

Workshop Manual Audi A3 2004 ➤

5-cylinder direct injection engine (2.5 ltr. 4-valve TFSI)

Engine ID	CEP A	CEP B						
-----------	----------	----------	--	--	--	--	--	--

Edition 07.2017

Audi

Protected by copyright. Copying for private 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.

List of Workshop Manual Repair Groups

Repair Group

- 00 - Technical data
- 10 - Removing and installing engine
- 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

Protected by copyright. Copying for private 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.

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

Contents

00 - Technical data	1
1 Engine number	1
2 Safety precautions	2
2.1 Safety precautions when working on the fuel supply system	2
2.2 Safety precautions when working on the cooling system	2
2.3 Safety precautions when working on vehicles with start/stop system	3
2.4 Safety precautions when using testers and measuring instruments during a road test	3
2.5 Working on the exhaust system	3
2.6 Safety precautions when working on the ignition system	3
3 General repair instructions	5
3.1 Rules for cleanliness when working on fuel supply system, injection system and turbocharger	5
3.2 Checking fuel system for leaks	5
3.3 Foreign particles in engine	5
3.4 Contact corrosion	6
3.5 Routing and attachment of pipes, hoses and wiring	6
3.6 Checking vacuum system	6
3.7 Installing radiators, condensers and charge air coolers	7
10 - Removing and installing engine	8
1 Removing engine	8
2 Separating engine and dual clutch gearbox	26
3 Securing engine to engine and gearbox support	29
4 Installing engine	31
5 Assembly mountings	35
5.1 Exploded view - assembly mountings	35
5.2 Supporting engine in installation position	36
5.3 Checking adjustment of assembly mountings (engine/gearbox mountings)	39
5.4 Adjusting assembly mountings	40
5.5 Removing and installing engine mountings	43
13 - Crankshaft group	47
1 Cylinder block (pulley end)	47
1.1 Exploded view - poly V-belt drive, bracket for ancillaries	47
1.2 Removing and installing poly V-belt for air conditioner compressor	50
1.3 Removing and installing poly V-belt for alternator and coolant pump	51
1.4 Removing and installing poly V-belt tensioner for air conditioner compressor	52
1.5 Removing and installing poly V-belt tensioner for alternator and coolant pump	52
1.6 Removing and installing bracket for ancillaries	54
1.7 Removing and installing vibration damper	54
1.8 Exploded view - sealing flange (pulley end)	56
1.9 Renewing sealing flange (pulley end)	57
2 Cylinder block (gearbox end)	61
2.1 Exploded view - dual-mass flywheel	61
2.2 Removing and installing dual-mass flywheel	62
2.3 Checking sender wheel	63
2.4 Renewing crankshaft oil seal (gearbox end)	64
3 Crankshaft	67
3.1 Exploded view - crankshaft	67
3.2 Crankshaft dimensions	69
3.3 Renewing needle bearing in crankshaft	69
3.4 Measuring axial clearance of crankshaft	71

3.5	Measuring radial clearance of crankshaft	72
4	Pistons and conrods	73
4.1	Exploded view - pistons and conrods	73
4.2	Removing and installing pistons	74
4.3	Checking pistons and cylinder bores	76
4.4	Separating parts of new conrod	77
4.5	Checking radial clearance of conrod bearings	78
15	Cylinder head, valve gear	79
1	Chain drive	79
1.1	Exploded view - timing chain covers	79
1.2	Removing and installing timing chain cover (top)	81
1.3	Renewing oil seal in timing chain cover (top)	84
1.4	Removing and installing timing chain cover (bottom)	85
1.5	Exploded view - camshaft timing chain	89
1.6	Removing and installing camshaft timing chain	90
1.7	Exploded view - drive chain for valve gear	97
1.8	Removing and installing drive chain for valve gear	98
2	Cylinder head	101
2.1	Exploded view - cylinder head cover and cylinder head	101
2.2	Removing and installing camshaft control valves N205 / N318	104
2.3	Removing and installing cylinder head cover	104
2.4	Removing and installing cylinder head	106
2.5	Checking compression	114
3	Valve gear	116
3.1	Exploded view - valve gear	116
3.2	Measuring axial clearance of camshafts	119
3.3	Measuring radial clearance of camshafts	120
3.4	Removing and installing camshafts	120
3.5	Renewing valve stem oil seals with cylinder head installed	124
3.6	Renewing valve stem oil seals with cylinder head removed	128
3.7	Checking hydraulic compensation elements	131
3.8	Valve dimensions	133
3.9	Checking valve guides	133
3.10	Checking valves	134
17	Lubrication	135
1	Sump and oil pump	135
1.1	Exploded view - sump (bottom section), sump (top section), oil pump	135
1.2	Removing and installing oil level and oil temperature sender G266	139
1.3	Removing and installing sump (bottom section)	139
1.4	Removing and installing sump (top section)	141
1.5	Removing and installing oil pump	147
2	Oil filter bracket and engine oil cooler	153
2.1	Exploded view - oil filter bracket and engine oil cooler	153
2.2	Removing and installing engine oil cooler	155
2.3	Removing and installing oil filter bracket with engine oil cooler	155
2.4	Removing and installing oil pressure switch F22	157
2.5	Removing and installing oil pressure switch for reduced oil pressure F378	159
2.6	Checking oil pressure	159
2.7	Removing and installing valve for oil pressure control N428	160
2.8	Engine oil	162
2.9	Checking oil level	162
19	Cooling	163

1	Cooling system	163
1.1	Connection diagram - coolant hoses	163
1.2	Draining and filling cooling system	165
1.3	Checking cooling system for leaks	170
2	Coolant pump and thermostat	172
2.1	Exploded view - coolant pump and thermostat with housing	172
2.2	Removing and installing continued coolant circulation pump V51	173
2.3	Removing and installing solenoid valve for coolant circuit N492	175
2.4	Removing and installing coolant pump	176
2.5	Removing and installing thermostat with housing	178
2.6	Removing and installing coolant distributor housing	180
3	Coolant pipes	182
3.1	Exploded view - coolant pipes	182
3.2	Removing and installing coolant temperature sender G62	183
3.3	Removing and installing coolant pipe (left-side)	184
3.4	Removing and installing coolant pipes (right-side)	185
3.5	Removing and installing coolant pipes (front)	187
3.6	Removing and installing coolant pipe on gearbox	188
4	Radiators and radiator fans	190
4.1	Exploded view - radiator and radiator fans	190
4.2	Removing and installing radiator	192
4.3	Removing and installing auxiliary radiator	193
4.4	Removing and installing radiator cowl	195
4.5	Removing and installing radiator fans V7 / V177	197
21	Turbocharging/supercharging	198
1	Turbocharger	198
1.1	Exploded view - turbocharger	198
1.2	Removing and installing charge pressure sender G31 / intake air temperature sender 2 G299	202
1.3	Removing and installing turbocharger air recirculation valve N249	202
1.4	Removing and installing turbocharger	203
2	Charge air cooler	208
2.1	Exploded view - charge air cooler	208
2.2	Removing and installing charge air cooler	210
2.3	Checking charge air system for leaks	211
24	Mixture preparation - injection	214
1	Injection system	214
1.1	Overview of fitting locations	214
2	Air cleaner	220
2.1	Exploded view - air cleaner	220
2.2	Removing and installing air filter element	221
2.3	Removing and installing air cleaner housing	223
3	Intake manifold, fuel rail and injectors	224
3.1	Exploded view - intake manifold	224
3.2	Removing and installing intake air temperature sender G42 / intake manifold pressure sender G71	228
3.3	Removing and installing throttle valve module J338	228
3.4	Removing and installing intake manifold (top section)	230
3.5	Removing and installing intake manifold (bottom section) with fuel rail	232
3.6	Exploded view - fuel rail with injectors	234
3.7	Removing and installing injectors	236
3.8	Removing and installing fuel pressure sender G247	241
3.9	Removing and installing fuel pressure sender for low pressure G410	243



3.10	Checking fuel pressure and residual pressure (up to high-pressure pump)	243
4	High-pressure pump	248
4.1	Exploded view - high-pressure pump	248
4.2	Removing and installing high-pressure pump	249
4.3	Removing and installing high-pressure pipe	250
5	Lambda probes	254
5.1	Overview - Lambda probes	254
5.2	Removing and installing Lambda probe G39 with Lambda probe heater Z19	255
5.3	Removing and installing Lambda probe after catalytic converter G130 with Lambda probe 1 heater after catalytic converter Z29	256
6	Engine control unit	259
6.1	Wiring and component check with isolator boxes VAS 6606	259
6.2	Removing and installing engine/motor control unit J623	260
26	- Exhaust system	264
1	Silencers	264
1.1	Exploded view - silencers	264
1.2	Removing and installing starter catalytic converter	266
1.3	Removing and installing catalytic converters	267
1.4	Stress-free alignment of exhaust system	267
1.5	Checking exhaust system for leaks	268
2	Exhaust manifold	269
3	Exhaust flap	270
3.1	Checking vacuum unit for exhaust flap	270
28	- Ignition system	271
1	Ignition system	271
1.1	Exploded view - ignition system	271
1.2	Test data	272
1.3	Removing and installing ignition coils	272
1.4	Removing and installing knock sensors G61 / G66	274
1.5	Removing and installing Hall senders G40 / G300	275
1.6	Removing and installing engine speed sender G28	276



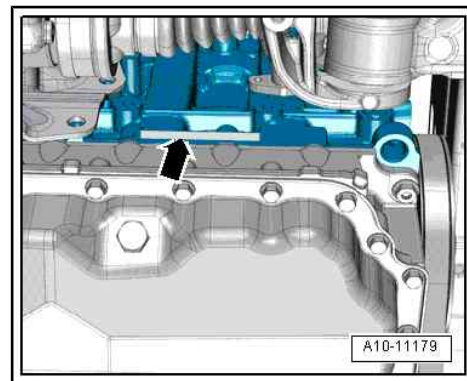
00 – Technical data

1 Engine number

(ARL005348; Edition 07.2017)

Engine number

- ◆ The engine number ("engine code letters" and "serial number") is located at the rear of the joint between cylinder block and sump (top section) -arrow-.
- ◆ There is also a sticker on the timing chain cover (top) showing the "engine code" and "serial number".
- ◆ Engine codes starting with the letter "C" have four letters (previously three letters).
- ◆ The first 3 characters of the engine code stand for the engine capacity and the mechanical construction and design. They are stamped onto the cylinder block together with the serial number.
- ◆ The 4th character indicates the power output and torque of the engine and is determined by the engine control unit.



Note

- ◆ *The four-letter engine code is found on the type plate (certain countries only), vehicle data sticker and engine control unit.*
- ◆ *Fitting locations of the type plate (certain countries only) and the vehicle data sticker ⇒ Maintenance ; Booklet 808 .*

Engine data

⇒ Technical data for petrol engines; Rep. gr. 00 ; Overview of engines



Protected by copyright. Copying for private 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.



2 Safety precautions

⇒ "2.1 Safety precautions when working on the fuel supply system", page 2

⇒ "2.2 Safety precautions when working on the cooling system", page 2

⇒ "2.3 Safety precautions when working on vehicles with start/stop system", page 3

⇒ "2.4 Safety precautions when using testers and measuring instruments during a road test", page 3

⇒ "2.5 Working on the exhaust system", page 3

⇒ "2.6 Safety precautions when working on the ignition system", page 3

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 a 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 the cooling system

Risk of scalding as hot coolant can escape

The cooling system is under pressure when the engine is hot. Risk of scalding due to hot steam and hot coolant.

Protected by copyright. Copying for private 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.

- Put on protective gloves.
- Put on safety goggles.
- Cover filler cap on expansion tank with a cloth and open carefully to release pressure.

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

Risk of injury - engine may start unexpectedly

The engine can start unexpectedly if the vehicle's start/stop system is activated. A message in the instrument cluster indicates whether the start/stop system is activated.

- To deactivate the start/stop system, switch off the ignition.

2.4 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.

2.5 Working on the exhaust system

When working on the exhaust system please note the following:



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.*

2.6 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.



Protected by copyright. Copying for private 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.

3 General repair instructions

⇒ [“3.1 Rules for cleanliness when working on fuel supply system, injection system and turbocharger”, page 5](#)

⇒ [“3.2 Checking fuel system for leaks”, page 5](#)

⇒ [“3.3 Foreign particles in engine”, page 5](#)

⇒ [“3.4 Contact corrosion”, page 6](#)

⇒ [“3.5 Routing and attachment of pipes, hoses and wiring”, page 6](#)

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

3.1 Rules for cleanliness when working on fuel supply system, injection system and turbocharger

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.
- ◆ Protect unplugged electrical connectors against dirt and moisture and make sure connections are dry when attaching.

3.2 Checking fuel system for leaks

- Allow engine to run for several minutes at moderate rpm.
- Switch off ignition.
- Check complete fuel system for leaks.
- If leaks are found although the connections have been tightened to the correct torque, the relevant component must be renewed.
- Road-test vehicle and accelerate with full throttle at least once.
- Then inspect high-pressure section of fuel system again for leaks.

3.3 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.

3.4 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.

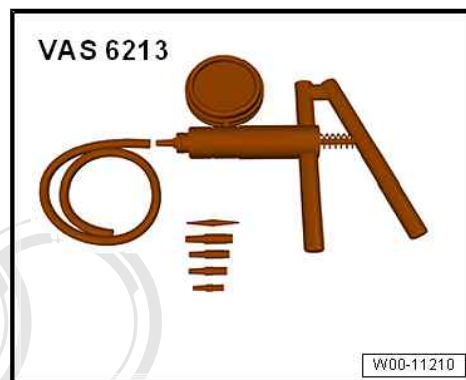
3.5 Routing and attachment of pipes, hoses and wiring

- ◆ 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 avoid damaging pipes, hoses and wiring, ensure sufficient clearance from all moving or hot components in engine compartment (limited space in engine compartment).

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.

Protected by copyright. Copying for private 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.

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

3.7 Installing radiators, condensers and charge air coolers

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.

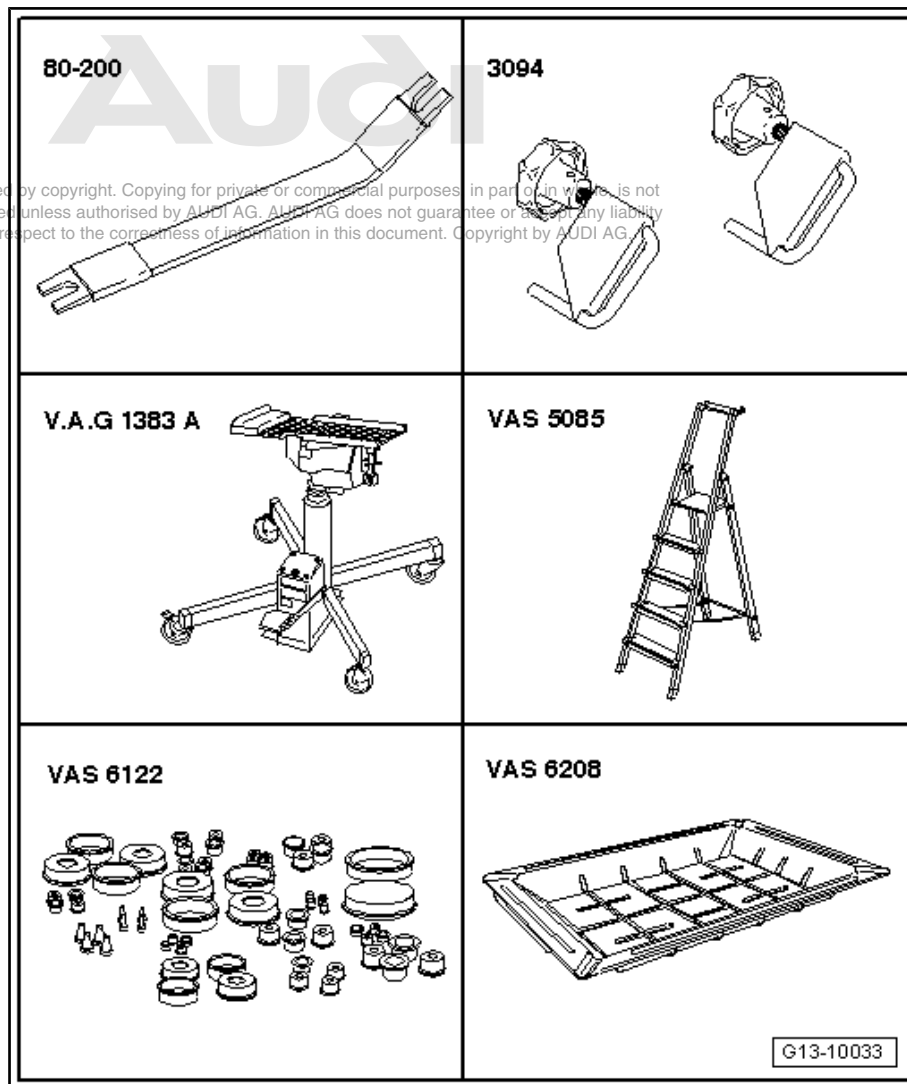


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

10 – Removing and installing engine

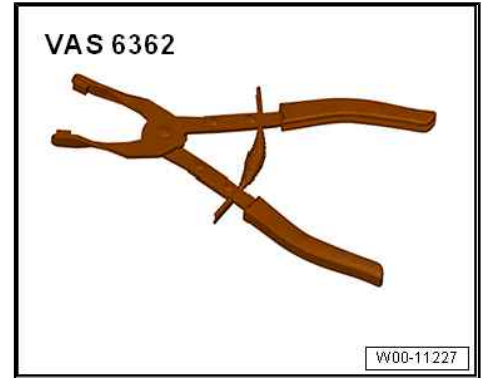
1 Removing engine

Special tools and workshop equipment required

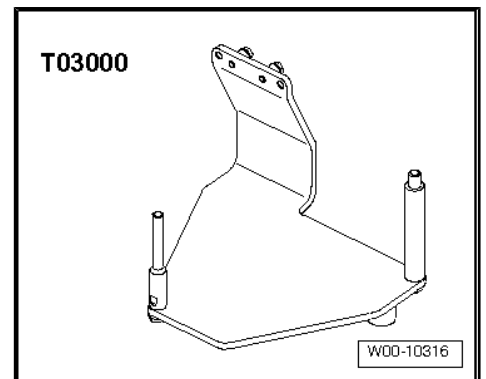


- ◆ Removal lever - 80 - 200-
- ◆ Hose clamps, up to 25 mm - 3094-
- ◆ Engine and gearbox jack - V.A.G 1383 A-
- ◆ Stepladder - VAS 5085-
- ◆ Engine bung set - VAS 6122-
- ◆ Drip tray for workshop hoist - VAS 6208-

- ◆ Hose clip pliers - VAS 6362-



- ◆ Engine bracket -T03000-



Procedure



Note

- ◆ The engine is removed from underneath together with the gearbox.
- ◆ Fit cable ties in the original positions when installing.
- ◆ Routing and attachment of pipes, hoses and wiring in engine compartment [⇒ page 6](#).

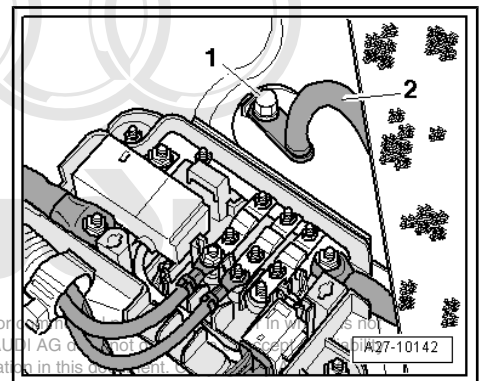


Caution

To prevent irreparable damage to the electronic components when disconnecting the battery:

- ◆ Observe notes on procedure for disconnecting the battery.

- With ignition switched off, disconnect earth cable -2- at battery
⇒ Electrical system; Rep. gr. 27.



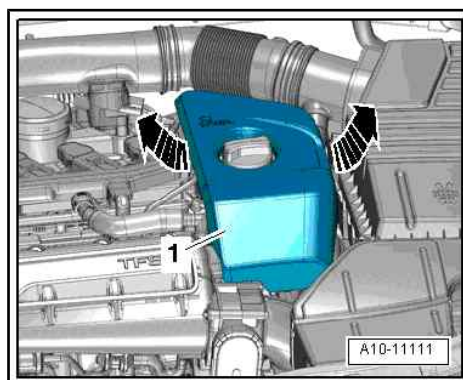
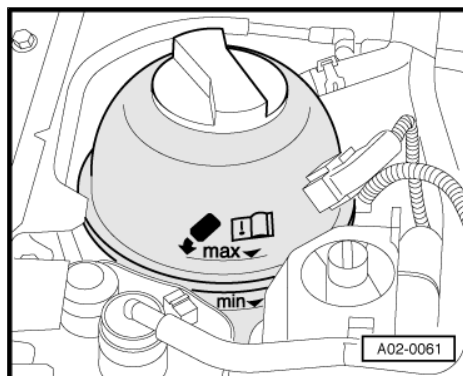
Protected by copyright. Copying for private or commercial use in any form is not permitted unless authorised by AUDI AG. AUDI AG does not accept any responsibility with respect to the correctness of information in this document.


WARNING

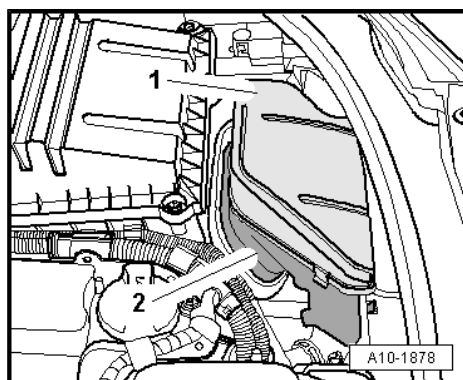
Risk of scalding due to hot steam and hot coolant.

- ◆ *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.*

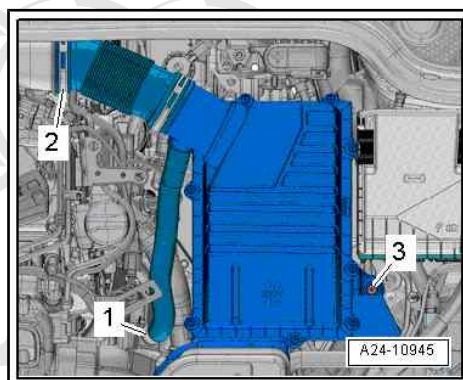
- Open filler cap on coolant expansion tank.
- Pull engine cover panel -1- off upwards -arrows-.



- Pull cover -1- off air duct (release clip on side).
- Unclip air duct -2-.

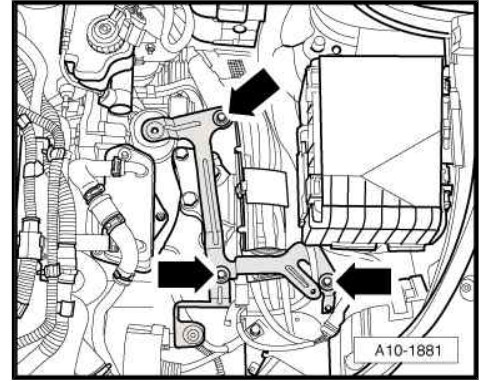


- Release hose clips -1- and -2- and disconnect air hoses.
- Remove bolt -3- and detach air cleaner housing from retaining pegs.

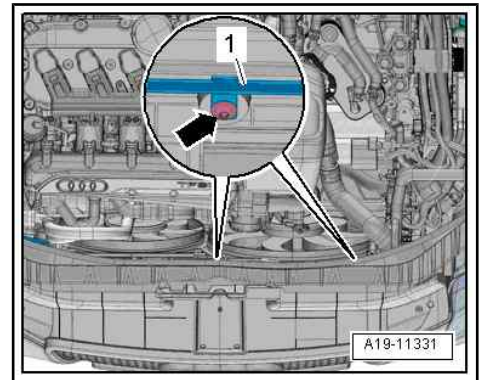


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Move electrical wiring harness clear at bracket for air cleaner housing.
- Remove bolts -arrows- and detach bracket for air cleaner housing.



- Remove bolt -arrow- and push coolant pipe -1- towards rear.

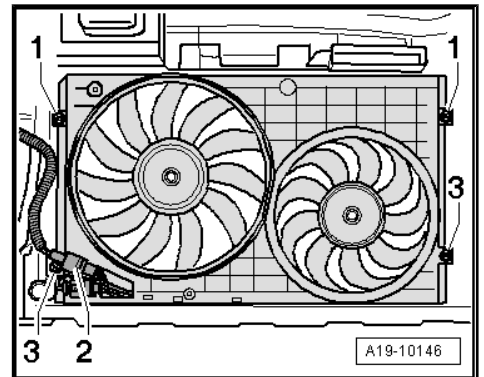


- Remove bolts -1- for radiator cowl.

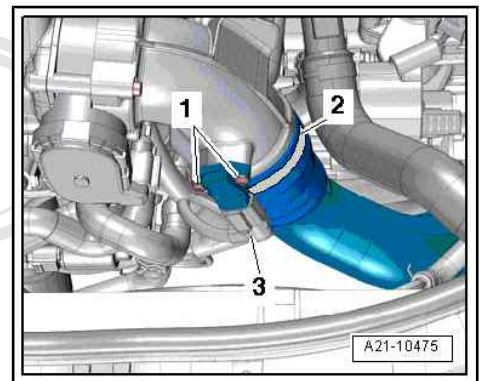


Note

- ◆ Bolts -3- are removed at a later stage.
- ◆ Disregard -item 2-.

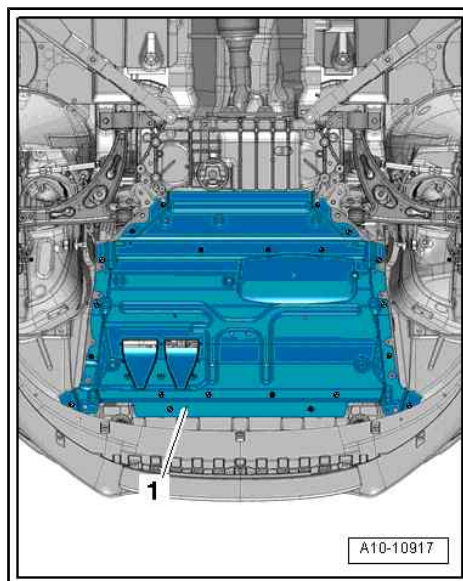


- Unplug electrical connector -3-.
- Unscrew bolts -1- and remove charge pressure sender - G31- / intake air temperature sender 2 - G299- .
- Release hose clip -2-.

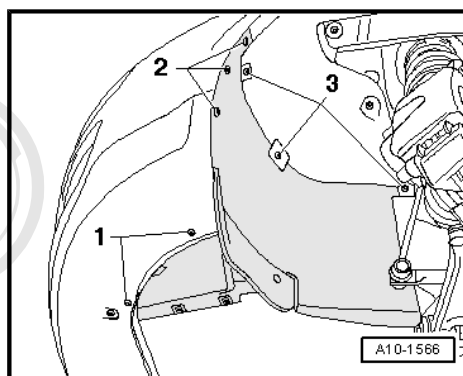


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Remove both front wheels ⇒ Wheels and tyres; Rep. gr. 44 .
- Remove noise insulation -1- ⇒ Rep. gr. 66 .

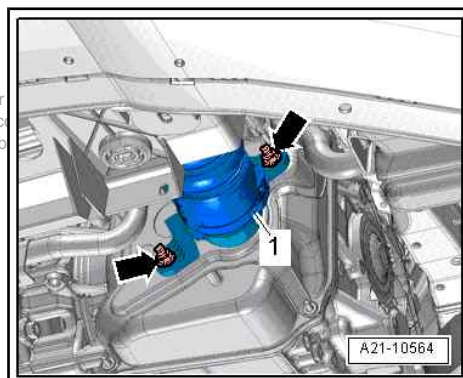


- Remove front left and front right wheel housing liners (front section) ⇒ Rep. gr. 66 .

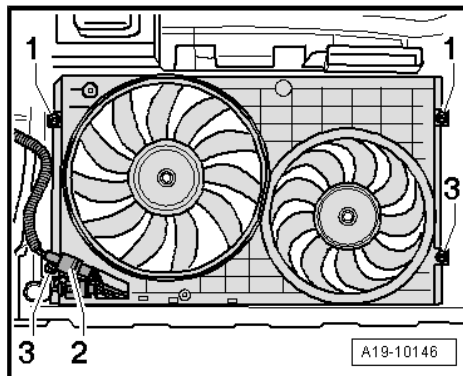


- Remove nuts -arrows-.
- Release hose clip -1- and detach air pipe.

Protected by copyright. Copying for private or commercial purposes, in part or permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept responsibility with respect to the correctness of information in this document. Copyright b



- Unplug electrical connector -2- for radiator fan.
- Remove bolts -3- and take out radiator cowl downwards.

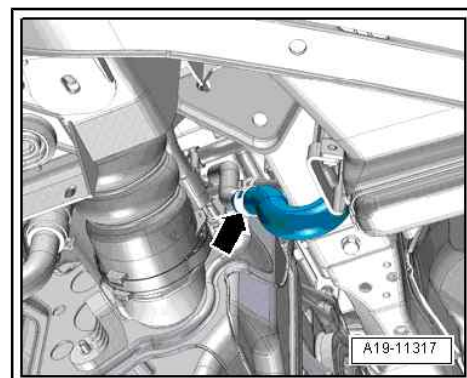
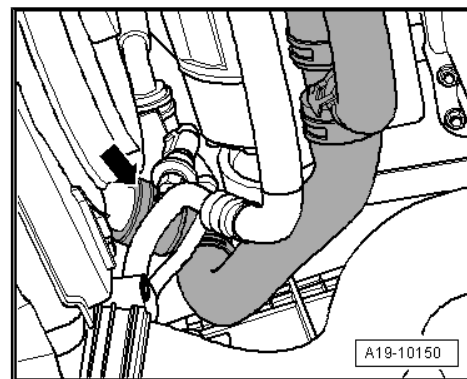




Note

Collect drained coolant in a clean container for re-use or disposal.

- Place drip tray for workshop hoist - VAS 6208- under connection.
- Lift retaining clip -arrow-, disconnect coolant hose (bottom right) from radiator and drain off coolant.
- Release hose clip -arrow-, disconnect coolant hose (bottom left) from radiator and drain off coolant.

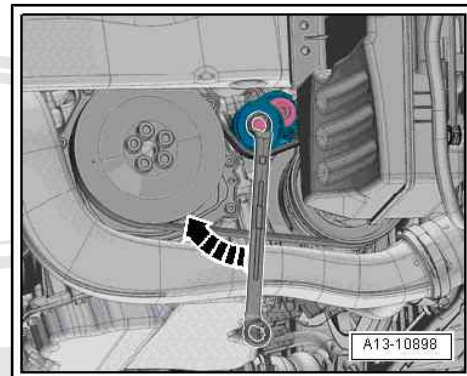


Caution

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

- ◆ *Before removing, mark direction of rotation of poly V-belt for air conditioner compressor with chalk or felt-tip pen for re-installation.*

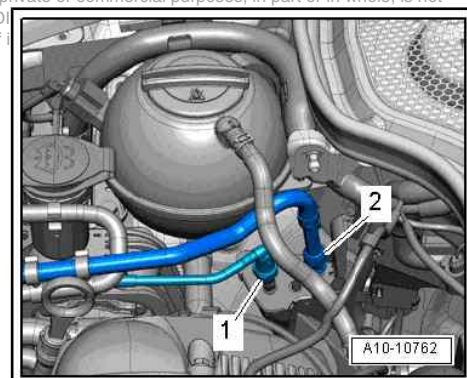
- Move tensioner in clockwise direction -arrow- to slacken poly V-belt.
- Detach poly V-belt for air conditioner compressor and release tensioner.



Caution

Risk of damage caused by particles of dirt.

- ◆ *Observe rules for cleanliness when working on the fuel supply system ⇒ [page 5](#).*



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:

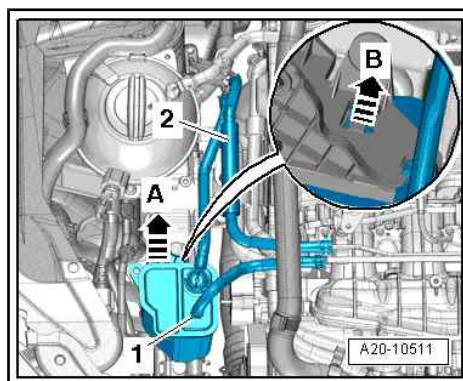
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI with respect to the correctness of the information.

- Put on safety goggles.
- Put on protective gloves.
- Release pressure (wrap a clean cloth around connection and open connection carefully).
- Disconnect fuel supply line -2- (pull release ring) and move clear.
- Seal off open lines and connections with clean plugs from engine bung set - VAS 6122- .
- Disconnect hose -1- at activated charcoal filter (press release tab) and move hose clear.
- Pull activated charcoal filter -1- with line attached upwards out of bracket -arrow B-; lift release tab -1- to do so.
- Release activated charcoal filter -arrow B-, lift off -arrow A- and move clear to one side.



Note

Disregard -item 2-.

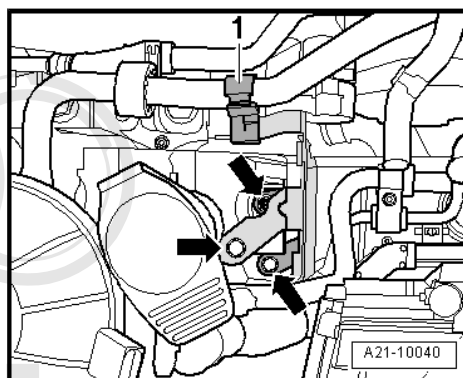


- Remove bolts -arrows- and detach bracket for activated charcoal filter.



Note

Disregard -item 1-.



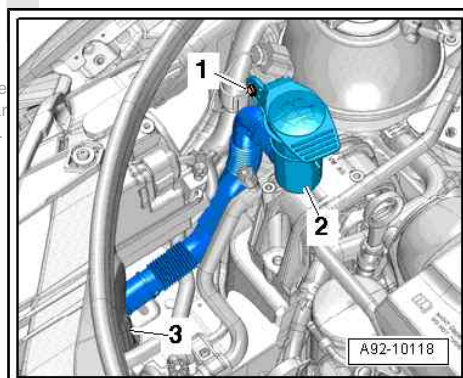
- Remove bolt -1-.
- Push filler pipe with filler neck -2- for washer fluid reservoir to side.

Protected by copyright. Copying for private or commercial purpose permitted unless authorised by AUDI AG. AUDI AG does not guarantee with respect to the correctness of information in this document.

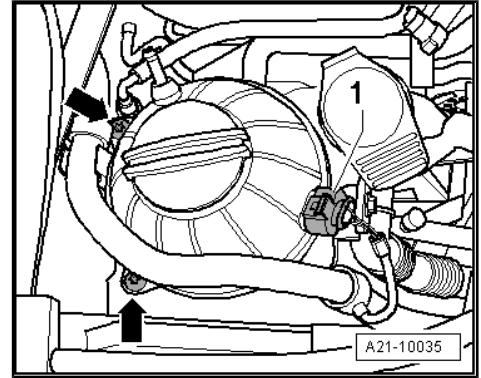


Note

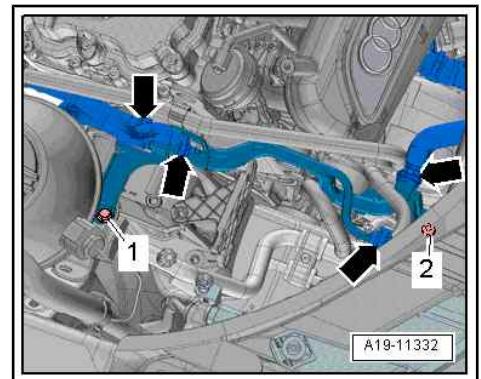
Disregard -item 3-.



- Unplug electrical connector -1- for coolant shortage indicator switch - F66- .
- Remove bolts -arrows- and push coolant expansion tank slightly to one side.



- Release hose clips -arrows- and detach coolant hoses.
- Unscrew bolts -1, 2- and remove coolant pipes (right-side).

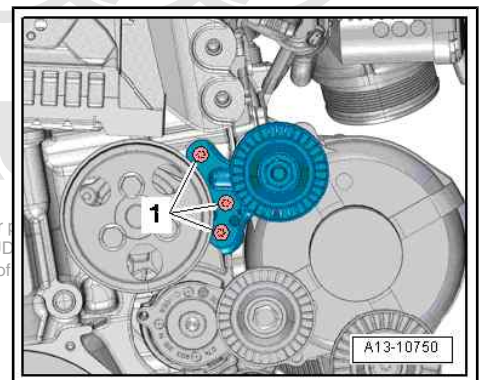
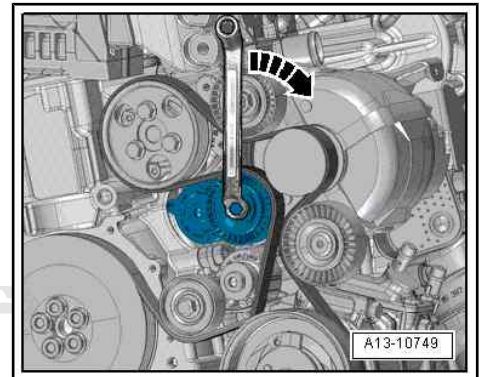


Caution

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

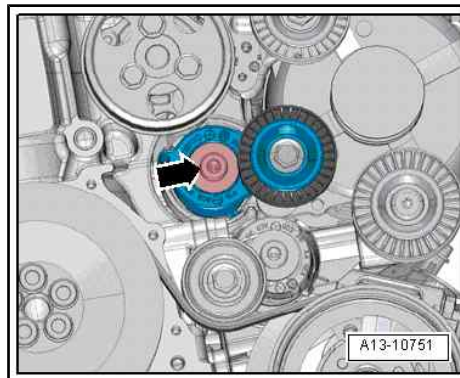
- ◆ ***Before removing, mark direction of rotation of poly V-belt for alternator and coolant pump with chalk or felt-tip pen for re-installation.***

- Move tensioner in clockwise direction -arrow- to slacken poly V-belt.
- Detach poly V-belt for alternator and coolant pump and release tensioner.
- Unscrew bolts -1- and remove idler roller.



Protected by copyright. Copying for
permitted unless authorised by AUD
with respect to the correctness of

- Remove bolt -arrow- and take off tensioner.

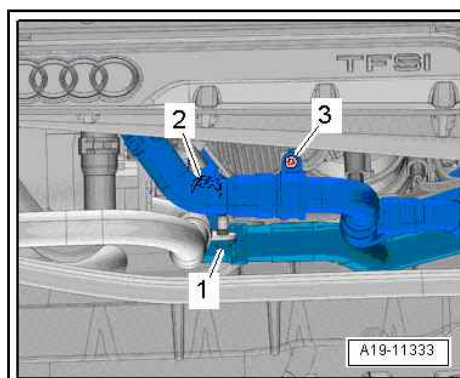


- Remove bolts -1, 3-.

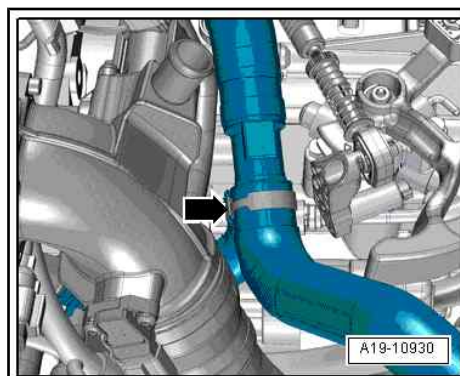


Note

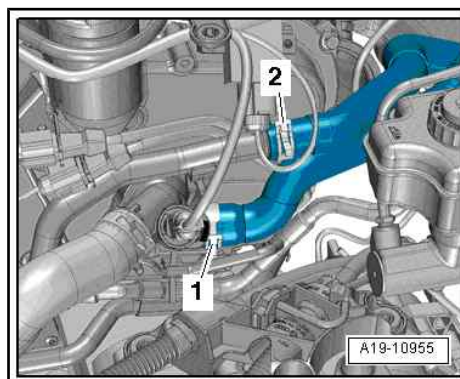
Disregard -item 2-.



- Release hose clip -arrow- and detach coolant hose.



- Release hose clips -1- and -2- and disconnect coolant hoses.

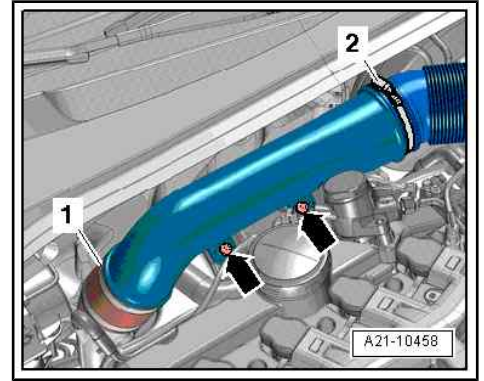


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Remove bolts -arrows-.
- Release hose clip -1- and detach air pipe.

 Note

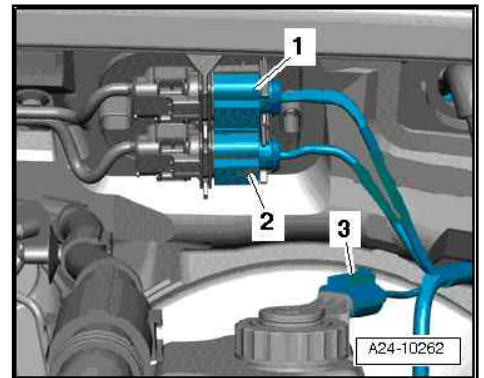
Disregard -item 2-.



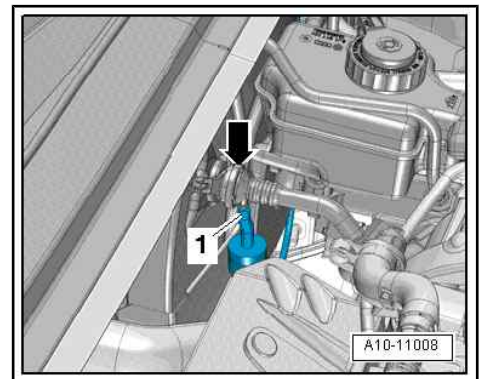
- Remove electrical connector -1- for Lambda probe - G39- from bracket and unplug connector.
- Move clear electrical wiring to Lambda probe.

 Note

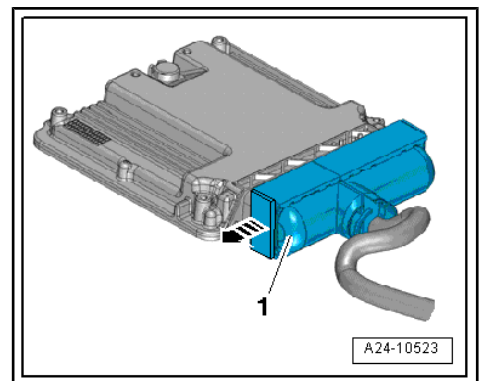
Disregard items -2 and 3-.



- Detach vacuum hose -1- from non-return valve -arrow-.
- Pull non-return valve off brake servo.

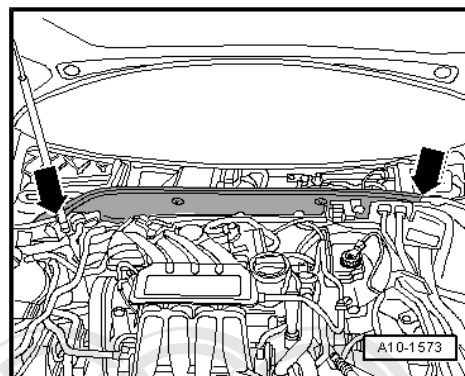


- Release electrical connector -1- for engine wiring harness -arrow- and detach ⇒ [page 260](#).

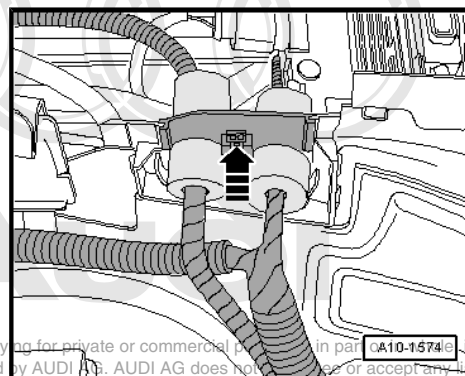


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Move clear engine wiring harness at rear of plenum chamber partition panel.

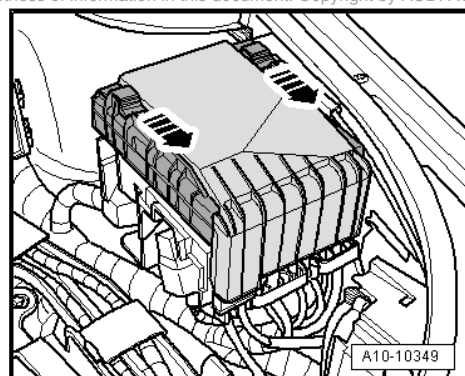


- Release wiring protector -1- for engine wiring harness -arrow- and lift off.

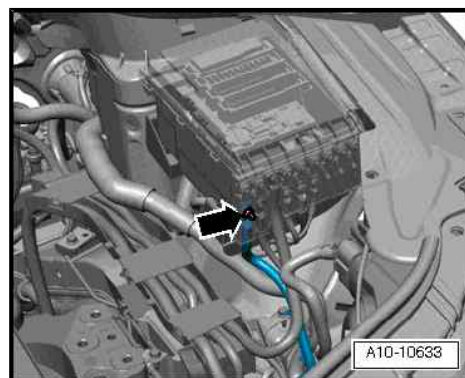


Protected by copyright. Copying for private or commercial purposes in part or in full is not permitted unless authorised by AUDI AG. AUDI AG does not accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

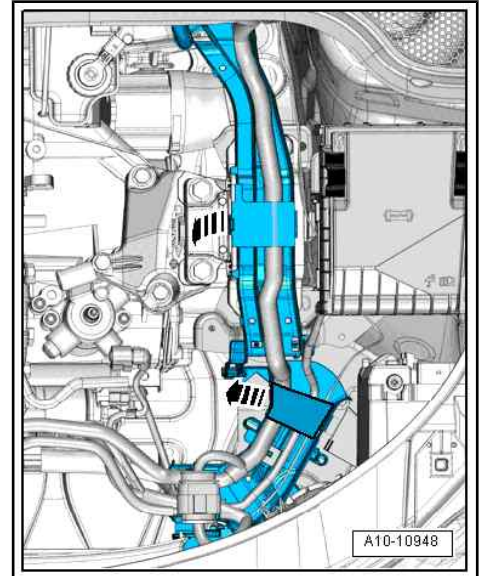
- Slide the two clips in the direction of the -arrows- and remove cover from electronics box in engine compartment.



- Remove nut -arrow-, detach terminal 30 wire from electronics box in engine compartment and move it clear.



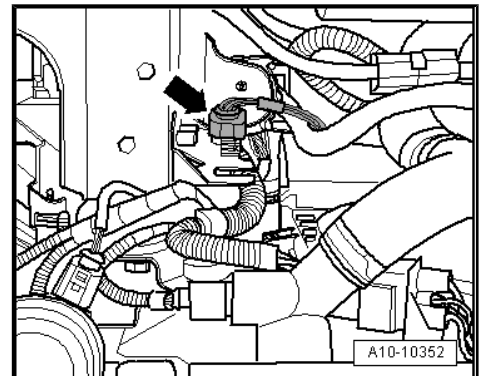
- Open wiring duct brackets -arrows-.



- Unplug electrical connector -arrow- at longitudinal member (bottom left).



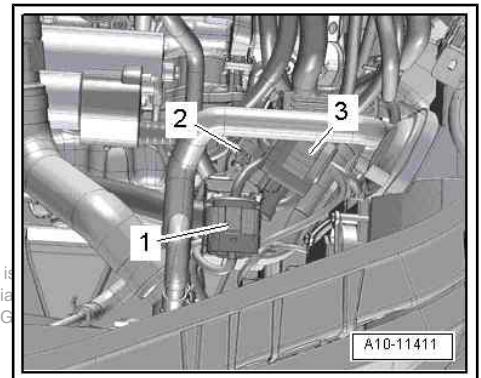
For illustration purposes, the installation position is shown from below.



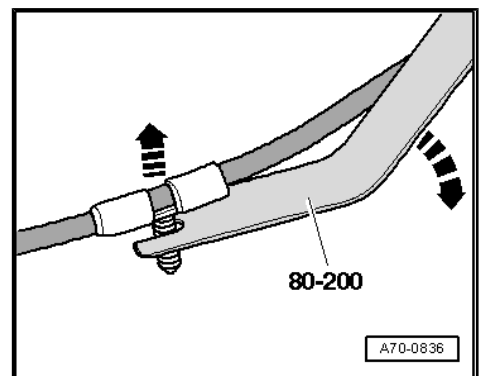
- Unclip electrical connectors -1, 3- from bracket and unplug.
- Open wiring duct bracket located underneath.
- Unclip wiring harness for engine control unit from wiring duct.
- Place engine wiring harness on top of engine.
- Secure engine control unit to prevent it falling.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is 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
Disregard -item 2-.



Use removal lever - 80 - 200- to lever out the wiring clips.



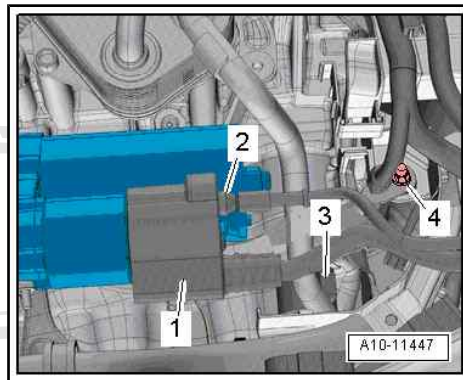
- Unplug electrical connector -2- at starter.
- Push back protective cover -1- and unscrew B+ cable at starter solenoid switch.
- Remove bolt -4- for earth connection.



Caution

Risk of irreparable damage to gearbox control unit (mechanronic unit) because of static discharge.

- ◆ **Do NOT touch connector contacts in gearbox connector with your hands.**

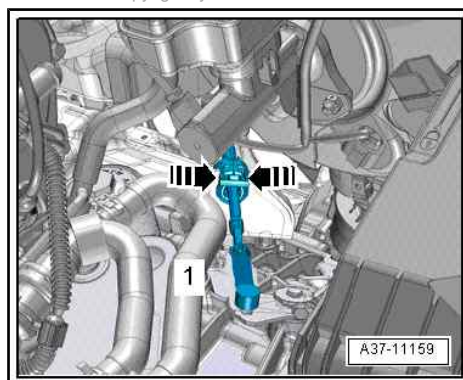


- Touch gearbox housing with your hand (without wearing gloves) to eliminate static charge.
- Turn retainer catch anti-clockwise and unplug electrical connector -3- at gearbox.
- Pry ball socket of selector lever cable off gearbox selector lever using removal lever - 80 - 200- .
- Release fasteners -arrows- and move selector lever cable clear.

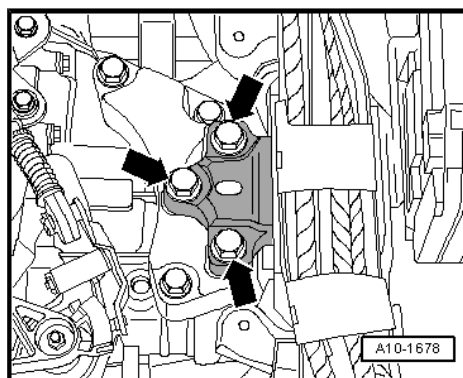


Note

Take care not to bend or kink selector lever cable.



- Loosen bolts -arrows- for gearbox mounting approx. 2 turns.

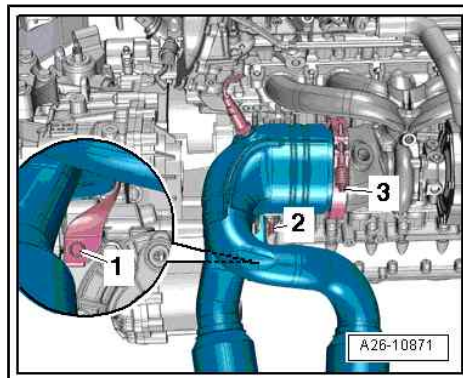


- Loosen bolt -3- and push clamp onto starter catalytic converter.
- Remove bolt -2-, tie up starter catalytic converter to rear.

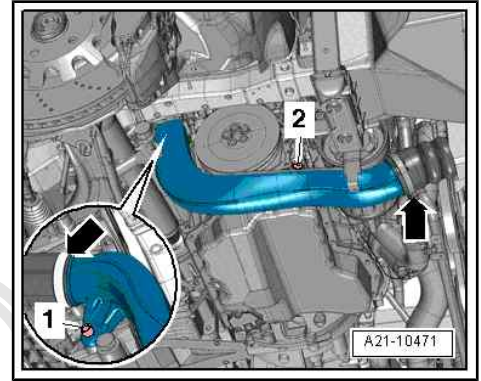


Note

Disregard -item 1-.



- Remove bolts -1- and -2-.
- Loosen hose clips -arrows- and detach air pipe.



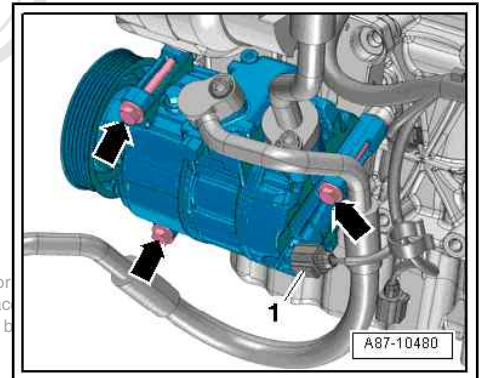
- Unplug electrical connector -1- on air conditioner compressor regulating valve - N280- .



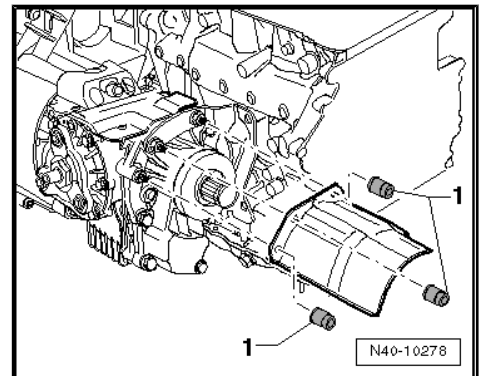
Caution

Danger of damage to refrigerant lines and hoses.

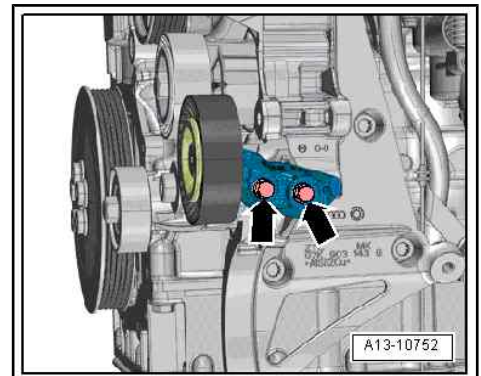
◆ ***Do NOT stretch, kink or bend refrigerant lines and hoses.***



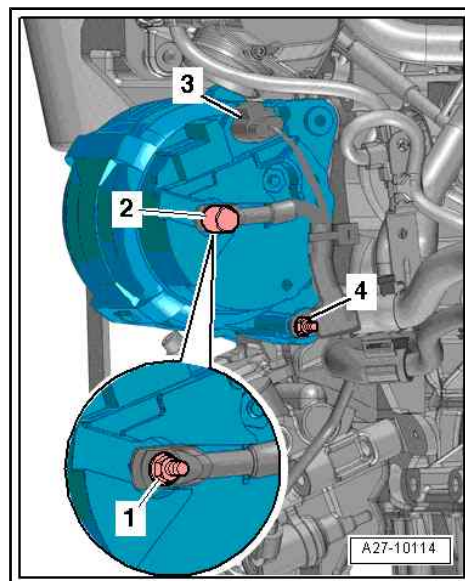
- Remove bolts -arrows-.
- Detach air conditioner compressor from bracket for ancillaries and tie up to the right side.
- Remove nuts -1- and detach heat shield for drive shaft (right-side).
- Remove drive shaft (left and right) ⇒ Rep. gr. 40 .



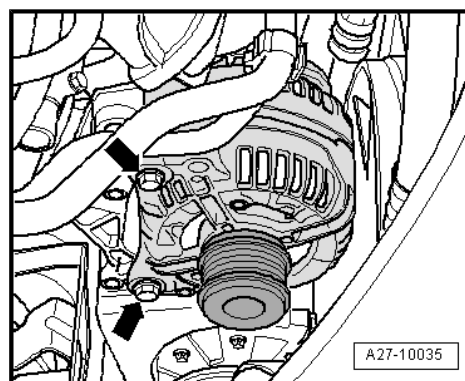
- Unscrew bolts -arrows- and remove idler roller.



- Unplug electrical connector -3- at alternator.
- Lever off protective cap -2- and remove nut -1- for terminal 30/B+.
- Remove nut -4- and detach wiring clamp.

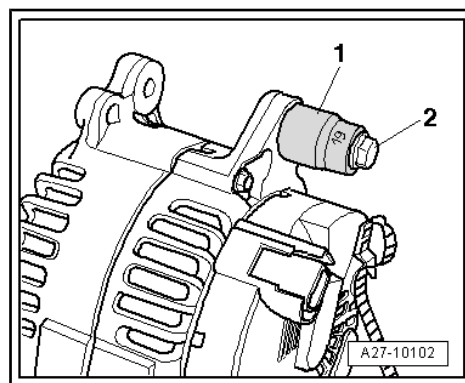


- Remove bolts -arrows- and lift out alternator.

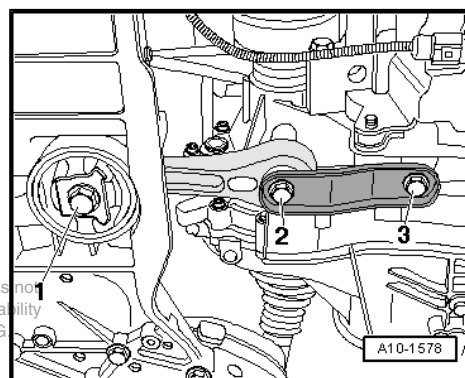


Note

- ♦ Apply $\frac{1}{2}$ " socket insert AF 19 -item 1- to sliding bush if alternator is stuck in bracket.
- ♦ Screw a bolt M8x45 -item 2- into sliding bush and pull sliding bush out of alternator by screwing in bolt.

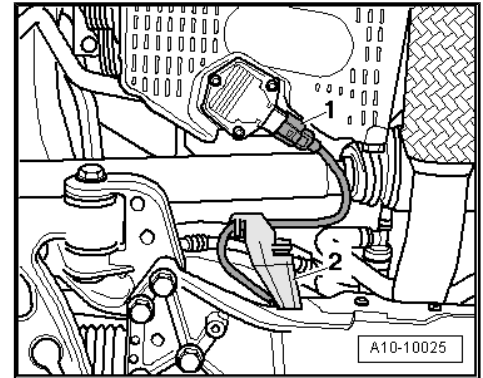


- Remove bolts -1, 2, 3- and detach pendulum support.

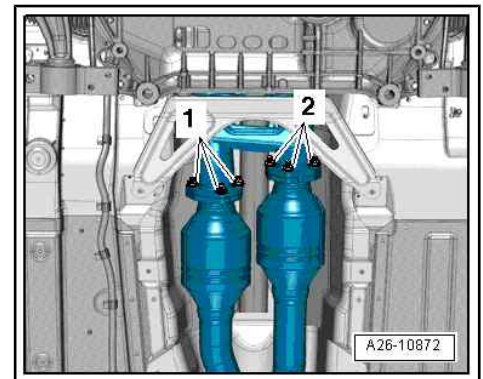


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG

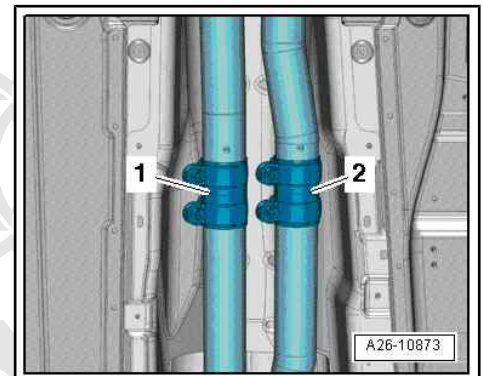
- Unplug electrical connector -1- at oil level and oil temperature sender - G266- .
- Unclip bracket -2- for electrical wiring from subframe.



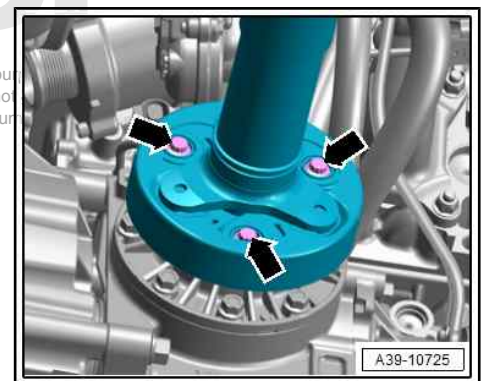
- Remove nuts -1- and -2-.



- Loosen clamps -1- and -2- and move to front.
- Detach catalytic converter (left and right).



- Mark position of flexible coupling and flange for bevel box in relation to each other for re-installation.
- Remove bolts -arrows- for flexible coupling for propshaft at bevel box (select gear on gearbox).

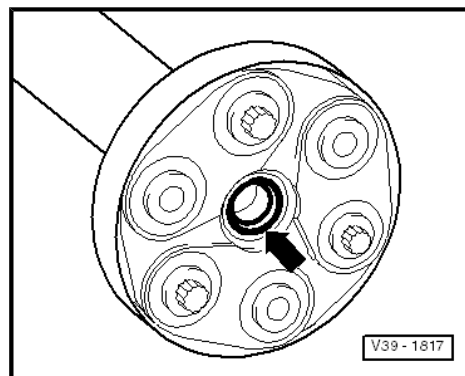




Caution

Make sure not to damage the oil seal -arrow- in the propshaft flange.

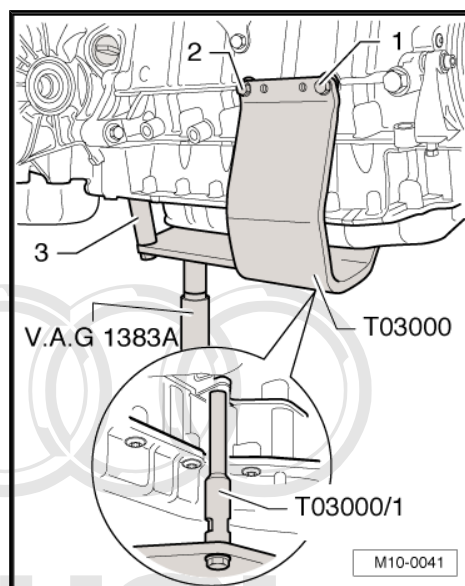
- ◆ **Push the propshaft horizontally to the rear as far as possible.**



Note

The propshaft must be renewed if the oil seal is damaged.

- Unscrew pin -T03000/1- from engine bracket -T03000- .
- Fit engine bracket -T03000- with remaining pin -3- to cylinder block, screw in bolts -1- and -2- by hand until they make contact.
- Fit pin -T03000/1- to cylinder block and tighten to 20 Nm.
- Tighten bolts -1- and -2- to 25 Nm.
- Insert engine and gearbox jack - V.A.G 1383 A- in engine bracket -T03000- and raise engine/gearbox assembly slightly.



Note

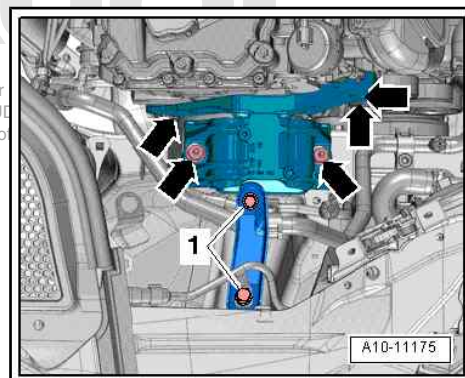
To unscrew bolts for assembly mounting use stepladder -VAS 5085- .

- Remove bolts -1- and -arrows- for engine mounting (left-side).



Note

The bolt at the rear of the cylinder block can be accessed from the wheel housing side.



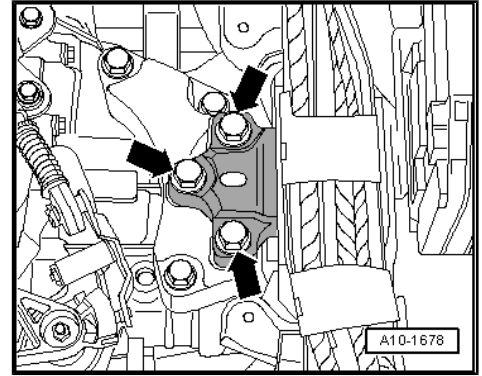
- Remove bolts -arrows- securing gearbox mounting.



Caution

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

- ◆ ***Check that all hoses and wiring connections between engine, gearbox, subframe and body have been detached.***
- ◆ ***Carefully guide engine/gearbox assembly out of engine compartment when lowering.***
- ◆ ***Make sure there is sufficient clearance from air conditioner compressor.***



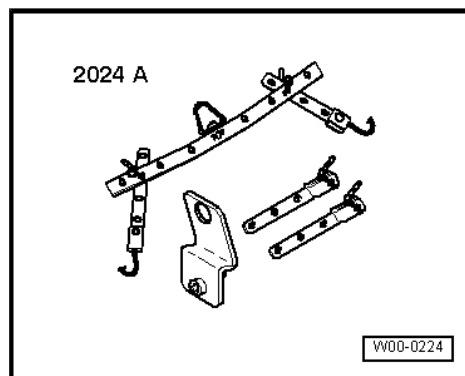
- Swing gearbox section of engine/gearbox assembly to front and only then lower further.

Protected by copyright. Copying for private 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.

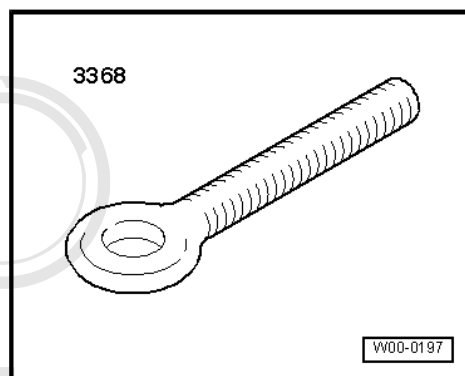
2 Separating engine and dual clutch gearbox

Special tools and workshop equipment required

- ◆ Lifting tackle - 2024 A-



- ◆ Eye-head bolt - 3368-

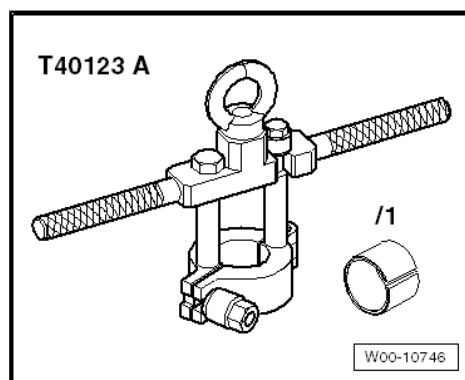


- ◆ Workshop hoist - VAS 6100-

Protected by copyright. Copying for private 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.

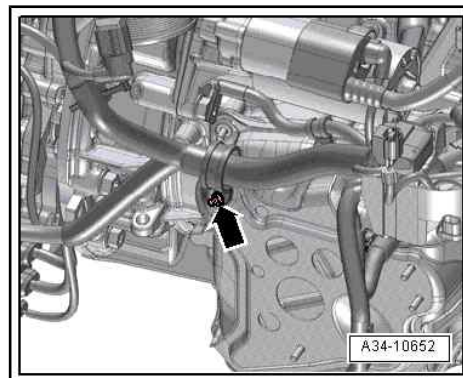


- ◆ Puller for ATF-supply - T40123 A-

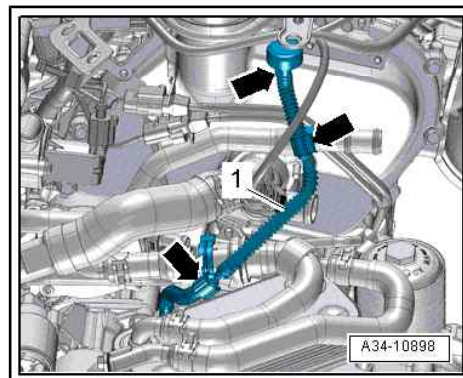


Procedure

- Engine/gearbox assembly removed and attached to engine support -T03000- .
- Remove bevel box ⇒ Rep. gr. 34 .
- Remove starter ⇒ Electrical system; Rep. gr. 27 .
- Remove nut -arrow- and move electrical wiring harness clear.



- Move breather hose -1- clear -arrows-.



- Remove eye on puller for ATF-supply - T40123 A- and screw into lower threaded hole for starter bolt as far as stop.
- Secure eye-head bolt - 3368- to bore in gearbox housing with two lock nuts -1-.
- Attach lifting tackle - 2024 A- to both eyes and to workshop hoist - VAS 6100- as shown in illustration.

Note

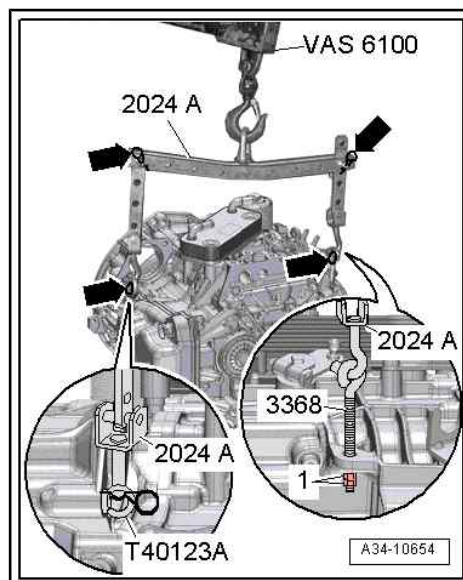
To adjust to the centre of gravity of the gearbox, the perforated rails of the support hooks must be positioned as shown.



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-.**

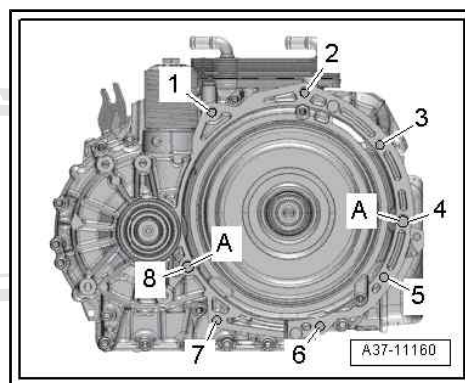


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Remove bolts -1 ... 8- securing gearbox to engine.
- Detach gearbox from engine.

**Note**

Disregard -item A-.

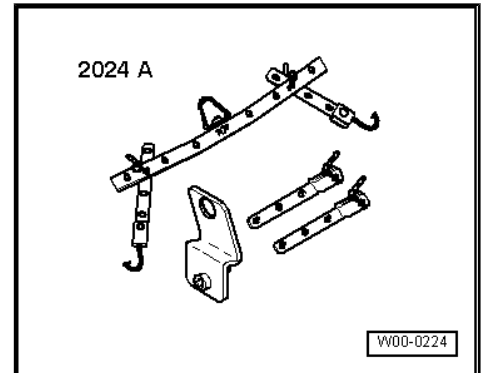


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

3 Securing engine to engine and gearbox support

Special tools and workshop equipment required

- ◆ Lifting tackle - 2024 A-



- ◆ Engine and gearbox support - VAS 6095-

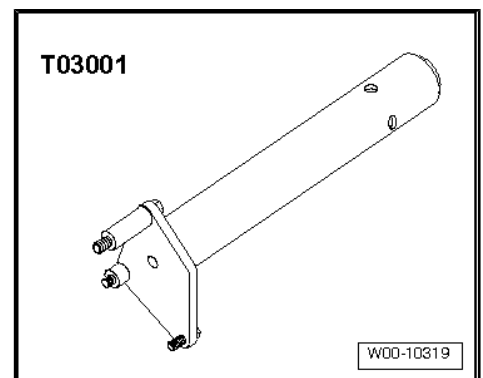
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- ◆ Workshop hoist - VAS 6100-



- ◆ Engine bracket -T03001-



Procedure

- Gearbox detached from engine.
 - Secure engine support -T03001- to cylinder block.
- 1 - 40 Nm
 - 2 - 25 Nm
 - 3 - 40 Nm
-
- 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.

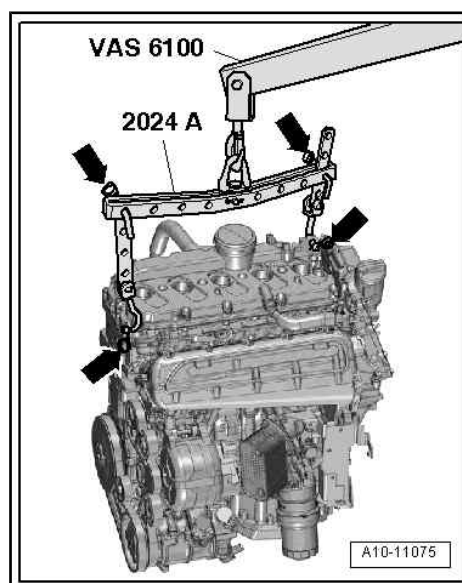
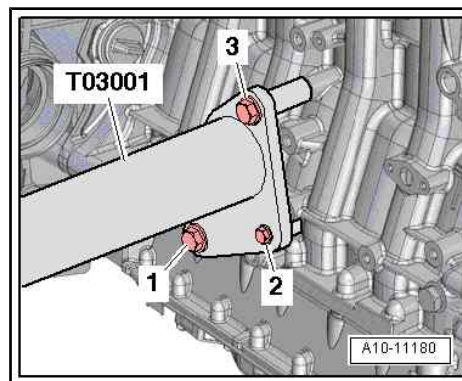


WARNING

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-.*

- Lift engine off engine bracket -T03000- using workshop hoist - VAS 6100- .
- Secure engine to engine and gearbox support - VAS 6095- using engine bracket -T03001- .



Protected by copyright. Copying for private 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.

4 Installing engine

Tightening torques



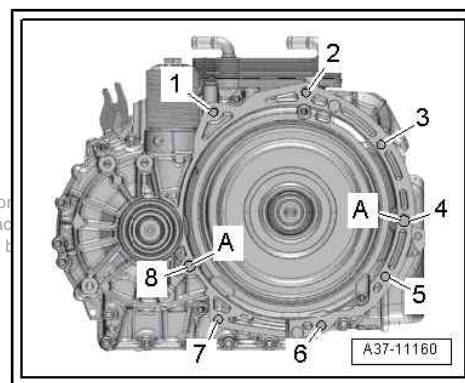
Note

- ◆ Tightening torques apply only to lightly greased, oiled, phosphated or black-finished nuts and bolts.
- ◆ Additional lubricants such as engine or gearbox oil may be used, but do not use lubricants containing graphite.
- ◆ Do not use degreased parts.
- ◆ Tolerance for tightening torques: $\pm 15\%$.

Component		Nm
Bolts/nuts	M6	10
	M7	15
	M8	22
	M10	40
	M12	65

Dual clutch gearbox to engine

Item	Bolt	Nm
1	M12x65	80
2, 3, 4	M12x70	80
5, 6, 7	M10x60	40
8 ¹⁾	M12x95	80
A	Dowel sleeves for centralising	
• 1) Screwed into gearbox from engine side		



Procedure

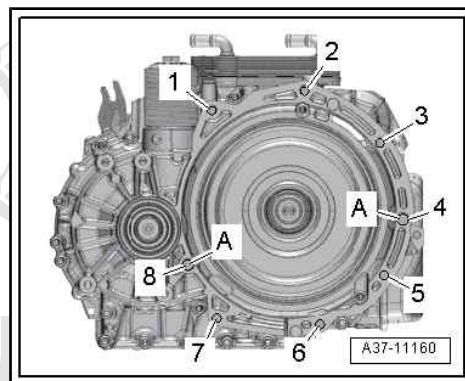
- Engine/gearbox assembly attached to engine bracket - T03000- .



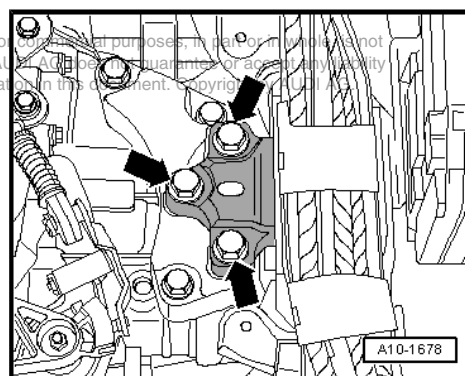
Note

- ◆ Renew the bolts tightened with specified tightening angle.
- ◆ Renew self-locking nuts and bolts as well as seals, gaskets and O-rings.
- ◆ 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.
- ◆ Routing and attachment of pipes, hoses and wiring in engine compartment ⇒ [page 6](#) .
- ◆ Fit all cable ties in the original positions when installing.

- If not already fitted, install dowel sleeves -A- for centring engine and gearbox in cylinder block.
- Install needle bearing if not fitted in crankshaft ⇒ [page 69](#) .
- Secure gearbox to engine.
- Secure bracket for bevel box ⇒ Rep. gr. 34 .
- Install coolant pipe (left-side) ⇒ [page 184](#) .
- Guide engine/gearbox assembly into body.
- Install engine mountings ⇒ [page 35](#) .



- Initially screw in bolts -arrows- for gearbox mounting by hand until they make contact.
- Detach engine support -T03000- from engine.
- Install pendulum support ⇒ Rep. gr. 34 .

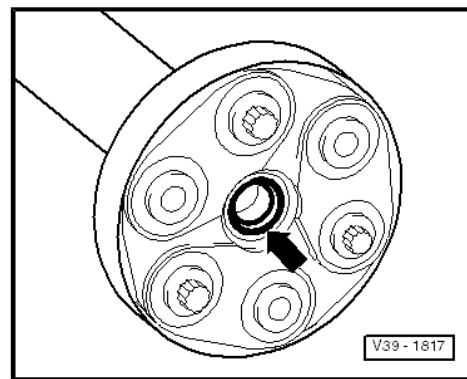




Caution

Make sure not to damage the oil seal -arrow- in the propshaft flange.

- ◆ **Push the propshaft horizontally to the rear as far as possible.**



Note

The propshaft must be renewed if the oil seal is damaged.

- Push engine/gearbox assembly towards plenum chamber partition panel, guiding pin on bevel box flange carefully into propshaft flange.
- Secure propshaft with flexible coupling to bevel box ⇒ Rear final drive; Rep. gr. 39 .

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

- Install catalytic converters ⇒ [page 267](#) .
- Install starter catalytic converter ⇒ [page 266](#) .
- Install wishbones and drive shafts ⇒ Rep. gr. 40 .
- Install heat shield for drive shaft ⇒ Rep. gr. 39 .
- Install selector lever cable ⇒ Rep. gr. 34 .
- Install starter ⇒ Electrical system; Rep. gr. 27 .
- Install plenum chamber partition panel ⇒ Rep. gr. 50 .
- Install coolant pipes (right-side) ⇒ [page 182](#) .
- Install filler pipe with filler neck for washer fluid reservoir ⇒ Electrical system; Rep. gr. 92 .
- Secure bracket for activated charcoal filter ⇒ Rep. gr. 20 .
- Install radiator cowl ⇒ [page 195](#) .
- Install air pipes ⇒ [page 208](#) .
- Install idler rollers and poly V-belt tensioner ⇒ [page 47](#) .
- Install alternator ⇒ Electrical system; Rep. gr. 27 .
- Install poly V-belt for alternator and coolant pump ⇒ [page 51](#) .
- Install air conditioner compressor ⇒ Rep. gr. 87 .
- Install poly V-belt for air conditioner compressor ⇒ [page 50](#) .
- Install noise insulation and front section of wheel housing liner (front) ⇒ Rep. gr. 66 .
- Fit front wheels ⇒ Wheels and tyres; Rep. gr. 44 .
- Adjust assembly mountings ⇒ [page 40](#) .
- Install engine control unit ⇒ [page 260](#) .
- Install air cleaner housing ⇒ [page 223](#) .
- Install charge pressure sender - G31- / intake air temperature sender 2 - G299- ⇒ [page 198](#) .

Protected by copyright. Copying for private 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.



- Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Observe notes on procedure for connecting the battery ⇒ Electrical system; Rep. gr. 27 .
- Check oil level ⇒ Maintenance ; Booklet 808 .



Caution

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

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

- Connect coolant hoses with plug-in connector ⇒ [page 191](#) .



Note

Do not reuse coolant.

- Fill up with coolant ⇒ [page 166](#) .



Protected by copyright. Copying for private 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.

5 Assembly mountings

⇒ ["5.1 Exploded view - assembly mountings", page 35](#)

⇒ ["5.2 Supporting engine in installation position", page 36](#)

⇒ ["5.3 Checking adjustment of assembly mountings \(engine/gearbox mountings\)", page 39](#)

⇒ ["5.4 Adjusting assembly mountings", page 40](#)

⇒ ["5.5 Removing and installing engine mountings", page 43](#)

5.1 Exploded view - assembly mountings

1 - Bolt

- ☐ Renew
- ☐ 40 Nm + 90°

2 - Bolt

- ☐ Renew
- ☐ 40 Nm + 90°

3 - Bolt

- ☐ Renew
- ☐ 40 Nm + 90°

4 - Bracket

- ☐ For activated charcoal filter

5 - Bolt

- ☐ Tightening torque ⇒ [Item 11 \(page 182\)](#)

6 - Nut

- ☐ 8 Nm

7 - Engine mounting

- ☐ Checking adjustment ⇒ [page 39](#)
- ☐ Adjusting ⇒ [page 40](#)
- ☐ Removing and installing ⇒ [page 43](#)

8 - Connecting bracket

9 - Bolt

- ☐ Renew
- ☐ 20 Nm + 90°

10 - Bolt

- ☐ Renew
- ☐ 20 Nm + 90°

11 - Bolt

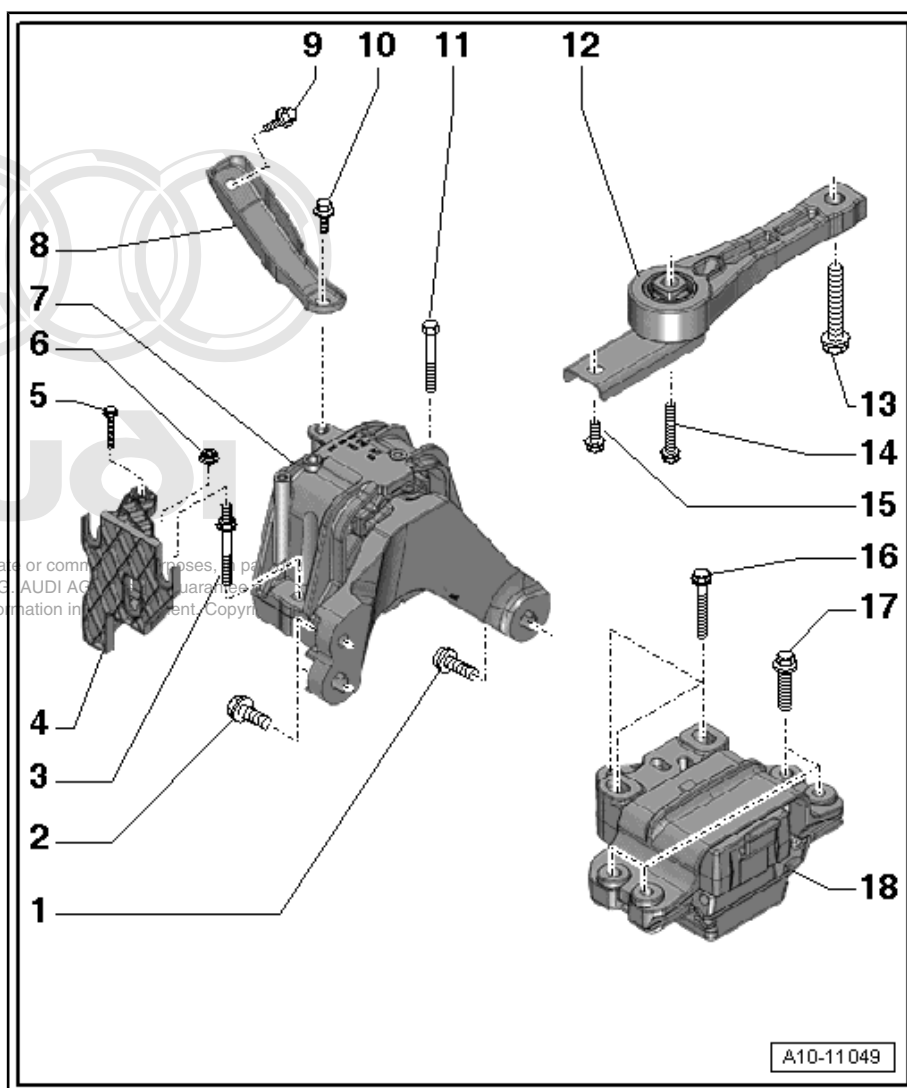
- ☐ Renew
- ☐ 40 Nm + 90°

12 - Pendulum support

- ☐ Removing and installing ⇒ Rep. gr. 34

13 - Bolt

- ☐ Tightening torque ⇒ Rep. gr. 34



14 - Bolt

- ☐ Tightening torque ⇒ Rep. gr. 34

15 - Bolt

- ☐ Tightening torque ⇒ Rep. gr. 34

16 - Bolt

- ☐ Tightening torque ⇒ Rep. gr. 34

17 - Bolt

- ☐ Tightening torque ⇒ Rep. gr. 34

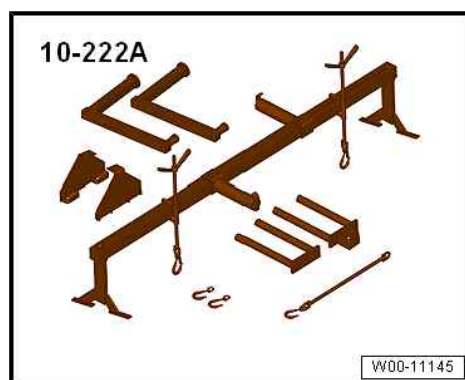
18 - Gearbox mounting

- ☐ Checking adjustment ⇒ [page 39](#)
- ☐ Adjusting ⇒ [page 40](#)
- ☐ Removing and installing ⇒ Rep. gr. 34

5.2 Supporting engine in installation position

Special tools and workshop equipment required

- ◆ Support bracket - 10-222A-

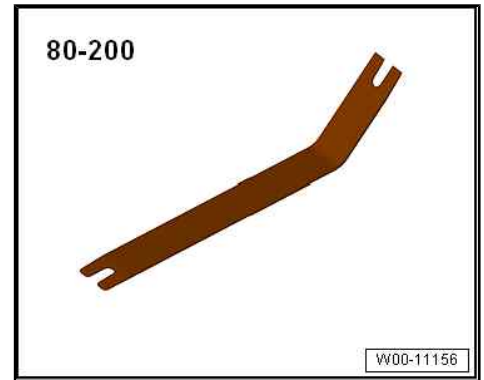


- ◆ Hook - 10-222A/10-

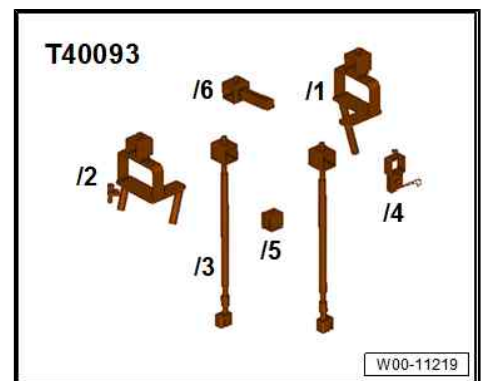


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- ◆ Removal lever - 80-200-



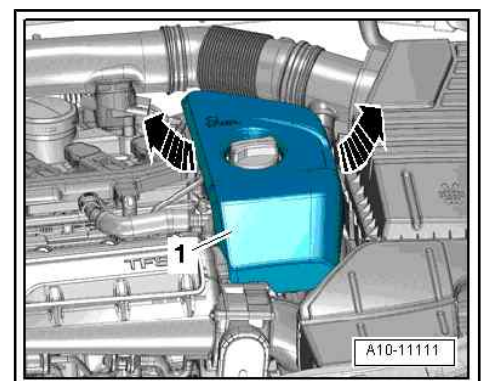
- ◆ -T40093/6- from engine support supplementary set - T40093-



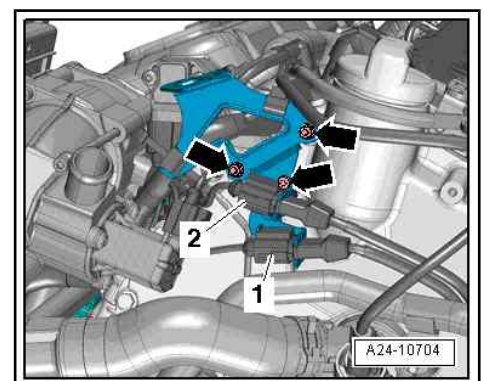
- ◆ Bracket -T40299-

Procedure

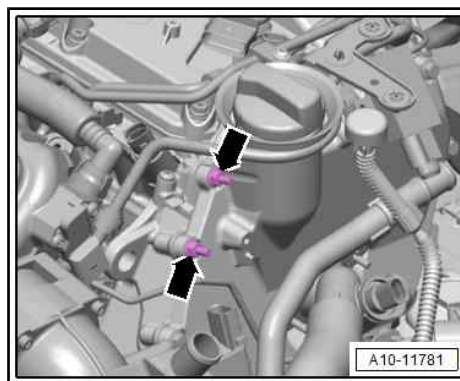
- Pull engine cover panel -1- off upwards -arrows-.



