuel dosage valve - N290-
- ❑ do not disassemble
- ❑ removing and installing ⇒ page 233

4 - High pressure pipe, 25 Nm

> **WARNING**
> *Risk of injury caused by fuel which is under high pressure.*
> *Before opening the high-pressure area of the injection system, the fuel pressure must be reduced to residual pressure ⇒ page 4 .*

- ❑ removing and installing ⇒ page 235
- ❑ Check for damage before reinstalling
- ❑ do not change bending form
- ❑ Connections must not be damaged
- ❑ Moisten thread of the union nuts with clean engine oil

5 - 20 Nm + torque a further 90° (1/4 turn)

- ❑ replace
- ❑ Tightening torque and tightening order ⇒ page 235

6 - Hose clamp

7 - Fuel feed line

8 - Connector

6.2 Removing and installing the high pressure pump

Removing

- Engine cold.

WARNING

Fuel under very high pressure creates a risk of injury.

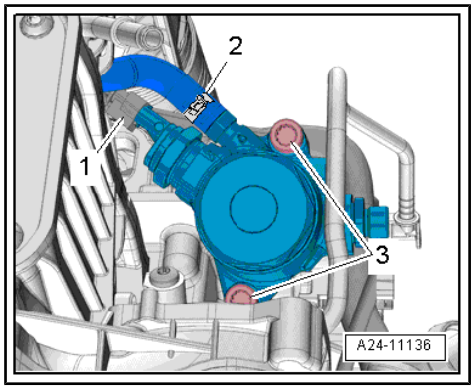
- *Before opening the high-pressure area of the injection system, the fuel pressure must be reduced to residual pressure ⇒ page 4 .*

Caution

Risk of malfunctions caused by soiling.

- *Safety measures ⇒ page 3*

– Remove high pressure pipe ⇒ page 235 .
– Unplug connector -1-.



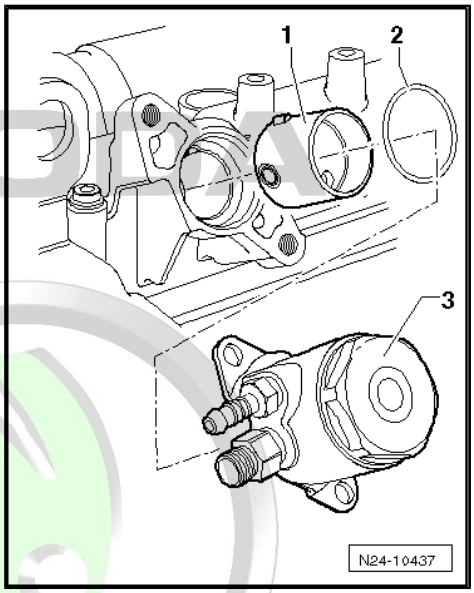
Note

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.

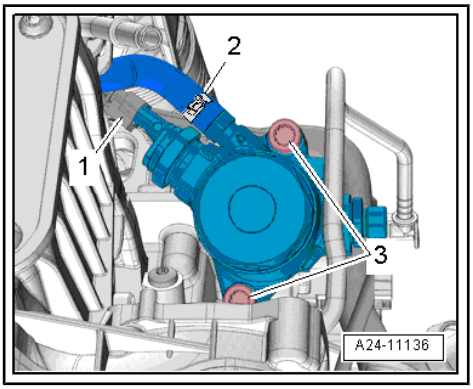


Note

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-.
– Tighten screws until hand-tight.

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 gradually as follows:

Stage	Screws	Tightening torque/torquing angle
1.	-3-	by hand as far as the stop
2.	-3-	Tighten by 1 turn alternately until the flange of the high pressure pump is at the camshaft housing
3.	-3-	20 Nm
4.	-3-	90° (torque a further 90° ($^1/_4$ turn)

– Check the fuel system for tightness.

6.3 Removing and installing high pressure pipe

Removing

– Remove throttle valve module - J338- ⇒ page 220 .

WARNING

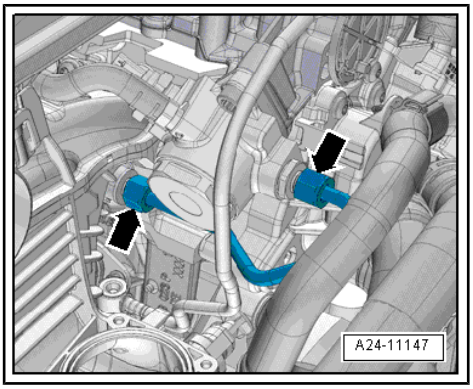
Fuel under very high pressure creates a risk of injury.

- *Before opening the high-pressure area of the injection system, the fuel pressure must be reduced to residual pressure ⇒ page 4 .*

Caution

Risk of malfunctions caused by soiling.

- ⇒ page 3



Note

Place a cloth below to absorb leaking fuel.

– Unscrew union nuts -arrows- and remove high pressure line.

Install

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

• Tightening torques ⇒ page 233 .

– 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 - J338- ⇒ page 220 .

7 Lambda probe

7.1 Lambda probe - Summary of components

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 ⇒ ETKA - Electronic Catalogue of Original Parts .*
- *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 after catalytic converter - G130- , 55 Nm

- ❑ removing and installing ⇒ page 237

2 - Connector

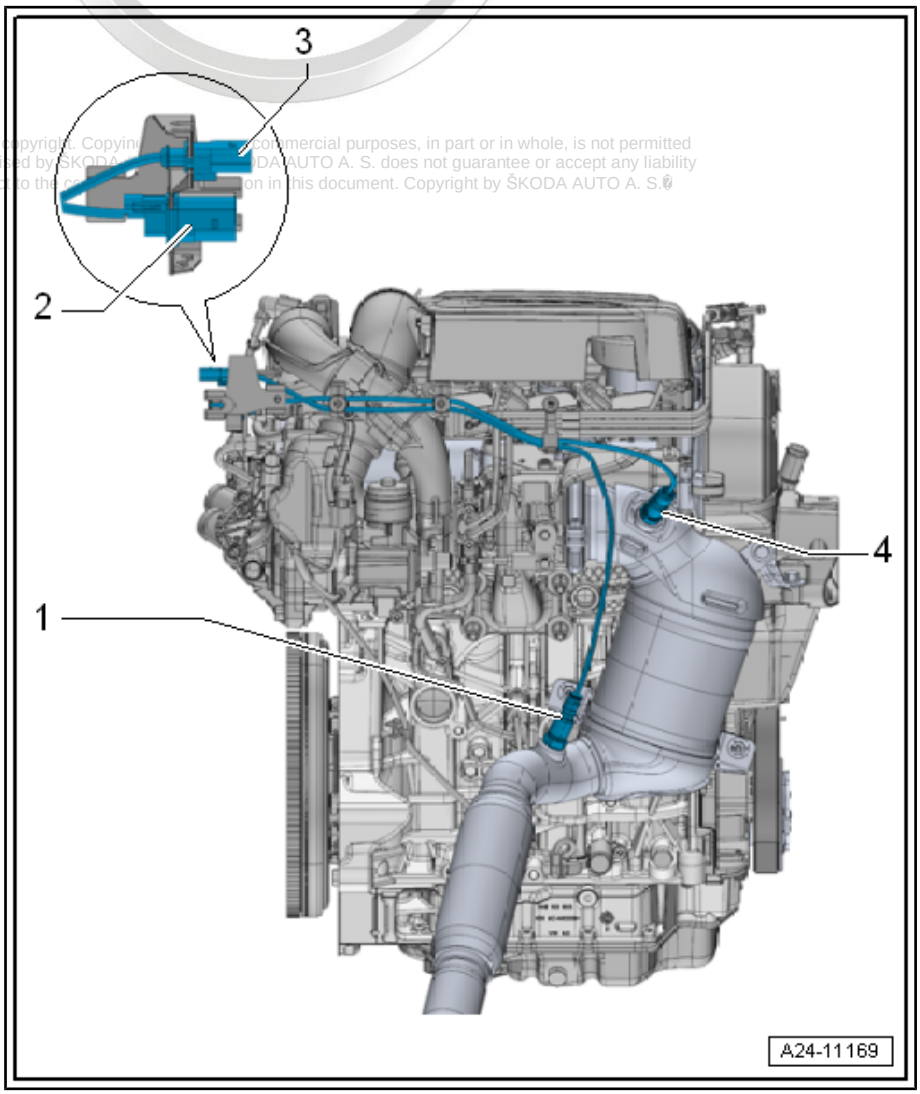
- ❑ for lambda probe downstream of catalytic converter - G130-

