

Workshop Manual

Audi A6 2005 ➤

**6-cylinder direct injection engine with supercharger
(3.0 ltr. 4-valve TFSI), mechanics**

Engine ID	CAJA	CCA A							
-----------	------	----------	--	--	--	--	--	--	--

Edition 02.2015

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
- 26 - Exhaust 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 Engine data	2
3 Safety precautions	3
3.1 Working on the fuel system	3
3.2 Procedure before opening high-pressure section of injection system	4
3.3 Working on the cooling system	4
3.4 Working on vehicles with start/stop system	4
3.5 Using testers and measuring instruments during a road test	5
3.6 Working on the exhaust system	5
4 General repair instructions	6
4.1 Rules for cleanliness when working on fuel supply system, injection system and turbocharger/supercharger	6
4.2 Checking fuel system for leaks	6
4.3 Foreign particles in engine	7
4.4 Contact corrosion!	7
4.5 Routing and attachment of pipes, hoses and wiring	7
4.6 Installing radiators and condensers	7
4.7 Checking vacuum system	7
10 - Removing and installing engine	9
1 Removing engine	9
2 Separating engine from automatic gearbox 09L	28
3 Securing engine to engine and gearbox support	35
4 Installing engine	38
5 Assembly mountings	45
5.1 Exploded view - assembly mountings	45
5.2 Removing and installing engine mounting (left-side)	46
5.3 Removing and installing engine mounting (right-side)	49
5.4 Removing and installing torque reaction support	52
13 - Crankshaft group	54
1 Cylinder block (pulley end)	54
1.1 Exploded view - poly V-belt drive for supercharger	54
1.2 Removing and installing poly V-belt for supercharger	55
1.3 Removing and installing poly V-belt tensioner for supercharger	57
1.4 Exploded view - poly V-belt drive	57
1.5 Removing and installing poly V-belt	60
1.6 Removing and installing tensioner for poly V-belt	61
1.7 Removing and installing vibration damper	62
1.8 Renewing sealing flange (pulley end) with crankshaft oil seal	63
2 Cylinder block (gearbox end)	67
2.1 Exploded view - drive plate, vehicles with automatic gearbox 09L	67
2.2 Removing and installing drive plate - vehicles with automatic gearbox 09L	68
2.3 Renewing crankshaft oil seal (gearbox end)	68
3 Crankshaft	71
3.1 Exploded view - crankshaft	71
3.2 Crankshaft dimensions	74
3.3 Measuring axial clearance of crankshaft	74
3.4 Measuring radial clearance of crankshaft	75
4 Pistons and conrods	76



4.1	Exploded view - pistons and conrods	76
4.2	Piston and cylinder dimensions	79
4.3	Measuring radial clearance of conrods	79
15	Cylinder head, valve gear	80
1	Chain drive	80
1.1	Exploded view - timing chain covers	80
1.2	Removing and installing timing chain covers (left and right)	82
1.3	Removing and installing timing chain cover (bottom)	85
1.4	Exploded view - camshaft timing chains	89
1.5	Removing timing chains from camshafts	92
1.6	Removing and installing camshaft timing chains	101
1.7	Exploded view - drive chain for valve gear	103
1.8	Removing and installing drive chain for valve gear	104
1.9	Exploded view - drive chain for auxiliary drives	105
1.10	Removing and installing drive chain for auxiliary drives	106
1.11	Exploded view - balance shaft	109
1.12	Removing and installing balance shaft	110
2	Cylinder head	113
2.1	Exploded view - cylinder head	113
2.2	Removing and installing cylinder head cover (left-side)	116
2.3	Removing and installing cylinder head cover (right-side)	117
2.4	Removing and installing cylinder heads	117
2.5	Checking compression	125
3	Servicing valve gear	128
3.1	Exploded view - valve gear	128
3.2	Measuring axial clearance of camshafts	131
3.3	Measuring radial clearance of camshafts	132
3.4	Removing and installing camshafts	132
3.5	Checking hydraulic valve compensation elements	138
3.6	Renewing valve stem oil seals with cylinder head installed	140
3.7	Renewing valve stem oil seals with cylinder head removed	143
3.8	Valve dimensions	147
3.9	Checking valve guides	147
3.10	Checking valves	148
17	Lubrication	149
1	Sump (bottom section), sump (top section), oil pump, engine oil cooler	149
1.1	Exploded view - sump (bottom section), sump (top section), oil pump, engine oil cooler	149
1.2	Removing and installing oil level and oil temperature sender G266	153
1.3	Removing and installing sump (bottom section)	153
1.4	Removing and installing oil pump	155
1.5	Removing and installing sump (top section)	155
1.6	Removing and installing engine oil cooler	158
2	Oil filter housing, oil pressure switch	161
2.1	Exploded view - oil filter housing, oil pressure switch	161
2.2	Removing and installing oil filter housing	162
2.3	Checking oil pressure switch F22 / oil pressure switch for reduced oil pressure F378	164
2.4	Removing and installing oil pressure switch F22	164
2.5	Removing and installing oil pressure switch for reduced oil pressure F378	166
2.6	Removing and installing valve for oil pressure control N428	167
2.7	Checking oil pressure	168
3	Oil retention valves, oil separator	170
3.1	Exploded view - oil retention valves, oil separator	170
3.2	Removing and installing crankcase breather hoses - not on USA models	171

3.3	Removing and installing cover with oil separator	172
3.4	Engine oil	172
3.5	Checking oil level	172
19	Cooling	173
1	Cooling system	173
1.1	Connection diagram - coolant hoses	173
1.2	Draining and filling cooling system	177
1.3	Checking cooling system for leaks	184
2	Coolant pump and thermostat	187
2.1	Exploded view - coolant pump, thermostat and connection	187
2.2	Removing and installing coolant pump	188
2.3	Removing and installing thermostat	189
2.4	Checking thermostat	190
3	Coolant pipes and charge air cooling pump V188	191
3.1	Exploded view - coolant pipes	191
3.2	Removing and installing coolant temperature sender G62	193
3.3	Removing and installing coolant pipes (left-side)	194
3.4	Removing and installing coolant pipes (front left)	197
3.5	Removing and installing coolant pipe (front)	199
3.6	Removing and installing coolant pipe (top)	203
3.7	Removing and installing coolant pipes on supercharger	205
3.8	Removing and installing charge air cooling pump V188	207
3.9	Exploded view - continued coolant circulation pump V51	208
3.10	Removing and installing continued coolant circulation pump V51	209
4	Radiator and radiator fans	211
4.1	Exploded view - radiator and radiator fans	211
4.2	Removing and installing radiator	212
4.3	Removing and installing water radiator for charge air cooling circuit	217
4.4	Removing and installing radiator cowl	220
4.5	Removing and installing radiator fans V7 / V177	222
21	Turbocharging/supercharging	223
1	Supercharger	223
1.1	Exploded view - supercharger	223
1.2	Removing and installing charge pressure sender G31 / G447	225
1.3	Removing and installing supercharger	226
1.4	Exploded view - charge air coolers	230
1.5	Securing supercharger to engine and gearbox support for assembly work	231
1.6	Securing supercharger to engine and gearbox support for leak test	233
1.7	Removing and installing charge air cooler	234
1.8	Exploded view - drive unit	237
1.9	Removing and installing drive unit and damper spring	238
1.10	Checking supercharger for leaks	240
26	Exhaust system	243
1	Silencers	243
1.1	Exploded view - silencers	243
1.2	Removing and installing front exhaust pipe (left-side) with catalytic converter	246
1.3	Removing and installing front exhaust pipe (right-side) with catalytic converter	248
1.4	Separating centre and rear silencers	251
1.5	Renewing tailpipe	252
1.6	Stress-free alignment of exhaust system	252
1.7	Aligning tailpipes	253
1.8	Checking exhaust system for leaks	254



2	Exhaust manifolds	255
2.1	Exploded view - exhaust manifold	255
2.2	Removing and installing exhaust manifold (left-side)	256
2.3	Removing and installing exhaust manifold (right-side)	258
3	Secondary air system	260
3.1	Exploded view - secondary air system	260
3.2	Removing and installing secondary air pump motor V101	261
3.3	Checking combination valves for secondary air system for correct operation and leakage	262
3.4	Removing and installing combination valve for secondary air system (left-side)	263
3.5	Removing and installing combination valve for secondary air system (right-side)	264
3.6	Removing and installing sender 1 for secondary air pressure G609	265



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.

00 – Technical data

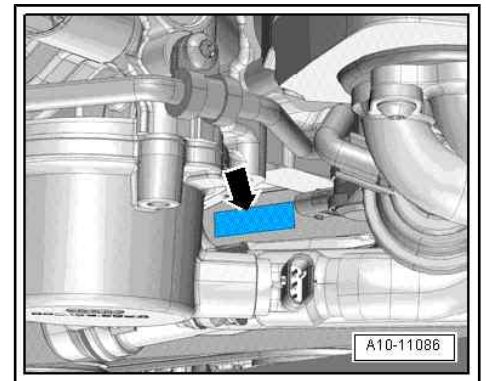
1 Engine number

(ARL004174; Edition 02.2015)

Note

Pull off engine cover panel (front) to make the engine number visible.

- ◆ The engine number ("engine code" and "serial number") can be found on the front of the cylinder block beneath the cylinder head (right-side) -arrow-.
- ◆ There is also a sticker on the timing chain cover (right-side) showing the "engine code" and "serial number".
- ◆ Starting with the letter "C", the engine codes consist of 4 letters.
- ◆ The first 3 characters of the engine code stand for the engine capacity and the mechanical construction and design. They are stamped on 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 4-character engine code can be found on the type plate (in versions for some countries only) and on the vehicle data sticker and the engine control unit.*
- ◆ *Fitting locations of the type plate (certain countries only) and the vehicle data sticker ⇒ Maintenance ; Booklet 405 .*

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 Engine data

Code letters		CAJA	CCAA
Capacity	ltr.	2.968	2.968
Power output	kW at rpm	213/5500	213/5500
Torque	Nm at rpm	420/1600	420/1600
Bore	Ø in mm	84.5	84.5
Stroke	mm	89.0	89.0
Compression ratio		10.5	10.5
RON	at least	95 ¹⁾	95 ¹⁾
Injection/ignition system		Simos	Simos
Firing order		1-4-3-6-2-5	1-4-3-6-2-5
Exhaust gas recirculation		no	no
Turbocharging/supercharging		Supercharger	Supercharger
Knock control		2 sensors	2 sensors
Lambda control		2 probes before catalytic converter	2 probes before catalytic converter
		2 probes after catalytic converter	2 probes after catalytic converter
Charge air cooling		yes	yes
Variable valve timing		Inlet	Inlet
Intake manifold change-over		no	no
Secondary air system		yes	yes
Valves per cylinder		4	4
¹⁾ Unleaded regular grade petrol (RON 91) can also be used, but this will result in a loss of power			

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.

3 Safety precautions

Overview

- ◆ ⇒ [“3.1 Working on the fuel system”, page 3](#)
- ◆ ⇒ [“3.2 Procedure before opening high-pressure section of injection system”, page 4](#)
- ◆ ⇒ [“3.3 Working on the cooling system”, page 4](#)
- ◆ ⇒ [“3.4 Working on vehicles with start/stop system”, page 4](#)
- ◆ ⇒ [“3.5 Using testers and measuring instruments during a road test”, page 5](#)
- ◆ ⇒ [“3.6 Working on the exhaust system”, page 5](#)

3.1 Working on the fuel system

When working on the fuel system note the following warnings:



WARNING

The fuel system operates at extremely high pressure. This can cause injury.

- ◆ *The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system.*
- ◆ *Wrap a clean cloth around the connection and carefully loosen the connection to allow the residual pressure to dissipate.*

- Procedure before opening high-pressure section of injection system ⇒ Rep. gr. 24 .

Observe the following to prevent injuries to persons and damage to the injection and ignition system:

- ◆ Always switch off the ignition before connecting or disconnecting electrical wiring for the injection or ignition system or tester cables.
- ◆ Always switch off ignition before washing engine.
- ◆ Entries are stored in event memory of engine control unit if electrical connectors were unplugged and engine was started: “Generate readiness code” in “Guided Functions” ⇒ Vehicle diagnostic tester.



Caution

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

- ◆ *Observe notes on procedure for disconnecting the battery.*
- ◆ *Always switch off the ignition before disconnecting the battery.*

- Disconnect battery ⇒ Electrical system; Rep. gr. 27 .

3.2 Procedure before opening high-pressure section of injection system



WARNING

- ◆ *The injection system consists of a high-pressure section (maximum approx. 120 bar) and a low-pressure section (approx. 6 bar).*
- ◆ *The fuel pressure in the high-pressure section must be reduced to a residual pressure of approx. 6 bar prior to opening the system. Procedure ⇒ Rep. gr. 24*

3.3 Working on the cooling system

When working on the cooling system note the following warnings:



WARNING

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

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

Risk of injury as the radiator fans may start up automatically.

- ◆ *Unplug electrical connectors before starting to work in the area of radiator cowl.*



Caution

Overheating can occur if the filler cap is not fitted properly.

- ◆ *The filler cap must engage positively and audibly when it is closed.*

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.

3.4 Working on vehicles with start/stop system

When performing repairs on vehicles with start/stop system, note the following:



WARNING

Risk of injury due to automatic engine start on vehicles with start/stop system.

- ◆ *On vehicles with activated start/stop system (this is indicated by a message in the instrument cluster display), the engine may start automatically on demand.*
- ◆ *Therefore it is important to ensure that the start/stop system is deactivated when performing repairs (switch off ignition, if required switch on ignition again).*

3.5 Using testers and measuring instruments during a road test

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



WARNING

Accidents can be caused if the driver is distracted by test equipment while road-testing, or if test equipment is not properly secured.

Persons sitting in the front passenger's seat could be injured if the airbag is triggered in an accident.

- *The use of test equipment while driving causes distraction.*
- *There is an increased risk of injury if test equipment is not secured.*
- ◆ *Test equipment must always be secured on the rear seat with a strap and operated from the rear seat by a second person.*

3.6 Working on the exhaust system

When working on the exhaust system please note the following:



Caution

Avoid 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.*

4 General repair instructions

Overview

- ◆ ⇒ [“4.1 Rules for cleanliness when working on fuel supply system, injection system and turbocharger/supercharger”, page 6](#)
- ◆ ⇒ [“4.2 Checking fuel system for leaks”, page 6](#)
- ◆ ⇒ [“4.3 Foreign particles in engine”, page 7](#)
- ◆ ⇒ [“4.4 Contact corrosion!”, page 7](#)
- ◆ ⇒ [“4.5 Routing and attachment of pipes, hoses and wiring”, page 7](#)
- ◆ ⇒ [“4.6 Installing radiators and condensers”, page 7](#)
- ◆ ⇒ [“4.7 Checking vacuum system”, page 7](#)

4.1 Rules for cleanliness when working on fuel supply system, injection system and turbocharger/supercharger

Even small amounts of dirt can cause malfunctions. For this reason, please observe the following rules when working on the fuel supply system, injection system and turbocharger/supercharger:

- ◆ Carefully clean connection points and the surrounding area with engine cleaner or brake cleaner and dry thoroughly before opening.
- ◆ Seal off open pipes/lines and connections immediately with clean plugs, e.g. from engine bung set - VAS 6122- .
- ◆ Place parts that have been removed on a clean surface and cover them over. Do not use fluffy 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 been previously unpacked and stored away loose (e.g. in toolboxes, etc.).
- ◆ When the system is open: Do not work with compressed air. Do not move the vehicle unless absolutely necessary.
- ◆ Make sure that no fuel runs onto the fuel hoses. Should this occur, the fuel hoses must be cleaned again immediately. Renew fuel hoses if damaged.
- ◆ Protect unplugged electrical connectors against dirt and moisture and make sure connections are dry when attaching.

4.2 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.

4.3 Foreign particles in engine

- ◆ When working on the engine, all open inlet and exhaust ports must be sealed with suitable plugs (e.g. from engine bung set - VAS 6122-) to prevent foreign particles from entering the engine.
- ◆ In the event of mechanical damage to one of the cylinder banks, the intake and exhaust systems and combustion chambers of the opposite cylinder bank must always be examined for foreign particles to prevent further damage occurring later.

4.4 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 used.

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 .

Note the following:

- ◆ 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 under warranty.

4.5 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 prevent damaging pipes, hoses and wiring, ensure sufficient clearance from all moving or hot components in engine compartment (little space in engine compartment).

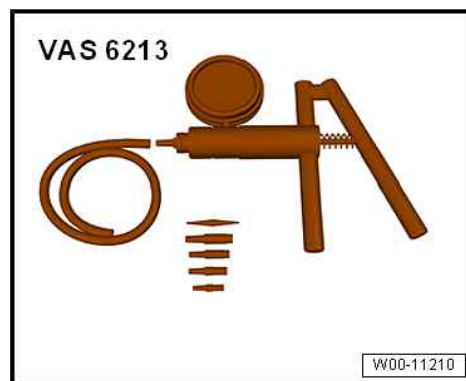
4.6 Installing radiators and condensers

Even when the radiator and condenser 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 or the condenser.

4.7 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
 - ◆ Lines porous or leaking
- Check vacuum line to solenoid valve and from solenoid valve to corresponding component.
- If a fault is stored in the event memory, check the vacuum lines leading to the corresponding component and also check the remaining vacuum lines in the system.
- If it is not possible to build up 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.

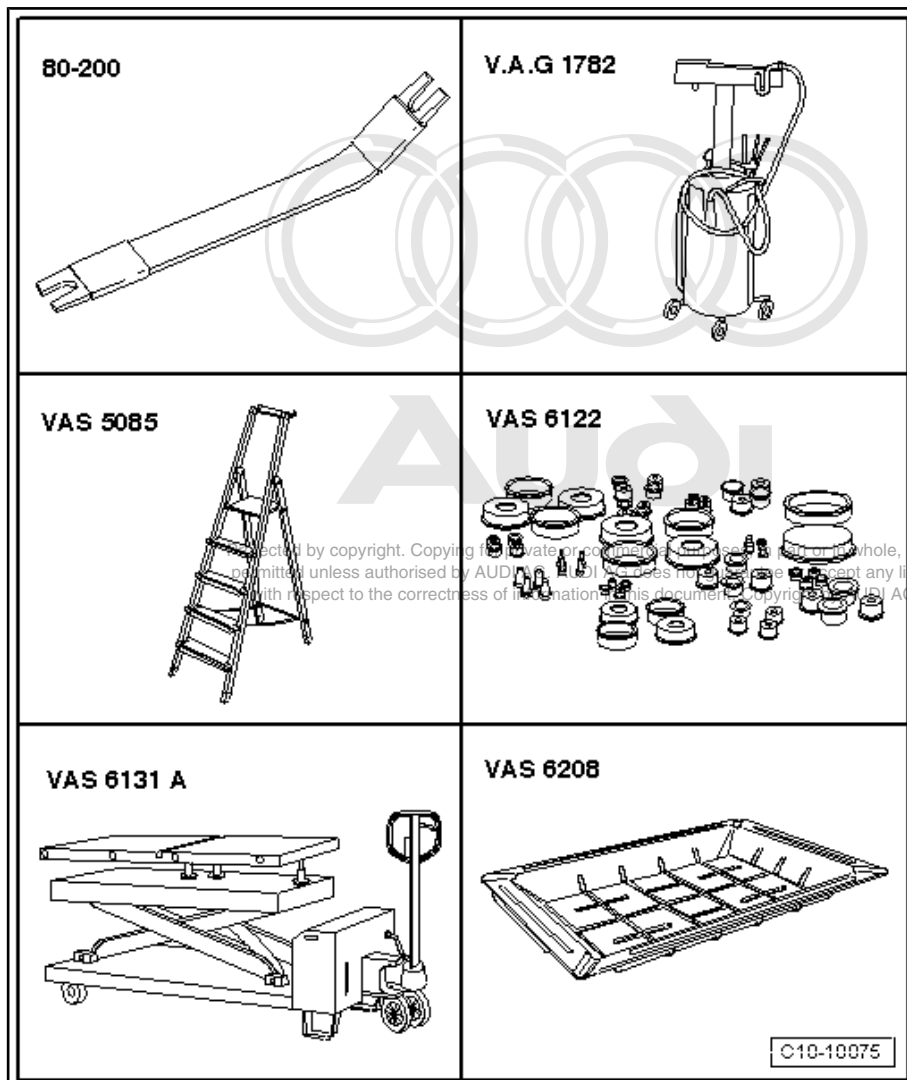
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

10 – Removing and installing engine

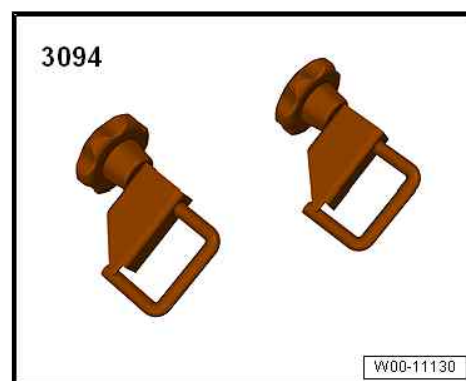
1 Removing engine

Special tools and workshop equipment required

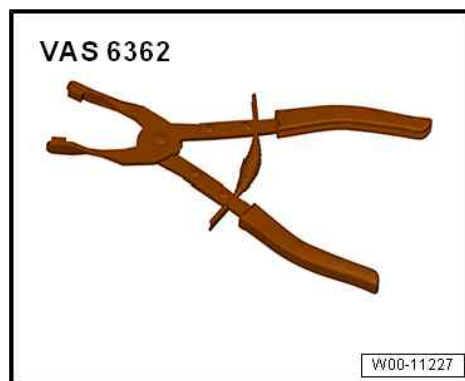
- ◆ Removal lever - 80 - 200-
- ◆ Used oil collection and extraction unit - V.A.G 1782-
- ◆ Stepladder - VAS 5085-
- ◆ Engine bung set - VAS 6122-
- ◆ Scissor-type assembly platform - VAS 6131 A- with support set for Audi - VAS 6131/10- and -VAS 6131/11-
- ◆ Drip tray for workshop hoist - VAS 6208-



- ◆ Hose clamps, up to 25 mm - 3094-



- ◆ Hose clip pliers - VAS 6362-



- ◆ Tensioning strap - T10038-



Procedure

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 engine is removed from underneath together with the gearbox and subframe (with lock carrier installed).*
- ◆ *Fit cable ties in the original positions when installing.*
- ◆ *Collect drained coolant in a clean container for re-use or disposal.*



WARNING

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

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

The fuel system operates at extremely high pressure. This can cause injury.

- ◆ ***The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system.***

- Reduce fuel pressure in high-pressure section of injection system ⇒ Rep. gr. 24 .

**Caution**

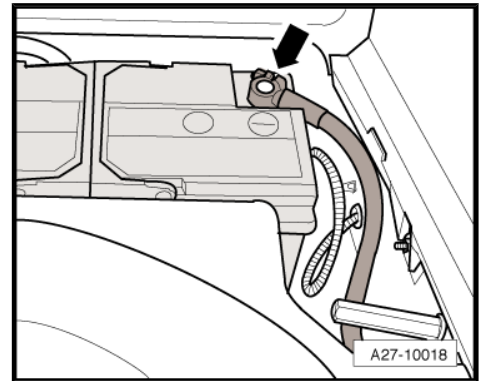
To prevent irreparable damage to the electronic components when disconnecting the battery:

- ◆ *Observe notes on procedure for disconnecting the battery.*
- ◆ *Always switch off the ignition before disconnecting the battery.*

**Note**

- ◆ *To make sure you can still move the front wheels when the battery has been disconnected, only disconnect the battery with the ignition key inserted.*
- ◆ *On four-wheel drive vehicles, the electromechanical parking brake must be released before disconnecting the battery so that the propshaft can be turned during removal.*

– Disconnect battery ⇒ Electrical system; Rep. gr. 27 .



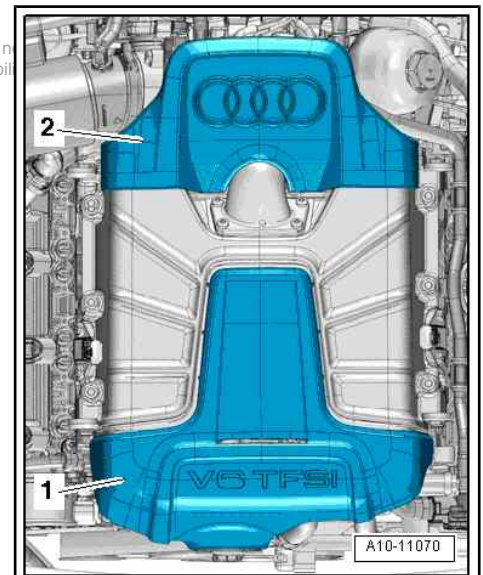
– Lift off engine cover panels -1- and -2-.

**WARNING**

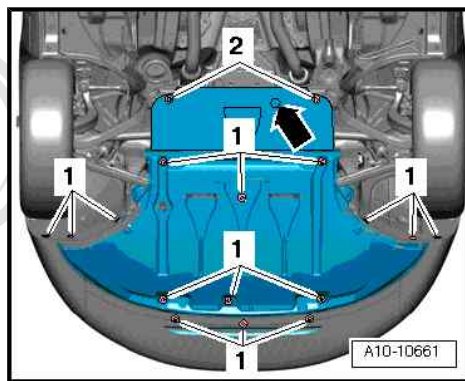
Hot steam/hot coolant can escape - risk of scalding.

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

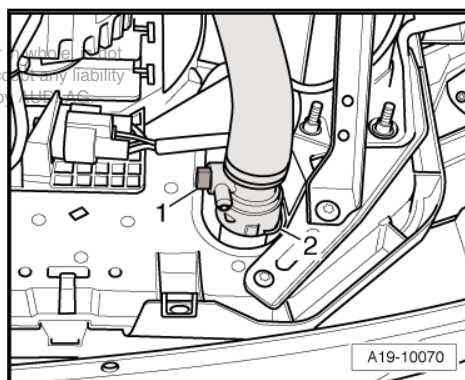
– Open filler cap on coolant expansion tank.



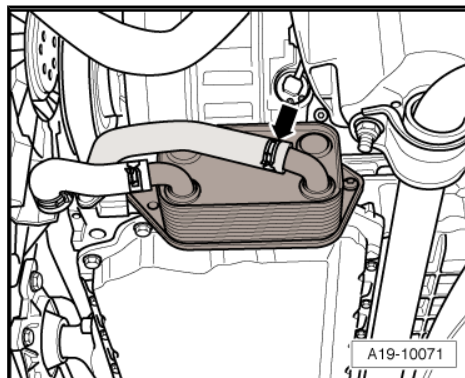
- Remove both front wheels ⇒ Wheels and tyres; Rep. gr. 44 .
- Release fasteners -1, 2, arrow- and remove noise insulation panels.



- Place drip tray for workshop hoist - VAS 6208- beneath engine.
- Open drain plug -1- and drain off coolant.
- Pull out retaining clip -2- and disconnect coolant hose (bottom right) from radiator.



- Release hose clip -arrow-, disconnect coolant hose from engine oil cooler and drain off coolant.

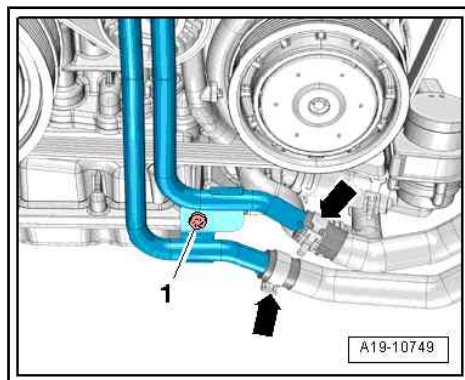


- Release hose clips -arrows-, disconnect coolant hoses from coolant pipes (front left) and drain off remaining coolant.



Note

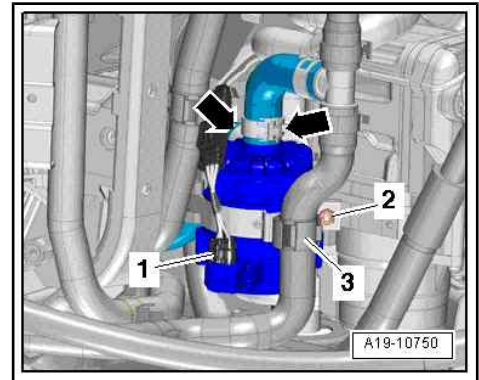
- ◆ Disregard -item 1-.
- ◆ For illustration purposes, the installation position is shown with the lock carrier removed.



- Unplug electrical connector -1- at charge air cooling pump - V188- and move clear.

 Note

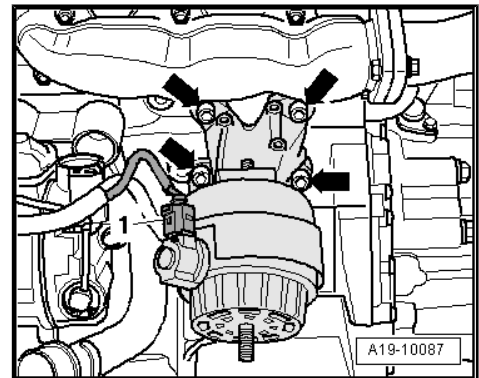
- ◆ Disregard items marked -2, 3- and -arrows-.
- ◆ For illustration purposes, the installation position is shown with the bumper cover removed.



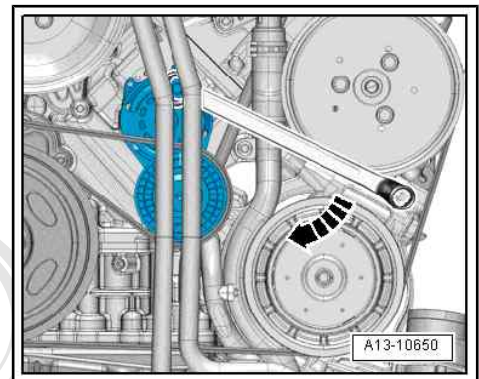
- Unplug electrical connector -1- on left electrohydraulic engine mounting solenoid valve - N144- .

 Note

Disregard -arrows-.



- To slacken poly V-belt turn tensioner in clockwise direction -arrow-.
- Remove poly V-belt from pulley of air conditioner compressor and release tensioner.



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



WARNING

Risk of injury caused by refrigerant.

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

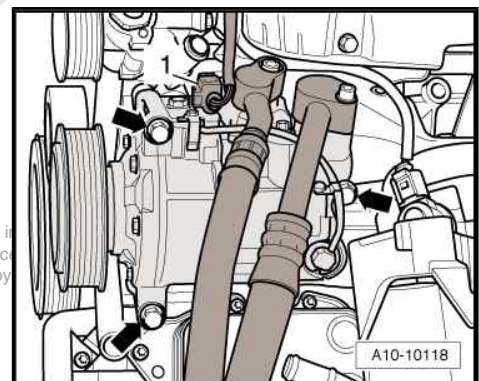
- Remove bolts -arrows- for air conditioner compressor.



Caution

Danger of damage to refrigerant lines and hoses.

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



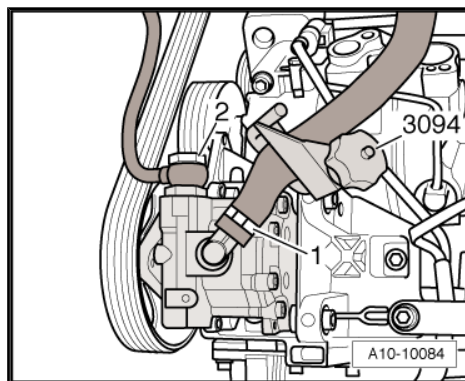
- Tie up air conditioner compressor to left side of vehicle with hoses/pipes connected.



Note

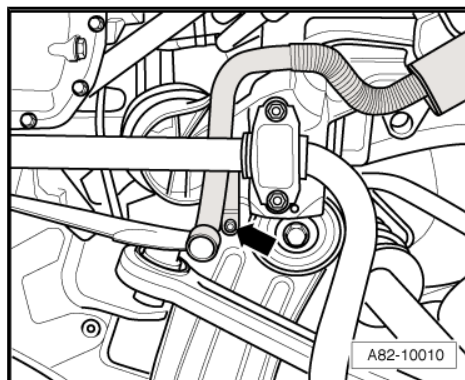
Lay a cloth under the hydraulic lines to catch escaping hydraulic fluid.

- Clamp off hydraulic hose for power steering pump using hose clamp up to 25 mm - 3094- .
- Release hose clip -1- and detach hydraulic hose from power steering pump.
- Remove banjo bolt -2- at power steering pump and lay hydraulic line aside on top of longitudinal member.

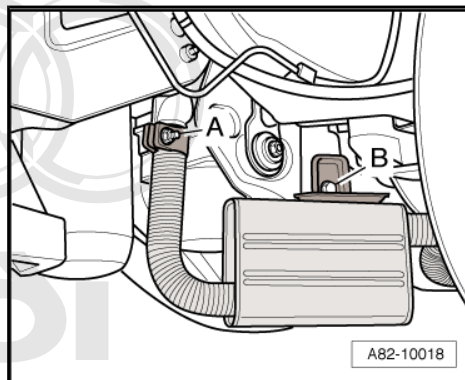


Vehicles with auxiliary heater:

- Detach front section of front left wheel housing liner ⇒ Rep. gr. 66 .
- Remove bolt -arrow- for corrugated exhaust pipe.

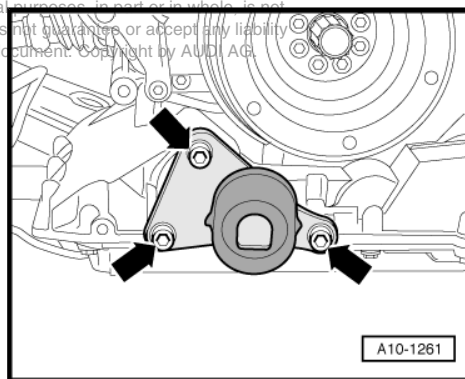


- Slacken nut -A- on clamp for corrugated exhaust pipe.
- Remove bolt -B- and detach silencer with corrugated exhaust pipes.



All vehicles (continued):

- Unscrew bolts -arrows- and detach torque reaction support from engine.

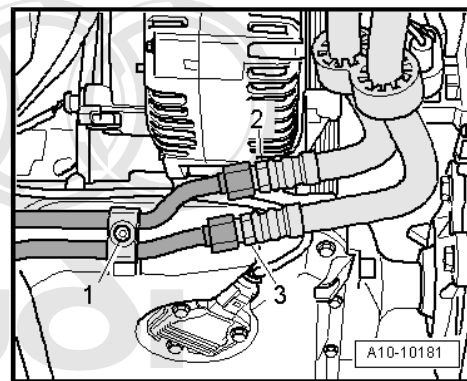


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

i Note

Observe rules for cleanliness when working on automatic gear-box ⇒ Rep. gr. 00.

- Position used oil collection and extraction unit - V.A.G 1782- below connection point.
- Loosen union nuts and disconnect ATF lines -2- and -3-.

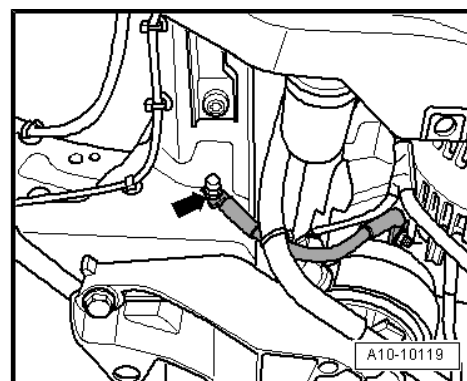


i Note

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.

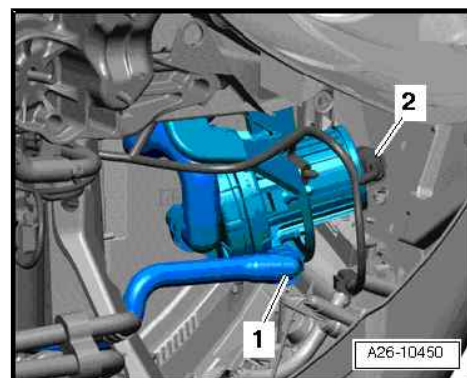
- Remove nut -arrow- for earth wire at longitudinal member (right-side).



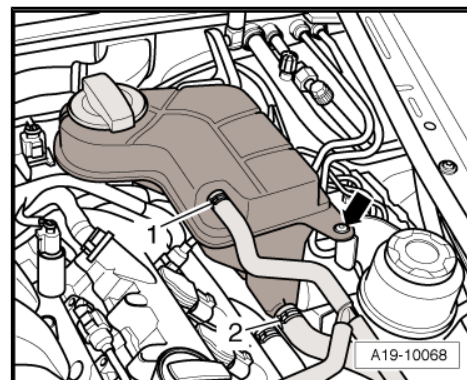
- Detach electrical connector -2- at secondary air pump motor - V101- and move wire clear.

i Note

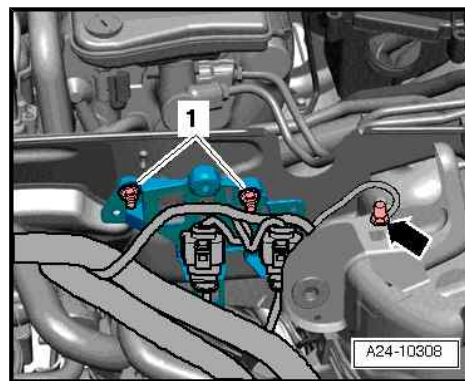
Disregard -item 1-.



- Remove bolt -arrow-.
- Unplug electrical connector for coolant shortage indicator switch - F66- at bottom of expansion tank and move expansion tank to one side with coolant hoses -1- and -2- attached.
- Move electrical wiring clear.



- Remove nuts -1- and detach bracket for connectors from plenum chamber partition panel (left-side).
- Remove nut -arrow- for earth wire at suspension turret (left-side).

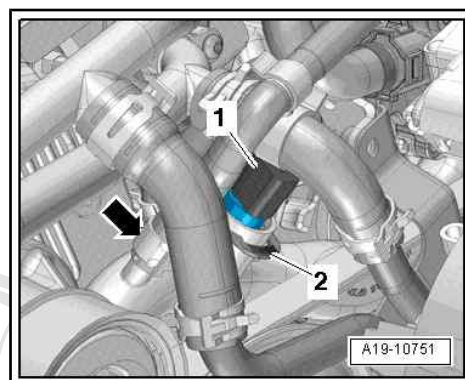


- Release hose clip -arrow-, detach coolant hose and move clear.

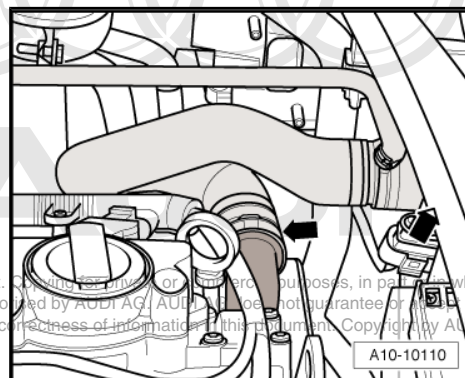


Note

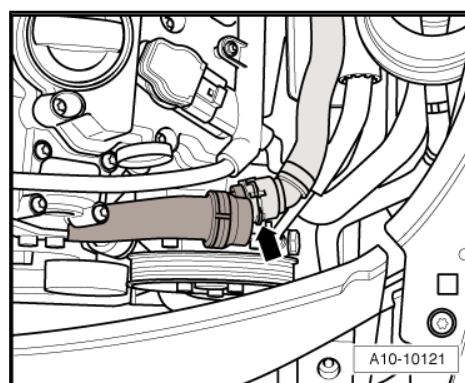
Disregard -items 1, 2-.



- Lift retaining clips -arrows- and disconnect coolant hose (front left) in engine compartment.



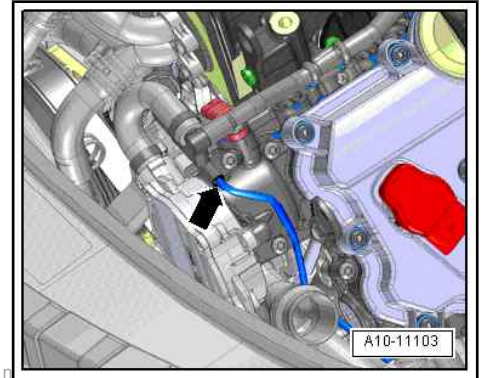
- Lift retaining clip -arrow- and detach coolant hose from coolant pipe (front).



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

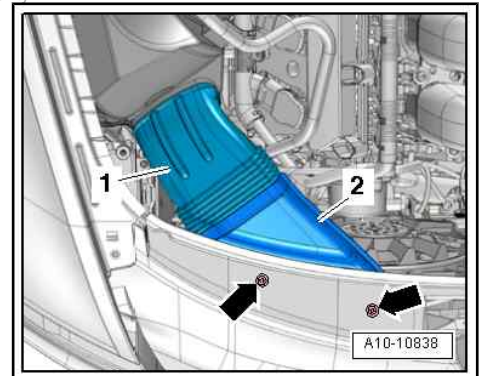
USA models:

- Disconnect vacuum hose leading to fuel system diagnostic pump - V144- .



All vehicles (continued):

- Remove bolts -arrows-, detach air ducts -1- and -2-.



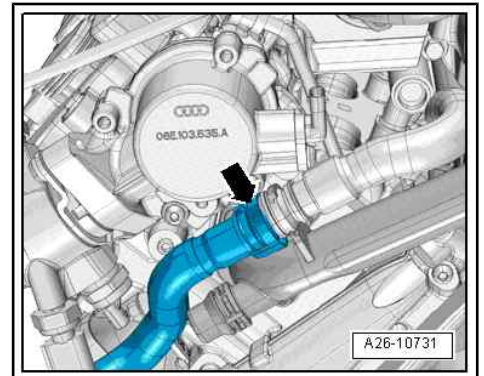
- Press release tabs and detach secondary air hose -arrow- to front from bracket.



Caution

Take care to keep components clean.

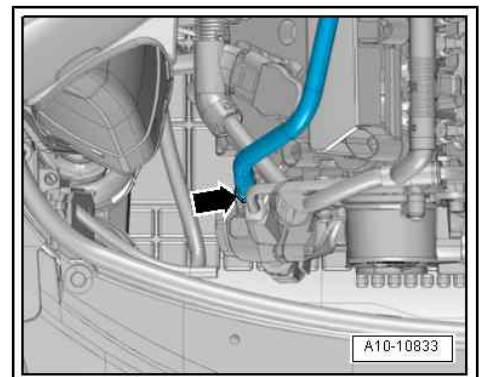
- ♦ *Rules for cleanliness when working on the injection system ⇒ [page 6](#) .*



WARNING

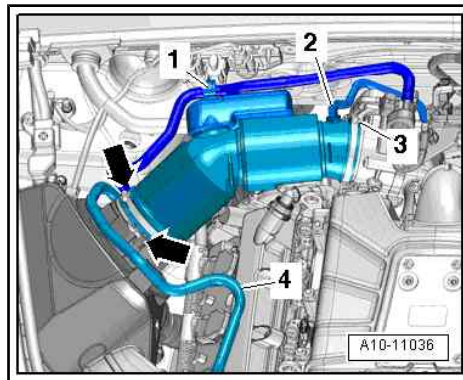
Risk of injury caused by fuel.

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

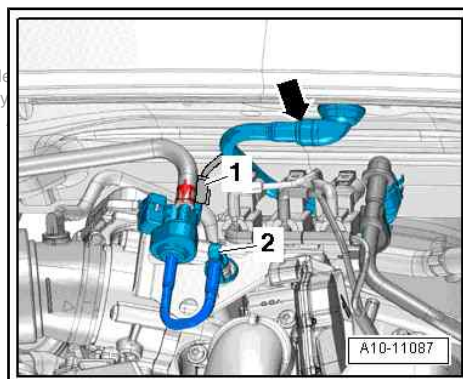


- Detach fuel supply hose from high-pressure pump -arrow- and move clear.

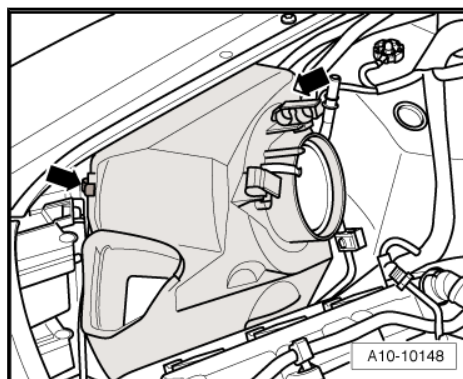
- Move fuel line -4- and line -1- leading to activated charcoal filter clear on air cleaner housing and air pipe.
- Detach vacuum hose -2- from connection on air hose.
- Remove air pipe. To do so, release hose clip -3- and clamps -arrows-.



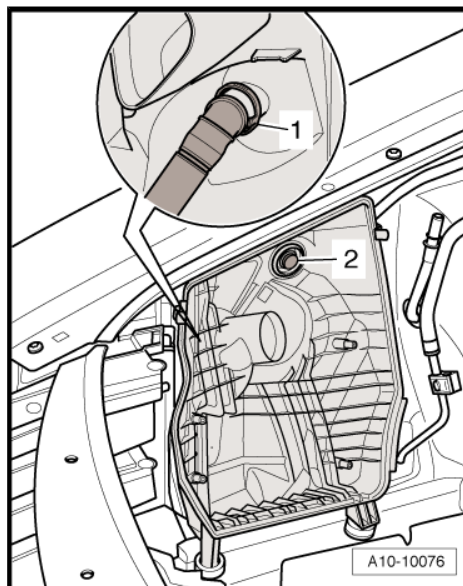
- Unplug electrical connector -1- at activated charcoal filter solenoid valve 1 - N80- and detach vacuum hose -2- (press release tabs).
- Detach activated charcoal filter solenoid valve 1 - N80- from bracket and move it clear to the side with hose still attached.
- Detach vacuum hose for brake servo -arrow-.



- Release clamps -arrows- and detach air cleaner (top section).



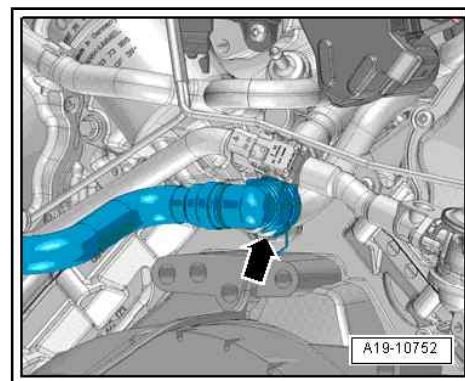
- Pull pin out of fastener -2-.
- Detach air cleaner (bottom section) and detach hose on reverse side -1- which leads to secondary air pump.



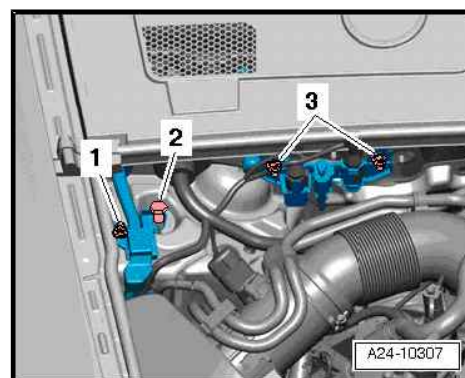
- Lift retaining clip -arrow- and detach coolant hose going to heat exchanger from rear of engine.

**Note**

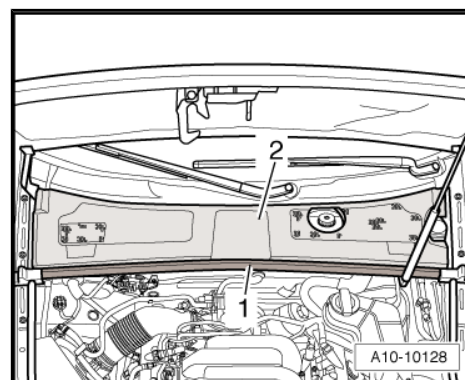
For illustration purposes, the installation position is shown from the rear and with the engine removed.



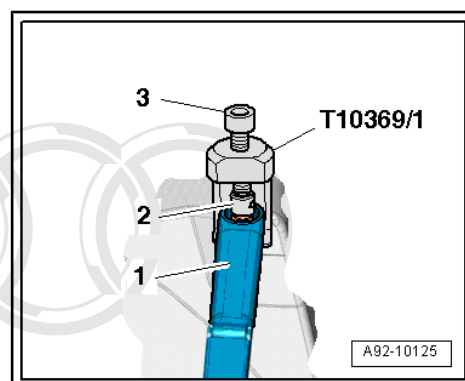
- Remove nuts -3- and detach bracket for connectors from plenum chamber partition panel (right-side).
- Remove nut -1- on remote positive terminal.
- Remove earth stud -2-.



- Pull off seal -1- and remove plenum chamber cover -2-.



- Remove wiper arms ⇒ Electrical system; Rep. gr. 92 .





Caution

Risk of damage to cowl panel trim.

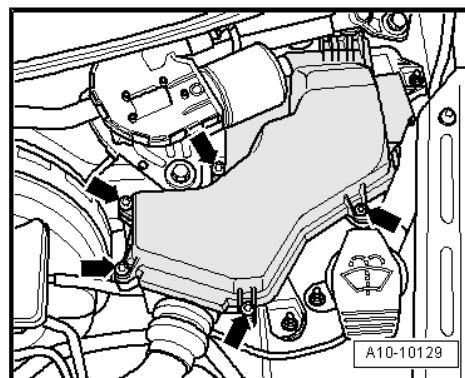
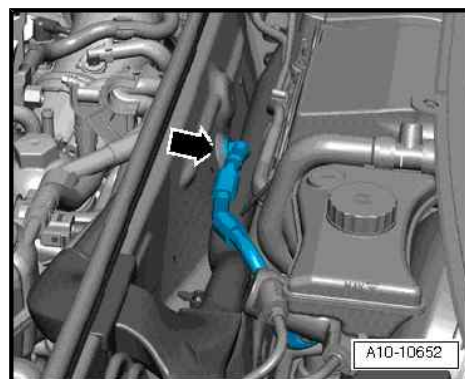
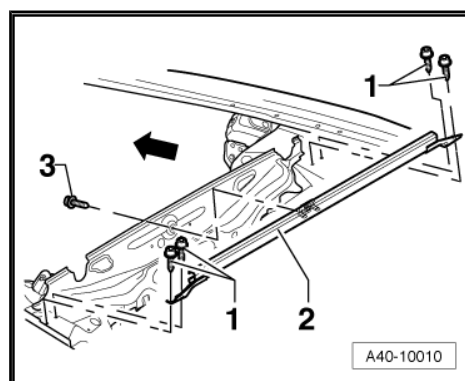
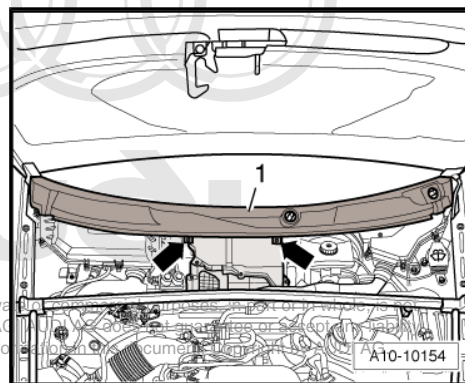
- ◆ *To avoid cracking the cowl panel trim -1- during removal, apply a small amount of soap solution to the joint between the windscreen and the cowl panel trim and pull the trim vertically up out of the windscreen surround, starting from the edge of the windscreen.*

- Unscrew bolts -arrows- and pull cowl panel trim off windscreen.

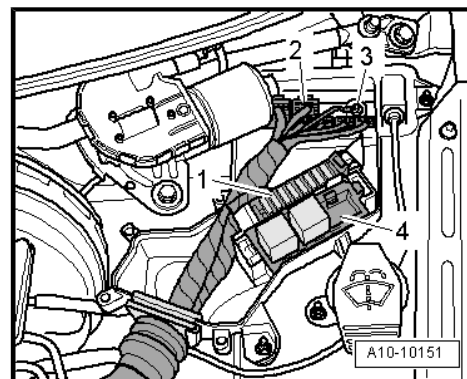
- Remove bolts -1- and -3- and detach body brace -2-.

- Detach vacuum line -arrow- going to brake servo at plenum chamber partition panel.

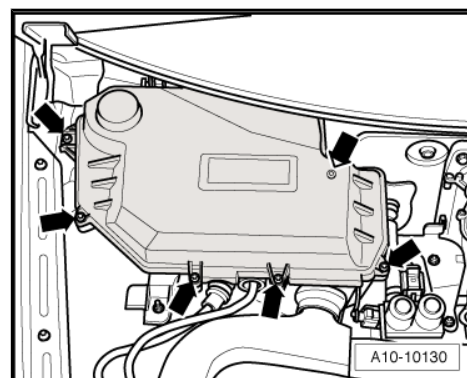
- Remove bolts -arrows- and detach cover for electronics box in engine compartment (left-side).



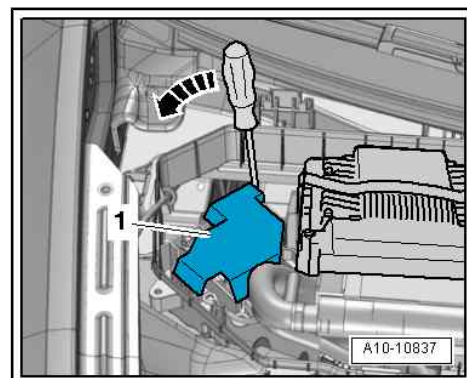
- Release fasteners, pull off fuse holder -1- and then 3-position relay carrier -4- upwards.
- Unscrew wiring -3-.
- Unplug three front electrical connectors -2- at rear of connector console.
- Disengage engine wiring harness at electronics box and move clear.



- Remove bolts -arrows- and detach cover for electronics box in engine compartment (right-side).



- Open cover -1- with screwdriver -arrow- and detach.



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.



WARNING

Risk of burns at the pump valve unit for the heating system (left-side in front of electronics box).

- ◆ **Wear protective gloves when working near the pump valve unit for the heating system.**

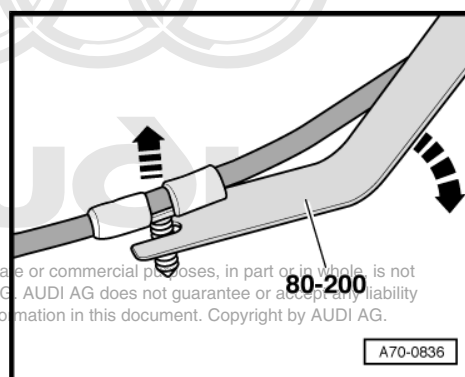
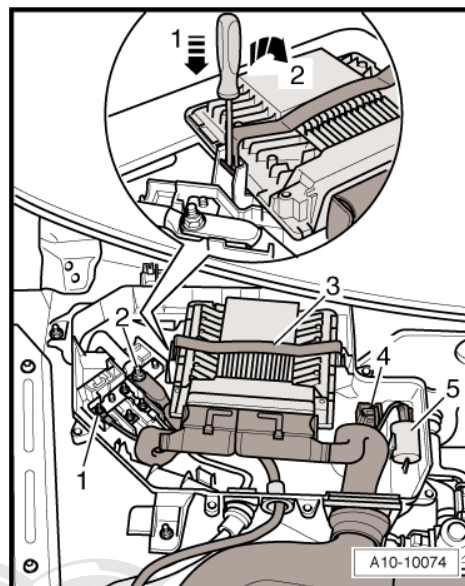
- Use screwdriver -arrows 1, 2- to carefully lever off retaining strap -3- and remove engine control unit from electronics box.



Note

The engine control unit remains connected to the wiring harness.

- Unclip suppressor capacitor -5- and take out of retainer in electronics box.
- Unplug electrical connector -4- at rear of connector console.
- Unscrew electrical wiring -1- and -2-.
- Use removal lever - 80 - 200- to release electrical wiring up to the alternator.
- Place both wiring harnesses on engine and secure engine control unit to prevent it from dropping.



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.

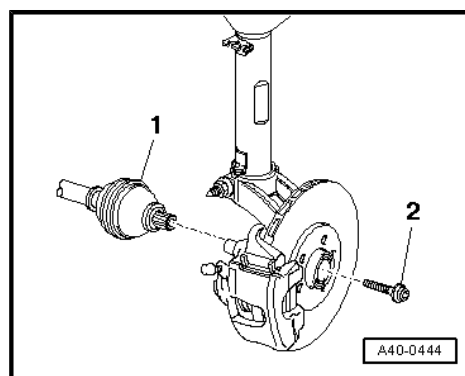


Caution

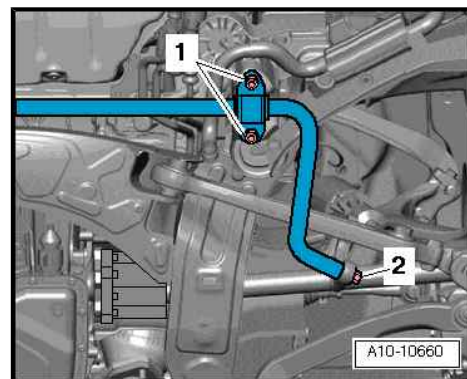
Risk of injury and risk of damage to brake discs and wheel bearings.

- ◆ **When slackening the flange bolt securing the drive shaft, the vehicle must not be standing on its wheels.**
- ◆ **Secure brake discs by screwing in two wheel bolts.**

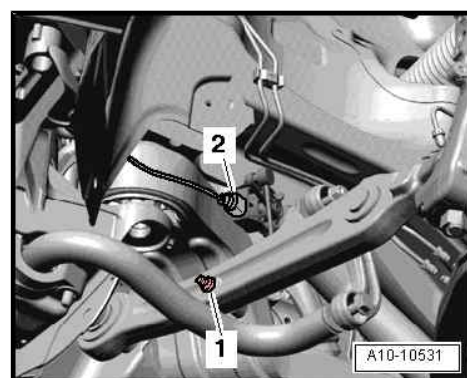
- Have a 2nd mechanic press the brake pedal.
- Unscrew flange bolt -2- from drive shafts -1- (left and right).
- Unbolt drive shaft (left and right) from gearbox flange shaft.



- Unscrew nuts -1- on both sides evenly.
- Unscrew bolts -2- on both sides and remove anti-roll bar.



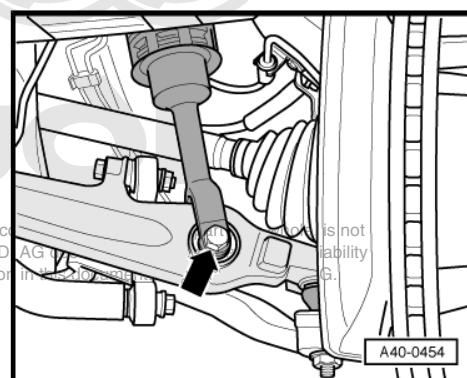
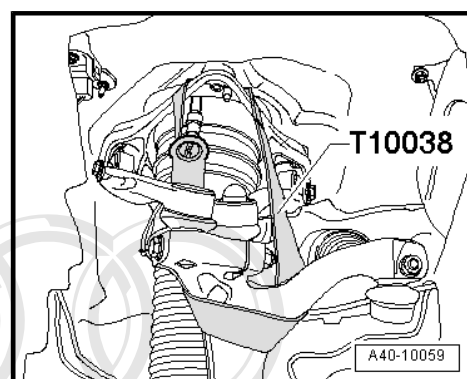
- Unplug electrical connector -2- at front left vehicle level sender - G78- .
- Remove nut -1- and detach coupling rod from track control link.

**Caution**

Danger of damage to the swivel joints of the upper links.

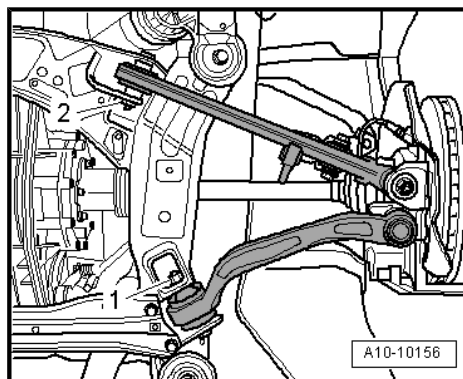
◆ *Support wheel bearing housing.*

- Tie up wheel bearing housing with tensioning strap - T10038- as shown on illustration.
- Remove bolt -arrow- and detach suspension strut from track control link.



Protected by copyright. Copying for private or commercial use is not permitted unless authorised by AUDI AG. AUDI AG is not liable for any damage or liability with respect to the correctness of information in this manual.

- Remove nut -1- for guide link and nut -2- for track control link at subframe, remove bolts.



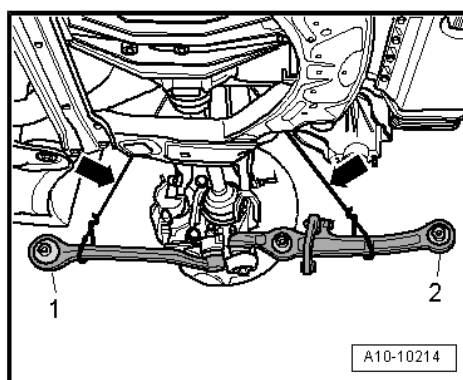
- Pivot guide link -1- and track control link -2- outwards.



Caution

Risk of damage if guide link and track control link are allowed to drop without support.

- ◆ Tie up guide link and track control link to wheel bearing housing -arrows- as shown in illustration.



Caution

Danger of damage to brake hose.

- ◆ Take care when detaching drive shaft.

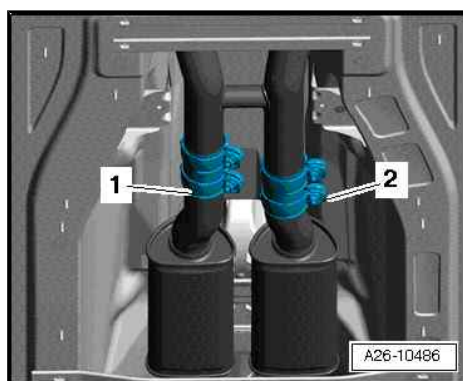
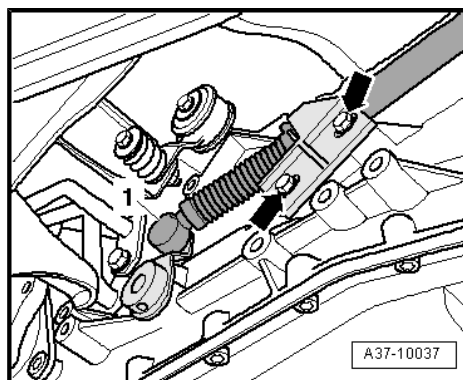
- Pivot wheel bearing housing outwards and detach drive shaft.
- Perform the same work steps on the other side of the vehicle.



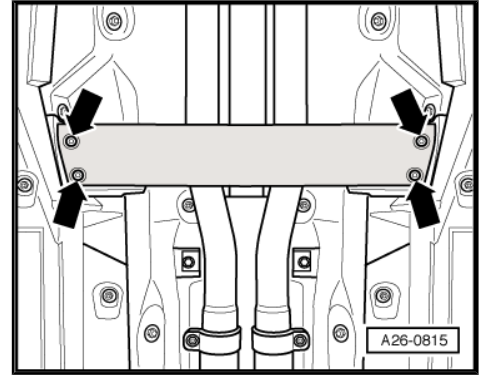
Note

Mark installation position of cable support bracket with a felt-tip pen.

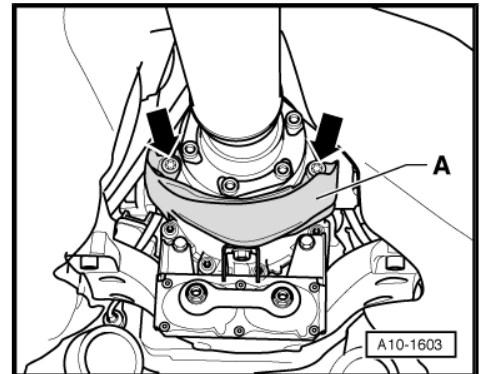
- Pry ball socket -1- of selector lever cable off gearbox selector lever.
- Remove bolts -arrows- and remove cable support bracket from gearbox.
- Move selector lever cable clear.
- Loosen clamps -1- and -2- and move to rear.



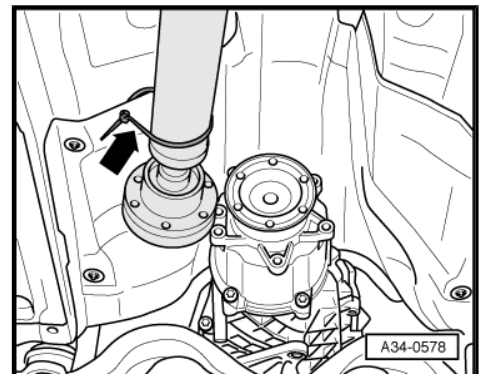
- Remove bolts -arrows- and detach front cross piece.



- Remove bolts -arrows- and detach heat shield -A- for propshaft.
- Remove bolts securing propshaft to gearbox.
- Push propshaft back towards rear final drive. The constant velocity joints can be moved axially.



- Tie propshaft up to side of heat shield -arrow-.



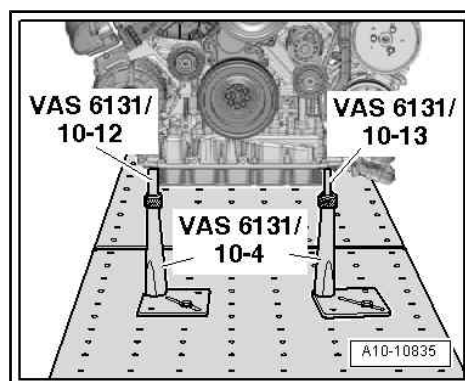
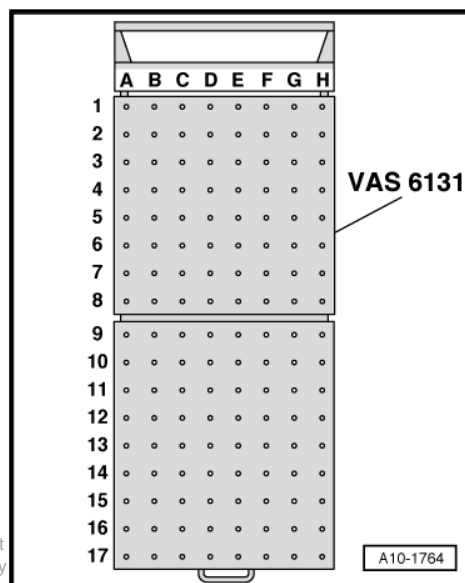
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Set up the scissor-type assembly platform as follows:

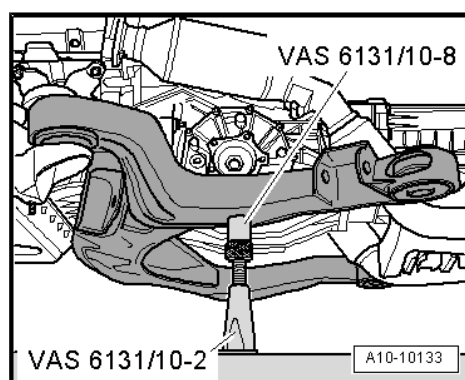
- Set up scissor-type assembly platform - VAS 6131 A- with support set for Audi - VAS 6131/10- and supplementary set - VAS 6131/11- as follows:

Platform coordinates	Parts of support set for Audi - VAS 6131/10- and supplementary set -VAS 6131/11-			
B4	/10-1	/10-4	/10-5	/10-13
F4	/10-1	/10-4	/10-5	/10-12
B10	/10-1	/10-2	/10-5	/10-8
G10	/10-1	/10-2	/10-5	/10-8
C15	/10-1	/10-3	/10-5	/11-2
F15	/10-1	/10-3	/10-5	/11-2

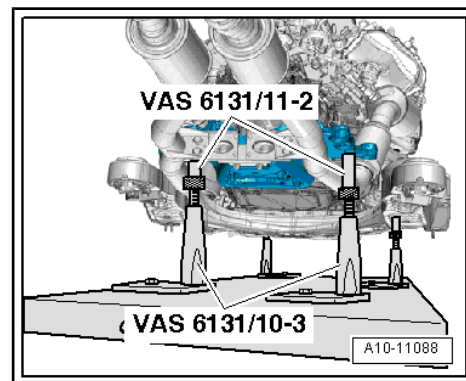
- Initially hand-tighten the support elements on the scissor-type assembly platform.
- Position scissor-type assembly platform - VAS 6131 A- horizontally.
- Take note of spirit level (bubble gauge).
- Position scissor-type assembly platform - VAS 6131 A- below engine/gearbox assembly.
- Position the support elements from -VAS 6131/10- at front of engine, as shown in illustration.



- Position the support elements from -VAS 6131/10- at left and right of subframe, as shown in illustration.



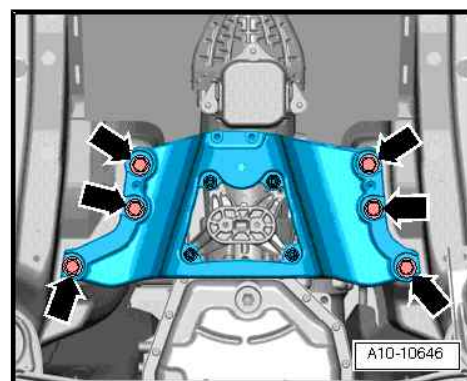
- Position support elements from -VAS 6131/10- and -VAS 6131/11- at rear of tunnel cross member, as shown in illustration.
- Turn all spindles for support elements upwards until all locating lugs make contact with mounting points.
- Tighten base plates for support elements to 20 Nm on scissor-type assembly platform - VAS 6131 A- .



- Remove bolts -arrows- for tunnel cross member.

**Note**

For illustration purposes, the installation position is shown with the front exhaust pipes removed.

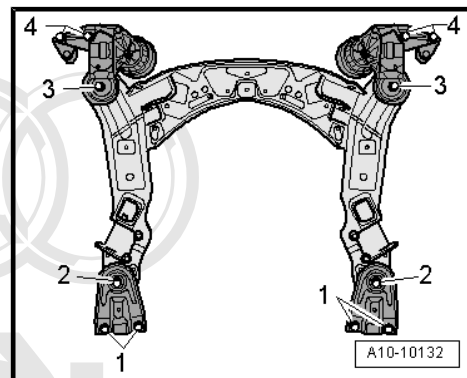


- Remove bolts -1-.
- Mark installation position of subframe and both consoles for engine mountings on longitudinal members with felt-tip pen.
- Remove bolts -2, 3, 4- in diagonal sequence and in stages.

**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 out engine/gearbox assembly with subframe from engine compartment when lowering.***



- Carefully lower engine/gearbox assembly.
- Pull out scissor-type assembly platform - VAS 6131 A- with engine/gearbox assembly from underneath vehicle.

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.

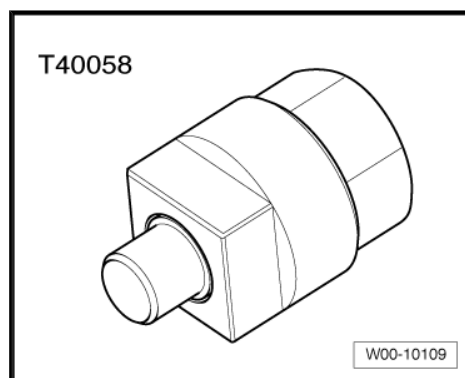
2 Separating engine from automatic gearbox 09L

Special tools and workshop equipment required

- ◆ Support bridge - 30 - 211 A-



- ◆ Gearbox support - VAS 6131/14-
- ◆ Adapter - T40058-



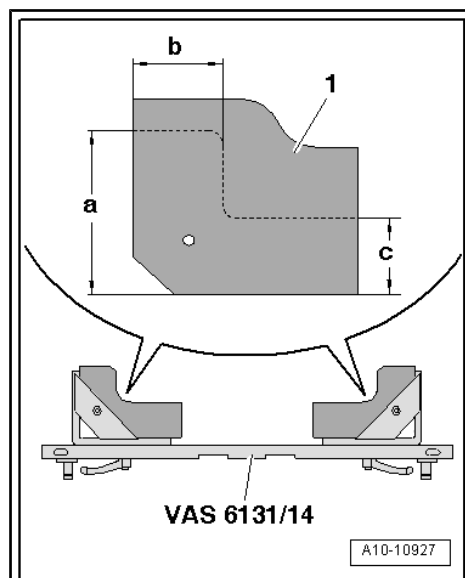
Setting up gearbox support - VAS 6131/14- :

- Cut foam plastic support pads according to the dimensions given.
- Dimension -a- = 20 mm
- Dimension -b- = 55 mm
- Dimension -c- = 55 mm



Note

Order two new support pads -VAS 6131/14-1- so that equipment for gearbox support - VAS 6131/14- is complete.



Procedure

- Engine/gearbox assembly removed and secured to scissor-type assembly platform - VAS 6131 A-
- Screw down spindles of support elements (left and right) at subframe as far as possible.
- Remove locating lugs from spindles.

**Note**

A second mechanic is required for removing the subframe.

- Take out subframe to the side.
- Unscrew both base plates for support elements for subframe from scissor-type assembly platform - VAS 6131 A-

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 for errors or omissions in this document. Copyright by AUDI AG.

**Note**

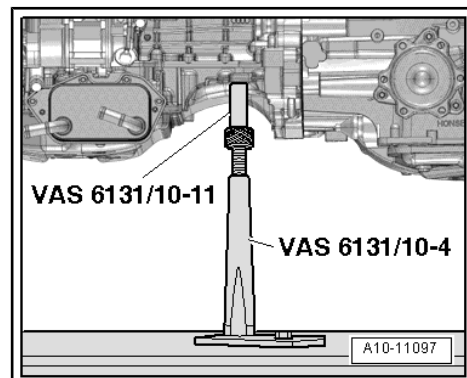
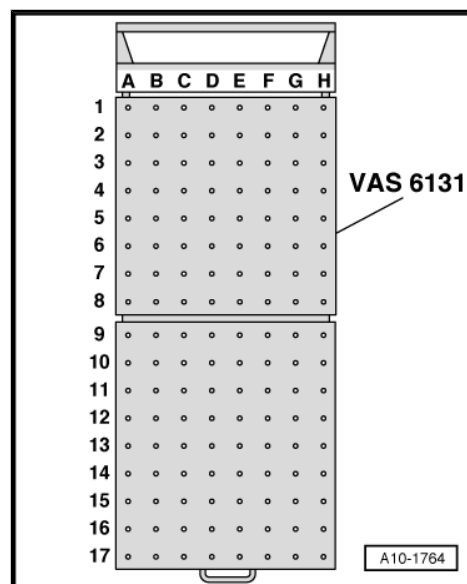
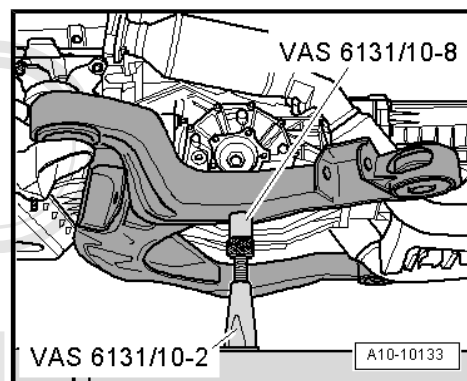
The mounting points for engine (front), gearbox and tunnel cross member remain unchanged.

- Set up scissor-type assembly platform - VAS 6131 A- with support set for Audi - VAS 6131/10- and gearbox support - VAS 6131/14- as follows:

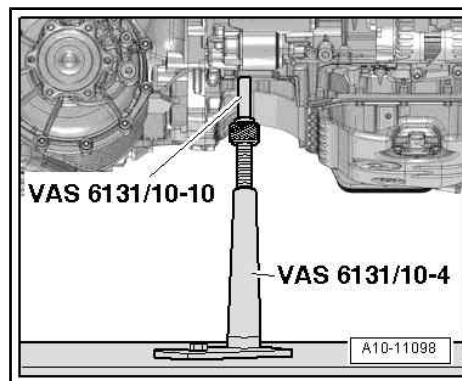
Platform coordinates	Parts of support set for Audi - VAS 6131/10- and gearbox support - VAS 6131/14-			
B4 ¹⁾	/10-1	/10-4	/10-5	/10-13
F4 ¹⁾	/10-1	/10-4	/10-5	/10-12
B8	/10-1	/10-4	/10-5	/10-11
G8	/10-1	/10-4	/10-5	/10-10
A10	/10-1	/10-2	/10-5	/14
H10	/10-1	/10-2	/10-5	
C15 ¹⁾	/10-1	/10-3	/10-5	/11-2
F15 ¹⁾	/10-1	/10-3	/10-5	/11-2

• ¹⁾ Support elements remain unchanged.

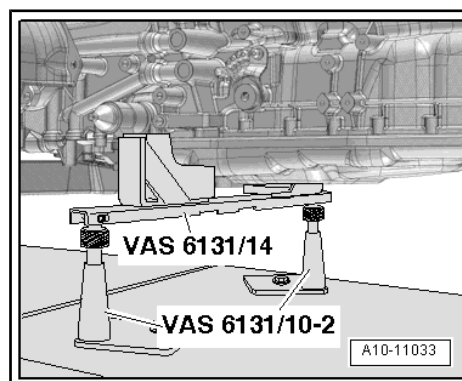
- Position the support elements from -VAS 6131/10- at left of engine, as shown in illustration.



- Position the support elements from -VAS 6131/10- at right of engine, as shown in illustration.
- Turn spindles for support elements upwards until all locating lugs make contact with mounting points.



- Position support elements from -VAS 6131/10- and gearbox support - VAS 6131/14- at front of gearbox, as illustrated.
- Screw spindles on both sides upwards until gearbox support - VAS 6131/14- makes full contact with gearbox.
- Tighten base plates for support elements to 20 Nm on scissor-type assembly platform - VAS 6131 A- .

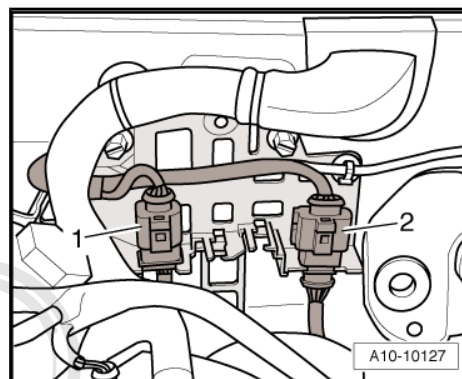


- Unplug electrical connector -2- for Lambda probe 2 after catalytic converter - G131- and move wiring clear.



Note

- ◆ Illustration shows electrical connector in installation position.
- ◆ Disregard -item 1-.

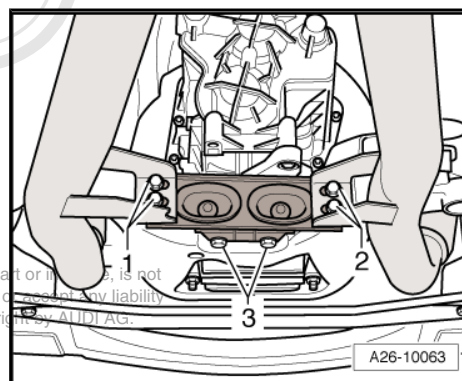


Caution

Risk of damage to flexible joints in front silencer.

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

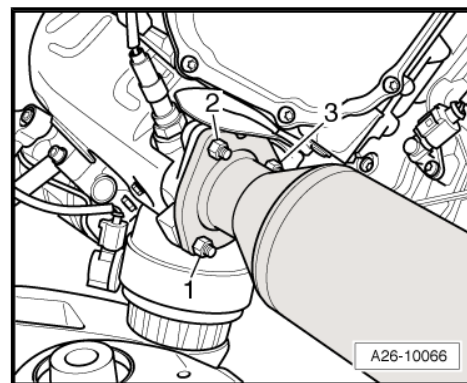
- Remove bolts -1- on bracket (rear) for exhaust system.



Note

- Disregard -items 2, 3-.

- Unfasten nuts -1, 2, 3- and remove front exhaust pipe (left-side) with catalytic converter.



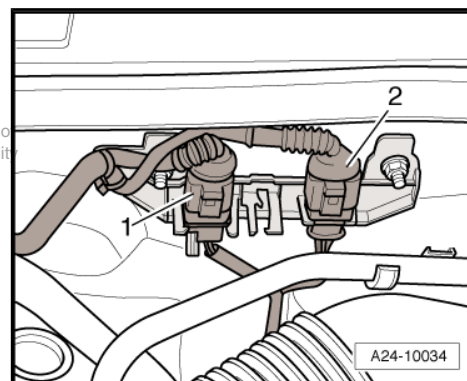
- Unplug electrical connector -2- for Lambda probe after catalytic converter - G130- and move wiring clear.

**Note**

ected 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.

◆ *Illustration shows electrical connector in installation position.*

◆ *Disregard -item 1-.*

**Caution**

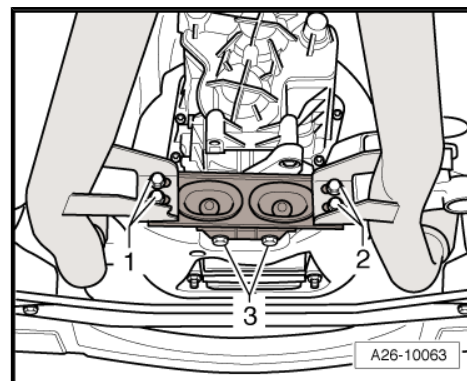
Risk of damage to flexible joints in front silencer.

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

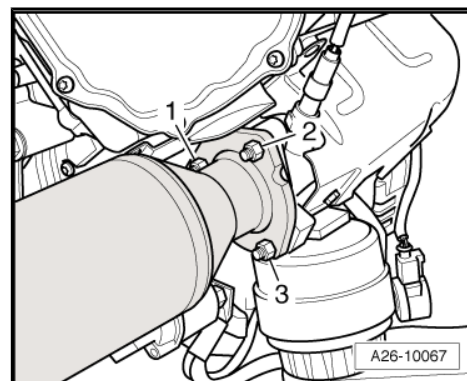
- Remove bolts -2- on bracket (rear) for exhaust system.

**Note**

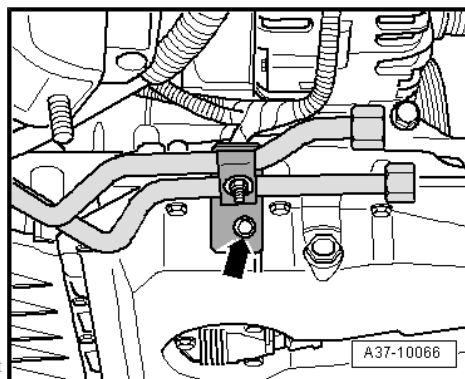
Disregard -items 1, 3-.



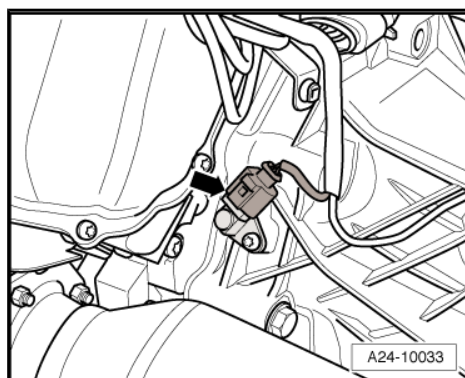
- Unfasten nuts -1, 2, 3- and remove front exhaust pipe (right-side) with catalytic converter.



- Remove bolt -arrow- on bracket for ATF lines at sump.



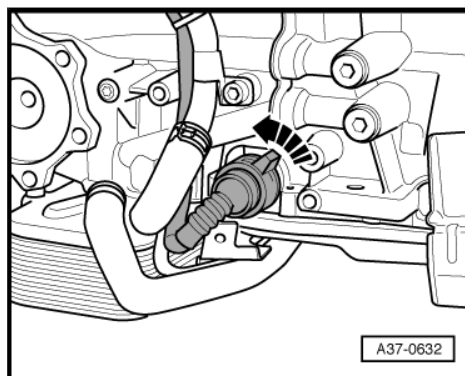
- Unplug electrical connector -arrow- for engine speed sender - G28- .



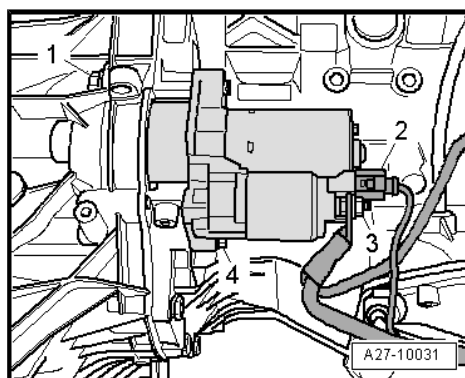
Caution

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

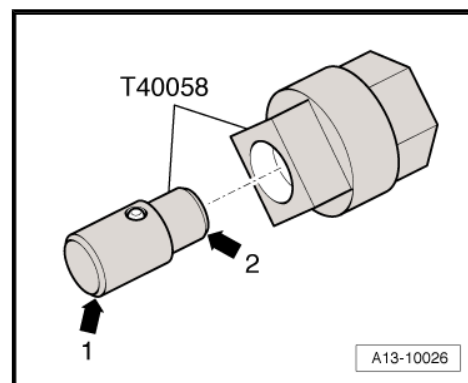
- ◆ **Do NOT touch connector contacts in gearbox connector with your hands.**



- Touch gearbox housing with your hand (without wearing gloves) to eliminate static charge.
- Turn retainer catch anti-clockwise -arrow- and unplug electrical connector on left of gearbox.
- Disconnect electrical wiring -2- and -3- from starter.
- Unscrew bolts -1- and -4- and remove starter.



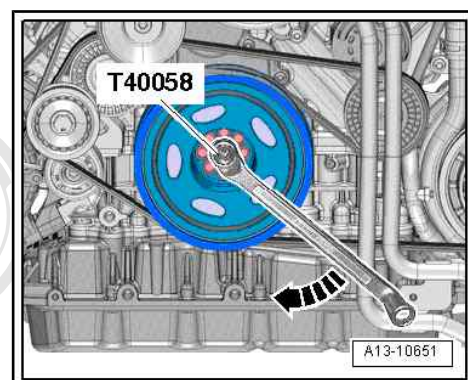
- Insert guide pin of adapter -T40058- as follows:
 - The larger-diameter section -arrow 1- faces towards the engine.
 - The smaller-diameter section -arrow 2- faces the adapter.



- Counterhold crankshaft using adapter - T40058- when slackening bolts for torque converter.