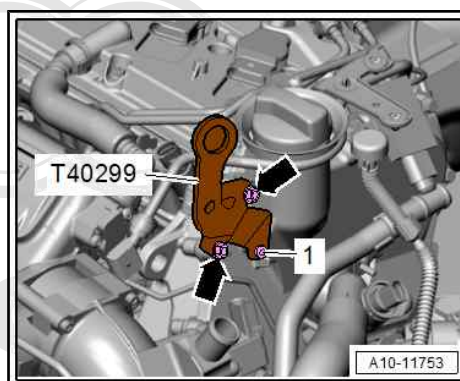
- Detach electrical connectors -1, 2- from bracket.
- Remove nuts and bolt -arrows- and detach bracket.



- Remove centre hex studs -arrows-.



- Secure bracket -T40299- with M6x25 bolts -arrows- and M6x20 bolt -1-, as shown in illustration.



- Position support bracket - 10-222A- on bolted flanges of wing panels as shown in illustration.

- Attach snap element of hook -10-222A/10- to engine lifting eye (front right) -arrow 2-.

- Attach hook of spindle - 10-222A/11- to engine lifting eye (rear left) -arrow 3-.

- Engage hook of spindle - 10-222A/11- to bracket -T40299- (front left) -arrow 1-.

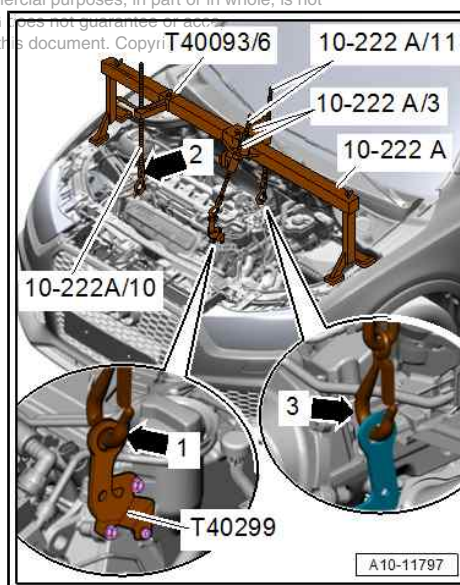
- Take up weight of engine/gearbox assembly evenly with all spindles (do not raise assembly).

Attaching

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

Tightening torques

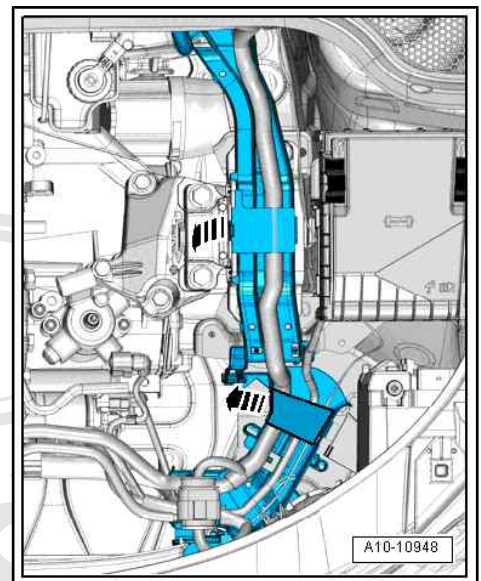
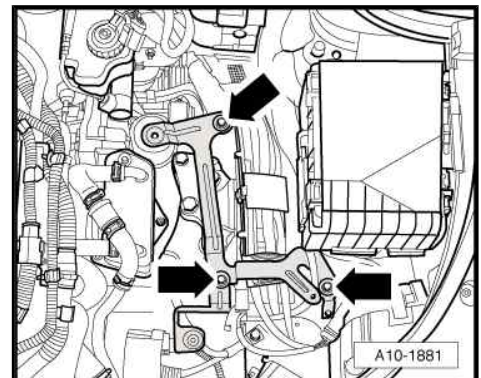
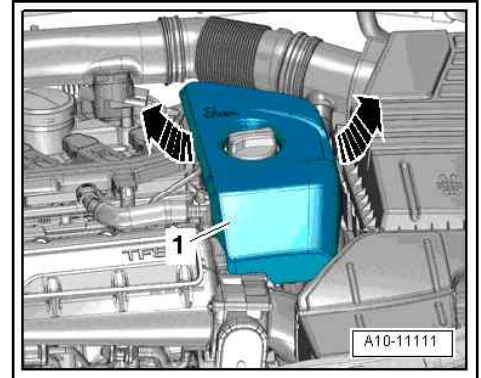
- ◆ ⇒ [“1.1 Exploded view - timing chain covers”, page 79](#)



5.3 Checking adjustment of assembly mountings (engine/gearbox mountings)

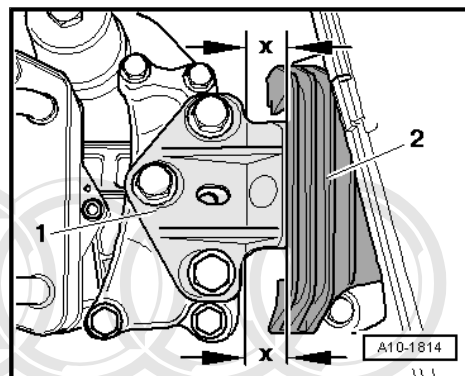
Procedure

- Pull engine cover panel -1- off upwards -arrows-.
- Remove air cleaner housing ⇒ [page 223](#) .
- Move electrical wiring harness clear at bracket for air cleaner housing.
- Remove bolts -arrows- and detach bracket for air cleaner housing.
- Open wiring duct brackets -arrows-.
- Cut through cable ties and press electrical wiring to side.
- Unclip wiring duct.



Protected by copyright. Copying for private 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.

- Ensure that edges of support arm (on gearbox side) -1- and gearbox mounting -2- are parallel.
- Dimension -x- = dimension -x-.



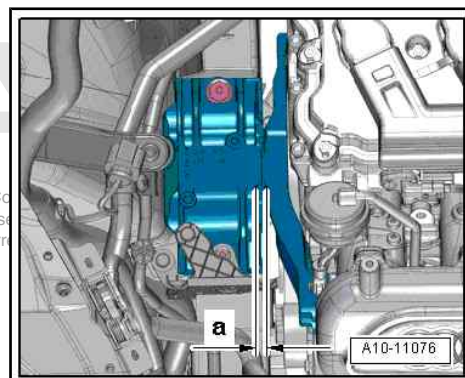
- Check installation position at engine mounting:
- The distance -a- between support arm and engine mounting must be at least 9 mm.



Note

Distance -a- can be checked using a $\varnothing 9$ mm drill bit or similar.

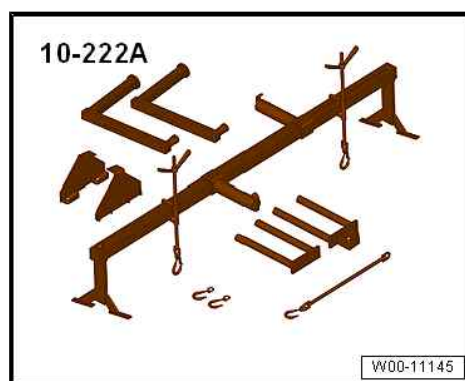
- If the distance measured is too small, the assembly mounting must be adjusted ⇒ [page 40](#).



5.4 Adjusting assembly mountings

Special tools and workshop equipment required

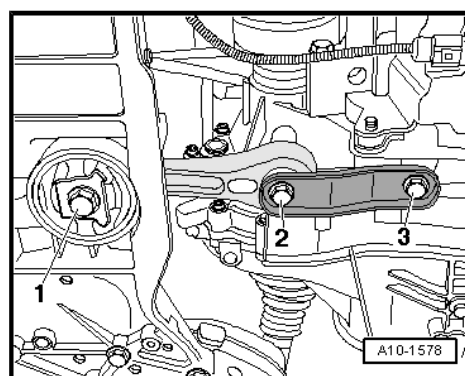
- ◆ Support bracket - 10-222A-



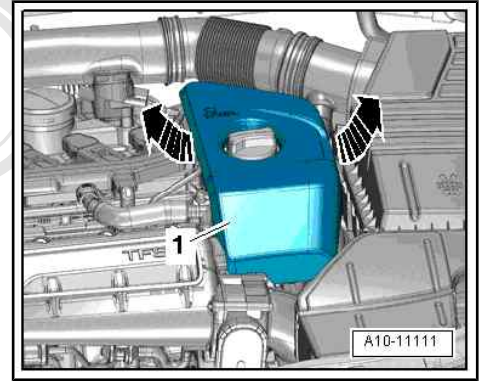
- ◆ Bracket -T40299-

Procedure

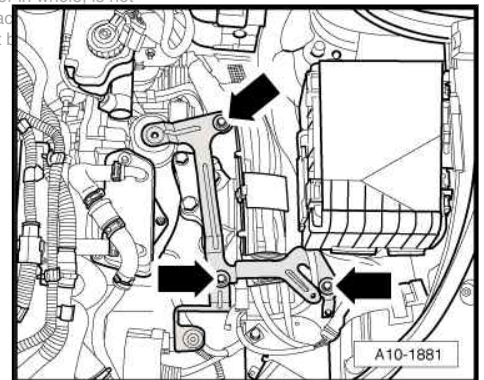
- Loosen bolts -1, 2, 3- for pendulum support approx. 1 turn (do not remove).



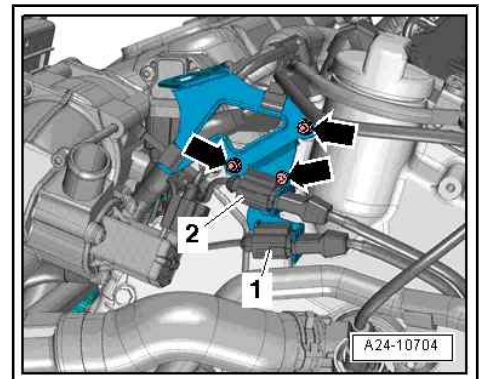
- Pull engine cover panel -1- off upwards -arrows-.



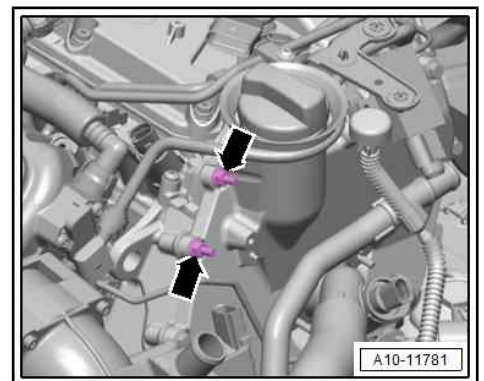
- Remove air cleaner housing -> [page 223](#).
- Move electrical wiring harness clear at bracket for air cleaner housing.
- Remove bolts -arrows- and detach bracket for air cleaner housing.



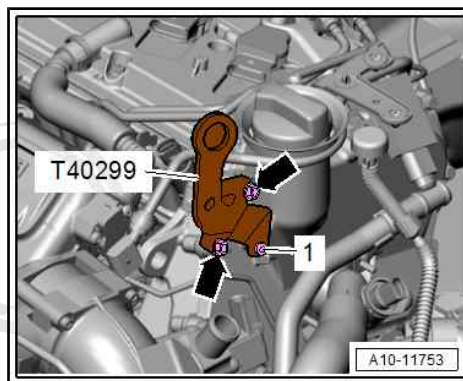
- Detach electrical connectors -1, 2- from bracket.
- Remove nuts and bolt -arrows- and detach bracket.



- Remove centre hex studs -arrows-.



- Secure bracket -T40299- with M6x25 bolts -arrows- and M6x20 bolt -1-, as shown in illustration.



- Position support bracket - 10 - 222 A- on bolted flanges of wing panels as shown in illustration.
- One spindle - 10-222A/11- should be at front, one at rear.

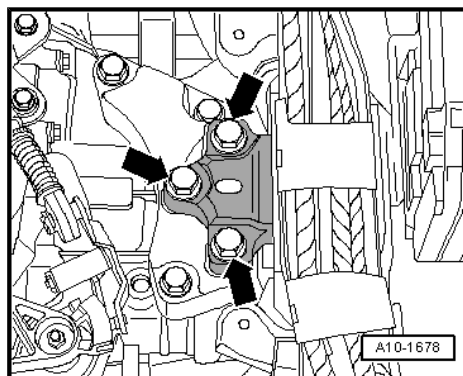
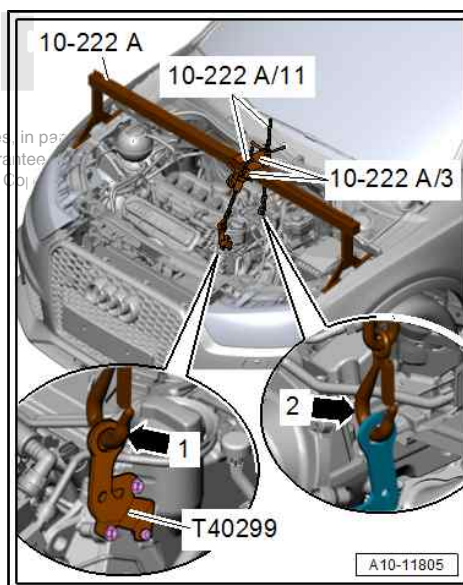


WARNING

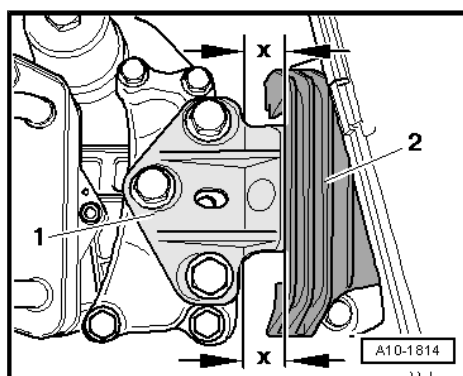
Risk of accident.

- ♦ *The support hooks and retaining pin on the lifting tackle must be secured with a locking pin -arrow-.*

- Attach hook of spindle - 10-222A/11- to engine lifting eye (rear) -arrow 2-.
- Engage hook of spindle - 10-222A/11- to bracket -T40299- (front) -arrow 1-.
- Apply light tension to spindles.
- The engine must be positioned in installation position, assembly mountings must not be under load.
- Remove bolts -arrows- securing gearbox mounting.
- Renew all three bolts one by one and screw in by hand until they make contact.



- Ensure that edges of support arm (on gearbox side) -1- and gearbox mounting -2- are parallel.
- Dimension -x- = dimension -x-.
- Tighten gearbox mounting bolts ⇒ Rep. gr. 34 .



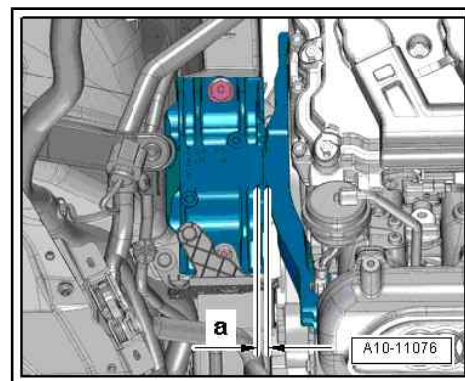
- Check installation position at engine mounting:
- The distance -a- between support arm and engine mounting must be at least 9 mm.



Note

Distance -a- can be checked using a $\varnothing 9$ mm drill bit or similar.

- Move engine/gearbox assembly sideways if necessary.

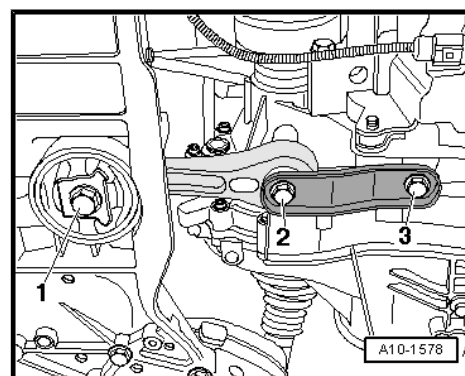


Installation is carried out in the reverse order; note the following:

- Tighten bolts -1, 2, 3- for pendulum support $\Rightarrow$ Rep. gr. 34 .
- Install air cleaner housing $\Rightarrow$ [page 223](#) .

Tightening torques

- ♦ $\Rightarrow$ ["1.1 Exploded view - timing chain covers", page 79](#)



5.5 Removing and installing engine mountings

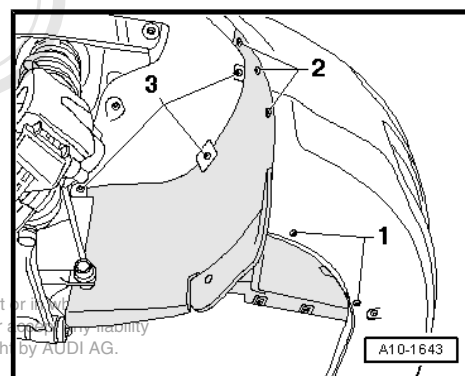
Special tools and workshop equipment required

- ♦ Support bracket - 10-222A-



Removing

- Remove front wheel (right-side) $\Rightarrow$ Wheels and tyres; Rep. gr. 44 .
- Remove front wheel housing liner (front section, right-side) $\Rightarrow$ Rep. gr. 66 .



Protected by copyright. Copying for private or commercial purposes, in part or in full, 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.

- Disconnect hose -1- at activated charcoal filter (press release tab) and move hose clear.



Note

Disregard -item 2-.

- Remove one bolt of rear section of front wheel housing liner (right-side).

- Release activated charcoal filter -arrow B-, lift off -arrow A- and move clear to one side with hose -1- connected.



Note

Disregard -item 2-.

- Remove bolts -arrows- and detach bracket for activated charcoal filter.



Note

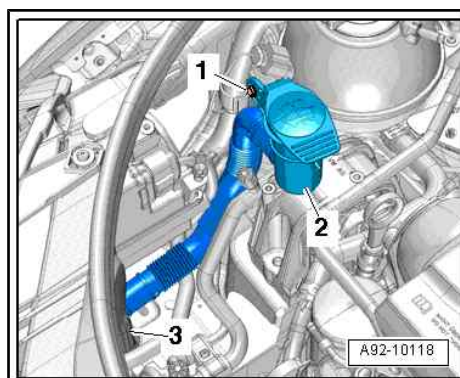
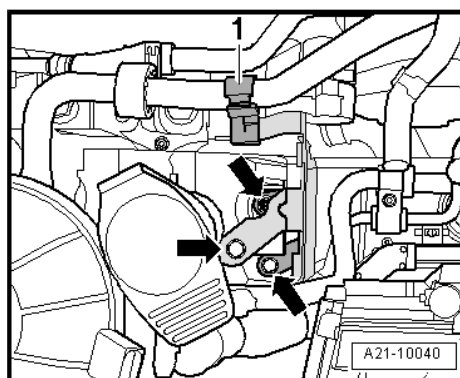
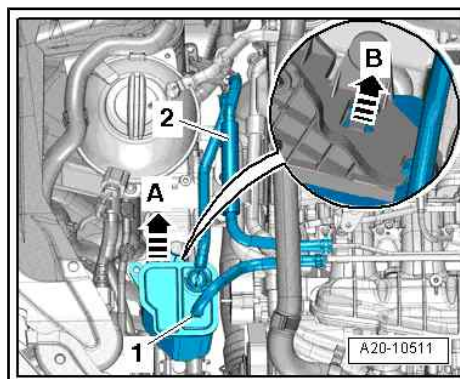
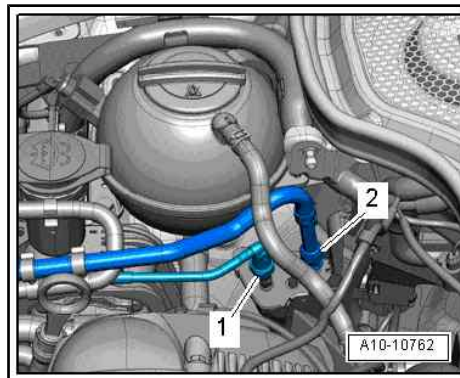
Disregard -item 1-.

- Remove bolt -1-.
- Push filler pipe with filler neck -2- for washer fluid reservoir to side.

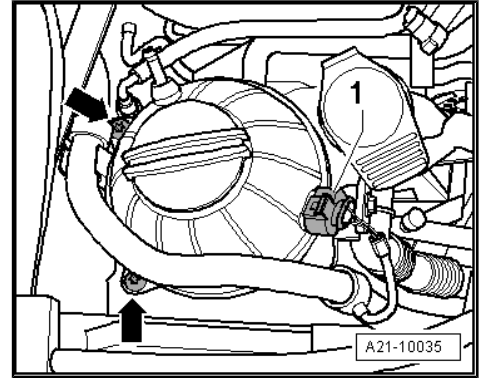


Note

Disregard -item 3-.



- Remove bolts -arrows-.
- Detach electrical connector -1- for coolant shortage indicator switch - F66- and move coolant expansion tank with coolant pipe (right-side) to side.

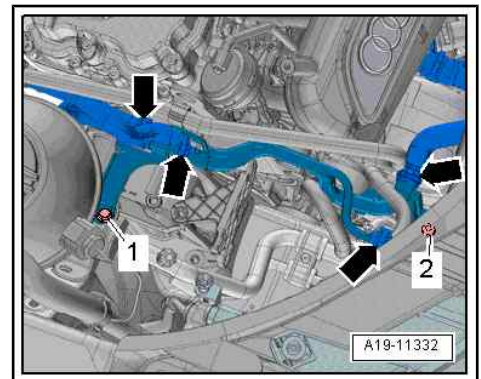


- Unscrew bolts -1 and 2- and press coolant pipes (right-side) slightly to the side.

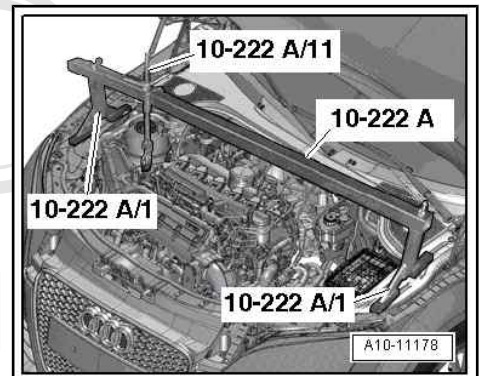


Note

Disregard -arrows-.



- Position support bracket - 10-222A- on bolted flanges of wing panels as shown in illustration.
- The spindle - 10-222A/11- is located at the front.
- Attach hook of spindle to engine lifting eye (right-side).
- Apply light tension to spindle.



Protected by copyright. Copying for private 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.

- Remove bolts -1- and -arrows- for engine mounting (left-side).

**Note**

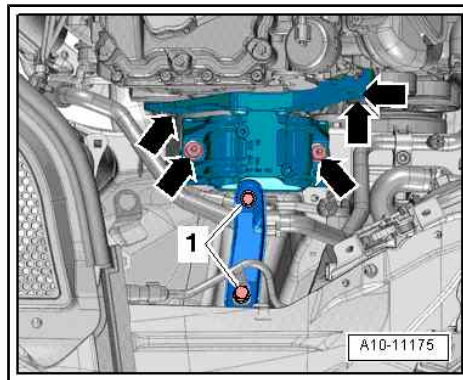
The bolt at the rear of the cylinder block can be accessed from the wheel housing side.

Installing

- Tightening torques
⇒ [“5.1 Exploded view - assembly mountings”, page 35](#)
- Check adjustment of assembly mountings (engine/gearbox mountings) ⇒ [page 39](#) .

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

- Install coolant pipes (right-side) ⇒ [page 182](#) .
- Install filler pipe with filler neck for washer fluid reservoir ⇒ Electrical system; Rep. gr. 92 .
- Secure bracket for activated charcoal filter ⇒ Rep. gr. 20 .
- Install front right wheel housing liner ⇒ Rep. gr. 66 .
- Fit front wheel (right-side) ⇒ Wheels and tyres; Rep. gr. 44 .



Protected by copyright. Copying for private 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.

13 – Crankshaft group

1 Cylinder block (pulley end)

⇒ [“1.1 Exploded view - poly V-belt drive, bracket for ancillaries”, page 47](#)

⇒ [“1.2 Removing and installing poly V-belt for air conditioner compressor”, page 50](#)

⇒ [“1.3 Removing and installing poly V-belt for alternator and coolant pump”, page 51](#)

⇒ [“1.4 Removing and installing poly V-belt tensioner for air conditioner compressor”, page 52](#)

⇒ [“1.5 Removing and installing poly V-belt tensioner for alternator and coolant pump”, page 52](#)

⇒ [“1.6 Removing and installing bracket for ancillaries”, page 54](#)

⇒ [“1.7 Removing and installing vibration damper”, page 54](#)

⇒ [“1.8 Exploded view - sealing flange \(pulley end\)”, page 56](#)

⇒ [“1.9 Renewing sealing flange \(pulley end\)”, page 57](#)

1.1 Exploded view - poly V-belt drive, bracket for ancillaries

Protected by copyright. Copying for private 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.

1 - Bolt

- 35 Nm

2 - Bolt

- Renew
- 50 Nm + 90°

3 - Vibration damper

- Removing and installing ⇒ [page 54](#)
- Can only be installed in one position

4 - Poly V-belt for air conditioner compressor

- Check for wear
- Before removing, mark direction of rotation with chalk or felt-tip pen
- Removing and installing ⇒ [page 50](#)
- Do not kink
- When installing, make sure it is properly seated on pulleys

5 - Tensioner

- For poly V-belt for air conditioner compressor
- Removing and installing ⇒ [page 52](#)

6 - Bolt

- 35 Nm

7 - Tensioner

- For poly V-belt for alternator and coolant pump
- Removing and installing ⇒ [page 52](#)

8 - Poly V-belt for alternator and coolant pump

- Check for wear
- Before removing, mark direction of rotation with chalk or felt-tip pen
- Removing and installing ⇒ [page 51](#)
- Do not kink
- When installing, make sure it is properly seated on pulleys

9 - Idler roller

10 - Bolt

- Tightening torque ⇒ [Item 2 \(page 173\)](#)

11 - Coolant pump

- Removing and installing ⇒ [page 176](#)

12 - Bolt

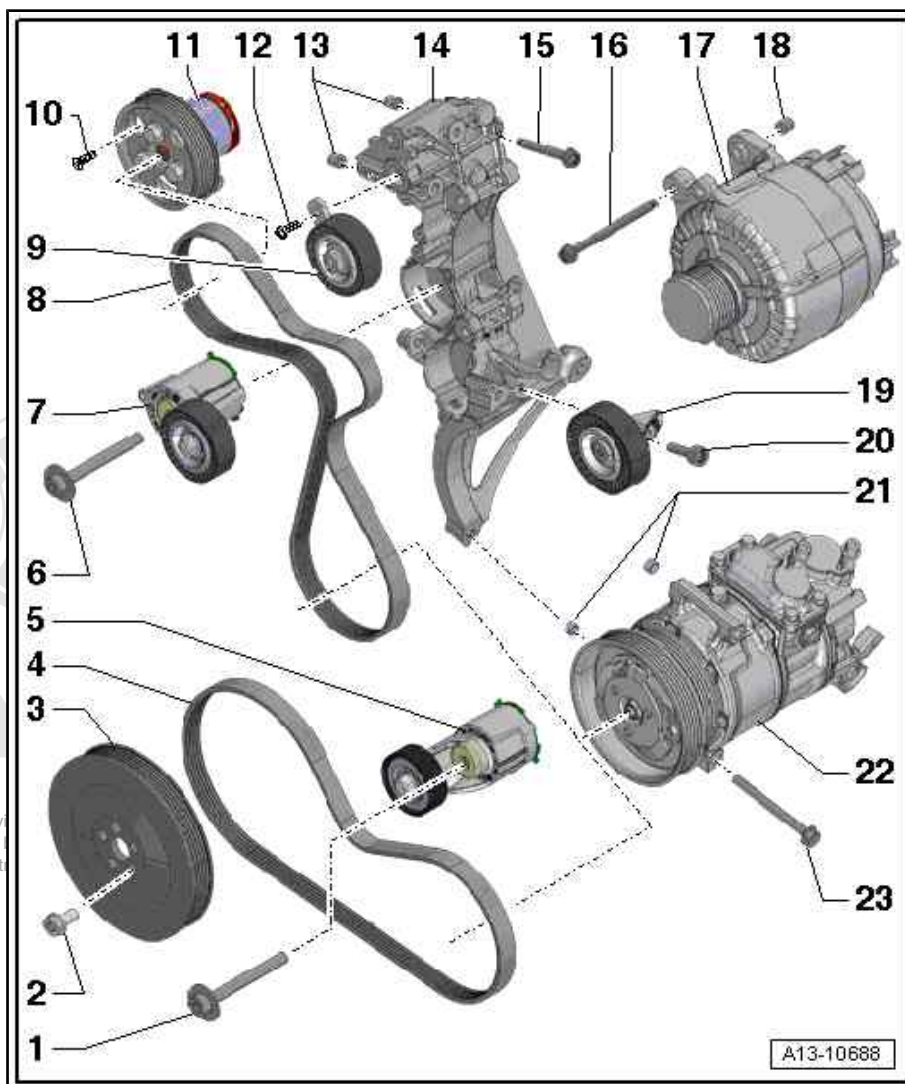
- 8 Nm

13 - Dowel sleeves

- For bracket for ancillaries

14 - Bracket for ancillaries

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



15 - Bolt

- ☐ Different lengths
- ☐ Tightening torque and sequence ⇒ [page 49](#)

16 - Bolt

- ☐ Tightening torque ⇒ Electrical system; Rep. gr. 27

17 - Alternator

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

18 - Sliding bush

19 - Idler roller

20 - Bolt

- ☐ 23 Nm

21 - Dowel sleeves

- ☐ For air conditioner compressor

22 - Air conditioner compressor

- ☐ With double-sided poly V-belt pulley
- ☐ Removing and installing ⇒ Rep. gr. 87

23 - Bolt

- ☐ Tightening torque ⇒ Rep. gr. 87

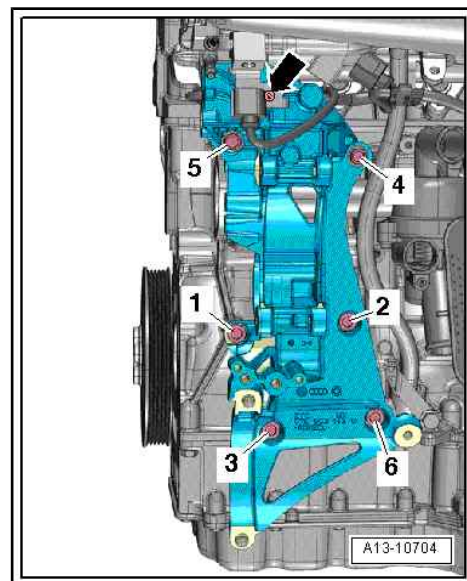
Bracket for ancillaries - tightening torque and tightening sequence

– Renew bolts for bracket for ancillaries and fit as follows:

- ◆ Bolts -1, 2, 3, 6- M8x30
- ◆ Bolt -4- M8x60
- ◆ Bolt -5- M8x110

– Tighten bolts in 2 stages in the sequence shown:

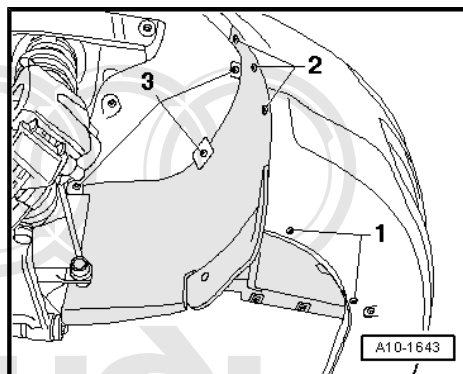
Stage	Bolts	Tightening torque
1.	-1 ... 6-	Screw in by hand until contact is made
2.	-1 ... 6-	23 Nm



1.2 Removing and installing poly V-belt for air conditioner compressor

Removing

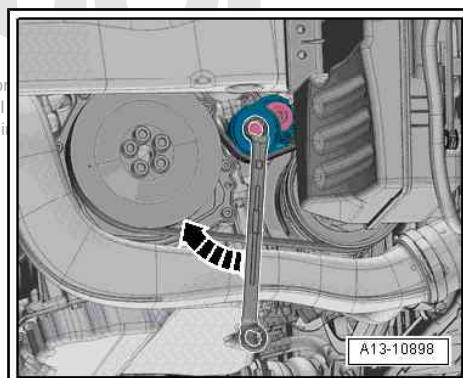
- Remove front wheel (right-side) ⇒ Wheels and tyres; Rep. gr. 44 .
- Remove front wheel housing liner (front section, right-side) ⇒ Rep. gr. 66 .



Caution

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

- ◆ **Before removing, mark direction of rotation of poly V-belt for air conditioner compressor with chalk or felt-tip pen for re-installation.**

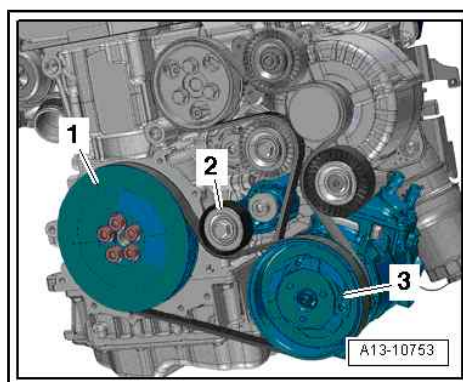


- Move tensioner in clockwise direction -arrow- to slacken poly V-belt.
- Detach poly V-belt for air conditioner compressor and release tensioner.

Installing

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

- Swivel tensioner in clockwise direction -arrow-.
- Fit poly V-belt on poly V-belt pulleys (on air conditioner pulley last).
- 1 - Vibration damper
- 2 - Tensioner
- 3 - Air conditioner compressor
- Release tensioner.
- Check that poly V-belt is in correct position.
- Start engine and check that poly V-belt(s) run properly.
- Install front section of front wheel housing liner (right-side) ⇒ Rep. gr. 66 .
- Fit front wheel (right-side) ⇒ Wheels and tyres; Rep. gr. 44 .



1.3 Removing and installing poly V-belt for alternator and coolant pump

Removing

- Remove poly V-belt for air conditioner compressor
⇒ [page 50](#).
- Disconnect hose -1- at activated charcoal filter (press release tab) and move hose clear.



Note

Disregard -item 2-.

- Pull activated charcoal filter -1- with line attached upwards out of bracket -arrow B-; lift release tab -1- to do so.
- Release activated charcoal filter -arrow B-, lift off -arrow A- and move clear to one side.



Note

Disregard -item 2-.



Caution

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

- ◆ **Before removing, mark direction of rotation of poly V-belt for alternator and coolant pump with chalk or felt-tip pen for re-installation.**

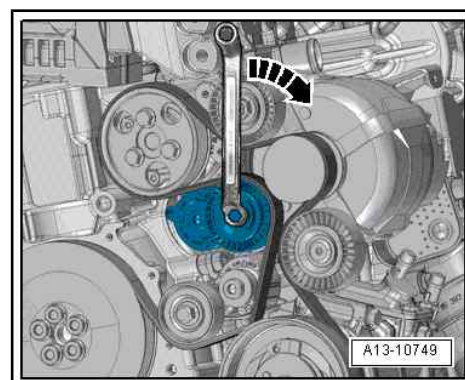
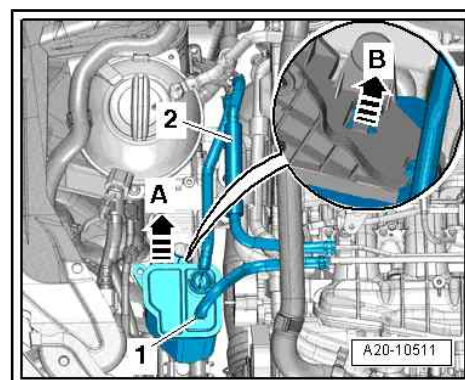
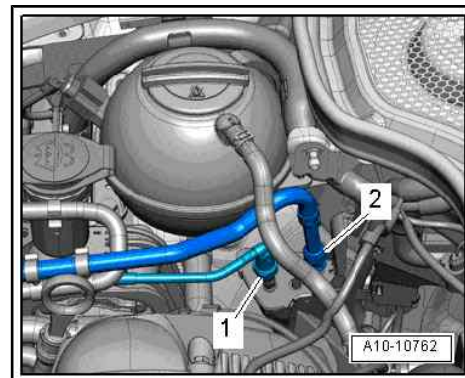
- Move tensioner in clockwise direction -arrow- to slacken poly V-belt.
- Detach poly V-belt for alternator and coolant pump and release tensioner.

Installing

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

- Swivel tensioner in clockwise direction -arrow-.

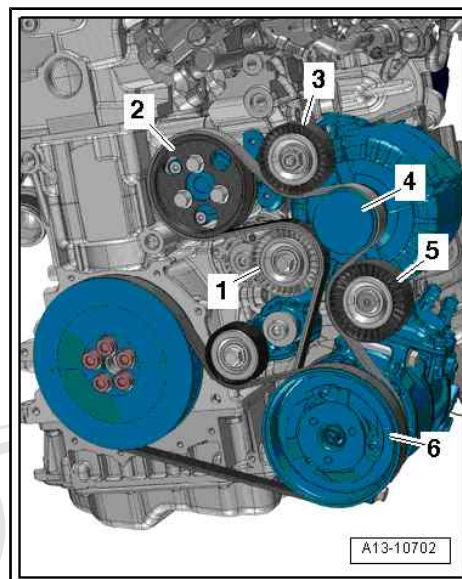
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- Fit poly V-belt on poly V-belt pulleys (on alternator pulley last).

- 1 - Tensioner
- 2 - Coolant pump
- 3 - Idler roller
- 4 - Alternator
- 5 - Idler roller
- 6 - Air conditioner compressor

- Release tensioner.
- Check that poly V-belt is in correct position.
- Install poly V-belt for air conditioner compressor ⇒ [page 50](#) .



1.4 Removing and installing poly V-belt tensioner for air conditioner compressor

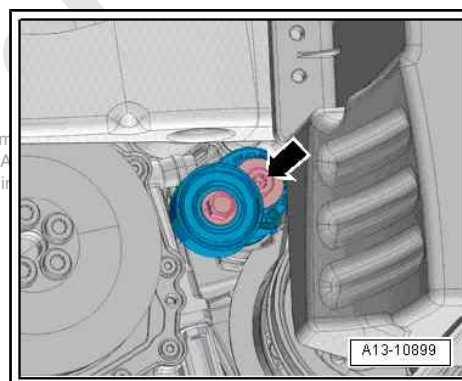
Removing

- Remove poly V-belt for air conditioner compressor ⇒ [page 50](#) .
- Remove bolt -arrow- and take off tensioner.

Installing

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

- Tightening torque
⇒ ["1.1 Exploded view - poly V-belt drive, bracket for ancillaries", page 47](#)
- Install poly V-belt for air conditioner compressor ⇒ [page 50](#) .



1.5 Removing and installing poly V-belt tensioner for alternator and coolant pump

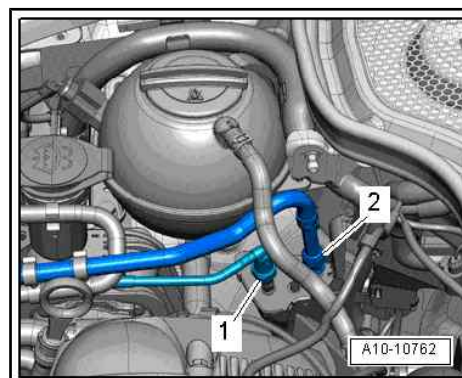
Removing

- Disconnect hose -1- at activated charcoal filter (press release tab) and move hose clear.



Note

Disregard -item 2-.



- Release activated charcoal filter -arrow B-, lift off -arrow A- and move clear to one side with hose -1- connected.



Disregard -item 2-.

- Move tensioner in clockwise direction -arrow- to slacken poly V-belt.
- Remove poly V-belt from alternator and release tensioner.

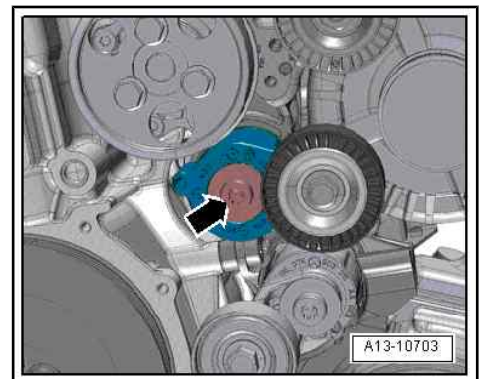
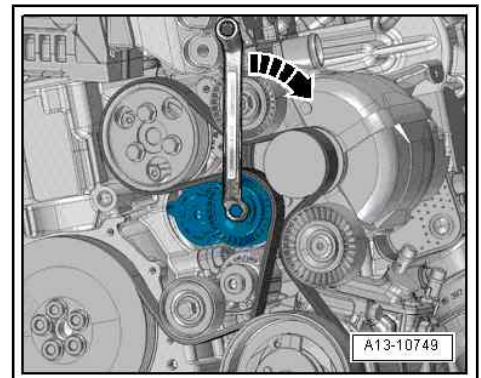
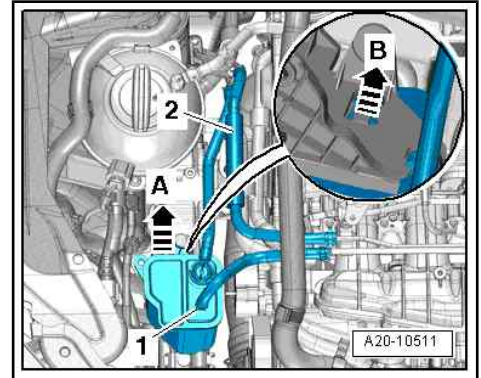
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Remove bolt -arrow- and take off tensioner.

Installing

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

- Tightening torque
⇒ ["1.1 Exploded view - poly V-belt drive, bracket for ancillaries", page 47](#)
- Install poly V-belt for alternator and coolant pump
⇒ [page 51](#) .

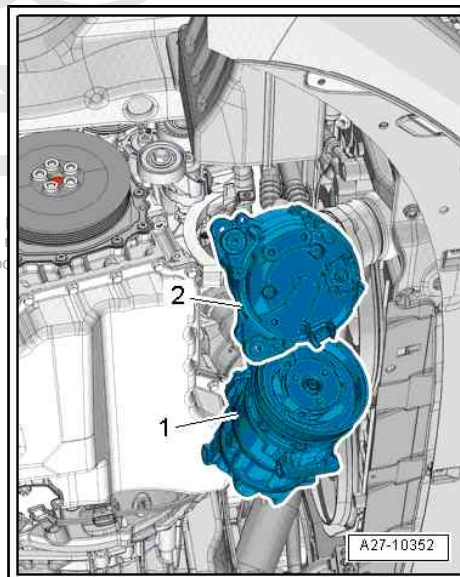


1.6 Removing and installing bracket for ancillaries

Removing

- Remove poly V-belt tensioner for air conditioner compressor ⇒ [page 52](#) .
- Remove engine mounting ⇒ [page 43](#) .
- Remove alternator ⇒ Electrical system; Rep. gr. 27 .

Protected by copyright. Copying for private or commercial permitted unless authorised by AUDI AG. AUDI AG does with respect to the correctness of information in this doc

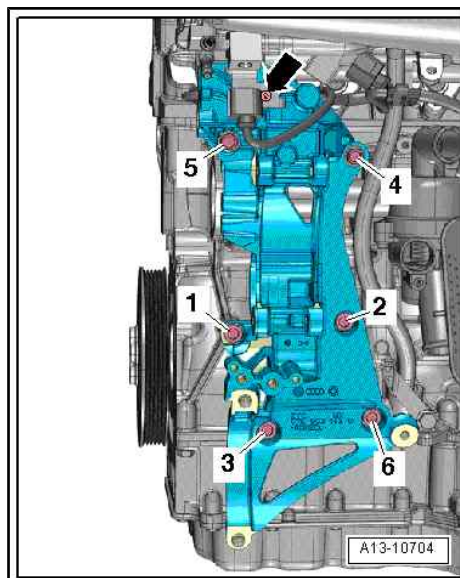


- Remove bolt -arrow-.
- Remove bolts -1 ... 6- and detach bracket for ancillaries.

Installing

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

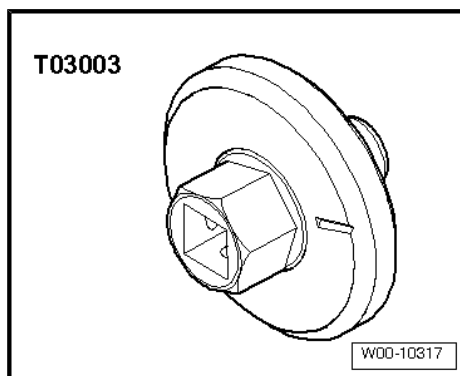
- Tightening torques
⇒ [Fig. "Bracket for ancillaries - tightening torque and tightening sequence"](#) , [page 49](#)
- Tighten bolts for bracket for ancillaries ⇒ [page 49](#) .
- Install engine mountings ⇒ [page 43](#) .
- Install alternator ⇒ Electrical system; Rep. gr. 27 .
- Install poly V-belt tensioner for air conditioner compressor ⇒ [page 52](#) .



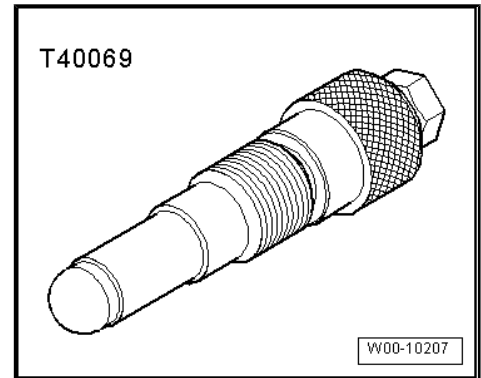
1.7 Removing and installing vibration damper

Special tools and workshop equipment required

- ◆ Wrench -T03003-

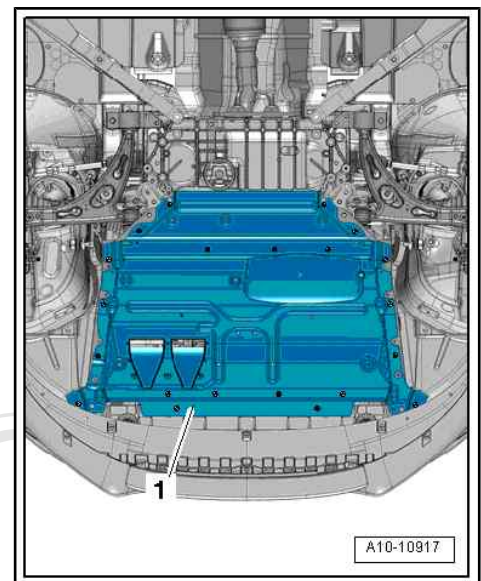


◆ Locking pin - T40069-



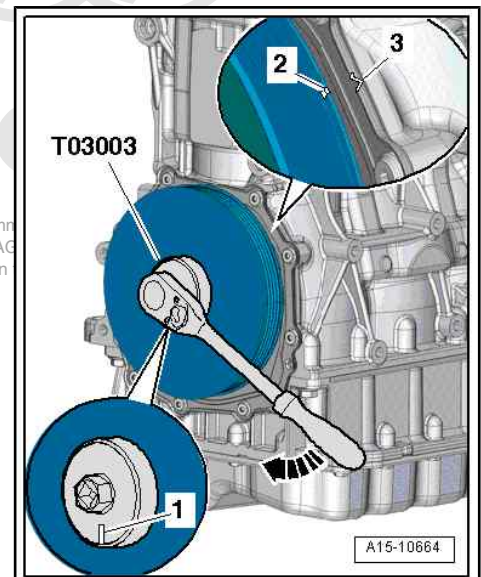
Removing

- Remove poly V-belt for air conditioner compressor
⇒ [page 50](#) .
- Remove noise insulation -1- ⇒ Rep. gr. 66 .

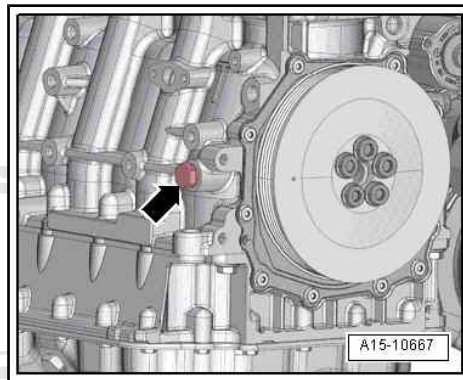


- Turn crankshaft with socket -T03003- in normal direction of rotation -arrow- to "TDC position".
- Notch -1- in socket -T03003- must be perpendicular to sealing surface of sump.
- Marking -2- on vibration damper must be opposite marking -3- on sealing flange.

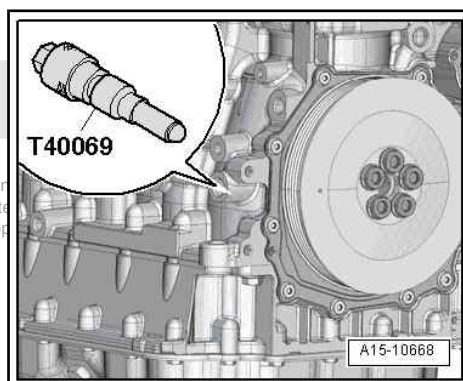
Protected by copyright. Copying for private or commercial use is not permitted unless authorised by AUDI AG. AUDI AG is not responsible for the correctness of information in this document.



- Unscrew plug -arrow- for “TDC” marking from cylinder block.



- Screw locking pin - T40069- into locating groove and tighten to 15 Nm. If necessary, turn crankshaft backwards and forwards slightly to fully centralise locking pin.



Protected by copyright. Copying for private or commercial purposes, in whole or in part, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee the correctness of information in this document. Copyright © 2017 Audi AG

- Unscrew bolts -arrow- and remove vibration damper.

Installing

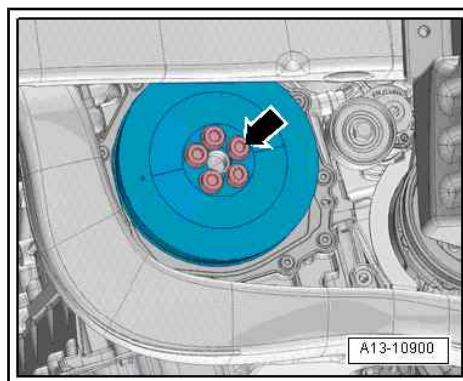
Installation is carried out in the reverse order; note the following:

- Tightening torque
⇒ [“1.1 Exploded view - poly V-belt drive, bracket for ancillaries”, page 47](#)



Note

- ◆ *Renew the bolts tightened with specified tightening angle.*
- ◆ *The vibration damper can only be fitted in one position.*
- Remove locking pin - T40069- .
- Tighten plug for “TDC” marking ⇒ [page 69](#) .
- Install noise insulation panels ⇒ Rep. gr. 66 .
- Install poly V-belt for air conditioner compressor ⇒ [page 50](#) .



1.8 Exploded view - sealing flange (pulley end)

1 - Bolt

- ☐ Tightening torque
⇒ [Item 2 \(page 48\)](#)

2 - Vibration damper

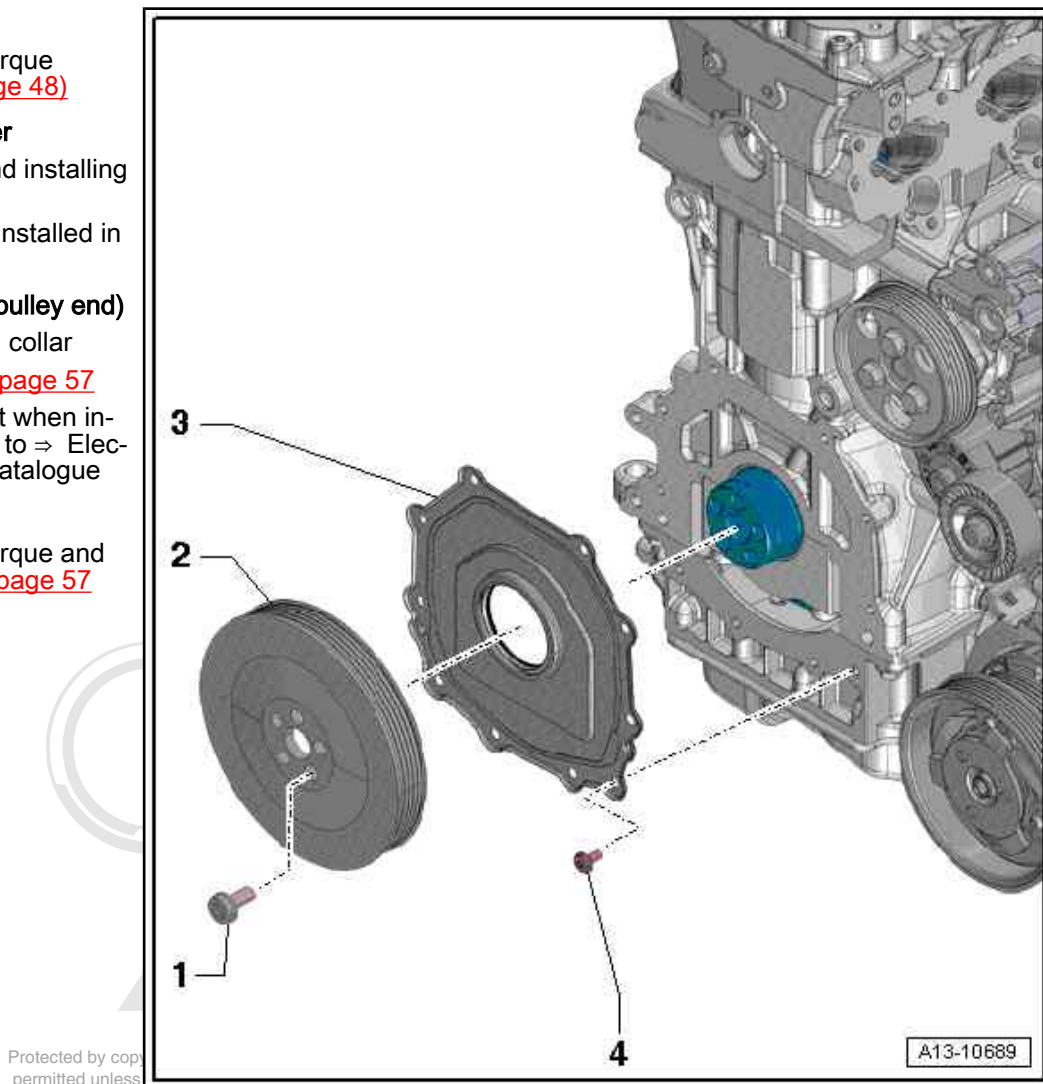
- ☐ Removing and installing
⇒ [page 54](#)
- ☐ Can only be installed in one position

3 - Sealing flange (pulley end)

- ☐ With centring collar
- ☐ Renewing ⇒ [page 57](#)
- ☐ Apply sealant when installing; refer to ⇒ Electronic parts catalogue

4 - Bolt

- ☐ Tightening torque and sequence ⇒ [page 57](#)

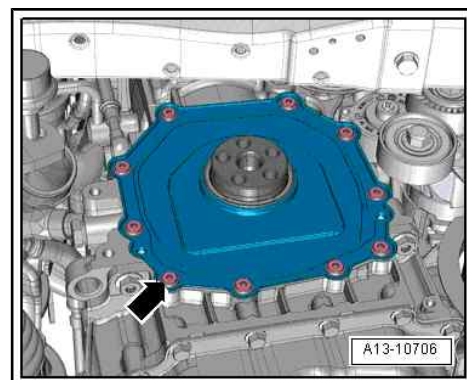


Protected by copyright, permitted unless with respect to the correctness of information in this document. Copyright by AUDI AG.

Sealing flange (pulley end) - tightening torque and sequence

– Tighten bolts in 2 stages:

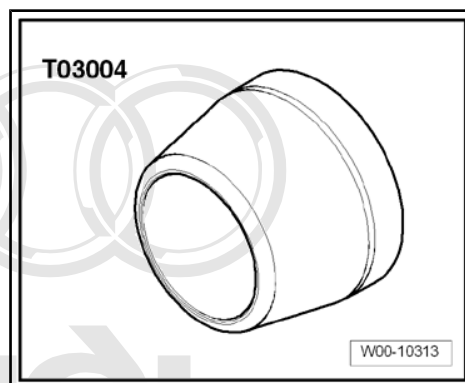
Stage	Bolts	Tightening torque
1.	-arrow-	Screw in by hand until contact is made
2.	-arrow-	Tighten in stages and in diagonal sequence; final torque 9 Nm



1.9 Renewing sealing flange (pulley end)

Special tools and workshop equipment required

- ◆ Assembly sleeve -T03004-



- ◆ Electric drill with plastic brush

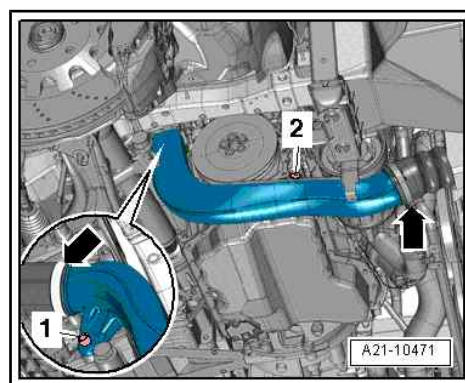
- ◆ Safety goggles

- ◆ Sealant ⇒ Electronic parts catalogue

Protected by copyright. Copying for private 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.

Procedure

- Tightening torques
⇒ Fig. "Sealing flange (pulley end) - tightening torque and sequence", page 57
- Remove vibration damper ⇒ page 54 .
- Remove bolts -1- and -2-.
- Loosen hose clips -arrows- and detach air pipe.



- Remove bolts -arrows-.
- Carefully release sealing flange from bonded joint.

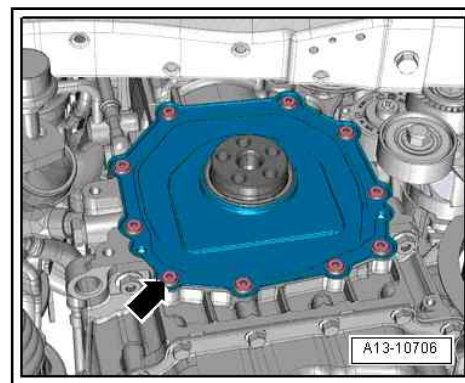
**Note**

Renew sealing flange.

**Caution**

Make sure sealant residue does not enter lubrication system.

- ◆ *Cover open area of cylinder block with a cloth.*

**WARNING**

Risk of eye injury.

- ◆ *Put on safety goggles.*

- Use e.g. rotating plastic brush to remove sealant residue on cylinder block.
- Clean sealing surfaces and crankshaft journal; they must be free of oil and grease.

**Note**

Do not additionally oil or grease sealing lip of oil seal in sealing flange.

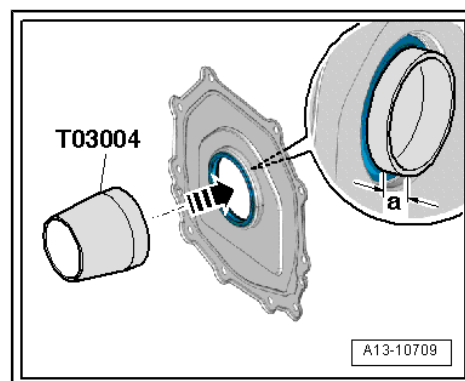
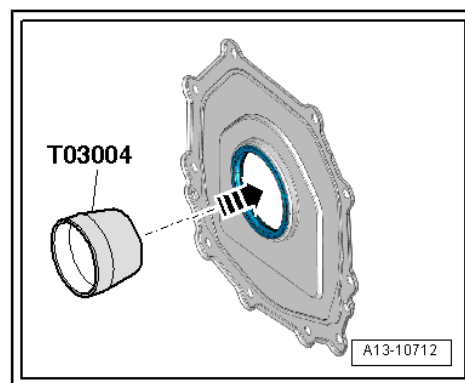
This document is not permitted for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

**Caution**

Risk of damage to oil seal in sealing flange.

- ◆ *To make sure sealing lip of oil seal is folded over when installing, the following procedures must be performed.*

- Open out sealing lip of oil seal in sealing flange using assembly sleeve -T03004- as shown in illustration.
- Small diameter faces oil seal.
- Detach assembly sleeve -T03004- after a short while, turn over and insert in oil seal again.
- Large diameter faces oil seal.
- Assembly sleeve -T03004- must protrude by distance -a- at inside of flange
- Distance -a- = approx. 3 mm.

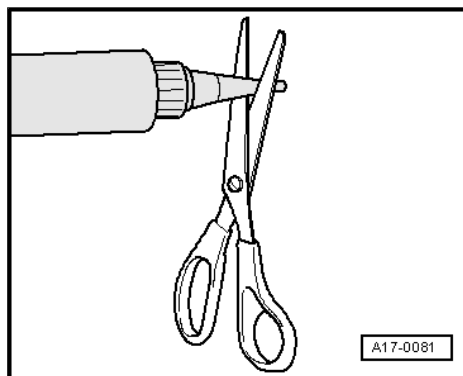




Note

Note the use-by date of the sealant.

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

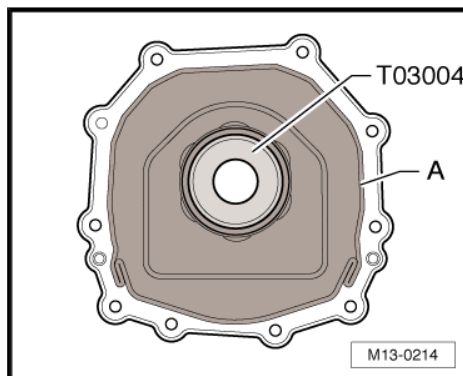


Caution

Make sure lubrication system is not clogged by excess sealant.

♦ ***The sealant bead must not be thicker than specified.***

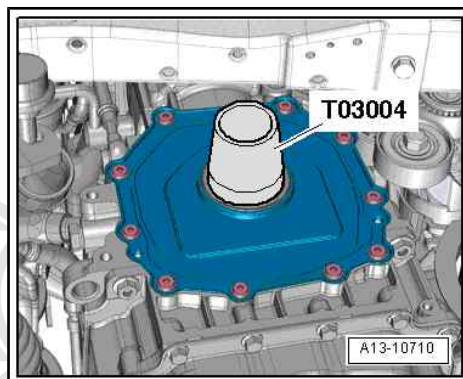
- Apply bead of sealant -A- onto clean sealing surface of sealing flange as shown in illustration.
- Width of sealant bead: 2.5 ... 3 mm
- The bead of sealant must project approx. 1.0 mm above the sealing surface.



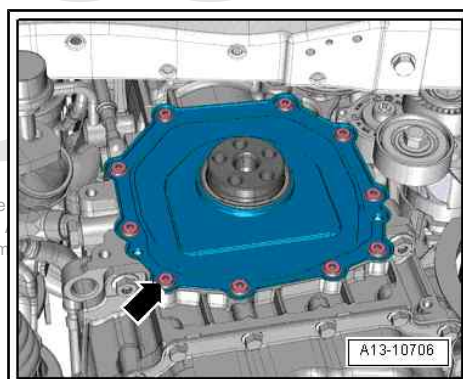
Note

The sealing flange must be installed within 5 minutes after applying the sealant.

- Use assembly sleeve -T03004- to carefully fit sealing flange onto crankshaft journal and press onto cylinder block evenly (note centring collar on left and right).



- Tighten sealing flange ⇒ [page 57](#) .
- Install air pipe ⇒ [page 208](#) .
- Install vibration damper ⇒ [page 54](#) .



Protected by copyright. Copying for private permitted unless authorised by AUDI AG. with respect to the correctness of inform

2 Cylinder block (gearbox end)

⇒ [“2.1 Exploded view - dual-mass flywheel”, page 61](#)

⇒ [“2.2 Removing and installing dual-mass flywheel”, page 62](#)

⇒ [“2.4 Renewing crankshaft oil seal \(gearbox end\)”, page 64](#)

2.1 Exploded view - dual-mass flywheel



Note

When performing assembly work, secure engine to engine and gearbox support ⇒ [page 29](#).

1 - Bolt

- ☐ Renew
- ☐ 60 Nm + 90°

2 - Dual-mass flywheel

- ☐ Removing and installing
⇒ [page 62](#)
- ☐ Can only be installed in
one position

3 - Diamond-coated washer

- ☐ Must always be re-
newed if bolts for dual-
mass flywheel are loos-
ened
- ☐ Can only be installed in
one position

4 - Sender wheel

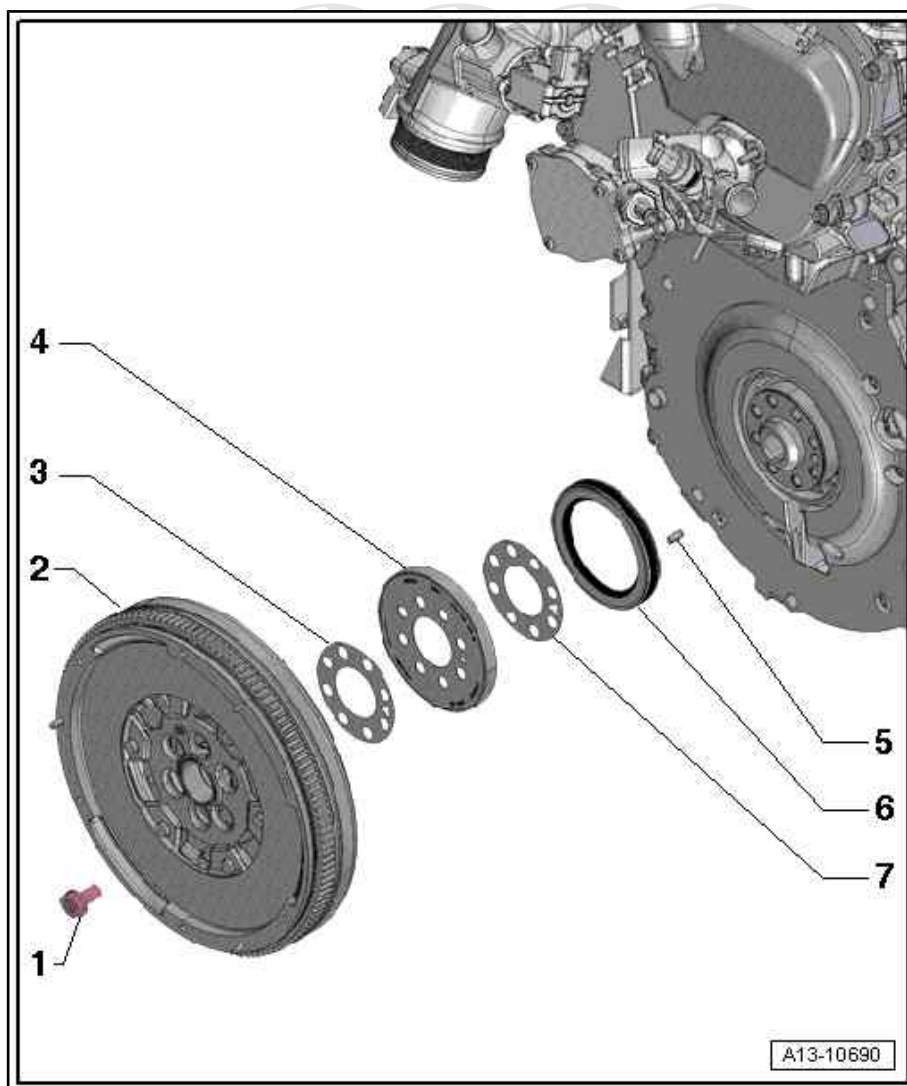
- ☐ For engine speed send-
er - G28-
- ☐ Can only be installed in
one position



Caution

*Risk of magnetic fields
causing irreparable
damage to sender
wheel.
The sender wheel must
be kept away from mag-
nets (e.g. base of torch,
loudspeaker).*

*! the drive plate/flywheel
or the sender wheel itself
has been removed or re-
newed, check that the
sender wheel is operat-
ing correctly before in-
stallation ⇒ [page 63](#).*



5 - Dowel pin

6 - Crankshaft oil seal (gearbox end)

- ☐ Renewing ⇒ [page 64](#)

7 - Diamond-coated washer

- ☐ Must always be renewed if bolts for dual-mass flywheel are loosened
- ☐ Can only be installed in one position

2.2 Removing and installing dual-mass flywheel

Special tools and workshop equipment required

- ◆ Counterhold tool - 3067-



Audi

Removing

- Gearbox removed

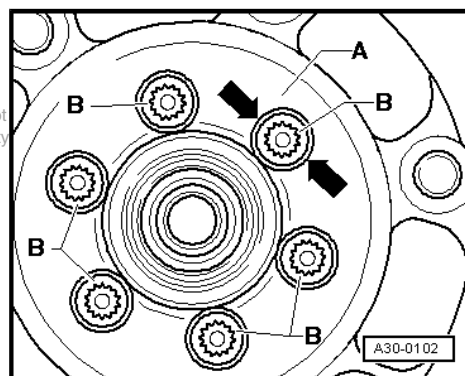
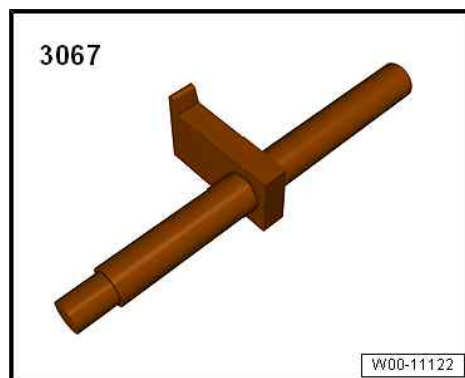


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted without the prior written authorisation by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Caution

Risk of irreparable damage to dual-mass flywheel.

- ◆ ***Remove bolts -B- using normal hand tools (do not use pneumatic wrench or impact driver, etc.).***
- ◆ ***When removing the bolts, make sure that the bolt heads do not come into contact with the dual-mass flywheel.***
- ◆ ***Rotate the dual-mass flywheel -A- so that the bolts -B- align centrally with the holes -arrows-.***



- Insert counterhold tool - 3067- in hole on cylinder block -item B-, slacken and remove bolts for dual-mass flywheel.

Installing

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

- Tightening torque
⇒ "2.1 Exploded view - dual-mass flywheel", page 61



Caution

Make sure friction is sufficient.

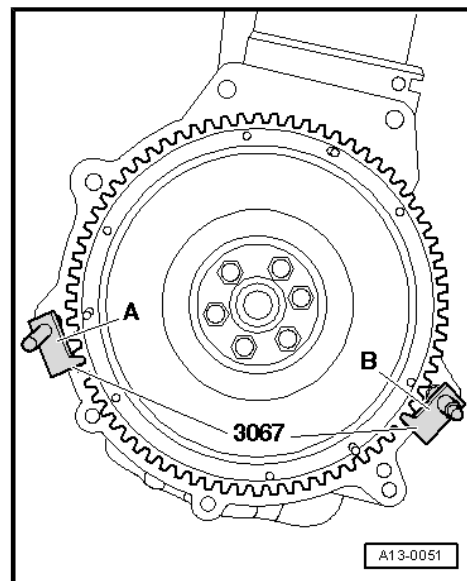
- ◆ *Always renew diamond-coated washers
⇒ Item 3 (page 61) and ⇒ Item 7 (page 62) after loosening
bolts for dual-mass flywheel.*



Caution

Risk of magnetic fields causing irreparable damage to sender wheel.

- ◆ *The sender wheel must be kept away from magnets (e.g. base of torch, loudspeaker).*
- ◆ *If the drive plate/flywheel or the sender wheel itself has been removed or renewed, check that the sender wheel is operating correctly before installation ⇒ page 63.*



Note

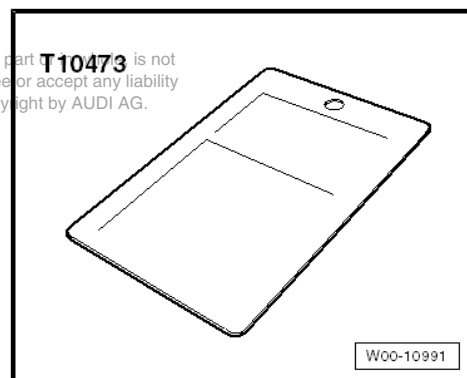
- ◆ *Renew the bolts tightened with specified tightening angle.*
 - ◆ *Dual-mass flywheel with sender wheel and diamond-coated washers can only be fitted in one position.*
- Insert counterhold - 3067- in hole on cylinder block -item A-.

2.3 Checking sender wheel

Special tools and workshop equipment required

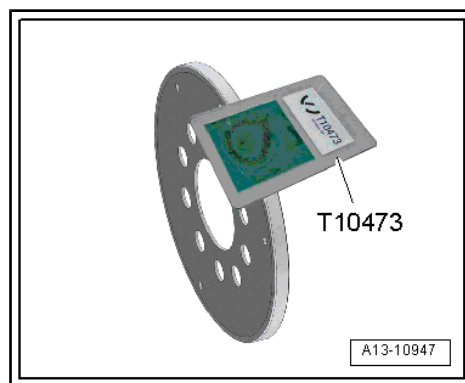
- ◆ Sensor gauge - T10473-

Protected by copyright. Copying for private or commercial purposes, in part or in full, 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.



Procedure

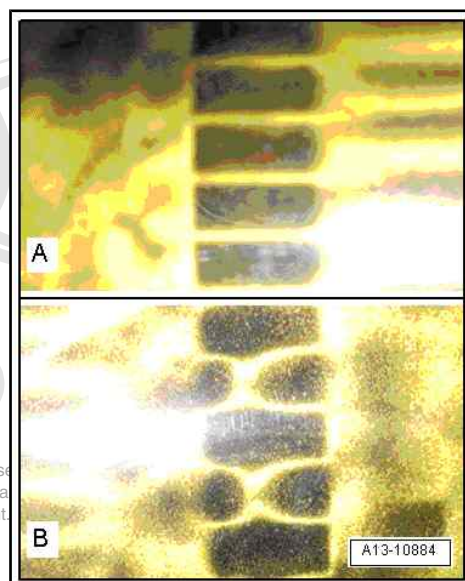
- Sender wheel removed
- Check entire circumference of sender wheel using sensor gauge - T10473-, as shown in illustration.



Inspection image of sender wheel

A - Sender wheel OK

B - Sender wheel defective

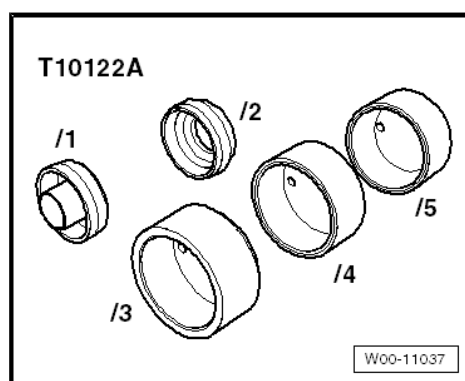


Protected by copyright. Copying for private or commercial purposes is permitted unless authorised by AUDI AG. AUDI AG does not guarantee with respect to the correctness of information in this document.

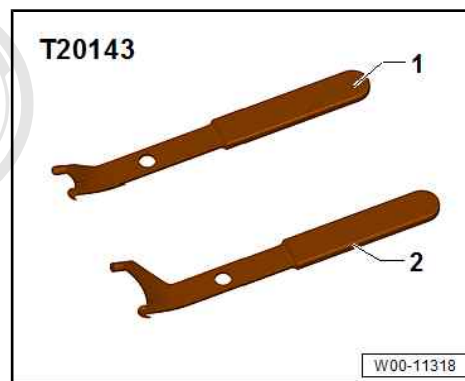
2.4 Renewing crankshaft oil seal (gearbox end)

Special tools and workshop equipment required

- ◆ Fitting tool - T10122A-



- ◆ Extractor hook - T20143/2-

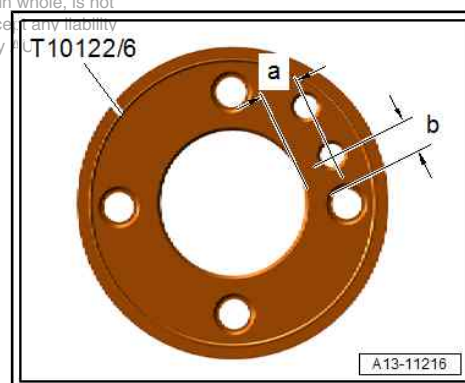


Preparing tool

Protected by copyright. Copying for private 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.

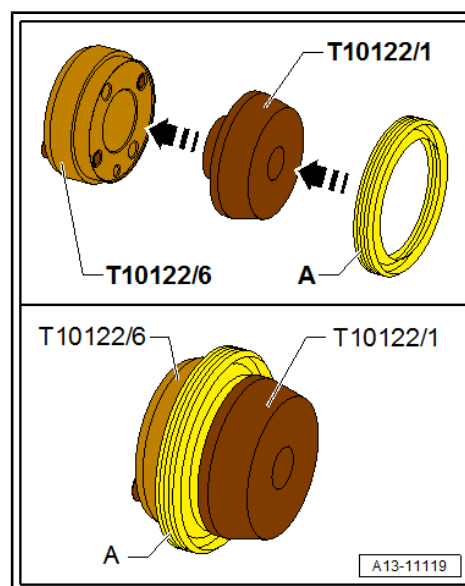
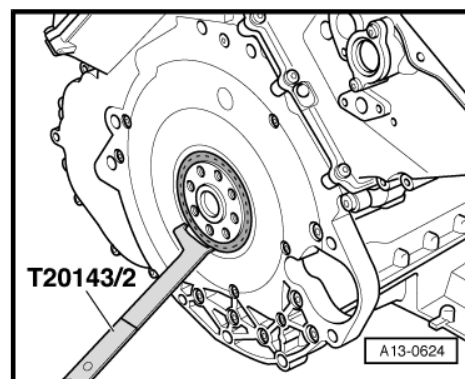
If there is no additional hole in guide piece - T10122/6- , drill one as follows:

- ◆ Dimension -a- = 11 mm
- ◆ Dimension -b- = 9.5 mm
- ◆ Diameter = 7.5 mm
- ◆ Depth = 14 mm



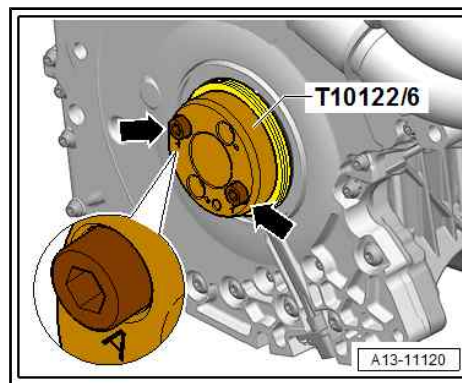
Procedure

- Gearbox removed ⇒ Rep. gr. 34 .
- Remove dual-mass flywheel ⇒ [page 62](#) .
- Pry out oil seal using extractor tool -T20143/2- .
- Clean contact surface and sealing surface.
- Fit assembly aid -T10122/1- onto guide piece -T10122/6- and slide oil seal -A- onto guide piece.
- Detach assembly aid -T10122/1- .



Version 1

- Fit guide piece - T10122/6- onto crankshaft.
- Bolt guide piece to crankshaft through securing points -A- using bolts -arrows-.



Version 2

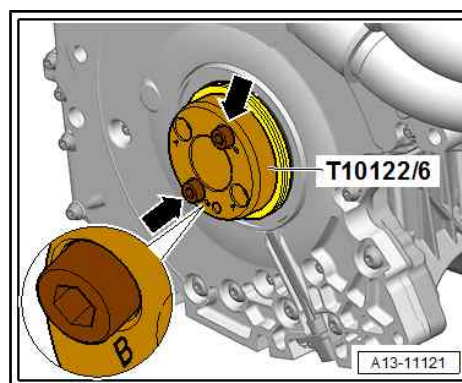
- Fit guide piece - T10122/6- onto crankshaft.
- Bolt guide piece to crankshaft by fitting bolts -arrows- through securing points -B-.



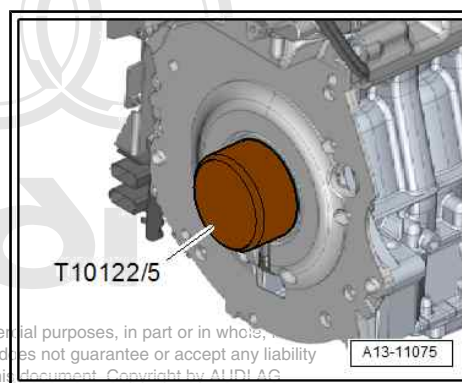
Caution

Risk of leaks if installed incorrectly.

- ◆ *Slide oil seal onto crankshaft by hand to prevent sealing lip on oil seal from folding over.*



- Slide oil seal over guide piece - T10122/6- onto crankshaft by hand.
- Press in oil seal uniformly until flush all round using thrust piece -T10122/5- .
- Remove guide piece - T10122/6- .
- Check that oil seal and its sealing lip are correctly seated. If sealing lip is partially folded over, repeat procedure with a new oil seal.
- Install dual-mass flywheel ⇒ [page 62](#) .



Protected by copyright. Copying for private 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.

3 Crankshaft

⇒ [“3.1 Exploded view - crankshaft”, page 67](#)

⇒ [“3.2 Crankshaft dimensions”, page 69](#)

⇒ [“3.3 Renewing needle bearing in crankshaft”, page 69](#)

⇒ [“3.4 Measuring axial clearance of crankshaft”, page 71](#)

⇒ [“3.5 Measuring radial clearance of crankshaft”, page 72](#)

3.1 Exploded view - crankshaft



Note

- ◆ When performing assembly work, secure engine to engine and gearbox support ⇒ [page 29](#).
- ◆ If large quantities of metal shavings or abrasion are found when performing engine repairs, this may be an indication of damage to the crankshaft or conrod bearings. To prevent further damage, the following steps are required after completion of repair work: clean the oil passages carefully and renew the oil spray jets, engine oil cooler and oil filter.

1 - Bolt

- ☐ Renew
- ☐ Use old bolts when measuring radial clearance
- ☐ 40 Nm + 90°

2 - Bearing caps

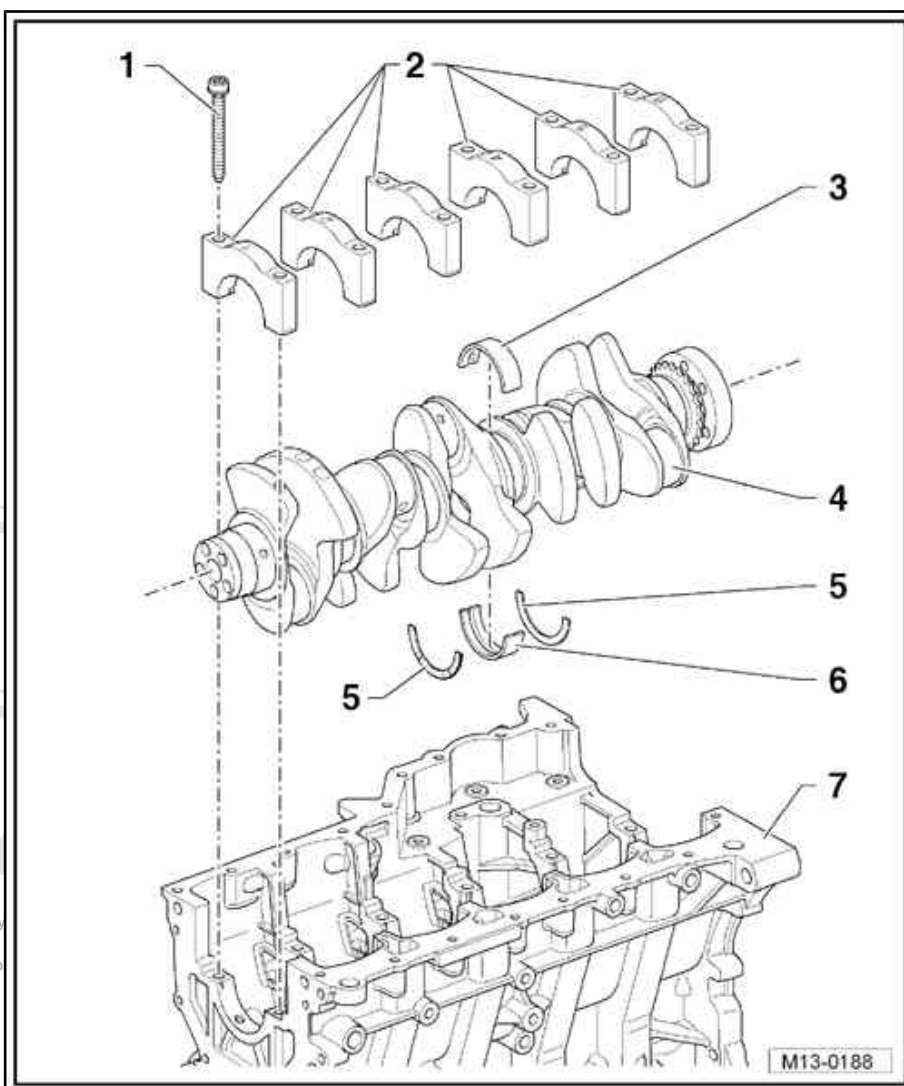
- ☐ Bearing cap 1: Pulley end
- ☐ Installation position: retaining lugs on bearing shells in cylinder block and bearing caps must be on the same side

3 - Bearing shell

- ☐ For bearing cap (without oil groove)
- ☐ Renew used bearing shells
- ☐ Insert new bearing shells with correct colour-coding ⇒ [page 68](#)

4 - Crankshaft

- ☐ For vehicles with dual clutch gearbox and needle bearing
- ☐ Extracting and driving in needle bearing ⇒ [page 69](#)
- ☐ Measuring axial clearance ⇒ [page 71](#)
- ☐ Measuring radial clearance ⇒ [page 72](#)
- ☐ Crankshaft dimensions ⇒ [page 69](#)



5 - Thrust washers

- ☐ For bearing No. 3

6 - Bearing shell

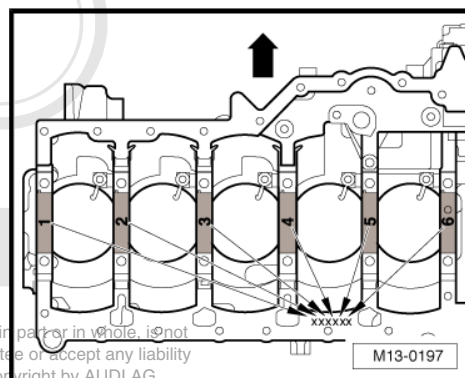
- ☐ For cylinder block (with oil groove)
- ☐ Renew used bearing shells
- ☐ Install new bearing shells for the cylinder block with the correct coloured markings ⇒ [page 68](#)

7 - Cylinder block

Allocation of crankshaft bearing shells for cylinder block

- ◆ Bearing shells of the correct thickness are matched to the bearings in the cylinder block at the factory. Coloured dots on the side of the bearing shells are used to identify the bearing shell thickness.
- ◆ Letter codes on the lower sealing surface of the cylinder block indicate the thickness of the bearing shell to be fitted at each location.

Letter on cylinder block	Colour coding of bearing
G =	Yellow
B =	Blue
W =	White



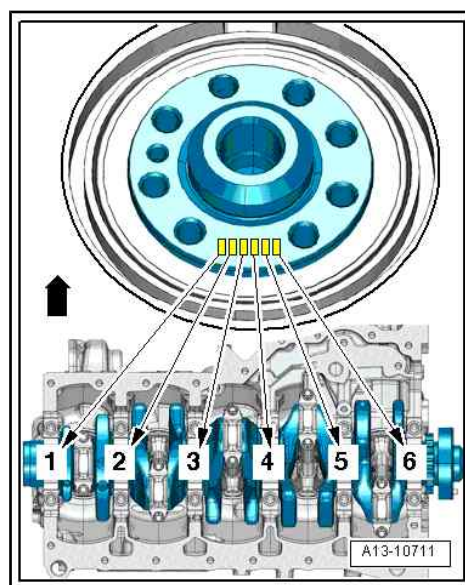
Note

-Arrow- points in direction of travel.

Allocation of crankshaft bearing shells for bearing caps

- ◆ Bearing shells of the correct thickness are assigned to the bearing caps at the factory. Coloured dots on the side of the bearing shells are used to identify the bearing shell thickness.
- ◆ The correct allocation of bearing shells to bearing cap is indicated by a sequence of letters on the pulley flange of the crankshaft. The first letter in the sequence stands for bearing "1", the second letter for bearing "2", etc.

Letter on crankshaft	Colour coding of bearing
R =	Red
G =	Yellow
B =	Blue
W =	White



Note

-Arrow- points in direction of travel.

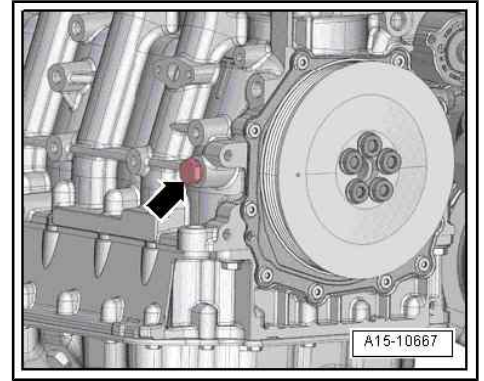
Plug for "TDC" marking - tightening torque



Note

Renew seal.

- Tighten plug -arrow- for "TDC" marking to 45 Nm.



3.2 Crankshaft dimensions

Honing dimension	Main bearing journal Ø mm	Conrod journal Ø mm
Basic dimension	58.000 – 0.022 – 0.042	47.800 – 0.022 – 0.042

3.3 Renewing needle bearing in crankshaft

Special tools and workshop equipment required

- ◆ Drift - VW 207 C-

Protected by copyright. Copying for private 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.