3 - Connector

- ❑ for lambda probe - G39-

4 - Lambda probe - G39- , 55 Nm

- ❑ removing and installing ⇒ page 237



7.2 Removing and installing lambda probe - G39- / -G130-

Special tools and workshop equipment required

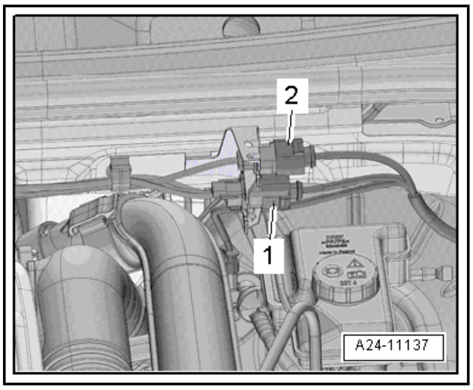
- ♦ Ring spanner set for lambda probe - 3337-

Removing

– Disconnect electrical plug connections:

1 - for lambda probe - G39-

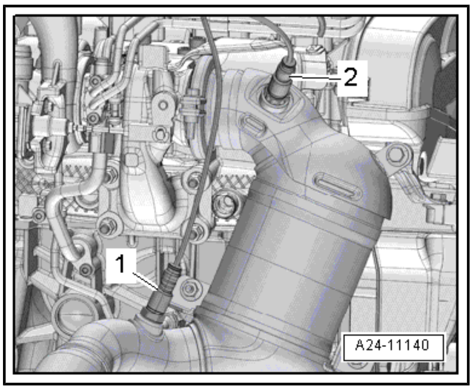
2 - for lambda probe downstream of catalytic converter - G130-



– Unscrew respective lambda probe using a spanner from the lambda probe ring spanner set - 3337- .

1 - Lambda probe after catalytic converter - G130-

2 - Lambda probe - G39-



Install

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

- Tightening torque ⇒ page 236 .

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 ⇒ ETKA - Electronic Catalogue of Original Parts*
- ♦ *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.*

8 Engine control unit

8.1 Removing and installing engine control unit - J623- (without protective housing)

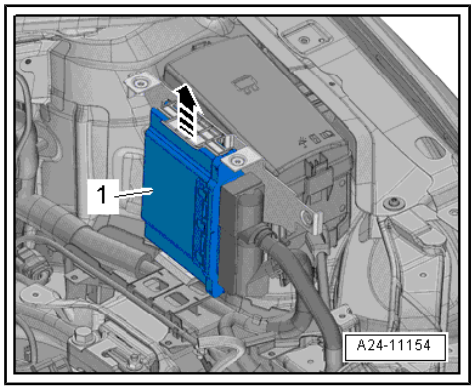
Removing

Note

If the engine control unit is replaced, vehicle diagnosis tester ⇒ Vehicle diagnostic testermust be connected and the function "replace engine control unit" must be carried out.

– Unlock 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.

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 the "Targeted functions" operating mode at "replace engine control unit".

8.2 Removing and installing engine control unit - J623- (with protective housing)

Removing

Special tools and workshop equipment required

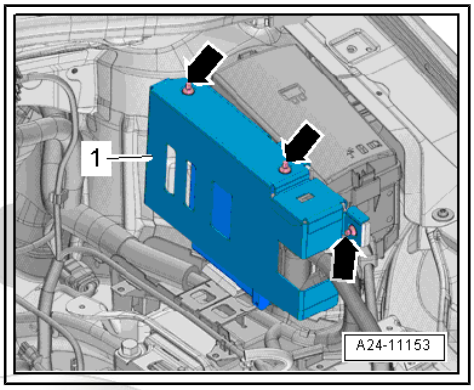
- Hot air blowers - VAS 1978/14A- with push-on nozzle from the wiring harness repair set - VAS 1978 B-
- commercially available miniature grinder

Removing

Note

If the engine control unit is replaced, vehicle diagnosis tester ⇒ Vehicle diagnostic testermust be connected and the function "replace engine control unit" must be carried out.

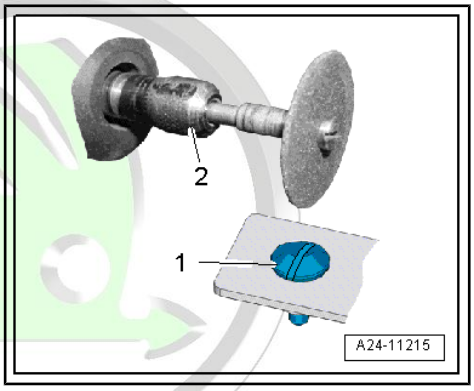
Unscrew shear bolts -arrows- to remove the protective housing -1- as follows:



– In the shear bolt head -1-, using a miniature grinder -2-, make a slot for a screwdriver.

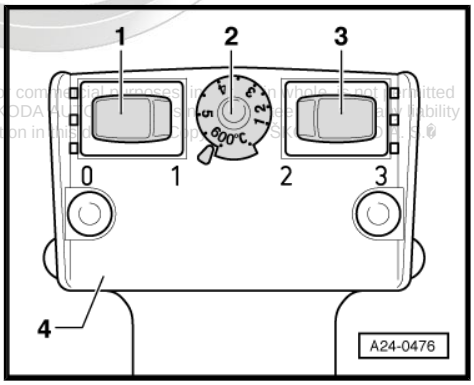
Note

- *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.



