Workshop Manual

Audi Q3 2012 ➤
Audi Q3 China 2013 ➤

4-cylinder direct injection engine (1.4 ltr. 4-valve TFSI EA211)									
Engine ID	CPT A	CHP B	CSS A	CZD A	CZE A	CZD B	CWL A		

Edition 05.2016

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

List of Workshop Manual Repair Groups

Repair Group

00 - Technical data
10 - Removing and installing engine
13 - Crankshaft group
15 - Cylinder head, valve gear
17 - Lubrication
19 - Cooling
21 - Turbocharging/supercharging
24 - Mixture preparation - injection
26 - Exhaust system
28 - Ignition system

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

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

All rights reserved.
No reproduction without prior agreement from publisher.

Copyright © 2016 Audi AG, Ingolstadt

Contents

00 - Technical data 1
1 Identification 1
1.1 Engine identification number/engine data 1
2 Safety precautions 2
2.1 Safety precautions when working on the fuel supply system 2
2.2 Safety precautions when working on vehicles with start/stop system 2
2.3 Safety precautions when using testers and measuring instruments during a road test 3
2.4 Safety precautions when working on the ignition system 3
2.5 Safety precautions when working on the cooling system 3
2.6 Safety precautions when working on the exhaust system 4
3 Repair instructions 5
3.1 Rules for cleanliness 5
3.2 Foreign particles in engine 5
3.3 Contact corrosion 5
3.4 Routing and attachment of pipes, hoses and wiring 6
3.5 Installing radiators and condensers 6
3.6 Checking vacuum system 6

10 - Removing and installing engine 8
1 Removing and installing engine 8
1.1 Removing engine 8
1.2 Separating engine and gearbox 22
1.3 Securing engine to engine and gearbox support 26
1.4 Installing engine 29
2 Assembly mountings 33
2.1 Exploded view - assembly mountings 33
2.2 Supporting engine in installation position 34
2.3 Removing and installing engine mountings 36
2.4 Removing and installing gearbox mounting 37
2.5 Removing and installing pendulum support 39
2.6 Checking adjustment of assembly mountings (engine/gearbox mountings) 40
2.7 Adjusting assembly mountings 41
3 Engine cover panel 44
3.1 Removing and installing engine cover panel 44

13 - Crankshaft group 45
1 Cylinder block (pulley end) 45
1.1 Exploded view - poly V-belt drive 45
1.2 Exploded view - sealing flange (pulley end) 47
1.3 Removing and installing poly V-belt 48
1.4 Removing and installing tensioner for poly V-belt 49
1.5 Removing and installing engine support 49
1.6 Removing and installing pulley 52
1.7 Renewing crankshaft oil seal (pulley end) 53
1.8 Removing and installing sealing flange (pulley end) 56
2 Cylinder block (gearbox end) 58
2.1 Exploded view - cylinder block (gearbox end) 58
2.2 Removing and installing flywheel 59
2.3 Removing and installing sealing flange (gearbox end) 60
3 Crankshaft 69
3.1 Crankshaft dimensions 69
3.2 Renewing needle bearing in crankshaft 69

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.

4 Pistons and conrods ... 71
4.1 Exploded view - pistons and conrods ... 71
4.2 Removing and installing pistons ... 73
4.3 Removing and installing oil spray jets ... 74
4.4 Checking pistons and cylinder bores ... 76
4.5 Separating parts of new conrod ... 77
4.6 Checking radial clearance of conrod bearings ... 78

15 - Cylinder head, valve gear ... 79

1 Toothed belt drive ... 79
1.1 Exploded view - toothed belt cover ... 79
1.2 Exploded view - toothed belt ... 80
1.3 Detaching toothed belt from camshaft ... 83
1.4 Removing and installing toothed belt ... 124

2 Cylinder head ... 168
2.1 Exploded view - cylinder head ... 168
2.2 Exploded view - camshaft housing ... 169
2.3 Removing and installing cylinder head ... 172
2.4 Removing and installing camshaft housing ... 175
2.5 Checking compression ... 181

3 Valve gear ... 184
3.1 Exploded view - valve gear ... 184
3.2 Measuring axial clearance of camshaft ... 185
3.3 Removing and installing camshaft oil seal ... 186
3.4 Removing and installing cam actuator ... 194
3.5 Removing and installing camshaft control valve 1 N205 ... 195
3.6 Removing and installing valve stem oil seals ... 196

4 Inlet and exhaust valves ... 204
4.1 Checking valve guides ... 204
4.2 Checking valves ... 204
4.3 Valve dimensions ... 205

17 - Lubrication ... 206

1 Sump/oil pump ... 206
1.1 Exploded view - sump/oil pump ... 206
1.2 Engine oil ... 209
1.3 Removing and installing sump (bottom section) ... 209
1.4 Removing and installing sump (top section) ... 211
1.5 Removing and installing oil pump ... 214
1.6 Removing and installing oil level and oil temperature sender G266 ... 215

2 Engine oil cooler ... 216
2.1 Exploded view - engine oil cooler ... 216
2.2 Removing and installing engine oil cooler ... 216

3 Crankcase breather ... 218
3.1 Exploded view - crankcase breather system ... 218
3.2 Removing and installing oil separator ... 219

4 Oil filter/oil pressure switches ... 222
4.1 Exploded view - oil filter/oil pressure switches ... 222
4.2 Removing and installing oil pressure switch F22 ... 223
4.3 Removing and installing oil pressure switch for reduced oil pressure F378 ... 224
4.4 Checking oil pressure ... 225
4.5 Removing and installing valve for oil pressure control N428 ... 226

19 - Cooling ... 228

1 Cooling system/coolant ... 228

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.

1.1 Connection diagram - coolant hoses . . . 228
1.2 Checking cooling system for leaks . . . 229
1.3 Draining and filling cooling system . . . 230
2 Coolant pump/thermostat assembly . . . 237
2.1 Exploded view - coolant pump/thermostat . . . 237
2.2 Exploded view - electric coolant pump . . . 239
2.3 Exploded view - coolant temperature senders . . . 241
2.4 Removing and installing electric coolant pump . . . 241
2.5 Removing and installing coolant pump . . . 243
2.6 Removing and installing thermostat . . . 247
2.7 Removing and installing toothed belt sprocket for coolant pump . . . 250
2.8 Removing and installing coolant temperature sender G62 . . . 254
2.9 Removing and installing radiator outlet coolant temperature sender G83 . . . 255
3 Coolant pipes . . . 257
3.1 Exploded view - coolant pipes . . . 257
3.2 Removing and installing coolant pipes . . . 258
4 Radiator/radiator fans . . . 262
4.1 Exploded view - radiator/radiator fans . . . 262
4.2 Removing and installing radiator . . . 264
4.3 Removing and installing water radiator for charge air cooling circuit . . . 267
4.4 Removing and installing radiator cowl . . . 269
4.5 Removing and installing radiator fans . . . 271

21 - Turbocharging/supercharging . . . 273
1 Turbocharger . . . 273
1.1 Exploded view - turbocharger . . . 273
1.2 Removing and installing turbocharger . . . 276
1.3 Renewing vacuum unit for turbocharger . . . 282
1.4 Removing and installing charge pressure positioner V465 . . . 283
2 Charge air system . . . 284
2.1 Exploded view - charge air system . . . 284
2.2 Removing and installing charge pressure sender G31 . . . 285
2.3 Removing and installing charge air cooler . . . 285
2.4 Checking charge air system for leaks . . . 287

24 - Mixture preparation - injection . . . 290
1 Injection system . . . 290
1.1 Overview of fitting locations - injection system . . . 290
2 Air cleaner . . . 297
2.1 Exploded view - air cleaner housing . . . 297
2.2 Removing and installing air cleaner housing . . . 298
3 Intake manifold . . . 299
3.1 Exploded view - intake manifold . . . 299
3.2 Removing and installing intake manifold . . . 300
3.3 Removing and installing throttle valve module J338 . . . 308
3.4 Cleaning throttle valve module . . . 310
4 Injectors . . . 312
4.1 Exploded view - fuel rail with injectors . . . 312
4.2 Removing and installing fuel rail . . . 313
4.3 Removing and installing injectors . . . 313
4.4 Cleaning injectors . . . 318
5 Senders and sensors . . . 320
5.1 Removing and installing intake air temperature sender G42 . . . 320
5.2 Removing and installing fuel pressure sender G247 . . . 320

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 and completeness of this (technical) information.

5.3 Checking fuel pressure sender G247 321
6 High-pressure pump 324
6.1 Exploded view - high-pressure pump 324
6.2 Removing and installing high-pressure pump 326
6.3 Removing and installing high-pressure pipe 327
7 Lambda probe 329
7.1 Exploded view - Lambda probe 329
7.2 Removing and installing Lambda probe 330
8 Engine control unit 331
8.1 Exploded view - engine control unit 331
8.2 Removing and installing engine control unit J623 332

26 - Exhaust system 335
1 Exhaust pipes/silencers 335
1.1 Exploded view - silencers 335
1.2 Removing and installing silencers 336
1.3 Stress-free alignment of exhaust system 337
1.4 Checking exhaust system for leaks 338
2 Emission control system 339
2.1 Exploded view - emission control system 339
2.2 Removing and installing catalytic converter 340
2.3 Removing and installing exhaust flap control unit J883 342

28 - Ignition system 344
1 Ignition system 344
1.1 Exploded view - ignition system 344
1.2 Test data, spark plugs 345
1.3 Removing and installing ignition coils with output stages 345
1.4 Removing and installing knock sensor 1 G61 348
1.5 Removing and installing Hall sender G40 348
1.6 Removing and installing engine speed sender G28 350

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

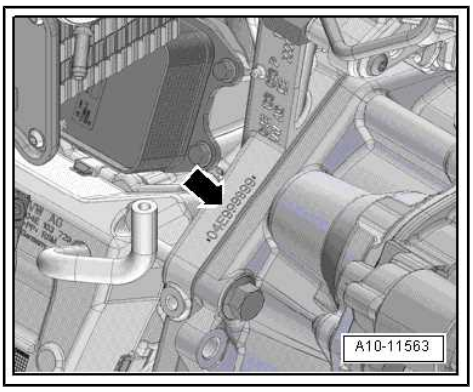
1 Identification

(ARL004467; Edition 05.2016)

⇒ “1.1 Engine identification number/engine data”, page 1

1.1 Engine identification number/engine data

Engine number



- The engine number (“engine code” and “serial number”) is located on the left side at the joint between engine and gearbox -arrow-.
- Additionally there is a sticker on the toothed belt cover (top) with engine code and serial number.
- Engine codes starting with the letter “C” have four letters (previously three letters).
- The first 3 characters of the engine code stand for the engine capacity and the mechanical construction and design. They are stamped onto the cylinder block together with the serial number.
- The 4th character indicates the power output and torque of the engine and is determined by the engine control unit.

Note

- *The four-letter engine code is found on the type plate (country specific version), vehicle data sticker and engine control unit.*
- *Fitting locations of the type plate (certain countries only) and the vehicle data sticker ⇒ Maintenance ; Booklet 820 .*

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 and completeness of this document. ©Copyright by AUDI AG.

Engine data

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

2 Safety precautions

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

⇒ “2.2 Safety precautions when working on vehicles with start/stop system”, page 2

⇒ “2.3 Safety precautions when using testers and measuring instruments during a road test”, page 3

⇒ “2.4 Safety precautions when working on the ignition system”, page 3

⇒ “2.5 Safety precautions when working on the cooling system”, page 3

⇒ “2.6 Safety precautions when working on the exhaust system”, page 4

2.1 Safety precautions when working on the fuel supply system

Risk of injury - fuel system operates under high pressure

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

Before opening the fuel system:

– Put on safety goggles.

– Put on protective gloves.

– Release pressure (wrap clean cloth around connection and open connection carefully).

Risk of fire due to escaping fuel

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

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

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 Safety precautions when working on vehicles with start/stop system

Risk of injury - engine may start unexpectedly

On vehicles with the start/stop system activated, the engine may start unexpectedly. If the start/stop system is activated, this is indicated by a message on the dash panel insert.

– Deactivate start/stop system by switching off ignition.

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

Risk of injury if test equipment is not secured

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

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

Or

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

2.4 Safety precautions when working on the ignition system

Risk of injury due to electric shock

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

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

Risk of damage to components

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

– Switch off ignition before connecting/disconnecting electrical wiring.

– Switch off ignition before cleaning engine.

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

2.5 Safety precautions when working on the cooling system

Risk of scalding as hot coolant can escape

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

– Put on protective gloves.

– Put on safety goggles.

– Release pressure (cover filler cap on coolant expansion tank with a cloth and open carefully).

2.6 Safety precautions when working on the exhaust system

When working on the exhaust system please note the following:

Risk of damage to flexible joint

The flexible joint can be damaged or develop leaks if it is handled incorrectly.

– Do not bend flexible joint more than 10°.

– Install flexible joint so that it is not under tension.

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 Repair instructions

⇒ “3.1 Rules for cleanliness”, page 5

⇒ “3.2 Foreign particles in engine”, page 5

⇒ “3.3 Contact corrosion”, page 5

⇒ “3.4 Routing and attachment of pipes, hoses and wiring”, page 6

⇒ “3.5 Installing radiators and condensers”, page 6

⇒ “3.6 Checking vacuum system”, page 6

3.1 Rules for cleanliness

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

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

3.2 Foreign particles in engine

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

The reproduction, distribution and utilization of this document as well as the communication of its contents to others without express authorization is not permitted. Offenders will be liable for the payment of damages. All rights reserved in the event of the grant of a patent, utility model or design. The AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Note

If the turbocharger has suffered mechanical damage
⇒ “1.2 Removing and installing turbocharger”, page 276

3.3 Contact corrosion

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

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

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

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

Please note:

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

3.4 Routing and attachment of pipes, hoses and wiring

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

3.5 Installing radiators and condensers

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

3.6 Checking vacuum system

Special tools and workshop equipment required

- Hand vacuum pump - VAS 6213-



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

– Check all vacuum lines in the complete vacuum system for:

- Cracks
- Traces of animal bites
- Kinked or crushed lines
- Porous or leaking lines

– Check vacuum line to solenoid valve and from solenoid valve to corresponding component.

– If an entry is stored in the event memory, check all vacuum lines leading to the corresponding component and also check the remaining vacuum lines leading to other components.

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

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 and installing engine

⇒ “1.1 Removing engine”, page 8

⇒ “1.2 Separating engine and gearbox”, page 22

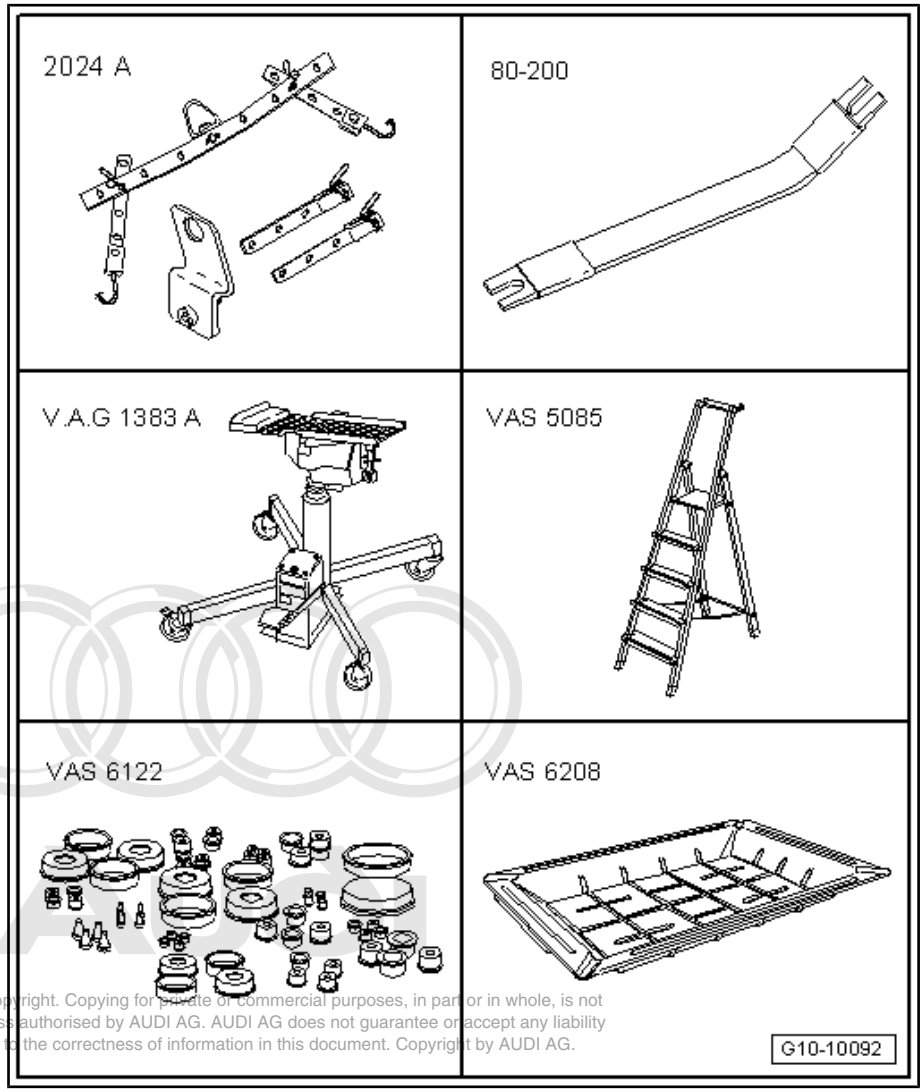
⇒ “1.3 Securing engine to engine and gearbox support”, page 26

⇒ “1.4 Installing engine”, page 29

1.1 Removing engine

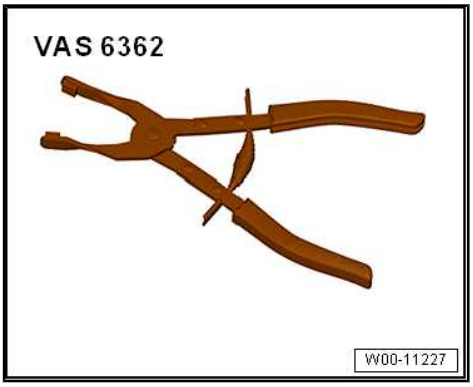
Special tools and workshop equipment required

- Extension -2024 A /1- for lifting tackle - 2024 A-
- Removal lever - 80 - 200-
- Engine and gearbox jack - V.A.G 1383 A-
- Stepladder - VAS 5085-
- Engine bung set - VAS 6122-
- Drip tray for workshop hoist - VAS 6208-

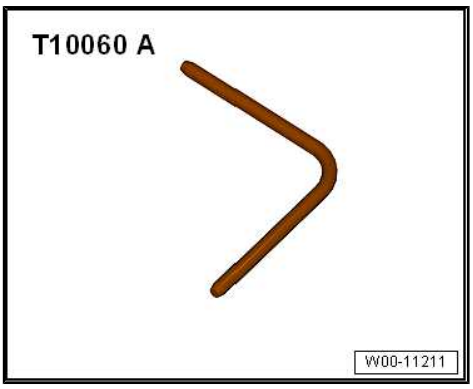


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

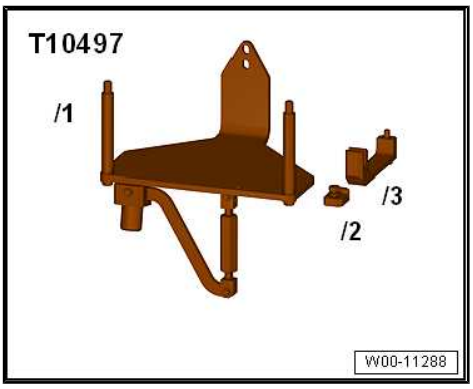
- Hose clip pliers - VAS 6362-



- Locking pin - T10060 A-



- Engine bracket - T10497-



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.

- Safety goggles
- Protective gloves

Procedure

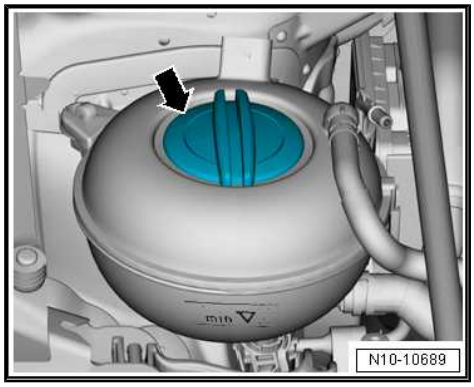
Note

- *The engine is removed from underneath together with the gearbox.*
- *Fit all cable ties in the original positions when installing.*

WARNING

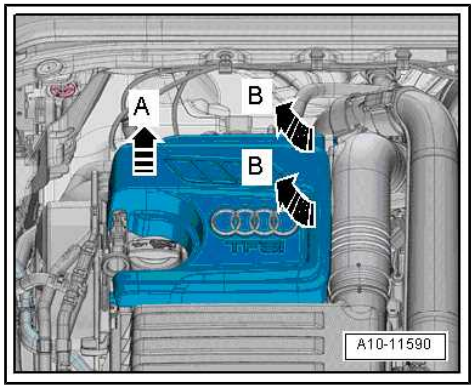
Hot steam/hot coolant can escape - risk of scalding.

- *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.*



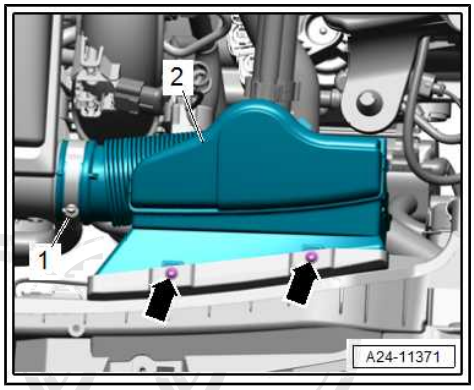
– Open filler cap -arrow- on coolant expansion tank.

– First pull engine cover panel off ball studs on right side -arrow A-, then detach towards right side -arrows B-.



– Remove bolts -arrows-.

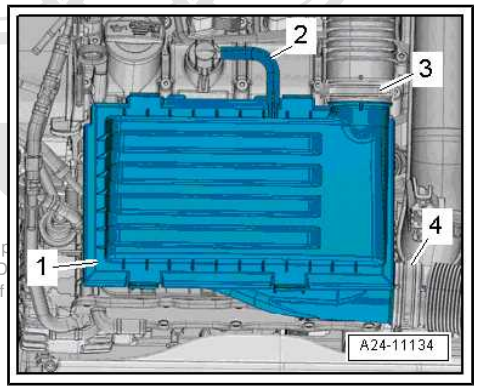
– Open hose clip -1- and detach air duct -2-.



– Disconnect crankcase breather hose -2-.

– Lift air cleaner housing -1- off ball studs.

– Release hose clip -3- and detach air pipe.



Note

Disregard -item 4-.

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

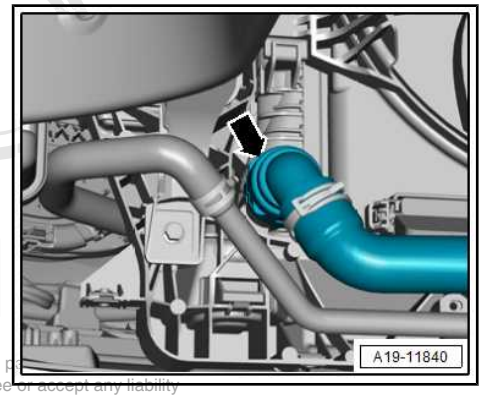
– Remove both front wheels ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres .

– Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

– Remove wheel spoilers (left and right) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Removing and installing wheel housing liner (front) .

– Place drip tray for workshop hoist - VAS 6208- underneath.

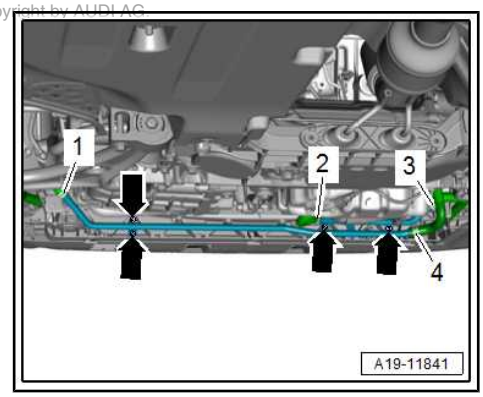
– Lift retaining clip -arrow-, disconnect coolant hose from radiator (bottom left) and drain off coolant.



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

– Release hose clips -1 … 4-, disconnect coolant hoses and drain off coolant.

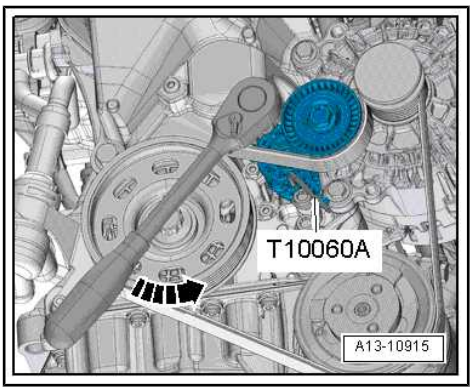
– Unscrew bolts -arrows- and detach coolant pipes on lock carrier.



Caution

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

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

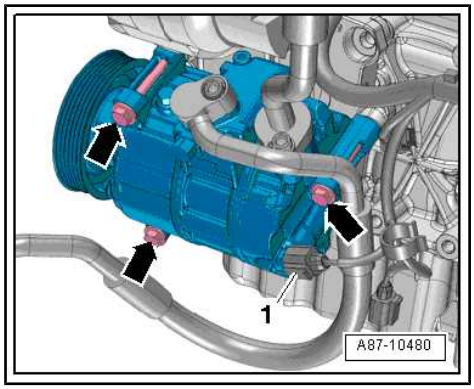


– To slacken poly V-belt, swivel tensioner in anti-clockwise direction -arrow- and detach poly V-belt from pulley for air conditioner compressor.

– Lock tensioner with locking pin - T10060 A- .

– Take off poly V-belt.

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



WARNING

Risk of injury caused by refrigerant.

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

– Remove bolts -arrows- for air conditioner compressor.

Caution

Risk of damage to air conditioner compressor and refrigerant pipes/hoses.

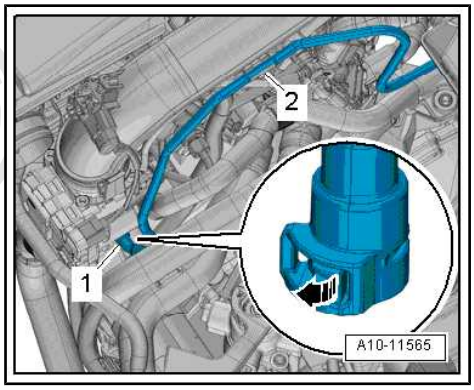
- *Do NOT stretch, kink or bend refrigerant lines and hoses.*

– Detach air conditioner compressor with refrigerant lines still connected and tie up to right side.

– Remove battery and battery tray ⇒ Electrical system; Rep. gr. 27 ; Battery; Removing and installing battery tray .

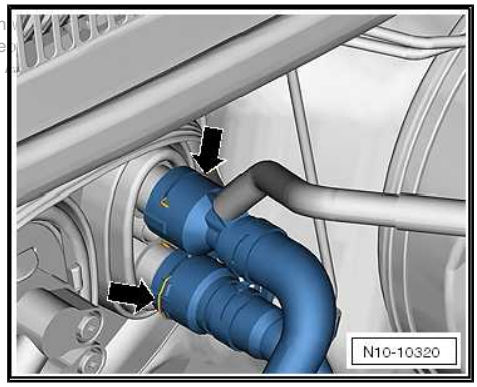
– Release catch -arrow- and disconnect vacuum hose -1-.

– Move vacuum hose clear at air pipe -2-.



Vehicles without auxiliary heater:

– Lift retaining clips -arrows- and disconnect coolant hoses from heat exchanger for heater.

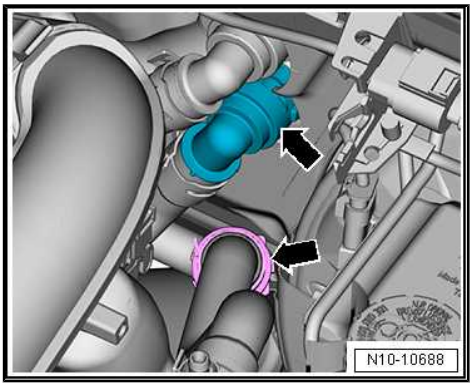


Copyright by AUDI AG. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Vehicles with auxiliary heater:

– Release retaining clip and hose clip and detach both coolant hoses -arrows-.

– Move electrical wiring for Lambda probes clear.

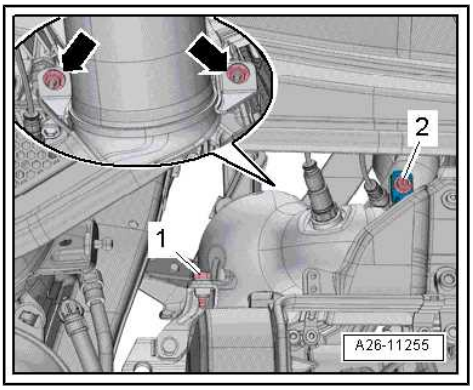


All vehicles (continued)

– Unscrew bolt -2- and remove screw-type clip.

– Remove bolt -1- and nuts -arrows- and tie up catalytic converter.

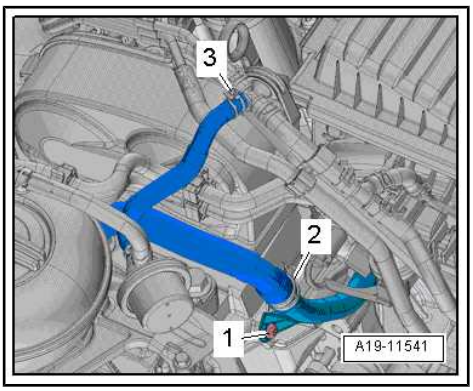
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



Note

Place a cloth underneath to catch escaping coolant.

– Release hose clips -2, 3- and disconnect coolant hoses.



Note

Disregard -item 1-.

Caution

Take care to keep components clean.

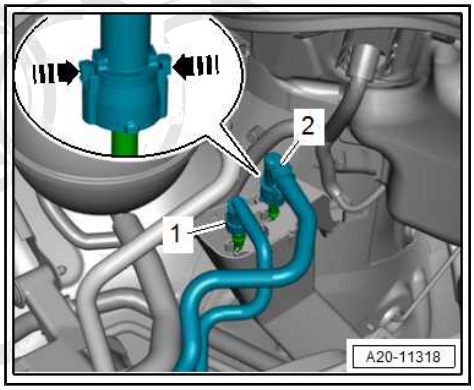
- ***Observe rules for cleanliness when working on the fuel supply system ⇒ "3.1 Rules for cleanliness", page 5 .***

WARNING

The fuel system is pressurised.

Risk of injury as fuel may spray out.

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



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.

– First press hose connector -2- downwards, and then press release tabs -arrows-.

– Pull off hose connector, keeping release tabs depressed.

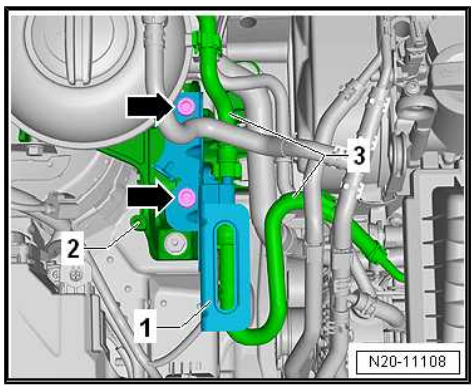
– Press release tab on hose -1- connected to activated charcoal filter.

– Disconnect hose and move it clear.

– If fitted, unscrew bolts -arrows- securing bracket for fuel quality sender - G446- .

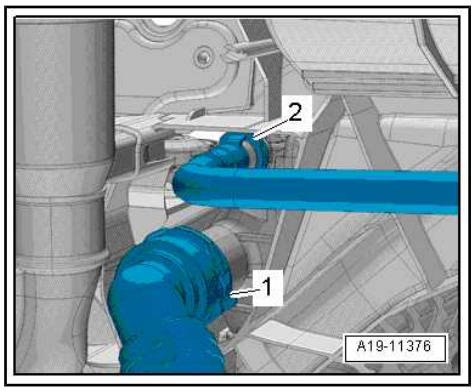
– Place bracket -1- with fuel quality sender - G446- to one side (pipes/hoses -3- remain connected).

- Observe rules for cleanliness
⇒ “3.1 Rules for cleanliness”, page 5 .



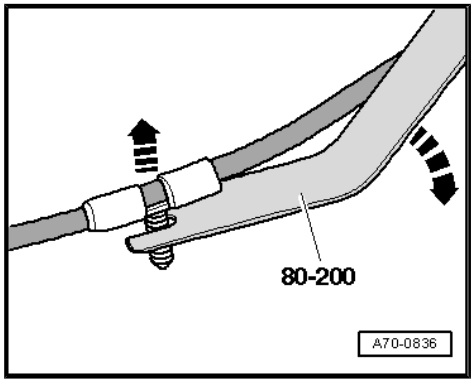
– Lift retaining clips -1 and 2- and disconnect coolant hoses (top left) from radiator.

– Remove engine control unit - J623-
⇒ “8.2 Removing and installing engine control unit J623 ”, page 332 .

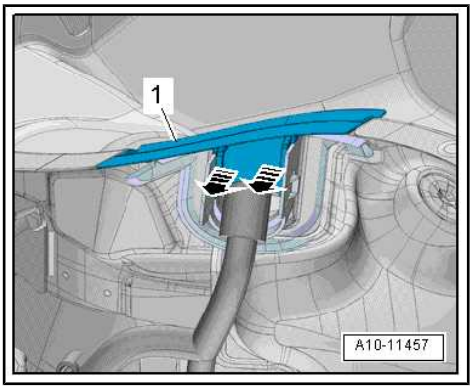


Note

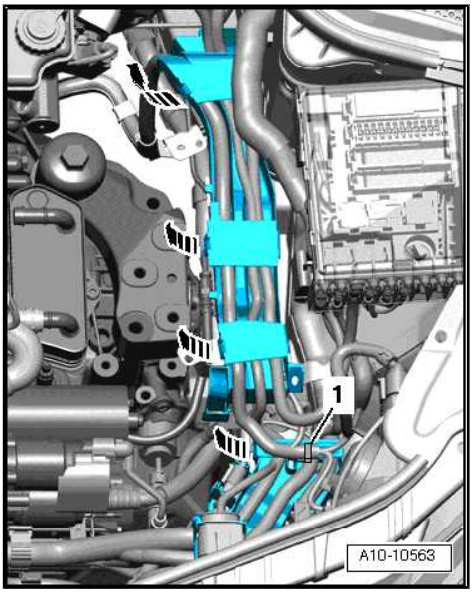
Use removal lever - 80 - 200- to lever out the wiring clips when performing the next work steps.



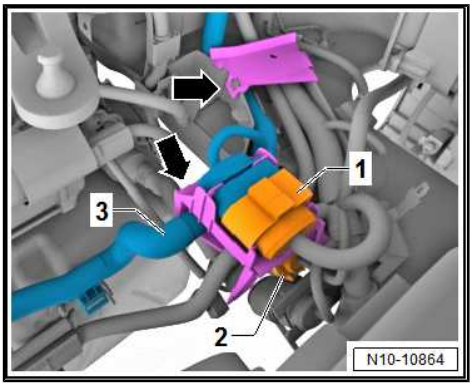
– Release wiring protector -1- for engine wiring harness -arrows- and lift off.



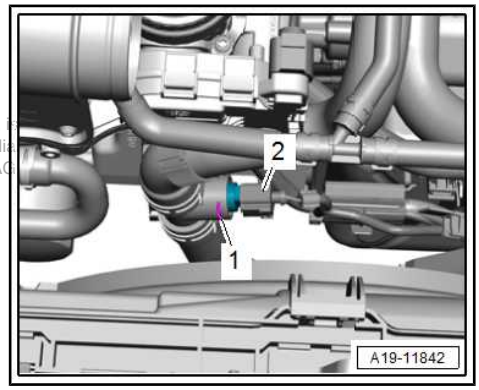
– Open retainers for wiring duct -arrows-.



– Release and unplug connectors -1 and 2-.
– Open fasteners -arrows- of cable guide and place engine wiring harness -3- on engine.
– Move electrical wiring clear.
– Attach electrical wiring to engine using cable tie.



– Unplug electrical connector -2- on radiator outlet coolant temperature sender - G83- and move wiring clear.

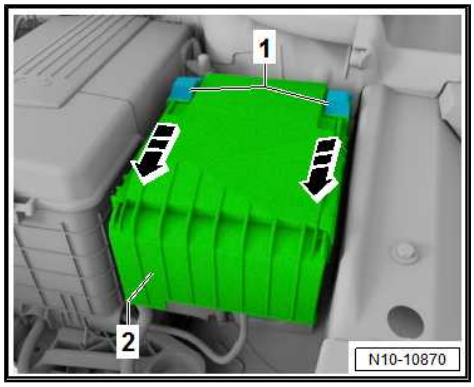


Note

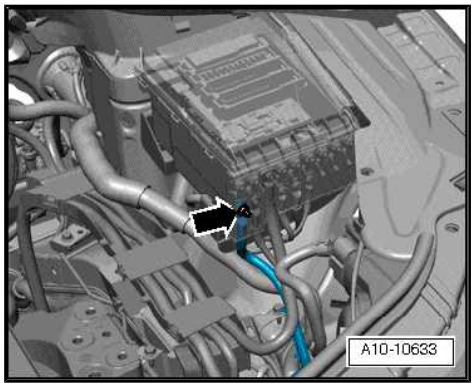
Disregard -item 1-.

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.

– Slide the two clips -1- in the direction of the -arrows- and remove cover -2- from electronics box in engine compartment.

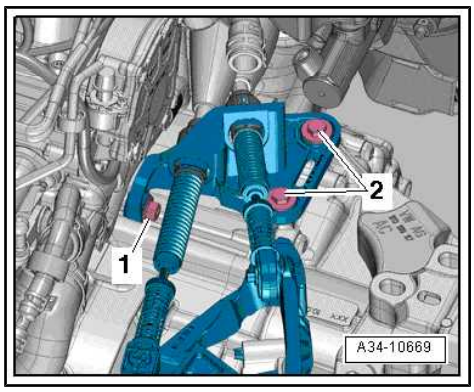


– Remove nut -arrow-, detach terminal 30 wire from electronics box in engine compartment and move it clear.



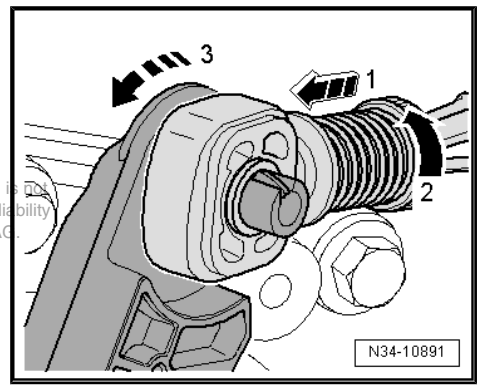
Vehicles with manual gearbox:

– Remove nut -1- and bolts -2- and place cable support bracket to one side with selector cables.



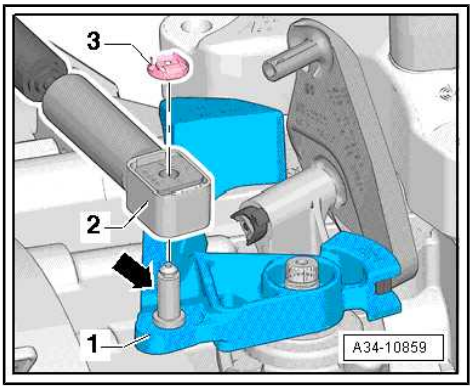
– Pull locking device forwards onto stop -arrow 1- and lock by turning anti-clockwise -arrow 2-.

– Press relay lever towards front -arrow 3-, take gate selector cable out of end-piece.

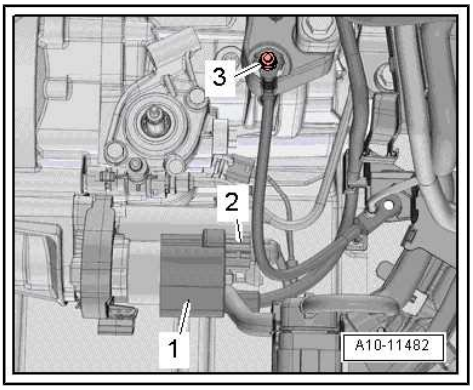


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

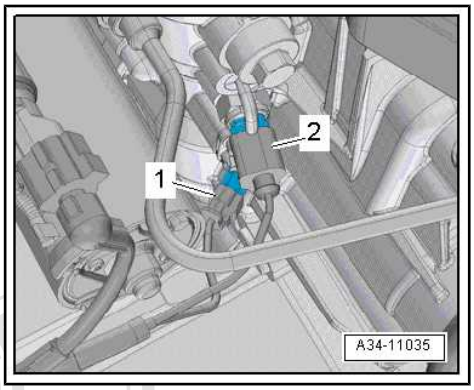
– Detach securing clip -3- for gear selector cable from gearbox selector lever -1- and pull cable -2- off pin -arrow-.



– Unplug electrical connector -2-.
– Push back cover -1- for positive battery terminal and unscrew positive wire from starter solenoid switch.
– Remove nut -3- and detach earth wire.



– Unplug electrical connectors -1, 2-.



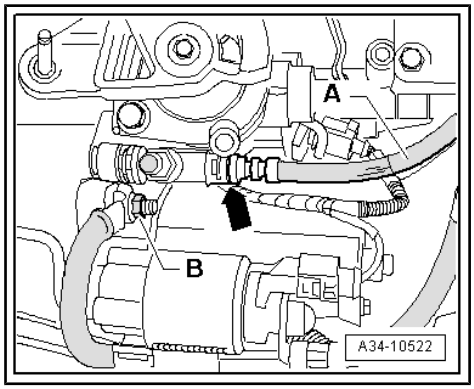
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Note

Make sure brake fluid does not come into contact with longitudinal member or gearbox when performing the following operations. If it does, clean affected area thoroughly.

– Place a lint-free cloth underneath bleeder connection.

– Pull out securing clip -arrow- as far as stop and disconnect pipe -A- from bleeder connection.



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

Disregard -item B-.

– Seal off open lines and connections with clean plugs from engine bung set - VAS 6122- .

Caution

Risk of contamination by escaping brake fluid.

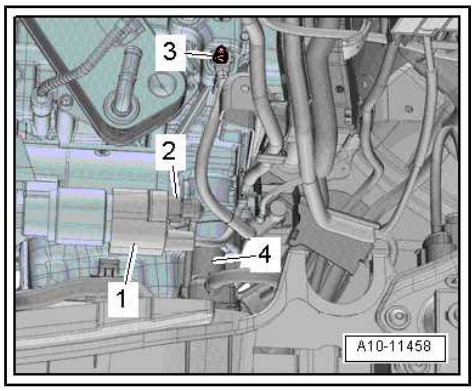
- ***Do not operate clutch pedal after detaching pipe from bleeder connection on clutch slave cylinder.***

Vehicles with dual clutch gearbox:

– Unplug electrical connector -2-.

– Push back cover -1- for positive battery terminal and unscrew positive wire from starter solenoid switch.

– Remove nut -3- and detach earth wire.



Caution

Risk of irreparable damage to control unit (mechatronic unit) because of electrostatic discharge.

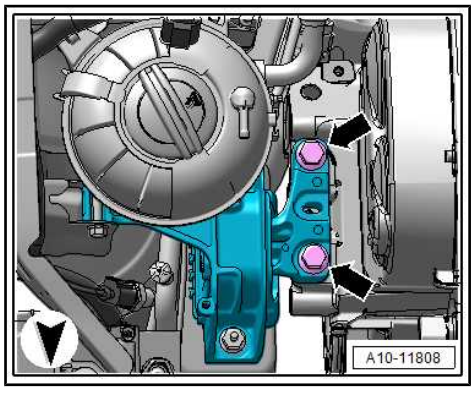
- ***Do NOT touch connector contacts in gearbox connector with your hands.***

– Touch vehicle earth with bare hands to eliminate any static charge.

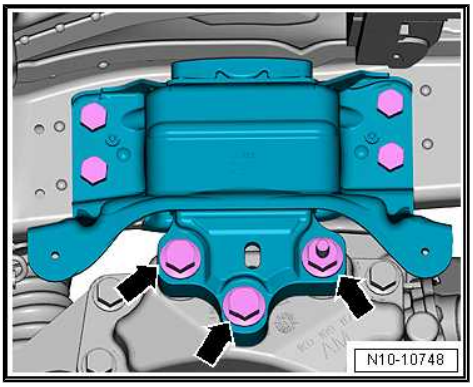
– Turn retainer catch anti-clockwise and unplug electrical connector -4- at gearbox.

Continued for all vehicles:

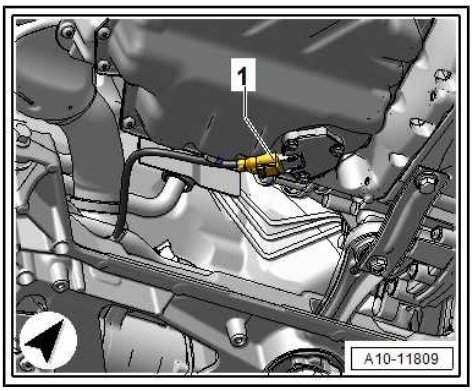
– Unscrew bolts -arrows- for engine mounting approx. 2 turns.



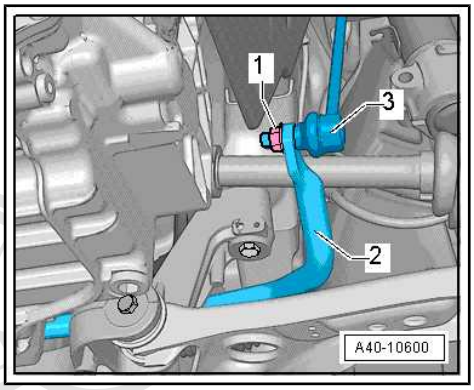
– Loosen bolts -arrows- for gearbox mounting approx. 2 turns.



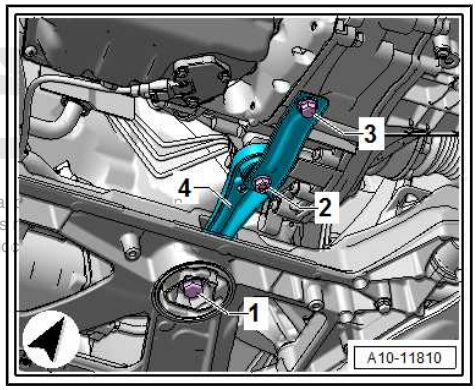
– Unplug electrical connector -1- at oil level and oil temperature sender - G266- .
– Unclip bracket -2- for wire to oil level and oil temperature sender - G266- from subframe.



– Remove nut -1- for coupling rod -3- on anti-roll bar -2- on both sides.

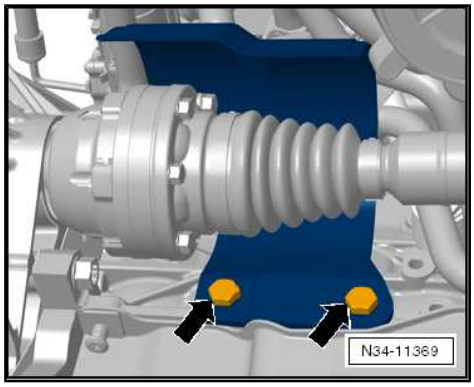


– Remove bolts -1, 2, 3- and detach pendulum support.

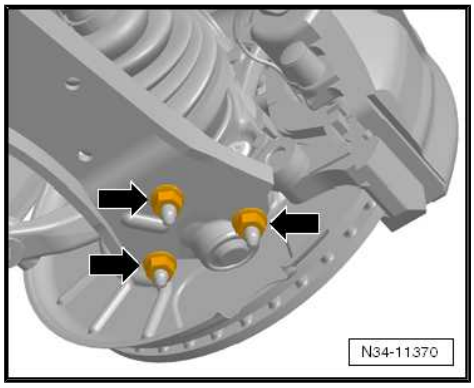


Protected by copyright. Copying for private or commercial
permitted unless authorised by AUDI AG. AUDI AG does
with respect to the correctness of information in this do

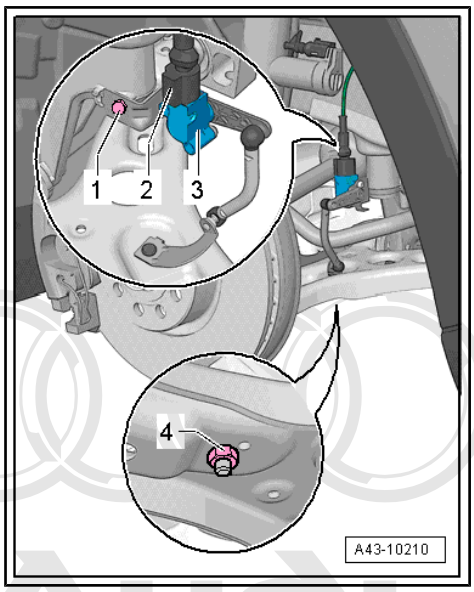
– Remove bolts -arrows- and detach heat shield for drive shaft (right-side).



– Remove nuts -arrows- for swivel joint on both sides.



– If fitted, remove nut -4- and bolt -1- and move front left vehicle level sender - G78- -item 3- aside.
– Detach swivel joint from wishbone (both sides).
– Detach drive shaft (left and right) from gearbox and tie up ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Removing and installing drive shaft .
• Take care not to damage the surface coating of the drive shaft.

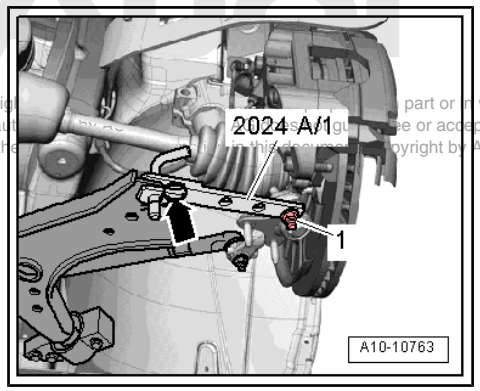


– Swing suspension strut (left-side) outwards and support with extension -2024 A /1- as shown in illustration.

WARNING

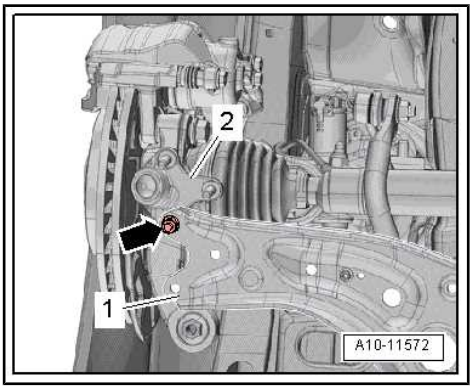
Accident risk from loose components of support bracket.

- *Secure retaining pin and swivel joint with locking pin -arrow- and nut -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.

– Secure swivel joint -2- (right-side) to wishbone -1- with nut -arrow-, as shown in illustration.



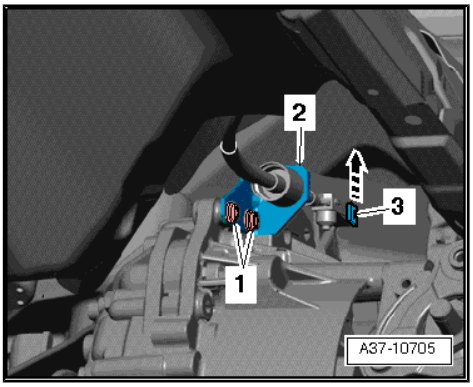
Vehicles with dual clutch gearbox:

– Remove bolts -1- for cable support bracket.

Caution

Risk of damage to selector lever cable.

- *Take care not to bend or kink selector lever cable.*



– Pull off securing clip -3- -arrow- and remove selector lever cable from gearbox.

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

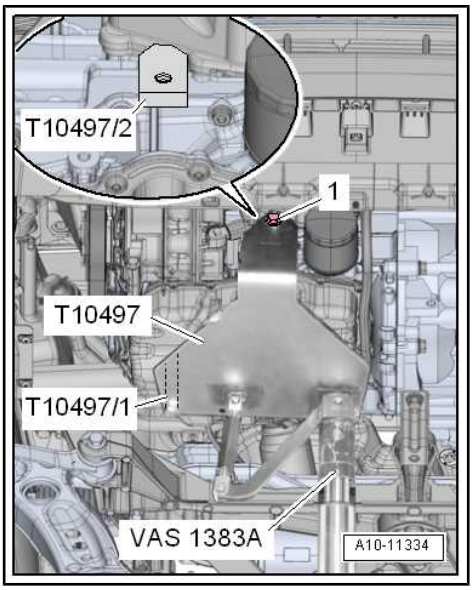
Disregard -item 2-.

Continued for all vehicles:

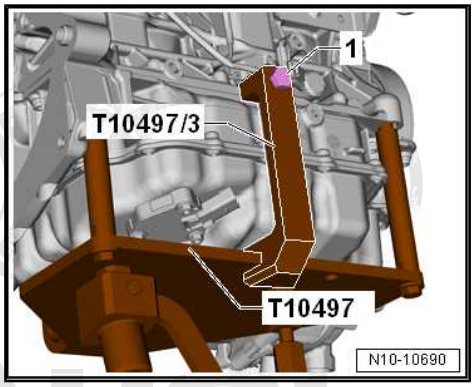
– Apply clamping piece T10497/2 at housing rib on cylinder block, as shown in illustration.

– Position engine bracket - T10497- on cylinder block using pin T10497/1 .

– Screw bolt -1- through hole “B” on engine bracket T10497 and tighten to 20 Nm.



– Fit adapter - T10497/3- onto engine bracket - T10497- and tighten bolt -1- to 20 Nm.
– Insert engine and gearbox jack - V.A.G 1383 A- in engine bracket T10497 and raise engine/gearbox assembly slightly.

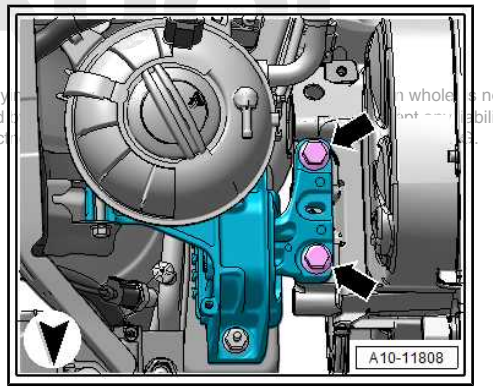


Note

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

Protected by copyright. Copy... unless authorised... with respect to the correct...

– Remove bolts -arrows- for engine mounting.

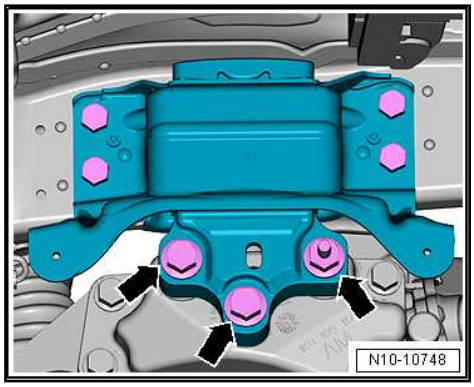


– Remove bolts -arrows- securing gearbox mounting.

Caution

Danger of damage to vacuum lines or electrical wiring and to engine compartment.

- ***Check that all vacuum lines and electrical wiring between engine, gearbox, subframe and body have been detached.***
- ***Carefully guide out engine/gearbox assembly with subframe from engine compartment when lowering.***



– First lower engine/gearbox assembly only slightly.
– Then push gearbox end of engine/gearbox assembly forwards and only then lower further.

1.2 Separating engine and gearbox

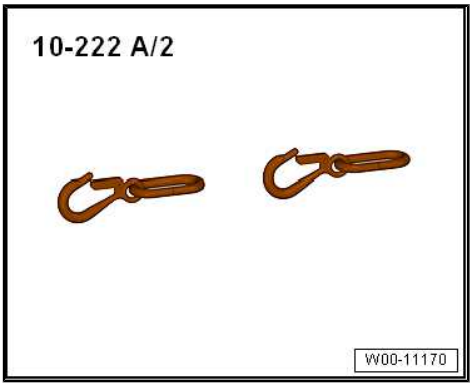
⇒ “1.2.1 Separating engine and gearbox - vehicles with manual gearbox”, page 22

⇒ “1.2.2 Separating engine and gearbox - vehicles with dual clutch gearbox”, page 24

1.2.1 Separating engine and gearbox - vehicles with manual gearbox

Special tools and workshop equipment required

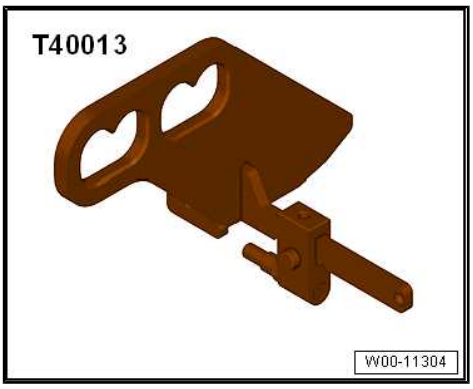
♦ Hooks - 10 - 222 A /2-



♦ Workshop hoist - VAS 6100-



♦ Lifting tackle - T40013-



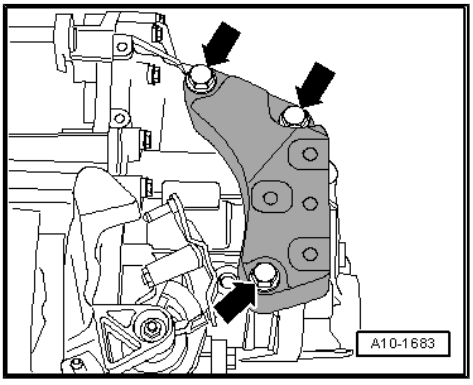
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Procedure

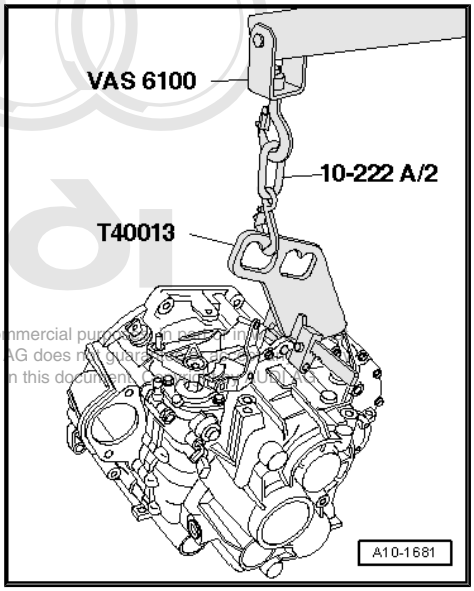
- Engine/gearbox assembly removed and attached to engine bracket - T10497- .

– Remove starter ⇒ Electrical system; Rep. gr. 27 ; Starter; Removing and installing starter .

– Unscrew bolts -arrows- and detach gearbox support.

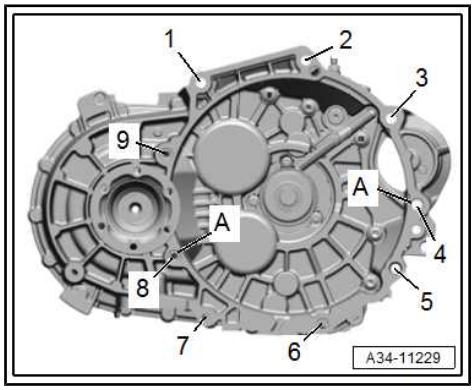


– Attach lifting tackle - T40013- to gearbox and close lock.
– Attach workshop hoist - VAS 6100- with hooks - 10 - 222 A / 2- to the lifting tackle.



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

– Remove bolts -1, 2, 5, 6, 7, 8, 9- securing gearbox to engine.



Note

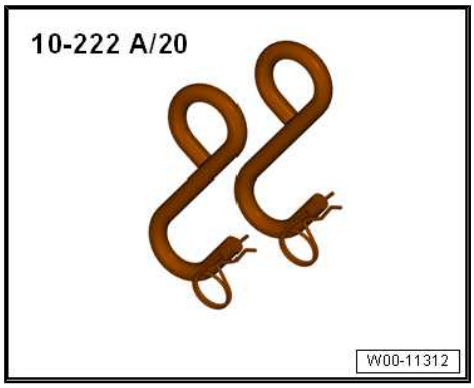
Disregard -items 3 and 4- and -A-.

– Detach gearbox from engine.

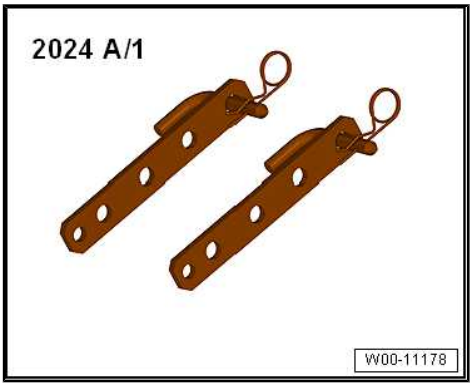
1.2.2 Separating engine and gearbox - vehicles with dual clutch gearbox

Special tools and workshop equipment required

♦ Adapter - 10 - 222 A /20-



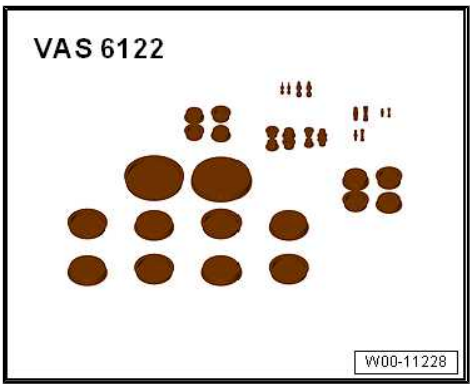
♦ Extension -2024 A /1- for lifting tackle - 2024 A-



♦ Workshop hoist - VAS 6100-



♦ Engine bung set - VAS 6122-



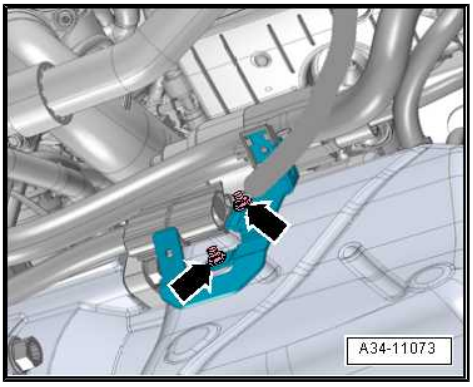
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Procedure

- Engine/gearbox assembly removed and attached to engine bracket - T10497- .

– Remove starter ⇒ Electrical system; Rep. gr. 27 ; Starter; Removing and installing starter .

– Remove nuts -arrows- and detach bracket at front of oil pan.



Note

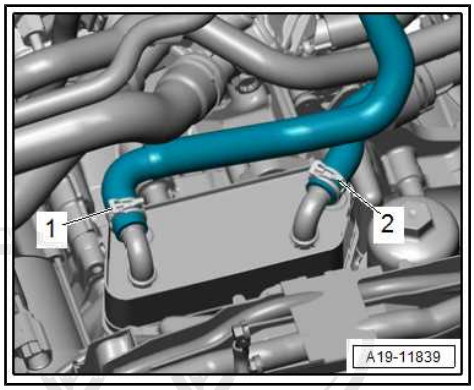
The studs are welded on to the front of the oil pan.

Note

Place a cloth underneath to catch escaping coolant.

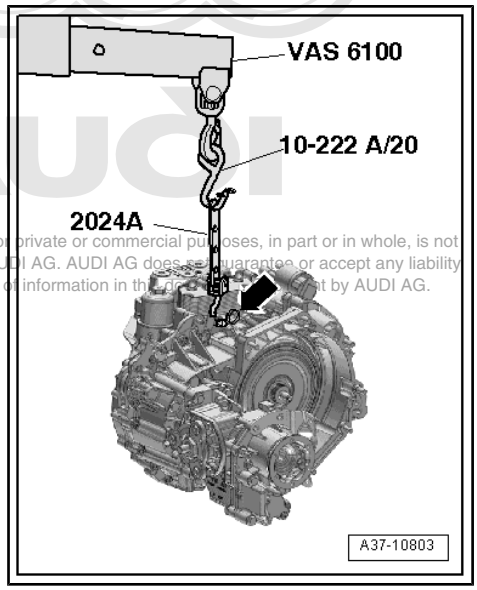
– Release hose clips -1, 2- and detach coolant hoses from gear oil cooler.

– Seal off open lines and connections with clean plugs from engine bung set - VAS 6122- .



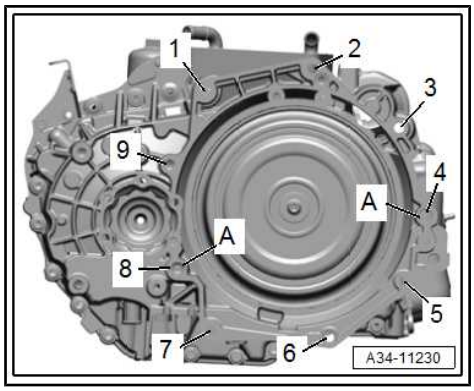
– Engage extension of lifting tackle - 2024 A- in gearbox lifting eye and secure with locking pin -arrow-.

– Engage workshop hoist - VAS 6100- with adapter - 10 - 222 A /20- in extension -2024 A /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 by AUDI AG.

– Remove bolts -1 ... 9- securing gearbox to engine.



Note

Disregard -item A-.

– Detach gearbox from engine.

1.3 Securing engine to engine and gearbox support

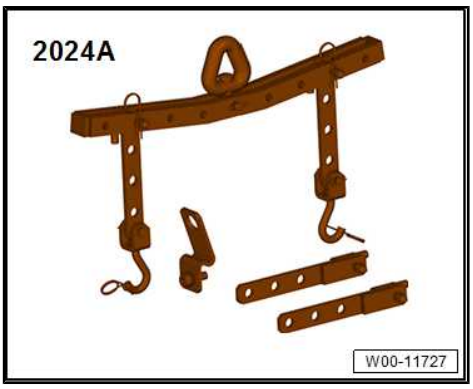
Special tools and workshop equipment required

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

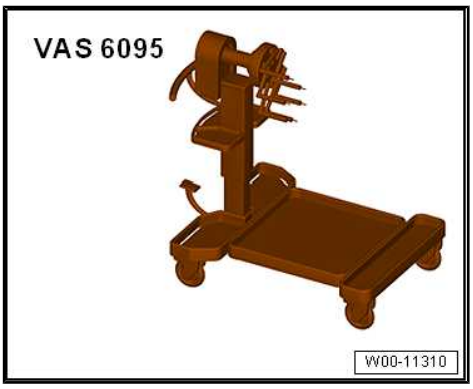
- Engine and gearbox support - VW 540-



- Lifting tackle - 2024 A-



- Engine and gearbox support - VAS 6095-



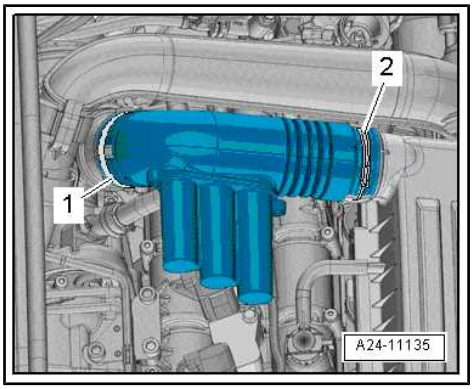
- Workshop hoist - VAS 6100-



Procedure

- Gearbox detached from engine
  ⇒ “1.2 Separating engine and gearbox”, page 22 .

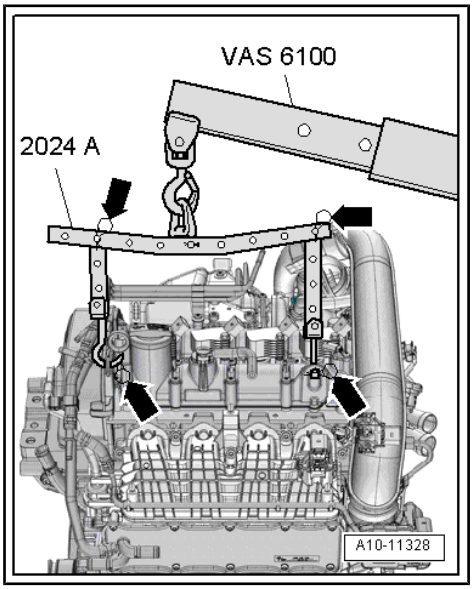
– Release hose clip -1- and detach air pipe.



Note

Disregard -item 2-.

– Attach lifting tackle - 2024 A- to engine and workshop hoist - VAS 6100- as shown in illustration.



Note

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

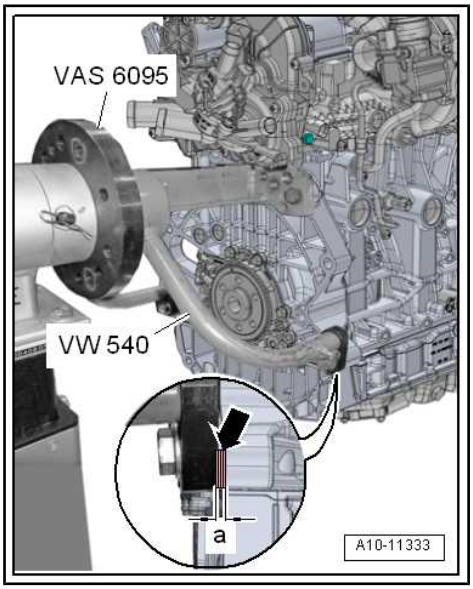
WARNING

Accident risk from loose components of lifting tackle.

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

– Lift engine off T10497 using workshop hoist - VAS 6100- .

– Secure engine to engine and gearbox support - VW 540- with engine and gearbox support - VAS 6095- , as shown in illustration.



– Fit spacers -arrows- between engine support and engine.

- Dimension -a- = 10 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.

1.4 Installing engine

Tightening torques

Note

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

Component		Nm
Bolts/nuts	M6	9
	M7	15
	M8	20
	M10	40
	M12	65

- Assembly mountings
  ⇒ “2.1 Exploded view - assembly mountings”, page 33
- Securing gearbox to engine ⇒ Rep. gr. 34 ; Removing and installing gearbox; Tightening torques for gearbox

Procedure

- Engine/gearbox assembly attached to engine bracket -T10497- .

Note

- *Renew bolts tightened with specified tightening angle.*
- *Renew self-locking nuts and bolts as well as seals, gaskets and O-rings.*
- *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.*

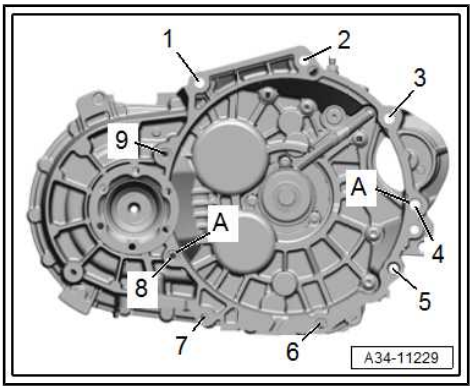
Reproduction or duplication of this Audi AG document or any part of it for commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Install intermediate plate
  ⇒ Fig. ““Installing intermediate plate”“ , page 59 .

Vehicles with manual gearbox:

– If not already fitted, install dowel sleeves -A- for centring engine and gearbox in cylinder block.

– Remove needle bearing in crankshaft if fitted
  ⇒ “3.2 Renewing needle bearing in crankshaft”, page 69 .



Vehicles with dual clutch gearbox:

– If not already fitted, install dowel sleeves -A- for centring engine and gearbox in cylinder block.

– Install needle bearing if not fitted in crankshaft
⇒ “3.2 Renewing needle bearing in crankshaft”, page 69 .

Continued for all vehicles:

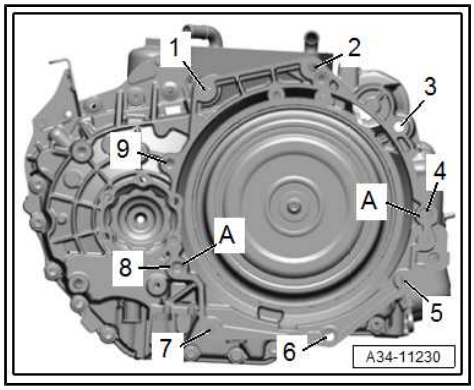
– Secure gearbox to engine.

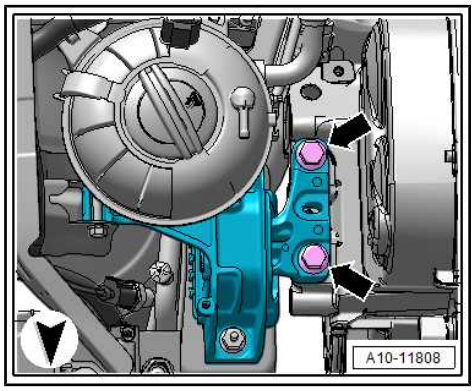
– Install gearbox support.

– Take up engine/gearbox assembly with engine bracket -T10497- .

– Guide engine/gearbox assembly into body.

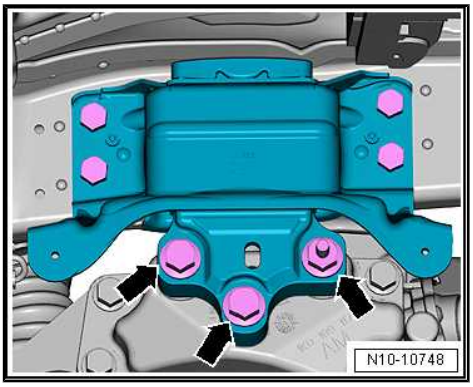
– Initially screw in bolts -arrows- for engine mounting by hand until they make contact.





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.

– Initially screw in bolts -arrows- for gearbox mounting by hand until they make contact.



Note

The bolts are tightened to final torque only after adjusting the assembly mountings
⇒ “2.7 Adjusting assembly mountings”, page 41 .

– Remove engine bracket - T10497- from engine.

– Install starter ⇒ Electrical system; Rep. gr. 27 ; Starter; Exploded view - starter .

– Install continued coolant circulation pump - V51-
⇒ page 241 .

– Install air pipe ⇒ Item 14 (page 285) .

– Install air ducts
⇒ “2.1 Exploded view - air cleaner housing”, page 297 .

– Install lines for clutch hydraulics ⇒ Rep. gr. 30 ; Clutch mechanism; Removing and installing lines for clutch hydraulics .

– Vehicles with manual gearbox: Install cables with cable support bracket ⇒ Rep. gr. 34 ; Selector mechanism; Exploded view - selector cables .

– Vehicles with dual clutch gearbox: Install selector lever cable with cable support bracket ⇒ Rep. gr. 34 ; Selector mechanism; Exploded view - selector cables .

– Install catalytic converter
⇒ “2.2 Removing and installing catalytic converter”, page 340 .

– Install drive shafts and heat shield ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Exploded view - drive shaft

– Install wishbone, swivel joint and coupling rod ⇒ Running gear, axles, steering; Rep. gr. 40 ; Lower wishbone, swivel joint; Exploded view - lower wishbone, swivel joint .

– Install alternator ⇒ Electrical system; Rep. gr. 27 ; Alternator; Exploded view - alternator .

– Install air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Exploded view - air conditioner compressor drive unit .

– Install poly V-belt
⇒ “1.3 Removing and installing poly V-belt”, page 48 .

– Electrical connections and routing ⇒ Electrical system; Rep. gr. 97 ; Relay carriers, fuse carriers, electronics boxes; Overview of fitting locations - relay carriers, fuse carriers, electronics boxes and ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

– Install throttle valve module - J338-
⇒ “3.3 Removing and installing throttle valve module J338 ”, page 308 .

– Install engine control unit - J623-
⇒ “8.2 Removing and installing engine control unit J623 ”, page 332 .

– Connect coolant hoses with plug-in connector
⇒ Fig. ““Connecting coolant hose with plug-in connector”“ , page 263 .

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 pendulum support
⇒ Fig. ““Installing pendulum support”“ , page 34 .

– Install wheel spoilers (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .

– Fit front wheels ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres .

– Adjust assembly mountings
⇒ “2.7 Adjusting assembly mountings”, page 41 .

– Install battery tray ⇒ Electrical system; Rep. gr. 27 ; Battery; Exploded view - battery .

– Install air cleaner housing
⇒ “2.1 Exploded view - air cleaner housing”, page 297 .

– If originally fitted, secure bracket with fuel quality sender - G446- ⇒ Fuel supply system; Rep. gr. 20 ; Senders and sensors .

– Check oil level ⇒ Maintenance ; Booklet 820 .

Caution

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

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

– Fill up with coolant ⇒ page 232 .

• Connect ⇒ Vehicle diagnostic tester.

- Erase entries in event memory, `Guided Functions`, `Interrogate event memory`.

• After renewing engine:

- Reset misfire adaption by selecting `01 - Reset adaptions misfires` in `Guided Functions`.

- Delete adaption values for injectors using ⇒ Vehicle diagnostic tester: select `Delete adaption values for injectors` in `Guided Functions`.

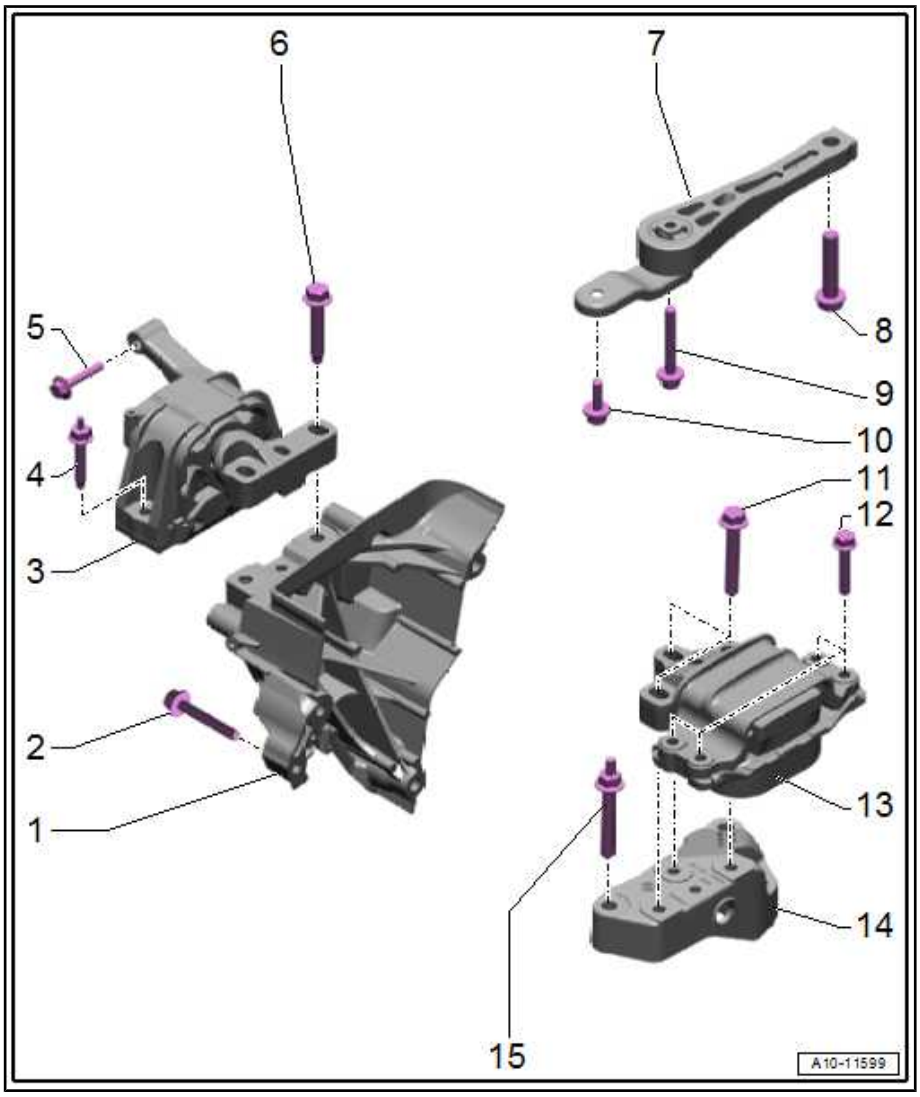
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

2 Assembly mountings

⇒ “2.1 Exploded view - assembly mountings”, page 33
⇒ “2.2 Supporting engine in installation position”, page 34
⇒ “2.3 Removing and installing engine mountings”, page 36
⇒ “2.4 Removing and installing gearbox mounting”, page 37
⇒ “2.5 Removing and installing pendulum support”, page 39
⇒ “2.6 Checking adjustment of assembly mountings (engine/gearbox mountings)”, page 40
⇒ “2.7 Adjusting assembly mountings”, page 41

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.

2.1 Exploded view - assembly mountings



1 - Engine support
- ❑ Removing and installing ⇒ “1.5 Removing and installing engine support”, page 49
- ❑ Tightening torque and sequence ⇒ Fig. ““Engine support - tightening torque and sequence”“ , page 34

2 - Bolt
- ❑ Renew after removing
- ❑ Tightening sequence ⇒ Fig. ““Engine support - tightening torque and sequence”“ , page 34

3 - Engine mounting
- ❑ With support arm
- ❑ Removing and installing ⇒ “2.3 Removing and installing engine mountings”, page 36

4 - Bolt
- ❑ Renew after removing
- ❑ 40 Nm +90°

5 - Bolt
- ❑ Renew after removing
- ❑ 20 Nm +90°

6 - Bolt
- ❑ Renew after removing
- ❑ 60 Nm +90°

7 - Pendulum support
- ❑ Removing and installing ⇒ “2.5 Removing and installing pendulum support”, page 39

8 - Bolt
- ❑ Renew after removing
- ❑ Tightening torque and sequence ⇒ Fig. ““Installing pendulum support”“ , page 34

9 - Bolt
- ❑ Renew after removing

- ❑ Tightening torque and sequence ⇒ Fig. ""Installing pendulum support"" , page 34

10 - Bolt

- ❑ Renew
- ❑ Tightening torque and sequence ⇒ Fig. ""Installing pendulum support"" , page 34

11 - Bolt

- ❑ Tightening torque ⇒ Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings

12 - Bolt

- ❑ Tightening torque ⇒ Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings

13 - Gearbox mounting

- ❑ With support arm
- ❑ Removing and installing ⇒ "2.4 Removing and installing gearbox mounting", page 37

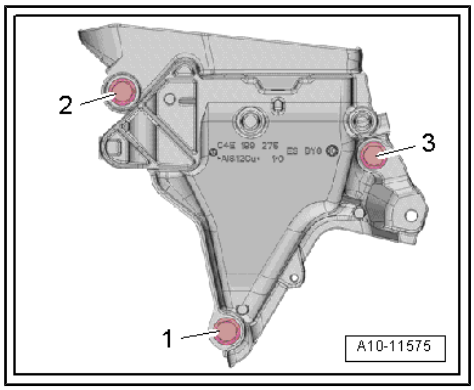
14 - Gearbox support

- ❑ Different versions available; for allocation refer to ⇒ Electronic parts catalogue

15 - Bolt

- ❑ Tightening torque ⇒ Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings

Engine support - tightening torque and sequence



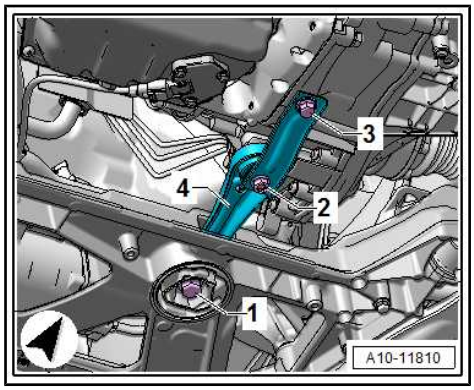
Note

Renew bolts tightened with specified tightening angle.

– Tighten bolts in stages in the sequence shown:

Stage	Bolts	Tightening torque/angle specification
1.	-1 … 3-	7 Nm
2.	-1 … 3-	40 Nm
3.	-1 … 3-	Turn 90° further

Installing pendulum support



- Renew bolts tightened with specified tightening angle.

– Tighten bolts in stages in the sequence shown:

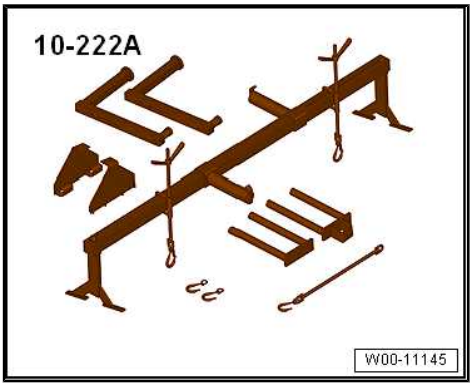
Stage	Bolts	Tightening torque/angle specification
1.	-2, 3-	50 Nm
2.	-1-	130 Nm
3.	-1 … 3-	Turn 90° further

2.2 Supporting engine in installation position

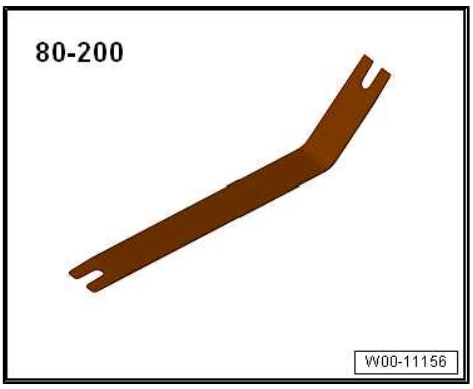
Special tools and workshop equipment required

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

♦ Support bracket - 10 - 222 A-



♦ Removal lever - 80 - 200-

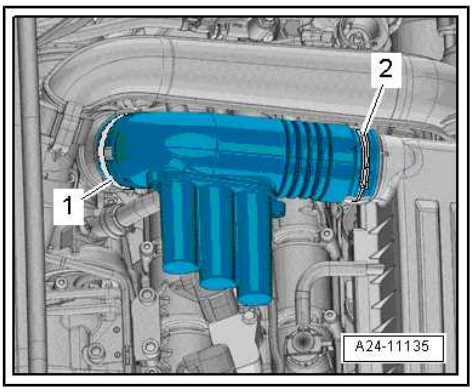


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Procedure

– Remove air cleaner housing
⇒ “2.2 Removing and installing air cleaner housing”, page 298 .

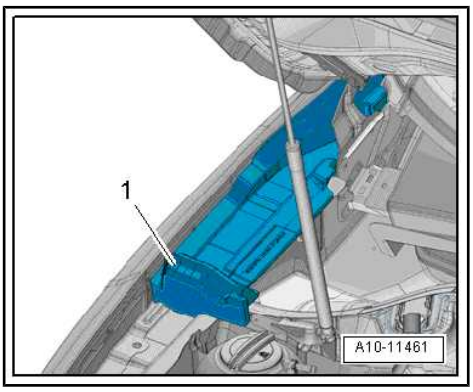
– Release hose clip -1- and detach air pipe.



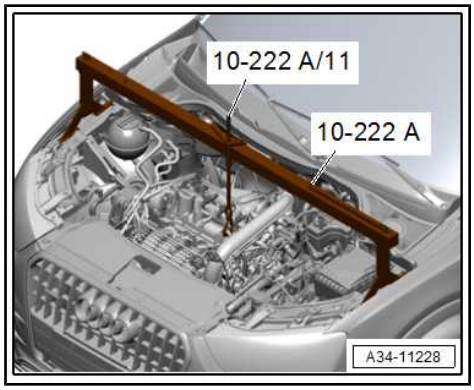
Note

Disregard -item 2-.

– Unclip sealing element -1- (left and right) using removal lever - 80 - 200- .



– Position support bracket - 10 - 222 A- with spindle - 10 - 222 A /11- on longitudinal member for wheel housing (top) as shown in illustration.



– Attach hook of spindle - 10 - 222 A /11- to engine lifting eye (left-side).
– Tighten spindle - 10 - 222 A /11- slightly to take up weight of engine/gearbox assembly; do not lift.

Assembling

Assemble in reverse order.

Tightening torques

♦ ⇒ “2.1 Exploded view - air cleaner housing”, page 297

2.3 Removing and installing engine mountings

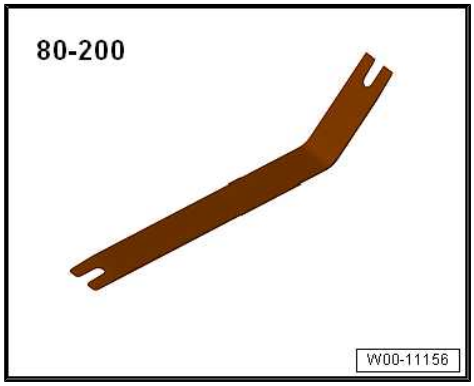
Special tools and workshop equipment required

♦ Support bracket - 10 - 222 A-



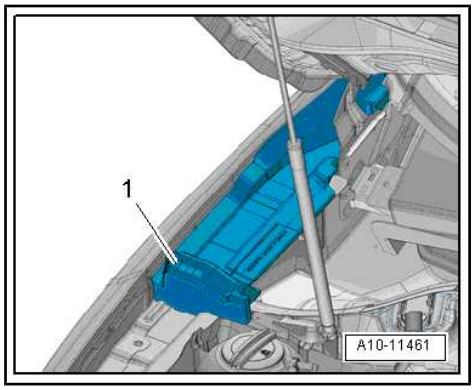
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

♦ Removal lever - 80 - 200-



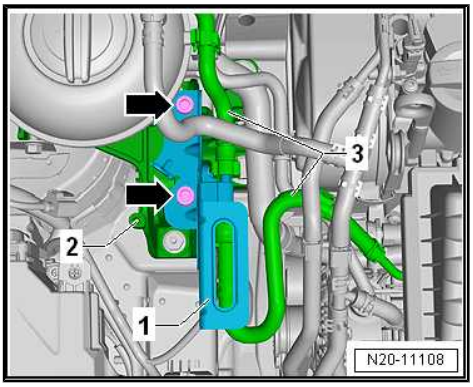
Removing

– Remove engine cover panel ⇒ page 44 .
– Unclip sealing element -1- (left and right) using removal lever - 80 - 200- .



– If fitted, unscrew bolts -arrows- securing bracket for fuel quality sender - G446- .

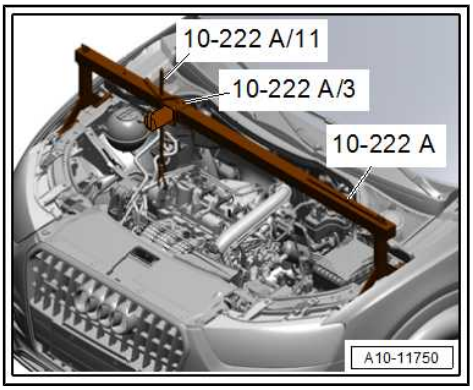
– Place bracket -1- with fuel quality sender - G446- to one side (pipes/hoses -3- remain connected).



– Position support bracket - 10 - 222 A- with spindle - 10 - 222 A /11- on longitudinal member for wheel housing (top) as shown in illustration.

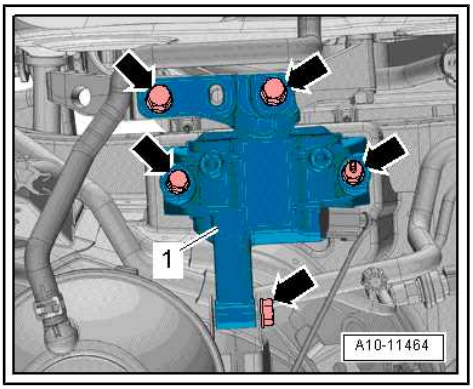
– Attach hook of spindle - 10 - 222 A /11- to engine lifting eye (right-side).

– Tighten spindle - 10 - 222 A /11- slightly to take up weight of engine/gearbox assembly; do not lift.



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

– Remove bolts -arrows- and detach engine mounting -1-.



Installing

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

– Check adjustment of assembly mountings (engine/gearbox mountings)
⇒ “2.6 Checking adjustment of assembly mountings (engine/gearbox mountings)”, page 40 .

– Install engine cover panel
⇒ “3.1 Removing and installing engine cover panel”, page 44 .

Tightening torques

♦ ⇒ “2.1 Exploded view - assembly mountings”, page 33

♦ If originally fitted, secure bracket with fuel quality sender - G446- ⇒ Fuel supply system; Rep. gr. 20 ; Senders and sensors .

2.4 Removing and installing gearbox mounting

Removing

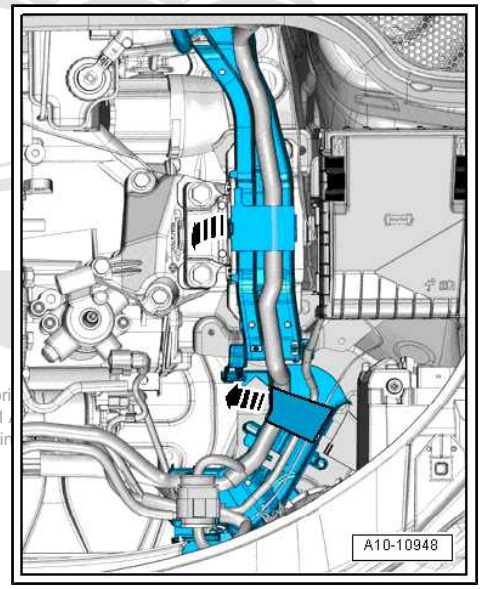
– Support engine in installation position
⇒ “2.2 Supporting engine in installation position”, page 34 .

– Remove battery and battery tray ⇒ Electrical system; Rep. gr. 27 ; Battery; Removing and installing battery tray .

– Open retainers for wiring duct -arrows- and press electrical wiring to one side.
– Unclip wiring duct.

Note

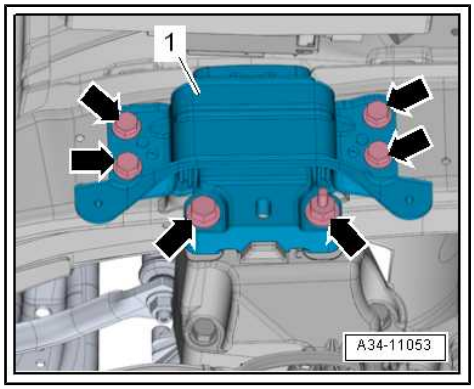
- Mark installation position of gearbox mounting if it is going to be reinstalled.



Protected by copyright. Copying for pri
permitted unless authorised by AUDI
with respect to the correctness of in

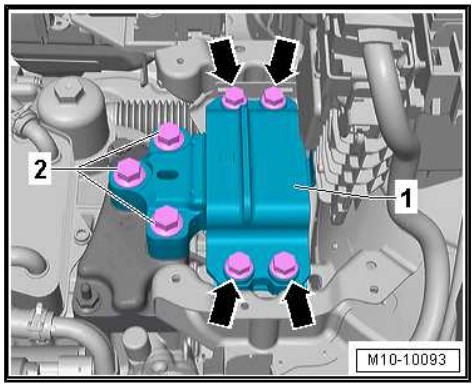
Vehicles with 2 bolted connections for gearbox

– Remove bolts -arrows- and detach gearbox mounting -1-.



Vehicles with 3 bolted connections for gearbox

– Remove bolts -2 and arrows- and detach gearbox mounting -1-.



Installing

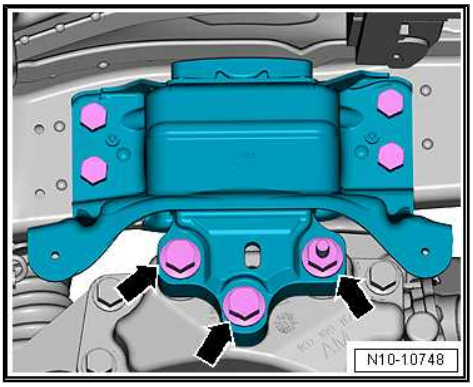
Installation is carried out in the reverse order; note the following:

Note

Renew the bolts tightened with specified tightening angle.

– Tighten gearbox mounting on longitudinal member.
– When reinstalling gearbox mounting, position it according to marking made previously and secure.

Illustration shows a gearbox mounting with three bolted connections as an example.



Caution

Bolts must be fitted straight to avoid damage to threads in gearbox bracket.

- *Gearbox bracket and support arm of gearbox mounting must be perfectly parallel to each other before screwing in bolts -arrows-. If necessary, lift gearbox at rear using trolley jack or engine and gearbox jack - V.A.G 1383 A- .*
- *Only remove support bracket - 10 - 222 A- when bolts on assembly mounting -arrows- have been tightened to specified torque.*

– Lift gearbox with spindle of support bracket until gearbox bracket makes contact with support arm of gearbox mounting.

– Detach support bracket - 10 - 222 A- from engine.

Tightening torques

- ⇒ Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings
- Battery tray and battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Exploded view - battery

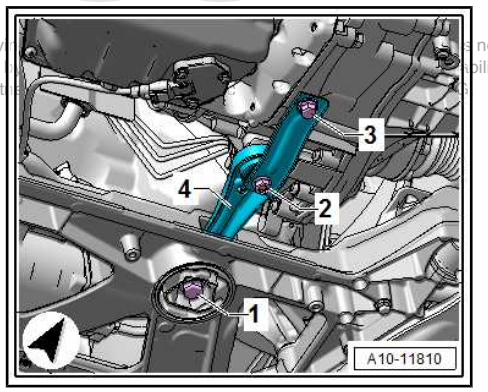
2.5 Removing and installing pendulum support

Removing

– Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

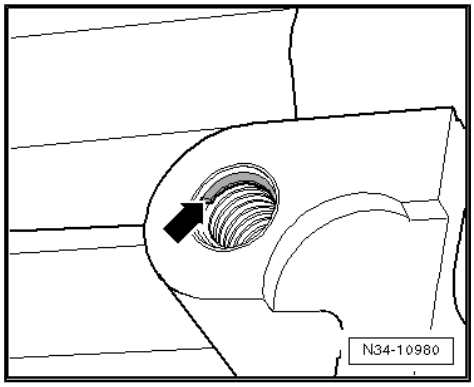
– Remove bolts -1, 2, 3- and detach pendulum support.

Protected by copyright. Copy... not permitted unless authorised ... bility with respect to the correct...



Installing

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



Note

- *Bolt holes for pendulum support are fitted with thread inserts (e.g. “Heli-Coil”).*
- *Identification: Shoulder on first thread -arrow-.*

Tightening torques

- ⇒ Fig. ““Installing pendulum support”“ , page 34
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

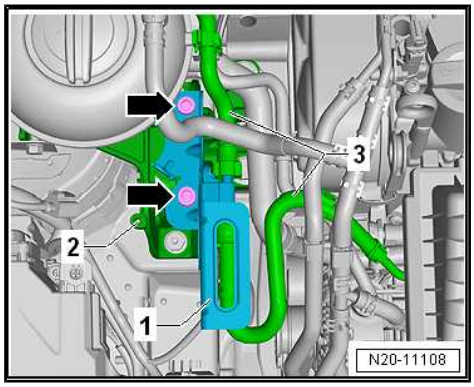
2.6 Checking adjustment of assembly mountings (engine/gearbox mountings)

Procedure

– Remove battery and battery tray ⇒ Electrical system; Rep. gr. 27 ; Battery; Removing and installing battery tray .

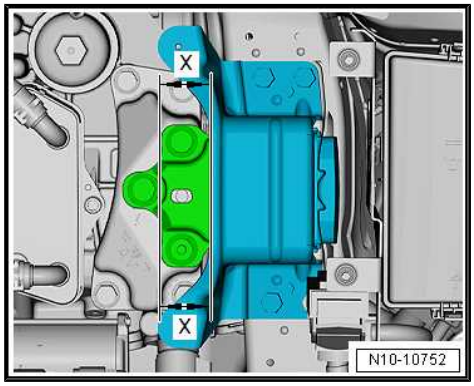
– If fitted, unscrew bolts -arrows- securing bracket for fuel quality sender - G446- .

– Place bracket -1- with fuel quality sender - G446- to one side (pipes/hoses -3- remain connected).



Vehicles with 3 bolted connections for gearbox

– Ensure that edges of support arm (on gearbox side) and gearbox mounting are parallel.



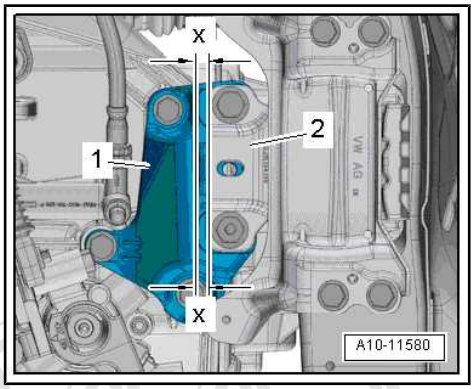
- Dimension -x- = dimension -x-.

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.

Vehicles with 2 bolted connections for gearbox

– Ensure that the edges of the support arm -2- (on the gearbox assembly mounting) and gearbox support -1- are parallel.

• Dimension -x- = dimension -x-.

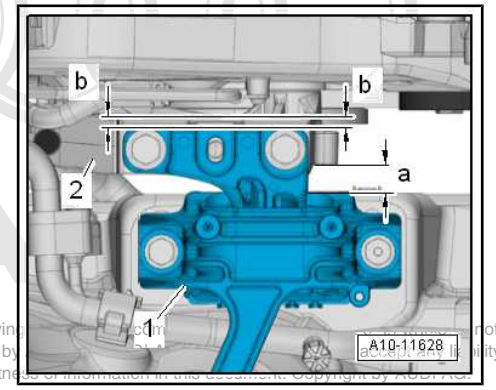


The following specifications must be obtained:

• There must be a distance of -a- = 10 mm between engine support -2- and engine mounting -1-.

• Side surface of engine support casting should be located parallel to support arm of engine mounting -1-.

• Distance -b- = distance -b-.



Note

Distance -a- = 10 mm can also be checked with a metal rod of suitable size, or similar.

Protected by copyright. Copying ... not authorised by ... accuracy and ... with respect to the correctness of information in this document. Copyright by AUDI AG.

– If the distance measured is too large or small, the assembly mountings must be adjusted
⇒ “2.7 Adjusting assembly mountings”, page 41 .

– If originally fitted, secure bracket with fuel quality sender - G446- ⇒ Fuel supply system; Rep. gr. 20 ; Senders and sensors .

2.7 Adjusting assembly mountings

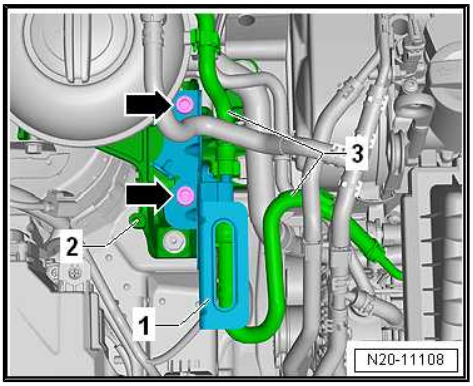
Procedure

– Support engine in installation position
⇒ “2.2 Supporting engine in installation position”, page 34 .

– Remove battery and battery tray ⇒ Electrical system; Rep. gr. 27 ; Battery; Removing and installing battery tray .

– If fitted, unscrew bolts -arrows- securing bracket for fuel quality sender - G446- .

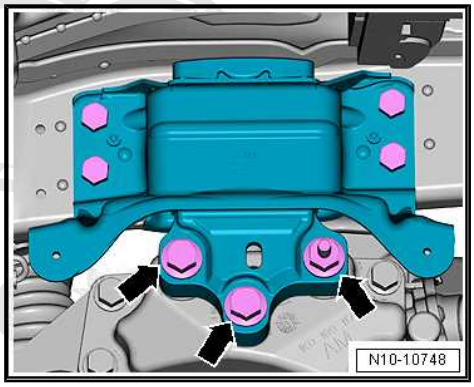
– Place bracket -1- with fuel quality sender - G446- to one side (pipes/hoses -3- remain connected).



Vehicles with 3 bolted connections for gearbox

– Remove bolts -arrows- securing gearbox mounting.

– Renew all three bolts one by one and screw in by hand until they make contact.

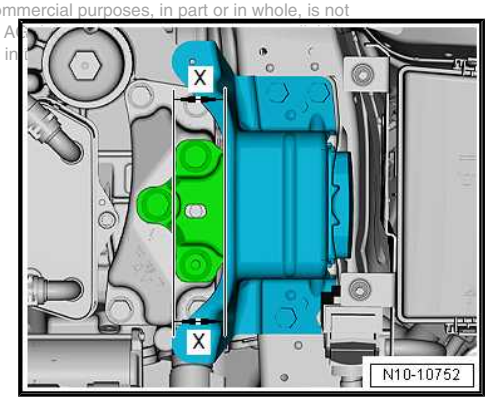


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not
with respect to the correctness of information in

– Ensure that edges of support arm (on gearbox side) and gearbox mounting are parallel.

• Dimension -x- = dimension -x-.

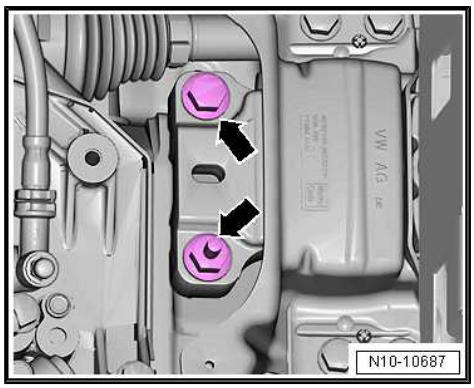
– Tighten bolts for gearbox mounting.



Vehicles with 2 bolted connections for gearbox

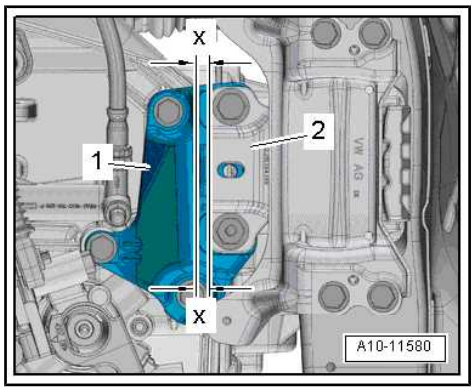
– Remove bolts -arrows- securing gearbox mounting.

– Renew both bolts one by one and screw in by hand until they make contact.

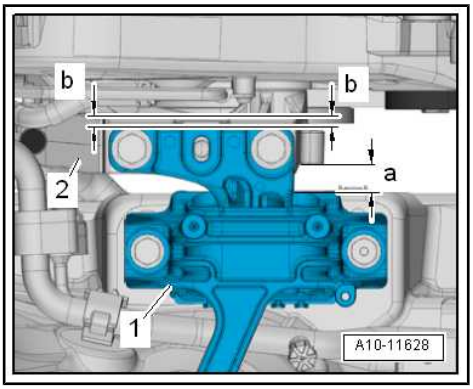


– Ensure that edges of support arm (on gearbox side) -2- and gearbox mounting -1- are parallel.

– Tighten bolts for gearbox mounting.



All vehicles (continued)



– Using assembly lever, adjust engine/gearbox assembly until specifications listed below are attained:

- There must be a distance of -a- = 10 mm between engine support -2- and engine mounting -1-.
- Side surface of engine support casting should be located parallel to support arm of engine mounting -1-.
- Distance -b- = distance -b-.

Note

Distance -a- = 10 mm can also be checked with a metal rod of suitable size, or similar.

Assemble in reverse order.

Tightening torques

- ⇒ “2.1 Exploded view - assembly mountings”, page 33
- Install battery tray and battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Exploded view - battery .
- ⇒ Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings
- If originally fitted, secure bracket with fuel quality sender - G446- ⇒ Fuel supply system; Rep. gr. 20 ; Senders and sensors .

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.

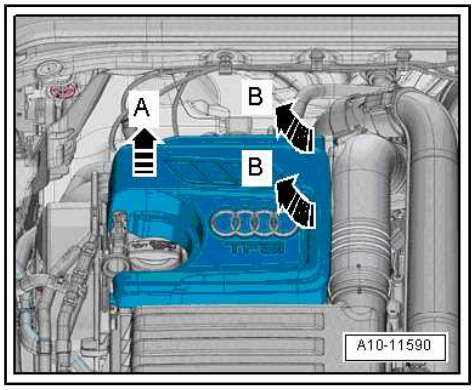
3 Engine cover panel

⇒ “3.1 Removing and installing engine cover panel”, page 44

3.1 Removing and installing engine cover panel

Removing

– Lift right side of engine cover panel -arrow A- and detach towards right -arrows B-.



Installing

– To avoid damage, do not strike the engine cover panel with your fist or with any kind of tool.

– Position engine cover panel, paying attention to oil filler neck and dipstick.

– Press engine cover panel into rubber grommets first on the left side and then at front.

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

13 – Crankshaft group

1 Cylinder block (pulley end)

⇒ “1.1 Exploded view - poly V-belt drive”, page 45

⇒ “1.2 Exploded view - sealing flange (pulley end)”, page 47

⇒ “1.3 Removing and installing poly V-belt”, page 48

⇒ “1.4 Removing and installing tensioner for poly V-belt”, page 49

⇒ “1.5 Removing and installing engine support”, page 49

⇒ “1.6 Removing and installing pulley”, page 52

⇒ “1.7 Renewing crankshaft oil seal (pulley end)”, page 53

1.1 Exploded view - poly V-belt drive

1 - Poly V-belt

- ❑ Check for wear
- ❑ Before removing, mark direction of rotation with chalk or felt-tip pen
- ❑ Do not kink
- ❑ Routing of poly V-belt ⇒ page 49
- ❑ Removing and installing ⇒ “1.3 Removing and installing poly V-belt”, page 48
- ❑ Assigning to decoupler pulley ⇒ Fig. ““Different versions of decoupler pulley”“ , page 46
- ❑ When installing, make sure it is properly seated on pulleys.

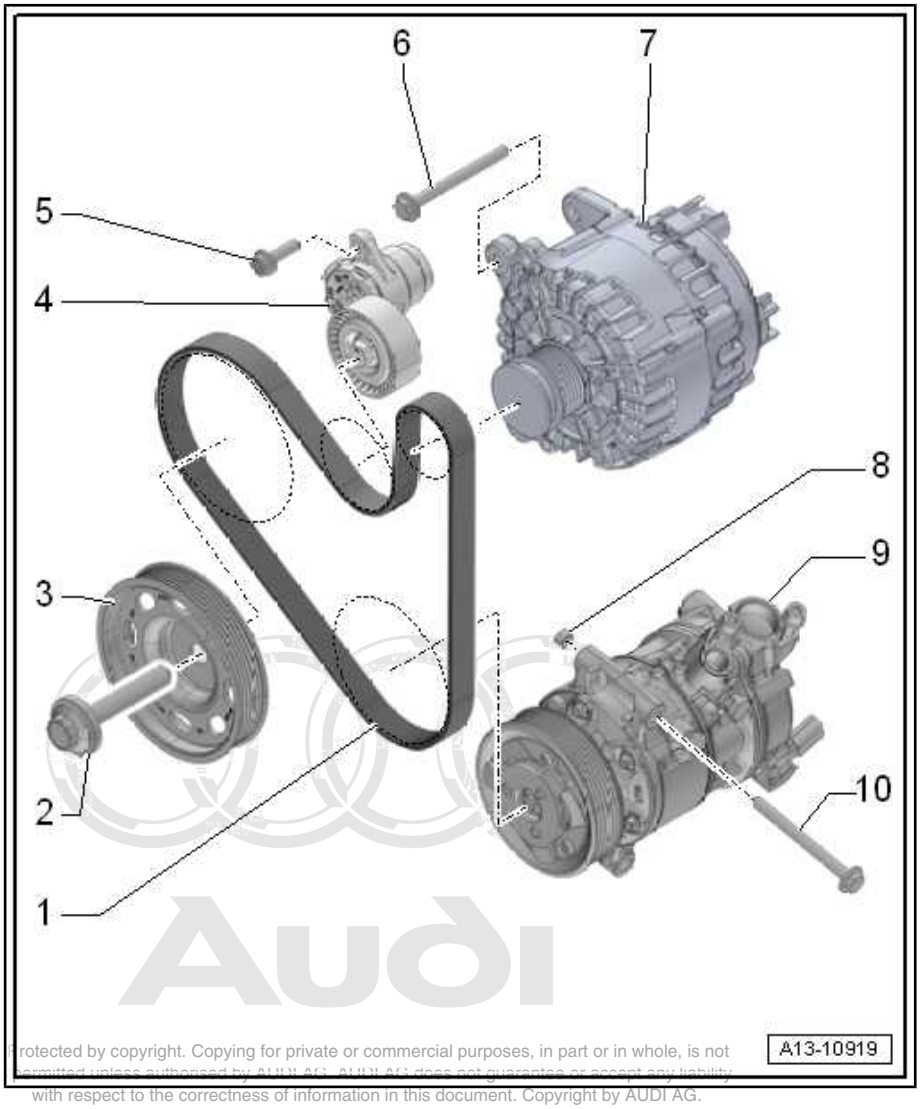
2 - Bolt

> **Caution**
>
> ***Risk of irreparable damage to engine.***
> ***To avoid disturbing valve timing, do not turn crankshaft when bolt is removed.***

- ❑ Tightening torque ⇒ Item 1 (page 47)

3 - Belt pulley/vibration damper

- ❑ Allocation ⇒ Electronic parts catalogue
- ❑ Removing and installing ⇒ “1.6 Removing and installing pulley”, page 52



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 irreparable damage to engine.
To avoid disturbing valve timing, do not turn crankshaft when pulley/vibration damper is removed.

4 - Tensioner for poly V-belt

- ❑ Pivot with socket to slacken poly V-belt
- ❑ Lock in position with locking pin - T10060 A- .
- ❑ Removing and installing ⇒ “1.4 Removing and installing tensioner for poly V-belt”, page 49

5 - Bolt

- ❑ 23 Nm

6 - Bolt

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

7 - Alternator

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

8 - Dowel sleeve

- ❑ For air conditioner compressor

9 - Air conditioner compressor

- ❑ Do not unscrew or disconnect refrigerant hoses or pipes
- ❑ Exploded view ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Exploded view - air conditioner compressor drive unit

10 - Bolt

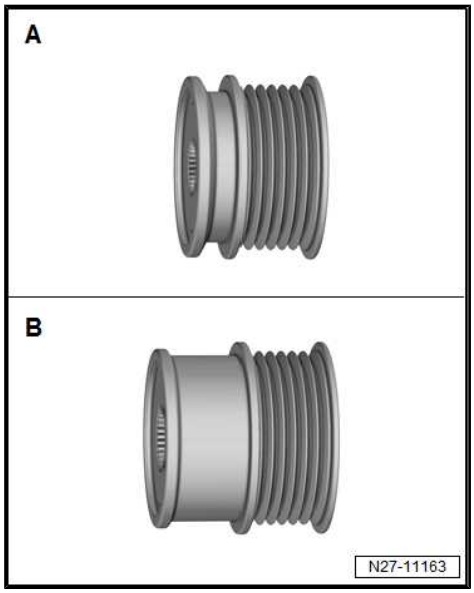
- ❑ Tightening torque ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Exploded view - air conditioner compressor drive unit

Different versions of decoupler pulley

Note

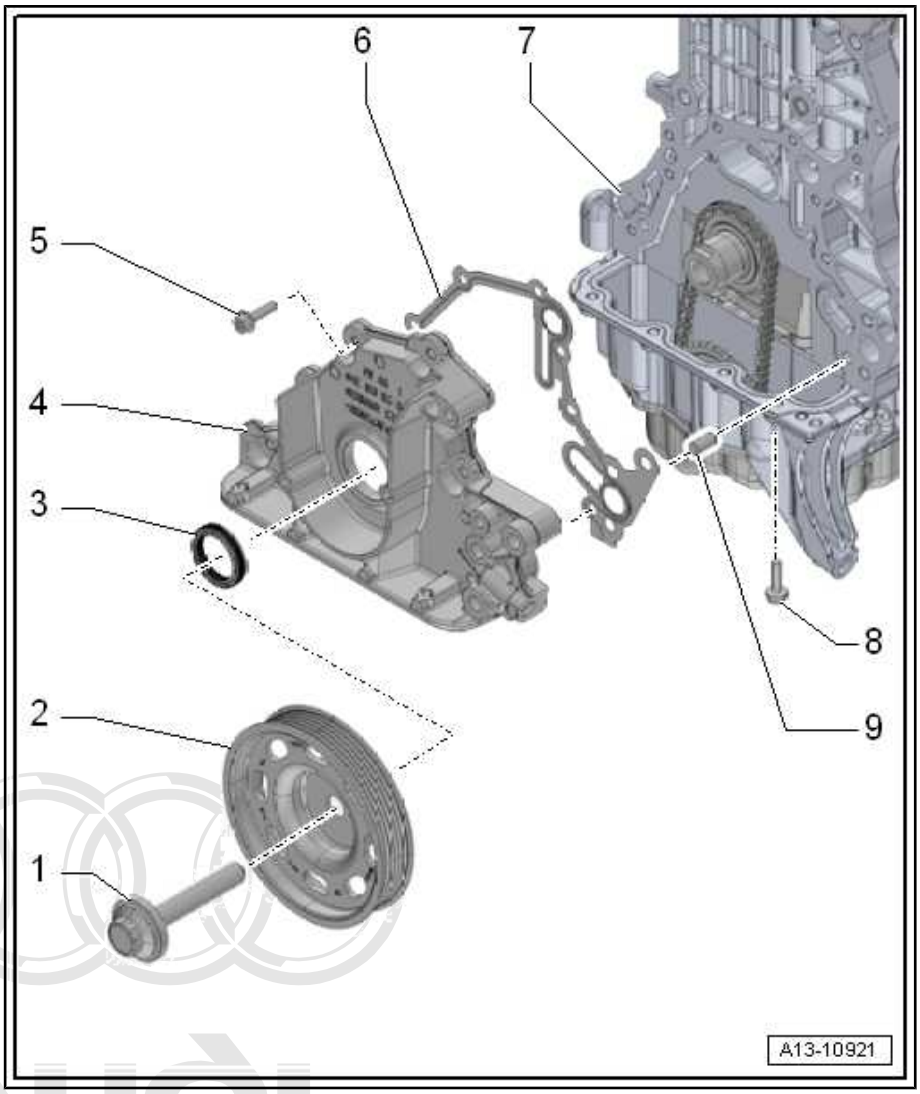
Poly V-belts of different lengths are assigned to decoupler pulleys -A, B-.

– Allocate poly V-belt ⇒ Electronic parts catalogue .



The reproduction, distribution and utilization of this document 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 with respect to the correctness of information in this document. Copyright by AUDI AG.

1.2 Exploded view - sealing flange (pulley end)



1 - Bolt

- ❑ Renew after removing
- ❑ Use counterhold tool - T10475- when loosening and tightening

> **Caution**
> *Risk of irreparable damage to engine.*
> *To avoid disturbing valve timing, do not turn crankshaft when bolt is removed.*

- ❑ 150 Nm +180°

2 - Belt pulley/vibration damper

- ❑ Allocation ⇒ Electronic parts catalogue
- ❑ Removing and installing ⇒ “1.6 Removing and installing pulley”, page 52

> **Caution**
> *Risk of irreparable damage to engine.*
> *To avoid disturbing valve timing, do not turn crankshaft when pulley/vibration damper is removed.*

3 - Oil seal

- ❑ For crankshaft (pulley end)
- ❑ Renewing ⇒ “1.7 Renewing crankshaft oil seal (pulley end)”, page 53
- ❑ Do not lubricate with oil

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.