- ◆ Internal puller Kukko 21/2



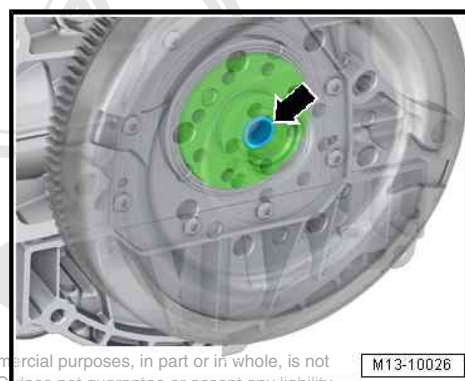
◆ Counter-support Kukko 22/1



Procedure

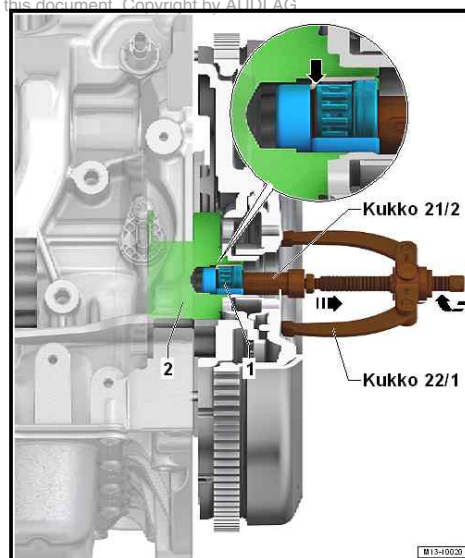
Conditions

- Gearbox removed ⇒ Rep. gr. 34 .
- The front edges of the internal puller must not be chipped.



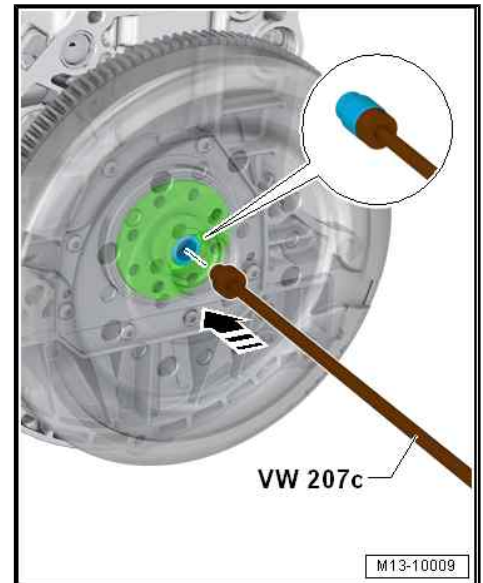
Removing

- Pull needle bearing -1- out of crankshaft -2- using commercially available internal puller (e.g. Kukko - 21/2-) and counter-support (e.g. Kukko - 22/1-).
- Internal puller must be positioned behind needle roller -arrow-.



Installing

- Clean bearing seat in crankshaft and grease lightly.
- Drive needle bearing into crankshaft with drift - VW 207 C- until it reaches installation depth.



- Installation depth: dimension -a- = 1.5 mm



Note

Renew needle bearing if you drive it in too far (needle bearing is damaged when it is pulled out again).



3.4 Measuring axial clearance of crankshaft

Special tools and workshop equipment required

- ◆ Universal dial gauge bracket - VW 387-



Protected by copyright. Copying for private 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.

◆ Dial gauge - VAS 6079-

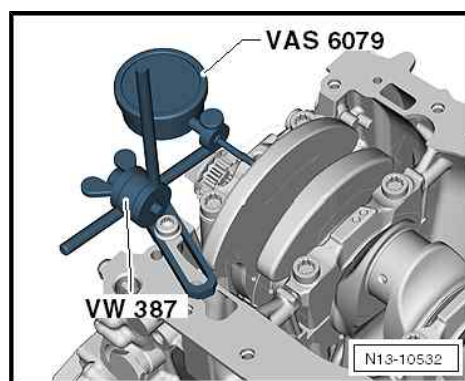


Procedure

- Secure dial gauge - VAS 6079- with universal dial gauge bracket - VW 387- to cylinder block as shown in illustration.
- Apply dial gauge to crank web.
- Press crankshaft against dial gauge by hand and set gauge to “0”.
- Push crankshaft away from dial gauge and read off value.

Axial clearance:

- New: 0.07 ... 0.21 mm.
- Wear limit: 0.30 mm.



3.5 Measuring radial clearance of crankshaft

Special tools and workshop equipment required

- ◆ Plastigauge

Procedure



Note

Use old bolts when measuring radial clearance.

- Remove bearing cap.
- Clean bearing cap and bearing journal.
- Place a length of Plastigauge corresponding to the width of the bearing on the bearing journal or in the bearing shell.
- The Plastigauge must be positioned in the centre of the bearing shell.
- Fit bearing cap and secure with old bolts ⇒ [Item 1 \(page 67\)](#) without rotating crankshaft.
- Remove bearing cap again.
- Compare width of Plastigauge with measurement scale.

Radial clearance:

- New: 0.023 ... 0.043 mm.
- Wear limit: 0.07 mm.
- When carrying out final assembly, renew bolts.

4 Pistons and conrods

⇒ [“4.1 Exploded view - pistons and conrods”, page 73](#)

⇒ [“4.2 Removing and installing pistons”, page 74](#)

⇒ [“4.3 Checking pistons and cylinder bores”, page 76](#)

⇒ [“4.4 Separating parts of new conrod”, page 77](#)

⇒ [“4.5 Checking radial clearance of conrod bearings”, page 78](#)

4.1 Exploded view - pistons and conrods



Note

- ◆ All bearing and running surfaces must be oiled before assembling.
- ◆ Oil spray jet and pressure relief valve ⇒ [page 74](#)

1 - Bolts

- ☐ Renew
- ☐ Use old bolts when measuring radial clearance
- ☐ Lubricate threads and contact surface
- ☐ 45 Nm + 90°

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

☐ Installation position:

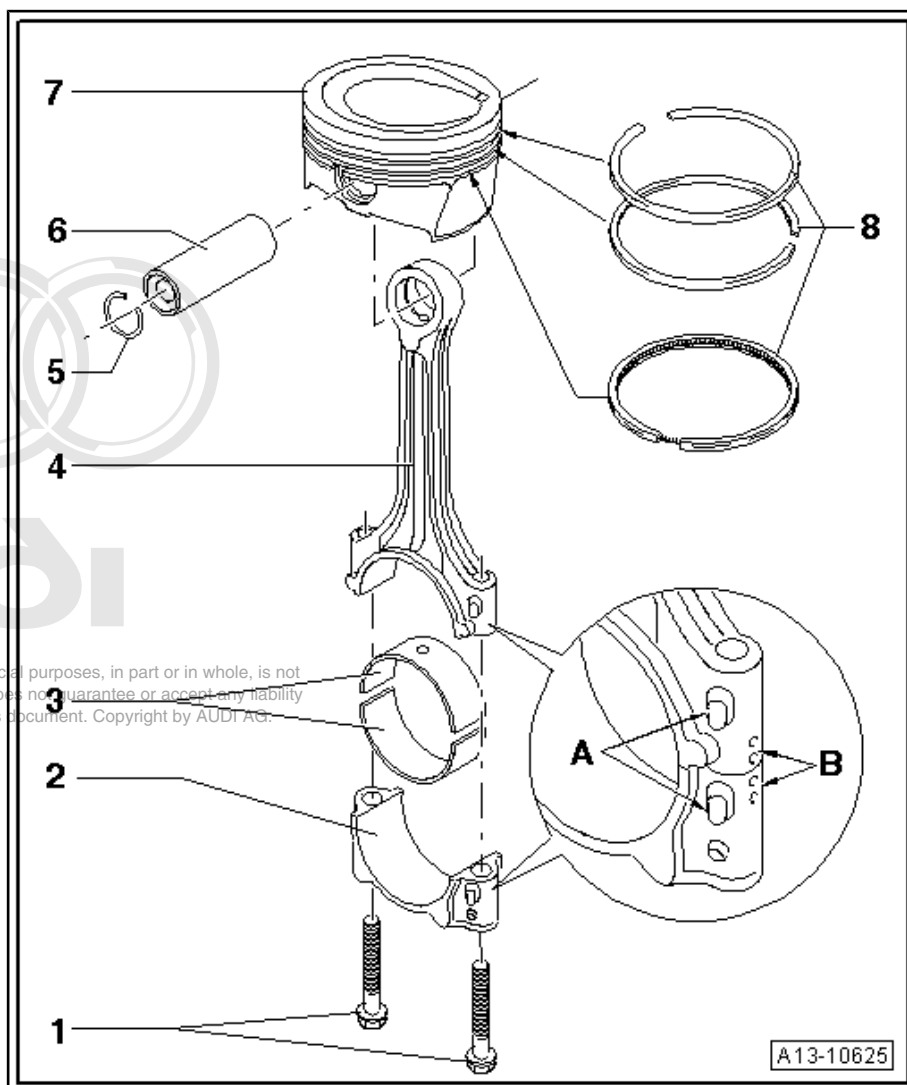
- Markings -A- face towards pulley end
- ☐ Separating parts of new conrod ⇒ [page 77](#)

3 - Bearing shells

- ☐ Without oil drilling
- ☐ Installation position ⇒ [page 74](#)
- ☐ Renew used bearing shells

4 - Conrod

- ☐ Only renew as a complete set
- ☐ Mark cylinder and conrod bearing cap allocation in colour -B-
- ☐ Installation position: Markings -A- face towards pulley end



- ☐ Measuring radial clearance ⇒ [page 78](#)
- ☐ Separating parts of new conrod ⇒ [page 77](#)

5 - Retaining ring

- ☐ Renew

6 - Piston pin

- ☐ Removing and installing ⇒ ["4.2 Removing and installing pistons", page 74](#)

7 - Piston

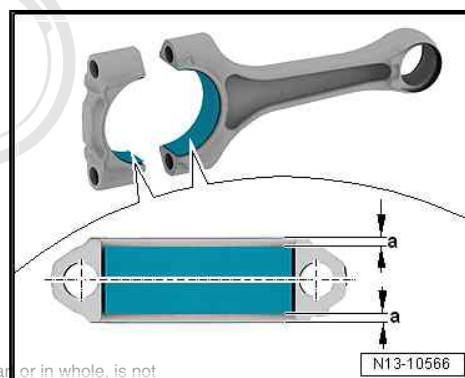
- ☐ Mark installation position to conrod and cylinder allocation
- ☐ Installation position: arrow on piston crown points to pulley end
- ☐ Removing and installing ⇒ [page 74](#)
- ☐ Checking pistons and cylinder bores ⇒ [page 76](#)

8 - Piston rings

- ☐ Offset gaps by 120°
- ☐ Use piston ring pliers to remove and install
- ☐ Inscription "TOP" faces towards piston crown
- ☐ Measuring ring gap ⇒ [page 76](#)
- ☐ Measuring ring-to-groove clearance ⇒ [page 76](#)

Installation position of bearing shells in conrods

- Insert bearing shells centrally in conrod/conrod bearing cap.
- Distance -a- = approx. 1.5 mm.



Protected by copyright. Copying for private 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.

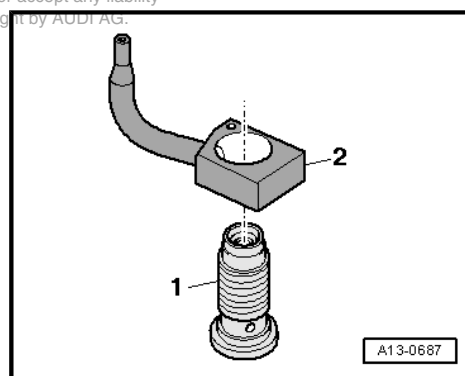
Oil spray jet and pressure relief valve

- 1 - Bolt with pressure relief valve, 27 Nm
 - 2 - Oil spray jet (for cooling of pistons)
- Installation position: align locating edge of oil spray jet with machined surface of cylinder block.



Note

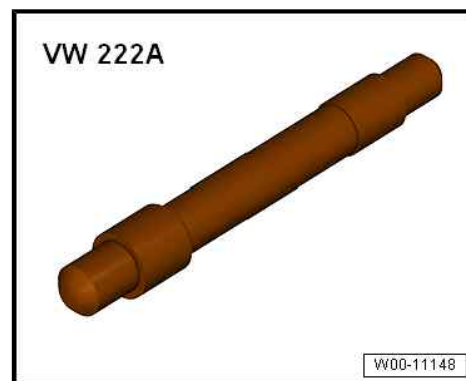
- ◆ Take care not to bend oil spray jets.
- ◆ Always renew bent oil spray jets.



4.2 Removing and installing pistons

Special tools and workshop equipment required

◆ Drift - VW 222A-



◆ Piston ring clamp, commercially available

Removing

- Secure engine to engine and gearbox support - VAS 6095-
⇒ [page 29](#) .
- Remove cylinder head ⇒ [page 106](#) .
- Remove sump (top section) ⇒ [page 141](#) .
- Mark installation position and cylinder number of piston.
- Mark installation position and cylinder number of conrod
⇒ [Item 4 \(page 73\)](#) .
- 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 222A- 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 7 \(page 74\)](#) .
- Install conrod bearing cap; note installation position
⇒ [Item 2 \(page 73\)](#) .
- Install cylinder head ⇒ [page 106](#) .
- Install sump (upper section) ⇒ [page 141](#) .

Tightening torques

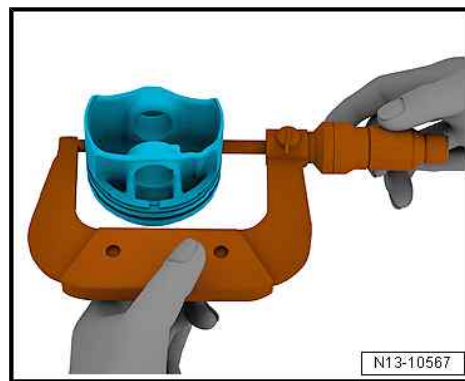
- ◆ ⇒ ["4.1 Exploded view - pistons and conrods", page 73](#)

4.3 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.

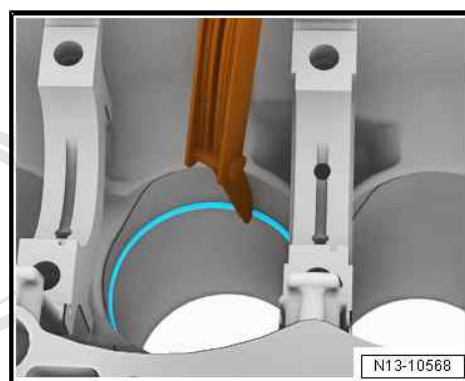
		Piston Ø
Nominal dimension	mm	82.451 ¹⁾
• ¹⁾ Dimensions not including coating (thickness 0.02 mm). The coating will wear down in service.		



Measuring piston ring gap

- Insert ring at right angle to cylinder wall from above and push down into lower cylinder opening approx. 15 mm from bottom of cylinder.
- To do so, use a piston without rings.
- Check gap using feeler gauge.

Piston ring	new mm	Wear limit mm
Compression rings	0.20 ... 0.40	0.8
Oil scraper ring	0.25 ... 0.50	0.8



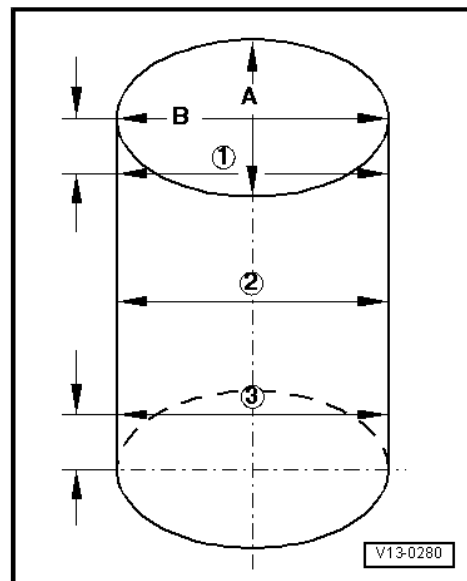
Measuring ring-to-groove clearance

- Clean annular groove of piston.
- Check gap using feeler gauge.

Piston ring	new mm	Wear limit mm
Compression rings	0.06 ... 0.09	0.20
Oil scraper ring	0.03 ... 0.06	0.15



Checking cylinder bore



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
Nominal dimension	mm	82.51



Note

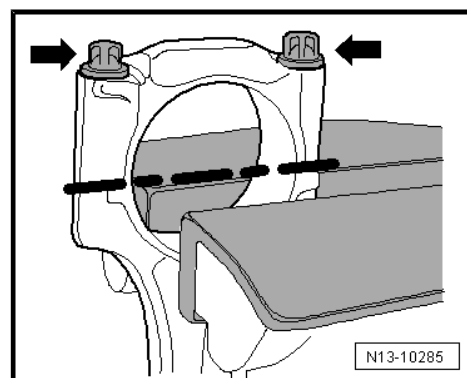
Measuring the cylinder bores must not be done when the cylinder block is mounted to the engine and gearbox support - VAS 6095-, as incorrect measurements may result.

Protected by copyright. Copying for private 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.

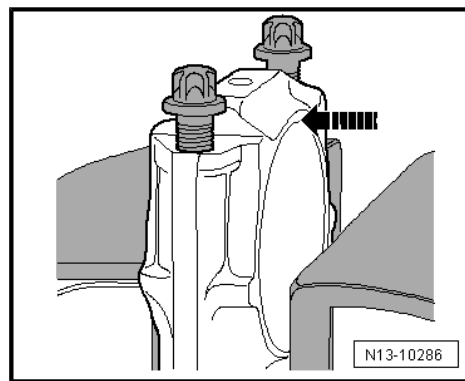
4.4 Separating parts of new conrod

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:

- To avoid any risk of damage, the conrod should only be clamped lightly in a vice using jaw covers as shown in illustration.
- The conrod is clamped in position below the dotted line.
- Unscrew bolts -arrows- approx. 5 turns.



- Using a plastic hammer, carefully knock conrod bearing cap loose -arrow-.



4.5 Checking radial clearance of conrod bearings

Special tools and workshop equipment required

◆ Plastigauge

Protected by copyright. Copying for private 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.

Procedure



Note

Use old bolts when measuring radial clearance.

- Remove conrod bearing cap. Clean bearing cap and bearing journal.
- Place a length of Plastigauge corresponding to the width of the bearing on the bearing journal or in the bearing shell.
- The Plastigauge must be positioned in the centre of the bearing shell.
- Fit conrod bearing cap and secure with old bolts
⇒ [Item 1 \(page 73\)](#) without rotating crankshaft.
- Remove conrod bearing cap again.
- Compare width of Plastigauge with measurement scale.

Radial clearance:

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

15 – Cylinder head, valve gear

1 Chain drive

⇒ [“1.1 Exploded view - timing chain covers”, page 79](#)

⇒ [“1.2 Removing and installing timing chain cover \(top\)”, page 81](#)

⇒ [“1.3 Renewing oil seal in timing chain cover \(top\)”, page 84](#)

⇒ [“1.4 Removing and installing timing chain cover \(bottom\)”, page 85](#)

⇒ [“1.5 Exploded view - camshaft timing chain”, page 89](#)

⇒ [“1.6 Removing and installing camshaft timing chain”, page 90](#)

⇒ [“1.7 Exploded view - drive chain for valve gear”, page 97](#)

⇒ [“1.8 Removing and installing drive chain for valve gear”, page 98](#)

1.1 Exploded view - timing chain covers

1 - Engine speed sender - G28-

- ☐ Removing and installing
⇒ [page 276](#)

2 - Crankshaft oil seal (gearbox end)

- ☐ Renewing ⇒ [page 64](#)

3 - Dowel sleeve

4 - Bolt

- ☐ Tightening torque and sequence ⇒ [page 81](#)

5 - O-ring

- ☐ Renew

6 - Cylinder head gasket

7 - Centre hex stud

- ☐ Tightening torque and sequence ⇒ [page 81](#)

8 - Nut

- ☐ 8 Nm

9 - Bracket

- ☐ For engine cover panel and high-pressure pipe

10 - Bolt

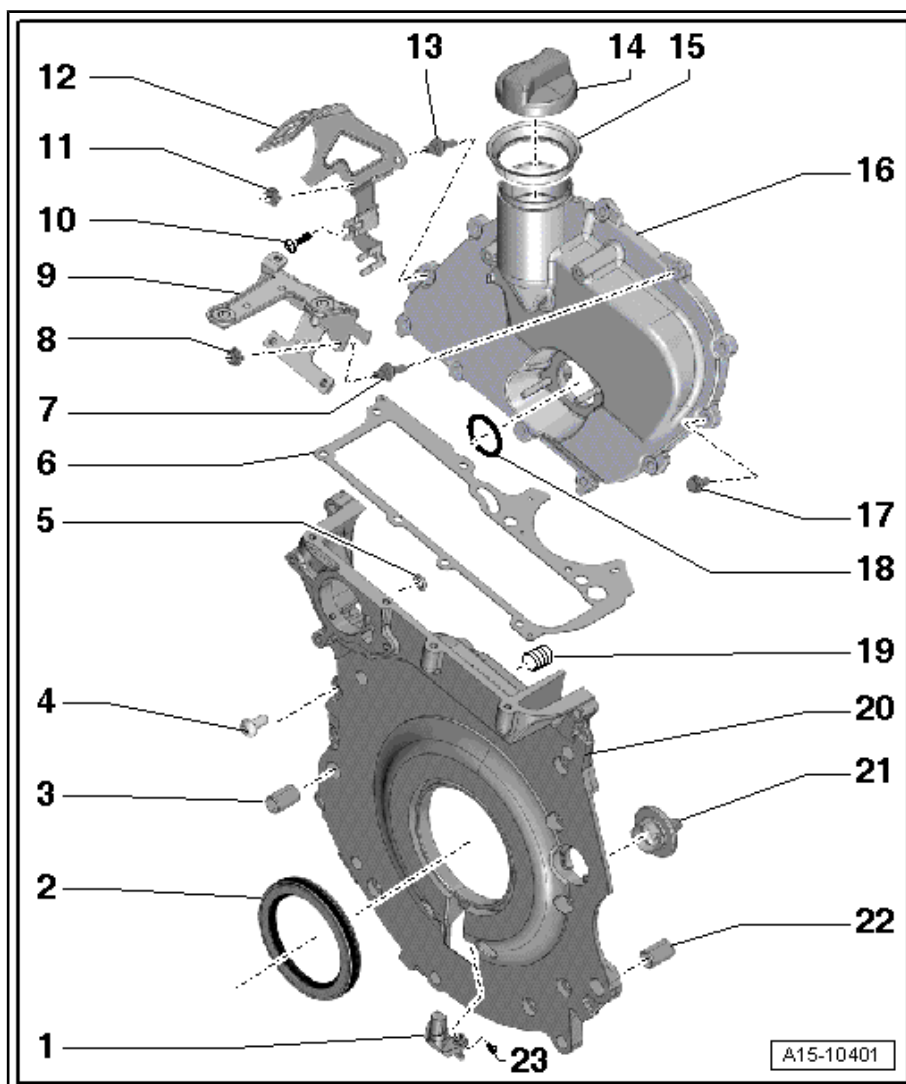
- ☐ 8 Nm

11 - Nut

- ☐ 8 Nm

12 - Bracket

- ☐ For engine cover panel and electrical connectors



13 - Centre hex stud

- ☐ Tightening torque and sequence ⇒ [page 80](#)

14 - Filler cap for oil filler neck

15 - Grommet

16 - Upper cover for timing chains

- ☐ Removing and installing ⇒ [page 81](#)
- ☐ Apply sealant when installing; refer to ⇒ [Electronic parts catalogue](#)

17 - Bolt

- ☐ Tightening torque and sequence ⇒ [page 80](#)

18 - Seal

- ☐ Renewing ⇒ [page 84](#)

19 - Sealing sleeve

- ☐ Renew

20 - Timing chain cover (bottom)

- ☐ Removing and installing ⇒ [page 85](#)
- ☐ Apply sealant when installing; refer to ⇒ [Electronic parts catalogue](#)

21 - Plug

22 - Dowel sleeve

23 - Bolt

- ☐ Tightening torque ⇒ [Item 16 \(page 272\)](#)

Timing chain cover (top) - tightening torque and tightening sequence

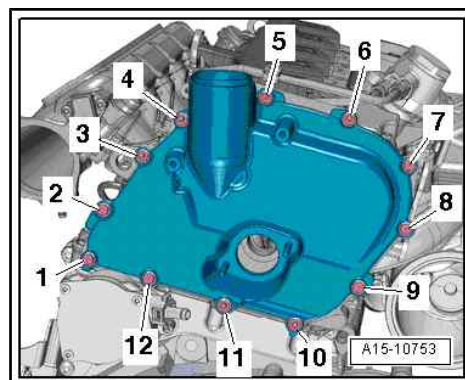


Note

Bolts -3, 4, 5, 6, 10, 11- are supplied as centre hex studs.

– Tighten bolts in 2 stages in the sequence shown:

Stage	Bolts	Tightening torque
1.	-1 ... 12-	Screw in by hand until contact is made
2.	-1 ... 12-	9 Nm



Timing chain cover (bottom) - tightening torque and sequence

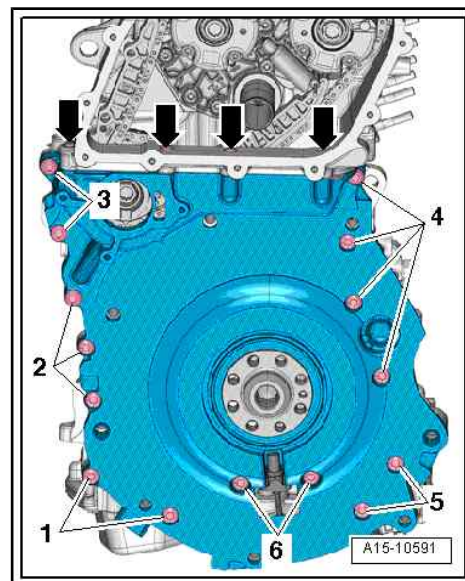


Note

Renew the bolts tightened with specified tightening angle.

– Tighten bolts in 6 stages:

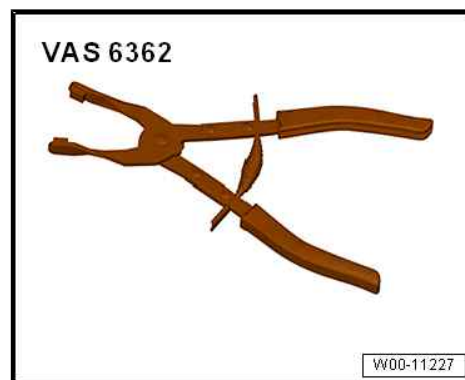
Stage	Bolts	Tightening torque
1.	-1 ... 6- and -arrows-	Screw in by hand until contact is made
2.	-arrows-	5 Nm
3.	-1 ... 6-	8 Nm in diagonal sequence
4.	-arrows-	8 Nm
5.	-1 ... 6-	20 Nm in diagonal sequence
6.	-arrows-	Turn 90° further



1.2 Removing and installing timing chain cover (top)

Special tools and workshop equipment required

◆ Hose clip pliers - VAS 6362-



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

Removing



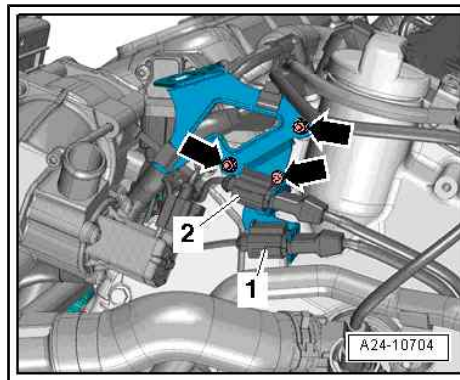
Note

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted without the prior written consent of Audi AG or accept any liability for the correctness of information in this document. Copyright by AUDI AG.

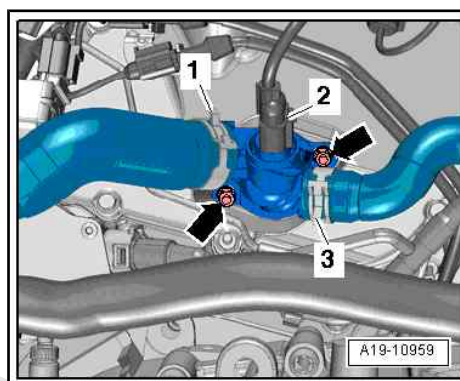
Routing and attachment of pipes, hoses and wiring in engine compartment ⇒ [page 6](#)

– Remove air cleaner housing ⇒ [page 223](#) .

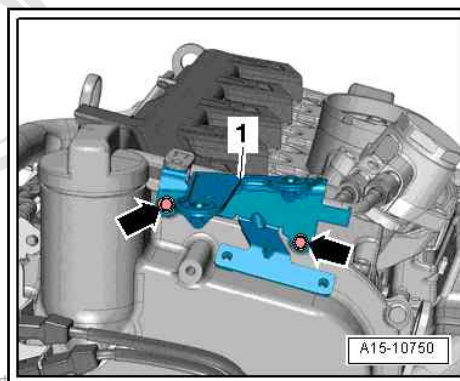
- Unplug electrical connectors -1- and -2-.
- Unscrew nuts and bolt -arrows- and move bracket for connectors to one side.
- Remove front coolant pipes ⇒ [page 187](#) .
- Remove coolant pipe (left-side) ⇒ [page 184](#) .



- Unplug electrical connector -2- at coolant temperature sender - G62- .
- Release hose clip -3- and detach coolant hose.
- Unscrew nuts -arrows- and move coolant connection to side with coolant hose -1- connected.



- Remove nuts -arrows- and detach bracket -1-.



- Remove bolts in the sequence 12...1 and carefully release timing chain cover (top) from bonded joint.
- Drive out oil seal in timing chain cover (top) ⇒ [page 84](#) .

Installing

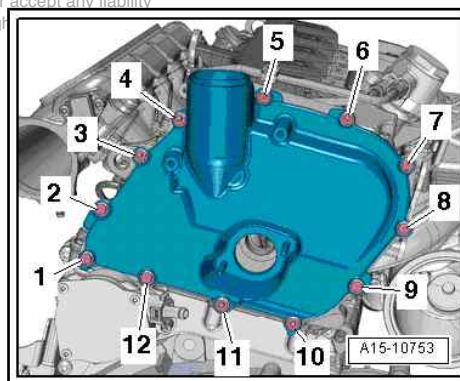
- Tightening torques
⇒ [Fig. "Timing chain cover \(top\) - tightening torque and tightening sequence"](#) , [page 80](#)



Caution

Protect lubrication system against contamination.

◆ *Cover exposed parts of the engine.*



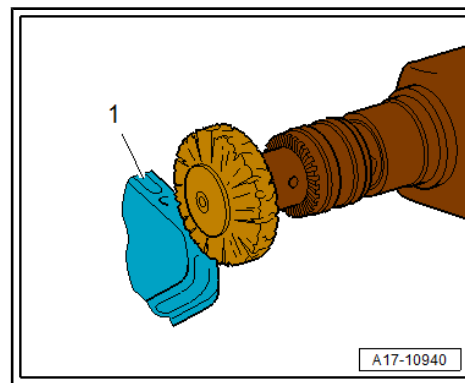


WARNING

Risk of eye injury.

◆ *Put on safety goggles.*

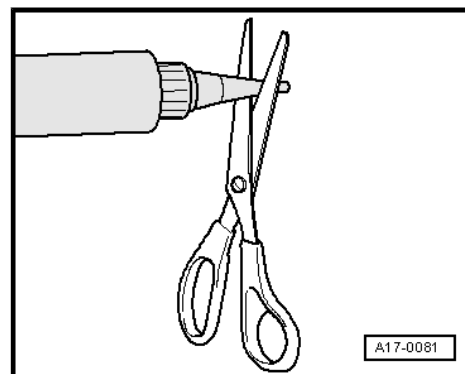
- Remove remaining sealant on timing chain cover -1-, cylinder block and cylinder head using rotating plastic brush or similar.
- Press in new oil seal in timing chain cover (top) ⇒ [page 84](#) .
- Clean sealing surfaces; they must be free of oil and grease.



Note

Note the use-by date of the sealant.

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

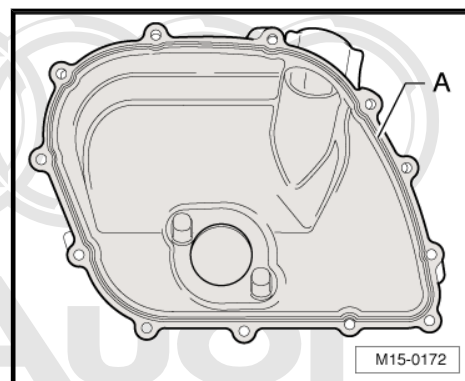


Caution

Make sure lubrication system is not clogged by excess sealant.

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

- Apply sealant bead -A- onto the clean sealing surface of the timing chain cover (top) as illustrated.
- Thickness of sealant bead: 1.5 ... 2.0 mm.

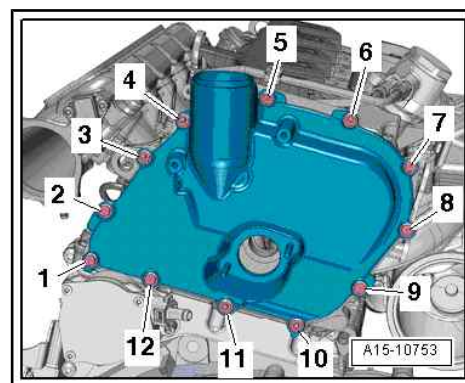


Note

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

Protected by copyright. Copying for private 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 for the correctness of information in this document. Copyright by AUDI AG.

- Install timing chain cover (top) and tighten bolts ⇒ [page 80](#) .
- Remaining installation steps are carried out in reverse sequence; note the following:
- Install coolant connection ⇒ [page 182](#) .
 - Install coolant pipe (left-side) ⇒ [page 184](#) .
 - Install coolant pipes (front) ⇒ [page 187](#) .



1.3 Renewing oil seal in timing chain cover (top)

Special tools and workshop equipment required

- ◆ Punch - VW 195-

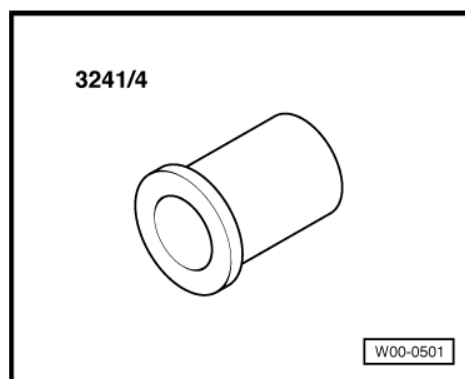
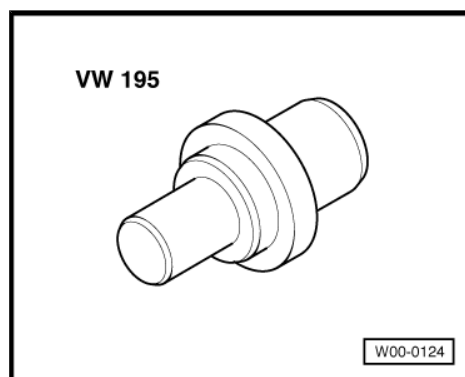


- ◆ Tube - VW 415 A-



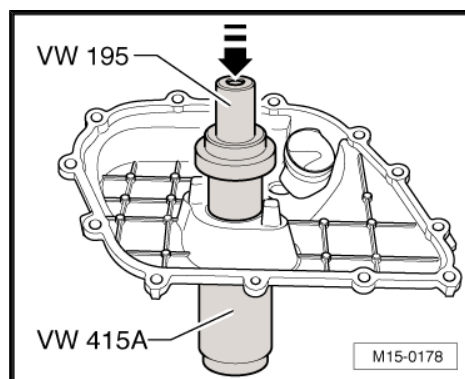
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- ◆ Fitting sleeve -3241/4-

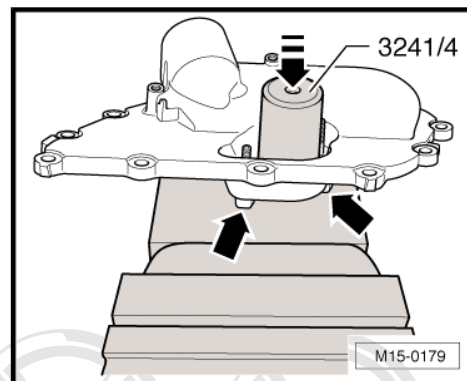


Procedure

- Remove timing chain cover (top) ⇒ [page 81](#) .
- Use punch - VW 195- to drive out oil seal -arrow-.



- Remove any sealant residue from timing chain cover (top), place cover on a fixed surface with lugs on casting -arrows- facing downwards and press in new seal until it makes contact using fitting sleeve -3241/4- .
- Install timing chain cover (top) ⇒ [page 81](#) .



1.4 Removing and installing timing chain cover (bottom)

Special tools and workshop equipment required

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

Removing

- Gearbox removed ⇒ Rep. gr. 34 .

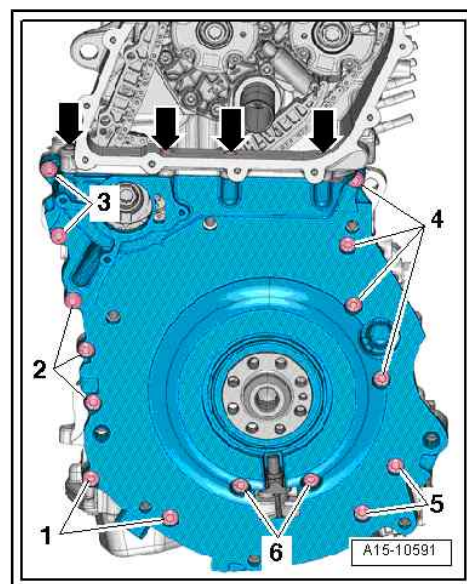


Note

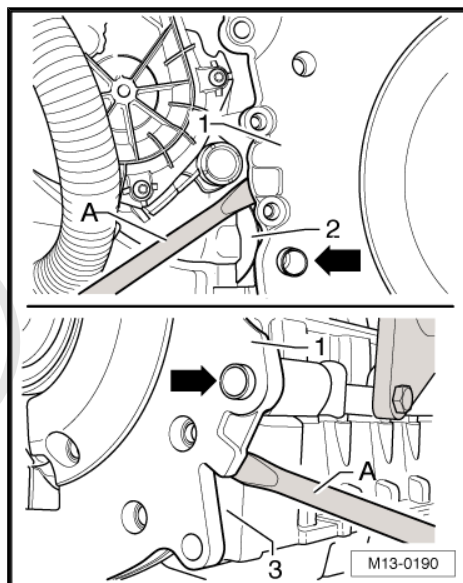
Fit all cable ties in the original positions when installing.

- Remove dual-mass flywheel ⇒ [page 62](#) .
- Remove timing chain cover (top) ⇒ [page 81](#) .
- Remove vacuum pump ⇒ Rep. gr. 47 .
- Remove engine speed sender - G28- ⇒ [page 276](#) .
- First remove bolts -arrows-, then -1 ... 6-.

Protected by copyright. Copying for private 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.



- Carefully release timing chain cover (bottom) -1- from bonded joint; to do so, apply screwdriver -A- at the correct positions at top and bottom.
- 2 - Cylinder block
- 3 - Sump (top section)
- Always start to release cover in area of dowel sleeves -arrows-.
- Press crankshaft oil seal (gearbox end) out of timing chain cover (bottom).



Installing

- **Tightening torques**
⇒ Fig. "Timing chain cover (bottom) - tightening torque and sequence" , page 81
- Drive back dowel sleeves -arrows- in timing chain cover (bottom) that they do not protrude beyond sealing surface.



Note

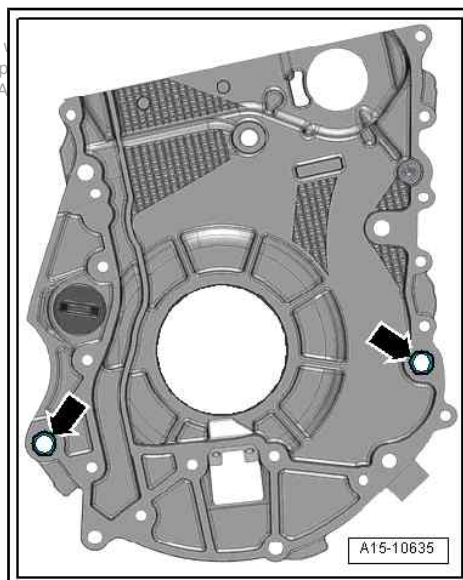
Renew gaskets, seals and O-rings.



Caution

Protect lubrication system against contamination.

- ◆ Cover exposed parts of the engine.

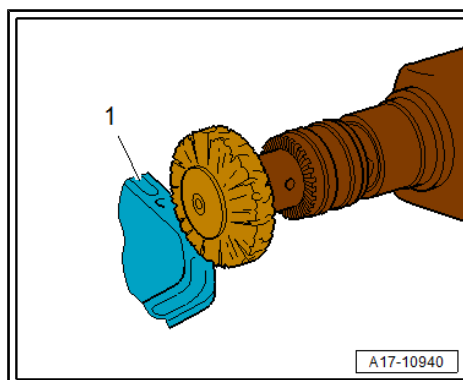


WARNING

Risk of eye injury.

- ◆ Put on safety goggles.

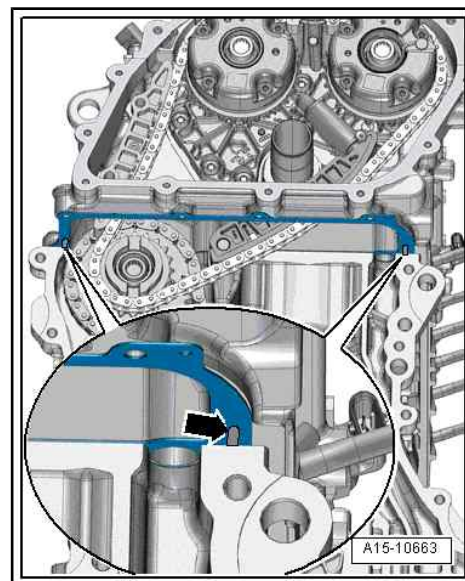
- Remove remaining sealant on timing chain cover (bottom) -1-, cylinder block and sump (top section) using rotating plastic brush or similar.
- Clean sealing surfaces; they must be free of oil and grease.



- Clean old sealant from holes -arrow- in cylinder head gasket.

**Note**

With the cylinder head installed the holes in the cylinder head gasket are only half visible.

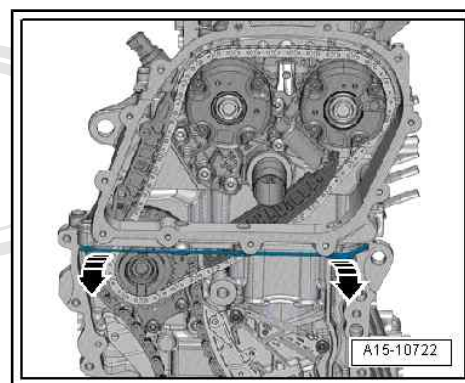
**Caution**

Avoid damage to cylinder head gasket.

- ◆ **Only bend the end of the cylinder head gasket slightly and do not kink.**

**Note**

If the cylinder head gasket has been bent and kinked it must be renewed.

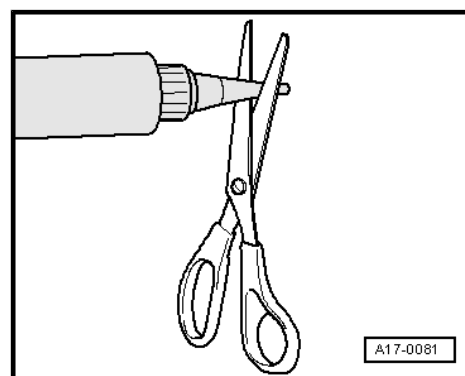


- Carefully bend the end of the cylinder head gasket down very slightly -arrows-, just far enough to be able to clean the upper sealing surface on the cylinder head gasket and cylinder head.
- Clean cylinder head gasket (top and bottom); it must be free of oil and grease.

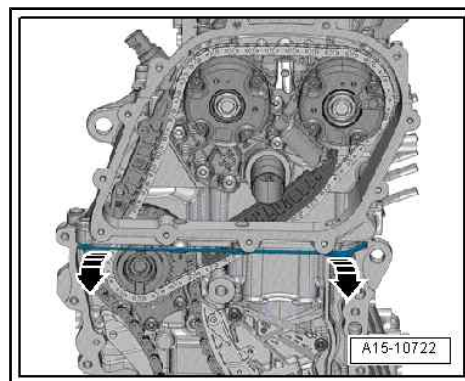
**Note**

Note the use-by date of the sealant.

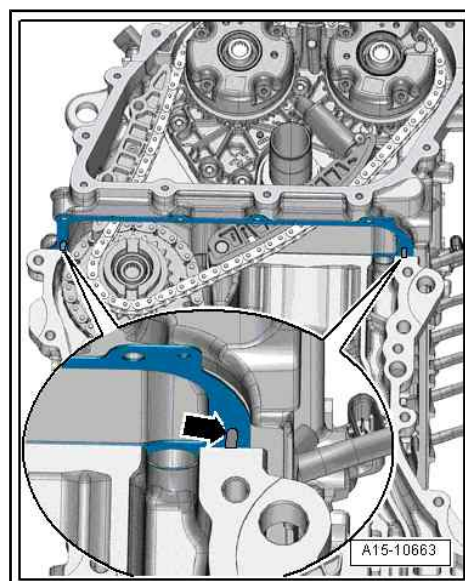
- Cut off nozzle of tube at front marking (nozzle Ø approx. 2 mm).



- Apply a small amount of sealant to sealing surface of cylinder head gasket (top and bottom). To do so, you again have to bend cylinder head gasket down very slightly -arrows-.
- Use a flat object (e.g. a feeler gauge) to apply sealant to the area between cylinder head and gasket.



- Clean holes -arrow- in cylinder head gasket and fill them with sealant.



Caution

Make sure lubrication system is not clogged by excess sealant.

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

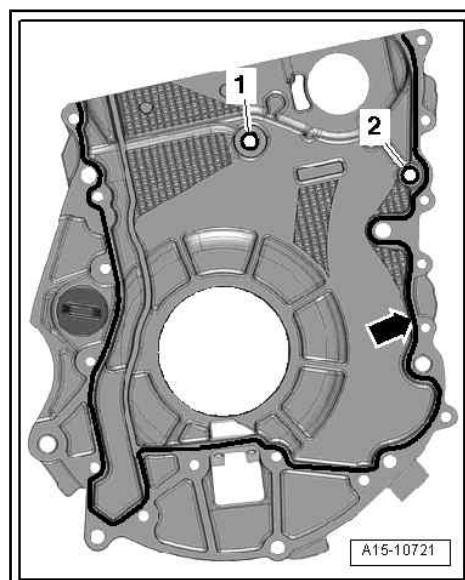
- Apply sealant bead -arrow- onto the clean sealing surface of the timing chain cover (bottom) as illustrated.
- Thickness of sealant bead: 1.5 ... 2.0 mm.



Note

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

- Fit dowel sleeve -1- and O-ring -2-.
- Fit timing chain cover (bottom), guiding it towards the sealing surface on cylinder block and cylinder head at an angle and from below.
- Take care not to damage the cylinder head gasket when fitting the cover.

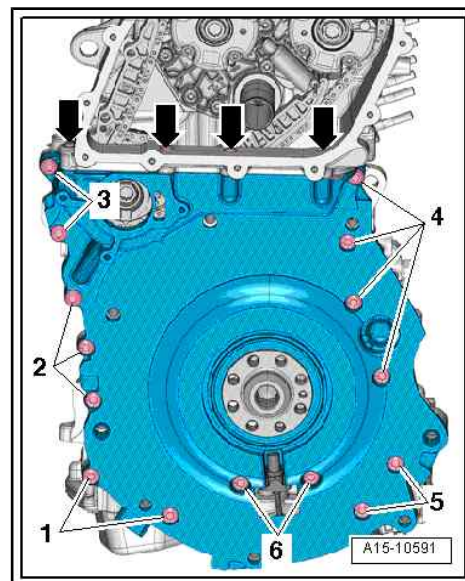


Copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Initially screw in bolts for timing chain cover (bottom) by hand until they make contact.
- Drive in dowel sleeves from timing chain cover (bottom) into cylinder block in each case until they make contact.
- Tighten bolts for timing chain cover (bottom) ➤ [page 81](#) .

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

- Install engine speed sender - G28- ➤ [page 276](#) .
- Install vacuum pump ➤ Rep. gr. 47 .
- Install timing chain cover (top) ➤ [page 81](#) .
- Install crankshaft oil seal (gearbox end) ➤ [page 64](#) .
- Install dual-mass flywheel ➤ [page 62](#) .



1.5 Exploded view - camshaft timing chain

1 - Chain sprocket for camshaft timing chain

2 - Guide rail

3 - Bolt

- ☐ Renew
- ☐ 60 Nm + 90°

4 - Camshaft adjuster for inlet camshaft

- ☐ Identification: "IN"
- ☐ Removing and installing ➤ ["1.6 Removing and installing camshaft timing chain", page 90](#)

5 - Bolt

- ☐ 9 Nm

6 - Chain tensioner for camshaft timing chain

7 - Oil strainer

- ☐ Inserted into cylinder head

8 - Gasket

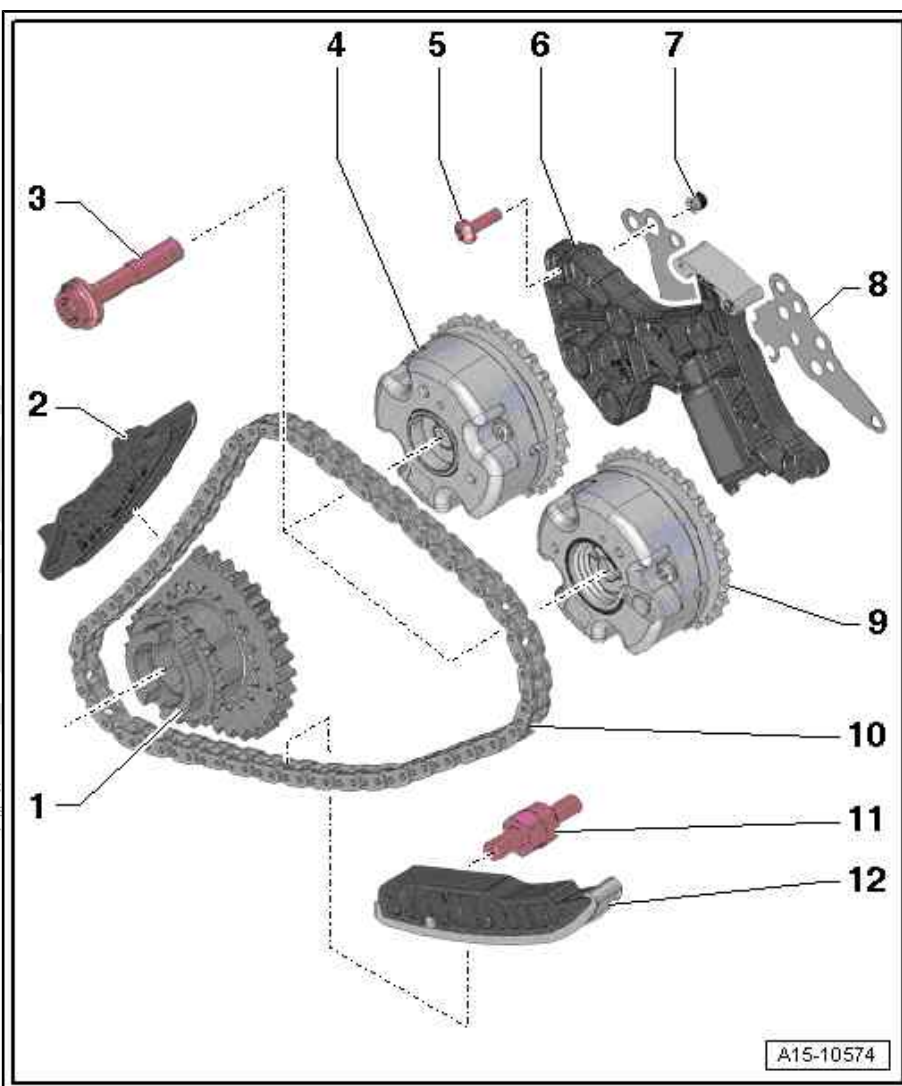
- ☐ Renew

9 - Camshaft adjuster for exhaust camshaft

- ☐ Identification: "EX"
- ☐ Removing and installing ➤ ["1.6 Removing and installing camshaft timing chain", page 90](#)

10 - Camshaft timing chain

- ☐ Before removing, mark running direction with paint
- ☐ Removing and installing ➤ [page 90](#)



11 - Bearing mounting

- 40 Nm

12 - Tensioning rail**1.6 Removing and installing camshaft timing chain****Special tools and workshop equipment required**

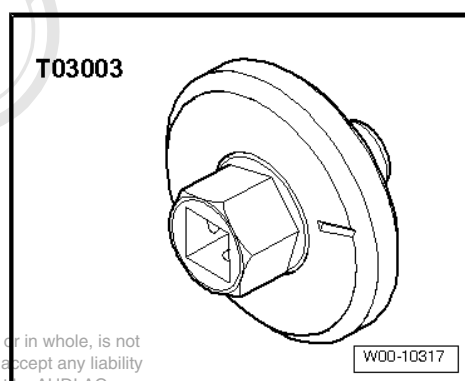
- ◆ Torque wrench - V.A.G 1331-



- ◆ Open end spanner insert, AF 24 - V.A.G 1332/11-

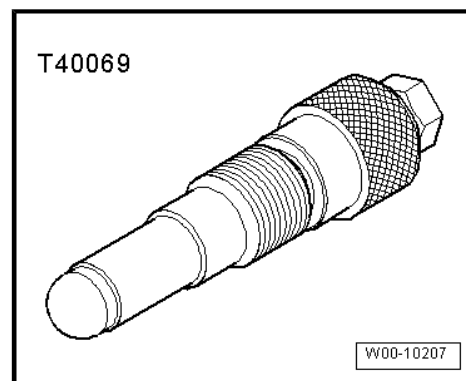


- ◆ Key - T03003-

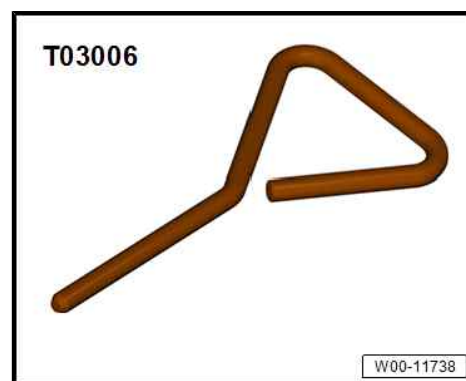


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

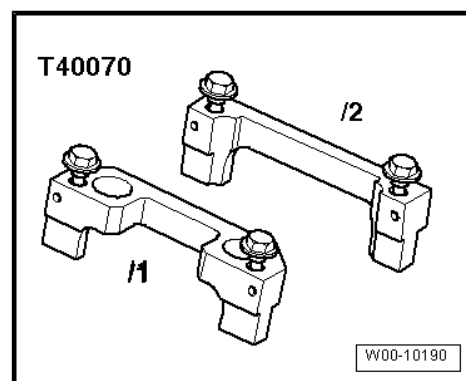
◆ Locking pin - T40069-



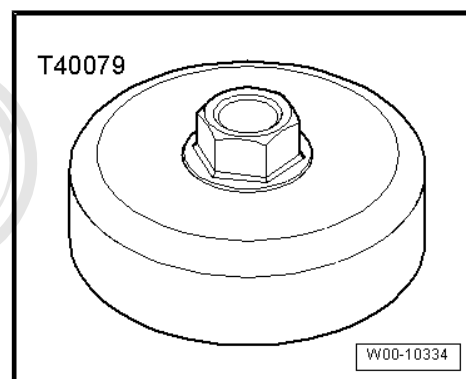
◆ Locking pin - T03006-



◆ Camshaft clamp - T40070-



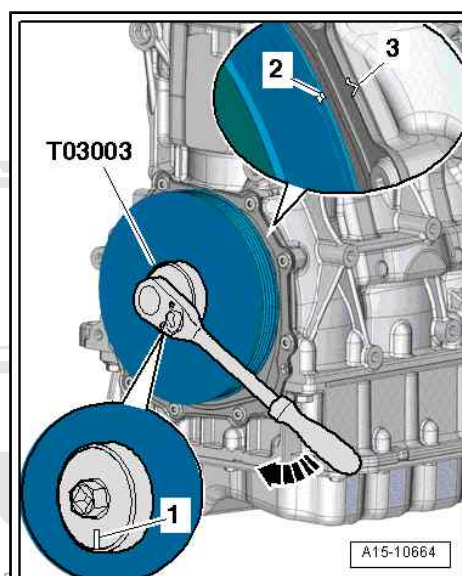
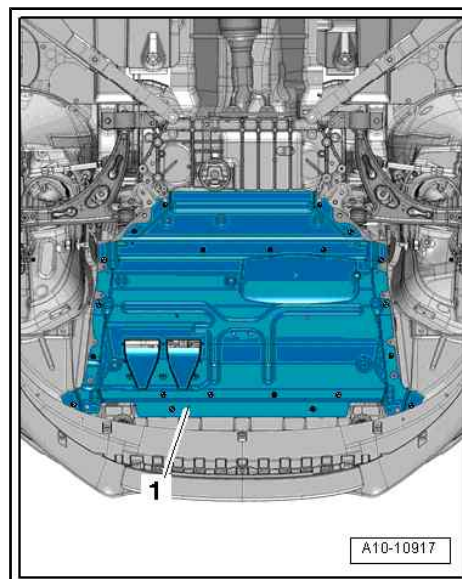
◆ Key - T40079-



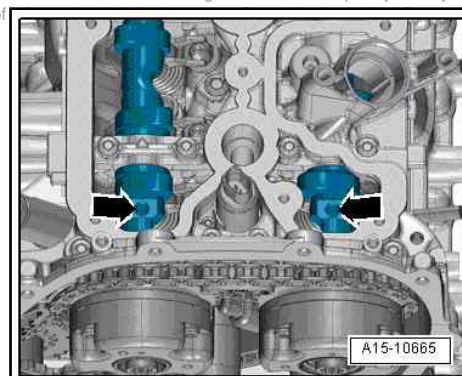
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Removing

- Remove noise insulation -1- ⇒ Rep. gr. 66 .
 - Remove vacuum pump ⇒ Rep. gr. 47 .
 - Remove cylinder head cover ⇒ [page 104](#) .
 - Remove timing chain cover (top) ⇒ [page 81](#) .
-
- Turn crankshaft with socket -T03003- in normal direction of rotation -arrow- to "TDC position".
 - Notch -1- in socket -T03003- must be perpendicular to sealing surface of sump.
 - Marking -2- on vibration damper must be opposite marking -3- on sealing flange.
-
- The threaded holes -arrows- in the camshafts must face upwards.



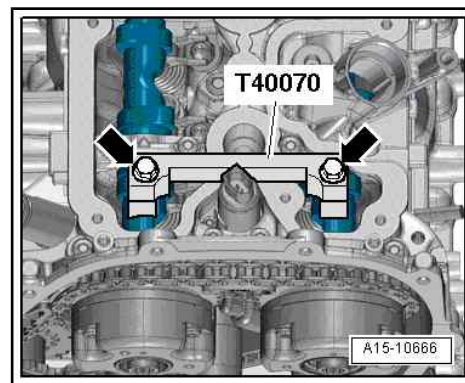
Protected by copyright. Copying for private use is permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of the information.



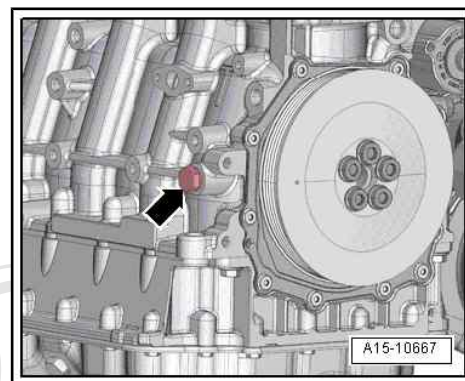
Note

Turn crankshaft by 360° if the threaded holes do not point upwards.

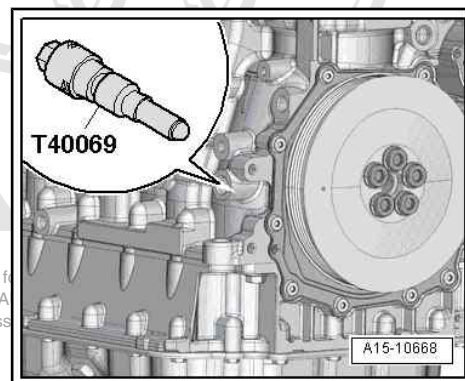
- Fit camshaft clamp - T40070- onto cylinder head and tighten bolts -arrows- to 25 Nm.
- The camshaft clamp - T40070- is positioned correctly if the holes for the cylinder head bolts remain free.



- Unscrew plug -arrow- for "TDC" marking from cylinder block.



- Screw locking pin - T40069- into locating groove and tighten to 15 Nm. If necessary, turn crankshaft backwards and forwards slightly to fully centralise locking pin.



- Press guide rail of chain tensioner for camshaft timing chain inwards as far as the stop using a screwdriver. Then lock chain tensioner by inserting locking pin -T03006- .



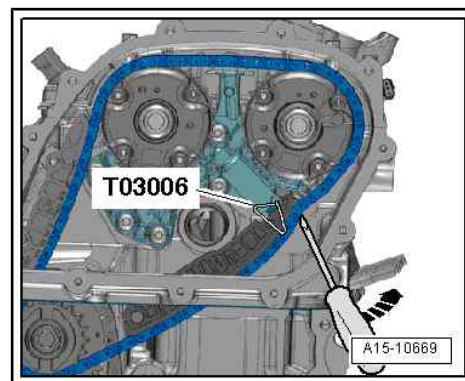
Caution

If a used timing chain rotates in the opposite direction when it is refitted, this can cause breakage.

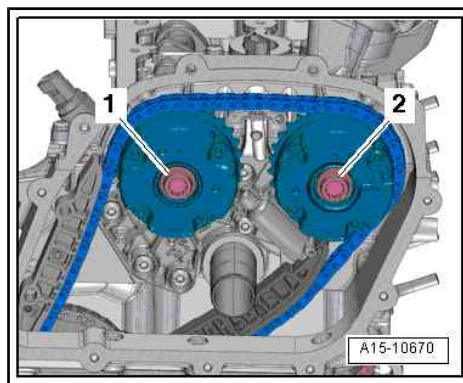
- ◆ *Mark running direction of timing chain with coloured arrows for re-installation. Do not mark timing chain by means of centre punch, notch or the like.*

Risk of irreparable damage to engine.

- ◆ *Block off the opening in the valve timing housing with a clean cloth to prevent small items from dropping into the engine.*



- Unscrew bolts -1- and -2- and detach both camshaft adjusters.



- Detach camshaft timing chain from drive sprocket -arrow- for camshaft timing chain.

Installing

- Tightening torques
⇒ [“1.5 Exploded view - camshaft timing chain”, page 89](#)



Note

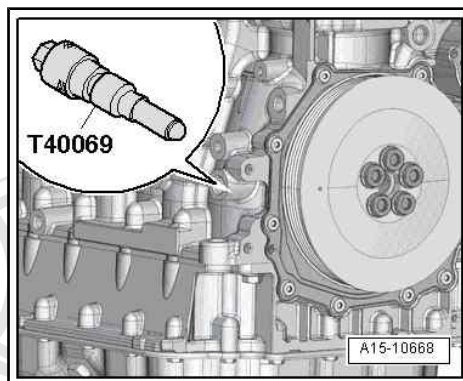
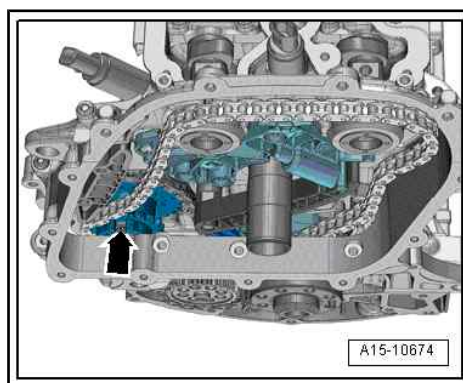
Renew the bolts tightened with specified tightening angle.



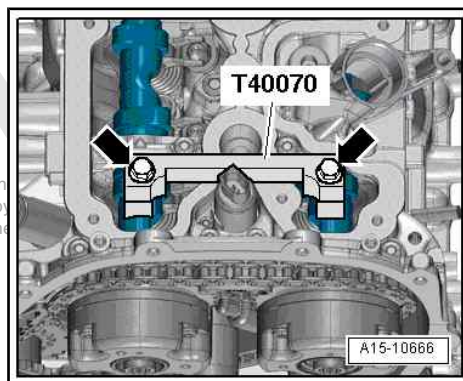
Caution

Risk of damage to valves and piston crowns.

- ◆ **The crankshaft must not be at “TDC” at any cylinder when the camshafts are turned.**

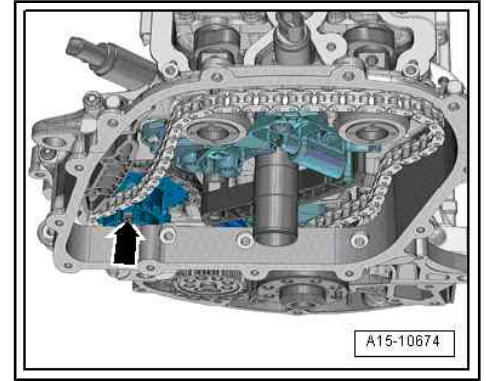


- Drive chain for valve gear installed ⇒ [page 98](#)
- Crankshaft locked in position with locking pin - T40069- .
- Camshaft clamp - T40070- installed and tightened to 25 Nm -arrows-.

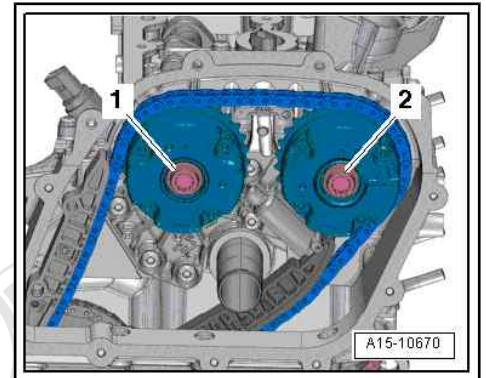


Protected by copyright. Copying permitted unless authorised by Audi AG with respect to the correctness of the information.

- Fit camshaft timing chain onto drive sprocket -arrow- for camshaft timing chain.



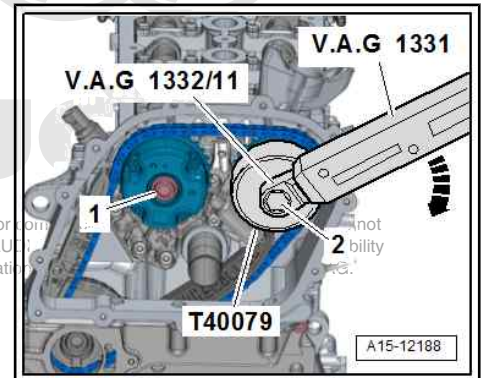
- Install camshaft adjusters according to marks applied when removing ⇒ [Item 4 \(page 89\)](#) and ⇒ [Item 9 \(page 89\)](#) .
- Attach camshaft adjusters with camshaft timing chain fitted, fit bolts -1- and -2- without tightening.
- It should just be possible to turn both camshaft adjusters on the camshaft without axial movement.
- Remove locking pin -T03006- .



 Note

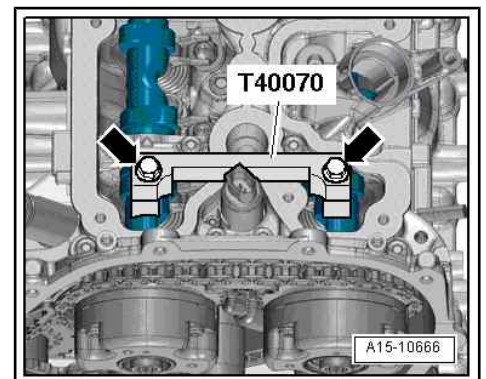
A second mechanic is required for the following work steps.

- Fit key - T40079- onto camshaft adjuster of exhaust camshaft.
- Apply torque wrench - V.A.G 1331- with open ring spanner insert, AF 24 - V.A.G 1332/11- to key - T40079- .
- Have a 2nd mechanic apply a torque of 25 Nm to camshaft adjuster in clockwise direction -arrow-.
- Tighten bolts as follows while keeping camshaft adjuster under tension:



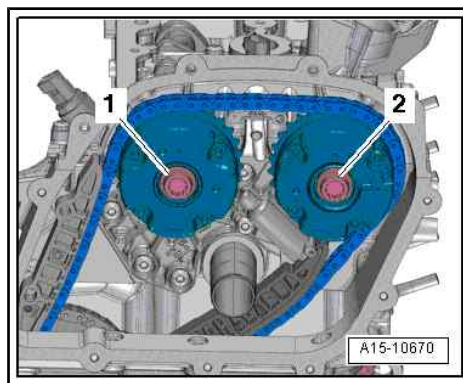
Stage	Bolt	Tightening torque
1.	-1-	On inlet camshaft: 60 Nm
1.	-2-	On exhaust camshaft: 60 Nm

- Remove key - T40079- .
- Remove camshaft clamp - T40070- -arrows-.

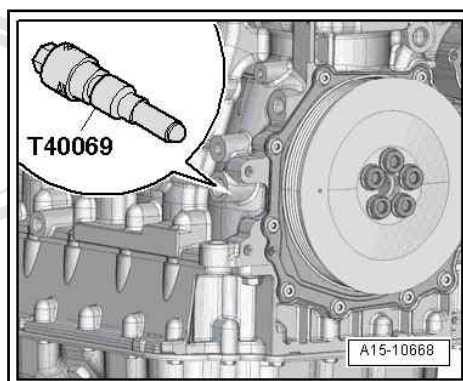


- Tighten bolts for camshaft adjusters in the following sequence:

Stage	Bolt	Angle to turn bolts
2.	-1-	90°
2.	-2-	90°



- Remove locking pin - T40069-.



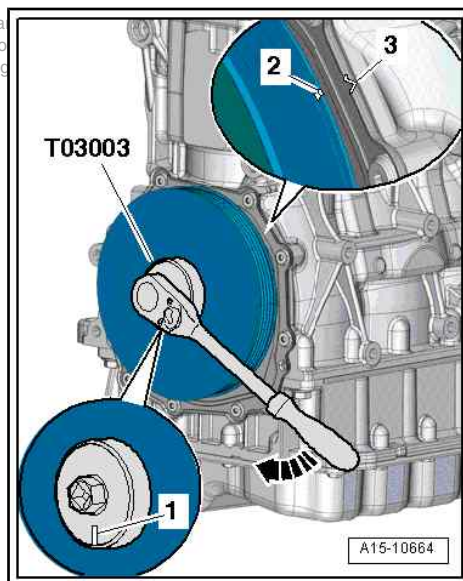
- Using socket -T03003-, turn crankshaft two rotations in normal direction of rotation arrow until crankshaft is at "TDC" again.

- Notch -1- in socket -T03003- must be perpendicular to sealing surface of sump.
- Marking -2- on vibration damper must be opposite marking -3- on sealing flange.



Note

If you turn the crankshaft beyond "TDC" by mistake, turn it back approx. 30° and set to "TDC" again.

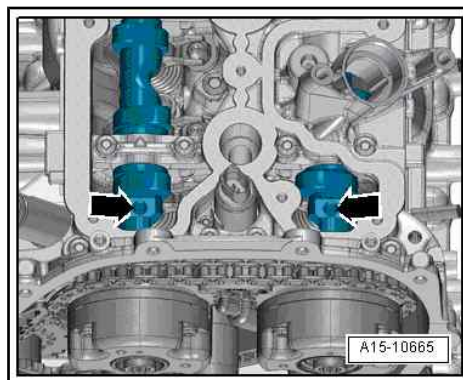


- The threaded holes -arrows- in the camshafts must face upwards.

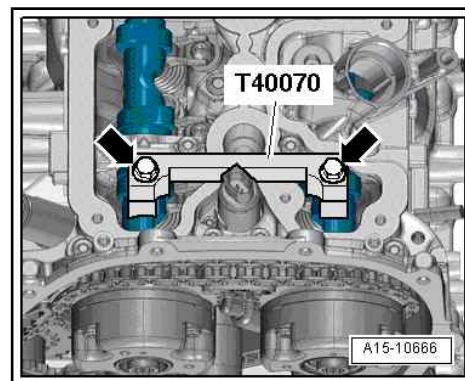


Note

Turn crankshaft by 360° if the threaded holes do not point upwards.



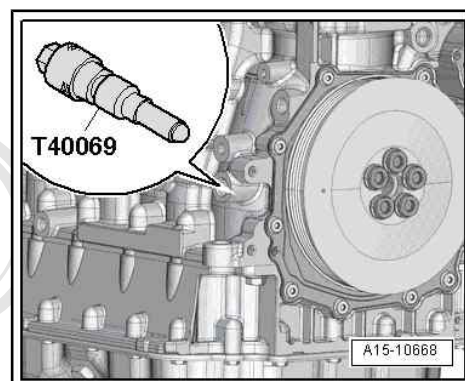
- Fit camshaft clamp - T40070- and tighten bolts -arrows- to 25 Nm.
- The camshaft clamp - T40070- is positioned correctly if the holes for the cylinder head bolts remain free.



- Screw locking pin - T40069- into locating groove and tighten to 15 Nm.
- The locking pin - T40069- must engage in the groove in the crankshaft. If it does not, reset valve timing.
- Remove camshaft clamp.
- Remove locking pin.

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

- Tighten plug for "TDC" marking ⇒ [page 69](#) .
- Install timing chain cover (top) ⇒ [page 81](#) .
- Install cylinder head cover ⇒ [page 104](#) .
- Install vacuum pump ⇒ Rep. gr. 47 .
- Install noise insulation ⇒ Rep. gr. 66 .



1.7 Exploded view - drive chain for valve gear

Protected by copyright. Copying for private 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 for errors or omissions. All rights reserved. © 2017 Audi AG.

1 - Bolt

- ☐ Renew
- ☐ 20 Nm + 90°

2 - Drive chain sprocket for oil pump

3 - Guide rail

4 - Bolt

- ☐ Renew
- ☐ 60 Nm + 90°

5 - Drive chain for valve gear

- ☐ Before removing, mark running direction with paint
- ☐ Removing and installing
⇒ [page 98](#)

6 - Chain sprocket for camshaft timing chain

- ☐ To remove, unscrew bolts -item 4- and -item 9- and detach chain sprocket together with bearing journal -item 7-

7 - Bearing journal for chain sprocket

8 - Thrust washer

9 - Bolt

- ☐ 9 Nm

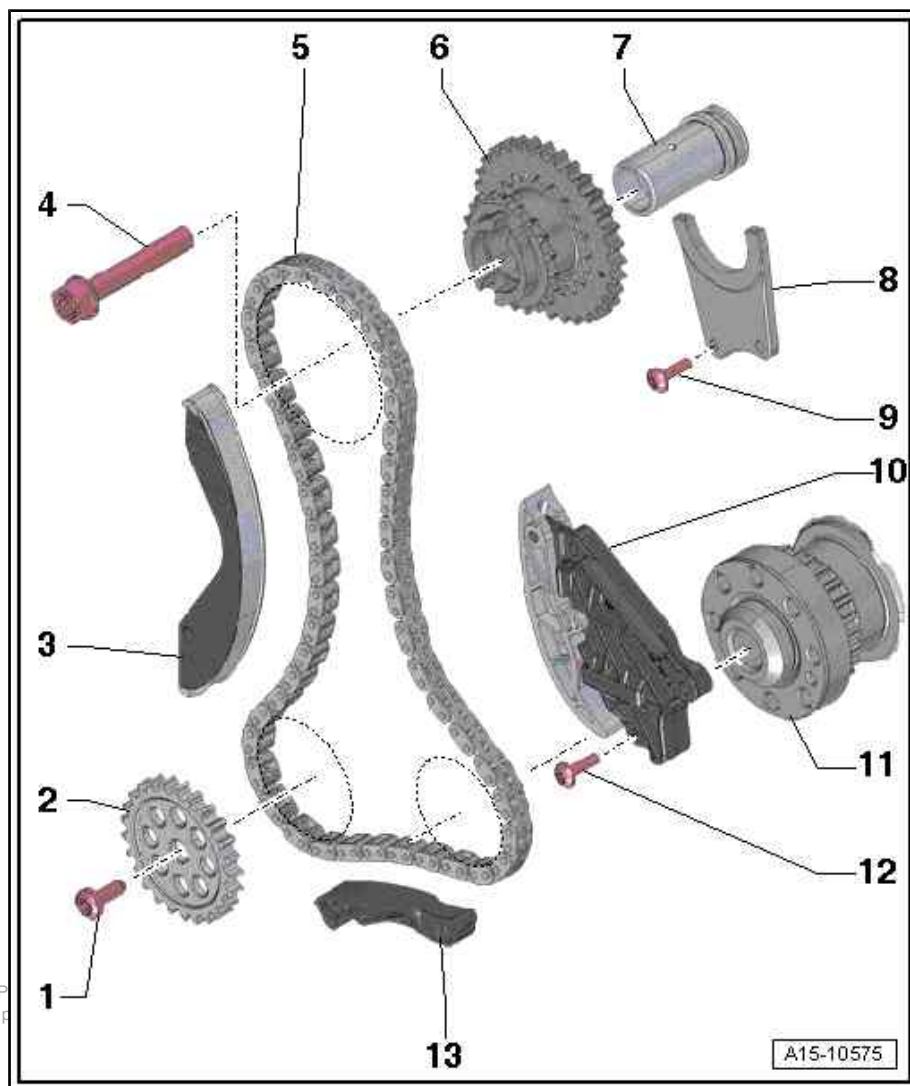
10 - Chain tensioner

11 - Crankshaft

12 - Bolt

- ☐ 9 Nm

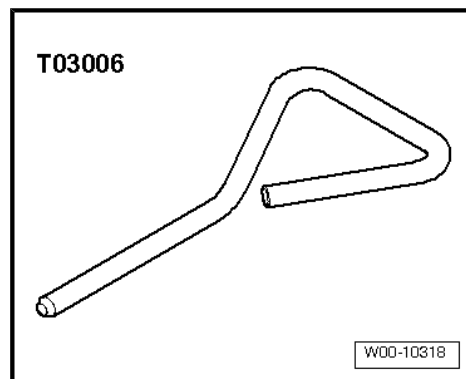
13 - Guide rail



1.8 Removing and installing drive chain for valve gear

Special tools and workshop equipment required

- ◆ Locking pin -T03006-



Removing

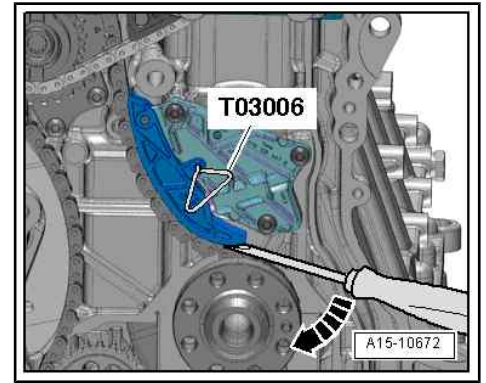
- Gearbox removed ⇒ Rep. gr. 34 .
- Remove camshaft timing chain ⇒ [page 90](#) .
- Remove timing chain cover (bottom) ⇒ [page 85](#) .
- Press guide rail of chain tensioner for drive chain in direction of -arrow- and lock chain tensioner by inserting locking pin - T03006- .



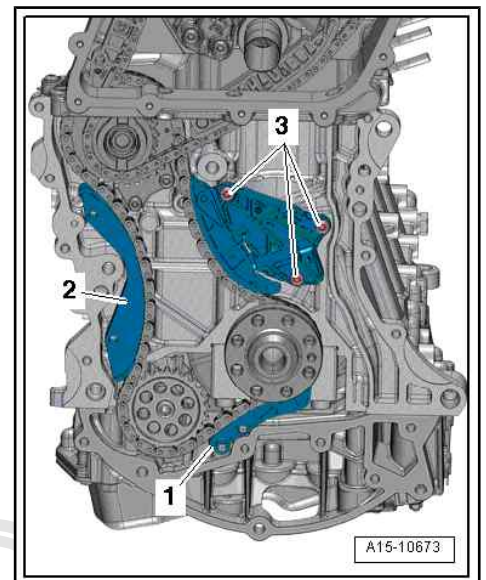
Caution

If a used drive chain rotates in the opposite direction when it is refitted, this can cause breakage.

- ◆ *Mark running direction of drive chain with paint for re-installation. Do not mark drive chain by means of centre punch, notch or the like.*



- Remove bolts -3- and take off chain tensioner.
- Detach guide rails -1- and -2-.



- Remove bolts -3-.
- Detach thrust washer -1-.
- Pull drive sprocket -2- for camshaft timing chain slightly off engine.
- Detach drive chain for valve gear.

Installing

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

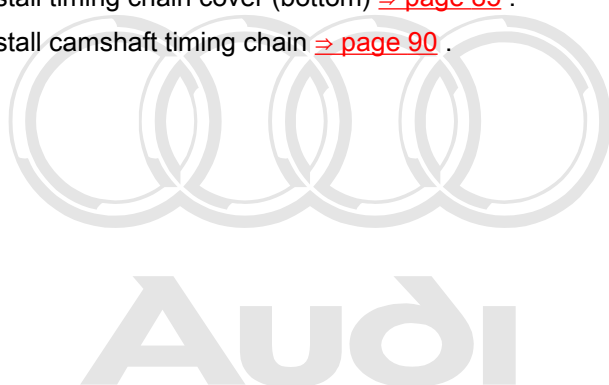
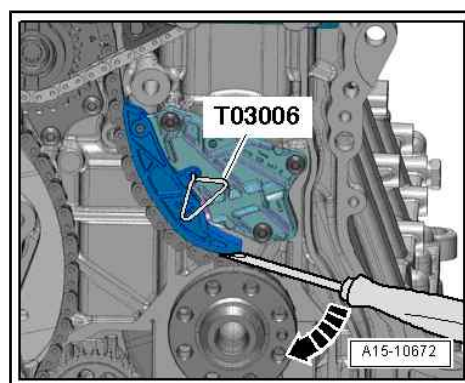
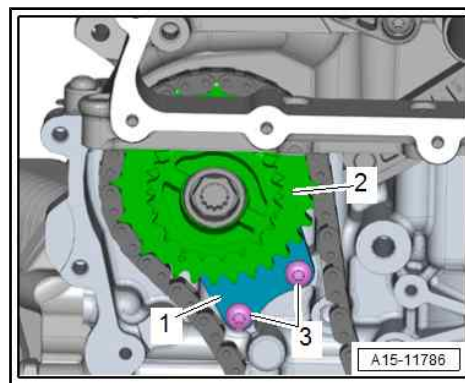
- Tightening torques
⇒ ["1.7 Exploded view - drive chain for valve gear", page 97](#)



Note

Renew the bolts tightened with specified tightening angle.

- Position drive chain for valve gear onto drive chain sprockets (according to marks applied during removal).
- Install guide rails -1- and -2-.
- Install chain tensioner and tighten bolts -3-.
- Press guide rail of chain tensioner for drive chain in direction of -arrow- and remove locking pin -T03006- .
- Install timing chain cover (bottom) ⇒ [page 85](#) .
- Install camshaft timing chain ⇒ [page 90](#) .



Protected by copyright. Copying for private 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.

2 Cylinder head

⇒ ["2.1 Exploded view - cylinder head cover and cylinder head", page 101](#)

⇒ ["2.2 Removing and installing camshaft control valves N205 / N318", page 104](#)

⇒ ["2.3 Removing and installing cylinder head cover", page 104](#)

⇒ ["2.4 Removing and installing cylinder head", page 106](#)

⇒ ["2.5 Checking compression", page 114](#)

2.1 Exploded view - cylinder head cover and cylinder head

1 - Cylinder head gasket

- ☐ Renewing
⇒ ["2.4 Removing and installing cylinder head", page 106](#)
- ☐ Note installation position: part number must face cylinder head
- ☐ Apply sealant when installing; refer to ⇒ Electronic parts catalogue

2 - Plug

- ☐ Renew
- ☐ 15 Nm

3 - Cylinder head

- ☐ Removing and installing
⇒ [page 106](#)
- ☐ Should be positioned on dowel pins
- ☐ Checking for distortion
⇒ [page 103](#)
- ☐ Cylinder head machining limit ⇒ [page 103](#)
- ☐ If renewed, change coolant and engine oil

4 - Engine lifting eye

5 - Bolt

- ☐ 22 Nm

6 - Gasket

- ☐ For cylinder head cover
- ☐ Renew if damaged or leaking

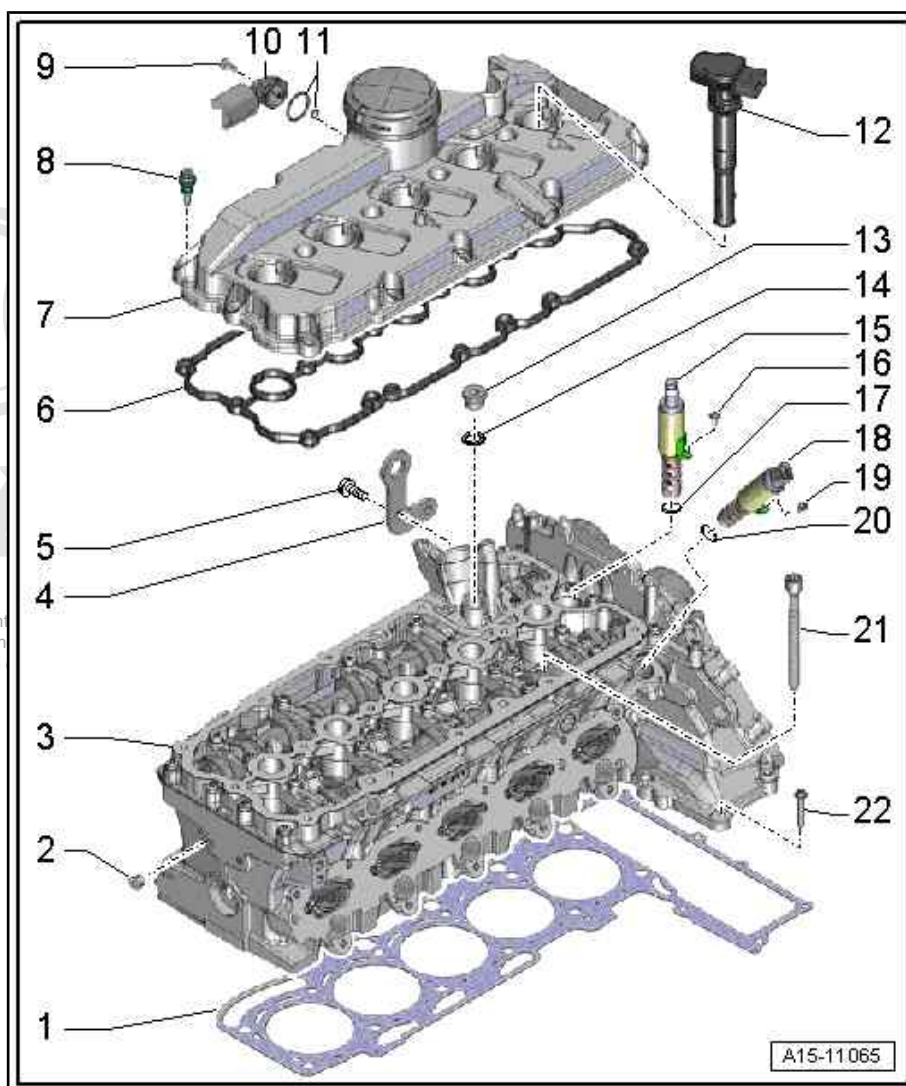
7 - Cylinder head cover

8 - Bolt

- ☐ Renew if gasket is damaged
- ☐ Tightening sequence ⇒ [page 102](#)

9 - Bolt

- ☐ 3.2 Nm



10 - Housing

- ☐ For crankcase breather

11 - Seals

- ☐ Renew

12 - Ignition coil

- ☐ Removing and installing ⇒ [page 272](#)

13 - Plug

- ☐ 35 Nm

14 - Seal

- ☐ Renew

15 - Camshaft control valve 1 - N205-

- ☐ Removing and installing ⇒ [page 104](#)

16 - Bolt

- ☐ 2.4 Nm

17 - O-ring

- ☐ Renew

18 - Exhaust camshaft control valve 1 - N318-

- ☐ Removing and installing ⇒ [page 104](#)

19 - Bolt

- ☐ 2.4 Nm

20 - O-ring

- ☐ Renew

21 - Bolt

- ☐ Renew
- ☐ Note correct sequence when loosening ⇒ [page 110](#)
- ☐ Tightening torque and sequence ⇒ [page 103](#)

22 - Bolt

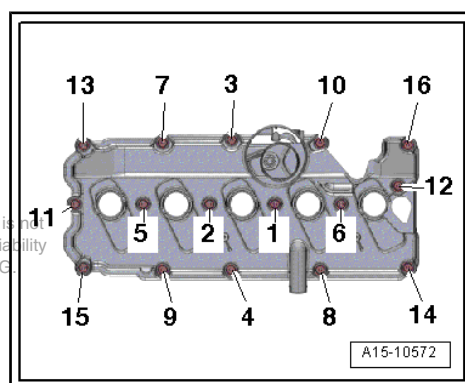
- ☐ Renew
- ☐ Note correct sequence when loosening ⇒ [page 110](#)
- ☐ Tightening torque and sequence ⇒ [page 103](#)

Cylinder head cover - tightening torque and sequence

- Tighten bolts in 2 stages in the sequence shown:

Stage	Bolt	Tightening torque
1.	-1 ... 16-	Screw in by hand until contact is made
2.	-1 ... 16-	10 Nm

Protected by copyright. Copying for private 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.