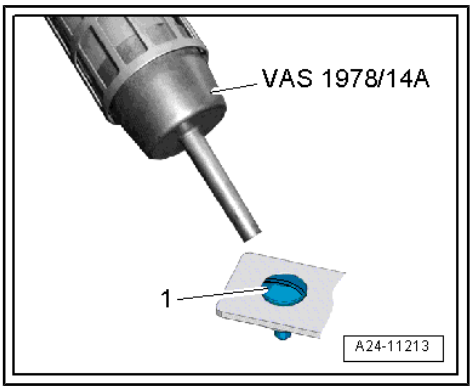
WARNING

Risk of burns from hot air blower.

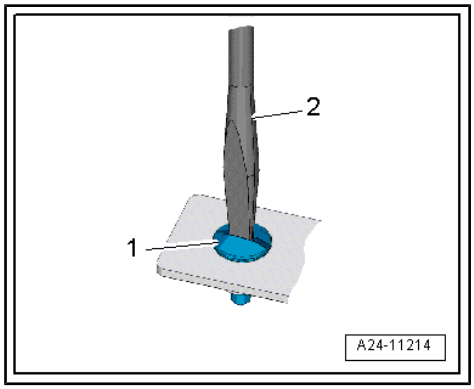
- ***Only warm up the pull-off screws with a hot air blower.***
- ***By warming the pull-off screws, the cover plate and parts in its vicinity are heated up strongly too. Where necessary, protect these parts by a piece of sheet covering.***

– Heat the shear bolt head -1- for approximately 20 to 30 seconds.

Continued for slackened screws:



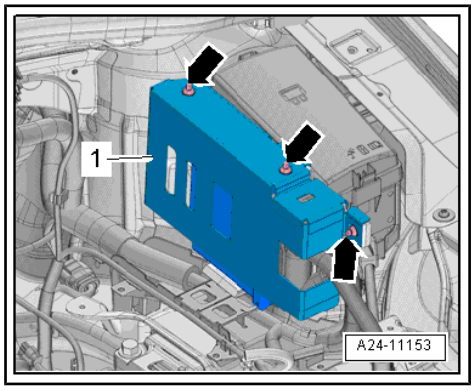
– Release shear bolt -1- using the screwdriver -2-.



– Remove protective housing -1-.

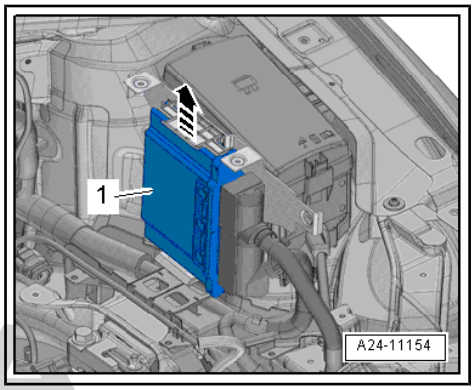
WARNING

If the engine control unit touches the plus pole of the battery, this will destroy it.



– Unlock 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:

– 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 tapper.

– Use new shear bolts.

After installing a new engine control unit, the following work step must be performed:

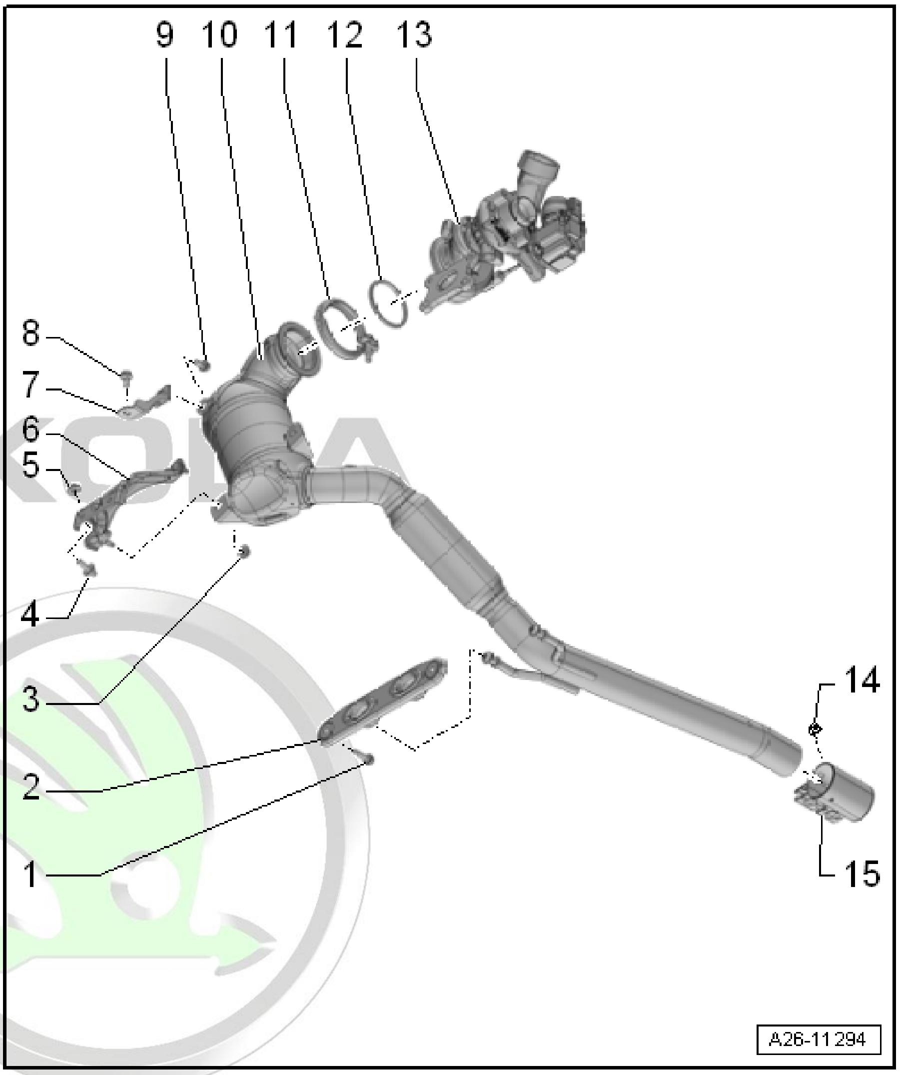
– Connect vehicle diagnosis tester ⇒ Vehicle diagnostic tester.

– Activate the engine control unit in the operating mode “SWM” and “Targeted functions” at “replace engine control unit”.

26 – Exhaust system

1 Removing and installing parts of the exhaust system

1.1 Pre-exhaust pipe with catalytic converter - Summary of components



1 - 20 Nm

2 - Support

- ❑ replace if damaged

3 - 20 Nm

- ❑ Tightening torque and tightening order ⇒ page 245 .

4 - 20 Nm

5 - 20 Nm

- ❑ Tightening torque and tightening order ⇒ page 245 .

6 - Support

7 - Support

8 - 20 Nm

- ❑ Tightening torque and tightening order ⇒ page 245 .

9 - 20 Nm

- ❑ Tightening torque and tightening order ⇒ page 245 .