4 - Sealing flange (pulley end)

- ❑ Should be positioned on dowel pins
- ❑ Removing and installing ⇒ “1.8 Removing and installing sealing flange (pulley end)”, page 56

5 - Bolt

- ❑ Different thread diameters ⇒ Electronic parts catalogue
- ❑ Renew after removing
- ❑ Tightening torque and sequence ⇒ Fig. ““Sealing flange (pulley end) - tightening torque and sequence”“ , page 48

6 - Seal

- ❑ Renew after removing

7 - Cylinder block

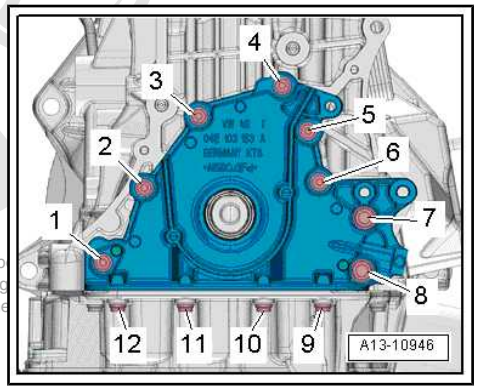
8 - Bolt

- ❑ Renew after removing
- ❑ Tightening torque and sequence ⇒ Fig. ““Sealing flange (pulley end) - tightening torque and sequence”“ , page 48

9 - Dowel pin

- ❑ 2x

Sealing flange (pulley end) - tightening torque and sequence



Note

Renew bolts tightened with specified tightening angle.

– Tighten bolts in stages:

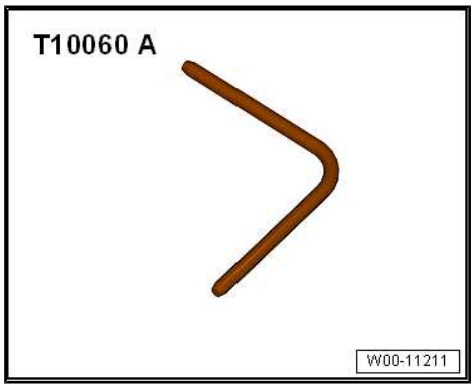
Stage	Bolts	Tightening torque/angle specification
1.	-1 … 12-	Screw in by hand until contact is made
2.	-1 … 12-	8 Nm in diagonal sequence
3.	-7, 8-	20 Nm
4.	-1 … 12-	Turn 90° further in diagonal sequence

Protected by copyright. Copying for private or commercial purp
with respect to the correctness of information in this docume

1.3 Removing and installing poly V-belt

Special tools and workshop equipment required

- ♦ Locking pin - T10060 A-

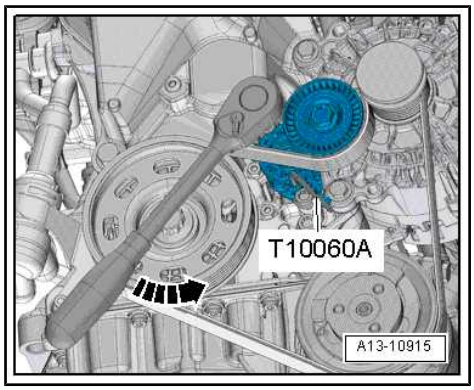


Removing

Caution

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

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



– To slacken poly V-belt, turn tensioner in anti-clockwise direction -arrow-.

– Lock tensioner with locking pin - T10060 A- .

– Take off poly V-belt.

Installing

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

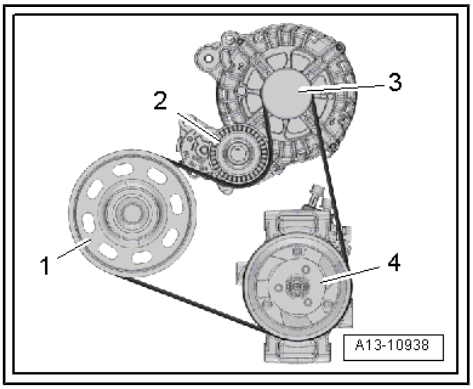
– Fit poly V-belt as shown in illustration:

1 - Pulley

2 - Tensioner for poly V-belt

3 - Alternator

4 - Air conditioner compressor



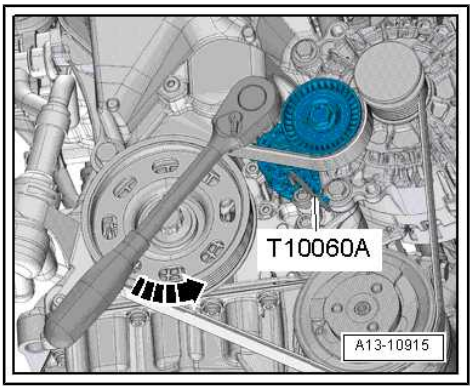
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Turn tensioner anti-clockwise -arrow- and remove locking pin - T10060 A- .

– Release tensioner.

– Check that poly V-belt is properly seated.

– Start engine and check that poly V-belt runs properly.

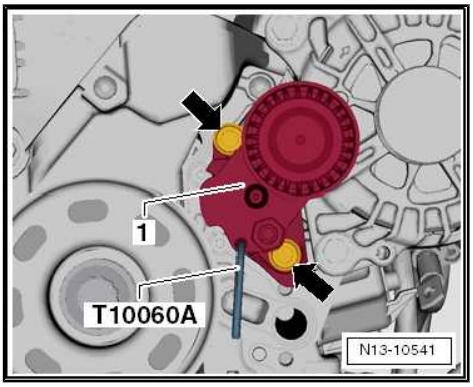


1.4 Removing and installing tensioner for poly V-belt

Removing

– Detach poly V-belt from tensioner
⇒ “1.3 Removing and installing poly V-belt”, page 48 .

– Remove bolts -arrows- and detach poly V-belt tensioner -1-.



Installing

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

– Install poly V-belt
⇒ “1.3 Removing and installing poly V-belt”, page 48 .

Tightening torques

♦ ⇒ “1.1 Exploded view - poly V-belt drive”, page 45

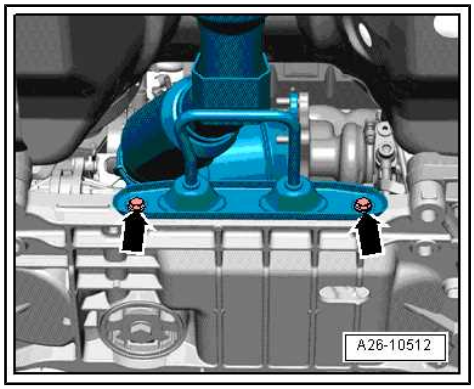
1.5 Removing and installing engine support

Removing

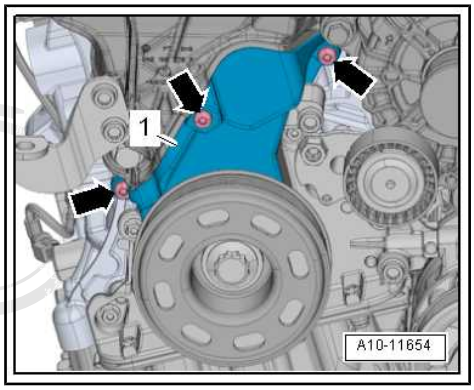
– Remove tensioner for poly V-belt
⇒ “1.4 Removing and installing tensioner for poly V-belt”, page 49 .

– Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

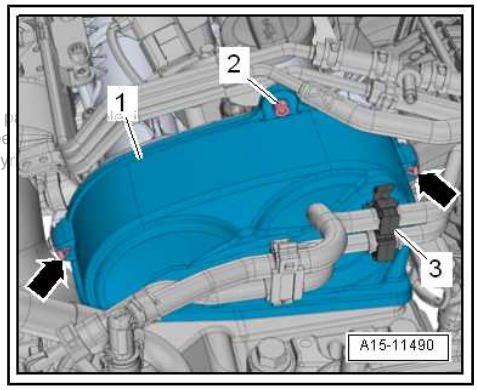
– Remove bolts -arrows-.



– Remove bolts -arrows- for toothed belt cover (bottom section).



– Move clear hoses at bracket -3-.
– Unscrew bolt -2-.
– Release clips -arrows- and detach toothed belt cover (top) -1-.

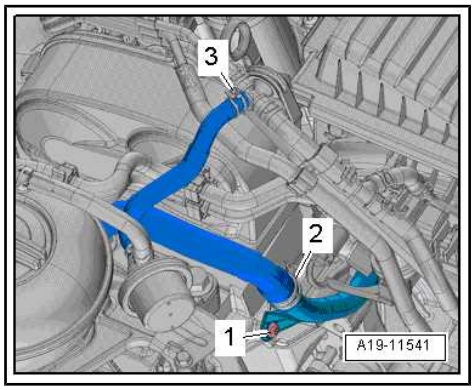


Protected by copyright. Copying for private or commercial purposes, in p
permitted unless authorised by AUDI AG. AUDI AG does not guarantee
with respect to the correctness of information in this document. Copy

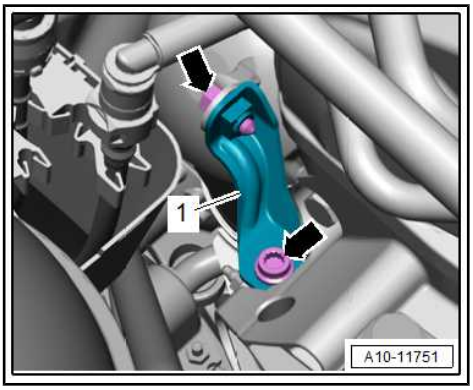
– Unscrew bolt -1-.

Note

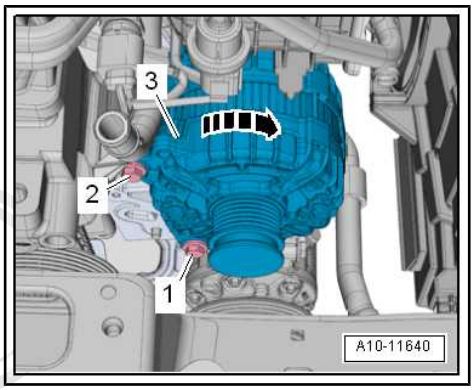
Disregard items -2 and 3-.



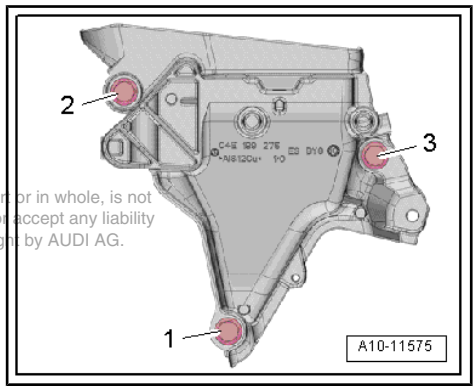
– Unscrew bolts -arrows- and detach bracket -1-.



– Loosen bolt -1- but do not remove.
– Unscrew bolt -2-.
– Swivel alternator -3- towards front.
– Remove engine mounting
⇒ “2.3 Removing and installing engine mountings”, page 36 .



– Remove bolts -1, 2, 3-.

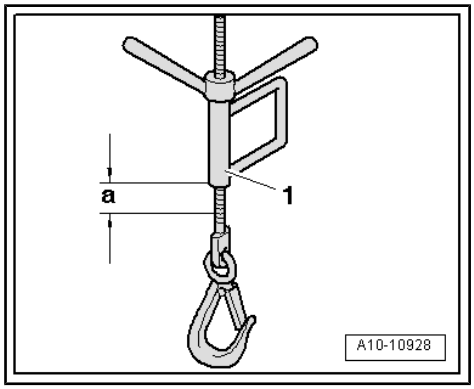


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Using spindle - 10 - 222 A /11- -item 1-, raise engine through distance -a-.

• Distance -a- is approx. 30 mm.

– Lift off engine support.



Installing

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

– Install engine mountings
⇒ “2.3 Removing and installing engine mountings”, page 36 .

– Check adjustment of assembly mountings (engine/gearbox mountings)
⇒ “2.6 Checking adjustment of assembly mountings (engine/gearbox mountings)”, page 40 .

Tightening torques

- ⇒ “2.1 Exploded view - assembly mountings”, page 33
- ⇒ “1.1 Exploded view - poly V-belt drive”, page 45
- ⇒ “1.1 Exploded view - toothed belt cover”, page 79
- ⇒ “2.1 Exploded view - emission control system”, page 339
- ⇒ Electrical system; Rep. gr. 27 ; Alternator; Exploded view - alternator
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation
- If originally fitted, secure bracket with fuel quality sender - G446- ⇒ Fuel supply system; Rep. gr. 20 ; Senders and sensors .

1.6 Removing and installing pulley

Special tools and workshop equipment required

- Counterhold tool - T10475-



Removing

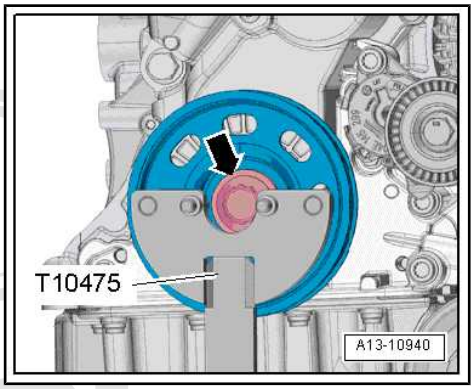
– Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

– Remove poly V-belt
⇒ “1.3 Removing and installing poly V-belt”, page 48 .

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 bolt -arrow- using counterhold tool - T10475- .

– Remove bolt and take off pulley/vibration damper.



Caution

Risk of irreparable damage to engine.

- ***To avoid disturbing valve timing, do not turn crankshaft when pulley/vibration damper is removed.***

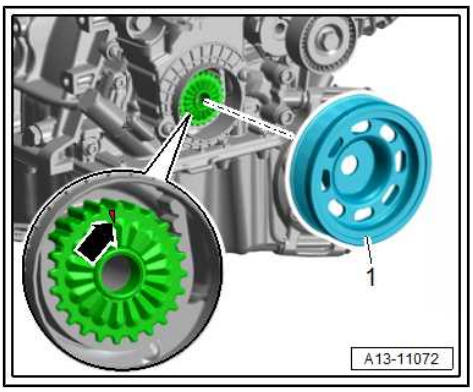
Installing

Note

- *Renew bolts tightened with specified tightening angle.*
- *All contact surfaces between bolt, pulley/vibration damper and crankshaft sprocket must be free of oil and grease.*

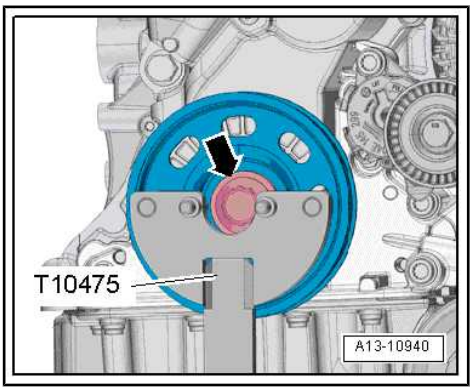
Audi AG. Any use for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Fit pulley/vibration damper -1- (pay attention to tooth-shaped profile -arrow-).



– Screw in bolt -arrow- by hand until it makes contact (lubricate thread of bolt).

– Tighten bolt using counterhold tool - T10475- .



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

– Install poly V-belt
⇒ “1.3 Removing and installing poly V-belt”, page 48 .

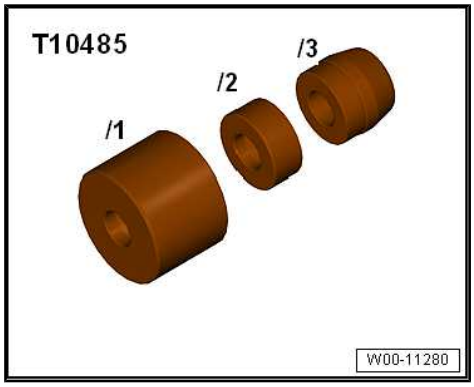
Tightening torques

- ⇒ “1.1 Exploded view - poly V-belt drive”, page 45
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

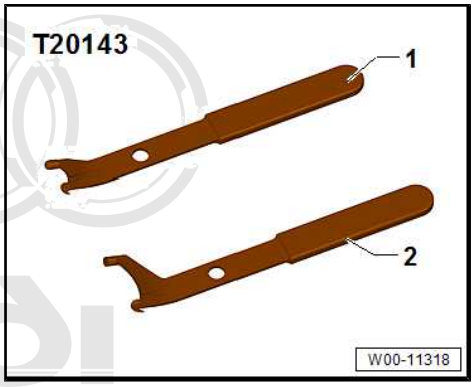
1.7 Renewing crankshaft oil seal (pulley end)

Special tools and workshop equipment required

- Assembly tool - T10485/1-3-



- Extractor tool - T20143-

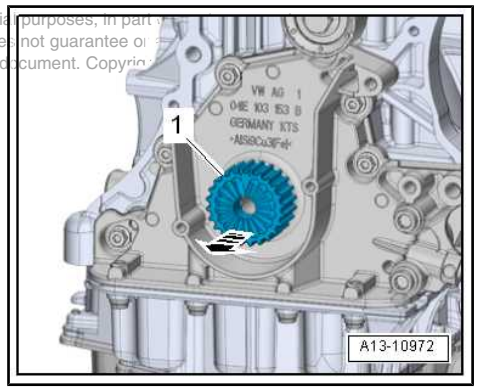


Protected by copyright. Copying for private or commercial purposes, in part ... permitted unless authorised by AUDI AG. AUDI AG does not guarantee or ... with respect to the correctness of information in this document. Copyright ...

Procedure

– Remove toothed belt
⇒ “1.4 Removing and installing toothed belt”, page 124 .

– Detach crankshaft sprocket -1- -arrow-.



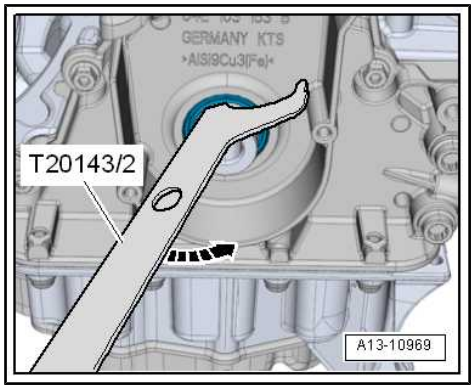
Caution

Risk of irreparable damage to engine.

- ***To avoid disturbing valve timing, do not turn crankshaft out of “TDC” position when pulley/vibration damper is removed.***

– Pry out oil seal using extractor tool -T20143/2- -arrow-.

– Clean contact surface and sealing surface.



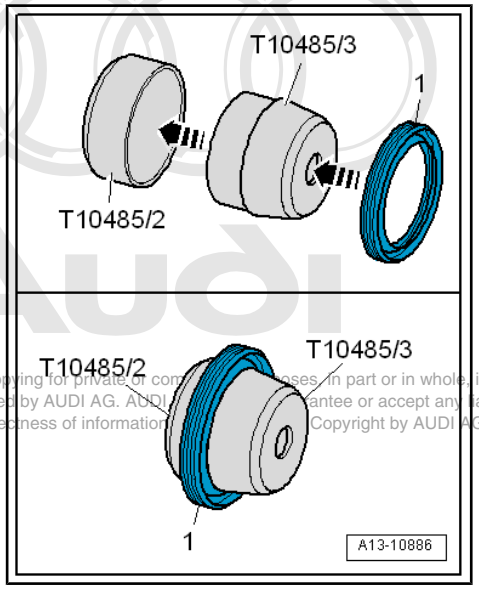
Note

Do not lubricate new oil seal.

– Slide oil seal -1- over fitting sleeve -T10485/3- onto guide sleeve -T10485/2- .

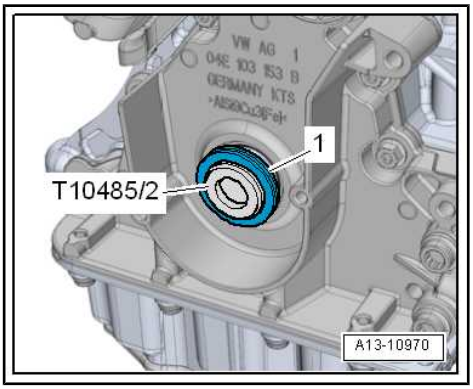
• Fitting position: closed side of oil seal faces guide sleeve.

– Detach fitting sleeve from guide sleeve.

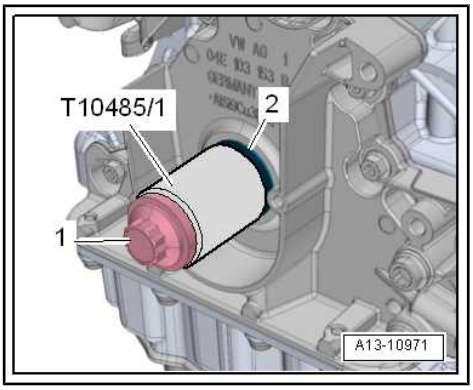


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information. Copyright by AUDI AG.

– Fit guide sleeve -T10485/2- with oil seal -1- onto crankshaft.



– Use thrust piece -T10485/1- and bolt -1- for poly V-belt pulley to pull in oil seal -2- onto stop.

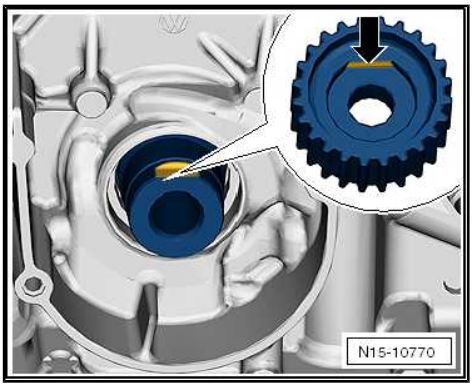


– Fit crankshaft sprocket onto crankshaft.

• Contact surface between poly V-belt pulley and crankshaft sprocket must be free of oil and grease.

• Machined surface -arrow- of crankshaft sprocket must be positioned over machined surface of crankshaft journal.

– Install toothed belt (adjust valve timing)
⇒ “1.4 Removing and installing toothed belt”, page 124 .



1.8 Removing and installing sealing flange (pulley end)

Special tools and workshop equipment required

- Flat scraper
- Sealant ⇒ Electronic parts catalogue

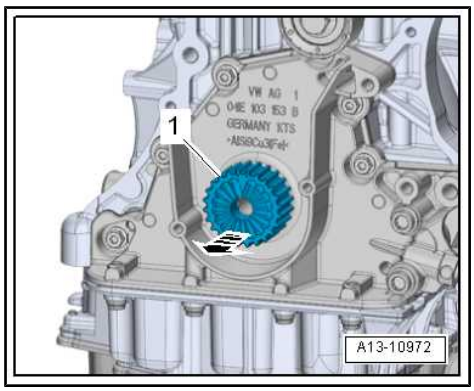
Removing

– Remove air conditioner compressor from bracket ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket .

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

– Remove toothed belt
⇒ “1.4 Removing and installing toothed belt”, page 124 .

– Detach crankshaft sprocket -1- -arrow-.



Caution

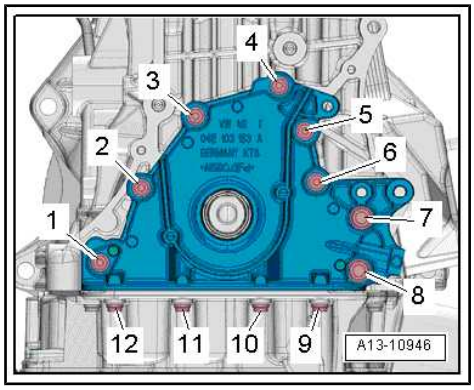
Risk of irreparable damage to engine.

- *To avoid disturbing valve timing, do not turn crankshaft out of “TDC” position when pulley/vibration damper is removed.*

– Remove bolts -1...12- and carefully release sealing flange from bonded joint.

The reproduction, distribution and utilization of this document as well as the communication of its contents to others without express authorization is prohibited. Offenders will be held liable for the payment of damages. All rights reserved 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.

– Drive out oil seal with sealing flange removed.



Installing

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

Caution

Make sure sealant residue does not enter lubrication system.

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

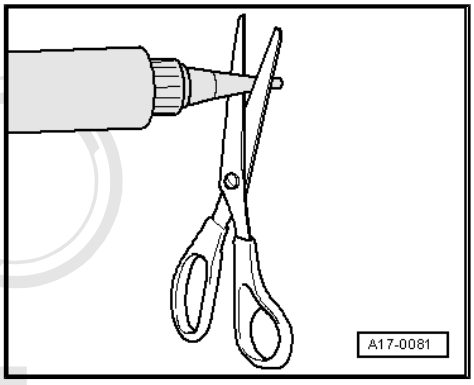
– Remove sealant residue from sealing flange and sump (top section).

– Clean surfaces; they must be free of oil and grease.

Note

Note the use-by date of the sealant.

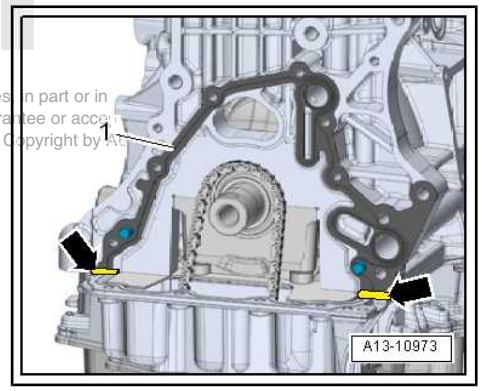
– Cut off nozzle of tube at front marking (nozzle ∅ approx. 2 mm).



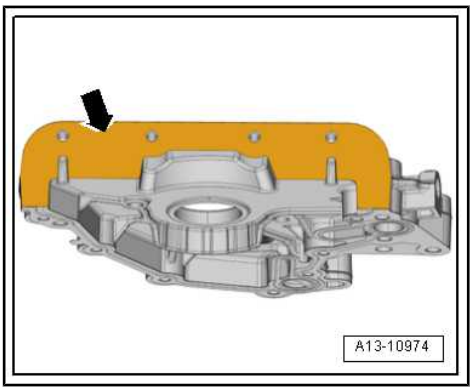
– Slide gasket -1- onto dowel pins in cylinder block.

– Apply a thin bead of sealant at the edge of the joint between the cylinder block and the sump -arrows-.

The reproduction, distribution and utilization of this document 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.



– Apply a thin coat of sealant to bottom sealing surface -arrow- on sealing flange.



Note

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

– Carefully fit sealing flange onto dowel pins in cylinder block.

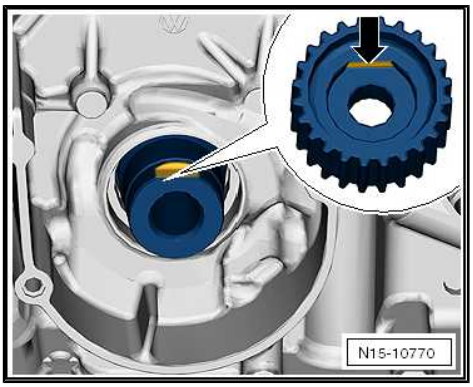
– Tighten sealing flange bolts
⇒ Fig. ""Sealing flange (pulley end) - tightening torque and sequence"" , page 48 .

– Install crankshaft oil seal (pulley end)
⇒ "1.7 Renewing crankshaft oil seal (pulley end)", page 53 .

– Fit crankshaft sprocket onto crankshaft.

- Contact surface between poly V-belt pulley and crankshaft sprocket must be free of oil and grease.
- Machined surface -arrow- of crankshaft sprocket must be positioned over machined surface of crankshaft journal.

– Install toothed belt (adjust valve timing)
⇒ "1.4 Removing and installing toothed belt", page 124 .



Tightening torques

- ⇒ Fig. ""Sealing flange (pulley end) - tightening torque and sequence"" , page 48
- ⇒ "1.1 Exploded view - poly V-belt drive", page 45
- ⇒ Electrical system; Rep. gr. 27 ; Alternator; Exploded view - alternator
- ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Exploded view - air conditioner compressor drive unit

2 Cylinder block (gearbox end)

⇒ “2.1 Exploded view - cylinder block (gearbox end)”, page 58

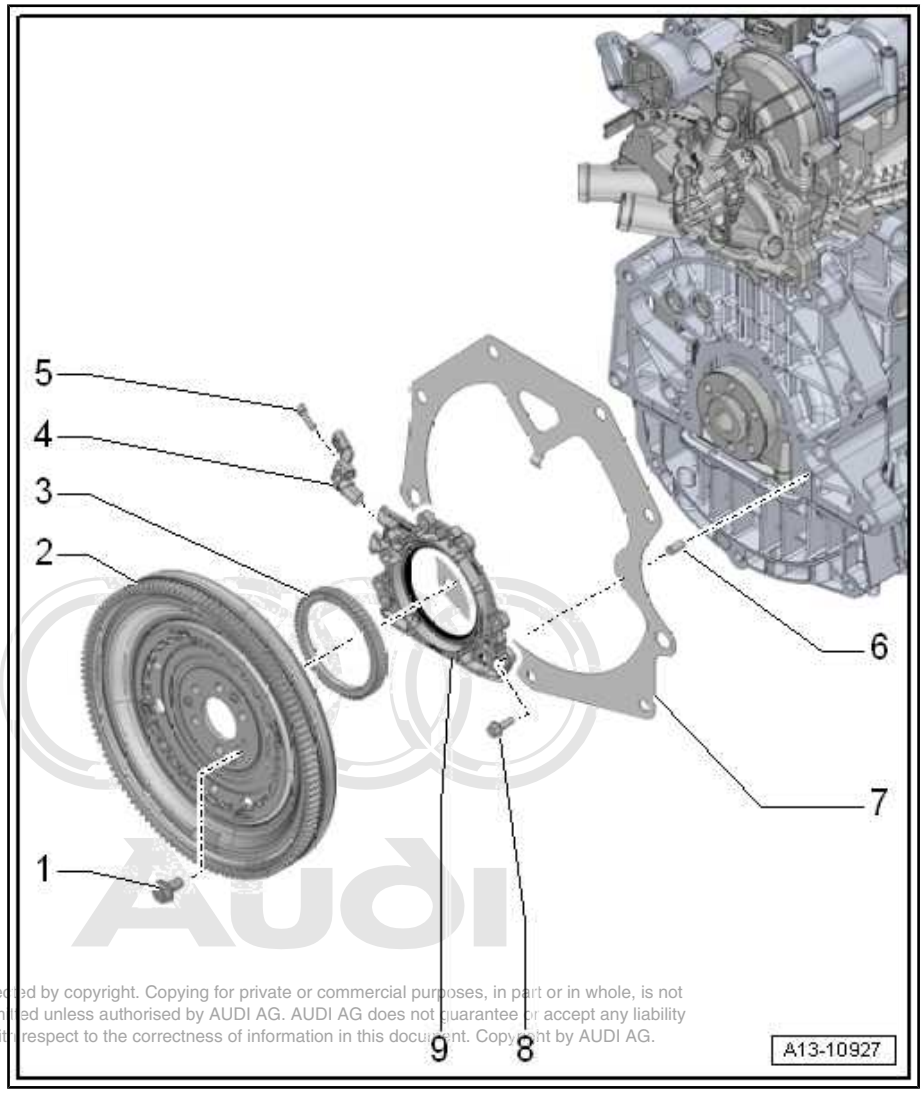
⇒ “2.2 Removing and installing flywheel”, page 59

⇒ “2.3 Removing and installing sealing flange (gearbox end)”, page 60

2.1 Exploded view - cylinder block (gearbox end)

Note

When performing assembly work, secure engine to engine and gearbox support ⇒ “1.3 Securing engine to engine and gearbox support”, page 26 .



1 - Bolt

- ❑ Renew after removing
- ❑ 60 Nm +90°

2 - Flywheel

- ❑ Removing and installing ⇒ “2.2 Removing and installing flywheel”, page 59
- ❑ Can only be installed in one position

3 - Sender wheel

- ❑ For engine speed sender - G28-
- ❑ Only renew together with sealing flange
- ❑ Renewing ⇒ “2.3 Removing and installing sealing flange (gearbox end)”, page 60

4 - Engine speed sender - G28-

- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 344
- ❑ Note installation position ⇒ page 351

5 - Bolt

- ❑ Tightening torque ⇒ “1.1 Exploded view - ignition system”, page 344

6 - Dowel pin

- ❑ 2x

7 - Intermediate plate

- ❑ Do not damage or bend when assembling
- ❑ Installing ⇒ Fig. ““Installing intermediate plate”“ , page 59

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.

8 - Bolt

- ❑ Tightening torque and sequence
  ⇒ Fig. ""Sealing flange (gearbox end) - tightening torque and sequence"" , page 59

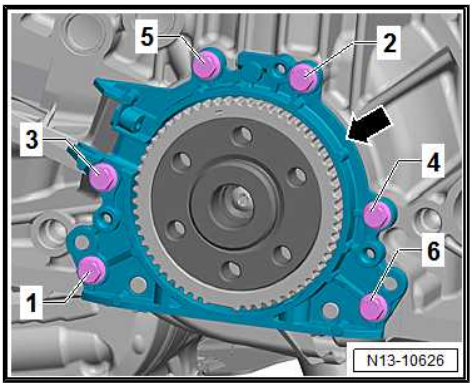
9 - Sealing flange (gearbox end)

- ❑ With oil seal
- ❑ Only renew together with sender wheel
- ❑ Renewing ⇒ "2.3 Removing and installing sealing flange (gearbox end)", page 60

Sealing flange (gearbox end) - tightening torque and sequence

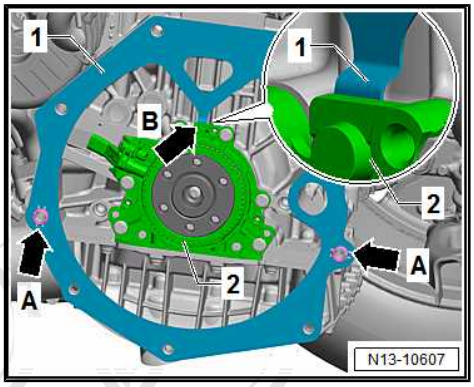
– Tighten bolts in stages as follows:

Stage	Bolts	Tightening torque
1.	-1 … 6-	Screw in by hand until contact is made
2.	-1 … 6-	Tighten in stages and in diagonal sequence; final torque 10 Nm.



Installing intermediate plate

– Engage intermediate plate -1- on sealing flange -2- -arrow B- and push onto dowel sleeves -arrows A-.



2.2 Removing and installing flywheel

Special tools and workshop equipment required

♦ Counterhold tool - 3067-



Protected by copyright. Copying for private or commercial purpos… not permitted unless authorised by AUDI AG. AUDI AG does not gua… liability with respect to the correctness of informa…on in this document. C… …DI AG.

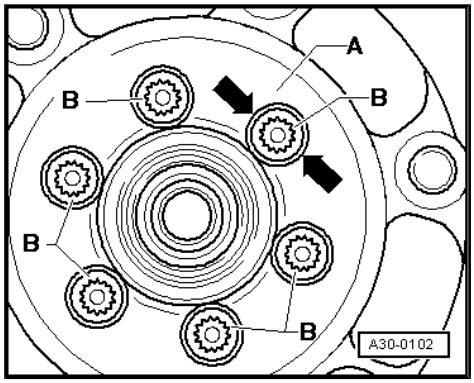
Removing

- Gearbox removed

Caution

Risk of serious damage to flywheel.

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



– Insert counterhold tool - 3067- in hole on cylinder block -item B-.

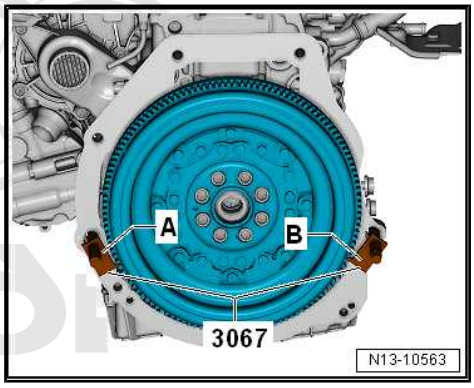
– Loosen and remove flywheel bolts.

Installing

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

Note

- *Renew bolts tightened with specified tightening angle.*
- *Flywheel with sender wheel can only be fitted in one position.*



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.

– Insert counterhold - 3067- in hole on cylinder block -item A-.

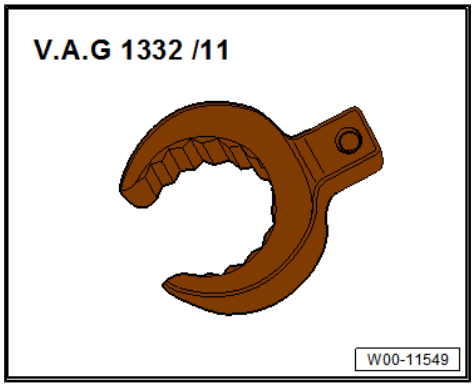
Tightening torques

- ⇒ “2.1 Exploded view - cylinder block (gearbox end)”, page 58

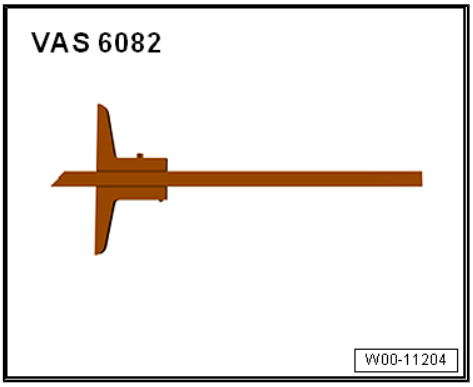
2.3 Removing and installing sealing flange (gearbox end)

Special tools and workshop equipment required

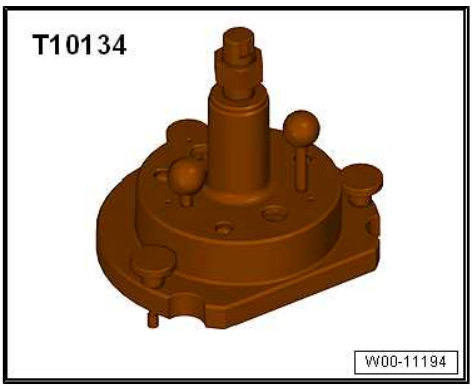
- Open ring spanner - V.A.G 1332/11-



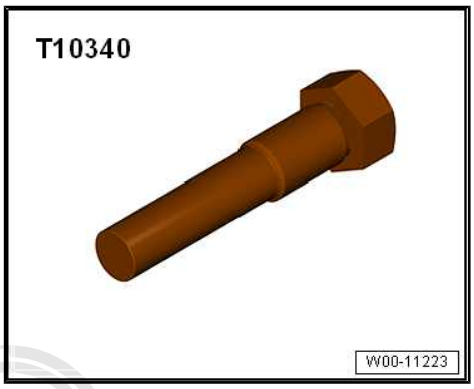
♦ Depth gauge - VAS 6082-



♦ Assembly tool - T10134-



♦ Locking pin - T10340-



♦ Bolt M6x35 (3x)

Procedure

• Gearbox removed

Note

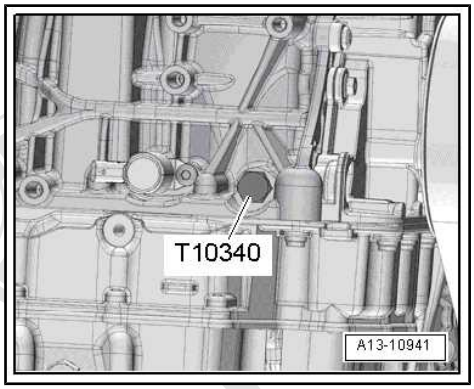
For illustration purposes, the procedure is shown with the engine removed.

– Remove flywheel ⇒ “2.2 Removing and installing flywheel”, page 59.

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.

Rotate crankshaft to “TDC” as follows:

– Unscrew plug for “TDC” hole on cylinder block.
– Screw locking pin - T10340- into cylinder block as far as stop and tighten to 30 Nm.
– Rotate crankshaft in normal direction of rotation as far as stop.
• The locking pin is now in contact with the crank web.



Note

The locking pin - T10340- locks the crankshaft only in the direction of engine rotation.

Caution

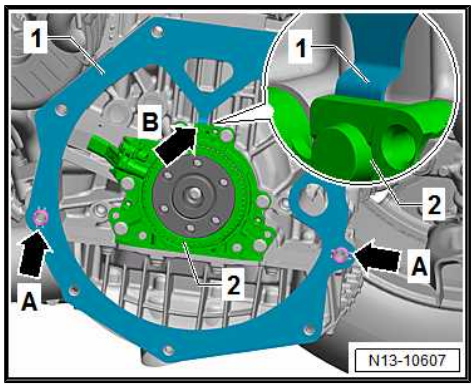
Risk of damage to engine.

- ***If the locking pin - T10340- cannot be screwed in as far as the stop, the crankshaft is not in the correct position.***
- ***In this case proceed as follows:***
- ***Remove locking pin.***
- ***Turn crankshaft by 90° in direction of engine rotation.***
- ***Screw locking pin - T10340- into cylinder block as far as stop and tighten to 30 Nm.***
- ***Turn crankshaft further in normal direction of rotation as far as stop.***

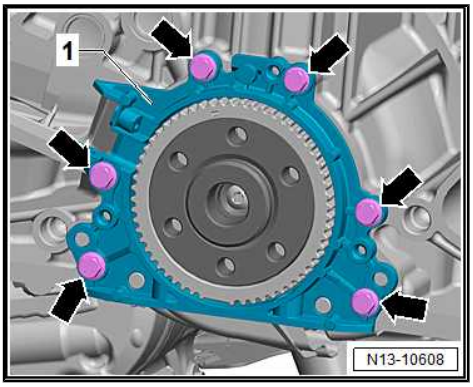
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Remove sump (top section) ⇒ page 211 .
– Remove engine speed sender - G28- ⇒ “1.6 Removing and installing engine speed sender G28 ”, page 350 .

– Detach intermediate plate -1- from dowel sleeves -arrows A-.
– Guide intermediate plate upwards; at the same time, pull retaining tab -arrow B- out of opening behind sealing flange -2-.



– Remove bolts -arrows- for sealing flange -1-.

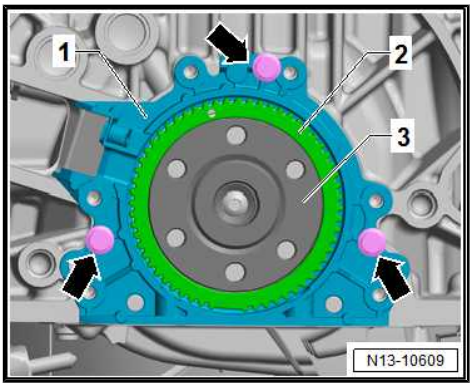


Note

The sealing flange -1- is pressed off the crankshaft -3- together with the sender wheel -2-.

– To press off, screw 3 bolts M6x35 -arrows- alternately into sealing flange not more than $^{1}/_{2}$ turn at a time.

– Detach sealing flange together with sender wheel.

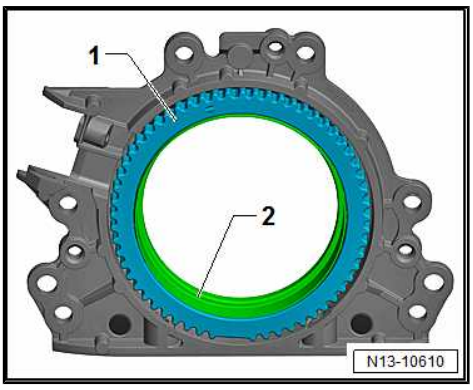


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Pressing in sealing flange with sender wheel

Note

- *The sealing flange with PTFE oil seal is fitted with a sealing lip support ring -2-. This support ring acts as an assembly sleeve and must not be removed before installation.*
- *Sealing flange and sender wheel -1- must not be separated or rotated out of position after removal from packaging.*
- *The sender wheel is held in its installation position by a locating pin on the assembly tool - T10134- .*
- *The sealing flange and oil seal are one unit and can only be replaced together with the sender wheel.*
- *The assembly tool - T10134- is held in the correct position relative to the crankshaft by a guide pin which is inserted into a hole in the crankshaft.*



Construction of assembly tool - T10134- :

A - Tensioning flats

B - Nut

C - Assembly housing

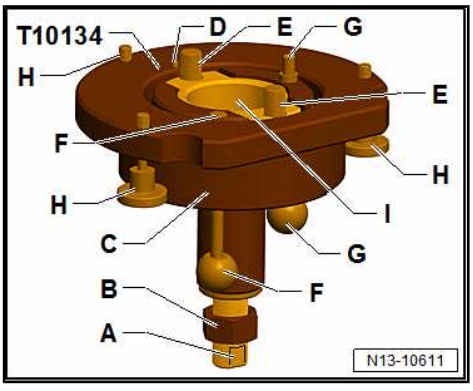
D - Locating pin

E - Hexagon socket head bolts (2x)

F - Guide pin for diesel engines (black handle)

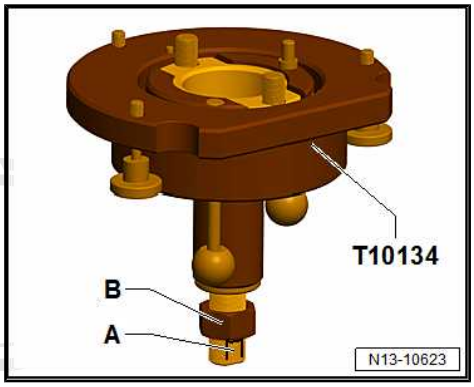
G - Guide pin for petrol engines (red handle)

H - Knurled screws (3x)



Fitting sealing flange with sender wheel onto assembly tool - T10134- :

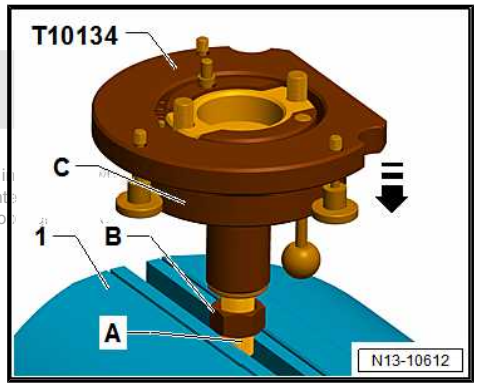
– Unscrew nut -B- until it is just in front of tightening flats -A- on threaded spindle.



– Clamp assembly tool - T10134- in a vice -1- on tightening flats -A- of threaded spindle.

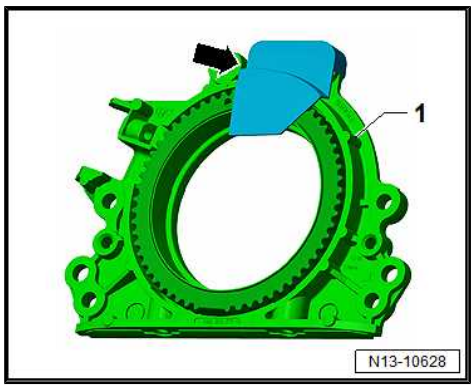
– Press assembly housing -C- downwards -arrow- so that it rests on nut -B-.

• Inner part of assembly device and assembly housing must align (be level) with each other.



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

– If fitted, remove securing clip -arrow- from new sealing flange.

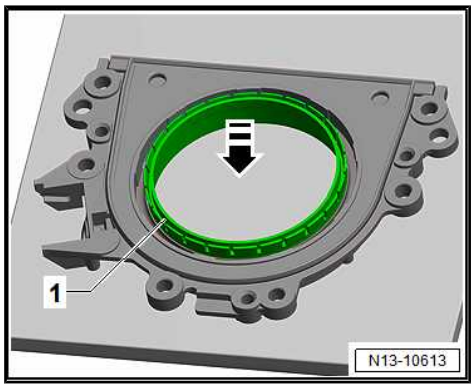


Note

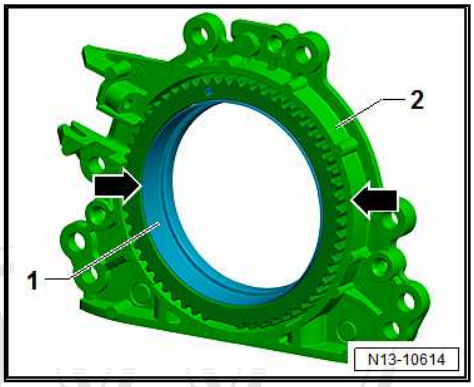
Do not take the sender wheel out of the sealing flange or rotate it out of position.

– Place sealing flange (with front side downwards) on a clean flat surface.

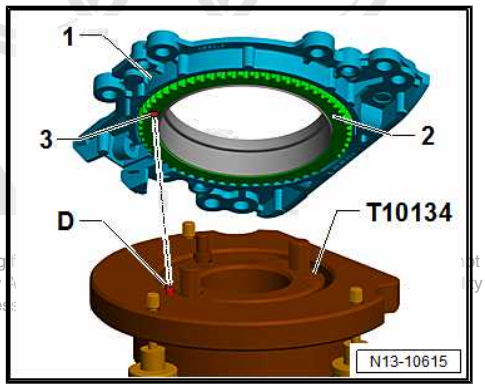
– Press sealing lip support ring -1- downwards in direction of -arrow- until it touches flat surface.



- Upper edge of sealing lip support ring -1- must be flush -arrows- with front edge of sealing flange -2-.

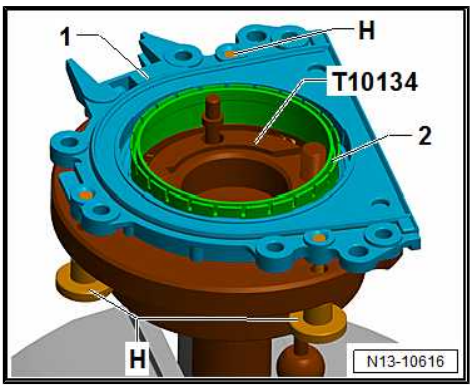


– Place front side of sealing flange -1- on assembly tool - T10134- so that locating pin -D- is seated in hole -3- in sender wheel -2-.
- Ensure that sealing flange lies flat on assembly tool.



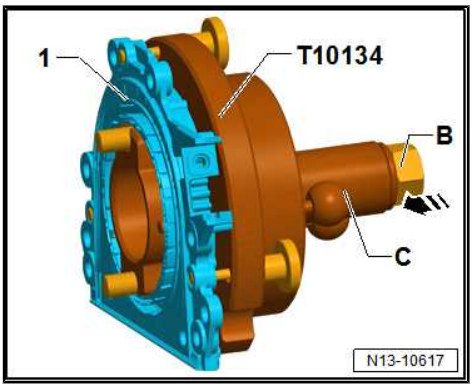
Protected by copyright. Copying
permitted unless authorised by
with respect to the correctnes

– Screw knurled screws -H- onto sealing flange -1-.
– When tightening, press sealing flange and sealing lip support ring -2- against surface of assembly tool - T10134- .
– This prevents locating pin from sliding out of hole in sender wheel.
– Ensure that sender wheel remains fixed on assembly tool when installing sealing flange.

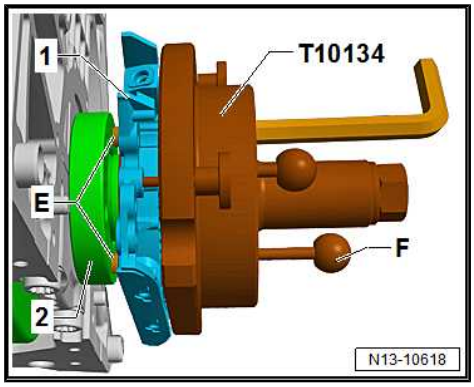


Securing assembly tool - T10134- with sealing flange -1- on crankshaft flange:

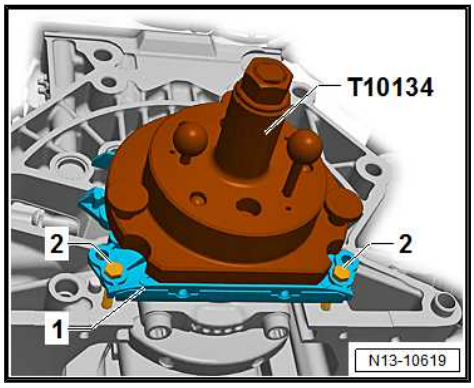
- Crankshaft flange must be free of oil and grease.
- Engine is at “TDC” position.
– Screw nut -B- to end of threaded spindle.
– Press threaded spindle of assembly tool - T10134- in direction of -arrow- until nut -B- makes contact with assembly housing -C-.
– Position flat edge of assembly housing towards sealing surface for sump on cylinder block.



– Secure assembly tool - T10134- with sealing flange -1- to crankshaft flange -2-.
– To do so, screw hexagon socket head bolts -E- approx. 5 turns into crankshaft flange with hexagon key.
– Insert guide pin for petrol engines (red handle) -F- into crankshaft flange.

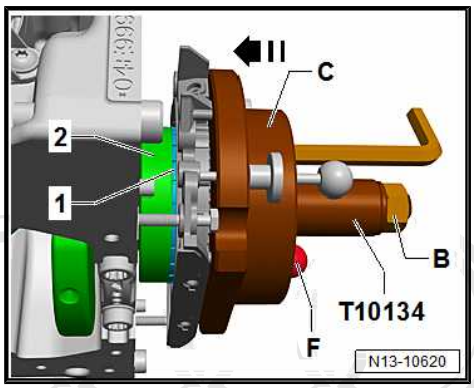


– Screw 2 bolts M6x35 -item 2- into cylinder block to guide sealing flange -1-.



Securing assembly tool - T10134- on crankshaft flange:

– Press assembly housing -C- by hand in direction of -arrow- until sealing lip support ring -1- touches surface of crankshaft flange -2-.
– Check that guide pin for petrol engines (red handle) -F- is fitted correctly in hole in crankshaft. This ensures that sender wheel reaches its final installation position.



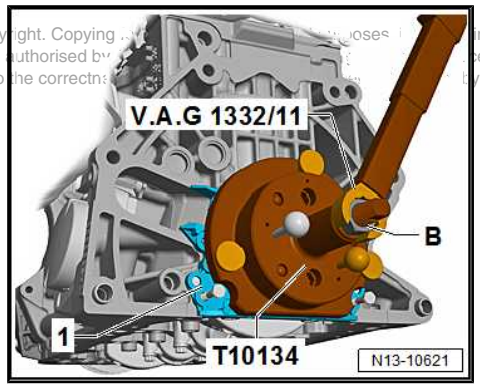
Note

The guide pin for diesel engines (black handle) must not be inserted into threaded hole in crankshaft.

– Tighten the two hexagon socket head bolts on assembly tool hand-tight.
– Screw nut -B- onto threaded spindle by hand until it touches assembly housing -C-.

Pressing sender wheel onto crankshaft flange with assembly tool - T10134- :

– Tighten nut -B- on assembly tool - T10134- to 35 Nm.
• There must be a small gap between cylinder block and sealing flange -1- after nut has been tightened to 35 Nm.



Protected by copyright. Copying ... in whole, is not permitted unless authorised by ... cept any liability with respect to the correctn... by AUDI AG.

Checking installation position of sender wheel on crankshaft:

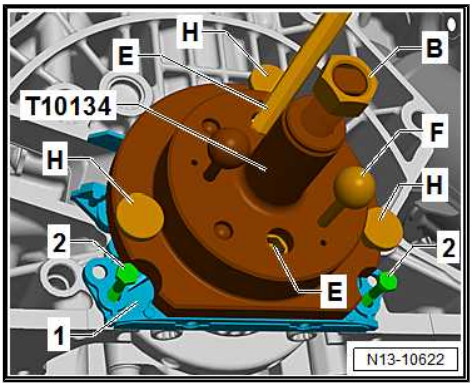
– Screw nut -B- to end of threaded spindle.

– Remove both bolts -2- from cylinder block.

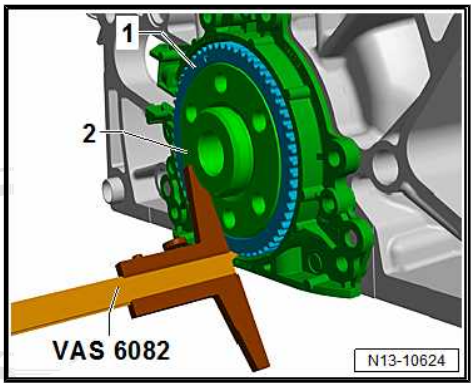
– Unscrew knurled screws -H- from sealing flange -1-.

– Unbolt assembly tool - T10134- from crankshaft flange (remove hexagon socket head bolts -E- from crankshaft flange).

– Detach sealing lip support ring.



– Apply depth gauge - VAS 6082- to crankshaft flange -2-.

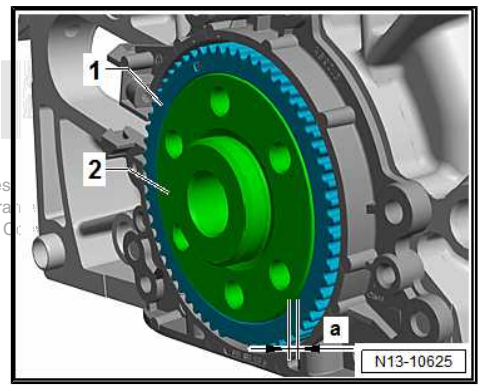


– Measure distance -a- between crankshaft flange -2- and sender wheel -1-.

• Specification: Distance -a- = 0.5 mm.

– Press sender wheel in further if measurement is too small ⇒ page 67 .

– If reading matches specification, continue with assembly ⇒ page 68 .



Protected by copyright. Copying for private or commercial purposes
with respect to the correctness of information in this document.

Pressing sender wheel in further:

– Secure assembly tool - T10134- to crankshaft flange.

– Ensure that locating pin of assembly tool - T10134- is fitted in hole in sender wheel.

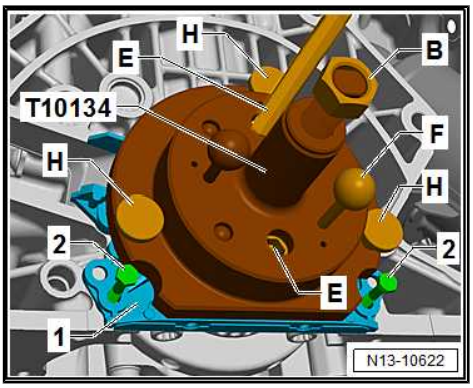
– Hand-tighten hexagon socket head bolts -E-.

– Slide assembly tool - T10134- onto sealing flange -1- by hand.

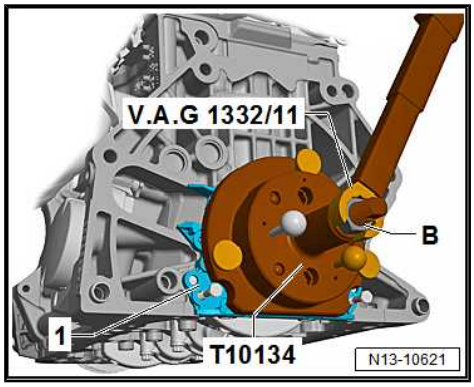
– Screw nut -B- onto threaded spindle by hand until it touches assembly tool - T10134- .

– Insert guide pin for petrol engines (red handle) -F- into crankshaft flange.

– Screw 2 bolts M6x35 -item 2- into cylinder block to guide sealing flange -1-.



– Tighten nut -B- on assembly tool - T10134- to 40 Nm.
– Check installation position of sender wheel on crankshaft again ⇒ page 67 .
– Tighten nut on assembly tool - T10134- to 45 Nm if measurement is too small.
– Check installation position of sender wheel on crankshaft again ⇒ page 67 .



Assembling:

– Tighten bolts for sealing flange in diagonal sequence.
– Install sump (bottom section) ⇒ “1.3 Removing and installing sump (bottom section)”, page 209 .
– Install intermediate plate ⇒ Fig. ““Installing intermediate plate”“ , page 59 .
– Install flywheel ⇒ “2.2 Removing and installing flywheel”, page 59 .
– After renewing sender wheel, misfire adaption must be reset. To do so, select `01 - Reset adaptions misfires` in `Guided Functions` mode of ⇒ Vehicle diagnostic tester.

Tightening torques

- ⇒ Fig. ““Sealing flange (gearbox end) - tightening torque and sequence”“ , page 59
- ⇒ Fig. ““Plug for TDC drilling in cylinder block - tightening torque”“ , page 81
- ⇒ “2.1 Exploded view - cylinder block (gearbox end)”, page 58
- Engine speed sender - G28- ⇒ “1.1 Exploded view - ignition system”, page 344

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

3 Crankshaft

⇒ "3.1 Crankshaft dimensions", page 69

⇒ "3.2 Renewing needle bearing in crankshaft", page 69

3.1 Crankshaft dimensions

Caution

Risk of deformation of the cylinder block bearing pedestals.

- *The crankshaft must not be removed. Even loosening the main bearing cap bolts will cause deformation of the cylinder block bearing pedestals. This will result in reduced bearing clearance. Even if bearing shells are not renewed, a change in bearing clearance can cause bearing damage.*
- *If the bearing cap bolts are loosened, the cylinder block must be renewed together with the crankshaft.*
- *Crankshaft bearing clearance cannot be measured using workshop equipment.*

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.

3.2 Renewing needle bearing in crankshaft

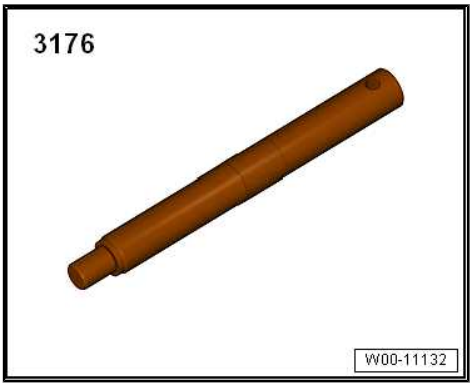
Only fitted on vehicles with dual clutch gearbox

Note

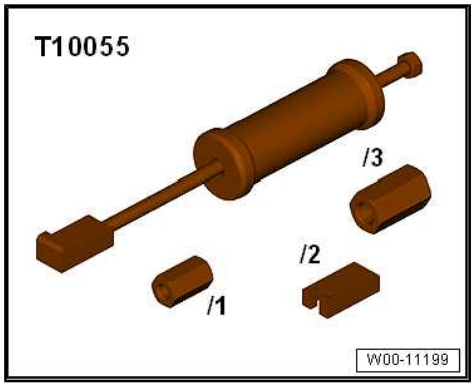
- *There should be no needle bearing fitted in the crankshaft on vehicles with manual gearbox.*
- *A needle bearing must be fitted in the crankshaft on vehicles with dual clutch gearbox ⇒ Electronic parts catalogue .*

Special tools and workshop equipment required

- Centring mandrel - 3176-



♦ Puller - T10055- with adapter -T10055/3-



♦ Internal puller Kukko 21/2

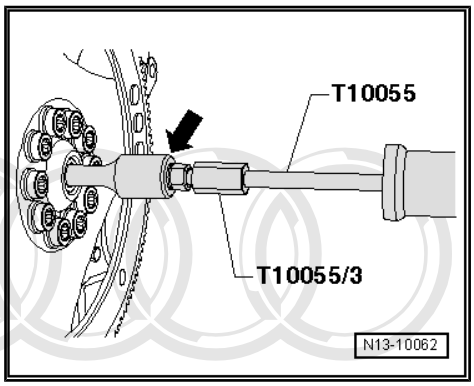


Procedure

- Gearbox removed

– Remove flywheel
⇒ “2.2 Removing and installing flywheel”, page 59 .

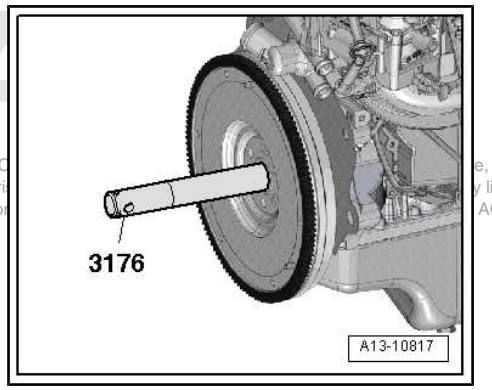
– Use internal puller Kukko 21/2 -arrow-, puller - T10055- and adapter -T10055/3- to pull out needle bearing.



– Drive in needle bearing using centring mandrel - 3176- ; needle bearing must be flush.

– Install flywheel
⇒ “2.2 Removing and installing flywheel”, page 59 .

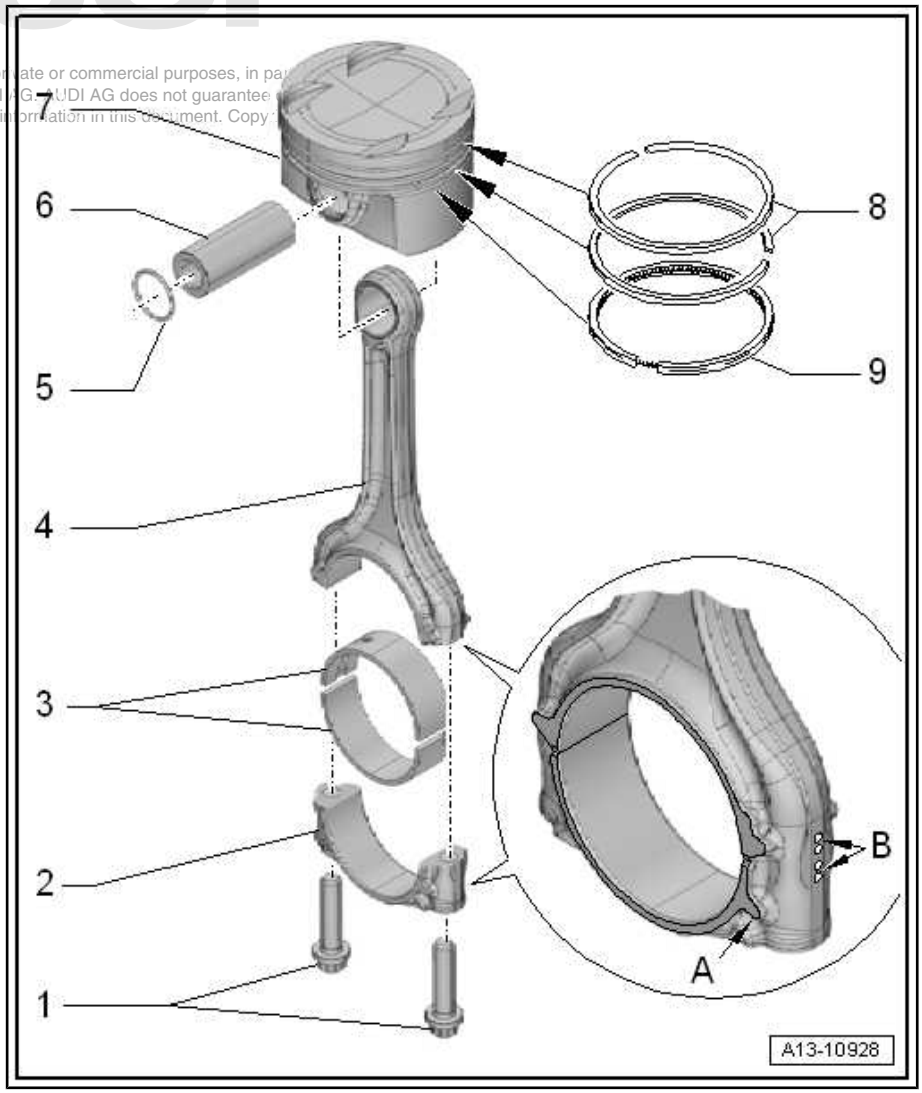
Protected by copyright. C e, is not
permitted unless authori y liability
with respect to the co AG.



4 Pistons and conrods

⇒ “4.1 Exploded view - pistons and conrods”, page 71
⇒ “4.2 Removing and installing pistons”, page 73
⇒ “4.3 Removing and installing oil spray jets”, page 74
⇒ “4.4 Checking pistons and cylinder bores”, page 76
⇒ “4.5 Separating parts of new conrod”, page 77
⇒ “4.6 Checking radial clearance of conrod bearings”, page 78

4.1 Exploded view - pistons and conrods



1 - Bolts

- ❑ Renew after removing
- ❑ Use old bolts when measuring radial clearance
- ❑ Lubricate threads and contact surface
- ❑ 30 Nm +90°

2 - Conrod bearing cap

- ❑ Due to the cracking method used to separate the bearing cap from the conrod in manufacture, the caps only fit in one position and only on the appropriate conrod
- ❑ Mark cylinder and conrod allocation in colour -B-
- ❑ Installation position: Lug -A- on conrod bearing cap faces towards pulley end

3 - Bearing shells

- ❑ Installation position ⇒ Fig. ““Installation position of bearing shell”“ , page 73
- ❑ Renew used bearing shells
- ❑ Check that it is securely seated

4 - Conrod

- ❑ With industrially cracked conrod bearing cap
- ❑ Only renew as a complete set
- ❑ Mark cylinder and conrod bearing cap allocation in colour -B-
- ❑ Measuring radial clearance ⇒ “4.6 Checking radial clearance of conrod bearings”, page 78
- ❑ Separating parts of new conrod ⇒ “4.5 Separating parts of new conrod”, page 77
- ❑ Installation position: Lug -A- on conrod bearing cap faces towards pulley end

5 - Circlip

- ❑ 2x
- ❑ Renew after removing

6 - Piston pin

- ❑ Removing and installing ⇒ “4.2 Removing and installing pistons”, page 73

7 - Piston

- ❑ With combustion chamber
- ❑ Mark installation position and cylinder number ⇒ Fig. ““Installation position of pistons and allocation of piston/cylinder”“ , page 72
- ❑ Removing and installing ⇒ “4.2 Removing and installing pistons”, page 73
- ❑ Checking pistons and cylinder bores ⇒ “4.4 Checking pistons and cylinder bores”, page 76

8 - Piston rings

- ❑ Compression rings
- ❑ Measuring ring gap ⇒ Fig. ““Measuring piston ring gap”“ , page 76
- ❑ Measuring ring-to-groove clearance ⇒ Fig. ““Measuring ring-to-groove clearance”“ , page 76
- ❑ Use piston ring pliers (commercially available) to remove and install
- ❑ Installation position: marking “TOP” or side with lettering faces towards piston crown
- ❑ Offset gaps by 120°

9 - Piston ring

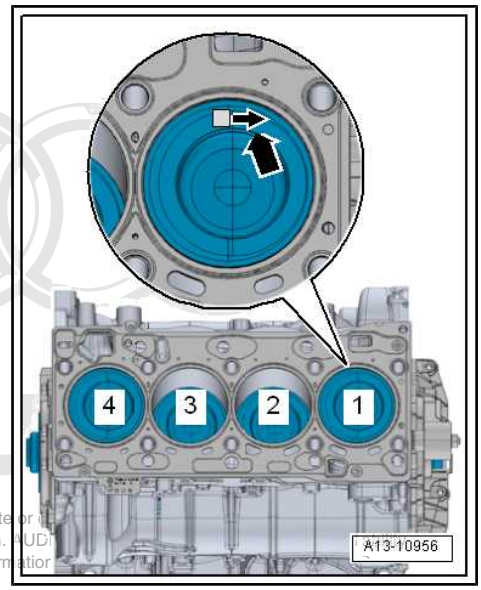
- ❑ Oil scraper ring
- ❑ Measuring ring gap ⇒ Fig. ““Measuring piston ring gap”“ , page 76
- ❑ Measuring ring-to-groove clearance ⇒ Fig. ““Measuring ring-to-groove clearance”“ , page 76
- ❑ Use piston ring pliers (commercially available) to remove and install
- ❑ Installation position: marking “TOP” or side with lettering faces towards piston crown
- ❑ Offset gap 120° from bottom compression ring

Installation position of pistons and allocation of piston/cylinder

Caution

Risk of damage to piston crown.

- *If you intend to re-install used pistons, mark the cylinder number on the piston crown using paint. Do not attempt to mark the piston crown with a centre punch or by making a scratch, notch or similar.*



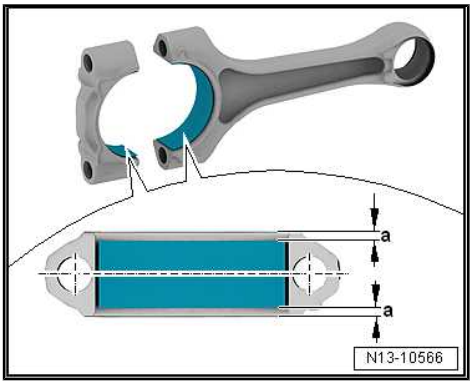
- Arrow on piston crown points to pulley end -arrow-.

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

Installation position of bearing shell

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

• Dimension -a- = 2.5 mm

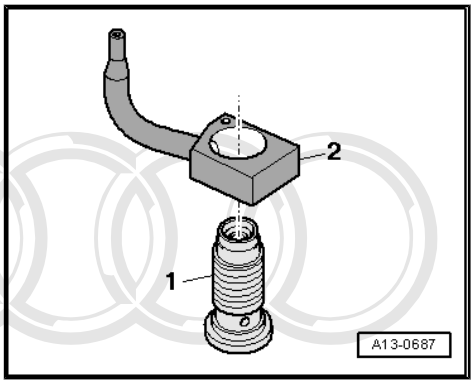


Oil spray jet and pressure relief valve

1 - Bolt with pressure relief valve, 27 Nm

2 - Oil spray jet (for cooling of pistons)

Removing and installing
⇒ “4.3 Removing and installing oil spray jets”, page 74



4.2 Removing and installing pistons

Special tools and workshop equipment required

♦ Drift - VW 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 or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

♦ Piston ring clamp, commercially available

Removing

– Remove cylinder head
⇒ “2.3 Removing and installing cylinder head”, page 172 .

– Remove sump (top section)
⇒ “1.4 Removing and installing sump (top section)”, page 211 and detach baffle plate.

– Mark installation position and cylinder number of piston.

– Mark installation position and matching of cylinder and conrod bearing cap to conrod ⇒ Item 4 (page 71) .

– Remove conrod bearing cap and pull out piston and conrod upwards.

Note

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

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

Installing

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

Note

Renew bolts tightened with specified tightening angle.

– Oil running surfaces of bearing shells.
– Install piston using commercially available piston ring clamp; note installation position
⇒ Fig. ""Installation position of pistons and allocation of piston/cylinder"" , page 72 .
– Install conrod bearing cap; note installation position
⇒ Item 2 (page 71) .
– Install cylinder head
⇒ "2.3 Removing and installing cylinder head", page 172 .
– Install sump (upper section)
⇒ "1.4 Removing and installing sump (top section)", page 211 .

Tightening torques

♦ ⇒ "4.1 Exploded view - pistons and conrods", page 71

4.3 Removing and installing oil spray jets

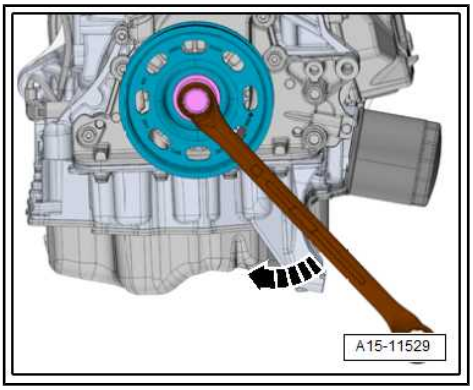
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Special tools and workshop equipment required

♦ Socket - T10545-



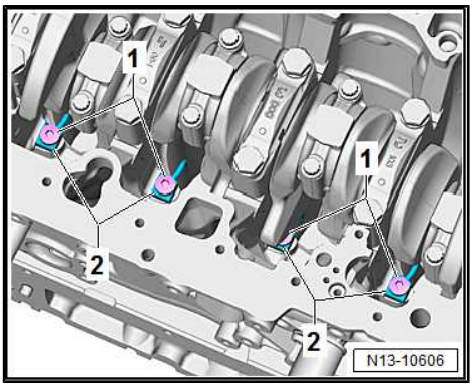
Removing



– Remove sump (top section)
⇒ “1.4 Removing and installing sump (top section)”, page 211 and detach baffle plate.

– Turn crankshaft at pulley/vibration damper in direction of engine rotation -arrow- until corresponding bolt is accessible.

– Keeping it as vertical as possible, insert socket - T10545- into pressure relief valve and ensure that teeth of socket - T10545- and pressure relief valve engage well in each other.



– Unscrew pressure relief valve -1- using socket - T10545- .

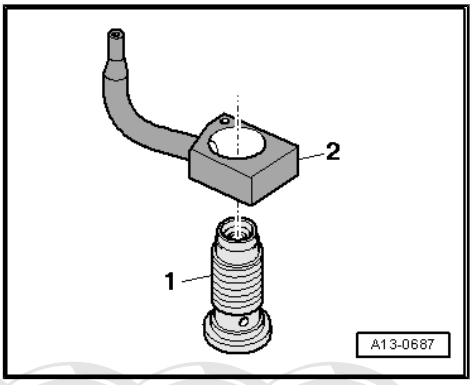
– Remove oil spray jet -2-.

Installing

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

- Installation position: Align locating edge of oil spray jet -2- with machined surface of cylinder block.

1 - Pressure relief valve



Caution

Risk of damage to oil spray jets.

- *Do not bend oil spray jets.*
- *Check that oil spray jets adequate clearance after re-installing pistons.*
- *Always renew bent oil spray jets.*

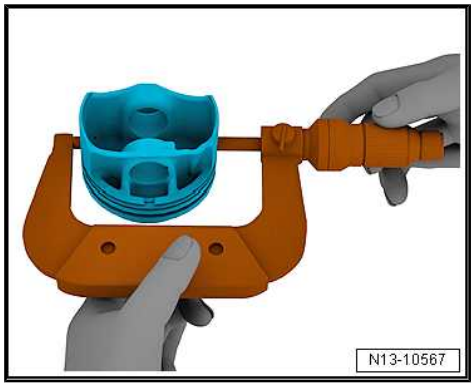
– Install sump (upper section)
⇒ “1.4 Removing and installing sump (top section)”, page 211 .

Tightening torques

- ⇒ “4.1 Exploded view - pistons and conrods”, page 71
- ⇒ “1.1 Exploded view - sump/oil pump”, page 206

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

4.4 Checking pistons and cylinder bores



Checking piston

– Using a micrometer, measure approx. 10 mm from the lower edge, perpendicular to the piston pin axis.

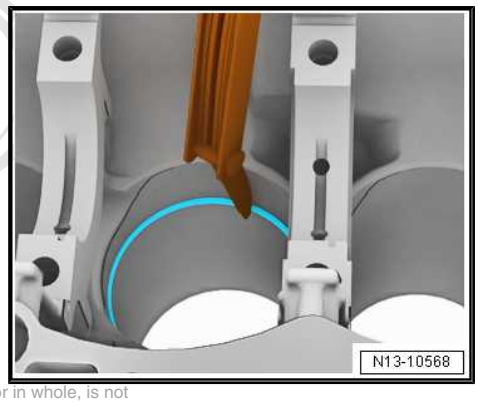
• Maximum deviation from nominal dimension: 0.04 mm.

Piston Ø mm	
Nominal dimension	74.42 [1]

• [1] Dimensions not including coating

• Coating thickness of pistons manufactured by “Federal-Mogul”: 0.018 mm on each side

• Coating thickness of pistons manufactured by “Mahle”: 0.015 mm on each side



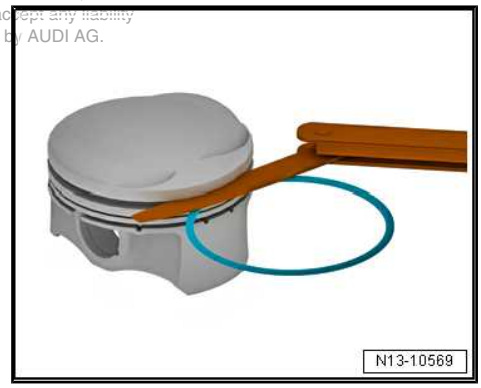
Measuring piston ring gap

– Insert ring at right angle to cylinder wall from above and push down into lower cylinder opening approx. 15 mm from bottom of cylinder.

– To do so, use a piston without rings.

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

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 ring-to-groove clearance

– Clean groove in piston before checking clearance.

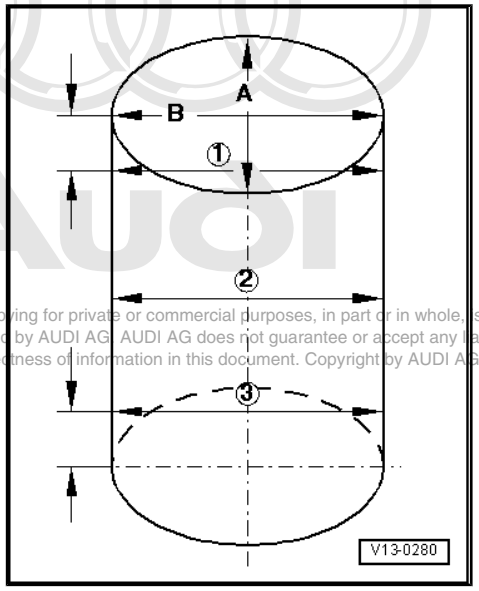
Piston ring	new mm	Wear limit mm
1st compression ring Manufacturer: “Federal-Mogul”	0.05 … 0.09	0.15
1st compression ring Manufacturer: “Mahle”	0.035 … 0.085	0.15
2nd compression ring	0.03 … 0.07	0.15
Oil scraper rings (2 parts)	0.04 … 0.08	-
Oil scraper rings (3 parts)	Cannot be measured	

Measuring cylinder bore

Caution

Risk of damage to the surface of the cylinder bore.

- *Do not machine cylinder bore (reboring, honing, grinding) with workshop equipment.*



– 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.

Cylinder bore Ø mm	
Nominal dimension	74.5 +0.015 +0.005

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

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

4.5 Separating parts of new conrod

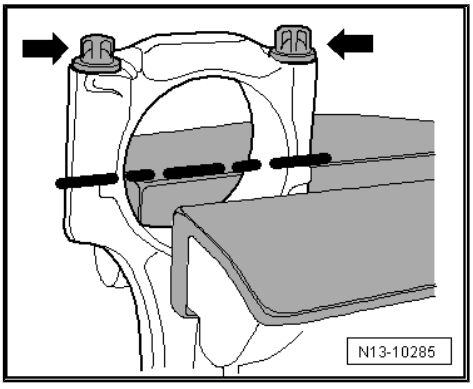
Procedure

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

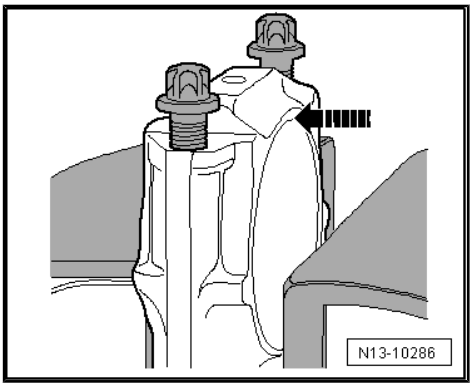
– To avoid any risk of damage, the conrod should only be clamped lightly in a vice using jaw covers as shown in illustration.

• The conrod is clamped in position below the dotted line.

– Unscrew bolts -arrows- approx. 5 turns.



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



4.6 Checking radial clearance of conrod bearings

Special tools and workshop equipment required

- Plastigage

Procedure

Note

Use old bolts when measuring radial clearance.

– Remove conrod bearing cap.

– Clean bearing cap and bearing journal.

– Place a length of Plastigage corresponding to the width of the bearing on the bearing journal or in the bearing shell.

– Fit conrod bearing cap and secure with old bolts ⇒ Item 1 (page 71) without rotating crankshaft.

– Remove conrod bearing cap again.

– Compare width of Plastigage with measurement scale.

• Radial clearance: 0.028 ... 0.065 mm

– When carrying out final assembly, renew bolts.

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.

15 – Cylinder head, valve gear

1 Toothed belt drive

⇒ “1.1 Exploded view - toothed belt cover”, page 79

⇒ “1.2 Exploded view - toothed belt”, page 80

⇒ “1.3 Detaching toothed belt from camshaft”, page 83

⇒ “1.4 Removing and installing toothed belt”, page 124

1.1 Exploded view - toothed belt cover

1 - Toothed belt cover (bottom)

2 - Bolt

- ❑ 8 Nm

3 - Engine support

- ❑ Tightening torque and sequence
  ⇒ Fig. ““Engine support - tightening torque and sequence”“ , page 34

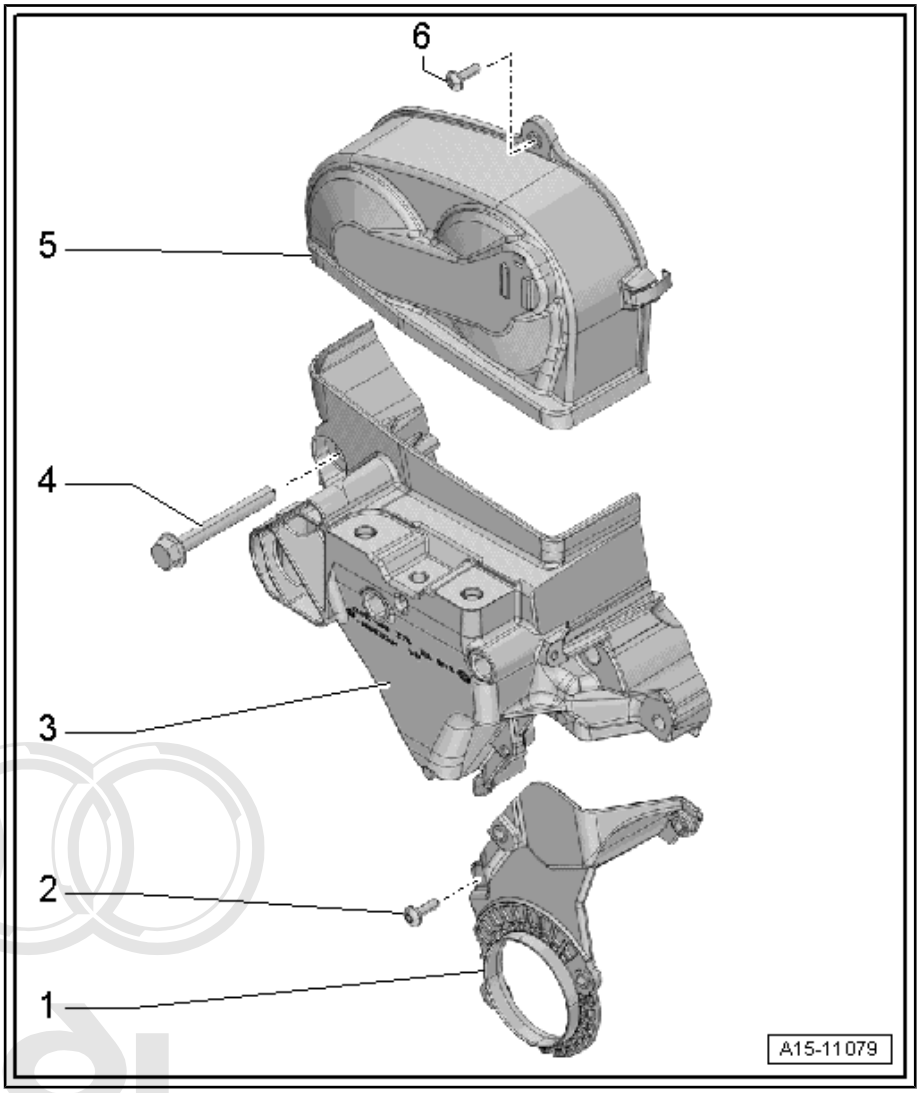
4 - Bolt

- ❑ Tightening torque and sequence
  ⇒ Fig. ““Engine support - tightening torque and sequence”“ , page 34

5 - Toothed belt cover (top)

6 - Bolt

- ❑ 8 Nm



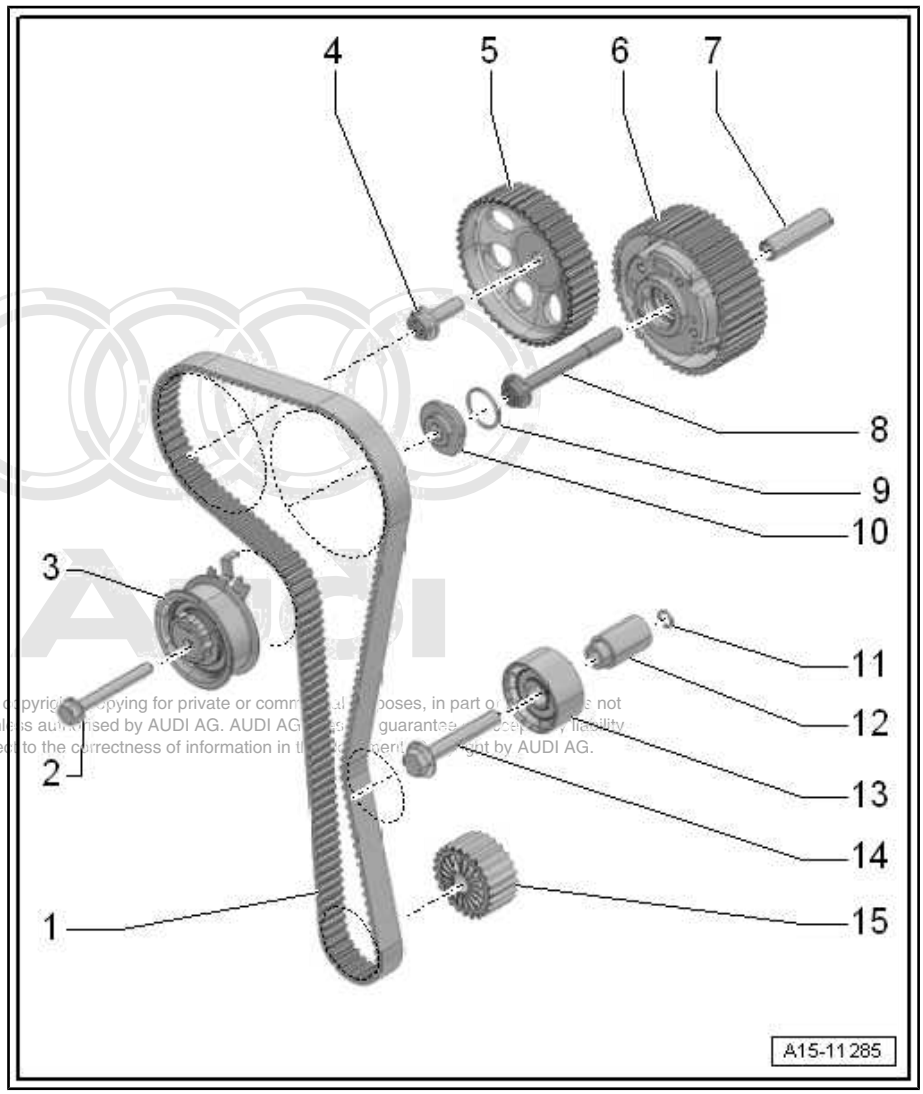
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

1.2 Exploded view - toothed belt

⇒ “1.2.1 Exploded view - toothed belt, engine code CHPB”, page 80

⇒ “1.2.2 Exploded view - toothed belt, engine codes CSSA, CZDA, CZEA, CZDB, CWLA”, page 82

1.2.1 Exploded view - toothed belt, engine code CHPB



1 - Toothed belt

- ❑ Before removing, mark direction of rotation with chalk or felt-tip pen
- ❑ Check for wear
- ❑ Removing from camshafts ⇒ “1.3 Detaching toothed belt from camshaft”, page 83
- ❑ Removing ⇒ “1.4 Removing and installing toothed belt”, page 124
- ❑ Installing (adjusting valve timing); procedure is described in chapter ⇒ “1.3 Detaching toothed belt from camshaft”, page 83

2 - Bolt

- ❑ 25 Nm

3 - Tensioning roller

- ❑ Removal and installation involve taking out engine support ⇒ “1.5 Removing and installing engine support”, page 49

4 - Bolt

- ❑ Renew after removing
- ❑ 50 Nm +90°

5 - Camshaft sprocket for exhaust camshaft

6 - Camshaft sprocket for inlet camshaft

- ❑ With camshaft adjuster

7 - Guide sleeve

8 - Bolt

- ❑ Renew after removing
- ❑ 50 Nm +135°

9 - O-ring

- ❑ Renew after removing

10 - Plug

- ❑ 20 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.

11 - O-ring

- ❑ Captive

12 - Spacer sleeve

13 - Idler roller

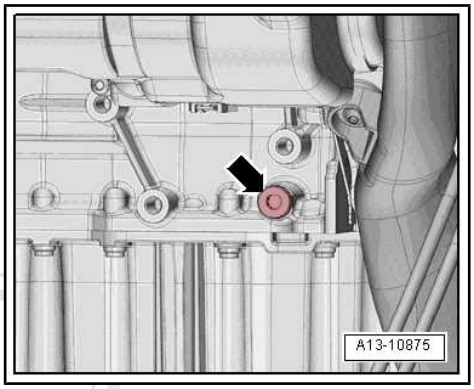
14 - Bolt

- ❑ 45 Nm

15 - Crankshaft sprocket

- ❑ Contact surface between sprocket and crankshaft must be free of oil
- ❑ Can only be installed in one position

Plug for “TDC” drilling in cylinder block - tightening torque



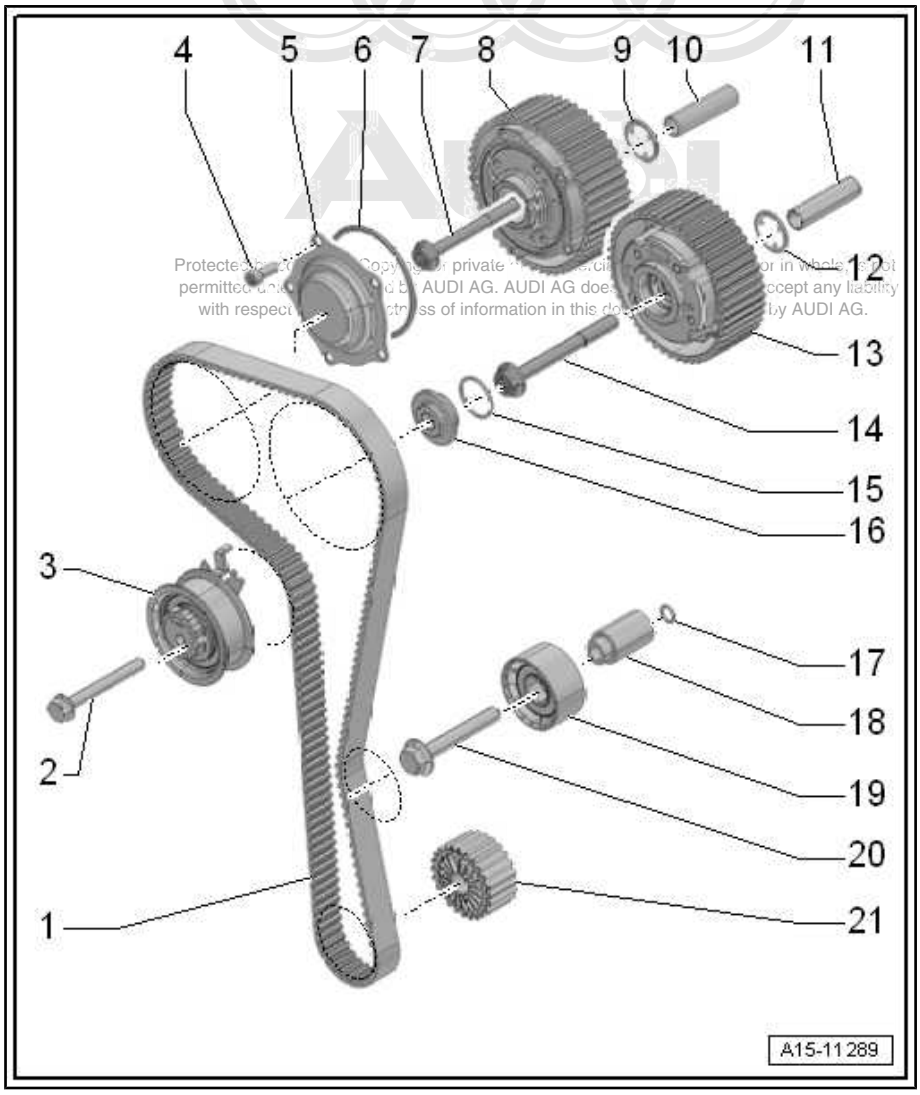
Note

Renew O-ring if damaged.

– Tighten bolt -arrow- to 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. Copyright by AUDI AG.

1.2.2 Exploded view - toothed belt, engine codes CSSA, CZDA, CZEA, CZDB, CWLA



1 - Toothed belt

- ❑ Before removing, mark direction of rotation with chalk or felt-tip pen
- ❑ Check for wear
- ❑ Removing from camshafts ⇒ “1.3 Detaching toothed belt from camshaft”, page 83
- ❑ Removing ⇒ “1.4 Removing and installing toothed belt”, page 124
- ❑ Installing (adjusting valve timing); procedure is described in chapter ⇒ “1.3 Detaching toothed belt from camshaft”, page 83

2 - Bolt

- ❑ 25 Nm

3 - Tensioning roller

- ❑ Removal and installation involve taking out engine support ⇒ “1.5 Removing and installing engine support”, page 49

4 - Bolt

- ❑ Renew after removing
- ❑ 8 Nm +45°

5 - Sealing cap

6 - O-ring

- ❑ Renew after removing

7 - Bolt

- ❑ Renew after removing
- ❑ 50 Nm +135°

8 - Camshaft sprocket for exhaust camshaft

- ❑ With camshaft adjuster

9 - Diamond-coated washer

- ❑ Not installed on all versions
- ❑ Renew after removing

10 - Guide sleeve

11 - Guide sleeve

12 - Diamond-coated washer

- ❑ Not installed on all versions
- ❑ Renew after removing

13 - Camshaft sprocket for inlet camshaft

- ❑ With camshaft adjuster

14 - Bolt

- ❑ Renew after removing
- ❑ 50 Nm +135°

15 - O-ring

- ❑ Renew after removing

16 - Plug

- ❑ 20 Nm

17 - O-ring

- ❑ Captive

18 - Spacer sleeve

19 - Idler roller

20 - Bolt

- ❑ 45 Nm

21 - Crankshaft sprocket

- ❑ Contact surface between sprocket and crankshaft must be free of oil
- ❑ Can only be installed in one position

1.3 Detaching toothed belt from camshaft

⇒ "1.3.1 Detaching toothed belt from camshaft - engine code CHPB", page 83

⇒ "1.3.2 Detaching toothed belt from camshaft - engine codes CSSA, CZDA, CZDB, CWLA", page 96

⇒ "1.3.3 Detaching toothed belt from camshaft - engine code CZEA", page 110

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.

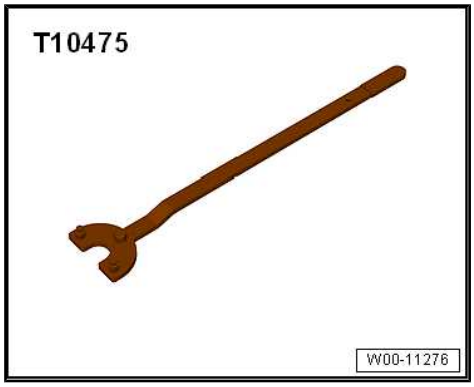
1.3.1 Detaching toothed belt from camshaft - engine code CHPB

Special tools and workshop equipment required

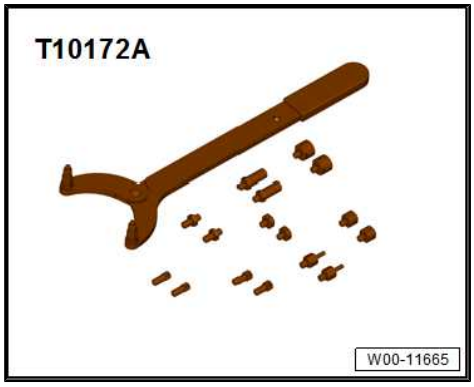
- ♦ Torque wrench - VAS 6583-



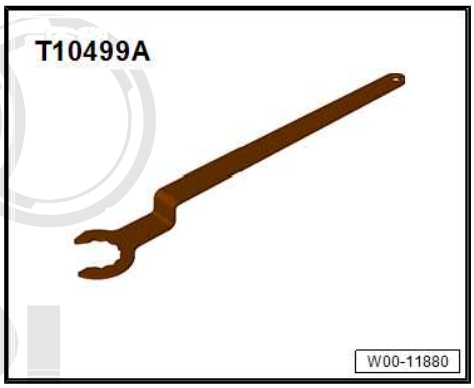
- Counterhold tool - T10475-



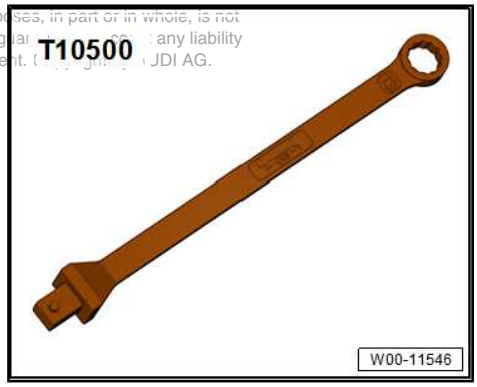
- Counterhold tool - T10172 A- with adapters -T10172/1-



- Special wrench, 30 mm - T10499 A-

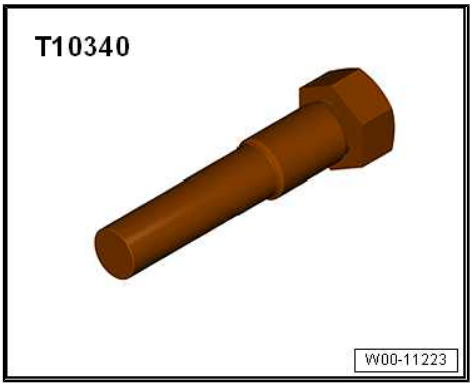


- Open end spanner insert, AF 13 - T10500-

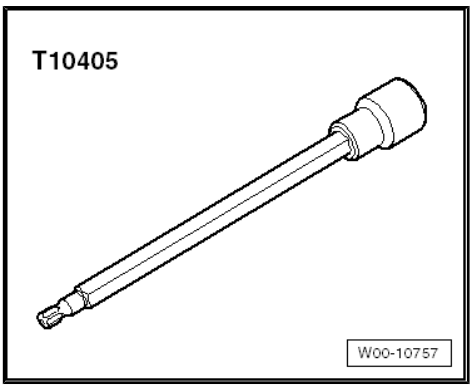


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

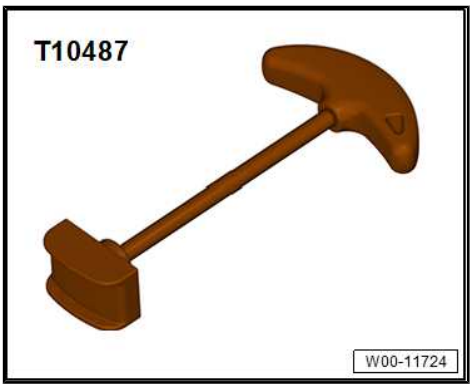
- Locking pin - T10340-



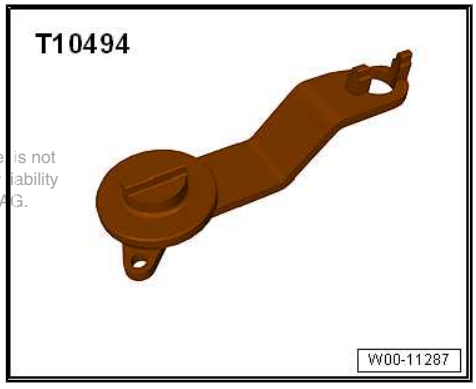
- Socket Torx T 30 - T10405-



- Assembly tool - T10487-

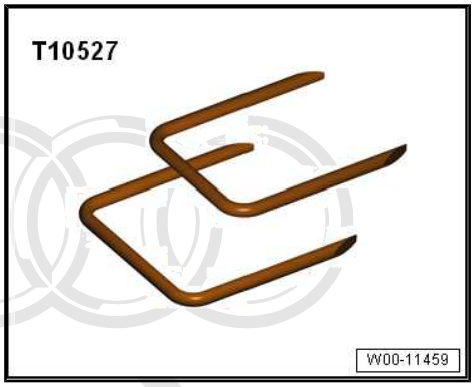


- Camshaft clamp - T10494-

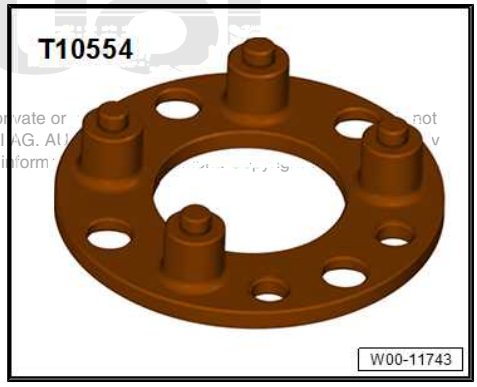


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Release tool - T10527- and -T10527/1-



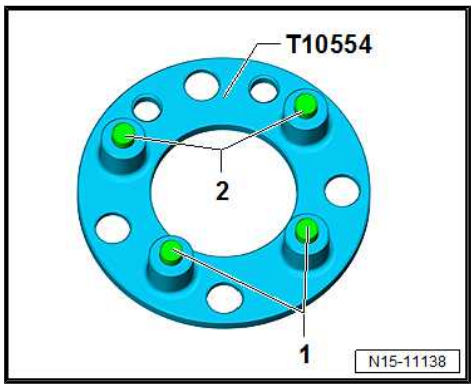
- Counterhold tool - T10554-



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

Counterhold tool - T10554-

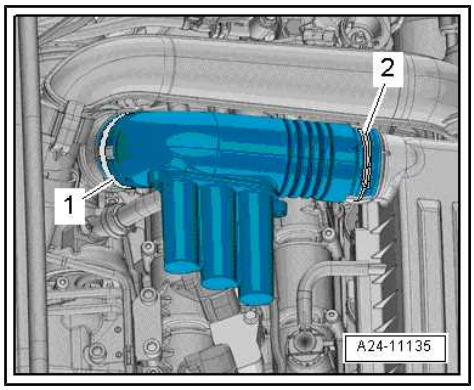
- The lugs -1- and -2- on counterhold tool - T10554- are different distances apart.
- Counterhold tool - T10554- can only be applied in one position.
- Position counterhold tool - T10554- flush against camshaft adjusters.



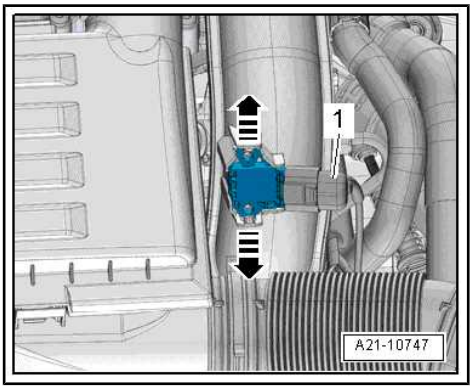
Procedure

– Remove engine cover panel ⇒ page 44 .

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



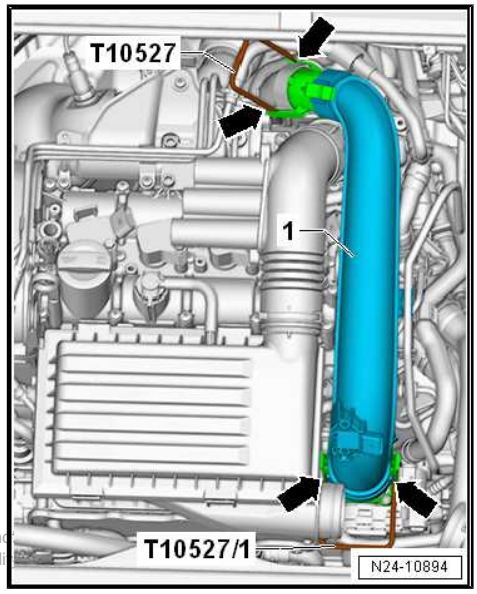
– Unplug electrical connector -1- from charge pressure sender - G31- .



Note

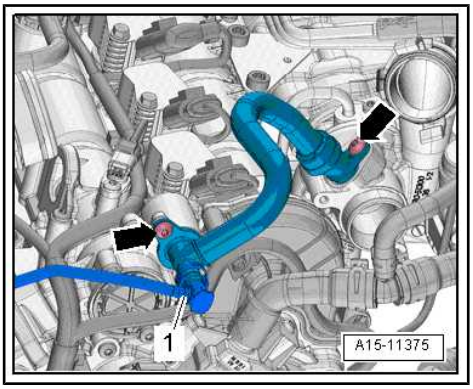
Disregard -arrows-.

– Move air hoses clear at air pipe.
– Release fasteners -arrows- with release tool - T10527- and - T10527/1- , and detach air pipe.

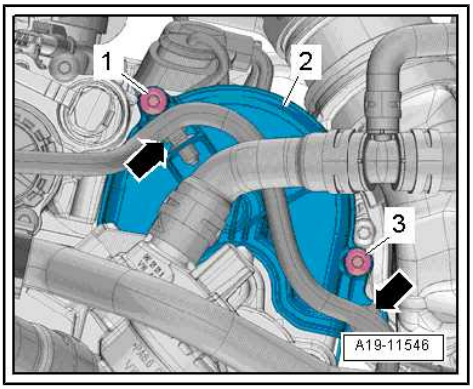


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is no
permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liabili
with respect to the correctness of information in this document. Copyright by AUDI AG.

– Press release tabs and disconnect hose -1- for activated charcoal filter.
– Remove bolts -arrows- and detach crankcase breather hose.



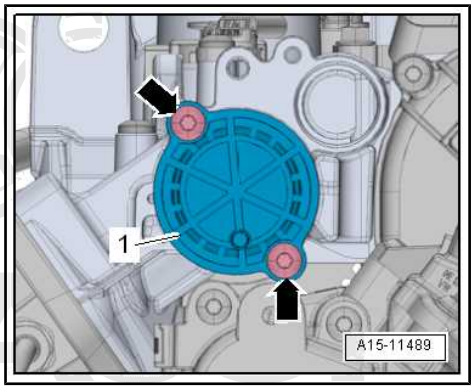
– Move electrical wiring harness clear -arrows-.
– Unscrew bolts -1, 3- and remove cover -2- for toothed belt for coolant pump.



Note

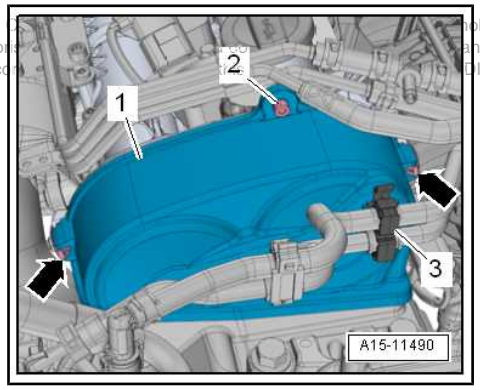
- *Danger of chemical damage to seal for coolant pump if oil enters between coolant pump and cylinder head.*
- *Cover coolant pump with a cloth.*
- *Catch escaping engine oil with a cloth.*

– Unscrew bolts -arrows- and detach sealing cap -1-.



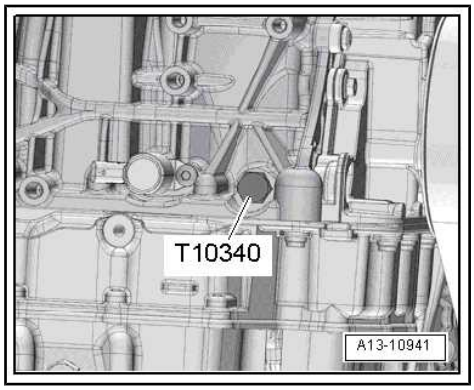
– Move clear hoses at bracket -3-.
– Unscrew bolt -2-.
– Release clips -arrows- and detach toothed belt cover (top) -1-.

Protected by copyright. ... permitted unless author... with respect to the co... ...ole, is not ...ny liability ...DI AG.



Rotate crankshaft to “TDC” as follows:

– Unscrew plug for “TDC” hole on cylinder block.
– Screw locking pin - T10340- into cylinder block as far as stop and tighten to 30 Nm.
– Rotate crankshaft in normal direction of rotation as far as stop.
• The locking pin is now in contact with the crank web.



Note

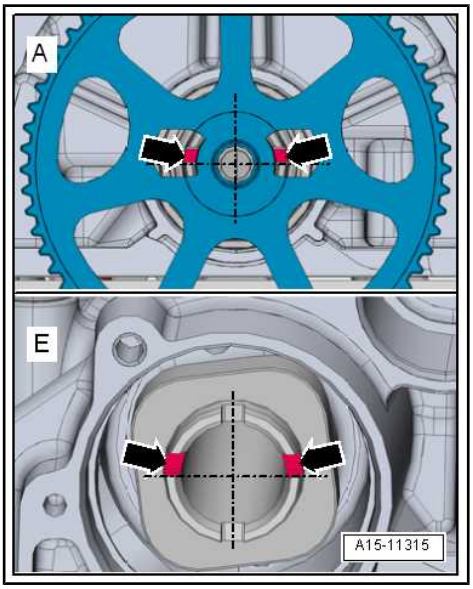
The locking pin - T10340- locks the crankshaft only in the direction of engine rotation.

Caution

Risk of damage to engine.

- ***If the locking pin - T10340- cannot be screwed in as far as the stop, the crankshaft is not in the correct position.***
- ***In this case proceed as follows:***
- ***Remove locking pin.***
- ***Turn crankshaft by 90° in direction of engine rotation.***
- ***Screw locking pin - T10340- into cylinder block as far as stop and tighten to 30 Nm.***
- ***Turn crankshaft further in normal direction of rotation as far as stop.***

- On both camshafts, asymmetrically positioned grooves -top and bottom arrows- on gearbox end must now face upwards, as shown in illustration.
- On exhaust camshaft -A-, grooves -top arrows- are accessible via openings in coolant pump drive sprocket.
- On inlet camshaft -E-, grooves -bottom arrows- must be positioned above centre of camshaft.



Note

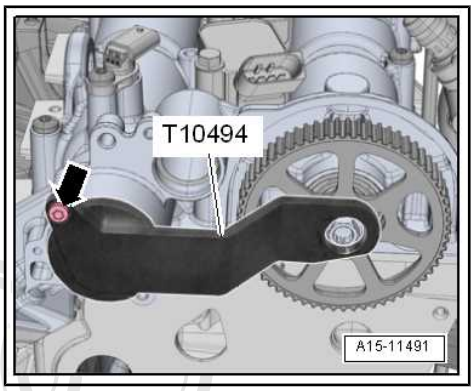
The camshafts have two pairs of grooves: one positioned symmetrically and one positioned asymmetrically. In TDC position, the asymmetrically positioned pair of grooves must be above the imaginary horizontal centre line.

– If camshafts are not positioned as described, unscrew locking pin - T10340- , turn crankshaft one rotation further and return to TDC position.

Note

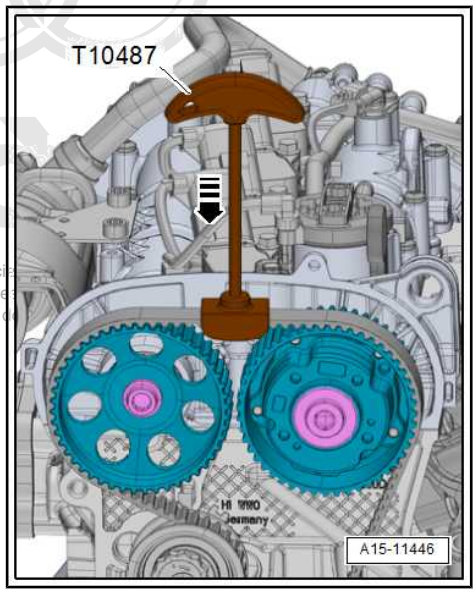
- *It should be possible to insert the camshaft clamp - T10494- easily.*
- *Do not knock camshaft clamp into place with any kind of tool.*

– When camshafts are positioned as described, insert camshaft clamp - T10494- into camshafts as far as stop and hand-tighten bolt -arrow-.



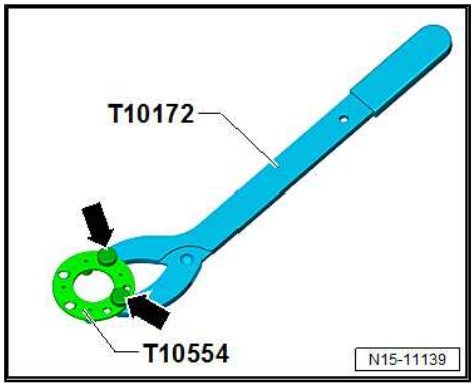
Note

- *If it is not possible to insert the camshaft clamp - T10494- easily:*
- *Press down toothed belt -arrow- using assembly tool -T10487- and then insert camshaft clamp - T10494- into camshafts as far as stop and hand-tighten bolt.*

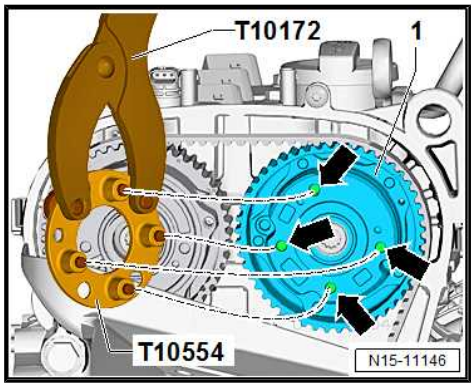


Protected by copyright. Copying for private or commercia
permitted unless authorised by AUDI AG. AUDI AG doe
with respect to the correctness of information in this

– Assemble tools as shown.
– Attach counterhold tool - T10172- to counterhold tool - T10554- using knurled screws -arrows-.



– Apply counterhold tool - T10554- with counterhold tool - T10172- to camshaft sprocket -1-, as shown.
– Lugs must be inserted correctly into holes -arrows-.
– Position counterhold tool - T10554- flush against camshaft adjuster -1-.



Caution

Risk of damage to camshaft.

- *The camshaft clamp - T10494- must not be used as a counterhold tool.*

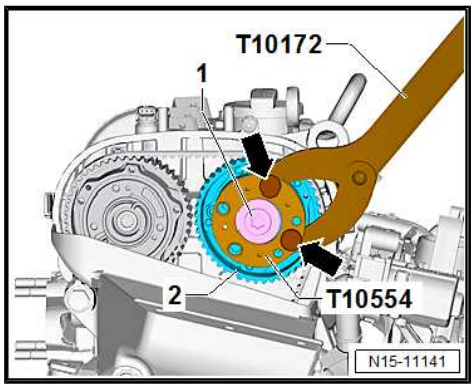
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Caution

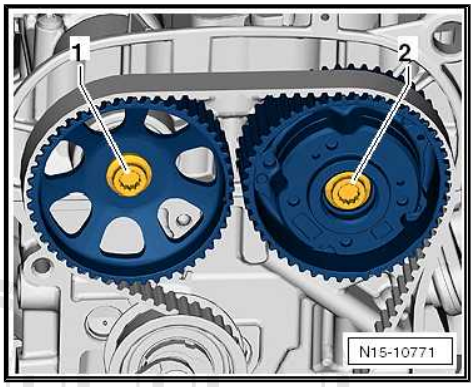
Risk of damage to engine due to oil on toothed belt.

- *Place a cloth underneath to catch escaping engine oil.*
- *Thoroughly clean any spaces/cavities that have filled with engine oil.*

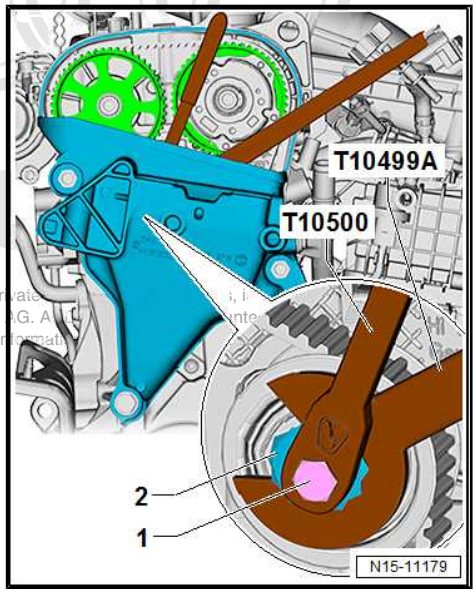
– Unscrew plug -1- on camshaft sprocket (inlet side).
– Use counterhold tool - T10554- and counterhold tool - T10172- to do so.



– Loosen bolt -2- approx. one turn using counterhold tool - T10554- and counterhold tool - T10172- .
– Loosen bolt -1- approx. one turn using counterhold tool - T10172A- with adapters -T10172/2- .



