

Workshop Manual

Audi A4 2008 ➤
Audi A5 Cabriolet 2009 ➤
Audi A5 Coupé 2008 ➤

4-cylinder direct injection engine (1.8, 2.0 ltr. 4-valve TFSI - generation III)

Engine ID	CJEB	CNC D	CUH A	CUJA	CJED	CNC E	CJEE		
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Edition 08.2016



Audi

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List of Workshop Manual Repair Groups

Repair Group

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- 13 - Crankshaft group
- 15 - Cylinder head, valve gear
- 17 - Lubrication
- 19 - Cooling
- 21 - Turbocharging/supercharging
- 24 - Mixture preparation - injection
- 26 - Exhaust system
- 28 - Ignition system

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

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00 – Technical data

1 Identification

(ARL004867; Edition 08.2016)

⇒ [“1.1 Engine identification number/engine data”, page 1](#)

1.1 Engine identification number/engine data

Engine number

The engine number (“engine code” and “serial number”) can be found at the front of the joint between engine and gearbox.

There is also a sticker with “engine code” and “serial number” attached to the toothed belt cover.

In addition, the engine code is listed on the vehicle data stickers.

Engine data

⇒ [Technical data for petrol engines; Rep. gr. 00; Overview of engines](#)
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2 Safety precautions

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

⇒ [“2.2 Safety precautions when working on vehicles with start/stop system”, page 2](#)

⇒ [“2.3 Safety precautions when using testers and measuring instruments during a road test”, page 3](#)

⇒ [“2.4 Safety precautions when working on the subframe”, page 3](#)

⇒ [“2.5 Safety precautions when working on the ignition system”, page 3](#)

⇒ [“2.6 Safety precautions when working on the cooling system”, page 4](#)

2.1 Safety precautions when working on the fuel supply system

Risk of injury - fuel system operates under high pressure

The fuel system is pressurised. There is a risk of injury as fuel may spray out.

Before opening the fuel system:

- Put on safety goggles.
- Put on protective gloves.
- Release pressure (wrap clean cloth around connection and open connection carefully).

Risk of fire due to escaping fuel

If the battery is connected, the door contact switch activates the fuel pump when the driver's door is opened. Escaping fuel may ignite, causing a fire.

- Before opening the fuel system, disconnect power supply to fuel pump.



2.2 Safety precautions when working on vehicles with start/stop system

Risk of injury - engine may start unexpectedly

On vehicles with the start/stop system activated, the engine may start unexpectedly. A message in the instrument cluster indicates whether the start/stop system is activated.

- Deactivate start/stop system by switching off ignition.



2.3 Safety precautions when using testers and measuring instruments during a road test

Risk of injury if test equipment is not secured

If an accident occurs and the front passenger's airbag is triggered, test equipment which is not secured adequately may be catapulted through the vehicle with potentially serious consequences.


- Secure test equipment on the rear seat with a strap.

Or

- Have a second mechanic operate test equipment on the rear seat.

2.4 Safety precautions when working on the subframe

Please note the following warnings when working on the subframe:

 Caution <i>Risk of damage to running gear components.</i> ◆ <i>The vehicle must NOT be lowered onto its wheels if the engine/gearbox mountings, steering rack or subframe cross brace are not properly installed.</i> ◆ <i>The vehicle must NOT be supported by applying a trolley jack or similar to the subframe or subframe cross brace.</i>

2.5 Safety precautions when working on the ignition system

Risk of injury due to electric shock

When the engine is running, there are high voltage levels in the ignition system. There is a risk of electric shock when touching the ignition system!

- Never touch or disconnect ignition wiring when the engine is running or being turned at cranking speed.

Risk of damage to components

Washing the engine or connecting/disconnecting electrical wiring may result in components being damaged if the engine is running.

- Switch off ignition before connecting/disconnecting electrical wiring.
- Switch off ignition before cleaning engine.



2.6 Safety precautions when working on the cooling system

Risk of scalding as hot coolant can escape

The cooling system is under pressure when the engine is hot. Hot steam/hot coolant can escape - risk of scalding.

- Put on protective gloves.
- Put on safety goggles.
- Release pressure (cover filler cap on coolant expansion tank with a cloth and open carefully).



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3 Repair instructions

⇒ [“3.1 Rules for cleanliness”, page 5](#)

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⇒ [“3.4 Routing and attachment of pipes, hoses and wiring”, page 6](#)

⇒ [“3.5 Installing radiators and condensers”, page 6](#)

⇒ [“3.6 Checking vacuum system”, page 6](#)

3.1 Rules for cleanliness

Even small quantities of dirt can lead to defects. For this reason, please observe the following rules when working on the fuel supply system, injection system and turbocharger:

- ◆ Carefully clean connection points and the surrounding area with engine cleaner or brake cleaner and dry thoroughly before opening.
- ◆ Immediately seal open lines and connections with clean plugs, for example from engine bung set - VAS 6122- .
- ◆ Place removed parts on a clean surface and cover them. Use only lint-free cloths.
- ◆ Carefully cover or seal open components if repairs cannot be carried out immediately.
- ◆ Only install clean components; replacement parts should only be unpacked immediately prior to installation. Do not use parts that have not been stored in their packing (e.g. in tool boxes etc.).
- ◆ When the system is open, do not work with compressed air and do not move the vehicle.
- ◆ Make sure that no fuel runs onto the fuel hoses. Should this occur, the fuel hoses must be cleaned again immediately.
- ◆ Protect unplugged electrical connectors against dirt and moisture and make sure connections are dry when attaching.

3.2 Foreign particles in engine

- ◆ When performing assembly work on the engine, all open passages in the intake and exhaust systems must be sealed with suitable plugs (e.g. from engine bung set - VAS 6122-) to prevent foreign particles from entering the engine.



Note

*If the turbocharger has suffered mechanical damage
⇒ [page 236](#)*

3.3 Contact corrosion

Contact corrosion can occur if unsuitable fasteners are used (e.g. bolts, nuts, washers, etc.).

For this reason, only fasteners with a special surface coating are fitted.

Additionally, all rubber and plastic parts and all adhesives are made of non-conductive materials.



Always install new parts if you are not sure whether used parts can be re-fitted ⇒ Electronic parts catalogue .

Please note:

- ◆ We recommend using only genuine replacement parts; these have been tested and are compatible with aluminium.
- ◆ We recommend the use of Audi accessories.
- ◆ Damage caused by contact corrosion is not covered by warranty.

3.4 Routing and attachment of pipes, hoses and wiring

- ◆ Mark fuel lines, hydraulic lines, vacuum lines, lines for activated charcoal filter and electrical wiring etc. before removal so they can be re-installed in the original positions and correctly connected. Make sketches or take photographs if necessary.
- ◆ To prevent damaging pipes, hoses and wiring, ensure sufficient clearance from all moving or hot components in engine compartment (little space in engine compartment).

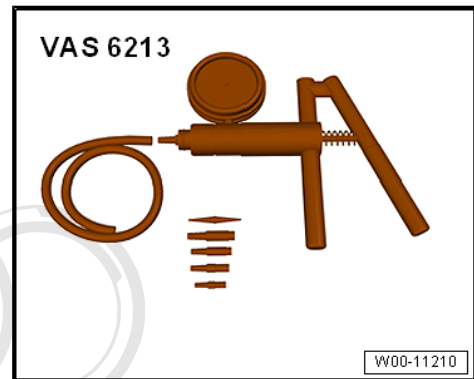
3.5 Installing radiators and condensers

Even when the radiator, condenser and charge air cooler are correctly installed, slight impressions may be visible on the fins of these components. This does not mean that the components are damaged. If the fins are only very slightly distorted, this does not justify renewal of the radiator, condenser or charge air cooler.

3.6 Checking vacuum system

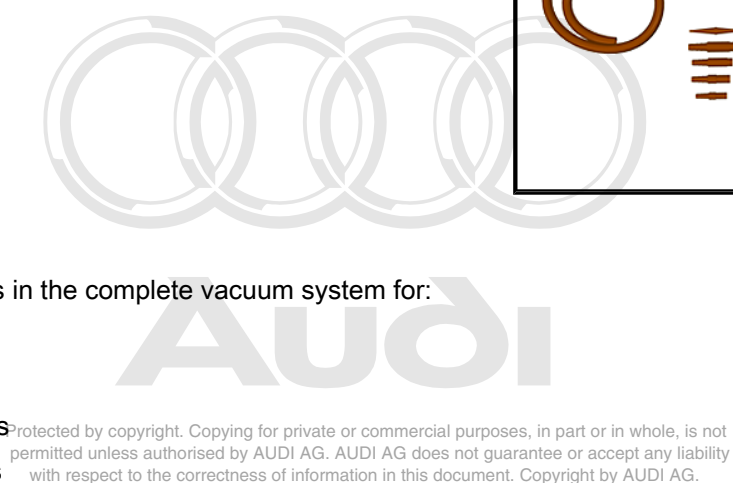
Special tools and workshop equipment required

- ◆ Hand vacuum pump - VAS 6213-



Procedure

- Check all vacuum lines in the complete vacuum system for:
 - ◆ Cracks
 - ◆ Traces of animal bites
 - ◆ Kinked or crushed lines
 - ◆ Porous or leaking lines
- Check vacuum line to solenoid valve and from solenoid valve to corresponding component.
- If a fault is stored in the event memory, check the vacuum lines leading to the corresponding component and also check the remaining vacuum lines in the system.



- If it is not possible to build up pressure with the hand vacuum pump - VAS 6213- or if the pressure drops again immediately, check the hand vacuum pump and connecting hoses for leaks.



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10 – Removing and installing engine

1 Removing and installing engine

⇒ [“1.1 Removing engine”, page 8](#)

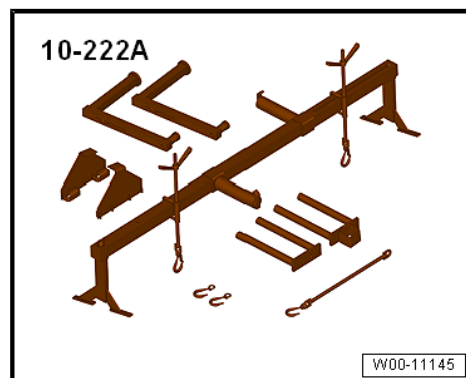
⇒ [“1.2 Securing engine to engine and gearbox support”, page 24](#)

⇒ [“1.3 Installing engine”, page 26](#)

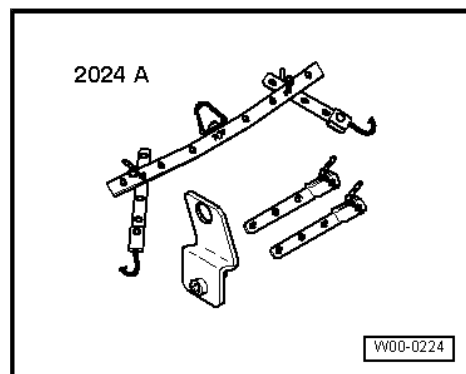
1.1 Removing engine

Special tools and workshop equipment required

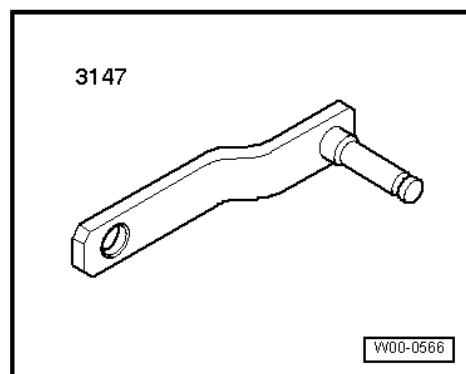
◆ Support bracket - 10 - 222 A-



◆ Lifting tackle - 2024 A-



◆ Gearbox support - 3147-



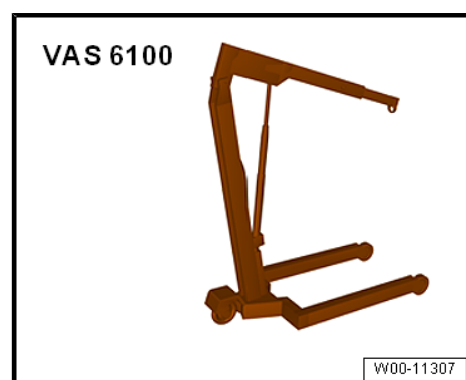
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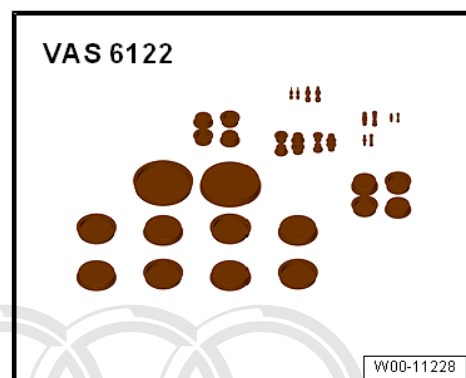
- ◆ Engine and gearbox jack - V.A.G 1383 A-



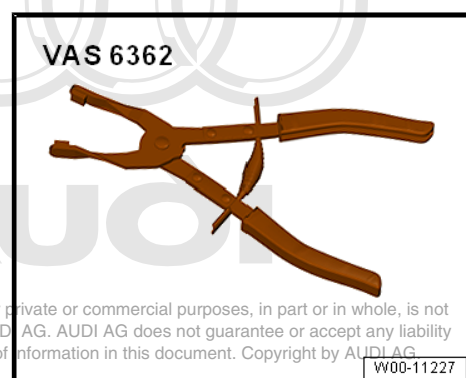
- ◆ Workshop hoist - VAS 6100-



- ◆ Engine bung set - VAS 6122-



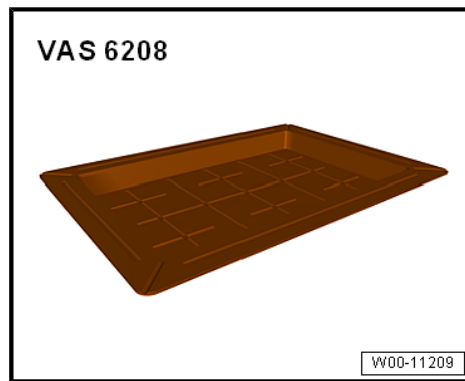
- ◆ Hose clip pliers - VAS 6362-



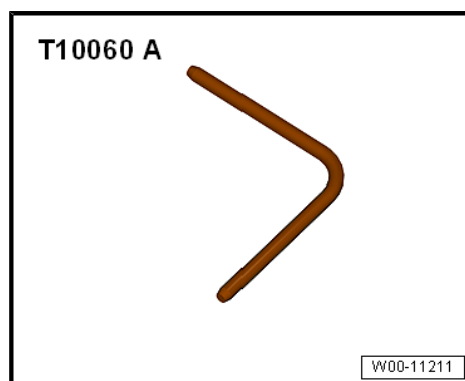
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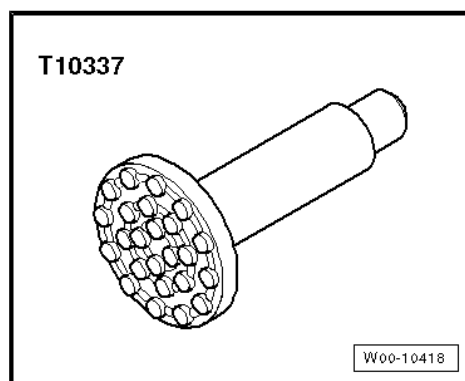
- ◆ Drip tray for workshop hoist - VAS 6208-



- ◆ Locking pin - T10060 A-



- ◆ Gearbox support - T10337-



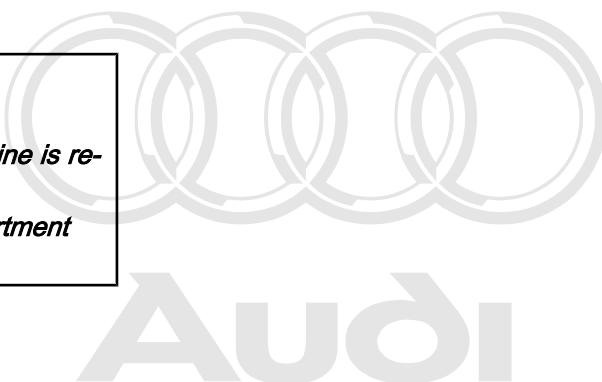
Procedure



WARNING

Make sure the vehicle cannot tip over when the engine is removed.

- ◆ *Secure the vehicle, to do so, the luggage compartment must be empty.*



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 **Note**

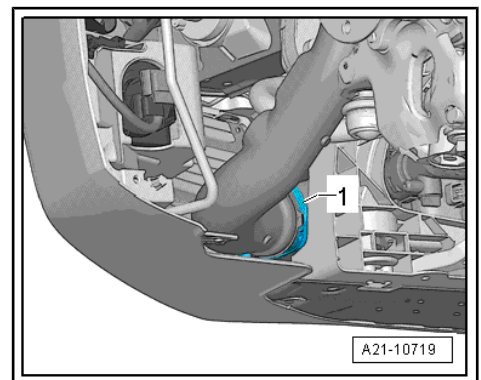
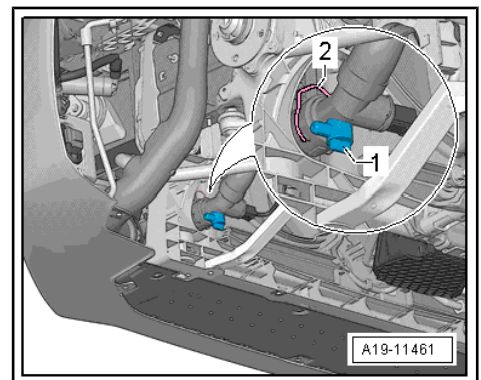
- ◆ *Lift out engine without gearbox.*
- ◆ *Collect drained coolant in a clean container for re-use or disposal.*
- ◆ *Fit all cable ties in the original positions when installing.*
- ◆ *On four-wheel drive vehicles the electromechanical parking brake must be released before disconnecting the battery, so that the propshaft can be turned during removal.*
- Disconnect battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .
- Remove both front wheels.

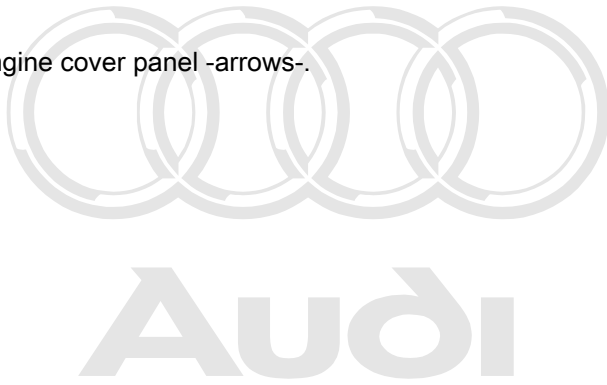
 **WARNING**

Hot steam/hot coolant can escape - risk of scalding.

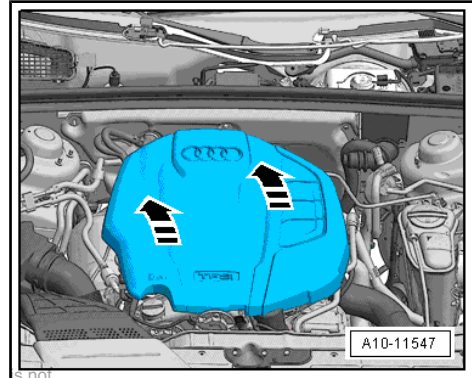
- ◆ *The cooling system is under pressure when the engine is hot.*
- ◆ *To allow pressure to dissipate, cover filler cap on coolant expansion tank with cloth and open carefully.*

- Open filler cap on coolant expansion tank.
- Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .
- Place drip tray for workshop hoist - VAS 6208- beneath engine.
- Unscrew radiator drain tap -1- at connection and drain off coolant, then detach connection -2- from radiator.
- Remove wheel spoilers (front) on both sides ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .
- Release hose clip -1- and disconnect air hose.
- Set service position ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Setting service position and returning to normal position .
- Remove front silencer ⇒ [page 296](#) .

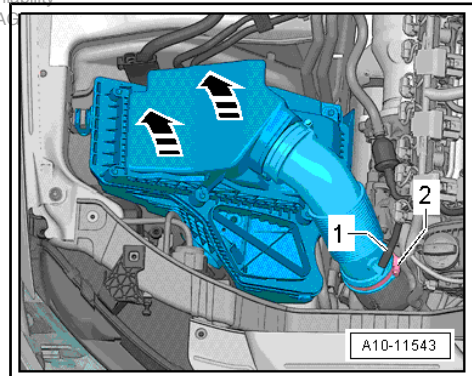




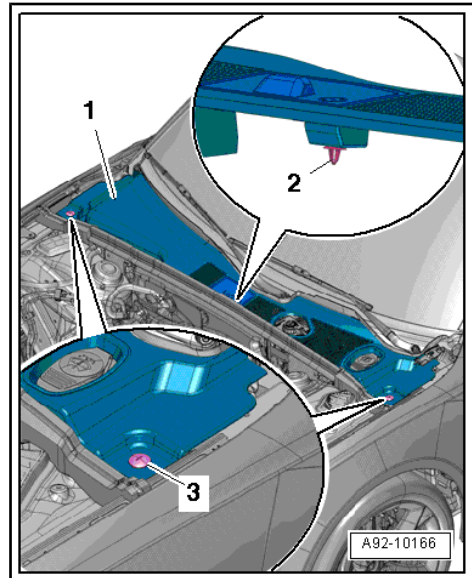
- Remove engine cover panel -arrows-.



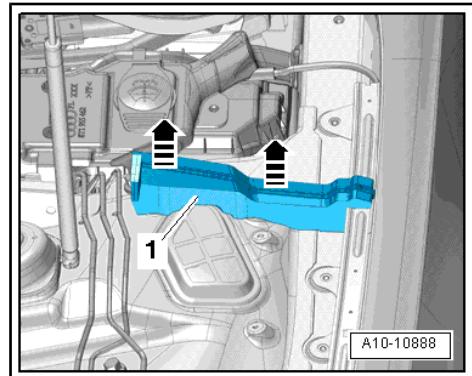
- Disconnect hose **1** from air cleaner.
- Disconnect air intake hose -2-.
- Pull air cleaner housing upwards -arrows-.
- Seal off turbocharger connection with sealing plug from engine bung set - VAS 6122- .



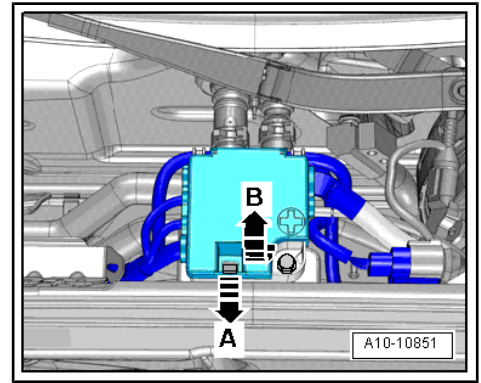
- Pull seal off plenum chamber partition panel.
- Remove plenum chamber cover => General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .



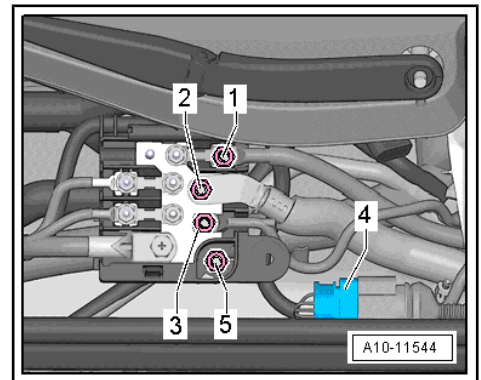
- Lift off foam plastic block **1** on both sides of vehicle -arrows-.



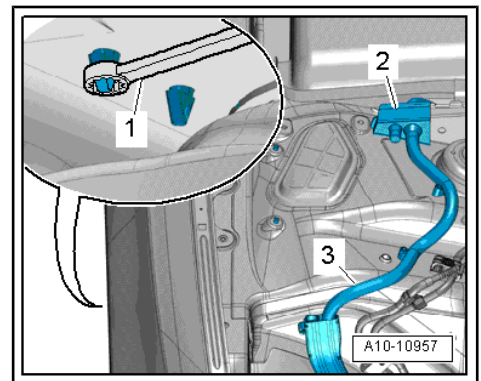
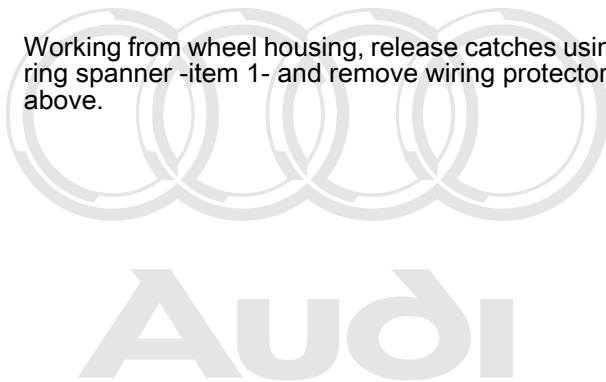
- Release retainer -arrow A- and open cover -arrow B-.



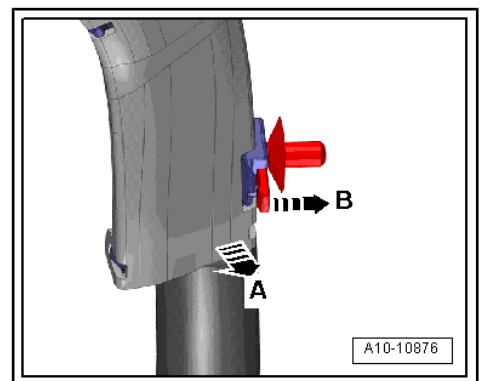
- Remove nuts -1 ... 3- for electrical wiring.
- Detach electrical connector -4- from bracket and unplug.
- Remove bolt -5- and detach wiring junction from body brace.



- Working from wheel housing, release catches using a 5.5 mm ring spanner -item 1- and remove wiring protector -2- from above.

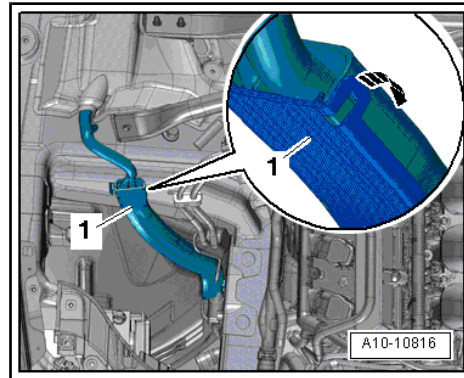


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- Wiring duct (version 1): release catch -arrow B- and move wiring harness clear by pulling it towards front -arrow A-.

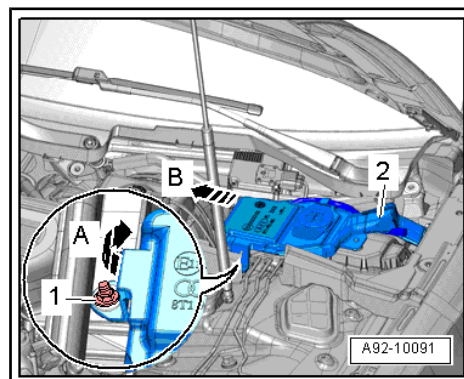




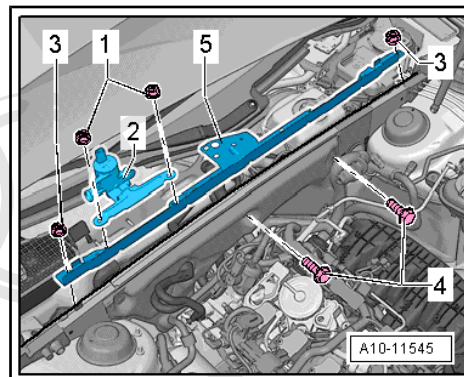
- Wiring duct (version 2): release catch -arrow- to open wiring duct -1- and move wiring harness clear.



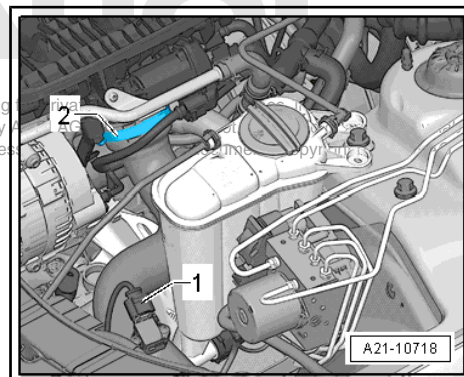
- Remove nut -1- and swivel filler neck for washer fluid reservoir slightly upwards -arrow A-.
- Pull filler neck -2- with filler pipe out of washer fluid reservoir and through opening in body -arrow B-.



- Remove nuts -1- and detach bracket -2-.
- Remove nuts -3- and bolts -4- and detach body brace -5-.

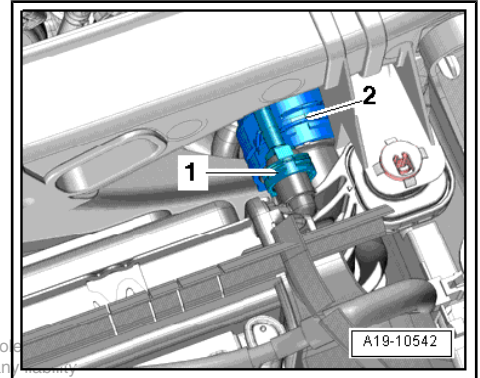


- Unplug electrical connector -1- for charge pressure sender -G31- and move clear.
- Open hose clip -2- and press air hose to left side.

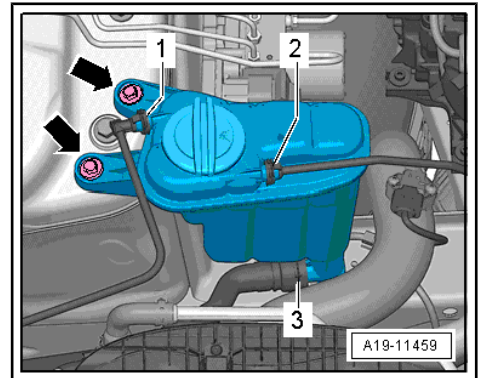


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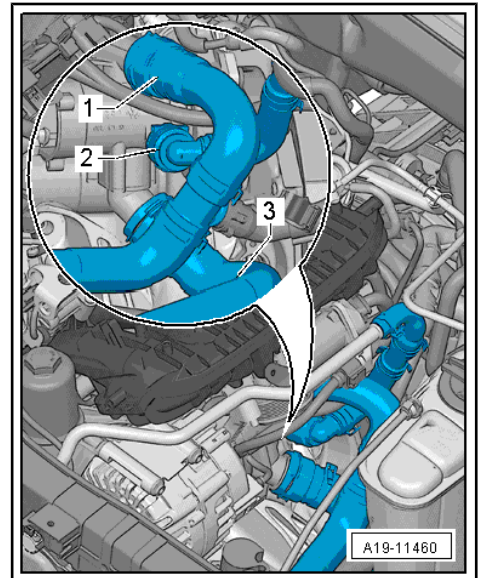
- Detach coolant hose -2- and permanent breather -1-.



- Detach permanent breather -1- and coolant hose -3- from coolant expansion tank.

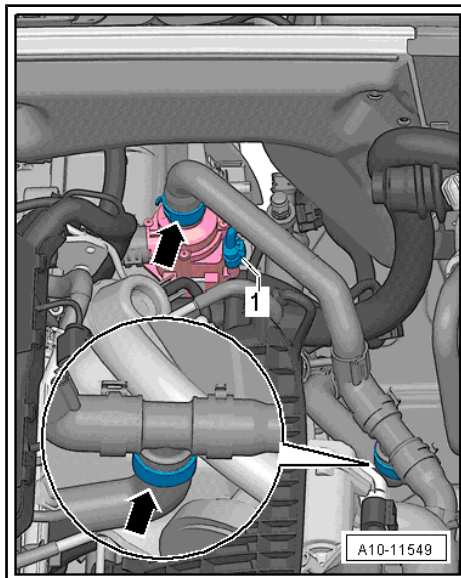


- Lift retaining clips and disconnect coolant hoses -1 ... 3-.

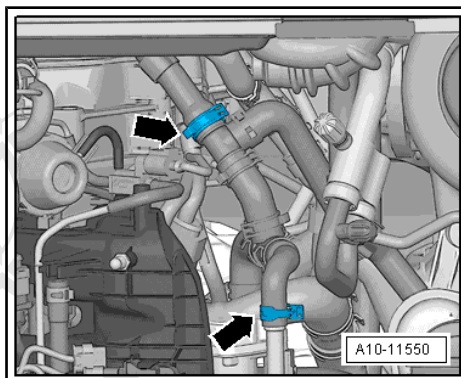




- Disconnect coolant hoses -arrows-.



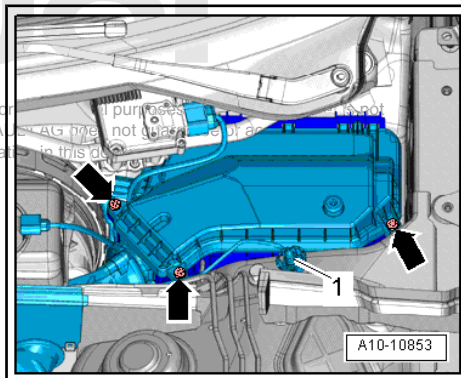
- Disconnect coolant hoses -arrows-.



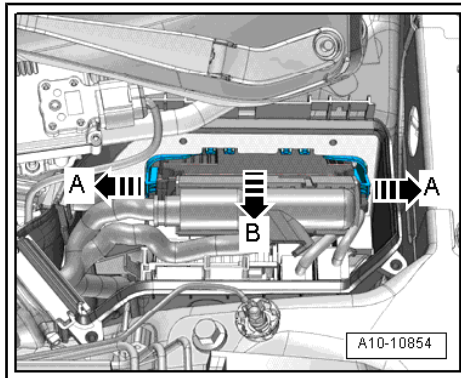
- Remove bolts -arrows- and detach cover for electronics box in engine compartment.

- Remove nut -1- and move electrical wiring clear.

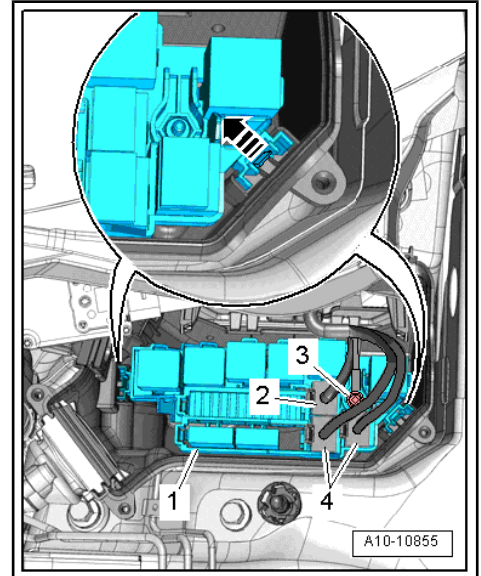
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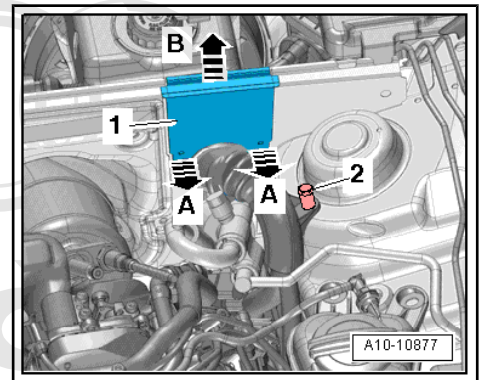
- Release catches -arrows A- and take out engine control unit -arrow B-.



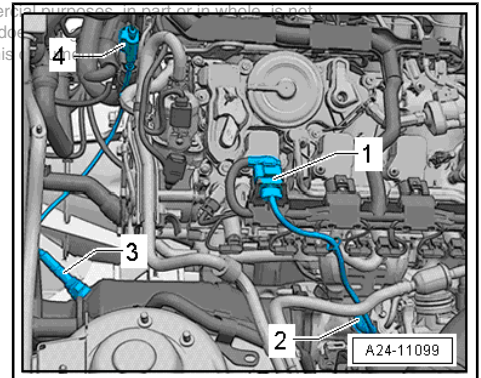
- Unplug electrical connectors -4- and unscrew nut -3- for wiring.
- If fitted, unplug electrical connector -2-.
- Release catches -arrow- and detach relay carrier with fuse holder -1-.



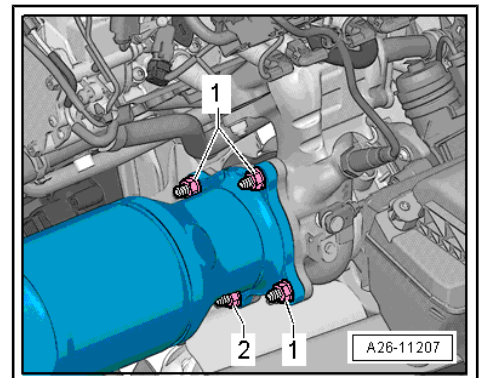
- Release catches -arrows A- and lift off wiring protector -1- -arrow B-.
- Disengage engine wiring harness at electronics box in engine compartment and move clear.
- Place wiring harness on engine and secure engine control unit to prevent it from dropping.



- Unplug electrical connector -1- for Lambda probe - G39- and Lambda probe heater - Z19- and move wiring clear.
- Unplug electrical connector -4- for Lambda probe after catalytic converter - G130- and Lambda probe 1 heater after catalytic converter - Z29- and move wiring clear.

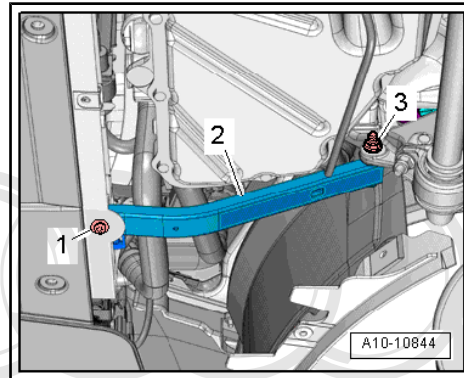


- Remove nuts -1- from above.

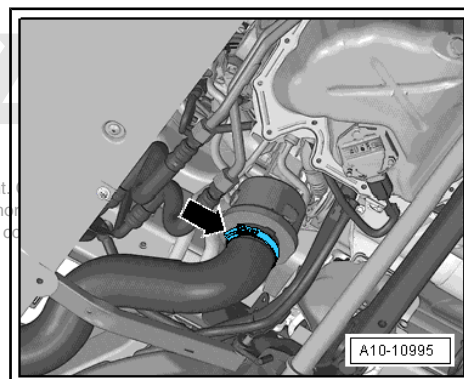




- Remove nuts -3- and longitudinal struts -2- on both sides.



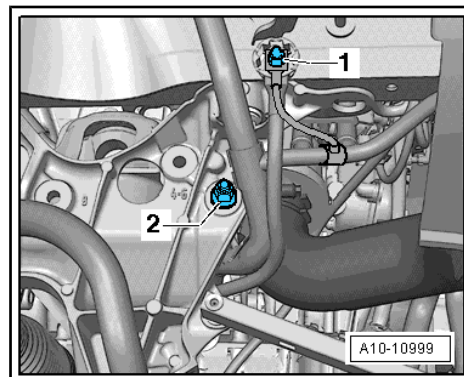
- Open hose clip -arrow-, detach air hose and swivel to side.



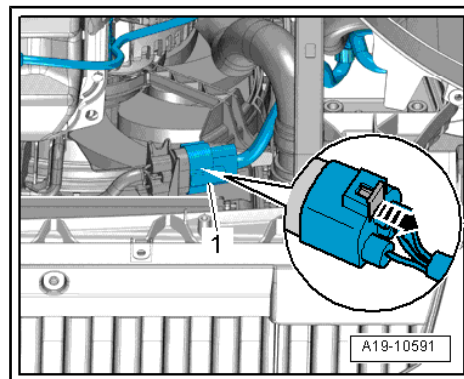
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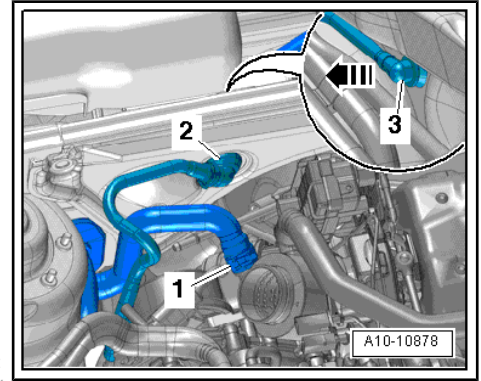
- Unscrew nut -1- on longitudinal member (right-side) and move earth cables clear.
- Remove nut -2- for bracket with wiring on right-hand side of vehicle.



- Unplug electrical connector -1- for radiator fan (push retainer to the rear -arrow- and press down release catch).
- Place wiring harness on engine and secure to prevent it from dropping.

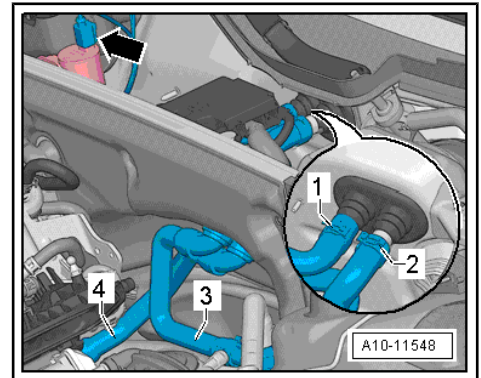


- Disconnect vacuum hose -3- on rear of plenum chamber partition panel -arrow- and detach vacuum connection -2- from plenum chamber partition panel.

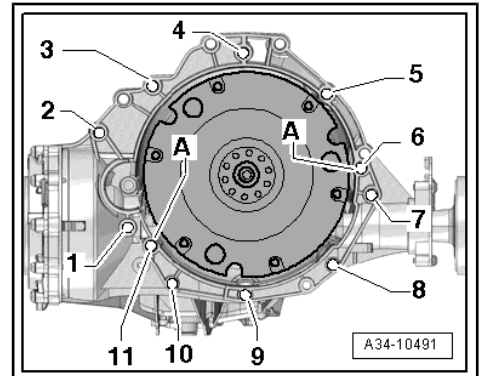


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- Unplug electrical connector -arrow-.
- Detach coolant hoses -1- to -4- and remove plenum chamber partition panel.

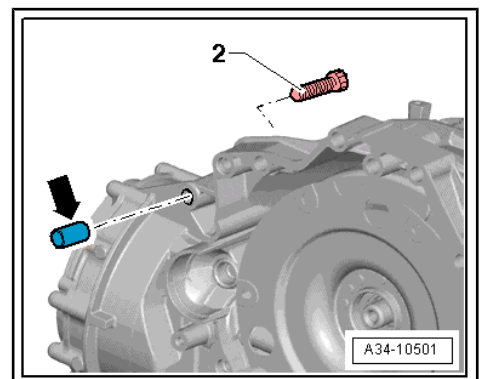


- Remove bolts -2 ... 7-.



 **Note**

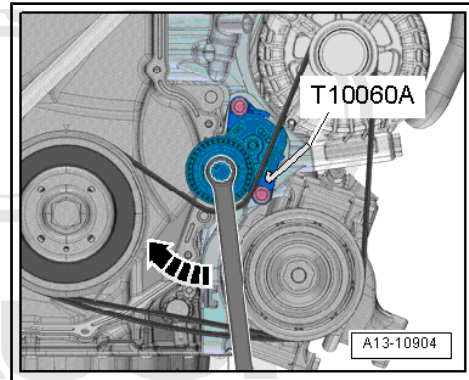
- ◆ Bolt -2- secures the starter to the gearbox and is provided with a spacer sleeve -arrow-.
 - ◆ Pay attention to the spacer sleeve -arrow- when removing and installing the engine. The spacer sleeve must be fitted between starter and gearbox.
- Open hose clip -2- and detach air hose.





Note

- ◆ *Wrong direction of rotation for a used poly V-belt can lead to irreparable damage.*
- ◆ *Before removing the poly V-belt mark the direction of rotation with chalk or a felt-tip pen for re-installation.*
- To slacken poly V-belt turn tensioner in direction of -arrow-.
- Lock tensioner with locking pin - T10060 A- .
- Take off poly V-belt.
- Unplug electrical connector -1- for magnetic clutch on air conditioner compressor.



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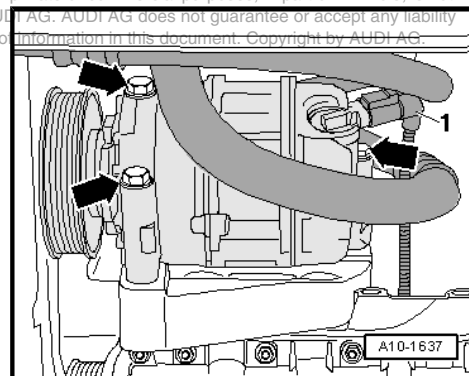


WARNING

Risk of injury caused by refrigerant.

- ◆ *The air conditioner refrigerant circuit must not be opened.*

- Remove bolts -arrows- for air conditioner compressor.



Caution

Danger of damage to refrigerant lines and hoses.

- ◆ *Do NOT stretch, kink or bend refrigerant lines and hoses.*

- Tie up air conditioner compressor together with refrigerant hoses to longitudinal member (refrigerant hoses remain connected).



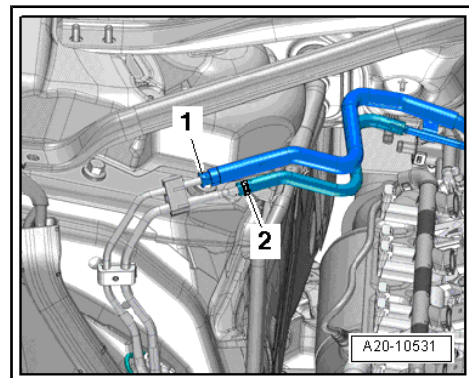
WARNING

The fuel system is pressurised.

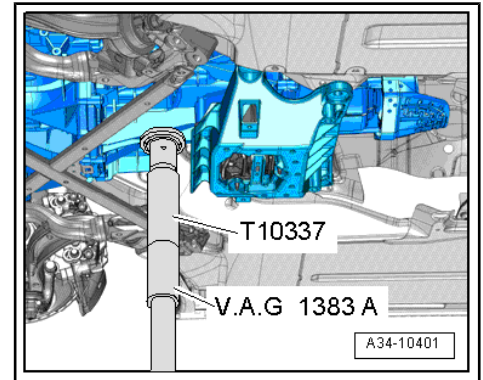
Risk of injury as fuel may spray out.

- *Put on safety goggles.*
- *Put on protective gloves.*
- *Release pressure (wrap clean cloth around connection and open connection carefully).*

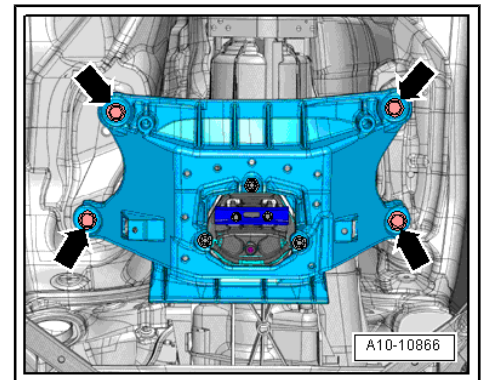
- Disconnect fuel supply hose -1- by pressing release ring.
- Disconnect hose -2- from activated charcoal filter.



- Support gearbox using engine and gearbox jack - V.A.G 1383 A- with gearbox support - T10337- attached.

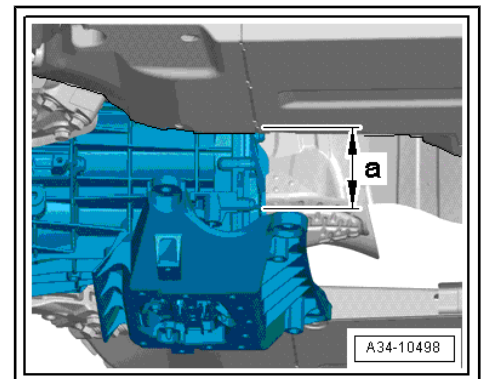


- Remove bolts -arrows- for tunnel cross member.

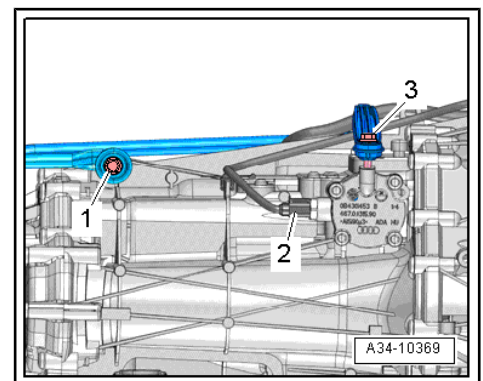


Vehicles with manual gearbox:

- Lower gearbox using engine and gearbox jack - V.A.G 1383 A- as far as distance -a-.
 - **Dimension -a- = 80 mm (maximum)**
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- Unplug electrical connector -2- at gear detection sensor - G604- and move clear.





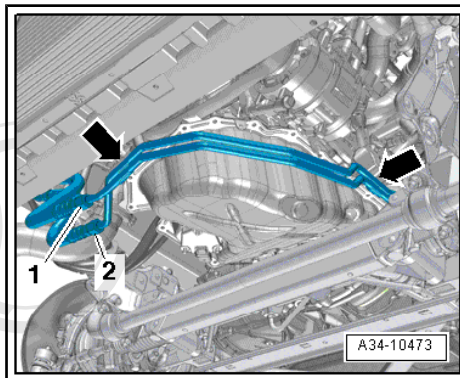
Vehicles with dual clutch gearbox/multitronic gearbox:

- Remove bolts -arrows- for ATF lines.



Note

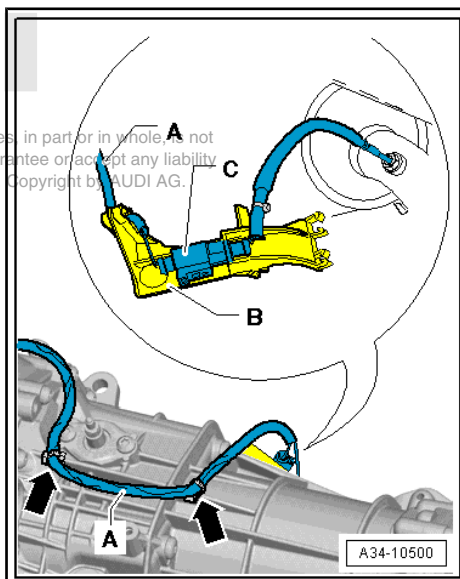
Disregard items -1 and 2-.



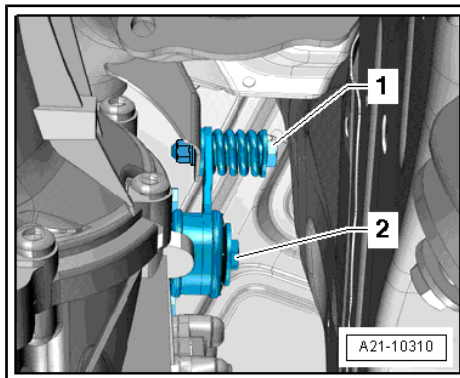
Continued for all vehicles:

- Unclip electrical wiring -A- from gearbox and unplug electrical connector -C-.

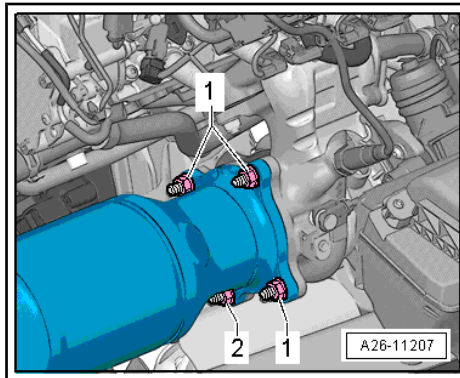
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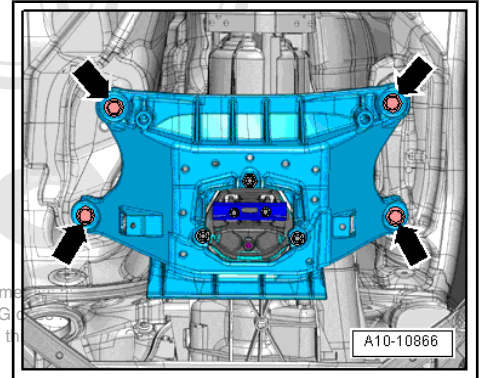
- Unfasten connection -1-, remove bolt -2- and take out mounting for catalytic converter.



- Remove nut -2- from below and take out catalytic converter downwards.

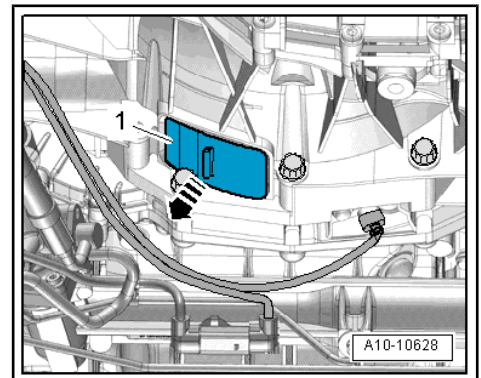


- Raise gearbox using engine and gearbox jack - V.A.G 1383 A- and fit bolts -arrows- for tunnel cross member.

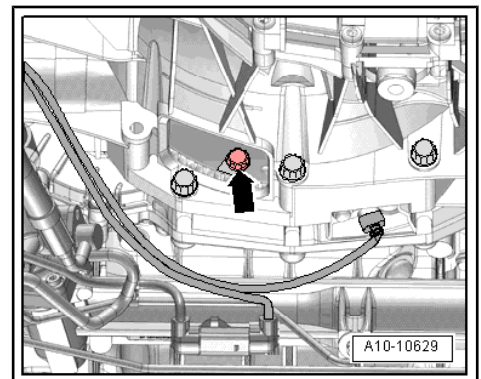


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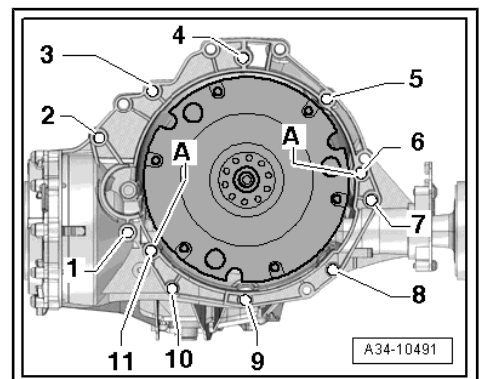
- Detach bottom cover -1- from gearbox -arrow-.



- Remove 3 bolts -arrow- for drive plate. Turn crankshaft each time by 120° in direction of engine rotation.



- Remove bolt -1- securing starter (work from side facing engine).
- Separate starter from gearbox and leave in position.
- Unscrew remaining bolts -8 ... 10- securing engine to gearbox.





- Set up support bracket - 10 - 222 A- with adapter - 10 - 222 A /8- on suspension turrets (left and right) as illustrated.
- Use gearbox support - 3147- to hook spindle onto gearbox.



Note

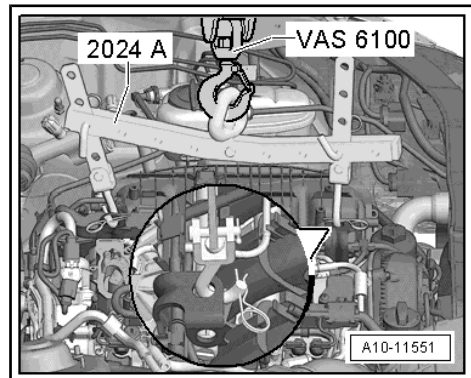
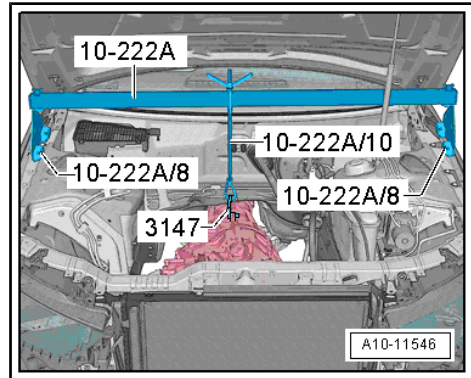
Shown in illustration with engine removed.

- Pre-tension spindle of support bracket - 10-222 A- slightly.
- Attach lifting tackle - 2024 A- to engine and workshop hoist - VAS 6100- as shown in illustration.



WARNING

The hook attachments and locating pins on the lifting tackle must be secured with locking pins.



- Tighten bolts -1- for left and right engine mountings.



Note

Disregard -arrow-.

- Raise engine until engine mountings are clear.
- Tighten spindle of support bracket - 10-222 A- further.



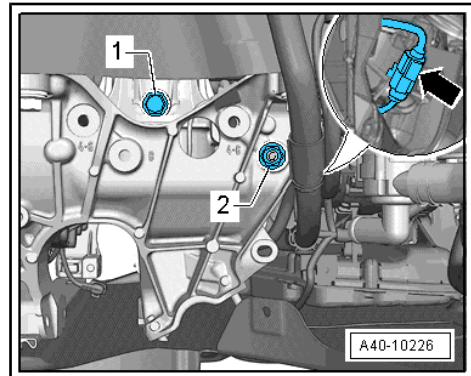
Caution

Danger of damage to hoses, pipes and wiring connections and to engine compartment.

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◆ **Check that all hoses and wiring connections between engine, gearbox, subframe and body have been detached.**

◆ **Carefully guide engine out of engine compartment when lifting out.**

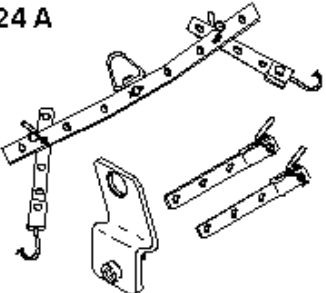

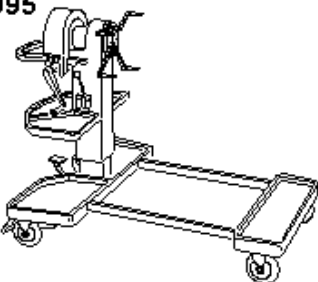


- Separate engine from gearbox and lift engine out of engine compartment.

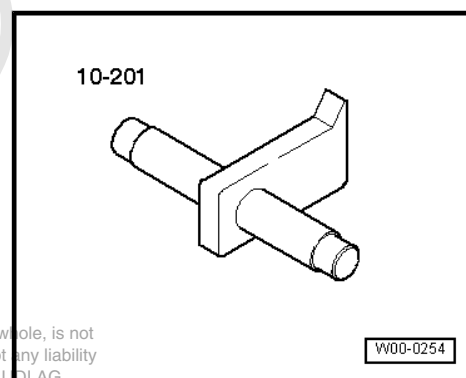
1.2 Securing engine to engine and gearbox support

Special tools and workshop equipment required

- ◆ Lifting tackle - 2024 A-
- ◆ Workshop hoist - VAS 6100-
- ◆ Engine and gearbox support - VAS 6095-

<p>2024 A</p> 	<p>VAS 6100</p> 
<p>VAS 6095</p> 	
	<p style="text-align: right;">W10-10006</p>

Counterhold tool - 10 - 201-



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Procedure

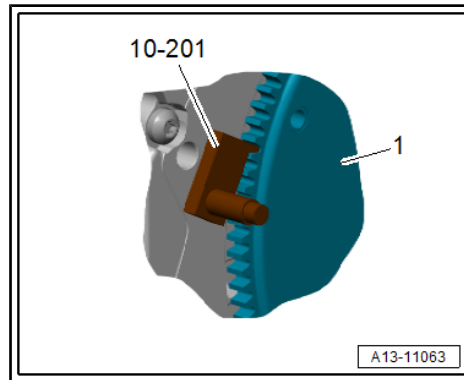
- Insert counterhold tool - 10 - 201- to slacken bolts.



Caution

Take care not to damage outer surface of bearing flange on drive plate.

- ◆ *Use a multi-point socket bit with a length of at least 40 mm to slacken and tighten the drive plate bolts.*



- Remove bolts and take off drive plate.



WARNING

Accident risk from loose components of lifting tackle.

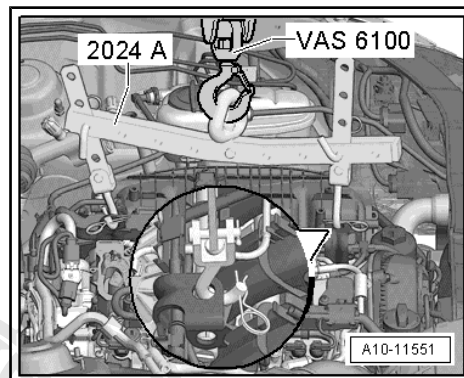
- ◆ *The support hooks and retaining pins on the lifting tackle must be secured with locking pins -arrows-.*

- Engage lifting tackle - 2024 A- on engine and workshop hoist - VAS 6100- .

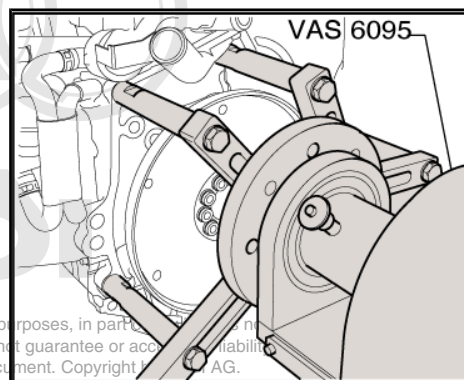


Note

To adjust to the centre of gravity of the assembly, the perforated rails of the support hooks must be positioned as shown.



- Secure engine to engine and gearbox support - VAS 6095- (gearbox end) as shown in illustration.

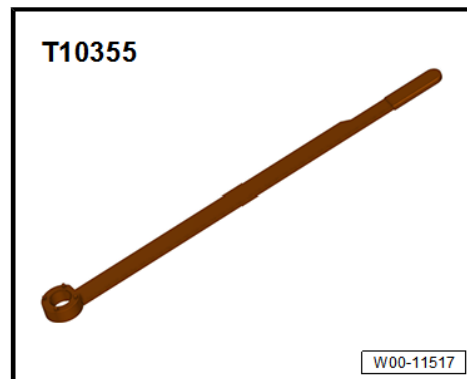


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1.3 Installing engine

Special tools and workshop equipment required

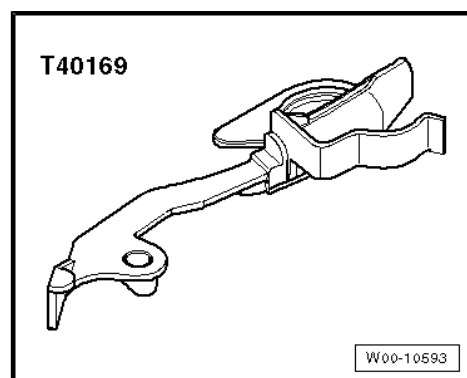
- ◆ Counterhold tool - T10355- for vehicles with dual clutch gear-box



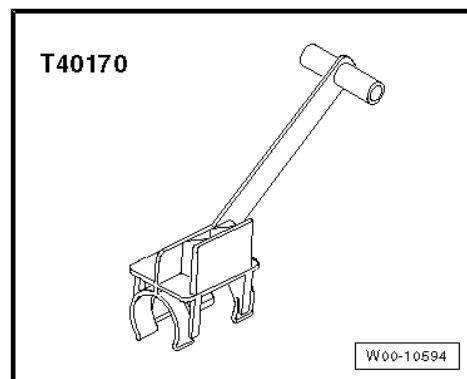
- ◆ Assembly aid - T40169-



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- ◆ Transport lock - T40170-



Tightening torques



Note

- ◆ *Tightening torques apply only to lightly greased, oiled, phosphated or black-finished nuts and bolts.*
- ◆ *Additional lubricants such as engine or gear oil may be used, but do not use lubricants containing graphite.*
- ◆ *Do not use degreased parts.*
- ◆ *Tolerance for tightening torques: $\pm 15\%$.*
- ◆ *After renewing engine, chain elongation must be adapted \Rightarrow Vehicle diagnostic tester; Guided Functions; 01 - Chain elongation adaption diagnosis.*

Tightening torques

\Rightarrow ["2.1 Exploded view - assembly mountings", page 34](#)



Further tightening torques

Component		Nm
Bolts/nuts	M6	9
	M8	20
	M10	40
	M12	65

Engine to gearbox ⇒ Rep. gr. 34 ; Removing and installing gearbox; Tightening torques for gearbox / ⇒ Rep. gr. 37 ; Removing and installing gearbox; Tightening torques for gearbox

Procedure



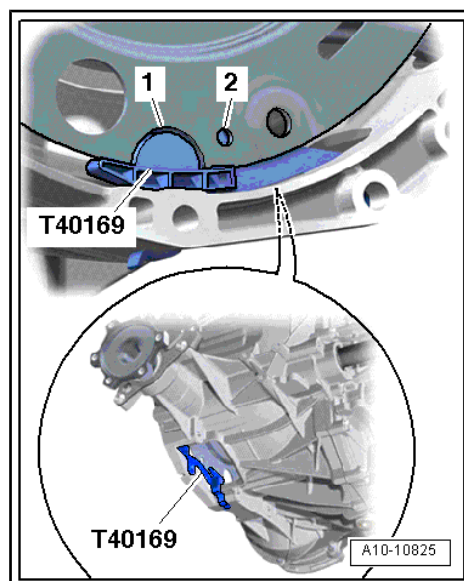
Note

- ◆ *Renew the bolts tightened with specified tightening angle.*
- ◆ *Renew self-locking nuts and bolts as well as seals, gaskets and O-rings.*
- ◆ *On vehicles with manual gearbox, a needle bearing is fitted in the drive plate. Before installing, check that the needle bearing is fitted. Removing and installing needle bearing in drive plate (pressing in and out) ⇒ [page 57](#).*
- ◆ *Hose connections and hoses for charge air system must be free of oil and grease prior to fitting.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ *Electronic parts catalogue* .*
- ◆ *To secure the charge air hoses at their connections, spray rust remover onto the worm thread of the used hose clips before installing.*
- ◆ *Fit all cable ties in the original positions when installing.*
- Check that dowel sleeves for centring engine and gearbox are fitted in the cylinder block; install missing dowel sleeves.
- The following preparations are required before joining engine and gearbox.
- Insert assembly aid - T40169- into gearbox housing and fly-wheel from below, as illustrated.

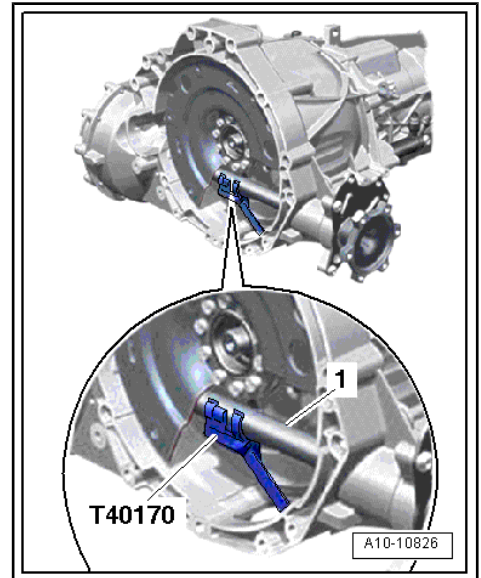


Note

There is only one inspection hole on the circumference; turn the clutch module accordingly.

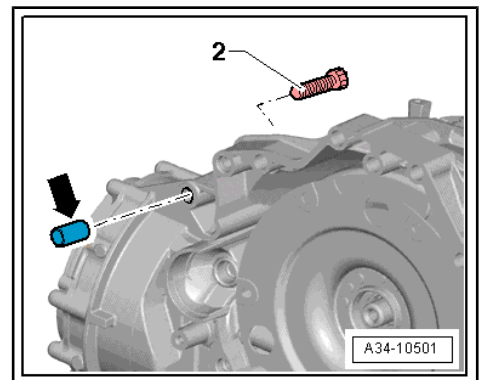


- Insert transport lock - T40170- into gearbox housing from below and clamp onto flange shaft -1-.



 **Note**

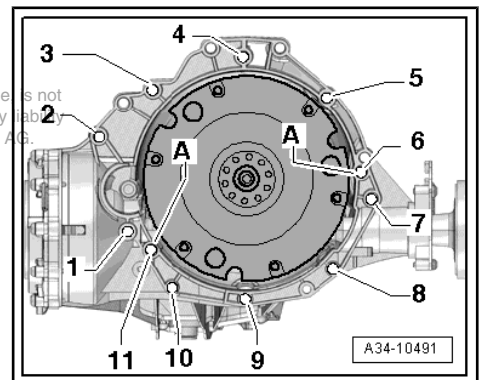
- ◆ Bolt -2- secures the starter to the gearbox and is provided with a spacer sleeve -arrow-.
- ◆ Pay attention to the spacer sleeve -arrow- when removing and installing the engine. The spacer sleeve must be fitted between starter and gearbox.



Vehicles with manual gearbox or multitrionic gearbox:

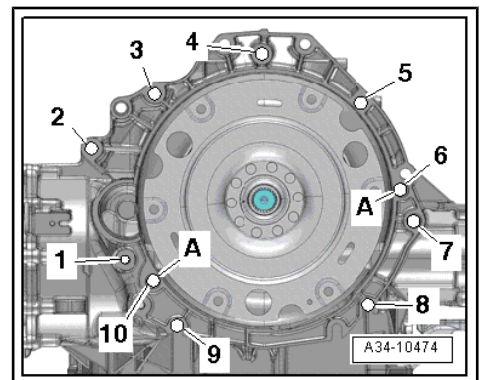
- Bring gearbox into position on engine and tighten bolts -7 ... 11- securing engine to gearbox.

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Vehicles with dual clutch gearbox:

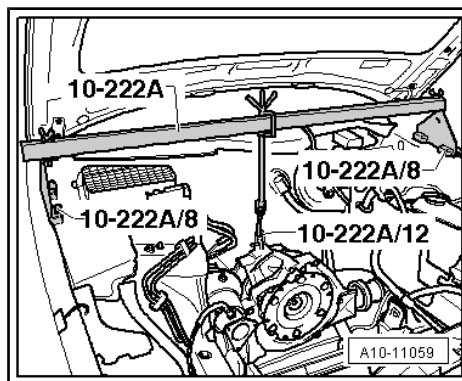
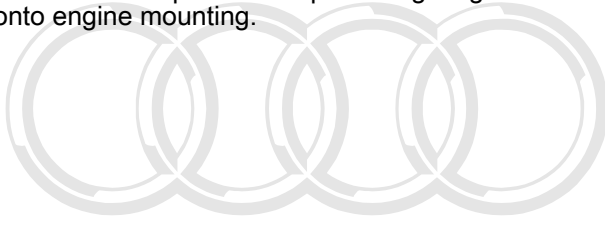
- Check whether dowel sleeves -A- for centring engine and gearbox are fitted in cylinder block; install missing dowel sleeves.
- Bring gearbox into position on engine and tighten bolts -7 ... 10- securing engine to gearbox.





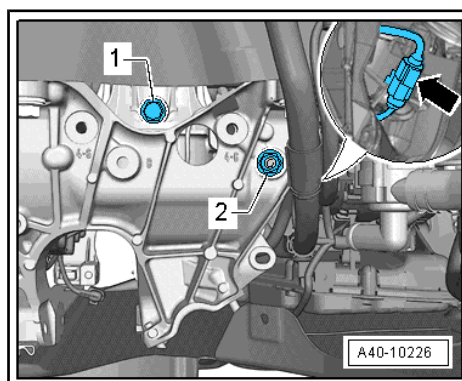
Continued for all vehicles:

- Release spindle of support bracket - 10-222 A- .
- Lower workshop hoist and place engine/gearbox assembly onto engine mounting.



- Fit bolts -1- for left and right engine mountings.
- Detach workshop hoist - VAS 6100- and lifting tackle - 2024 A- .

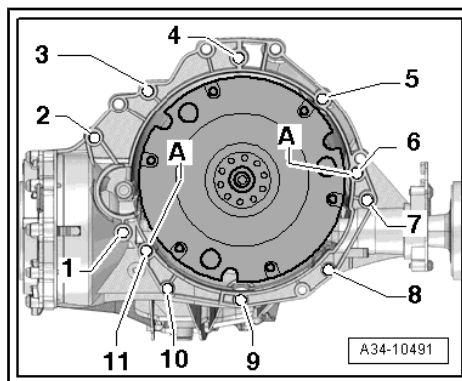
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- Screw in bolts -1 ... 6- securing engine to gearbox and tighten.

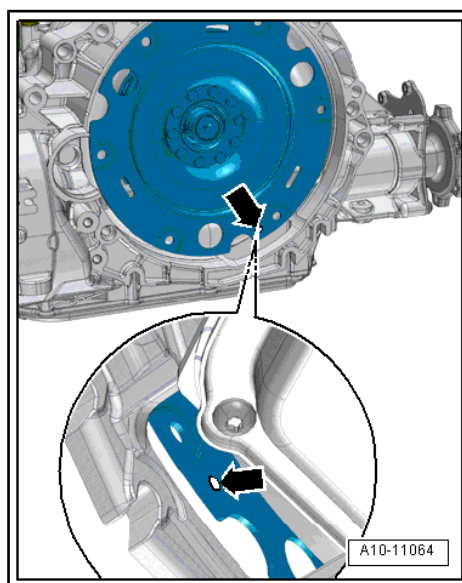
Note

- ◆ Disregard -item A-.
- ◆ Illustration shows manual gearbox (similar on other gearbox versions).



Vehicles with manual gearbox:

- Fit front wheels ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres; Tightening torque for wheel bolts .
- Engage 4th gear and turn front wheels in direction of travel until flywheel is rotated by one complete turn (360°).
- The inspection hole -arrow- should be visible again in the recess on the gearbox housing.



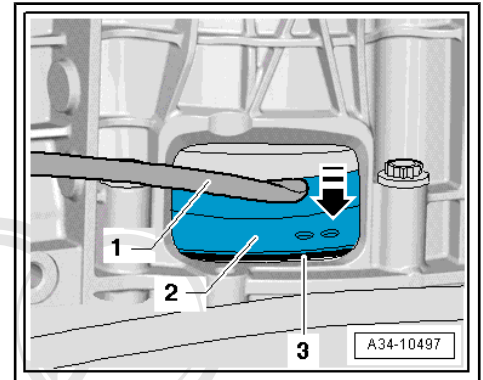
Continued for all vehicles:

- Remove transport lock - T40170- and assembly aid - T40169- .

 **Note**

The following step is necessary to ensure that the flywheel is straight and that it makes even contact with the drive plate.

- Use assembly lever -1- to press flywheel -2- slightly against drive plate -3- in direction of -arrow-.



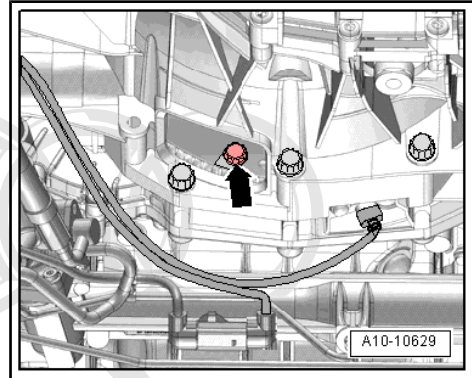
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Tightening sequence - flywheel to drive plate

- Screw in first bolt -arrow- hand-tight.
- Turn crankshaft by 120° in direction of engine rotation and fit second bolt hand-tight.
- Turn crankshaft by 120° in direction of engine rotation once again.
- Now tighten third bolt to specified torque ⇒ Rep. gr. 30 ; Clutch; Exploded view - clutch module or ⇒ Rep. gr. 37 ; Removing and installing gearbox .
- Then tighten remaining bolts to final torque.



The remaining installation steps are carried out in the reverse sequence.

- Install starter ⇒ Electrical system; Rep. gr. 27 ; Starter; Removing and installing starter .
- Install ATF lines ⇒ Rep. gr. 34 ; ATF circuit; Removing and installing ATF lines or ⇒ Rep. gr. 37 ; ATF circuit; Removing and installing ATF lines .
- Install catalytic converter ⇒ [page 301](#) .
- Install front silencer ⇒ [page 296](#) .
- Align the exhaust system so it is free of stress ⇒ [page 298](#) .
- Install air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket .
- Install poly V-belt ⇒ [page 41](#) .
- Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Install engine control unit ⇒ [page 289](#) .
- Install electrical wiring, terminal 30 wiring junction 2 - TV22- and cover for electronics box in engine compartment ⇒ Electrical system; Rep. gr. 97 ; Relay carriers, fuse carriers, electronics boxes .
- Install body brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links; Removing and installing body brace .
- Install filler neck for washer fluid reservoir ⇒ Electrical system; Rep. gr. 92 ; Windscreen washer system .
- Observe steps required after re-connecting battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .



Caution

Risk of irreparable damage to control units because of excessive voltage.

- ◆ ***Never use battery charging equipment for boost starting.***

- Install air cleaner housing ⇒ [page 256](#) .
- Reset service position ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Setting service position and returning to normal position .

Check oil level: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé
⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ;
Booklet 818 .

- Fill up with coolant ⇒ [page 196](#) .



Note

Do not reuse coolant.

- Install noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .
- Install front wheel housing liners ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .
- After renewing engine, chain elongation must be adapted ⇒ Vehicle diagnostic tester ; Guided Functions ; 01 - Chain elongation adaption diagnosis.
- After renewing engine, misfire adaptations must be reset. To do so, select 01 - Reset adaptations misfires in Guided Functions mode of ⇒ Vehicle diagnostic tester.

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2 Assembly mountings

⇒ "2.1 Exploded view - assembly mountings", page 34

⇒ "2.2 Removing and installing engine mountings", page 35

2.1 Exploded view - assembly mountings

1 - Not fitted

2 - Bolt

- 20 Nm

3 - Retaining plate

- For engine mounting
- Renew bracket if engine mounting is defective
- Check bracket on opposite side; renew if necessary

4 - Retainer

- For hydraulic line

5 - Nut

- 9 Nm

6 - Bolt

- 40 Nm

7 - Engine support

8 - Bolt

- 10 Nm

9 - Heat shield

10 - Bolt

- Renew
- 90 Nm + turn 90° further

11 - Engine mounting

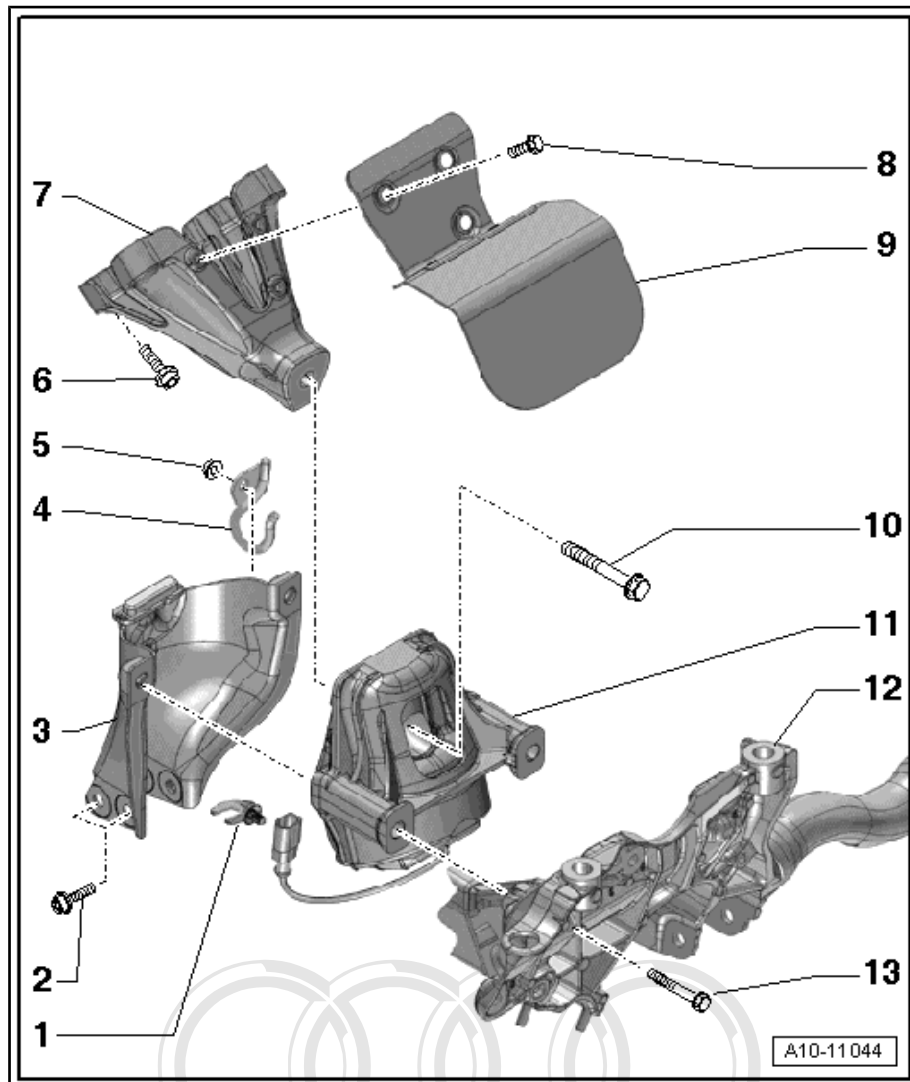
- Depending on version: with left electrohydraulic engine mounting solenoid valve - N144- / right electrohydraulic engine mounting solenoid valve - N145-

- Removing and installing ⇒ [page 35](#)

12 - Subframe

13 - Bolt

- 55 Nm



A10-11 044

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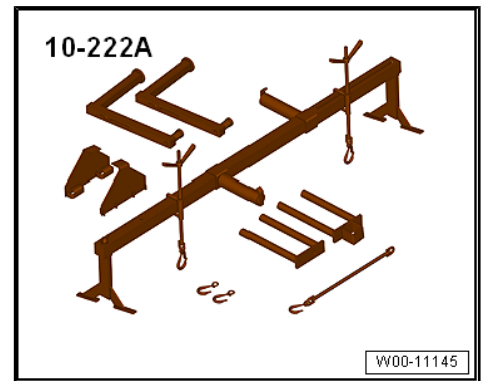
2.2 Removing and installing engine mountings

Note

- ◆ To avoid repeat repairs, proceed as follows if an engine mounting is defective:
- ◆ Renew engine mounting and corresponding bracket.
- ◆ On some vehicle versions, the engine mounting on the other side of the vehicle has to be renewed as well; for allocation refer to ⇒ *Electronic parts catalogue*.
- ◆ The following chapter describes the procedure for the engine mounting (left-side).

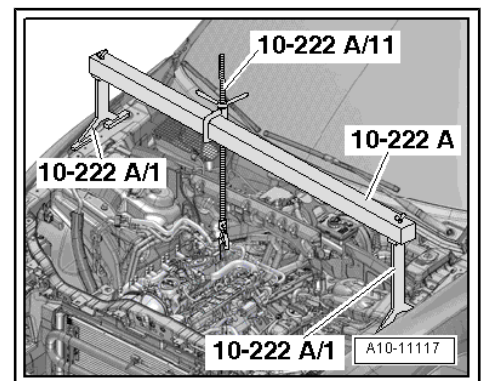
Special tools and workshop equipment required

- ◆ Support bracket - 10 - 222 A-



Removing

- Remove engine cover panel ⇒ [page 37](#).
- Set up support bracket - 10 - 222 A- on suspension turrets (left and right) as illustrated.
- Attach spindle -10 - 222 A /11- to rear engine lifting eye.
- Partly take up weight of engine with spindle.

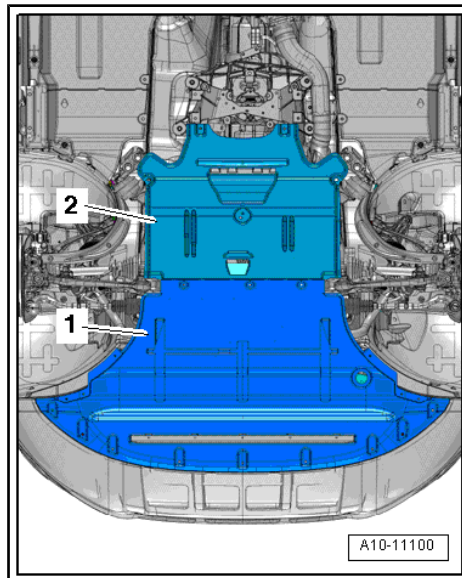


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- Remove front left wheel.
- Remove front noise insulation -1- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .
- Remove wheel housing liner (front left) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .



- If fitted: Move clear and unplug electrical connector -3- for electrohydraulic engine mounting solenoid valve.
- Remove bolts -1, 4, 5- for engine mounting.
- Move retaining plate -2- for engine mounting clear to the side.
- Detach engine mounting.

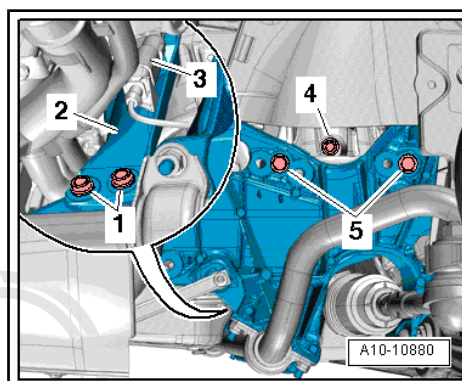
Installing

Installation is carried out in the reverse order; note the following:

Note

Renew the bolts tightened with specified tightening angle.

- Install engine cover panel ⇒ [page 37](#) .
- Install noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .
- Install front wheel housing liner (left-side) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .
- Fit front wheel ⇒ [Running gear, axles, steering; Rep. gr. 44](#) ; Wheels, tyres; Tightening torque for wheel bolts



Tightening torques

- ◆ ⇒ ["2.1 Exploded view - assembly mountings", page 34](#)

3 Engine cover panel

⇒ **“3.1 Removing and installing engine cover panel”, page 37**

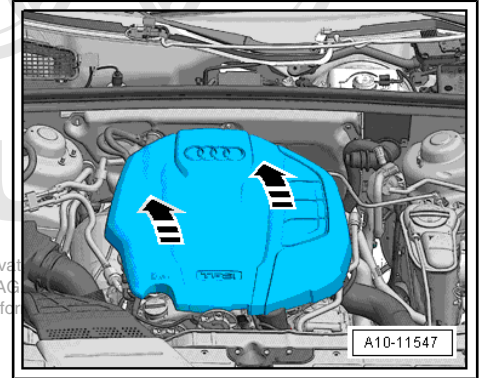
3.1 Removing and installing engine cover panel

Removing

- Carefully pull engine cover panel off retaining pins one after another -arrows-. Do not jerk engine cover panel away, and do not try to pull on one side only.

Installing

- To avoid damage, do not strike the engine cover panel with your fist or with any kind of tool.
- Position engine cover panel, paying attention to oil filler neck and dipstick.
- Press engine cover panel into rubber grommets first on left side, then on right side.



13 – Crankshaft group

1 Cylinder block (pulley end)

⇒ “1.1 Exploded view - cylinder block (pulley end)”, page 38

⇒ “1.2 Removing and installing poly V-belt”, page 40

⇒ “1.3 Removing and installing tensioner for poly V-belt”, page 41

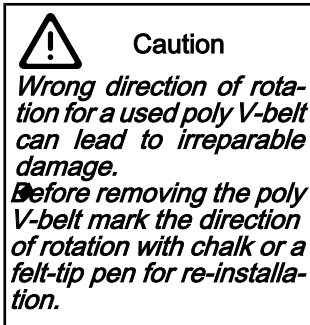
⇒ “1.4 Removing and installing vibration damper”, page 42

⇒ “1.5 Removing and installing bracket for ancillaries”, page 49

1.1 Exploded view - cylinder block (pulley end)

1 - Poly V-belt

- Check for wear
- Do not kink
- Routing of poly V-belt
⇒ page 40



- Removing and installing
⇒ page 40
- When installing, make sure it is properly seated on pulleys.

2 - Tensioner for poly V-belt

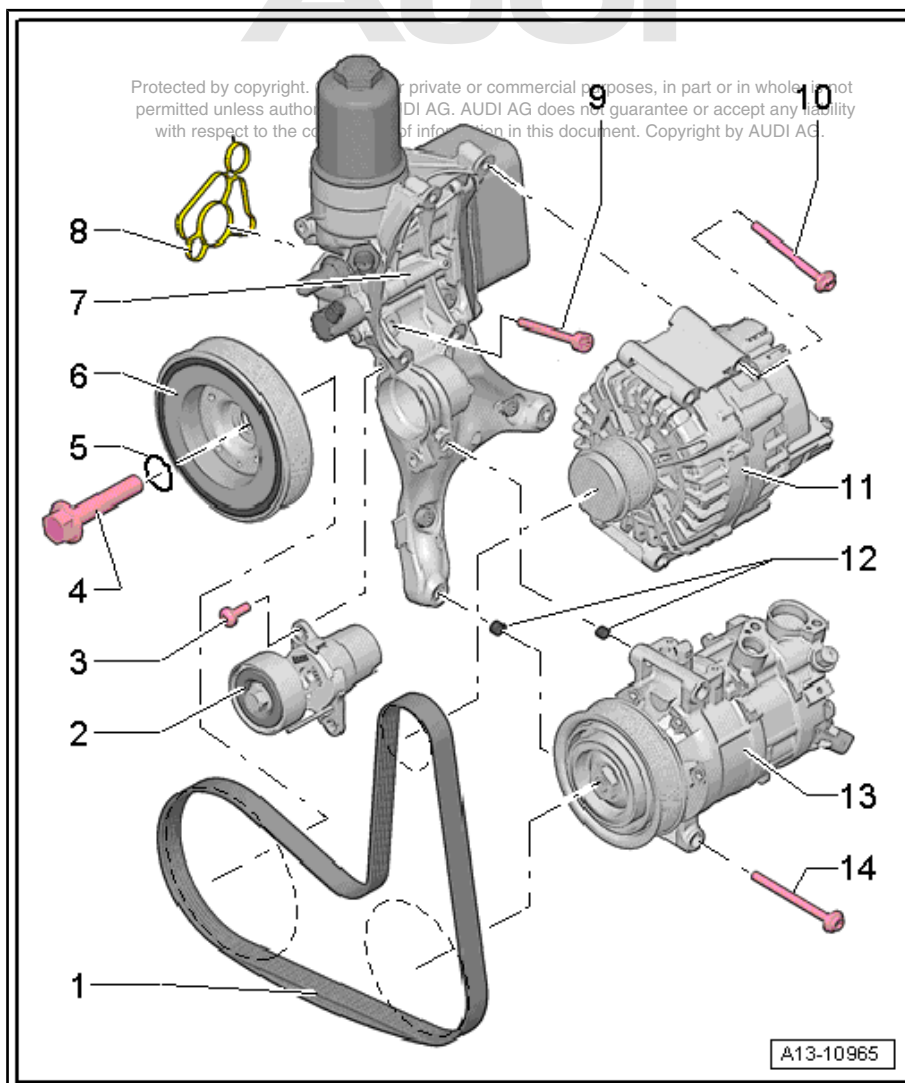
- Pivot with wrench to slacken poly V-belt
- Lock in position with locking pin - T10060 A-
- Removing and installing
⇒ page 41

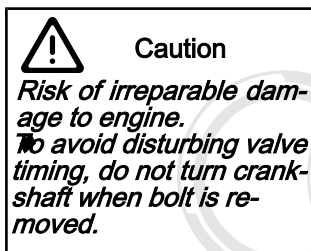
3 - Bolt

- Renew
- 8 Nm + turn 45° further

4 - Bolt

- Renew
- Lubricate O-ring with oil
- 150 Nm + turn 90° further
- Use counterhold tool - T10355- when loosening and tightening





5 - O-ring

- Not available as replacement part; supplied together with bolt

6 - Vibration damper

- With poly V-belt pulley
- Removing and installing ⇒ [page 42](#)



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7 - Bracket for ancillaries

- With oil filter and engine oil cooler
- Removing and installing bracket for ancillaries ⇒ [page 49](#)
- Removing and installing engine oil cooler ⇒ [page 177](#)

8 - Gasket

- Renew

9 - Bolt

- Renew
- Tightening torque and sequence ⇒ [page 40](#)

10 - Bolt

- Tightening torque ⇒ Electrical system; Rep. gr. 27 ; Alternator; Exploded view - alternator

11 - Alternator

- Removing and installing ⇒ Electrical system; Rep. gr. 27 ; Alternator; Removing and installing alternator

12 - Dowel sleeves

- For air conditioner compressor

13 - Air conditioner compressor

- Do not unscrew or disconnect refrigerant hoses or pipes
- Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket

14 - Bolt

- Tightening torque ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket .



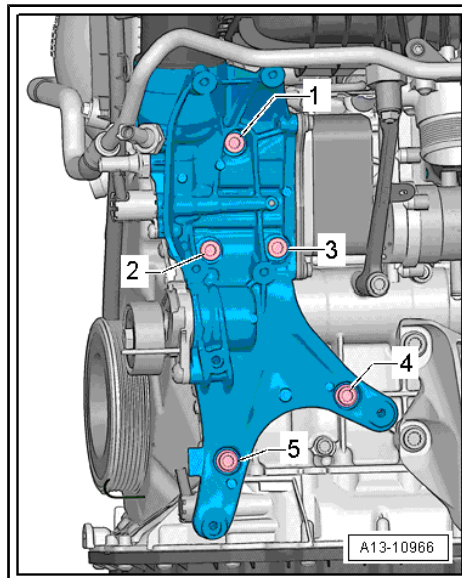
Bracket for ancillaries - tightening torque and tightening sequence



Note

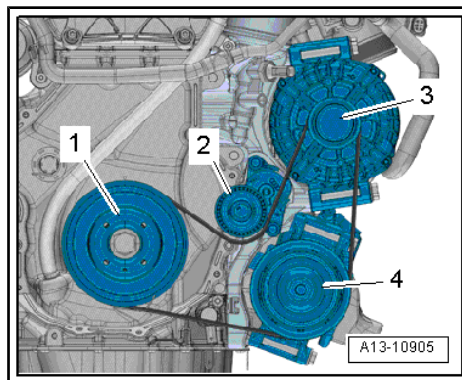
Renew the bolts tightened with specified tightening angle.

- Fit bracket for ancillaries (first tighten bolt -4-).
- Tighten bolts in the sequence -1 ... 5- in 3 stages as follows:
 1. Tighten bolts hand tight.
 2. Tighten bolts to 20 Nm.
 3. Turn bolts 90° further.



Routing of poly V-belt

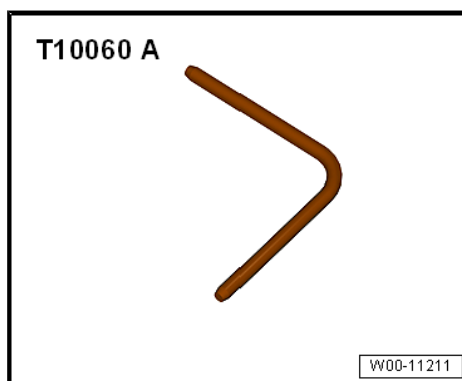
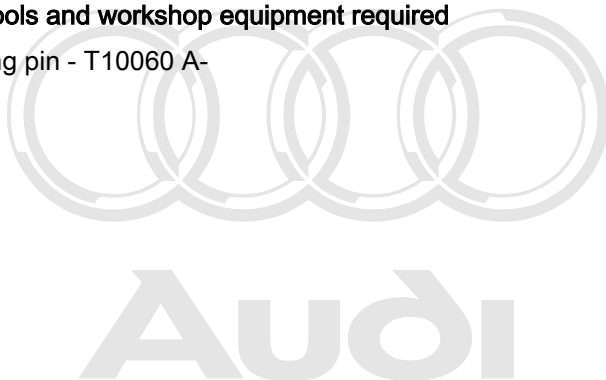
- 1 - Vibration damper
- 2 - Tensioner for poly V-belt
- 3 - Alternator
- 4 - Air conditioner compressor



1.2 Removing and installing poly V-belt

Special tools and workshop equipment required

- ◆ Locking pin - T10060 A-



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Removing

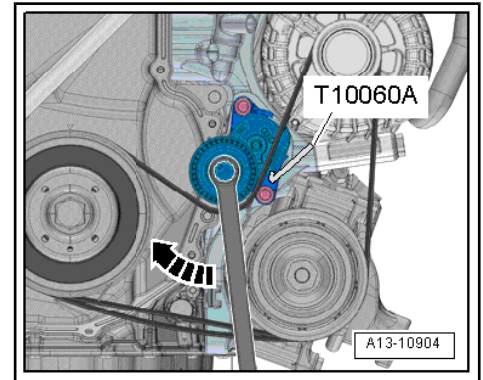


Caution

Wrong direction of rotation for a used poly V-belt can lead to irreparable damage.

- ◆ *Before removing the poly V-belt mark the direction of rotation with chalk or a felt-tip pen for re-installation.*

- To slacken poly V-belt turn tensioner in direction of -arrow-.
- Lock tensioner with locking pin - T10060 A- .
- Take off poly V-belt.



Installing

Installation is carried out in the reverse order; note the following:

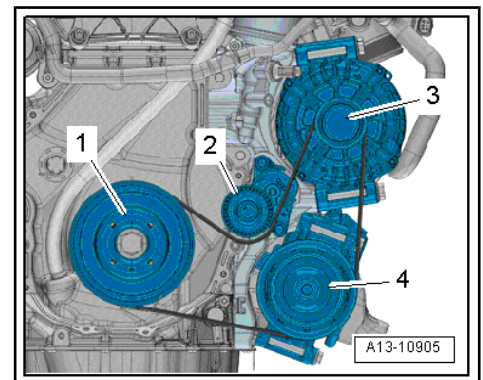


Note

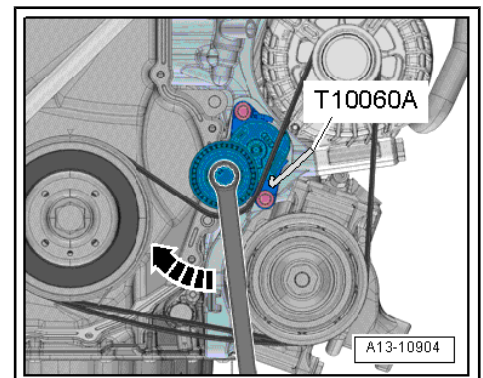
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Secure alternator and air conditioner compressor before fitting poly V-belt.

- Fit poly V-belt as shown in illustration.



- Turn tensioner in direction of -arrow- and remove locking pin - T10060 A- .
- Release tensioner.
- Check that poly V-belt is properly seated.
- Start engine and check that poly V-belt runs properly.



1.3 Removing and installing tensioner for poly V-belt

Removing

- Detach poly V-belt from tensioner
 ⇒ ["1.2 Removing and installing poly V-belt", page 40](#) .



- Remove bolts -arrows- and take off tensioner -1- for poly V-belt from bracket for ancillaries.

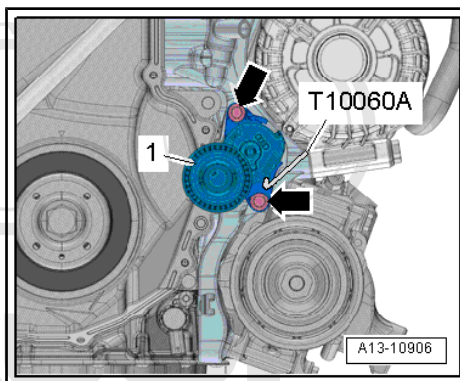
Installing

Installation is carried out in the reverse order; note the following:

- Install poly V-belt => [page 40](#) .

Tightening torques

- ◆ => "1.1 Exploded view - cylinder block (pulley end)", [page 38](#)

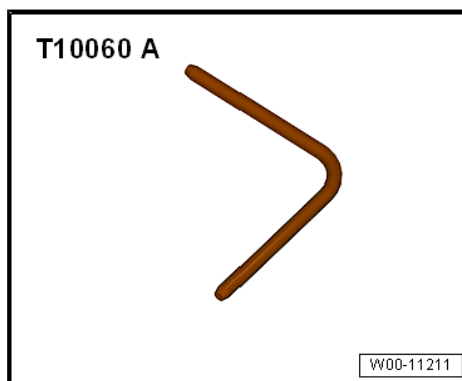


1.4 Removing and installing vibration damper

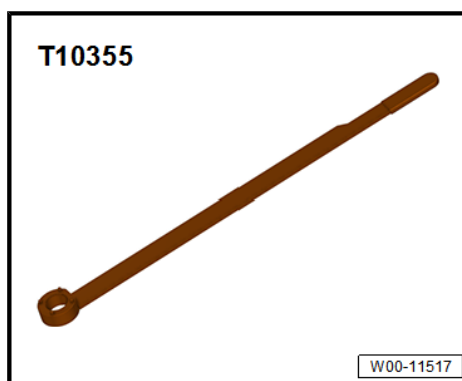
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Special tools and workshop equipment required

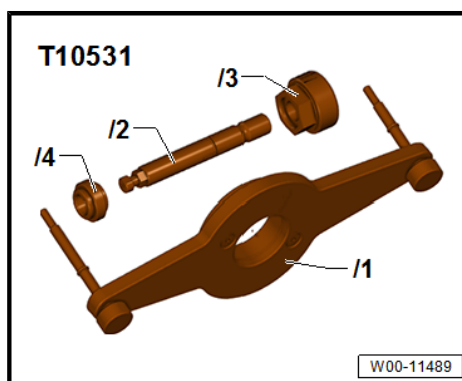
- ◆ Locking pin - T10060 A-



- ◆ Counterhold tool - T10355-



- ◆ Assembly tool - T10531-



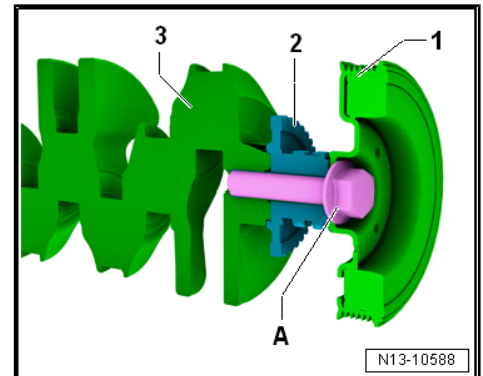
Components of assembly tool - T10531- :

- ◆ Bracket - T10531/1-

- ◆ Clamping pin - T10531/2-
- ◆ Turning-over tool - T10531/3-
- ◆ Flange nut - T10531/4-

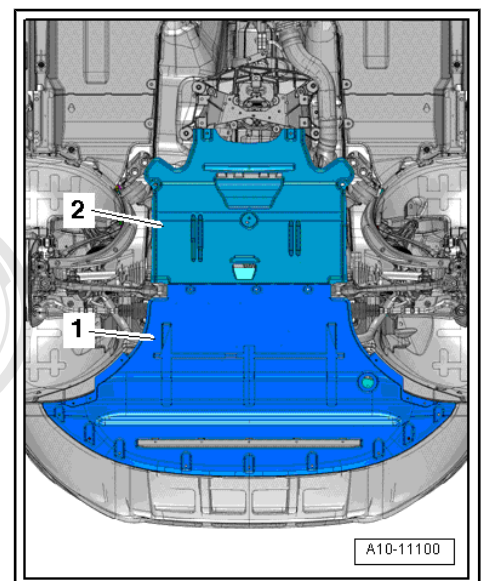
 **Note**

The securing bolt for the vibration damper -A- secures the vibration damper -1-, timing chain sprocket -2- and crankshaft -3- to each other. Before removing the securing bolt, the timing chain sprocket must be secured to the crankshaft as described below.

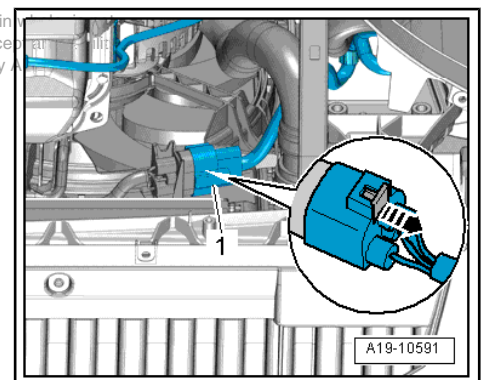


Removing

- Remove front noise insulation -1- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .



- Take electrical connector -1- for radiator fan out of bracket and unplug connector (push retainer to the rear -arrow- and press down release catch).
- Move clear electrical wiring harness leading to radiator fan control unit - J293- .