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 cataylitic converter against shocks and blows
- ❑ removing and installing ⇒ page 242
- ❑ Remove the protection for the decoupling element -T10403- on the spare part as late as possible
- ❑ Align exhaust system free of stress ⇒ page 248

11 - Screw clamp, 15 Nm

- ❑ Tightening torque and tightening order ⇒ page 245

12 - Gasket

- ❑ replace

13 - Exhaust gas turbocharger

14 - 30 Nm

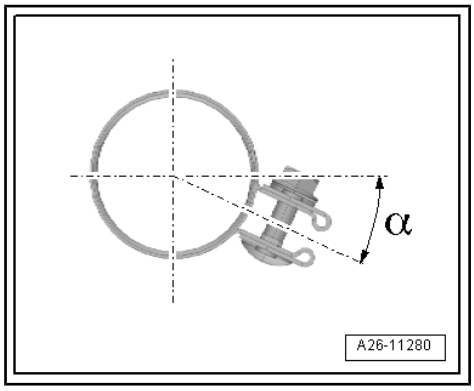
15 - Clamp

- ❑ before tightening, align exhaust system free of stress ⇒ page 248
- ❑ Tighten bolted connections evenly

Installation position of front clamp

– Install clamping sleeve in the position shown.

- Angle -α- = approximately 20°.
- Bolted connection to the right.
- Nuts upwards.



1.2 Removing and installing pre-exhaust pipe with catalytic converter

Note

The catalytic converter is remove with the pre-exhaust pipe.

Special tools and workshop equipment required

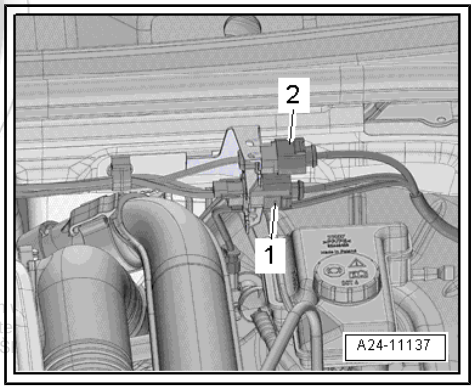
♦ Hot bolt paste ⇒ ETKA - Electronic Catalogue of Original Parts

Removing

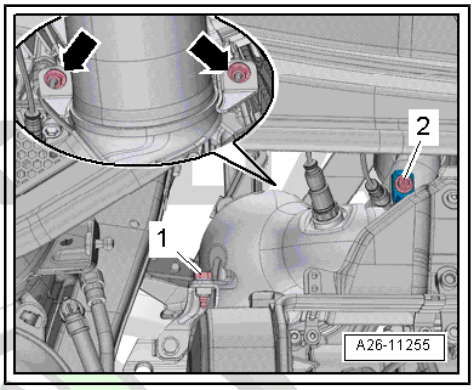
Note

All cable straps should be fastened again in the same place when installing.

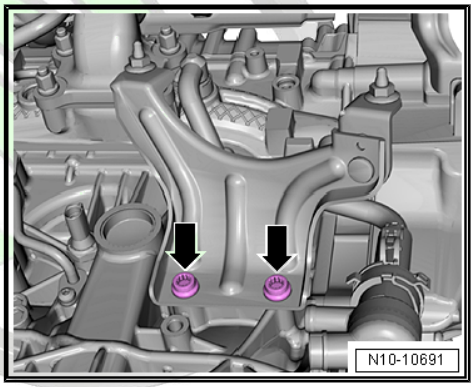
– Take plug connections -1- and -2- out of the holder, disconnect and expose electric cables.



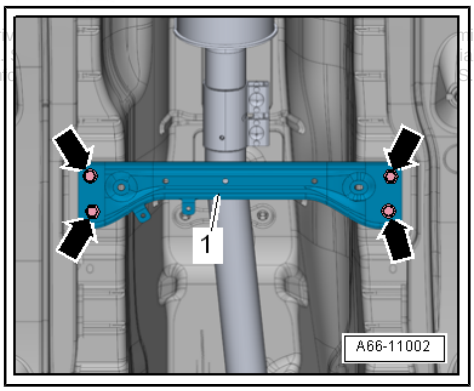
– Unscrew screw -2- and remove screw clamp.
– Unscrew screws -1- and nuts -arrows-.



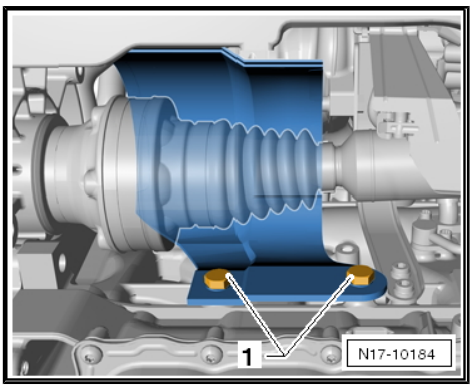
– Release screws -arrows- of the holder.



– Remove tunnel bridge ⇒ Rep. gr. 50 .

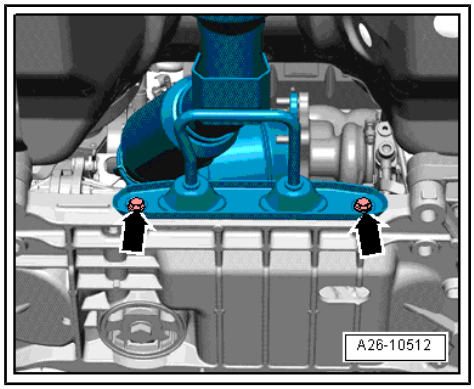


– Release screws -1- and remove heat shield for right drive shaft, if present.
– Remove plastic cover for floor tunnel ⇒ Rep. gr. 50 .



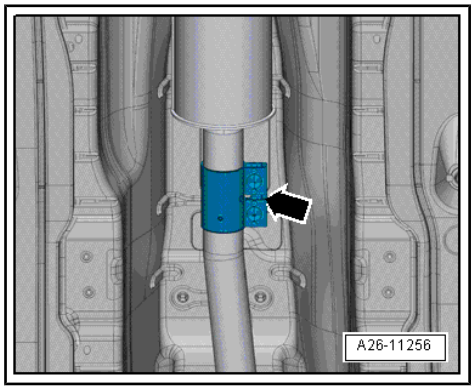
– Remove bolts -arrows-.

– Remove plug connection from holder, disconnect and expose lambda probe electric cable.



– Loosen the clamping sleeve -arrow- and slide it backwards.

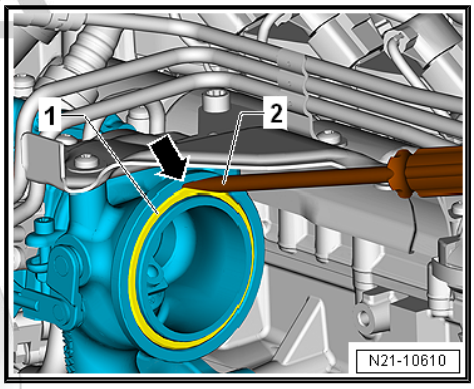
– Remove catalytic converter backwards.