– Loosen bolt -1- using insert tool, 13 mm - T10500- and release tensioning roller on eccentric adjuster -2- using special wrench, 30 mm - T10499 A- .
– Detach toothed belt from camshaft sprockets.
• The bending radius of the toothed belt must be at least 25 mm (approx. half the diameter of the crankshaft sprocket).



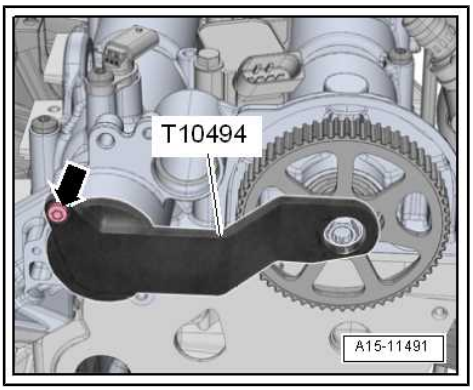
Protected by copyright. Copying for private
permitted unless authorised by AUDI AG. A
with respect to the correctness of

Installing (adjusting valve timing)

Note

- *Renew bolts tightened with specified tightening angle.*
- *Renew O-ring of plug if damaged.*

– Check “TDC” position of camshaft and crankshaft:
• Camshaft clamp - T10494- must be fitted to camshaft housing.

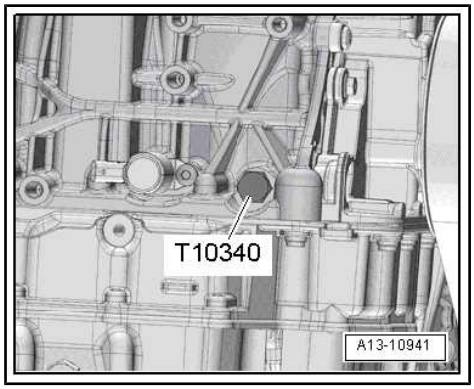


Caution

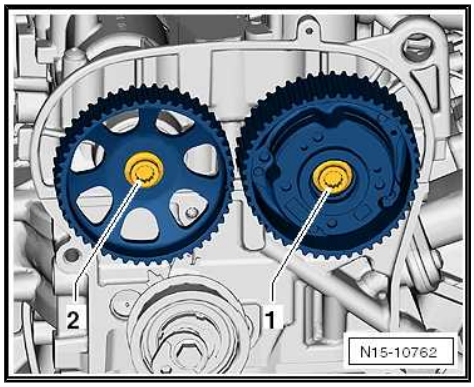
Risk of damage to camshafts.

- ***The camshaft clamp - T10494- must not be used as a counterhold tool.***

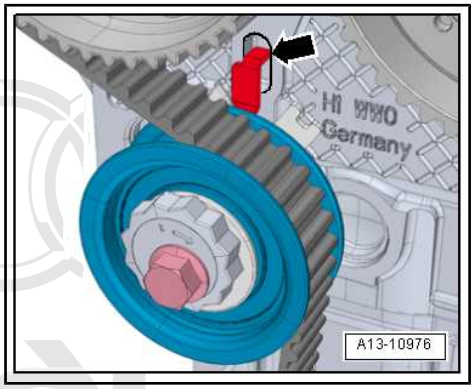
- Locking pin - T10340- is screwed into cylinder block as far as stop and tightened to 30 Nm.
- Crankshaft is turned in normal direction of rotation until it makes contact with locking pin - T10340- = “TDC” position.



– Fit new bolts -1, 2- for camshaft sprockets, but do not tighten.
- It should just be possible to turn the adjusters on the camshafts without axial movement.

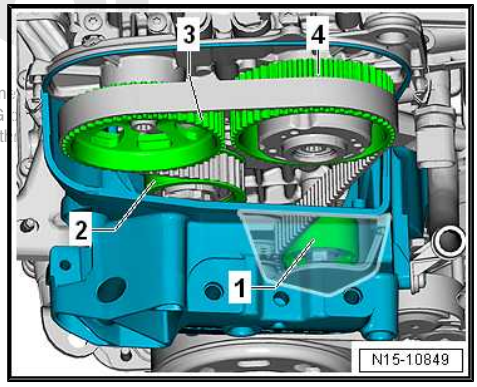


- Metal lug -arrow- of tensioning roller must engage in cast recess on cylinder head.



Note correct sequence for fitting toothed belt:

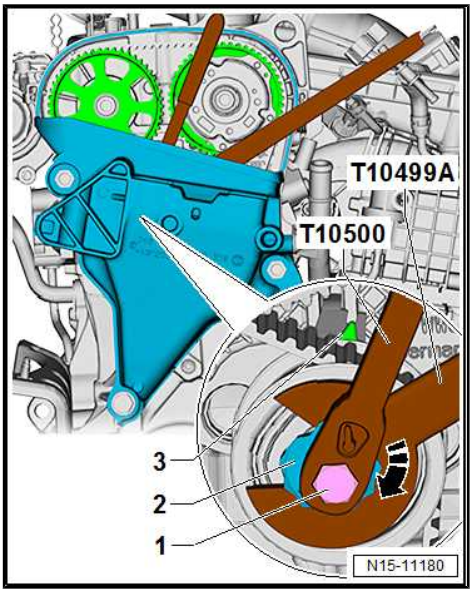
– Pull toothed belt upwards and fit onto idler roller -1-, tensioning roller -2- and camshaft sprockets -3, 4-.



...ected by copyright. Copying for private or comm...
permitted unless authorised by AUDI AG. AUDI AG ...
with respect to the correctness of information in t...

– Using special wrench, 30 mm - T10499 A- , turn eccentric adjuster -2- of tensioning roller in direction of -arrow- until adjustment indicator -3- is positioned approx. 10 mm to right of adjustment window.

– Turn eccentric adjuster -2- back until adjustment indicator -3- is positioned exactly in adjustment window.



Caution

Risk of damage to engine if tightening torque is incorrect.

- ***Torque wrench - VAS 6583- must be used to tighten the bolts.***
- ***When setting the tightening torque on the torque wrench - VAS 6583- , the reading on the insert tool, 13 mm - T10500- must be entered in the torque wrench.***

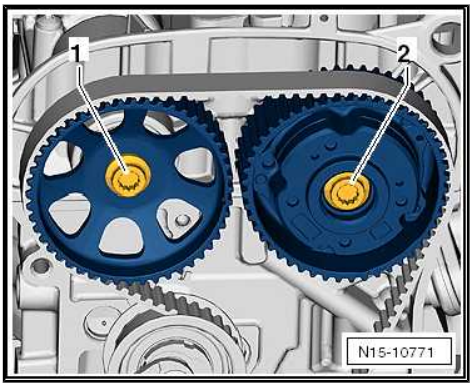
– Hold eccentric adjuster in this position and tighten bolt -1- using insert tool, 13 mm - T10500- with torque wrench - VAS 6583- .

Note

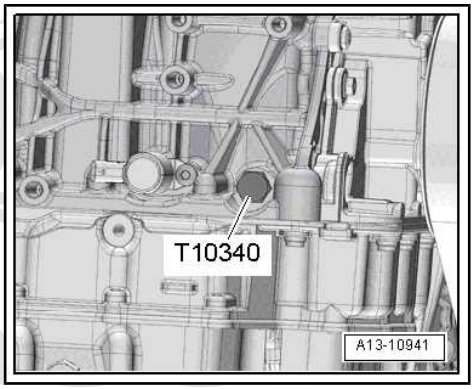
Turning the engine further or running the engine may lead to slight differences in the position of the adjustment indicator -3- in relation to the adjustment window. This does not affect the toothed belt tension.

– Tighten bolt -1- initially to 50 Nm using counterhold tool - T10172A- with adapters -T10172/2- .

– Tighten bolt -2- initially to 50 Nm using counterhold tool - T10554- and counterhold tool - T10172- .

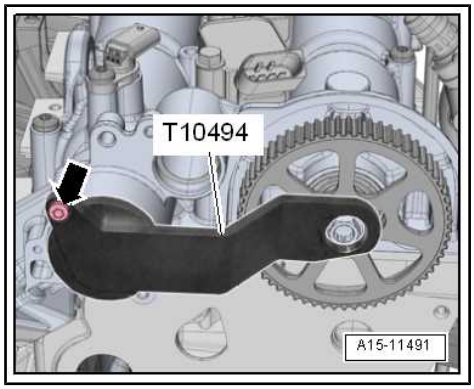


– Remove locking pin - T10340- .



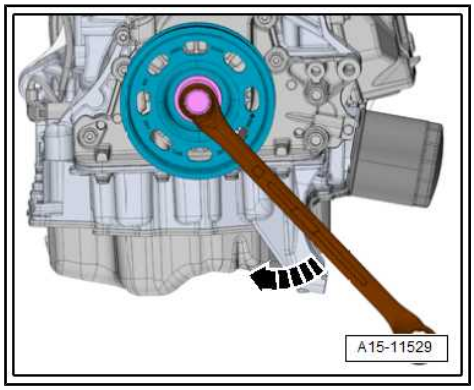
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Remove bolt -arrow- and detach camshaft clamp - T10494- .



Checking valve timing:

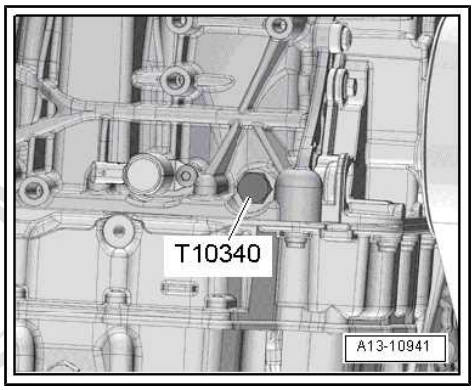
– Turn crankshaft 2 rotations in normal direction of engine rotation -arrow-.



– Screw locking pin - T10340- into cylinder block as far as stop and tighten to 30 Nm.

– Rotate crankshaft further in normal direction of rotation as far as stop.

• The locking pin is now in contact with the crank web.



Note

The locking pin - T10340- locks the crankshaft only in the direction of engine rotation.

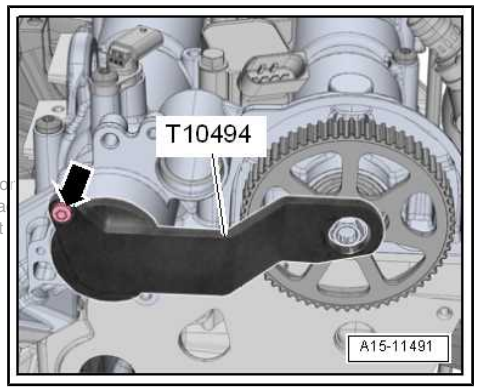
Note

♦ *It should be possible to insert the camshaft clamp - T10494- easily.*

♦ *Do not knock camshaft clamp into place with any kind of tool.*

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

– Insert camshaft clamp - T10494- into camshafts as far as stop and hand-tighten with bolt -arrow-.

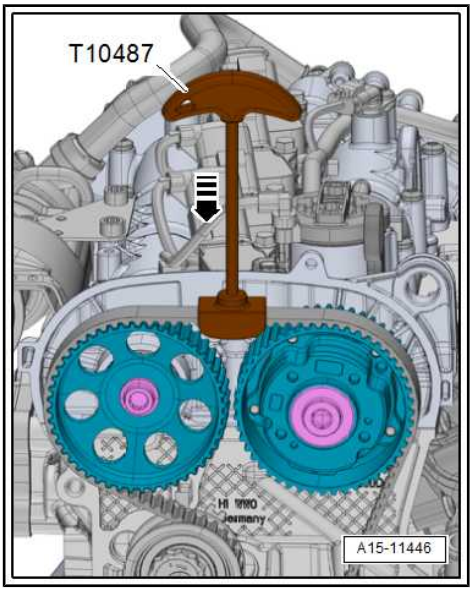


Note

- *If it is not possible to insert the camshaft clamp - T10494- easily:*
- *Press down toothed belt -arrow- using assembly tool -T10487- and then insert camshaft clamp - T10494- into camshafts as far as stop and hand-tighten bolt.*

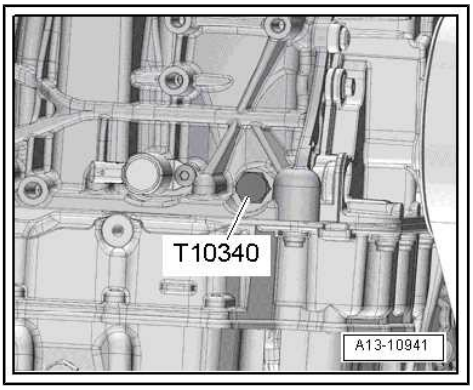
If it is not possible to insert camshaft clamp - T10494- , valve timing is not OK.

– Adjust valve timing again ⇒ page 91 .

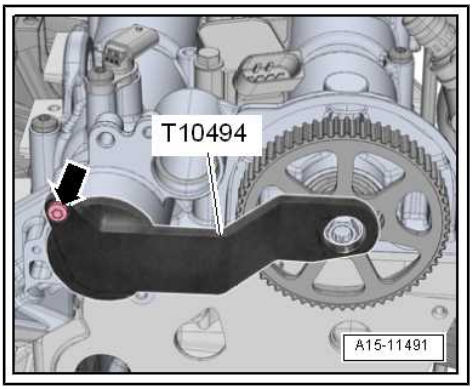


If it is possible to insert camshaft clamp - T10494- , valve timing is OK.

– Remove locking pin - T10340- .

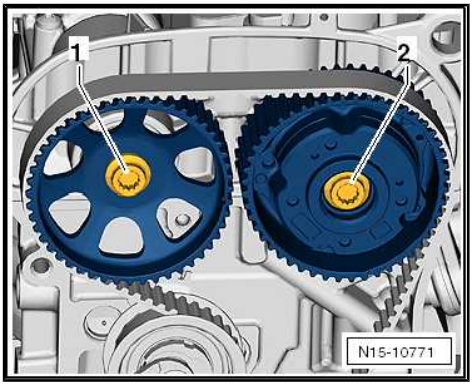


– Remove bolt -arrow- and detach camshaft clamp - T10494- .

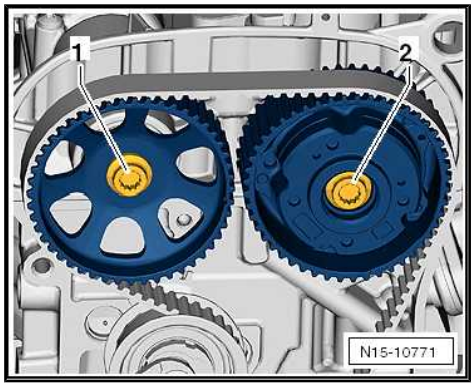


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

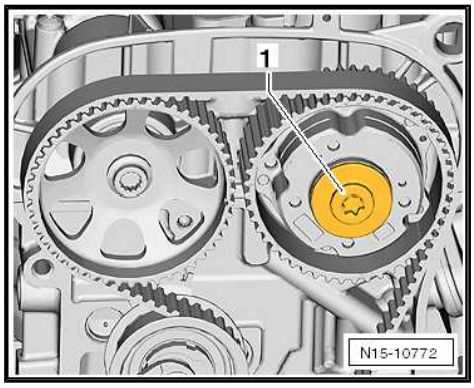
– Tighten bolt -1- to final tightening torque ⇒ page 82 using counterhold tool - T10172 A- with adapters -T10172/1- .



– Tighten bolts -1, 2- to final tightening torque ⇒ page 80 using counterhold tool - T10172A- with adapters -T10172/2- , or counterhold tool - T10554- and counterhold tool - T10172- .



– Tighten plug -1- using counterhold tool - T10554- and counterhold tool - T10172- .



Caution

Risk of irreparable damage to engine.

- *After completing work, check that locking pin - T10340- and camshaft clamp - T10494- have been removed.*

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

Tightening torques

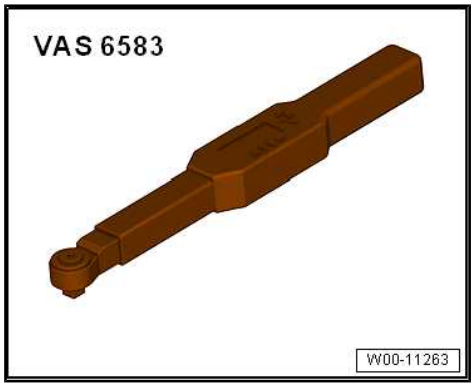
- ⇒ “1.2.1 Exploded view - toothed belt, engine code CHPB”, page 80
- ⇒ Fig. ““Plug for TDC drilling in cylinder block - tightening torque”“ , page 81
- ⇒ “2.2 Exploded view - camshaft housing”, page 169
- ⇒ “2.1 Exploded view - charge air system”, page 284
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

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.

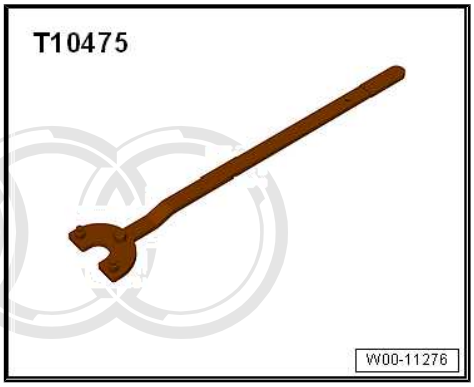
1.3.2 Detaching toothed belt from camshaft - engine codes CSSA, CZDA, CZDB, CWLA

Special tools and workshop equipment required

- Torque wrench - VAS 6583-



- Counterhold tool - T10475-

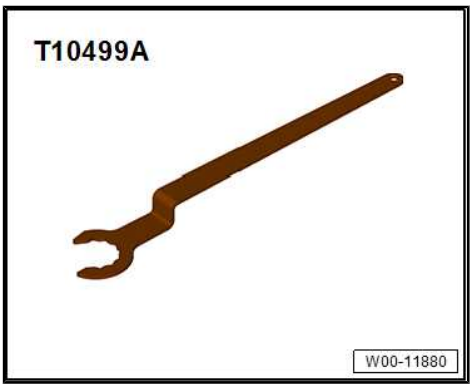


- Counterhold tool - T10172 A- with adapters -T10172/1-

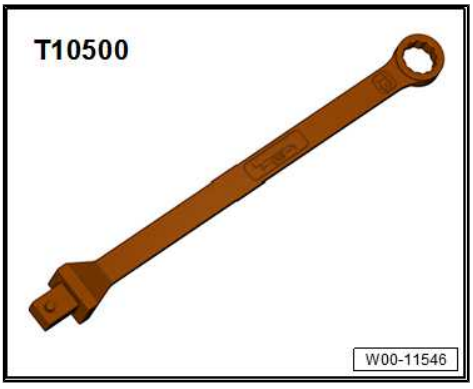


Protected by copyright. Copying for private or commercial purposes, in ... is not permitted unless authorised by AUDI AG. AUDI AG does not guara... ...ept ...ility with respect to the correctness of information in ... ...UDI...

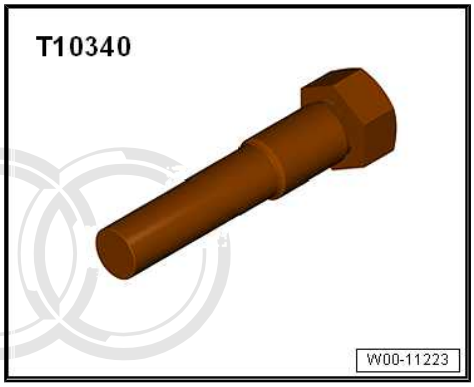
- Special wrench, 30 mm - T10499 A-



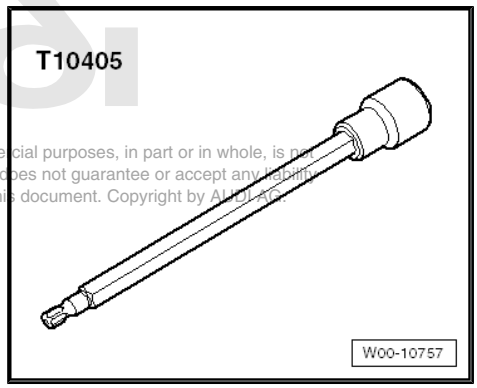
- Open end spanner insert, AF 13 - T10500-



- Locking pin - T10340-

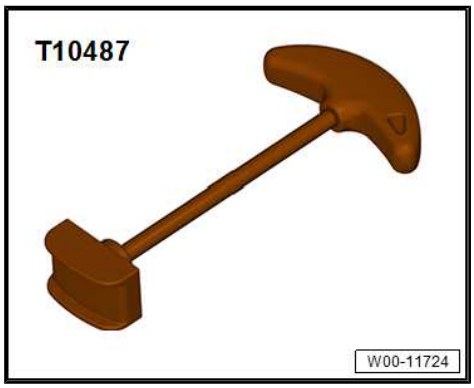


- Socket Torx T 30 - T10405-

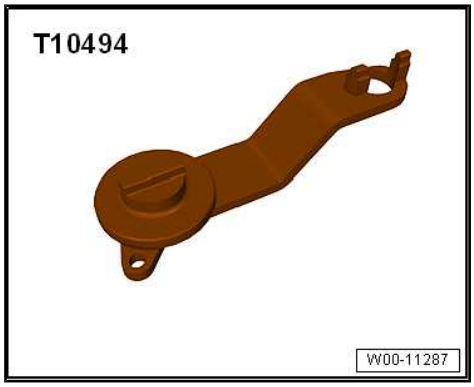


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

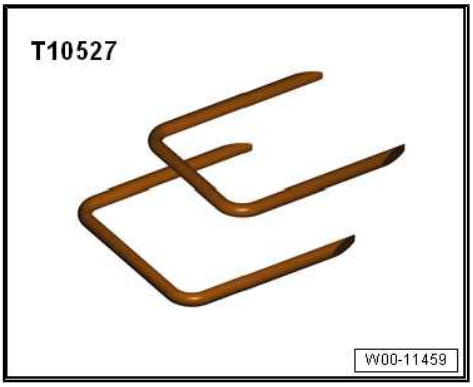
- Assembly tool - T10487-



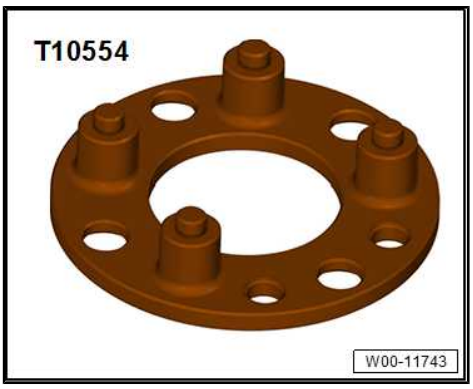
- Camshaft clamp - T10494-



♦ Release tool - T10527- and -T10527/1-

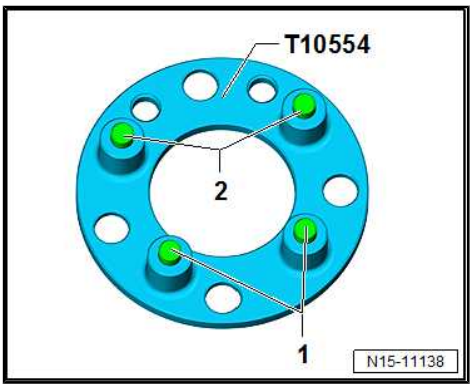


♦ Counterhold tool - T10554-



Counterhold tool - T10554-

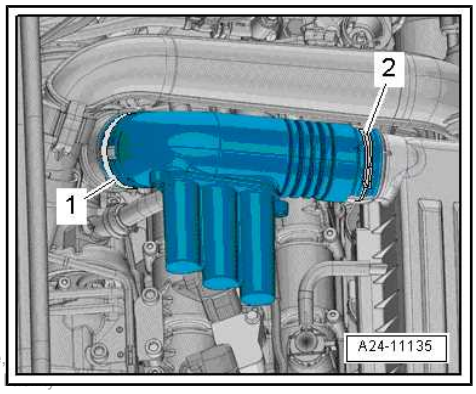
- The lugs -1- and -2- on counterhold tool - T10554- are different distances apart.
- Counterhold tool - T10554- can only be applied in one position.
- Position counterhold tool - T10554- flush against camshaft adjusters.



Procedure

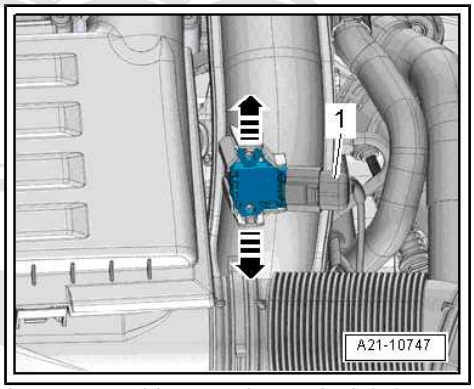
– Remove engine cover panel ⇒ page 44 .

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



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

– Unplug electrical connector -1-.

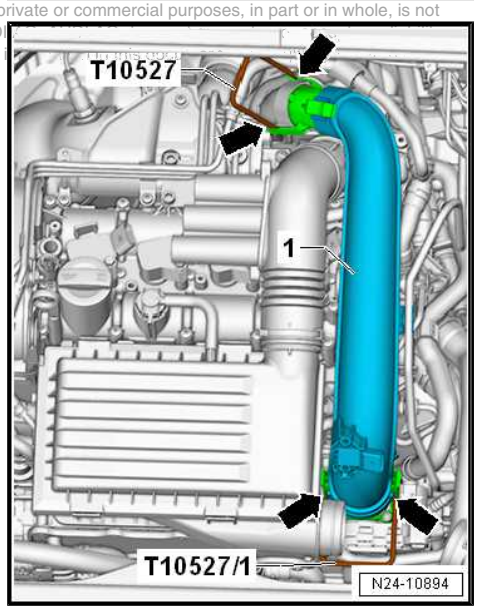


Note

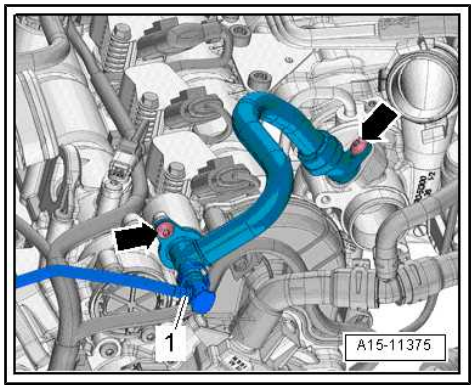
Disregard -arrows-.

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.

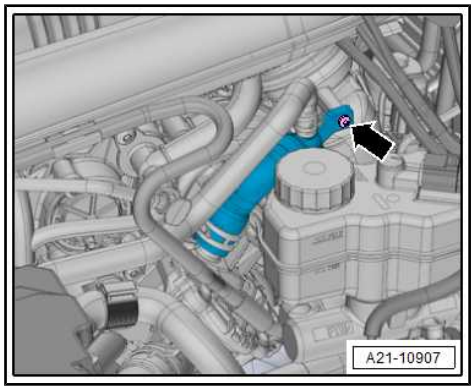
– Release fasteners -arrows- with release tool - T10527- and - T10527/1- .
– Detach air pipe -1-.



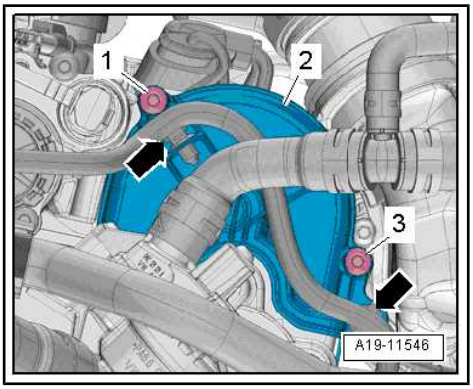
– Press release tabs and disconnect hose -1- for activated charcoal filter.
– Remove bolts -arrows- and detach crankcase breather hose.



– If fitted, remove bolt -arrow- from connection and press coolant hose slightly forwards.



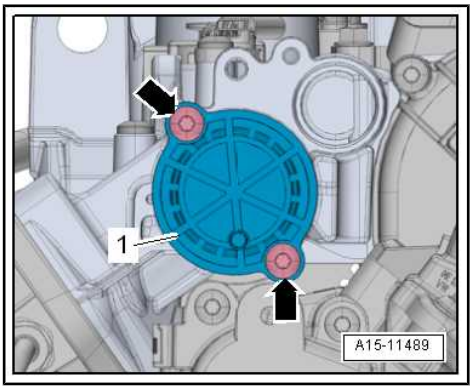
– Move electrical wiring harness clear -arrows-.
– Unscrew bolts -1, 3- and remove cover -2- for toothed belt for coolant pump.



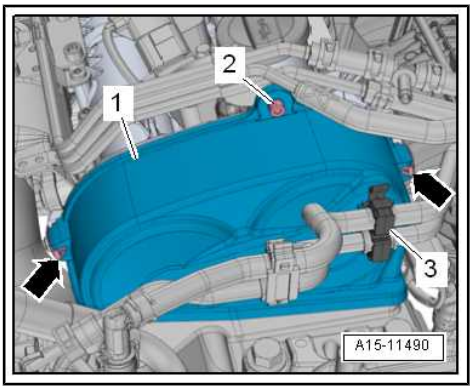
Note

- *Danger of chemical damage to seal for coolant pump if oil enters between coolant pump and cylinder head.*
- *Cover coolant pump with a cloth.*
- *Catch escaping engine oil with a cloth.*

– Unscrew bolts -arrows- and detach sealing cap -1-.



– Move clear hoses at bracket -3-.
– Unscrew bolt -2-.
– Release clips -arrows- and detach toothed belt cover (top) -1-.

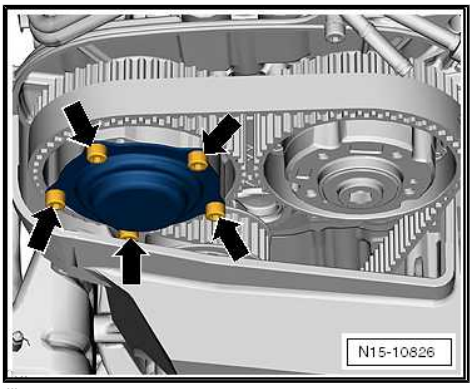


Caution

Risk of damage to engine due to oil on toothed belt.

- ***Place a cloth underneath to catch escaping engine oil.***

– Remove bolts -arrows-.

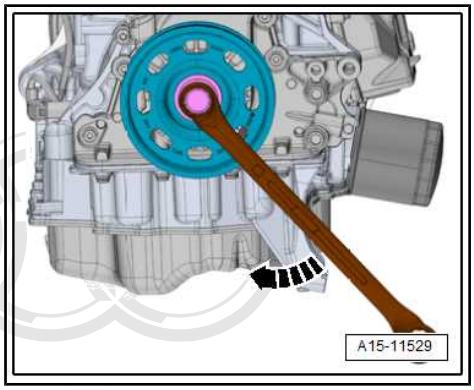


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Note

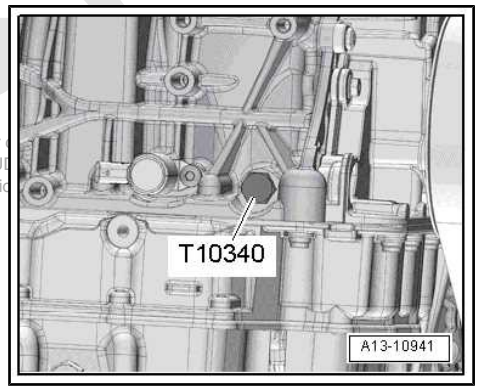
To remove all bolts, rotate crankshaft in direction of engine rotation by turning bolt for vibration damper pulley in direction of -arrow-.

– Detach cover from camshaft adjuster of exhaust camshaft.



Rotate crankshaft to “TDC” as follows:

– Unscrew plug for “TDC” hole on cylinder block.
– Screw locking pin - T10340- into cylinder block as far as stop and tighten to 30 Nm.
– Rotate crankshaft in normal direction of rotation as far as stop.
• The locking pin is now in contact with the crank web.



Protected by copyright. Copying for private or
permitted unless authorised by AUDI AG. AU
Information

Note

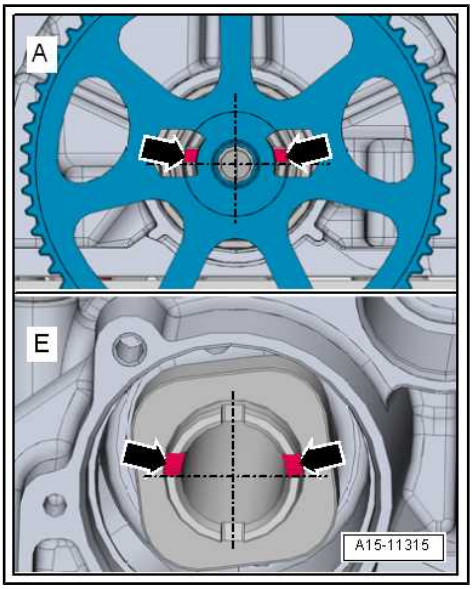
The locking pin - T10340- locks the crankshaft only in the direction of engine rotation.

Caution

Risk of damage to engine.

- ***If the locking pin - T10340- cannot be screwed in as far as the stop, the crankshaft is not in the correct position.***
- ***In this case proceed as follows:***
- ***Remove locking pin.***
- ***Turn crankshaft by 90° in direction of engine rotation.***
- ***Screw locking pin - T10340- into cylinder block as far as stop and tighten to 30 Nm.***
- ***Turn crankshaft further in normal direction of rotation as far as stop.***

- On both camshafts, asymmetrically positioned grooves -top and bottom arrows- on gearbox end must now face upwards, as shown in illustrations.
- On exhaust camshaft -A-, grooves -top arrows- are accessible via openings in coolant pump drive sprocket.
- On inlet camshaft -E-, grooves -bottom arrows- are directly accessible.



Note

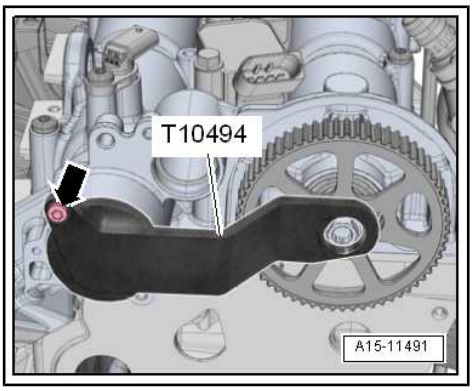
The camshafts have two pairs of grooves: one positioned symmetrically and one positioned asymmetrically. In TDC position, the asymmetrically positioned pair of grooves must be above the imaginary horizontal centre line.

– If camshafts are not positioned as described, unscrew locking pin - T10340- , turn crankshaft one rotation further and return to TDC position.

Note

- *It should be possible to insert the camshaft clamp - T10494- easily.*
- *Do not knock camshaft clamp into place with any kind of tool.*

– When camshafts are positioned as described, insert camshaft clamp - T10494- into camshafts as far as stop and hand-tighten bolt -arrow-.



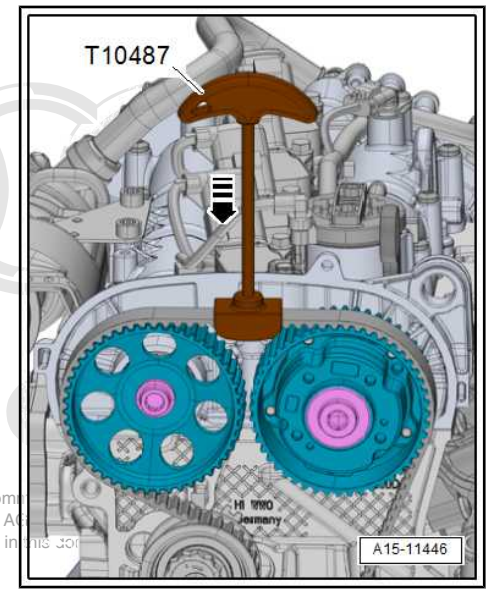
Note

- *If it is not possible to insert the camshaft clamp - T10494- easily:*
- *Press down toothed belt -arrow- using assembly tool -T10487- and then insert camshaft clamp - T10494- into camshafts as far as stop and hand-tighten bolt.*

Caution

Risk of damage to camshaft.

- ***The camshaft clamp - T10494- must not be used as a counterhold tool.***

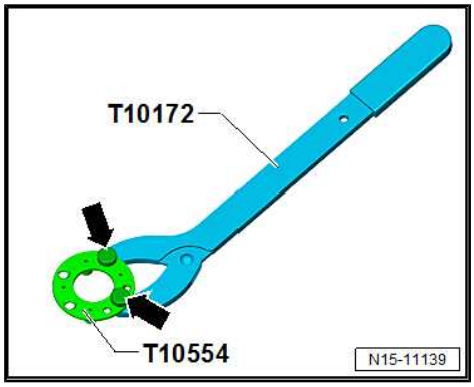


Protected by copyright. Copying for private or comm
permitted unless authorised by AUDI AG. AUDI A
with respect to the correctness of information in this

Inlet camshaft

– Assemble tools as shown.

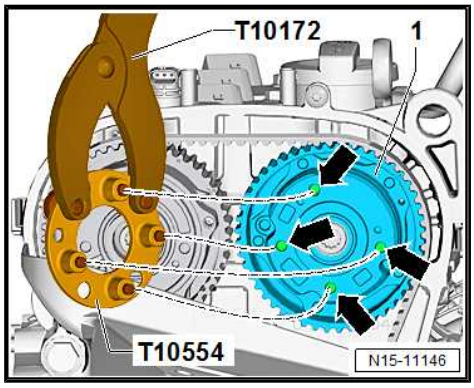
– Attach counterhold tool - T10172- to counterhold tool - T10554/1- using knurled screws -T10554/2- -arrows-.



– Apply counterhold tool - T10554/1- with counterhold tool - T10172- flush against camshaft adjuster -1-, as shown.

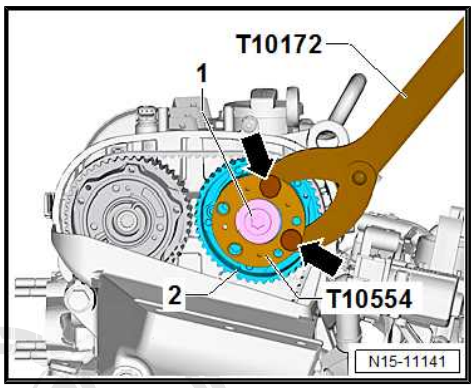
– Lugs must be inserted correctly into holes -arrows-.

– Secure camshaft with counterhold tool - T10172- and counterhold tool - T10554/1- so that it cannot turn.



– Unscrew plug -1- and loosen bolt located behind it for camshaft sprocket (inlet side) one turn.

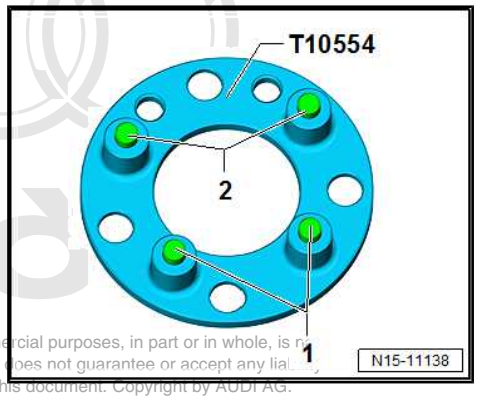
– Use counterhold tool - T10172- and counterhold tool - T10554/1- to do so.



Exhaust camshaft:

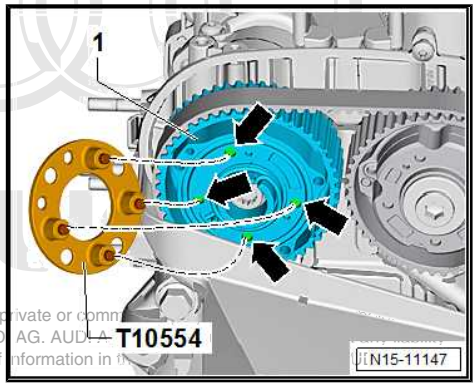
– Guide in counterhold tool - T10554/1- between camshaft adjuster and engine support.

– To do so, first guide area between lugs -2- on counterhold tool - T10554/1- past camshaft adjuster.



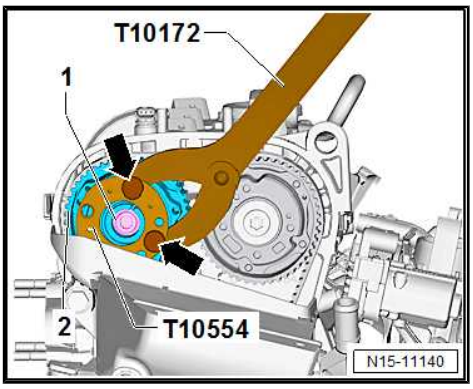
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Turn counterhold tool - T10554/1- so that it can be inserted in holes -arrows- as shown.
– Position counterhold tool - T10554/1- flush against camshaft adjuster -1-.



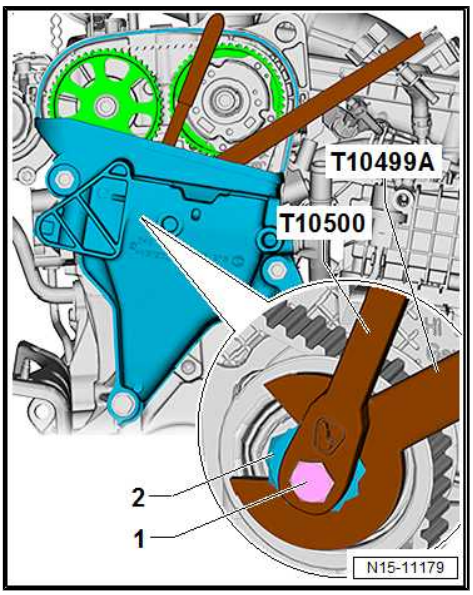
Protected by copyright. Copying for private or comm
permitted unless authorised by AUD AG. AUD
with respect to the correctness of information in

– Loosen bolt -1- one turn. Secure camshaft sprocket in place with counterhold tool - T10172- and counterhold tool - T10554/1- .



Both sides (continued):

– Fit special wrench, 30 mm - T10499 A- onto eccentric adjuster -2- of tensioning roller.
– Loosen bolt -1- using insert tool, 13 mm - T10500- .
– Release tensioning roller on eccentric adjuster -2- using special wrench, 30 mm - T10499 A- .
– Detach toothed belt from camshaft sprockets.
• The bending radius of the toothed belt must be at least 25 mm (approx. half the diameter of the crankshaft sprocket).



Installing (adjusting valve timing)

Note

♦ *Renew bolts tightened with specified tightening angle.*
♦ *Renew O-ring of plug if damaged.*
♦ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

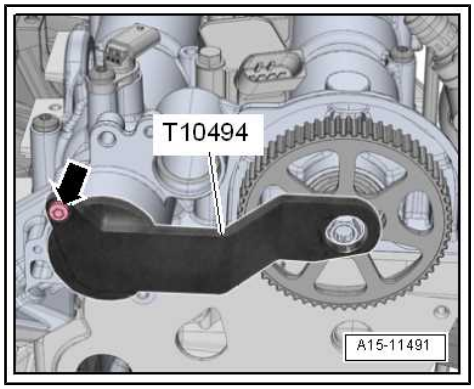
– Check “TDC” position of camshaft and crankshaft:

- Camshaft clamp - T10494- must be fitted to camshaft housing.

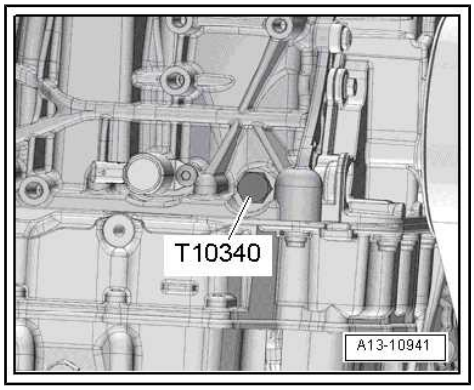
Caution

Risk of damage to camshafts.

- *The camshaft clamp - T10494- must not be used as a counterhold tool.*



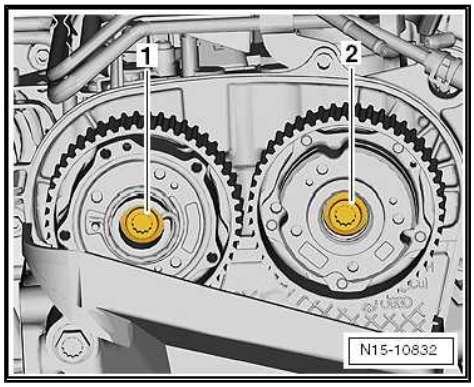
- Locking pin - T10340- is screwed into cylinder block as far as stop and tightened to 30 Nm.
- Crankshaft is turned in normal direction of rotation until it makes contact with locking pin - T10340- = “TDC” position.



Caution

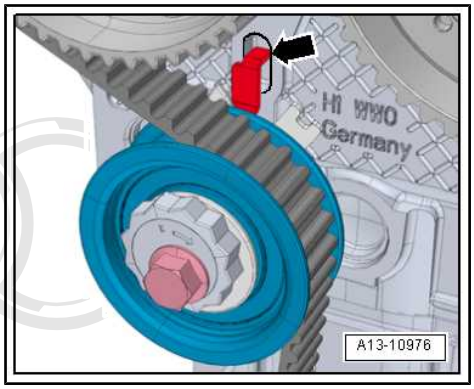
Risk of damage to camshafts.

- *The camshaft clamp - T10494- must not be used as a counterhold tool.*



– Fit new bolts -1, 2- for camshaft sprockets, but do not tighten.

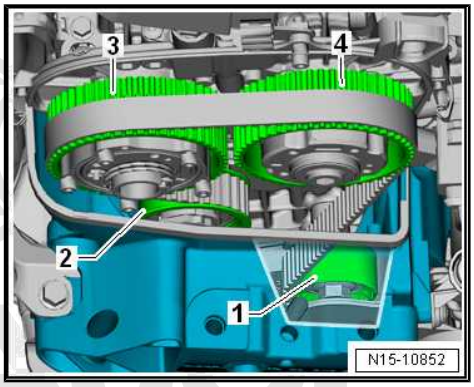
- It should just be possible to turn the adjusters on the camshafts without axial movement.
- Metal lug -arrow- of tensioning roller must engage in cast recess on cylinder head.



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.

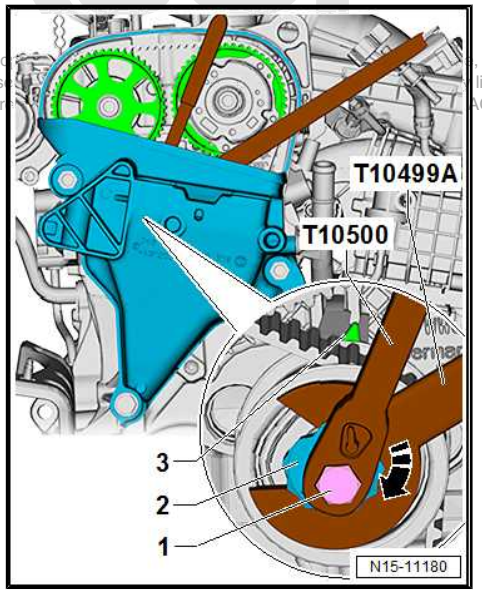
Note correct sequence for fitting toothed belt:

– Pull toothed belt upwards and fit onto idler roller -1-, tensioning roller -2- and camshaft sprockets -3, 4-.



– Using special wrench, 30 mm - T10499 A- , turn eccentric adjuster -2- of tensioning roller in direction of -arrow- until adjustment indicator -3- is positioned approx. 10 mm to right of adjustment window.

– Turn eccentric adjuster -2- back until adjustment indicator -3- is positioned exactly in adjustment window.



Caution

Risk of damage to engine if tightening torque is incorrect.

- ***Torque wrench - VAS 6583- must be used to tighten the bolts.***
- ***When setting the tightening torque on the torque wrench - VAS 6583- , the reading on the insert tool, 13 mm - T10500- must be entered in the torque wrench.***

– Hold eccentric adjuster in this position and tighten bolt -1- using insert tool, 13 mm - T10500- with torque wrench - VAS 6583- .

Note

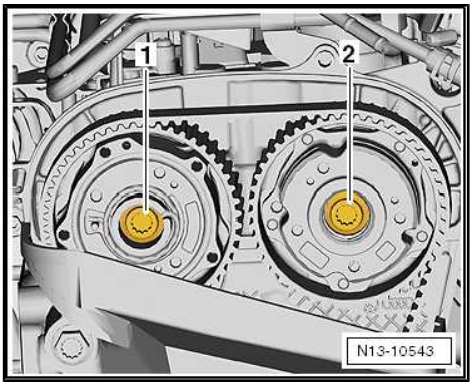
Turning the engine further or running the engine may lead to slight differences in the position of the adjustment indicator -3- in relation to the adjustment window. This does not affect the toothed belt tension.

Caution

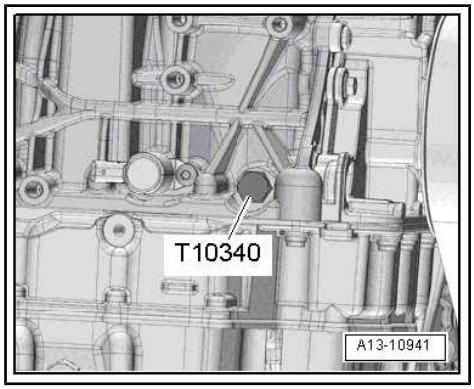
Risk of damage to camshafts.

- ***The camshaft clamp - T10494- must not be used as a counterhold tool.***

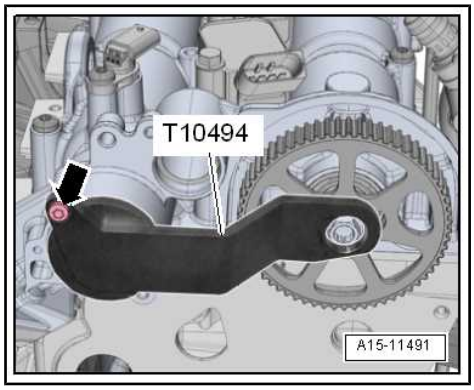
– Tighten bolts -1, 2- initially to 50 Nm using counterhold tool - T10172A- with adapters -T10172/2- , or counterhold tool - T10554- and counterhold tool - T10172- .



– Remove locking pin - T10340- .

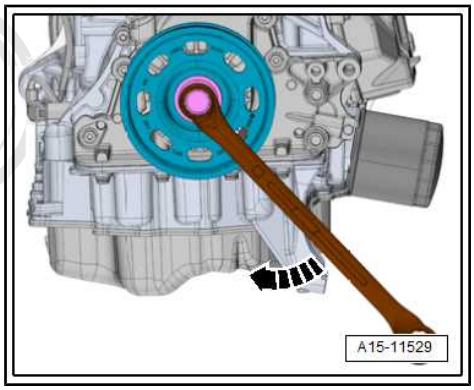


– Remove bolt -arrow- and detach camshaft clamp - T10494- .



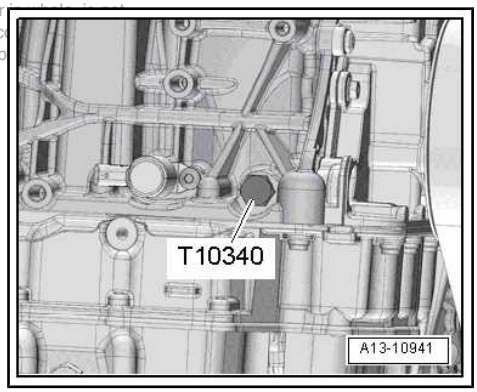
Checking valve timing:

– Turn crankshaft 2 rotations in normal direction of engine rotation.



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

– Screw locking pin - T10340- into cylinder block as far as stop and tighten to 30 Nm.
– Rotate crankshaft further in normal direction of rotation as far as stop.
• The crank web is now in contact with the locking pin.



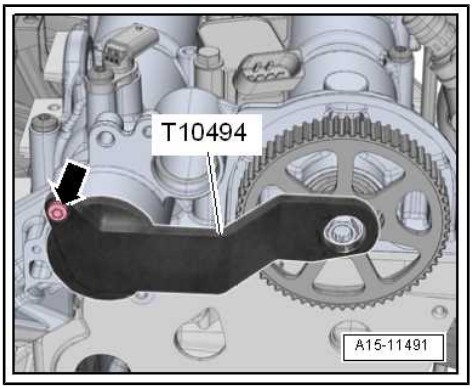
Note

The locking pin - T10340- locks the crankshaft only in the direction of engine rotation.

Note

- *It should be possible to insert the camshaft clamp - T10494- easily.*
- *Do not knock camshaft clamp into place with any kind of tool.*

– Insert camshaft clamp - T10494- into camshafts as far as stop and hand-tighten with bolt -arrow-.



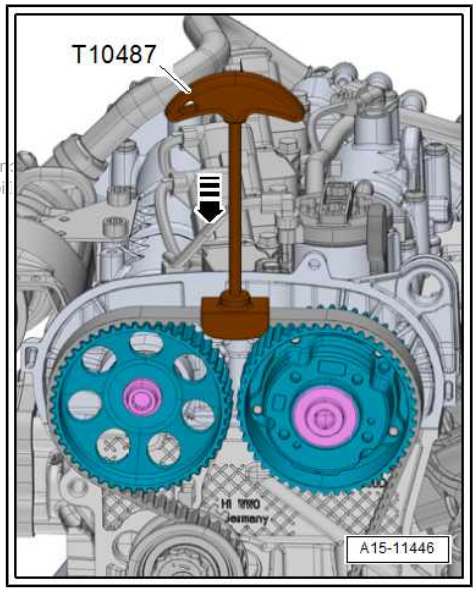
Note

- *If it is not possible to insert the camshaft clamp - T10494- easily:*
- *Press down toothed belt -arrow- using assembly tool -T10487- and then insert camshaft clamp - T10494- into camshafts as far as stop and hand-tighten bolt.*

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorized by AUDI AG. Any liability for the correctness, completeness or currency of the data is excluded. Rights of third parties may exist. Copyright by AUDI AG.

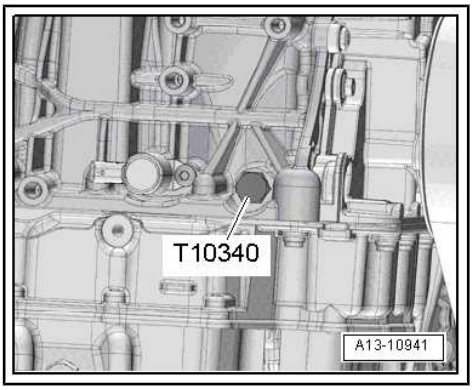
If it is not possible to insert camshaft clamp - T10494- , valve timing is not OK.

– Adjust valve timing again ⇒ page 105 .

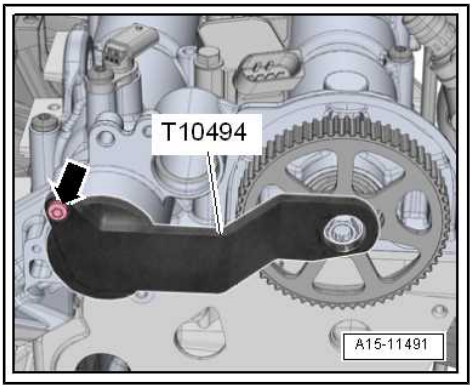


If it is possible to insert camshaft clamp - T10494- , valve timing is OK.

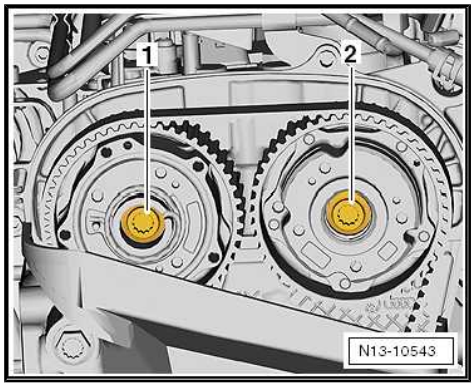
– Remove locking pin - T10340- .



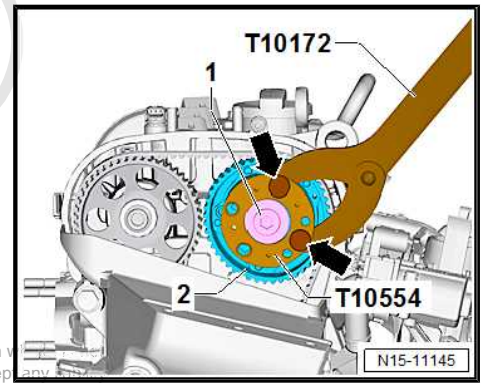
– Remove bolt -arrow- and detach camshaft clamp - T10494- .



– Tighten bolts -1, 2- to final tightening torque ⇒ page 82 using counterhold tool - T10172A- with adapters -T10172/2- , or counterhold tool - T10554- and counterhold tool - T10172- .



– Tighten plug -1- using counterhold tool - T10172- with counterhold tool - T10554- .



Caution

Risk of irreparable damage to engine.

- *After completing work, check that locking pin - T10340- and camshaft clamp - T10494- have been removed.*

Further installation is carried out in the reverse order; note the following:

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.

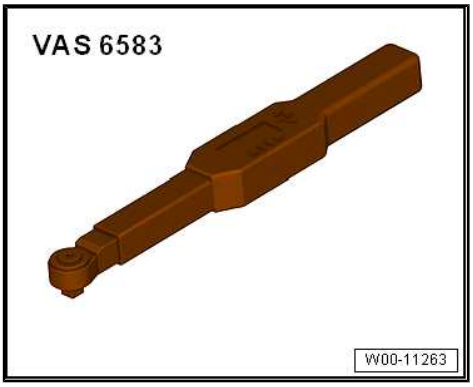
– Install engine cover panel ⇒ “3 Engine cover panel”, page 44 .

Tightening torques

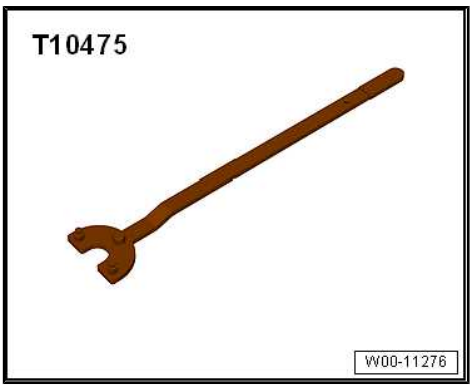
- ⇒ “1.2.2 Exploded view - toothed belt, engine codes CSSA, CZDA, CZEA, CZDB, CWLA”, page 82
- ⇒ “1.1 Exploded view - toothed belt cover”, page 79
- ⇒ Fig. ““Plug for TDC drilling in cylinder block - tightening torque”“ , page 81
- ⇒ “2.2 Exploded view - camshaft housing”, page 169
- ⇒ “3.1 Exploded view - crankcase breather system”, page 218
- ⇒ “2.1 Exploded view - coolant pump/thermostat”, page 237
- ⇒ “1.1 Exploded view - turbocharger”, page 273
- ⇒ “2.1 Exploded view - charge air system”, page 284

1.3.3 Detaching toothed belt from camshaft - engine code CZEA

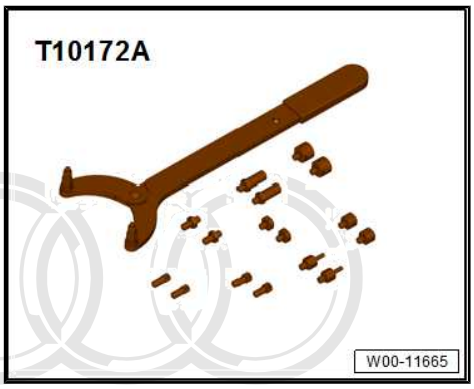
- Torque wrench - VAS 6583-



- Counterhold tool - T10475-



- Counterhold tool - T10172 A- with adapters -T10172/1-

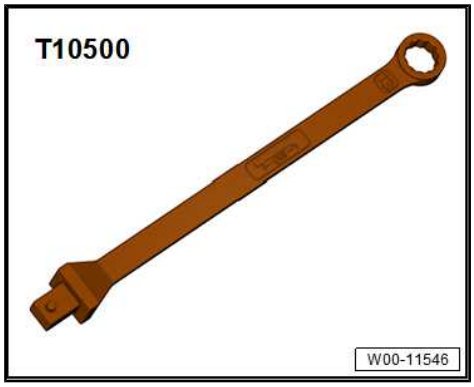


- Special wrench, 30 mm - T10499 A-

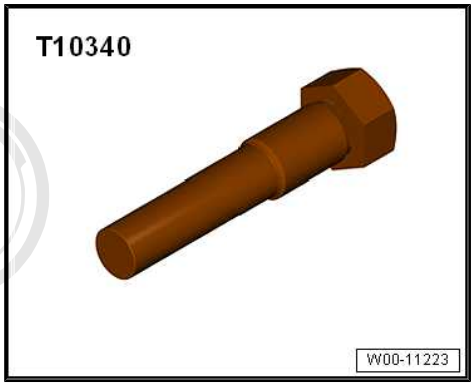


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

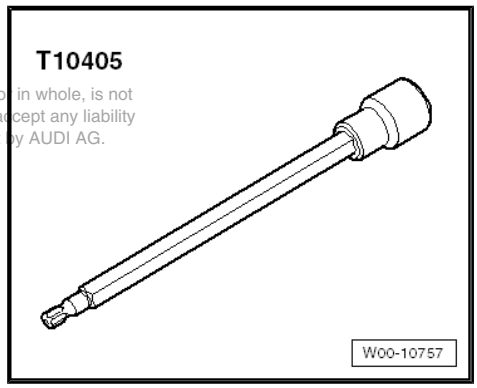
- Open end spanner insert, AF 13 - T10500-



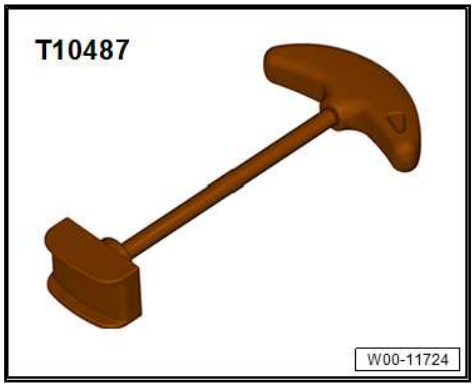
- Locking pin - T10340-



- Socket Torx T 30 - T10405-

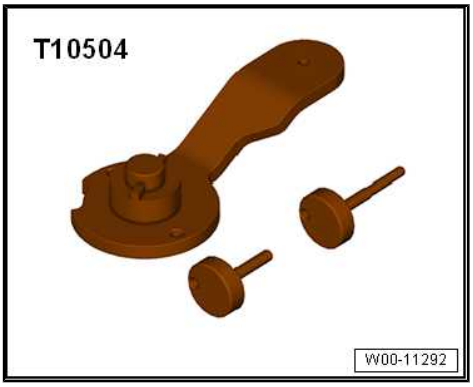


- Assembly tool - T10487-

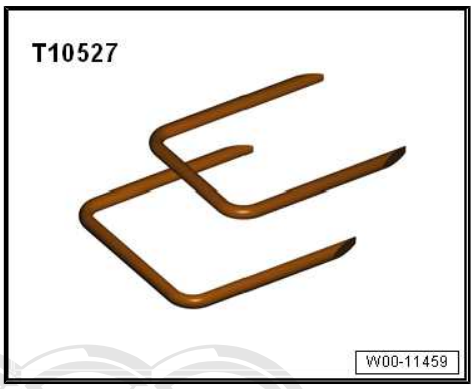


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Camshaft clamp - T10504-



- Release tool - T10527- and -T10527/1-



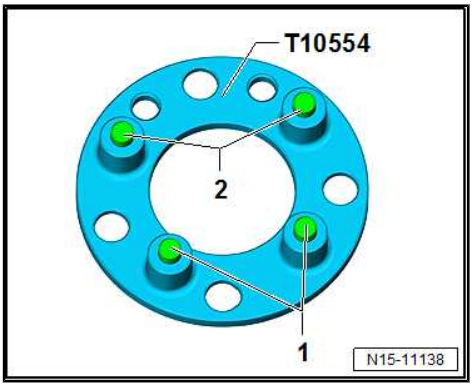
- Counterhold tool - T10554-



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

Counterhold tool - T10554-

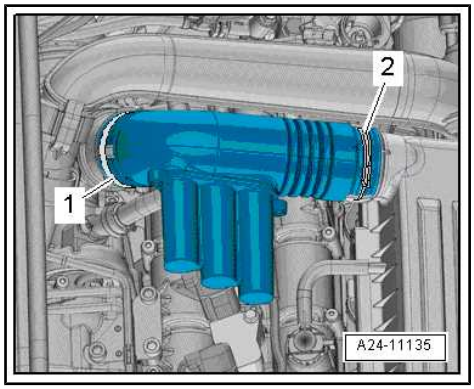
- The lugs -1- and -2- on counterhold tool - T10554- are different distances apart.
- Counterhold tool - T10554- can only be applied in one position.
- Position counterhold tool - T10554- flush against camshaft adjusters.



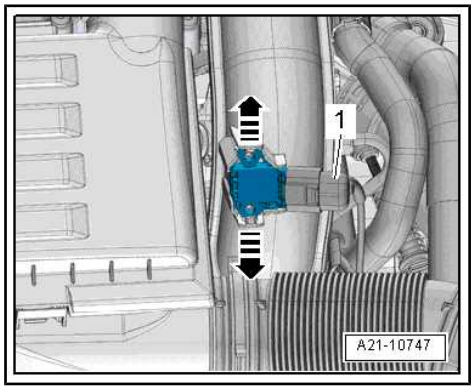
Procedure

– Remove engine cover panel ⇒ page 44 .

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



– Unplug electrical connector -1- at charge pressure sender - G31- / intake air temperature sender 2 - G299- .

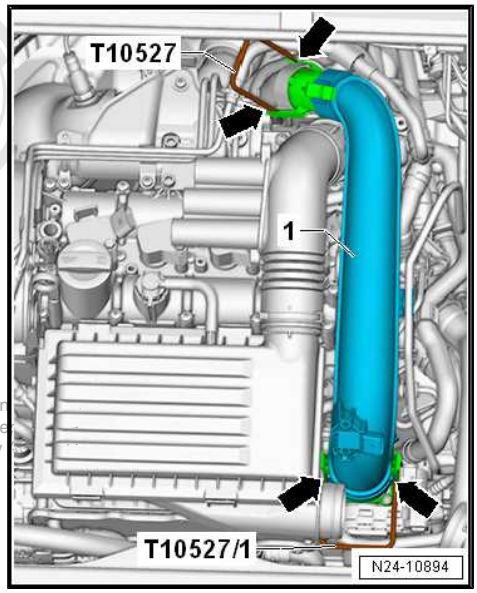


Note

Disregard -arrows-.

– Move air hoses clear at air pipe.

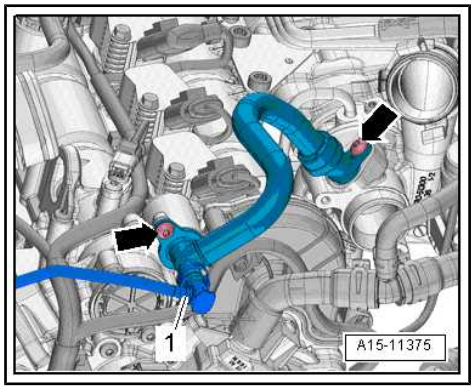
– Release fasteners -arrows- with release tool - T10527- and - T10527/1- , and detach air pipe -1-.



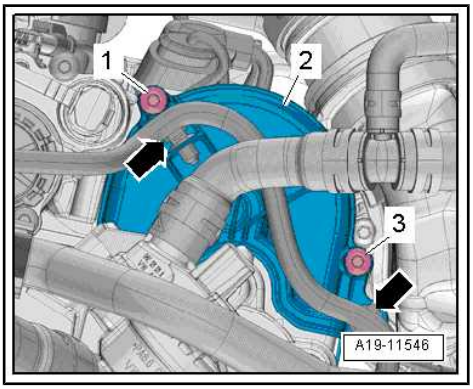
Protected by copyright. Copying for private or commercial purposes, in part or in
permitted unless authorised by AUDI AG. AUDI AG does not guarantee or acce
with respect to the correctness of information in this document. Copyright by

– Press release tabs and disconnect hose -1- for activated charcoal filter.

– Remove bolts -arrows- and detach crankcase breather hose.



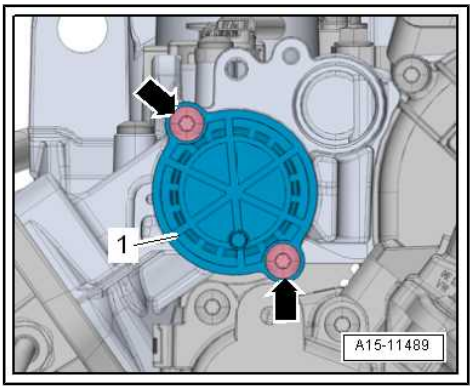
– Move electrical wiring harness clear -arrows-.
– Unscrew bolts -1, 3- and remove cover -2- for toothed belt for coolant pump.



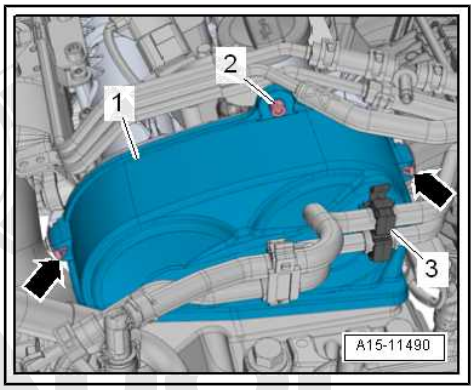
Note

- *Danger of chemical damage to seal for coolant pump if oil enters between coolant pump and cylinder head.*
- *Cover coolant pump with a cloth.*
- *Catch escaping engine oil with a cloth.*

– Unscrew bolts -arrows- and detach sealing cap -1-.



– Move clear hoses at bracket -3-.
– Unscrew bolt -2-.
– Release clips -arrows- and detach toothed belt cover (top) -1-.



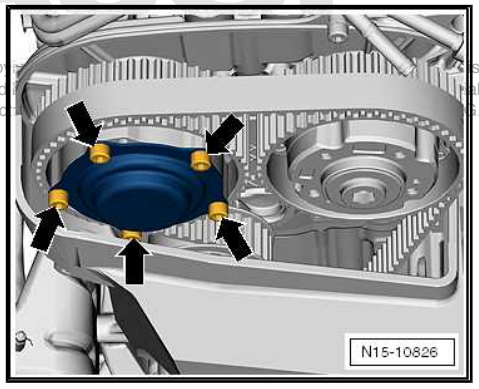
Caution

Risk of damage to engine due to oil on toothed belt.

- ***Place a cloth underneath to catch escaping engine oil.***

Protected by copyright. Copy... is not permitted unless authorised... liability with respect to the correct... s.

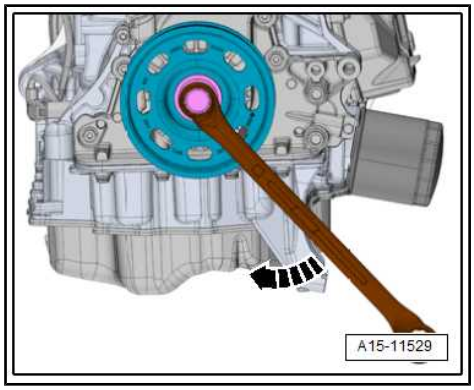
– Remove bolts -arrows-.



Note

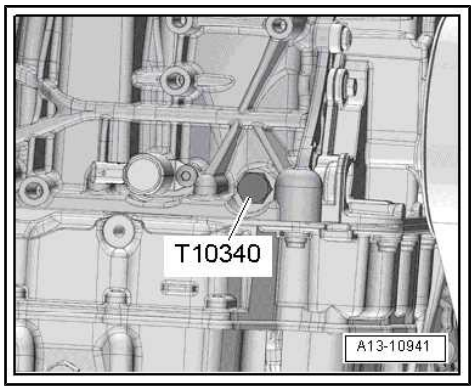
To remove all bolts, rotate crankshaft in direction of engine rotation by turning bolt for vibration damper pulley in direction of -arrow-.

– Detach cover from camshaft adjuster of exhaust camshaft.



Rotate crankshaft to “TDC” as follows:

– Unscrew plug for “TDC” hole on cylinder block.
– Screw locking pin - T10340- into cylinder block as far as stop and tighten to 30 Nm.
– Rotate crankshaft in normal direction of rotation as far as stop.
• The locking pin is now in contact with the crank web.



Note

The locking pin - T10340- locks the crankshaft only in the direction of engine rotation.

Caution

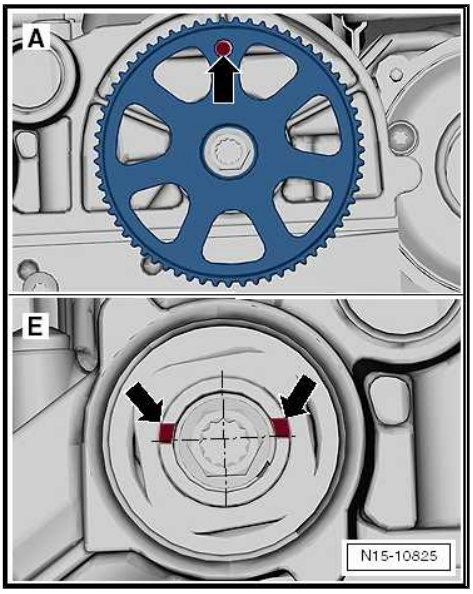
Risk of damage to engine.

- ***If the locking pin - T10340- cannot be screwed in as far as the stop, the crankshaft is not in the correct position.***
- ***In this case proceed as follows:***
- ***Remove locking pin.***
- ***Turn crankshaft by 90° in direction of engine rotation.***
- ***Screw locking pin - T10340- into cylinder block as far as stop and tighten to 30 Nm.***
- ***Turn crankshaft further in normal direction of rotation as far as stop.***

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 exhaust camshaft -A-, hole -arrow- in coolant pump drive sprocket must be aligned with hole in camshaft housing.
- On inlet camshaft -E-, grooves -arrows- must be positioned above centre of camshaft.

– If camshafts are not positioned as described, unscrew locking pin - T10340- , turn crankshaft one rotation further and return to TDC position.



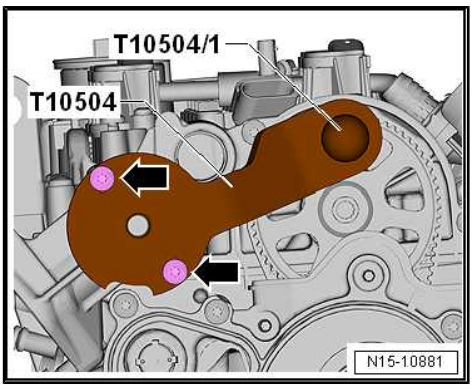
Note

- *It should be possible to insert the camshaft clamp - T10504- easily.*
- *Do not knock camshaft clamp into place with any kind of tool.*

– When camshafts are positioned as described, insert camshaft clamp - T10504- into inlet camshaft as far as stop and fit bolts -arrows- (do not screw in yet).

– Insert locating pin -T10504/1- as far as stop.

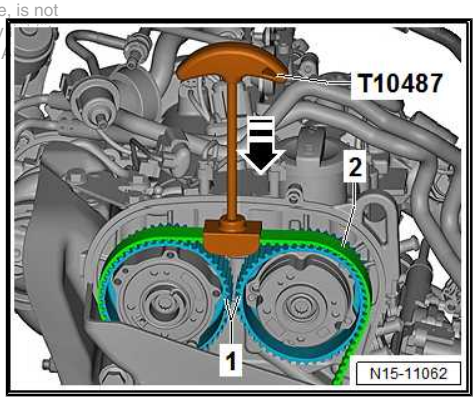
– Tighten bolts -arrows- hand-tight.



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

If it is not possible to insert camshaft clamp - T10504- easily, press down toothed belt -arrow- using assembly tool - T10487- and then insert camshaft clamp - T10504- into camshafts as far as stop and tighten bolts hand-tight. Insert locating pin -T10504/1- as far as stop.



Caution

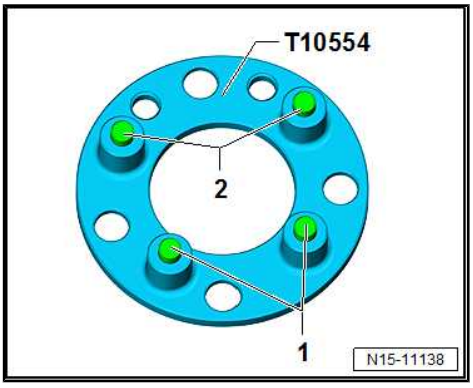
Risk of damage to camshaft.

- ***The camshaft clamp - T10504- must not be used as a counterhold tool.***

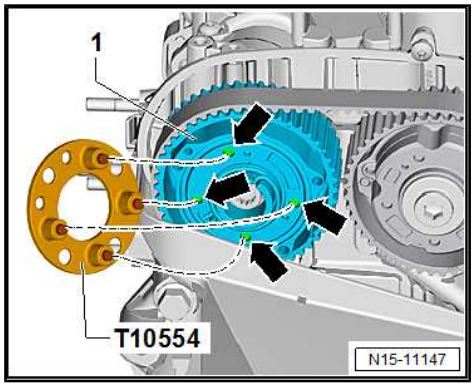
Exhaust camshaft:

– Guide in counterhold tool - T10554- between camshaft adjuster and engine support.

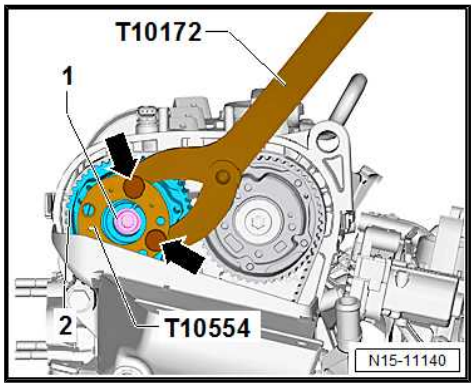
– To do so, first guide area between lugs -2- on counterhold tool - T10554- past camshaft adjuster.



– Turn counterhold tool - T10554- so that it can be inserted in holes -arrows- as shown.
– Position counterhold tool - T10554- flush against camshaft adjuster -1-.

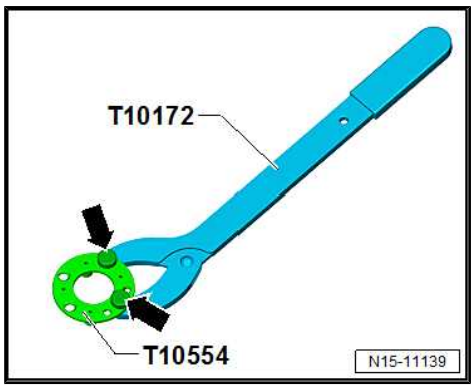


– Loosen bolt -1- one turn. Secure camshaft sprocket in place with counterhold tool - T10554- and counterhold tool - T10172- .

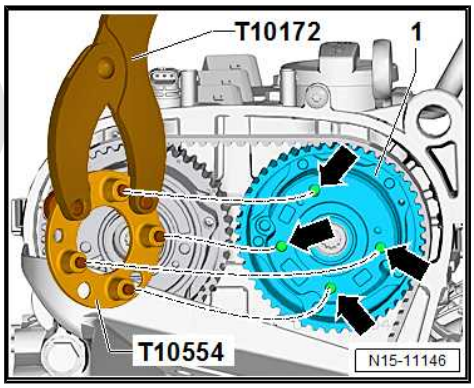


Inlet camshaft

– Assemble tools as shown.
– Attach counterhold tool - T10172- to counterhold tool - T10554- using knurled screws -arrows-.



– Apply counterhold tool - T10554- with counterhold tool - T10172- to camshaft sprocket -1-, as shown.
– Lugs must be inserted correctly into holes -arrows-.
– Position counterhold tool - T10554- flush against camshaft adjuster -1-.
– Secure camshaft with counterhold tool - T10554- and counterhold tool - T10172- so that it cannot turn.



Caution

Risk of damage to engine due to oil on toothed belt.

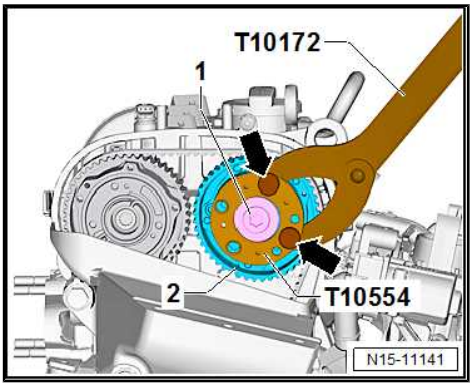
- *Place a cloth underneath to catch escaping engine oil.*

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

– Unscrew plug -1- on camshaft sprocket (inlet side).

– Use counterhold tool - T10554- with counterhold tool - T10172- to do so.

– Loosen bolt -1- one turn. Secure camshaft sprocket in place with counterhold tool - T10554- and counterhold tool - T10172- .



Both sides (continued):

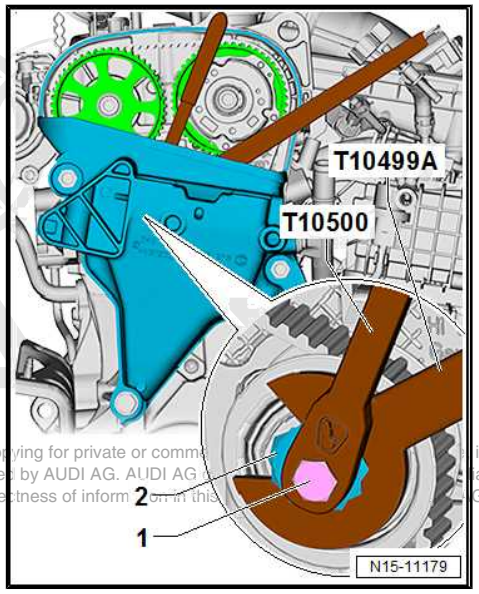
– Fit special wrench, 30 mm - T10499 A- onto eccentric adjuster -2- of tensioning roller.

– Loosen bolt -1- using insert tool, 13 mm - T10500- .

– Release tensioning roller on eccentric adjuster -2- using special wrench, 30 mm - T10499 A- .

– Detach toothed belt from camshaft sprockets.

• The bending radius of the toothed belt must be at least 25 mm (approx. half the diameter of the crankshaft sprocket).



Installing (adjusting valve timing)

Note

♦ *Renew bolts tightened with specified tightening angle.*

♦ *Renew O-ring of plug if damaged.*

Protected by copyright. Copying for private or comm... is not permitted unless authorised by AUDI AG. AUDI AG ... liability with respect to the correctness of inform... in this ... AG.

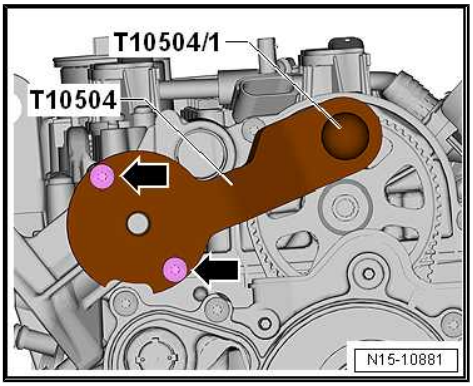
– Check “TDC” position of camshaft and crankshaft:

• Camshaft clamp - T10504- with locating pin -T10504/1- must be fitted to camshaft housing.

Caution

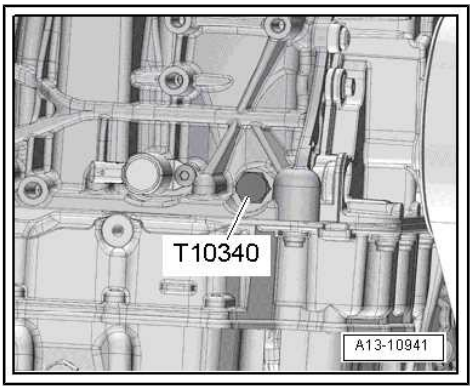
Risk of damage to engine if valve timing is incorrectly adjusted.

♦ ***Locating pin -T10504/1- must be inserted as far as stop.***



• Locking pin - T10340- is screwed into cylinder block as far as stop and tightened to 30 Nm.

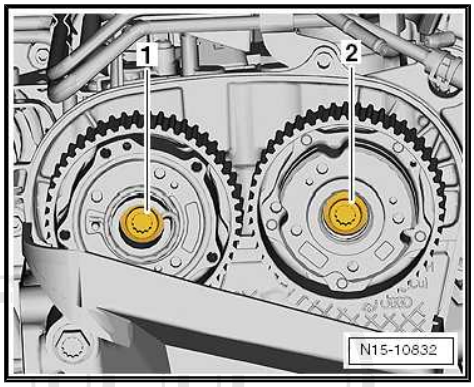
• Crankshaft is turned in normal direction of rotation until it makes contact with locking pin - T10340- = “TDC” position.



Caution

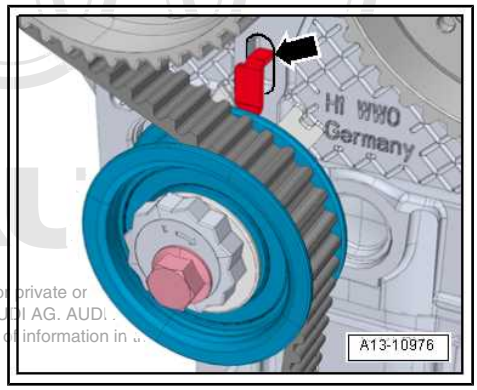
Risk of damage to camshafts.

- *The camshaft clamp - T10504- must not be used as a counterhold tool.*



– Fit new bolts -1, 2- for camshaft sprockets, but do not tighten.

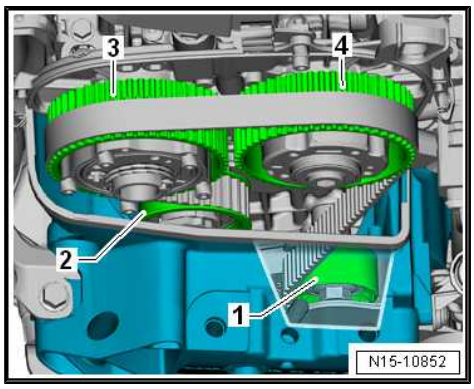
- It should just be possible to turn the adjusters on the camshafts without axial movement.
- Metal lug -arrow- of tensioning roller must engage in cast recess on cylinder head.



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

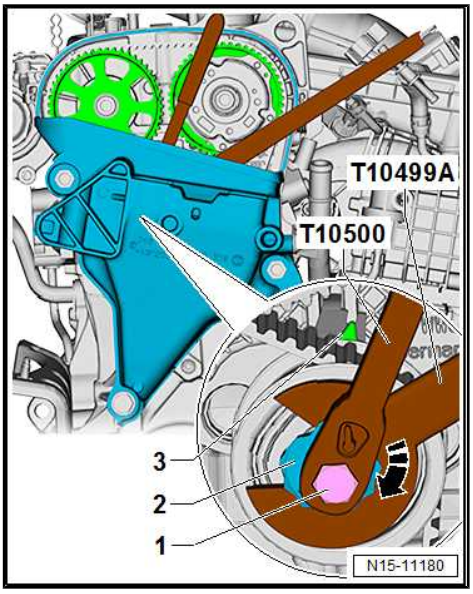
Note correct sequence for fitting toothed belt:

– Pull toothed belt upwards and fit onto idler roller -1-, tensioning roller -2- and camshaft sprockets -3, 4-.



– Using special wrench, 30 mm - T10499 A- , turn eccentric adjuster -2- of tensioning roller in direction of -arrow- until adjustment indicator -3- is positioned approx. 10 mm to right of adjustment window.

– Turn eccentric adjuster back until adjustment indicator is positioned exactly in adjustment window.



Caution

Risk of damage to engine if tightening torque is incorrect.

- ***Torque wrench - VAS 6583- must be used to tighten the bolts.***
- ***When setting the tightening torque on the torque wrench - VAS 6583- , the reading on the insert tool, 13 mm - T10500- must be entered in the torque wrench.***

– Hold eccentric adjuster in this position and tighten bolt -1- using insert tool, 13 mm - T10500- with torque wrench - VAS 6583- .

Note

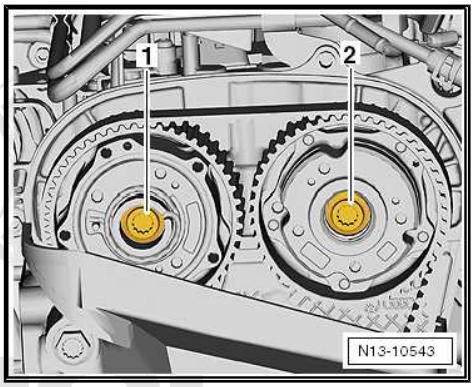
Turning the engine further or running the engine may lead to slight differences in the position of the adjustment indicator -3- in relation to the adjustment window. This does not affect the toothed belt tension.

Caution

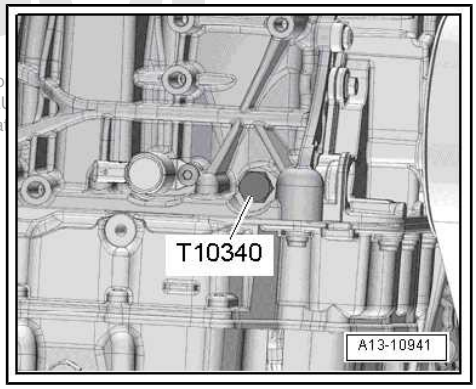
Risk of damage to camshafts.

- ***The camshaft clamp - T10504- must not be used as a counterhold tool.***

– Tighten bolts -1, 2- initially to 50 Nm using counterhold tool - T10172A- with adapters -T10172/2- , or counterhold tool - T10554- and counterhold tool - T10172- .

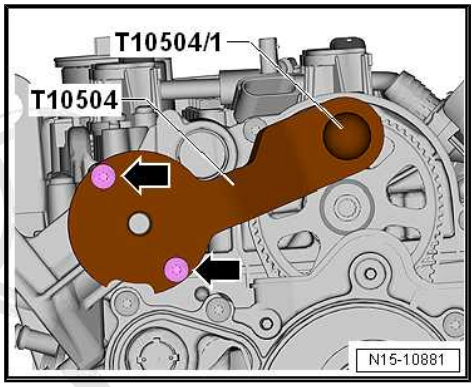


– Remove locking pin - T10340- .



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

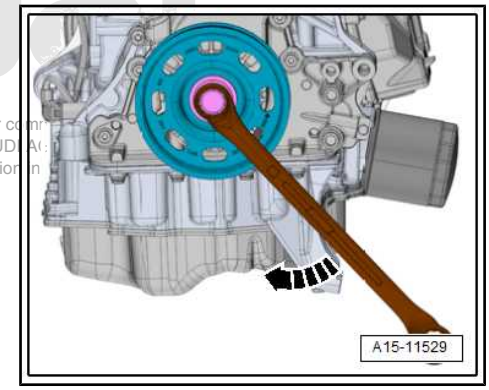
– Remove locating pin -T10504/1- .
– Remove bolts -arrows- and detach camshaft clamp - T10504- .



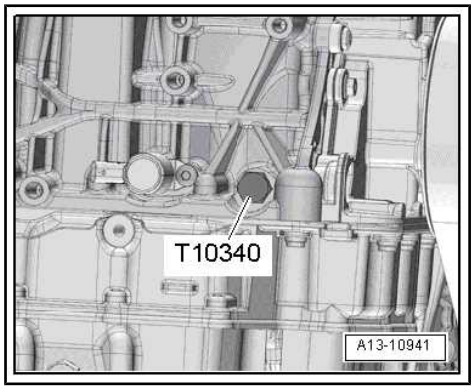
Checking valve timing:

– Turn crankshaft 2 rotations in normal direction of engine rotation -arrow-.

Protected by copyright. Copying for private or com
permitted unless authorised by AUDI AG. AUDI A
with respect to the correctness of information in



– Screw locking pin - T10340- into cylinder block as far as stop and tighten to 30 Nm.
– Rotate crankshaft further in normal direction of rotation as far as stop.
• The crank web is now in contact with the locking pin.



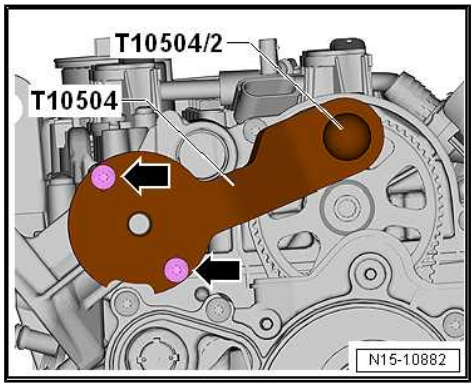
Note

The locking pin - T10340- locks the crankshaft only in the direction of engine rotation.

Note

♦ *It should be possible to insert the camshaft clamp - T10504- easily.*
♦ *Do not knock camshaft clamp into place with any kind of tool.*

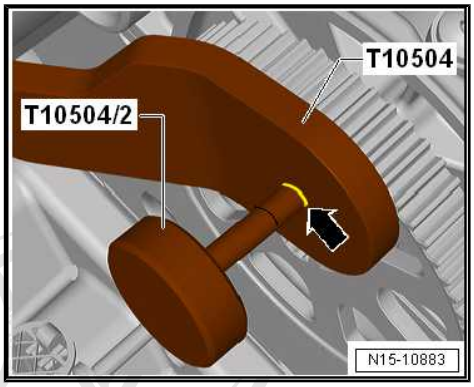
– Insert camshaft clamp - T10504- into inlet camshaft as far as stop and fit bolts -arrows- (do not screw in yet).
– Insert test pin -T10504/2- as far as stop.
– Tighten bolts -arrows- hand-tight.



Caution

Risk of damage to engine if valve timing is incorrectly adjusted.

- ***If groove -arrow- is not flush with camshaft clamp - T10504- , test pin -T10504/2- is not inserted far enough.***



– Check whether groove -arrow- on test pin -T10504/2- is flush with camshaft clamp - T10504- .

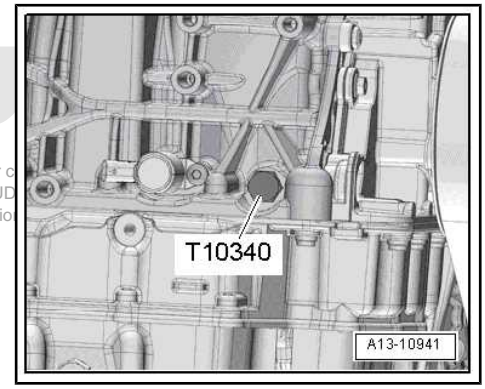
If it is not possible to insert camshaft clamp - T10504- with test pin -T10504/2- , valve timing is not OK:

– Adjust valve timing again ⇒ page 119 .

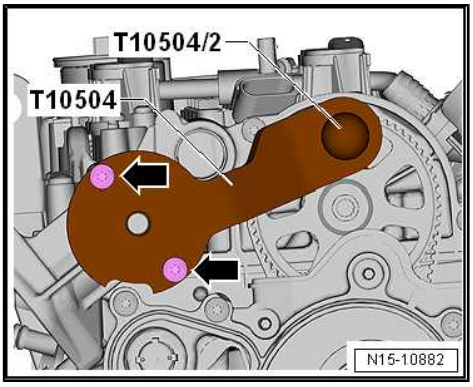
If it is possible to insert camshaft clamp - T10504- with test pin -T10504/2- , valve timing is OK.

– Remove locking pin - T10340- .

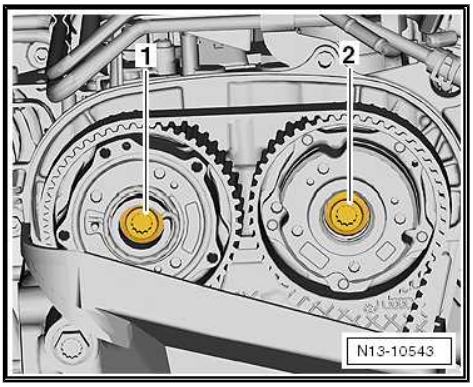
Protected by copyright. Copying for private or c
permitted unless authorised by AUDI AG. AUD
with respect to the correctness of informatio



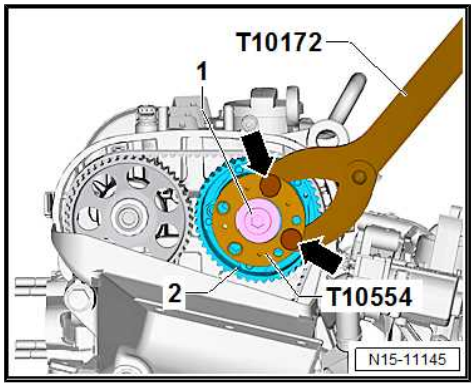
– Remove bolts -arrows- and detach camshaft clamp - T10504- with test pin -T10504/2- .



– Tighten bolts -1, 2- to final tightening torque ⇒ page 82 using counterhold tool - T10172A- with adapters -T10172/2- , or counterhold tool - T10554- and counterhold tool - T10172- .



– Tighten plug -1- using counterhold tool - T10172- with counterhold tool - T10554- .



Caution

Risk of irreparable damage to engine.

- *After completing work, check that locking pin - T10340- and camshaft clamp - T10504- have been removed.*

Further installation is carried out in the reverse order; note the following:

– Fill up with coolant ⇒ page 236 .

Tightening torques

- ⇒ “1.2.2 Exploded view - toothed belt, engine codes CSSA, CZDA, CZEA, CZDB, CWLA”, page 82
- ⇒ “1.1 Exploded view - toothed belt cover”, page 79
- ⇒ Fig. ““Plug for TDC drilling in cylinder block - tightening torque”“ , page 81
- ⇒ “2.2 Exploded view - camshaft housing”, page 169
- ⇒ “3.1 Exploded view - crankcase breather system”, page 218
- ⇒ “1.1 Exploded view - turbocharger”, page 273
- ⇒ “2.1 Exploded view - charge air system”, page 284

1.4 Removing and installing toothed belt

⇒ “1.4.1 Removing and installing toothed belt - engine code CHPB”, page 124

⇒ “1.4.2 Removing and installing toothed belt - engine codes CSSA, CZDA, CZDB, CWLA”, page 138

⇒ “1.4.3 Removing and installing toothed belt - engine code CZEA”, page 153

1.4.1 Removing and installing toothed belt - engine code CHPB

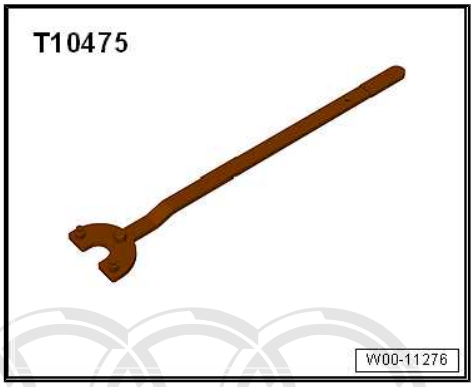
Special tools and workshop equipment required

- Torque wrench - VAS 6583-



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

- Counterhold tool - T10475-

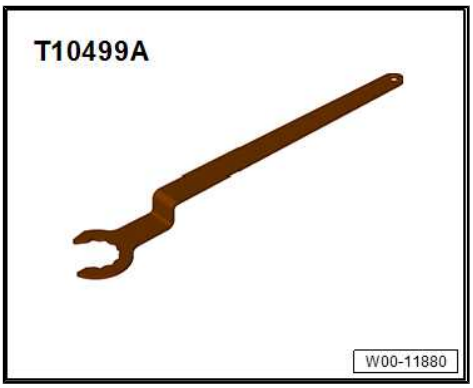


- Counterhold tool - T10172 A- with adapters -T10172/1-

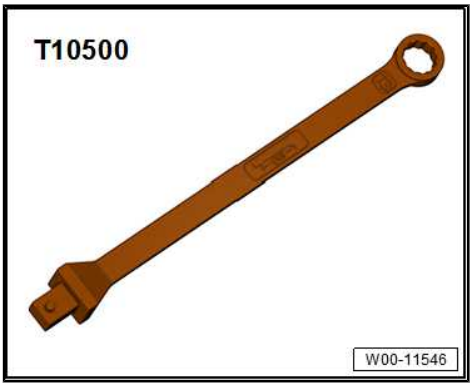


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright

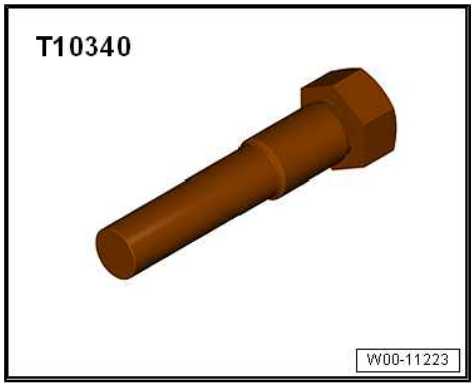
- Special wrench, 30 mm - T10499 A-



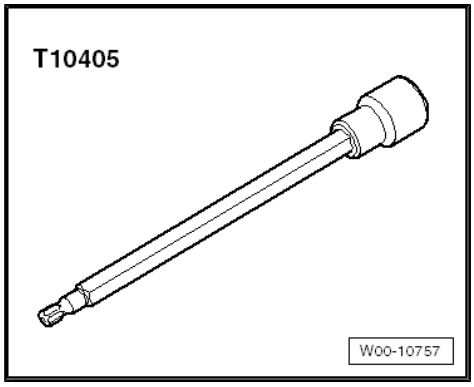
- Open end spanner insert, AF 13 - T10500-



- Locking pin - T10340-



- Socket Torx T 30 - T10405-



- Assembly tool - T10487-

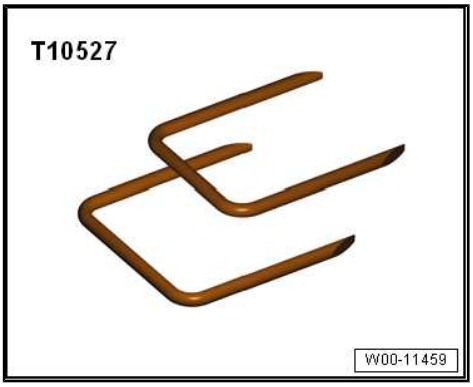


- Camshaft clamp - T10494-

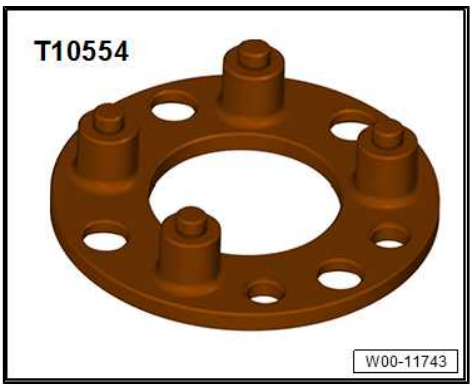


Protected by copyright. Copying for private or commercial purposes, in part or whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

♦ Release tool - T10527- and -T10527/1-

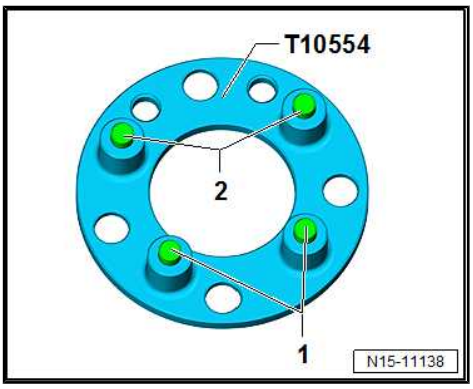


♦ Counterhold tool - T10554-



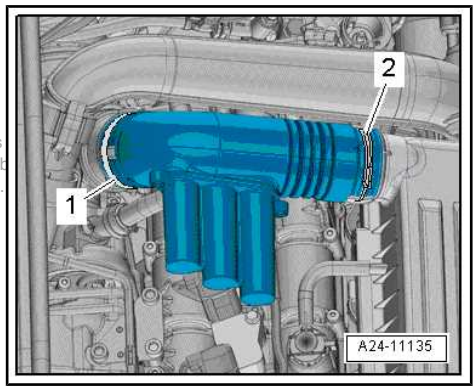
Counterhold tool - T10554-

- The lugs -1- and -2- on counterhold tool - T10554- are different distances apart.
- Counterhold tool - T10554- can only be applied in one position.
- Position counterhold tool - T10554- flush against camshaft adjusters.



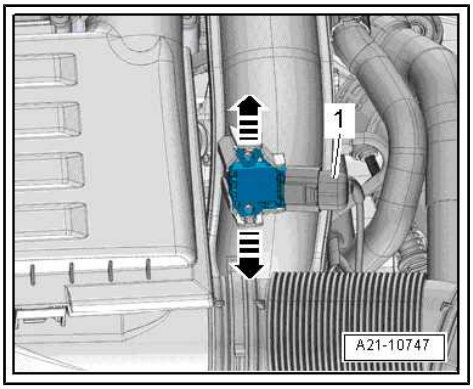
Removing

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



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

– Unplug electrical connector -1- from charge pressure sender - G31- .



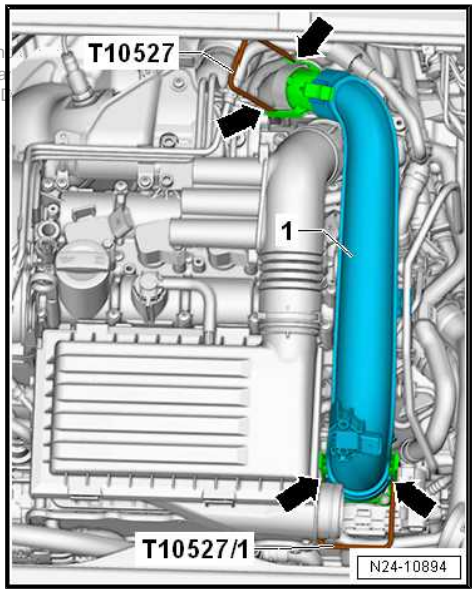
Note

Disregard -arrows-.

Protected by copyright. Copying for private or commercial purposes, in part or in wh
purposes unless authorised by AUDI AG. AUDI AG does not guarantee or accept a
any kind for the correctness of information in this document. Copyright by AUDI

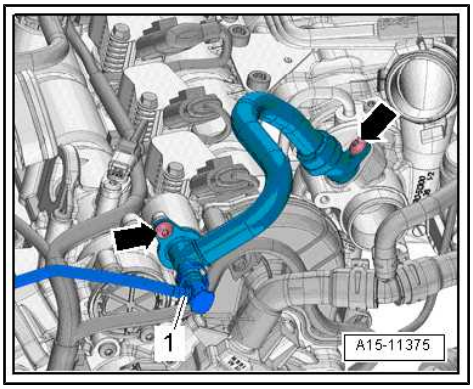
– Move air hoses clear at air pipe.

– Release fasteners -arrows- with release tool - T10527- and - T10527/1- , and detach air pipe.



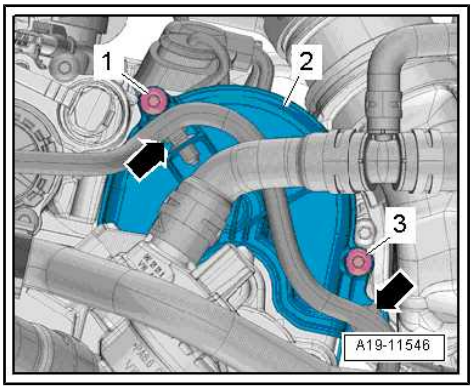
– Press release tabs and disconnect hose -1- for activated charcoal filter.

– Remove bolts -arrows- and detach crankcase breather hose.



– Move electrical wiring harness clear -arrows-.

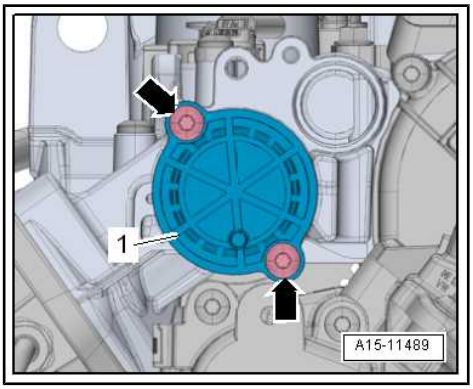
– Unscrew bolts -1, 3- and remove cover -2- for toothed belt for coolant pump.



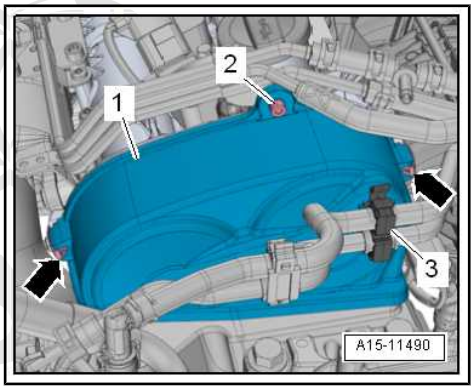
Note

- *Danger of chemical damage to seal for coolant pump if oil enters between coolant pump and cylinder head.*
- *Cover coolant pump with a cloth.*
- *Catch escaping engine oil with a cloth.*

– Unscrew bolts -arrows- and detach sealing cap -1-.



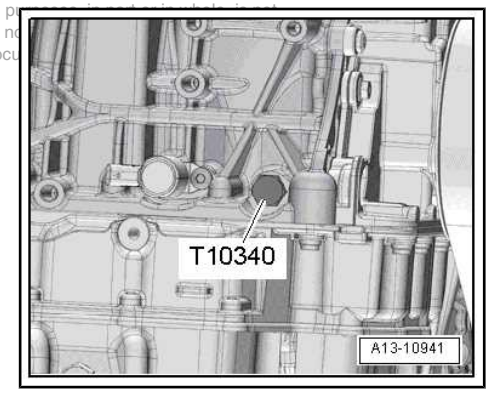
– Move clear hoses at bracket -3-.
– Unscrew bolt -2-.
– Release clips -arrows- and detach toothed belt cover (top) -1-.



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

Rotate crankshaft to “TDC” as follows:

– Unscrew plug for “TDC” hole on cylinder block.
– Screw locking pin - T10340- into cylinder block as far as stop and tighten to 30 Nm.
– Rotate crankshaft in normal direction of rotation as far as stop.
• The locking pin is now in contact with the crank web.



Note

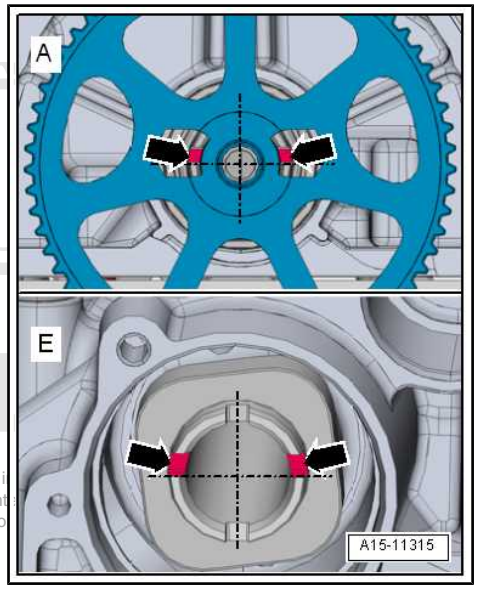
The locking pin - T10340- locks the crankshaft only in the direction of engine rotation.

Caution

Risk of damage to engine.

- ***If the locking pin - T10340- cannot be screwed in as far as the stop, the crankshaft is not in the correct position.***
- ***In this case proceed as follows:***
- ***Remove locking pin.***
- ***Turn crankshaft by 90° in direction of engine rotation.***
- ***Screw locking pin - T10340- into cylinder block as far as stop and tighten to 30 Nm.***
- ***Turn crankshaft further in normal direction of rotation as far as stop.***

- On both camshafts, asymmetrically positioned grooves -top and bottom arrows- on gearbox end must now face upwards, as shown in illustration.
- On exhaust camshaft -A-, grooves -top arrows- are accessible via openings in coolant pump drive sprocket.
- On inlet camshaft -E-, grooves -bottom arrows- must be positioned above centre of camshaft.



Note

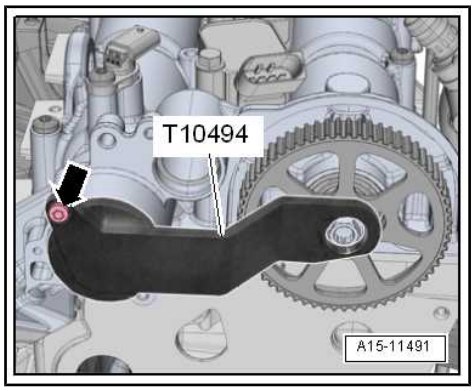
The camshafts have two pairs of grooves: one positioned symmetrically and one positioned asymmetrically. In TDC position, the asymmetrically positioned pair of grooves must be above the imaginary horizontal centre line.

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

– If camshafts are not positioned as described, unscrew locking pin - T10340- , turn crankshaft one rotation further and return to TDC position.

Note

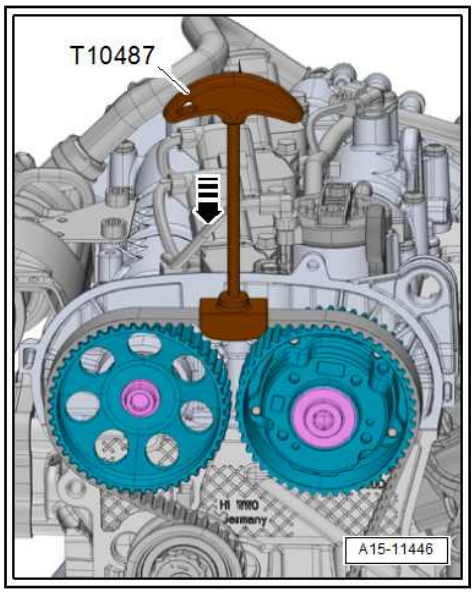
- ♦ *It should be possible to insert the camshaft clamp - T10494- easily.*
- ♦ *Do not knock camshaft clamp into place with any kind of tool.*



– When camshafts are positioned as described, insert camshaft clamp - T10494- into camshafts as far as stop and hand-tighten bolt -arrow-.

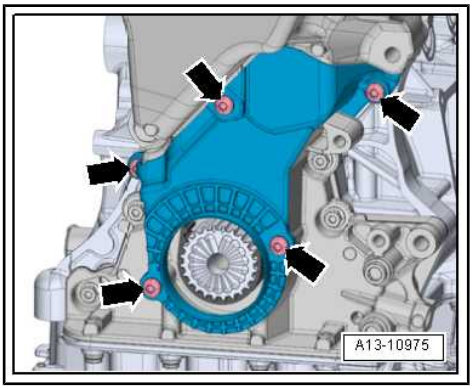
Note

- ♦ *If it is not possible to insert the camshaft clamp - T10494- easily:*
- ♦ *Press down toothed belt -arrow- using assembly tool -T10487- and then insert camshaft clamp - T10494- into camshafts as far as stop and hand-tighten bolt.*

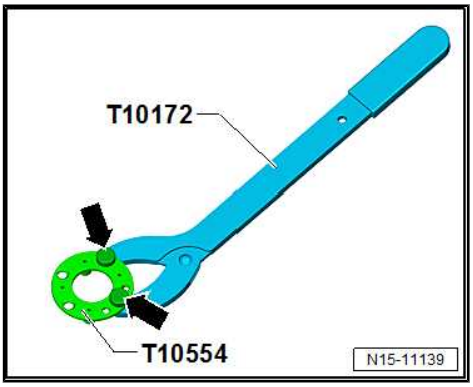


– Remove poly-V-belt pulley
⇒ “1.6 Removing and installing pulley”, page 52 .

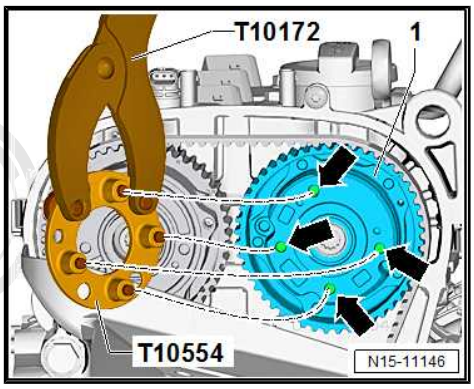
– Remove bolts -arrows- and detach toothed belt cover (bottom).



– Assemble tools as shown.
– Attach counterhold tool - T10172- to counterhold tool - T10554- using knurled screws -arrows-.



– Apply counterhold tool - T10554- with counterhold tool - T10172- to camshaft sprocket -1-, as shown.
– Lugs must be inserted correctly into holes -arrows-.
– Position counterhold tool - T10554- flush against camshaft adjuster -1-.



Caution

Risk of damage to camshaft.

- *The camshaft clamp - T10494- must not be used as a counterhold tool.*

Caution

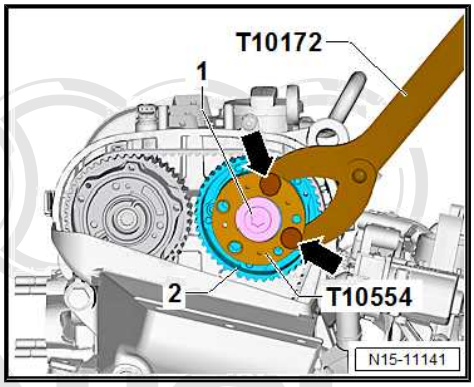
Risk of damage to engine due to oil on toothed belt.

- *Place a cloth underneath to catch escaping engine oil.*
- *Thoroughly clean any spaces/cavities that have filled with engine oil.*

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.

– Unscrew plug -1- on camshaft sprocket (inlet side).

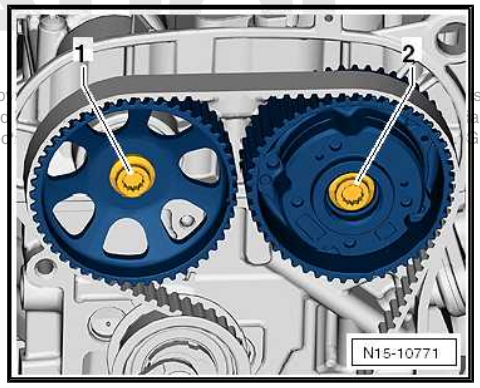
– Use counterhold tool - T10554- and counterhold tool - T10172- to do so.



– Loosen bolt -2- approx. one turn using counterhold tool - T10554- and counterhold tool - T10172- .

– Loosen bolt -1- approx. one turn using counterhold tool - T10172A- with adapters -T10172/2- .

...ected by copyright. Cop... ...s not permitted unless authorised... ...ability with respect to the correc... ...s.

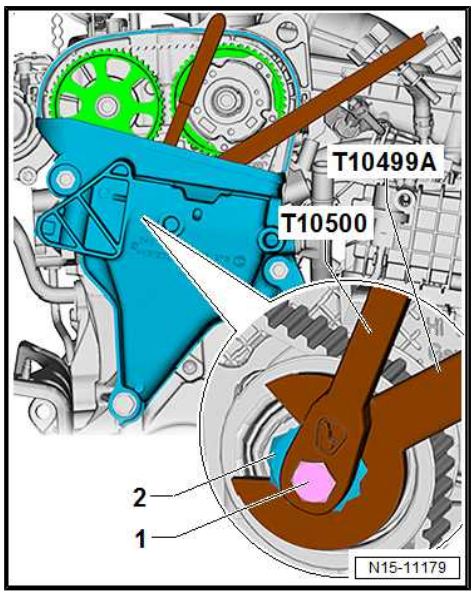


– Loosen bolt -1- using insert tool, 13 mm - T10500- and release tensioning roller on eccentric adjuster -2- using special wrench, 30 mm - T10499 A- .