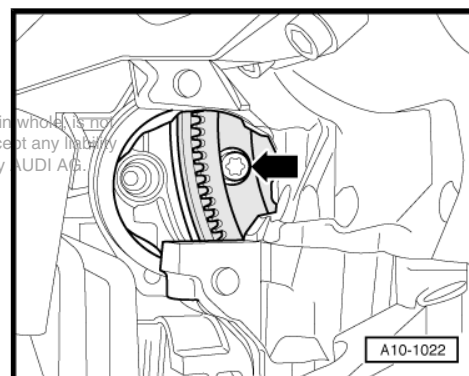
**Note**

When performing the next step, turn the crankshaft only in the normal direction of rotation -arrow-.



- Remove 3 bolts -arrow- for torque converter through opening for starter (turn crankshaft 120° each time).

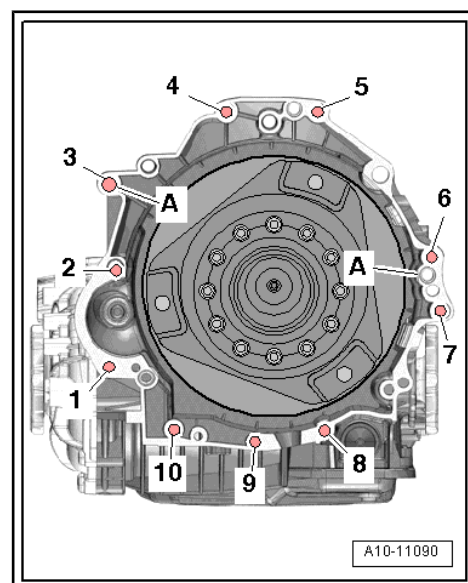
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



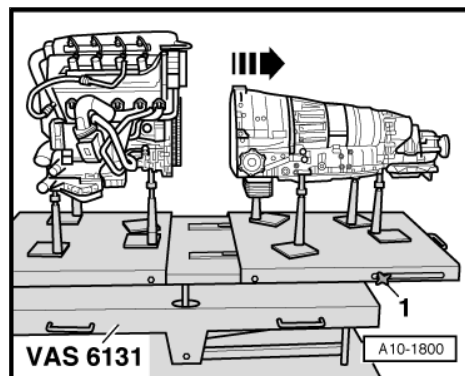
- Unscrew remaining bolts -3 ... 10- securing engine to gearbox.

**Note**

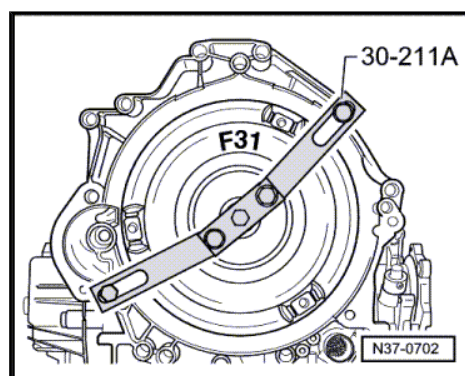
Disregard -item A-.



- Loosen clamping bolts -1- on sides of scissor-type assembly platform - VAS 6131 A- and pull rear section of platform together with gearbox towards rear -arrow-.
- Simultaneously separate torque converter from drive plate through opening of removed starter.



- Secure the torque converter in the gearbox using support bridge - 30 - 211 A- to prevent it falling out.

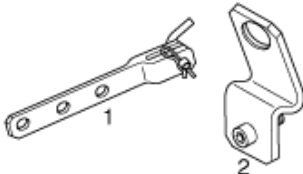
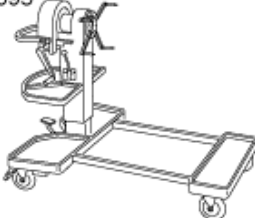


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

3 Securing engine to engine and gearbox support

Special tools and workshop equipment required

- ◆ Lifting tackle - 2024 A-
- ◆ Engine and gearbox support - VAS 6095- with universal mounting - VAS 6095/1- and bracket for V6 FSI engine, Audi A6 - VAS 6095/1-5-
- ◆ Workshop hoist - VAS 6100-
- ◆ Lift arm extension (workshop hoist) - VAS 6101-

2024 A/ 	VAS 6095 
VAS 6100 	VAS 6101 
	G10-0093

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



WARNING

Risk of accident.

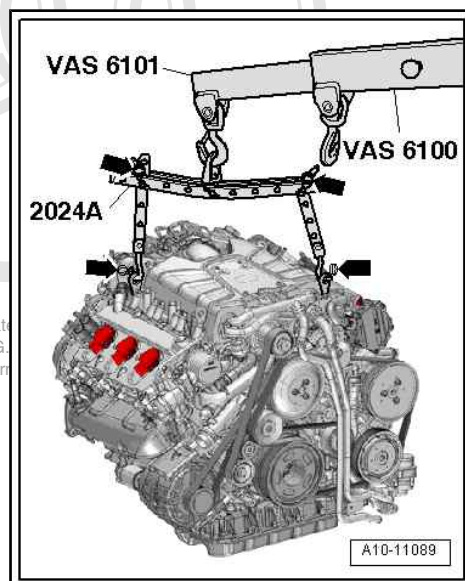
- ♦ *The engine can only be transported with the gearbox removed using the method described.*

- Engine separated from gearbox ⇒ [page 28](#)
- Attach lifting tackle - 2024 A- to engine and workshop hoist - VAS 6100- with lift arm extension (workshop hoist) - VAS 6101- as shown in illustration.



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.

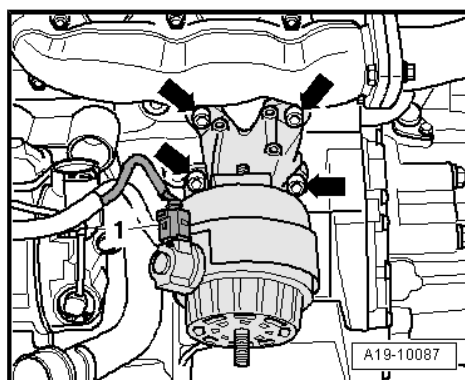
- ♦ *The support hooks and retaining pins must be secured with locking pins -arrows-.*

- Unscrew bolts -arrows- and remove engine support (left-side).



Note

- ♦ *For illustration purposes, the installation position is shown without console for engine mounting.*
- ♦ *Disregard -item 1-.*

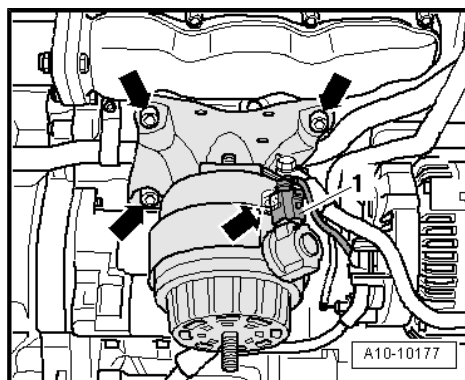


- Unplug electrical connector -1- on right electrohydraulic engine mounting solenoid valve - N145- .
- Move electrical wiring clear at console for engine mounting.
- Unscrew bolts -arrows- and remove engine support (right-side).

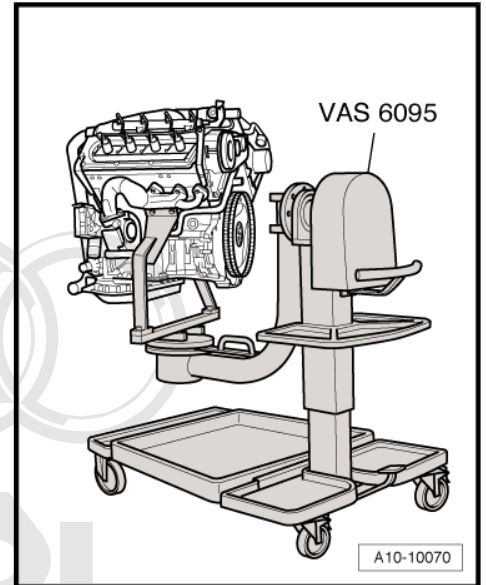


Note

For illustration purposes, the installation position is shown without console for engine mounting.



- Secure engine with universal mounting - VAS 6095/1- and support bracket for V6 FSI engine, Audi A6 - VAS 6095/1-5- to engine and gearbox support - VAS 6095- as shown in illustration and tighten to 40 Nm.

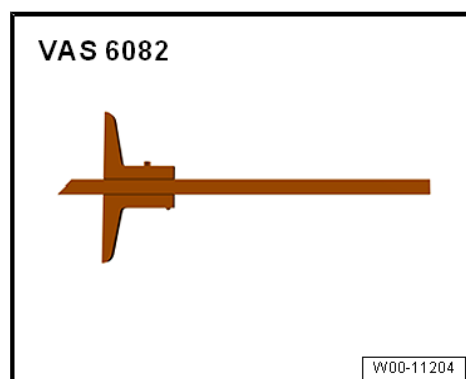


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

4 Installing engine

Special tools and workshop equipment required

- ◆ Depth gauge - VAS 6082-



Tightening torques



Note

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

Component		Nm
Bolts/nuts	M6	9
	M7	15
	M8	20
	M10	40
	M12	65
Except for the following:		
Drive plate to torque converter		85 ¹⁾
• ¹⁾ Renew bolts; use only genuine bolts (same as original equipment) ⇒ Electronic parts catalogue .		

Assembly mountings⇒ **"5.1 Exploded view - assembly mountings", page 45****Securing automatic gearbox 09L to engine**

Item	Bolt	Nm
1	M10x100 ¹⁾	65
2, 6	M12x120	65
3, 4, 5	M12x105	65
7	M12x130	65
8, 9, 10	M10x80	45
A	Dowel sleeves for centralising	

- ¹⁾ Property class 10.9.

Procedure

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**

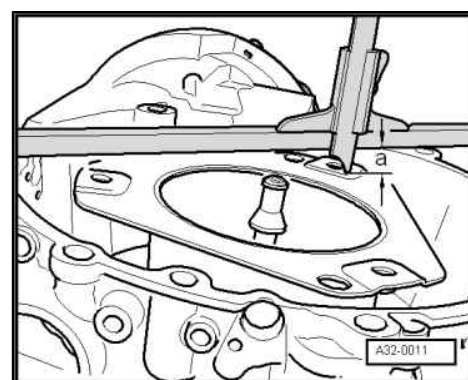
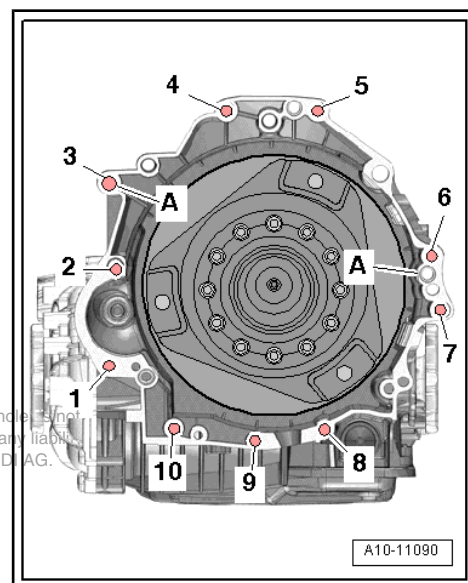
- ◆ *Renew the bolts tightened with specified tightening angle.*
 - ◆ *Renew self-locking nuts and bolts as well as seals, gaskets and O-rings.*
 - ◆ *To secure torque converter on drive plate, use only new bolts of the correct type (same as original equipment) as specified in ⇒ *Electronic parts catalogue*.*
 - ◆ *The threaded holes in the flange shaft for the propshaft on the gearbox must be cleaned of remaining locking fluid with a thread tap before assembling.*
 - ◆ *Hose connections and air pipes and hoses must be free of oil and grease before assembly.*
 - ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ *Electronic parts catalogue*.*
 - ◆ *To ensure that the air hoses can be properly secured at their connections, spray rust remover onto the worm thread of used hose clips before installing.*
 - ◆ *Fit all cable ties in the original positions when installing.*
- Install engine supports (left and right).
 - Check that dowel sleeves for centring engine and gearbox are fitted in the cylinder block; install missing dowel sleeves.

Checking installation depth of torque converter**Caution**

Risk of damage to drive lug of ATF pump if torque converter is installed incorrectly.

- ◆ **Check installation depth of torque converter.**

- If the torque converter has been correctly installed, the distance -a- between the contact surfaces at the threaded holes in the torque converter and the joint surface on the torque converter bellhousing for automatic gearbox 09L is at least 19 mm.



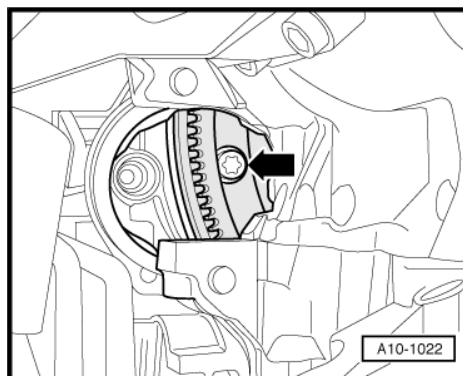
- Before bringing engine and gearbox together, turn torque converter and drive plate on engine so that the holes for one securing bolt are in line with the opening for the starter motor -arrow-.
- Press intermediate plate between engine and gearbox onto dowel sleeves.



Caution

Risk of damage to gearbox if torque converter is installed incorrectly.

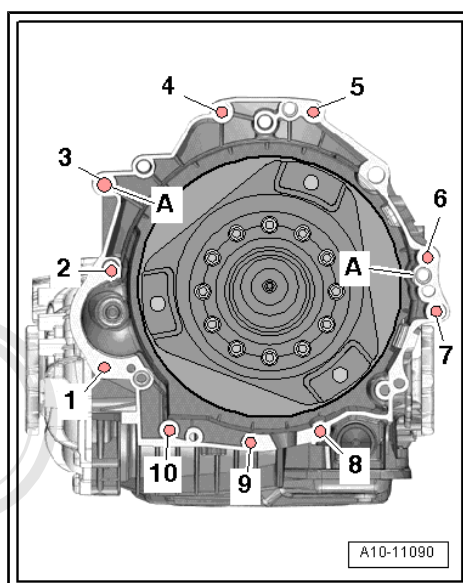
- ◆ **Before and during tightening of bolts securing engine to gearbox, continually check that the torque converter behind the drive plate can be turned.**
- ◆ **If the torque converter cannot be turned, the drive lugs of the ATF pump and consequently the gearbox will be damaged when the bolts are finally tightened.**



- Bring gearbox into position on engine and tighten bolts -3 ... 10-.

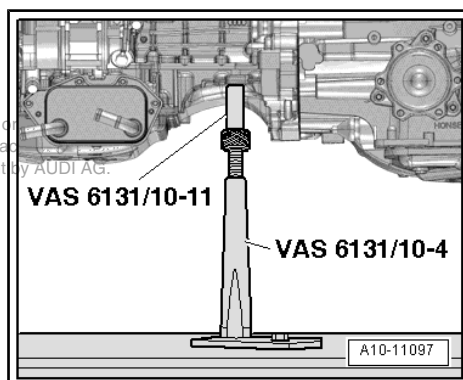
Installation is carried out in the reverse order; note the following:

- Install starter ⇒ Electrical system; Rep. gr. 27 .
- Secure ATF lines ⇒ Rep. gr. 37 .
- Install front exhaust pipes: left-side ⇒ [page 246](#) , right-side ⇒ [page 248](#) .

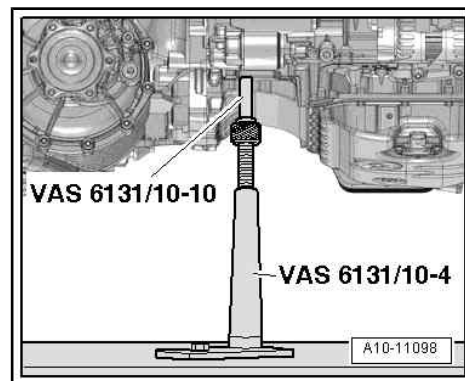


- Screw spindle for support element at left of engine downwards.
- Unscrew base plate for support element (left-side) from scissor-type assembly platform VAS 6131 A.

permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability for the use of this information for private or commercial purposes, in part or in full, without the written consent of AUDI AG. Copyright by AUDI AG.



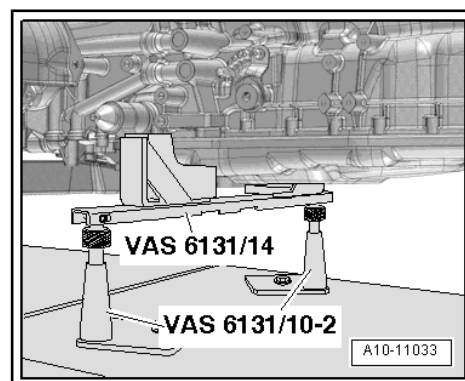
- Screw spindle for support element at right of engine downwards.
- Unscrew base plate for support element (right-side) from scissor-type assembly platform - VAS 6131 A- .



- Screw down spindles of support elements on front of gearbox.
- Unscrew base plates for support elements from scissor-type assembly platform - VAS 6131 A- .

**Note**

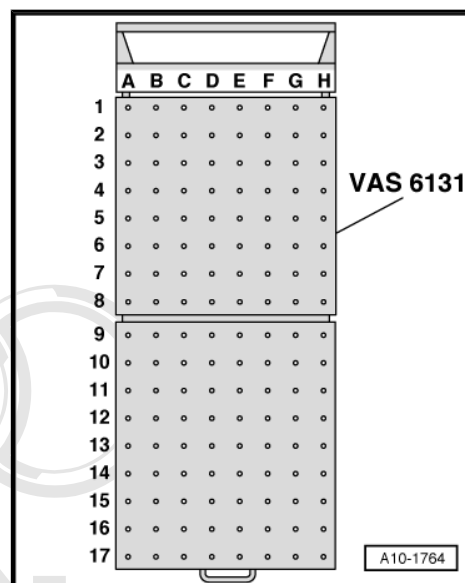
The mounting points for engine (front), gearbox and tunnel cross member remain unchanged.



- Set up scissor-type assembly platform - VAS 6131 A- with support set for Audi - VAS 6131/10- and supplementary set - VAS 6131/11- as follows:

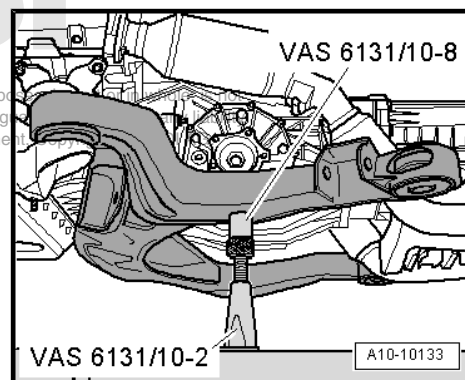
Platform coordinates	Parts of support set for Audi - VAS 6131/10- and supplementary set -VAS 6131/11-			
B4	/10-1	/10-4	/10-5	/10-13
F4	/10-1	/10-4	/10-5	/10-12
B10 ²⁾	/10-1	/10-2	/10-5	/10-8
G10 ²⁾	/10-1	/10-2	/10-5	/10-8
C15	/10-1	/10-3	/10-5	/11-2
F15	/10-1	/10-3	/10-5	/11-2

- ¹⁾ Support elements remain unchanged.
- ²⁾ Secure support elements only after installing the subframe.

**Note**

A second mechanic is required for positioning the subframe on the support elements.

- Fit subframe on both support elements -VAS 6131/10-8- .
- Screw up spindles of support elements on both sides.
- Tighten base plates for support elements to 20 Nm on scissor-type assembly platform - VAS 6131 A- .
- Guide engine/gearbox assembly together with subframe into body from below using scissor-type assembly platform - VAS 6131 A- .

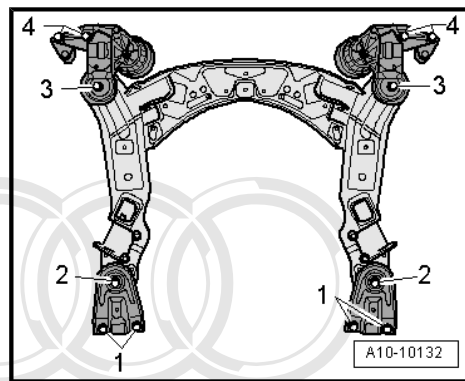


- Align subframe and consoles for engine mounting on longitudinal members according to markings made before removal.
- Tighten bolts for subframe and consoles for engine mountings only to specified torque (do not turn further); the bolts are only fully tightened after performing the wheel alignment check ⇒ Rep. gr. 40 .


WARNING

Risk of accident because of loose bolt connections.

- ◆ **Do NOT drive the vehicle unless the subframe bolts have been tightened to their final torque.**



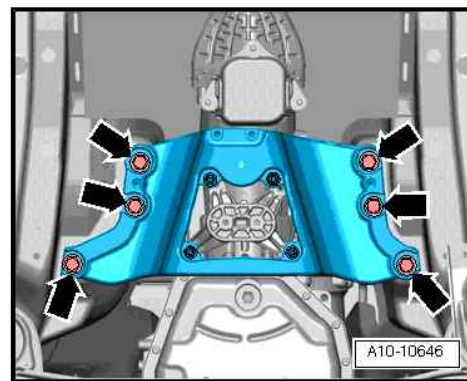
Audi

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.

- Tighten bolts for tunnel cross member ⇒ Rep. gr. 37 .

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

- Install selector lever cable and check adjustment ⇒ Rep. gr. 37 .
- Install drive shafts, guide links, track control links, anti-roll bar, coupling rod and suspension struts ⇒ Rep. gr. 40 .
- Install front cross piece ⇒ Rep. gr. 50 .
- Install propshaft ⇒ Rear final drive 0AR; Rep. gr. 39 .
- Align the exhaust system so it is free of stress ⇒ [page 252](#) .
- Install air conditioner compressor ⇒ Rep. gr. 87 .
- Install hydraulic fluid line for power steering pump ⇒ Rep. gr. 48 .
- Install fuel supply hose ⇒ Rep. gr. 24 .
- Install poly V-belt ⇒ [page 60](#) .
- Install torque reaction support ⇒ [page 52](#) .
- 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 .



Caution

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

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

- Install and adjust wiper arms ⇒ Electrical system; Rep. gr. 92 .
- Install body brace ⇒ Rep. gr. 40 .
- Check oil level ⇒ Maintenance ; Booklet 405 .
- Before starting engine, top up hydraulic fluid in power steering reservoir ⇒ Rep. gr. 48 .



Note

The power steering pump must not be run when dry.

- Bleed fuel system ⇒ Rep. gr. 24 .
- Fill up with coolant ⇒ [page 179](#) .



Note

- ◆ *Do not use drained coolant again if:*
- ◆ *the cylinder head or cylinder block have been renewed.*
- ◆ *the coolant is contaminated or dirty.*
- Check ATF level ⇒ Rep. gr. 37 .



- Align subframe and both consoles for engine mountings ⇒ Rep. gr. 40 .
- On vehicles with auxiliary heater: install exhaust silencer with corrugated exhaust pipes ⇒ Rep. gr. 82 .
- Fit front wheels ⇒ Wheels and tyres; Rep. gr. 44 .
- Perform wheel alignment check ⇒ Rep. gr. 44 .



WARNING

Risk of accident because of loose bolt connections.

- ◆ *Tighten bolts for subframe to final setting after performing wheel alignment check.*

- Install noise insulation panels ⇒ Rep. gr. 50 .



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

Overview

- ◆ ⇒ [“5.1 Exploded view - assembly mountings”, page 45](#)
- ◆ ⇒ [“5.2 Removing and installing engine mounting \(left-side\)”, page 46](#)
- ◆ ⇒ [“5.3 Removing and installing engine mounting \(right-side\)”, page 49](#)
- ◆ ⇒ [“5.4 Removing and installing torque reaction support”, page 52](#)

5.1 Exploded view - assembly mountings

1 - Stop for torque reaction support

- ☐ Must rest at top and bottom of buffer for torque reaction support, so that there is no play

2 - Bolt

- ☐ 40 Nm

3 - Torque reaction support

- ☐ Removing and installing ⇒ [page 52](#)

4 - Nut

- ☐ 40 Nm

5 - Bolt

- ☐ 75 Nm

6 - Console for engine mounting (right-side)

- ☐ Removing and installing ⇒ [“5.3 Removing and installing engine mounting \(right-side\)”, page 49](#)

7 - Engine mounting (right-side)

- ☐ Removing and installing ⇒ [page 49](#)

8 - Bolt

- ☐ 40 Nm

9 - Nut

- ☐ 40 Nm

10 - Engine support (right-side)

- ☐ Removing and installing ⇒ [page 49](#)

11 - Engine support (left-side)

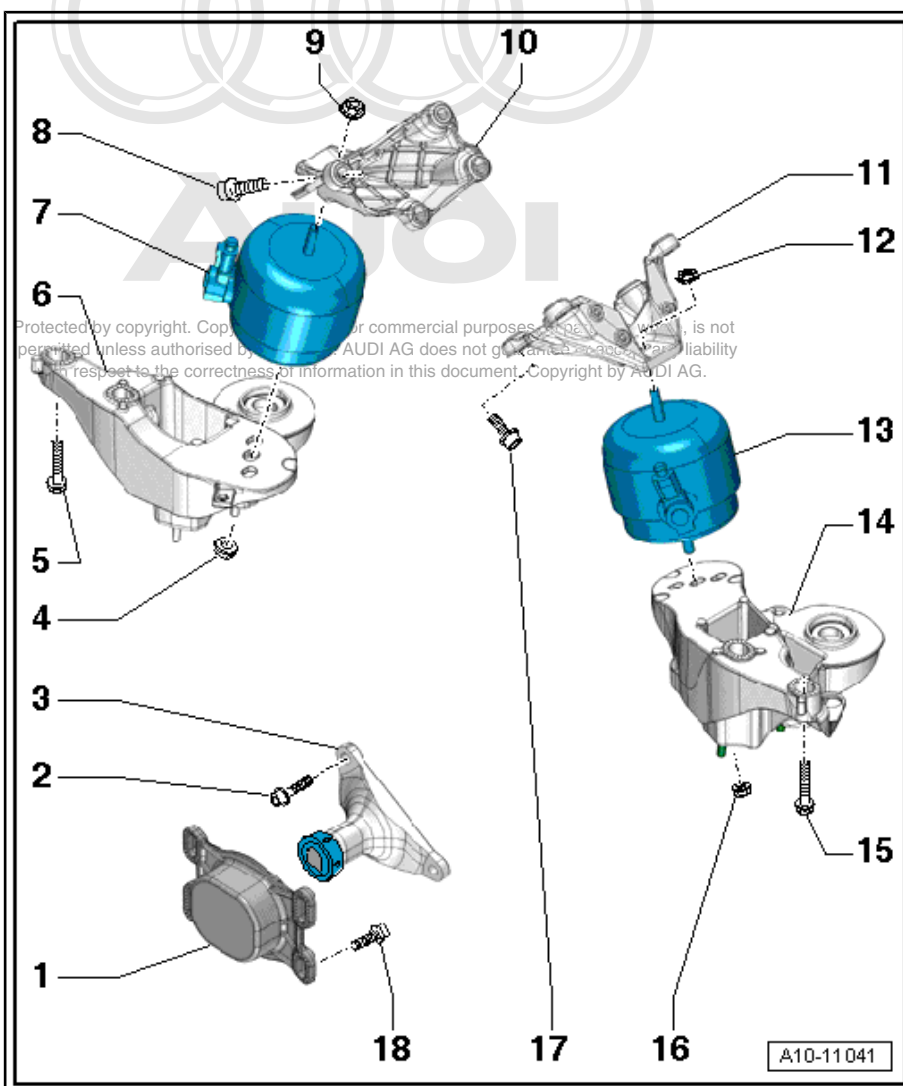
- ☐ Removing and installing ⇒ [page 46](#)

12 - Nut

- ☐ 40 Nm

13 - Engine mounting (left-side)

- ☐ Removing and installing ⇒ [page 46](#)



14 - Console for engine mounting (left-side)

- ❑ Removing and installing ⇒ ["5.2 Removing and installing engine mounting \(left-side\)", page 46](#)

15 - Bolt

- ❑ 75 Nm

16 - Nut

- ❑ 40 Nm

17 - Bolt

- ❑ 40 Nm

18 - Bolt

- ❑ 40 Nm

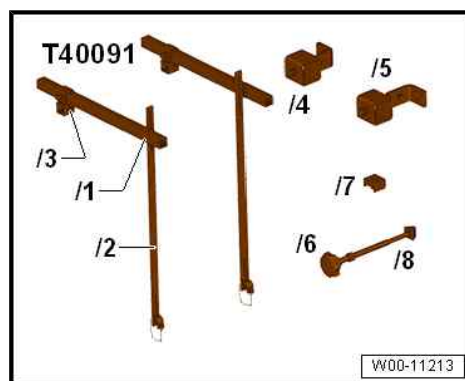
5.2 Removing and installing engine mounting (left-side)

Special tools and workshop equipment required

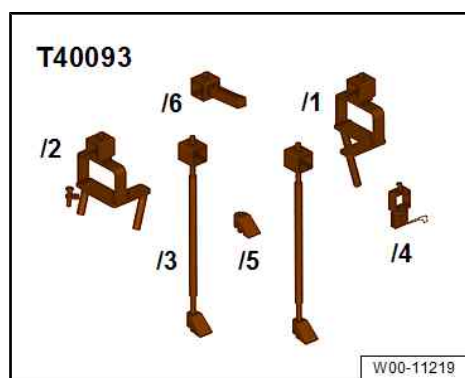
- ◆ Support bracket - 10 - 222 A-



- ◆ Engine support bracket (basic set) - T40091-

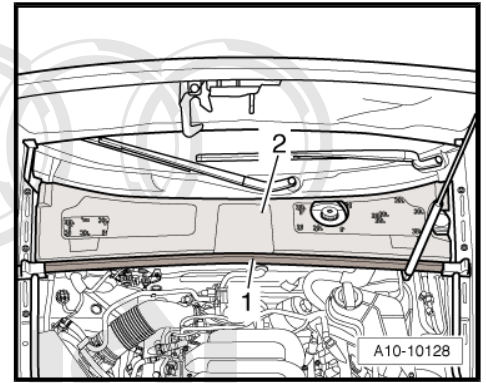


- ◆ Engine support bracket (supplementary set) - T40093-

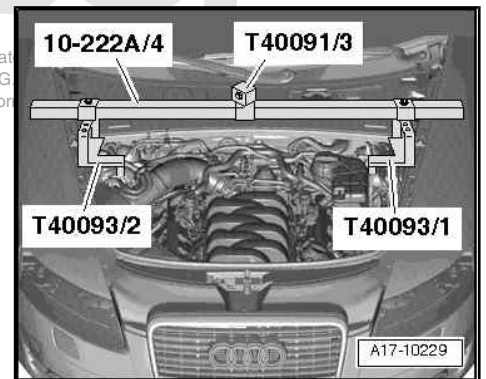


Removing

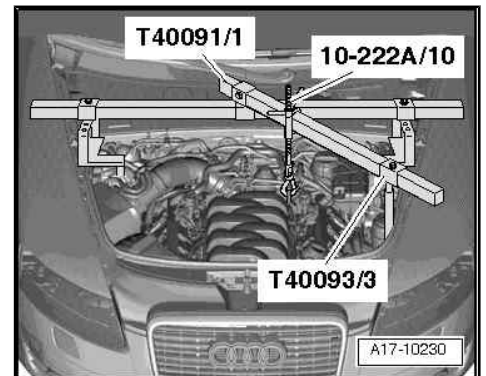
- Pull off seal -1- and remove plenum chamber cover -2-.



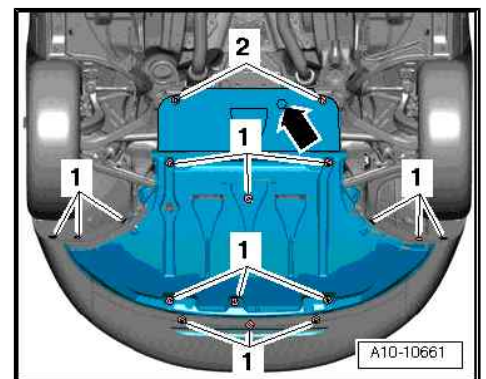
- Set up adapter - 10 - 222 A /4- with connecting piece - T40091/3- and supports -T40093/1- and -T40093/2- on suspension turrets as illustrated.
- Supports are marked for left and right side of vehicle.



- Attach further components of support bracket - 10 - 222 A - , - T40091- and -T40093- as shown in illustration. Position support -T40093/3- onto flange of longitudinal member.
- Engage hook - 10 - 222 A /10- at engine lifting eye (left-side).
- Take up weight of engine with spindle.

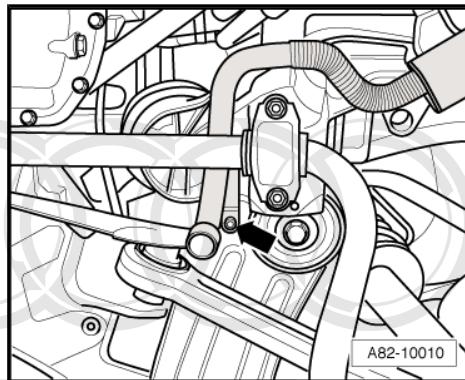


- Release fasteners -1, 2, arrow- and remove noise insulation panels.

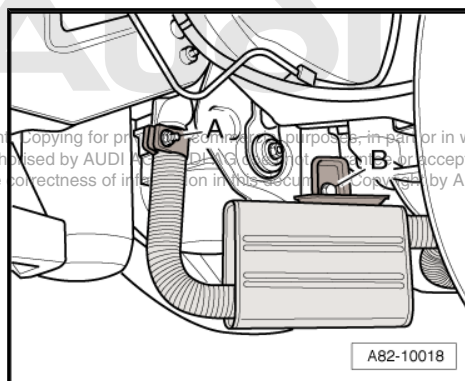


Vehicles with auxiliary heater:

- Remove front wheel (left-side) ⇒ Wheels and tyres; Rep. gr. 44 .
- Remove front left wheel housing liner ⇒ Rep. gr. 66 .
- Remove bolt -arrow- for corrugated exhaust pipe.



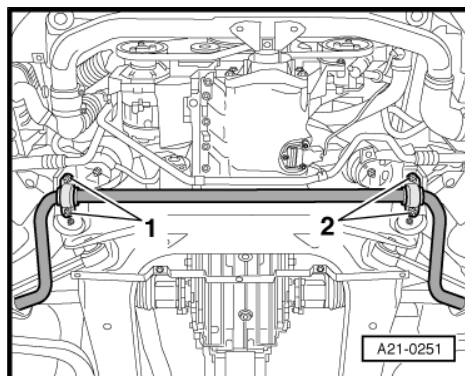
- Slacken nut -A- on clamp for corrugated exhaust pipe.
- Remove bolt -B- and detach silencer with corrugated exhaust pipes.



Protected by copyright. Copying for private or commercial purposes in part or in whole, is not permitted unless authorised by AUDI AG. Any further reproduction or distribution in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, is prohibited. Copyright by AUDI AG.

All vehicles (continued):

- Remove bolts -1- and -2- for anti-roll bar mounting on both sides and slightly lower anti-roll bar.

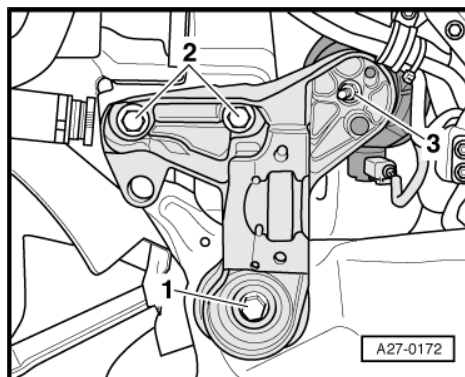


- Remove nut -3-.
- Remove bolts -1- and -2- and take off console for engine mounting (left-side).

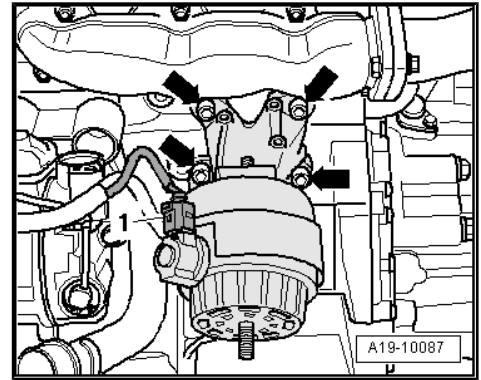


Note

The procedure is illustrated for the console for engine mounting (right-side).



- Unplug electrical connector -1- on left electrohydraulic engine mounting solenoid valve - N144- .
- Remove bolts -arrows- and detach engine support with engine mounting.



- Remove nut -arrow- and detach engine mounting from engine support.

Installing

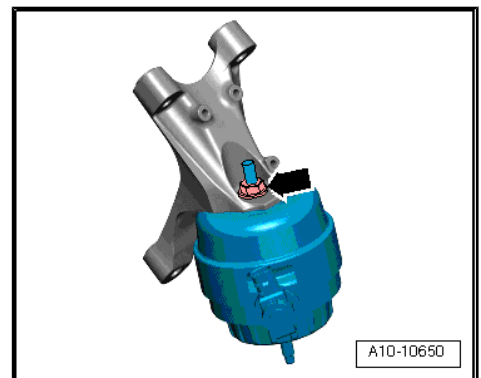
Installation is carried out in the reverse order; note the following:

- Tightening torques
⇒ ["5.1 Exploded view - assembly mountings", page 45](#)



Note

- ◆ *Renew the bolts tightened with specified tightening angle.*
- ◆ *Fit all cable ties in the original positions when installing.*
- Install subframe and anti-roll bar ⇒ Rep. gr. 40 .
- On vehicles with auxiliary heater: install exhaust silencer with corrugated exhaust pipes ⇒ Rep. gr. 82 .
- Fit front wheel ⇒ Wheels and tyres; Rep. gr. 44 .



5.3 Removing and installing engine mounting (right-side)

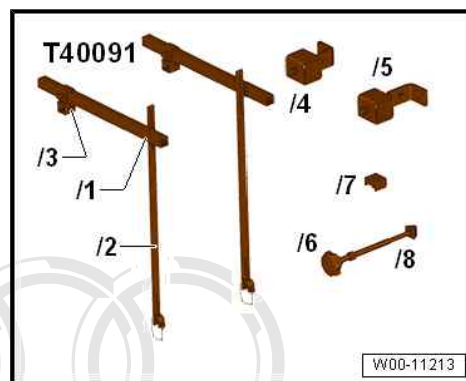
Special tools and workshop equipment required

- ◆ Support bracket - 10 - 222 A-

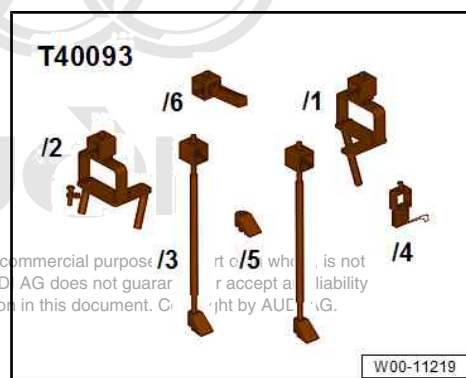


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee the accuracy of the information with respect to the correctness of information in this document. Copyright by AUDI AG.

◆ Engine support bracket (basic set) - T40091-



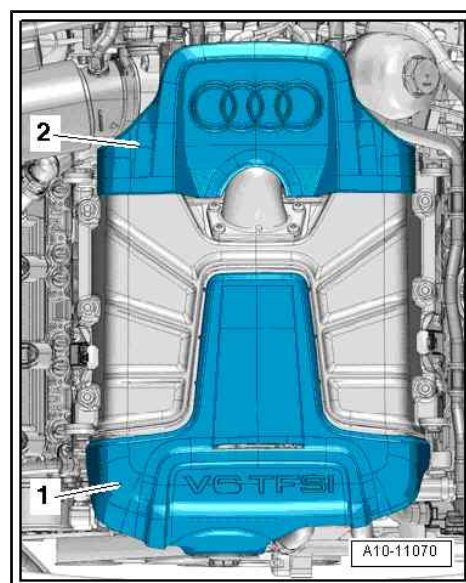
◆ Engine support bracket (supplementary set) - T40093-



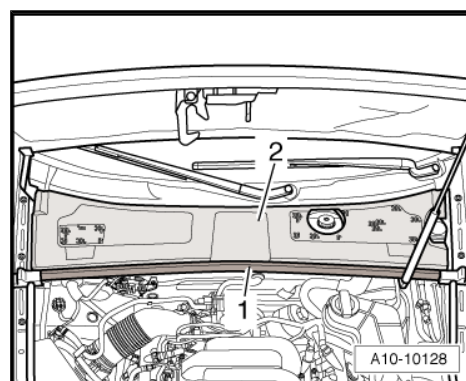
Protected by copyright. Copying for private or commercial purposes is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee the correctness of information in this document. Copyright by AUDI AG.

Removing

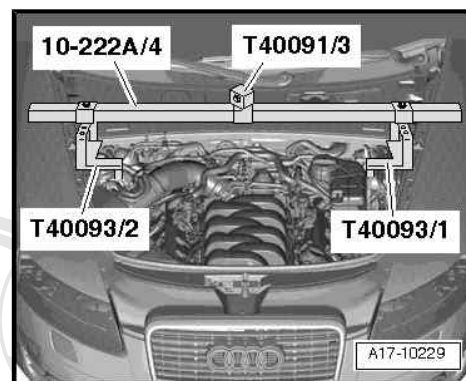
- Lift off engine cover panel (rear) -2-.
- Remove air cleaner housing ⇒ Rep. gr. 24 .



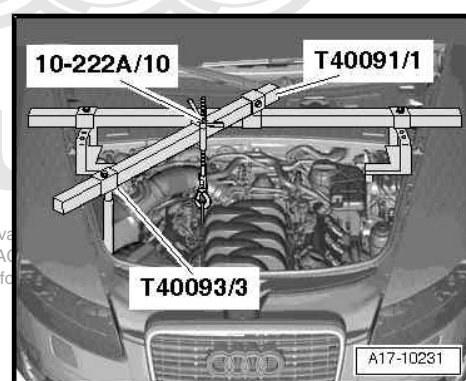
- Pull off seal -1- and remove plenum chamber cover -2-.



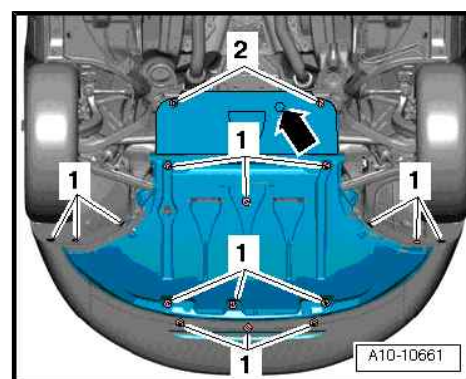
- Set up adapter - 10 - 222 A /4- with connecting piece - T40091/3- and supports -T40093/1- and -T40093/2- on suspension turrets.
- Supports are marked for left and right side of vehicle.



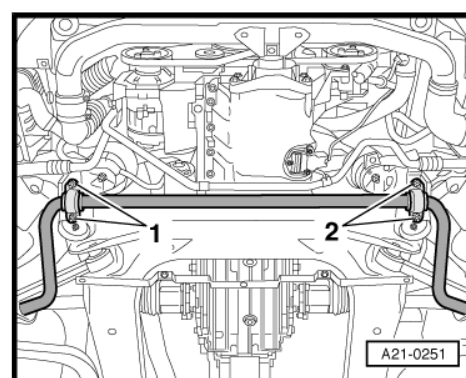
- Attach further components of support bracket - 10 - 222 A - , - T40091- and -T40093- as shown in illustration. Position support -T40093/3- onto flange of longitudinal member.
- Engage hook - 10 - 222 A /10- at engine lifting eye (left-side).
- Take up weight of engine with spindle.



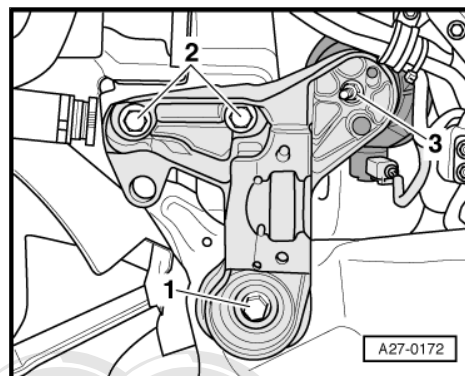
- Release fasteners -1, 2, arrow- and remove noise insulation panels.



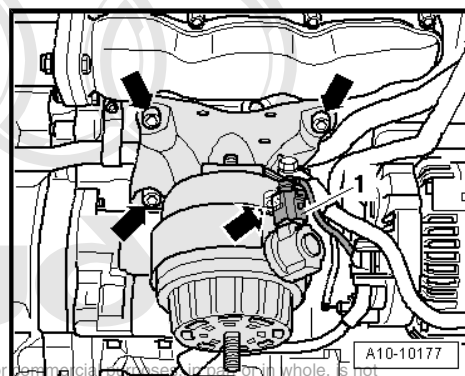
- Remove bolts -1- and -2- for anti-roll bar mounting on both sides and slightly lower anti-roll bar.



- Remove nut -3-.
- Remove bolts -1- and -2- and take off console for engine mounting (right-side).



- Unplug electrical connector -1- on right electrohydraulic engine mounting solenoid valve - N145- .
- Remove bolts -arrows- and detach engine support with engine mounting.



- Remove nut -arrow- and detach engine mounting from engine support.

Installing

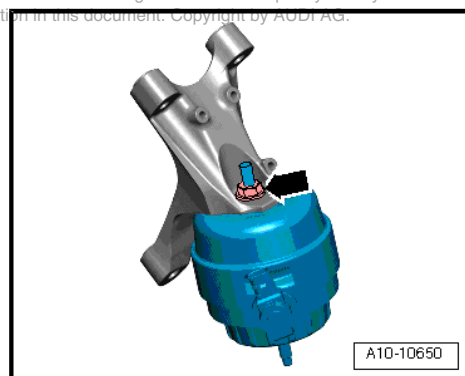
Installation is carried out in the reverse order; note the following:

- Tightening torques
⇒ ["5.1 Exploded view - assembly mountings", page 45](#)

Note

- ◆ *Renew the bolts tightened with specified tightening angle.*
- ◆ *Fit all cable ties in the original positions when installing.*

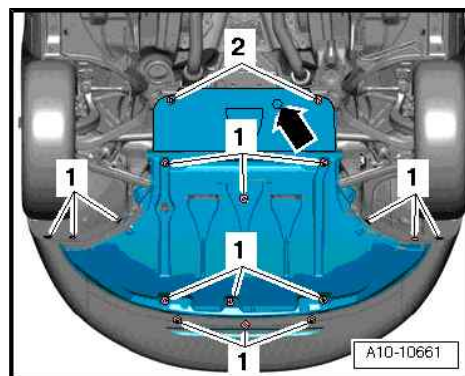
- Install subframe and anti-roll bar ⇒ Rep. gr. 40 .
- Install air cleaner housing ⇒ Rep. gr. 24 .



5.4 Removing and installing torque reaction support

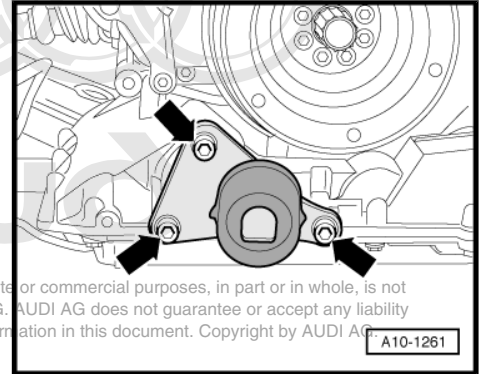
Removing

- Release fasteners -1, 2, arrow- and remove noise insulation panels.



- Unscrew bolts -arrows- and detach torque reaction support from engine.

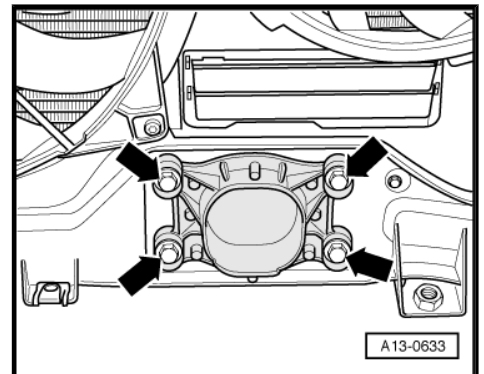
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG



Installing

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

- Tightening torques
⇒ ["5.1 Exploded view - assembly mountings", page 45](#)
- Allow stop for torque reaction support to rest on rubber buffer for torque reaction support under its own weight, and tighten bolts.
- Install noise insulation panels ⇒ Rep. gr. 50 .



13 – Crankshaft group

1 Cylinder block (pulley end)

Overview

- ◆ ⇒ [“1.1 Exploded view - poly V-belt drive for supercharger”, page 54](#)
- ◆ ⇒ [“1.2 Removing and installing poly V-belt for supercharger”, page 55](#)
- ◆ ⇒ [“1.3 Removing and installing poly V-belt tensioner for supercharger”, page 57](#)
- ◆ ⇒ [“1.4 Exploded view - poly V-belt drive”, page 57](#)
- ◆ ⇒ [“1.5 Removing and installing poly V-belt”, page 60](#)
- ◆ ⇒ [“1.6 Removing and installing tensioner for poly V-belt”, page 61](#)
- ◆ ⇒ [“1.7 Removing and installing vibration damper”, page 62](#)
- ◆ ⇒ [“1.8 Renewing sealing flange \(pulley end\) with crankshaft oil seal”, page 63](#)

1.1 Exploded view - poly V-belt drive for supercharger



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 - Poly V-belt for supercharger

- ☐ Check for wear
- ☐ Removing and installing
⇒ [page 60](#)
- ☐ When installing, make sure it is properly seated on pulleys

2 - Bolt

- ☐ 42 Nm

3 - Washer**4 - Cover****5 - Supercharger**

- ☐ Removing and installing
⇒ [page 226](#)

6 - Idler roller for poly V-belt**7 - Vibration damper**

- ☐ With dual poly V-belt pulley
- ☐ Can only be installed in one position (holes are off-set).
- ☐ Removing and installing
⇒ [page 62](#)

8 - Bolt

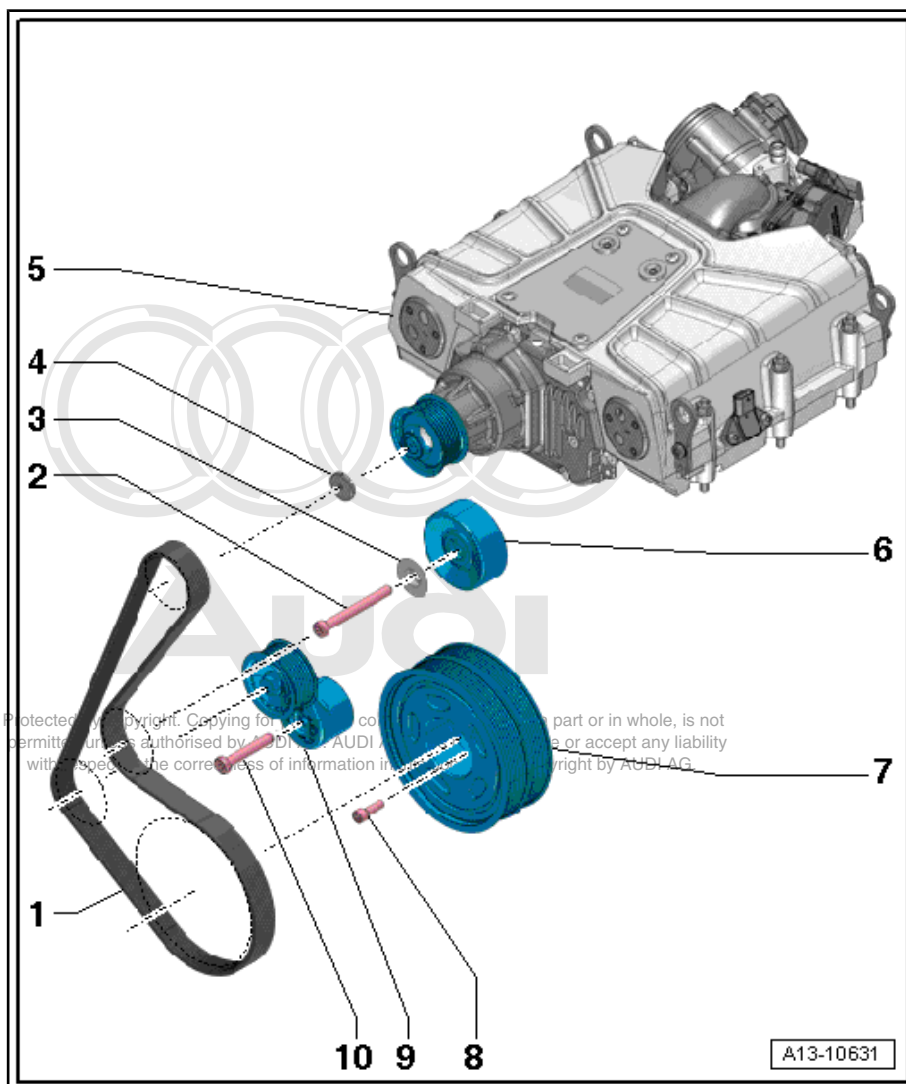
- ☐ Tightening torque
⇒ [Item 2 \(page 58\)](#)

9 - Poly V-belt tensioner

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

10 - Bolt

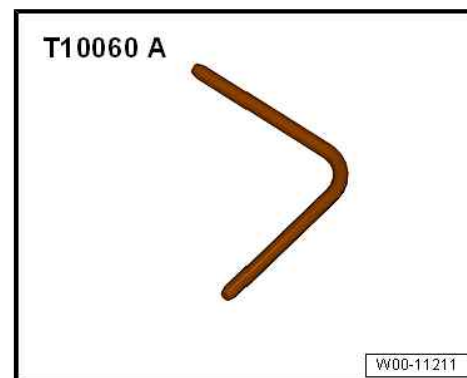
- ☐ 40 Nm



1.2 Removing and installing poly V-belt for supercharger

Special tools and workshop equipment required

- ◆ Locking pin - T10060 A-



Removing

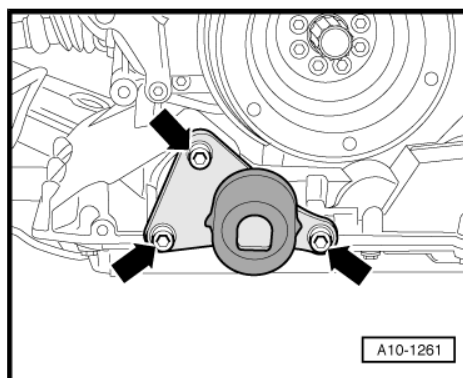
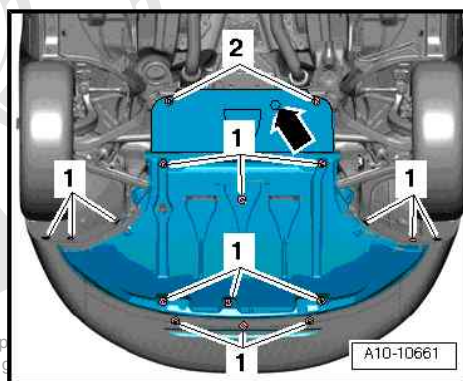
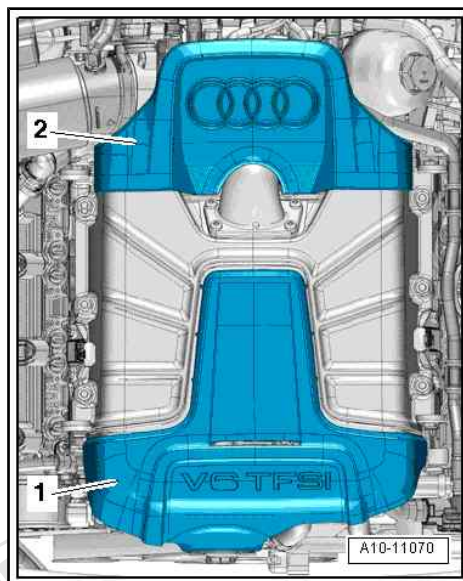


WARNING

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.*

- Lift off engine cover panel (front) -1-.
- Release fasteners -1, 2, arrow- and remove noise insulation panels.
- Unscrew bolts -arrows- and detach torque reaction support from engine.

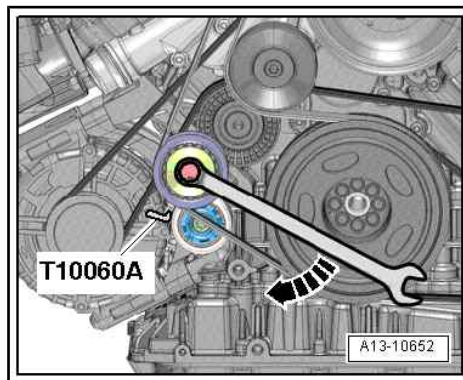


Caution

If a used belt runs in the opposite direction when it is refitted, this can cause breakage.

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

- To slacken poly V-belt turn tensioner in clockwise direction -arrow-.
- Detach poly V-belt and lock tensioner with locking pin - T10060 A- .



Installing

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

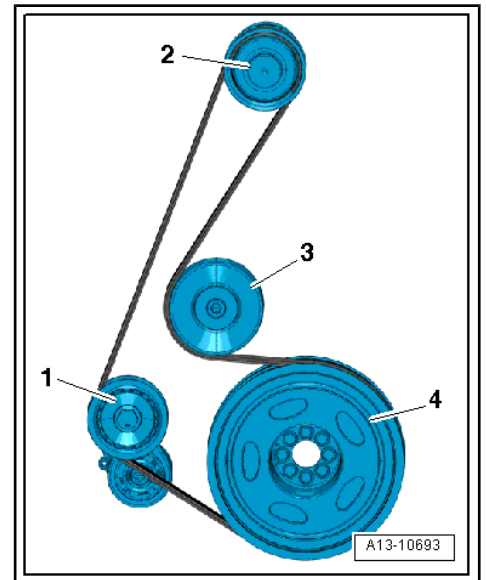
- Fit poly V-belt on pulleys as shown in illustration:
- 1 - Tensioner
- 2 - Supercharger
- 3 - Idler roller
- 4 - Vibration damper



Note

When installing poly V-belt, make sure it is properly seated on pulleys.

- Start engine and check that belt runs properly.
- Install torque reaction support ⇒ [page 52](#) .



1.3 Removing and installing poly V-belt tensioner for supercharger

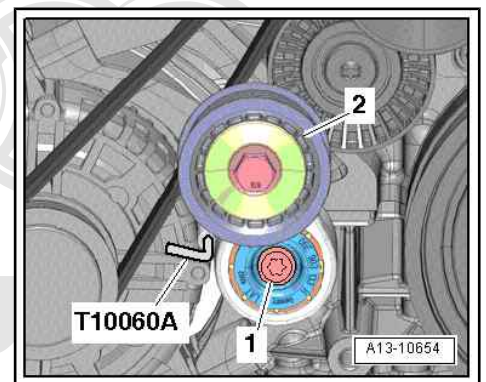
Removing

- Remove poly V-belt for supercharger ⇒ [page 55](#) .
- Remove bolt -1- and take off poly V-belt tensioner -2-.

Installing

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

- Tightening torque
⇒ ["1.1 Exploded view - poly V-belt drive for supercharger", page 54](#)
- Install poly V-belt for supercharger ⇒ [page 55](#) .



1.4 Exploded view - poly V-belt drive

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted without express 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.

1 - Poly V-belt

- ☐ Check for wear
- ☐ Before removing, mark direction of rotation with chalk or felt-tip pen
- ☐ Removing and installing ⇒ [page 60](#)
- ☐ Do not kink
- ☐ When installing, make sure it is properly seated on pulleys

2 - Bolt

- ☐ Renew
- ☐ 20 Nm + turn 90° further

3 - Alternator

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

4 - Bolt

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

5 - Cover for idler roller

6 - Idler roller for poly V-belt

- ☐ 40 Nm

7 - Bolt

- ☐ Tightening torque and sequence ⇒ [page 59](#)

8 - Bolt

- ☐ Tightening torque ⇒ [Item 2 \(page 187\)](#)

9 - Poly V-belt pulley for coolant pump

- ☐ Removing and installing ⇒ ["2.2 Removing and installing coolant pump", page 188](#)

10 - Bolt

- ☐ Tightening torque ⇒ [Item 1 \(page 187\)](#)

11 - Coolant pump

- ☐ Removing and installing ⇒ [page 188](#)

12 - Sealing flange (pulley end)

- ☐ Renewing ⇒ [page 63](#)

13 - Bolt

- ☐ Tightening torque ⇒ Rep. gr. 48

14 - Bracket for power steering pump

15 - Sliding bush

16 - Bolt

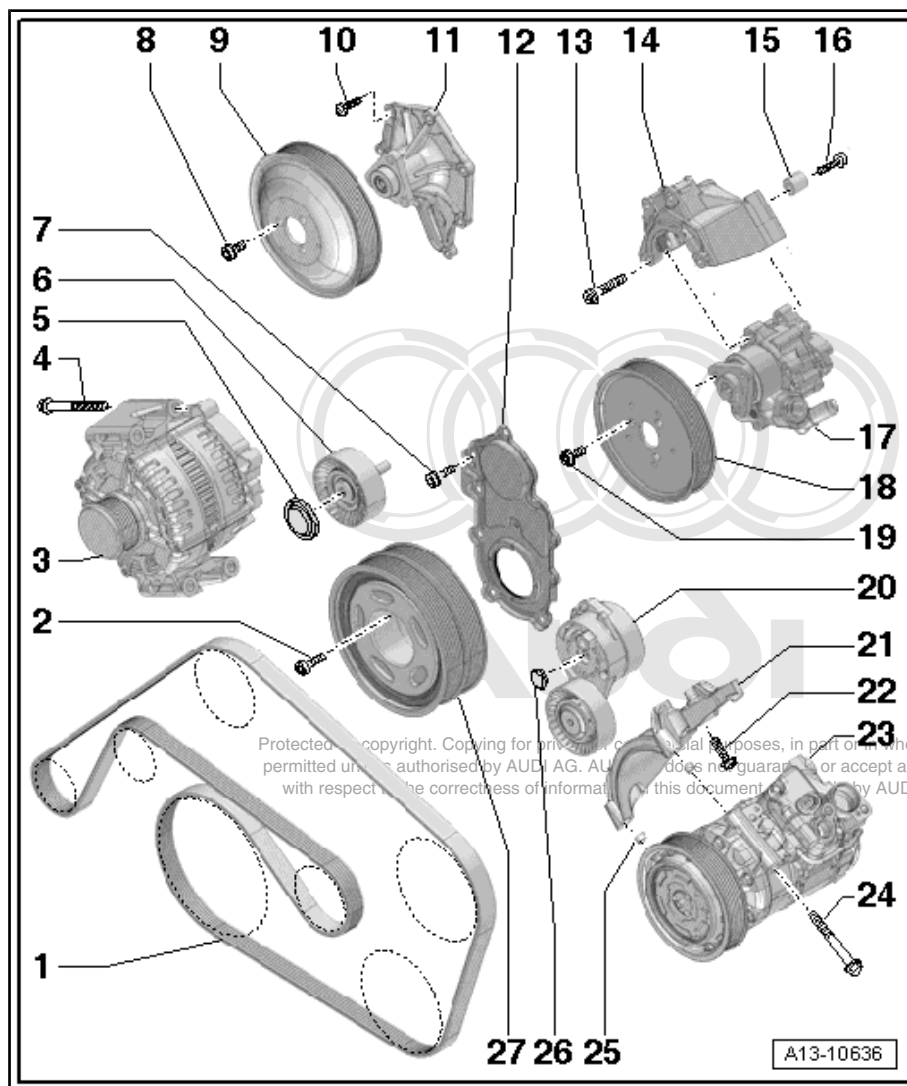
- ☐ Tightening torque ⇒ Rep. gr. 48

17 - Power steering pump

- ☐ Removing and installing ⇒ Rep. gr. 48

18 - Pulley for power steering pump

- ☐ Removing and installing ⇒ Rep. gr. 48



19 - Bolt

- ☐ Tightening torque ⇒ Rep. gr. 48

20 - Poly V-belt tensioner

- ☐ Removing and installing ⇒ [page 61](#)
- ☐ 40 Nm

21 - Bracket for air conditioner compressor

- ☐ Removing and installing ⇒ Rep. gr. 87

22 - Bolt

- ☐ Tightening torque ⇒ Rep. gr. 87

23 - Air conditioner compressor

- ☐ Do not unscrew or disconnect refrigerant hoses or pipes.
- ☐ Removing and installing ⇒ Rep. gr. 87

24 - Bolt

- ☐ Tightening torque ⇒ Rep. gr. 87

25 - Dowel sleeve

- ☐ 2x

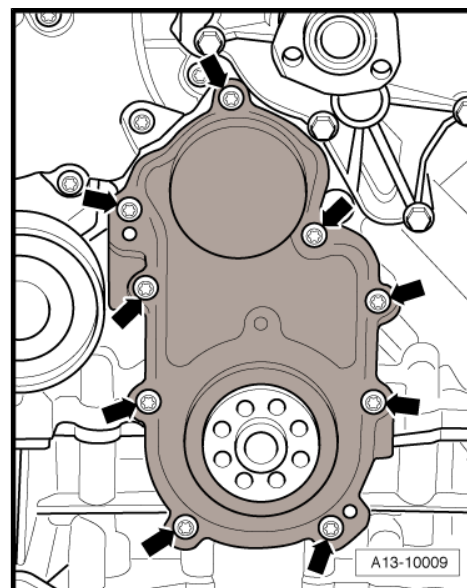
26 - Cover for tensioner

27 - Vibration damper

- ☐ With dual poly V-belt pulley
- ☐ Removing and installing ⇒ [page 62](#)

Sealing flange (pulley end) - tightening torque and sequence

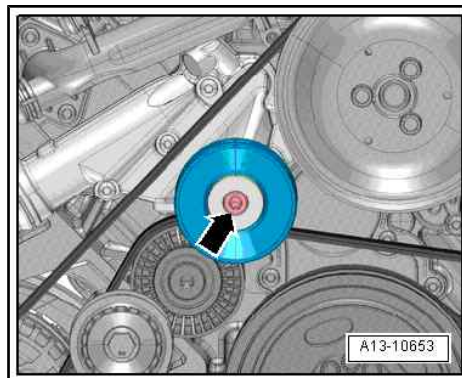
- Tighten bolts -arrows- in stages and in diagonal sequence; final torque 9 Nm.



1.5 Removing and installing poly V-belt

Removing

- Remove poly V-belt for supercharger ⇒ [page 55](#) .
- Remove bolt -arrow- and detach with idler roller.

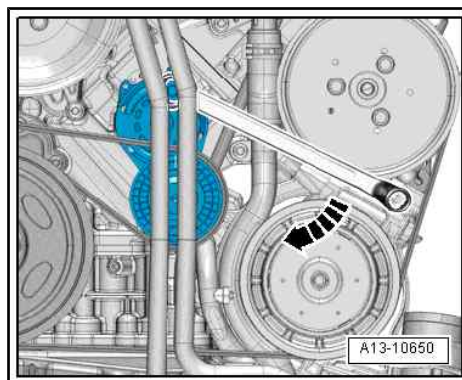


Caution

If a used belt runs in the opposite direction when it is refitted, this can cause breakage.

- ◆ *Mark direction of rotation of poly V-belt with chalk or felt-tip pen for re-installation.*

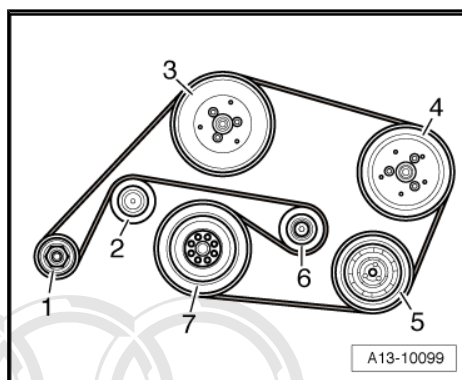
- To slacken poly V-belt turn tensioner in clockwise direction -arrow-.
- Remove poly V-belt and release tensioner.



Installing

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

- Tightening torque
⇒ ["1.4 Exploded view - poly V-belt drive", page 57](#)
 - Fit poly V-belt on pulleys as shown in illustration.
- 1 - Alternator
 - 2 - Idler roller
 - 3 - Coolant pump
 - 4 - Power steering pump
 - 5 - Air conditioner compressor
 - 6 - Tensioner for poly V-belt
 - 7 - Vibration damper



Note

When installing poly V-belt, make sure it is properly seated on pulleys.

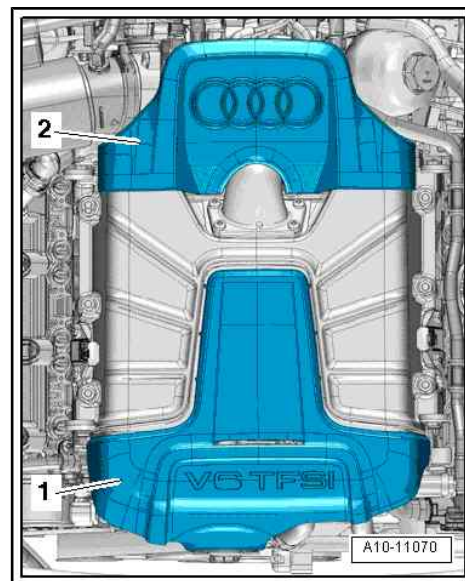
- Start engine and check that belt runs properly.
- Install poly V-belt for supercharger ⇒ [page 55](#) .

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.

1.6 Removing and installing tensioner for poly V-belt

Removing

- Lift off engine cover panel (front) -1-.

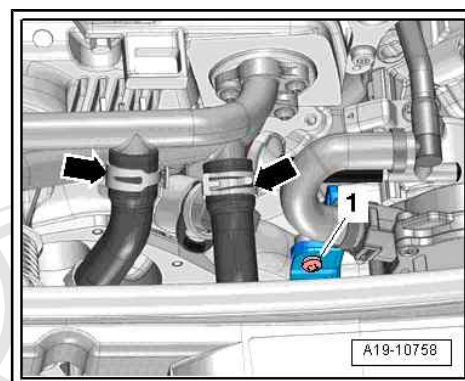


- Remove bolt -1-.

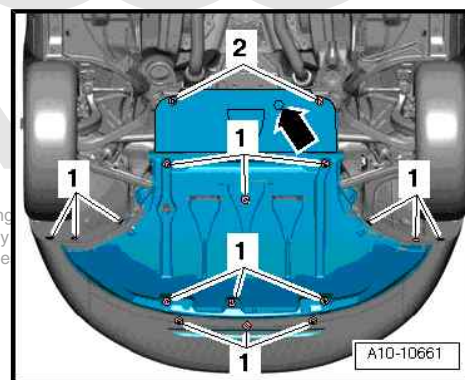


Note

Disregard -arrows-.



- Release fasteners -1- and remove front noise insulation panel.



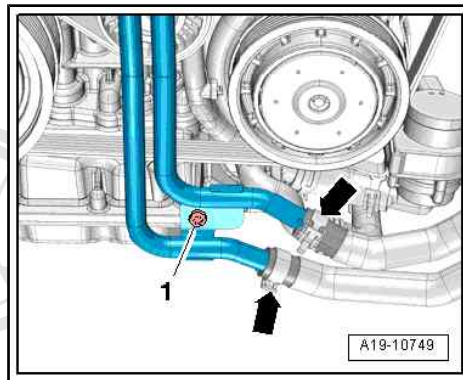
Protected by copyright. Copying
permitted unless authorised by
with respect to the correctne

- Remove bolt -1-.



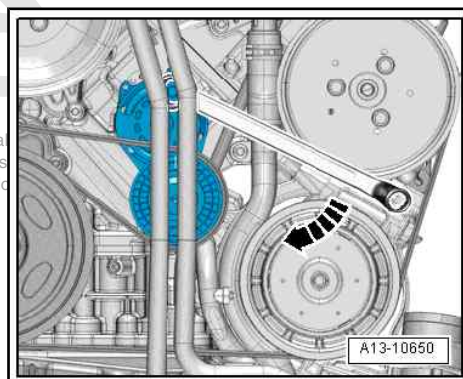
Note

Disregard -arrows-.



- To slacken poly V-belt turn tensioner in clockwise direction -arrow-.
- Remove poly V-belt from tensioner and release tensioner.

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

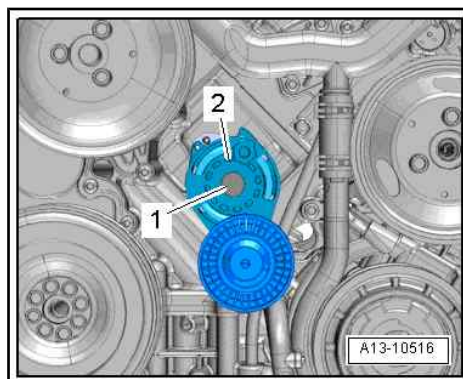


- Detach cover and remove bolt -1- behind it.
- Detach poly V-belt tensioner -2- from cylinder block.

Installing

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

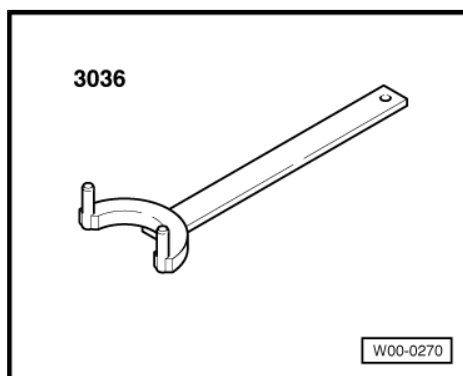
- Tightening torque
⇒ [“1.4 Exploded view - poly V-belt drive”, page 57](#)
- Install poly V-belt ⇒ [page 60](#) .
- Install coolant pipes (front left) ⇒ [page 197](#) .



1.7 Removing and installing vibration damper

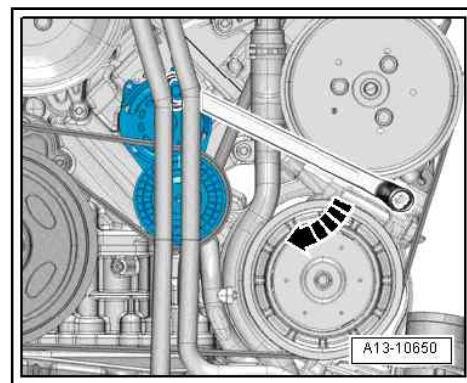
Special tools and workshop equipment required

- ◆ Counterhold tool - 3036-



Removing

- Remove poly V-belt for supercharger ⇒ [page 55](#) .
- To slacken poly V-belt turn tensioner in clockwise direction -arrow-.
- Remove poly V-belt from vibration damper and release tensioner.



- Remove bolts -1- for vibration damper using counterhold tool - 3036- .
- Remove vibration damper.

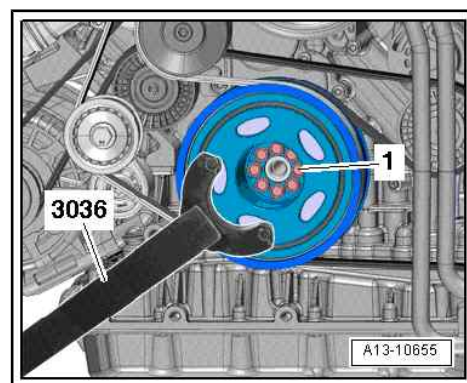
Installing

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

- Tightening torque
⇒ ["1.1 Exploded view - poly V-belt drive for supercharger", page 54](#)

**Note**

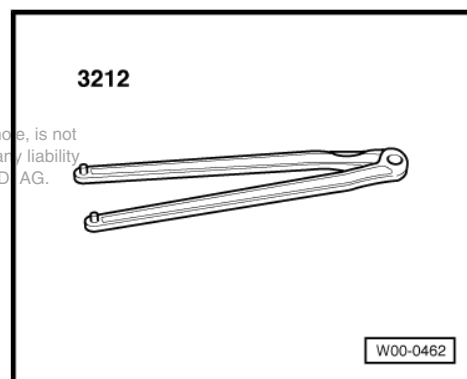
- ◆ *Renew the bolts tightened with specified tightening angle.*
- ◆ *Can only be installed in one position (holes are off-set)*
- Install poly V-belt ⇒ [page 60](#) .



1.8 Renewing sealing flange (pulley end) with crankshaft oil seal

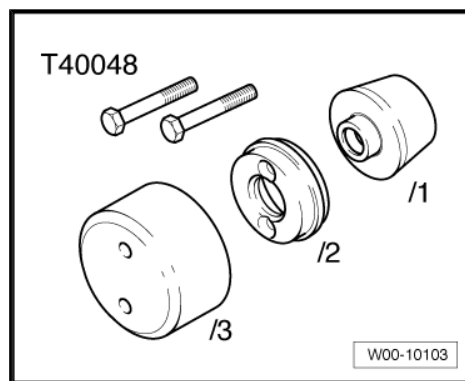
Special tools and workshop equipment required

- ◆ Pin wrench - 3212-



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.

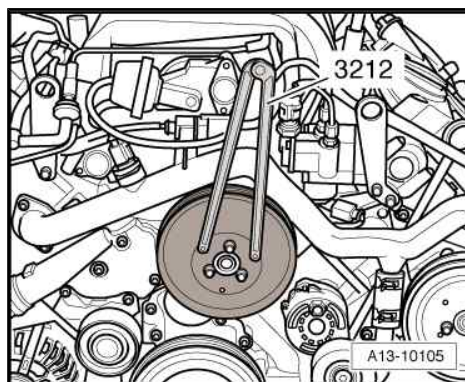
- ◆ Assembly tool - T40048-



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

Procedure

- Remove poly V-belt ⇒ [page 60](#) .
- Remove vibration damper ⇒ [page 62](#) .
- Remove bolts for coolant pump pulley (counterhold with pin wrench - 3212-).
- Detach poly-V-belt pulley.

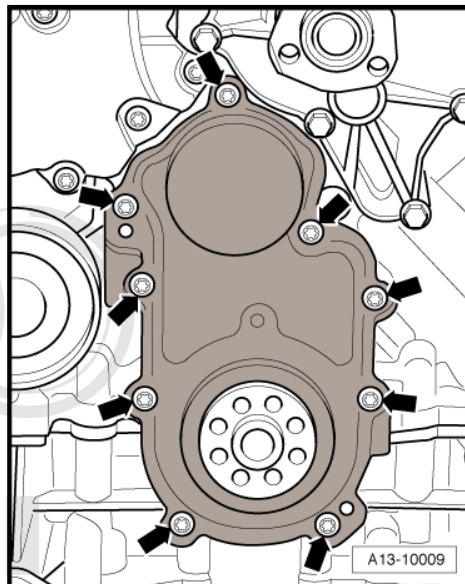


- Remove bolts -arrows-.
- Carefully release sealing flange (pulley end) from bonded joint.



Note

Renew sealing flange (pulley end).



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.

**Caution**

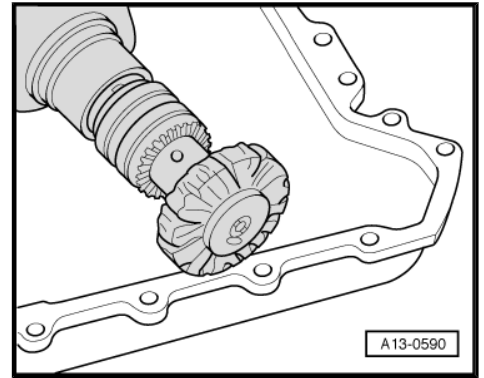
Protect lubrication system against contamination.

- ◆ *Cover exposed parts of the engine.*

**WARNING**

Risk of eye injury.

- ◆ *Wear safety goggles.*

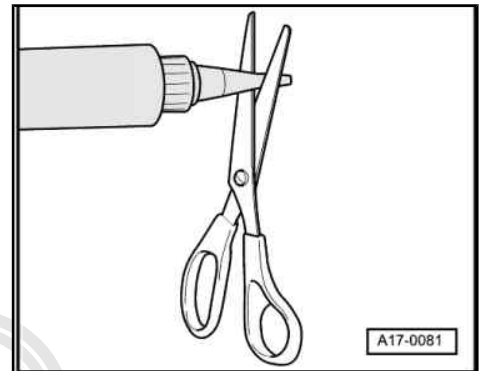


- Remove sealant residue from cylinder block and sump (top section) using rotating plastic brush or similar.
- Clean sealing surfaces; they must be free of oil and grease.

**Note**

Note the use-by date of the sealant.

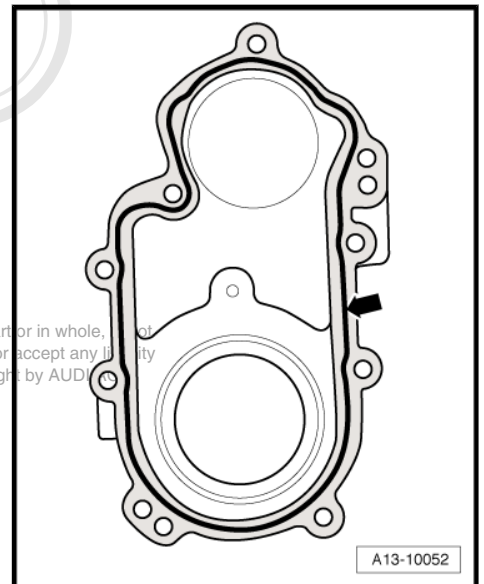
- Cut off nozzle of tube at front marking (nozzle Ø approx. 2 mm).

**Caution**

Make sure lubrication system is not clogged by excess sealant.

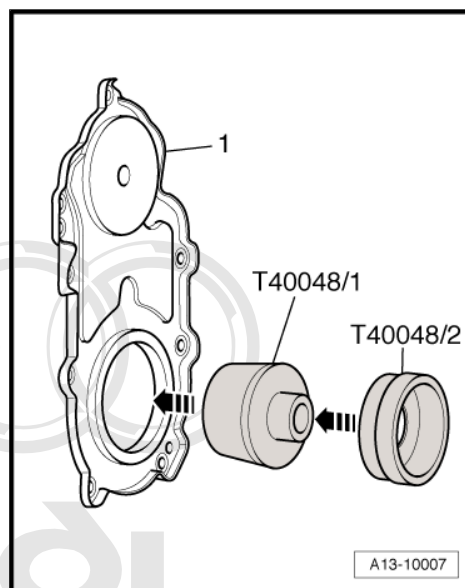
- ◆ *The bead of sealant must not be thicker than specified.*

- Apply bead of sealant onto clean sealing surface of sealing flange as illustrated.
- The groove -arrow- on the sealing surface must be completely filled with sealant.
- The bead of sealant must project 1.5 ... 2.0 mm above the sealing surface.

**Note**

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

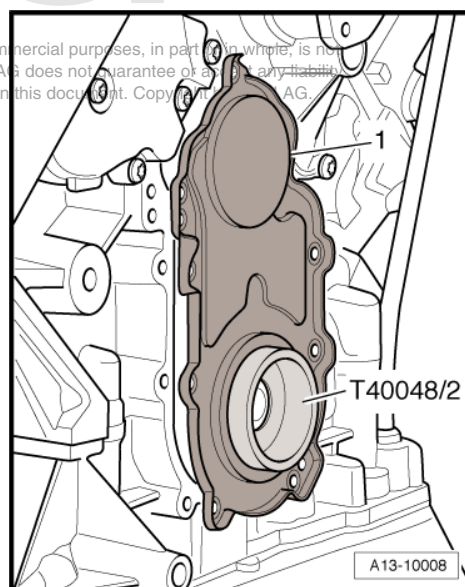
- Fit assembly aid -T40048/1- onto assembly sleeve -T40048/2- and slide sealing flange -1- onto assembly sleeve.
- Detach assembly aid.



- First position sealing flange -1- (with assembly sleeve -T40048/2- inserted) on crankshaft.
- Keep sealing flange straight while pushing it onto engine sealing surface. Then bolt on ⇒ [page 59](#) .

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

- Install poly V-belt pulley for coolant pump ⇒ [page 187](#) .
- Install vibration damper ⇒ [page 62](#) .



2 Cylinder block (gearbox end)

Overview

- ◆ ⇒ "2.1 Exploded view - drive plate, vehicles with automatic gearbox 09L", page 67
- ◆ ⇒ "2.2 Removing and installing drive plate - vehicles with automatic gearbox 09L", page 68
- ◆ ⇒ "2.3 Renewing crankshaft oil seal (gearbox end)", page 68



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.

When performing assembly work, secure engine to engine and gearbox support - VAS 6095- ⇒ [page 35](#).