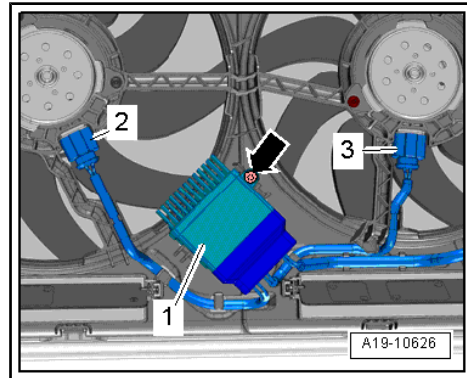
- Unplug electrical connectors -2- and -3-.



Note

Some versions have only one radiator fan.

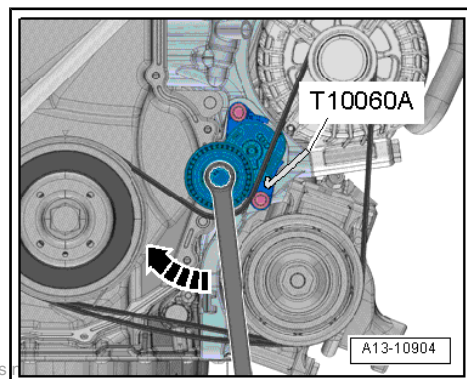
- Unscrew bolt -arrow- and remove radiator fan control unit -1-.



Caution

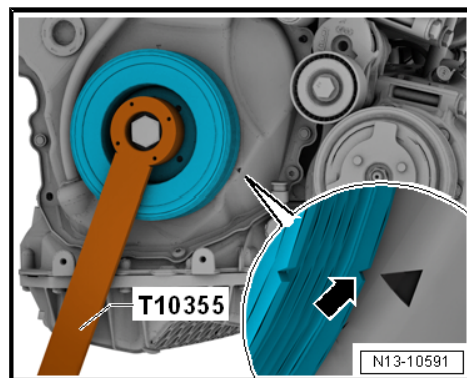
Wrong direction of rotation for a used poly V-belt can lead to irreparable damage.

- ◆ **Before removing the poly V-belt mark the direction of rotation with chalk or a felt-tip pen for re-installation.**



- To slacken poly V-belt turn tensioner in direction of -arrow-.
- Lock tensioner with locking pin - T10060 A-
- Take off poly V-belt.

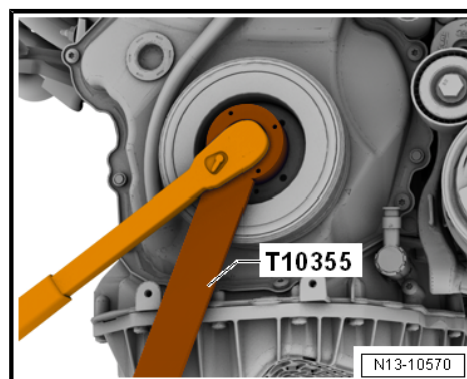
- Turn vibration damper to "TDC" position -arrow- using counterhold tool - T10355- .
- Notch on vibration damper must align with arrow marking on cover for timing chains (bottom).
- Marking on cover must be in »4 o'clock position«.



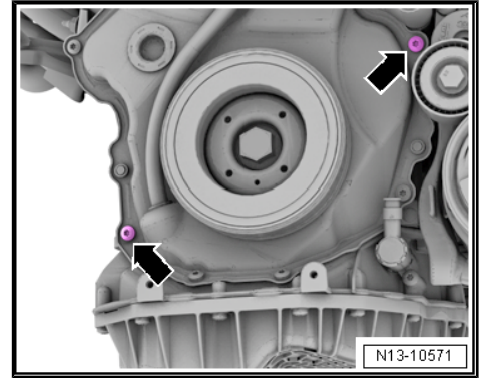
Caution

Do not loosen securing bolt for vibration damper by more than a half turn at this stage.

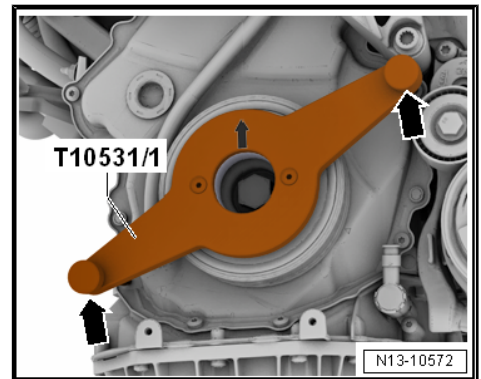
- Loosen bolt for vibration damper by approx. a half turn using counterhold tool - T10355- .
- If vibration damper has been twisted out of position, correct TDC position.



- Remove bolts -arrows- (as illustrated) from timing chain cover. These bolts must be renewed.



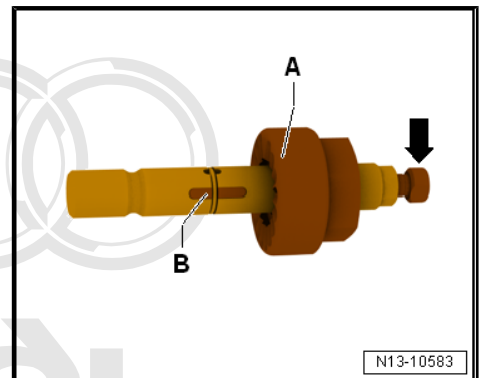
- Apply support - T10531/1- (as illustrated) to vibration damper and secure hand-tight with knurled screws -arrows-.
- Remove bolt for vibration damper completely.



- Check whether turning-over tool -A- slides easily over clamps -B-. Turn tensioning bolt -arrow- if necessary.

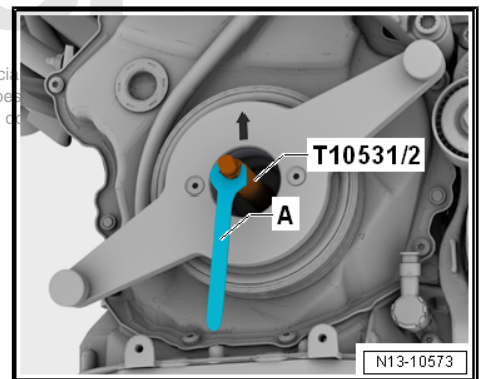
 **Note**

Do not turn the tensioning bolt from this stage onwards; otherwise the clamping pin - T10531/2- will get stuck when it is screwed into the crankshaft.



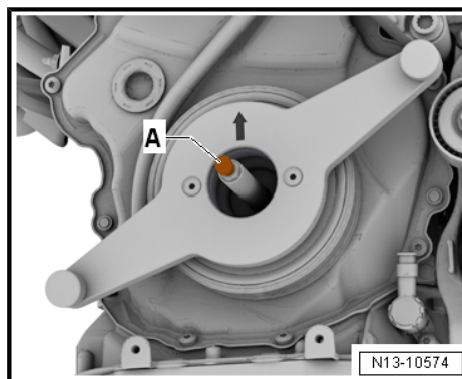
- Screw clamping pin - T10531/2- into crankshaft and hand-tighten with open-end spanner, 12 mm -A-.

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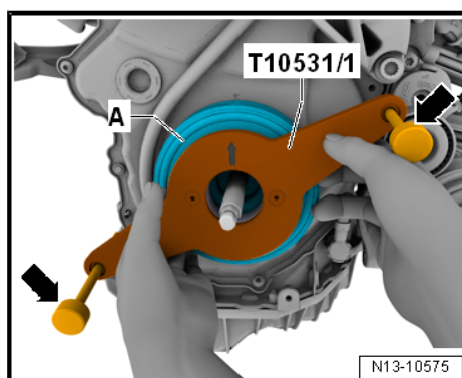




- Hand-tighten tensioning bolt -A- to secure chain sprocket to crankshaft.

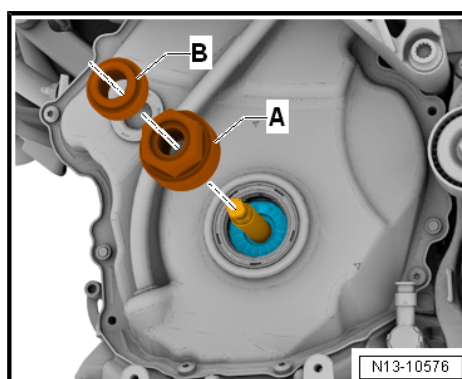


- Remove knurled screws -arrows-. Detach support - T10531/1- and vibration damper -A-.

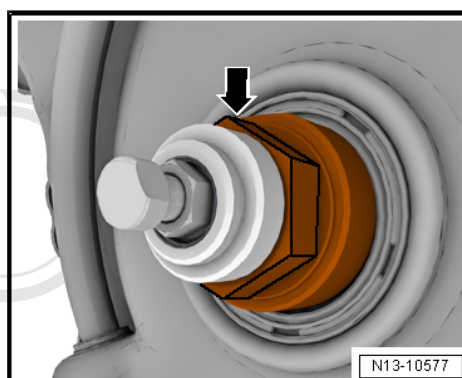


If crankshaft needs to be rotated without vibration damper:

- Fit turning-over tool -A- onto clamping pin (pay attention to tooth-shaped profile on chain sprocket). In TDC position, flat surface of tool faces upwards.
- Tighten turning-over tool with flange nut -B-.



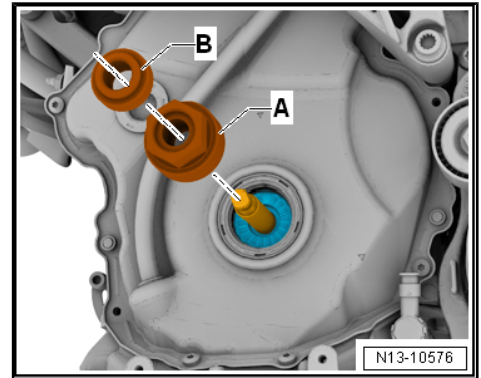
- Crankshaft can now be rotated at hexagon flats -arrow-.



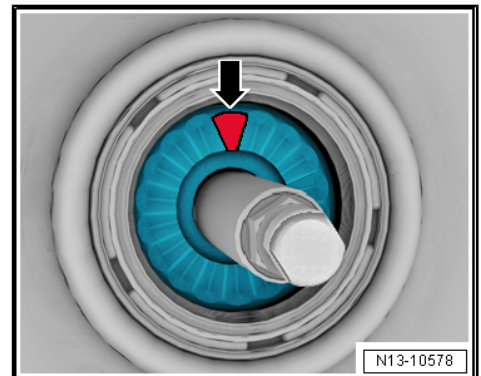
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Installing vibration damper:

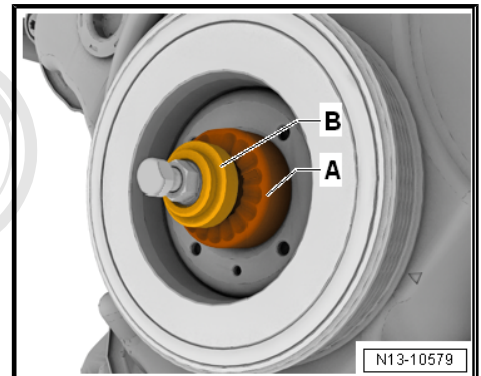
- If necessary, detach flange nut -B- and turning-over tool -A- from clamping pin.



- Fit vibration damper in TDC position (pay attention to tooth-shaped profile -arrow- on chain sprocket).

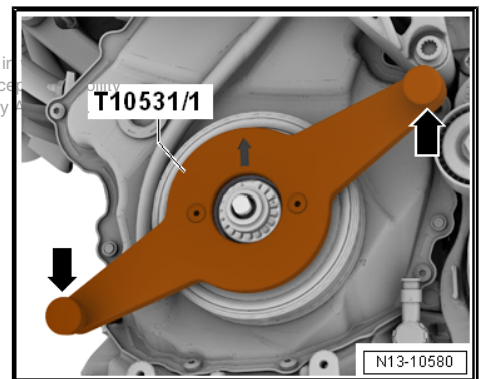


- Fit turning-over tool -A- onto clamping pin so that hexagon flats face towards vibration damper.
- Screw flange nut -B- on while moving vibration damper back and forth slightly to check whether vibration damper is seated correctly in tooth-shaped profile. Tighten flange nut until vibration damper can no longer be rotated.



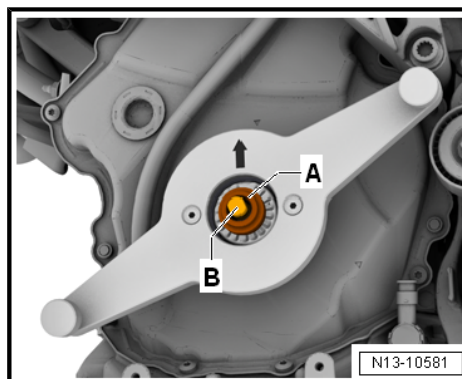
- Apply support - T10531/1- (as illustrated) to vibration damper and secure hand-tight with knurled screws -arrows-

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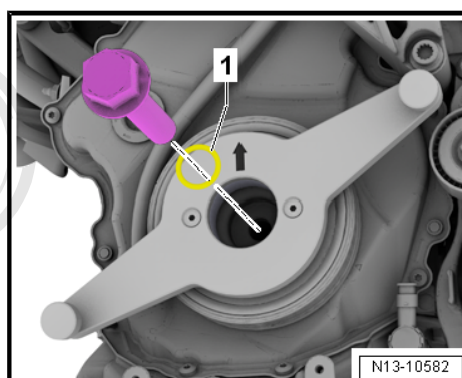




- Unscrew flange nut -A- and loosen tensioning bolt -B-.
- Unscrew clamping pin and remove with turning-over tool .

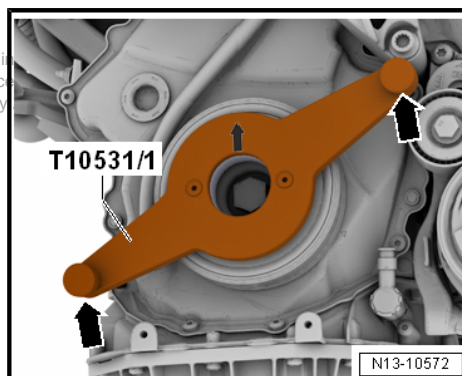


- Screw in new bolt for vibration damper with lubricated O-ring -1- hand-tight.

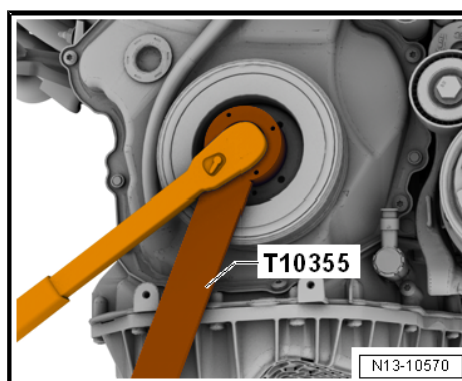


- Remove knurled screws -arrows- and detach support - T10531/1- .

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- Tighten bolt for vibration damper using counterhold tool - T10355- .



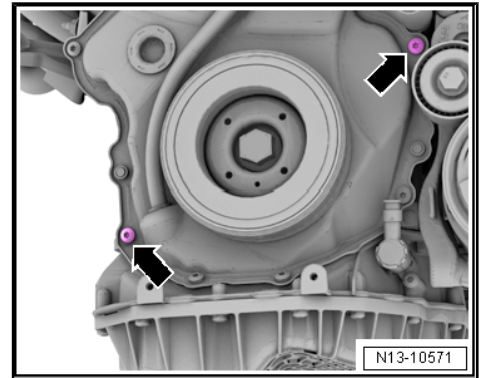
- Screw in new securing bolts -arrows-.

Remaining installation steps are carried out in reverse sequence; note the following:

- Install poly V-belt ⇒ [page 40](#) .
- Install radiator fan control unit - J293- ⇒ [page 229](#) .

Tightening torques

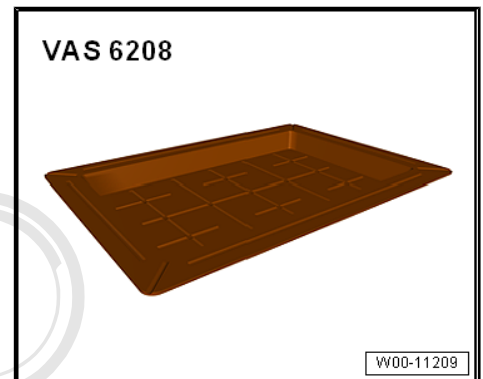
- ◆ ⇒ [“1.1 Exploded view - cylinder block \(pulley end\)”, page 38](#)



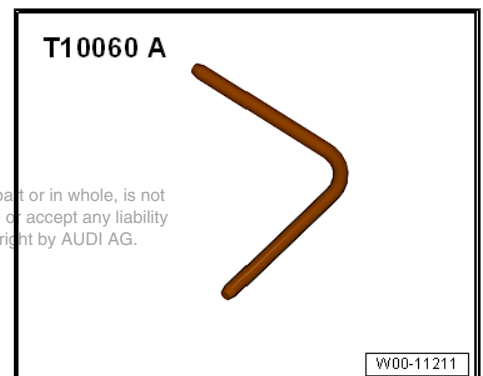
1.5 Removing and installing bracket for ancillaries

Special tools and workshop equipment required

- ◆ Drip tray for workshop hoist - VAS 6208-




- ◆ Locking pin - T10060 A-



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Removing

 **WARNING**

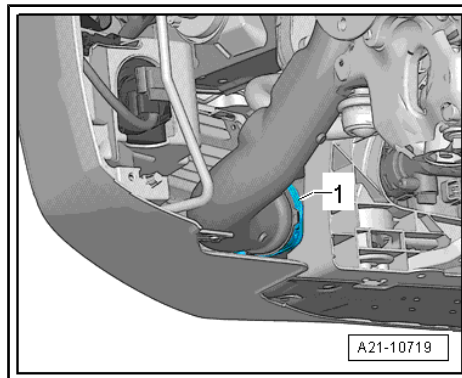
Hot steam/hot coolant can escape - risk of scalding.

- ◆ *The cooling system is under pressure when the engine is hot.*
- ◆ *Cover filler cap on coolant expansion tank with a cloth and open carefully to dissipate pressure.*

- Drain coolant ⇒ [page 194](#) .



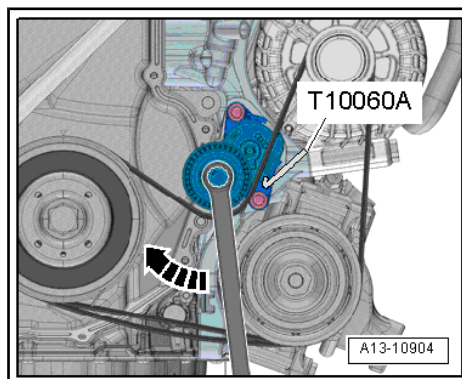
- Release hose clip -1- and disconnect air hose.



Caution

Wrong direction of rotation for a used poly V-belt can lead to irreparable damage.

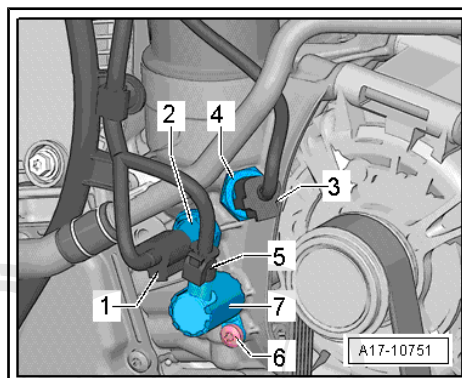
◆ *Before removing the poly V-belt mark the direction of rotation with chalk or a felt-tip pen for re-installation.*



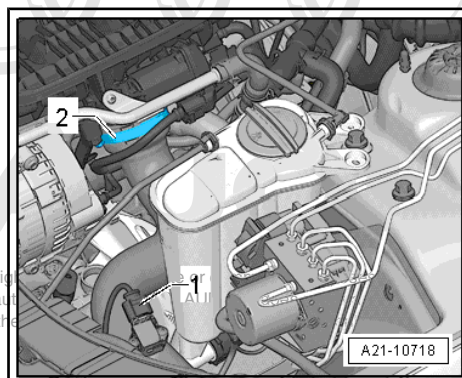
- To slacken poly V-belt turn tensioner in direction of -arrow-.
- Lock tensioner with locking pin - T10060 A- .
- Take off poly V-belt.

- Unplug electrical connectors:

- 1 - For oil pressure switch - F22- -item 2-
- 3 - For oil pressure switch for reduced oil pressure - F378- -item 4-
- 5 - For piston cooling jet control valve - N522- -item 7-



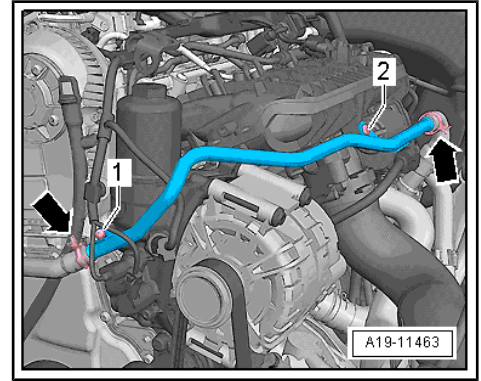
- Unplug electrical connector -1- for charge pressure sender - G31- and move clear.
- Open hose clip -2- and detach air hose.




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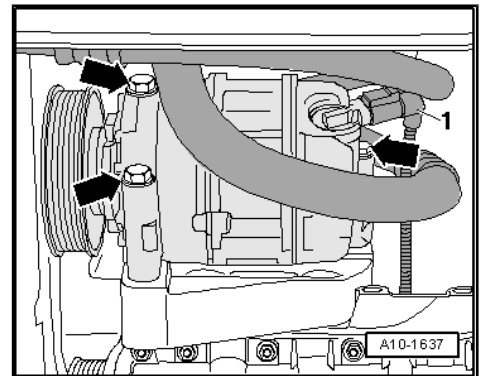
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- Unscrew bolts -1- and -2- and swivel coolant pipe (front) upwards.
- Remove alternator ⇒ Electrical system; Rep. gr. 27 ; Alternator; Removing and installing alternator .




- Unplug electrical connector -1- for magnetic clutch on air conditioner compressor.

 **WARNING**
Risk of injury caused by refrigerant.
 ♦ *The air conditioner refrigerant circuit must not be opened.*



- Remove bolts -arrows- for air conditioner compressor.

 **Caution**
Danger of damage to refrigerant lines and hoses.
 ♦ *Do NOT stretch, kink or bend refrigerant lines and hoses.*

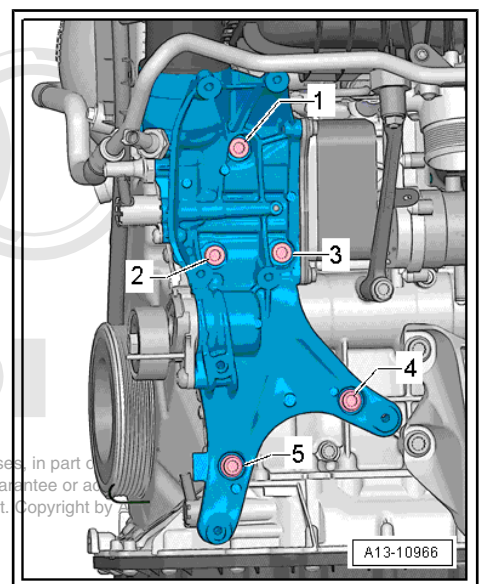
- Tie up air conditioner compressor together with refrigerant hoses to longitudinal member (refrigerant hoses remain connected).
- Remove oil filter ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .
- Unscrew bolts -1 ... 5- and detach bracket for ancillaries from coolant pump housing.

Installing

Installation is carried out in the reverse order; note the following:

 **Note**

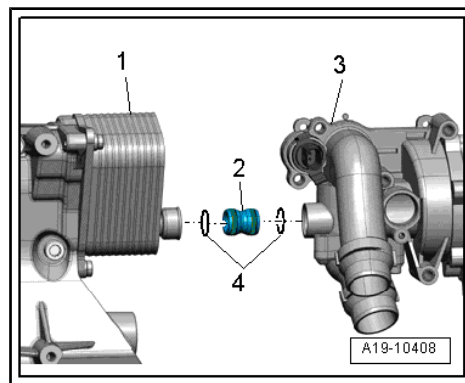
- ♦ *Renew the bolts tightened with specified tightening angle.*
- ♦ *Renew O-rings and gaskets.*



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- Lubricate new O-rings -4- lightly with coolant additive, for coolant refer to ⇒ Electronic parts catalogue .
- Insert connection -2- into coolant pump housing -3-.
- Push bracket for ancillaries -1- onto connection, fit bolts and tighten; tightening sequence ⇒ [page 40](#) .
- Install air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket .
- Install alternator ⇒ Electrical system; Rep. gr. 27 ; Alternator; Removing and installing alternator .
- Install poly V-belt ⇒ [page 40](#) .
- Fill up with coolant ⇒ [page 196](#) .
- Install oil filter and check oil level: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .



Tightening torques

- ◆ ⇒ [“1.1 Exploded view - cylinder block \(pulley end\)”, page 38](#)



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2 Cylinder block (gearbox end)

⇒ [“2.1 Exploded view - cylinder block \(gearbox end\)”, page 53](#)

⇒ [“2.2 Removing and installing drive plate”, page 54](#)

⇒ [“2.3 Removing and installing sealing flange \(gearbox end\)”, page 55](#)

⇒ [“2.4 Renewing needle bearing in drive plate”, page 57](#)

2.1 Exploded view - cylinder block (gearbox end)

1 - Cylinder block

2 - Dowel sleeves

3 - Sealing flange (gearbox end)

- With oil seal
- Renew after removing
- Do not lubricate oil seal
- Removing and installing
⇒ [page 55](#)
- Before installing, remove oil residue from crankshaft journal with a clean cloth
- Guide sleeve is not to be removed until sealing flange has been slipped onto crankshaft journal

4 - Bolt

- Tightening torque and sequence, with 6 bolts
⇒ [page 54](#)
- Tightening torque and sequence, with 8 bolts
⇒ [page 54](#)

5 - Drive plate

- Removing and installing
⇒ [page 54](#)

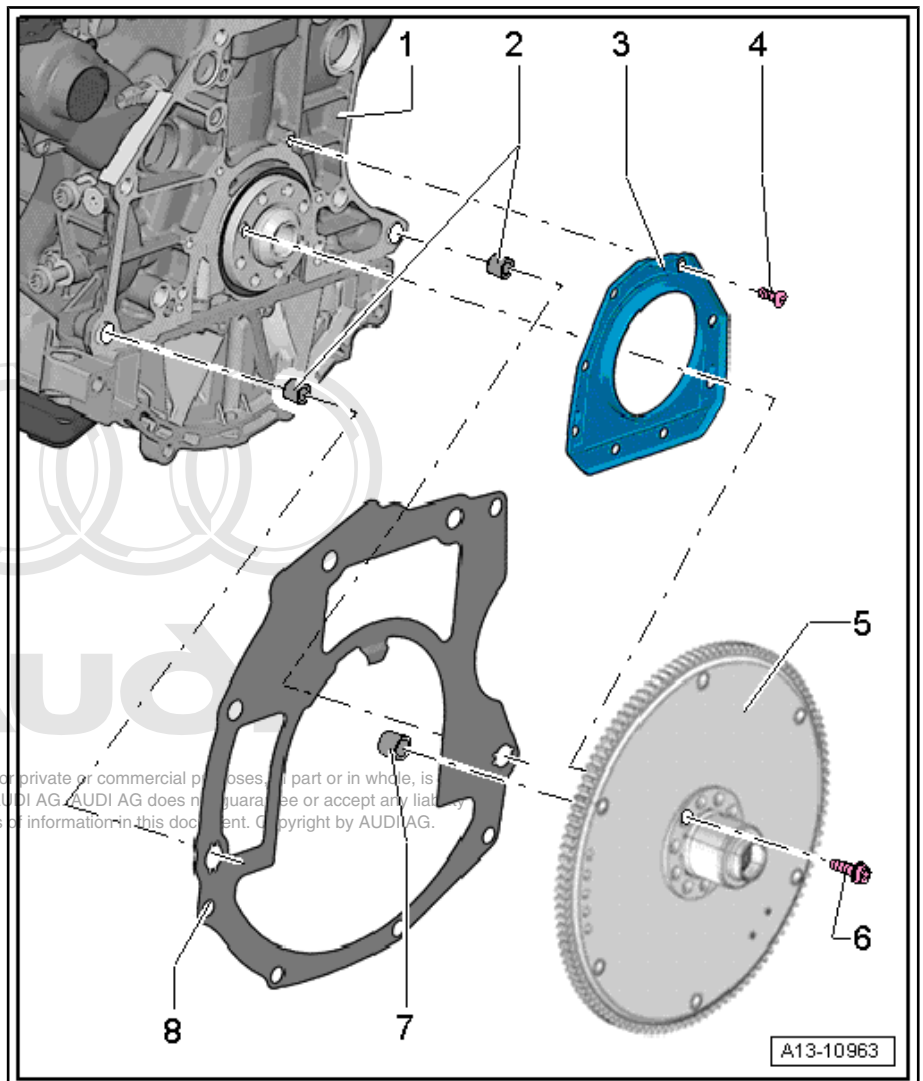
6 - Bolt

- 60 Nm + 90°
- Renew

7 - Needle bearing

- Removing and installing needle bearing ⇒ [page 57](#)

8 - Not fitted





Sealing flange (gearbox end) - tightening torque and sequence, with 6 bolts

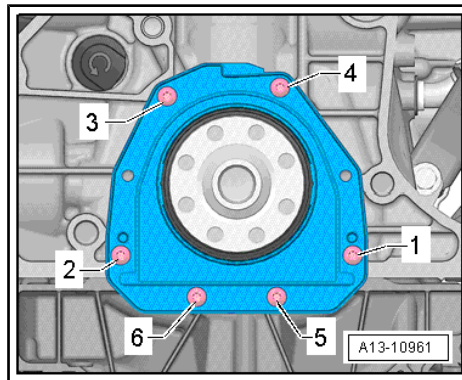
- Tighten new bolts in stages in the sequence shown:

Stage	Bolts	Tightening torque/angle specification
1.	-1 ... 6-	Screw in by hand until contact is made
2.	-1 ... 6-	9 Nm



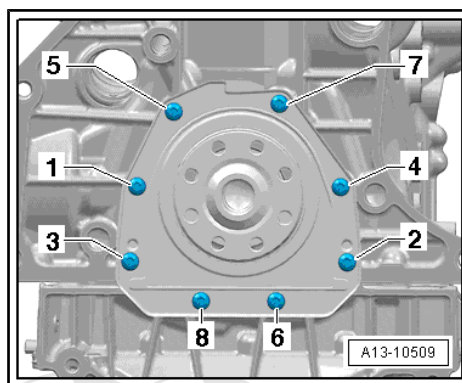
Note

Only 6 bolts are fitted; 2 bolt holes remain free.



Sealing flange (gearbox end) - tightening torque and sequence, with 8 bolts

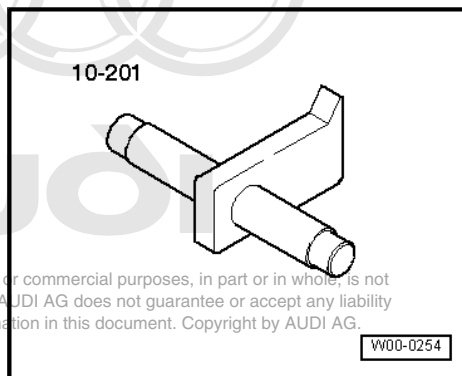
Stage	Bolts	Tightening torque/angle specification
1.	-1 ... 8-	Screw in by hand until contact is made
2.	-1 ... 8-	9 Nm



2.2 Removing and installing drive plate

Special tools and workshop equipment required

- ◆ Counterhold tool - 10 - 201-



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W00-0254

Removing

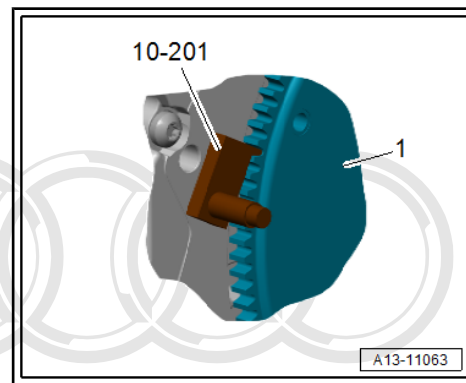
- Gearbox removed
- Insert counterhold tool - 10 - 201- to slacken bolts.



Caution

Take care not to damage outer surface of bearing flange on drive plate.

- ◆ *Use a multi-point socket bit with a length of at least 40 mm to slacken and tighten the drive plate bolts.*



- Remove bolts and take off drive plate and sender wheel.

Installing

Installation is carried out in the reverse order; note the following:



Note

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- ◆ *Renew bolts for drive plate.*
- ◆ *On vehicles with manual gearbox, a needle bearing is fitted in the drive plate. Before installing, check that the needle bearing is fitted. Removing and installing needle bearing in drive plate (pressing in and out) ⇒ [page 57](#) .*
- Fit counterhold tool - 10 - 201- the other way round to tighten bolts.

Tightening torques

- ◆ ⇒ [“2.1 Exploded view - cylinder block \(gearbox end\)”](#), [page 53](#)

2.3 Removing and installing sealing flange (gearbox end)

Special tools and workshop equipment required

- ◆ Assembly sleeve - T20097-



- ◆ Electric drill with plastic brush attachment
- ◆ Safety goggles
- ◆ Sealant ⇒ Electronic parts catalogue

Removing

- Gearbox removed
- Remove drive plate ⇒ [page 54](#) .

- Remove bolts -1 ... 8-. (Some versions may only have six bolts.)
- Release sealing flange from bonded joint.

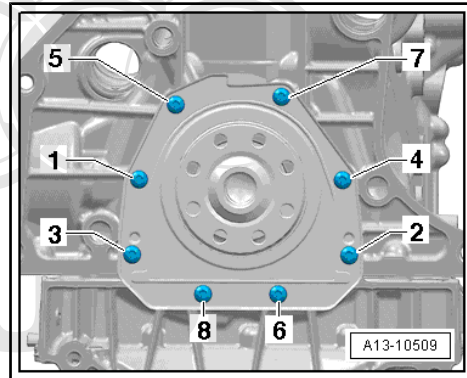
Installing



Caution

Make sure sealant residue does not enter lubrication system.

- ◆ *Place a clean cloth over the exposed section of the sump.*



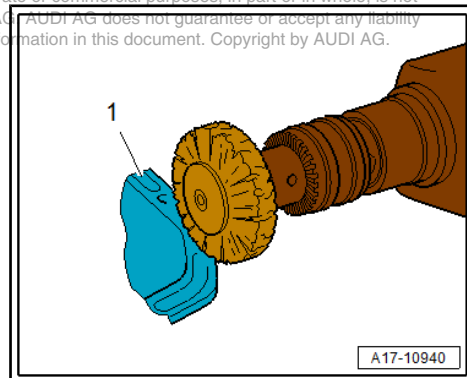
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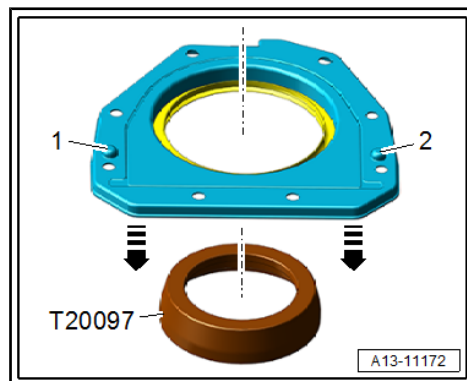
WARNING

Risk of eye injury.

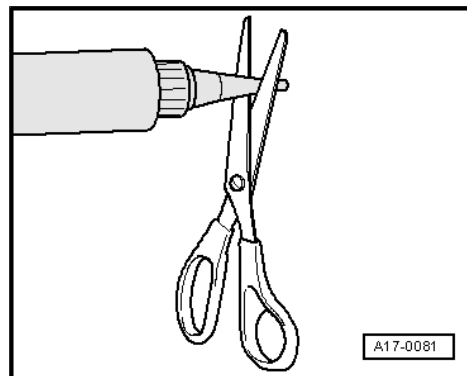
- ◆ *Put on safety goggles.*




- Remove sealant remaining on cylinder block -1- with flat scraper or rotating plastic brush.
- Clean sealing surfaces and crankshaft journals; they must be free of oil and grease.
- Do not oil or grease sealing lip of oil seal in sealing flange.
- The preparations below are necessary to prevent damage to the oil seal in the sealing flange.
- Sealing lip of oil seal in sealing flange must be folded back prior to installation.
- Use assembly sleeve - T20097- to fold back sealing lip of oil seal in sealing flange as follows:
 - Smaller diameter side of assembly sleeve must face oil seal.
 - Centring collar -1- and -2- of sealing flange must face upwards.
- Slide sealing flange onto assembly sleeve -arrows- and allow it to rest for five minutes.



- Note expiry date of sealant.
- Cut off nozzle of tube at front marking (nozzle Ø approx. 2 mm).



 **Caution**
Make sure lubrication system is not clogged by excess sealant.
 ♦ ***The bead of sealant must not be thicker than specified.***

- Apply a bead of sealant -arrow- onto clean sealing surface of sealing flange, as shown.
- Remove assembly sleeve - T20097- .
- Thickness of sealant bead: 2 ... 3 mm
- The sealing flange must be installed within 5 minutes after applying sealant.
- Position assembly sleeve - T20097- on crankshaft journal.
- Use assembly sleeve to bring sealing flange -1- carefully into installation position (pay attention to centring collar on left and right).
- Secure sealing flange with bolts.
- After installing sealing flange, wait about 30 minutes for sealant to dry. Then (and only then) fill the engine with engine oil.

Remaining installation steps are carried out in reverse sequence; note the following:

- Install drive plate ⇒ [page 54](#) .
- Check oil level ⇒ [page 176](#) .

Tightening torques

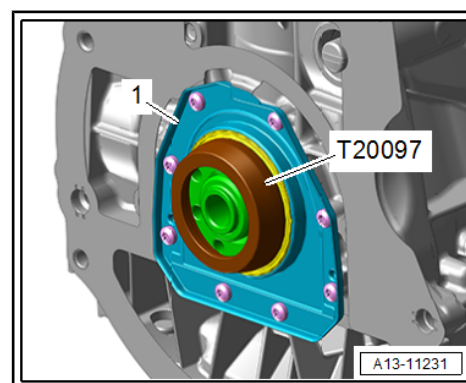
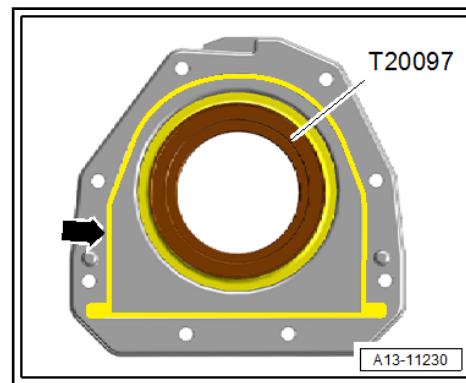
- ♦ ⇒ [Fig. ““Sealing flange \(gearbox end\) - tightening torque and sequence, with 6 bolts””, page 54](#)
 - ♦ ⇒ [Fig. ““Sealing flange \(gearbox end\) - tightening torque and sequence, with 8 bolts””, page 54](#)
 - ♦ ⇒ [“2.1 Exploded view - cylinder block \(gearbox end\)””, page 53](#)
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2.4 Renewing needle bearing in drive plate

Note

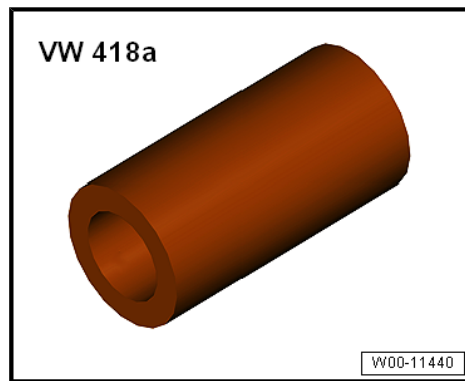
A needle bearing is fitted in the drive plate only on vehicles with manual gearbox.

Special tools and workshop equipment required

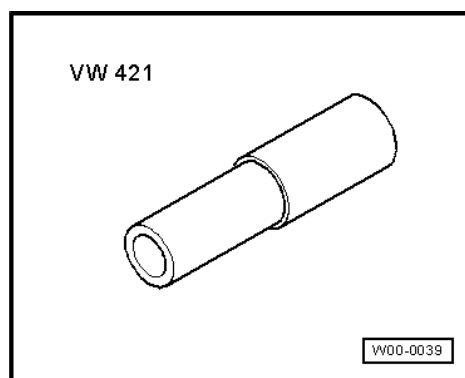




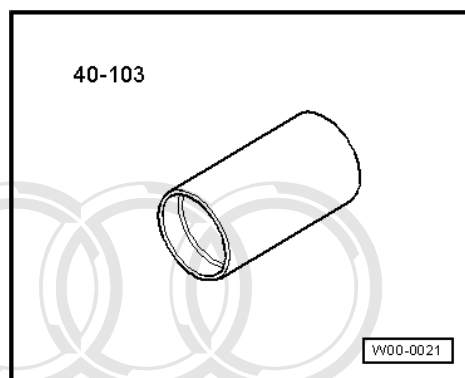
◆ Tube - VW 418 A-



◆ Tube - VW 421-

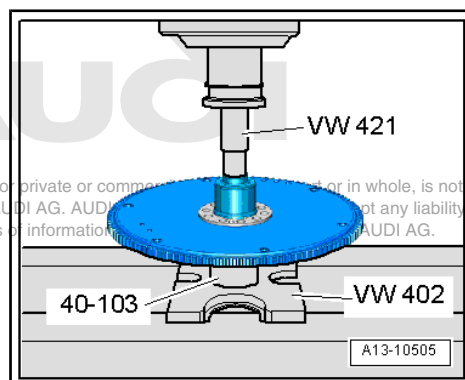


◆ Support - 40 - 103-

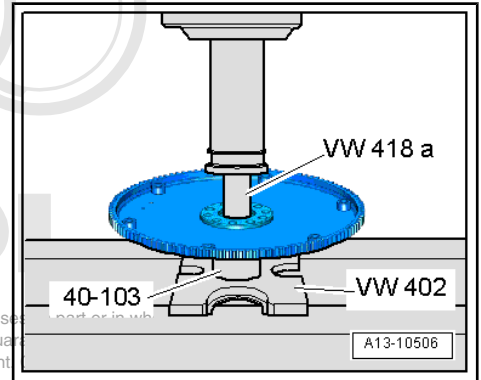


Procedure

- Gearbox removed
- Remove drive plate => [page 54](#) .
- Place support - 40 - 103- under drive plate when pressing out and pressing in needle bearing.
- Use tube - VW 421- and workshop press and press out needle bearing.
- Smaller diameter of tube -VW 421- faces drive plate.



- Carefully press in needle bearing as far as stop, using tube - VW 418 A- and workshop press.
- Installation position: closed side of needle bearing faces engine.
- Install drive plate ⇒ [page 54](#) .



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3 Crankshaft

⇒ [“3.1 Exploded view - crankshaft”, page 60](#)

⇒ [“3.2 Crankshaft dimensions”, page 61](#)

⇒ [“3.3 Allocation of main bearing shells”, page 62](#)

⇒ [“3.4 Measuring axial clearance of crankshaft”, page 63](#)

⇒ [“3.5 Measuring radial clearance of crankshaft”, page 64](#)

⇒ [“3.6 Removing and installing sender wheel”, page 64](#)

3.1 Exploded view - crankshaft



Note

Secure engine to engine and gearbox support - VAS 6095- when dismantling/assembling engine ⇒ [page 24](#) .

1 - Cylinder block

2 - Bearing shell for cylinder block

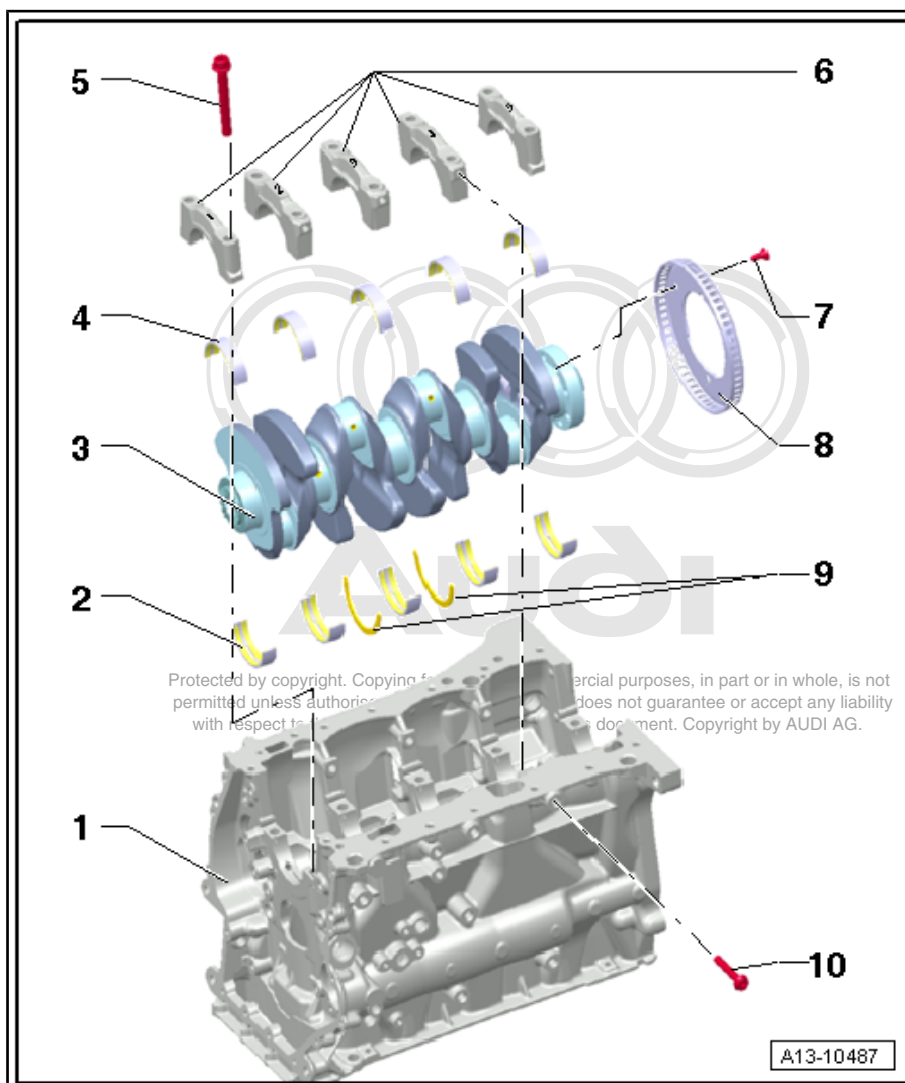
- With oil groove
- Lubricate
- Renew used bearing shells
- Classification of crankshaft bearing shells ⇒ [page 62](#)

3 - Crankshaft

- After removing, place it down so that the sender wheel does not become damaged ⇒ [Item 8 \(page 61\)](#)
- If crankshaft is renewed, new bearing shells must be assigned to bearing caps ⇒ [page 62](#)
- Axial clearance ⇒ [page 63](#)
- Radial clearance ⇒ [page 64](#)
- Do not rotate the crankshaft when checking the radial clearance
- Crankshaft dimensions ⇒ [page 61](#)

4 - Bearing shell for bearing cap

- Without oil groove
- Lubricate
- Renew used bearing shells
- Classification of crankshaft bearing shells ⇒ [page 62](#)



5 - Bolt

- Renew
- Use old bolts when measuring radial clearance
- Tightening sequence ⇒ [page 61](#)

6 - Bearing caps

- Bearing cap 1: Pulley end
- Bearing shell retaining lugs (cylinder block/bearing cap) must be on the same side

7 - Bolt

- 10 Nm + turn 90° further
- Renew
- Sender wheel must be renewed if bolts are loosened ⇒ [page 64](#)

8 - Sender wheel

- For engine speed sender - G28-
- Can only be installed in one position. Holes are off-set
- Sender wheel must be renewed if bolts are loosened
- Removing and installing ⇒ [page 64](#)

9 - Thrust washers

- For bearing No. 3
- Lubricate

10 - Bolt

- Renew
- Tightening sequence ⇒ [page 61](#)

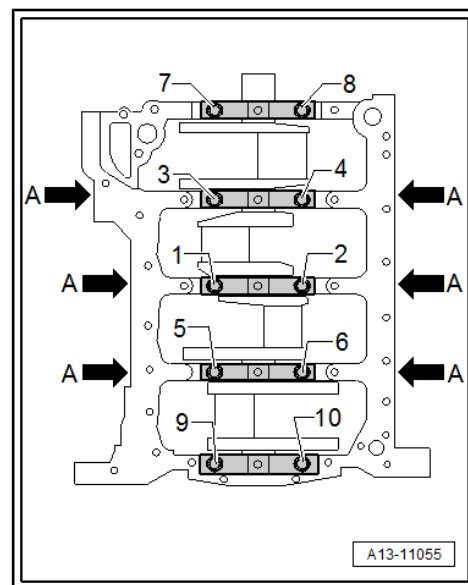
Crankshaft - tightening sequence

– Tighten crankshaft bolts in the sequence -1 ... 5- as follows:

1. Screw in bolts -1 ... 10- and -arrows A- hand-tight.
2. Initially tighten bolts -1 ... 10- to 65 Nm.
3. Turn bolts -1 ... 10- 90° further using a rigid wrench.
4. Initially tighten bolts -arrows A- to 15 Nm.
5. Turn bolts -arrows A- 90° further using a rigid wrench.



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3.2 Crankshaft dimensions

(in mm)

Honing dimension 1)	Crankshaft main bearing journal Ø	Conrod journal Ø
Basic dimension	58.00	47.80

1) There is currently no provision for machining used crankshafts.



3.3 Allocation of main bearing shells

Bearing shells of the correct thickness are allocated to the cylinder block at the factory. Coloured dots are used to identify the thickness of the bearing shells.

Letter codes on lower sealing surface or end of cylinder block indicate which bearing shell is to be fitted in cylinder block (top bearing shell) at each location.

Letter codes on crankshaft indicate which bearing shell is to be fitted in bearing cap (bottom bearing shell).

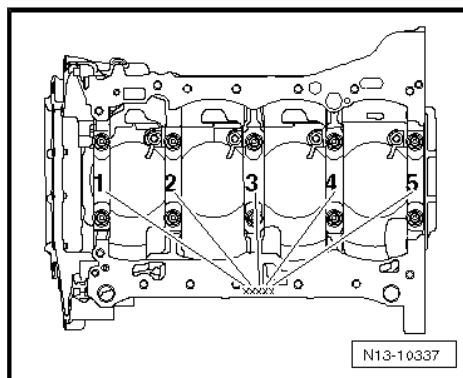
The first letter stands for bearing cap 1, the second letter for bearing cap 2, etc.

Marking of bearing shell for cylinder block:



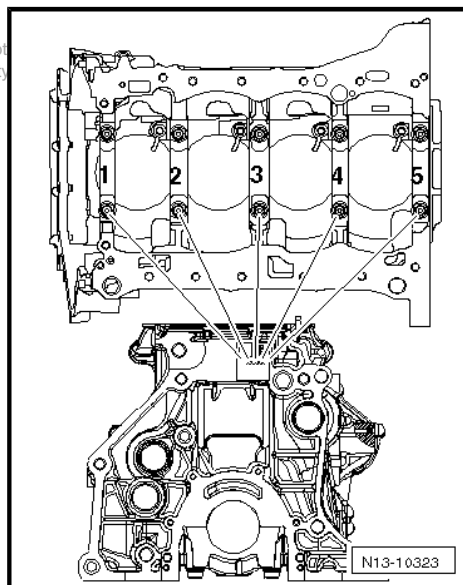
Note

Markings on cylinder block are applied either onto sealing surface for sump or gearbox end of cylinder block.



Marking on cylinder block refers to top bearing shell (bearing shell for cylinder block).
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– Note down letters and refer to table for colour code to be fitted!

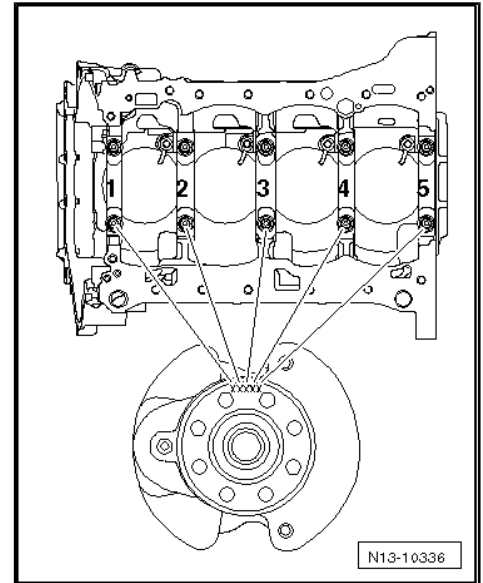


Marking of bearing shell for bearing cap:

Marking on crankshaft refers to bottom bearing shell (bearing shell for bearing cap).

- Note down letters and refer to table for colour code to be fitted.

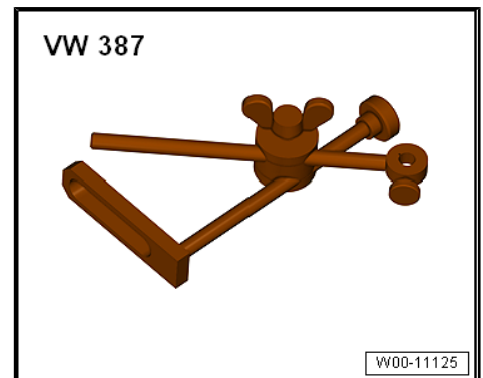
S	=	Black
R	=	Red
G	=	Yellow
B	=	Blue
W	=	White



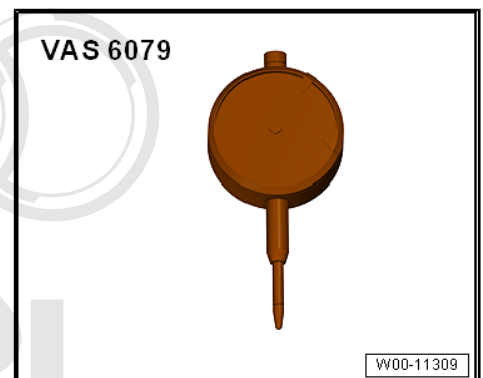
3.4 Measuring axial clearance of crankshaft

Special tools and workshop equipment required

- ◆ Universal dial gauge bracket - VW 387-



- ◆ Dial gauge - VAS 6079-



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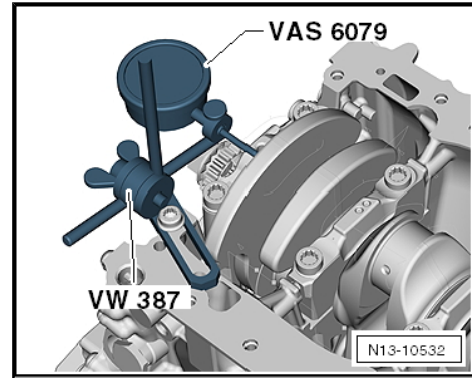


Procedure

- Bolt dial gauge - VAS 6079- with universal dial gauge bracket - VW 387- onto cylinder block and set it against crank web.
- Push crankshaft against dial gauge by hand and set gauge to "0".
- Push crankshaft away from dial gauge and read off value.

Axial clearance:

- New: 0.070 ... 0.231 mm.
- Wear limit: 0.30 mm.



3.5 Measuring radial clearance of crankshaft

Special tools and workshop equipment required

- ◆ Plastigage

Procedure



Note

Use old bolts when measuring radial clearance.

- Remove crankshaft bearing caps and clean bearing caps and journals.
- Place a length of Plastigage corresponding to the width of the bearing on the bearing journal or bearing shell.
- The Plastigage must be positioned in the centre of the bearing shell.
- Fit crankshaft bearing caps and secure with old bolts -1 ... 10- => [page 61](#) without rotating crankshaft.



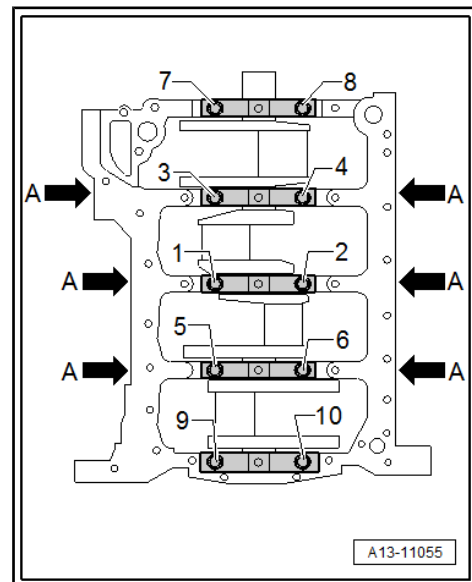
Note

Disregard bolts indicated by -arrows A-.

- Remove crankshaft bearing caps again.
- Compare width of Plastigage with measurement scale.

Radial clearance:

- New: 0.017 ... 0.037 mm.
- Wear limit: 0.15 mm.
- When carrying out final assembly, renew bolts.



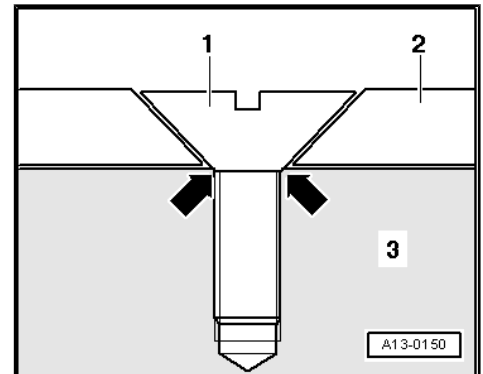
3.6 Removing and installing sender wheel

- Remove engine.
- Remove sealing flange (gearbox end) => [page 55](#) .
- Remove sump (top section) => [page 174](#) .
- Remove balance shaft timing chain => [page 100](#) .

- Unbolt conrod bearing caps.
- Remove crankshaft bearing caps.
- Remove crankshaft and unbolt sender wheel.
- Sender wheel -2- must always be renewed after slackening off bolts -1-.

 **Note**

- ◆ *If the countersunk bolts are tightened a second time, the seats for the bolt heads in the sender wheel will be deformed to such an extent that the bolt heads make contact with the crankshaft -3- -arrows- and the sender wheel beneath the bolts will be loose.*
- ◆ *Sender wheel can only be fitted in one position because holes are offset.*



Tightening torques

- ◆ ⇒ [“3.1 Exploded view - crankshaft”, page 60](#)
- After renewing sender wheel, misfire adaptations must be reset. To do so, select 01 - Reset adaptations misfires in Guided Functions mode of ⇒ Vehicle diagnostic tester.



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4 Balance shaft

⇒ [“4.1 Exploded view - balance shaft”, page 66](#)

⇒ [“4.2 Removing and installing balance shaft”, page 67](#)

⇒ [“4.3 Renewing oil seal for balance shaft \(inlet side\)”, page 71](#)

4.1 Exploded view - balance shaft

1 - Bolt

- Aluminium bolt: 4 Nm + turn 45° further
- Steel bolt: 9 Nm

2 - Balance shaft

- Exhaust side
- Lubricate bearing with engine oil
- Always renew both sides together
⇒ [page 70](#)

3 - Needle bearing

- Always renew after removal
- Needle bearing is colour-coded; a needle bearing with the same colour must be installed
- Lubricate bearing with engine oil

4 - Tube for balance shaft

- Installation position
⇒ [page 67](#)

5 - Cylinder block

6 - Oil seal for balance shaft (inlet side)

- Renewing ⇒ [page 71](#)

7 - Balance shaft

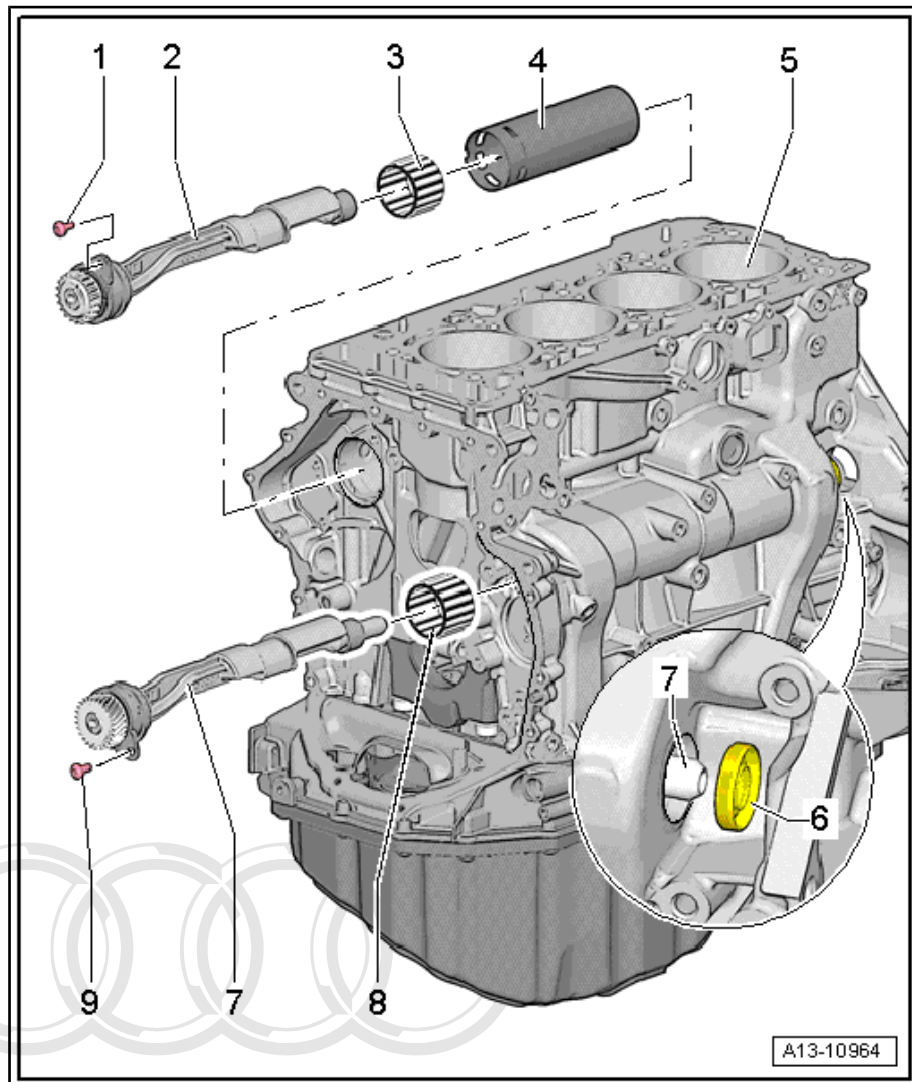
- Inlet side
- Lubricate bearing with engine oil
- Always renew both sides together ⇒ [page 67](#)

8 - Needle bearing

- Always renew after removal
- Needle bearing is colour-coded; a needle bearing with the same colour must be installed
- Lubricate bearing with engine oil

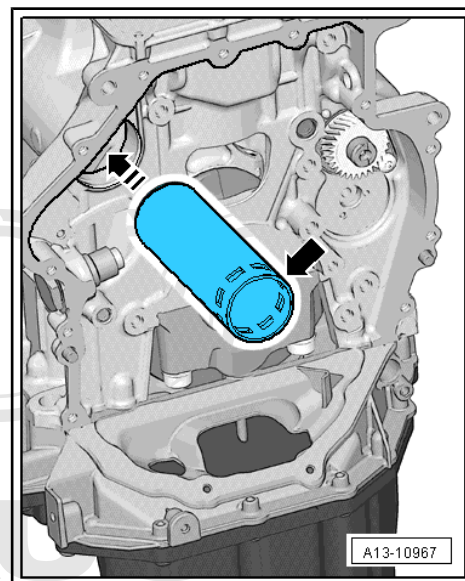
9 - Bolt

- Aluminium bolt: 4 Nm + turn 45° further
- Steel bolt: 9 Nm



Tube for balance shaft - installation position

The openings -arrow- must face chain side.



4.2 Removing and installing balance shaft

⇒ ["4.2.1 Removing and installing balance shaft \(inlet side\)", page 67](#)

⇒ ["4.2.2 Removing and installing balance shaft \(exhaust side\)", page 70](#)

4.2.1 Removing and installing balance shaft (inlet side)

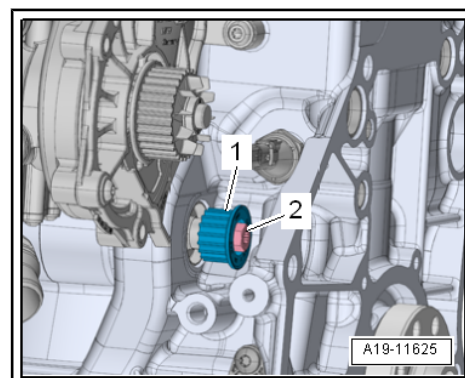
Removing



Note

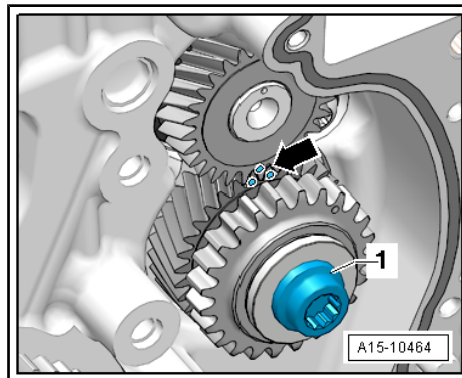
- ◆ *The needle bearing must always be renewed when removing and installing the balance shaft.*
- ◆ *The needle bearing is colour-coded; a needle bearing with the same colour must be installed.*

- Engine removed
- Remove toothed belt for coolant pump ⇒ [page 206](#) .
- Remove timing chain cover (top) ⇒ [page 83](#) .
- Remove timing chain cover (bottom) ⇒ [page 85](#) .
- Remove camshaft timing chain ⇒ [page 100](#) .
- Remove bolt -2-.
- Detach drive sprocket -1- for toothed belt for coolant pump.

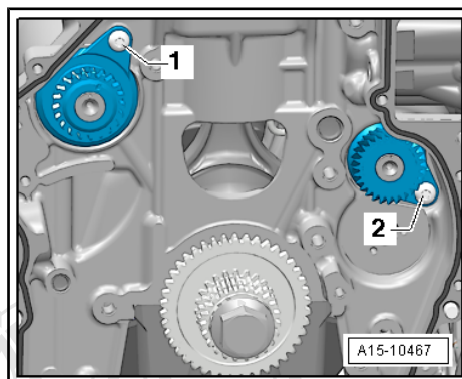




- Remove idler gear -1-.

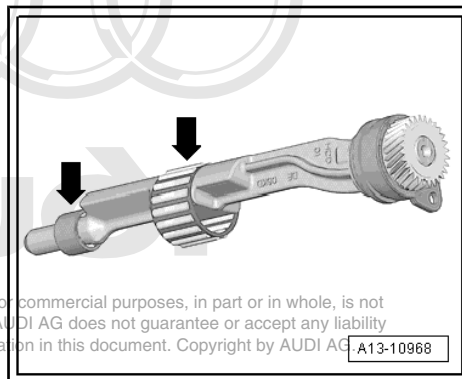


- Remove bolt -2- securing balance shaft (inlet side) and pull out balance shaft.



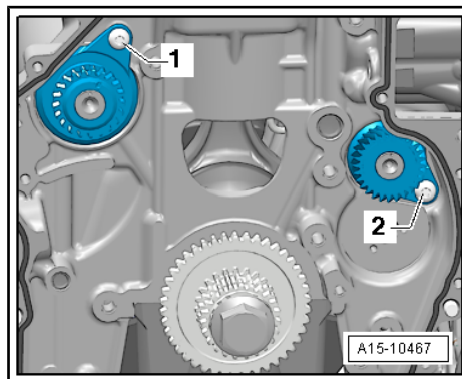
Installing

- Lubricate balance shaft bearings -arrows- with engine oil.




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- Install balance shaft (inlet side) and tighten bolt -2-.



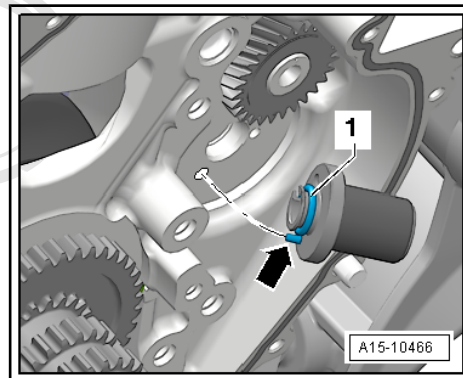
- Renew O-ring -1- and lubricate with engine oil.
- Lubricate bearing mounting with engine oil and install; dowel pin -arrow- for bearing mounting must engage in bore in cylinder block.



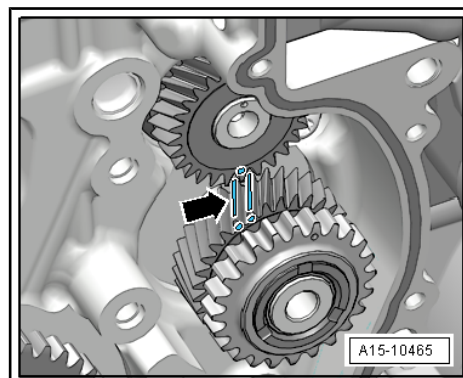
Caution

Always renew idler gear. If this is not done, there is no backlash, which causes engine damage.

The new idler gear has a special lubricant coating which wears off after a short running period and thus automatically creates the specified backlash.



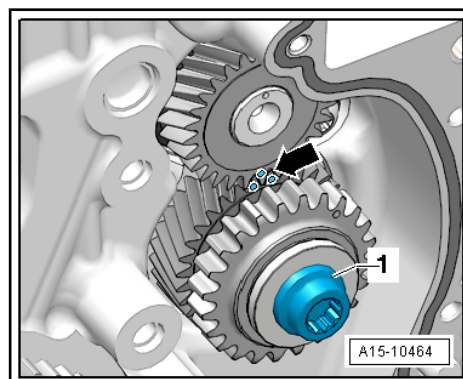
- Mark faces of gear teeth of idler gear with paint marker -arrow-.
- Insert idler gear; marking on balance shaft must be positioned between markings on faces of gear teeth.



- Tighten bolt -1- for idler gear: tightening sequence ⇒ [page 96](#) .
- Check markings on idler gear/balance shaft -arrow-.

Further assembly is basically carried out in reverse order of dismantling. Note the following:

- Install camshaft timing chain ⇒ [page 100](#) .
- Install timing chain cover (bottom) ⇒ [page 85](#) .
- Install timing chain cover (top) ⇒ [page 83](#) .
- Install poly V-belt tensioner ⇒ [page 41](#) .
- Install poly V-belt ⇒ [page 41](#) .
- Renew oil seal for balance shaft (inlet side) ⇒ [page 71](#) .
- Install toothed belt for coolant pump ⇒ [page 206](#) .



Tightening torques

- ◆ ⇒ [“4.1 Exploded view - balance shaft”, page 66](#)



4.2.2 Removing and installing balance shaft (exhaust side)

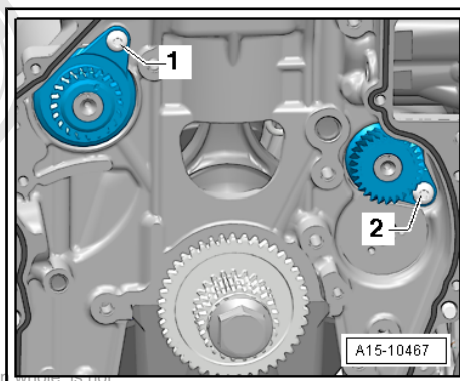
Removing



Note

- ◆ *The needle bearing must always be renewed when removing and installing the balance shaft.*
- ◆ *The needle bearing is colour-coded; a needle bearing with the same colour must be installed.*

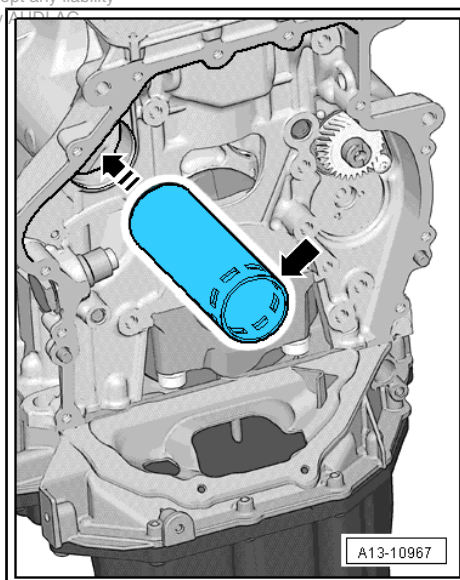
- Engine removed
- Remove timing chain cover (top) ⇒ [page 83](#) .
- Remove timing chain cover (bottom) ⇒ [page 85](#) .
- Remove camshaft timing chain ⇒ [page 100](#) .
- Remove bolt -1- securing balance shaft (exhaust side) and pull out balance shaft.



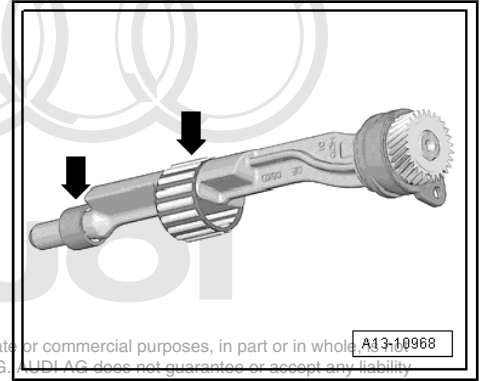
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Installing

- Check installation position of tube for balance shaft; openings -arrow- must face chain side.



- Lubricate balance shaft bearings -arrows- with engine oil.



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- Install balance shaft (exhaust side).
- Make sure that balance shaft is in full contact with crankcase before tightening bolt -1-.

 **Note**

Repeat insertion of tube for balance shaft if the balance shaft is not in full contact.

Further assembly is basically carried out in reverse order of dismantling. Note the following:

- Install camshaft timing chain ⇒ [page 100](#) .
- Install timing chain cover (bottom) ⇒ [page 85](#) .
- Install timing chain cover (top) ⇒ [page 83](#) .
- Install poly V-belt tensioner ⇒ [page 41](#) .
- Install poly V-belt ⇒ [page 40](#) .

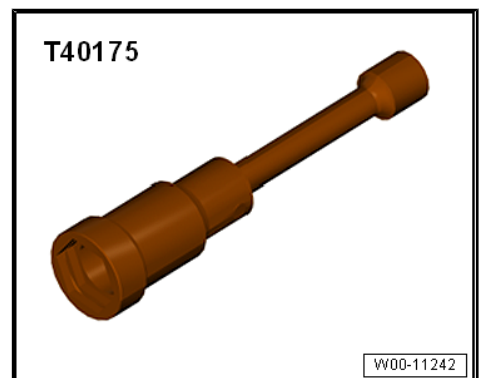
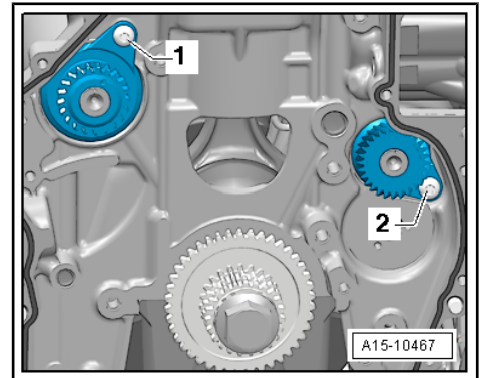
Tightening torques

- ◆ ⇒ [“4.1 Exploded view - balance shaft”, page 66](#)

4.3 Renewing oil seal for balance shaft (inlet side)

Special tools and workshop equipment required

- ◆ Articulated wrench, 24 mm - T40175-





◆ Thrust piece - T10353/1-



Procedure

i Note

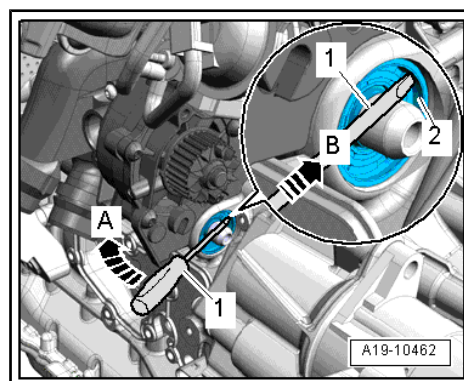
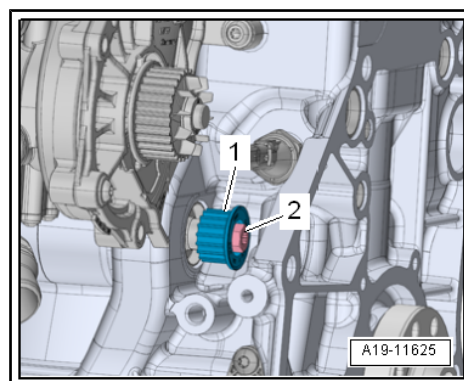
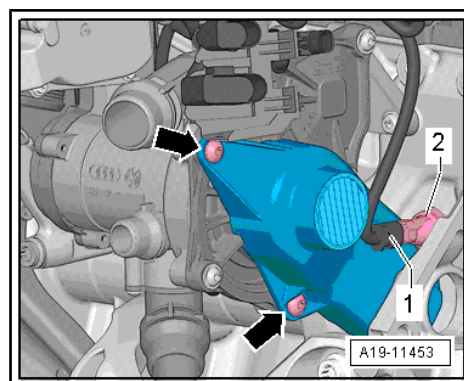
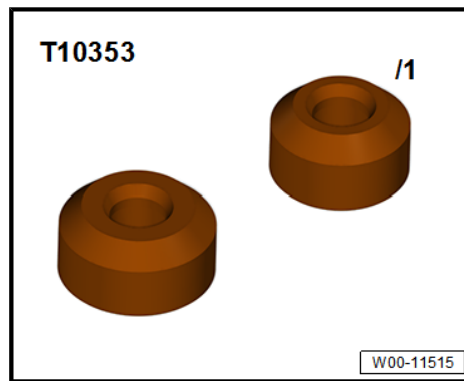
Place a cloth under oil pressure switch to catch escaping oil.

– Use articulated wrench, 24 mm - F447- to unscrew stage 3 oil pressure switch - T40175-2-.

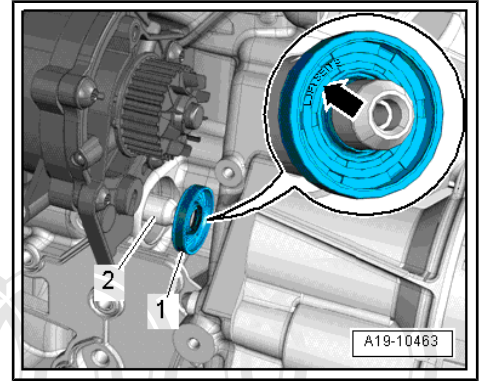
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- Remove toothed belt for coolant pump ⇒ [page 206](#) .
- Unscrew bolt -2- and detach drive sprocket -1- for toothed belt for coolant pump.

- Press screwdriver -1- firmly onto section -2- of oil seal -arrow B-.
- Lever out oil seal -arrow A-.
- Clean contact surface and sealing surface.



- Lubricate sealing surface of balance shaft -2- with gear oil.
- Fit oil seal -1- onto balance shaft.
- The marking "Luftseite" ("Outside") -arrow- should be legible from the outside.

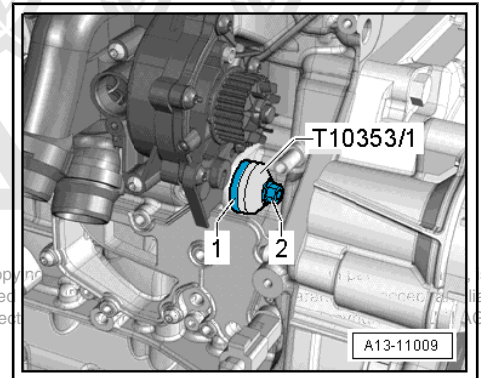


Caution

Risk of damage to thread.

- ◆ ***The drive sprocket bolt has a left-hand thread.***

- Apply thrust piece - T10353/1- to oil seal -1- and press into cylinder block as far as stop using bolt -2- (take care not to tilt oil seal).
- Install toothed belt for coolant pump ⇒ [page 206](#) .
- Install stage 3 oil pressure switch - F447- ⇒ [page 187](#) .
- Fill up with coolant ⇒ [page 196](#) .



5 Pistons and conrods

⇒ [“5.1 Exploded view - pistons and conrods”, page 74](#)

⇒ [“5.2 Removing and installing pistons”, page 75](#)

⇒ [“5.4 Separating parts of new conrod”, page 78](#)

⇒ [“5.3 Checking pistons and cylinder bores”, page 77](#)

⇒ [“5.5 Checking radial clearance of conrod bearings”, page 79](#)

5.1 Exploded view - pistons and conrods

1 - Conrod bolts

- Renew
- Lubricate threads and contact surface
- Use old bolts when measuring radial clearance
- On vehicles with 1.8 ltr. engine: 30 Nm + turn 90° further
- On vehicles with 2.0 ltr. engine: 45 Nm + turn 90° further

2 - Conrod bearing cap

- Note installation position
- Due to the cracking method used to separate the bearing cap from the conrod in manufacture, the caps only fit in one position and only on the appropriate conrod
- Mark cylinder and conrod allocation in colour -A-
- Installation position: Marking -B- faces towards pulley end
- Separating parts of new conrod ⇒ [page 78](#)

3 - Bearing shells

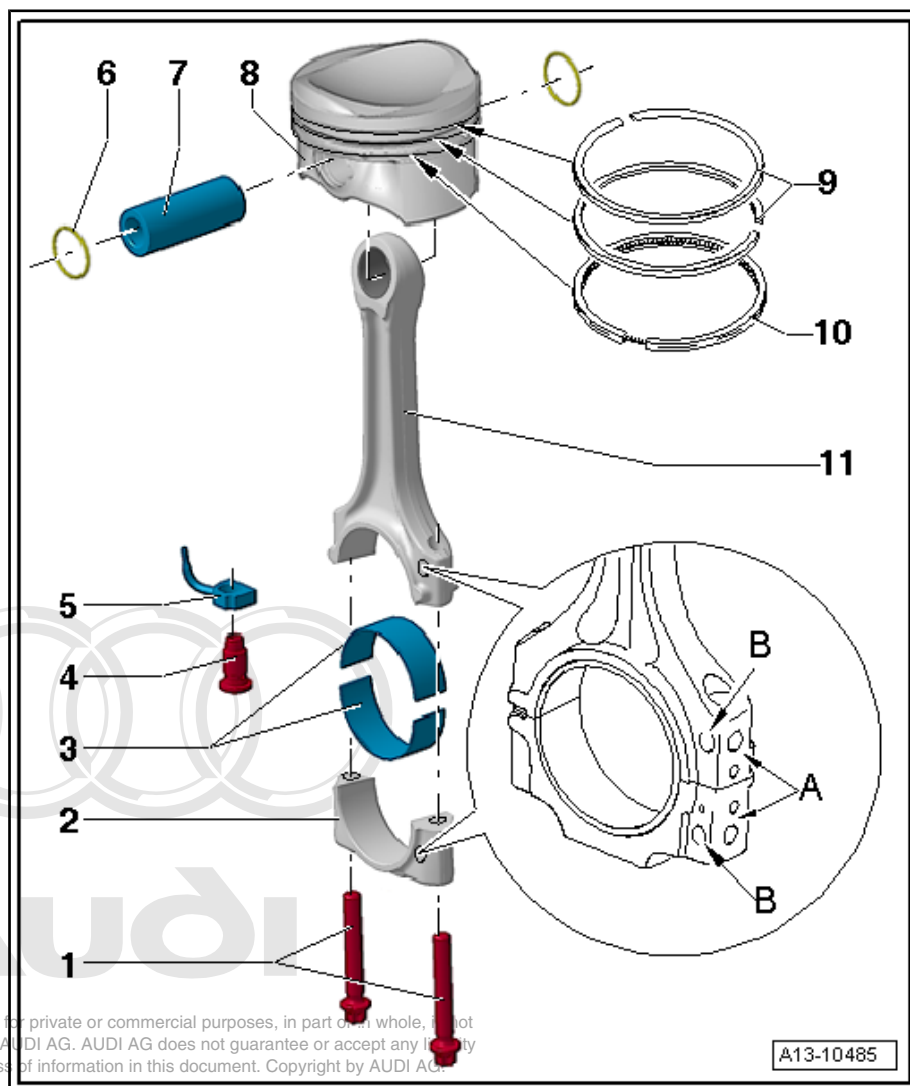
- Installation position ⇒ [page 75](#)
- Renew used bearing shells
- Lubricate before installing
- Axial clearance when new: 0.10...0.35 mm; wear limit: 0.40 mm
- Measuring radial clearance ⇒ [page 79](#)

4 - Pressure relief valve

- 27 Nm

5 - Oil spray jet

- For piston cooling



6 - Circlip

- Renew

7 - Piston pin

- Lubricate before installing

8 - Piston

- Removing and installing ⇒ [page 75](#)
- Mark installation position and cylinder number
- Arrow on piston crown points to pulley end
- Checking pistons and cylinder bores ⇒ [page 77](#)

9 - Compression rings

- Use piston ring pliers (commercially available) to remove and install
- Offset gaps by 120°
- Installation position: "TOP" or "R" must face towards piston crown
- Checking ring gap ⇒ [page 77](#)
- Checking ring-to-groove clearance ⇒ [page 77](#)

10 - Oil scraper ring

- 2 parts
- Install with gap offset by 120° to next compression ring
- "TOP" or "R" must face towards piston crown
- Checking ring gap ⇒ [page 77](#)
- Ring-to-groove clearance cannot be checked

11 - Conrod

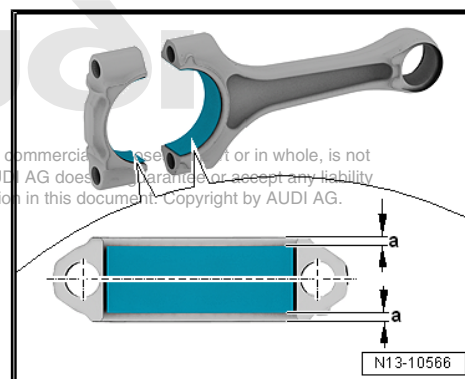
- Only renew as a complete set
- Mark cylinder and conrod bearing cap allocation
- Installation position: Marking -B- faces towards pulley end
- Separating parts of new conrod ⇒ [page 78](#)
- Measuring radial clearance ⇒ [page 79](#)

Installation position of bearing shell

- Position bearing shells in centre of conrod and conrod bearing cap when fitting.

Dimension -a- must be identical on both sides.

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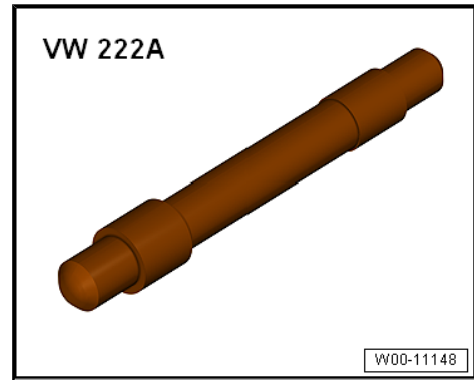


5.2 Removing and installing pistons

Special tools and workshop equipment required



◆ Drift - VW 222 A-



◆ Piston ring clamp, commercially available

Removing

- Remove engine ⇒ [page 8](#) .
- Secure engine to engine and gearbox support - VAS 6095- ⇒ [page 24](#) .
- Remove cylinder head ⇒ [page 119](#) .
- Remove sump (top section) ⇒ [page 174](#) .
- Mark installation position and cylinder number of piston.
- Mark installation position and cylinder number of conrod ⇒ [Item 11 \(page 75\)](#) .
- Remove conrod bearing cap and pull out piston and conrod upwards.



Note

If piston pin is difficult to remove, heat piston to approx. 60 °C.

- Take circlip out of piston pin boss.
- Use drift - VW 222 A- to drive out piston pin.

Installing

Installation is carried out in the reverse order; note the following:



Note

- ◆ *Renew the bolts tightened with specified tightening angle.*
- ◆ *Arrow on piston crown points to pulley end.*
- ◆ *Piston ring gaps should be spaced at 120°.*
- Oil running surfaces of bearing shells.
- Install piston using commercially available piston ring clamp; note installation position ⇒ [Item 8 \(page 75\)](#) .
- Install conrod bearing cap; note installation position ⇒ [Item 2 \(page 74\)](#) .
- Install cylinder head ⇒ [page 119](#) .
- Install sump (upper section) ⇒ [page 174](#) .

Tightening torques

- ◆ ⇒ [“5.1 Exploded view - pistons and conrods”, page 74](#)

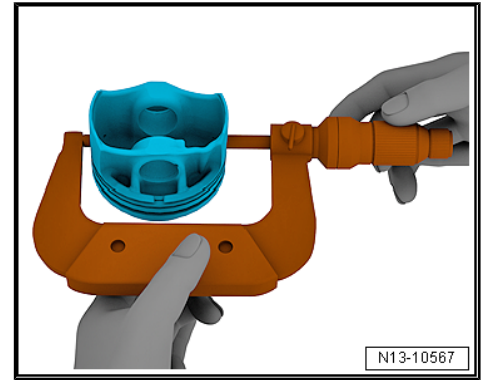
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5.3 Checking pistons and cylinder bores

Checking piston

- Using a micrometer (75 ... 100 mm), measure approx. 15 mm from the lower edge, perpendicular to the piston pin axis.
- ◆ Difference between actual and nominal diameter: not more than 0.04 mm.

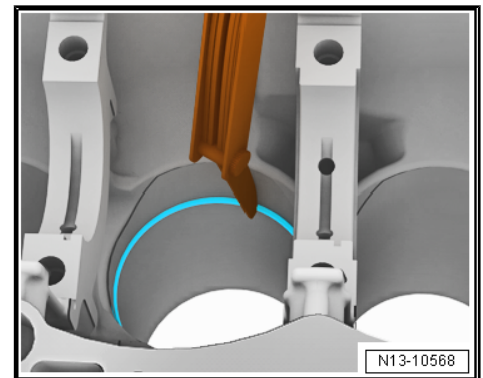
		Piston Ø
Basic dimension	mm	82.420 ¹⁾
<ul style="list-style-type: none"> • ¹⁾Dimensions not including graphite coating (thickness 0.02 mm). The graphite coating will wear down in service. 		



Checking piston ring gap

- Insert piston ring at right angle to cylinder wall from above and push down into lower cylinder opening approx. 15 mm from bottom of cylinder. Use a piston without rings to push ring into bore.

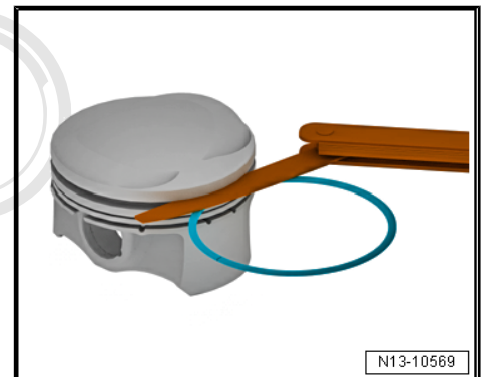
Piston ring Dimensions in mm	New	Wear limit
1st compression ring	0.30 ... 0.40	0.80
2nd compression ring	0.40 ... 0.50	0.80
Oil scraper ring	0.20 ... 0.40	0.80



Checking ring-to-groove clearance

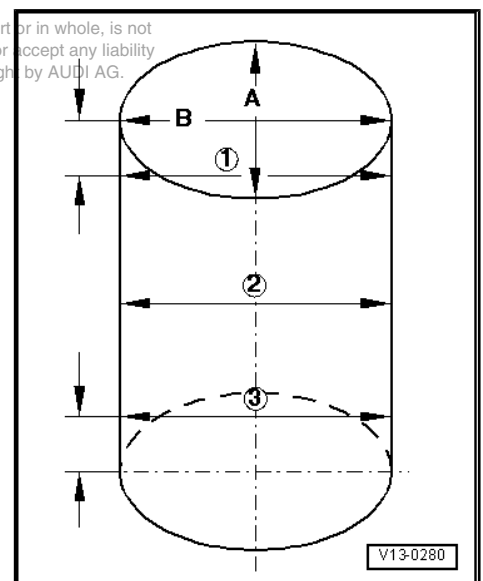
- Clean groove in piston before checking clearance.

Piston ring Dimensions in mm	New	Wear limit
1st compression ring	0.06 ... 0.09	0.20
2nd compression ring	0.03 ... 0.06	0.15
Oil scraper rings	Cannot be measured	



Checking cylinder bore

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Special tools and workshop equipment required

- ◆ Cylinder gauge - VAS 6078-



Caution

Machining (reboring, honing, grinding) cylinder bore with workshop equipment is not permitted. The surface of the cylinder bore is damaged by machining.

- Use a cylinder gauge - VAS 6078- to take measurements at 3 points in transverse direction -A- and in longitudinal direction -B-.
- ◆ Difference between actual and nominal diameter: not more than 0.08 mm.

		Cylinder bore Ø
Basic dimension	mm	82.51



Note

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Measuring the cylinder bores must not be done when the cylinder block is mounted to the engine and gearbox stand - VAS 6095- , as incorrect measurements may result.

5.4 Separating parts of new conrod

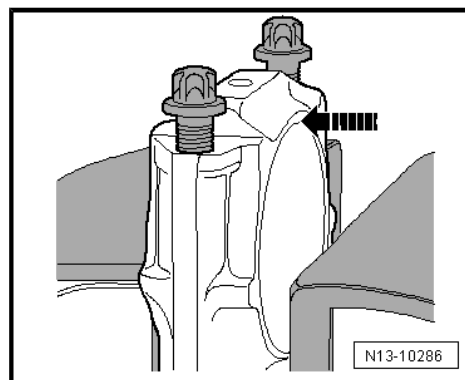
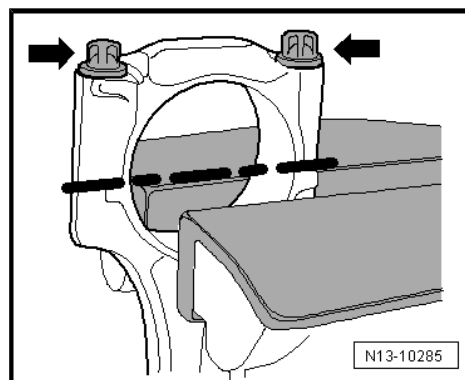
It is possible that the two parts of a new conrod are not completely separated as intended. If it is not possible to take off the conrod bearing cap by hand, proceed as follows:

- Mark cylinder number of conrod ➔ [Item 11 \(page 75\)](#) .
- Clamp the conrod lightly in a vice using aluminium jaw covers as shown in illustration.



Note

- ◆ *To avoid any risk of damage, the conrod should only be clamped lightly.*
- ◆ *The conrod is clamped in a position below the dotted line.*
- Unscrew the two bolts -arrows-. approx. 5 turns.
- Using a plastic hammer, carefully knock conrod bearing cap loose in direction of -arrow-.



5.5 Checking radial clearance of conrod bearings

Special tools and workshop equipment required

- ◆ Plastigage

Procedure



Note

Use old bolts when measuring radial clearance.

- Remove conrod bearing cap.
- Clean bearing cap and bearing journal.
- Place a length of Plastigage corresponding to the width of the bearing on the bearing journal or in the bearing shell.
- Fit conrod bearing cap and secure with old bolts
⇒ [Item 1 \(page 74\)](#) without rotating crankshaft.
- Remove conrod bearing cap again.
- Compare width of Plastigage with measurement scale.

Radial clearance:

- New: 0.02 ... 0.06 mm.
- Wear limit: 0.09 mm.
- When carrying out final assembly, renew bolts.

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15 – Cylinder head, valve gear

1 Timing chain cover

⇒ “1.1 Exploded view - timing chain cover”, page 80

⇒ “1.2 Removing and installing camshaft control valve 1 N205 and exhaust camshaft control valve 1 N318”, page 83

⇒ “1.3 Removing and installing timing chain cover”, page 83

⇒ “1.4 Renewing oil seal for vibration damper”, page 89

1.1 Exploded view - timing chain cover

1 - Bolt

- Renew
- Aluminium bolts: 4 Nm + turn 45° further
- Steel bolts: 9 Nm

2 - Exhaust camshaft control valve 1 - N318-

- Removing and installing ⇒ page 83
- Renew O-ring ⇒ Item 9 (page 80)

3 - Oil seals

- Installation position: side with small inner diameter faces outwards
- To renew, remove timing chain cover (top) ⇒ Item 4 (page 80)
- Lubricate before installing

4 - Timing chain cover (top)

- Removing and installing ⇒ page 83

5 - Seal

- Renew if damaged

6 - Sealing cap

7 - Bolt

- Tightening sequence ⇒ page 81

8 - Gasket

- Renew if damaged

9 - O-ring

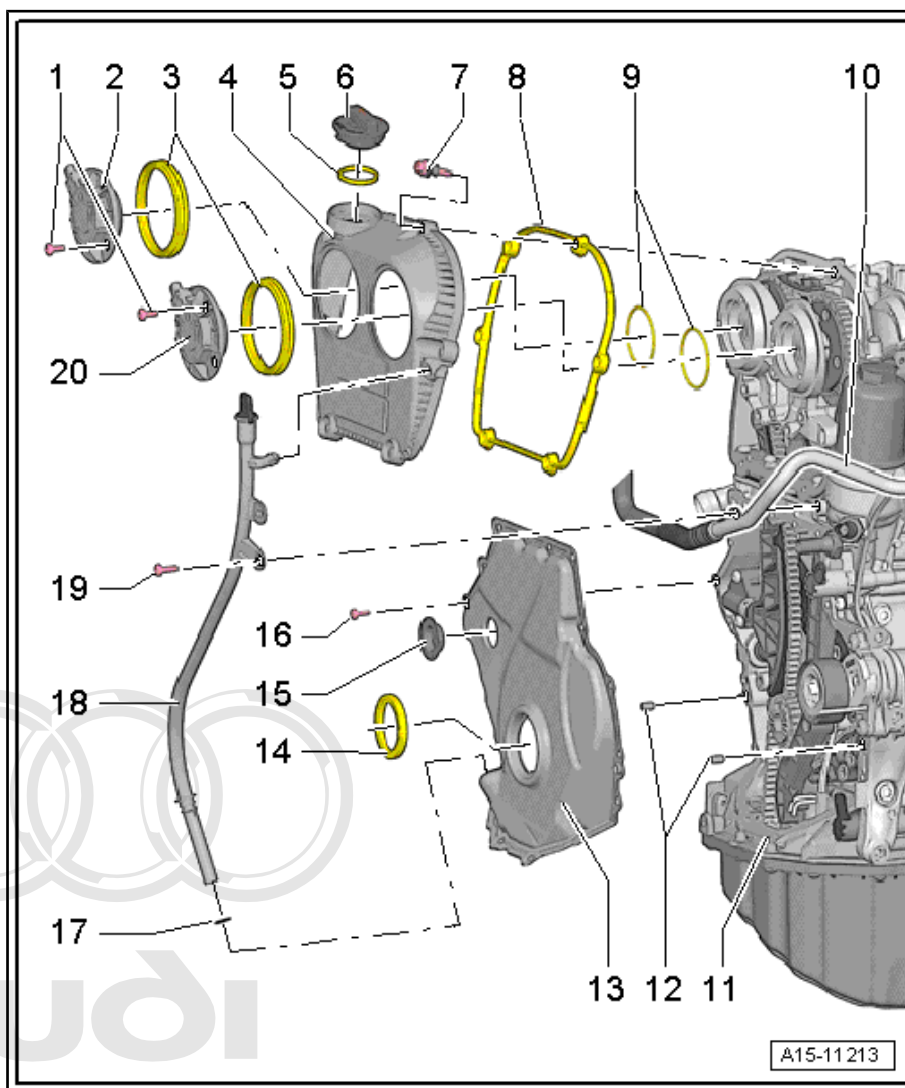
- Renew
- Lubricate lightly with engine oil

10 - Coolant pipe (front)

11 - Engine

12 - Dowel pins

- For centring cover



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13 - Timing chain cover (bottom)

- With oil seal
- Renewing ⇒ [page 85](#)

14 - Oil seal

- For vibration damper
- Renewing ⇒ [page 89](#)

15 - Sealing plug

- Renew

16 - Bolt

- Renew
- Tightening sequence with 15 bolts ⇒ [page 82](#)
- Tightening sequence with 8 bolts ⇒ [page 82](#)

17 - O-ring

- Renew
- Lubricate before installing

18 - Guide tube for oil dipstick

19 - Bolt

- 9 Nm

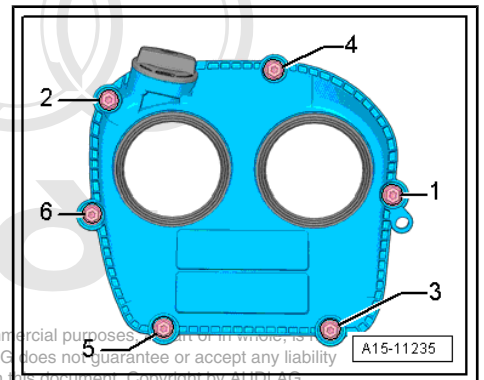
20 - Camshaft control valve 1 - N205-

- Removing and installing ⇒ [page 83](#)
- Renew O-ring ⇒ [Item 9 \(page 80\)](#)

Timing chain cover (top) - tightening sequence

– Tighten bolts -1 to 6- in the sequence shown:

1. Tighten bolts to 9 Nm.

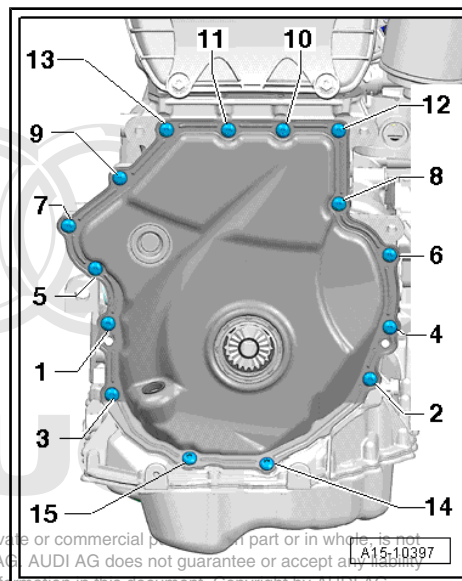


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Timing chain cover (bottom), tightening sequence with 15 bolts

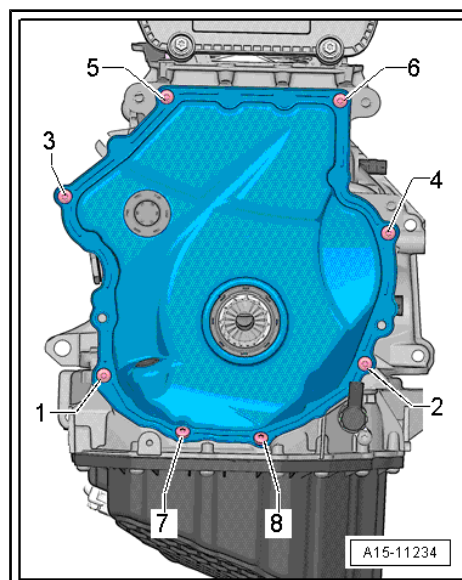
- Tighten bolts -1 to 15- in two stages in the sequence shown:
- 1. Tighten bolts to 8 Nm.
- 2. Turn bolts 45° further.



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Timing chain cover (bottom), tightening sequence with 8 bolts

- Tighten bolts -1 to 8- in two stages in the sequence shown:
- 1. Tighten bolts to 8 Nm.
- 2. Turn bolts 45° further.



1.2 Removing and installing camshaft control valve 1 - N205- and exhaust camshaft control valve 1 - N318-

Removing

- Unplug connector -1- from exhaust camshaft control valve 1 - N318- and connector -3- from camshaft control valve 1 - N205- .
- Unscrew bolts -arrows- and remove camshaft control valve 1 - N205- -item 4- and exhaust camshaft control valve 1 - N318- -item 2-.

Installing

Installation is carried out in the reverse order; note the following:



Note

Renew O-rings.

- Lubricate sealing surfaces of oil seals to inlet camshaft control valve 1 - N205- / exhaust camshaft control valve 1 - N318- with engine oil.