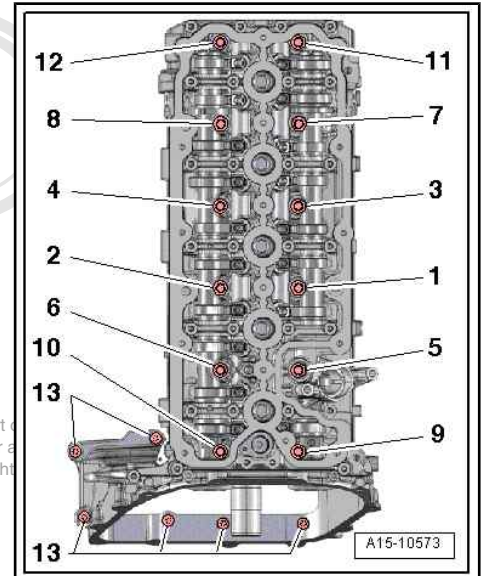


Cylinder head - tightening torque and sequence

– Tighten bolts in 6 stages in the sequence shown:

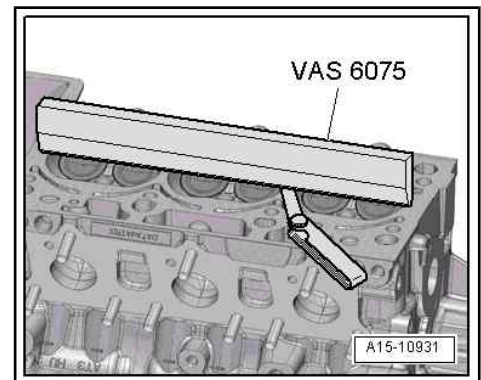
Stage	Bolts	Tightening torque/tightening angle
1.	-1 ... 12-	10 Nm
2.	-1 ... 12-	40 Nm
3.	-1 ... 12-	Turn 90° further
4.	-1 ... 12-	Turn 90° further
5.	-13-	8 Nm
6.	-13-	Turn 90° further

Protected by copyright. Copying for private 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



Checking cylinder head for distortion

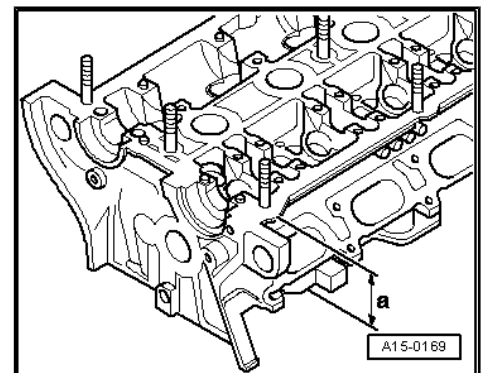
- Use straight edge 500 mm - VAS 6075- and feeler gauge to measure cylinder head for distortion at several points.
- Max. permissible distortion: 0.05 mm.



Cylinder head machining limit

Machining of the cylinder head (surface grinding) is only permissible down to the minimum dimension -a-.

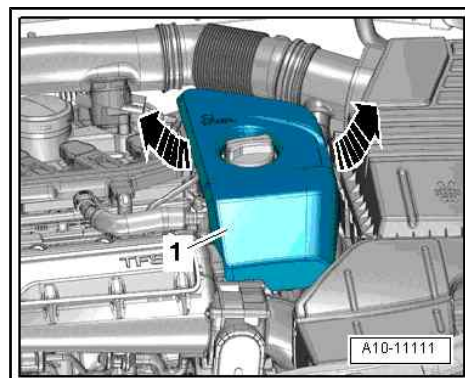
- Minimum dimension: -a- = 139.20 mm



2.2 Removing and installing camshaft control valves -N205- / -N318-

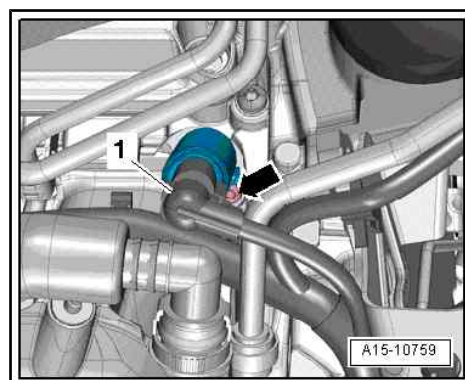
Removing

- Pull engine cover panel -1- off upwards -arrows-.



Camshaft control valve 1 - N205- :

- Unplug electrical connector -1-.
- Unscrew bolt -arrow- and remove camshaft control valve 1 - N205- .



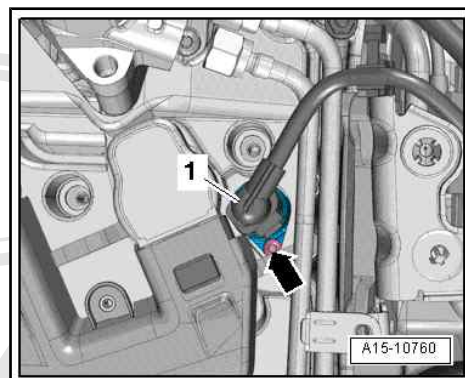
Exhaust camshaft control valve 1 - N318- :

- Unplug electrical connector -1-.
- Remove bolt -arrow- and remove exhaust camshaft control valve 1 - N318- .

Installing

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

- Tightening torques
⇒ ["2.1 Exploded view - cylinder head cover and cylinder head", page 101](#)



Note

- ♦ *Fit new O-ring.*
- ♦ *Clean camshaft control valve and mounting in cylinder head from any kind of dirt.*
- Lubricate O-ring with engine oil.

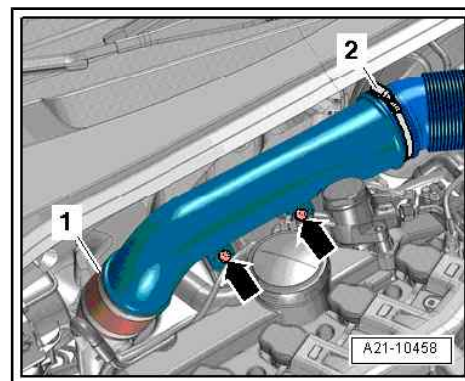
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

2.3 Removing and installing cylinder head cover

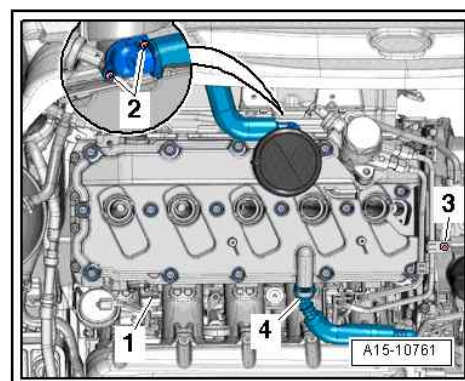
Removing

- Remove exhaust camshaft control valve 1 - N318-
⇒ [page 104](#) .
- Remove ignition coils ⇒ [page 272](#) .

- Remove bolts -arrows-.
- Release hose clips -1- and -2- and remove air pipe.



- Unplug electrical connector -1- and move electrical wiring harness clear.
- Remove bolts -2- and detach crankcase breather hose.
- Detach crankshaft breather hose -4- on opposite side (press release tabs).
- Remove bolt -3-, detach retaining clip for fuel line.



- Slacken cylinder head cover bolts in the sequence -16 ... 1-.
- Remove bolts and take off cylinder head cover.

Installing

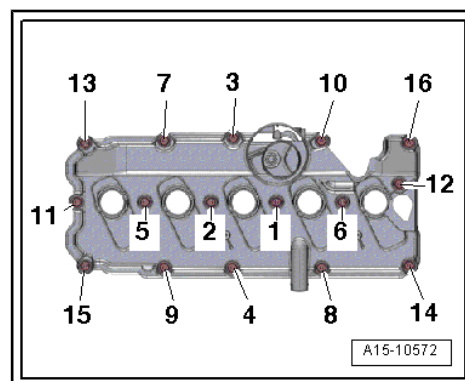
Installation is carried out in the reverse order; note the following:

- Tightening torques
⇒ Fig. "Cylinder head cover - tightening torque and sequence", page 102



Note

- ◆ Renew gasket for cylinder head cover if damaged.
- ◆ Renew bolts for cylinder head cover if seals on bolts are damaged.
- ◆ Fit new O-rings.
- ◆ 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.

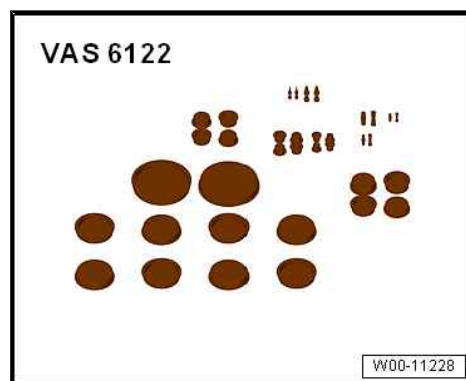


- Tighten cylinder head cover bolts ⇒ page 102.
- Install air pipe ⇒ page 208.
- Install ignition coils ⇒ page 272.
- Install exhaust camshaft control valve 1 - N318- ⇒ page 104.

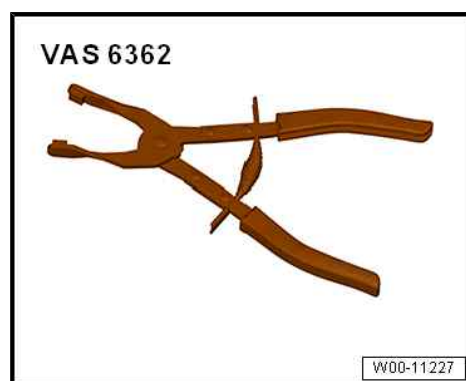
2.4 Removing and installing cylinder head

Special tools and workshop equipment required

- ◆ Engine bung set - VAS 6122-



- ◆ Hose clip pliers - VAS 6362-



- ◆ Special wrench - T10070- or commercially available socket XZN M12 (at least 140 mm)



Protected by copyright. Copying for private 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.

Removing



Note

Fit all cable ties in the original positions when installing.



Caution

To prevent irreparable damage to the electronic components when disconnecting the battery:

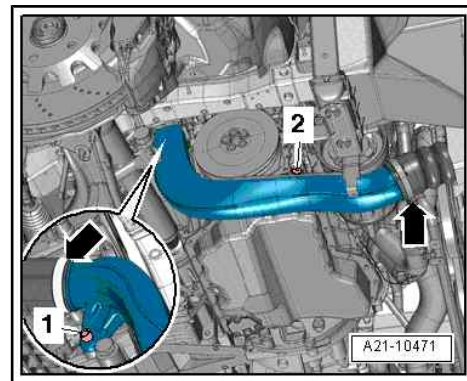
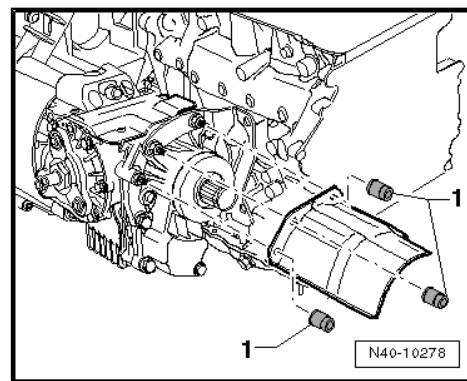
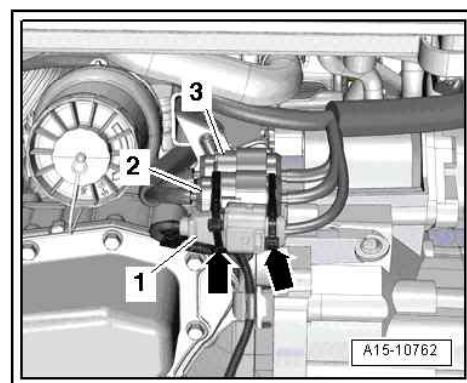
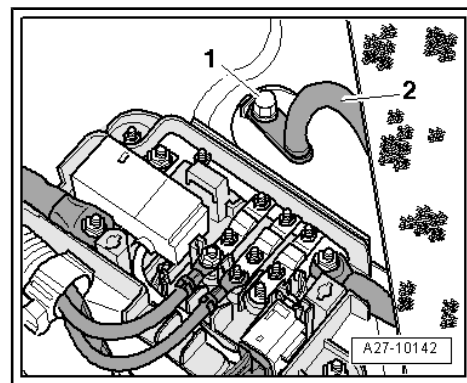
◆ Observe notes on procedure for disconnecting the battery.

- With ignition switched off, disconnect earth cable -2- at battery
⇒ Electrical system; Rep. gr. 27 .
- Drain coolant ⇒ [page 165](#) .
- Move clear electrical connector -1- (cut open cable ties -arrows-).
- Detach electrical connectors -2- and -3- from bracket and unplug connectors.
- Move electrical wiring harness clear.

Protected by copyright. Copying for private 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.

- Remove nuts -1- and detach heat shield for drive shaft (right-side).

- Remove bolts -1- and -2-.
- Loosen hose clips -arrows- and detach air pipe.





Note

Place a cloth underneath to catch escaping coolant and engine oil.

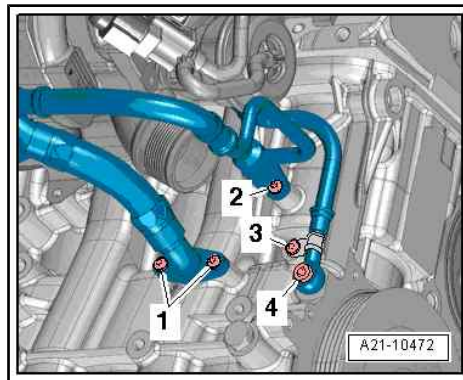
- Unscrew bolts -1, 2, 3- and banjo bolt -4- and detach pipes from cylinder block.
- Seal off open lines and connections with clean plugs from engine bung set - VAS 6122- .
- Remove plenum chamber partition panel ⇒ Rep. gr. 50 .
- Remove intake manifold (bottom section) ⇒ [page 232](#) .



WARNING

Risk of injury caused by fuel.

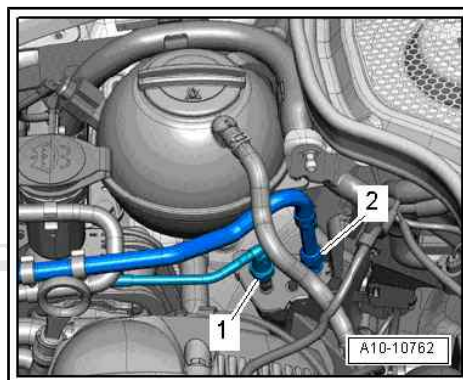
- ◆ To allow the fuel pressure to dissipate, wrap a clean cloth around the connection and carefully loosen the connection before opening the fuel system.



Caution

Risk of damage caused by particles of dirt.

- ◆ Observe rules for cleanliness when working on the fuel supply system ⇒ [page 5](#) .

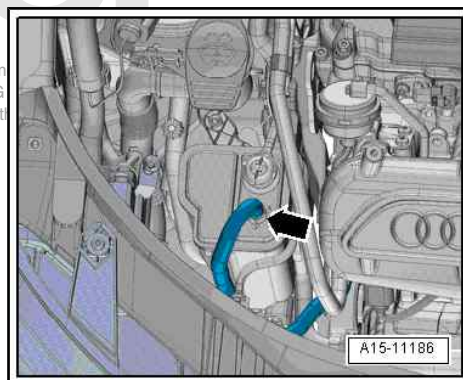


Note

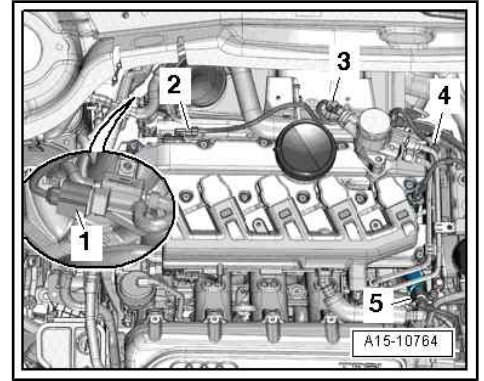
Disregard -item 1-.

- Release hose clip -arrow- and detach hose from activated charcoal filter.

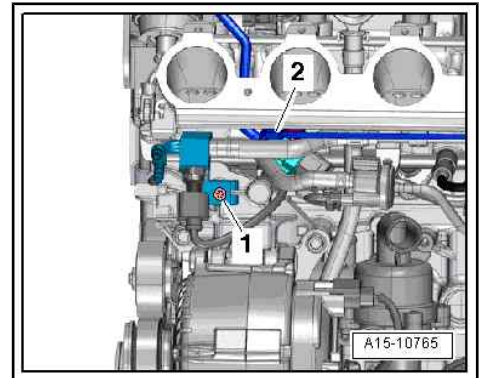
Protected by copyright. Copying for private or commercial use is permitted unless authorised by AUDI AG. AUDI AG is not responsible for the correctness of information in this document.



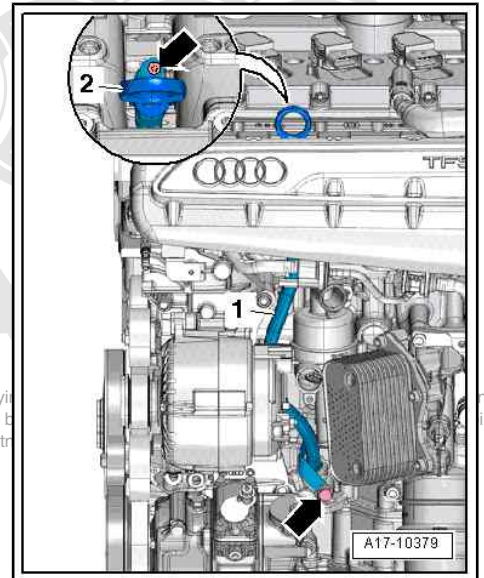
- Remove nut -4- and move earth wire clear.
- Unplug electrical connectors:
 - 1 - Charge pressure control solenoid valve - N75-
 - 2 - Hall sender 3 - G300-
 - 3 - Fuel metering valve - N290-
 - 5 - Camshaft control valve 1 - N205-
- Move electrical wiring harness clear.



- Remove bolt -1-.
- Detach vacuum hose -2- and move clear.



- Pull out oil dipstick -2-.
- Remove bolts -arrows- and lift off guide tube -1- for oil dipstick.
- Remove camshaft timing chain [⇒ page 90](#).

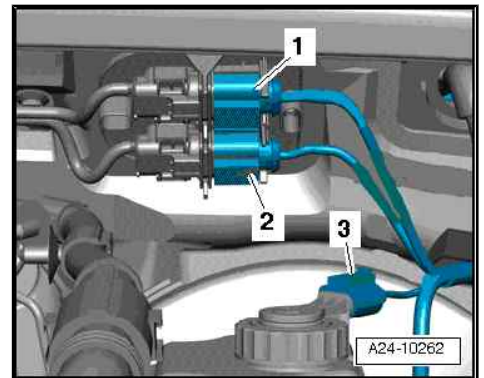


- Remove electrical connector -1- for Lambda probe - G39- from bracket and unplug connector.
- Move clear electrical wiring to Lambda probe.

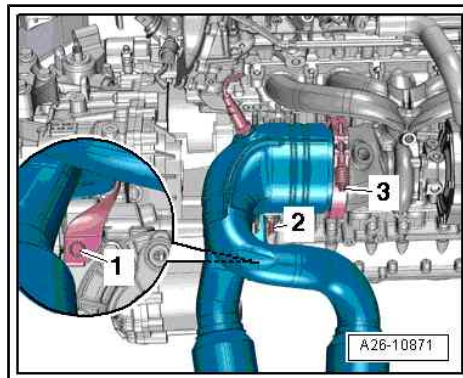


Note

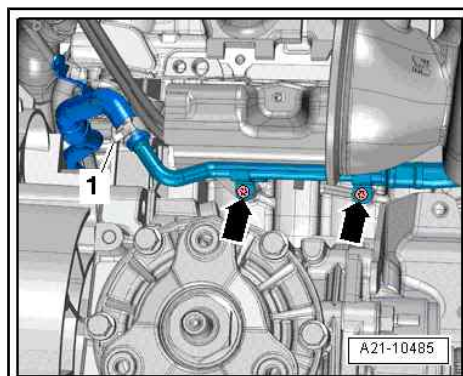
Disregard items -2 and 3-.



- Loosen bolt -3- and push clamp onto starter catalytic converter.
- Remove bolt -2-, tie up starter catalytic converter to rear.



- Remove bolts -arrows-.
- Release hose clip -1- and disconnect coolant line.

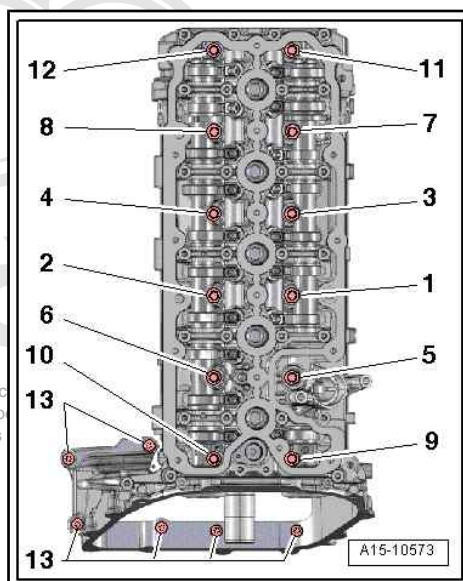


- Loosen and remove cylinder head bolts in sequence -13 ... 1-.



Note

- ◆ If bolt -10- cannot be removed with a magnet, loosen bolts of camshaft clamp - T40070- one turn, push -T40070- to front right and tighten bolts again.
- ◆ Two mechanics are needed to remove the cylinder head.
- Take off cylinder head.



Caution

Risk of irreparable damage to engine.

- ◆ Block off the opening in the valve timing housing with a clean cloth to prevent small items from dropping into the engine.

Avoid damage to cylinder walls.

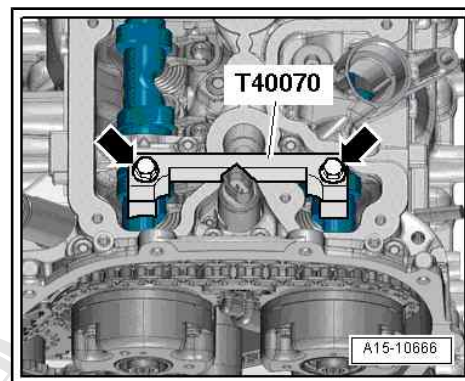
- ◆ Cover cylinders with clean cloths to prevent metal particles and emery remains from entering the space between cylinder wall and piston.

Installing

- Camshafts locked in position with camshaft clamp - T40070- .

Tightening torques

- ⇒ Fig. [“Cylinder head - tightening torque and sequence”](#), page 103
- ⇒ [“2.1 Exploded view - cylinder head cover and cylinder head”](#), page 101



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.*

Risk of leaks at cylinder head gasket.

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



Note

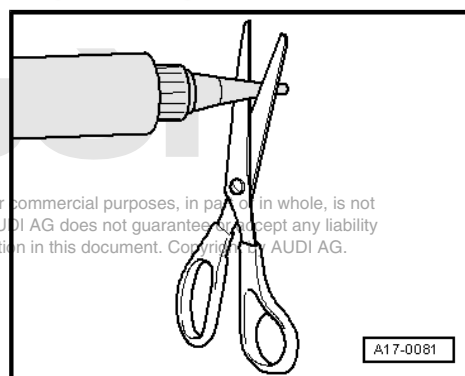
- ◆ *Renew the bolts tightened with specified tightening angle.*
 - ◆ *Renew self-locking nuts as well as seals, gaskets and O-rings.*
 - ◆ *When installing an exchange cylinder head, the contact surfaces between the hydraulic compensation elements, roller rocker fingers and cams must be oiled before installing the cylinder head.*
 - ◆ *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 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.*
- Clean sealing surfaces; they must be free of oil and grease.



Note

Note the use-by date of the sealant.

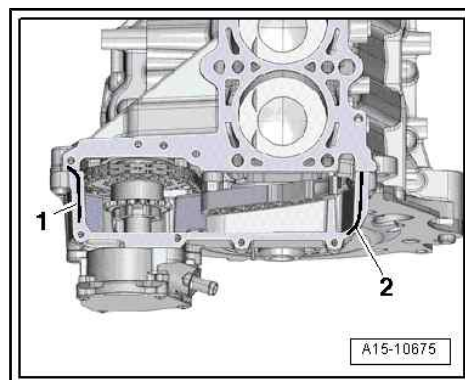
- Cut off nozzle of tube at front marking (nozzle Ø approx. 2.0 mm).



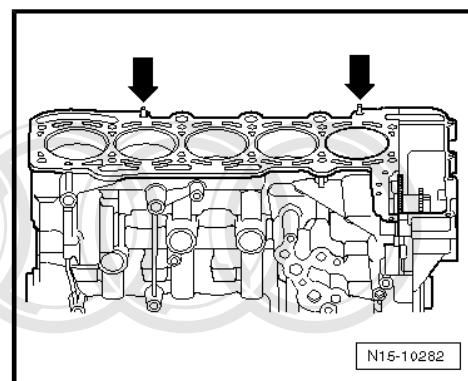
Caution

Make sure lubrication system is not clogged by excess sealant.

- ◆ ***The sealant beads must not be thicker than specified.***
- Apply beads of sealant -1- and -2- onto clean sealing surfaces of cylinder block as shown in illustration.
- Thickness of sealant bead: 2.0 ... 2.5 mm.



- Place cylinder head gasket in position.
- Installation position: Part No. must be visible.
- Pay attention to dowel sleeves -arrows- in cylinder block.

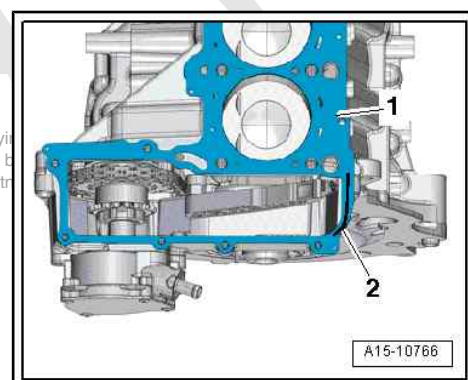


- Apply bead of sealant -2- onto cylinder head gasket -1- as shown in illustration.

**Note**

The cylinder head must be installed within 5 minutes after applying the sealant.

Protected by copyright. Copying permitted unless authorised by Audi AG with respect to the correct



- Fit cylinder head.
- Tighten cylinder head bolts ⇒ [page 103](#) .

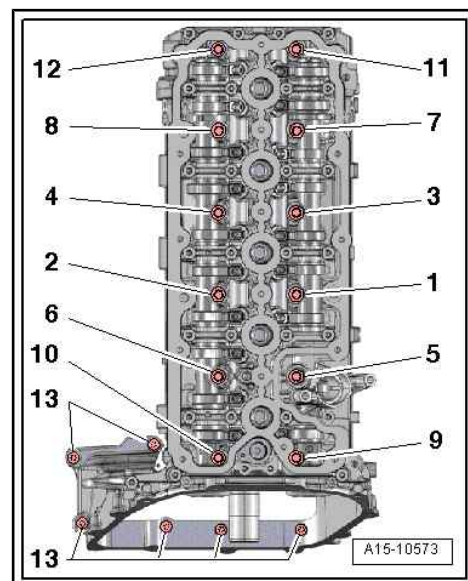
**Note**

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

- Wipe off surplus sealant.

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

- Install starter catalytic converter ⇒ [page 266](#) .
- Install camshaft timing chain ⇒ [page 90](#) .
- Secure dipstick guide tube ⇒ [page 138](#) .
- Install plenum chamber partition panel ⇒ Rep. gr. 50 .
- Install intake manifold (bottom section) ⇒ [page 232](#) .
- Install turbocharger ⇒ [page 198](#) .
- Install air pipe ⇒ [page 208](#) .
- Install heat shield for drive shaft ⇒ Rep. gr. 39 .
- Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Observe notes on procedure for connecting the battery ⇒ Electrical system; Rep. gr. 27 .
- Change engine oil ⇒ Maintenance ; Booklet 808 .
- Fill cooling system with fresh coolant ⇒ [page 165](#) .



2.5 Checking compression

Special tools and workshop equipment required

- ◆ Spark plug spanner - 3122 B-



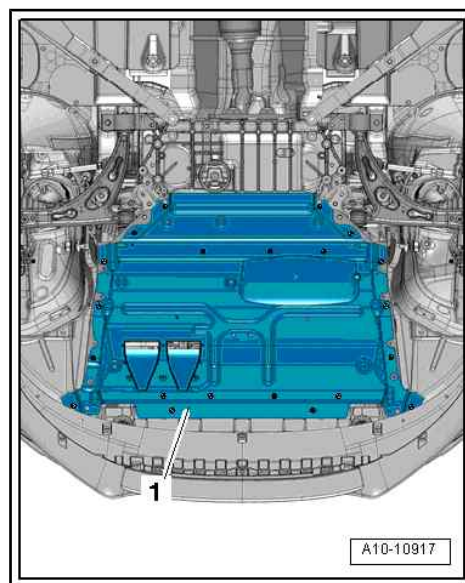
- ◆ Compression tester - V.A.G 1763-



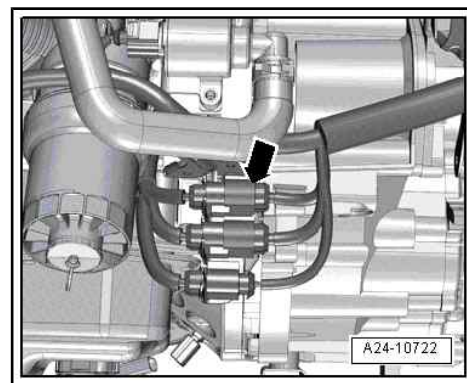
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Procedure

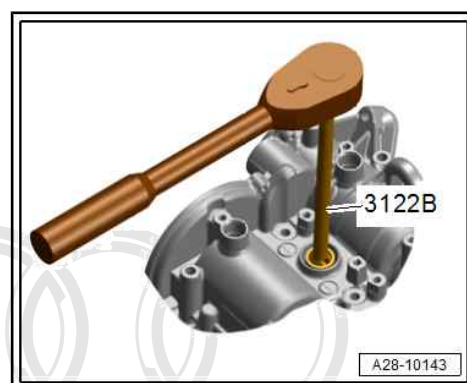
- Engine oil temperature at least 30 °C
- Battery voltage at least 12.5 V
- Remove noise insulation -1- ⇒ Rep. gr. 66 .



- Unplug electrical connector -arrow- for injectors.
- Remove ignition coils ⇒ [page 272](#) .



- Unscrew spark plugs using spark plug socket - 3122 B- .
- Check compression pressure with compression tester - V.A.G 1763- (see ⇒ operating instructions for details of how to use tester).
- Have a 2nd mechanic press down the accelerator pedal completely and at the same time operate the starter until the pressure on the tester display no longer increases.
- Repeat procedure on each cylinder.



Compression pressure	bar
When new	10.0 ... 14.0
Wear limit	7.0
Maximum difference between cylinders	3.0

Attaching

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

- Install spark plugs ⇒ Maintenance ; Booklet 808 .
- Install ignition coils ⇒ [page 272](#) .
- Faults are stored in engine control unit because electrical connectors were unplugged and engine was started: "Generate readiness code" in "Guided Functions" ⇒ Vehicle diagnostic tester.

Protected by copyright. Copying for private 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 for the correctness of information in this document. Copyright by AUDI AG.

3 Valve gear

- ⇒ [“3.1 Exploded view - valve gear”, page 116](#)
- ⇒ [“3.2 Measuring axial clearance of camshafts”, page 119](#)
- ⇒ [“3.3 Measuring radial clearance of camshafts”, page 120](#)
- ⇒ [“3.4 Removing and installing camshafts”, page 120](#)
- ⇒ [“3.5 Renewing valve stem oil seals with cylinder head installed”, page 124](#)
- ⇒ [“3.6 Renewing valve stem oil seals with cylinder head removed”, page 128](#)
- ⇒ [“3.7 Checking hydraulic compensation elements”, page 131](#)
- ⇒ [“3.8 Valve dimensions”, page 133](#)
- ⇒ [“3.9 Checking valve guides”, page 133](#)
- ⇒ [“3.10 Checking valves”, page 134](#)

3.1 Exploded view - valve gear



Note

Cylinder heads which have cracks between the valve seats or between a valve seat insert and the spark plug thread can be re-installed without reducing service life, provided the cracks are only slight and do not exceed a maximum of 0.3 mm in width, and no more than the first 4 turns of the spark plug threads are cracked.



Protected by copyright. Copying for private 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.

1 - Cylinder head

- ☐ Checking valve guides
⇒ [page 133](#)

2 - Dowel pins

3 - Bolt

- ☐ Tightening torque
⇒ [Item 6 \(page 271\)](#)

4 - Hall sender 3 - G300-

- ☐ Exhaust side
- ☐ Removing and installing
⇒ [page 275](#)

5 - O-ring

- ☐ Renew

6 - Inlet camshaft

- ☐ Removing and installing
⇒ [page 120](#)
- ☐ Measuring axial clearance ⇒ [page 119](#)
- ☐ Measuring radial clearance ⇒ [page 120](#)
- ☐ Use old bolts when measuring radial clearance
- ☐ Runout: max. 0.04 mm

7 - Exhaust camshaft

- ☐ With additional cam for high-pressure pump
- ☐ Removing and installing
⇒ [page 120](#)
- ☐ Measuring axial clearance ⇒ [page 119](#)
- ☐ Measuring radial clearance ⇒ [page 120](#)
- ☐ Use old bolts when measuring radial clearance
- ☐ Runout: max. 0.04 mm

8 - Retaining frame

- ☐ With integrated camshaft bearings

9 - Bolt

- ☐ To avoid damage to retaining frame for camshafts, refer to tightening torque and sequence
⇒ [page 119](#)

10 - O-ring

- ☐ Renew

11 - Hall sender - G40-

- ☐ Inlet side
- ☐ Removing and installing ⇒ [page 275](#)

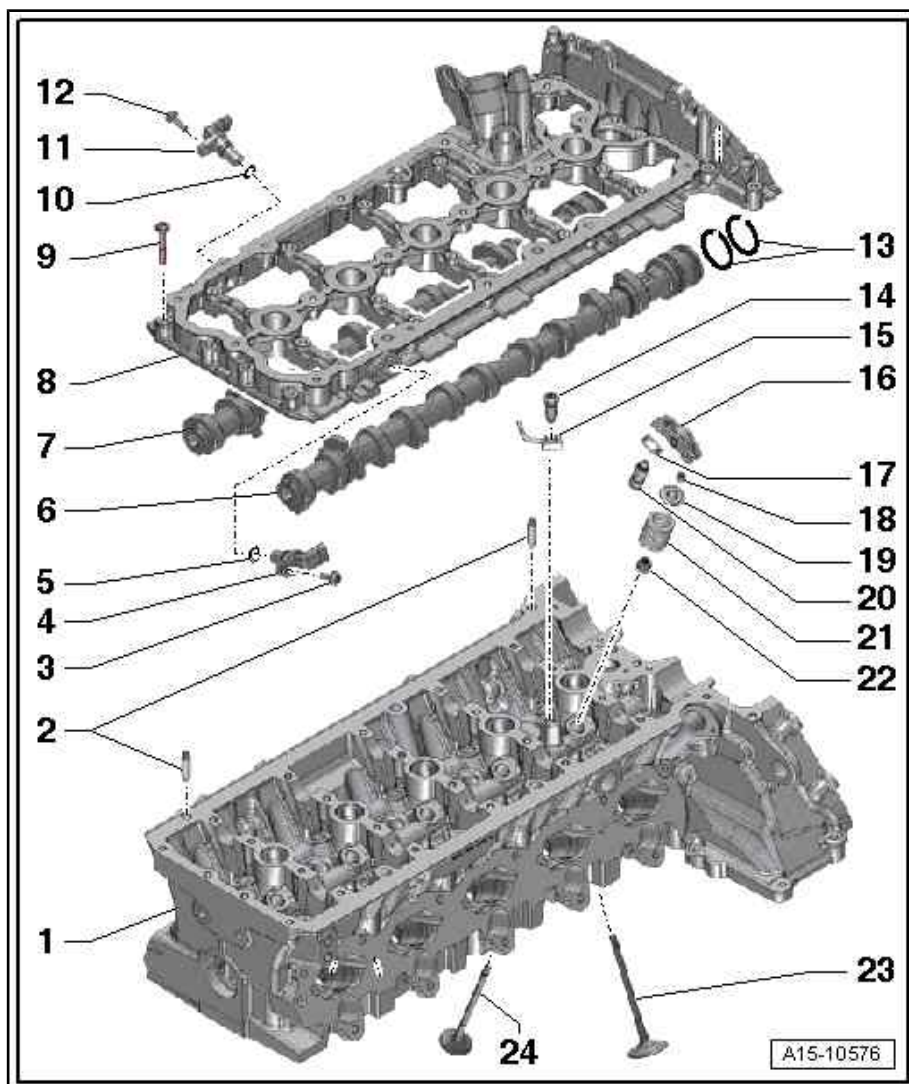
12 - Bolt

- ☐ Tightening torque ⇒ [Item 1 \(page 271\)](#)

13 - Rectangular section seals

14 - Bolt

- ☐ With pressure relief valve
- ☐ 27 Nm



with respect to the correctness of information in this document. Copyright by AUDI AG.

15 - Oil spray jet**16 - Roller rocker finger**

- ☐ Mark installation position for re-installation
- ☐ Check roller bearings for ease of movement
- ☐ Lubricate contact surface before installing
- ☐ Assembly: attach to hydraulic compensation element -item 20- using securing clip -item 17-

17 - Securing clip

- ☐ Not supplied separately
- ☐ Check for firm attachment

18 - Valve cotters**19 - Valve spring plate****20 - Hydraulic compensation element**

- ☐ Clipped into roller rocker finger -item 16-
- ☐ Checking ⇒ [page 131](#)
- ☐ Mark installation position for re-installation
- ☐ Lubricate contact surface before installing

21 - Valve spring

- ☐ Installation position ⇒ [page 118](#)

22 - Valve stem oil seal

- ☐ Renewing with cylinder head installed ⇒ [page 124](#)
- ☐ Renewing with cylinder head removed ⇒ [page 128](#)

23 - Inlet valve

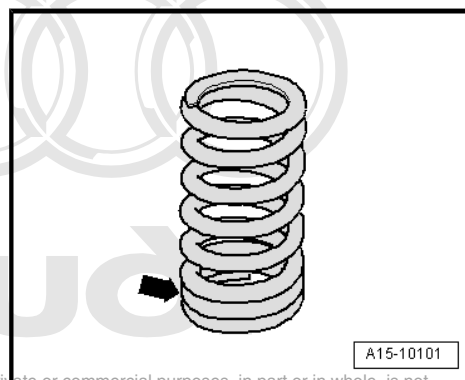
- ☐ Must not be machined; only grinding-in is permissible
- ☐ Mark installation position for re-installation
- ☐ Checking ⇒ [page 134](#)
- ☐ Valve dimensions ⇒ [page 133](#)
- ☐ Checking valve guides ⇒ [page 133](#)

24 - Exhaust valve

- ☐ Must not be machined; only grinding-in is permissible
- ☐ Mark installation position for re-installation
- ☐ Checking ⇒ [page 134](#)
- ☐ Valve dimensions ⇒ [page 133](#)
- ☐ Checking valve guides ⇒ [page 133](#)

Position of valve spring

- The closely spaced spring coils -arrow- face the cylinder head.



Protected by copyright. Copying for private use is 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.

Retaining frame for camshafts - tightening torque and sequence



Note

Renew the bolts tightened with specified tightening angle.



Caution

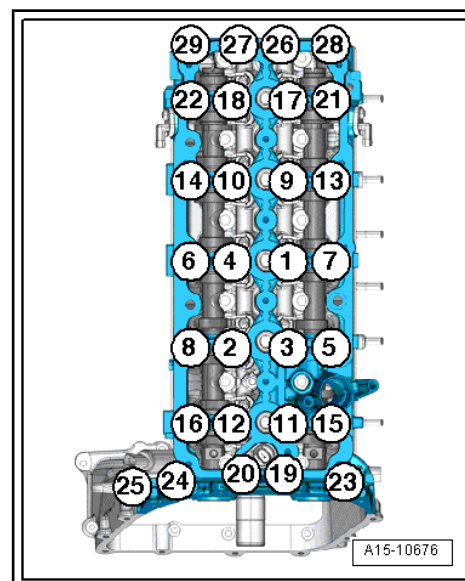
Risk of damage to retaining frame for camshafts.

- It is important to tighten the bolts securing the retaining frame as described below.

– Tighten bolts in 4 stages in the sequence shown:

Stage	Bolts	Tightening torque/angle specification
1.	-1 ... 29-	Screw in by hand until bolt heads make contact with retaining frame
2.	-1 ... 29-	Continue tightening 1 turn at a time in several stages until retaining frame makes full contact with cylinder head and a torque of 8 Nm is reached
3.	-1 ... 29-	8 Nm ¹⁾
4.	-1 ... 29-	Turn 90° further

• ¹⁾ This procedure guarantees that all bolts are tightened to 8 Nm after retaining frame has settled.



3.2 Measuring axial clearance of camshafts

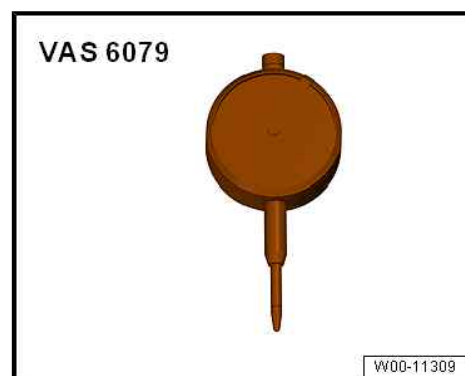
Special tools and workshop equipment required

- Universal dial gauge bracket - VW 387-

Protected by copyright. Copying for private or commercial purposes 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.

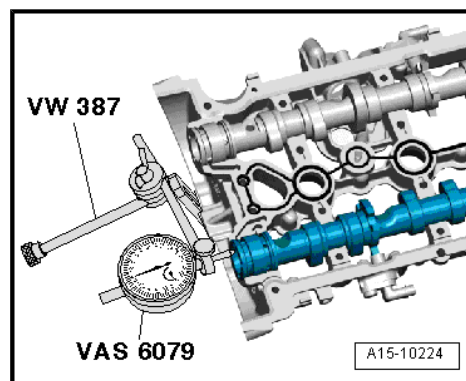


- Dial gauge - VAS 6079-



Procedure

- Remove retaining frame
⇒ [“3.4 Removing and installing camshafts”, page 120](#).
- Fit camshaft to be tested in retaining frame.
- Attach dial gauge - VAS 6079- with universal dial gauge bracket - VW 387- to retaining frame.
- Press camshaft against dial gauge by hand.
- Set dial gauge to “0”.
- Press camshaft away from dial gauge and read off value:
- Axial clearance: 0.100 ... 0.191 mm



3.3 Measuring radial clearance of camshafts

Special tools and workshop equipment required

- ◆ Plastigauge

Procedure

- Remove roller rocker fingers
⇒ [“3.4 Removing and installing camshafts”, page 120](#).
- Clean bearings and bearing journals.
- Place a length of Plastigauge corresponding to the width of the bearing on the bearing journal or bearing shell to be measured.
- The Plastigauge must be positioned in the centre of the bearing.
- Fit retaining frame and secure with old bolts (tighten further to appropriate torque) ⇒ [page 119](#) without rotating camshafts.
- Remove retaining frame again.
- Compare width of Plastigauge with measurement scale.

Radial clearance:

- 24 mm bearing diameter: 0.024 ... 0.066 mm.
- 36 mm bearing diameter: 0.050 ... 0.100 mm.
- When carrying out final assembly, renew bolts.

3.4 Removing and installing camshafts

Special tools and workshop equipment required

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

Removing

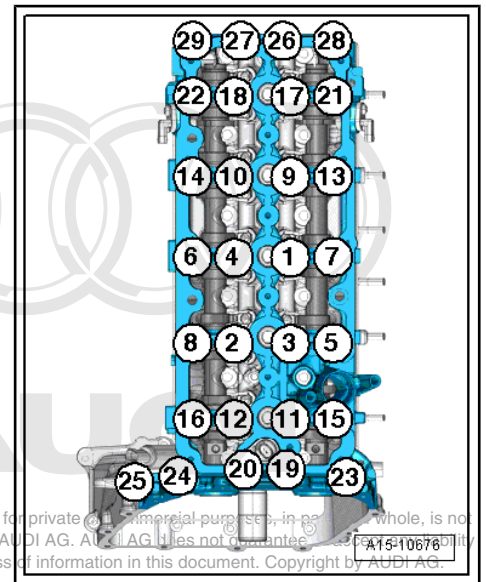
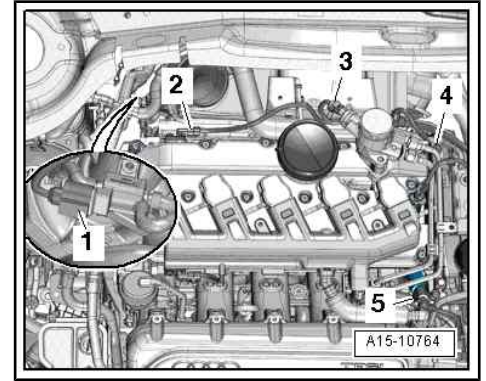
- Remove camshaft timing chain ⇒ [page 90](#) .
 - Remove nut -4- and move earth wire clear.
 - Unplug electrical connectors:
- 2 - Hall sender 3 - G300-
- 3 - Fuel metering valve - N290-



Note

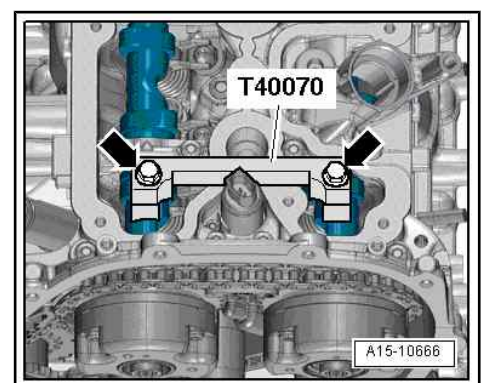
Disregard items -1 and 5-.

- Remove high-pressure pipe ⇒ [page 250](#) .
- Remove high-pressure pump ⇒ [page 249](#) .
- Slacken retaining frame bolts in the sequence -29 ... 1-.
- Remove bolts, carefully release retaining frame from bonded joint and set it down on a soft surface on workbench.



Protected by copyright. Copying for private or commercial purposes, in whole or in part, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee the accuracy of the information in this document. Copyright by AUDI AG.

- Remove camshaft clamp - T40070- .
- Mark and remove camshafts.



Installing

- Crankshaft locked in position with locking pin - T40069- .
- Hydraulic compensation elements and roller rocker fingers installed.
- Tightening torques
⇒ Fig. [“Retaining frame for camshafts - tightening torque and sequence”](#), page 119



Note

- ◆ *Renew the bolts tightened with specified tightening angle.*
- ◆ *Renew seals/gaskets and sealing plugs.*



Caution

Protect lubrication system and bearings against contamination.

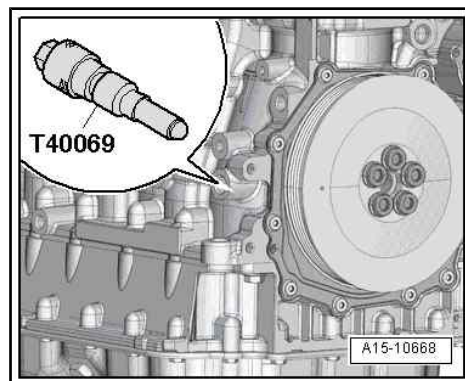
- ◆ *Cover exposed parts of the engine.*



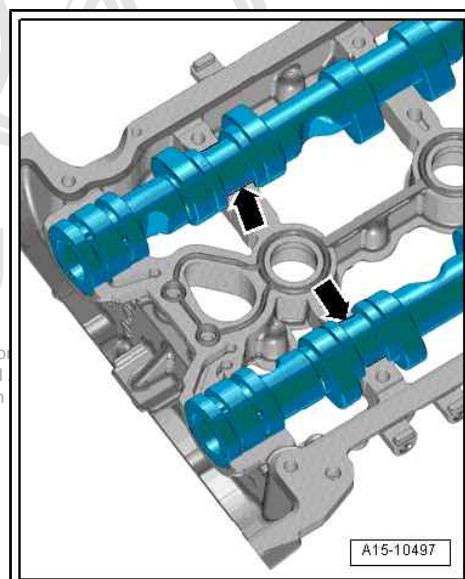
WARNING

Risk of eye injury.

- ◆ *Put on safety goggles.*

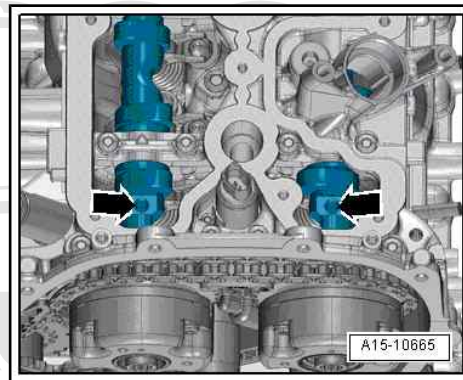


- Remove remaining sealant from cylinder head and retaining frame using rotating plastic brush or similar.
- Clean sealing surfaces and grooves in sealing surfaces; they must be free of oil and grease.
- Oil running surfaces of both camshafts.
- Fit camshafts in retaining frame.
- The exhaust camshaft has an additional cam for high-pressure pump.
- Camshafts must be in correct position in axial bearings -arrows- in retaining frame.
- Turn retaining frame over with camshafts fitted, holding camshafts firmly in position.

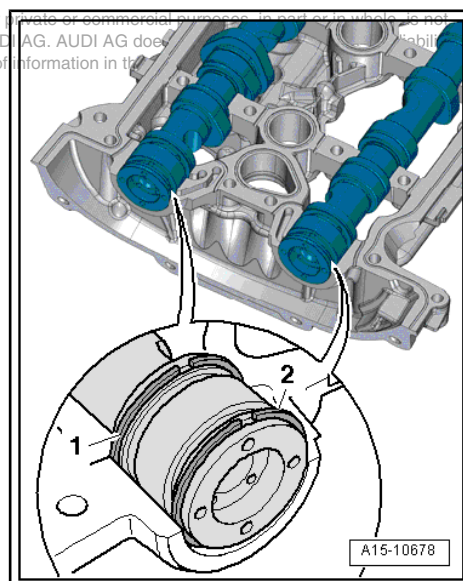


Protected by copyright. Copying for private or commercial use is permitted unless authorised by AUDI AG. AUDI AG is not responsible for the correctness of information.

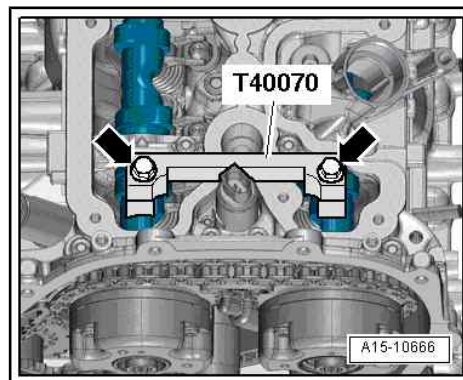
- Turn camshafts until threaded holes -arrows- point upwards.
- Check that camshafts are still in correct position in axial bearings in retaining frame.



- Check position of ends of rectangular section seals.
- The ends of the rectangular section seals -1- and -2- must point up or down, never to the side.



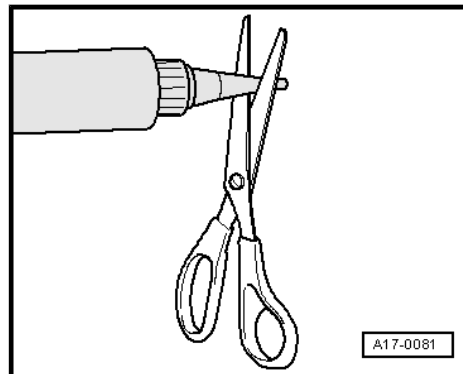
- Fit camshaft clamp - T40070- and tighten bolts -arrows- to 25 Nm.



Note

Note the use-by date of the sealant.

- Cut off nozzle of tube at front marking (nozzle $\varnothing$ approx. 2 mm).



- Turn retaining frame upside down again.



Caution

Make sure lubrication system is not clogged by excess sealant.

- ◆ **The sealant beads must not be thicker than specified.**

- Apply even, slightly protruding sealant beads into clean grooves of retaining frame as shown in illustration.
- Width of sealant bead -1-: 4.0 mm.
- Width of sealant beads -2, 3-: 3.0 mm.



Note

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

- Fit retaining frame with camshafts onto cylinder head.
- Fit bolts securing retaining frame for camshafts and tighten
⇒ [page 119](#).



Note

After installing the retaining frame, wait about 30 minutes for the sealant to dry.

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

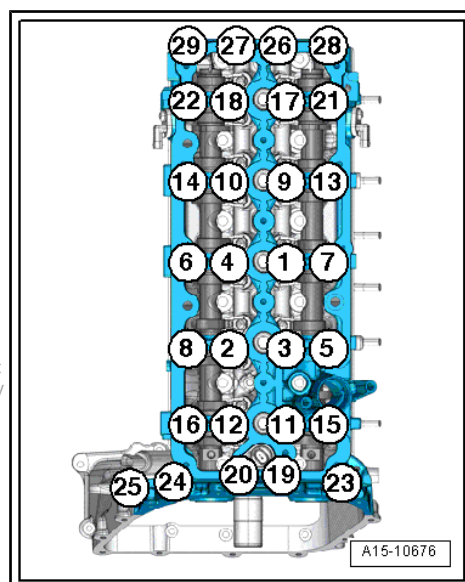
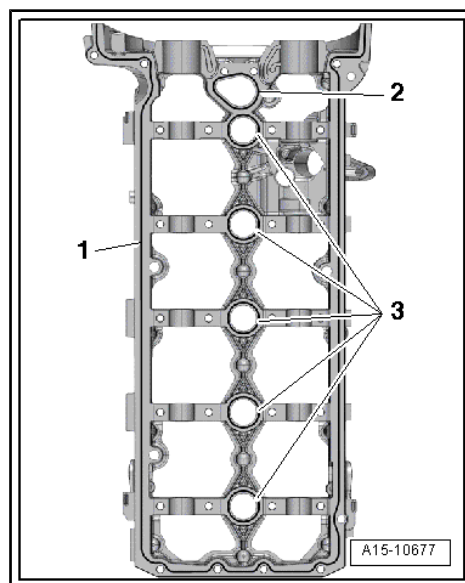
- Install high-pressure pump ⇒ [page 249](#)
- Install high-pressure pipe ⇒ [page 250](#)
- Install camshaft timing chain ⇒ [page 90](#).



Caution

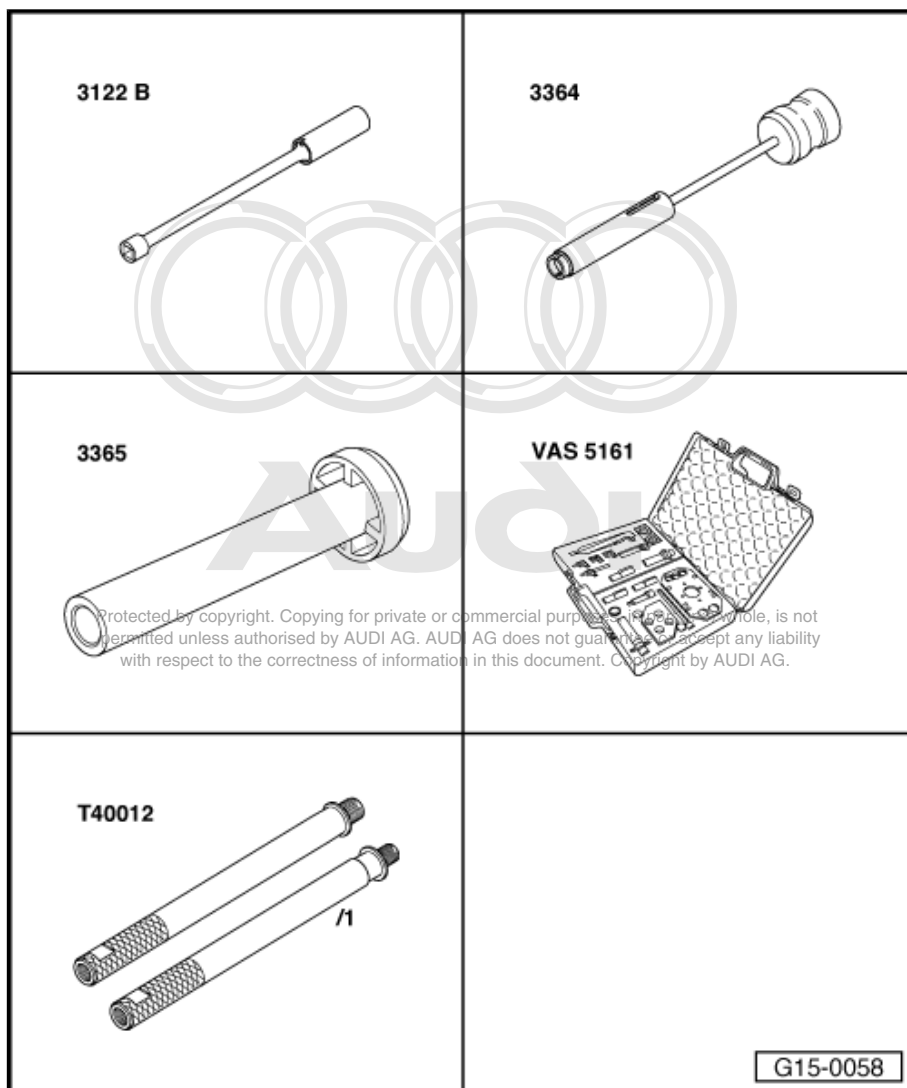
Risk of damage to valves and piston crowns after working on valve gear.

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



3.5 Renewing valve stem oil seals with cylinder head installed

Special tools and workshop equipment required

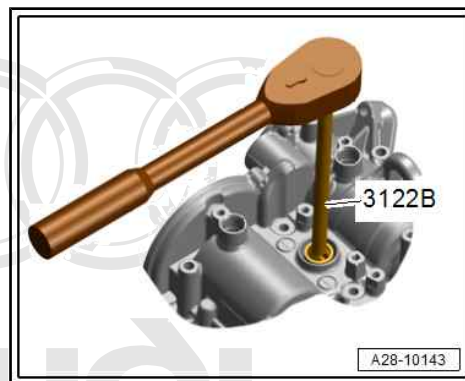


- ◆ Spark plug spanner - 3122 B-
- ◆ Valve stem seal puller - 3364-
- ◆ Valve stem seal fitting tool - 3365-
- ◆ Removal and installation device for valve cotters - VAS 5161 A- with guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19C-
- ◆ Adapters - T40012-

Removing

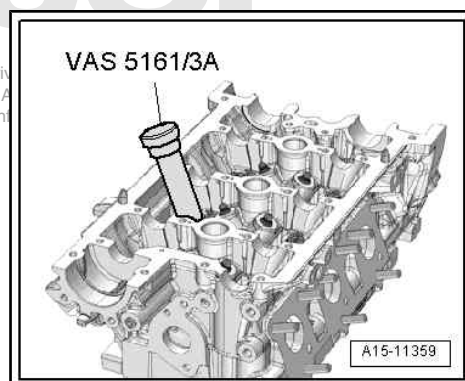
- Remove camshafts ⇒ [page 120](#) .
- Mark original positions of roller rocker fingers and hydraulic compensation elements for re-installation.
- Remove roller rocker fingers together with hydraulic compensation elements and put down on a clean surface.

- Unscrew spark plugs using spark plug socket - 3122 B- .
- Set piston of appropriate cylinder to “bottom dead centre”.

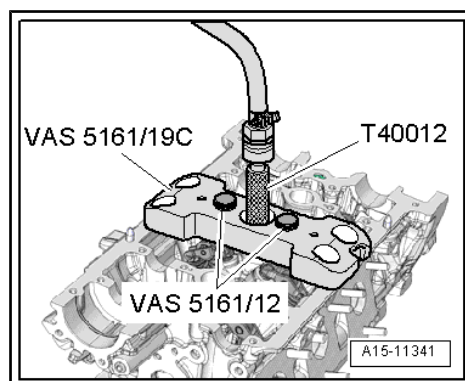


- Apply drift -VAS 5161/3A- to valve spring plate and use plastic-headed hammer to release sticking valve cotters.

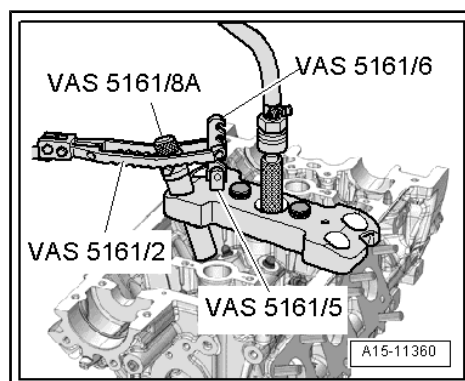
Protected by copyright. Copying for private use is permitted unless authorised by AUDI AG. The copyright holder assumes no responsibility with respect to the correctness of information.



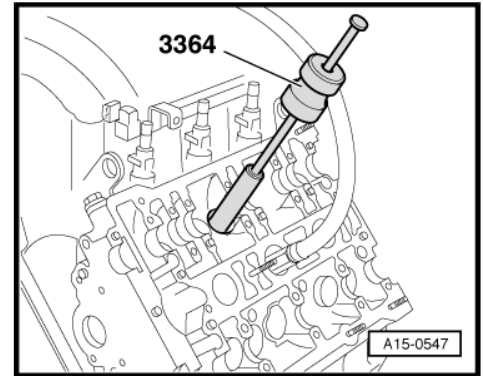
- Fit guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19C- onto cylinder head.
- Secure guide plate with knurled screws -VAS 5161/12- .
- Screw adapter - T40012- with seal hand-tight into the corresponding spark plug thread.
- Connect adapter to compressed air line using a commercially available connection piece and apply constant air pressure.
- Minimum pressure: 6 bar



- Screw snap-in device -VAS 5161/6- with engaging fork - VAS 5161/5- into guide plate.
- Insert assembly cartridge -VAS 5161/8A- in guide plate.
- Attach pressure fork -VAS 5161/2- to snap-in device and push assembly cartridge down.
- At the same time, turn knurled screw of assembly cartridge 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.
- Take out assembly cartridge.
- Detach guide plate and turn to one side.
- The compressed air hose remains connected.
- Detach valve spring with valve spring plate.



- Pull off valve stem oil seal with valve stem seal puller - 3364- .

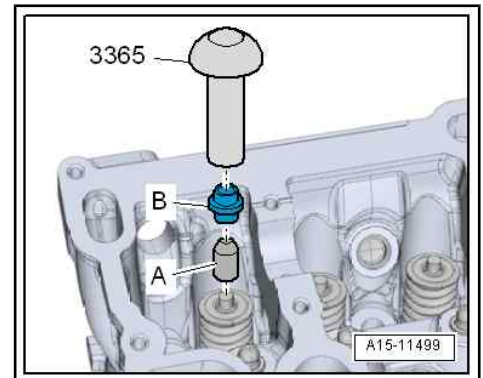


Caution

Make sure valve stem oil seals are not damaged when installing.

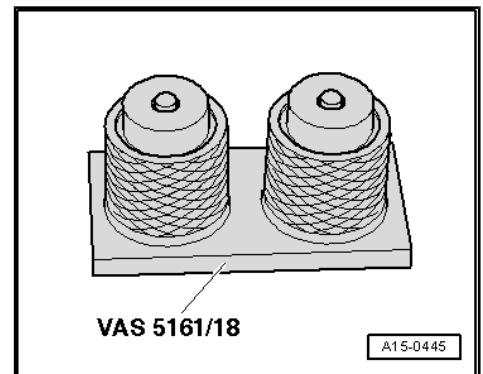
- ◆ **New valve stem oil seals -B- are supplied with plastic sleeve; fit plastic sleeve -A- onto valve stem.**

- 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.



If valve cotters have been removed from assembly cartridge, they must first be inserted in insertion device -VAS 5161/18- .

- Larger diameter of valve cotters faces upwards.
- Press assembly cartridge onto insertion device from above and pick up valve cotters.
- Insert valve spring and valve spring plate ⇒ [page 118](#) .

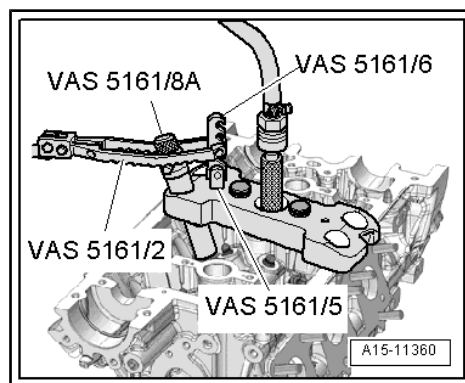


- Bolt guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19C- onto cylinder head once again.
- Insert assembly cartridge in guide plate.
- Press down pressure fork and pull knurled screw upwards while turning screw in both directions - this will insert the valve cotter.
- Release pressure fork with knurled screw still in pulled position.
- Repeat procedure for each valve.

Attaching

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

- Ensure that all roller rocker fingers make contact with the ends of the valve stems correctly and are clipped onto their respective hydraulic compensation elements.
- Install camshafts ⇒ [page 120](#) .
- Install spark plugs ⇒ Maintenance ; Booklet 808 .



3.6 Renewing valve stem oil seals with cylinder head removed

Special tools and workshop equipment required

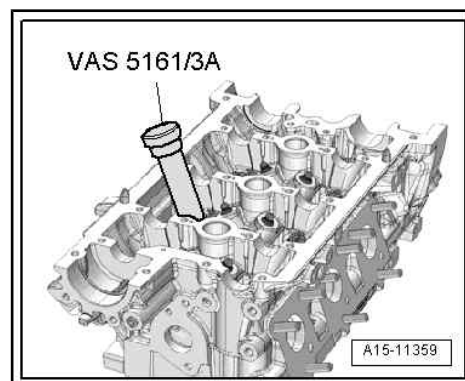
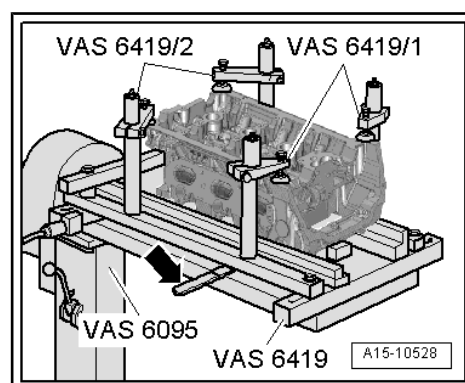
3364 	3365
VAS 5161 	VAS 6095
VAS 6419 	

Protected by copyright. Copying for private use without the express permission of AUDI AG is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee and accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

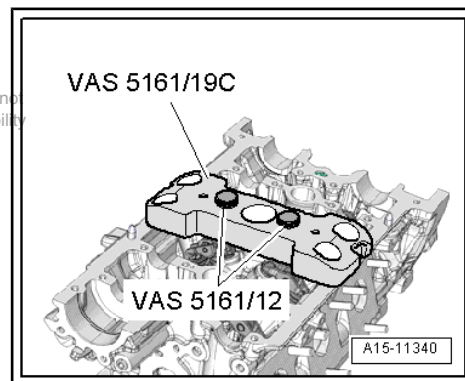
- ◆ Valve stem seal puller - 3364-
- ◆ Valve stem seal fitting tool - 3365-
- ◆ Removal and installation device for valve cotters - VAS 5161 A- with guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19C-
- ◆ Engine and gearbox support - VAS 6095-
- ◆ Cylinder head tensioning device - VAS 6419-

Procedure

- Remove camshafts ⇒ [page 120](#) .
- 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 tensioning device - VAS 6419- into engine and gearbox support - VAS 6095- .
- Secure cylinder head in cylinder head tensioning device, as shown in illustration.
- Connect cylinder head tensioning device to compressed air supply.
- 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.
- Apply drift -VAS 5161/3A- to valve spring plate and use plastic-headed hammer to release sticking valve cotters.

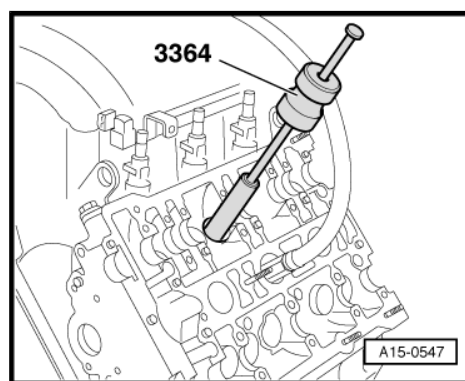
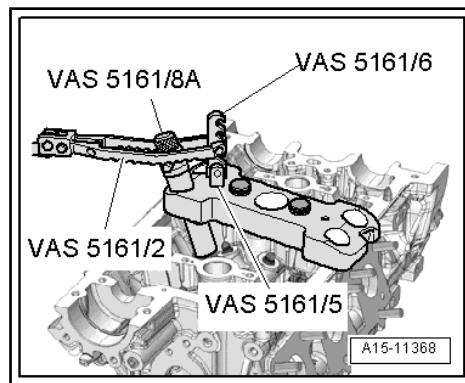


- Fit guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19C- onto cylinder head.
- Secure guide plate with knurled screws -VAS 5161/12-



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.

- Screw snap-in device -VAS 5161/6- with engaging fork - VAS 5161/5- into guide plate.
- Insert assembly cartridge -VAS 5161/8A- in guide plate.
- Attach pressure fork -VAS 5161/2- to snap-in device and push assembly cartridge down.
- At the same time, turn knurled screw of assembly cartridge 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.
- Take out assembly cartridge.
- Detach guide plate and turn to one side.
- Detach valve spring with valve spring plate.
- Pull off valve stem oil seal with valve stem seal puller - 3364- .

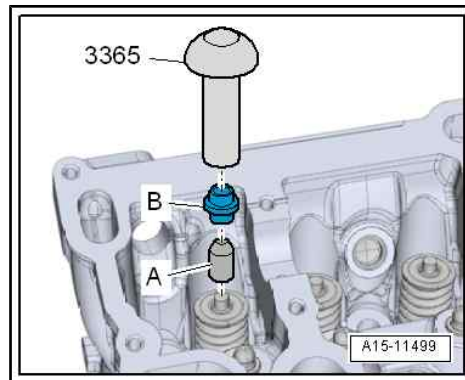


Caution

Make sure valve stem oil seals are not damaged when installing.

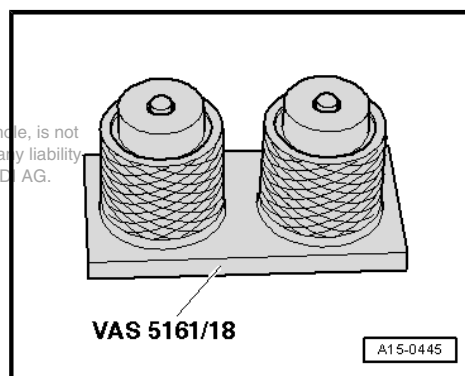
- ◆ **New valve stem oil seals -B- are supplied with plastic sleeve; fit plastic sleeve -A- onto valve stem.**

- 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.

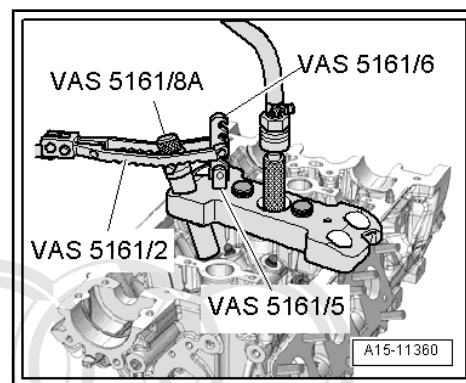


If valve cotters have been removed from assembly cartridge, they must first be inserted in insertion device -VAS 5161/18- .

- Larger diameter of valve cotters faces upwards.
- Press assembly cartridge onto insertion device from above and pick up valve cotters
- Insert valve spring and valve spring plate ⇒ [page 118](#) .



- Bolt guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19C- onto cylinder head once again.
- Insert assembly cartridge in guide plate.
- Press down pressure fork and pull knurled screw upwards while turning screw in both directions - this will insert the valve cotter.
- Release pressure fork with knurled screw still in pulled position.
- Repeat procedure for each valve.



Attaching

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

- Ensure that all roller rocker fingers make contact with the ends of the valve stems correctly and are clipped onto their respective hydraulic compensation elements.
- Install camshafts ⇒ [page 120](#) .

3.7 Checking hydraulic compensation elements

Protected by copyright. Copying for private 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.

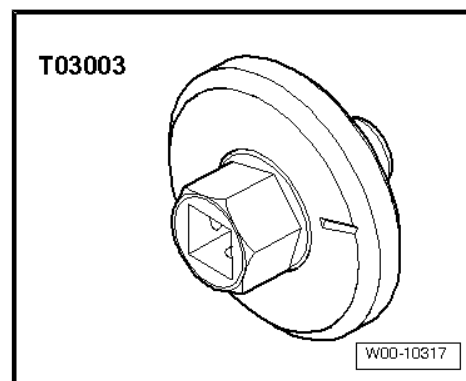


Note

- ◆ *The hydraulic compensation elements cannot be serviced.*
- ◆ *Irregular valve noises when starting engine are normal.*

Special tools and workshop equipment required

- ◆ Wrench -T03003-



- ◆ Feeler gauge

Procedure

- Start engine and run until radiator fan has started up once.
- Increase engine speed to approx. 2500 rpm for 2 minutes (perform road test if necessary).

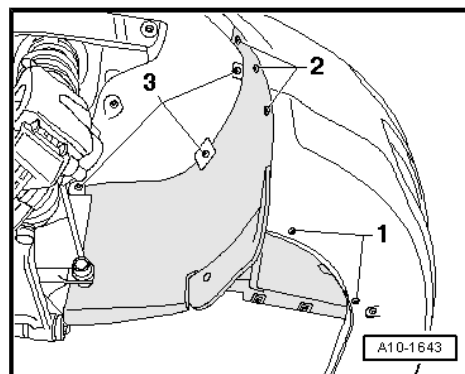


Note

If irregular valve noise disappears but repeatedly re-occurs when travelling short distances, renew oil filter bracket with integrated oil retention valve.

- If the compensation elements are still noisy, locate the defective compensation element as follows:

- Remove cylinder head cover ⇒ [page 104](#) .
- Remove front wheel (right-side) ⇒ [Wheels and tyres; Rep. gr. 44](#) .
- Remove front wheel housing liner (front section, right-side) ⇒ [Rep. gr. 66](#) .

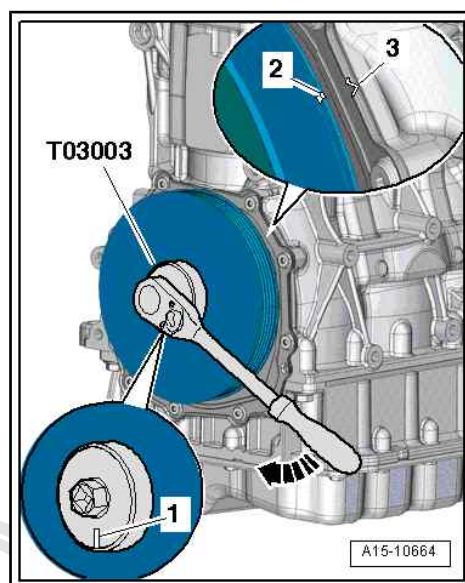


- Turn crankshaft with socket -T03003- in direction of engine rotation -arrow- until cam of hydraulic compensation element to be tested faces upwards.



Note

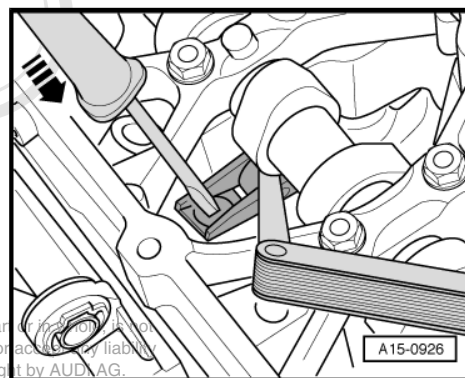
Disregard items -1 and 2-.



- Press roller rocker finger down -arrow- to determine clearance between cam and roller rocker finger.
- If it is possible to insert a feeler gauge of 0.20 mm between cam and roller rocker finger, renew hydraulic compensation element
⇒ [“3.4 Removing and installing camshafts”, page 120](#) .

Final steps

- Install front section of front wheel housing liner (right-side) ⇒ [Rep. gr. 66](#) .
- Fit front wheel (right-side) ⇒ [Wheels and tyres; Rep. gr. 44](#) .
- Install cylinder head cover ⇒ [page 104](#) .



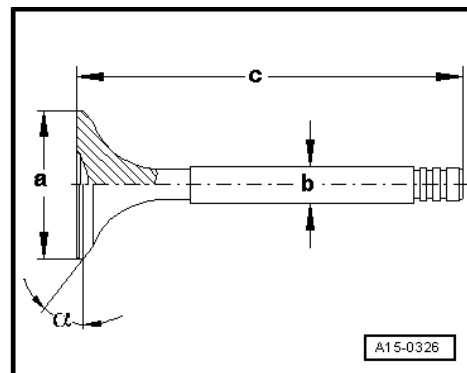
3.8 Valve dimensions



Note

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

Dimension		Inlet valve	Exhaust valve
Ø a	mm	33.85 + 0.10	28.0 + 0.1
Ø b	mm	5.965 + 0.005	5.955 + 0.007
c	mm	103.97 + 0.20	101.87 + 0.20
α	°	45	45



WARNING

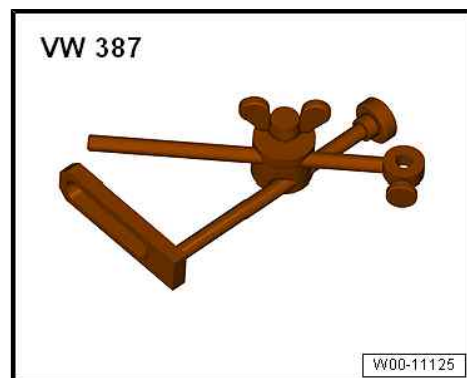
Care must be taken when disposing of old sodium-cooled exhaust valves - risk of injury.

- ◆ *The valves must be sawn in two with a metal saw between the centre of the stem and valve head. When doing so, the valves must not come into contact with water.*
- ◆ *Then throw a maximum of ten valves into a bucket of water and step away immediately.*
- ◆ *A sudden chemical reaction will occur upon contact with water in which the sodium filling burns.*
- ◆ *After performing these steps the valves can be disposed of in the normal way.*

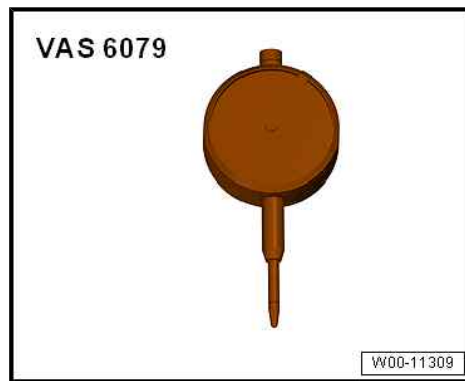
3.9 Checking valve guides

Special tools and workshop equipment required

- ◆ Universal dial gauge bracket - VW 387-



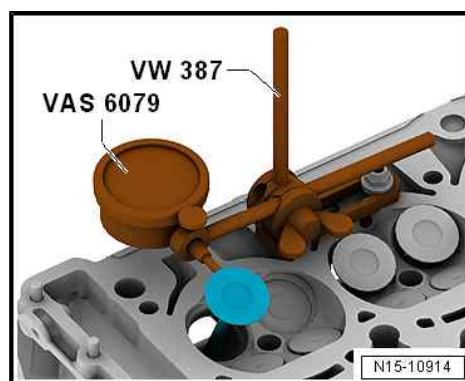
- ◆ Dial gauge - VAS 6079-



Procedure

Note

- ◆ *If the valve has to be renewed as part of a repair, use a new valve for the measurement.*
- ◆ *Only insert inlet valve into inlet valve guide and exhaust valve into exhaust valve guide, as the stem diameters are different.*
- Insert valve into guide.
- End of valve stem must be flush with valve guide.
- Measure the amount of sideways play.
- Wear limit: 0.8 mm.
- If the wear limit is exceeded, repeat the measurement with new valves.
- Renew cylinder head if wear limit is still exceeded.



Note

Valve guides cannot be renewed.

3.10 Checking valves

- Visually inspect for scoring on valve stems and valve seat surfaces.
- Renew valve if scoring is clearly visible.

Protected by copyright. Copying for private 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.

17 – Lubrication

1 Sump and oil pump

⇒ [“1.1 Exploded view - sump \(bottom section\), sump \(top section\), oil pump”, page 135](#)

⇒ [“1.2 Removing and installing oil level and oil temperature sender G266”, page 139](#)

⇒ [“1.3 Removing and installing sump \(bottom section\)”, page 139](#)

⇒ [“1.4 Removing and installing sump \(top section\)”, page 141](#)

⇒ [“1.5 Removing and installing oil pump”, page 147](#)

1.1 Exploded view - sump (bottom section), sump (top section), oil pump



Note

- ◆ *If large quantities of metal shavings or abrasion are found when performing engine repairs, this is an indication of damage to the crankshaft or conrod bearings. To prevent further damage, the following steps are required after completion of repair work: clean the oil passages carefully and renew the oil spray jets, engine oil cooler and oil filter.*
- ◆ *Oil spray jet and pressure relief valve* ⇒ [page 74](#)

Protected by copyright. Copying for private 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.

1 - Sump (bottom section)

- ☐ Removing and installing
⇒ [page 139](#)
- ☐ Apply sealant when installing; refer to ⇒ Electronic parts catalogue

2 - Bolt

- ☐ With bush and rubber ring
- ☐ 9 Nm

3 - Bolt

- ☐ 9 Nm

4 - Bracket

- ☐ For oil intake pipe

5 - Seal

- ☐ Renew

6 - Bolt

- ☐ Renew
- ☐ Tightening torque and sequence ⇒ [page 138](#)

7 - Sump (top section)

- ☐ Removing and installing
⇒ [page 141](#)
- ☐ Apply sealant when installing; refer to ⇒ Electronic parts catalogue

8 - Bolt

- ☐ 20 Nm

9 - Oil pump

- ☐ Do not dismantle
- ☐ Removing and installing ⇒ [page 147](#)

10 - Drive chain sprocket

- ☐ For oil pump
- ☐ Installation position: lettering must be legible from outside

11 - Bolt

- ☐ Renew
- ☐ 20 Nm + 90°

12 - Cylinder block

13 - O-ring

- ☐ Renew

14 - O-ring

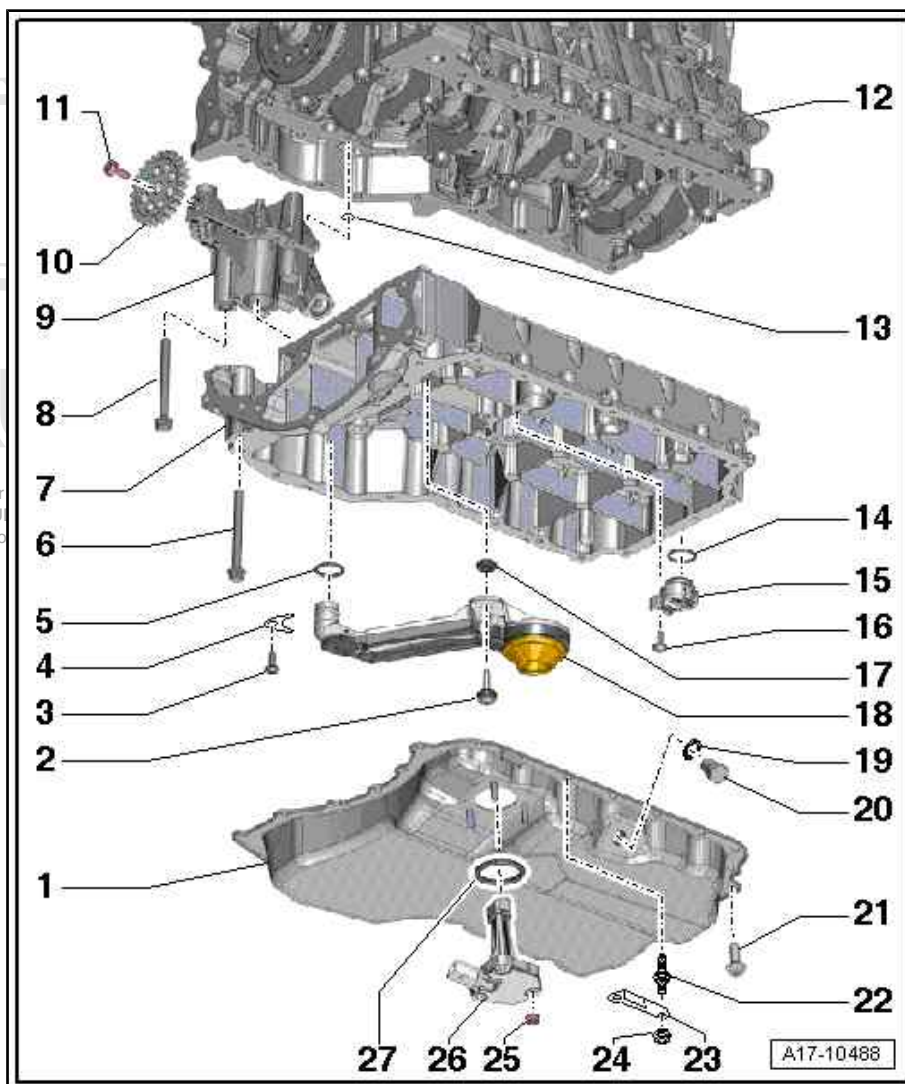
- ☐ Renew

15 - Connection

- ☐ For oil return

16 - Bolt

- ☐ 9 Nm



17 - Rubber ring

18 - Oil intake pipe

19 - Seal

☐ Renew

20 - Oil drain plug

☐ 25 Nm

21 - Bolt

☐ Renew

☐ Tightening torque and sequence [⇒ page 137](#)

22 - Centre hex stud

☐ Tightening torque and sequence [⇒ page 137](#)

23 - Bracket

24 - Nut

☐ 9 Nm

25 - Nut

☐ 9 Nm

26 - Oil level and oil temperature sender - G266-

☐ Removing and installing [⇒ page 139](#)

27 - Seal

☐ Renew

Sump (bottom section) - tightening torque and sequence



Note

Renew the bolts tightened with specified tightening angle.

– Tighten bolts in 3 stages:

Stage	Bolts	Tightening torque/angle specification
1.	-arrow-	Screw in by hand until contact is made
2.	-arrow-	8 Nm in diagonal sequence
3.	-arrow-	Turn 45° further in diagonal sequence

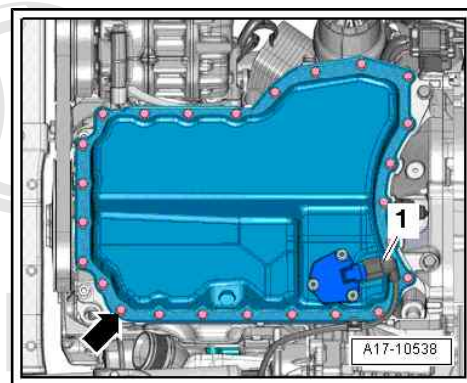


Illustration by copyright. Copying or reuse for non-commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Sump (top section) - tightening torque and sequence

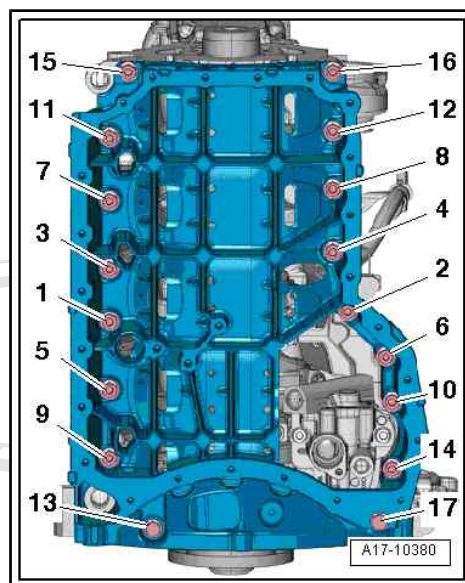


Note

Renew the bolts tightened with specified tightening angle.

– Tighten bolts in 3 stages in the sequence shown:

Stage	Bolts	Tightening torque/angle specification
1.	-1 ... 17-	Screw in by hand until contact is made
2.	-1 ... 17-	20 Nm
3.	-1 ... 17-	Turn 90° further

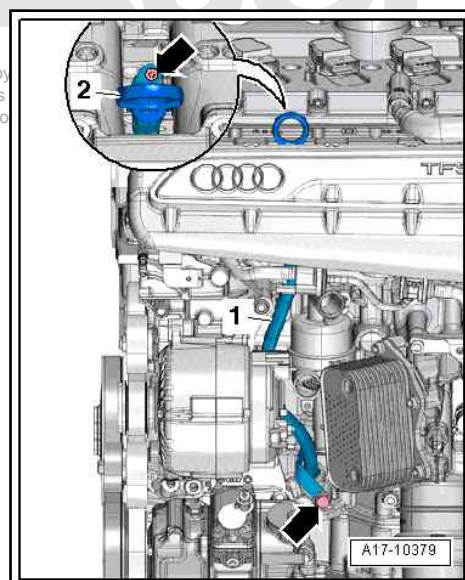


Guide tube for oil dipstick - tightening torque

– Tighten bolts -arrows- as follows:

- ◆ M6: 9 Nm
- ◆ M8: 23 Nm

Protected by copy
permitted unless
with respect to



in whole, is not
cept any liability
y AUDI AG.