Caution

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

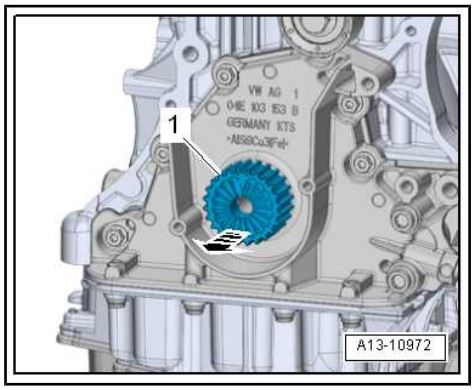
- ***Before removing, mark direction of rotation of toothed belt with chalk or felt-tip pen for re-installation.***



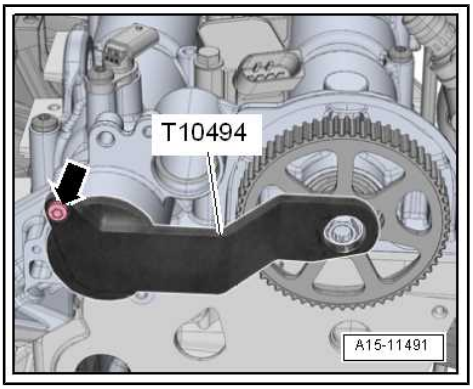
– Take off toothed belt.

• The bending radius of the toothed belt must be at least 25 mm (approx. half the diameter of the crankshaft sprocket).

– Detach crankshaft sprocket -1- -arrow-.



Installing (adjusting valve timing)



Note

- *Renew bolts tightened with specified tightening angle.*
- *Renew O-ring of plug if damaged.*

– Check “TDC” position of camshaft and crankshaft:

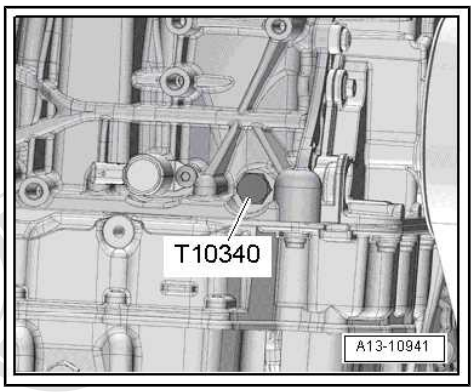
- Camshaft clamp - T10494- must be fitted to camshaft housing -arrow-.

Caution

Risk of damage to camshafts.

- ***The camshaft clamp - T10494- must not be used as a counterhold tool.***

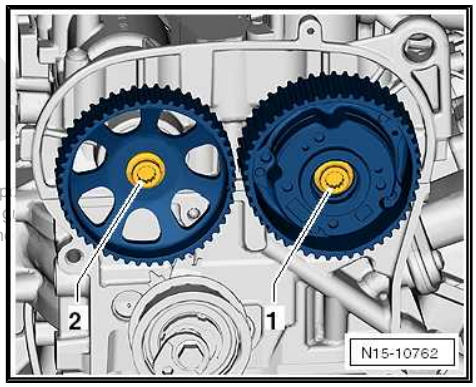
- Locking pin - T10340- is screwed into cylinder block as far as stop and tightened to 30 Nm.
- Crankshaft is turned in normal direction of rotation until it makes contact with locking pin - T10340- = “TDC” position.



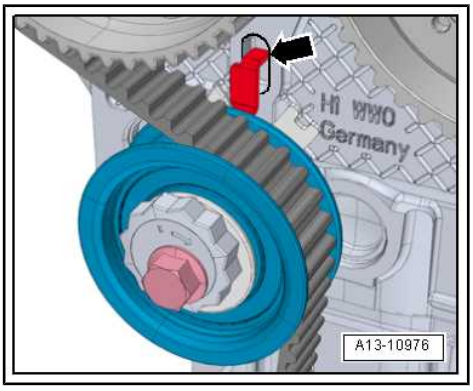
– Fit new bolts -1, 2- for camshaft sprockets, but do not tighten.

- It should just be possible to turn the adjusters on the camshafts without axial movement.

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

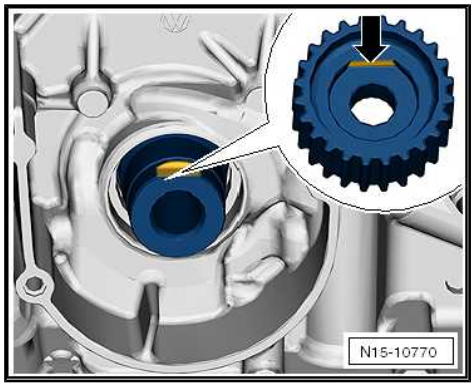


- Metal lug -arrow- of tensioning roller must engage in cast recess on cylinder head.



– Fit crankshaft sprocket onto crankshaft.

- Contact surface between poly V-belt pulley and crankshaft sprocket must be free of oil and grease.
- Machined surface -arrow- of crankshaft sprocket must be positioned over machined surface of crankshaft journal.



– Fit toothed belt in the specified sequence.

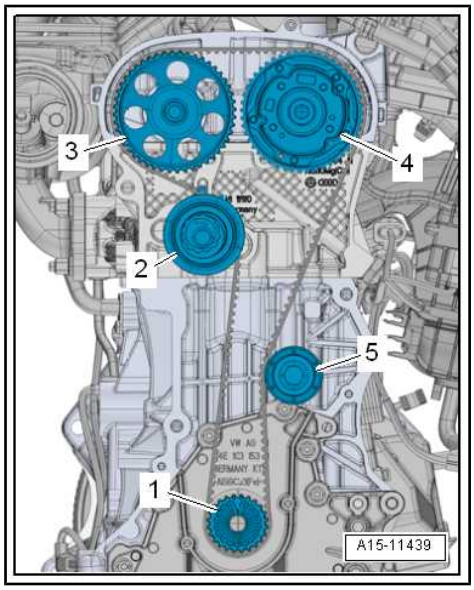
1 - Crankshaft sprocket

5 - Idler roller

2 - Tensioning roller

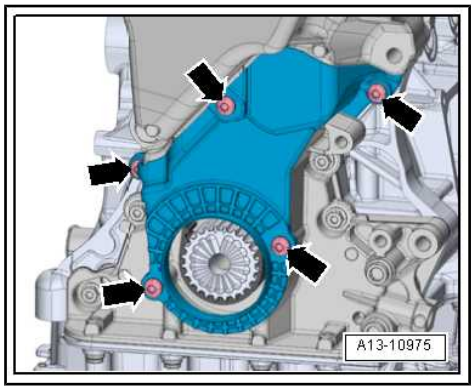
3 - Camshaft sprocket, exhaust side

4 - Camshaft sprocket, inlet side



– Install toothed belt cover (bottom section).

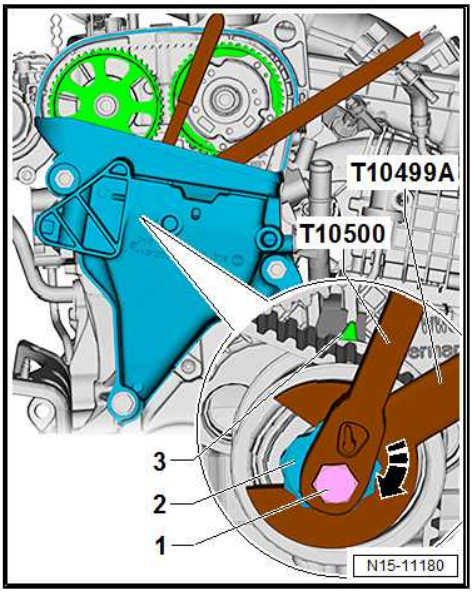
– Install poly-V-belt pulley
⇒ “1.6 Removing and installing pulley”, page 52 .



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.

– Using special wrench, 30 mm - T10499 A- , turn eccentric adjuster -2- of tensioning roller in direction of -arrow- until adjustment indicator -3- is positioned approx. 10 mm to right of adjustment window.

– Turn eccentric adjuster -2- back until adjustment indicator -3- is positioned exactly in adjustment window.



Caution

Risk of damage to engine if tightening torque is incorrect.

- ***Torque wrench - VAS 6583- must be used to tighten the bolts.***
- ***When setting the tightening torque on the torque wrench - VAS 6583- , the reading on the insert tool, 13 mm - T10500- must be entered in the torque wrench.***

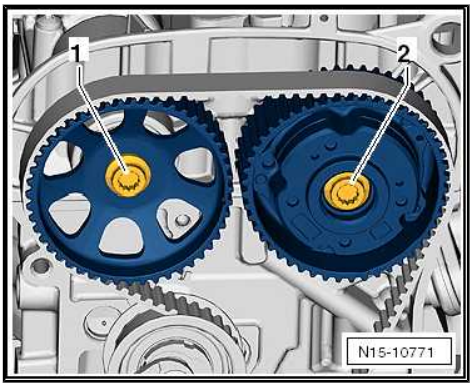
– Hold eccentric adjuster in this position and tighten bolt -1- using insert tool, 13 mm - T10500- with torque wrench - VAS 6583- .

Note

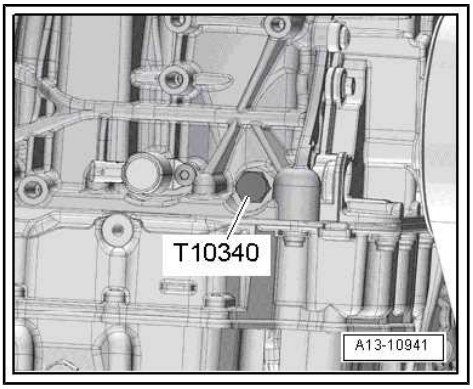
Turning the engine further or running the engine may lead to slight differences in the position of the adjustment indicator -3- in relation to the adjustment window. This does not affect the toothed belt tension.

– Tighten bolt -1- initially to 50 Nm using counterhold tool - T10172 A- with adapters -T10172/1- .

– Tighten bolt -2- initially to 50 Nm using counterhold tool - T10554- and counterhold tool - T10172- .

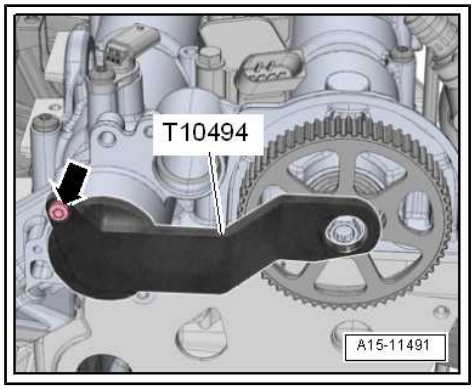


– Remove locking pin - T10340- .



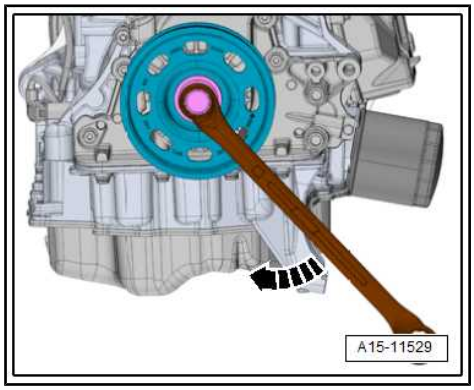
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Remove bolt -arrow- and detach camshaft clamp - T10494- .



Checking valve timing:

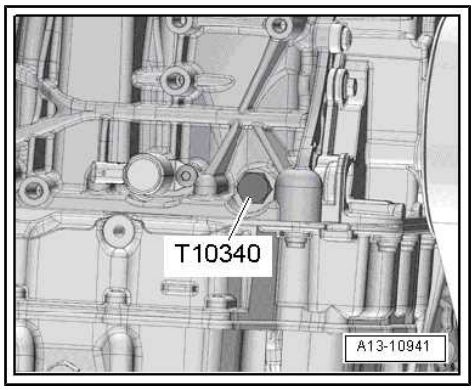
– Turn crankshaft 2 rotations in normal direction of engine rotation -arrow-.



– Screw locking pin - T10340- into cylinder block as far as stop and tighten to 30 Nm.

– Rotate crankshaft further in normal direction of rotation as far as stop.

• The locking pin is now in contact with the crank web.



Note

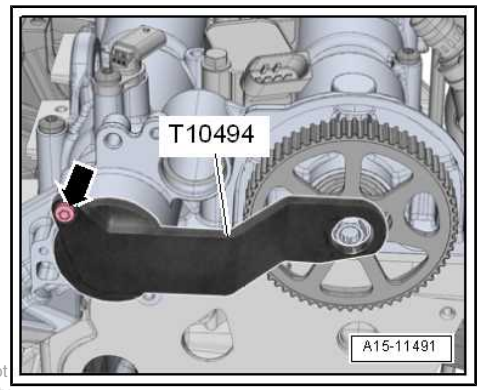
The locking pin - T10340- locks the crankshaft only in the direction of engine rotation.

Note

♦ *It should be possible to insert the camshaft clamp - T10494- easily.*

♦ *Do not knock camshaft clamp into place with any kind of tool.*

– Insert camshaft clamp - T10494- into camshafts as far as stop and hand-tighten with bolt -arrow-.



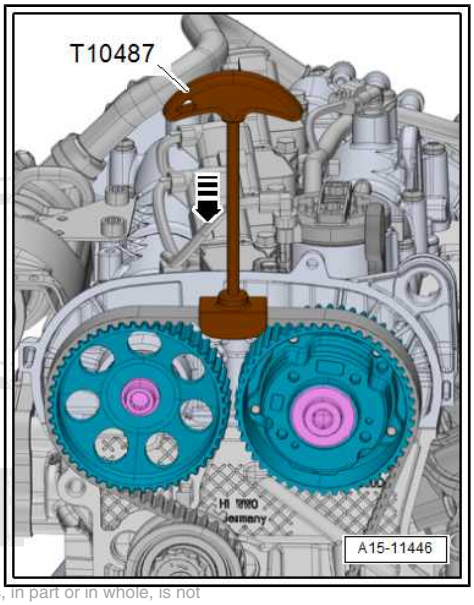
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Note

- *If it is not possible to insert the camshaft clamp - T10494- easily:*
- *Press down toothed belt -arrow- using assembly tool -T10487- and then insert camshaft clamp - T10494- into camshafts as far as stop and hand-tighten bolt.*

If it is not possible to insert camshaft clamp - T10494- , valve timing is not OK.

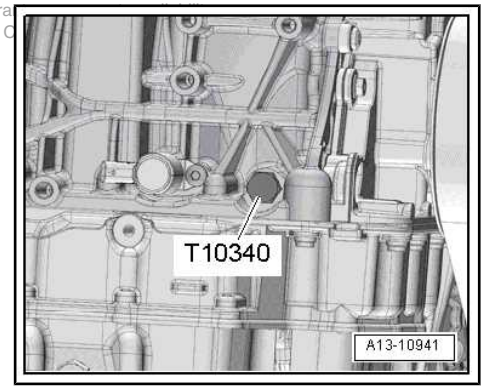
– Adjust valve timing again ⇒ page 91 .



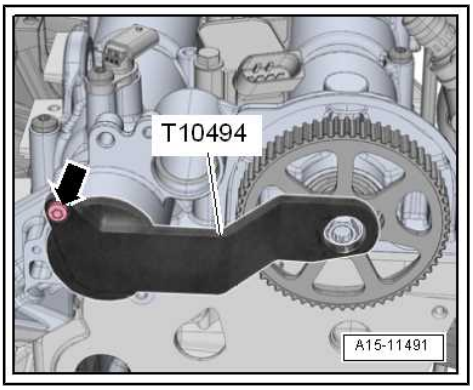
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. ©

If it is possible to insert camshaft clamp - T10494- , valve timing is OK.

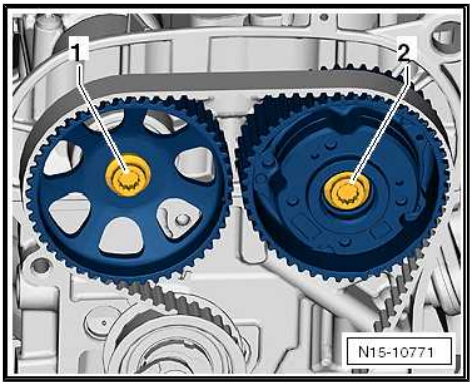
– Remove locking pin - T10340- .



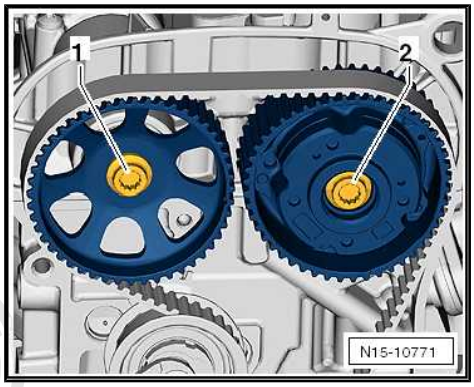
– Remove bolt -arrow- and detach camshaft clamp - T10494- .



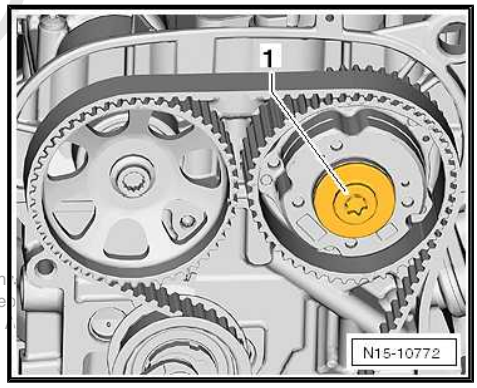
– Tighten bolt -1- to final tightening torque ⇒ page 82 using counterhold tool - T10172 A- with adapters -T10172/1- .



– Tighten bolts -1, 2- to final tightening torque ⇒ page 80 using counterhold tool - T10172A- with adapters -T10172/2- , or counterhold tool - T10554- and counterhold tool - T10172- .



– Tighten plug -1- using counterhold tool - T10554- and counterhold tool - T10172- .



Caution

Risk of irreparable damage to engine.

- *After completing work, check that locking pin - T10340- and camshaft clamp - T10494- have been removed.*

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

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

Tightening torques

- ⇒ “1.1 Exploded view - poly V-belt drive”, page 45
- ⇒ “1.2.1 Exploded view - toothed belt, engine code CHPB”, page 80
- ⇒ Fig. ““Plug for TDC drilling in cylinder block - tightening torque”“ , page 81
- ⇒ “2.2 Exploded view - camshaft housing”, page 169
- ⇒ “1.1 Exploded view - turbocharger”, page 273
- ⇒ “2.1 Exploded view - charge air system”, page 284
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

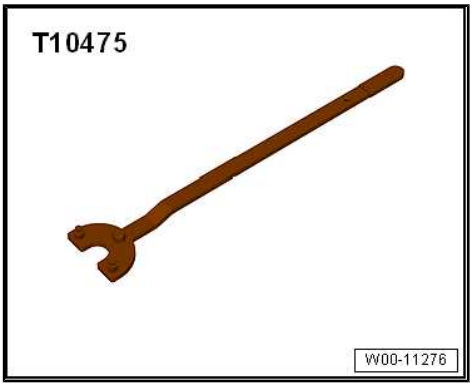
1.4.2 Removing and installing toothed belt - engine codes CSSA, CZDA, CZDB, CWLA

Special tools and workshop equipment required

- Torque wrench - VAS 6583-



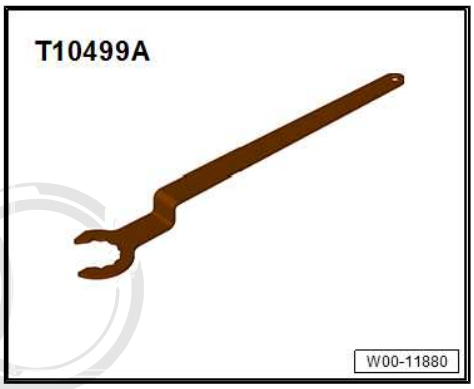
- Counterhold tool - T10475-



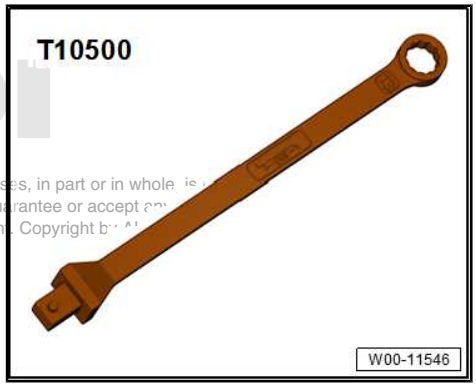
- Counterhold tool - T10172 A- with adapters -T10172/1-



- Special wrench, 30 mm - T10499 A-

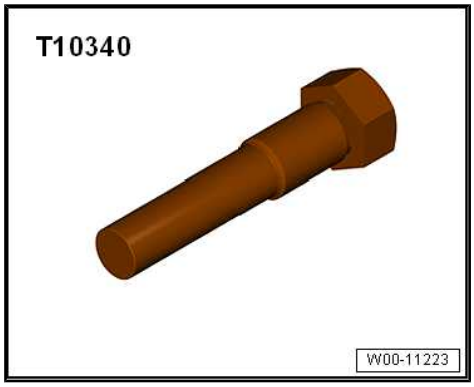


- Open end spanner insert, AF 13 - T10500-

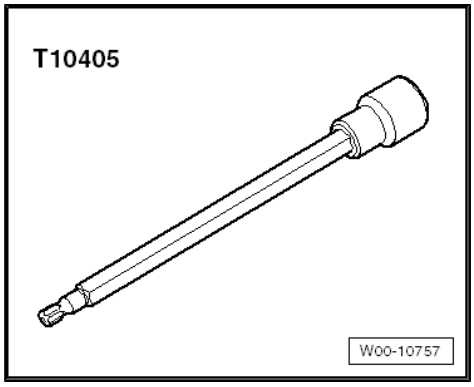


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

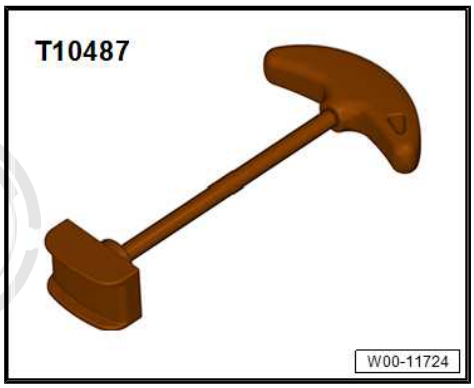
- Locking pin - T10340-



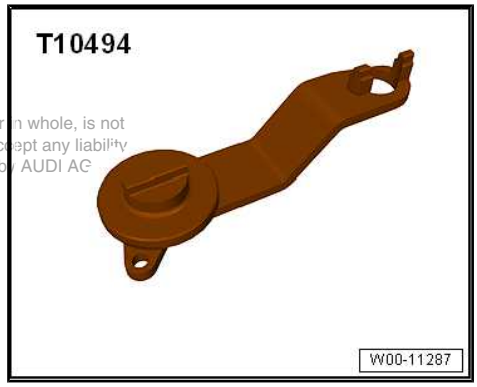
- Socket Torx T 30 - T10405-



- Assembly tool - T10487-

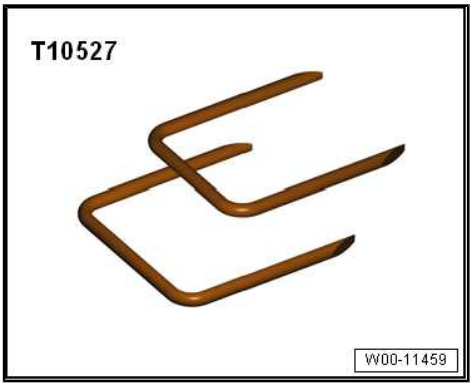


- Camshaft clamp - T10494-

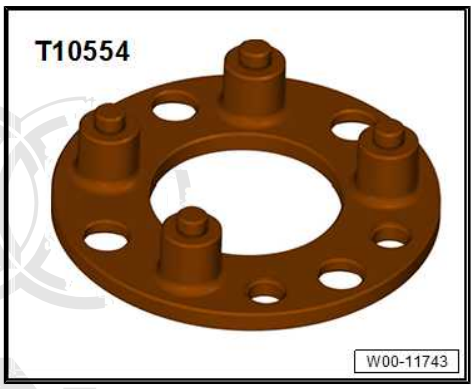


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG

♦ Release tool - T10527- and -T10527/1-

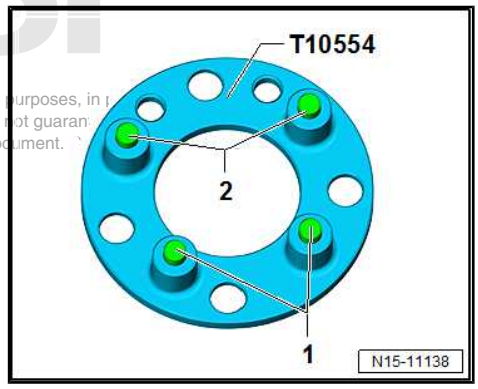


♦ Counterhold tool - T10554-



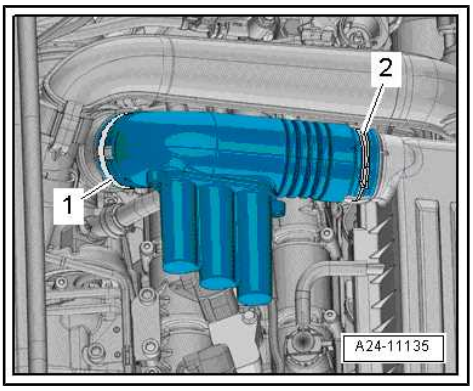
Counterhold tool - T10554-

- The lugs -1- and -2- on counterhold tool - T10554- are different distances apart.
- Counterhold tool - T10554- can only be applied in one position.
- Position counterhold tool - T10554- flush against camshaft adjusters.



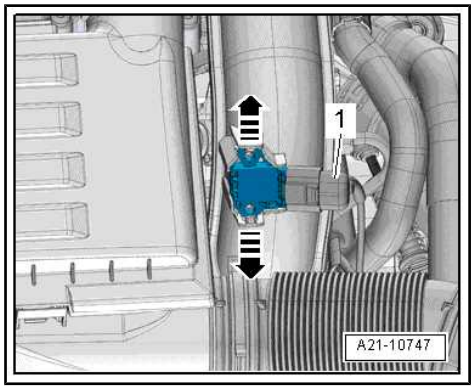
Removing

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



Protected by copyright. Copying for private or commercial purposes, in p
permitted unless authorised by AUDI AG. AUDI AG does not guaran
or liability for the correctness of this document.

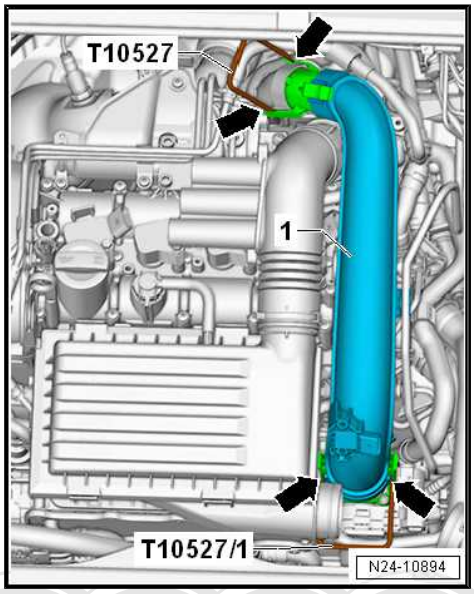
– Unplug electrical connector -1-.



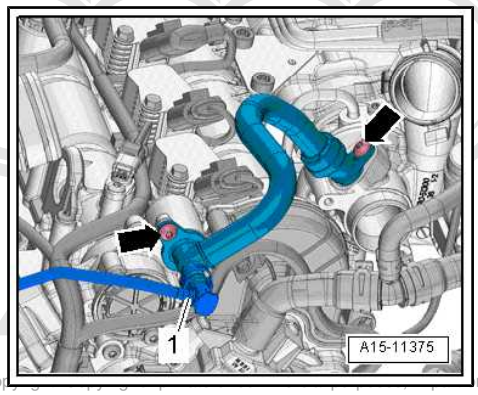
Note

Disregard -arrows-.

– Release fasteners -arrows- with release tool - T10527- and - T10527/1- .
– Detach air pipe -1-.

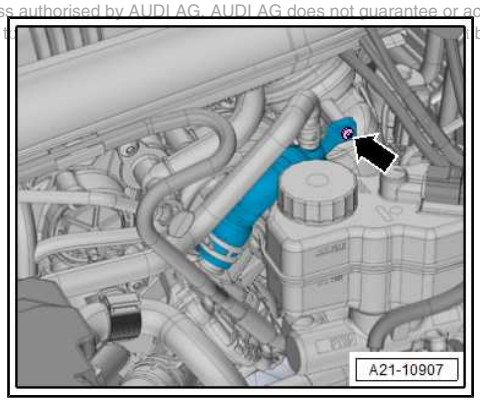


– Press release tabs and disconnect hose -1- for activated charcoal filter.
– Remove bolts -arrows- and detach crankcase breather hose.

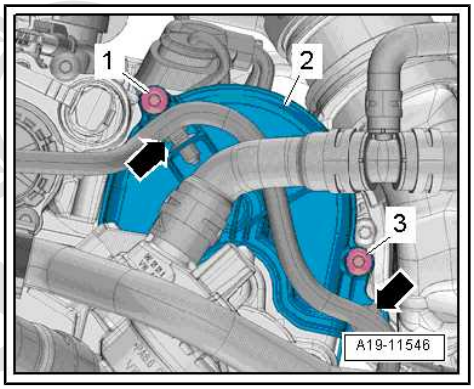


Protected by co r in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect t by AUDI AG.

– If fitted, remove bolt -arrow- from connection and press coolant hose slightly forwards.



– Move electrical wiring harness clear -arrows-.
– Unscrew bolts -1, 3- and remove cover -2- for toothed belt for coolant pump.

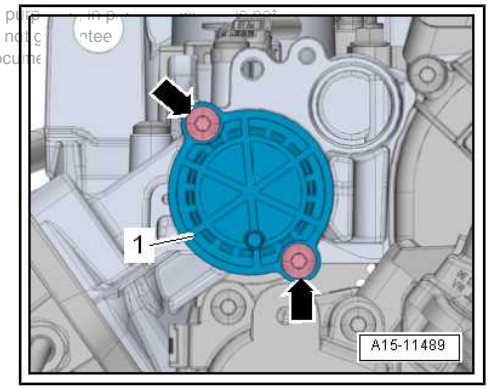


Protected by copyright. Copying for private or commercial purposes, in part, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee with respect to the correctness of information in this document.

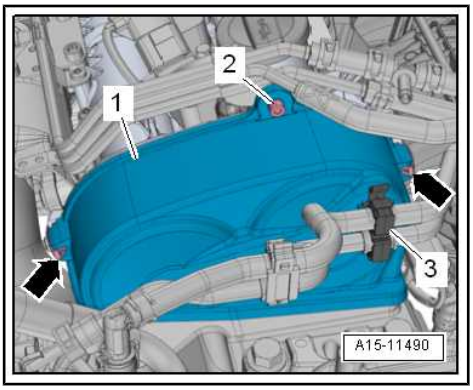
Note

- *Danger of chemical damage to seal for coolant pump if oil enters between coolant pump and cylinder head.*
- *Cover coolant pump with a cloth.*
- *Catch escaping engine oil with a cloth.*

– Unscrew bolts -arrows- and detach sealing cap -1-.



– Move clear hoses at bracket -3-.
– Unscrew bolt -2-.
– Release clips -arrows- and detach toothed belt cover (top) -1-.

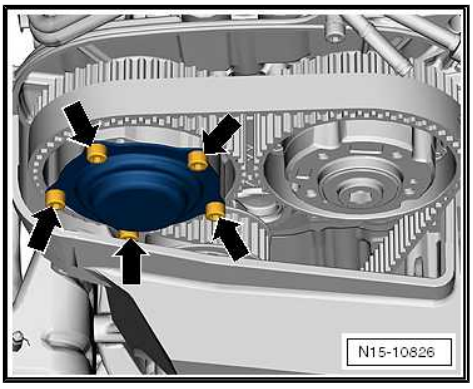


Caution

Risk of damage to engine due to oil on toothed belt.

- ***Place a cloth underneath to catch escaping engine oil.***

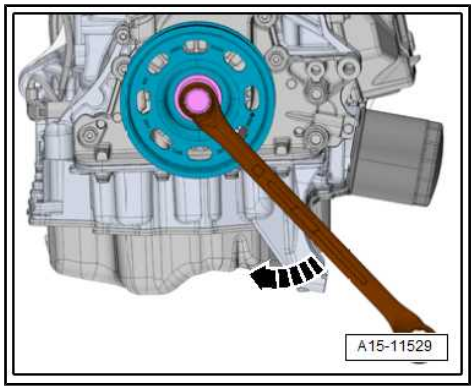
– Remove bolts -arrows-.



Note

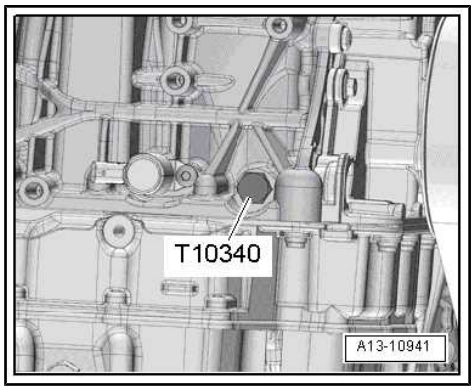
To remove all bolts, rotate crankshaft in direction of engine rotation by turning bolt for vibration damper pulley in direction of -arrow-.

– Detach cover from camshaft adjuster of exhaust camshaft.



Rotate crankshaft to “TDC” as follows:

– Unscrew plug for “TDC” hole on cylinder block.
– Screw locking pin - T10340- into cylinder block as far as stop and tighten to 30 Nm.
– Rotate crankshaft in normal direction of rotation as far as stop.
• The locking pin is now in contact with the crank web.



Note

The locking pin - T10340- locks the crankshaft only in the direction of engine rotation.

Caution

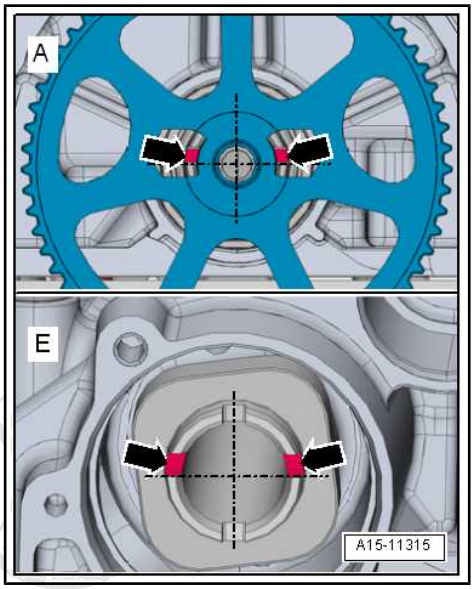
Risk of damage to engine.

- ***If the locking pin - T10340- cannot be screwed in as far as the stop, the crankshaft is not in the correct position.***
- ***In this case proceed as follows:***
- ***Remove locking pin.***
- ***Turn crankshaft by 90° in direction of engine rotation.***
- ***Screw locking pin - T10340- into cylinder block as far as stop and tighten to 30 Nm.***
- ***Turn crankshaft further in normal direction of rotation as far as stop.***

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 both camshafts, asymmetrically positioned grooves -top and bottom arrows- on gearbox end must now face upwards, as shown in illustrations.
- On exhaust camshaft -A-, grooves -top arrows- are accessible via openings in coolant pump drive sprocket.
- On inlet camshaft -E-, grooves -bottom arrows- are directly accessible.

– If camshafts are not positioned as described, unscrew locking pin - T10340- , turn crankshaft one rotation further and return to TDC position.

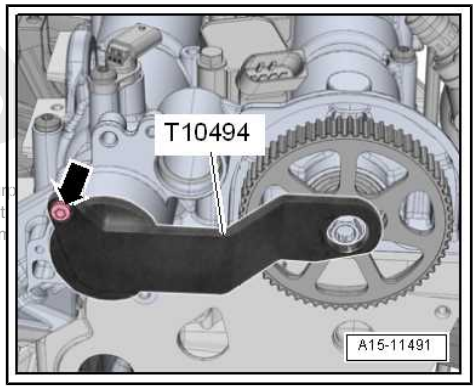


Note

- *It should be possible to insert the camshaft clamp - T10494- easily.*
- *Do not knock camshaft clamp into place with any kind of tool.*

Copyright AUDI AG. Any commercial purp
permitted unless authorised by AUDI AG. AUDI AG does not
with respect to the correctness of information in this docun

– When camshafts are positioned as described, insert camshaft clamp - T10494- into camshafts as far as stop and hand-tighten bolt -arrow-.



Note

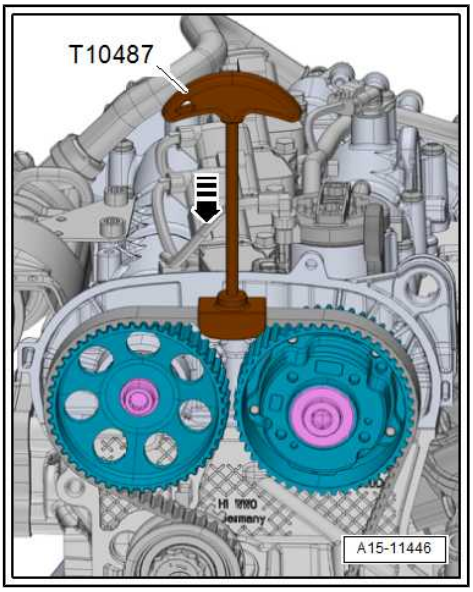
- *If it is not possible to insert the camshaft clamp - T10494- easily:*
- *Press down toothed belt -arrow- using assembly tool -T10487- and then insert camshaft clamp - T10494- into camshafts as far as stop and hand-tighten bolt.*

– Remove poly-V-belt pulley
⇒ “1.6 Removing and installing pulley”, page 52 .

Caution

Risk of damage to camshaft.

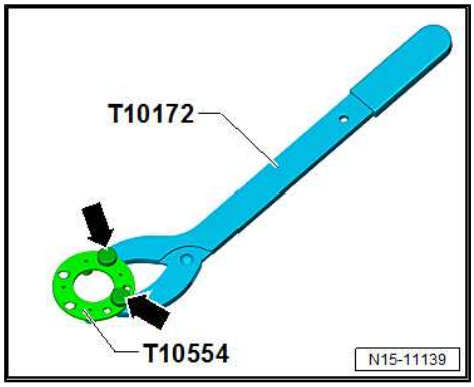
- ***The camshaft clamp - T10494- must not be used as a counterhold tool.***



Inlet camshaft

– Assemble tools as shown.

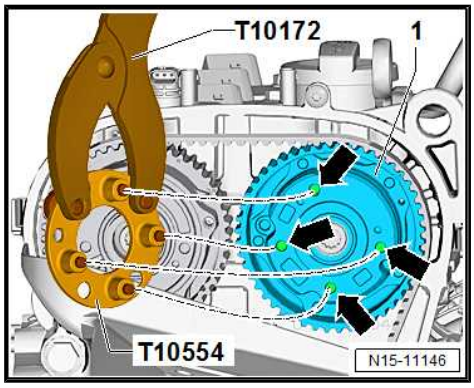
– Attach counterhold tool - T10172- to counterhold tool - T10554/1- using knurled screws -T10554/2- -arrows-.



– Apply counterhold tool - T10554/1- with counterhold tool - T10172- flush against camshaft adjuster -1-, as shown.

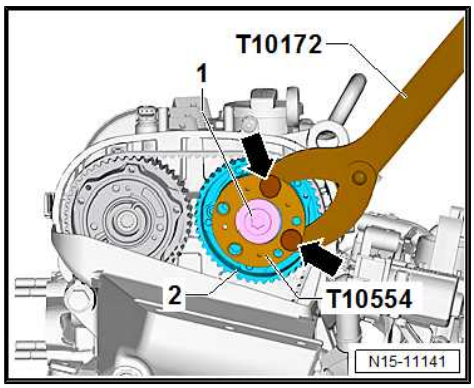
– Lugs must be inserted correctly into holes -arrows-.

– Secure camshaft with counterhold tool - T10172- and counterhold tool - T10554/1- so that it cannot turn.



– Unscrew plug -1- and loosen bolt located behind it for camshaft sprocket (inlet side) one turn.

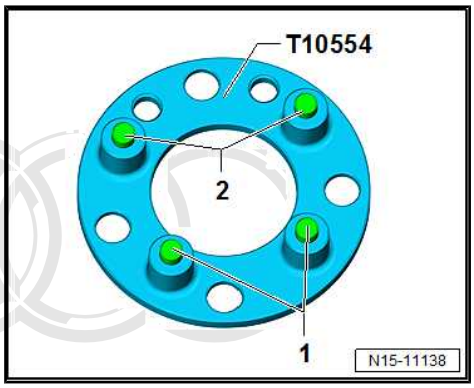
– Use counterhold tool - T10172- and counterhold tool - T10554/1- to do so.



Exhaust camshaft:

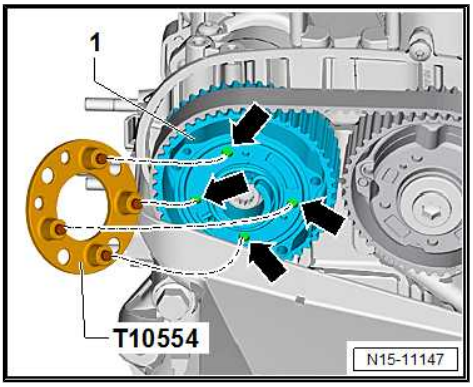
– Guide in counterhold tool - T10554/1- between camshaft adjuster and engine support.

– To do so, first guide area between lugs -2- on counterhold tool - T10554/1- past camshaft adjuster.

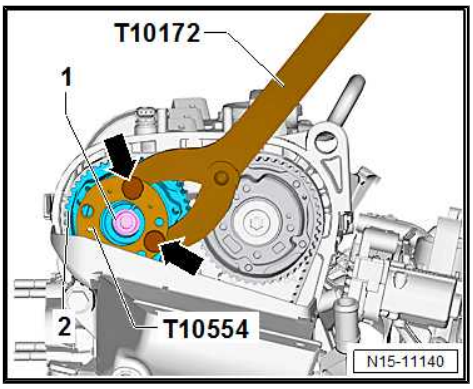


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

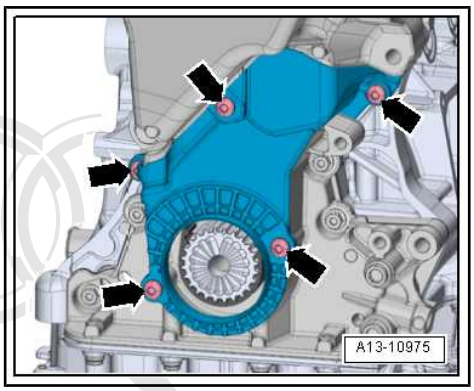
– Turn counterhold tool - T10554/1- so that it can be inserted in holes -arrows- as shown.
– Position counterhold tool - T10554/1- flush against camshaft adjuster -1-.



– Loosen bolt -1- one turn. Secure camshaft sprocket in place with counterhold tool - T10172- and counterhold tool - T10554/1- .
– Remove pulley ⇒ page 52 .



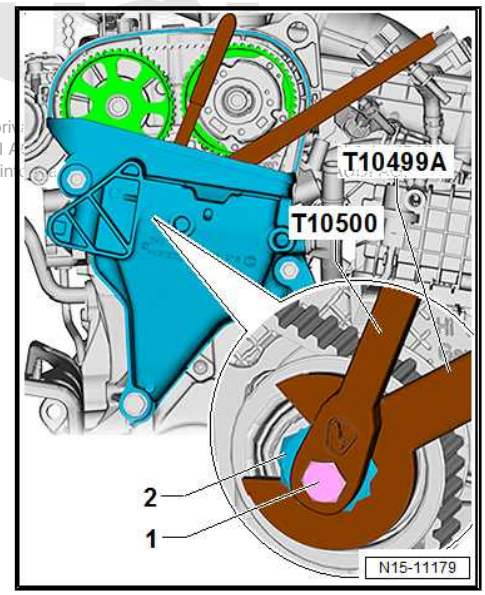
– Remove bolts -arrows- and detach toothed belt cover (bottom).



Both sides (continued):

– Fit special wrench, 30 mm - T10499 A- onto eccentric adjuster -2- of tensioning roller.
– Loosen bolt -1- using insert tool, 13 mm - T10500- .
– Release tensioning roller on eccentric adjuster -2- using special wrench, 30 mm - T10499 A- .

Protected by copyright. Copying for priv
permitted unless authorised by AUDI A
with respect to the correctness of in



Caution

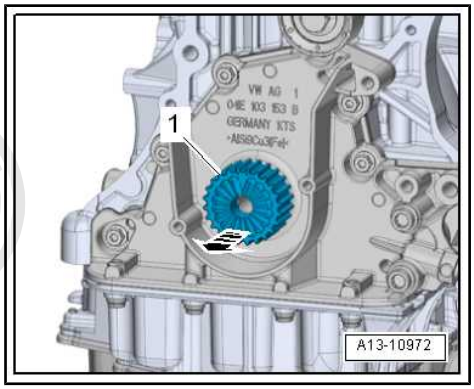
If a used belt runs in the opposite direction when it is refitted, this can cause breakage.

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

– Take off toothed belt.

- The bending radius of the toothed belt must be at least 25 mm (approx. half the diameter of the crankshaft sprocket).

– Detach crankshaft sprocket -1- -arrow-.



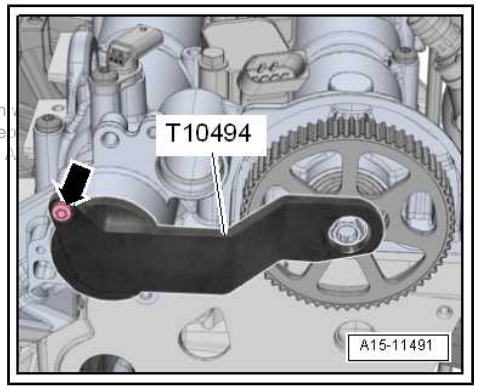
Installing (adjusting valve timing)

Note

- *Renew bolts tightened with specified tightening angle.*
- *Renew O-ring of plug if damaged.*

– Check “TDC” position of camshaft and crankshaft:

- Camshaft clamp - T10494- must be fitted to camshaft housing -arrow-.



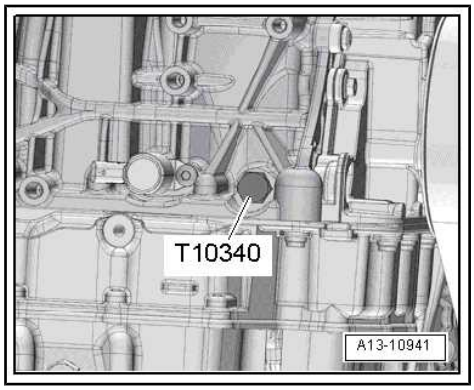
Protected by copyright. Copying for private or commercial purposes, in part or in
permitted unless authorised by AUDI AG. AUDI AG does not guarantee or acce
with respect to the correctness of information in this document. Copyright by

Caution

Risk of damage to camshafts.

- ***The camshaft clamp - T10494- must not be used as a counterhold tool.***

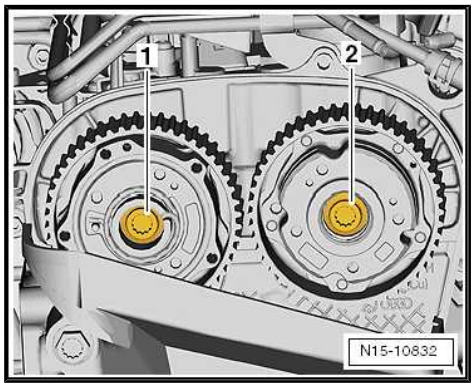
- Locking pin - T10340- is screwed into cylinder block as far as stop and tightened to 30 Nm.
- Crankshaft is turned in normal direction of rotation until it makes contact with locking pin - T10340- = “TDC” position.



Caution

Risk of damage to camshafts.

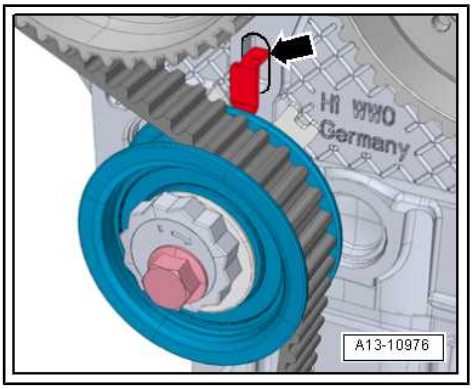
- ***The camshaft clamp - T10494- must not be used as a counterhold tool.***



– Fit new bolts -1, 2- for camshaft sprockets, but do not tighten.

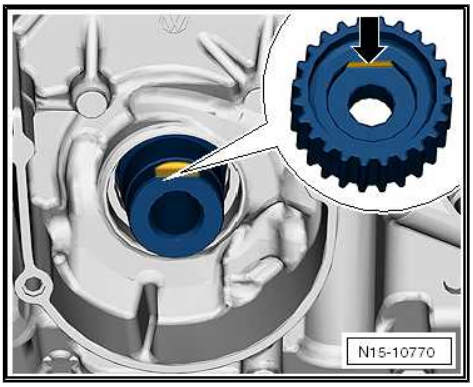
- It should just be possible to turn the adjusters on the camshafts without axial movement.

- Metal lug -arrow- of tensioning roller must engage in cast recess on cylinder head.



– Fit crankshaft sprocket onto crankshaft.

- Contact surface between poly V-belt pulley and crankshaft sprocket must be free of oil and grease.
- Machined surface -arrow- of crankshaft sprocket must be positioned over machined surface of crankshaft journal.



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 toothed belt in the specified sequence.

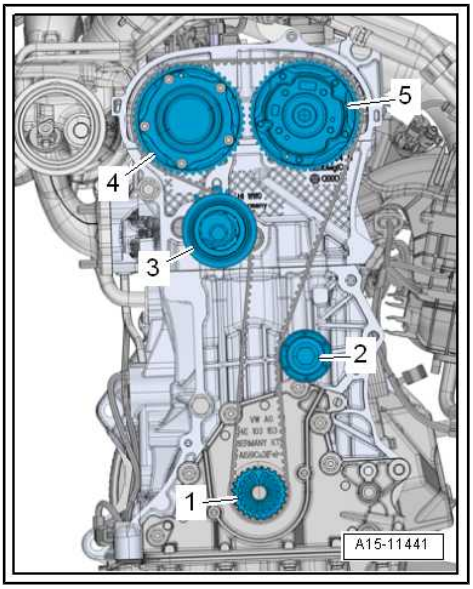
1 - Crankshaft sprocket

2 - Idler roller

3 - Tensioning roller

4 - Camshaft sprocket, exhaust side

5 - Camshaft sprocket, inlet side

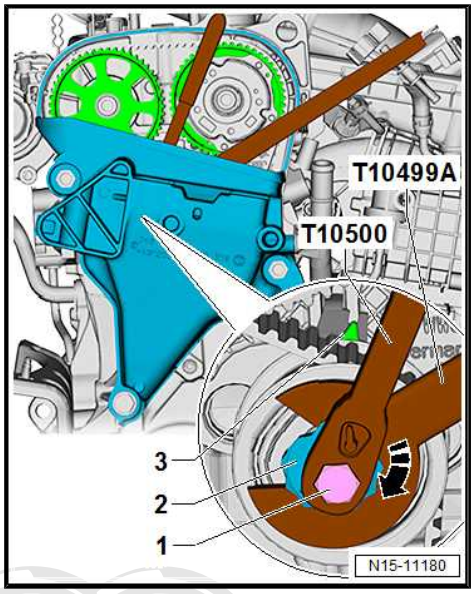


– Install toothed belt cover (bottom section).

– Install pulley ⇒ page 52 .

– Using special wrench, 30 mm - T10499 A- , turn eccentric adjuster -2- of tensioning roller in direction of -arrow- until adjustment indicator -3- is positioned approx. 10 mm to right of adjustment window.

– Turn eccentric adjuster -2- back until adjustment indicator -3- is positioned exactly in adjustment window.



Caution

Risk of damage to engine if tightening torque is incorrect.

- ***Torque wrench - VAS 6583- must be used to tighten the bolts.***
- ***When setting the tightening torque on the torque wrench - VAS 6583- , the reading on the insert tool, 13 mm - T10500- must be entered in the torque wrench.***

– Hold eccentric adjuster in this position and tighten bolt -1- using insert tool, 13 mm - T10500- with torque wrench - VAS 6583- .

Note

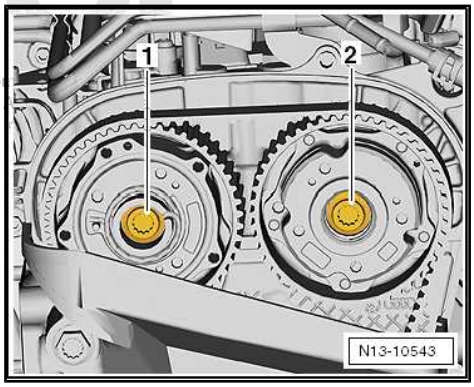
Turning the engine further or running the engine may lead to slight differences in the position of the adjustment indicator -3- in relation to the adjustment window. This does not affect the toothed belt tension.

Caution

Risk of damage to camshafts.

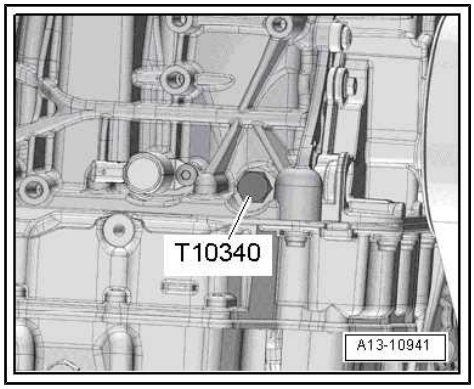
- ***The camshaft clamp - T10494- must not be used as a counterhold tool.***

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

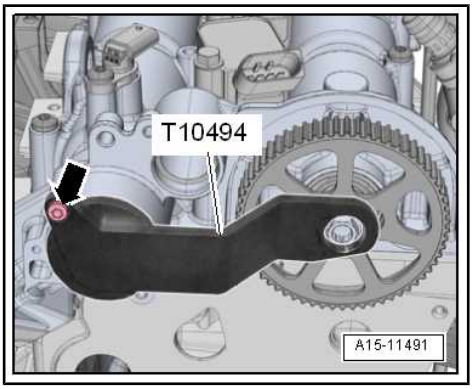


– Tighten bolts -1, 2- initially to 50 Nm using counterhold tool - T10172A- with adapters -T10172/2- , or counterhold tool - T10554- and counterhold tool - T10172- .

– Remove locking pin - T10340- .

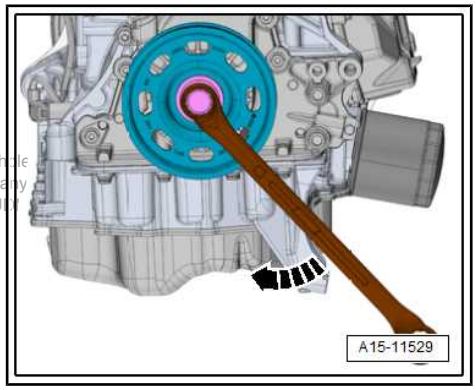


– Remove bolt -arrow- and detach camshaft clamp - T10494- .



Checking valve timing:

– Turn crankshaft 2 rotations in normal direction of engine rotation -arrow-.

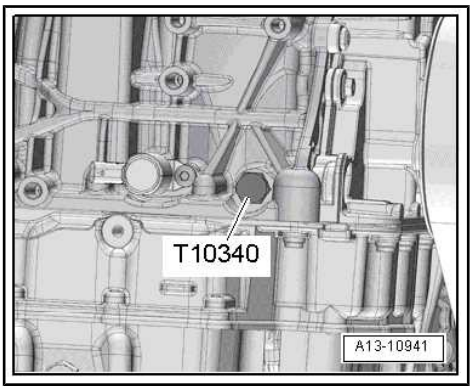


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Screw locking pin - T10340- into cylinder block as far as stop and tighten to 30 Nm.

– Rotate crankshaft further in normal direction of rotation as far as stop.

• The locking pin is now in contact with the crank web.



Note

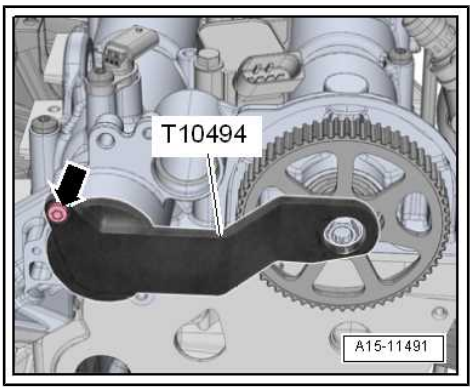
The locking pin - T10340- locks the crankshaft only in the direction of engine rotation.

Note

♦ *It should be possible to insert the camshaft clamp - T10494- easily.*

♦ *Do not knock camshaft clamp into place with any kind of tool.*

– Insert camshaft clamp - T10494- into camshafts as far as stop and hand-tighten with bolt -arrow-.

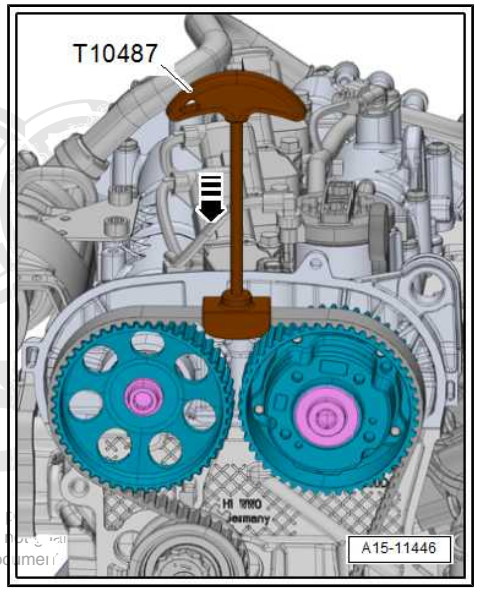


Note

- *If it is not possible to insert the camshaft clamp - T10494- easily:*
- *Press down toothed belt -arrow- using assembly tool -T10487- and then insert camshaft clamp - T10494- into camshafts as far as stop and hand-tighten bolt.*

If it is not possible to insert camshaft clamp - T10494- , valve timing is not OK.

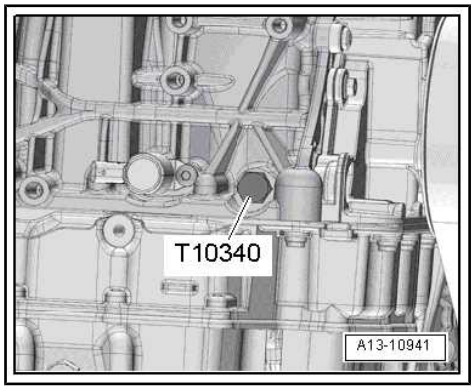
– Adjust valve timing again ⇒ page 105 .



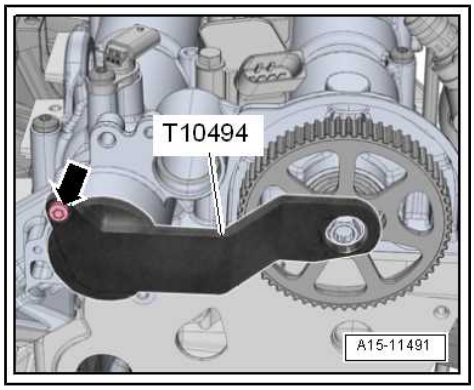
Protected by copyright. Copying for private or commercial purposes, in part, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document.

If it is possible to insert camshaft clamp - T10494- , valve timing is OK.

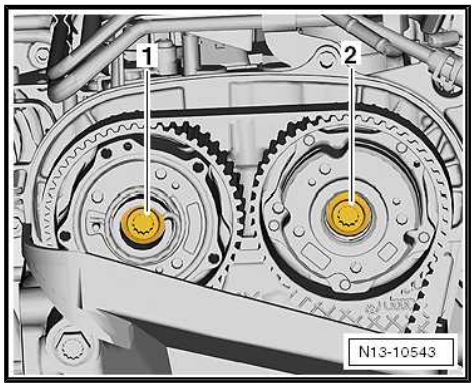
– Remove locking pin - T10340- .



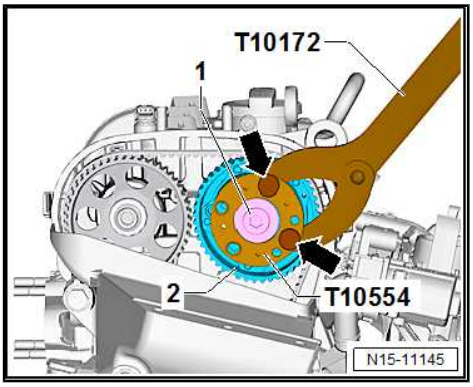
– Remove bolt -arrow- and detach camshaft clamp - T10494- .



– Tighten bolts -1, 2- to final tightening torque ⇒ page 82 using counterhold tool - T10172A- with adapters -T10172/2- , or counterhold tool - T10554- and counterhold tool - T10172- .



– Tighten plug -1- using counterhold tool - T10172- with counterhold tool - T10554- .



Caution

Risk of irreparable damage to engine.

- *After completing work, check that locking pin - T10340- and camshaft clamp - T10494- have been removed.*

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

Tightening torques

- ⇒ “1.1 Exploded view - poly V-belt drive”, page 45
- ⇒ “1.1 Exploded view - toothed belt cover”, page 79
- ⇒ “1.2.2 Exploded view - toothed belt, engine codes CSSA, CZDA, CZEA, CZDB, CWLA”, page 82
- ⇒ Fig. ““Plug for TDC drilling in cylinder block - tightening torque”“ , page 81
- ⇒ “2.2 Exploded view - camshaft housing”, page 169
- ⇒ “3.1 Exploded view - crankcase breather system”, page 218
- ⇒ “2.1 Exploded view - coolant pump/thermostat”, page 237
- ⇒ “1.1 Exploded view - turbocharger”, page 273
- ⇒ “2.1 Exploded view - charge air system”, page 284

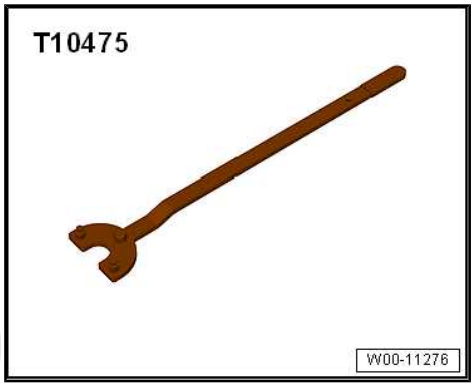
1.4.3 Removing and installing toothed belt - engine code CZEA

- Torque wrench - VAS 6583-



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

- Counterhold tool - T10475-

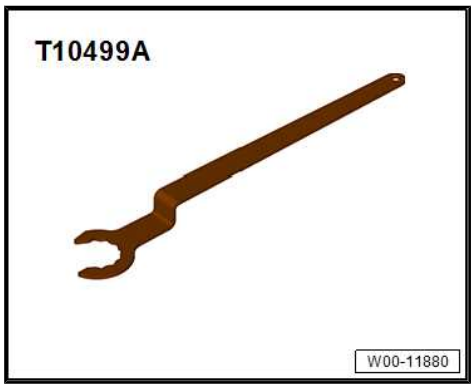


- Counterhold tool - T10172 A- with adapters -T10172/1-

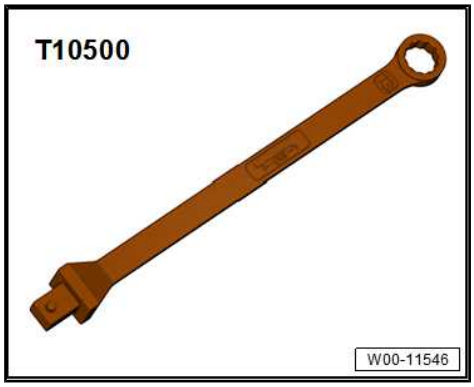


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

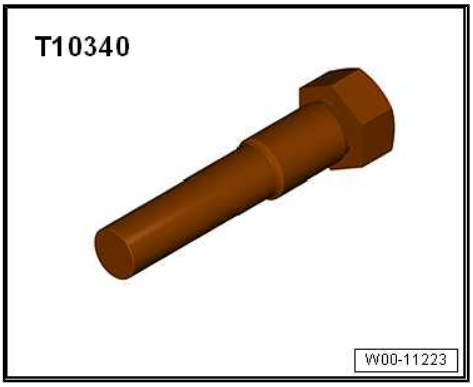
- Special wrench, 30 mm - T10499 A-



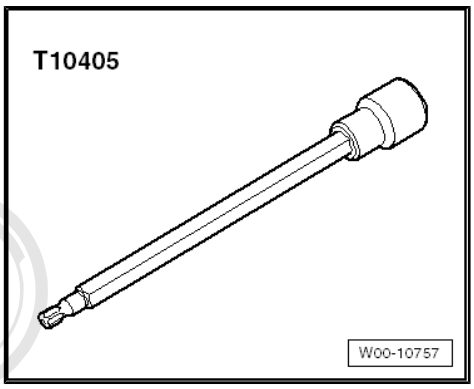
- Open end spanner insert, AF 13 - T10500-



- Locking pin - T10340-



- Socket Torx T 30 - T10405-

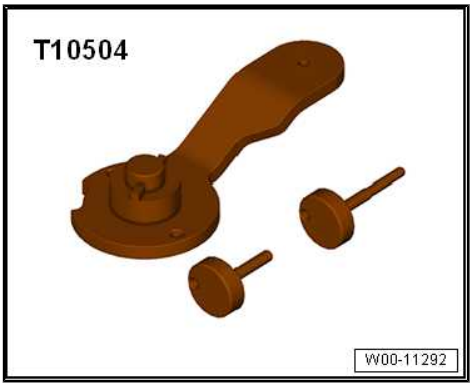


- Assembly tool - T10487-

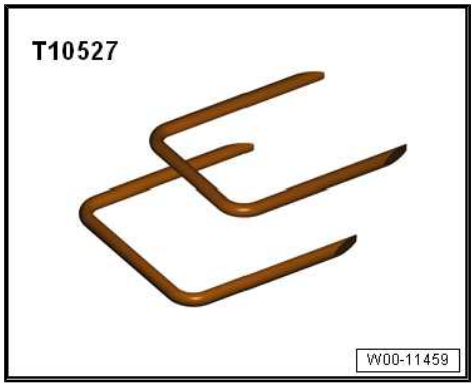


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

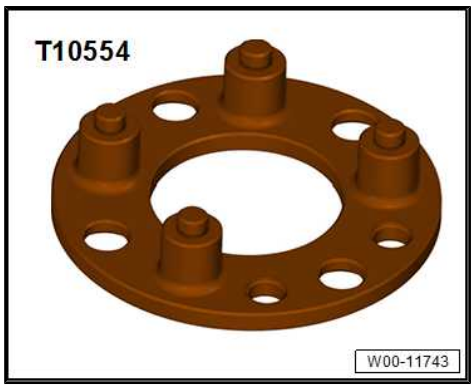
- Camshaft clamp - T10504-



♦ Release tool - T10527- and -T10527/1-

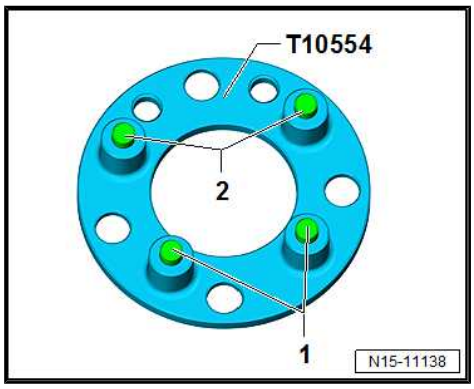


♦ Counterhold tool - T10554-



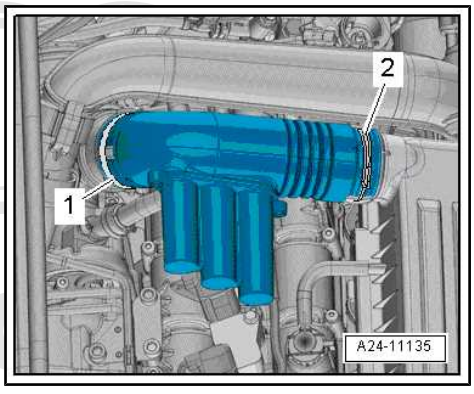
Counterhold tool - T10554-

- The lugs -1- and -2- on counterhold tool - T10554- are different distances apart.
- Counterhold tool - T10554- can only be applied in one position.
- Position counterhold tool - T10554- flush against camshaft adjusters.



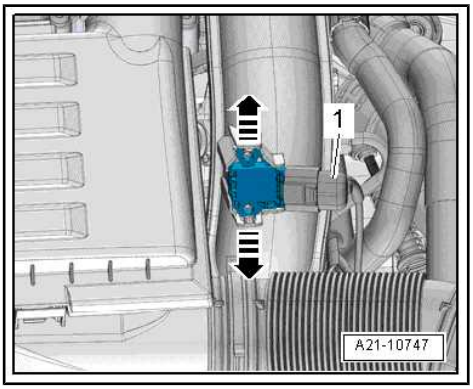
Removing

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



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

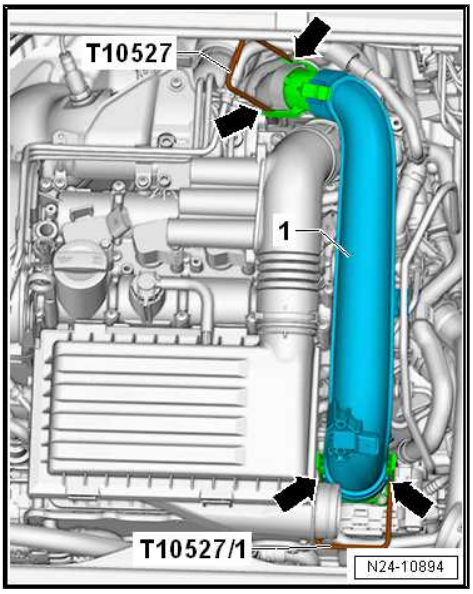
– Unplug electrical connector -1- at charge pressure sender - G31- / intake air temperature sender 2 - G299- .



Note

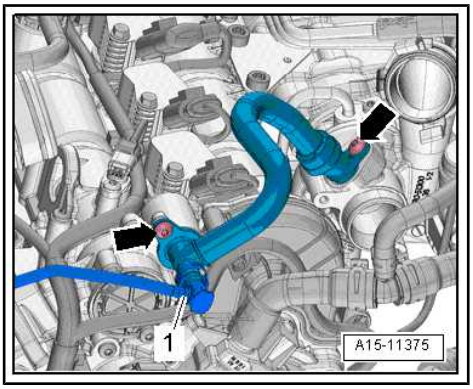
Disregard -arrows-.

– Move air hoses clear at air pipe.
– Release fasteners -arrows- with release tool - T10527- and - T10527/1- , and detach air pipe -1-.

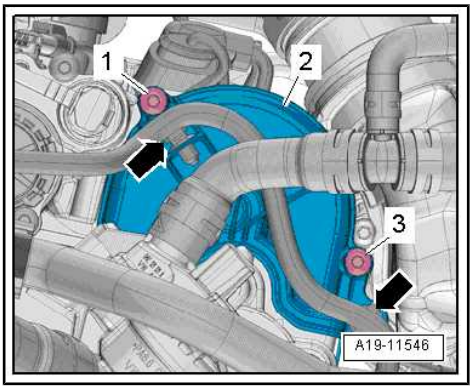


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Press release tabs and disconnect hose -1- for activated charcoal filter.
– Remove bolts -arrows- and detach crankcase breather hose.



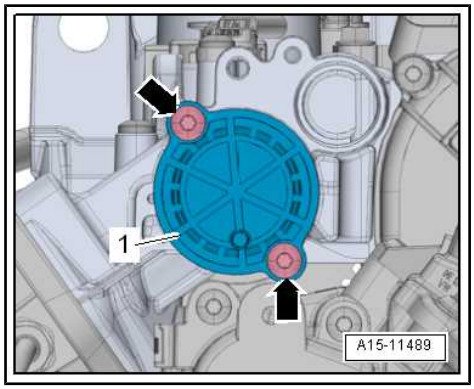
– Move electrical wiring harness clear -arrows-.
– Unscrew bolts -1, 3- and remove cover -2- for toothed belt for coolant pump.



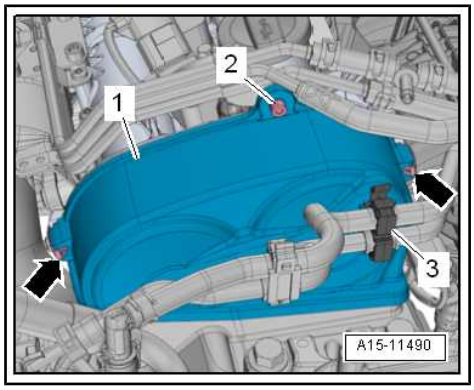
Note

- *Danger of chemical damage to seal for coolant pump if oil enters between coolant pump and cylinder head.*
- *Cover coolant pump with a cloth.*
- *Catch escaping engine oil with a cloth.*

– Unscrew bolts -arrows- and detach sealing cap -1-.



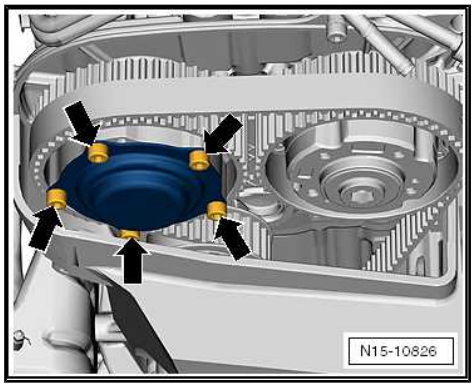
– Move clear hoses at bracket -3-.
– Unscrew bolt -2-.
– Release clips -arrows- and detach toothed belt cover (top) -1-.



Caution

Risk of damage to engine due to oil on toothed belt.

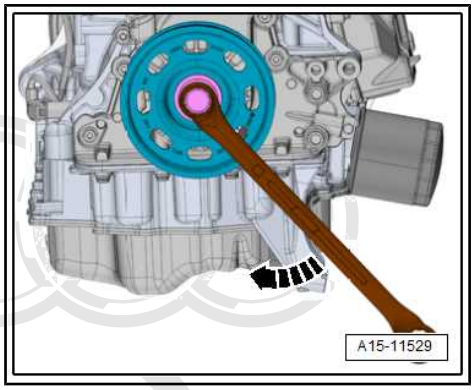
- ***Place a cloth underneath to catch escaping engine oil.***



– Remove bolts -arrows-.

Note

To remove all bolts, rotate crankshaft in direction of engine rotation by turning bolt for vibration damper pulley in direction of -arrow-.



– Detach cover from camshaft adjuster of exhaust camshaft.

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.

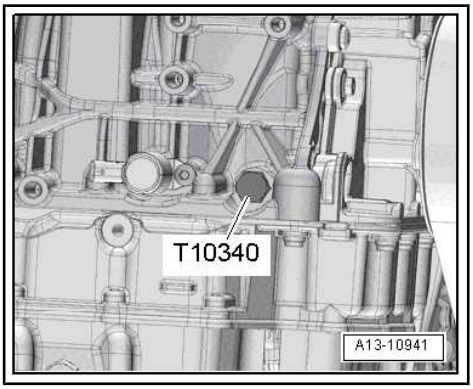
Rotate crankshaft to “TDC” as follows:

– Unscrew plug for “TDC” hole on cylinder block.

– Screw locking pin - T10340- into cylinder block as far as stop and tighten to 30 Nm.

– Rotate crankshaft in normal direction of rotation as far as stop.

• The locking pin is now in contact with the crank web.



Note

The locking pin - T10340- locks the crankshaft only in the direction of engine rotation.

Caution

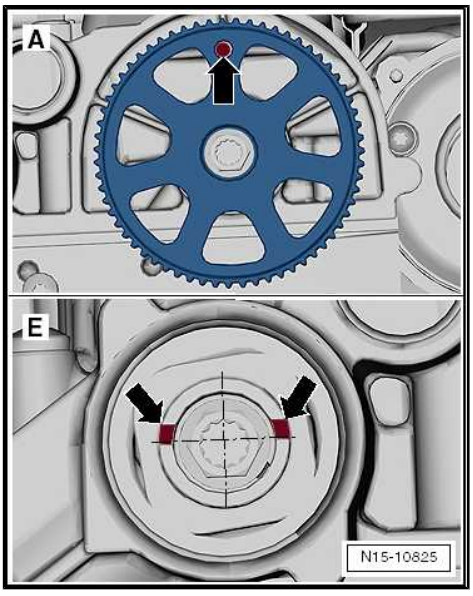
Risk of damage to engine.

- ***If the locking pin - T10340- cannot be screwed in as far as the stop, the crankshaft is not in the correct position.***
- ***In this case proceed as follows:***
- ***Remove locking pin.***
- ***Turn crankshaft by 90° in direction of engine rotation.***
- ***Screw locking pin - T10340- into cylinder block as far as stop and tighten to 30 Nm.***
- ***Turn crankshaft further in normal direction of rotation as far as stop.***

• On exhaust camshaft -A-, hole -arrow- in coolant pump drive sprocket must be aligned with hole in camshaft housing.

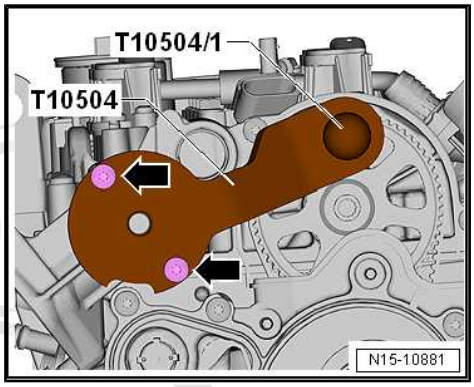
• On inlet camshaft -E-, grooves -arrows- must be positioned above centre of camshaft.

– If camshafts are not positioned as described, unscrew locking pin - T10340- , turn crankshaft one rotation further and return to TDC position.



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.

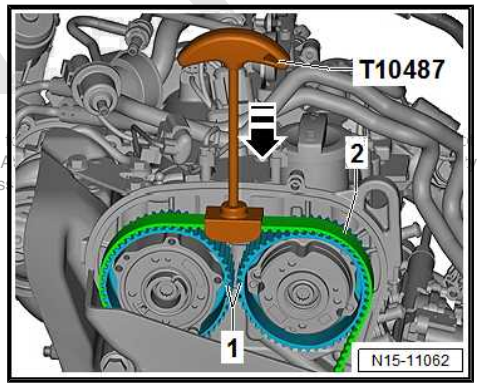
– When camshafts are positioned as described, insert camshaft clamp - T10504- into inlet camshaft as far as stop and fit bolts -arrows- (do not screw in yet).
– Insert locating pin -T10504/1- as far as stop.
– Tighten bolts -arrows- hand-tight.



Note

If it is not possible to insert camshaft clamp - T10504- easily, press down toothed belt -arrow- using assembly tool - T10487- and then insert camshaft clamp - T10504- into camshafts as far as stop and tighten bolts hand-tight. Insert locating pin -T10504/1- as far as stop.

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



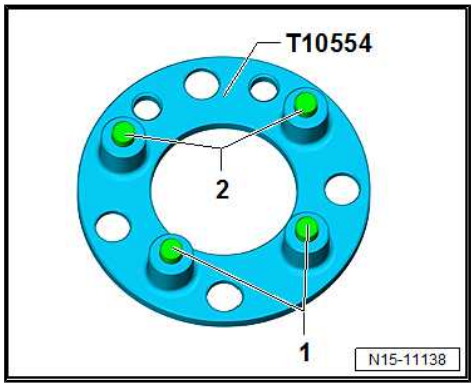
Caution

Risk of damage to camshaft.

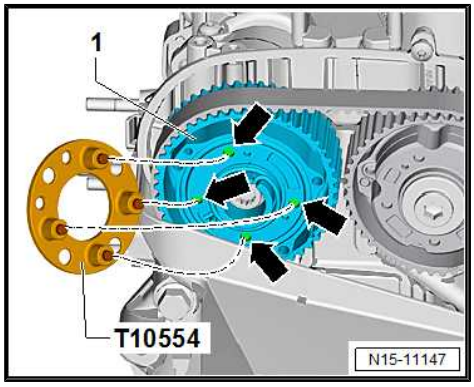
- *The camshaft clamp - T10504- must not be used as a counterhold tool.*

Exhaust camshaft:

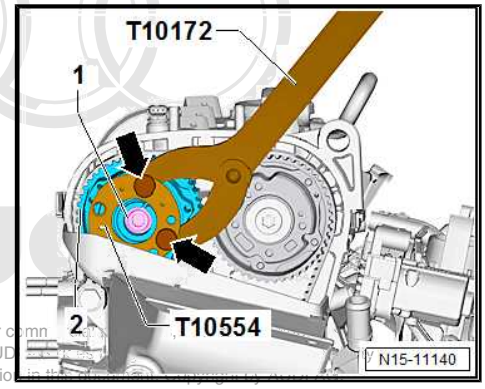
– Guide in counterhold tool - T10554- between camshaft adjuster and engine support.
– To do so, first guide area between lugs -2- on counterhold tool - T10554- past camshaft adjuster.



– Turn counterhold tool - T10554- so that it can be inserted in holes -arrows- as shown.
– Position counterhold tool - T10554- flush against camshaft adjuster -1-.



– Loosen bolt -1- one turn. Secure camshaft sprocket in place with counterhold tool - T10554- and counterhold tool - T10172- .

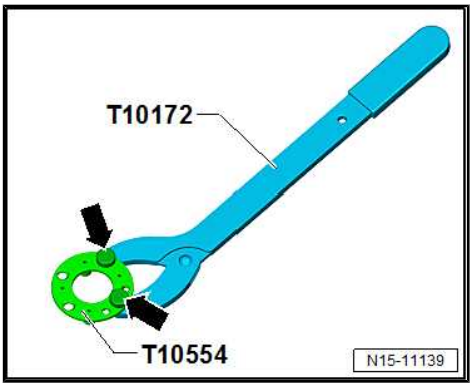


Protected by copyright. Copying for private or comm
permitted unless authorised by AUDI AG. AUD
with respect to the correctness of informatio

Inlet camshaft

– Assemble tools as shown.

– Attach counterhold tool - T10172- to counterhold tool - T10554- using knurled screws -arrows-.

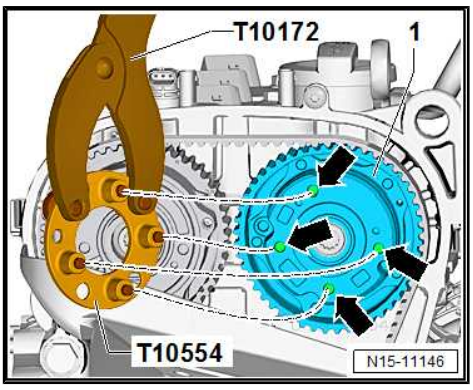


– Apply counterhold tool - T10554- with counterhold tool - T10172- to camshaft sprocket -1-, as shown.

– Lugs must be inserted correctly into holes -arrows-.

– Position counterhold tool - T10554- flush against camshaft adjuster -1-.

– Secure camshaft with counterhold tool - T10554- and counterhold tool - T10172- so that it cannot turn.



Caution

Risk of damage to engine due to oil on toothed belt.

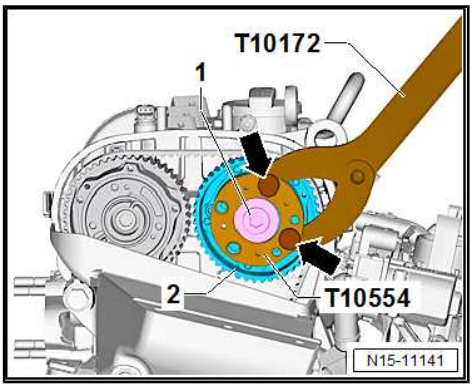
- ***Place a cloth underneath to catch escaping engine oil.***

– Unscrew plug -1- on camshaft sprocket (inlet side).

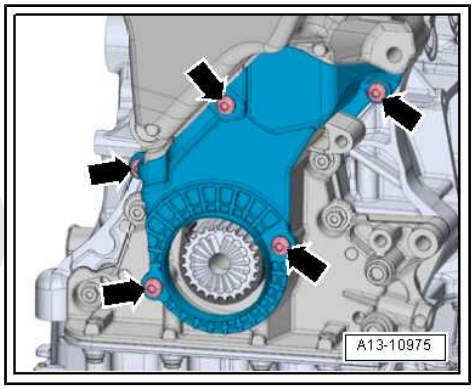
– Use counterhold tool - T10554- with counterhold tool - T10172- to do so.

– Loosen bolt -1- one turn. Secure camshaft sprocket in place with counterhold tool - T10554- and counterhold tool - T10172- .

– Remove pulley ⇒ page 52 .



– Remove bolts -arrows- and detach toothed belt cover (bottom).

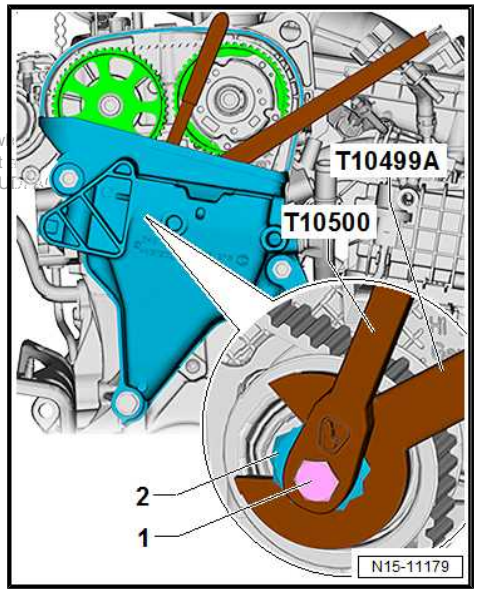


Both sides (continued):

– Fit special wrench, 30 mm - T10499 A- onto eccentric adjuster -2- of tensioning roller.

– Loosen bolt -1- using insert tool, 13 mm - T10500-.

– Release tensioning roller on eccentric adjuster -2- using special wrench, 30 mm - T10499 A- .



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 toothed belt with chalk or felt-tip pen for re-installation.*

– Take off toothed belt.

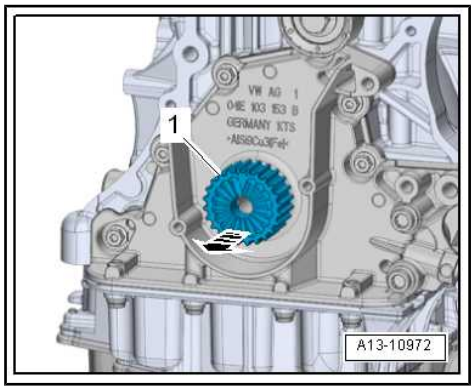
• The bending radius of the toothed belt must be at least 25 mm (approx. half the diameter of the crankshaft sprocket).

– Detach crankshaft sprocket -1- -arrow-.

Installing (adjusting valve timing)

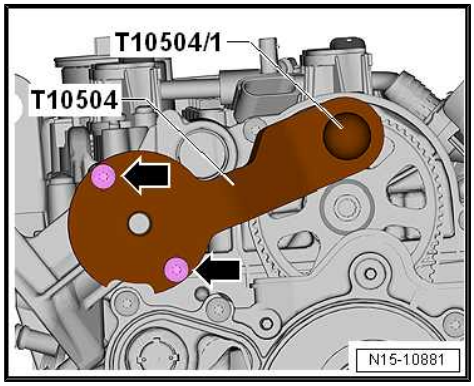
Note

- *Renew bolts tightened with specified tightening angle.*
- *Renew O-ring of plug if damaged.*



– Check “TDC” position of camshaft and crankshaft:

• Camshaft clamp - T10504- with locating pin -T10504/1- must be fitted to camshaft housing.

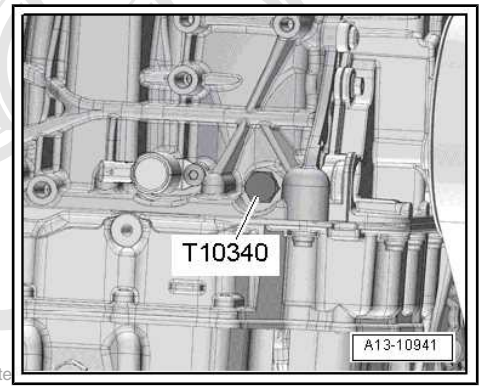


Caution

Risk of damage to engine if valve timing is incorrectly adjusted.

- *Locating pin -T10504/1- must be inserted as far as stop.*

- Locking pin - T10340- is screwed into cylinder block as far as stop and tightened to 30 Nm.
- Crankshaft is turned in normal direction of rotation until it makes contact with locking pin - T10340- = “TDC” position.

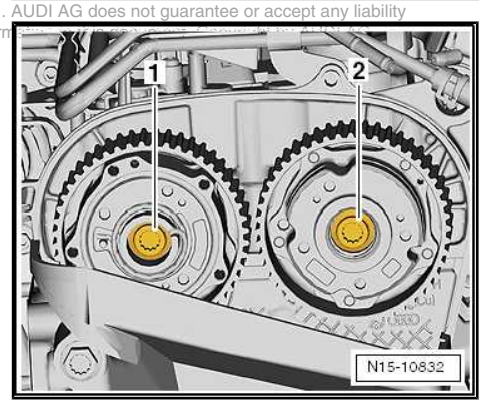


Protected by copyright. Copying for private
permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability
with respect to the correctness of inform

Caution

Risk of damage to camshafts.

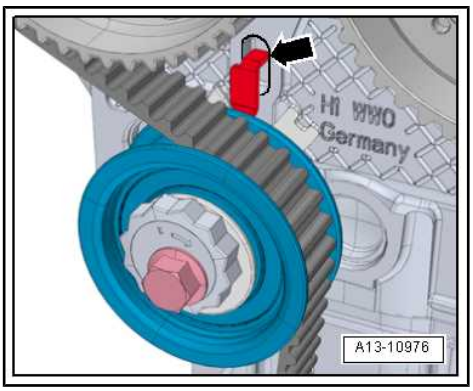
- *The camshaft clamp - T10504- must not be used as a counterhold tool.*



– Fit new bolts -1, 2- for camshaft sprockets, but do not tighten.

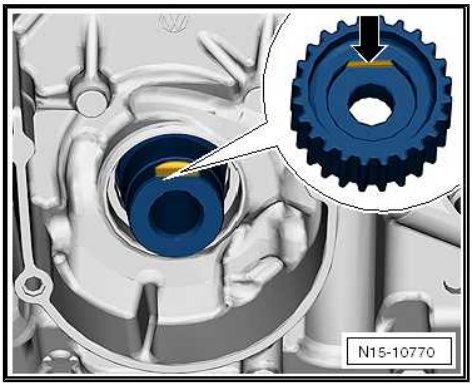
- It should just be possible to turn the adjusters on the camshafts without axial movement.

- Metal lug -arrow- of tensioning roller must engage in cast recess on cylinder head.



– Fit crankshaft sprocket onto crankshaft.

- Contact surface between poly V-belt pulley and crankshaft sprocket must be free of oil and grease.
- Machined surface -arrow- of crankshaft sprocket must be positioned over machined surface of crankshaft journal.



– Fit toothed belt in the specified sequence.

1 - Crankshaft sprocket

2 - Idler roller

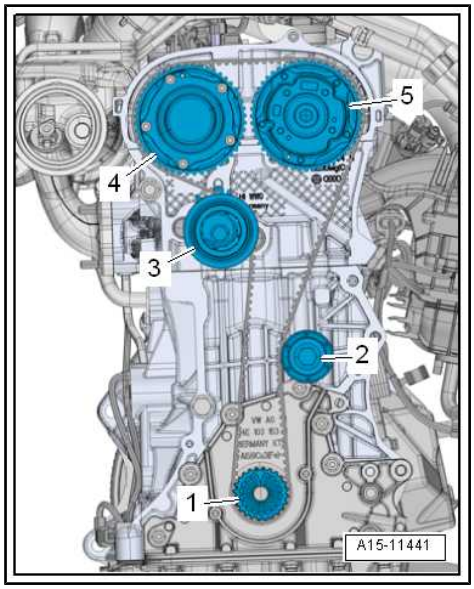
3 - Tensioning roller

4 - Camshaft sprocket, exhaust side

5 - Camshaft sprocket, inlet side

– Install toothed belt cover (bottom section).

– Install pulley
⇒ “1.6 Removing and installing pulley”, page 52 .



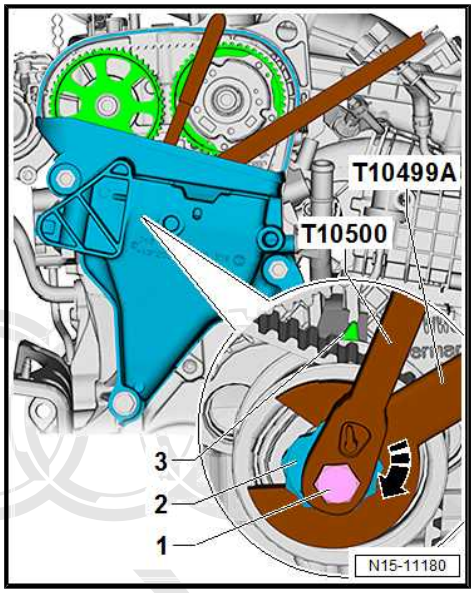
– Using special wrench, 30 mm - T10499 A- , turn eccentric adjuster -2- of tensioning roller in direction of -arrow- until adjustment indicator -3- is positioned approx. 10 mm to right of adjustment window.

– Turn eccentric adjuster back until adjustment indicator is positioned exactly in adjustment window.

Caution

Risk of damage to engine if tightening torque is incorrect.

- ***Torque wrench - VAS 6583- must be used to tighten the bolts.***
- ***When setting the tightening torque on the torque wrench - VAS 6583- , the reading on the insert tool, 13 mm - T10500- must be entered in the torque wrench.***



– Hold eccentric adjuster in this position and tighten bolt -1- using insert tool, 13 mm - T10500- with torque wrench - VAS 6583- .

Note

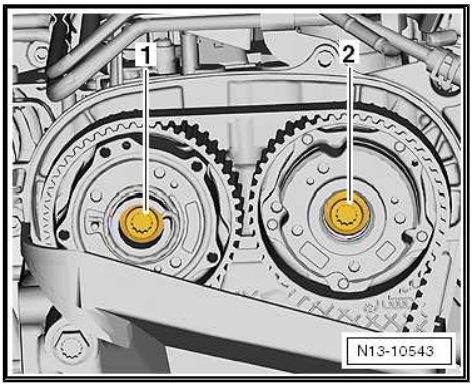
Turning the engine further or running the engine may lead to slight differences in the position of the adjustment indicator -3- in relation to the adjustment window. This does not affect the toothed belt tension.

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

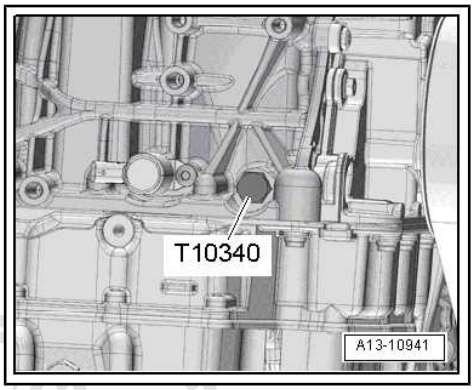
Risk of damage to camshafts.

- *The camshaft clamp - T10504- must not be used as a counterhold tool.*



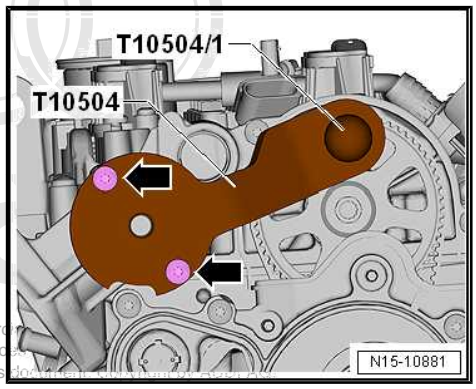
– Tighten bolts -1, 2- initially to 50 Nm using counterhold tool - T10172A- with adapters -T10172/2- , or counterhold tool - T10554- and counterhold tool - T10172- .

– Remove locking pin - T10340- .



– Remove locating pin -T10504/1- .

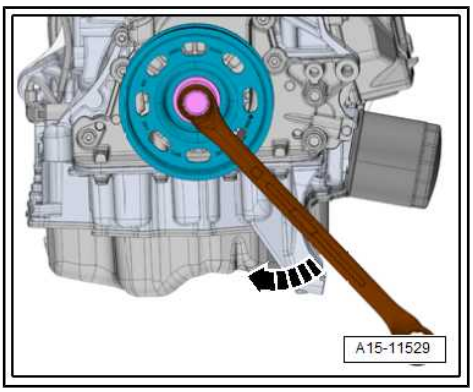
– Remove bolts -arrows- and detach camshaft clamp - T10504- .



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. ©AUDI AG, Ingolstadt

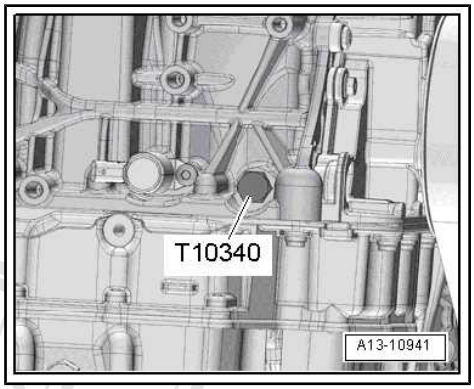
Checking valve timing:

– Turn crankshaft 2 rotations in normal direction of engine rotation -arrow-.



– Screw locking pin - T10340- into cylinder block as far as stop and tighten to 30 Nm.
– Rotate crankshaft further in normal direction of rotation as far as stop.

• The locking pin is now in contact with the crank web.



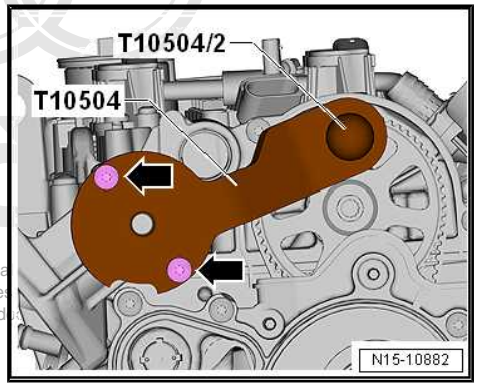
Note

The locking pin - T10340- locks the crankshaft only in the direction of engine rotation.

Note

♦ *It should be possible to insert the camshaft clamp - T10504- easily.*
♦ *Do not knock camshaft clamp into place with any kind of tool.*

– Insert camshaft clamp - T10504- into inlet camshaft as far as stop and fit bolts -arrows- (do not screw in yet).
– Insert test pin -T10504/2- as far as stop.
– Tighten bolts -arrows- hand-tight.

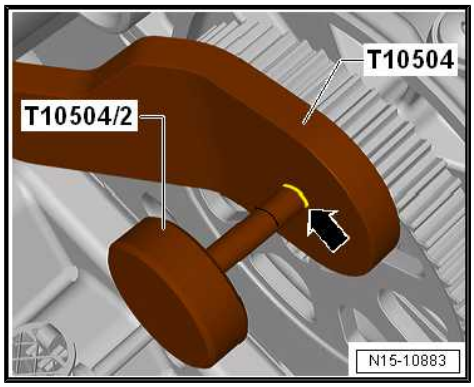


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document.

Caution

Risk of damage to engine if valve timing is incorrectly adjusted.

♦ ***If groove -arrow- is not flush with camshaft clamp - T10504- , test pin -T10504/2- is not inserted far enough.***



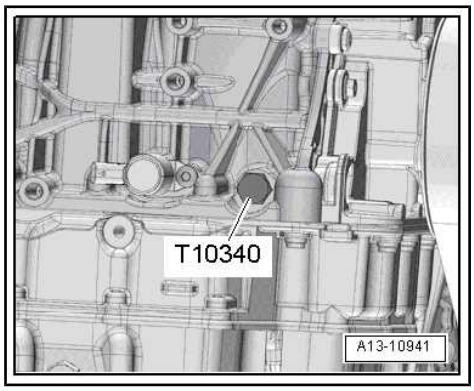
– Check whether groove -arrow- on test pin -T10504/2- is flush with camshaft clamp - T10504- .

If it is not possible to insert camshaft clamp - T10504- with test pin -T10504/2- , valve timing is not OK:

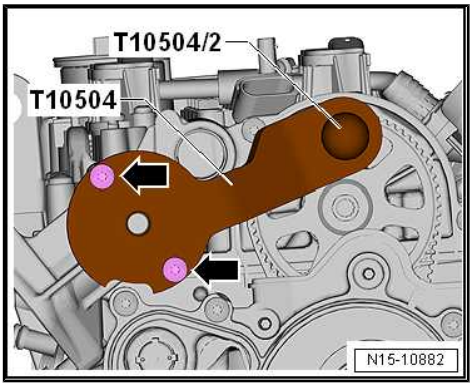
– Adjust valve timing again ⇒ page 105 .

If it is possible to insert camshaft clamp - T10504- with test pin -T10504/2- , valve timing is OK.

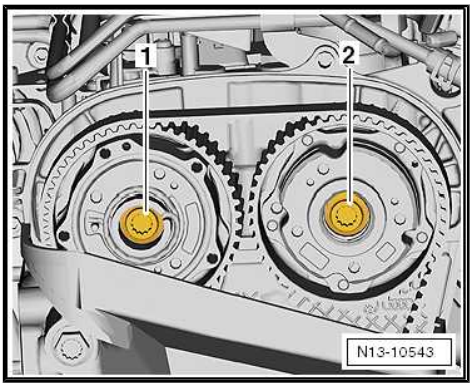
– Remove locking pin - T10340- .



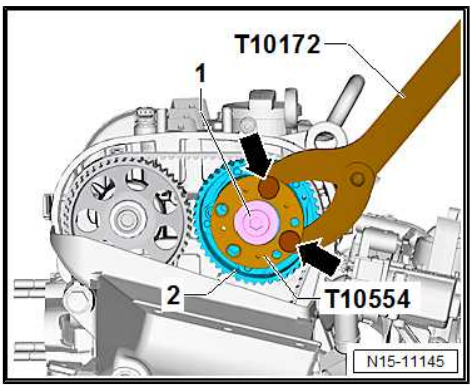
– Remove bolts -arrows- and detach camshaft clamp - T10504- with test pin -T10504/2- .



– Tighten bolts -1, 2- to final tightening torque ⇒ page 82 using counterhold tool - T10172A- with adapters -T10172/2- , or counterhold tool - T10554- and counterhold tool - T10172- .



– Tighten plug -1- using counterhold tool - T10172- with counterhold tool - T10554- .



Caution

Risk of irreparable damage to engine.

- *After completing work, check that locking pin - T10340- and camshaft clamp - T10504- have been removed.*

Further installation is carried out in the reverse order; note the following:

Note

Do not reuse coolant.

– Fill up with coolant ⇒ page 236 .

Tightening torques

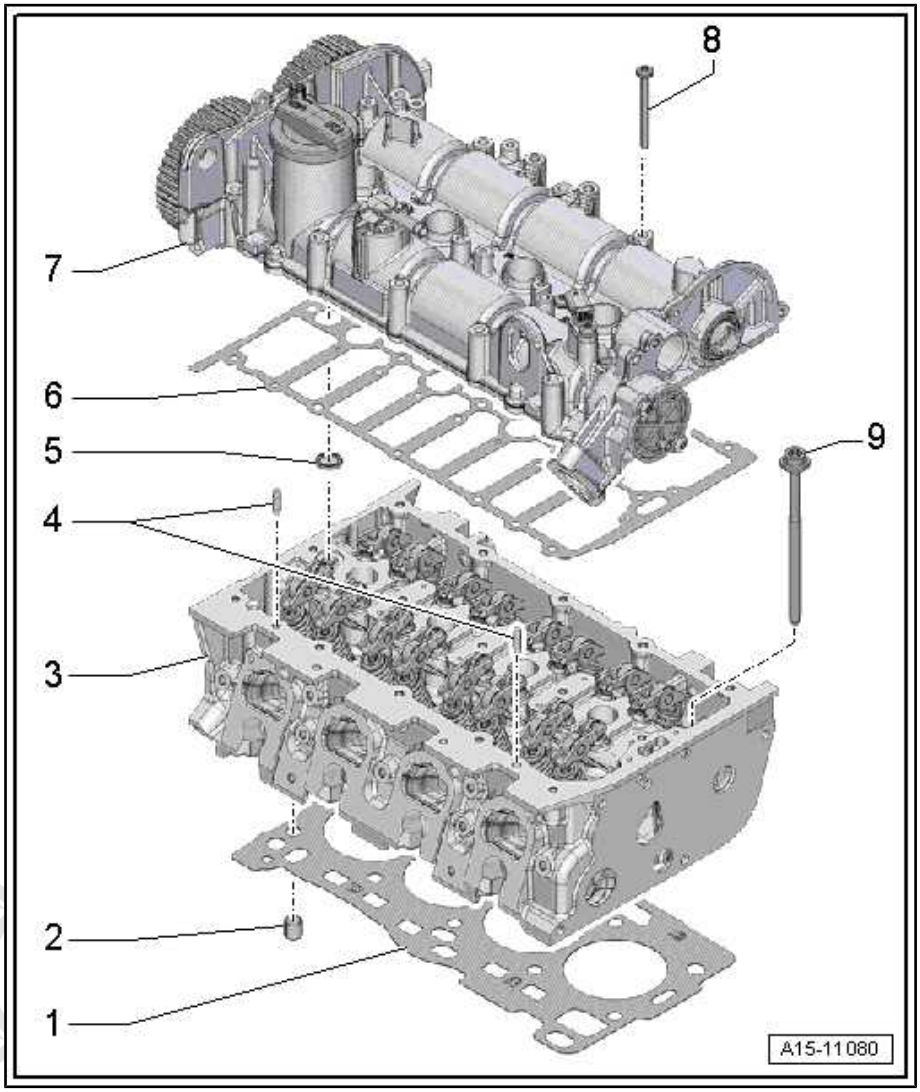
- ⇒ “1.1 Exploded view - poly V-belt drive”, page 45
- ⇒ “1.1 Exploded view - toothed belt cover”, page 79
- ⇒ “1.2.2 Exploded view - toothed belt, engine codes CSSA, CZDA, CZEA, CZDB, CWLA”, page 82
- ⇒ Fig. ““Plug for TDC drilling in cylinder block - tightening torque”“ , page 81
- ⇒ “2.2 Exploded view - camshaft housing”, page 169
- ⇒ “2.1 Exploded view - coolant pump/thermostat”, page 237
- ⇒ “1.1 Exploded view - turbocharger”, page 273
- ⇒ “2.1 Exploded view - charge air system”, page 284

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 accuracy or completeness of this document. Copyright by AUDI AG.

2 Cylinder head

⇒ “2.1 Exploded view - cylinder head”, page 168
⇒ “2.2 Exploded view - camshaft housing”, page 169
⇒ “2.3 Removing and installing cylinder head”, page 172
⇒ “2.4 Removing and installing camshaft housing”, page 175
⇒ “2.5 Checking compression”, page 181

2.1 Exploded view - cylinder head



1 - Cylinder head gasket

- ❑ Renewing ⇒ “2.3 Removing and installing cylinder head”, page 172
- ❑ Different versions available; for allocation refer to ⇒ Electronic parts catalogue
- ❑ Note installation position: part number must face cylinder head

2 - Dowel sleeve

- ❑ 2x

3 - Cylinder head

- ❑ Removing and installing ⇒ “2.3 Removing and installing cylinder head”, page 172
- ❑ Checking for distortion ⇒ Fig. ““Checking cylinder head for distortion”“ , page 169

4 - Dowel pins

5 - Oil strainer

- ❑ Inserted into cylinder head
- ❑ Not fitted on later versions; allocation ⇒ Electronic parts catalogue

6 - Gasket

- ❑ Renew after removing

7 - Camshaft housing

- ❑ Engine code CZEA with cam actuator
- ❑ Removing and installing ⇒ “2.4 Removing and installing camshaft housing”, page 175

8 - Bolt

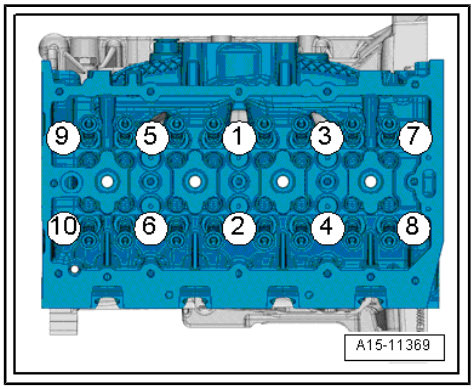
- ❑ Tightening torque and sequence ⇒ Fig. ““Camshaft housing - tightening torque and sequence”“ , page 171

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.

9 - Bolt

- ❑ Renew after removing
- ❑ Correct sequence when slackening ⇒ page 174
- ❑ Tightening torque and sequence ⇒ Fig. ““Cylinder head - tightening torque and sequence”“ , page 169

Cylinder head - tightening torque and sequence



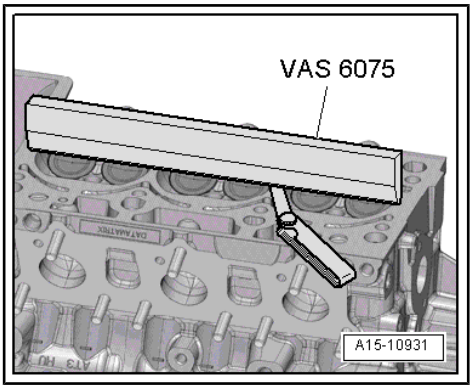
Note

Renew bolts tightened with specified tightening angle.

– Tighten bolts in stages in the sequence shown:

Stage	Bolts	Tightening torque/angle specification
1.	-1 … 10-	40 Nm
2.	-1 … 10-	Turn 90° further
3.	-1 … 10-	Turn 90° further
4.	-1 … 10-	Turn 90° further

Checking cylinder head for distortion

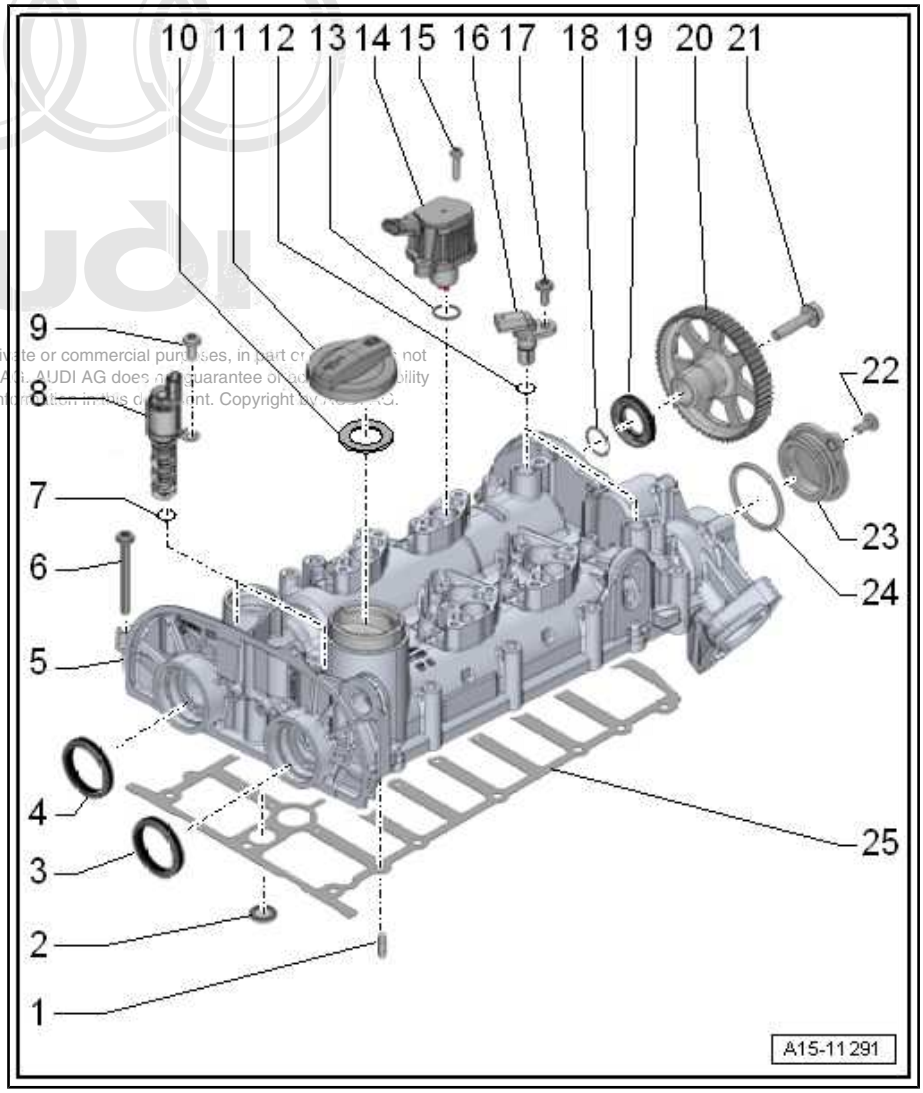


– Use straight edge 500 mm - VAS 6075- and feeler gauge to measure cylinder head for distortion at several points.

- Max. permissible distortion: 0.05 mm.

2.2 Exploded view - camshaft housing

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 - Dowel pin

2 - Oil strainer

- ❑ Inserted into cylinder head
- ❑ Not fitted on later versions; allocation ⇒ Electronic parts catalogue

3 - Oil seal

- ❑ For inlet camshaft
- ❑ Renewing ⇒ “3.3.1 Removing and installing inlet camshaft oil seal, pulley end”, page 186

4 - Oil seal

- ❑ For exhaust camshaft (pulley end)
- ❑ Renewing ⇒ “3.3.2 Removing and installing exhaust camshaft oil seal, pulley end”, page 188

5 - Camshaft housing

- ❑ Removing and installing ⇒ “2.4 Removing and installing camshaft housing”, page 175

6 - Bolt

- ❑ Tightening torque and sequence ⇒ Fig. ““Camshaft housing - tightening torque and sequence”“ , page 171

7 - O-ring

- ❑ Renew after removing

8 - Camshaft control valve 1 - N205-

- ❑ In addition for engine codes CSSA, CZDA, CZDB, CWLA, CZEA: exhaust camshaft control valve 1 - N318-
- ❑ Removing and installing ⇒ “3.5 Removing and installing camshaft control valve 1 N205 ”, page 195

9 - Bolt

- ❑ 8 Nm

10 - Seal

- ❑ For filler cap

11 - Sealing cap

12 - O-ring

- ❑ Renew after removing

13 - O-ring

- ❑ Only for engine code CZEA
- ❑ Renew after removing

14 - Cam actuator

- ❑ Only for engine code CZEA
- ❑ -N583- … -N597-

- ❑ Removing and installing ⇒ “3.4 Removing and installing cam actuator”, page 194

15 - Bolt

- ❑ Only for engine code CZEA
- ❑ 8 Nm

16 - Hall sender - G40-

- ❑ In addition for engine codes CSSA, CZDA, CZDB, CWLA, CZEA: Hall sender 2 - G163-
- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 344

17 - Bolt

- ❑ Tightening torque ⇒ Item 6 (page 345)

18 - O-ring

- ❑ Only for engine code CZEA
- ❑ Renewing
  ⇒ “2.7.2 Removing and installing toothed belt sprocket for coolant pump - engine code CZEA”, page 251

19 - Oil seal

- ❑ For exhaust camshaft, gearbox end
- ❑ Renewing
  ⇒ “3.3.3 Removing and installing exhaust camshaft oil seal, gearbox end - engine codes CHPB, CSSA, CZDA, CZDB, CWLA”, page 191

20 - Toothed belt drive sprocket

- ❑ For coolant pump
- ❑ Removing and installing
  ⇒ “2.7 Removing and installing toothed belt sprocket for coolant pump”, page 250

21 - Bolt

- ❑ Tightening torque ⇒ Item 8 (page 238)

22 - Bolt

- ❑ 8 Nm

23 - Sealing cap

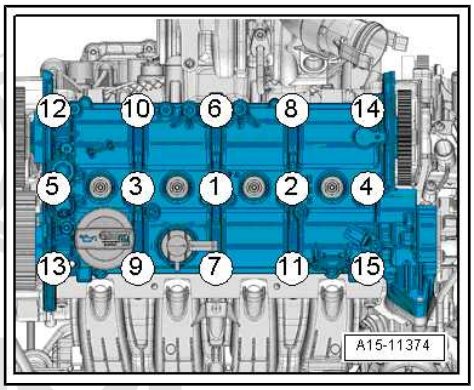
24 - O-ring

- ❑ Renew after removing

25 - Gasket

- ❑ Renew after removing

Camshaft housing - tightening torque and sequence



Note

Renew bolts tightened with specified tightening angle.

– Tighten bolts in stages in the sequence shown:

Stage	Bolts	Tightening torque/angle specification
1.	-1 … 15-	10 Nm
2.	-1 … 15-	Turn 180° further

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

2.3 Removing and installing cylinder head

Removing

Note

Fit all heat insulation sleeves in the original position when installing.

– Remove camshaft housing
⇒ “2.4 Removing and installing camshaft housing”, page 175 .

– Remove intake manifold
⇒ “3.2 Removing and installing intake manifold”, page 300 .

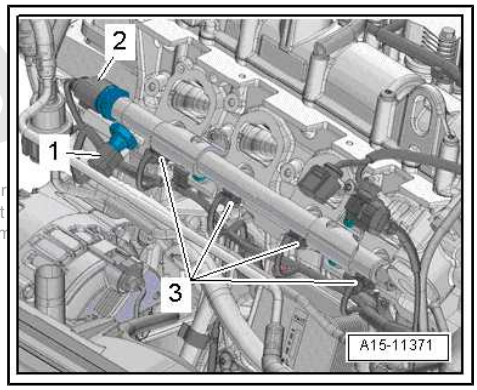
– Unplug electrical connectors:

1 - At oil pressure switch for reduced oil pressure - F378-

2 - At fuel pressure sender - G247-

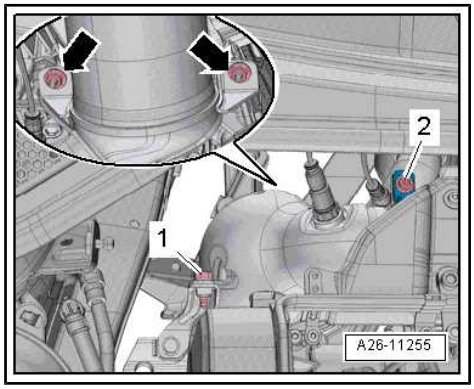
3 - At injectors -N30- ... -N33-

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

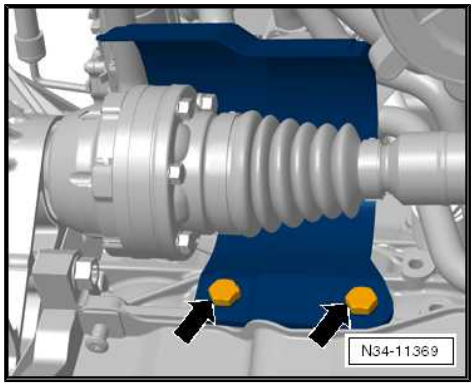


– Unscrew bolt -2- and remove screw-type clip.

– Remove bolt -1- and nuts -arrows- and tie up catalytic converter.

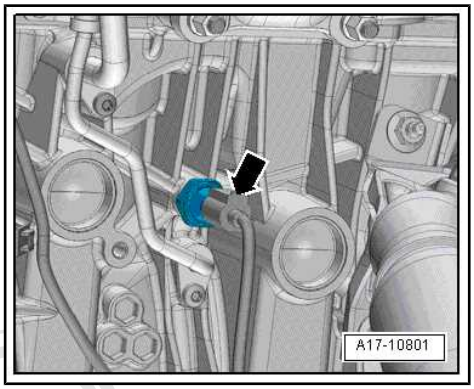


– Remove bolts -arrows- and detach heat shield for drive shaft (right-side).