Tightening torques

- ◆ ⇒ [“1.1 Exploded view - timing chain cover”, page 80](#)

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1.3 Removing and installing timing chain cover

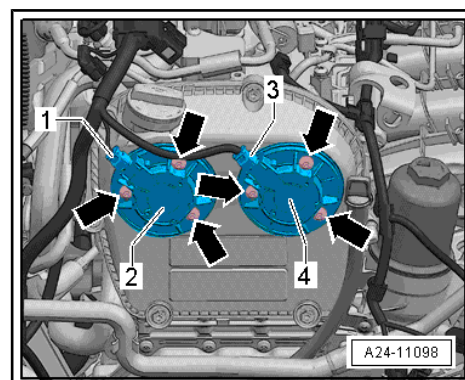
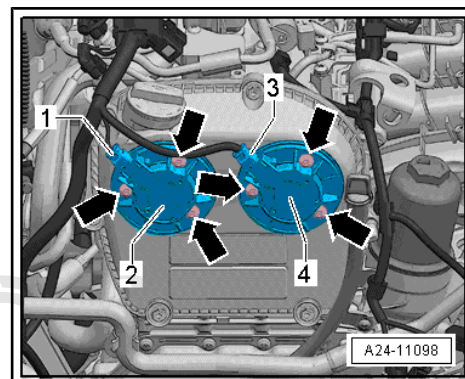
⇒ [“1.3.1 Removing and installing timing chain cover \(top\)”, page 83](#)

⇒ [“1.3.2 Renewing timing chain cover \(bottom\)”, page 85](#)

1.3.1 Removing and installing timing chain cover (top)

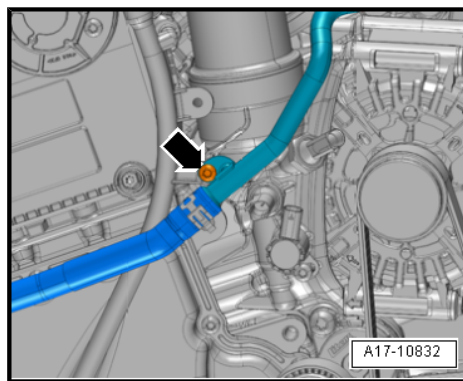
Removing

- Remove engine cover panel ⇒ [page 37](#) .
- Unplug connector -1- from exhaust camshaft control valve 1 - N318- and connector -3- from camshaft control valve 1 - N205- .
- Unscrew bolts -arrows- and remove camshaft control valve 1 - N205- -item 4- and exhaust camshaft control valve 1 - N318- -item 2-.





- Remove bolt -1- and detach guide tube for oil dipstick from timing chain cover.



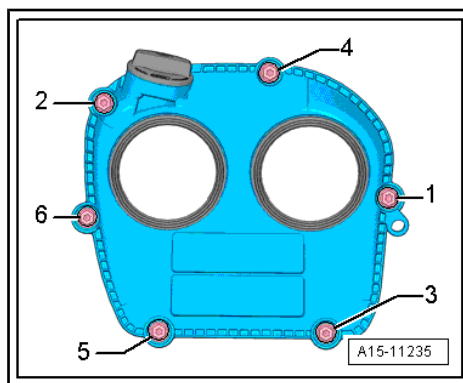
- Unscrew bolts -1 to 6- and remove timing chain cover (top).

Installing

Installation is carried out in the reverse order; note the following:

i Note

Renew O-rings.



Caution

Make sure sealant residue does not enter lubrication system.

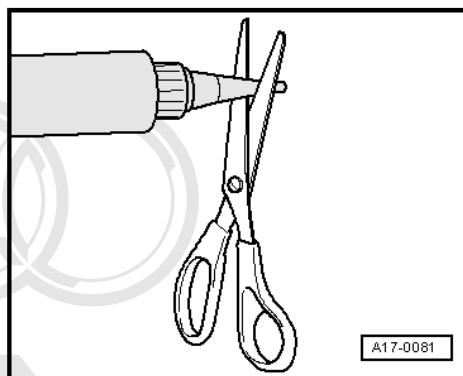
- ◆ ***Place a clean cloth over the exposed section of the cylinder head.***

- Remove sealant residue on bearing saddle.
- Clean surfaces; they must be free of oil and grease.

i Note

Note the use-by date of the sealant.

- Cut off nozzle of tube at front marking (nozzle Ø approx. 1.5 mm).



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Caution

Make sure lubrication system is not clogged by excess sealant.

◆ **The bead of sealant must not be thicker than specified.**

- Apply beads of sealant -arrows- onto clean oil seals as shown in illustration.
- Width of beads of sealant: 2 mm.



Note

The timing chain cover (top) must be installed within 5 minutes of applying the sealant.

- Install timing chain cover (top); tightening sequence ⇒ [page 81](#) .
- Lubricate seals and O-rings with engine oil.
- Install timing chain cover (top); tightening sequence ⇒ [page 81](#) .
- Install camshaft control valve 1 - N205- and exhaust camshaft control valve 1 - N318- ⇒ [page 83](#) .
- Install engine cover panel ⇒ [page 37](#) .

Tightening torques

- ◆ ⇒ ["1.1 Exploded view - timing chain cover", page 80](#)

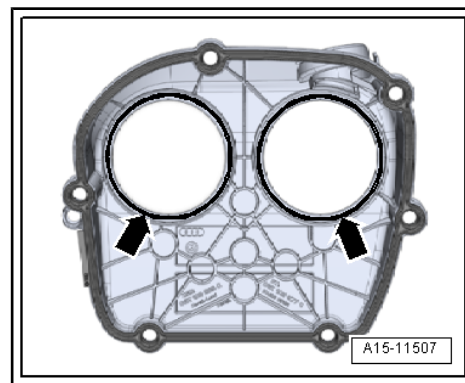
1.3.2 Renewing timing chain cover (bottom)

Special tools and workshop equipment required

- ◆ Locking pin - T10060 A-

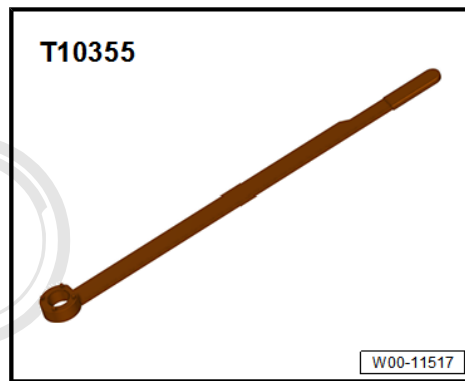
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T10060 A



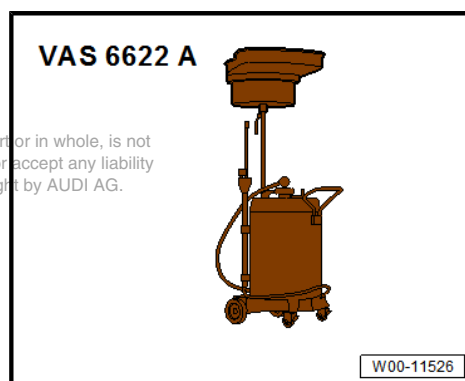


- ◆ Counterhold tool - T10355-



- ◆ Used oil collection and extraction unit - VAS 6622A-

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Removing

- Remove front noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .
- Place used oil collection and extraction unit - V.A.G 1782- below engine and drain off engine oil.

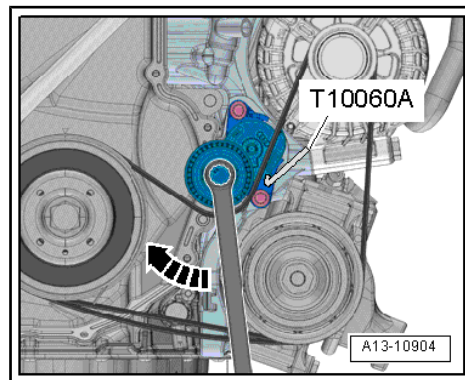


Caution


Wrong direction of rotation for a used poly V-belt can lead to irreparable damage.

- ◆ *Before removing the poly V-belt mark the direction of rotation with chalk or a felt-tip pen for re-installation.*

- To slacken poly V-belt turn tensioner in direction of -arrow-.
- Lock tensioner with locking pin - T10060 A- .
- Take off poly V-belt.

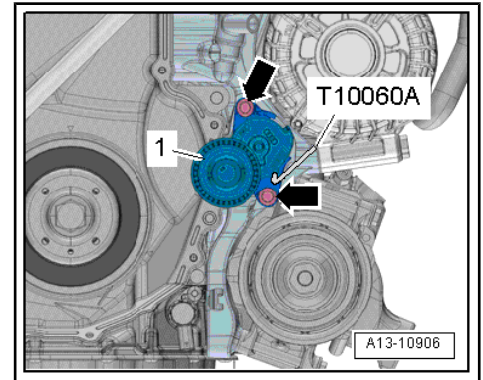


- Remove bolts -arrows- and take off tensioner -1- for poly V-belt from bracket for ancillaries.
- Remove vibration damper ⇒ [page 42](#) .

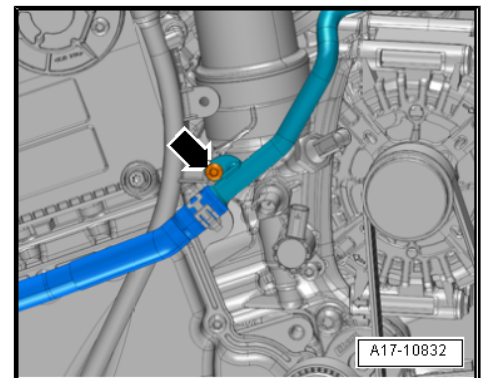
 **Caution**

Risk of irreparable damage to engine.

◆ *To avoid disturbing valve timing, do not turn crankshaft out of "TDC" position when bolt for vibration damper is removed.*



- Remove bolt -arrow- and detach guide tube for oil dipstick from timing chain cover.



- Remove bolts -1 ... 15-.

 **Note**

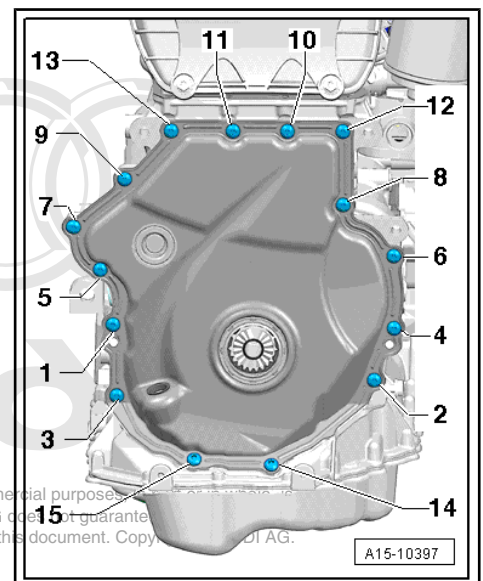
Some versions have only 8 bolts.


- Prise off timing chain cover (bottom).

Installing

 **Note**

- ◆ *Note the expiry date of the silicone sealant.*
- ◆ *Silicone sealant ⇒ Electronic parts catalogue*
- ◆ *The cover must be installed within 5 minutes after applying the silicone sealant.*
- ◆ *Renew the bolts tightened with specified tightening angle.*
- ◆ *Renew seals, gaskets and self-locking nuts.*



 **Caution**

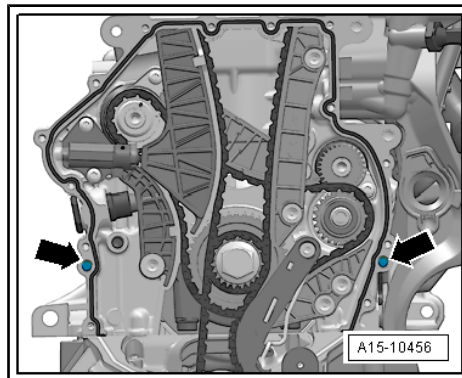
Protect lubrication system against contamination.

◆ *Cover exposed parts of the engine.*

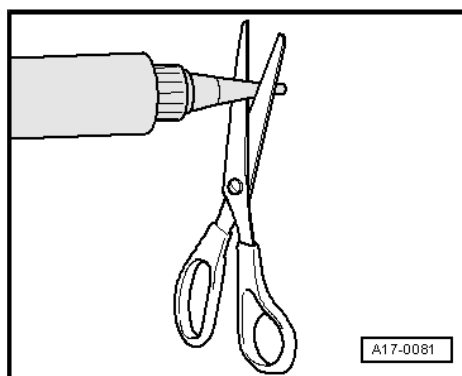
- Remove sealant remaining on cylinder block with flat scraper.
- Clean surfaces; they must be free of oil and grease.



- Check that both dowel pins are fitted in cover -arrows-.

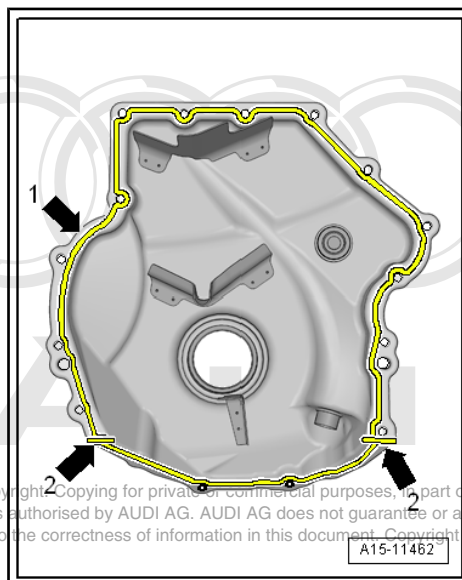


- Cut off nozzle of tube at front marking (Ø of nozzle approx. 3 mm).



Cover with 15 bolts

- Apply silicone sealant onto clean sealing surface -arrow 1- and onto edges -arrow 2- of new cover, as illustrated.
- ◆ Thickness of sealant bead: 2 ... 3 mm



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Cover with 8 bolts

- Apply silicone sealant onto clean sealing surface -arrow 1- and onto edges -arrow 2- of new cover, as illustrated.

◆ Thickness of sealant bead: 2 ... 3 mm



Note

- ◆ *The cover must be installed within 5 minutes after applying the silicone sealant.*
- ◆ *The bead of sealant must not be thicker than specified, otherwise excess sealant can enter the sump and obstruct the strainer in the oil intake pipe.*

- Immediately fit timing chain cover and tighten bolts:

◆ Cover with 15 bolts ⇒ [page 82](#)

◆ Cover with 8 bolts ⇒ [page 82](#)



Note

After fitting cover, let sealant dry for approx. 30 minutes. Then (and only then) fill the engine with engine oil.

- Install vibration damper ⇒ [page 42](#) .
- Install poly V-belt tensioner ⇒ [page 49](#) .
- Install poly V-belt ⇒ [page 40](#) .
- Install noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .
- Check oil level: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .

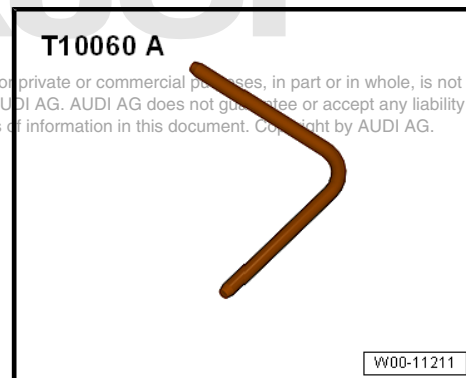
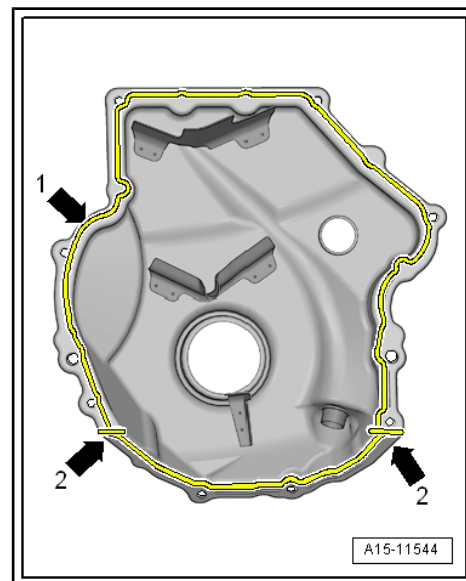
Tightening torques

◆ ⇒ [“1.1 Exploded view - timing chain cover”, page 80](#)

1.4 Renewing oil seal for vibration damper

Special tools and workshop equipment required

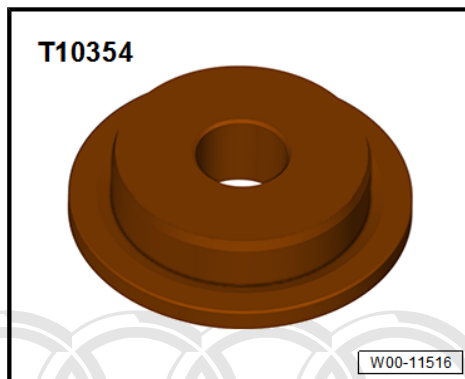
◆ Locking pin - T10060 A-



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- ◆ Thrust piece - T10354-

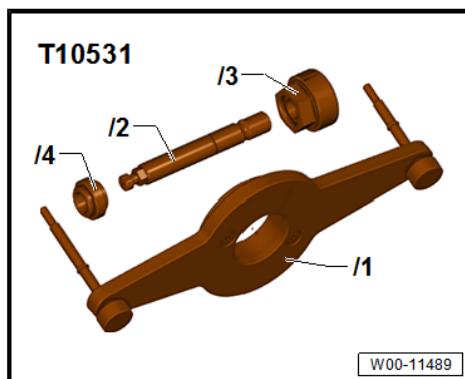


- ◆ Thrust pad - T10375-

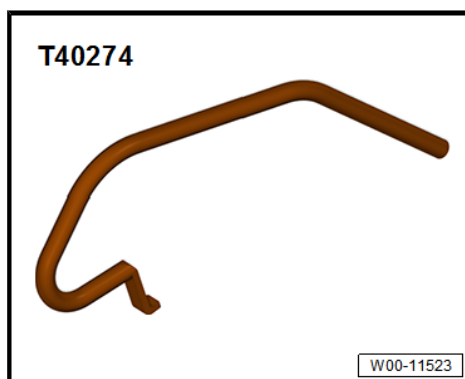


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- ◆ Flange nut - 10531/4- from assembly tool - T10531-



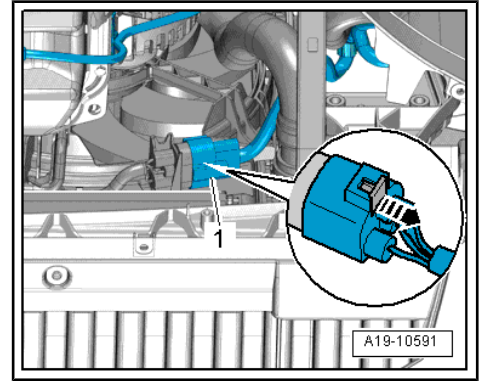
- ◆ Extractor hook - T40274-



Removing

- Remove front noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

- Take electrical connector -1- for radiator fan out of bracket and unplug connector (push retainer to the rear -arrow- and press down release catch).
- Move clear electrical wiring harness going to radiator fan control unit.



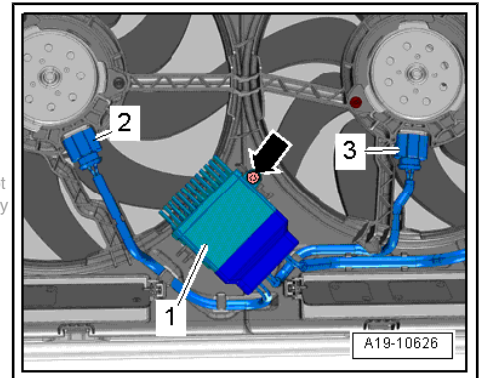
- Unplug electrical connectors -2- and -3-.



Some versions have only one radiator fan.

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- Unscrew bolt -arrow- and remove radiator fan control unit -1-.

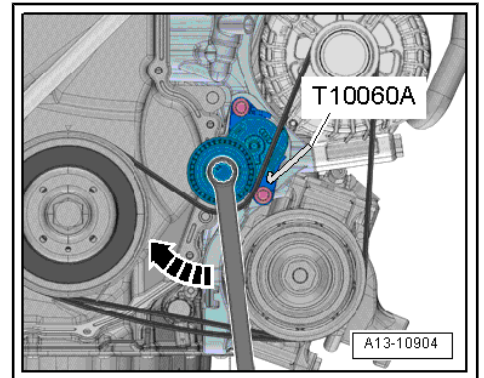


Caution

Wrong direction of rotation for a used poly V-belt can lead to irreparable damage.

- ◆ **Before removing the poly V-belt mark the direction of rotation with chalk or a felt-tip pen for re-installation.**

- To slacken poly V-belt turn tensioner in direction of -arrow-.
- Lock tensioner with locking pin - T10060 A- .
- Take off poly V-belt.



Caution

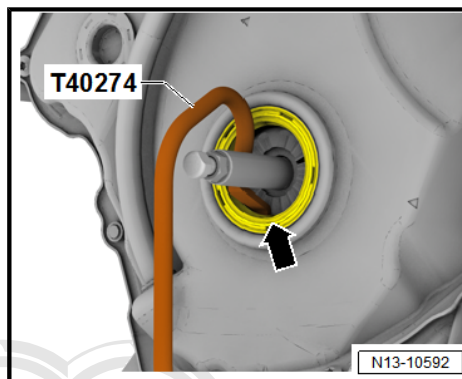
Risk of irreparable damage to engine.

- ◆ **To avoid disturbing valve timing, do not turn crankshaft out of "TDC" position when vibration damper is removed.**

- Remove vibration damper ⇒ [page 42](#) .



- Pry out oil seal -arrow- using extractor hook - T40274- .
- Clean contact surface and sealing surface.

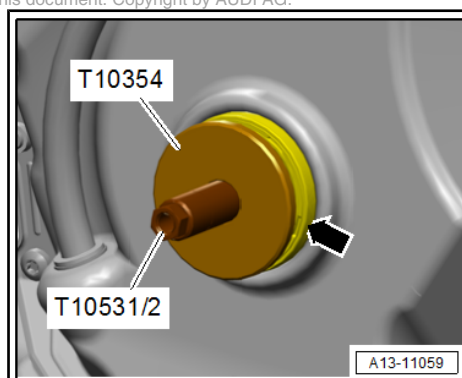


- Fit oil seal -arrow- onto thrust piece - T10354- .
- Closed side of oil seal faces thrust piece - T10354- .



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- Slide oil seal -arrow- with thrust piece - T10354- onto clamping pin - T10531/2- and position on timing chain cover (bottom).



- Also fit thrust pad - T10375- and tighten flange nut - 10531/4- .
- Drive oil seal in as far as stop using thrust piece - T10354- .

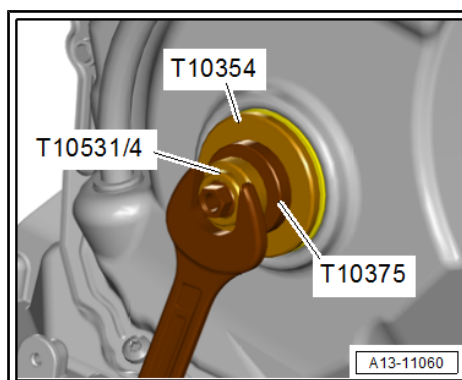
i Note

Renew bolt with O-ring for vibration damper.

- Install vibration damper ⇒ [page 42](#) .
- Install poly V-belt ⇒ [page 41](#) .

Tightening torques

- ◆ ⇒ ["1.1 Exploded view - cylinder block \(pulley end\)", page 38](#)



2 Chain drive

⇒ [“2.1 Exploded view - camshaft timing chains”, page 93](#)

⇒ [“2.2 Exploded view - drive chain for balance shaft”, page 95](#)

⇒ [“2.3 Removing and installing bearing saddle”, page 96](#)

⇒ [“2.4 Removing and installing camshaft timing chain”, page 100](#)

⇒ [“2.5 Checking chain elongation”, page 112](#)

⇒ [“2.6 Checking valve timing”, page 113](#)

2.1 Exploded view - camshaft timing chains



Note

After working on chain drive, *chain elongation must be adapted*
 ⇒ *Vehicle diagnostic tester; [Guided Functions]; [01 - Chain elongation adaption diagnosis].*

1 - Bolt

- Renew
- 4 Nm + 90°

2 - Chain tensioner

- Exerts spring pressure
- Before removing, lock in place using locking tool - T40267-

3 - Tensioning rail for timing chain

4 - Guide pin

- 20 Nm

5 - Bolt

- Renew
- Tightening sequence
⇒ [page 94](#)

6 - Spring pin

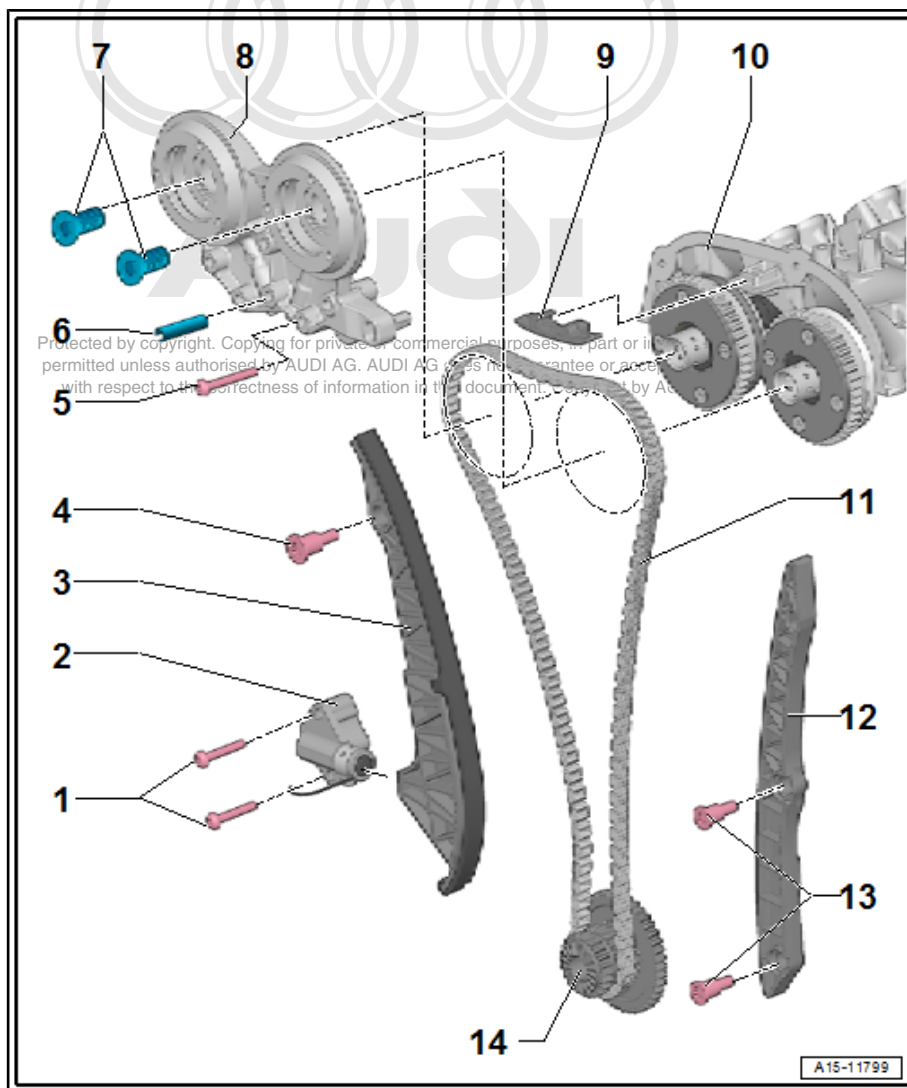
- Not fitted on all bearing saddle versions

7 - Timing valves

- Left-hand thread
- 35 Nm
- Remove with assembly tool - T10352/2-

8 - Bearing saddle

- Removing and installing
⇒ [page 96](#)





9 - Guide rail for camshaft timing chain

10 - Camshaft housing

11 - Camshaft timing chain

- Before removing, mark running direction with paint

12 - Guide rail for camshaft timing chain

13 - Guide pin

- 20 Nm

14 - Three-part chain sprocket assembly

- Crankshaft
- Installation position [⇒ page 94](#)

Bearing saddle - tightening torque and sequence

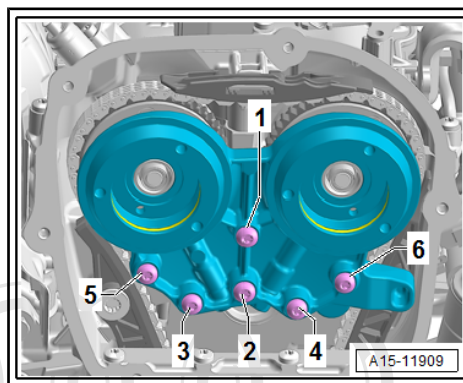
– Tighten bolts in stages in the sequence shown:

For steel bolts

Stage	Bolts	Tightening torque/angle specification
1.	-1 ... 6-	Screw in by hand until contact is made
2.	-1 ... 6-	9 Nm

For aluminium bolts

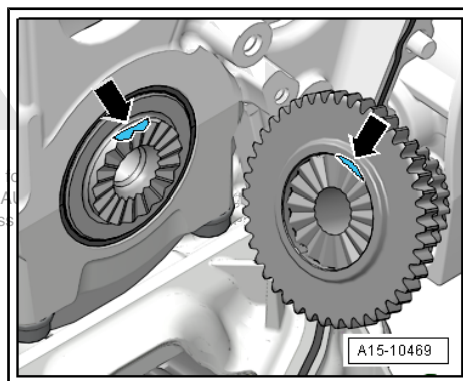
Stage	Bolts	Tightening torque/angle specification
1.	-1 ... 6-	Screw in by hand until contact is made
2.	-1 ... 6-	Pre-tighten to 4 Nm
3.	-1 ... 6-	Turn 180° further



Three-part chain sprocket assembly - installation position

- The two sections -arrows- must be aligned.

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2.2 Exploded view - drive chain for balance shaft

1 - Guide pin

- 20 Nm

2 - Tensioning rail

- For timing chain

3 - Balance shaft

- Exhaust side
- Lubricate bearing with engine oil
- Always renew both sides together
⇒ [page 70](#)

4 - Guide pin

- 20 Nm

5 - Guide rail

- For timing chain

6 - Chain tensioner

- 85 Nm
- Apply locking fluid when installing; refer to ⇒ Electronic parts catalogue

7 - Oil seal

8 - Cylinder block

9 - O-ring

- Lubricate with engine oil

10 - Bearing mounting

- Lubricate with engine oil
- Installation position
⇒ [page 96](#)

11 - Idler gear

- If bolt ⇒ [Item 13 \(page 95\)](#) has been loosened, idler gear must be renewed

12 - Thrust washer

13 - Bolt

- Renew
- If bolt has been loosened, idler gear ⇒ [Item 11 \(page 95\)](#) must be renewed
- Tightening sequence ⇒ [page 96](#)

14 - Guide rail

- For balance shaft timing chain

15 - Guide pin

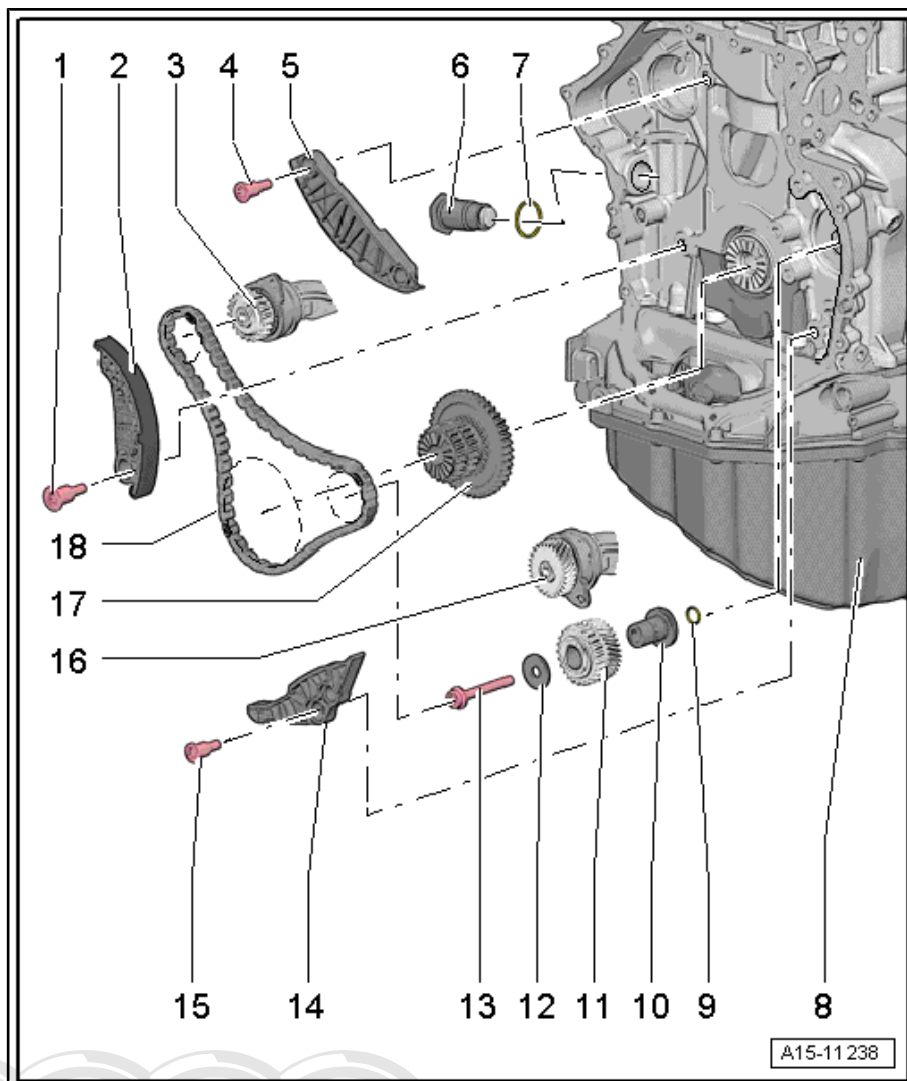
- 20 Nm

16 - Balance shaft

- Inlet side
- Lubricate bearing with engine oil
- Always renew both sides together ⇒ [page 67](#)

17 - Three-part chain sprocket assembly

- Installation position ⇒ [page 94](#)



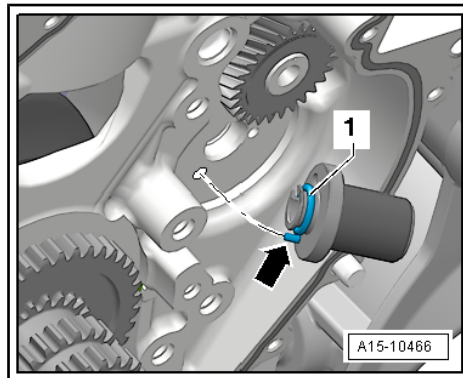
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18 - Drive chain for balance shafts

- Removing and installing ⇒ ["2.4 Removing and installing camshaft timing chain", page 100](#)

Bearing mounting - installation position

- Renew O-ring -1- and lubricate with oil.
- Dowel pin -arrow- for bearing mounting must engage in bore in cylinder block.
- Lubricate bearing mounting.



Idler gear - tightening sequence



Caution

Always renew idler gear. If this is not done, there is no backlash, which causes engine damage.

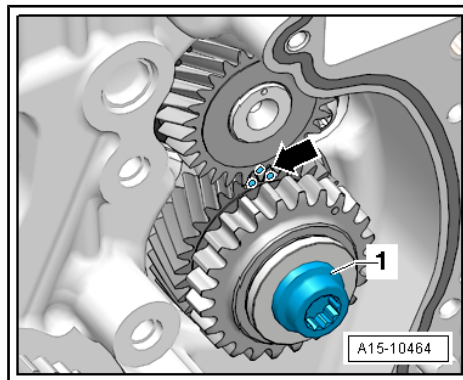
The new idler gear has a special lubricant coating which wears off after a short running period and thus automatically creates the specified backlash.

– Secure with new bolt as follows:

1. Tighten with torque wrench initially to 10 Nm.
2. Turn idler gear.

Idler gear must be without play; otherwise loosen bolt and tighten again.

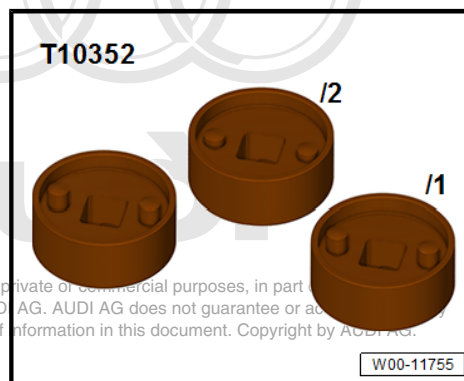
3. Tighten with torque wrench to 25 Nm.
4. Use rigid wrench to turn 90° further.



2.3 Removing and installing bearing saddle

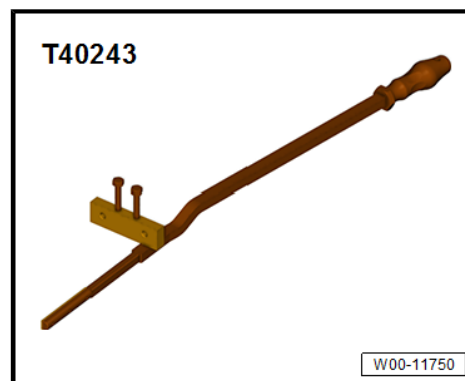
Special tools and workshop equipment required

- ◆ Assembly tool - T10352-

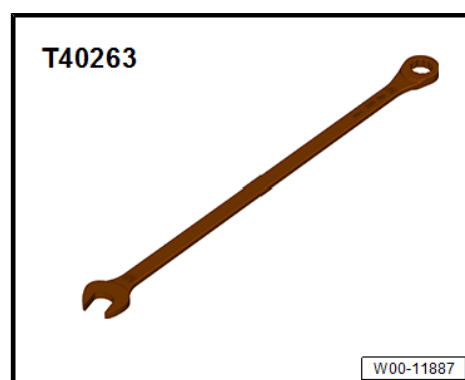


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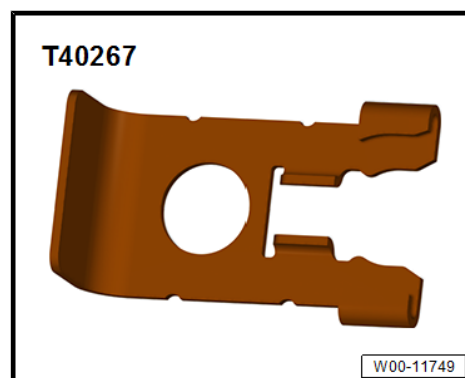
◆ Lever - T40243-



◆ Wrench, 21 mm - T40263-

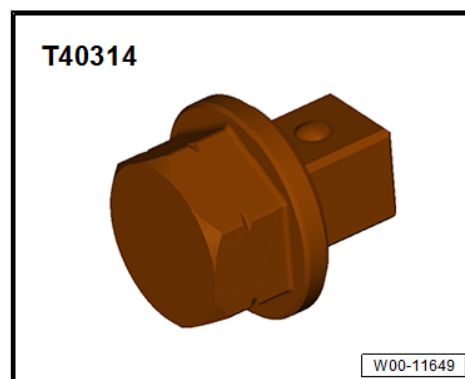


◆ Locking tool - T40267-




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◆ Adapter - T40314-



Removing

- Remove timing chain cover (top) ⇒ [page 83](#) .

 **Caution**

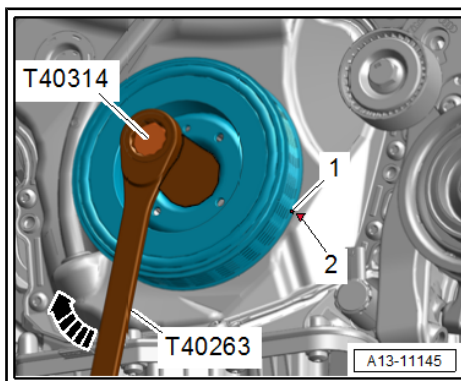
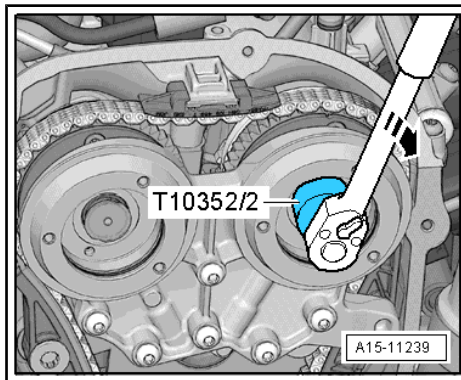
Risk of damage to thread.

◆ *The timing valves have a left-hand thread.*


- Turn assembly tool - T10352/2- in direction of -arrow- to remove timing valve (left and right sides).
- To do so, counterhold with wrench, 21 mm - T40263- , adapter - T40314- and socket, 24 mm.

 **Note**

Disregard -items 1, 2 and arrow-.



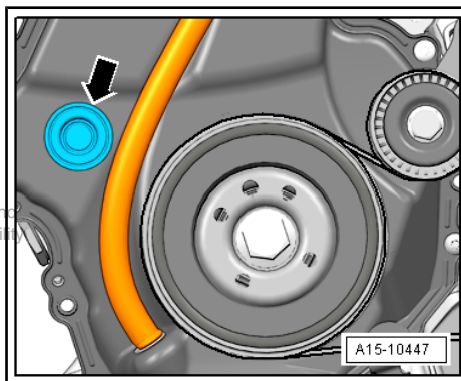
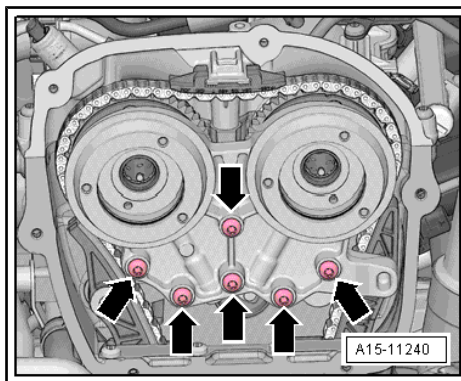
- Remove bolts -arrows-.

 **WARNING**

Risk of damage to bearing saddle.

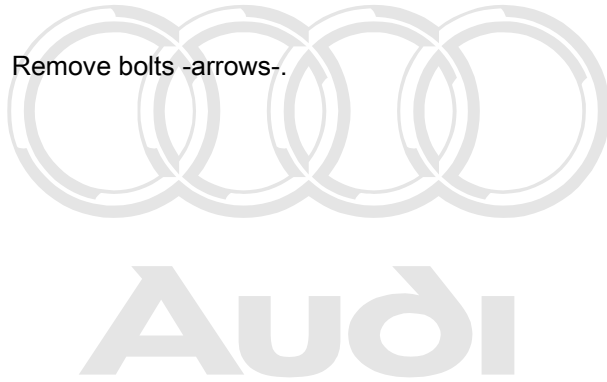
◆ *Detach bearing saddle carefully without tilting it.*

- Detach bearing saddle.
- Remove sealing plug -arrow-.



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- Remove bolts -arrows-.



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 - Bolt lever - T40243- onto cylinder head -bottom arrows-.

i Note

A second mechanic is required for the following steps.

- Compress and hold circlip -1- for chain tensioner.
- Push lever - T40243- slowly in direction of -arrow- and hold in place.
- This will press the chain tensioner back.

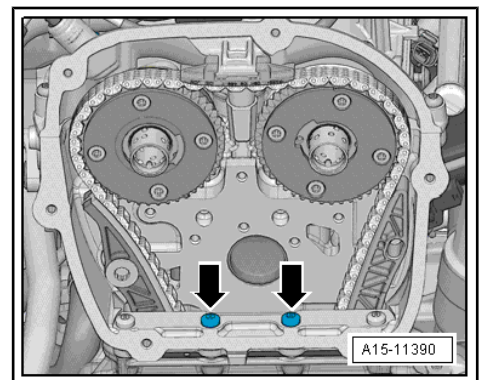
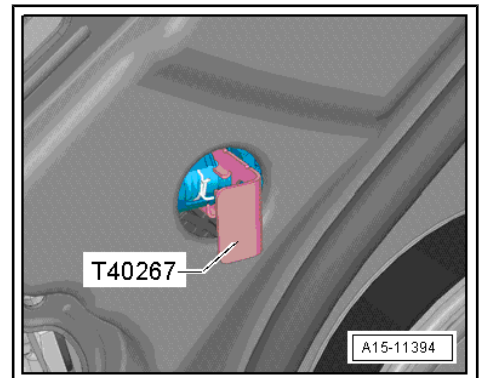
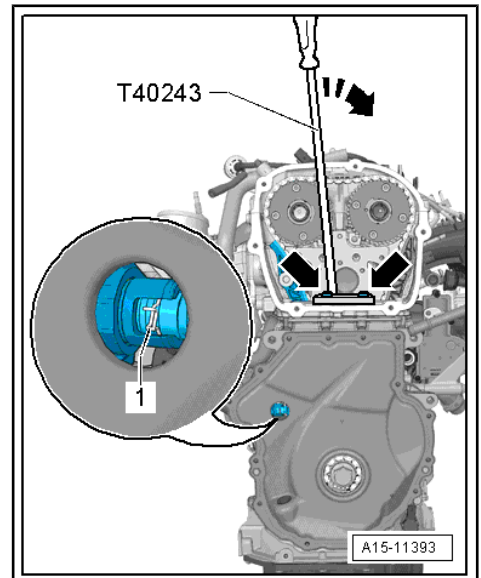
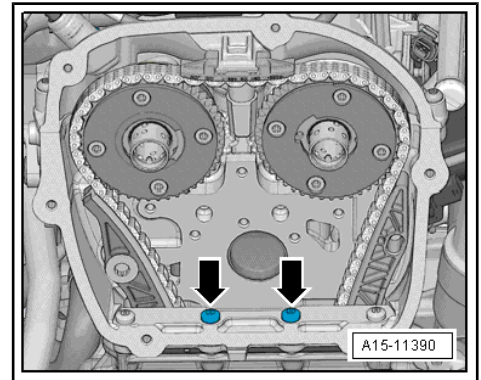
i Note

The chain tensioner is oil-damped and can therefore only be pressed back slowly by applying constant pressure.

- Lock chain tensioner with locking tool - T40267- .
- Remove lever - T40243- .

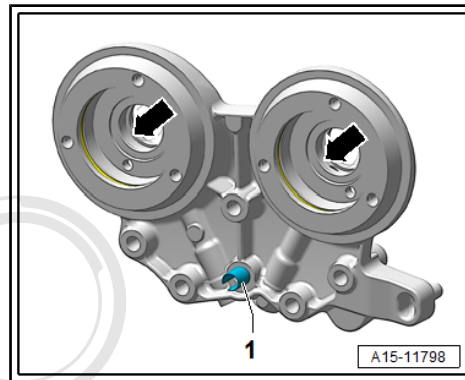
Installing

- Fit and tighten bolts -arrows-. Tightening torque
 ⇒ [Item 4 \(page 117\)](#)





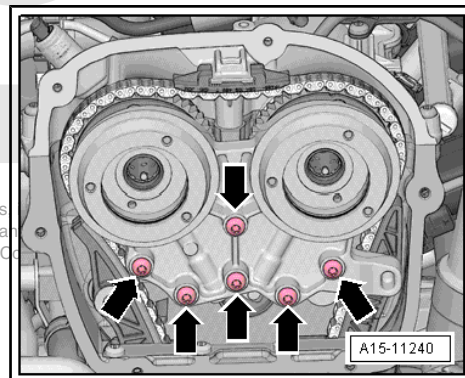
- Lubricate holes -arrows- with engine oil.
- Check whether clamping sleeve -1- is fitted.



⚠ WARNING
Risk of damage to bearing saddle.
 ♦ **Carefully attach bearing saddle without tilting it.**

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- Fit bearing saddle and screw in bolts -arrows- by hand until they make contact.
- Remove locking tool - T40267- .
- Tighten bolts for bearing saddle ⇒ [page 94](#) .



Remaining installation steps are carried out in reverse sequence; note the following:

- Install timing chain cover (top) ⇒ [page 83](#) .

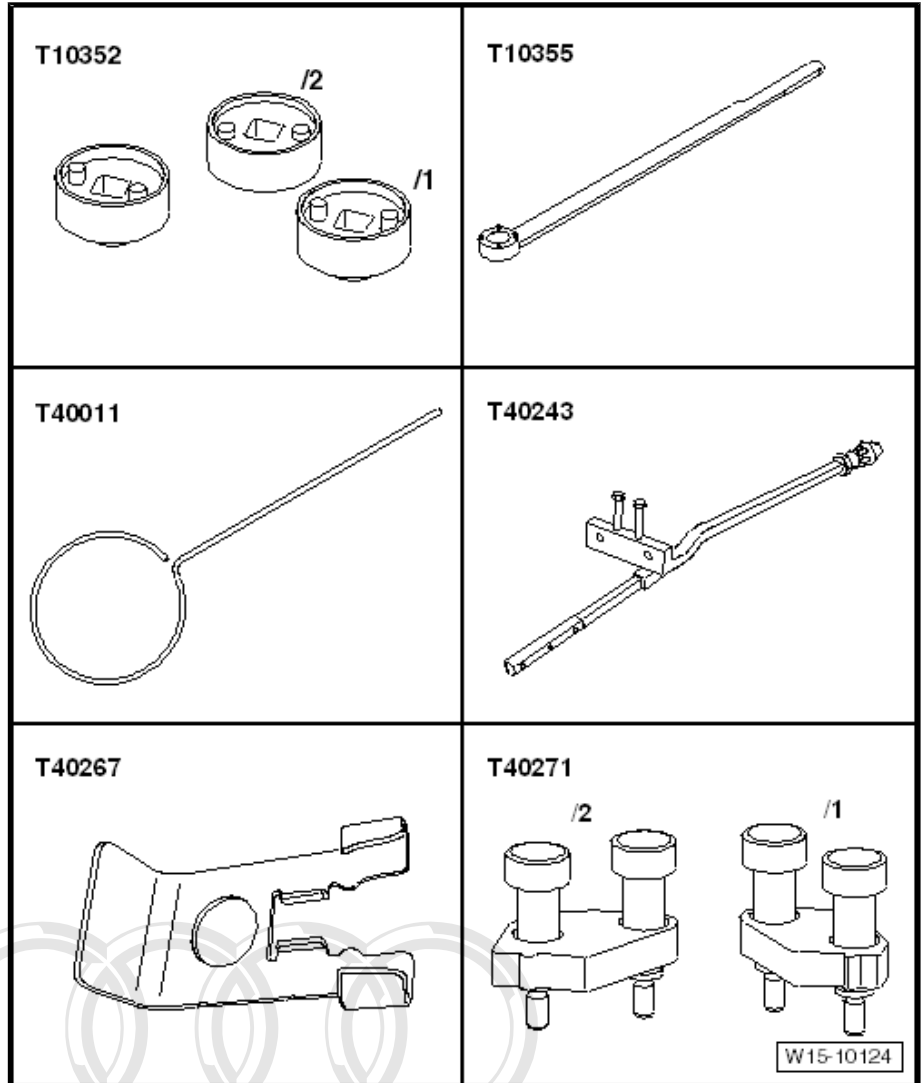
Tightening torques

- ♦ ⇒ [Fig. ““Bearing saddle - tightening torque and sequence””, page 94](#)
- ♦ ⇒ [“2.1 Exploded view - camshaft timing chains”, page 93](#)
- ♦ ⇒ [“3.1 Exploded view - cylinder head”, page 117](#)

2.4 Removing and installing camshaft timing chain

Special tools and workshop equipment required

- ◆ Removal tool - T10352-
- ◆ Counterhold tool - T10355-
- ◆ Locking pin - T40011-
- ◆ Assembly lever - T40243-
- ◆ Locking tool - T40267-
- ◆ Camshaft clamp - T40271-



- ◆ Assembly tool - T40266-



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Removing

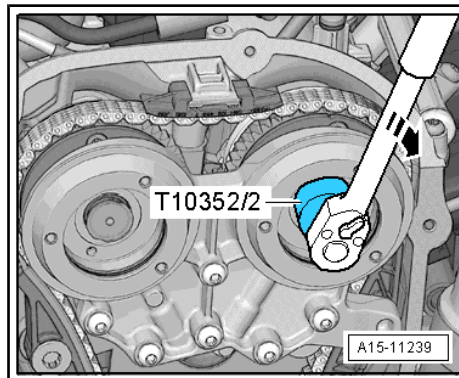
- Remove timing chain cover (top) ⇒ [page 83](#) .



Caution

The timing valves have a left-hand thread.

- Turn assembly tool - T10352/2- in direction of -arrow- to remove timing valve (left and right sides).



- Remove bolts -arrows-.

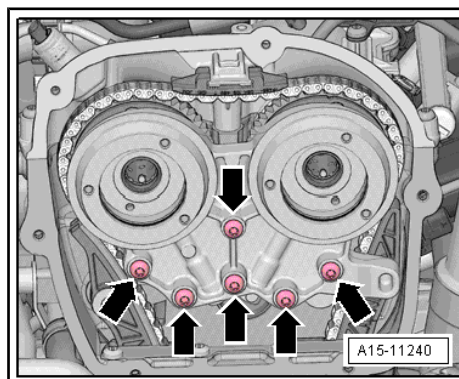


WARNING

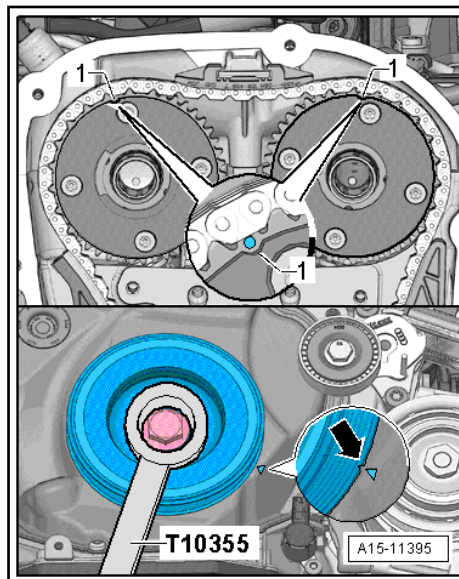
Risk of damage to bearing saddle.

◆ *Detach bearing saddle carefully without tilting it.*

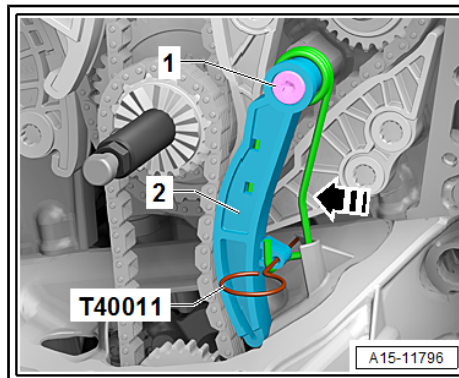
- Detach bearing saddle.



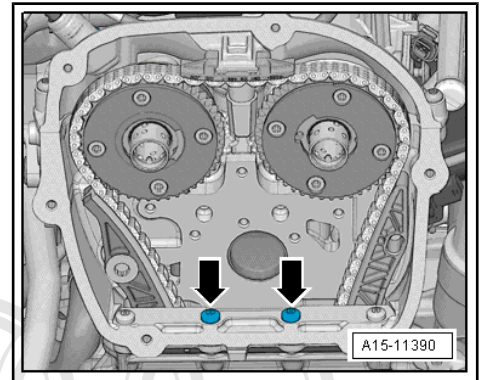
- Turn vibration damper to "TDC" position using counterhold tool - T10355-
- **Notch on vibration damper and marking on cover for timing chains (bottom) must be aligned -arrow-.**
- The markings -1- on the camshaft chain sprockets must face upwards.
- Remove timing chain cover (bottom) ⇒ [page 85](#) .
- Check "TDC" position again.



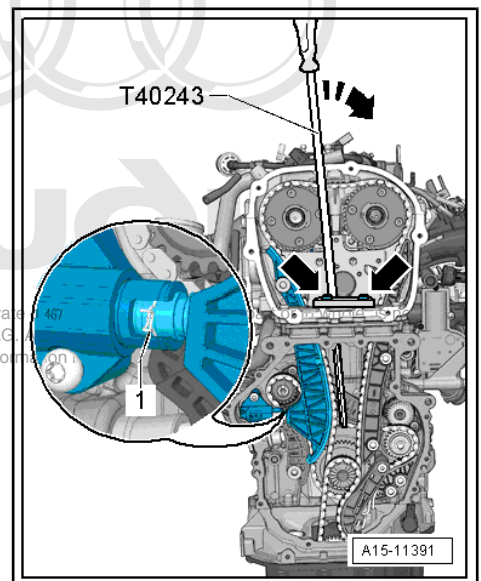
- Press retainer for oil pump chain tensioner in direction of -arrow- and lock in place using locking pin - T40011- .
- Remove oil pump chain tensioner -1-.



- Remove bolts -arrows-.

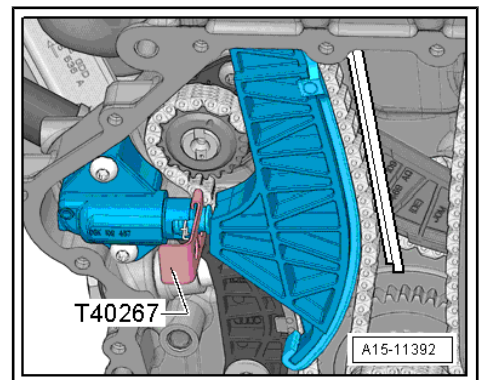


- Screw in assembly lever - T40243- -arrows-.
- Compress and hold circlip -1- for chain tensioner.
- Push assembly lever - T40243- slowly in direction of -arrow- and hold in place.

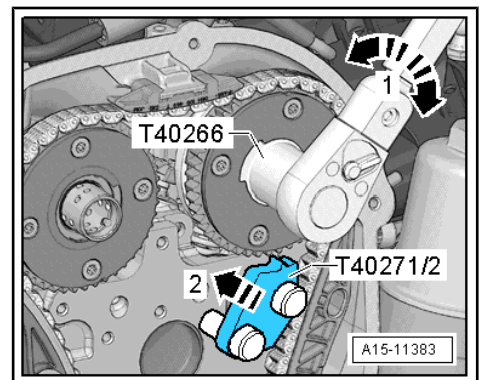


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- Hold chain tensioner in position with locking tool - T40267- .
- Remove assembly lever - T40243- .



- Bolt camshaft clamp - T40271/2- onto cylinder head and slide into teeth on chain sprocket in direction of -arrow 2-; if necessary, use assembly tool - T40266- to turn inlet camshaft in direction of -arrow 1-.

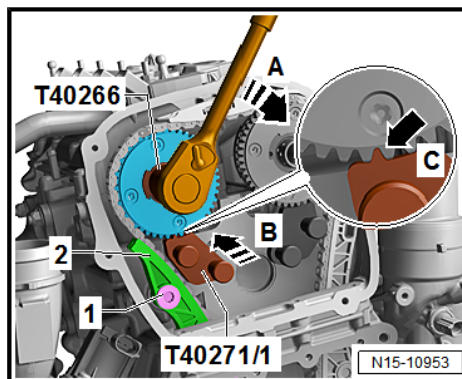




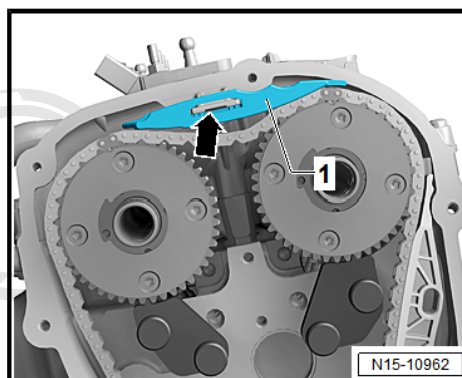
- Bolt camshaft clamp - T40271/1- onto cylinder head.

A second mechanic is required for the following step.

- Turn exhaust camshaft in direction of -arrow A- using assembly tool - T40266- and hold in place. Remove bolt -1- and guide tensioning rail -2- downwards.
- Continue turning exhaust camshaft clockwise -arrow A- until camshaft clamp - T40271/1- can be pressed into teeth -C- on chain sprocket in direction of -arrow B-.

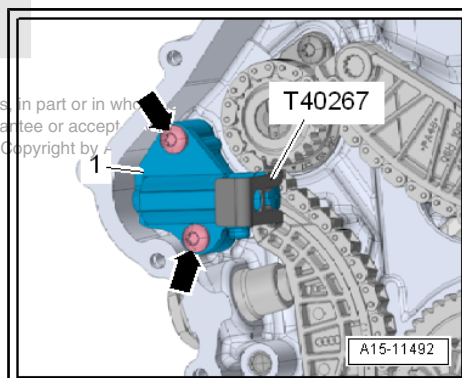


- Use screwdriver to release catch -arrow- and press off guide rail -1- towards front.

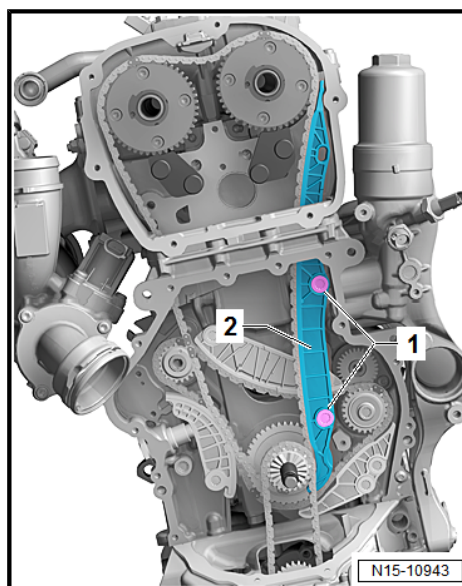


- Unscrew bolts -arrows- and remove chain tensioner -1-.

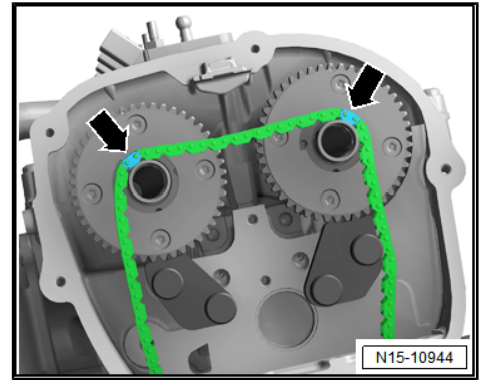
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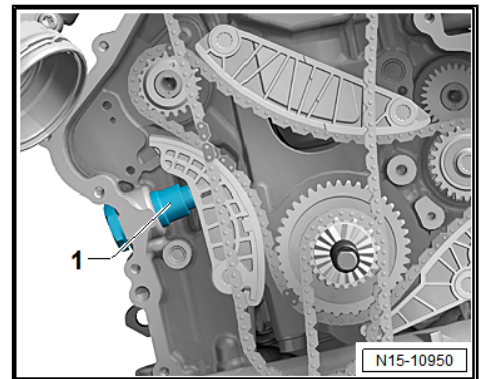
- Unscrew bolts -1- and remove guide rail -2-.



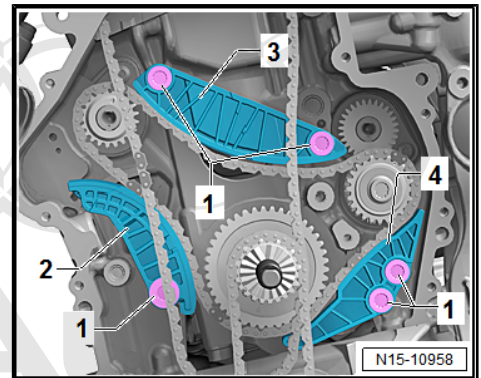
- Remove camshaft timing chain from camshaft sprockets and place onto camshaft journals -arrows-.



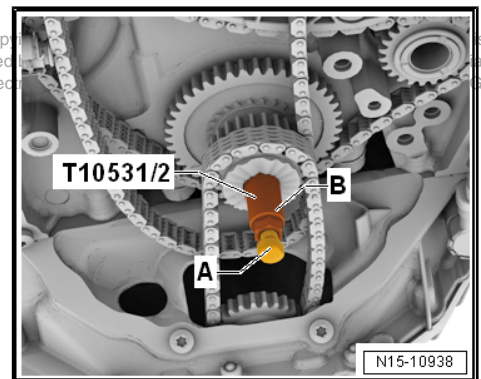
- Remove chain tensioner -1- for balance shaft timing chain.



- Remove bolts -1-. Remove tensioning rail -2- and guide rails -3- and -4-.



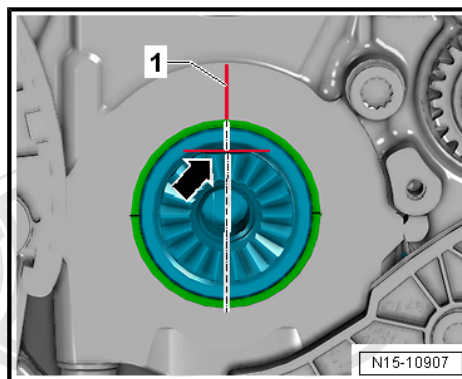
- Loosen tensioning bolt -A- and remove clamping pin -B-.
- Remove three-part chain sprocket assembly; to do so, remove oil pump chain.
- Detach camshaft timing chain and drive chain for balance shaft.



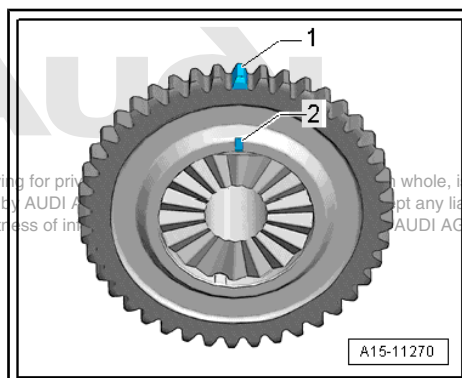


Installing

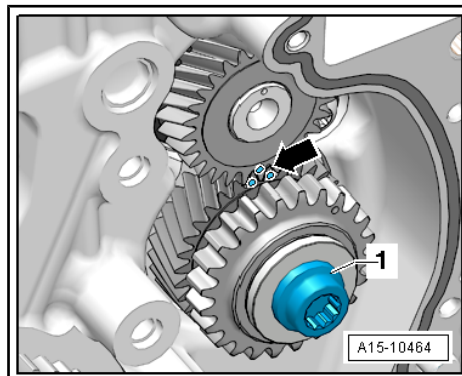
- Check TDC position of crankshaft; flat surface of crankshaft -arrow- must be horizontal.
- Use a waterproof pen to mark cylinder block -1-.



- Mark tooth -1- of three-part chain sprocket adjacent to marking -2- using waterproof pen.

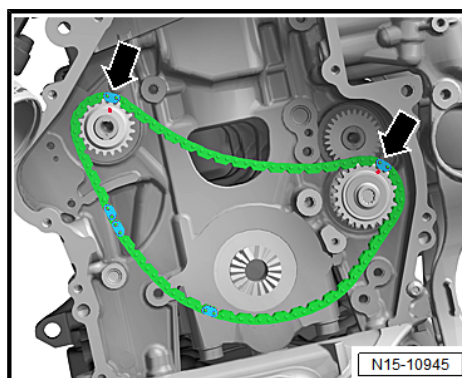


- Turn idler gear/balance shaft to markings -arrow- (do not slacken bolt -1-).



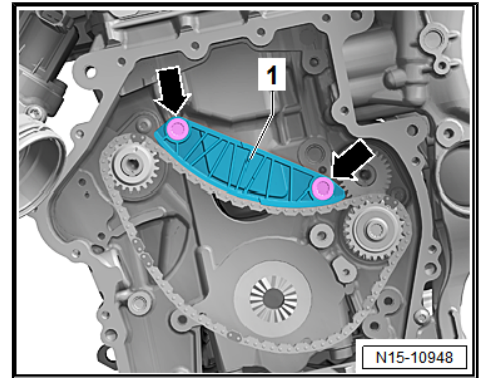
i Note

- ◆ *The links with coloured markings must be positioned at the markings on the chain sprockets.*
- ◆ *There is no need to note the position of any other coloured links.*
- Fit drive chain for balance shafts; links with coloured markings -arrows- must be positioned at markings on chain sprockets.

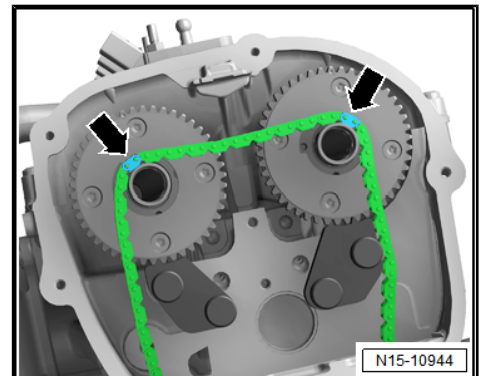


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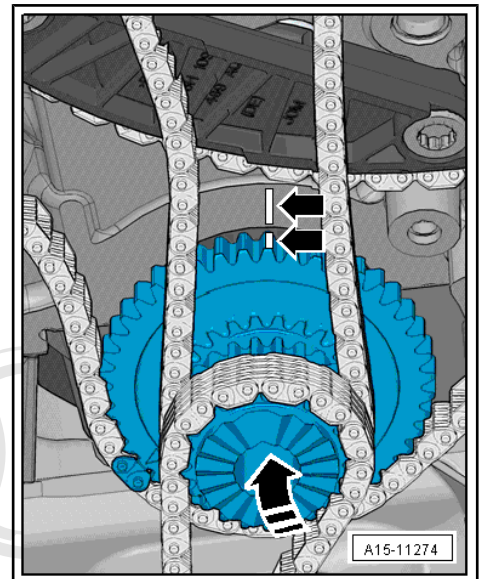
- Install guide rail -1- and tighten bolts -arrows-.



- Fit camshaft timing chain so that coloured markings -arrows- are positioned on camshaft journals.



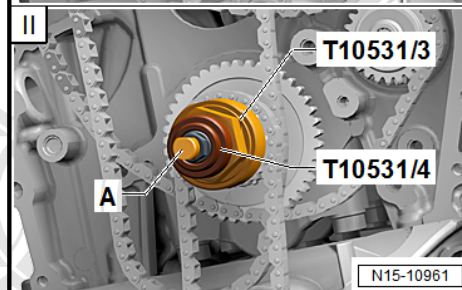
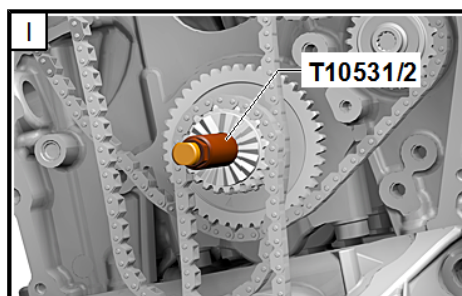
- Fit oil pump chain onto three-part chain sprocket assembly.
- Swivel three-part chain sprocket assembly towards engine in direction of -arrow- and secure on crankshaft. The marks -arrows- must align.



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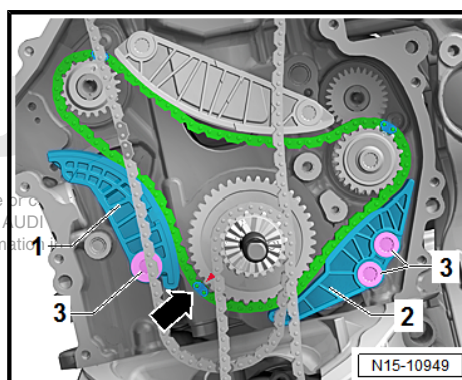


1. Screw clamping pin - T10531/2- into crankshaft and hand-tighten.
2. Attach turning-over tool - T10531/3- . Screw on flange nut - T10531/4- and hand-tighten. Move turning-over tool back and forth slightly using open-end spanner, 32 mm; at the same time, tighten flange nut until chain sprocket is firmly seated on teeth of crankshaft. Now (and not before) tighten tensioning bolt -A-.

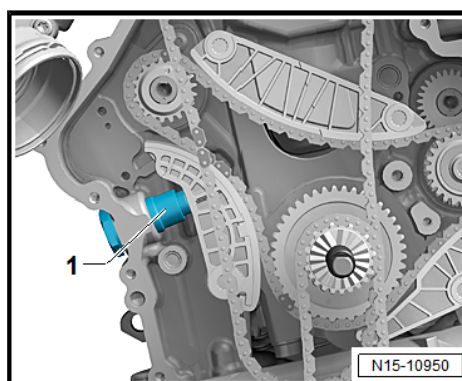


- Position link of drive chain for balance shafts with coloured marking -arrow- at marking on three-part chain sprocket assembly. Install tensioning rail -1- and guide rail -2-. Tighten bolts -3-.

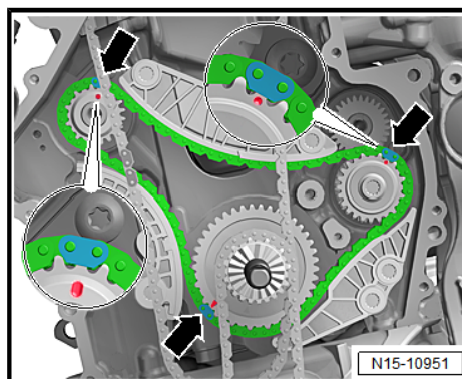
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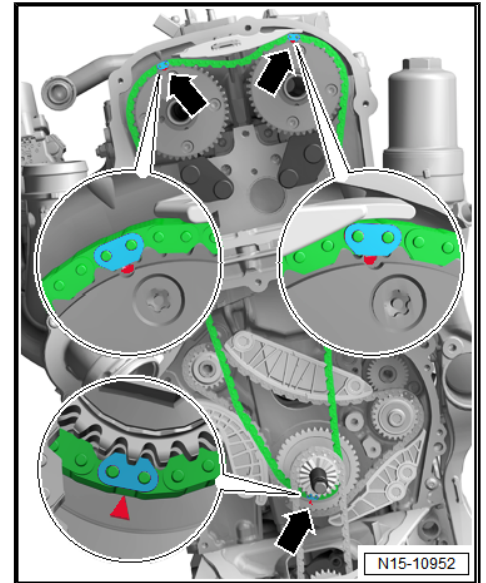
- Install chain tensioner -1-.



- Check setting again; links with coloured markings -arrows- must be positioned at markings on chain sprockets.



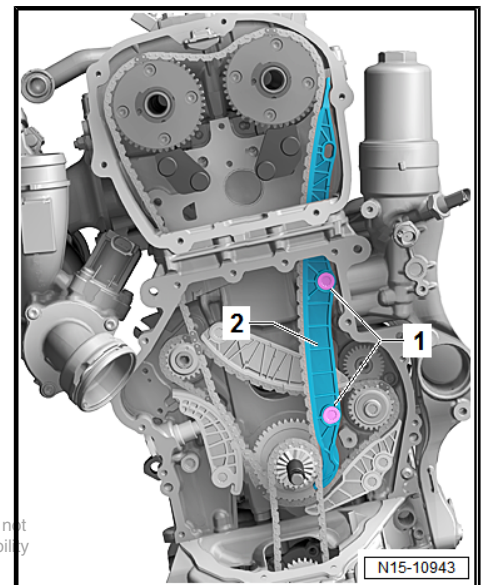
- Fit camshaft timing chain onto inlet camshaft, exhaust camshaft and crankshaft. Position links with coloured markings -arrows- at markings on chain sprockets.



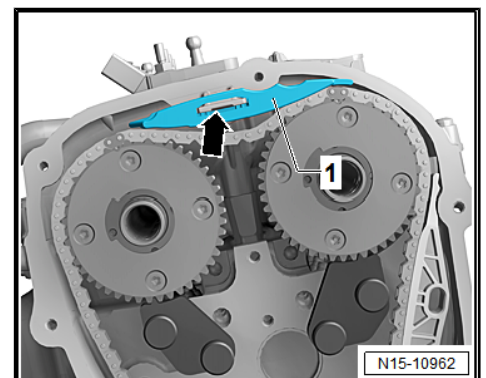
- Install guide rail -2- and tighten bolts -1-.



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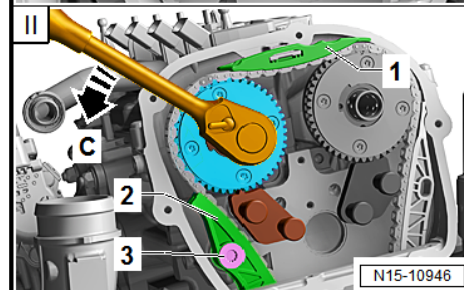
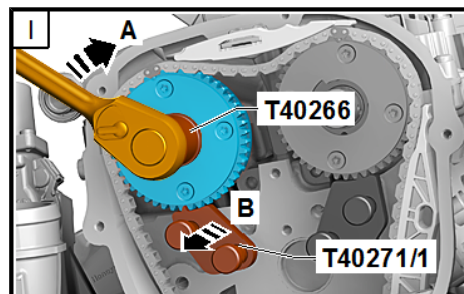
- Install top guide rail -1-.



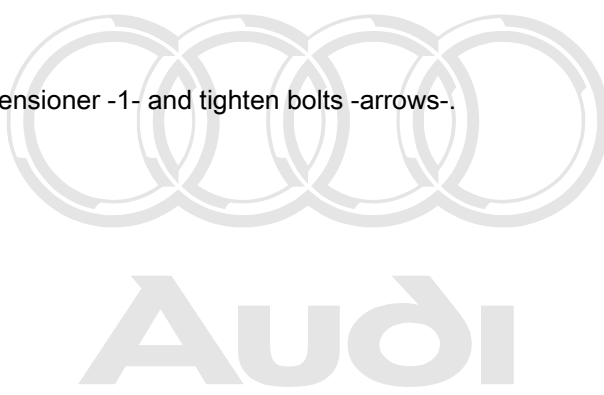


A second mechanic is required for the following step.

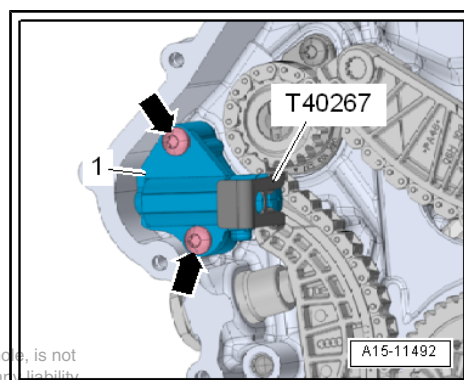
- Use assembly tool - T40266- to turn exhaust camshaft slightly in direction of -arrow A- and slide camshaft clamp - T40271/1- out of teeth on chain sprocket in direction of -arrow B-.
- Release camshaft in direction of -arrow C- until timing chain is in contact with guide rail -1-. Hold camshaft in this position, install tensioning rail -2- and tighten bolt -3-.



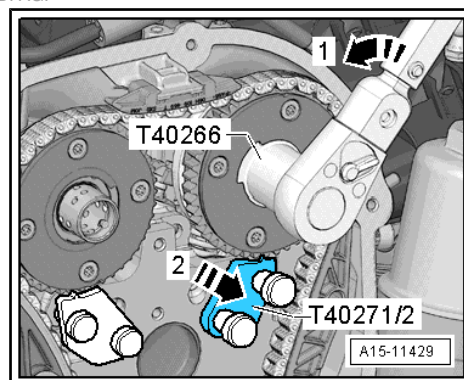
- Install chain tensioner -1- and tighten bolts -arrows-.



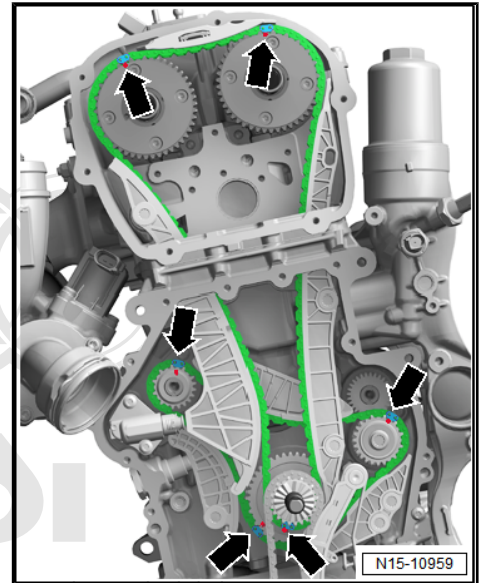
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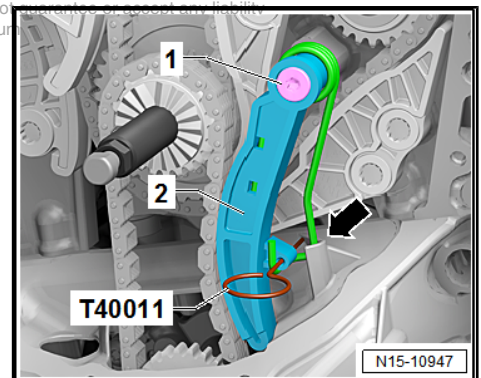
- Turn inlet camshaft in direction of -arrow 1- with assembly tool - T40266- , slide camshaft clamp - T40271/2- out of teeth on chain sprocket in direction of -arrow 2- and release camshaft.
- Remove camshaft clamp - T40271/2- .



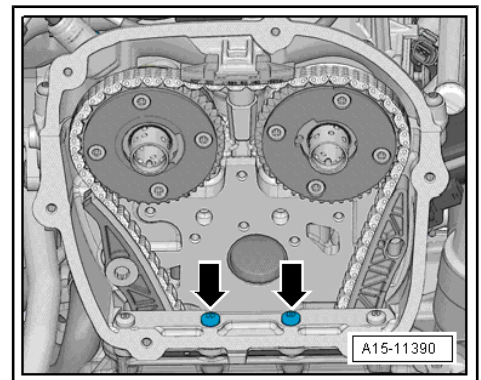
- Check setting; links with coloured markings -arrows- must be positioned at markings on chain sprockets.



- Install chain tensioner -2- and tighten bolt -1-. Remove locking pin - T40011- ; support wire must come into contact with opening -arrow- on sump (top section).



- Fit and tighten bolts -arrows-. Tightening torque
 ⇒ [Item 4 \(page 117\)](#)

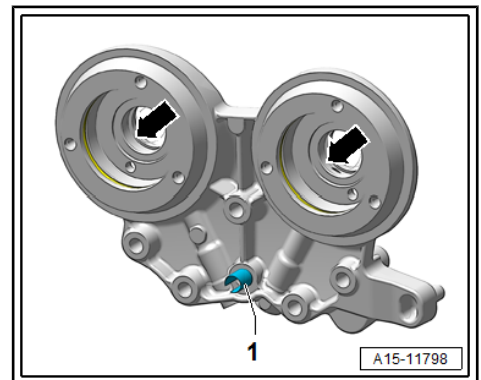


- Lubricate holes -arrows- with engine oil.

 **Note**

Spring pin -1- is not fitted on all bearing saddles.

- Check whether clamping sleeve -1- is fitted.





WARNING

Risk of damage to bearing saddle.

- ◆ *Carefully attach bearing saddle without tilting it.*

- Fit bearing saddle and screw in bolts -arrows- by hand until they make contact.

- Remove locking tool - T40267- .
- Tighten bolts for bearing saddle ⇒ [page 94](#) .
- Install timing valves ⇒ [Item 7 \(page 93\)](#) .
- Turn engine two rotations in direction of engine rotation.



Note

Due to the ratio, the timing chain links with coloured markings are no longer aligned after the engine has been turned.

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Remaining installation steps are carried out in reverse sequence; note the following:

- Detach turning-over tool and install timing chain cover (bottom) ⇒ [page 85](#) .



Note

Only tighten bolts -1- and -4- to final tightening angle after installing the vibration damper. The bolts must be unscrewed again to install the vibration damper.

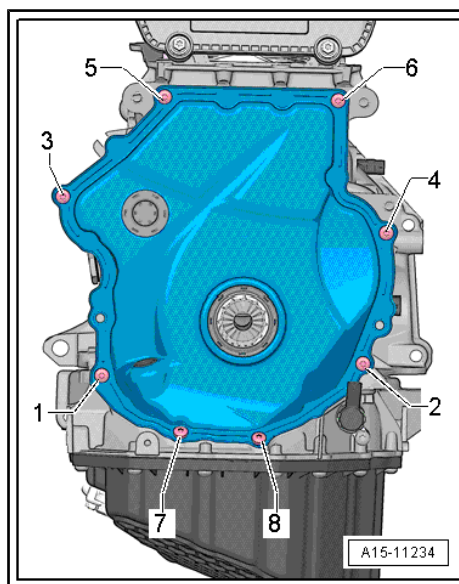
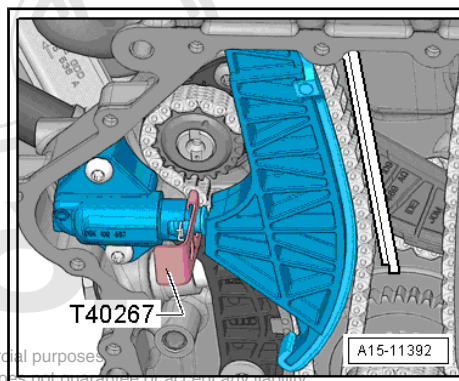
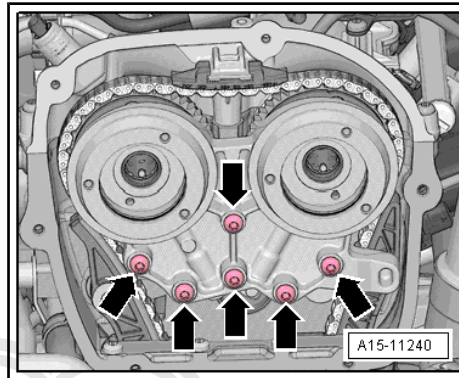
- Install vibration damper ⇒ [page 42](#) .
- Install timing chain cover (top) ⇒ [page 83](#) .
- Install poly V-belt tensioner ⇒ [page 41](#) .
- Install poly V-belt ⇒ [page 40](#) .
- After working on chain drive, chain elongation must be adapted ⇒ [Vehicle diagnostic tester](#) ; [Guided Functions](#); [01 - Chain elongation adaption diagnosis](#).

Tightening torques

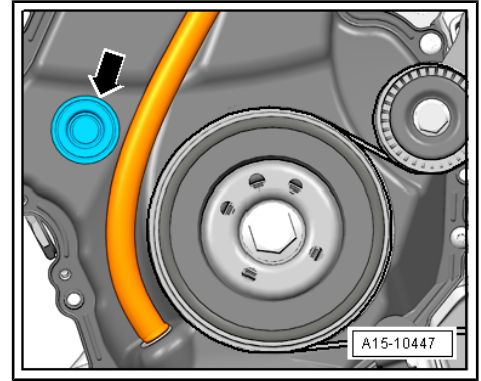
- ◆ ⇒ [“2.1 Exploded view - camshaft timing chains”, page 93](#)
- ◆ ⇒ [“2.2 Exploded view - drive chain for balance shaft”, page 95](#)

2.5 Checking chain elongation

- Remove front noise insulation ⇒ [General body repairs, exterior](#); [Rep. gr. 66](#) ; [Noise insulation](#); [Exploded view - noise insulation](#) .



- Remove sealing plug -arrow-.



- Turn vibration damper in direction of engine rotation until piston of chain tensioner has extended as far as it will go in direction of -arrow-.
- Count visible teeth of piston.

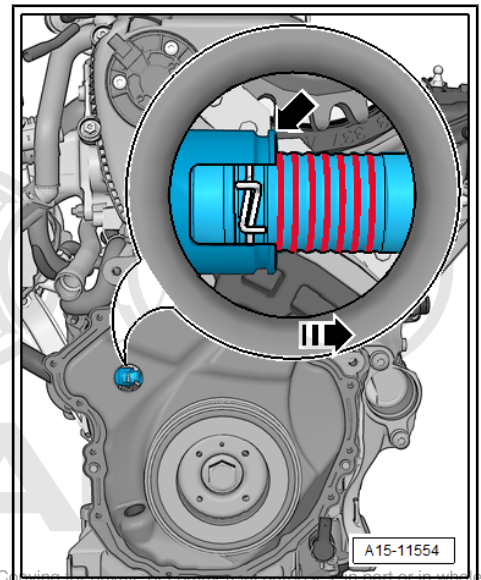
 **Note**

Visible teeth are all teeth to the right of the chain tensioner housing -arrow-.

- ◆ If six or fewer teeth are visible and there is an entry in the event memory: Adapt chain elongation (⇒ Vehicle diagnostic tester, Guided Functions, 01 - Chain elongation adaption diagnosis) and delete event memory.
- ◆ If seven or more teeth are visible: Renew camshaft timing chain ⇒ [page 100](#) .

 **Note**

The timing chain must not be replaced if six or fewer teeth are visible.

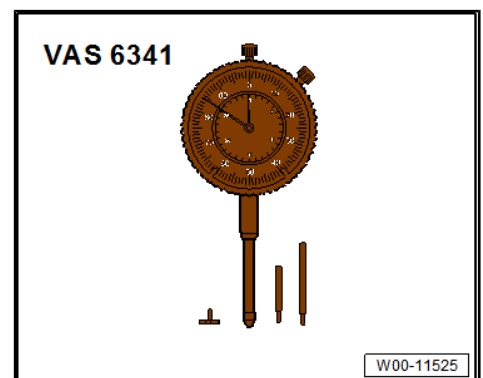


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2.6 Checking valve timing

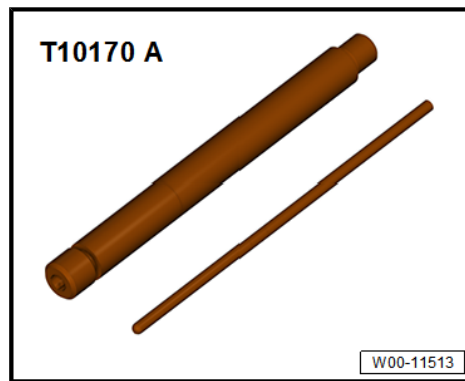
Special tools and workshop equipment required

- ◆ Dial gauge set, 4-part - VAS 6341-



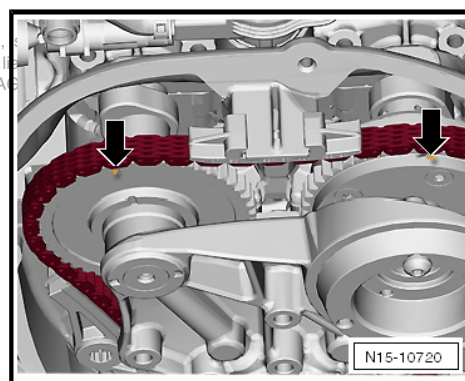


◆ Adapter for dial gauge - T10170 A-

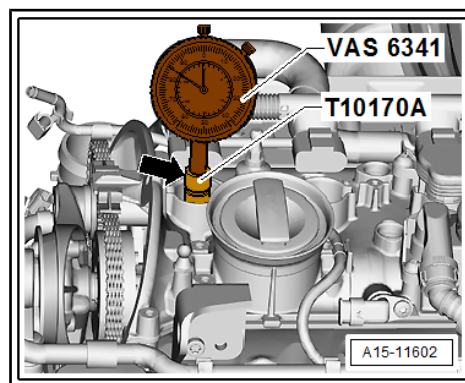


Procedure

- Remove timing chain cover (top) ⇒ [page 83](#) .
- Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .
- Using 24 mm socket or counterhold tool - T10355- , turn crankshaft via vibration damper in normal direction of rotation until markings -arrows- are almost at top .
- Remove spark plug on cylinder 1.



- Screw dial gauge adapter - T10170/A- into spark plug thread as far as stop.
- Insert dial gauge from dial gauge set, 4-part - VAS 6341- with extension - T10170A/1- as far as stop and secure with locking nut -arrow-.
- Turn crankshaft slowly in normal direction of engine rotation until needle in dial gauge has reached maximum position. When needle has moved to maximum position (i.e. turning point in dial gauge), piston is at »TDC«.

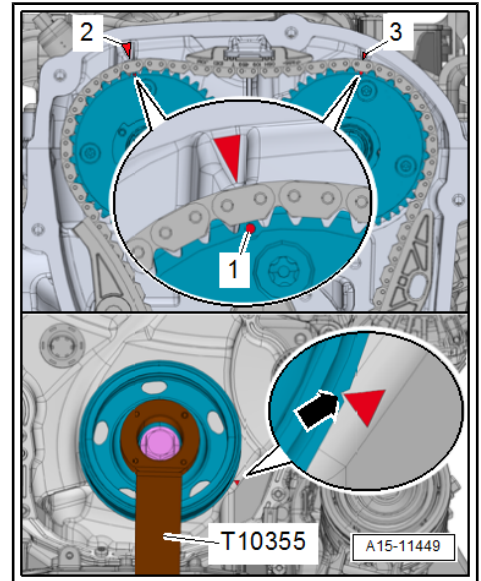


Note

- ◆ *To turn the vibration damper, use a ratchet with 24 mm socket or a counterhold tool - T10355- .*
- ◆ *If the crankshaft has been turned beyond the "TDC" position, it must again be turned two rotations in normal direction of engine rotation. Do not turn engine in opposite direction to normal rotation.*

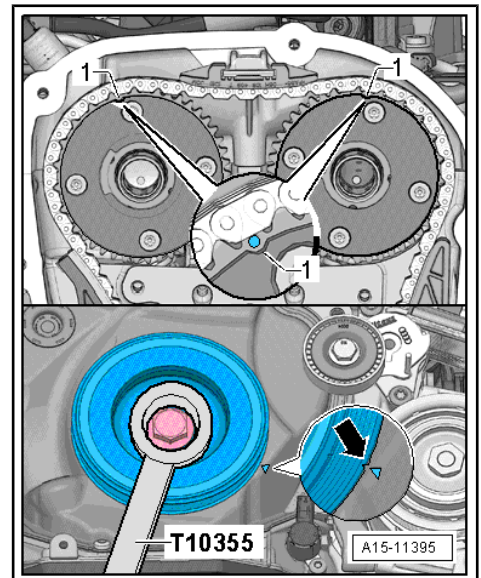
With markings on cylinder head

- Notch on vibration damper must align with arrow marking on timing chain cover (bottom) -arrow-.
- Markings -1- on camshaft chain sprockets must be aligned with markings -2 and 3- on cylinder head.

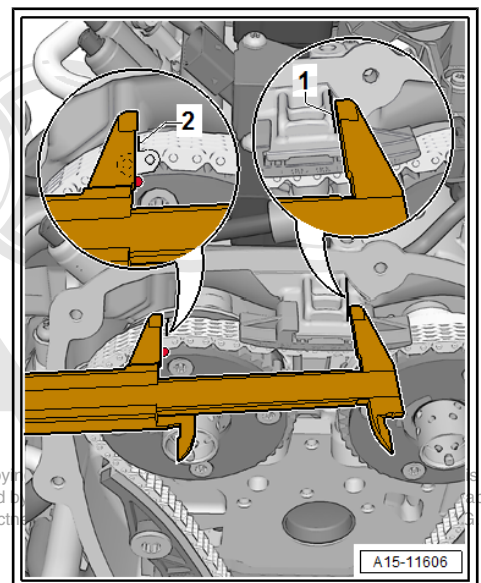


Without markings on cylinder head

- Notch on vibration damper and marking on cover for timing chains (bottom) must be aligned -arrow-.
- The markings -1- on the camshaft chain sprockets must face upwards.



- Measure distance from edge -1- to marking -2- on exhaust camshaft chain sprocket.
- Specification: 74 ... 77 mm



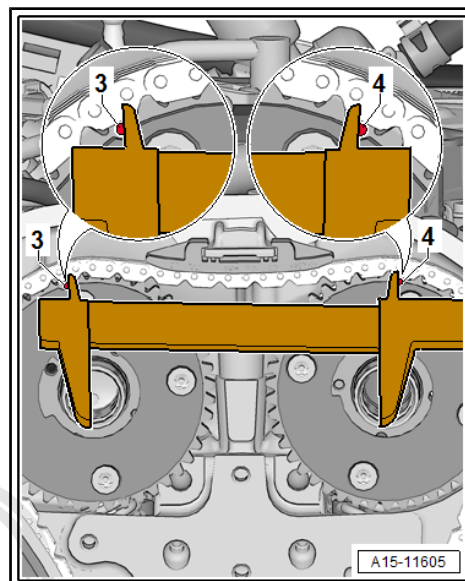


- If specification is obtained, measure distance between marking on exhaust camshaft chain sprocket -3- and marking on inlet camshaft chain sprocket -4-.
- Specification: 124 ... 127 mm



Note

If the timing chain is one tooth out of position, this results in a deviation of approx. 6 mm from specification. The timing chain must be refitted if it is not in the correct position.



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3 Cylinder head

⇒ [“3.1 Exploded view - cylinder head”, page 117](#)

⇒ [“3.2 Removing and installing cylinder head”, page 119](#)

⇒ [“3.3 Checking compression”, page 128](#)

3.1 Exploded view - cylinder head



Note

- ◆ *Renew the cylinder head bolts.*
- ◆ *During assembly, renew oil seals and gaskets as well as self-locking nuts and bolts that are tightened by turning through to a specified angle.*
- ◆ *The plastic protectors fitted to protect the open valves must only be removed immediately before fitting the cylinder head.*
- ◆ *After fitting a new cylinder head or cylinder head gasket, change the engine oil and coolant.*

1 - Dowel pin

2 - Cylinder head gasket

- Renew
- Note installation position: part number must face cylinder head

3 - Cylinder head

- Removing and installing ⇒ [page 119](#)
- Checking for distortion ⇒ [page 119](#)

4 - Bolt

- Renew
- Note procedure when loosening ⇒ [page 118](#)
- Note procedure when tightening ⇒ [page 118](#)

5 - Bolt

- 9 Nm

6 - Heat shield

7 - Bolt

- 9 Nm

8 - Bolt

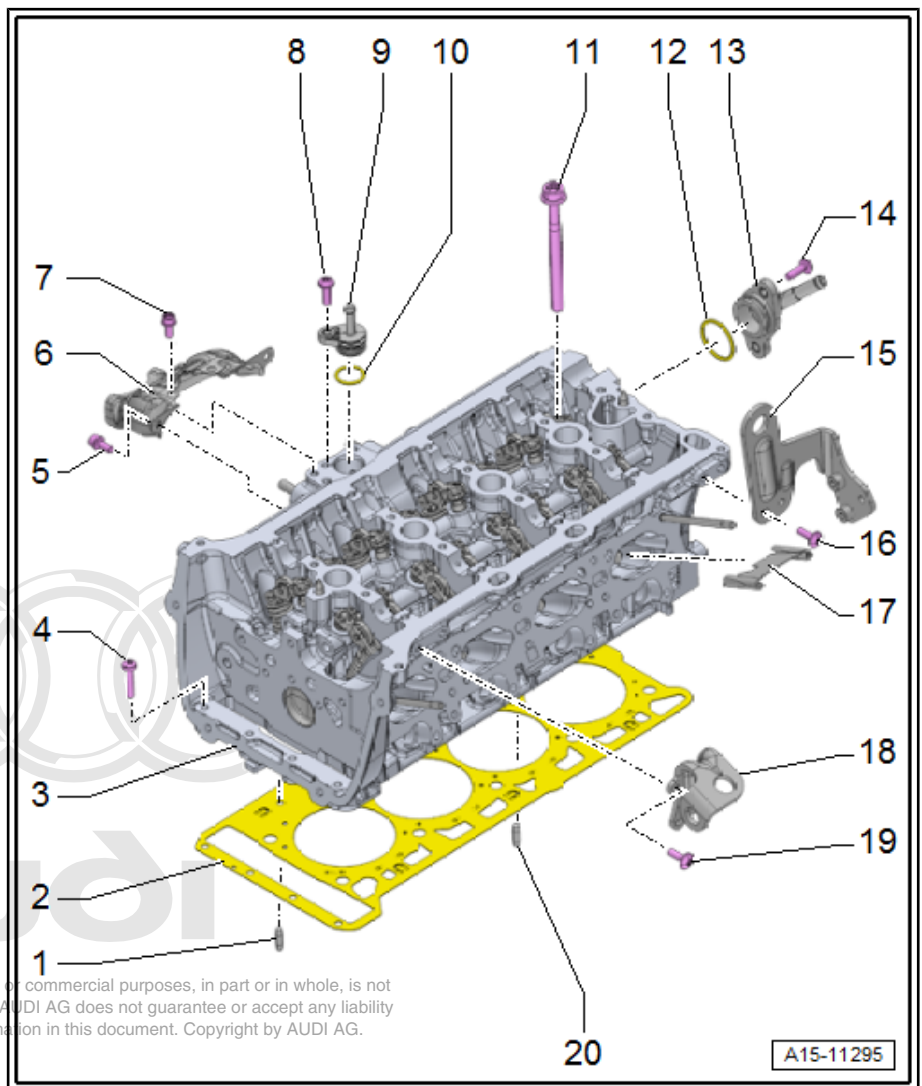
- 9 Nm

9 - Connection

- For coolant hose

10 - O-ring

- Renew
- Lubricate with coolant



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11 - Cylinder head bolt

- Renew
- Note procedure when loosening ⇒ [page 118](#)
- Note procedure when tightening ⇒ [page 118](#)

12 - O-ring

- Renew
- Lubricate with coolant

13 - Connection

- For coolant hose

14 - Bolt

- 9 Nm

15 - Engine lifting eye

16 - Bolt

- Renew
- 10 Nm +90°

17 - Separating plate

18 - Engine lifting eye

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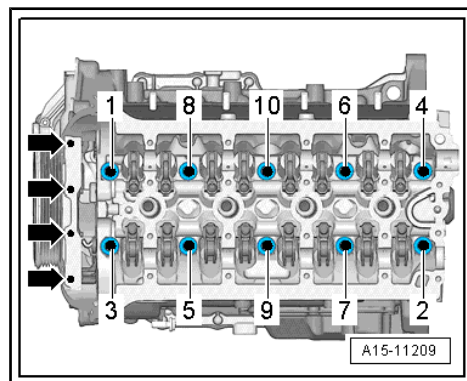
19 - Bolt

- Renew
- 10 Nm +90°

20 - Dowel pin

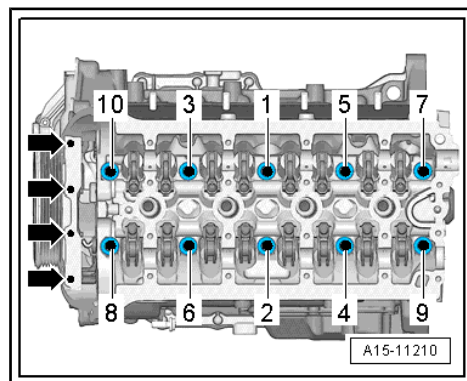
Slackening cylinder head bolts

- Remove bolts -arrows-.
- Slacken cylinder head bolts in the sequence -1 ... 10-.



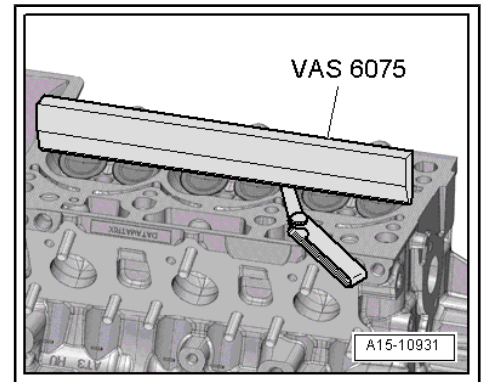
Tightening sequence for cylinder head

- Tighten cylinder head bolts in the sequence -1 ... 10- as follows:
1. Tighten with torque wrench initially to 40 Nm.
 2. Use rigid wrench to turn 90° further.
 3. Use rigid wrench to turn 90° further.
 4. Pre-tighten bolts -arrows- to 8 Nm.
 5. Turn bolts -arrows- 90° further using a rigid wrench.



Checking cylinder head for distortion

- Use straight edge 500 mm - VAS 6075- and feeler gauge to measure cylinder head for distortion at several points.
- ◆ Max. permissible distortion: 0.05 mm



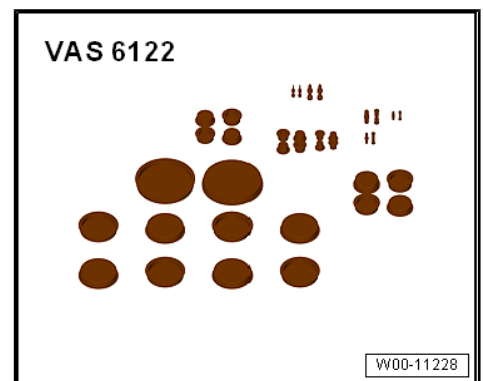
3.2 Removing and installing cylinder head

Special tools and workshop equipment required

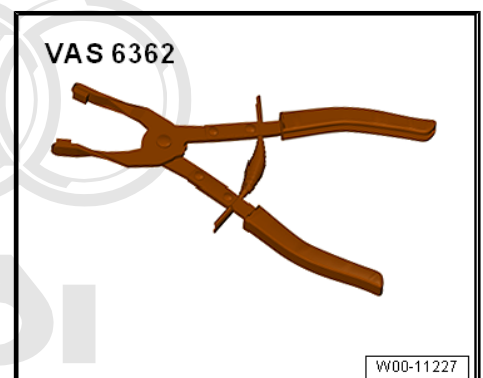
- ◆ Spark plug spanner - 3122 B-



- ◆ Engine bung set - VAS 6122-



- ◆ Hose clip pliers - VAS 6362-



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- ◆ Special wrench (Polydrive) - T10070-



- ◆ Bit XZN 12 - T40270-



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Removing



Note

- ◆ *Fit cable ties in the original positions when installing.*
 - ◆ *All open inlet and exhaust ports must be sealed with suitable plugs (e.g. from engine bung set - VAS 6122-).*
- Remove camshafts => [page 135](#) .