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

Removing

- Drain off engine oil ⇒ Maintenance ; Booklet 808 .
- Unplug electrical connector -2-.
- Remove nuts -1-.
- Pull oil level and oil temperature sender - G266- -item 3- off sump (bottom section) and remove together with seal -4-.

Installing

- Tightening torque ⇒ [page 135](#)

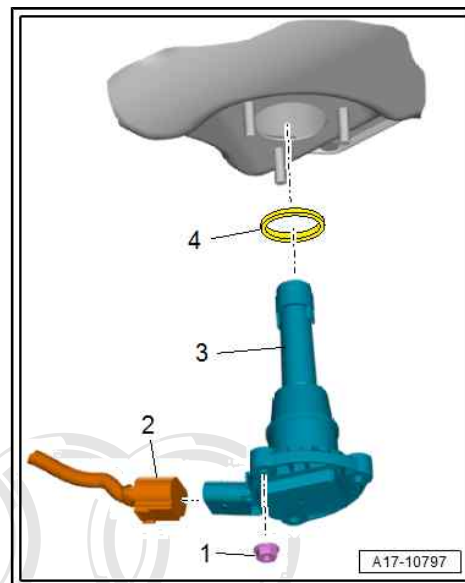
Installation is carried out in the reverse order; note the following:



Note

Renew seal.

- Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 808 .



1.3 Removing and installing sump (bottom section)

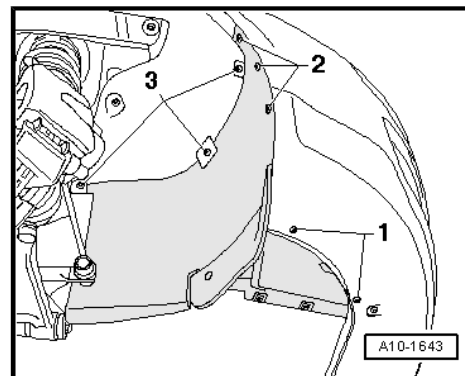
Special tools and workshop equipment required

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

Protected by copyright. Copying for private 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.

Removing

- Engine oil drained ⇒ Maintenance ; Booklet 808
- Remove front wheel housing liner (front section, right-side) ⇒ Rep. gr. 66 .

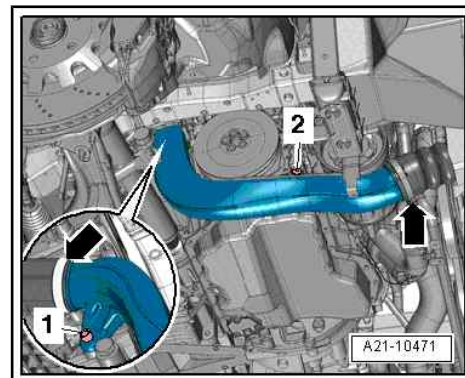


- Remove bolts -1, 2- and press air pipe to left side.

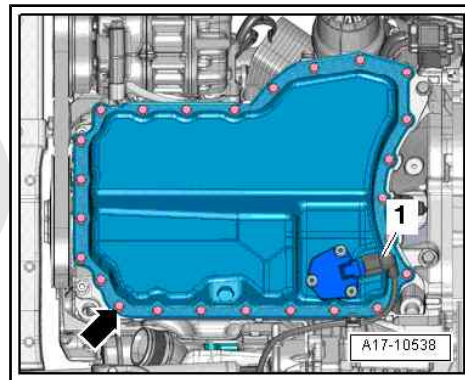


Note

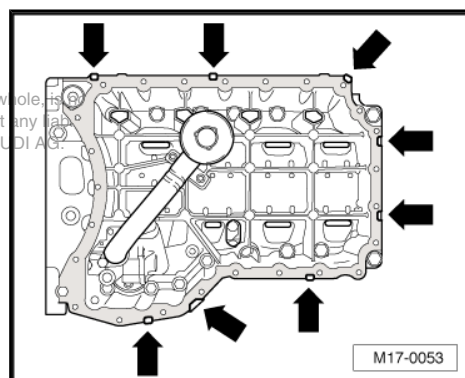
Disregard -arrows-.



- Unplug electrical connector -1- at oil level and oil temperature sender - G266- .
- Remove bolts -arrow- for sump (bottom section) in diagonal sequence.



- Carefully release sump (bottom section) from bonded joint; to do so, apply screwdriver at the slots -arrows- all round the sump.



Installing

- Tightening torques
⇒ Fig. "Sump (bottom section) - tightening torque and sequence", page 137



Caution

Protect lubrication system against contamination.

- ◆ *Cover exposed parts of the engine.*

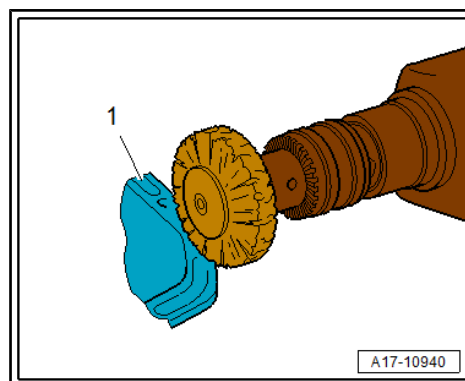


WARNING

Risk of eye injury.

- ◆ *Put on safety goggles.*

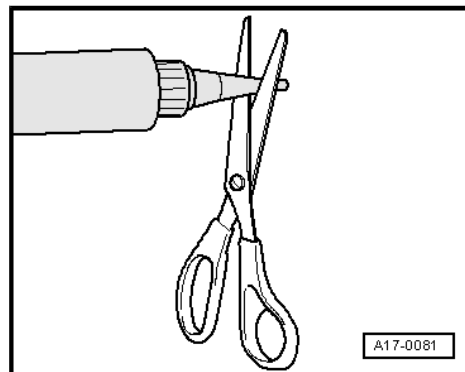
- Remove remaining sealant on bottom section -1- and top section of sump with a rotating plastic brush or similar.
- Clean sealing surfaces; they must be free of oil and grease.



Note

Note the use-by date of the sealant.

- Cut off nozzle of tube at front marking (nozzle Ø approx. 2.0 mm).





Caution

Make sure lubrication system is not clogged by excess sealant.

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

- Apply sealant bead -arrow- onto clean sealing surface of sump (bottom section) as shown in illustration.
- Thickness of sealant bead: 1.5 ... 2.0 mm.



Note

The sump (bottom section) must be installed within 5 minutes after applying the sealant.

- Fit sump (bottom section) and tighten bolts ⇒ [page 137](#) .

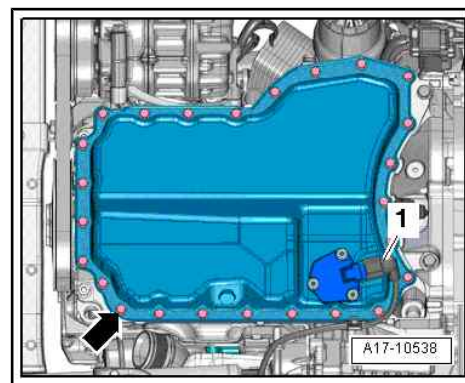
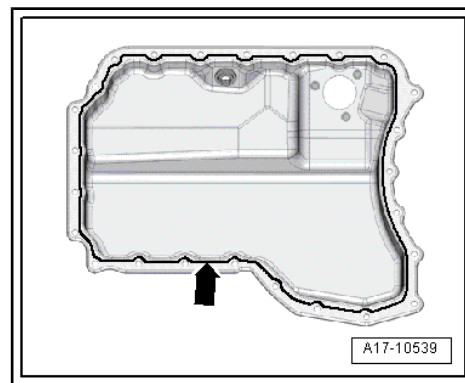


Note

After installing the sump (bottom section), wait about 30 minutes for the 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:

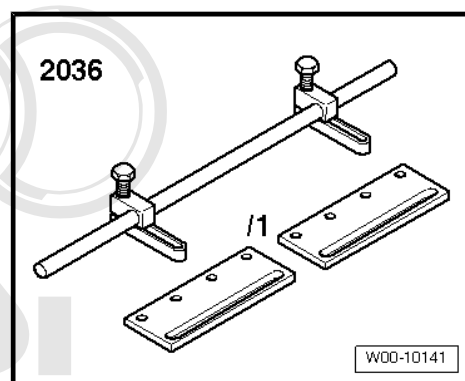
- Install air pipe ⇒ [page 208](#) .
- Install front section of front wheel housing liner (right-side) ⇒ Rep. gr. 66 .
- Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 808 .



1.4 Removing and installing sump (top section)

Special tools and workshop equipment required

- ◆ Plates -2036/1- from valve assembly device - 2036-



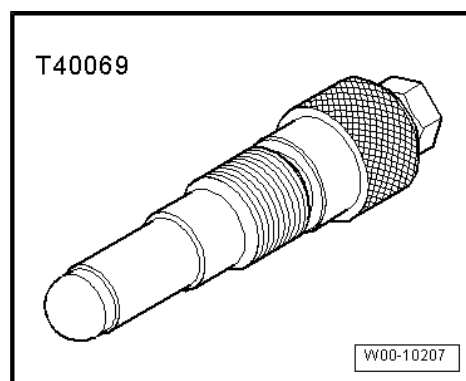
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- ◆ Counterhold tool - T10172A-



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee the reliability of the information in this document. Copyright © 2017 Audi AG.

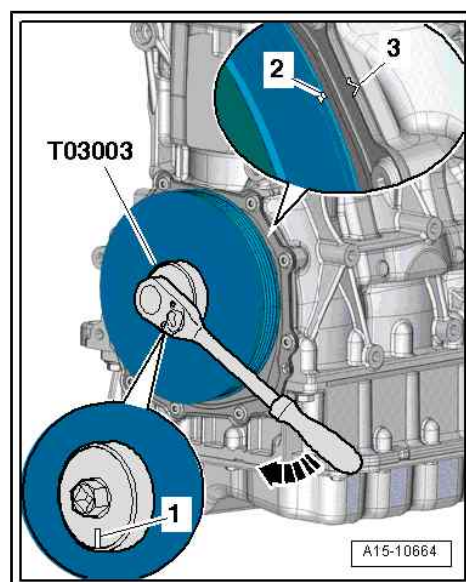
- ◆ Locking pin - T40069-



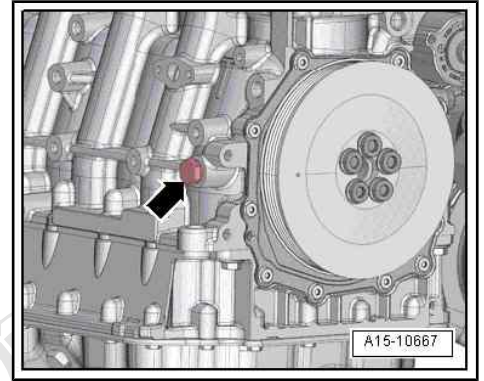
- ◆ Safety goggles
- ◆ Electric drill with plastic brush attachment
- ◆ Sealant ⇒ Electronic parts catalogue

Removing

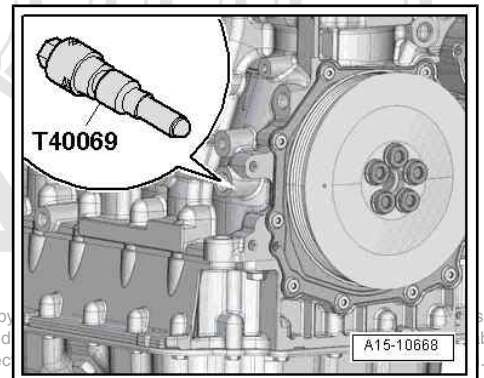
- Gearbox removed
- Turn crankshaft with socket -T03003- in normal direction of rotation -arrow- to "TDC position".
- Notch -1- in socket -T03003- must be perpendicular to sealing surface of sump.
- Marking -2- on vibration damper must be opposite marking -3- on sealing flange.



- Unscrew plug -arrow- for “TDC” marking from cylinder block.



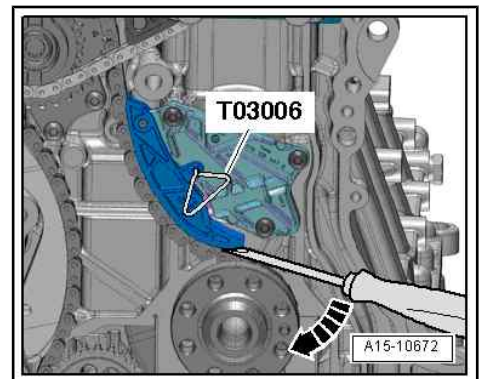
- Screw locking pin - T40069- into locating groove and tighten to 15 Nm. If necessary, turn crankshaft backwards and forwards slightly to fully centralise locking pin.
- Remove sealing flange (pulley end) ⇒ [page 57](#) .
- Remove timing chain cover (bottom) ⇒ [page 85](#) .



Protected by copyright. Copy
permitted unless authorised
with respect to the correc

is not
bility

- Press guide rail of chain tensioner for drive chain in direction of -arrow- and lock chain tensioner by inserting locking pin - T03006- .

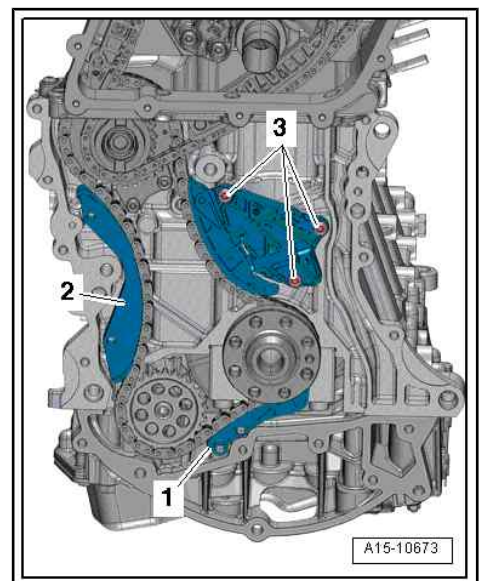


- Detach guide rail (bottom) -1-.

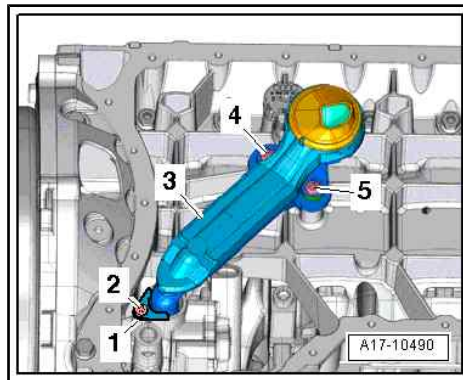


Note

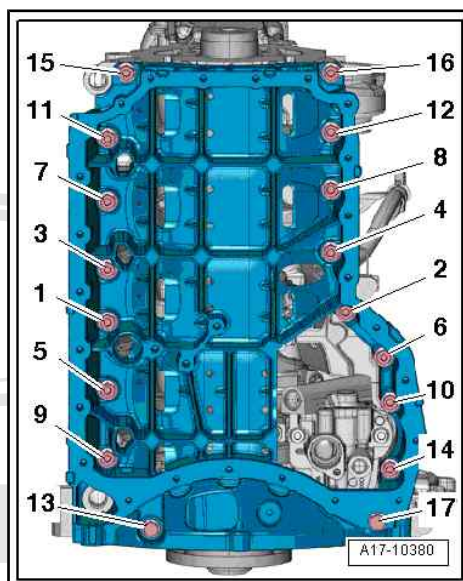
Disregard items -2 and 3-.



- Remove sump (bottom section) ⇒ [page 139](#) .
- Unscrew bolts -2, 4, 5- and remove bracket -1-.
- Detach oil intake pipe -3-.



- Slacken and remove bolts in the sequence: -17 ... 1-.



- Carefully release sump (top section) from bonded joint; apply screwdriver -A- at positions shown in illustration.

B - Bearing cap 6 for crankshaft

C - Bearing cap 1 for crankshaft

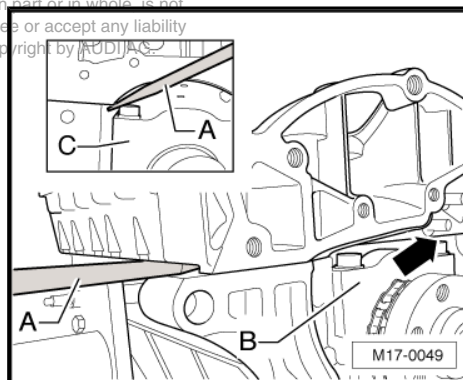
Installing

- Tightening torques
⇒ [Fig. "Sump \(top section\) - tightening torque and sequence"](#) , [page 138](#)



Note

Renew seals and O-rings.



Caution

Protect lubrication system against contamination.

- ◆ *Cover exposed parts of the engine.*

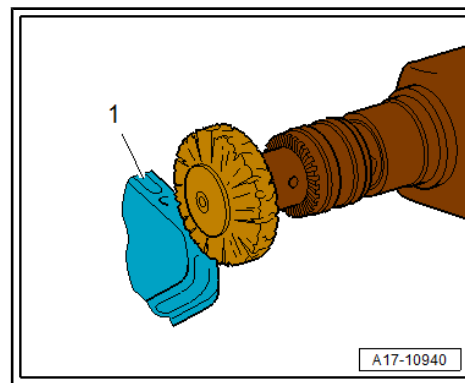


WARNING

Risk of eye injury.

◆ *Put on safety goggles.*

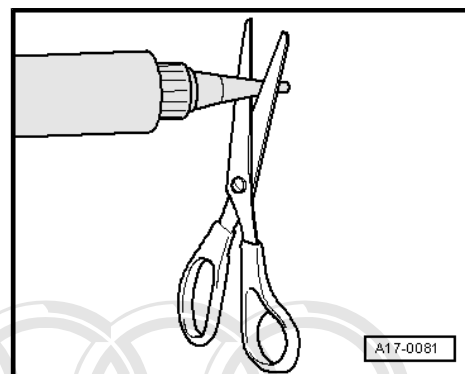
- Remove sealant residue from sump (top section) -1- and cylinder block using rotating plastic brush or similar.
- Clean sealing surfaces; they must be free of oil and grease.



Note

Note the use-by date of the sealant.

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



Caution

Make sure lubrication system is not clogged by excess sealant.

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

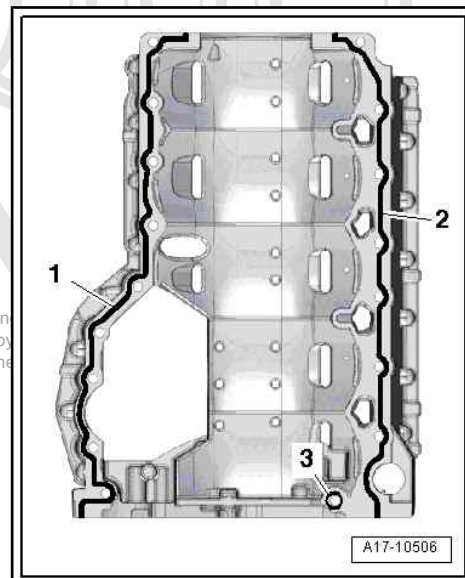
- Apply beads of sealant -1, 2, 3- onto clean sealing surface of sump (top section) as shown in illustration.
- Thickness of sealant bead: 1.5 ... 2.0 mm.

Protected by copyright. Copying permitted unless authorised by Audi AG with respect to the correctness of the information.

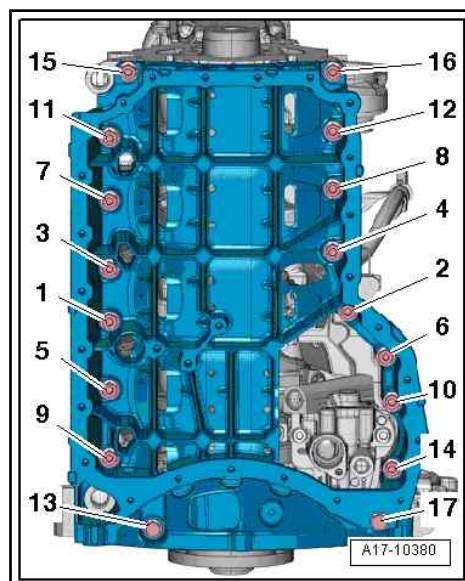


Note

The sump (top section) must be installed within 5 minutes after applying the sealant.



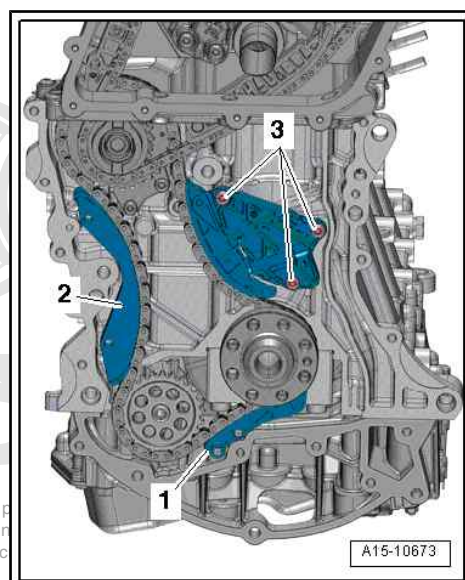
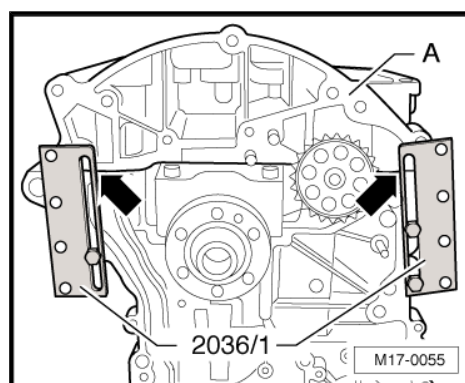
- Fit sump (top section) and screw in bolts -13, 15, 16, 17- by hand until they make contact.



- Wipe off surplus sealant -arrows-.
- Loosen bolts slightly.
- Secure plates -2036/1- to 20 Nm at cylinder block as shown in illustration.
- Press sump (top section) -A- firmly onto plates.
- Tighten bolts for sump (top section) ⇒ [page 138](#).
- The sump (top section) must remain in contact with plates.

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

- Install sump (bottom section) ⇒ [page 139](#).
- Insert guide rail (bottom) -1-.



Protected by copyright. Copying for private or commercial purposes is not permitted unless authorised by AUDI AG. AUDI AG does not accept any liability with respect to the correctness of information in this document.



Note

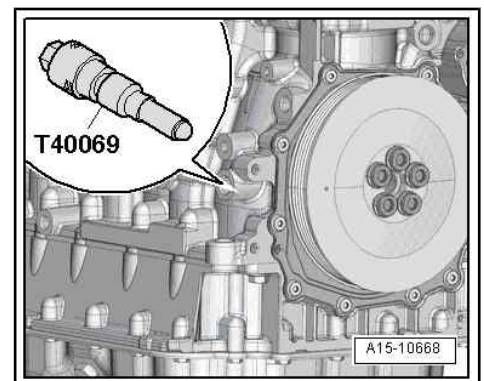
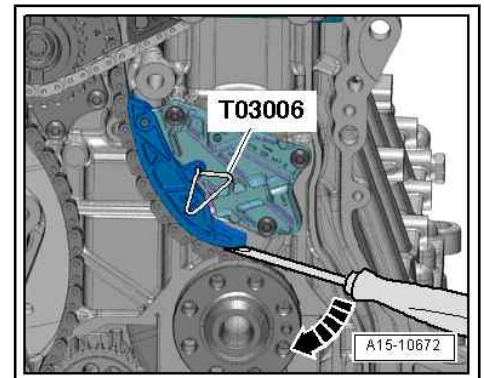
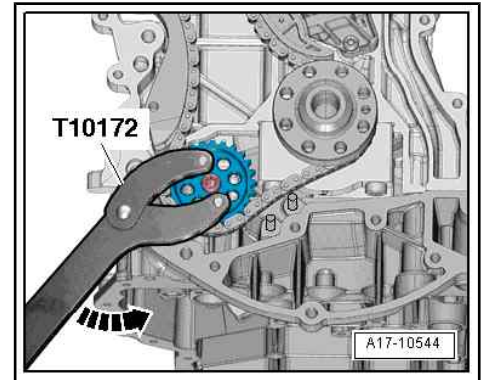
If necessary for insertion of guide rail, pre-tension drive chain for valve gear via oil pump drive sprocket using counterhold tool - T10172A- .

- Press guide rail of chain tensioner for drive chain in direction of -arrow- and remove locking pin -T03006- .
- Install timing chain cover (bottom) ⇒ [page 85](#) .
- Install sealing flange (pulley end) ⇒ [page 57](#) .



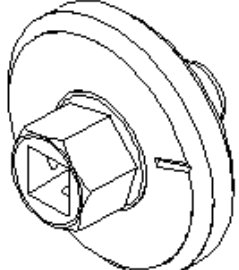
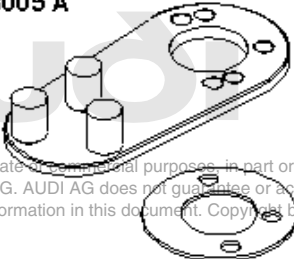
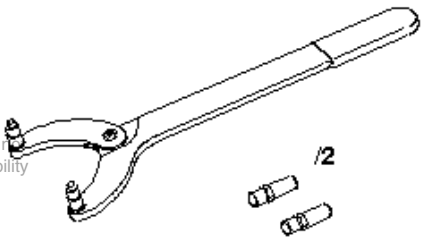
Protected by copyright. Copying, reprinting or distribution for other purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information on technical data and dimensions by AUDI AG.

- Remove locking pin - T40069-
- Tighten plug for "TDC" marking ⇒ [page 69](#)



1.5 Removing and installing oil pump

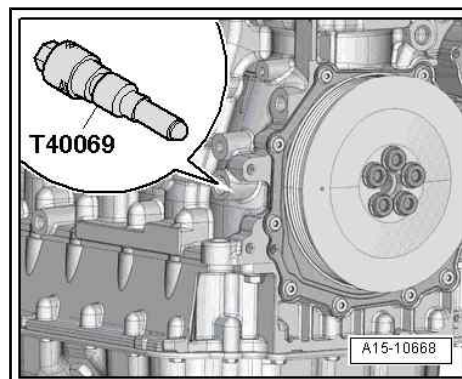
Special tools and workshop equipment required

3409 	T03003 
T03005 A 	T10172 
G17-10022	

- ◆ Removal wedge - 3409-
- ◆ Wrench -T03003-
- ◆ Oil pump lock -T03005 A-
- ◆ Counterhold tool - T10172A-

Removing

- Remove sump (top section) ⇒ [page 141](#) .
- Crankshaft locked in position with locking pin - T40069- .



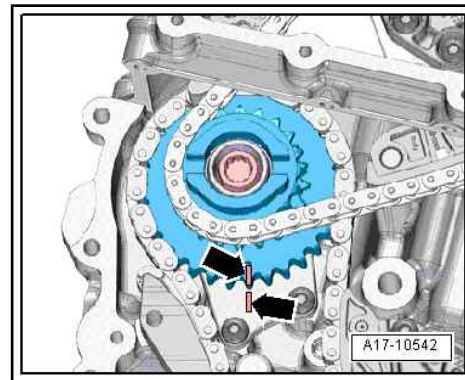
- Mark position of drive chain sprocket for camshaft timing chain and thrust washer with paint -arrows-.



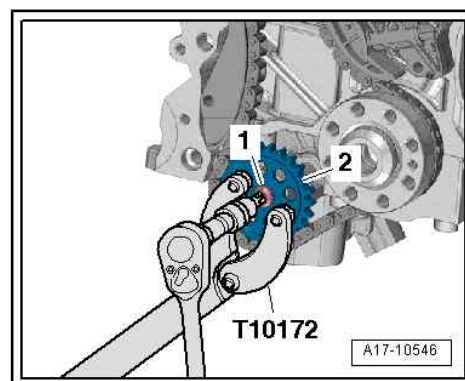
Caution

Risk of damage to engine.

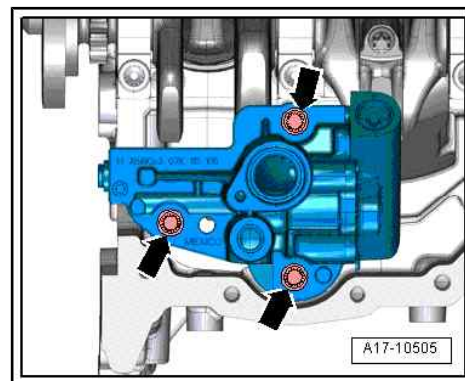
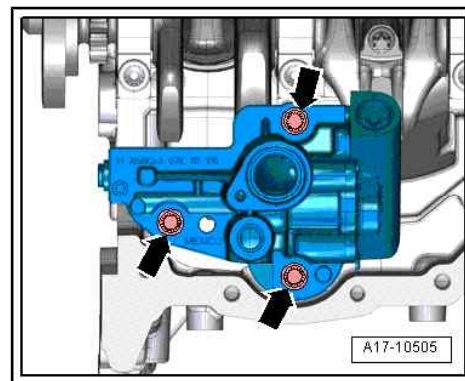
- ◆ *The markings serve to check whether the position of the drive chain sprocket for camshaft (and, as a result, the position of the camshafts) has been changed during the following work steps.*
- ◆ *If the position was changed, the valve timing must be adjusted after completing work
⇒ "1.6 Removing and installing camshaft timing chain", page 90 .*



- Counterhold using counterhold tool - T10172A- , remove bolt -1- and detach drive chain sprocket -2-.



- Remove bolts -arrows- and detach oil pump.



Installing

- Tightening torques ⇒ page 135

Protected by copyright. Copying for private 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.

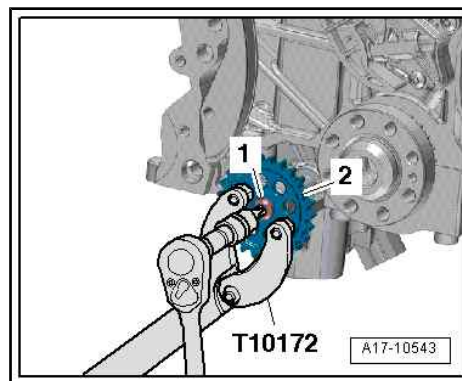


Note

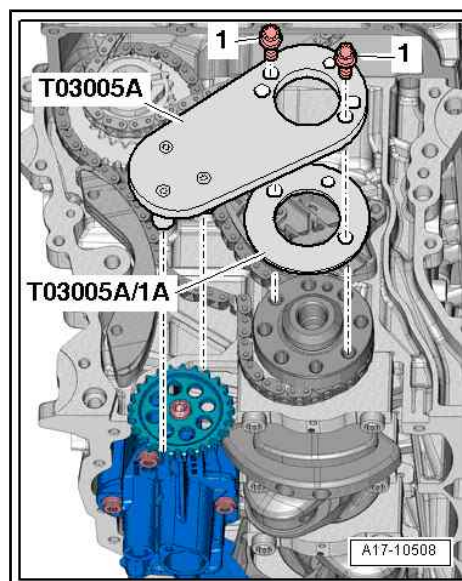
Fit new O-ring.

- Initially screw in bolts -arrows- for oil pump by hand until they make contact.
- It must still be possible to move oil pump by hand.

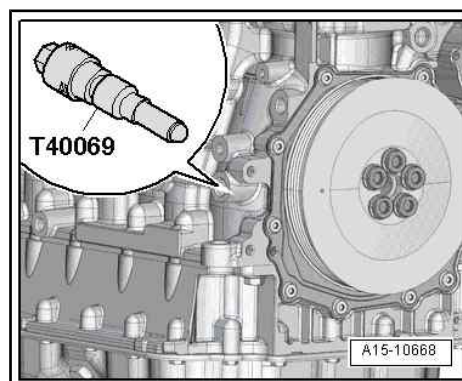
- Drive chain for valve gear must not be fitted.
- Fit drive chain sprocket -2- onto oil pump.
- Lettering on drive chain sprocket must be legible.
- Tighten bolt -1- to 20 Nm (counterhold using counterhold tool - T10172A-).



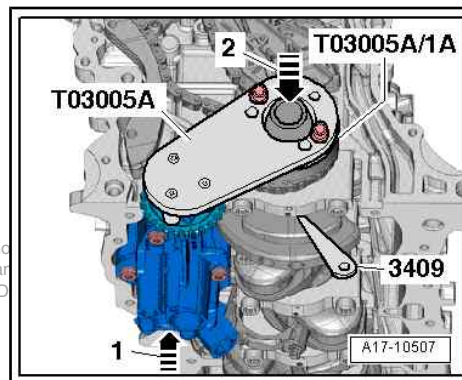
- Remove protective plates on magnets of oil pump lock - T03005 A- if fitted.
- Check if there are metal shavings on magnets of oil pump lock.
- The contact surfaces on crankshaft, tools and drive chain sprocket must be clean.
- Fit plate -T03005 /1A- and oil pump lock -T03005 A- at crankshaft journal and tighten to 30 Nm with two bolts -1- for dual-mass flywheel.
- The oil pump is drawn nearer by the magnets.



- Remove locking pin - T40069- .

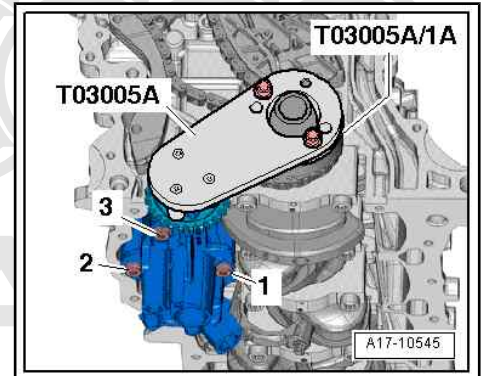


- Press crankshaft via axial bearing clearance towards pulley end -arrow 2- and secure in this position using removal wedge - 3409- .
- Press oil pump via axial bearing clearance slightly towards gearbox end -arrow 1- and hold in position.

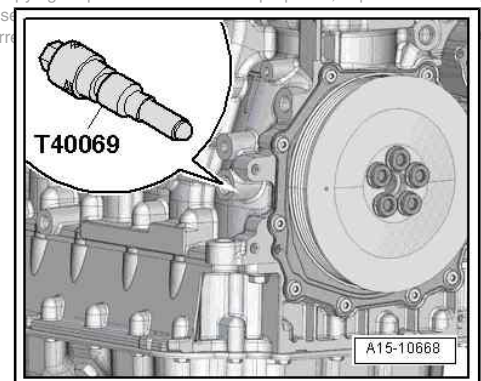


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

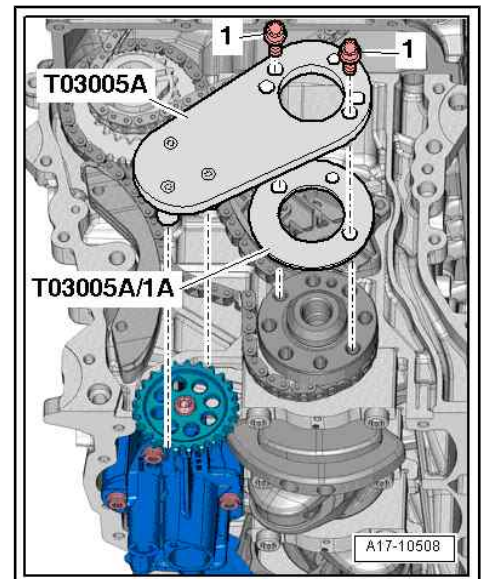
- Tighten bolts in the sequence -1, 2, 3-.



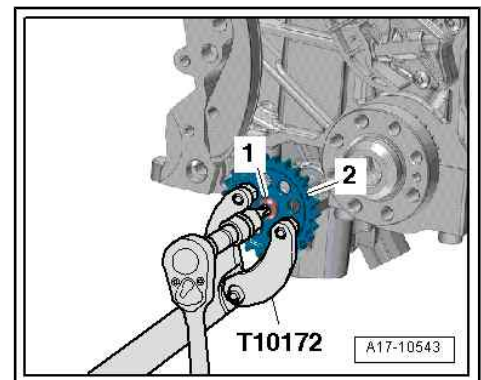
- Screw locking pin - T40069- into locating groove and tighten to 15 Nm.



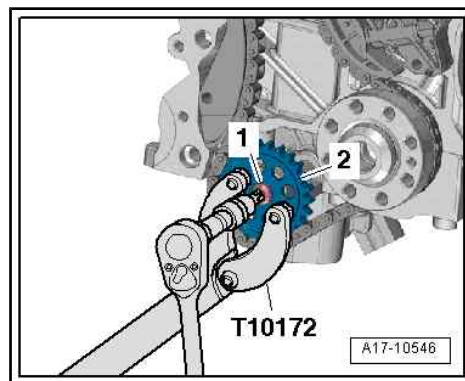
- Remove bolts -1- and detach oil pump lock -T03005 A- and plate -T03005 /1A- .
- If a new oil pump is fitted, fill in clean engine oil via intake port and turn oil pump several turns.



- Counterhold using counterhold tool - T10172A- , remove bolt -1- and detach drive chain sprocket -2- again.



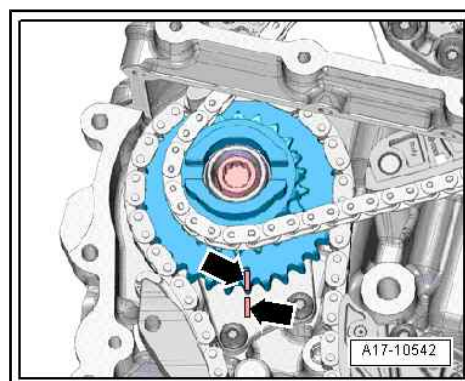
- Insert drive chain sprocket in drive chain, tighten bolt -1- (counterhold using counterhold tool - T10172A-).
- Install sump (upper section) ⇒ [page 141](#) .



- Check that colour codings -arrows- marking position between drive chain sprocket for camshaft timing chain and thrust washer still align.
- Continue installation if the markings align.
- Adjust valve timing if the markings do not align
⇒ [“1.6 Removing and installing camshaft timing chain”, page 90](#) .

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

- Remove locking pin - T40069- .
- Tighten plug for “TDC” marking ⇒ [page 69](#) .



Note

Clean removal wedge - 3409- thoroughly as wedge is normally used for interior body repairs.



Protected by copyright. Copying for private 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.

2 Oil filter bracket and engine oil cooler

⇒ ["2.1 Exploded view - oil filter bracket and engine oil cooler", page 153](#)

⇒ ["2.2 Removing and installing engine oil cooler", page 155](#)

⇒ ["2.3 Removing and installing oil filter bracket with engine oil cooler", page 155](#)

⇒ ["2.4 Removing and installing oil pressure switch F22", page 157](#)

⇒ ["2.5 Removing and installing oil pressure switch for reduced oil pressure F378", page 159](#)

⇒ ["2.6 Checking oil pressure", page 159](#)

⇒ ["2.8 Engine oil", page 162](#)

⇒ ["2.9 Checking oil level", page 162](#)

2.1 Exploded view - oil filter bracket and engine oil cooler

1 - Seal

- ☐ Renew
- ☐ Lubricate lightly with oil
- ☐ Installation position: service lug faces upwards

2 - Oil filter element

- ☐ Removing and installing ⇒ Maintenance ; Booklet 808

3 - Bolt

- ☐ 20 Nm

4 - Engine oil cooler

- ☐ See note ⇒ [page 135](#)
- ☐ Ensure clearance from surrounding components
- ☐ Connection diagram - coolant hoses ⇒ [page 163](#)
- ☐ Removing and installing ⇒ [page 155](#)

5 - Seal

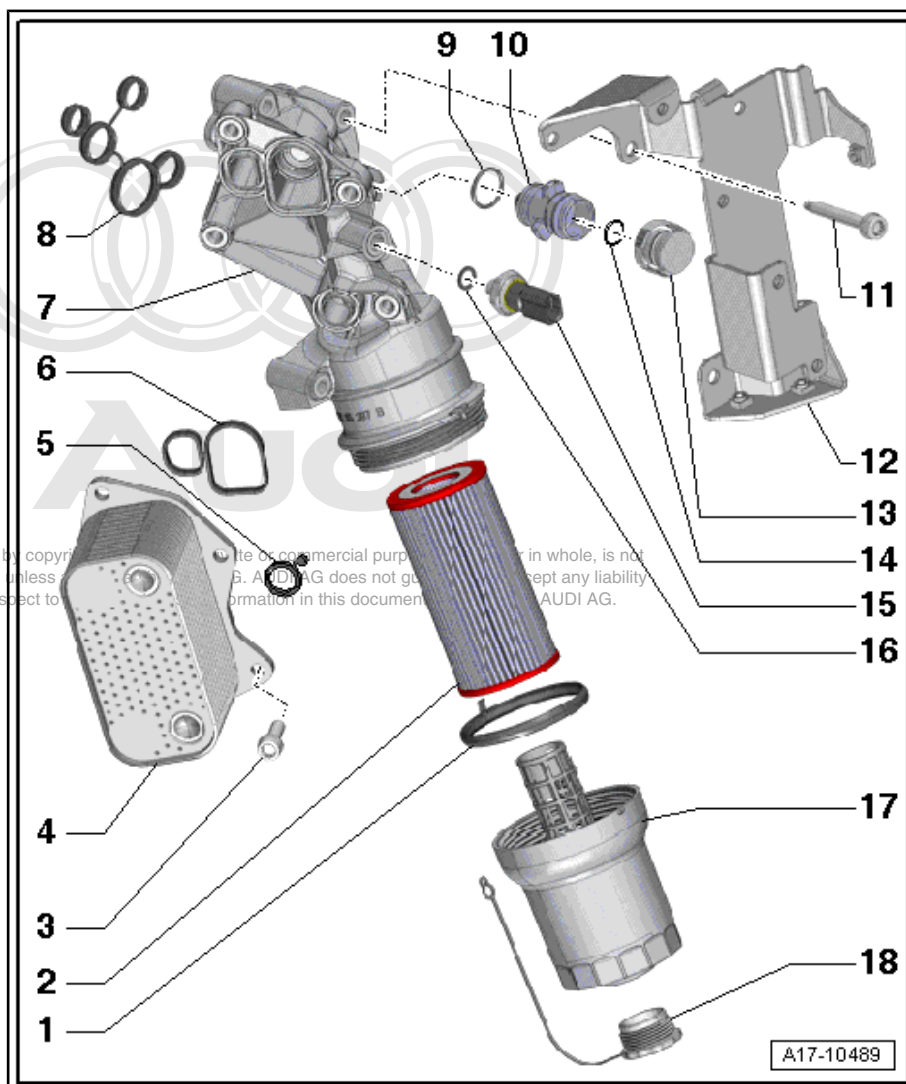
- ☐ Renew
- ☐ Insert positioning lug in groove on oil filter bracket

6 - Gasket

- ☐ Renew

7 - Oil filter bracket

- ☐ With bypass valve for engine oil cooler and oil retention valve
- ☐ Removing and installing ⇒ [page 155](#)



8 - Gasket

- ☐ Renew

9 - O-ring

- ☐ Renew

10 - Connection

11 - Bolt

- ☐ 20 Nm

12 - Bracket

13 - Cap

14 - O-ring

- ☐ Renew

15 - Oil pressure switch for reduced oil pressure - F378

- ☐ Brown insulation
- ☐ Opening/closing pressure 0.55 ... 0.85 bar
- ☐ Checking in [Guided Functions](#) ⇒ Vehicle diagnostic tester
- ☐ Removing and installing ⇒ [page 159](#)
- ☐ 20 Nm

16 - Seal

- ☐ Renew

17 - Oil filter housing

- ☐ Draining, removing and installing ⇒ Maintenance ; Booklet 808

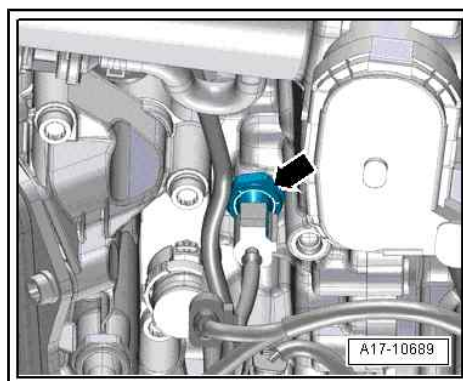
18 - Dust cap

Oil pressure switch - F22-

- ◆ Blue insulation
- ◆ Opening/closing pressure 2.15 ... 2.95 bar
- ◆ 20 Nm
- ◆ Renew seal.

Checking in [Guided Functions](#) ⇒ Vehicle diagnostic tester

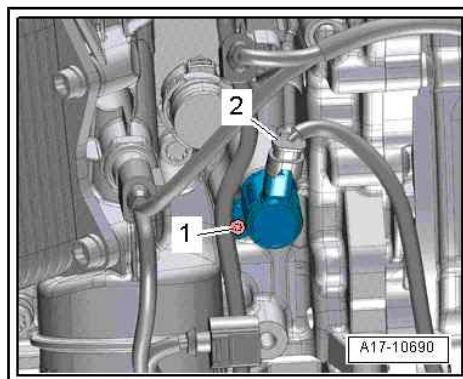
Removing and installing ⇒ [page 157](#)



Valve for oil pressure control - N428-

- 1 - Bolt
- ◆ 9 Nm
- ◆ Renew O-ring
- 2 - Electrical connector

Removing and installing ⇒ [page 160](#)



2.2 Removing and installing engine oil cooler

Removing

- Remove thermostat with housing ⇒ [page 178](#) .



Note

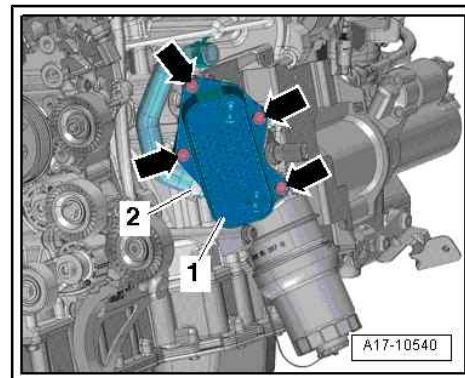
Place a cloth beneath the oil filter housing to catch escaping oil.

- Remove bolts -arrows-.
- Detach engine oil cooler -1- and detach coolant hose (release hose clip -2-).

Installing

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

- Tightening torque
⇒ ["2.1 Exploded view - oil filter bracket and engine oil cooler"](#),
[page 153](#)



Note

Renew all seals and gaskets.

- Install thermostat with housing ⇒ [page 178](#) .
- Check oil level ⇒ Maintenance ; Booklet 808 .

2.3 Removing and installing oil filter bracket with engine oil cooler

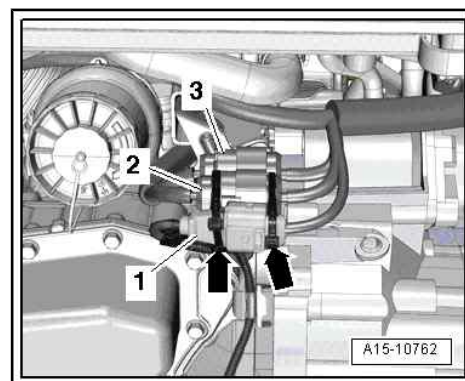
Removing



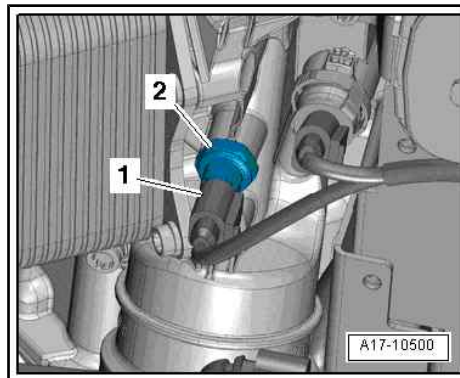
Note

Fit all cable ties in the original positions when installing.

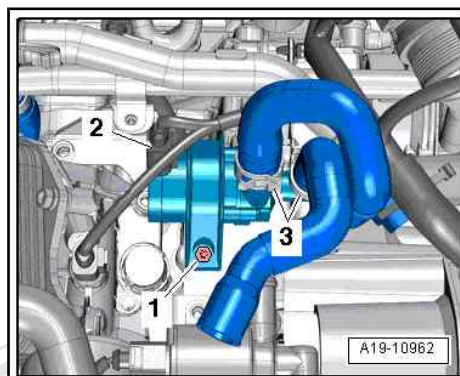
- Drain oil filter housing ⇒ Maintenance ; Booklet 808 .
- Remove front coolant pipes ⇒ [page 187](#) .
- Move electrical connector -1- clear and cut open cable ties (if fitted) -arrows-.
- Take electrical connectors -2- and -3- out of bracket.



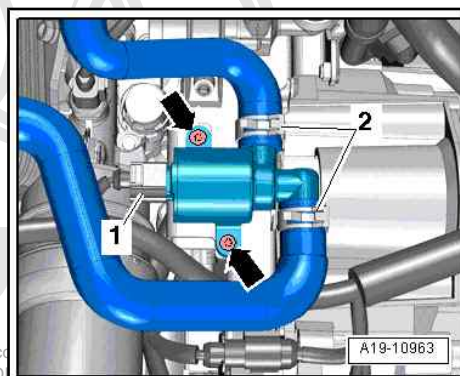
- Unplug electrical connector -1- on oil pressure switch - F22-
-item 2-.



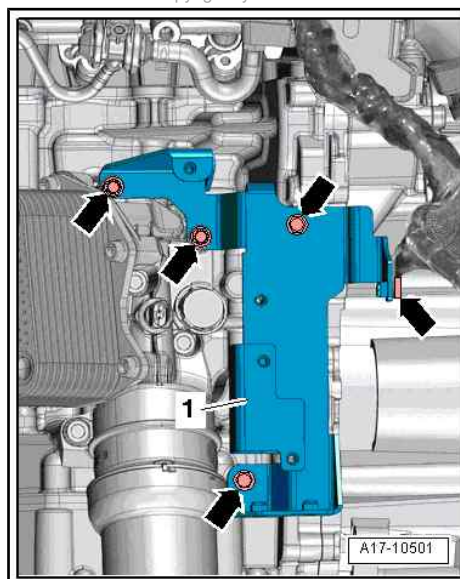
- Unplug electrical connector -2-.
- Unscrew bolt -1- and move continued coolant circulation pump
- V51- to one side (coolant hoses -3- remain connected).



- Unplug electrical connector -1-.
- Unscrew bolts -arrows- and move solenoid valve for coolant
circuit - N492- to one side (coolant hoses -2- remain connected).



- Unscrew bolts -arrows- and detach bracket -1-.



Protected by copyright. Copying for private or commercial use is not permitted unless authorised by AUDI AG. AUDI AG is not responsible with respect to the correctness of information in this document. Copyright by AUDI AG.

 Note

Place a cloth beneath the oil filter housing to catch escaping oil.

- Unscrew bolts arrows and remove oil filter bracket with engine oil cooler.

Installing

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

- Tightening torques
⇒ ["2.1 Exploded view - oil filter bracket and engine oil cooler", page 153](#)

 Note

Renew seals and/or gaskets.

- Install continued coolant circuit pump - V51- and solenoid valve for coolant circuit - N492- ⇒ [page 172](#) .
- Install coolant pipe (left-side) ⇒ [page 184](#) .
- Install coolant pipes (front) ⇒ [page 187](#) .

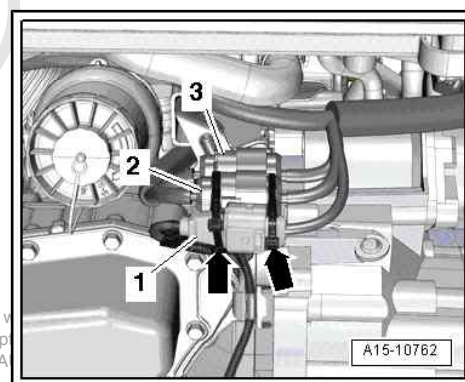
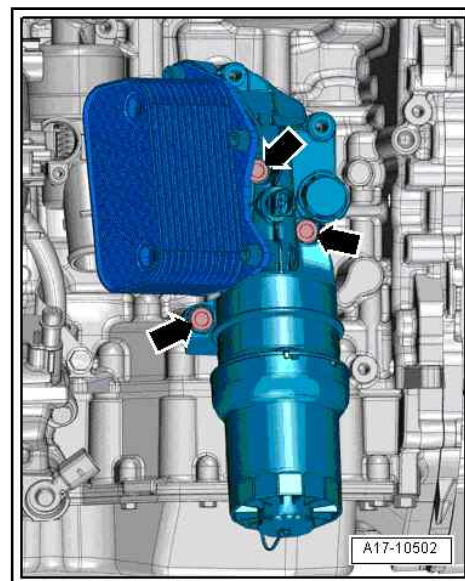
2.4 Removing and installing oil pressure switch - F22-

Removing

 Note

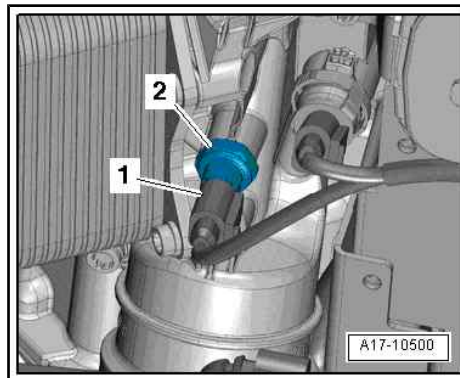
Fit all cable ties in the original positions when installing.

- Drain oil filter housing ⇒ Maintenance ; Booklet 808 .
- Remove front coolant pipes ⇒ [page 187](#) .
- Move electrical connector -1- clear and cut open cable ties (if fitted) -arrows-.
- Take electrical connectors -2- and -3- out of bracket.

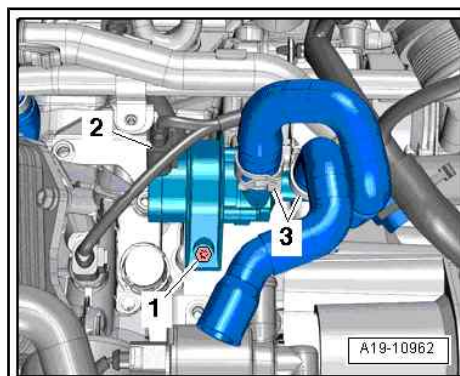


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept responsibility with respect to the correctness of information in this document. Copyright by Audi AG

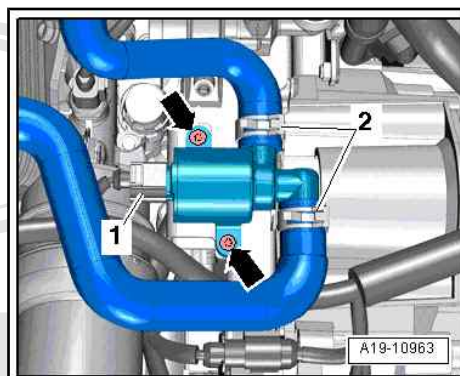
- Unplug electrical connector -1- on oil pressure switch -2-.



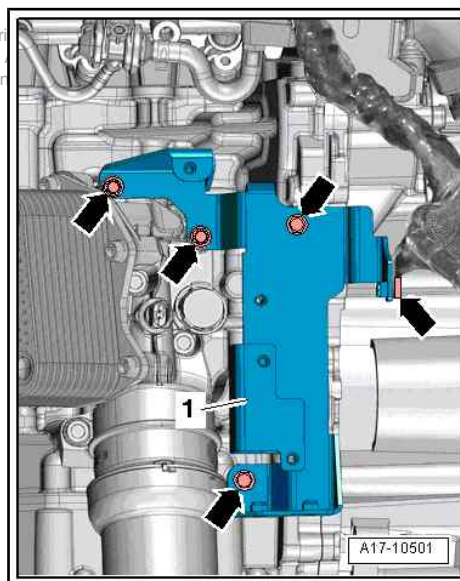
- Unplug electrical connector -2-.
- Unscrew bolt -1- and move continued coolant circulation pump - V51- to one side (coolant hoses -3- remain connected).



- Unplug electrical connector -1-.
- Unscrew bolts -arrows- and move solenoid valve for coolant circuit - N492- to one side (coolant hoses -2- remain connected).



- Unscrew bolts -arrows- and detach bracket -1-.



i Note

Place a cloth underneath to catch escaping engine oil.

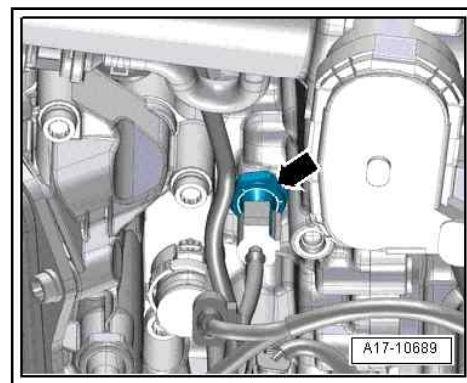
- Unplug electrical connector -arrow-.
- Unscrew oil pressure switch - F22- .

Installing

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

Tightening torques

- [⇒ Fig. "Oil pressure switch -F22- ", page 154](#)



i Note

Renew seal/O-ring.

- Install continued coolant circuit pump - V51- and solenoid valve for coolant circuit - N492- [⇒ page 172](#) .
- Install coolant pipe (left-side) [⇒ page 184](#) .
- Install coolant pipes (front) [⇒ page 187](#) .

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

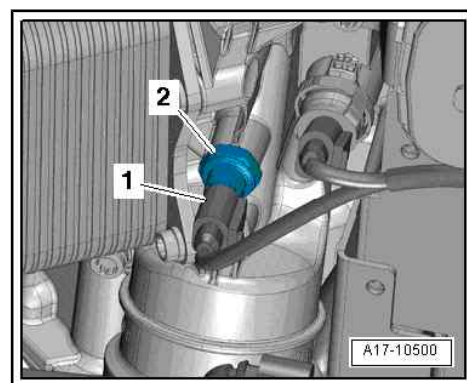
Removing

- Unplug electrical connector -1-.
- Unscrew oil pressure switch for reduced oil pressure - F378- -item 2-.

Installing

Installation is carried out in reverse sequence.

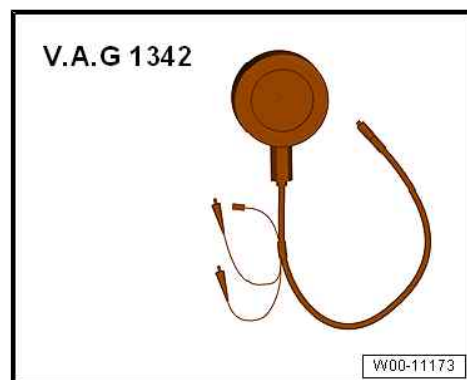
- Tightening torque
[⇒ "2.1 Exploded view - oil filter bracket and engine oil cooler", page 153](#)



2.6 Checking oil pressure

Special tools and workshop equipment required

- ◆ Oil pressure tester - V.A.G 1342-



Procedure

- Oil level OK
- Engine oil temperature approx. 80 °C
- Remove oil pressure switch for reduced oil pressure - F378-
⇒ [page 159](#) .
- Screw oil pressure switch into oil pressure tester - V.A.G 1342- .
- Screw oil pressure tester - V.A.G 1342- into bore for oil pressure switch in oil filter bracket.
- Start engine.
- Oil pressure at idling speed: at least 1.0 bar.
- Oil pressure at 3800 rpm: at least 3.0 bar.
- Install oil pressure switch for reduced oil pressure - F378-
⇒ [page 159](#) .

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

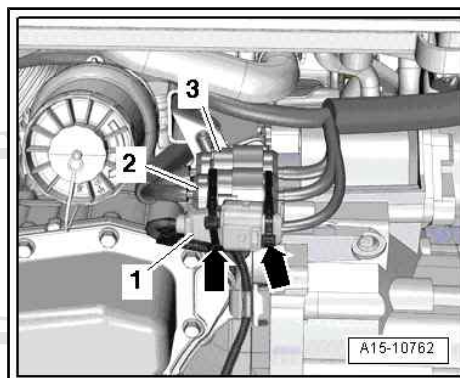
Removing



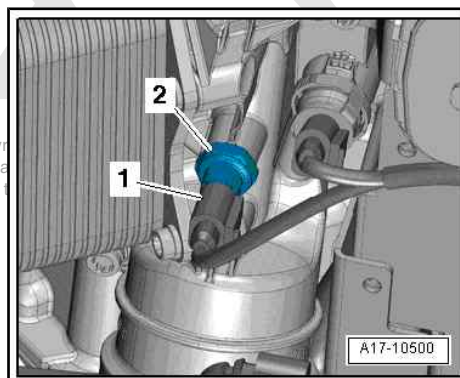
Note

Fit all cable ties in the original positions when installing.

- Drain oil filter housing ⇒ Maintenance ; Booklet 808 .
- Remove front coolant pipes ⇒ [page 187](#) .
- Move electrical connector -1- clear and cut open cable ties (if fitted) -arrows-.
- Take electrical connectors -2- and -3- out of bracket.



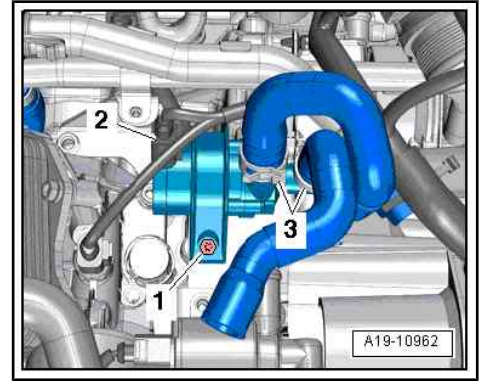
- Unplug electrical connector -1- on oil pressure switch -2-.



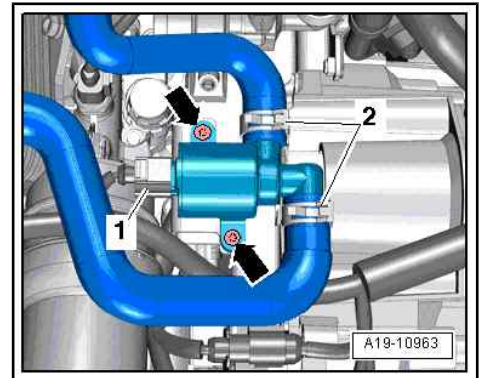
Protected by copyright
permitted unless a
with respect to

in whole, is not
apt any liability
AUDI AG.

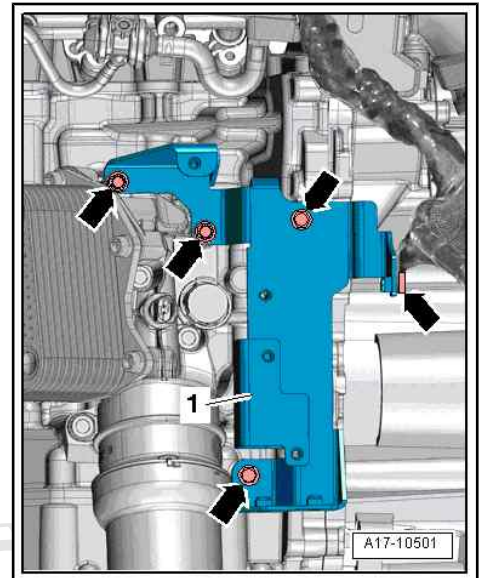
- Unplug electrical connector -2-.
- Unscrew bolt -1- and move continued coolant circulation pump - V51- to one side (coolant hoses -3- remain connected).



- Unplug electrical connector -1-.
- Unscrew bolts -arrows- and move solenoid valve for coolant circuit - N492- to one side (coolant hoses -2- remain connected).



- Unscrew bolts -arrows- and detach bracket -1-.



Protected by copyright. Copying for private 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.



Note

Place a cloth underneath to catch escaping engine oil.

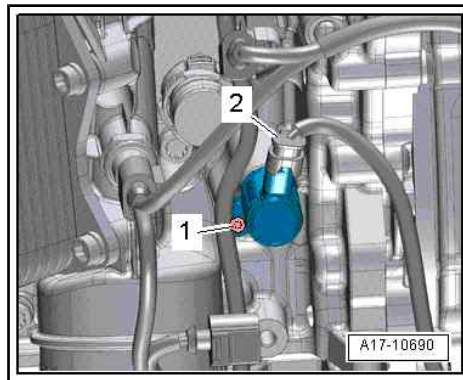
- Unplug electrical connector -2-.
- Remove bolt -1- and detach valve for oil pressure control - N428- .

Installing

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

Tightening torques

- ⇒ [Fig. “Valve for oil pressure control -N428- ”, page 154](#)



Note

Renew seal/O-ring.

- Install continued coolant circuit pump - V51- and solenoid valve for coolant circuit - N492- ⇒ [page 172](#) .
- Install coolant pipe (left-side) ⇒ [page 184](#) .
- Install coolant pipes (front) ⇒ [page 187](#) .

2.8 Engine oil

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



Caution

Risk of damage to catalytic converter.

- ◆ **The oil level must not be above the “max” mark on the dipstick.**

Protected by copyright. Copying for private 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.

2.9 Checking oil level

Check oil level ⇒ Maintenance ; Booklet 808 .

19 – Cooling

1 Cooling system

⇒ [“1.1 Connection diagram - coolant hoses”, page 163](#)

⇒ [“1.2 Draining and filling cooling system”, page 165](#)

⇒ [“1.3 Checking cooling system for leaks”, page 170](#)

1.1 Connection diagram - coolant hoses



WARNING

Risk of scalding due to hot steam and hot coolant.

- ◆ *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.*



Note

- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- ◆ *The arrow markings on coolant pipes and on ends of hoses must align when installing.*



Note

- ◆ *Blue = Large coolant circuit.*
- ◆ *Red = Small coolant circuit with heating circuit.*
- ◆ *Orange = Coolant circuit for turbocharger.*
- ◆ *Arrows show direction of coolant flow.*

Protected by copyright. Copying for private 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.

1 - Radiator
2 - Non-return valve

- ☐ Arrow indicates direction of flow

3 - Thermostat with housing
4 - Coolant pump
5 - Cylinder head and cylinder block
6 - Coolant expansion tank

- ☐ With filler cap and pressure relief valve
- ☐ Checking pressure relief valve ⇒ [page 171](#)

7 - Heat exchanger for heater
8 - Bleeder screw
9 - Restrictor
10 - Turbocharger
11 - Coolant temperature sender - G62-
12 - Engine oil cooler
13 - Thermostat

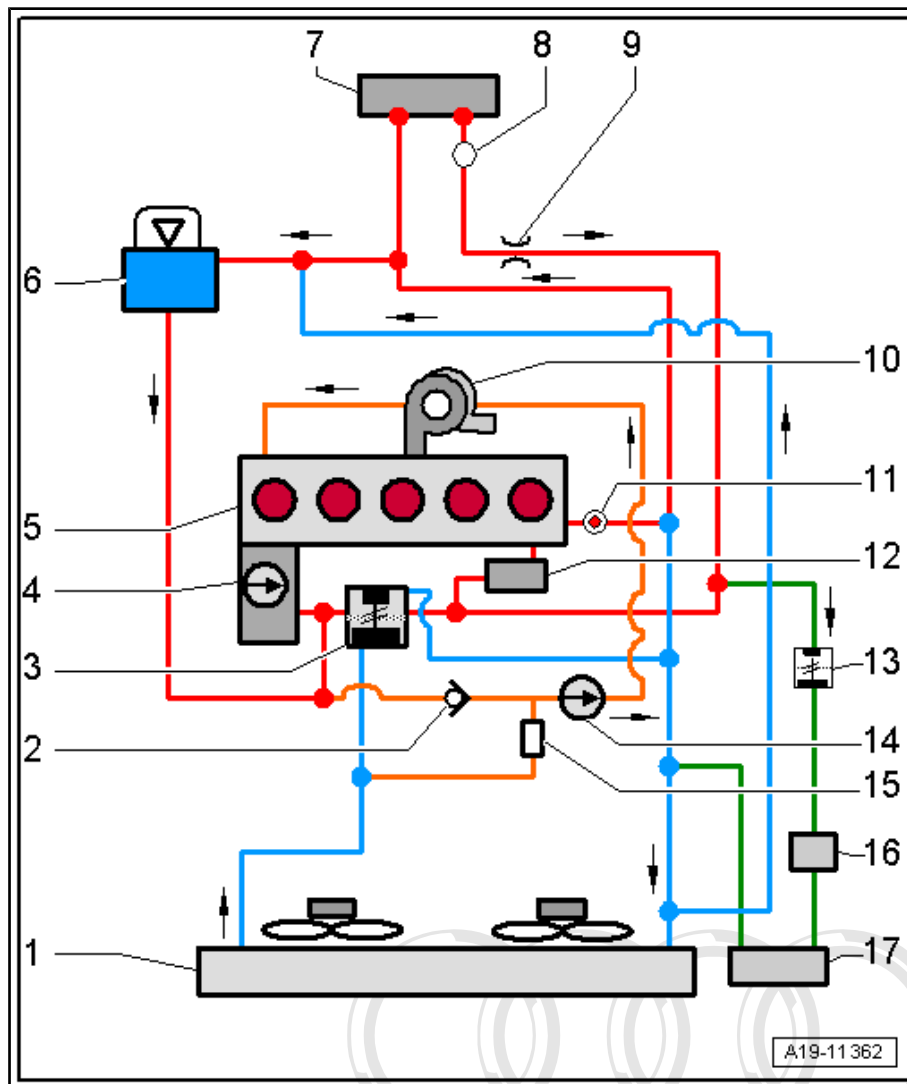
- ☐ For coolant circuit for gearbox

14 - Continued coolant circulation pump - V51-
15 - Solenoid for coolant circuit - N492-
16 - Heat exchanger

- ☐ For gear oil

17 - Auxiliary radiator (left-side)

- ☐ For coolant circuit for gearbox

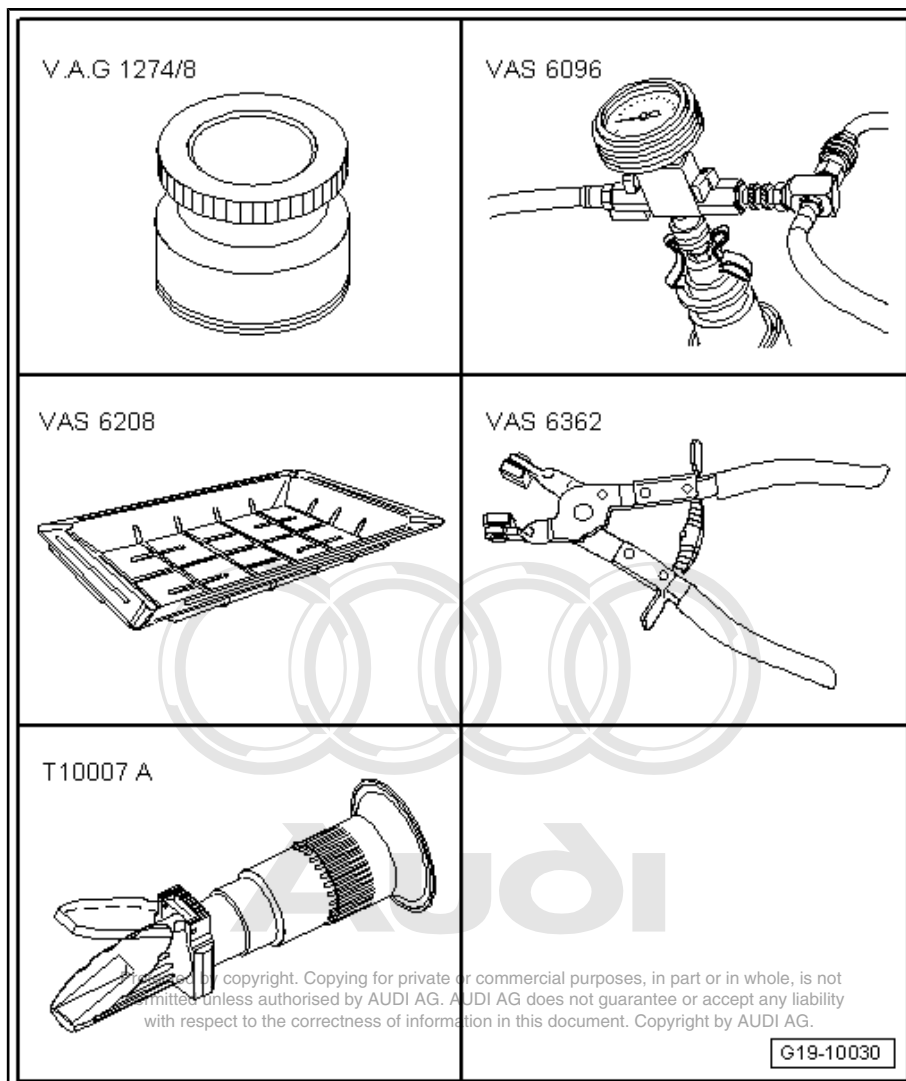


A19-11362

Protected by copyright. Copying for private 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.

1.2 Draining and filling cooling system

Special tools and workshop equipment required



- ◆ Adapter for cooling system tester - V.A.G 1274/8-
- ◆ Cooling system charge unit - VAS 6096- with -VAS 6096/1-
- ◆ Drip tray for workshop hoist - VAS 6208-
- ◆ Hose clip pliers - VAS 6362-
- ◆ Refractometer - T10007 A-

Draining

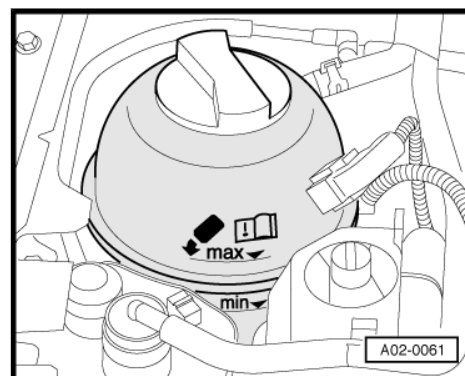


WARNING

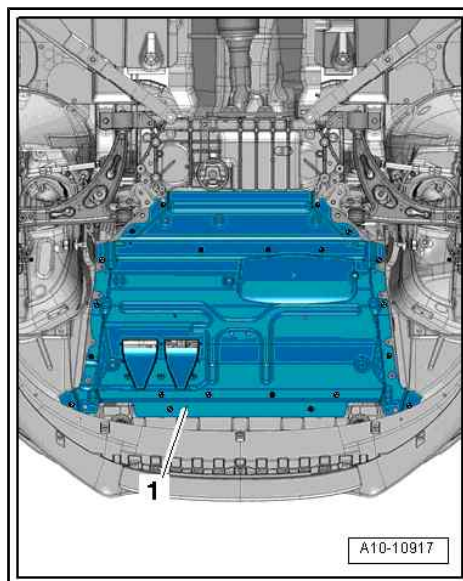
Risk of scalding due to hot steam and hot coolant.

- ◆ *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.*

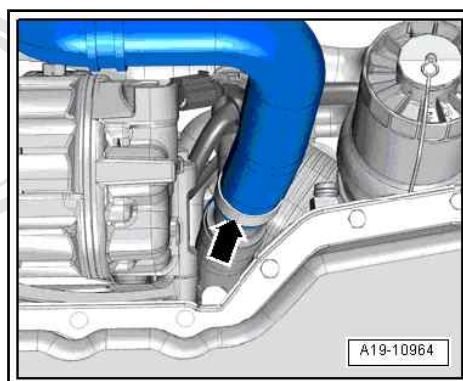
- Open filler cap on coolant expansion tank.



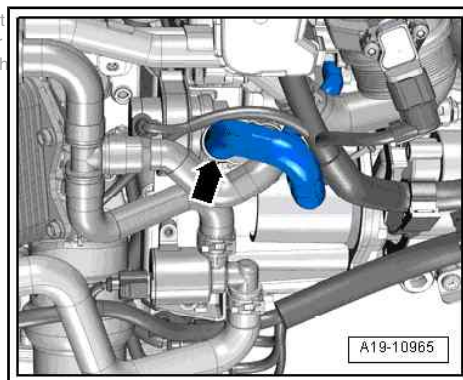
- Remove noise insulation -1- ⇒ Rep. gr. 66 .



- Place drip tray for workshop hoist - VAS 6208- beneath engine.
- Release hose clip -arrow-, disconnect coolant hose and drain off coolant.



- Release hose clip -arrow-, disconnect coolant hose from continued coolant circulation pump - V51- and drain off coolant.



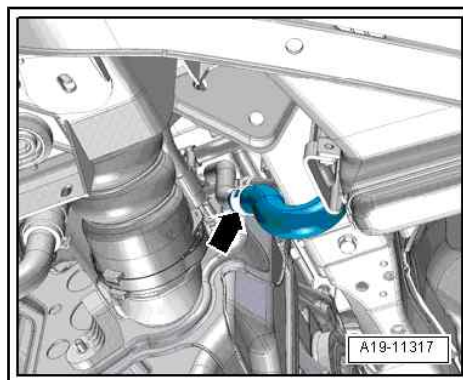
- Release hose clip -arrow-, disconnect coolant hose and drain off coolant.

Filling



Caution

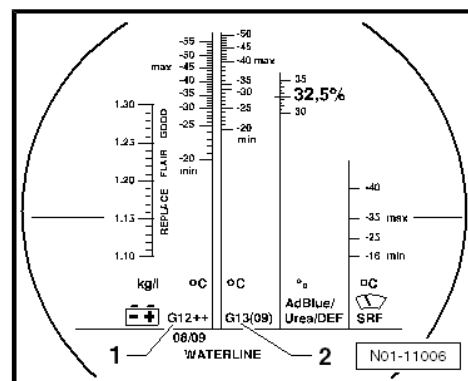
To ensure optimal corrosion protection, only distilled water may be mixed with coolant additives.





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.



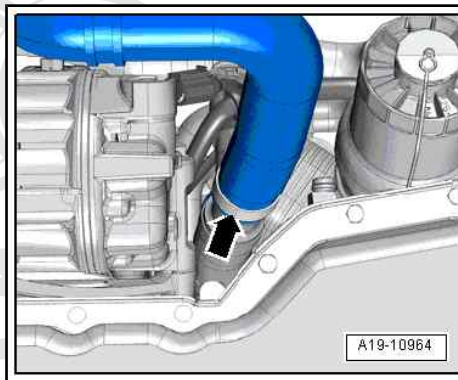
Recommended mixture ratio for coolant

- 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)

Protected by copyright. Copying for private 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.

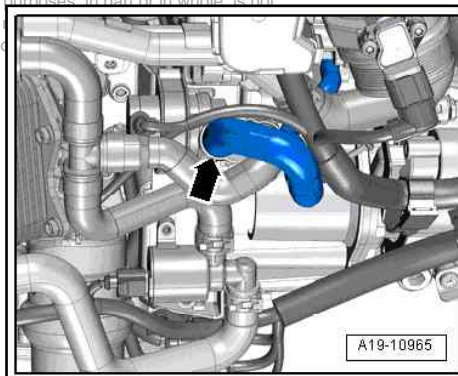
Procedure

- Connect coolant hose -arrow-.

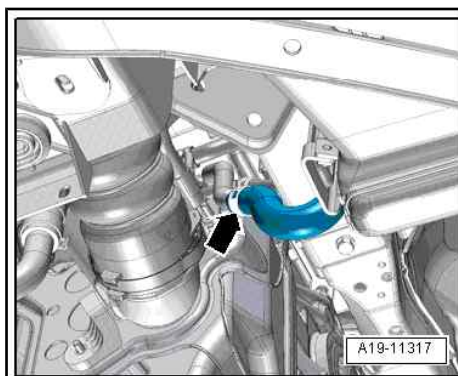


- Connect coolant hose -arrow-.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not accept any liability with respect to the correctness of information in this document.



- Connect coolant hose -arrow-.



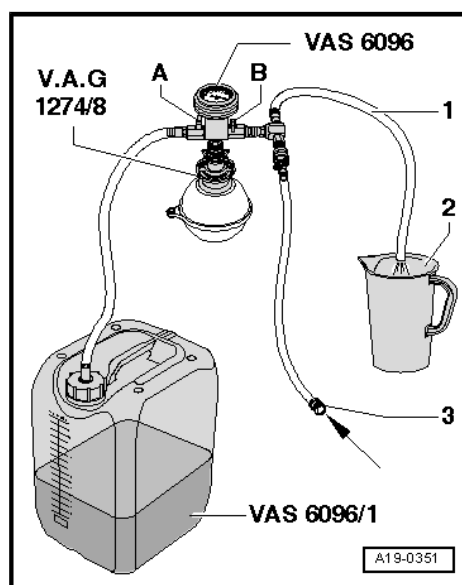
- Fill reservoir of -VAS 6096- with 10 litres of premixed coolant (according to recommended ratio ⇒ [page 167](#)).
- Fit adapter for cooling system tester - V.A.G 1274/8- onto coolant expansion tank.
- Attach cooling system charge unit - VAS 6096- to adapter - V.A.G 1274/8- .
- Run vent hose -1- into a small container -2-.



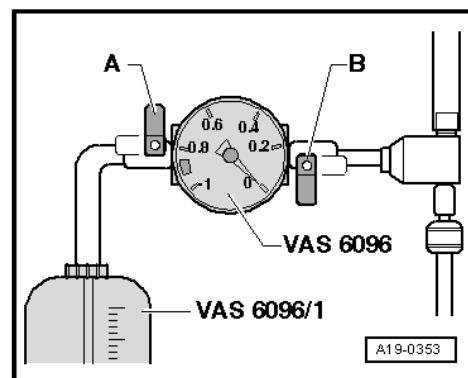
Note

The vented air draws along a small amount of coolant, which should be collected.

- Close both valves -A- and -B- (turn lever at right angles to direction of flow).
- Connect hose -3- to compressed air supply.
- Pressure: 6 ... 10 bar.

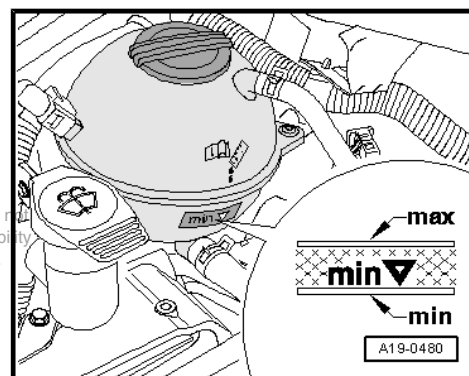


- Open valve -B- by setting lever in direction of flow.
- The suction jet pump generates a partial vacuum in the cooling system; the needle on the gauge should move into the green zone.
- Also briefly open valve -A- (turn lever in direction of flow) so that hose on reservoir of -VAS 6096- can fill with 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

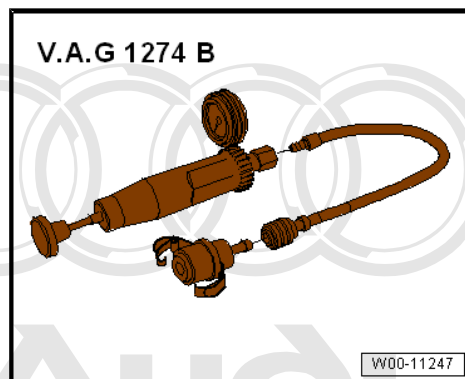
- ◆ *If the needle does not reach the green zone, repeat the process.*
- ◆ *Check cooling system for leaks if the vacuum is not maintained.*
- Detach compressed air hose.
- Open valve -A-.
- The vacuum in the cooling system causes the coolant to be drawn out of the reservoir of -VAS 6096- ; the cooling system is then filled.
- Detach cooling system charge unit - VAS 6096- from coolant expansion tank.
- Top up coolant to "max" mark.
- Set temperature to "HI".
- Switch off air conditioner compressor (press **ECON** button).
- Start engine and run for 2 minutes (maximum) at approx. 1500 rpm.
- **Top up coolant to overflow hole on expansion tank with engine running.**
- Close filler cap on coolant expansion tank (make sure it engages).
- Allow engine to run at idling speed until both large coolant hoses at radiator become warm.
- Switch off ignition and allow engine to cool down.
- Install noise insulation ⇒ Rep. gr. 66 .
- Check coolant level.
- The coolant level must be between the "min" and "max" markings when the engine is cold.
- The coolant level can be at the "max" marking when the engine is warm.
- Top up with coolant again if necessary.



1.3 Checking cooling system for leaks

Special tools and workshop equipment required

- ◆ Cooling system tester - V.A.G 1274 B-



- ◆ Adapter for cooling system tester - V.A.G 1274/8-

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. Copyright by AUDI AG.



- ◆ Adapter for cooling system tester - V.A.G 1274/9-



Procedure

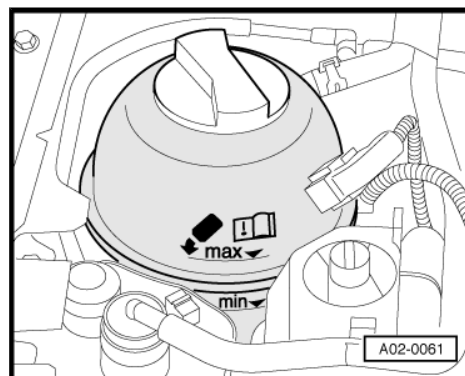
- Engine must be warm.



WARNING

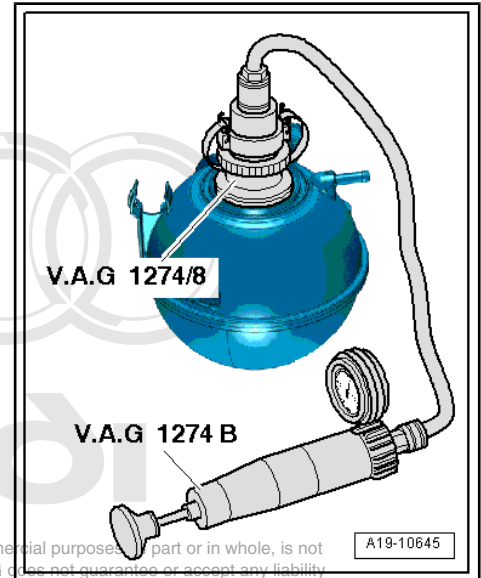
Risk of scalding due to hot steam and hot coolant.

- ◆ *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.*



- Open filler cap on coolant expansion tank.

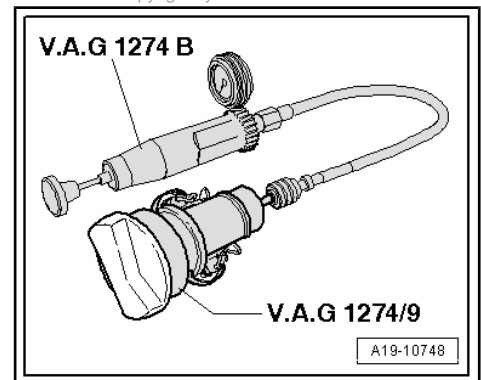
- Fit cooling system tester - V.A.G 1274 B- with adapter - V.A.G 1274/8- onto coolant expansion tank.
- Using hand pump on cooling system tester, build up a pressure of approx. 1.0 bar.
- If this pressure is not maintained, locate and rectify leaks.



Protected by copyright. Copying for private 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.

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.
- The pressure relief valve should open at a pressure of 1.4 ... 1.6 bar.
- Renew filler cap if pressure relief valve does not open as described.



2 Coolant pump and thermostat

⇒ [“2.1 Exploded view - coolant pump and thermostat with housing”, page 172](#)

⇒ [“2.2 Removing and installing continued coolant circulation pump V51”, page 173](#)

⇒ [“2.3 Removing and installing solenoid valve for coolant circuit N492”, page 175](#)

⇒ [“2.4 Removing and installing coolant pump”, page 176](#)

⇒ [“2.5 Removing and installing thermostat with housing”, page 178](#)

⇒ [“2.6 Removing and installing coolant distributor housing”, page 180](#)

2.1 Exploded view - coolant pump and thermostat with housing



WARNING

Risk of scalding due to hot steam and hot coolant.

- ◆ *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.*



Protected by copyright. Copying for private 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.