2.1 Exploded view - drive plate, vehicles with automatic gearbox 09L

1 - Bolt

- ☐ Renew
- ☐ 60 Nm + turn 90° further

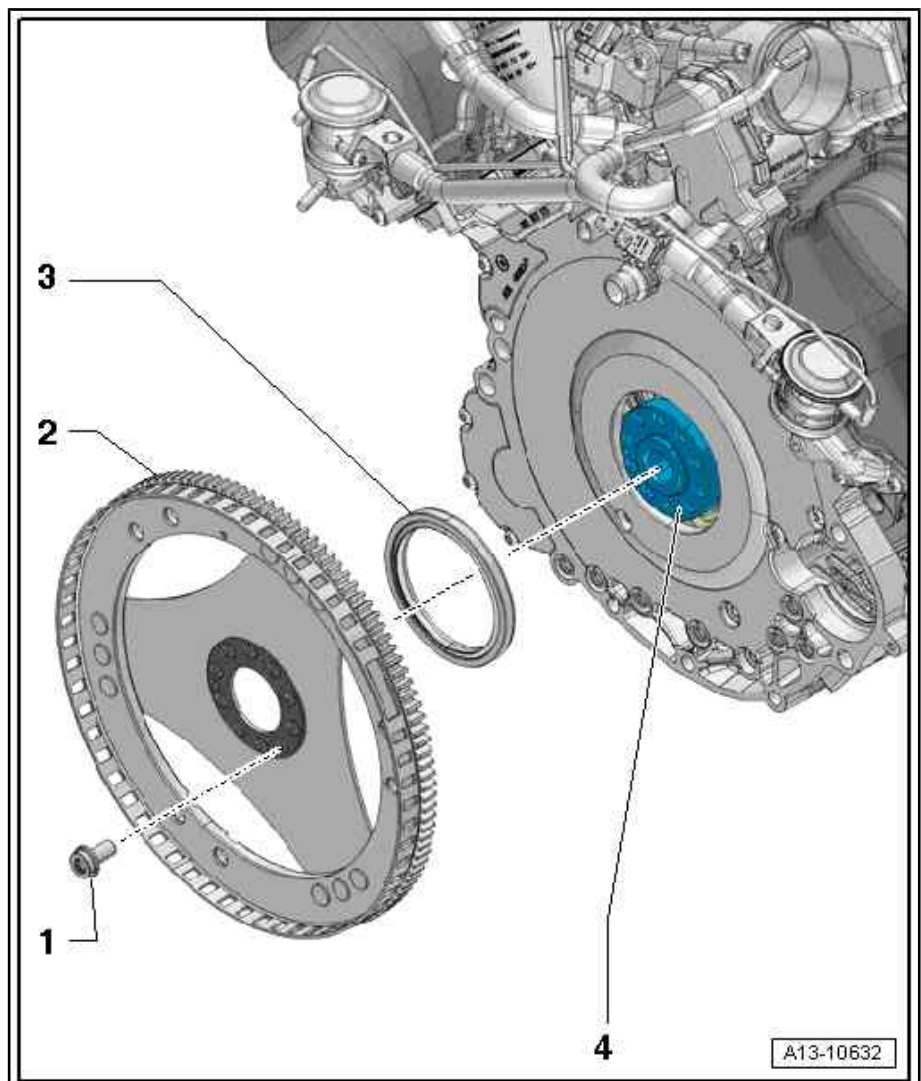
2 - Drive plate

- ☐ Can only be installed in one position (holes are off-set).
- ☐ Removing and installing ⇒ [page 68](#)

3 - Crankshaft oil seal (gearbox end)

- ☐ Renewing ⇒ [page 68](#)

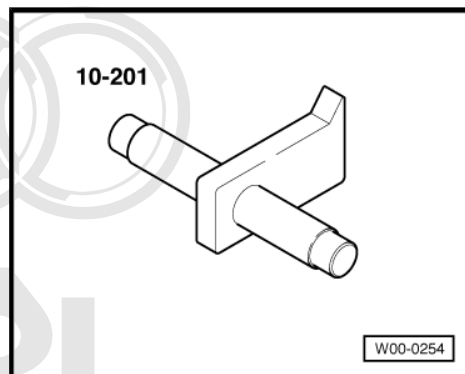
4 - Crankshaft



2.2 Removing and installing drive plate - vehicles with automatic gearbox 09L

Special tools and workshop equipment required

- ◆ Counterhold tool - 10 - 201-



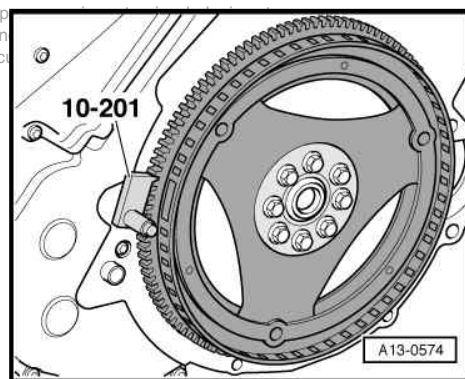
Removing

- Gearbox removed
- Insert counterhold tool - 10 - 201- to slacken bolts.
- Remove bolts and take off drive plate.

Installing

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

- Tightening torque
⇒ ["2.1 Exploded view - drive plate, vehicles with automatic gearbox 09L", page 67](#)



Note

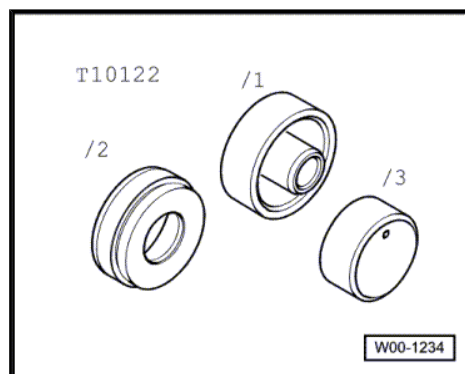
Renew the bolts tightened with specified tightening angle.

- Fit counterhold tool - 10 - 201- the other way round to tighten bolts.

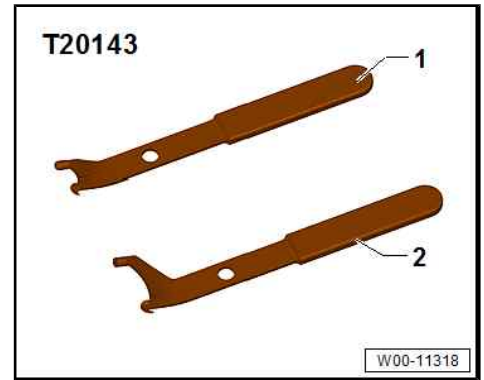
2.3 Renewing crankshaft oil seal (gearbox end)

Special tools and workshop equipment required

- ◆ Fitting tool - T10122-

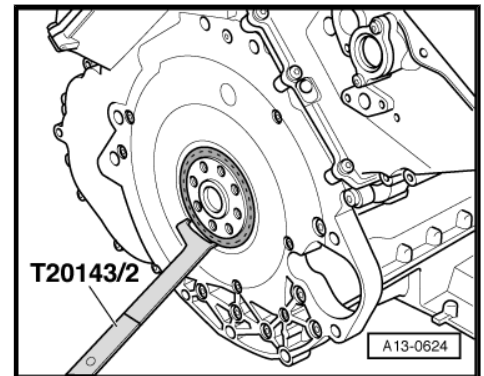


◆ Extractor tool - T20143-

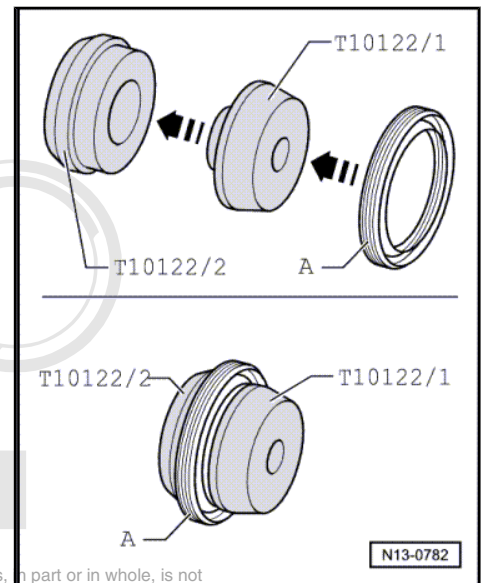


Procedure

- Gearbox removed
- Remove drive plate ➔ [page 68](#) .
- Pry out oil seal using extractor tool -T20143/2- .
- Clean contact surface and sealing surface.

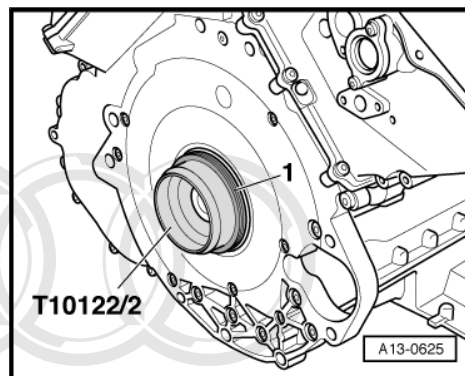


- Fit assembly aid -T10122/1- onto assembly sleeve -T10122/2- and slide oil seal -A- onto assembly sleeve.
- Detach assembly aid.



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.

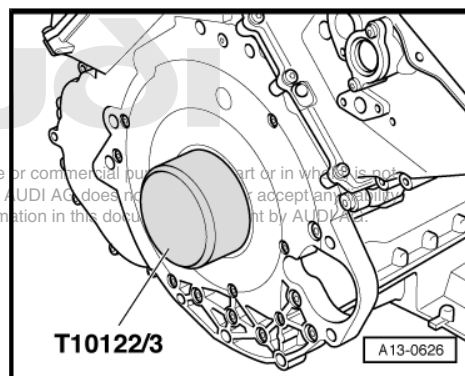
- Fit assembly sleeve -T10122/2- with oil seal -1- onto crankshaft.



- Press in oil seal uniformly until flush all round using press sleeve -T10122/3- .

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

- Install drive plate ⇒ [page 68](#) .



Protected by copyright. Copying for private or commercial purposes without the written consent of Audi AG is not permitted unless authorised by AUDI AG. AUDI AG does not accept any liability for errors or omissions with respect to the correctness of information in this document.

3 Crankshaft

Overview

- ◆ ⇒ [“3.1 Exploded view - crankshaft”, page 71](#)
- ◆ ⇒ [“3.2 Crankshaft dimensions”, page 74](#)
- ◆ ⇒ [“3.3 Measuring axial clearance of crankshaft”, page 74](#)
- ◆ ⇒ [“3.4 Measuring radial clearance of crankshaft”, page 75](#)



Note

When performing assembly work, secure engine to engine and gearbox support - VAS 6095- ⇒ [page 35](#).

3.1 Exploded view - crankshaft

1 - Sealing flange (pulley end)

- ☐ Renewing ⇒ [page 63](#)

2 - Bolt

- ☐ Tightening torque and sequence ⇒ [page 59](#)

3 - Crankshaft

- ☐ Measuring axial clearance ⇒ [page 74](#)
- ☐ Measuring radial clearance ⇒ [page 75](#)
- ☐ Crankshaft dimensions ⇒ [page 74](#)

4 - Dowel sleeve

- ☐ 4x
- ☐ Inserting in retaining frame ⇒ [page 73](#)

5 - Seal

- ☐ Renew

6 - Bolt

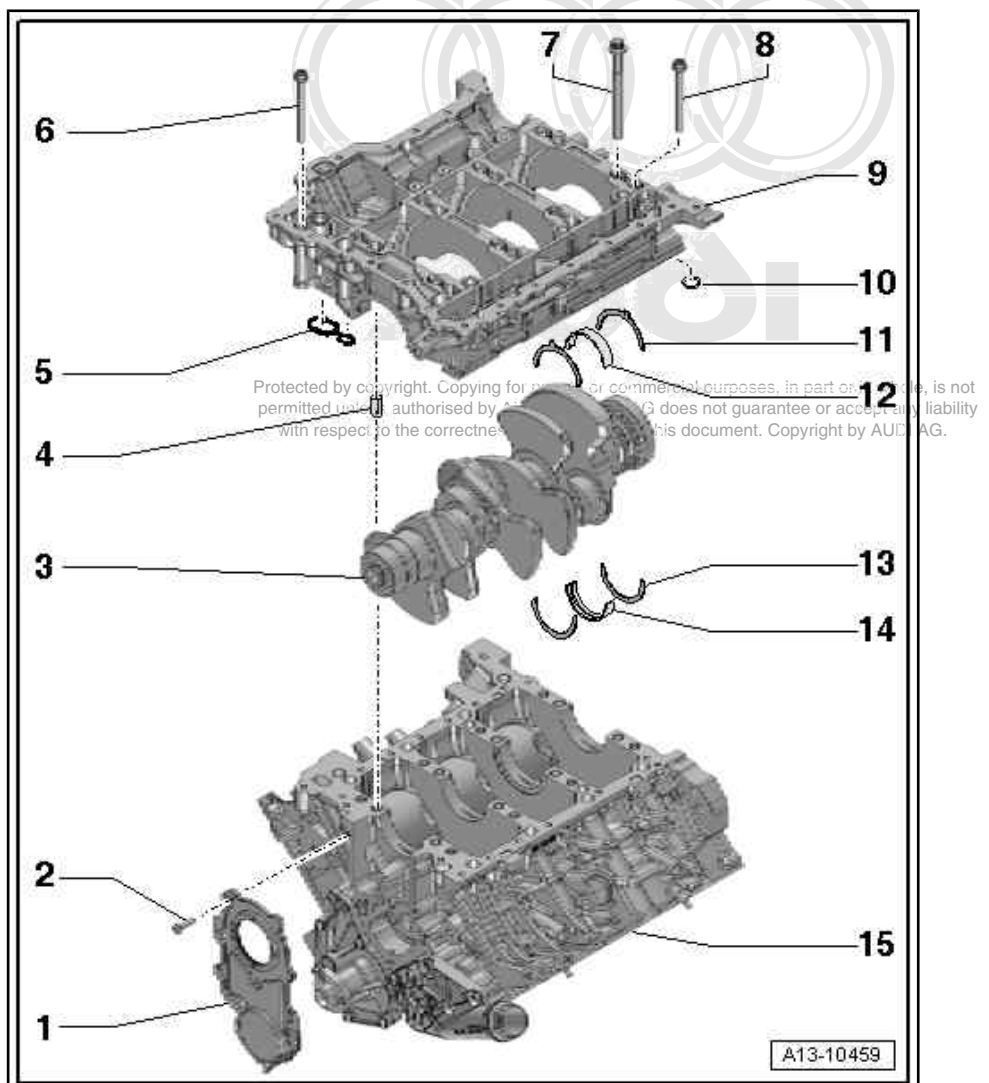
- ☐ For sealing surfaces: retaining frame to cylinder block
- ☐ Differing bolt lengths and bolt heads
- ☐ Tightening sequence ⇒ [page 73](#)

7 - Bolt (long, large collar)

- ☐ For retaining frame (inner row)
- ☐ Renew
- ☐ Use old bolts when measuring radial clearance
- ☐ Tightening sequence ⇒ [page 73](#)

8 - Bolt (short, small collar)

- ☐ For retaining frame (outer row)
- ☐ Renew



- ☐ Use old bolts when measuring radial clearance
- ☐ Tightening sequence ⇒ [page 73](#)

9 - Retaining frame

- ☐ With valve for oil pressure control - N428- ⇒ [page 152](#)
- ☐ To remove, detach guide rail ⇒ [Item 1 \(page 103\)](#) for drive chain for valve gear
- ☐ Applying sealant ⇒ [page 73](#)
- ☐ Removing and installing valve for oil pressure control - N428- ⇒ [page 167](#)

10 - Seal

- ☐ Renew

11 - Thrust washer

- ☐ Only fitted on 3rd crankshaft bearing
- ☐ Oil grooves face outwards
- ☐ Make sure it engages in retaining frame
- ☐ Measuring axial clearance of crankshaft ⇒ [page 74](#)

12 - Bearing shell

- ☐ For retaining frame (without oil groove)
- ☐ Renew used bearing shells
- ☐ Note installation position
- ☐ Install new bearing shells for retaining frame with correct coloured markings ⇒ [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.

13 - Thrust washer

- ☐ Only fitted on 3rd crankshaft bearing
- ☐ Oil grooves face outwards
- ☐ Make sure it engages in cylinder block
- ☐ Measuring axial clearance of crankshaft ⇒ [page 74](#)

14 - Bearing shell

- ☐ For cylinder block (with oil groove)
- ☐ Renew used bearing shells
- ☐ Note installation position
- ☐ Install new bearing shells for the cylinder block with the correct coloured markings ⇒ [page 73](#)

15 - Cylinder block

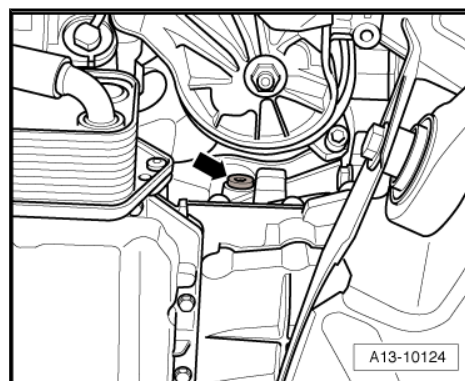
Plug for crankshaft "TDC" mark - tightening torque



Note

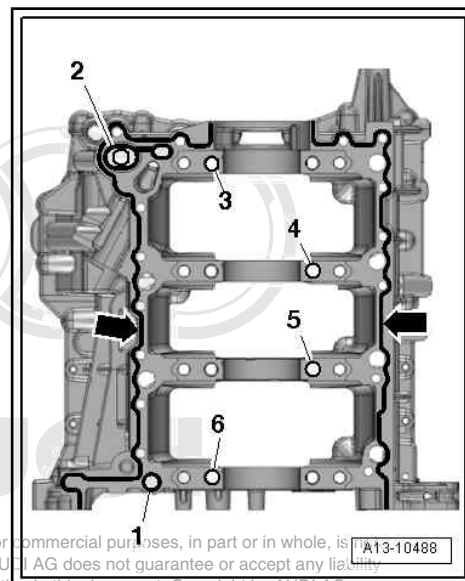
Renew seal.

- Tighten plug -arrow- to 14 Nm.



Applying sealant to retaining frame, position of dowel sleeves

- Clean sealing surfaces (top and bottom); they must be free of oil and grease.
- Apply beads of sealant -arrows- onto clean sealing surfaces of retaining frame as shown in illustration.
- The groove on the sealing surface must be completely filled with sealant.
- The beads of sealant must project 1.5 ... 2.0 mm above the sealing surface.
- Fit seals -1- and -2-.
- Check that dowel sleeves -3 ... 6- are inserted in retaining frame at positions shown in illustration.



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.

Installing retaining frame

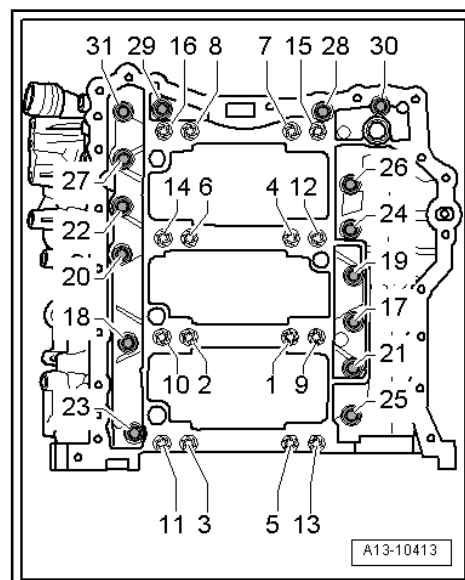


Note

Renew the bolts tightened with specified tightening angle.

- Install long bolts in inner row on retaining frame.
- Tighten bolts in 3 stages in the sequence shown:

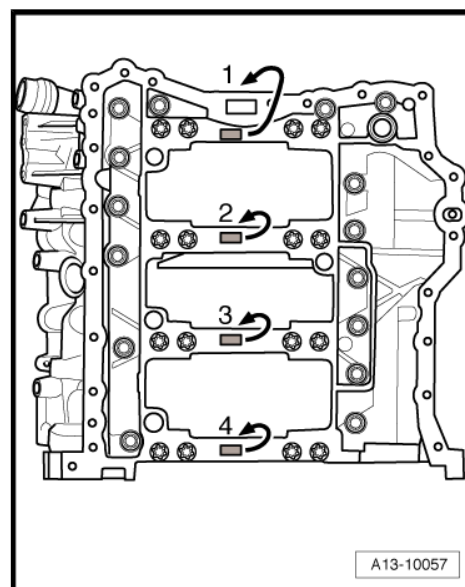
Stage	Bolts	Tightening torque/angle specification
1.	-1 ... 16-	50 Nm
2.	-1 ... 16-	Turn 90° further
3.	-17 ... 31-	23 Nm



Matching crankshaft bearing shells to bearings in 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.
- ◆ The allocation of the bearing shells to the bearing positions in the cylinder block is indicated by a code letter at the relevant bearing -item 1 ... 4- on the retaining frame.

Code letter on retaining frame	Colour coding of bearing
R =	Red
G =	Yellow
B =	Blue
S =	Black

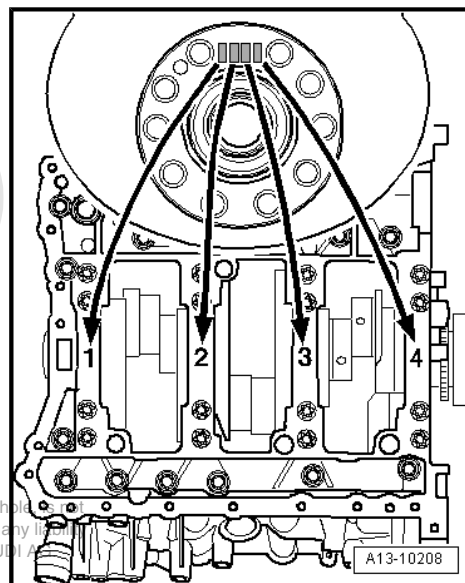


Matching crankshaft bearing shells to bearings in retaining frame

- ◆ Bearing shells of the correct thickness are matched to the bearings in the retaining frame at the factory. Coloured dots on the side of the bearing shells are used to identify the bearing shell thickness.
- ◆ The allocation of the bearing shells to the bearing positions in the retaining frame is indicated by a sequence of letters on the gearbox flange on 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
S =	Black

Protected by copyright. Copying for private or professional 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.



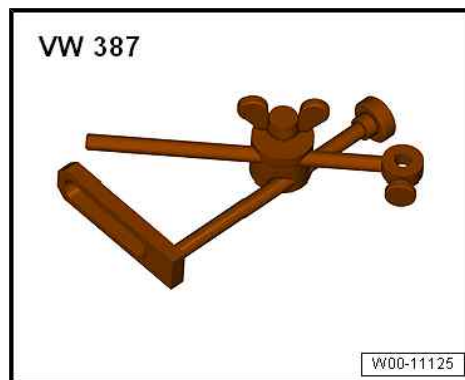
3.2 Crankshaft dimensions

Honing dimension	Crankshaft bearing journal Ø mm	Crankshaft conrod journal Ø mm
Basic dimension	65.00 – 0.022 – 0.042	56.00 – 0.022 – 0.042

3.3 Measuring axial clearance of crankshaft

Special tools and workshop equipment required

- ◆ Universal dial gauge bracket - VW 387-

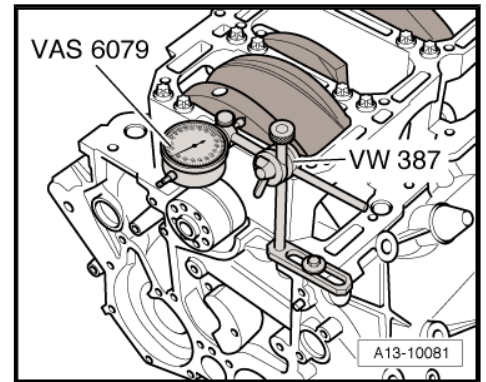


- ◆ Dial gauge - VAS 6079-



Procedure

- Bolt dial gauge - VAS 6079- with universal dial gauge bracket - VW 387- onto cylinder block and set it against crank web.
- Press crankshaft against dial gauge by hand.
- Set dial gauge to “0”.
- Push crankshaft away from dial gauge and read off value.
- Axial clearance: 0.15 ... 0.25 mm



3.4 Measuring radial clearance of crankshaft

Special tools and workshop equipment required

- ◆ Plastigage

Procedure

- Remove retaining frame and clean bearing journals.
- Place a length of Plastigage corresponding to the width of the bearing on the bearing journal or bearing shell.
- The Plastigage must be positioned in the centre of the bearing shell.
- Fit retaining frame and secure with old bolts ⇒ [page 73](#) without rotating crankshaft.
- Remove retaining frame again.
- Compare width of Plastigage with measurement scale.

Radial clearance:

- New: 0.015 ... 0.055 mm.
- Wear limit: 0.08 mm.
- When carrying out final assembly, use new bolts.

4 Pistons and conrods

Overview

- ◆ ⇒ [“4.1 Exploded view - pistons and conrods”, page 76](#)
- ◆ ⇒ [“4.2 Piston and cylinder dimensions”, page 79](#)
- ◆ ⇒ [“4.3 Measuring radial clearance of conrods”, page 79](#)



Note

- ◆ *All bearing and running surfaces must be oiled before assembling.*
- ◆ *Oil spray jet for piston cooling ⇒ [page 79](#).*

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.

4.1 Exploded view - pistons and conrods

1 - Bolts

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

2 - Conrod bearing cap

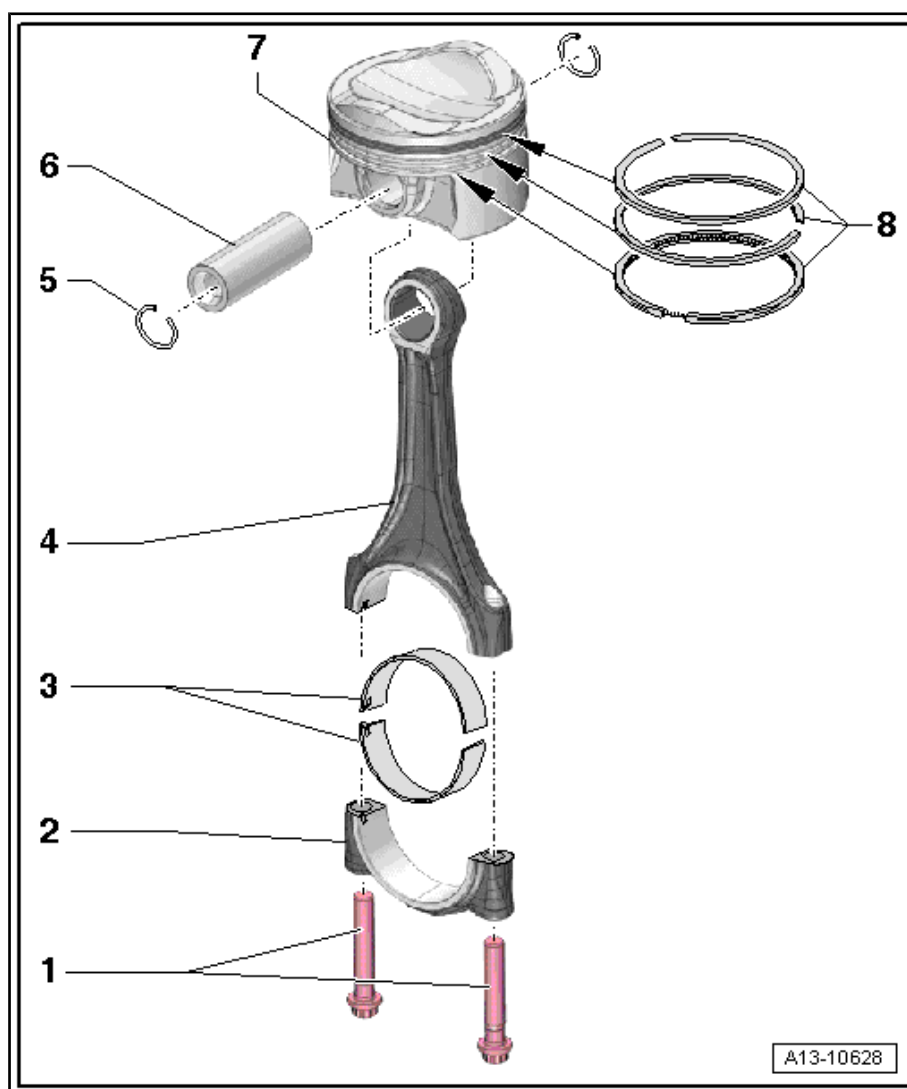
- ☐ Mark installation position for re-installation
- ☐ Mark cylinder allocation in colour ⇒ [page 78](#)
- ☐ Installation position of conrod pairs ⇒ [page 79](#)

3 - Bearing shells

- ☐ Ensure that retaining lugs are securely seated.
- ☐ Renew used bearing shells
- ☐ Measuring radial clearance ⇒ [page 79](#)
- ☐ There are oversized bearings available for machined crankshaft conrod journals ⇒ Electronic parts catalogue
- ☐ Lugs on conrod bearings must be on the same side

4 - Conrod

- ☐ Only renew as a complete set
- ☐ Mark cylinder allocation in colour ⇒ [page 78](#)
- ☐ Installation position of conrod pairs ⇒ [page 79](#)
- ☐ Axial clearance for each conrod pair (when new): 0.20 ... 0.45 mm



A13-10628

- ☐ Measuring radial clearance ➔ [page 79](#)

5 - Circlip

- ☐ Renew

6 - Piston pin

- ☐ If difficult to move, heat piston to approx. 60 °C
- ☐ Remove and install using drift - VW 222 A-

7 - Piston

- ☐ Mark installation position and cylinder number ➔ [page 78](#)
- ☐ Checking ➔ [page 78](#)
- ☐ Install using piston ring clamp
- ☐ Piston and cylinder dimensions ➔ [page 79](#)
- ☐ Measuring cylinder bore ➔ [page 78](#)

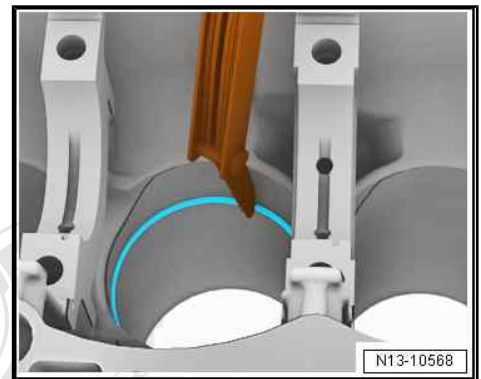
8 - Piston rings

- ☐ Offset gaps by 120°
- ☐ Use piston ring pliers to remove and install
- ☐ Installation position: marking "TOP" or side with lettering faces towards piston crown
- ☐ Measuring ring gap ➔ [page 77](#)
- ☐ Measuring ring-to-groove clearance ➔ [page 77](#)

Checking 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.

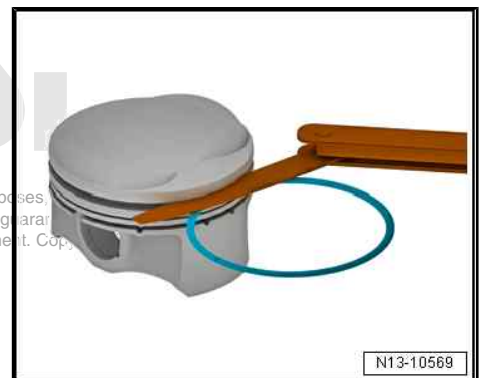
Piston ring	new mm	Wear limit mm
1st compression ring	0.20 ... 0.30	0.80
2nd compression ring	0.50 ... 0.70	0.80
Oil scraper ring	0.25 ... 0.50	– 1)
• 1) Specification not yet available.		



Checking ring-to-groove clearance

- Clean groove in piston before checking clearance.

Piston ring	new mm	Wear limit mm
1st compression ring	0.04 ... 0.08	0.20
2nd compression ring	0.03 ... 0.07	0.20
Oil scraper ring	0.02 ... 0.06	0.15

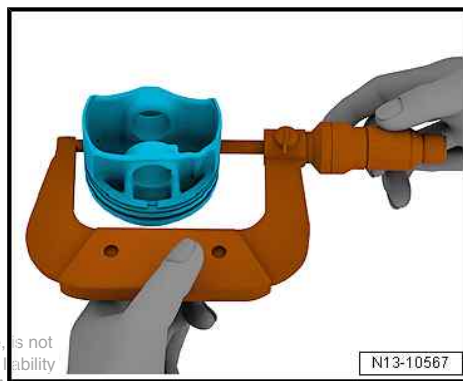


Checking piston

- Using a micrometer (75 ... 100 mm), measure approx. 10 mm from the lower edge, at 90° to the piston pin axis.
- Maximum deviation from nominal dimension: 0.03 mm.

Nominal dimension

⇒ ["4.2 Piston and cylinder dimensions", page 79](#) .



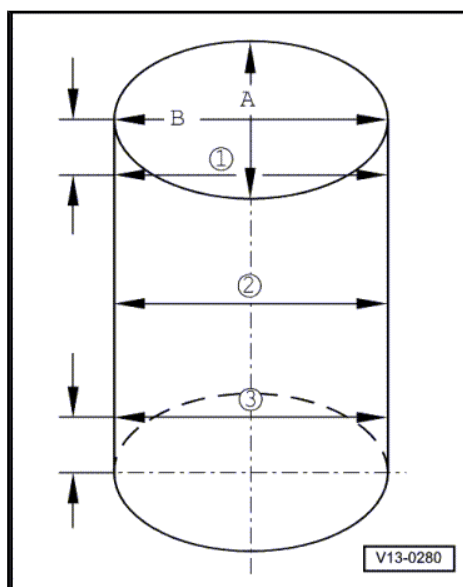
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Measuring cylinder bore

- Use a cylinder gauge - VAS 6078- to take measurements at 3 points in transverse direction -A- and in longitudinal direction -B-.
- Maximum deviation from nominal dimension: 0.08 mm.

Nominal dimension

⇒ ["4.2 Piston and cylinder dimensions", page 79](#) .



Installation position of pistons

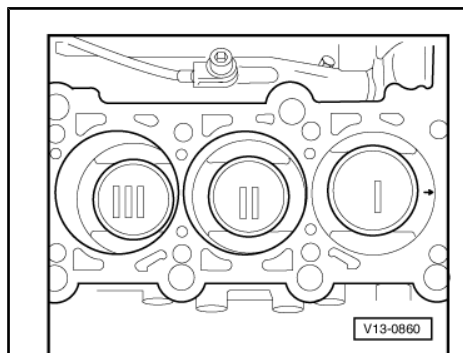


Caution

Do not damage the coating of the piston crown.

- ◆ Use a coloured pen to mark piston/cylinder allocation on piston crown for re-installation. Do not mark piston crown by means of centre punch, notch or the like.

- Installation position: Arrow on piston crown points to pulley end.



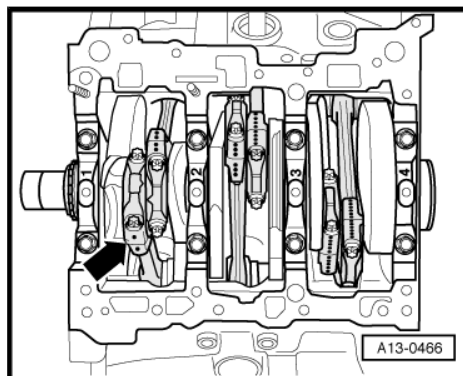
Marking conrods



Note

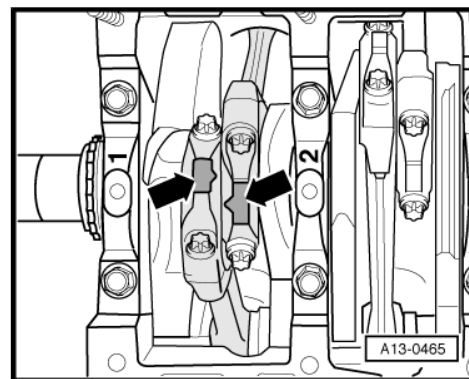
Only renew conrods as a complete set.

- Use a coloured pen to mark matching conrods and conrod bearing caps with cylinder numbers -arrow- for re-installation.



Conrod installation position

- The cast lugs -arrows- on the ground surfaces of the conrod pairs "1 and 2", "3 and 4", and "5 and 6" must face each other.



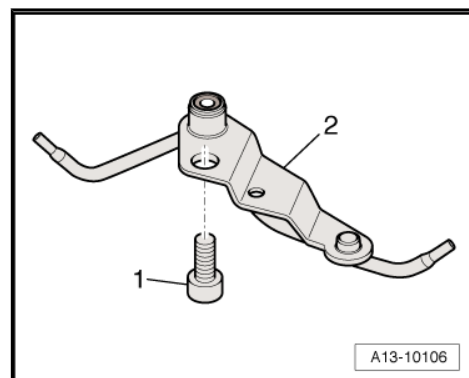
Oil spray jet for piston cooling

- 1 - Apply locking fluid to bolt when installing; for locking fluid refer to ⇒ Electronic parts catalogue . Tighten to 9 Nm.
- 2 - Oil spray jet with spray nozzle valve



Note

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



4.2 Piston and cylinder dimensions

Honing dimension	Piston Ø mm	Cylinder bore Ø mm
Basic dimension	84.49	84.51

4.3 Measuring radial clearance of conrods

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

Special tools and workshop equipment required

- ◆ Plastigage

Procedure

- Remove conrod bearing cap.
- Clean bearing cap and bearing journal.
- Place a length of Plastigage corresponding to the width of the bearing on the bearing journal or bearing shell.
- Fit conrod bearing cap and tighten with old bolts
⇒ [Item 1 \(page 76\)](#) . Do not rotate crankshaft.
- Remove conrod bearing cap again.
- Compare width of Plastigage with measurement scale.

Radial clearance:

- New: 0.010 ... 0.052 mm.
- Wear limit: 0.12 mm.
- Renew conrod bolts.

15 – Cylinder head, valve gear

1 Chain drive

Overview

- ◆ ⇒ [“1.1 Exploded view - timing chain covers”, page 80](#)
- ◆ ⇒ [“1.2 Removing and installing timing chain covers \(left and right\)”, page 82](#)
- ◆ ⇒ [“1.3 Removing and installing timing chain cover \(bottom\)”, page 85](#)
- ◆ ⇒ [“1.4 Exploded view - camshaft timing chains”, page 89](#)
- ◆ ⇒ [“1.5 Removing timing chains from camshafts”, page 92](#)
- ◆ ⇒ [“1.6 Removing and installing camshaft timing chains”, page 101](#)
- ◆ ⇒ [“1.7 Exploded view - drive chain for valve gear”, page 103](#)
- ◆ ⇒ [“1.8 Removing and installing drive chain for valve gear”, page 104](#)
- ◆ ⇒ [“1.9 Exploded view - drive chain for auxiliary drives”, page 105](#)
- ◆ ⇒ [“1.10 Removing and installing drive chain for auxiliary drives”, page 106](#)
- ◆ ⇒ [“1.11 Exploded view - balance shaft”, page 109](#)
- ◆ ⇒ [“1.12 Removing and installing balance shaft”, page 110](#)

1.1 Exploded view - timing chain covers

This document is copyrighted by Audi AG. It is not permitted to reproduce, copy, or use 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

- ☐ Tightening torque and sequence ⇒ [page 82](#)

2 - Crankshaft oil seal (gearbox end)

- ☐ Renewing ⇒ [page 68](#)

3 - Dowel sleeve

- ☐ 2x

4 - Timing chain cover (bottom)

- ☐ Removing and installing ⇒ [page 85](#)

5 - Centre hex stud

- ☐ Tightening torque and sequence ⇒ [page 82](#)

6 - Cylinder head gasket (left-side)
7 - Bracket

- ☐ For electrical wiring harness

8 - Bolt

- ☐ Renew
- ☐ Tightening torque and sequence ⇒ [page 82](#)

9 - Timing chain cover (left-side)

- ☐ Removing and installing ⇒ [page 82](#)

10 - Seal

- ☐ Renew

11 - Seal

- ☐ Renew

12 - Bracket

- ☐ For electrical wiring harness

13 - Bolt

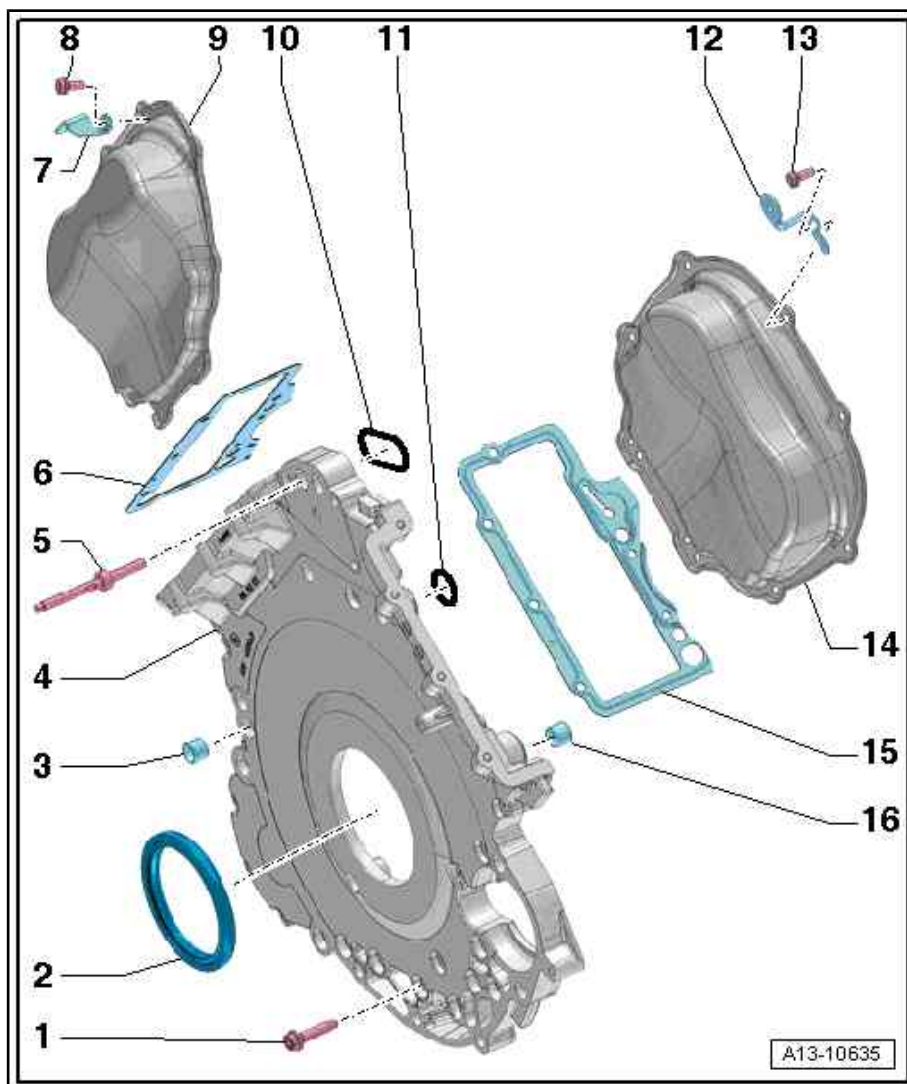
- ☐ Renew
- ☐ Tightening torque and sequence ⇒ [page 82](#)

14 - Timing chain cover (right-side)

- ☐ Removing and installing ⇒ [page 82](#)

15 - Cylinder head gasket (right-side)
16 - Dowel sleeve

- ☐ 2x



Timing chain cover (left-side) - tightening torque and sequence

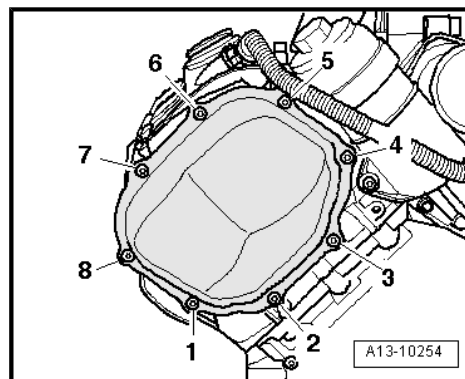


Note

Renew the bolts tightened with specified tightening angle.

- Tighten bolts in 2 stages in the sequence shown:

Stage	Bolts	Tightening torque/angle specification
1.	-1 ... 8-	5 Nm
2.	-1 ... 8-	Turn 90° further



Timing chain cover (right-side) - tightening torque and sequence

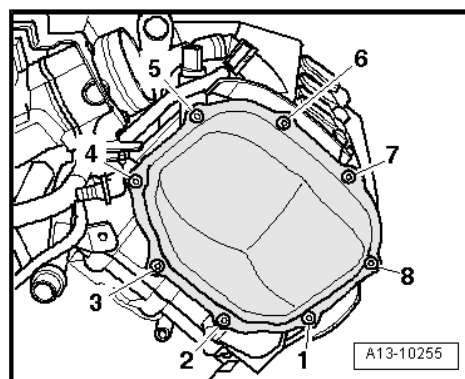


Note

Renew the bolts tightened with specified tightening angle.

- Tighten bolts in 2 stages in the sequence shown:

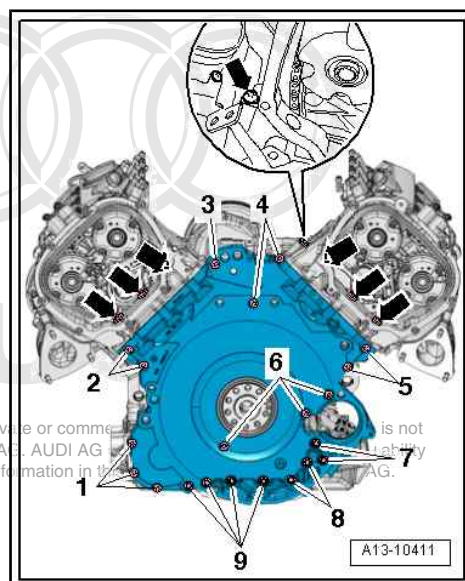
Stage	Bolts	Tightening torque/angle specification
1.	-1 ... 8-	5 Nm
2.	-1 ... 8-	Turn 90° further



Timing chain cover (bottom) - tightening torque and sequence

- Tighten bolts in 5 stages as follows:

Stage	Bolts	Tightening torque
1.	-arrows-	5 Nm
2.	-1 ... 9-	9 Nm in diagonal sequence
3.	-arrows-	9 Nm
4.	-7, 8, 9-	20 Nm
5.	-3-	16 Nm



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 manual.

1.2 Removing and installing timing chain covers (left and right)

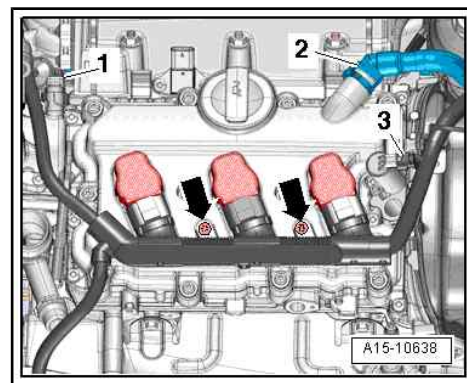
Special tools and workshop equipment required

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

Removing

Timing chain cover (left-side):

- Remove combination valve for secondary air (left-side)
⇒ [page 263](#) .
- Unplug electrical connector -3-.
- Remove bolts -arrows-.
- Unplug electrical connectors at ignition coils on cylinder head (left-side).



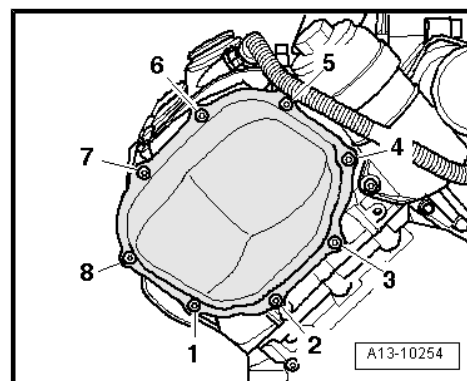
Note

Disregard -items 1, 2-.

- Move electrical wiring clear.
- Remove bolts -1 ... 8-.
- Carefully release timing chain cover (left-side) from bonded joint.

Timing chain cover (right-side):

- Remove combination valve for secondary air (right-side)
⇒ [page 264](#) .
- Move electrical wiring clear.

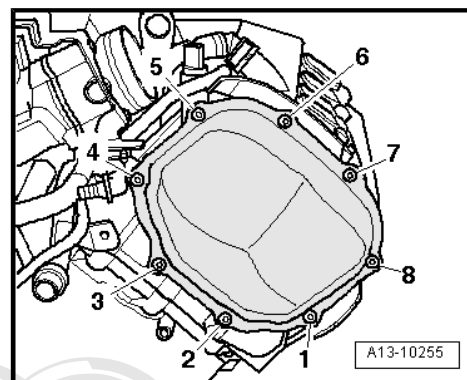


- Remove bolts -1 ... 8-.
- Carefully release timing chain cover (right-side) from bonded joint.

Installing

Tightening torques

- ⇒ Fig. “Timing chain cover (left-side) - tightening torque and sequence” , page 82 .
- ⇒ Fig. “Timing chain cover (right-side) - tightening torque and sequence” , page 82 .



Note

Fit all cable ties in the original positions when installing.



WARNING

Risk of eye injury.

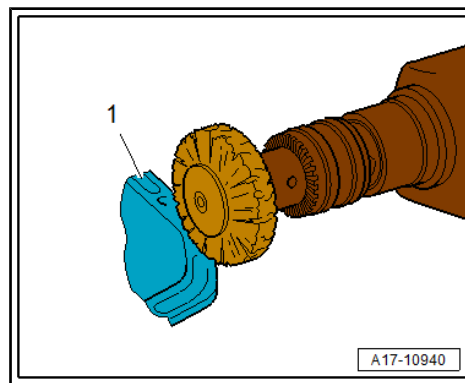
- ◆ *Wear safety goggles.*



Caution

Protect lubrication system against contamination.

- ◆ *Cover exposed parts of the engine.*



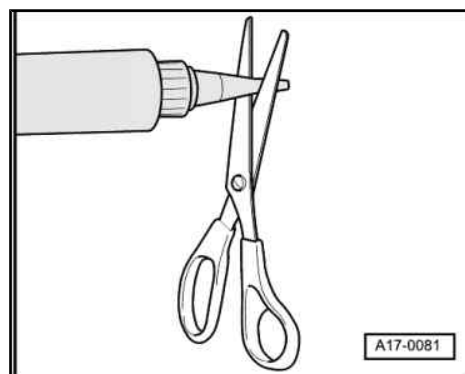
- Remove remaining sealant on timing chain cover, cylinder block and cylinder head using rotating plastic brush or similar.
- Clean sealing surfaces; they must be free of oil and grease.



Note

Note the use-by date of the sealant.

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

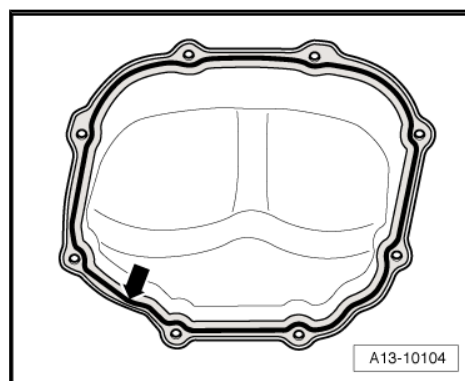


Caution

Make sure lubrication system is not clogged by excess sealant.

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

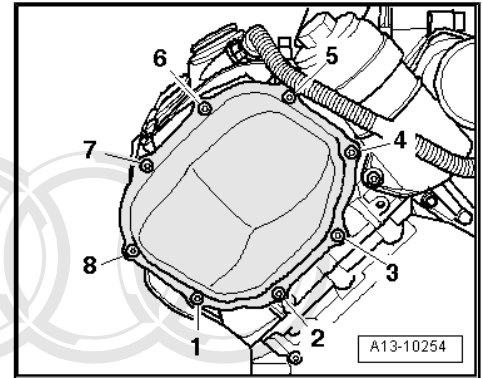
- Apply sealant bead -arrow- onto the clean sealing surface of the timing chain cover (left-side) as illustrated.
- Width of sealant bead: 2.5 mm.



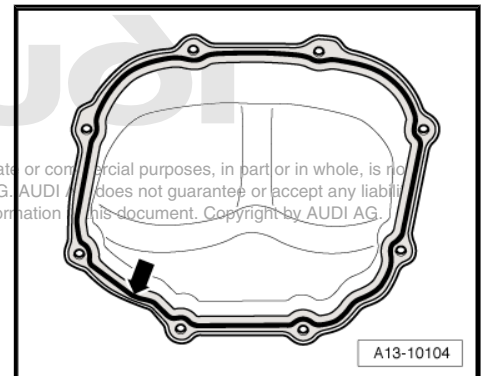
Note

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

- Install timing chain cover (left-side) and tighten bolts
⇒ [page 82](#) .



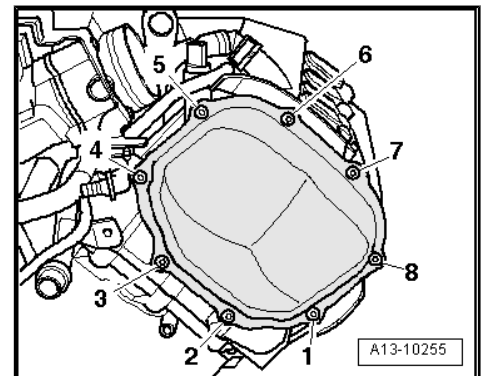
- Apply sealant bead -arrow- onto the clean sealing surface of the timing chain cover (right-side) as illustrated.
- Width of sealant bead: 2.5 mm.



- Install timing chain cover (right-side) and tighten bolts
⇒ [page 82](#) .

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

- Install combination valve for secondary air system: left-side
⇒ [page 263](#) , right-side ⇒ [page 264](#) .



1.3 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
- Engine oil drained ⇒ Maintenance ; Booklet 405



WARNING

Injury risk.

- ◆ *The lock carrier must be installed and the torque reaction support must be secured.*

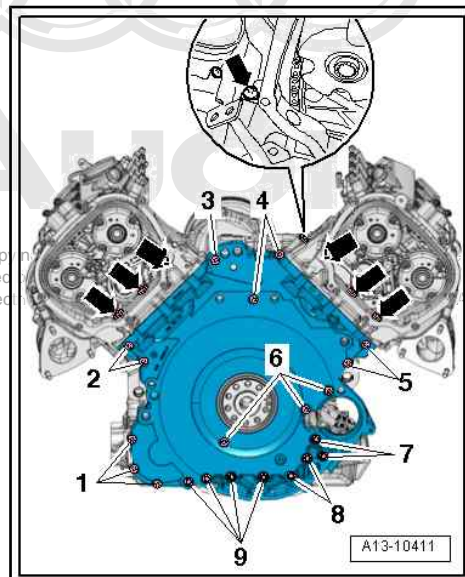
- Remove coolant pipe (top) ⇒ [page 203](#) .
- Remove drive plate ⇒ [page 68](#) .
- Remove timing chain covers (left and right) ⇒ [page 82](#) .
- Remove oil filter housing ⇒ [page 162](#) .
- Remove bolts -arrows-.
- Remove bolts -1, 2- and -4 ... 9-.
- Carefully release timing chain cover (bottom) from bonded joint.
- Press crankshaft oil seal (gearbox end) out of timing chain cover (bottom).



Note

Disregard -item 3-.

Protected by copyright. Copying is not permitted unless authorised by Audi AG with respect to the correct use.



Installing



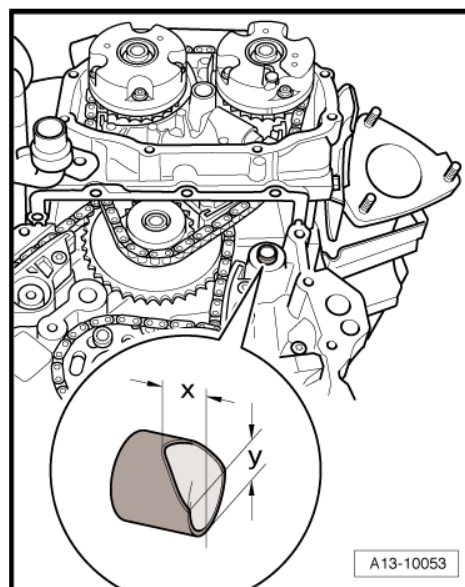
Note

- ◆ Renew gaskets, seals and O-rings.
- ◆ Fit all cable ties in the original positions when installing.
- Pull dowel sleeve at top right out of cylinder block.
- Bevel the dowel sleeve with a file, as illustrated.
- Dimension -x- = 6.5 mm.
- Dimension -y- = 8 mm.
- Fit dowel sleeve on cylinder block in such a way that the bevelled side points upwards.



Note

Bevelling the dowel sleeve makes it easier to fit the timing chain cover (bottom) with the cylinder head installed.

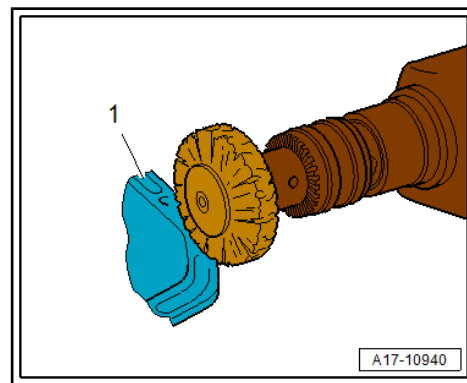


**WARNING***Risk of eye injury.*

- ◆ *Wear safety goggles.*

**Caution***Protect lubrication system against contamination.*

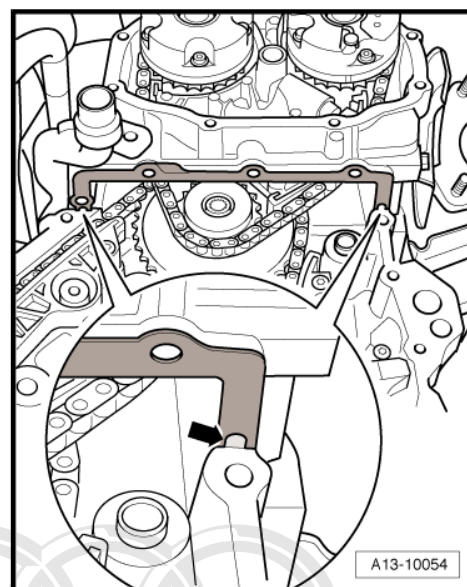
- ◆ *Cover exposed parts of the engine.*



- Remove remaining sealant on timing chain cover, cylinder block and cylinder head 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 gaskets.

**Note**

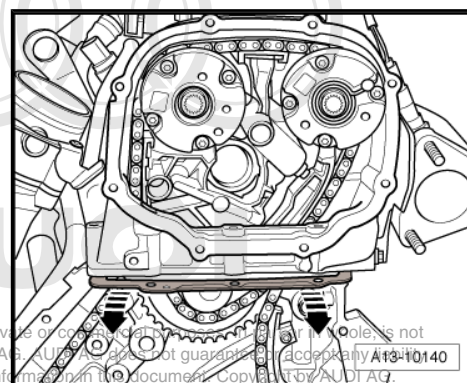
With the cylinder head installed the holes in the cylinder head gasket are only half visible.

**Caution***Avoid damage to cylinder head gasket.*

- ◆ *Only bend the ends of the cylinder head gaskets slightly and do not kink.*

**Note**

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



- Carefully bend the ends of the cylinder head gaskets 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 gaskets (top and bottom); they must be free of oil and grease.

Protected by copyright. Copying for private or confidential use is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee the correctness of information in this document. Copyright © AUDI AG.



Note

Note the use-by date of the sealant.

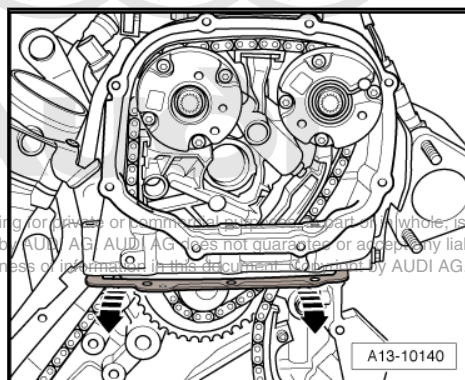
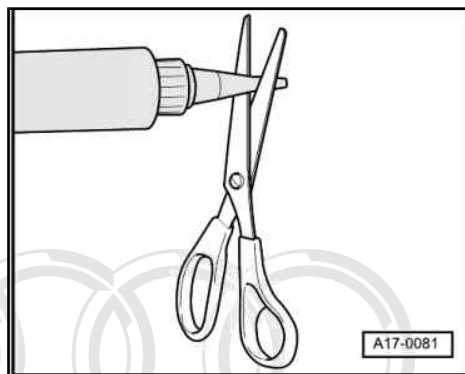
- Cut off nozzle of tube at front marking (nozzle Ø approx. 2 mm).



Note

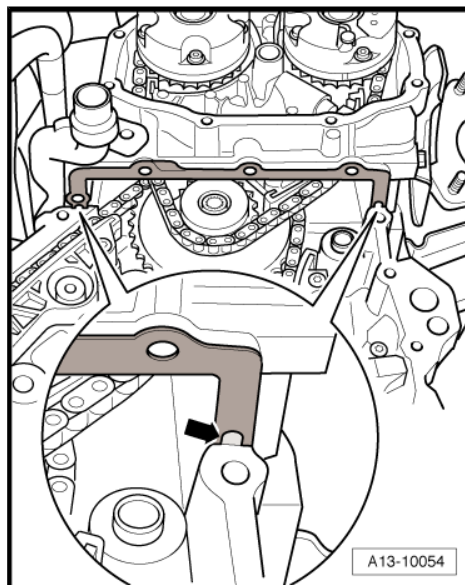
The sealant must be applied at several points on the engine as described below.

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



Protected by copyright. Copying or reproducing or communicating to the public in any form (whole, in part or in extracts) is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness or completeness of the information contained in this document. Copyright © 2015 AUDI AG.

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



**Caution**

Make sure lubrication system is not clogged by excess sealant.

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

- Apply sealant beads -1 ... 4- onto the clean sealing surfaces of the timing chain cover (bottom) as illustrated.
- The groove on the sealing surface must be completely filled with sealant.
- The beads of sealant must project 1.5 ... 2.0 mm above the sealing surface.
- The sealant -2- must be applied in a continuous bead as shown in the illustration (although the groove is not continuous).

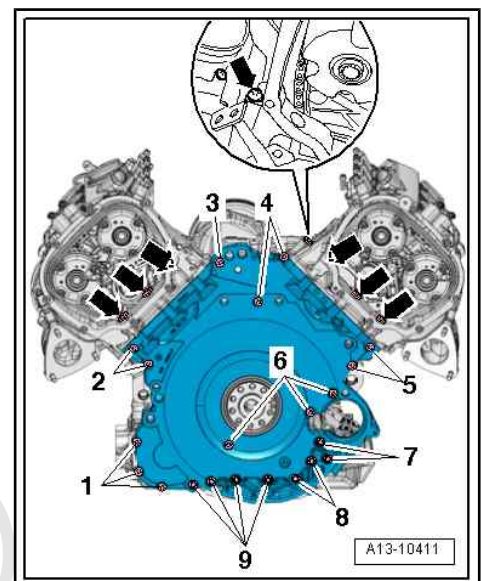
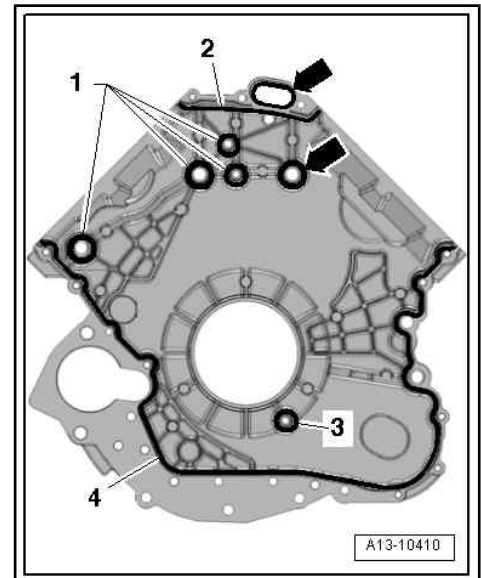
**Note**

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

- Insert seals -arrows- in grooves on timing chain cover (bottom).
- 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 gaskets when fitting the cover.
- Tighten bolts for timing chain cover (bottom) ⇒ [page 82](#) .

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

- Install oil filter housing ⇒ [page 162](#) .
- Install timing chain covers (left and right) ⇒ [page 82](#) .
- Install crankshaft oil seal (gearbox end) ⇒ [page 68](#) .
- Install drive plate ⇒ [page 68](#) .
- Install coolant pipe (top) ⇒ [page 203](#) .
- Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 405 .



1.4 Exploded view - camshaft timing chains

Camshaft timing chain (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.

1 - Bolt

- ☐ Renew
- ☐ 80 Nm + turn 90° further

2 - Bolt

- ☐ Renew
- ☐ 80 Nm + turn 90° further

3 - Camshaft chain sprocket for exhaust camshaft

- ☐ Removing and installing
⇒ ["1.5 Removing timing chains from camshafts", page 92](#)

4 - Camshaft adjuster for inlet camshaft

- ☐ Identification "Intake"
- ☐ Removing and installing
⇒ ["1.5 Removing timing chains from camshafts", page 92](#)

5 - Camshaft timing chain (left-side)

- ☐ Removing from camshafts ⇒ [page 92](#)
- ☐ Removing and installing
⇒ [page 101](#)

6 - Bolt

- ☐ 9 Nm

7 - Slide
8 - Chain tensioner for camshaft timing chain (left-side)

- ☐ Removing and installing
⇒ ["1.5 Removing timing chains from camshafts", page 92](#)

9 - Bearing plate for drive sprocket
10 - Bolt

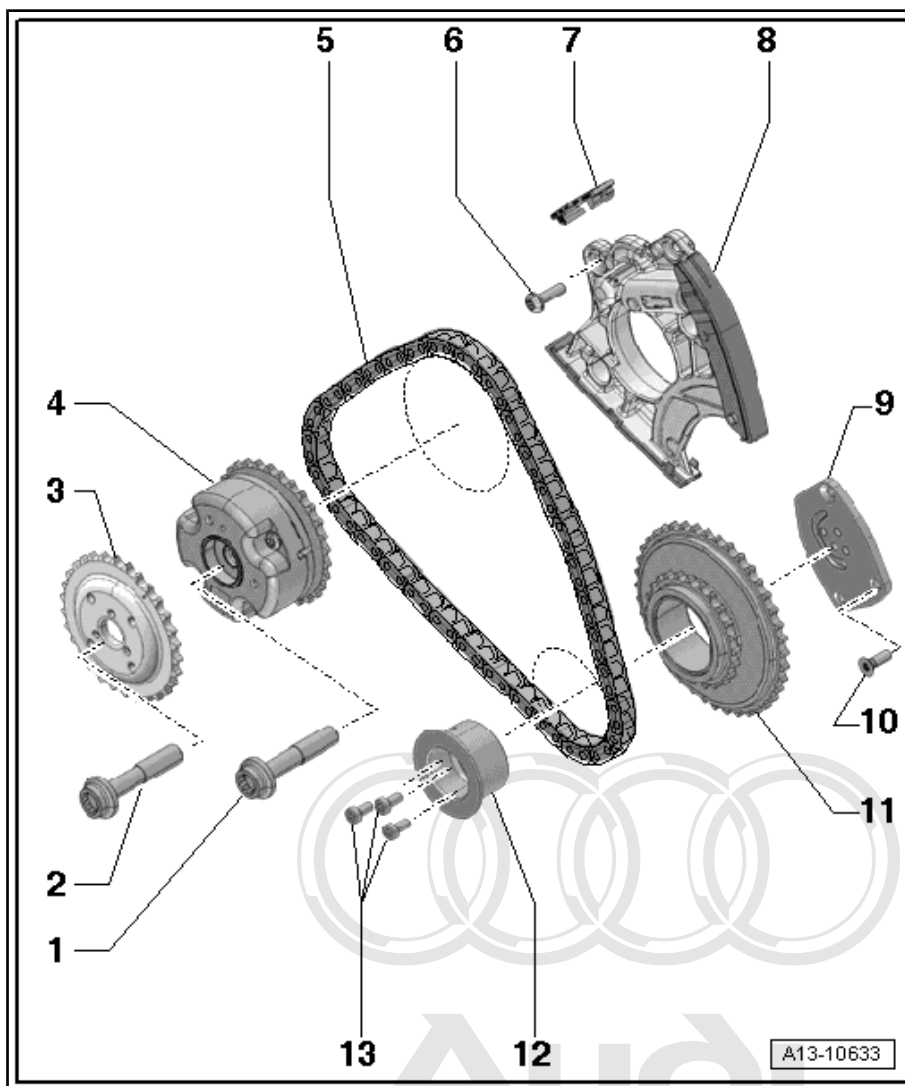
- ☐ Renew
- ☐ 8 Nm + turn 45° further

11 - Drive sprocket for camshaft timing chain (left-side)
12 - Bearing mounting for drive sprocket

- ☐ For camshaft timing chain (left-side)

13 - Bolts

- ☐ Renew
- ☐ 5 Nm + turn 60° further

Camshaft timing chain (right-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 - Bolt

- ☐ Renew
- ☐ 80 Nm + turn 90° further

2 - Camshaft chain sprocket for exhaust camshaft

- ☐ Removing and installing
⇒ ["1.5 Removing timing chains from camshafts", page 92](#)

3 - Bolt

- ☐ Renew
- ☐ 80 Nm + turn 90° further

4 - Camshaft adjuster for inlet camshaft

- ☐ Identification "Intake"
- ☐ Removing and installing
⇒ ["1.5 Removing timing chains from camshafts", page 92](#)

5 - Bolt

- ☐ 30 Nm + turn 90° further

6 - Bearing mounting for drive sprocket

- ☐ For camshaft timing chain (right-side)
- ☐ Asymmetric version
- ☐ Installation position
⇒ [page 104](#)

7 - Drive sprocket for camshaft timing chain (right-side)

- ☐ Installation position
⇒ [page 104](#)

8 - Camshaft timing chain (right-side)

- ☐ Removing from camshafts ⇒ [page 92](#)
- ☐ Removing and installing ⇒ [page 101](#)

9 - Thrust washer for drive sprocket

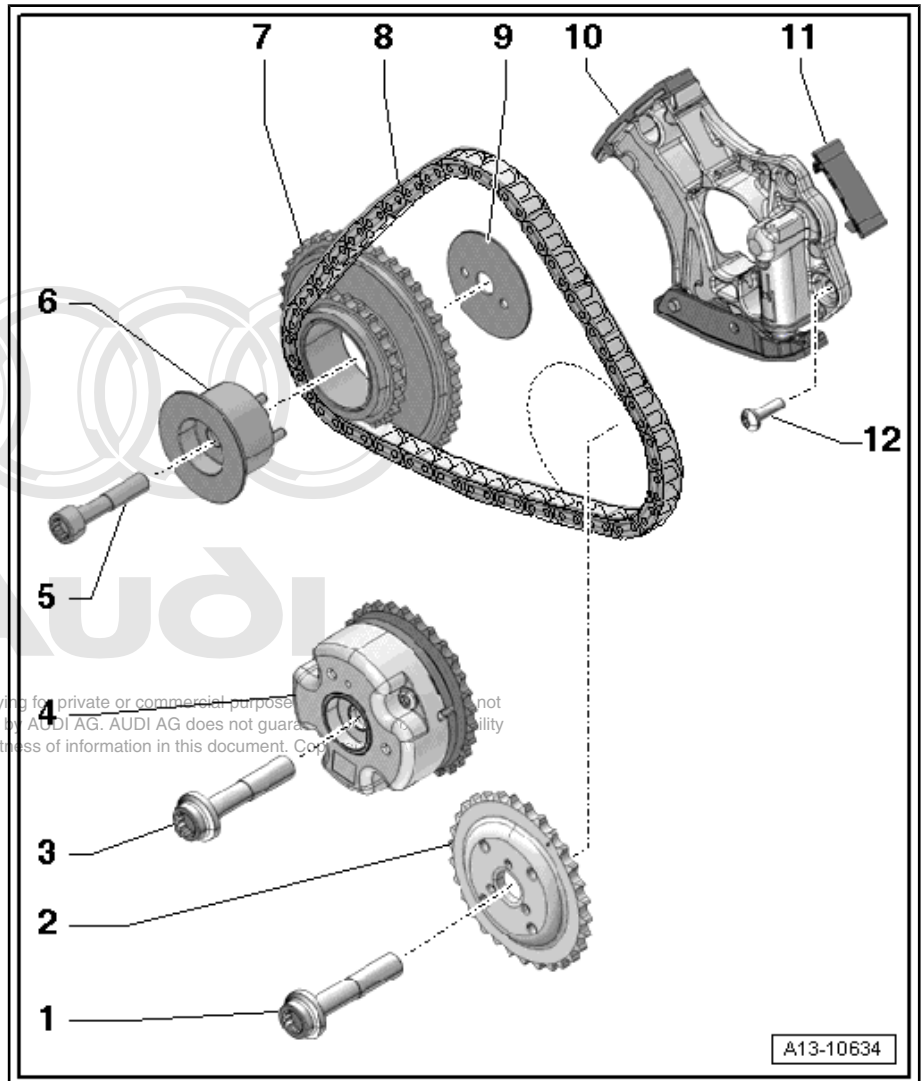
- ☐ For camshaft timing chain (right-side)
- ☐ Asymmetric version
- ☐ Installation position ⇒ [page 104](#)

10 - Chain tensioner for camshaft timing chain (right-side)

- ☐ Removing and installing ⇒ ["1.5 Removing timing chains from camshafts", page 92](#)

11 - Slide**12 - Bolt**

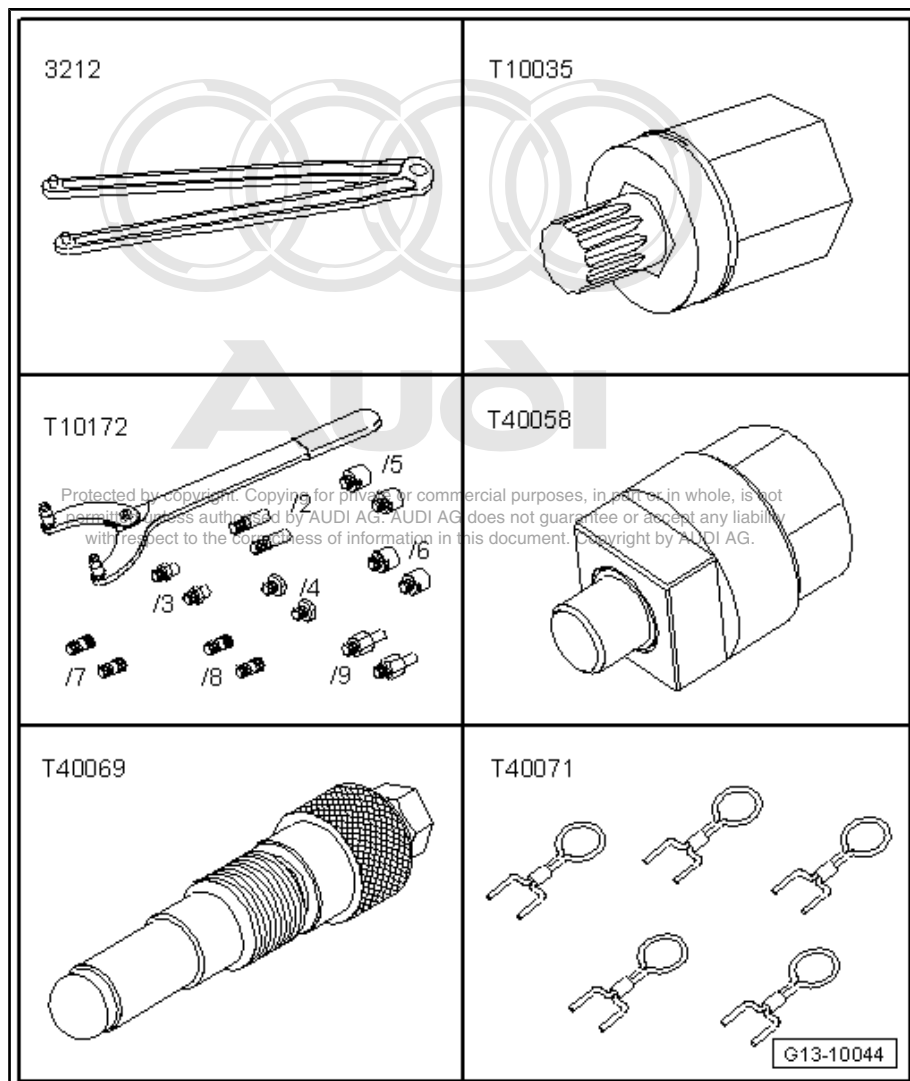
- ☐ 9 Nm



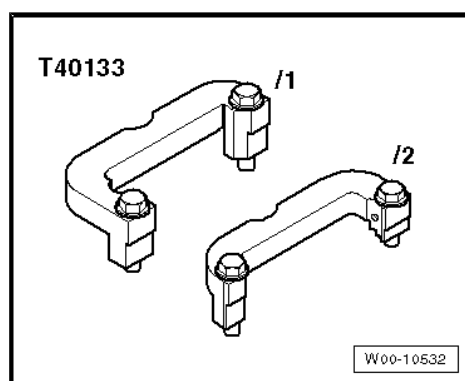
1.5 Removing timing chains from camshafts

Special tools and workshop equipment required

- ◆ Pin wrench - 3212-
- ◆ Special wrench - T10035-
- ◆ Counterhold tool - T10172- with -T10172/2-
- ◆ Adapter - T40058-
- ◆ Locking pin - T40069-
- ◆ 2x Locking pin - T40071-



- ◆ 2x Camshaft clamp - T40133-



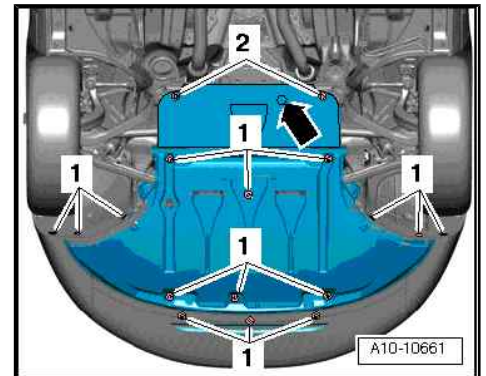
Removing

**WARNING***Risk of injury as the radiator fans may start up automatically.*

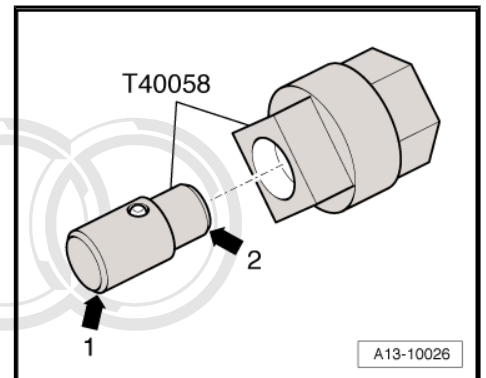
- ◆ *Even when the ignition is switched off, the radiator fans can start up without warning due to accumulated heat in the engine compartment, etc.*

**Note***In the following procedure the camshaft timing chains remain on the engine.*

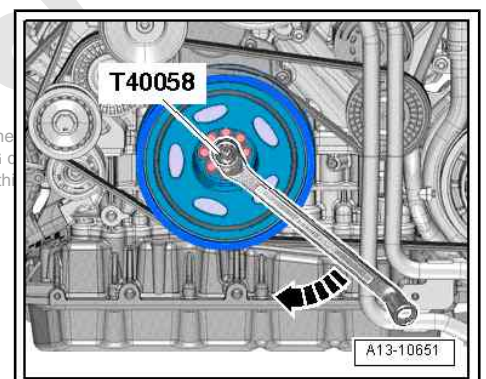
- Remove timing chain covers (left and right) ⇒ [page 82](#) .
- Remove cylinder head covers: left-side ⇒ [page 116](#) ; right-side ⇒ [page 117](#) .
- Release fasteners -1- and remove front noise insulation panel.



- Insert guide pin of adapter -T40058- as follows:
 - The larger-diameter section -arrow 1- faces towards the engine.
 - The smaller-diameter section -arrow 2- faces the adapter.

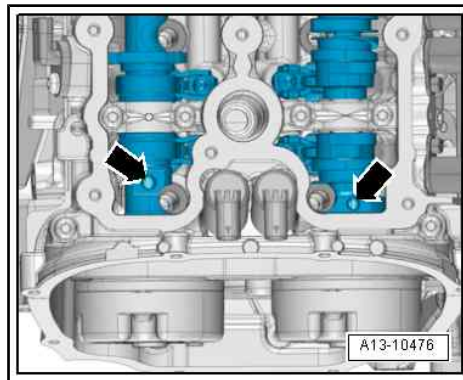


- Turn crankshaft with adapter - T40058- in normal direction of rotation -arrow- to "TDC position".



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

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

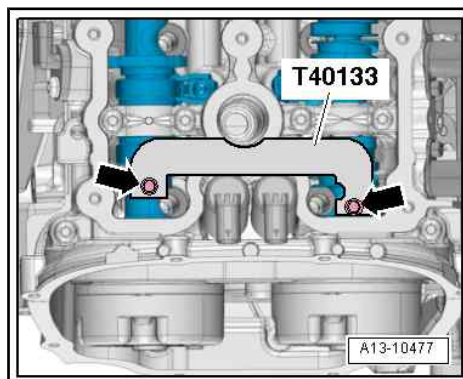


- Fit camshaft clamps - T40133- onto both cylinder heads and tighten bolts -arrows- to 25 Nm.

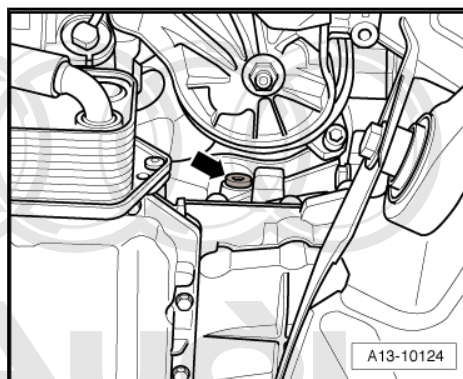


Note

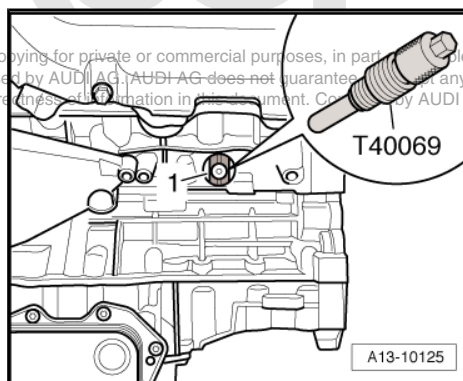
The illustration shows the left-side cylinder head.



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



- Screw locking pin - T40069- into hole (20 Nm); if necessary, turn crankshaft -1- backwards and forwards slightly to fully centralise locking pin.

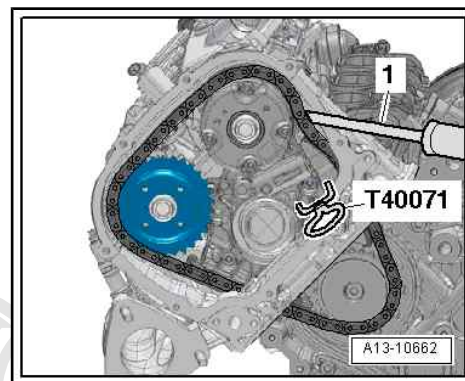


Copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee any liability with respect to the correctness of the information in this document. Copyright by AUDI AG.

- Press guide rail of chain tensioner for camshaft timing chain (left-side) inwards as far as the stop using a screwdriver -1-. Then lock chain tensioner by inserting locking pin - T40071- .

**Note**

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

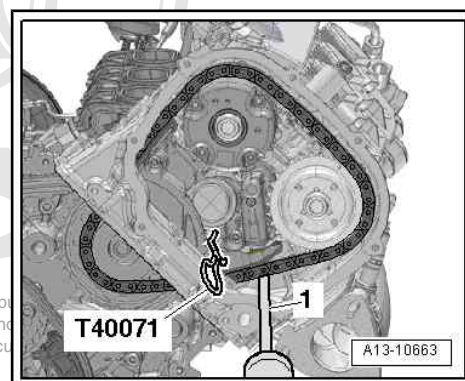


- Press guide rail of chain tensioner for camshaft timing chain (right-side) inwards as far as the stop using a screwdriver -1-. Then lock chain tensioner by inserting locking pin - T40071- .

**Note**

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

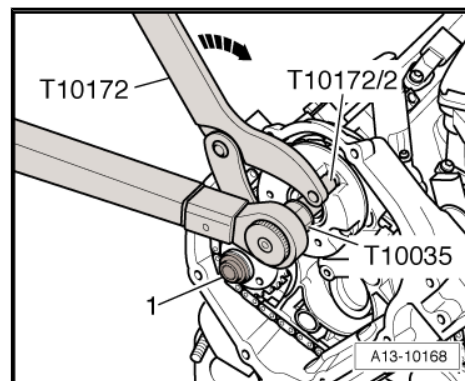
Protected by copyright. Copying for private or commercial purposes is not permitted unless authorised by AUDI AG. AUDI AG does not accept any liability with respect to the correctness of information in this document.

**Caution**

Avoid damage to camshaft.

- ◆ **Do NOT use camshaft clamp - T40133- to counterhold when loosening camshaft adjuster bolt.**

- Fit counterhold tool - T10172- with pin -T10172/2- to counterhold on corresponding camshaft adjuster and loosen bolt with special wrench - T10035- .

**Note**

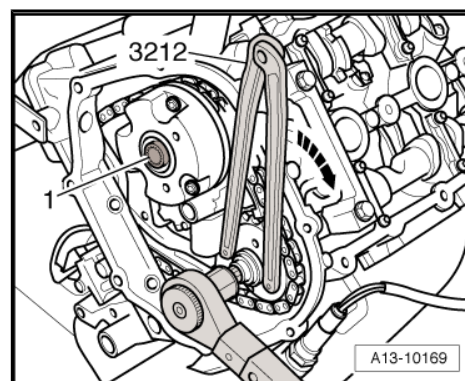
Disregard -item 1- and -arrow-.

**Caution**

Avoid damage to camshaft.

- ◆ **Do NOT use camshaft clamp - T40133- to counterhold when loosening camshaft sprocket bolt.**

- Fit pin wrench - 3212- to counterhold on corresponding camshaft sprocket and loosen bolt with special wrench - T10035- .

**Note**

Disregard -item 1- and -arrow-.

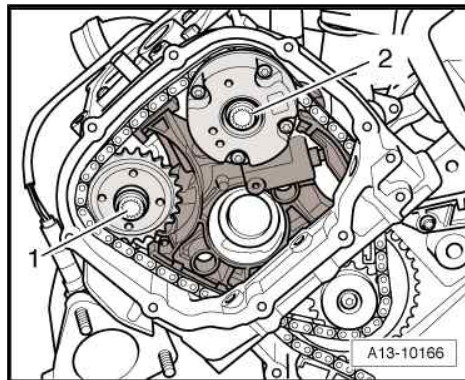
- Mark position of camshaft adjuster and camshaft sprocket with paint for re-installation.



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.**



- Unscrew bolts -1- and -2- on cylinder head (left-side) and remove camshaft adjuster and camshaft sprocket.
- Mark position of camshaft adjuster and camshaft sprocket with paint for re-installation.
- Unscrew bolts -1- and -2- on cylinder head (right-side) and remove camshaft adjuster and camshaft sprocket.

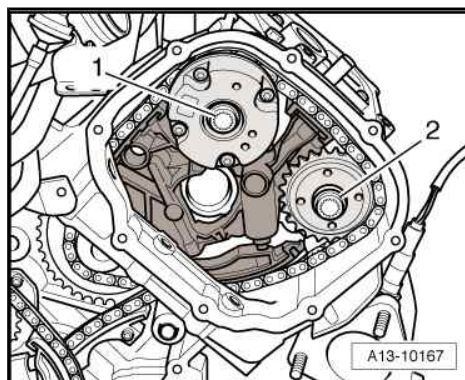
Installing

- Tightening torques
⇒ ["1.4 Exploded view - camshaft timing chains", page 89](#)



Note

Renew bolts for camshaft adjusters and camshaft sprockets.

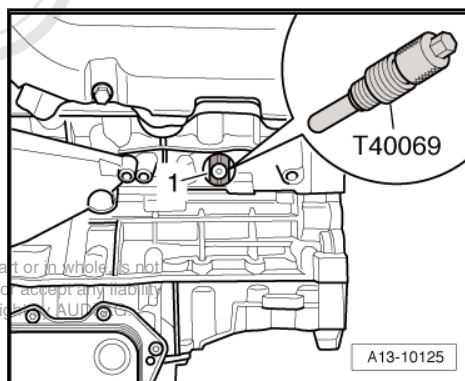


Caution

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 104](#)
- Crankshaft -1- locked in "TDC" position with locking pin - T40069- .