Caution

Risk of damage to valves and piston crowns.

- ◆ *Do not turn the crankshaft after the camshafts have been removed.*

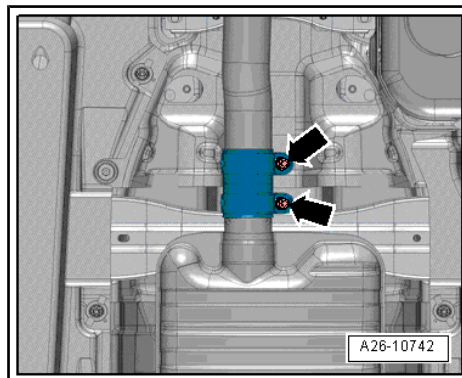


Caution


Risk of damage to flexible joints in front silencer.

- ◆ *Do NOT bend the flexible joints in the front silencer more than 10°.*

- Loosen bolted connections -arrows- and push clamp towards rear.

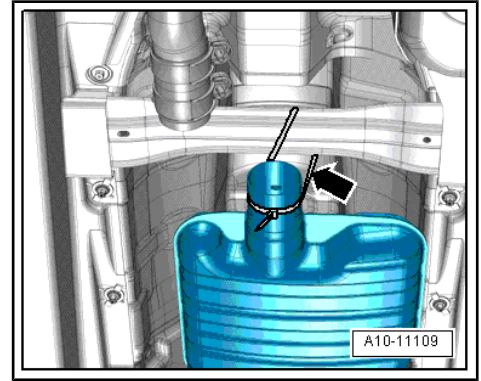


- Lower front silencer slightly and tie up to cross piece -arrow-.

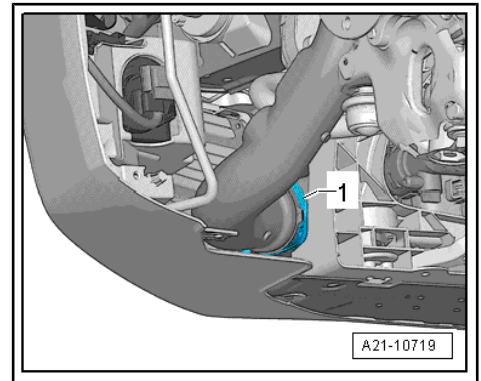
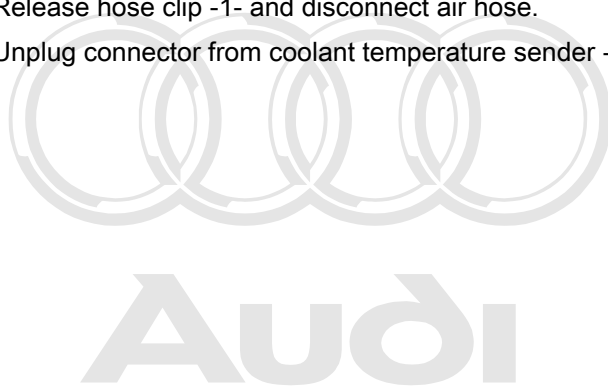
 **WARNING**

Hot steam/hot coolant can escape - risk of scalding.

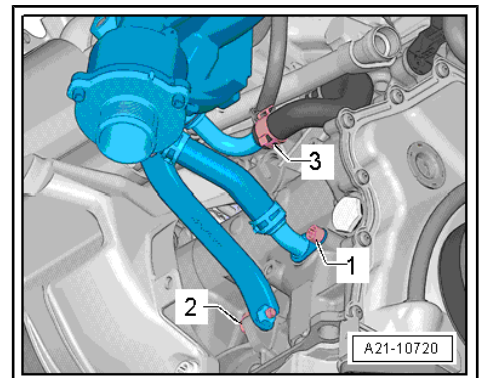
- ◆ *The cooling system is under pressure when the engine is hot.*
- ◆ *Cover filler cap on coolant expansion tank with a cloth and open carefully to dissipate pressure.*



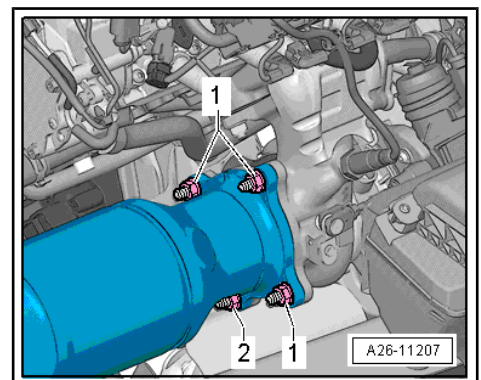
- Drain coolant ⇒ [page 194](#) .
- Disconnect coolant hoses on rear of cylinder head.
- Release hose clip -1- and disconnect air hose.
- Unplug connector from coolant temperature sender - G62- .



- Loosen bolt -2- and unscrew 2 turns.
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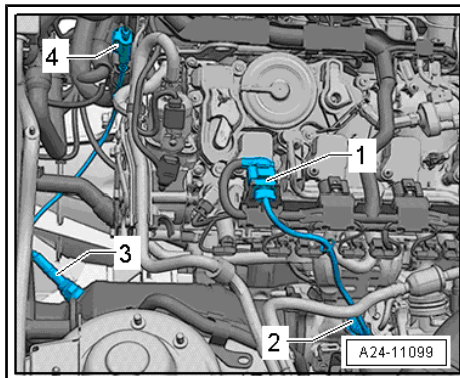


- Remove nut -2- from below.

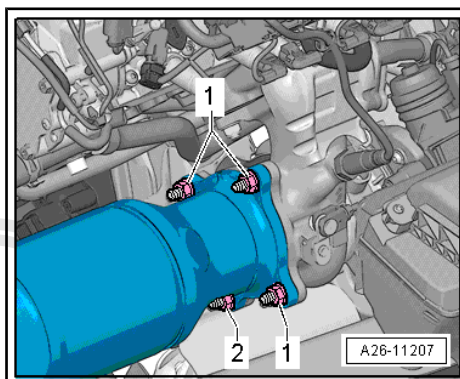




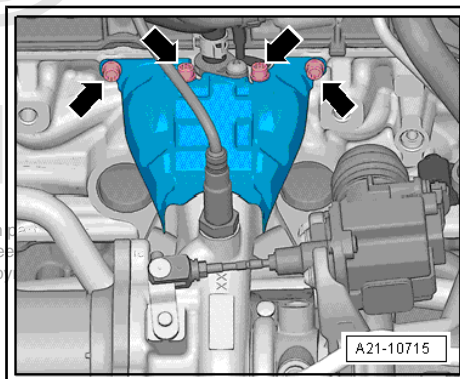
- Unplug electrical connector -1- for Lambda probe - G39- and Lambda probe heater - Z19- and move wiring clear.
- Unplug electrical connector -4- for Lambda probe after catalytic converter - G130- and Lambda probe 1 heater after catalytic converter - Z29- and move wiring clear.



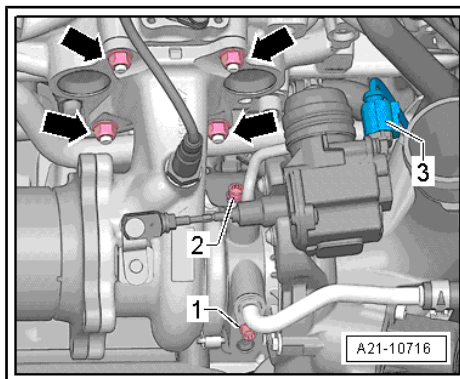
- Remove nuts -1- from above and push catalytic converter towards rear.



- Remove heat shield -arrows-.

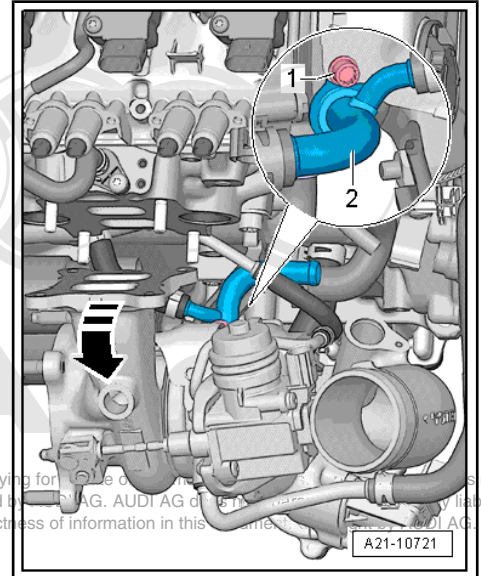


- Remove nuts -arrows-.

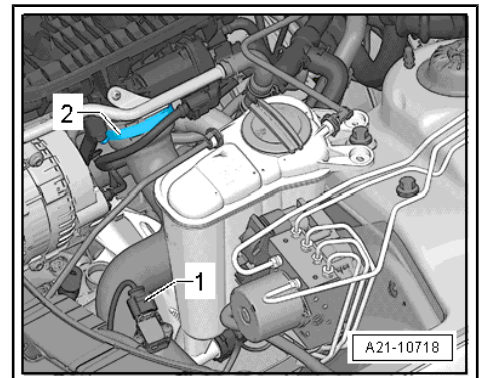


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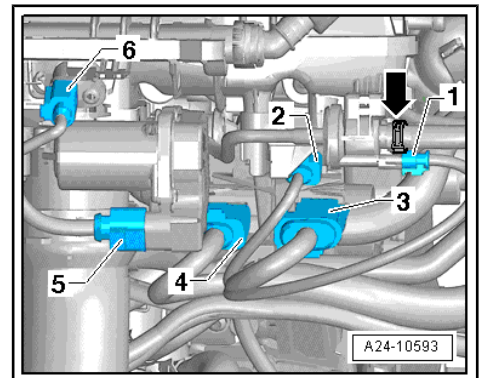
- Pull turbocharger off studs in direction of -arrow-.



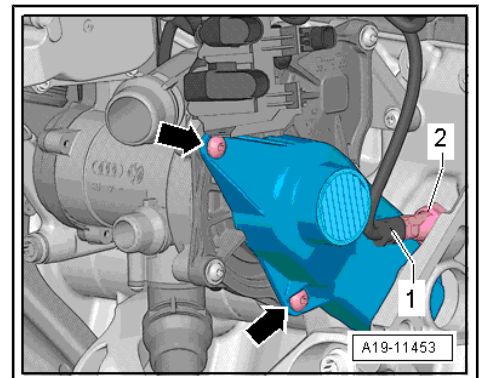
- Unplug electrical connector -1- for charge pressure sender - G31- and move clear.
- Open hose clip -2- and detach air hose.



- Unplug the following electrical connectors:
 - 2 - From knock sensor 1 - G61- (unplug and move clear).
 - 3 - From intake manifold flap valve - N316- , fuel pressure sender - G247- and Hall sender - G40-
 - 4 - From injectors
 - 5 - From throttle valve module - J338-
 - 6 - From intake air temperature sender - G42-



- Unplug electrical connector -1- on stage 3 oil pressure switch - F447- .



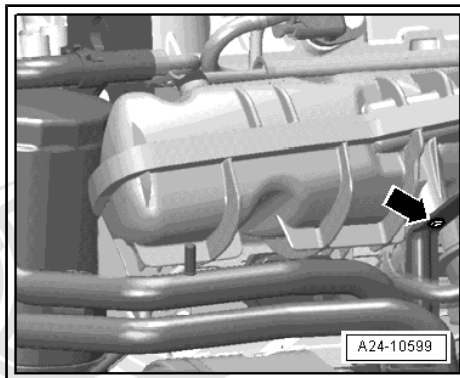


- Unbolt bracket for coolant pipe -arrow-.

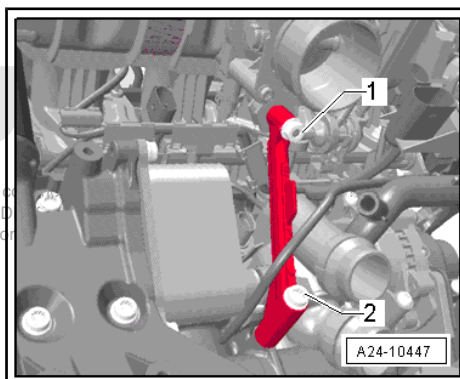


Note

The installation position is shown in the following illustrations with the engine removed.

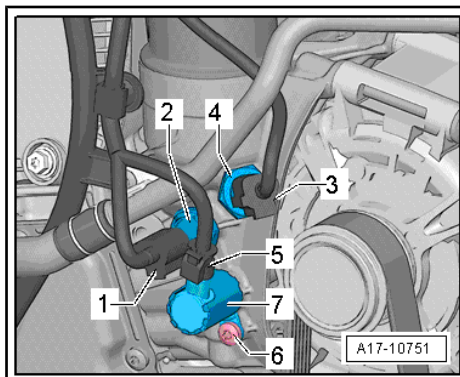


- Remove intake manifold support (remove securing nut -1- and bolt -2-).

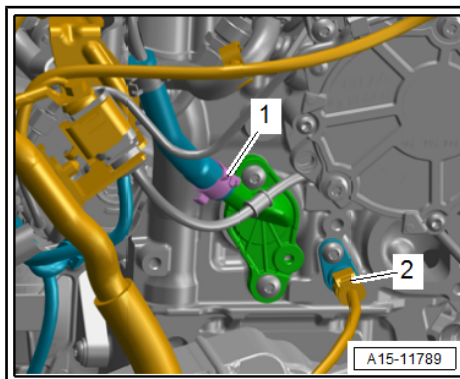


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- Unplug electrical connectors -1 and 3- from oil pressure switch - F22- and electrical connector -5- from oil pressure switch for reduced oil pressure - F378- .



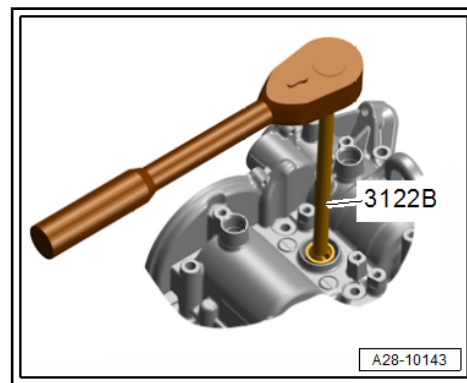
- Release hose clip -1- and detach coolant hose (rear).
- Unplug electrical connector -2- for coolant temperature sender - G62- .



- Remove spark plugs with spark plug spanner - 3122 B- .



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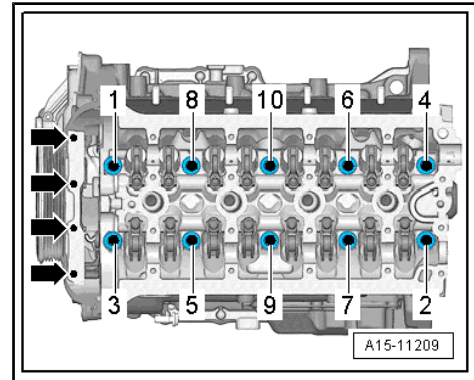
- Remove bolts -arrows-.
- Use socket - T10070- or bit XZN 12 - T40270- to remove cylinder head bolts in the sequence -1 ... 10-.



Note

- ◆ *Make sure all hoses/pipes and wiring on component are disconnected.*
- ◆ *Make sure tensioning rail and guide rail are not damaged when lifting off cylinder head.*

- Take off cylinder head.
- Place cylinder head onto soft surface (foam plastic).



Installing



Caution

Risk of damage to sealing surfaces.

- ◆ *Carefully remove sealant residue from cylinder head and cylinder block.*
- ◆ *Ensure that no long scores or scratches are made on the surfaces.*

Risk of damage to cylinder block.

- ◆ *No oil or coolant must be allowed to remain in the blind holes for the cylinder head bolts in the cylinder block.*

Ensure that cylinder head gasket seals properly:

- ◆ *Carefully remove any remaining emery and abrasive material.*
- ◆ *Do not remove new cylinder head gasket from packaging until it is ready to be fitted.*
- ◆ *Handle the cylinder head gasket very carefully to prevent damage to the silicone coating or the indented area of the gasket.*

Risk of damage to open valves.

- ◆ *When installing an exchange cylinder head, the plastic protectors fitted to protect the open valves should not be removed until the cylinder head is ready to be fitted.*

Risk of damage to valves and piston crowns after working on valve gear.

- ◆ *Turn the engine carefully at least 2 rotations to ensure that none of the valves make contact when the starter is operated.*





Note

- ◆ *Renew the bolts tightened with specified tightening angle.*
- ◆ *Renew seals, gaskets and self-locking nuts.*
- ◆ *Note the different sealants for sealing surfaces and cylinder head bolts.*
- ◆ *When installing an exchange cylinder head, the contact surfaces between the hydraulic compensation elements, roller rocker fingers and cams must be oiled before installing the camshafts.*
- ◆ *Hose connections and air pipes and hoses must be free of oil and grease before assembly.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- ◆ *To ensure that the charge air hoses can be properly secured at their connections, spray rust remover onto the worm thread of used hose clips before installing.*
- ◆ *After fitting a new cylinder head or cylinder head gasket, change the engine oil and coolant.*



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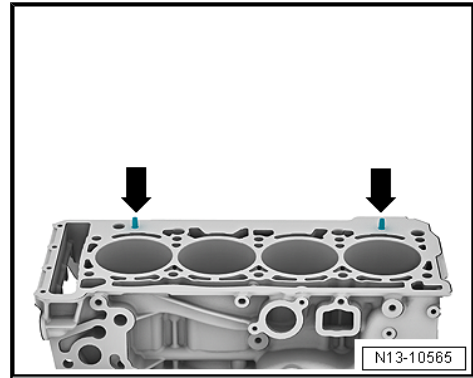


- Place cylinder head gasket in position.
- ◆ Note position of centring pins in cylinder block -arrows-.
- ◆ Note installation position of cylinder head gasket. Part No. should be legible from inlet side.



WARNING

Make sure that components are not damaged by the timing chain when rotating the crankshaft.



- If crankshaft has been rotated: set No. 1 cylinder piston to top dead centre and then turn crankshaft back slightly.
- Fit cylinder head.
- Insert and hand-tighten cylinder head bolts.
- Tightening sequence for cylinder head
⇒ [Fig. "Tightening sequence for cylinder head"](#) , page 118



Note

Cylinder head bolts do not have to be torqued down again later after repair work.

The remaining installation steps are carried out in the reverse sequence. Note the following points:

- Install camshafts ⇒ [page 135](#) .
- Install timing chain cover (top) ⇒ [page 83](#) .
- Change engine oil: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .
- Fill cooling system with fresh coolant ⇒ [page 194](#) .
- Install catalytic converter ⇒ [page 301](#) .
- Install front silencer ⇒ [page 296](#) .



WARNING

Never use battery charging equipment for boost starting. There is danger of damaging the vehicle's control units.

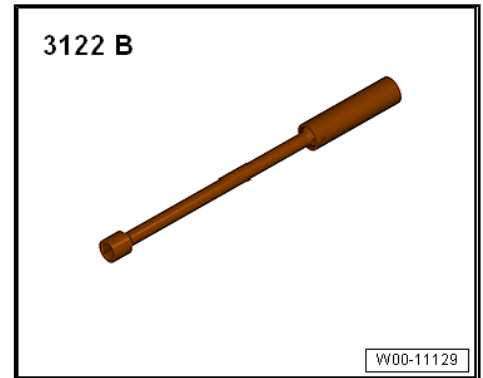
Tightening torques

- ◆ ⇒ ["3.1 Exploded view - cylinder head"](#) , page 117
- ◆ ⇒ ["3.1 Exploded view - intake manifold"](#) , page 257
- ◆ ⇒ ["1.1 Exploded view - turbocharger"](#) , page 233
- ◆ ⇒ ["1.1 Exploded view - silencers"](#) , page 293

3.3 Checking compression

Special tools and workshop equipment required

- ◆ Spark plug spanner - 3122 B-



- ◆ Compression tester - V.A.G 1763-

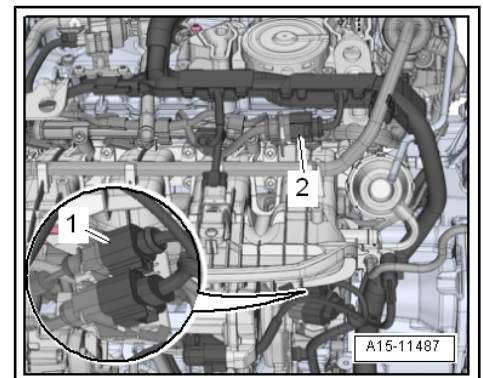


Test sequence



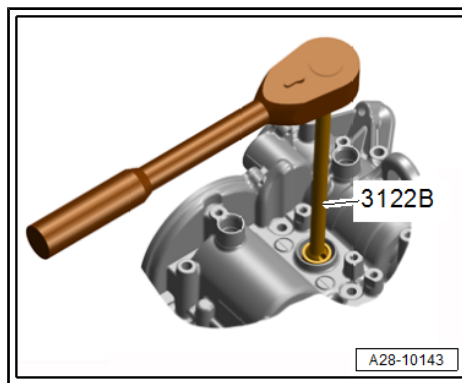
Note

- ◆ *Engine oil temperature at least 30 °C*
 - ◆ *Battery voltage at least 12.7 V*
- Remove engine cover panel ➔ [page 37](#) .
 - Unplug electrical connectors:
 - 1 - For FSI injectors -N30- ... -N33-
 - 2 - For MPI injectors -N532- or -N535-
 - Remove ignition coils with output stages ➔ [page 306](#) .





- Remove spark plugs with spark plug spanner - 3122 B- .



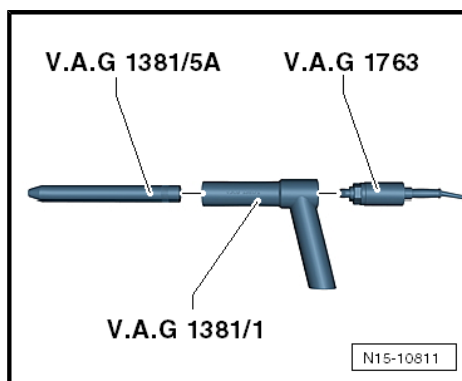
- Check compression pressure with compression tester - V.A.G 1763- , adapter - V.A.G 1381/1- and adapter - V.A.G 1381/5A- .



Note

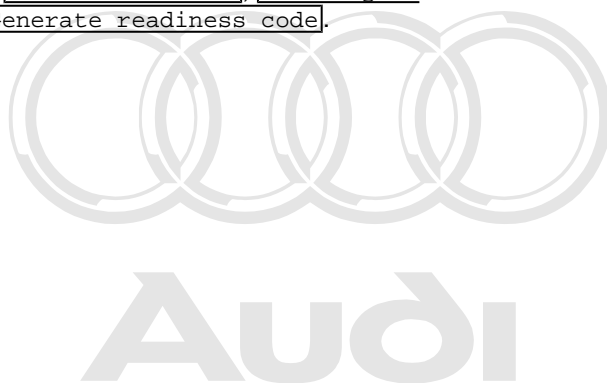
Using the compression tester ⇒ Operating instructions .

- Operate starter until pressure reading on tester no longer rises.



Compression pressure	bar
When new	11.0 ... 14.0
Wear limit	7.0
Maximum difference between cylinders	3.0

- Install spark plugs: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .
- Install ignition coils with output stages ⇒ [page 306](#) .
- Erase any entries in event memory resulting from testing ⇒ Vehicle diagnostic tester, Guided Functions, Interrogate event memory, then Generate readiness code.



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4 Valve gear

⇒ [“4.1 Exploded view - valve gear”, page 131](#)

⇒ [“4.2 Removing and installing camshaft”, page 135](#)

⇒ [“4.3 Installing ball for slider”, page 151](#)

⇒ [“4.4 Removing and installing actuators for camshaft adjustment”, page 152](#)

⇒ [“4.5 Removing and installing valve stem oil seals”, page 153](#)

4.1 Exploded view - valve gear



Note

- ◆ *Cylinder head and cylinder head cover must be renewed together.*
- ◆ *After installing camshafts, wait for approx. 30 minutes before starting engine. The hydraulic compensation elements must settle (otherwise valves will strike pistons).* AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.
- ◆ *After working on the valve gear, turn the engine carefully at least 2 rotations to ensure that none of the valves make contact when the starter is operated.*
- ◆ *Always fit new seals and gaskets.*
- ◆ *After installing camshafts, chain elongation must be adapted ⇒ Vehicle diagnostic tester; [Guided Functions](#); [01 - Chain elongation adaption diagnosis](#).*

Part I

Part II ⇒ [page 133](#)



1 - Exhaust valve

- Do not machine, only grinding-in is permitted
- Valve dimensions ⇒ [page 164](#)
- Checking valve guides ⇒ [page 163](#)

2 - Cylinder head

3 - Valve stem oil seal

- Renewing ⇒ [page 153](#)

4 - Valve spring

5 - Valve spring plate

6 - Valve cotters

7 - Hydraulic compensation element

- Do not interchange
- Lubricate contact surface

8 - Securing clip

- For hydraulic compensation element

9 - Roller rocker finger

- Removing and installing ⇒ ["4.2 Removing and installing camshaft", page 135](#)
- Mark installation position for re-installation
- Check roller bearings for ease of movement
- Lubricate contact surfaces before installing

10 - Exhaust camshaft

- Removing and installing ⇒ [page 135](#)
- Check radial clearance with Plastigage (roller rocker fingers removed)
- Radial clearance: 0.024 ... 0.066 mm
- Runout: max. 0.04 mm

11 - Spring

- Not available as replacement part

12 - Ball

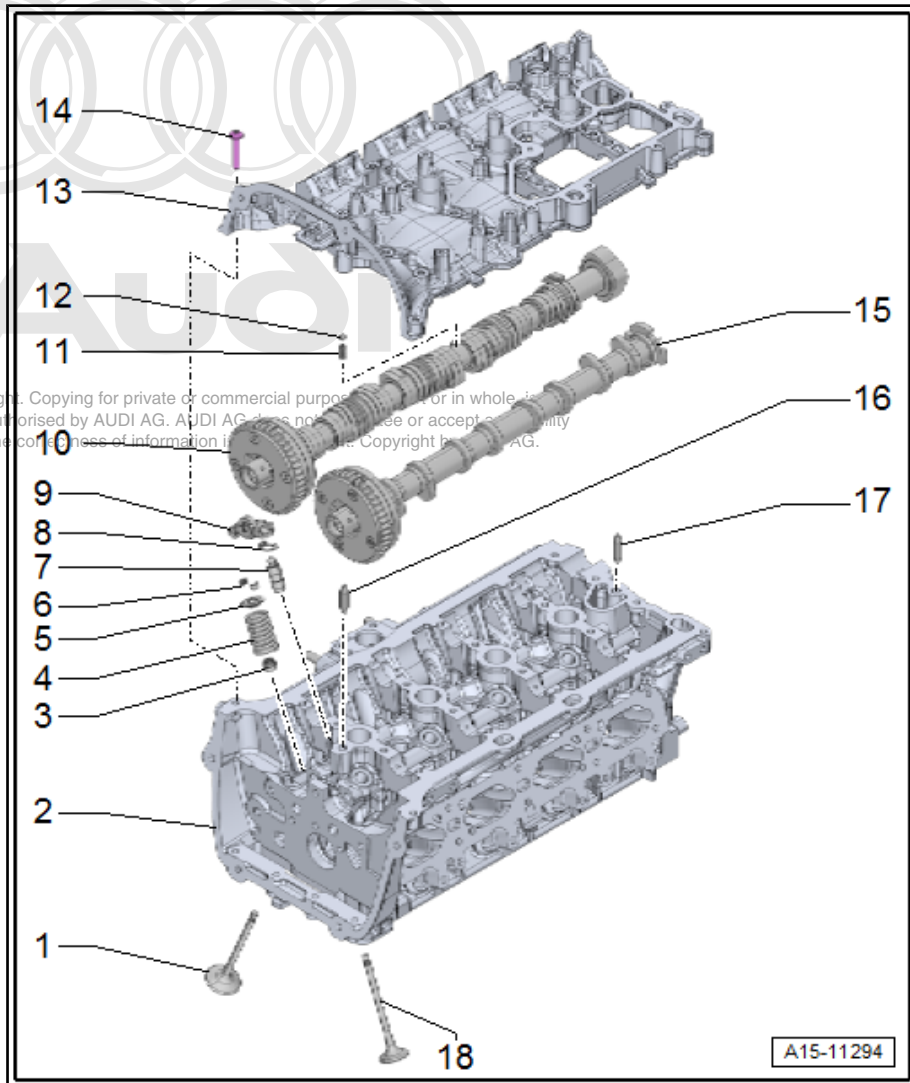
- For slider
- Installing ⇒ [page 151](#)

13 - Cylinder head cover

- With integrated camshaft bearings
- Clean sealing surface; machining not permitted
- Remove old sealant residues
- Removing ⇒ ["4.2 Removing and installing camshaft", page 135](#)

14 - Bolt

- Renew
- Slackening ⇒ [page 133](#)



- ❑ Tightening sequence ⇒ [page 133](#)

15 - Inlet camshaft

- ❑ Removing and installing ⇒ [page 135](#)
- ❑ Check radial clearance with Plastigage (roller rocker fingers removed)
- ❑ Radial clearance: 0.024 ... 0.066 mm
- ❑ Runout: max. 0.04 mm

16 - Dowel pins

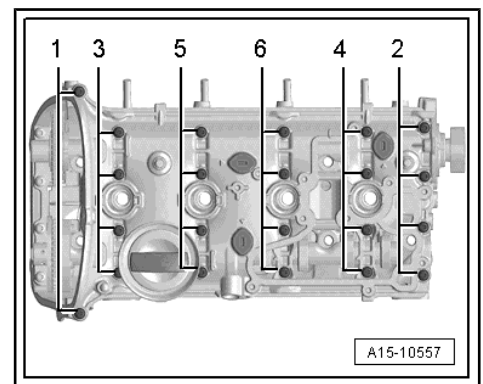
17 - Dowel pins

18 - Inlet valve

- ❑ Do not machine, only grinding-in is permitted
- ❑ Valve dimensions ⇒ [page 164](#)
- ❑ Checking valve guides ⇒ [page 163](#)

Loosening cylinder head cover

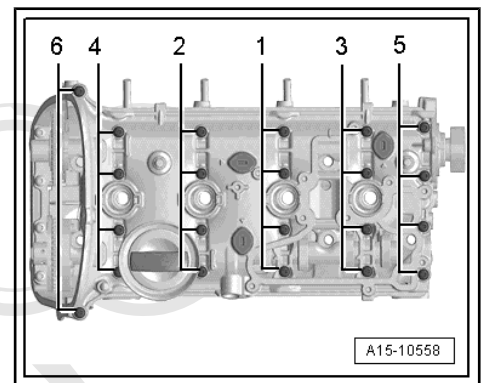
- Loosen cylinder head cover bolts in the sequence -1 ... 6-



Tightening sequence for cylinder head cover

- Renew bolts.

 1. Fit bolts in the sequence -1 ... 6- and hand-tighten in several stages.
 2. Tighten bolts in the sequence -1 ... 6- to 8 Nm using torque wrench.
 3. Turn 90° further in the sequence -1 ... 6- using a rigid wrench.



 **Note**

Take care to keep cylinder head cover straight.

Part II

Part I ⇒ [page 131](#)

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1 - Cylinder head

2 - O-ring

- Lubricate with engine oil
- Check for damage
- Not available as a replacement part, supplied together with actuator for camshaft adjustment

3 - Actuator for camshaft adjustment

- Actuator 1 for camshaft adjustment - F366- ... actuator 8 for camshaft adjustment - F373-
- Removing and installing ⇒ [page 152](#)
- Bringing into installation position ⇒ [page 153](#)

4 - Bolt

- 5 Nm

5 - Ball stud

- For engine cover panel
- 9 Nm

6 - O-ring

- Renew
- Lubricate with engine oil

7 - Sealing plug

8 - O-ring

- Renew
- Lubricate with engine oil

9 - Hall sender 3 - G300-

- Exploded view ⇒ [page 305](#)

10 - Bolt

- Tightening torque ⇒ [Item 8 \(page 305\)](#)

11 - Oil separator

- Removing and installing ⇒ [page 181](#)

12 - Bolt

- Tightening torque and sequence ⇒ [page 181](#)

13 - Gasket

- Renew

14 - Vacuum pump

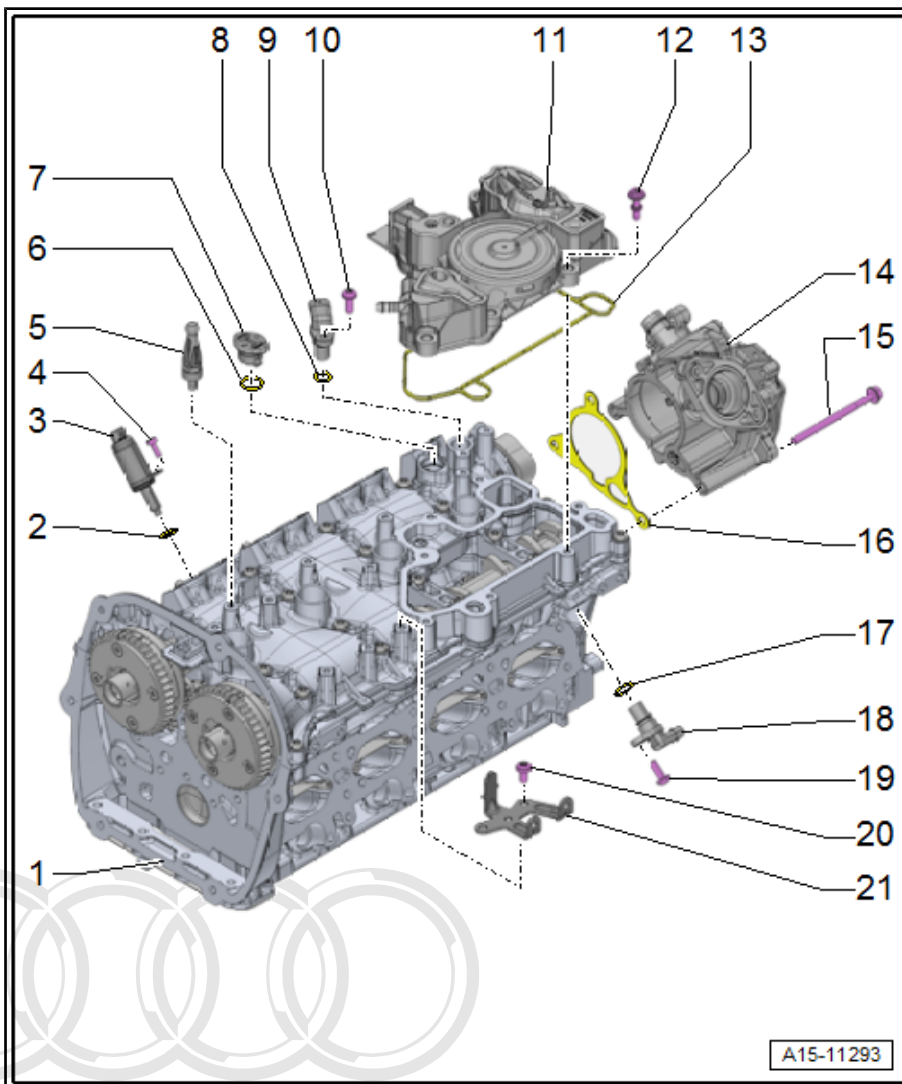
- Removing and installing ⇒ Brake system; Rep. gr. 47 ; Vacuum system; Removing and installing vacuum pump

15 - Bolt

- Tightening torque ⇒ Brake system; Rep. gr. 47 ; Vacuum system; Exploded view - vacuum pump

16 - Gasket

- Renew if damaged



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17 - O-ring

- Renew
- Lubricate lightly with engine oil

18 - Hall sender - G40-

- Exploded view ⇒ [page 305](#)

19 - Bolt

- Tightening torque ⇒ [Item 13 \(page 306\)](#)

20 - Bolt

- 9 Nm

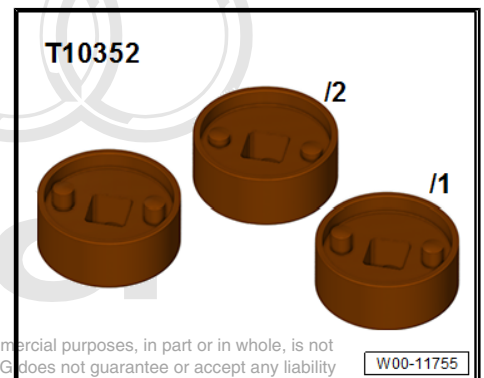
21 - Bracket

- For activated charcoal filter solenoid valve 1 - N80-

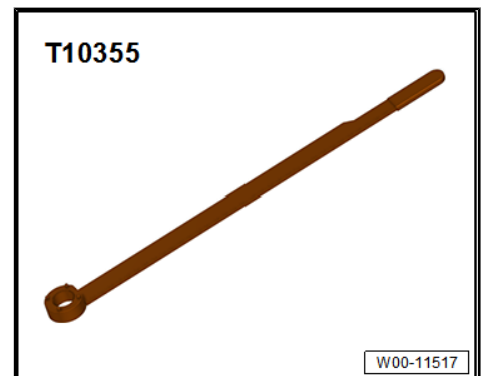
4.2 Removing and installing camshaft

Special tools and workshop equipment required

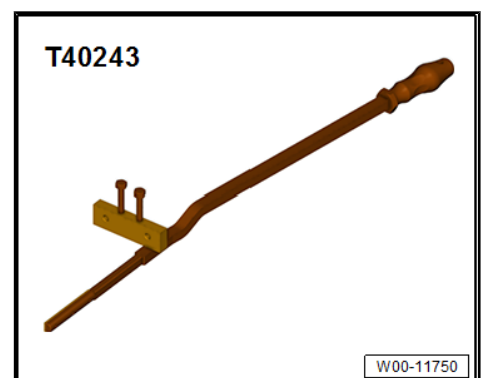
- ◆ Assembly tool - T10352-



- ◆ Counterhold tool - T10355-

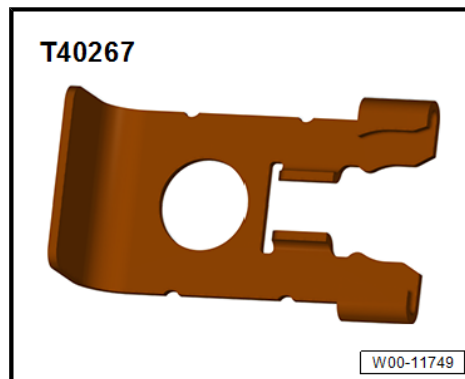


- ◆ Lever - T40243-

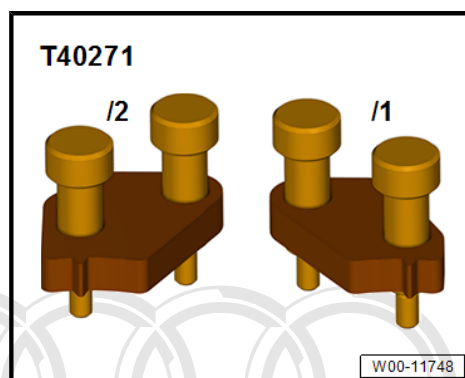




◆ Locking tool - T40267-



◆ Camshaft clamp - T40271-

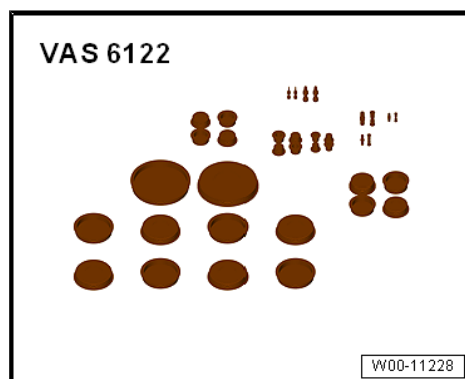


◆ Assembly tool - T40266-



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◆ Engine bung set - VAS 6122-

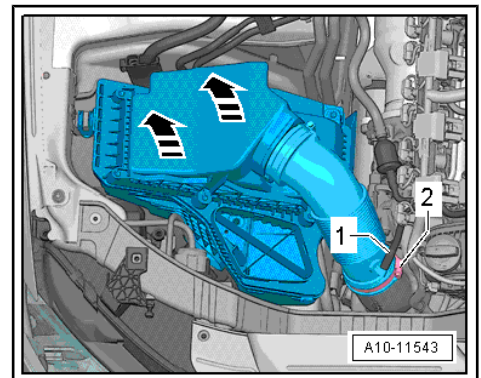
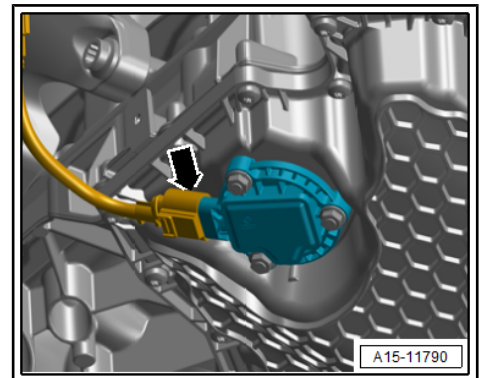


Removing



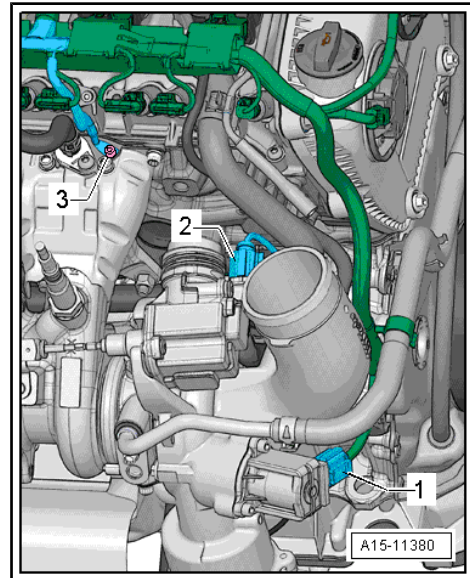
Note

- ◆ *Sealing surfaces at bottom of cylinder head cover and top of cylinder head must not be machined.*
 - ◆ *The camshaft bearings are integrated into the cylinder head and cylinder head cover. The timing chain must be slackened before removing the cylinder head cover.*
 - ◆ *Fit cable ties in the original positions when installing.*
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- Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .
 - Unplug connector from oil level and oil temperature sender - G266- -arrow-.
 - Remove engine cover panel ⇒ [page 37](#) .
 - Detach air duct at bottom together with air hose.
-
- Disconnect hose -1- from air cleaner.
 - Disconnect air intake hose -2-.
 - Pull air cleaner housing upwards in direction of -arrows-.
 - Seal off turbocharger connection with sealing plug from engine bung set - VAS 6122- .

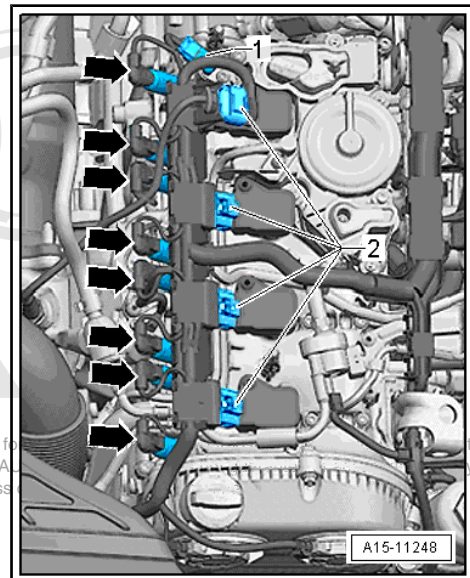




- Unplug electrical connector -1- from charge pressure positioner - V465-
- Unplug electrical connector -2- from turbocharger air recirculation valve - N249- .
- If fitted, unscrew earth wire -3-.

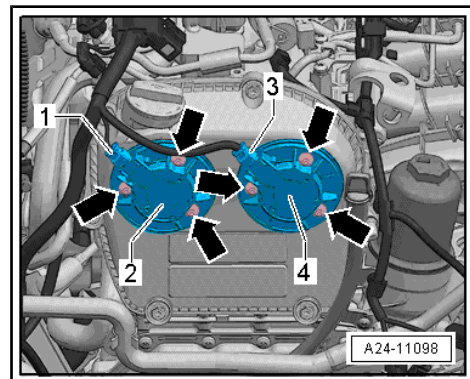


- Unplug electrical connector -1- from Hall sender 3 - G300- .
- Unplug electrical connectors -arrows- at actuators for camshaft adjustment.
- Remove ignition coils with output stages ⇒ [page 306](#) .

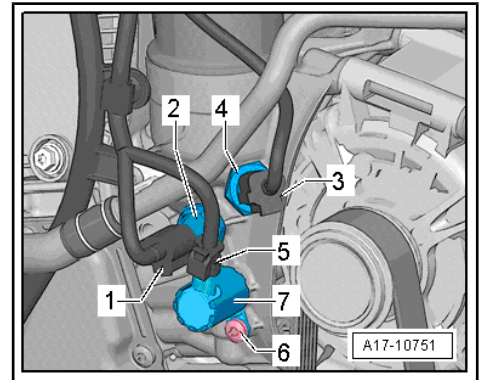


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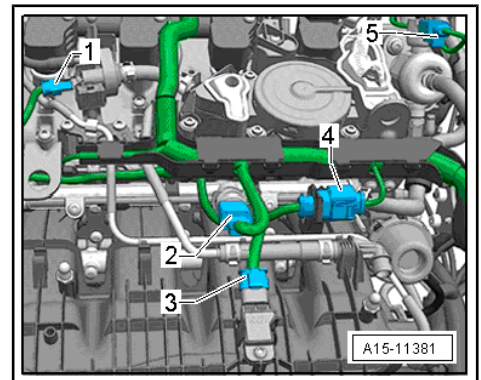
- Unplug connector -1- from exhaust camshaft control valve 1 - N318- and connector -3- from camshaft control valve 1 - N205- .



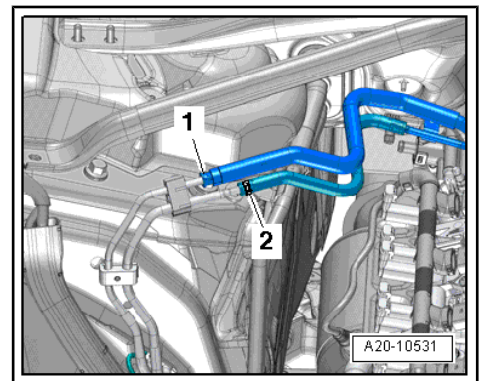
- Unplug electrical connectors -1 and 3- from oil pressure switch - F22- and oil pressure switch for reduced oil pressure - F378- .
- Unplug electrical connector -5- from piston cooling jet control valve - N522- .



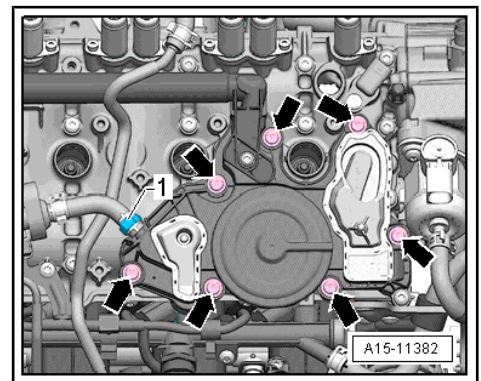
- Unplug electrical connector -1- from activated charcoal filter solenoid valve 1 - N80- .
- Unplug electrical connector -2- at fuel pressure sender for low pressure - G410- .
- Unplug electrical connector -3- from intake air temperature sender - G42- with intake manifold pressure sender - G71- .
- Unplug electrical connector -4- .
- Unplug electrical connector -5- and move electrical wiring harness clear.



- Disconnect hose -2- from activated charcoal filter.

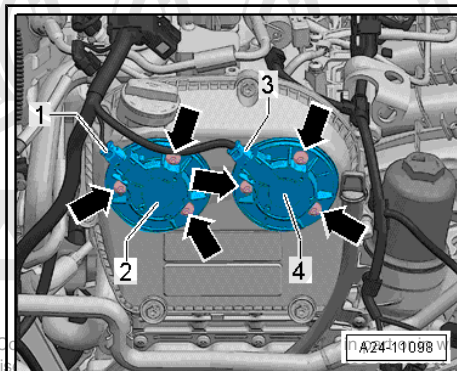


- Detach hose for activated charcoal filter -1- and move clear.
- Remove bolts -arrows- and detach crankcase breather system with crankcase breather hose.
- Move vacuum lines clear.
- Remove high-pressure pump => [page 284](#) .
- Remove vacuum pump => Brake system; Rep. gr. 47 ; Vacuum system; Removing and installing vacuum pump .



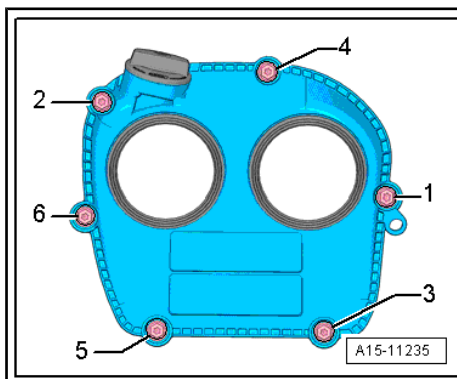


- Unscrew bolts -arrows- and remove camshaft control valve 1 - N205- -4- and exhaust camshaft control valve 1 - N318- -2-.



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- Unscrew bolts -1 to 6- and remove timing chain cover (top).

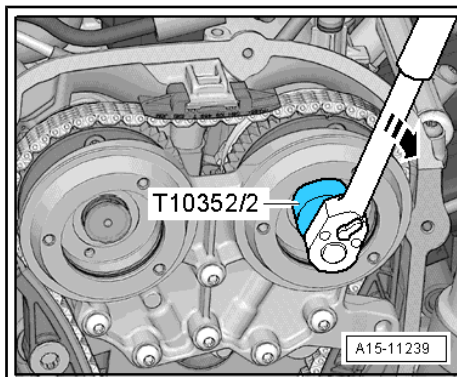





Caution

The timing valves have a left-hand thread.

- Turn assembly tool - T10352/2- in direction of -arrow- to remove timing valve (left and right sides).



- Remove bolts -arrows-.

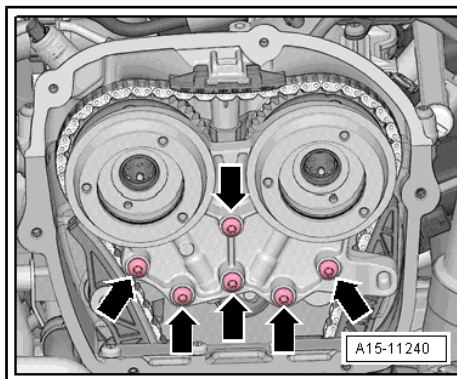


WARNING

Risk of damage to bearing saddle.

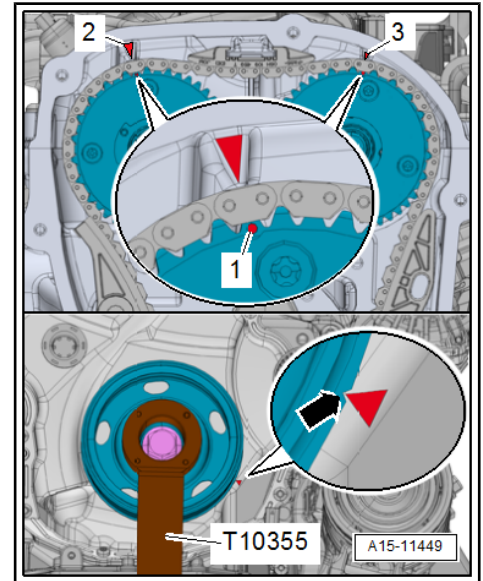
◆ *Detach bearing saddle carefully without tilting it.*

- Detach bearing saddle.



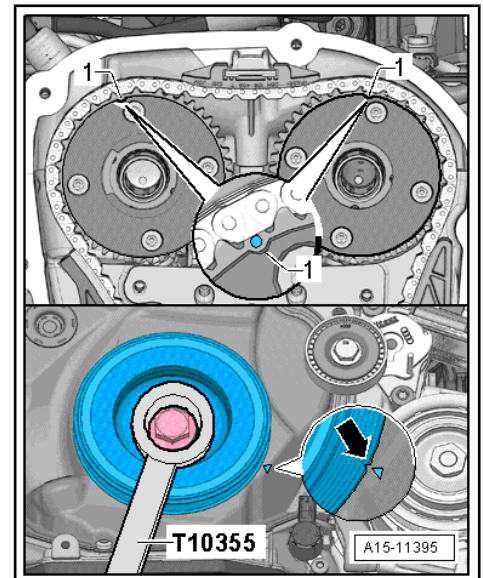
With markings on cylinder head

- Turn vibration damper to “TDC” position using counterhold tool - T10355- .
- Notch on vibration damper must align with arrow marking on timing chain cover (bottom) -arrow-.
- Markings -1- on camshaft chain sprockets must be aligned with markings -2 and 3- on cylinder head.

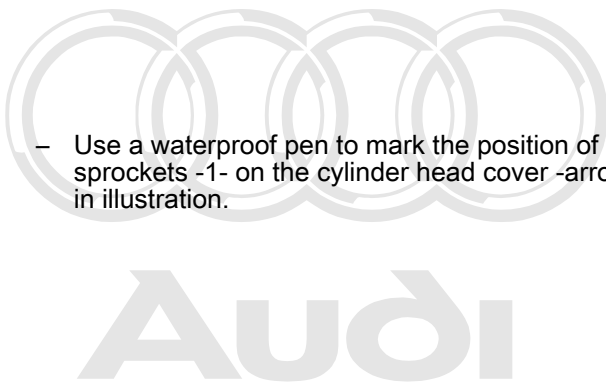
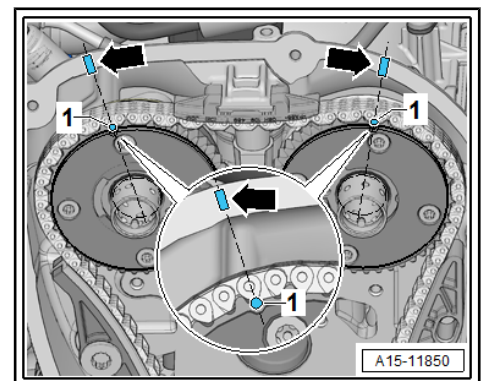


Without markings on cylinder head

- Turn vibration damper to “TDC” position using counterhold tool - T10355- .
- Notch on vibration damper and marking on cover for timing chains (bottom) must be aligned -arrow-.
- The markings -1- on the camshafts must face upwards.



- Use a waterproof pen to mark the position of the camshaft sprockets -1- on the cylinder head cover -arrows-, as shown in illustration.

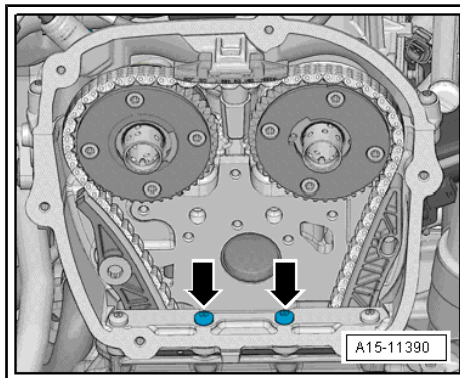


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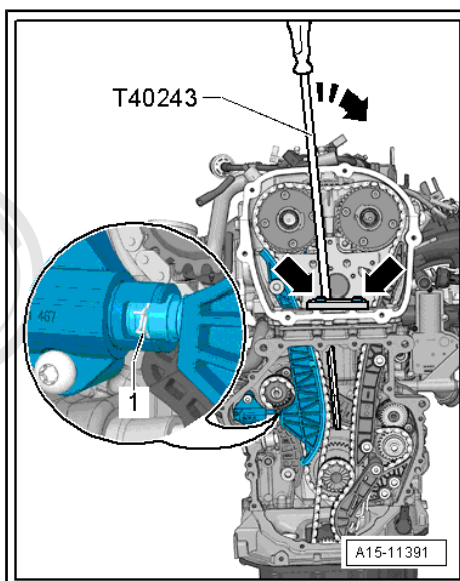


All engine versions (continued)

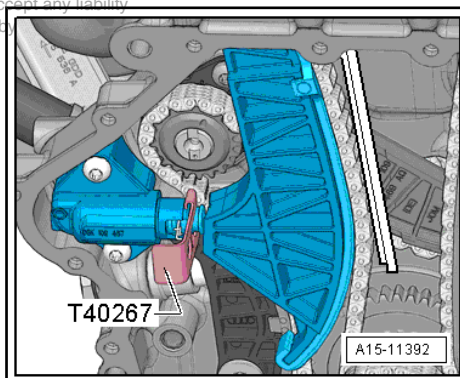
- Remove bolts -arrows-.
- Remove timing chain cover (bottom) ⇒ [page 85](#) .
- Check "TDC" position again.



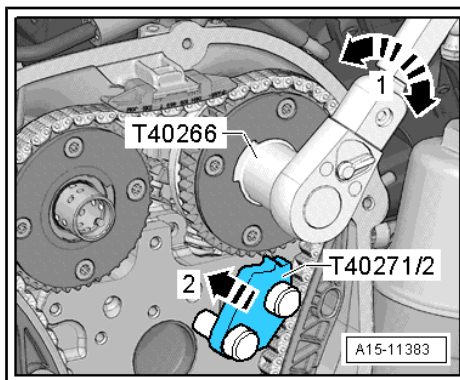
- Screw in assembly lever - T40243- -arrows-.
- Compress and hold circlip -1- for chain tensioner.
- Push assembly lever - T40243- slowly in direction of -arrow- and hold in place.



- Hold chain tensioner in position with locking tool - T40267.
- Remove assembly lever - T40243- .



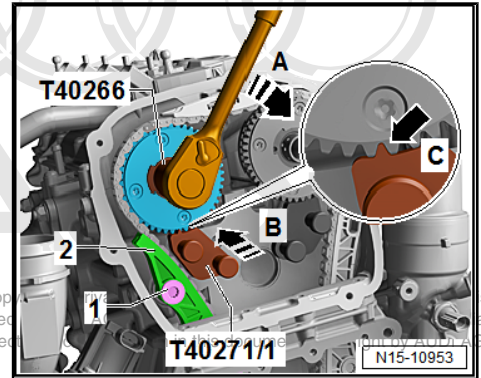
- Bolt camshaft clamp - T40271/2- onto cylinder head and slide into teeth on chain sprocket in direction of -arrow 2-; if necessary, use assembly tool - T40266- to turn inlet camshaft in direction of -arrow 1-.



- Bolt camshaft clamp - T40271/1- onto cylinder head.

A second mechanic is required for the following step.

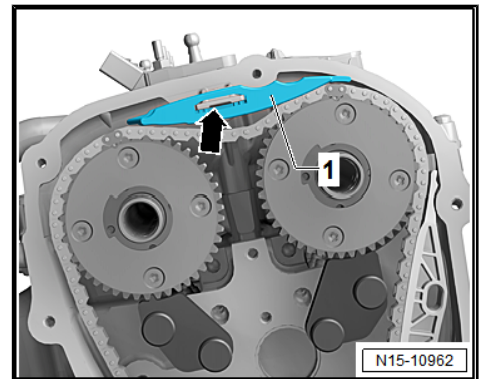
- Turn exhaust camshaft in direction of -arrow A- using assembly tool - T40266- and hold in place. Remove bolt -1- and guide tensioning rail -2- downwards. Continue turning camshaft clockwise -arrow A- until camshaft clamp - T40271/1- can be pressed into teeth on chain sprocket -arrow B-.
- Check installation position -C- of camshaft clamp - T40271/1- .



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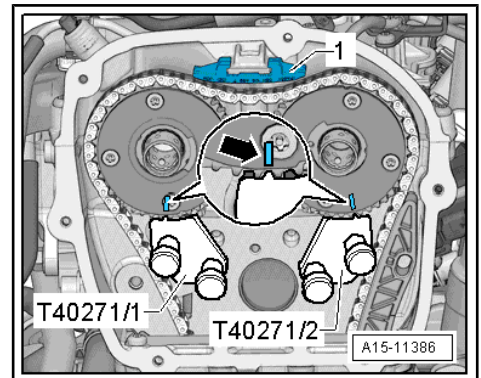
is not liability Audi AG.

- Use screwdriver to release catch -arrow- and press off guide rail -1- towards front.



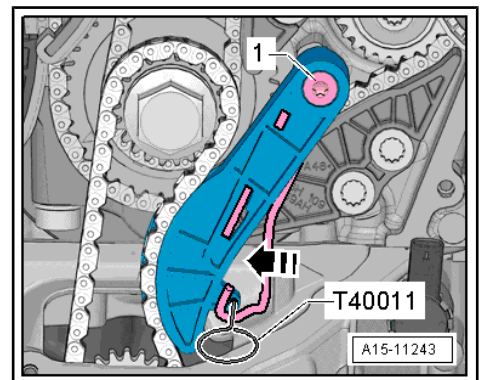
Without markings on cylinder head

- Mark camshaft chain sprockets relative to camshaft clamp - T40271/1- and camshaft clamp - T40271/2- -arrows-.



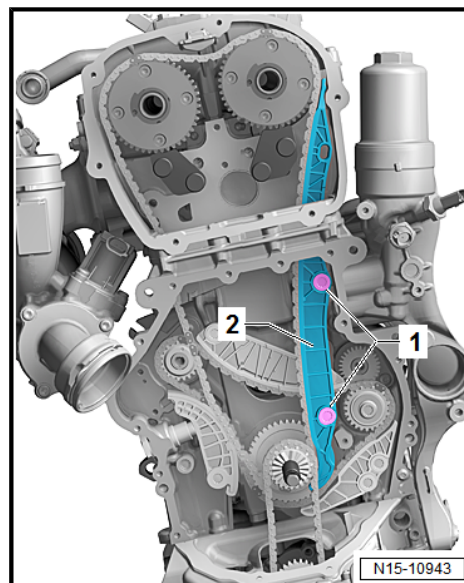
All engine versions (continued)

- Press retainer for oil pump chain tensioner in direction of -arrow- and lock in place using locking pin - T40011- .
- Unscrew bolt -1- and remove chain tensioner.

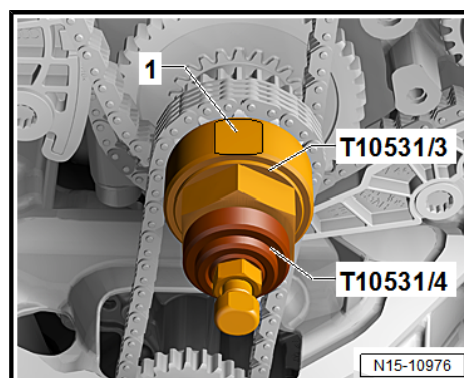




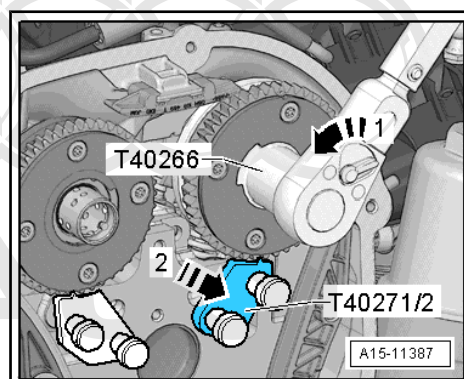
- Unscrew bolts -1- and remove guide rail -2-.
- Detach camshaft timing chain from sprockets and guide it downwards.



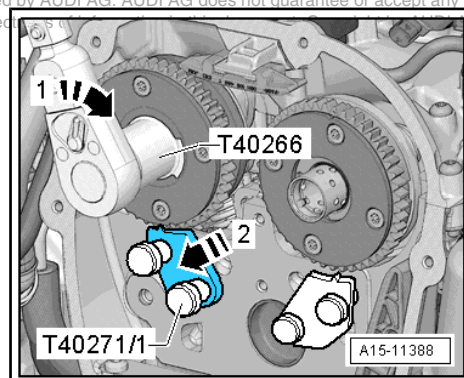
- Attach turning-over tool - T10531/3- . In "TDC" position, flat surface -1- is positioned at top (facing cylinder head). Screw on flange nut - T10531/4- . Turn crankshaft anti-clockwise out of "TDC" position using open-end spanner, 32 mm.



- Turn inlet camshaft in direction of -arrow 1- with assembly tool - T40266- , slide camshaft clamp - T40271/2- out of teeth on chain sprocket in direction of -arrow 2- and move camshaft into rest position.



- Turn exhaust camshaft in direction of -arrow 1- with assembly tool - T40266- , slide camshaft clamp - T40271/1- out of teeth on chain sprocket in direction of -arrow 2- and move camshaft into rest position.



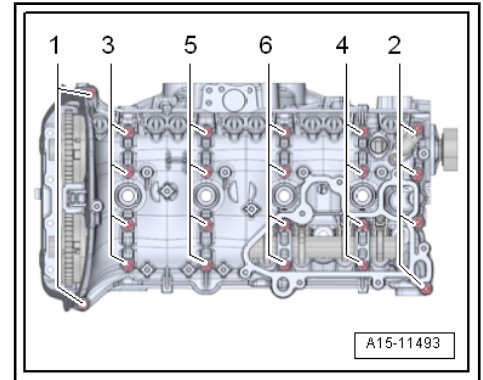
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- Remove cylinder head cover bolts in the sequence -1 ... 6-.
- Guide cylinder head cover out under permanent breather.
- Detach camshafts and cover exposed parts of engine.

Installing

Note

- ◆ *The sealing surfaces must be free of oil and grease.*
- ◆ *Ensure that all roller rocker fingers contact the valve ends correctly.*
- ◆ *Crankshaft must not be at "TDC" position.*
- If crankshaft has been rotated: set No. 1 cylinder piston to top dead centre and then turn crankshaft back slightly.
- Remove sealant remaining on cylinder head with flat scraper.



WARNING

Risk of eye injury.

- ◆ *Put on safety goggles.*

Caution

Protect lubrication system and bearings against contamination.

- ◆ *Cover exposed parts of the engine.*

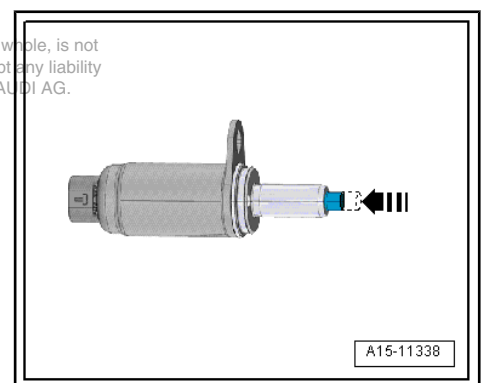
- Remove sealant residue from groove in cylinder head cover and from sealing surfaces.
- Clean sealing surfaces; they must be free of oil and grease.

Caution

Risk of damage to engine.

- ◆ *Pins of actuators for camshaft adjustment must be brought into installation position.*

- Press down pins of actuators for camshaft adjustment -arrow- by hand.
- Pins of actuators must not be in extended position.
- Oil running surfaces of both camshafts.





Without markings on cylinder head

- If camshafts are renewed, markings -arrow- must be transferred to new camshafts.

All engine versions (continued)



WARNING

Risk of eye injury.

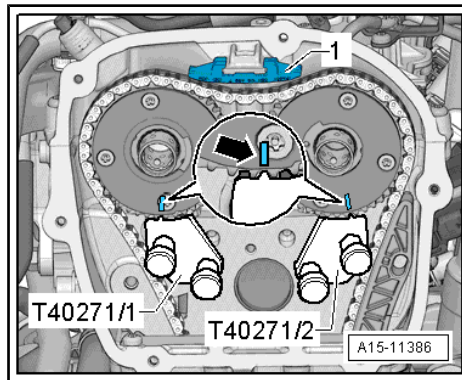
- ◆ *Put on safety goggles.*



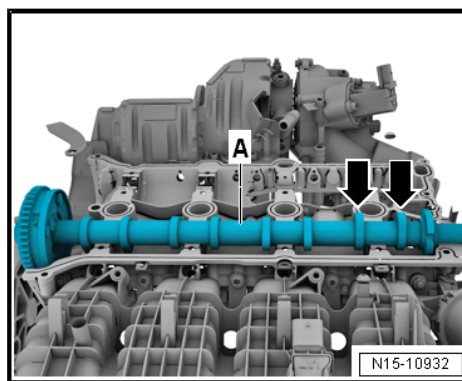
Caution

Risk of damage to valves and piston crowns.

- ◆ *When installing the camshafts, the crankshaft must not be in "TDC" position.*

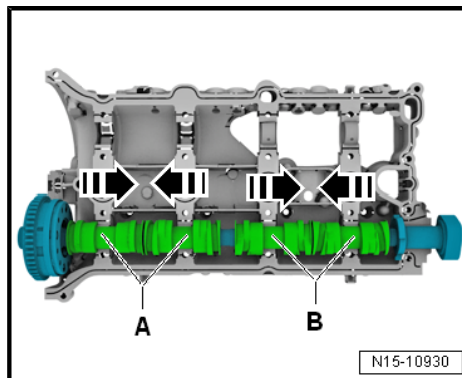


- Fit inlet camshaft -A- in cylinder head. Rotate cams of cylinder 4 -arrows- so that they face upwards.



- Fit exhaust camshaft in cylinder head cover, as shown in illustration. Pairs of cams -A- and -B- must be pushed together.

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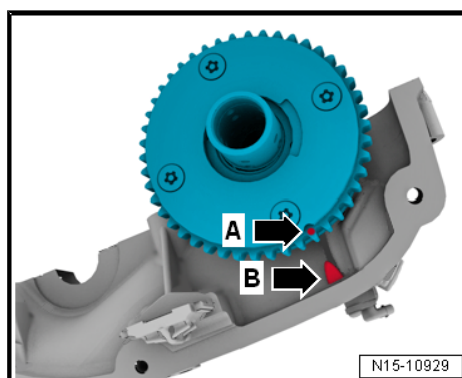


- Rotate exhaust camshaft until markings -A- and -B- are aligned.

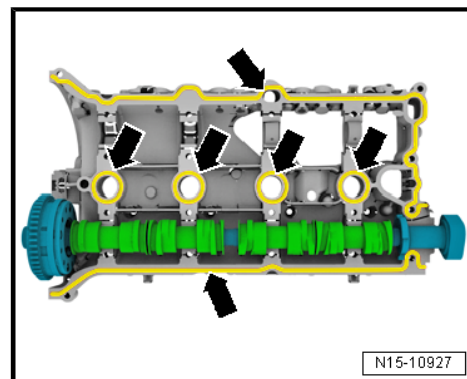


Note

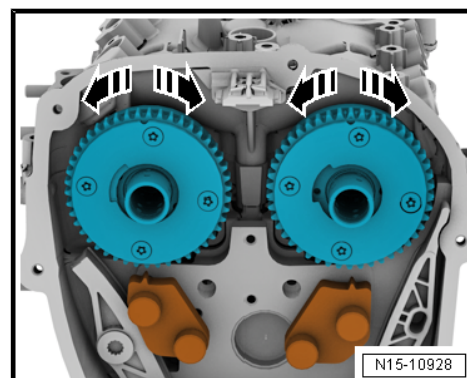
- ◆ *Illustration shows version with marking -B- made at factory.*
- ◆ *If you are working on a version for which you had to make a marking, the marking -A- must be opposite the marking on the cylinder head that you made yourself.*



- Apply sealant onto clean sealing surface -arrows- of cylinder head cover, as shown in illustration.
- ◆ Thickness of sealant bead: 2 ... 3 mm.
- Hold camshaft in position and place cylinder head cover on cylinder head with camshaft fitted.



- Press lightly on cylinder head cover with your hand and rotate camshafts slightly until cylinder head cover comes into contact with cylinder head such that it is free of tension.
- Renew bolts for cylinder head cover.
- Tighten bolts in several stages; tightening sequence => [page 133](#) .

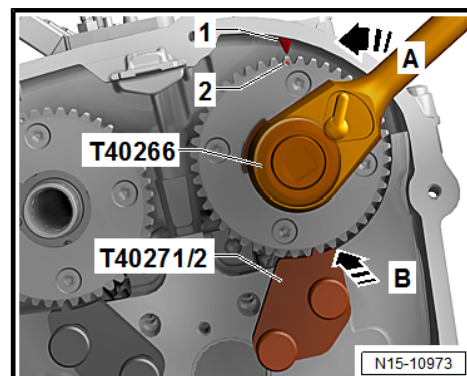


 **Note**

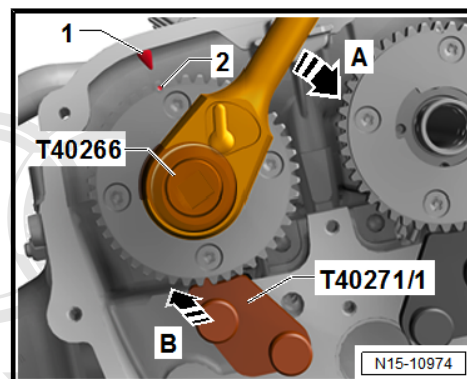
Take care to keep cylinder head cover straight.

With markings on cylinder head

- Turn inlet camshaft in direction of -arrow A- using assembly tool - T40266- until markings -1- and -2- are aligned. Slide camshaft clamp - T40271/2- into teeth of chain sprocket in direction of -arrow B-.



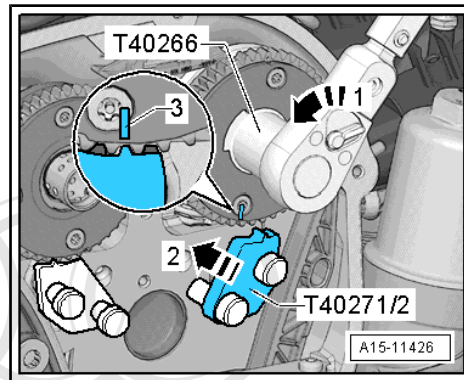
- Turn exhaust camshaft in direction of -arrow A- using assembly tool - T40266- until markings -1- and -2- are aligned. Slide camshaft clamp - T40271/1- into teeth of chain sprocket in direction of -arrow B-. Marking -2- is offset slightly to the right.



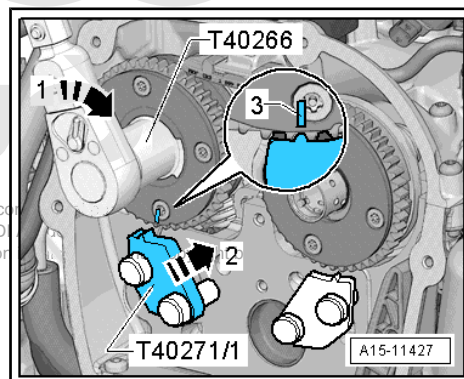


Without markings on cylinder head

- Turn inlet camshaft in direction of -arrow 1- until marking -3- aligns with camshaft clamp - T40271/2- .
- Slide camshaft clamp - T40271/2- into teeth of chain sprocket in direction of -arrow 2-.



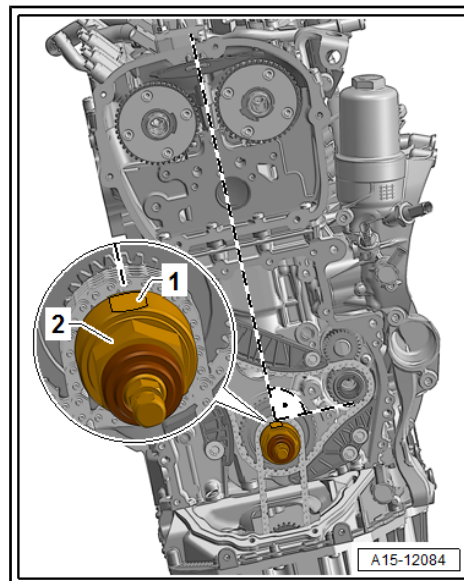
- Turn exhaust camshaft in direction of -arrow 1- until marking -3- aligns with camshaft clamp - T40271/1- .
- Slide camshaft clamp - T40271/1- into teeth of chain sprocket in direction of -arrow 2-.



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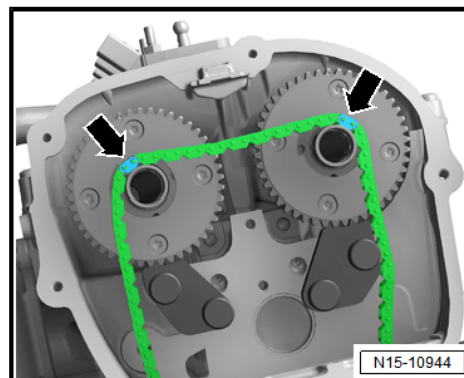
All engine versions (continued)

- Turn crankshaft at hexagon flats -2- into "TDC" position. In "TDC" position, flat surface -1- is positioned at top (facing cylinder head).



Installing camshaft timing chain

- Fit camshaft timing chain so that coloured markings -arrows- are positioned on camshaft journals.

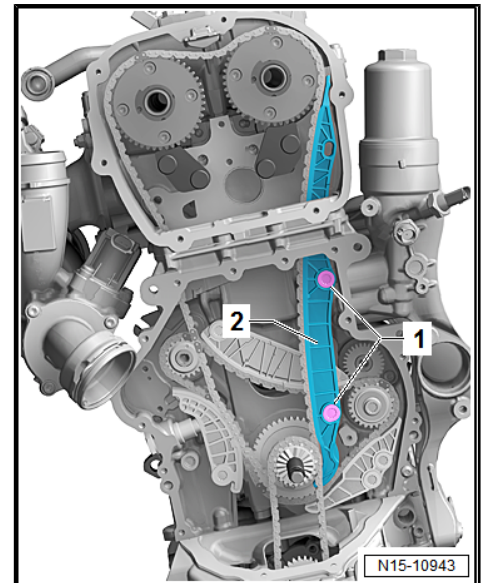
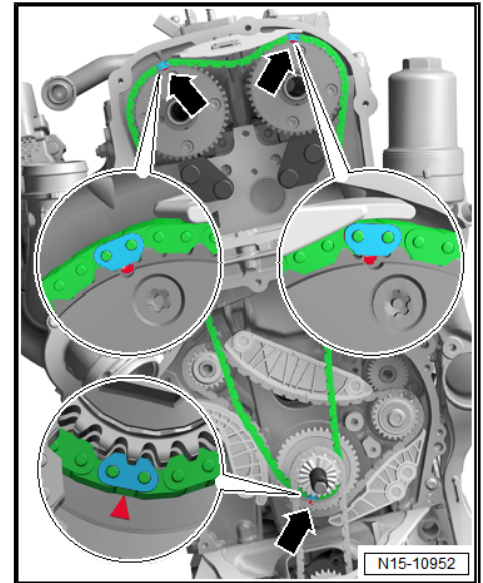


- Fit camshaft timing chain onto inlet camshaft, exhaust camshaft and crankshaft. Position links with coloured markings -arrows- at markings on chain sprockets.

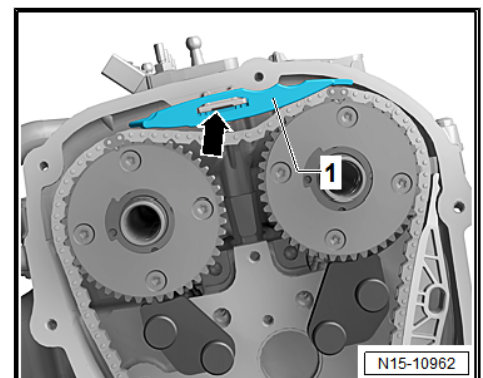


- Install guide rail -2- and tighten bolts -1-.

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- Install top guide rail -1-.



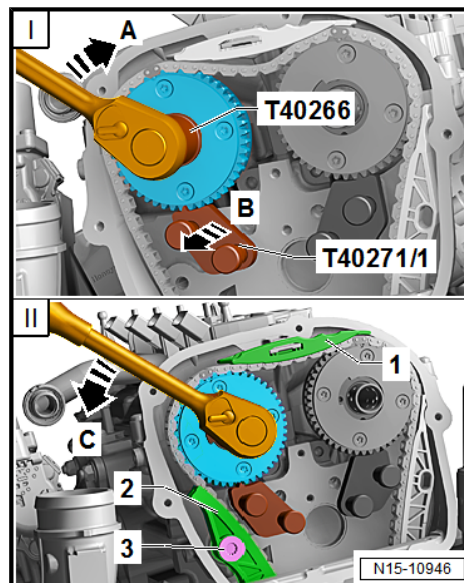
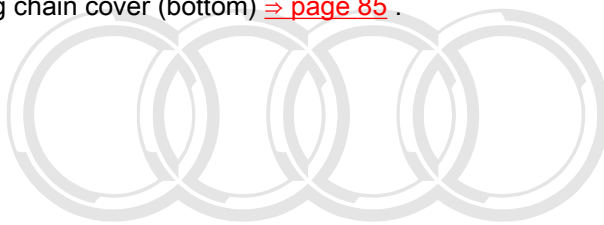


A second mechanic is required for the following step.

I - Use assembly tool - T40266- to turn exhaust camshaft slightly in direction of -arrow A- and slide camshaft clamp - T40271/1- out of teeth on chain sprocket in direction of -arrow B-.

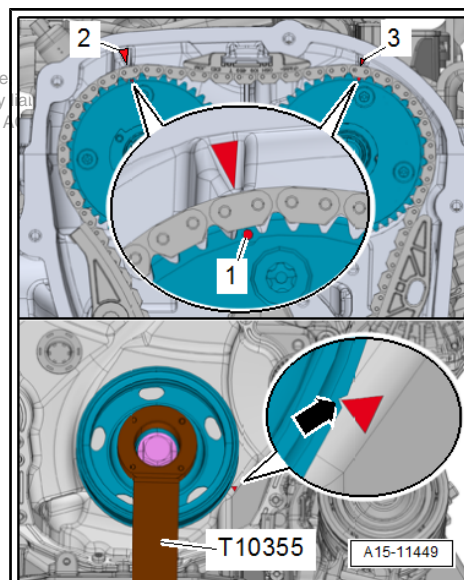
II - Release camshaft in direction of -arrow C- until timing chain is in contact with guide rail -1-. Hold camshaft in this position, install tensioning rail -2- and tighten bolt -3-. Then release camshaft.

- Install timing chain cover (bottom) ⇒ [page 85](#) .



Checking valve timing - with markings on cylinder head

- Turn vibration damper to "TDC" position using counterhold tool - T10355- permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG
- Notch on vibration damper must align with arrow marking on timing chain cover (bottom) -arrow-.
- Markings -1- on camshaft chain sprockets must be aligned with markings -2 and 3- on cylinder head.



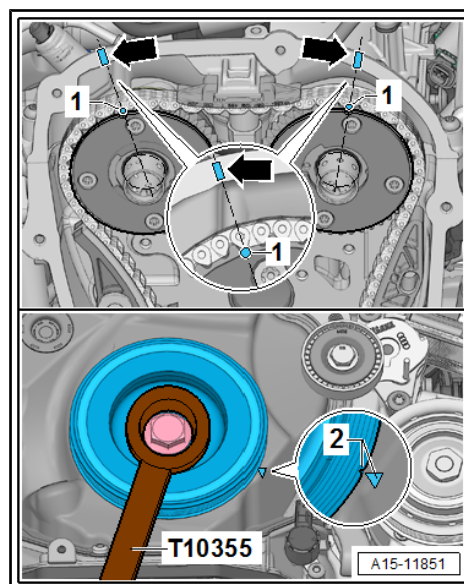
Checking valve timing - without markings on cylinder head

- The markings made on the cylinder head cover -arrows- must align with the markings on the chain sprockets -1-.
- Notch on vibration damper must align with marking on cover for timing chain (bottom) -2-.



Note

If the markings you have made are no longer visible, check the valve timing ⇒ [page 113](#) .

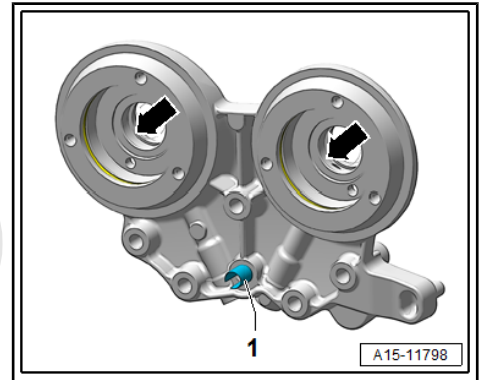


All engine versions (continued)

Note

Spring pin -1- is not fitted on all bearing saddles.

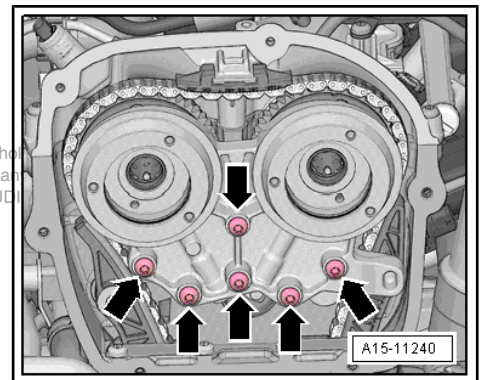
- Lubricate holes -arrows- with engine oil.
- Check whether clamping sleeve -1- is fitted.



 **WARNING**

Risk of damage to bearing saddle.

◆ **Carefully attach bearing saddle without tilting it.**



- Fit bearing saddle and screw in bolts -arrows- by hand until they make contact.
- Remove locking tool - T40267- .
- Tighten bolts -arrows- for bearing saddle ⇒ [page 93](#) .
- Install timing valves ⇒ [Item 7 \(page 93\)](#) .
- Install timing chain cover (top) ⇒ [page 83](#) .
- Install vacuum pump ⇒ Brake system; Rep. gr. 47 ; Vacuum system; Removing and installing vacuum pump .
- Install high-pressure pump ⇒ [page 284](#) .
- Install engine cover panel ⇒ [page 37](#) .
- Adapt chain elongation ⇒ Vehicle diagnostic tester ; Guided Functions; 01 - Chain elongation adaption diagnosis.

Further assembly is basically carried out in reverse order of dismantling.

Tightening torques

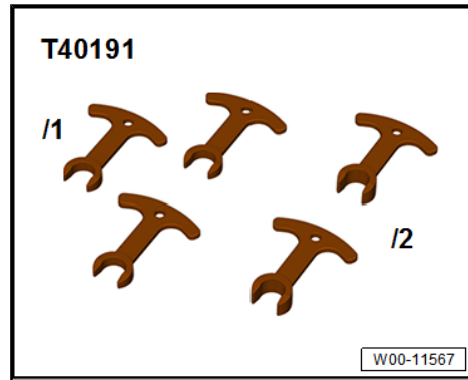
- ◆ ⇒ [“4.1 Exploded view - valve gear”, page 131](#)
- ◆ ⇒ [“2.1 Exploded view - air cleaner housing”, page 255](#)
- ◆ ⇒ [“6.1 Exploded view - high-pressure pump”, page 282](#)
- ◆ Vacuum system; Exploded view - vacuum pump ⇒ Brake system; Rep. gr. 47 ; Vacuum system; Exploded view - vacuum pump

4.3 Installing ball for slider

Special tools and workshop equipment required



◆ Spacers - T40191-



Installing

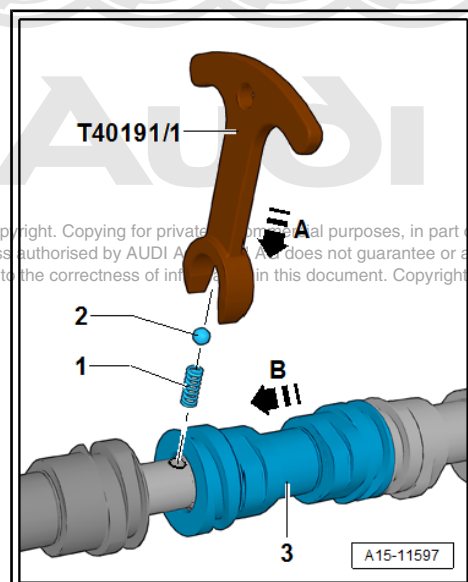


WARNING

Ball may spring out - risk of eye injury.

◆ *Put on safety goggles.*

- Insert spring -1- in camshaft.
- Place ball -2- on spring in camshaft.
- Push ball and spring downwards in direction of -arrow A- with spacer - T40191/1- and hold in place.
- Push slider -3- in direction of -arrow B-.



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4.4 Removing and installing actuators for camshaft adjustment

Removing

- Remove engine cover panel ⇒ [page 37](#) .
- Unplug relevant electrical connector -2-.
- Unscrew bolt -1- and detach actuator for camshaft adjustment.

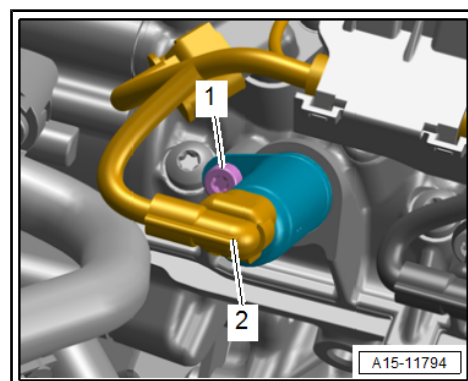
Installing

Installation is carried out in the reverse order; note the following:



Note

Check O-rings for damage.





Caution

Risk of damage to engine.

- ◆ *Pin of actuator for camshaft adjustment must be brought into installation position.*

- Press down pin of actuator for camshaft adjustment -arrow- by hand.
- Pin of actuator must not be in extended position.
- Install engine cover panel ⇒ [page 37](#) .

Tightening torques

- ◆ ⇒ ["4.1 Exploded view - valve gear", page 131](#)

4.5 Removing and installing valve stem oil seals

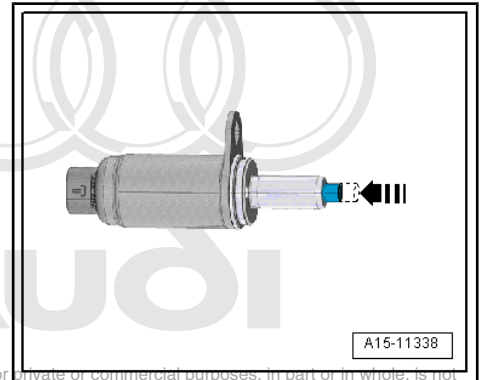
⇒ ["4.5.1 Removing and installing valve stem oil seals \(cylinder head installed\)", page 153](#)

⇒ ["4.5.2 Removing and installing valve stem oil seals \(cylinder head removed\)", page 158](#)

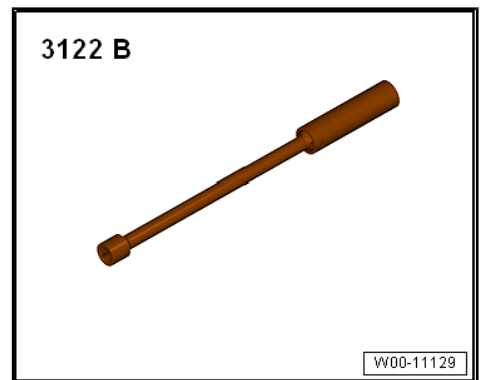
4.5.1 Removing and installing valve stem oil seals (cylinder head installed)

Special tools and workshop equipment required

- ◆ Spark plug spanner - 3122B-
- ◆ Valve stem seal puller - 3364-



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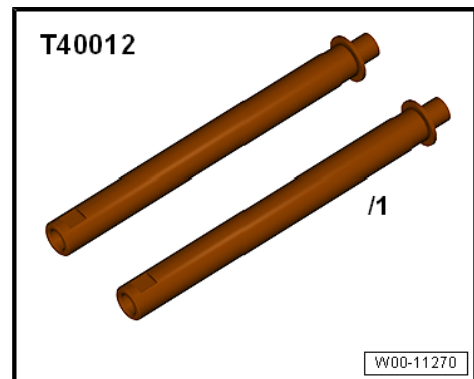




- ◆ Valve stem seal fitting tool - 3365-



- ◆ Adapter - T40012-



- ◆ Removal and installation device for valve cotters - VAS 5161 A-



- ◆ Guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19C-

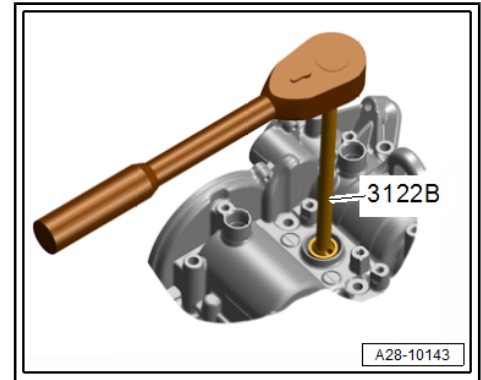
- ◆ Assembly sleeve ⇒ Electronic parts catalogue

Removing valve stem oil seals

- Remove camshafts ⇒ [page 135](#) .
- Mark original positions of roller rocker fingers and hydraulic compensation elements for re-installation.
- Remove roller rocker fingers together with hydraulic compensation elements and put down on a clean surface.

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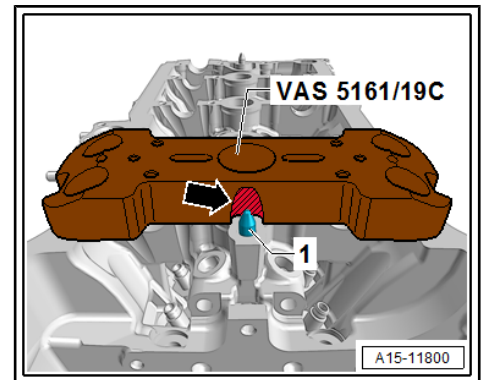
- Remove spark plugs with spark plug spanner - 3122 B- .



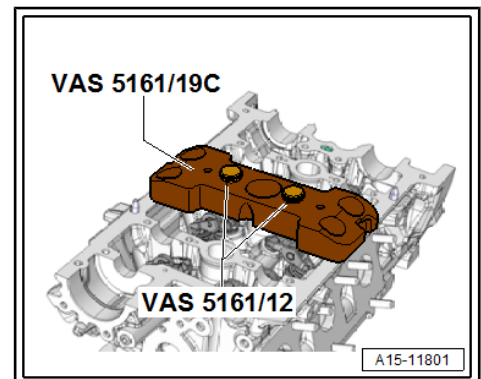
Machining guide plate

Check whether there is a recess -arrow-.

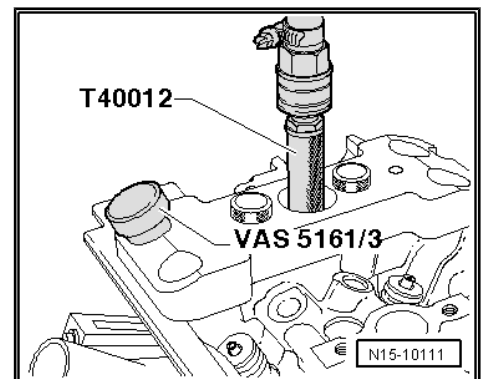
- If necessary, machine guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19C- -arrow- so that guide plate rests on cylinder head and guide pin -1- does not make contact.



- Secure guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19C- to cylinder head with knurled screws - VAS 5161/12- as shown
- Set piston of appropriate cylinder to "bottom dead centre".



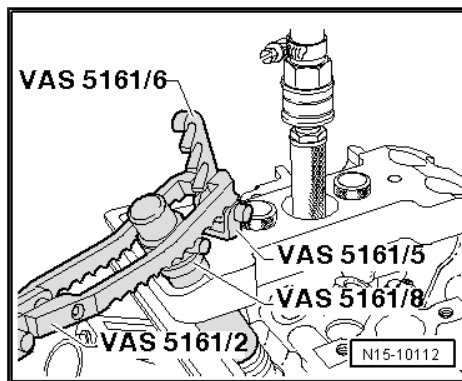
- Screw adapter - T40012- into spark plug thread.
- Connect to compressed air supply of at least 6 bar.
- Knock loose sticking valve cotters using punch - VAS 5161/3- and a plastic-headed hammer.





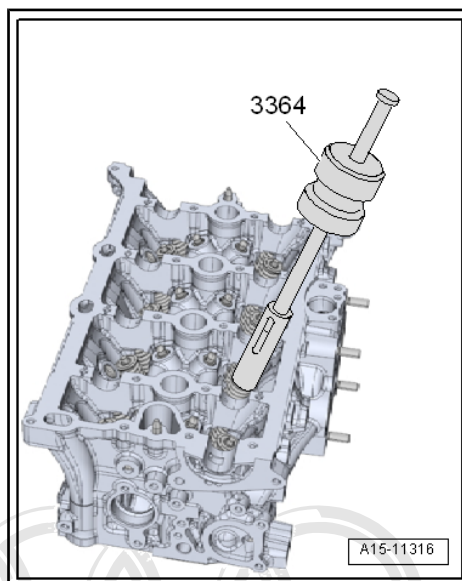
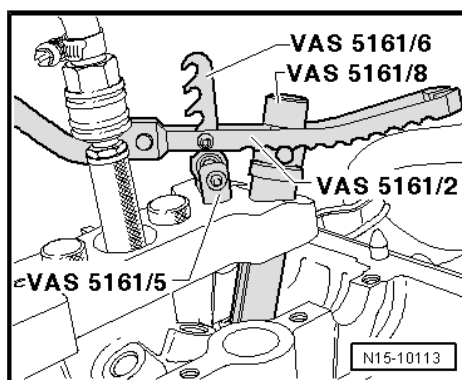
For inlet side

- Screw snap-in device - VAS 5161/6- with engaging fork - VAS 5161/5- into centre thread on guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B- .
- Insert assembly cartridge - VAS 5161/8- into guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B- .
- Engage pressure fork - VAS 5161/2- on snap-in device - VAS 5161/6- .

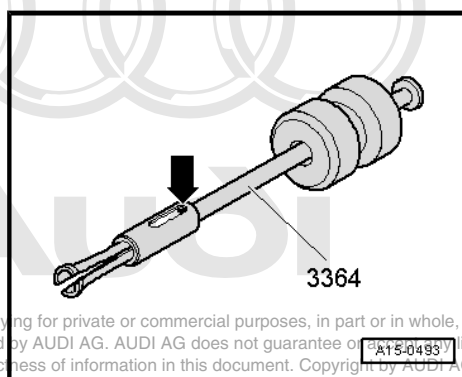


For exhaust side

- Screw snap-in device - VAS 5161/6- with engaging fork - VAS 5161/5- into outer thread on guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B- .
- Press down assembly cartridge - VAS 5161/8- and at the same time, turn knurled screw of assembly cartridge - VAS 5161/8- clockwise until tips engage in valve cotters.
- Move knurled screw back and forth slightly; the valve cotters are thus forced apart and taken up by the assembly cartridge.
- Release pressure fork - VAS 5161/2- .
- Take out assembly cartridge - VAS 5161/8- .
- Pull off valve stem oil seal with valve stem seal puller - 3364- .

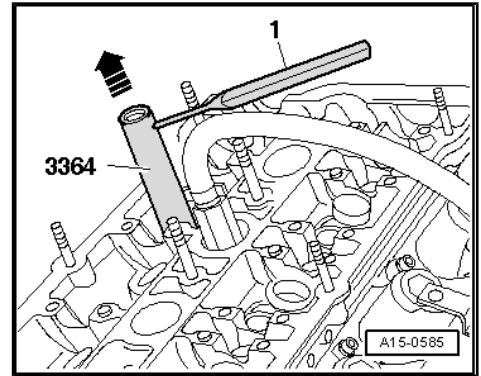


- If valve stem seal puller - 3364- cannot be used on account of restricted space, knock out pin -arrow- with a punch and remove the impact extractor attachment.

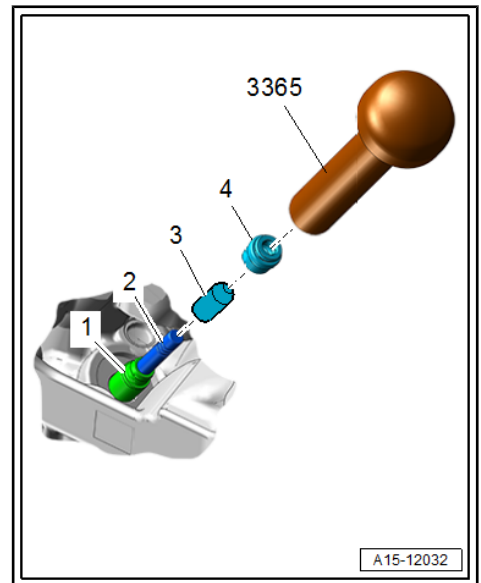


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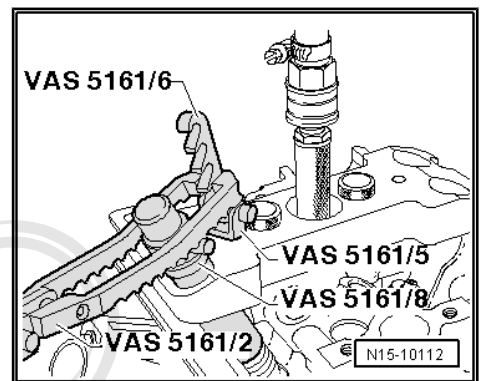
- Position lower part of valve stem seal puller - 3364- on valve stem oil seal.
- Insert a punch -1- through hole in lower section of puller.
- Apply assembly lever to puller and pull out valve stem oil seal -arrow-.



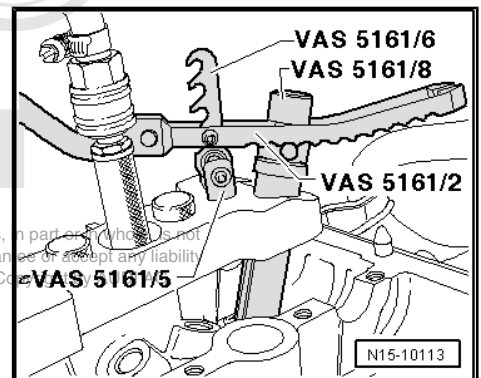
- To avoid damaging new valve stem oil seal -4- during installation, fit assembly sleeve -item 3- onto valve stem -2-.
- Lightly oil sealing lip of valve stem oil seal.
- Slide valve stem oil seal onto plastic sleeve.
- Carefully press valve stem oil seal onto valve guide using valve stem seal fitting tool - 3365- .
- Take out plastic sleeve.
- Insert valve spring and valve spring plate.
- Set up removal and installation device for valve cotters - VAS 5161- as shown.



Inlet side



Exhaust side



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Note

- ◆ *If valve cotters have been removed from assembly cartridge, they need to be put into insertion device - VAS 5161/18- first.*
- ◆ *Press assembly cartridge -VAS 5161/8- onto insertion device from above and pick up valve cotters.*
- Use pressure fork - VAS 5161/8- to press down assembly cartridge - VAS 5161/2- , then turn knurled screw of assembly cartridge back and forth while pulling upwards.
- Release pressure fork - VAS 5161/2- with knurled screw in pulled position.
- Detach removal and installation device for valve cotters - VAS 5161- .

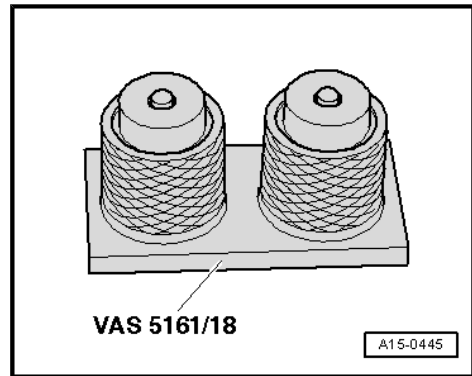
The remaining installation steps are carried out in the reverse sequence. Note the following:

- Install camshafts ⇒ [page 135](#) .