1 - Seal

- ☐ Renew

2 - Bolt

- ☐ 9 Nm

3 - Coolant pump

- ☐ Removing and installing
⇒ [page 176](#)

4 - Continued coolant circulation pump - V51-

- ☐ Removing and installing
⇒ [page 173](#)

5 - Bolt

- ☐ 9 Nm

6 - Solenoid for coolant circuit - N492-

- ☐ Removing and installing
⇒ [page 175](#)

7 - Bolt

- ☐ 9 Nm

8 - Coolant distributor housing

- ☐ Removing and installing
⇒ [page 180](#)

9 - O-ring

- ☐ Renew

10 - Bolt

- ☐ 6 Nm

11 - Coolant pipes (front)

12 - Bolt

- ☐ 9 Nm

13 - O-ring

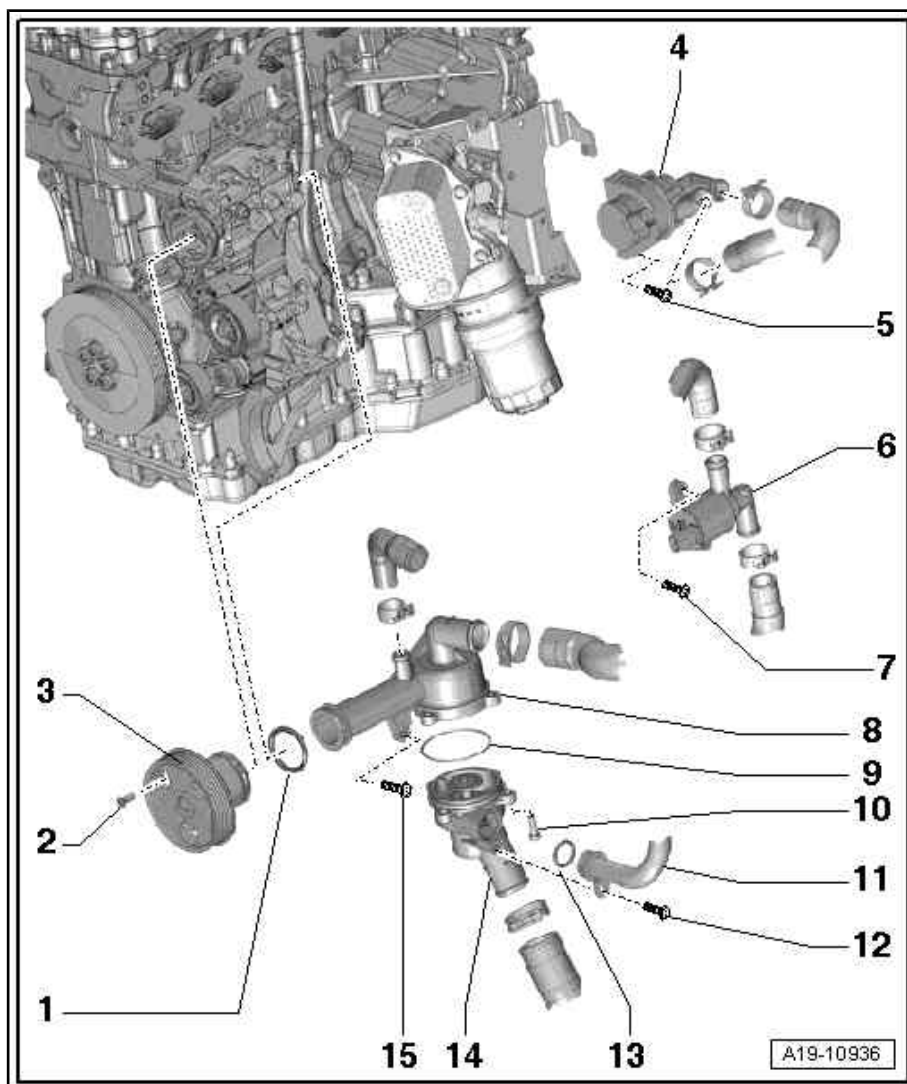
- ☐ Renew

14 - Thermostat with housing

- ☐ Removing and installing ⇒ [page 178](#)

15 - Bolt

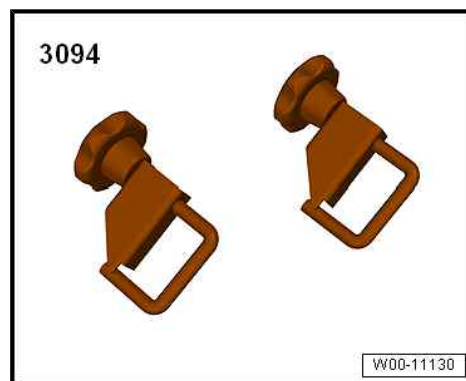
- ☐ 9 Nm



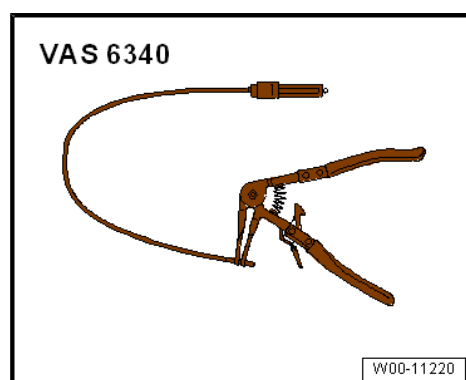
2.2 Removing and installing continued coolant circulation pump - V51-

Special tools and workshop equipment required

- ◆ Hose clamps, up to 25 mm - 3094-

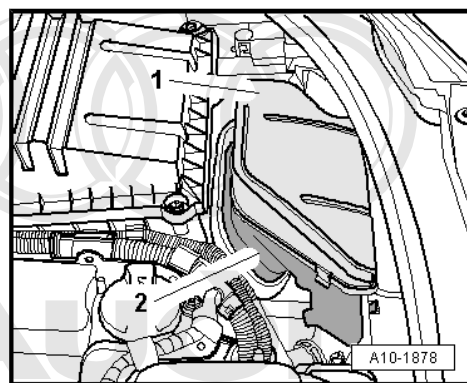


- ◆ Hose clip pliers - VAS 6340-



Removing

- Pull cover -1- off air duct (release clip on side).
- Unclip air duct -2-.



Protected by copyright. Copying for private 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.



Note

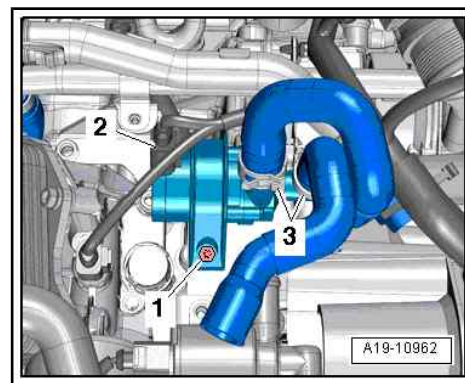
Place a cloth underneath to catch escaping coolant.

- Unplug electrical connector -2-.
- Remove bolt -1- and detach continued coolant circulation pump - V51- .
- Clamp off coolant hoses -3- with hose clamps up to 25 mm - 3094- and detach.

Installing

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

- Tightening torque
⇒ ["2.1 Exploded view - coolant pump and thermostat with housing", page 172](#)



Note

Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .

- Check coolant level ⇒ [page 169](#) .

2.3 Removing and installing solenoid valve for coolant circuit - N492-

Special tools and workshop equipment required

- ◆ Hose clamps, up to 25 mm - 3094-



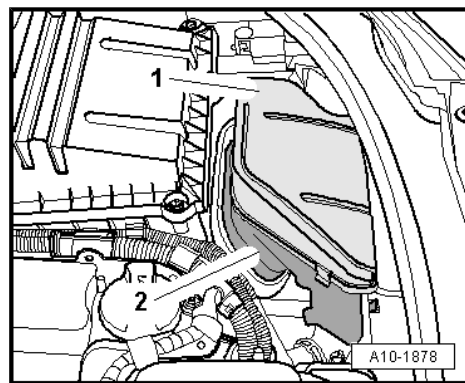
- ◆ Hose clip pliers - VAS 6362-



Protected by copyright. Copying for private 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.

Removing

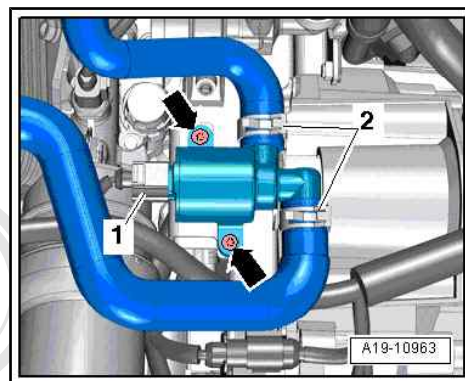
- Pull cover -1- off air duct (release clip on side).
- Unclip air duct -2-.



Note

Place a cloth underneath to catch escaping coolant.

- Unplug electrical connector -1-.
- Remove bolts -arrows- and detach solenoid valve for coolant circuit - N492- .
- Clamp off coolant hoses -2- with hose clamps up to 25 mm - 3094- and detach.



Installing

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

- Tightening torque
⇒ ["2.1 Exploded view - coolant pump and thermostat with housing", page 172](#)



Note

Protected by copyright. Copying for private 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.

Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ *Electronic parts catalogue* .

- Check coolant level ⇒ [page 169](#) .

2.4 Removing and installing coolant pump

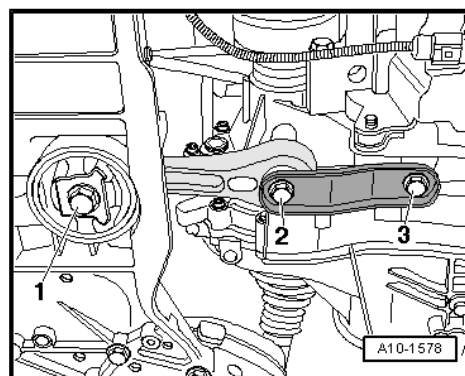
Removing

- Drain coolant ⇒ [page 165](#) .
- Support engine in installation position ⇒ [page 36](#) .
- Remove engine mounting ⇒ [page 43](#) .
- Remove bolts -2- and -3-.



Note

Disregard -item 1-.

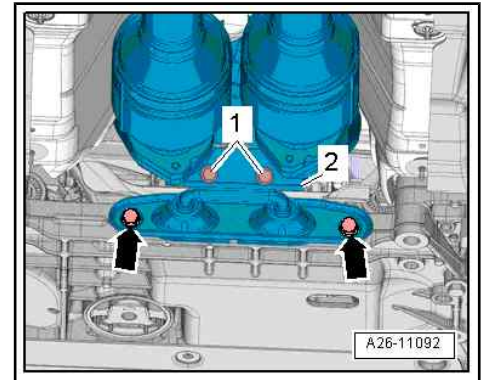


- Remove bolts -arrows-.

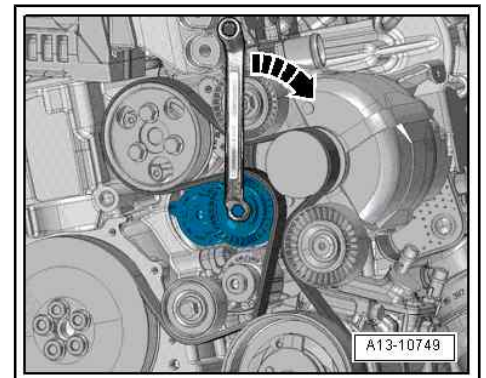


Note

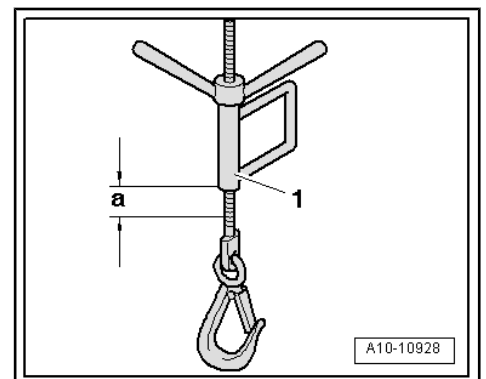
Disregard items -1 and 2-.



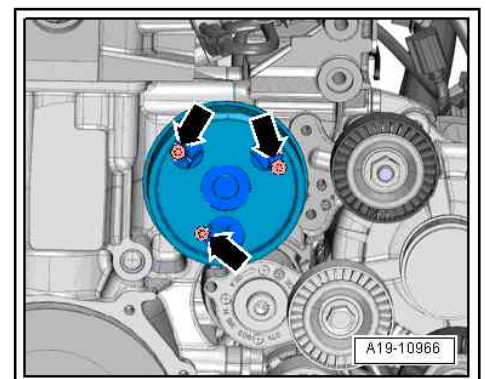
- Move tensioner in clockwise direction -arrow- to slacken poly V-belt.
- Remove poly V-belt from alternator and release tensioner.



- Use spindle (right-side) to raise engine by distance -a-.
- Dimension -a- = 55 mm



- Remove bolts -arrows- (access via holes in poly V-belt pulley) and detach coolant pump.



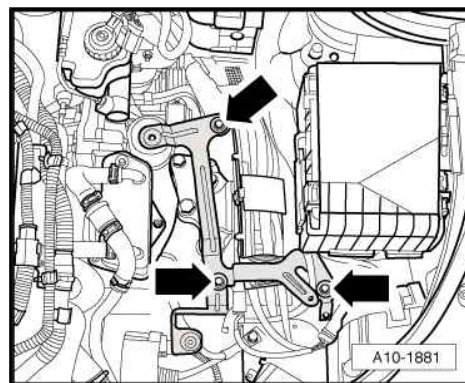
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



Note

Depending on the tolerance position of the assembly mountings, it might be necessary to also loosen the bolts for the gearbox mounting before the coolant pump can be detached. To do so, proceed as follows:

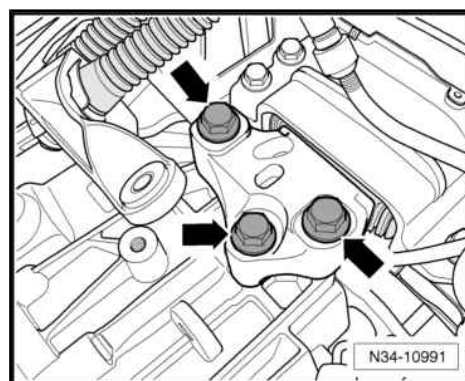
- Remove air cleaner housing ⇒ [page 223](#) .
- Move electrical wiring harness clear at bracket for air cleaner housing.
- Remove bolts -arrows- and detach bracket for air cleaner housing.
- Remove bolts -arrows- securing gearbox mounting.
- Push engine/gearbox assembly slightly towards left and detach coolant pump.



Installing

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

- Tightening torque
⇒ ["2.1 Exploded view - coolant pump and thermostat with housing", page 172](#)
- Clean and smoothen sealing surface for integrated silicone seal on coolant pump.
- Install gearbox mounting ⇒ Rep. gr. 34 .
- Install engine mountings ⇒ [page 43](#) .
- Install air cleaner housing ⇒ [page 223](#) .
- Install poly V-belt for alternator and coolant pump
⇒ [page 51](#) .
- Install cross piece ⇒ [page 264](#) .
- Install pendulum support ⇒ Rep. gr. 34 .



Note

Do not reuse coolant.

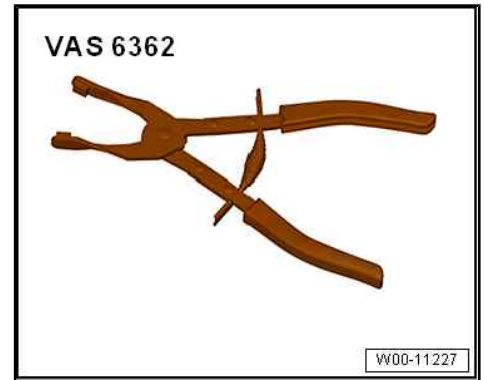
- Fill up with coolant ⇒ [page 166](#) .

Protected by copyright. Copying for private 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.

2.5 Removing and installing thermostat with housing

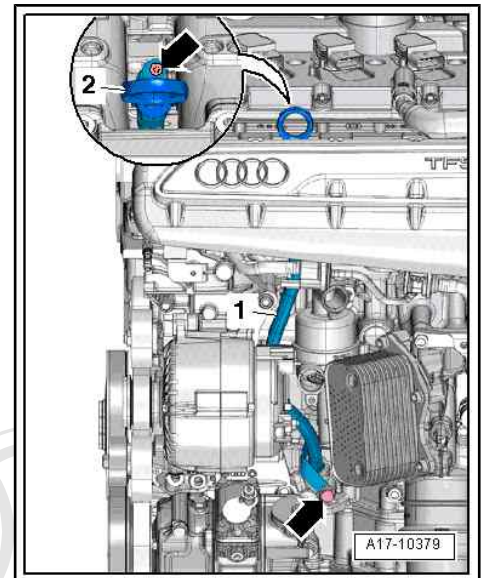
Special tools and workshop equipment required

- ◆ Hose clip pliers - VAS 6362-

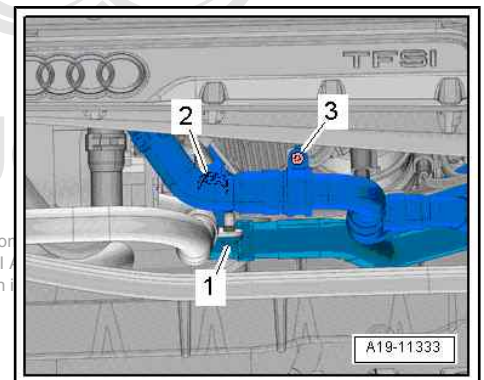


Removing

- Drain coolant ⇒ [page 165](#) .
- Remove radiator cowl ⇒ [page 195](#) .
- Pull out oil dipstick -2-.
- Remove bolts -arrows- and lift off guide tube -1- for oil dipstick.



- Remove bolts -1, 3-.
- Release hose clip -2- and detach coolant hose.
- Remove air cleaner housing ⇒ [page 223](#) .



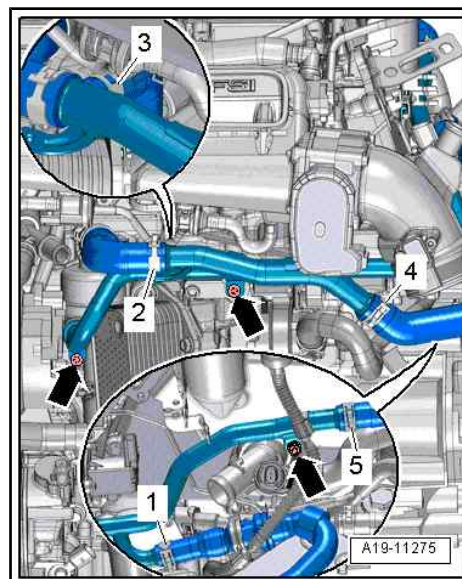
Protected by copyright. Copying for private or commercial use is not permitted unless authorised by AUDI AG. AUDI AG is not responsible for the correctness of information.

- Release hose clip -1- and detach coolant hose.
- Remove bolts and nut -arrows- and detach front coolant pipes from thermostat housing.



Note

Disregard -items 2, 3, 4, 5-.



- Remove bolts -arrows- and detach thermostat housing.

Installing

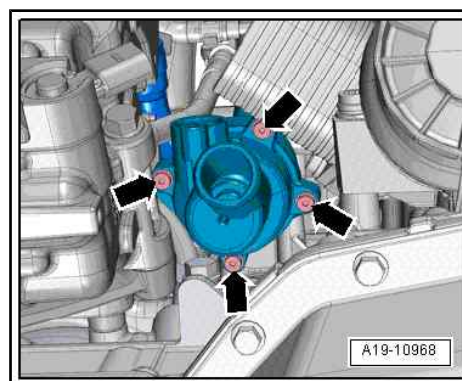
Installation is carried out in the reverse order; note the following:

- Tightening torque
⇒ ["2.1 Exploded view - coolant pump and thermostat with housing", page 172](#)



Note

- ◆ Fit new O-ring.
- ◆ Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ *Electronic parts catalogue*.



- Clean and smoothen sealing surface for O-ring.
- Lubricate O-ring with coolant.
- Install coolant pipes (front) ⇒ [page 187](#).
- Install air cleaner housing ⇒ [page 223](#).
- Secure dipstick guide tube ⇒ [page 138](#).



Note

Do not reuse coolant.

- Fill up with coolant ⇒ [page 166](#).

2.6 Removing and installing coolant distributor housing

Special tools and workshop equipment required

Copyright © 2017 Audi AG. All rights reserved. Copying for private 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.

- ◆ Hose clip pliers - VAS 6362-



Protected by copyright. Copying for private 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

Removing

- Remove intake manifold (top section) ⇒ [page 230](#) .
- Remove thermostat with housing ⇒ [page 178](#) .
- Release hose clip -1- and detach coolant hose.
- Remove bolts -arrows- and detach coolant distributor housing -2- to the left from cylinder block.

Installing

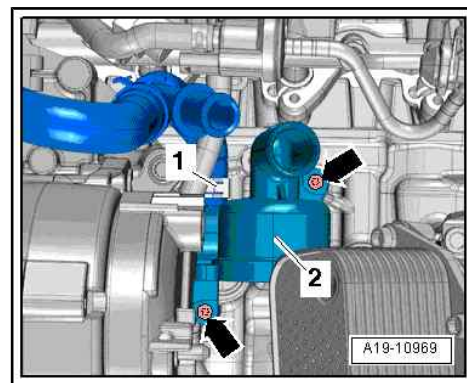
Installation is carried out in the reverse order; note the following:

- Tightening torques
⇒ ["2.1 Exploded view - coolant pump and thermostat with housing", page 172](#)



Note

- ◆ *Fit new O-rings.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ [Electronic parts catalogue](#) .*
- Clean and smoothen sealing surface for O-ring.
- Lubricate O-ring with coolant and slide onto coolant distributor housing.
- Slide coolant distributor housing into bore in cylinder block.
- Install thermostat with housing ⇒ [page 178](#) .
- Install intake manifold (top section) ⇒ [page 230](#) .



3 Coolant pipes

⇒ ["3.1 Exploded view - coolant pipes", page 182](#)

⇒ ["3.2 Removing and installing coolant temperature sender G62", page 183](#)

⇒ ["3.3 Removing and installing coolant pipe \(left-side\)", page 184](#)

⇒ ["3.4 Removing and installing coolant pipes \(right-side\)", page 185](#)

⇒ ["3.5 Removing and installing coolant pipes \(front\)", page 187](#)

⇒ ["3.6 Removing and installing coolant pipe on gearbox", page 188](#)

3.1 Exploded view - coolant pipes

1 - Coolant pipes (right-side)

- ☐ Removing and installing
⇒ [page 185](#)

2 - Bolt

- ☐ 20 Nm

3 - Seal

- ☐ Renew

4 - Nut

- ☐ 9 Nm

5 - Retaining clip

6 - Coolant temperature sender - G62-

- ☐ Removing and installing
⇒ [page 183](#)

7 - O-ring

- ☐ Renew

8 - Coolant connection

9 - Nut

- ☐ 9 Nm

10 - Coolant pipe (left-side)

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

11 - Bolt

- ☐ 9 Nm

12 - Coolant pipes (front)

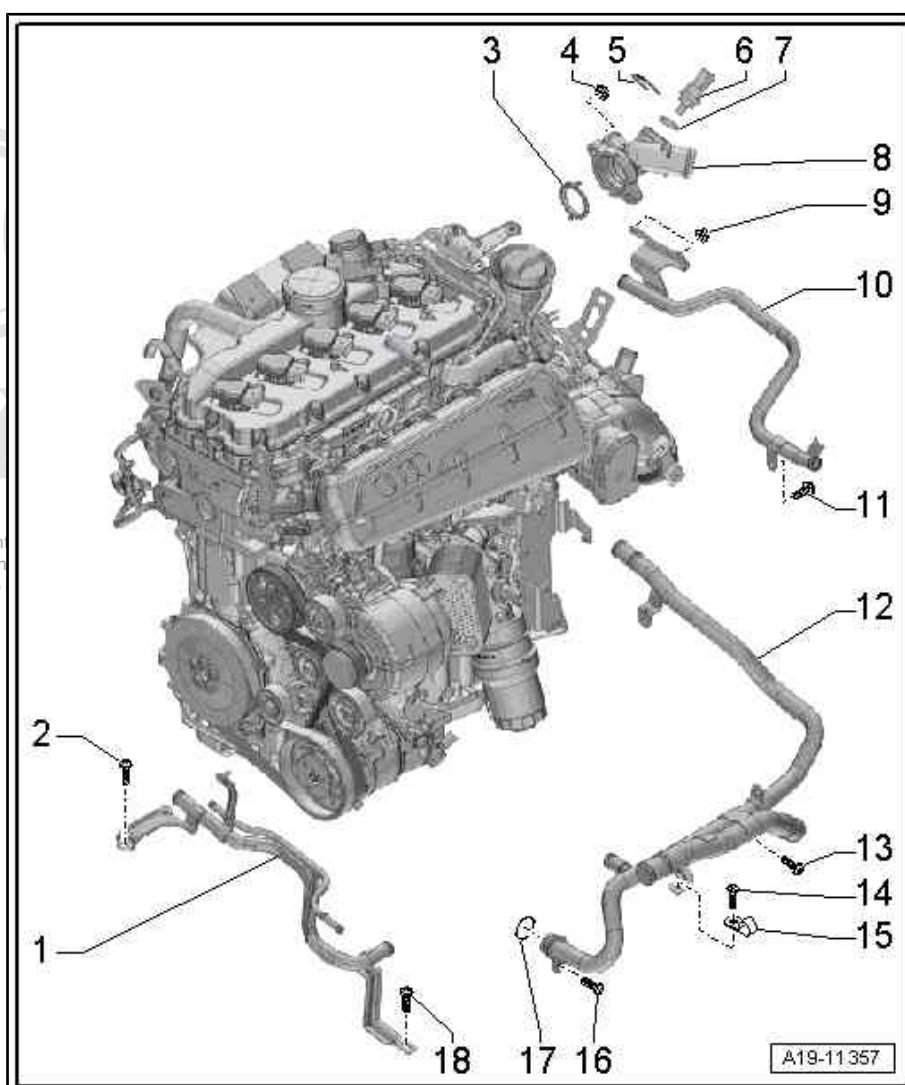
- ☐ Removing and installing
⇒ [page 187](#)

13 - Bolt

- ☐ 9 Nm

14 - Bolt

- ☐ 9 Nm



15 - Retaining clamp

16 - Bolt

- ☐ 9 Nm

17 - O-ring

- ☐ Renew

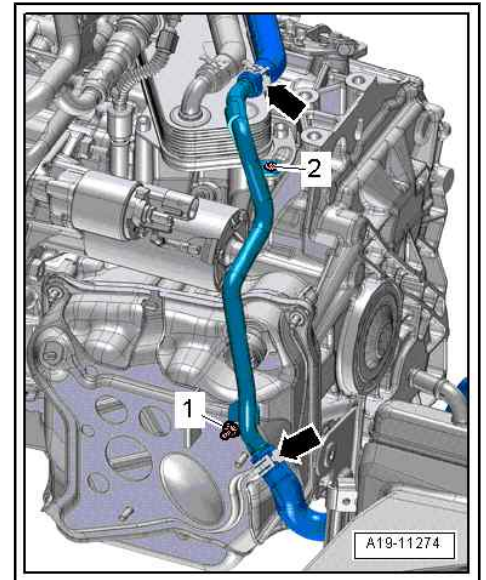
18 - Bolt

- ☐ 9 Nm

Coolant pipe on gearbox - tightening torques

- 1 - Nut, 9 Nm

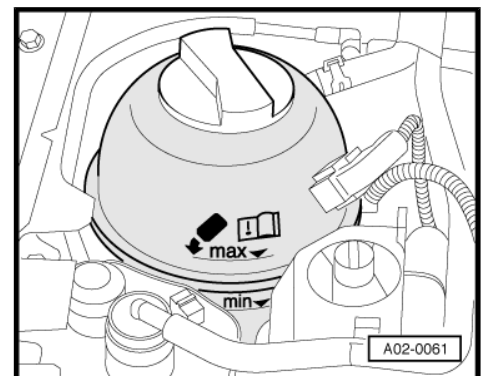
- 2 - Bolt, 9 Nm



3.2 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 air cleaner housing → [page 223](#)



- Unplug electrical connector -1-.



Note

Place a cloth underneath to catch escaping coolant.

- Pull out retaining clip -2- and detach coolant temperature sender - G62- .

Installing

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



Note

- ◆ Fit new O-ring.
- ◆ Insert new coolant temperature sender - G62- immediately in-to connection to avoid loss of coolant.

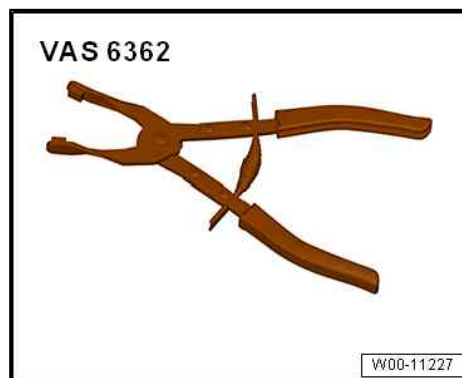
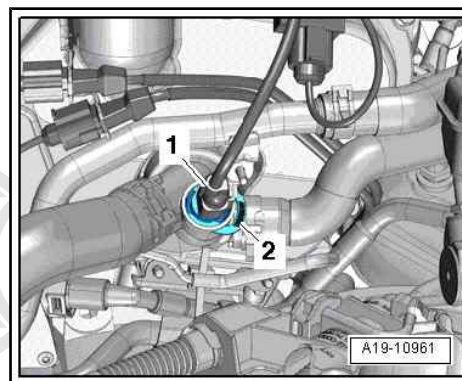
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Install air cleaner housing ⇒ [page 223](#) .
- Check coolant level ⇒ [page 169](#) .

3.3 Removing and installing coolant pipe (left-side)

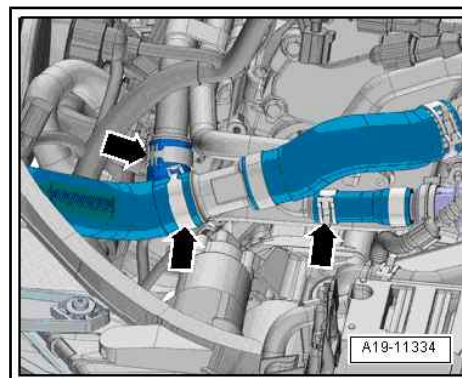
Special tools and workshop equipment required

- ◆ Hose clip pliers - VAS 6362-

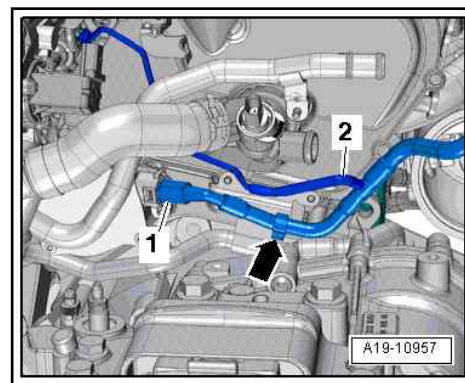


Removing

- Drain coolant ⇒ [page 165](#) .
- Remove air cleaner housing ⇒ [page 223](#) .
- Release hose clips -arrows- and detach coolant hoses.
- Remove gear oil filter ⇒ Rep. gr. 34 .



- Disconnect vacuum hose -2-.
- Move clear vacuum hose -1- -arrow- and disconnect from vacuum pump for brake servo.



- Remove nuts and bolts -arrows-.
- Release hose clip -2- and detach coolant pipe (left-side).

i Note

Disregard -item 1-.

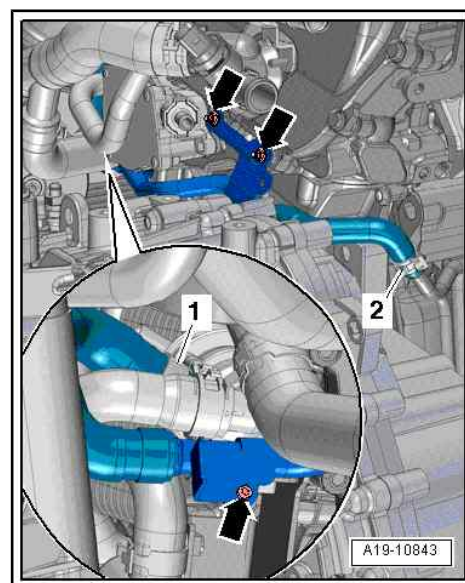
Installing

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

- Tightening torque
⇒ ["3.1 Exploded view - coolant pipes", page 182](#)

i Note

Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ *Electronic parts catalogue*.



- Install air cleaner housing ⇒ [page 223](#).

i Note

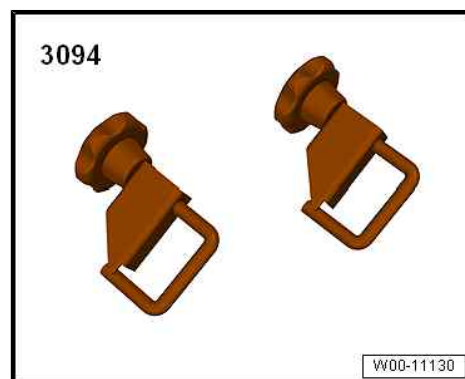
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted.
Do not reuse coolant. AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Fill up with coolant ⇒ [page 166](#).

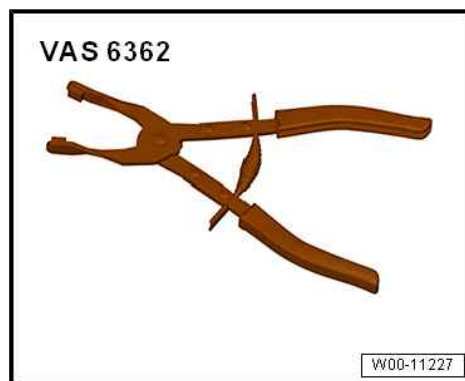
3.4 Removing and installing coolant pipes (right-side)

Special tools and workshop equipment required

- ◆ Hose clamps, up to 25 mm - 3094-



- ◆ Hose clip pliers - VAS 6362-



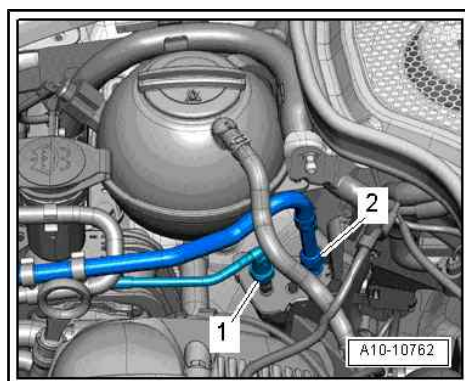
Removing

- Disconnect hose -1- at activated charcoal filter (press release tab) and move hose clear.



Note

Disregard -item 2-.

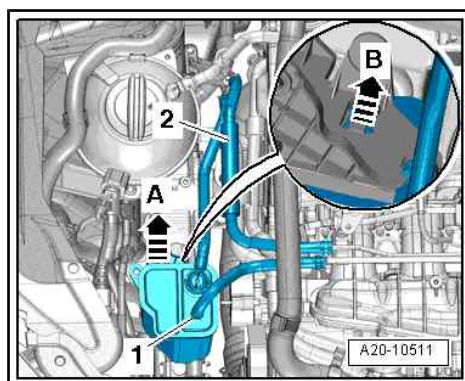


- Release activated charcoal filter -arrow B-, lift off -arrow A- and move clear to one side with hose -1- connected.

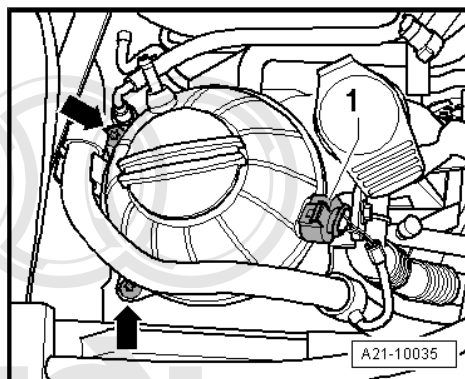


Note

Disregard -item 2-.



- Remove bolts -arrows-.
- Unplug electrical connector -1- for coolant shortage indicator switch - F66- and move coolant expansion tank to side.



 Note

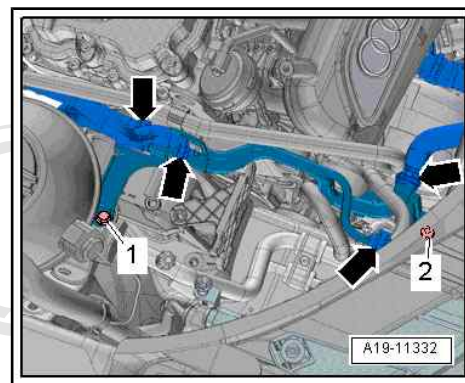
Place a cloth underneath to catch escaping coolant.

- Move fuel hose clear.
- Clamp off coolant hoses -arrows- with hose clamps up to 25 mm - 3094- and detach.
- Unscrew bolt -1, 2- and remove coolant pipes (right-side).

Installing

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

- Tightening torques
⇒ ["3.1 Exploded view - coolant pipes", page 182](#)



 Note

Protected by copyright. Copying for private 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.

Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ [Electronic parts catalogue](#) .

- Check coolant level ⇒ [page 169](#) .

3.5 Removing and installing coolant pipes (front)

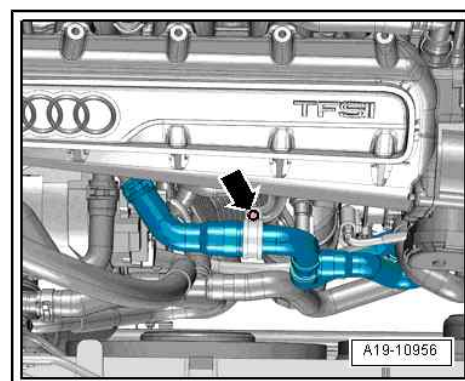
Special tools and workshop equipment required

- ◆ Hose clip pliers - VAS 6362-

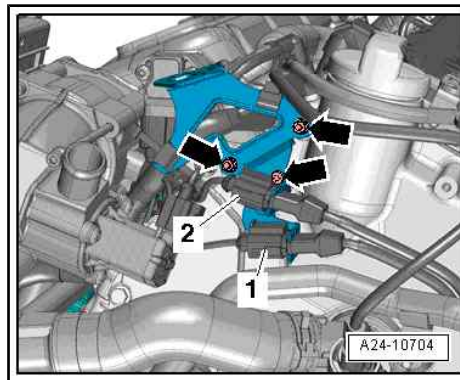


Removing

- Remove air cleaner housing ⇒ [page 223](#) .
- Remove intake manifold (top section) ⇒ [page 230](#) .
- Drain coolant ⇒ [page 165](#) .
- Remove bolt -arrow- from retaining clamp.



- Take electrical connectors -1- and -2- out of bracket.
- Remove nut and bolt -arrows- and detach bracket.



- Release hose clips -1 ... 5- and detach coolant hoses.
- Remove bolts and nut -arrows- and detach front coolant pipes from thermostat housing.

Installing

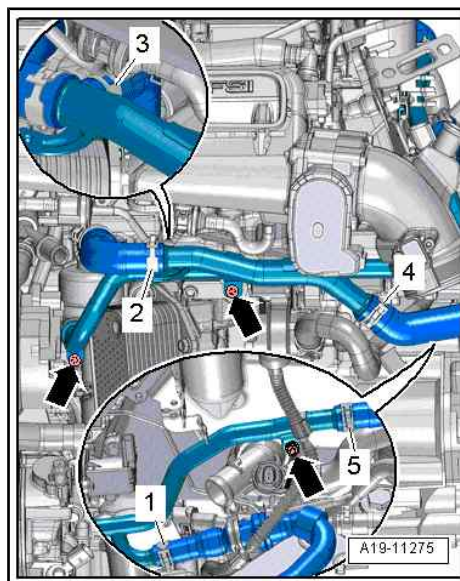
Tightening torques

- ⇒ [“3.1 Exploded view - coolant pipes”, page 182](#)
- ⇒ [“1.1 Exploded view - timing chain covers”, page 79](#)

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

Note

- ◆ *Fit new O-ring.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ [Electronic parts catalogue](#) .*
- Install intake manifold (top section) ⇒ [page 230](#) .
- Install air cleaner housing ⇒ [page 223](#) .



Note

Do not reuse coolant.

- Fill up with coolant ⇒ [page 166](#) .

3.6 Removing and installing coolant pipe on gearbox

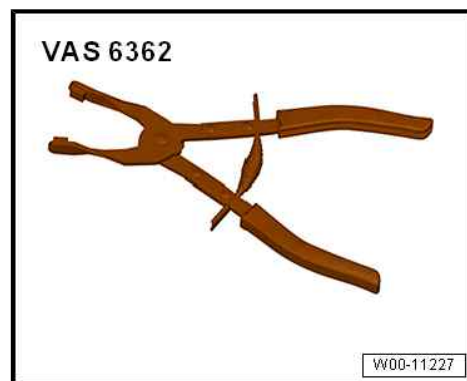
Special tools and workshop equipment required

- ◆ Hose clamps, up to 25 mm - 3094-



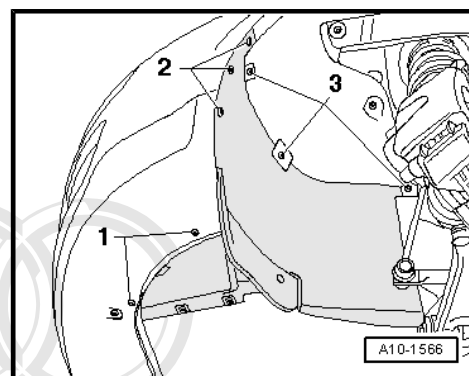
Protected by copyright. Copying for private or commercial purposes, in part or in full, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept liability with respect to the correctness of information in this document. Copyright

- ◆ Hose clip pliers - VAS 6362-



Removing

- Remove air cleaner housing ⇒ [page 223](#) .
- Remove front section of front wheel housing liner (left-side) ⇒ Rep. gr. 66 .



- Remove nut -1- and bolt -2-.



Note

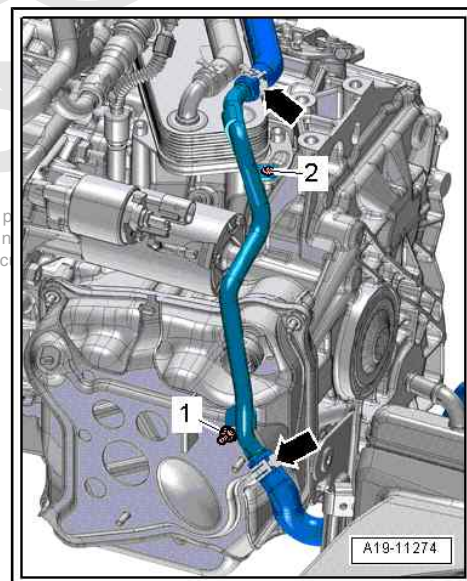
Place a cloth underneath to catch escaping coolant.

- Clamp off coolant hoses -arrows- with hose clamps up to 25 mm - 3094- and detach from coolant pipe.

Installing

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

- Tightening torques
⇒ ["3.1 Exploded view - coolant pipes", page 182](#)
- Install front section of front wheel housing liner (left-side) ⇒ Rep. gr. 66 .
- Install air cleaner housing ⇒ [page 223](#) .
- Check coolant level ⇒ [page 169](#) .



4 Radiators and radiator fans

⇒ ["4.1 Exploded view - radiator and radiator fans", page 190](#)

⇒ ["4.2 Removing and installing radiator", page 192](#)

⇒ ["4.3 Removing and installing auxiliary radiator", page 193](#)

⇒ ["4.4 Removing and installing radiator cowl", page 195](#)

⇒ ["4.5 Removing and installing radiator fans V7 / V177", page 197](#)

4.1 Exploded view - radiator and radiator fans

Radiator, radiator fans

1 - Radiator fan - V7-

- ☐ Removing and installing
⇒ [page 197](#)

2 - Nut

- ☐ 10 Nm

3 - Radiator cowl

- ☐ Removing and installing
⇒ [page 195](#)

4 - Coolant hose (top)

- ☐ Connecting to radiator
⇒ [page 191](#)

5 - Coolant hose

6 - O-ring

- ☐ Renew

7 - Radiator

- ☐ Removing and installing
⇒ [page 192](#)

8 - Bolt

- ☐ 5 Nm

9 - Mounting

10 - Mounting

11 - O-ring

- ☐ Renew

12 - Coolant hose (bottom)

- ☐ Connecting to radiator
⇒ [page 191](#)

13 - Nut

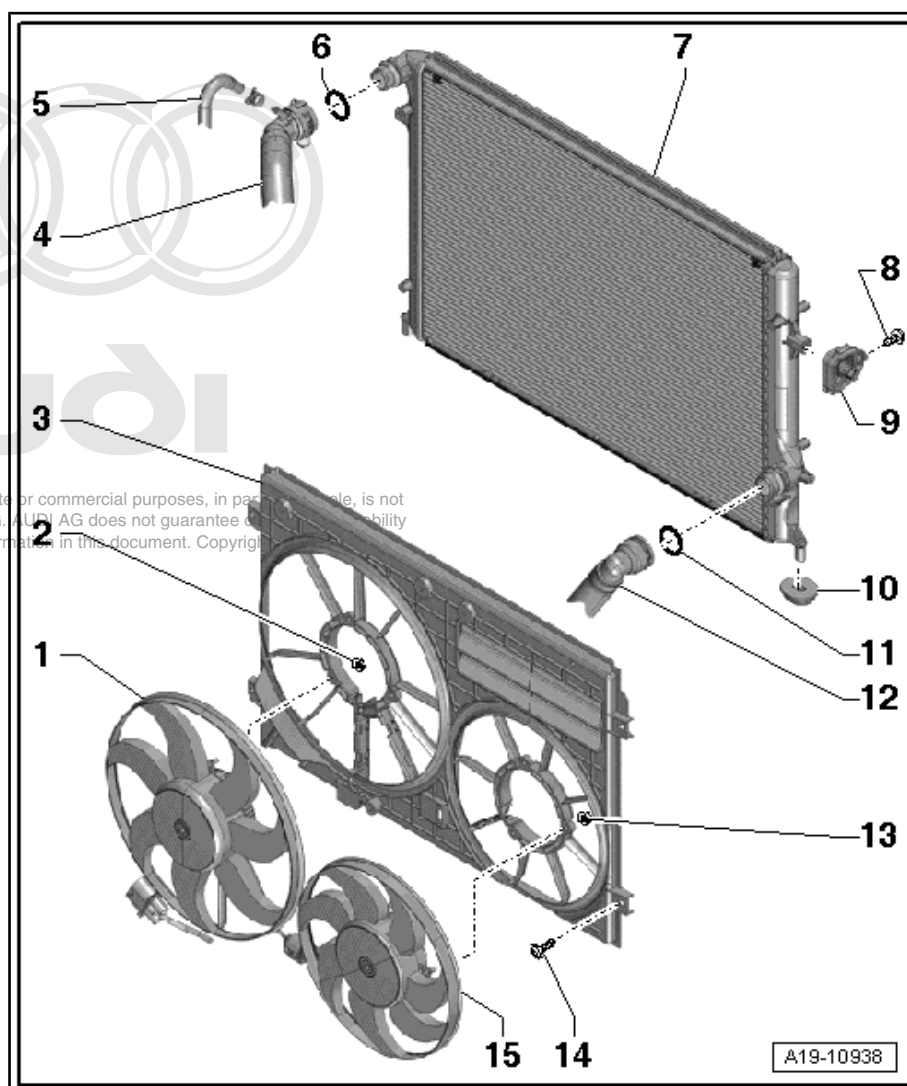
- ☐ 10 Nm

14 - Bolt

- ☐ 5 Nm

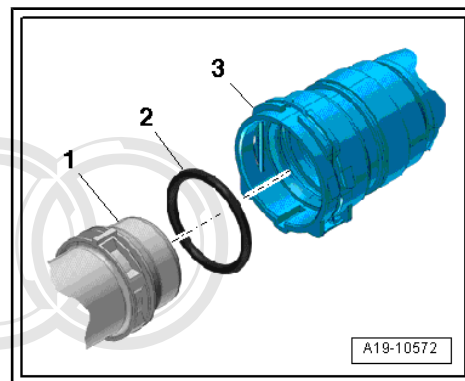
15 - Radiator fan 2 - V177-

- ☐ Removing and installing ⇒ [page 197](#)



Connecting coolant hose with plug-in connector to radiator

- Remove old O-ring -2- from coolant hose -3-.
- Lightly lubricate new O-ring with coolant and fit O-ring in coolant hose.
- Press coolant hose onto radiator -1- until it engages with a click.
- Press coolant hose in again and then pull to check that plug-in connector is correctly engaged.



Auxiliary radiator

1 - Air duct

2 - Auxiliary radiator

- ☐ Removing and installing
⇒ [page 193](#)

3 - Retaining clamp

4 - Bolt

- ☐ 6.5 Nm

5 - Nut

- ☐ 23 Nm

6 - Grommet

7 - Bracket

8 - Coolant hose

9 - Coolant hose

10 - Bracket

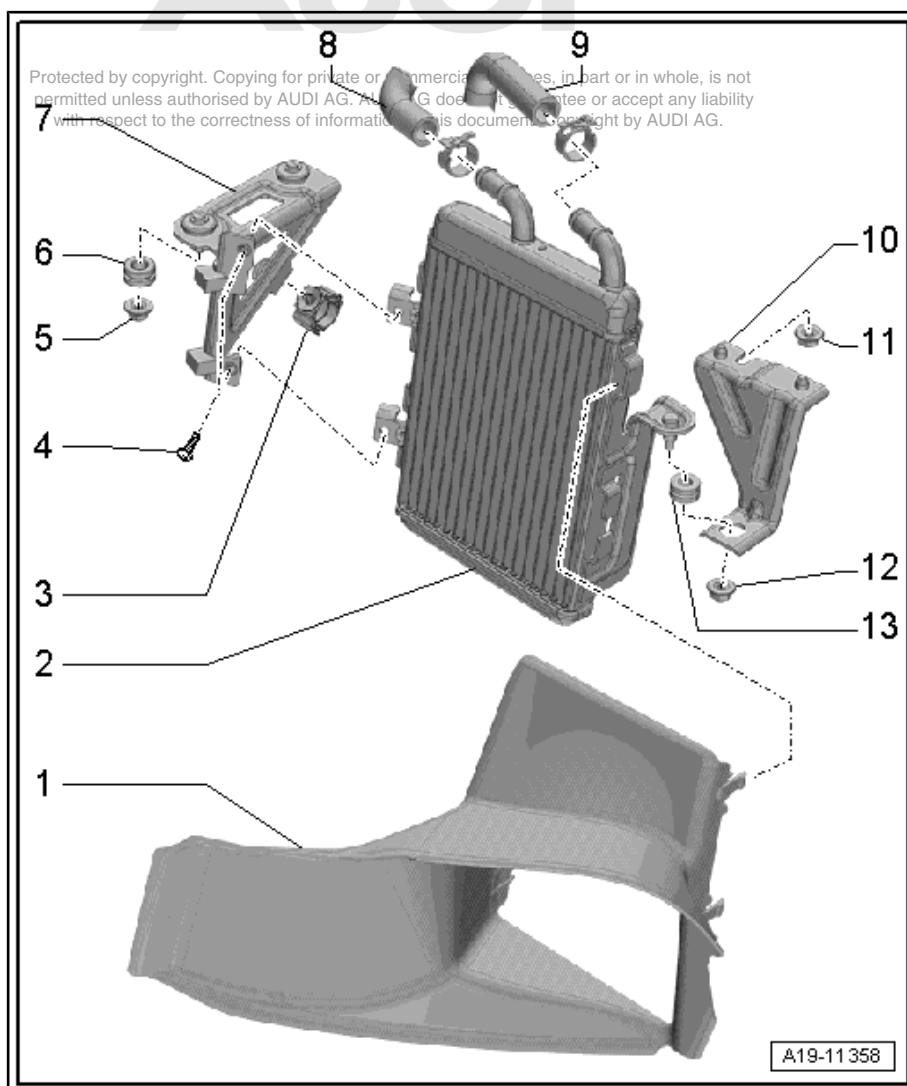
11 - Nut

- ☐ 23 Nm

12 - Nut

- ☐ 9 Nm

13 - Grommet



4.2 Removing and installing radiator

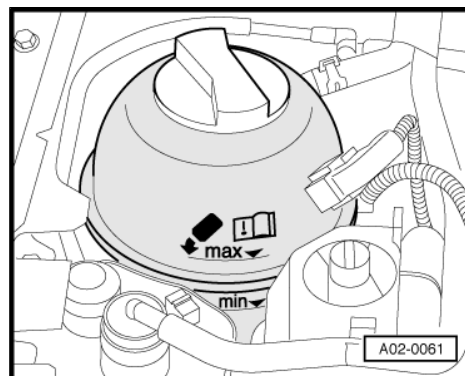
Removing



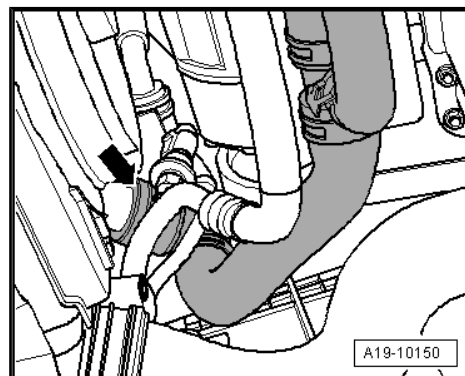
WARNING

Risk of scalding due to hot steam and hot coolant.

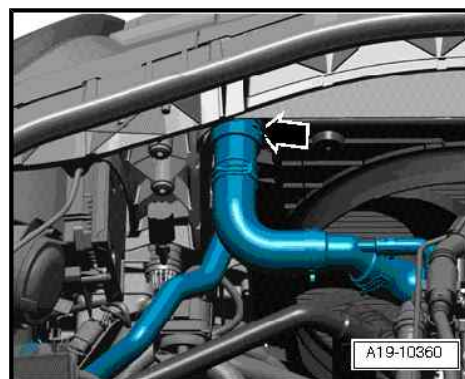
- ◆ *The cooling system is under pressure when the engine is hot.*
- ◆ *To allow pressure to dissipate, cover filler cap on coolant expansion tank with cloth and open carefully.*



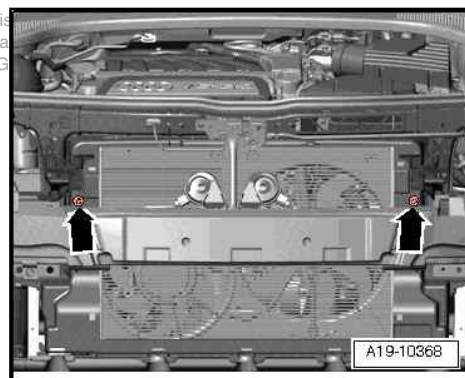
- Open filler cap on coolant expansion tank.
- Remove charge air cooler ⇒ [page 210](#) .
- Remove radiator cowl ⇒ [page 195](#) .
- Place drip tray for workshop hoist - VAS 6208- beneath engine.
- Lift retaining clip -arrow-, disconnect coolant hose (bottom) from radiator and drain off coolant.



- Lift retaining clip -arrow- and disconnect coolant hose (top) from radiator.



- Remove bolts -arrows-.
- Swivel top edge of radiator slightly to rear.
- Lift radiator out of bottom mounting points.
- Push radiator towards engine.
- Support radiator from below to prevent radiator from dropping.





WARNING

Risk of injury caused by refrigerant.

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



Caution

Risk of damage to condenser and refrigerant pipes/hoses.

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

- Remove bolts -arrows-.
- Disconnect condenser from radiator.
- Move condenser to front and place in lock carrier, then secure with cable ties to prevent from dropping.
- Take out radiator downwards.

Installing

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

- Tightening torques
⇒ ["4.1 Exploded view - radiator and radiator fans", page 190](#)



Note

If there are slight impressions on the fins, refer to ⇒ [page 7](#).

- Install condenser ⇒ Rep. gr. 87 .
- Install radiator cowl ⇒ [page 195](#) .
- Connect coolant hose with plug-in connector to radiator
⇒ [page 191](#) .
- Install charge air cooler ⇒ [page 210](#) .



Note

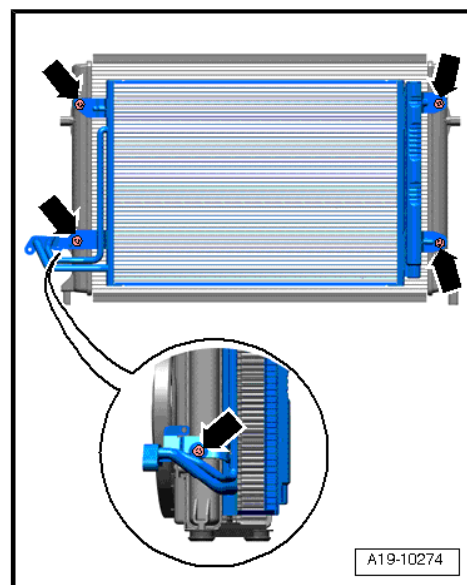
Do not reuse coolant.

- Fill up with coolant ⇒ [page 166](#) .

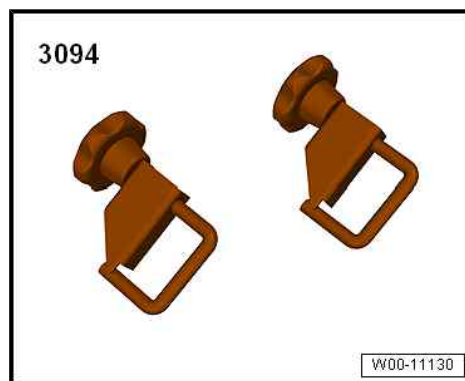
4.3 Removing and installing auxiliary radiator

Special tools and workshop equipment required

Protected by copyright. Copying for private 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.



- ◆ Hose clamps, up to 25 mm - 3094-



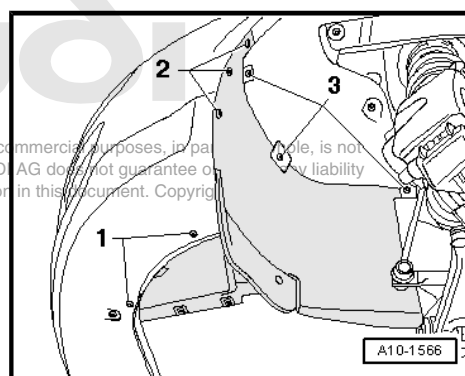
- ◆ Hose clip pliers - VAS 6362-



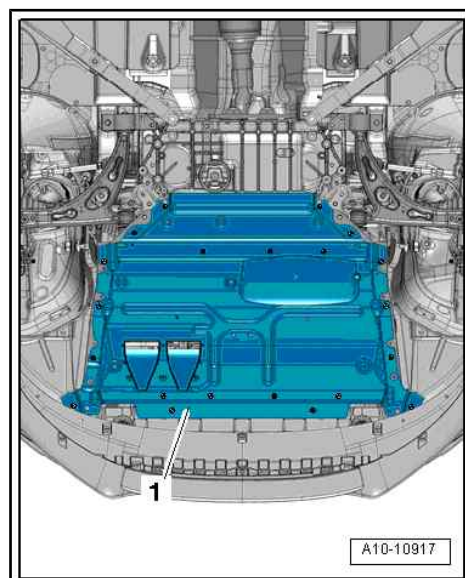
Removing

- Remove front section of front wheel housing liner (left-side) ⇒ Rep. gr. 66 .

Protected by copyright. Copying for private or commercial purposes, in part or in full, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee the accuracy of the information with respect to the correctness of information in this document. Copyright



- Remove noise insulation -1- ⇒ Rep. gr. 66 .



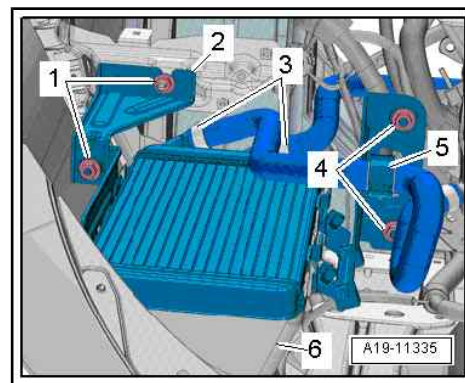
- Move coolant hose clear -5-.
- Remove nuts -1- and detach bracket -2-.
- Unscrew nuts -4- and detach auxiliary radiator.
- Clamp off coolant hoses using hose clamps -3094- , release hose clips -3- and disconnect coolant hoses.
- Unclip air duct -6- from auxiliary radiator.



Caution

Take care to keep components clean.

◆ *There will still be some coolant in the auxiliary cooler.*



Installing

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

- Tightening torques
⇒ ["4.1 Exploded view - radiator and radiator fans", page 190](#)



Note

Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .

- Install noise insulation and front section of front wheel housing liner (left-side) ⇒ Rep. gr. 66 .



Note

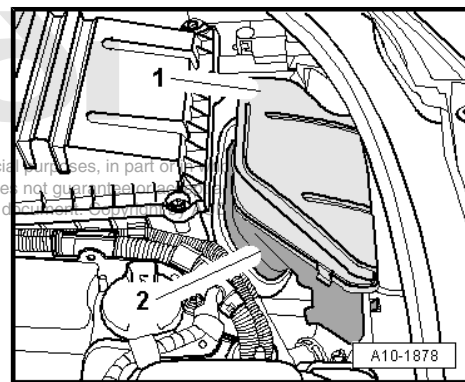
Do not reuse coolant.

- Fill up with coolant ⇒ [page 166](#) .

4.4 Removing and installing radiator cowl

Removing

- Pull cover -1- off air duct (release clip on side).
- Unclip air duct -2-.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee the accuracy of the information with respect to the correctness of information in this document.


WARNING

Risk of injury as the radiator fans may start up automatically.

- ◆ *Even when the ignition is switched off, the radiator fans can start up without warning due to accumulated heat in the engine compartment, etc.*

– Remove bolt -arrow- and push coolant pipe -1- towards rear.

– Remove bolts -1-.


Note

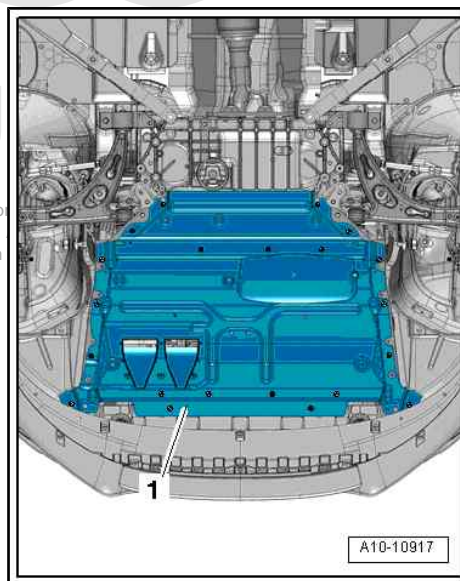
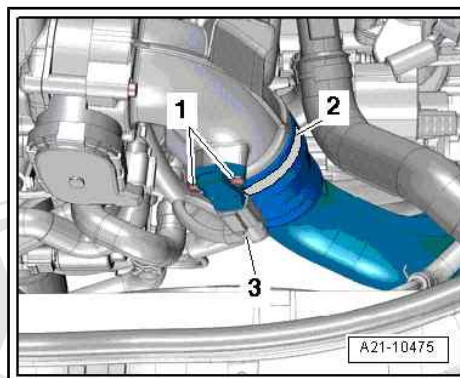
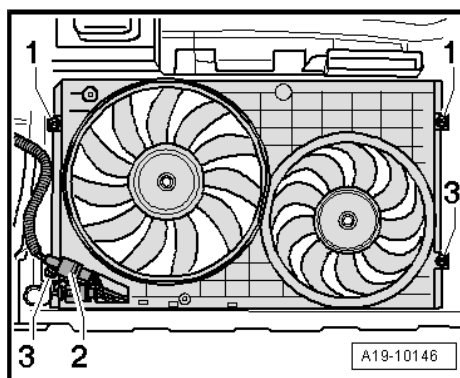
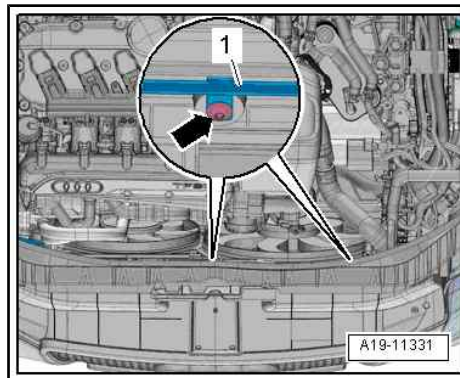
Bolts -3- are removed at a later stage.

– Release hose clip -2-.


Note

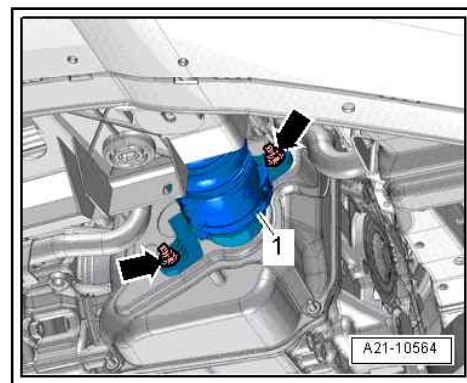
Disregard items -1 and 3-.

– Remove noise insulation -1- ⇒ Rep. gr. 66 .



Protected by copyright. Copying for private or commercial use is not permitted unless authorised by AUDI AG. AUDI AG is not responsible for the correctness of information.

- Remove nuts -arrows-.
- Release hose clip -1- and detach air pipe.



- Unplug electrical connector -2- for radiator fan.
- Remove bolts -3- and take out radiator cowl downwards.

Installing

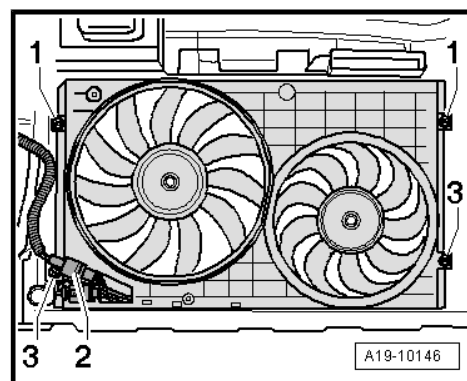
Installation is carried out in the reverse order; note the following:

- Tightening torque
⇒ ["4.1 Exploded view - radiator and radiator fans", page 190](#)



Note

Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .



- Install air pipe ⇒ [page 208](#) .
- Install noise insulation ⇒ Rep. gr. 66 .
- Install charge pressure sender - G31- / intake air temperature sender 2 - G299- ⇒ [page 202](#) .

4.5 Removing and installing radiator fans - V7- / -V177-

Removing

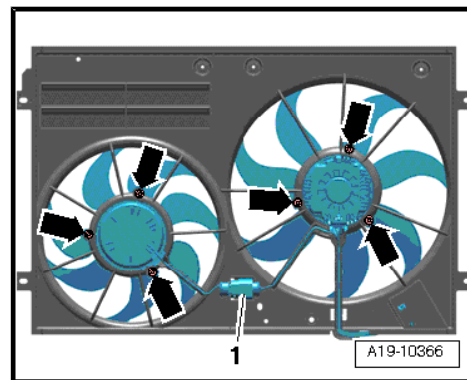
- Remove radiator cowl ⇒ [page 195](#) .
- Unplug electrical connector -1-.
- ~~Move electrical wiring clear.~~
- Unscrew nuts -arrows- and remove corresponding radiator fan.

Installing

- Tightening torque ⇒ [page 190](#)

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

- Install radiator cowl ⇒ [page 195](#) .



21 – Turbocharging/supercharging

1 Turbocharger

⇒ “1.1 Exploded view - turbocharger”, page 198

⇒ “1.2 Removing and installing charge pressure sender G31 / intake air temperature sender 2 G299”, page 202

⇒ “1.3 Removing and installing turbocharger air recirculation valve N249”, page 202

⇒ “1.4 Removing and installing turbocharger”, page 203

1.1 Exploded view - turbocharger

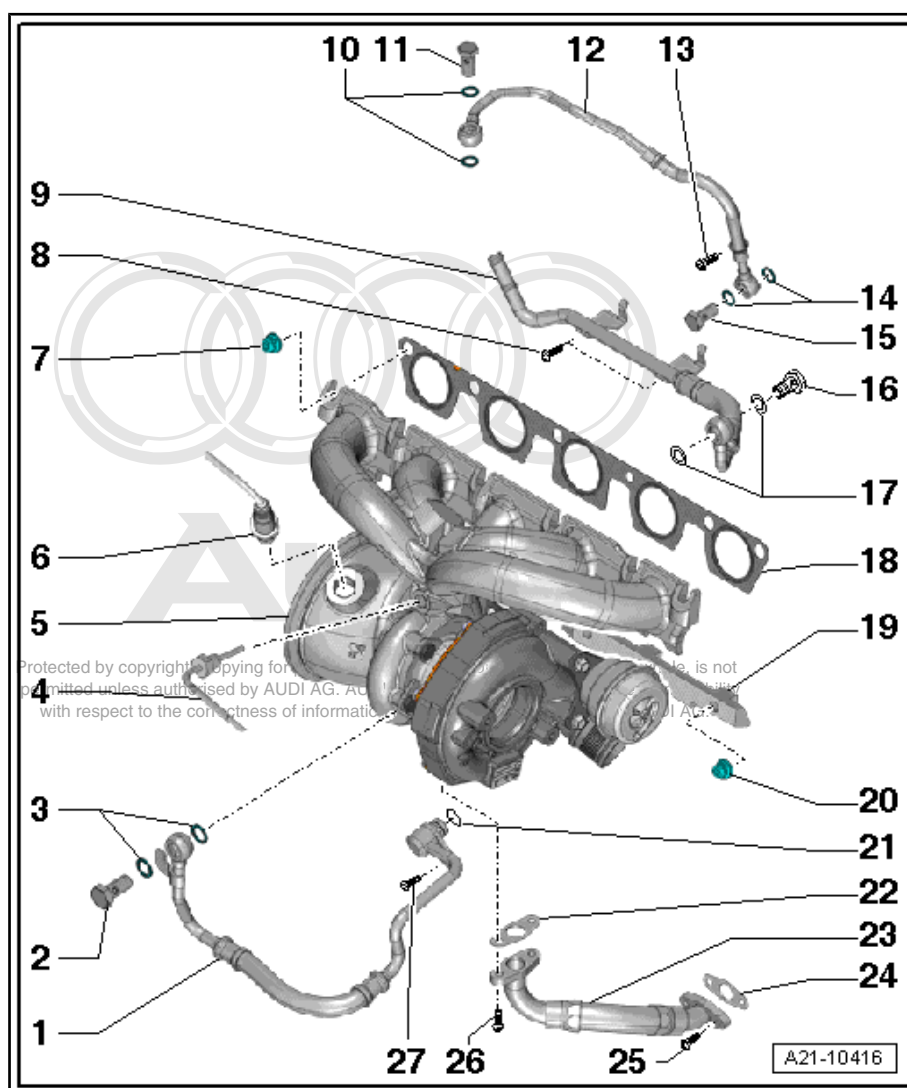


Note

- ◆ Observe rules for cleanliness ⇒ [page 5](#).
- ◆ Check that all air pipes and hoses and vacuum lines are correctly fitted and that there are no leaks before carrying out tests or repairs.

Part 1

- 1 - Coolant supply line
- 2 - Banjo bolt
 - 37.5 Nm
- 3 - Seals
 - Renew
- 4 - Not fitted
- 5 - Turbocharger
 - Combined with exhaust manifold
 - Removing and installing ⇒ [page 203](#)
- 6 - Lambda probe - G39- with Lambda probe heater - Z19-
 - Removing and installing ⇒ [page 255](#)
- 7 - Nut
 - Tightening torque and sequence ⇒ [page 199](#)
- 8 - Bolt
 - 9 Nm
- 9 - Coolant return line
- 10 - Seals
 - Renew
- 11 - Banjo bolt
 - 37.5 Nm
- 12 - Oil supply line
- 13 - Bolt
 - 9 Nm



14 - Seals

- ☐ Renew

15 - Banjo bolt

- ☐ 37.5 Nm

16 - Banjo bolt

- ☐ 37.5 Nm

17 - Seals

- ☐ Renew

18 - Gasket

- ☐ Renew

19 - Mounting strip

- ☐ Remains installed when turbocharger is removed

20 - Nut

- ☐ Renew

- ☐ First tighten centre nut on mounting strip

- ☐ 30 Nm

21 - O-ring

- ☐ Renew

22 - Gasket

- ☐ Renew

23 - Oil return line

24 - Gasket

- ☐ Renew

25 - Bolt

- ☐ 9 Nm

26 - Bolt

- ☐ 9 Nm

27 - Bolt

- ☐ 9 Nm

Turbocharger - tightening torque and sequence

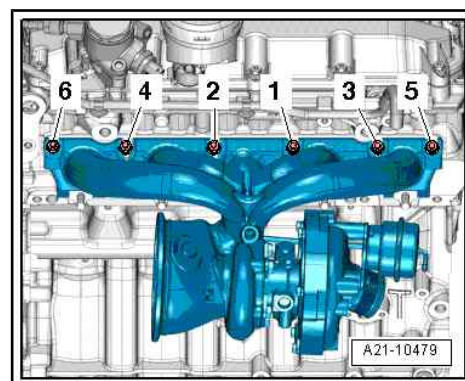


Note

Renew nuts for turbocharger.

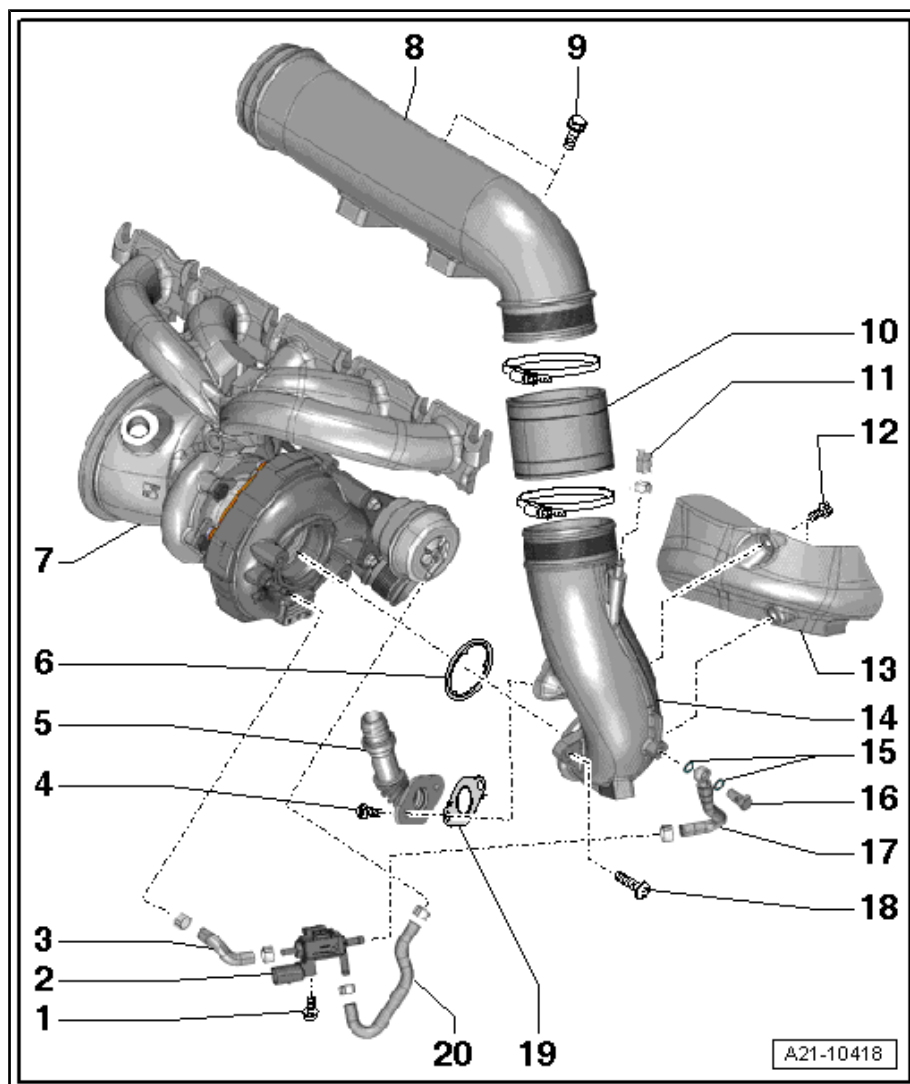
- Tighten bolts in 4 stages in the sequence shown:

Stage	Bolts	Tightening torque
1.	-1 ... 6-	15 Nm
2.	-1 ... 6-	33 Nm
3.	-1 ... 6-	33 Nm ¹⁾
4.	-1 ... 6-	33 Nm ¹⁾
• ¹⁾ Performing this procedure guarantees all bolts remain tightened to 33 Nm after turbocharger gasket has settled.		



Part 2

- 1 - Bolt
 - ☐ 4 Nm
- 2 - Charge pressure control solenoid valve - N75-
- 3 - Hose
- 4 - Bolt
 - ☐ 9 Nm
- 5 - Connection
 - ☐ For crankcase breather
- 6 - Seal
 - ☐ Renew
 - ☐ Clip onto air pipe
- 7 - Turbocharger
 - ☐ Combined with exhaust manifold
 - ☐ Removing and installing
⇒ [page 203](#)
- 8 - Air pipe
- 9 - Bolt
 - ☐ 9 Nm
- 10 - Air hose
- 11 - Hose
- 12 - Bolt
 - ☐ 9 Nm
- 13 - Heat shield
- 14 - Air pipe
- 15 - Seals
 - ☐ Renew
- 16 - Banjo bolt
 - ☐ 15.5 Nm
- 17 - Hose
- 18 - Bolt
 - ☐ 9 Nm
- 19 - Gasket
 - ☐ Renew
 - ☐ Clip onto connection
- 20 - Hose



Protected by copyright. Copying for private 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.

Part 3

1 - O-ring

- ☐ Renew

2 - Throttle valve module - J338-

- ☐ Removing and installing
⇒ [page 228](#)

3 - Intake connecting pipe

- ☐ Removing and installing
⇒ "3.3 Removing and installing throttle valve module J338",
[page 228](#)

4 - Bolt

- ☐ Tightening torque
⇒ [Item 21 \(page 225\)](#)

5 - Turbocharger air recirculation valve - N249-

- ☐ Removing and installing
⇒ [page 202](#)

6 - Bolt

- ☐ 9 Nm

7 - O-ring

- ☐ Renew

8 - O-ring

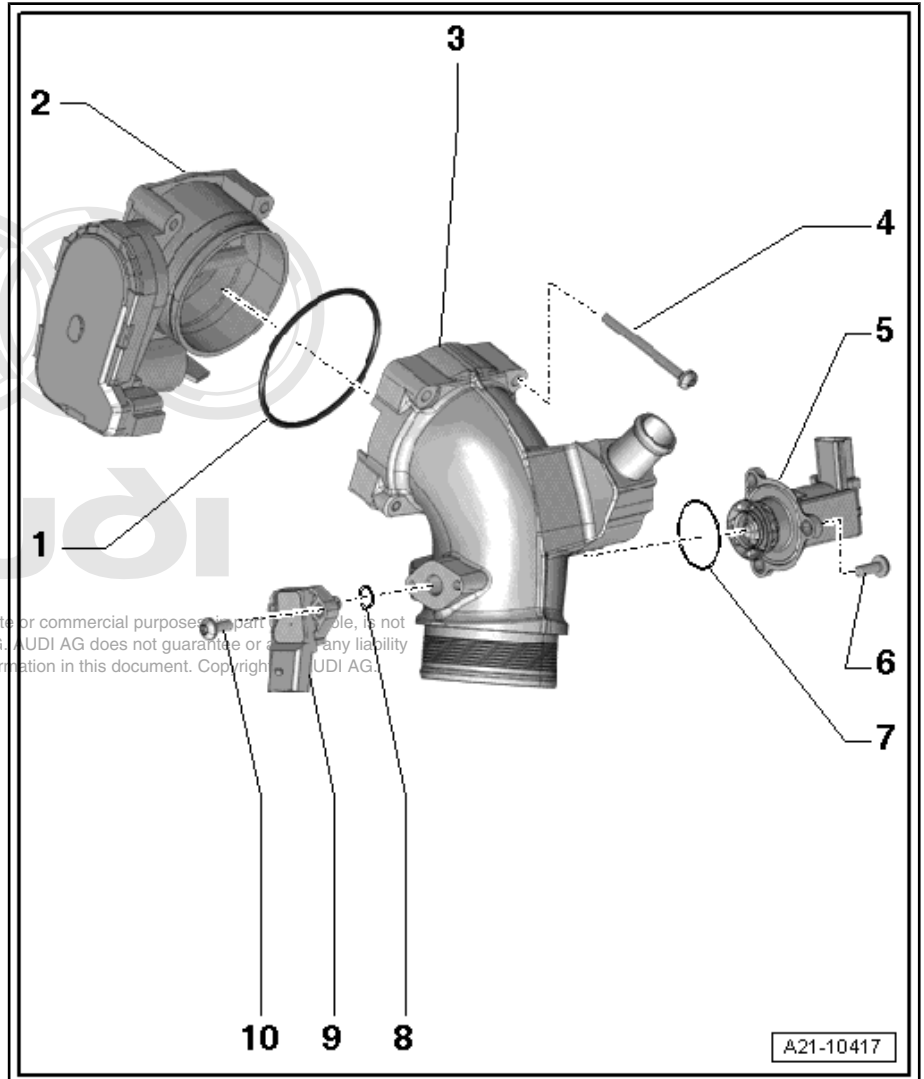
- ☐ Renew

9 - Charge pressure sender - G31- / intake air temperature sender 2 - G299-

- ☐ Removing and installing
⇒ [page 202](#)

10 - Bolt

- ☐ 9 Nm



1.2 Removing and installing charge pressure sender - G31- / intake air temperature sender 2 - G299-

Removing

- Unplug electrical connector -3-.
- Unscrew bolts -1- and remove charge pressure sender - G31- / intake air temperature sender 2 - G299- .



Note

Disregard -item 2-.

Installing

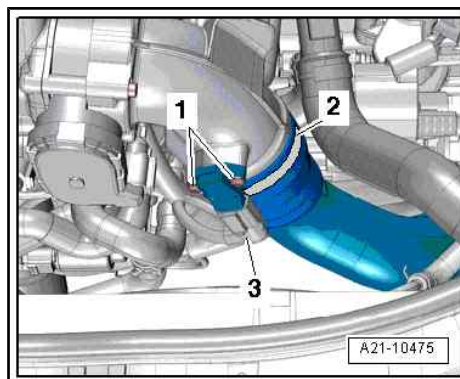
- Tightening torque ⇒ [page 198](#)

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



Note

Fit new O-ring.



1.3 Removing and installing turbocharger air recirculation valve - N249-

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted without the prior written consent of 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.

Removing

- Remove air cleaner housing ⇒ [page 223](#) .
- Unplug electrical connector -2-.
- Unscrew bolts -1- and remove turbocharger air recirculation valve - N249- .

Installing

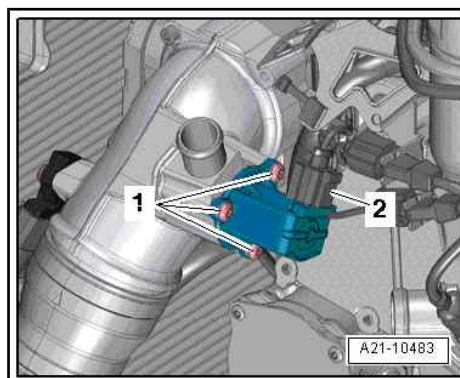
- Tightening torque ⇒ [page 198](#)

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

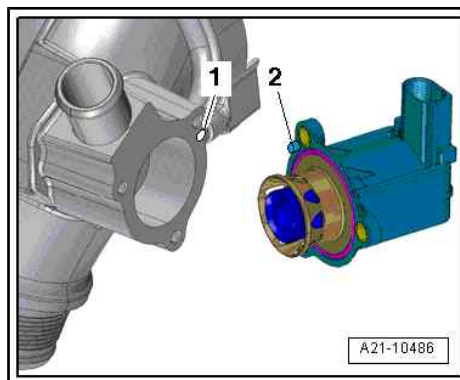


Note

Fit new O-ring.



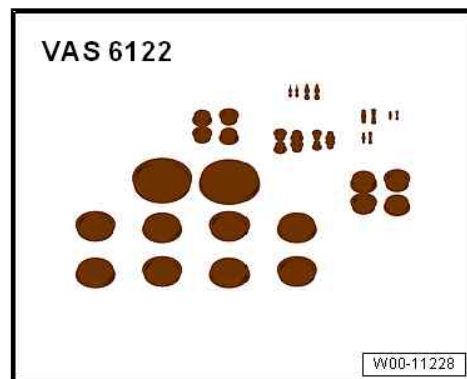
- Installation position: Lug -2- on turbocharger air recirculation valve - N249- must be inserted in hole -1- on intake connection.
- Install air cleaner housing ⇒ [page 223](#) .



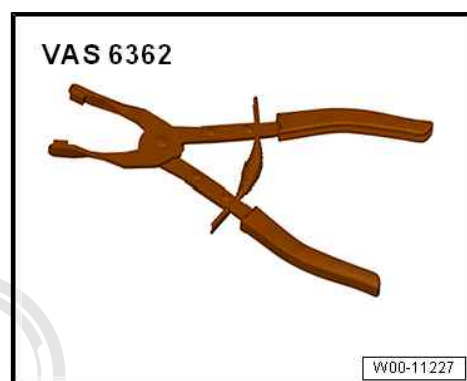
1.4 Removing and installing turbocharger

Special tools and workshop equipment required

- ◆ Engine bung set - VAS 6122-



- ◆ Hose clip pliers - VAS 6362-



Removing



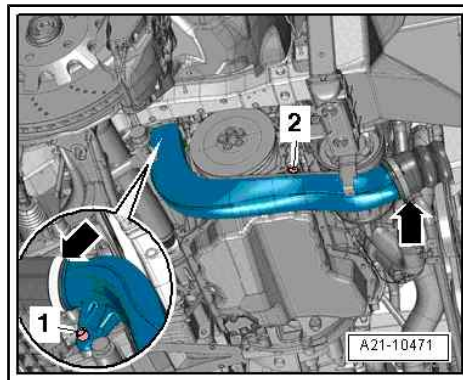
Caution

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.**

- Drain coolant ⇒ [page 165](#) .
- Remove plenum chamber partition panel ⇒ Rep. gr. 50 .
- Remove Lambda probe - G39- ⇒ [page 255](#) .
- Remove high-pressure pump ⇒ [page 249](#) .

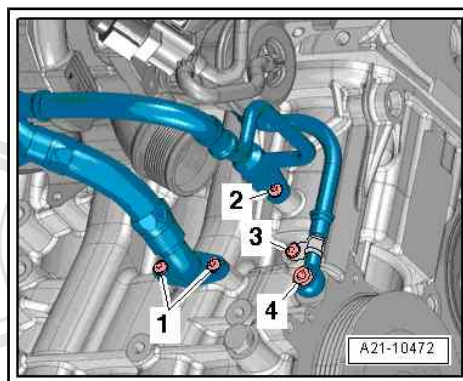
- Remove bolts -1- and -2-.
- Loosen hose clips -arrows- and detach air pipe.



Note

Place a cloth underneath to catch escaping coolant and engine oil.

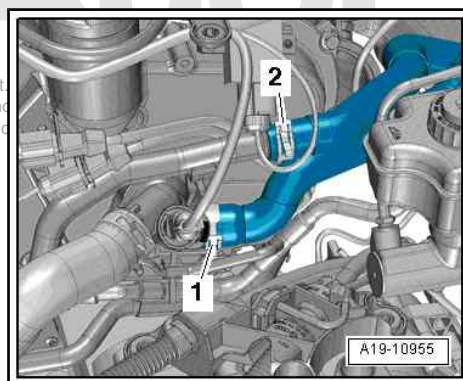
- Unscrew bolts -1, 2, 3- and banjo bolt -4- and detach pipes from cylinder block.
- Seal openings on turbocharger and all relevant ducts and hoses of the charge air system with plugs from engine bung set - VAS 6122- .
- Remove air cleaner housing ⇒ [page 223](#) .
- Remove gear oil filter ⇒ Rep. gr. 34 .
- Release hose clip -1- and detach coolant hose.



Note

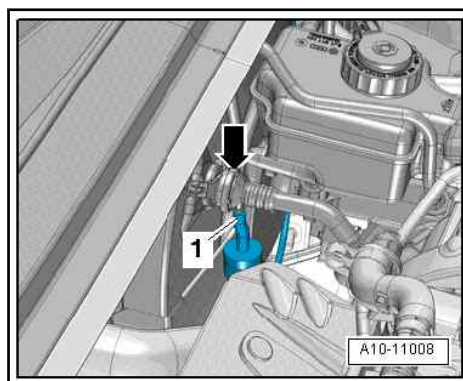
Disregard -item 2-.

Protected by copyright.
permitted unless author
with respect to the c

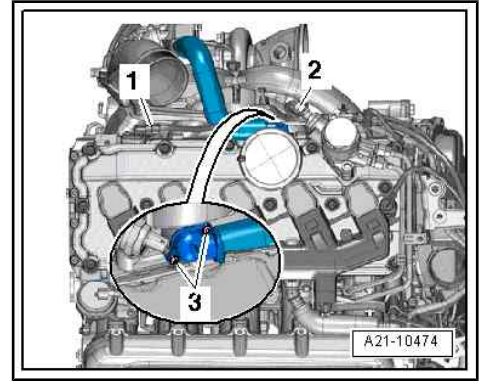


ole, is not
any liability
DI AG.

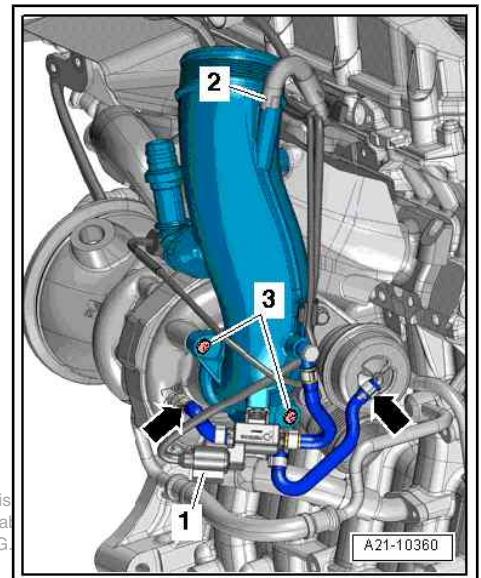
- Detach vacuum hose -1- from non-return valve -arrow-.
- Pull non-return valve off brake servo.



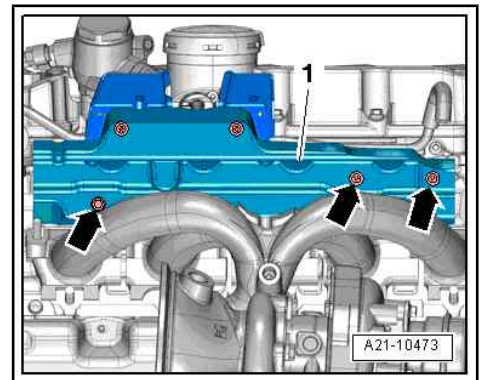
- Unplug electrical connectors -1- and -2-.
- Remove bolts -3- and detach connection from cylinder head cover.



- Unplug electrical connector -1- at charge pressure control solenoid valve - N75- and move electrical wiring clear.
- Release hose clips -arrows- and -2- and detach hoses.
- Remove bolts -3- and move intake connecting pipe to rear.



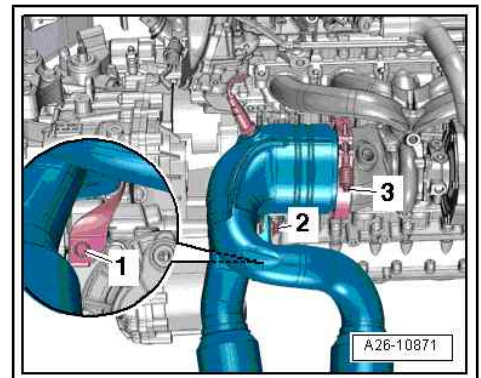
- Move clear electrical wiring harness at heat shield -1-.
- Remove bolts -arrows- and detach heat shield.
- Detach intake connecting pipe.