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 overtensioning.*

– Push screwdriver -2- into the recess -arrow- of the exhaust gas turbocharger and lever out the sealing ring -1-.

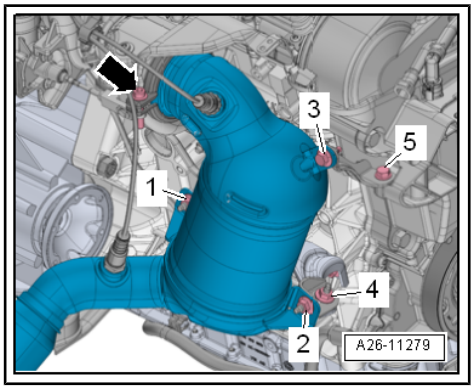


Install

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

Installing catalytic converter - tightening torque and tightening order

1.	– Position catalytic converter on exhaust gas turbocharger, loosely tighten clamp -arrow-	
2.	– Loosely insert screws -3, 5- and nuts -1, 2, 4- by hand.	• It must still be possible to move the catalytic converter and the bracket
3.	– Tighten screw clamp -arrow-.	15 Nm
4.	– Tighten screws and nuts in the order -1...5-.	20 Nm



Note

- *Replace the gasket and the self-locking nuts.*
- *Coat bolts and screws of the catalytic converter with hot bolt paste, hot bolt paste ⇒ ETKA - Electronic Catalogue of Original Parts .*

– Align exhaust system free of stress ⇒ page 248 .

1.3 Middle or rear part of the exhaust system - Summary of components

1 - Middle and rear part of the exhaust system

- ❑ for first version a building unit, replace individually when carrying out repairs ⇒ page 246
- ❑ Align exhaust system free of stress ⇒ page 248

2 - 20 Nm

3 - Support

- ❑ Observe part number ⇒ ETKA - Electronic Catalogue of Original Parts

4 - Retaining strap

- ❑ replace if damaged
- ❑ Observe part number ⇒ ETKA - Electronic Catalogue of Original Parts

5 - Support

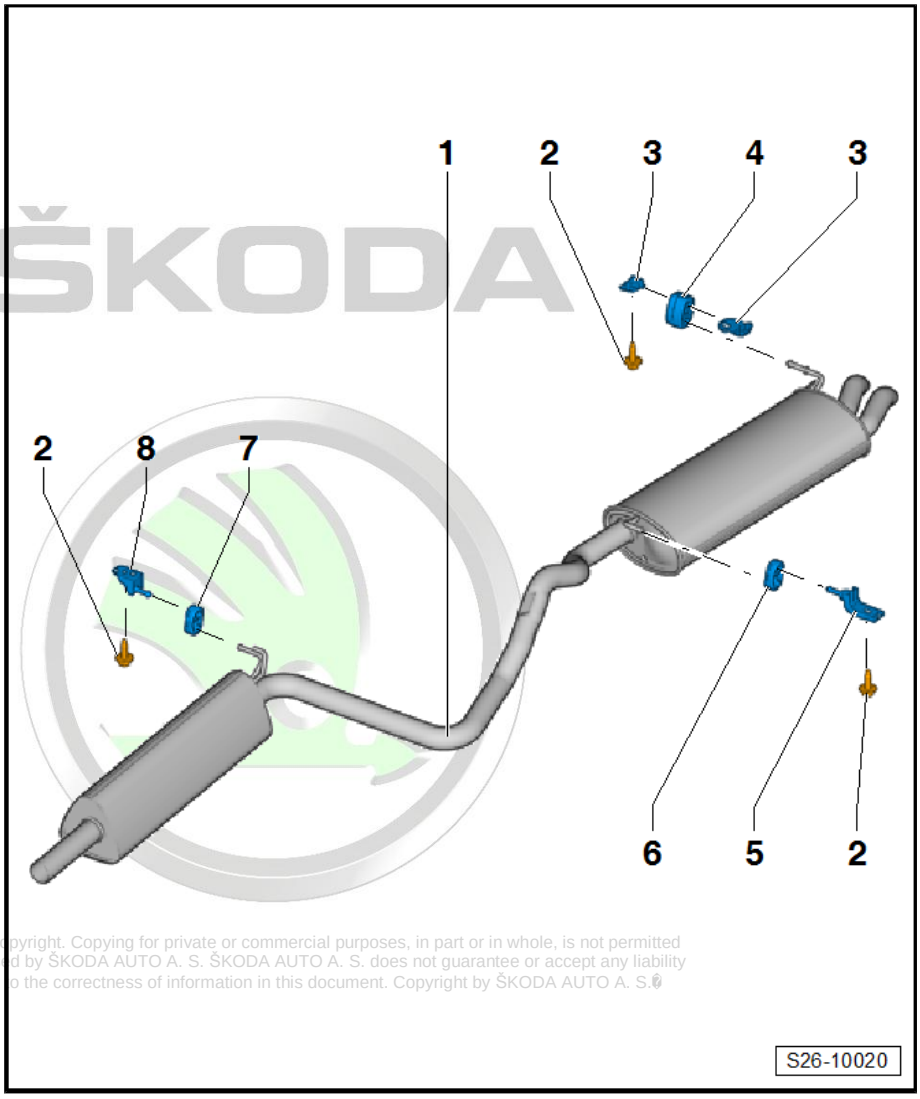
- ❑ Observe part number ⇒ ETKA - Electronic Catalogue of Original Parts

6 - Retaining strap

- ❑ replace if damaged
- ❑ Observe part number ⇒ ETKA - Electronic Catalogue of Original Parts

7 - Retaining strap

- ❑ replace if damaged
- ❑ Observe part number ⇒ ETKA - Electronic Catalogue of Original Parts



8 - Support

- ❑ Observe part number ⇒ ETKA - Electronic Catalogue of Original Parts

1.4 Replacing middle or rear part of the exhaust system

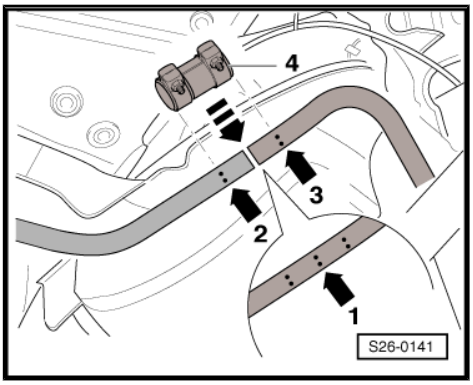
Special tools and workshop equipment required

- ◆ Body saw e.g. -V.A.G 1523/A-

Work procedure

Vehicles with middle and rear part of the exhaust system as a building unit

– Separate exhaust pipe at right angles at the separation point -arrow 1- using the body saw e.g. -V.A.G 1523/A- .