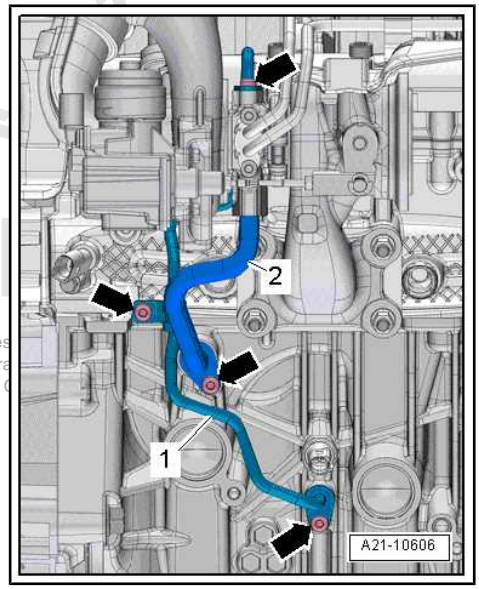


– Detach heat shield sleeve.

– Unplug electrical connector -arrow- on oil pressure switch - F22- .



– Unscrew bolts -arrows- and detach oil supply pipe -1- and oil return pipe -2-.

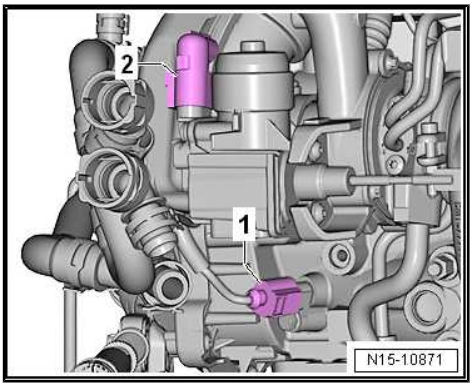


Protected by copyright. Copying for private or commercial purposes
permitted unless authorised by AUDI AG. AUDI AG does not guara
with respect to the correctness of information in this document.

– Unplug electrical connectors:

2 - For coolant temperature sender - G62-

3 - For charge pressure positioner - V465- on vehicles with engine codes CHPB, CZDA, CZEA

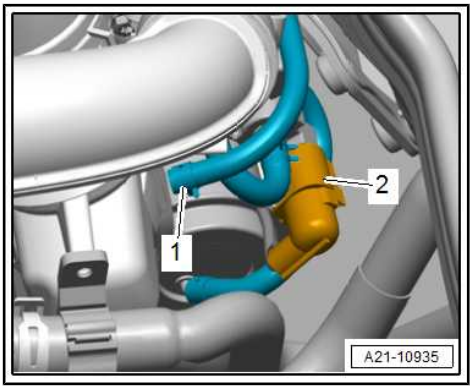


Note

Disregard -item 1-.

Engine code CSSA:

– Unplug electrical connector -2- at charge pressure control solenoid valve - N75- .

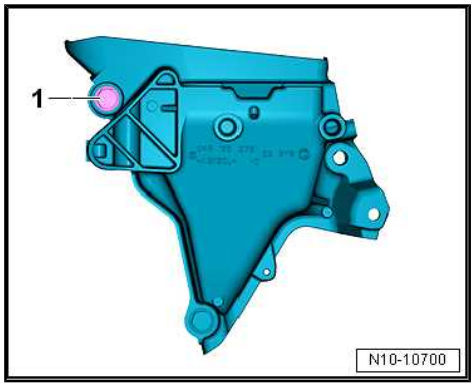


Note

Disregard -item 1-.

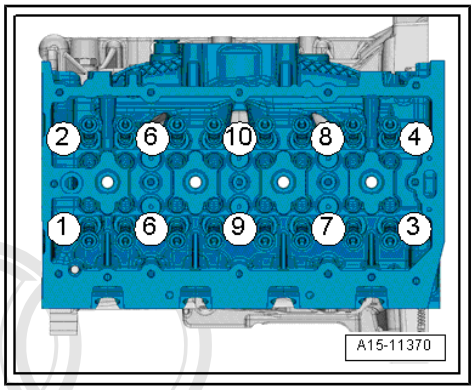
All engine versions (continued):

– Remove bolt -1- on engine support.



– Loosen and remove cylinder head bolts in sequence -1 ... 10-.

– Take off cylinder head and set it down on a soft surface (foam plastic).



Installing

Caution

Risk of damage to sealing surfaces.

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

Risk of damage to cylinder block.

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

Ensure that cylinder head gasket seals properly:

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

The reproduction, distribution and utilization of this document 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 with respect to the correctness of information in this document. Copyright by AUDI AG.

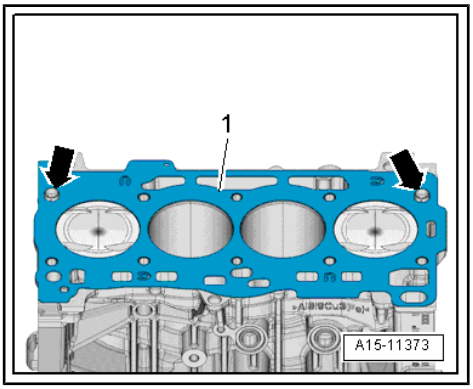
Note

- *Renew bolts tightened with specified tightening angle.*
- *Renew self-locking nuts, as well as seals, gaskets and O-rings.*
- *When installing an exchange cylinder head, the contact surfaces between the hydraulic compensation elements, roller rocker fingers and cams must be oiled before installing the camshaft housing.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *After fitting a new cylinder head or cylinder head gasket, change the engine oil and the coolant in the entire cooling system.*

– Fit cylinder head gasket -1-.

♦ Note position of centring pins in cylinder block -arrows-.

♦ Note installation position of cylinder head gasket. Part No. should be legible from inlet side.



– If crankshaft has been rotated: set No. 1 cylinder piston to top dead centre and then turn crankshaft back slightly.

– Fit cylinder head.

– Insert and hand-tighten cylinder head bolts.

– Tighten cylinder head bolts
⇒ Fig. ""Cylinder head - tightening torque and sequence"" , page 169 .

Note

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

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

– Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

– Install intake manifold
⇒ "3.2 Removing and installing intake manifold", page 300 .

– Install camshaft housing
⇒ "2.4 Removing and installing camshaft housing", page 175 .

– Change engine oil ⇒ Maintenance ; Booklet 820 .

– Fill cooling system with fresh coolant
⇒ "1.3 Draining and filling cooling system", page 230 .

Tightening torques

♦ ⇒ Fig. ""Engine support - tightening torque and sequence"", page 34

♦ ⇒ "2.1 Exploded view - cylinder head", page 168

♦ ⇒ "1.1 Exploded view - turbocharger", page 273

♦ ⇒ Fig. ""Installing catalytic converter - tightening torque and sequence"" , page 340

♦ Heat shield for drive shaft ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Exploded view - drive shaft

2.4 Removing and installing camshaft housing

Removing

– Remove engine cover panel
⇒ "3.1 Removing and installing engine cover panel", page 44 .

– Remove coolant pump
⇒ "2.5 Removing and installing coolant pump", page 243 .

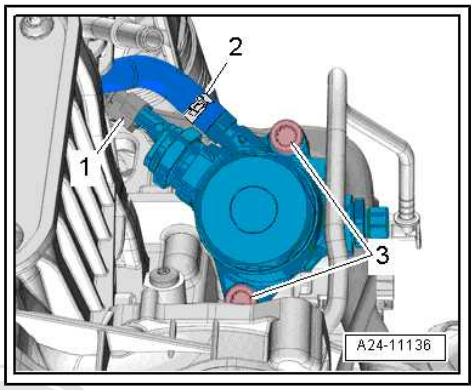
– Remove air cleaner housing
⇒ "2.2 Removing and installing air cleaner housing", page 298 .

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 ignition coils
⇒ “1.3 Removing and installing ignition coils with output stages”, page 345 .
– Detach toothed belt from camshafts
⇒ “1.3 Detaching toothed belt from camshaft”, page 83 .
– Remove high-pressure pipe
⇒ “6.3 Removing and installing high-pressure pipe”, page 327 .

Engine codes CHPB, CZEA:

– Unplug electrical connector -1-.
– Release hose clip -2- and disconnect hose.

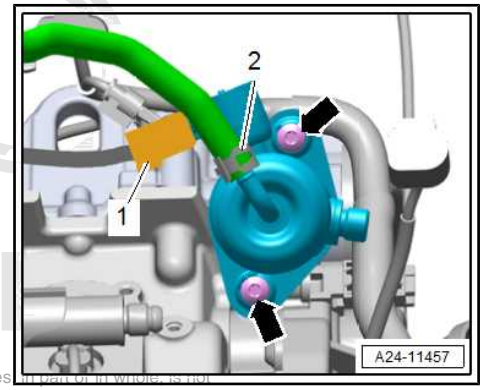


Note

Disregard -item 3-.

Engine codes CSSA, CZDA:

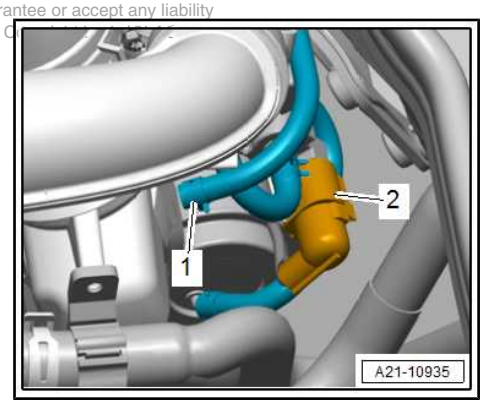
– Unplug electrical connector -1-.
– Release hose clip -2- and detach fuel supply hose.



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

Engine code CSSA:

– Unplug electrical connector -2- at charge pressure control solenoid valve - N75- .
– Detach vacuum hose -1-.

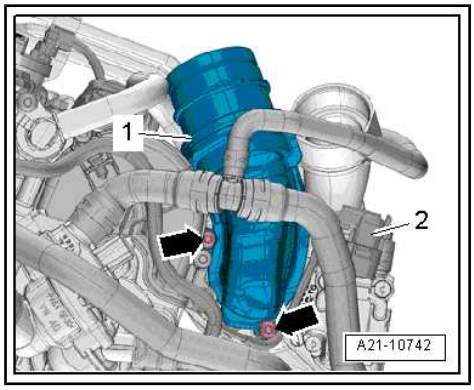


Engine codes CHPB, CZDA, CZDB, CWLA, CZEA:

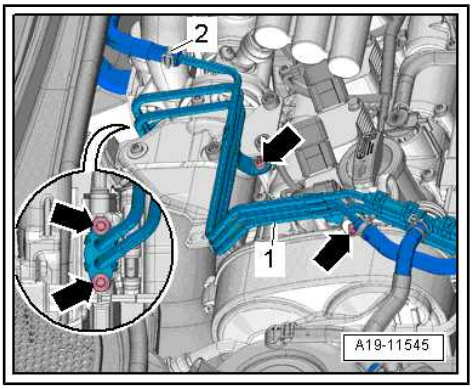
– Unplug electrical connector -2- at charge pressure positioner - V465- .

All engine versions (continued):

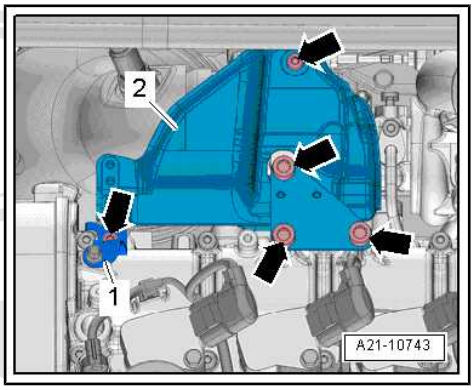
– Remove bolts -arrows- and detach connection -1-.
– If necessary, move coolant hose clear.



– If fitted, release hose clip -2- and detach coolant hose.
– Remove bolts -arrows- and pivot coolant lines to right side.

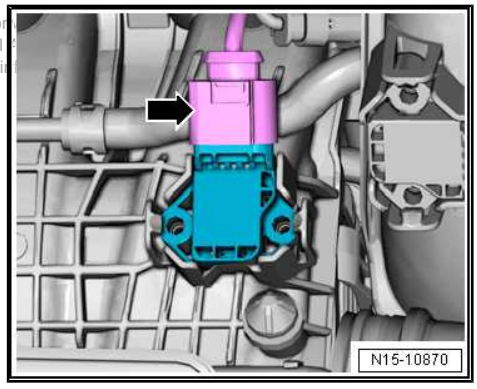


– Remove bolts -arrows- and detach bracket with heat shield -2- and bracket -1- for engine cover panel.



– Unplug electrical connector -arrow- at intake air temperature sender - G42- .

Copyright by AUDI AG.
Passing on to third parties or storing 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.



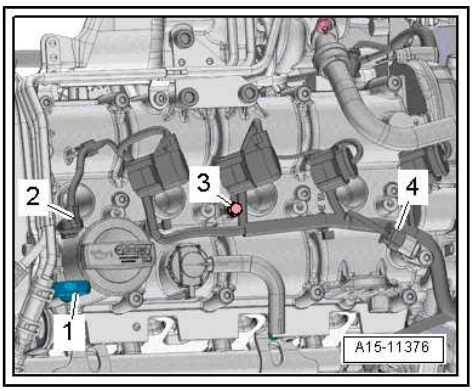
Engine code CHPB:

– Unplug electrical connectors:

2 - For camshaft control valve 1 - N205-

4 - For Hall sender - G40-

– Remove bolt -3-, move wiring harness clear and place to left side.
– Pull out oil dipstick -1-.



Engine code CZEA:

– Unplug electrical connectors:

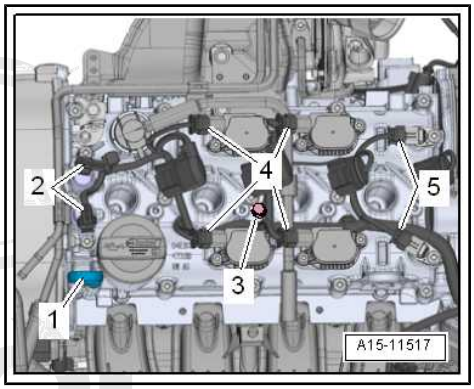
2 - For camshaft control valve 1 - N205- / exhaust camshaft control valve 1 - N318-

4 - For cam actuators -N583- ... -N597-

5 - For Hall sender - G40- / Hall sender 2 - G163-

– Remove bolt -3-, move wiring harness clear and place to left side.

– Pull out oil dipstick -1-.



Engine codes CSSA, CZDA, CZDB, CWLA:

– Unplug electrical connectors:

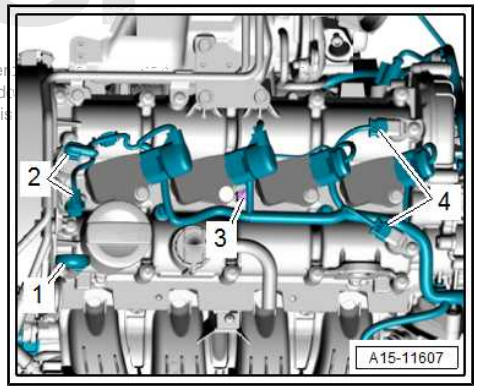
Protected by copyright. Copying for private or commer
permitted unless authorised by AUDI AG. AUDI AG d
respect to the correctness of information in this

2 - For camshaft control valve 1 - N205- / exhaust camshaft control valve 1 - N318-

4 - For Hall sender - G40- / Hall sender 2 - G163-

– Remove bolt -3-, move wiring harness clear and place to left side.

– Pull out oil dipstick -1-.



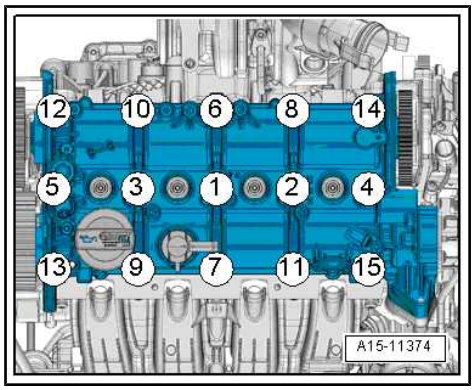
All engine versions (continued):

– Loosen and remove bolts for camshaft housing in the sequence -15 ... 1-.

– Carefully release camshaft housing from bonded joint and detach.

– Mark original positions of roller rocker fingers and compensation elements for re-installation.

– Remove roller rocker fingers together with compensation elements and put down on a clean surface.



Installing

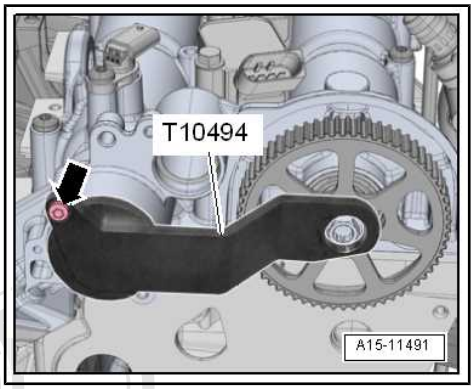
Note

- *Renew bolts tightened with specified tightening angle.*
- *Renew gaskets and seals.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

– Check “TDC” position of camshaft and crankshaft:

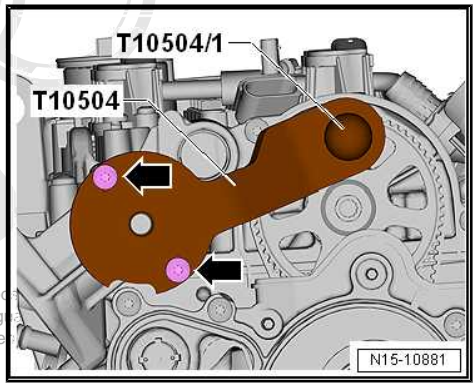
Engine codes CTPA, CHPB, CSSA, CZDA, CZDB, CWLA:

- Camshaft clamp - T10494- must be fitted to camshaft housing.



Engine code CZEA:

- Camshaft clamp - T10504- with locating pin -T10504/1- must be fitted to camshaft housing.



All engine versions (continued):

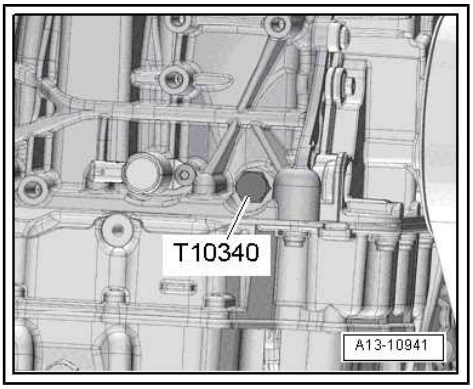
Caution

Risk of damage to valve gear.

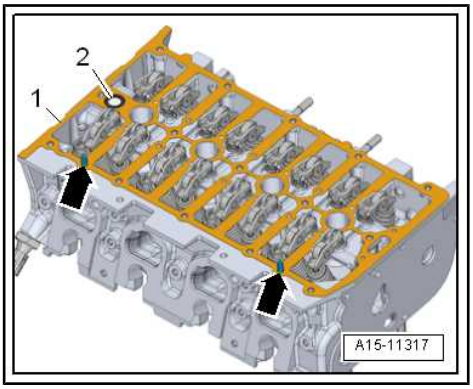
- ***The camshafts must not be moved axially when turning.***

Protected by copyright. Copying for private or commercial purpo
with respect to the correctness of information in this docume

- Locking pin - T10340- is screwed into cylinder block as far as stop and tightened to 30 Nm.
- Crankshaft is turned in normal direction of rotation until it makes contact with locking pin - T10340- = “TDC” position.



– Make sure that all roller rocker fingers make contact with the valve ends correctly and are clipped into their respective support elements.
– If originally fitted, fit oil strainer -2- into cylinder head -1-.
– Fit gasket onto dowel pins -arrows-.

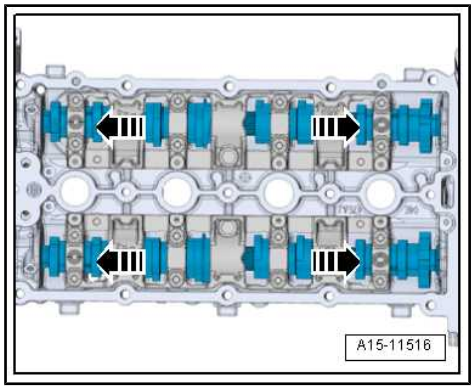


Engine code CZEA:

Caution

Risk of damage to engine.

- *Camshaft sliders must be brought into installation position.*



– Bring camshaft sliders into installation position -arrows-:

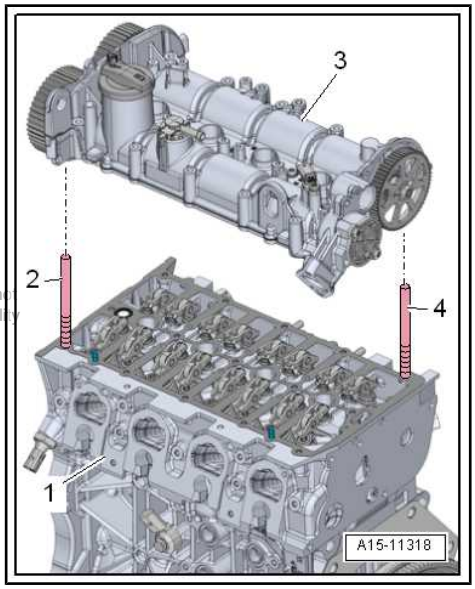
• Sliders must be moved towards both ends of each camshaft.

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.

All engine versions (continued):

– Screw 2 studs -items 2, 4- (e.g. -T10288/4-) into cylinder head.

– Carefully lower camshaft housing -3- vertically onto studs in cylinder head.



Note

Make sure that camshaft housing is kept straight.

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 camshaft housing bolts
⇒ Fig. ""Camshaft housing - tightening torque and sequence"" , page 171 .

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

– Install high-pressure pipe
⇒ "6.3 Removing and installing high-pressure pipe", page 327 .

– Install toothed belt (adjust valve timing)
⇒ "1.3 Detaching toothed belt from camshaft", page 83 .

– Install ignition coils
⇒ "1.3 Removing and installing ignition coils with output stages", page 345 .

– Install coolant pump
⇒ "2.5 Removing and installing coolant pump", page 243 .

– Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

– Install engine cover panel
⇒ "3.1 Removing and installing engine cover panel", page 44 .

Caution

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

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

Tightening torques

- ⇒ "2.2 Exploded view - camshaft housing", page 169
- ⇒ "1.1 Exploded view - turbocharger", page 273
- ⇒ "2.1 Exploded view - air cleaner housing", page 297

2.5 Checking compression

Special tools and workshop equipment required

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

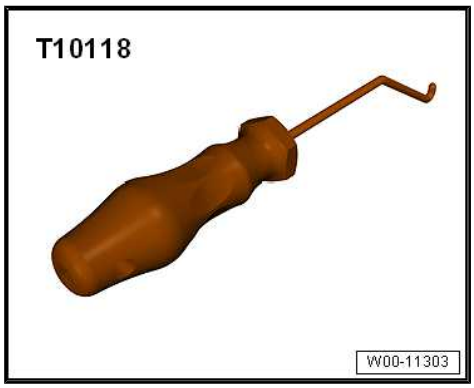
♦ Spark plug spanner - 3122 B-



♦ Compression tester - V.A.G 1763-



♦ Assembly tool - T10118-

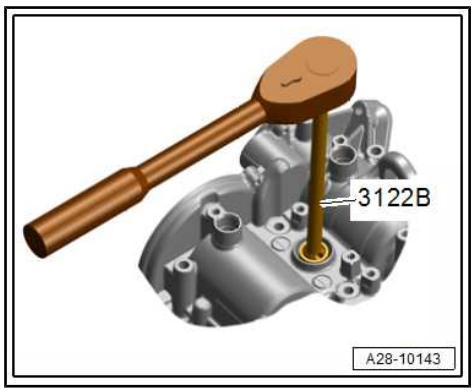


Procedure

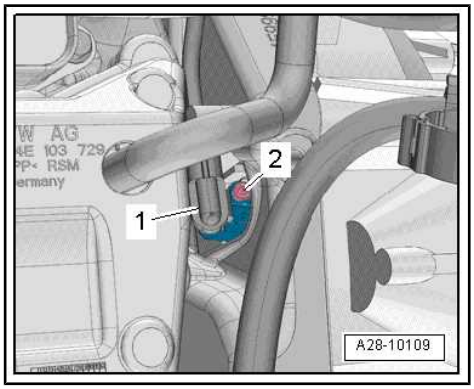
- Engine oil temperature at least 30 °C
- Battery voltage at least 12.5 V

– Remove ignition coils
⇒ “1.3 Removing and installing ignition coils with output stages”, page 345 .

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



– Use assembly tool - G28- to release and unplug electrical connector -1- at engine speed sender - T10118- .



Note

Disregard -item 2-.

– 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.

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.

Compression pressure	bar
When new	10.0 … 15.0
Wear limit	7.0
Maximum difference between cylinders	3.0

Assembling

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

– Install spark plugs ⇒ Maintenance ; Booklet 820 .

– Install ignition coils
⇒ “1.3 Removing and installing ignition coils with output stages”, page 345 .

– Erase any entries in event memory resulting from testing ⇒ Vehicle diagnostic tester, `Guided Functions`, then `Interrogate event memory`.

3 Valve gear

⇒ “3.1 Exploded view - valve gear”, page 184

⇒ “3.2 Measuring axial clearance of camshaft”, page 185

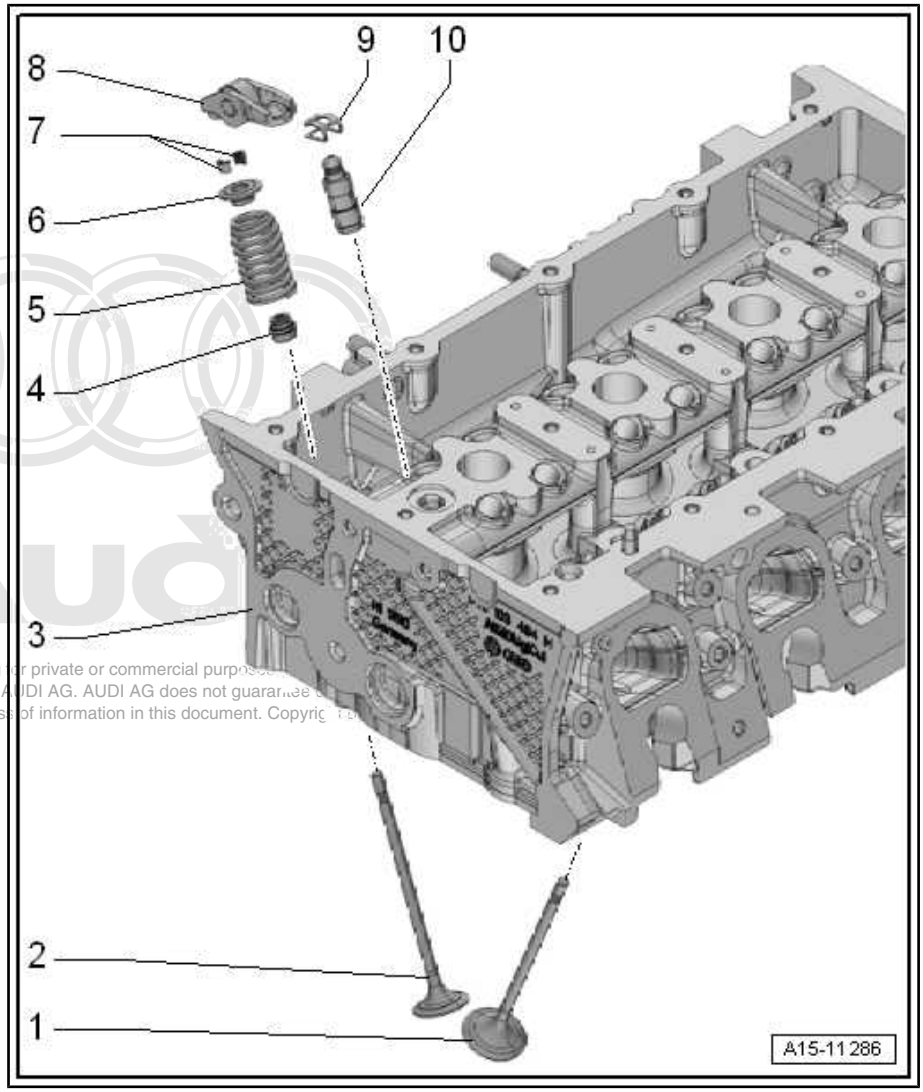
⇒ “3.3 Removing and installing camshaft oil seal”, page 186

⇒ “3.4 Removing and installing cam actuator”, page 194

⇒ “3.5 Removing and installing camshaft control valve 1 N205 ”, page 195

⇒ “3.6 Removing and installing valve stem oil seals”, page 196

3.1 Exploded view - valve gear



1 - Inlet valve

- ❑ Do not machine, only grinding-in is permitted
- ❑ Valve dimensions ⇒ “4.3 Valve dimensions”, page 205
- ❑ Checking valve guides ⇒ “4.1 Checking valve guides”, page 204

2 - Exhaust valve

- ❑ Do not machine, only grinding-in is permitted
- ❑ Valve dimensions ⇒ “4.3 Valve dimensions”, page 205
- ❑ Checking valve guides ⇒ “4.1 Checking valve guides”, page 204

3 - Cylinder head

4 - Valve stem oil seal

- ❑ Renewing ⇒ “3.6 Removing and installing valve stem oil seals”, page 196

5 - Valve spring

- ❑ Installation position ⇒ Fig. ““Position of valve spring”“ , page 185

6 - Valve spring plate

7 - Valve cotters

8 - Roller rocker finger

- ❑ Removing and installing ⇒ “2.4 Removing and installing camshaft housing”, page 175
- ❑ Mark installation position for re-installation
- ❑ Check roller bearings for ease of movement
- ❑ Lubricate contact surfaces before installing

9 - Securing clip

- ❑ For hydraulic compensation element

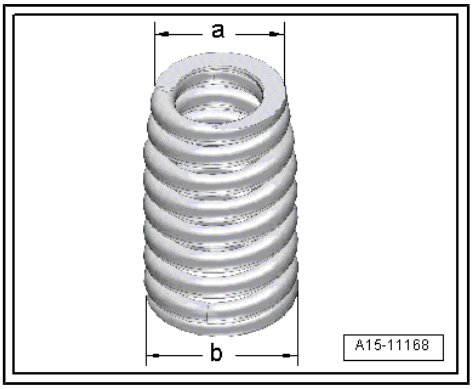
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

10 - Hydraulic compensation element

- ❑ Do not interchange
- ❑ Lubricate contact surface

Position of valve spring

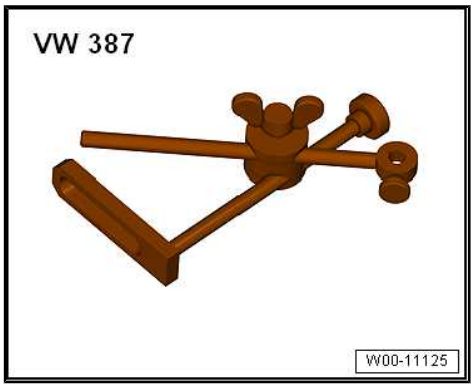
- The smaller ∅ -a- faces the valve spring plate.
- The larger ∅ -b- faces the cylinder head.



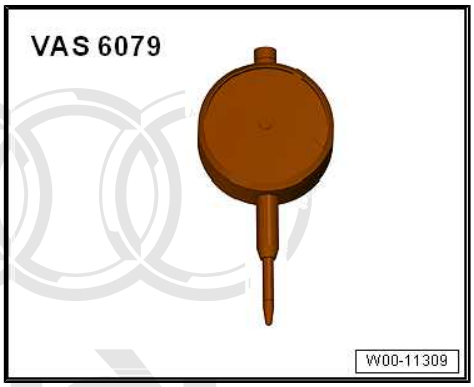
3.2 Measuring axial clearance of camshaft

Special tools and workshop equipment required

- ♦ Universal dial gauge bracket - VW 387-

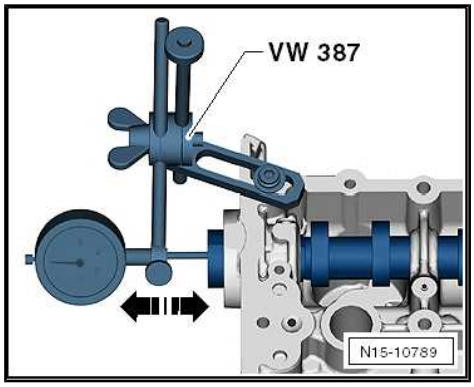


- ♦ Dial gauge - VAS 6079-



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



– Remove camshaft housing
⇒ “2.4 Removing and installing camshaft housing”, page 175 .
– Secure dial gauge - VAS 6079- to camshaft housing with universal dial gauge bracket - VW 387- 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:

• Wear limit: 0.25 mm.

3.3 Removing and installing camshaft oil seal

⇒ “3.3.1 Removing and installing inlet camshaft oil seal, pulley end”, page 186

⇒ “3.3.2 Removing and installing exhaust camshaft oil seal, pulley end”, page 188

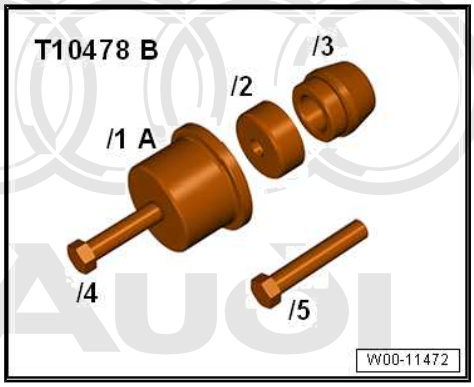
⇒ “3.3.3 Removing and installing exhaust camshaft oil seal, gearbox end - engine codes CHPB, CSSA, CZDA, CZDB, CWLA”, page 191

⇒ “3.3.4 Removing and installing exhaust camshaft oil seal, gearbox end - engine code CZEA”, page 193

3.3.1 Removing and installing inlet camshaft oil seal, pulley end

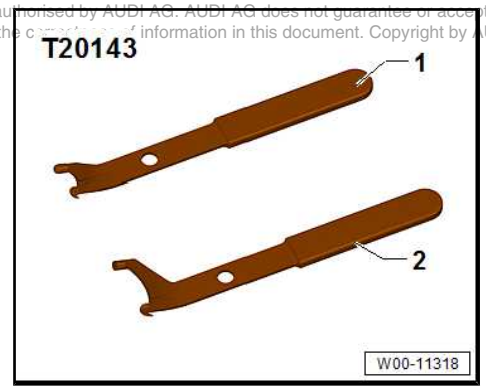
Special tools and workshop equipment required

♦ Assembly tool - T10478 B-



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.

♦ Extractor tool - T20143-



Removing

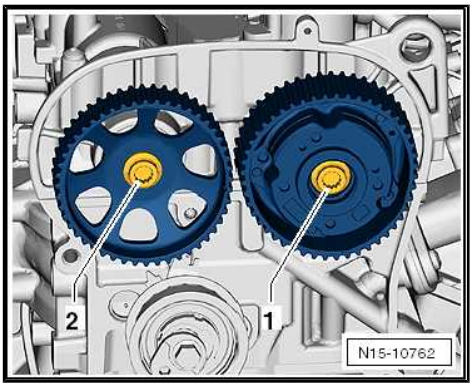
– Detach toothed belt from camshafts
⇒ “1.3 Detaching toothed belt from camshaft”, page 83 .

Engine code CHPB:

– Unscrew bolt -1- and remove camshaft sprocket.

Note

Disregard -item 2-.

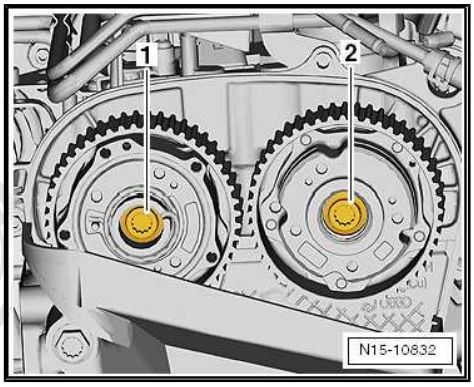


Engine codes CSSA, CZDA, CZDB, CWLA, CZEA:

– Unscrew bolt -2- and remove camshaft sprocket.

Note

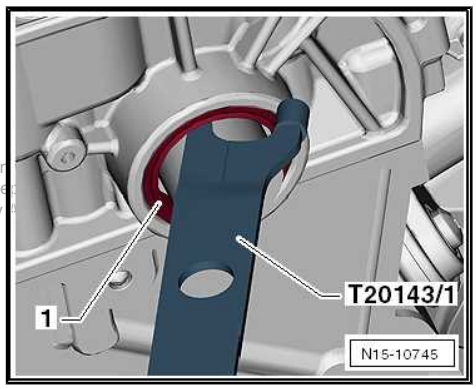
Disregard -item 1-.



All engine versions (continued):

– Pull out oil seal -1- using extractor tool -T20143/1- .

Protected by copyright. Copyright by AUDI AG.



Installing

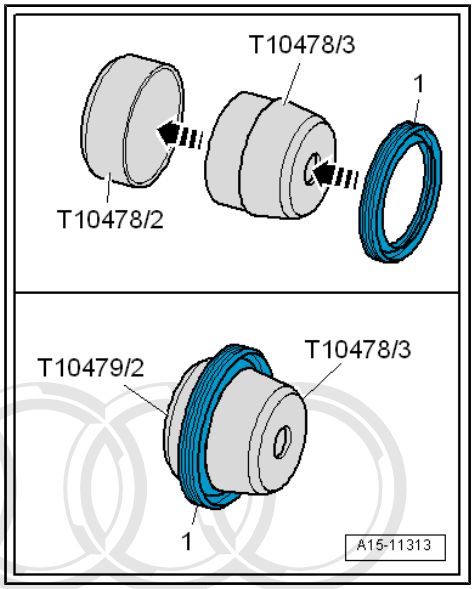
Note

Do not lubricate new oil seal.

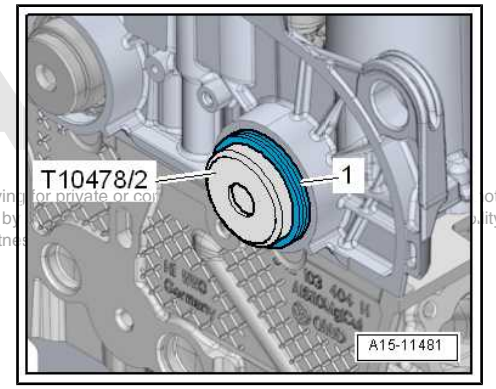
– Slide oil seal -1- over fitting sleeve -T10478/3- onto guide sleeve -T10478/2- .

• Fitting position: closed side of oil seal faces guide sleeve.

– Detach fitting sleeve from guide sleeve.



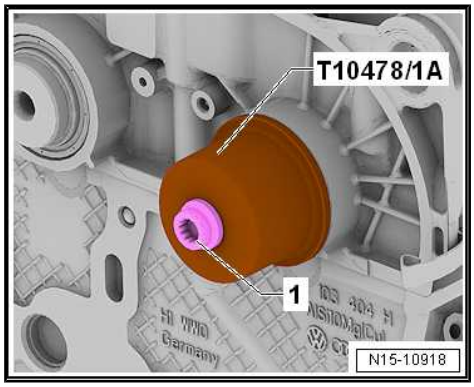
– Fit guide sleeve -T10478/2- with oil seal -1- onto camshaft.



Protected by copyright. Copying for private or co... ot permitted unless authorised by ...ity with respect to the correctne...

– Use thrust piece -T10478/1A- and bolt -1- for camshaft sprocket to pull in oil seal onto stop.

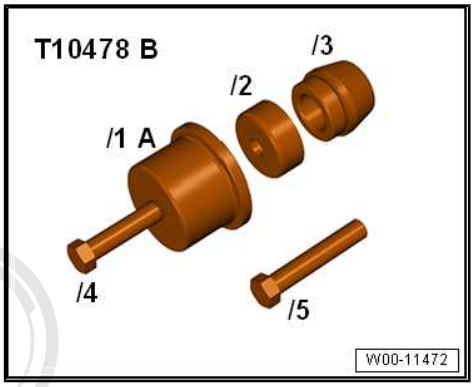
– Install toothed belt (adjust valve timing)
⇒ “1.3 Detaching toothed belt from camshaft”, page 83 .



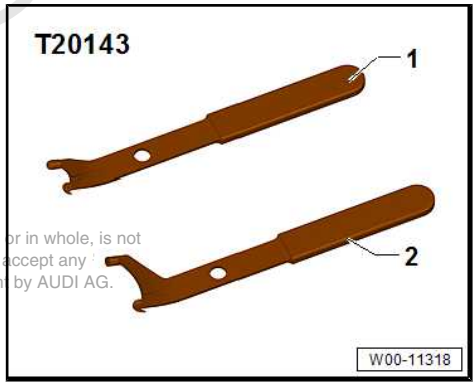
3.3.2 Removing and installing exhaust camshaft oil seal, pulley end

Special tools and workshop equipment required

♦ Assembly tool - T10478 B-



♦ Extractor tool - T20143-



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

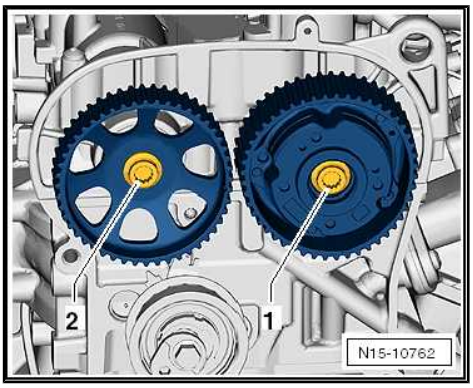
– Detach toothed belt from camshafts
⇒ “1.3 Detaching toothed belt from camshaft”, page 83 .

Engine code CHPB:

– Unscrew bolt -2- and remove camshaft sprocket.

Note

Disregard -item 1-.



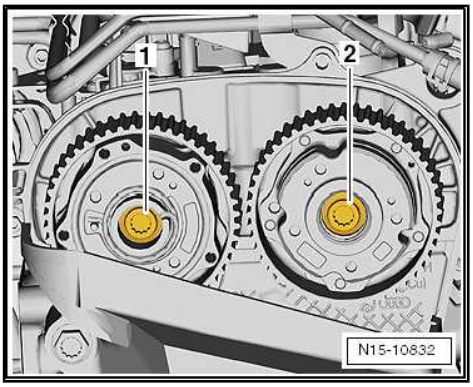
Engine codes CSSA, CZDA, CZDB, CWLA, CZEA:

– Remove engine support
⇒ “1.5 Removing and installing engine support”, page 49 .

– Unscrew bolt -1- and remove camshaft sprocket.

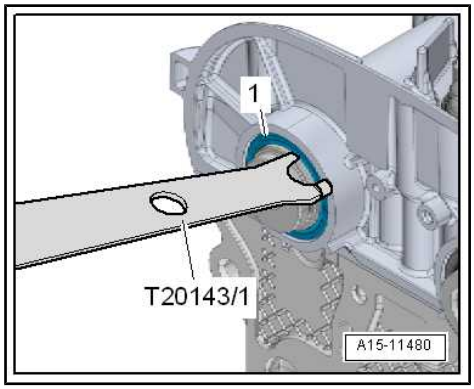
Note

Disregard -item 2-.



All engine versions (continued):

– Pull out oil seal -1- using extractor tool -T20143/1- .



Installing

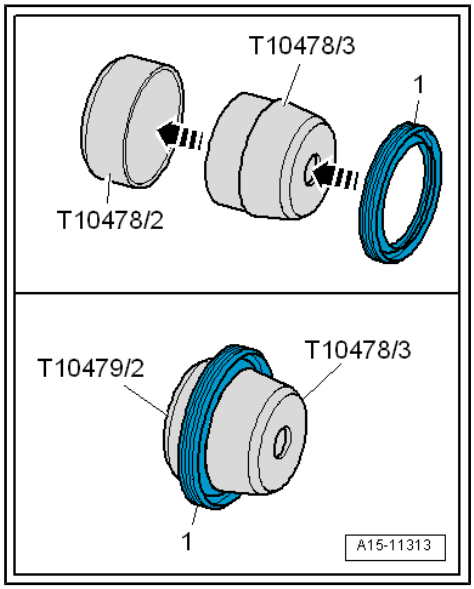
Note

Do not lubricate new oil seal.

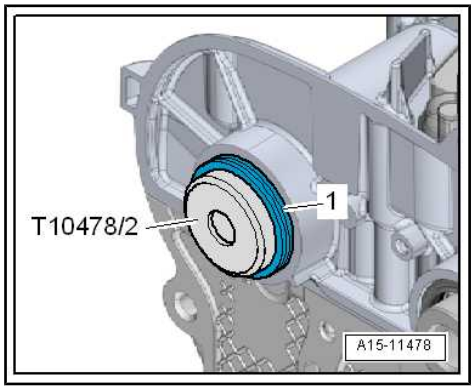
– Slide oil seal -1- over fitting sleeve -T10478/3- onto guide sleeve -T10478/2- .

• Fitting position: closed side of oil seal faces guide sleeve.

– Detach fitting sleeve from guide sleeve.

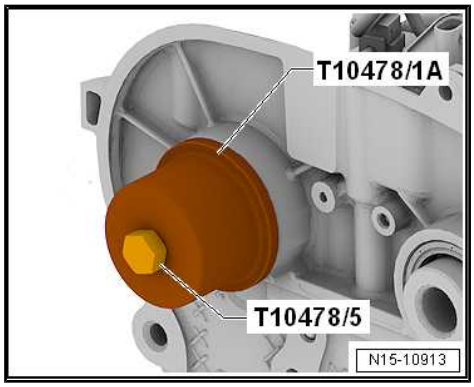


– Fit guide sleeve -T10478/2- with oil seal -1- onto camshaft.



– Pull in thrust piece -T10478/1A- with bolt -T10478/5- as far as stop.

– Install toothed belt (adjust valve timing)
⇒ “1.3 Detaching toothed belt from camshaft”, page 83 .



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.

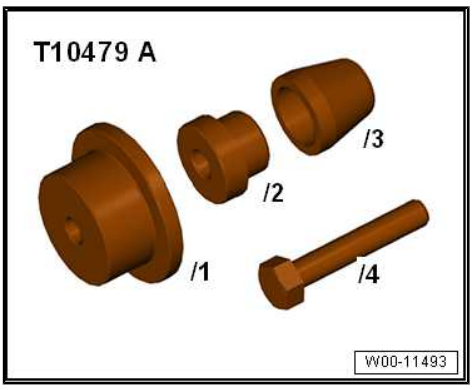
Engine codes CSSA, CZDA, CZDB, CWLA, CZEA:

– Install engine support
⇒ “1.5 Removing and installing engine support”, page 49 .

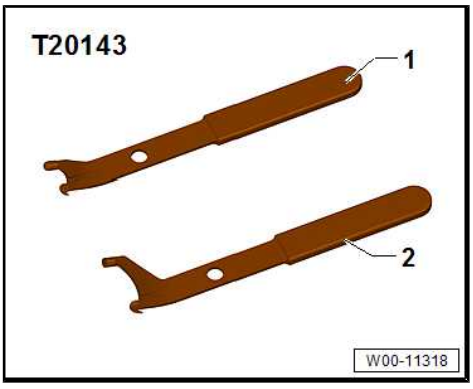
3.3.3 Removing and installing exhaust camshaft oil seal, gearbox end - engine codes CHPB, CSSA, CZDA, CZDB, CWLA

Special tools and workshop equipment required

- Assembly tool - T10479 A-



- Extractor tool - T20143-



Removing

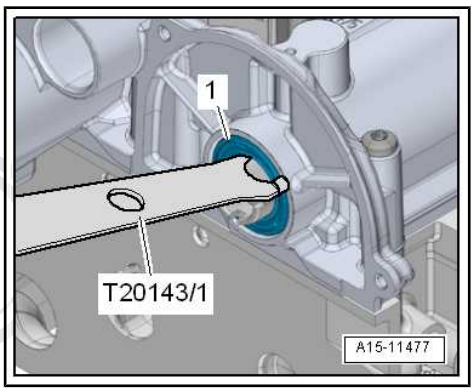
– Remove toothed belt sprocket for coolant pump ⇒ “2.7 Removing and installing toothed belt sprocket for coolant pump”, page 250 .

Note

Danger of chemical damage to seal for coolant pump if oil enters between coolant pump and cylinder head.

- Cover coolant pump with a cloth.
- Catch escaping engine oil with a cloth.

– Carefully slide extractor tool -T20143/1- between camshaft and oil seal -1-.

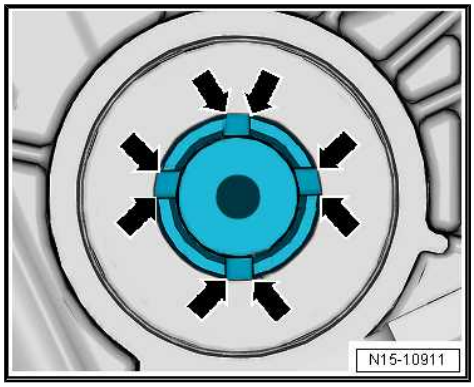


– Pry out oil seal.

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

– If necessary, use fine sandpaper (grit 220 ... 1000) to remove any burrs that have formed on the outside of the outer grooves on the exhaust camshaft -arrows-.



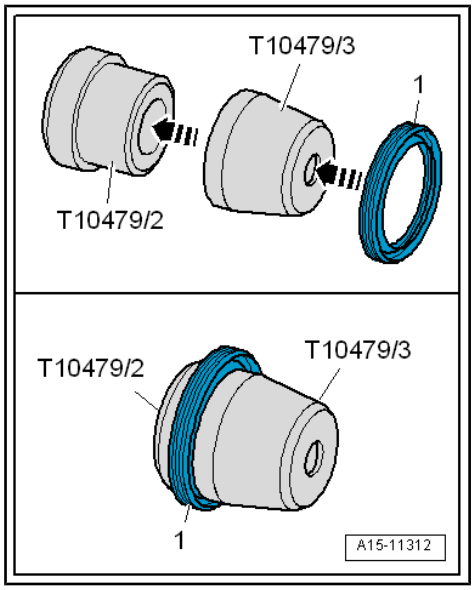
Note

Do not lubricate new oil seal.

– Slide oil seal -1- over fitting sleeve -T10479/3- onto guide sleeve -T10479/2- .

• Fitting position: closed side of oil seal faces guide sleeve.

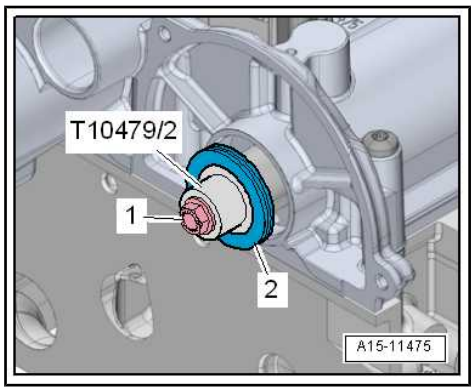
– Detach fitting sleeve from guide sleeve.



– Fit guide sleeve -T10479/2- with oil seal -2- onto camshaft so that it is centred.

– Secure guide sleeve onto camshaft using bolt -1- for coolant pump drive sprocket.

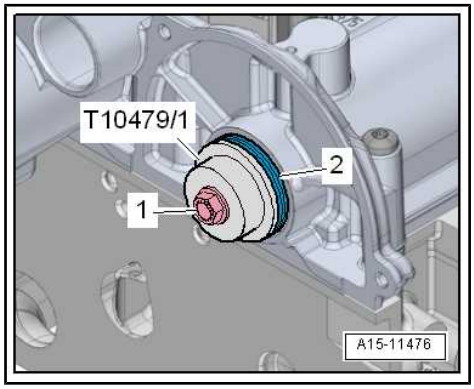
– Slide oil seal onto camshaft and unbolt guide sleeve.



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.

– Use thrust piece -T10479/1- and bolt -1- for coolant pump drive sprocket to pull in oil seal -2- onto stop.

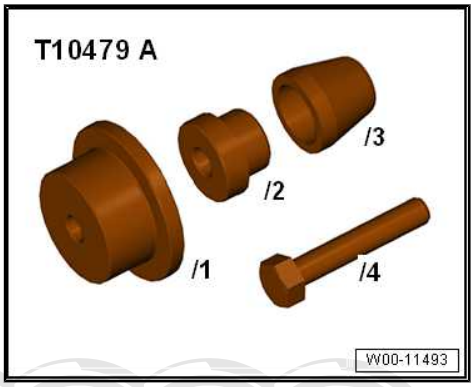
– Install toothed belt sprocket for coolant pump ⇒ “2.7 Removing and installing toothed belt sprocket for coolant pump”, page 250 .



3.3.4 Removing and installing exhaust camshaft oil seal, gearbox end - engine code CZEA

Special tools and workshop equipment required

- Assembly tool - T10479A-



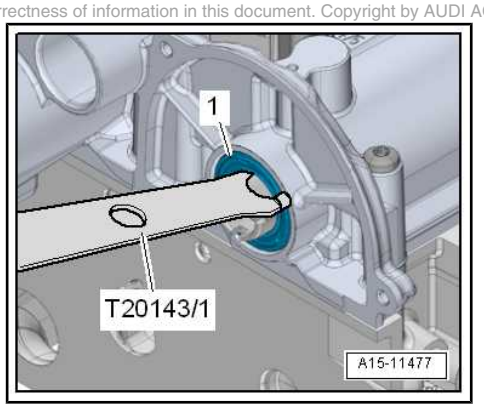
- Assembly sleeve - T10505-



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 toothed belt sprocket for coolant pump ⇒ “2.7.2 Removing and installing toothed belt sprocket for coolant pump - engine code CZEA”, page 251 .



Note

Danger of chemical damage to seal for coolant pump if oil enters between coolant pump and cylinder head.

- Cover coolant pump with a cloth.
- Catch escaping engine oil with a cloth.

– Carefully slide extractor tool -T20143/1- between camshaft and oil seal -1-.

– Pry out oil seal.

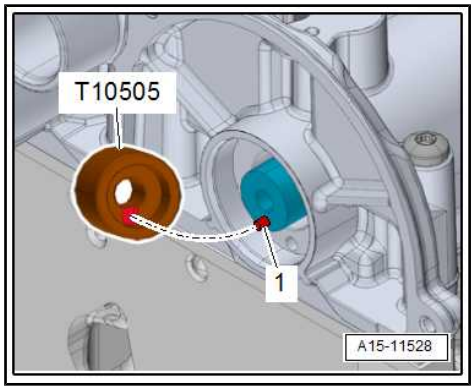
Installing

Note

Do not lubricate new oil seal.

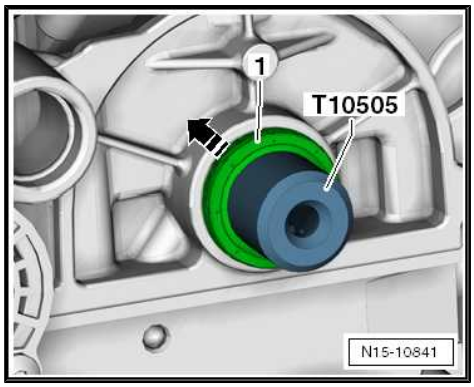
– Fit assembly tool - T10505- onto exhaust camshaft.

• Pin -1- on camshaft must engage in recess on assembly tool.



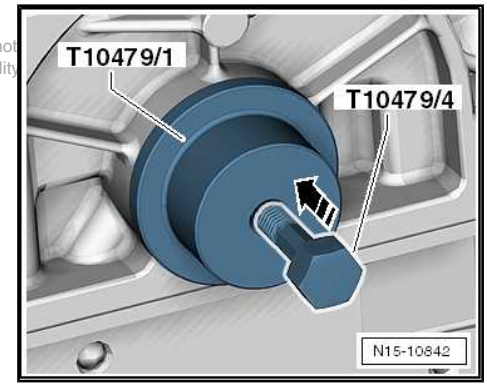
– Fit oil seal -1- onto camshaft housing -arrow-.

• Installation position: open side of oil seal faces camshaft housing.



– Pull in oil seal onto stop using press tool -T10479/1- and bolt -T10479/4-

– Install toothed belt sprocket for coolant pump ⇒ “2.7.2 Removing and installing toothed belt sprocket for coolant pump - engine code CZEA”, page 251 .



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 Removing and installing cam actuator

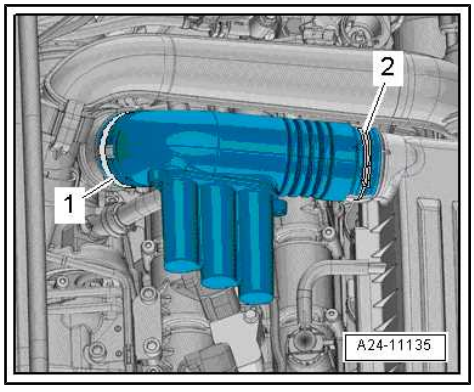
Note

The following procedure applies to vehicles with engine code CZEA.

Removing

– Remove engine cover panel ⇒ “3.1 Removing and installing engine cover panel”, page 44 .

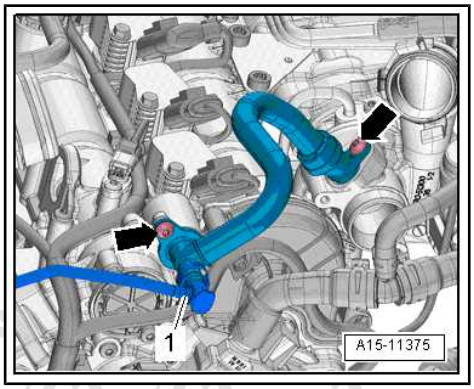
– Loosen hose clips -1, 2- and remove air pipe.



Exhaust cam actuator, cylinder 3:

– Press release tabs and disconnect hose -1- for activated charcoal filter.

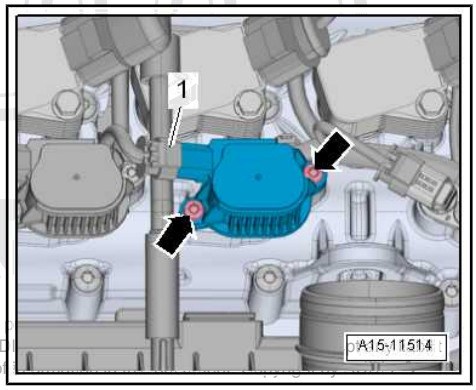
– Remove bolts -arrows- and press crankcase breather hose slightly to one side.



Continued for all cam actuators:

– Unplug relevant electrical connector -1-.

– Remove bolts -arrows- and detach cam actuator.



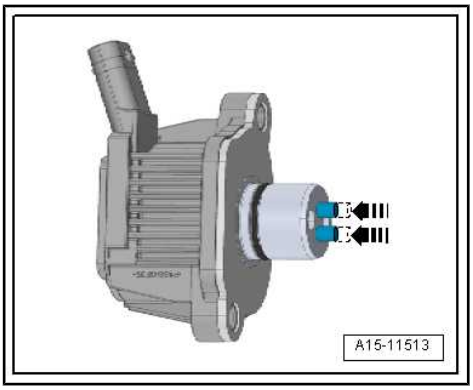
Protected by copyright. Copying for
permitted unless authorised by AUD
with respect to the correctness of

Installing

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

Note

Renew O-ring.



– Bring pins of actuators for camshaft adjustment into installation position.

• Pins of all actuators must be inserted completely -arrows-.

Tightening torques

◆ ⇒ “3.1 Exploded view - valve gear”, page 184

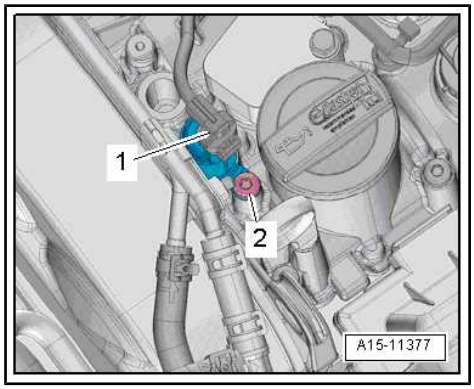
◆ ⇒ “1.1 Exploded view - turbocharger”, page 273

3.5 Removing and installing camshaft control valve 1 - N205-

Note

Follow the same procedure to remove exhaust camshaft control valve 1 - N318- .

Removing



– Remove engine cover panel
⇒ “3.1 Removing and installing engine cover panel”, page 44 .
– Unplug electrical connector -1-.
– Unscrew bolt -2- and remove camshaft control valve 1 - N205- .

Installing

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

Note

Renew O-ring.

– Install engine cover panel
⇒ “3.1 Removing and installing engine cover panel”, page 44 .

Tightening torques

♦ ⇒ “2.2 Exploded view - camshaft housing”, page 169

3.6 Removing and installing valve stem oil seals

⇒ “3.6.1 Removing and installing valve stem oil seals (cylinder head installed)”, page 196

⇒ “3.6.2 Removing and installing valve stem oil seals (cylinder head removed)”, page 200

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

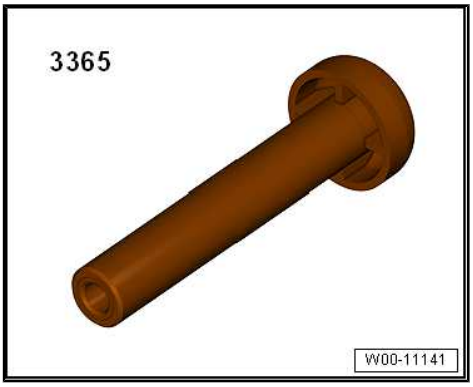
Special tools and workshop equipment required

♦ Spark plug spanner - 3122 B-



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.

- Valve stem seal fitting tool - 3365-

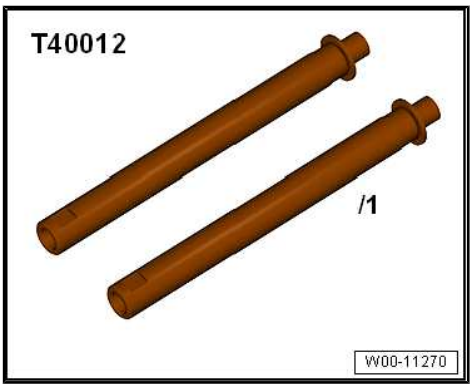


- Removal and installation device for valve cotters - VAS 5161 A- with set -VAS 5161 A/32-

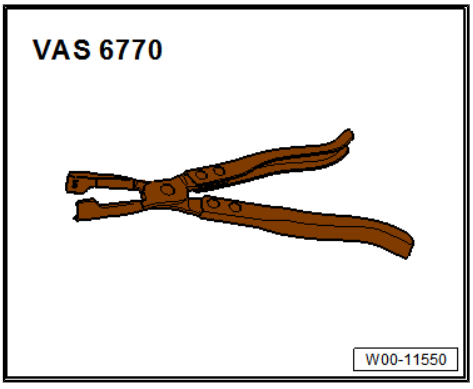


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Adapter - T40012-



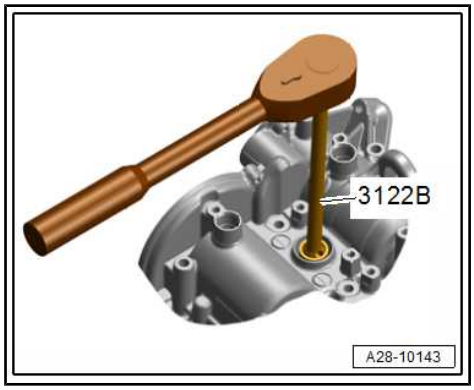
- Valve shaft pliers - VAS 6770-



Procedure

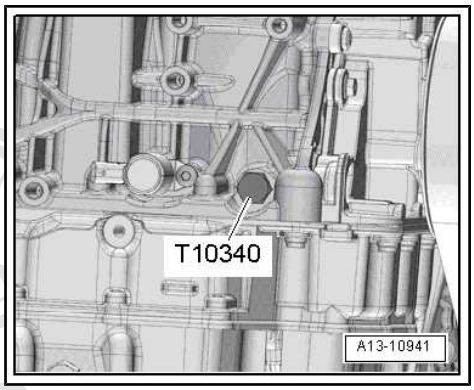
– Remove camshaft housing
⇒ “2.4 Removing and installing camshaft housing”, page 175 .

– Unscrew spark plugs using spark plug socket - 3122 B- .



– Remove locking pin - T10340- .

– Set piston of appropriate cylinder to “bottom dead centre”.



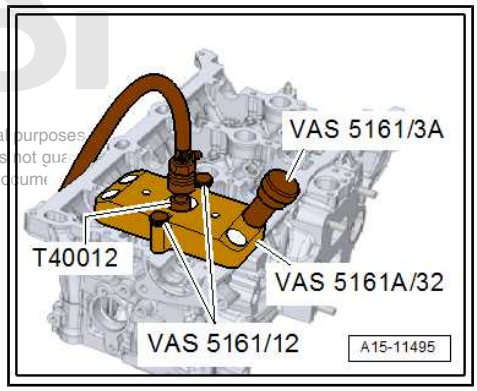
– Fit guide plate -VAS 5161 A/32- onto cylinder head and secure with knurled screws -VAS 5161/12- .

– 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

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



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

– Screw snap-in device -VAS 5161/6- with engaging fork -VAS 5161/5- into guide plate.

– Insert assembly cartridge -VAS 5161 A/32-1- (slide on sleeve -VAS 5161 A/32-2-) in guide plate.

– Attach pressure fork -VAS 5161/2- to snap-in device and push assembly cartridge down.

– At the same time, turn knurled screw of assembly cartridge clockwise until tips engage in valve cotters.

– Move knurled screw back and forth slightly; the valve cotters are thus forced apart and taken up by the assembly cartridge.

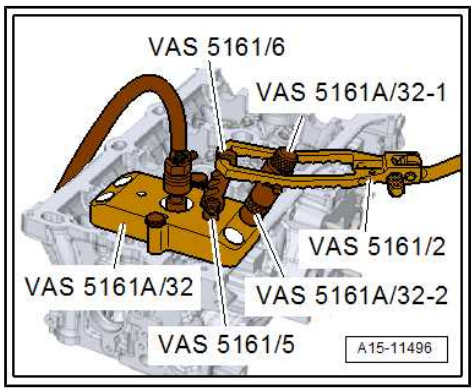
– Release pressure fork.

– Take out assembly cartridge.

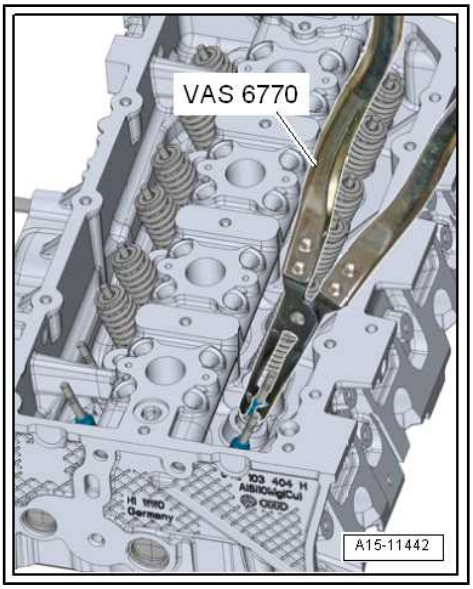
– Detach guide plate and turn to one side.

• The compressed air hose remains connected.

– Detach valve spring with valve spring plate.



– Pull off valve stem oil seal with valve shaft pliers - VAS 6770- .

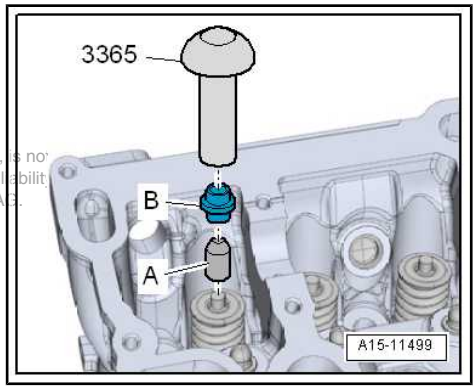


Caution

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

- ***Fit plastic sleeve -A- ⇒ Electronic parts catalogue (ETKA) on valve stem.***

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.

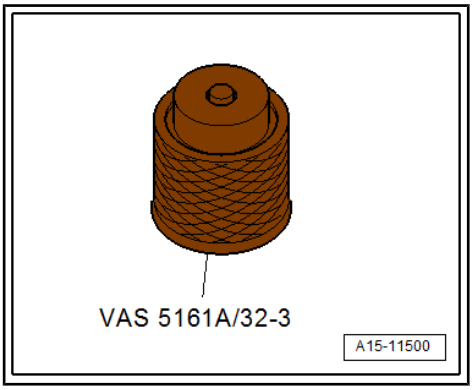


– Lightly oil sealing lip of valve stem oil seal.
– Slide valve stem oil seal onto plastic sleeve.
– Carefully press valve stem oil seal onto valve guide using valve stem seal fitting tool - 3365- .
– Remove plastic sleeve.

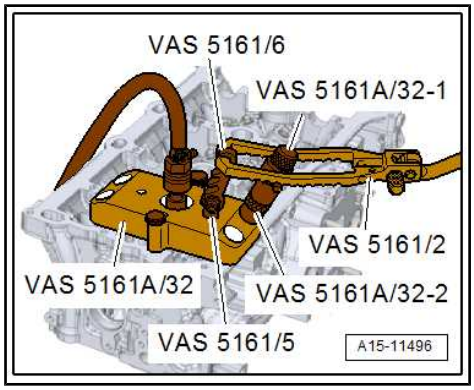
If valve cotters have been removed from assembly cartridge, they must first be inserted in insertion device -VAS 5161 A/32-3- .

- 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 of valve spring ⇒ Fig. ""Position of valve spring"" , page 185 .



– Secure guide plate -VAS 5161 A/32- back onto cylinder head.
– Insert assembly cartridge -VAS 5161 A/32-1- with sleeve -VAS 5161 A/32-2- into 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

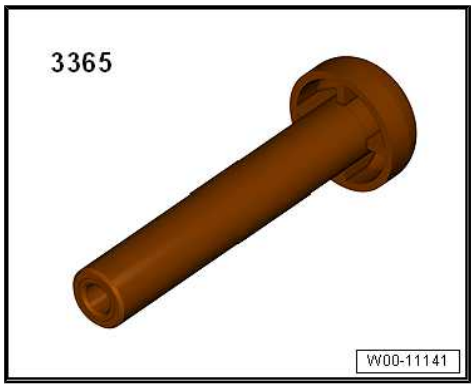
Installation is carried out in the reverse order; note the following:

– Install spark plugs ⇒ Maintenance ; Booklet 820 .
– Install camshaft housing
⇒ “2.4 Removing and installing camshaft housing”, page 175 .

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

Special tools and workshop equipment required

♦ Valve stem seal fitting tool - 3365-

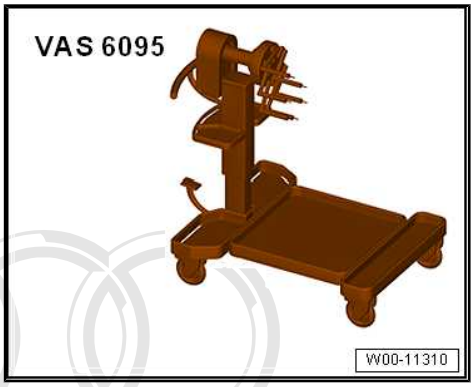


♦ Removal and installation device for valve cotters - VAS 5161 A- with set -VAS 5161 A/32-

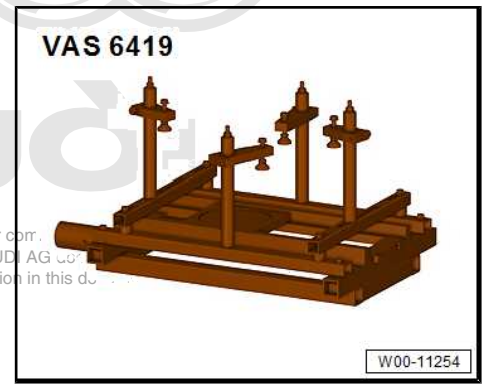


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Engine and gearbox support - VAS 6095-

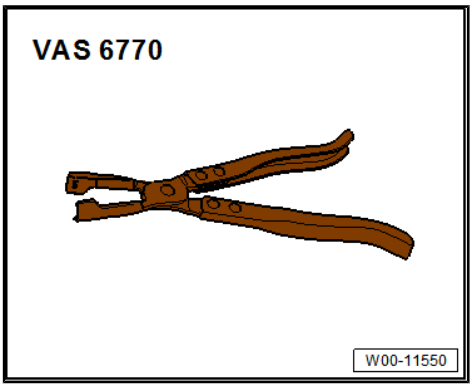


- Cylinder head tensioning device - VAS 6419-



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

- Valve shaft pliers - VAS 6770-



Procedure

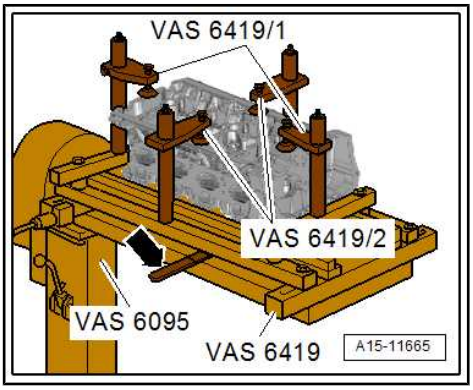
– Insert cylinder head tensioning device - VAS 6419- into engine and gearbox support - VAS 6095- .

– Secure cylinder head in cylinder head tensioning device, as shown in illustration.

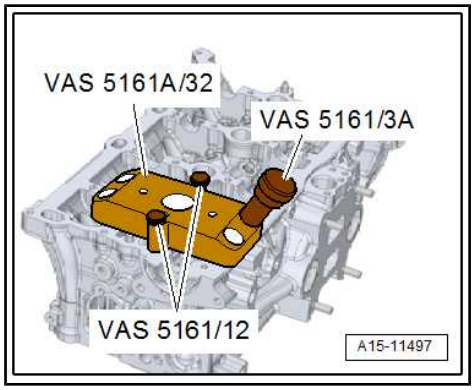
– Connect cylinder head tensioning device to compressed air.

– Using lever -arrow-, slide air pad under combustion chamber where valve stem oil seals are to be removed.

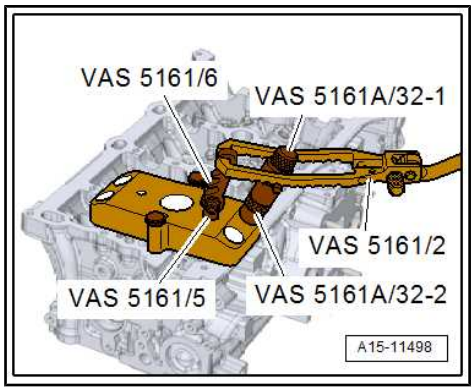
– Apply just enough compressed air to bring air pad into contact with valve heads.



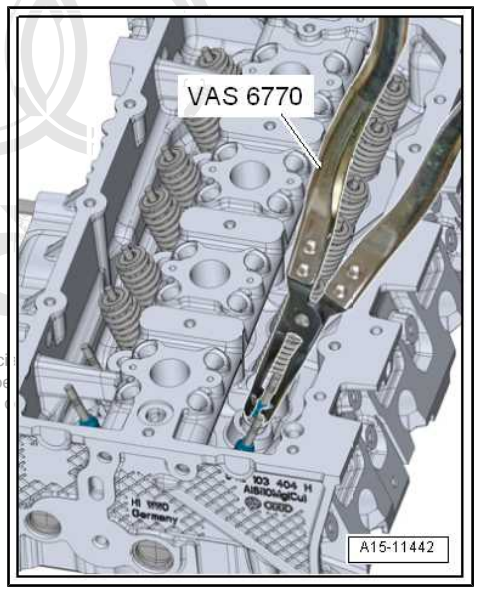
– Fit guide plate -VAS 5161 A/32- onto cylinder head and secure with knurled screws -VAS 5161/12- .
– Apply drift -VAS 5161/3A- to guide plate and use plastic-headed hammer to release sticking valve cotters.



– Screw snap-in device -VAS 5161/6- with engaging fork -VAS 5161/5- into guide plate.
– Insert assembly cartridge -VAS 5161 A/32-1- (slide on sleeve -VAS 5161 A/32-2-) 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 shaft pliers - VAS 6770- .

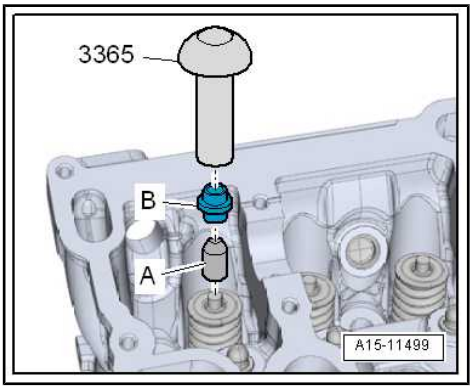


Protected by copyright. Copying for private or commerci
permitted unless authorised by AUDI AG. AUDI AG doe
with respect to the correctness of information in this

Caution

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

- ***Fit plastic sleeve -A- ⇒ Electronic parts catalogue (ETKA) on valve stem.***



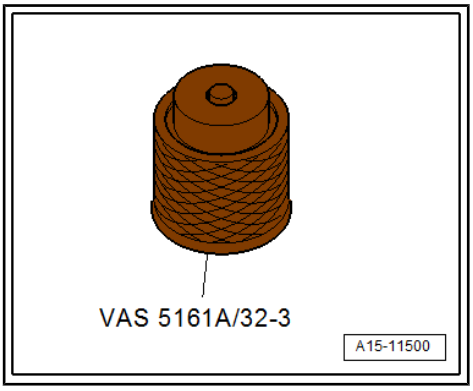
– Lightly oil sealing lip of valve stem oil seal.

– Slide valve stem oil seal onto plastic sleeve.

– Carefully press valve stem oil seal onto valve guide using valve stem seal fitting tool - 3365- .

– Remove plastic sleeve.

If valve cotters have been removed from assembly cartridge, they must first be inserted in insertion device -VAS 5161 A/32-3- .



• 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 of valve spring ⇒ Fig. ""Position of valve spring"" , page 185 .

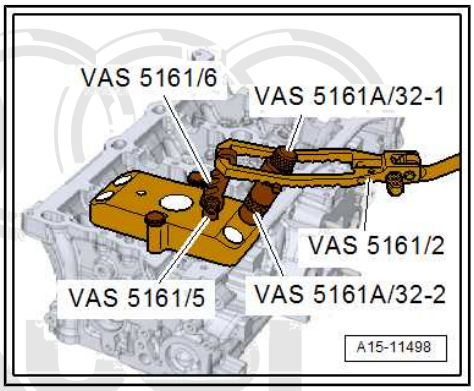
– Secure guide plate -VAS 5161 A/32- back onto cylinder head.

– Insert assembly cartridge -VAS 5161 A/32-1- with sleeve -VAS 5161 A/32-2- into 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.



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 Inlet and exhaust valves

⇒ “4.1 Checking valve guides”, page 204

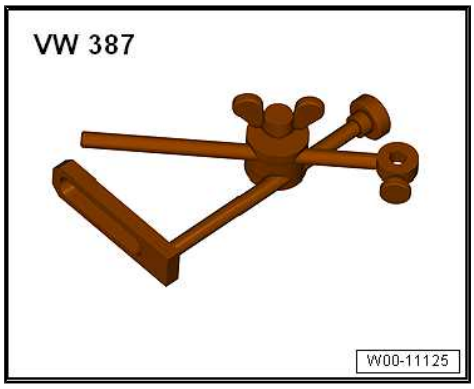
⇒ “4.2 Checking valves”, page 204

⇒ “4.3 Valve dimensions”, page 205

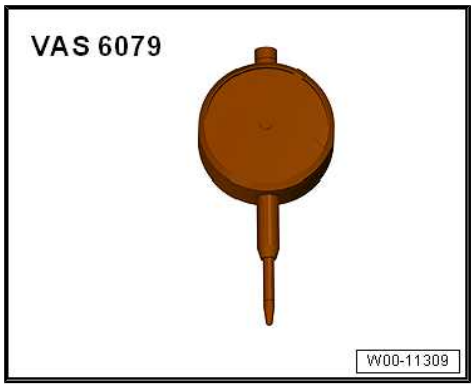
4.1 Checking valve guides

Special tools and workshop equipment required

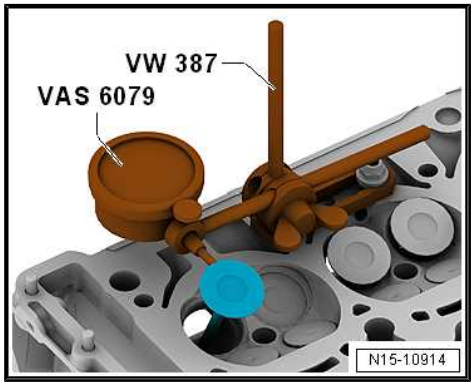
- Universal dial gauge bracket - VW 387-



- Dial gauge - VAS 6079-



Test sequence



– Insert valve into guide. End of valve stem must be flush with guide. Only insert inlet valve into inlet valve guide and exhaust valve into exhaust valve guide, as the stem diameters are different.

– Measure the amount of sideways play.

• Wear limit: 0.5 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.

4.2 Checking valves

– Visually inspect for scoring on valve stems and valve seat surfaces.

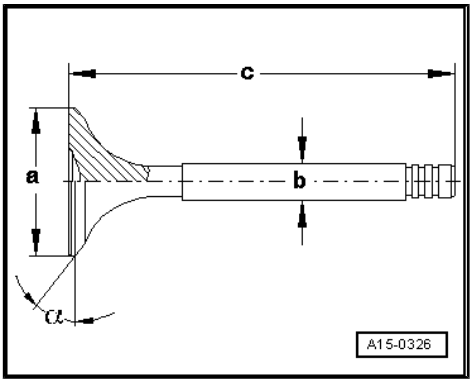
– Renew valve if scoring is clearly visible.

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

4.3 Valve dimensions

Note

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



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

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

17 – Lubrication

1 Sump/oil pump

⇒ “1.1 Exploded view - sump/oil pump”, page 206

⇒ “1.2 Engine oil”, page 209

⇒ “1.3 Removing and installing sump (bottom section)”, page 209

⇒ “1.4 Removing and installing sump (top section)”, page 211

⇒ “1.5 Removing and installing oil pump”, page 214

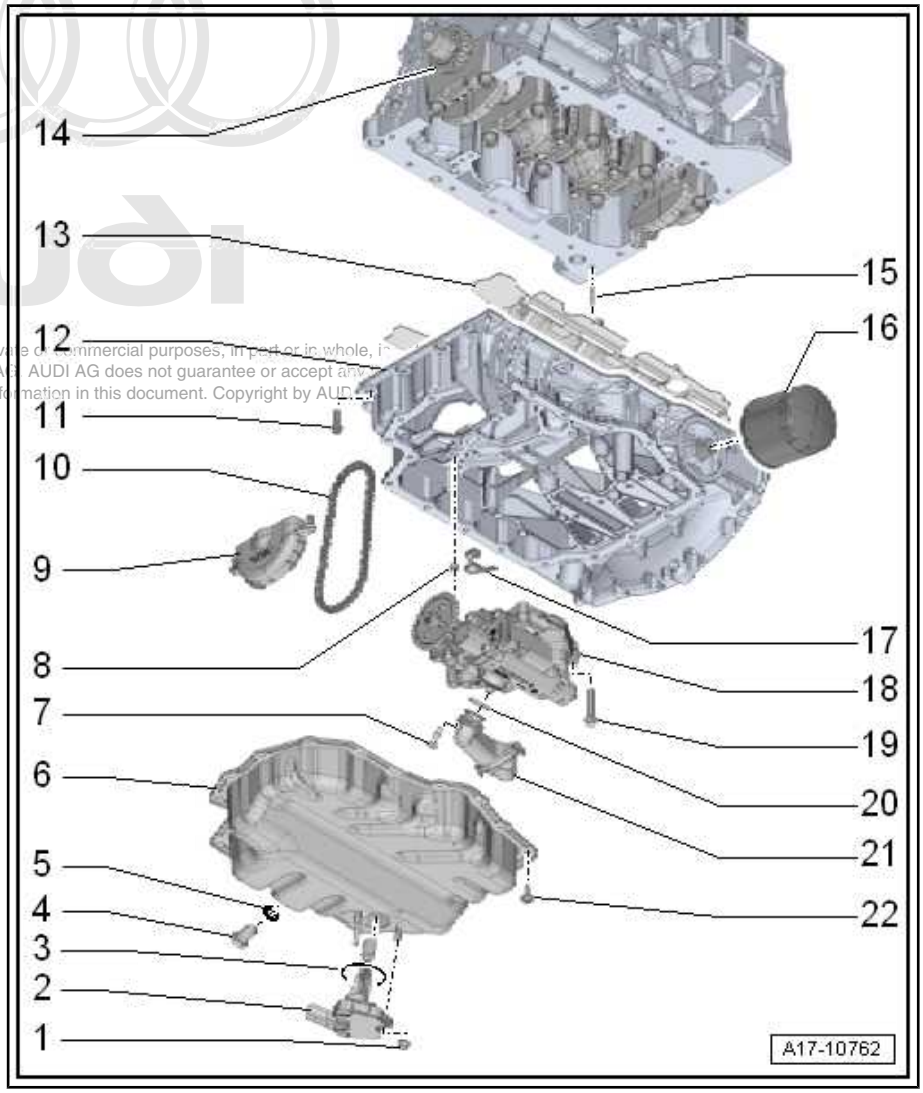
⇒ “1.6 Removing and installing oil level and oil temperature sender G266 ”, page 215

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.

1.1 Exploded view - sump/oil pump

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.*
- *Oil spray jet and pressure relief valve* *⇒ “4.3 Removing and installing oil spray jets”, page 74*



1 - Nut

- ❑ 9 Nm

2 - Oil level and oil temperature sender - G266-

- ❑ Removing and installing ⇒ “1.6 Removing and installing oil level and oil temperature sender G266 ”, page 215

3 - Seal

- ❑ Renew after removing

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 - Oil drain plug

- ❑ With attached seal on new vehicles
- ❑ Renewed when first oil change is performed
- ❑ The oil drain plug with separate seal (fitted when first oil change is performed) can be re-used
- ❑ 30 Nm

5 - Seal

- ❑ For oil drain plug, fitted when first oil change is performed
- ❑ Renew after removing

6 - Sump (bottom section)

- ❑ Removing and installing ⇒ “1.3 Removing and installing sump (bottom section)”, page 209

7 - Bolt

- ❑ Renew after removing
- ❑ 5 Nm +90°

8 - Dowel sleeve

- ❑ 2x

9 - Cover

- ❑ For oil pump drive chain sprocket

10 - Drive chain

- ❑ For oil pump
- ❑ Before removing, mark running direction with paint

11 - Bolt

- ❑ Renew after removing
- ❑ Tightening torque and sequence ⇒ Fig. ““Sump (top section) - tightening torque and sequence”“ , page 209

12 - Sump (top section)

- ❑ Removing and installing ⇒ “1.4 Removing and installing sump (top section)”, page 211

13 - Baffle plate

14 - Chain sprocket

- ❑ For oil pump drive

15 - Dowel pin

16 - Oil filter

- ❑ See note ⇒ page 206
- ❑ Removing and installing ⇒ Maintenance ; Booklet 820

17 - Seal

- ❑ With oil strainer

18 - Oil pump

- ❑ Removing and installing ⇒ “1.5 Removing and installing oil pump”, page 214

19 - Bolt

- ❑ 10 Nm

20 - O-ring

- ❑ Renew after removing

21 - Oil intake pipe

- ❑ Clean strainer if dirty

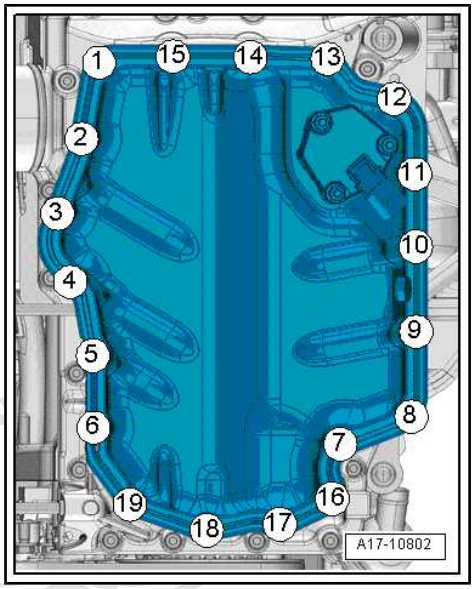
22 - Bolt

- ❑ Renew after removing
- ❑ Tightening sequence ⇒ Fig. ““Sump (bottom section) - tightening torque and sequence”“ , page 208

Sump (bottom section) - tightening torque and sequence

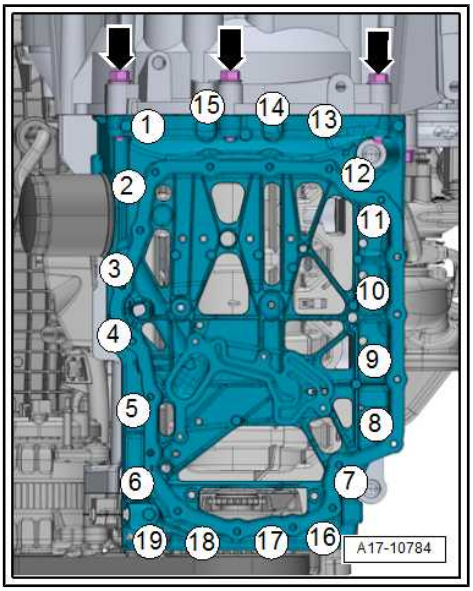
– Tighten bolts in stages in the sequence shown:

Stage	Bolts	Tightening torque
1.	-1 … 19-	Screw in by hand until contact is made
2.	-1 … 19-	12 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.

Sump (top section) - tightening torque and sequence



Note

Renew bolts tightened with specified tightening angle.

– Tighten bolts in stages in the sequence shown:

Stage	Bolts	Tightening torque/angle specification
1.	-1 … 19-	Screw in by hand until contact is made
2.	-arrows-	Screw in by hand until contact is made
3.	-1 … 19-	8 Nm
4.	-1 … 19-	Turn 90° further
5.	-arrows-	Tightening torque ⇒ Rep. gr. 34 ; Removing and installing gearbox; Tightening torques for gearbox

1.2 Engine oil

Oil capacities, oil specifications and viscosity grades ⇒ Maintenance tables .

Caution

Risk of damage to catalytic converter.

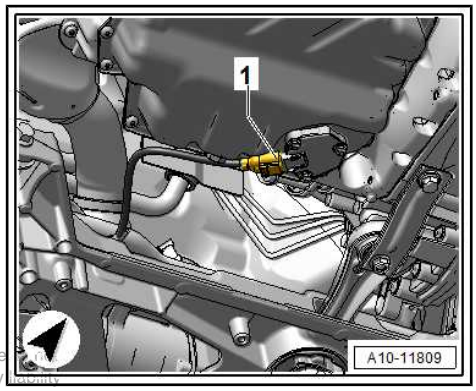
- ***The oil level must not be above the "MAX" mark on the dipstick.***

1.3 Removing and installing sump (bottom section)

Special tools and workshop equipment required

- Flat scraper
- Sealant remover
- Electric drill with plastic brush attachment
- Safety goggles
- Sealant ⇒ Electronic parts catalogue

Removing

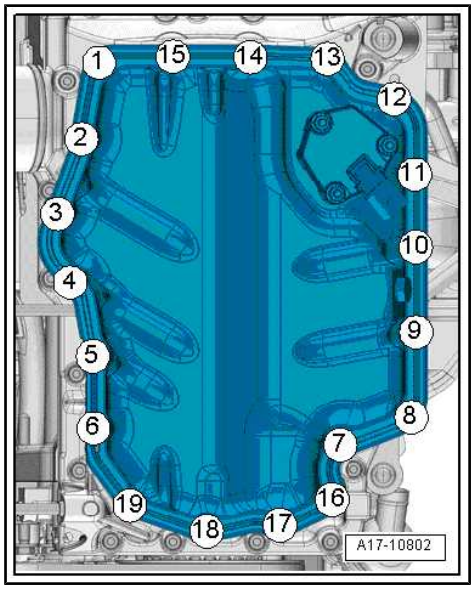


• Engine oil drained ⇒ Maintenance ; Booklet 820

– Unplug electrical connector -1- at oil level and oil temperature sender - G266- .

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.

– Slacken and remove bolts in the sequence: -19 ... 1-.



– Carefully lever off sump (bottom section) with a screwdriver at position marked by “arrow”.
– Carefully release sump (bottom section) from bonded joint using a spatula (commercially available).



Installing

Caution

Protect lubrication system against contamination.

- *Cover exposed parts of the engine.*

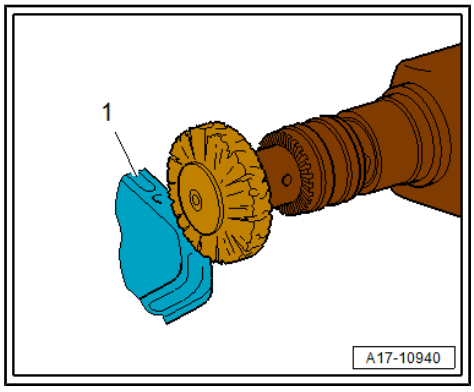
– Spray sealing surface with sealant remover and wait for it to take effect.
– Remove sealant remaining on sump (top section) with flat scraper.

WARNING

Risk of eye injury.

- *Put on safety goggles.*

– Remove sealant residue on sump (bottom section) using rotating plastic brush or similar.
– Clean surfaces; they must be free of oil and grease.

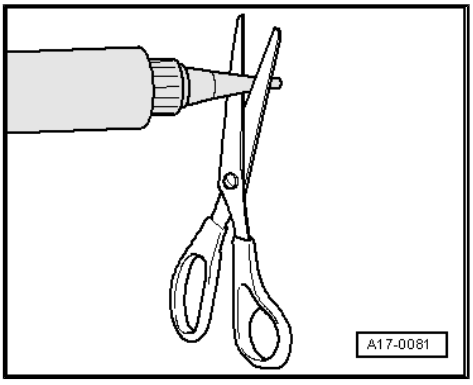


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Note

Note the use-by date of the sealant.

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



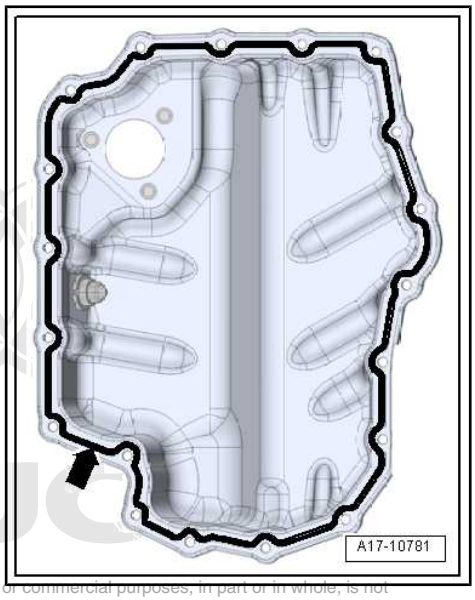
Caution

Make sure lubrication system is not clogged by excess sealant.

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

– Apply bead of sealant -arrow- onto clean sealing surface of sump (bottom section) as shown in illustration.

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



Note

- *Take particular care when applying sealant bead in area of sealing flange.*
- *The sump (bottom section) must be installed within 5 minutes after applying the sealant.*

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

– Fit sump (bottom section) and tighten bolts ⇒ Fig. ""Sump (bottom section) - tightening torque and sequence"" , page 208 .

Note

After installing the sump (bottom section), wait about 30 minutes for the sealant to dry. Then (and only then) fill the engine with engine oil.

– Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 820 .

Tightening torques

- ⇒ Fig. ""Sump (bottom section) - tightening torque and sequence"" , page 208

1.4 Removing and installing sump (top section)

Special tools and workshop equipment required

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

Removing

– Detach air conditioner compressor from bracket and tie up ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket .

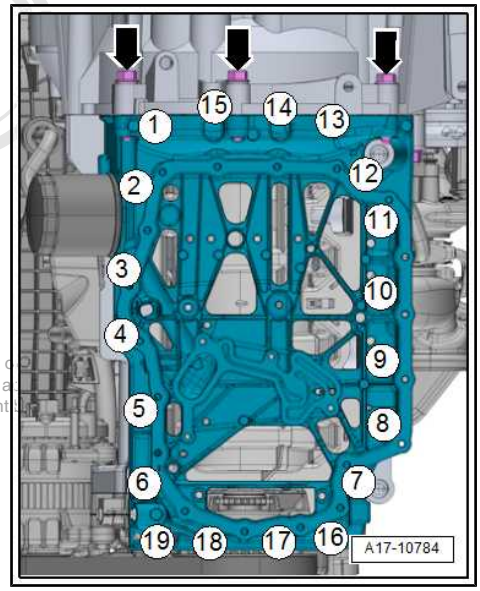
– Remove oil pump
⇒ “1.5 Removing and installing oil pump”, page 214 .

– Remove bolts -arrows- securing gearbox to sump (top section).

– Slacken and remove bolts in the sequence: -19 ... 1-.

– Carefully release sump (top section) from bonded joint.

– Detach baffle plate.



Installing

Note

- *Renew bolts tightened with specified tightening angle.*
- *Renew seals, 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.

Caution

Protect lubrication system against contamination.

- *Cover exposed parts of the engine.*

– Remove sealant remaining on cylinder block with flat scraper.

WARNING

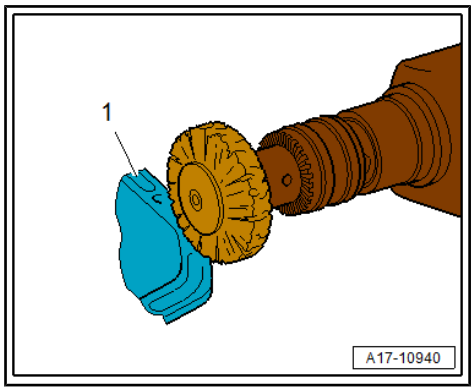
Risk of eye injury.

- *Put on safety goggles.*

– Use e.g. a rotating plastic brush to remove sealant residue on sump (top section) flange.

– Check oil passages in sump (top section) and in cylinder block for dirt.

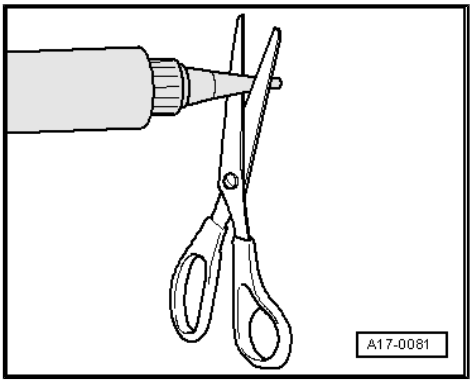
– Clean surfaces; they must be free of oil and grease.



Note

Note the use-by date of the sealant.

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



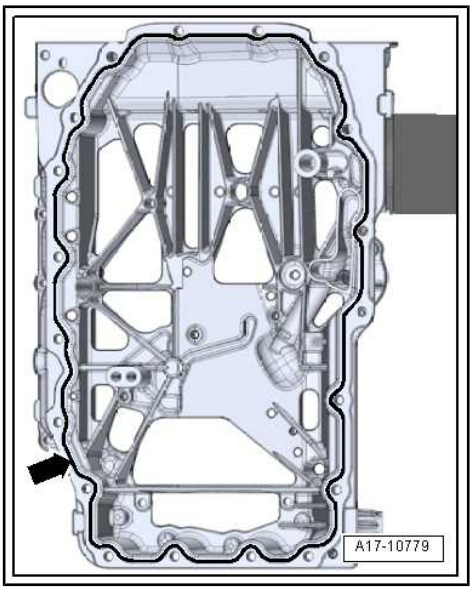
Caution

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.

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



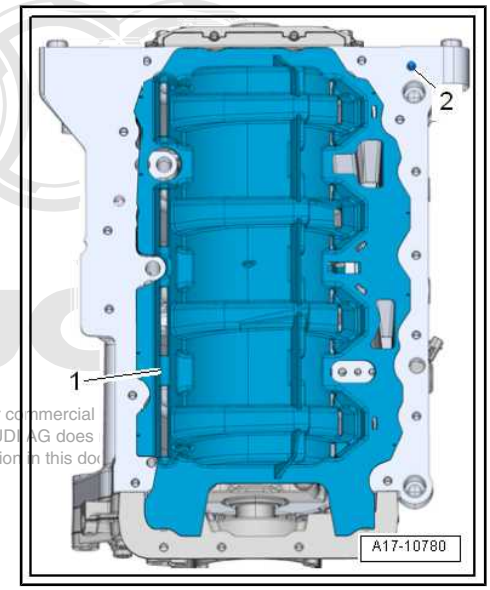
Note

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

– Check that dowel pin -2- is securely seated in cylinder block.

– Attach baffle plate -1- to cylinder block.

– Fit sump (top section) and tighten bolts
⇒ Fig. ""Sump (top section) - tightening torque and sequence"" , page 209 .



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

– Install oil pump
⇒ "1.5 Removing and installing oil pump", page 214 .

– Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 820 .

Tightening torques

- ⇒ "1.1 Exploded view - sump/oil pump", page 206
- ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Exploded view - air conditioner compressor drive unit

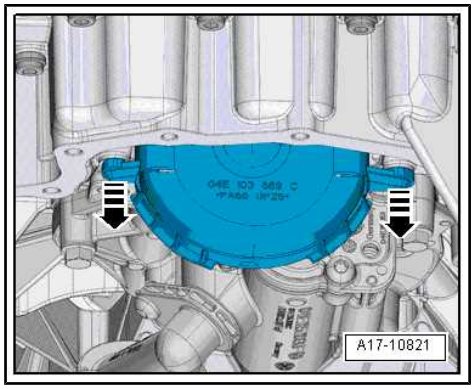
Protected by copyright. Copying for private or commercial permitted unless authorised by AUDI AG. AUDI AG does with respect to the correctness of information in this do

1.5 Removing and installing oil pump

Removing

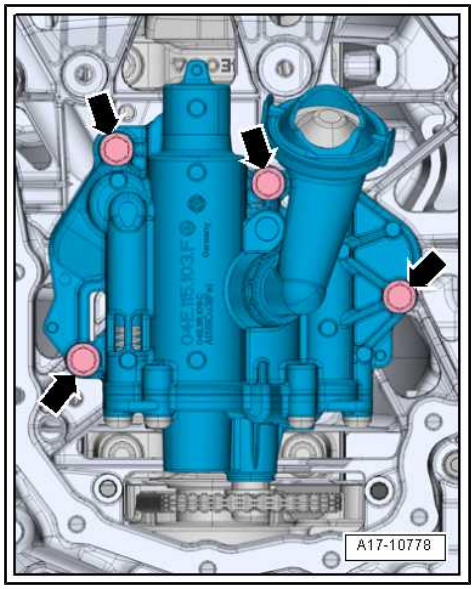
– Remove sump (bottom section)
⇒ “1.3 Removing and installing sump (bottom section)”, page 209 .

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



– Remove bolts -arrows-.

– Guide out oil pump with drive chain sprocket under drive chain.



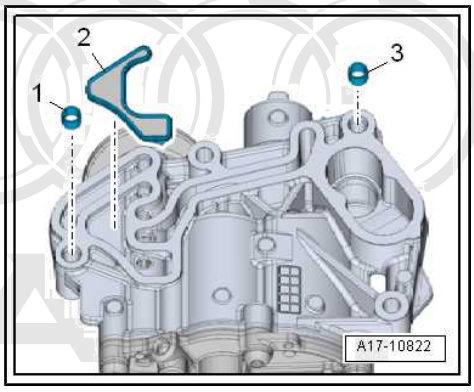
Installing

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

– Check that dowel sleeves -1, 3- are fitted in oil pump.

– Fit seal with strainer -2- in oil pump.

– Turn oil pump drive chain sprocket by hand to check oil pump for ease of movement.



Note

Renew oil pump if it does not turn easily.

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 oil pump with drive chain sprocket into drive chain and secure.

– Install sump (bottom section)
⇒ “1.3 Removing and installing sump (bottom section)”, page 209 .

– Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 820 .

Tightening torques

◆ ⇒ “1.1 Exploded view - sump/oil pump”, page 206

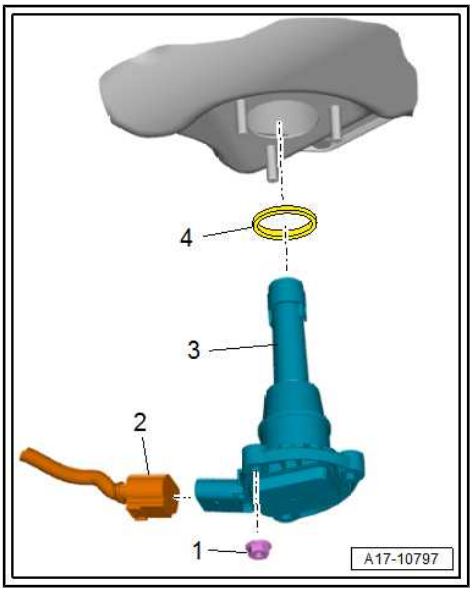
1.6 Removing and installing oil level and oil temperature sender - G266-

Removing

- Engine oil drained ⇒ Maintenance ; Booklet 820

– Unplug electrical connector -2-.

– Remove nuts -1- and detach oil level and oil temperature sender - G266- -item 3-.



Installing

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

Note

Renew seal -2-.

– Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 820 .

Tightening torques

♦ ⇒ “1.1 Exploded view - sump/oil pump”, page 206

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 oil cooler

⇒ “2.1 Exploded view - engine oil cooler”, page 216

⇒ “2.2 Removing and installing engine oil cooler”, page 216

2.1 Exploded view - engine oil cooler

1 - Engine oil cooler

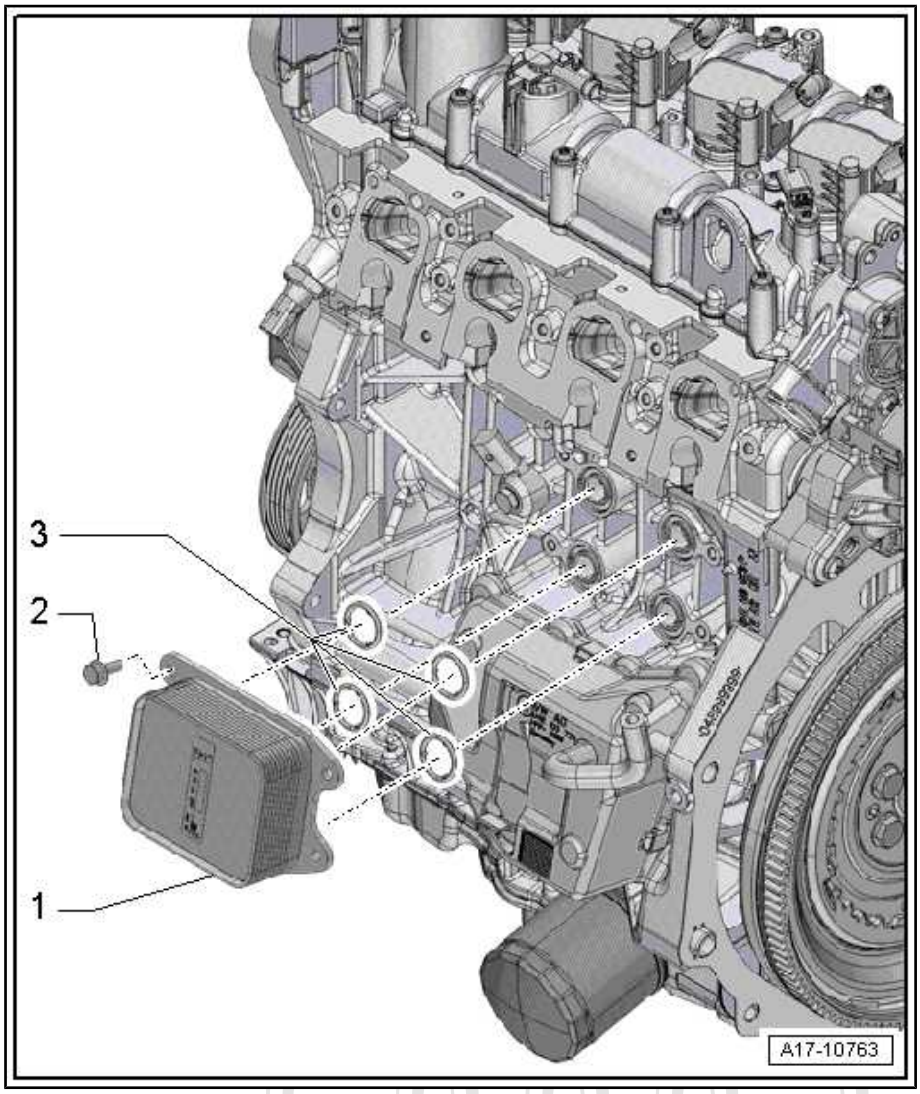
- ❑ See note ⇒ “1 Sump/oil pump”, page 206
- ❑ Removing and installing ⇒ “2.2 Removing and installing engine oil cooler”, page 216
- ❑ If renewed, refill system with fresh coolant

2 - Bolt

- ❑ Renew after removing
- ❑ 8 Nm +90°

3 - Seals

- ❑ Renew after removing

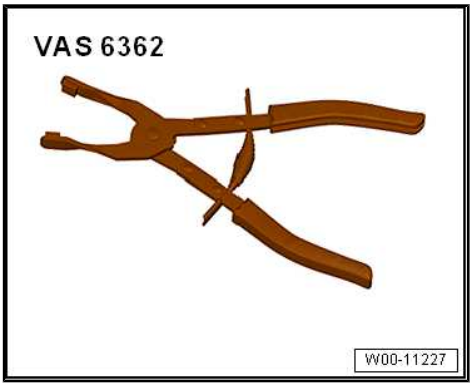


2.2 Removing and installing engine oil cooler

Special tools and workshop equipment required

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

- Hose clip pliers - VAS 6362-

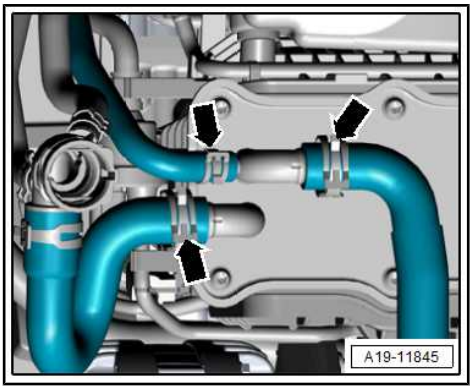


Removing

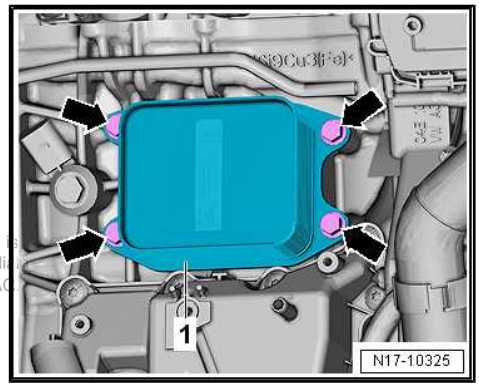
– Drain coolant
⇒ “1.3 Draining and filling cooling system”, page 230 .

– Release hose clips -arrows- and detach coolant hoses from charge air cooler.

– Remove intake manifold
⇒ “3.2 Removing and installing intake manifold”, page 300 .



– Unscrew bolts -arrows- and detach engine oil cooler -1-.



Installing

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

Note

- *Renew seals.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

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

– Install intake manifold
⇒ “3.2 Removing and installing intake manifold”, page 300 .

– Fill up with coolant ⇒ page 236 .

Tightening torques

- ⇒ “2.1 Exploded view - engine oil cooler”, page 216

3 Crankcase breather

⇒ “3.1 Exploded view - crankcase breather system”, page 218

⇒ “3.2 Removing and installing oil separator”, page 219

3.1 Exploded view - crankcase breather system

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.

The illustration shows the engine with code CZEA.

1 - Hose
- ❑ For crankcase breather

2 - Cover
- ❑ For oil separator

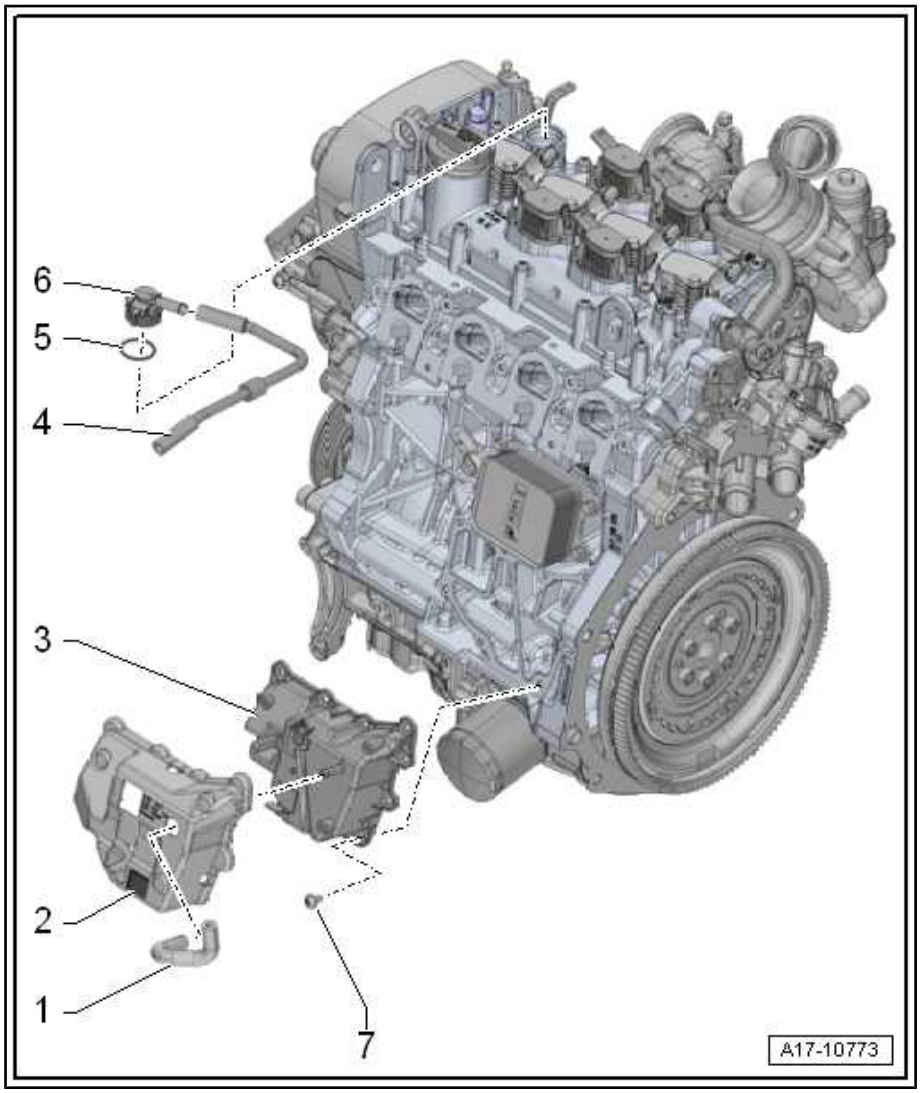
3 - Oil separator
- ❑ Removing and installing ⇒ “3.2 Removing and installing oil separator”, page 219
- ❑ Renew if damaged

4 - Hose
- ❑ For crankcase breather
- ❑ Different versions available; for allocation refer to ⇒ Electronic parts catalogue

5 - O-ring
- ❑ Renew after removing

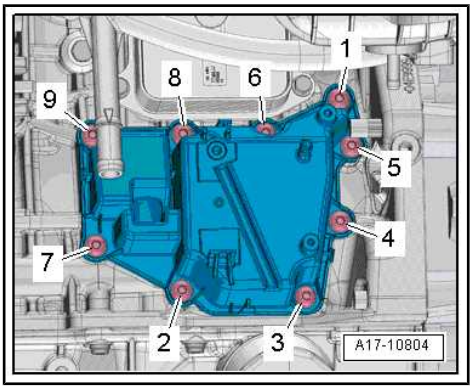
6 - Connecting piece

7 - Bolt
- ❑ Self-locking
- ❑ Renew after removing
- ❑ 9 Nm



Oil separator - tightening torque and sequence

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



3.2 Removing and installing oil separator

Special tools and workshop equipment required

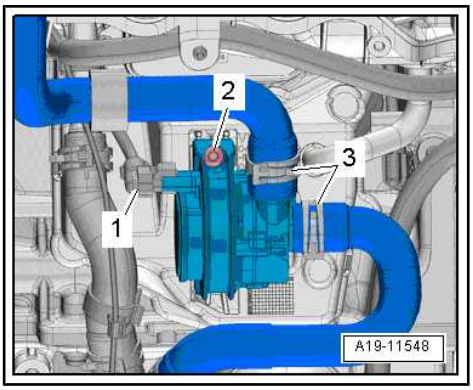
- Flat scraper
- Studs, M6x20 mm
- Sealant
- Sealant ⇒ Electronic parts catalogue

Removing

– Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

– Unplug electrical connector -1-.

– Remove bolt -2- and press continued coolant circulation pump - V51- to side.

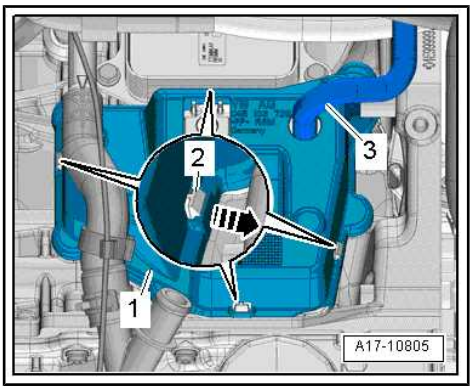


Note

Disregard -item 3-.

– Disconnect crankcase breather hose -3-.

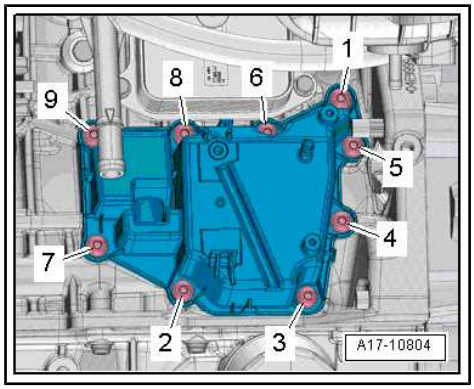
– Release fasteners -2- -arrow- on cover -1- for oil separator and detach cover.



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

– Slacken and remove bolts in the sequence: -9 ... 1-.

– Carefully release oil separator from bonded joint.



Installing

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

Caution

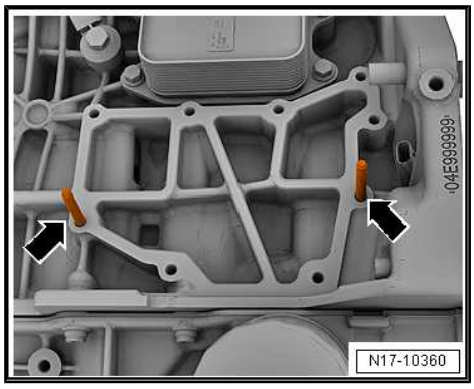
Protect lubrication system against contamination.

- ***Cover exposed parts of the engine.***

– Remove sealant remaining on cylinder block with flat scraper.

– Clean surfaces; they must be free of oil and grease.

– Screw 2 studs a few turns into holes -arrows-.