- Loosen bolt -3- and push clamp onto starter catalytic converter.
- Remove bolt -2-, tie up starter catalytic converter to rear.

**Note**

Disregard -item 1-.

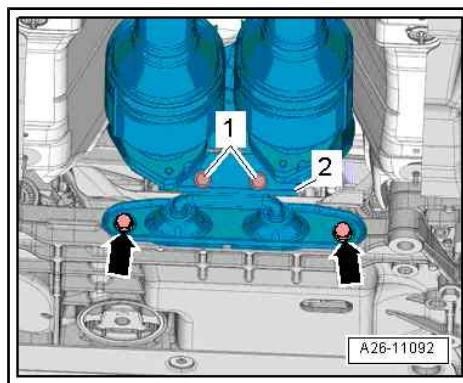


- Remove bolts -arrows-.

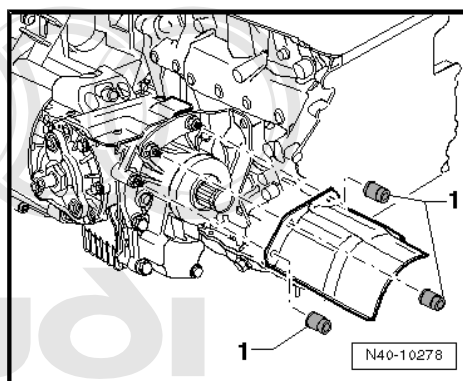


Note

Disregard items -1 and 2-.



- Remove nuts -1- and detach heat shield for drive shaft (right-side).

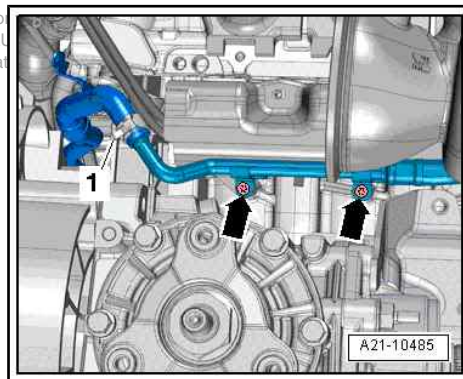


- Remove bolts -arrows-.

- Release hose clip -1- and detach coolant hose.

- Remove cylinder head cover ⇒ [page 104](#) .

Protected by copyright. Copying for private or permitted unless authorised by AUDI AG. All rights reserved. No part may be reproduced without the written consent of the copyright holder. The copyright holder is not responsible for the correctness of information.

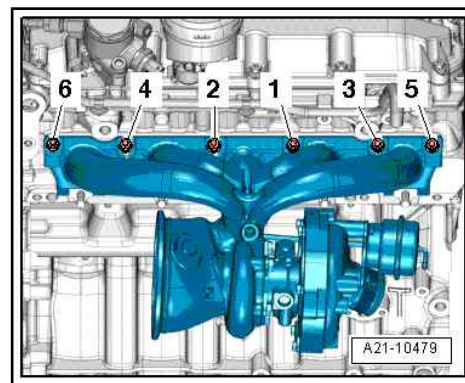


- Remove nuts in the sequence: -6 ... 1- and detach turbocharger.
- Seal off open lines and connections with clean plugs from engine bung set - VAS 6122- .

Installing

- Tightening torques
 ⇒ ["1.1 Exploded view - turbocharger", page 198](#) ,
 ⇒ ["2.1 Exploded view - charge air cooler", page 208](#) ,
 ⇒ ["2.1 Exploded view - cylinder head cover and cylinder head", page 101](#)

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



Note

- ◆ *Renew seals and O-rings.*
- ◆ *Fill turbocharger with engine oil at connection for oil supply line.*
- ◆ *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 .*
- ◆ *After installing the turbocharger, allow the engine to idle for approx. 1 minute without pressing the accelerator to ensure that the turbocharger is supplied with oil.*
- Install cylinder head cover ⇒ [page 104](#) .
- Install Lambda probe - G39- ⇒ [page 255](#) .
- Install high-pressure pump ⇒ [page 249](#) .
- Install air pipes ⇒ [page 208](#) .
- Install air cleaner housing ⇒ [page 223](#) .
- Check oil level ⇒ Maintenance ; Booklet 808 .



Note

Do not reuse coolant.

- Fill up with coolant ⇒ [page 166](#) .

2 Charge air cooler

⇒ "2.1 Exploded view - charge air cooler", page 208

⇒ "2.2 Removing and installing charge air cooler", page 210

⇒ "2.3 Checking charge air system for leaks", page 211

2.1 Exploded view - charge air cooler



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*.
- ◆ 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.

1 - Retainer

2 - Bolt

□ 5 Nm

3 - Grommet

4 - Charge air cooler

□ Removing and installing
⇒ [page 210](#)

5 - Grommet

6 - Bush

7 - Bolt

□ 5 Nm

8 - Hose clip

□ Tightening torque
⇒ [page 209](#)

9 - Air hose

□ Installation position
⇒ [page 209](#)

10 - Hose clip

□ Tightening torque
⇒ [page 209](#)

11 - Bolt

□ 9 Nm

12 - Air pipe (right-side)

13 - Hose clip

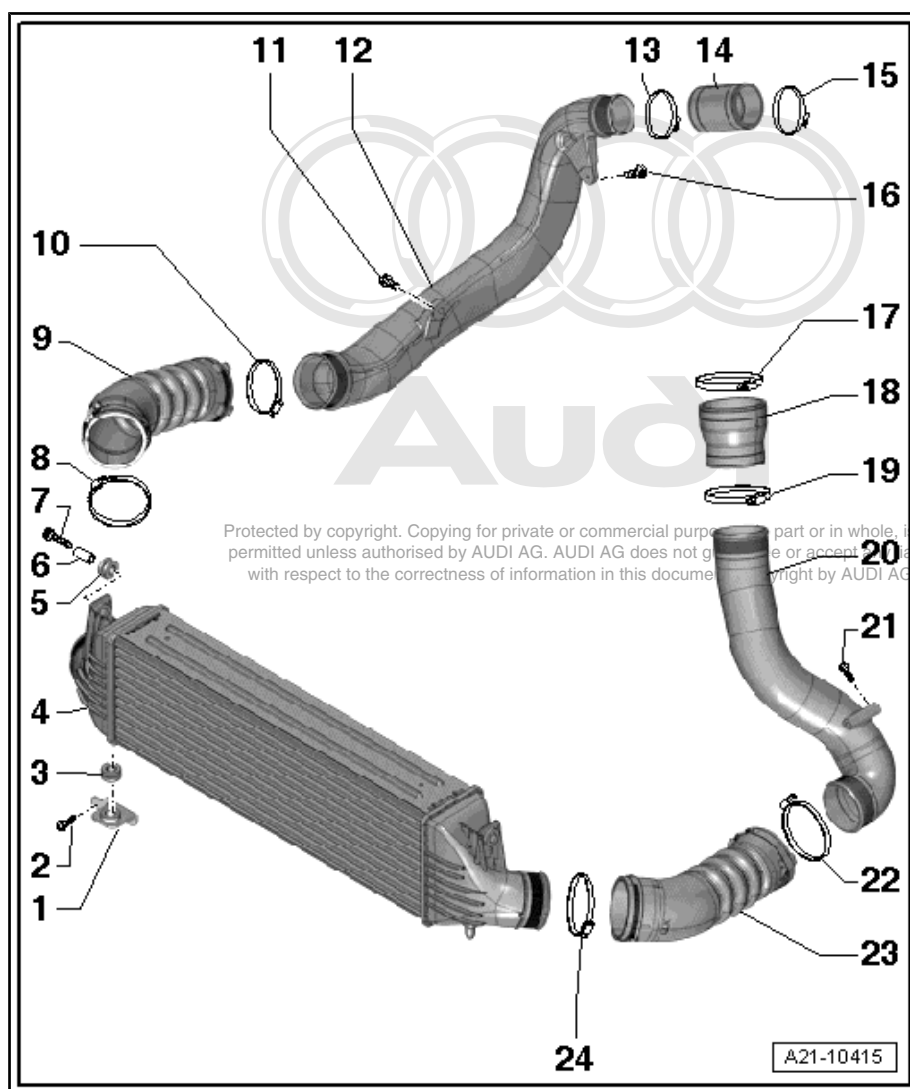
□ Tightening torque
⇒ [page 210](#)

14 - Air hose

□ Installation position
⇒ [page 210](#)

15 - Hose clip

□ Tightening torque ⇒ [page 210](#)



16 - Bolt

- ☐ 9 Nm

17 - Hose clip

- ☐ Tightening torque ⇒ [page 209](#)

18 - Air hose

- ☐ Installation position ⇒ [page 209](#)

19 - Hose clip

- ☐ Tightening torque ⇒ [page 209](#)

20 - Air pipe (left-side)

21 - Bolt

- ☐ 9 Nm

22 - Hose clip

- ☐ Tightening torque ⇒ [page 209](#)

23 - Air hose

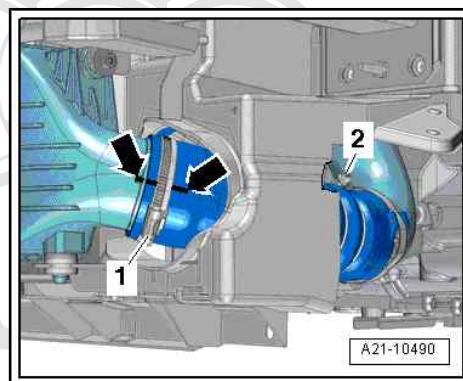
- ☐ Installation position ⇒ [page 209](#)

24 - Hose clip

- ☐ Tightening torque ⇒ [page 209](#)

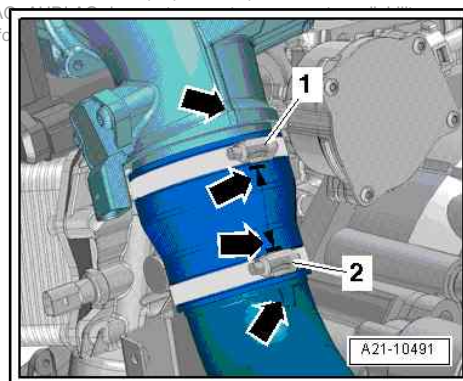
Air hoses to charge air cooler - installation position and tightening torque

- The marks -arrows- must align.
- The fastening screws of hose clips -1- and -2- fitted must be positioned as shown.
- Tighten hose clips to 5.5 Nm



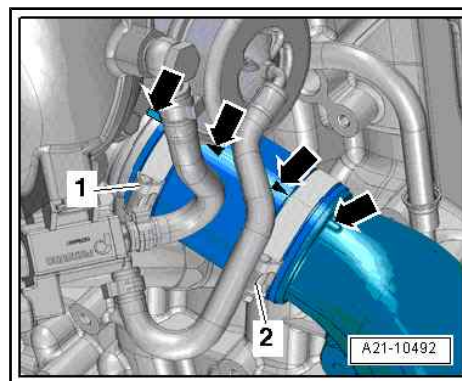
Air duct (left-side) to intake connecting pipe - installation position and tightening torque

- The marks -arrows- must align.
- The fastening screws of hose clips -1- and -2- fitted must be positioned as shown.
- Tighten hose clips to 5.5 Nm



Air duct (right-side) to turbocharger - installation position and tightening torque

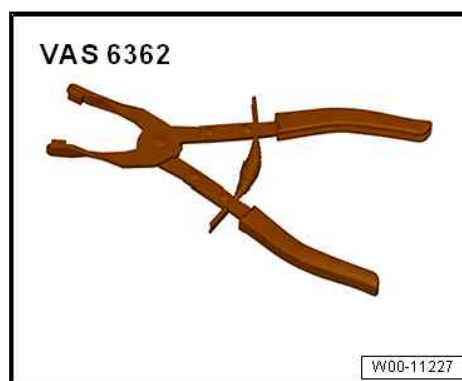
- The marks -arrows- must align.
- The fastening screws of hose clips -1- and -2- fitted must be positioned as shown.
- Tighten hose clips to 5.5 Nm



2.2 Removing and installing charge air cooler

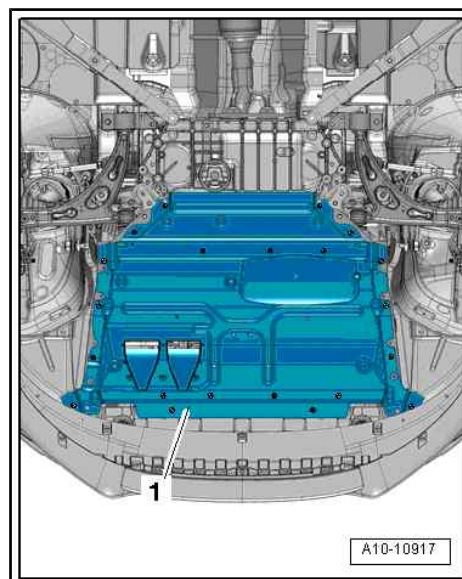
Special tools and workshop equipment required

- ◆ Hose clip pliers - VAS 6362-



Removing

- Remove noise insulation -1- ⇒ Rep. gr. 66 .
- Remove bumper cover (front) ⇒ Rep. gr. 63 .



Protected by copyright. Copying for private 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.

- Release hose clips -1- (left and right) and remove air hoses.
- Remove bolts -arrows- and detach charge air cooler.

Installing

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

Tightening torques

- ⇒ [“2.1 Exploded view - charge air cooler”, page 208](#)
- ⇒ [“4.1 Exploded view - radiator and radiator fans”, page 190](#)



Note

- ◆ *If there are slight impressions on the fins, refer to ⇒ [page 7](#).*
- ◆ *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*.*
- ◆ *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.*

Protected by copyright. Copying for private 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.

- Install front sections of wheel housing liner (front) ⇒ Rep. gr. 66.
- Install bumper cover (front) ⇒ Rep. gr. 63.

2.3 Checking charge air system for leaks

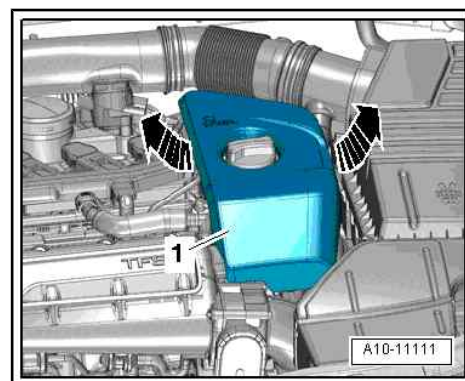
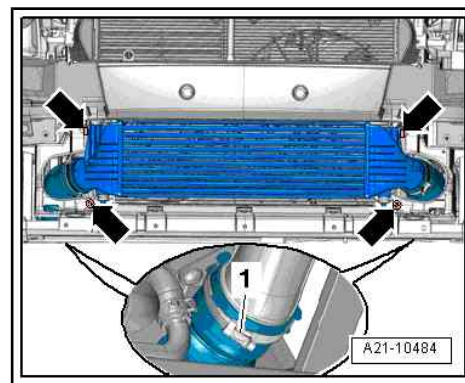
Special tools and workshop equipment required

- ◆ Charge air system tester - V.A.G 1687-

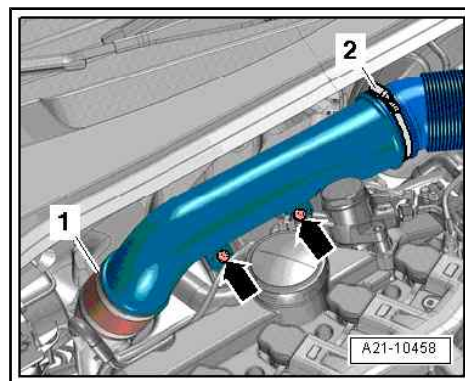
- ◆ Adapter - V.A.G 1687/12-

Procedure

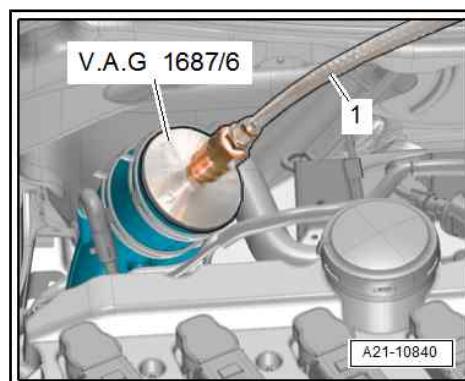
- Pull engine cover panel -1- off upwards -arrows-.



- Remove bolts -arrows-.
- Release hose clips -1- and -2- and remove air pipe.



- Connect adapter - 1687/6- to turbocharger, as shown in illustration.
- Connect hose -1- of charge air system tester -V.A.G 1687- to adapter.



Protected by copyright. Copying for private 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.

Prepare charge air system tester - V.A.G 1687- as follows:

- Unscrew pressure control valve -2- completely and close valves -3- and -4-.
- Make sure knob is pulled out before turning pressure control valve -2-.
- 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 0.2 bar.***

- Adjust pressure to 0.2 bar via pressure control valve -2-.
- Open valve -4- and wait until test system is pressurised. If necessary, adjust pressure to 0.2 bar again.
- Check charge air system for audible leaks or leaks that can be felt with the hand; apply commercially available leak detection 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.*
- ◆ *For operation of ultrasonic tester -V.A.G 1842- , refer to ⇒ Operating instructions .*
- ◆ *Release pressure in test circuit by detaching hose coupling from adapter before removing adapter.*

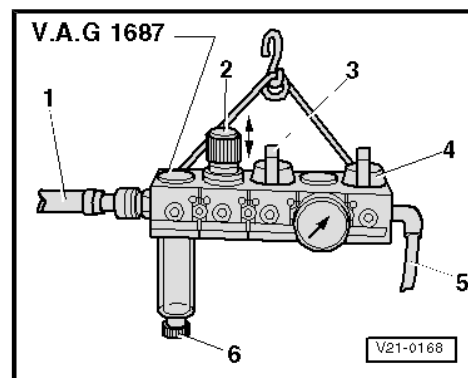
Attaching

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



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.*
- Install air pipe ⇒ [page 208](#) .



24 – Mixture preparation - injection

1 Injection system

⇒ [“1.1 Overview of fitting locations”, page 214](#)

1.1 Overview of fitting locations

Engine (intake side)

1 - Intake manifold flap valve - N316-

2 - Fuel pressure sender for low pressure - G410-

- ☐ Lubricate O-ring with clean oil
- ☐ 15 Nm

3 - Injector, cylinder 2 - N31-

- ☐ Removing and installing
⇒ [page 236](#)

4 - Injector, cylinder 1 - N30-

5 - Hall sender - G40-

- ☐ Inlet side
- ☐ Removing and installing
⇒ [page 275](#)

6 - Ignition coil 1 with output stage - N70-

- ☐ Removing and installing
⇒ [page 272](#)

7 - Ignition coil 2 with output stage - N127-

8 - Ignition coil 3 with output stage - N291-

9 - Ignition coil 4 with output stage - N292-

10 - Ignition coil 5 with output stage - N323-

11 - Camshaft control valve 1 - N205-

- ☐ Fitting location
⇒ [page 218](#)
- ☐ Removing and installing ⇒ [page 104](#)

12 - Intake air temperature sender - G42- / intake manifold pressure sender - G71-

- ☐ Removing and installing ⇒ [page 228](#)

13 - Intake manifold flap potentiometer - G336-

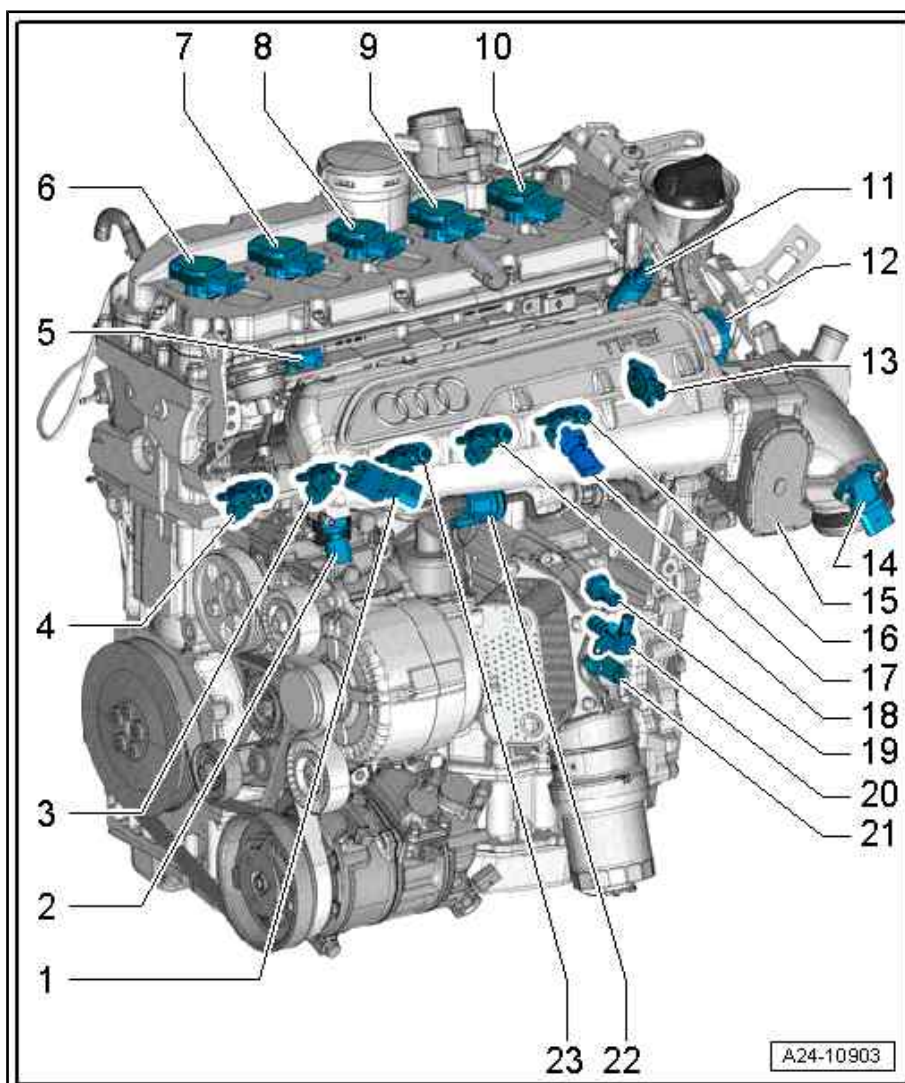
- ☐ After renewing, perform “Adaption” in “Guided Functions” under “Adapting potentiometer for air flow control flaps”

14 - Charge pressure sender - G31- / intake air temperature sender 2 - G299-

- ☐ Removing and installing ⇒ [page 202](#)

15 - 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-



in whole, is not
cept any liability
/ AUDI AG.

- ☐ Removing and installing ⇒ [page 228](#)
- ☐ After renewing, perform “Adaption” in “Guided Functions”

16 - Injector, cylinder 5 - N83-

17 - Fuel pressure sender - G247-

- ☐ Removing and installing ⇒ [page 241](#)

18 - Injector, cylinder 4 - N33-

19 - Oil pressure switch for reduced oil pressure - F378-

- ☐ Fitting location ⇒ [page 219](#)
- ☐ Removing and installing ⇒ [page 159](#)

20 - Valve for oil pressure control - N428-

- ☐ Fitting location ⇒ [page 219](#)
- ☐ Removing and installing ⇒ [page 160](#)

21 - Oil pressure switch - F22-

- ☐ Fitting location ⇒ [page 219](#)
- ☐ Removing and installing ⇒ [page 157](#)

22 - Activated charcoal filter solenoid valve 1 - N80-

23 - Injector, cylinder 3 - N32-

Engine (exhaust side)



Protected by copyright. Copying for private 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.

1 - Engine speed sender - G28-

- ☐ Removing and installing
⇒ [page 276](#)

2 - Lambda probe after catalytic converter - G130- with Lambda probe 1 heater after catalytic converter - Z29-

- ☐ Fitting location of connector ⇒ [page 217](#)
- ☐ Removing and installing
⇒ [page 256](#)

3 - Coolant temperature sender - G62-

- ☐ Removing and installing
⇒ [page 183](#)

4 - Turbocharger air recirculation valve - N249-

- ☐ Removing and installing
⇒ [page 202](#)

5 - Exhaust camshaft control valve 1 - N318-

- ☐ Removing and installing
⇒ [page 104](#)

6 - Fuel metering valve - N290-

- ☐ Combined with high-pressure pump
- ☐ Cannot be renewed separately

7 - Hall sender 3 - G300-

- ☐ Exhaust side
- ☐ Removing and installing
⇒ [page 275](#)

8 - Charge pressure control solenoid valve - N75-

9 - Lambda probe - G39- (before catalytic converter) with Lambda probe heater - Z19-

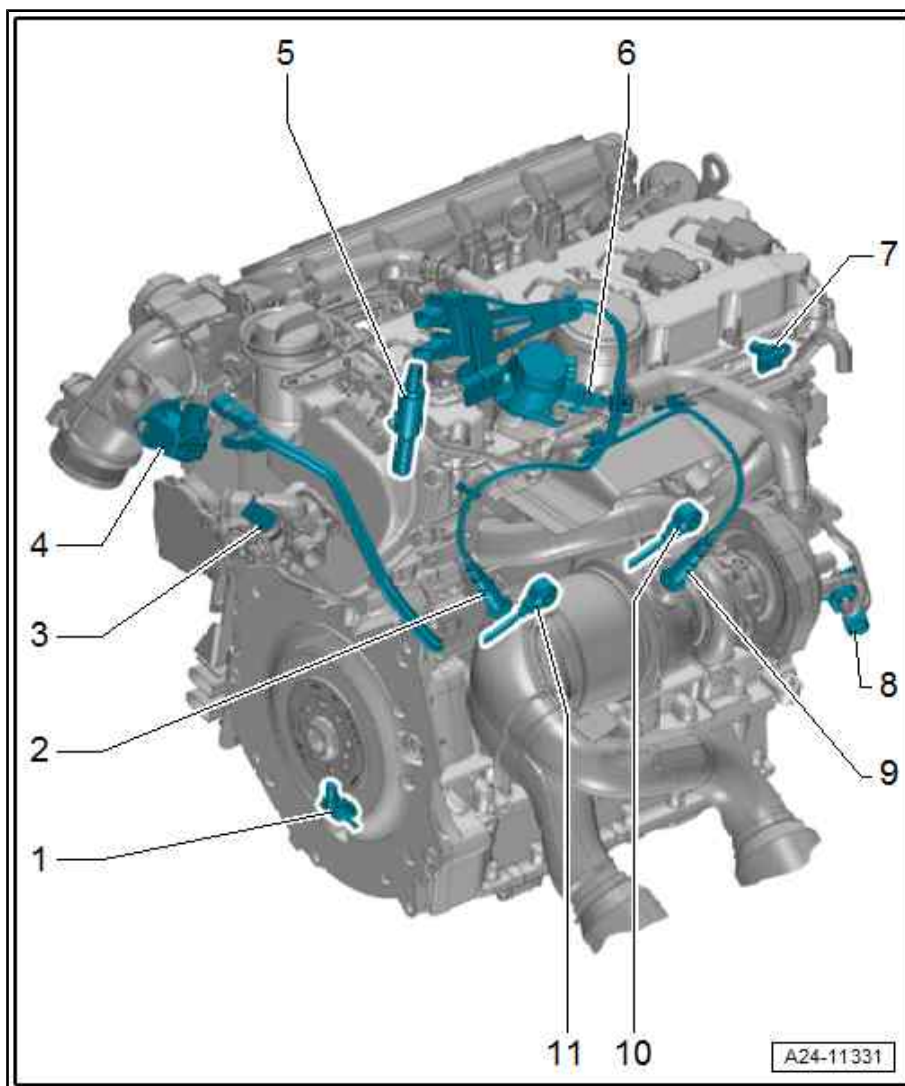
- ☐ Fitting location of connector ⇒ [page 217](#)
- ☐ Removing and installing ⇒ [page 255](#)

10 - Knock sensor 1 - G61-

- ☐ Fitting location of connector ⇒ [page 218](#)
- ☐ Removing and installing ⇒ [page 274](#)

11 - Knock sensor 2 - G66-

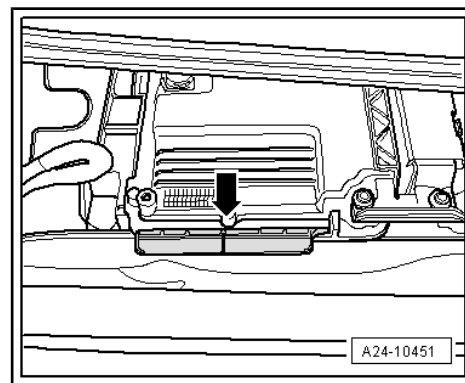
- ☐ Fitting location of connector ⇒ [page 218](#)
- ☐ Removing and installing ⇒ [page 274](#)



Protected by copyright. Copying for private 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.

Fitting location of engine control unit - J623-

- ◆ In electronics box (plenum chamber)
- ◆ Removing and installing ⇒ [page 260](#)



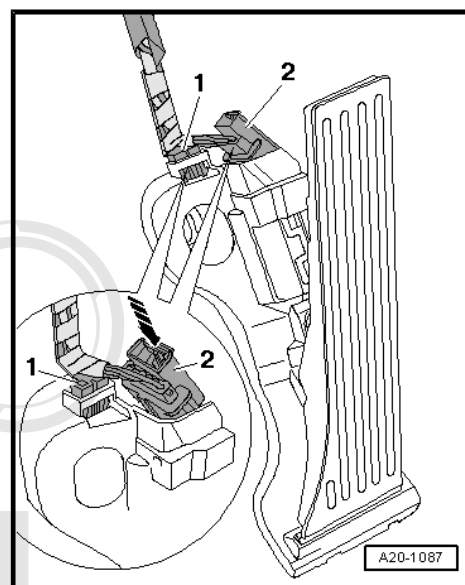
Fitting location of accelerator position sender - G79- with accelerator position sender 2 - G185-

- ◆ Combined with accelerator pedal module
- ◆ Removing and installing accelerator pedal module ⇒ Rep. gr. 20



Note

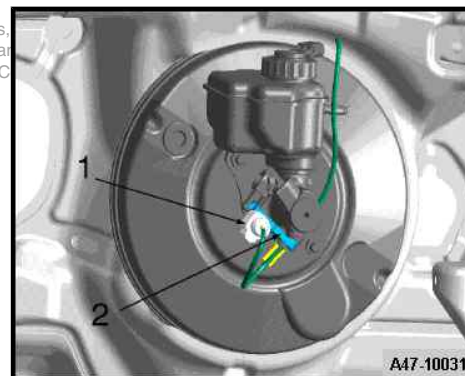
The illustration shows the set-up for left-hand drive vehicles.



Fitting location of brake light switch - F- with brake pedal switch - F47-

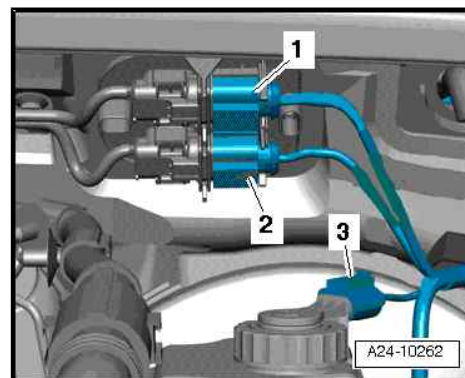
- 1 - Brake light switch - F- with brake pedal switch - F47-

- ◆ On brake master cylinder
- ◆ Removing and installing ⇒ Rep. gr. 47



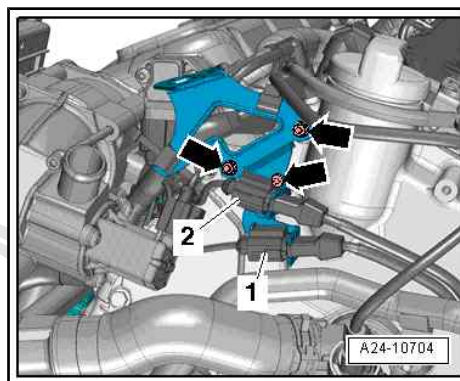
Fitting location of electrical connectors for Lambda probes

- 1 - For Lambda probe, before catalytic converter - G39- with Lambda probe heater - Z19-
 - 2 - For Lambda probe after catalytic converter - G130- with Lambda probe 1 heater after catalytic converter - Z29-
- ◆ At plenum chamber partition panel



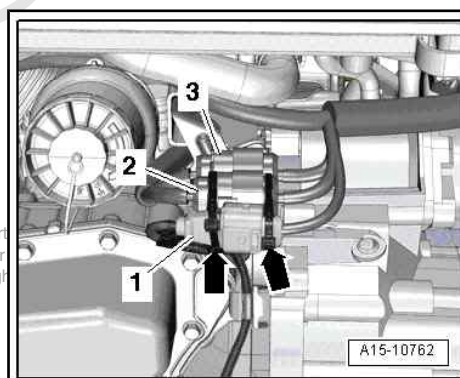
Fitting location of electrical connectors for knock sensors

- 1 - For knock sensor 2 - G66-
- 2 - For knock sensor 1 - G61-
- ◆ On cylinder head cover



Fitting location of electrical connectors on cylinder head

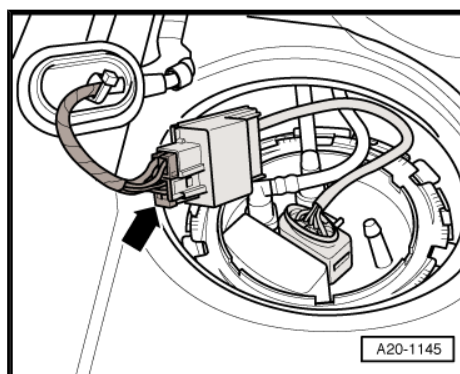
- 1 - For engine speed sender - G28-
- 3 - For injectors



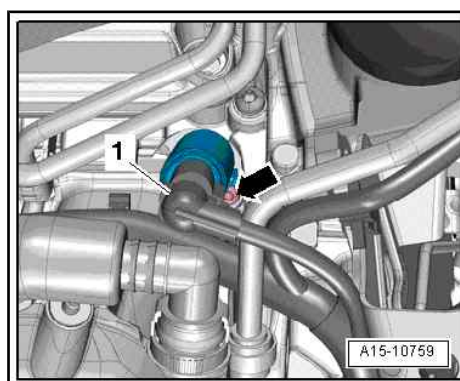
Protected by copyright. Copying for private or commercial purposes, in part permitted unless authorised by AUDI AG. AUDI AG does not guarantee or with respect to the correctness of information in this document. Copyright

Fitting location of fuel pump control unit - J538-

- ◆ Under cover for flange for fuel delivery unit -arrow-.



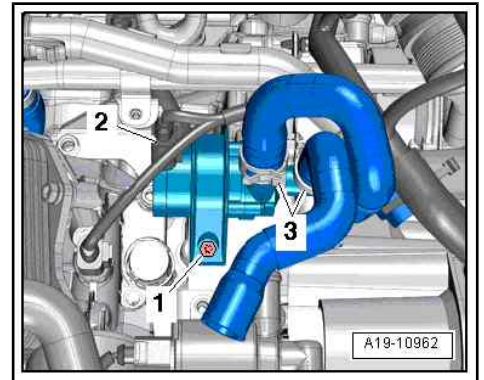
Camshaft control valve 1 - N205-



Fitting location of continued coolant circulation pump - V51-

2 - Continued coolant circulation pump - V51-

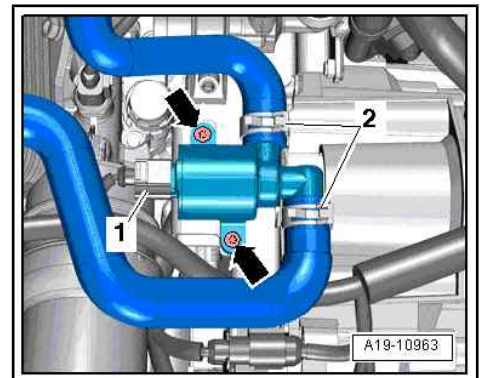
- ◆ On cylinder block (inlet side)



Fitting location of solenoid for coolant circuit - N492-

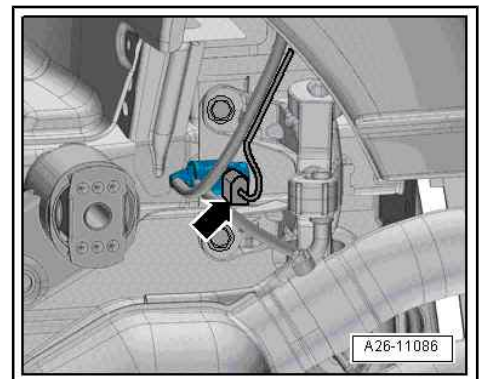
1 - Solenoid for coolant circuit - N492-

- ◆ On cylinder block (inlet side)



Fitting location of exhaust flap 1 valve - N321-

- ◆ On left side of rear silencer -arrow-

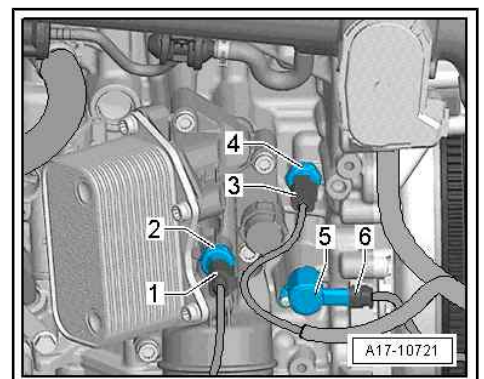


Oil pressure control

2 - Oil pressure switch for reduced oil pressure - F378-

4 - Oil pressure switch - F22-

5 - Valve for oil pressure control - N428-



Protected by copyright. Copying for private 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.

2 Air cleaner

⇒ “2.1 Exploded view - air cleaner”, page 220

⇒ **“2.2 Removing and installing air filter element”, page 221**

⇒ “2.3 Removing and installing air cleaner housing”, page 223

2.1 Exploded view - air cleaner

- 1 - Clip nut
2 - Front air duct
- ❑ Remove any salt residue, dirt and leaves

- 3 - Bolt
□ 1.5 Nm

- #### 4 - Lower part of air duct
- ❑ Remove any salt residue, dirt and leaves

- ## 5 - Air duct cover

- 6 - Bolt**
☐ 5 Nm

- 7 - Hose**
- ☐ For crankcase breather

- ### 8 - Air hose

- 9 - Bolt**
☐ 3 Nm

- ## 10 - Air pipe

- 11 - Seal**
- ☐ Renew if damaged

- 12 - Air cleaner (top section)**
- ☐ Clean out salt deposits, dirt and leaves, etc.

- ### 13 - Air filter element
- ❑ Always use genuine part for air filter element
 - ❑ Removing and installing
⇒ page 221

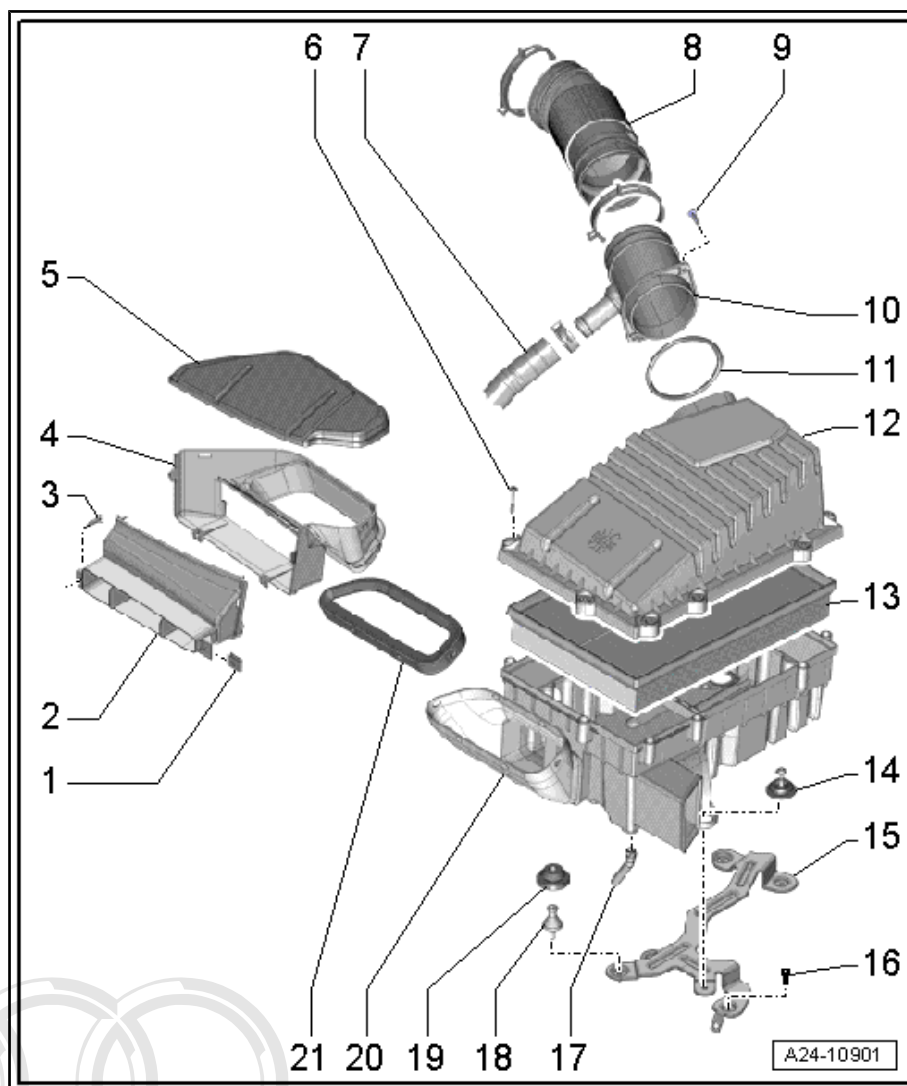
- ❑ Observe change intervals $\Rightarrow$ Maintenance ; Booklet 808

- 14 - Bolt**
- ☐ With captive rubber grommet
 - ☐ 10 Nm

- 15 - Bracket**
- ☐ For air cleaner housing

- ## 16 - Bolt
- With captive rubber grommet
 - 10 Nm

- 17 - Water drain
☐ Clean



18 - Retaining peg

- ☐ 10 Nm

19 - Rubber grommet

20 - Air cleaner (bottom section)

- ☐ Clean out salt deposits, dirt and leaves, etc.
- ☐ Removing and installing ⇒ [page 223](#)

21 - Gasket

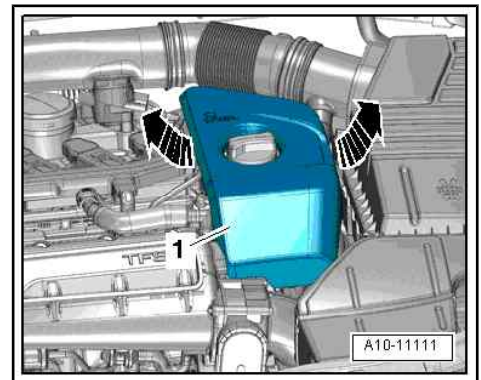
- ☐ Clipped into air cleaner (bottom section)

2.2 Removing and installing air filter element

Removing

- Pull engine cover panel -1- off upwards -arrows-.

Protected by copyright. Copying for private 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.



- Remove all bolts from air cleaner (top section) -arrow- and swivel air cleaner (top section) away upwards with hoses -1- and -2- connected.
- Take out air filter element.

Installing

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

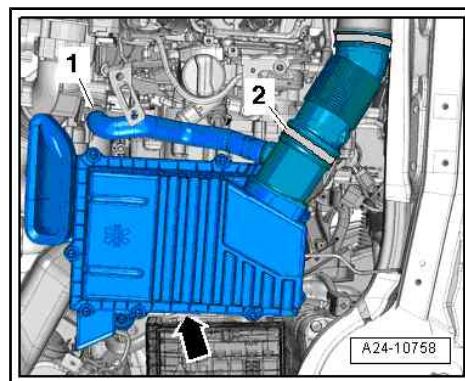
- Tightening torques
⇒ [“2.1 Exploded view - air cleaner”, page 220](#)



Note

- ◆ *Always use genuine air filter elements (same as original equipment).*
- ◆ *The inside of the air cleaner housing must be clean.*
- ◆ *To prevent malfunctions, cover the air pipes etc. with clean cloths when blowing out the air cleaner housing with compressed air.*
- ◆ *Hose connections and air pipes/hoses must be free of oil and grease prior to fitting.*
- ◆ *Do not use any lubricants containing silicone when assembling.*
- ◆ *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.*

- Blow out water drain (small hole in bottom section of air cleaner) with compressed air.
- Clean salt residue, dirt and leaves out of air cleaner housing (top and bottom sections), using a vacuum cleaner if necessary.
- Check for salt residue, dirt and leaves in air hoses (engine intake side).
- Check air duct leading from lock carrier to air cleaner housing for dirt and leaves.
- When fitting air filter element, check that it is properly centred in the retainer in the air cleaner (bottom section).
- Carefully fit top section of air cleaner onto bottom section, without applying any force. When doing so, make sure that the air cleaner (top section) is fitted straight on the air filter element (note the position of the sealing lip on the air filter element).



Protected by copyright. Copying for private 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.

2.3 Removing and installing air cleaner housing

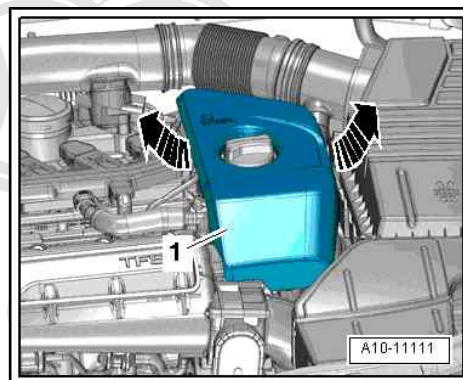
Removing



Note

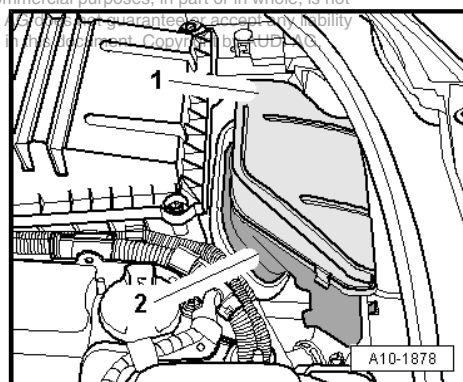
Fit all cable ties in the original positions when installing.

- Pull engine cover panel -1- off upwards -arrows-.



- Pull cover -1- off air duct (release clip on side).
- Unclip air duct -2-.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted without the prior written authorisation of AUDI AG. AUDI AG does not accept any liability with respect to the correctness of information.



- Release hose clips -1- and -2- and disconnect air hoses.
- Remove bolt -3- and detach air cleaner housing from retaining pegs.

Installing

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

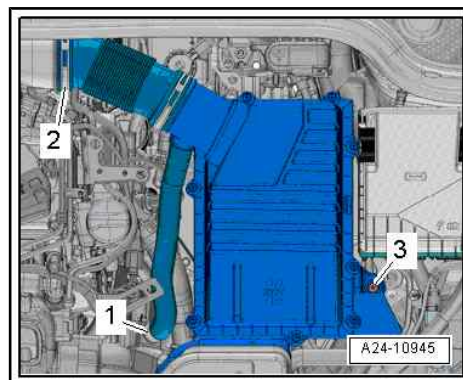
- Tightening torques
⇒ ["2.1 Exploded view - air cleaner", page 220](#)



Note

- ◆ *Hose connections and air pipes/hoses must be free of oil and grease prior to fitting.*
- ◆ *Do not use any lubricants containing silicone when assembling.*
- ◆ *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.*

- Check air duct leading from lock carrier to air cleaner housing for dirt and leaves.



3 Intake manifold, fuel rail and injectors

⇒ ["3.1 Exploded view - intake manifold", page 224](#)

⇒ ["3.2 Removing and installing intake air temperature sender G42 / intake manifold pressure sender G71 ", page 228](#)

⇒ ["3.3 Removing and installing throttle valve module J338 ", page 228](#)

⇒ ["3.4 Removing and installing intake manifold \(top section\)", page 230](#)

⇒ ["3.5 Removing and installing intake manifold \(bottom section\) with fuel rail", page 232](#)

⇒ ["3.6 Exploded view - fuel rail with injectors", page 234](#)

⇒ ["3.7 Removing and installing injectors", page 236](#)

⇒ ["3.8 Removing and installing fuel pressure sender G247", page 241](#)

This document 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.

⇒ ["3.9 Removing and installing fuel pressure sender for low pressure G410 ", page 243](#)

⇒ ["3.10 Checking fuel pressure and residual pressure \(up to high-pressure pump\)", page 243](#)

3.1 Exploded view - intake manifold

Intake manifold (top section)

1 - Seal

- ☐ Renew

2 - Throttle valve module - J338-

- ☐ Removing and installing
⇒ [page 228](#)
- ☐ After renewing, perform
"Adaption" in "Guided
Functions"

3 - Non-return valve

4 - Bolt

- ☐ 9 Nm

5 - Activated charcoal filter solenoid valve 1 - N80-

6 - Bolt

- ☐ 9 Nm

7 - Bracket

8 - Intake manifold (top section)

- ☐ Removing and installing
⇒ [page 230](#)

9 - Trim

10 - Emblem

11 - Gasket

- ☐ Renew

12 - Hose

- ☐ For crankcase breather

13 - O-ring

- ☐ Renew

14 - Bolt/nut

- ☐ Tightening torque and sequence ⇒ [page 226](#)

15 - O-ring

- ☐ Renew

16 - Intake air temperature sender - G42- / intake manifold pressure sender - G71-

- ☐ Removing and installing ⇒ [page 228](#)

17 - Bolt

- ☐ 9 Nm

18 - Gasket

- ☐ Renew

19 - Union

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

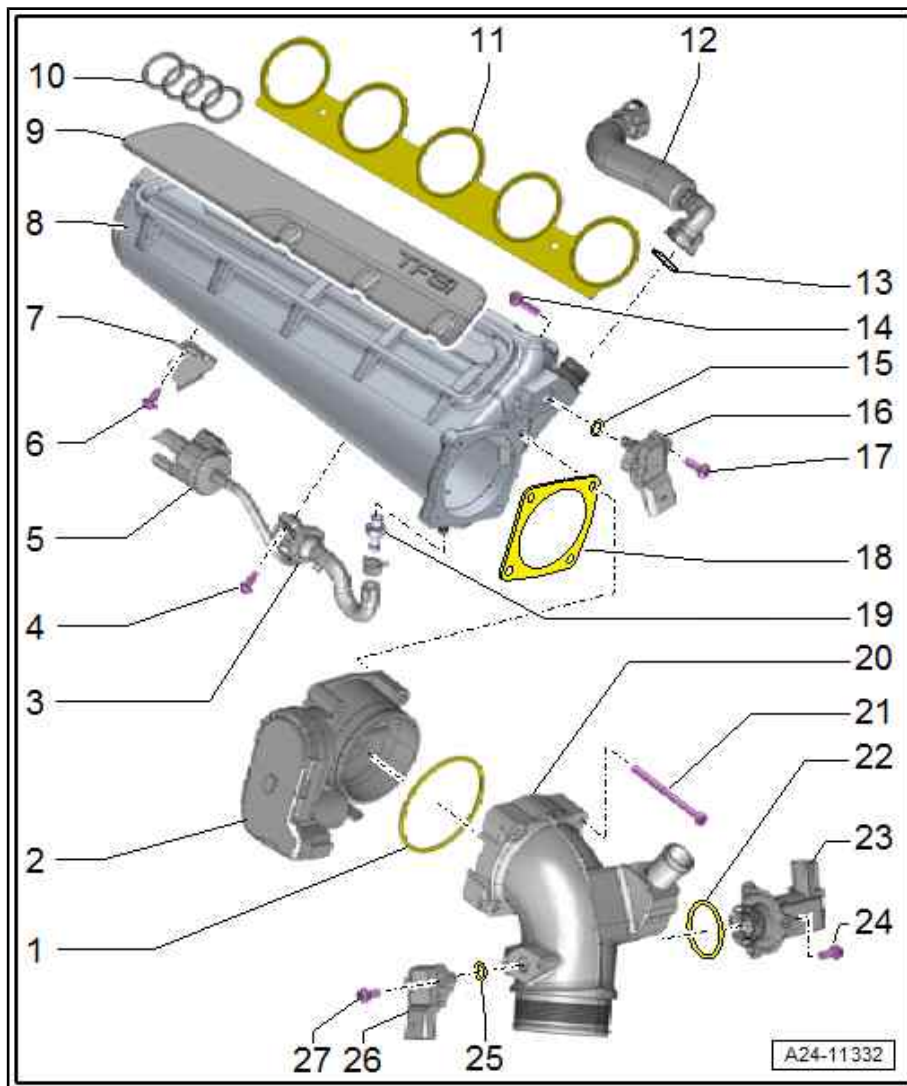
20 - Intake connecting pipe

21 - Bolt

- ☐ 9 Nm

22 - O-ring

- ☐ Renew



Protected by copyright. Copying for private 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.

23 - Turbocharger air recirculation valve - N249-

- ☐ Removing and installing ⇒ [page 202](#)

24 - Bolt

- ☐ 9 Nm

25 - O-ring

- ☐ Renew

26 - Charge pressure sender - G31- / intake air temperature sender 2 - G299-

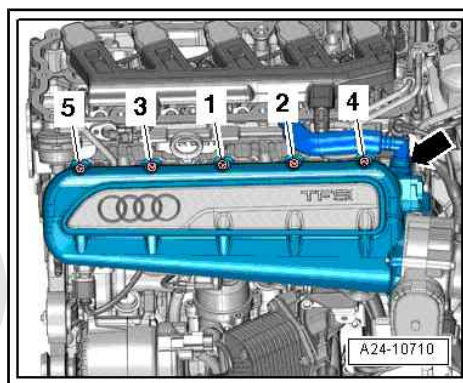
- ☐ Removing and installing ⇒ [page 202](#)

27 - Bolt

- ☐ 9 Nm

Intake manifold (top section) - tightening torque and sequence

- Tighten bolts/nuts for intake manifold in the sequence -1 to 5-.
- ◆ Initially screw in by hand until contact is made.
- ◆ Subsequently tighten to 9 Nm

**Intake manifold (bottom section)**

Protected by copyright. Copying for private 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.

1 - Intake manifold (bottom section)

- ☐ With vacuum unit for intake manifold flaps
- ☐ Removing and installing [⇒ page 232](#)

2 - Bolt

- ☐ 9 Nm

3 - Fuel line (low-pressure)

4 - Bracket

5 - Bolt

- ☐ 9 Nm

6 - Dowel pin

- ☐ 2x

7 - Gasket

- ☐ Renew after removing

8 - Dowel pin

- ☐ 2x

9 - Intake manifold flap potentiometer - G336-

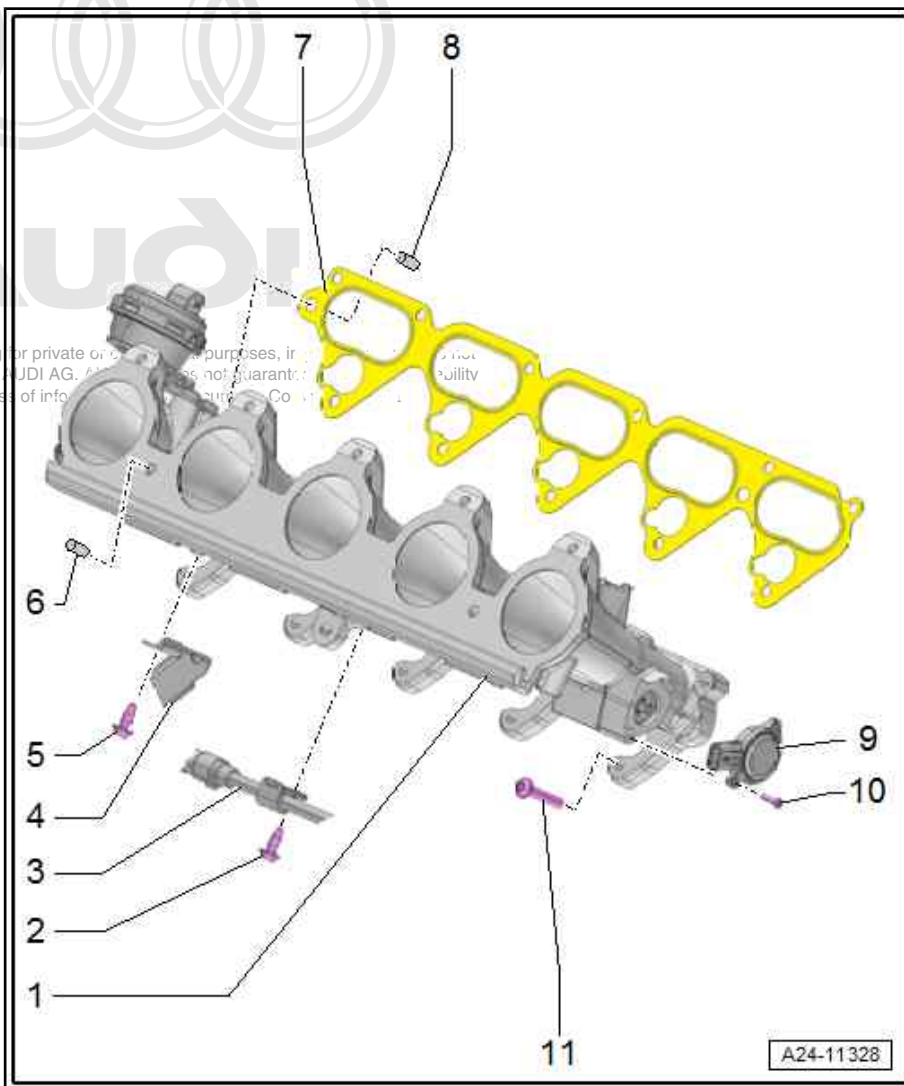
- ☐ After renewing, perform "Adaption" for engine control unit - J623- / intake manifold flap potentiometer - G336- using [⇒ Vehicle diagnostic tester, Guided Functions](#)

10 - Bolt

- ☐ 2.5 Nm

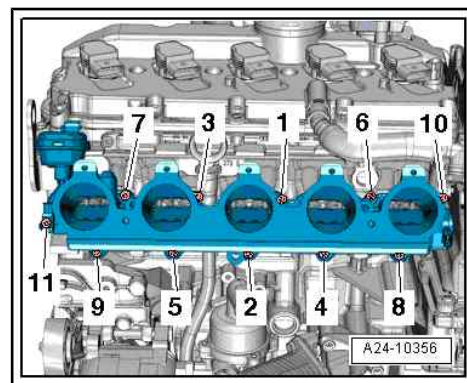
11 - Bolt

- ☐ Tightening torque and tightening sequence [⇒ page 227](#)



Intake manifold (bottom section) - tightening torque and tightening sequence

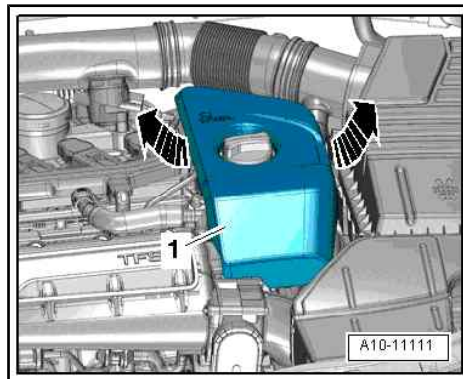
- Tighten bolts and nuts for intake manifold (bottom section) in the sequence -1 to 11- in 2 stages.
- ◆ Tighten initially to 7 Nm
- ◆ Subsequently tighten to 9 Nm



3.2 Removing and installing intake air temperature sender - G42- / intake manifold pressure sender - G71-

Removing

- Pull engine cover panel -1- off upwards -arrows-.



- Unplug electrical connector -1-.
- Unscrew bolts -2- and detach intake air temperature sender - G42- / intake manifold pressure sender - G71- .

Installing

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

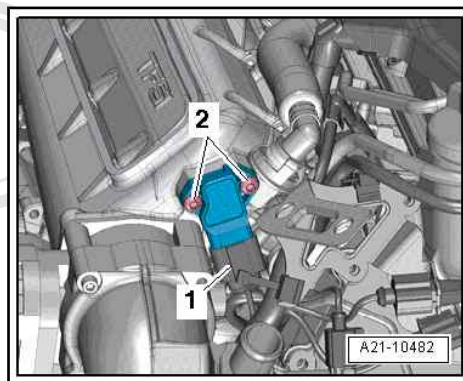
- Tightening torques
⇒ [“3.1 Exploded view - intake manifold”, page 224](#)



Note

Fit new O-ring.

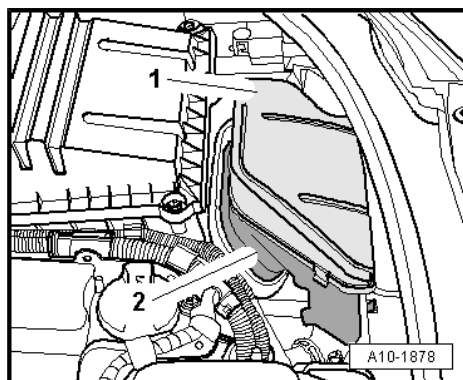
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



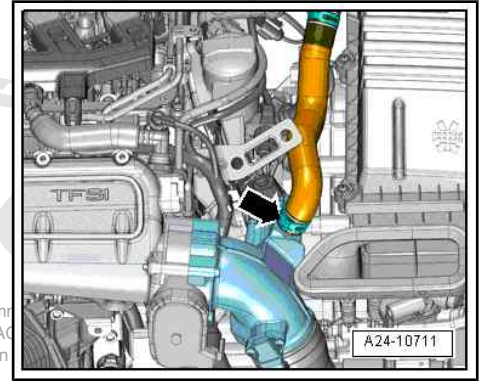
3.3 Removing and installing throttle valve module - J338-

Removing

- Pull cover -1- off air duct (release clip on side).
- Unclip air duct -2-.



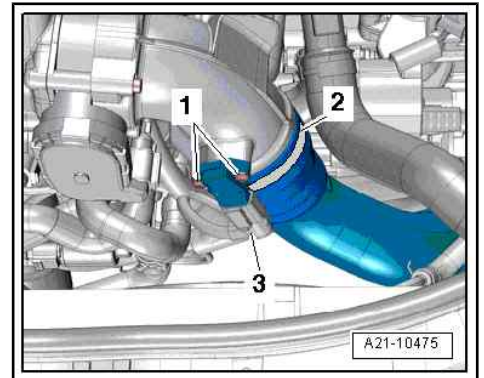
- Release hose clip -arrow- and detach air hose.



- Release hose clip -2-.
- Unplug electrical connector -3- at charge pressure sender - G31- / intake air temperature sender 2 - G299- .

 Note

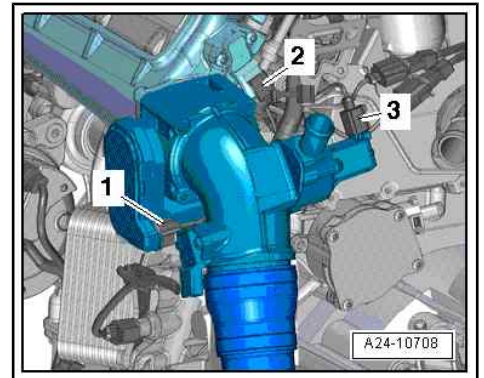
Disregard -item 1-.



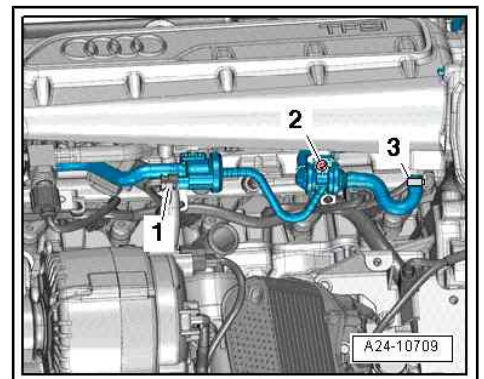
- Unplug electrical connectors:
- 1 - Throttle valve module - J338-
- 3 - Turbocharger air recirculation valve - N249-

 Note

Disregard -item 2-.



- Disengage activated charcoal filter solenoid valve 1 - N80- -item 1-.
- Remove bolt -2-.
- Release hose clip -3- and detach hose.



- Remove bolts -arrows- and detach throttle valve module - J338- -item 1- with connection from air hose -2-.

Installing

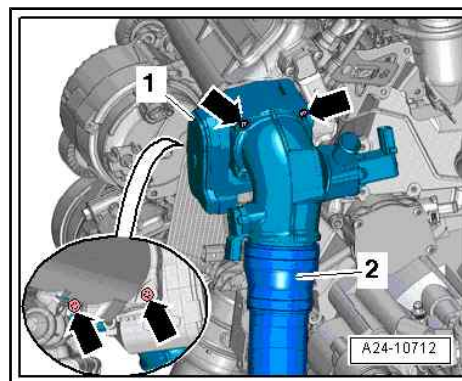
Installation is carried out in the reverse order; note the following:

- Tightening torques
⇒ [“3.1 Exploded view - intake manifold”, page 224](#) and
⇒ [“2.1 Exploded view - air cleaner”, page 220](#)



Note

- ◆ *Renew gasket and O-ring.*
 - ◆ *Hose connections and air pipes/hoses must be free of oil and grease prior to fitting.*
 - ◆ *Do not use any lubricants containing silicone when assembling.*
 - ◆ *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.*
- After renewing, perform “Adaption” in “Guided Functions”
⇒ Vehicle diagnostic tester

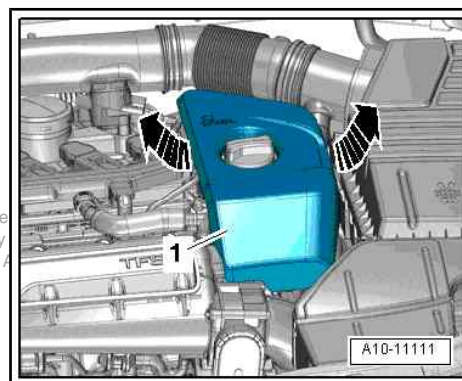


3.4 Removing and installing intake manifold (top section)

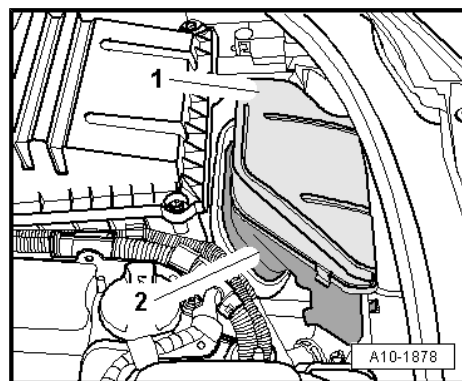
Removing

- Pull engine cover panel -1- off upwards -arrows-.
- Pull cover -1- off air duct (release clip on side).

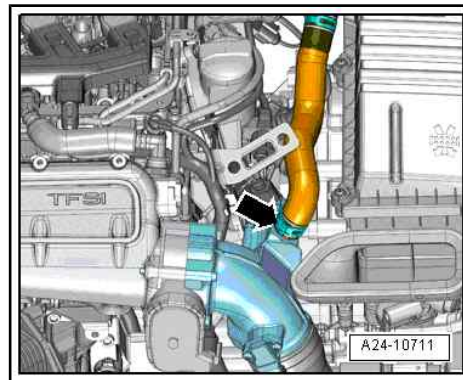
Protected by copyright. Copying for private or commercial purposes, in part or in whole permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any with respect to the correctness of information in this document. Copyright by AUDI AG



- Unclip air duct -2-.



- Release hose clip -arrow- and detach air hose.

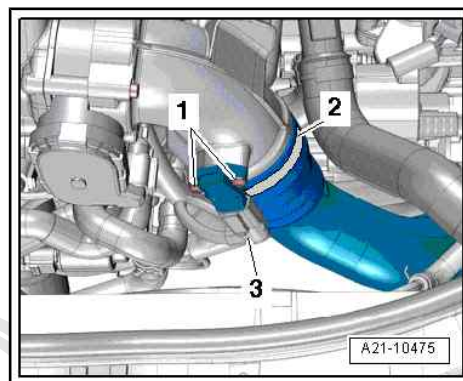


- Release hose clip -2-.
- Unplug electrical connector -3- at charge pressure sender - G31- / intake air temperature sender 2 - G299- .

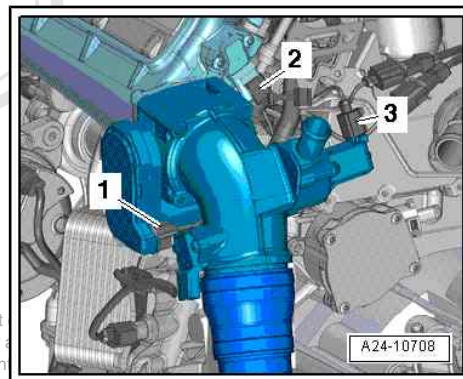


Note

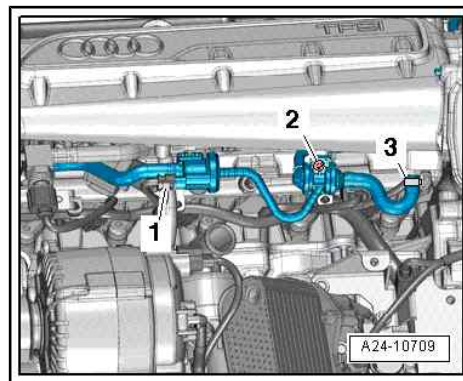
Disregard -item 1-.



- Unplug electrical connectors:
- 1 - Throttle valve module - J338-
- 2 - Intake air temperature sender - G42- / intake manifold pressure sender - G71-
- 3 - Turbocharger air recirculation valve - N249-



- Disengage activated charcoal filter solenoid valve 1 - N80- -item 1-.
- Remove bolt -2-.
- Release hose clip -3- and detach hose.
- If intake manifold is secured with nuts: Remove throttle valve module - J338- → [page 228](#) .



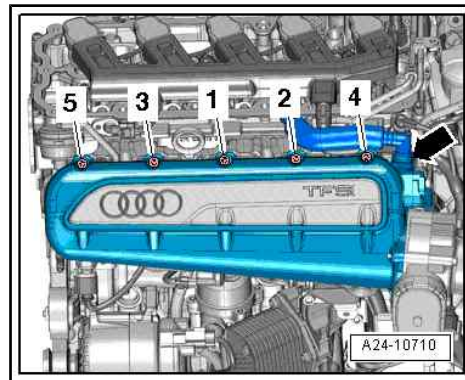
- Press release tabs and disconnect crankcase breather hose -arrow-.
- Unscrew bolts/nuts -1 ... 5- and detach intake manifold (top section).



Caution

Risk of irreparable damage to engine.

- ◆ **Block off the openings of the intake ports in the cylinder head with a clean cloth to prevent small items from dropping into the engine.**



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted without the express written consent of 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.

Installing

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

Tightening torques

- ⇒ [“3.1 Exploded view - intake manifold”, page 224](#)
- ⇒ [Fig. “Intake manifold \(top section\) - tightening torque and sequence””, page 226](#)
- ⇒ [“2.1 Exploded view - air cleaner”, page 220](#)
- If intake manifold is secured with nuts: Install throttle valve module - J338- ⇒ [page 228](#) .



Note

- ◆ *Renew gasket and O-ring.*
- ◆ *Hose connections and air pipes/hoses must be free of oil and grease prior to fitting.*
- ◆ *Do not use any lubricants containing silicone when assembling.*
- ◆ *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.*

3.5 Removing and installing intake manifold (bottom section) with fuel rail

Removing

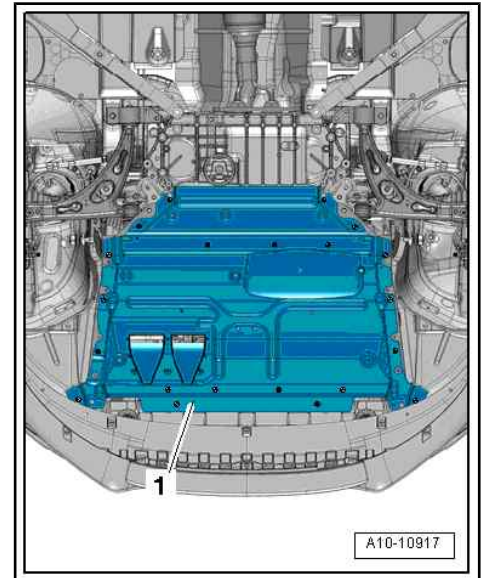
- Remove intake manifold (top section) ⇒ [page 230](#) .
- Remove high-pressure pipe ⇒ [page 250](#) .

- Remove noise insulation -1- ⇒ Rep. gr. 66 .

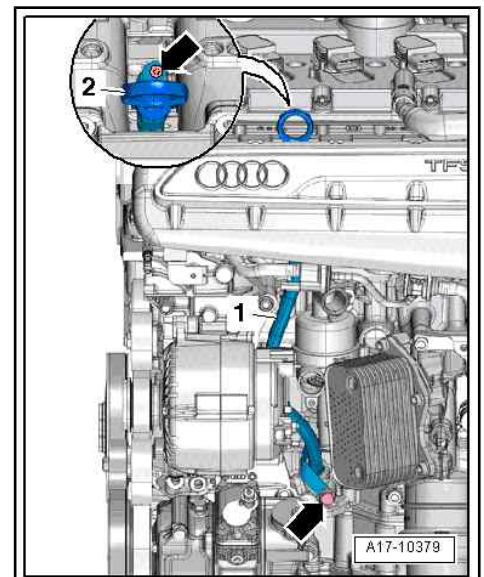


Note

Fit all cable ties in the original positions when installing.



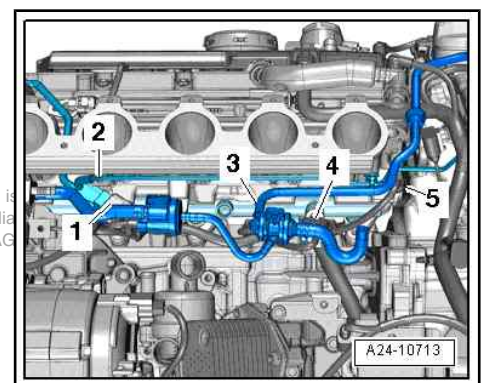
- Pull out oil dipstick -2-.
- Remove bolts -arrows- and lift off guide tube -1- for oil dipstick.



- Unplug electrical connectors:
- 1 - Intake manifold flap valve - N316-
- 4 - Fuel pressure sender - G247-
- 5 - Intake manifold flap potentiometer - G336-

- Disconnect vacuum hose -2- and hose -3- from activated charcoal filter and move clear.

- Move electrical wiring harness clear.



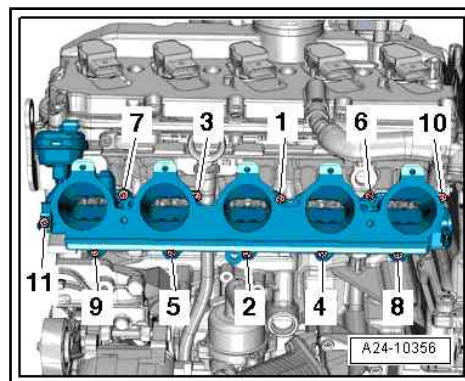
- Loosen bolts in the sequence -11 ... 1-.
- Remove bolts and detach intake manifold (bottom section).



Caution

Risk of irreparable damage to engine.

- ◆ **Block off the openings of the intake ports in the cylinder head with a clean cloth to prevent small items from dropping into the engine.**



Note

Injectors must be removed before gasket for intake manifold (bottom section) can be detached.

- Remove injectors ⇒ [page 236](#) .

Installing

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

- Tightening torque
⇒ [Fig. "Intake manifold \(bottom section\) - tightening torque and tightening sequence"](#) , [page 227](#)



Note

- ◆ **Renew seals and O-rings.**
- ◆ **Injectors must be installed after gasket for intake manifold (bottom section) has been attached.**
- Install injectors ⇒ [page 236](#) .
- Secure dipstick guide tube ⇒ [page 138](#) .
- Install high-pressure pipe ⇒ [page 250](#) .
- Install intake manifold (top section) ⇒ [page 230](#) .
- Install noise insulation ⇒ Rep. gr. 66 .

3.6 Exploded view - fuel rail with injectors

1 - Fuel pressure sender - G247-

- ☐ Removing and installing ⇒ [page 241](#)
- ☐ 25 Nm

2 - Bolt

- ☐ 9 Nm

3 - High-pressure pipe

- ☐ Connections must not be damaged
- ☐ Do not alter shape
- ☐ Removing and installing ⇒ [page 250](#)
- ☐ 27 Nm

4 - Connection

- ☐ Renew
- ☐ 40 Nm

5 - Fuel rail

- ☐ Removing and installing ⇒ [page 232](#)

6 - Bolt

- ☐ 9 Nm

7 - Sealing element

- ☐ Combined as a unit with -item 8-
- ☐ Renew

8 - Mounting

- ☐ Combined as a unit with -item 7-
- ☐ Renew

9 - Combustion chamber ring seal

- ☐ Do not apply grease to ring seal or use any other lubricants
- ☐ Renewing ⇒ ["3.7 Removing and installing injectors", page 236](#)

10 - Injector

- ☐ Illustration shows version 2 (from 09.2011 onwards)
- ☐ Version 1 (up to 09.2011) ⇒ [page 236](#) ; is replaced with version 2 for repair purposes
- ☐ Removing and installing ⇒ [page 236](#)

11 - Spacer ring

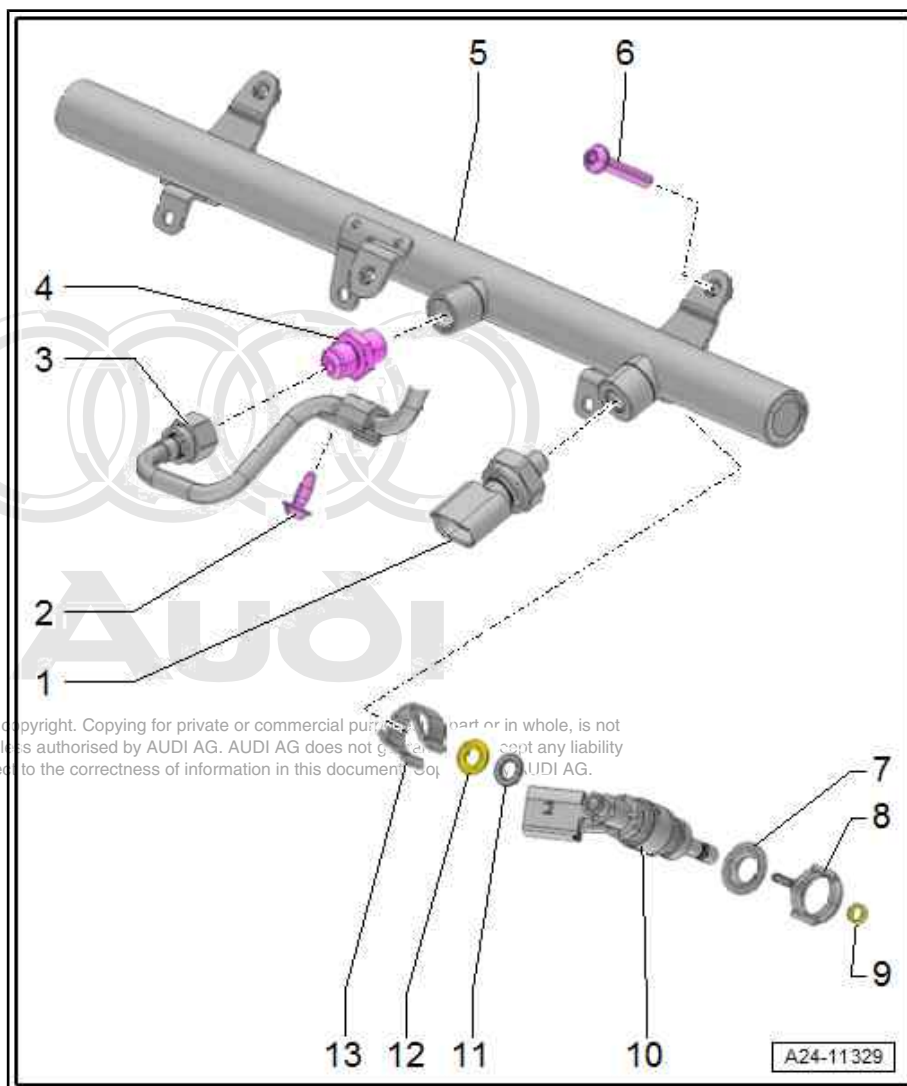
- ☐ Renew after removing

12 - O-ring

- ☐ Renew after removing
- ☐ Lubricate lightly with clean engine oil

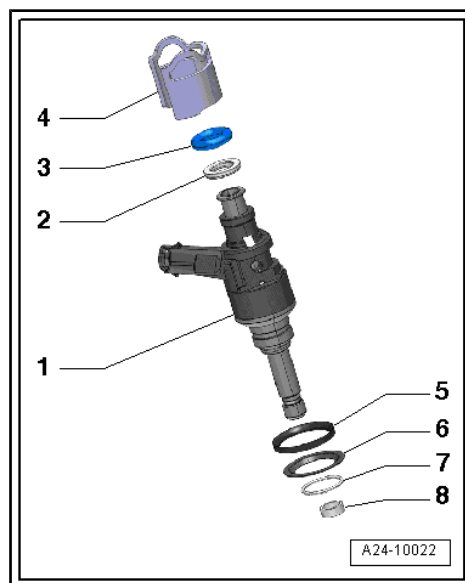
13 - Support ring

- ☐ Renew after removing
- ☐ Via this support ring, the fuel rail exerts the clamping force that holds the injector in the cylinder head
- ☐ Clipped to -item 10-



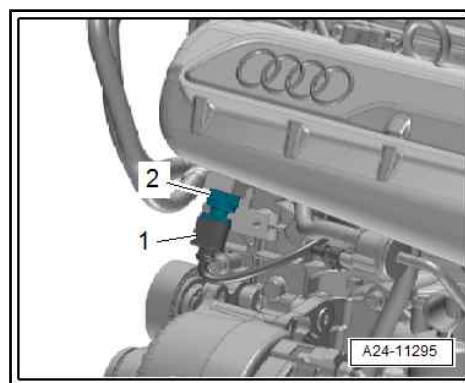
Injector, version 1 (up to 09.2011)

- 1 - Injector
- 2 - Spacer ring
- 3 - O-ring
- 4 - Support ring
- 5 - Sealing element (top); not supplied separately
- 6 - Sealing element (bottom); not supplied separately
- 7 - Circlip; not supplied separately
- 8 - Combustion chamber ring seal



Fuel pressure sender for low pressure - G410-

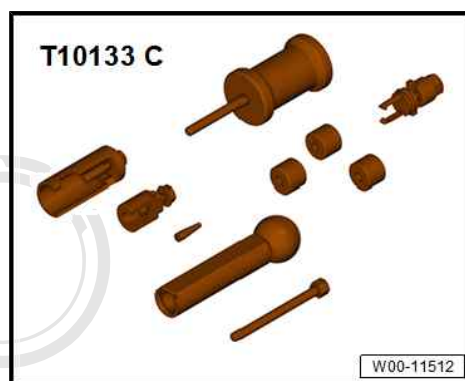
- 1 - Electrical connector
- 2 - Fuel pressure sender for low pressure - G410-
- ◆ 15 Nm
- ◆ Renew O-ring
- ◆ Removing and installing ⇒ [page 243](#)



3.7 Removing and installing injectors

Special tools and workshop equipment required

- ◆ Tool set for FSI engines - T10133C-



Removing

- Remove intake manifold (bottom section) ⇒ [page 232](#) .



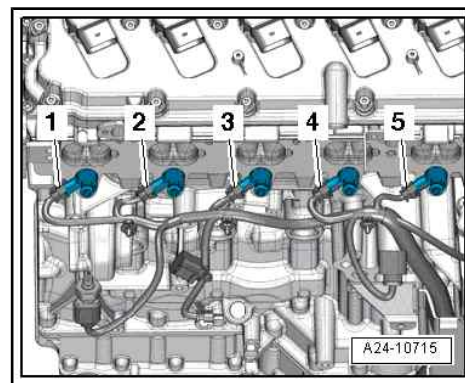
Note

Protected by copyright. Copying for private 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.

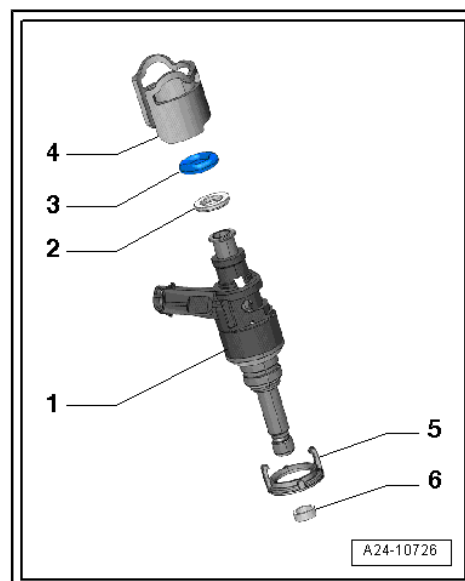
Carefully pull out any injectors that remain lodged in the fuel rail.

- Cover open inlet ports with a clean cloth.

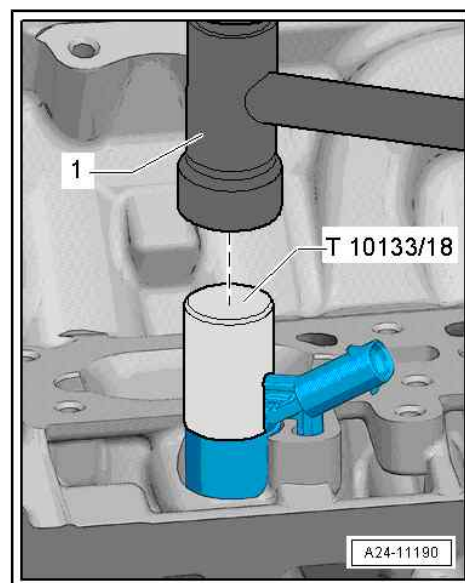
- Unplug electrical connectors -1 to 5- at injectors.



- Detach support ring -4- from injector -1-.



- Slide stop sleeve -T10133/18- over injector.
- Carefully knock against stop sleeve several times with a plastic hammer -1- to loosen injector.

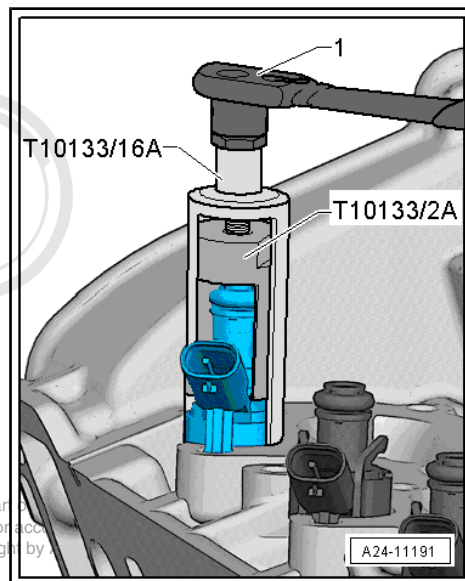


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



Note

- ◆ Use a torque wrench to pull out injector.
- ◆ Adjust torque wrench to 5 Nm.
- ◆ Observe correct torque to avoid irreparable damage to injector.
- Guide puller -T10133/2A- into groove on injector.
- Then apply puller T10133/16A .
- Pull out injector by turning bolt with torque wrench -1-.
- If injector does not come loose after torque limit of 5 Nm is reached, remove puller again.
- Repeat procedure using stop sleeve to loosen injector.
- Repeat procedure for each injector.
- Detach gasket for intake manifold (bottom section).



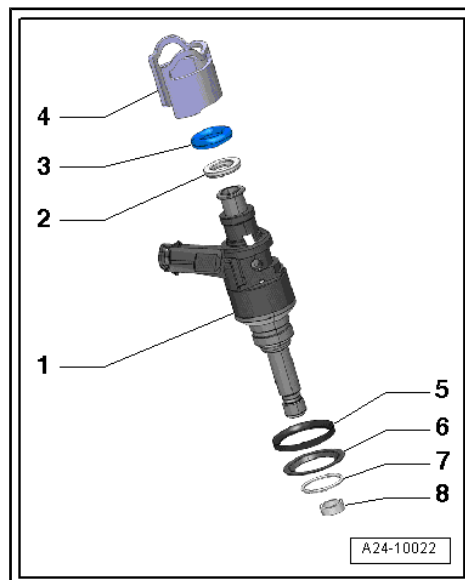
Dismantling injector, version 1 (up to 09.2011)

- Pull O-ring -3- and spacer ring -2- off injector -1-.
- Detach circlip -7-, sealing element (top) -5- and sealing element (bottom) -6-.
- Carefully remove old combustion chamber ring seal -8-. To do so, cut open seal using knife or prise open with small screwdriver and then pull off forwards.



Note

Take care not to damage groove on injector. The injector must be renewed if the groove is damaged.



Dismantling injector, version 2 (from 09.2011 onwards)

- Pull O-ring -3- and spacer ring -2- off injector -1-.
- Unclip sealing element -5-.
- Carefully remove old combustion chamber ring seal -6-. To do so, cut open combustion chamber ring seal using knife or prise open with small screwdriver and then pull off forwards.