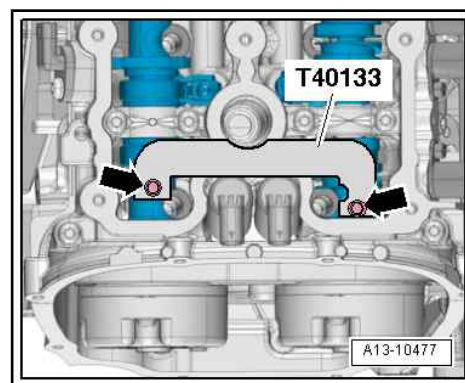


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright © AUDI AG 2015.

- Camshaft clamps - T40133- installed on both cylinder heads -arrows- and tightened to 25 Nm.

**Note**

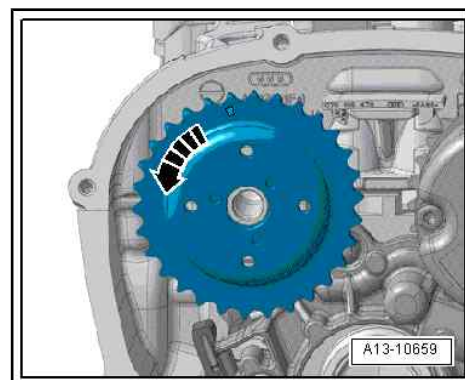
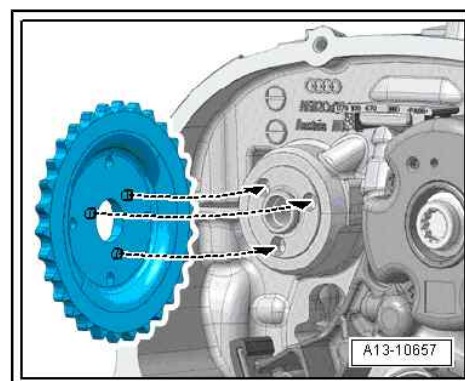
The illustration shows the left-side cylinder head.

**Caution**

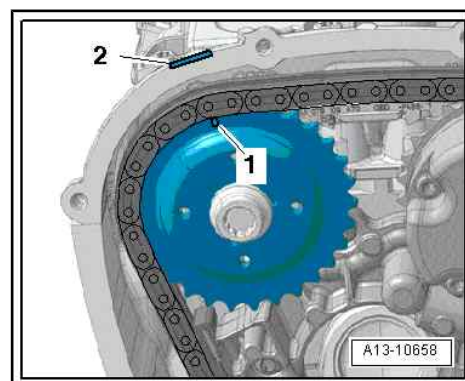
Risk of damage to engine.

- ◆ ***The camshaft sprockets MUST be installed as described in the following work steps:***

- Fit camshaft sprockets according to marks applied when removing.
- When fitting camshaft sprockets, make sure that the lugs on the camshaft sprockets engage in the slots on the camshafts -arrows-.
- Turn camshaft sprocket on camshaft anti-clockwise onto stop -arrow-.



- Dot -1- should align with adjustment window -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.



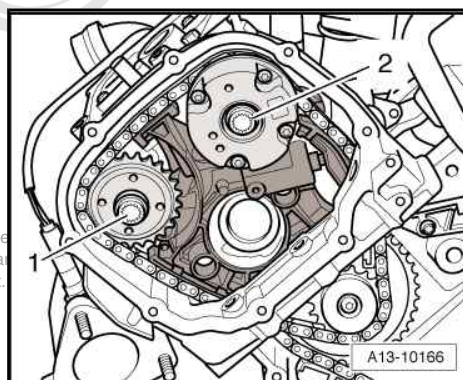
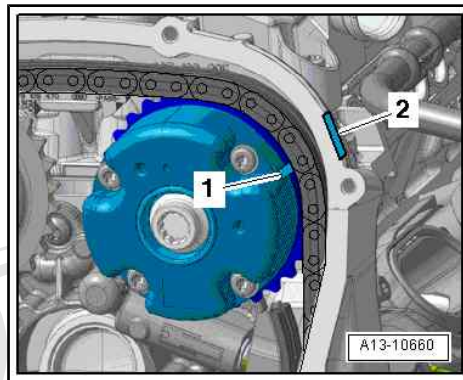
Caution

Risk of damage to engine.

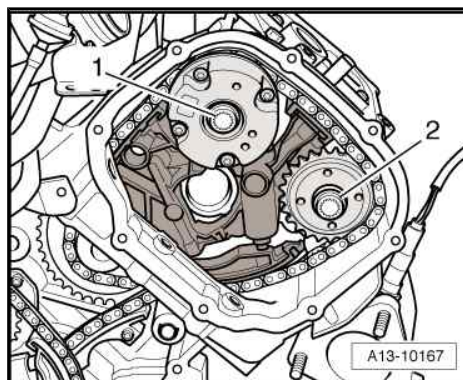
- ◆ **The camshaft adjusters *MUST* be installed as described in the following work steps:**

- Fit camshaft adjusters according to marks applied during removal.
- Groove -1- on camshaft adjuster should align with adjustment window -2-.
- Fit camshaft timing chain (left-side) onto drive sprocket, camshaft adjuster and camshaft sprocket and fit bolts -1- and -2- without tightening.
- It should just be possible to turn the camshaft adjuster and camshaft sprocket on the camshaft without axial movement.
- Remove locking pin - T40071- .

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.

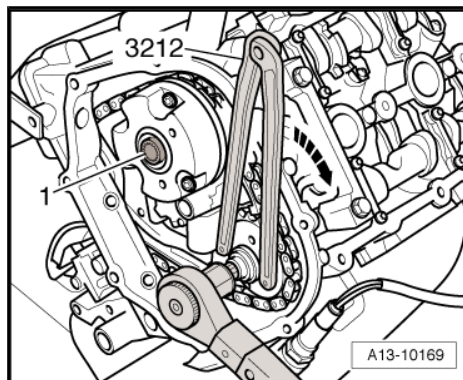


- Re-install camshaft adjuster on cylinder head (right-side) in the same position as before (pay attention to marks applied when removing).
- Fit camshaft timing chain (right-side) onto drive sprocket, camshaft adjuster and camshaft sprocket and fit bolts -1- and -2- without tightening.
- It should just be possible to turn the camshaft adjuster and camshaft sprocket on the camshaft without axial movement.
- Remove locking pin - T40071- .

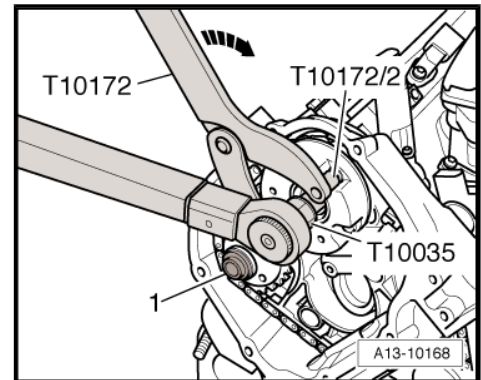


- Fit pin wrench - 3212- onto camshaft sprocket of exhaust camshaft (right-side).
- Have a 2nd mechanic apply tension to camshaft timing chain by pressing camshaft sprocket in direction of -arrow-.
- Tighten bolts as follows while keeping camshaft sprocket under tension:

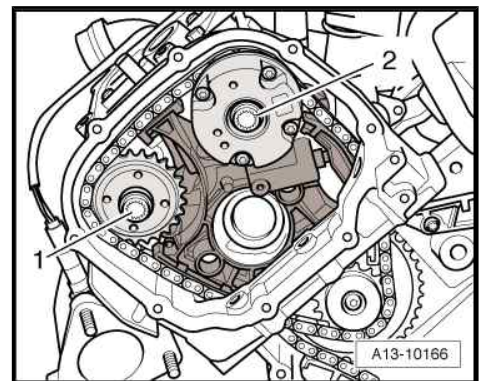
1. Pre-tighten bolt on exhaust camshaft to 80 Nm.
2. Pre-tighten bolt -1- on inlet camshaft to 80 Nm.



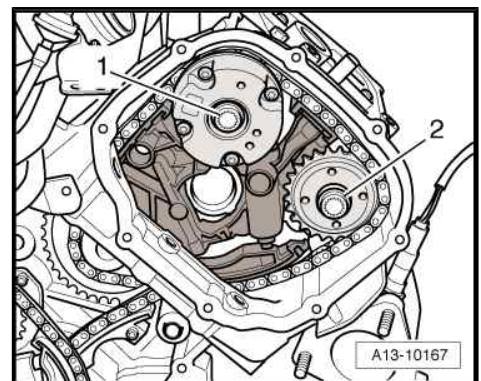
- Apply counterhold tool - T10172- with pin -T10172/2- onto camshaft adjuster of inlet camshaft (left-side).
- Have a 2nd mechanic apply tension to camshaft timing chain by pressing counterhold tool in direction of -arrow-.
- Tighten bolts as follows while keeping camshaft adjuster under tension:
 1. Pre-tighten bolt on inlet camshaft to 80 Nm.
 2. Pre-tighten bolt -1- on exhaust camshaft to 80 Nm.



- Tighten bolts securing camshaft adjuster and camshaft sprocket on cylinder head (left-side) as follows:
 1. Tighten bolt -1- on exhaust camshaft to final tightening torque => [Item 2 \(page 90\)](#).
 2. Tighten bolt -2- on inlet camshaft to final tightening torque => [Item 1 \(page 90\)](#).



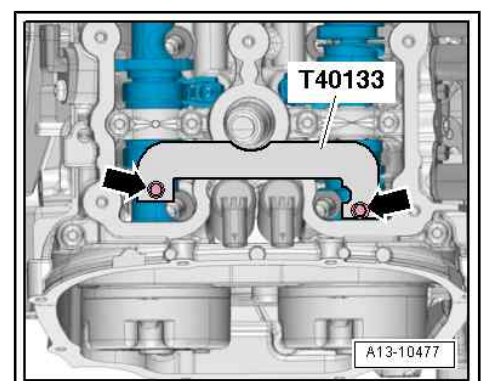
- Tighten bolts securing camshaft adjuster and camshaft sprocket on cylinder head (right-side) as follows:
 1. Tighten bolt -1- on inlet camshaft to final tightening torque => [Item 3 \(page 91\)](#).
 2. Tighten bolt -2- on exhaust camshaft to final tightening torque => [Item 1 \(page 91\)](#).



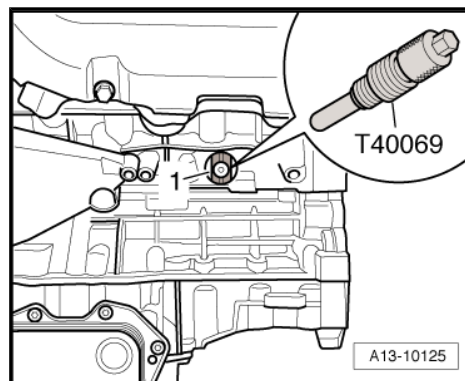
- Remove camshaft clamps - T40133- from both cylinder heads -arrows-.



The illustration shows the left-side cylinder head.



- Remove locking pin - T40069- .

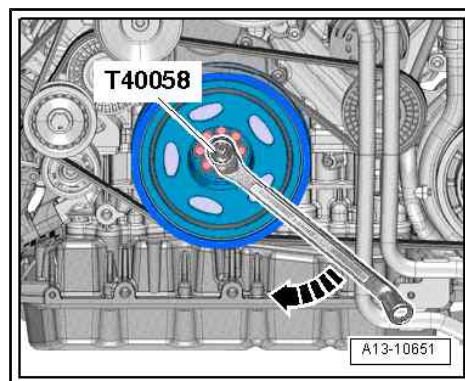


- Using adapter - T40058- , turn crankshaft 2 revolutions in normal direction of rotation -arrow- until crankshaft is at "TDC" again.

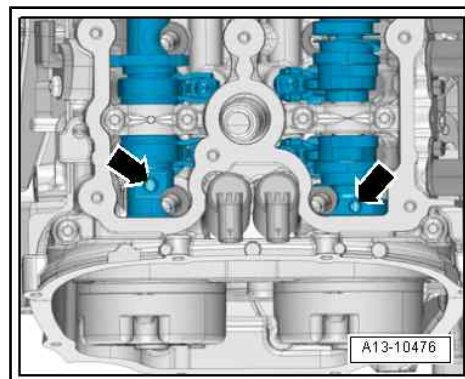


Note

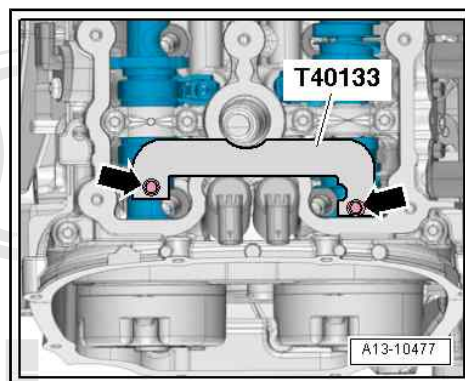
If you turn the crankshaft beyond "TDC" by mistake, turn it back approx. 30° and set to "TDC" again.



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



- Fit camshaft clamps - T40133- onto both cylinder heads and tighten bolts -arrows- to 25 Nm.

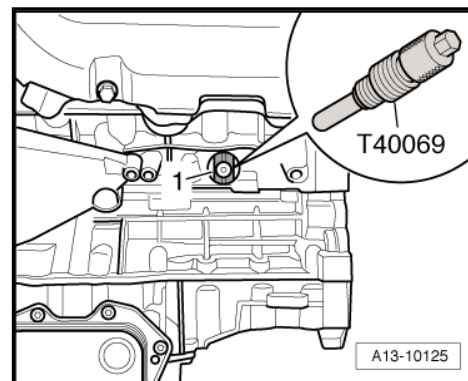


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Screw the locking pin - T40069- directly into the hole.
- The locking pin - T40069- must engage in the locating hole in crankshaft -1-. If it does not, reset valve timing.
- Remove camshaft clamps from both cylinder heads.
- Remove locking pin.

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

- Install plug for crankshaft “TDC” mark ⇒ [page 72](#) .
- Install cylinder head covers: left-side ⇒ [page 116](#) ; right-side ⇒ [page 117](#) .
- Install timing chain covers (left and right) ⇒ [page 82](#) .
- Install front noise insulation ⇒ Rep. gr. 66 .



1.6 Removing and installing camshaft timing chains

Removing

- Gearbox removed
- Engine oil drained ⇒ Maintenance ; Booklet 405
- Remove timing chain cover (bottom) ⇒ [page 85](#) .
- Remove cylinder head covers: left-side ⇒ [page 116](#) ; right-side ⇒ [page 117](#) .
- Remove timing chain from camshafts on relevant side ⇒ [page 92](#) .

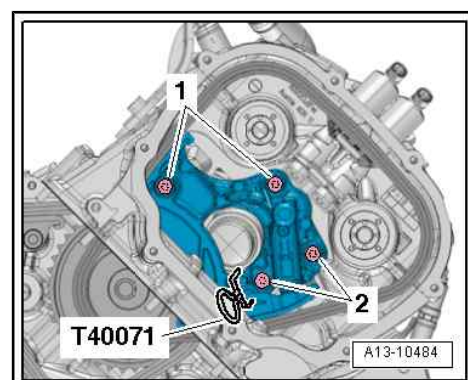
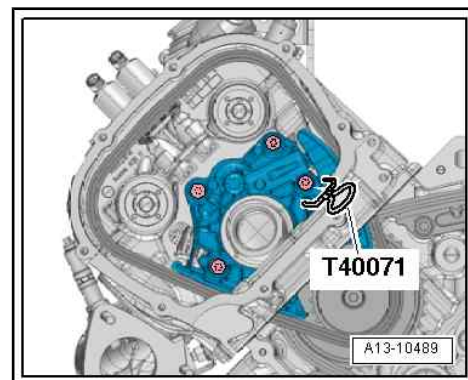


Caution

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

- ◆ *Mark running direction of timing chains (left and right) with paint for re-installation. Do not mark timing chain by means of centre punch, notch or the like.*

- Remove locking pin - T40071- and detach camshaft timing chain (left-side).
- Remove bolts -1- and -2- and take off chain tensioner (right-side).



- Press guide rail of chain tensioner for drive chain for valve gear in direction of -arrow- and lock chain tensioner by inserting locking pin - T40071- .
- Remove bolt -1- securing drive sprocket.
- Pull off drive sprocket with bearing mounting and lift off camshaft timing chain (right-side).

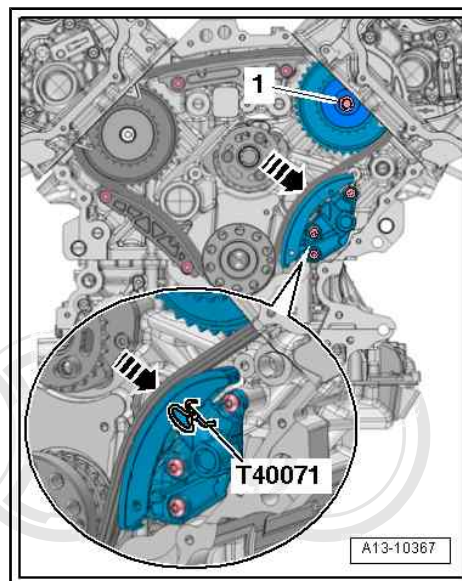
Installing

- Tightening torque
⇒ ["1.4 Exploded view - camshaft timing chains", page 89](#)



Note

- ◆ *Note the correct installation position if the tensioning element has been removed from the chain tensioner: drilling in base of housing faces chain tensioner and piston faces tensioner rail.*
- ◆ *Renew the bolts tightened with specified tightening angle.*



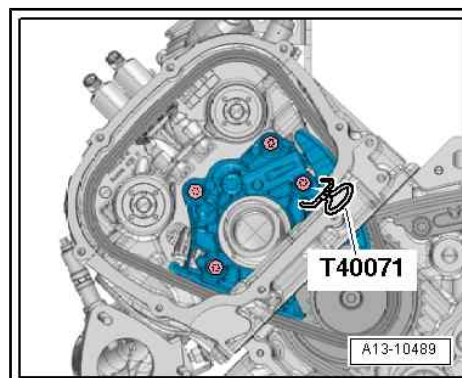
Caution

Risk of damage to valves and piston crowns.

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

Copyright by AUDI AG. 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.

- Position timing chain (left-side) as shown in the illustration (according to marks applied during removal).
- Press down guide rail of chain tensioner for timing chain (left-side) and lock chain tensioner by inserting locking pin - T40071- .

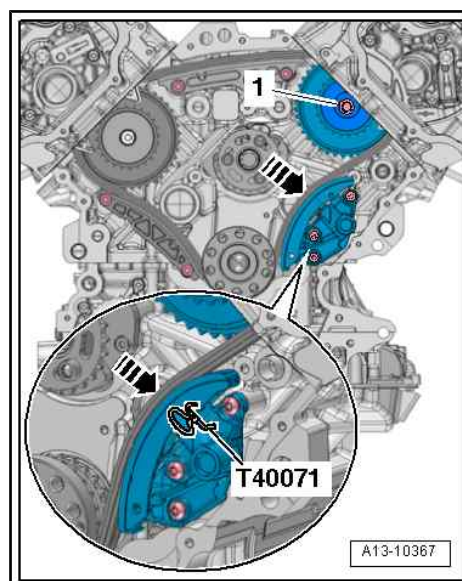


- Guide camshaft timing chain upwards to cylinder head (note marks applied when removing).
- Install drive sprocket ⇒ [page 104](#) .
- Tighten bolt -1- for bearing mounting.
- Remove locking pin - T40071- .



Note

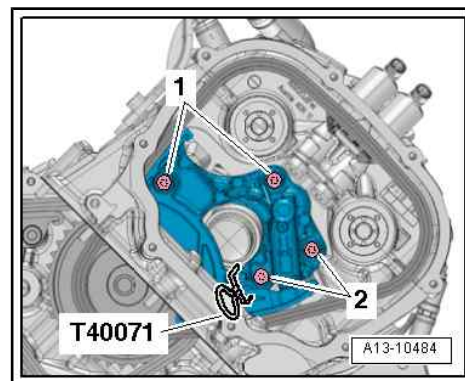
Disregard -arrow-.



- Fit chain tensioner on cylinder head (right-side) and position timing chain.
- Tighten bolts -1- and -2-.

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

- Fit timing chains on camshafts [⇒ page 92](#).
- Install cylinder head covers: left-side [⇒ page 116](#); right-side [⇒ page 117](#).
- Install timing chain cover (bottom) [⇒ page 85](#).
- Fill with engine oil and check oil level [⇒ Maintenance](#); Booklet 405.



1.7 Exploded view - drive chain for valve gear

1 - Guide rail

2 - Bolt

- ☐ Renew
- ☐ 10 Nm + turn 90° further

3 - Bolts

- ☐ Tightening torque [⇒ Item 13 \(page 90\)](#)

4 - Bearing mounting for drive sprocket

5 - Drive sprocket for timing chain (left-side)

6 - Bolt

- ☐ Renew
- ☐ 10 Nm + turn 90° further

7 - Drive chain for valve gear

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

8 - Bolt

- ☐ Renew
- ☐ 10 Nm + turn 90° further

9 - Guide rail

10 - Bolt

- ☐ Renew
- ☐ 8 Nm + turn 45° further

11 - Bearing plate for drive sprocket

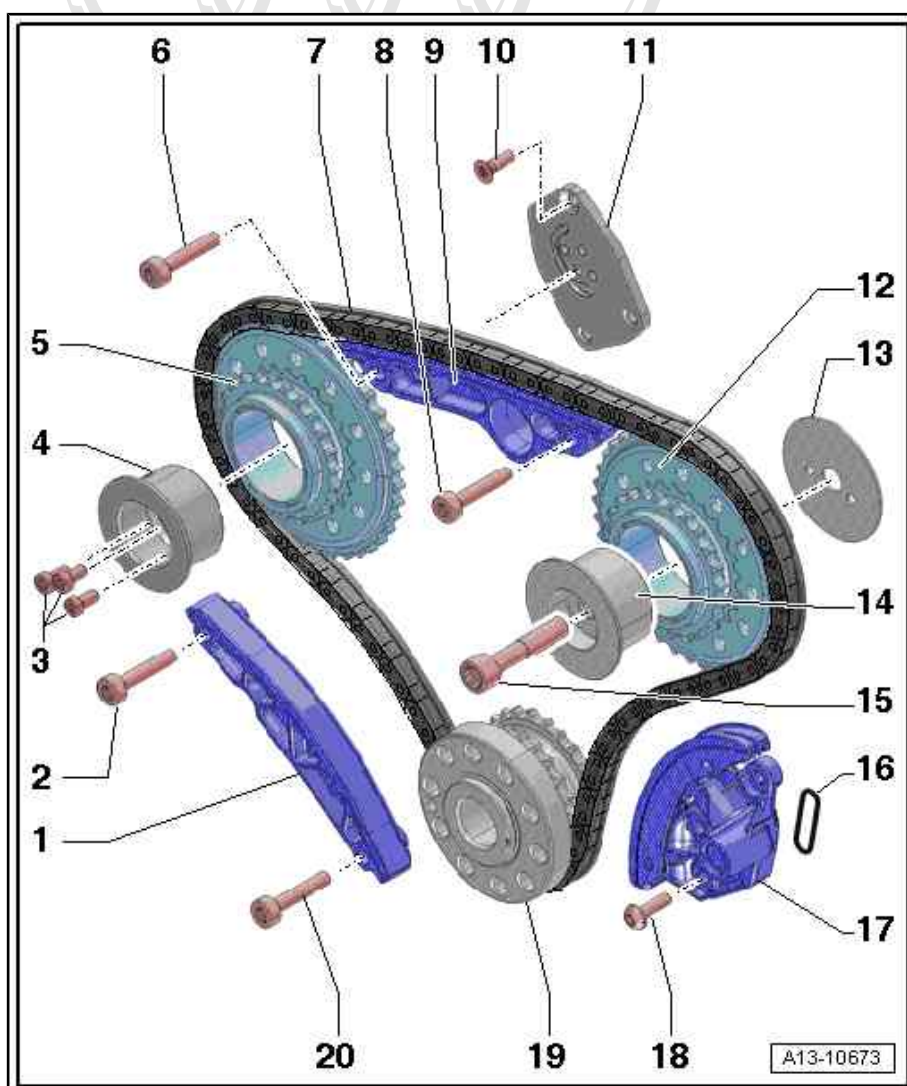
- ☐ For camshaft timing chain (right-side)
- ☐ Asymmetric version

12 - Drive sprocket for timing chain (right-side)

- ☐ Installation position [⇒ page 104](#)

13 - Thrust washer

- ☐ Asymmetric version
- ☐ Installation position [⇒ page 104](#)



14 - Bearing mounting for drive sprocket

- ☐ Asymmetric version
- ☐ Installation position ⇒ [page 104](#)

15 - Bolt

- ☐ Tightening torque ⇒ [Item 5 \(page 91\)](#)

16 - Seal

- ☐ Renew

17 - Chain tensioner

- ☐ Removing and installing ⇒ ["1.8 Removing and installing drive chain for valve gear", page 104](#)

18 - Bolt

- ☐ 9 Nm

19 - Crankshaft

20 - Bolt

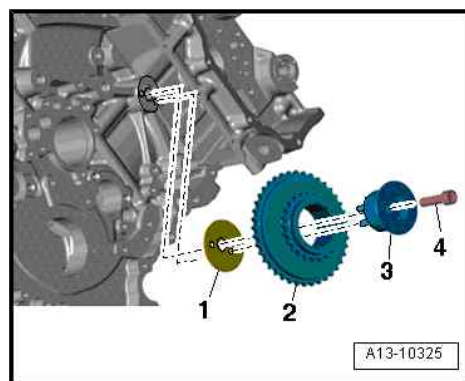
- ☐ Renew
- ☐ 10 Nm + turn 90° further

Installation position: bearing mounting for drive sprocket for camshaft timing chain (right-side)

- Dowel pins in bearing mounting -3- for drive sprocket for camshaft timing chain (right-side) must engage in drillings in thrust washer -1- and in cylinder block drillings.

2 - Drive sprocket for camshaft timing chain (right-side)

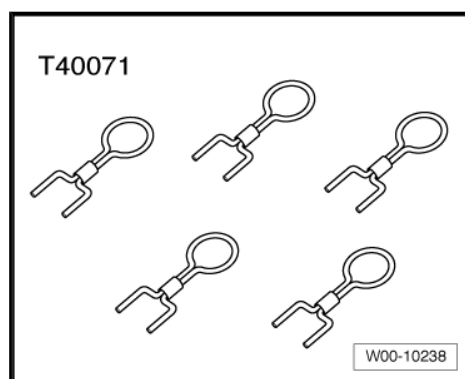
4 - Bolt



1.8 Removing and installing drive chain for valve gear

Special tools and workshop equipment required

- ◆ Locking pin - T40071-



Removing

- Gearbox removed
- Engine oil drained ⇒ Maintenance ; Booklet 405

**WARNING***Injury risk.*

- ◆ *The lock carrier must be installed and the torque reaction support must be secured.*

- Remove timing chain cover (bottom) ➔ [page 85](#) .
- Remove timing chains from camshafts ➔ [page 92](#) .
- Remove drive chain for auxiliary drives ➔ [page 106](#) .
- Press guide rail of chain tensioner for drive chain in direction of -arrow- and lock chain tensioner by inserting locking pin - T40071- .

**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.*

- Unscrew bolts -1- and remove guide rail.
- Remove bolts -2- and take off chain tensioner.
- Detach drive chain for valve gear.

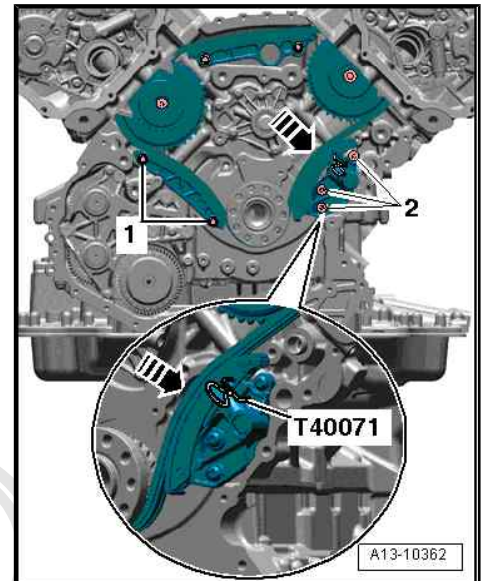
Installing

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

- Tightening torques
➔ ["1.7 Exploded view - drive chain for valve gear", page 103](#)

**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 rail and tighten bolts -1-.
- Install chain tensioner and tighten bolts -2-.
- Press guide rail of chain tensioner for drive chain in direction of -arrow- and remove locking pin - T40071- .
- Install drive chain for auxiliary drives ➔ [page 106](#) .
- Fit timing chains on camshafts ➔ [page 92](#) .
- Install timing chain cover (bottom) ➔ [page 85](#) .
- Fill with engine oil and check oil level ➔ Maintenance ; Booklet 405 .

**1.9 Exploded view - drive chain for auxiliary drives**

1 - Crankshaft

2 - Drive chain for auxiliary drives

- ☐ Removing and installing
⇒ [page 106](#)

3 - Drive chain sprocket for oil pump

- ☐ Installation position:
Side with lettering faces engine

4 - Bolt

- ☐ Renew
- ☐ 30 Nm + turn 90° further

5 - Compression spring

6 - Bolt

- ☐ Renew
- ☐ 15 Nm + turn 90° further

7 - Chain sprocket for balance shaft

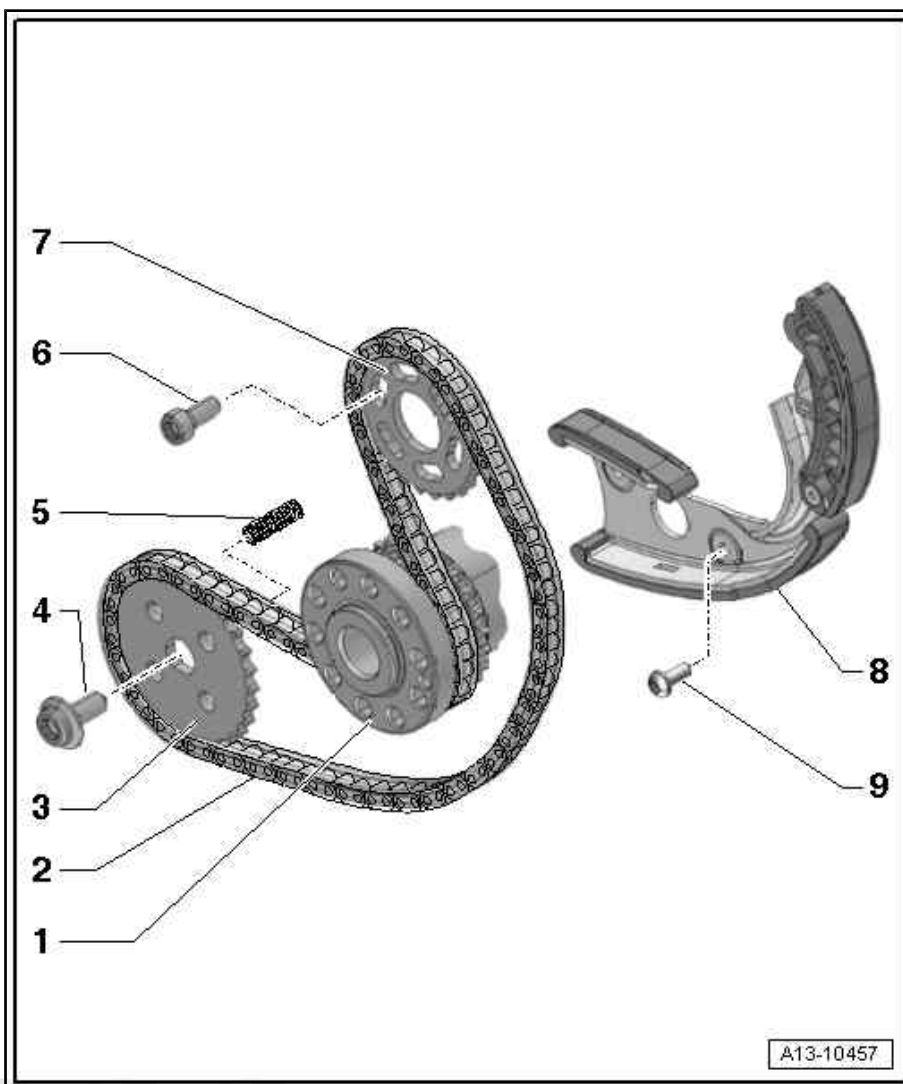
- ☐ Installation position:
Side with lettering faces gearbox

8 - Chain tensioner

- ☐ With guide rail
- ☐ Removing and installing
⇒ ["1.10 Removing and installing drive chain for auxiliary drives", page 106](#)

9 - Bolt

- ☐ Renew
- ☐ 10 Nm + turn 45° further

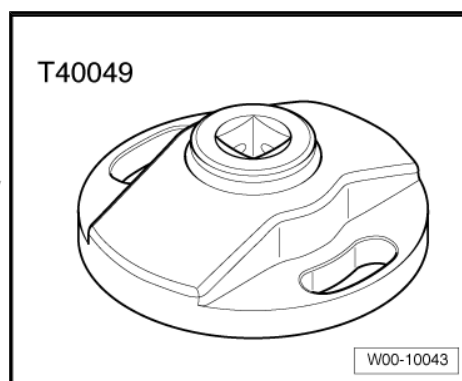


1.10 Removing and installing drive chain for auxiliary drives

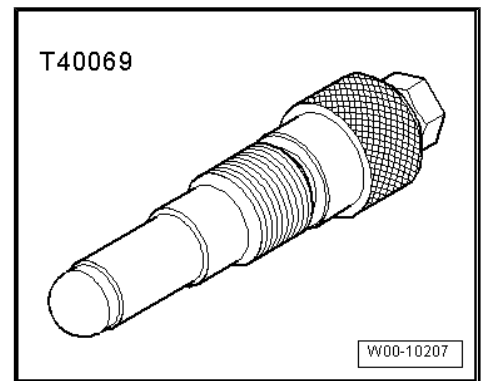
Special tools and workshop equipment required

- ◆ Special wrench - T40049-

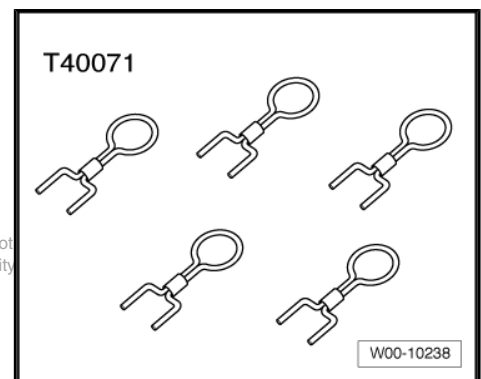
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



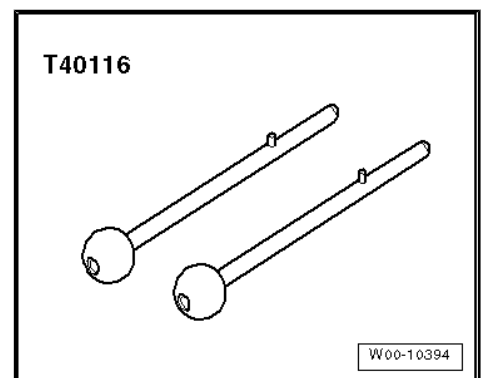
◆ Locking pin - T40069-



◆ Locking pin - T40071-



◆ Locating pins - T40116-



Removing

- Gearbox removed
- Engine oil drained ⇒ Maintenance ; Booklet 405



WARNING

Injury risk.

- ◆ ***The lock carrier must be installed and the torque reaction support must be secured.***

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



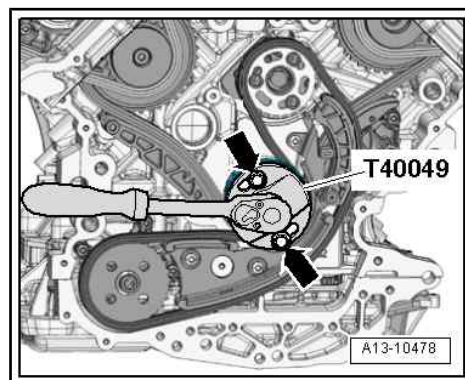
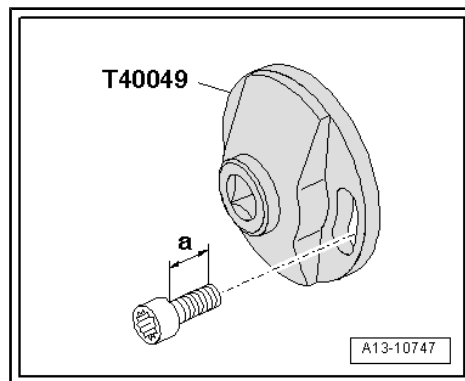
Caution

Risk of damage to drive chain if thread of bolt exceeds specified length.

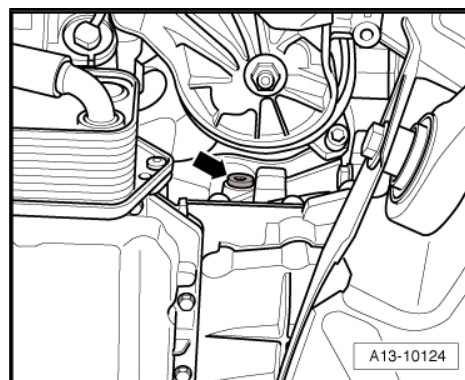
- ◆ Use bolts with a maximum thread length -a- of 22 mm to attach special wrench -T40049-.
- ◆ If no suitable bolts are available, position suitable washer(s) under bolt head so that remaining thread length does not exceed 22 mm.

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.

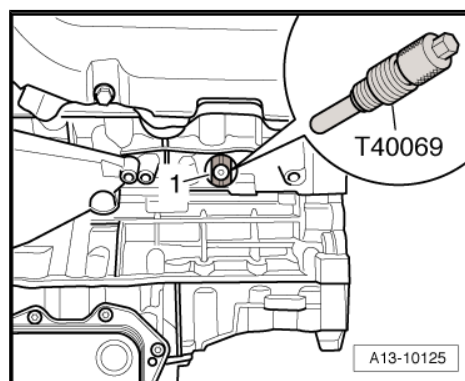
- Attach special wrench - T40049- at rear end of crankshaft using 2 bolts -arrows-.



- Remove plug -arrow- for crankshaft "TDC" marking from cylinder block.
- Rotate crankshaft in normal direction of rotation to "TDC".



- Screw locking pin - T40069- into hole (20 Nm); if necessary, turn crankshaft -1- backwards and forwards slightly to fully centralise locking pin.

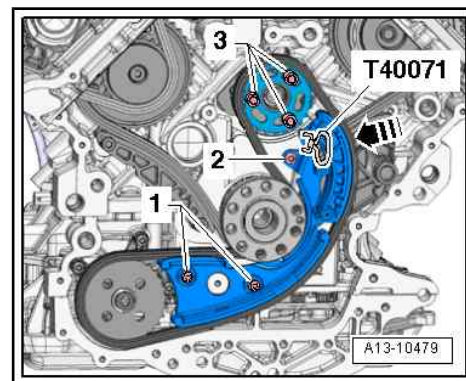


- Press guide rail of chain tensioner in direction of -arrow- and lock chain tensioner by inserting locking pin - T40071- .

**Caution**

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

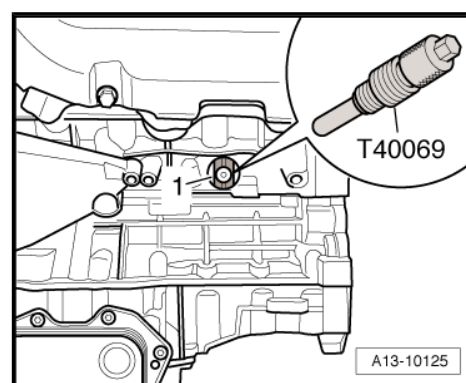
- ◆ **Mark running direction of drive chain with paint for re-installation. Do not mark drive chain by means of centre punch, notch or the like.**



- Unscrew bolts -3- and detach chain sprocket from balance shaft.
- Remove bolts -1- and -2- and take off chain tensioner with chain.

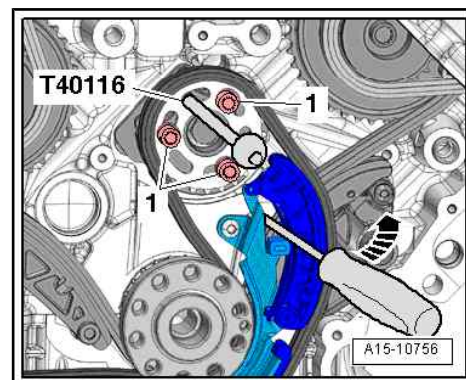
Installing

- Tightening torques
⇒ **“1.7 Exploded view - drive chain for valve gear”, page 103**
- Crankshaft -1- locked in “TDC” position with locking pin - T40069- .



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 chain tensioner with chain and balance shaft sprocket.
- Lock balance shaft in “TDC” position using locating pin - T40116- .
- The elongated holes in the balance shaft sprocket must be aligned centrally over the threaded holes in the balance shaft. If necessary move chain one tooth further.
- Tighten bolts for chain tensioner.
- Fit bolts -1- for chain sprocket without tightening.
- It should just be possible to turn the sprocket on the balance shaft without axial movement.
- Pull out locking pin - T40071- to release chain tensioner.
- Press against guide rail of chain tensioner -arrow- using a screwdriver, and at the same time tighten bolts -1- securing chain sprocket.
- Pull locating pin -T40116- out of balance shaft.



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

- Install timing chain cover (bottom) ⇒ **page 85** .
- Install plug for crankshaft “TDC” mark ⇒ **page 72** .
- Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 405 .

1.11 Exploded view - balance shaft

1 - Balance shaft

- ☐ Removing and installing
⇒ [page 110](#)

2 - Bolt

- ☐ 60 Nm
- ☐ Use locating pin - T40116- as counterhold when loosening and tightening

3 - Balance weight (gearbox end)

- ☐ Can only be fitted on balance shaft in one position.

4 - Bearing plate

- ☐ Types differ depending on version

5 - Bolt

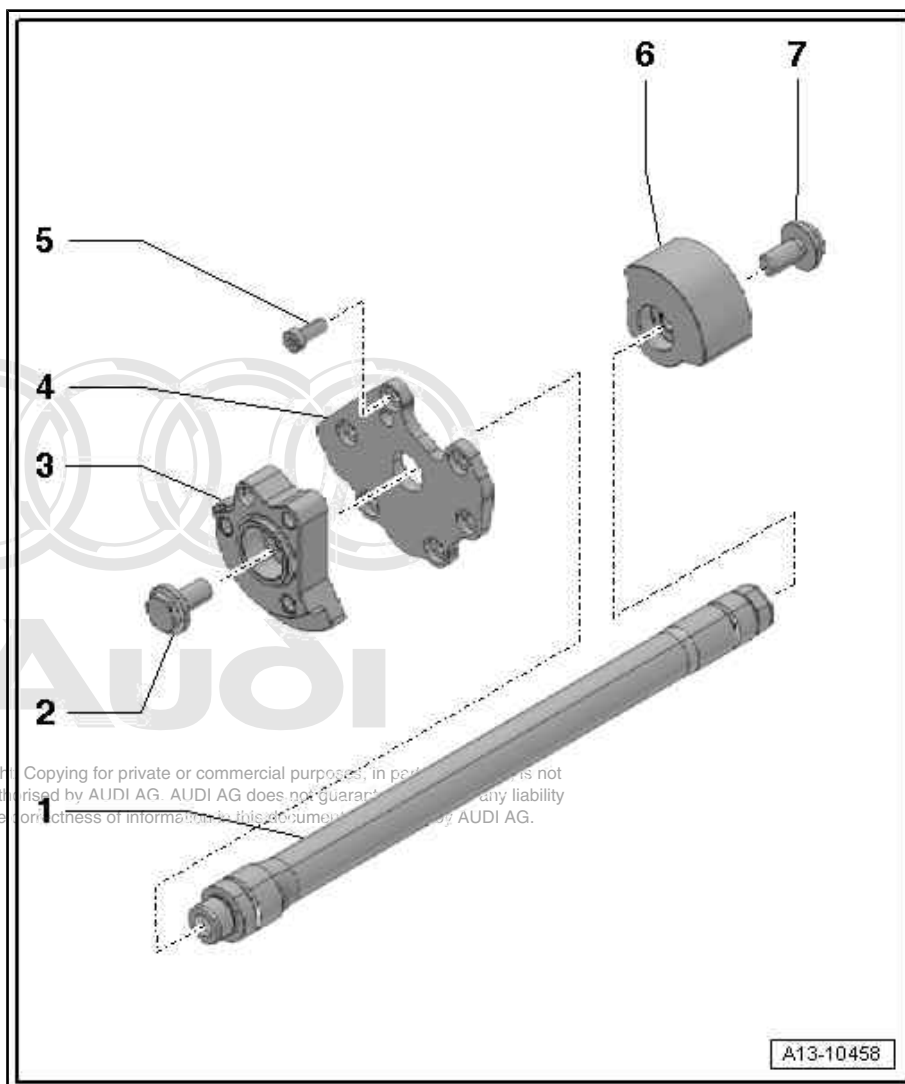
- ☐ 13 Nm

6 - Balance weight (pulley end)

- ☐ Can only be fitted on balance shaft in one position.

7 - Bolt

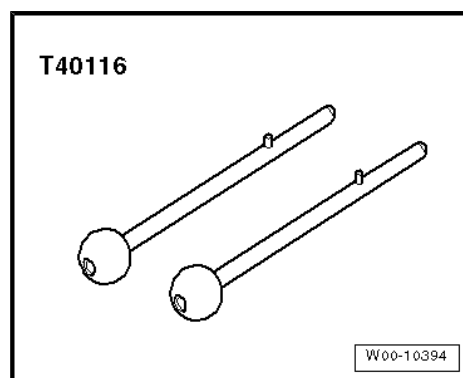
- ☐ 60 Nm
- ☐ Use locating pin - T40116- as counterhold when loosening and tightening



1.12 Removing and installing balance shaft

Special tools and workshop equipment required

- ◆ Locating pins - T40116-



Removing

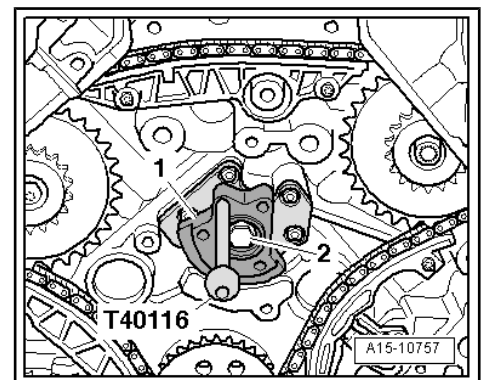


WARNING

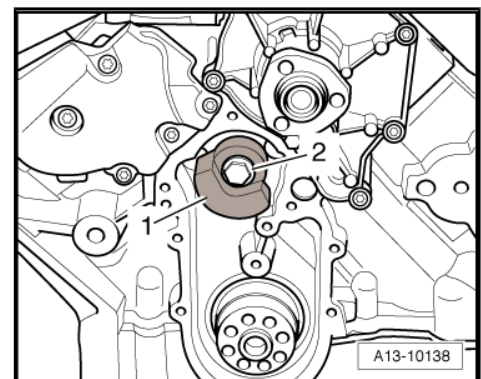
Injury risk.

- ◆ *The lock carrier must be installed and the torque reaction support must be secured.*

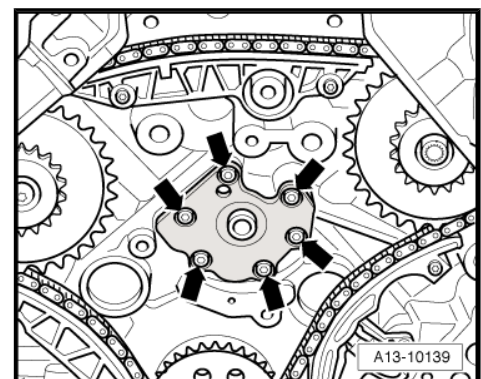
- Gearbox removed
- Engine oil drained ⇒ Maintenance ; Booklet 405
- Remove sealing flange (pulley end) ⇒ [page 63](#)
- Remove timing chain cover (bottom) ⇒ [page 85](#)
- Remove drive chain for auxiliary drives ⇒ [page 106](#) .
- Use locating pin -T40116- to lock balance weight -1- in position at rear of engine.
- Unscrew bolt -3- and detach balance weight from balance shaft.



- Unscrew bolt -2- (counterhold balance weight -1- with a suitable pin) and detach balance weight at front of engine from balance shaft.



- Unscrew bolts -arrows- and detach bearing plate for balance shaft at rear of engine.
- Pull balance shaft to rear out of cylinder block.



Installing

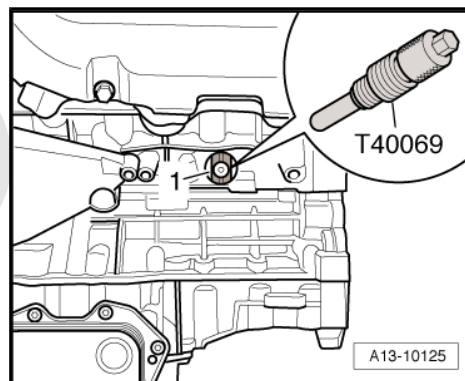
Installation is carried out in the reverse order; note the following:

- Tightening torques
⇒ ["1.11 Exploded view - balance shaft", page 109](#)
- Crankshaft -1- locked in "TDC" position with locking pin - T40069- .



Note

Balance weights can only be fitted on balance shaft in one position.



- Install drive chain for auxiliary drives ⇒ [page 106](#) .

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

- Install sealing flange (pulley end) ⇒ [page 63](#) .

2 Cylinder head

Overview

- ◆ ⇒ [“2.1 Exploded view - cylinder head”, page 113](#)
- ◆ ⇒ [“2.2 Removing and installing cylinder head cover \(left-side\)”, page 116](#)
- ◆ ⇒ [“2.3 Removing and installing cylinder head cover \(right-side\)”, page 117](#)
- ◆ ⇒ [“2.4 Removing and installing cylinder heads”, page 117](#)
- ◆ ⇒ [“2.5 Checking compression”, page 125](#)

2.1 Exploded view - cylinder head



Note

The diagram shows the cylinder head on cylinder bank 2 (left-side).

1 - Cylinder head gasket

- ☐ Renewing
⇒ [“2.4 Removing and installing cylinder heads”, page 117](#)
- ☐ Installation position:
part number must face
cylinder head
- ☐ If renewed, change
coolant and engine oil

2 - Cylinder head

- ☐ Removing and installing
⇒ [page 117](#)
- ☐ Checking for distortion
⇒ [page 115](#)
- ☐ Machining limit
⇒ [page 115](#)
- ☐ If renewed, change
coolant and engine oil

3 - Bolt

- ☐ Tightening torque ⇒
Rep. gr. 47

4 - Vacuum pump

- ☐ Removing and installing
⇒ Rep. gr. 47

5 - O-ring

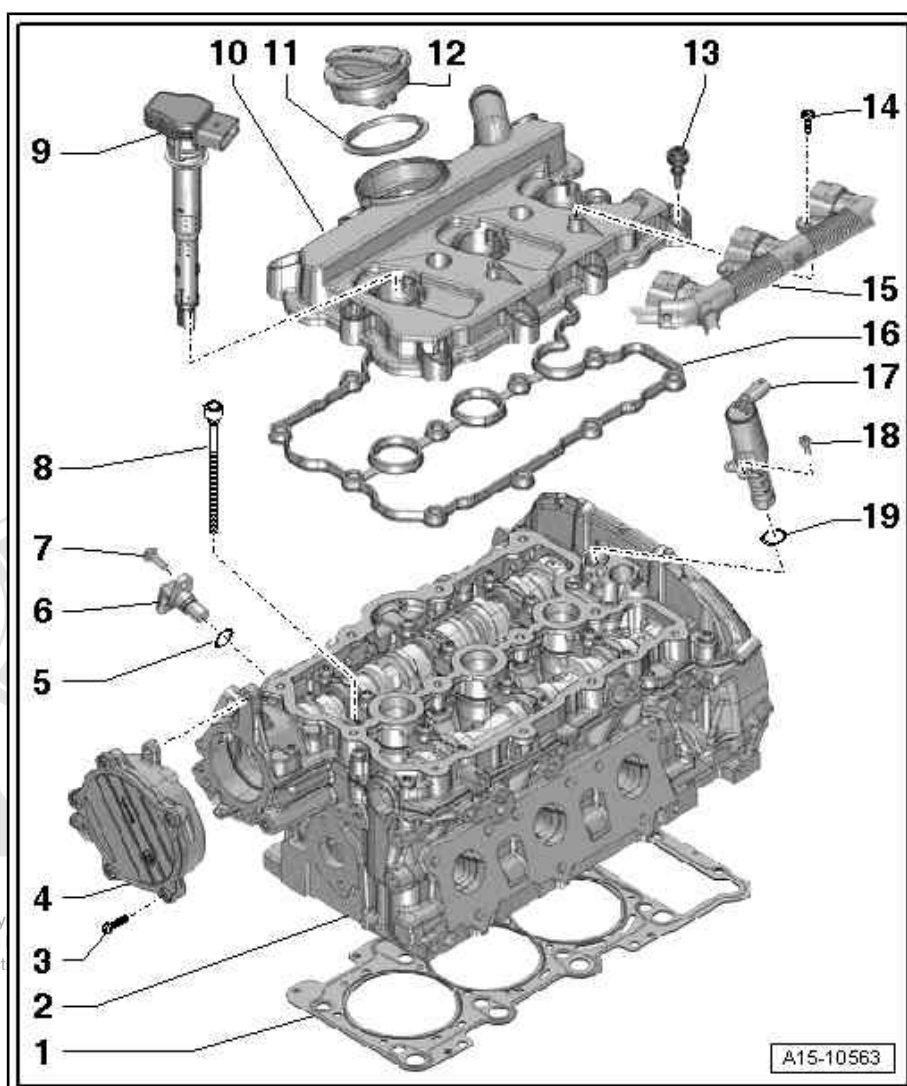
- ☐ Renew

6 - Hall sender

- ☐ Cylinder bank 1 (right-
side): Hall sender -
G40-; cylinder bank 2
(left-side): Hallsender 2
- G163-

7 - Bolt

- ☐ Tightening torque ⇒ Rep. gr. 28



8 - Bolt

- ☐ Renew
- ☐ Note correct sequence when loosening ⇒ [page 123](#)
- ☐ Tightening torque and sequence ⇒ [page 115](#)

9 - Ignition coil

- ☐ Removing and installing ⇒ Rep. gr. 28

10 - Cylinder head cover

- ☐ Removing and installing: left-side ⇒ [page 116](#) , right-side ⇒ [page 117](#)

11 - Seal

- ☐ Renew if damaged or leaking

12 - Filler cap

13 - Bolt

- ☐ Renew if seal is damaged
- ☐ Tightening torque and tightening sequence: cylinder head cover (left-side) ⇒ [page 114](#) , cylinder head cover (right-side) ⇒ [page 115](#)

14 - Bolt

- ☐ Tightening torque ⇒ Rep. gr. 28

15 - Connector rail

- ☐ For ignition coils

16 - Gasket for cylinder head cover

- ☐ Renew if damaged or leaking

17 - Solenoid valve for camshaft control (inlet side)

- ☐ Cylinder bank 1 (right-side): camshaft control valve 1 - N205- , cylinder bank 2 (left-side): camshaft control valve 2 - N208-

18 - Bolt

- ☐ 5 Nm

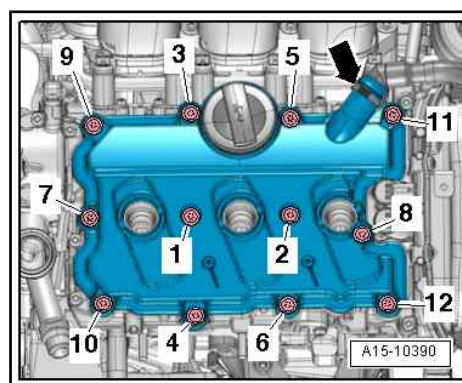
19 - O-ring

- ☐ 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.

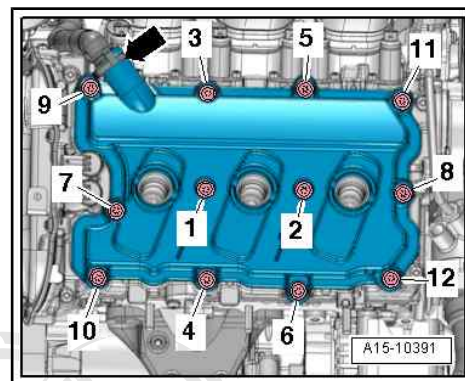
Cylinder head cover (left-side) - tightening torque and sequence

- Tighten bolts in the sequence -1 ... 12- to 9 Nm.



Cylinder head cover (right-side) - tightening torque and sequence

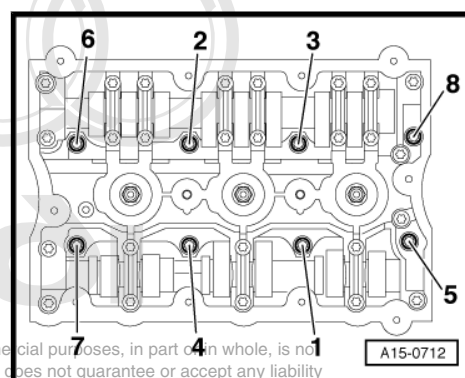
- Tighten bolts in the sequence -1 ... 12- to 9 Nm.

**Cylinder head - tightening torque and sequence****Note**

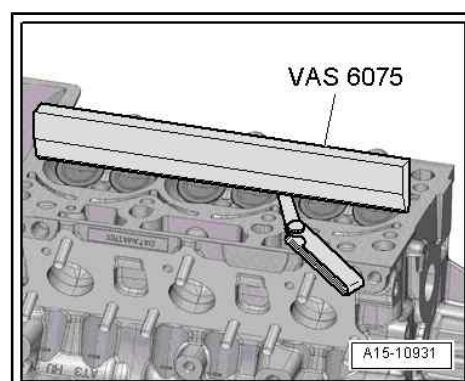
Renew the bolts tightened with specified tightening angle.

- Tighten bolts in 4 stages in the sequence shown:

Stage	Bolts	Tightening torque/angle specification
1.	-1 ... 8-	Screw in by hand until contact is made
2.	-1 ... 8-	40 Nm
3.	-1 ... 8-	Turn 90° further
4.	-1 ... 8-	Turn 90° further

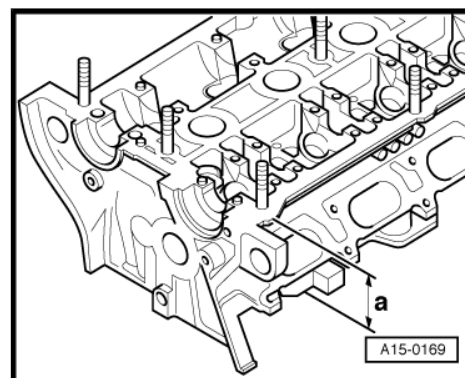
**Checking cylinder head for distortion**

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

**Cylinder head machining limit**

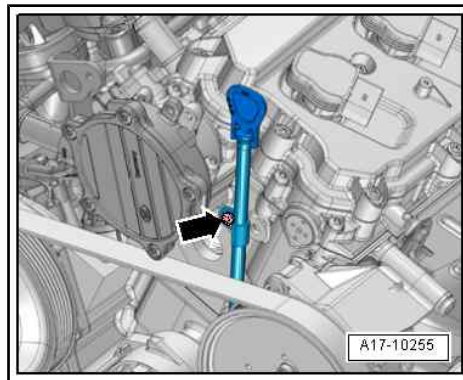
Machining of the cylinder head (surface grinding) is only permissible down to the minimum dimension -a-.

- Minimum dimension: -a- = 139.20 mm



Guide tube for oil dipstick - tightening torque

- Tighten bolt -arrow- to 9 Nm.



2.2 Removing and installing cylinder head cover (left-side)

Removing

- Remove ignition coils ⇒ Rep. gr. 28 .

Rest-of-world vehicles:

- Disconnect crankcase breather hose -arrow- by pressing release tabs.
- Unscrew bolts for cylinder head cover (left-side) in the sequence -12 ... 1- and remove cylinder head cover.

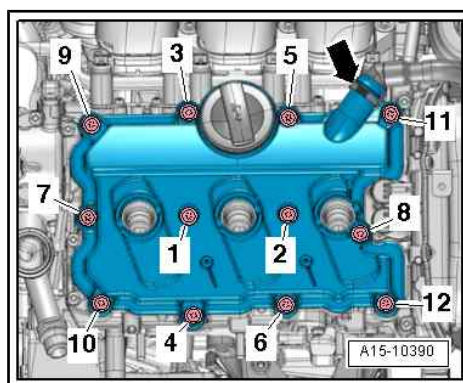
USA models:



Caution

Risk of violating emission legislation applying to USA models.

- ◆ *Do NOT open hose connection -arrow-.*



- Remove bolts for cylinder head cover (left-side) in the sequence -12 ... 1- and move cylinder head cover clear to one side (crankcase breather hose -arrow- remains connected).

Installing

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

- Tightening torque
⇒ [Fig. "Cylinder head cover \(left-side\) - tightening torque and sequence", page 114](#)



Note

- ◆ *Renew gasket for cylinder head cover if damaged.*
- ◆ *Renew bolts for cylinder head cover if seals on bolts are damaged.*
- Clean sealing surfaces; they must be free of oil and grease.
- Tighten bolts for cylinder head cover (left-side) ⇒ [page 114](#).
- Install ignition coils ⇒ Rep. gr. 28 .

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted without express 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.

2.3 Removing and installing cylinder head cover (right-side)

Removing

- Remove ignition coils ⇒ Rep. gr. 28 .

Rest-of-world vehicles:

- Disconnect crankcase breather hose -arrow- by pressing release tabs.
- Unscrew bolts for cylinder head cover (right-side) in the sequence -12 ... 1- and remove cylinder head cover.

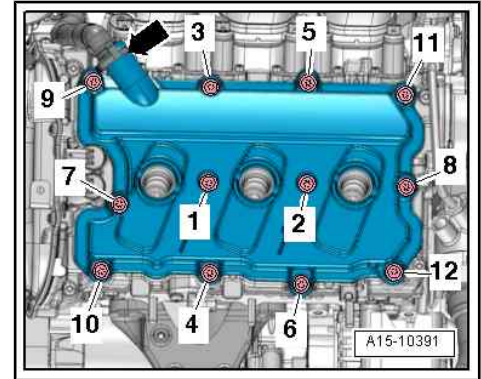
USA models:



Caution

Risk of violating emission legislation applying to USA models.

- ◆ *Do NOT open hose connection -arrow-.*



- Remove bolts for cylinder head cover (right-side) in the sequence -12 ... 1- and move cylinder head cover clear to one side (crankcase breather hose -arrow- remains connected).

Installing

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

- Tightening torque
⇒ [Fig. "Cylinder head cover \(right-side\) - tightening torque and sequence", page 115](#)



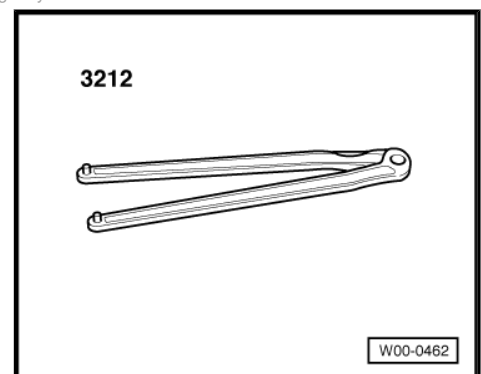
Note

- ◆ *Renew gasket for cylinder head cover if damaged.*
- ◆ *Renew bolts for cylinder head cover if seals on bolts are damaged.*
- Clean sealing surfaces; they must be free of oil and grease.
- Tighten bolts for cylinder head cover (right-side) ⇒ [page 115](#) .
- Install ignition coils ⇒ Rep. gr. 28 .

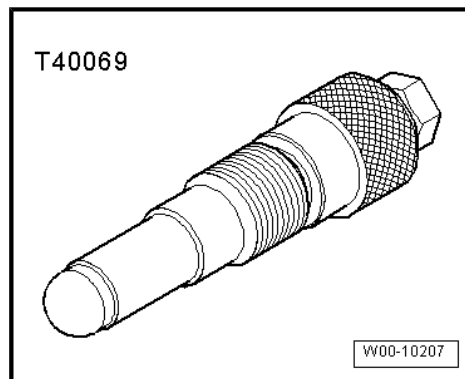
2.4 Removing and installing cylinder heads

Special tools and workshop equipment required

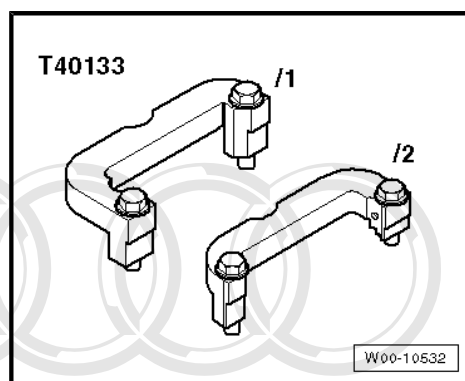
- ◆ Pin wrench - 3212-



◆ Locking pin - T40069-



◆ Camshaft clamp - T40133-



Removing

- Engine in vehicle.



Note

- ◆ *The following chapter describes how to remove both cylinder heads together.*
- ◆ *If only one of the cylinder heads is to be removed, refer to the corresponding procedure described in this chapter.*

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.



WARNING

The fuel system operates at extremely high pressure. This can cause injury.

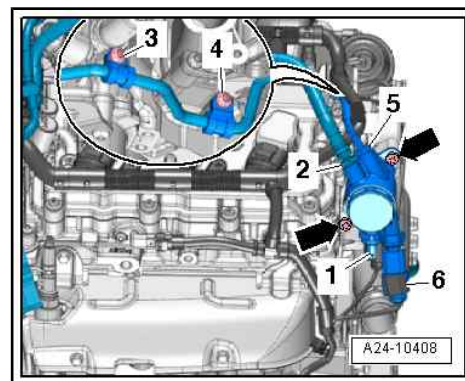
- ◆ ***The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system.***

- Reduce fuel pressure in high-pressure section of injection system ⇒ Rep. gr. 24 .
- Remove front exhaust pipes: left-side ⇒ [page 246](#) , right-side ⇒ [page 248](#) .
- Remove coolant pipes (front left) ⇒ [page 197](#) .
- Remove poly V-belt ⇒ [page 60](#) .
- Remove coolant pipe (top) ⇒ [page 203](#) .
- Remove intake manifold bottom sections ⇒ Rep. gr. 24 .
- Unplug electrical connectors at injectors.

- Unscrew connection -2- and move fuel supply hose clear to one side.
- Unplug electrical connectors -1- and -6-.

**Note**

Disregard items marked -3, 4, 5- and -arrows-.



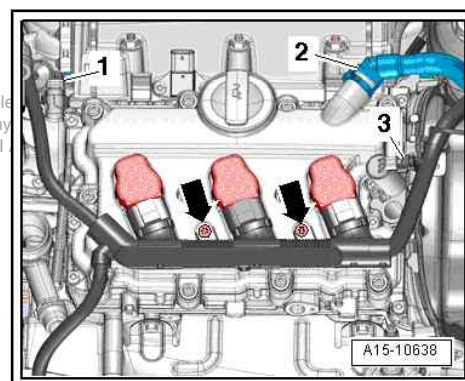
- Unplug electrical connectors on cylinder head (left-side):

1 - Hall sender 2 - G163-

3 - Camshaft control valve 2 - N208-

**Note**

Ignore items marked -2- and -arrows-.



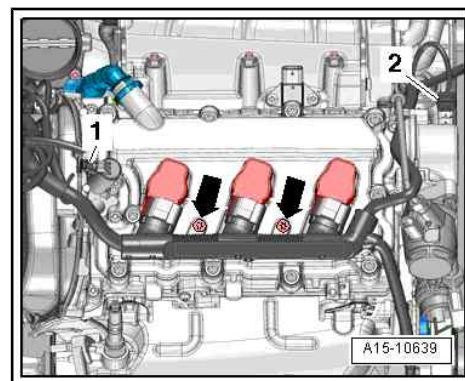
- Unplug electrical connectors on cylinder head (right-side):

1 - Camshaft control valve 1 - N205-

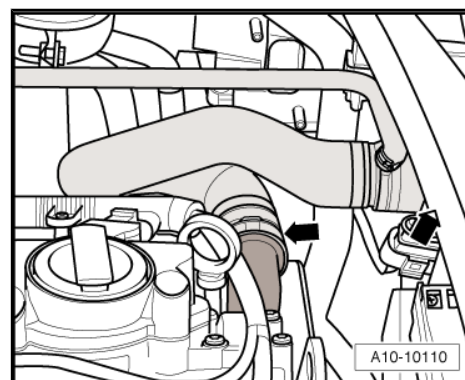
2 - Hall sender - G40-

**Note**

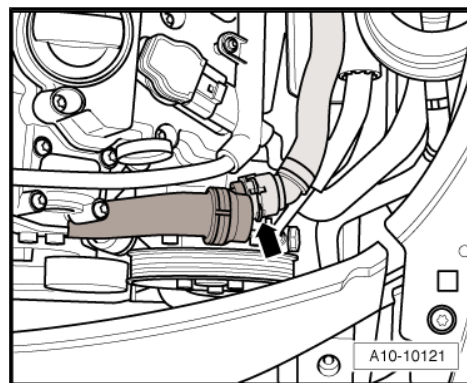
Disregard -arrows-.



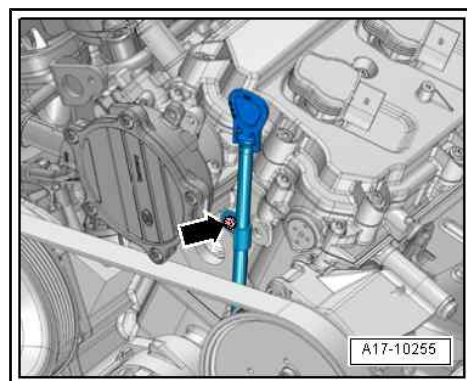
- Move electrical wiring harness clear to side.
- Remove timing chain from camshafts on relevant side
⇒ [page 92](#) .
- Lift retaining clips -arrows- and disconnect coolant hose (front left) in engine compartment.



- Lift retaining clip -arrow- and detach coolant hose from coolant pipe (front).



- Remove bolt -arrow- and pull out guide tube with oil dipstick.

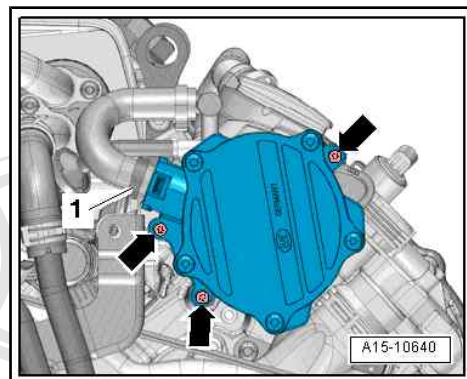


- Detach vacuum hose -1- from vacuum pump and move clear.



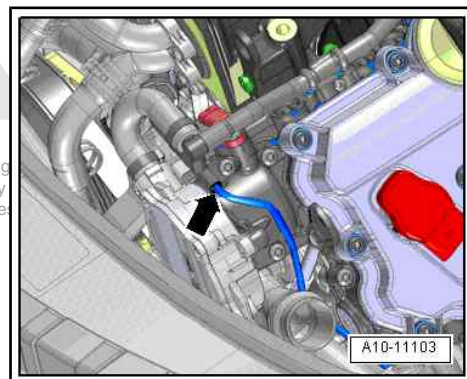
Note

Disregard -arrows-.



USA models:

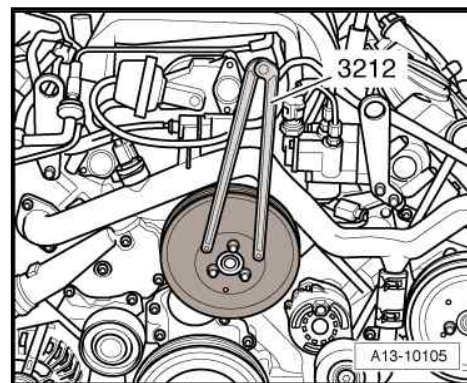
- Disconnect vacuum hose leading to fuel system diagnostic pump - V144- .



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

All vehicles (continued):

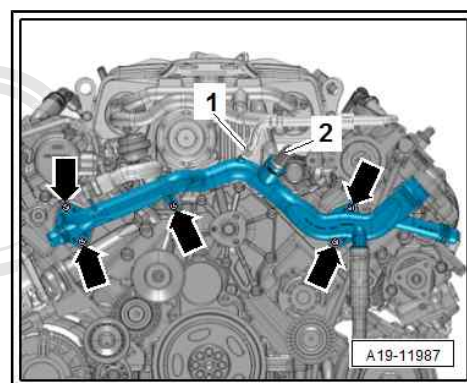
- Remove bolts for coolant pump pulley (counterhold with pin wrench - 3212-).
- Detach poly-V-belt pulley.



- Unplug electrical connector -2- for coolant temperature sender - G62- .
- Remove bolts -arrows- at coolant pipe (front).

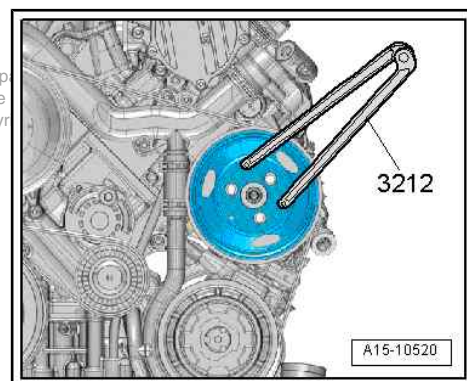
**Note**

Disregard -item 1-.

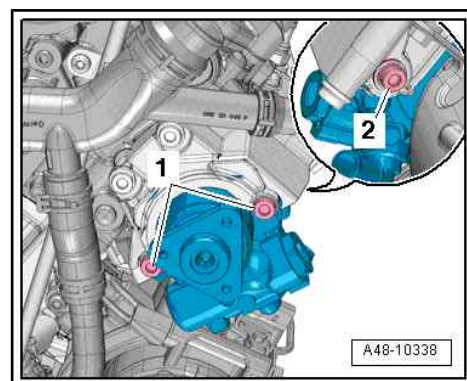


- Remove bolts on poly V-belt pulley for power steering pump (counterhold with pin wrench - 3212-).
- Detach poly-V-belt pulley.

Protected by copyright. Copying for private or commercial purposes, in part or in full, without the written permission of Audi AG is prohibited. Audi AG does not guarantee the correctness of information in this document. Copyright © 2015 Audi AG.



- Remove bolts -1- and -2- and move power steering pump to one side.

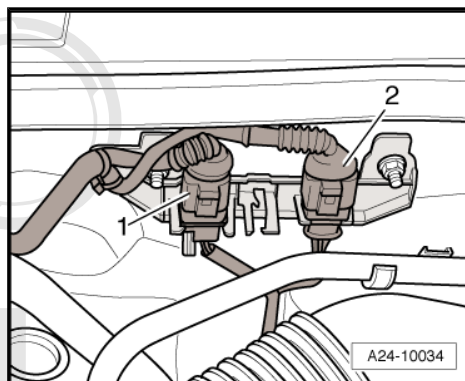


- Unplug electrical connector -1- for Lambda probe - G39- and move wiring clear.



Note

Disregard -item 2-.

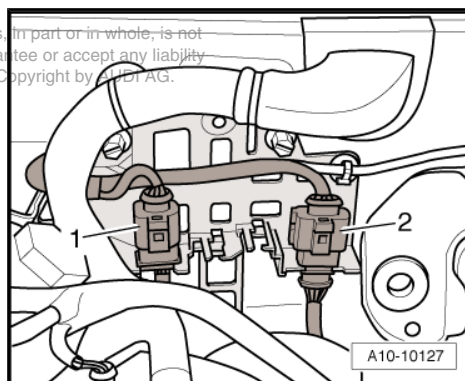


- Unplug electrical connector -1- for Lambda probe 2 - G108- and move wiring clear.



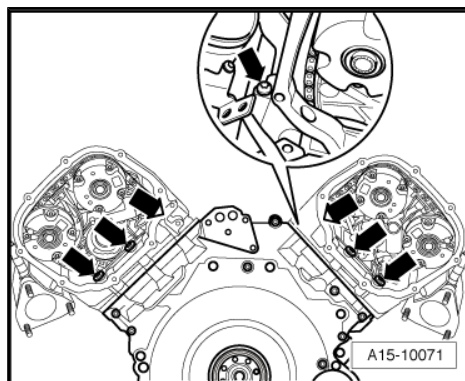
Note

Disregard -item 2-.



- Remove bolts -arrows- at rear of cylinder head.

- ◆ Cylinder head (left-side): 3 bolts
- ◆ Cylinder head (right-side): 4 bolts



- Slacken cylinder head bolts in the sequence -1 ... 8-.
- Unscrew bolts, detach cylinder head and set it down on a soft surface (foam plastic).

Installing

- Tightening torques
⇒ ["2.1 Exploded view - cylinder head", page 113](#)



Caution

Avoid 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.**

Avoid damage to cylinder block.

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

Ensure that cylinder head gasket seals properly:

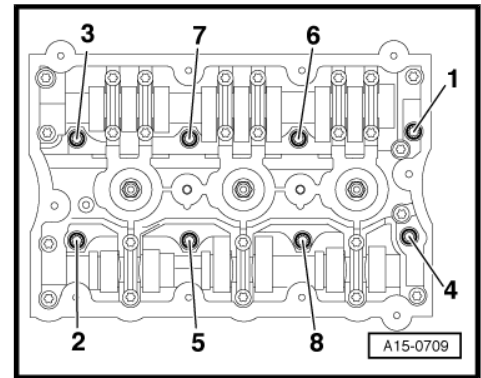
- ◆ **Carefully remove any sealant residue from the cylinder head and cylinder block. Ensure that no long scores or scratches are made on the surfaces.**
- ◆ **Carefully remove any remaining emery and abrasive material.**
- ◆ **Do not remove new cylinder head gasket from packaging until it is ready to be fitted.**
- ◆ **Handle the cylinder head gasket very carefully to prevent damage to the silicone coating or the indented area of the gasket.**

Avoid 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.**

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

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

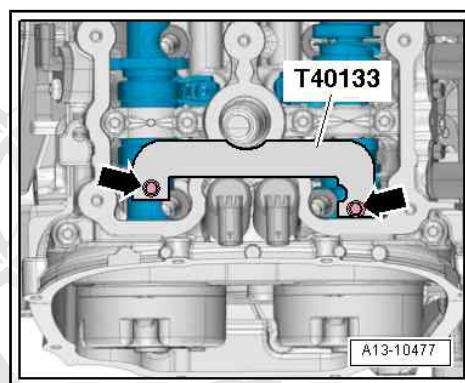




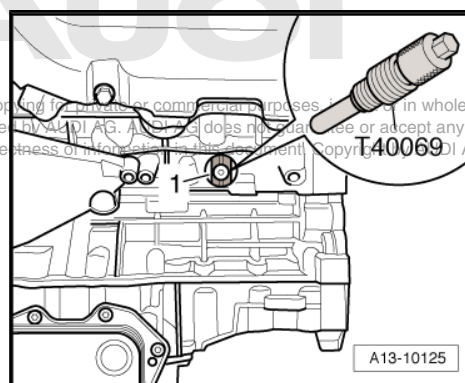
Note

- ◆ Renew the bolts tightened with specified tightening angle.
- ◆ Renew self-locking nuts as well as seals, gaskets and O-rings.
- ◆ Note the different sealants for sealing surfaces and cylinder head bolts.
- ◆ When installing an exchange cylinder head with camshafts fitted, the contact surfaces between the hydraulic compensation elements, roller rocker fingers and cams must be oiled.
- ◆ Hose connections and air pipes and hoses must be free of oil and grease before assembly.
- ◆ Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .
- ◆ To ensure that the 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.

- Camshafts on both cylinder heads locked in "TDC" position -arrows- with camshaft clamp - T40133- (25 Nm).
- The camshaft clamp - T40133- is positioned correctly if the holes for the cylinder head bolts remain free.

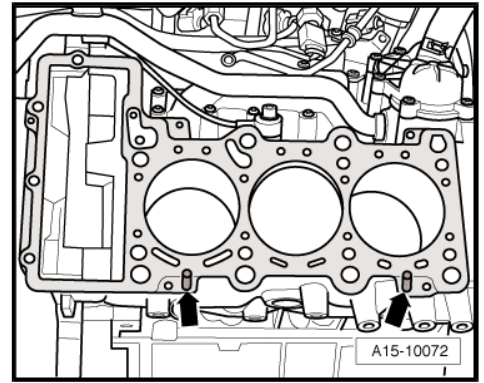


- Crankshaft -1- locked in "TDC" position with locking pin - T40069- .

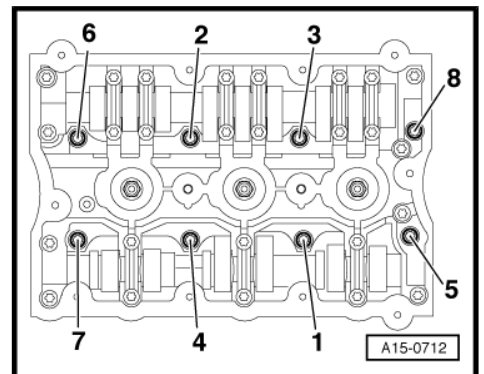


Protected by copyright. Copying for private or commercial purposes is prohibited in whole or in part, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright © AUDI AG.

- Renew seals and O-rings for coolant pipe (front).
- Place cylinder head gasket in position.
- Installation position: the word “oben” (top) or the Part No. should be visible.
- Pay attention to dowel sleeves -arrows- in cylinder block.
- Fit cylinder head.



- Tighten cylinder head bolts ⇒ [page 115](#) .



- Tighten bolts -arrows-.
- ♦ Cylinder head (left-side): 3 bolts
- ♦ Cylinder head (right-side): 4 bolts

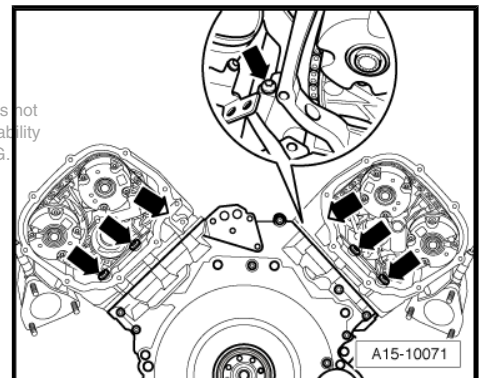


Note

Cylinder head bolts do not have to be torqued down again.

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

- Install camshaft timing chains ⇒ [page 92](#) .
- Install intake manifold (bottom sections) ⇒ Rep. gr. 24 .
- Install coolant pipe (front) ⇒ [page 199](#) .
- Install coolant pipe (top) ⇒ [page 203](#) .
- Install dipstick guide tube ⇒ [page 116](#) .
- Install poly V-belt ⇒ [page 60](#) .
- Install coolant pipes (front left) ⇒ [page 197](#) .
- Install front exhaust pipes with catalytic converter: left-side ⇒ [page 246](#) , right-side ⇒ [page 248](#) .
- Change engine oil ⇒ Maintenance ; Booklet 405 .
- Fill cooling system with fresh coolant ⇒ [page 177](#) .



2.5 Checking compression

Special tools and workshop equipment required

- ◆ Spark plug socket and extension - 3122 B-



- ◆ Compression tester - V.A.G 1763-



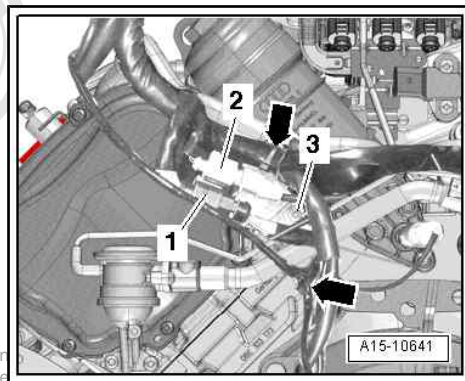
Procedure

- Engine oil temperature at least 30 °C
- Battery voltage at least 12.5 V
- Remove all ignition coils ⇒ Rep. gr. 28 .
- Unplug electrical connector -1- for injectors at rear of cylinder head (left-side).



Note

Disregard items marked -2, 3- and -arrows-.



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

- Unplug electrical connector -2- for injectors at rear of cylinder head (right-side).

**Note**

Disregard -item 1- and -arrow-.

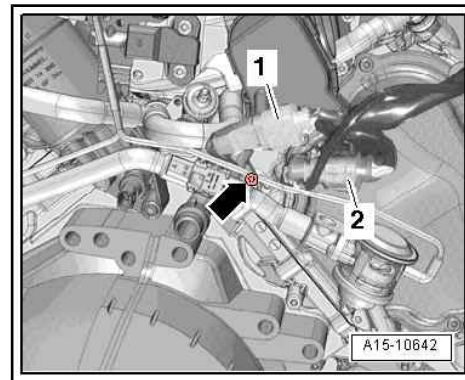
- Remove spark plugs with spark plug socket and extension - 3122 B- .
- Check compression pressure with compression tester - V.A.G 1763- (see ⇒ operating instructions for details of how to use tester).
- Have a 2nd mechanic press down the accelerator pedal completely and at the same time operate the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

Compression pressure	bar
When new	11.0 ... 14.0
Wear limit	10.0
Difference between cylinders	3.0 (maximum)

Assembling

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

- Install spark plugs ⇒ Maintenance ; Booklet 405 .
- Install ignition coils ⇒ Rep. gr. 28 .
- Faults are stored in engine control unit because connectors were unplugged and the 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 with respect to the correctness of information in this document. Copyright by AUDI AG.