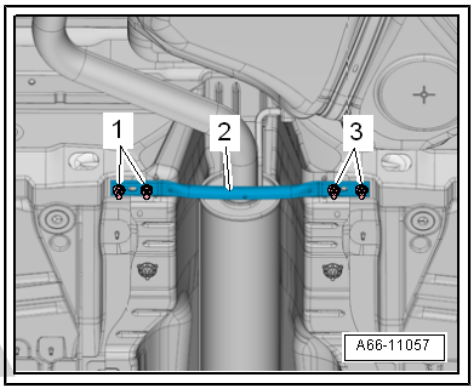


Vehicles with separable middle or rear part of the exhaust system

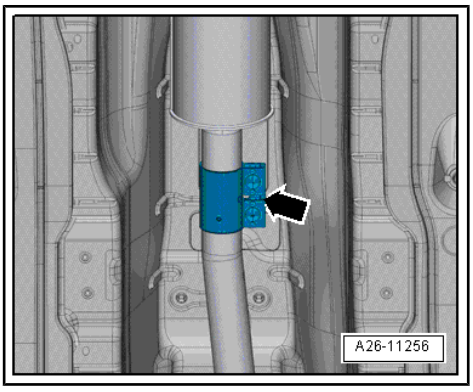
– Loosen the clamping sleeve and slide it backwards.

Replace middle part of exhaust system

– Unscrew nuts -1 and 3- and remove tunnel bridge rear -2-.

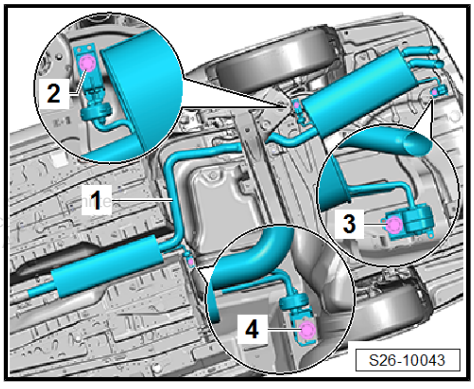


– Loosen the clamping sleeve -arrow- and slide it forwards.

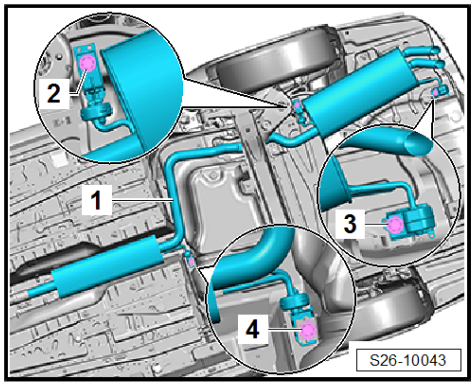


– Unscrew retaining strap screw -4- and remove middle part of the exhaust system.

Replace rear part of the exhaust system



– Unscrew retaining strap rear screws -2 and 3- and remove rear part of the exhaust system.

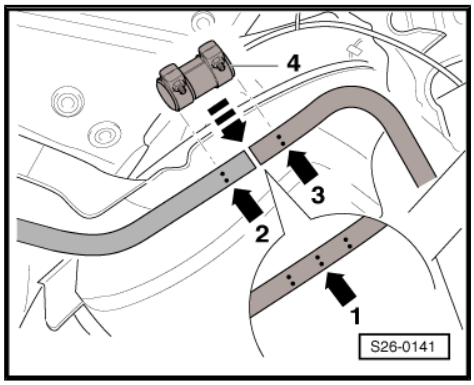


Install

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

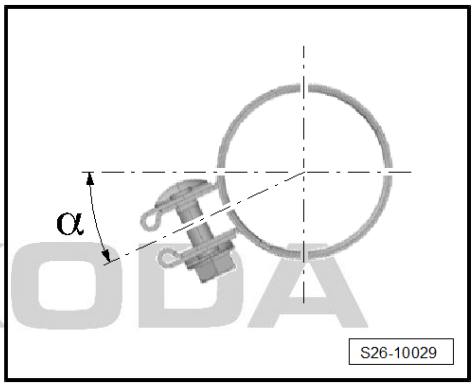
- Tightening torques ⇒ page 245 .

– When installing, position rear clamping sleeve -4- at the side markings -arrow 2- and -arrow 3-.



– Install rear clamping sleeve in the position shown.
- Angle -α- = approximately 30°.
- The threaded connections point to the fuel tank.
- Nuts downwards.

– Tighten bolted connections of clamping sleeve evenly to 30 Nm.
– Align exhaust system free of stress ⇒ page 248 .



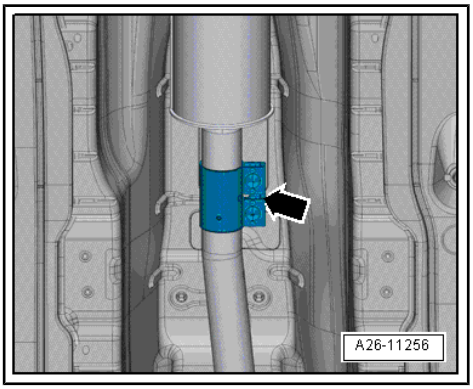
1.5 Aligning exhaust system free of stress

1.5.1 Aligning exhaust system free of stress

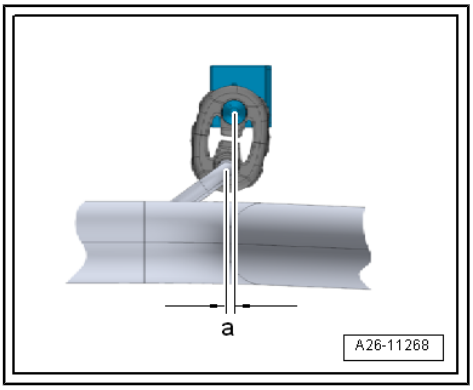
Work procedure

- The exhaust system is aligned when cold.
- Tightening torques ⇒ page 241 .

– Loosen bolted connections on clamping sleeve -arrow-.

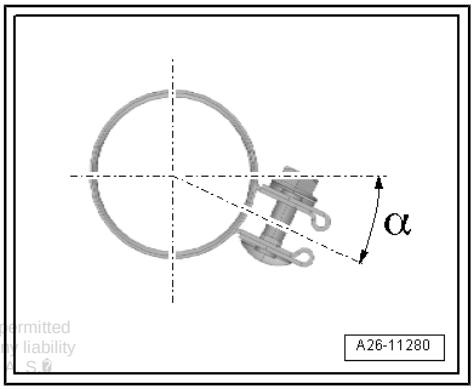


– Push the rear silencer so far forward in the driving direction until the pre-tensioning on the retaining strap on the exhaust pipe is -a- = 5 mm.



– Re-install clamping sleeve in the position shown.
- Angle -α- = approximately 20°.
- Bolted connection to the right.
- Nuts upwards.

– Tighten bolted connections of clamping sleeve evenly to 30 Nm.

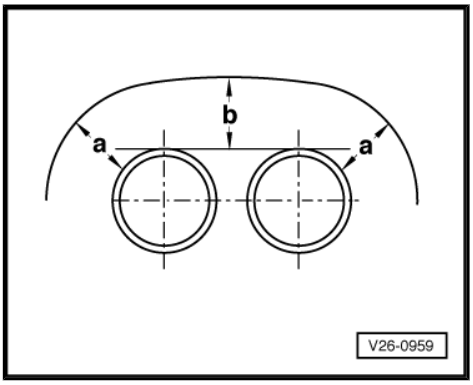


1.5.2 Align exhaust tailpipes

Work procedure

– Align rear silencer in such a way that there is an equal distance -a- and -b- between bumper opening and exhaust tailpipes.