4.5.2 Removing and installing valve stem oil seals (cylinder head removed)

Special tools and workshop equipment required

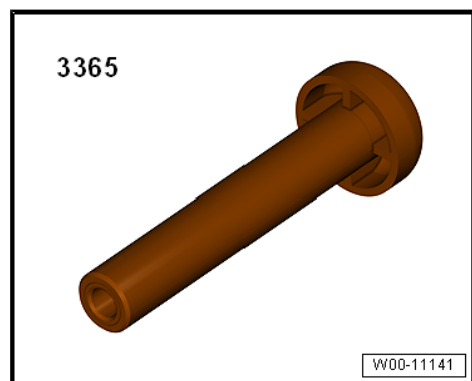
- ◆ Valve stem seal puller - 3364-



- ◆ Valve stem seal fitting tool - 3365-



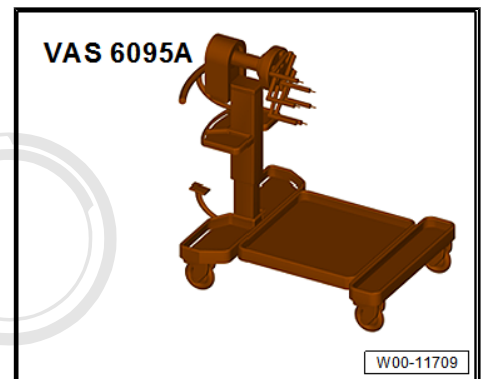
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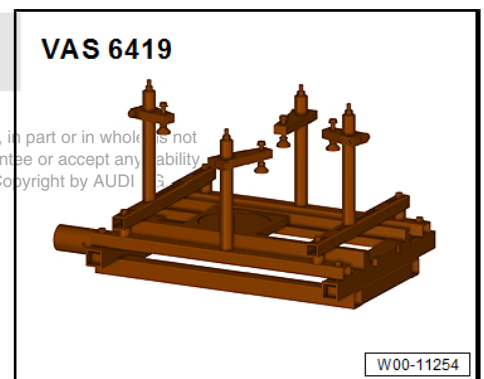
- ◆ Removal and installation device for valve cotter - VAS 5161 A-



- ◆ Guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19C-
- ◆ Engine and gearbox support - VAS 6095A-



- ◆ Cylinder head tensioning device - VAS 6419-



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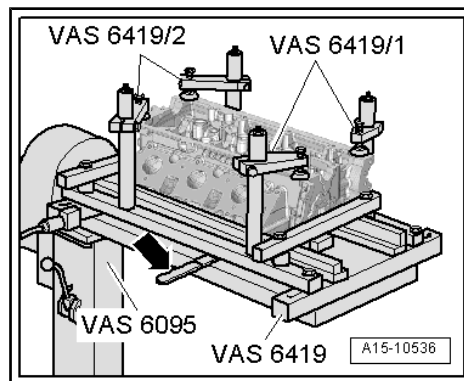
- ◆ Assembly sleeve ⇒ Electronic parts catalogue

Removing valve stem oil seals

- Remove camshafts ⇒ [page 135](#) .
- Mark original positions of roller rocker fingers and hydraulic compensation elements for re-installation.
- Remove roller rocker fingers together with hydraulic compensation elements and put down on a clean surface.



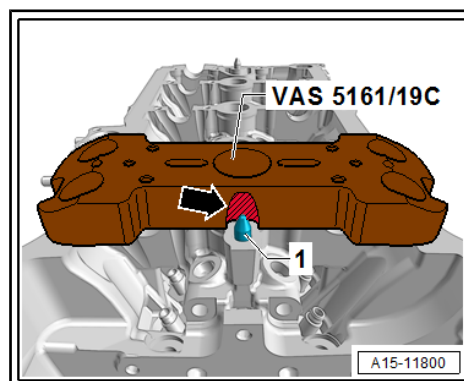
- Insert cylinder head tensoning device - VAS 6419- into engine and gearbox support - VAS 6095- .
- Secure cylinder head in cylinder head tensoning device, as shown in illustration.
- Connect cylinder head tensoning device to compressed air.
- Using lever -arrow-, slide air pad under combustion chamber where valve stem oil seal is to be removed.
- Apply just enough compressed air to bring air pad into contact with valve heads.



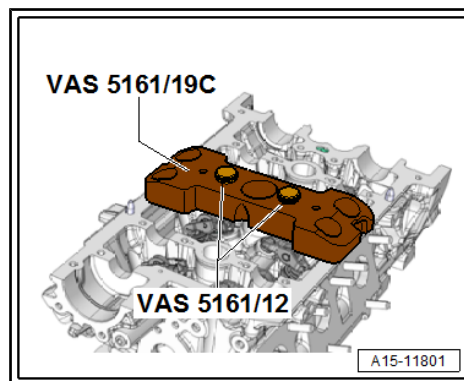
Machining guide plate

Check whether there is a recess -arrow-.

- If necessary, machine guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19C- -arrow- so that guide plate rests on cylinder head and guide pin -1- does not make contact.

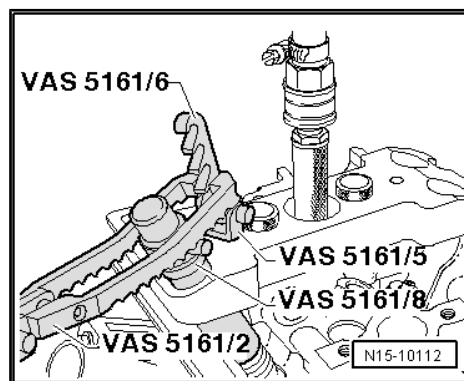


- Secure guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19C- to cylinder head with knurled screws - VAS 5161/12- as shown.
- Insert drift -VAS 5161/3- into guide plate and use plastic-headed hammer to release sticking valve cotters.



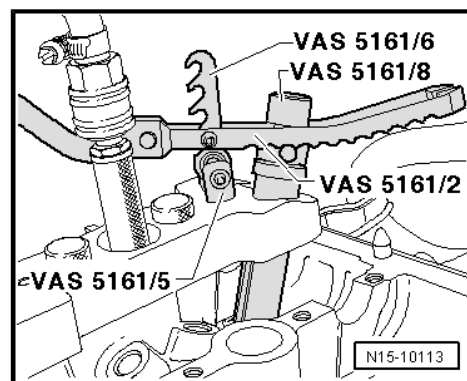
For inlet side

- Screw snap-in device - VAS 5161/6- with engaging fork - VAS 5161/5- into centre thread on guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B- .
- Insert assembly cartridge - VAS 5161/8- into guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B- .
- Engage pressure fork - VAS 5161/2- on snap-in device - VAS 5161/6- .

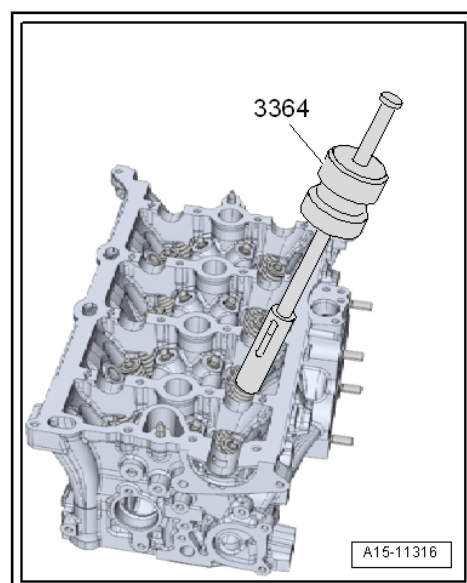


For exhaust side

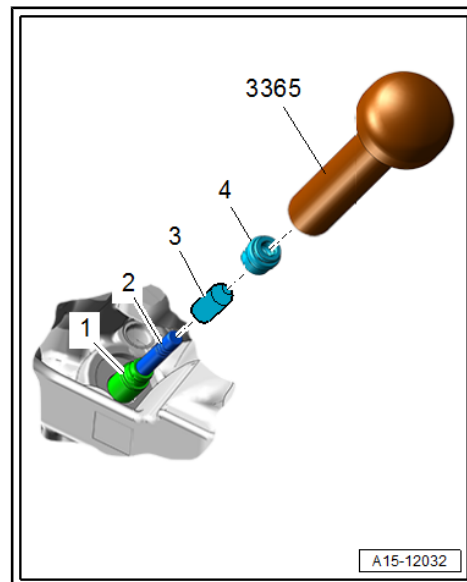
- Screw snap-in device - VAS 5161/6- with engaging fork - VAS 5161/5- into outer thread on guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B- .
- Press down assembly cartridge - VAS 5161/8- and at the same time, turn knurled screw of assembly cartridge - VAS 5161/8- clockwise until tips engage in valve cotters.
- Move knurled screw back and forth slightly; the valve cotters are thus forced apart and taken up by the assembly cartridge.
- Release pressure fork - VAS 5161/2- .
- Take out assembly cartridge - VAS 5161/8- .
- Pull off valve stem oil seal with valve stem seal puller - 3364- .



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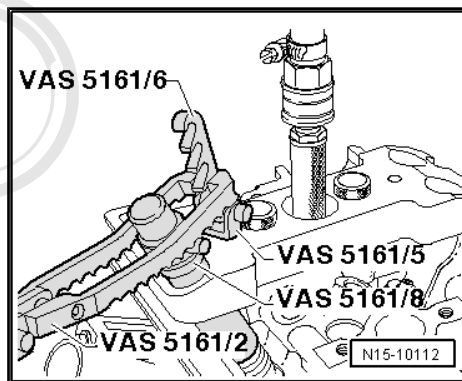


- To avoid damaging new valve stem oil seal -4- during installation, fit assembly sleeve -item 3- onto valve stem -2-.
- Lightly oil sealing lip of valve stem oil seal.
- Slide valve stem oil seal onto plastic sleeve.
- Carefully press valve stem oil seal onto valve guide using valve stem seal fitting tool - 3365- .
- Take off plastic sleeve.
- Insert valve spring and valve spring plate.
- Set up removal and installation device for valve cottoers - VAS 5161- as shown.



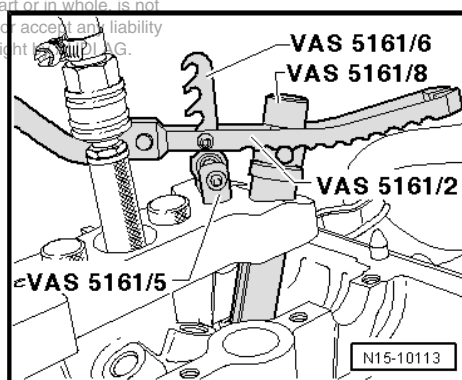


Inlet side



Exhaust side

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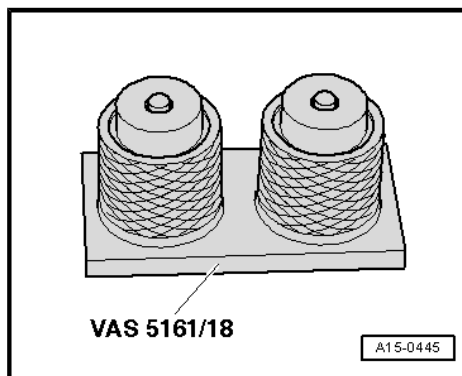


Note

- ◆ *If valve cotters have been removed from assembly cartridge, they need to be put into insertion device - VAS 5161/18- first.*
- ◆ *Press assembly cartridge -VAS 5161/8- onto insertion device from above and pick up valve cotters.*
- Use pressure fork - VAS 5161/8- to press down assembly cartridge - VAS 5161/2- , then turn knurled screw of assembly cartridge back and forth while pulling upwards.
- Release pressure fork - VAS 5161/2- with knurled screw in pulled position.
- Detach removal and installation device for valve cotters - VAS 5161- .

Further assembly is basically carried out in reverse order of dismantling. Note the following:

- Install camshafts => [page 135](#) .



5 Inlet and exhaust valves

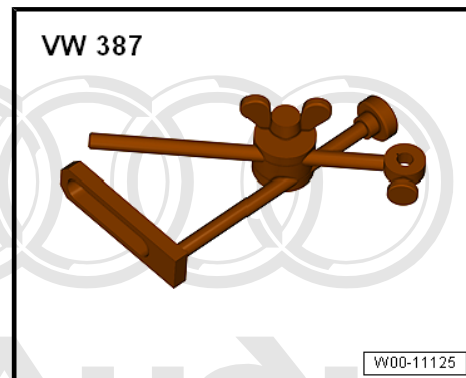
⇒ [“5.1 Checking valve guides”, page 163](#)

⇒ [“5.2 Valve dimensions”, page 164](#)

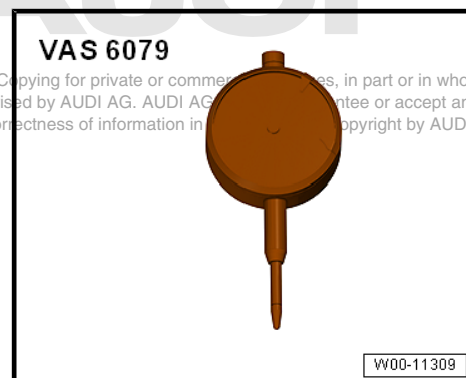
5.1 Checking valve guides

Special tools and workshop equipment required

- ◆ Universal dial gauge bracket - VW 387-



- ◆ Dial gauge - VAS 6079-



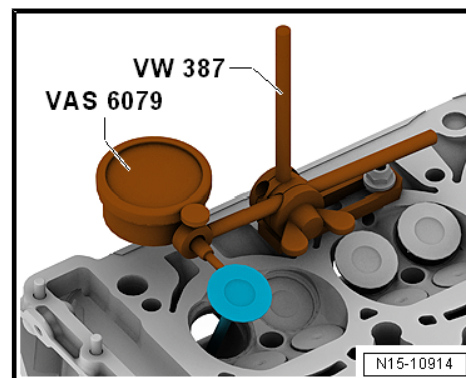
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Test sequence

- Insert valve into guide. End of valve stem must be flush with guide. Only insert inlet valve into inlet valve guide and exhaust valve into exhaust valve guide, as the stem diameters are different.
- Measure the amount of sideways play.

Wear limit

Inlet valve guide	Exhaust valve guide
0.60 mm	0.60 mm



Note

- ◆ If the wear limit is exceeded, repeat the measurement with new valves. Renew cylinder head if wear limit is still exceeded.
- ◆ If the valve has to be renewed as part of a repair, use a new valve for the measurement.



5.2 Valve dimensions

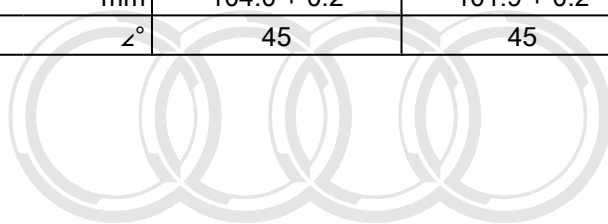
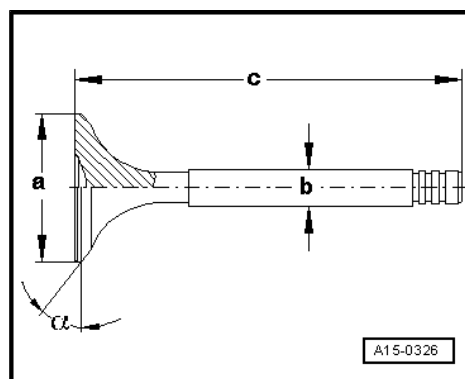
Valve dimensions



Note

Inlet and exhaust valves must not be machined. Only grinding-in is permitted.

Dimension		Inlet valve	Exhaust valve
∅ a	mm	33.85 + 0.10	28.0 + 0.1
∅ b	mm	5.98 + 0.01	5.96 + 0.01
c	mm	104.0 + 0.2	101.9 + 0.2
α	∠°	45	45



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17 – Lubrication

1 Sump/oil pump

⇒ [“1.1 Exploded view - sump/oil pump”, page 165](#)

⇒ [“1.2 Removing and installing oil level and oil temperature sender G266”, page 168](#)

⇒ [“1.3 Removing and installing sump \(bottom section\)”, page 168](#)

⇒ [“1.4 Removing and installing oil pump”, page 172](#)

⇒ [“1.5 Removing and installing sump \(top section\)”, page 174](#)

⇒ [“1.6 Engine oil”, page 176](#)

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1.1 Exploded view - sump/oil pump



Note

If large quantities of metal shavings or other particles are found in the engine oil when repairing the engine (possibly caused by partial seizure of crankshaft and conrod bearings), clean the oil passages thoroughly and renew the engine oil cooler to prevent further damage occurring later.



1 - Nut

- 9 Nm

2 - Oil level and oil temperature sender - G266-

- Removing and installing ⇒ [page 168](#)

3 - Seal

- Renew

4 - Bolt

- Renew
- Tightening sequence ⇒ [page 168](#)

5 - Gasket

- Only for sump (bottom section), plastic version

6 - O-ring

- Renew
- Lubricate lightly with engine oil

7 - Bolt

- Renew
- 4 Nm + 45°

8 - Suction pipe

- Clean strainer if dirty

9 - O-ring

- Renew
- Lubricate lightly with engine oil

10 - Oil pump

- Removing and installing ⇒ [page 172](#)

11 - Centring sleeve

12 - O-ring

- Renew
- Lubricate lightly with engine oil

13 - Bolt

- Renew
- Tightening torque ⇒ [Item 1 \(page 183\)](#)

14 - Valve for oil pressure control - N428-

- Removing and installing ⇒ [page 184](#)

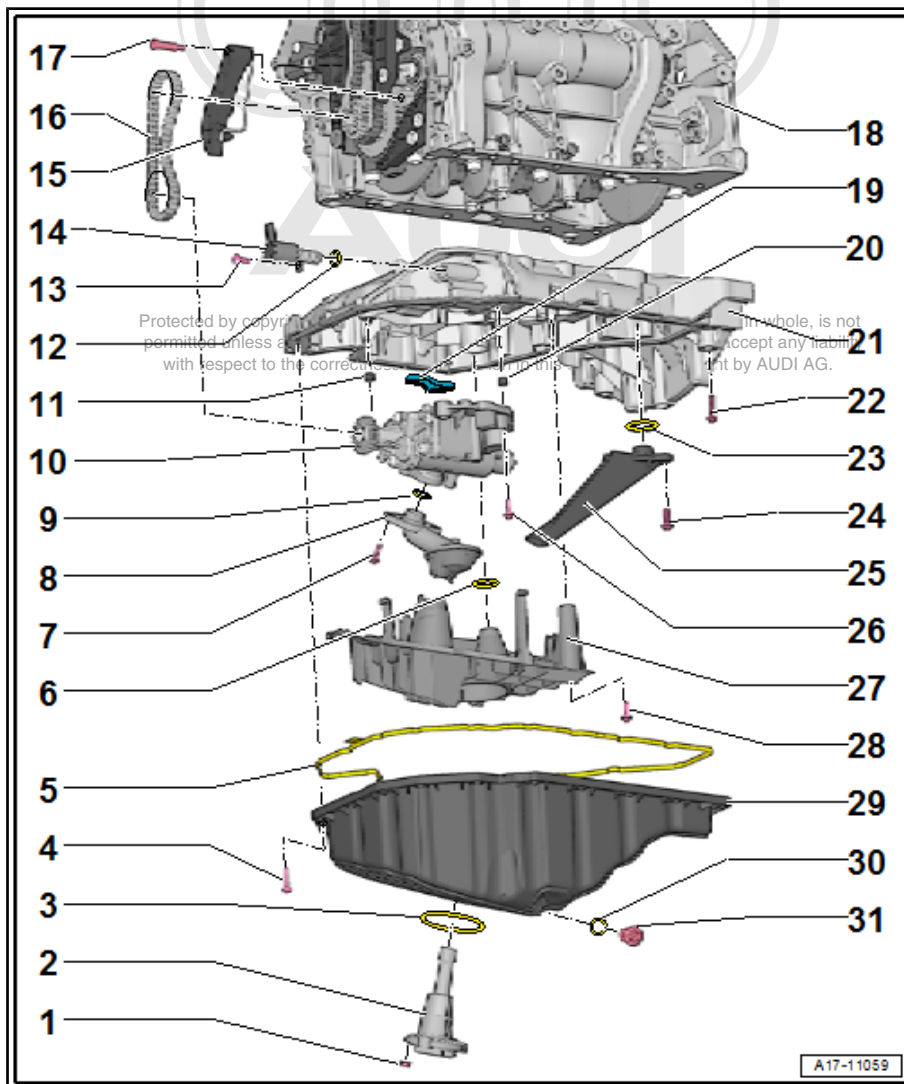
15 - Chain tensioner

16 - Drive chain for oil pump

- Mark direction of rotation before removing

17 - Bolt

- 9 Nm



18 - Cylinder block

19 - Oil strainer

20 - Centring sleeve

21 - Sump (top section)

- Removing and installing ⇒ [page 174](#)

22 - Bolt

- Renew
- Tightening sequence ⇒ [page 168](#)

23 - O-ring

- Renew
- Lubricate lightly with engine oil

24 - Bolt

- Renew
- 4 Nm + 45°

25 - Oil return pipe

26 - Bolt

- Renew
- 8 Nm + 90°

27 - Baffle plate

- Renew

28 - Bolt

- Renew
- 4 Nm + 45°

29 - Sump (bottom section)

- Removing and installing ⇒ [page 168](#)

30 - O-ring

- Seal for sheet-metal version of sump (bottom section)
- O-ring for plastic version of sump (bottom section)
- Renew
- Lubricate O-ring with engine oil

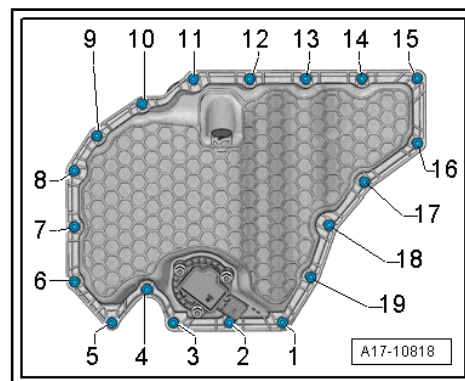
31 - Oil drain plug or sealing plug

- Oil drain plug for sheet-metal version of sump (bottom section)
- Oil drain plug: 30 Nm
- Sealing plug for plastic version of sump (bottom section)
- Tighten sealing plug as far as stop

Tightening sequence for sump (bottom section), plastic version

– Tighten bolts -1 to 19- in two stages in the sequence shown:

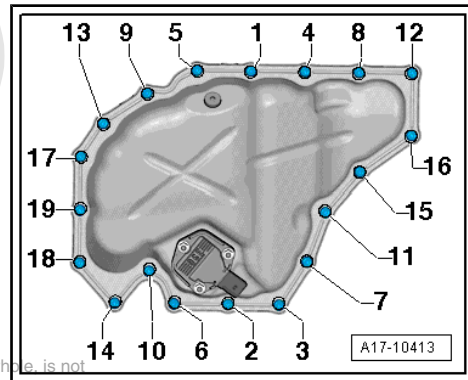
1. Tighten bolts to 8 Nm.
2. Turn bolts 90° further.





Tightening sequence for sump (bottom section), sheet-metal version

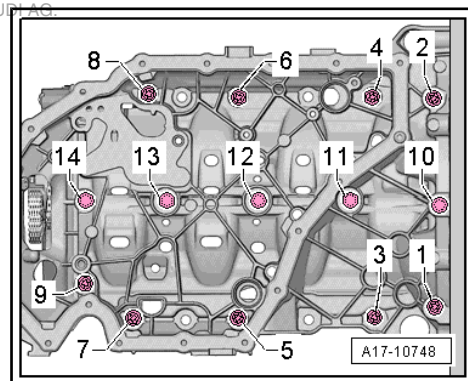
- Tighten bolts -1 to 19- in two stages in the sequence shown:
- 1. Tighten bolts to 8 Nm.
- 2. Turn bolts 90° further.



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Tightening sequence for sump (top section)

- Tighten bolts -1 to 14- in the sequence shown:
- 1. Tighten bolts -1 to 14- to 8 Nm.
- 2. Turn bolts -1 and 2- 180° further.
- 3. Turn bolts -3 to 9- 45° further.
- 4. Turn bolt -10- 180° further.
- 5. Turn bolts -11 to 14- 90° further.



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

Removing

- Engine oil drained: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .
- Unplug electrical connector -2-.
- Remove nuts -1- and detach oil level and oil temperature sender - G266- -3-.

Installing

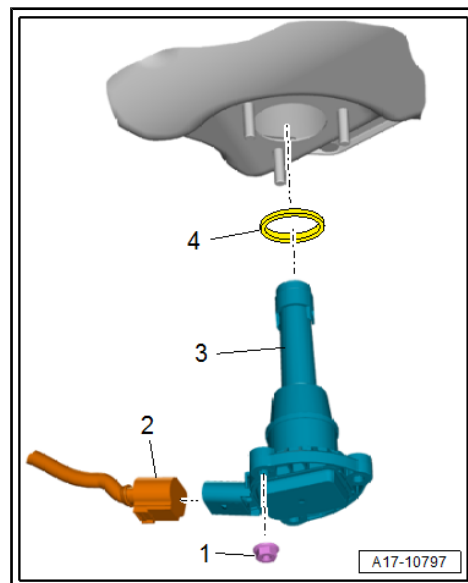
Installation is carried out in the reverse order; note the following:



Note

Renew seal -4-.

- Fill up engine oil and check oil level ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .



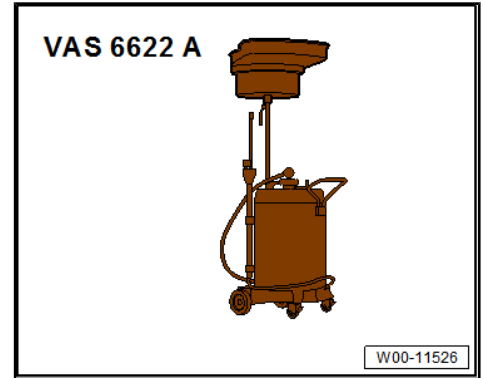
Tightening torques

- ♦ ⇒ ["1.1 Exploded view - sump/oil pump", page 165](#)

1.3 Removing and installing sump (bottom section)

Special tools and workshop equipment required

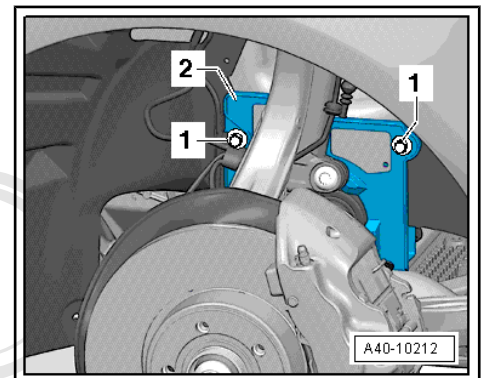
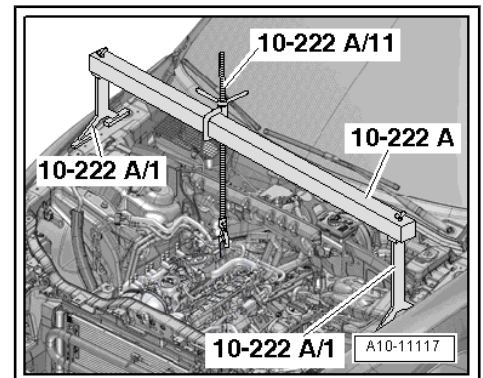
- ◆ Used oil collection and extraction unit - VAS 6622A-



- ◆ Electric drill with plastic brush attachment
- ◆ Safety goggles
- ◆ Silicone sealant: ⇒ Electronic parts catalogue

Removing

- Remove engine cover panel ⇒ [page 37](#) .
- Set up support bracket - 10 - 222 A- on suspension turrets (left and right) as illustrated.
- Attach spindle -10 - 222 A /11- to rear engine lifting eye.
- Partly take up weight of engine with spindle.
- Remove both front wheels.
- Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .
- Remove nuts -1- and detach cover -2- (left and right).



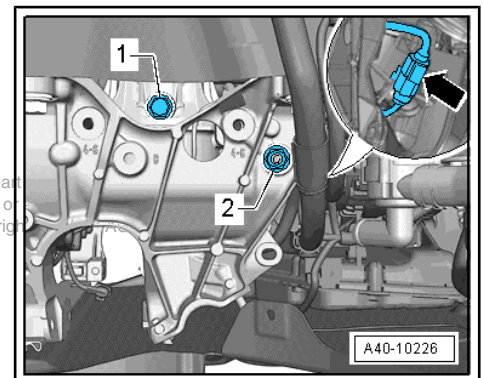
- Remove bolt -1- from engine mountings (left and right) and raise engine slightly via spindle.
- Place used oil collection and extraction unit - V.A.G 1782- below engine and drain off engine oil.



Note

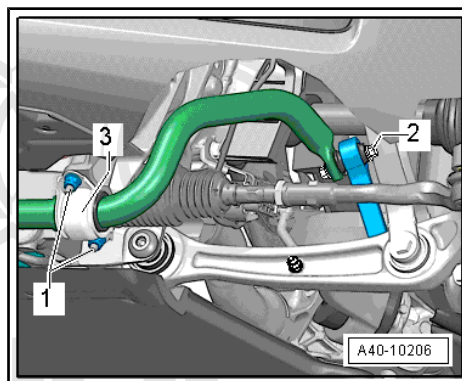
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Please observe requirements for disposal.



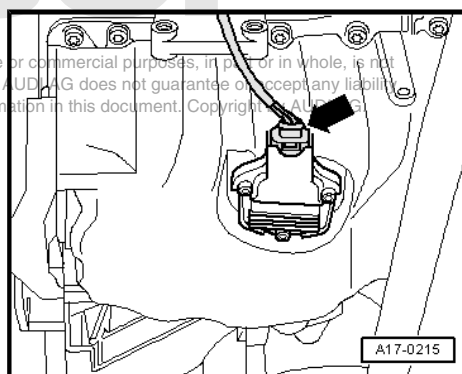


- Unscrew nuts -1- on both sides and swivel anti-roll bar downwards.



- Unplug connector from oil level and oil temperature sender - G266- -arrow-.
- Remove oil level and oil temperature sender - G266-

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- Remove bolts -1 ... 19-.
- Take off sump: if necessary loosen it by striking lightly with a rubber hammer.

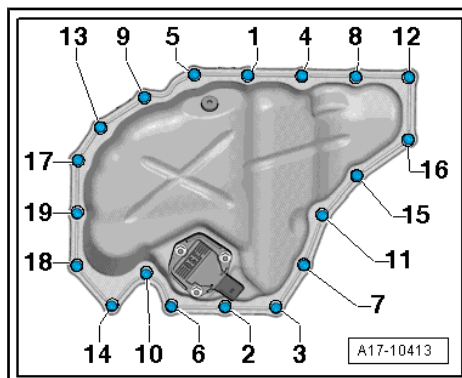
Installing


For vehicles with sump, sheet-metal version



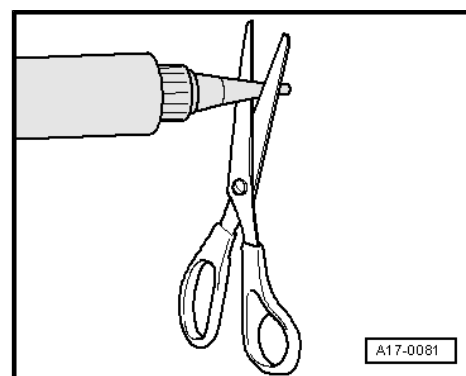
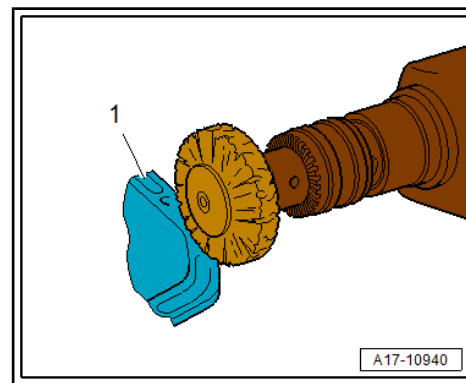
Note

- ◆ *Note expiry date of silicone sealant.*
- ◆ *The sump must be installed within 5 minutes after applying the silicone sealant.*
- ◆ *Renew the bolts tightened with specified tightening angle.*
- ◆ *Renew seals, gaskets and self-locking nuts.*
- Spray sealing surface with sealant remover and wait for it to take effect.
- Remove sealant remaining on sump (top section) with flat scraper.



 **WARNING**
Risk of eye injury.
 ♦ *Put on safety goggles.*

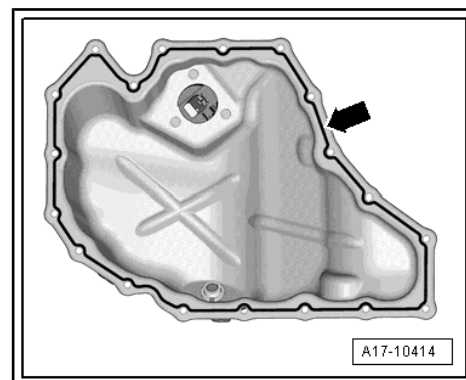
- Remove sealant residue on sump (bottom section) -1- using rotating plastic brush or similar.
- Clean sealing surfaces; they must be free of oil and grease.
- Cut off nozzle of tube at front marking (∅ of nozzle approx. 3 mm).



- Apply the bead of silicone sealant onto the clean sealing surface of the sump (bottom section), as illustrated.
- ♦ Thickness of sealant bead: 2 ... 3 mm

 **Note**

- ♦ *The sump must be installed within 5 minutes after applying the silicone sealant.*
- ♦ *The bead of sealant must not be thicker than specified, otherwise excess sealant can enter the sump and obstruct the strainer in the oil intake pipe.*
- ♦ *After fitting sump assembly, the sealant must dry for approx. 30 minutes. Then (and only then) fill the engine with engine oil.*



For all vehicles

- Immediately fit sump (bottom section) and tighten bolts; tightening sequence ⇒ [page 168](#) .
- Fill up engine oil and check oil level: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .
- Install anti-roll bar ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Removing and installing anti-roll bar
- Install noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

Further assembly is basically carried out in reverse order of dismantling.

Tightening torques

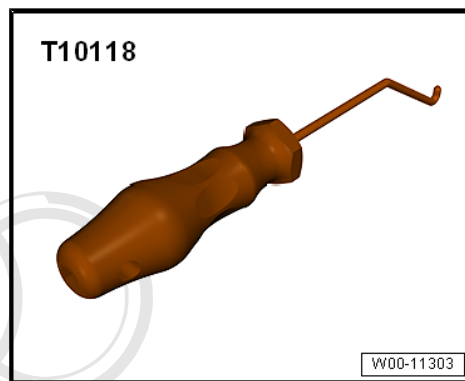
- ♦ ⇒ [“1.1 Exploded view - sump/oil pump”, page 165](#)



1.4 Removing and installing oil pump

Special tools and workshop equipment required

- ◆ Assembly tool - T10118-



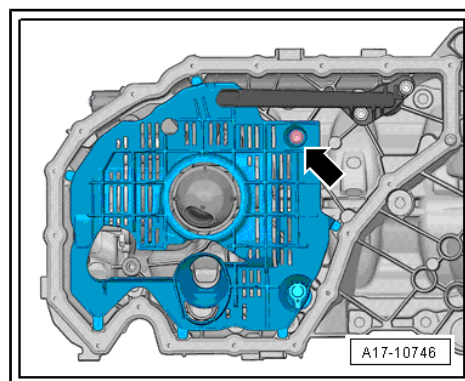
- ◆ Locking tool - T40265-



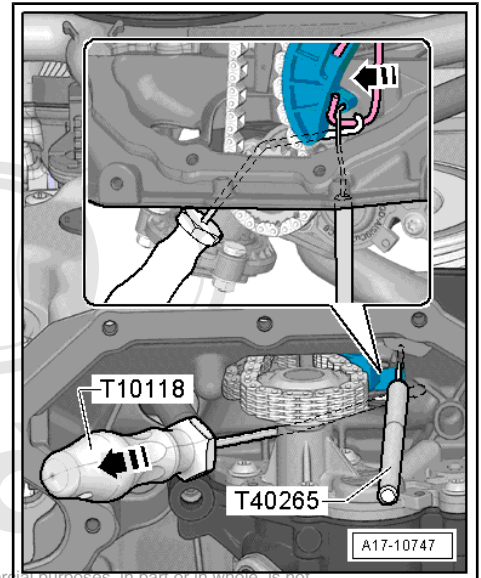
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Removing

- Remove sump (bottom section) ⇒ [page 168](#) .
- Remove bolt -arrow- and detach baffle plate.



- Using assembly tool - T10118- , pull spring of chain tensioner in direction of -arrow- and secure with locking tool - T40265- .

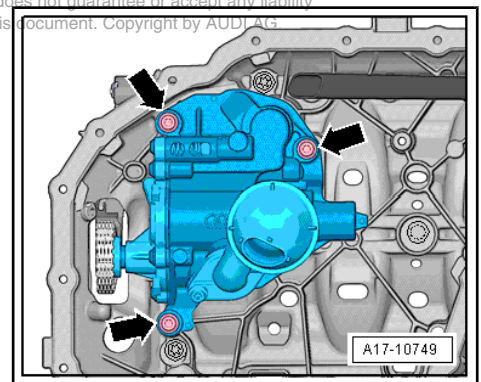


- Remove bolts -arrows- and detach oil pump.

Installing

Installation is carried out in the reverse order; note the following:

- Check that both centring sleeves are fitted in oil pump.
- Before installing oil pump, check strainer in oil intake pipe and oil passages in sump (top section) for dirt.
- Guide oil pump sprocket into drive chain and install oil pump.



Caution

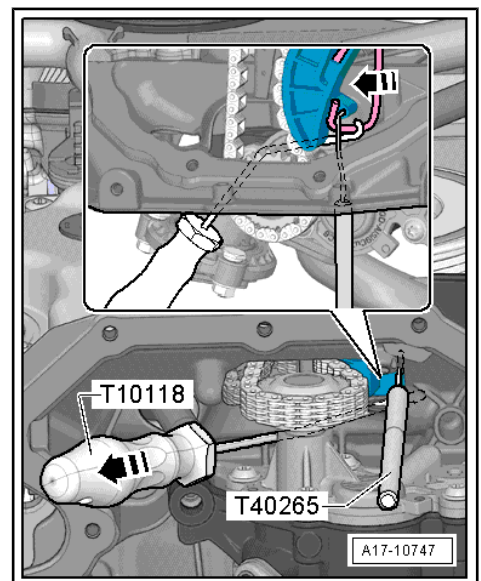
Risk of irreparable damage to engine.

- ◆ *The following step must be performed to ensure that spring of chain tensioner returns to installation position:*

- Using assembly tool - T10118- , pull spring of chain tensioner in direction of -arrow- and remove locking tool - T40265- .
- Fit O-ring ⇒ [Item 6 \(page 166\)](#) onto new baffle plate and lubricate with engine oil.
- Fit new baffle plate and secure in position.
- Install sump (bottom section) ⇒ [page 168](#) .
- Fill up engine oil and check oil level: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .

Tightening torques

- ◆ ⇒ ["1.1 Exploded view - sump/oil pump", page 165](#)





1.5 Removing and installing sump (top section)

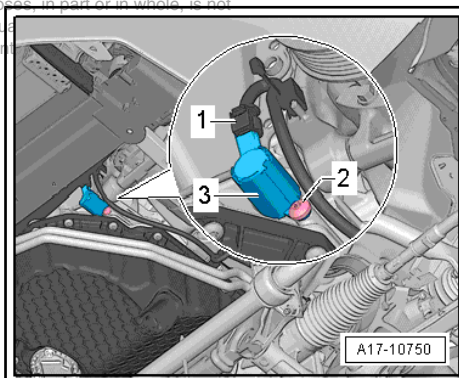
Special tools and workshop equipment required

- ◆ Electric drill with plastic brush
- ◆ Safety goggles
- ◆ Silicone sealant ⇒ Electronic parts catalogue

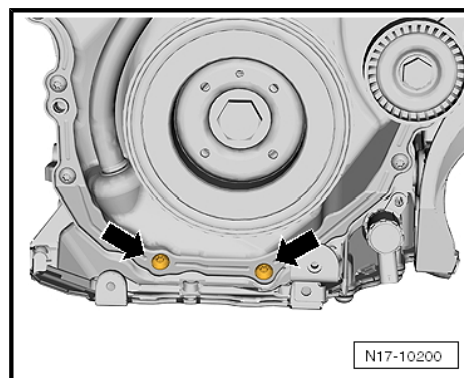
Removing

- Gearbox removed
- Remove electromechanical steering rack ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering rack; Removing and installing steering rack .
- Remove sump (bottom section) ⇒ [page 168](#) .
- Remove rear sealing flange ⇒ [page 55](#) .
- Remove oil pump ⇒ [page 172](#) .
- Unplug electrical connector 45.


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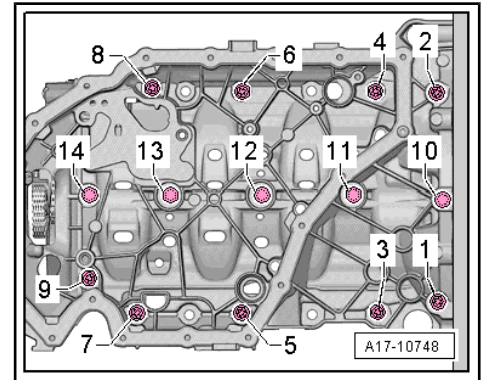


- Remove bolts -arrows-.



- Remove bolts -1 to 14- and detach sump (top section).

 **Caution**
Lever off sump (top section) at gearbox end first. Take care timing chain cover is not bent when levering off.




Installing

- ◆ Silicone sealant ⇒ Electronic parts catalogue

 **Note**

- ◆ *Note expiry date of silicone sealant.*
- ◆ *The sump (top section) must be installed within 5 minutes after applying the silicone sealant.*
- ◆ *Renew the bolts tightened with specified tightening angle.*
- ◆ *Renew seals, gaskets and self-locking nuts.*

- Remove sealant remaining on cylinder block with flat scraper.

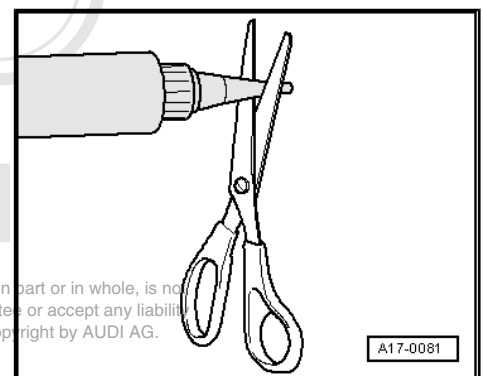
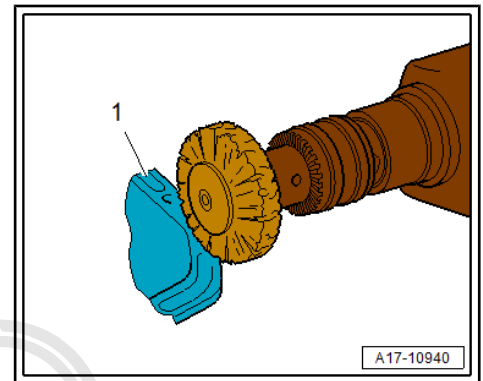
 **WARNING**
Risk of eye injury.
 ◆ *Put on safety goggles.*

- Remove residual sealant on sump (top section) and timing chain cover (bottom) -1- using rotating plastic brush or similar.

 **Note**

Check if timing chain cover is deformed. For this purpose, first fit sump (top section) without sealant and determine gap between cover and sump (top section). If the cover is deformed and cannot be straightened, renew cover after installing sump (top section).

- Clean sealing surfaces; they must be free of oil and grease.
- Check oil passages in sump (top section) and crankcase for contamination.
- Cut off nozzle of tube at front marking (∅ of nozzle approx. 2 mm).





Caution

Make sure lubrication system is not clogged by excess sealant.

◆ *The bead of sealant must not be thicker than specified.*

- ◆ Thickness of sealant bead: 2 ... 3 mm.
- Apply silicone sealant onto clean sealing surface of sump (top section) as illustrated -arrow-.
- Apply silicone sealant between cylinder block and timing chain cover (bottom), as illustrated -arrows-.



Note

- ◆ *The sump (top section) must be installed within 5 minutes after applying the silicone sealant.*
- ◆ *The bead of sealant must not be thicker than specified, otherwise excess sealant can enter the sump and obstruct the strainer in the oil intake pipe.*
- Sump (top section) and crankcase must be flush at gearbox end.
- Immediately fit sump (top section) and tighten bolts, tightening torque ⇒ [page 168](#) .

- Fit bolts -arrows-. Tightening torques ⇒ [Item 16 \(page 81\)](#)
- Install rear sealing flange ⇒ [page 55](#) .
- Install oil pump ⇒ [page 172](#) .
- Fit new baffle plate and secure in position.
- Install sump (bottom section) ⇒ [page 168](#) .
- Install electromechanical steering rack ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering rack; Removing and installing steering rack .

Further assembly is basically carried out in reverse order of dismantling.

- Fill up engine oil and check oil level: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .

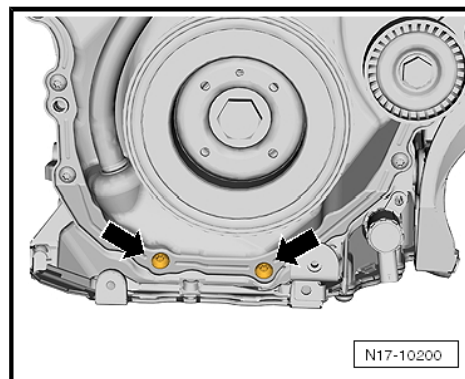
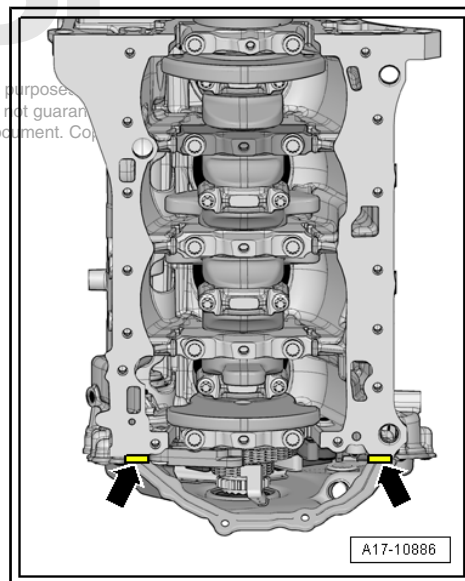
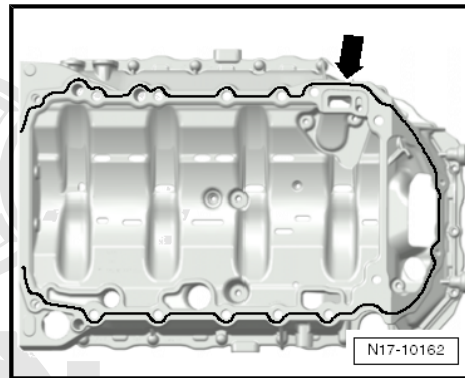
Tightening torques

- ◆ ⇒ [“1.1 Exploded view - sump/oil pump”, page 165](#)

1.6 Engine oil

Refer to ⇒ Maintenance tables for viscosity grades, oil specifications and engine oil capacity.

- Check oil level: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .



2 Engine oil cooler

⇒ [“2.1 Exploded view - engine oil cooler”, page 177](#)

⇒ [“2.2 Removing and installing engine oil cooler”, page 177](#)

⇒ [“2.3 Removing and installing mechanical switching valve”, page 179](#)

2.1 Exploded view - engine oil cooler

1 - Bracket for ancillaries

- Removing and installing
 ⇒ [page 49](#)

2 - Gasket

- Renew

3 - O-rings

- Renew
- Lubricate lightly with engine oil

4 - Mechanical switching valve

- Renewing ⇒ [page 179](#)

5 - Engine oil cooler

- See note ⇒ [page 165](#)
- Removing and installing
 ⇒ [page 177](#)

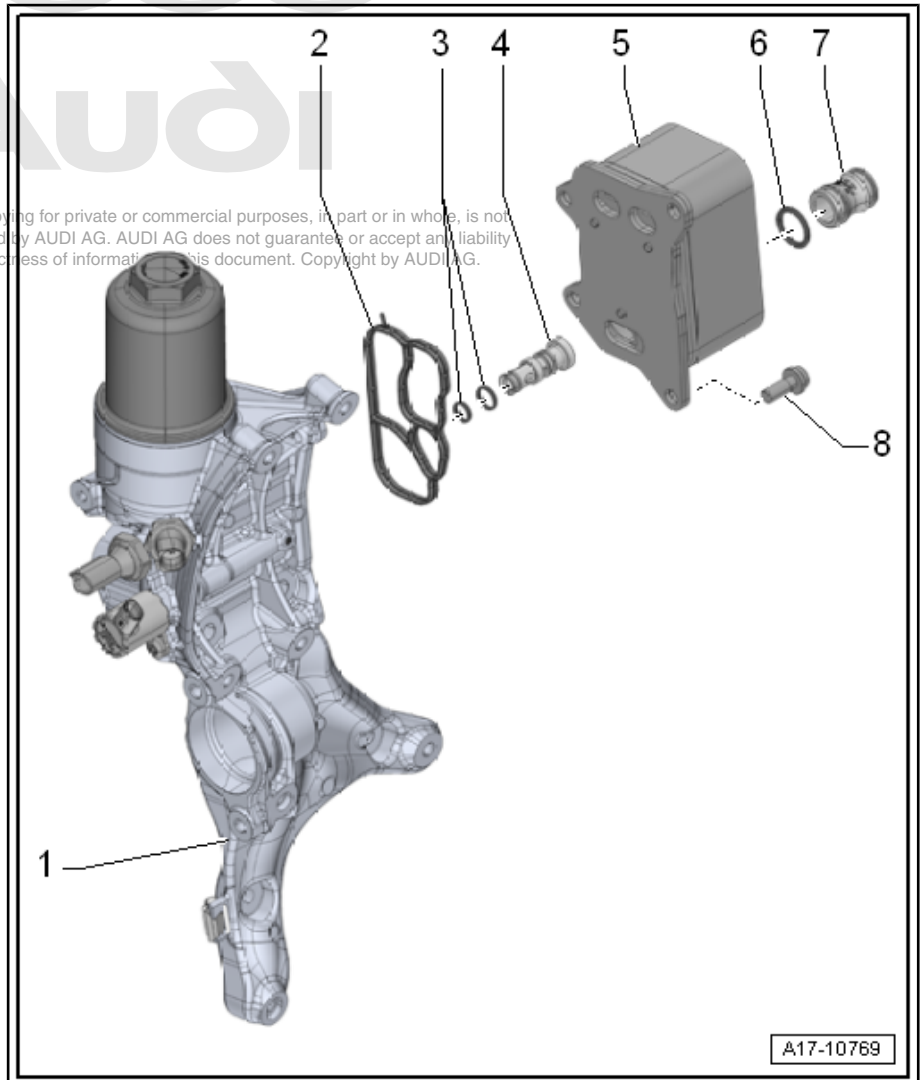
6 - Seal

- Renew
- Lubricate with coolant

7 - Connection

8 - Bolt

- Renew
- 8 Nm + 45°

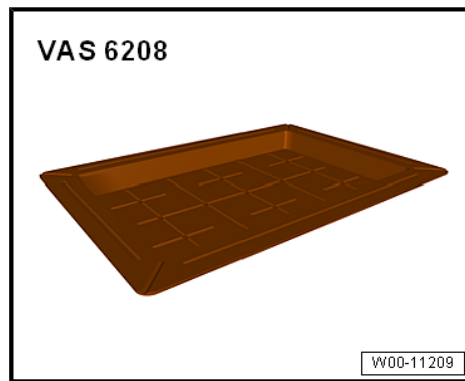


2.2 Removing and installing engine oil cooler

Special tools and workshop equipment required



- ◆ Drip tray for workshop hoist - VAS 6208-



Removing



WARNING

Hot steam/hot coolant can escape - risk of scalding.

- ◆ *The cooling system is under pressure when the engine is hot.*
- ◆ *Cover filler cap on coolant expansion tank with a cloth and open carefully to dissipate pressure.*

- Drain coolant ⇒ [page 194](#) .
- Remove bracket for ancillaries ⇒ [page 49](#) .
- Unscrew bolts -4 and 5- and remove engine oil cooler -3- together with seal -2-.

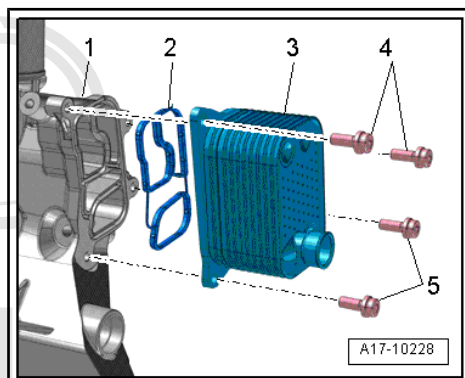
Installing

Installation is carried out in the reverse order; note the following:



Note

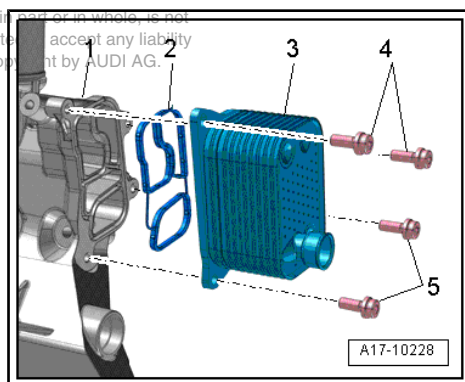
- ◆ *Renew gaskets and seals.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ [Electronic parts catalogue](#) .*



- Install engine oil cooler -3- with new seal -2-.
- Install bracket for ancillaries ⇒ [page 49](#) .
- Fill up with coolant ⇒ [page 196](#) .
- Fill up engine oil and check oil level: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .

Tightening torques

- ◆ ⇒ ["2.1 Exploded view - engine oil cooler", page 177](#)



2.3 Removing and installing mechanical switching valve

Removing

- Remove engine oil cooler ⇒ [page 177](#) .
- Take mechanical switching valve -1- out of bracket for ancillaries -arrow-.

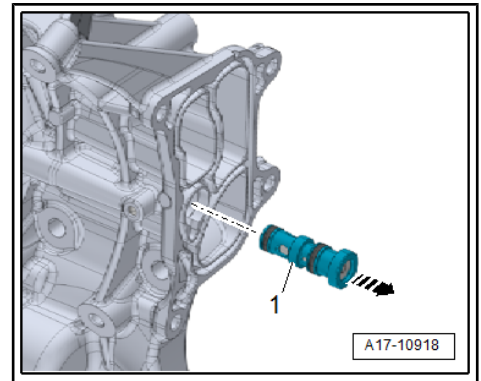
Installing

Installation is carried out in the reverse order; note the following:

Note

- ◆ *Renew gaskets and seals.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ [Electronic parts catalogue](#) .*
- Lightly lubricate O-rings of mechanical switching valve with engine oil and install.
- ~~Install engine oil cooler ⇒ [page 177](#)~~

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3 Crankcase breather

⇒ "3.1 Exploded view - crankcase breather system", page 180

⇒ "3.2 Removing and installing oil separator", page 181

3.1 Exploded view - crankcase breather system

1 - Cylinder head cover

2 - Gasket

- Renew

3 - Hose

- To activated charcoal filter solenoid valve 1 - N80-

4 - Oil separator

- Removing and installing
⇒ page 181

5 - Seal

- Renew

6 - Hose

- For crankcase breather
- To turbocharger

7 - Bolt

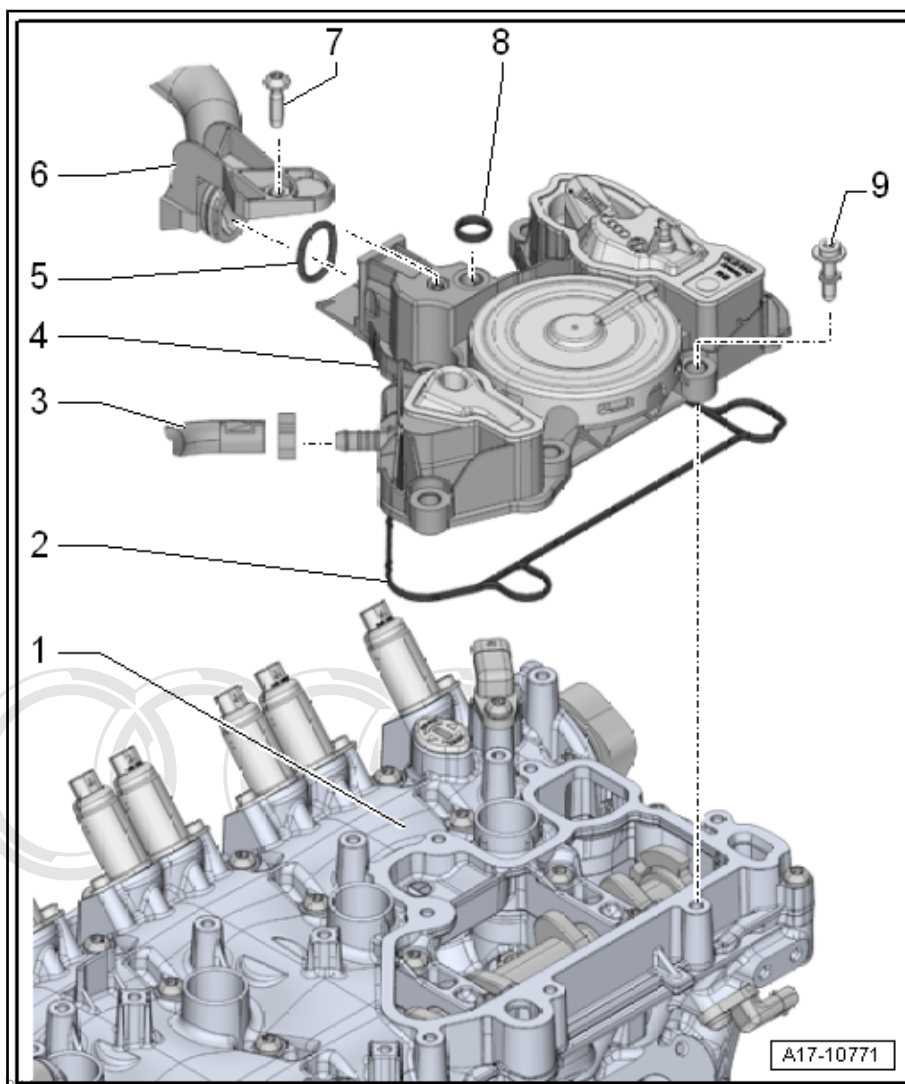
- Thread-forming
- Fit and screw in bolt by hand so that it is screwed into old thread. Then tighten bolt to torque.
- 4 Nm

8 - Seal

- Renew

9 - Bolt

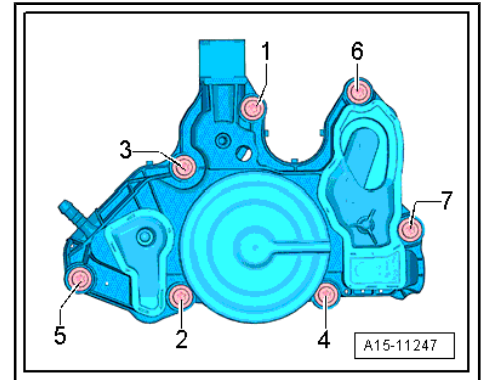
- Thread-forming
- Fit and screw in bolt by hand so that it is screwed into old thread. Then tighten bolt to torque.



- Tightening torque and sequence ⇒ page 181

Tightening sequence - oil separator

- Tighten bolts in the sequence -1 ... 7- to 9 Nm.



3.2 Removing and installing oil separator

Removing

- Remove ignition coils for cylinders 3 and 4 ⇒ [page 306](#) .
- Release hose clip -1- and detach hose from activated charcoal filter solenoid valve 1 - N80- .
- Remove bolt -2- and detach crankcase breather hose -3- from oil separator.
- Remove bolts -arrows- and detach oil separator.

Installing

Installation is carried out in the reverse order; note the following

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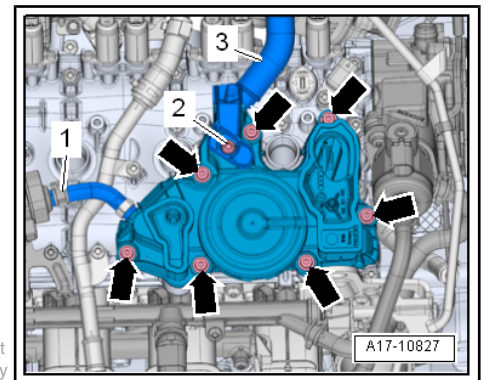


Note

- ◆ *Renew gasket and seals.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ [Electronic parts catalogue](#) .*

Tightening torques

- ◆ ⇒ [“3.1 Exploded view - crankcase breather system”, page 180](#)



4 Oil filter/oil pressure switch

⇒ [“4.1 Exploded view - oil filter”, page 182](#)

⇒ [“4.2 Exploded view - oil pressure switches/oil pressure control”, page 183](#)

⇒ [“4.3 Removing and installing piston cooling jet control valve N522”, page 184](#)

⇒ [“4.4 Removing and installing valve for oil pressure control N428”, page 184](#)

⇒ [“4.5 Removing and installing oil pressure switch F22”, page 186](#)

⇒ [“4.6 Removing and installing oil pressure switch for reduced oil pressure F378”, page 187](#)

⇒ [“4.7 Removing and installing stage 3 oil pressure switch F447”, page 187](#)

⇒ [“4.8 Checking oil pressure”, page 188](#)

4.1 Exploded view - oil filter

1 - Bracket for ancillaries

- Removing and installing
⇒ [page 49](#)

2 - Gasket

- Renew

3 - Oil filter

- Removing and installing: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818

4 - O-ring

- Renew
- Lubricate lightly with engine oil

5 - Oil filter housing

- 25 Nm

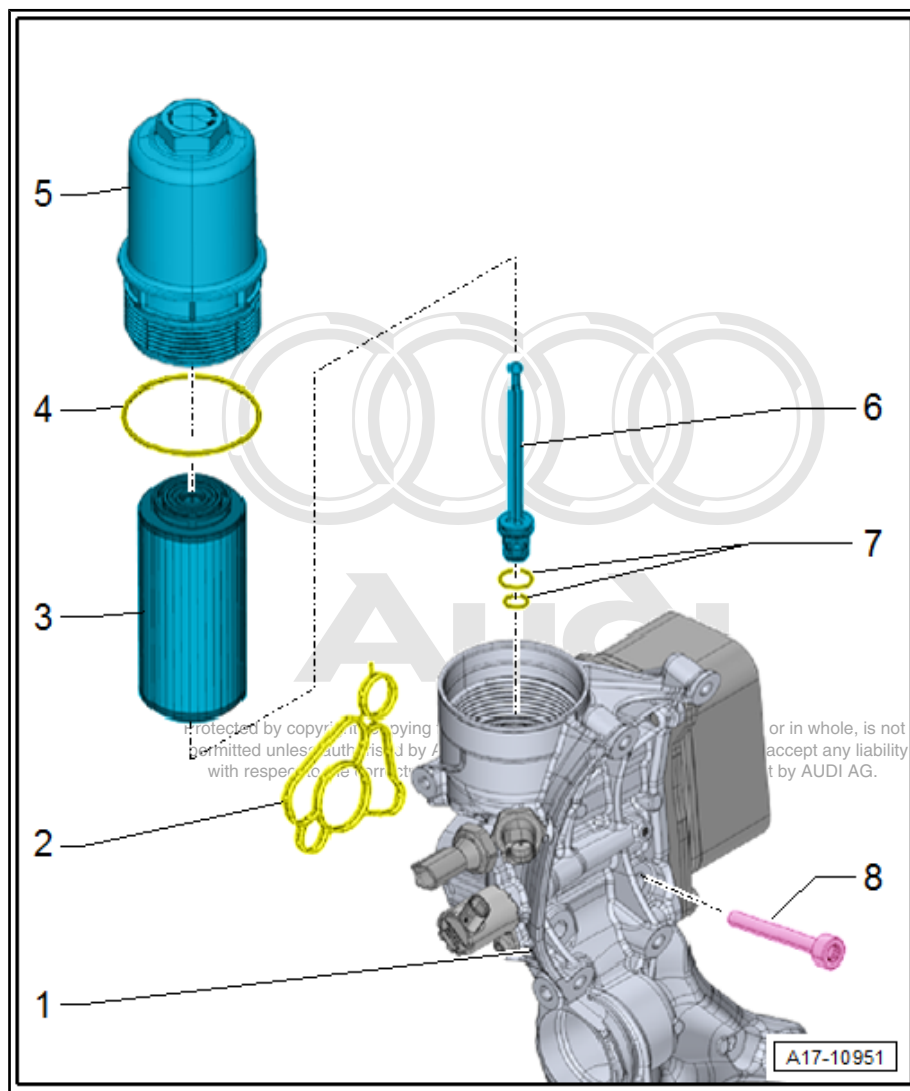
6 - Oil drain connection

7 - O-rings

- Not available as replacement part, supplied together with
⇒ [Item 6 \(page 182\)](#)

8 - Bolt

- Tightening torque and sequence ⇒ [page 40](#)



4.2 Exploded view - oil pressure switches/oil pressure control

1 - Bolt

- Renew
- 4 Nm +90°

2 - Valve for oil pressure control - N428-

- Removing and installing ⇒ [page 184](#)

3 - O-ring

- Renew
- Lubricate lightly with engine oil

4 - O-rings

- Renew
- Lubricate lightly with engine oil

5 - Bolt

- Renew
- Aluminium bolt: 4 Nm +45°
- Steel bolt: 9 Nm

6 - Piston cooling jet control valve - N522-

- Removing and installing ⇒ [page 184](#)

7 - Seal

- Renew

8 - Oil pressure switch - F22-

- Blue or grey insulation
- Checking ⇒ Vehicle diagnostic tester
- Removing and installing ⇒ [page 186](#)
- 20 Nm

9 - Oil pressure switch for reduced oil pressure - F378-

- Brown insulation
- Checking ⇒ Vehicle diagnostic tester
- Removing and installing ⇒ [page 187](#)
- 20 Nm

10 - Seal

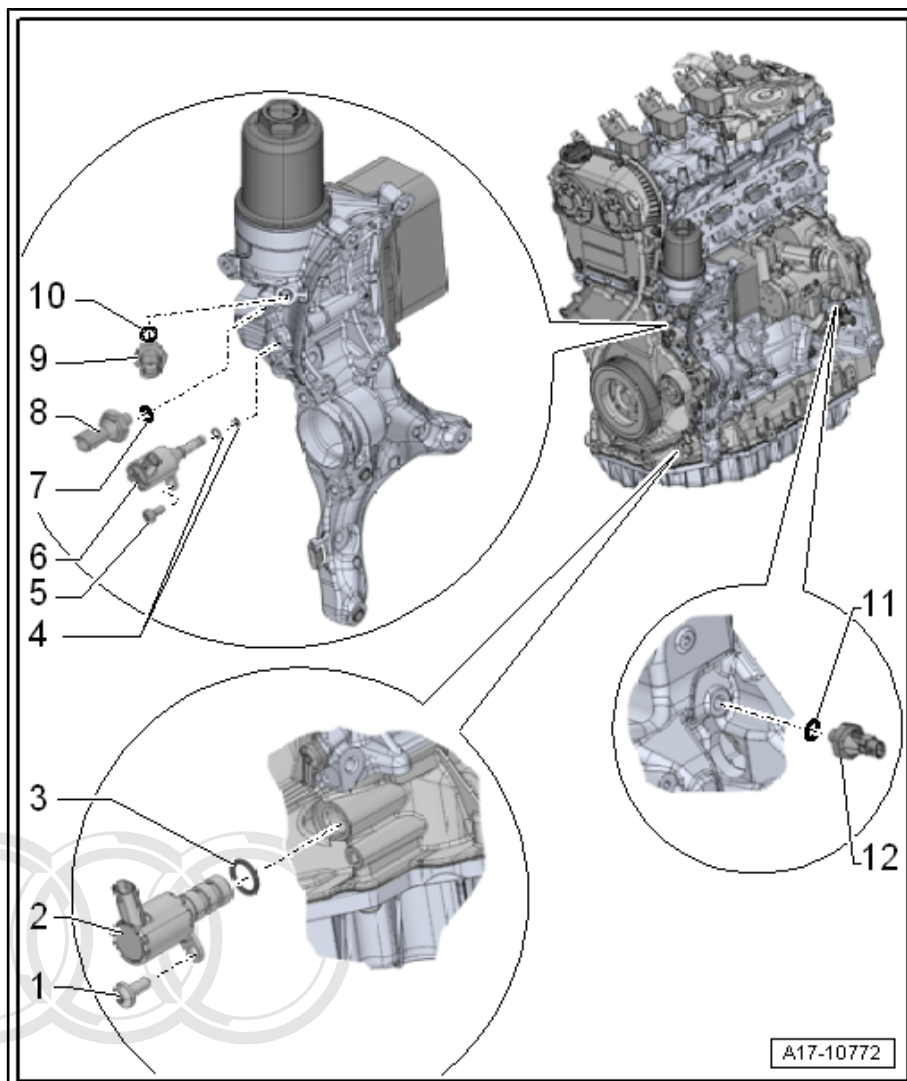
- Renew

11 - Seal

- Renew

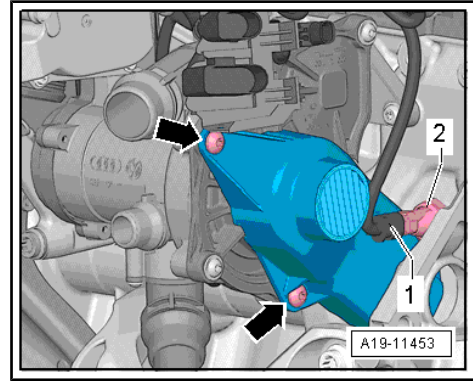
12 - Stage 3 oil pressure switch - F447-

- Checking ⇒ Vehicle diagnostic tester
- Removing and installing ⇒ [page 187](#)
- Installation position ⇒ [page 184](#)
- 20 Nm





Installation position stage 3 oil pressure switch - F447-



4.3 Removing and installing piston cooling jet control valve - N522-

Removing



Note

Place a cloth underneath bracket for ancillaries to catch any escaping oil.

- Unplug electrical connector -2- at piston cooling jet control valve - N522- .
- Unscrew bolt -3- and remove piston cooling jet control valve - N522- -1-.

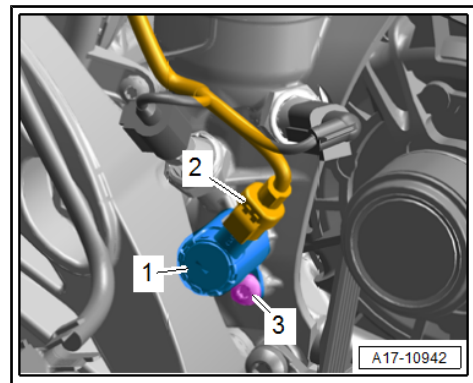
Installing

Installation is carried out in the reverse order; note the following:



Note

- ◆ Fit new O-rings.
 - ◆ Fit the new piston cooling jet control valve - N522- into the connection immediately to avoid loss of oil.
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- Check oil level: A4 ➤ Maintenance ; Booklet 812 ; A5 Coupé ➤ Maintenance ; Booklet 811 , A5 Cabriolet ➤ Maintenance ; Booklet 818 .



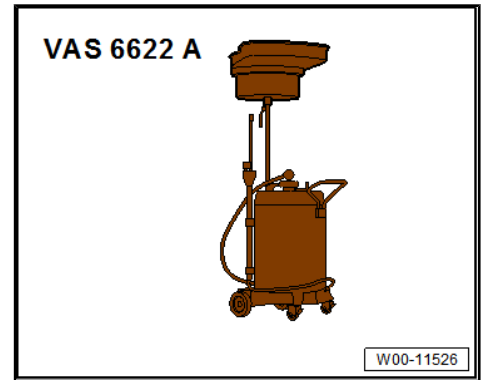
Tightening torques

- ◆ => ["4.2 Exploded view - oil pressure switches/oil pressure control", page 183](#)

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

Special tools and workshop equipment required

- ◆ Used oil collection and extraction unit - VAS 6622A-



Removing

- Remove front noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .
- Position used oil collection and extraction unit - VAS 6622- below engine.
- Unplug electrical connector -1-.
- Unscrew bolt -2- and remove valve for oil pressure control - N428- .

Installing

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



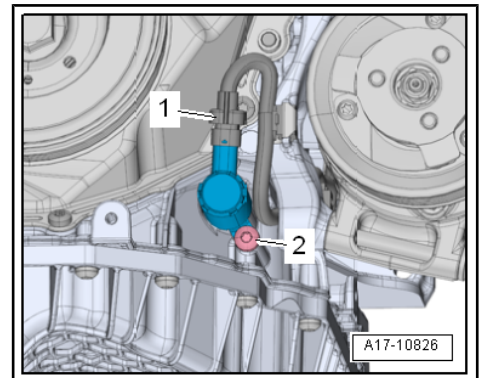
Note

Fit new O-ring.

- Install noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

Tightening torques

- ◆ ⇒ ["4.2 Exploded view - oil pressure switches/oil pressure control", page 183](#)





4.5 Removing and installing oil pressure switch - F22-

Removing



Note

Place a cloth underneath bracket for ancillaries to catch any escaping oil.

- Unplug electrical connector -1- on oil pressure switch - F22- .
- Remove oil pressure switch - F22- -2-.

Installing

Installation is carried out in the reverse order; note the following:

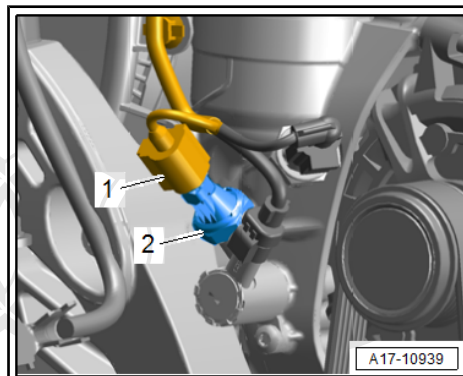


Note

- ◆ *Renew seal.*
- ◆ *Fit the new oil pressure switch - F22- into the connection immediately to avoid loss of oil.*
- Check oil level: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .

Tightening torques

- ◆ ⇒ [“4.1 Exploded view - oil filter”, page 182](#)



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

Removing



Note

Place a cloth underneath bracket for ancillaries to catch any escaping oil.

- Unplug electrical connector -2- at oil pressure switch for reduced oil pressure - F378- .
- Unscrew oil pressure switch for reduced oil pressure - F378-1-.

Installing

Installation is carried out in the reverse order; note the following:



Note

- ◆ *Renew seal.*
- ◆ *Fit the new oil pressure switch for reduced oil pressure - F378- into the connection immediately to avoid loss of oil.*
- Check oil level: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .

Tightening torques

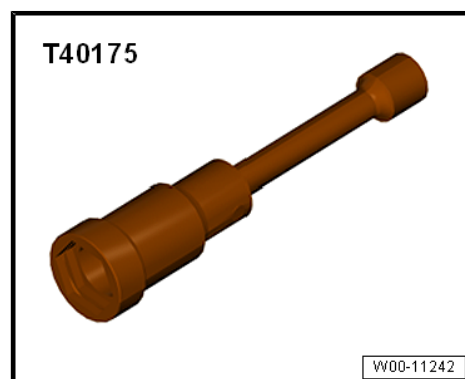
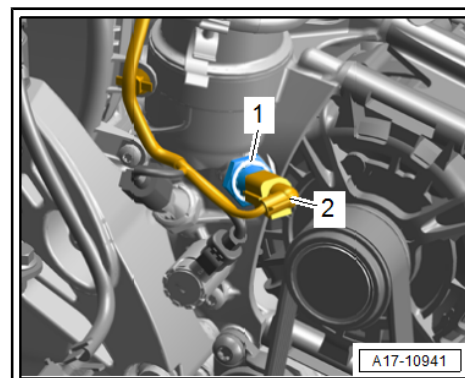
- ◆ ⇒ [“4.1 Exploded view - oil filter”, page 182](#)

4.7 Removing and installing stage 3 oil pressure switch - F447-

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Special tools and workshop equipment required

- ◆ Articulated wrench, 24 mm - T40175-





Removing

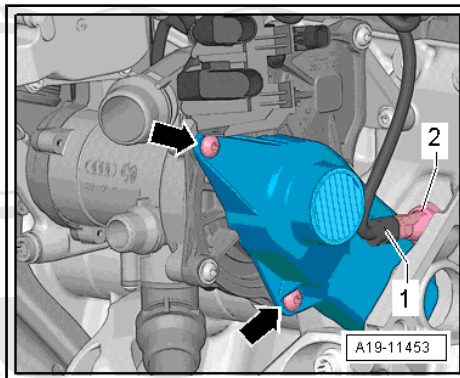
- Unplug electrical connector -1- on stage 3 oil pressure switch - F447- .
- Remove bolts -arrows- and detach toothed belt cover.



Note

Place a cloth under oil pressure switch to catch escaping oil.

- Use articulated wrench, 24 mm - F447- to unscrew stage 3 oil pressure switch - T40175- -2-.



Installing

Installation is carried out in the reverse order; **note the following:**

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Note

- ◆ *Renew seal.*
- ◆ *Fit the new stage 3 oil pressure switch - F447- into the connection immediately to avoid loss of oil.*
- Check oil level: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .

Tightening torques

- ◆ ⇒ [“4.1 Exploded view - oil filter”, page 182](#)
- ◆ ⇒ [“2.1 Exploded view - coolant pump/thermostat”, page 202](#)

4.8 Checking oil pressure

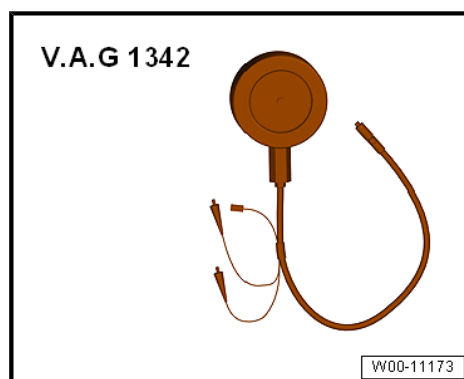
⇒ [“4.8.1 Checking engine oil pressure”, page 188](#)

⇒ [“4.8.2 Checking oil pressure for piston cavity oil jets”, page 190](#)

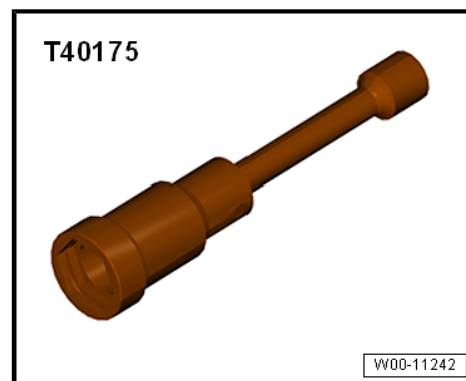
4.8.1 Checking engine oil pressure

Special tools and workshop equipment required

- ◆ Oil pressure tester - V.A.G 1342-



- ◆ Articulated wrench, 24 mm - T40175-



Test requirements

- Oil level OK
- Engine oil temperature at least 80 °C (radiator fan must have run once).



Note

- ◆ *The oil pump is regulated and has two pressure stages. The pressure stages are tested one after the other.*
- ◆ *During the running-in period or when the engine is in emergency running mode, the oil pump only operates in the higher pressure stage.*
- ◆ *The oil pressure is dependent on the engine oil temperature. The mean value should be reached at an engine oil temperature of around 80 °C.*

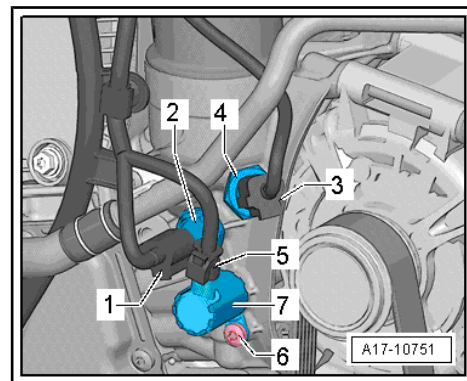
Test sequence



Note

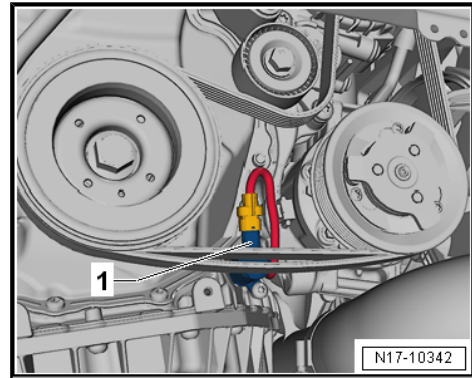
Place a cloth underneath bracket for ancillaries to catch any escaping oil.

- Unplug electrical connector -3- at oil pressure switch for reduced oil pressure - F378- .
- Unscrew oil pressure switch for reduced oil pressure - F378-4-.
- Screw oil pressure tester - V.A.G 1342- into oil filter bracket in place of oil pressure switch.
- Screw oil pressure switch for reduced oil pressure - F378- into oil pressure tester - V.A.G 1342- and plug in electrical connector.
- Start engine.
- Oil pressure at idling speed: 0.85 ... 1.6 bar
- Oil pressure at 2000 rpm: 1.2 ... 1.6 bar
- Oil pressure at 3700 rpm: 1.2 ... 1.6 bar
- Switch off engine.
- Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .



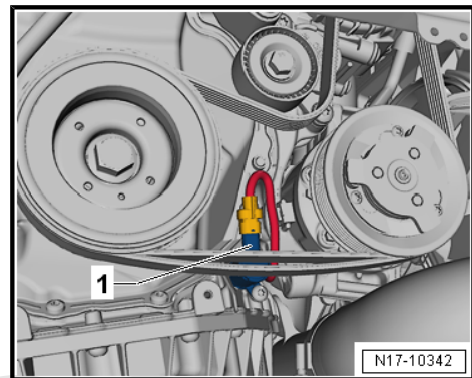


- Unplug connector -1- from valve for oil pressure control - N428-. Unfasten wire and route downwards so that it does not come into contact with belt drive. When connector is unplugged, oil pump operates in the higher pressure stage.
- Start engine and check oil pressure at specified engine speeds.
 - Oil pressure at idling speed: 0.85 ... 4.0 bar
 - Oil pressure at 2000 rpm: 2.0 ... 4.0 bar
 - Oil pressure at 3700 rpm: 3.0 ... 4.0 bar



Assembling

- Install oil pressure switch.
- Plug in connector -1- at valve for oil pressure control - N428-. Route wire carefully.
- Install noise insulation => General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .
- Interrogate event memory of engine control unit and erase all entries.



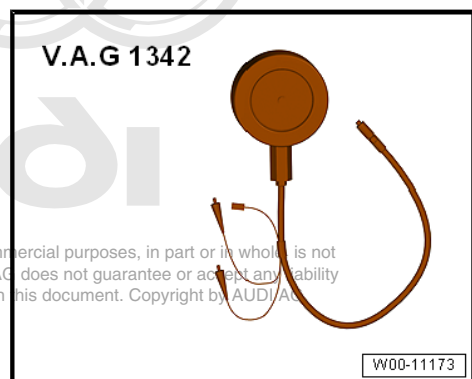
Tightening torques

- ◆ => ["4.2 Exploded view - oil pressure switches/oil pressure control", page 183](#)

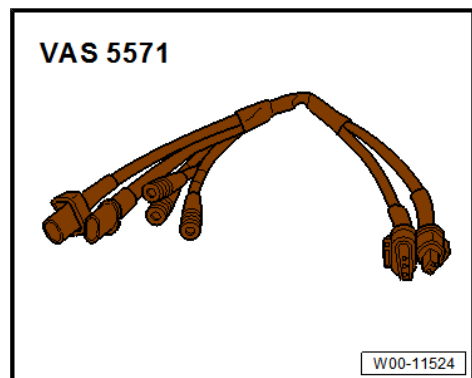
4.8.2 Checking oil pressure for piston cavity oil jets

Special tools and workshop equipment required

- ◆ Oil pressure tester - V.A.G 1342-



- ◆ Test instrument adapter - VAS 5571-



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Test requirements

- Oil level OK
- Engine oil temperature at least 80 °C (radiator fan must have run once).

Test sequence

- Remove stage 3 oil pressure switch - F447- ⇒ [page 187](#) .
- Screw stage 3 oil pressure switch - F447- into oil pressure tester - V.A.G 1342- .
- Screw in oil pressure tester - V.A.G 1342- in place of oil pressure switch.
- Connect test instrument adapter/DSO (2-pin) - VAS 5571- to oil pressure switch.
- Plug electrical connector for stage 3 oil pressure switch - F447- into test instrument adapter/DSO (2-pin) - VAS 5571- .
- Check oil pressure: Stage 3 oil pressure switch F447 in Guided Fault Finding mode of ⇒ Vehicle diagnostic tester.

Assembling

- Install oil pressure switch.

Tightening torques

- ◆ ⇒ [“4.1 Exploded view - oil filter”, page 182](#)

4.9 Checking oil pressure and oil pressure switch

- Check oil pressure ⇒ [page 188](#) .
- Check oil pressure switch ⇒ Vehicle diagnostic tester.



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19 – Cooling

1 Cooling system/coolant

⇒ "1.1 Connection diagram - coolant hoses", page 192

⇒ "1.2 Checking cooling system for leaks", page 193

⇒ "1.3 Draining and filling cooling system", page 194

1.1 Connection diagram - coolant hoses



Note

- ◆ Blue = Large coolant circuit.
- ◆ Red = Small coolant circuit.
- ◆ Brown = Heating circuit.

1 - Radiator

- If renewed, refill system with fresh coolant

2 - Turbocharger

3 - Non-return valve

4 - Non-return valve

5 - Cylinder head/cylinder block

- If renewed, refill system with fresh coolant

6 - Coolant shut-off valve

- Activated by Climatronic coolant shut-off valve - N422- (negative pressure)

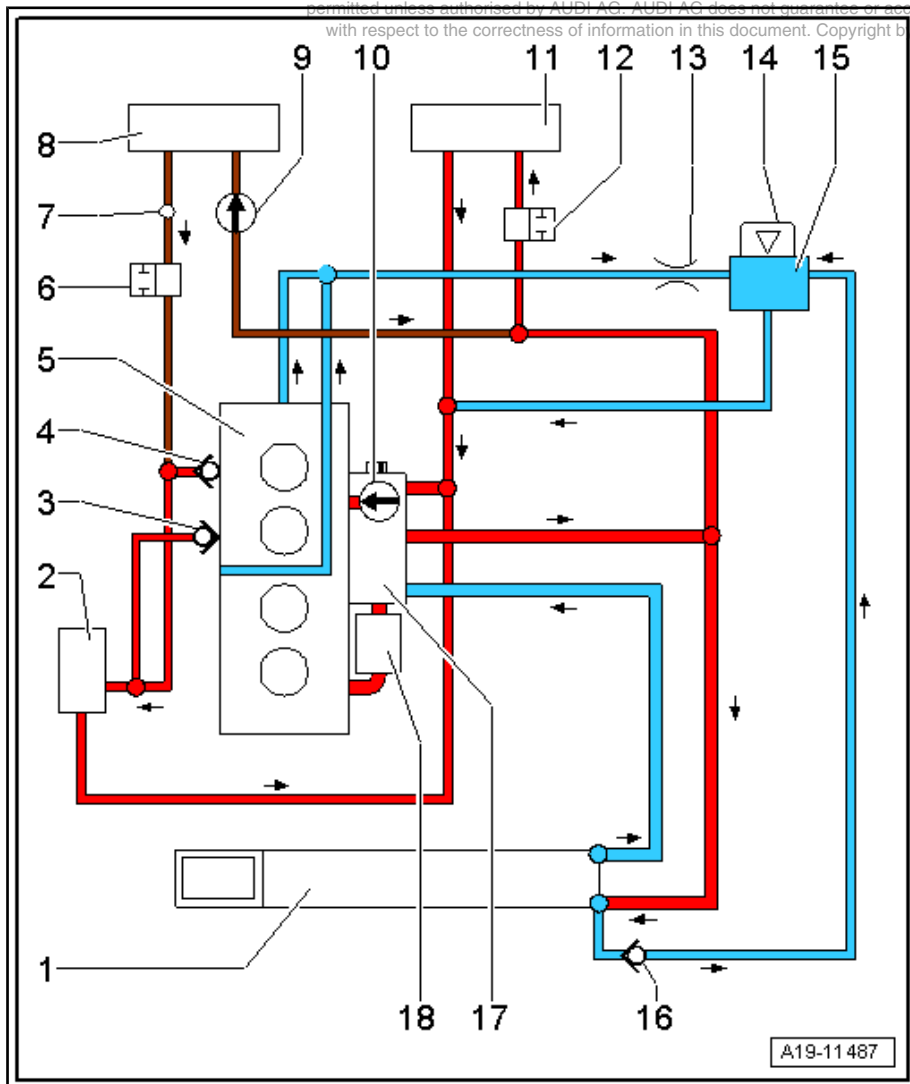
7 - Bleeder hole

8 - Heat exchanger for heater

- Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87 ; Front air conditioning unit; Removing and installing heat exchanger
- If renewed, refill system with fresh coolant

9 - Coolant circulation pump - V50-

- Only installed on vehicles with start/stop system



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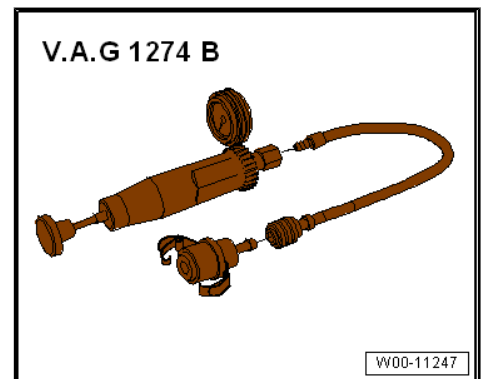
- 10 - Coolant pump
- 11 - Gear oil cooler
- 12 - Coolant shut-off valve
- 13 - Restrictor
- 14 - Filler cap for expansion tank
 - ❑ Checking pressure relief valve ⇒ [page 194](#)
- 15 - Coolant expansion tank
- 16 - Non-return valve
- 17 - Actuator for engine temperature regulation - N493-
- 18 - Engine oil cooler

1.2 Checking cooling system for leaks

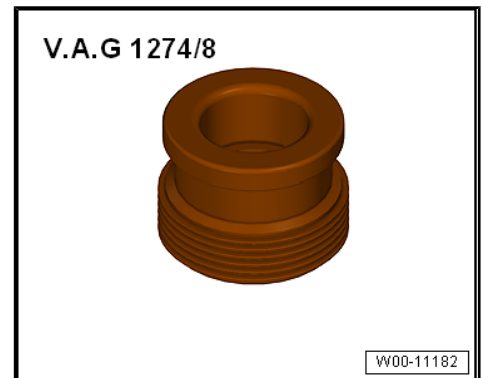
Special tools and workshop equipment required

- ◆ Cooling system tester - V.A.G 1274 B-

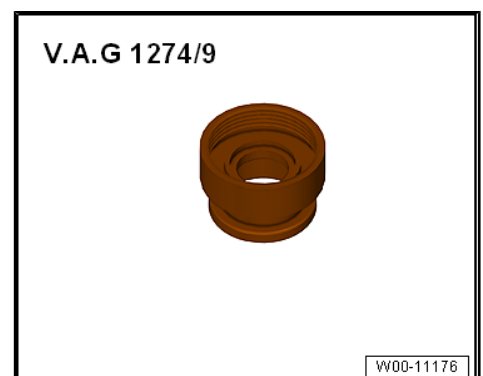
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- ◆ Adapter for cooling system tester - V.A.G 1274/8-



- ◆ Adapter for cooling system tester - V.A.G 1274/9-





Procedure

- Engine must be warm.



WARNING

The cooling system is under pressure when the engine is hot. Hot steam/hot coolant can escape - risk of scalding.

Danger of scalding skin and other parts of the body.

- ◆ *Put on protective gloves.*
- ◆ *Put on safety goggles.*
- ◆ *Release pressure (cover filler cap on coolant expansion tank with a cloth and open carefully).*

- Open filler cap on coolant expansion tank.
- Fit cooling system tester - V.A.G 1274 B- with adapter - V.A.G 1274/8- onto coolant expansion tank.
- Using hand pump on cooling system tester, build up a pressure of approx. 1.5 bar.
- The pressure should not drop more than 0.2 bar within 10 minutes.
- If the pressure drops more than 0.2 bar, locate leak and eliminate fault.



Note

The drop in pressure of 0.2 bar within 10 minutes is caused by the decrease in coolant temperature. The colder the engine is, the less the pressure will fall. If necessary, check again when the engine is cold.

Checking pressure relief valve in filler cap

- Fit cooling system tester - V.A.G 1274 B- with adapter - V.A.G 1274/9- onto filler cap.
- Build up pressure with hand pump on cooling system tester.

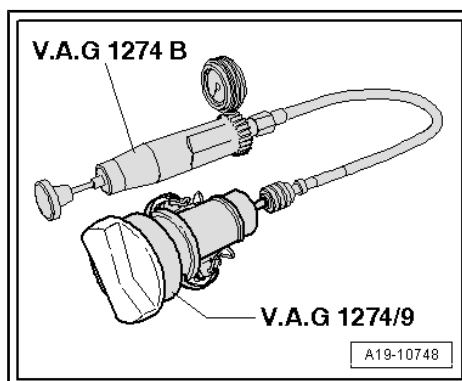
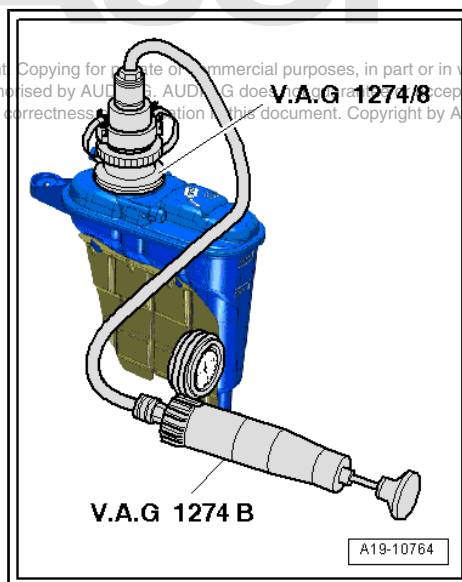
Blue filler cap

- ◆ The pressure relief valve should open at a pressure of 1.4 ... 1.6 bar.

Black filler cap

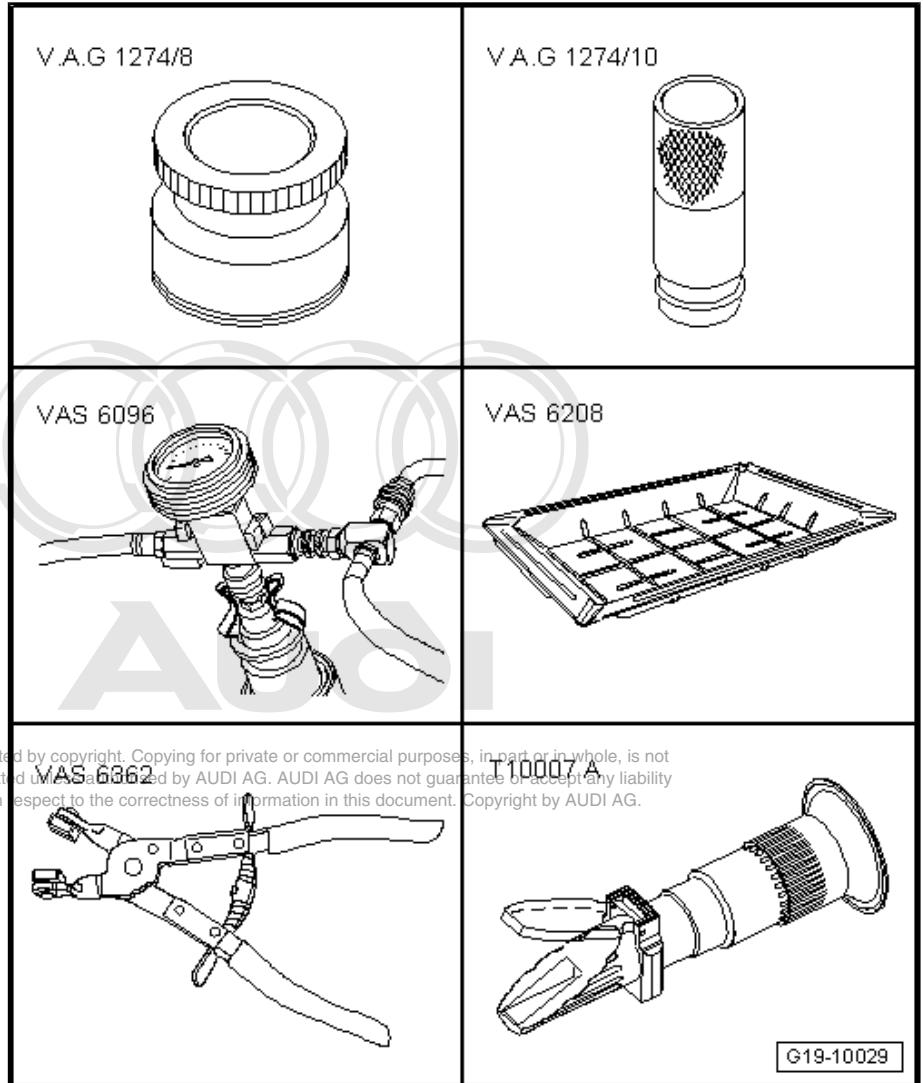
- ◆ The pressure relief valve should open at a pressure of 1.6 ... 1.8 bar.

1.3 Draining and filling cooling system



Special tools and workshop equipment required

- ◆ Adapter for cooling system tester - V.A.G 1274/8-
- ◆ Pipe for cooling system tester - V.A.G 1274/10-
- ◆ Hose clip pliers - V.A.G 1921-
- ◆ Cooling system charge unit - VAS 6096-
- ◆ Drip tray for workshop hoist - VAS 6208-
- ◆ Refractometer - T10007 A-



Draining



Collect drained coolant in a clean container for disposal.

Risk of scalding as hot coolant can escape

The cooling system is under pressure when the engine is hot. Hot steam/hot coolant can escape - risk of scalding.

- Put on protective gloves.
- Put on safety goggles.
- Release pressure (cover filler cap on coolant expansion tank with a cloth and open carefully).
- Open filler cap on coolant expansion tank.
- Remove front noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .



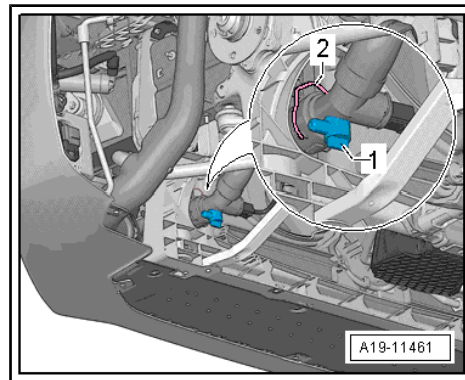
- Place drip tray for workshop hoist - VAS 6208- beneath engine.
- Open drain tap -1- at connection and drain off coolant.

Filling



Caution

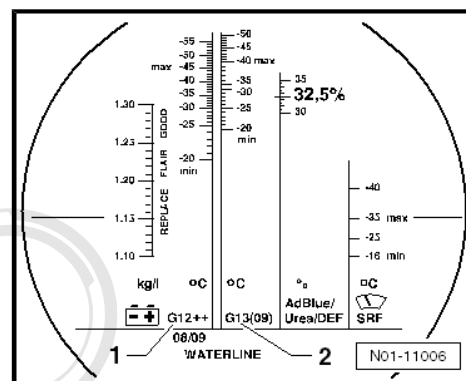
To ensure optimal corrosion protection, only distilled water may be mixed with coolant additives.



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 **Note**

- ◆ *The effectiveness of the coolant is greatly influenced by the quality of the water with which it is mixed. Because water may contain different substances depending on the country or even the region, the water quality to be used for cooling systems has been specified. Distilled water meets all the requirements and is therefore recommended for use when topping up or filling up with coolant.*
- ◆ *Use only coolant additives listed in the ⇒ Electronic parts catalogue (ETKA) . If you use other coolant additives, this can significantly impair in particular the corrosion protection effect. The resulting damage could lead to loss of coolant and consequently to serious engine damage.*
- ◆ *Coolant with the recommended mixture ratio prevents frost and corrosion damage and stops scaling. At the same time it raises the boiling point of the fluid in the system. For this reason the cooling system must be filled all year round with the correct coolant additive.*
- ◆ *Because of its high boiling point, the coolant improves engine reliability under heavy loads, particularly in countries with tropical climates.*
- ◆ *The refractometer - T10007A- MUST be used to determine the current level of frost protection.*
- ◆ *The mixture must guarantee frost protection down to at least -25 °C (in countries with arctic climate: down to -36 °C). The amount of antifreeze should only be increased if greater frost protection is required in very cold climates. This must only be down to -48 °C, however, as otherwise the cooling efficiency of the coolant is impaired.*
- ◆ *The coolant concentration must not be reduced by adding water even in warmer seasons and in warmer countries. Frost protection must be provided to at least -25 °C.*
- ◆ *Read off the level of frost protection on the scale for the relevant coolant additive.*
- ◆ *The temperature indicated on the refractometer - T10007A- corresponds to the temperature at which the first ice crystals can form in the coolant.*
- ◆ *Do not reuse coolant.*
- ◆ *Only use water/coolant additive as a lubricant for coolant hoses.*



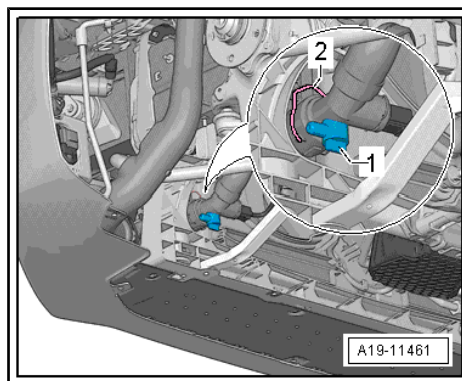
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Recommended mixture ratio for coolant

- Coolant (40 %) and distilled water (60 %) for frost protection to -25 °C
- Coolant (50 %) and distilled water (50 %) for frost protection to -36 °C
- Coolant ⇒ Electronic parts catalogue (ETKA)
- ◆ Coolant ⇒ Electronic parts catalogue



- Close drain plug -1-.



- Fill reservoir of cooling system charge unit - VAS 6096- with 10 litres of premixed coolant (according to recommended ratio). For recommended ratio, refer to => [page 197](#) .
- Fit adapter for cooling system tester - V.A.G 1274/8- onto coolant expansion tank.
- Fit pipe for cooling system tester - V.A.G 1274/10- onto adapter for cooling system tester - V.A.G 1274/8- .
- Run vent hose -1- into a small container -2-.

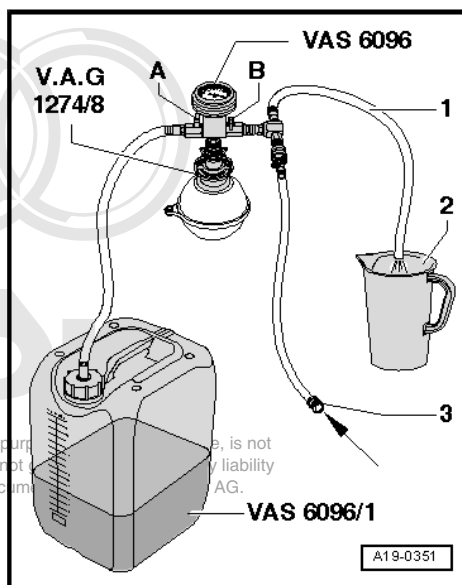


Note

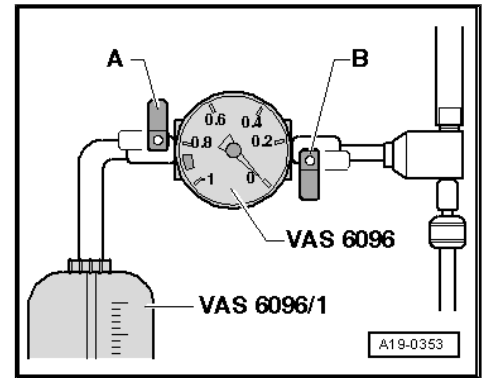
The vented air draws along a small amount of coolant, which should be collected.

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- Close both valves -A- and -B- (turn lever at right angles to direction of flow).
- Connect hose -3- to compressed air.
- Pressure: 7 ... 10 bar.
- Open valves in coolant circuit; select 01 - Coolant circuit bleeding routine in Guided Functions => vehicle diagnostic tester .