3 Servicing valve gear

Overview

- ◆ ⇒ [“3.1 Exploded view - valve gear”, page 128](#)
- ◆ ⇒ [“3.2 Measuring axial clearance of camshafts”, page 131](#)
- ◆ ⇒ [“3.3 Measuring radial clearance of camshafts”, page 132](#)
- ◆ ⇒ [“3.4 Removing and installing camshafts”, page 132](#)
- ◆ ⇒ [“3.5 Checking hydraulic valve compensation elements”, page 138](#)
- ◆ ⇒ [“3.6 Renewing valve stem oil seals with cylinder head installed”, page 140](#)
- ◆ ⇒ [“3.7 Renewing valve stem oil seals with cylinder head removed”, page 143](#)
- ◆ ⇒ [“3.8 Valve dimensions”, page 147](#)
- ◆ ⇒ [“3.9 Checking valve guides”, page 147](#)
- ◆ ⇒ [“3.10 Checking valves”, page 148](#)

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.



Caution

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

- ◆ *The hydraulic tappets have to settle; wait for approx. 30 minutes after installing camshafts before starting engine.*
- ◆ *Turn the engine carefully at least 2 rotations to ensure that none of the valves make contact when the starter is operated.*



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.

3.1 Exploded view - valve gear



Note

The diagram shows the cylinder head on cylinder bank 2 (left-side).

1 - Sealing plug

- ☐ Apply sealant when installing; refer to ⇒ Electronic parts catalogue

2 - Cylinder head

- ☐ Checking valve guides ⇒ [page 147](#)

3 - Valve stem oil seal

- ☐ Renewing with cylinder head installed ⇒ [page 140](#)
- ☐ Renewing with cylinder head removed ⇒ [page 143](#)

4 - Valve spring

- ☐ Installation position ⇒ [page 130](#)

5 - Hydraulic valve compensation element

- ☐ Clipped into roller rocker finger -item 8-
- ☐ Checking ⇒ [page 138](#)
- ☐ Mark installation position for re-installation
- ☐ Lubricate contact surface before installing

6 - Valve spring plate**7 - Valve cotters****8 - 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 5- using securing clip -item 9-

9 - Securing clip

- ☐ Not supplied separately
- ☐ Check for firm attachment

10 - Inlet camshaft

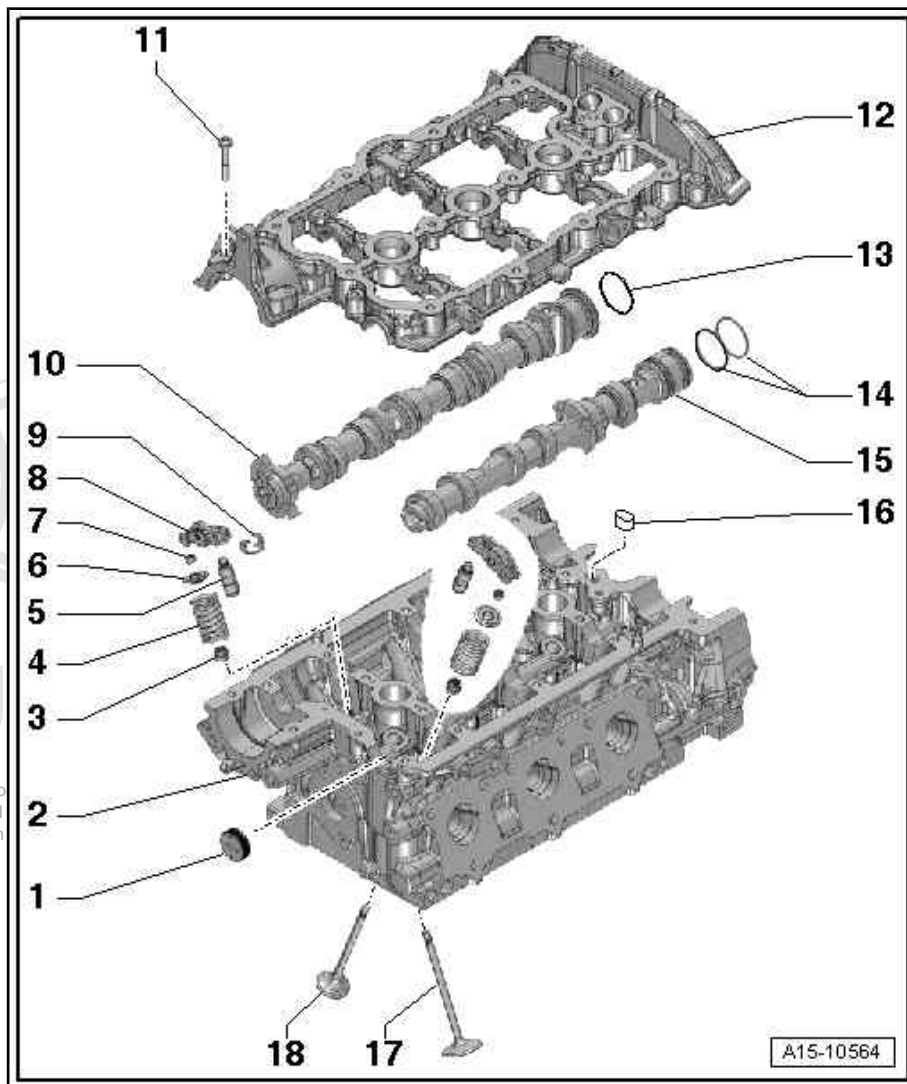
- ☐ Removing and installing ⇒ [page 132](#)
- ☐ Measuring axial clearance ⇒ [page 131](#)
- ☐ Measuring radial clearance ⇒ [page 132](#)
- ☐ Runout: max. 0.04 mm

11 - Bolt

- ☐ Renew
- ☐ Tightening torque and sequence ⇒ [page 131](#)
- ☐ Use old bolts when measuring radial clearance

12 - Retaining frame

- ☐ With integrated camshaft bearings
- ☐ Removing and installing ⇒ ["3.4 Removing and installing camshafts", page 132](#)



13 - Compression ring

14 - Rectangular section seals

15 - Exhaust camshaft

- ☐ Removing and installing ⇒ [page 132](#)
- ☐ Measuring axial clearance ⇒ [page 131](#)
- ☐ Measuring radial clearance ⇒ [page 132](#)
- ☐ Runout: max. 0.04 mm

16 - Oil strainer

- ☐ Not fitted on all versions; for allocation, refer to ⇒ Electronic parts catalogue

17 - Inlet valve

- ☐ Must not be machined; only grinding-in is permissible
- ☐ Mark installation position for re-installation
- ☐ Checking ⇒ [page 148](#)
- ☐ Valve dimensions ⇒ [page 147](#)
- ☐ Checking valve guides ⇒ [page 147](#)

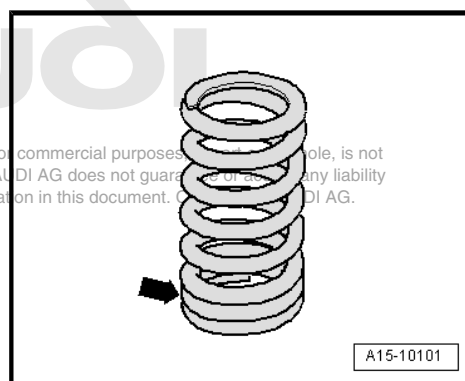
18 - Exhaust valve

- ☐ Must not be machined; only grinding-in is permissible
- ☐ Mark installation position for re-installation
- ☐ Checking ⇒ [page 148](#)
- ☐ Valve dimensions ⇒ [page 147](#)
- ☐ Checking valve guides ⇒ [page 147](#)

Position of valve spring

- Closely spaced spring coils -arrow- face towards cylinder head.

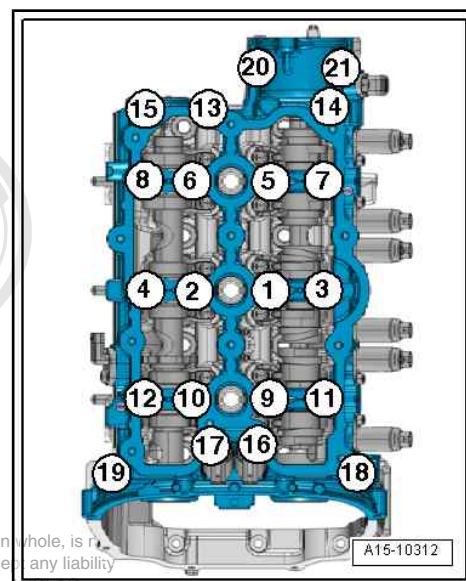
Protected by copyright. Copying for private or commercial purposes without the express written permission of AUDI AG is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. © AUDI AG.



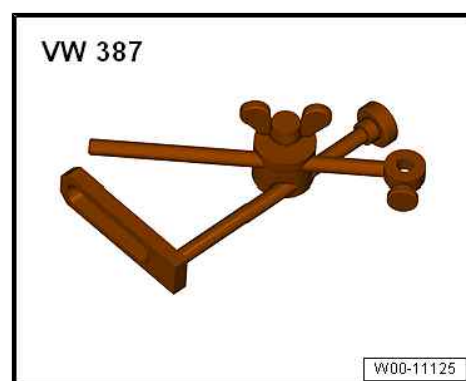
Retaining frame for camshafts - tightening torque and sequence**Note**

- ◆ *The illustration shows the retaining frame for the camshafts of the left-hand cylinder head. The procedure is symmetrically opposite on the right-hand cylinder head.*
 - ◆ *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 ... 21-	Screw in by hand until they make contact. • The retaining frame should make contact with the cylinder head over the full surface
2.	-1 ... 21-	8 Nm
3.	-1 ... 21-	Turn 90° further

**3.2 Measuring axial clearance of camshafts****Special tools and workshop equipment required**

- ◆ Universal dial gauge bracket - VW 387-

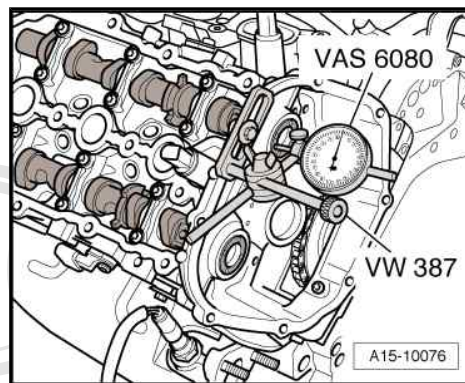


- ◆ Dial gauge - VAS 6080-



Procedure

- Remove camshafts ⇒ [page 132](#) .
- Mark allocation of roller rocker fingers for re-installation.
- Carefully remove roller rocker fingers and place them on a clean surface.
- Re-insert camshafts, install retaining frame ⇒ [page 131](#) and tighten with old bolts to 8 Nm.
- Secure universal dial gauge bracket - VW 387 - with dial gauge - VAS 6079 - to cylinder head as shown in illustration.
- 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

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.

Special tools and workshop equipment required

- ◆ Plastigage

Procedure

- Remove roller rocker fingers
⇒ ["3.4 Removing and installing camshafts", page 132](#) .
- Clean bearings and bearing journals.
- Place a length of Plastigage corresponding to the width of the bearing on the bearing journal or bearing shell to be measured.
- The Plastigage must be positioned in the centre of the bearing.
- Fit retaining frame and secure with old bolts ⇒ [page 131](#) without rotating camshafts.
- Remove retaining frame again.
- Compare width of Plastigage with measurement scale.

Radial clearance:

- 24 mm bearing diameter: 0.024 ... 0.066 mm.
- 36 mm bearing diameter: 0.032 ... 0.078 mm.
- When carrying out final assembly, use new bolts.

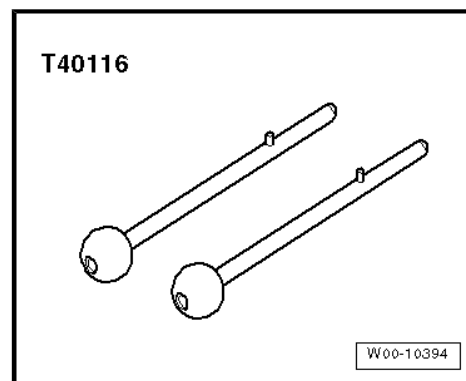
3.4 Removing and installing camshafts

Special tools and workshop equipment required

- ◆ Impact extractor attachment -T10133/3- from tool set for FSI engines - T10133-



◆ Locating pins - T40116-

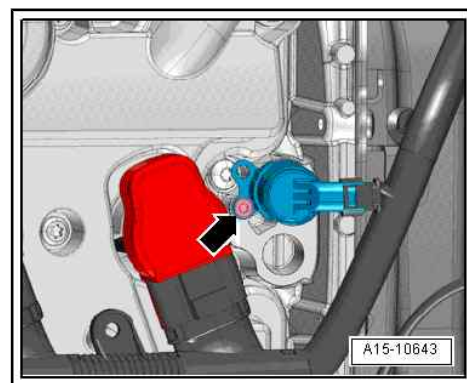


- ◆ Electric drill with plastic brush attachment
- ◆ Safety goggles
- ◆ Sealant ➔ Electronic parts catalogue

Removing

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted. Remove timing chains from camshafts ➔ page 92. Audi AG assumes no liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Remove timing chains from camshafts ➔ page 92
- To remove camshafts in cylinder head (left-side), first remove vacuum pump for brake servo ➔ Rep. gr. 47 .
- To remove camshafts in cylinder head (right-side), first remove high-pressure pump and housing for high-pressure pump drive ➔ Rep. gr. 24 .
- Remove bolt -arrow- and detach camshaft control valve.

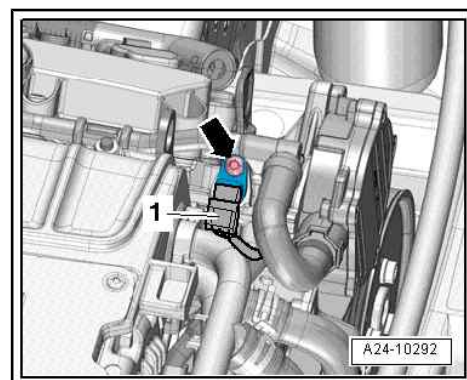


- Unplug electrical connector -1- at Hall sender.



Note

Disregard -arrow-.



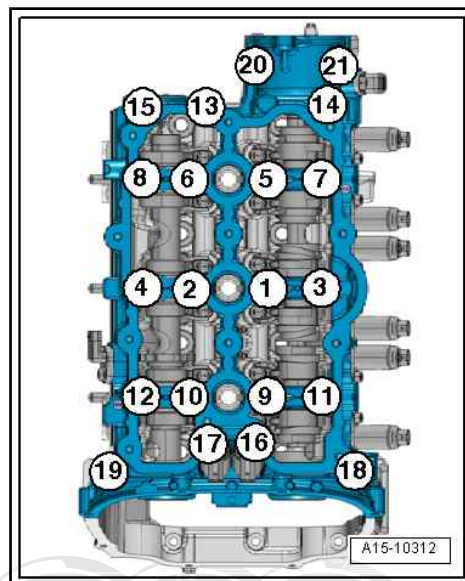
- Slacken retaining frame bolts in the sequence -21 ... 1-.



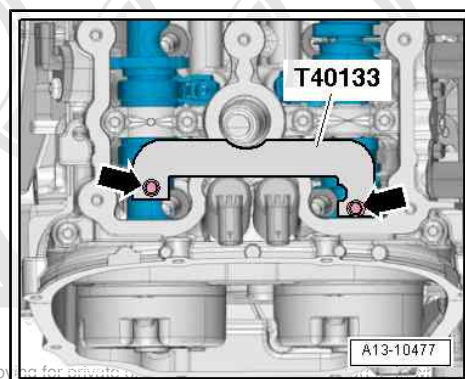
Note

Perform the same procedure (laterally reversed) on retaining frame (right-side).

- Remove bolts, carefully release retaining frame from bonded joint and set it down on a soft surface on workbench.



- Remove camshaft clamp - T40133- -arrows-.
- Mark and remove camshafts.



Protected by copyright. Copying for private use 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.

Installing



Note

Renew seals/gaskets and sealing plugs.

- Crankshaft -1- locked in position with locking pin - T40069- .
- Hydraulic compensation elements and roller rocker fingers installed.



Caution

Protect lubrication system and bearings against contamination.

- ◆ *Cover exposed parts of the engine.*



WARNING

Risk of eye injury.

- ◆ *Wear safety goggles.*

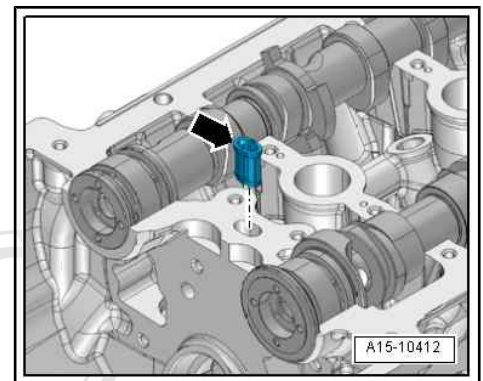
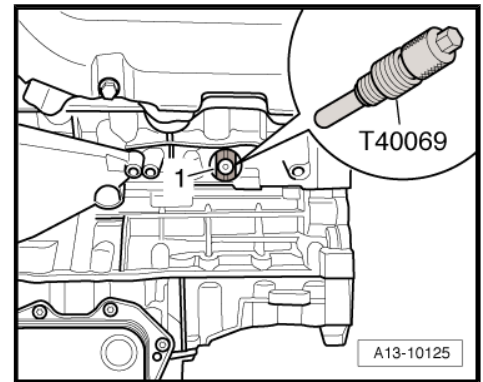
- Remove remaining sealant from cylinder head and retaining frame using rotating plastic brush or similar.
- Clean sealing surfaces; they must be free of oil and grease.
- Check strainer -arrow- for dirt and clean as necessary.



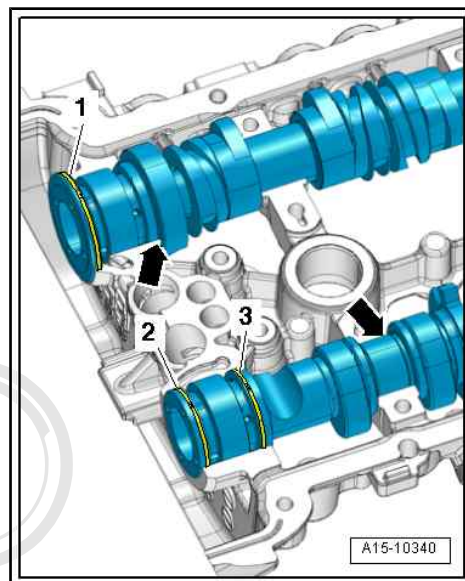
Note

Strainer -2- is not fitted on all versions; for allocation refer to ⇒ Electronic parts catalogue .

- Oil running surfaces of both camshafts.

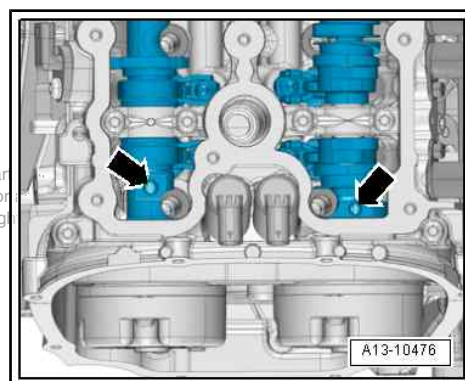


- Fit camshafts in retaining frame.
- Camshafts must be in correct position in axial bearings -arrows- in retaining frame.
- The ends of the rectangular section seals -1, 2, 3- must point up or down, never to the side.
- Turn retaining frame over with camshafts fitted, holding camshafts firmly in position.

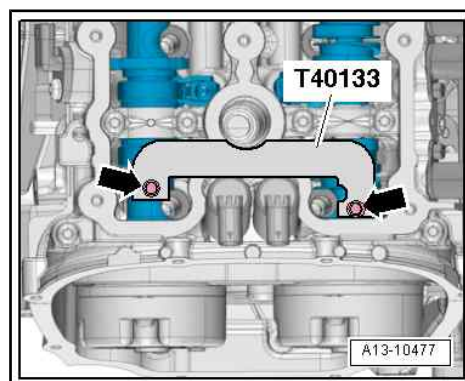


- Turn camshafts until threaded holes -arrows- point upwards.
- Check that camshafts are still in correct position in axial bearings in retaining frame.

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



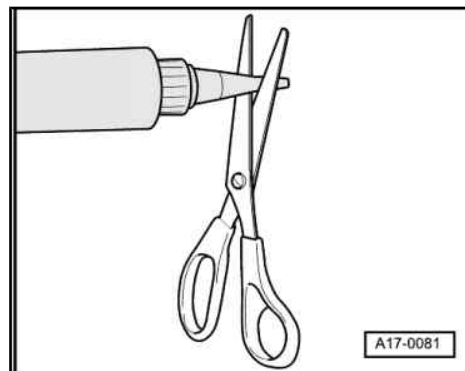
- Fit camshaft clamps - T40133- onto both cylinder heads and tighten bolts -arrows- to 25 Nm.



Note

Note the use-by date of the sealant.

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



- Turn retaining frame upside down again.

**Caution**

Make sure lubrication system is not clogged by excess sealant.

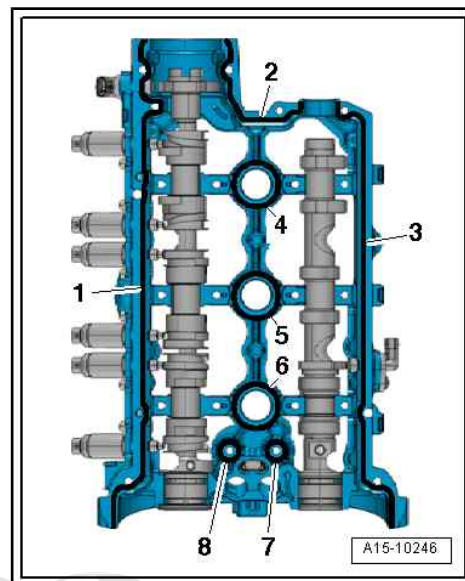
- ◆ *The beads of sealant must not be thicker than specified.*

- Apply beads of sealant -4 ... 8- onto clean sealing surfaces of retaining frame as shown in illustration.
- Width of beads of sealant: 2.0 mm.
- Apply beads of sealant -1 ... 3- onto clean sealing surfaces of retaining frame as shown in illustration.
- Width of beads of sealant: 2.5 mm.

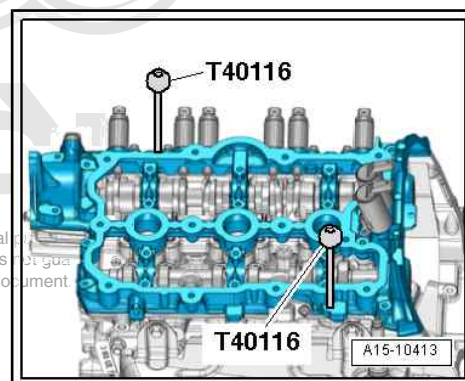
**Note**

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

- Fit retaining frame onto cylinder head.
- Insert locating pins -T40116- in retaining frame and cylinder head.



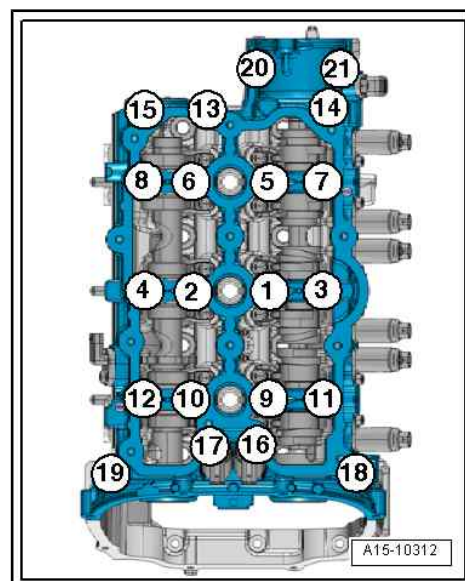
Protected by copyright. Copying for private or commercial use is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee with respect to the correctness of information in this document.



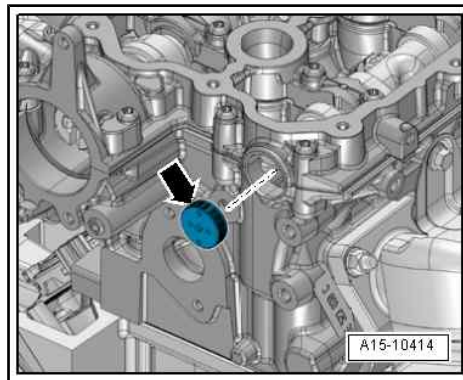
- Tighten bolts securing retaining frame for camshafts
⇒ [page 131](#).

**Note**

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



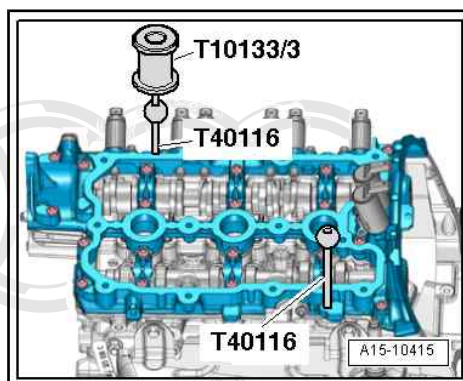
- Clean bore for sealing plug in cylinder head; it must be free of oil and grease.
- Coat outer circumference of sealing plug -arrow- with sealant; for sealant refer to ⇒ Electronic parts catalogue .
- Drive in sealing plug until flush.



- Use impact extractor attachment -T40116- to pull out locating pins -T10133/3- .

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

- Install vacuum pump for brake servo ⇒ Rep. gr. 47 .
- Install housing for high-pressure pump drive and high-pressure pump ⇒ Rep. gr. 24 .
- Fit timing chains on camshafts ⇒ [page 92](#) .



Caution

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

- ◆ **The hydraulic tappets have to settle; wait for approx. 30 minutes after installing camshafts before starting engine.**
- ◆ **Turn the engine carefully at least 2 rotations to ensure that none of the valves make contact when the starter is operated.**

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.

3.5 Checking hydraulic valve compensation elements

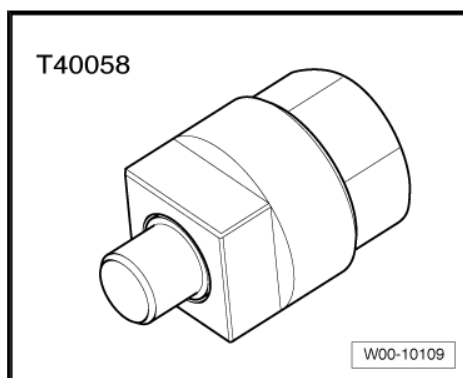


Note

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

Special tools and workshop equipment required

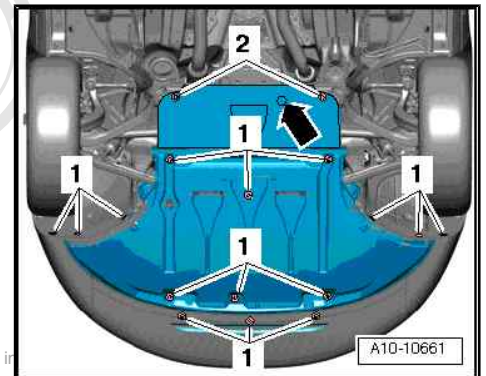
- ◆ Adapter - T40058-



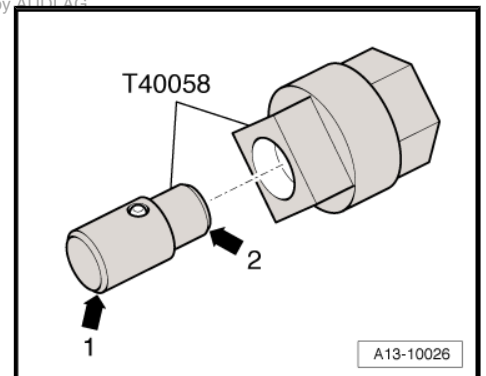
◆ Feeler gauge

Procedure

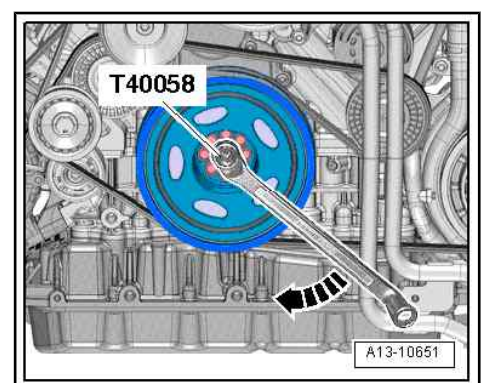
- Start engine and run until radiator fan has started up once.
- Increase engine speed to approx. 2500 rpm for 2 minutes (perform road test if necessary).
- If the compensation elements are still noisy, locate the defective compensation element as follows:
- Remove cylinder head cover: left-side ⇒ [page 116](#) ; right-side ⇒ [page 117](#) .
- Release fasteners -1- and remove front noise insulation panel.



- Insert guide pin of adapter -T40058- as follows:
- The larger-diameter section -arrow 1- faces towards the engine.
- The smaller-diameter section -arrow 2- faces the adapter.



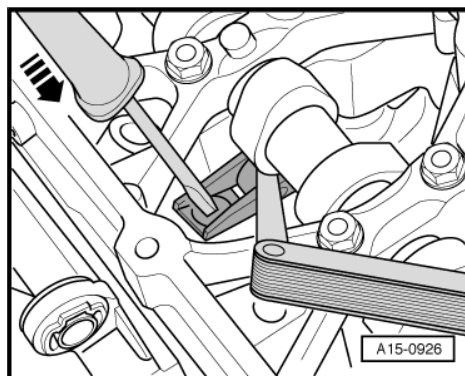
- Turn crankshaft with adapter - T40058- in direction of engine rotation -arrow- until cam of hydraulic compensation element to be tested faces upwards.



- 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 132](#) .

Additional steps required

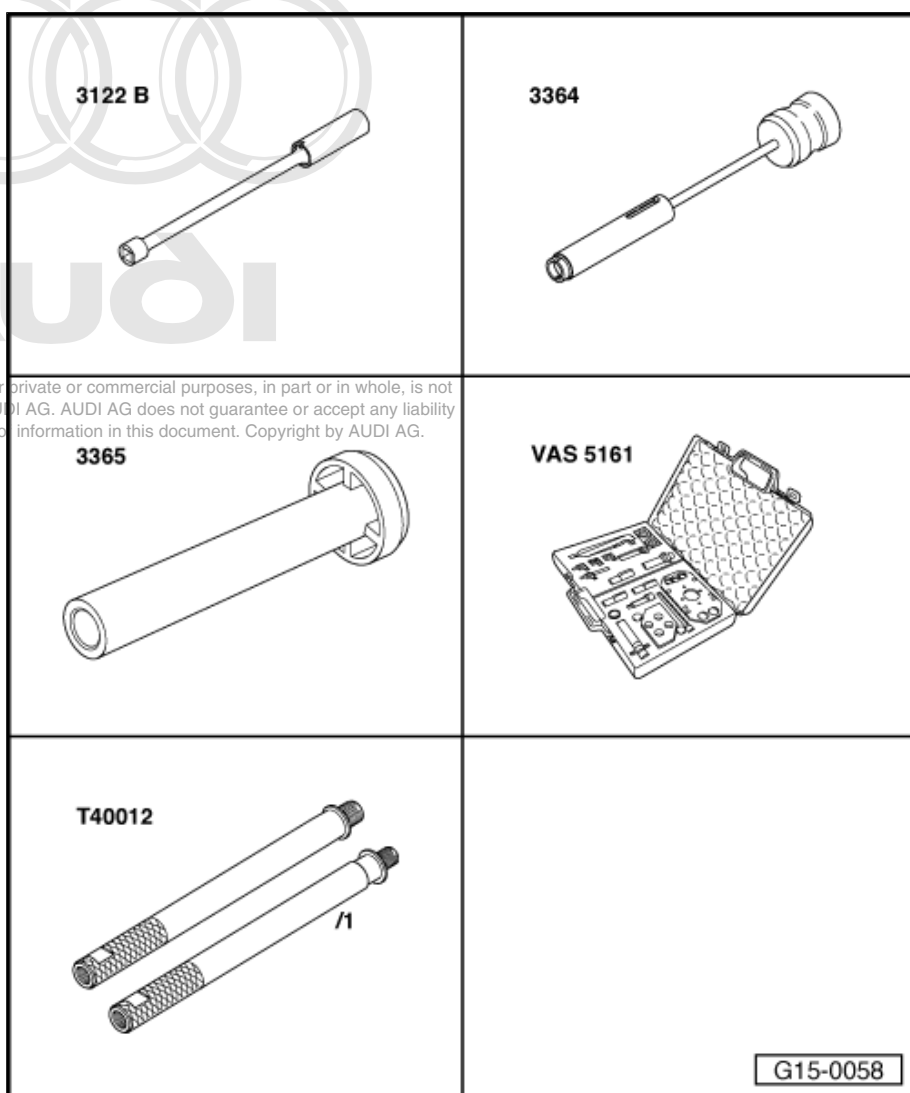
- Install cylinder head cover: left-side ⇒ [page 116](#) ; right-side ⇒ [page 117](#) .
- Install noise insulation ⇒ Rep. gr. 50 .



3.6 Renewing valve stem oil seals with cylinder head installed

Special tools and workshop equipment required

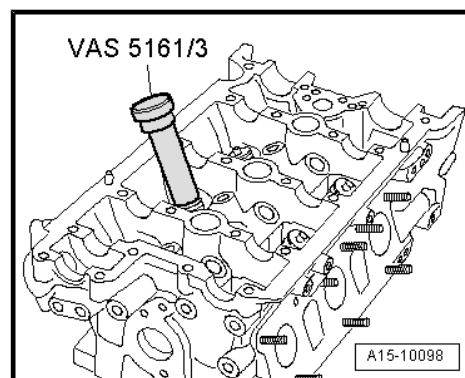
- ◆ Spark plug socket and extension - 3122 B-
- ◆ Valve stem seal puller - 3364-
- ◆ Valve stem seal fitting tool - 3365-
- ◆ Removal and installation device for valve cotters - VAS 5161- with guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B-
- ◆ Adapters - T40012-



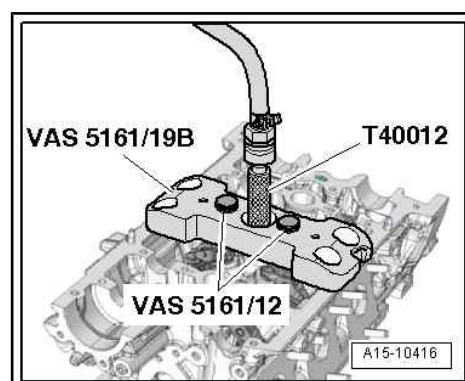
Procedure

- Remove camshafts ⇒ [page 132](#) .
- 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.

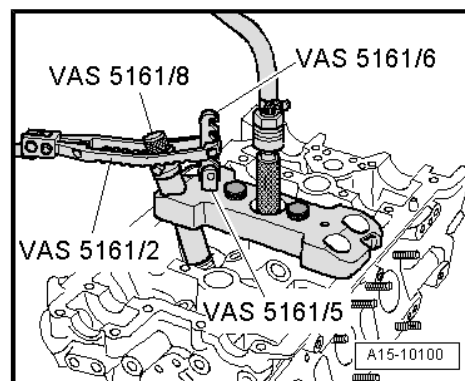
- Remove spark plugs with spark plug socket and extension - 3122 B- .
- Set piston of appropriate cylinder to “bottom dead centre”.
- Apply drift -VAS 5161/3- to valve spring plate and use plastic-headed hammer to release sticking valve cotters.



- Fit guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B- 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

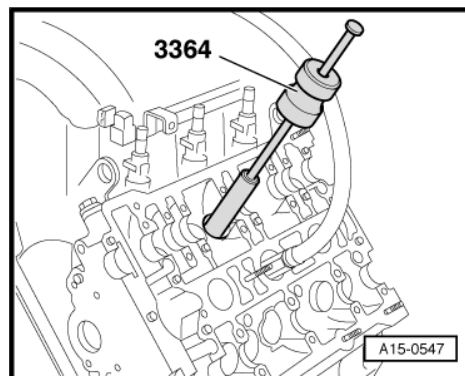


- Screw snap-in device -VAS 5161/6- with engaging fork - VAS 5161/5- into guide plate.
- Insert assembly cartridge -VAS 5161/8- in guide plate.
- Attach pressure fork -VAS 5161/2- to snap-in device and push assembly cartridge down.
- At the same time, turn knurled screw of assembly cartridge clockwise 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.



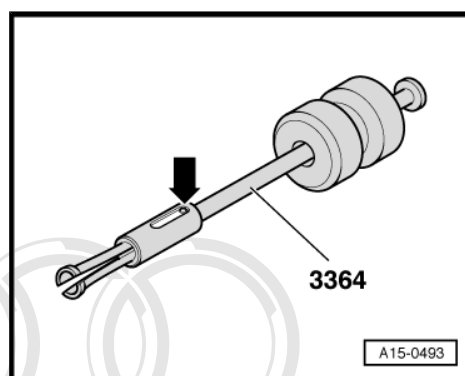
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted. Audi AG does not accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

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

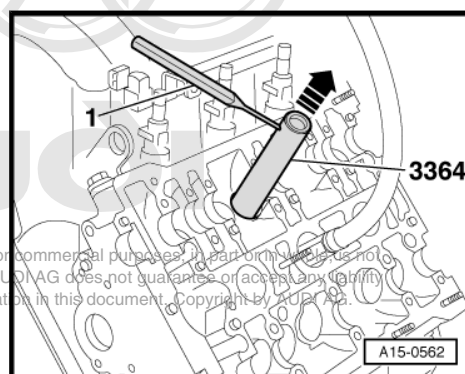


If the puller -3364- cannot be used on some of the valve stem oil seals due to the confined space, proceed as follows:

- Knock out pin -arrow- of puller using a drift and remove impact extractor attachment.



- Apply bottom section of puller -3364- to valve stem oil seal.
- Secure puller with a punch or roll-pin drift -1-, as shown in illustration.
- Apply assembly lever to puller and pull out valve stem oil seal -arrow-.



Protected by copyright. Copying for private or commercial purposes in any form whatsoever 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.

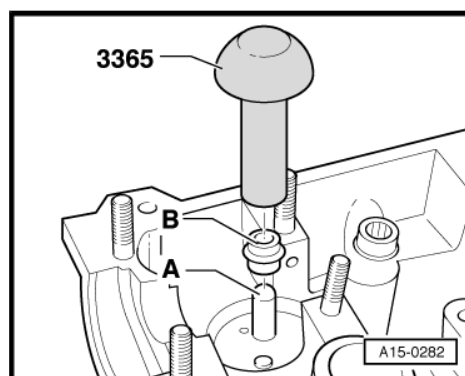


Caution

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

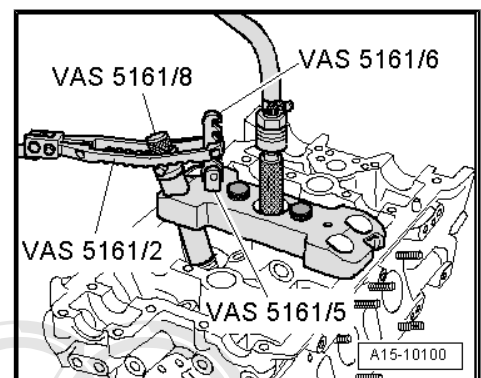
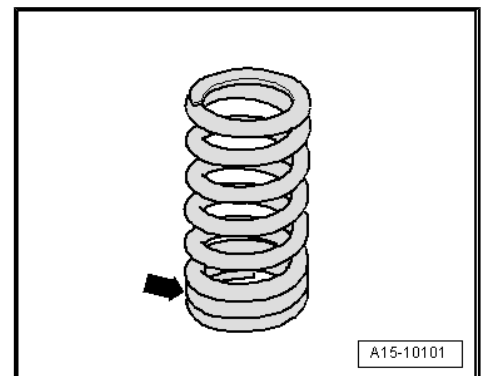
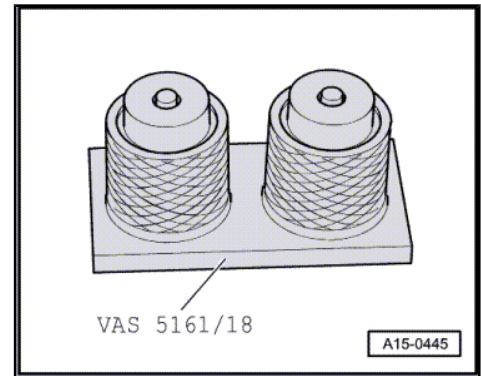
- ◆ ***New valve stem oil seals -B- are supplied with plastic sleeve; fit plastic sleeve -A- onto valve stem.***

- 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 had 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.
- Installation position: Closely spaced spring coils -arrow- face towards cylinder head.
- Secure guide plate back onto cylinder head.
- 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 cotters.
- Release pressure fork with knurled screw still in pulled position.
- Repeat procedure for each valve.



Assembling

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 132](#) .
- Install spark plugs ⇒ Maintenance ; Booklet 405 .



Caution

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

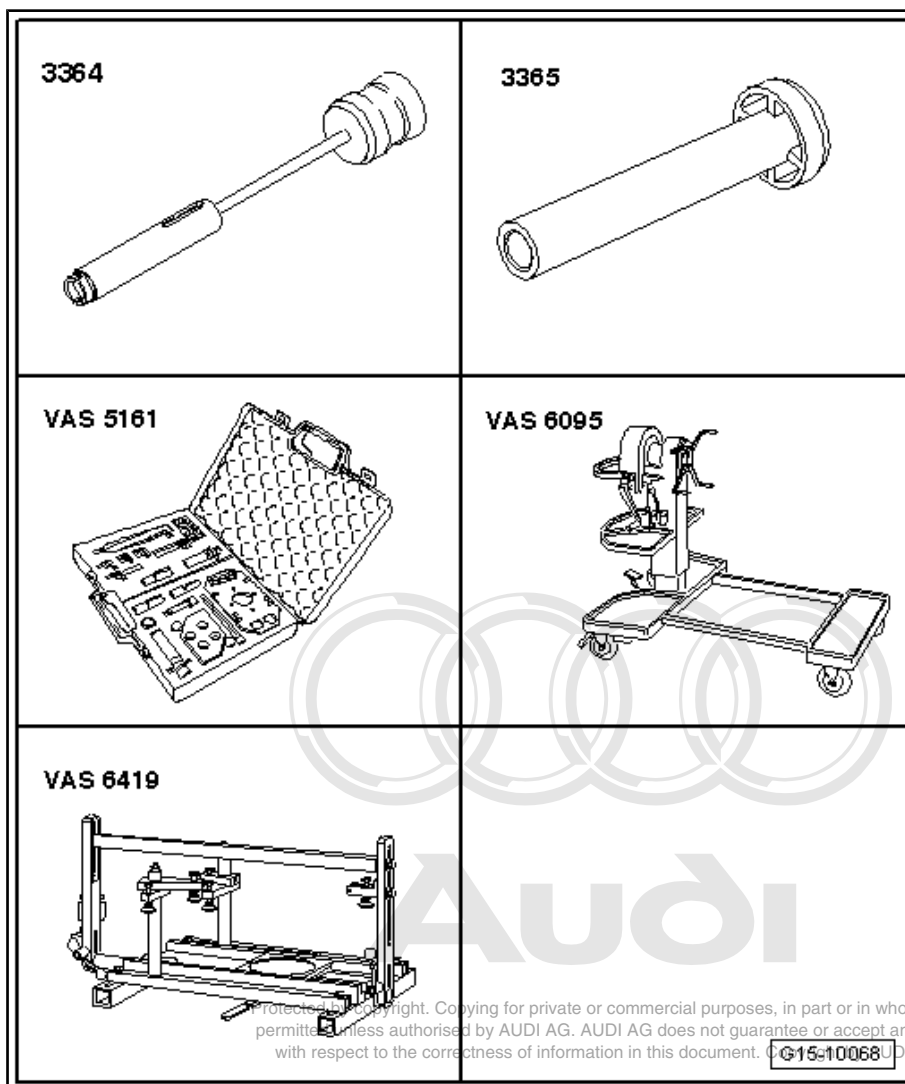
- ◆ **The hydraulic tappets have to settle; wait for approx. 30 minutes after installing camshafts before starting engine.**
- ◆ **Turn the engine carefully at least 2 rotations to ensure that none of the valves make contact when the starter is operated.**

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. The copyright in this document is reserved to the copyright owner. Copyright by AUDI AG.

3.7 Renewing valve stem oil seals with cylinder head removed

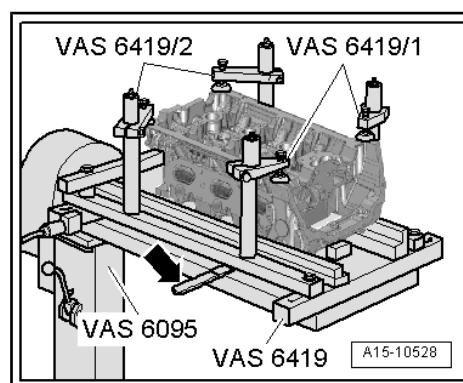
Special tools and workshop equipment required

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

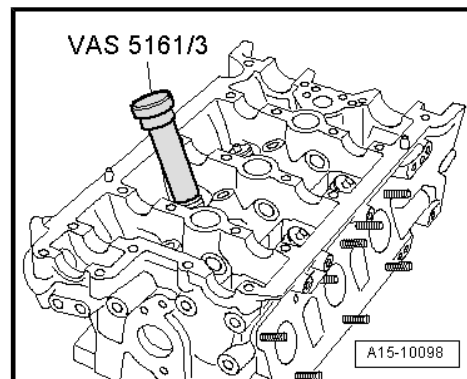


Procedure

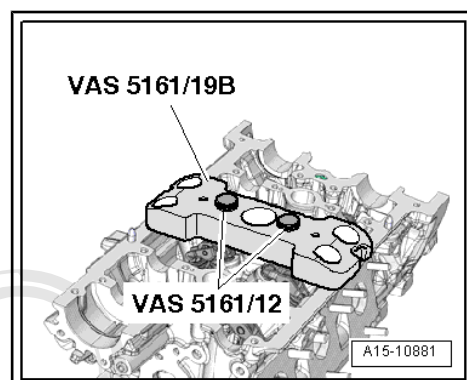
- Remove camshafts ⇒ [page 132](#) .
- Mark original positions of roller rocker fingers and hydraulic compensation elements for re-installation.
- Remove roller rocker fingers together with hydraulic compensation elements and put down on a clean surface.
- Insert cylinder head tensioning device - VAS 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.
- 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.



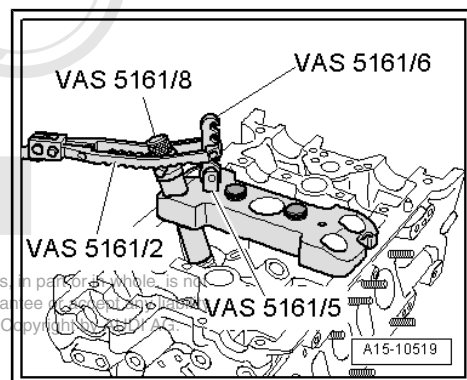
- Apply drift -VAS 5161/3- to valve spring plate and use plastic-headed hammer to release sticking valve cotters.



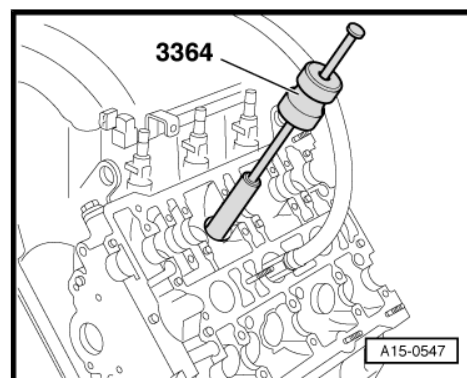
- Fit guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B- onto cylinder head.
- Secure guide plate with knurled screws -VAS 5161/12- .



- Screw snap-in device -VAS 5161/6- with engaging fork - VAS 5161/5- into guide plate.
- Insert assembly cartridge -VAS 5161/8- 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- .

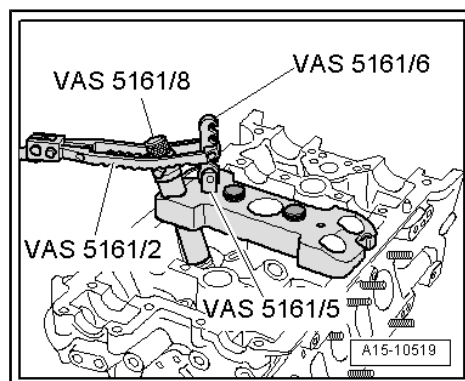
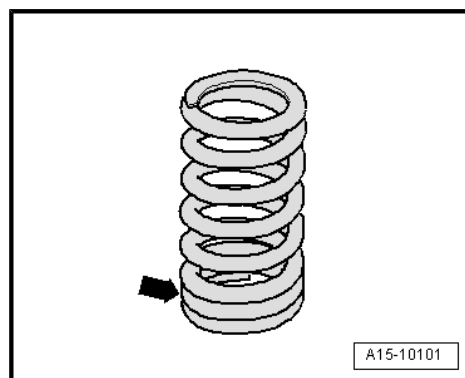
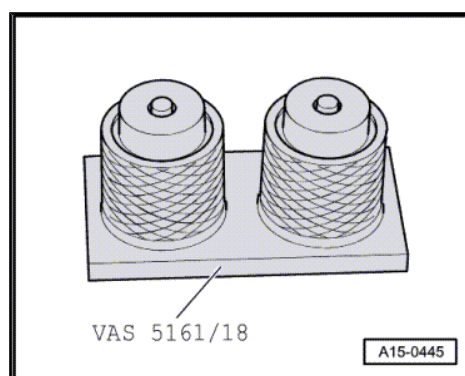
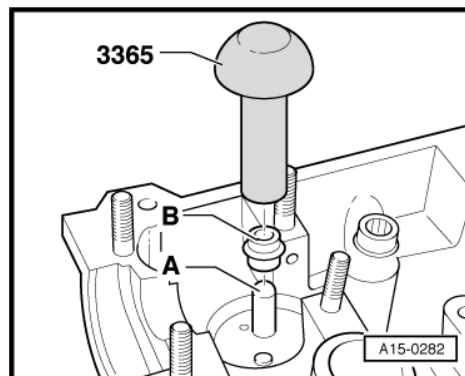
- Larger diameter of valve cotters faces upwards.
- Press assembly cartridge onto insertion device from above and pick up valve cotters.
- Insert valve spring and valve spring plate.
- Installation position: Closely spaced spring coils -arrow- face towards cylinder head.

- Secure guide plate back onto cylinder head.
- 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 cotters.
- Release pressure fork with knurled screw still in pulled position.
- Repeat procedure for each valve.

Assembling

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 132](#) .



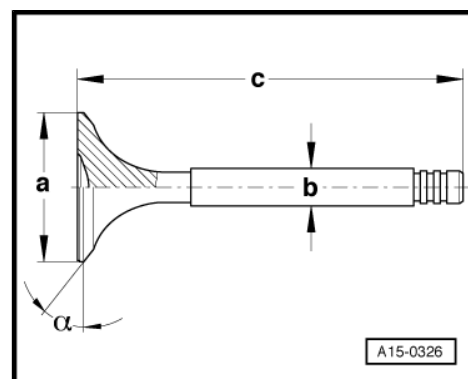
3.8 Valve dimensions



Note

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

Dimension		Inlet valve	Exhaust valve
$\varnothing a$	mm	33.85 ± 0.10	28.0 ± 0.1
$\varnothing b$	mm	5.98 ± 0.01	5.96 ± 0.01
c	mm	104.0 ± 0.2	101.9 ± 0.2
α	$^{\circ}$	45	45



WARNING

- ◆ *Care must be taken when disposing of old sodium-cooled exhaust valves.*
- ◆ *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. After preparing the valves, throw a maximum of ten into a bucket of water. Then step away immediately, since a chemical reaction will occur in which the sodium filling burns.*
- ◆ *After performing these steps the valves can be disposed of in the normal way.*

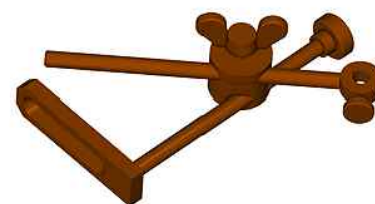
3.9 Checking valve guides

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted without the express 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.

Special tools and workshop equipment required

- ◆ Universal dial gauge bracket - VW 387-

VW 387



W00-11125

- ◆ Dial gauge - VAS 6079-

VAS 6079



W00-11309

Procedure



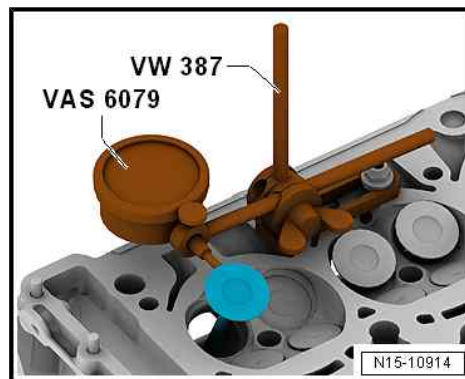
Note

- ◆ *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.

Copyright © Audi AG. 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 (bottom section), sump (top section), oil pump, engine oil cooler

Overview

- ◆ ⇒ [“1.1 Exploded view - sump \(bottom section\), sump \(top section\), oil pump, engine oil cooler”, page 149](#)
- ◆ ⇒ [“1.2 Removing and installing oil level and oil temperature sender G266”, page 153](#)
- ◆ ⇒ [“1.3 Removing and installing sump \(bottom section\)”, page 153](#)
- ◆ ⇒ [“1.4 Removing and installing oil pump”, page 155](#)
- ◆ ⇒ [“1.5 Removing and installing sump \(top section\)”, page 155](#)



Caution

Risk of damage to catalytic converter.

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



Note

- ◆ *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 galleries carefully and renew the oil spray jets, engine oil cooler and oil filter.*
- ◆ *Refer to ⇒ Maintenance tables for engine oil capacity, oil specifications and viscosity grades.*

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



Note

Oil spray jet for piston cooling ⇒ [page 79](#).

1 - Nut

- ☐ 9 Nm

2 - Oil level and oil temperature sender - G266-

- ☐ Removing and installing
⇒ [page 153](#)

3 - Seal

- ☐ Renew

4 - Sump (bottom section)

- ☐ Removing and installing
⇒ [page 153](#)

5 - Bolt

- ☐ 9 Nm

6 - Baffle plate (bottom)
7 - Bolt

- ☐ Tightening torque and
sequence ⇒ [page 152](#)

8 - Sump (top section)

- ☐ Removing and installing
⇒ [page 155](#)

9 - Dowel sleeve

- ☐ 2x

10 - O-ring

- ☐ Inserted in retaining
frame
- ☐ Renew

11 - Bolt

- ☐ Apply locking fluid when
installing; refer to ⇒
Electronic parts cata-
logue
- ☐ 9 Nm

12 - Baffle plate (top)
13 - Seal

- ☐ Inserted in retaining frame
- ☐ Renew

14 - Gasket

- ☐ Renew

15 - Bolt

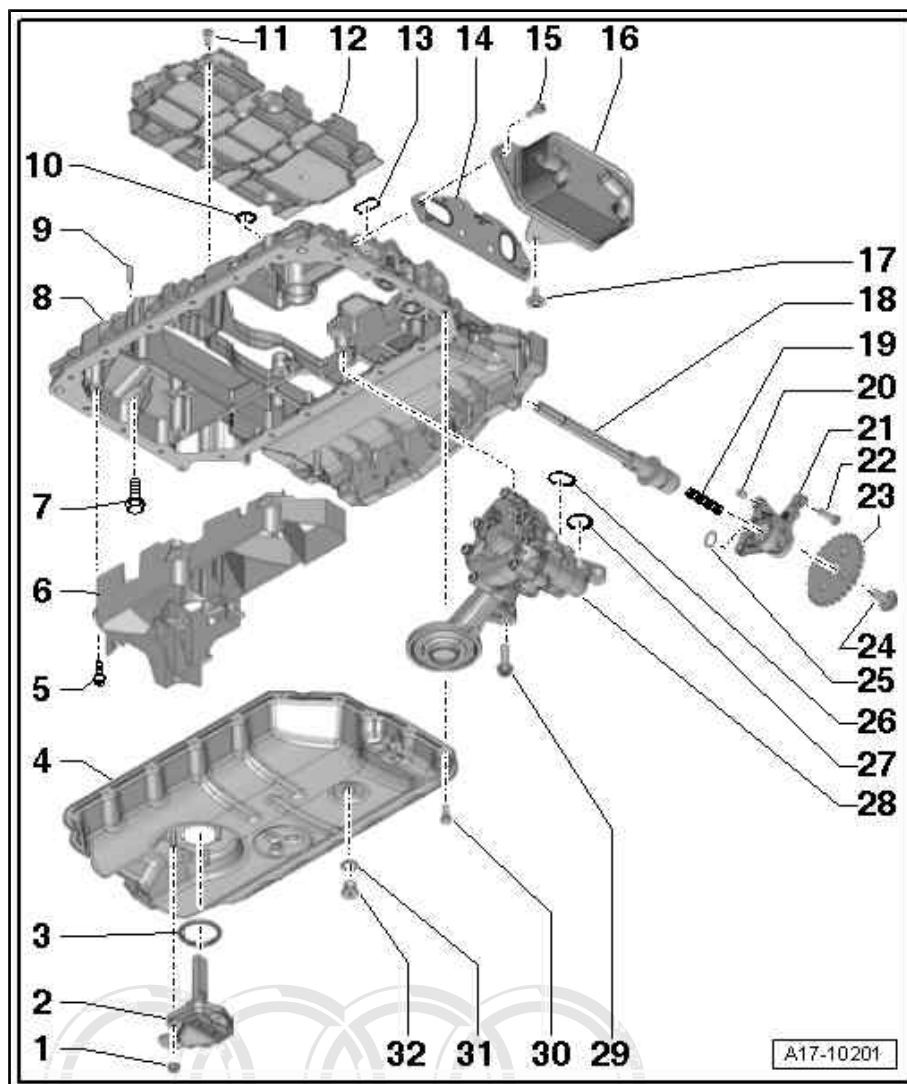
- ☐ 9 Nm

16 - Engine oil cooler

- ☐ See note ⇒ [page 149](#)
- ☐ Removing and installing ⇒ [page 158](#)
- ☐ With oil cooler bypass valve

17 - Bolt

- ☐ 9 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.

18 - Oil pump drive shaft

19 - Compression spring

20 - Sleeve

- ☐ 2x

21 - Bearing bracket

22 - Bolt

- ☐ 9 Nm

23 - Chain sprocket for oil pump

- ☐ Can only be fitted in one position on drive shaft

24 - Bolt

- ☐ Renew
- ☐ To loosen and tighten, use pin wrench - 3212- to counterhold chain sprocket
- ☐ 30 Nm + turn 90° further

25 - O-ring

- ☐ Renew

26 - Seal

- ☐ Renew

27 - O-ring

- ☐ Renew

28 - Oil pump

- ☐ Do not dismantle
- ☐ Removing and installing ⇒ [page 155](#)

29 - Bolt

- ☐ 20 Nm

30 - Bolt

- ☐ Renew
- ☐ Tightening torque and sequence ⇒ [page 151](#)

31 - Seal

- ☐ Renew

32 - Oil drain plug

- ☐ 30 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.

Sump (bottom section) - tightening torque and sequence

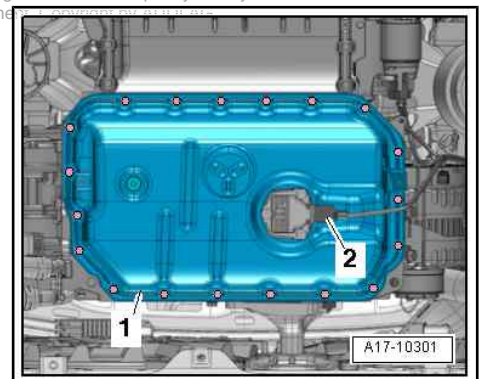


Note

Renew the bolts tightened with specified tightening angle.

– Tighten bolts in 2 stages as follows:

Stage	Tightening torque/angle specification
1.	3 Nm in diagonal sequence
2.	Turn 90° further in diagonal sequence



Sump (top section) - tightening torque and sequence

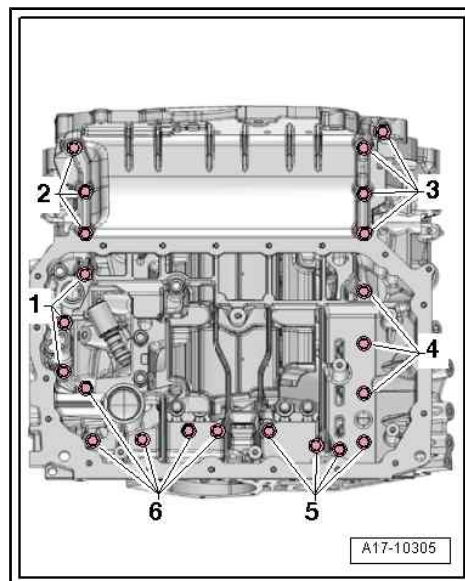


Note

Renew the bolts tightened with specified tightening angle.

– Tighten bolts in 2 stages as follows:

Stage	Bolts	Tightening torque/angle specification
1.	-1 ... 6-	8 Nm in diagonal sequence
2.	-1 ... 6-	Turn 90° further in diagonal sequence



Valve for oil pressure control - N428-

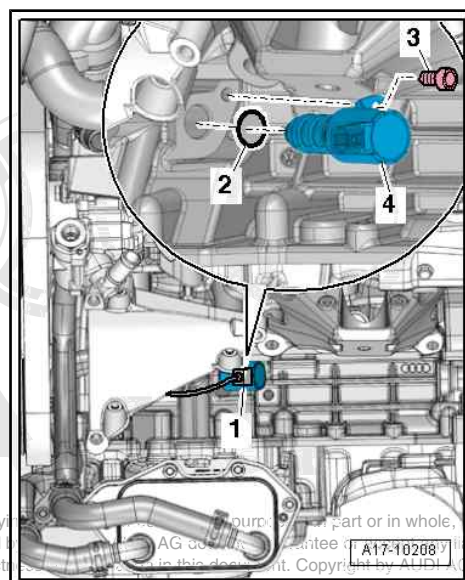
1 - Electrical connector

2 - O-ring - renew

3 - Bolt, 9 Nm

4 - Valve for oil pressure control - N428-

– Removing and installing valve for oil pressure control - N428-
⇒ [page 167](#) .



Protected by copyright. Copying or reproduction in any form or by any means, in whole or in part, is not permitted unless authorised in writing by Audi AG. This document is the property of Audi AG and is to be used only for the purpose intended. Copyright by Audi AG.

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

Removing

- Drain off engine oil ⇒ Maintenance ; Booklet 405 .
- Unplug electrical connector -3-.
- Remove nuts -1- and detach oil level and oil temperature sender - G266- -item 4- with seal -2-.

Installing

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

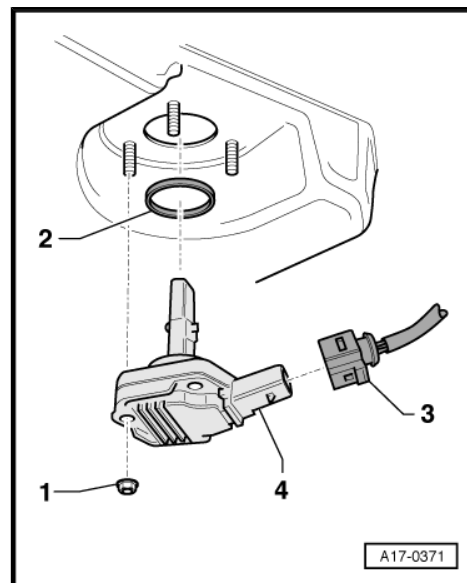
- Tightening torque
⇒ ["1.1 Exploded view - sump \(bottom section\), sump \(top section\), oil pump, engine oil cooler", page 149](#)



Note

Renew seal.

- Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 405 .



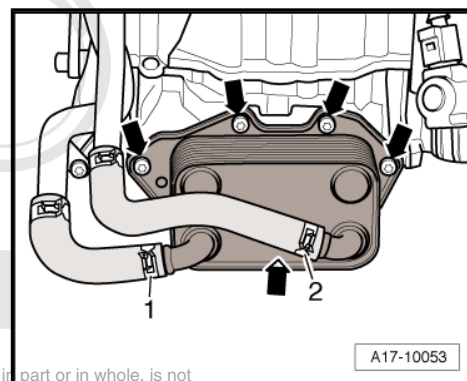
1.3 Removing and installing sump (bottom section)

Special tools and workshop equipment required

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

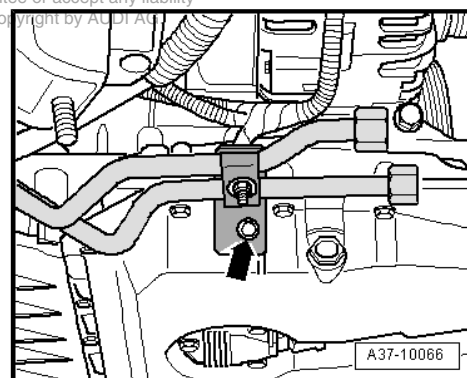
Removing

- Drain off engine oil ⇒ Maintenance ; Booklet 405 .
- Remove bolts -arrows- and remove engine oil cooler (coolant hoses -1- and -2- remain connected).



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 in this document. Copyright by AUDI AG.

- Remove bolt -arrow- securing bracket for ATF lines on sump (bottom section).



- Unplug electrical connector -2- at oil level and oil temperature sender - G266- and move electrical wiring clear.
- Remove bolts for sump (bottom section) -1-.
- Carefully release sump (bottom section) from bonded joint.

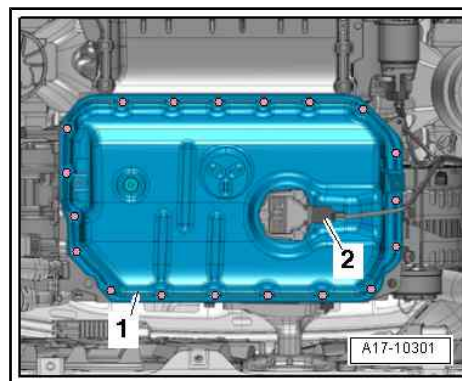
Installing

- Tightening torques
⇒ ["1.1 Exploded view - sump \(bottom section\), sump \(top section\), oil pump, engine oil cooler", page 149](#)



Note

- ◆ *Renew seal and gaskets.*
- ◆ *The sump (bottom section) must be renewed if its coating is damaged or if it is bent.*



Caution

Protect lubrication system and bearings against contamination.

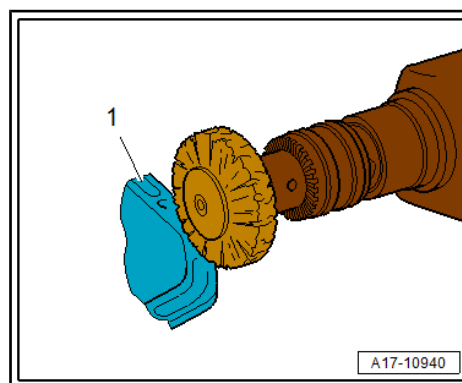
- ◆ *Cover exposed parts of the engine.*



WARNING

Risk of eye injury.

- ◆ *Wear safety goggles.*



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



Note

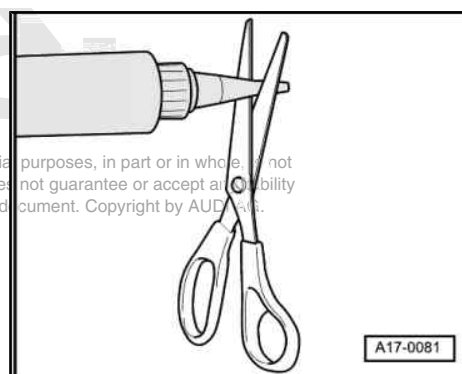
Take care not to damage the coating on the sump (bottom section).



Note

Note the use-by date of the sealant.

- Cut off nozzle of tube at front marking (nozzle Ø approx. 1 mm).



**Caution**

Make sure lubrication system is not clogged by excess sealant.

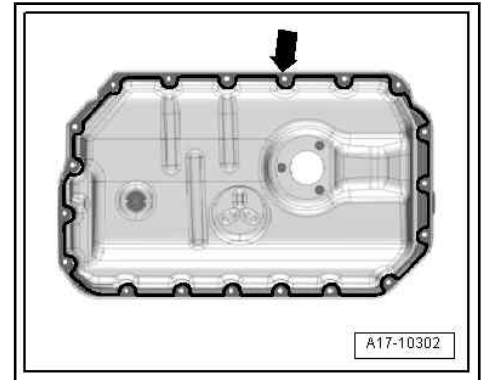
◆ ***The bead of sealant must not be thicker than specified.***

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

**Note**

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

- Fit sump (bottom section) and tighten bolts ⇒ [page 151](#) .
- Install engine oil cooler ⇒ [page 158](#) .
- Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 405 .



1.4 Removing and installing oil pump

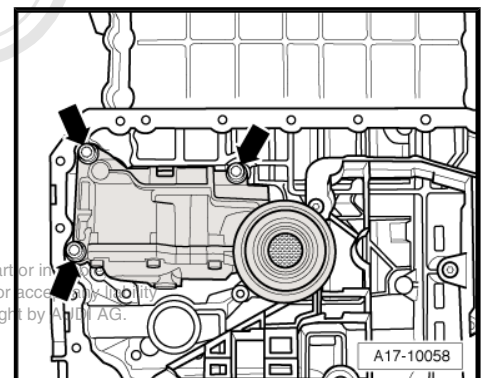
Removing

- Remove sump (bottom section) ⇒ [page 153](#) .
- Remove bolts -arrows-.
- Pull oil pump forwards off drive shaft; if required, push drive shaft slightly to rear.

Installing

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

- Tightening torque
⇒ ["1.1 Exploded view - sump \(bottom section\), sump \(top section\), oil pump, engine oil cooler", page 149](#)

**Note**

Fit new O-rings.

- Fit oil pump onto drive shaft and tighten bolts.
- Install sump (bottom section) ⇒ [page 153](#) .

1.5 Removing and installing sump (top section)

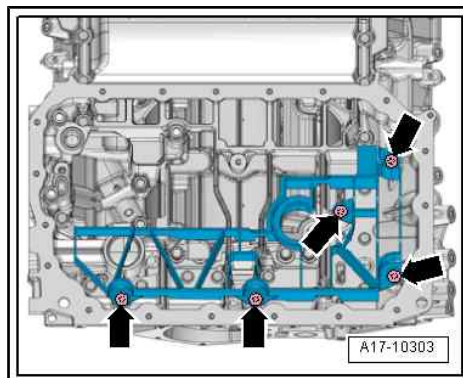
Special tools and workshop equipment required

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

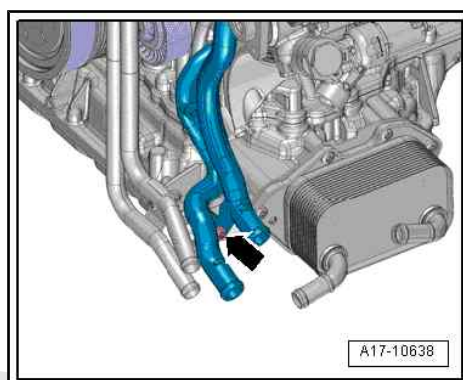
Removing

- Engine removed, engine separated from gearbox ⇒ [page 28](#) .
- Engine secured to engine and gearbox support ⇒ [page 35](#) .

- Remove timing chain cover (bottom) ⇒ [page 85](#) .
- Remove oil pump ⇒ [page 155](#) .
- Remove bolts -arrows- and detach baffle plate (bottom).



- Remove bolt -arrow- for coolant pipes (left-side).



- Remove bolts -1 ... 6- for sump (top section).
- Carefully release sump (top section) from bonded joint and pry sump off dowel pins on cylinder block.

Installing

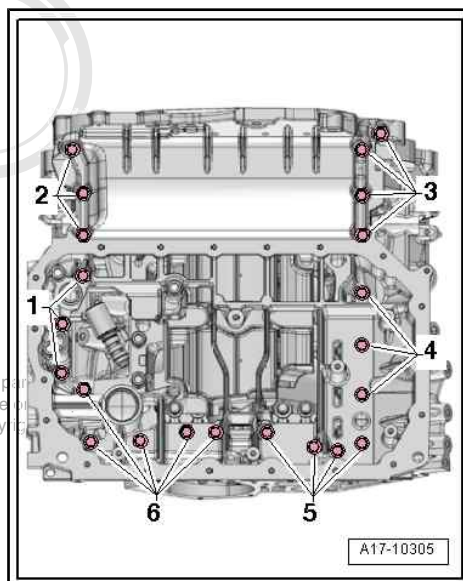
- Tightening torque
⇒ ["1.1 Exploded view - sump \(bottom section\), sump \(top section\), oil pump, engine oil cooler", page 149](#)



Note

Renew gaskets, seals and O-rings.

- Remove old sealant from grooves on sump (top section) and from sealing surfaces.





Caution

Protect lubrication system and bearings against contamination.

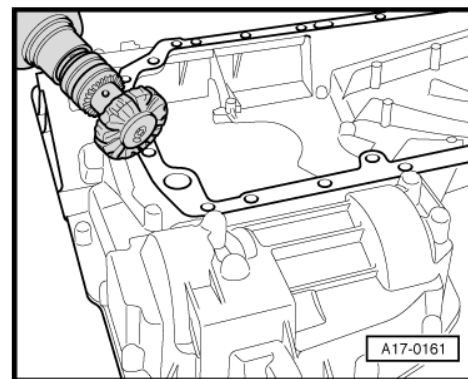
- ◆ *Cover exposed parts of the engine.*



WARNING

Risk of eye injury.

- ◆ *Wear safety goggles.*



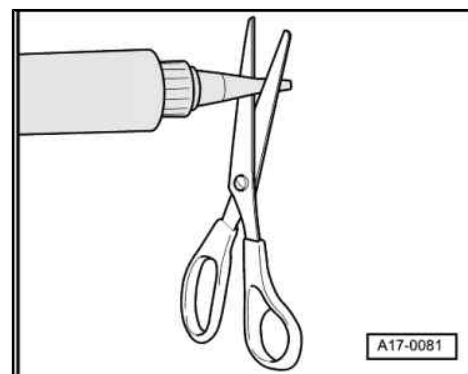
- Remove sealant residue from sump (top section) and cylinder block using rotating plastic brush or similar.
- Clean sealing surfaces; they must be free of oil and grease.



Note

Note the use-by date of the sealant.

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



Caution

Make sure lubrication system is not clogged by excess sealant.

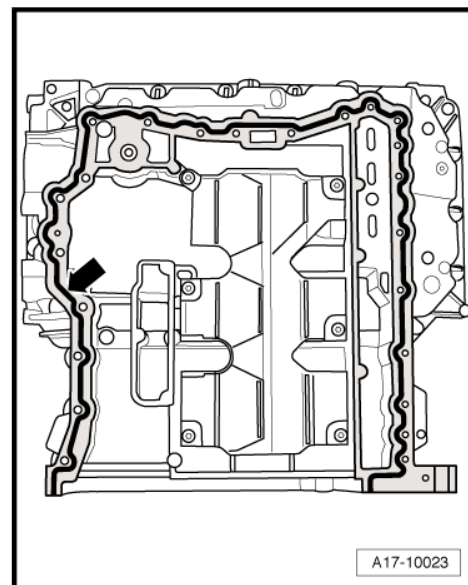
- ◆ *The bead of sealant must not be thicker than specified.*

- Apply bead of sealant -arrow- onto clean sealing surface of sump (top section) as shown in illustration.
- The grooves on the sealing surfaces must be completely filled with sealant.
- The bead of sealant must project 1.5 ... 2.0 mm above the sealing surface.

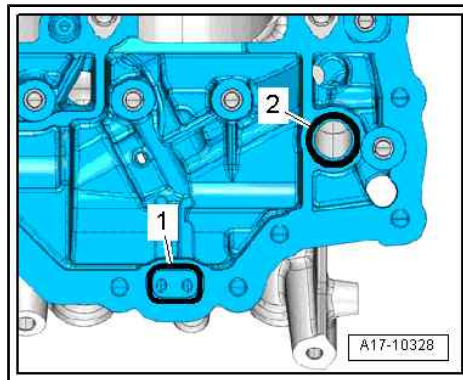


Note

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



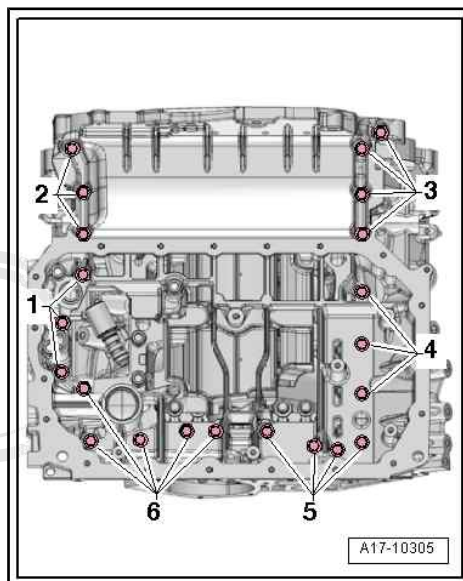
- Fit seal -1- and O-ring -2- in retaining frame.



- Check that dowel sleeves are fitted, fit sump (top section) and tighten bolts ⇒ [page 152](#) .

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

- Secure coolant pipes (left-side) ⇒ [page 191](#) .
- Install oil pump ⇒ [page 155](#) .
- Install timing chain cover (bottom) ⇒ [page 85](#) .

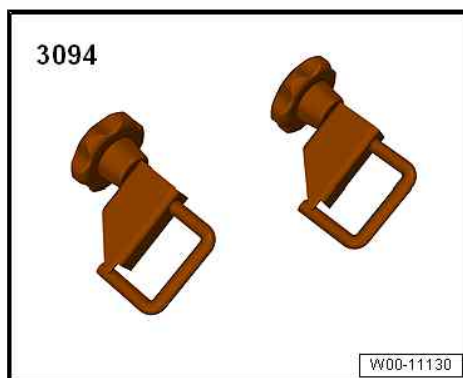


1.6 Removing and installing engine oil cooler

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.

Special tools and workshop equipment required

- ◆ Hose clamps, up to 25 mm - 3094-



- ◆ Used oil collection and extraction unit - V.A.G 1782-



- ◆ Drip tray for workshop hoist - VAS 6208-



Removing



WARNING

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

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

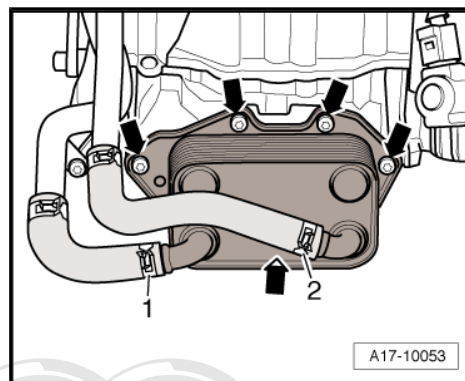
- Open filler cap on coolant expansion tank.

- Place drip tray for workshop hoist - VAS 6208- beneath engine.
- Clamp off coolant hoses -1- and -2- using hose clamps up to 25 mm - 3094- and disconnect hoses from engine oil cooler.
- Position used oil collection and extraction unit - V.A.G 1782- below engine.
- Unscrew bolts -arrows- and detach engine oil cooler.

Installing

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

- Tightening torque
⇒ ["1.1 Exploded view - sump \(bottom section\), sump \(top section\), oil pump, engine oil cooler", page 149](#)



Note

- ◆ *Renew all seals and gaskets.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ [Electronic parts catalogue](#).*
- Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 405 .
- Fill up with coolant ⇒ [page 179](#) .

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 housing, oil pressure switch

Overview

- ◆ ⇒ ["2.1 Exploded view - oil filter housing, oil pressure switch", page 161](#)
- ◆ ⇒ ["2.2 Removing and installing oil filter housing", page 162](#)
- ◆ ⇒ ["2.3 Checking oil pressure switch F22 / oil pressure switch for reduced oil pressure F378", page 164](#)
- ◆ ⇒ ["2.4 Removing and installing oil pressure switch F22", page 164](#)
- ◆ ⇒ ["2.5 Removing and installing oil pressure switch for reduced oil pressure F378", page 166](#)
- ◆ ⇒ ["2.6 Removing and installing valve for oil pressure control N428", page 167](#)
- ◆ ⇒ ["2.7 Checking oil pressure", page 168](#)

Protected by copyright. All rights reserved. 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.

2.1 Exploded view - oil filter housing, oil pressure switch

1 - Bolt

- ☐ 13 Nm

2 - Oil pressure switch - F22-

- ☐ Grey-beige insulation
- ☐ Opening/closing pressure 2.5 ... 3.2 bar
- ☐ Checking in [Guided Fault Finding](#) ⇒ Vehicle diagnostic tester
- ☐ Removing and installing ⇒ [page 164](#)
- ☐ 20 Nm

3 - Seal

- ☐ Renew

4 - Flange nut

- ☐ 13 Nm

5 - Bolt

- ☐ 9 Nm

6 - Sleeve

7 - Rubber grommet

8 - Oil filter housing

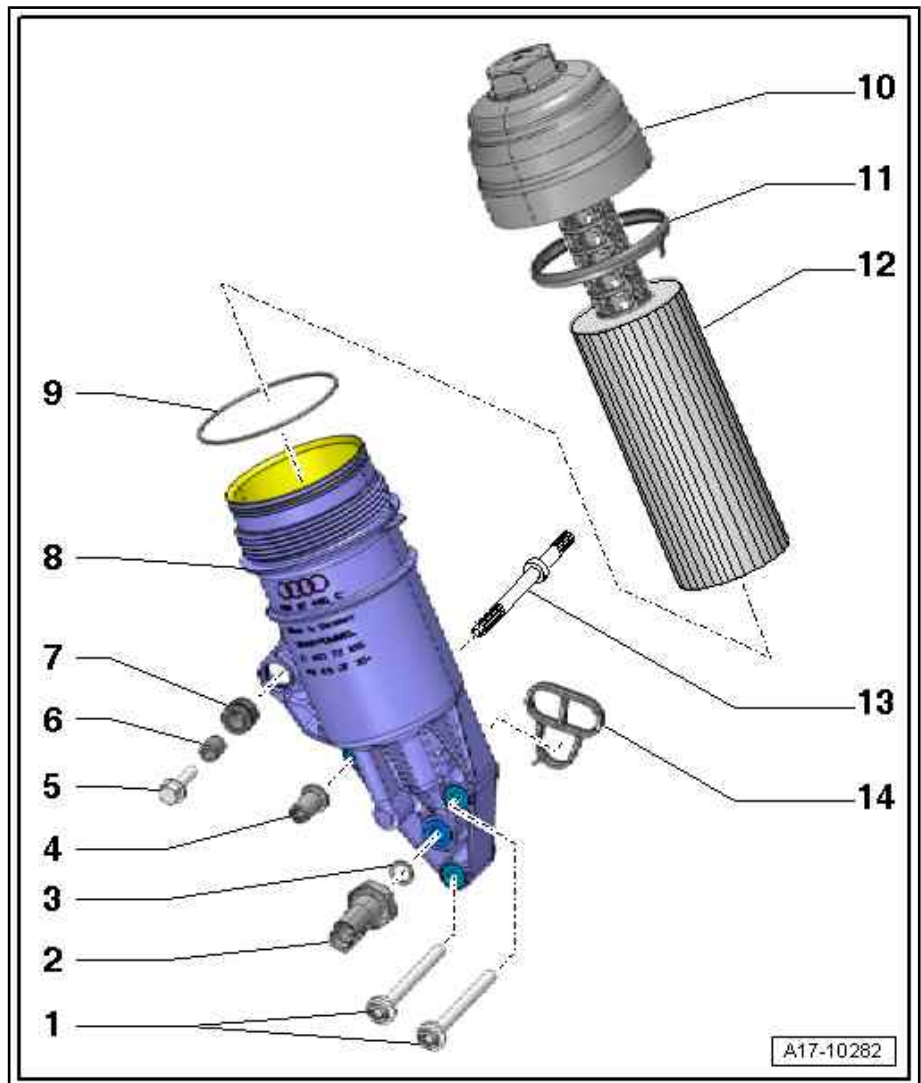
- ☐ With filter bypass valve
- ☐ With oil retention valve
- ☐ The oil retention valve cannot be renewed

9 - O-ring

- ☐ Renew
- ☐ Installing ⇒ [page 162](#)

10 - Sealing cap

- ☐ 25 Nm



11 - Seal

- ☐ Renew
- ☐ Removing and installing ⇒ [page 162](#)

12 - Oil filter element

- ☐ Removing and installing ⇒ Maintenance ; Booklet 405

13 - Centre hex stud

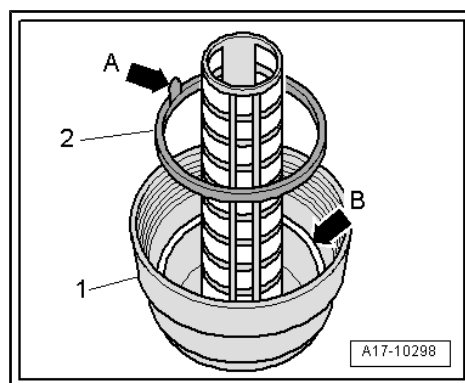
- ☐ 16 Nm

14 - Seal

- ☐ Renew

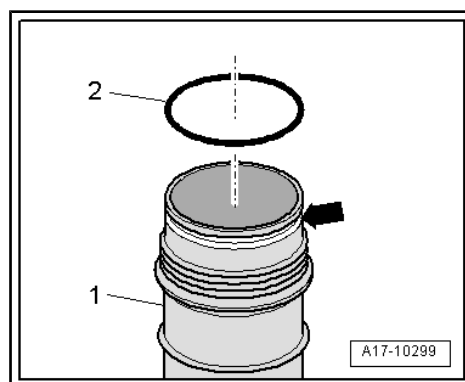
Renewing seal on sealing cap

- Take hold of tab -arrow A- and pull seal -2- out of sealing cap -1-.
- Install new seal so that semi-circular profile fits in groove -arrow B- in sealing cap.
- The tab -arrow A- must face upwards.



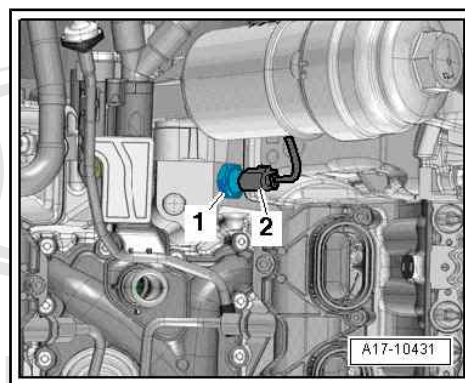
Installing O ring on oil filter housing

- Install O-ring -2- in groove -arrow- on oil filter housing -1-.