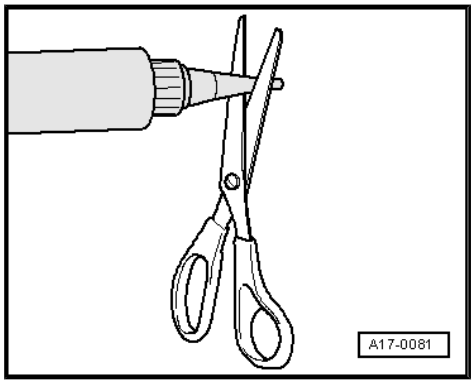


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Note

Note the use-by date of the sealant.

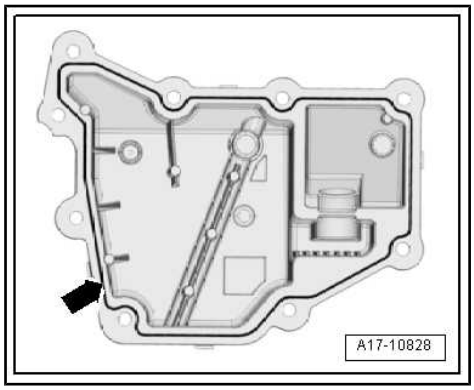
– Cut off nozzle of tube at front marking (nozzle ∅ approx. 2 mm).



Caution

Make sure lubrication system is not clogged by excess sealant.

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



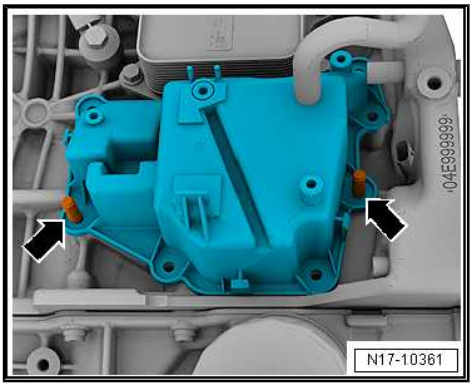
– Apply bead of sealant -arrow- onto clean sealing surface of oil separator as shown in illustration.

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

The oil separator must be installed within 5 minutes after applying the sealant.

– Place oil separator onto studs and crankcase.
– Remove studs again.
– Tighten bolts in sequence to specified torque ⇒ Fig. ""Oil separator - tightening torque and sequence"" , page 219 .
– Check oil level ⇒ Maintenance ; Booklet 820 .

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



Tightening torques

- ⇒ Fig. ""Oil separator - tightening torque and sequence"" , page 219
- ⇒ "2.2 Exploded view - electric coolant pump", page 239
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

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 Oil filter/oil pressure switches

⇒ “4.1 Exploded view - oil filter/oil pressure switches”, page 222

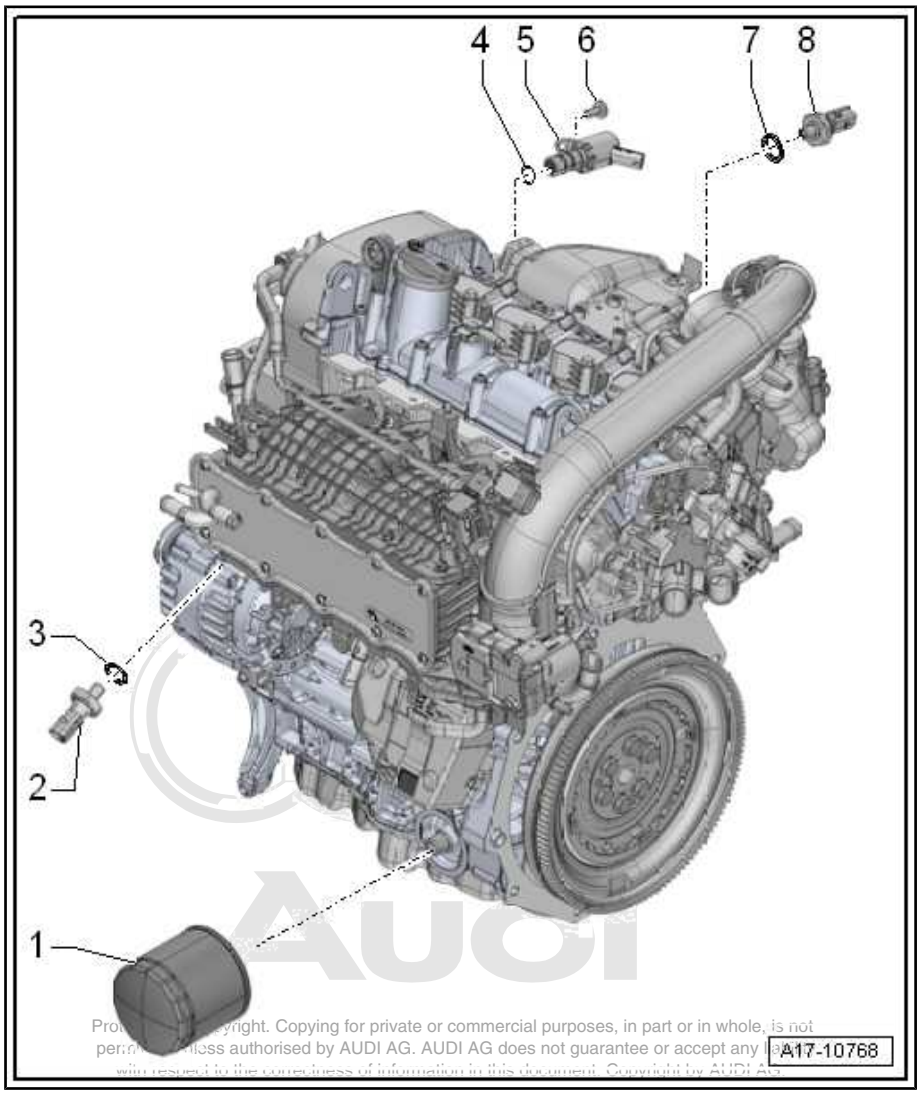
⇒ “4.2 Removing and installing oil pressure switch F22 ”, page 223

⇒ “4.3 Removing and installing oil pressure switch for reduced oil pressure F378 ”, page 224

⇒ “4.4 Checking oil pressure”, page 225

⇒ “4.5 Removing and installing valve for oil pressure control N428 ”, page 226

4.1 Exploded view - oil filter/oil pressure switches



1 - Oil filter

- ❑ See note ⇒ page 206
- ❑ Removing and installing ⇒ Maintenance ; Booklet 820
- ❑ ⇒ Fig. ““Securing threaded connection for oil filter”“ , page 223

2 - Oil pressure switch for reduced oil pressure - F378-

- ❑ Opening/closing pressure 0.3 ... 0.6 bar
- ❑ Green insulation
- ❑ Check in `Guided Fault Finding` ⇒ Vehicle diagnostic tester
- ❑ Always renew oil pressure switch after removal
- ❑ Removing and installing ⇒ “4.3 Removing and installing oil pressure switch for reduced oil pressure F378 ”, page 224
- ❑ 20 Nm

3 - Seal

- ❑ Seal cannot be renewed individually
- ❑ Always renew oil pressure switch after removal

4 - O-ring

- ❑ Renew after removing

5 - Valve for oil pressure control - N428-

- ❑ Removing and installing ⇒ “4.5 Removing and installing valve for oil pressure control N428 ”, page 226

6 - Bolt

- ❑ 8 Nm

Pro… yright. Copying for private or commercial purposes, in part or in whole, is not per… …loss authorised by AUDI AG. AUDI AG does not guarantee or accept any l… …with respect to the correctness of information in this document. Copyright by AUDI AG.

7 - Seal

- ❑ Renew after removing

8 - Oil pressure switch - F22-

- ❑ Opening/closing pressure 2.15 ... 2.95 bar
- ❑ Blue insulation
- ❑ Check in `Guided Fault Finding` ⇒ Vehicle diagnostic tester
- ❑ Renew after removing
- ❑ Removing and installing ⇒ “4.2 Removing and installing oil pressure switch F22 ”, page 223
- ❑ 20 Nm

Securing threaded connection for oil filter

- Secure threaded connection -2- as described below if it has come loose from sump (top section) -1-.

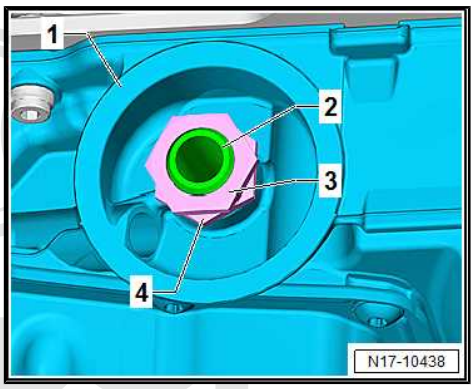
Carry out this procedure using the two nuts -3 and 4- only.

- Hexagon nuts - 068 115 723- (2x) ⇒ Electronic parts catalogue

– Fit nuts -3- and -4- onto threaded connection -2- and screw them against one another to counter-lock.

– Tighten connection -2- via nut -3-.

– Unscrew and remove both nuts, taking care not to loosen connection when doing so.



Tightening torques

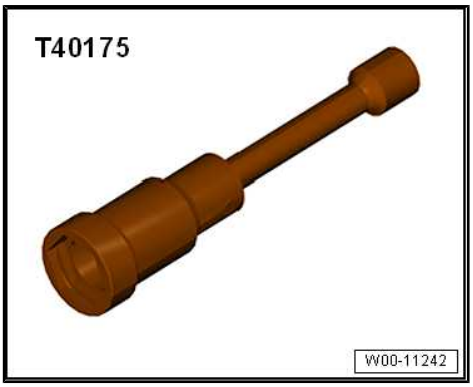
Threaded connection	Tightening torque
-2-	50 Nm

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.

4.2 Removing and installing oil pressure switch - F22-

Special tools and workshop equipment required

- ♦ Articulated wrench, 24 mm - T40175-



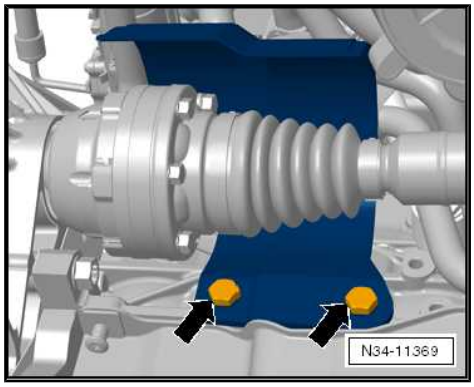
Removing

Note

Fit all heat insulation sleeves in the original position when installing.

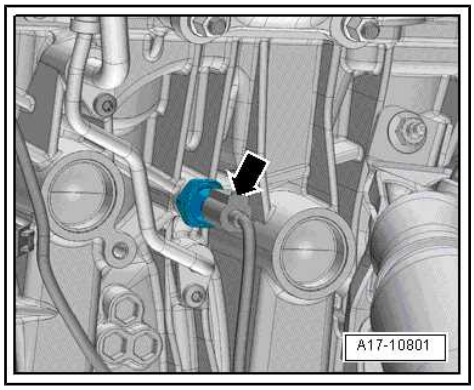
– Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

– Remove bolts -arrows- and detach heat shield for drive shaft (right-side).



– Detach heat shield sleeve.

– Unplug electrical connector -arrow-.



Note

Place a cloth underneath to catch escaping engine oil.

– Unscrew oil pressure switch - F22- .

Installing

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

Note

- *Renew seal.*
- *Fit the new oil pressure switch - F22- into the connection immediately to avoid loss of oil.*

– Check oil level ⇒ Maintenance ; Booklet 820 .

Tightening torques

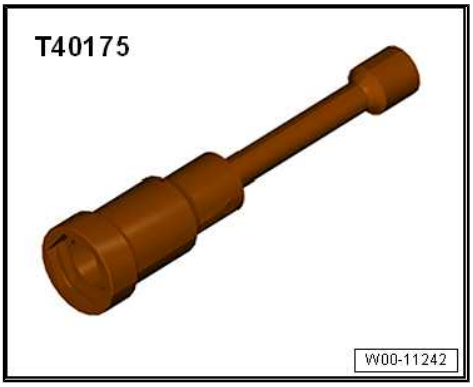
- ⇒ “4.1 Exploded view - oil filter/oil pressure switches”, page 222
- Heat shield for drive shaft ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Exploded view - drive shaft
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

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

Special tools and workshop equipment required

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

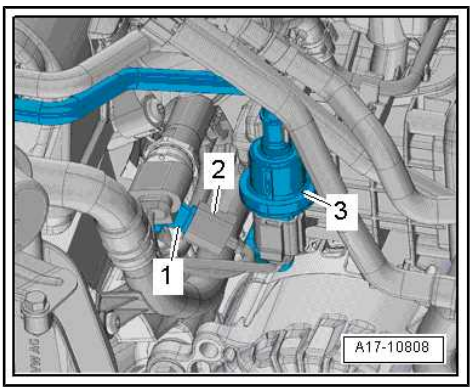
♦ Articulated wrench, 24 mm - T40175-



Removing

– Detach solenoid valve 1 for activated charcoal filter - N80- -item 3- from intake manifold and press downwards slightly.

– Unplug electrical connector -2-.



Note

Place a cloth underneath to catch escaping engine oil.

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

– Unscrew oil pressure switch for reduced oil pressure - F378- -item 1-.

Installing

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

Note

♦ *Renew seal.*

♦ *Fit the new oil pressure switch into the connection immediately to avoid loss of oil.*

– Check oil level ⇒ Maintenance ; Booklet 820 .

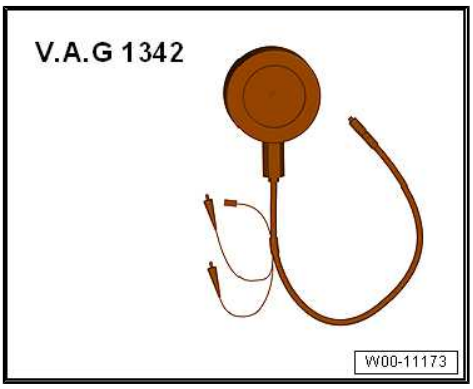
Tightening torques

♦ ⇒ “4.1 Exploded view - oil filter/oil pressure switches”, page 222

4.4 Checking oil pressure

Special tools and workshop equipment required

♦ Oil pressure tester - V.A.G 1342-



Procedure

- Oil level OK, checking ⇒ Maintenance ; Booklet 820
- Engine oil temperature at least 80 °C (radiator fan must have run once).

– Remove oil pressure switch for reduced oil pressure - F378- ⇒ “4.3 Removing and installing oil pressure switch for reduced oil pressure F378 ”, page 224 .

– Screw oil pressure tester - V.A.G 1342- into hole for oil pressure switch.

– Screw oil pressure switch for reduced oil pressure - F378- into hole in oil pressure tester - V.A.G 1342- to seal it off.

– Start engine.

- Oil pressure at idling speed: at least 0.6 bar.
- Minimum oil pressure at 2000 rpm: 1.5 bar.
- Minimum oil pressure at 4500 rpm: 2.8 bar.

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.

Assembling

– Install oil pressure switch for reduced oil pressure - F378- ⇒ “4.3 Removing and installing oil pressure switch for reduced oil pressure F378 ”, page 224 .

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

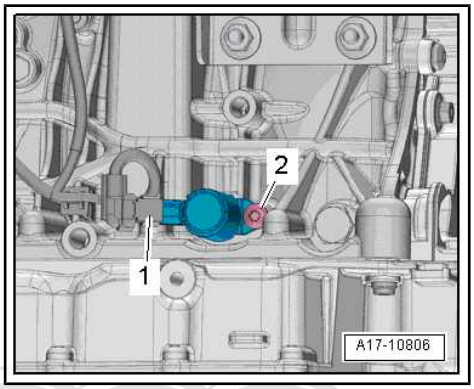
Removing

Note

Fit all heat insulation sleeves in the original position when installing.

– Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

– Detach heat insulation sleeves.
– Unplug electrical connector -1-.



Note

Place a cloth underneath to catch escaping engine oil.

– Remove bolt -2- and detach valve for oil pressure control - N428- .

Installing

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

Note

Renew O-ring.

Tightening torques

- ⇒ “4.1 Exploded view - oil filter/oil pressure switches”, page 222
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

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/coolant

⇒ “1.1 Connection diagram - coolant hoses”, page 228

⇒ “1.2 Checking cooling system for leaks”, page 229

⇒ “1.3 Draining and filling cooling system”, page 230

1.1 Connection diagram - coolant hoses

Note

- *Blue = Large coolant circuit.*
- *Red = Small coolant circuit.*
- *Green = Charge air cooling circuit.*
- *Brown = Heating circuit.*
- *Yellow = Gear oil coolant circuit*
- *Arrows show direction of coolant flow.*

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

1 - Water radiator for charge air cooling circuit

2 - Radiator

3 - Non-return valve

4 - Charge air cooler

5 - Cylinder head/cylinder block

6 - Coolant expansion tank

- ❑ With filler cap

7 - Sealing cap

- ❑ For coolant expansion tank
- ❑ Checking pressure relief valve ⇒ page 230

8 - Turbocharger

9 - Coolant temperature sender - G62-

10 - Heat exchanger for heater

11 - Gear oil cooler

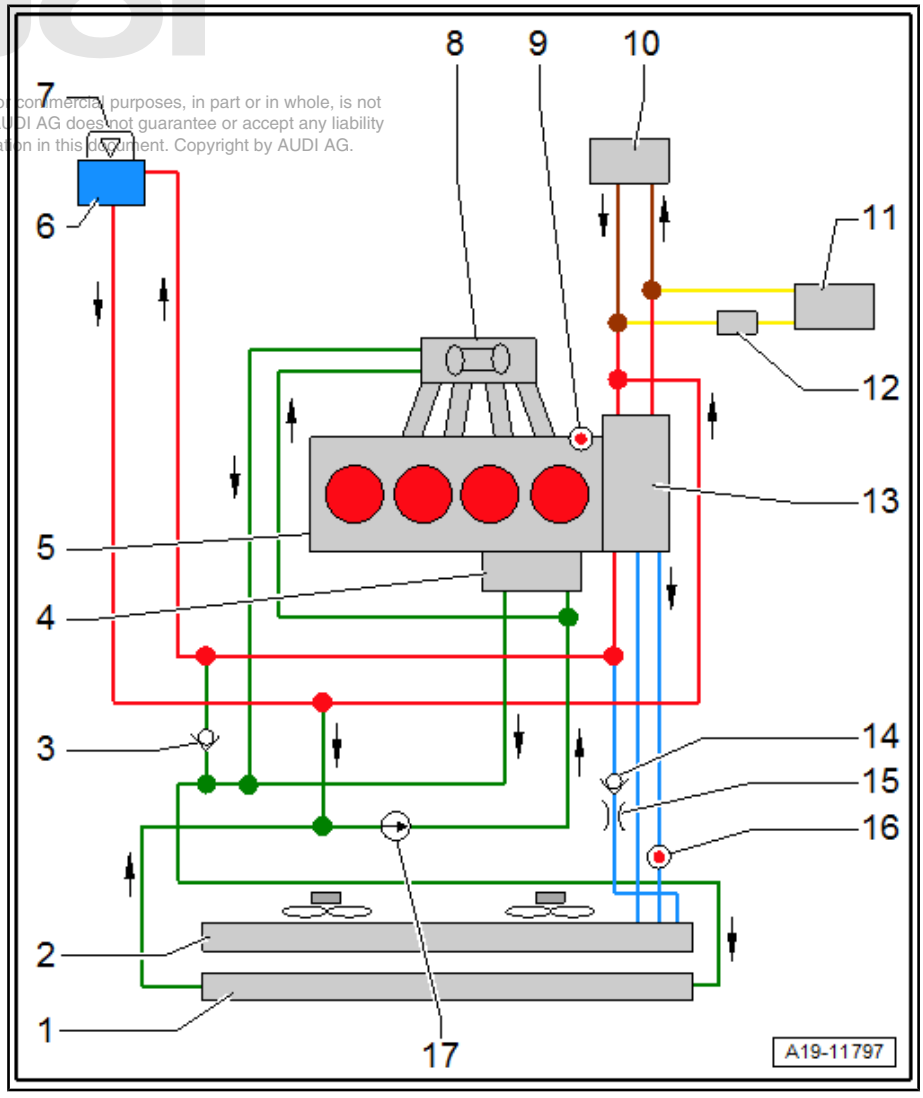
- ❑ For vehicles with dual clutch gearbox

12 - Thermostat

- ❑ For gear oil coolant circuit

13 - Coolant pump

- ❑ With thermostat housing



14 - Non-return valve

15 - Restrictor

16 - Radiator outlet coolant temperature sender - G83-

17 - Continued coolant circulation pump - V51-

1.2 Checking cooling system for leaks

Special tools and workshop equipment required

- Adapter for cooling system tester - V.A.G 1274/8-
- Adapter for cooling system tester - V.A.G 1274/9-
- Cooling system tester - V.A.G 1274 B-

Protected by copyright. Copying for private or commercial p... not ... AUDI AG. AUDI AG does n... ...ility ... with regard to the correctness of information in this docu...



Procedure

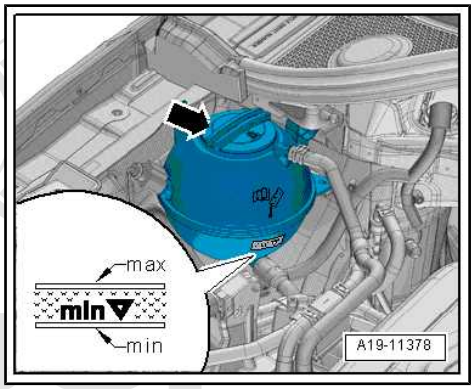
- Engine must be warm.

WARNING

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

Danger of scalding skin and other parts of the body.

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



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.

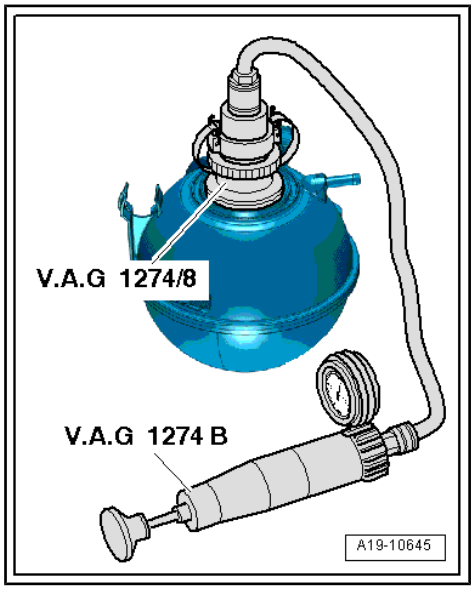
– Open filler cap -arrow- on coolant expansion tank.

– Fit cooling system tester - V.A.G 1274 B- with adapter - V.A.G 1274/8- onto coolant expansion tank.

– Using hand pump on cooling system tester, build up a pressure of approx. 1.5 bar.

- The pressure should not drop more than 0.2 bar within 10 minutes.

– If the pressure drops more than 0.2 bar, locate leak and eliminate fault.



Note

The drop in pressure of 0.2 bar within 10 minutes is caused by the decrease in coolant temperature. The colder the engine is, the less the pressure will fall. If necessary, check again when the engine is cold.

Checking pressure relief valve in filler cap

– Fit cooling system tester - V.A.G 1274 B- with adapter - V.A.G 1274/9- onto filler cap.

– Build up pressure with hand pump on cooling system tester.

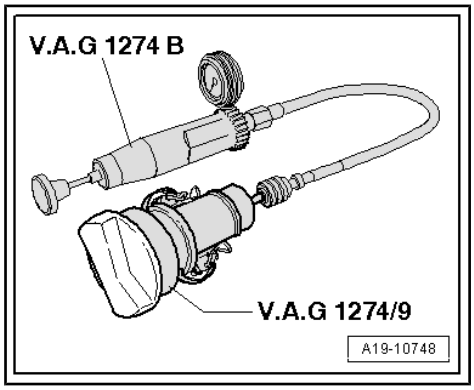
Blue filler cap

- The pressure relief valve should open at a pressure of 1.4 ... 1.6 bar.

Black filler cap

- The pressure relief valve should open at a pressure of 1.6 ... 1.8 bar.

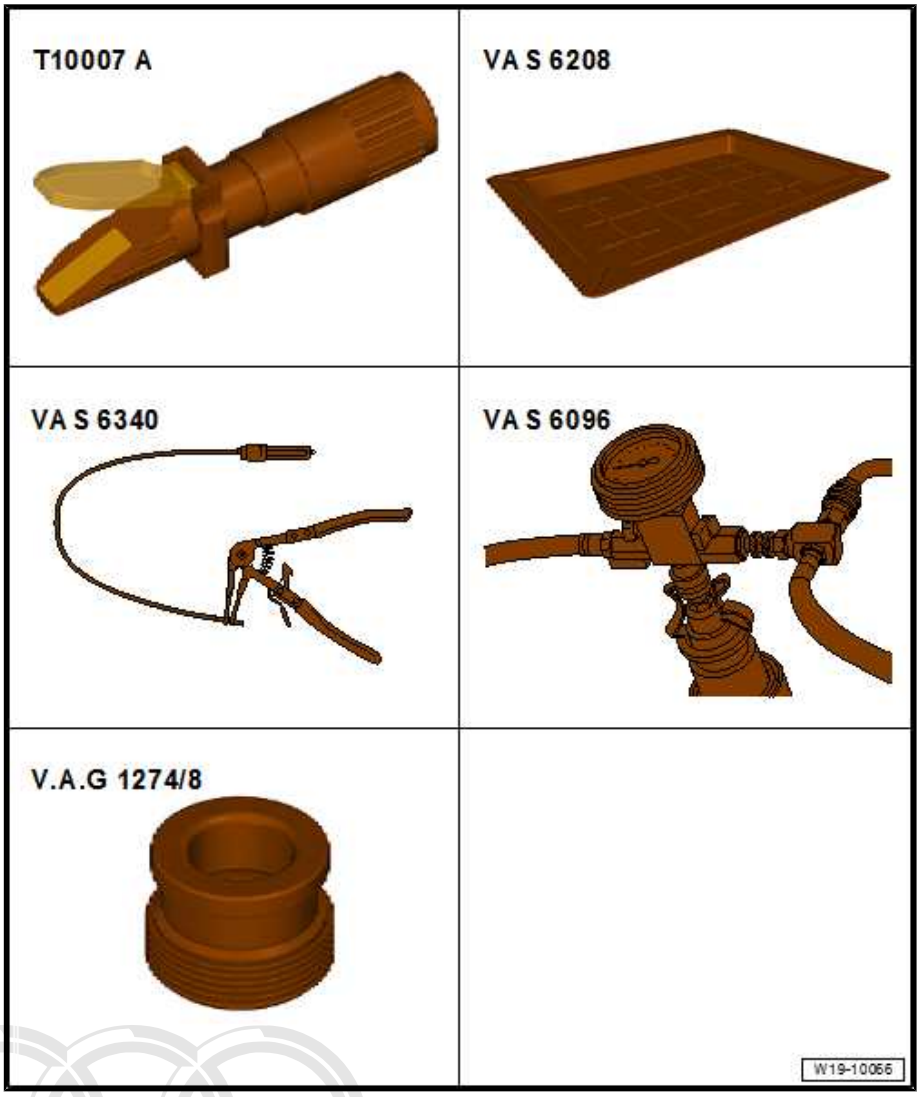
– Renew filler cap if pressure relief valve does not open as described.



1.3 Draining and filling cooling system

Special tools and workshop equipment required

- Refractometer - T10007A-
- Drip tray for workshop hoist - VAS 6208-
- Hose clip pliers - VAS 6340-
- Cooling system charge unit - VAS 6096-
- Adapter for cooling system tester - V.A.G 1274/8-
- Safety goggles
- Protective gloves



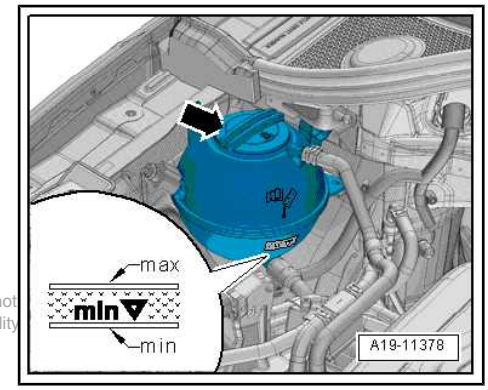
Draining

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.***

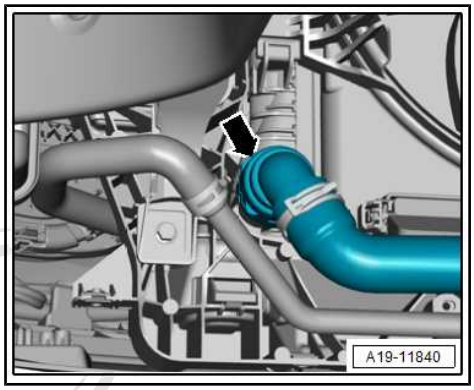
Copyright AUDI AG. All rights reserved. Distribution to third parties, publication or other uses, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



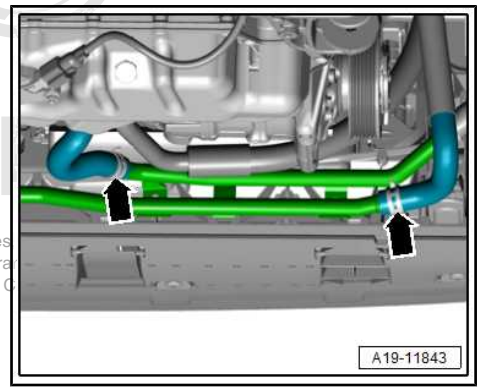
– Open filler cap -arrow- on coolant expansion tank.

– Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

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



– Release hose clips -arrows-, disconnect coolant hoses and drain off coolant.

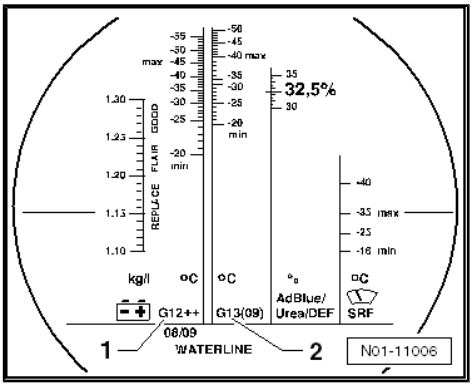


Filling

Caution

To ensure optimal corrosion protection, only distilled water may be mixed with coolant additives.

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) . If you use other coolant additives, this can significantly impair in particular the corrosion protection effect. The resulting damage could lead to loss of coolant and consequently to serious engine damage.*
- *Coolant with the recommended mixture ratio prevents frost and corrosion damage and stops scaling. At the same time it raises the boiling point of the fluid in the system. For this reason the cooling system must be filled all year round with the correct coolant additive.*
- *Because of its high boiling point, the coolant improves engine reliability under heavy loads, particularly in countries with tropical climates.*
- *The refractometer - T10007A- MUST be used to determine the current level of frost protection.*
- *The mixture must guarantee frost protection down to at least -25 °C (in countries with arctic climate: down to -36 °C). The amount of antifreeze should only be increased if greater frost protection is required in very cold climates. This must only be down to -48 °C, however, as otherwise the cooling efficiency of the coolant is impaired.*
- *The coolant concentration must not be reduced by adding water even in warmer seasons and in warmer countries. Frost protection must be provided to at least -25 °C.*
- *Read off the level of frost protection on the scale for the relevant coolant additive.*
- *The temperature indicated on the refractometer - T10007A- corresponds to the temperature at which the first ice crystals can form in the coolant.*
- *Do not reuse coolant.*
- *Only use water/coolant additive as a lubricant for coolant hoses.*

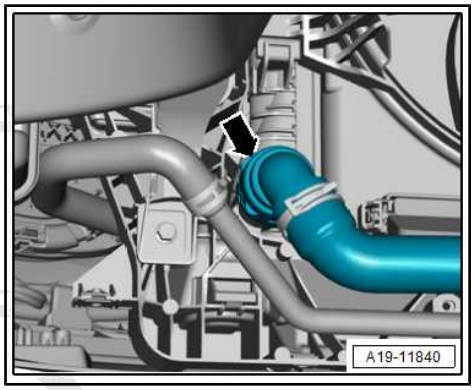
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Recommended mixture ratio for coolant

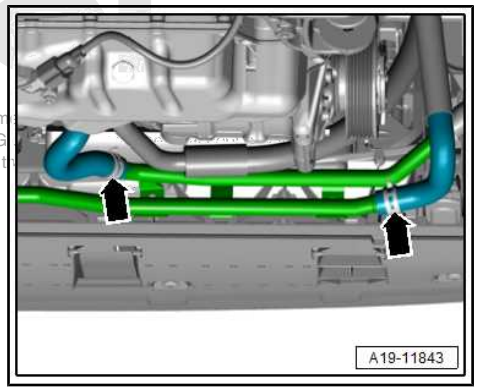
- Coolant (40 %) and distilled water (60 %) for frost protection to -25 °C
- Coolant (50 %) and distilled water (50 %) for frost protection to -36 °C
- Coolant ⇒ Electronic parts catalogue

Procedure

– Connect coolant hose with plug-in connector to radiator (bottom left) ⇒ page 263 .

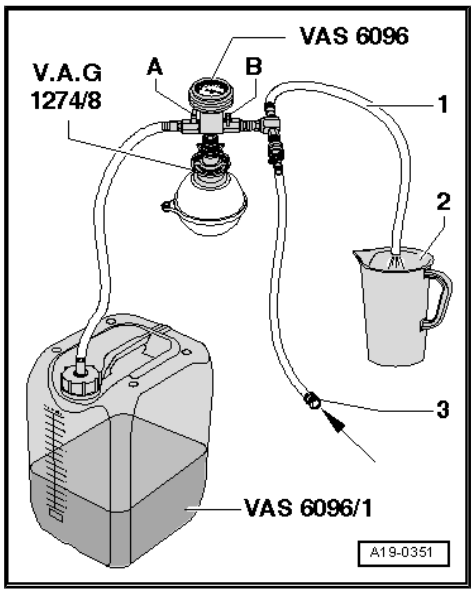


– Connect coolant hoses using hose clips -arrows-.



Protected by copyright. Copying for private or comm
permitted unless authorised by AUDI AG. AUDI AG
with respect to the correctness of information in t

– Fill reservoir of -VAS 6096- with at least 10 litres of premixed coolant (according to recommended ratio).
– Fit adapter for cooling system tester - V.A.G 1274/8- onto coolant expansion tank.
– Attach cooling system charge unit - VAS 6096- to adapter - V.A.G 1274/8- .
– Run vent hose -1- into a small container -2-.

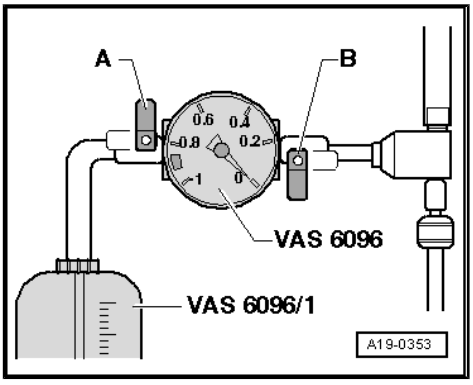


Note

The vented air draws along a small amount of coolant, which should be collected.

– Close both valves -A- and -B- (turn lever at right angles to direction of flow).
– Connect hose -3- to compressed air.
• Pressure: 7 ... 10 bar.

– Open valve -B- by setting lever in direction of flow.



• The suction jet pump generates a partial vacuum in the cooling system; the needle on the gauge should move into the green zone.

– Also briefly open valve -A- (turn lever in direction of flow) so that hose on reservoir of -VAS 6096- can fill with coolant.

– Close valve -A- again.

– Leave valve -B- open for another 2 minutes.

• The suction jet pump continues to generate a partial vacuum in the cooling system; the needle on the gauge should remain in the green zone.

– Close valve -B-.

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.

• The needle on the gauge should stop in the green zone. The vacuum level in the cooling system is then sufficient for subsequent filling.

Note

♦ *If the needle does not reach the green zone, repeat the process.*

♦ *Check cooling system for leaks if the vacuum is not maintained.*

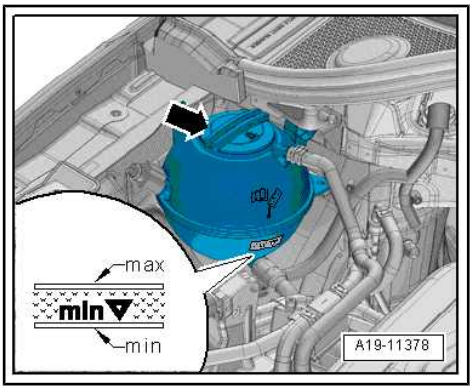
– Detach compressed air hose.

– Open valve -A-.

• The vacuum in the cooling system causes the coolant to be drawn out of the reservoir of -VAS 6096- ; the cooling system is then filled.

– Detach cooling system charge unit - VAS 6096- from coolant expansion tank.

– Top up coolant to upper mark.



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

– Set temperature to “HI”.

– Set fresh air blower to lowest setting.

– Switch off air conditioner compressor (press AC button).

• LED in button should not light up.

– Start engine and run alternately at approx. 1500 rpm and max. 2800 rpm until radiator fan cuts in.

– Top up coolant to overflow hole on expansion tank with engine running.

– Close filler cap on coolant expansion tank (make sure it engages).

– On vehicles with auxiliary heater, switch heater on (for about 30 seconds) and then off again.

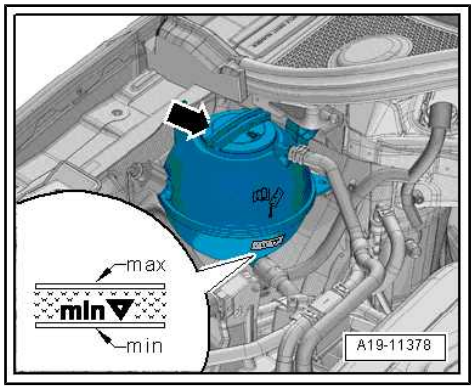
– Switch off ignition and allow engine to cool down.

– Check coolant level.

• The coolant level must be between the “min” and the upper marks when the engine is cold.

• The coolant level can be at or above the top marking when the engine is warm.

– Top up with coolant again if necessary.



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/thermostat assembly

⇒ “2.1 Exploded view - coolant pump/thermostat”, page 237

⇒ “2.2 Exploded view - electric coolant pump”, page 239

⇒ “2.3 Exploded view - coolant temperature senders”, page 241

⇒ “2.4 Removing and installing electric coolant pump”, page 241

⇒ “2.5 Removing and installing coolant pump”, page 243

⇒ “2.6 Removing and installing thermostat”, page 247

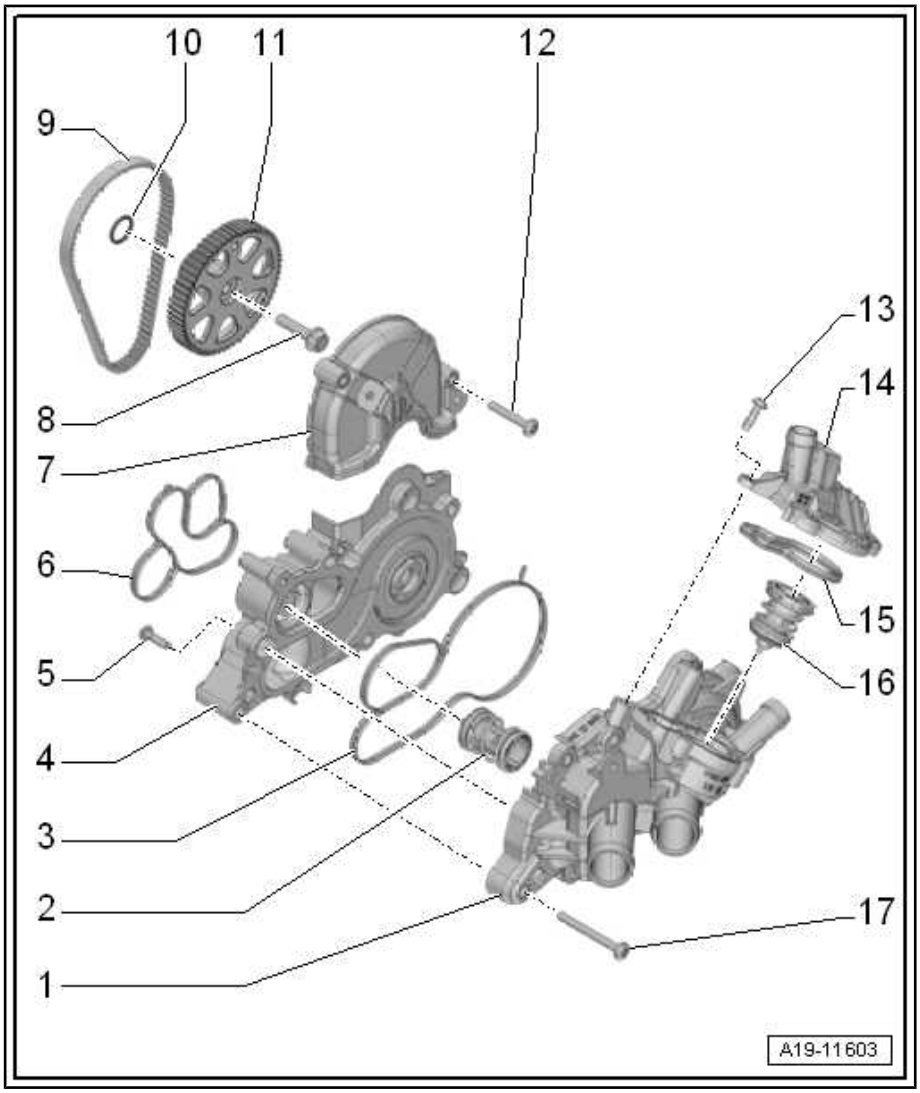
⇒ “2.7 Removing and installing toothed belt sprocket for coolant pump”, page 250

⇒ “2.8 Removing and installing coolant temperature sender G62 ”, page 254

⇒ “2.9 Removing and installing radiator outlet coolant temperature sender G83 ”, page 255

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.

2.1 Exploded view - coolant pump/thermostat



1 - Thermostat housing

- ❑ Removing and installing ⇒ “2.6.2 Removing and installing thermostat for small coolant circuit”, page 249

2 - Thermostat

- ❑ For small coolant circuit
- ❑ Starts to open at approx. 105 °C
- ❑ Removing and installing ⇒ “2.6.2 Removing and installing thermostat for small coolant circuit”, page 249

3 - Gasket

- ❑ Renew after removing

4 - Coolant pump

- ❑ Removing and installing ⇒ “2.5 Removing and installing coolant pump”, page 243
- ❑ Renew toothed belt as well when renewing coolant pump

5 - Bolt

- ❑ Thread-forming
- ❑ Fit and screw in bolt by hand so that it is screwed into old thread. Then tighten bolt to torque.
- ❑ Tightening torque and sequence ⇒ Fig. ““Thermostat housing to coolant pump - tightening torque and sequence”“ , page 239

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

6 - Seal

- ❑ Renew after removing

7 - Toothed belt cover

- ❑ For toothed belt for coolant pump

8 - Bolt

- ❑ Renew after removing
- ❑ 20 Nm +90°

9 - Toothed belt

- ❑ For coolant pump
- ❑ Always renew if removed

10 - O-ring

- ❑ Renew after removing
- ❑ Only for engine code CZEA
- ❑ Removing and installing
  ⇒ “2.7.2 Removing and installing toothed belt sprocket for coolant pump - engine code CZEA”, page 251

11 - Toothed belt sprocket

- ❑ For coolant pump
- ❑ Removing and installing
  ⇒ “2.7 Removing and installing toothed belt sprocket for coolant pump”, page 250
- ❑ Renew O-ring -item 10- after removing
- ❑ Installation position ⇒ page 251
- ❑ Apply sealant when installing

12 - Bolt

- ❑ 8 Nm

13 - Bolt

- ❑ Thread-forming
- ❑ Fit and screw in bolt by hand so that it is screwed into old thread. Then tighten bolt to torque.
- ❑ Tightening torque and sequence
  ⇒ Fig. ““Cover for thermostat to thermostat housing - tightening torque”“ , page 239

14 - Cover

- ❑ For thermostat

15 - Gasket

- ❑ Renew after removing

16 - Thermostat

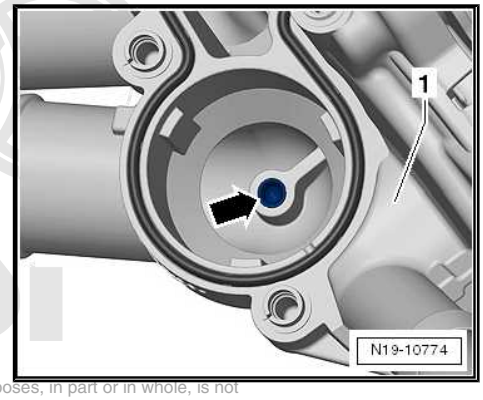
- ❑ For large coolant circuit
- ❑ Different versions available ⇒ Electronic parts catalogue
- ❑ Starts to open at approx. 87 °C
- ❑ Removing and installing
  ⇒ “2.6.2 Removing and installing thermostat for small coolant circuit”, page 249
- ❑ Installation position ⇒ Fig. ““Installation position of thermostat for large coolant circuit”“ , page 239

17 - Bolt

- ❑ Tightening torque and sequence ⇒ page 246

Installation position of thermostat for large coolant circuit

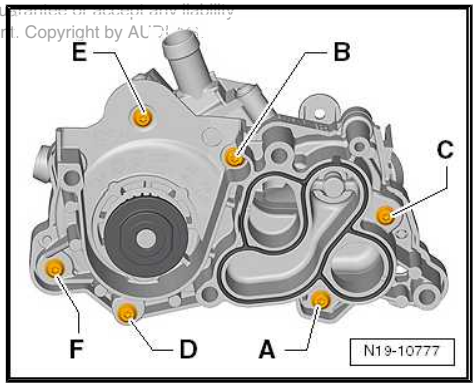
- Must be positioned with centring pin in guide -arrow- in thermostat housing.



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.

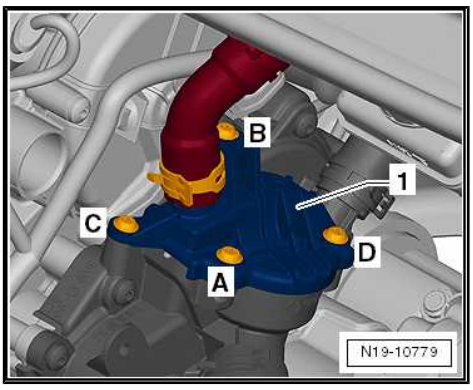
Thermostat housing to coolant pump - tightening torque and sequence

– Tighten bolts in the sequence -A ... F- to 7 Nm.



Cover for thermostat to thermostat housing - tightening torque

– Tighten bolts for cover -1- in the sequence -A ... D- to 7 Nm.



2.2 Exploded view - electric coolant pump

1 - Continued coolant circulation pump - V51-

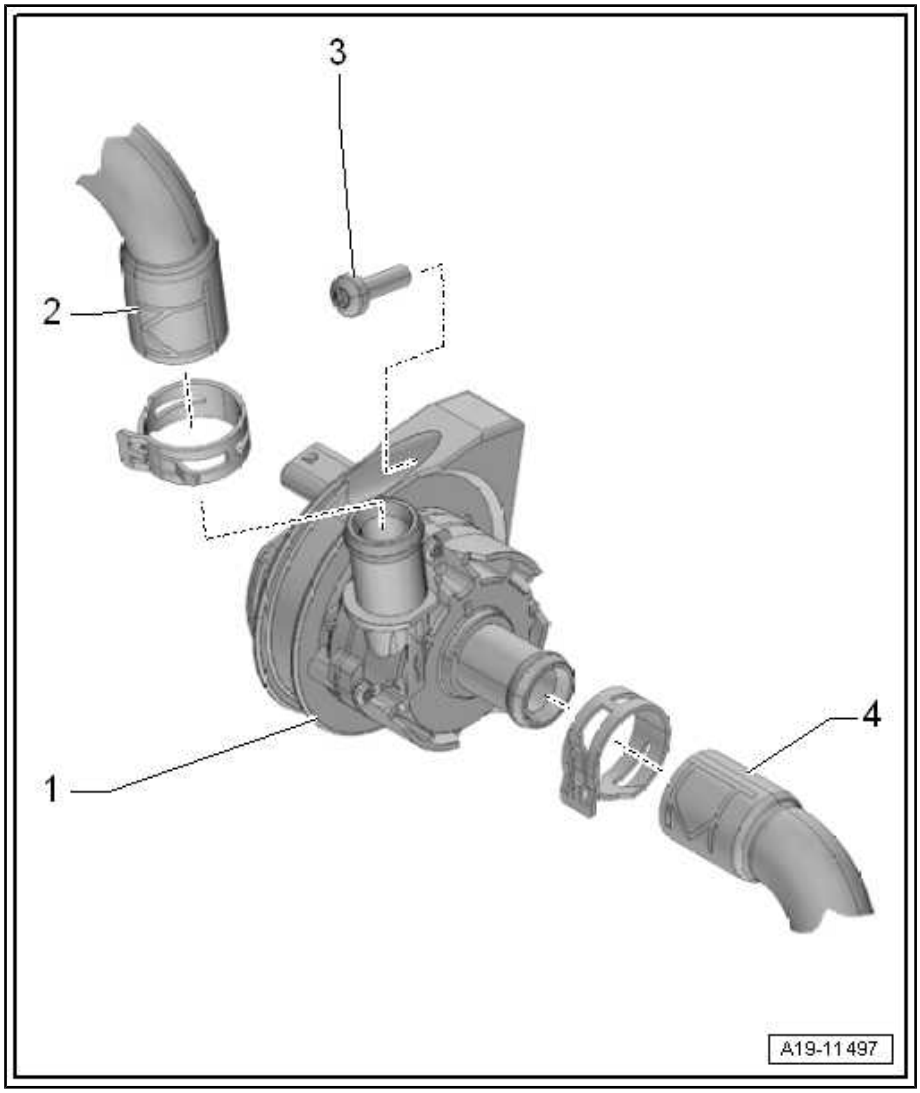
- ❑ With bracket
- ❑ Removing and installing ⇒ “2.4 Removing and installing electric coolant pump”, page 241

2 - Coolant hose

3 - Bolt

- ❑ 8 Nm

4 - Coolant hose



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

2.3 Exploded view - coolant temperature senders

1 - Retaining clip

- ❑ Check for firm attachment

2 - Connection

3 - O-ring

- ❑ Renew after removing

4 - Radiator outlet coolant temperature sender - G83-

- ❑ Removing and installing ⇒ “2.9 Removing and installing radiator outlet coolant temperature sender G83 ”, page 255

5 - O-ring

- ❑ Renew after removing

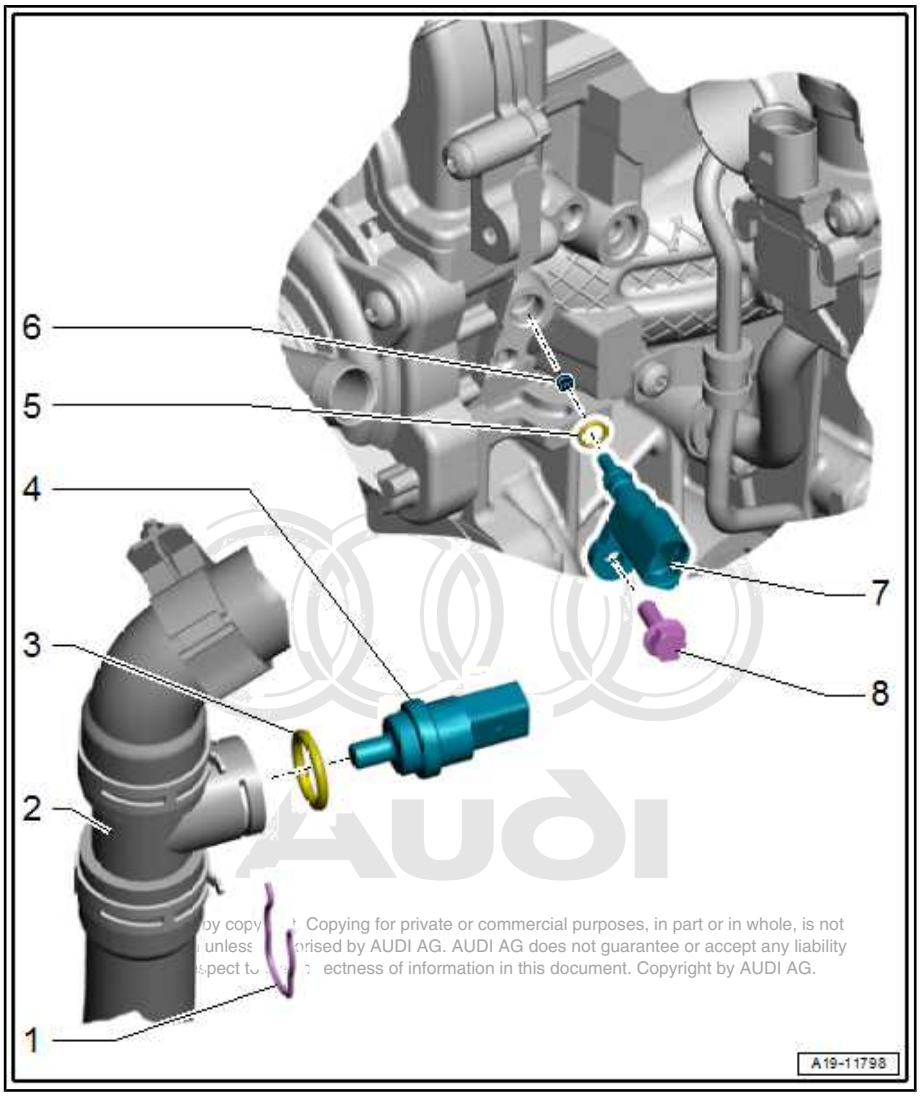
6 - Support ring

7 - Coolant temperature sender - G62-

- ❑ Removing and installing ⇒ “2.8 Removing and installing coolant temperature sender G62 ”, page 254

8 - Bolt

- ❑ 8 Nm

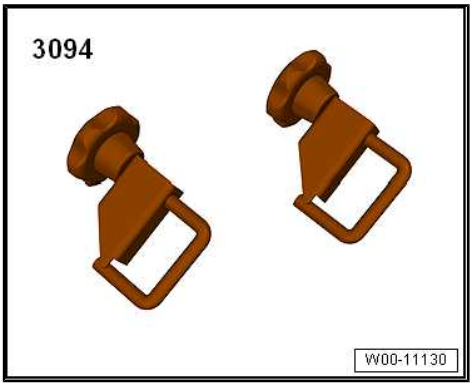


Copying for private or commercial purposes, in part or in whole, is not unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

2.4 Removing and installing electric coolant pump

Special tools and workshop equipment required

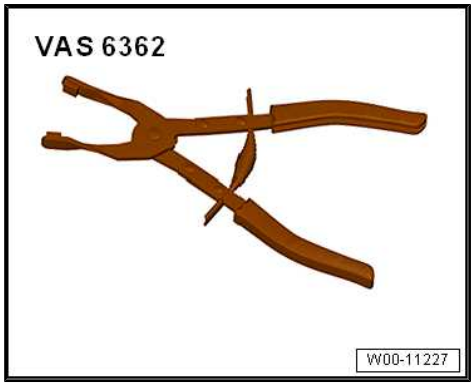
- ♦ Hose clamps, up to 25 mm - 3094-



- Drip tray for workshop hoist - VAS 6208-



- Hose clip pliers - VAS 6362-

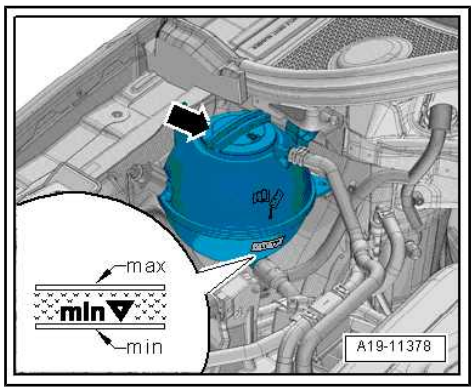


Removing

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.***

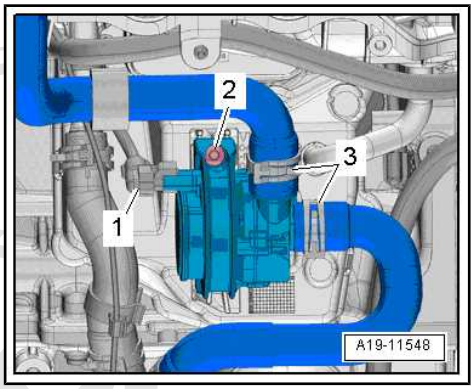


– Open filler cap -arrow- on coolant expansion tank.

– Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

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-.
– Place drip tray for workshop hoist - VAS 6208- underneath.
– Use hose clamps up to 25 mm - V51- to clamp off coolant hoses at continued coolant circulation pump - 3094- .
– Release hose clips -3- and disconnect coolant hoses.
– Remove bolt -2- and detach continued coolant circulation pump - V51- .



Installing

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

Note

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

Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .

– Check coolant level ⇒ page 236 .

Tightening torques

♦ ⇒ “2.2 Exploded view - electric coolant pump”, page 239
♦ ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

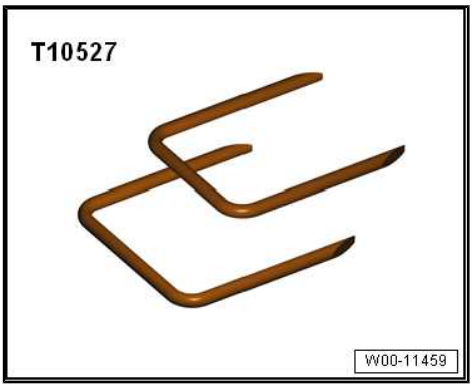
2.5 Removing and installing coolant pump

Special tools and workshop equipment required

♦ Torque wrench -VAS 6583-



♦ Release tool - T10527- and -T10527/1-

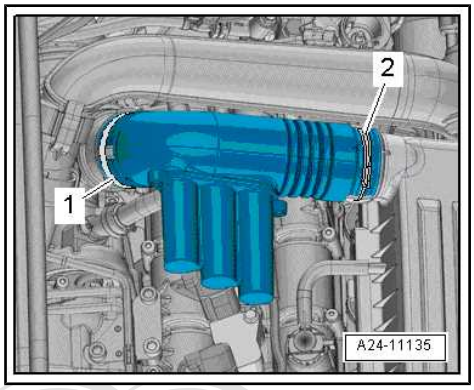


Removing

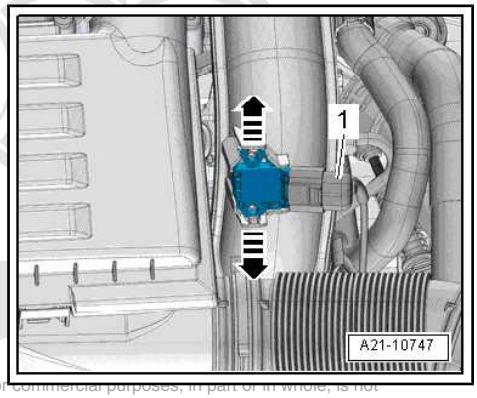
– Remove battery and battery tray ⇒ Electrical system; Rep. gr. 27 ; Battery; Removing and installing battery tray .

– Drain coolant
⇒ “1.3 Draining and filling cooling system”, page 230 .

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



– Unplug electrical connector -1-.



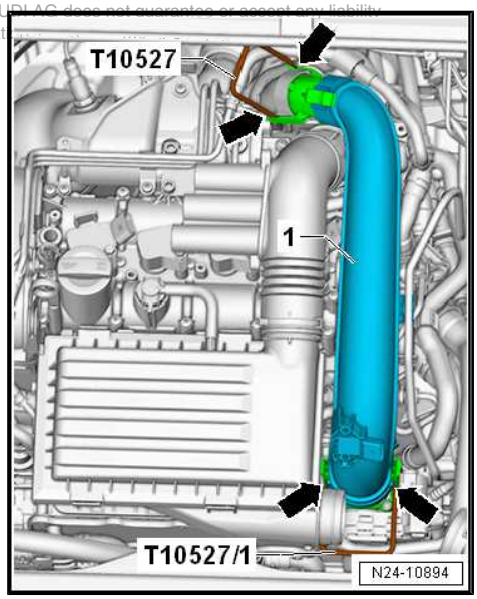
Note

Disregard -arrows-.

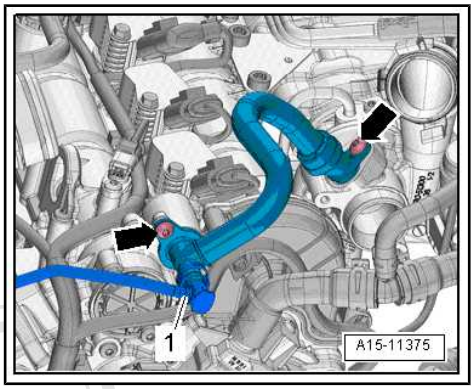
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information.

– Release fasteners -arrows- with release tool - T10527- and - T10527/1- .

– Detach air pipe -1-.

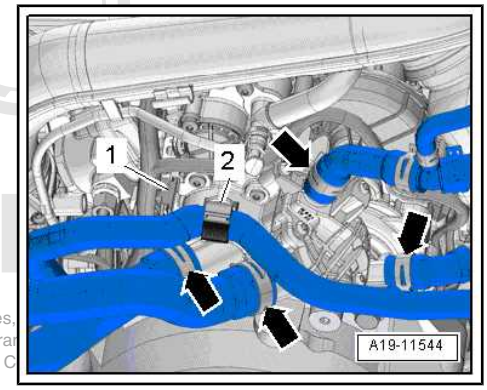


– Press release tabs and disconnect hose -1- for activated charcoal filter.
– Remove bolts -arrows- and detach crankcase breather hose.



Version 1:

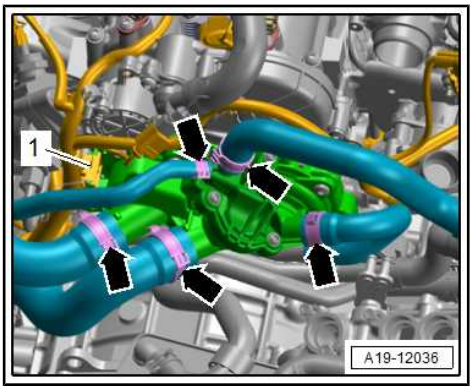
– Move clear electrical wiring harness -1- and coolant hose -2-.
– Release hose clips -arrows- and disconnect coolant hoses.



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

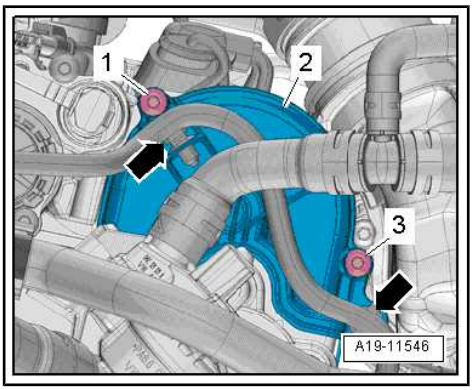
Version 2:

– Move electrical wiring harness -1- clear.
– Release hose clips -arrows- and disconnect coolant hoses.



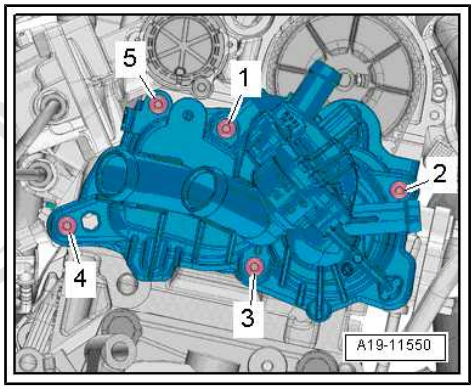
All versions (continued):

– Move electrical wiring harness clear -arrows-.
– Unscrew bolts -1, 3- and remove cover -2- for toothed belt for coolant pump.



– Slacken and remove bolts in the sequence: -5 ... 1-.

– Detach coolant pump with toothed belt.



Installing

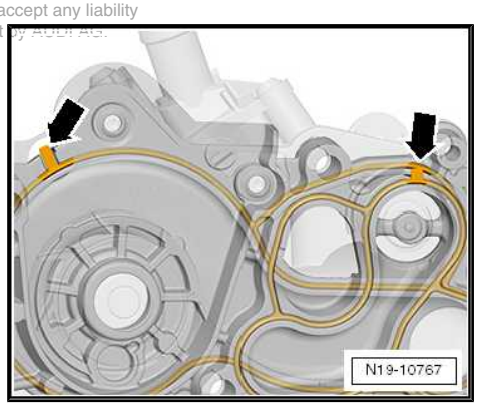
Note

- *Renew gasket.*
- *If coolant pump is being renewed, renew toothed belt as well.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

– Set cylinder 1 to TDC position (for description of procedure refer to ⇒ “1.4 Removing and installing toothed belt”, page 124).

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 that gaskets are correctly seated -arrows-.

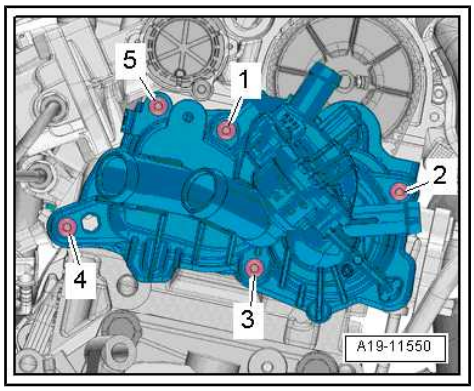


– Lubricate seal for coolant pump lightly with coolant.

– Fit toothed belt so that it is centred and move coolant pump into installation position.

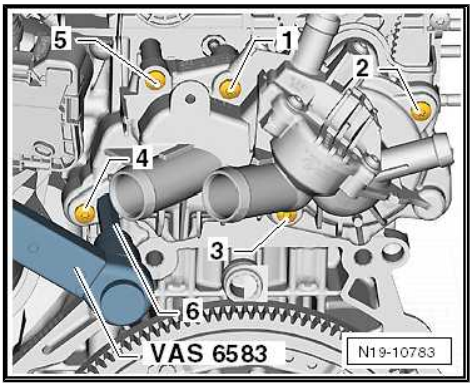
– Tighten bolts to initial torque in the specified sequence:

Stage	Bolts	Tightening torque
1.	-1 … 5-	Screw in by hand until contact is made
2.	-1 … 5-	10 Nm



– Loosen all bolts again by one turn.

– Apply torque wrench -VAS 6583- with hexagon key (10 mm) -item 6- to coolant pump.



Note

For ease of handling, apply torque wrench -VAS 6583- vertically.

– Have a second mechanic apply a torque of 30 Nm to coolant pump.

Note

- *Do not support torque wrench with your other hand.*
- *Do not apply excessive force to torque wrench.*

– While keeping coolant pump under tension, tighten bolts for coolant pump in specified sequence:

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

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

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

Note

Do not reuse coolant.

– Fill up with coolant ⇒ page 232 .

Tightening torques

- Coolant pump ⇒ page 246
- ⇒ “1.1 Exploded view - turbocharger”, page 273
- ⇒ “2.1 Exploded view - charge air system”, page 284
- Install battery tray and battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Exploded view - battery .

2.6 Removing and installing thermostat

⇒ “2.6.1 Removing and installing thermostat for large coolant circuit”, page 247

⇒ “2.6.2 Removing and installing thermostat for small coolant circuit”, page 249

2.6.1 Removing and installing thermostat for large coolant circuit

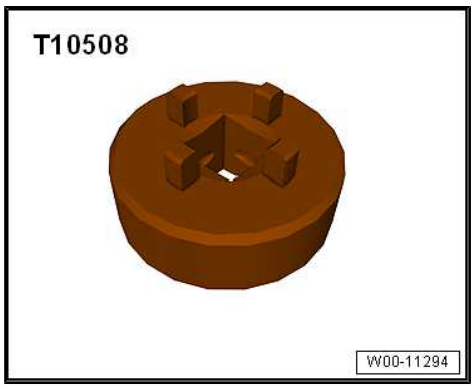
Special tools and workshop equipment required

♦ 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.

♦ Key - T10508-



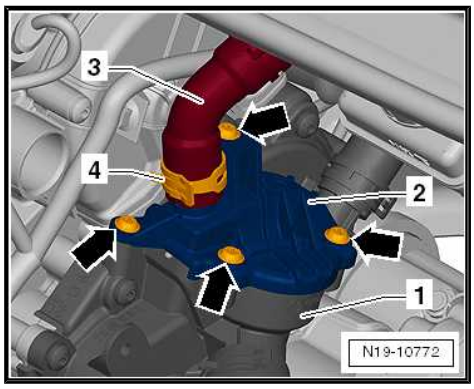
Removing

– Drain coolant
⇒ “1.3 Draining and filling cooling system”, page 230 .

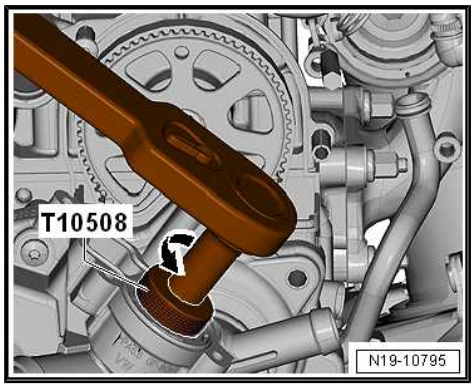
– Release hose clip -4- and detach coolant hose -3-.

– Remove bolts -arrows- and detach cover -2- from thermostat housing.

– If necessary, move hoses clear at thermostat and push to one side.

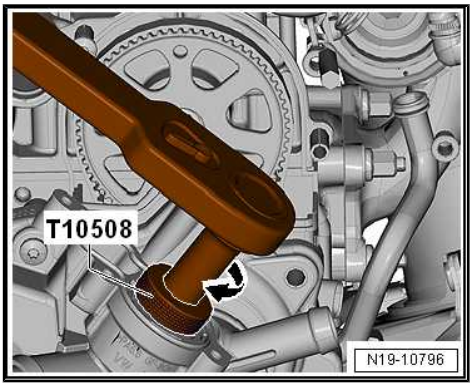


– Turn thermostat anti-clockwise -arrow- using special wrench - T10508- and detach.



Installing

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



Note

Renew gasket.

– Lubricate gasket lightly with coolant.

• Installation position of thermostat
⇒ Fig. ""Installation position of thermostat for large coolant circuit"" , page 239 .

– Bring thermostat into position with special wrench - T10508- , press down slightly and turn clockwise -arrow- as far as stop.

Note

Do not reuse coolant.

– Fill up with coolant ⇒ page 232 .

Tightening torques

◆ ⇒ Fig. ""Cover for thermostat to thermostat housing - tightening torque"" , page 239

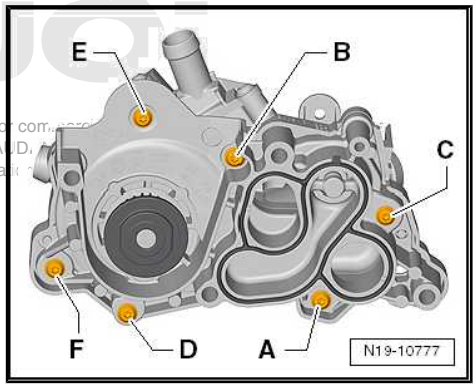
2.6.2 Removing and installing thermostat for small coolant circuit

Removing

– Remove coolant pump
⇒ "2.5 Removing and installing coolant pump", page 243 .

– Remove bolts in the sequence -F … A-.

– Detach coolant pump from thermostat housing.

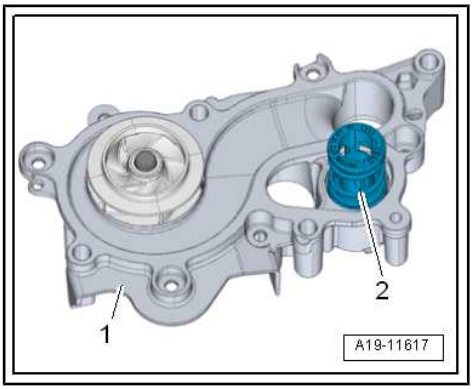


Protected by copyright. Copying for private or com... permitted unless authorised by AUDI AG. AUDI ... with respect to the correctness of informati...

– Detach thermostat -2- from coolant pump -1-.

Installing

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



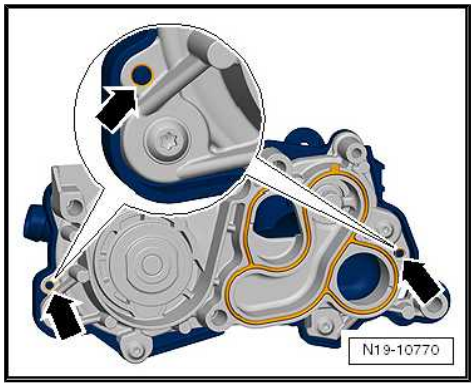
Note

Renew gasket.

– Lubricate gasket lightly with coolant.

– Fit thermostat housing onto coolant pump.

• Centring pins on thermostat must be fitted in guides -arrows- on coolant pump.



– Tighten bolts for thermostat housing
⇒ Fig. ““Thermostat housing to coolant pump - tightening torque and sequence”“ , page 239 .

– Install coolant pump
⇒ “2.5 Removing and installing coolant pump”, page 243 .

Note

Do not reuse coolant.

– Fill up with coolant ⇒ page 232 .

Tightening torques

◆ ⇒ Fig. ““Thermostat housing to coolant pump - tightening torque and sequence”“ , page 239

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.

2.7 Removing and installing toothed belt sprocket for coolant pump

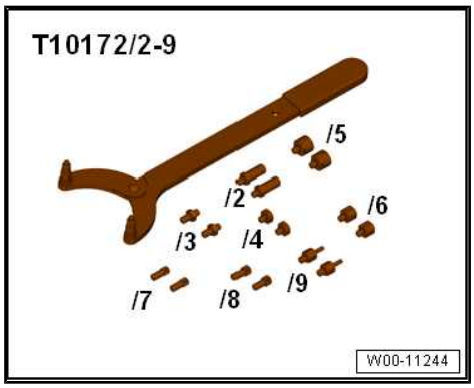
⇒ “2.7.1 Removing and installing toothed belt sprocket for coolant pump - engine codes CHPB, CSSA, CZDA”, page 250

⇒ “2.7.2 Removing and installing toothed belt sprocket for coolant pump - engine code CZEA”, page 251

2.7.1 Removing and installing toothed belt sprocket for coolant pump - engine codes CHPB, CSSA, CZDA

Special tools and workshop equipment required

◆ Counterhold tool - T10172A- with adapters -T10172/2-

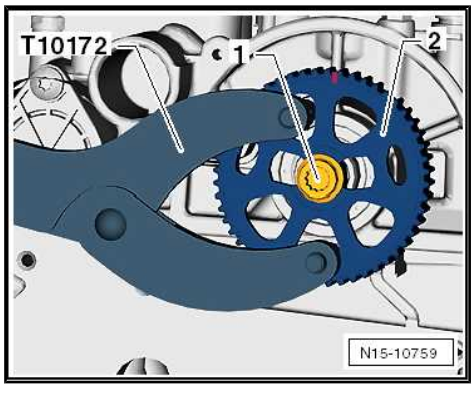


Removing

– Remove coolant pump
⇒ “2.5 Removing and installing coolant pump”, page 243 .

– Loosen bolt -1- using counterhold tool - T10172A- with adapters -T10172/2- .

– Remove bolt and take off toothed belt drive sprocket -2-.



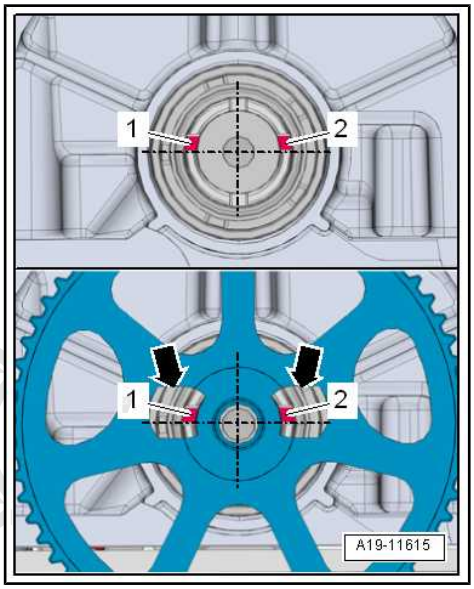
Installing

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

– Fit toothed belt drive sprocket:

- Grooves -1, 2- in camshaft are arranged asymmetrically.
- Openings -arrows- in toothed belt sprocket are also arranged asymmetrically.

– Fit toothed belt sprocket onto camshaft so that asymmetrical grooves are positioned exactly in centre of openings.



Tightening torques

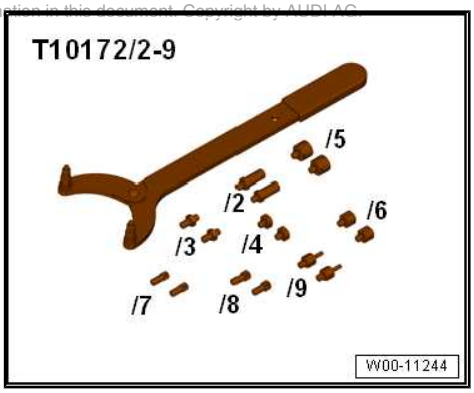
♦ ⇒ “2.1 Exploded view - coolant pump/thermostat”, page 237

2.7.2 Removing and installing toothed belt sprocket for coolant pump - engine code CZEA

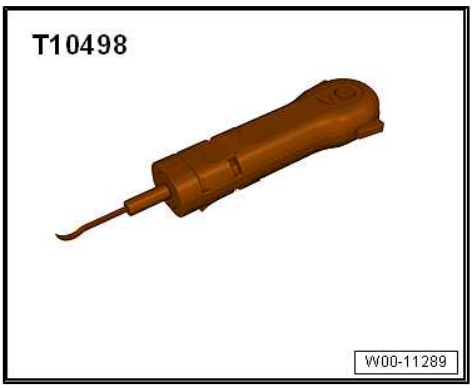
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Special tools and workshop equipment required

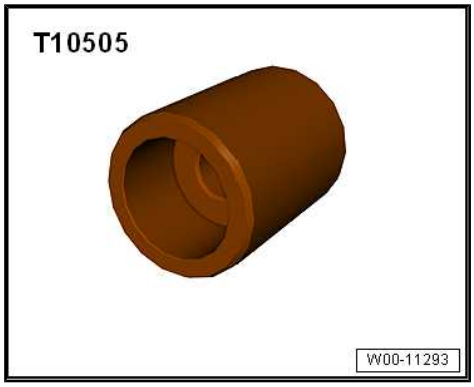
♦ Counterhold tool - T10172A- with adapters -T10172/2-



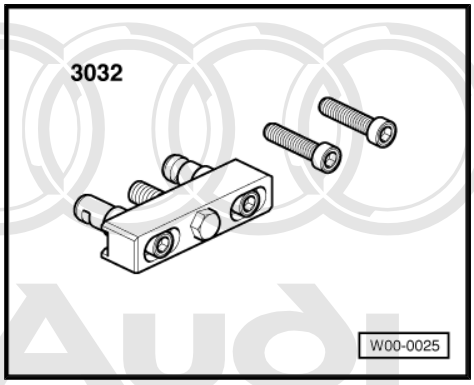
♦ Release tool - T10498-



♦ Assembly sleeve - T10505-



♦ Puller - 3032- with adapter - 3032/1+/2-



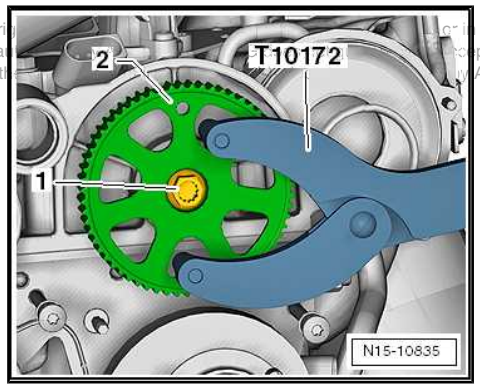
Protected by copyri... whole, is not permitted unless a... with respect to t... pt any liability ...AUDI AG.

Removing

– Remove coolant pump ⇒ “2.5 Removing and installing coolant pump”, page 243 .

– Loosen bolt -1- using counterhold tool - T10172A- .

– Remove bolt and take off toothed belt drive sprocket -2-.

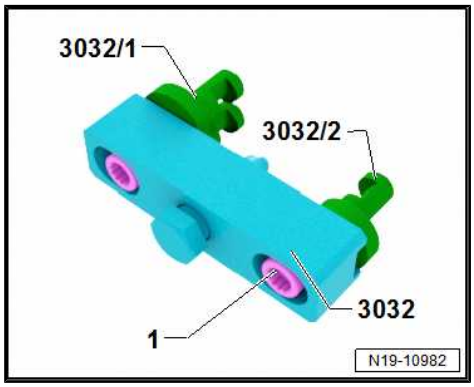


– If it is not possible to detach toothed belt drive sprocket, tighten bolt -1- for adapter -3032/2- in centre of elongated hole.

– Apply puller - 3032- to toothed belt drive sprocket.

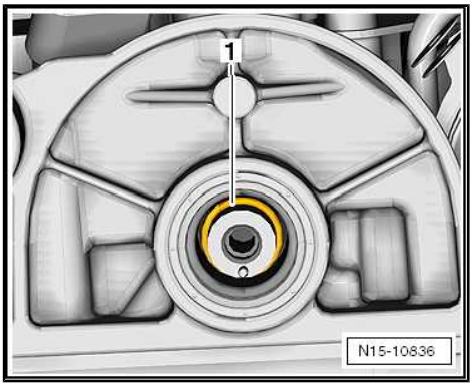
– Slide adapter - 3032/1- to right as far as stop and tighten bolt hand-tight.

– Detach toothed belt drive sprocket by turning centre bolt.

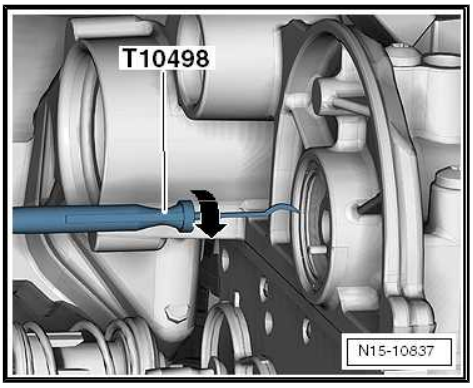


Note

- *The O-ring -1- in the camshaft must be renewed every time the toothed belt drive sprocket is removed.*
- *The O-ring is positioned approx. 15 mm behind stub of camshaft.*



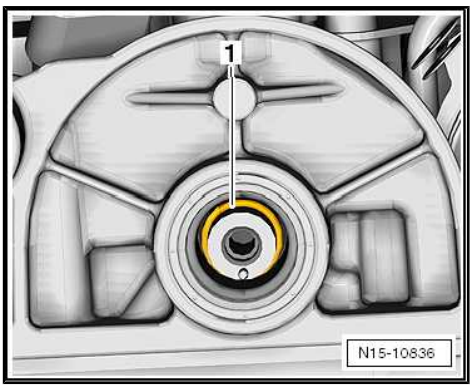
– Guide release tool - T10498- above camshaft as far as O-ring.
– Turn release tool -T10498- -arrow- to bring point of tool under O-ring.
– Pull O-ring off camshaft.



Installing

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

– Fit new O-ring -1- onto stub of camshaft.

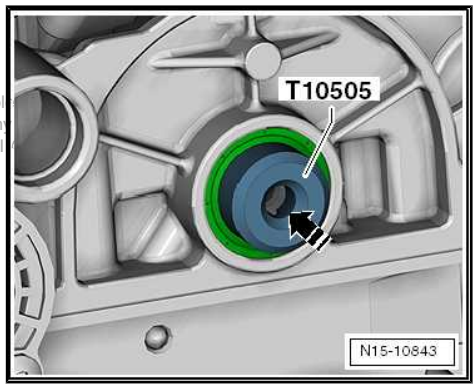


Note

Pin on camshaft must engage in recess on assembly tool -T10505- .

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 tool - T10505- onto camshaft and press onto stop by hand -arrow-.
– Remove assembly tool.
• O-ring must be positioned in groove on camshaft.



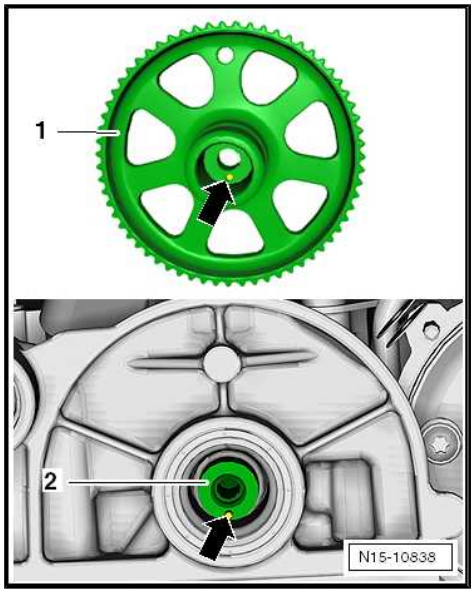
– Fit toothed belt drive sprocket -1- onto camshaft -2-:

• Pin on camshaft must engage in hole on toothed belt drive sprocket -arrows-.

– Install coolant pump
⇒ “2.5 Removing and installing coolant pump”, page 243 .

Tightening torques

◆ ⇒ “2.1 Exploded view - coolant pump/thermostat”, page 237



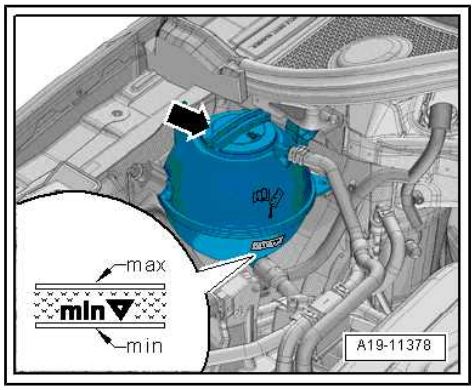
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

2.8 Removing and installing coolant temperature sender - G62-

Removing

• Engine cold.

– To relieve residual pressure in cooling system, open filler cap -arrow- on coolant expansion tank briefly and then close cap again (it should click into place).

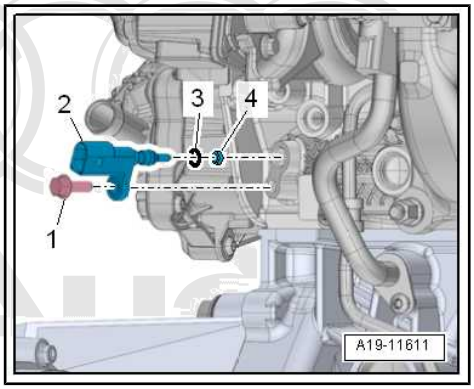


– Unplug electrical connector.

Note

Place a cloth underneath to catch escaping coolant.

– Unscrew bolt -1- and pull off coolant temperature sender - G62- -item 2-.



Note

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

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

Installing

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

Note

Renew O-ring.

– Check coolant level ⇒ page 236 .

Tightening torques

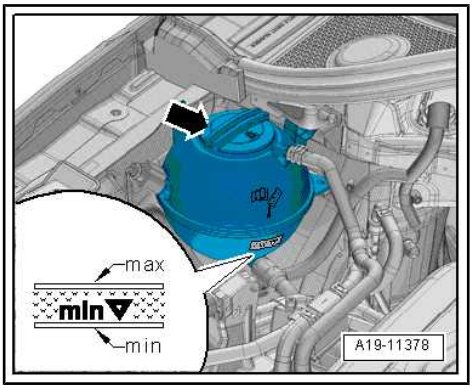
- ⇒ “2.3 Exploded view - coolant temperature senders”, page 241

2.9 Removing and installing radiator outlet coolant temperature sender - G83-

Removing

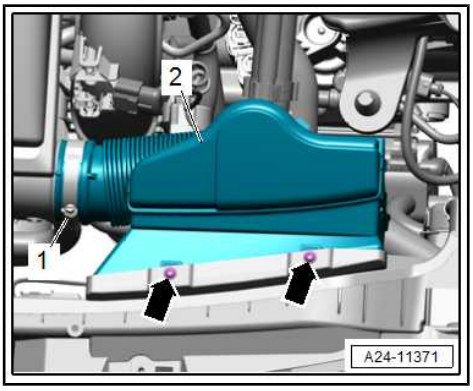
- Engine cold.

– To relieve residual pressure in cooling system, open filler cap -arrow- on coolant expansion tank briefly and then close cap again (it should click into place).



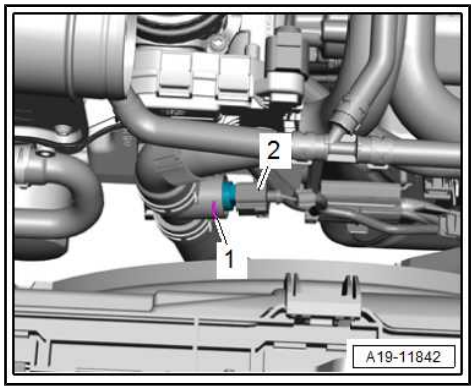
– Remove bolts -arrows-.

– Release hose clip -1- and detach air duct.



– Unplug electrical connector -2-.

– Pull off retaining clip -1- and detach radiator outlet coolant temperature sender - G83- .



Installing

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

Note

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

– Check coolant level ⇒ page 236 .

Tightening torques

- ⇒ “2.1 Exploded view - air cleaner housing”, page 297

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 Coolant pipes

⇒ “3.1 Exploded view - coolant pipes”, page 257

⇒ “3.2 Removing and installing coolant pipes”, page 258

3.1 Exploded view - coolant pipes

Note

The arrow markings on coolant pipes and on ends of hoses must align.

1 - Coolant hose

2 - Bolt

- ❑ 8 Nm

3 - Coolant pipe

- ❑ Different versions available; for allocation refer to ⇒ Electronic parts catalogue
- ❑ Removing and installing:

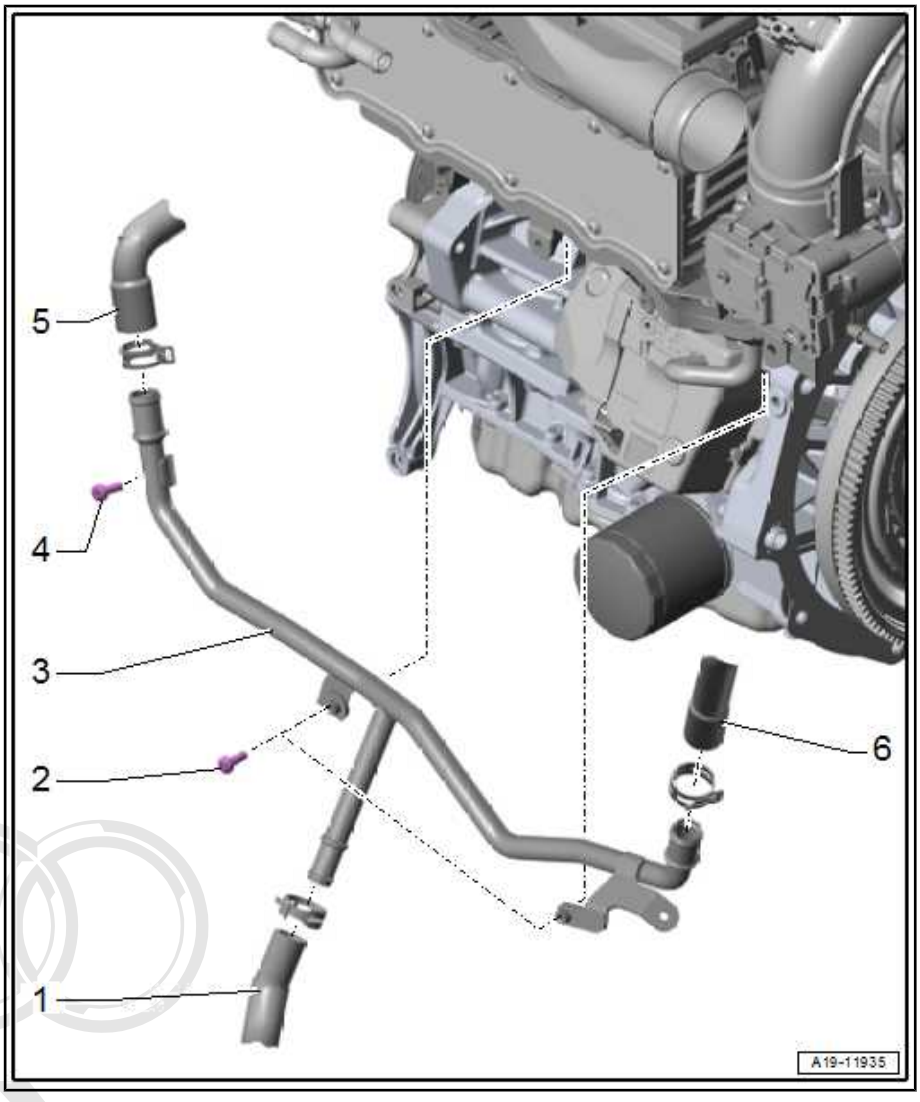
- ◆ Clipped version ⇒ “3.2.1 Removing and installing coolant pipe (clipped version)”, page 258
- ◆ Bolted version ⇒ “3.2.2 Removing and installing coolant pipe (bolted version)”, page 259

4 - Bolt

- ❑ 8 Nm

5 - Coolant hose

6 - Coolant hose



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

3.2 Removing and installing coolant pipes

⇒ “3.2.1 Removing and installing coolant pipe (clipped version)”, page 258

⇒ “3.2.2 Removing and installing coolant pipe (bolted version)”, page 259

3.2.1 Removing and installing coolant pipe (clipped version)

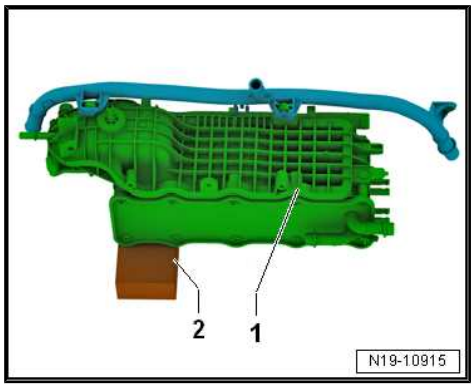
Removing

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 intake manifold ⇒ “3.2 Removing and installing intake manifold”, page 300 .

– Place intake manifold -1- on workbench (as shown in illustration).

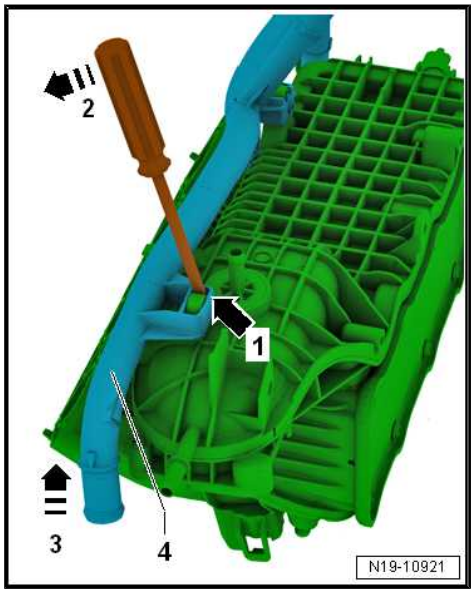
– Place a piece of wood -2- (or similar) under intake manifold to support it.



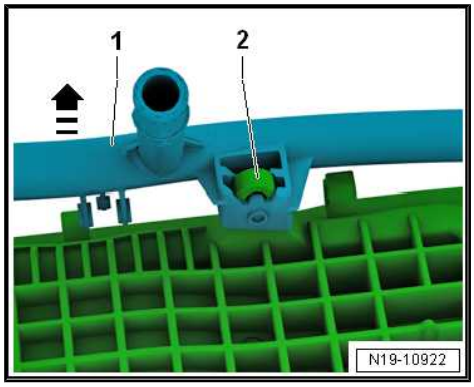
> **Caution**
>
> *Danger of damage to intake manifold and coolant pipe.*
>
> ♦ *Proceed very carefully when performing this work.*

– Insert a flat-bladed screwdriver into opening -arrow 1-.

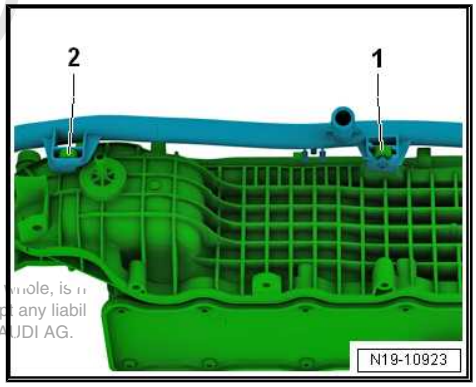
– Press screwdriver carefully in direction of -arrow 2- and at the same time lift coolant pipe -4- in direction of -arrow 3- until it is released from mounting.



– Keep lifting coolant pipe -1- in direction of -arrow- until it is released from mounting -2-.



Installing



– Start by pressing coolant pipe onto mounting -1- until it engages.
– Then press coolant pipe onto mounting -2- until it engages.
– Check that coolant pipe is properly engaged in both mountings by pulling it.

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

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

Note

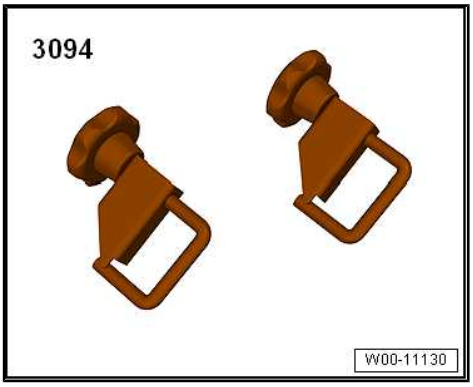
- *Renew seals and O-rings.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

– Install intake manifold
⇒ “3.2 Removing and installing intake manifold”, page 300 .
– Check coolant level ⇒ page 236 .

3.2.2 Removing and installing coolant pipe (bolted version)

Special tools and workshop equipment required

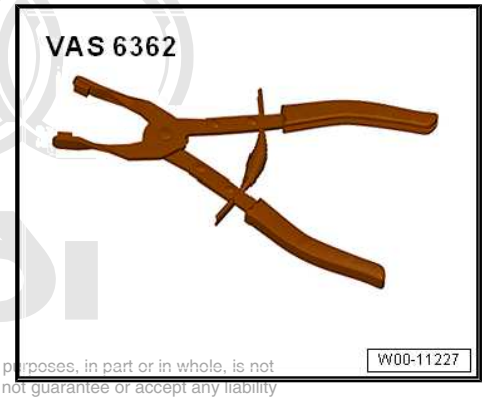
- Hose clamps, up to 25 mm - 3094-



- Drip tray for workshop hoist - VAS 6208-



♦ Hose clip pliers - VAS 6362-



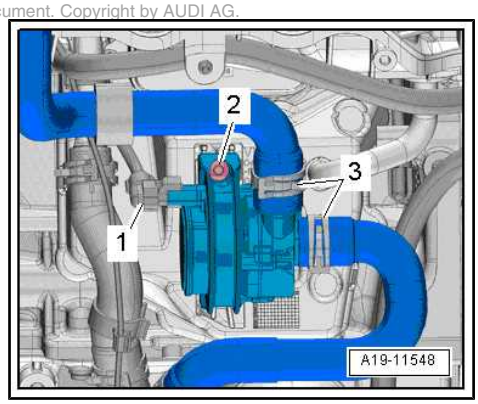
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Removing

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

– Unplug electrical connector -1-.

– Remove bolt -2- and press continued coolant circulation pump - V51- to side.

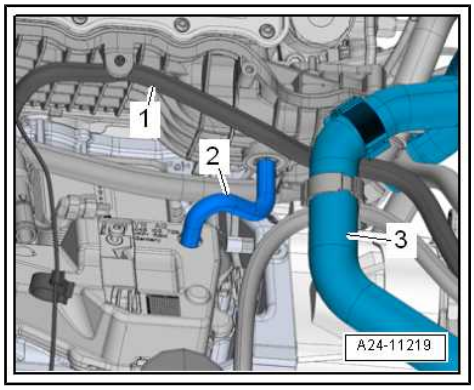


Note

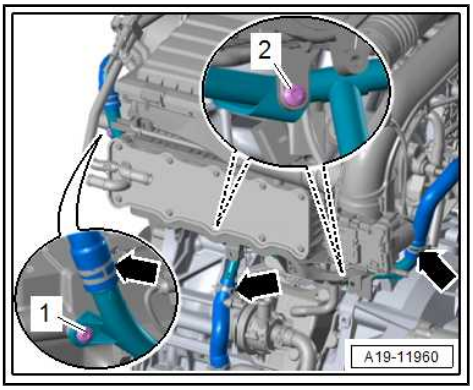
Disregard -item 3-.

– Move electrical wiring harness -1- and coolant hose -3- clear at intake manifold.

– Disconnect crankcase breather hose -2-.



– Clamp off coolant hoses at coolant pipe with hose clamps up to 25 mm - 3094- .
– Release hose clips -arrows- and disconnect coolant hoses.
– Unscrew bolts -1, 2- and detach coolant pipe.



Installing

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

Note

- *Renew seals and O-rings.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

Reproduction of this publication or its parts 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 continued coolant circulation pump - V51- ⇒ “2.4 Removing and installing electric coolant pump”, page 241 .

Tightening torques

- ⇒ “3.1 Exploded view - coolant pipes”, page 257
- ⇒ Electrical system; Rep. gr. 27 ; Alternator; Exploded view - alternator

4 Radiator/radiator fans

⇒ “4.1 Exploded view - radiator/radiator fans”, page 262

⇒ “4.2 Removing and installing radiator”, page 264

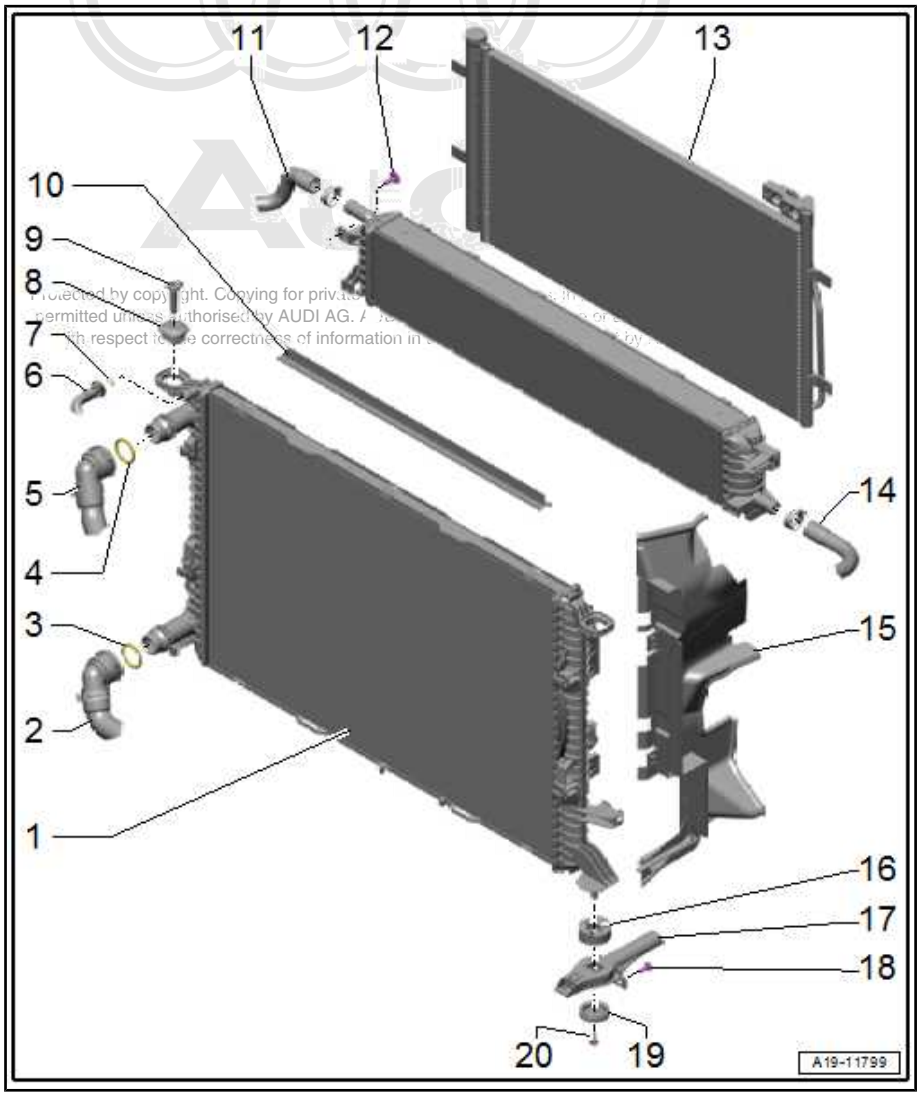
⇒ “4.3 Removing and installing water radiator for charge air cooling circuit”, page 267

⇒ “4.4 Removing and installing radiator cowl”, page 269

⇒ “4.5 Removing and installing radiator fans”, page 271

4.1 Exploded view - radiator/radiator fans

Radiator, water radiator for charge air cooling circuit, condenser



1 - Radiator

- ❑ Removing and installing ⇒ “4.2 Removing and installing radiator”, page 264
- ❑ If renewed, refill system with fresh coolant

2 - Coolant hose

- ❑ Lift retaining clip to detach
- ❑ Connecting ⇒ Fig. ““Connecting coolant hose with plug-in connector”“ , page 263

3 - O-ring

- ❑ Renew after removing
- ❑ Lubricate with coolant

4 - O-ring

- ❑ Renew after removing
- ❑ Lubricate with coolant

5 - Coolant hose

- ❑ Lift retaining clip to detach
- ❑ Connecting ⇒ Fig. ““Connecting coolant hose with plug-in connector”“ , page 263

6 - Coolant hose

- ❑ Lift retaining clip to detach
- ❑ Connecting ⇒ Fig. ““Connecting coolant hose with plug-in connector”“ , page 263

7 - O-ring

- ❑ Renew after removing
- ❑ Lubricate with coolant

8 - Rubber bush

- ❑ For radiator

9 - Retaining pin

- ❑ Use screwdriver to release and pull off

10 - Sealing panel

11 - Coolant hose

- ❑ For water radiator for charge air cooling circuit ⇒ “4.2 Removing and installing radiator”, page 264
- ❑ Lift hose clip to detach

12 - Bolt

- ❑ 5 Nm

13 - Condenser

- ❑ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87 ; Refrigerant circuit; Removing and installing condenser

14 - Coolant hose

- ❑ For water radiator for charge air cooling circuit ⇒ “4.2 Removing and installing radiator”, page 264
- ❑ Lift hose clip to detach

15 - Air duct

16 - Rubber mounting

- ❑ For radiator

17 - Radiator bracket

18 - Bolt

- ❑ 5 Nm

19 - Washer

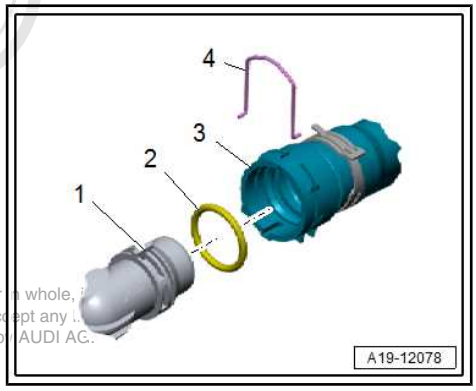
20 - Bolt

- ❑ 8 Nm

Connecting coolant hose with plug-in connector

Note

If damaged, renew retaining clip -4-.



– 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.

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.

Radiator cowl and radiator fans

1 - Radiator fan control unit

- ❑ Radiator fan control unit - J293- with radiator fan control unit 2 - J671-
- ❑ Removing and installing ⇒ “4.5.2 Removing and installing radiator fan control unit”, page 272

2 - Bolt

- ❑ 3.5 Nm

3 - Bolt

- ❑ 5 Nm

4 - Radiator cowl

- ❑ Removing and installing ⇒ “4.4 Removing and installing radiator cowl”, page 269

5 - Radiator fan - V7-

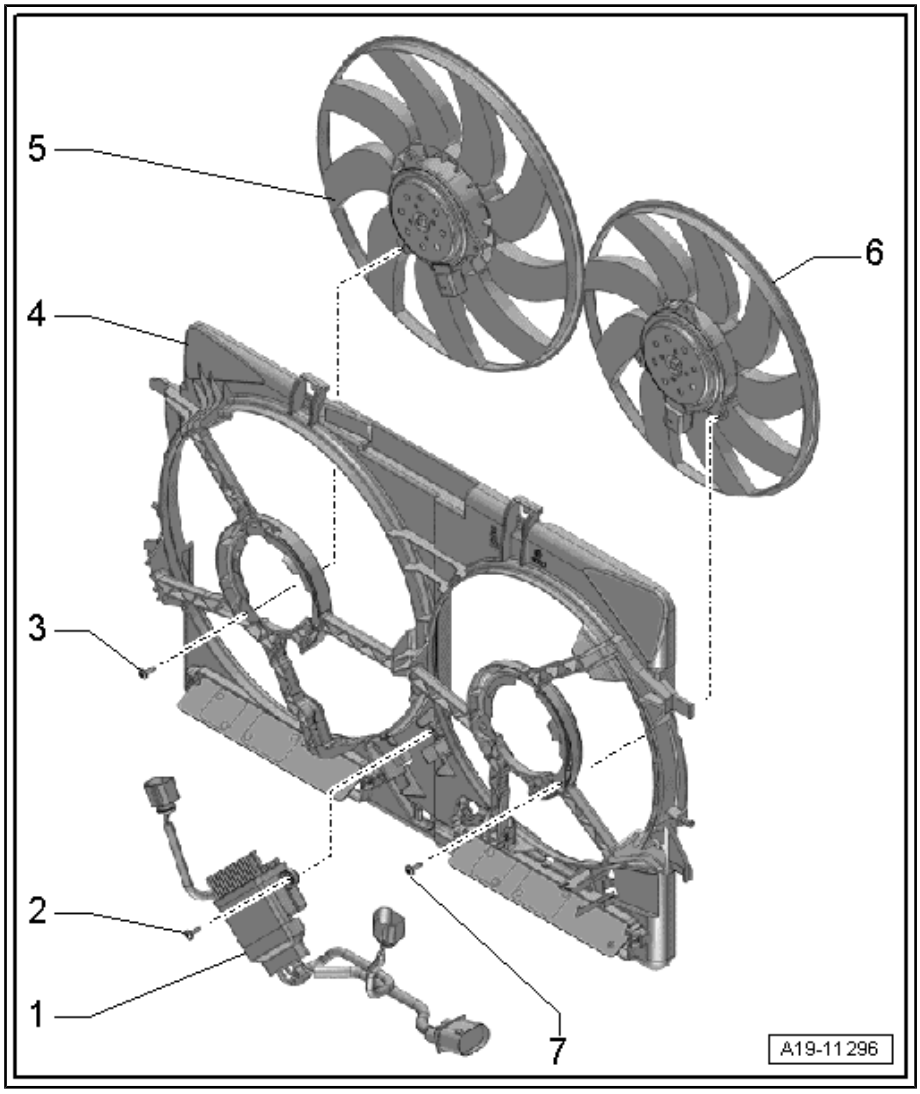
- ❑ Removing and installing ⇒ “4.5.1 Removing and installing radiator fan”, page 271

6 - Radiator fan 2 - V177-

- ❑ Removing and installing ⇒ “4.5.1 Removing and installing radiator fan”, page 271

7 - Bolt

- ❑ 5 Nm



4.2 Removing and installing radiator

Note

Radiator and radiator cowl are removed together.

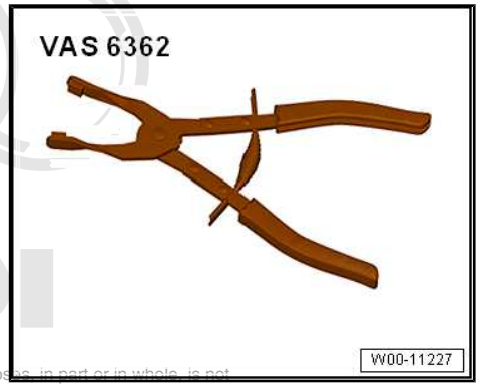
Special tools and workshop equipment required

- ♦ 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-



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

Removing

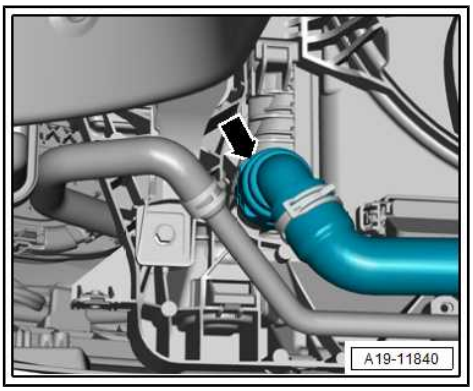
– Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

– Remove bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing bumper cover .

– Remove water radiator for charge air cooling circuit ⇒ “4.3 Removing and installing water radiator for charge air cooling circuit”, page 267 .

– Place drip tray for workshop hoist - VAS 6208- underneath.

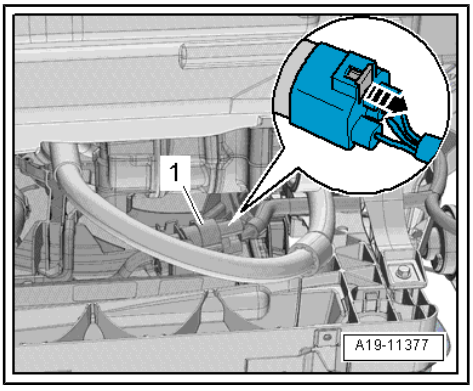
– Lift retaining clip -arrow-, disconnect coolant hose from radiator (bottom left) and drain off coolant.



WARNING

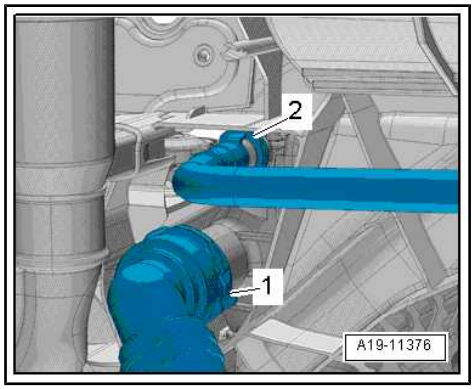
Risk of injury as the radiator fan(s) may start up automatically.

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

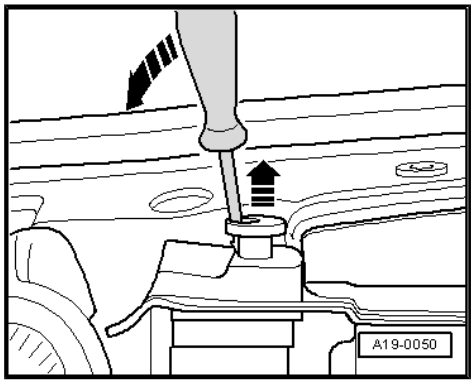


– Unplug electrical connector -1- for radiator fan (push retainer to the rear -arrow- and press down release catch).

– Lift retaining clips -1, 2- and detach connection from radiator.



– Release retaining pins for radiator on both sides and pull out upwards -arrows-.



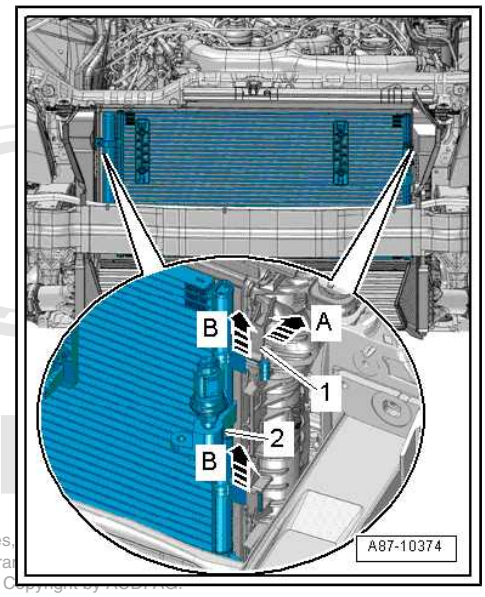
– Have a second mechanic release retaining clips -1- in direction of -arrow A- and lift condenser -2- out of mountings on radiator -arrows B-.

Caution

Risk of damage to condenser, refrigerant lines and refrigerant hoses.

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

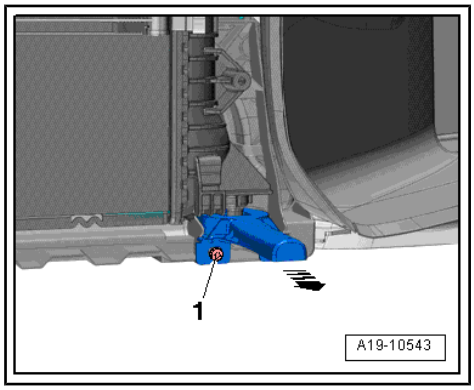
– Pivot condenser forwards with pipes/hoses attached.



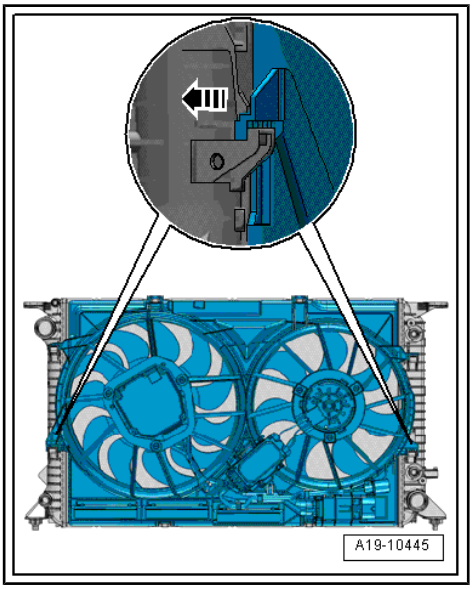
Protected by copyright. Copying for private or commercial purposes, permitted unless authorised by AUDI AG. AUDI AG does not guara with respect to the correctness of information in this document.

– Remove bolts -1- on both sides and detach radiator bracket with radiator from lock carrier -arrow-.

– Detach radiator downwards.



– Press locking tabs on left and right sides of radiator cowl -arrow- and at the same time lift radiator cowl off radiator.



Installing

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

Note

- *If there are slight impressions on the fins, refer to ⇒ "3.5 Installing radiators and condensers", page 6 .*
- *Renew O-rings.*

– Install bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Exploded view - bumper cover .

– Install water radiator for charge air cooling circuit ⇒ "4.3 Removing and installing water radiator for charge air cooling circuit", page 267 .

– Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

– Connect coolant hose with plug-in connector ⇒ Fig. ""Connecting coolant hose with plug-in connector"" , page 263 .

Note

Do not reuse coolant.

– Fill up with coolant ⇒ page 236 .

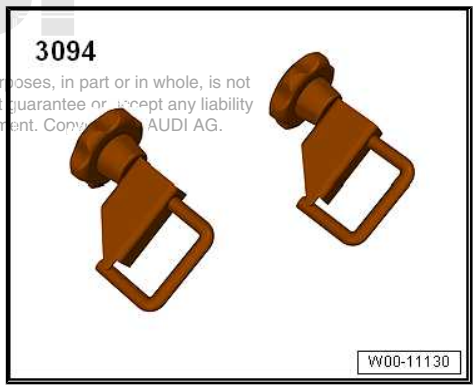
Tightening torques

- ⇒ "4.1 Exploded view - radiator/radiator fans", page 262
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

4.3 Removing and installing water radiator for charge air cooling circuit

Special tools and workshop equipment required

- Hose clamps, up to 25 mm - 3094-

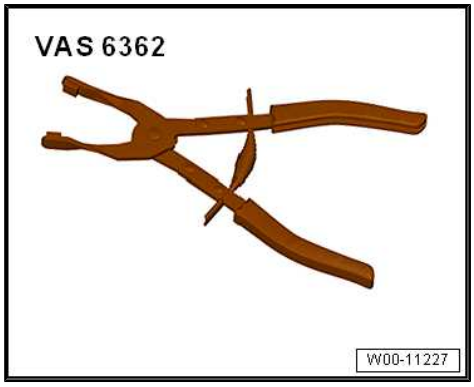


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

♦ Drip tray for workshop hoist - VAS 6208-



♦ Hose clip pliers - VAS 6362-



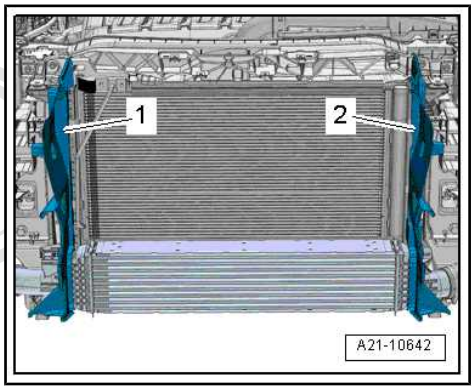
Removing

– Remove lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Exploded view - bumper cover .