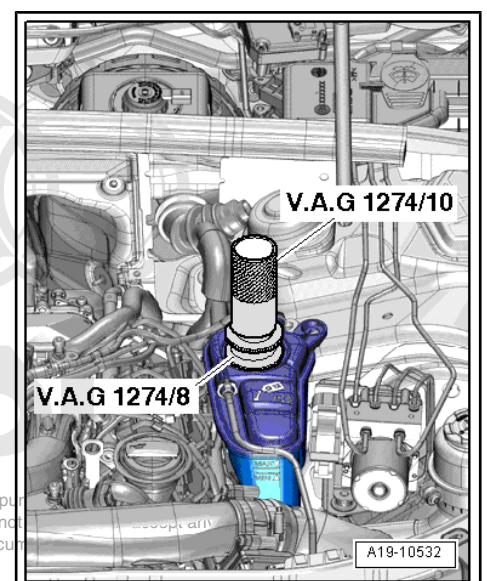


- Open valve -B- by setting lever in direction of flow.
- The suction jet pump generates a partial vacuum in the cooling system; the needle on the gauge should move into the green zone.
- Also briefly open valve -A- (turn lever in direction of flow) so that hose on reservoir of cooling system charge unit - VAS 6096- can fill with coolant.
- Close valve -A- again.
- Leave valve -B- open for another 2 minutes.
- The suction jet pump continues to generate a partial vacuum in the cooling system; the needle on the gauge should remain in the green zone.
- Close valve -B-.
- The needle on the gauge should stop in the green zone. The vacuum level in the cooling system is then sufficient for subsequent filling.



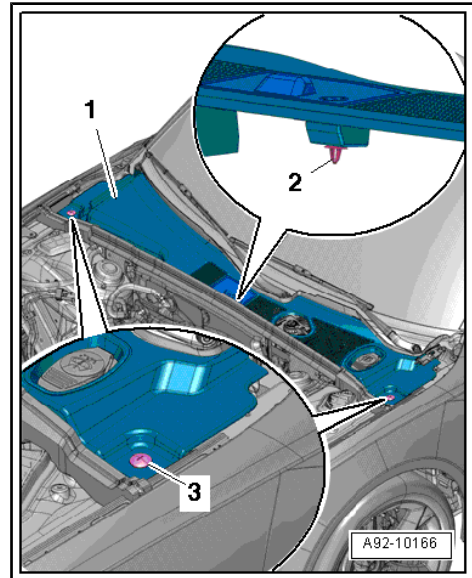
 **Note**

- ◆ *If the needle does not reach the green zone, repeat the process.*
- ◆ *Check cooling system for leaks if the vacuum is not maintained.*
- Detach compressed air hose.
- Open valve -A-.
- The vacuum in the cooling system causes the coolant to be drawn out of the reservoir of the cooling system charge unit - VAS 6096- ; the cooling system is then filled.
- Detach cooling system charge unit - VAS 6096- from adapter for cooling system tester - V.A.G 1274/8- on coolant expansion tank.
- Fit pipe for cooling system tester - V.A.G 1274/10- onto adapter for cooling system tester - V.A.G 1274/8- .
- Fill up pipe for cooling system tester - V.A.G 1274/10- with coolant. If required, add further coolant when performing bleeding procedure.

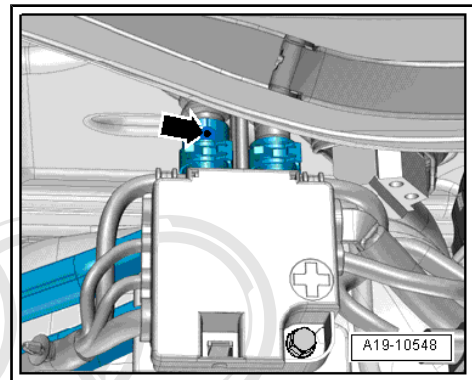


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- Pull seal off plenum chamber partition panel.
- Remove plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .



- Release coolant hose going to heat exchanger for heater and pull back hose until bleeder hole -arrow- in hose is no longer blocked by connection.
- Fill up with coolant until it flows out at bleeder hole in coolant hose.
- Push coolant hose back onto connection and secure with spring-type hose clip.
- Close filler cap on expansion tank.
- Start engine.
- Set temperature to "HI" in all zones.
- Set fresh air blower to lowest setting.
- Switch off air conditioner compressor (press **AC** button).
- LED in button should not light up.
- Run engine for 3 minutes at 2000 rpm.
- Allow engine to run at idling speed until both large coolant hoses at radiator become warm.
- Run engine for 2 minutes at 2000 rpm.
- On vehicles with auxiliary heater, switch heater on for approx. 30 seconds and allow engine to run at idling speed.
- Switch off ignition and allow engine to cool down.
- Install noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .



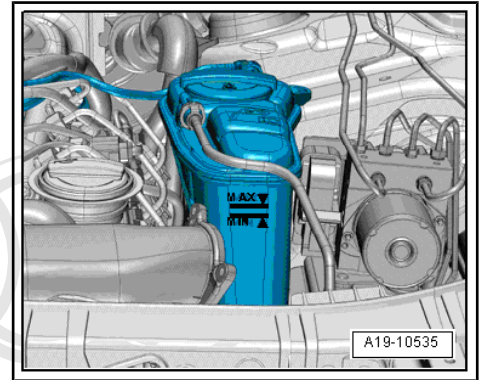
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Risk of scalding as hot coolant can escape

The cooling system is under pressure when the engine is hot. Hot steam/hot coolant can escape - risk of scalding.

- Put on protective gloves.
- Put on safety goggles.
- Release pressure (cover filler cap on coolant expansion tank with a cloth and open carefully).

- Check coolant level.
- The coolant level must be at the “MAX” marking when the engine is cold.
- The coolant level can be above the “MAX” marking when the engine is warm.



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2 Coolant pump/thermostat assembly

⇒ [“2.1 Exploded view - coolant pump/thermostat”, page 202](#)

⇒ [“2.2 Exploded view - coolant temperature senders”, page 204](#)

⇒ [“2.3 Removing and installing coolant pump”, page 204](#)

⇒ [“2.4 Removing and installing toothed belt for coolant pump”, page 206](#)

⇒ [“2.5 Removing and installing actuator for engine temperature regulation N493”, page 207](#)

⇒ [“2.6 Removing and installing coolant temperature sender G62”, page 209](#)

⇒ [“2.7 Removing and installing radiator outlet coolant temperature sender G83”, page 210](#)

2.1 Exploded view - coolant pump/thermostat

1 - Connection

2 - O-ring

- Renew
- Coat with coolant, coolant ⇒ Electronic parts catalogue

3 - Centring pin

4 - Bolt

- Tightening sequence ⇒ [page 207](#)

5 - Gasket

- Renew

6 - Coolant pump

- Removing and installing ⇒ [page 204](#)
- New coolant pump: remove protective cap

7 - Bolt

- Tightening sequence ⇒ [page 203](#)

8 - Toothed belt

- For coolant pump
- Removing and installing ⇒ [page 206](#)

9 - Bolt

- 9 Nm

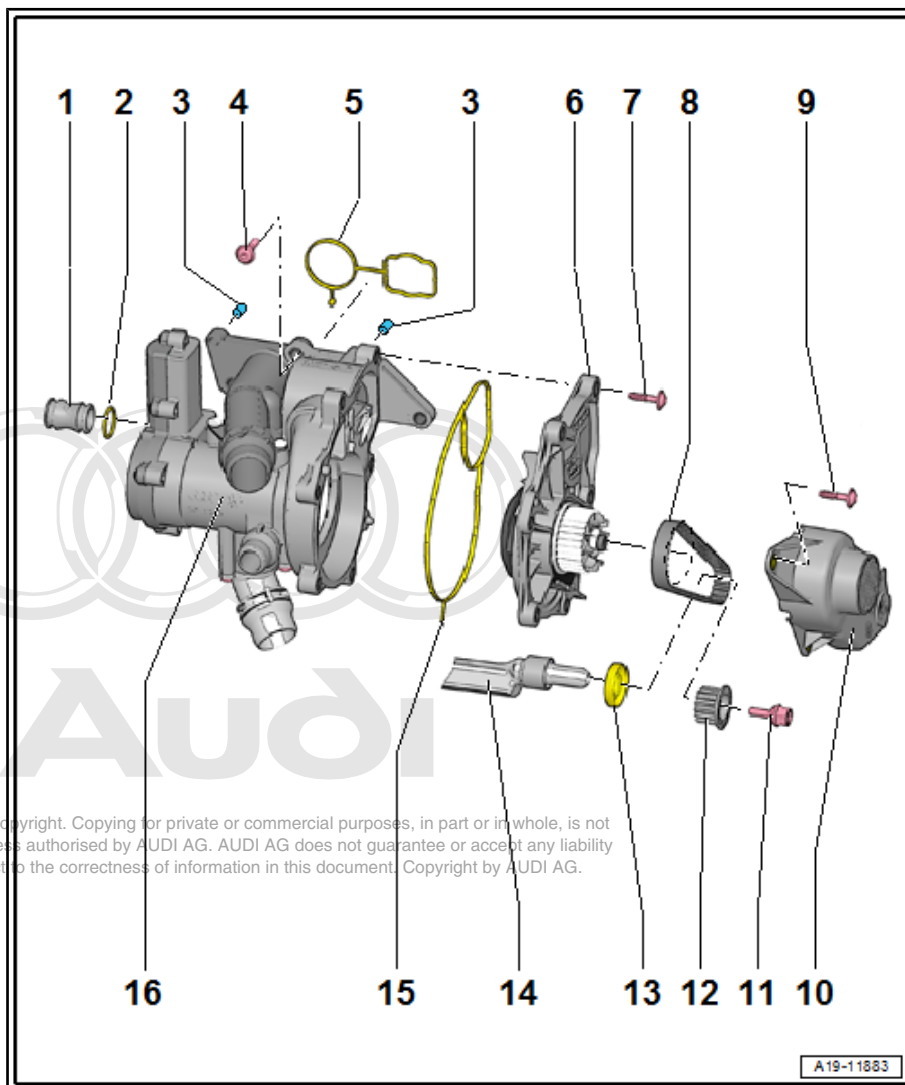
10 - Toothed belt cover

11 - Bolt

- Left-hand thread
- Renew
- 10 Nm + turn 90° further

12 - Toothed belt drive sprocket

- Note installation position



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13 - Oil seal

- Renewing ⇒ [page 71](#)

14 - Balance shaft

15 - Gasket

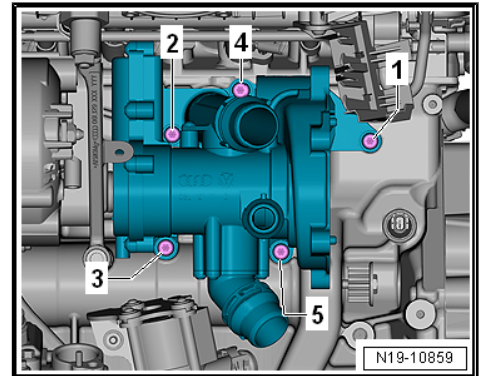
- Renew

16 - Actuator for engine temperature regulation - N493-

- Removing and installing ⇒ [page 207](#)

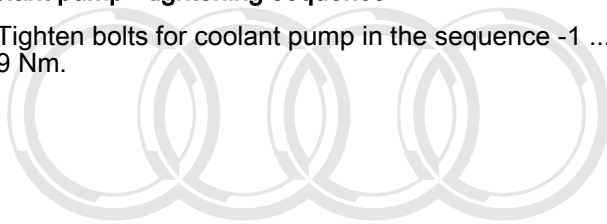
Actuator for engine temperature regulation - N493- - tightening sequence

- Tighten bolts in the sequence -1 ... 5- to 9 Nm.



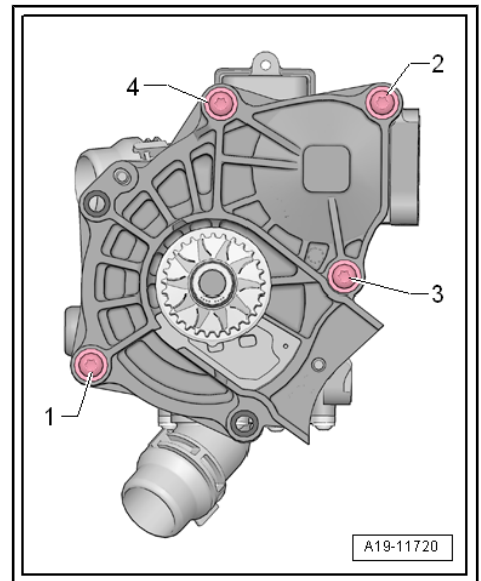
Coolant pump - tightening sequence

- Tighten bolts for coolant pump in the sequence -1 ... 4- to 9 Nm.



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2.2 Exploded view - coolant temperature senders

1 - O-ring

- Renew after removing
- Lubricate with coolant

2 - Radiator outlet coolant temperature sender - G83-

- Removing and installing
⇒ [page 210](#)

3 - Retaining clip

- Check for firm attachment

4 - O-ring

- Renew after removing
- Lubricate with coolant

5 - O-ring

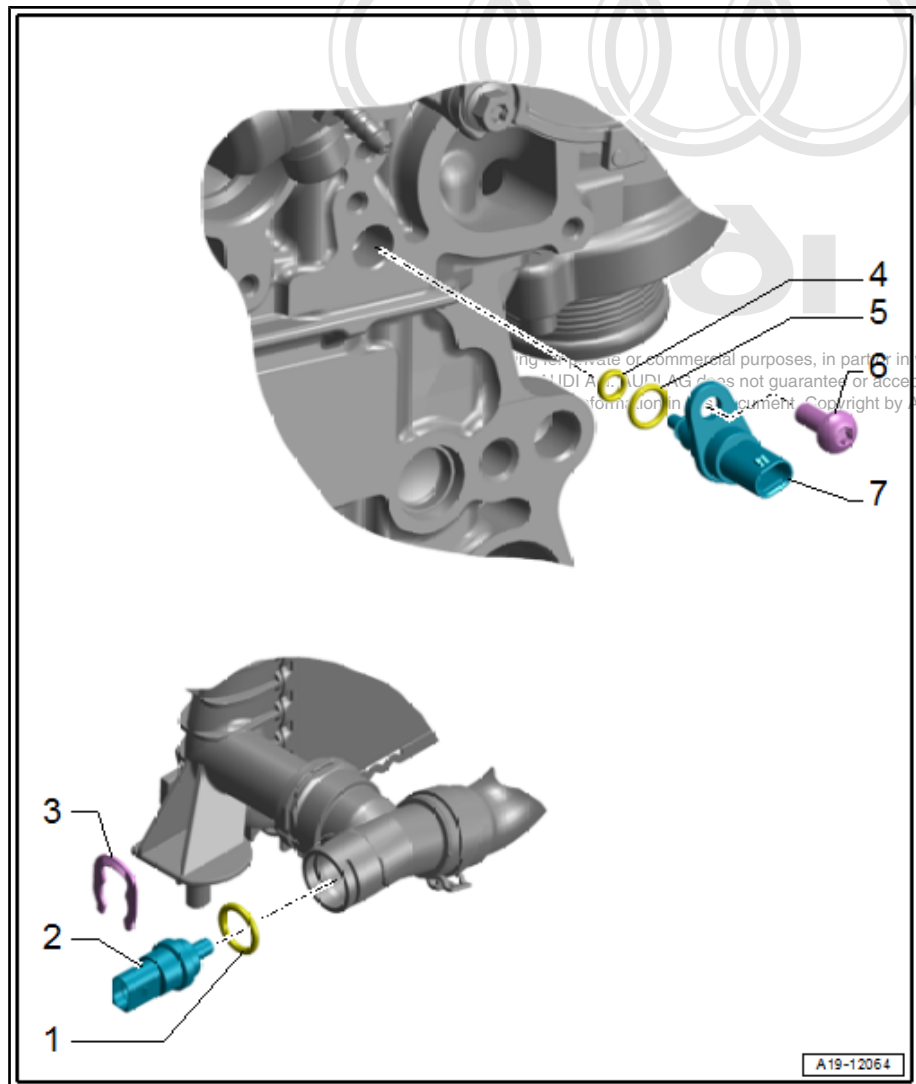
- Renew after removing
- Lubricate with coolant

6 - Bolt

- Renew after removing
- 4 Nm +45°

7 - Coolant temperature sender - G62-

- On cylinder head (gearbox end)
- Removing and installing
⇒ [page 209](#)



2.3 Removing and installing coolant pump

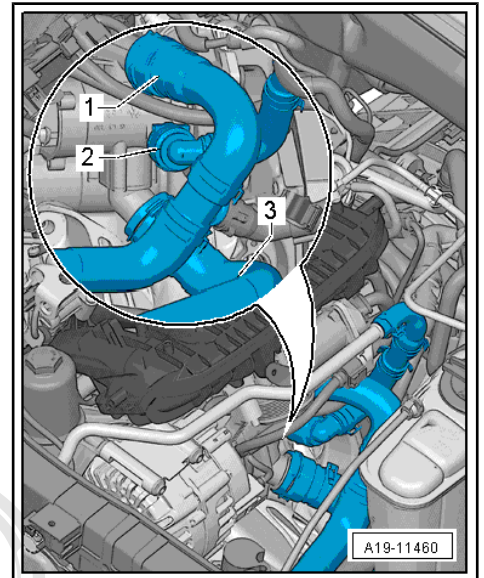
Removing

- Remove engine cover panel.
- Drain coolant ⇒ [page 194](#) .
- Remove throttle valve module - J338- ⇒ [page 261](#) .

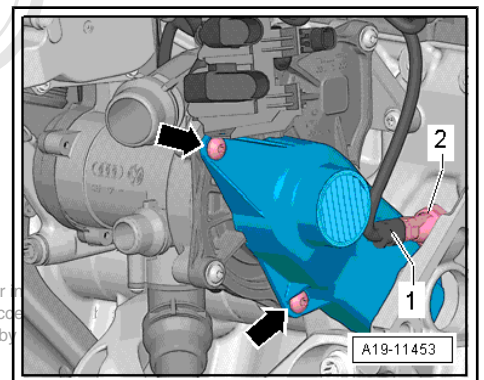
- Lift retaining clips -1 and 2- and disconnect coolant hoses.

 **Note**

Disregard -item 3-.



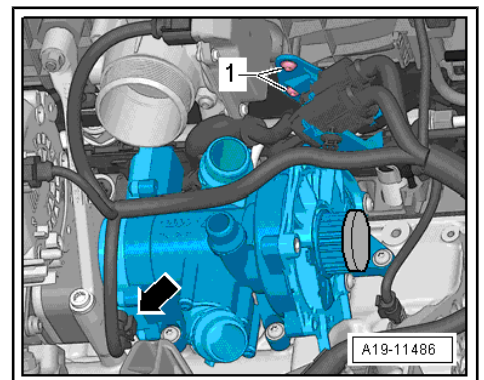
- Unplug electrical connector -1- on stage 3 oil pressure switch - F447- -item 2-.
- Remove bolts -arrows- and detach toothed belt cover.



- Remove bolts -1-.

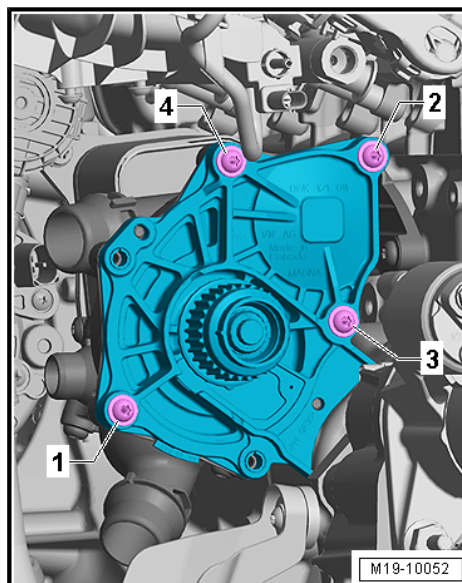
 **Note**

Disregard -arrow-.





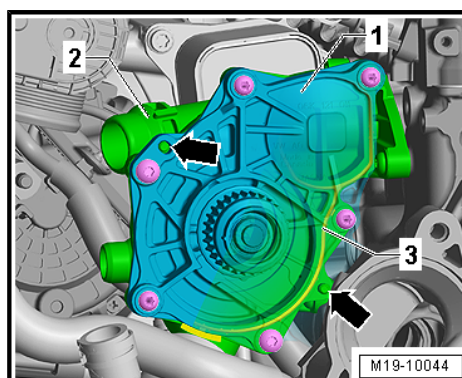
- Loosen bolts -1 ... 4- and detach toothed belt from coolant pump.
- Remove bolts -1 ... 4- and detach coolant pump from actuator for engine temperature regulation - N493- .



Installing

Installation is carried out in the reverse order; note the following:

- Position coolant pump and fit toothed belt.
- Check that centring elements -arrows- and gasket -3- are seated correctly.
- Tighten coolant pump bolts => [page 203](#) .

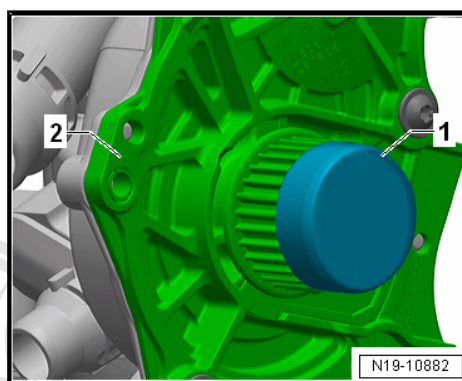


- After fitting new coolant pump -2-, remove protective cap -1- from drive sprocket.
- Install throttle valve module - J338- => [page 261](#) .

Note

Do not reuse coolant.

- Fill up with coolant => [page 196](#) .
- Install engine cover panel => [page 37](#) .



Tightening torques

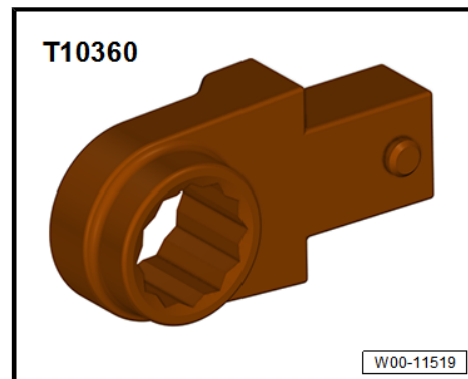
◆ => [“2.1 Exploded view - coolant pump/thermostat”, page 202](#)

2.4 Removing and installing toothed belt for coolant pump

Special tools and workshop equipment required

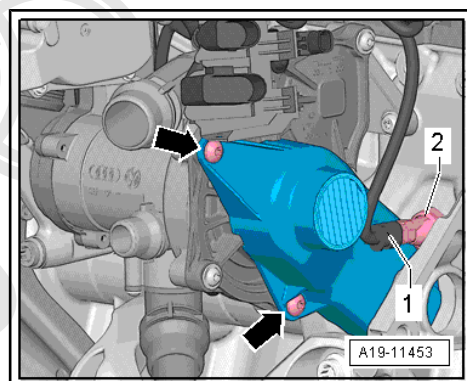
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- ◆ Tool insert - T10360-




Removing

- Unplug electrical connector -1- from stage 3 oil pressure switch - F447- .
- Remove bolts -arrows- and detach toothed belt cover.



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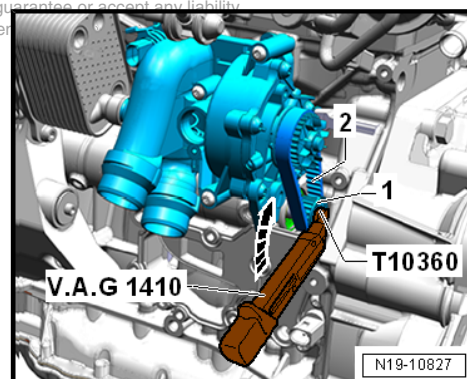


Caution

Risk of damage to thread.

◆ *The drive sprocket bolt has a left-hand thread.*

- Use torque wrench - V.A.G 1410- and insert tool - T10360- to loosen bolt on coolant pump drive sprocket -1- and unscrew three turns (counterhold at vibration damper).
- Remove toothed belt -2-.



Installing

Installation is carried out in the reverse order; note the following:

Note

- ◆ *Renew drive sprocket bolt.*
- ◆ *Note installation position of toothed belt sprocket ⇒ [Item 12 \(page 202\)](#) .*
- Fill up with coolant ⇒ [page 196](#) .

Tightening torques

- ◆ ⇒ [“2.1 Exploded view - coolant pump/thermostat”, page 202](#)

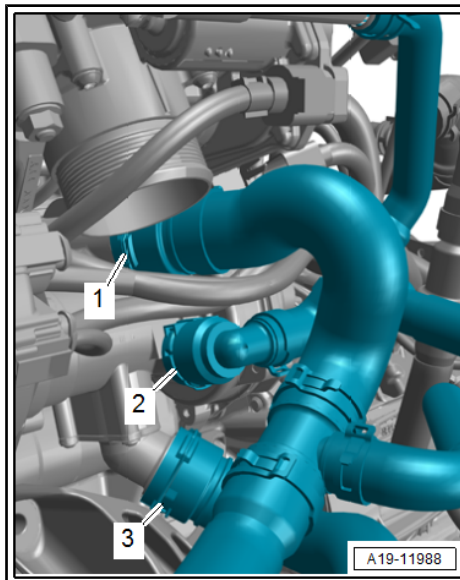
2.5 Removing and installing actuator for engine temperature regulation - N493-

Removing

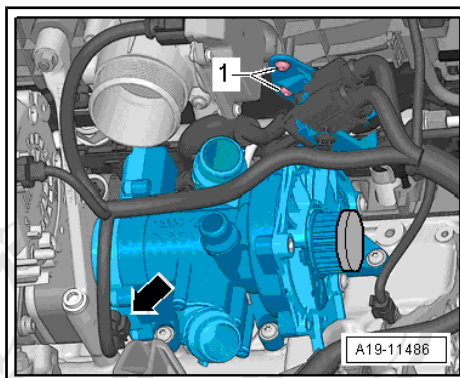
- Remove coolant pump ⇒ [page 204](#) .



- Lift retaining clips and disconnect coolant hoses -3-.



- Unplug electrical connector -arrow- from actuator for engine temperature regulation - N493- .



- Remove bolts -1 ... 5-.
- Detach actuator for engine temperature regulation - N493- from centring pins and pull actuator off engine oil cooler.



Note

Disregard -arrow-.

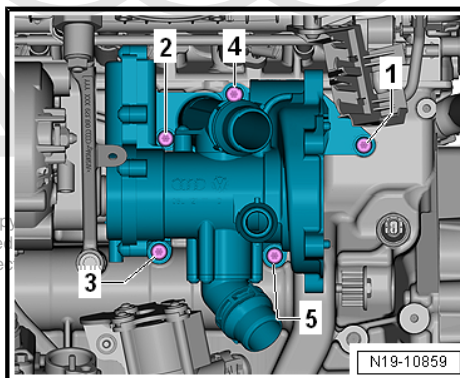
Installing

Installation is carried out in the reverse order; note the following:



Note

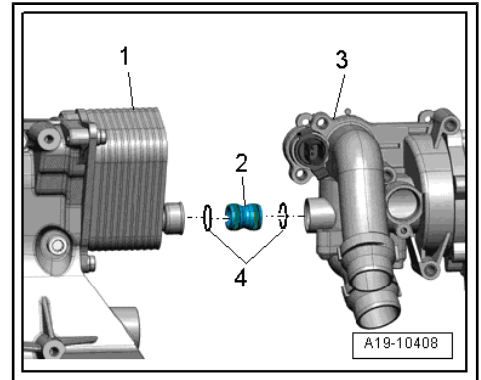
Renew gaskets and O-rings.



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is not permitted unless authorised in writing with respect to the correct use.

- Lubricate new O-rings -4- lightly with coolant, for coolant refer to ⇒ Electronic parts catalogue .
- Check whether the two centring pins are fitted in the cylinder block; install if necessary.
- Fit connecting piece -2- into engine oil cooler -1-.
- Push actuator for engine temperature regulation - N493- -3- onto connecting piece and centring pins in cylinder block.



- Tighten bolts for actuator for engine temperature regulation - N493- ⇒ [page 203](#) .

 **Note**

Detach protective cap -arrow- if a new coolant pump has been fitted.

- Install coolant pump ⇒ [page 204](#) .

 **Note**

Do not reuse coolant.

- Fill up with coolant ⇒ [page 196](#) .
- After renewing, perform “Adaption” for actuator for engine temperature regulation - N493- in Guided Functions mode of ⇒ Vehicle diagnostic tester.

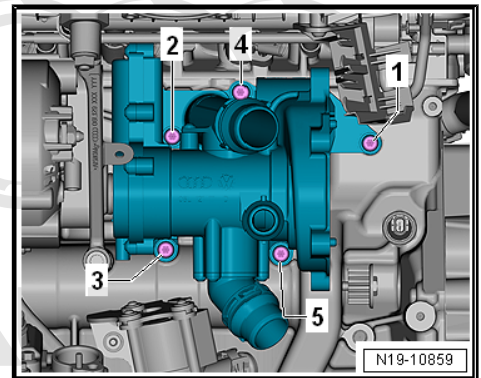
Tightening torques

- ◆ ⇒ [“2.1 Exploded view - coolant pump/thermostat”, page 202](#)

2.6 Removing and installing coolant temperature sender - G62-

Removing

- Engine cold.
- Open filler cap on coolant expansion tank briefly and allow residual pressure in cooling system to dissipate.
- Remove engine cover panel ⇒ [page 37](#) .



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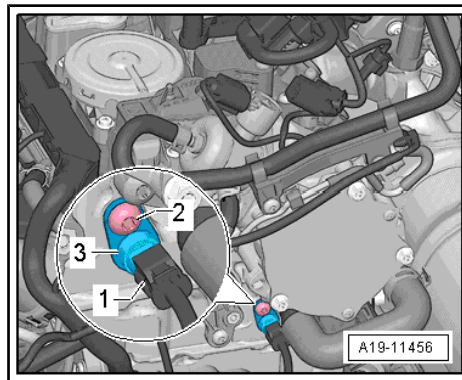


- Unplug electrical connector -1- at coolant temperature sender - G62- .



Note

- ◆ *Place a cloth underneath to catch escaping coolant.*
- ◆ *Insert new coolant temperature sender - G62- immediately into connection to avoid loss of coolant.*
- Remove bolt -arrow- and detach coolant temperature sender - G62- -3-.



Installing

Installation is carried out in the reverse order; note the following:



Note

Fit new O-rings.

- Check coolant level ⇒ [page 201](#) .
- Install engine cover panel ⇒ [page 37](#) .

Tightening torques

- ◆ ⇒ [“2.2 Exploded view - coolant temperature senders”, page 204](#)

2.7 Removing and installing radiator outlet coolant temperature sender - G83-

Removing

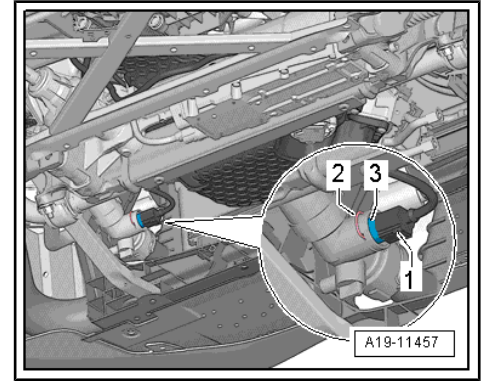
- Engine cold.
- Remove front noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .
- Open filler cap on coolant expansion tank briefly and allow residual pressure in cooling system to dissipate.

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- Unplug electrical connector -1- at radiator outlet coolant temperature sender - G83- .
- Lift retaining clip -2- and pull out radiator outlet coolant temperature sender - G83- -3-.

 **Note**

- ◆ *Place a cloth underneath to catch escaping coolant.*
- ◆ *Insert new radiator outlet coolant temperature sender - G83- immediately into connection to avoid loss of coolant.*



Installing

Installation is carried out in the reverse order; note the following:

 **Note**

Fit new O-rings.

- Check coolant level ⇒ [page 201](#) .
- Install noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .



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3 Coolant pipes

⇒ "3.1 Exploded view - coolant pipes", page 212

⇒ "3.2 Removing and installing coolant pipes", page 213

3.1 Exploded view - coolant pipes

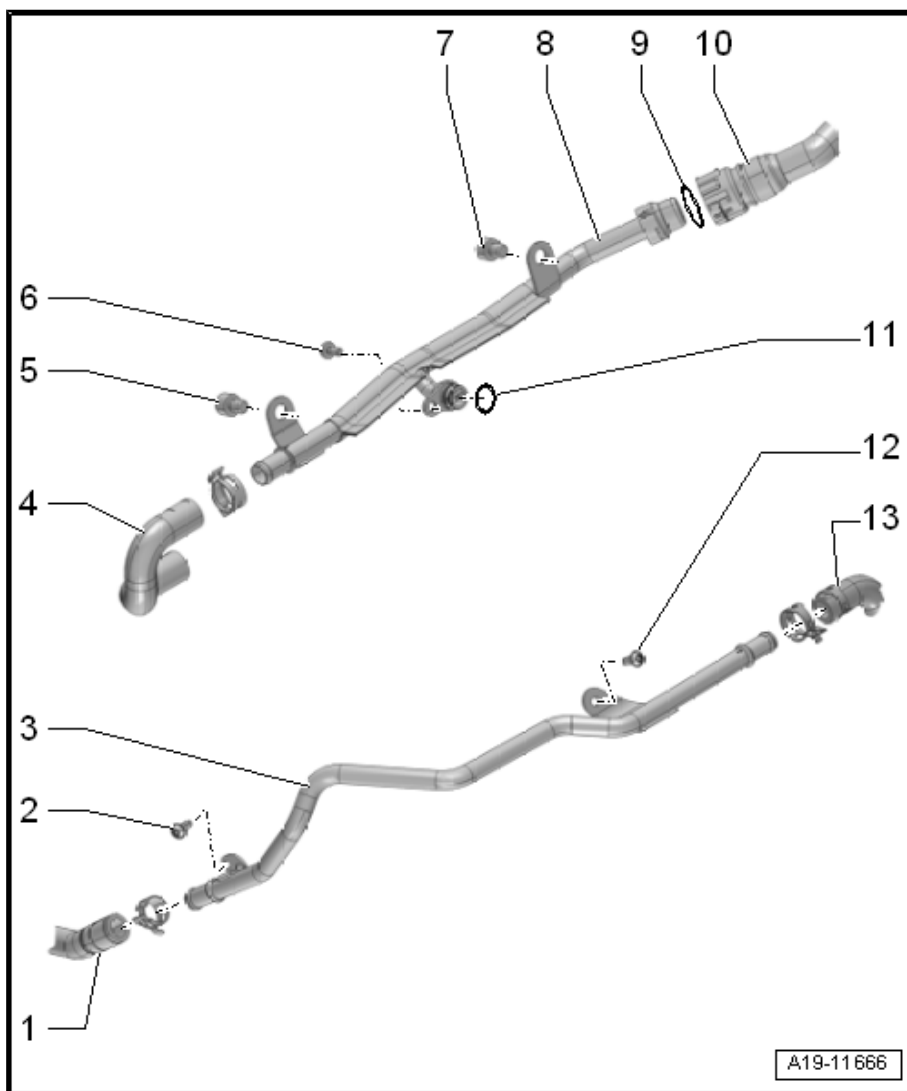


Note

The arrow markings on coolant pipes and on ends of hoses must align.

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- 1 - Coolant hose
- 2 - Bolt
 - 9 Nm
- 3 - Coolant pipe (left-side)
 - Removing and installing ⇒ page 213
- 4 - Coolant hose
- 5 - Bolt
 - 20 Nm
- 6 - Bolt
 - 9 Nm
- 7 - Bolt
 - 20 Nm
- 8 - Coolant pipe (right-side)
 - Removing and installing ⇒ page 214
- 9 - O-ring
 - Renew
- 10 - Coolant hose
- 11 - O-ring
 - Renew
- 12 - Bolt
 - 6 Nm
- 13 - Coolant hose



3.2 Removing and installing coolant pipes

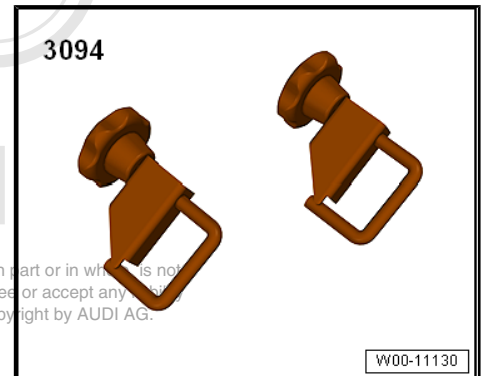
⇒ [“3.2.1 Removing and installing coolant pipe \(left-side\)”, page 213](#)

⇒ [“3.2.2 Removing and installing coolant pipe \(right-side\)”, page 214](#)

3.2.1 Removing and installing coolant pipe (left-side)

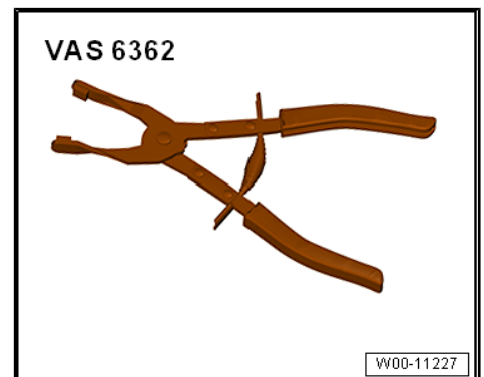
Special tools and workshop equipment required

- ◆ Hose clamps, up to 25 mm - 3094-



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- ◆ Hose clip pliers - VAS 6362-





Removing

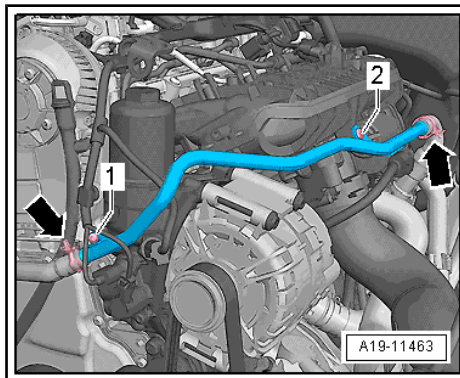
- Remove engine cover panel ⇒ [page 37](#) .



Note

Place a cloth under coolant pipe to catch escaping coolant.

- Remove bolts -1- and -2-.
- Clamp off coolant hoses with hose clamps up to 25 mm - 3094- and detach -arrows-.



Installing

Installation is carried out in the reverse order; note the following:



Note

Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ *Electronic parts catalogue* .

- Install engine cover panel ⇒ [page 37](#) .
- Check coolant level ⇒ [page 201](#) .

Tightening torques

- ◆ ⇒ [“3.1 Exploded view - coolant pipes”, page 212](#)

3.2.2 Removing and installing coolant pipe (right-side)

Special tools and workshop equipment required

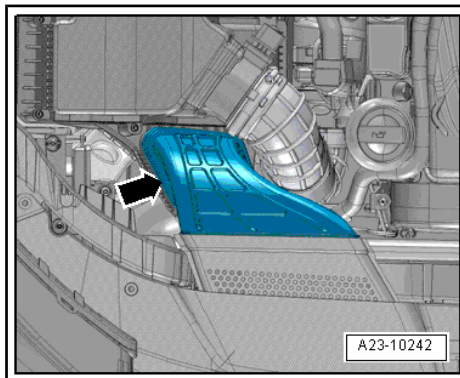
- ◆ Hose clip pliers - VAS 6362-



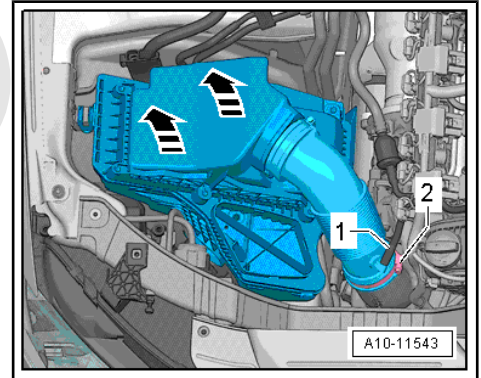
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Removing

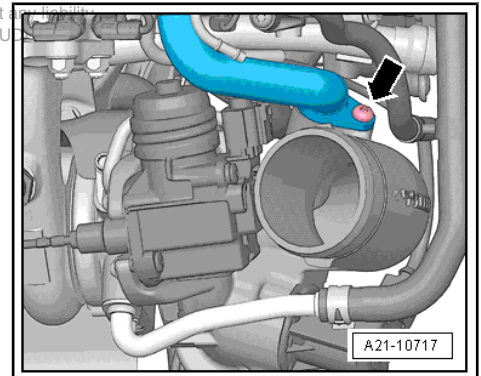
- Remove engine cover panel ⇒ [page 37](#) .
- Detach air duct -arrow-.



- Disconnect hose -1- from air pipe.
- Loosen hose clip -2- and detach air pipe.
- Pull air cleaner housing upwards -arrows-.
- Seal off turbocharger connection with sealing plug from engine bung set - VAS 6122- .
- Remove catalytic converter ⇒ [page 301](#) .
- Drain coolant ⇒ [page 194](#) .



- Remove bolts -arrow- and detach crankcase breather system from turbocharger.



- Lift retaining clip -1-, release hose clip -2- and detach coolant hoses.
- Remove bolts -arrows-, detach coolant pipe (right-side) from cylinder block and remove coolant pipe.

Installing

Installation is carried out in the reverse order; note the following:

Note

Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .



- Install catalytic converter ⇒ [page 301](#) .
- Fill up with coolant ⇒ [page 196](#) .
- Install engine cover panel ⇒ [page 37](#) .

Tightening torques

- ◆ ⇒ [“3.1 Exploded view - coolant pipes”, page 212](#)
- ◆ ⇒ [“2.1 Exploded view - air cleaner housing”, page 255](#)

4 Radiator/radiator fans

⇒ ["4.1 Exploded view - radiator/radiator fans", page 216](#)

⇒ ["4.2 Removing and installing radiator", page 218](#)

⇒ ["4.3 Removing and installing radiator cowl", page 224](#)

⇒ ["4.4 Removing and installing radiator fan control unit J293", page 229](#)

⇒ ["4.5 Removing and installing radiator fans", page 230](#)

4.1 Exploded view - radiator/radiator fans

Radiator, radiator cowl and radiator fans - version 1

1 - Bolt

- 2.5 Nm

2 - Radiator fan control unit - J293-

- Removing and installing
⇒ [page 229](#)

3 - Bolt

- 5 Nm

4 - Radiator cowl

- A4: Remove and install together with radiator
⇒ [page 218](#)
- A5: Removing
⇒ [page 224](#)

5 - Radiator fan - V7-

- Removing and installing
⇒ [page 230](#)

6 - Bolt

- 3.5 Nm

7 - Washer

8 - Rubber bush

- For radiator

9 - Coolant hose

- Lift retaining clip to detach

10 - O-ring

- Renew

11 - Coolant hose

- Lift retaining clip to detach

12 - O-ring

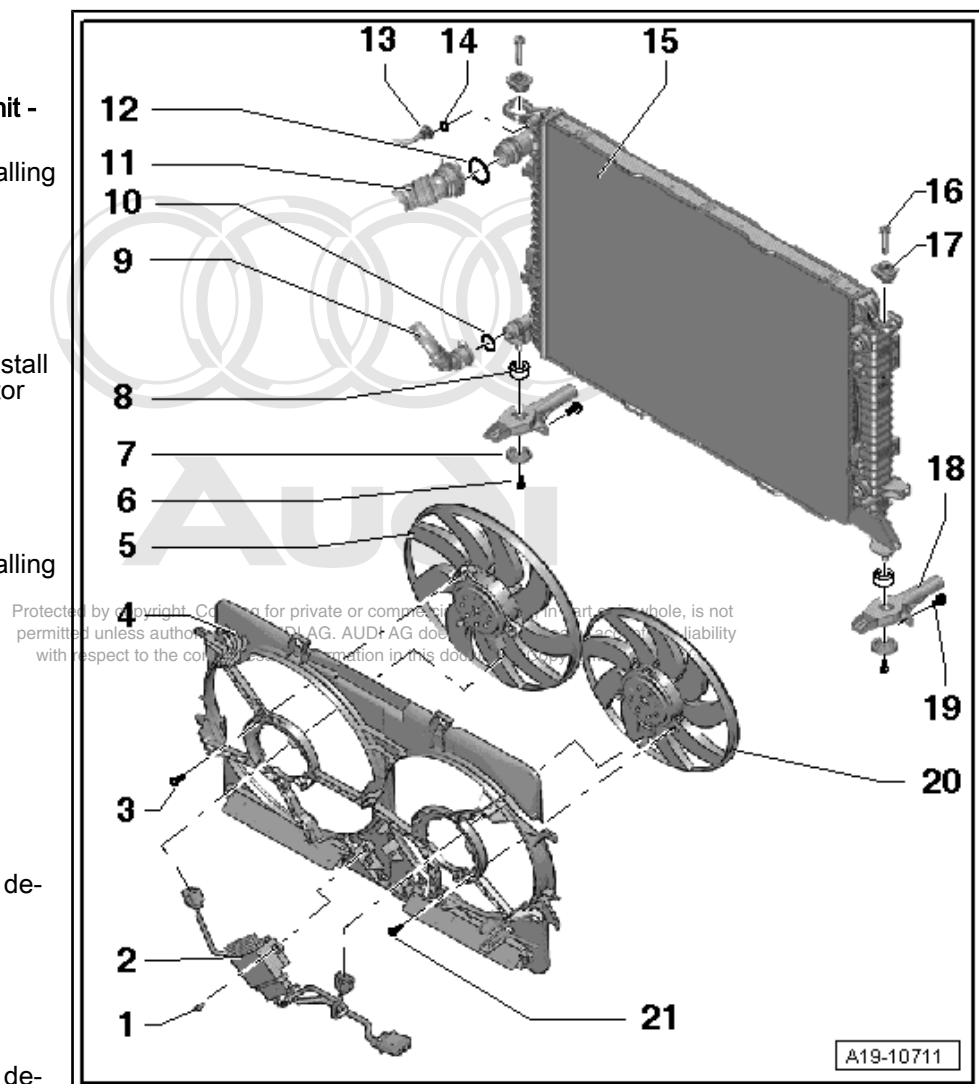
- Renew

13 - Coolant hose

- To coolant expansion tank

14 - O-ring

- Renew



15 - Radiator

- Remove and install together with radiator cowl ⇒ [page 218](#)
- If renewed, refill system with fresh coolant

16 - Retaining pin

- Use screwdriver to release and pull off

17 - Rubber buffer

18 - Radiator bracket

19 - Bolt

- 5.5 Nm

20 - Radiator fan 2 - V177-

- Not fitted if fan runs with 400 W
- Removing and installing ⇒ [page 230](#)

21 - Bolt

- 5 Nm

Radiator cowl and radiator fans - version 2

1 - Radiator fan 2 - V177-

- With radiator fan control unit 2 - J671-
- Removing and installing ⇒ [page 230](#)

2 - Radiator fan - V7-

- With radiator fan control unit - J293-
- Removing and installing ⇒ [page 230](#)

3 - Radiator cowl

- Removing and installing ⇒ [page 224](#)

4 - Bolt

- 3.5 Nm

5 - Fan wheel

- Pin must engage in hole

6 - Bolt

- 5 Nm

7 - Fan wheel

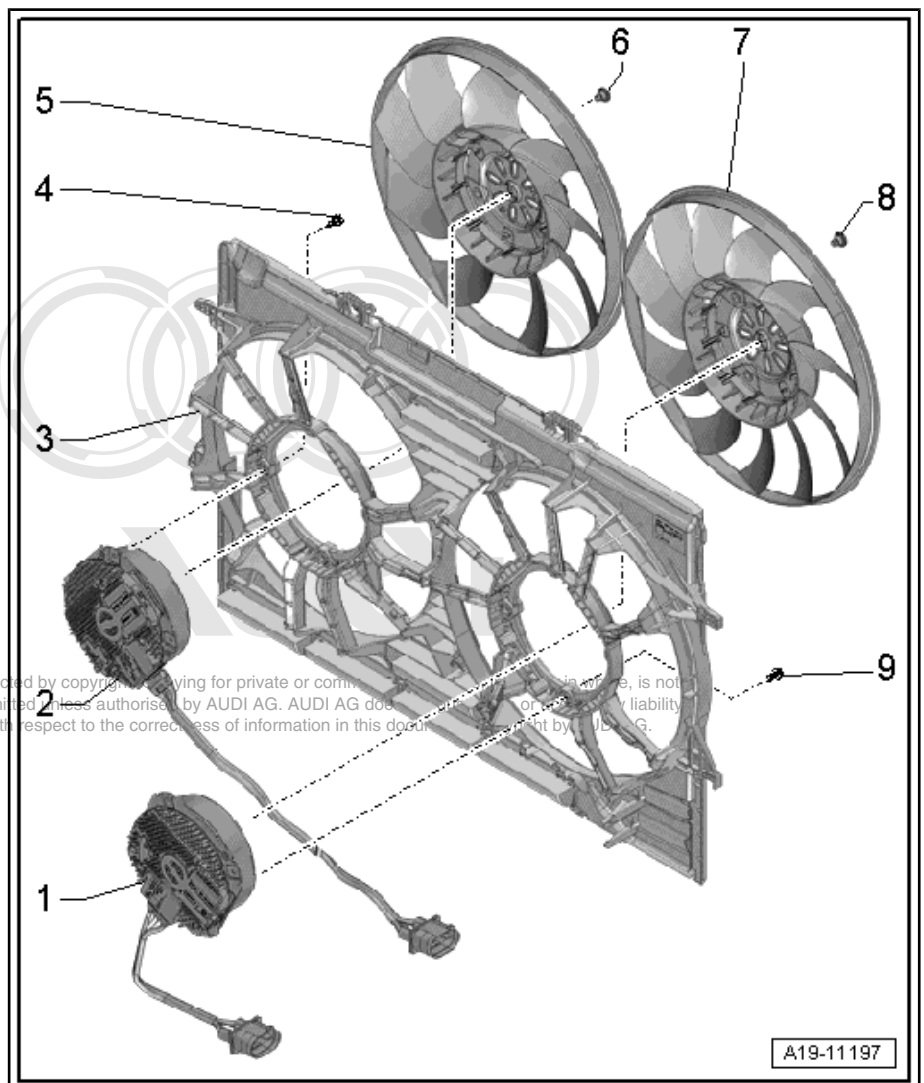
- Pin must engage in hole

8 - Bolt

- 5 Nm

9 - Bolt

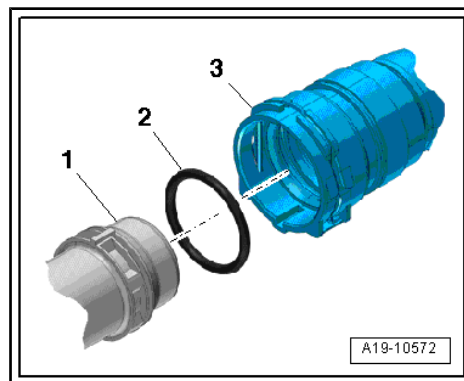
- 3.5 Nm





Connecting coolant hose with plug-in connector

- Remove old O-ring -2- from coolant hose -3-.
- Lubricate new O-ring with coolant additive and fit O-ring in coolant hose.
- Press coolant hose onto coolant pipe -1- until it engages with a click.
- Press coolant hose in again and then pull to check that plug-in connector is correctly engaged.



4.2 Removing and installing radiator

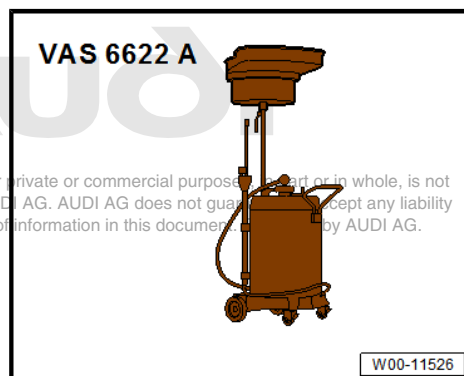


Note

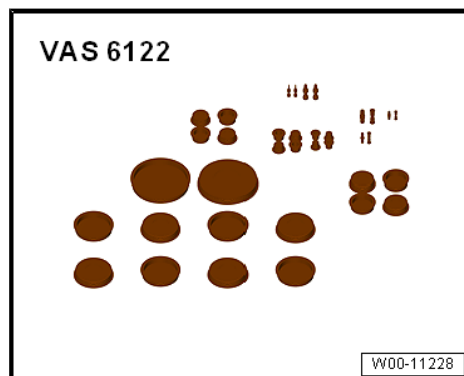
- ◆ *Radiator and radiator cowl can only be removed and installed together as one unit.*
- ◆ *On more recent versions it is no longer possible to remove the condenser from the radiator with the refrigerant lines attached. This is described below under "version 2".*

Special tools and workshop equipment required

- ◆ Used oil collection and extraction unit - VAS 6622A- for vehicles with dual clutch gearbox 0B5

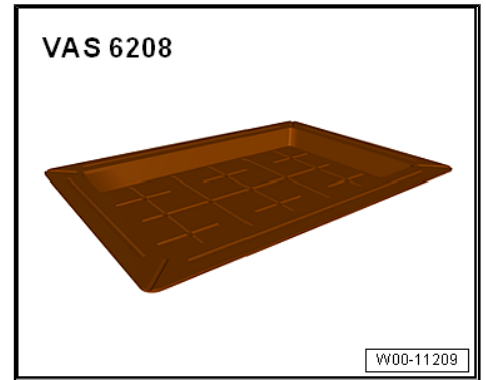


- ◆ Engine bung set - VAS 6122- for vehicles with dual clutch gearbox 0B5



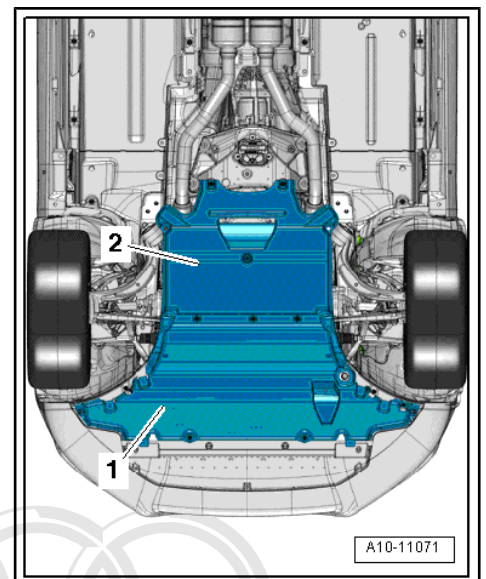
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- ◆ Drip tray for workshop hoist - VAS 6208-

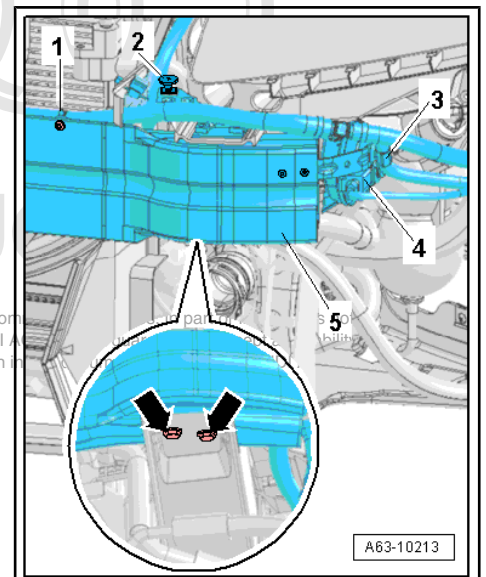


Removing

- Remove front noise insulation -1- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .



- Remove impact bar -5- ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing impact bar .

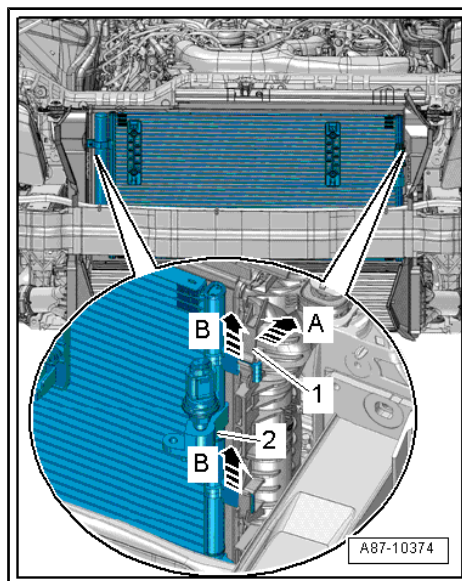


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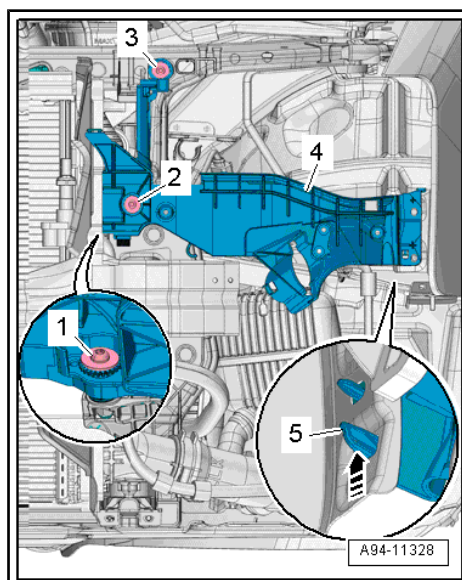
Vehicles with refrigerant lines (version 2):

- Remove condenser ⇒ Heating, air conditioning; Rep. gr. 87 ; Refrigerant circuit; Removing and installing condenser .



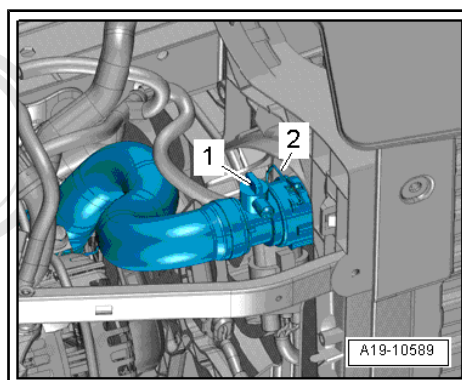
Audi A4:

- Remove bracket for mounting for headlight housing ⇒ Electrical system; Rep. gr. 94 ; Headlights; Exploded view - headlights .



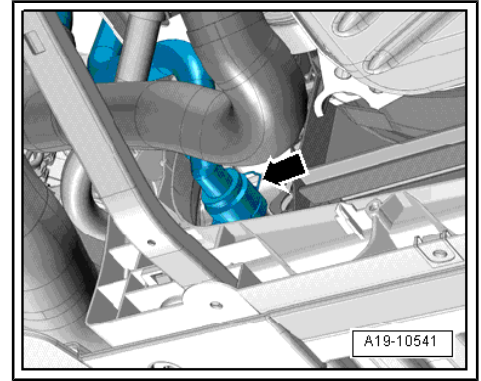
Continued for all vehicles:


- Place drip tray for workshop hoist - VAS 6208- beneath engine.
- Remove drain plug -1- and drain off coolant.
- Lift retaining clip -2- and disconnect coolant hose from radiator.



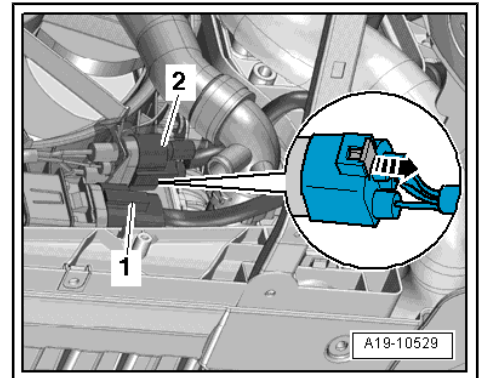
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- Detach connection from radiator (lift retaining clip -arrow-).



 **WARNING**
Risk of injury as the radiator fan(s) may start up automatically.
 ♦ *Unplug electrical connectors before starting to work in the area of radiator cowl.*

- Unplug electrical connectors -1- and -2- for radiator fan (push retainer to the rear -arrow- and press down release catch).



Vehicles with dual clutch gearbox 0B5:

- Position used oil collection and extraction unit - V.A.G 1782- below connection point.

 **Note**

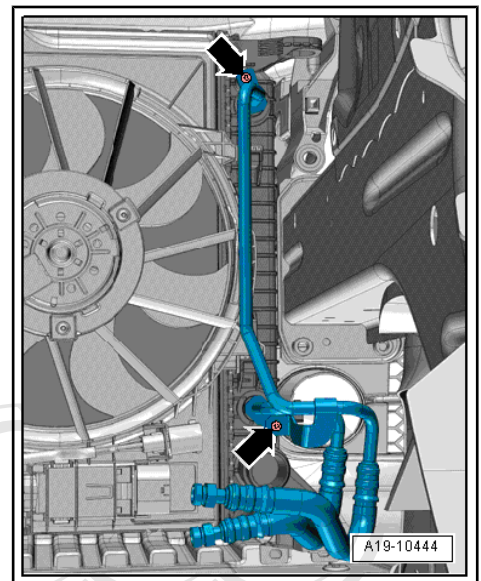
Observe rules for cleanliness when working on gearbox => Rep. gr. 00 ; Repair instructions; Rules for cleanliness .

- Unscrew bolts -arrows- and detach ATF lines from radiator.

 **Note**

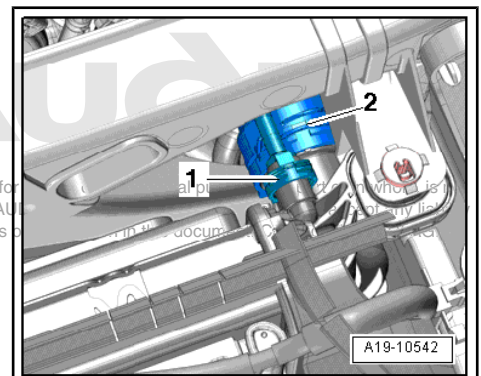
Tie ATF lines up onto longitudinal member to prevent fluid escaping.

- Seal off open lines and connections with clean plugs from engine bung set - VAS 6122- .



Continued for all vehicles:

- Lift retaining clips -1- and -2- and detach connection from radiator.



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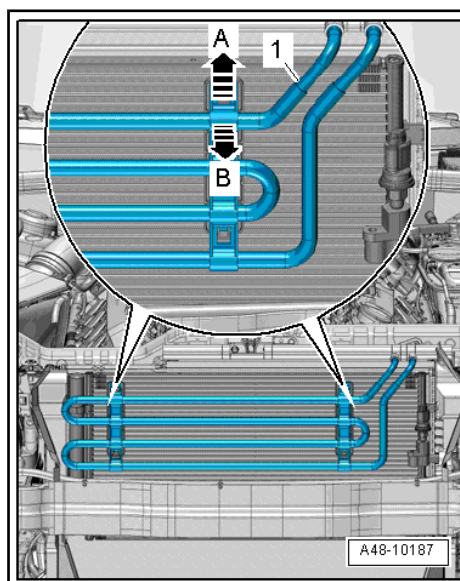
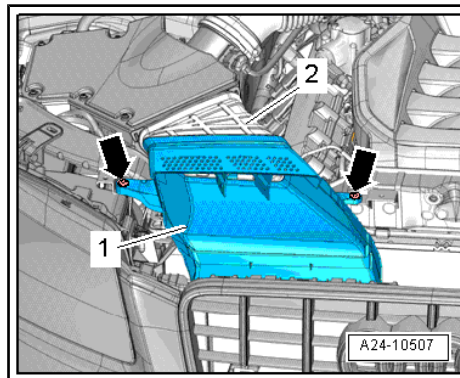
- Remove bolts -arrows-.
- Detach air duct -1- from intermediate flange -2- for air cleaner housing.

Audi

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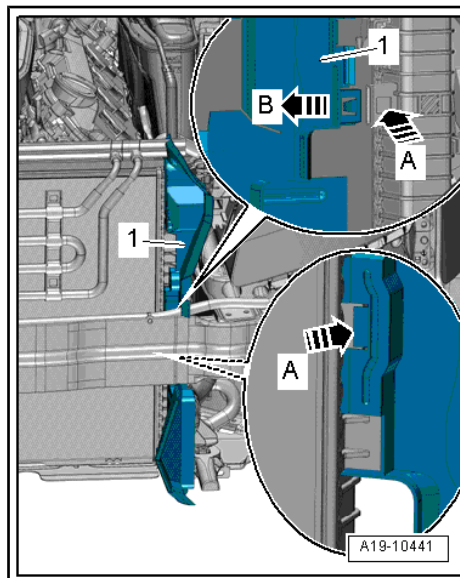
Vehicles with hydraulic power steering:

- If fitted, release retaining clips -arrow A- and swivel power steering cooling pipe -1- to front -arrow B-.
- Lift power steering cooling pipe away from condenser and place onto engine.

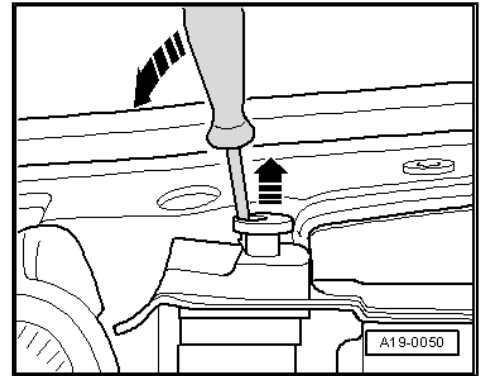


Continued for all vehicles:

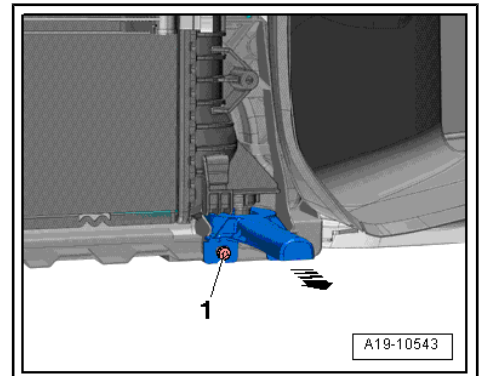
- Release catches -arrows A- and detach air duct -1- on left and right -arrow B-.




- Release retaining pins for radiator on both sides and pull out upwards -arrows-.



- Remove bolts -1- on both sides and detach radiator bracket with radiator from lock carrier -arrow-.
- Slightly lower radiator.



Vehicles with refrigerant lines (version 1):

 **Caution**

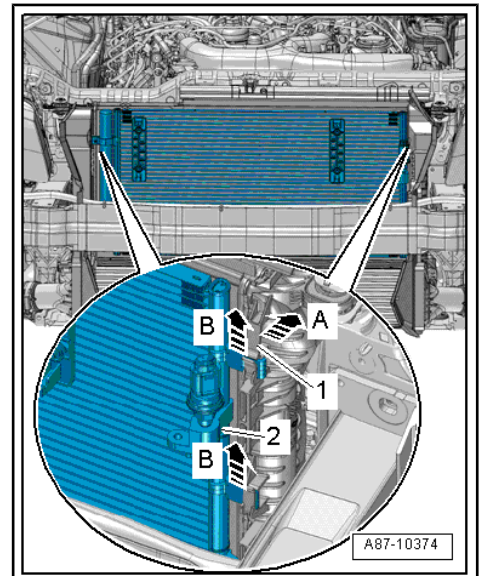
Risk of damage to condenser, refrigerant lines and refrigerant hoses.

◆ **Do NOT stretch, kink or bend refrigerant lines and hoses.**

- Have a second mechanic release retaining clips -1- in direction of -arrow A- and lift condenser -2- out of mountings on radiator -arrows B-.
- Pivot condenser forwards with refrigerant lines attached.

Continued for all vehicles:

- Detach radiator.



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- Press locking tabs on left and right sides of radiator cowl -arrow- and at the same time lift radiator cowl off radiator.

Installing

Installation is carried out in the reverse order; note the following:



Note

If there are slight impressions on the fins, refer to ⇒ [page 6](#) .

- Vehicles with dual clutch gearbox 0B5: Install ATF lines ⇒ Rep. gr. 34 ; ATF circuit; Removing and installing ATF lines .

- Connect coolant hose with plug-in connector ⇒ [page 218](#) .
- Audi A4: Install bracket for mounting for headlight housing ⇒ Electrical system; Rep. gr. 94 ; Headlights; Exploded view - headlights .
- Install condenser ⇒ Heating, air conditioning; Rep. gr. 87 ; Refrigerant circuit; Removing and installing condenser .
- Install impact absorber ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing impact absorber .
- Fill up with coolant ⇒ [page 196](#) .



Note

The coolant in the entire system must be changed if the radiator is renewed.

- Vehicles with dual clutch gearbox 0B5: Check ATF level ⇒ Rep. gr. 34 ; ATF; Checking ATF level .

Tightening torques

- ◆ ⇒ [“4.1 Exploded view - radiator/radiator fans”, page 216](#)
- ◆ ⇒ [“2.1 Exploded view - air cleaner housing”, page 255](#)

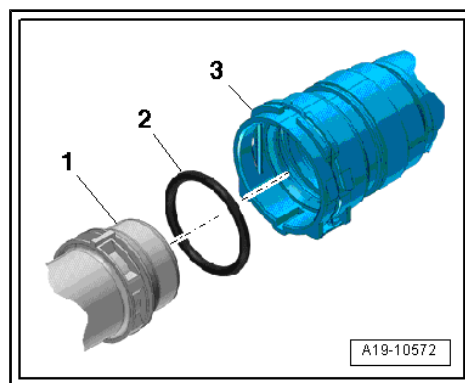
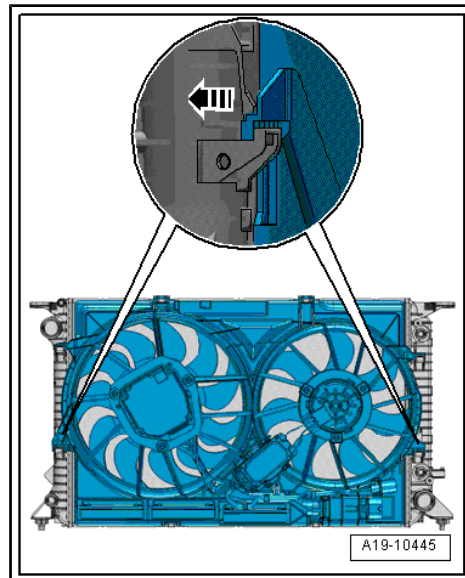
4.3 Removing and installing radiator cowl



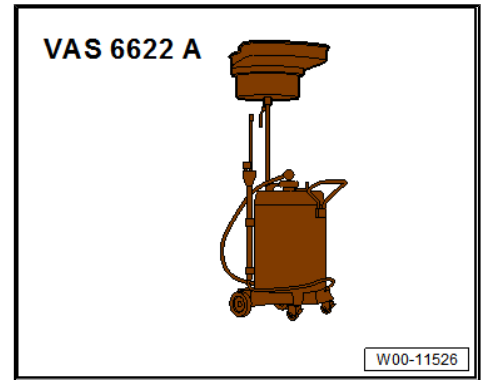
Note

The radiator cowl can only be removed separately on the Audi A5.

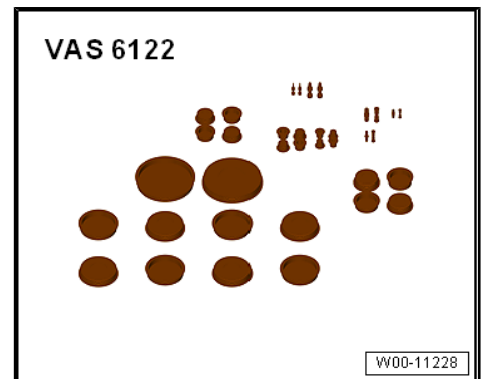
Special tools and workshop equipment required



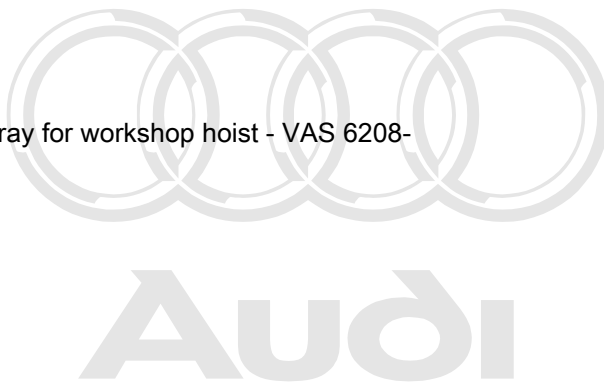
- ◆ Used oil collection and extraction unit - VAS 6622A- for vehicles with dual clutch gearbox 0B5



- ◆ Engine bung set - VAS 6122- for vehicles with dual clutch gearbox 0B5



- ◆ Drip tray for workshop hoist - VAS 6208-

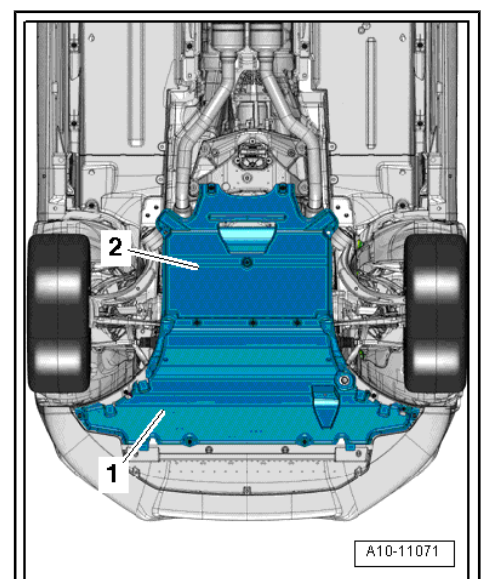


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Removing

- Remove front noise insulation -1- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .



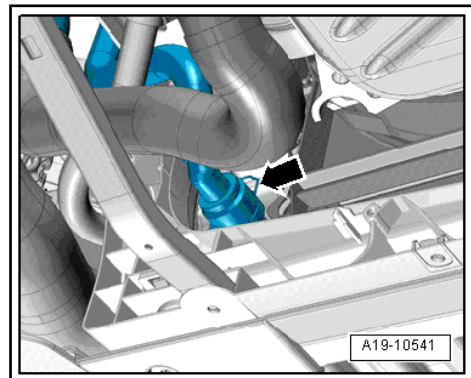
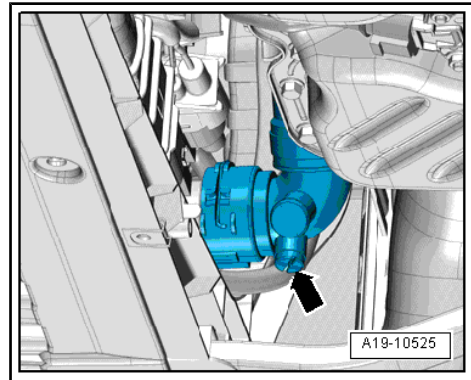


- Place drip tray for workshop hoist - VAS 6208- beneath engine.
- Remove drain plug -arrow- at connection and drain off coolant.



- Detach connection from radiator (lift retaining clip -arrow-).

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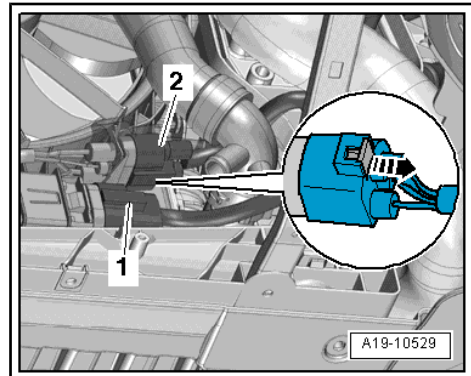


WARNING

Risk of injury as the radiator fan(s) may start up automatically.

- ◆ *Unplug electrical connectors before starting to work in the area of radiator cowl.*

- Unplug electrical connector -1- and, if fitted, -2- for radiator fan (push retainer to the rear -arrow- and press down release catch).



Vehicles with dual clutch gearbox 0B5:

- Position used oil collection and extraction unit - V.A.G 1782- below connection point.



Note

Observe rules for cleanliness when working on gearbox => Rep. gr. 00 ; Repair instructions; Rules for cleanliness .

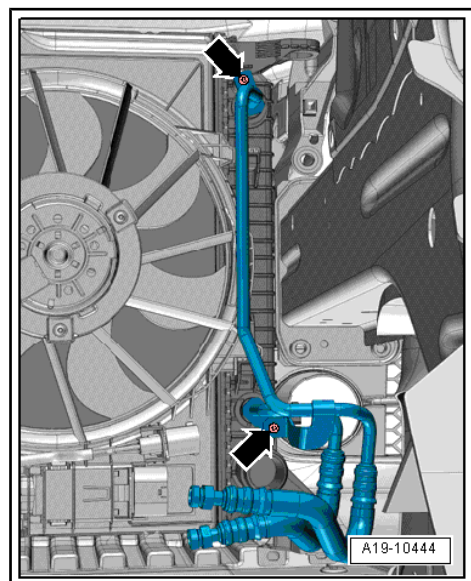
- Unscrew bolts -arrows- and detach ATF lines from radiator.



Note

Tie ATF lines up onto longitudinal member to prevent fluid escaping.

- Seal off open lines and connections with clean plugs from engine bung set - VAS 6122- .



Continued for all vehicles:

- Remove closure plate for bumper cover => General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments .



- Remove bolts -1- on both sides.



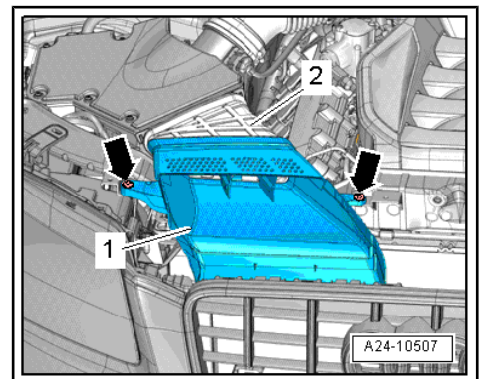
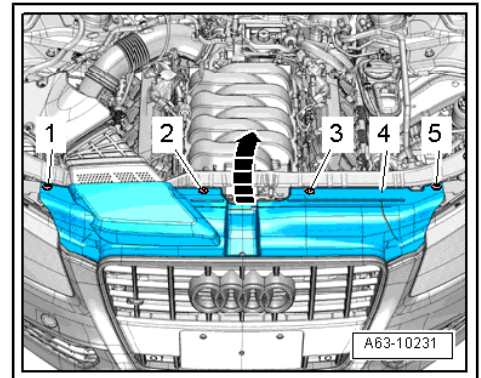
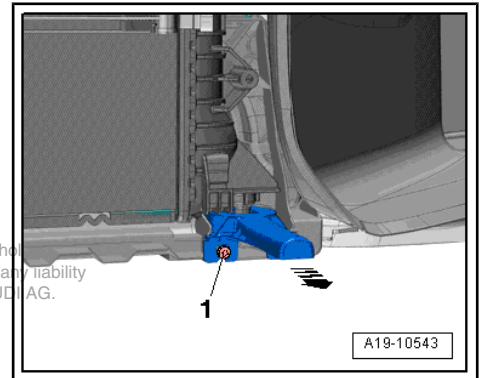
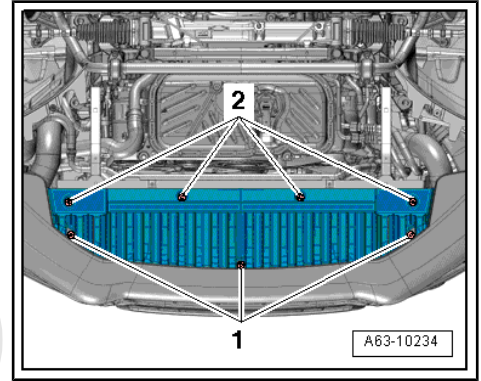
Note

Disregard -arrow-.

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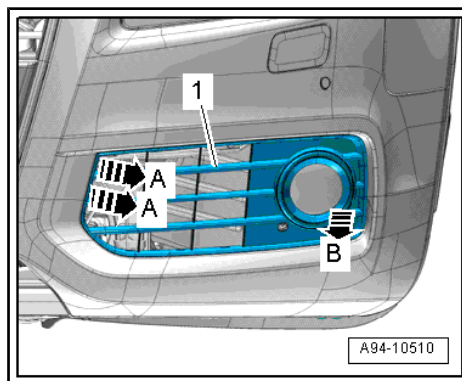
- Remove lock carrier cover -4- => General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Exploded view - bumper cover .

- Remove bolts -arrows-.
- Detach air duct -1- from intermediate flange -2- for air cleaner housing.



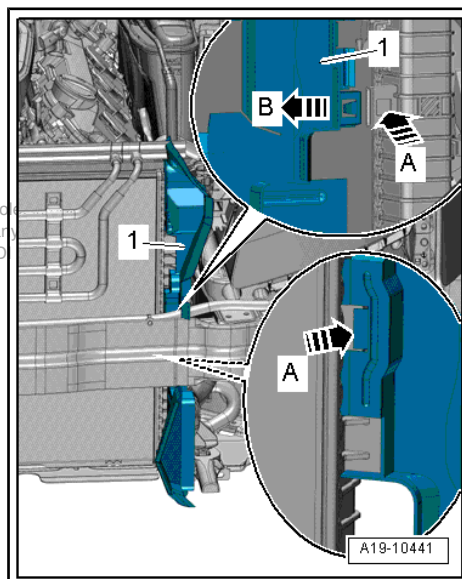


- Remove air intake grille -1- on both sides => General body repairs, exterior; Rep. gr. 63 ; Bumper (front) .

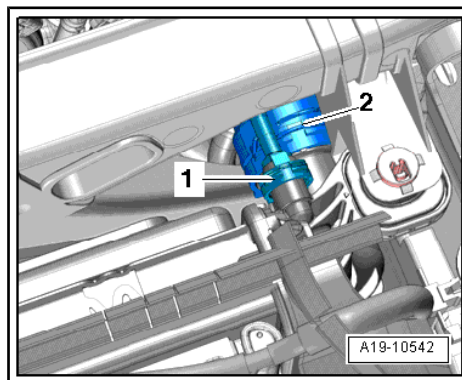


- Release catches -arrows A- and swivel air duct -1- on left and right to centre of vehicle -arrow B-.

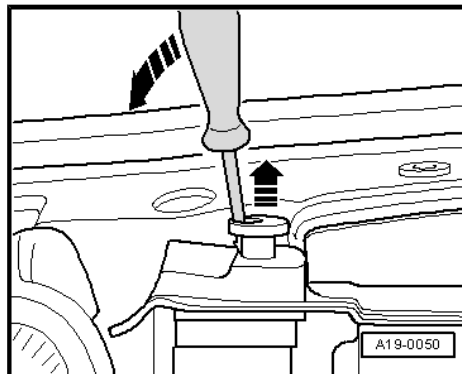
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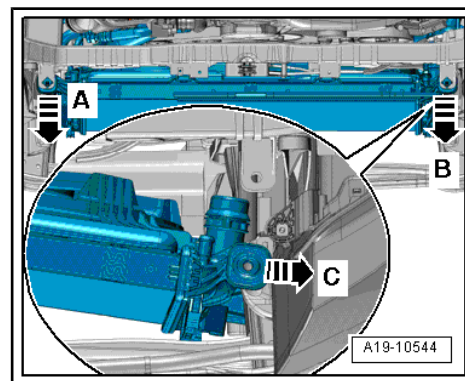
- Lift retaining clips -1- and -2- and detach connection from radiator.



- Release retaining pins for radiator on both sides and pull out upwards -arrows-.



- Move left side of radiator to front -arrow B-, then press to left -arrow C- and then move forward on right side -arrow A-.



- Press locking tabs on left and right sides of radiator cowl -arrow- and at the same time lift radiator cowl off radiator.

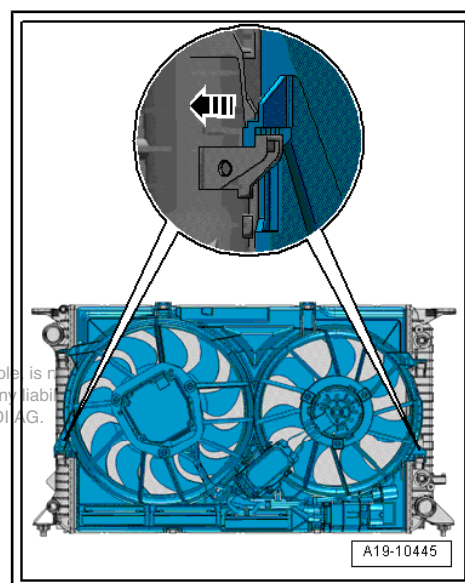
Installing

Installation is carried out in the reverse order; note the following:



Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.

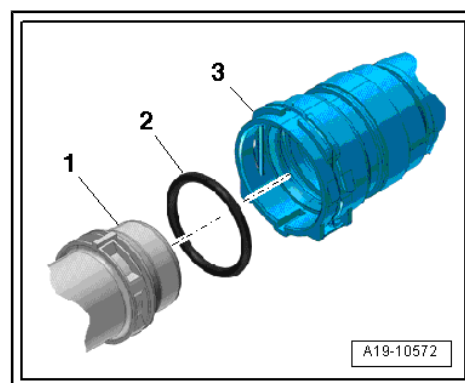
- Vehicles with dual clutch gearbox 0B5: Secure ATF lines ⇒ Rep. gr. 34 ; ATF circuit; Removing and installing ATF lines
- Install lock carrier cover and closure plate at bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Exploded view - bumper cover .



- Attach connection with plug-in connector ⇒ [page 218](#) .
- Fill up with coolant ⇒ [page 196](#) .
- Vehicles with dual clutch gearbox 0B5: Check ATF level ⇒ Rep. gr. 34 ; ATF; Checking ATF level .

Tightening torques

- ◆ ⇒ [“4.1 Exploded view - radiator/radiator fans”, page 216](#)
- ◆ Air duct to intermediate flange for air cleaner housing ⇒ [“2.1 Exploded view - air cleaner housing”, page 255](#)



4.4 Removing and installing radiator fan control unit - J293-

Removing

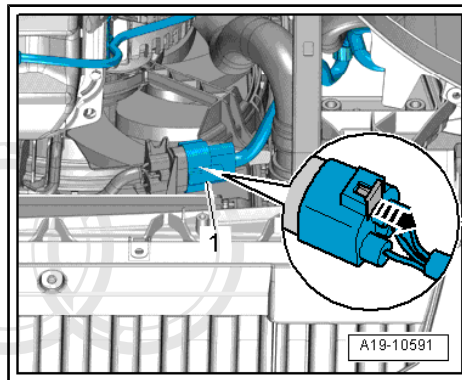


Fit all cable ties in the original positions when installing.

- Remove front noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .



- Take electrical connector -1- for radiator fan out of bracket and unplug connector (push retainer to the rear -arrow- and press down release catch).
- Move clear electrical wiring harness going to radiator fan control unit.



- Unplug electrical connectors -2- and -3-.

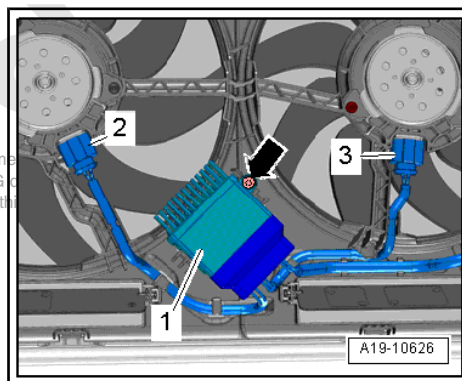


Note

Some versions have only one radiator fan.

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- Unscrew bolt -arrow- and remove radiator fan control unit -1-.



Installing

Installation is carried out in the reverse order; note the following:

- Install noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

Tightening torques

- ◆ ⇒ [“4.1 Exploded view - radiator/radiator fans”, page 216](#)

4.5 Removing and installing radiator fans

⇒ [“4.5.1 Removing and installing radiator fans V7 / V177 , version 1”, page 230](#)

⇒ [“4.5.2 Removing and installing radiator fans V7 / V177 , version 2”, page 231](#)

4.5.1 Removing and installing radiator fans - V7- / -V177- , version 1

Removing

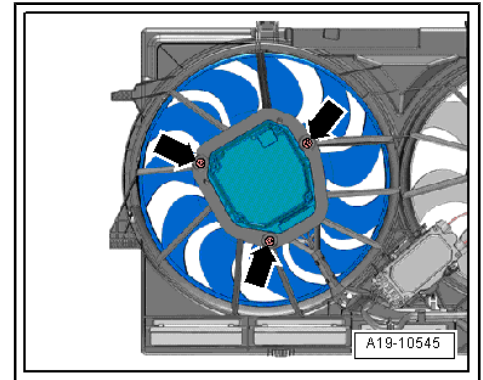


Note

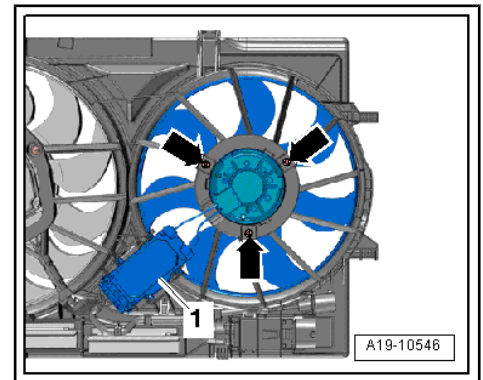
Radiator fan 2 - V177- not fitted if fan runs with 400 W.

- Remove radiator with radiator cowl ⇒ [page 218](#) .

- Remove bolts -arrows- on radiator fan - V7- (left-side).
- Move electrical wiring harness clear and detach radiator fan.



- Remove bolts -arrows- on radiator fan 2 - V177- (right-side).
- Move electrical wiring harness clear.
- Unclip radiator fan control unit -1- from radiator cowl and detach radiator fan with control unit.



Installing

Installation is carried out in the reverse order; note the following:

- Install radiator with radiator cowl ⇒ [page 218](#) .

Tightening torques

- ◆ ⇒ [“4.1 Exploded view - radiator/radiator fans”, page 216](#)

4.5.2 Removing and installing radiator fans - V7- / -V177- , version 2

Removing

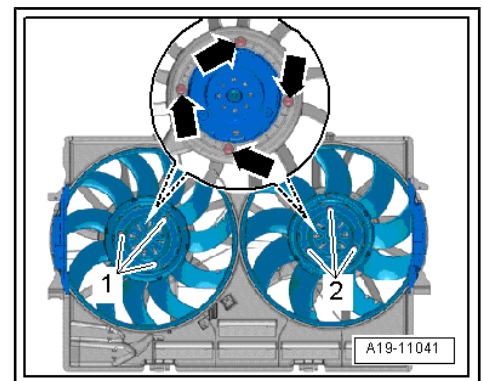


Note

- ◆ *Radiator fan 2 - V177- not fitted if fan runs with 400 W.*
- ◆ *Fit all cable ties in the original positions when installing.*

- Remove radiator cowl:
- ◆ Audi A4 ⇒ [page 218](#) .
- ◆ Audi A5 ⇒ [page 224](#) .
- Remove bolts -1- or -2- and detach corresponding fan wheel.
- Remove bolts -arrows- on radiator fan.
- Move electrical wiring harness clear and detach radiator fan.

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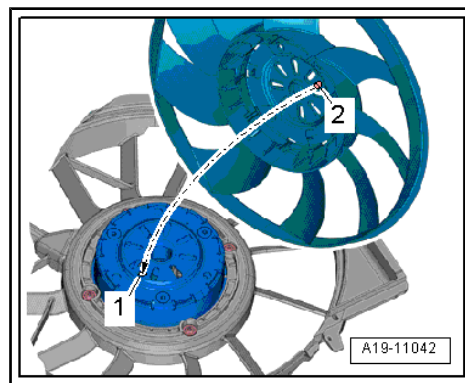
Installing

Installation is carried out in the reverse order; note the following:

- Note installation position of fan wheel:
- Pin -2- must engage in hole -1-.
- Install radiator cowl:
- ◆ Audi A4 ⇒ [“4.2 Removing and installing radiator”, page 218](#) .
- ◆ Audi A5
⇒ [“4.3 Removing and installing radiator cowl”, page 224](#) .

Tightening torques

- ◆ ⇒ [“4.1 Exploded view - radiator/radiator fans”, page 216](#)



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21 – Turbocharging/supercharging

1 Turbocharger

⇒ [“1.1 Exploded view - turbocharger”, page 233](#)

⇒ [“1.2 Removing and installing turbocharger”, page 236](#)

1.1 Exploded view - turbocharger

Part I

Part II ⇒ [page 234](#)

1 - Gasket

- Renew

2 - Nut

- Renew
- 25 Nm
- Coat studs with high-temperature paste; for high-temperature paste refer to ⇒ [Electronic parts catalogue](#)

3 - Nut

- 10 Nm

4 - Bolt

- 10 Nm

5 - Charge pressure positioner - V465-

- Supplied together with turbocharger

6 - O-ring

- Renew
- Lubricate with coolant

7 - Coolant return line

8 - Bolt

- 9 Nm

9 - Turbocharger

- Removing and installing ⇒ [page 236](#)

10 - Turbocharger air recirculation valve - N249-

- Note installation position ⇒ [page 234](#)

11 - Bolt

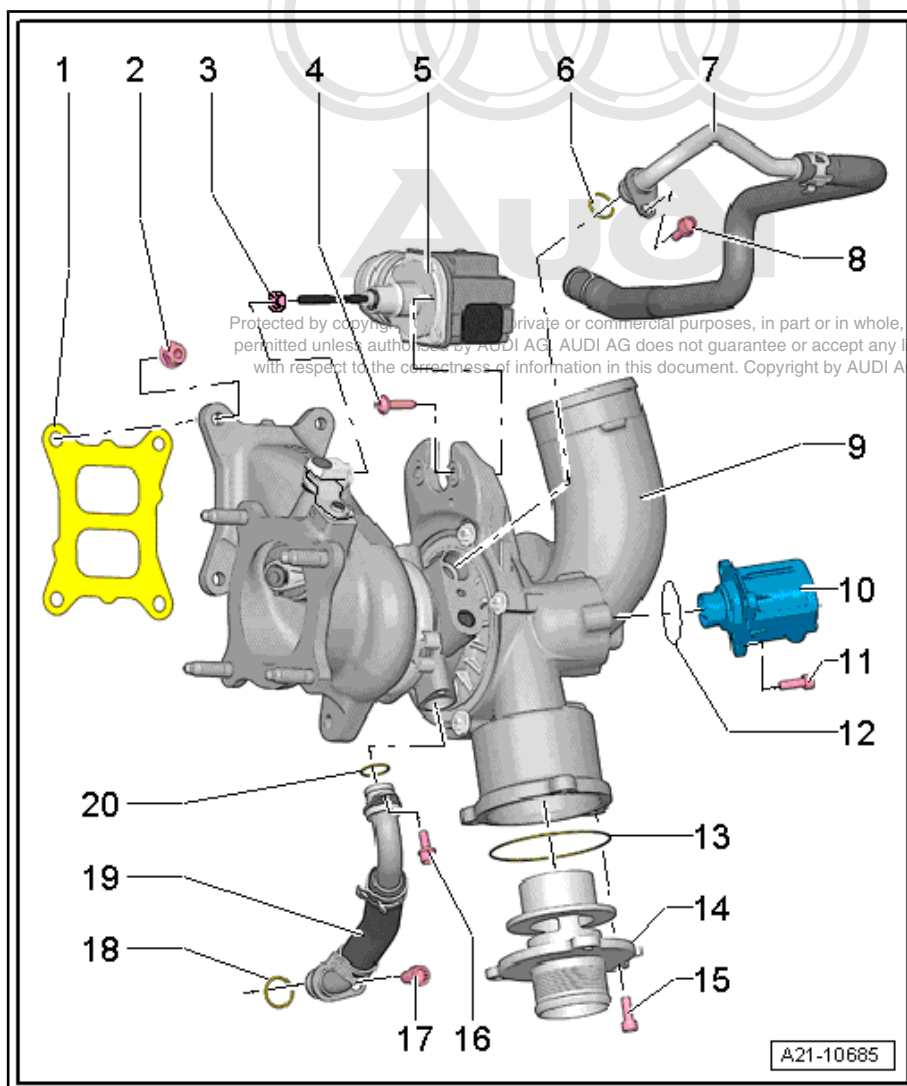
- 9 Nm

12 - O-ring

- Renew

13 - O-ring

- Renew



A21-10685



14 - Connection

15 - Bolt

- 9 Nm

16 - Bolt

- 9 Nm

17 - Bolt

- 25 Nm

18 - O-ring

- Renew
- Lubricate lightly with engine oil

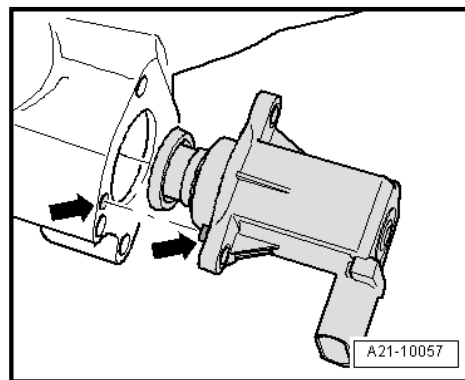
19 - Oil return line

20 - O-ring

- Renew
- Lubricate lightly with engine oil

Fitting location of turbocharger air recirculation valve - N249-

- Note installation position -arrows-



Part II

Part I => [page 233](#)



Audi

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1 - Bolt

- 9 Nm

2 - Hose

3 - Lambda probe - G39- and Lambda probe heater - Z19-

- The threads on the new Lambda probes are coated with a special assembly paste.
- If re-installing old Lambda probe, coat thread with high-temperature paste: Refer to ⇒ Electronic parts catalogue for high-temperature paste
- The assembly paste/high-temperature paste must not get into the slots on the Lambda probe body
- Removing and installing ⇒ [page 287](#)

4 - Heat shield

5 - Bolt

- 9 Nm

6 - O-ring

- Renew
- Lubricate lightly with engine oil

7 - Bolt

- 9 Nm

8 - Oil supply line

9 - Bolt

- 9 Nm

10 - O-ring

- Renew
- Lubricate lightly with engine oil

11 - Heat shield

12 - Bolt

- 30 Nm
- Coat with high-temperature paste; for high-temperature paste refer to ⇒ Electronic parts catalogue

13 - Coolant supply line

14 - O-ring

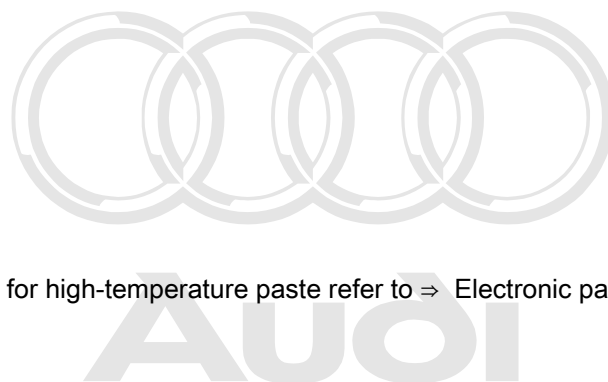
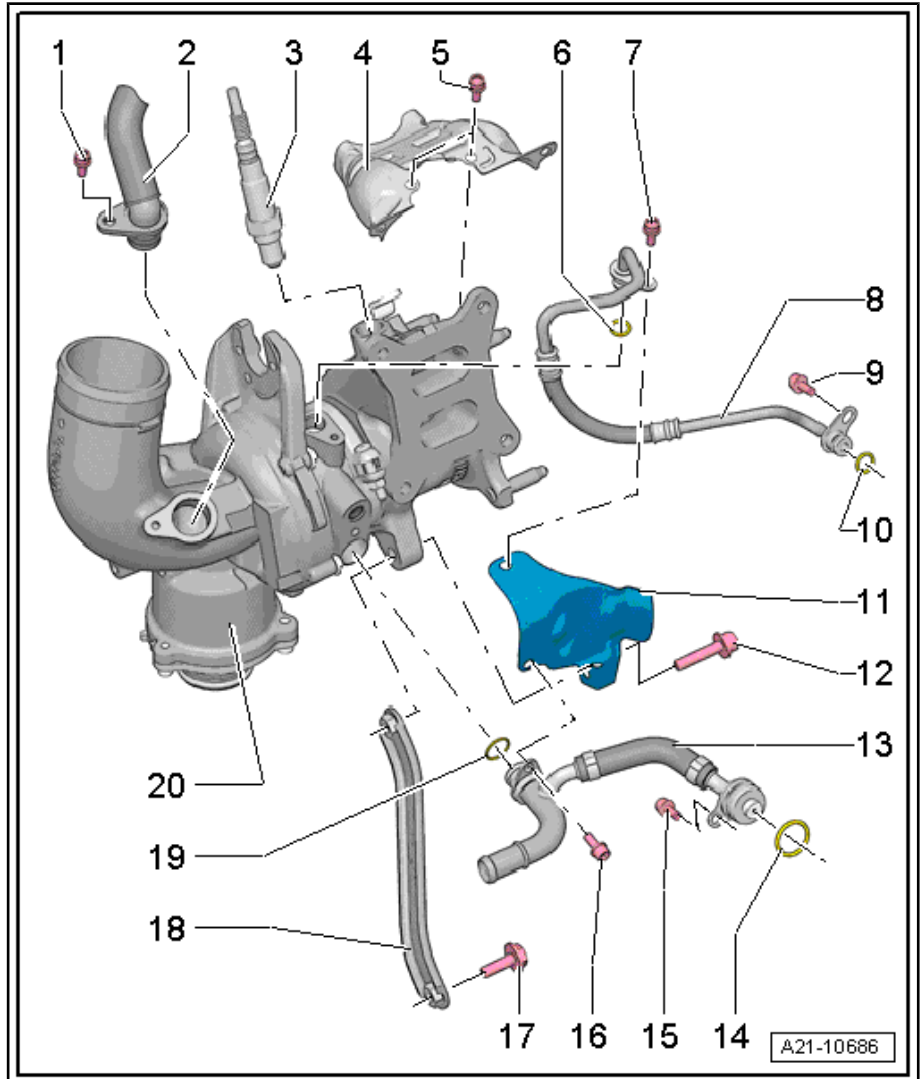
- Renew
- Lubricate with coolant

15 - Bolt

- 9 Nm

16 - Bolt

- 9 Nm



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17 - Bolt

- Renew
- 20 Nm + turn 90° further

18 - Support

19 - O-ring

- Renew
- Lubricate with coolant

20 - Turbocharger

- Removing and installing => [page 236](#)



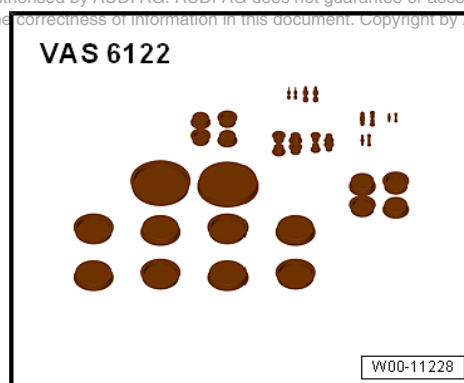
Audi

1.2 Removing and installing turbocharger

Special tools and workshop equipment required

- ◆ Engine bung set - VAS 6122-

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Removing



Caution

If the turbocharger has suffered mechanical damage (e.g. damaged compressor wheel), it is not sufficient merely to fit a new turbocharger. The following work must be performed in order to avoid further damage:

- ◆ *Check air cleaner housing, air filter element and air hoses for dirt and foreign particles.*
- ◆ *Check the entire charge air system (including the charge air cooler) for foreign matter.*
- ◆ *If foreign matter is found in the charge air system, clean all relevant ducts and hoses and renew charge air cooler if necessary.*



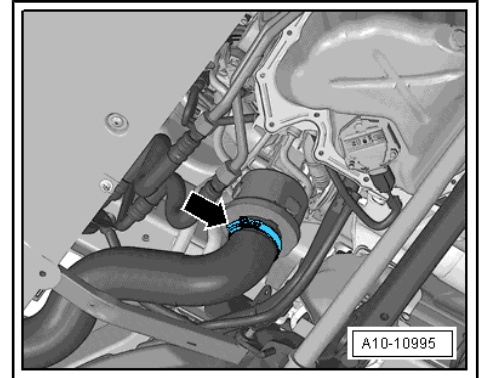
WARNING


Hot steam/hot coolant can escape - risk of scalding.