Oil pressure switch for reduced oil pressure - F378-

- 1 - Oil pressure switch for reduced oil pressure - F378-
 - 2 - Electrical connector
- ◆ Opening/closing pressure 0.75 ... 1.05 bar
 - ◆ Grey insulation
 - ◆ Checking in [Guided Fault Finding](#) ⇒ Vehicle diagnostic tester
 - ◆ Removing and installing ⇒ [page 166](#)
 - ◆ 20 Nm

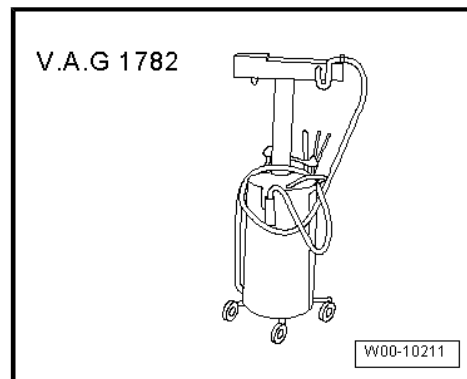


2.2 Removing and installing oil filter housing

Special tools and workshop equipment required

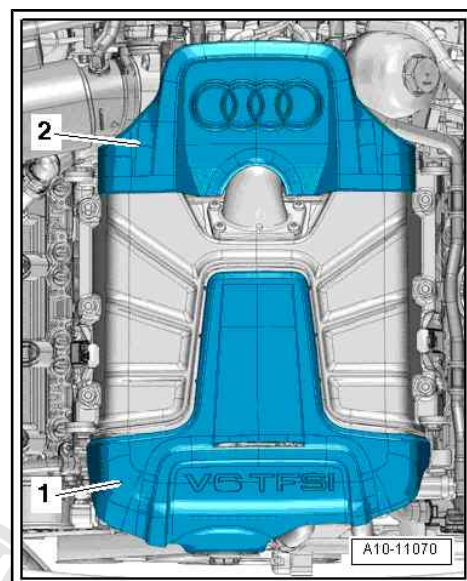
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted without the written permission of AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

◆ Used oil collection and extraction unit - V.A.G 1782-

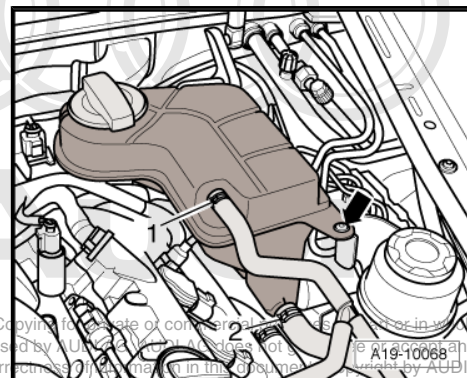


Removing

- Lift off engine cover panel (rear) -2-.
- Remove oil filter element ⇒ Maintenance ; Booklet 405 .
- Extract engine oil from oil filter housing using used oil collection and extraction unit - V.A.G 1782- .



- Remove bolt -arrow-.
- Unplug electrical connector for coolant shortage indicator switch - F66- at bottom of expansion tank and move expansion tank to one side with coolant hoses -1- and -2- attached.



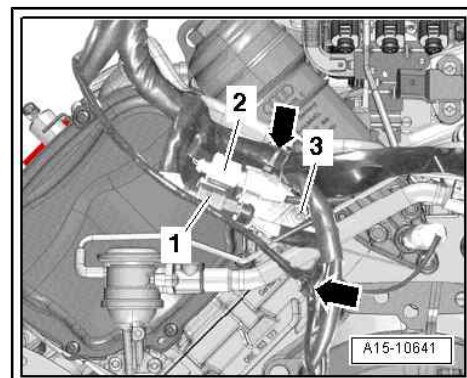
Protected by copyright. Copying, distribution or commercial use of this work is not permitted unless authorised by Audi AG. Audi AG is not liable for any liability with respect to the correctness of the information in this document. Audi AG.



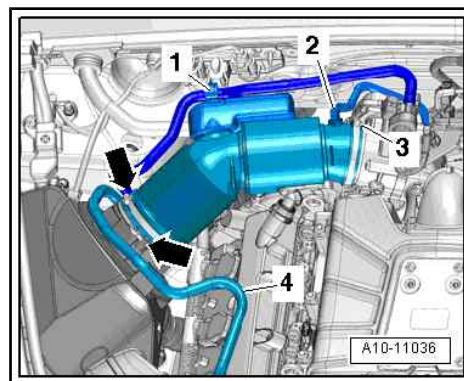
Note

For illustration purposes, the work steps are shown in the following illustrations from the rear with the engine removed.

- Detach electrical connectors -1- and -2- from bracket and unplug connectors.
- Move electrical wiring clear -arrows-.
- Remove nut -3- and move earth wire clear.
- Remove centre hex stud and remove bracket.



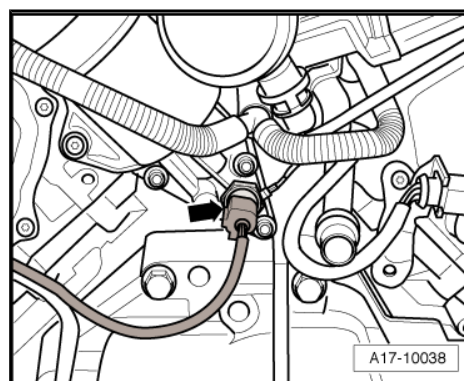
- Move fuel line -4- and line -1- leading to activated charcoal filter clear on air cleaner housing and air pipe.
- Detach vacuum hose -2- from connection on air hose.
- Remove air pipe. To do so, release hose clip -3- and clamps -arrows-.



Note

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

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

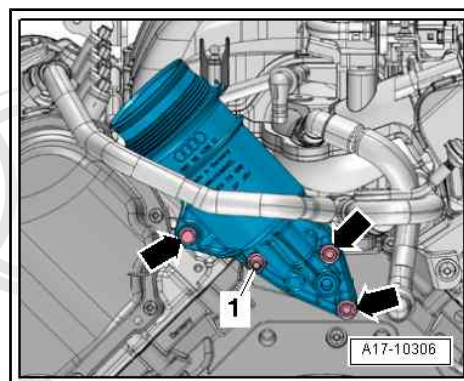


- Remove bolts -arrows-.
- Remove nut -1- and centre hex stud, and detach oil filter housing.

Installing

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

- Tightening torques
⇒ ["2.1 Exploded view - oil filter housing, oil pressure switch", page 161](#)



Note

Renew gaskets, seals and O-rings.

- Install oil filter element and fill up with engine oil → Maintenance ; Booklet 405 .

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.

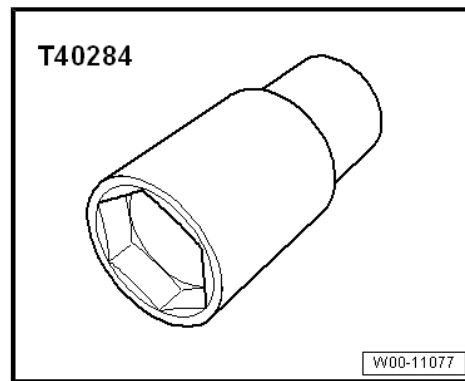
2.3 Checking oil pressure switch - F22- / oil pressure switch for reduced oil pressure - F378-

Checking oil pressure switch - F22- / oil pressure switch for reduced oil pressure - F378- in [Guided Fault Finding](#) ⇒ Vehicle diagnostic tester.

2.4 Removing and installing oil pressure switch - F22-

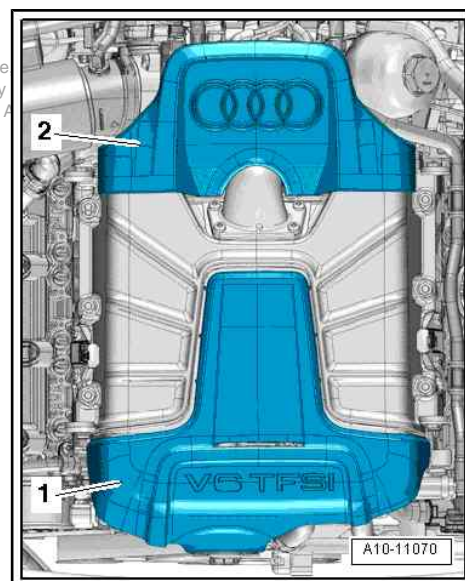
Special tools and workshop equipment required

- ◆ Socket, AF 24 mm - T40284-

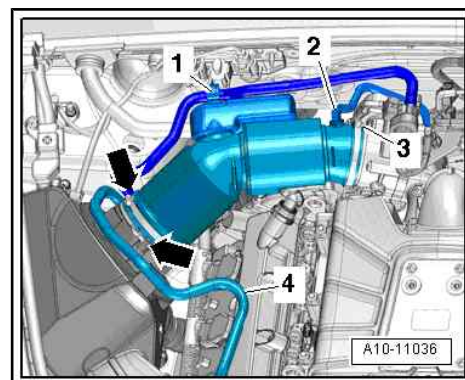


Removing

- Lift off engine cover panel (rear) -2-.



- Move fuel line -4- and line -1- leading to activated charcoal filter clear on air cleaner housing and air pipe.
- Detach vacuum hose -2- from connection on air hose.
- Remove air pipe. To do so, release hose clip -3- and clamps -arrows-.





Note

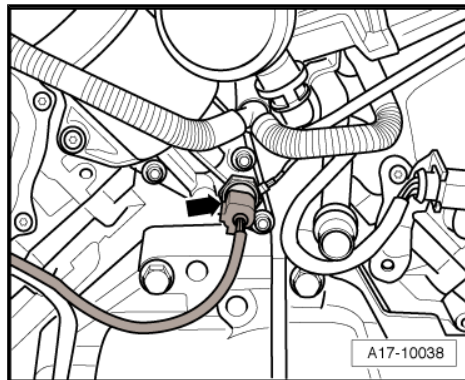
Place a cloth beneath the oil filter housing to catch escaping oil.

- Unplug electrical connector on oil pressure switch - F22-
-arrow-.
- Use socket (24 mm) - T40284- to unscrew oil pressure switch
- F22- .

Installing

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

- Tightening torque
⇒ ["2.1 Exploded view - oil filter housing, oil pressure switch",
page 161](#)



Note

Screw new oil pressure switch - F22- immediately into bore to avoid loss of engine oil.

- Check oil level ⇒ Maintenance ; Booklet 405 .

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

Special tools and workshop equipment required

- ◆ Assembly tool - T10118-

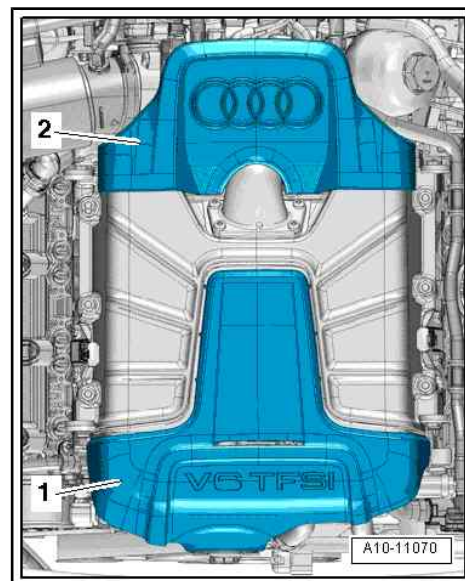


- ◆ Articulated wrench, 24 mm - T40175-



Removing

- Lift off engine cover panel (rear) -2-.

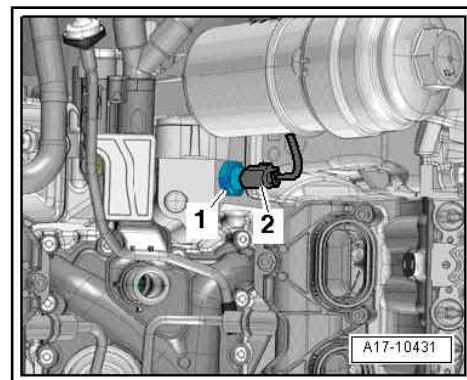


- Use assembly tool - T10118- to unplug electrical connector -2-.
- Use articulated wrench, 24 mm - T40175- to unscrew oil pressure switch for reduced oil pressure - F378- -item 1-.



Note

For illustration purposes, the installation position is shown with the supercharger removed.



Installing

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

- Tightening torque
⇒ [Fig. "Oil pressure switch for reduced oil pressure -F378-" , page 162](#)

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

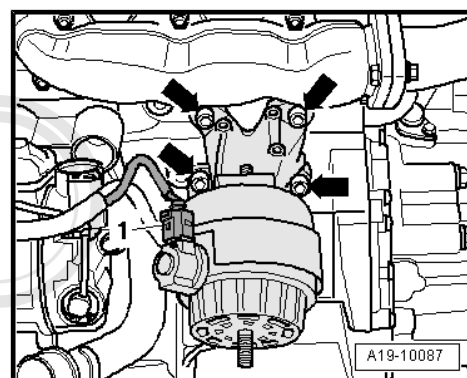
Removing

- Remove poly V-belt from A/C compressor pulley
⇒ ["1.5 Removing and installing poly V-belt", page 60](#) .
- Unplug electrical connector -1- on left electrohydraulic engine mounting solenoid valve - N144- .



Note

Disregard -arrows-.



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



WARNING

Risk of injury caused by refrigerant.

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

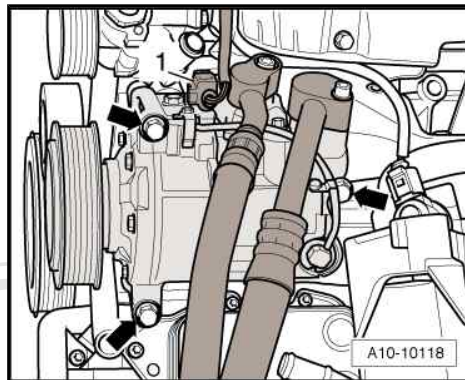
- Remove bolts -arrows- for air conditioner compressor.



Caution

Danger of damage to refrigerant lines and hoses.

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



- Tie up air conditioner compressor to left side of vehicle with hoses/pipes connected.

- Unplug electrical connector -1-.

- Remove bolt -3- and detach valve for oil pressure control -N428- -item 4-.

Installing

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

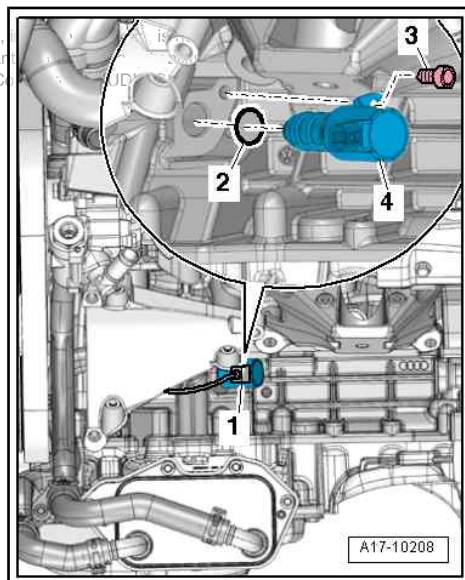
- Tightening torque
⇒ [Fig. "Valve for oil pressure control -N428- ", page 152](#)



Note

Fit new O-ring -2-.

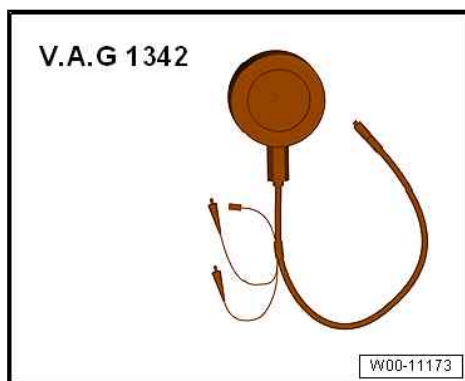
- Install air conditioner compressor ⇒ Rep. gr. 87 .
- Install poly V-belt ⇒ [page 60](#) .



2.7 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 - F22- ➔ [page 164](#) .
- Connect oil pressure tester - V.A.G 1342- to bore for oil pressure switch.
- Screw oil pressure switch - F22- into oil pressure tester.
- Start engine.
- Minimum oil pressure at idling speed: 1.2 bar.
- Minimum oil pressure at 2000 rpm: 1.5 bar.

Assembling

- Install oil pressure switch - F22- ➔ [page 164](#) .



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.

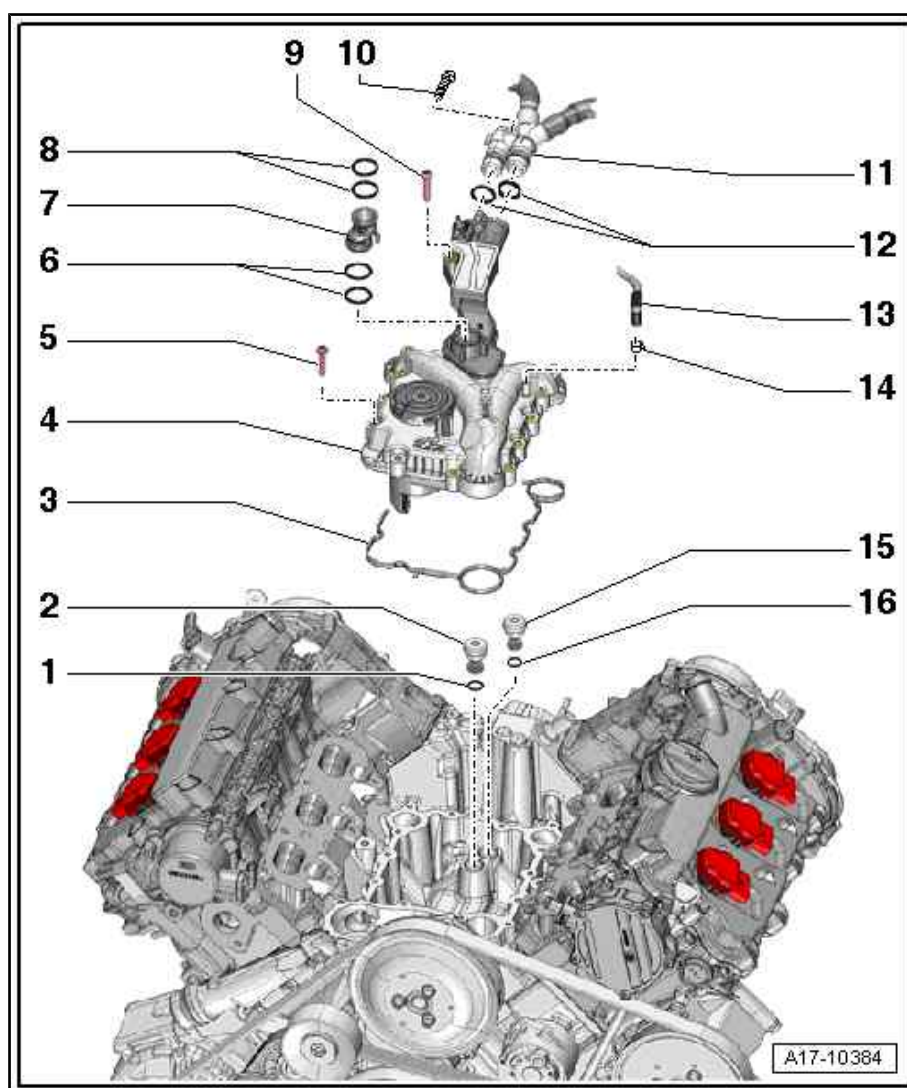
3 Oil retention valves, oil separator

Overview

- ◆ ⇒ [“3.1 Exploded view - oil retention valves, oil separator”, page 170](#)
- ◆ ⇒ [“3.2 Removing and installing crankcase breather hoses - not on USA models”, page 171](#)
- ◆ ⇒ [“3.3 Removing and installing cover with oil separator”, page 172](#)
- ◆ ⇒ [“3.4 Engine oil”, page 172](#)
- ◆ ⇒ [“3.5 Checking oil level”, page 172](#)

3.1 Exploded view - oil retention valves, oil separator

- 1 - O-ring
 - ☐ Renew
- 2 - Oil retention valve
 - ☐ For oil supply to cylinder head (right-side)
 - ☐ 20 Nm
- 3 - Gasket
 - ☐ Renew
- 4 - Cover with oil separator
 - ☐ With connection for crankcase breather
 - ☐ Removing and installing ⇒ [page 172](#)
- 5 - Bolt
 - ☐ 9 Nm
- 6 - O-ring
 - ☐ Renew
 - ☐ USA models: 2x
- 7 - Connection
 - ☐ For crankcase breather
 - ☐ Installation position ⇒ [page 171](#)
- 8 - O-ring
 - ☐ Renew
 - ☐ USA models: 2x
- 9 - Bolt
 - ☐ 9 Nm
- 10 - Bolt
 - ☐ 3 Nm
- 11 - Crankcase breather hoses
 - ☐ To cylinder head covers
 - ☐ Removing and installing ⇒ [page 171](#)
- 12 - O-rings
 - ☐ Renew



13 - Crankcase breather hose

- ☐ To air pipe

14 - Hose clip**15 - Oil retention valve**

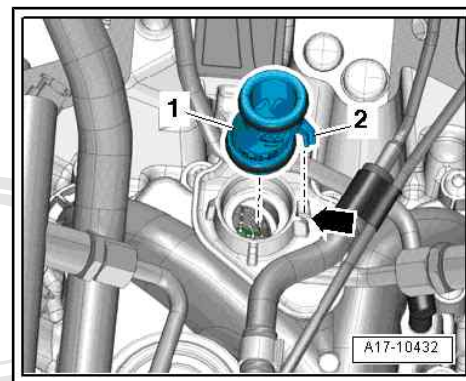
- ☐ For oil supply to cylinder head (left-side)
- ☐ 20 Nm

16 - O-ring

- ☐ Renew

Installing connection for crankcase breather

- Insert connection -1- for crankcase breather with new O-rings in cover for oil separator:
- Installation position: lug -2- must engage in guide -arrow-.



3.2 Removing and installing crankcase breather hoses - not on USA models

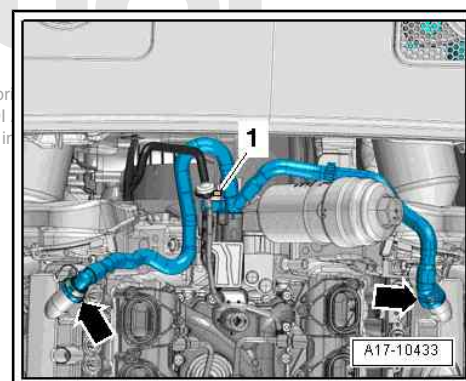
Removing

- Remove supercharger ➔ [page 226](#) .
- Detach crankcase breather hoses -arrows- from cylinder head covers.
- Move crankcase breather hoses clear.
- Remove bolt -1- and detach connection with crankcase breather hoses.

Installing

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

- Tightening torque
➔ ["3.1 Exploded view - oil retention valves, oil separator", page 170](#)

**Note**

- ◆ *Renew gaskets and O-rings.*
- ◆ *Fit all cable ties in the original positions when installing.*
- Install supercharger ➔ [page 226](#) .

3.3 Removing and installing cover with oil separator

Removing

- Remove coolant pipe (top) ⇒ [page 203](#) .
- Remove intake manifold bottom section (left-side) ⇒ Rep. gr. 24 .
- Remove bolts -arrows-.
- Detach bracket for high-pressure pipes and cover -1- with oil separator.

Installing

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

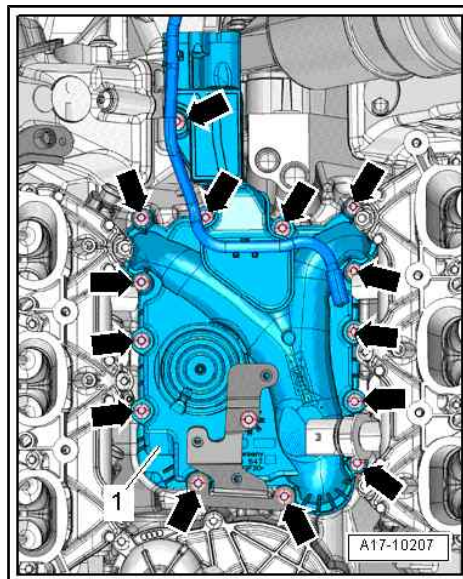
- Tightening torque
⇒ ["3.1 Exploded view - oil retention valves, oil separator", page 170](#)



Note

Renew gasket.

- Install intake manifold bottom section (left-side) ⇒ Rep. gr. 24 .
- Install coolant pipe (top) ⇒ [page 203](#) .



3.4 Engine oil

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

3.5 Checking oil level

Checking oil level ⇒ Maintenance ; Booklet 405



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.

19 – Cooling

1 Cooling system

Overview

- ◆ ⇒ [“1.1 Connection diagram - coolant hoses”, page 173](#)
- ◆ ⇒ [“1.2 Draining and filling cooling system”, page 177](#)
- ◆ ⇒ [“1.3 Checking cooling system for leaks”, page 184](#)



WARNING

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

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

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.*



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.*

1.1 Connection diagram - coolant hoses

Vehicles without auxiliary heater



Note

- ◆ *Blue = Large coolant circuit.*
- ◆ *Red = Small coolant circuit.*
- ◆ *Orange = Coolant circuit for charge air cooler.*
- ◆ *Brown = Heating circuit.*

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 - Water radiator for charge air cooling circuit

- ☐ If renewed, refill system with fresh coolant

2 - Radiator

- ☐ With ATF cooler
- ☐ If renewed, refill system with fresh coolant

3 - Coolant temperature sender - G62-

4 - Auxiliary radiator

- ☐ Country-specific version
- ☐ If renewed, refill system with fresh coolant

5 - Non-return valve

- ☐ Arrow indicates direction of flow
- ☐ Located in coolant hose

6 - Thermostat

7 - Coolant pump

8 - Charge air cooler (right-side)

- ☐ Located in supercharger housing with charge air coolers
- ☐ If renewed, refill system with fresh coolant

9 - Bleeder screw

10 - Cylinder head, bank 1 (right-side)

- ☐ If renewed, refill system with fresh coolant

11 - Pump/valve unit

- ☐ For heat regulation
- ☐ Removing and installing ⇒ Rep. gr. 87

12 - Heat exchanger for heater

- ☐ Removing and installing ⇒ Rep. gr. 87
- ☐ If renewed, refill system with fresh coolant

13 - Restrictor

- ☐ Located in coolant hose

14 - Bleeder hole

15 - Cylinder head, bank 2 (left-side)

- ☐ If renewed, refill system with fresh coolant

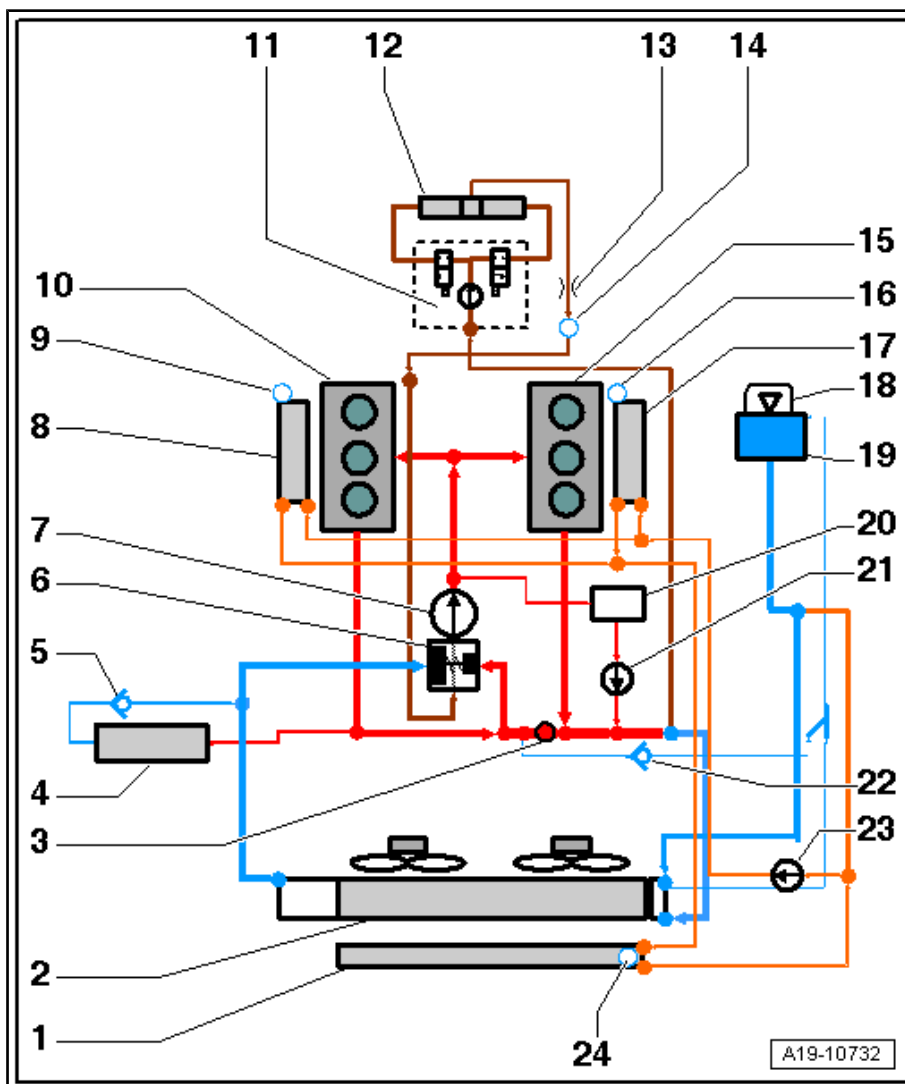
16 - Bleeder screw

17 - Charge air cooler (left-side)

- ☐ Located in supercharger housing with charge air coolers
- ☐ If renewed, refill system with fresh coolant

18 - Filler cap for expansion tank

- ☐ Checking pressure relief valve ⇒ [page 186](#)



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.

19 - Coolant expansion tank

20 - Engine oil cooler

21 - Continued coolant circulation pump - V51-

- ☐ Country-specific version

22 - Non-return valve

- ☐ Arrow indicates direction of flow
- ☐ Located in coolant hose

23 - Charge air cooling pump - V188-

24 - Bleeder screw

Vehicles with auxiliary heater



Note

- ◆ *Blue = Large coolant circuit.*
 - ◆ *Red = Small coolant circuit.*
 - ◆ *Orange = Coolant circuit for charge air cooler.*
 - ◆ *Brown = Heating circuit.*
- 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 regard to the correctness of the information in this document. Copyright by AUDI AG.

1 - Water radiator for charge air cooling circuit

- ☐ If renewed, refill system with fresh coolant

2 - Radiator

- ☐ With ATF cooler
- ☐ If renewed, refill system with fresh coolant

3 - Coolant temperature sender - G62-

4 - Auxiliary radiator

- ☐ Country-specific version
- ☐ If renewed, refill system with fresh coolant

5 - Non-return valve

- ☐ Arrow indicates direction of flow
- ☐ Located in coolant hose

6 - Thermostat

7 - Coolant pump

8 - Charge air cooler (right-side)

- ☐ Located in supercharger housing with charge air coolers
- ☐ If renewed, refill system with fresh coolant

9 - Bleeder screw

10 - Cylinder head, bank 1 (right-side)

- ☐ If renewed, refill system with fresh coolant

11 - Pump/valve unit

- ☐ For heat regulation
- ☐ Removing and installing ⇒ Rep. gr. 87

12 - Heat exchanger for heater

- ☐ Removing and installing ⇒ Rep. gr. 87
- ☐ If renewed, refill system with fresh coolant

13 - Restrictor

- ☐ Located in coolant hose

14 - Bleeder hole

15 - Cylinder head, bank 2 (left-side)

- ☐ If renewed, refill system with fresh coolant

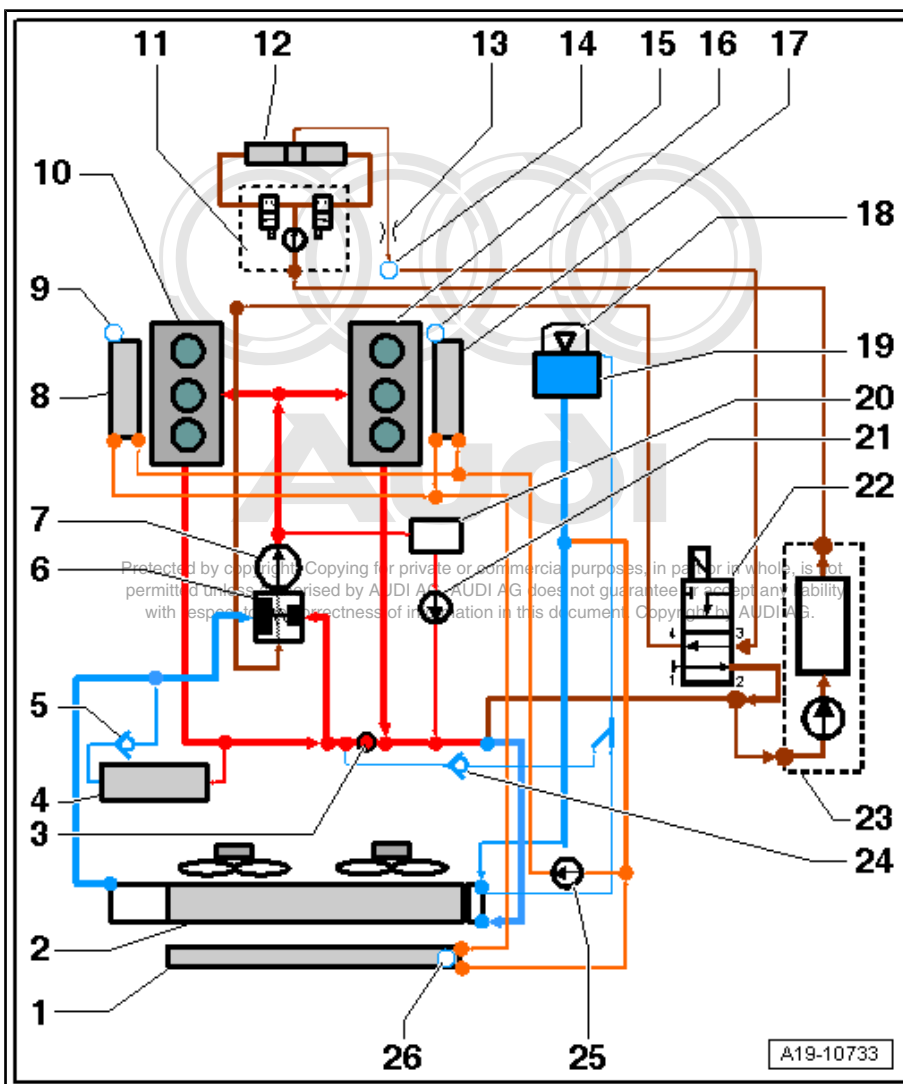
16 - Bleeder screw

17 - Charge air cooler (left-side)

- ☐ Located in supercharger housing with charge air coolers
- ☐ If renewed, refill system with fresh coolant

18 - Filler cap for expansion tank

- ☐ Checking pressure relief valve ⇒ [page 186](#)



19 - Coolant expansion tank

20 - Engine oil cooler

21 - Continued coolant circulation pump - V51-

- ☐ Country-specific version

22 - Heater coolant shut-off valve - N279-

23 - Auxiliary heater

24 - Non-return valve

- ☐ Arrow indicates direction of flow
- ☐ Located in coolant hose

25 - Charge air cooling pump - V188-

26 - Bleeder screw

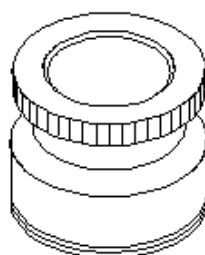
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

1.2 Draining and filling cooling system

Special tools and workshop equipment required

- ◆ Adapter for cooling system tester - V.A.G 1274/8-
- ◆ Pipe for cooling system tester - V.A.G 1274/10-
- ◆ Cooling system charge unit - VAS 6096-
- ◆ Drip tray for workshop hoist - VAS 6208-
- ◆ Hose clip pliers - VAS 6362-
- ◆ Refractometer - T1000 7A-
- ◆ ⇒ Vehicle diagnostic tester

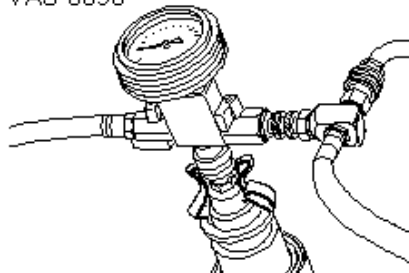
V.A.G 1274/8



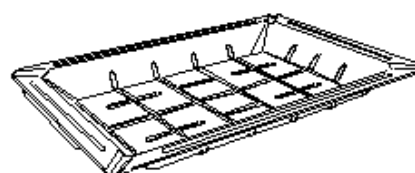
V.A.G 1274/10



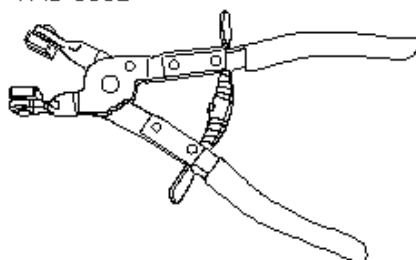
VAS 6096



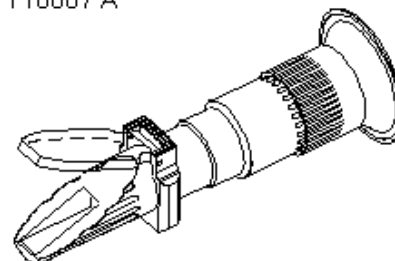
VAS 6208



VAS 6362



T10007 A



G19-10029

Draining



Note

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

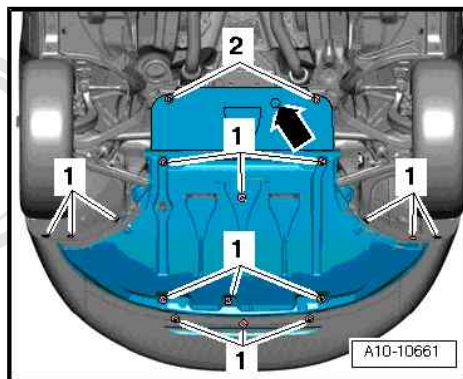


WARNING

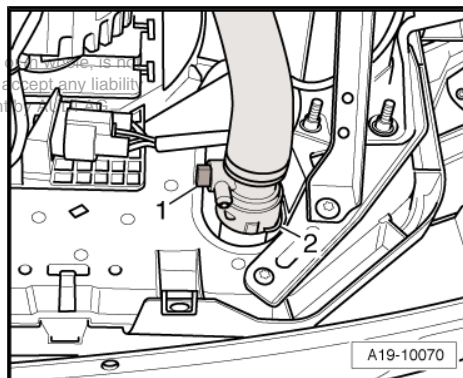
Hot steam/hot coolant can escape - risk of scalding.

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

- Open filler cap on coolant expansion tank.
- Release fasteners -1, 2, arrow- and remove noise insulation panels.



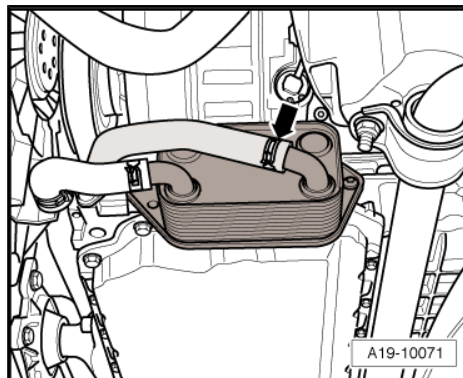
- Place drip tray for workshop hoist - VAS 6208- beneath engine.
- Open drain plug -1- and drain off coolant.



Note

Disregard -item 2-.

- Disconnect coolant hose -arrow- from engine oil cooler and drain off coolant.



- Release hose clips -arrows-, disconnect coolant hoses from coolant pipes (front left) and drain off remaining coolant.



Note

- ◆ Disregard -item 1-.
- ◆ For illustration purposes, the installation position is shown with the lock carrier removed.

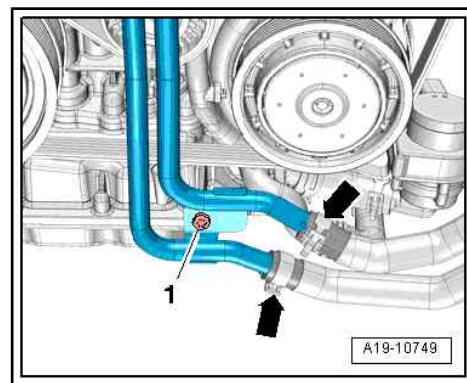
Filling

- Ignition off.



Caution

Always use distilled water for mixing coolant additives as this ensures optimum corrosion protection.



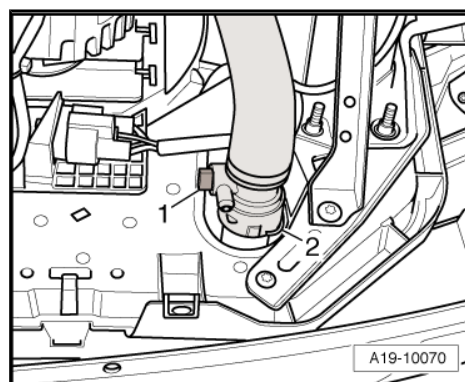
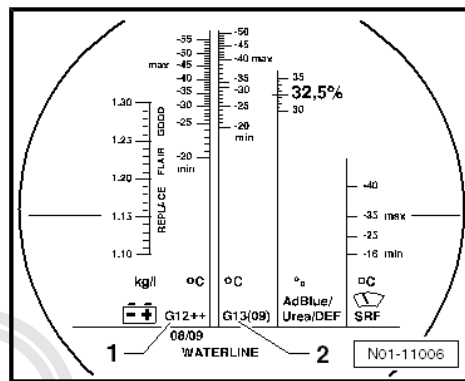
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



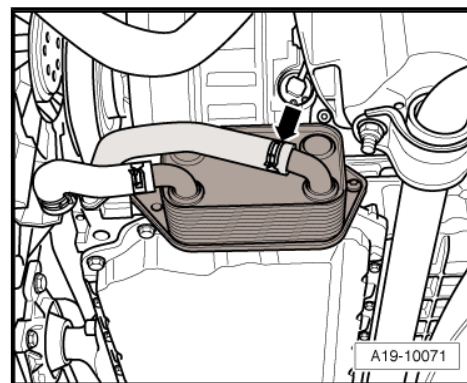
Note

- ◆ The 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) . Other coolant additives could seriously impair in particular the anti-corrosion properties. 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.

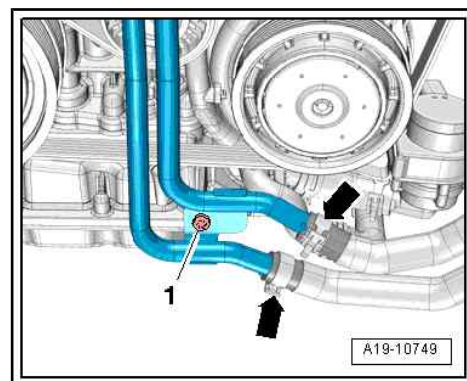
- Close drain plug -1-.



- Connect coolant hose to engine oil cooler -arrow-.



- Fit coolant hoses onto coolant pipes (front left) -arrows-.

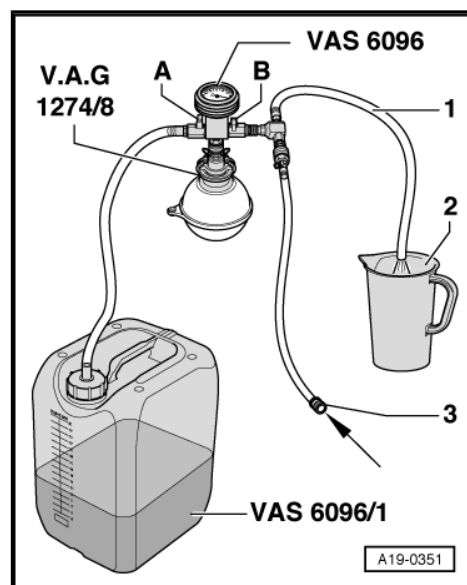


- Fill reservoir of cooling system charge unit -VAS 6096- with 12 litres of premixed coolant (according to recommended ratio):
 - Coolant (40 %) and water (60 %) for frost protection to –25 °C
 - Coolant (50 %) and water (50 %) for frost protection to –36 °C
 - Coolant additive ⇒ Electronic parts catalogue
- Fit adapter for cooling system tester - V.A.G 1274/8- onto coolant expansion tank.
- Attach cooling system charge unit - VAS 6096- to adapter.
- 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).

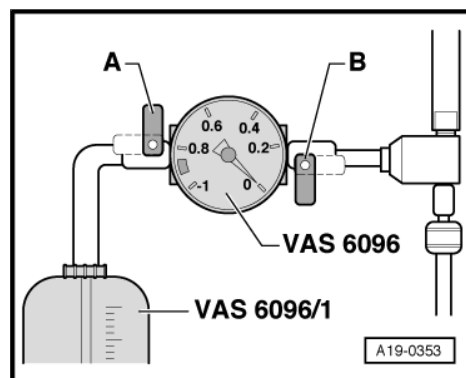
- Connect hose 3 to compressed air.

Protected by copyright. Any reproduction, 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 the information in this document. Copyright by AUDI AG.

- Pressure: 6 ... 10 bar

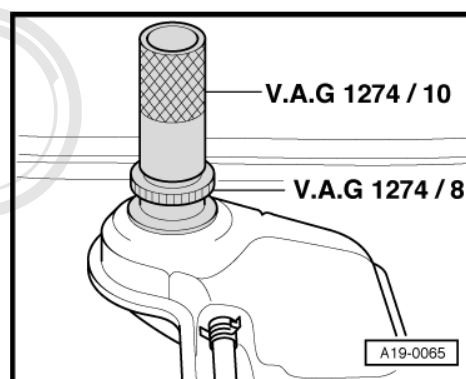
- Connect ⇒ Vehicle diagnostic tester to vehicle.
- Select following menu options on ⇒ Vehicle diagnostic tester:
 - ◆ Guided Functions mode
 - ◆ 01 - Simos fuel injection and ignition system
 - ◆ Functions - engine
 - ◆ 01 - Coolant circuit vent routine
- Follow instructions shown on vehicle diagnostic tester .

- Open valve -B- by setting lever in direction of flow.
- The suction jet pump generates a partial vacuum in the cooling system; the needle on the gauge should move into the green zone.
- Also briefly open valve -A- (turn lever in direction of flow) so that hose on reservoir of -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.



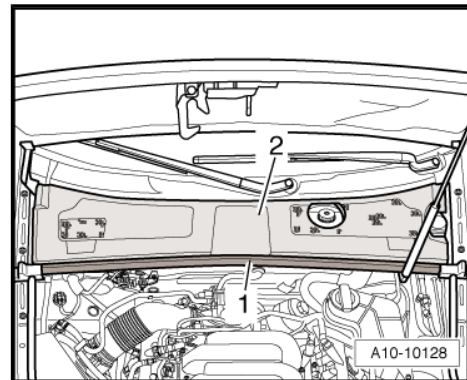
Note

- ◆ 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 adapter -V.A.G 1274/8- on coolant expansion tank.
- Fit pipe for cooling system tester - V.A.G 1274/10- onto adapter.
- Fill up with coolant until pipe for cooling system tester is filled. If required, add further coolant when performing bleeding procedure.

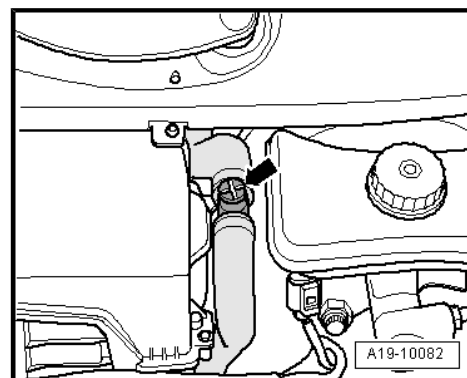


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

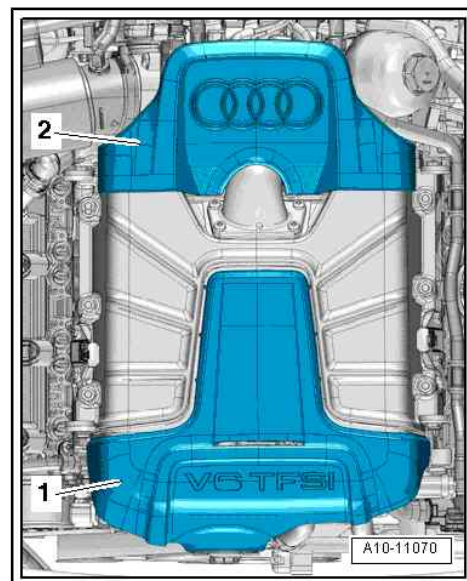
- Pull off seal -1- and remove plenum chamber cover -2-.



- Open bleeder screw -arrow- until coolant flows out.
- Close bleeder screw.



- Lift off engine cover panel (rear) -2-.

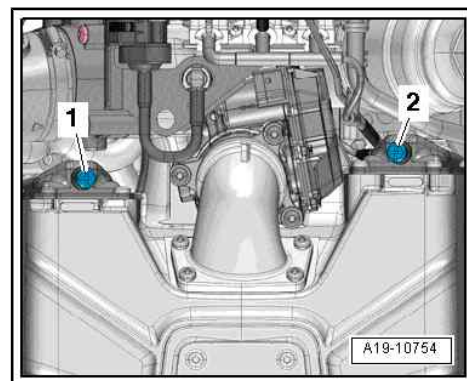


Note

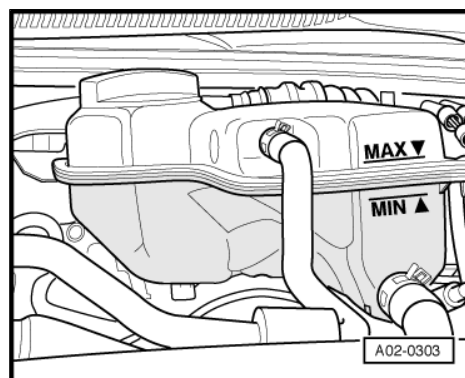
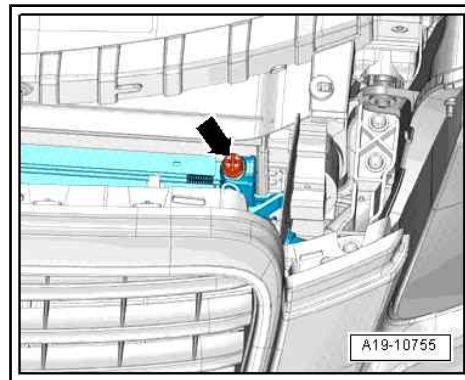
Place a cloth underneath to catch escaping coolant.

- Open bleeder screws -1- and -2- one after the other until coolant flows out.
- Close bleeder screws.

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.



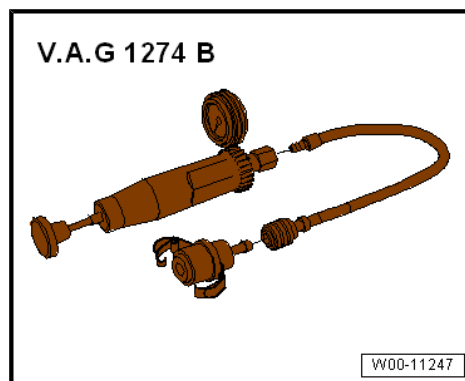
- Remove lock carrier cover ⇒ Rep. gr. 63 .
- Open bleeder screw -arrow- until coolant flows out.
- Close bleeder screw.
- On vehicles with auxiliary heater, switch heater on (for about 30 seconds) and then off again.
- Close filler cap on coolant filler tank.
- Start engine.
- Set temperature to “HI” in all zones.
- Switch off air conditioner compressor; to do so, press **ECON** or **AC** button (depending on version).
- **ECON** button: LED must light up.
- **AC** button: LED must not light up.
- Run engine for 3 minutes at 2000 rpm.
- Allow engine to run at idling speed until both large coolant hoses at radiator become warm.
- Run engine for 2 minutes at 2000 rpm.
- Switch off ignition and allow engine to cool down.
- Install front noise insulation ⇒ Rep. gr. 50 .
- Check coolant level.
- The coolant level must be at the “MAX” marking when the engine is cold.
- The coolant level can be above the “MAX” marking when the engine is warm.



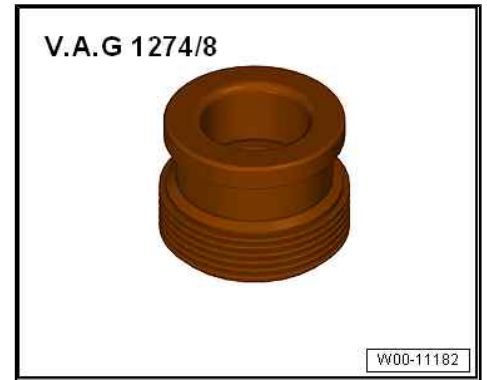
1.3 Checking cooling system for leaks

Special tools and workshop equipment required

- ◆ Cooling system tester - V.A.G 1274 B-



- ◆ Adapter for cooling system tester - V.A.G 1274/8-



- ◆ Adapter for cooling system tester - V.A.G 1274/9-
- ◆ W00-11176

Procedure

- Engine must be warm.

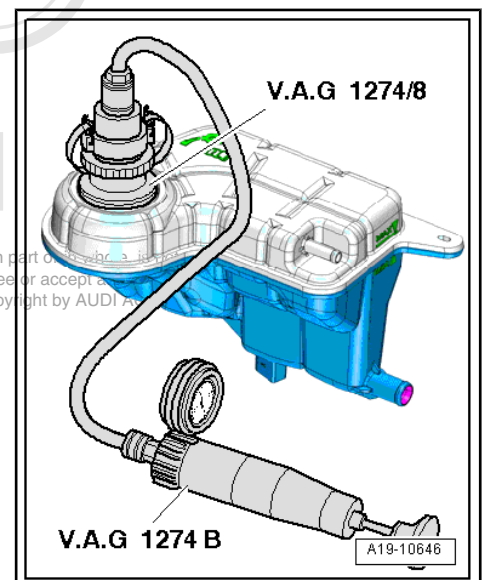


WARNING

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

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

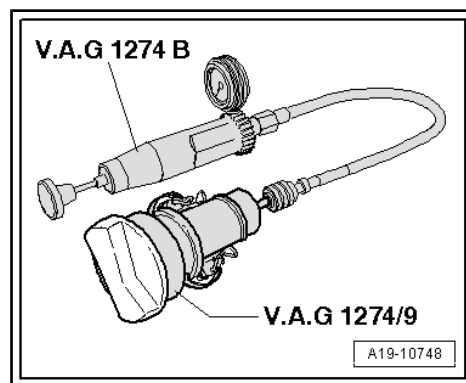
- Open filler cap on coolant expansion tank.
- Fit cooling system tester - V.A.G 1274 B- with adapter - V.A.G 1274/8- onto coolant expansion tank.
- Using hand pump on cooling system tester, build up a pressure of approx. 1.0 bar.
- If this pressure is not maintained, locate and rectify leaks.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is prohibited without the written permission 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.

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.



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 Coolant pump and thermostat

Overview

- ◆ ⇒ [“2.1 Exploded view - coolant pump, thermostat and connection”, page 187](#)
- ◆ ⇒ [“2.2 Removing and installing coolant pump”, page 188](#)
- ◆ ⇒ [“2.3 Removing and installing thermostat”, page 189](#)
- ◆ ⇒ [“2.4 Checking thermostat”, page 190](#)

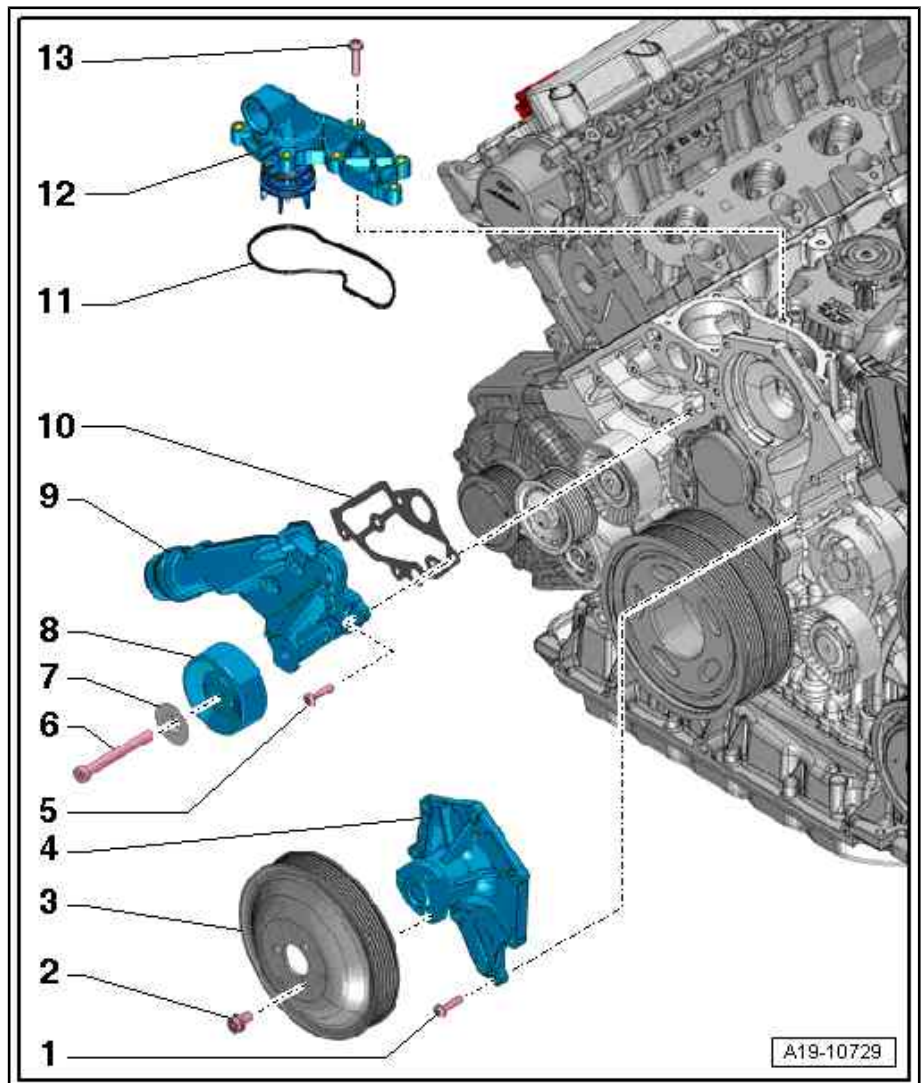
2.1 Exploded view - coolant pump, thermostat and connection

- 1 - Bolt
 - ☐ 9 Nm
- 2 - Bolt
 - ☐ 20 Nm
- 3 - Poly V-belt pulley for coolant pump
- 4 - Coolant pump
 - ☐ With seal
 - ☐ Removing and installing ⇒ [page 188](#)
- 5 - Bolt
 - ☐ 9 Nm
- 6 - Bolt
 - ☐ Tightening torque ⇒ [Item 2 \(page 55\)](#)
- 7 - Washer
- 8 - Idler roller for poly V-belt
- 9 - Connection
 - ☐ For coolant hose
- 10 - Gasket
 - ☐ Renew
- 11 - Seal
- 12 - Thermostat
 - ☐ Removing and installing ⇒ [page 189](#)
 - ☐ Checking ⇒ [page 190](#)



Note

When removing and installing the thermostat, make sure that the needle is fitted correctly (conical end fitted in wax expansion element of thermostat). If necessary, push thermostat needle as far as possible into wax expansion element.

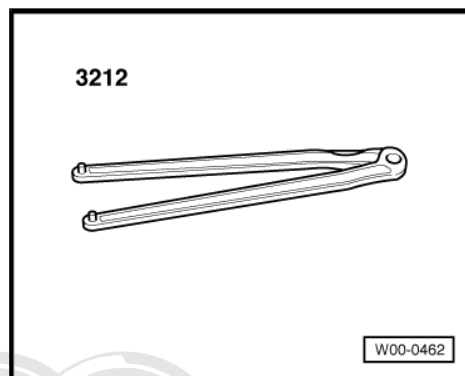


- 13 - Bolt
 - ☐ 9 Nm

2.2 Removing and installing coolant pump

Special tools and workshop equipment required

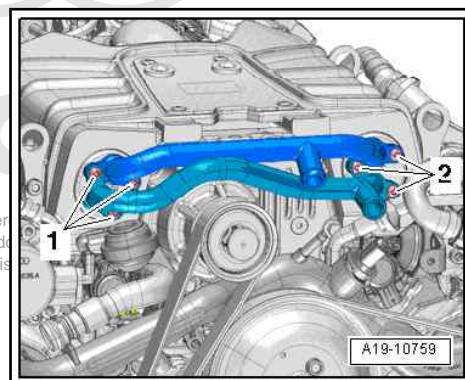
- ◆ Pin wrench - 3212-



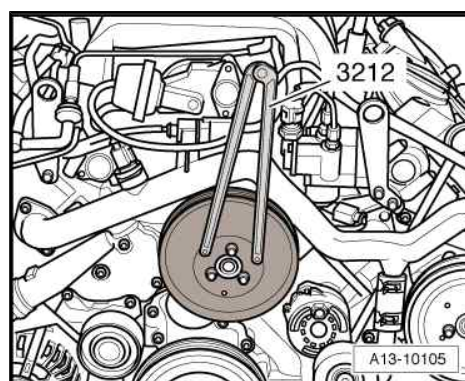
Removing

- Drain coolant ⇒ [page 177](#) .
- Remove coolant pipes (front left) ⇒ [page 197](#) .
- Remove bolts -1- and -2- and take off coolant pipes.
- Remove poly V-belt ⇒ [page 60](#) .
- Remove poly V-belt tensioner for supercharger ⇒ [page 57](#) .

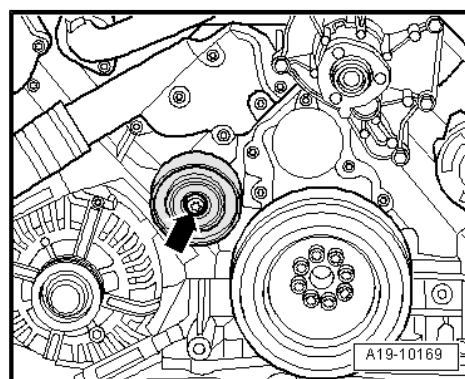
Protected by copyright. Copying for private or commercial use is prohibited without permission unless authorised by AUDI AG. AUDI AG does not accept any liability with respect to the correctness of information in this manual.



- Remove bolts for coolant pump pulley (counterhold with pin wrench - 3212-).
- Detach poly-V-belt pulley.



- Pry off cap.
- Remove bolt -arrow- and detach idler roller.



 Note

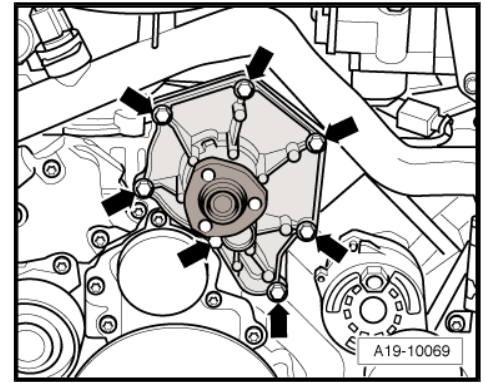
Place a cloth underneath to catch escaping coolant.

- Remove bolts -arrows- and detach coolant pump.

Installing

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

- Tightening torques
⇒ [“2.1 Exploded view - coolant pump, thermostat and connection”, page 187](#)
- Clean sealing surfaces; they must be free of oil and grease.
- Install poly V-belt tensioner for supercharger ⇒ [page 57](#) .
- Install poly V-belt ⇒ [page 60](#) .
- Install coolant pipes (front left) ⇒ [page 197](#) .
- Fill up with coolant ⇒ [page 179](#) .



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

2.3 Removing and installing thermostat

Removing

- Drain coolant ⇒ [page 177](#) .
- Remove supercharger ⇒ [page 226](#) .
- Remove coolant pipe (front) ⇒ [page 199](#) .



Note

Place a cloth underneath to catch any escaping coolant.

- Remove bolts -arrows-.
- Detach coolant thermostat with hose connection.

Installing

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



Note

When removing and installing the thermostat, make sure that the needle is fitted correctly (conical end fitted in wax expansion element of thermostat). If necessary, push thermostat needle as far as possible into wax expansion element.

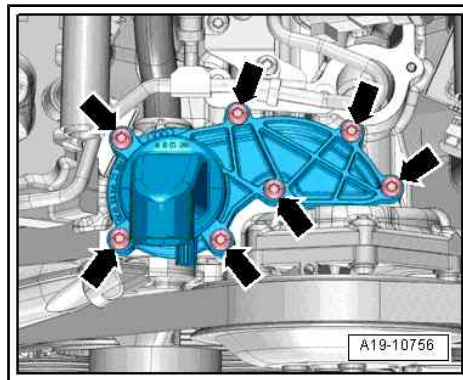
- Tightening torque
⇒ ["2.1 Exploded view - coolant pump, thermostat and connection", page 187](#)



Note

Renew seals and/or gaskets.

- Install coolant pipe (front) ⇒ [page 199](#) .
- Install supercharger ⇒ [page 226](#) .
- Fill up with coolant ⇒ [page 179](#) .



2.4 Checking thermostat

- Remove thermostat and heat it in a water bath.

Starts to open	Fully open	Opening travel
approx. 87 °C	approx. 102 °C ¹⁾	at least 8 mm
• 1) Cannot be tested.		

- Before starting the check, make sure that the thermostat needle is fitted correctly (conical end fitted in wax expansion element of thermostat). If necessary, push thermostat needle as far as possible into wax expansion element.

3 Coolant pipes and charge air cooling pump - V188-

Overview

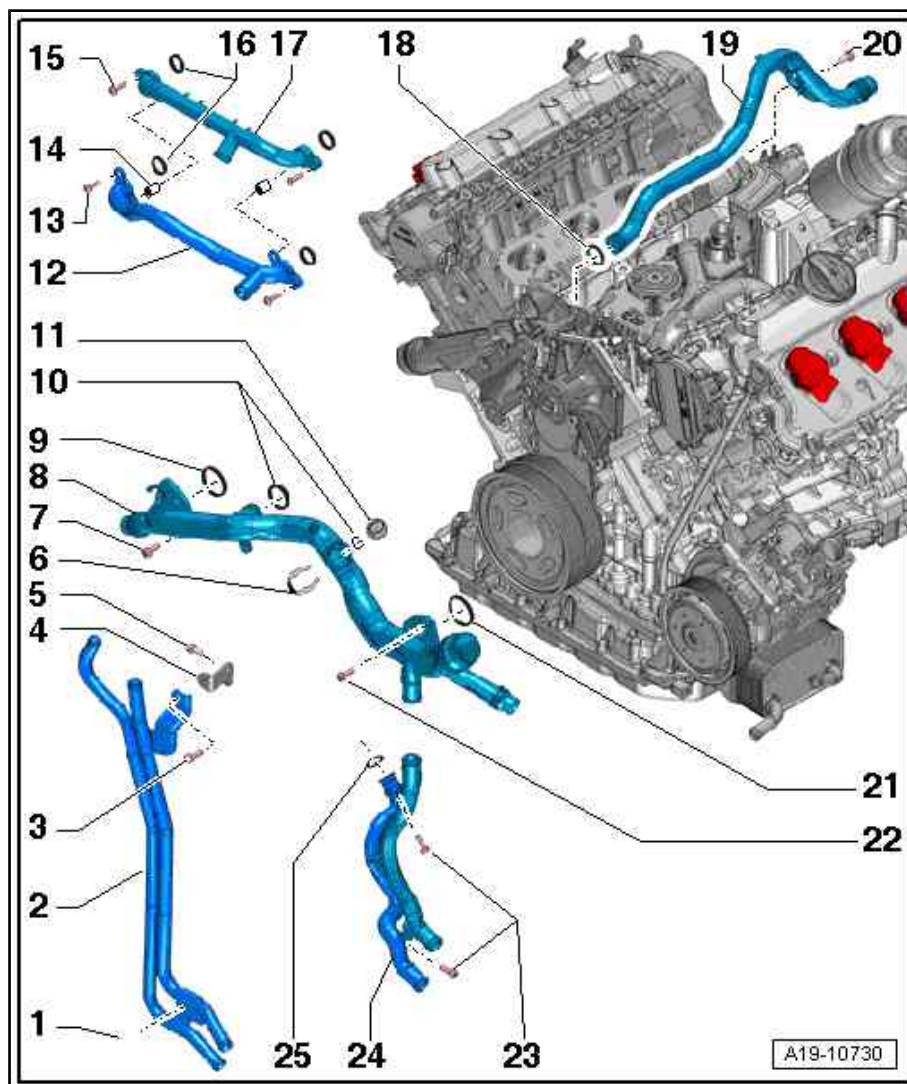
- ◆ ⇒ [“3.1 Exploded view - coolant pipes”, page 191](#)
- ◆ ⇒ [“3.2 Removing and installing coolant temperature sender G62”, page 193](#)
- ◆ ⇒ [“3.3 Removing and installing coolant pipes \(left-side\)”, page 194](#)
- ◆ ⇒ [“3.4 Removing and installing coolant pipes \(front left\)”, page 197](#)
- ◆ ⇒ [“3.5 Removing and installing coolant pipe \(front\)”, page 199](#)
- ◆ ⇒ [“3.6 Removing and installing coolant pipe \(top\)”, page 203](#)
- ◆ ⇒ [“3.7 Removing and installing coolant pipes on supercharger”, page 205](#)
- ◆ ⇒ [“3.8 Removing and installing charge air cooling pump V188”, page 207](#)
- ◆ ⇒ [“3.9 Exploded view - continued coolant circulation pump V51”, page 208](#)
- ◆ ⇒ [“3.10 Removing and installing continued coolant circulation pump V51”, page 209](#)

3.1 Exploded view - coolant pipes



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
 - ☐ 9 Nm
- 2 - Coolant pipes (front left)
 - ☐ Removing and installing ⇒ [page 197](#)
- 3 - Bolt
 - ☐ 9 Nm
- 4 - Bracket
- 5 - Bolt
 - ☐ 22 Nm
- 6 - Retaining clip
- 7 - Bolt
 - ☐ 9 Nm
- 8 - Coolant pipe (front)
 - ☐ Removing and installing ⇒ [page 199](#)
- 9 - Seal
 - ☐ Renew
- 10 - O-rings
 - ☐ Renew
- 11 - Coolant temperature sender - G62-
 - ☐ Removing and installing ⇒ [page 193](#)
- 12 - Coolant pipe (bottom) on supercharger
 - ☐ Remove and install together with -item 17- ⇒ [page 205](#)
- 13 - Bolt
 - ☐ 5 Nm
- 14 - Dowel sleeve
 - ☐ 2x
- 15 - Bolt
 - ☐ 5 Nm
- 16 - O-rings
 - ☐ Renew
- 17 - Coolant pipe (top) on supercharger
 - ☐ Remove and install together with -item 11- ⇒ [page 205](#)
- 18 - O-ring
 - ☐ Renew
- 19 - Coolant pipe (top)
 - ☐ Removing and installing ⇒ [page 203](#)
- 20 - Bolt
 - ☐ 9 Nm
- 21 - Seal
 - ☐ Renew



22 - Bolt

- ☐ 9 Nm

23 - Bolts

- ☐ 9 Nm

24 - Coolant pipes (left-side)

- ☐ Removing and installing ⇒ [page 194](#)

25 - O-ring

- ☐ Renew

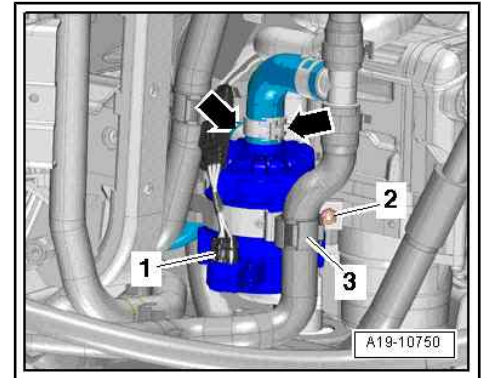
Charge air cooling pump - V188-

1 - Electrical connector

2 - Nut, 9 Nm

3 - Coolant hose

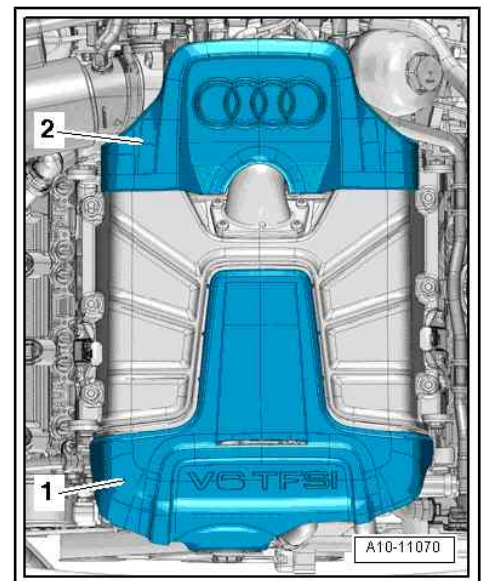
◆ Removing and installing ⇒ [page 207](#)



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.
- Lift off engine cover panel (front) -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.

- Unplug electrical connector -1- at coolant temperature sender - G62- .



Note

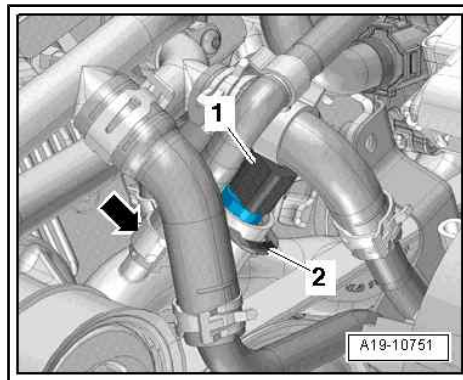
Place a cloth underneath to catch escaping coolant.

- Pull off retaining clip -2- and detach coolant temperature sender - G62- .



Note

Disregard -arrow-.



Installing

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



Note

- ◆ Fit new O-ring.
- ◆ Insert new coolant temperature sender - G62- immediately into connection to avoid loss of coolant.
- Check coolant level ⇒ [page 184](#) .

3.3 Removing and installing coolant pipes (left-side)

Special tools and workshop equipment required

- ◆ Drip tray for workshop hoist - VAS 6208-



- ◆ Hose clip pliers - VAS 6362-



Removing

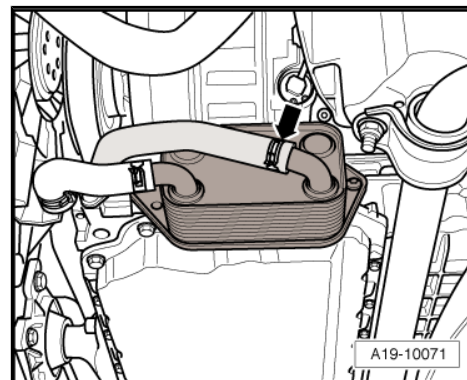


WARNING

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

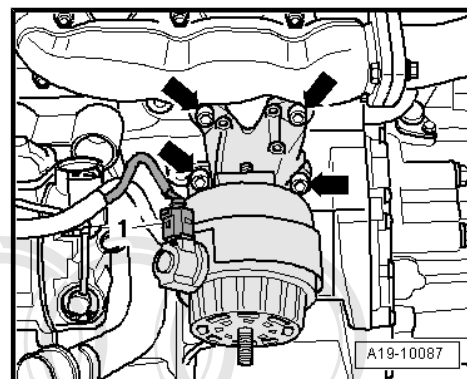
- ◆ *The cooling system is under pressure when the engine is hot.*
- ◆ *To allow pressure to dissipate, cover filler cap on coolant expansion tank with cloth and open carefully.*

- Open filler cap on coolant expansion tank.
- Remove poly V-belt from air conditioner compressor pulley
⇒ ["1.5 Removing and installing poly V-belt", page 60](#) .
- Place drip tray for workshop hoist - VAS 6208- beneath engine.
- Disconnect coolant hose -arrow- from engine oil cooler and drain off coolant.
- Unplug electrical connector -1- on left electrohydraulic engine mounting solenoid valve - N144- .



Note

Disregard -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.

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

**WARNING**

Risk of injury caused by refrigerant.

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

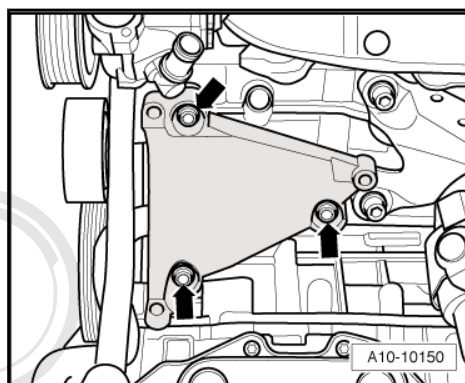
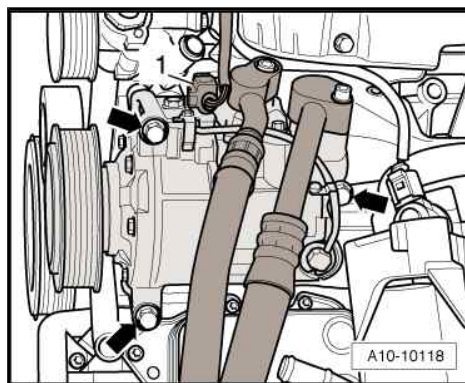
- Remove bolts -arrows- for air conditioner compressor.

**Caution**

Danger of damage to refrigerant lines and hoses.

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

- Tie up air conditioner compressor to left side of vehicle with hoses/pipes connected.
- Remove bolts -arrows- and detach bracket for air conditioner compressor.



- Remove bolts -arrows-.
- Release hose clips -1- and -2- and disconnect coolant pipes (left-side) from coolant hoses.

i Note

For illustration purposes, the installation position is shown with the power steering pump removed.

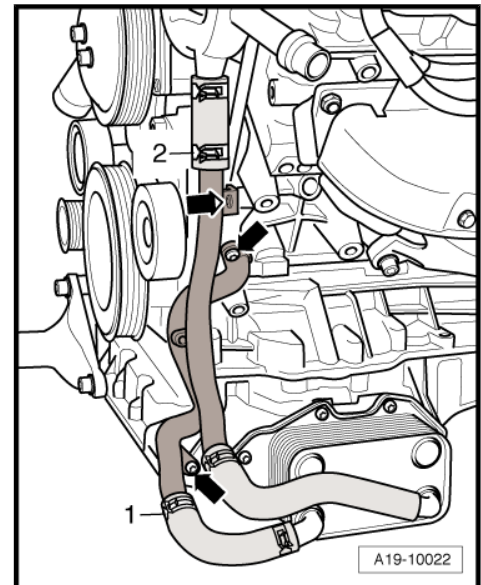
Installing

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

- Tightening torque
⇒ [“3.1 Exploded view - coolant pipes”, page 191](#)

i Note

- ◆ Fit new O-rings.
- ◆ Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ *Electronic parts catalogue*.
- Before installing, clean and smoothen sealing surface for O-ring as required.
- Lubricate O-ring with coolant and slide onto coolant pipe.
- Install bracket for air conditioner compressor and air conditioner compressor ⇒ Rep. gr. 87.
- Install poly V-belt ⇒ [page 60](#).
- Fill up with coolant ⇒ [page 179](#).



3.4 Removing and installing coolant pipes (front left)

Special tools and workshop equipment required

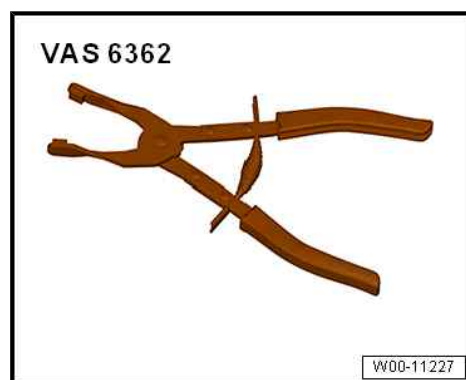
- ◆ Drip tray for workshop hoist - VAS 6208-



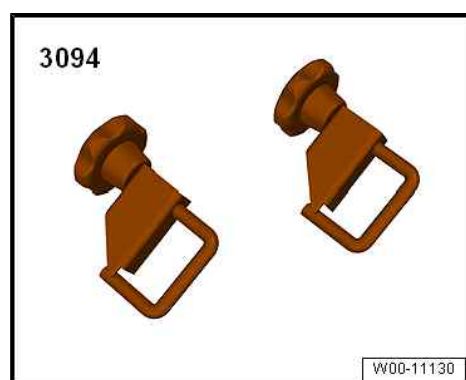
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- ◆ Hose clip pliers - VAS 6362-

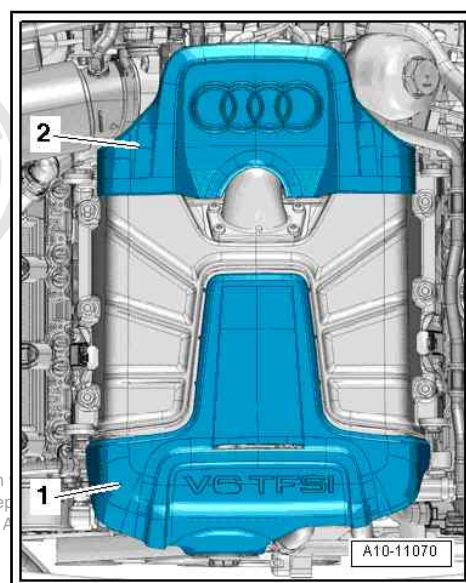


- ◆ Hose clamps, up to 25 mm - 3094-



Removing

- Lift off engine cover panel (front) -1-.



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

- Release fasteners -1, 2, arrow- and remove noise insulation panels.

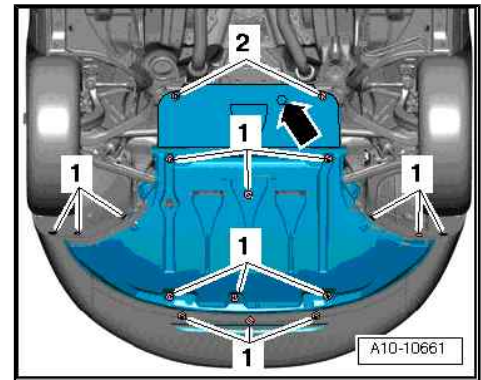
**WARNING**

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

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

Risk of injury as the radiator fans may start up automatically.

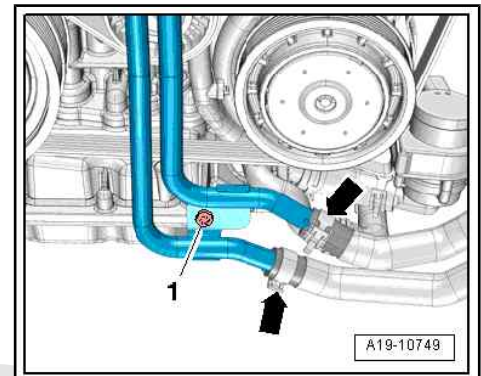
- ◆ *Even when the ignition is switched off, the radiator fans can start up without warning due to accumulated heat in the engine compartment, etc.*



- Open filler cap on coolant expansion tank.
- Place drip tray for workshop hoist - VAS 6208- beneath engine.
- Clamp off coolant hoses using hose clamps up to 25 mm - 3094- , release hose clips -arrows- and disconnect coolant hoses from coolant pipes (front left).
- Remove bolt -1-.

**Note**

For illustration purposes, the installation position is shown with the lock carrier removed.



- Release hose clips -arrows- and detach coolant hoses.
- Remove bolt -1-.
- Detach coolant pipes (front left) from below.

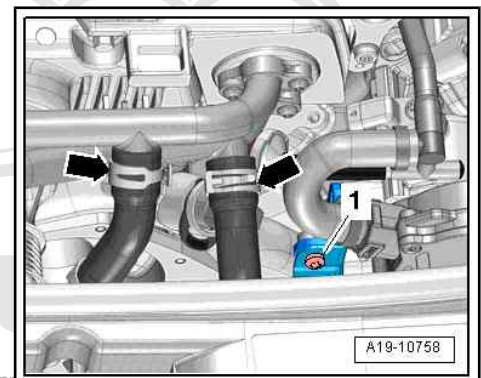
Installing

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

- Tightening torques
⇒ ["3.1 Exploded view - coolant pipes", page 191](#)

**Note**

Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .

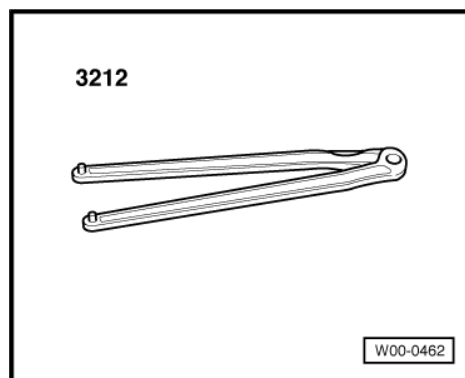


- Fill up with coolant ⇒ [page 179](#) .
- Install noise insulation panels ⇒ Rep. gr. 50 .