– For centering the exhaust tailpipes, if necessary loosen the suspension of the rear silencer.



1.6 Inspecting the exhaust system for leak-tightness

Work procedure

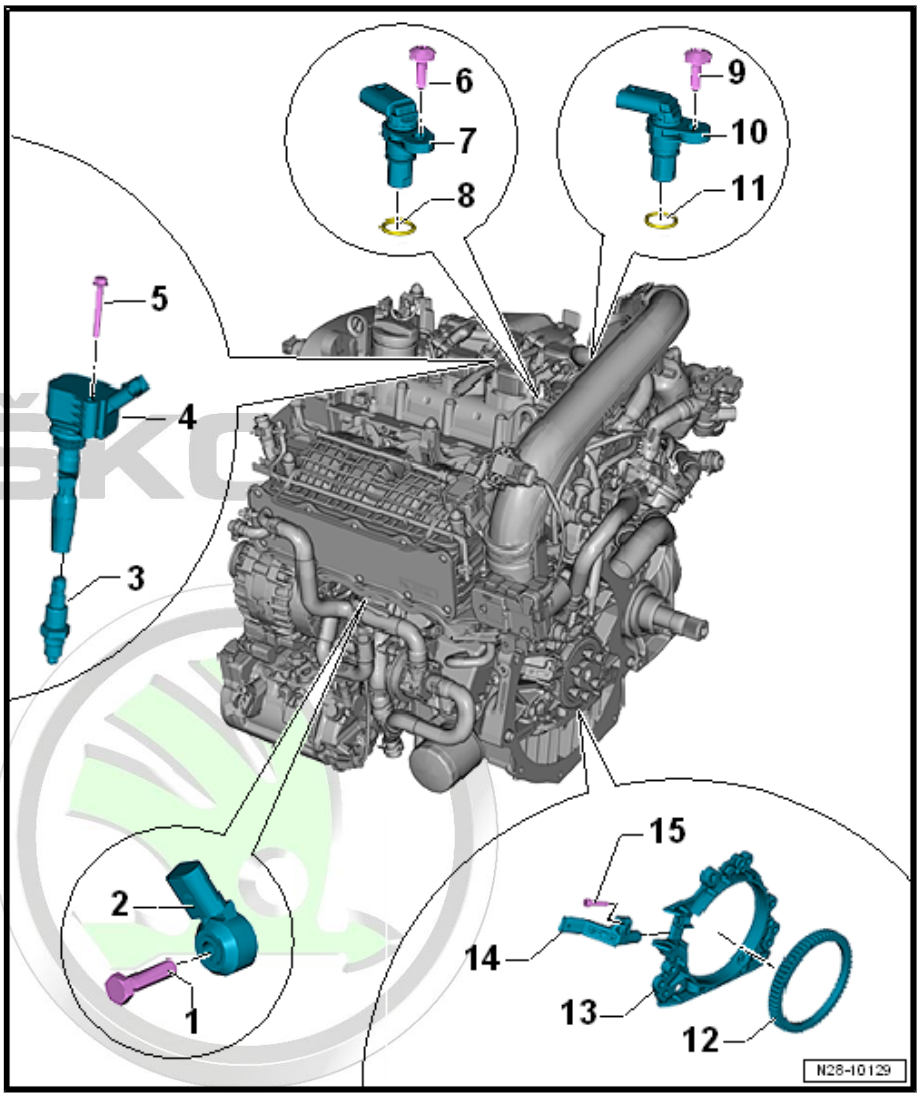
– Start engine and run at idling speed.

– Close off exhaust tailpipes for the duration of the leak test, for example using cloths or plugs.
– Check connection points for leaktightness 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 Ignition system - Summary of components



1 - 20 Nm

- ❑ the tightening torque influences the knock sensor function

2 - Knock sensor 1 - G61-

- ❑ removing and installing ⇒ page 253

3 - Spark plug, 22 Nm

- ❑ use spark plug wrench e.g. - 3122 B- for removing and installing
- ❑ Change interval, type and electrode gap ⇒ Maintenance ; Booklet Octavia III
- ❑ Observe part number ⇒ ETKA - Electronic Catalogue of Original Parts

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-
  - ❑ removing and installing ⇒ page 252

5 - 8 Nm

6 - 8 Nm

7 - Hall sender - G40-

- ❑ removing and installing ⇒ page 254

8 - O-ring

9 - 8 Nm

10 - Hall sender 3 - G300-

- ❑ removing and installing ⇒ page 253

11 - O-ring

- ❑ replace if damaged

12 - Rotor

- ❑ for engine speed sender - G28-
- ❑ removing and installing ⇒ page 80

13 - Sealing flange on the gearbox side

- ❑ removing and installing ⇒ page 80

14 - Engine speed sender - G28-

- ❑ removing and installing ⇒ page 254

15 - 5 Nm

1.2 Removing and installing ignition coils with output stage

Special tools and workshop equipment required

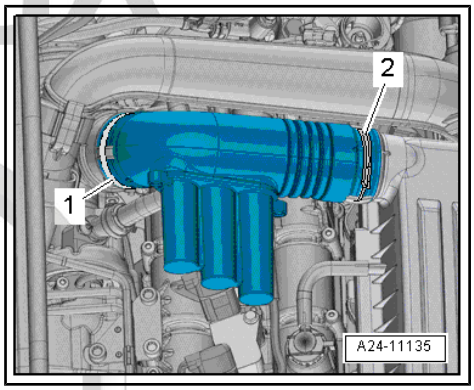
- ♦ Extractor -T10530-

Removing

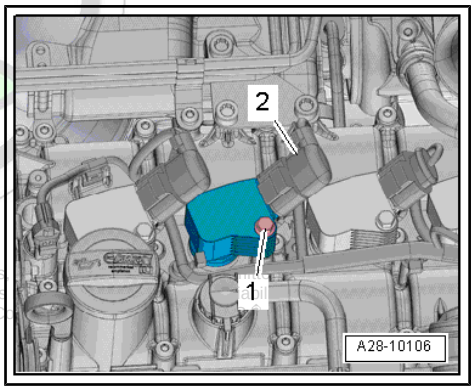
Ignition coils for “cylinders 2, 3 and 4”

– Loosen hose clamps -1, 2- and remove air guide pipe.