Note

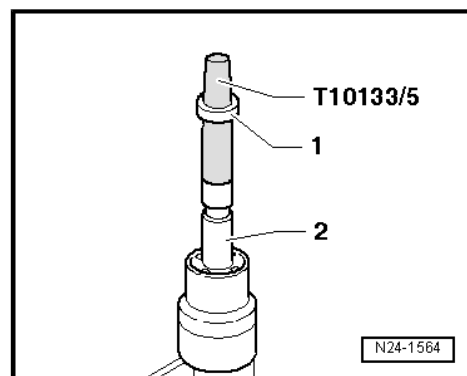
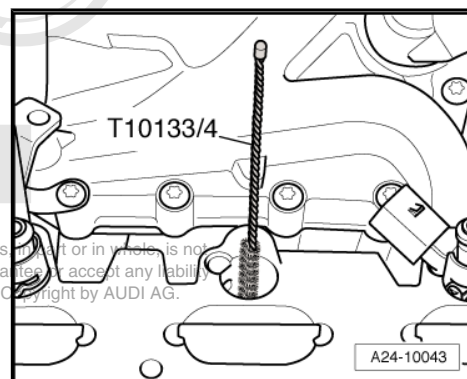
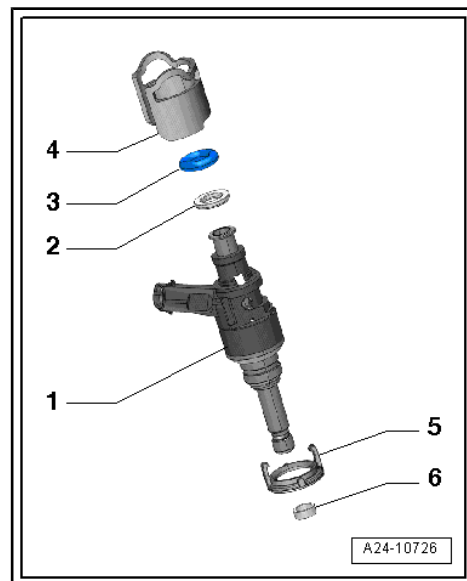
Take care not to damage groove on injector. Injector must be renewed if groove is damaged.

Installing



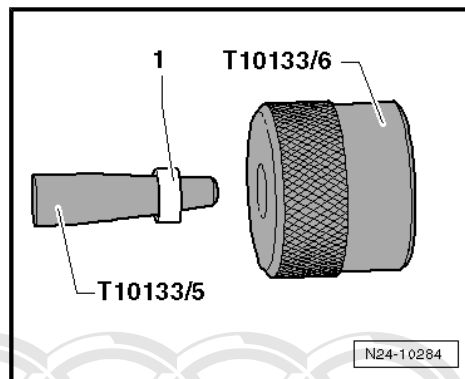
Note

- ◆ *Use complete repair set when installing.*
 - ◆ *Renew support ring.*
 - ◆ *Renew combustion chamber ring seal before re-installing injector.*
 - ◆ *Lubricate O-rings of injectors lightly with clean engine oil.*
- Clean bore in cylinder head with nylon cylinder brush - T10133/4- .
 - When re-installing an injector, clean any combustion residue off groove for combustion chamber ring seal and injector stem with a clean cloth.

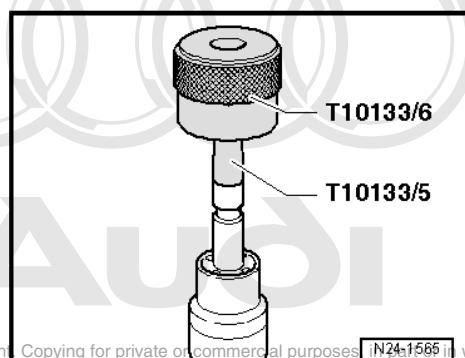


- Fit assembly cone -T10133/5- with new combustion chamber ring seal -1- onto injector -2-.

- Using assembly sleeve -T10133/6- , push combustion chamber ring seal -1- onto assembly cone -T10133/5- as far as it will go.



- Turn round assembly sleeve -T10133/6- and slide combustion chamber ring seal into groove.



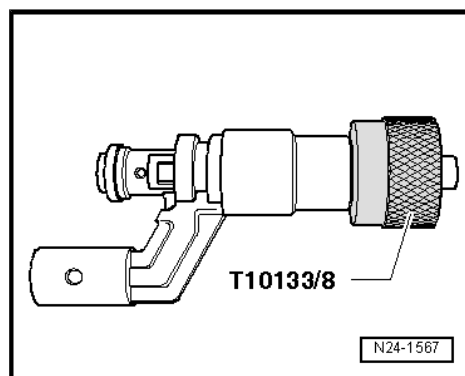
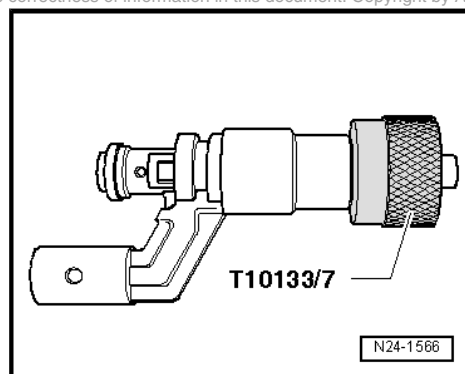
Protected by copyright. Copying for private or commercial purposes, in whole or in part, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



Note

The combustion chamber ring seal is widened when it is pushed onto the injector. After pushing it on, it therefore has to be compressed again. This is done in two stages, as described below.

- 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.



- Before installing new injector -1-, lubricate new O-ring -3- lightly with clean engine oil.

i Note

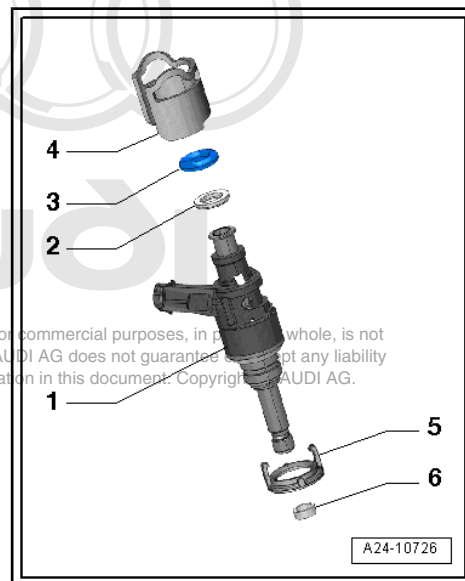
The combustion chamber ring seal -6- must not be lubricated.

- Fit new gasket for intake manifold (bottom section).
- Push injector by hand as far as it will go into aperture in cylinder head (do not use oil or grease). **Ensure that the injector is properly seated in the cylinder head.**
- Electrical connector of injector must engage in recess in cylinder head.

i Note

It should be possible to insert injector easily. If necessary wait until the combustion chamber ring seal has contracted sufficiently.

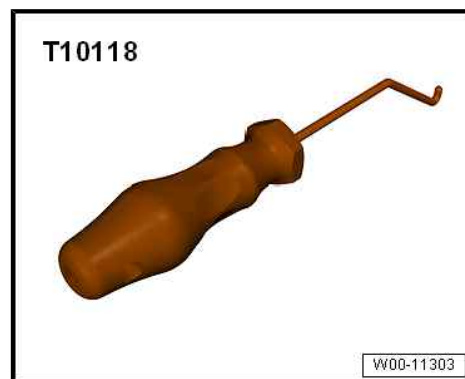
- Fit support ring onto injector.
- Install intake manifold (bottom section) ⇒ [page 232](#).



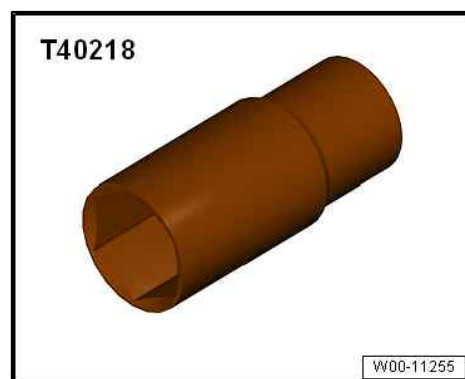
3.8 Removing and installing fuel pressure sender - G247-

Special tools and workshop equipment required

- ◆ Assembly tool - T10118-



- ◆ Socket - T40218-



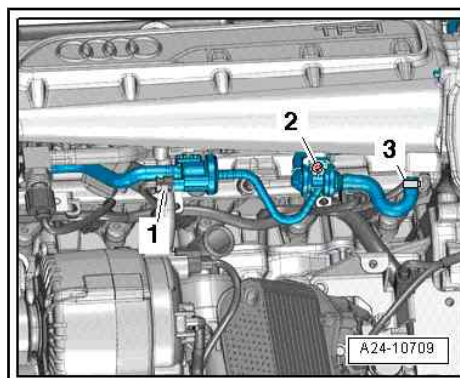
Removing

- Disengage activated charcoal filter solenoid valve 1 - N80-item 1-.
- Remove bolt -2-.
- Release hose clip -3- and detach hose.

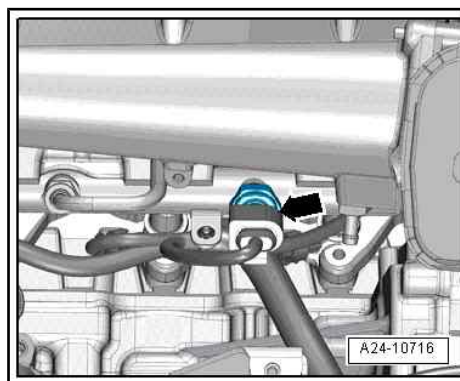


Note

Place a cloth underneath to catch escaping fuel.



- Unplug electrical connector -arrow-.



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 a clean cloth around connection and open connection carefully).

- Unscrew fuel pressure sender - G247- using socket, 27 mm - T40218- .

Installing

Installation is carried out in reverse sequence.

- Tightening torques
⇒ [“3.6 Exploded view - fuel rail with injectors”, page 234](#) and
⇒ [“2.1 Exploded view - air cleaner”, page 220](#)

Protected by copyright. Copying for private 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.

3.9 Removing and installing fuel pressure sender for low pressure - G410-

Removing

- Unplug electrical connector -1-.
- Unscrew fuel pressure sender for low-pressure - G410- -item 2-.

Installing

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

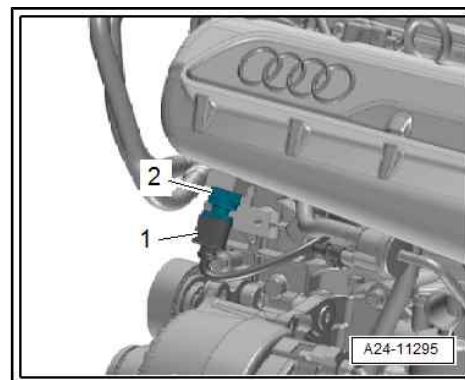


Note

- ◆ Fit new O-ring.
- ◆ Lubricate the O-ring with clean engine oil.

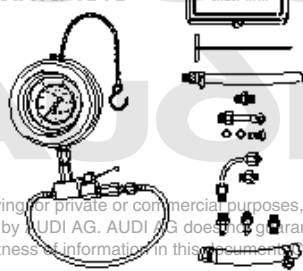
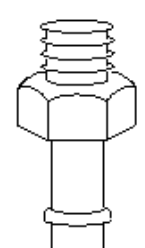
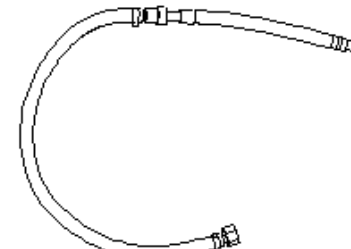
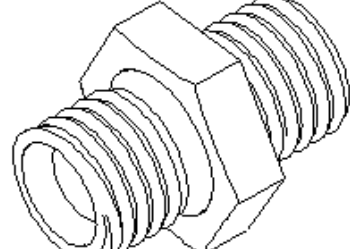
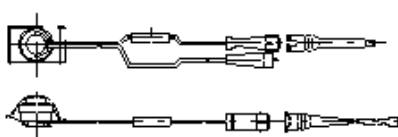
Tightening torques

- ◆ ⇒ Fig. "" Fuel pressure sender for low pressure -G410- "" , page 236



3.10 Checking fuel pressure and residual pressure (up to high-pressure pump)

Special tools and workshop

V.A.G 1318 	V.A.G 1318/11 
V.A.G 1318/17A 	V.A.G 1318/23 
V.A.G 1348/3A 	V.A.G 1594 C  G24-10009

Protected by copyright. Copying for private 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.

equipment required

- ◆ K-Jetronic pressure tester - V.A.G 1318-
- ◆ Adapter - V.A.G 1318/11-
- ◆ Adapter set - V.A.G 1318/17A-
- ◆ Connector - V.A.G 1318/23-
- ◆ Remote control - V.A.G 1348/3A- for V.A.G 1348 with adapter cable -V.A.G 1348/3-3-
- ◆ Auxiliary measuring set - V.A.G 1594C-
- ◆ Fuel-resistant measuring container

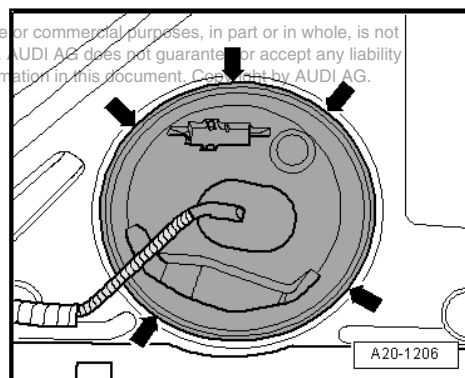
Test conditions

- Battery voltage at least 12.5 V
- Fuel filter OK.
- Fuel tank at least $\frac{1}{4}$ full.
- Fuel pump control unit - J538- OK; checking in "Guided Fault Finding" ⇒ Vehicle diagnostic tester.
- Ignition switched off.

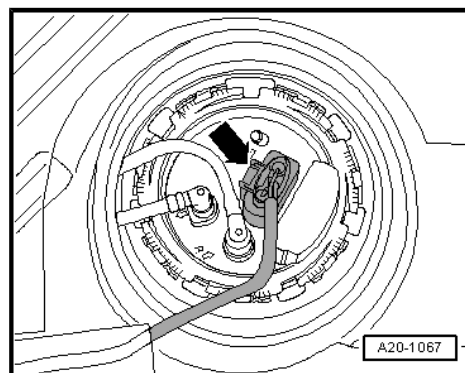
Checking fuel pressure

- Remove rear seat bench ⇒ Rep. gr. 72 .
- Unclip retaining tabs -arrows- for flange cover.

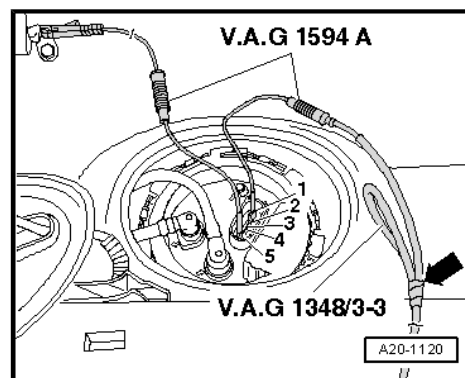
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- Unplug electrical connector -arrow- at flange.



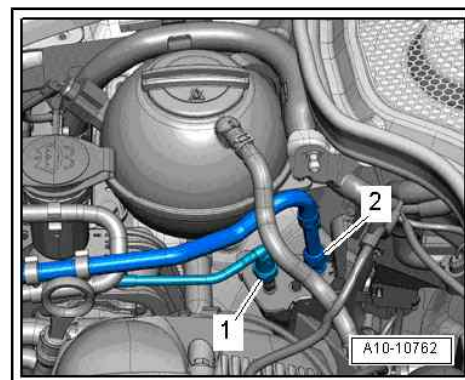
- Connect remote control - V.A.G 1348/3A- for V.A.G 1348 to contact -1- using adapter cable -V.A.G 1348/3-3- and test lead from auxiliary measuring set - V.A.G 1594C- .
- Tape off 2nd connector contact of adapter cable -V.A.G 1348/3-3- with insulating tape -arrow- to prevent short circuits.
- Connect contact -5- to the body (earth) using a test lead from auxiliary measuring set - V.A.G 1594C- .
- Connect crocodile clip to battery “+” (remote positive terminal in engine compartment).
- Remove filler cap from fuel filler neck.

**WARNING**

The fuel system operates at high pressure - risk of injuries!

- ◆ *To reduce the pressure in the fuel system, wrap a clean cloth around the connection and loosen the connection carefully.*

- Disconnect fuel supply line -2- (pull release ring) and move clear.
- Seal off open lines and connections with clean plugs.

**Note**

Disregard -item 1-.



Protected by copyright. Copying for private 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.

- Screw connector - V.A.G 1318/23- and adapter -V.A.G 1318/17A- onto K-Jetronic pressure tester - V.A.G 1318- .
- Fit adapter -V.A.G 1318/17A- onto disconnected fuel supply line.
- Screw adapter - V.A.G 1318/11- onto K-Jetronic pressure tester - V.A.G 1318- .
- Attach test hose -arrow- and hold end of hose in measuring container.
- Open cut-off valve on pressure tester.
- Lever must point in direction of flow.
- Press and hold remote control switch until K-Jetronic pressure tester - V.A.G 1318- shows no further increase in pressure.
- Specification: approx. 6 bar (4 ... 8 bar).

If specification is not attained, check delivery rate of fuel pump ⇒ Rep. gr. 20 .

Checking residual pressure

- Check system for leaks and check residual pressure by watching the drop in pressure on the K-Jetronic pressure tester - V.A.G 1318- .
- After 10 minutes pressure should still be at least 3.0 bar.

If the residual pressure drops below 3 bar:

- ◆ Check union between K-Jetronic pressure tester - V.A.G 1318- and fuel supply line for leaks.
- ◆ Check K-Jetronic pressure tester - V.A.G 1318- for leaks.
- ◆ Check fuel lines and their connections for leaks.
- ◆ Renew fuel filter with integrated fuel pressure regulator ⇒ Rep. gr. 20 .
- ◆ If fuel filter is OK, renew fuel pump ⇒ Rep. gr. 20 .

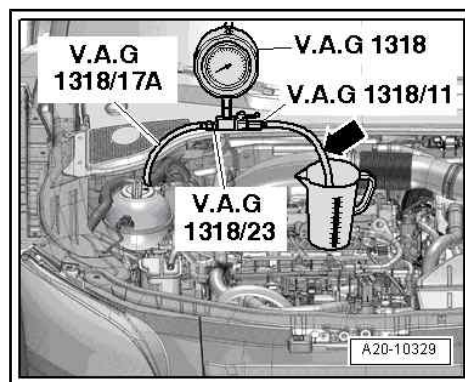
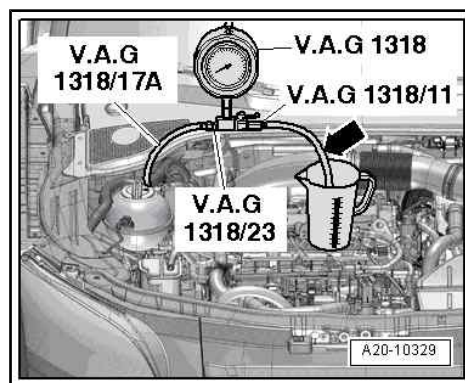
Attaching

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

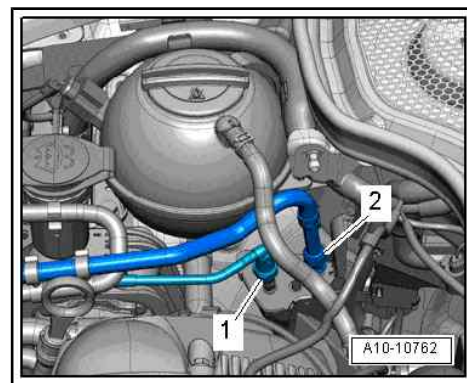


Note

Before removing the pressure tester, release the fuel pressure by opening the cut-off valve. Hold end of test hose -arrow- in measuring container.



- Re-attach fuel supply line -2- (make sure that all parts are clean and that there are no leaks).
- Install rear seat bench ⇒ Rep. gr. 72 .



Protected by copyright. Copying for private 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.

4 High-pressure pump

⇒ "4.1 Exploded view - high-pressure pump", page 248

⇒ "4.2 Removing and installing high-pressure pump", page 249

⇒ "4.3 Removing and installing high-pressure pipe", page 250

4.1 Exploded view - high-pressure pump

1 - High-pressure pipe

- ☐ Different versions available; for correct version refer to ⇒ Electronic parts catalogue
- ☐ Connections must not be damaged
- ☐ Do not alter shape
- ☐ Lubricate thread lightly with oil
- ☐ Removing and installing
⇒ page 250

2 - Bolt

- ☐ 9 Nm

3 - Union nut

- ☐ Connections must not be damaged
- ☐ 27 Nm

4 - Roller tappet

5 - O-ring

- ☐ Renew after removing

6 - High-pressure pump

- ☐ Removing and installing
⇒ page 249

7 - Bolt

- ☐ Tighten in stages
⇒ page 250
- ☐ Final tightening torque:
20 Nm

8 - Connecting piece

- ☐ Renew
- ☐ 35 Nm

9 - Connecting piece

- ☐ Renew
- ☐ 35 Nm

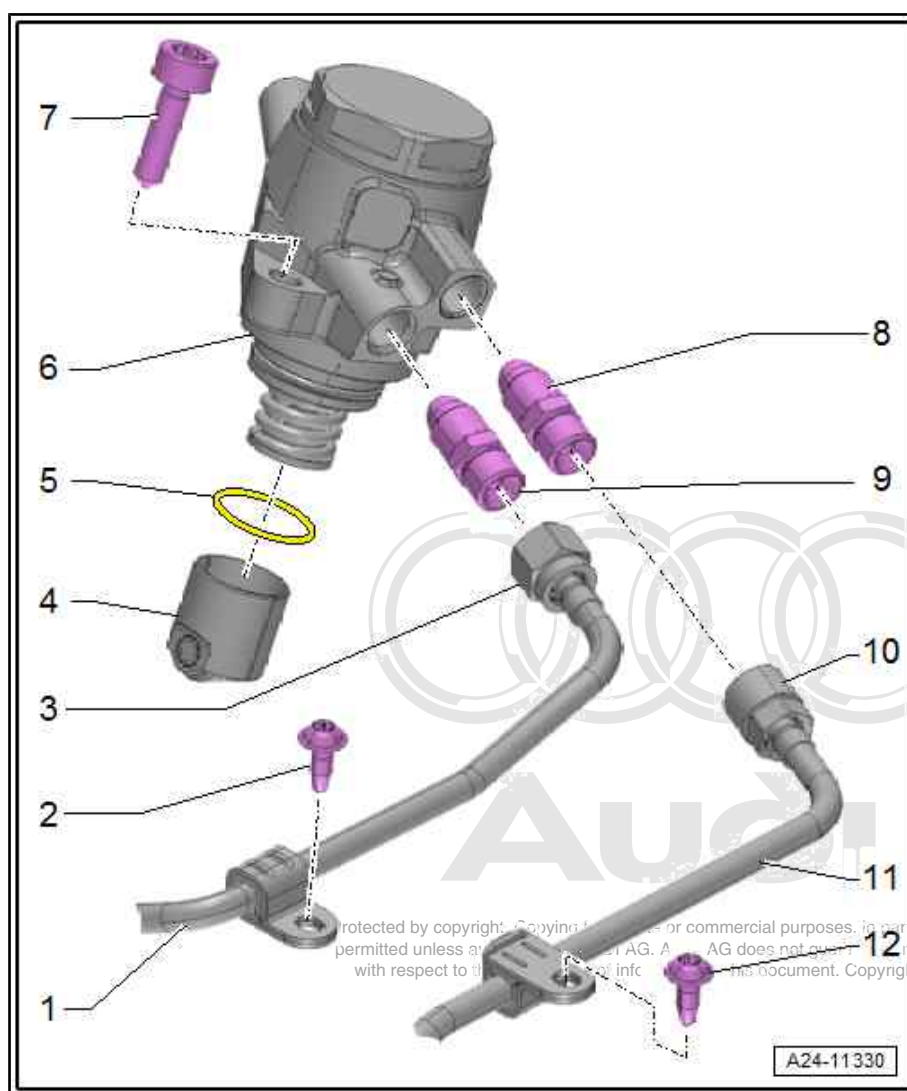
10 - Union nut

- ☐ Connections must not be damaged
- ☐ 27 Nm

11 - Fuel supply line

12 - Bolt

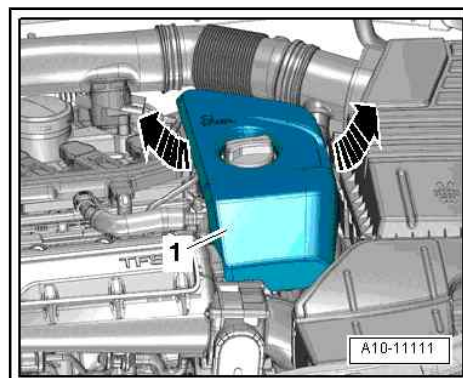
- ☐ 9 Nm



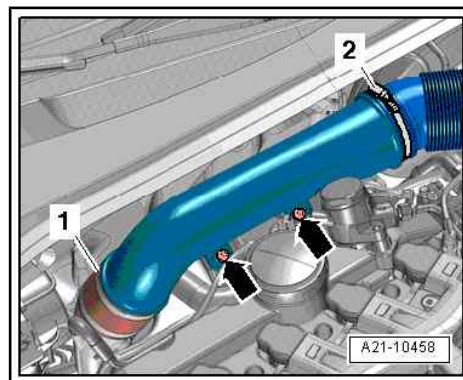
4.2 Removing and installing high-pressure pump

Removing

- Pull engine cover panel -1- off upwards -arrows-.

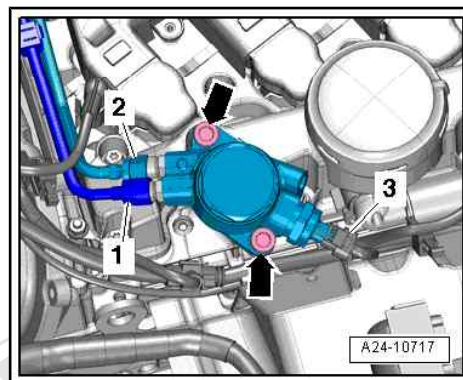


- Remove bolts -arrows-.
- Release hose clips -1- and -2- and remove air pipe.



Note

Place a cloth underneath to catch escaping fuel.



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 a clean cloth around connection and open connection carefully).

- Unscrew union nuts -1- and -2-.
- Unplug electrical connector -3- for fuel metering valve - N290- .

Protected by copyright. Copying for private 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.



- Remove bolts -arrows-.
- Carefully press fuel lines to the side and detach high-pressure fuel pump.

Installing

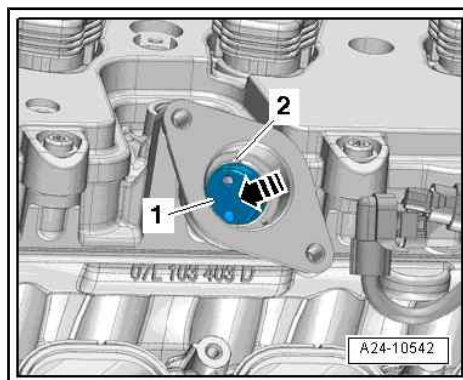
Installation is carried out in the reverse order; note the following:



Note

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted without the prior written consent of Audi AG. Audi AG and its companies not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- ◆ **Renew O-ring for high-pressure pump.**
- ◆ *The connections of the high-pressure pipes must not be damaged.*
- Check roller tappet -1- for damage and renew if necessary.
- Lightly lubricate roller tappet with oil and fit in cylinder head so that guide -2- is in correct position -arrow-.
- Fit high-pressure pump and press downwards in guide as far as stop.
- Tighten bolts hand tight in small steps.
- Then initially tighten bolts alternately to 5 Nm (do not tilt high-pressure pump).



Note

- ◆ *The high-pressure pump can be damaged if it is tightened too much on one side (keep it straight).*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- Final tightening torque for bolts ⇒ [Item 7 \(page 248\)](#)
- Tightening torque
⇒ ["4.1 Exploded view - high-pressure pump", page 248](#)
- Install air pipe ⇒ [page 208](#) .

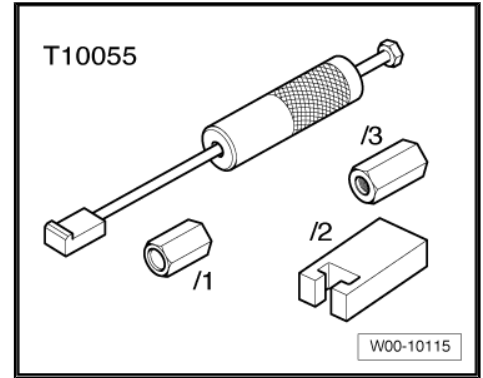
4.3 Removing and installing high-pressure pipe

Special tools and workshop equipment required

- ◆ Open end spanner insert, AF 17 - V.A.G 1331/6-



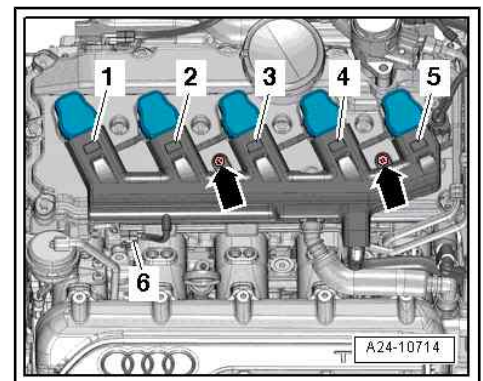
◆ Puller - T10055-



Removing

- Remove intake manifold (top section) ⇒ [page 230](#) .
- Remove bolts -arrows-.
- Unplug electrical connector -6- for Hall sender 3 - G300- .
- Release electrical connectors and pull connectors off ignition coils -1 ... 5- simultaneously.
- Disengage electrical wiring harness and move clear to left side.

Protected by copyright. Copying for private 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.

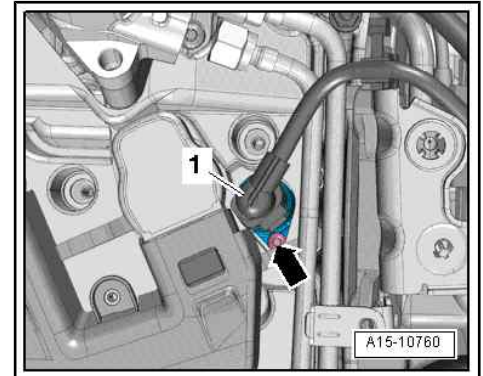


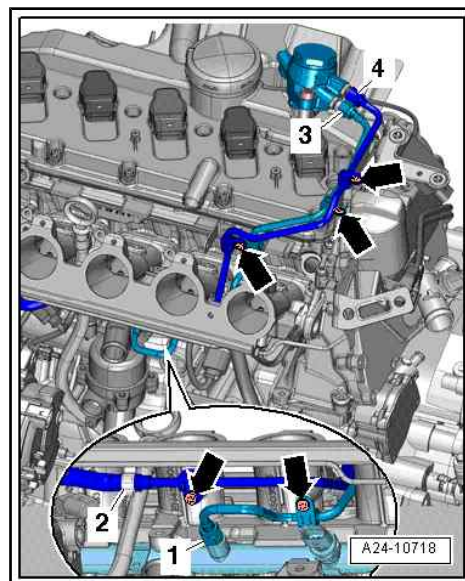
- Unplug electrical connector -1- at exhaust camshaft control valve 1 - N318- .



Note

Disregard -arrow-.





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 a clean cloth around connection and open connection carefully).

- Remove bolts -arrows- and union nut -4-.
- Release hose clip -2- and detach fuel hose.
- Detach fuel supply line.
- Remove union nuts -1- and -3- and detach high-pressure pipe.

Protected by copyright. Copying for private 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.



Note

Do not attempt to bend high-pressure pipe to a different shape.

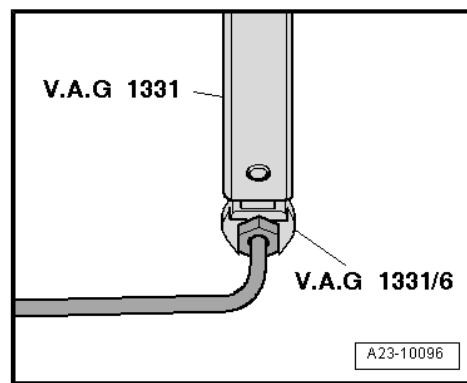
Installing



Note

- ◆ *The connections of the high-pressure pipe must not be damaged.*
- ◆ *Do not attempt to bend high-pressure pipe to a different shape.*

- First tighten union nut by hand until it makes contact, making sure that high-pressure pipe is not under tension.
- Tighten union nut with torque wrench - V.A.G 1331- and open end spanner insert (AF 17) - V.A.G 1331/6- ; to do so, counterhold at hexagon flats of threaded connection with an open-end spanner.
- Tightening torques
⇒ ["4.1 Exploded view - high-pressure pump", page 248](#) and
⇒ ["3.6 Exploded view - fuel rail with injectors", page 234](#)
- Do not tighten bolt for retainer until high-pressure pipe has been tightened.
- Install intake manifold (top section) ⇒ [page 230](#) .



Protected by copyright. Copying for private 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.

5 Lambda probes

⇒ [“5.1 Overview - Lambda probes”, page 254](#)

⇒ [“5.2 Removing and installing Lambda probe G39 with Lambda probe heater Z19”, page 255](#)

⇒ [“5.3 Removing and installing Lambda probe after catalytic converter G130 with Lambda probe 1 heater after catalytic converter Z29”, page 256](#)

5.1 Overview - Lambda probes



Note

- ◆ *Threads of new Lambda probes are already coated with assembly paste; the paste must not get into the slots on the 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. For high-temperature paste refer to ⇒ [Electronic parts catalogue](#)*
- ◆ *When installing, it is important to re-attach the Lambda probe wiring at the same locations to prevent it from coming into contact with the exhaust pipe.*

1 - Starter catalytic converter

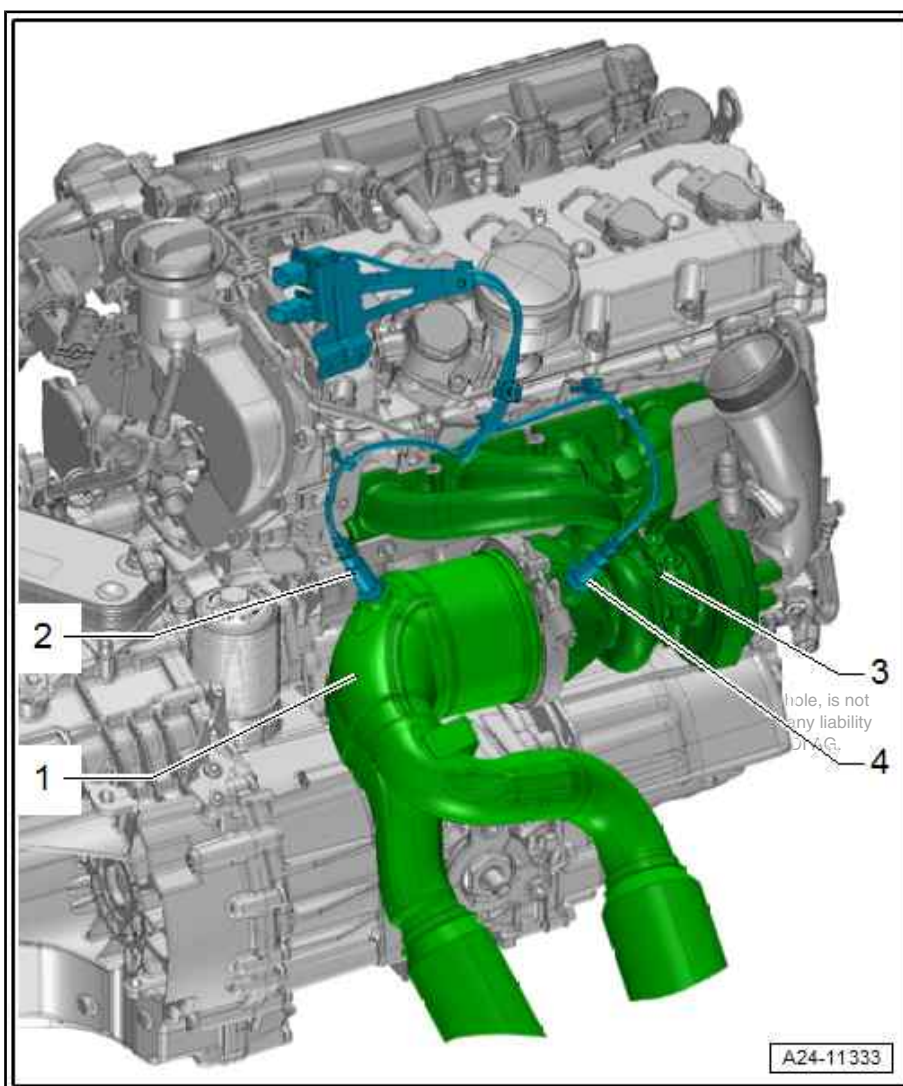
2 - Lambda probe after catalytic converter - G130- with Lambda probe 1 heater after catalytic converter - Z29-

- ☐ Removing and installing
⇒ [page 256](#)
- ☐ 55 Nm

3 - Lambda probe - G39- with Lambda probe heater - Z19-

- ☐ Removing and installing
⇒ [page 255](#)
- ☐ 55 Nm

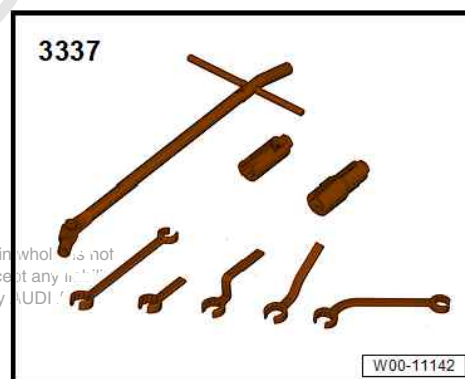
4 - Turbocharger



5.2 Removing and installing Lambda probe - G39- with Lambda probe heater - Z19-

Special tools and workshop equipment required

- ◆ Lambda probe open ring spanner set - 3337-



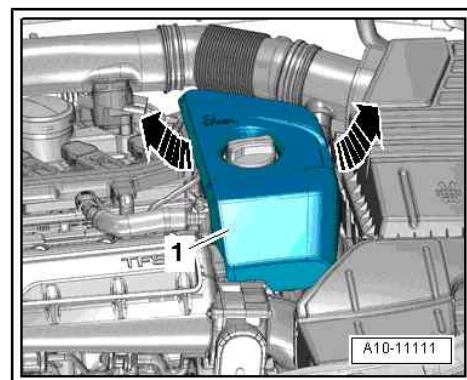
Removing

- Pull engine cover panel -1- off upwards -arrows-.

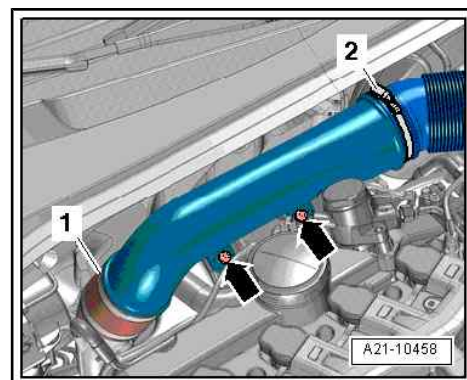


Note

- ◆ *Fit cable ties in the original positions when installing.*
- ◆ *Fit heat insulation sleeves in the original positions when installing.*



- Remove bolts -arrows-.
- Release hose clips -1- and -2- and remove air pipe.

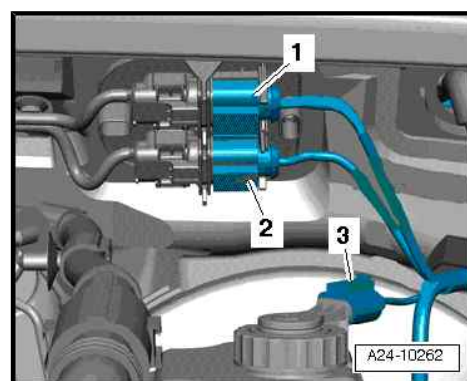


- Remove electrical connector -1- for Lambda probe - G39- from bracket and unplug connector.
- Move clear electrical wiring for Lambda probe.



Note

Disregard items -2 and 3-.



- Detach heat shield sleeve.
- Unscrew Lambda probe - G39- -item 2- using a tool from Lambda probe open ring spanner set - 3337- .



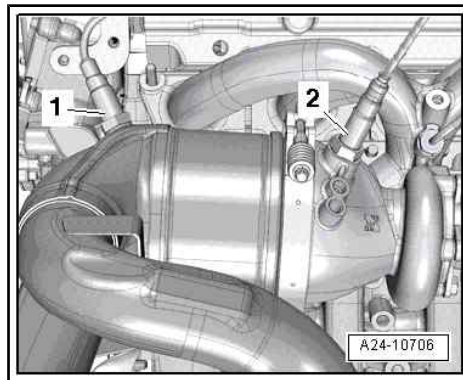
Note

Disregard -item 1-.

Installing

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

- Tightening torque
⇒ ["5.1 Overview - Lambda probes", page 254](#)



Note

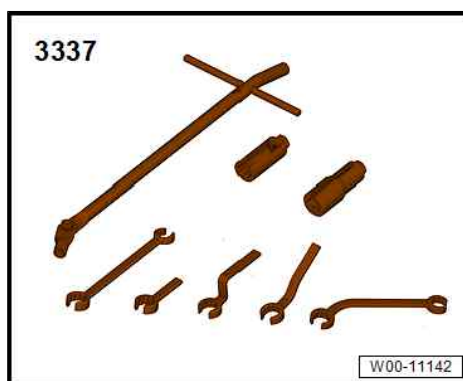
- ◆ *Threads of new Lambda probes are already coated with assembly paste; the paste must not get into the slots on the probe body.*
- ◆ *In the case of a used Lambda probe grease only the thread with high-temperature paste. The paste must not get into the slots on the Lambda probe body. For high-temperature paste refer to ⇒ [Electronic parts catalogue](#)*
- ◆ *When installing, it is important to re-attach the Lambda probe wiring at the same locations to prevent it from coming into contact with the exhaust pipe.*
- Install air pipe ⇒ [page 208](#) .

5.3 Removing and installing Lambda probe after catalytic converter - G130- with Lambda probe 1 heater after catalytic converter - Z29-

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted without the prior written consent of Audi AG. Audi AG does not warrant or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Special tools and workshop equipment required

- ◆ Lambda probe open ring spanner set - 3337-



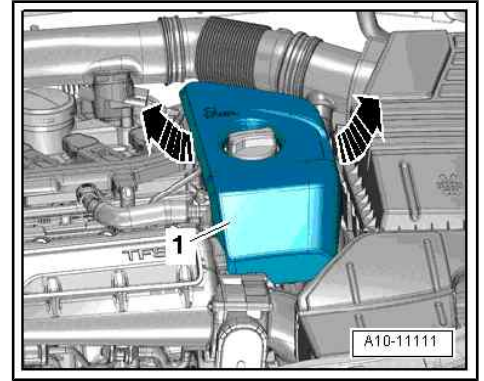
Removing

- Pull engine cover panel -1- off upwards -arrows-.

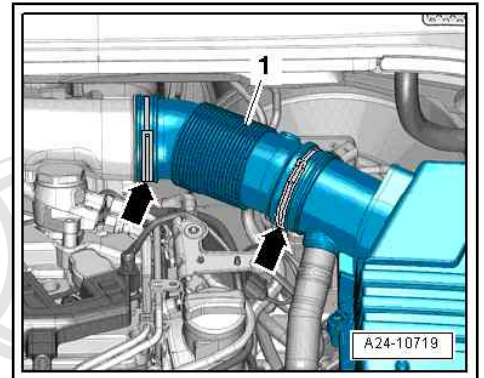


Note

Fit cable ties in the original positions when installing.



- Release hose clips -arrows- and detach air pipe -1-.



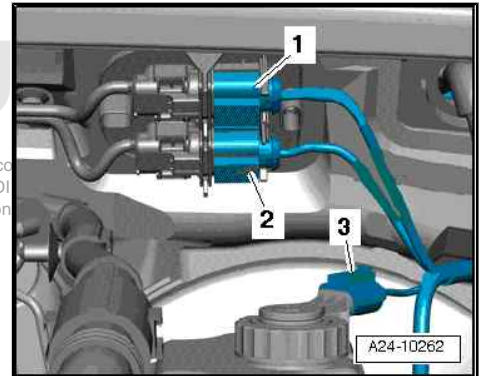
- Remove electrical connector -2- for Lambda probe after catalytic converter - G130- from bracket and unplug connector.
- Move clear electrical wiring for Lambda probe.



Note

Disregard items -1 and 3-.

Protected by copyright. Copying for private or commercial use is permitted unless authorised by AUDI AG. AUDI AG is not responsible with respect to the correctness of information.



- Unscrew Lambda probe after catalytic converter - G130-item 1- using a tool from Lambda probe open ring spanner set - 3337- .



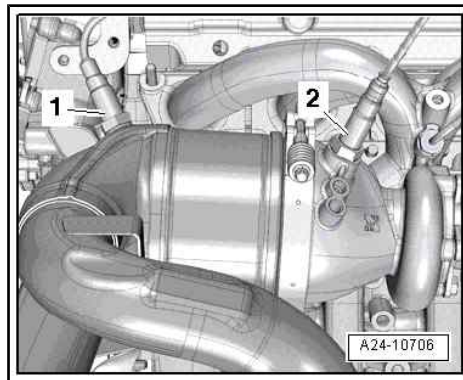
Note

Disregard -item 2-.

Installing

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

- Tightening torque
⇒ ["5.1 Overview - Lambda probes", page 254](#)



Note

- ◆ *Threads of new Lambda probes are already coated with assembly paste; the paste must not get into the slots on the 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. For high-temperature paste refer to ⇒ [Electronic parts catalogue](#)*
- ◆ *When installing, it is important to re-attach the Lambda probe wiring at the same locations to prevent it from coming into contact with the exhaust pipe.*
- ◆ *Hose connections and air pipes/hoses must be free of oil and grease prior to fitting.*
- ◆ *Do not use any lubricants containing silicone when assembling.*
- ◆ *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.*



Protected by copyright. Copying for private 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.

6 Engine control unit

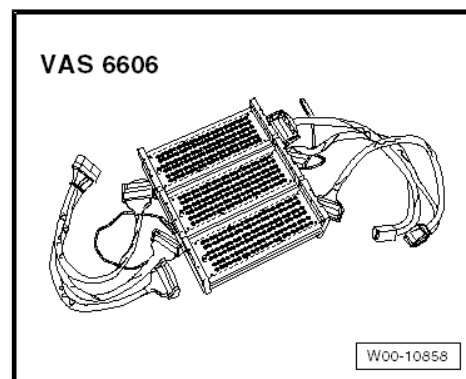
⇒ ["6.1 Wiring and component check with isolator boxes VAS 6606", page 259](#)

⇒ ["6.2 Removing and installing engine/motor control unit J623", page 260](#)

6.1 Wiring and component check with isolator boxes -VAS 6606-

Special tools and workshop equipment required

- ◆ Isolator box, 198-pin - VAS 6606/1-1-



- ◆ Isolator box, 198-pin - VAS 6606/1-2-
- ◆ Isolator box, 198-pin - VAS 6606/1-3-
- ◆ Sheets -VAS 6606/1-1-
- ◆ Sheets -VAS 6606/2-1-
- ◆ Sheets -VAS 6606/3-1-
- ◆ Set of cables -VAS 6606/7-1- and -VAS 6606/7-2-



Note

- ◆ *Always make sure that the cables are properly connected.*
- ◆ *Do not use damaged or worn tools and accessories.*
- ◆ *Observe operating instructions.*
- Connect both cable sets -VAS 6606/7-1- and -VAS 6606/7-2- to the three isolator boxes -VAS 6606-.
- Use the following sheets:
 - ◆ -VAS 6606/1-1- for isolator box, 198-pin - VAS 6606/1-1-
 - ◆ -VAS 6606/2-1- for isolator box, 198-pin - VAS 6606/1-2-
 - ◆ -VAS 6606/3-1- for isolator box, 198-pin - VAS 6606/1-3-



Note

Make sure that all plug-in bridges are inserted completely in all isolator boxes.

- Connect earth strap to an isolator box and to an earth point on the vehicle.
- Remove engine control unit ⇒ [page 260](#).

- Connect engine control unit to cable set -VAS 6606/7-1- .
- Connect vehicle wiring harness to cable set -VAS 6606/7-2- .

The connection on the engine control unit consists of a large and a small connector.

The large connector has 105 pins and is assigned to the sheets for the isolator box marked "A 1 to A 105".

The small connector has 91 pins and is assigned to the sheets for the isolator box marked "B 1 to B 91".

When a push-in bridge is pulled out, the corresponding wiring connection is disconnected.



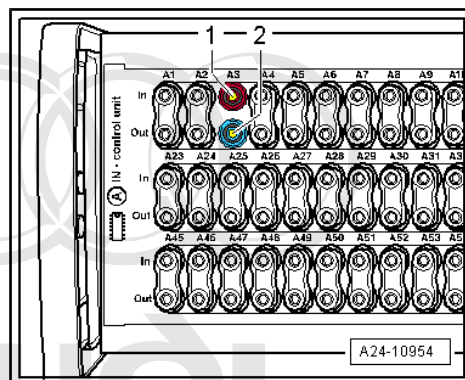
Note

- ♦ The "In" contact -1- (red socket) leads to the engine control unit.
- ♦ The "Out" contact -2- (blue socket) leads to the wiring harness.
- Carry out test as described in appropriate repair procedures.

Installing engine control unit

Installation is performed in the reverse sequence.

The procedure required after connecting the new engine control unit is described in the Guided Fault Finding or Guided Functions.



Note

Protected by copyright. Copying for private 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.

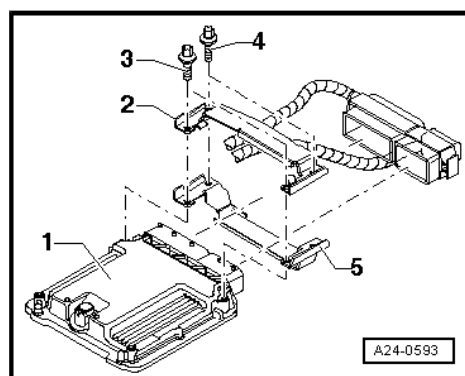
After completion of the Guided Fault Finding routine, the tester will attempt to erase the event memories of all control units. If this is not successful, the remaining events saved in the memories must be dealt with so that all event memory entries can be erased.

6.2 Removing and installing engine/motor control unit - J623-



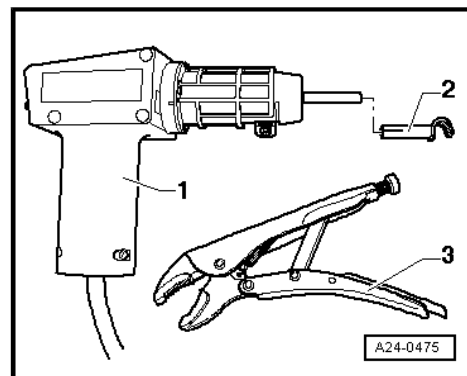
Note

- ♦ 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 protective 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).



Special tools and workshop equipment required

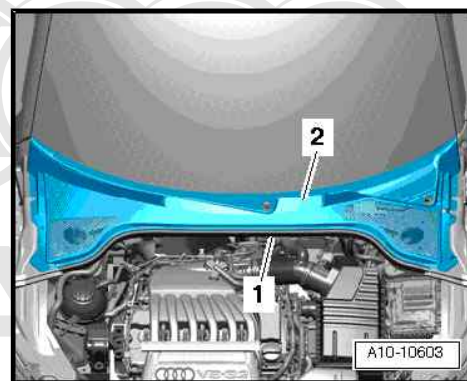
- ◆ Hot air blower - VAS 1978/14A- -item 1- with nozzle attachment -2- from wiring harness repair set - VAS 1978 B-



- ◆ Small mole grips -3- (commercially available)

Removing

- If engine control unit is to be renewed, select test sequence/ function "Replace engine control unit" in "Guided Functions" mode ⇒ Vehicle diagnostic tester.
- Remove wiper arms ⇒ Electrical system; Rep. gr. 92 .
- Pull off rubber seal -1- and remove plenum chamber cover -2-.



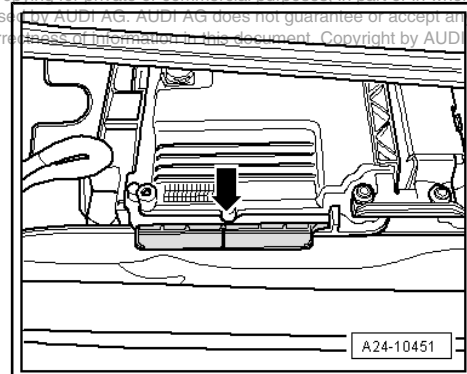
- Release clip -arrow- and remove engine control unit -1-.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted without the prior written authorisation of 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.



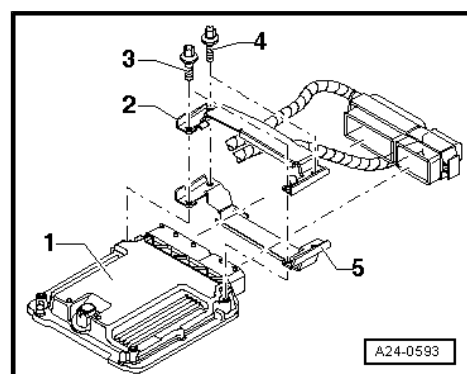
Note

Cover painted surfaces with a cloth to prevent scratching.

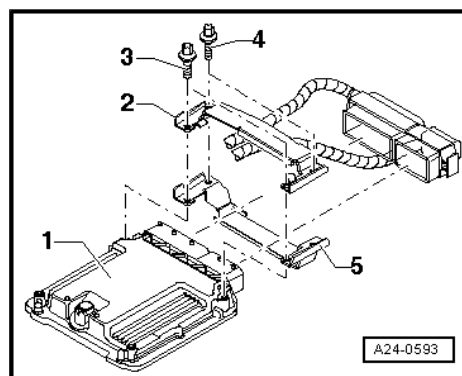


To help prevent unauthorised access to the connectors on the engine control unit, the engine control unit -1- is bolted to a protective housing -5- by means of shear bolts -3 and 4- and a locking plate -2-.

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.

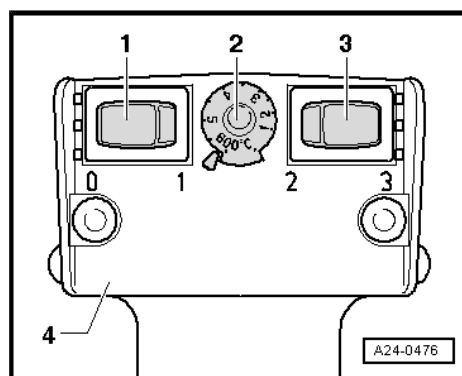


Select settings on hot air blower as shown in illustration, i.e. set temperature potentiometer -2- to maximum heat output and two-stage air flow switch -3- to position 3.



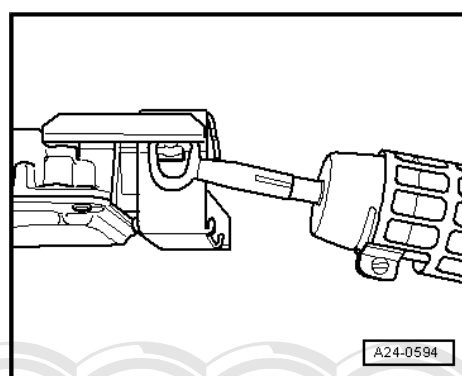
WARNING

Heating the thread of the locking plate also heats up the shear bolts and parts of the metal housing. 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.

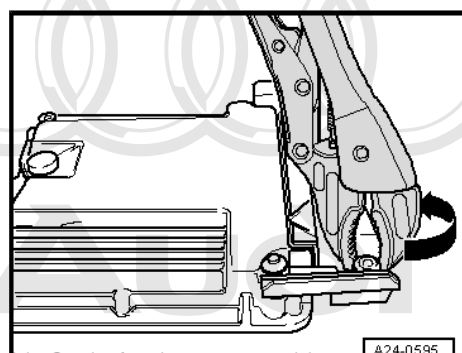


Apply heat to the threads of the shear bolts on the connector side as shown in the illustration.

Switch on the hot air blower and heat the bolt for approximately 20 ... 30 seconds.



- 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.
- Unscrew both securing bolts from engine control unit - J623- .



Protected by copyright. Copying for private or commercial purposes in part or in whole, is not permitted unless authorized 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.

- Release connectors -1- on engine control unit - J623- and unplug connectors.
- Take out old engine control unit - J623- and connect new engine control unit - J623- .



Note

When the connectors are unplugged from the engine control unit, the learnt values are erased, but the contents of the event memory remain intact.

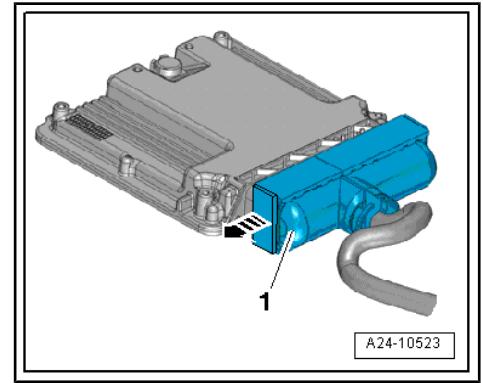
Installing

Installation is performed in the reverse sequence.

- Re-install protective housing on engine control unit.
- Clean threaded holes for shear bolts to remove any residue from locking fluid. This can be done using a thread tap.
- Use new shear bolts.
- Install wiper arms ⇒ Rep. gr. 92 .

After installing a new engine control unit, the following operation must be performed:

- Activate engine control unit using ⇒ Vehicle diagnostic tester in "Guided Functions" mode, "Replace engine control unit".



Protected by copyright. Copying for private 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.

26 – Exhaust system

1 Silencers

⇒ [“1.1 Exploded view - silencers”, page 264](#)

⇒ [“1.2 Removing and installing starter catalytic converter”, page 266](#)

⇒ [“1.3 Removing and installing catalytic converters”, page 267](#)

⇒ [“1.4 Stress-free alignment of exhaust system”, page 267](#)

⇒ [“1.5 Checking exhaust system for leaks”, page 268](#)

1.1 Exploded view - silencers

1 - Centre silencer

- ☐ Combined with rear silencer
- ☐ Align exhaust system so it is free of stress
⇒ [page 267](#)

2 - Nut

- ☐ 20 Nm

3 - Rubber mounting

- ☐ Renew if damaged

4 - Bracket for exhaust system

5 - Bolt

- ☐ 23 Nm

6 - Bracket for exhaust system

7 - Bolt

- ☐ 23 Nm

8 - Bracket for exhaust system

- ☐ Renew if damaged

9 - Bolt

- ☐ 23 Nm

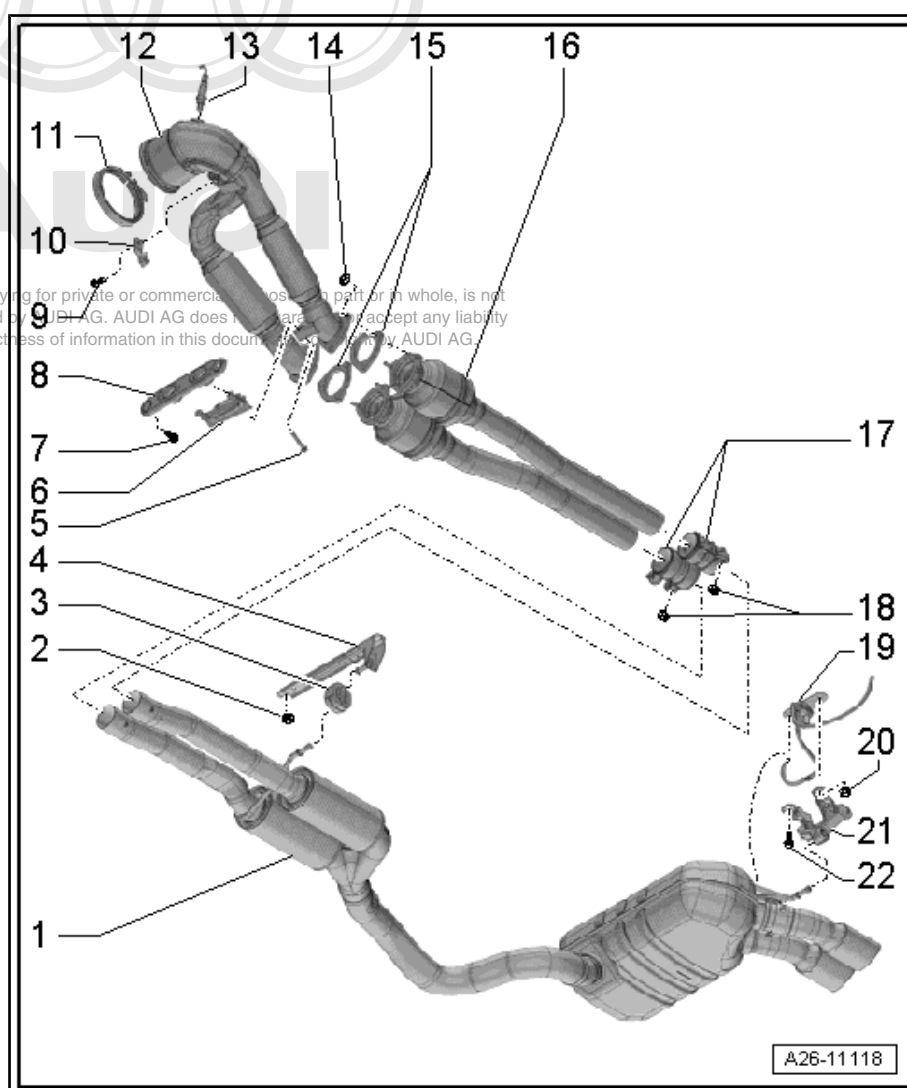
10 - Bracket for exhaust system

11 - Clamp

- ☐ 7 Nm

12 - Starter catalytic converter

- ☐ With flexible joint; do not bend flexible joint more than 10° – otherwise it can be damaged
- ☐ Install flexible joint so that it is not under tension.
- ☐ Take care not to damage wire mesh on flexible joint
- ☐ Protect starter catalytic converter against knocks and impact
- ☐ Removing and installing ⇒ [page 266](#)
- ☐ Do not remove protective packaging from replacement part until you are ready to fit the flexible joint
- ☐ Align exhaust system so it is free of stress ⇒ [page 267](#)



13 - Lambda probe after catalytic converter - G130- with Lambda probe 1 heater after catalytic converter - Z29-

- ☐ Removing and installing ⇒ [page 256](#)

14 - Nut

- ☐ Renew
- ☐ Coat threaded pins with high-temperature paste; for high-temperature paste refer to ⇒ Electronic parts catalogue
- ☐ 23 Nm

15 - Gaskets

- ☐ Renew

16 - Catalytic converters

- ☐ Removing and installing ⇒ [page 267](#)
- ☐ Align exhaust system so it is free of stress ⇒ [page 267](#)

17 - Clamp

- ☐ Before tightening, align exhaust system so it is free of stress ⇒ [page 267](#)
- ☐ Installation position ⇒ [page 265](#)
- ☐ Tighten bolted connections evenly

18 - Nuts

- ☐ Tighten bolted connections evenly
- ☐ 23 Nm

19 - Exhaust flap 1 valve - N321-

- ☐ With vacuum reservoir
- ☐ Checking vacuum unit for exhaust flap ⇒ [page 270](#)

20 - Nut

- ☐ 20 Nm

21 - Rubber mounting

- ☐ Renew if damaged

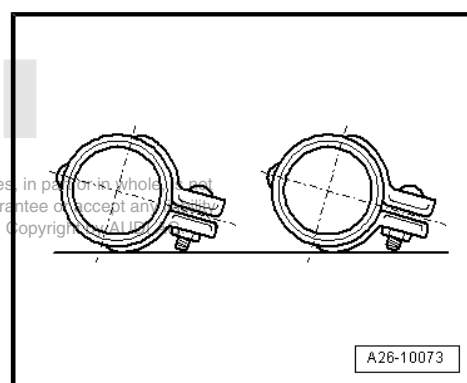
22 - Bolt

- ☐ 20 Nm

Installation position of clamps

- Install clamps so that ends of bolts do not protrude beyond bottom of clamps.
- Bolt connections facing towards right

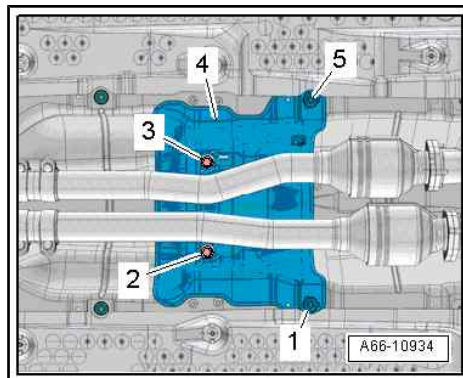
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright © AUDI AG



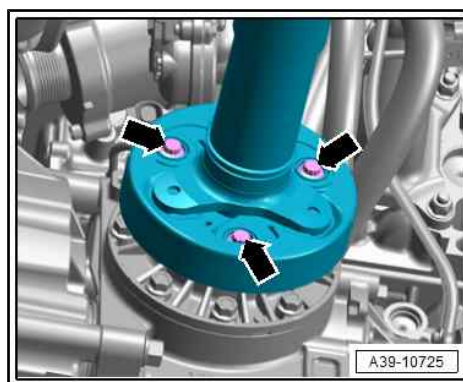
1.2 Removing and installing starter catalytic converter

Removing

- Remove heat shield -4- ⇒ Rep. gr. 66 .



- Remove propshaft ⇒ Rear final drive; Rep. gr. 39 .



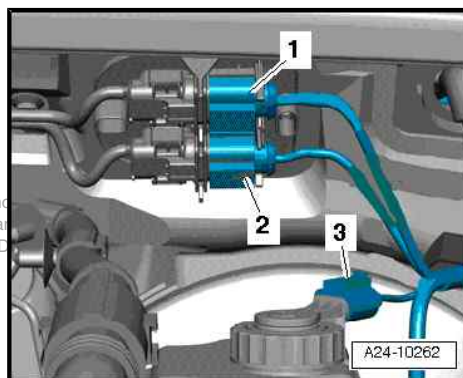
- Remove electrical connector -1- for Lambda probe - G39- from bracket and unplug connector.
- Move clear electrical wiring to Lambda probe.



Note

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is 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.

Disregard items 2 and 3.



- Unscrew bolts -1- and -2- and remove bracket for starter catalytic converter.
- Slacken bolt -3- and remove clamp from flange
- Remove starter catalytic converter.

Installing

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

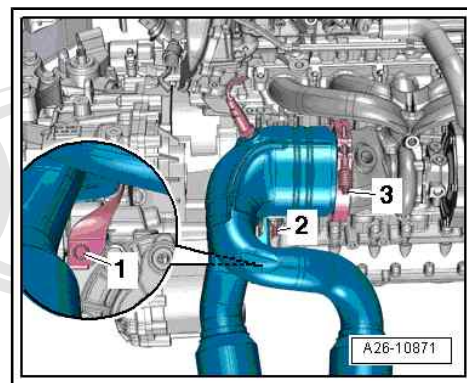
- Tightening torques
⇒ ["1.1 Exploded view - silencers", page 264](#)



Note

Renew gasket and self-locking nuts.

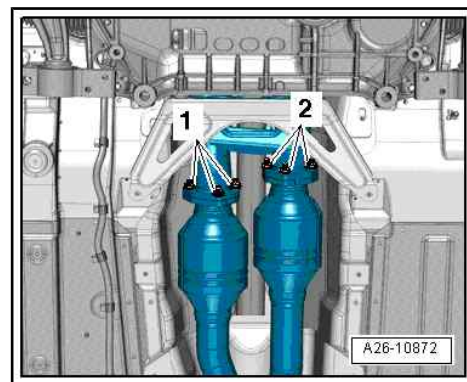
- Install propshaft ⇒ Rear final drive; Rep. gr. 39
- Install heat shield ⇒ Rep. gr. 66 .
- Align the exhaust system so it is free of stress ⇒ [page 267](#) .



1.3 Removing and installing catalytic converters

Removing

- Remove nuts -1- or -2-.



- Detach clamp -1- or -2- and detach catalytic converter with clamp.

Installing

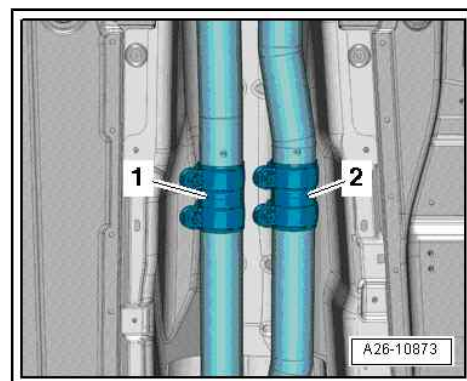
Installation is carried out in the reverse order; note the following.

- Tightening torques
⇒ ["1.1 Exploded view - silencers", page 264](#)



Note

Renew gasket and self-locking nuts.

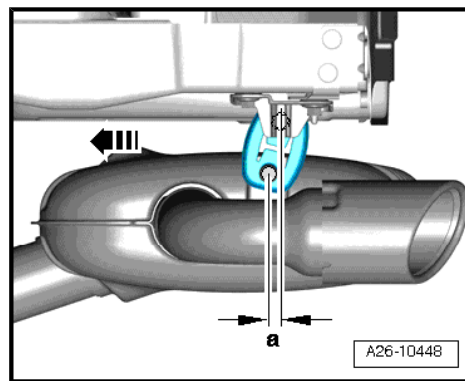


1.4 Stress-free alignment of exhaust system

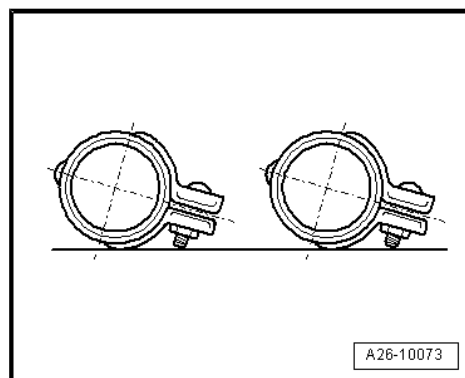
Procedure

- The exhaust system must be aligned when it is cool.
- Tightening torques
⇒ ["1.1 Exploded view - silencers", page 264](#)

- Loosen bolt connections for clamp.
- Push rear silencer towards front of vehicle -arrow- so that rubber mounting (left-side) on rear silencer is preloaded by -a- = 11 ... 13 mm.



- Install clamps so that ends of bolts do not protrude beyond bottom of clamps.
- Bolt connections facing towards right



1.5 Checking exhaust system for leaks

Procedure

- Start engine and run at idling speed.
- Plug tailpipes during leak test (e.g. with cloth or plugs).
- Listen for noise at connections between cylinder head/exhaust manifold with turbocharger, exhaust manifold with turbocharger/starter catalytic converter etc. to locate any leaks.
- Rectify any leaks that are found.

Protected by copyright. Copying for private 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.

2 Exhaust manifold

The exhaust manifold and the turbocharger are combined as one unit; removing and installing ⇒ [page 203](#) .



Protected by copyright. Copying for private 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.

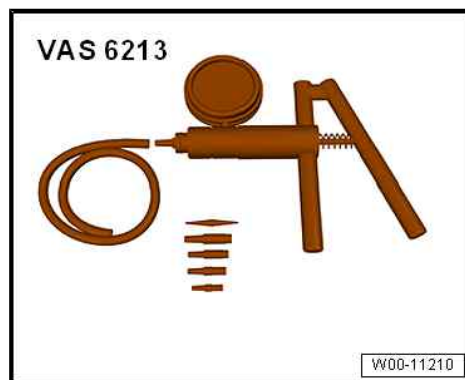
3 Exhaust flap

⇒ ["3.1 Checking vacuum unit for exhaust flap", page 270](#)

3.1 Checking vacuum unit for exhaust flap

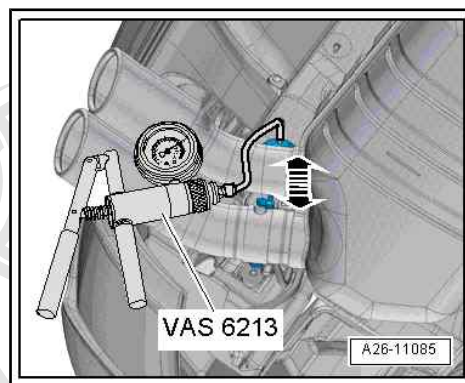
Special tools and workshop equipment required

- ◆ Hand vacuum pump - VAS 6213-



Procedure

- Detach hose from vacuum unit for exhaust flap on rear silencer.
- Connect hand vacuum pump - VAS 6213- to vacuum unit.
- Operate hand vacuum pump.
 - The linkage should move upwards -arrow-.
- Vent vacuum pump.
 - The linkage should move downwards -arrow-.
- If linkage does not move, check linkage for ease of movement and check vacuum unit for leaks.



Protected by copyright. Copying for private 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.

28 – Ignition system

1 Ignition system

⇒ "1.1 Exploded view - ignition system", page 271

⇒ "1.2 Test data", page 272

⇒ "1.3 Removing and installing ignition coils", page 272

⇒ "1.4 Removing and installing knock sensors G61 / G66", page 274

⇒ "1.5 Removing and installing Hall senders G40 / G300", page 275

⇒ "1.6 Removing and installing engine speed sender G28", page 276

1.1 Exploded view - ignition system

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not assume any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

1 - Bolt

- ☐ 9 Nm

2 - Hall sender - G40-

- ☐ Removing and installing
⇒ page 275

3 - O-ring

- ☐ Renew if damaged
- ☐ Lubricate lightly with
clean engine oil

4 - O-ring

- ☐ Renew if damaged
- ☐ Lubricate lightly with
clean engine oil

5 - Hall sender 3 - G300-

- ☐ Removing and installing
⇒ page 275

6 - Bolt

- ☐ 9 Nm

7 - Electrical connector

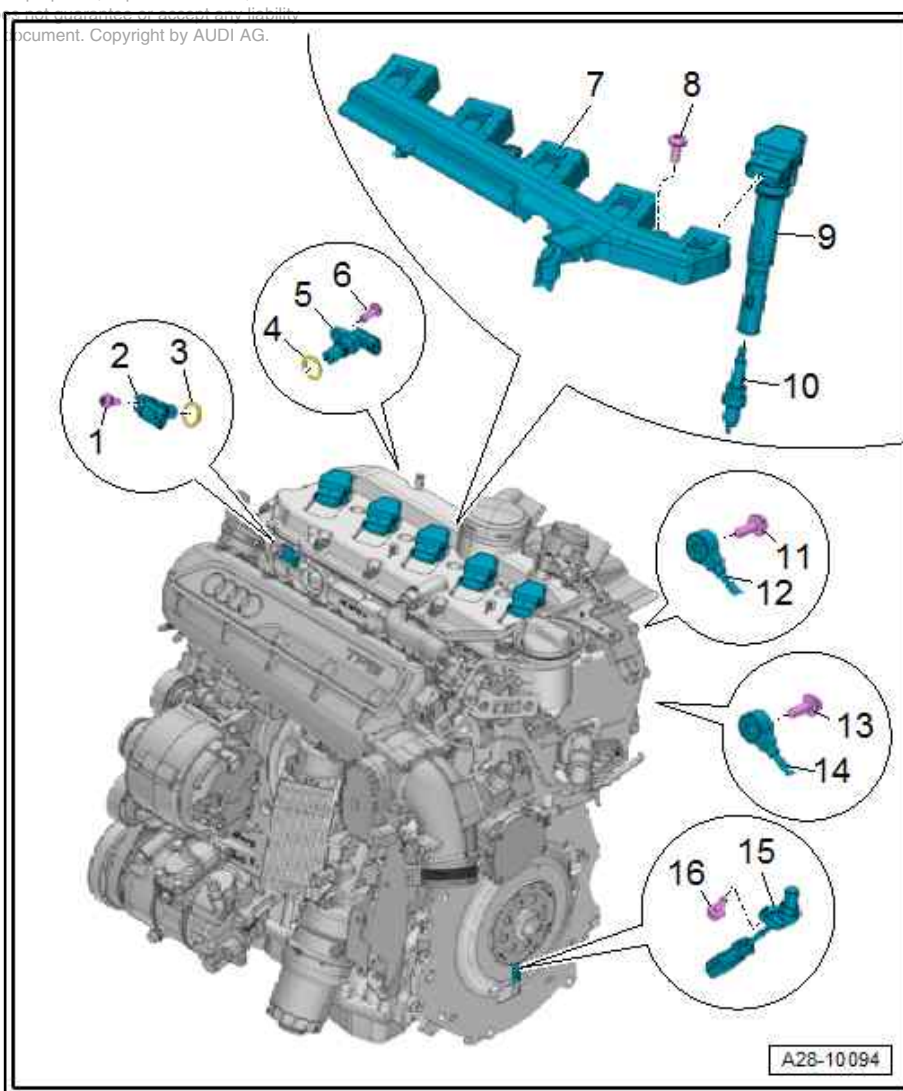
- ☐ For ignition coils

8 - Bolt

- ☐ 5 Nm

9 - Ignition coil

- ☐ 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-
- ☐ Ignition coil 5 with output stage - N323-
- ☐ Removing and installing ⇒ page 272



10 - Spark plug

- ☐ Remove and install with spark plug socket and extension - 3122 B- → Maintenance ; Booklet 808

11 - Bolt

- ☐ The tightening torque influences the function of the knock sensor
- ☐ 20 Nm

12 - Knock sensor 1 - G61-

- ☐ Contact surfaces between knock sensor and cylinder block must be free of corrosion, oil and grease
- ☐ Removing and installing ⇒ [page 274](#)

13 - Bolt

- ☐ The tightening torque influences the function of the knock sensor
- ☐ 20 Nm

14 - Knock sensor 2 - G66-

- ☐ Contact surfaces between knock sensor and cylinder block must be free of corrosion, oil and grease
- ☐ Removing and installing ⇒ [page 274](#)

15 - Engine speed sender - G28-

- ☐ Removing and installing ⇒ [page 276](#)

16 - Bolt

- ☐ Not available separately; supplied with -item 15-
- ☐ 5 Nm

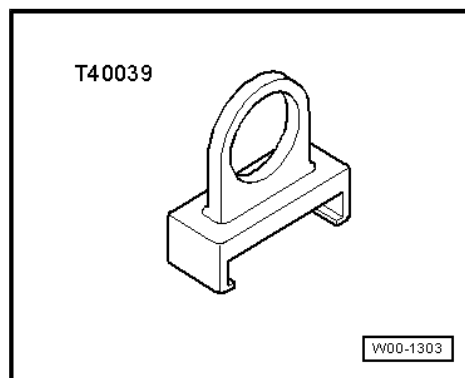
1.2 Test data

Engine data		2.5 ltr. TFSI engine
Idling speed (not adjustable)		
Ignition timing		Not adjustable (determined by control unit)
Ignition system		Multi-coil system with 5 ignition coils (output stages integrated) connected directly to spark plugs via spark plug connectors
Spark plugs	Designations	⇒ Electronic parts catalogue
	Tightening torque	⇒ Maintenance ; Booklet 808
Firing order		1-2-4-5-3

1.3 Removing and installing ignition coils

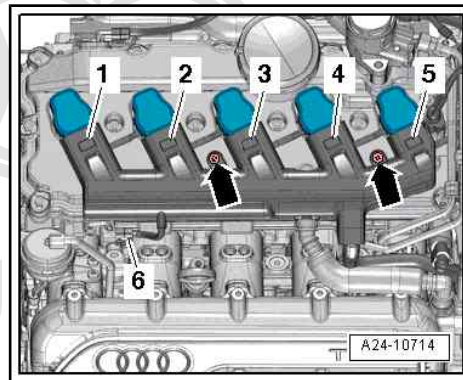
Special tools and workshop equipment required

- ◆ Puller - T40039-



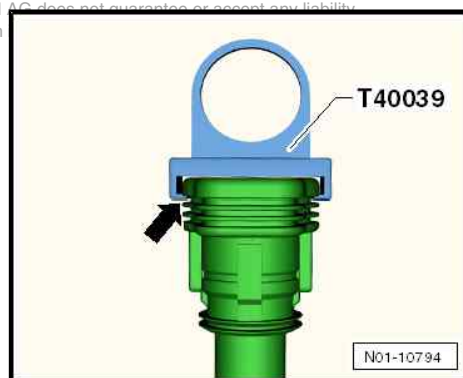
Removing

- Unplug electrical connector -6- for Hall sender 3 - G300- .
- Remove bolts -arrows-.
- Release electrical connectors and pull connectors off ignition coils -1 ... 5- simultaneously.

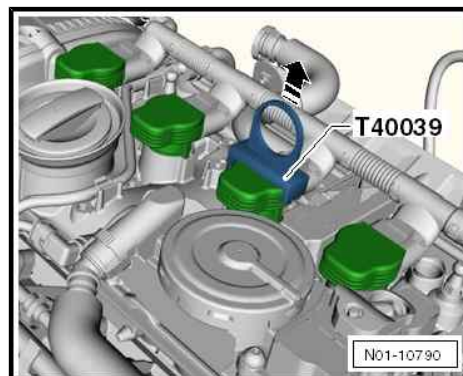


Note

- ◆ To remove ignition coils, fit puller - T40039- onto upper (thick) rib -arrow- of ignition coil with output stage.
- ◆ The lower ribs can be damaged if they are used.



- Pull out ignition coil -arrow-.



Installing

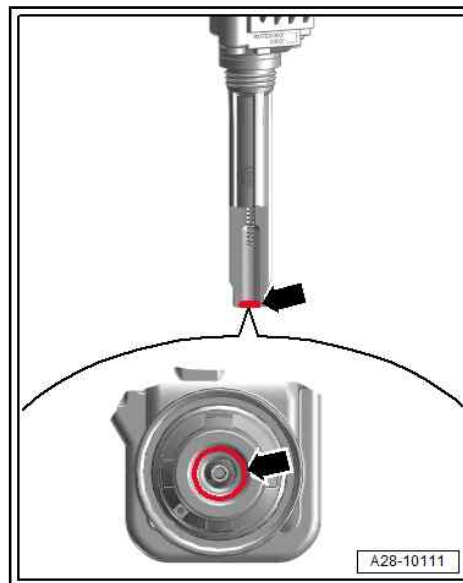
Installation is carried out in the reverse order; note the following:

- Apply a thin bead of silicone paste all around end of sealing hose of ignition coil with output stage -arrow-.



Note

- ◆ Use only the silicone paste approved for this purpose ⇒ ET-KA .
- ◆ Using any other paste could damage the ignition coil irreparably.

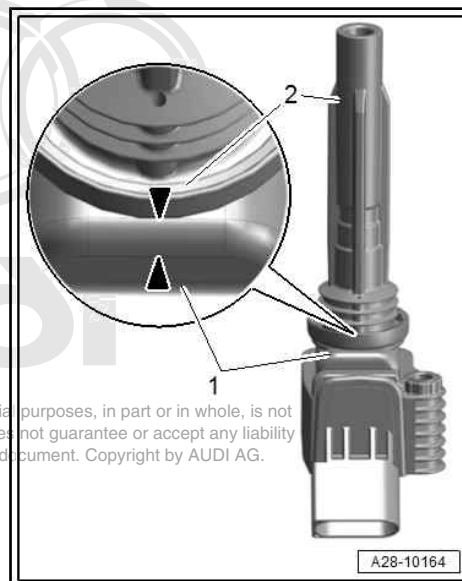


- Push spark plug connector -2- onto ignition coil -1- by hand as far as stop.
- The arrow markings on the spark plug connector and the ignition coil must be aligned, as shown.
- Fit all ignition coils loosely into spark plug holes.
- Align ignition coils with connectors and attach all connectors onto ignition coils simultaneously.
- Press ignition coils onto spark plugs by hand evenly (do not knock in with tools).

Tightening torques

- ◆ ⇒ [“1.1 Exploded view - ignition system” page 271](#)

Protected by copyright. Copying for private 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.



1.4 Removing and installing knock sensors -G61- / -G66-

Removing

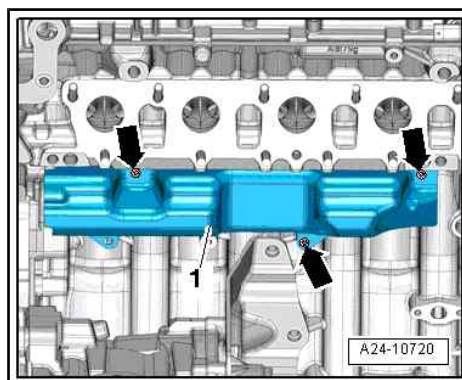
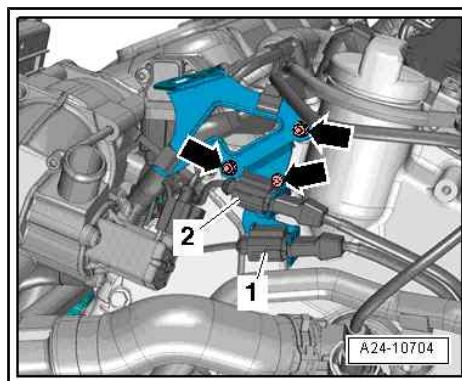
- Remove turbocharger ⇒ [page 203](#) .
 - Detach appropriate electrical connector from bracket and unplug:
- 1 - For knock sensor 2 - G66-
 - 2 - For knock sensor 1 - G61-



Note

Disregard -arrows-.

- Remove bolts -arrows- and detach heat shield -1-.



– Remove corresponding bolt and detach knock sensor:

1 - Knock sensor 2 - G66-

2 - Knock sensor 1 - G61-

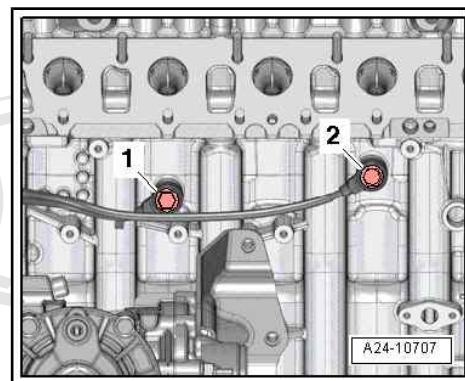
Installing

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

Tightening torques

◆ ⇒ [“1.1 Exploded view - ignition system”, page 271](#)

– Install turbocharger ⇒ [page 203](#) .



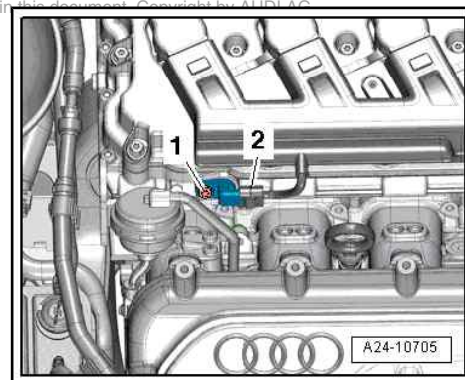
1.5 Removing and installing Hall senders - G40- / -G300-

Removing

Hall sender - G40-

- Unplug electrical connector -2-.
- Unscrew bolt -1- and remove Hall sender - G40- .

Protected by copyright. Copying for private 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



Hall sender 3 - G300-

- Unplug electrical connector -1-.
- Unscrew bolt -2- and remove Hall sender 3 - G300- .

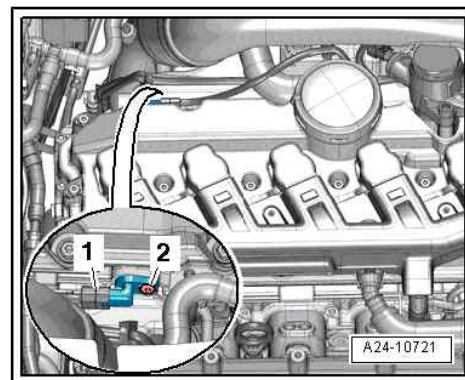
Installing

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



Note

Fit new O-rings.



Tightening torques

◆ ⇒ [“1.1 Exploded view - ignition system”, page 271](#)

1.6 Removing and installing engine speed sender - G28-

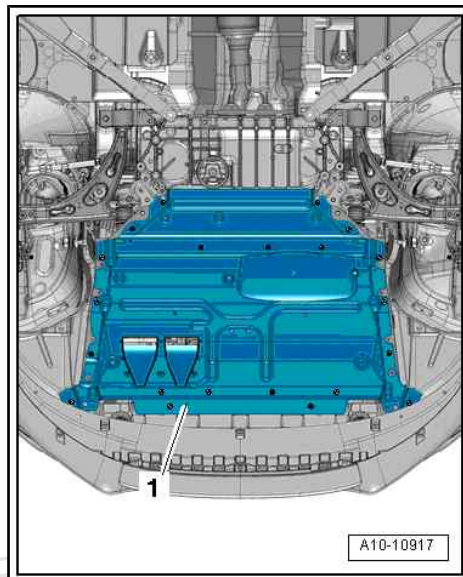
Removing



Note

Fit all cable ties in the original positions when installing.

- Remove noise insulation -1- ⇒ Rep. gr. 66 .



- Move electrical connector -2- clear and disconnect.
- Move electrical wiring harness clear -arrows-.
- Unscrew bolts -1- and detach engine speed sender - G28- .

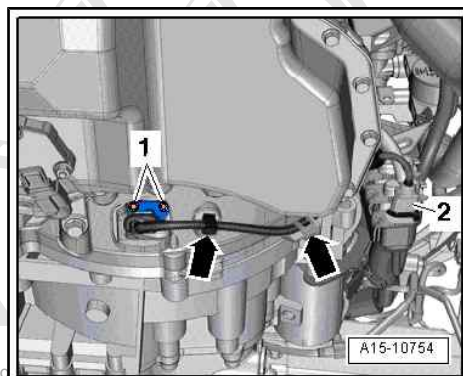
Installing

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

Tightening torques

- ♦ ⇒ [“1.1 Exploded view - ignition system”, page 271](#)

- Install noise insulation ⇒ Rep. gr. 66 .



Protected by copyright. Copying for private use is 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.