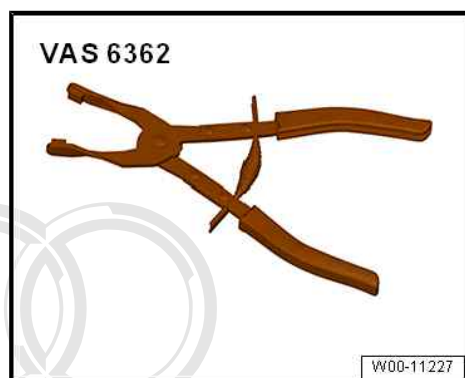
3.5 Removing and installing coolant pipe (front)

Special tools and workshop equipment required

◆ Pin wrench - 3212-

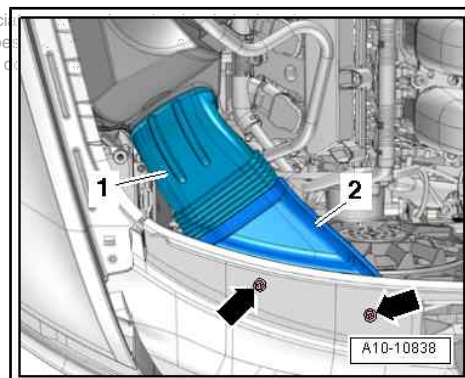


◆ Hose clip pliers - VAS 6362-

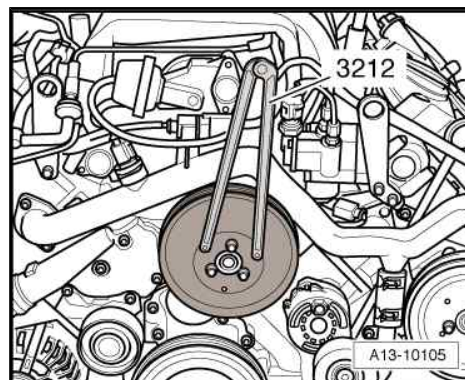


Removing

- Remove poly V-belt ⇒ [page 60](#) .
- Remove coolant pipes (front left) ⇒ [page 197](#) .
- Remove vacuum pump ⇒ Rep. gr. 47 .
- Remove bolts -arrows-, detach air ducts 1- and 2-



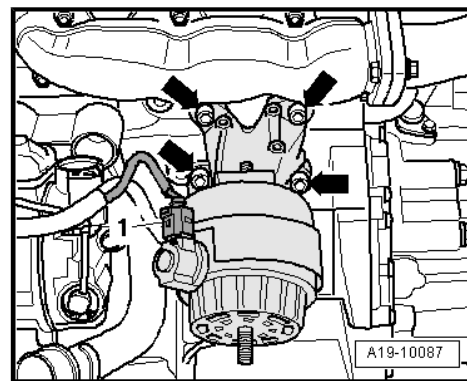
- Remove bolts for coolant pump pulley (counterhold with pin wrench - 3212-).
- Detach poly-V-belt pulley.



- Unplug electrical connector -1- on left electrohydraulic engine mounting solenoid valve - N144- .

**Note**

Disregard -arrows-.

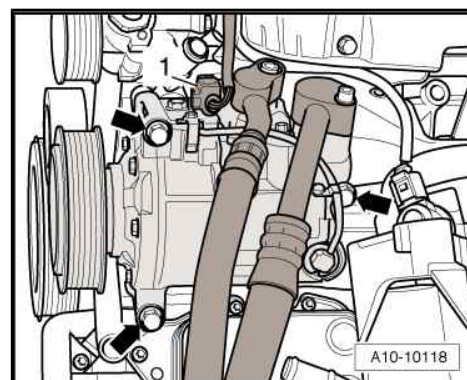


- Unplug electrical connector -1- for magnetic clutch on air conditioner compressor.

**WARNING**

Risk of injury caused by refrigerant.

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



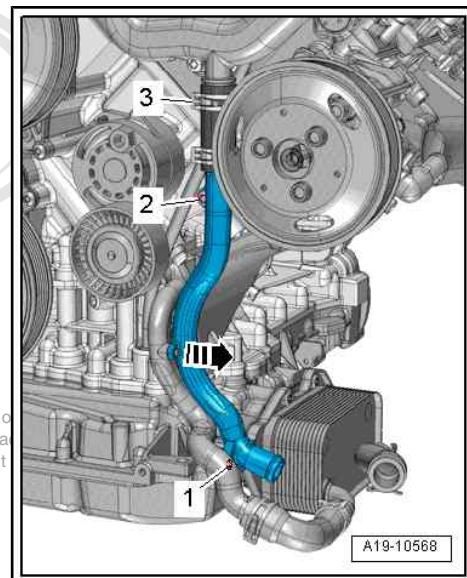
- Remove bolts -arrows- for air conditioner compressor.

**Caution**

Danger of damage to refrigerant lines and hoses.

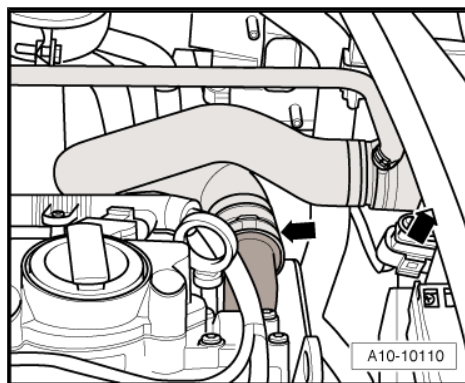
- ◆ *Do NOT stretch, kink or bend refrigerant lines and hoses.*

- Detach air conditioner compressor from bracket and place to one side with lines/wiring connected.
- Release hose clip -3- and remove bolts -1- and -2- for coolant pipes (left-side).
- Swivel coolant pipe slightly to the left -arrow- and pull it upwards out of coolant pipe (top).

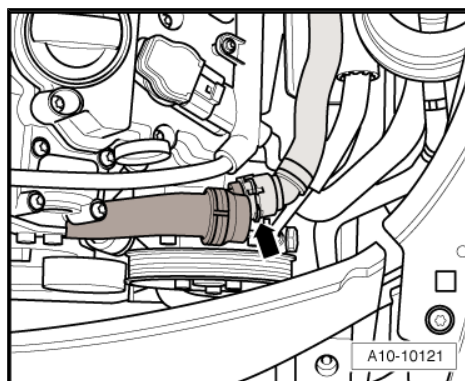


Protected by copyright. Copying for private or commercial purposes, in part or in full, is permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept liability with respect to the correctness of information in this document. Copyright

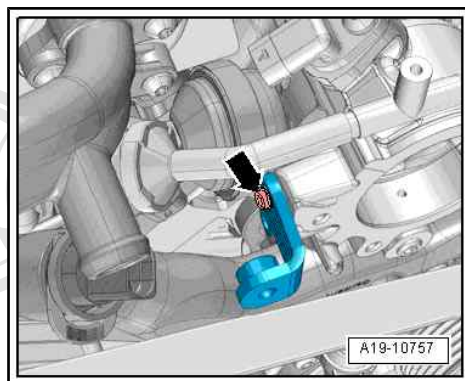
- Lift retaining clips -arrows- and disconnect coolant hose (front left) in engine compartment.



- Lift retaining clip -arrow- and detach coolant hose from coolant pipe (front).



- Remove bolt -arrow- and detach bracket for coolant pipes (front left).



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.

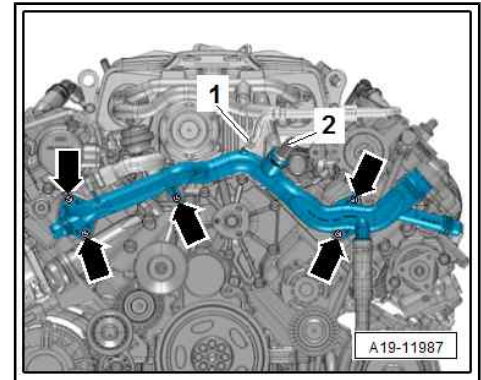
- Unplug electrical connector -2- at coolant temperature sender - G62- .
- Release hose clip -1- and detach coolant hose.
- Remove bolts -arrows- and detach coolant pipe upwards.

Installing

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

Tightening torques

- ⇒ [“2.1 Exploded view - coolant pump, thermostat and connection”, page 187](#) .
- ⇒ [“3.1 Exploded view - coolant pipes”, page 191](#) .



Note

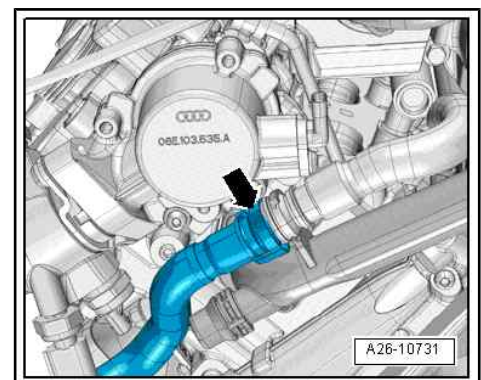
- ◆ *Renew seals and O-rings.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- Before installing, clean and smoothen sealing surfaces for O-rings as required.
- Lubricate seals and O-rings with coolant and slide onto coolant pipe.
- Install coolant pipes (left-side) ⇒ [page 194](#) .
- Install air conditioner compressor ⇒ Rep. gr. 87 .
- Install vacuum pump ⇒ Rep. gr. 47 .
- Install coolant pipes (front left) ⇒ [page 197](#) .
- Install poly V-belt ⇒ [page 60](#) .
- Fill up with coolant ⇒ [page 179](#) .

3.6 Removing and installing coolant pipe (top)

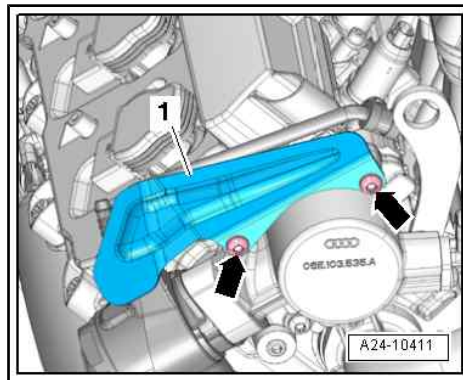
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted without the express written permission of AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Removing

- Drain coolant ⇒ [page 177](#) .
- Remove supercharger ⇒ [page 226](#) .
- Remove intake manifold (bottom section, right-side) ⇒ Rep. gr. 24 .
- Press release tabs and detach secondary air hose -arrow- to front from bracket.
- Move secondary air hose and vacuum hoses clear and press to side.



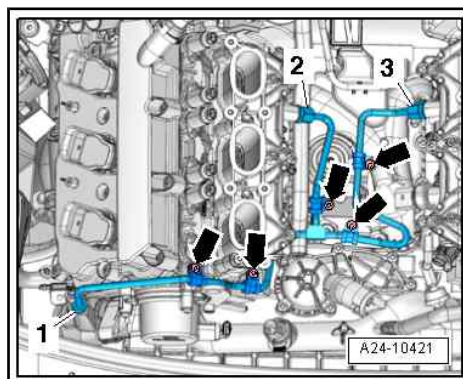
- Remove bolts -arrows- and detach guard plate -1- for high-pressure pipe.



WARNING

The fuel system operates at extremely high pressure. This can cause injury.

- ◆ *The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system.*
- ◆ *Wrap a clean cloth around the connection and carefully loosen the connection to allow the residual pressure to dissipate.*



- Reduce fuel pressure in high-pressure section of injection system ⇒ Rep. gr. 24 .
- Unscrew connection -1- and union nut -3-.
- Unscrew bolts -arrows- on retaining clips and detach high-pressure pipe.



Note

Disregard -item 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.

i Note

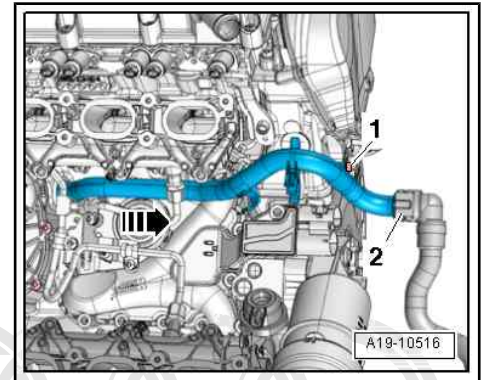
Place a cloth under coolant pipe to catch escaping coolant.

- Detach coolant hose -2- from coolant pipe.
- Unscrew bolt -1- and pull coolant pipe out of cylinder block towards the rear -arrow-.

Installing

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

- Tightening torque
⇒ ["3.1 Exploded view - coolant pipes", page 191](#)

**i Note**

- ◆ *Fit new O-ring.*
- ◆ *Fit all cable ties in the original positions when installing.*
- Before installing, clean and smoothen sealing surface for O-ring as required.
- Lubricate O-ring with coolant and slide onto coolant pipe.
- Install high-pressure pipe ⇒ Rep. gr. 24 .
- Install intake manifold (bottom section, right-side) ⇒ Rep. gr. 24 .
- Install supercharger ⇒ [page 226](#) .
- Fill up with coolant ⇒ [page 179](#) .

3.7 Removing and installing coolant pipes on supercharger

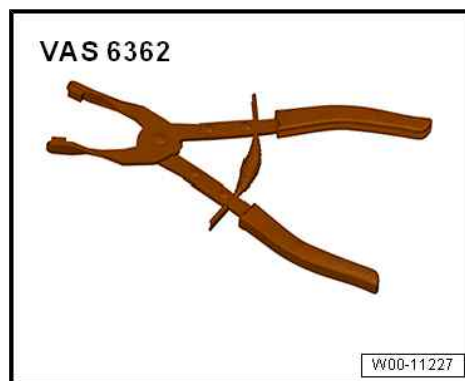
Special tools and workshop equipment required

- ◆ Drip tray for workshop hoist - VAS 6208-





- ◆ Hose clip pliers - VAS 6362-



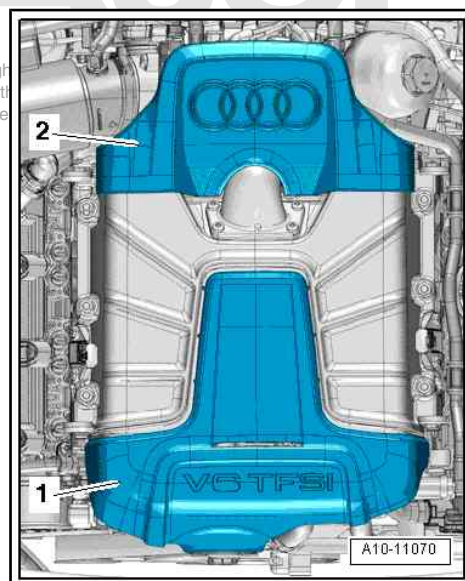
- ◆ Hose clamps, up to 25 mm - 3094-



Removing

- Lift off engine cover panel (front) -1-.

Protected by copyright
permitted unless authorized
with respect to the



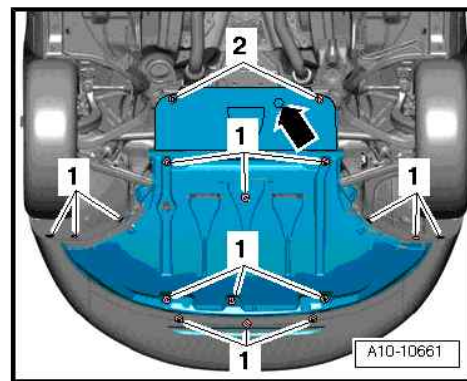
hole, is not
any liability
UDI AG.

- Release fasteners -1, 2, arrow- and remove noise insulation panels.

**WARNING**

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

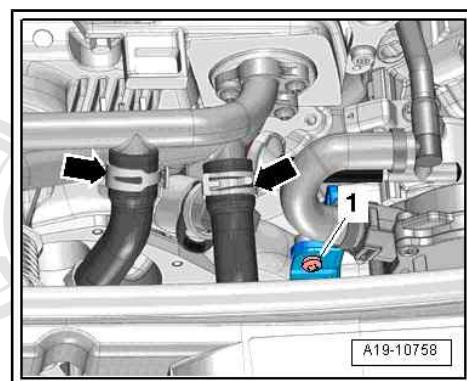
- ◆ *The cooling system is under pressure when the engine is hot.*
- ◆ *To allow pressure to dissipate, cover filler cap on coolant expansion tank with cloth and open carefully.*



- Open filler cap on coolant expansion tank.
- Place drip tray for workshop hoist - VAS 6208- beneath engine.
- Clamp off coolant hoses using hose clamps up to 25 mm - 3094- , release hose clips -arrows- and disconnect coolant hoses from coolant pipes at supercharger.

**Note**

Disregard -item 1-.



- Remove bolts -1- and -2- and take off coolant pipes.

Installing

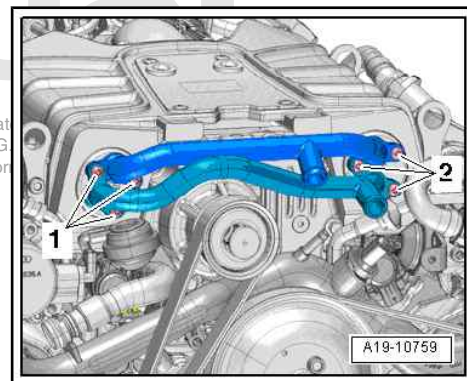
Installation is carried out in the reverse order: **note the following:**

- Tightening torque
⇒ ["3.1 Exploded view - coolant pipes", page 191](#)

**Note**

- ◆ *Renew seals and/or gaskets.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

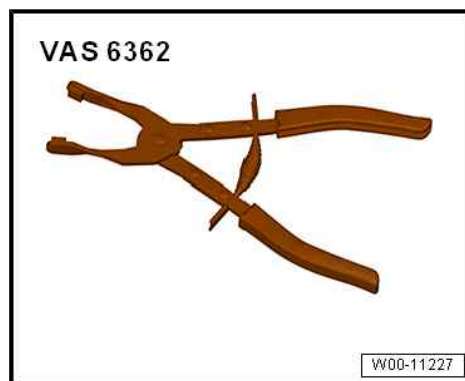
- Fill up with coolant ⇒ [page 179](#) .
- Install noise insulation panels ⇒ Rep. gr. 50 .



3.8 Removing and installing charge air cooling pump - V188-

Special tools and workshop equipment required

- ◆ Hose clip pliers - VAS 6362-



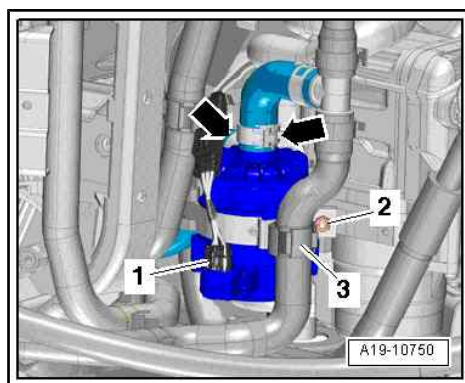
Removing

- Drain coolant ⇒ [page 177](#) .
- Unplug electrical connector -1- and move coolant hose -3- clear.
- Remove nut -2- and detach retaining tab.
- Detach charge air cooling pump - V188- , then release hose clips -arrows- and disconnect coolant hoses.

Installing

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

- Tighten nut -2- ⇒ [page 193](#) .
- Fill up with coolant ⇒ [page 179](#) .

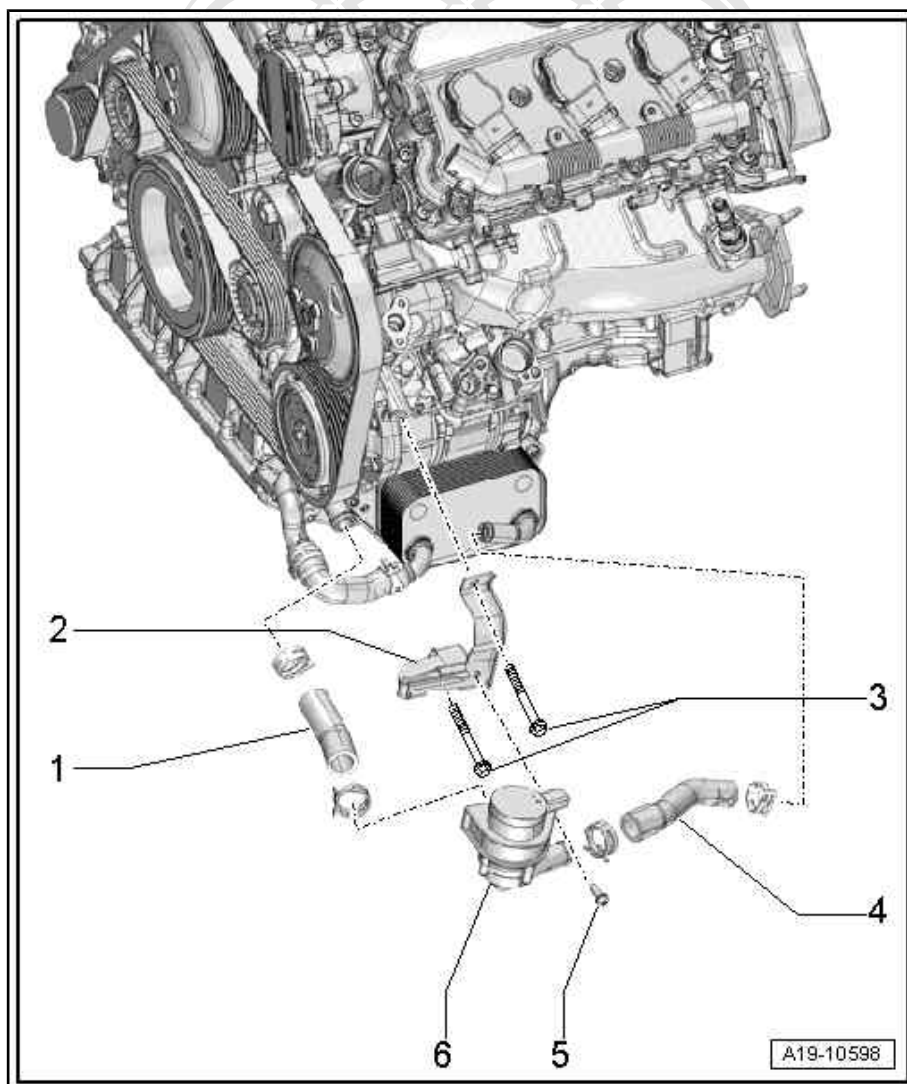


3.9 Exploded view - continued coolant circulation pump - V51-



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 - Coolant hose
- 2 - Bracket
- 3 - Bolts
 - 9 Nm
- 4 - Coolant hose
- 5 - Bolt
 - 4 Nm
- 6 - Continued coolant circulation pump - V51-
 - Removing and installing
⇒ [page 209](#)



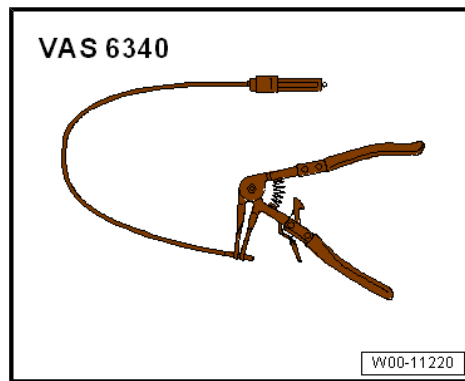
3.10 Removing and installing continued coolant circulation pump - V51-

Special tools and workshop equipment required

- ◆ Drip tray for workshop hoist - VAS 6208-



- ◆ Hose clip pliers - VAS 6340-



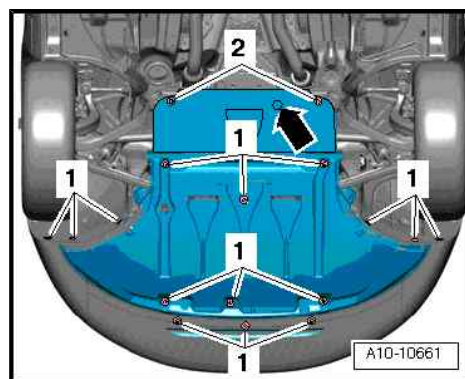
Removing



WARNING

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

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

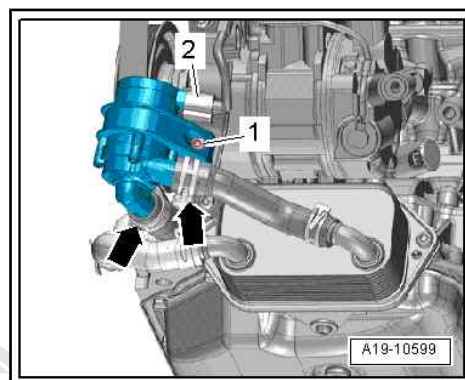


- Open filler cap on coolant expansion tank.
- Release fasteners -1- and remove front noise insulation panel.
- Remove bolt -1- and unplug electrical connector -2-.
- Place drip tray for workshop hoist - VAS 6208- beneath engine.
- Disconnect continued coolant circulation pump - V51- from coolant hoses -arrows-.

Installing

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

- Tightening torque
⇒ ["3.9 Exploded view - continued coolant circulation pump V51", page 208](#)
- Fill up with coolant ⇒ [page 184](#) .
- Install front noise insulation ⇒ Rep. gr. 50 .



4 Radiator and radiator fans

Overview

- ◆ ⇒ [“4.1 Exploded view - radiator and radiator fans”, page 211](#)
- ◆ ⇒ [“4.2 Removing and installing radiator”, page 212](#)
- ◆ ⇒ [“4.3 Removing and installing water radiator for charge air cooling circuit”, page 217](#)
- ◆ ⇒ [“4.4 Removing and installing radiator cowl”, page 220](#)
- ◆ ⇒ [“4.5 Removing and installing radiator fans V7 / V177”, page 222](#)



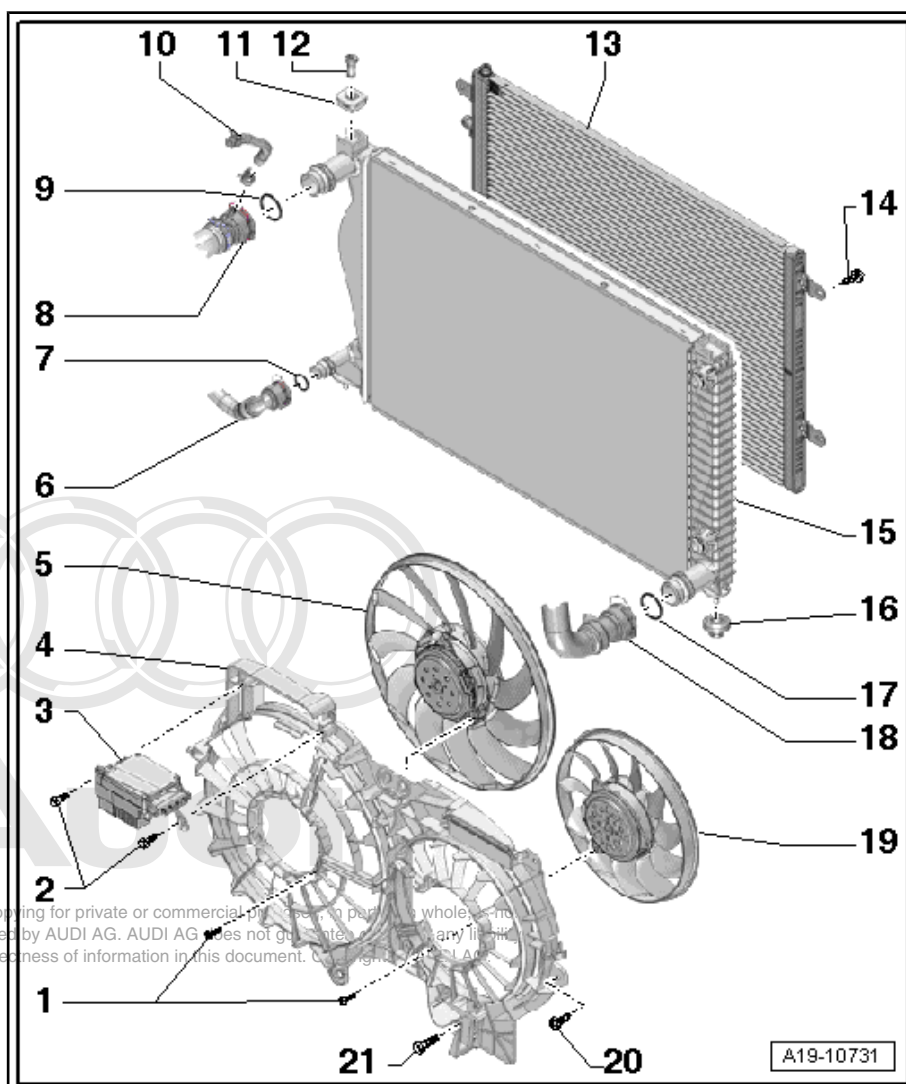
WARNING

Risk of injury as the radiator fans may start up automatically.

- ◆ *Unplug electrical connectors before starting to work in the area of radiator cowl.*

4.1 Exploded view - radiator and radiator fans

- 1 - Bolt
 - ☐ 5 Nm
- 2 - Bolt
 - ☐ 2.1 Nm
- 3 - Radiator fan control unit - J293-
- 4 - Radiator cowl
 - ☐ Removing and installing
⇒ [page 220](#)
- 5 - Radiator fan - V7-
 - ☐ Removing and installing
⇒ [page 222](#)
- 6 - Coolant hose
 - ☐ Lift retaining clip to detach
 - ☐ Connecting to radiator
⇒ [page 212](#)
- 7 - O-ring
 - ☐ Renew
- 8 - Coolant hose
 - ☐ Lift retaining clip to detach
 - ☐ Connecting to radiator
⇒ [page 212](#)
- 9 - O-ring
 - ☐ Renew



10 - Coolant hose

11 - Rubber bush (top)

12 - Retaining pin

13 - Water radiator for charge air cooling circuit

- ☐ Removing and installing ⇒ [page 217](#)
- ☐ If renewed, change coolant in entire system

14 - Bolt

- ☐ 5 Nm

15 - Radiator

- ☐ Removing and installing ⇒ [page 212](#)
- ☐ If renewed, change coolant in entire system

16 - Rubber bush (bottom)

17 - O-ring

- ☐ Renew

18 - Coolant hose

- ☐ Lift retaining clip to detach
- ☐ Connecting to radiator ⇒ [page 212](#)

19 - Radiator fan 2 - V177-

- ☐ With radiator fan control unit 2 - J671-
- ☐ Removing and installing ⇒ [page 222](#)

20 - Bolt

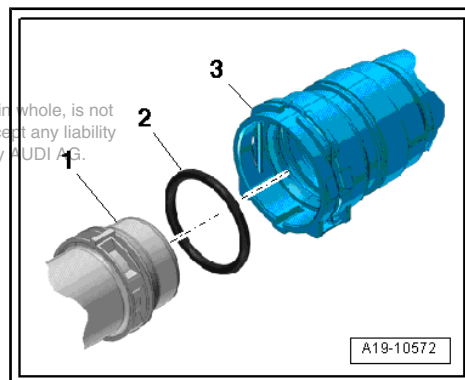
- ☐ 2.1 Nm

21 - Bolt

- ☐ 11 Nm

Connecting coolant hose with plug-in connector

- 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 connection -1- until it engages audibly.
- Press coolant hose in again and then pull to check that plug-in connector is correctly engaged.



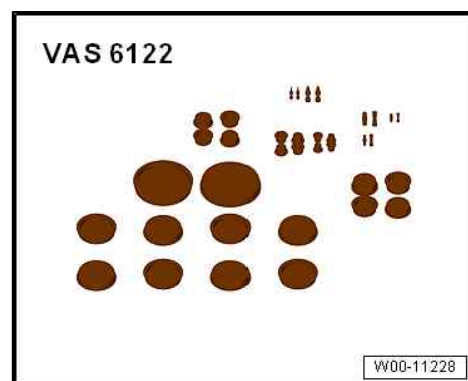
4.2 Removing and installing radiator

Special tools and workshop equipment required

- ◆ Used oil collection and extraction unit - V.A.G 1782-



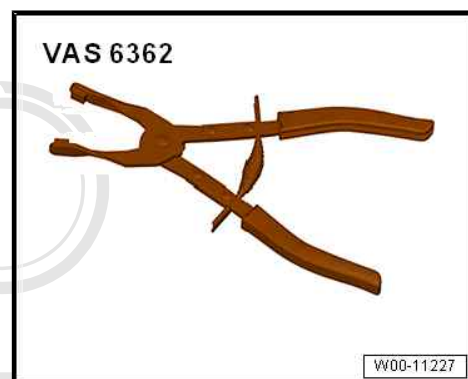
- ◆ Engine bung set - VAS 6122-



- ◆ Drip tray for workshop hoist - VAS 6208-



- ◆ 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



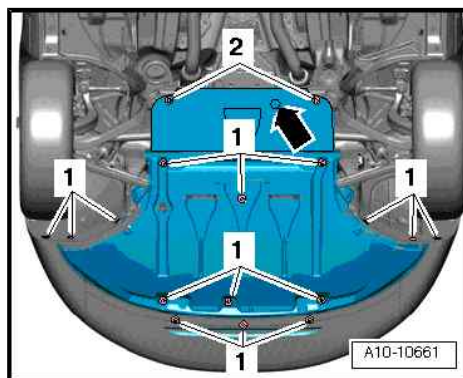
WARNING

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

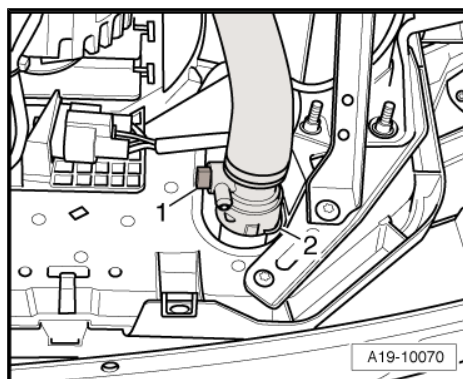
- ◆ *The cooling system is under pressure when the engine is hot.*
- ◆ *To allow pressure to dissipate, cover filler cap on coolant expansion tank with cloth and open carefully.*

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.

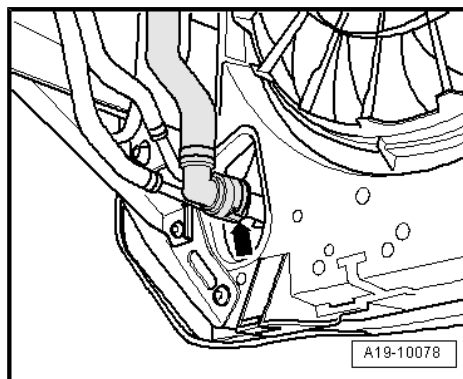
- Open filler cap on coolant expansion tank.
- Release fasteners -1, 2, arrow- and remove noise insulation panels.
- Remove front left and front right wheel housing liners ⇒ Rep. gr. 66 .
- Remove bumper cover (front) ⇒ Rep. gr. 63 .



- Place drip tray for workshop hoist - VAS 6208- beneath engine.
- Open drain plug -1- and drain off coolant.
- Pull out retaining clip -2- and disconnect coolant hose from radiator.



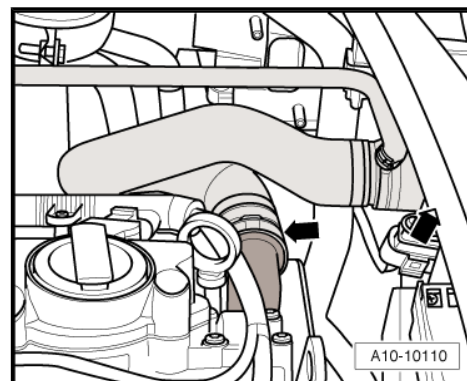
- Lift retaining clip -arrow- and disconnect coolant hose (bottom left) from radiator.



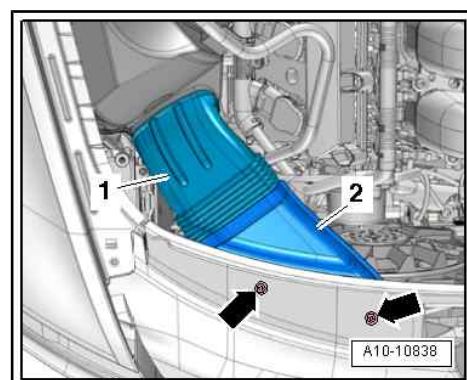
- Detach coolant hose (top) -arrow on right- from radiator.

**Note**

Ignore -arrow on left side of illustration-.

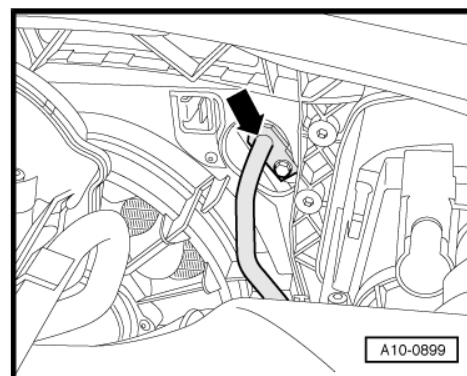


- Remove bolts -arrows-, detach air ducts -1- and -2-.

**Note**

Observe rules for cleanliness when working on automatic gear-box ⇒ Rep. gr. 00.

- Position used oil collection and extraction unit - V.A.G 1782- below connection point.
- Remove ATF lines (top -arrow- and bottom) from radiator: ⇒ Rep. gr. 37.

**Note**

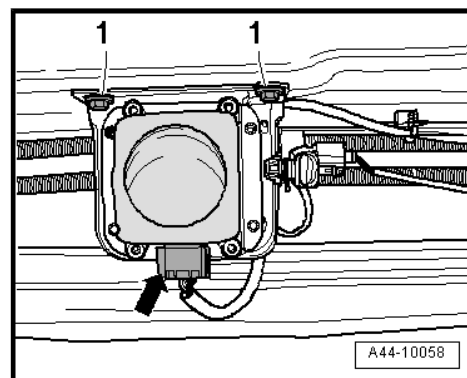
Tie AT pipes up onto longitudinal member and seal with clean plugs to prevent ATF from escaping.

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.

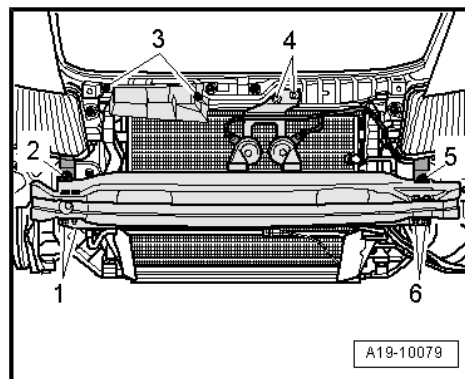
- On vehicles with adaptive cruise control, unplug electrical connector -arrow- at adaptive cruise control unit - J428-.

**Note**

Disregard -item 1-.



- Unscrew bolts -3- and remove air duct.
- Unscrew bolts -4- and detach bracket for horns; the wiring remains connected.
- Unscrew bolts -2- and -5- and remove brackets for headlights.
- Remove nuts -1- and -6- and detach bumper.

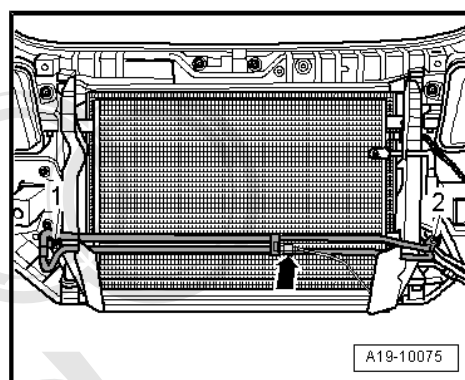


- Unclip ambient temperature sensor - G17- -arrow- from bracket.
- Unscrew bolts -1- and -2- for power steering cooling pipe; the hydraulic hoses remain attached.
- Unbolt air ducts on left and right sides of radiator.


WARNING

Risk of injury caused by refrigerant.

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



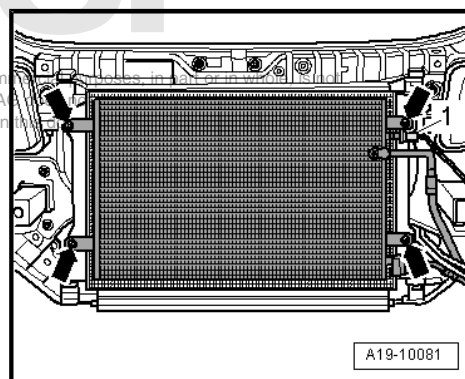
- Unplug electrical connector -1-.
- Remove bolts -arrows-.


Caution

Risk of damage to condenser and refrigerant pipes/hoses.

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

- Pivot condenser and water radiator for charge air cooling circuit forwards with refrigerant lines and coolant hoses attached.



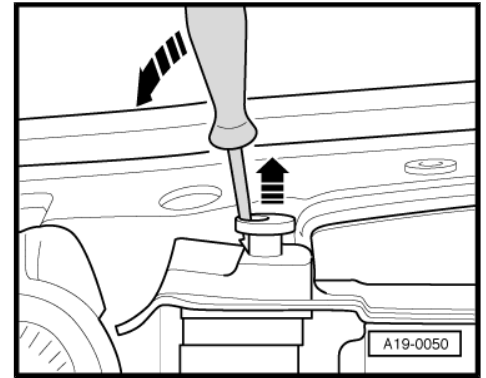
Protected by copyright. Copying for private or commercial use is prohibited without permission from AUDI AG. AUDI AG is not responsible for the correctness of information in this document.

- Release two retaining pins for radiator and pull out upwards -arrows-.
- Swivel radiator forwards and lift off.
- Tie condenser and water radiator for charge air cooling circuit onto longitudinal member.

Installing

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

- Tightening torque
⇒ ["4.2 Removing and installing radiator", page 212](#)



Note

- ◆ *If there are slight impressions on the fins, refer to ⇒ [page 7](#).*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ [Electronic parts catalogue](#).*
- Install condenser ⇒ Rep. gr. 87.
- Install cooling pipe for power steering ⇒ Rep. gr. 48.
- Install bracket for horns ⇒ Electrical system; Rep. gr. 96.
- Install ATF lines ⇒ Rep. gr. 37.
- Install front bumper ⇒ Rep. gr. 63.
- Install front wheel housing liners ⇒ Rep. gr. 66.
- Connect coolant hoses with plug-in connector ⇒ [page 212](#).
- Fill up with coolant ⇒ [page 179](#).



Note

The coolant in the entire system must be changed if the radiator is renewed.

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.

- Check ATF level ⇒ Rep. gr. 37.
- Install noise insulation panels ⇒ Rep. gr. 50.
- Adjustment must be performed in [Guided Functions](#) after removing and installing adaptive cruise control unit - J428- ⇒ Rep. gr. 44 and ⇒ Vehicle diagnostic tester.

4.3 Removing and installing water radiator for charge air cooling circuit

Special tools and workshop equipment required

◆ Drip tray for workshop hoist - VAS 6208-



◆ Hose clip pliers - VAS 6362-



◆ Hose clamps, up to 25 mm - 3094-



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

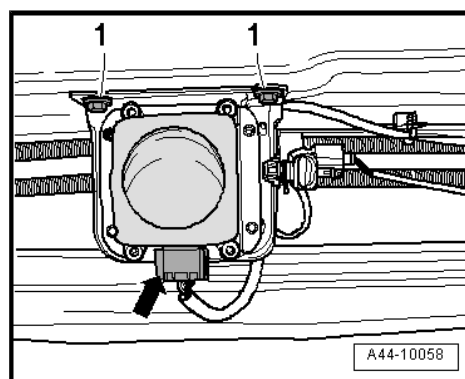
Removing

- Remove bumper cover (front) ⇒ Rep. gr. 63 .
- On vehicles with adaptive cruise control, unplug electrical connector -arrow- at adaptive cruise control unit - J428- .

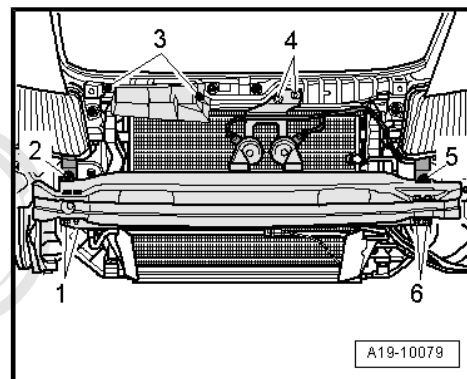


Note

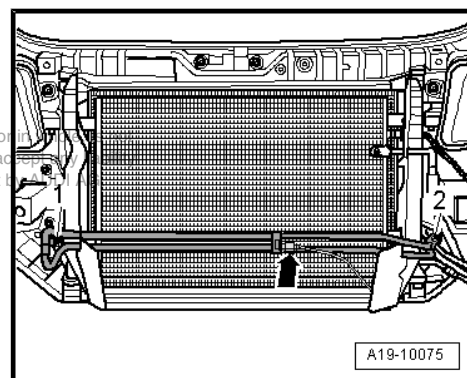
Disregard -item 1-.



- Unscrew bolts -3- and remove air duct.
- Unscrew bolts -4- and detach bracket for horns; the wiring remains connected.
- Unscrew bolts -2- and -5- and remove brackets for headlights.
- Remove nuts -1- and -6- and detach bumper.



- Unclip ambient temperature sensor - G17- -arrow- from bracket.
- Unscrew bolts -1- and -2- for power steering cooling pipe; the hydraulic hoses remain attached.
- Unbolt air ducts on left and right sides of radiator.

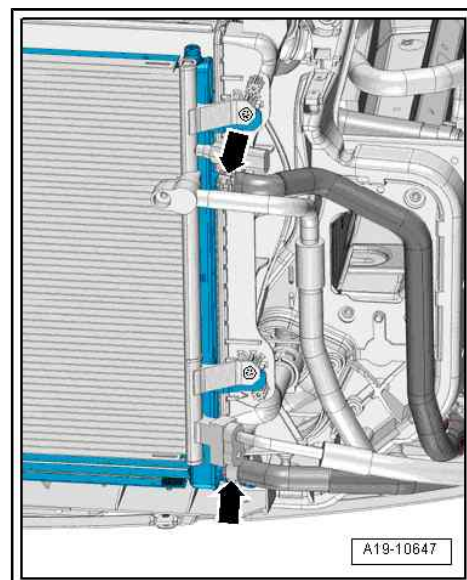


- Place drip tray for workshop hoist - VAS 6208- beneath engine.
- Clamp off coolant hoses using hose clamps up to 25 mm - 3094- , release hose clips -arrows- and disconnect hoses.

**WARNING**

Risk of injury caused by refrigerant.

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



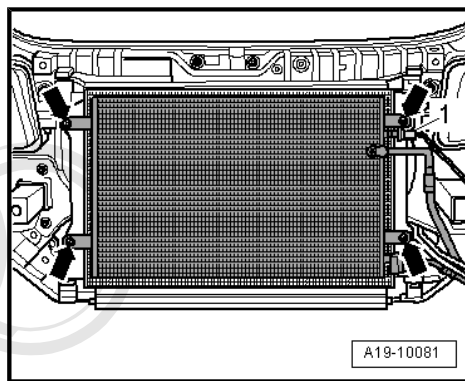
- Unplug electrical connector -1-.
- Remove bolts -arrows-.



Caution

Risk of damage to condenser and refrigerant pipes/hoses.

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



- Pivot condenser forwards with pipes/hoses attached.
- Detach water radiator for charge air cooling circuit
- Secure condenser with bolts.

Installing

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

- Tightening torque Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted without prior written permission from 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.
⇒ **“4.2 Removing and installing radiator”, page 212**



Note

- ◆ *If there are slight impressions on the fins, refer to ⇒ **page 7**.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ **Electronic parts catalogue**.*
- Install condenser ⇒ Rep. gr. 87.
- Install cooling pipe for power steering ⇒ Rep. gr. 48.
- Install bracket for horns ⇒ Electrical system; Rep. gr. 96.
- Install front bumper ⇒ Rep. gr. 63.
- Fill up with coolant ⇒ **page 179**.



Note

The coolant in the entire system must be changed if the water radiator for the charge air cooling circuit is renewed.

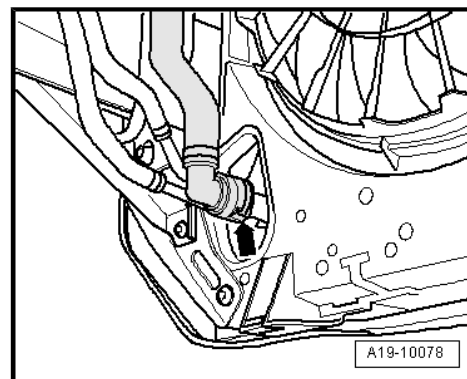
- Adjustment must be performed in **Guided Functions** after removing and installing adaptive cruise control unit - J428- ⇒ Rep. gr. 44 and ⇒ Vehicle diagnostic tester.

4.4 Removing and installing radiator cowl

Removing

- Drain coolant ⇒ **page 177**.
- Remove coolant pipes (front left) ⇒ **page 197**.
- Remove vibration damper ⇒ **page 62**.
- Remove poly V-belt tensioner for supercharger ⇒ **page 57**.
- Remove air cleaner housing ⇒ Rep. gr. 24.

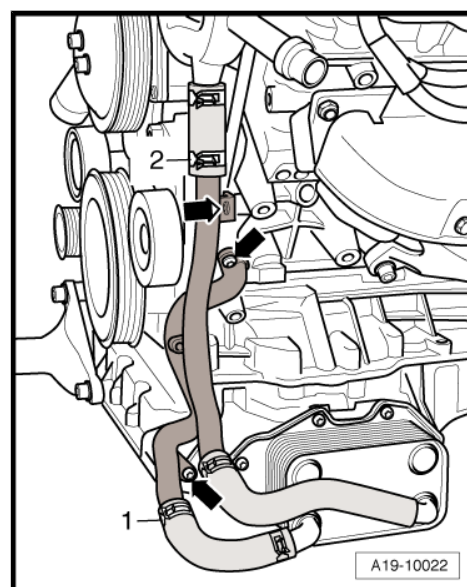
- Lift retaining clip -arrow- and disconnect coolant hose (bottom left) from radiator.



- Remove bolts -arrows-.
- Release hose clip -1- and detach coolant hose.

**Note**

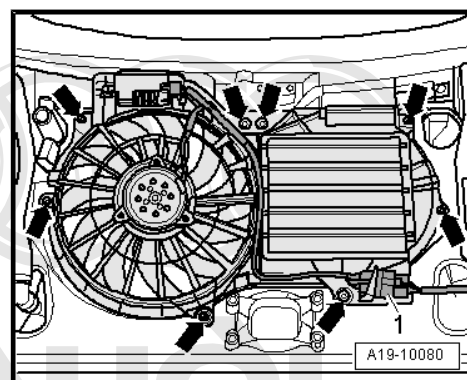
- ◆ For illustration purposes, the installation position is shown with the power steering pump removed.
- ◆ Disregard -item 2-.

**WARNING**

Risk of injury as the radiator fans may start up automatically.

- ◆ *Unplug electrical connectors before starting to work in the area of radiator cowl.*

- Unplug electrical connector -1- for radiator fan.
- Remove bolts -arrows- and take out radiator cowl from below.

**Installing**

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

- Tightening torque
⇒ ["4.1 Exploded view - radiator and radiator fans", page 211](#)
- Install air cleaner housing ⇒ Rep. gr. 24 .
- Install poly V-belt tensioner for supercharger ⇒ [page 57](#) .
- Install vibration damper ⇒ [page 62](#) .
- Connect coolant hose with plug-in connector ⇒ [page 212](#) .
- Install coolant pipes (front left) ⇒ [page 197](#) .

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.

4.5 Removing and installing radiator fans - V7- / -V177-

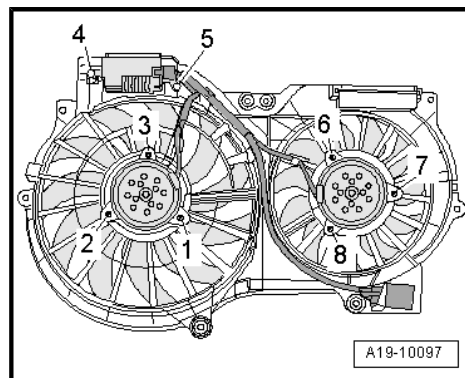
Removing

- Remove radiator cowl ⇒ [page 220](#) .
- Move electrical wiring clear.
- Remove bolts -1 ... 8-.
- Detach radiator fans with radiator fan control unit.

Installing

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

- Tightening torque
⇒ ["4.1 Exploded view - radiator and radiator fans", page 211](#)
- Install radiator cowl ⇒ [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.

21 – Turbocharging/supercharging

1 Supercharger

Overview

- ◆ ⇒ [“1.1 Exploded view - supercharger”, page 223](#)
- ◆ ⇒ [“1.2 Removing and installing charge pressure sender G31 / G447”, page 225](#)
- ◆ ⇒ [“1.3 Removing and installing supercharger”, page 226](#)
- ◆ ⇒ [“1.4 Exploded view - charge air coolers”, page 230](#)
- ◆ ⇒ [“1.5 Securing supercharger to engine and gearbox support for assembly work”, page 231](#)
- ◆ ⇒ [“1.6 Securing supercharger to engine and gearbox support for leak test”, page 233](#)
- ◆ ⇒ [“1.7 Removing and installing charge air cooler”, page 234](#)
- ◆ ⇒ [“1.8 Exploded view - drive unit”, page 237](#)
- ◆ ⇒ [“1.9 Removing and installing drive unit and damper spring”, page 238](#)
- ◆ ⇒ [“1.10 Checking supercharger for leaks”, page 240](#)



Note

- ◆ *Observe rules for cleanliness ⇒ [page 6](#).*
- ◆ *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.*

1.1 Exploded view - supercharger

1 - Engine lifting eye

2 - Bolt

- 27 Nm

3 - Supercharger

- With charge air coolers
- Removing and installing supercharger
⇒ [page 226](#)
- Exploded view - charge air coolers ⇒ [page 230](#)
- Removing and installing
⇒ [page 226](#)
- Secure to engine and gearbox support - VAS 6095- when performing assembly work
⇒ [page 231](#)
- Secure to engine and gearbox support - VAS 6095- when checking for leaks ⇒ [page 233](#)

4 - Insulating plate

5 - Bolt

- 5 Nm

6 - Rubber grommet

- 2x

7 - Intermediate flange

8 - Bolt

- Tightening torque ⇒ Rep. gr. 24

9 - Throttle valve module - J338-

- Removing and installing ⇒ Rep. gr. 24

10 - O-rings

- Renew

11 - Connection

12 - Bolt

- Tightening torque and sequence ⇒ Rep. gr. 24

13 - Bracket

- For change-over valves

14 - Bolt

- 9 Nm

15 - Bolt

- Tightening torque and sequence ⇒ Rep. gr. 24

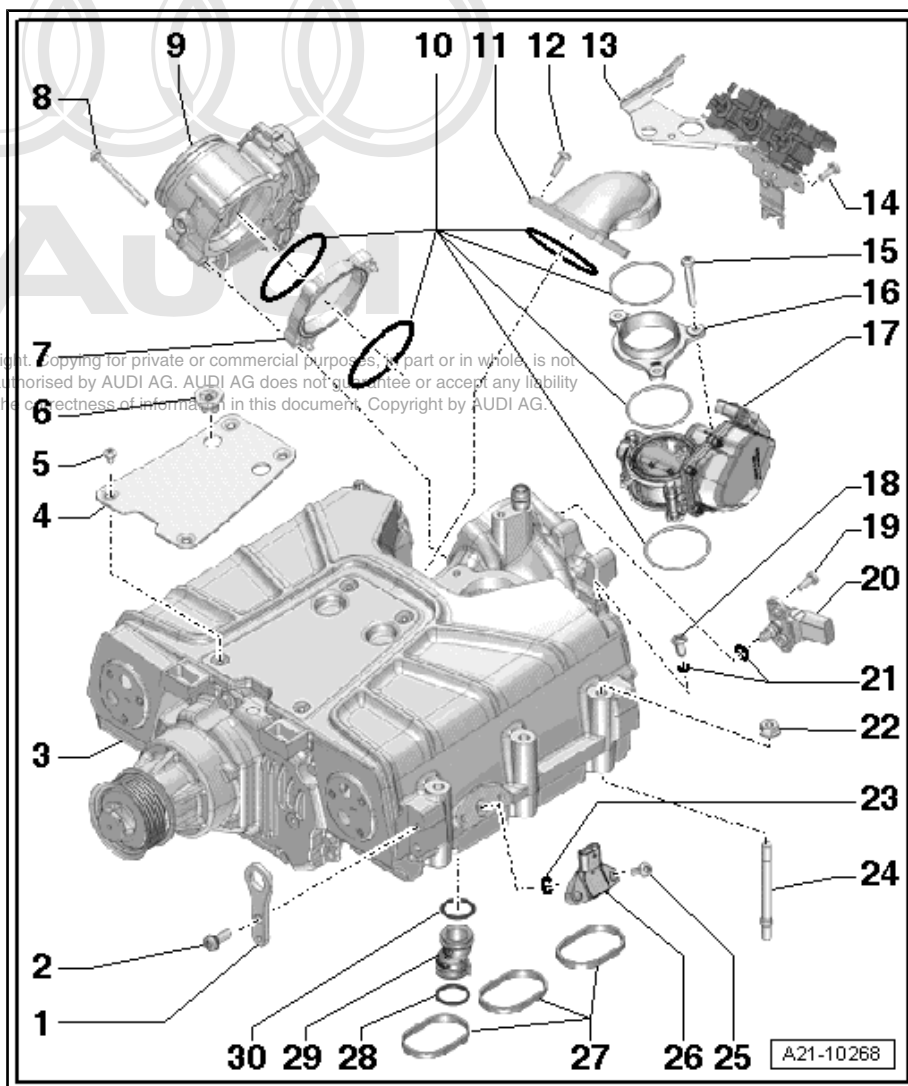
16 - Intermediate flange

17 - Regulating flap control unit - J808-

- Removing and installing ⇒ Rep. gr. 24

18 - Bleeder screw

- For charge air cooler (left-side)
- 1.5 ... 3.0 Nm



19 - Bolt

- ☐ Tightening torque ⇒ Rep. gr. 24

20 - Intake air temperature sender - G42-

- ☐ Removing and installing ⇒ Rep. gr. 24

21 - O-rings

- ☐ Renew

22 - Nut

- ☐ 20 Nm

23 - O-ring

- ☐ Renew

24 - Threaded pin

- ☐ 17 Nm

25 - Bolt

- ☐ Self-locking
- ☐ Renew
- ☐ Before assembly, always remove residues from threaded holes using a thread tap
- ☐ 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.

26 - Charge pressure sender

- ☐ Cylinder bank 1 (right-side): charge pressure sender - G31- , cylinder bank 2 (left-side): charge pressure sender 2 - G447-
- ☐ Removing and installing ⇒ [page 225](#)

27 - Seals

- ☐ Renew

28 - O-ring

- ☐ Renew

29 - Connection

- ☐ For crankcase breather
- ☐ Installation position ⇒ [page 171](#)

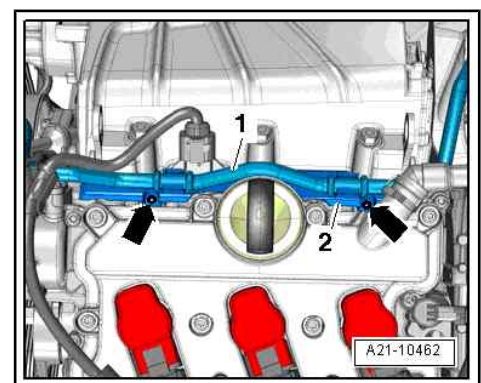
30 - O-rings

- ☐ Renew

1.2 Removing and installing charge pressure sender -G31- / -G447-

Removing**Cylinder bank 2 (left-side):**

- Move clear vacuum hose -1-.
- Remove bolts -arrows- and detach cover -2-.



Both sides (continued):

- Unplug electrical connector -1-.
- Unscrew bolts -arrows- and remove charge pressure sender.

Installing

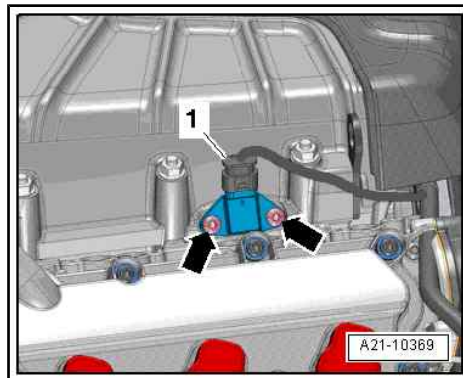
Installation is carried out in the reverse order; note the following:

- Tightening torque
⇒ ["1.1 Exploded view - supercharger", page 223](#)



Note

- ◆ *Renew self-locking bolts and O-ring.*
- ◆ *Before assembly, always remove residues from threaded holes for charge pressure senders in supercharger housing using a thread tap.*



1.3 Removing and installing supercharger

Special tools and workshop equipment required

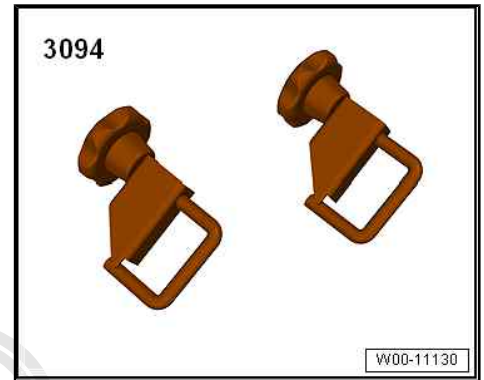
- ◆ Drip tray for workshop hoist - VAS 6208-



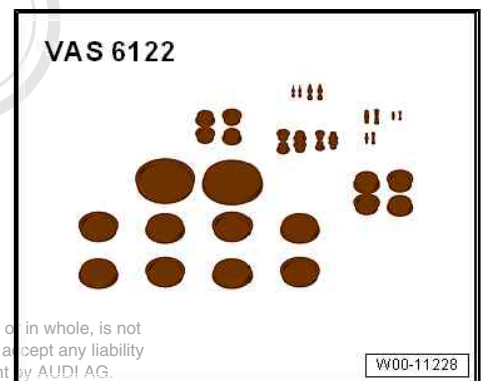
- ◆ Hose clip pliers - VAS 6362-



- ◆ Hose clamps, up to 25 mm - 3094-



- ◆ Engine bung set - VAS 6122-



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.

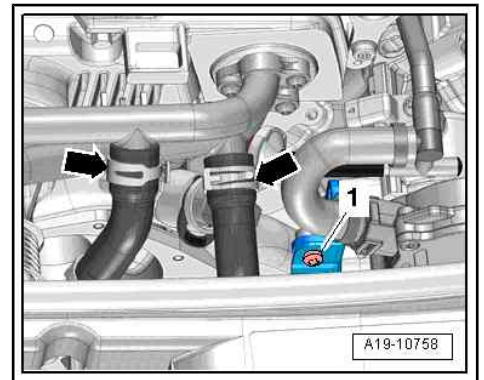
Removing

- Remove poly V-belt for supercharger ⇒ [page 55](#) .
- Place drip tray for workshop hoist - VAS 6208- beneath engine.
- Clamp off coolant hoses using hose clamps up to 25 mm - 3094- , release hose clips -arrows- and disconnect coolant hoses from coolant pipes at supercharger.

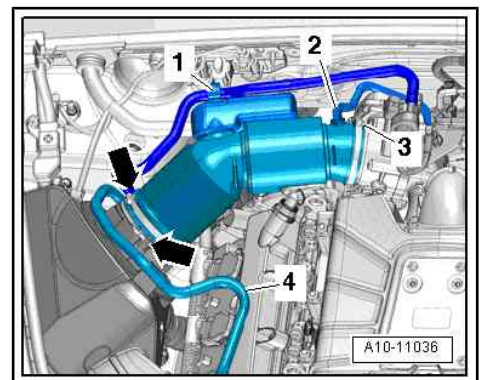


Note

Disregard -item 1-.



- Move fuel line -4- and line -1- leading to activated charcoal filter clear on air cleaner housing and air pipe.
- Detach vacuum hose -2- from connection on air hose.
- Remove air pipe. To do so, release hose clip -3- and clamps -arrows-.

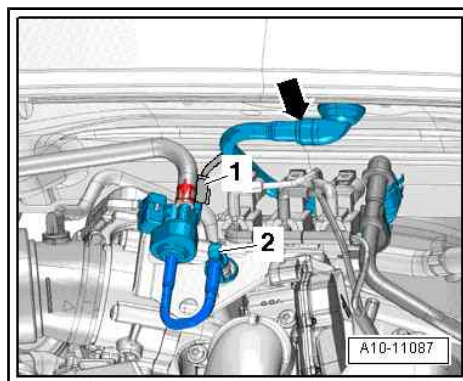


- Unplug electrical connector -1- at activated charcoal filter solenoid valve 1 - N80- and detach vacuum hose -2-.
- Detach activated charcoal filter solenoid valve 1 - N80- from bracket and move it clear to the side with hose still attached.

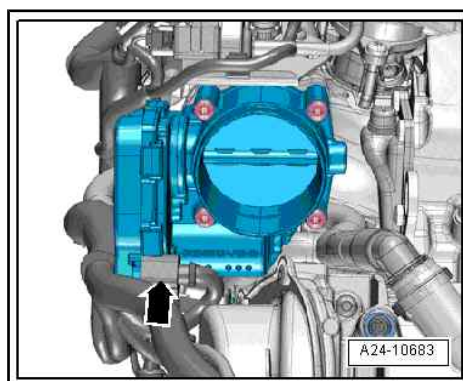


Note

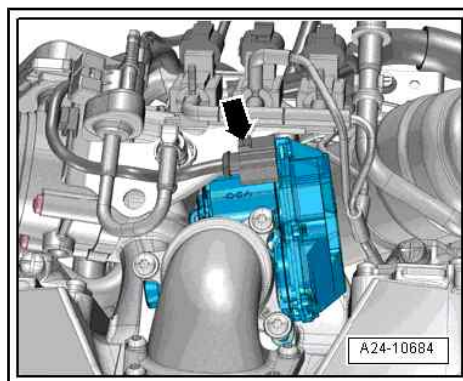
Disregard -arrow-.



- Unplug electrical connector -arrow- at throttle valve module - J338- .



- Unplug electrical connector -arrow- at regulating flap control unit - J808- .



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.

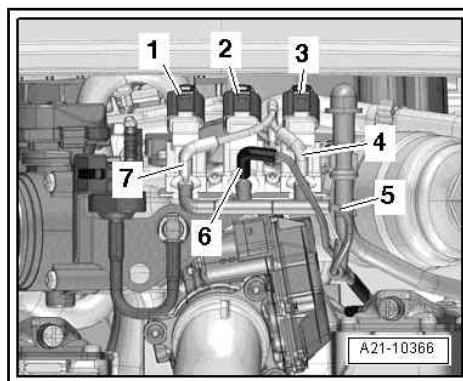
- Unplug electrical connectors -1, 2, 3-.



Note

Mark position of vacuum hoses for re-installation.

- Disconnect vacuum hoses -4 ... 7-.



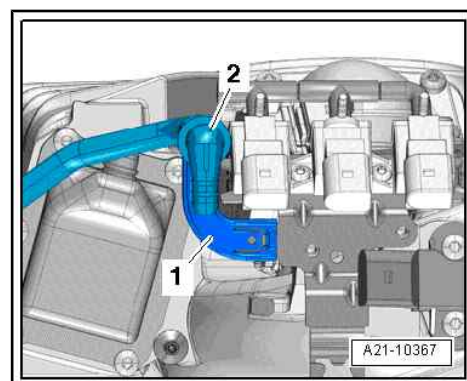
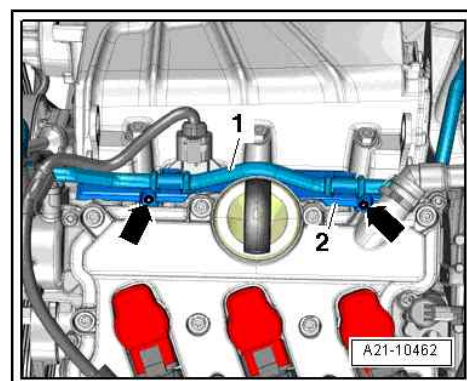
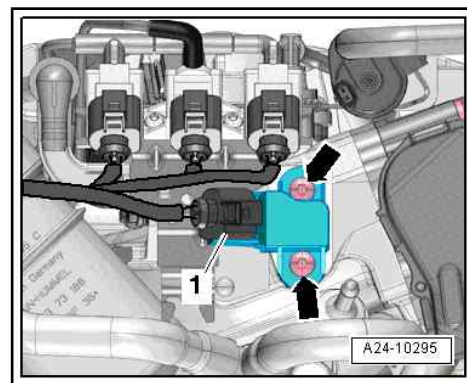
- Unplug electrical connector -1- at intake air temperature sender - G42- / intake manifold pressure sender - G71- .



Disregard -arrows-.

- ~~Move clear vacuum hose -1- for commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability~~
- ~~Remove bolts -arrows- on both sides and detach cover -2-.~~

- Release vacuum hose -2- leading to brake servo at bracket -1-.



- Unplug electrical connectors -1- and -2-.
- Remove nuts -arrows- and lift off supercharger with charge air coolers.
- Seal openings on supercharger and all relevant ducts and hoses of the charge air system with plugs from engine bung set - VAS 6122- .

Installing

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

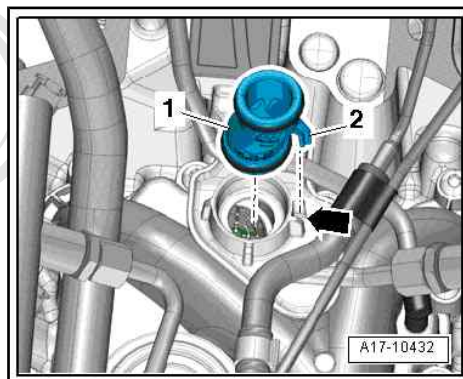
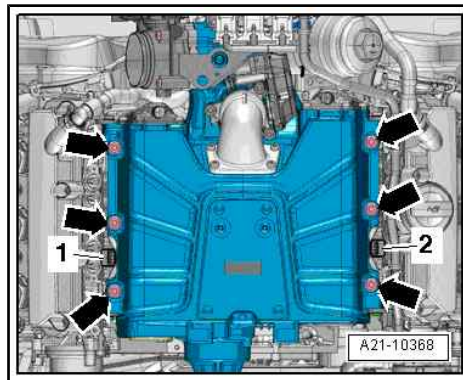
- Tightening torque
⇒ ["1.1 Exploded view - supercharger", page 223](#)



Note

- ◆ *Renew seals and/or gaskets.*
- ◆ *Hose connections and air pipes and hoses must be free of oil and grease before assembly.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ [Electronic parts catalogue](#) .*
- ◆ *To ensure that the air hoses can be properly secured at their connections, spray rust remover onto the worm thread of used hose clips before installing.*

- Ensure that crankcase breather connection is positioned correctly ⇒ [page 171](#) when fitting supercharger.
- Install poly V-belt for supercharger ⇒ [page 55](#) .
- Fill up with coolant ⇒ [page 179](#) .



1.4

Exploded view - charge air coolers

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

1 - Gasket

- ☐ Renew

2 - O-ring

- ☐ Renew
- ☐ Coat with engine oil when installing charge air cooler

3 - O-ring

- ☐ Renew
- ☐ Coat with engine oil when installing charge air cooler

4 - Supercharger housing**5 - Gasket**

- ☐ Renew

6 - Charge air cooler (right-side)

- ☐ Removing and installing
⇒ [page 234](#)

7 - Bolt

- ☐ Self-locking
- ☐ Renew
- ☐ 10 Nm

8 - Seal

- ☐ Not supplied separately
- ☐ Must not be detached from charge air cooler
- ☐ Coat with engine oil when installing charge air cooler

9 - Bolt

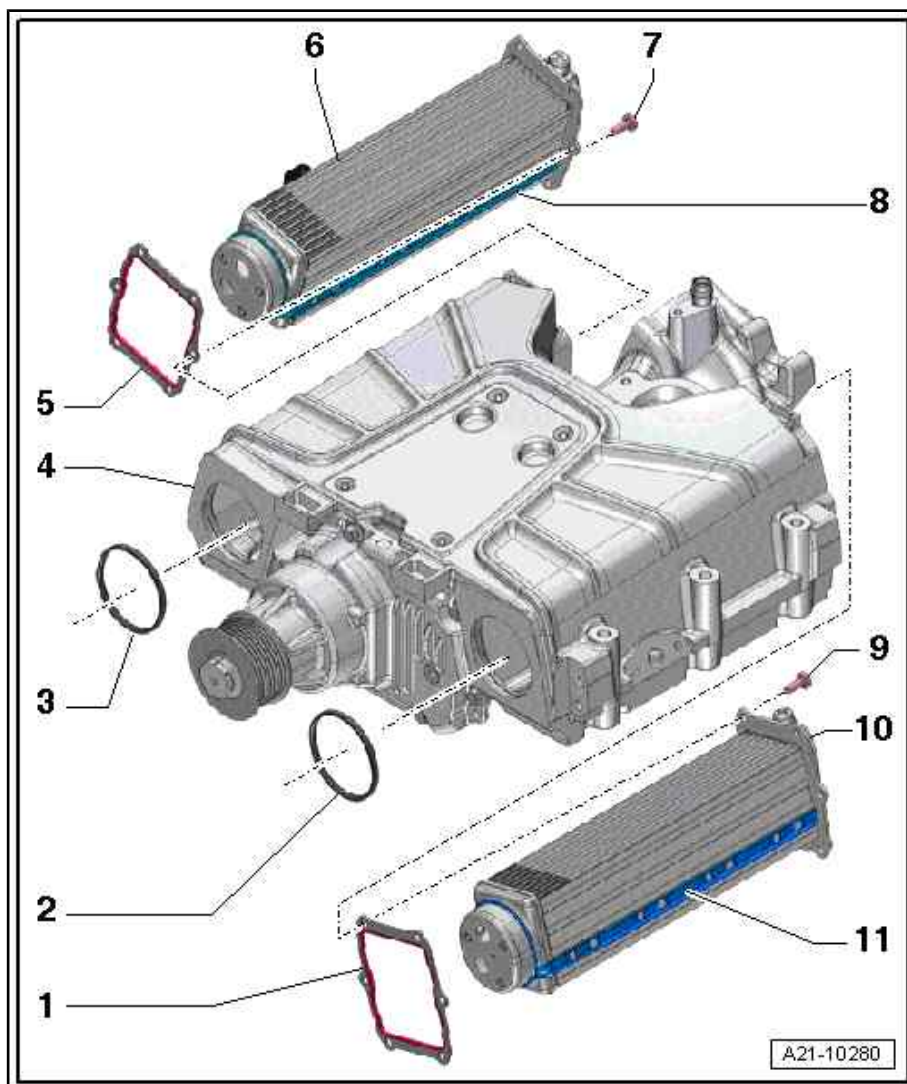
- ☐ Self-locking
- ☐ Renew
- ☐ 10 Nm

10 - Charge air cooler (left-side)

- ☐ Removing and installing ⇒ [page 234](#)

11 - Seal

- ☐ Not supplied separately
- ☐ Must not be detached from charge air cooler
- ☐ Coat with engine oil when installing charge air cooler



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

1.5 Securing supercharger to engine and gearbox support for assembly work

**Note**

When performing assembly work, the openings in the bottom of the supercharger housing make it possible for you to see and access the charge air coolers.

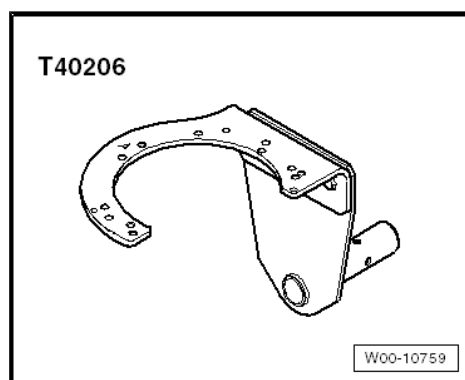
Special tools and workshop equipment required

- ◆ Engine and gearbox support - VAS 6095-



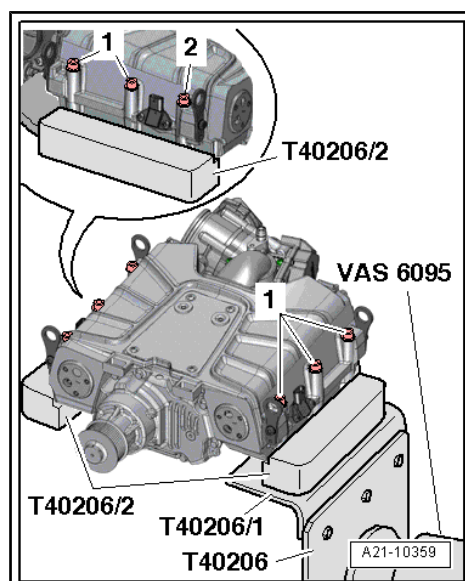
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- ◆ Gearbox support -T40206-



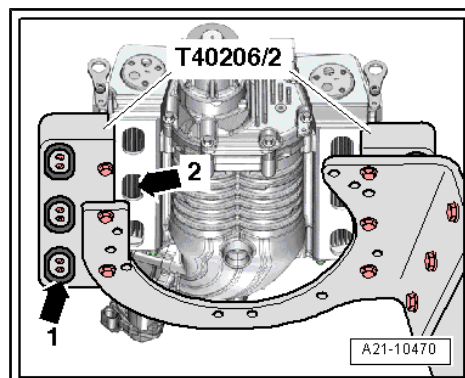
Procedure

- Supercharger removed ⇒ [page 226](#) .
- Insert gearbox support -T40206- with -T40206/1- into engine and gearbox support - VAS 6095- .
- Secure supercharger to gearbox support, as shown in illustration (use holes "1", "4", "9", "11" and "13" for bolted connections -1-).
- Attach sealing element -T40206/2- directly to supercharger housing at front right with bolt -2-.



Installation position of sealing elements -T40206/2- :

- Seals -arrow 1- of sealing elements should point downwards.
- Openings -arrow 2- in supercharger housing make it possible for you to see and access charge air coolers.



1.6 Securing supercharger to engine and gearbox support for leak test



Note

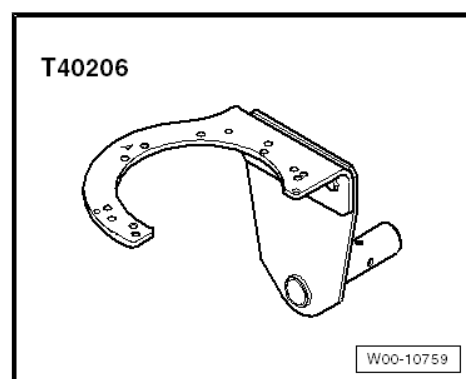
When checking for leaks, the seals on the sealing elements - T40206/2- should seal off the openings in the supercharger housing.

Special tools and workshop equipment required

- ◆ Engine and gearbox support - VAS 6095-

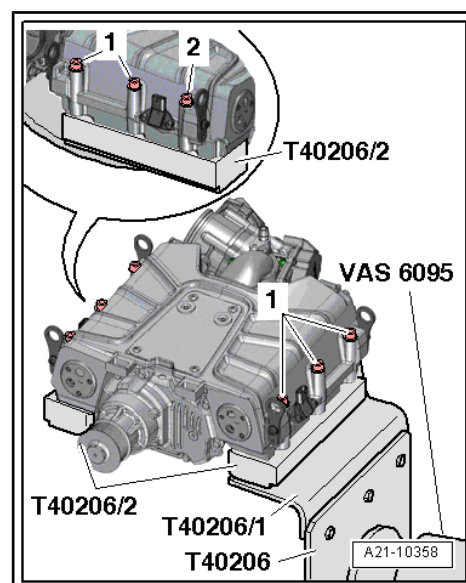


- ◆ Gearbox support - T40206-



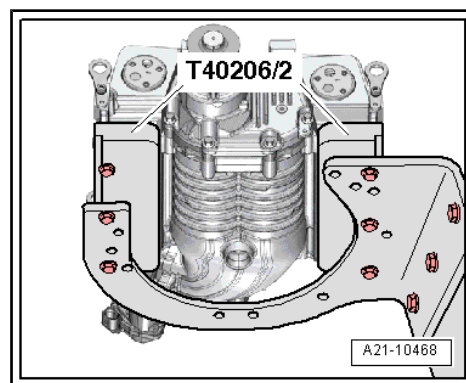
Procedure

- Supercharger removed ⇒ [page 226](#) .
- Insert gearbox support -T40206- with -T40206/1- into engine and gearbox support - VAS 6095- .
- Secure supercharger to gearbox support, as shown in illustration (use holes "1", "4", "9", "11" and "13" for bolted connections -1-).
- Attach sealing element -T40206/2- directly to supercharger housing at front right with bolt -2-.



Installation position of sealing elements -T40206/2- :

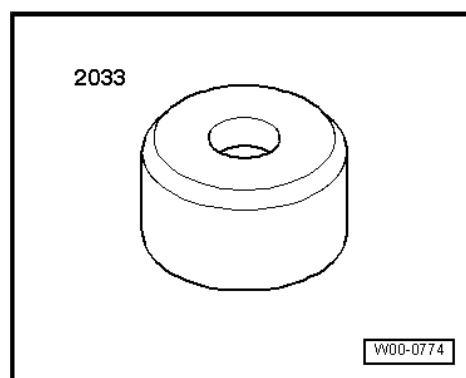
- Seals of sealing elements should seal off openings in supercharger housing.



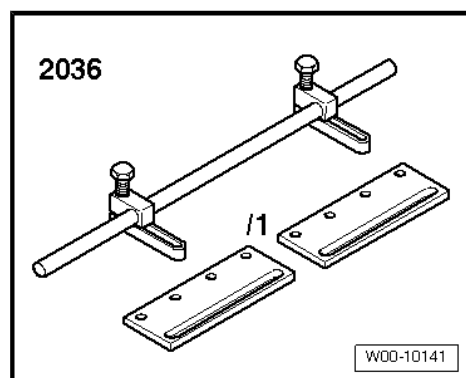
1.7 Removing and installing charge air cooler

Special tools and workshop equipment required

- ◆ Fitting sleeve - 2033-



- ◆ Assembly device for valves - 2036-



- ◆ Tyre lever for aluminium rims - V.A.G 1942-

Removing

- Supercharger secured to engine and gearbox support - VAS 6095- for assembly work ⇒ [page 231](#) .

Charge air cooler (left-side):

- Unclip bracket -1- for vacuum hose.



Note

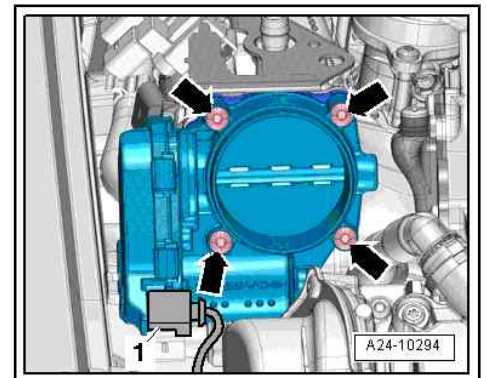
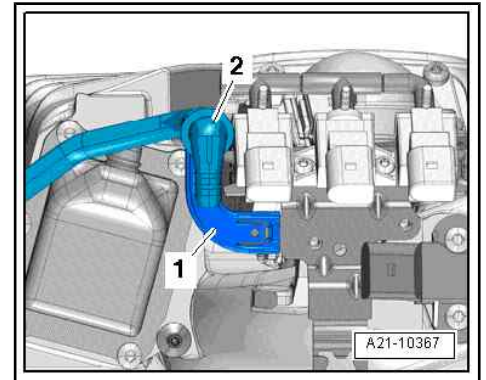
Disregard -item 2-.

- Remove charge pressure sender 2 - G447- ⇒ [page 225](#) .

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 in this document. Copyright by AUDI AG.

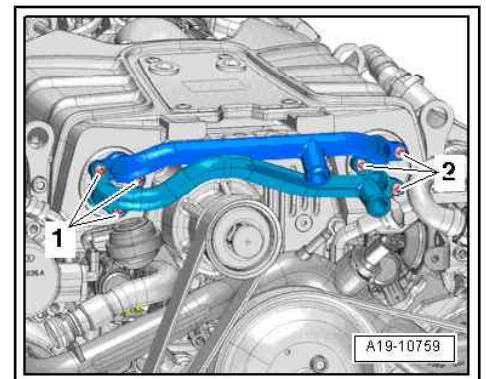
Charge air cooler (right-side):

- Remove throttle valve module - J338- ⇒ Rep. gr. 24 .
- Remove charge pressure sender - G31- ⇒ [page 225](#) .

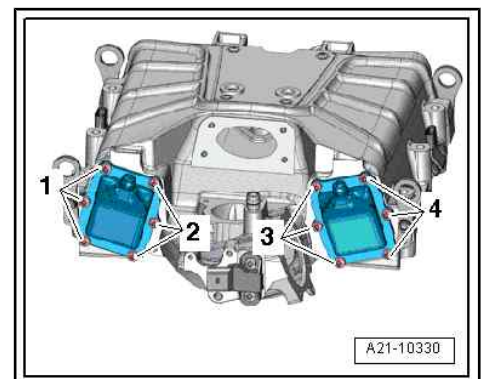


Both sides (continued):

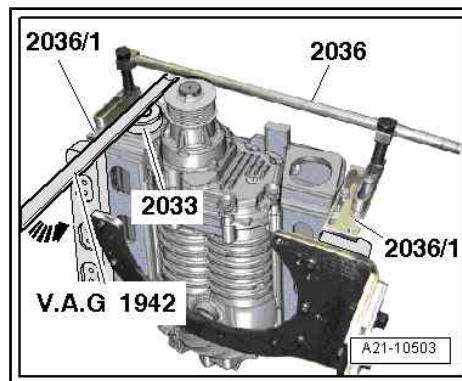
- Remove bolts -1- and -2- and detach coolant pipes from supercharger.



- Remove bolts -1, 2- for charge air cooler (left-side) and bolts -3, 4- for charge air cooler (right-side).



- Attach valve assembly device - 2036- with -2036/1- to supercharger, as shown in illustration.
- Apply fitting sleeve - 2033- at front of charge air cooler.
- Using tyre lever - V.A.G 1942- , apply moderate pressure and slowly press charge air cooler out of supercharger housing.



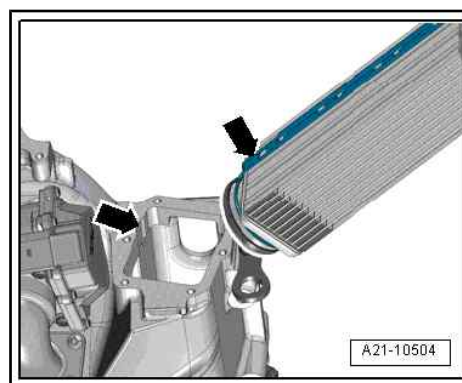
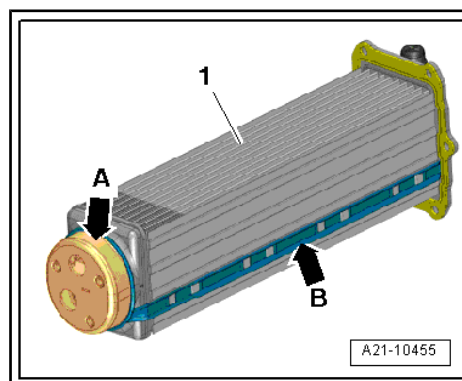
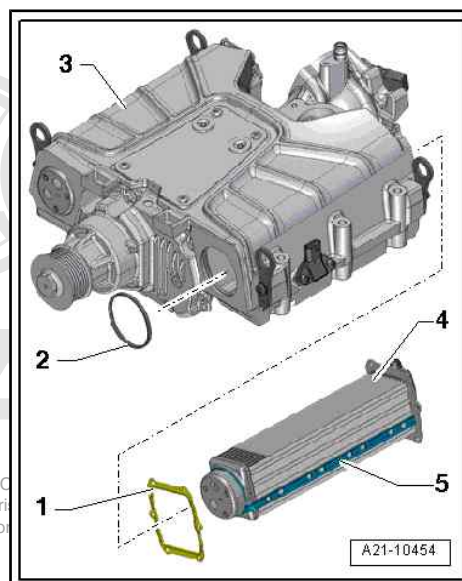
Installing

- Tightening torque
⇒ ["1.4 Exploded view - charge air coolers", page 230](#)



Note

- ◆ *Renew seals, gaskets, O-rings and self-locking bolts.*
- ◆ *Before assembly, always remove residues from threaded holes in supercharger housing using a thread tap.*
- Check gasket -5- on charge air cooler -4-.
- The gasket must not be cracked or damaged.
- Slide gasket -1- onto charge air cooler.
- Insert O-ring -2- into opening in supercharger housing -3-.
- Coat sealing surface -arrow A- and gasket -arrow B- of charge air cooler -1- with engine oil.
- Also coat sealing surface inside supercharger housing with engine oil.
- When fitting charge air cooler, make sure that seals align with recesses in supercharger housing -arrows-.