– Remove air intake grille on both sides ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Exploded view - bumper cover .

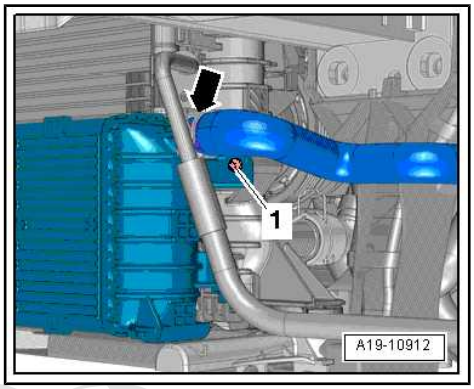
– Remove closure plate at bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Exploded view - bumper cover

– Unclip air ducts -1 and 2-.

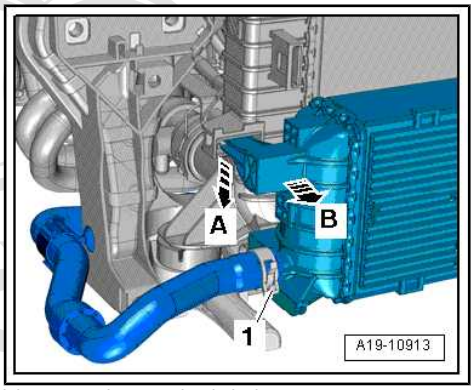


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Place drip tray for workshop hoist - VAS 6208- underneath.
– Clamp off coolant hoses (left and right) on water radiator for charge air cooling circuit using hose clamps up to 25 mm - 3094- .
– Release hose clip (left-side) -arrow- and detach coolant hose.
– Unscrew bolt -1-.



– Release hose clip -1- and disconnect coolant hose.
– Push catch down -arrow A- and move water radiator for charge air cooling circuit slightly in direction of -arrow B-.
– Detach water radiator for charge air cooling circuit.



Installing

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

Note

- *If there are slight impressions on the fins, refer to ⇒ "3.5 Installing radiators and condensers", page 6 .*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

– Install closure plate for bumper cover, air intake grille and lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Exploded view - bumper cover .

Note

Do not reuse coolant.

– Fill up with coolant ⇒ page 236 .

Tightening torques

- ⇒ "4.1 Exploded view - radiator/radiator fans", page 262

4.4 Removing and installing radiator cowl

Removing

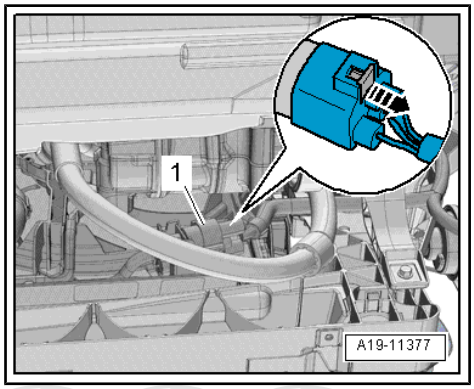
– Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
– Remove water radiator for charge air cooling circuit ⇒ "4.3 Removing and installing water radiator for charge air cooling circuit", page 267 .

The reproduction, distribution and utilization of this document 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 injury as the radiator fan(s) may start up automatically.

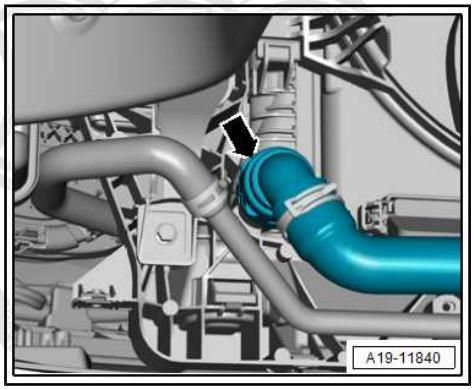
- *Unplug electrical connectors before starting to work in the area of radiator cowl.*



– Unplug electrical connector -1- for radiator fan (push retainer to the rear -arrow- and press down release catch).

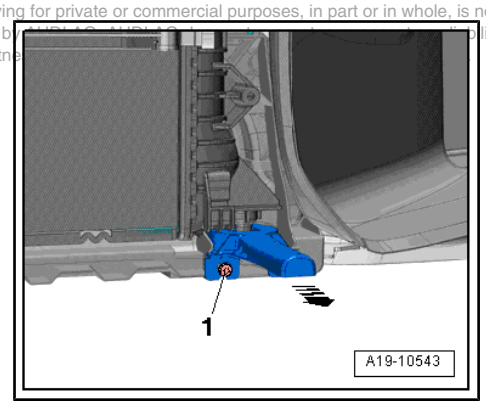
– Place drip tray for workshop hoist - VAS 6208- beneath engine.

– Lift retaining clip -arrow-, disconnect coolant hose from radiator (bottom left) and drain off coolant.

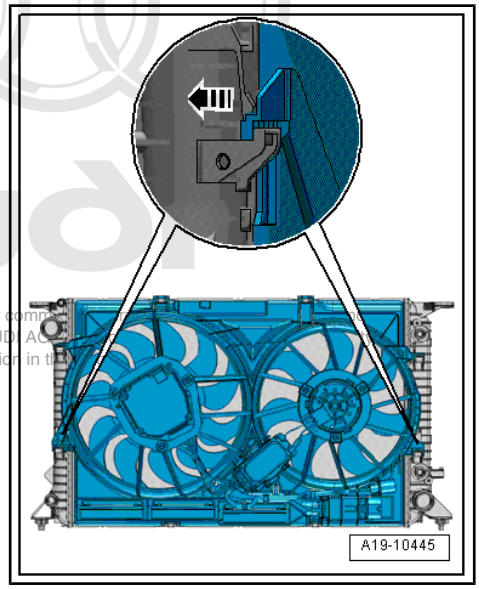


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not
with respect to the correctn

– Remove bolts -1- on both sides and detach radiator bracket with radiator from lock carrier -arrow-.



– Press locking tabs on left and right sides of radiator cowl simultaneously -arrow- and detach radiator cowl downwards from radiator.



Installing

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

– Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

– Connect coolant hose with plug-in connector ⇒ Fig. ""Connecting coolant hose with plug-in connector"" page 263 .

– Install water radiator for charge air cooling circuit ⇒ "4.3 Removing and installing water radiator for charge air cooling circuit", page 267 .

– Connect coolant hose with plug-in connector ⇒ Fig. ""Connecting coolant hose with plug-in connector"" , page 263 .

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

Note

Do not reuse coolant.

– Fill up with coolant ⇒ page 236 .

Tightening torques

- ⇒ "4.1 Exploded view - radiator/radiator fans", page 262
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

4.5 Removing and installing radiator fans

⇒ **"4.5.1 Removing and installing radiator fan", page 271**

⇒ **"4.5.2 Removing and installing radiator fan control unit", page 272**

4.5.1 Removing and installing radiator fan

Removing

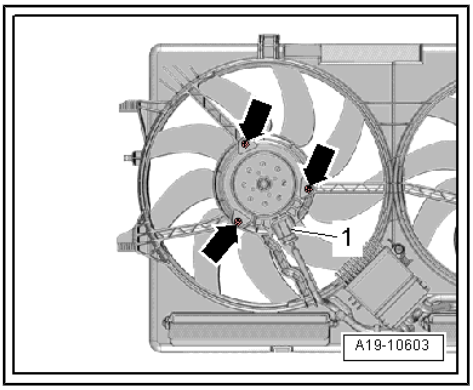
Note

Fit all cable ties in the original positions when installing.

– Remove radiator cowl ⇒ "4.4 Removing and installing radiator cowl", page 269 .

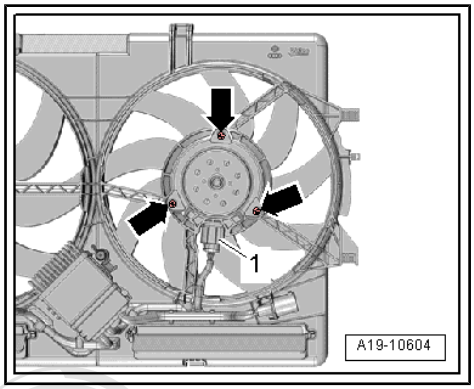
– Unplug electrical connector -1-.

– Unscrew bolts -arrows- and remove radiator fan - V7- .



– Unplug electrical connector -1-.

– Unscrew bolts -arrows- and remove radiator fan 2 - V177- .



Installing

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

– Install radiator cowl
⇒ “4.4 Removing and installing radiator cowl”, page 269 .

Tightening torques

♦ ⇒ “4.1 Exploded view - radiator/radiator fans”, page 262

4.5.2 Removing and installing radiator fan control unit

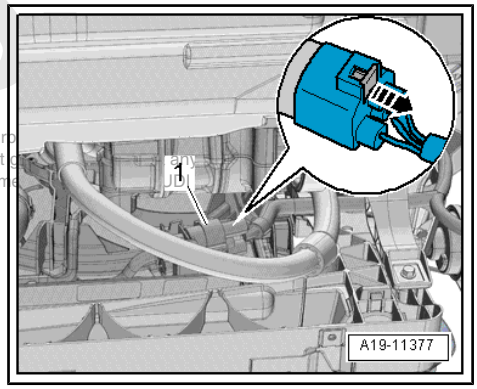
Removing

– Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

– Take electrical connector -1- for radiator fan out of bracket and unplug connector (push retainer to the rear -arrow- and press down release catch).

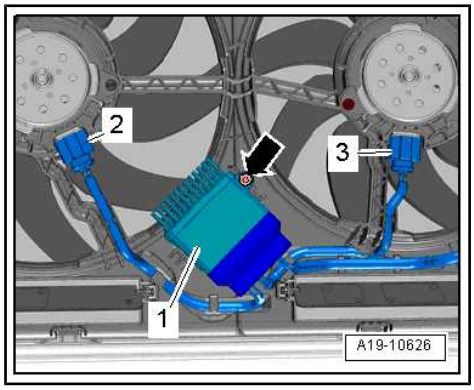
– Move electrical wiring harness going to radiator fan control unit clear.

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



– Unplug electrical connector -2-.

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



Note

Disregard -item 3-.

Installing

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

– Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

Tightening torques

♦ ⇒ “4.1 Exploded view - radiator/radiator fans”, page 262

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

21 – Turbocharging/supercharging

1 Turbocharger

⇒ “1.1 Exploded view - turbocharger”, page 273

⇒ “1.2 Removing and installing turbocharger”, page 276

⇒ “1.3 Renewing vacuum unit for turbocharger”, page 282

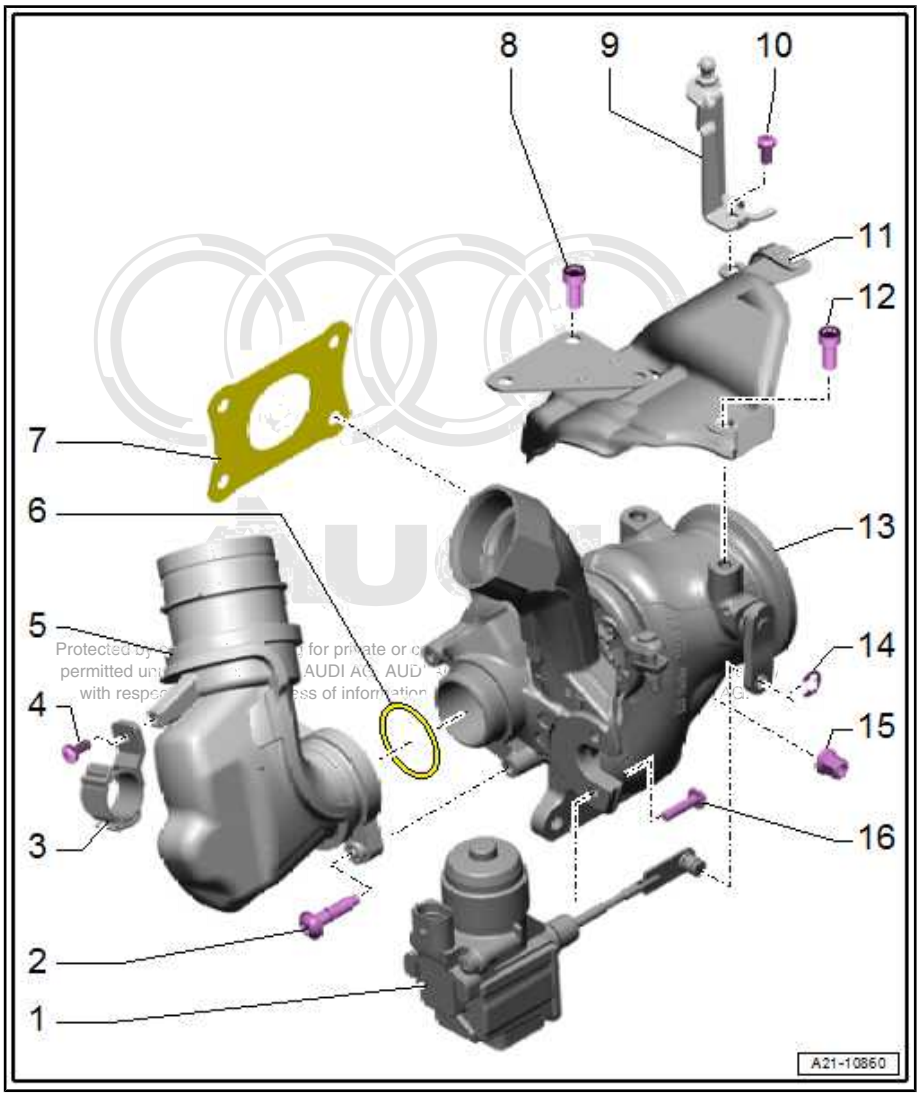
⇒ “1.4 Removing and installing charge pressure positioner V465 ”, page 283

1.1 Exploded view - turbocharger

⇒ “1.1.1 Exploded view - turbocharger, engine codes CHPB, CZDA, CZEA”, page 273

⇒ “1.1.2 Exploded view - turbocharger, engine code CSSA”, page 274

1.1.1 Exploded view - turbocharger, engine codes CHPB, CZDA, CZEA



1 - Charge pressure positioner - V465-

- ❑ Removing and installing ⇒ “1.4 Removing and installing charge pressure positioner V465 ”, page 283

2 - Bolt

- ❑ 8 Nm

3 - Bracket

- ❑ For coolant hose

4 - Bolt

- ❑ 4.5 Nm

5 - Connection

6 - O-ring

- ❑ Renew after removing

7 - Gasket

- ❑ Renew after removing

8 - Bolt

- ❑ 20 Nm

9 - Bracket

- ❑ With ball stud for engine cover panel

10 - Bolt

- ❑ 8 Nm

11 - Heat shield

12 - Bolt

- ❑ 20 Nm

13 - Turbocharger

- ❑ Can only be renewed together with exhaust manifold

- ❑ Removing and installing ⇒ “1.2 Removing and installing turbocharger”, page 276

14 - Securing clip

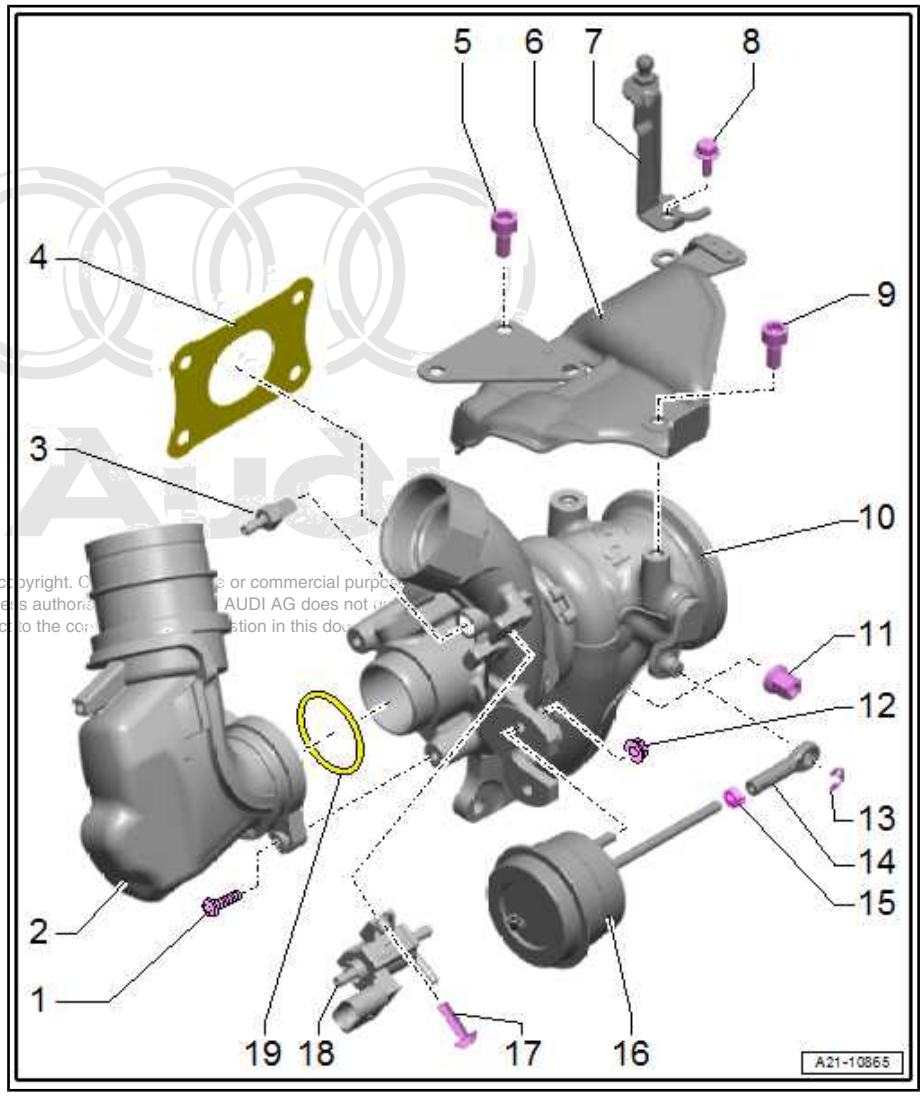
15 - Nut

- ❑ 25 Nm

16 - Bolt

- ❑ 9 Nm

1.1.2 Exploded view - turbocharger, engine code CSSA



1 - Bolt

- ❑ 8 Nm

2 - Connection

3 - Stud

4 - Gasket

- ❑ Renew after removing

5 - Bolt

- ❑ 20 Nm

6 - Heat shield

7 - Bracket

- ❑ With ball stud for engine cover panel

8 - Bolt

- ❑ 8 Nm

9 - Bolt

- ❑ 20 Nm

10 - Turbocharger

- ❑ Can only be renewed together with exhaust manifold
- ❑ Removing and installing ⇒ “1.2 Removing and installing turbocharger”, page 276

11 - Nut

- ❑ 25 Nm

12 - Nut

- ❑ 9 Nm

13 - Securing clip

14 - Operating lever

- ❑ For vacuum unit

15 - Lock nut

- ❑ 10 Nm

16 - Vacuum unit

- ❑ For turbocharger
- ❑ Removing and installing ⇒ “1.3 Renewing vacuum unit for turbocharger”, page 282

17 - Bolt

- ❑ 8 Nm

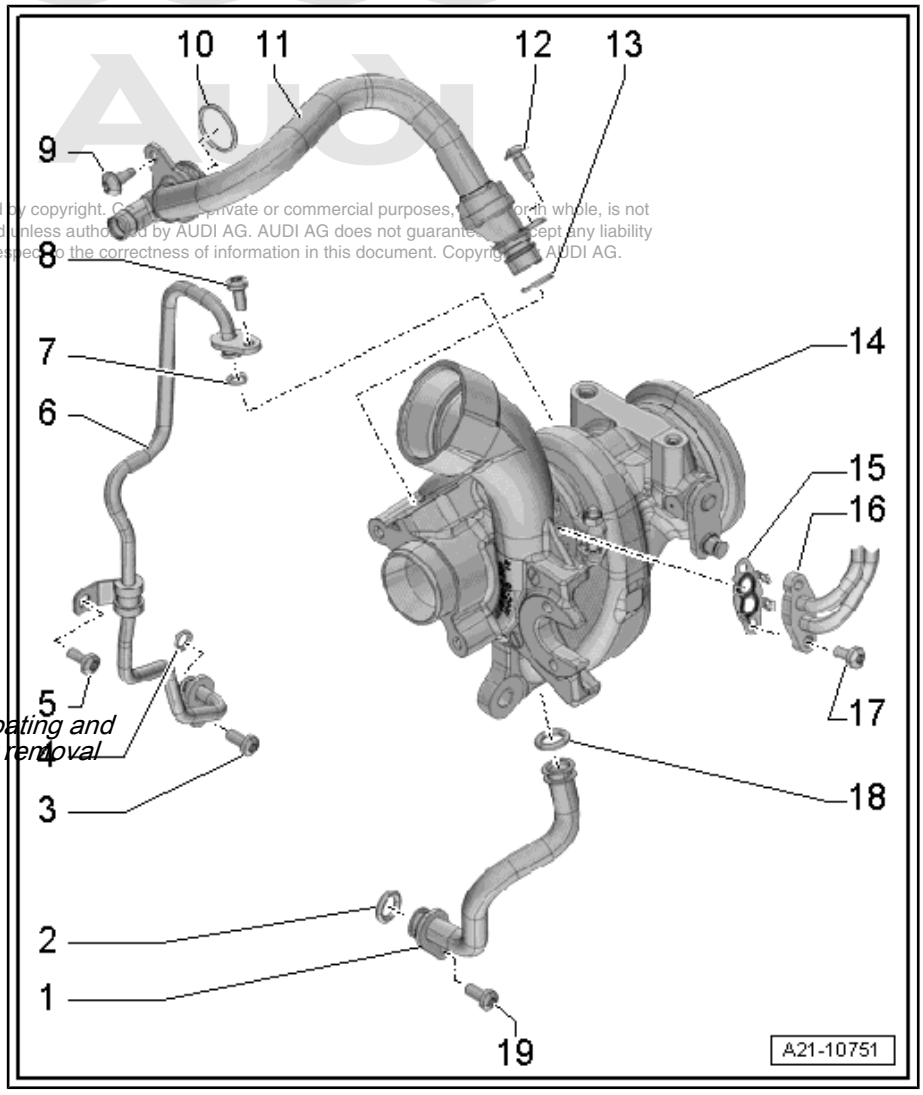
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document.

18 - Charge pressure control solenoid valve - N75-

19 - O-ring

- ❑ Renew after removing

1.1.3 Exploded view - turbocharger and pipes/hoses for all engines



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

1 - Oil return line

2 - O-ring

- ❑ Renew after removing

3 - Bolt

- ❑ 9 Nm

4 - O-ring

- ❑ Renew after removing

5 - Bolt

- ❑ 9 Nm

6 - Oil supply line

7 - O-ring

- ❑ Renew after removing

8 - Bolt

- ❑ 9 Nm

9 - Bolt

Note

Bolts have a special coating and must be renewed after removal

- ❑ Renew
- ❑ 5 Nm

10 - O-ring

- ❑ Renew crankcase breather hose -item 11- if damaged
- ❑ Lubricate lightly with engine oil

11 - Hose

- ❑ For crankcase breather

12 - Bolt

Note

Bolts have a special coating and must be renewed after removal

- ❑ Renew
- ❑ 5 Nm

13 - O-ring

- ❑ 1x or 2x (depending on version)
- ❑ Renew after removing

14 - Turbocharger

- ❑ Can only be renewed together with exhaust manifold
- ❑ Removing and installing ⇒ “1.2 Removing and installing turbocharger”, page 276

15 - Gasket

- ❑ Renew after removing

16 - Coolant pipes

- ❑ Supply and return

17 - Bolt

- ❑ 8 Nm

18 - O-ring

- ❑ Renew after removing

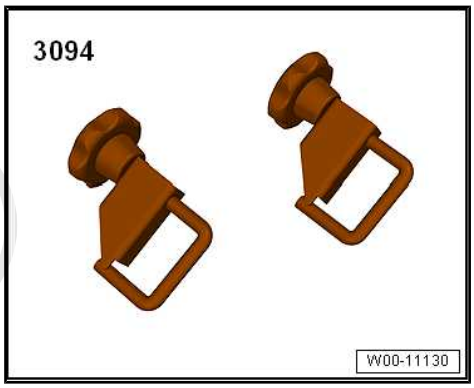
19 - Bolt

- ❑ 9 Nm

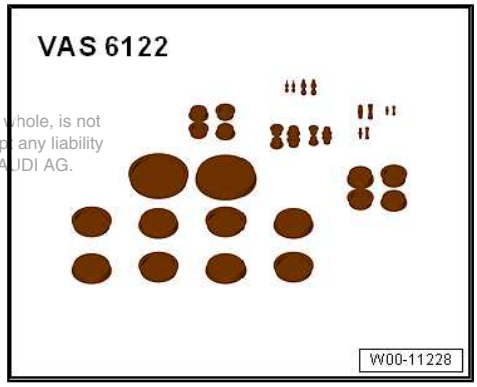
1.2 Removing and installing turbocharger

Special tools and workshop equipment required

- ♦ Hose clamps, up to 25 mm - 3094-

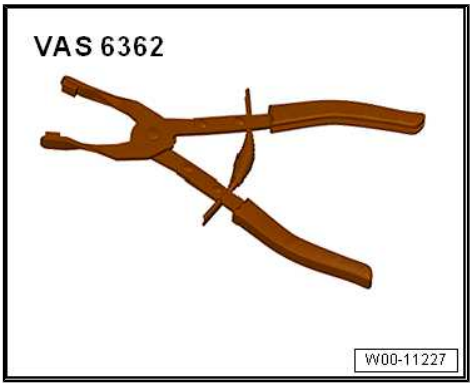


- ♦ Engine bung set - VAS 6122-

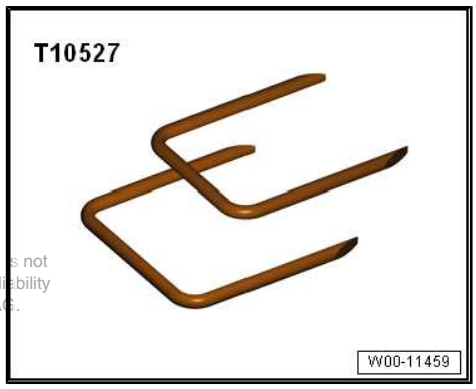


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Hose clip pliers - VAS 6362-



- Release tool - T10527- and -T10527/1-



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.

Removing

Note

- *Observe rules for cleanliness*
  ⇒ "3.1 Rules for cleanliness", page 5 .
- *Fit all heat insulation sleeves in the original position when installing.*

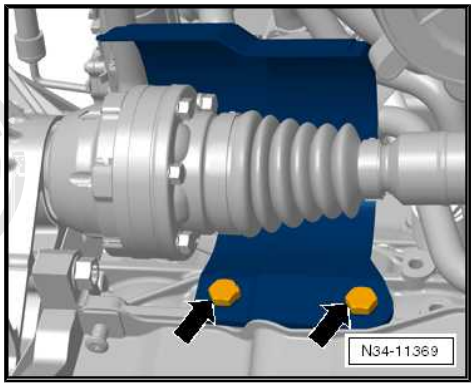
Caution

If the turbocharger has suffered mechanical damage (e.g. damaged compressor wheel), it is not sufficient merely to fit a new turbocharger. The following work must be performed in order to avoid further damage:

- ***Check air cleaner housing, air filter element and air hoses for dirt and foreign particles.***
- ***Check the entire charge air system (including the charge air cooler) for foreign matter.***
- ***If foreign matter is found in the charge air system, clean all relevant ducts and hoses and renew charge air cooler if necessary.***

– Remove engine cover panel
⇒ "3.1 Removing and installing engine cover panel", page 44 .

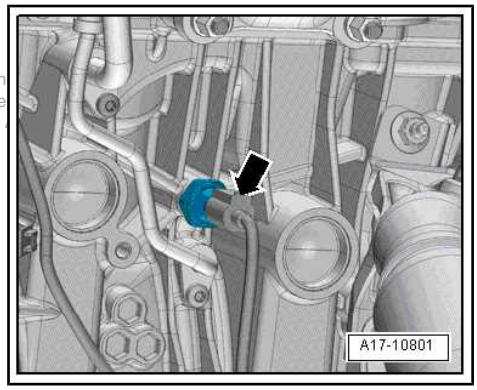
– Remove bolts -arrows- and detach heat shield for drive shaft (right-side).



– Detach heat shield sleeve.

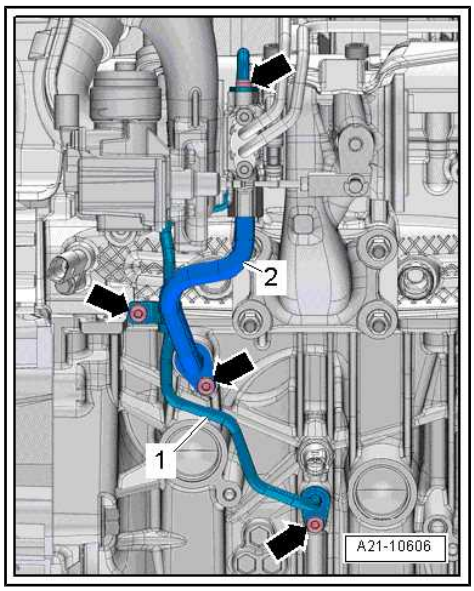
– Unplug electrical connector -arrow- on oil pressure switch - F22- .

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



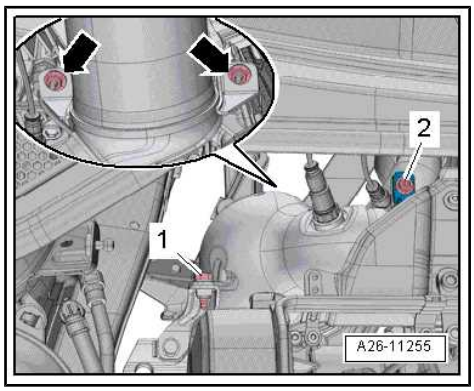
– Remove bolts -arrows- and detach oil supply line -1- and oil return line -2-.

– Seal off open lines and connections with clean plugs from engine bung set - VAS 6122- .

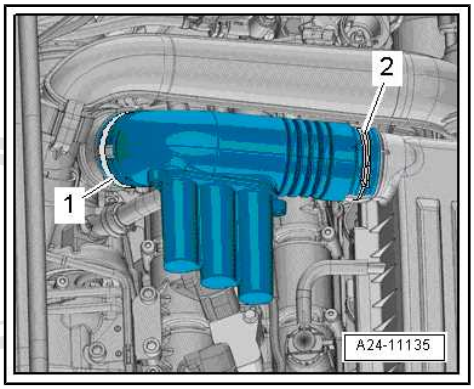


– Unscrew bolt -2- and remove screw-type clip.

– Remove bolt -1- and nuts -arrows- and tie up catalytic converter.



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

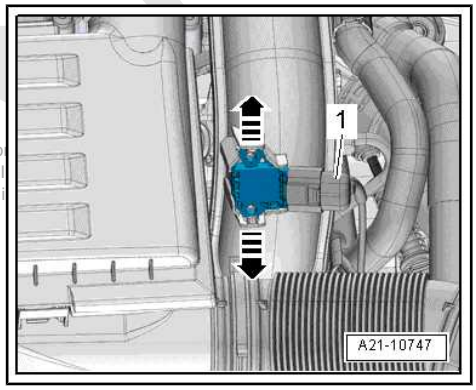


– Unplug electrical connector -1-.

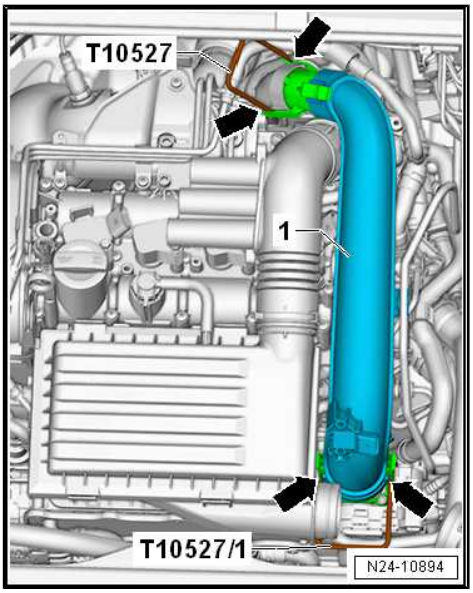
Note

Disregard -arrows-.

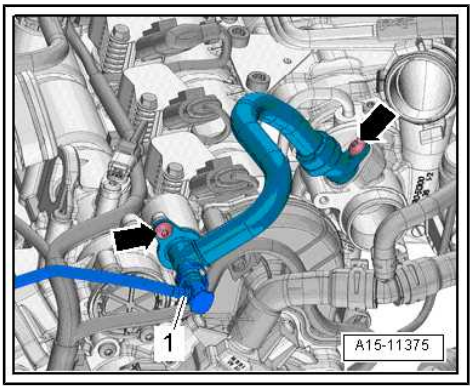
Protected by copyright. Copying for pr
permitted unless authorised by AUDI
with respect to the correctness of i



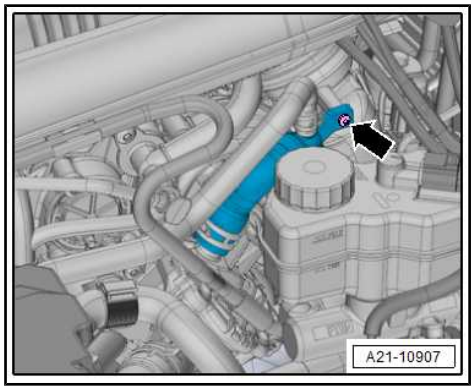
– Release fasteners -arrows- with release tool - T10527- and - T10527/1- .
– Detach air pipe -1-.



– Press release tabs and disconnect hose -1- for activated charcoal filter.
– Remove bolts -arrows- and detach crankcase breather hose.



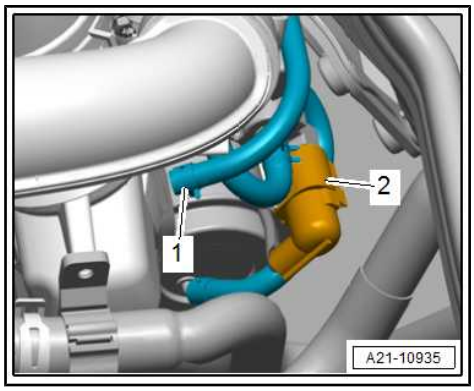
– If fitted, remove bolt -arrow- from connection and press coolant hose slightly forwards.



Engine code CSSA:

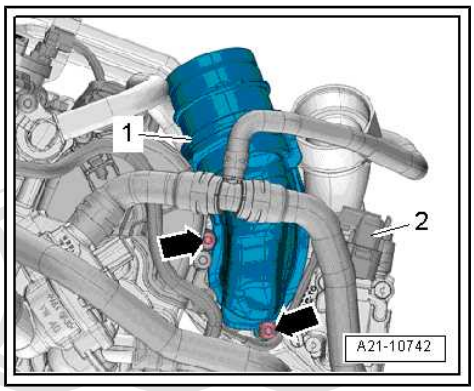
– Unplug electrical connector -2- at charge pressure control solenoid valve - N75- .

– Detach vacuum hose -1-.



Engine codes CHPB, CZDA, CZEA:

– Unplug electrical connector -2-.

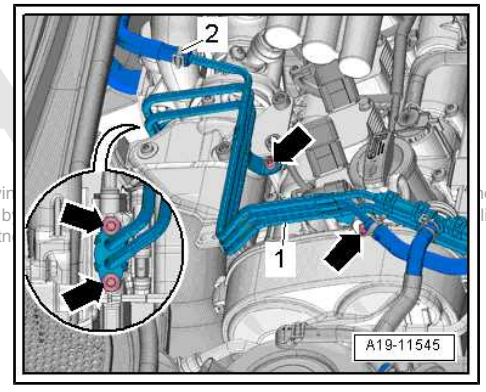


All engine versions (continued):

– Remove bolts -arrows- and detach connection -1-.

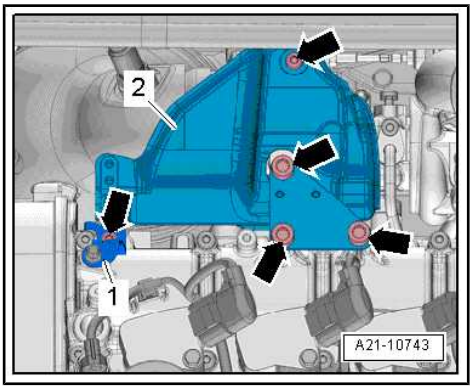
– If fitted, clamp off coolant hose using hose clamp -3094- , release hose clip -2- and disconnect coolant hose.

– Remove bolts -arrows- and pivot coolant lines -1- to right side.



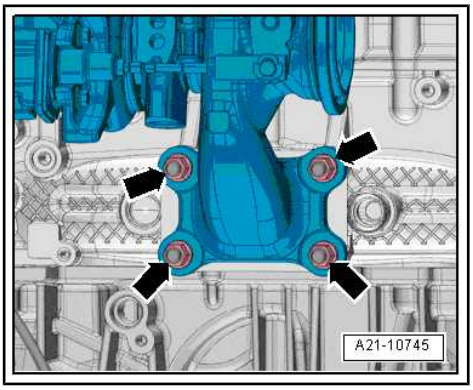
Protected by copyright. Copyin ot
permitted unless authorised b lity
with respect to the correctn

– Remove bolts -arrows- and detach bracket with heat shield -2- and bracket -1- for engine cover panel.

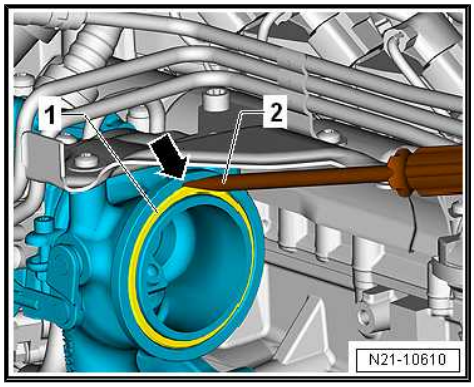


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Remove nuts -arrows- and detach turbocharger.



– Insert screwdriver -2- into groove -arrow- on turbocharger and lever out seal -1-.



Installing

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

Note

- *Renew seal, gaskets and O-rings.*
- *Fill turbocharger with engine oil at connection for oil supply line.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *After installing the turbocharger, allow the engine to idle for approx. 1 minute without pressing the accelerator to ensure that the turbocharger is supplied with oil.*

– Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

– Install engine cover panel ⇒ “3.1 Removing and installing engine cover panel”, page 44 .

– Check coolant level and top up if necessary ⇒ page 236 .

Tightening torques

- ⇒ “1.1 Exploded view - turbocharger”, page 273
- ⇒ “2.1 Exploded view - charge air system”, page 284
- ⇒ Fig. ““Installing catalytic converter - tightening torque and sequence”“ , page 340
- Heat shield for drive shaft ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Exploded view - drive shaft

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.

1.3 Renewing vacuum unit for turbocharger

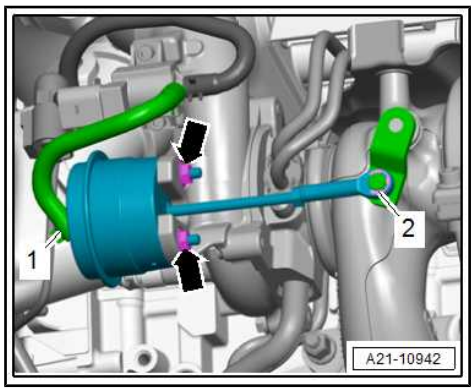
This repair step cannot be performed at present.

Removing

– Detach vacuum hose -1-.

– Detach securing clip -2-.

– Remove bolts -arrows- and detach vacuum unit.



Installing

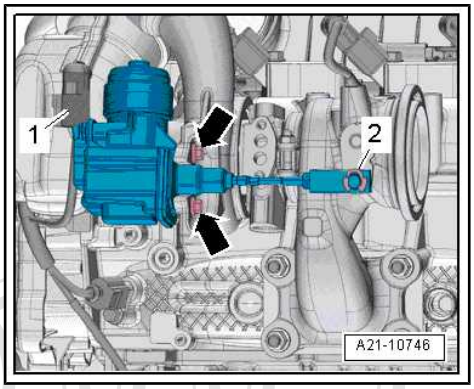
Install in reverse sequence.

Tightening torques

- ⇒ “1.1.2 Exploded view - turbocharger, engine code CSSA”, page 274

1.4 Removing and installing charge pressure positioner - V465-

Removing



– Unplug electrical connector -1-.
– Detach securing clip -2-.
– Remove bolts -arrows- and detach charge pressure positioner - V465- .

Installing

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

– Adapt engine control unit - J623- to charge pressure positioner - V465- ⇒ Vehicle diagnostic tester, `Guided Functions`.

Tightening torques

♦ ⇒ “1.1 Exploded view - turbocharger”, page 273

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 Charge air system

⇒ “2.1 Exploded view - charge air system”, page 284

⇒ “2.2 Removing and installing charge pressure sender G31 ”, page 285

⇒ “2.3 Removing and installing charge air cooler”, page 285

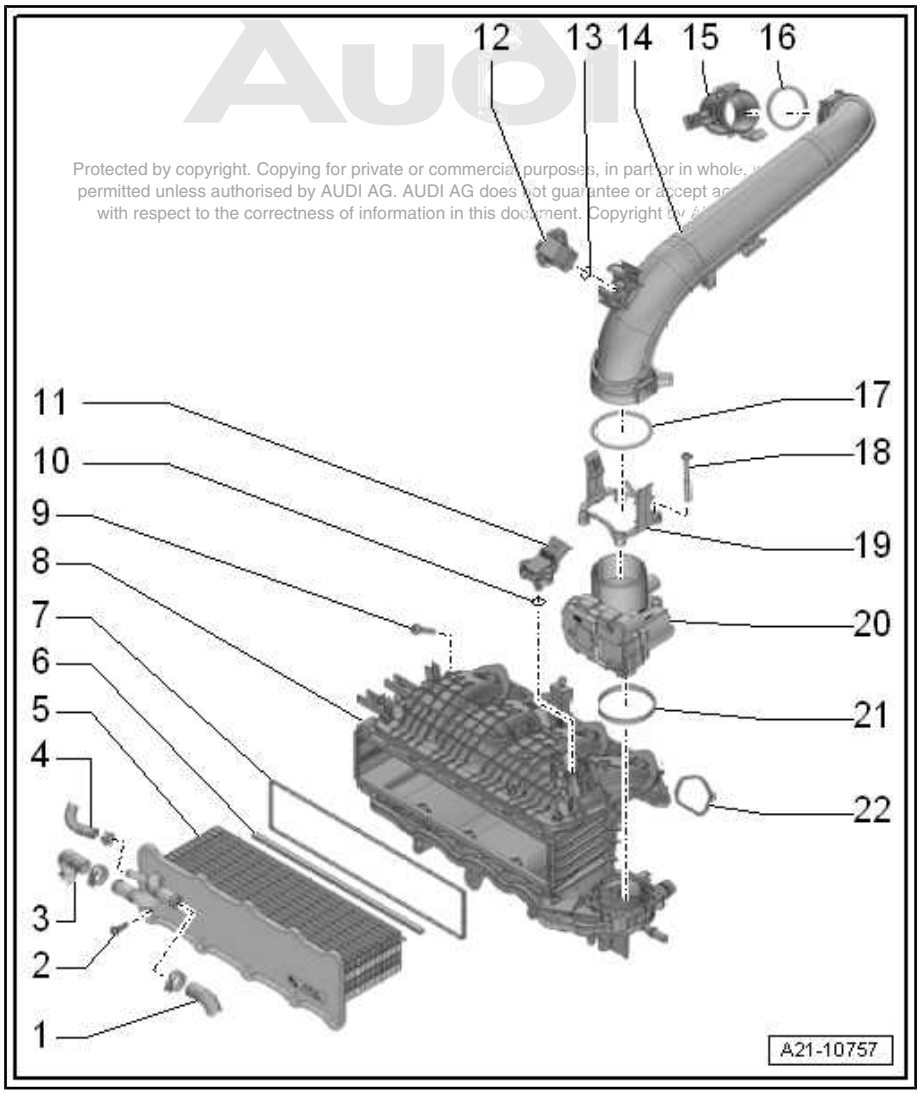
⇒ “2.4 Checking charge air system for leaks”, page 287

2.1 Exploded view - charge air system

Note

- *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.*
- *Observe rules for cleanliness ⇒ “3.1 Rules for cleanliness”, page 5 .*

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 - Bolt

- ❑ Thread-forming
- ❑ Fit and screw in bolt by hand so that it is screwed into old thread. Then tighten bolt to torque.
- ❑ 15 Nm

3 - Coolant hose

4 - Coolant hose

5 - Charge air cooler

- ❑ Removing and installing ⇒ “2.3 Removing and installing charge air cooler”, page 285
- ❑ If renewed, refill system with fresh coolant

6 - Sealing strip

- ❑ Renew after removal (apply thin coating of clean engine oil prior to installation)

7 - Gasket

- ❑ Renew after removing

8 - Intake manifold

Removing and installing ⇒ “3.2 Removing and installing intake manifold”, page 300

9 - Bolt

- ❑ Tightening torque and sequence ⇒ Fig. ““Intake manifold - tightening torque and sequence”“ , page 300

10 - O-ring

- ❑ If necessary, renew after removing

11 - Intake air temperature sender - G42-

- ❑ Removing and installing
  ⇒ “5.1 Removing and installing intake air temperature sender G42 ”, page 320

12 - Charge pressure sender - G31-

- ❑ Removing and installing ⇒ “2.2 Removing and installing charge pressure sender G31 ”, page 285

13 - O-ring

- ❑ If necessary, renew after removing

14 - Air pipe

15 - Connection

16 - O-ring

- ❑ Renew after removal (apply thin coating of clean engine oil prior to installation)

17 - O-ring

- ❑ Renew after removal (apply thin coating of clean engine oil prior to installation)

18 - Bolt

- ❑ Thread-forming
- ❑ Fit and screw in bolt by hand so that it is screwed into old thread. Then tighten bolt to torque.
- ❑ 7 Nm

19 - Retaining clip

- ❑ For air pipe

20 - Throttle valve module - J338-

- ❑ Removing and installing ⇒ “3.1 Exploded view - intake manifold”, page 299

21 - Seal

- ❑ Renew after removing

22 - Gasket

- ❑ 4x
- ❑ Renew after removing

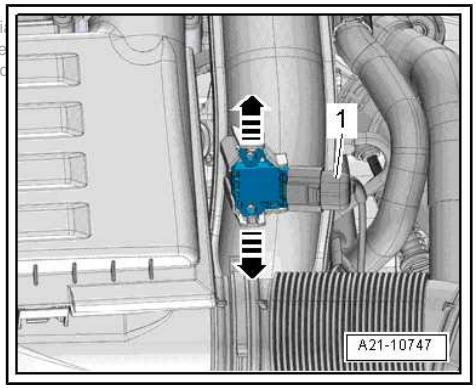
2.2 Removing and installing charge pressure sender - G31-

Removing

Protected by copyright. Copying for private or commerci
permitted unless authorised by AUDI AG. AUDI AG doe
with respect to the correctness of information in this d

– Unplug electrical connector -1-.

– Release catches -arrows- and detach charge pressure sender - G31- .



Installing

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

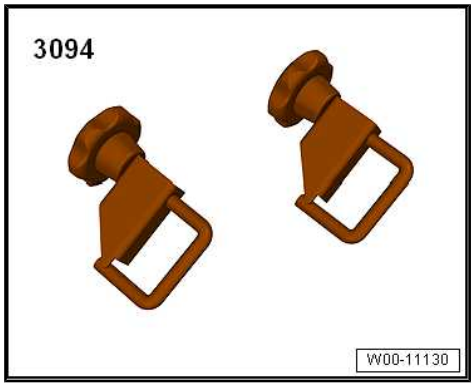
Note

Renew O-ring.

2.3 Removing and installing charge air cooler

Special tools and workshop equipment required

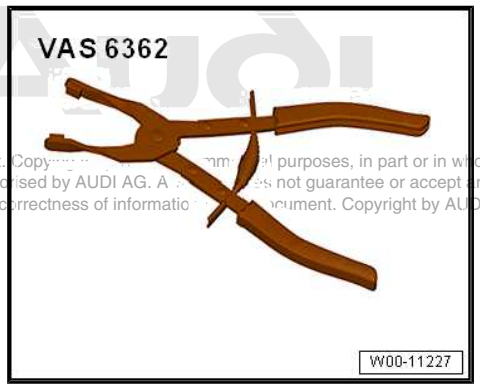
- Hose clamps, up to 25 mm - 3094-



- Drip tray for workshop hoist - VAS 6208-



- Hose clip pliers - VAS 6362-



Protected by copyright. Copy... ...mmercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. A... ...es not guarantee or accept any liability with respect to the correctness of informatio... ...ocument. Copyright by AUDI AG.

Removing

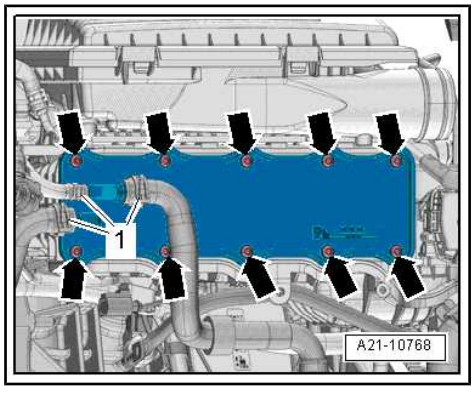
– Remove radiator cowl
⇒ “4.4 Removing and installing radiator cowl”, page 269 .

– Remove air cleaner housing
⇒ “2.2 Removing and installing air cleaner housing”, page 298 .

– Place drip tray for workshop hoist - VAS 6208- underneath.

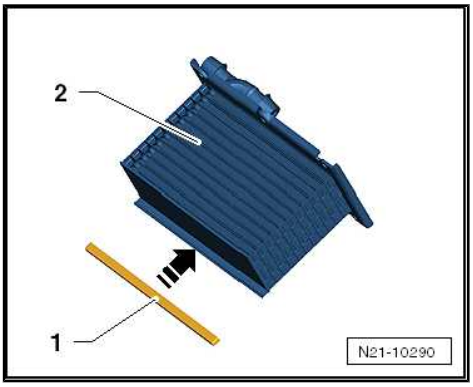
– Release hose clips -1- and disconnect coolant hoses.

– Remove bolts -arrows- and detach charge air cooler.



Installing

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



Note

- *If there are slight impressions on the fins, refer to ⇒ "3.5 Installing radiators and condensers", page 6 .*
- *Renew gasket after removing ⇒ "2.1 Exploded view - charge air system", page 284 .*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

– Attach sealing strip -1- to charge air cooler -2- (-arrow-).
– Insert new gasket into groove on intake manifold.
– Install radiator cowl ⇒ "4.4 Removing and installing radiator cowl", page 269 .
– Check coolant level ⇒ page 236 .

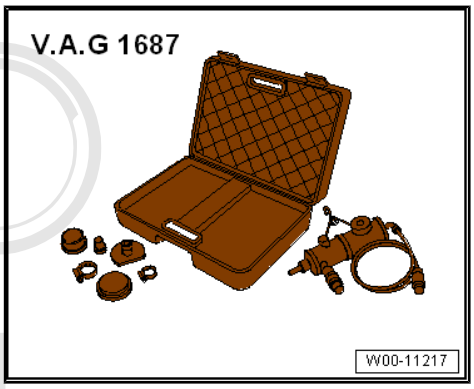
Tightening torques

- ⇒ "2.1 Exploded view - charge air system", page 284
- ⇒ "2.1 Exploded view - air cleaner housing", page 297

2.4 Checking charge air system for leaks

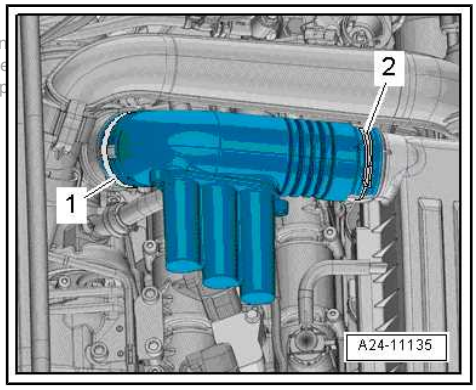
Special tools and workshop equipment required

- Charge air system tester - V.A.G 1687-



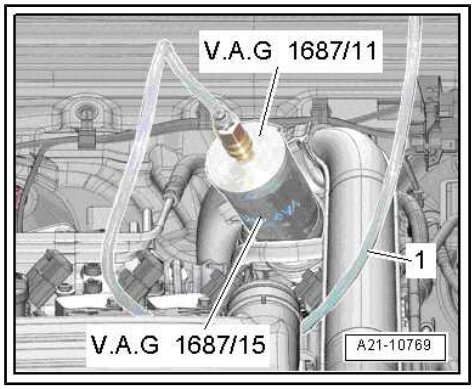
Procedure

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



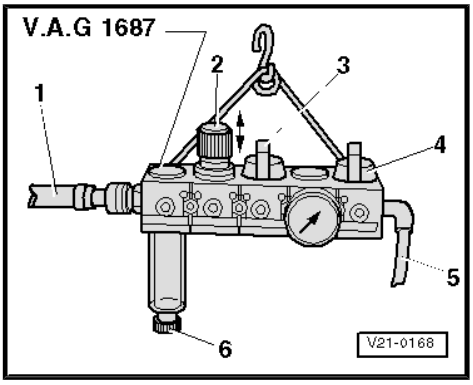
Protected by copyright. Copying for private or commercial purposes, in
part is not permitted unless authorized by AUDI AG. AUDI AG does not guarante
with respect to the correctness of information in this document. Cop

– Connect adapter - V.A.G 1687/15- with -V.A.G 1687/11- to turbocharger.
– Connect hose -1- of charge air system tester -V.A.G 1687- to adapter.



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

Prepare charge air system tester - V.A.G 1687- as follows:



– Unscrew pressure control valve -2- completely and close valves -3- and -4-.

• Make sure knob is pulled out before turning pressure control valve -2-.

– Using a commercially available connection piece, connect charge air system tester - V.A.G 1687- to compressed air -1-.

Note

If there is water in sight glass, remove drain plug -6- and drain water.

– Open valve -3-.

Caution

Risk of damage if pressure is set too high.

- ***The pressure must not exceed 0.2 bar.***

– Adjust pressure to 0.2 bar via pressure control valve -2-.

– Open valve -4- and wait until test system is pressurised. If necessary, adjust pressure to 0.2 bar again.

– Check charge air system for audible leaks or leaks that can be felt with the hand; apply commercially available leak detecting spray or use ultrasonic tester - V.A.G 1842- .

Note

- *A small amount of air escapes through the valves and enters the engine. Therefore it is not possible to perform a pressure retention test.*
- *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.*

Assembling

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

Note

Renew seal and O-rings.

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.

Tightening torques

- ⇒ “2.1 Exploded view - air cleaner housing”, page 297

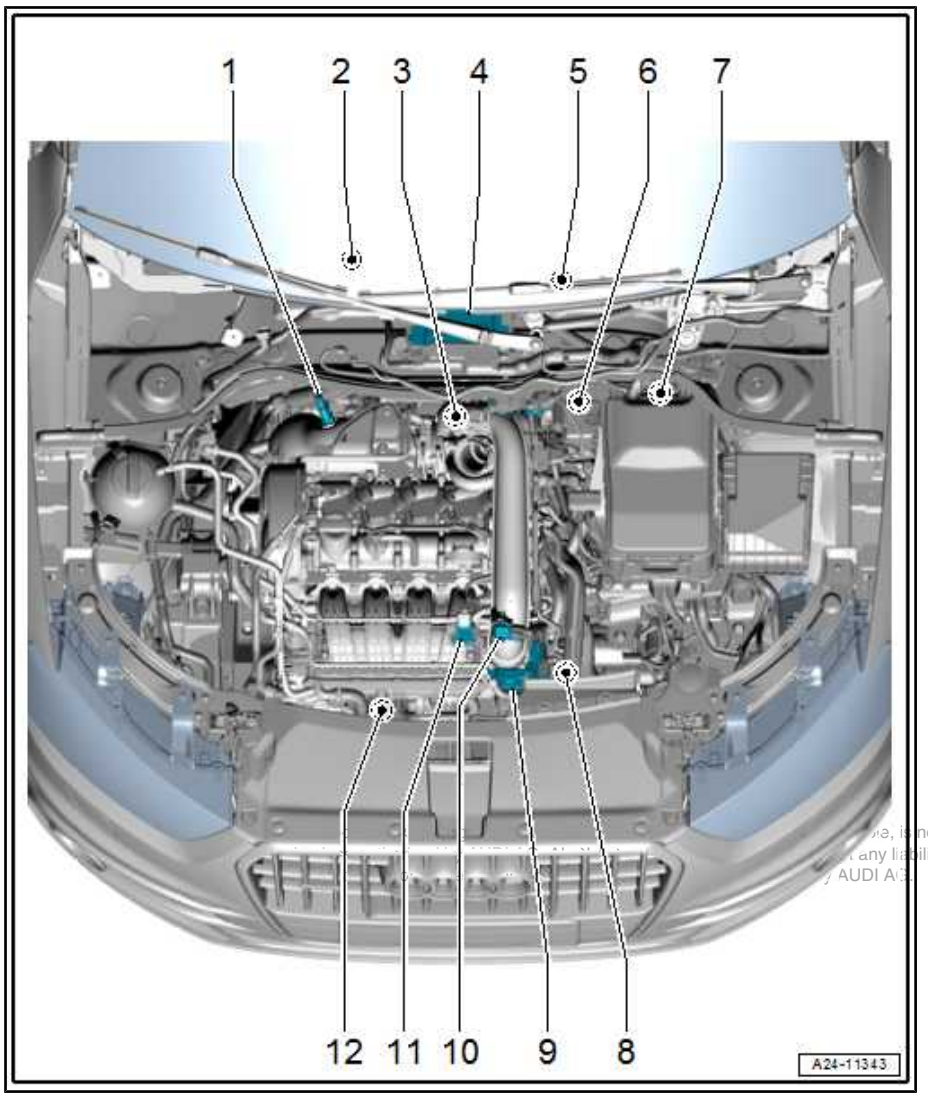
24 – Mixture preparation - injection

1 Injection system

⇒ “1.1 Overview of fitting locations - injection system”, page 290

1.1 Overview of fitting locations - injection system

Overview of fitting locations - engine compartment



1 - Lambda probe - G39- and Lambda probe heater - Z19-

- ❑ Exploded view ⇒ “7.1 Exploded view - Lambda probe”, page 329

2 - Lambda probe after catalytic converter - G130- and Lambda probe heater 1 after catalytic converter - Z29-

- ❑ Exploded view ⇒ “7.1 Exploded view - Lambda probe”, page 329

3 - Charge pressure positioner - V465- or charge pressure control solenoid valve - N75-

- ❑ Charge pressure positioner - V465- for vehicles with engine code CHPB: fitting location ⇒ Fig. ““Fitting location of charge pressure positioner -V465- ”“ , page 292
- ❑ Charge pressure control solenoid valve - N75- for vehicles with engine code CSSA: fitting location ⇒ Fig. ““Fitting location of charge pressure control solenoid valve -N75- ”“ , page 292

4 - Engine control unit - J623-

- ❑ Removing and installing ⇒ “8.2 Removing and installing engine control unit J623 ”, page 332

5 - Accelerator position sender - G79- and accelerator position sender 2 - G185-

- ❑ Fitting location ⇒ Fig. ““ Accelerator position sender -G79- and accelerator position sender 2 -G185- ”“ , page 291
- ❑ Removing and installing ⇒ Fuel supply system, petrol engines; Rep. gr. 20 ; Accelerator mechanism; Exploded view - accelerator pedal module

6 - Brake light switch - F- / brake pedal switch - F63-

- ❑ Fitting location ⇒ Fig. ““Fitting location of brake light switch -F- / brake pedal switch -F63- ”“ , page 291
- ❑ Removing and installing ⇒ Brake system; Rep. gr. 45 ; Overview of fitting locations; Overview of fitting locations - ABS/ESP

7 - Clutch position sender - G476-

- ❑ Fitting location ⇒ Fig. ""Fitting location of clutch position sender -G476- "" , page 292

8 - Radiator outlet coolant temperature sender - G83-

- ❑ Fitting location ⇒ Fig. ""Fitting location of radiator outlet coolant temperature sender -G83- "" , page 292
- ❑ Exploded view ⇒ "2.3 Exploded view - coolant temperature senders", page 241

9 - Throttle valve module - J338-

- ❑ Including throttle valve drive for electric throttle - G186- , throttle valve drive angle sender 1 for electric throttle - G187- and throttle valve drive angle sender 2 for electric throttle - G188-
- ❑ Exploded view ⇒ "3.1 Exploded view - intake manifold", page 299

10 - Charge pressure sender - G31-

- ❑ Exploded view ⇒ "2.1 Exploded view - charge air system", page 284

11 - Intake air temperature sender - G42-

- ❑ Exploded view ⇒ "3.1 Exploded view - intake manifold", page 299

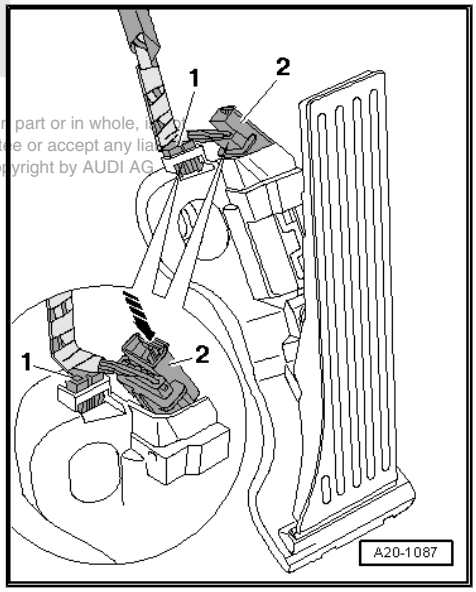
12 - Continued coolant circulation pump - V51-

- ❑ Fitting location ⇒ Fig. ""Fitting location of continued coolant circulation pump -V51- "" , page 293
- ❑ Exploded view ⇒ "2.2 Exploded view - electric coolant pump", page 239

Accelerator position sender - G79- and accelerator position sender 2 - G185-

- ♦ In accelerator pedal module

2 - Electrical connector for accelerator pedal module



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 accelerator position sender - G79- and accelerator position sender 2 - G185- are integrated in the accelerator pedal module and cannot be renewed individually.

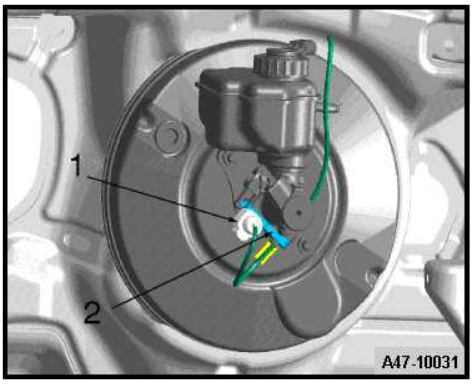
Removing and installing ⇒ Fuel supply system, petrol engines; Rep. gr. 20 ; Accelerator mechanism; Removing and installing accelerator pedal module with accelerator position sender -G79- / -G185-

Fitting location of brake light switch - F- / brake pedal switch - F63-

- ♦ On brake servo in engine compartment

1 - Brake light switch - F- with brake pedal switch - F47-

Removing and installing ⇒ Brake system; Rep. gr. 47 ; Brake servo/brake master cylinder; Removing and installing brake light switch

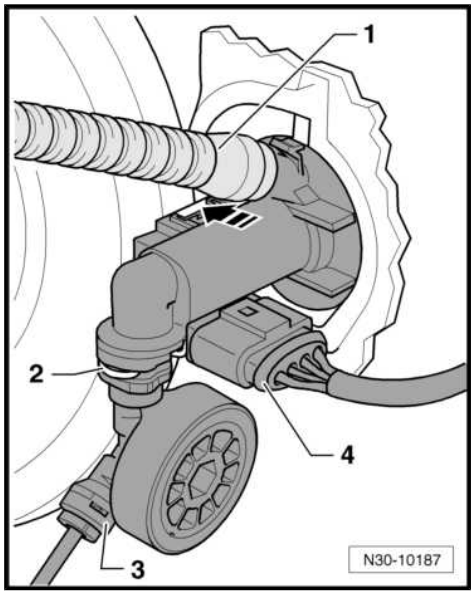


Fitting location of clutch position sender - G476-

♦ On clutch master cylinder -4-

Removing and installing ⇒ Rep. gr. 30 ; Clutch mechanism; Removing and installing clutch position sender - G476-

Integrated functions: clutch pedal switch for engine start - F194- and clutch pedal switch - F36- (manual gearbox only)



Fitting location of charge pressure positioner - V465-

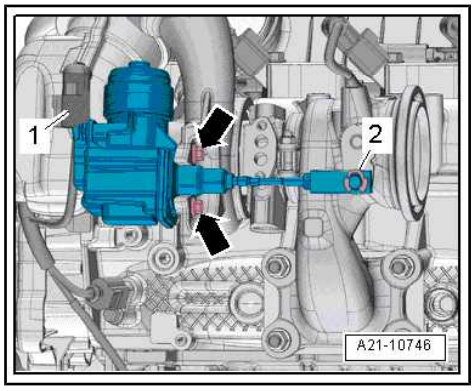
• On turbocharger

1 - Electrical connector for charge pressure positioner - V465-

Note

Shown in illustration from rear with engine removed.

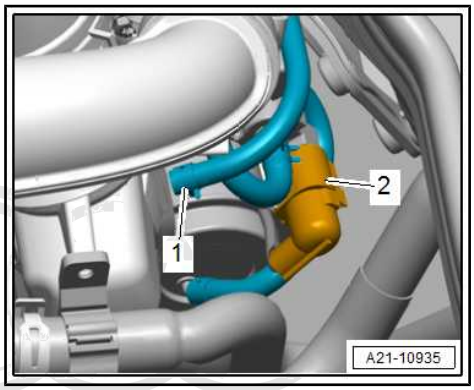
Removing and installing ⇒ page 283



Fitting location of charge pressure control solenoid valve - N75-

♦ On turbocharger

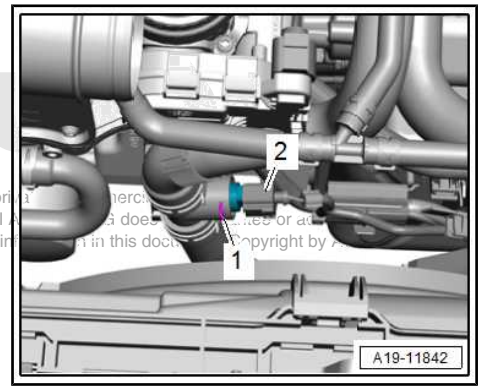
2 - Electrical connector for charge pressure control solenoid valve - N75-



Fitting location of radiator outlet coolant temperature sender - G83-

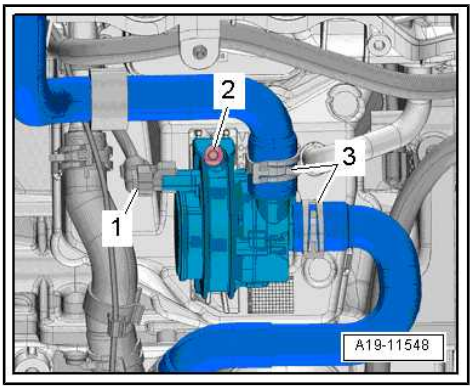
• At bottom left of radiator

2 - Electrical connector for radiator outlet coolant temperature sender - G83-



Protected by copyright. Copying for priv... permitted unless authorised by AUDI ... with respect to the correctness of in... in this doc... opyright by ...

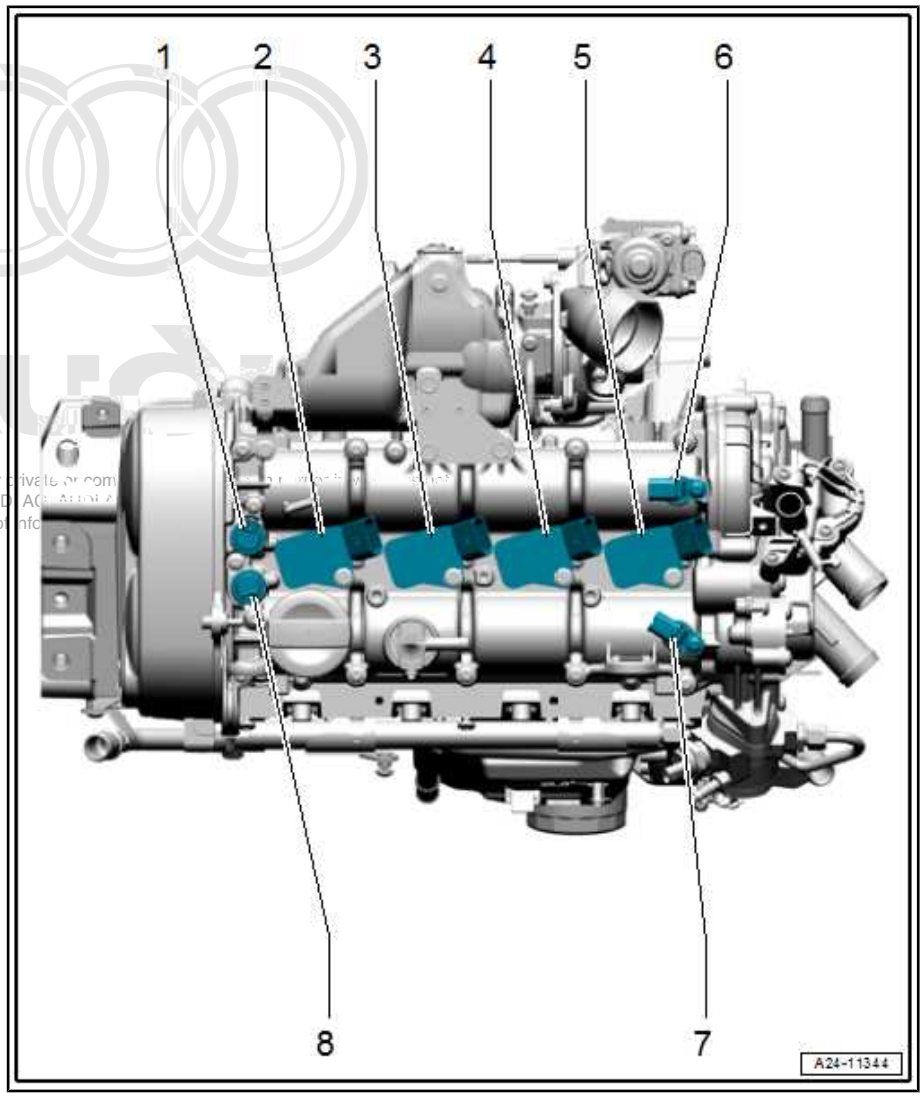
Fitting location of continued coolant circulation pump - V51-



- ♦ At front of engine

1 - Electrical connector for continued coolant circulation pump - V51-

Overview of fitting locations - engine (view from above), vehicles with engine codes CHPB, CSSA, CZDA, CZDB, CWLA



1 - Exhaust camshaft control valve 1 - N318-

- ❑ Exploded view ⇒ “2.2 Exploded view - camshaft housing”, page 169

2 - Ignition coil 1 with output stage - N70-

- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 344

3 - Ignition coil 3 with output stage - N291-

- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 344

4 - Hall sender 2 - G163-

- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 344

5 - Hall sender - G40- (camshaft position sensor)

- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 344

6 - Ignition coil 4 with output stage - N292-

- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 344

7 - Ignition coil 2 with output stage - N127-

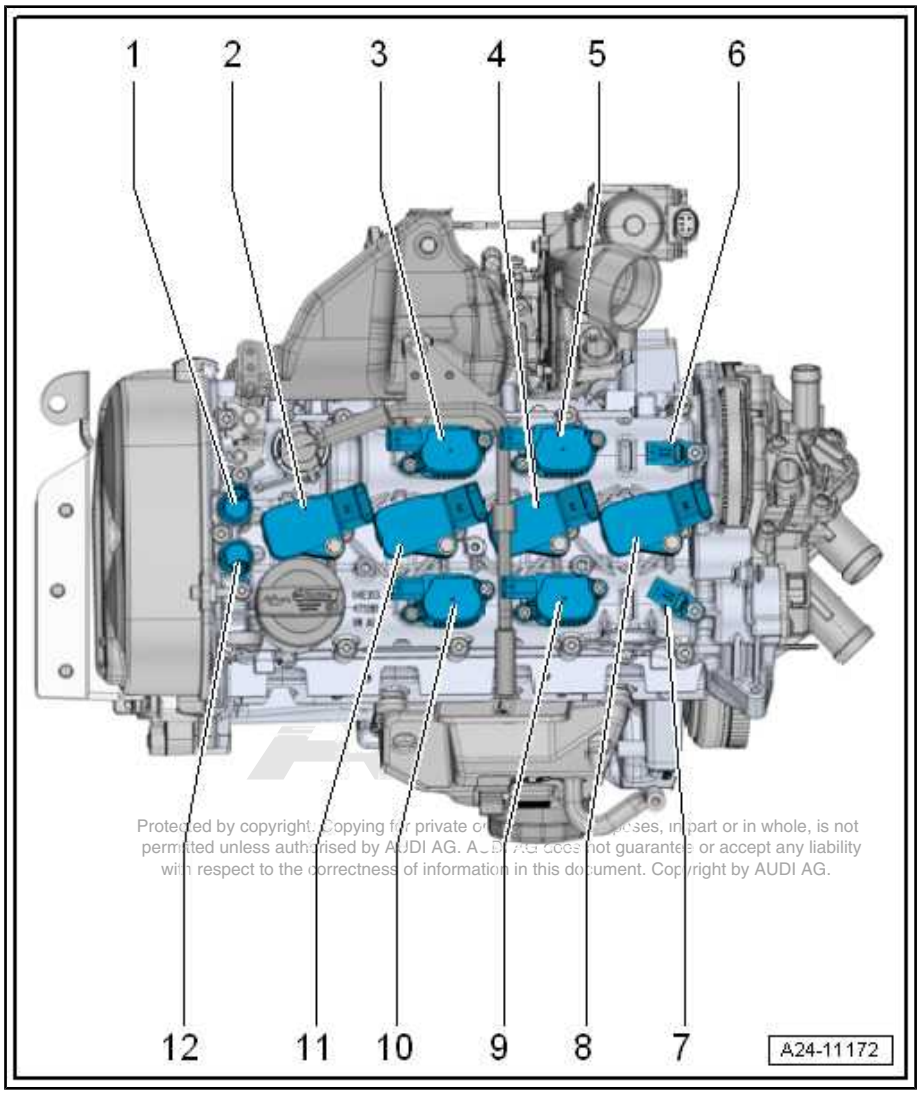
- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 344

8 - Camshaft control valve 1 - N205-

- ❑ Exploded view ⇒ “2.2 Exploded view - camshaft housing”, page 169

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.

Overview of fitting locations - engine (view from above), vehicles with engine code CZEA



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 - Exhaust camshaft control valve 1 - N318-

- ❑ Exploded view ⇒ “2.2 Exploded view - camshaft housing”, page 169

2 - Ignition coil 1 with output stage - N70-

- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 344

3 - Exhaust cam actuator for cylinder 2

- ♦ Exhaust cam actuator for cylinder 2 - N587-
- ♦ Exhaust cam actuator A for cylinder 2 - N588-
- ♦ Exhaust cam actuator B for cylinder 2 - N589-
  - ❑ Exploded view ⇒ “2.2 Exploded view - camshaft housing”, page 169

4 - Ignition coil 3 with output stage - N291-

- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 344

5 - Exhaust cam actuator for cylinder 3

- ♦ Exhaust cam actuator for cylinder 3 - N595-
- ♦ Exhaust cam actuator A for cylinder 3 - N596-
- ♦ Exhaust cam actuator B for cylinder 3 - N597-
  - ❑ Exploded view ⇒ “2.2 Exploded view - camshaft housing”, page 169

6 - Hall sender 2 - G163- (camshaft position sensor)

- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 344

7 - Hall sender - G40- (camshaft position sensor)

- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 344

8 - Ignition coil 4 with output stage - N292-

- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 344

9 - Inlet cam actuator for cylinder 3

- ♦ Inlet cam actuator for cylinder 3 - N591-
- ♦ Inlet cam actuator A for cylinder 3 - N592-
- ♦ Inlet cam actuator B for cylinder 3 - N593-
  - ❑ Exploded view ⇒ “2.2 Exploded view - camshaft housing”, page 169

10 - Inlet cam actuator for cylinder 2

- ♦ Inlet cam actuator for cylinder 2 - N583-
- ♦ Inlet cam actuator A for cylinder 2 - N584-
- ♦ Inlet cam actuator B for cylinder 2 - N585-
  - ❑ Exploded view ⇒ “2.2 Exploded view - camshaft housing”, page 169

11 - Ignition coil 2 with output stage - N127-

- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 344

12 - Camshaft control valve 1 - N205-

- ❑ Exploded view ⇒ “2.2 Exploded view - camshaft housing”, page 169

Overview of fitting locations - engine (inlet side)

1 - Knock sensor 1 - G61-

- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 344

2 - Oil pressure switch for reduced oil pressure - F378-

- ❑ Exploded view ⇒ “4.1 Exploded view - oil filter/oil pressure switches”, page 222

3 - Fuel pressure sender - G247-

- ❑ Exploded view ⇒ “4.1 Exploded view - fuel rail with injectors”, page 312

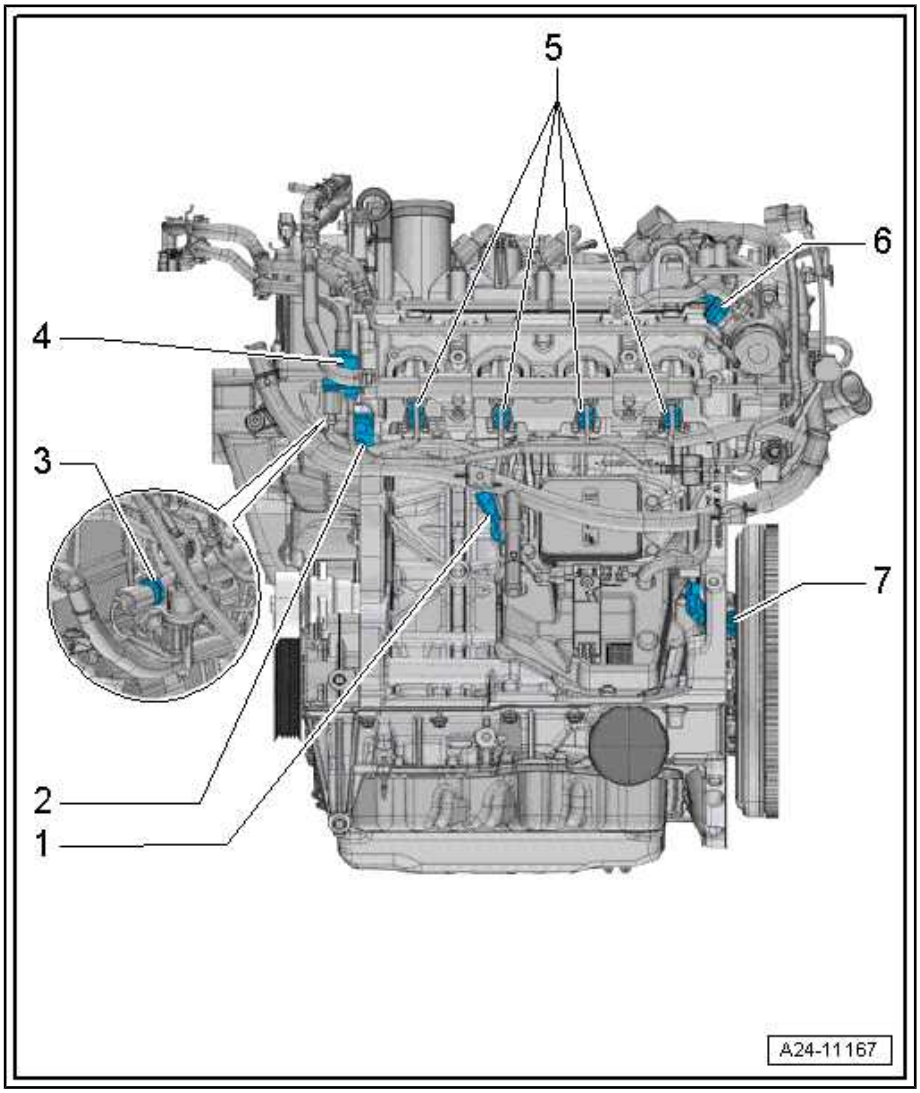
4 - Activated charcoal filter solenoid valve 1 - N80-

5 - Injectors

- ♦ Injector, cylinder 1 - N30-
- ♦ Injector, cylinder 2 - N31-
- ♦ Injector, cylinder 3 - N32-
- ♦ Injector, cylinder 4 - N33-
  - ❑ Exploded view ⇒ “4.1 Exploded view - fuel rail with injectors”, page 312

6 - Fuel pressure regulating valve - N276-

- ❑ At high-pressure pump
- ❑ Exploded view ⇒ “6.1 Exploded view - high-pressure pump”, page 324



7 - Engine speed sender - G28-

- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 344

Overview of fitting locations - engine (exhaust side)

1 - Oil level and oil temperature sender - G266-

- ❑ Exploded view
  ⇒ “4.1 Exploded view - oil filter/oil pressure switches”, page 222

2 - Coolant temperature sender - G62-

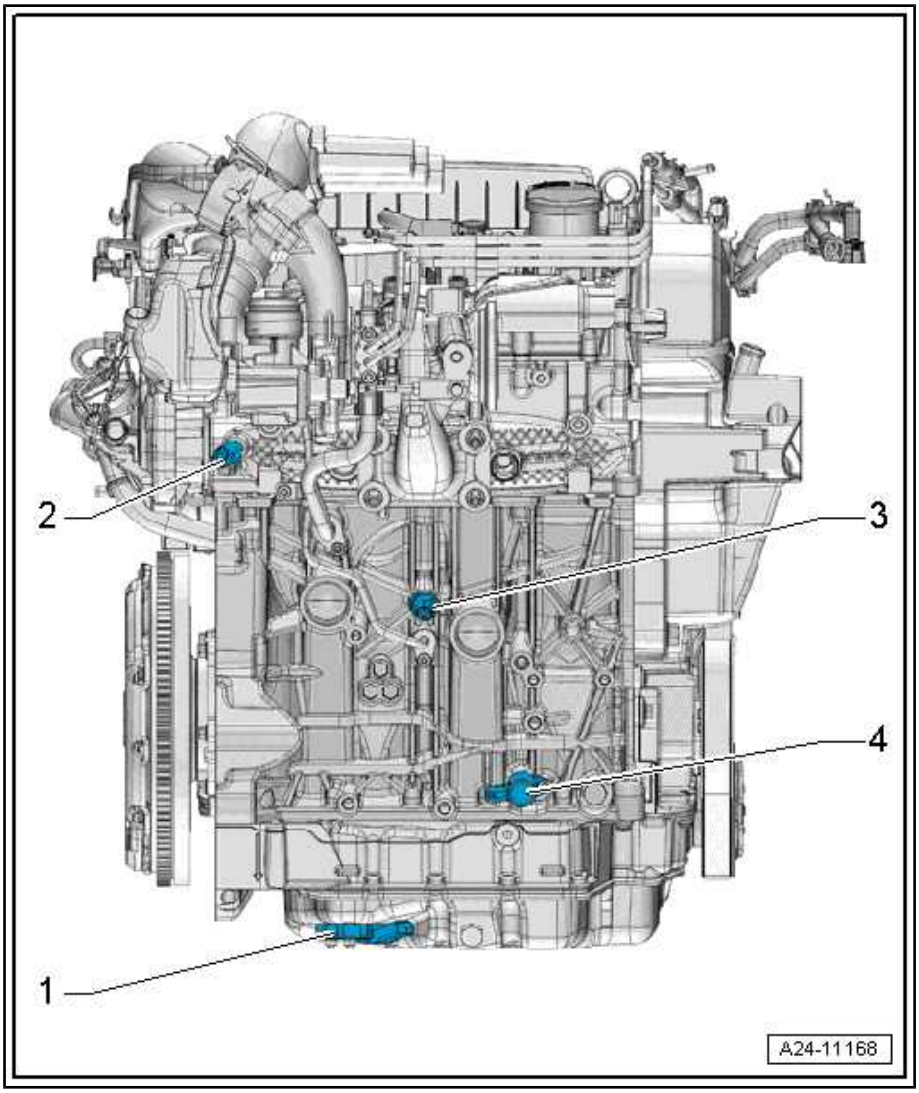
- ❑ Exploded view
  ⇒ “2.3 Exploded view - coolant temperature senders”, page 241

3 - Oil pressure switch - F22-

- ❑ Exploded view
  ⇒ “4.1 Exploded view - oil filter/oil pressure switches”, page 222

4 - Valve for oil pressure control - N428-

- ❑ Exploded view
  ⇒ “4.1 Exploded view - oil filter/oil pressure switches”, page 222

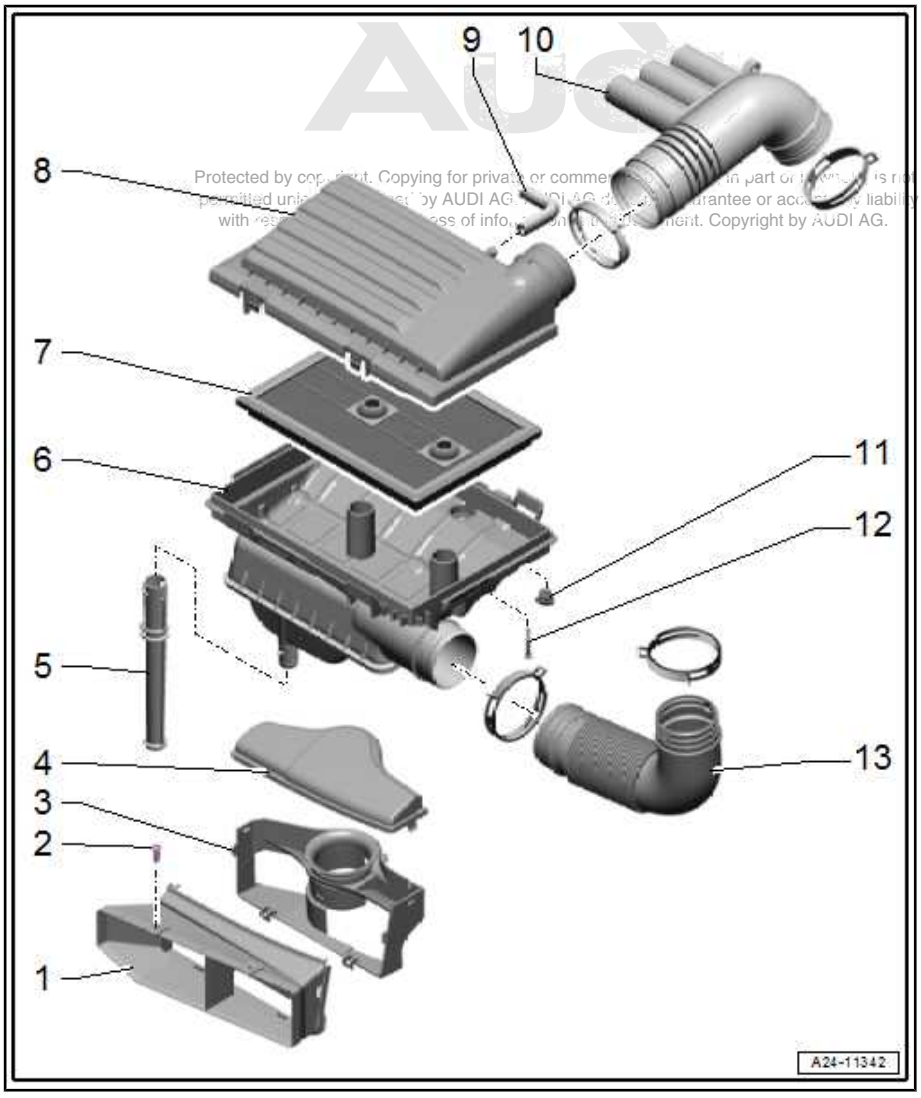


2 Air cleaner

⇒ "2.1 Exploded view - air cleaner housing", page 297

⇒ "2.2 Removing and installing air cleaner housing", page 298

2.1 Exploded view - air cleaner housing



1 - Air duct

- ❑ On lock carrier

2 - Bolt

- ❑ 5 Nm

3 - Air duct (bottom section)

- ❑ On lock carrier

4 - Air duct (top section)

- ❑ On lock carrier

5 - Water drain

- ❑ Clean

6 - Air cleaner (bottom section)

- ❑ Remove any salt residue, dirt and leaves

7 - Air filter element

- ❑ Use genuine air filter element ⇒ Electronic parts catalogue
- ❑ Change intervals ⇒ Maintenance tables
- ❑ Removing and installing ⇒ Maintenance ; Booklet 820

8 - Air cleaner (top section)

- ❑ Remove any salt residue, dirt and leaves

9 - Hose

- ❑ For crankcase breather
- ❑ Different versions available; for allocation refer to ⇒ Electronic parts catalogue

10 - Air hose

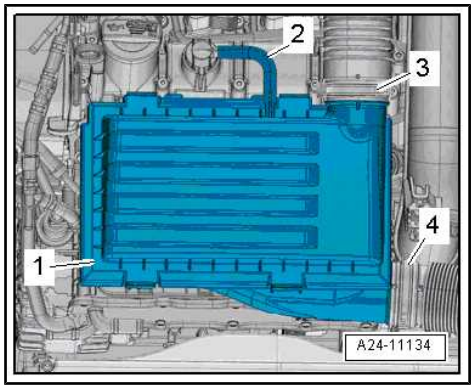
11 - Rubber buffer

12 - Bolt

- ❑ 1.5 Nm

13 - Air hose

2.2 Removing and installing air cleaner housing



Removing

– Remove engine cover panel
⇒ “3.1 Removing and installing engine cover panel”, page 44 .

– Lift air cleaner housing -1- off ball studs.

– Release hose clips -3 and 4- and detach air ducts and crankcase breather hose -2-.

Installing

Note

- *If the air filter element is very dirty or wet, dirt or water could reach components and affect the measured values. This will cause a loss of power, as the calculated injection quantities will be too low.*
- *Always use genuine air filter elements (same as original equipment).*
- *The air cleaner housing must always be clean.*
- *Hose connections and air pipes/hoses must be free of oil and grease prior to fitting.*
- *Use a lubricant (silicone-free) when installing air hoses.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *To prevent malfunctions, cover critical parts of the engine air intake (air pipes etc.) with a clean cloth when blowing out the air cleaner housing with compressed air.*
- *Observe environmental requirements for disposal.*

– Clean salt residue, dirt and leaves out of air cleaner housing (top and bottom sections) using a vacuum cleaner.

– Blow out water drain with compressed air.

– Install engine cover panel
⇒ “3.1 Removing and installing engine cover panel”, page 44 .

Tightening torques

- ⇒ “2.1 Exploded view - air cleaner housing”, page 297

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 Intake manifold

⇒ “3.1 Exploded view - intake manifold”, page 299

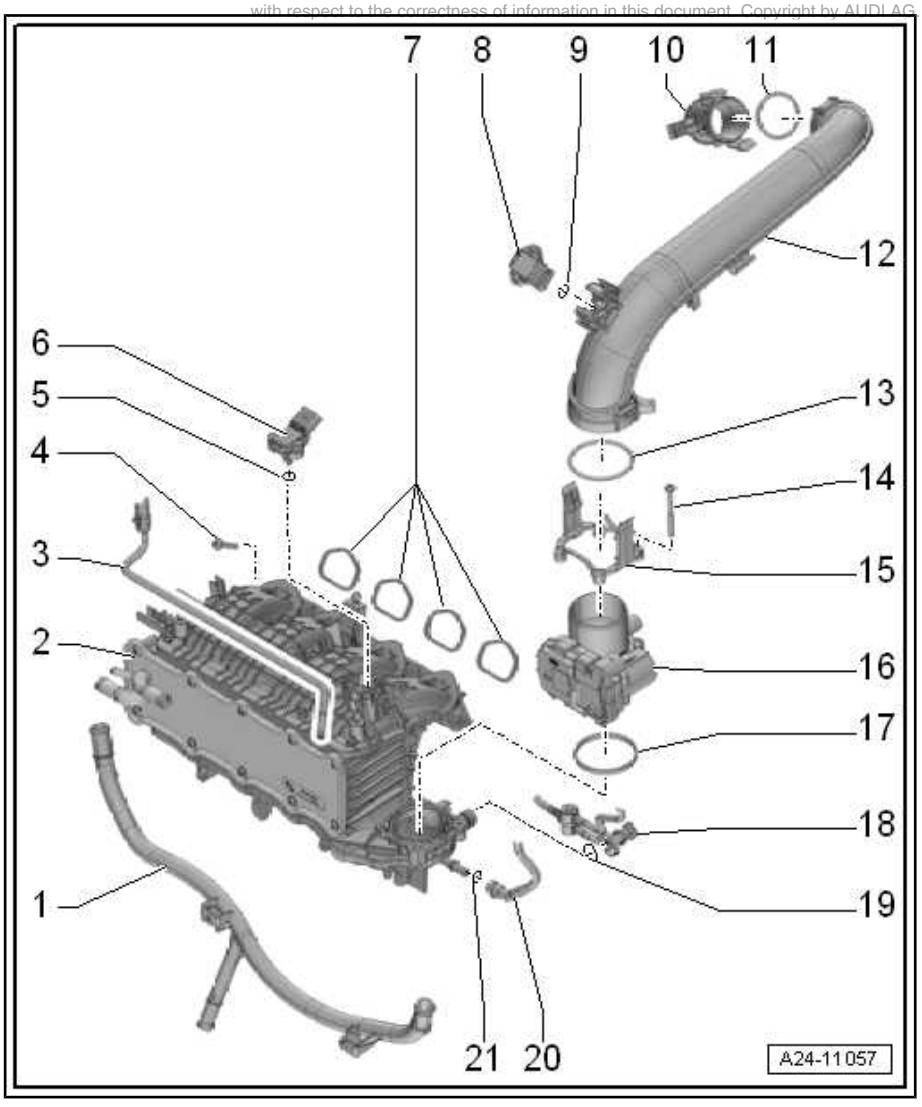
⇒ “3.2 Removing and installing intake manifold”, page 300

⇒ “3.3 Removing and installing throttle valve module J338 ”, page 308

⇒ “3.4 Cleaning throttle valve module”, page 310

3.1 Exploded view - intake manifold

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 pipe

- ❑ Clipped onto intake manifold

2 - Intake manifold

- ❑ Combined with charge air cooler
- ❑ Removing and installing ⇒ “3.2 Removing and installing intake manifold”, page 300

3 - Coolant pipe

- ❑ Clipped onto intake manifold

4 - Bolt

- ❑ Tightening torque and sequence ⇒ Fig. ““Intake manifold - tightening torque and sequence”“ , page 300

5 - O-ring

- ❑ If necessary, renew after removing

6 - Intake air temperature sender - G42-

- ❑ Removing and installing ⇒ “5.1 Removing and installing intake air temperature sender G42 ”, page 320

7 - Gaskets

- ❑ Renew after removing

8 - Charge pressure sender - G31-

- ❑ Removing and installing ⇒ “2.2 Removing and installing charge pressure sender G31 ”, page 285

9 - O-ring

- ❑ If necessary, renew after removing

10 - Connection

11 - O-ring

- ❑ Renew after removal (apply thin coating of clean engine oil prior to installation)

12 - Air pipe

13 - O-ring

- ❑ Renew after removal (apply thin coating of clean engine oil prior to installation)

14 - Bolt

- ❑ Thread-forming
- ❑ Fit and screw in bolt by hand so that it is screwed into old thread. Then tighten bolt to torque.
- ❑ 7 Nm

15 - Retaining clip

- ❑ For air pipe

16 - Throttle valve module - J338-

- ❑ Removing and installing ⇒ “3.3 Removing and installing throttle valve module J338 ”, page 308
- ❑ Cleaning ⇒ “3.4 Cleaning throttle valve module”, page 310
- ❑ After renewing, adapt engine control unit - J623- to new throttle valve module - J338- using `Guided Functions` ⇒ Vehicle diagnostic tester.

17 - Seal

- ❑ Renew after removing

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 - Vacuum line

19 - O-ring

- ❑ Renew after removing

20 - Vacuum line

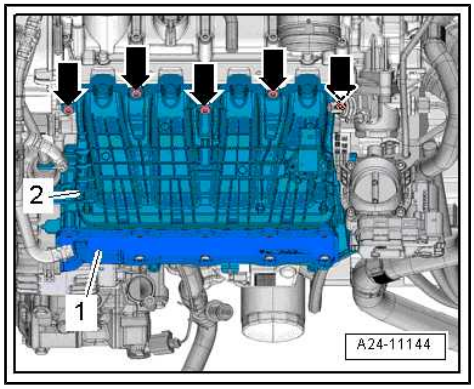
21 - O-ring

- ❑ Renew after removing

Intake manifold - tightening torque and sequence

– Tighten bolts in stages as follows:

Stage	Bolts	Tightening torque
1.	-arrows-	Starting in centre, screw in bolts alternately by hand until they make contact
2.	-arrows-	Starting in centre, screw in bolts alternately: 8 Nm



3.2 Removing and installing intake manifold

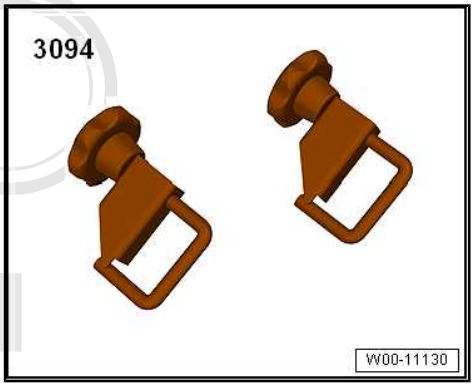
⇒ “3.2.1 Removing and installing intake manifold, vehicles with clipped coolant pipe”, page 300

⇒ “3.2.2 Removing and installing intake manifold, vehicles with bolted coolant pipe”, page 304

3.2.1 Removing and installing intake manifold, vehicles with clipped coolant pipe

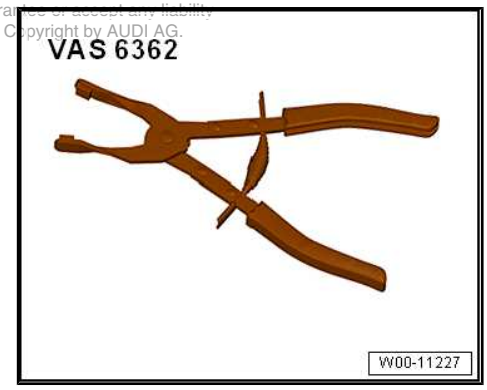
Special tools and workshop equipment required

- Hose clamps, up to 25 mm - 3094-

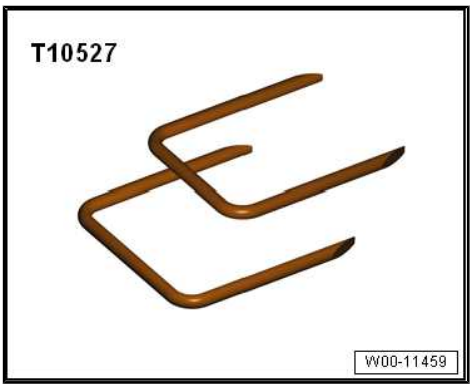


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Hose clip pliers - VAS 6362-



- Release tool - T10527- and -T10527/1-



Removing

– Remove air cleaner housing
⇒ “2.2 Removing and installing air cleaner housing”, page 298 .

– Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

Caution

Risk of malfunctions caused by dirt.

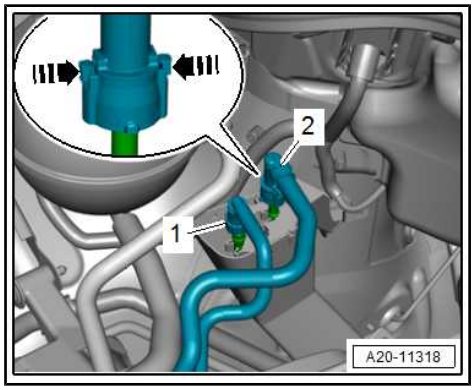
- *Observe rules for cleanliness*
⇒ “3.1 Rules for cleanliness”, page 5 .

WARNING

The fuel system is pressurised.

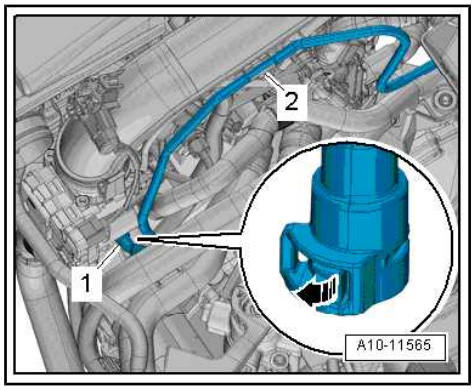
Risk of injury as fuel may spray out.

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

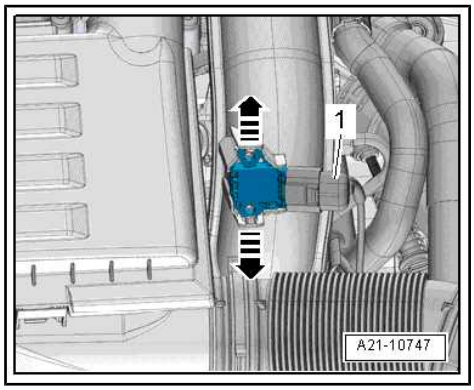


– First press hose connector -2- downwards, and then press release tabs -arrows-.
– Pull off hose connector, keeping release tabs depressed.
– Press release tab on hose -1- for activated charcoal filter.
– Disconnect hose and move it clear.

– Release catch -arrow- and disconnect vacuum hose -1-.
– Move vacuum hose clear at air pipe -2-.
– Move air hoses clear at air pipe.



– Unplug electrical connector -1-.

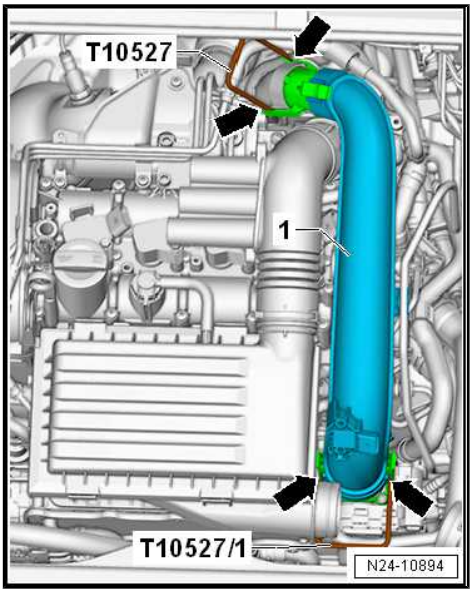


Note

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.

– Release fasteners -arrows- with release tool - T10527- and - T10527/1- .
– Detach air pipe -1-.
– Detach air duct from lock carrier.



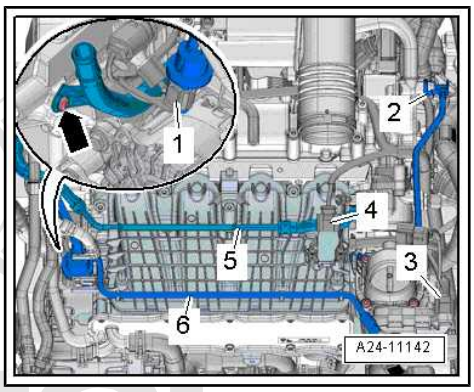
– Unplug electrical connectors:

1 - For activated charcoal filter solenoid valve 1 - N80-

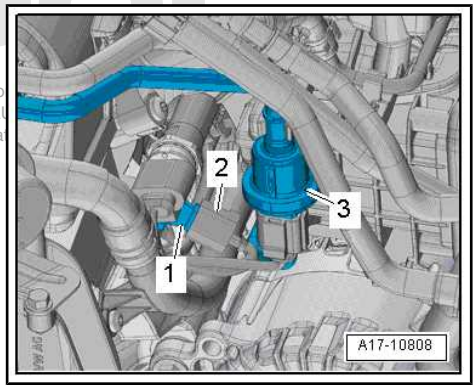
3 - For throttle valve module - J338-

4 - For intake air temperature sender - G42-

– Remove bolt -arrow-.
– Press release tabs and disconnect hose -2- for activated charcoal filter.
– Unclip fuel supply line -5- and coolant line -6- from intake manifold and push them to one side.



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

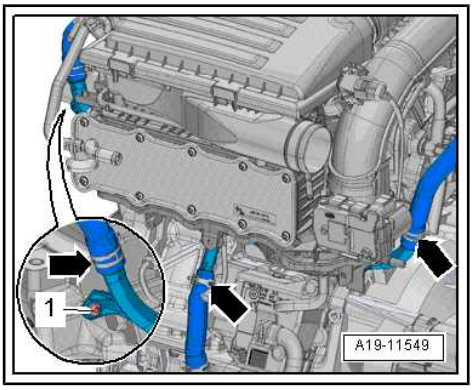


Protected by copyright. Copying for private o
permitted unless authorised by AUDI AG. Au
with respect to the correctness of informa

Note

Disregard -item 3-.

– Clamp off coolant hoses with hose clamps up to 25 mm - 3094- .



Note

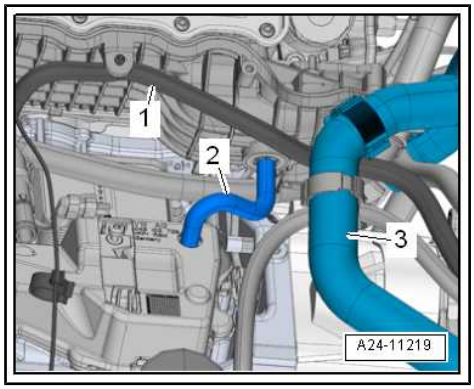
Place a cloth underneath to catch escaping coolant.

– Release hose clips -arrows- and disconnect coolant hoses.

Note

Disregard -item 1-.

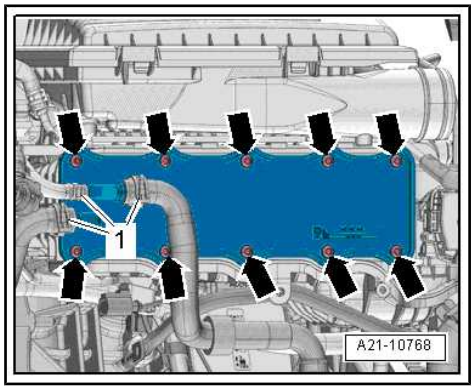
– Move electrical wiring harness -1- and coolant hose -3- clear at intake manifold.
– Disconnect crankcase breather hose -2-.



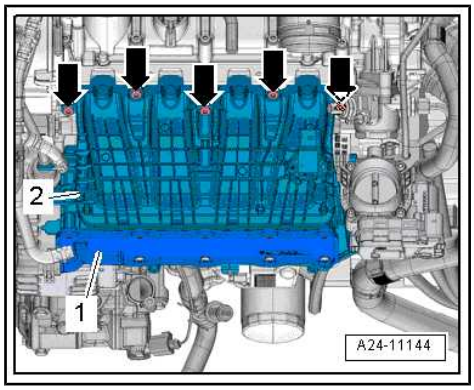
– Remove bolts -arrows-.

Note

Disregard -item 1-.



– Remove bolts -arrows-.
– Detach intake manifold -2-; at the same time pull off charge air cooler -1-.



Installing

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

Note

Renew seals and O-rings.

– Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

Tightening torques

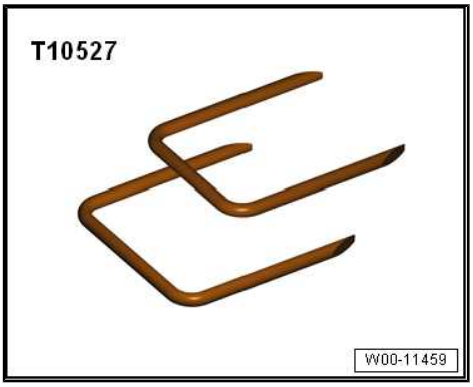
- ⇒ “3.1 Exploded view - coolant pipes”, page 257
- ⇒ “2.1 Exploded view - charge air system”, page 284
- ⇒ “2.1 Exploded view - air cleaner housing”, page 297
- ⇒ “3.1 Exploded view - intake manifold”, page 299
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

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.

3.2.2 Removing and installing intake manifold, vehicles with bolted coolant pipe

Special tools and workshop equipment required

♦ Release tool - T10527- and -T10527/1-



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.

Removing

– Remove air cleaner housing ⇒ “2.2 Removing and installing air cleaner housing”, page 298 .

– Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

Caution

Risk of malfunctions caused by dirt.

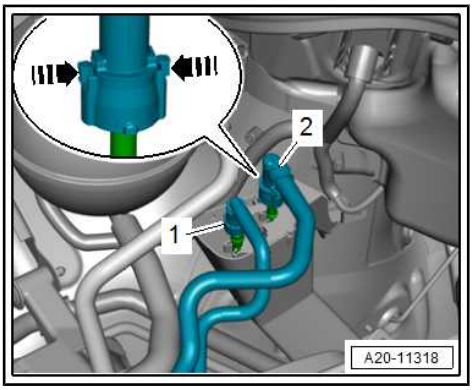
♦ *Observe rules for cleanliness ⇒ “3.1 Rules for cleanliness”, page 5 .*

WARNING

The fuel system is pressurised.

Risk of injury as fuel may spray out.

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



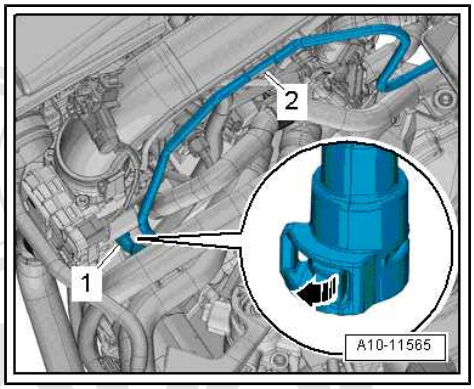
– First press hose connector -2- downwards, and then press release tabs -arrows-.

– Pull off hose connector, keeping release tabs depressed.

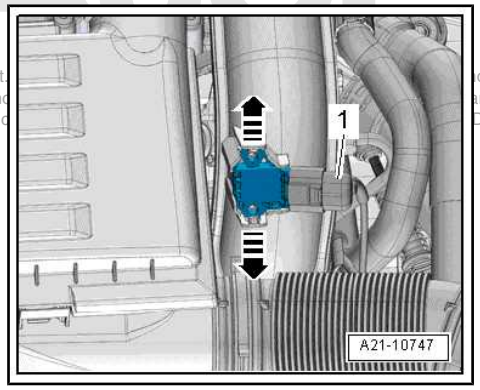
– Press release tab on hose -1- for activated charcoal filter.

– Disconnect hose and move it clear.

– Release catch -arrow- and disconnect vacuum hose -1-.
– Move vacuum hose clear at air pipe -2-.
– Move air hoses clear at air pipe.



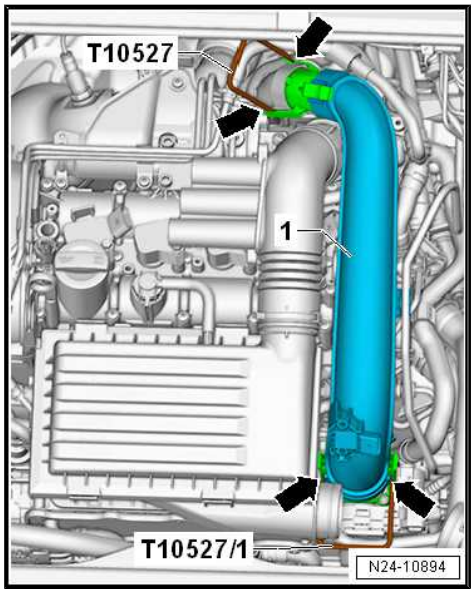
– Unplug electrical connector -1-.



Note

Disregard -arrows-.

– Release fasteners -arrows- with release tool - T10527- and - T10527/1- .
– Detach air pipe -1-.
– Detach air duct from lock carrier.



Protected by copyright. ole, is not permitted unless autho any liability with respect to the c DI AG.

– Unplug electrical connectors:

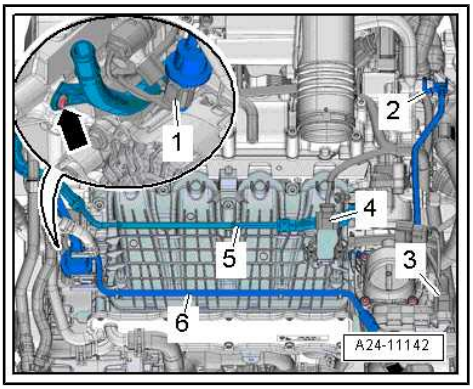
1 - For activated charcoal filter solenoid valve 1 - N80-

3 - For throttle valve module - J338-

4 - For intake air temperature sender - G42-

– Press release tabs and disconnect hose -2- for activated charcoal filter.

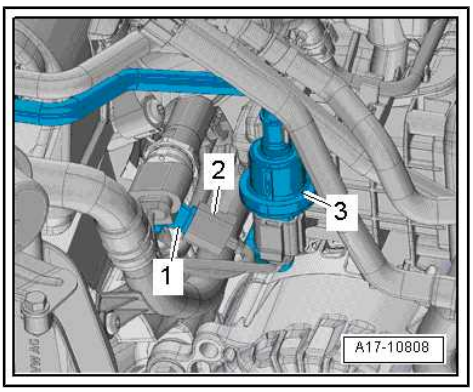
– Unclip fuel supply line -5- and coolant line -6- from intake manifold and push them to one side.



Note

Disregard -arrow-.

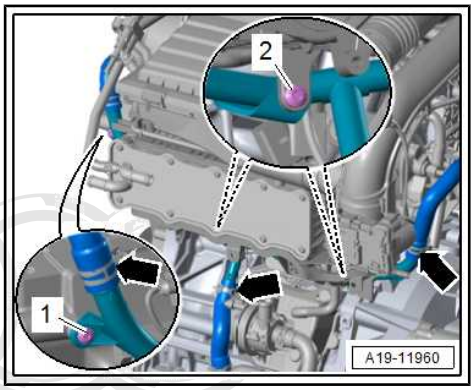
– Unplug electrical connector -2- on oil pressure switch for reduced oil pressure - F378- -item 1-.



Note

Disregard -item 3-.

– Remove bolts -1, 2-.

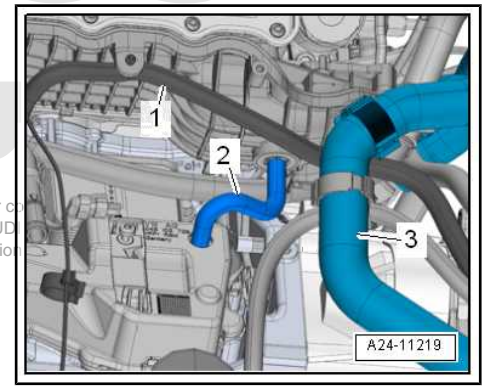


Note

Disregard -arrows-.

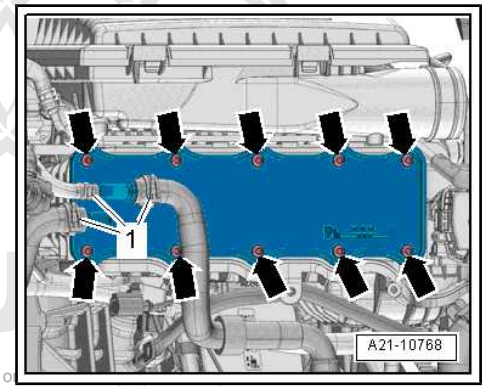
– Move electrical wiring harness -1- and coolant hose -3- clear at intake manifold.

– Disconnect crankcase breather hose -2-.



Protected by copyright. Copying for private or c
permitted unless authorised by AUDI AG. AUD
with respect to the correctness of information

– Remove bolts -arrows-.



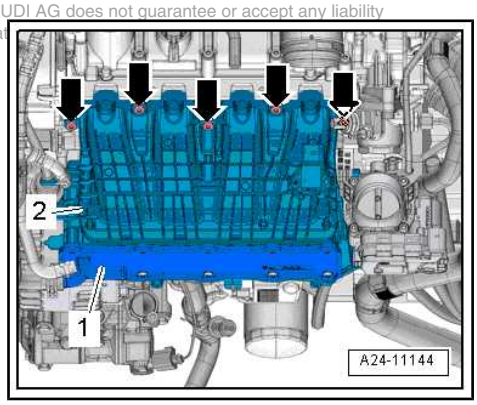
Note

Disregard -item 1-.

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

– Remove bolts -arrows-.

– Detach intake manifold -2-; at the same time pull off charge air cooler -1-.



Installing

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

Note

Renew seals and O-rings.

– Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

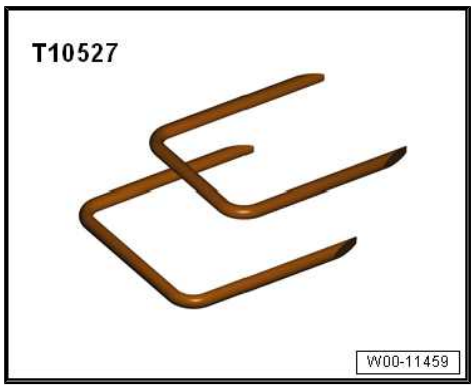
Tightening torques

- ⇒ “3.1 Exploded view - coolant pipes”, page 257
- ⇒ “2.1 Exploded view - charge air system”, page 284
- ⇒ “2.1 Exploded view - air cleaner housing”, page 297
- ⇒ “3.1 Exploded view - intake manifold”, page 299
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

3.3 Removing and installing throttle valve module - J338-

Special tools and workshop equipment required

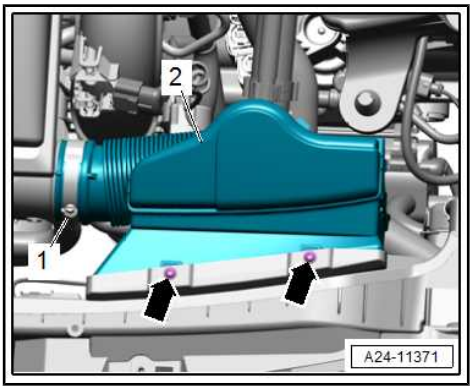
- Release tool - T10527- and -T10527/1-



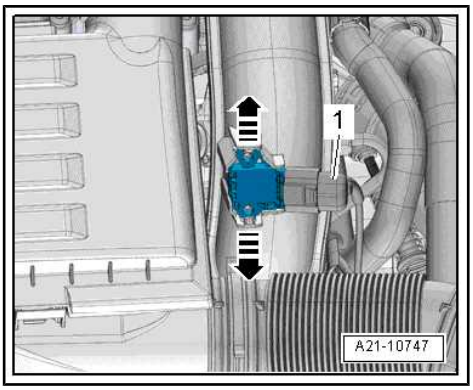
Removing

– Remove bolts -arrows-.