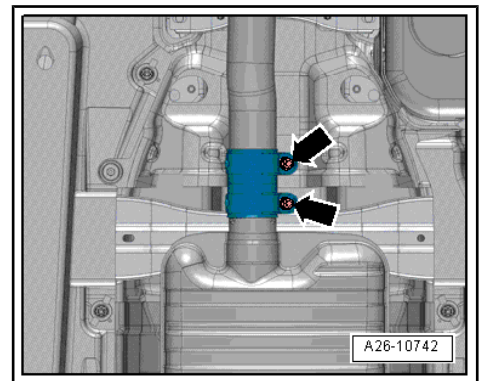
- ◆ *The cooling system is under pressure when the engine is hot.*
- ◆ *To allow pressure to dissipate, cover filler cap on coolant expansion tank with cloth and open carefully.*

- Open filler cap on coolant expansion tank.

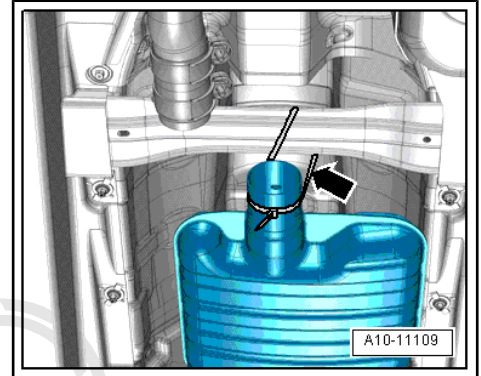
- Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .
- Open hose clip -arrow-, detach air hose and swivel to side.



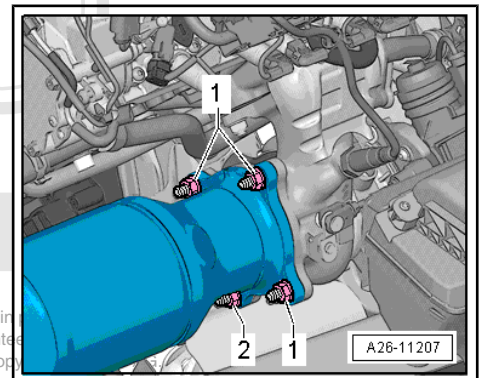
 **Caution**
Risk of damage to flexible joints in front silencer.
 ♦ **Do NOT bend the flexible joints in the front silencer more than 10°.**



- Loosen bolted connections -arrows- and push clamp towards rear.
- Lower front silencer slightly and tie up to cross piece -arrow-.



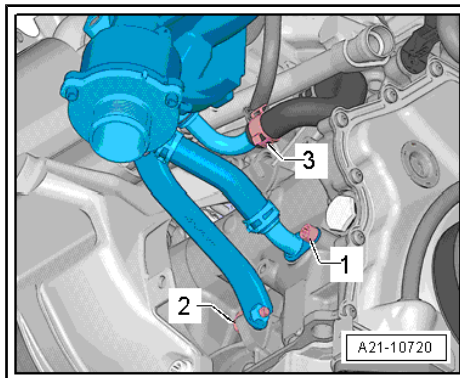
- Remove nut -2- from below.
- Drain coolant ⇒ [page 194](#) .



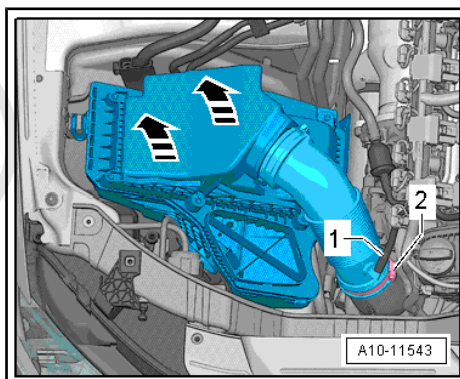
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- Remove bolt -1- and detach oil return line.
- Loosen bolt -2- and unscrew 2 turns.
- Remove engine cover panel => [page 37](#) .

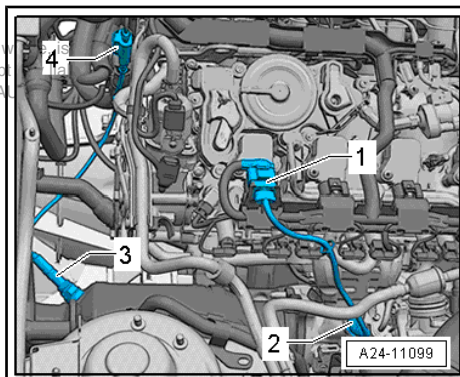


- Disconnect hose -1- from air cleaner.
- Disconnect air intake hose -2-.
- Pull air cleaner housing upwards -arrows-.
- Seal off turbocharger connection with sealing plug from engine bung set - VAS 6122- .

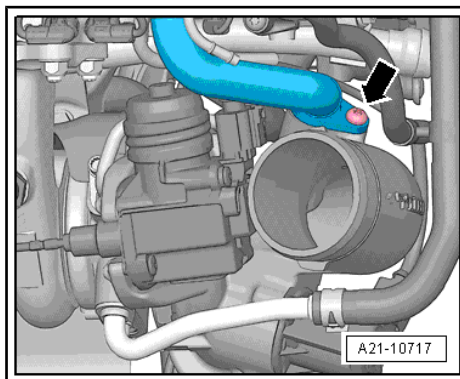


- Unplug electrical connector -1- for Lambda probe - G39- and Lambda probe heater - Z19- and move wiring clear.

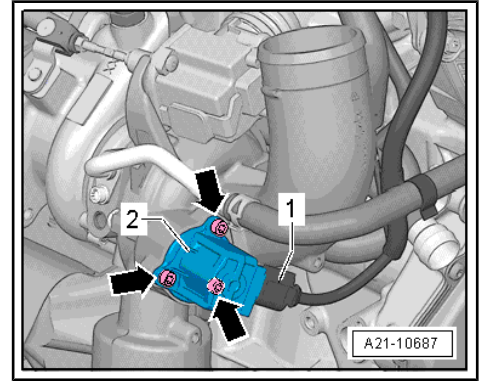
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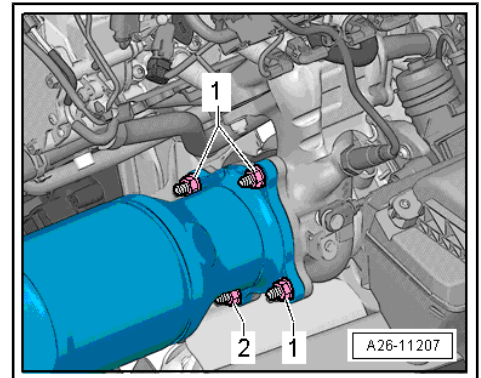
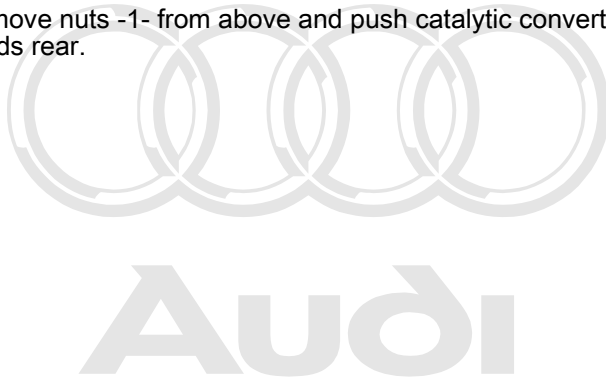
- Remove bolts -arrow- and detach crankcase breather system from turbocharger.



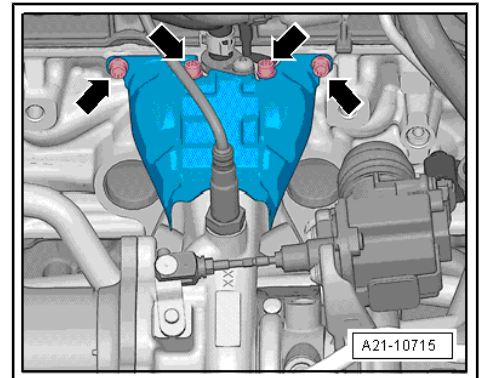
- Unplug electrical connector -1- for turbocharger air recirculation valve - N249- .



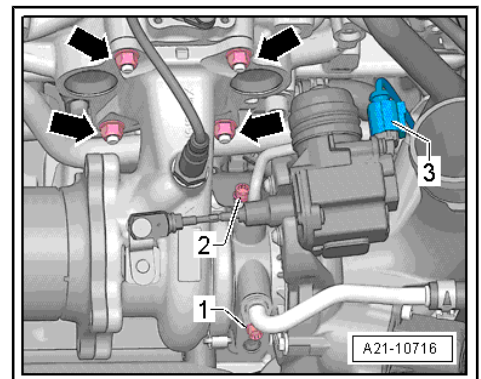
- Remove nuts -1- from above and push catalytic converter towards rear.



- Remove heat shield -arrows- or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- Unscrew bolt -1- and remove coolant return line.
- Remove bolt -2- and detach oil supply line.
- Unplug electrical connector -3- at charge pressure positioner - V465- .
- Remove nuts -arrows-.





- Pull turbocharger off studs in direction of -arrow-.
- Have a second mechanic hold turbocharger; remove bolt -1-, disconnect coolant supply line -2- and lift out turbocharger.

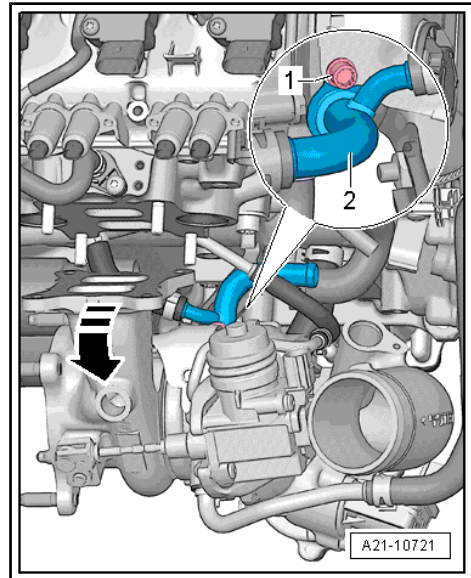
Installing

Installation is carried out in the reverse order; note the following:



Note

- ◆ *Renew seals, gaskets, O-rings and self-locking nuts.*
 - ◆ *Lubricate studs for turbocharger with high-temperature paste. For high-temperature paste refer to ⇒ [Electronic parts catalogue](#) .*
 - ◆ *Fill turbocharger with engine oil at connection for oil supply line.*
 - ◆ *Hose connections and charge air system hoses must be free of oil and grease prior to fitting.*
 - ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ [Electronic parts catalogue](#) .*
- Install catalytic converter ⇒ [page 301](#) .
 - Align the exhaust system so it is free of stress ⇒ [page 298](#) .
 - Check oil level: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .
 - Install engine cover panel ⇒ [page 37](#) .



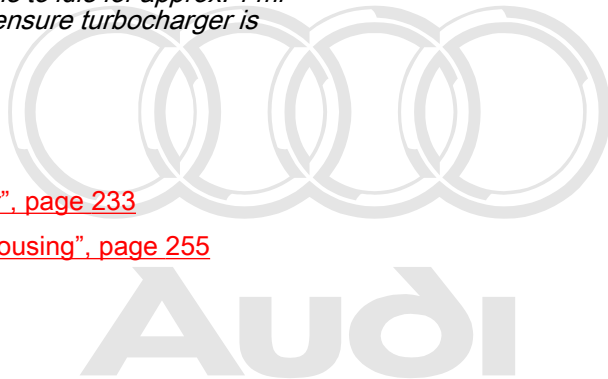
Note

After installing turbocharger, allow engine to idle for approx. 1 minute and do not rev up immediately to ensure turbocharger is supplied with oil.

- Fill up with coolant ⇒ [page 196](#) .

Tightening torques

- ◆ ⇒ [“1.1 Exploded view - turbocharger”, page 233](#)
- ◆ ⇒ [“2.1 Exploded view - air cleaner housing”, page 255](#)



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2 Charge air system

⇒ "2.1 Exploded view - charge air system", page 241

⇒ "2.2 Removing and installing charge air cooler", page 242

⇒ "2.3 Removing and installing charge pressure sender G31", page 245

⇒ "2.4 Checking charge air system for leaks", page 245

2.1 Exploded view - charge air system

– Observe rules for cleanliness ⇒ [page 5](#) .



Note

If there are slight impressions on the fins, refer to ⇒ [page 6](#) .

1 - Charge air cooler

- Removing and installing
⇒ [page 242](#)



Note

If there are slight impressions on the fins, refer to ⇒ [page 6](#) .

2 - Hose clip

- Reinforced
- 5.5 Nm

3 - Air hose

- To turbocharger
- Installing ⇒ [page 242](#)

4 - Hose clip

- Reinforced
- 5.5 Nm

5 - Hose clip

- Reinforced
- 5.5 Nm

6 - O-ring

- Renew

7 - Charge pressure sender - G31-

- Removing and installing
⇒ [page 245](#)

8 - Bolt

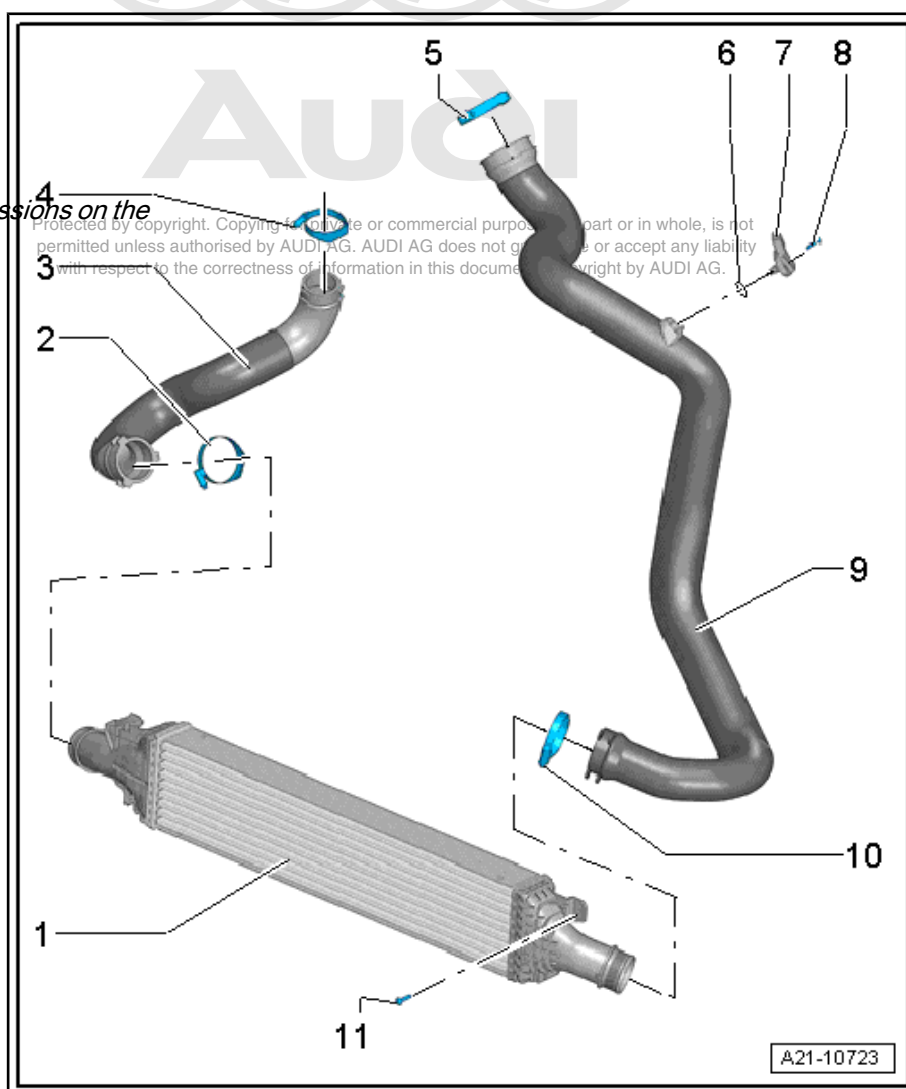
- 5 Nm

9 - Air pipe

- Installing ⇒ [page 242](#)

10 - Hose clip

- Reinforced
- 5.5 Nm





11 - Bolt

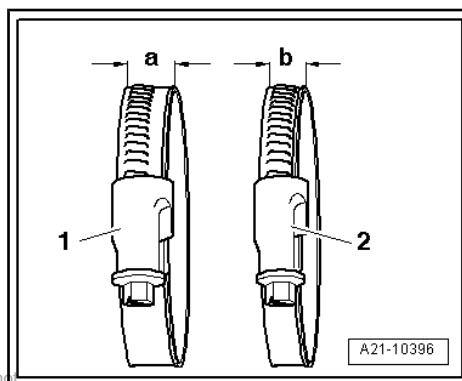
- 7 Nm

Installing air hoses with screw-type clips



Note

- ◆ *Hose connections and air pipes/hoses must be free of oil and grease prior to fitting.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- ◆ *The screw sections of used screw-type clips must be sprayed with rust remover prior to fitting so that the air hoses can be attached securely to the hose connections.*



Tightening torque for

- 1 - Hose clip with width -a- = 13 mm: 5.5 Nm
- 2 - Hose clip with width -b- = 9 mm: 3 Nm

2.2 Removing and installing charge air cooler

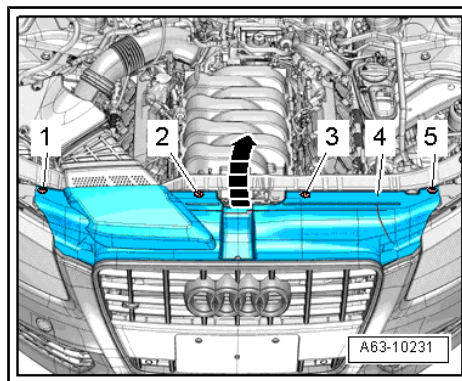
Removing



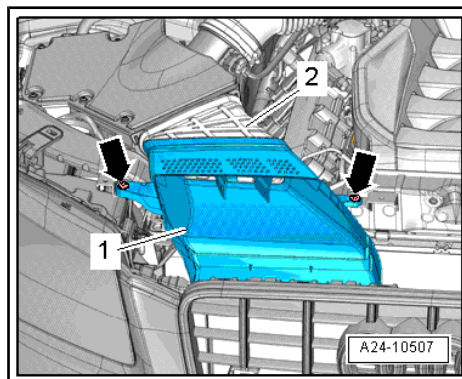
Note

If there are slight impressions on the fins, refer to ⇒ page 6 .

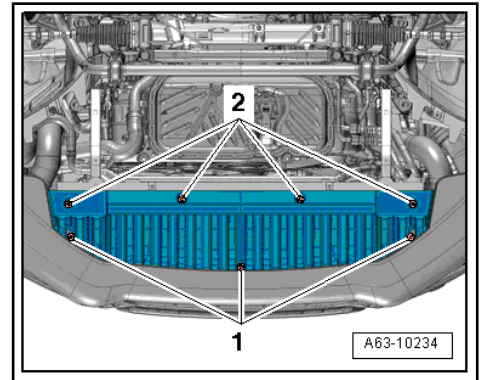
- Remove bolts -1, 2, 3, 5-
- Lift cover -4- above lock carrier and detach from radiator grille -arrow-.



- Remove bolts -arrows-.
- Detach air duct -1- from intermediate flange -2- for air cleaner housing.



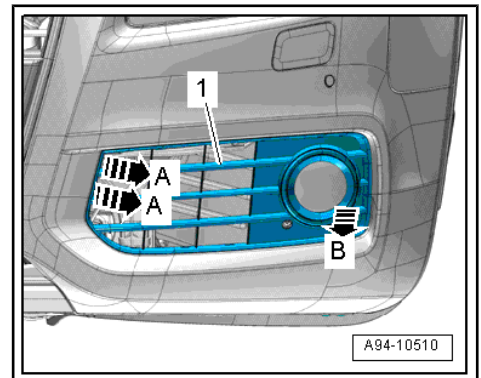
- Loosen bolts -1- and -2- and detach noise insulation at front bumper cover towards rear.



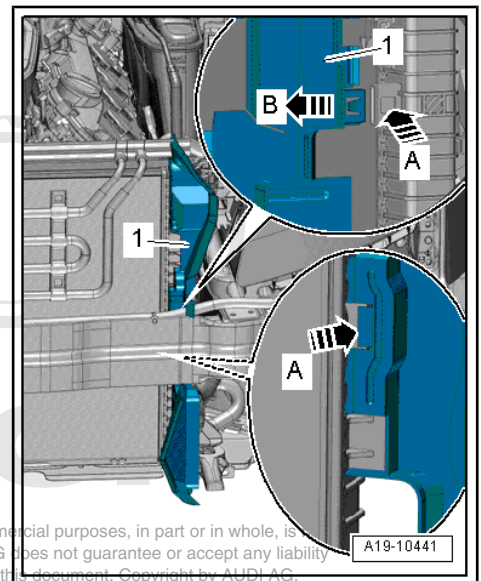
- Release retaining clips -arrows A- and detach air intake grille -1- on left and right from bottom section of bumper cover -arrow B-.

 **Note**

For illustration purposes, the installation position is shown in the following illustrations with the bumper removed.

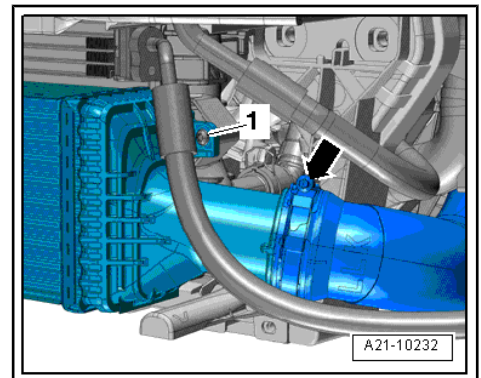


- Release catches -arrows A- and swivel air duct -1- on left and right to centre of vehicle -arrow B-.



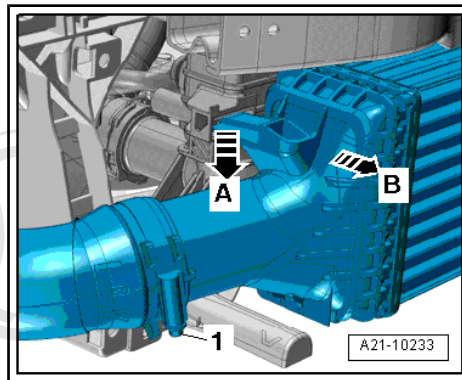
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- Release hose clip -arrow- and detach air hose from charge air cooler.
- Remove bolt -1-.

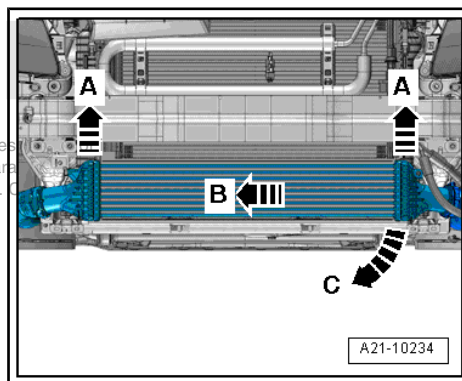




- Release hose clip -1- and detach air hose from charge air cooler.
- Push catch down -arrow A- and move top of charge air cooler slightly in direction of -arrow B-.



- Lift charge air cooler off radiator -arrows A- and press in direction of -arrow B-.
- Pull left side of charge air cooler downwards -arrow C- and detach charge air cooler.



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Installing

Installation is carried out in the reverse order; note the following:

 **Note**

If there are slight impressions on the fins, refer to [⇒ page 6](#) .

 **Note**

- ◆ *Hose connections and hoses for charge air system must be free of oil and grease prior to fitting.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ [Electronic parts catalogue](#) .*
- ◆ *To ensure that the charge air hoses can be properly secured at their connections, spray rust remover onto the worm thread of used hose clips before installing.*

Tightening torques

- ◆ [⇒ “2.1 Exploded view - charge air system”, page 241](#)

2.3 Removing and installing charge pressure sender - G31-

Removing

- Unplug electrical connector -1- from charge pressure sender - G31- .
- Remove bolts -arrows- and pull charge pressure sender - G31- out of air pipe.

Installing

Installation is carried out in the reverse order; note the following:

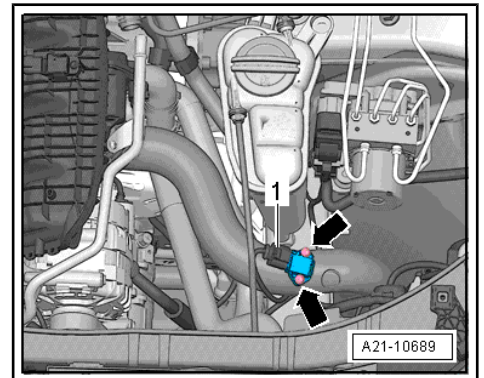
Tightening torques

- ◆ ⇒ ["2.1 Exploded view - charge air system", page 241](#)



Note

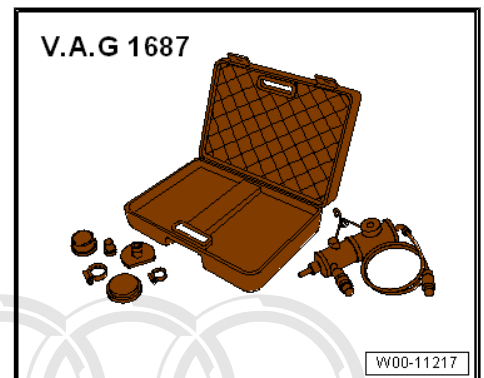
Fit new O-ring.



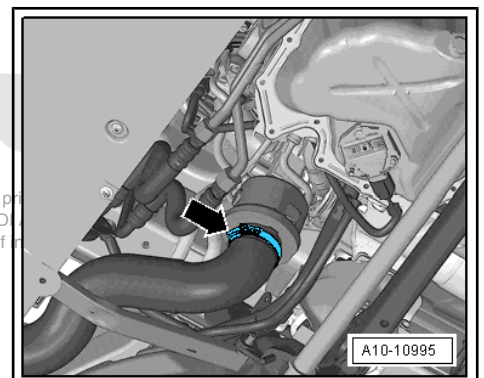
2.4 Checking charge air system for leaks

Special tools and workshop equipment required

- ◆ Charge air system tester - V.A.G 1687-



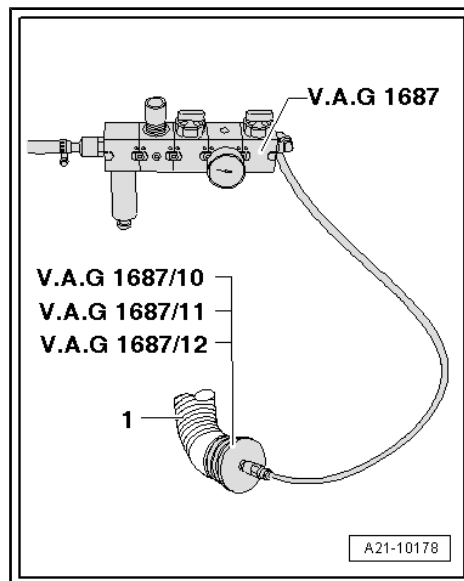
- Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .
- Open hose clip -arrow-, detach air hose and swivel to side.



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- Depending on hose diameter, insert adapter - 1687/10- , -1687/11- or -1687/12- into air hose -1- and secure with hose clip.
- Connect charge air system tester - V.A.G 1687- as shown on illustration.



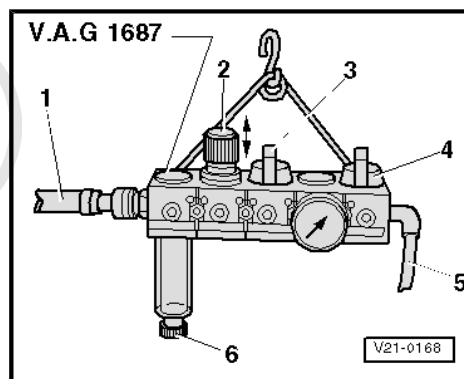
Prepare charge air system tester - V.A.G 1687- as follows:

- Unscrew pressure control valve -2- completely and close valves -3- and -4-.



Note

Make sure knob is pulled out before turning pressure control valve -2-.



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- Using a commercially available connection piece, connect charge air system tester - V.A.G 1687- to compressed air -1-.

 **Note**

If there is water in sight glass, remove drain plug -6- and drain water.

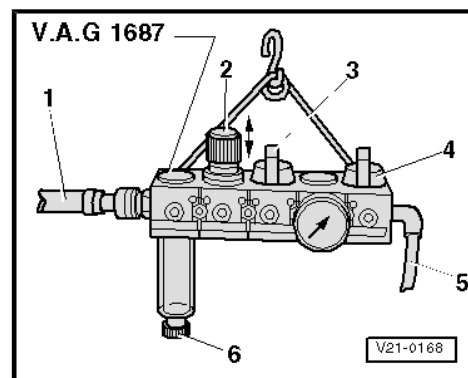
- Open valve -3-.



Caution

Risk of damage if pressure is set too high.

◆ *The pressure must not exceed 0.5 bar.*



- Adjust pressure to 0.5 bar via pressure control valve -2-.
- Open valve -4- and wait until test system is pressurised. If necessary, adjust pressure to 0.5 bar again.
- Check charge air system for audible leaks or leaks that can be felt with the hand; apply commercially available leak detecting spray or use ultrasonic tester - V.A.G 1842- .

 **Note**

- ◆ *A small amount of air escapes through the valves and enters the engine. Therefore it is not possible to perform a pressure retention test.*
- ◆ *Operation of ultrasonic tester - V.A.G 1842- ⇒ Operating instructions .*
- ◆ *Release pressure in test circuit by detaching coupling from adapter before removing adapter.*
- ◆ *Hose connections and air pipes/hoses must be free of oil and grease prior to fitting.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- ◆ *To secure the air hoses properly at their connections, spray rust remover onto the worm thread of the used hose clips before installing.*

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24 – Mixture preparation - injection

1 Injection system

⇒ [“1.1 Overview of fitting locations - injection system”, page 248](#)

1.1 Overview of fitting locations - injection system

Overview of fitting locations - engine compartment

1 - Lambda probe - G39- and Lambda probe heater - Z19-

- ❑ Exploded view ⇒ [page 286](#)

2 - Right electrohydraulic engine mounting solenoid valve - N145-

- ❑ Fitting location ⇒ [page 249](#)

3 - Lambda probe after catalytic converter - G130- and Lambda probe heater 1 after catalytic converter - Z29-

- ❑ Exploded view ⇒ [page 286](#)

4 - Coolant valve for gearbox - N488-

- ❑ Fitting location ⇒ [page 250](#)

5 - Gear detection sensor - G604-

- ❑ For vehicles with manual gearbox
- ❑ Fitting location ⇒ [page 250](#)

6 - Accelerator position sender - G79- and accelerator position sender 2 - G185-

- ❑ Fitting location ⇒ [page 249](#)
- ❑ Exploded view ⇒ Fuel supply system; Rep. gr. 20 ; Accelerator mechanism

7 - Brake light switch - F-

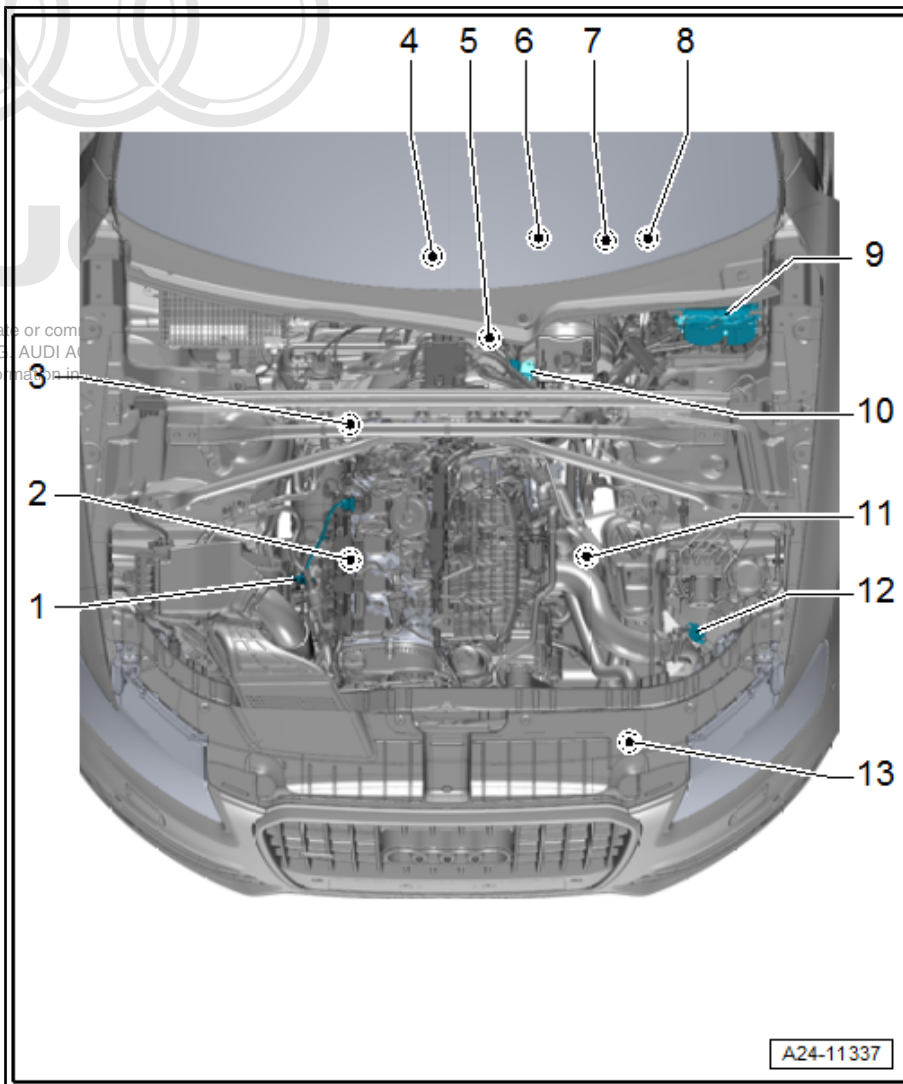
- ❑ Fitting location ⇒ [page 249](#)
- ❑ Removing and installing ⇒ Brake system; Rep. gr. 45 ; Sensors; Removing and installing brake light sensor

8 - Clutch position sender - G476-

- ❑ With clutch pedal switch - F36- / clutch pedal switch for engine start - F194-
- ❑ For vehicles with manual gearbox
- ❑ Fitting location ⇒ [page 249](#)

9 - Engine control unit - J623-

- ❑ Removing and installing ⇒ [page 289](#)



10 - Brake servo pressure sensor - G294-

11 - Left electrohydraulic engine mounting solenoid valve - N144-

- ❑ Fitting location ⇒ [page 249](#)

12 - Charge pressure sender - G31-

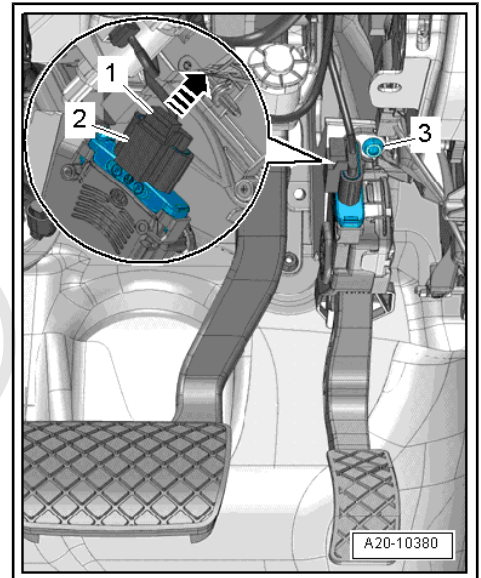
- ❑ Exploded view ⇒ [page 241](#)

13 - Radiator outlet coolant temperature sender - G83-

- ❑ Fitting location ⇒ [page 250](#)

Accelerator position sender - G79- and accelerator position sender 2 - G185-

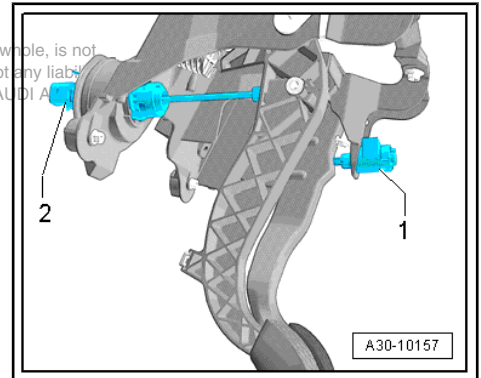
- 2 - Electrical connector



Brake light switch - F- / clutch position sender - G476-

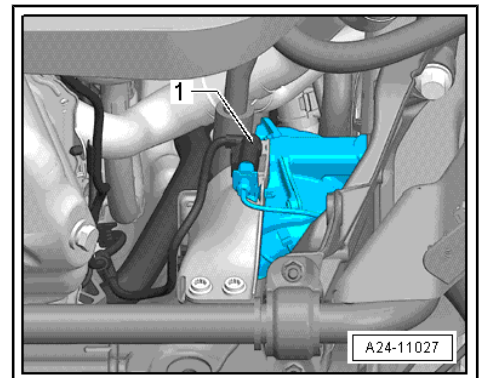
- ◆ On mounting bracket for pedal cluster

- 1 - Brake light switch - F-
- 2 - Clutch position sender - G476- with clutch pedal switch - F36- / clutch pedal switch for engine start - F194- for vehicles with manual gearbox



Fitting location of electrohydraulic engine mounting solenoid valves -N144- / -N145-

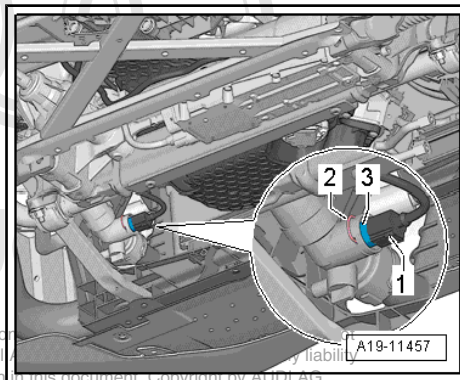
- ◆ Integrated in engine mountings (both sides)





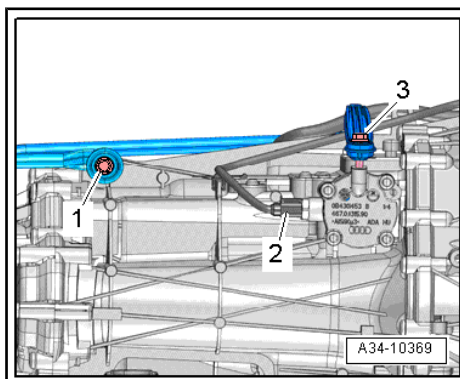
Fitting location of radiator outlet coolant temperature sender - G83-

- ◆ -Item 3- in coolant hose on radiator (bottom left)



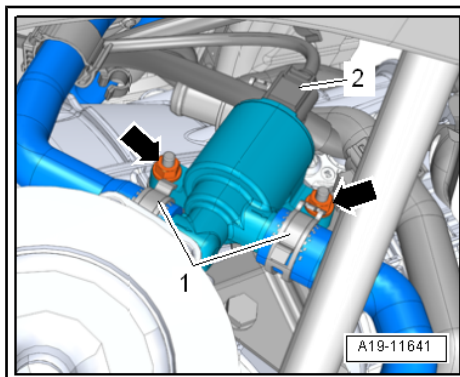
Fitting location of gear detection sensor - G604-

- ◆ On right of gearbox



Fitting location of coolant valve for gearbox - N488-

- ◆ On top of gearbox housing



Overview of fitting locations - engine (view from above)

1 - Ignition coil 1 with output stage - N70-

- Exploded view
 ⇒ [page 305](#)

2 - Ignition coil 2 with output stage - N127-

- Exploded view
 ⇒ [page 305](#)

3 - Ignition coil 3 with output stage - N291-

- Exploded view
 ⇒ [page 305](#)

4 - Ignition coil 4 with output stage - N292-

- Exploded view
 ⇒ [page 305](#)

5 - Hall sender 3 - G300-

- Exploded view
 ⇒ [page 305](#)

6 - Fuel metering valve - N290- or fuel pressure regulating valve - N276-

- Fuel metering valve - N290- or fuel pressure regulating valve - N276- may be fitted, depending on version
- Integrated in high-pressure pump

7 - Injector 2, cylinder 4 - N535-

- Exploded view
 ⇒ [page 266](#)

8 - Fuel pressure sender for low pressure - G410-

- Exploded view ⇒ [page 266](#)

9 - Intake air temperature sender - G42- / intake manifold pressure sender - G71-

- Exploded view ⇒ [page 265](#)

10 - Injector 2, cylinder 3 - N534-

- Exploded view ⇒ [page 266](#)

11 - Injector 2, cylinder 2 - N533-

- Exploded view ⇒ [page 266](#)

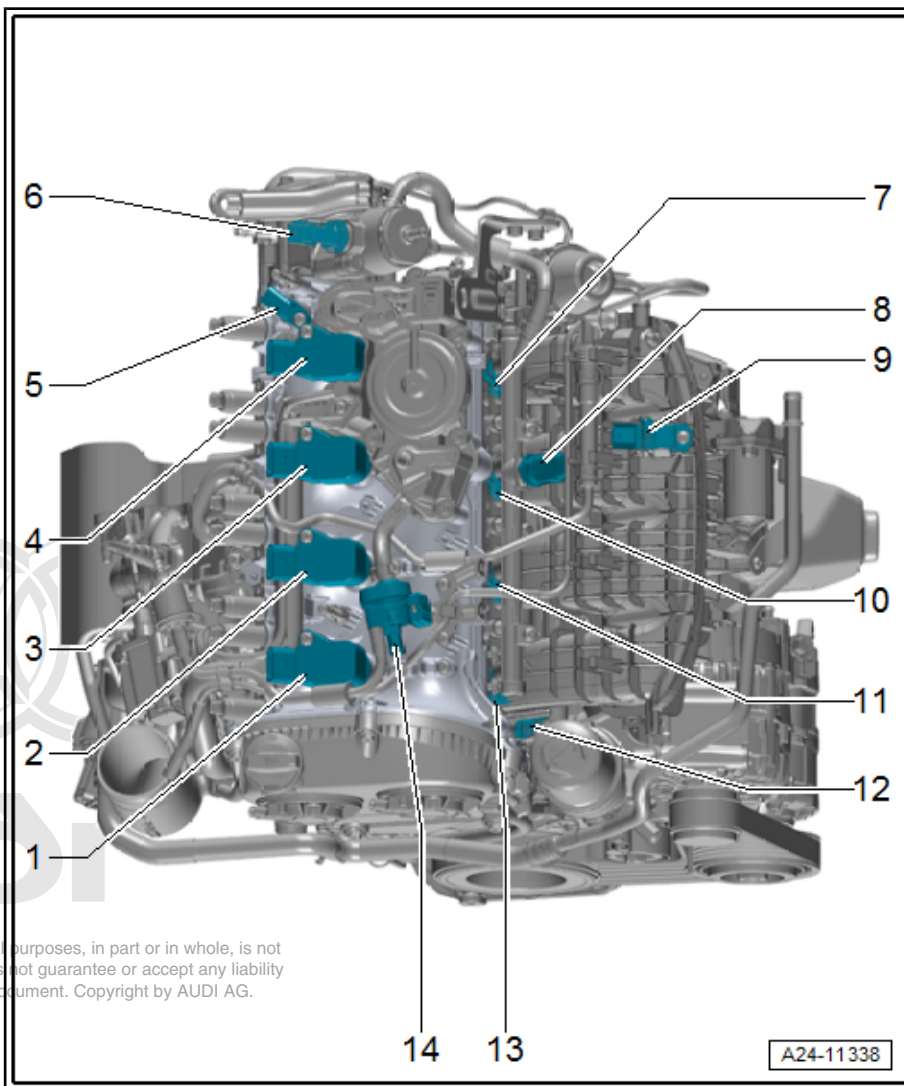
12 - Intake manifold flap potentiometer - G336-

- Exploded view ⇒ [page 265](#)

13 - Injector 2, cylinder 1 - N532-

- Exploded view ⇒ [page 266](#)

14 - Activated charcoal filter solenoid valve 1 - N80-



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Overview of fitting locations - engine (view from left side)



1 - Actuator for engine temperature regulation - N493-

2 - Injector, cylinder 2 - N31-

- ❑ Exploded view ⇒ [page 265](#)

3 - Injector, cylinder 1 - N30-

- ❑ Exploded view ⇒ [page 265](#)

4 - Fuel pressure sender - G247-

- ❑ Exploded view ⇒ [page 265](#)

5 - Throttle valve module - J338-

- ❑ Including throttle valve drive (electric throttle operation) - G186-, angle sender for throttle valve drive - G187- and angle sender 2 for throttle valve drive - G188-
- ❑ Exploded view ⇒ [page 257](#)

6 - Intake manifold flap valve - N316-

- ❑ Exploded view ⇒ [page 257](#)

7 - Hall sender - G40-

- ❑ Exploded view ⇒ [page 305](#)

8 - Injector, cylinder 4 - N33-

- ❑ Exploded view ⇒ [page 265](#)

9 - Injector, cylinder 3 - N32-

- ❑ Exploded view ⇒ [page 265](#)

10 - Stage 3 oil pressure switch - F447-

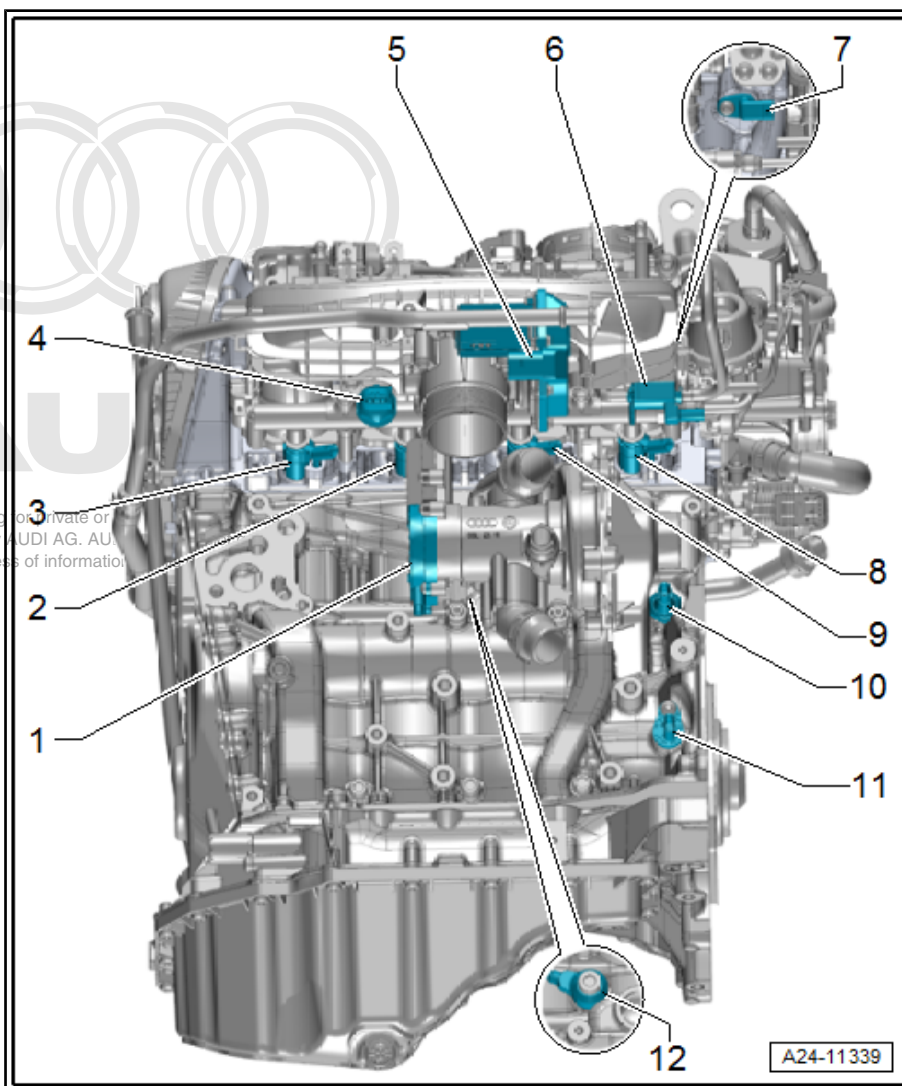
- ❑ Exploded view ⇒ [page 183](#)

11 - Engine speed sender - G28-

- ❑ Exploded view ⇒ [page 305](#)

12 - Knock sensor 1 - G61-

- ❑ Exploded view ⇒ [page 305](#)



Overview of fitting locations - engine (view from right side)

1 - Coolant temperature sender - G62-

- Exploded view
 ⇒ [page 202](#)

2 - Actuator 8 for camshaft adjustment - F373- (for cylinder No. 4)

- Exploded view
 ⇒ [page 131](#)

3 - Actuator 7 for camshaft adjustment - F372- (for cylinder No. 4)

- Exploded view
 ⇒ [page 131](#)

4 - Actuator 6 for camshaft adjustment - F371- (for cylinder No. 3)

- Exploded view
 ⇒ [page 131](#)

5 - Actuator 5 for camshaft adjustment - F370- (for cylinder No. 3)

- Exploded view
 ⇒ [page 131](#)

6 - Actuator 4 for camshaft adjustment - F369- (for cylinder No. 2)

- Exploded view
 ⇒ [page 131](#)

7 - Actuator 3 for camshaft adjustment - F368- (for cylinder No. 2)

- Exploded view
 ⇒ [page 131](#)

8 - Actuator 2 for camshaft adjustment - F367- (for cylinder No. 1)

- Exploded view ⇒ [page 131](#)

9 - Actuator 1 for camshaft adjustment - F366- (for cylinder No. 1)

- Exploded view ⇒ [page 131](#)

10 - Charge pressure positioner - V465- with position sender for charge pressure positioner - G581-

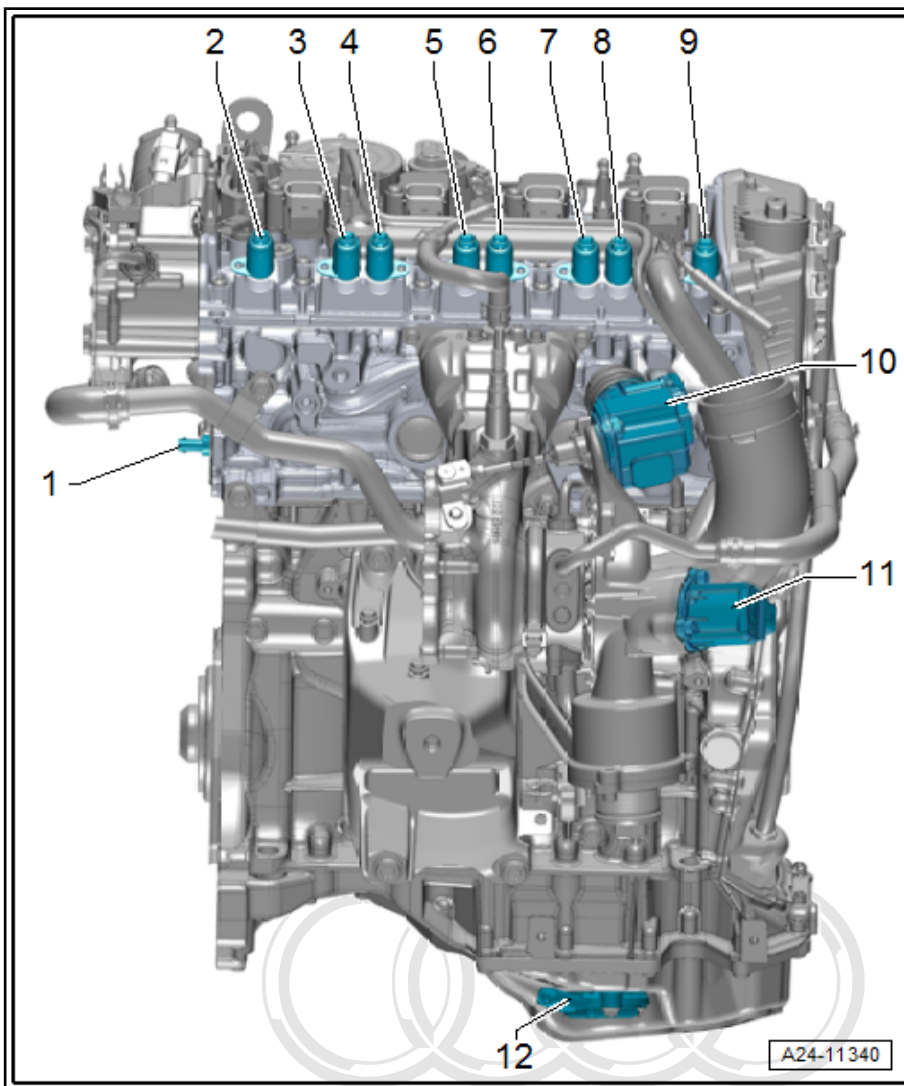
- Exploded view ⇒ [page 233](#)

11 - Turbocharger air recirculation valve - N249-

- Exploded view ⇒ [page 233](#)

12 - Oil level and oil temperature sender - G266-

- Exploded view ⇒ [page 165](#)



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Overview of fitting locations - engine (view from front)



1 - Exhaust camshaft control valve 1 - N318-

- Exploded view
⇒ [page 80](#)

2 - Camshaft control valve 1 - N205-

- Exploded view
⇒ [page 80](#)

3 - Oil pressure switch - F22-

- Exploded view
⇒ [page 183](#)

4 - Oil pressure switch for reduced oil pressure - F378-

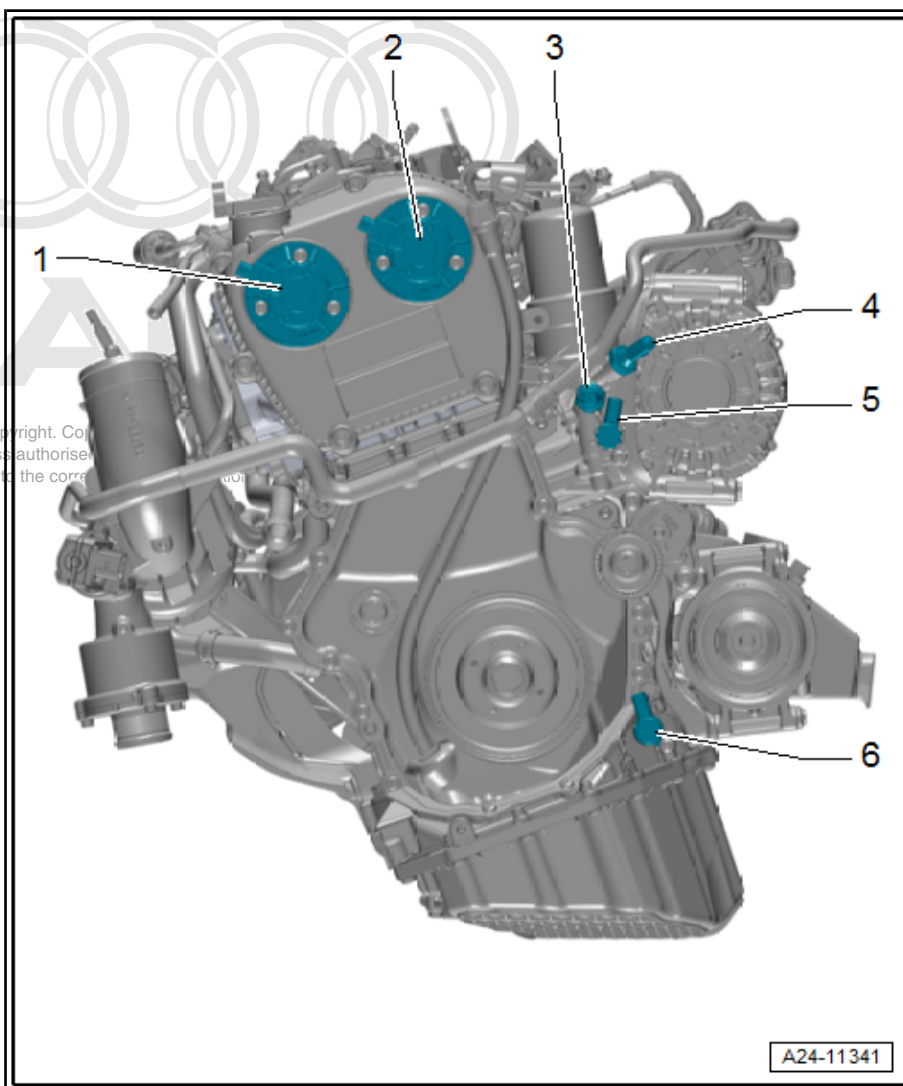
- Exploded view
⇒ [page 183](#)

5 - Piston cooling jet control valve - N522-

- Exploded view
⇒ [page 183](#)

6 - Valve for oil pressure control - N428-

- Exploded view
⇒ [page 183](#)



2 Air cleaner

⇒ ["2.1 Exploded view - air cleaner housing", page 255](#)

⇒ ["2.2 Removing and installing air cleaner housing", page 256](#)

2.1 Exploded view - air cleaner housing

1 - Air hose

2 - Hose clip

3 - Air duct

- Clipped into air cleaner housing
- Clean dirt and leaves out of air duct

4 - Air duct

- Clean dirt and leaves out of air duct

5 - Air duct

- Secure to lock carrier (2 Nm)
- Clean dirt and leaves out of air duct

6 - Rubber grommet

7 - Water drain hose

- Clean connection

8 - Guide for water drain hose

9 - Air cleaner (bottom section)

10 - Retainer for air cleaner (bottom section)

- Must engage positively
- Do not use any lubricants

11 - Air filter element

- Maintenance intervals ⇒ Maintenance tables
- Removing and installing: A4 ⇒ Maintenance ; Booklet 812 , A5 ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818
- Always use genuine part for air filter element
- Also clean snow screen (if fitted)

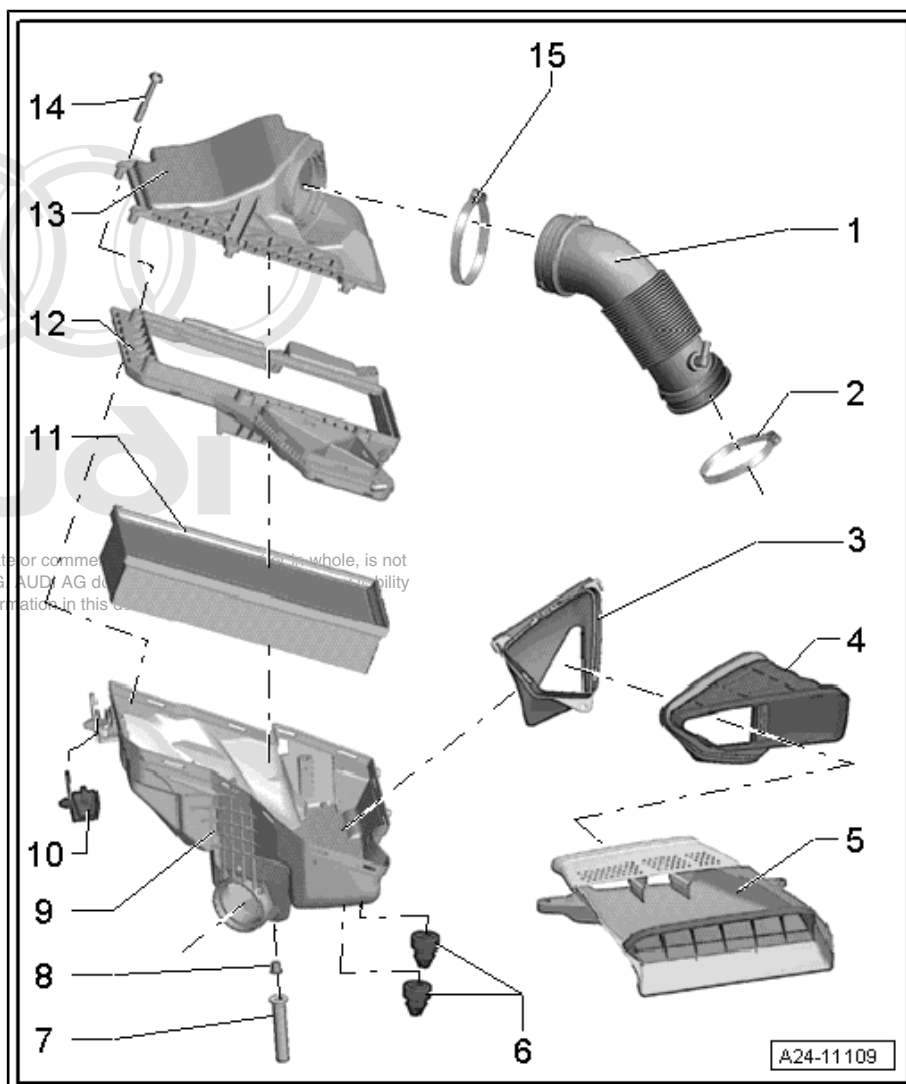
12 - Frame insert for air cleaner (bottom section)

13 - Air cleaner (top section)

- Clean any salt residue, leaves and dirt out of air cleaner (top section)

14 - Bolt

15 - Hose clip





2.2 Removing and installing air cleaner housing

Removing

- Release hose clip -1- securing air hose (going to turbocharger) and disconnect hose from air cleaner housing.
- Remove air duct -2-.
- Release retainer -3- for bottom section of air cleaner (press in rubber on left and right side and pull upwards).



Note

Do not use lubricants when installing retainer.

- Carefully take out complete air cleaner housing.

Installing



Note

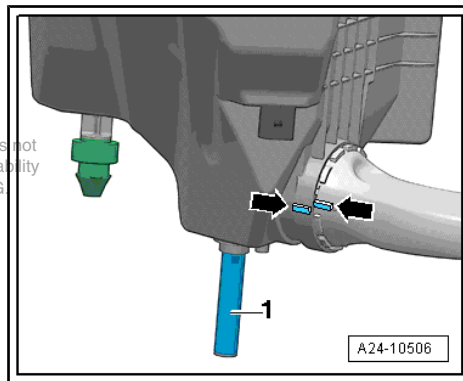
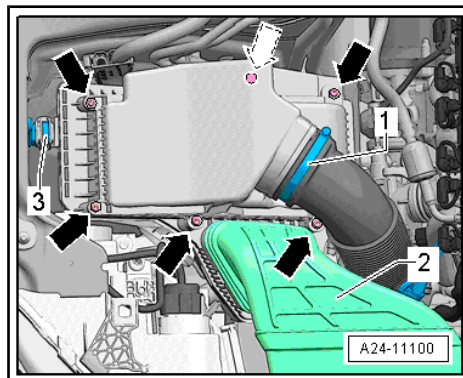
- ◆ *Always use genuine air filter elements (same as original equipment).*
- ◆ *Use a silicone-free lubricant when installing the air hose.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

- If hot air intake is fitted (for countries with cold climates only), make sure that air intake connection has engaged properly -arrows- (pay attention to markings).
- Check water drain hose -1- in air cleaner (bottom section) for dirt and other obstructions (clean if necessary).
- Check air hose (engine intake side) for salt residue, dirt and leaves.
- Check intake duct as far as air filter element for dirt.
- Re-install air cleaner housing.



Note

The water drain hose must be routed straight downwards without kinks.



3 Intake manifold

⇒ [“3.1 Exploded view - intake manifold”, page 257](#)

⇒ [“3.2 Removing and installing intake manifold”, page 258](#)

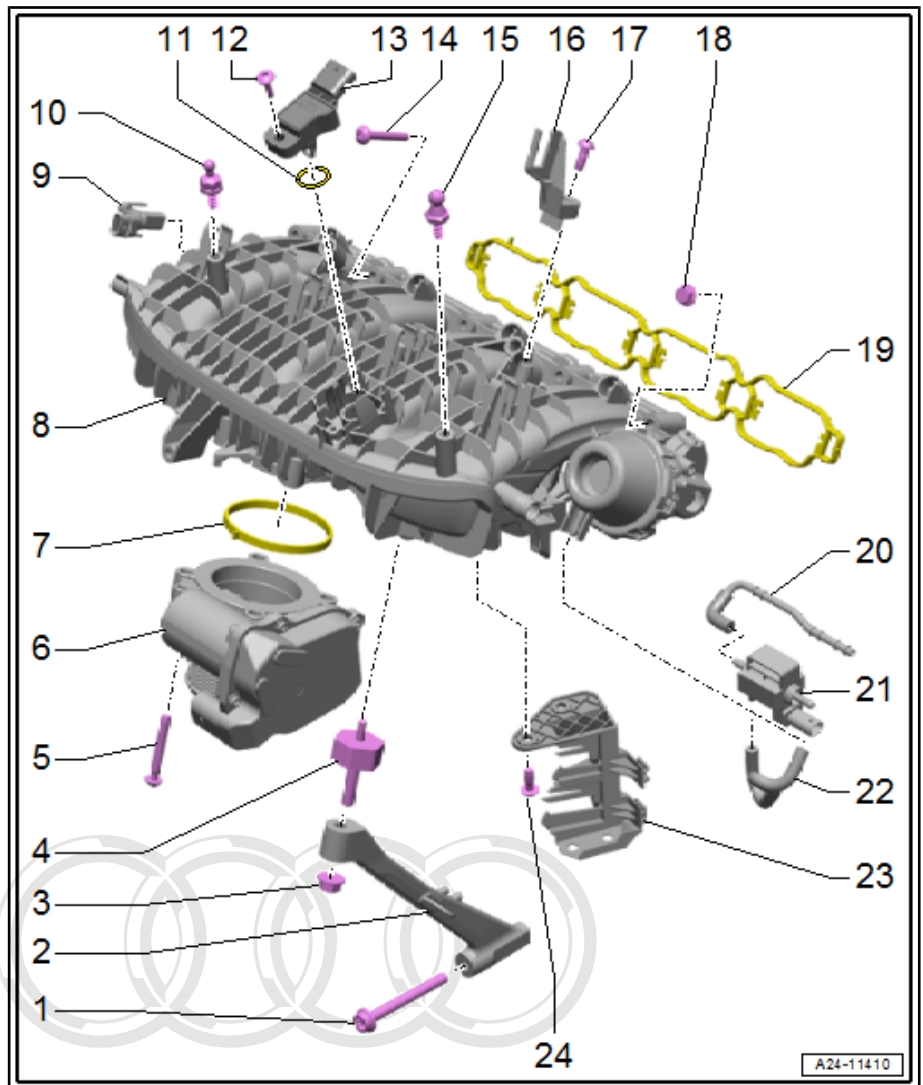
⇒ [“3.3 Removing and installing throttle valve module J338”, page 261](#)

⇒ [“3.4 Cleaning throttle valve module”, page 262](#)

⇒ [“3.5 Checking intake manifold change-over function”, page 263](#)

3.1 Exploded view - intake manifold

- 1 - Bolt
 - 20 Nm
- 2 - Support for intake manifold
- 3 - Nut
 - 10 Nm
- 4 - Bonded rubber bush
 - 5 Nm
- 5 - Bolt
 - 7 Nm
- 6 - Throttle valve module - J338-
 - Including throttle valve drive for electric throttle - G186-, throttle valve drive angle sender 1 for electric throttle - G187- and throttle valve drive angle sender 2 for electric throttle - G188-
 - Throttle valve module - J338- must be re-adapted to engine control unit - J623- after it has been removed, installed or renewed; see “Guided Functions” using ⇒ Vehicle diagnostic tester
- 7 - Seal
 - Renew after removing
- 8 - Intake manifold
 - Removing and installing ⇒ [page 258](#)
- 9 - Intake manifold flap potentiometer - G336-
- 10 - Ball stud
 - For engine cover panel
 - 5 Nm
- 11 - O-ring
 - Renew after removing



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12 - Bolt

- 1.5 Nm

13 - Intake air temperature sender - G42- / intake manifold pressure sender - G71-

- Removing and installing ⇒ [page 281](#)

14 - Bolt

- Tighten in several stages and in diagonal sequence
- 9 Nm

15 - Ball stud

- For engine cover panel
- 5 Nm

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16 - Bracket

- For electrical connector

17 - Bolt

- 5 Nm

18 - Nut

- 9 Nm
- Tighten in several stages and in diagonal sequence

19 - Gasket

- Renew after removing

20 - Vacuum hose

21 - Intake manifold flap valve - N316-

22 - Vacuum hose

23 - Bracket

- For electrical connectors

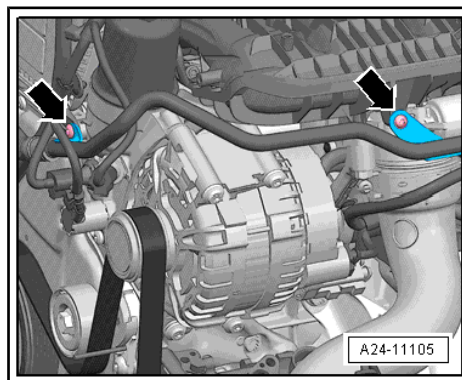
24 - Bolt

- 5 Nm

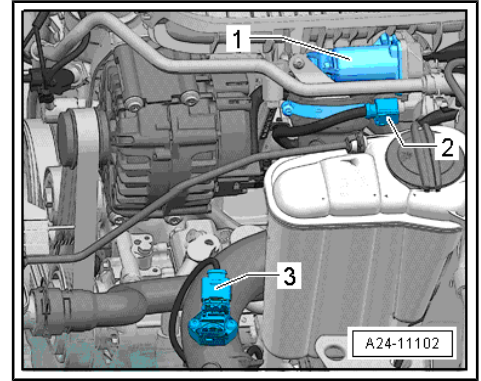
3.2 Removing and installing intake manifold

Removing

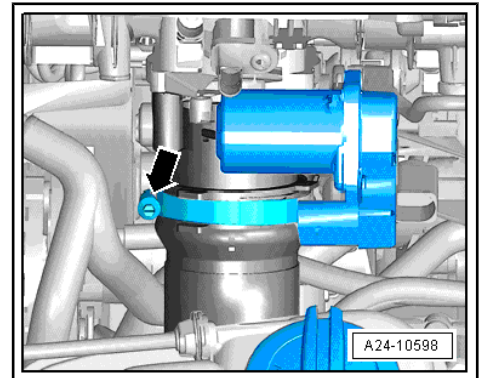
- Remove engine cover panel ⇒ [page 37](#) .
- Unscrew bolts -arrows- for coolant line from intake manifold.



- Unplug electrical connector -2- from throttle valve module - J338- .



- Release hose clip -arrow- on air hose and pull air hose downwards off throttle valve module - J338- .



- Unplug the following electrical connectors:

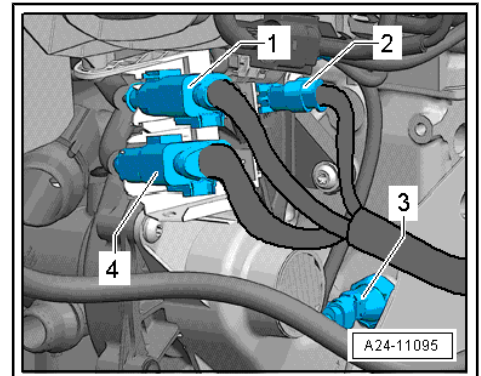
1 - From FSI injectors

2 - From knock sensor 1 - G61-

4 - For intake manifold flap valve - N316- , fuel pressure sender - G247- , intake manifold flap potentiometer - G336- , coolant temperature sender - G62- and Hall sender - G40-

- Detach vacuum line -1- and coolant line -2- from intake manifold.

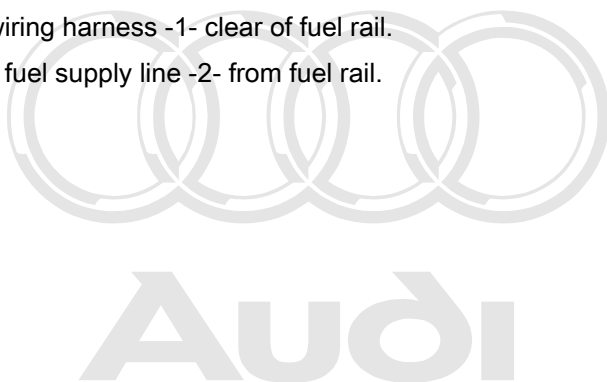
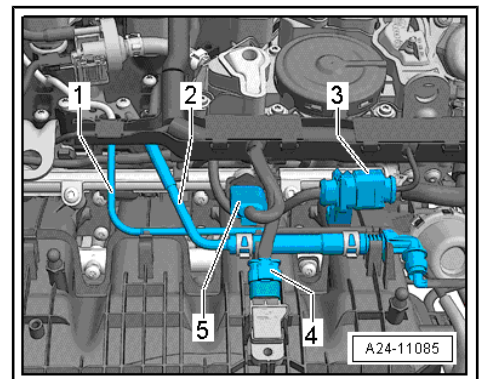
- Detach electrical connector -3- from retainer.



- Unplug electrical connectors -4 and 5-

- Move wiring harness -1- clear of fuel rail.

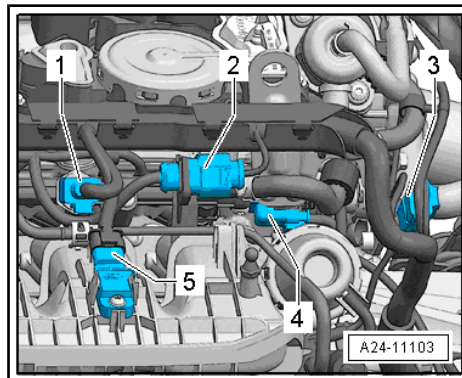
- Detach fuel supply line -2- from fuel rail.



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- Unplug electrical connector -4-.
- Unplug electrical connector for intake manifold flap valve - N316- -2-.

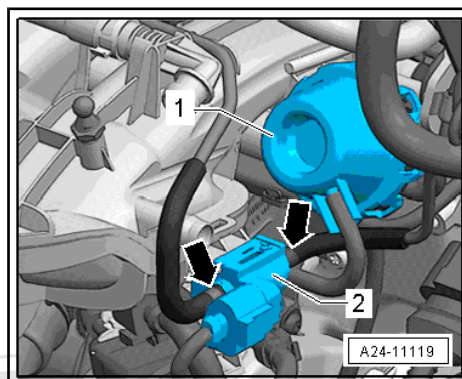


- Disconnect vacuum lines -arrows- from intake manifold flap valve - N316- -2-.

! WARNING

*The fuel system is pressurised.
Risk of injury as fuel may spray out.*

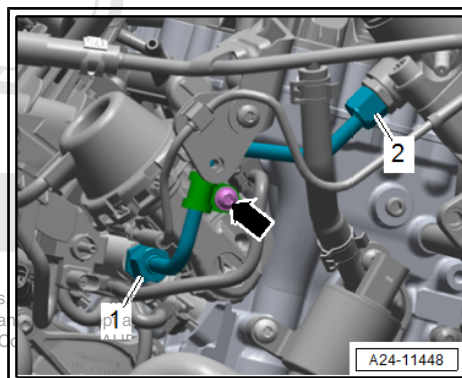
- Put on safety goggles.
- Put on protective gloves.
- Release pressure (wrap clean cloth around connection and open connection carefully).



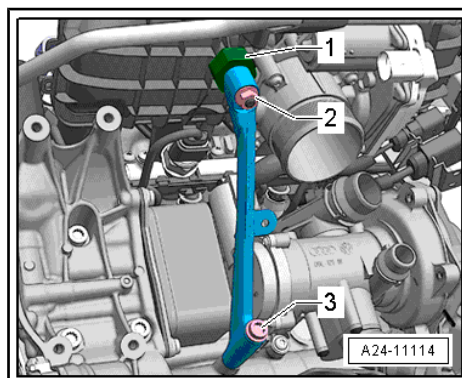
- Unscrew bolt -arrow- and union nuts -1, 2-.
- Take out high-pressure pipe.

i Note

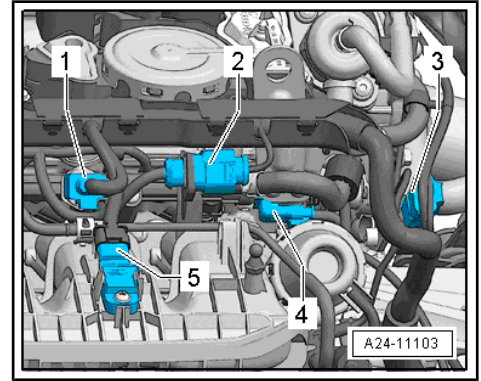
- ◆ The fuel system must not be under pressure.
- ◆ Use a clean cloth to catch escaping fuel.
- ◆ Seal off open connections with clean caps. Make sure no dirt gets into the fuel system.



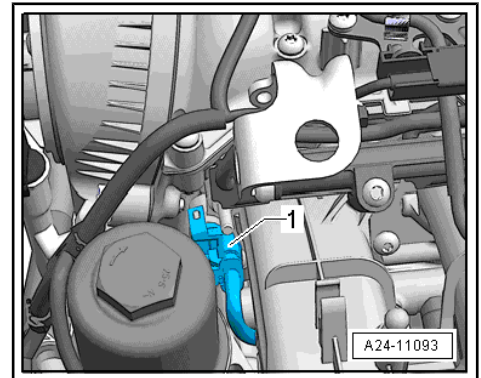
- Slightly loosen securing nut -2- and remove bolt -3-.



- Unplug electrical connector -4- from Hall sender - G40- .
- Open oil filter by a few turns.



- Unplug electrical connector -1- from intake manifold flap potentiometer - G336- .
- Unscrew bolts from intake manifold.



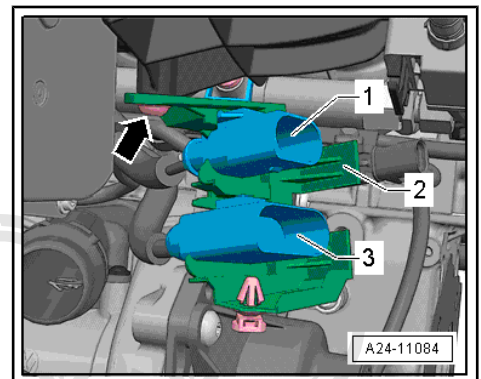
- Pull intake manifold slightly off cylinder head and detach bracket for electrical connectors.

 **Note**

Block off intake ports with a clean cloth.

Installing

- Renew both connecting pieces for high-pressure pipe.
- Re-connect bracket for electrical connectors.
- Fit intake manifold onto studs (left and right) on cylinder head.
- Remaining installation steps are carried out in reverse sequence; note the following:
- Install engine cover panel ⇒ [page 37](#) .



Tightening torques

- ◆ ⇒ [“4.1.1 Exploded view - fuel rail with injectors, FSI engines”, page 265](#)

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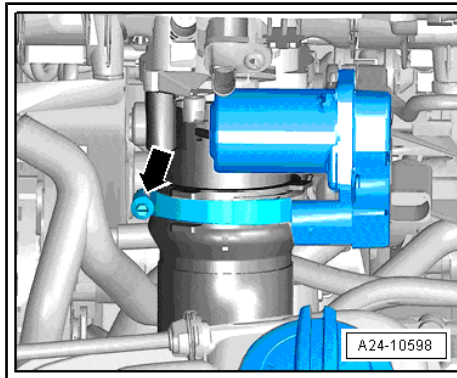
3.3 Removing and installing throttle valve module - J338-

Removing

- Remove engine cover panel ⇒ [page 37](#) .



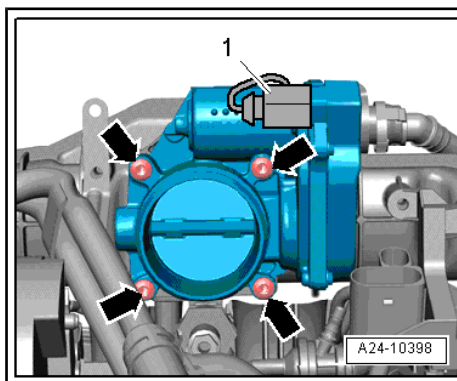
- Open hose clip -arrow- securing air hose and disconnect hose downwards from throttle valve module - J338- .
- Unplug electrical connector -1- from throttle valve module - J338- .



- Remove the four bolts -arrows- from throttle valve module - J338- and detach throttle valve module - J338- .

Installing

- Remaining installation steps are carried out in reverse sequence; note the following:
- Clean sealing surface for seal.
- Renew seal.
- Install engine cover panel ⇒ [page 37](#) .
- After renewing, perform “Adaption” for engine control unit - J623- / throttle valve module - J338- using ⇒ Vehicle diagnostic tester, [\[Guided Functions\]](#).



Tightening torques

- ◆ ⇒ [“3.1 Exploded view - intake manifold”, page 257](#)

3.4 Cleaning throttle valve module



Note

Take care not to scratch the throttle valve housing when cleaning it.

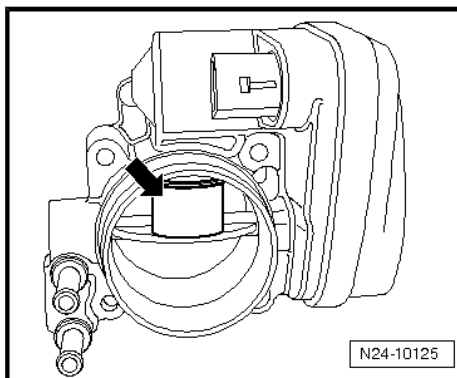
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- Remove throttle valve module - J338- ⇒ [page 261](#) .
- Open throttle valve by hand and block it in the open position with a suitable object (e.g. plastic or wooden wedge) -arrow-.

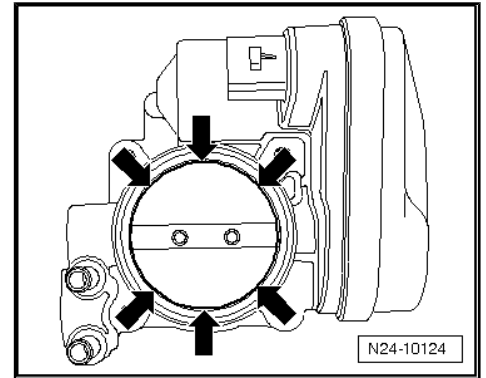


WARNING

Acetone is highly flammable. Please observe all accident prevention regulations and safety precautions when handling flammable liquids. Do not use compressed air when cleaning the throttle valve. Wear safety goggles and protective clothing to avoid possible injury and skin contact.



- Clean throttle valve housing thoroughly, especially around the points -arrows- where the throttle valve closes, using commercially available acetone and a small brush.
- Wipe out throttle valve housing with a lint-free cloth.
- Allow acetone to evaporate completely and re-install throttle valve module after cleaning.
- Erase learnt values and perform "Adaption" for engine control unit - J623- / throttle valve module - J338- using ⇒ Vehicle diagnostic tester, Guided Functions.

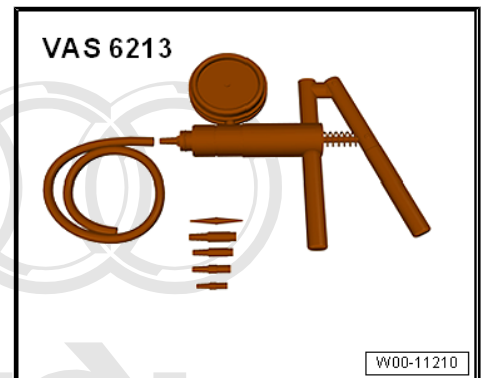


3.5 Checking intake manifold change-over function

Only perform this test if there is a loss of engine torque (poor flexibility or lack of pulling power).

Special tools and workshop equipment required

- ◆ Hand vacuum pump - VAS 6213-



Test condition

- ◆ Intake manifold flap valve - N316- has been checked with a vehicle diagnostic tester.

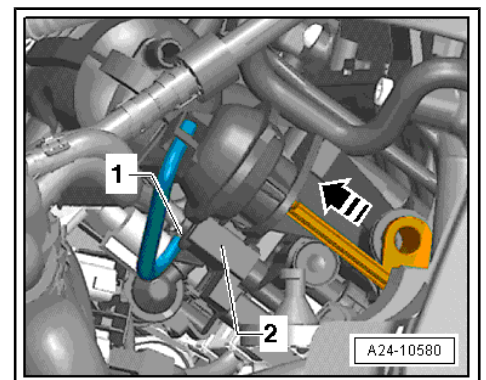
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Perform the following steps if the intake manifold flap valve - N316- is OK.

- Remove engine cover panel ⇒ [page 37](#) .
- Start engine and run at idling speed.
- Have a second mechanic rev up engine quickly (short burst of throttle) and observe vacuum unit for intake manifold change-over.
- The vacuum unit should pick up -arrow-.

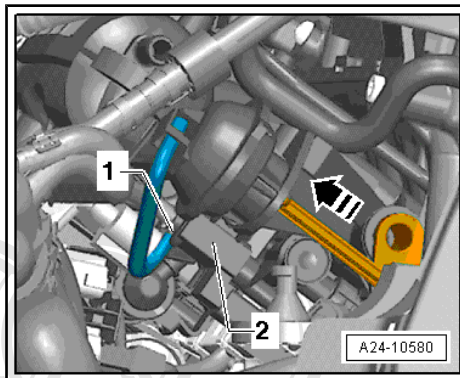
If the change-over does not operate as described:

- Check vacuum system for leaks.
- Check that change-over mechanism moves freely by moving linkage manually.
- Check proper connection of vacuum lines.
- Check vacuum hoses for porosity.

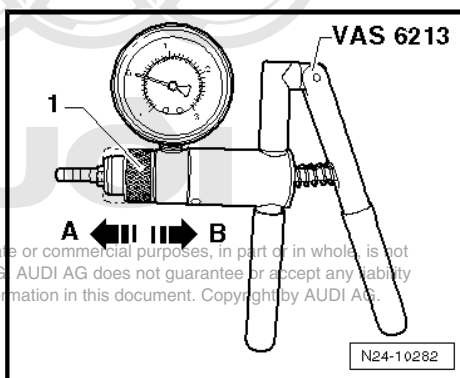




- Detach vacuum hose -1- from intake manifold flap valve - N316- -2-.

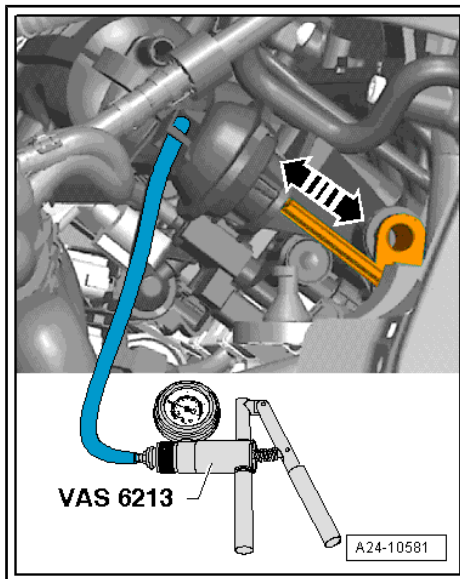


- Move adjuster ring -1- on hand vacuum pump - VAS 6213- to position -A- to select "vacuum".



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- Connect hand vacuum pump - VAS 6213- to vacuum unit for intake manifold flap valve - N316- .
 - Operate the hand vacuum pump - VAS 6213- several times. The linkage should now pick up.
 - Vent vacuum. Linkage should return to initial position.
- Linkage should move in both directions (arrows).
- Renew vacuum unit if linkage does not move.



4 Injectors

⇒ [“4.1 Exploded view - fuel rail with injectors”, page 265](#)

⇒ [“4.2 Removing and installing fuel rail”, page 267](#)

⇒ [“4.3 Removing and installing injectors”, page 268](#)

⇒ [“4.4 Cleaning injectors”, page 274](#)

4.1 Exploded view - fuel rail with injectors

⇒ [“4.1.1 Exploded view - fuel rail with injectors, FSI engines”, page 265](#)

⇒ [“4.1.2 Exploded view - fuel rail with injectors, MPI engines”, page 266](#)

4.1.1 Exploded view - fuel rail with injectors, FSI engines

1 - Bolt

- 9 Nm

2 - Fuel rail for FSI injectors

- Removing and installing
 ⇒ [“4.2 Removing and installing fuel rail”, page 267](#)

3 - Fuel pressure sender

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- Lubricate taper lightly with clean engine oil; do not lubricate thread
- Removing and installing
 ⇒ [page 276](#)
- 27 Nm

4 - Support ring

- Renew after removing

5 - O-ring

- Renew after removing

6 - Spacer ring

- Renew after removing

7 - Injector

- Ensure correct installation position.
- Removing and installing
 ⇒ [page 268](#)

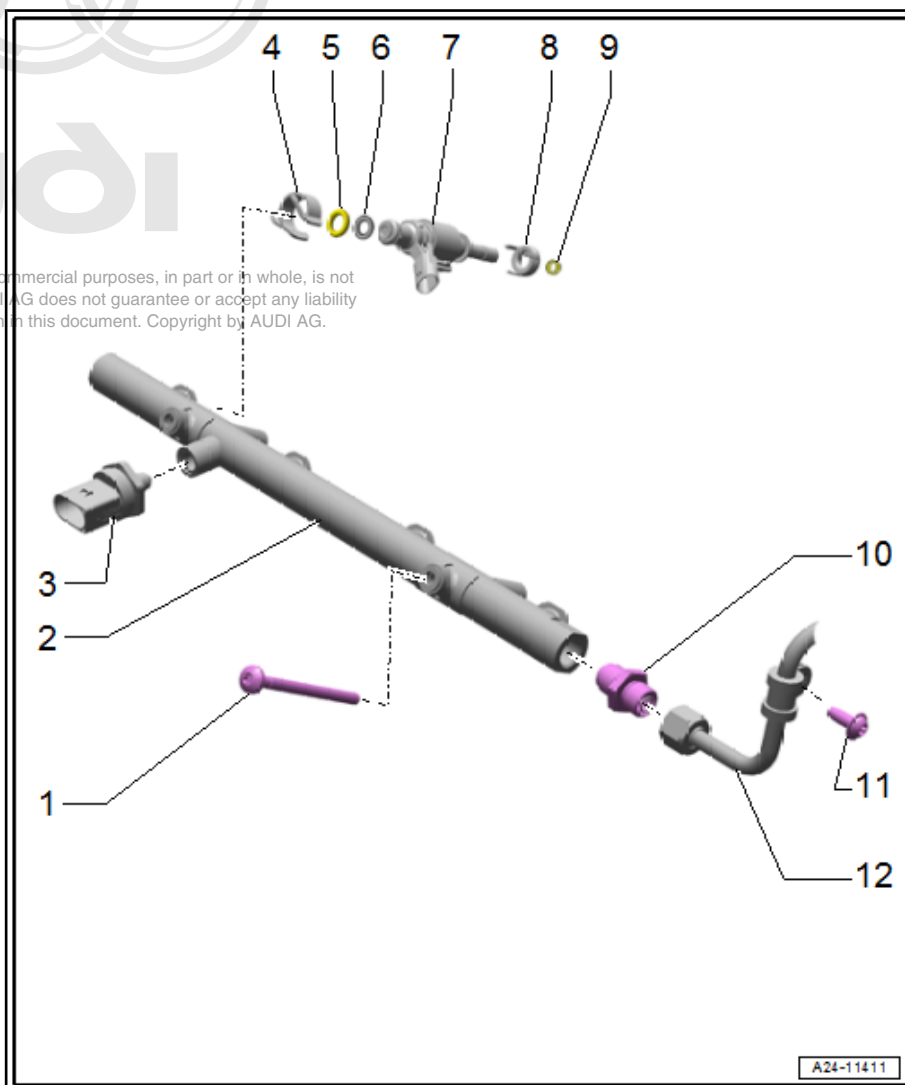
8 - Sealing element

9 - Combustion chamber ring seal

- Renewing after injector has been removed
 ⇒ [page 268](#)

10 - Connecting piece

- For high-pressure pipe on fuel rail
- Renew after removing
- Lubricate threads lightly with clean engine oil





- 40 Nm

11 - Bolt

- 5 Nm

12 - High-pressure pipe

- Lubricate ball lightly with clean engine oil
- 27 Nm

4.1.2 Exploded view - fuel rail with injectors, MPI engines

1 - Retaining clip

- For fuel pressure sender for low pressure - G410-

2 - O-ring

- Renew after removing

3 - Adapter

- Must be screwed onto fuel pressure sender for low pressure - G410- -item 4-
- 27 Nm

4 - Fuel pressure sender for low pressure - G410-

- Must be screwed onto adapter -item 3-
- Removing and installing ⇒ [page 279](#)
- 27 Nm

5 - Fuel rail for MPI injectors

6 - Bolt

- 9 Nm

7 - Spring-type clip

- Renew

8 - Fuel supply line

- To fuel rail for MPI injectors
- Install so that parts are free of tension

9 - Retaining clip

10 - O-ring

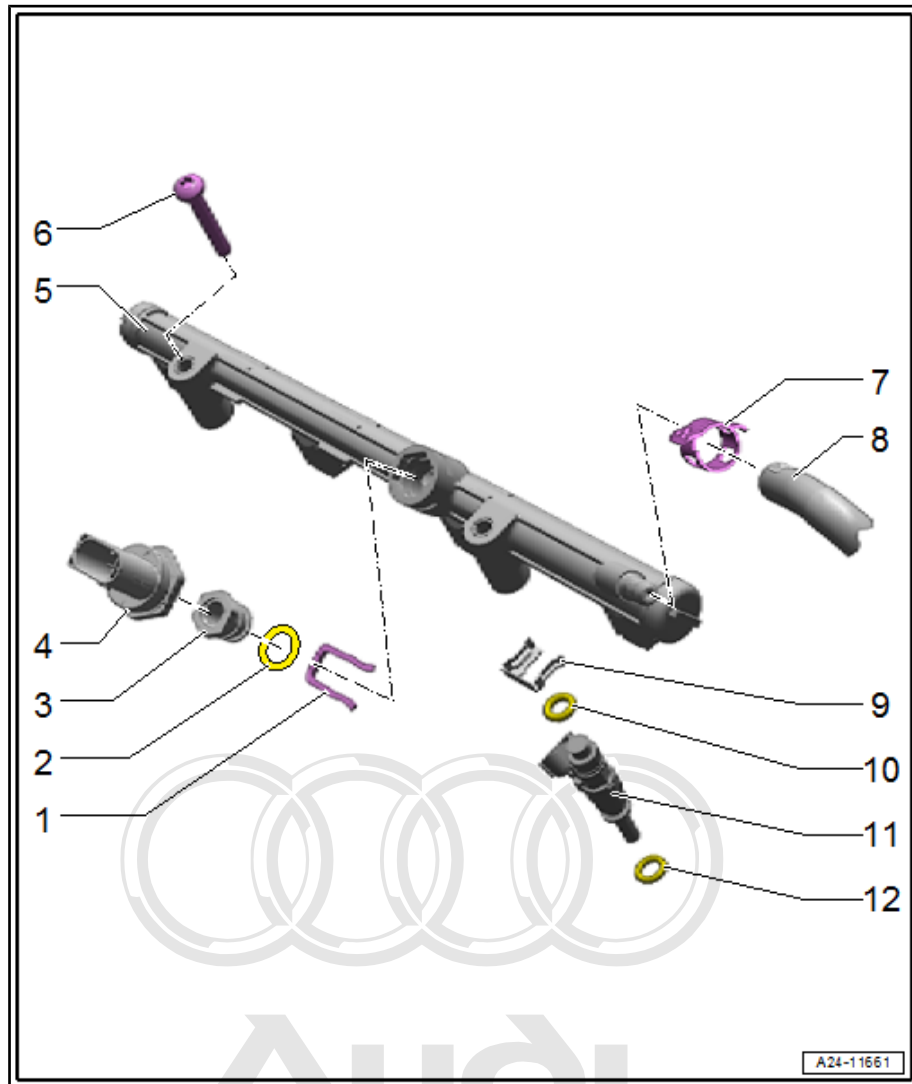
- Renew after removing

11 - Injector

- Ensure correct installation position.
- Removing and installing ⇒ [page 273](#)

12 - O-ring

- Renew after removing



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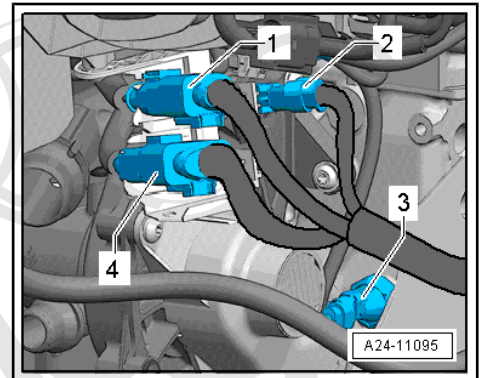
4.2 Removing and installing fuel rail



The following procedure applies to the fuel rail for FSI injectors.

Removing

- Remove intake manifold ⇒ [page 258](#) .
- Unplug electrical connector -3- from stage 3 oil pressure switch - F447- .
- Unplug all electrical connectors at injectors.



- Unscrew bolts -arrows- from fuel rail.
- Detach fuel rail from cylinder head.

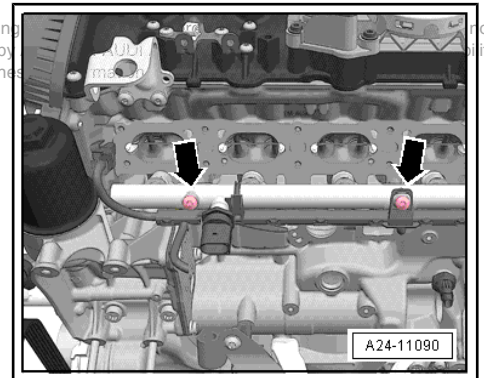
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Installing

- Install in reverse sequence.
- Install intake manifold ⇒ [page 258](#) .

Tightening torques

- ◆ ⇒ [“4.1.1 Exploded view - fuel rail with injectors, FSI engines”, page 265](#)





4.3 Removing and installing injectors

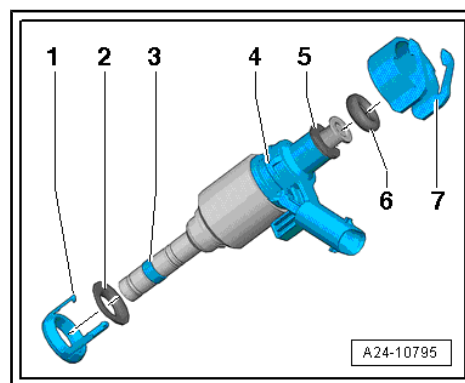
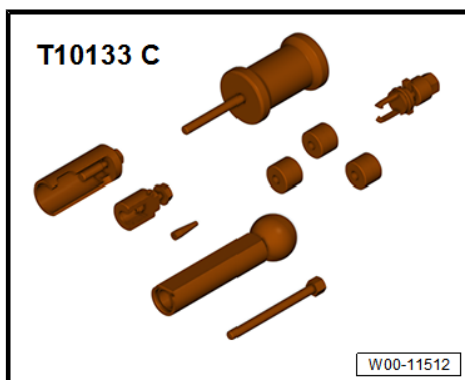
⇒ [“4.3.1 Removing and installing injectors, FSI engines”, page 268](#)

⇒ [“4.3.2 Removing and installing injectors, MPI engines”, page 273](#)

4.3.1 Removing and installing injectors, FSI engines

Special tools and workshop equipment required

- ◆ Tool set for FSI engines - T10133 C-



Exploded view - injector

- 1 - Sealing element (renew)
- 2 - Retainer (renew)
- 3 - Combustion chamber ring seal (teflon ring seal) - renew; when fitting, do not grease ring or use any other lubricant.
- 4 - Injector
- 5 - Spacer ring (renew)
- 6 - O-ring - renew (apply thin coating of clean engine oil prior to installation)
- 7 - Support ring (renew - via this support ring, fuel rail exerts force which secures injector in cylinder head)

Removing



Note

Injectors must only be installed when the engine is cold.

- Remove fuel rail
⇒ [page 267](#) .

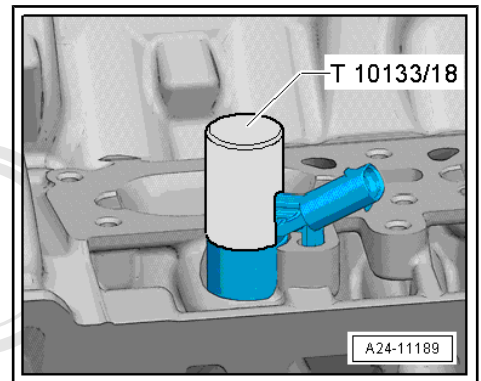


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 **Note**

Carefully pull out any injectors that remain lodged in the fuel rail.

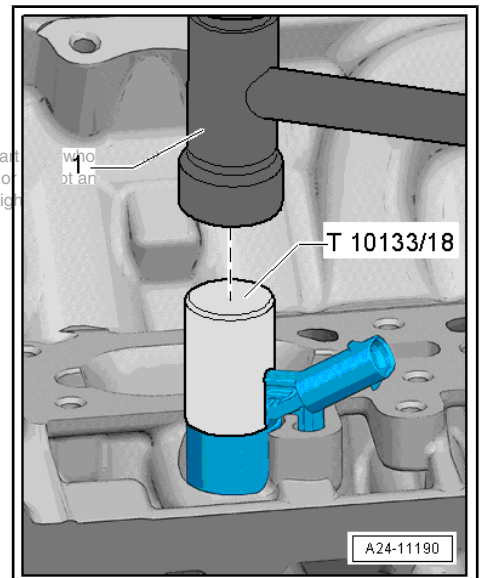
- Remove the injectors if they remain lodged in the cylinder head.
- Cover open inlet ports with a clean cloth.
- Unplug electrical connector on injector that is to be removed and pull off support ring.
- Slide sleeve -T10133/18- over injector.



- Knock against stop sleeve several times to loosen injector.

 **Note**

- ◆ *Use a torque wrench to pull out injector.*
- ◆ *Adjust torque wrench to 5 Nm.*





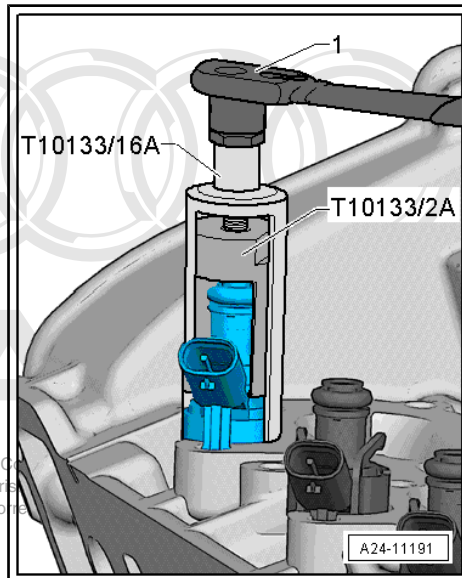
- Fit puller -T10133/2A- to groove on injector.
- Then fit guide puller T10133/16A .
- Pull out injector by turning bolt with torque wrench -1-.
- If injector does not come loose after limit torque of 5 Nm is reached, remove puller and repeat procedure using stop sleeve to loosen injector.



Note

- ◆ *Observe correct torque to avoid irreparable damage to injector.*
- ◆ *The combustion chamber ring seal must always be renewed before the injector is re-installed.*

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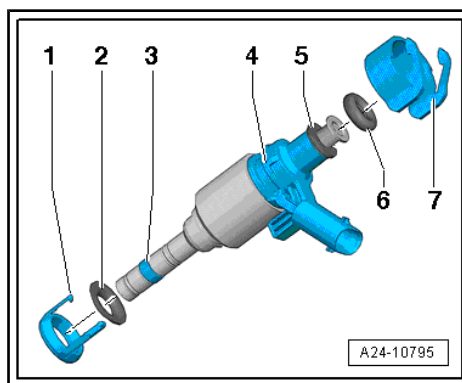
Dismantling injector

- Pull O-ring -6- and spacer ring -5- off injector -4-.
- Unclip sealing element -1-.
- Carefully remove old combustion chamber ring seal -3-. To do so, cut open combustion chamber ring seal using knife or prise open with small screwdriver and then pull off forwards.



Note

Take care not to damage groove on injector. Injector must be renewed if groove is damaged.