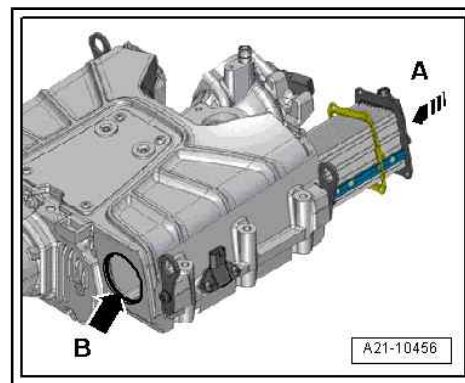
**Note**

To make it easier to insert and press in the charge air cooler, position the supercharger housing vertically in engine and gearbox support - VAS 6095-.

**Caution**

Risk of damage to charge air cooler.

- ◆ **Only insert charge air cooler by hand.**

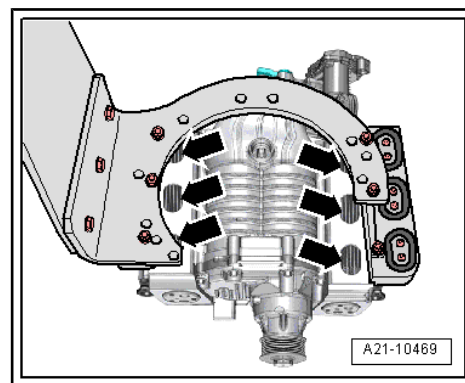


- Insert charge air cooler in supercharger housing -arrow A- by hand as far as stop, letting charge air cooler slide into hole -arrow B- in front of supercharger housing.
- If necessary, guide charge air cooler by hand via openings -arrows- in supercharger housing when inserting cooler.
- As soon as possible (due to length of bolts), screw in 2 bolts loosely by hand to guide charge air cooler additionally.

**Caution**

Risk of damage to charge air cooler.

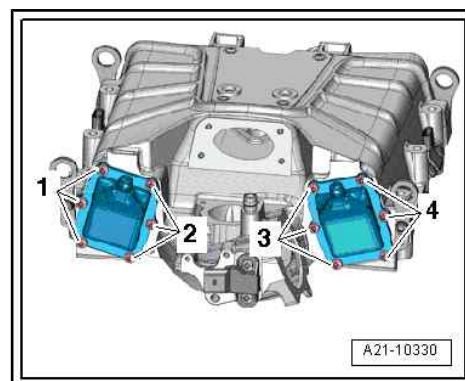
- ◆ **The charge air cooler must not be pulled in by screwing in the securing bolts.**
- ◆ **Insert charge air cooler by hand (without using tools) until sealing flange with gasket makes contact with supercharger housing (maximum: 1 mm distance). Only then tighten bolts, as described in the following.**



- Tighten bolts -1, 2- for charge air cooler (left-side) and bolts -3, 4- for charge air cooler (right-side) in diagonal sequence and in small steps.

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

- Install coolant pipes on supercharger ➔ [page 205](#) .
- Install throttle valve module - J338- ➔ Rep. gr. 24 .
- Check supercharger for leaks ➔ [page 240](#) .



1.8 Exploded view - drive unit

1 - Bolt

- ☐ Self-locking
- ☐ Renew
- ☐ Before assembly, always remove residues from threaded holes using a thread tap
- ☐ 25 Nm

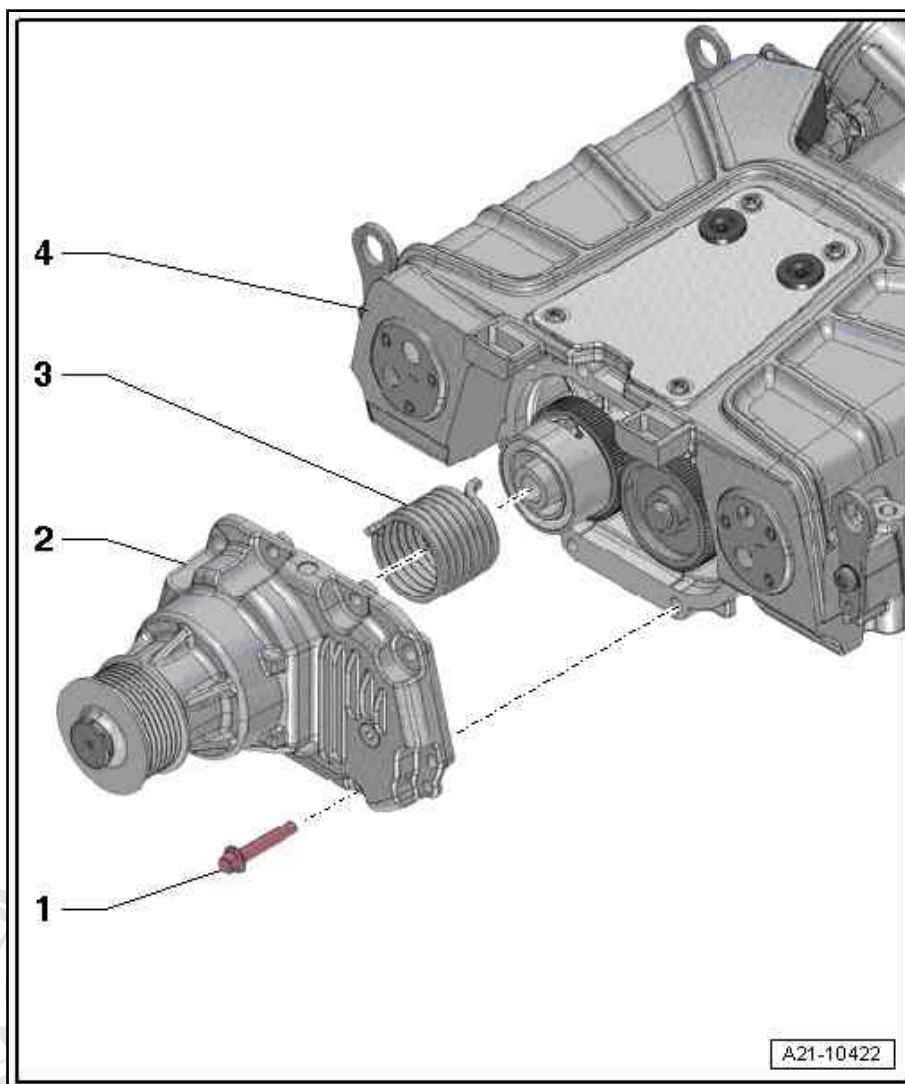
2 - Drive unit

- ☐ Removing and installing
⇒ [page 238](#)

3 - Damper spring

- ☐ Removing and installing
⇒ [page 238](#)

4 - Supercharger housing



1.9 Removing and installing drive unit and damper spring

Special tools and workshop equipment required

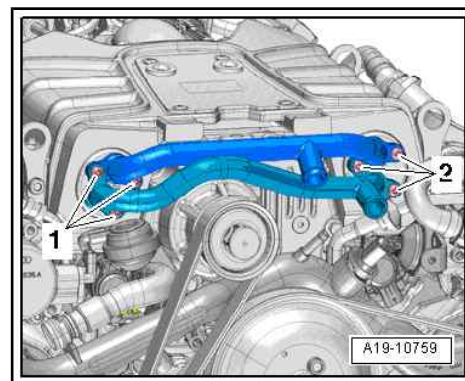
- ◆ Used oil collection and extraction unit - V.A.G 1782-
Protected by copyright. Copying for private or commercial purposes, in whole or in part, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



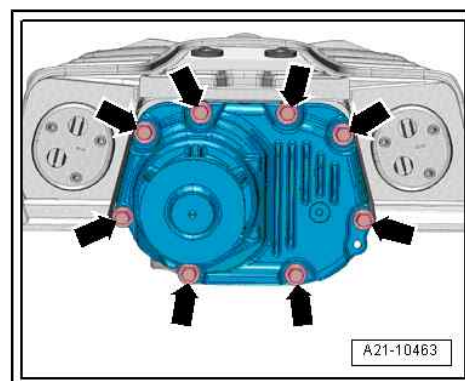
- ◆ Sealant ⇒ Electronic parts catalogue
- ◆ Oil for supercharger drive ⇒ Electronic parts catalogue
- ◆ Spreader tool (commercially available)

Removing

- Supercharger secured to engine and gearbox support - VAS 6095- ⇒ [page 231](#) .
- Detach coolant pipes from supercharger ⇒ [page 205](#) .
- Position supercharger vertically in engine and gearbox support.
- Drive unit faces upwards.



- Remove bolts -arrows-.

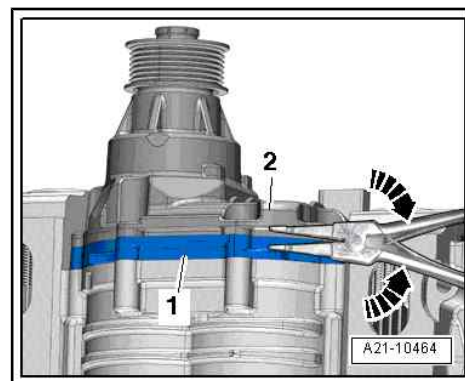


Caution

- ◆ *To make sure bearing cover -1- does not come loose and remains properly sealed, always use spreader tool -arrows- to press off drive unit -2- as shown in illustration (do not use a hammer).*

- Carefully press off drive unit from bearing cover and detach.

- Detach damper spring.



Protected by copyright. This document, 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.

- With the aid of used oil collection and extraction unit - V.A.G 1782- , extract all oil for supercharger drive from bearing cover (including oil chambers -arrows- between ribs).

Installing

- Tightening torque
⇒ ["1.8 Exploded view - drive unit", page 237](#)



Note

- ◆ *Renew the drive unit bolts.*
- ◆ *Fit self-locking bolts or insert bolts with locking fluid ⇒ [Elec-tronic parts catalogue](#) .*

- Clean sealing surfaces; they must be free of oil and grease.
- Before assembly, always remove residues from threaded holes for drive unit in bearing cover using a thread tap.
- Fill bearing cover with oil for supercharger drive.



Note

The container is filled with the required amount of oil. It is not possible to check the oil level at a later stage.

- Insert damper spring in damper element.
- End -1- of damper spring must engage in hole -arrow- in rear damper element.
- Apply a thin layer of sealant to sealing surface of drive unit.
- Fit drive unit to supercharger housing (pay attention to dowel sleeves).



Caution

Avoid damage to drive shaft.

- ◆ *The drive unit must not be pulled in by screwing in the bolts.*

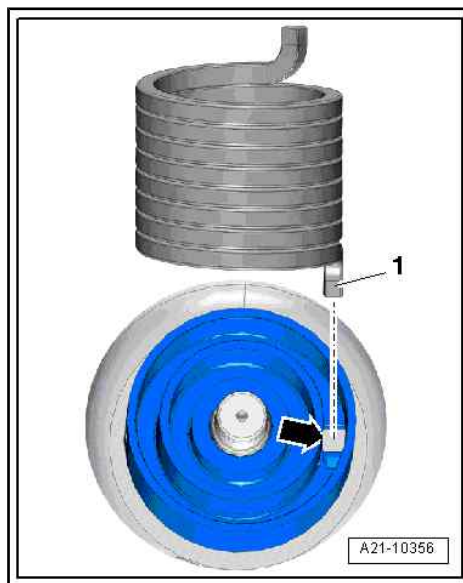
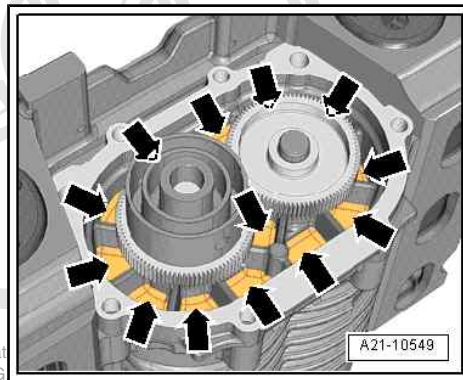
- Simultaneously turn drive pulley until opposite end of damper spring engages in hole in drive unit.

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

- Check supercharger for leaks ⇒ [page 240](#) .
- Install coolant pipes on supercharger ⇒ [page 205](#) .

1.10 Checking supercharger for leaks

Special tools and workshop equipment required



- ◆ Charge air system tester - V.A.G 1687- with adapters - V.A.G 1687/10- -V.A.G 1687/13-1- , -V.A.G 1687/13-2- and -V.A.G 1687/13-3-



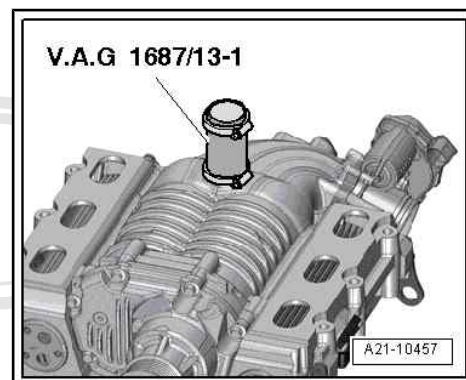
Procedure

- Supercharger secured to engine and gearbox support - VAS 6095- for leak test ⇒ [page 231](#) .
- Regulating flap control unit - J808- installed ⇒ Rep. gr. 24 .
- Secure -V.A.G 1687/13-1- to bottom of supercharger housing.
- Secure hose connections with hose clips.

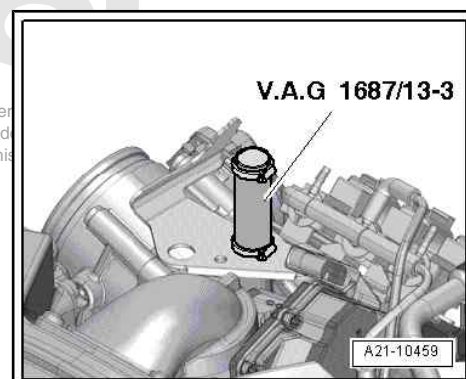


Note

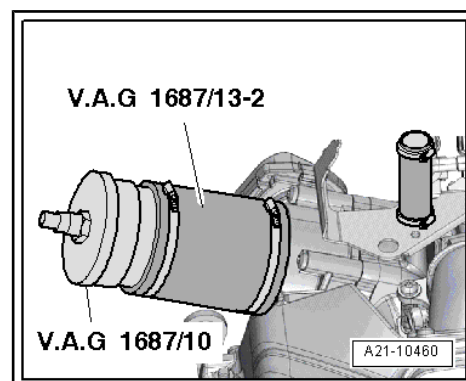
For illustration purposes the supercharger is shown without the gearbox support.



- Secure -V.A.G 1687/13-3- to top of supercharger housing.
- Secure hose connections with hose clips.

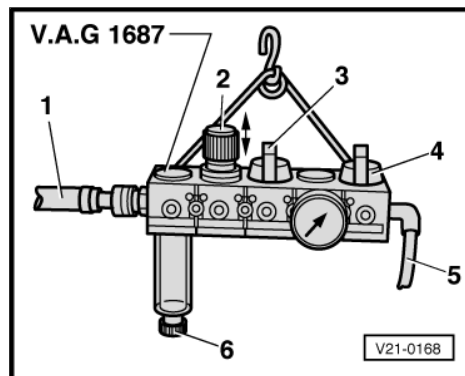


- Secure -V.A.G 1687/13-2- to supercharger housing with adapter - V.A.G 1687/10- .
- Secure hose connections with hose clips.

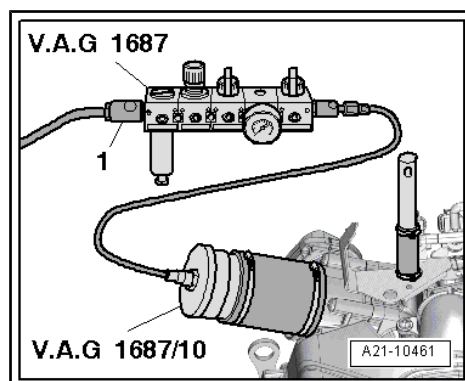


Prepare charge air system tester - V.A.G 1687- as follows:

- Unscrew pressure control valve -2- completely and close valves -3- and -4-.
- Make sure knob is pulled out before turning pressure control valve.



- Connect charge air system tester - V.A.G 1687- as shown in illustration, and connect to compressed air line using a commercially available connection piece -1-.



- If there is water in sight glass, remove drain plug -6- and drain water.
- Open valve -3-.

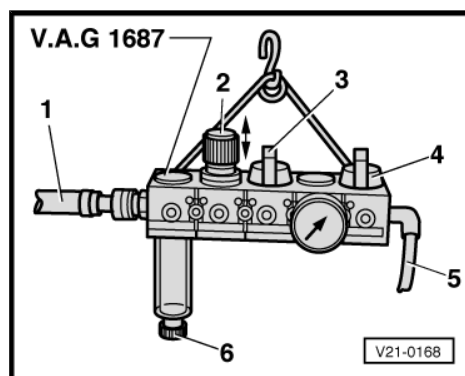


Caution

Risk of damage if pressure is set too high.

- ♦ *The pressure must not exceed 0.5 bar.*

- Adjust pressure to 0.5 bar via pressure control valve -2-.
- Open valve -4- and wait until test system is pressurised. If necessary, adjust pressure to 0.5 bar again.
- Close valve -3-.
- Pressure must not drop by more than 0.1 bar for 30 seconds.
- Check charge air system for audible leaks or leaks that can be felt with the hand; apply commercially available leak detecting spray or use ultrasonic tester - V.A.G 1842- .



Note

- ♦ *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.*

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

Overview

- ◆ ⇒ [“1.1 Exploded view - silencers”, page 243](#)
- ◆ ⇒ [“1.2 Removing and installing front exhaust pipe \(left-side\) with catalytic converter”, page 246](#)
- ◆ ⇒ [“1.3 Removing and installing front exhaust pipe \(right-side\) with catalytic converter”, page 248](#)
- ◆ ⇒ [“1.4 Separating centre and rear silencers”, page 251](#)
- ◆ ⇒ [“1.5 Renewing tailpipe”, page 252](#)
- ◆ ⇒ [“1.6 Stress-free alignment of exhaust system”, page 252](#)
- ◆ ⇒ [“1.7 Aligning tailpipes”, page 253](#)
- ◆ ⇒ [“1.8 Checking exhaust system for leaks”, page 254](#)

1.1 Exploded view - silencers

1 - Bolt

- ☐ 23 Nm

2 - Mounting

- ☐ Renew if damaged

3 - Centre silencer

- ☐ Combined in one unit with rear silencer as original equipment. Can be renewed individually for repair purposes
- ☐ Cutting point
⇒ [page 251](#)
- ☐ Align exhaust system so it is free of stress
⇒ [page 252](#)

4 - Exhaust manifold

- ☐ Exploded view
⇒ [page 255](#)

5 - Gasket

- ☐ Renew

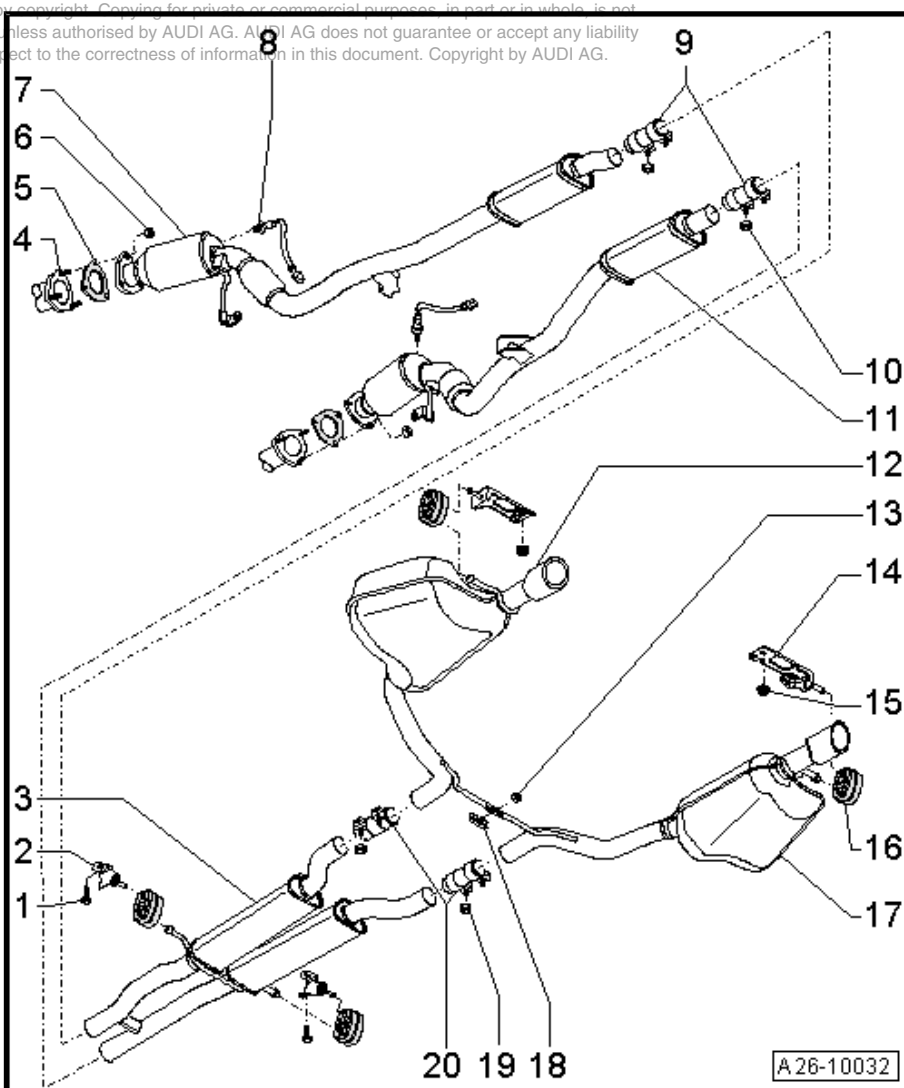
6 - Nut

- ☐ Renew
- ☐ 23 Nm

7 - Front exhaust pipe with catalytic converter and front silencer

- ☐ For cylinder bank 2 (left-side)
- ☐ With flexible joint
- ☐ Protect against knocks and impact
- ☐ Removing and installing
⇒ [page 246](#)

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.





- ☐ Align exhaust system so it is free of stress ⇒ [page 252](#)

8 - Lambda probe after catalytic converter

- ☐ Removing and installing ⇒ Rep. gr. 24

9 - Clamps (front)

- ☐ Installation position ⇒ [page 245](#)
- ☐ Before tightening bolt connections, align exhaust system so it is free of stress ⇒ [page 252](#)
- ☐ Tighten bolted connections evenly

10 - Nut

- ☐ 23 Nm

11 - Front exhaust pipe with catalytic converter and front silencer

- ☐ For cylinder bank 1 (right-side)
- ☐ With flexible joint
- ☐ Protect against knocks and impact
- ☐ Removing and installing ⇒ [page 248](#)
- ☐ Align exhaust system so it is free of stress ⇒ [page 252](#)

12 - Rear silencer with tailpipe

- ☐ Left side of vehicle
- ☐ Combined as one unit with centre silencer as original equipment
- ☐ Centre silencer, rear silencer and tailpipe can be renewed separately as required
- ☐ Cutting point: centre silencer / rear silencer ⇒ [page 251](#)
- ☐ Cutting point: rear silencer / tailpipe ⇒ [page 252](#)
- ☐ Align exhaust system so it is free of stress ⇒ [page 252](#)

13 - Nut

- ☐ Renew
- ☐ 23 Nm

14 - Mounting

15 - Nut

- ☐ 23 Nm

16 - Mounting

- ☐ Renew if damaged

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 - Rear silencer with tailpipe

- ☐ Right side of vehicle
- ☐ Combined as one unit with centre silencer as original equipment
- ☐ Centre silencer, rear silencer and tailpipe can be renewed separately as required
- ☐ Cutting point: centre silencer / rear silencer ⇒ [page 251](#)
- ☐ Cutting point: rear silencer / tailpipe ⇒ [page 252](#)
- ☐ Align exhaust system so it is free of stress ⇒ [page 252](#)

18 - Bracket

19 - Nut

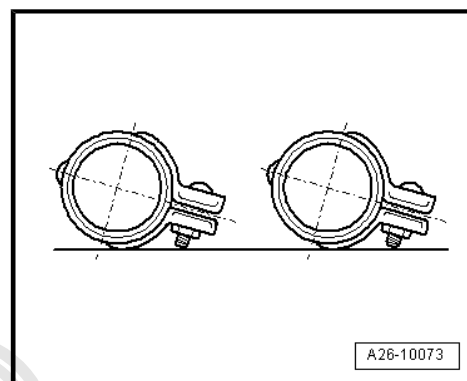
- ☐ 23 Nm

20 - Clamps (rear)

- ☐ For separate replacement of centre and rear silencers
- ☐ Position clamp so that it aligns with centre of cutting location
- ☐ Installation position ⇒ [page 245](#)
- ☐ Before tightening bolt connections, align exhaust system so it is free of stress ⇒ [page 252](#)
- ☐ Tighten bolted connections evenly

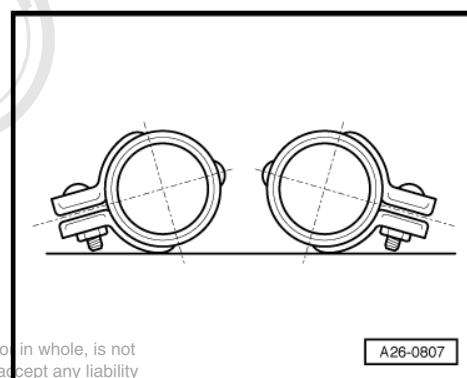
Installation position of front clamps

- Install clamps so that the bolt ends do not protrude beyond bottom of clamp.
- Bolt connections face to right.



Installation position of rear clamps

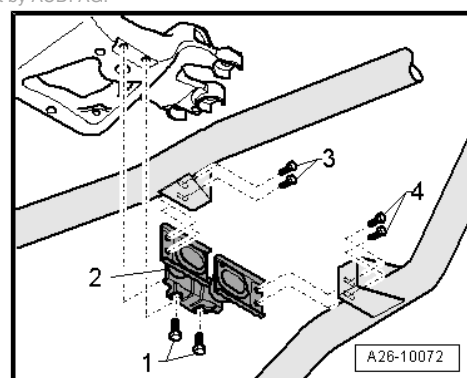
- Install clamps so that the bolt ends do not protrude beyond bottom of clamp.
- Bolt connections face outwards.



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.

Mounting components for centre bracket for front exhaust pipes

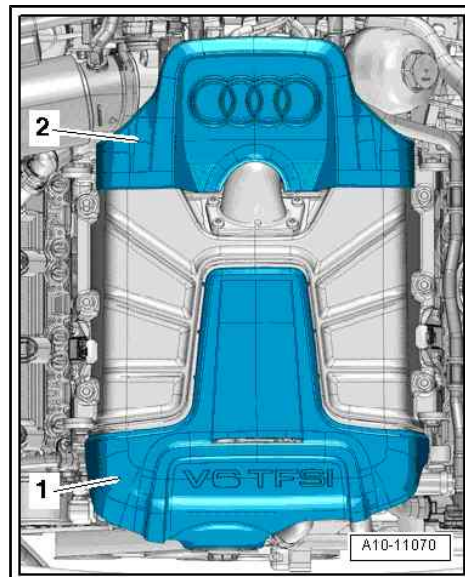
- 1 - Bolt, 23 Nm
- 2 - Bracket
- 3 - Bolt, 23 Nm
- 4 - Bolt, 23 Nm



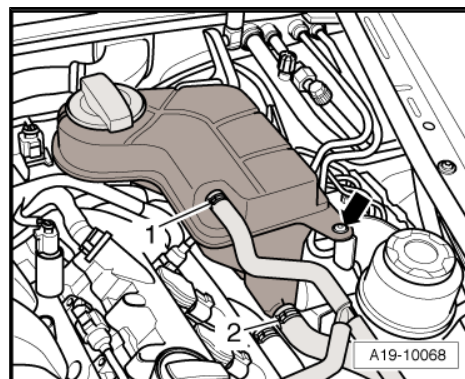
1.2 Removing and installing front exhaust pipe (left-side) with catalytic converter

Removing

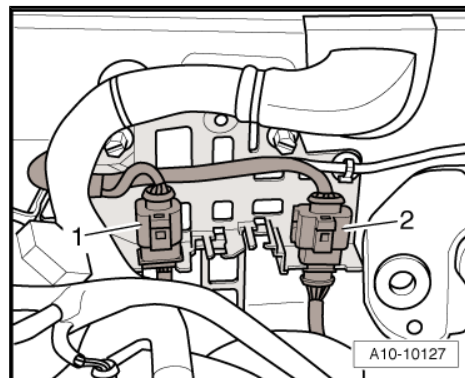
- Lift off engine cover panel (rear) -2-.



- Remove bolt -arrow-.
- Unplug electrical connector for coolant shortage indicator switch - F66- at bottom of expansion tank and move expansion tank to one side with coolant hoses -1- and -2- attached.



- Unplug electrical connector -2- for Lambda probe 2 after catalytic converter - G131- , guide wiring downwards and move clear.



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.

- Unscrew nut (accessible from above) -2- securing front exhaust pipe to exhaust manifold.

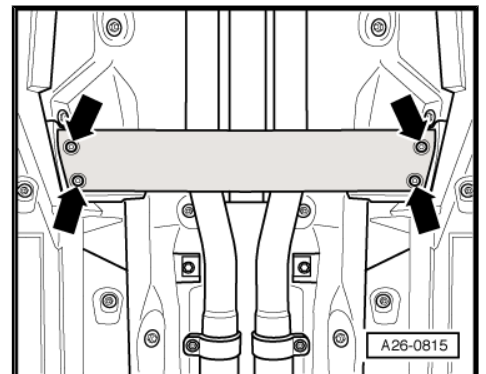
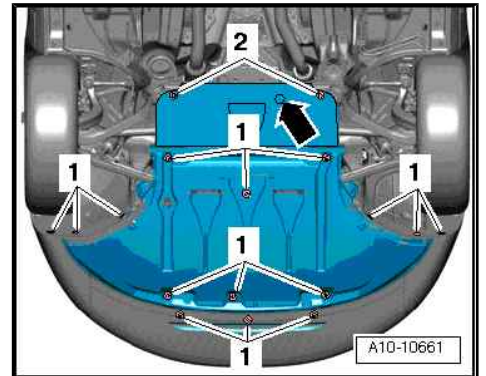
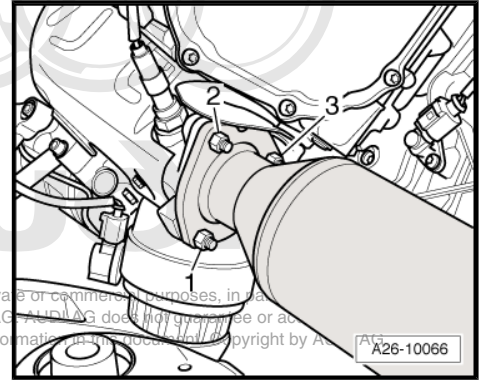
 Note

For illustration purposes, the installation position is shown from the rear and with the engine removed.

- Remove front wheel (left-side) ⇒ Wheels and tyres; Rep. gr. 44 .

- Release fasteners -1, 2, arrow- and remove noise insulation panels.

- Remove bolts -arrows- and detach front cross piece.



Caution

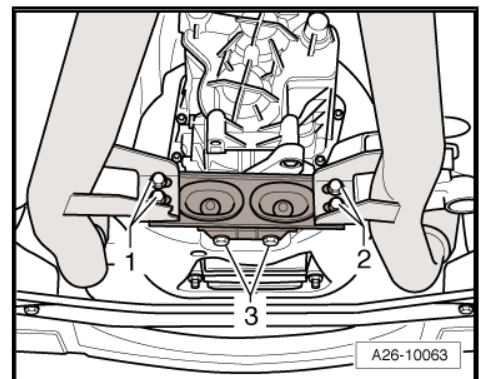
Risk of damage to flexible joints in front silencer.

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

- Remove bolts -1- on bracket (rear) for exhaust system.

 Note

Disregard -items 2, 3-.

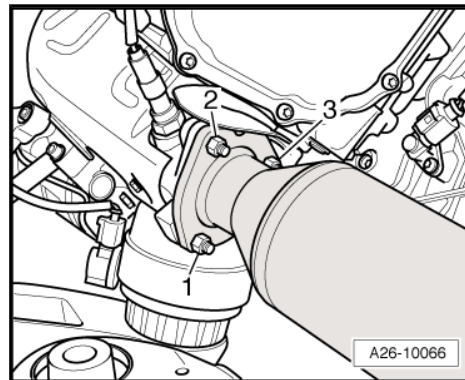


- Unscrew nuts -1- and -3- (accessible from below) securing front exhaust pipe to exhaust manifold.



Note

For illustration purposes, the installation position is shown from the rear and with the engine removed.



- Loosen clamp (left-side) -1- and push to rear.
- Detach front silencer (left-side) with catalytic converter.

Installing

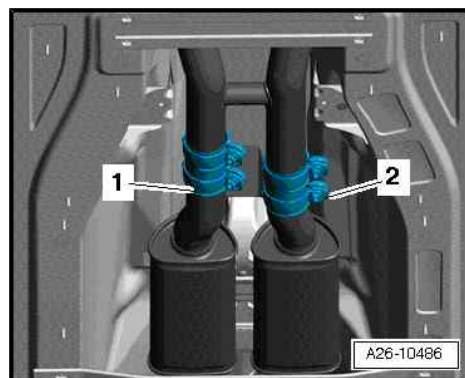
Installation is carried out in the reverse order; note the following:

- Tightening torques
⇒ ["1.1 Exploded view - silencers", page 243](#)



Note

- ◆ Renew gaskets and self-locking nuts.
- ◆ Fit all cable ties in the original positions when installing.
- ◆ When installing, the Lambda probe wire must always be reattached at the same locations to prevent it from coming into contact with the exhaust pipe.

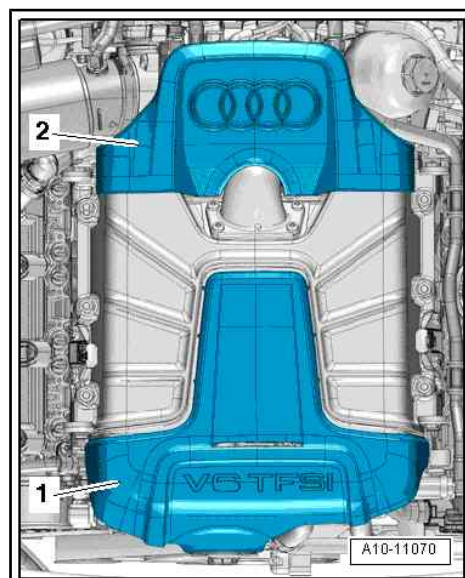


- Install front cross piece and noise insulation panels ⇒ Rep. gr. 50 .
- Align the exhaust system so it is free of stress ⇒ [page 252](#) .
- Fit front wheel ⇒ Wheels and tyres; Rep. gr. 44 .

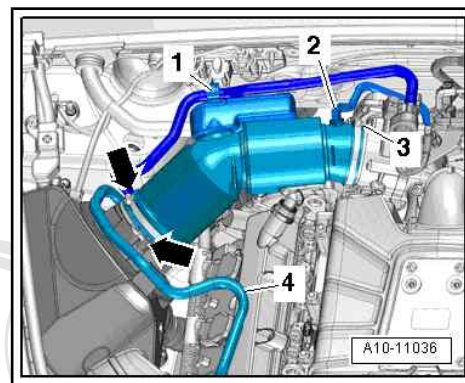
1.3 Removing and installing front exhaust pipe (right-side) with catalytic converter

Removing

- Lift off engine cover panel (rear) -2-.



- Move fuel line -4- and line -1- leading to activated charcoal filter clear on air cleaner housing and air pipe.
- Detach vacuum hose -2- from connection on air hose.
- Remove air pipe. To do so, release hose clip -3- and clamps -arrows-.

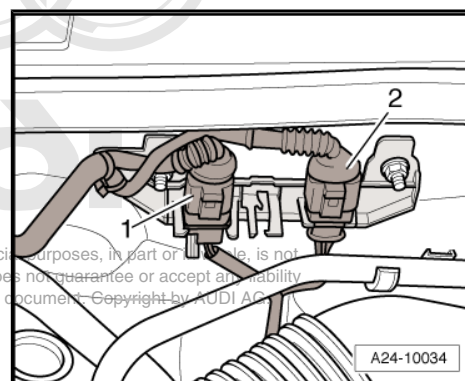


- Unplug electrical connector -2- for Lambda probe after catalytic converter - G130- and move wiring clear.

**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.

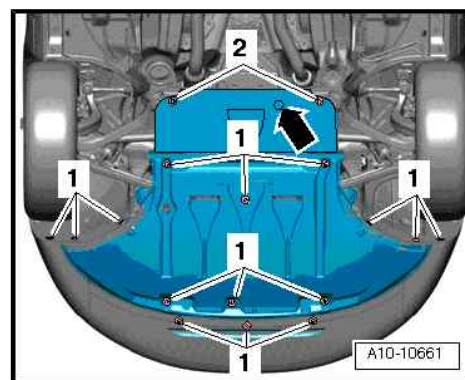
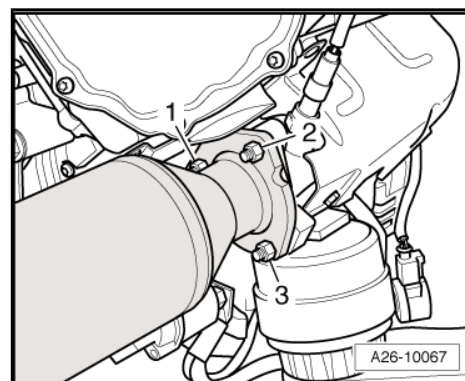


- Unscrew nut (accessible from above) -2- securing front exhaust pipe to exhaust manifold.

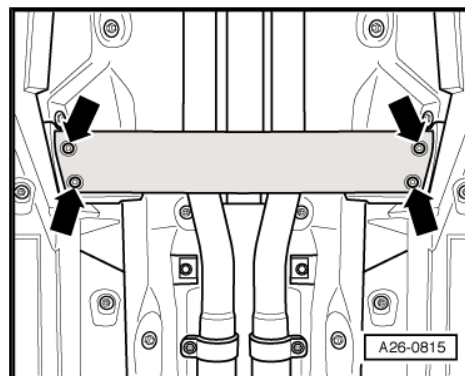
**Note**

For illustration purposes, the installation position is shown from the rear and with the engine removed.

- Remove front wheel (right-side) ⇒ Wheels and tyres; Rep. gr. 44 .
- Release fasteners -1, 2, arrow- and remove noise insulation panels.



- Remove bolts -arrows- and detach front cross piece.



Caution

Risk of damage to flexible joints in front silencer.

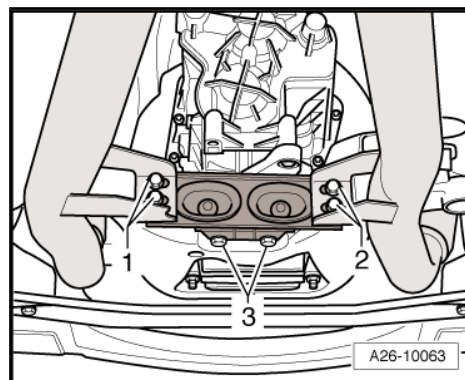
- ◆ **Do NOT bend the flexible joints in the front silencer more than 10°.**

- Remove bolts -2- on bracket (rear) for exhaust system.



Note

Disregard -items 1, 3-.

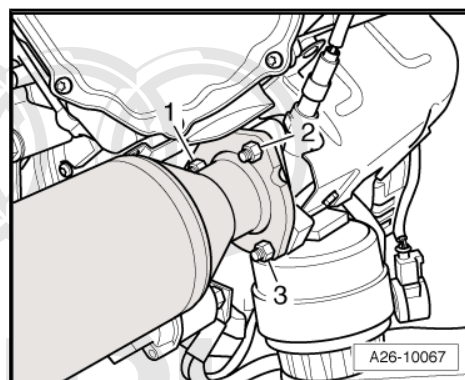


- Unscrew nuts -1- and -3- (accessible from below) securing front exhaust pipe to exhaust manifold.



Note

For illustration purposes, the installation position is shown from the rear and with the engine removed.



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.

- Loosen clamp (right-side) -2- and push to rear.
- Detach front silencer (right-side) with catalytic converter.

Installing

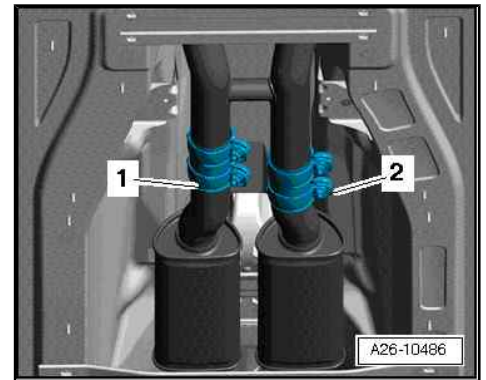
Installation is carried out in the reverse order; note the following:

- Tightening torques
⇒ ["1.1 Exploded view - silencers", page 243](#)



Note

- ◆ *Renew gaskets and self-locking nuts.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ [Electronic parts catalogue](#) .*
- ◆ *Fit all cable ties in the original positions when installing.*
- ◆ *When installing, the Lambda probe wire must always be reattached at the same locations to prevent it from coming into contact with the exhaust pipe.*
- Install front cross piece and noise insulation panels ⇒ Rep. gr. 50 .
- Align the exhaust system so it is free of stress ⇒ [page 252](#) .

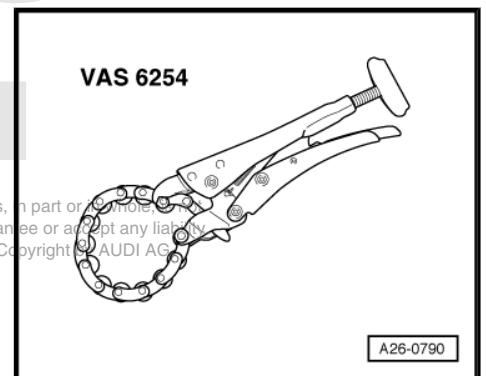


1.4 Separating centre and rear silencers

- ◆ The connecting pipe can be cut through at the cutting point provided in order to renew the centre and rear silencers separately.
- ◆ The cutting point is marked by an indentation on the outside of the exhaust pipe.

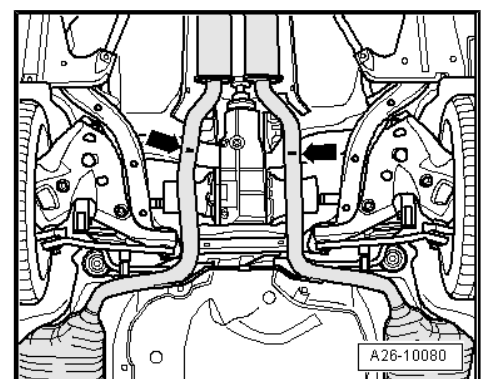
Special tools and workshop equipment required

- ◆ Chain pipe cutter - VAS 6254-

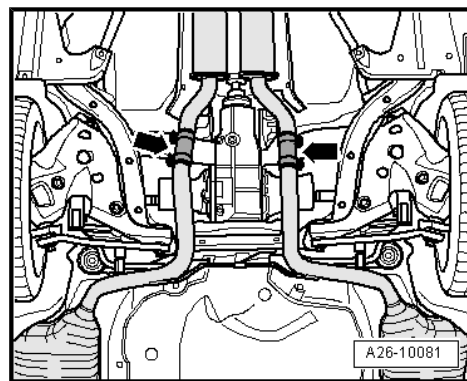


Procedure:

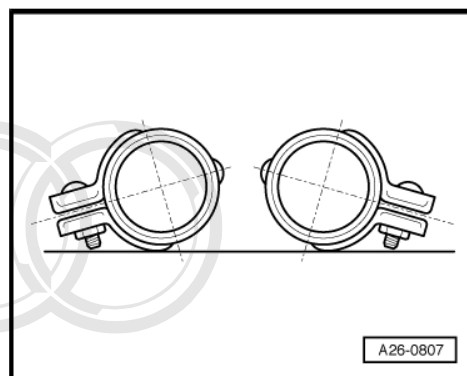
- Tightening torque
⇒ ["1.1 Exploded view - silencers", page 243](#)
- Cut through exhaust pipes at right angles at the positions marked -arrows- using chain-type pipe cutter - VAS 6254- .



- When installing, position centre of clamps -arrows- over cutting location.



- Install clamps so that the bolt ends do not protrude beyond bottom of clamp.
- Bolt connections face outwards.
- Align the exhaust system so it is free of stress ⇒ [page 252](#).



1.5 Renewing tailpipe

Special tools and workshop equipment required

- ◆ Chain pipe cutter - VAS 6254-

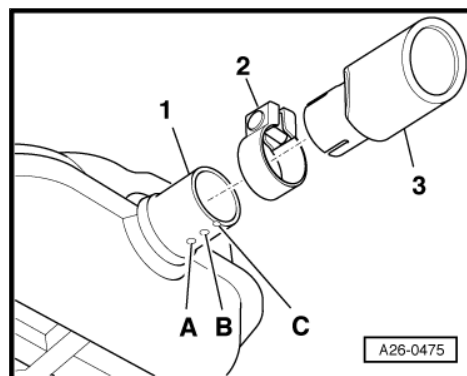
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document.



A26-0790

Procedure

- Tightening torque
⇒ ["1.1 Exploded view - silencers", page 243](#)
- Cut through tailpipe -1- at a right angle at cutting point -C- using chain pipe cutter - VAS 6254-.
- Push new tailpipe -3- onto rear silencer -1- as far as marking -A-. Slot on tailpipe should align with marking -B-.
- Fit clamp -2-.



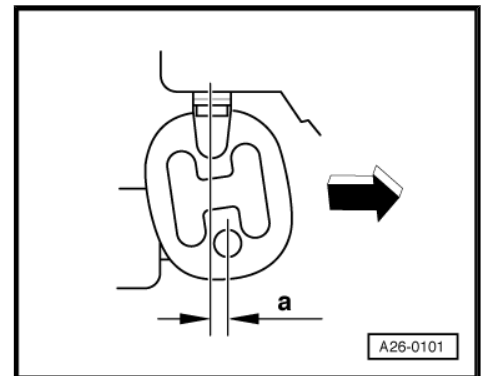
1.6 Stress-free alignment of exhaust system

- The exhaust system must be aligned when it is cool.

- Tightening torque
⇒ "1.1 Exploded view - silencers", page 243

Vehicles without clamps between centre silencer and rear silencer

- Loosen bolt connections on front clamps.
- Push exhaust system towards front of vehicle -arrow-, so that mountings (right-side) for rear silencers are preloaded by -a- = 5 ... 9 mm.
- Tighten bolt connections on clamps evenly.
- Align tailpipes ⇒ page 253 .



Vehicles with clamps between centre silencer and rear silencer

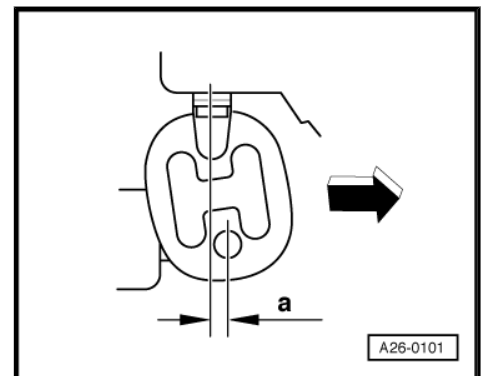
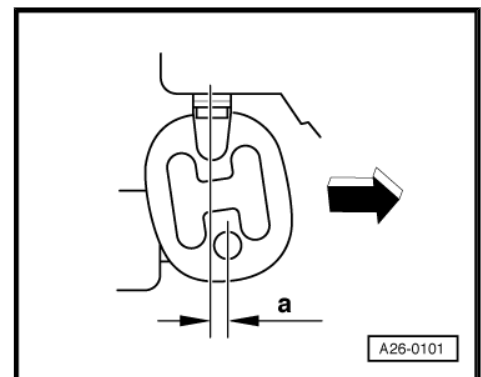


Note

Prohibited 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

On vehicles with clamps fitted between centre silencer and rear silencer, it is also necessary to align the centre silencer.

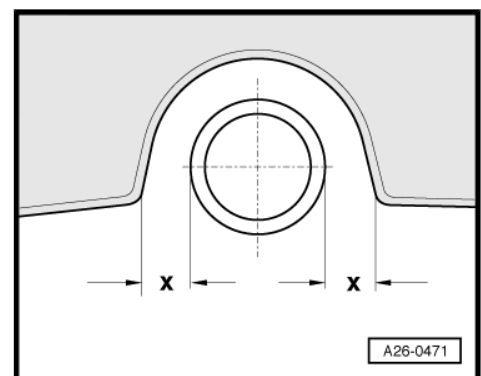
- Loosen bolt connections on front and rear clamps.
- Push front section of exhaust system towards front of vehicle -arrow-, so that mountings for centre silencer are preloaded by -a- = 5 ... 9 mm.
- Tighten bolt connections on front clamps evenly.
- Push rear section of exhaust system towards front of vehicle -arrow-, so that mountings (rear) for rear silencers are preloaded by -a- = 5 ... 9 mm.
- Align rear silencers so they are horizontal.
- Tighten bolt connections on rear clamps evenly.
- Align tailpipes ⇒ page 253 .



1.7 Aligning tailpipes

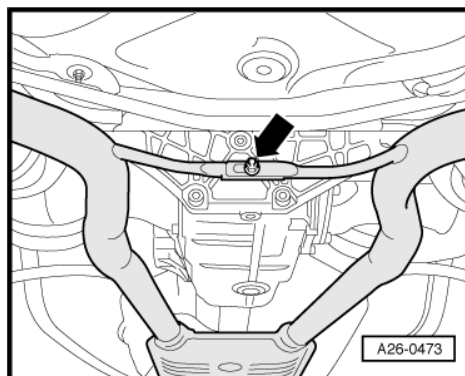
Procedure

- Tightening torque
⇒ "1.1 Exploded view - silencers", page 243
- Check clearance between tailpipes and bumper on both sides.
- Dimension -x- (left-side) = dimension -x- (right-side)

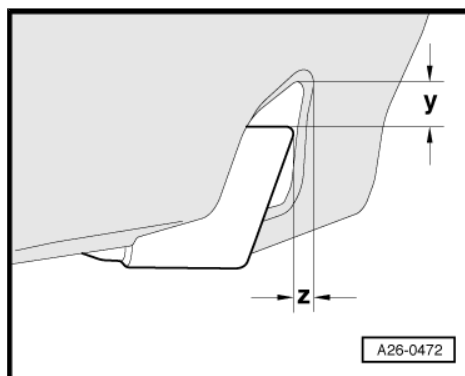


If necessary, correct dimension "x" as follows:

- Loosen connection -arrow- on strut between exhaust pipes.
- Adjust the distance between the rear silencers.
- Tighten connection.



- Check distances -y- and -z- between tailpipes and bumper:
- Dimension -y- = 17 ... 19 mm.
- Dimension -z- = 0 ± 2 mm.
- If necessary, check whether the exhaust system is aligned free of stress ⇒ [page 252](#).



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.

1.8 Checking exhaust system for leaks

- Start the engine and run at idling speed.
- Plug tailpipes for duration of leak test (e.g. with cloths or plugs).
- Listen for noise at connection points (cylinder head/exhaust manifold, exhaust manifold/front exhaust pipe, etc.) to locate any leaks.
- Rectify any leaks that are found.

2 Exhaust manifolds

Overview

- ◆ ⇒ ["2.1 Exploded view - exhaust manifold", page 255](#)
- ◆ ⇒ ["2.2 Removing and installing exhaust manifold \(left-side\)", page 256](#)
- ◆ ⇒ ["2.3 Removing and installing exhaust manifold \(right-side\)", page 258](#)

2.1 Exploded view - exhaust manifold

1 - Nut

- ☐ Renew
- ☐ Coat thread with high-temperature paste; for high-temperature paste refer to ⇒ Electronic parts catalogue
- ☐ Tightening torque and tightening sequence: exhaust manifold (left-side) ⇒ [page 256](#) ; exhaust manifold (right-side) ⇒ [page 256](#)

2 - Bracket for heat shield

3 - Exhaust manifold

- ☐ Removing and installing: left-side ⇒ [page 256](#) , right-side ⇒ [page 258](#)

4 - Gasket

- ☐ Renew

5 - Heat shield

6 - Bolt

- ☐ 10 Nm

7 - Lambda probe

- ☐ Before catalytic converter
- ☐ Removing and installing ⇒ [Rep gr 24](#)

8 - Front exhaust pipe with catalytic converter and front silencer

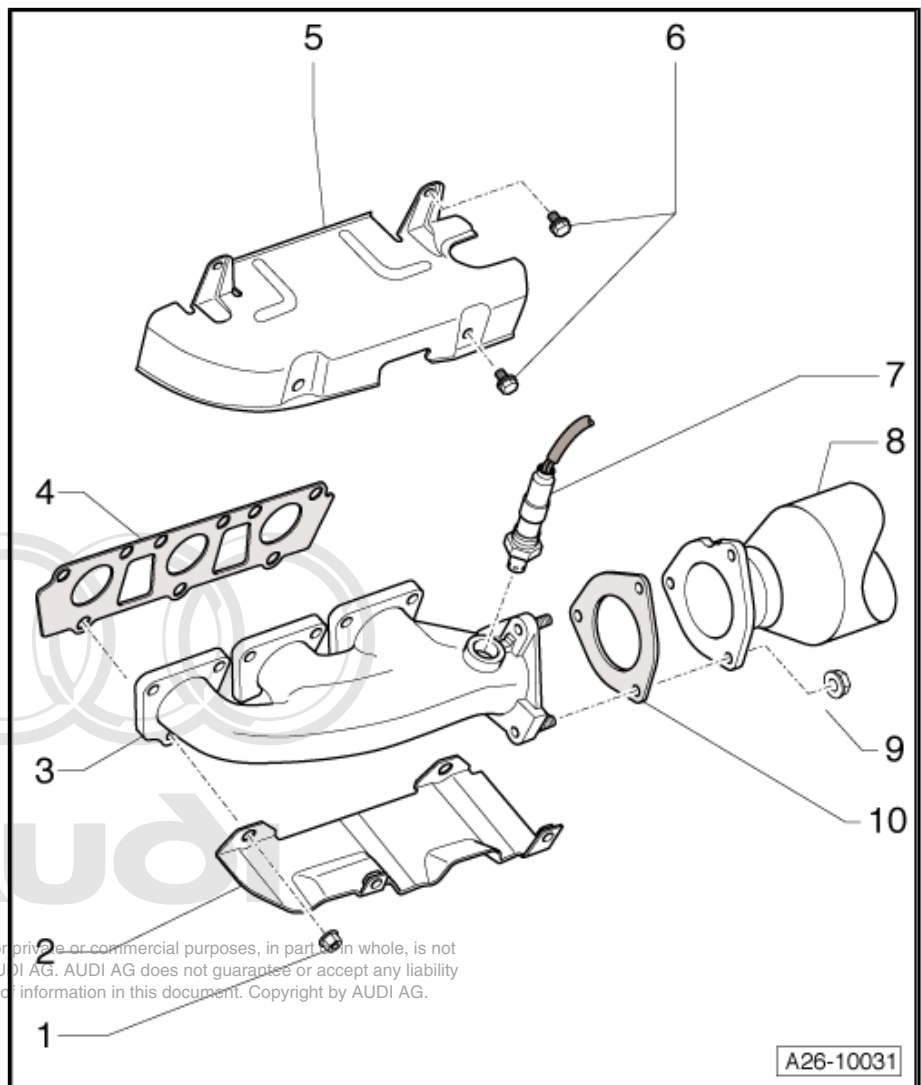
- ☐ Protect against knocks and impact

9 - Nut

- ☐ Renew
- ☐ Coat thread with high-temperature paste; for high-temperature paste refer to ⇒ Electronic parts catalogue
- ☐ 23 Nm

10 - Gasket

- ☐ Renew



Exhaust manifold (left-side) - tightening torque and sequence

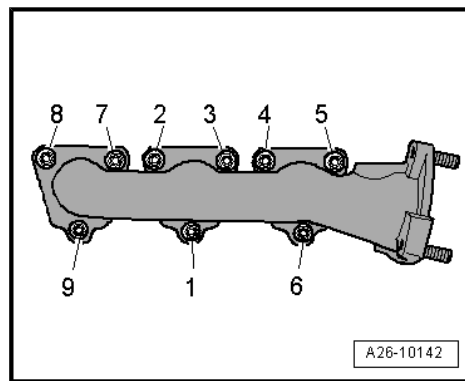


Note

- ◆ Renew the nuts.
- ◆ Coat threads of nuts with high-temperature paste; for high temperature paste refer to ⇒ *Electronic parts catalogue*.

– Tighten nuts in 3 stages in the sequence shown:

Stage	Nuts	Tightening torque
1.	-1 ... 9-	Screw in by hand until contact is made
2.	-1 ... 9-	15 Nm
3.	-1 ... 9-	25 Nm



Exhaust manifold (right-side) - tightening torque and sequence

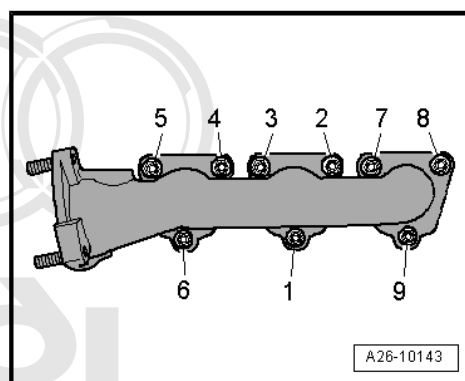


Note

- ◆ Renew the nuts.
- ◆ Coat threads of nuts with high-temperature paste; for high temperature paste refer to ⇒ *Electronic parts catalogue*.

– Tighten nuts in 3 stages in the sequence shown:

Stage	Nuts	Tightening torque
1.	-1 ... 9-	Screw in by hand until contact is made
2.	-1 ... 9-	15 Nm
3.	-1 ... 9-	25 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.

2.2 Removing and installing exhaust manifold (left-side)

Removing

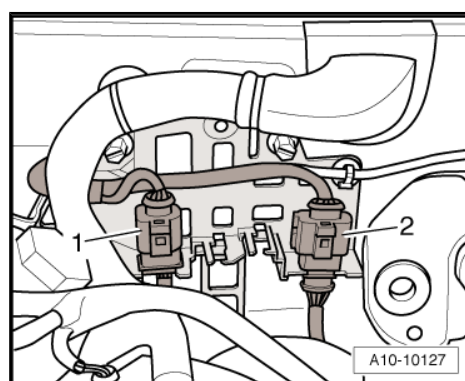
- Remove front left exhaust pipe with catalytic converter ⇒ [page 246](#).
- Unplug electrical connector -1- for Lambda probe 2 - G108- and move wiring clear.



Note

Disregard -item 2-.

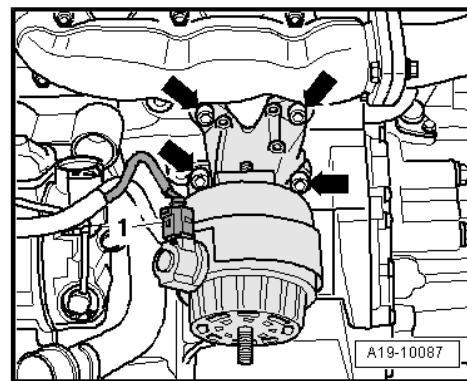
- Remove poly V-belt from air conditioner compressor pulley ⇒ [“1.5 Removing and installing poly V-belt”, page 60](#).



- Unplug electrical connector -1- on left electrohydraulic engine mounting solenoid valve - N144- .

**Note**

Disregard -arrows-.

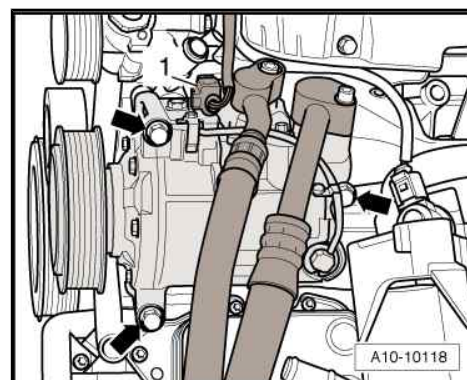


- Unplug electrical connector -1- for magnetic clutch on air conditioner compressor.

**WARNING**

Risk of injury caused by refrigerant.

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



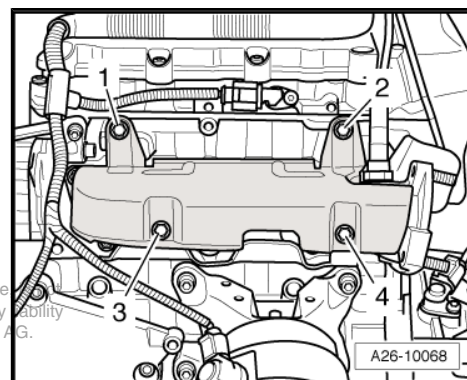
- Remove bolts -arrows- for air conditioner compressor.

**Caution**

Danger of damage to refrigerant lines and hoses.

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

- Tie up air conditioner compressor to left side of vehicle with hoses/pipes connected.
- Remove bolts -1 ... 4- and detach heat shield.



- Remove nuts -1- and -8- and detach bracket for heat shield.
- Remove nuts -2 ... 7- and -9- and detach exhaust manifold.

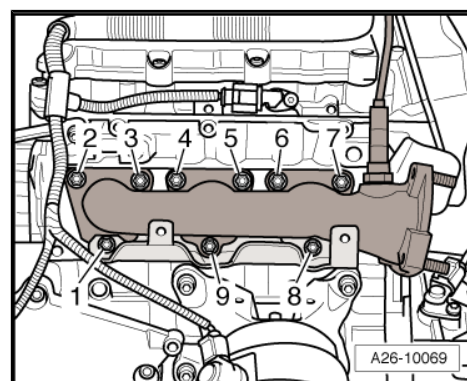
Installing

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

- Tightening torque
⇒ ["2.1 Exploded view - exhaust manifold", page 255](#)

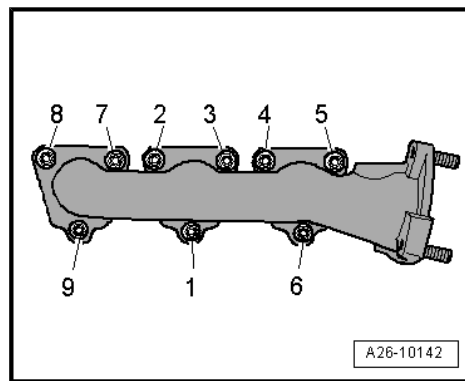
**Note**

Renew gaskets and self-locking nuts.



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.

- Tighten nuts for exhaust manifold ⇒ [page 256](#) .
- Install front exhaust pipe (left-side) with catalytic converter ⇒ [page 246](#) .
- Install air conditioner compressor ⇒ Rep. gr. 87 .
- Install poly V-belt ⇒ [page 60](#) .



2.3 Removing and installing exhaust manifold (right-side)

Removing

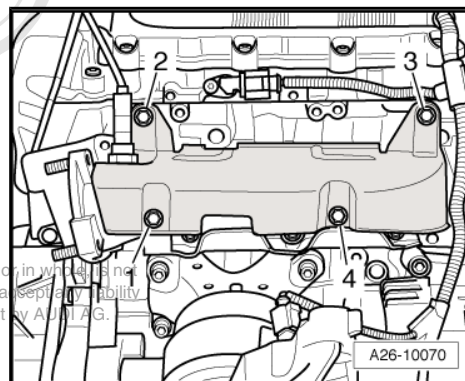
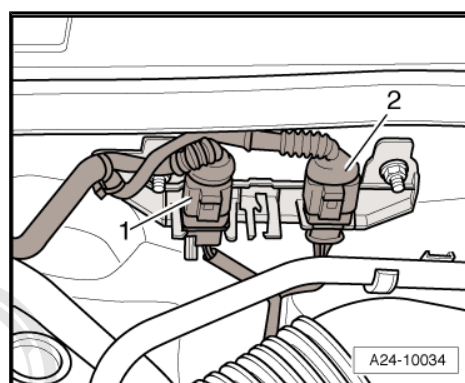
- Remove air cleaner housing ⇒ Rep. gr. 24 .
- Remove front exhaust pipe (right-side) with catalytic converter ⇒ [page 248](#) .
- Unplug electrical connector -1- for Lambda probe - G39- and move wiring clear.



Note

Disregard -item 2-.

- Remove bolts -1 ... 4- and detach heat shield.



- Remove nuts -7- and -9- and detach bracket for heat shield.
- Remove nuts -1 ... 6- and -8- and detach exhaust manifold.

Installing

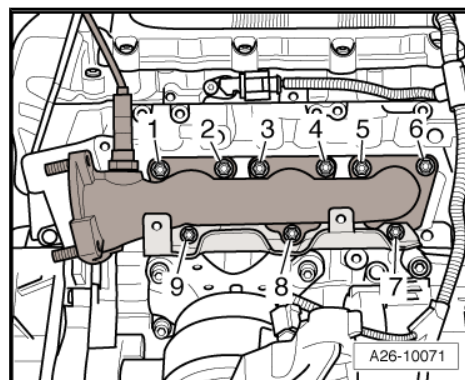
Installation is carried out in the reverse order; note the following:

- Tightening torques
⇒ ["2.1 Exploded view - exhaust manifold", page 255](#)

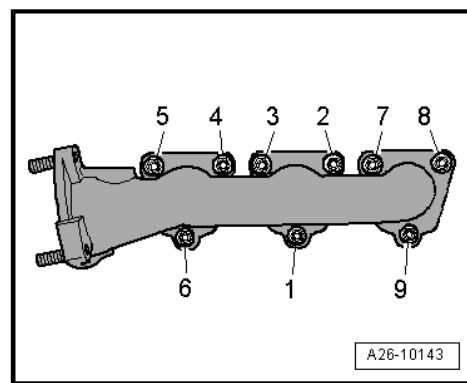


Note

Renew gaskets and self-locking nuts.



- Tighten nuts for exhaust manifold ➔ [page 256](#) .
- Install front exhaust pipe (right-side) with catalytic converter ➔ [page 248](#) .
- Install air cleaner housing ➔ Rep. gr. 24 .



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 Secondary air system

Overview

- ◆ ⇒ [“3.1 Exploded view - secondary air system”, page 260](#)
- ◆ ⇒ [“3.2 Removing and installing secondary air pump motor V101”, page 261](#)
- ◆ ⇒ [“3.3 Checking combination valves for secondary air system for correct operation and leakage”, page 262](#)
- ◆ ⇒ [“3.4 Removing and installing combination valve for secondary air system \(left-side\)”, page 263](#)
- ◆ ⇒ [“3.5 Removing and installing combination valve for secondary air system \(right-side\)”, page 264](#)
- ◆ ⇒ [“3.6 Removing and installing sender 1 for secondary air pressure G609”, page 265](#)

3.1 Exploded view - secondary air system

1 - Secondary air hose

2 - O-rings

- ☐ Renew

3 - Secondary air pump motor - V101-

- ☐ Removing and installing ⇒ [page 261](#)
- ☐ Clip electrical connector into bracket
- ☐ Check in [Guided Functions](#) ⇒ Vehicle diagnostic tester.

4 - Bonded rubber bush

5 - Bracket

- ☐ For secondary air pump motor - V101-

6 - Nut

- ☐ 9 Nm

7 - Bolt

- ☐ 9 Nm

8 - Gasket

- ☐ Renew

9 - Bolts

- ☐ 9 Nm

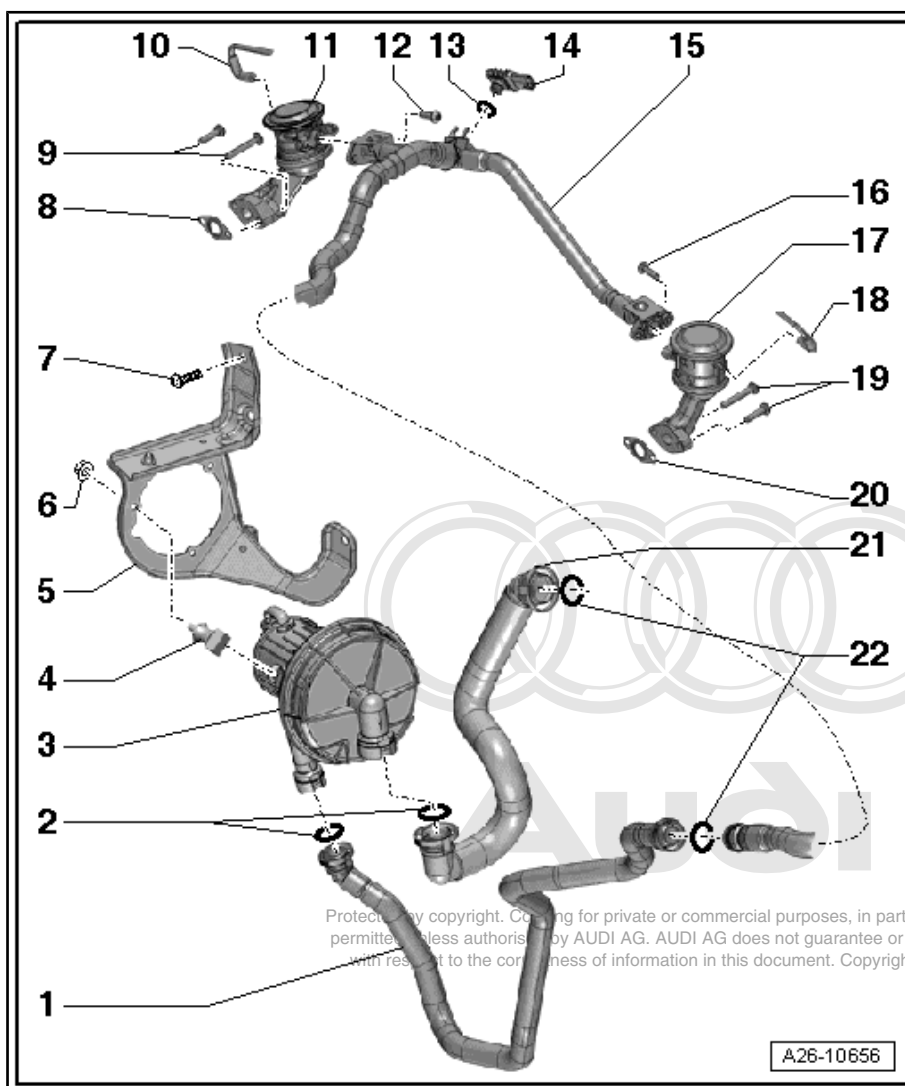
10 - Vacuum hose

11 - Combination valve for secondary air system (right-side)

- ☐ Checking ⇒ [page 262](#)
- ☐ Removing and installing ⇒ [page 264](#)

12 - Bolt

- ☐ 9 Nm



13 - O-ring

- ☐ Renew

14 - Sender 1 for secondary air pressure - G609-

- ☐ Only on USA models
- ☐ Removing and installing ⇒ [page 265](#)

15 - Secondary air pipe

16 - Bolt

- ☐ 9 Nm

17 - Combination valve for secondary air system (left-side)

- ☐ Checking ⇒ [page 262](#)
- ☐ Removing and installing ⇒ [page 263](#)

18 - Vacuum hose

19 - Bolts

- ☐ 9 Nm

20 - Gasket

- ☐ Renew

21 - Secondary air hose

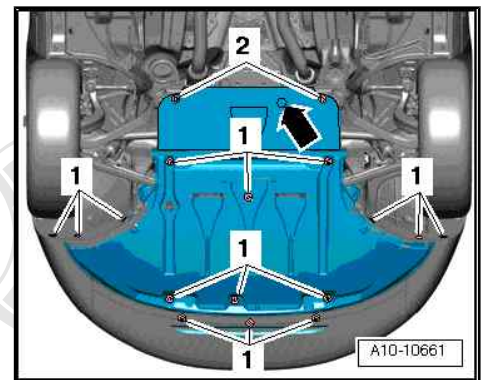
22 - O-rings

- ☐ Renew

3.2 Removing and installing secondary air pump motor - V101-

Removing

- Release fasteners -1, 2, arrow- and remove noise insulation panels.



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.

- Press release tabs and detach secondary air hoses -1- and -3- from secondary air pump motor - V101- .
- Unplug electrical connector -2-.
- Remove nuts -arrows- and detach secondary air pump.

Installing

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

- Tightening torque
⇒ ["3.1 Exploded view - secondary air system", page 260](#)



Note

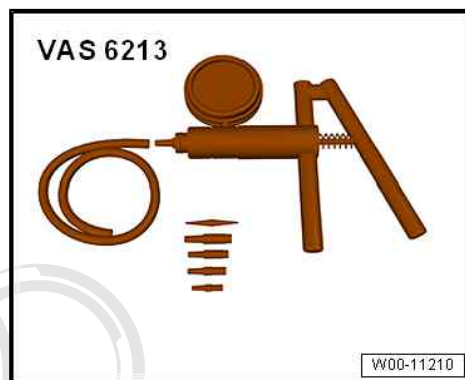
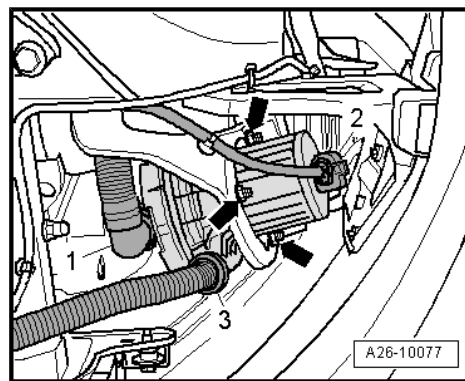
Fit all cable ties in the original positions when installing.

- Install noise insulation panels ⇒ Rep. gr. 50 .

3.3 Checking combination valves for secondary air system for correct operation and leakage

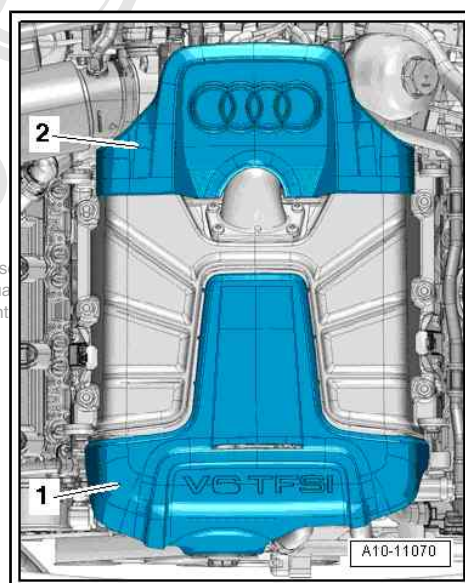
Special tools and workshop equipment required

- ◆ Hand vacuum pump - VAS 6213-



Procedure

- Vacuum hoses and hose connections do not leak.
- Vacuum hoses are not clogged.
- Lift off engine cover panels -1- and -2-.



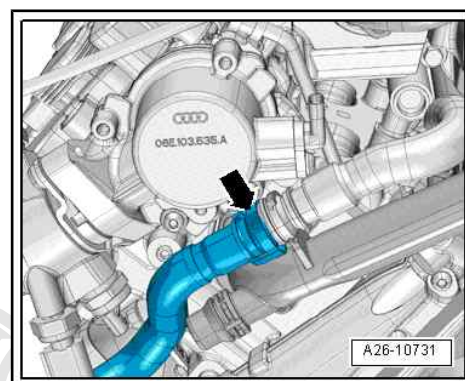
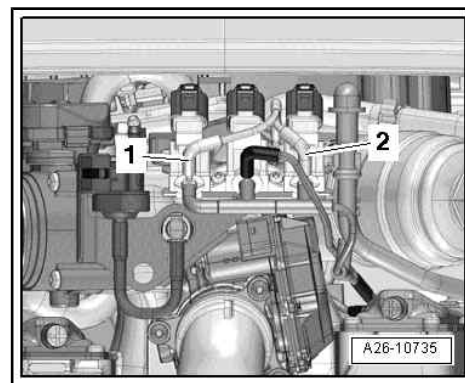
Protected by copyright. Copying for private or commercial purposes is permitted unless authorised by AUDI AG. AUDI AG does not guarantee the correctness of information in this document.

- Detach vacuum hose -2- from combination valve to be checked.

**Note**

The illustration shows the combination valve (left side).

- Connect hand vacuum pump - VAS 6213- to vacuum hose of combination valve to be checked.
- Press release tabs and detach secondary air hose -arrow- to front from bracket.
- Blow lightly into secondary air hose with your mouth (do not use compressed air).
- The combination valves for secondary air should be closed; it should not be possible to blow through the hose.
- Operate hand vacuum pump.
- The combination valve should open; it should now be possible to blow through the hose.
- Renew combination valve for secondary air system if it does not open: on left-side ➔ [page 263](#) , on right-side ➔ [page 264](#) .

**Assembling**

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

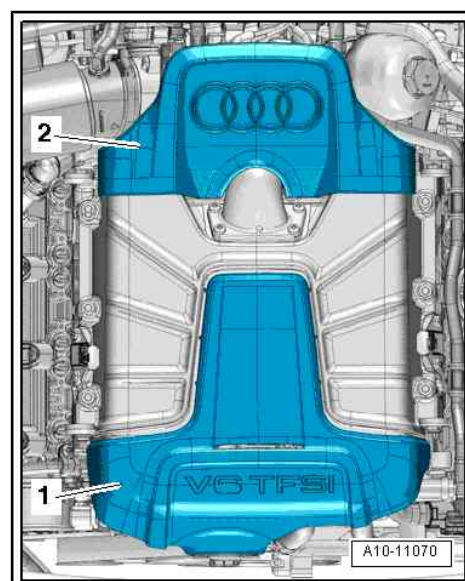
**Note**

Fit new O-ring.

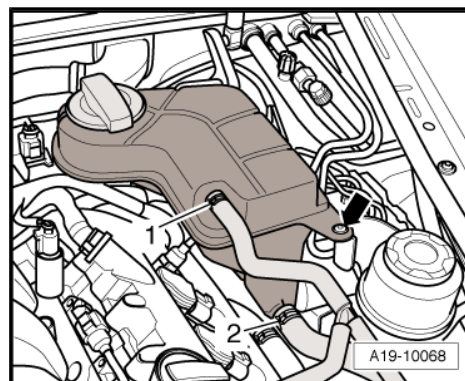
3.4 Removing and installing combination valve for secondary air system (left-side)

Removing

- Lift off engine cover panel (rear) -2-.



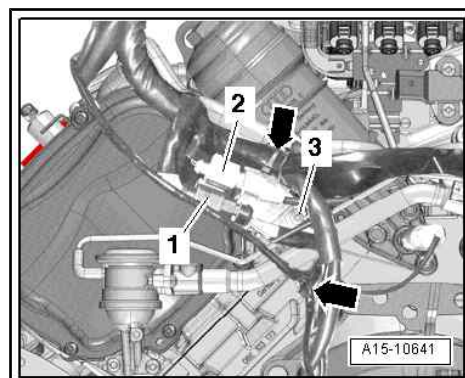
- Remove bolt -arrow-.
- Unplug electrical connector for coolant shortage indicator switch - F66- at bottom of expansion tank and move expansion tank to one side with coolant hoses -1- and -2- attached.



Note

For illustration purposes, the work steps are shown in the following illustrations from the rear with the engine removed.

- Detach electrical connectors -1- and -2- from bracket and unplug connectors.
- Move electrical wiring clear -arrows-.
- Remove nut -3- and move earth wire clear.
- Remove centre hex stud and remove bracket.
- Remove bolts -3- for secondary air system hose.
- Detach vacuum hose -2- from combination valve for secondary air system.
- Unscrew bolts -1- and detach combination valve for secondary air system.



Installing

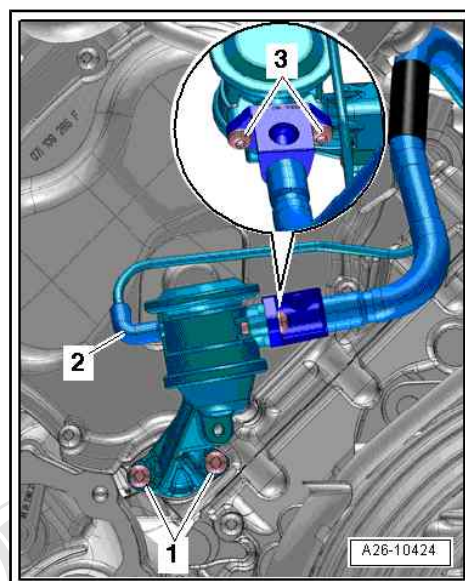
Installation is carried out in the reverse order; note the following:

- Tightening torque
⇒ ["3.1 Exploded view - secondary air system", page 260](#)



Note

Renew gasket.

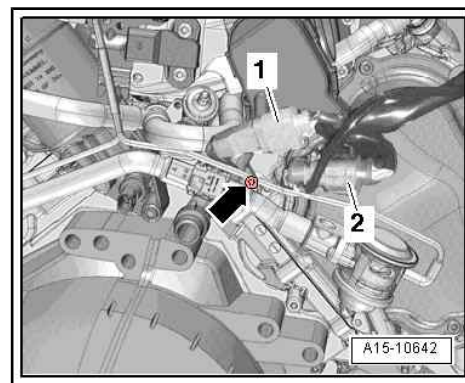


3.5 Removing and installing combination valve for secondary air system (right-side)

Removing

- Remove throttle valve module - J338- ⇒ Rep. gr. 24 .

- Unplug electrical connectors -1- and -2- at rear of cylinder head (right-side).
- Remove bolt -arrow- and remove bracket.



- Remove bolts -1- for secondary air system hose.
- Detach vacuum hose -2- from combination valve for secondary air system.
- Unscrew bolts -3- and detach combination valve for secondary air system.

Printed by copyright. Copying for private or commercial purposes, even for private use, 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.

Installing

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

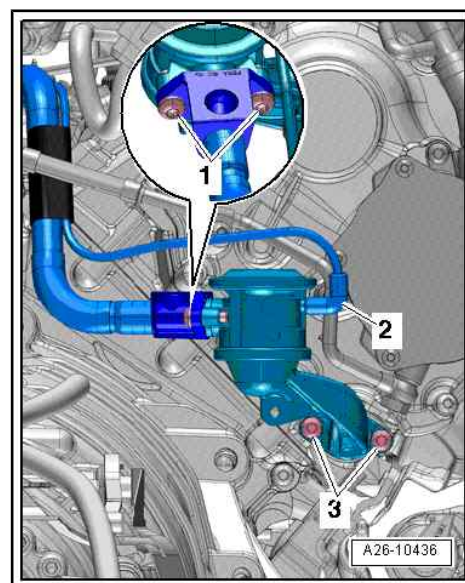
- Tightening torque
⇒ ["3.1 Exploded view - secondary air system", page 260](#)



Note

Renew gasket.

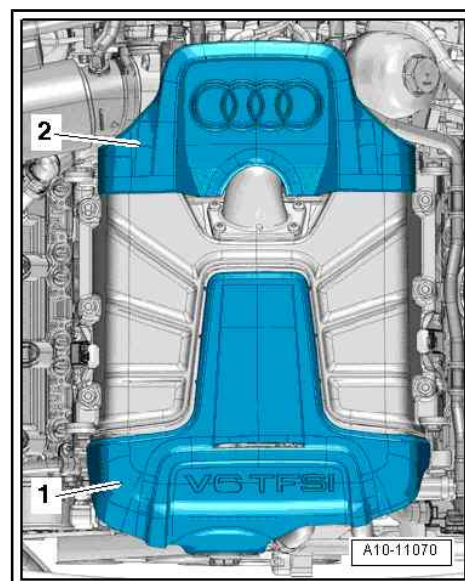
- Install throttle valve module - J338- ⇒ Rep. gr. 24 .



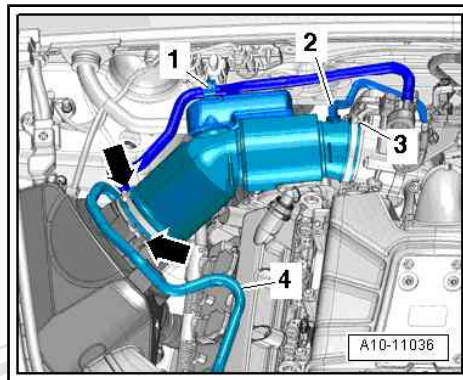
3.6 Removing and installing sender 1 for secondary air pressure - G609-

Removing

- Lift off engine cover panel (rear) -2-.



- Move fuel line -4- and line -1- leading to activated charcoal filter clear on air cleaner housing and air pipe.
- Detach vacuum hose -2- from connection on air hose.
- Remove air pipe. To do so, release hose clip -3- and clamps -arrows-.



- Unplug electrical connector -1-.
- Release catches -arrows- and detach sender 1 for secondary air pressure - G609- -item 2-.

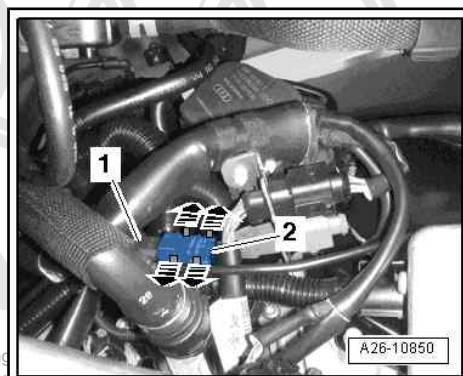
Installing

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



Note

- ◆ *Fit new O-ring.*
- ◆ *Hose connections and air pipes and hoses must be free of oil and grease before assembly.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- ◆ *To ensure that the 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 or reproduction in any form is prohibited without the written permission of Audi AG. Copyright by Audi AG.