– Release hose clip -1- and detach air duct.



– Unplug electrical connector -1-.

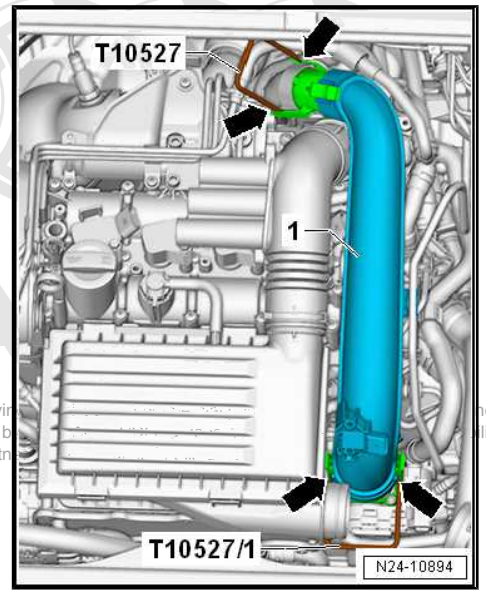


Note

Disregard -arrows-.

– Release fasteners -arrows- with release tool - T10527- and - T10527/1- .

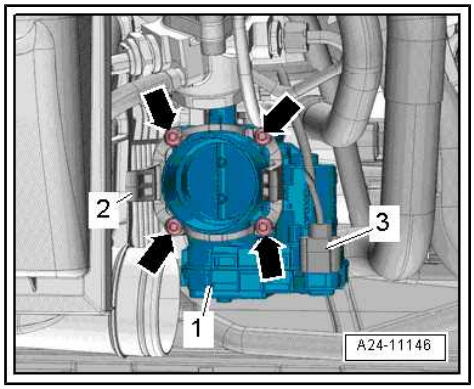
– Detach air pipe -1-.



Protected by copyright. Copyin
permitted unless authorised b
with respect to the correctn
not
ility

– Unplug electrical connector -3-.

– Remove bolts -arrows- and detach throttle valve module - J338- -item 1- with adapter -2-.



Installing

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

Note

Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .

– After renewing, adapt engine control unit - J623- to new throttle valve module - J338- using Guided Functions ⇒ Vehicle diagnostic tester.

Tightening torques

- ⇒ “2.1 Exploded view - charge air system”, page 284
- ⇒ “2.1 Exploded view - air cleaner housing”, page 297
- ⇒ “3.1 Exploded view - intake manifold”, page 299

3.4 Cleaning throttle valve module

Note

- *Carbon deposits and dirt in the limit stop can lead to incorrect adaption values.*
- *Take care not to scratch the throttle valve housing when cleaning it.*

Special tools and workshop equipment required

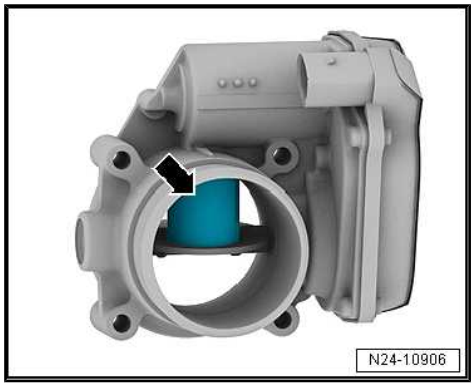
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Acetone (commercially available)
- Brush

Procedure

– Remove throttle valve module - J338- ⇒ “3.3 Removing and installing throttle valve module J338 ”, page 308 .

– Open throttle valve by hand and lock it in open position with a wedge (plastic or wood) -arrow-.

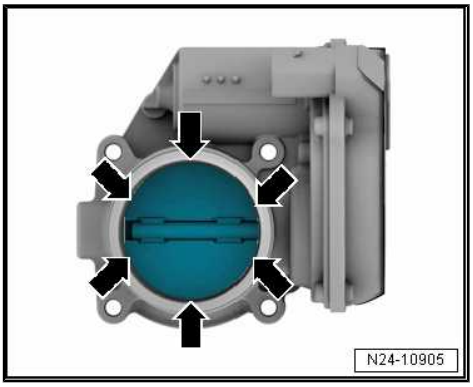


WARNING

Acetone is highly flammable.

- ***Observe all accident prevention regulations and safety precautions when handling flammable liquids.***
- ***Do not use compressed air when cleaning the throttle valve.***
- ***Wear safety goggles and protective clothing to avoid any contact with skin and risk of injury.***

– Clean throttle valve housing thoroughly, especially around the points -arrows- where the throttle valve closes, using commercially available acetone and a small brush.
– Wipe out throttle valve housing with a lint-free cloth.
– Allow acetone to flash off completely.
– Install throttle valve module - J338-
⇒ “3.3 Removing and installing throttle valve module J338 ”, page 308 .
– Erase learnt values and adapt engine control unit - J623- to throttle valve module - J338- in `Guided Functions` mode ⇒ 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.

4 Injectors

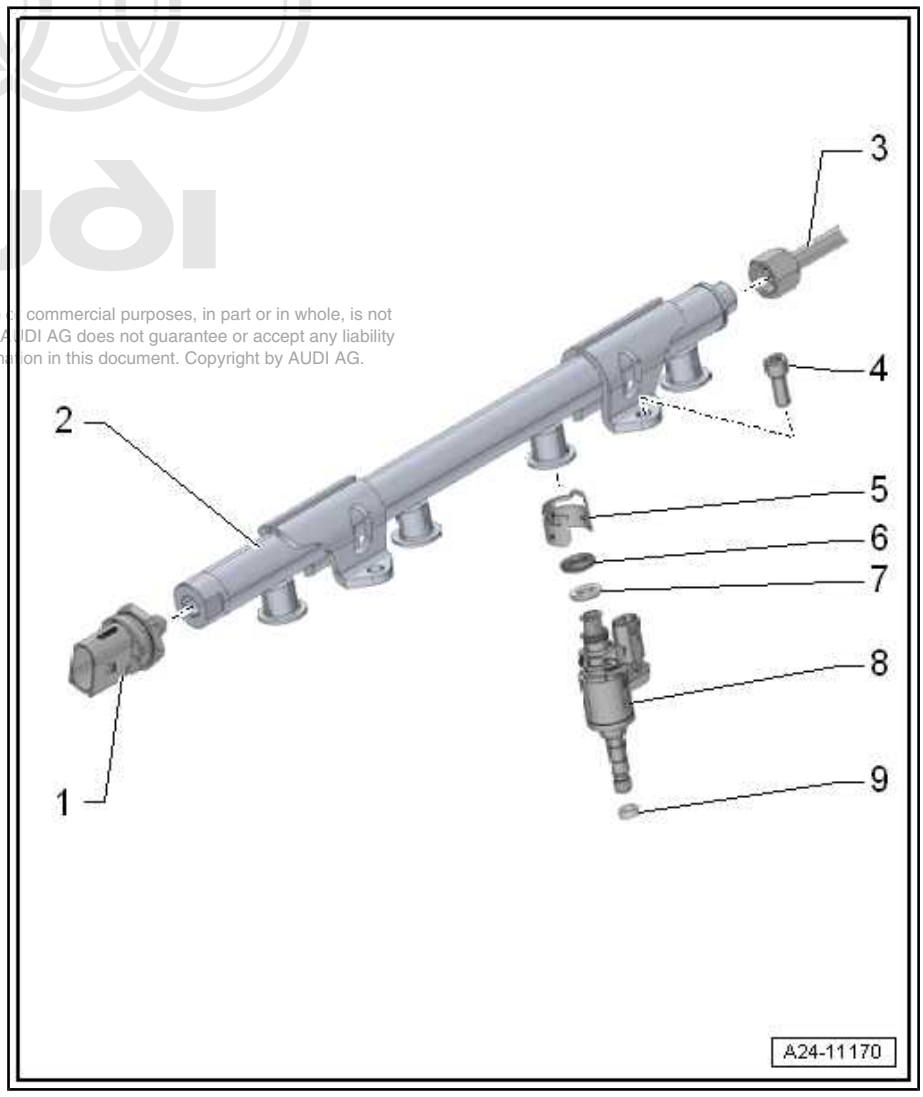
⇒ “4.1 Exploded view - fuel rail with injectors”, page 312

⇒ “4.2 Removing and installing fuel rail”, page 313

⇒ “4.3 Removing and installing injectors”, page 313

⇒ “4.4 Cleaning injectors”, page 318

4.1 Exploded view - fuel rail with injectors



1 - Fuel pressure sender - G247-

- ❑ Renew after removing
- ❑ Checking ⇒ “5.3 Checking fuel pressure sender G247 ”, page 321
- ❑ Removing and installing ⇒ “5.2 Removing and installing fuel pressure sender G247 ”, page 320
- ❑ Lubricate taper and threads lightly with clean engine oil
- ❑ 35 Nm

2 - Fuel rail

- ❑ Removing and installing ⇒ page 313

3 - High-pressure pipe

- ❑ Renew after removing
- ❑ Connections must not be damaged
- ❑ Do not alter shape
- ❑ Removing and installing ⇒ “6.3 Removing and installing high-pressure pipe”, page 327
- ❑ Lubricate threads of union nuts with clean engine oil
- ❑ 16 Nm + 45°

4 - Bolt

- ❑ Tighten alternately in stages; final torque 9 Nm

5 - Support ring

- ❑ Renew after removing
- ❑ Via this support ring, the fuel rail exerts the clamping force that holds the injector in the cylinder head
- ❑ Clipped to -item 8-

6 - O-ring

- ❑ Renew after removing
- ❑ Lubricate lightly with clean engine oil

7 - Spacer ring

- ❑ 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.

8 - Injector

- ❑ Removing and installing ⇒ “4.3 Removing and installing injectors”, page 313

9 - Combustion chamber ring seal

- ❑ Do not apply grease or use any other lubricants
- ❑ Renewing ⇒ “4.3 Removing and installing injectors”, page 313

4.2 Removing and installing fuel rail

Removing

Caution

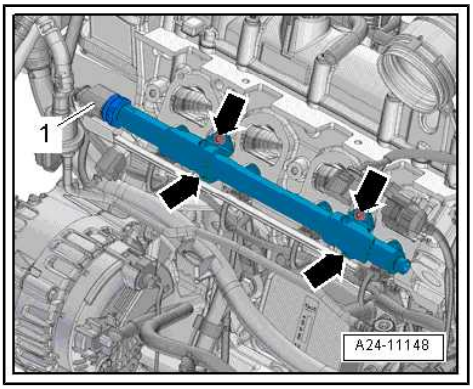
Risk of malfunctions caused by dirt.

- ♦ *Observe rules for cleanliness ⇒ “3.1 Rules for cleanliness”, page 5 .*

– Remove intake manifold ⇒ “3.2 Removing and installing intake manifold”, page 300 .

– Remove high-pressure pipe ⇒ “6.3 Removing and installing high-pressure pipe”, page 327 .

– Unplug electrical connector -1-.



Note

Place a cloth underneath to catch escaping fuel.

– Remove bolts -arrows- and pull fuel rail off injectors.

Installing

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

Note

Fit new O-ring.

– Apply mountings on fuel rail onto injectors.

– Press fuel rail onto injectors as far as stop (first on right side, then on left side).

– Press fuel rail down firmly in vicinity of bracket and screw in bolts two turns.

– Install high-pressure pipe ⇒ “6.3 Removing and installing high-pressure pipe”, page 327 .

– Install intake manifold ⇒ “3.2 Removing and installing intake manifold”, page 300 .

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.

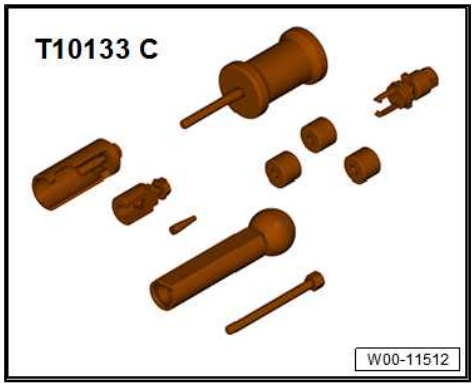
Tightening torques

♦ ⇒ “4.1 Exploded view - fuel rail with injectors”, page 312

4.3 Removing and installing injectors

Special tools and workshop equipment required

- Tool set for FSI engines - T10133 C- with -T10133/16A- and -T10133/19-

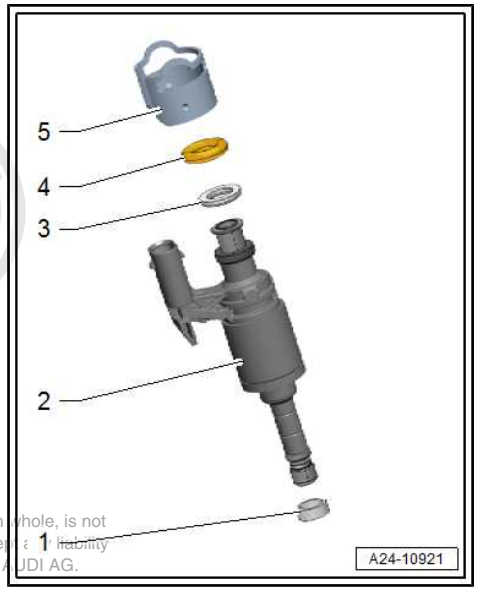


Removing

Caution

Risk of malfunctions caused by dirt.

- ***Observe rules for cleanliness***
  ⇒ "3.1 Rules for cleanliness", page 5 .



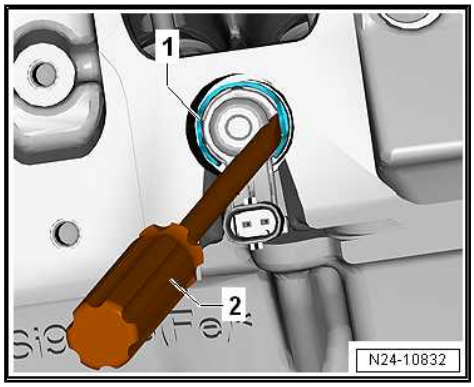
Note

Injectors must only be installed when the engine is cold.

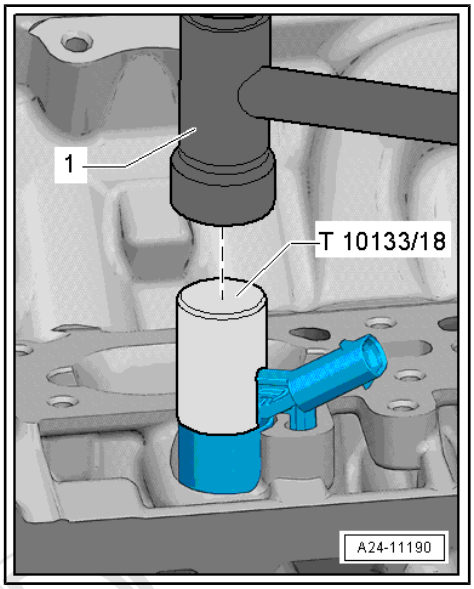
– Remove fuel rail
⇒ "4.2 Removing and installing fuel rail", page 313 .
– Remove O-ring -4- from injector -2-.
– Unplug electrical connector from corresponding injector.

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

– Use screwdriver -2- to prise support ring -1- off injector.



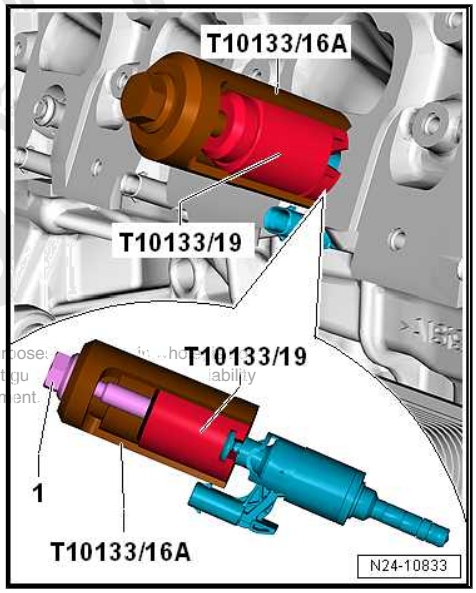
– Slide stop sleeve -T10133/18- over injector.
– Carefully knock against stop sleeve several times with a plastic hammer -1- to loosen injector.



Note

- *Use a torque wrench to pull out injector.*
- *Set torque wrench to 5 Nm.*
- *Observe correct torque to avoid irreparable damage to injector.*

– Apply puller -T10133/19- to groove on injector.
– Attach removal tool -T10133/16 A- to puller.
– Pull out injector by screwing in bolt -1-.
– If injector does not come loose after limit torque of 5 Nm is reached, remove puller and repeat procedure using stop sleeve to loosen injector.
– Repeat procedure for each injector.
– Detach gasket for intake manifold (bottom section).

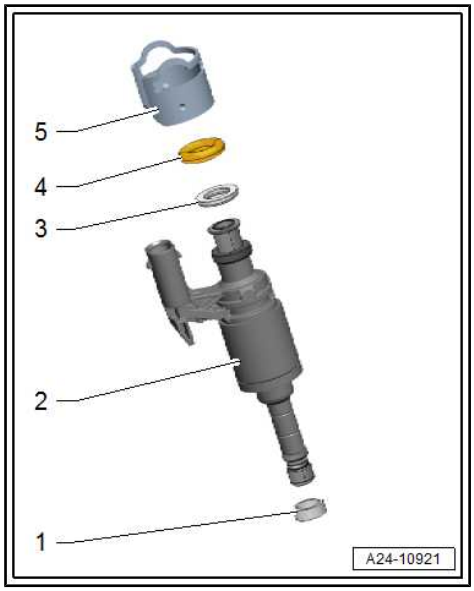


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document.

Dismantling injector

– Pull support ring -5- and spacer ring -3- off injector -2-.

– Carefully remove old combustion chamber ring seal -1-. To do so, cut open seal using knife or prise open with small screwdriver and then pull off forwards.



Note

Take care not to damage groove on injector. The injector must be renewed if the groove is damaged.

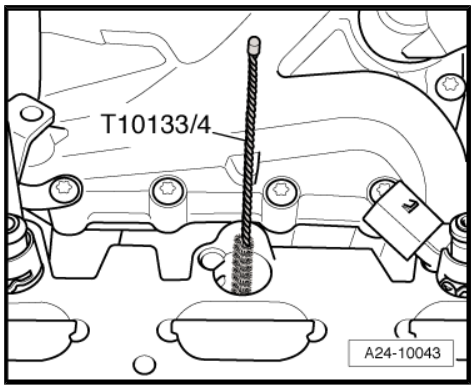
Installing

Note

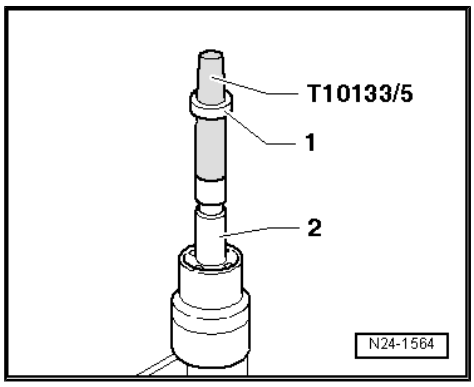
- *Use complete repair set when installing.*
- *Renew support ring.*
- *Renew combustion chamber ring seal before re-installing injector.*
- *Lubricate O-rings of injectors lightly with clean engine oil.*

– Clean bore in cylinder head with nylon cylinder brush - T10133/4- .

– When re-installing an injector, clean any combustion residue off groove for combustion chamber ring seal and injector stem with a clean cloth.

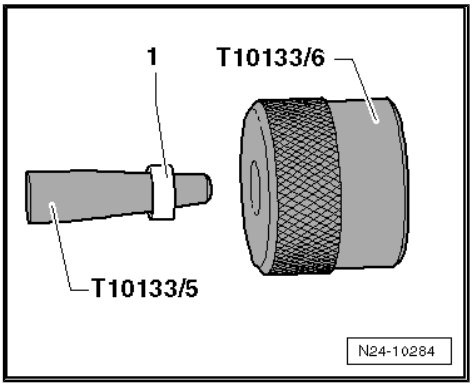


– Fit assembly cone -T10133/5- with new combustion chamber ring seal -1- onto injector -2-.

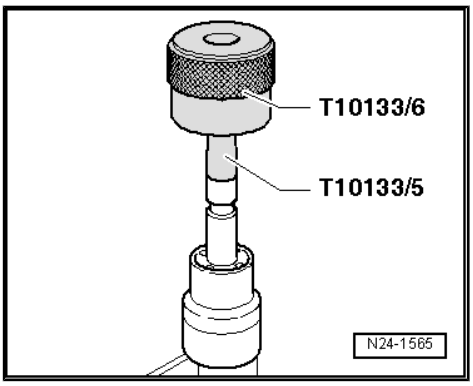


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Using assembly sleeve -T10133/6- , push combustion chamber ring seal onto assembly cone -T10133/5- as far as it will go.



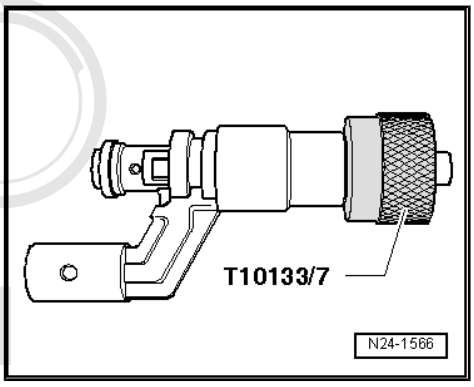
– Turn round assembly sleeve -T10133/6- and slide combustion chamber ring seal into groove.



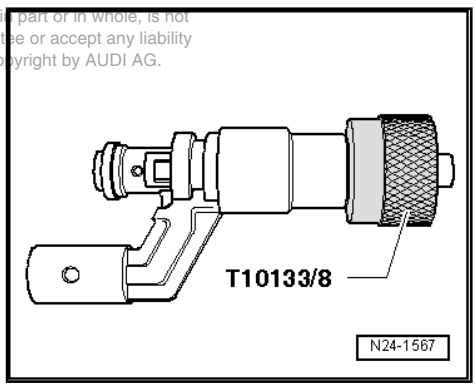
Note

The combustion chamber ring seal is widened when it is pushed onto the injector. After pushing it on, it therefore has to be compressed again. This is done in two stages, as described below.

– Push calibration sleeve -T10133/7- onto injector as far as it will go and simultaneously turn it slightly (approx. 180°).
– Pull calibration sleeve -T10133/7- off again by turning it in the opposite direction.

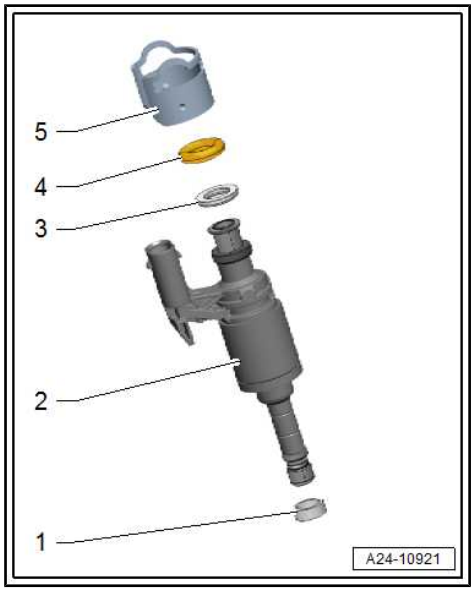


– Push calibration sleeve -T10133/8- onto injector as far as it will go and simultaneously turn it slightly (approx. 180°).
– Pull calibration sleeve -T10133/8- off again by turning it in the opposite direction.



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.

– Before installing new injector -2-, lubricate new O-ring -4- lightly with clean engine oil.



Note

The combustion chamber ring seal -1- must not be lubricated.

– Fit gasket for intake manifold (bottom section).

– Push injector by hand as far as it will go into aperture in cylinder head (do not use oil or grease). Ensure that the injector is properly seated in the cylinder head.

• Electrical connector of injector must engage in recess in cylinder head.

Note

It should be possible to insert injector easily. If necessary wait until the combustion chamber ring seal has contracted sufficiently.

– Install fuel rail
⇒ “4.2 Removing and installing fuel rail”, page 313 .

– Connect ⇒ Vehicle diagnostic tester and perform the function “Delete adaption values for injectors” in Guided Functions.

4.4 Cleaning injectors

Special tools and workshop equipment required

♦ Ultrasonic cleaning unit - VAS 6418-

♦ Mounting plate for injection modules - VAS 6418/1-

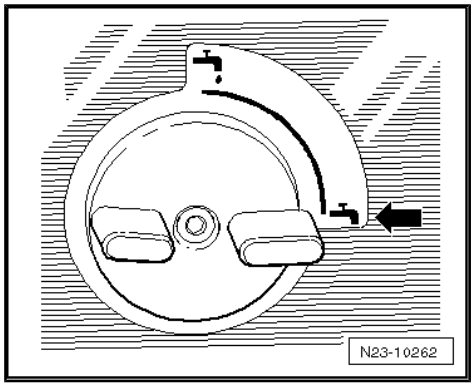
♦ Cleaning fluid - VAS 6418/2-

Cleaning

– Remove injectors ⇒ page 313 .

– Close drain tap -arrow- on ultrasonic cleaning unit - VAS 6418- (located on right side of housing).

– Fill ultrasonic unit with 2,120 ml of water which has been allowed to settle for a few minutes and cleaning fluid - VAS 6418/2- .

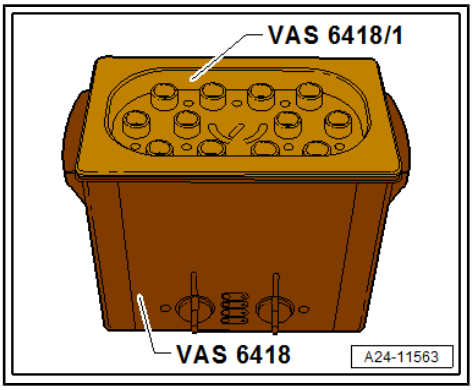


Mixture ratio for cleaning fluid

• 2,100 ml of tap water which has been allowed to settle for a few minutes and 20 ml of cleaning fluid - VAS 6418/2-

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.

– Place mounting plate for injection modules - VAS 6418/1- on top of cleaning unit.



WARNING

It is important to read the safety notes in the operating instructions before switching on the ultrasonic cleaning unit - VAS 6418- .

The ideal fluid level is approx. 1-4 mm above the base of the mounting plate. The ultrasonic cleaning unit - VAS 6418- can be damaged if the fluid level is too low.

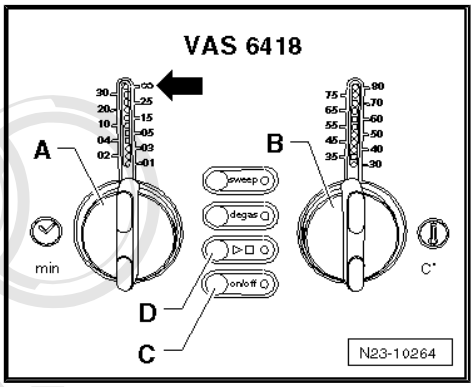
– Insert FSI injectors all the way into guides of mounting plate for injection modules - VAS 6418/1- .

– Switch on cleaning unit by pressing on/off button -C-.

– Select a cleaning time of 30 minutes with rotary control -A-.

– Set rotary control -B- to a temperature of 50°C.

– Press ▶ button -D- to start cleaning procedure.



Note

- *The temperature-controlled cleaning process is now started. While the fluid is being heated, the ultrasound is activated at intervals in order to circulate the cleaning solution. The ultrasound is activated continuously when the preselected temperature is reached.*
- *The actual cleaning process commences when the temperature reaches at least 50 °C and must last for at least 30 minutes.*

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

– After cleaning, renew combustion chamber ring seal for each injector ⇒ “4.3 Removing and installing injectors”, page 313 .

5 Senders and sensors

⇒ “5.1 Removing and installing intake air temperature sender G42 ”, page 320

⇒ “5.2 Removing and installing fuel pressure sender G247 ”, page 320

⇒ “5.3 Checking fuel pressure sender G247 ”, page 321

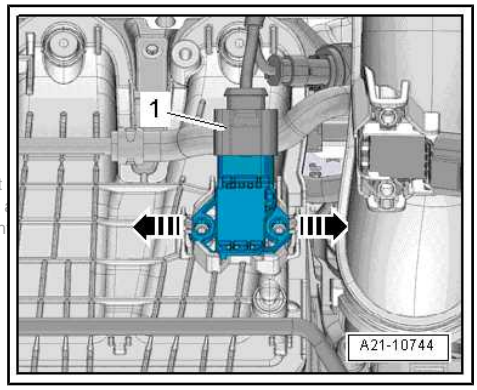
5.1 Removing and installing intake air temperature sender - G42-

Removing

– Remove air cleaner housing ⇒ “2.2 Removing and installing air cleaner housing”, page 298 .

– Unplug electrical connector -1-.

– Release catches -arrows- and detach intake air temperature sender - G42- .



Installing

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

permitted unless authorised by AUDI AG. AUDI AG does not guarantee or
with respect to the correctness of information in this document. Copyrigh

Note

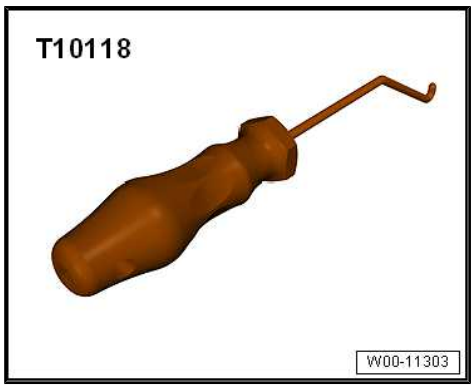
If necessary, renew O-ring after removal.

– Install air cleaner housing ⇒ “2.2 Removing and installing air cleaner housing”, page 298 .

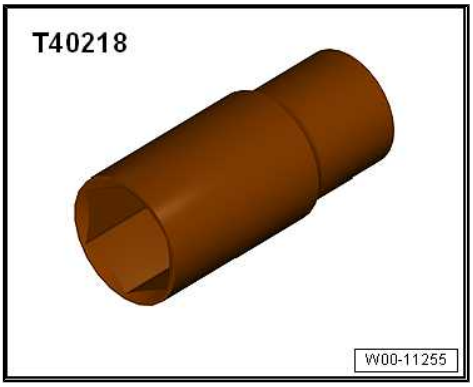
5.2 Removing and installing fuel pressure sender - G247-

Special tools and workshop equipment required

♦ Assembly tool - T10118-

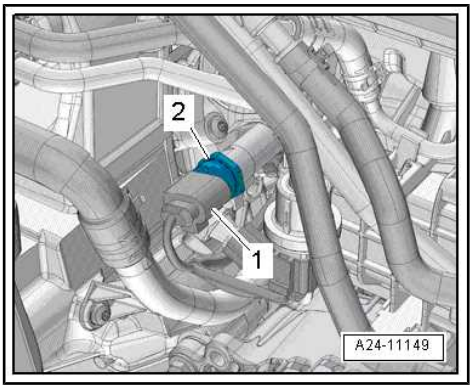


♦ Bit (27 mm) - T40218- or commercially available socket (27 mm)



Removing

– Unplug electrical connector -1-.



WARNING

The fuel system is pressurised.

Risk of injury as fuel may spray out.

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

– Unscrew fuel pressure sender - G247- -2- using bit, 27 mm - T40218- .

Installing

Install in reverse sequence.

Tightening torques

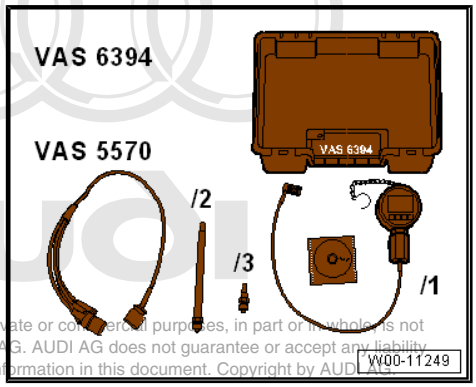
♦ ⇒ “4.1 Exploded view - fuel rail with injectors”, page 312

5.3 Checking fuel pressure sender - G247-

Special tools and workshop equipment required

♦ Vehicle diagnostic tester

♦ Test instrument adapter/DSO (3-pin) - VAS 5570-



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.

♦ Pressure sensor tester - VAS 6394-

Procedure

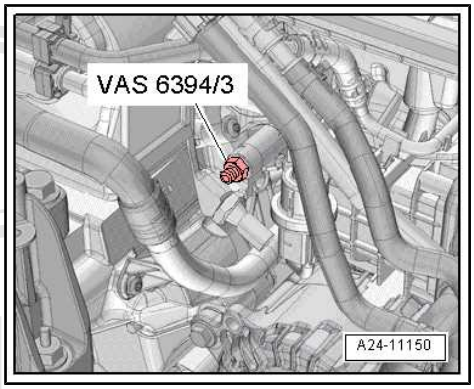
Caution

Risk of malfunctions caused by dirt.

- *Observe rules for cleanliness*
  ⇒ "3.1 Rules for cleanliness", page 5 .

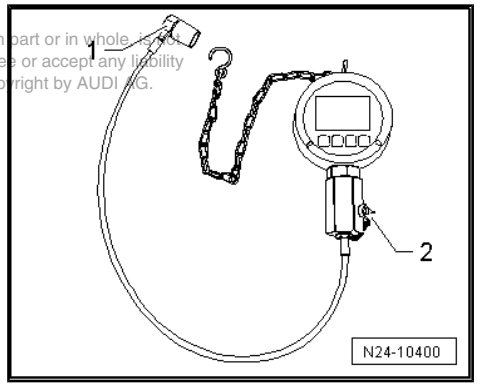
– Remove fuel pressure sender - G247-
⇒ "5.2 Removing and installing fuel pressure sender G247 ", page 320 .

– Lubricate taper seal of adapter -VAS 6394/3- with clean engine oil and screw into fuel rail (22 Nm).

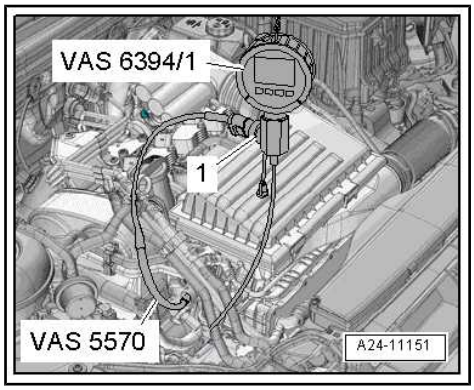


– Unscrew plug -2- and screw fuel pressure sender - G247- into tester -VAS 6394/1- .

– Connect pressure line -1- of tester to adapter - VAS 6394/3- .

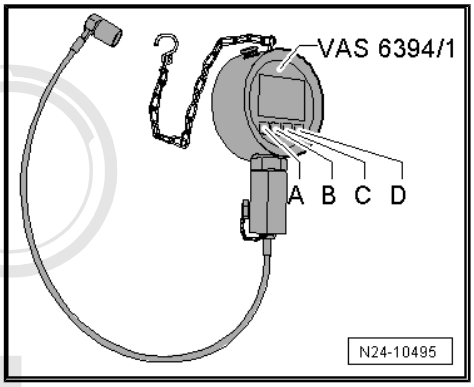


– Connect vehicle and fuel pressure sender - VAS 5570- electrically using test instrument adapter/DSO (3-pin) - G247- .



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.

– Switch on tester -VAS 6394/1- by pressing button -A- once briefly.



Note

- *You can press and hold button -A- for 2 seconds to switch on the illumination for 20 seconds.*
- *If tester -VAS 6394/1- does not indicate 0 bar, zero the tester ⇒ Operating instructions .*

– Connect a vehicle diagnostic tester .

– Start engine and run at idling speed.

– Select “Engine electronics” in vehicle self-diagnosis.

– Then select “Measured values”.

– Select “Fuel pressure” from the list.

– Compare fuel pressure indicated on tester -VAS 6394/1- with actual value displayed on vehicle diagnostic tester .

– Observe fuel pressure displayed on vehicle diagnostic tester.

• The pressure readings must not deviate by more than 5 bar.

– If deviation is more than 5 bar, renew fuel pressure sender - G247- .

– Repeat the test with the new fuel pressure sender - G247- and compare the two pressure values.

– If measured values are now the same, install new fuel pressure sender - G247- .

– If measured values are not the same again, check electrical connection between fuel pressure sender - G247- and engine control unit - J623- ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

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

6 High-pressure pump

⇒ “6.1 Exploded view - high-pressure pump”, page 324

⇒ “6.2 Removing and installing high-pressure pump”, page 326

⇒ “6.3 Removing and installing high-pressure pipe”, page 327

6.1 Exploded view - high-pressure pump

⇒ “6.1.1 Exploded view - high-pressure pump, engine codes CHPB, CZEA, CZDB, CWLA”, page 324

⇒ “6.1.2 Exploded view - high-pressure pump, engine codes CSSA, CZDA”, page 325

6.1.1 Exploded view - high-pressure pump, engine codes CHPB, CZEA, CZDB, CWLA

1 - Fuel return hose

- ❑ Always renew hose clip if removed

2 - Fuel supply line

3 - High-pressure pump

- ❑ With fuel metering valve - N290-
- ❑ Do not dismantle
- ❑ Removing and installing ⇒ “6.2 Removing and installing high-pressure pump”, page 326

4 - Roller tappet

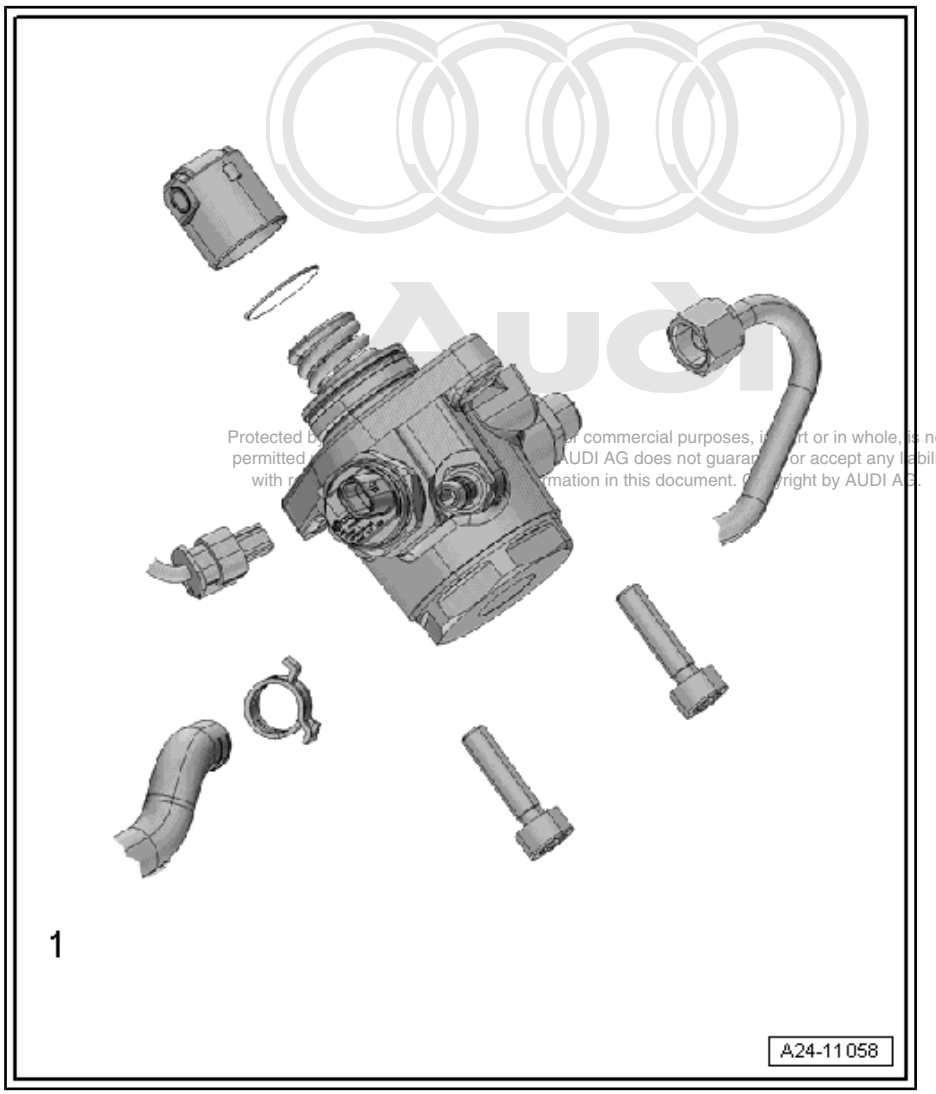
- ❑ When installing lubricate lightly with clean engine oil

5 - O-ring

- ❑ Renew after removing
- ❑ When installing lubricate lightly with clean engine oil

6 - High-pressure pipe

- ❑ Renew after removing
- ❑ Removing and installing ⇒ “6.3 Removing and installing high-pressure pipe”, page 327
- ❑ Do not alter shape
- ❑ Connections must not be damaged
- ❑ Lubricate threads of union nuts with clean engine oil
- ❑ 16 Nm +45°



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

7 - Bolt

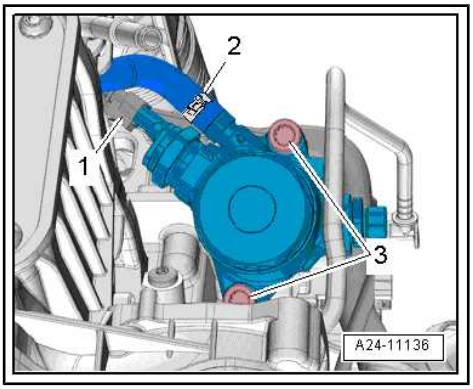
- ❑ Renew after removing
- ❑ Tightening torque and sequence ⇒ Fig. ““High-pressure pump - tightening torque and sequence”“ , page 325

High-pressure pump - tightening torque and sequence

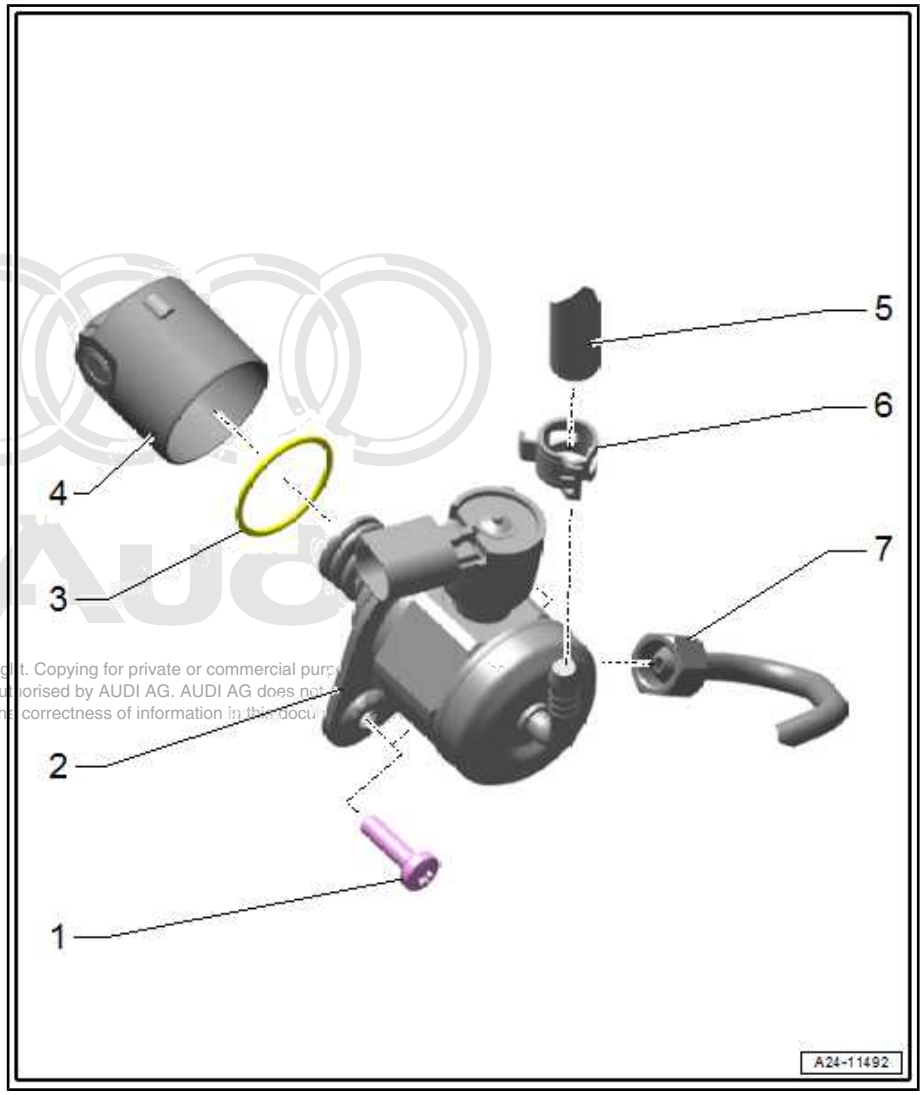
To prevent flange of high-pressure pump from being deformed during installation, fit high-pressure pump as follows:

– Tighten bolts in stages as follows:

Stage	Bolts	Tightening torque/angle specification
1.	-3-	Screw in by hand until contact is made
2.	-3-	Tighten one turn alternately until flange of high-pressure pump makes contact with camshaft housing
3.	-3-	20 Nm
4.	-3-	Turn 90° further



6.1.2 Exploded view - high-pressure pump, engine codes CSSA, CZDA



1 - Bolt

- ❑ Tightening torque and sequence ⇒ Fig. ""High-pressure pump - tightening torque and sequence"", page 326

2 - High-pressure pump

- ❑ With fuel metering valve - N290-
- ❑ Do not dismantle
- ❑ Removing and installing ⇒ "6.2 Removing and installing high-pressure pump", page 326

3 - O-ring

- ❑ Renew after removing
- ❑ When installing lubricate lightly with clean engine oil

4 - Roller tappet

- ❑ When installing lubricate lightly with clean engine oil

5 - Fuel return line

6 - Hose clip

- ❑ Always renew after removing

7 - High-pressure pipe

- ❑ Renew after removing
- ❑ Removing and installing ⇒ "6.3 Removing and installing high-pressure pipe", page 327
- ❑ Do not alter shape
- ❑ Connections must not be damaged
- ❑ Lubricate threads of union nuts with clean engine oil
- ❑ 16 Nm +45°

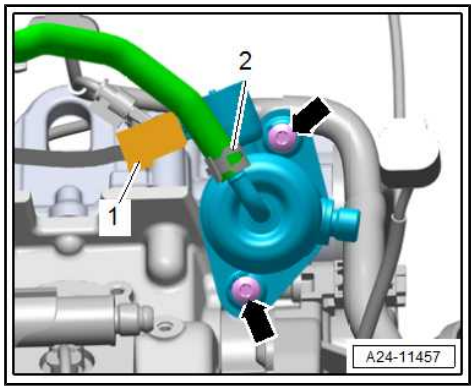
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document.

High-pressure pump - tightening torque and sequence

To prevent flange of high-pressure pump from being deformed during installation, fit high-pressure pump as follows:

– Tighten bolts in stages as follows:

Stage	Bolts	Tightening torque/angle specification
1.	-arrows-	Screw in by hand until contact is made
2.	-arrows-	Tighten one turn alternately until flange of high-pressure pump makes contact with camshaft housing
3.	-arrows-	8 Nm
4.	-arrows-	Turn 90° further



6.2 Removing and installing high-pressure pump

Removing

- Engine cold.

Caution

Risk of malfunctions caused by dirt.

- *Observe rules for cleanliness*
  ⇒ "3.1 Rules for cleanliness", page 5 .

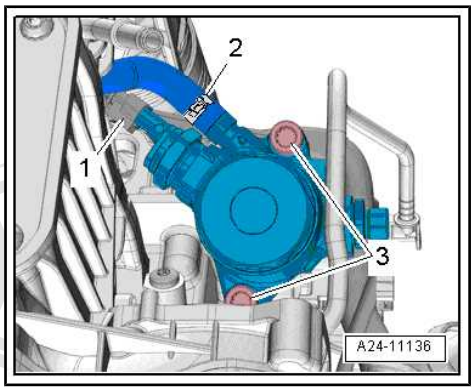
– Remove high-pressure pipe
⇒ "6.3 Removing and installing high-pressure pipe", page 327 .

Engine codes CHPB, CZEA, CZDB, CWLA:

– Unplug electrical connector -1-.

– Release hose clip -2- and detach fuel supply hose.

– Unscrew bolts -3- and detach high-pressure pump with roller tappet.

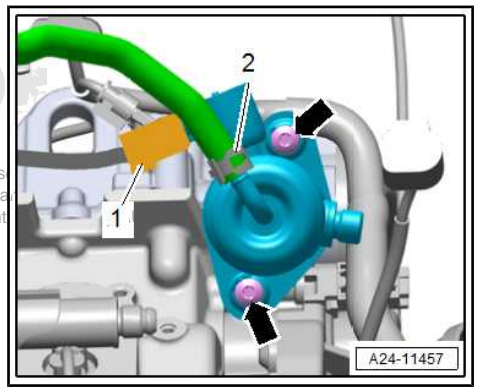


Engine codes CSSA, CZDA:

– Unplug electrical connector -1-.

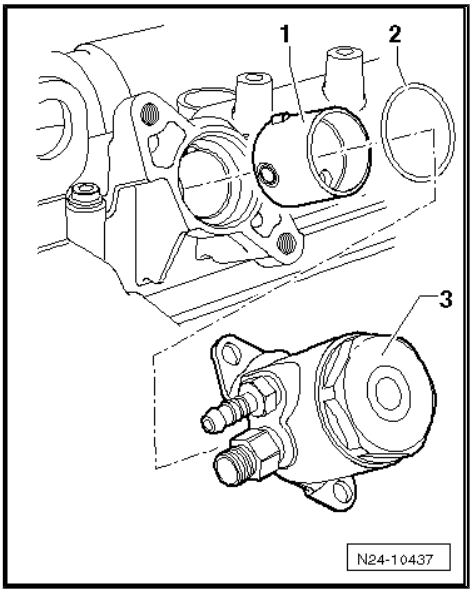
– Release hose clip -2- and detach fuel supply hose.

– Unscrew bolts -arrows- and detach high-pressure pump with roller tappet.



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

Installing



Note

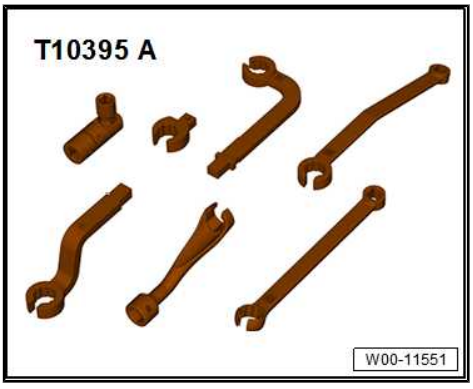
Renew O-ring.

- Check roller tappet for damage and renew if necessary.
- Lubricate roller tappet -1- with clean engine oil.
- Insert lubricated roller tappet -1- into camshaft housing.
- Turn crankshaft in direction of engine rotation until roller tappet is positioned at lowest point.
- Insert a new, oiled O-ring -2- into groove on high-pressure pump -3-.
- Tighten bolts hand-tight.
- Tighten bolts alternately to specified torque
  ⇒ Fig. ""High-pressure pump - tightening torque and sequence"" , page 325 .
- Install high-pressure pipe
  ⇒ "6.3 Removing and installing high-pressure pipe", page 327 .
- Check fuel system for leaks.

6.3 Removing and installing high-pressure pipe

Special tools and workshop equipment required

- Tool insert - T10395/3- from tool set - T10395 A-



Removing

- Remove throttle valve module - J338-
  ⇒ "3.3 Removing and installing throttle valve module J338 ", page 308 .

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 malfunctions caused by dirt.

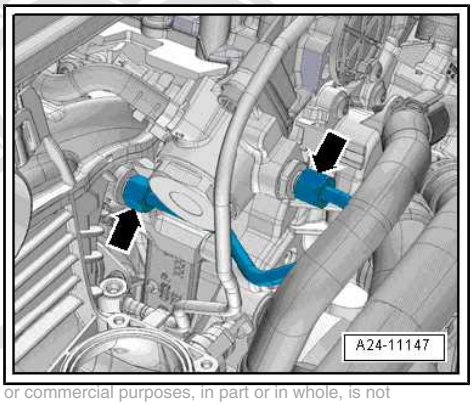
- ***Observe rules for cleanliness***
  ⇒ "3.1 Rules for cleanliness", page 5 .

WARNING

The fuel system is pressurised.

Risk of injury as fuel may spray out.

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



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 union nuts -arrows- and detach high-pressure pipe.

Installing

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

- Renew high-pressure pipe after removing.
- Secure all hose connections with correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .

– Lubricate threads of union nuts with clean engine oil.

– First tighten union nut at high-pressure pump and then at high-pressure pipe.

– Hand-tighten union nuts for high-pressure pipe (make sure that pipe is not under tension).

– Tighten union nuts.

– Install throttle valve module - J338-
⇒ “3.3 Removing and installing throttle valve module J338 ”, page 308 .

Tightening torques

◆ ⇒ “4.1 Exploded view - fuel rail with injectors”, page 312
◆ ⇒ “6.1 Exploded view - high-pressure pump”, page 324

7 Lambda probe

⇒ “7.1 Exploded view - Lambda probe”, page 329

⇒ “7.2 Removing and installing Lambda probe”, page 330

7.1 Exploded view - Lambda probe

Note

- *New Lambda probes are coated with an assembly paste. The paste must not get into the slots on the Lambda probe body.*
- *In the case of a used Lambda probe grease only the thread with high-temperature paste. The paste must not get into the slots on the Lambda probe body. High-temperature paste ⇒ Electronic parts catalogue*
- *The electrical wiring of the lambda probe must be secured at the original locations when installing. The wiring must NOT come into contact with the exhaust pipe.*

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 - Lambda probe after catalytic converter - G130- with Lambda probe 1 heater after catalytic converter - Z29-

- ❑ Removing and installing ⇒ “7.2 Removing and installing Lambda probe”, page 330
- ❑ 55 Nm

2 - Electrical connector

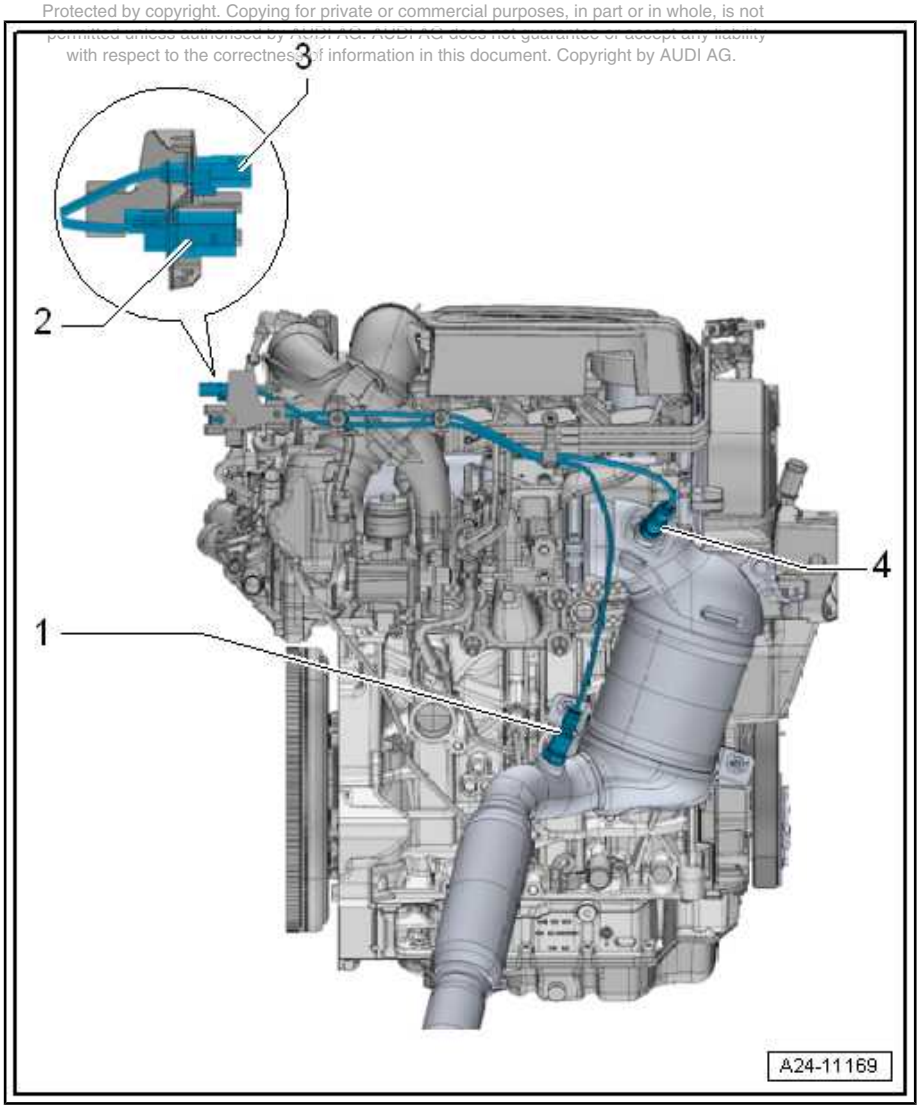
- ❑ For Lambda probe after catalytic converter - G130- with Lambda probe 1 heater after catalytic converter - Z29-

3 - Electrical connector

- ❑ For Lambda probe - G39- with Lambda probe heater - Z19-

4 - Lambda probe - G39- with Lambda probe heater - Z19-

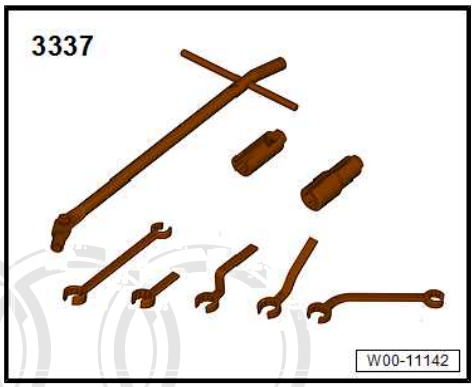
- ❑ Removing and installing ⇒ “7.2 Removing and installing Lambda probe”, page 330
- ❑ 55 Nm



7.2 Removing and installing Lambda probe

Special tools and workshop equipment required

- Lambda probe open ring spanner set - 3337-



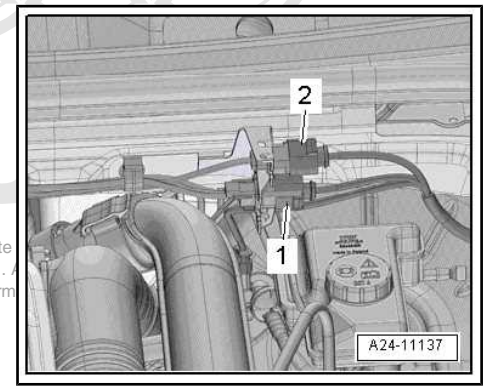
Removing

– Unplug corresponding electrical connector:

1 - For Lambda probe - G39- and Lambda probe heater - Z19-

2 - For Lambda probe after catalytic converter - G130- and Lambda probe heater - Z19-

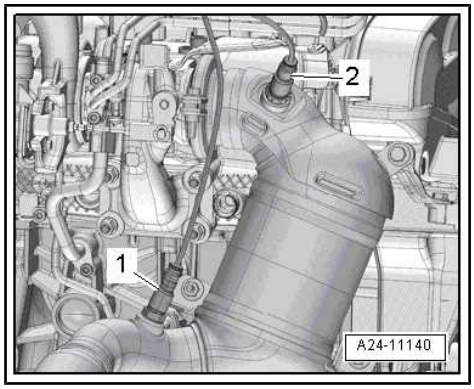
Protected by copyright. Copying for private
permitted unless authorised by AUDI AG.
with respect to the correctness of inform



– Unscrew corresponding Lambda probe using a tool from Lambda probe open ring spanner set - 3337- .

1 - Lambda probe after catalytic converter - G130-

2 - Lambda probe - G39-



Installing

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

Note

- *New Lambda probes are coated with an assembly paste. The paste must not get into the slots on the Lambda probe body.*
- *In the case of a used Lambda probe grease only the thread with high-temperature paste. The paste must not get into the slots on the Lambda probe body. High-temperature paste ⇒ Electronic parts catalogue*
- *The electrical wiring of the lambda probe must be secured at the original locations when installing. The wiring must NOT come into contact with the exhaust pipe.*

Tightening torques

- ⇒ “7.1 Exploded view - Lambda probe”, page 329

8 Engine control unit

⇒ “8.1 Exploded view - engine control unit”, page 331

⇒ “8.2 Removing and installing engine control unit J623 ”, page 332

8.1 Exploded view - engine control unit

1 - Nuts
- ❑ 9 Nm

2 - Bracket
- ❑ For engine control unit - J623-

3 - Retainer

4 - Retaining bracket

5 - Shear bolt
- ❑ Renew after removing

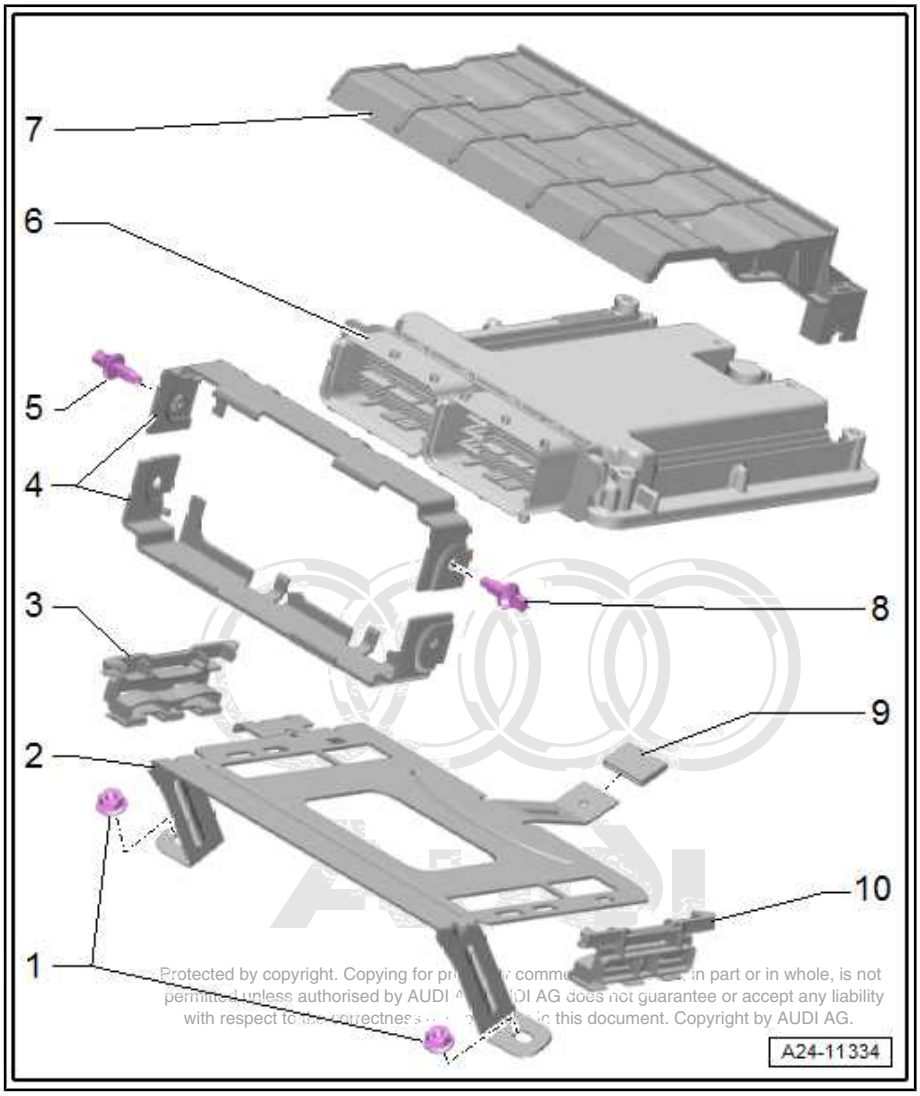
6 - Engine control unit - J623-
- ❑ Removing and installing ⇒ “8.2 Removing and installing engine control unit J623 ”, page 332

7 - Cover
- ❑ Depending on version

8 - Shear bolt
- ❑ Renew after removing

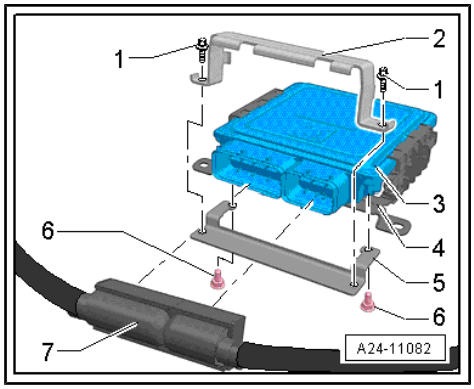
9 - Clip

10 - Retainer



Protected by copyright. Copying for pr... comme... in part or in whole, is not permitted unless authorised by AUDI ... DI AG does not guarantee or accept any liability with respect to the correctnes... ...in this document. Copyright by AUDI AG.

8.2 Removing and installing engine control unit - J623-

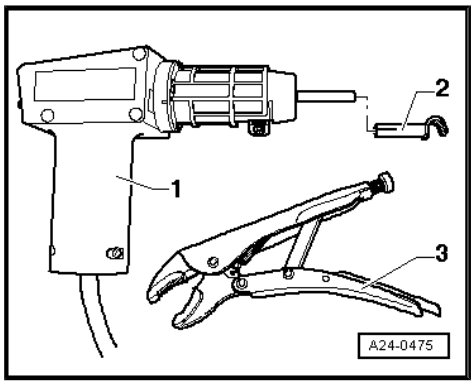


Note

- *Not every engine control unit is bolted to a protective housing. Whether a protective housing is fitted depends on the engine/ gearbox combination.*
- *The engine control unit -3- is bolted to the retaining bracket -2 and 5-. To make it more difficult to unscrew the shear bolts -1- for locking plate -2-, their threads have been coated with locking fluid.*
- *The protective housing has to be removed before the connectors can be unplugged from the engine control unit (e.g. to connect the test box or renew the engine control unit).*

Special tools and workshop equipment required

- Hot air blower - VAS 1978/14A- -item 1- with nozzle attachment -2- from wiring harness repair set - VAS 1978 B-



- Small vice-grip pliers (commercially available)

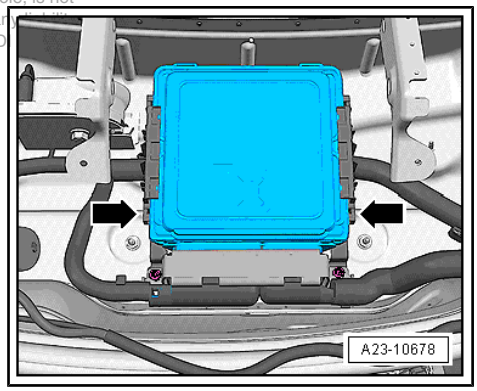
Removing

– If engine control unit is to be renewed, select test sequence/ function “Replace engine control unit” using ⇒ Vehicle diagnostic tester, `Guided Functions`.

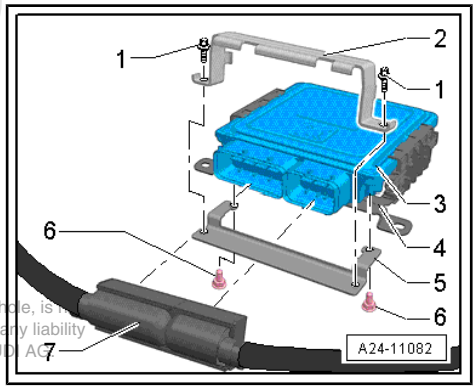
– Remove plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .

– Release clips -arrows- and pull out engine control unit - J623- towards front.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not
with respect to the correctness of information in this document. Copyright by AUD



Engine control unit with retaining bracket:

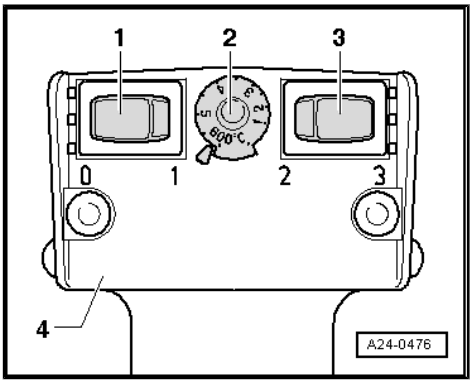


Note

The threads of the two shear bolts -1- which are not screwed into the engine control unit are secured with locking fluid. To unscrew these bolts, the threads must therefore be heated with the hot air blower.

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.

– Select settings on hot air blower as shown in illustration, i.e. set temperature potentiometer -2- to maximum heat output and two-stage air flow switch -3- to position 3.

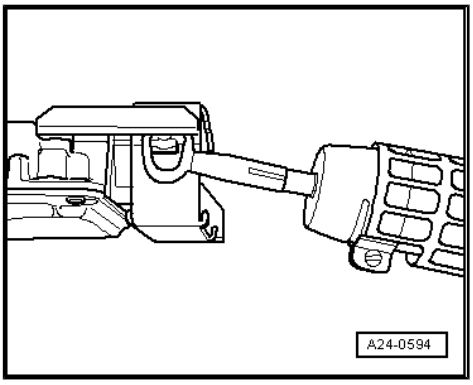


WARNING

Risk of burns from hot air blower.

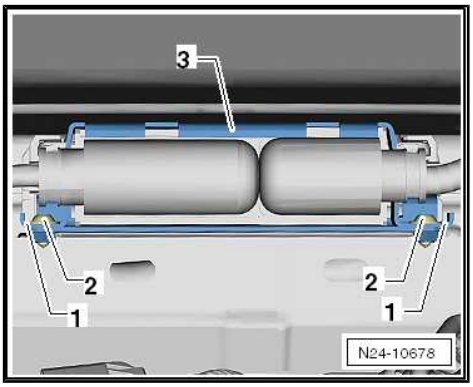
- ***Parts of the protective housing will become very hot as a result of heating the threads. It is also important to ensure that only the thread is heated and none of the surrounding components if at all possible. These should be covered if necessary.***

– Switch on hot air blower and heat bolt for 20 to 30 seconds.

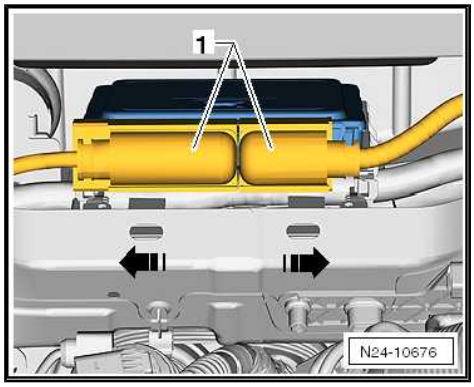


– If necessary, bend vertical edges -1- of retaining bracket outwards.

– Remove shear bolts -2- using mole grips and detach retaining bracket -3-.



– Slide catches -1- on engine control unit in direction of -arrow- and unplug both connectors.



Installing

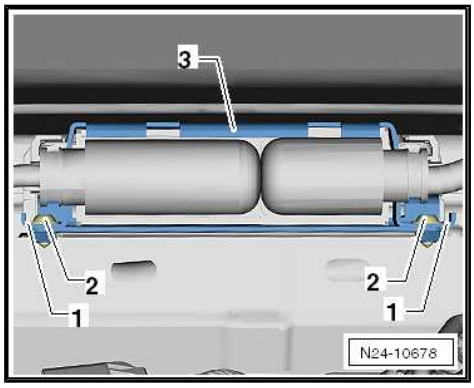
Installation is carried out in the reverse order; note the following:

– Clean threaded holes for shear bolts to remove any residue from locking fluid. This can be done using a thread tap.

– Always use new shear bolts.

– Retaining bracket must be renewed if it has been bent outwards.

– Tighten retaining bracket -3- with new shear bolts -2- evenly until heads of bolts shear off.

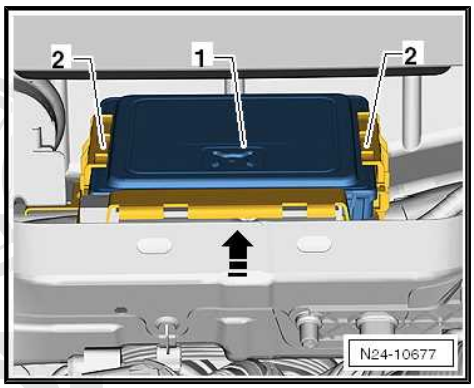


Note

Disregard -item 1-.

– Slide engine control unit -1- in direction of -arrow- into side guides -2-.

– Install plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .



After installing a new engine control unit, the following operation must be performed:

– Activate engine control unit in test sequence/function “Replace engine control unit” using ⇒ Vehicle diagnostic tester, Guided Functions.

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 Exhaust pipes/silencers

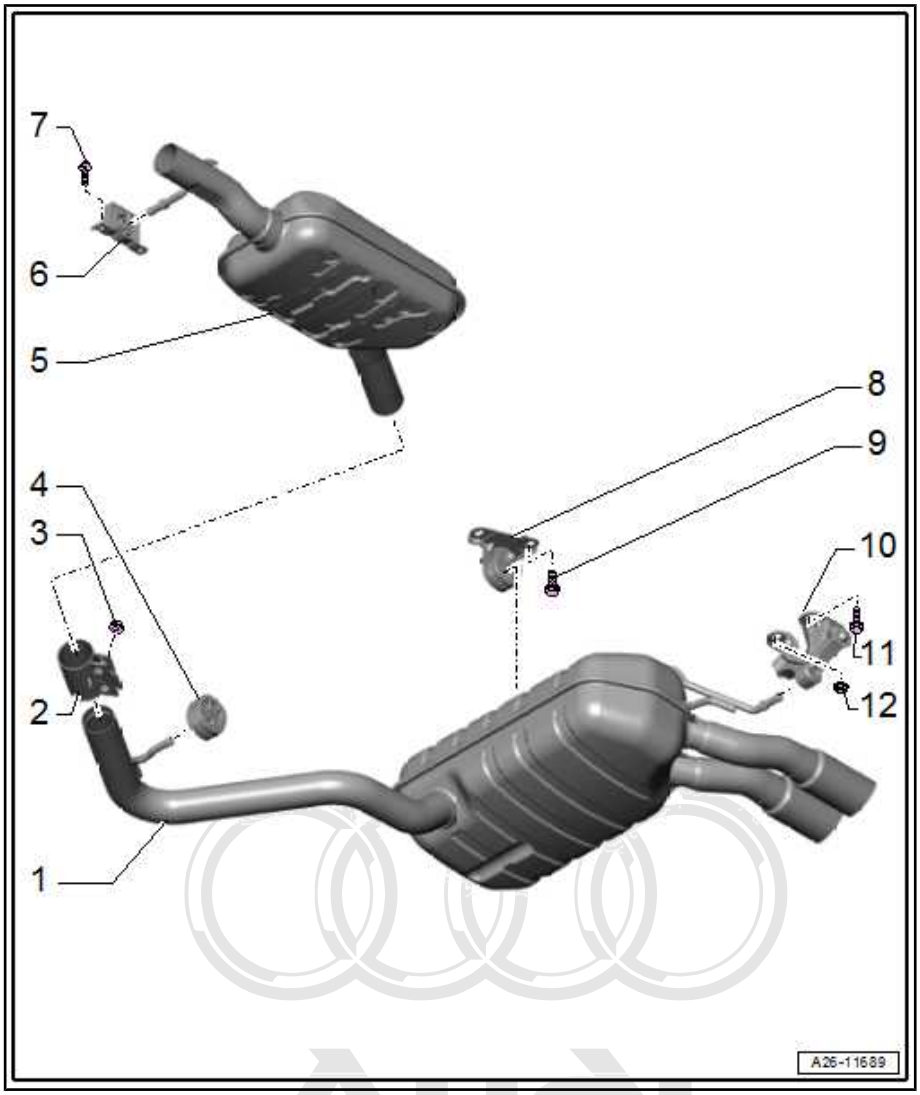
⇒ “1.1 Exploded view - silencers”, page 335

⇒ “1.2 Removing and installing silencers”, page 336

⇒ “1.3 Stress-free alignment of exhaust system”, page 337

⇒ “1.4 Checking exhaust system for leaks”, page 338

1.1 Exploded view - silencers



1 - Rear silencer

- ❑ Combined in one unit with centre silencer as original equipment. Can be renewed individually for repair purposes
- ❑ Removing and installing ⇒ “1.2 Removing and installing silencers”, page 336
- ❑ Align exhaust system so it is free of stress ⇒ “1.3 Stress-free alignment of exhaust system”, page 337

2 - Clamp (rear)

- ❑ Before tightening, align exhaust system so it is free of stress ⇒ “1.3 Stress-free alignment of exhaust system”, page 337
- ❑ Installation position ⇒ Fig. ““Installation position of rear clamp”“ , page 336
- ❑ Tighten bolted connections evenly

3 - Nut

- ❑ 30 Nm

4 - Rubber mounting

- ❑ Renew if damaged

5 - Centre silencer

- ❑ Align exhaust system so it is free of stress ⇒ “1.3 Stress-free alignment of exhaust system”, page 337

6 - Bracket for exhaust system

7 - Bolt

- ❑ 23 Nm

8 - 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.

9 - Bolt

- ❑ 23 Nm

10 - Bracket for exhaust system

11 - Bolt

- ❑ 23 Nm

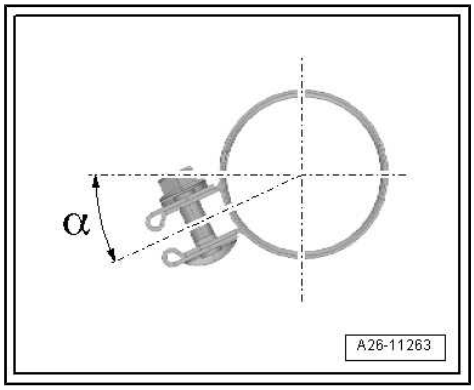
12 - Nut

- ❑ 23 Nm

Installation position of rear clamp

– Fit clamp in position shown.

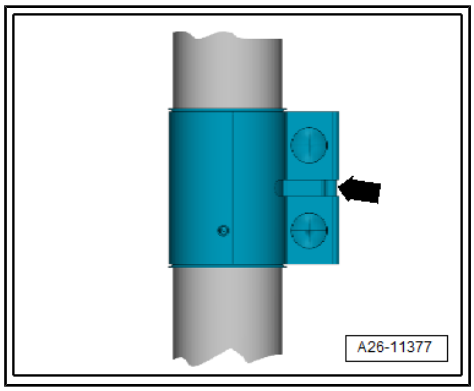
- Angle -α- = approx. 20°
- Bolt connections face to rear.
- Nuts facing upwards



1.2 Removing and installing silencers

Removing

– Loosen bolt connections for front clamp -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.

– Unplug electrical connector -5- from exhaust flap control unit - J883- .

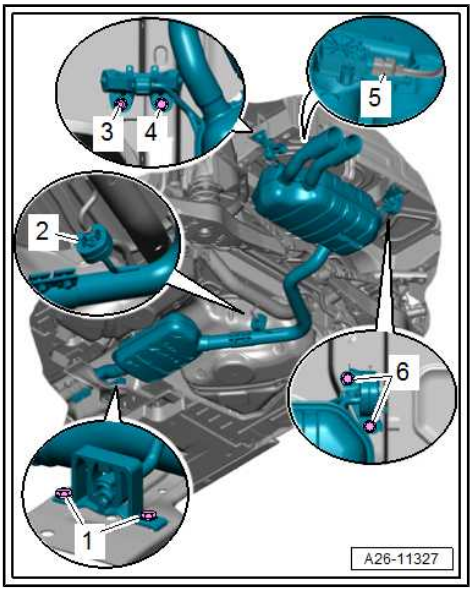
– Disengage rubber mounting -2-.

WARNING

Risk of accident caused by weight of silencers.

- *A second mechanic is required for removal of the rear silencer.*

– Unscrew bolts -1, 4, 6- and nut -3- and remove silencers.



Installing

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

– Align the exhaust system so it is free of stress
⇒ “1.3 Stress-free alignment of exhaust system”, page 337 .

Tightening torques

- ⇒ “1.1 Exploded view - silencers”, page 335
- ⇒ “2.1 Exploded view - emission control system”, page 339

1.3 Stress-free alignment of exhaust system

⇒ “1.3.1 Stress-free alignment of exhaust system”, page 337
⇒ “1.3.2 Aligning tailpipes”, page 338

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.

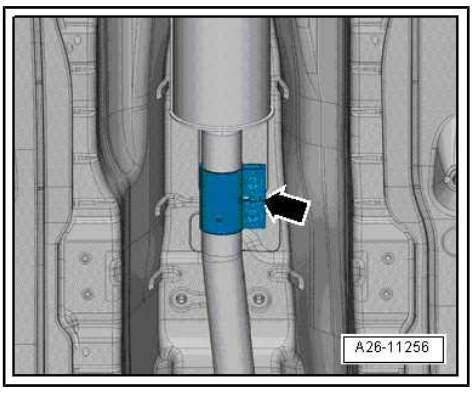
1.3.1 Stress-free alignment of exhaust system

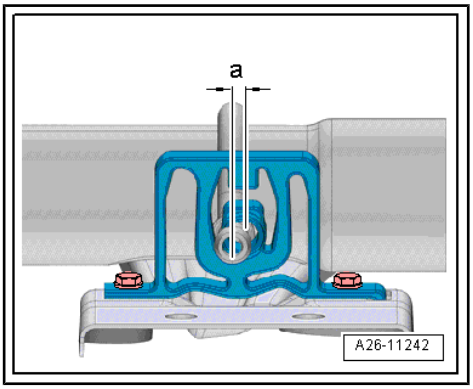
Procedure

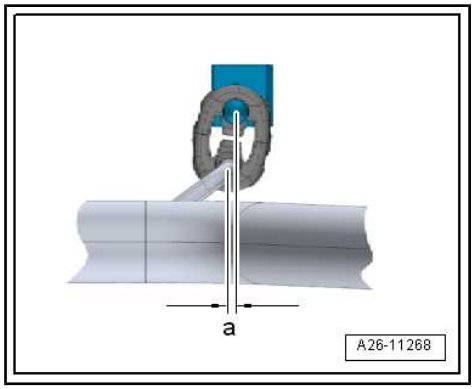
- The exhaust system must be aligned when it is cool.

– Loosen bolt connections for front clamp -arrow-.

– Push front exhaust system far enough towards front of vehicle so that rubber mountings are pre-loaded as follows:

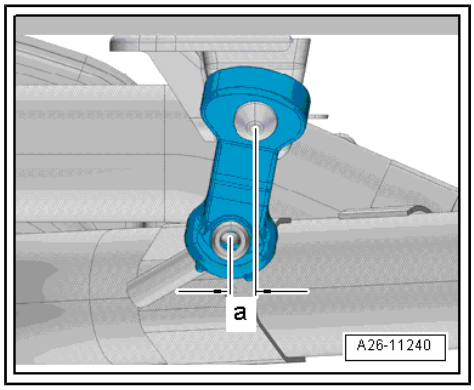






- Rubber mounting (front): dimension -a- = 4.7 mm
- Rubber mounting (centre): dimension -a- = 8 mm
- Rubber mounting (rear left): dimension -a- = 11 mm

– Fit front clamp
⇒ Fig. ““Installation position of front clamp”“ , page 340 .



Tightening torques

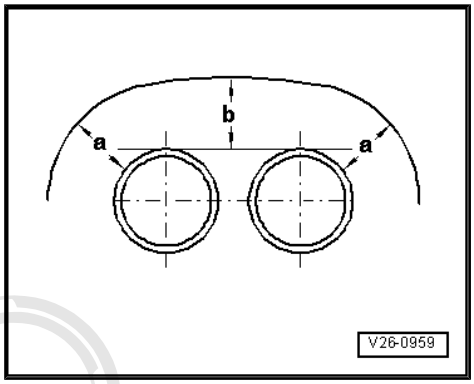
- ⇒ “1.1 Exploded view - silencers”, page 335

1.3.2 Aligning tailpipes

Procedure

– Align rear silencer so that there is an equal distance -a- and -b- between bumper cut-out and tailpipes.

– Unfasten rear silencer mounting to align tailpipes.



Tightening torques

- ⇒ “1.1 Exploded view - silencers”, page 335

1.4 Checking exhaust system for leaks

Procedure

– Start the engine and run at idling speed.

– Plug tailpipes during leak test (e.g. with cloth or plug).

– Listen for noise at the connection points of cylinder head/exhaust manifold, turbocharger/front exhaust pipe etc. to locate any leaks.

– Rectify any leaks that are found.

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

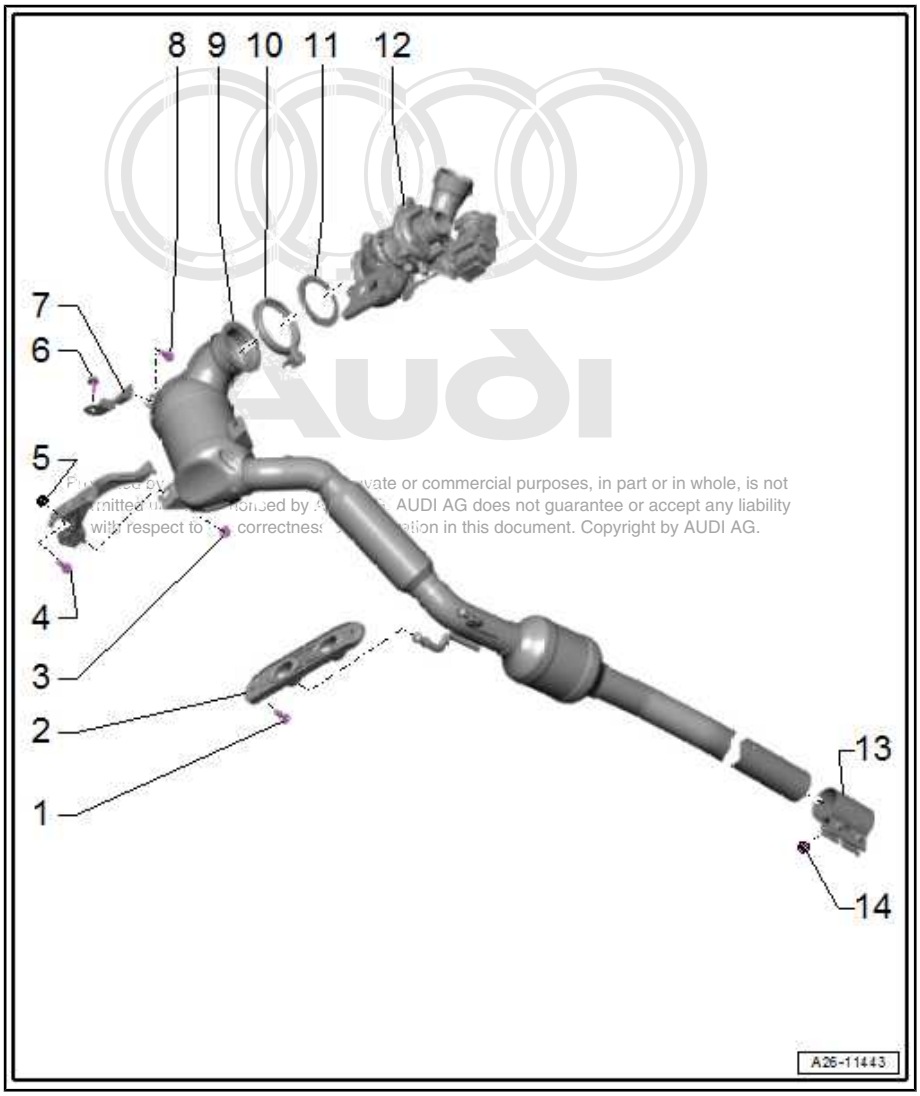
2 Emission control system

⇒ “2.1 Exploded view - emission control system”, page 339

⇒ “2.2 Removing and installing catalytic converter”, page 340

⇒ “2.3 Removing and installing exhaust flap control unit J883 ”, page 342

2.1 Exploded view - emission control system



1 - Bolt

- ❑ 20 Nm

2 - Bracket

- ❑ Renew if damaged

3 - Nut

- ❑ Tightening torque and sequence ⇒ Fig. ““Installing catalytic converter - tightening torque and sequence”“ , page 340

4 - Bolt

- ❑ 20 Nm

5 - Nut

- ❑ Tightening torque and sequence ⇒ Fig. ““Installing catalytic converter - tightening torque and sequence”“ , page 340

6 - Bolt

- ❑ Tightening torque and sequence ⇒ Fig. ““Installing catalytic converter - tightening torque and sequence”“ , page 340

7 - Bracket

8 - Bolt

- ❑ Tightening torque and sequence ⇒ Fig. ““Installing catalytic converter - tightening torque and sequence”“ , page 340

9 - Front exhaust pipe with catalytic converter

- ❑ Do not bend flexible joint more than 10° - otherwise it can be damaged
- ❑ Install flexible joint so that it is not under tension.
- ❑ Take care not to damage wire mesh on flexible joint.
- ❑ Protect catalytic converter from damage by knocks and impact
- ❑ Removing and installing ⇒ “2.2 Removing and installing catalytic converter”, page 340
- ❑ Do not remove protective packaging from replacement part until you are ready to fit the flexible joint
- ❑ Align exhaust system so it is free of stress ⇒ “1.3 Stress-free alignment of exhaust system”, page 337

10 - Screw-type clip

- ❑ Tightening torque and sequence
  ⇒ Fig. ""Installing catalytic converter - tightening torque and sequence"" , page 340

11 - Seal

- ❑ Renew after removing

12 - Turbocharger

13 - Clamp (front)

- ❑ Before tightening, align exhaust system so it is free of stress
  ⇒ "1.3 Stress-free alignment of exhaust system", page 337
- ❑ Installation position ⇒ Fig. ""Installation position of front clamp"" , page 340
- ❑ Tighten bolted connections evenly

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.

14 - Nut

- ❑ 30 Nm

Installation position of front clamp

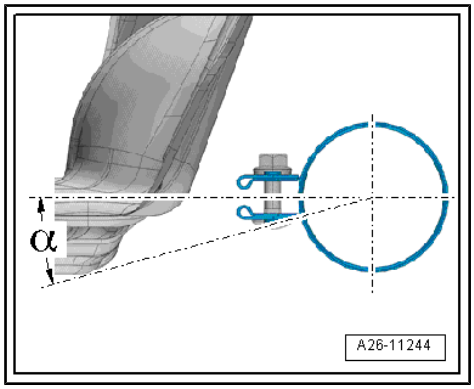
– Fit clamp in position shown.

• Angle -α- = approx. 5°

• Bolt connections face to left

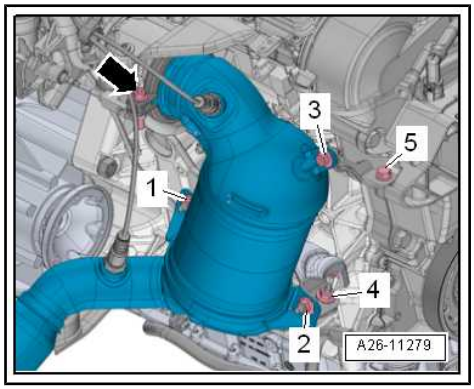
• Nuts facing upwards

– Tighten bolt connections on clamp evenly.



Installing catalytic converter - tightening torque and sequence

1.	– Fit catalytic converter to turbocharger, attach screw-type clip -arrow- without tightening	
2.	– Loosely screw in bolts -3, 5- and bolts -1, 2, 4- by hand	• It must still be possible to move catalytic converter and bracket
3.	– Tighten screw-type clip -arrow-	15 Nm
4.	– Tighten bolts and nuts in the sequence -1 ... 5-	20 Nm



2.2 Removing and installing catalytic converter

Note

The catalytic converter is removed together with the front exhaust pipe.

Special tools and workshop equipment required

♦ High-temperature paste ⇒ Electronic parts catalogue

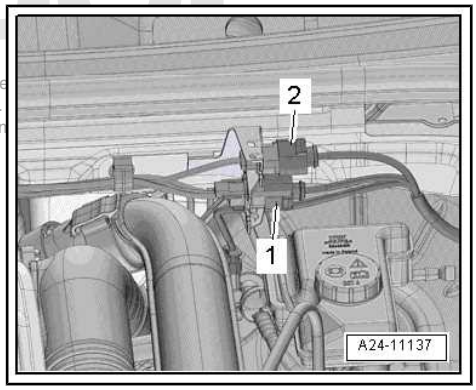
Removing

Note

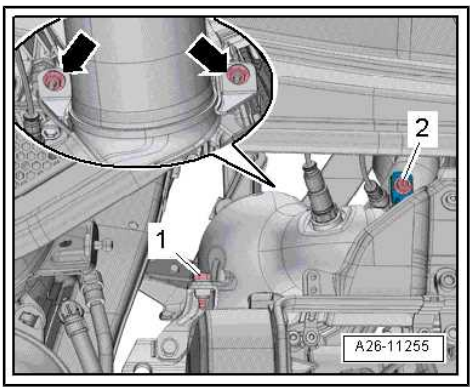
Fit all cable ties in the original positions when installing.

– Detach electrical connectors -1, 2- from bracket, unplug connectors and move electrical wiring clear.

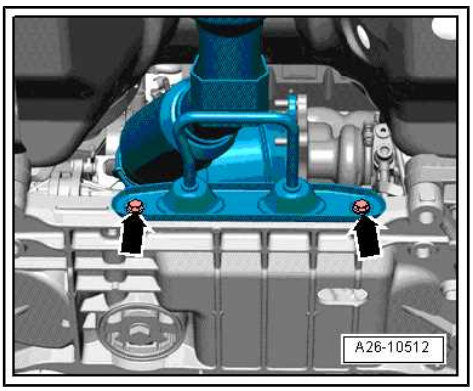
Protected by copyright. Copying for private
permitted unless authorised by AUDI AG.
with respect to the correctness of inform



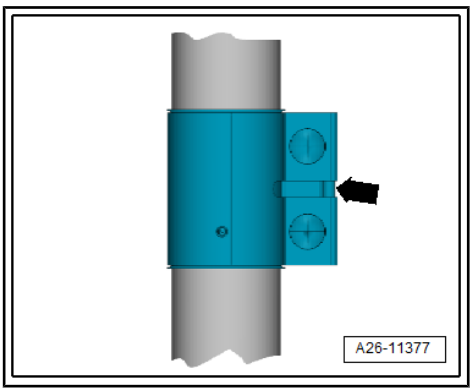
– Unscrew bolt -2- and remove screw-type clip.
– Remove bolt -1- and nuts -arrows-.



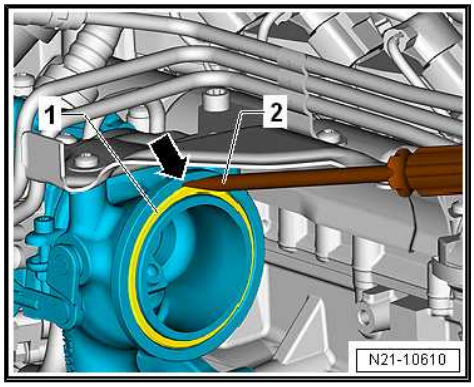
– Remove bolts -arrows-.
– Detach electrical connector from bracket and move clear wiring to Lambda probe.



– Loosen clamp -arrow- and push towards rear.
– Detach catalytic converter with front exhaust pipe.



– Insert screwdriver -2- into groove -arrow- on turbocharger and lever out seal -1-.



Installing

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

Note

- *Renew seal and self-locking nuts.*
- *Coat exhaust manifold studs with high-temperature paste; for high-temperature paste refer to ⇒ Electronic parts catalogue .*

– Align the exhaust system so it is free of stress
⇒ “1.3 Stress-free alignment of exhaust system”, page 337 .

Tightening torques

- ⇒ Fig. ““Installing catalytic converter - tightening torque and sequence”“ , page 340

2.3 Removing and installing exhaust flap control unit - J883-

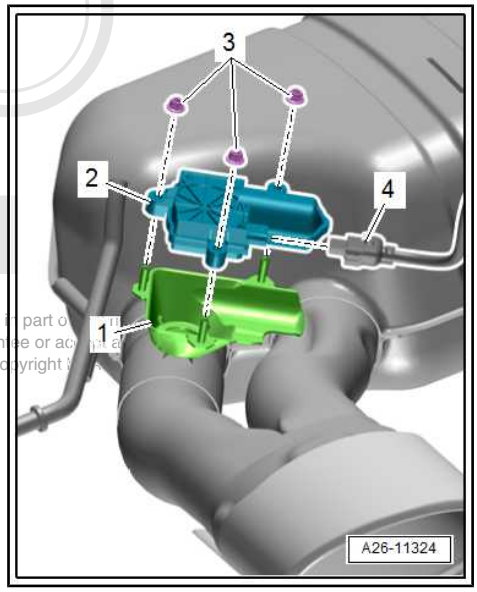
Note

The exhaust flap control unit - J883- is only fitted on some versions.

Removing

– Remove silencer
⇒ “1.2 Removing and installing silencers”, page 336 .

– Remove nuts -3- and detach exhaust flap control unit -2-.



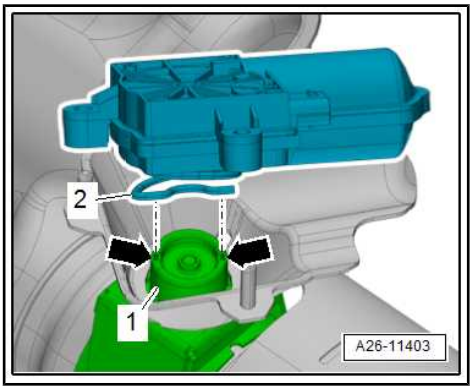
Note

Disregard items -1 and 4-.

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

Installing

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



Note

Renew the nuts.

– Move exhaust flap control unit - J883- into installation position.

• Spring -2- must engage in grooves -arrows- on exhaust flap -1-.

– Install silencer
⇒ “1.2 Removing and installing silencers”, page 336 .

Tightening torques

♦ ⇒ “1.1 Exploded view - silencers”, page 335

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

28 – Ignition system

1 Ignition system

⇒ “1.1 Exploded view - ignition system”, page 344

⇒ “1.2 Test data, spark plugs”, page 345

⇒ “1.3 Removing and installing ignition coils with output stages”, page 345

⇒ “1.4 Removing and installing knock sensor 1 G61 ”, page 348

⇒ “1.5 Removing and installing Hall sender G40 ”, page 348

⇒ “1.6 Removing and installing engine speed sender G28 ”, page 350

1.1 Exploded view - ignition system

1 - Bolt

- ❑ Tightening torque influences the function of the knock sensor
- ❑ 20 Nm

2 - Knock sensor 1 - G61-

- ❑ Removing and installing ⇒ “1.4 Removing and installing knock sensor 1 G61 ”, page 348

3 - Spark plug

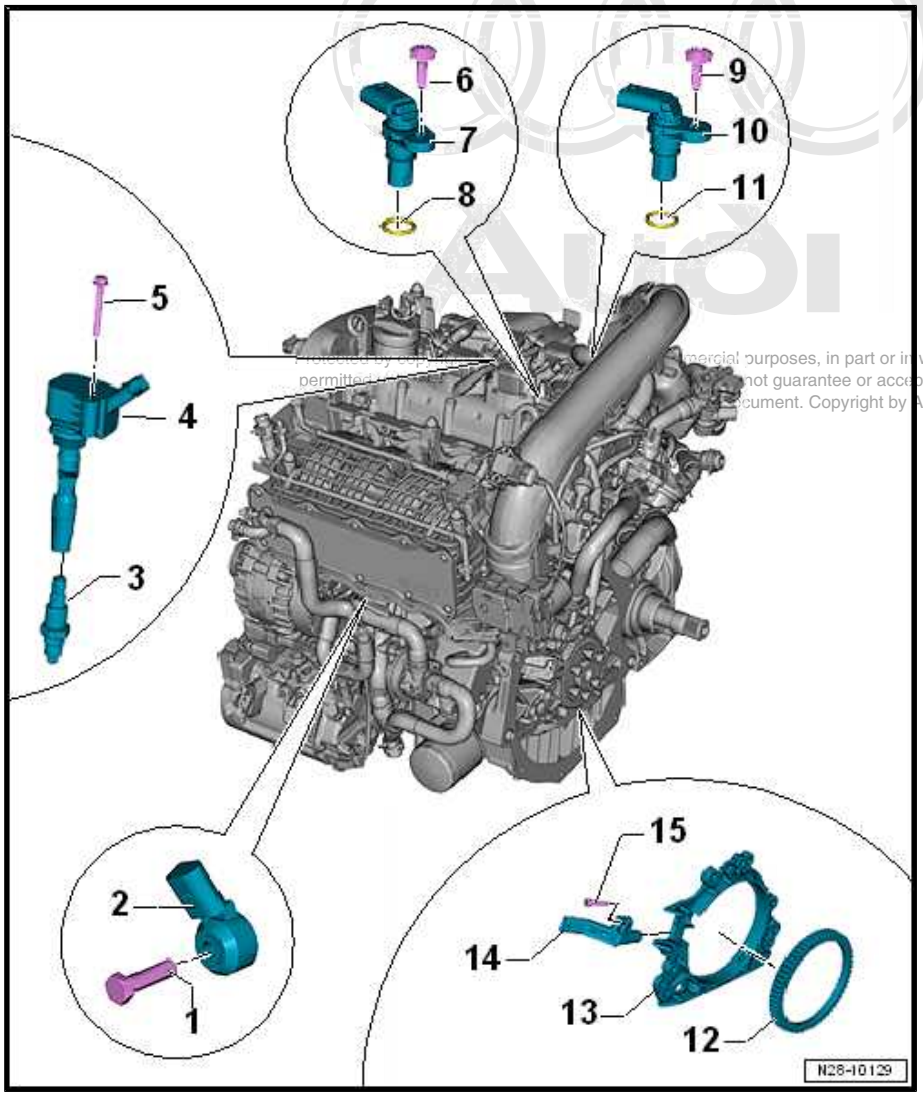
- ❑ Removing and installing ⇒ Maintenance ; Booklet 820
- ❑ Tightening torque ⇒ Maintenance ; Booklet 820
- ❑ Change interval ⇒ Maintenance tables

4 - Ignition coil with output stage

- ◆ Ignition coil 1 with output stage - N70-
- ◆ Ignition coil 2 with output stage - N127-
- ◆ Ignition coil 3 with output stage - N291-
- ◆ Ignition coil 4 with output stage - N292-
  - ❑ Removing and installing ⇒ “1.3 Removing and installing ignition coils with output stages”, page 345

5 - Bolt

- ❑ 8 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.

6 - Bolt

- ❑ 8 Nm

7 - Hall sender - G40-

- ❑ Removing and installing ⇒ “1.5 Removing and installing Hall sender G40 ”, page 348

8 - O-ring

- ❑ Renew if damaged

9 - Bolt

- ❑ 8 Nm

10 - Hall sender 2 - G163-

- ❑ Engine codes CSSA and CZEA only
- ❑ Removing and installing ⇒ “1.5 Removing and installing Hall sender G40 ”, page 348

11 - O-ring

- ❑ Renew if damaged

12 - Sender wheel

- ❑ For engine speed sender - G28-
- ❑ Combined as one unit with sealing flange (gearbox end)

13 - Sealing flange (gearbox end)

- ❑ Removing and installing ⇒ “2.3 Removing and installing sealing flange (gearbox end)”, page 60

14 - Engine speed sender - G28-

- ❑ Removing and installing ⇒ “1.6 Removing and installing engine speed sender G28 ”, page 350
- ❑ Note installation position ⇒ page 351

15 - Bolt

- ❑ 4.5 Nm

1.2 Test data, spark plugs

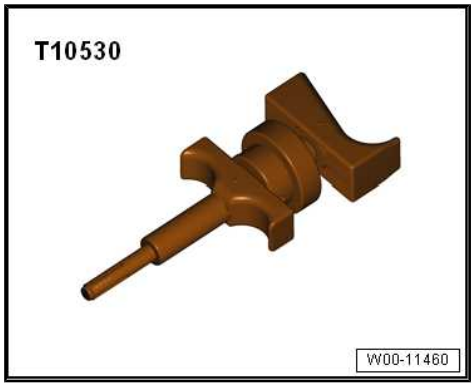
Engine data	1.4 ltr. TFSI engine
Idling speed (not adjustable)	
Ignition timing	Not adjustable (determined by control unit)
Ignition system	Multi-coil system with 4 ignition coils (output stages integrated) connected directly to spark plugs via spark plug connectors
Spark plugs	⇒ Electronic parts catalogue
Firing order	1-3-4-2

1.3 Removing and installing ignition coils with output stages

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

♦ Puller - T10530-

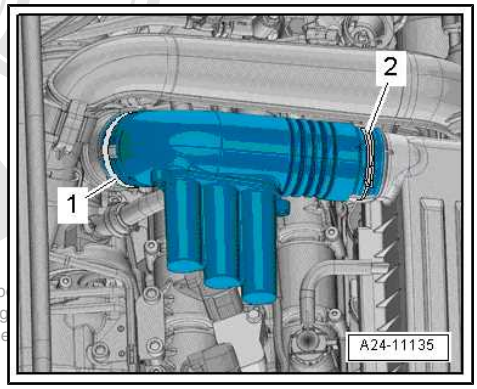


Removing

– Remove engine cover panel
⇒ “3.1 Removing and installing engine cover panel”, page 44 .

Ignition coils for cylinders 2, 3 and 4:

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

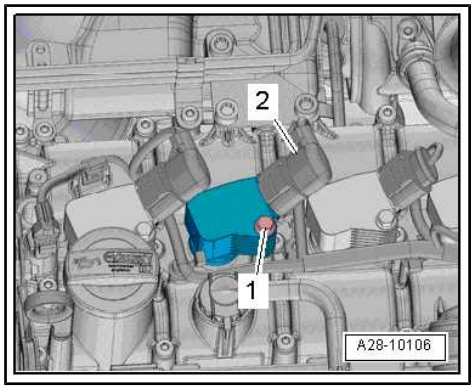


Protected by copyright. Copying for private or commercial purp
permitted unless authorised by AUDI AG. AUDI AG does not g
with respect to the correctness of information in this docume

All ignition coils (continued):

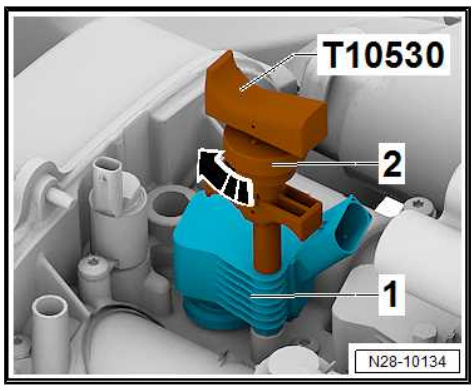
– Unplug electrical connector -2-.

– Unscrew bolt -1-.

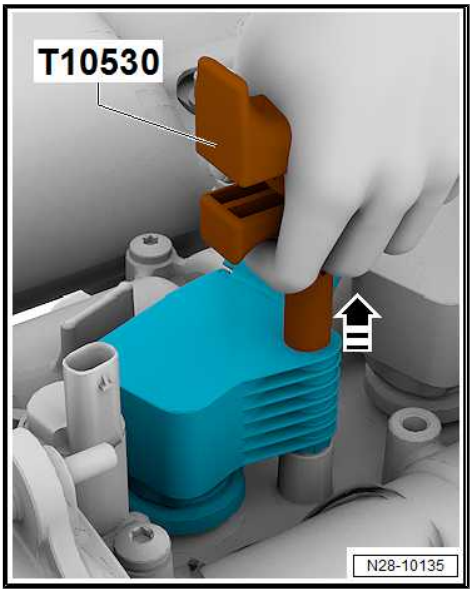


– Press puller - T10530- into hole in ignition coil -1- as far as stop.

– Tighten knurled nut -2- clockwise -arrow-.



– Pull ignition coil out of camshaft housing with puller - T10530- -arrow-.

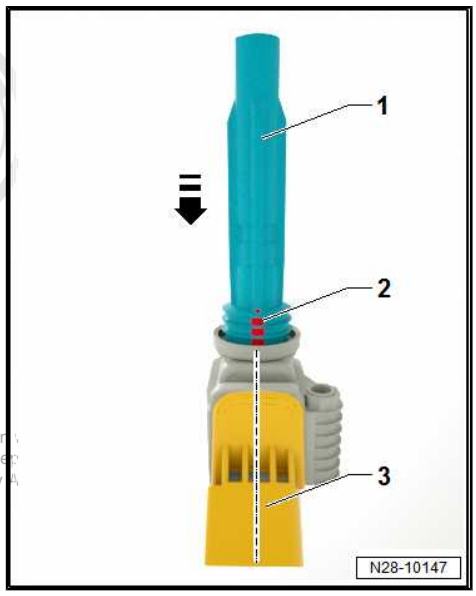


Installing

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

– Push spark plug connector -1- onto ignition coil by hand as far as stop.

• Vent channel -2- must be positioned so that it is aligned centrally with connector housing -3-.



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

– Apply a thin bead of silicone paste all around end of sealing hose of ignition coil with output stage -arrow-.

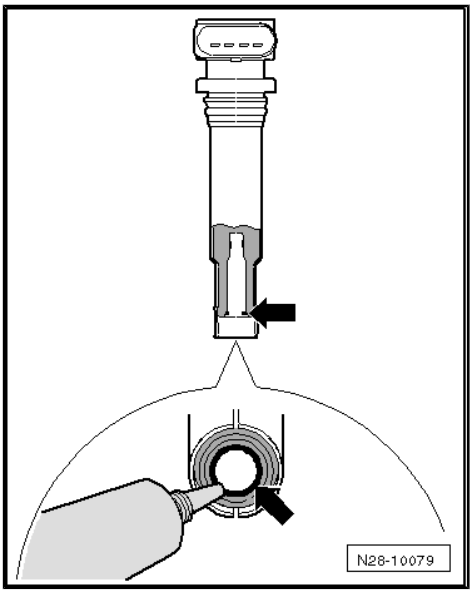
Silicone paste ⇒ Electronic parts catalogue (ETKA) .

– Fit all ignition coils loosely into spark plug holes.

– Align ignition coils with connectors and attach all connectors onto ignition coils simultaneously.

– Press ignition coils onto spark plugs by hand evenly (do not knock in with tools).

– Install engine cover panel
⇒ “3.1 Removing and installing engine cover panel”, page 44 .



Tightening torques

◆ ⇒ “1.1 Exploded view - ignition system”, page 344

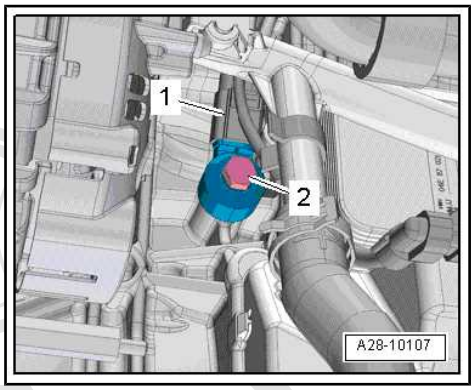
1.4 Removing and installing knock sensor 1 - G61-

Removing

– Detach air conditioner compressor from bracket and tie up ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket .

– Unplug electrical connector -1-.

– Unscrew bolt -2- and remove knock sensor 1 - G61- .



Installing

Install in reverse sequence.

Tightening torques

♦ ⇒ “1.1 Exploded view - ignition system”, page 344

♦ ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Exploded view - air conditioner compressor drive unit

1.5 Removing and installing Hall sender - G40-

Special tools and workshop equipment required

♦ Release tool - T10527- and -T10527/1-

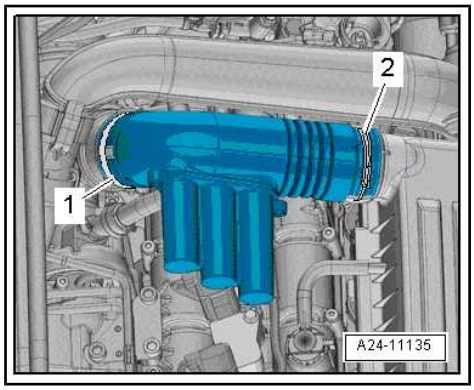
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



Removing

– Remove engine cover panel ⇒ page 44 .

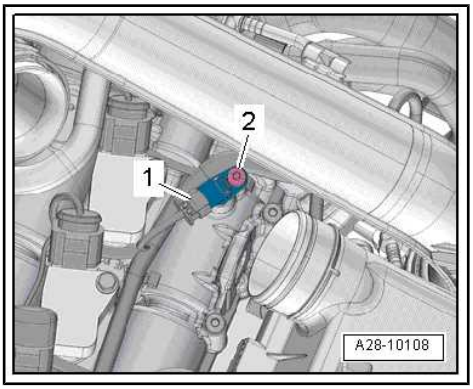
– Loosen hose clips -1, 2- and remove air pipe.



Hall sender - G40- :

– Unplug electrical connector -1-.

– Unscrew bolt -2- and remove Hall sender - G40- .

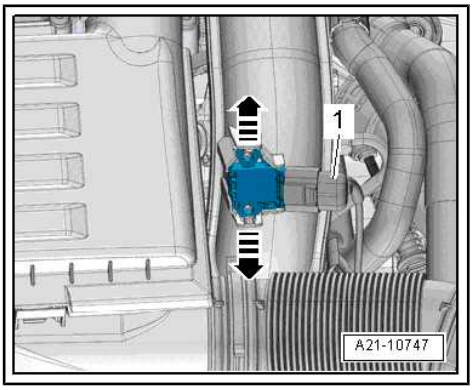


Hall sender 2 - G163- :

– Unplug electrical connector -1-.

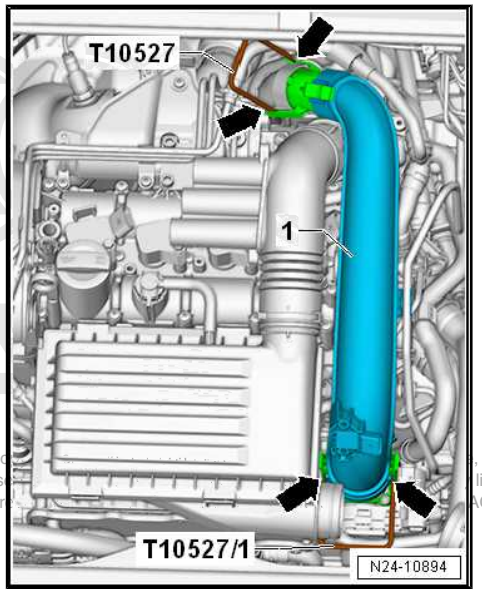
Note

Disregard -arrows-.



– Release fasteners -arrows- with release tool - T10527- and - T10527/1- .

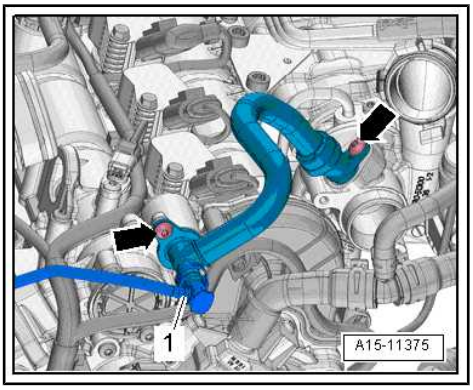
– Detach air pipe -1-.



Protected by copyright. Co... is not permitted unless authoris... liability with respect to the corr... AG.

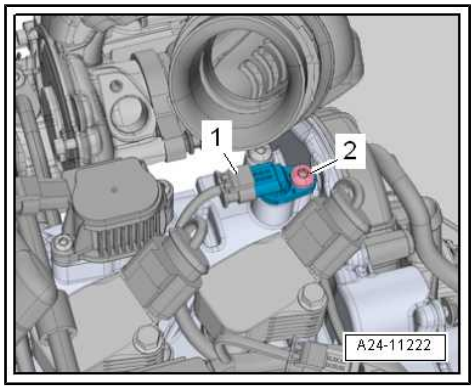
– Press release tabs and disconnect hose -1- for activated charcoal filter.

– Remove bolts -arrows- and detach crankcase breather hose.



– Unplug electrical connector -1-.

– Unscrew bolt -2- and remove Hall sender 2 - G163- .



Installing

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

Note

Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .

– Install engine cover panel
⇒ “3.1 Removing and installing engine cover panel”, page 44 .

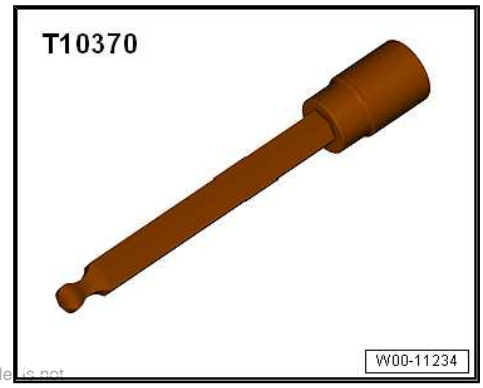
Tightening torques

- ⇒ “1.1 Exploded view - ignition system”, page 344
- ⇒ “3.1 Exploded view - intake manifold”, page 299
- ⇒ “1.1 Exploded view - turbocharger”, page 273

1.6 Removing and installing engine speed sender - G28-

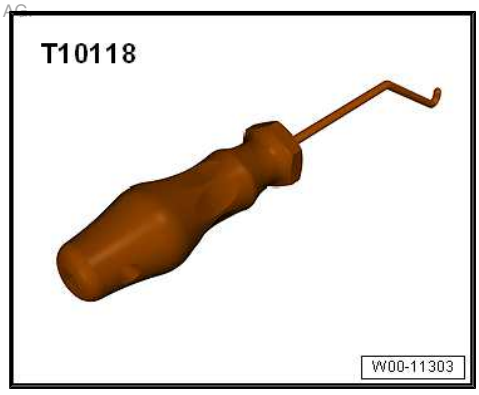
Special tools and workshop equipment required

- Socket (4 mm) - T10370-



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.

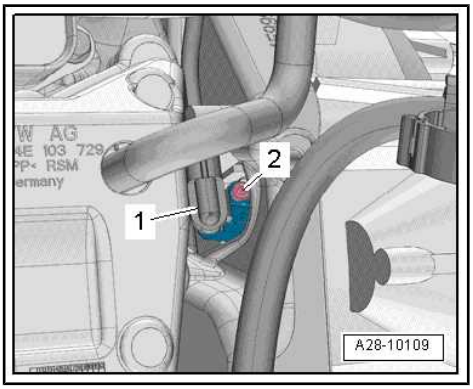
- Assembly tool - T10118-



Removing

– Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

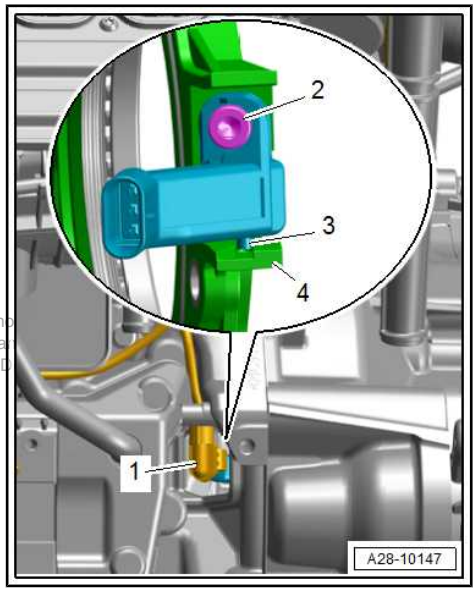
– Release and unplug electrical connector with assembly tool - T10118- .
– Unscrew bolt -2- using socket AF 4 mm - T10370- and remove engine speed sender - G28- .



Installing

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

– Move engine speed sender - G28- into installation position, ensuring that tab -3- slides into guide slot on sealing flange -4-, as shown in illustration.
– Tighten bolt -2- and plug in electrical connector -1-.



Tightening torques

♦ ⇒ “1.1 Exploded view - ignition system”, page 344
♦ ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

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.