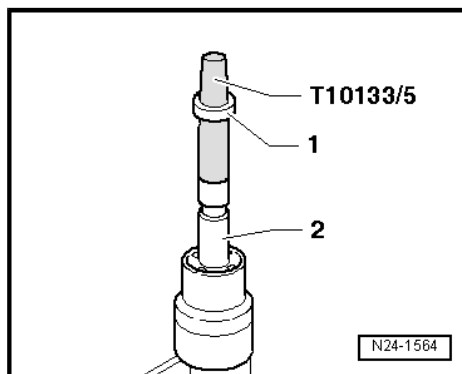


Installing

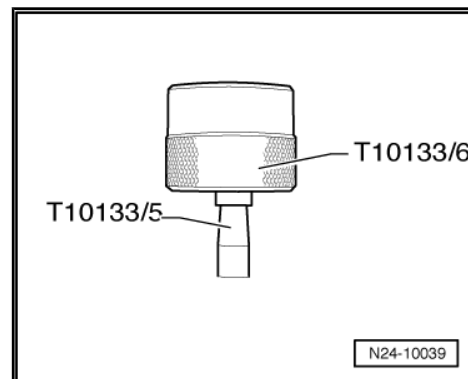


Note

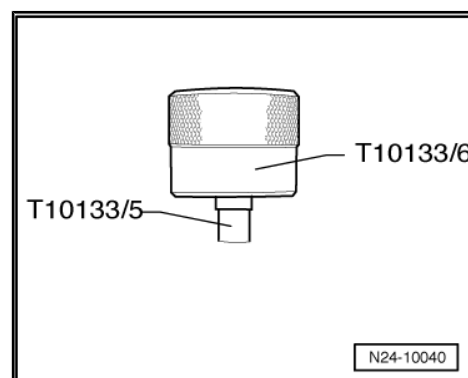
- ◆ *Renew sealing element, combustion chamber ring seal and O-ring.*
- ◆ *Renew spacer ring if damaged.*
- ◆ *Lubricate O-rings of injectors lightly with clean engine oil.*
- Before new combustion chamber ring seal is fitted, any combustion residue must be removed from ring groove and injector stem using a clean cloth.
- Fit assembly cone -T10133/5- with new combustion chamber ring seal -1- onto injector -2-.



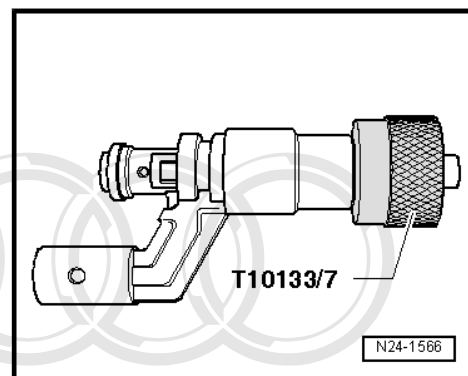
- Using assembly sleeve -T10133/6- , push combustion chamber ring seal onto assembly cone -T10133/5- as far as it will go.



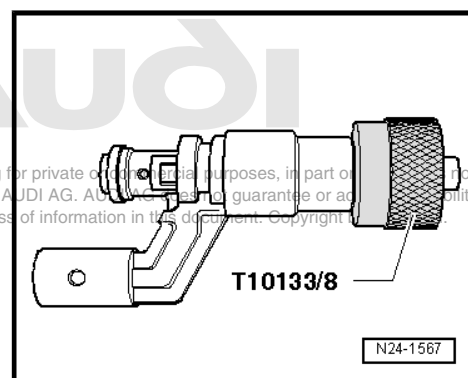
- Turn assembly sleeve - T10133/6- upside down and push combustion chamber ring seal to end of assembly cone - T10133/5- .
- Remove assembly cone - T10133/5- and push combustion chamber ring seal into sealing ring groove using assembly sleeve - T10133/6- .



- Push calibration sleeve -T10133/7- onto injector as far as it will go and simultaneously turn it slightly (approx. 180°).
- Pull calibration sleeve -T10133/7- off again by turning it in the opposite direction.



- Push calibration sleeve -T10133/8- onto injector as far as it will go and simultaneously turn it slightly (approx. 180°).
- Pull calibration sleeve -T10133/8- off again by turning it in the opposite direction.
- Fully assemble injector using parts from repair kit.



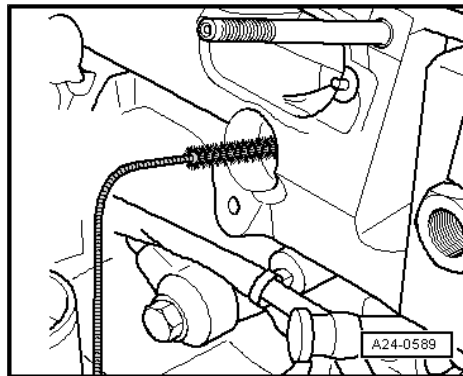
 **Note**

- ◆ *The combustion chamber ring seal on the injector must not be oiled or greased.*
- ◆ *Make sure that there is no cleaning fluid or oil in the holes in the cylinder head when installing the injectors.*

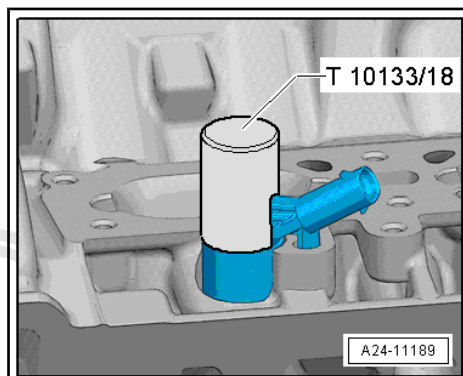
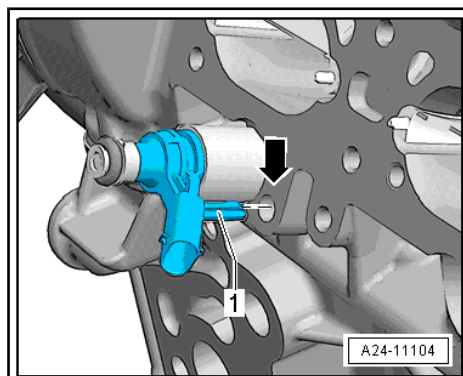
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- Before installing injectors, thoroughly clean apertures for injectors in cylinder head using supplied nylon brush - T10133/4- .



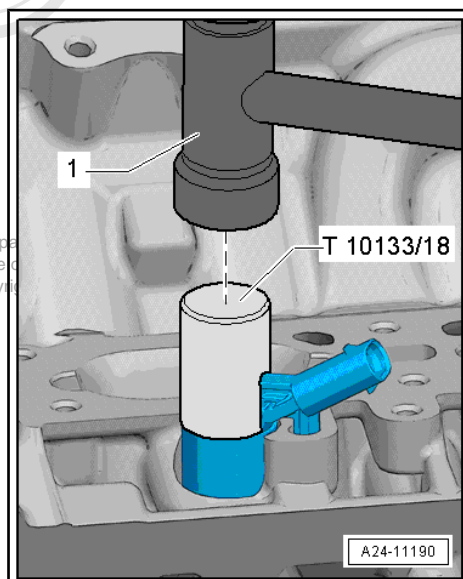
- Press injector by hand as far as it will go into aperture in cylinder head (aperture must be free of oil and grease). Ensure that the injector is properly seated -arrow- in the cylinder head.
- Lug -1- and hole -arrow- in cylinder head must face each other.



i Note

- ◆ *It should be possible to insert injector easily. If necessary wait until the combustion chamber ring seal has contracted sufficiently.*
- ◆ *Note correct installation position and ensure that injectors are properly seated in cylinder head.*
- ◆ *If it is not possible to install injector by hand, proceed as follows:*
- ◆ *Slide sleeve -T10133/18- over injector.*
- ◆ *Knock against stop sleeve several times to drive injector in.*

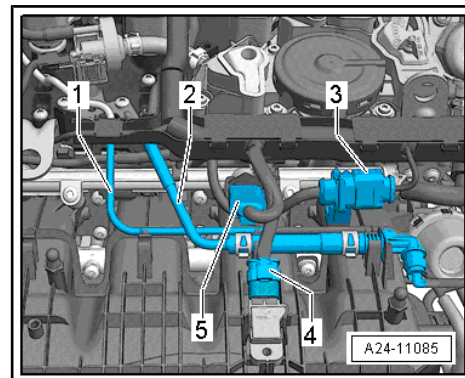
- Fit support ring onto injector.
- Lightly lubricate O-rings for injectors with clean engine oil.
- Install fuel rail ⇒ [page 267](#) .



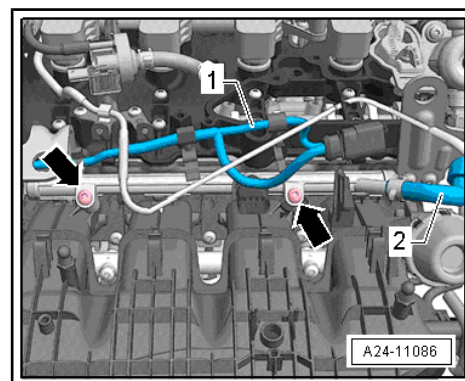
4.3.2 Removing and installing injectors, MPI engines

Removing

- Detach vacuum lines -1 and 2- from intake manifold.
- Detach electrical connector -3- from retainer.
- Unplug electrical connectors -4 and 5-.
- Move clear wiring harness -1- from fuel rail.
- Detach fuel supply line -2- from fuel rail.

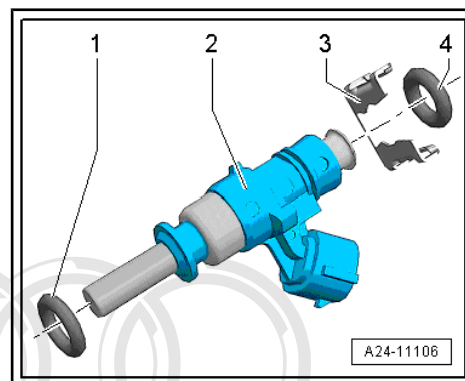


- Unscrew bolts -arrows- from fuel rail.
- Carefully lift out fuel rail with injectors.
- Unplug electrical connectors at injectors.



Injector - exploded view

- 1 - O-ring - renew (apply thin coating of clean engine oil prior to installation)
- 2 - Injector
- 3 - Retaining clip
- 4 - O-ring - renew (apply thin coating of clean engine oil prior to installation)



Installing

- Fit new O-rings on injector. Lubricate O-rings lightly with clean engine oil before installing.
- Fit electrical connectors at injectors.
- Push fuel rail with injectors by hand as far as it will go into aperture in intake manifold (do not use oil or grease).
- The remaining installation steps are carried out in the reverse sequence.
- Install fuel rail.

Tightening torques

- ◆ ⇒ ["4.1.2 Exploded view - fuel rail with injectors, MPI engines" page 266](#)

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4.4 Cleaning injectors



Note

The following procedure applies to FSI injectors.

Special tools and workshop equipment required

- ◆ Ultrasonic cleaning unit - VAS 6418-
- ◆ Mounting plate for injection modules - VAS 6418/1-
- ◆ Cleaning fluid - VAS 6418/2-

Cleaning

- Close drain tap -arrow- on ultrasonic cleaning unit - VAS 6418- (located on right side of housing).
- Fill ultrasonic unit with 2,120 ml of water which has been allowed to settle for a few minutes and cleaning fluid - VAS 6418/2- .

Mixture ratio for cleaning fluid

- 2,100 ml of tap water which has been allowed to settle for a few minutes and 20 ml of cleaning fluid - VAS 6418/2-
- Remove injectors ⇒ [page 268](#) .

- Place mounting plate for injection modules - VAS 6418/1- on top of cleaning unit.

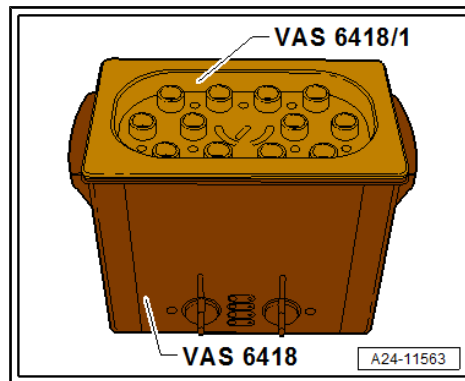
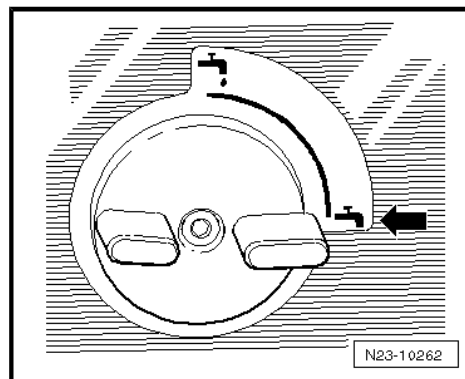


WARNING

It is important to read the safety notes in the operating instructions before switching on the ultrasonic cleaning unit - VAS 6418- .

The ideal fluid level is approx. 1-4 mm above the base of the mounting plate. The ultrasonic cleaning unit - VAS 6418- can be damaged if the fluid level is too low.

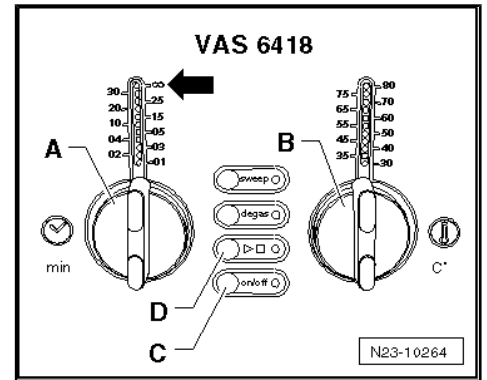
- Insert FSI injectors all the way into guides of mounting plate for injection modules - VAS 6418/1- .



- Switch on cleaning unit by pressing **on/off** button -C-.
- Select a cleaning time of 30 minutes with rotary control -A-.
- Set rotary control -B- to a temperature of 50°C.
- Press **▶** button -D- to start cleaning procedure.

 **Note**

- ◆ *The temperature-controlled cleaning process is now started. While the fluid is being heated, the ultrasound is activated at intervals in order to circulate the cleaning solution. The ultrasound is activated continuously when the preselected temperature is reached.*
 - ◆ *The actual cleaning process commences when the temperature reaches at least 50 °C and must last for at least 30 minutes.*
- Install injectors with new combustion chamber seal
⇒ [page 268](#) .



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5 Senders and sensors

⇒ [“5.1 Removing and installing fuel pressure sender G247”, page 276](#)

⇒ [“5.2 Checking fuel pressure sender G247”, page 277](#)

⇒ [“5.3 Removing and installing fuel pressure sender for low pressure G410”, page 279](#)

⇒ [“5.4 Removing and installing intake air temperature sender G42 / intake manifold pressure sender G71”, page 281](#)

5.1 Removing and installing fuel pressure sender - G247-

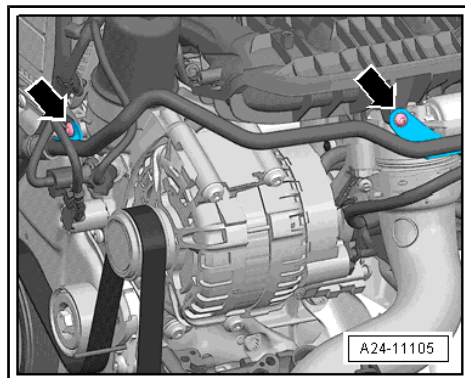
Special tools and workshop equipment required

- ◆ Assembly tool - T10118-

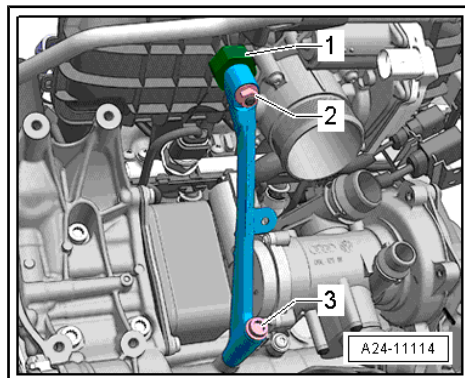


Removing


- Remove engine cover panel ⇒ [page 37](#) .
- Remove bolts -arrows- for coolant line from intake manifold.



- Remove intake manifold support; to do so, unscrew nut -2- and bolt -3-.
- Remove rubber bush -1- for intake manifold support.



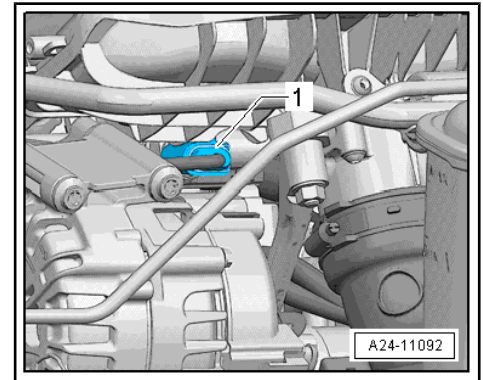
- Release connector on fuel pressure sender - G247- -1- using assembly tool - T10118- .

 **WARNING**

The fuel system is pressurised.

Risk of injury as fuel may spray out.

- *Put on safety goggles.*
- *Put on protective gloves.*
- *Release pressure (wrap clean cloth around connection and open connection carefully).*



- Unscrew fuel pressure sender - G247- -1- using bit, 27 mm - T40218- .

Installing

- Installation is carried out in the reverse order; note the following:
- Install engine cover panel ⇒ [page 37](#) .

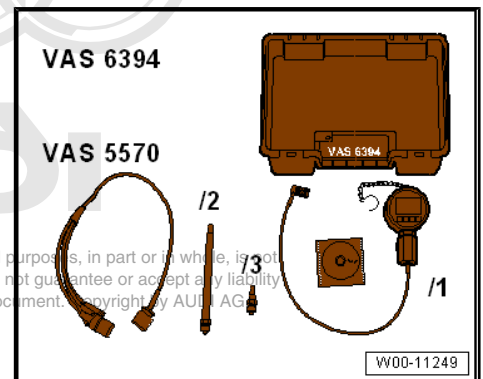
Tightening torques

- ◆ ⇒ [“4.1.1 Exploded view - fuel rail with injectors, FSI engines”, page 265](#)

5.2 Checking fuel pressure sender - G247-

Special tools and workshop equipment required

- ◆ Test instrument adapter - VAS 5570-



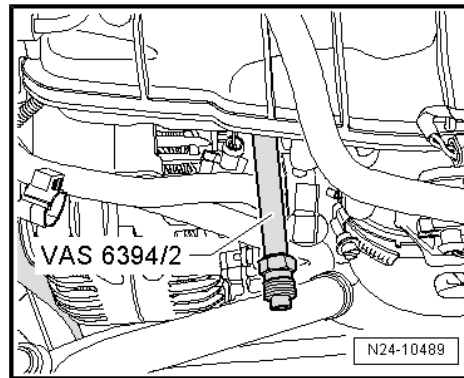
- ◆ Pressure sensor tester - VAS 6394-
- ◆ Vehicle diagnostic tester

Procedure:

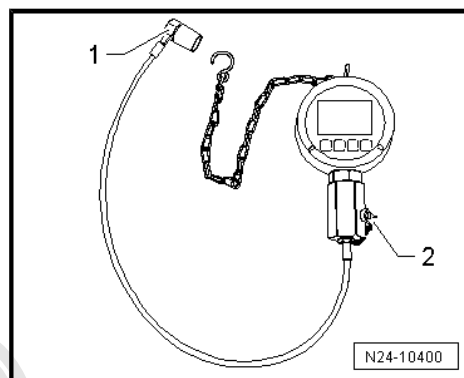
- Remove engine cover panel ⇒ [page 37](#) .
- Remove fuel pressure sender - G247- ⇒ [page 276](#) .



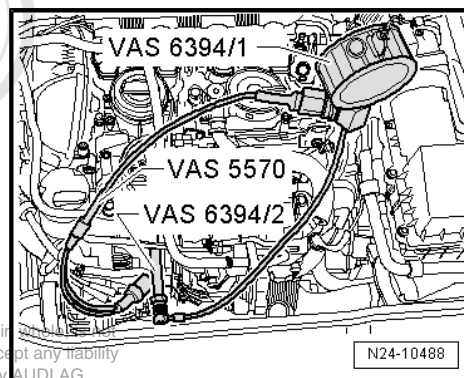
- Screw in adapter - G247- in place of fuel pressure sender - VAS 6394/2- and tighten adapter with the same torque as that specified for fuel pressure sender - G247- .



- Unscrew plug -2- on pressure gauge - VAS 6394/1- and screw removed fuel pressure sender - G247- into opening. Tighten to torque specified for fuel pressure sender.



- Use test instrument adapter - VAS 5570- to make electrical connection between vehicle and fuel pressure sender - G247- .
- Connect vehicle diagnostic tester .
- Switch on ignition.
- Select "Engine electronics" in vehicle self-diagnosis.
- Then select "Measured values".
- Select "Fuel pressure" from the list.



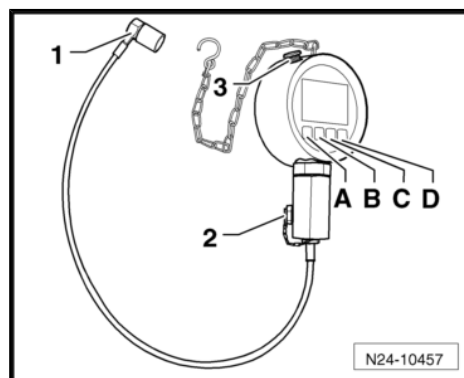
The display zone shows the actual pressure value being transmitted to the engine control unit by the fuel pressure sender G247- .

- Switch on pressure gauge - VAS 6394/1- by pressing button -A- once briefly.

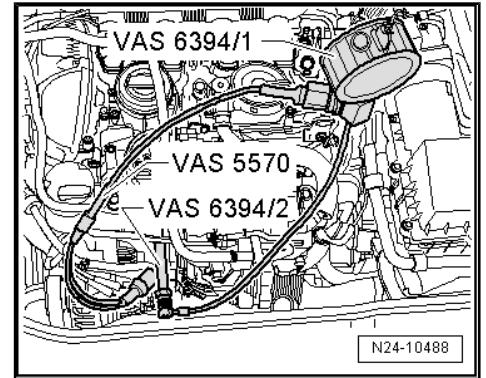
i Note

You can press and hold button -A- for 2 seconds to switch on the illumination for 20 seconds.

Pressure gauge - VAS 6394/1- should indicate 0 bar. If this is not the case, press button -C- once briefly to zero the tester.



- Connect pressure line of pressure gauge - VAS 6394/1- to adapter - VAS 6394/2- .
- Start the engine.
- Compare the pressure indicated by pressure gauge - VAS 6394/1- with the actual pressure value on ⇒ Vehicle diagnostic tester.
- The pressure readings must not deviate by more than 5 bar.
- If the deviation is more than 5 bar, test a new fuel pressure sender - G247- .
- Screw a new fuel pressure sender - G247- into pressure gauge - VAS 6394/1- .
- Repeat the test with the new fuel pressure sender - G247- and compare the two pressure values.



If the two values still do not agree:

- Check electrical connection between fuel pressure sender - G247- and engine control unit. Refer to ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

If the values agree:

- Install the new fuel pressure sender - G247- ⇒ [page 276](#) .

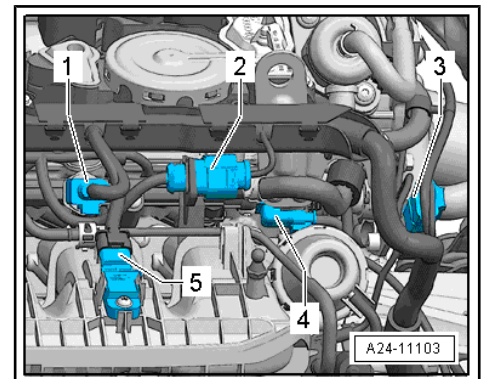
Tightening torques

- ◆ ⇒ [“4.1.1 Exploded view - fuel rail with injectors, FSI engines”, page 265](#)

5.3 Removing and installing fuel pressure sender for low pressure - G410-

Removing

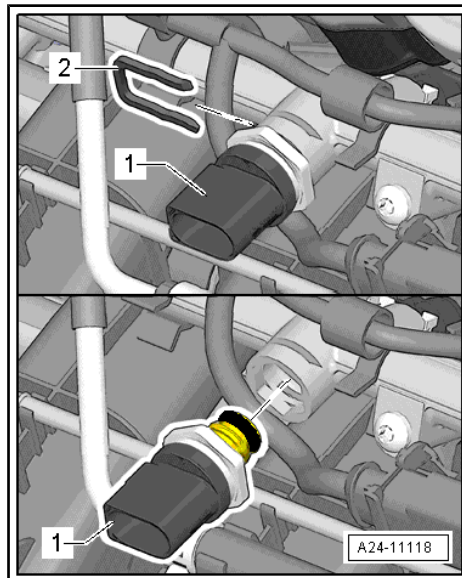
- Remove engine cover panel ⇒ [page 37](#) .
- Unplug electrical connector -1- at fuel pressure sender for low pressure - G410- .



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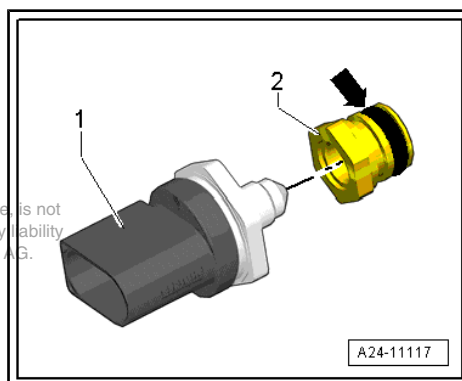
- Pull out clip -2-.
- Pull fuel pressure sender for low pressure - G410- -1- out of fuel rail.



- Unscrew fuel pressure sender for low pressure - G410- -1- from adapter -2-.

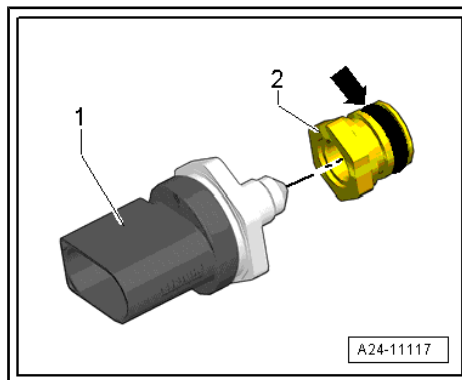


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Installing

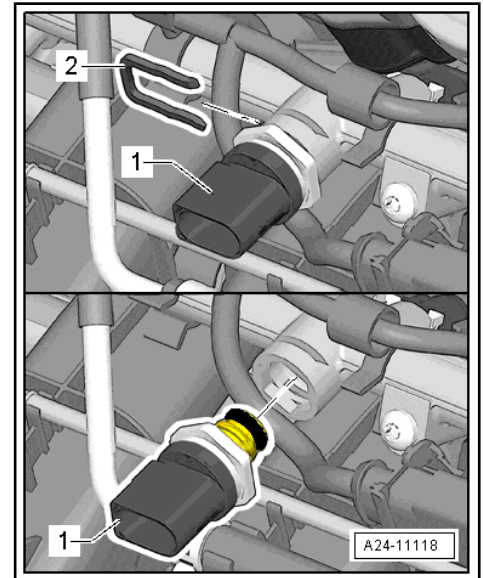
- Fit new O-ring -arrow-.
- Screw adapter -2- onto fuel pressure sender for low pressure - G410- -1-.



- Carefully slide fuel pressure sender for low pressure - G410-1- into fuel rail as far as it will go.
- To lock fuel pressure sender for low pressure - G410- , push clip -2- into groove.
- Plug in electrical connector.
- Install engine cover panel ⇒ [page 37](#) .

Tightening torques

- ◆ ⇒ [“4.1.2 Exploded view - fuel rail with injectors, MPI engines”, page 266](#)



5.4 Removing and installing intake air temperature sender - G42- / intake manifold pressure sender - G71-

Removing

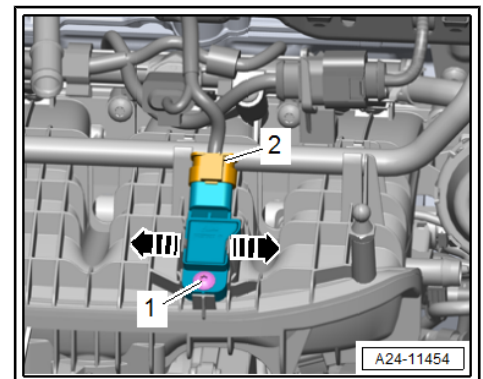
- Remove engine cover panel ⇒ [page 37](#) .
- Unplug electrical connector -2-.
- Remove bolt -1-.
- Release catches -arrows- and detach intake air temperature sender - G42- / intake manifold pressure sender - G71- from intake manifold.

Installing

- Installation is carried out in the reverse order; note the following:
- Install engine cover panel ⇒ [page 37](#) .

Tightening torques

- ◆ ⇒ [“3.1 Exploded view - intake manifold”, page 257](#)



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6 High-pressure pump

⇒ "6.1 Exploded view - high-pressure pump", page 282

⇒ "6.2 Removing and installing high-pressure pump", page 284

6.1 Exploded view - high-pressure pump

1 - Quick release coupling

- With cut-off valve
- Fitted on some versions only

2 - Electrical connector

3 - Fuel metering valve - N290- or fuel pressure regulating valve - N276-

- Fuel metering valve - N290- or fuel pressure regulating valve - N276- may be fitted, depending on version
- Integrated in high-pressure pump; cannot be renewed separately

4 - High-pressure pump

- With fuel metering valve - N290- or fuel pressure regulating valve - N276- (do not loosen)
- Observe rules for cleanliness when installing ⇒ [page 5](#)
- Removing and installing ⇒ [page 284](#)
- Take care not to tilt when installing

5 - O-ring

- Renew if damaged
- Lubricate lightly with engine oil

6 - Roller tappet

- May remain lodged in vacuum pump when high-pressure pump is removed

7 - Vacuum pump

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8 - Connection

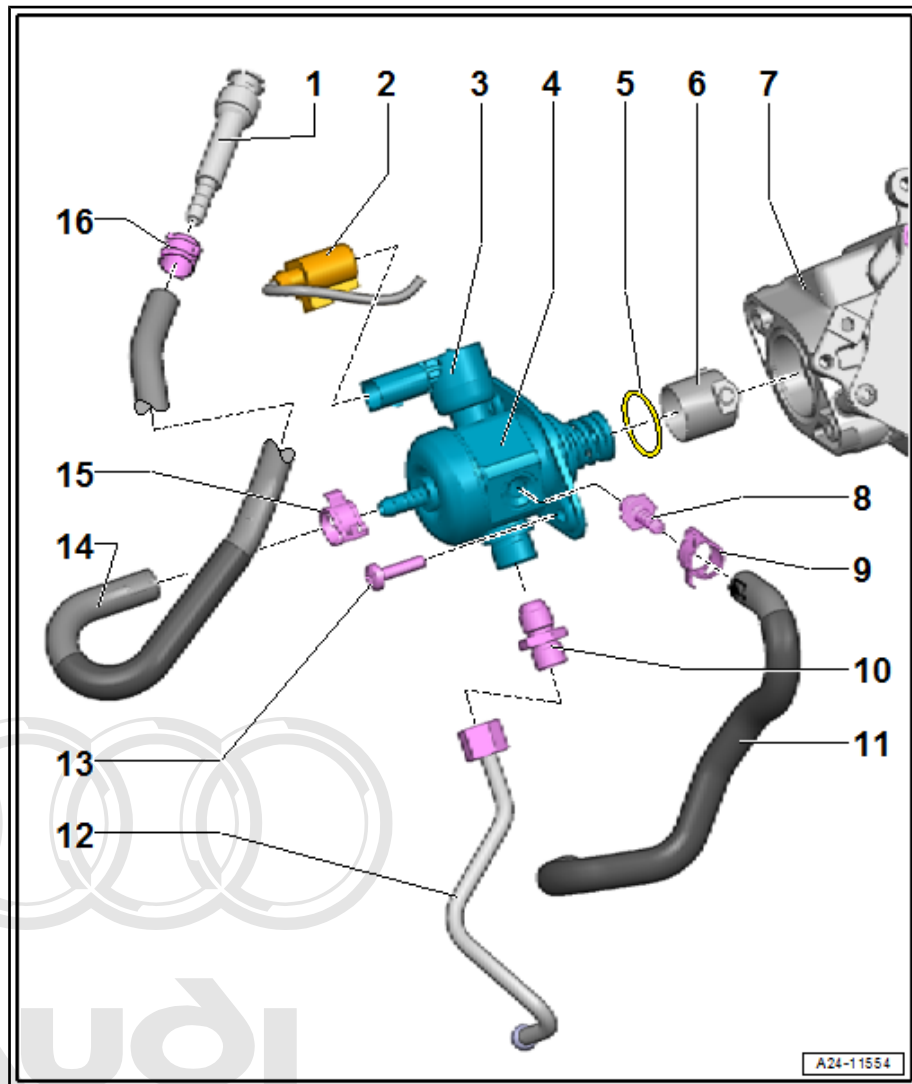
- For fuel supply line
- For vehicles with MPI engine
- Without MPI engine, with plug (depending on version)
- Must always be renewed once loosened
- M10: 15 Nm
- M12: 20 Nm

9 - Clip

- Renew

10 - Connection

- For fuel supply line at high-pressure pump



- Counterhold when loosening union nut
- Must always be renewed once loosened
- 40 Nm

11 - Fuel supply line

- To fuel rail for MPI injectors
- Fuel supply line must be free of tension when installed (make sure all parts are clean)

12 - Fuel supply line

- With union nut, 27 Nm
- To fuel rail for FSI injectors
- Lightly lubricate ball of fuel supply line with engine oil
- Fuel supply line must be free of tension when installed (make sure all parts are clean)

13 - Bolt

- M6; renew
- Tightening torque and sequence ⇒ [page 283](#)

14 - Fuel supply line

- From fuel tank

15 - Spring-type clip

- Renew

16 - Spring-type clip

- Renew

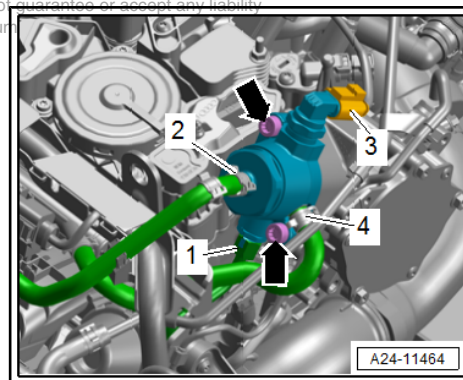
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High-pressure pump - tightening torque and sequence

To prevent flange of high-pressure pump from being deformed during installation, fit high-pressure pump as follows:

– Tighten bolts in stages as follows:

Stage	Bolts	Tightening torque
1.	-arrows-	Screw in by hand until contact is made
2.	-arrows-	Tighten one turn alternately until flange of high-pressure pump makes contact with vacuum pump
3.	-arrows-	M6 bolt: 8 Nm + 90°; renew bolts after removal M8 bolt: 20 Nm





6.2 Removing and installing high-pressure pump



Note

- ◆ *The high-pressure pump must only be removed when the engine is cold.*
- ◆ *When installing the high-pressure fuel pump, it is essential to ensure that no dirt enters the fuel system.*
- ◆ *Use a cloth to catch escaping fuel.*
- ◆ *Check O-ring on high-pressure fuel pump and renew if damaged.*
- ◆ *Lubricate high-pressure fuel pipes lightly with engine oil and always ensure that pipes are free of tension when tightening the connections.*

Removing

- Remove engine cover panel ⇒ [page 37](#) .
- Unplug electrical connector -2-.

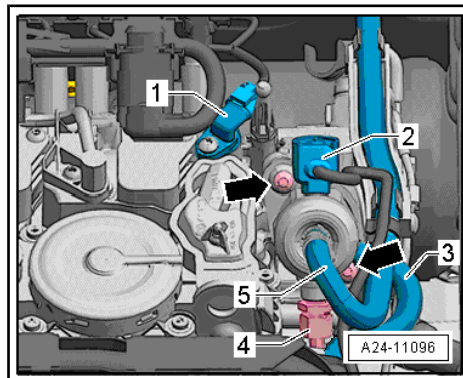


WARNING

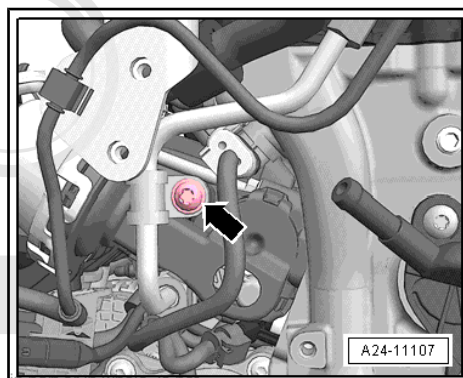
The fuel system is pressurised.

Risk of injury as fuel may spray out.

- *Put on safety goggles.*
- *Put on protective gloves.*
- *Release pressure (wrap clean cloth around connection and open connection carefully).*



- Detach fuel lines -3, 4 and 5-.
- Unscrew retaining clip -arrow-.



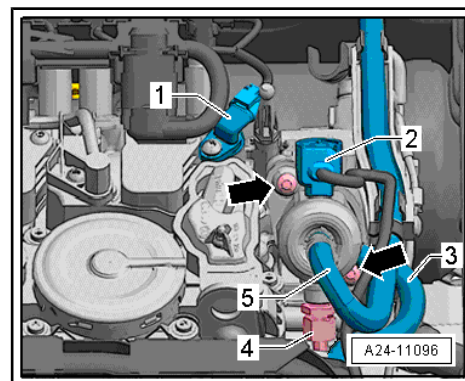
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- Remove bolts -arrows-.
- Carefully pull out high-pressure pump. It is possible that the roller tappet may remain lodged in the vacuum pump.

Installing

Note

- ◆ *Renew O-ring after removal.*
- ◆ *Renew bolts tightened with specified tightening angle.*
- Before fitting, check roller tappet for damage and renew if necessary.
- Fit roller tappet (note position of locating element) in vacuum pump.



Note

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- ◆ *The roller tappet must be positioned at the lowest point when installing the high-pressure pump.*
- ◆ *When installing a used high-pressure pump, the connecting piece for the fuel supply line (high-pressure section of the system) ⇒ [Item 10 \(page 282\)](#) must be renewed.*
- Turn crankshaft until roller tappet is positioned at lowest point.
- Renew connecting piece on high-pressure pump.
- Tighten bolts in stages ⇒ [page 283](#) .

Note

The high-pressure pump can be damaged if it is tightened too much on one side (keep it straight).

- Fit both fuel lines and secure with spring-type clips.
- Tighten union nut on fuel line hand-tight initially. Align so it is free of tension and tighten to specified torque ⇒ [page 282](#) .

Tightening torques

- ◆ ⇒ [“6.1 Exploded view - high-pressure pump”, page 282](#)
- ◆ ⇒ [Fig. “High-pressure pump - tightening torque and sequence”, page 283](#)
- ◆ ⇒ [“2.1 Exploded view - charge air system”, page 241](#)
- Install engine cover panel ⇒ [page 37](#) .

Note

Check fuel system for leaks.

7 Lambda probe

⇒ ["7.1 Exploded view - Lambda probe", page 286](#)

⇒ ["7.2 Removing and installing Lambda probe", page 287](#)

7.1 Exploded view - Lambda probe

1 - Nut

- Tightening torque
⇒ [Item 1 \(page 300\)](#)

2 - Gasket

- Renew

3 - Turbocharger

4 - Lambda probe - G39- and Lambda probe heater - Z19-

- Allocation ⇒ Electronic parts catalogue
- The threads on the new Lambda probes are coated with a special assembly paste.
- If re-installing old Lambda probe, coat thread with high-temperature paste: Refer to ⇒ Electronic parts catalogue for high-temperature paste
- The assembly paste/ high-temperature paste must not get into the slots on the Lambda probe body
- Removing and installing ⇒ [page 287](#)
- 60 Nm

5 - Lambda probe after catalytic converter - G130- and Lambda probe heater 1 after catalytic converter - Z29-

- Allocation ⇒ Electronic parts catalogue
- The threads on the new Lambda probes are coated with a special assembly paste.
- If re-installing old Lambda probe, coat thread with high-temperature paste: Refer to ⇒ Electronic parts catalogue for high-temperature paste
- The assembly paste/ high-temperature paste must not get into the slots on the Lambda probe body
- Removing and installing ⇒ [page 287](#)
- 60 Nm

6 - Catalytic converter

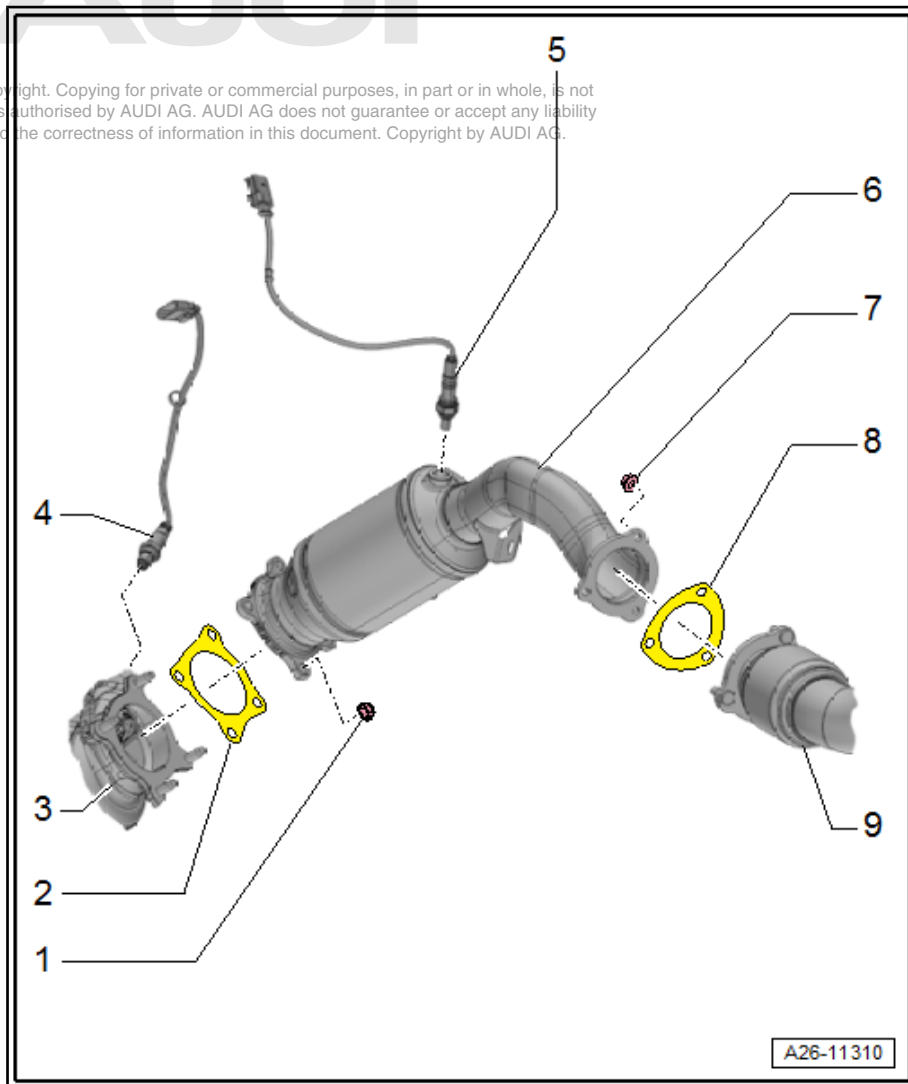
- Removing and installing ⇒ [page 301](#)

7 - Nut

- Tightening torque ⇒ [Item 7 \(page 300\)](#)

8 - Seal

- Renew



9 - Front silencer

7.2 Removing and installing Lambda probe

⇒ [“7.2.1 Removing and installing Lambda probe G39”](#),
page 287

⇒ [“7.2.2 Removing and installing Lambda probe after catalytic converter G130”](#), page 287

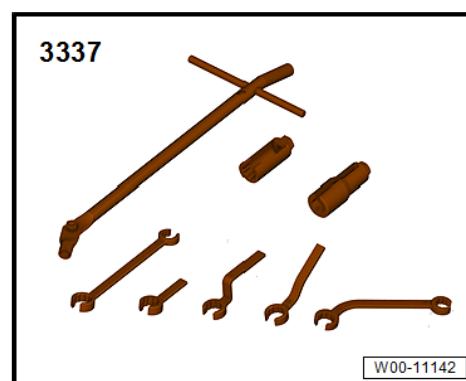
7.2.1 Removing and installing Lambda probe - G39-

Special tools and workshop equipment required

- ◆ Lambda probe open ring spanner set - 3337-



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Removing

- Unplug electrical connector -1- for Lambda probe - G39- and Lambda probe heater - Z19- .
- Unscrew Lambda probe - G39- -2- using tool from Lambda probe open ring spanner set - 3337- .

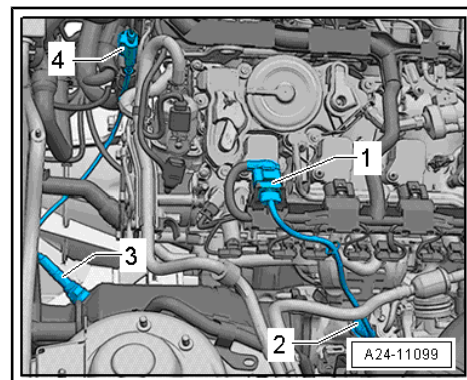
Installing

When installing, note the following:



Note

- ◆ *New Lambda probes are coated with an assembly paste. The paste must not get into the slots on the Lambda probe body.*
- ◆ *In the case of a used Lambda probe grease only the thread with high-temperature paste. The paste must not get into the slots on the Lambda probe body. High-temperature paste ⇒ Electronic parts catalogue*
- ◆ *The electrical wiring of the lambda probe must be secured at the original locations when installing. The wiring must NOT come into contact with the exhaust pipe.*



Tightening torques

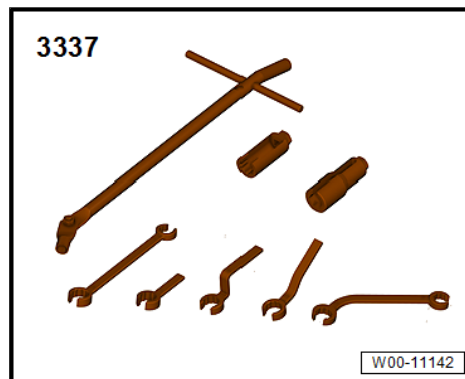
- ◆ ⇒ [“7.1 Exploded view - Lambda probe”](#), page 286

7.2.2 Removing and installing Lambda probe after catalytic converter - G130-

Special tools and workshop equipment required



◆ Lambda probe open ring spanner set - 3337-



Removing

- Unplug electrical connector -4- for Lambda probe after catalytic converter - G130- and Lambda probe 1 heater after catalytic converter - Z29- .
- Unscrew Lambda probe after catalytic converter - G130- -3- using tool from Lambda probe open ring spanner set - 3337- .

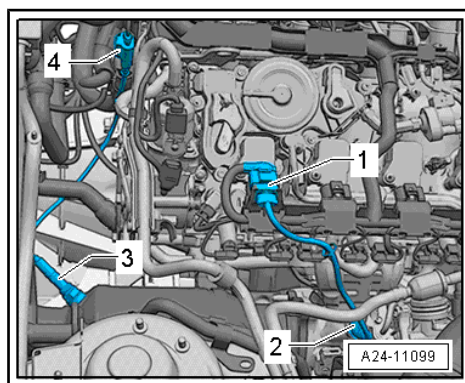
Installing

When installing, note the following:



Note

- ◆ *New Lambda probes are coated with an assembly paste. The paste must not get into the slots on the Lambda probe body.*
- ◆ *In the case of a used Lambda probe grease only the thread with high-temperature paste. The paste must not get into the slots on the Lambda probe body. High-temperature paste ⇒ Electronic parts catalogue*
- ◆ *The electrical wiring of the lambda probe must be secured at the original locations when installing. The wiring must NOT come into contact with the exhaust pipe.*
- ◆ ⇒ [“7.1 Exploded view - Lambda probe”, page 286](#)



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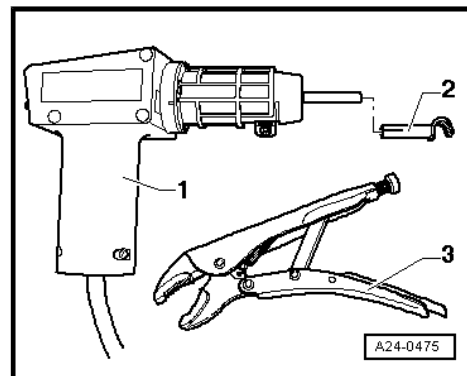
8 Engine control unit

⇒ **"8.1 Removing and installing engine control unit J623", page 289**

8.1 Removing and installing engine control unit - J623-

Special tools and workshop equipment required

- ◆ Hot air blower - VAS 1978/14A- -item 1- with nozzle attachment -2- from wiring harness repair set - VAS 1978 B-

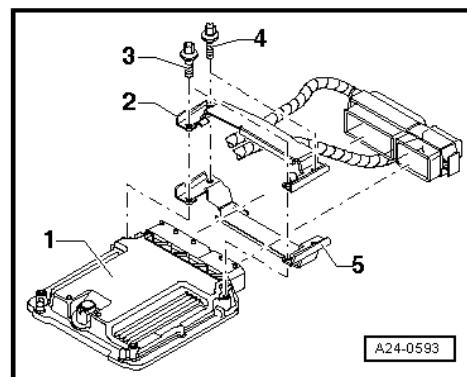


- ◆ Small, commercially available mole grips -3-



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- ◆ *Not every engine control unit is bolted to a protective housing. Whether a protective housing is fitted depends on the engine/gearbox combination.*
- ◆ *The engine control unit -1- is bolted to a protective casing -2 and 5-. To make it more difficult to unscrew the shear bolts -4- for locking plate -2-, their threads have been coated with locking fluid.*
- ◆ *The metal housing has to be removed before the connectors can be unplugged from the engine control unit (e.g. to connect the test box or renew the engine control unit).*

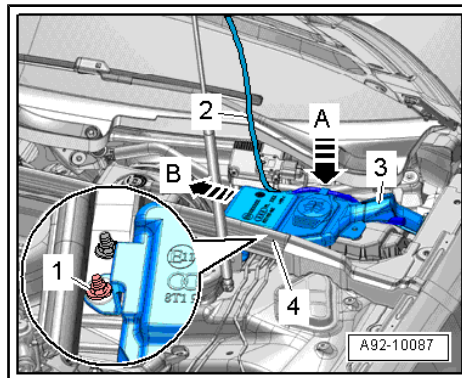


Removing

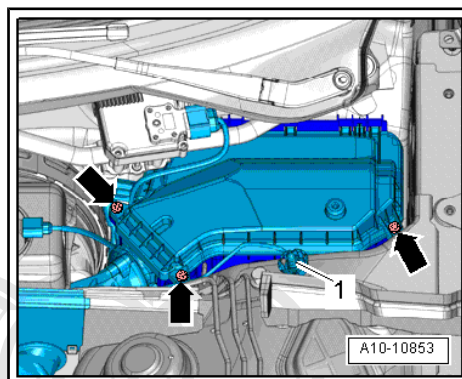
- If renewing engine control unit, adaption values for chain length must be read out from engine control unit.
- Read out adaption values ⇒ Vehicle diagnostic tester; Guided Functions; 01 - Chain elongation adaption diagnosis.
- Switch off ignition and remove ignition key.
- Remove plenum chamber cover.



- Slightly pull off rubber seal in front of nut -1- on plenum chamber cover.
- Unhook wiring harness -2- from retainers -A-.
- Unscrew nut -1-.
- Pull filler neck -3- with filler pipe out of washer fluid reservoir and through opening in body.

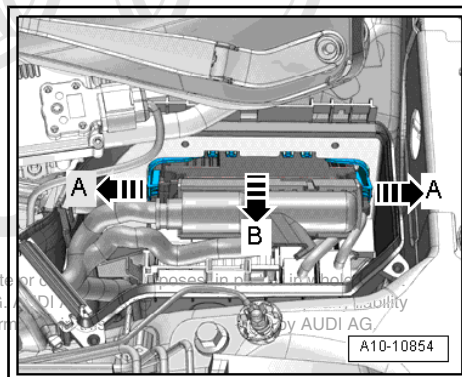


- Unscrew bolts -arrows- and take off lid for electronics box.



- Release retainers -arrows A- and pull out engine control unit - J623- -arrow B-.

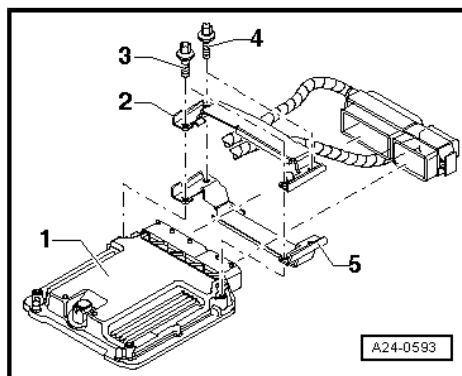
Perform the following work steps if a protective housing is fitted:



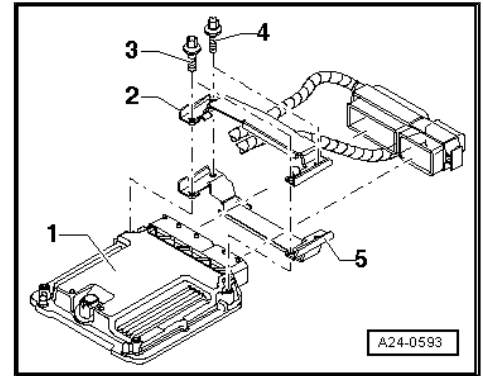
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To help prevent unauthorised access to the connectors on the engine control unit, the engine control unit -1- is bolted to a protective housing -5- by means of shear bolts -3 and 4- and a locking plate -2-.

The threads of the two shear bolts -4- which are not screwed into the engine control unit are secured with locking fluid. To unscrew these two bolts, the threads must therefore be heated with the hot air blower.



The threads of the two shear bolts -3- which are screwed into the engine control unit are not secured with locking fluid. Do not apply heat to the threads in the control unit housing; this is not necessary and would cause overheating of the control unit.

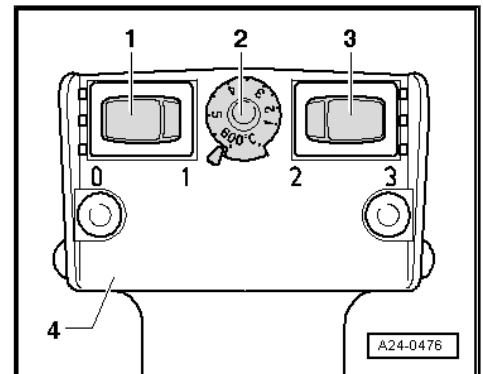


- Select settings on hot air blower as shown in illustration, i.e. set temperature potentiometer -2- to maximum heat output and two-stage air flow switch -3- to position 3.

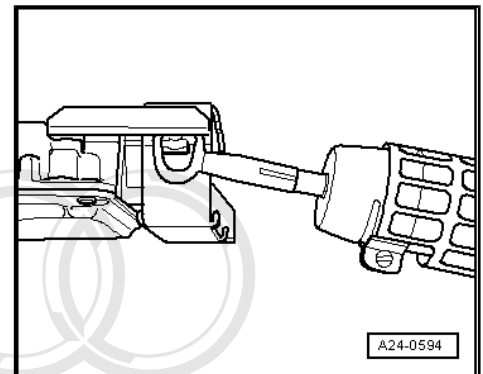


WARNING

The shear bolts and protective housing also become very hot when heating the threads of the locking mechanism. Take care to avoid burns. It is also important to ensure that only the thread is heated and none of the surrounding components if at all possible. These should be covered if necessary.



- Switch on the hot air blower and heat the bolt for approximately 20 ... 30 seconds.

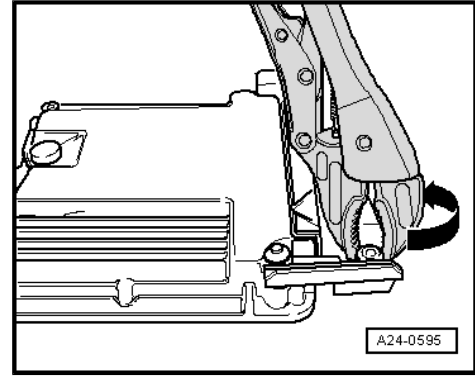


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- Unscrew shear bolts using suitable vice-grip pliers (see arrow in illustration).
- The two shear bolts screwed into the engine control unit do not need to be heated. They should be removed without being heated.
- Detach protective housing from control unit connectors.
- Release connectors on engine control unit and unplug connectors.
- Take out old engine control unit - J623- and install new engine control unit - J623- .



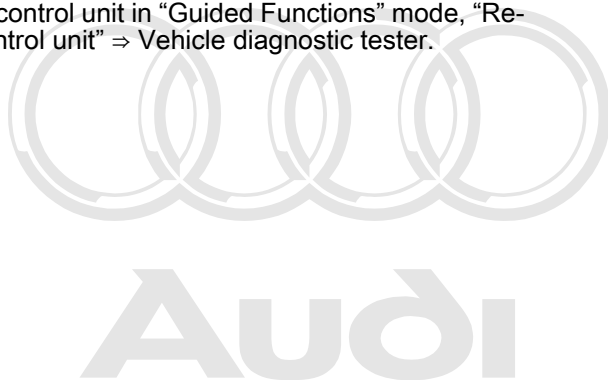
Installing

Installation is performed in the reverse sequence.

- It is important that the protective housing is re-fitted on the engine control unit (if fitted previously).
- Clean threaded holes for shear bolts to remove any residue from locking fluid. This can be done using a thread tap.
- Always use new shear bolts.
- Tightening torque for bolts securing lid of electronics box ⇒ Electrical system; Rep. gr. 97 ; Relay carriers, fuse carriers, electronics boxes

After installing a new engine control unit, the following operation must be performed:

- Activate engine control unit in “Guided Functions” mode, “Replace engine control unit” ⇒ Vehicle diagnostic tester.



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26 – Exhaust system

1 Exhaust pipes/silencers

- ⇒ [“1.1 Exploded view - silencers”, page 293](#)
- ⇒ [“1.2 Separating exhaust pipes/silencers”, page 295](#)
- ⇒ [“1.3 Removing and installing front silencers”, page 296](#)
- ⇒ [“1.4 Renewing tailpipes”, page 297](#)
- ⇒ [“1.5 Stress-free alignment of exhaust system”, page 298](#)
- ⇒ [“1.6 Checking exhaust system for leaks”, page 299](#)

1.1 Exploded view - silencers

1 - Rear silencer

- Combined in one unit with centre silencer as original equipment. Can be renewed individually for repair purposes
- Cutting point ⇒ [page 295](#)
- Align exhaust system so it is free of stress ⇒ [page 298](#)

2 - Nut

- 23 Nm

3 - Clamp (rear)

- Before tightening, align exhaust system so it is free of stress ⇒ [page 298](#)
- Installation position ⇒ [page 295](#)
- Tighten bolt connections evenly.

4 - Bolt

- 23 Nm

5 - Bracket

6 - Rubber mounting

- Renew if damaged

7 - Nut

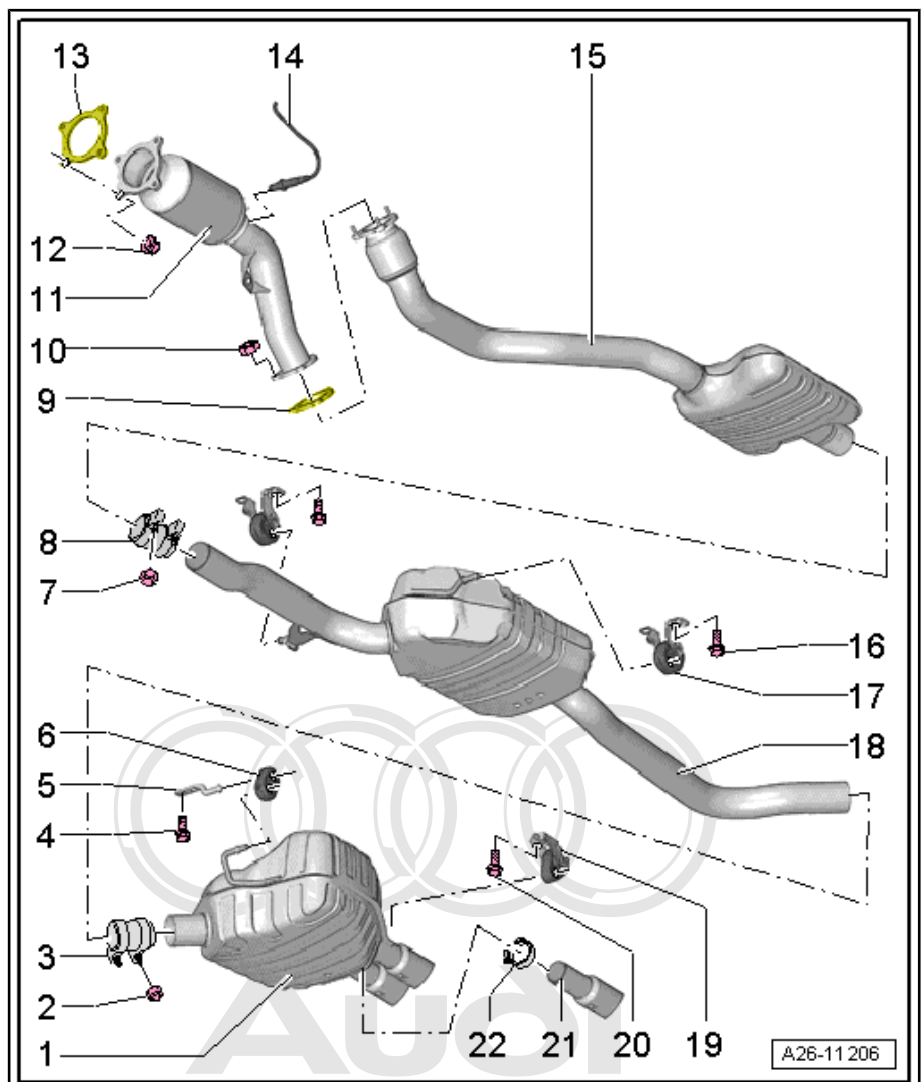
- 23 Nm

8 - Clamp (front)

- Before tightening, align exhaust system so it is free of stress ⇒ [page 298](#)
- Installation position ⇒ [page 295](#)
- Tighten bolt connections evenly.

9 - Gasket

- Renew



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10 - Nut

- 25 Nm

11 - Catalytic converter

- Protect catalytic converter from damage by knocks and impact
- Removing and installing ⇒ [page 301](#)
- Align exhaust system so it is free of stress ⇒ [page 298](#)

12 - Nut

- 40 Nm
- Renew
- Coat studs of turbocharger with high-temperature paste
- High-temperature paste ⇒ Electronic parts catalogue

13 - Gasket

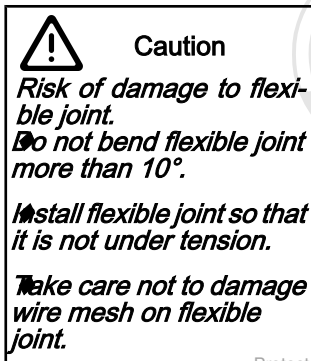
- Renew

14 - Lambda probe after catalytic converter - G130- and Lambda probe heater 1 after catalytic converter - Z29-

- The threads on the new Lambda probes are coated with a special assembly paste.
- If re-installing old Lambda probe, coat thread with high-temperature paste: Refer to ⇒ Electronic parts catalogue for high-temperature paste
- The assembly paste/high-temperature paste must not get into the slots on the Lambda probe body
- Removing and installing ⇒ [page 287](#)

15 - Front silencer

- With flexible joint



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- Removing and installing ⇒ [page 296](#)
- Align exhaust system so it is free of stress ⇒ [page 298](#)

16 - Bolt

- 23 Nm

17 - Mounting

- Renew if damaged
- Check preload ⇒ [page 298](#)

18 - Centre silencer

- Combined in one unit with rear silencer as original equipment. Can be renewed individually for repair purposes
- Cutting point ⇒ [page 295](#)
- Align exhaust system so it is free of stress ⇒ [page 298](#)

19 - Mounting

- Renew if damaged
- Check preload ⇒ [page 298](#)

20 - Bolt

- 23 Nm

21 - Tailpipe

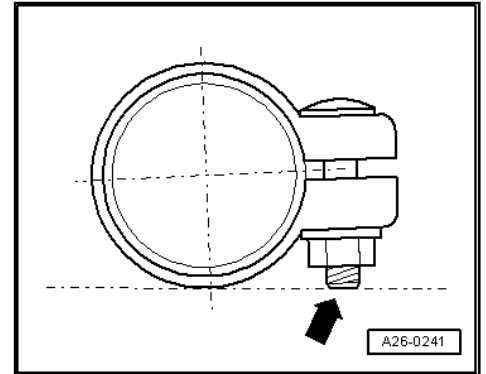
- ❑ Can be renewed separately for repair purposes ⇒ [page 297](#)
- ❑ Cutting point between rear silencer and tailpipe ⇒ [page 297](#)

22 - Clamp

- ❑ 60 Nm

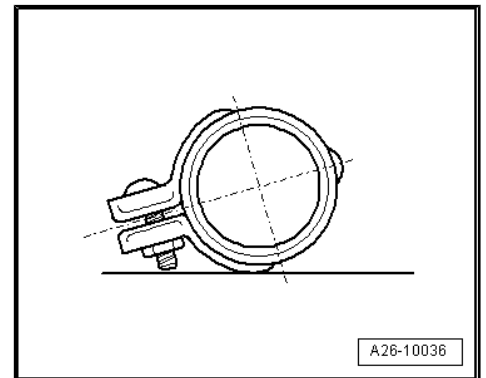
Installation position of front clamp

- Install clamp so that ends of bolts -arrow- do not protrude below bottom of clamp.
- Bolted connections face to right.



Installation position of rear clamp

- Install clamp so that ends of bolts do not protrude beyond bottom of clamp.
- Bolt connections face to left.

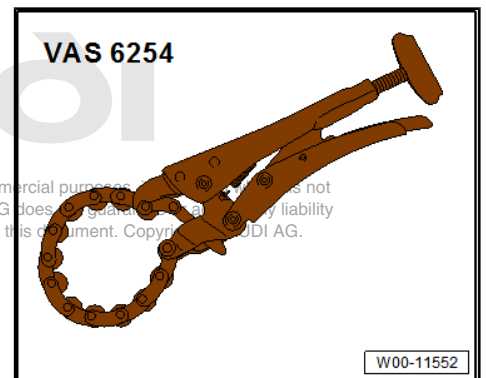


1.2 Separating exhaust pipes/silencers

- ◆ The connecting pipe can be cut through at the cutting location in order to renew the centre and rear silencers separately.
- ◆ The cutting point is marked by an indentation on the circumference of the exhaust pipe.

Special tools and workshop equipment required

- ◆ Chain pipe cutter - VAS 6254-

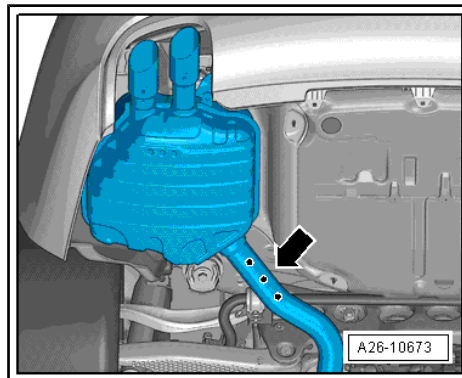


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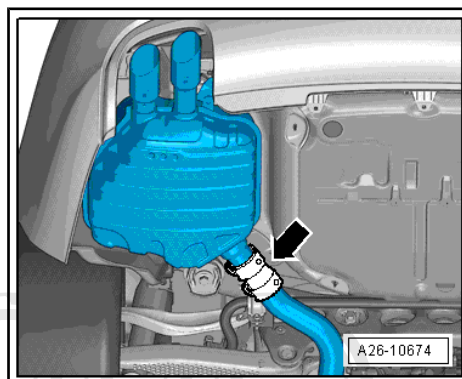


Procedure

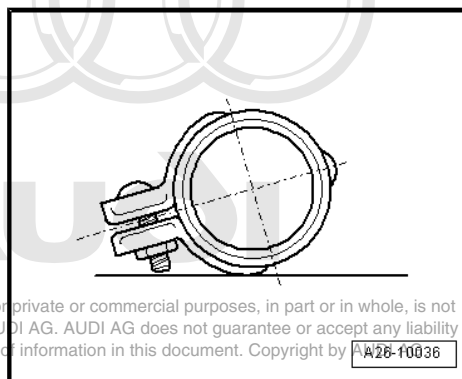
- Cut through exhaust pipe at right angle at the position marked by -arrows- using chain pipe cutter - VAS 6254- .



- Position centre of clamps -arrows- over cutting location.



- Install clamps so that the bolt ends do not protrude beyond bottom of clamp.
- Bolted connection faces to left.
- Align the exhaust system so it is free of stress => [page 298](#) .



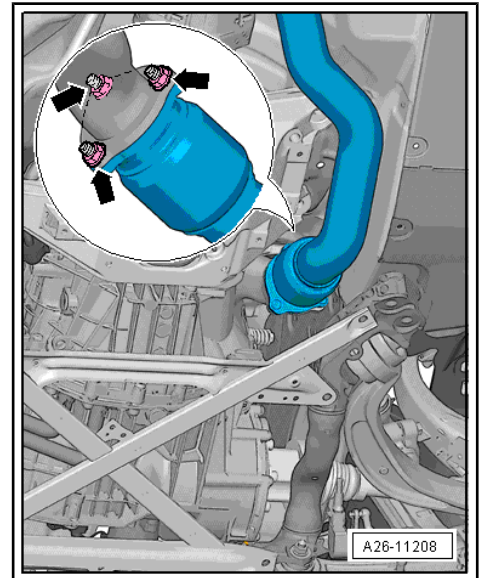
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1.3 Removing and installing front silencers

Removing

- Remove noise insulation (rear) => General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

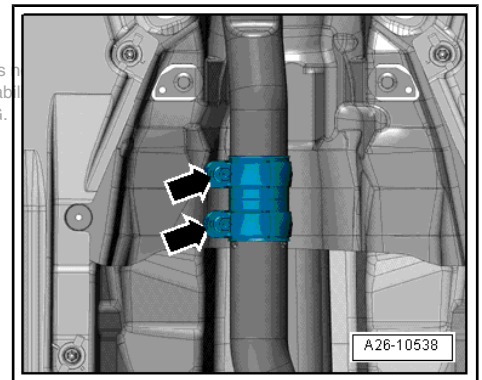
- Remove nuts -arrows-.



 **Caution**

Risk of damage to flexible joint.

- ◆ Do not bend flexible joint more than 10°.
- ◆ Install flexible joint so that it is not under tension.
- ◆ Take care not to damage wire mesh on flexible joint.



- Unfasten connections -arrows-, push clamp towards rear and detach front silencer.

Installing

Installation is carried out in the reverse order; note the following:

 **Note**

Renew seals, gaskets and self-locking nuts.

- Align the exhaust system so it is free of stress ⇒ [page 298](#) .
- Install noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

Tightening torques

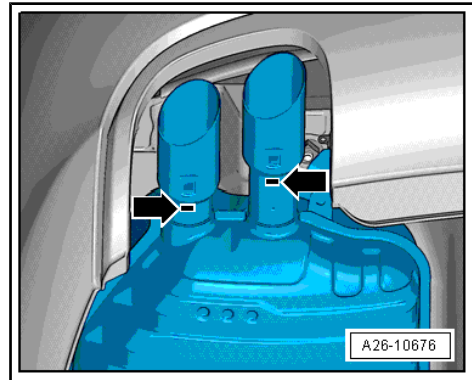
- ◆ ⇒ [“1.1 Exploded view - silencers”, page 293](#)

1.4 Renewing tailpipes

- ◆ The tailpipes can be cut through at the point marked so that the tailpipes can be renewed separately.
- ◆ The cutting point is marked by an indentation on the circumference of the exhaust pipe.



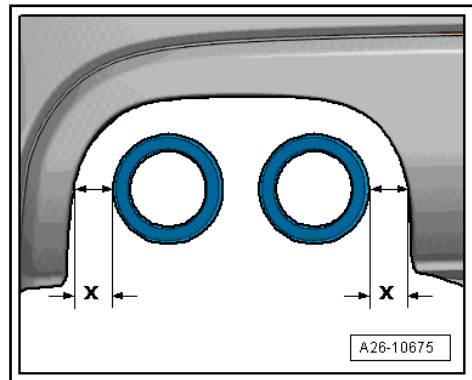
- Cut through exhaust pipe at right angle at the position marked by -arrows- using chain pipe cutter - VAS 6254- .
- Fit tailpipes.



- Check clearance between tailpipes and bumper:
- Dimension -x- (left-side) = dimension -x- (right-side)
- Tighten bolt connections on clamps.

Tightening torques

◆ => "1.1 Exploded view - silencers", page 293



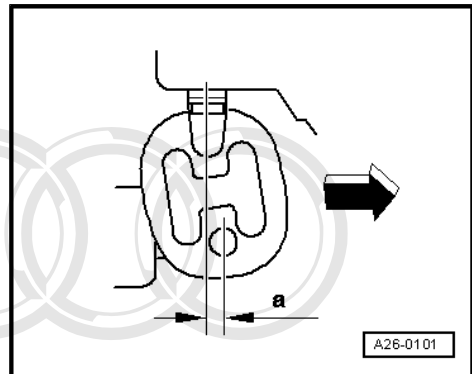
1.5 Stress-free alignment of exhaust system

Procedure

- The exhaust system must be aligned when it is cool.
- Tightening torques
=> "1.1 Exploded view - silencers", page 293

Vehicles without clamps between centre silencer and rear silencer

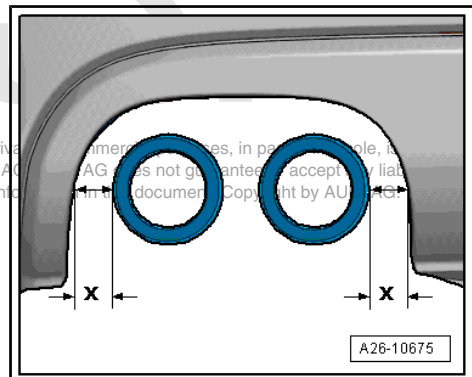
- Loosen bolted connections on front clamp.
- Push exhaust system towards front of vehicle -arrow- so that rear mountings for rear silencer are preloaded by -a- = 6 ... 10 mm.
- Align rear silencer so it is horizontal.



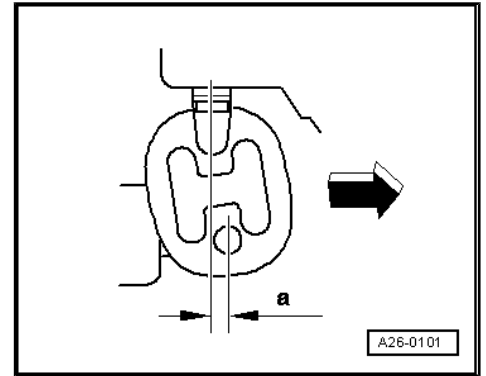
- Check clearance between tailpipes and bumper:
- Dimension -x- (left-side) = dimension -x- (right-side)
- Tighten bolt connections on clamp evenly.

Vehicles with clamps between centre silencer and rear silencer

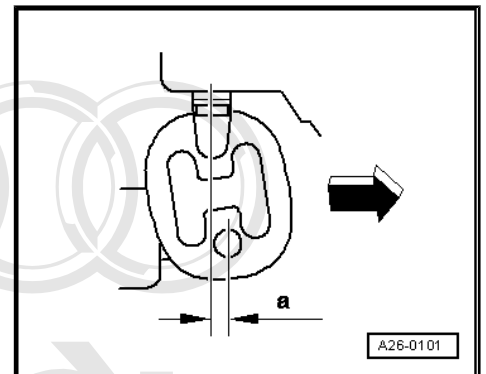
- Loosen bolted connections on front and rear clamps.



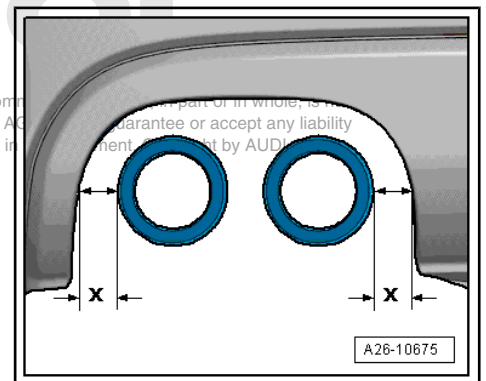
- Push centre silencer towards front of vehicle -arrow- until mounting for centre silencer is preloaded by -a- = 6 ... 10 mm.
- Tighten bolt connections on front clamp evenly.



- Push rear silencer towards front of vehicle -arrow- so that rear mounting for rear silencer is preloaded by -a- = 11 ... 15 mm.
- Align rear silencer so it is horizontal.



- Check clearance between tailpipes and bumper:
 - Dimension -x- (left-side) = dimension -x- (right-side)
- Tighten bolted connections on rear clamps evenly.



1.6 Checking exhaust system for leaks

- Start engine and run at idling speed.
- Plug tailpipes (e. g. with rags or stopper) and leave plugged until the check is complete.
- Listen for noise at connection points (cylinder head/turbocharger, turbocharger/front exhaust pipe etc.) to locate any leaks.
- Rectify any leaks that are found.

2 Emission control system

⇒ "2.1 Exploded view - emission control system", page 300

⇒ "2.2 Removing and installing catalytic converter", page 301

2.1 Exploded view - emission control system

1 - Nut

- Renew
- Coat studs of turbo-charger with high-temperature paste
- High-temperature paste
⇒ Electronic parts catalogue
- 40 Nm

2 - Gasket

- Renew

3 - Turbocharger

4 - Lambda probe - G39- and Lambda probe heater - Z19-

- Removing and installing
⇒ [page 287](#)

5 - Lambda probe after catalytic converter - G130- and Lambda probe heater 1 after catalytic converter - Z29-

- Removing and installing
⇒ [page 287](#)

6 - Catalytic converter

- Protect catalytic converter from damage by knocks and impact
- Removing and installing
⇒ [page 301](#)
- Mounting components
⇒ [page 301](#)
- Align exhaust system so it is free of stress
⇒ [page 298](#)

7 - Nut

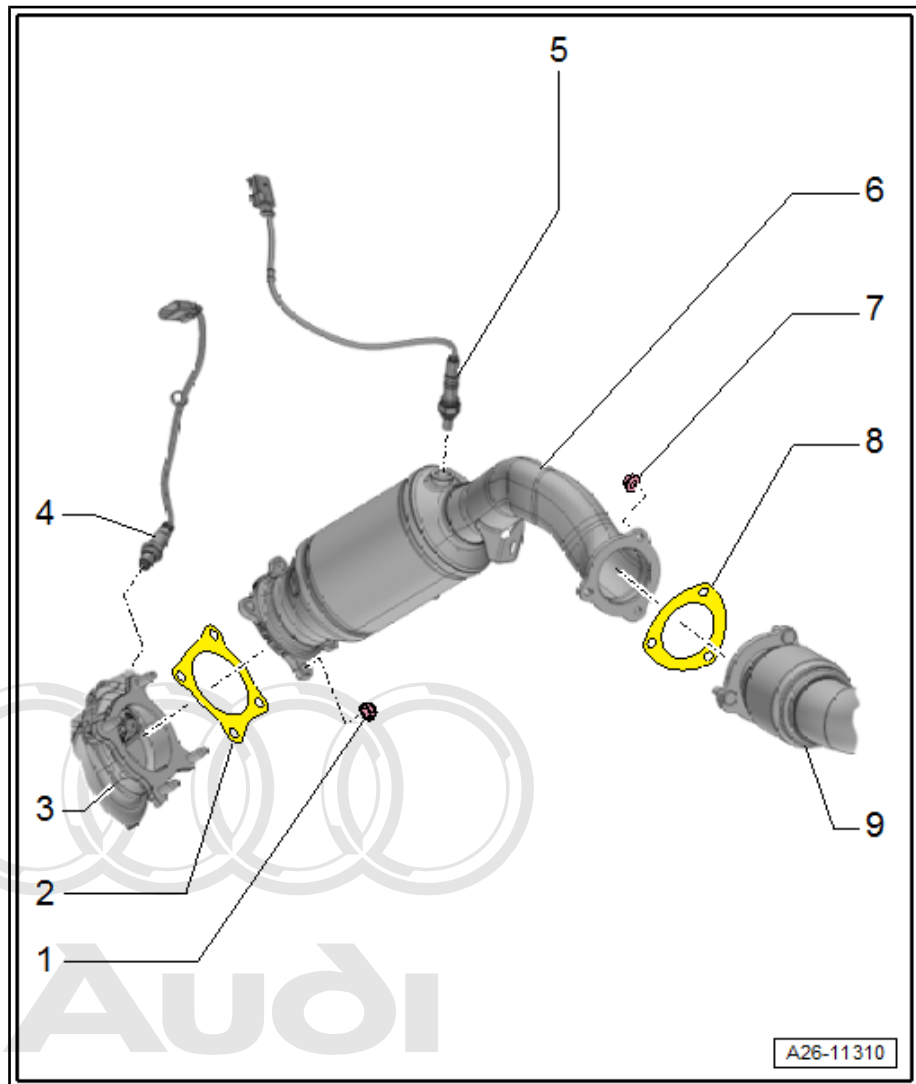
- Renew
- 25 Nm

8 - Gasket


- Renew

9 - Front silencer

- With flexible joint



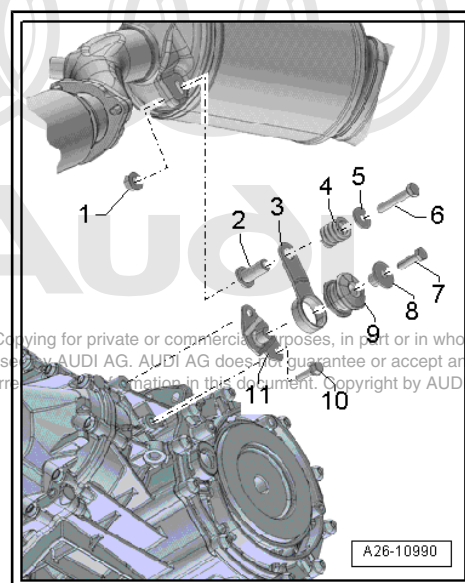
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 **Caution**
Risk of damage to flexible joint.
Do not bend flexible joint more than 10°.
Install flexible joint so that it is not under tension.
Take care not to damage wire mesh on flexible joint.

- Removing and installing ⇒ [page 296](#)
- Align exhaust system so it is free of stress ⇒ [page 298](#)

Components of mountings for catalytic converter

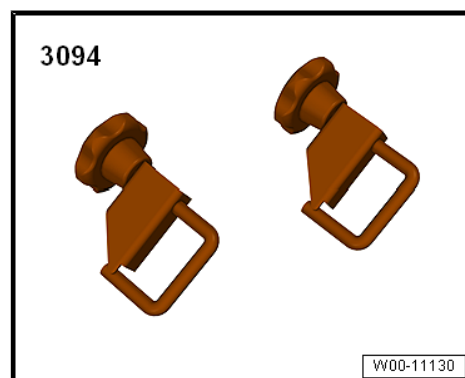
- 1 - Nut
- 2 - Spacer sleeve
- 3 - Bracket
- 4 - Compression spring
- 5 - Washer
- 6 - Bolt, 23 Nm
- 7 - Bolt, 23 Nm
- 8 - Spacer sleeve
- 9 - Buffer
- 10 - Bolt, 23 Nm
- 11 - Bracket



2.2 Removing and installing catalytic converter

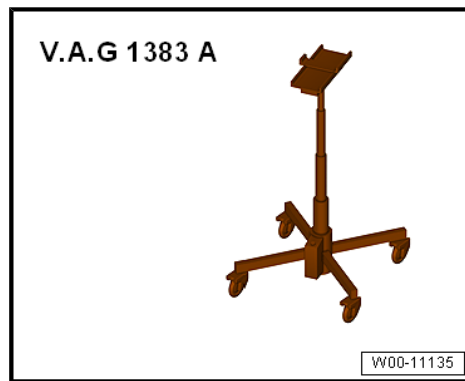
Special tools and workshop equipment required

- ◆ Hose clamps, up to 25 mm - 3094-

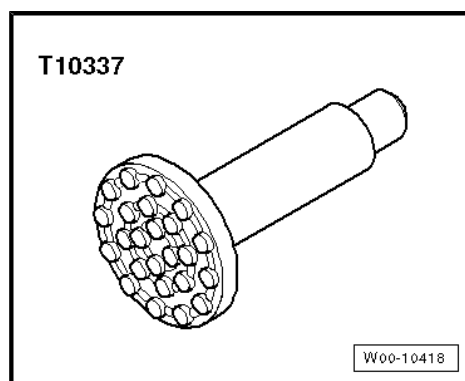




◆ Engine and gearbox jack - V.A.G 1383 A-



◆ Gearbox support - T10337-



Removing

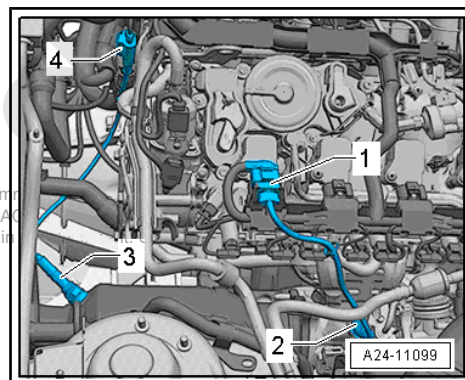


Note

Fit all cable ties in the original positions when installing.

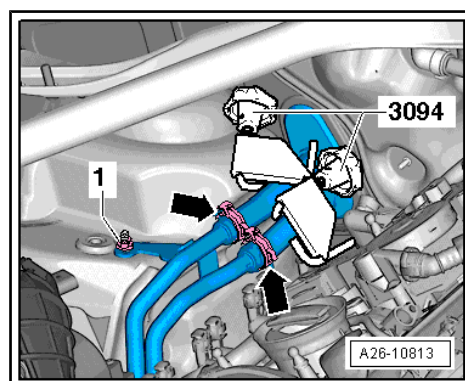
- Unplug electrical connector -4- for Lambda probe after catalytic converter - G130- and Lambda probe 1 heater after catalytic converter - Z29- and move wiring clear.
- Remove noise insulation (rear) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

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Vehicles with auxiliary heater

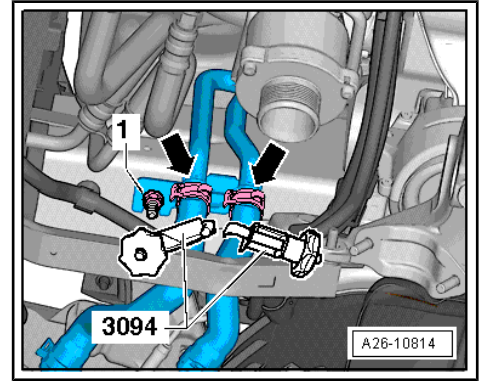
- Clamp off coolant lines (top) for auxiliary heater with hose clamps up to 25 mm - 3094- and detach coolant lines.
- Unfasten coolant lines -1- from body.



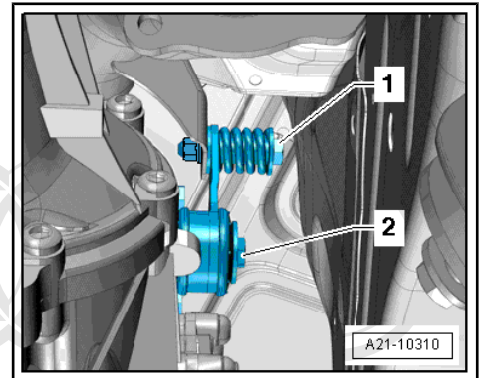
- Clamp off coolant lines (bottom) for auxiliary heater with hose clamps up to 25 mm - 3094- and detach coolant pipes.
- Unfasten coolant lines -1- from body and detach.

All vehicles

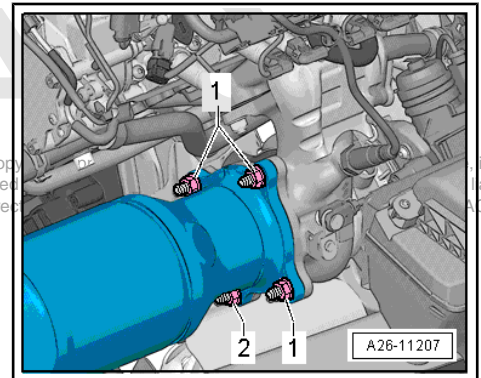
- Remove front silencer ⇒ [page 296](#) .




- Unfasten connection -1-, remove bolt -2- and take out mounting for catalytic converter.



- Remove nuts -1- from above.

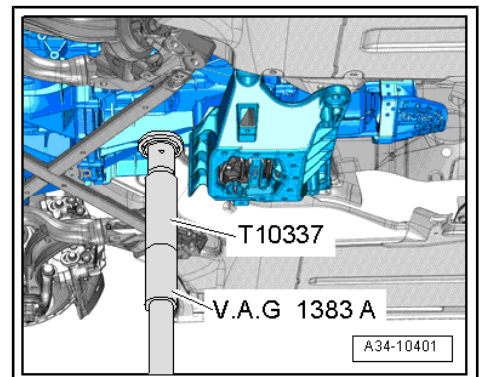


- Position engine and gearbox jack -V.A.G 1383 A- (with gearbox support - T10337- attached) underneath gearbox.
- Raise gearbox slightly using engine and gearbox jack - V.A.G 1383 A- .

 **WARNING**

Risk of accident.

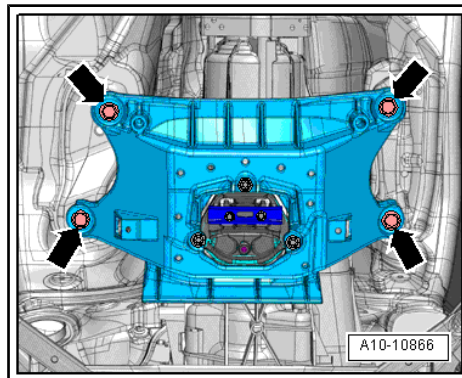
◆ *Engine and gearbox jack - V.A.G 1383 A- must remain in position when work is being carried out and must not be left unattended.*



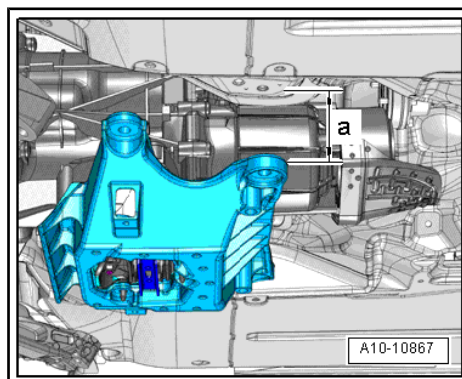
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- Remove bolts -arrows- for tunnel cross member.



- Lower engine and gearbox jack - V.A.G 1383 A- as far as distance -a-.
- Dimension -a- = 80 mm (maximum).



- Remove nut -2- from below and take out catalytic converter downwards.

Installing

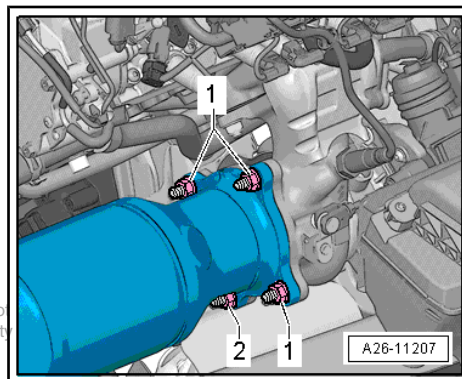
Installation is carried out in the reverse order; note the following:

 **Note**

Renew seals, gaskets and self-locking nuts.

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- Install tunnel cross piece ➔ Rep. gr. 34 : Assembly mountings; Exploded view - assembly mountings .
- Install front silencer ➔ [page 296](#) .



Vehicles with auxiliary heater

- Bleed auxiliary heater ➔ Auxiliary heater, supplementary heater; Rep. gr. 82 ; Auxiliary/supplementary heater; Removing and installing auxiliary/supplementary heater .

Tightening torques

- ◆ ➔ [“1.1 Exploded view - silencers”, page 293](#)

28 – Ignition system

1 Ignition system

⇒ [“1.1 Exploded view - ignition system”, page 305](#)

⇒ [“1.2 Removing and installing ignition coils with output stages”, page 306](#)

⇒ [“1.3 Removing and installing knock sensor”, page 308](#)

⇒ [“1.4 Removing and installing Hall senders”, page 308](#)

⇒ [“1.5 Removing and installing engine speed sender G28”, page 309](#)

1.1 Exploded view - ignition system

1 - Bolt

- Renew
- 8 Nm + 90°
- Tightening torque influences functions of knock sensor

2 - Knock sensor 1 - G61-

- Removing and installing
⇒ [page 308](#)

3 - Spark plug

- Removing and installing: A4 ⇒ Maintenance ; Booklet 812 , A5 ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818

4 - Spark plug connectors

5 - Ignition coil with 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 306](#)

6 - Centre hex stud

- 10 Nm

7 - Nut

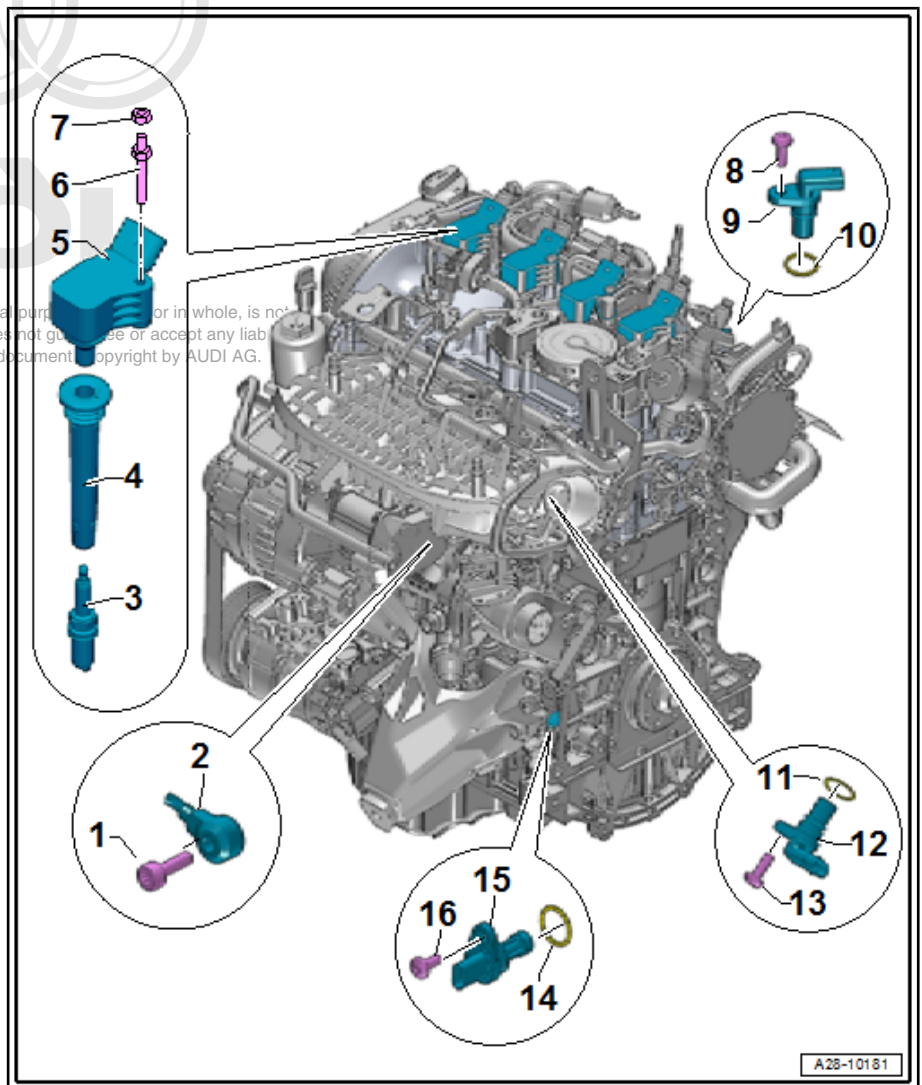
- 9 Nm

8 - Bolt

- 9 Nm

9 - Hall sender 3 - G300-

- Removing and installing





10 - O-ring

- Renew if damaged

11 - O-ring

- Renew if damaged

12 - Hall sender - G40-

- Removing and installing

13 - Bolt

- 9 Nm

14 - O-ring

- Renew if damaged

15 - Engine speed sender - G28-

- Check O-ring for damage
- Removing and installing => [page 309](#)

16 - Bolt

- Renew
- 4 Nm +45°

1.2 Removing and installing ignition coils with output stages

Special tools and workshop equipment required

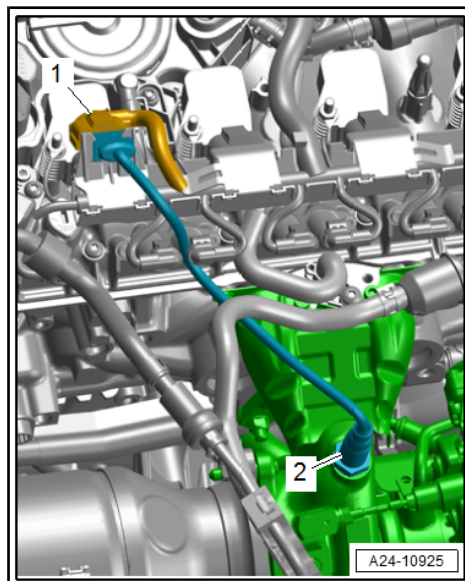
- ◆ Puller - T10530-



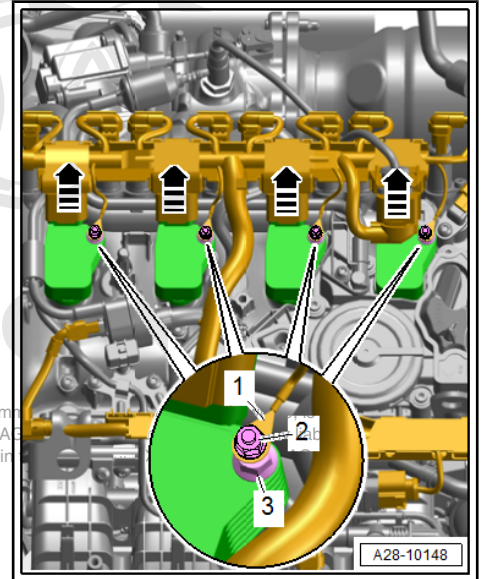
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Removing

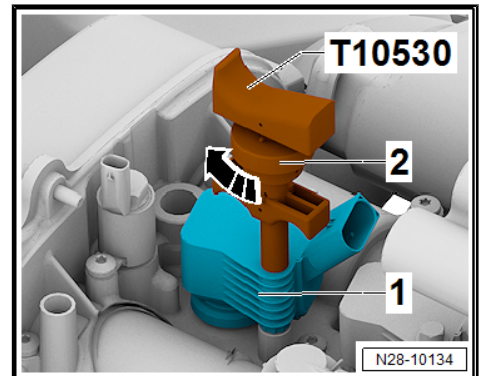
- Remove engine cover panel => [page 37](#) .
- Remove electrical connector -1- for Lambda probe - G39-
-item 2- from bracket.



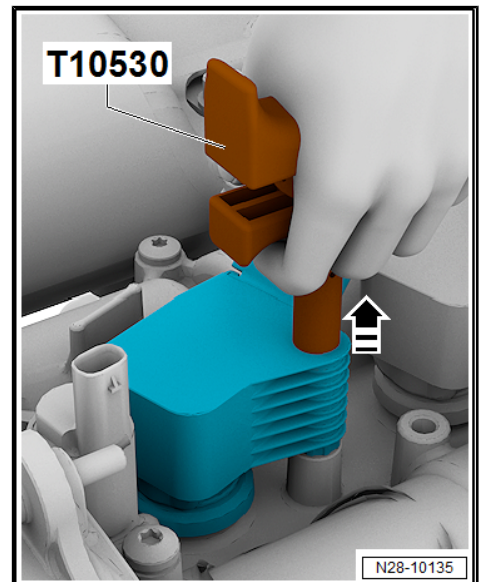
- If fitted, remove nut -2- and move earth wire -1- clear.
- Release electrical connectors and detach simultaneously from ignition coils in direction of -arrows-.
- Remove corresponding centre hex stud -3-.



- Insert puller - T10530- into hole -1- in ignition coil.
- Turn knurled nut -2- clockwise until puller is secured in place.



- Working vertically upwards, carefully pull ignition coil out with puller - T10530- .





Installing

- Apply a thin bead of silicone paste all around end of sealing hose of ignition coil with output stage -arrow-.

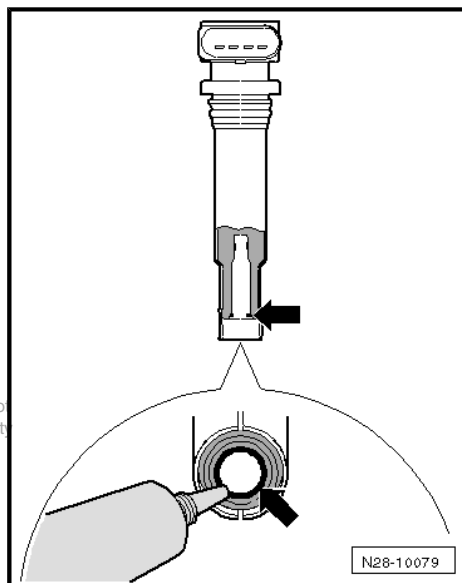
Silicone paste ⇒ Electronic parts catalogue (ETKA) .

- Press ignition coils onto spark plugs by hand evenly (do not use tools).
- Secure ignition coils.
- Install engine cover panel ⇒ [page 37](#) .

Tightening torques

- ♦ ⇒ [“1.1 Exploded view - ignition system”, page 305](#)

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1.3 Removing and installing knock sensor

Removing

- Unplug electrical connector -2- for knock sensor 1 - G61- .



Note

Knock sensor 1 - G61- is located below the intake manifold and behind the coolant pump.

- Remove actuator for engine temperature regulation - N493- ⇒ [page 207](#) .

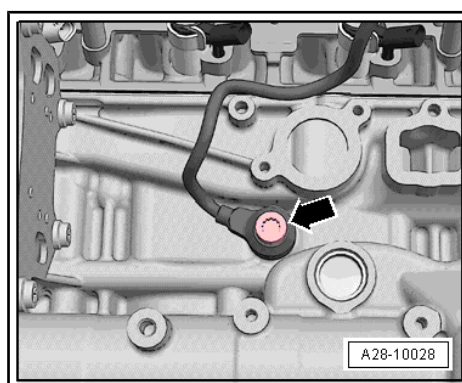
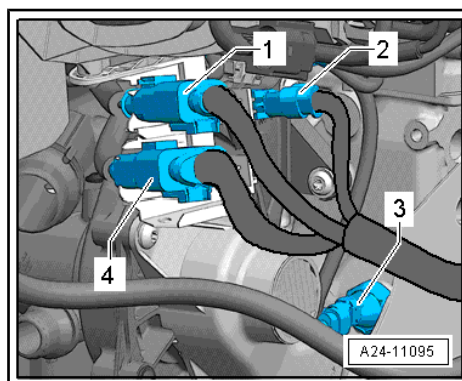
- Unscrew knock sensor 1 - G61- -arrow-.

Installing

- Install in reverse sequence.
- Note installation position of knock sensor.
- Install actuator for engine temperature regulation - N493- ⇒ [page 207](#) .

Tightening torques

- ♦ ⇒ [“1.1 Exploded view - ignition system”, page 305](#)



1.4 Removing and installing Hall senders

⇒ [“1.4.1 Removing and installing Hall sender G40”, page 308](#)

⇒ [“1.4.2 Removing and installing Hall sender 3 G300”, page 309](#)

1.4.1 Removing and installing Hall sender - G40-

Removing

- Remove intake manifold ⇒ [page 258](#) .

- Unplug electrical connector -3- at Hall sender - G40- -item 2-.
- Unscrew bolt -1- and detach Hall sender.

Installing

Installation is carried out in the reverse order; note the following:



Note

Fit new O-ring.

- Install intake manifold ⇒ [page 258](#) .

Tightening torques

- ◆ ⇒ [“1.1 Exploded view - ignition system”, page 305](#)

1.4.2 Removing and installing Hall sender 3 - G300-

Removing

- Remove engine cover panel ⇒ [page 37](#) .
- Unplug electrical connector -3- at Hall sender 3 - G300- -item 2-.
- Unscrew bolt -1- and detach Hall sender.

Installing

Installation is carried out in the reverse order; note the following:



Note

Fit new O-ring.

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- Install engine cover panel ⇒ [page 37](#) .

Tightening torques

- ◆ ⇒ [“1.1 Exploded view - ignition system”, page 305](#)

1.5 Removing and installing engine speed sender - G28-

Removing

- Unplug electrical connector -1- at engine speed sender - G28- -2-.
- Unscrew securing bolt -arrow-.

Installing

Installation is carried out in the reverse order; note the following:

Tightening torques

- ◆ ⇒ [“1.1 Exploded view - ignition system”, page 305](#)