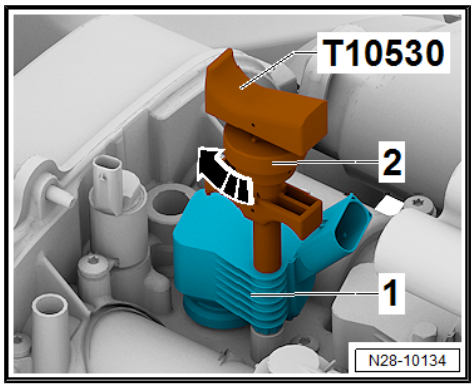
Continued for all ignition coils



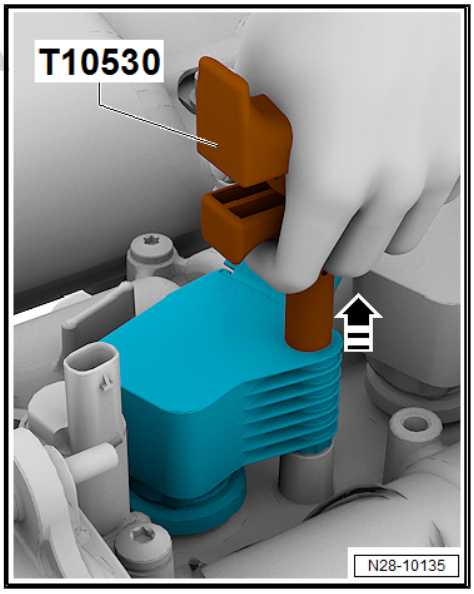
– Unplug connector -2-.
– Unscrew screw -1-.



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

- Tightening torque ⇒ page 251 .

– Place 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).

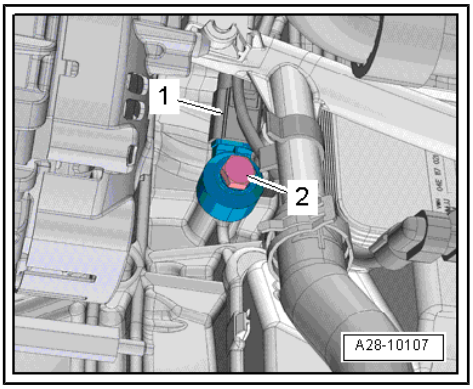
1.3 Remove and install knock sensor 1 - G61-

Removing

– Remove AC compressor from holder and strap up ⇒ Heating, Air Conditioning; Rep. gr. 87 .

– Unplug connector -1-.

– Release screw -2- and remove knock sensor 1 - G61- .



Install

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

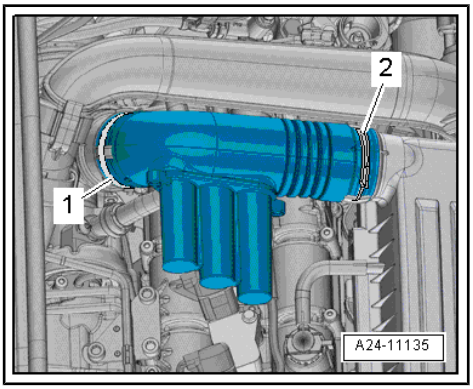
- Tightening torque ⇒ page 251 .

– Install AC compressor ⇒ Heating, Air Conditioning; Rep. gr. 87 .

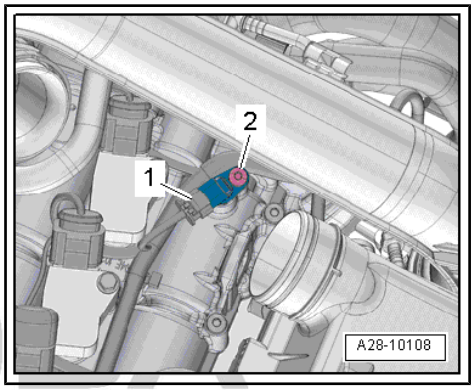
1.4 Removing and installing Hall sender - G40-

Removing

– Loosen hose clamps -1, 2- and remove air guide pipe.



– Unplug connector -1-.
– Unscrew screw -2- and remove Hall sender - G40- .



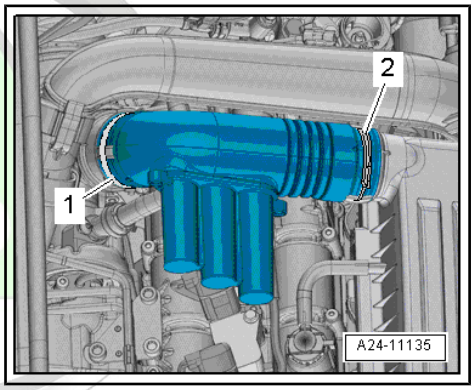
Install

– Installation is carried out in the reverse order.
• Tightening torque ⇒ page 251 .

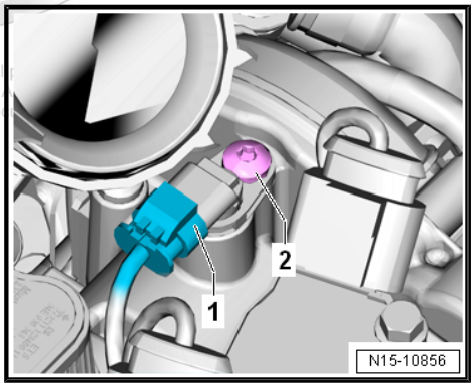
1.5 Removing and installing hall sender 3 - G300-

Removing

– Loosen hose clamps -1, 2- and remove air guide pipe.



– Unplug connector -1-.
– Release screw -2- and remove Hall sender 3 - G300- .



Install

– Installation is carried out in the reverse order.
• Tightening torque ⇒ page 251 .

1.6 Removing and installing engine speed sender - G28-

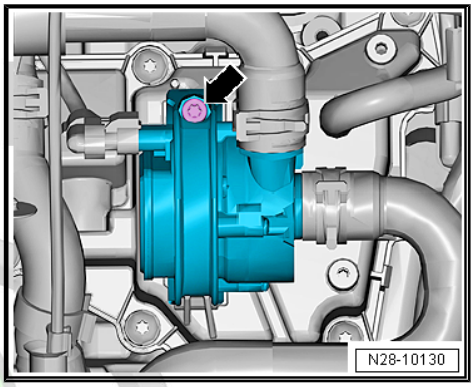
Special tools and workshop equipment required

♦ Socket insert 4 mm - T10370-

Removing

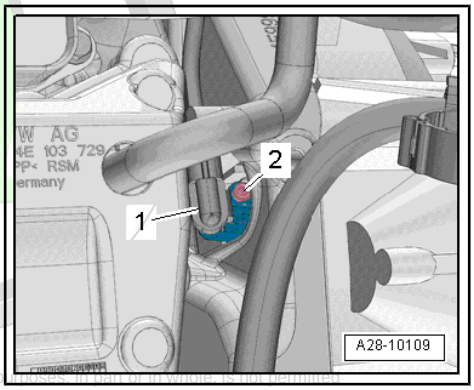
– Remove the sound dampening system ⇒ Body Work; Rep. gr. 66 .

– Unscrew screw -arrow- and push coolant recirculation pump - V51- to the side.



– Unplug connector -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 carried out in the reverse order.

Tightening torques:

- Ignition system ⇒ page 251
- Electric coolant pump ⇒ page 149

– Install the noise insulation ⇒ Body Work; Rep. gr. 66 .